TC-3000C Bluetooth Tester
Operating Manual

R20140925

http://www.tescom.co.kr

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1

General Information

This chapter covers the instrument warranty, specifications, key features, and safety consideration.

1.1 WARRANTY

TESCOM warrants that this product is free from defects in terms of materials and workmanship for a period of one (1) year from the date of shipment. During the warranty period, TESCOM will -- at its discretion -- either repair or replace products that prove to be defective.

For the warranty service or repair, the Customer must notify TESCOM of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to the service center designated by TESCOM. The Customer shall prepay the shipping charge to a TESCOM designated service center, and TESCOM shall pay the shipping charge to return the product to the Customer. In case the Customer is located outside of Korea, the Customer is responsible for all shipping charges including freight, taxes, and any other charge if the product is returned for service to TESCOM.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate malignance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, accident, or abnormal conditions of operation.

TESCOM`s responsibility to repair or replace defective products is the sole and exclusive remedy provided to the Customer in case of breach of this warranty. TESCOM will not be liable for any indirect, special, incidental, or consequential damages regardless of whether TESCOM served advance notice of the possibility of such damages.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

EC Attestation of Conformity

No.: N8 02 09 43088 004

TÜV PRODUCT SERVICE

Tescom Co., Ltd.

927 Unitechvil, 1141-2,
Baeksuk-Dong,Ilsan-Ku,Kyunggi,
Korea

Product:	**Laboratory Equipment** (Bluetooth Tester)	
Models:	**TC-3000A**	
Parameters:	Rated input voltage:	100-240 V a.c.
	Rated frequency:	50/60 Hz
	Rated input power:	40 W
	Protection class:	I
	Installation category:	CAT II
	Degree of Protection against ingress of liquids:	ordinary

The equipment complies with the principal protection requirements of the Low Voltage Directive (Directive 73/23/EEC relating to electrical equipment designed for use within certain voltage limits) based on a voluntary test.

This attestation applies only to the particular sample of the product provided for testing and certification. The detailed test results and all standards used as well as the operation mode are listed in

Test report no. CPSA0172822

Test standards: EN 61010-1:2001

This attestation is released with the above mentioned attestation number by the Certification Body of TÜV PRODUCT SERVICE. It does not permit the use of a TÜV PRODUCT SERVICE certification mark.

After preparation of the necessary technical documentation as well as the conformity declaration the CE marking as shown below can be affixed on the equipment. Other relevant Directives have to be observed.

CE

TÜV 089091

Department: ELSKR/jwy
Date: Sep-18-2002

TÜV PRODUCT SERVICE GMBH · Zertifizierstelle · Ridlerstrasse 65 · D-80339 München

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

EC Attestation of Conformity

No.: E8 02 09 43088 003

TÜV PRODUCT SERVICE

Tescom Co., Ltd.

927 Unitechvil, 1141-2,
Baeksuk-Dong,Ilsan-Ku,Kyunggi,
Korea

Item Identification:	**Information Technology Equipment**
	Bluetooth Tester
Item Description:	TC-3000A
	Input: 100-240 V, 50/60 Hz, Max.40 W

The equipment complies with the principal protection requirements of the EMC Directive (Directive 89/336/EEC relating to electromagnetic compatibility) based on a voluntary test.

This attestation applies only to the particular sample of the product and its technical documentation provided for testing and certification. The detailed test results and all standards used as well as the operation mode are listed in

Test report no. EMC-CE-0011

Test standards: EN 61326:1997/A1:1998,A2:2001
EN 61000-3-2:2000
EN 61000-3-3:1995,A1:2001

This attestation is released with the above mentioned attestation number by the Certification Body of TÜV PRODUCT SERVICE. It does not permit the use of a TÜV PRODUCT SERVICE certification mark.

After preparation of the necessary technical documentation as well as the conformity declaration the CE marking as shown below can be affixed on the equipment as stipulated in Article 10.1 of the Directive. Other relevant Directives have to be observed.

CE

TÜV 080064

Department: EMCKR / ysy
Date: Sep-05-2002

TÜV PRODUCT SERVICE GMBH · Zertifizierstelle · Ridlerstrasse 65 · D-80339 München

1.2 Safety Consideration

Review the following safety precautions to avoid injury and prevent damage to this product or any product connected to it:

1.2.1 Injury Precautions

- **Use the Appropriate Power Cord**
  To avoid fire hazard, use only the power cord specified for this product.
- **Avoid Electric Overload**
  To avoid electric shock or fire hazard, do not apply voltage beyond the specified range to a terminal.
- **Ground the Product**
  This product is grounded through the grounding conductor of the power cord. In case no ground is available at the power outlet, providing a separate grounding path to the instrument is recommended by connecting wire between the instrument ground terminal and earth ground to avoid electric shock or instrument damage. Before making connections to the input or output terminals of the product, make sure that the product is properly grounded.
- **Do Not Operate Without Covers**
  To avoid electric shock or product damage, do not operate this product with the protective covers removed.
- **Do Not Operate in Wet/Damp Conditions**
  To avoid injury or fire hazard, do not operate this product in wet or damp conditions.
- **Do Not Use in a Manner Other than That Specified by the Manufacturer**

1.2.2 Product Damage Precautions

- **Use Appropriate Power Source**
  Do not operate this product using a power source that applies more than the specified voltage. Main supply voltage fluctuations should not exceed ± 10% of the nominal voltage.
- **Provide Proper Ventilation**
  To prevent product overheating, provide proper ventilation.
- **Do Not Operate in case of Suspected Failures**
  If you think there is damage to this product, have it inspected by qualified service personnel.
- **Environmental Conditions**
  Refrain from using this equipment in a place subject to considerable vibration, direct sunlight, outdoors, and where the ground is not level. Likewise, do not use it where the ambient temperature is beyond the range of 5 °C - 40 °C and altitude is more than 2000 m. The maximum relative humidity is 80 % for temperatures up to 31 °C, decreasing linearity of up to 50%, and relative humidity at 40 °C, and Over voltage Installation Category II for the main supply (Pollution Degree 2).
- **Shut down System**
  Do not power switch off by compulsion, to avoid injury or damage the internal host PC.

In order to power off safely, press **Menu** → select “Quit” → press “Yes” and then do power switch off.

1.3 Safety Symbols and Terms

These terms may appear in this manual.

WARNING: Warning statements describe the conditions or practices that could result in injury or loss of life.

CAUTION: Caution statements describe the conditions or practices that could result in damage to this product or other property.

Symbols on the Product: The following symbols may appear on the product:

Power ON

Power OFF

WARRING / CAUTION

Indicates earth (ground) terminal

1.4 TESCOM Sales and Service Office

If you have difficulty with the product, call or write to our Technical Support specialists at:

TESCOM Company Limited
927 Unitechvil., 142, Ilsan-ro, Ilsandong-gu, Goyang-si, Gyunggi-do, Korea [ZIP 410-722]

TEL.: 82-31-920-6601 FAX: 82-31-920-6607
Email: tescom-sales@tescom.org
http://www.tescom.co.kr

1.5 Manual Convention

- [ ] This indicates menus following notational conventions.
- Keypad buttons are indicated with the ☐ symbol. ex) FCN
-  key on the front is indicated as ENT.

1.6 Instruction and Key Features

TESCOM TC-3000C Bluetooth Tester eliminates the need for several costly testers by combining key RF and Protocol test & measurement functions in one convenient box. Designed for a wide range of applications in R&D, manufacturing, QA and service, this feature-packed powerful instrument is simple to use, lightweight and portable, and may be operated with all standard AC voltages. In addition to Bluetooth testing applications, TC-3000C may be used for non-Bluetooth RF testing along the 2.4 GHz ISM band.

1.6.1 Key Features

- Bluetooth V1.1/V1.2/V2.0/V3.0/V4.0 Specification Compliant
- RF, Audio, and Protocol Combination Tester
- Bluetooth Conformance Test
- Supports Audio (SCO Link) Functional Testing (3000-10)
- Bluetooth RF and Baseband Measurement Functions (3000-20)
- Basic Bluetooth Protocol Analyzer Functions
  - Supports Master and Slave modes
  - Link test in Pico-net
  - Packet information in Baseband, LMP, HCI, SDP, RFCOMM, and Profile
  - Direct HCI command execution from the screen
- Bluetooth EDR testing (3000-40)
- Bluetooth LE testing (3000-50)
- Utility digital signal generator
- User definable Baseband IN/OUT ports for real time signal monitoring, external modulation, audio source and audio analyzer
- Device HCI Interface Options: USB and RS-232C (UART, BCSP)
- Remote Operation: TCP/IP (LAN) and RS-232C
- Easy S/W Upgrades through USB
- Listed on the Bluetooth Qualified Products List (QPL) as a Development Tool
- CE Compliant: EN61010-2001, EN61326,A2:2001, EN61000-3-2, 2000, EN61000-3-3,A1:2001

1.7 Specification

Specifications are listed in Appendix A.

1.8 Connectors

This section contains reference information for TC-3000C's connectors.

Connector	Specification
RS-232C	Working Voltage: 100V Dielectric Withstanding Voltage: 300V
N Type Connector	Impedance: 50 ohm Voltage Rating: 250 Vpeak Dielectric Withstanding Voltage: 750 Vrms
BNC Connector	Impedance: 50 ohm Voltage: ± 1Vpk

Chapter

2

Installation

This section provides the information needed to install the TC-3000C Bluetooth Tester, including information pertinent to initial inspection, power requirements, environment, upgrade, storage, and shipment.

2.1 Initial Inspection

This section provides information for verifying proper shipment of the TC-3000C Bluetooth Tester.

Product Condition and Accessory Check

1. Upon receipt of the TC-3000C Bluetooth Tester, check for damage that could have occurred during shipment.
2. Check whether you have received all the standard accessories supplied with TC-3000C as listed in table below.

[Table 1] Accessory List

No.	Part Number	Name	Specification	Qty.
1	3407-0004	Adaptor	N(m) to BNC(m)	1
2	4003-0012	RS-232C Cable	DB9(s) to DB9(s) cable, 2 m	1
3	4006-0004	RF Cable	N(m) to N(m) cable, 1 m	1
4	4007-0001	RF Cable	BNC(m) to BNC(m) cable, 1 m	2
5	4008-0012	LAN Cable	STP, Cross, RJ45 cable, 2 m	1
6	4008-0016	USB Cable	USB A (p) to USB A (s) cable, 1.8 m	1
7	E92050A	Antenna	Sleeve 2.4 GHz	1
8	E99912A	Attenuator	10 dB, 0.5W, N Type	1
9		Power Cord	2 m	1
10		Operating Manual		1

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to the equipment.

2.2 Power Requirement

This Tester is a portable instrument, requiring no physical installation other than connection to a power source.

[Table 2] Power Requirement

Characteristic	Requirement
Input voltage	100 VAC - 240 VAC
Frequency	50/60 Hz
Power Consumption	Less than 40 watt

WARNING

If AC power is beyond the range of operation, the equipment may malfunction or sustain permanent damage. Main supply voltage fluctuations should not exceed 10% of the nominal voltage.

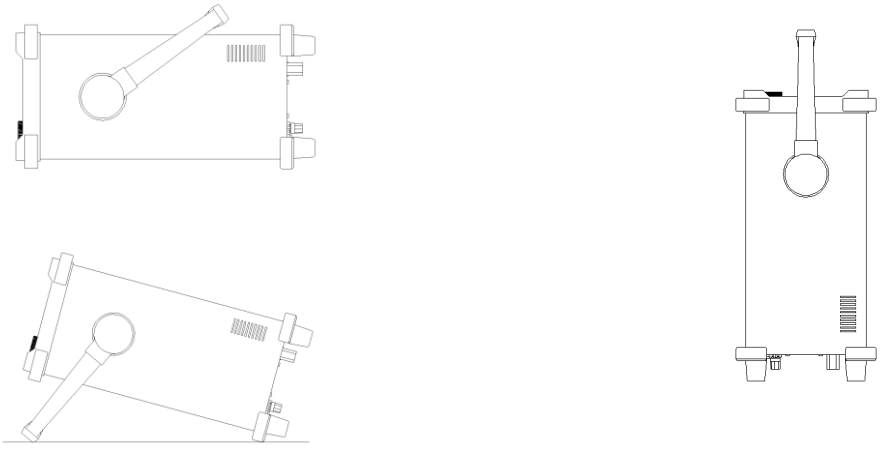
2.3 Operating Environment

Refrain from using this equipment in a place subject to considerable vibration, direct sunlight, outdoor, and where the ground is not level. Likewise, do not use it in areas where the ambient temperature is beyond the range of 5 °C ~ 40 °C, and altitude is more than 2000 m.
The maximum relative humidity is 80 % for temperatures up to 31 °C, decreasing linearity to 50% relative humidity at 40 °C. (Over voltage Installation Category II for main supply; Pollution Degree 2)

The storage temperature range for this equipment is –20 °C ~ 70 °C, when this equipment is not used for a long period of time, store in a dry place away from direct sunlight by covering with vinyl or placing in a cardboard box.

2.4 Carrying Handle and Caution for Moving

Carrying Handle Adjustment
To adjust the handle position, push both caps covering the rotary joints on each side. .
Then, rotate the handle to the desired position.



Bench-top viewing position **Carrying position**

[Figure 1] Carrying Handle

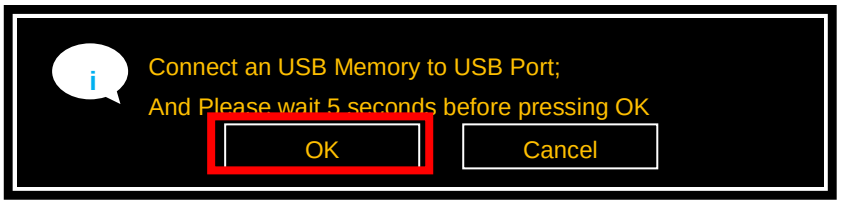
Caution for moving
When you are moving the TC-3000C, please use USB cable protector on rear panel. If not, USB cable between host and host controller could be damaged.

2.5 Firmware Upgrade

TC-3000C Firmware can be upgraded easily using USB memory. You can download the upgrade data file from Tescom website.

Upgrade from the USB Memory

1. Download Firmware files from Tescom website.
2. Unzip the firmware files.
3. When you unzip upgrade3000c.tgz file is created.
4. Save the “upgrade3000c.tgz” files to the USB Memory
5. Plug in the USB Memory at front panel USB port.
6. Press **Menu** → select “Configuration” from the pop-up menu on the screen → **M5** (Network”)
7. Move “more 3/3” using the **F8** key and press **F3** (“Upgrade S/W”)
8. Select “USB Memory” from the pop-up menu and select “ok” button.



9. When Upgrade is completed successfully, select “ok” button

10. When the TC TC-3000C is turned off, turn off and on the rear panel power switch.
11. Turn on the front panel SW switch.


NOTE

If download is failed, please check following cases.
[Case 1]: The connection cable between Host and Host Controller on rear panel must be a USB cable.
[Case 2]: USB recognition time is different depends on USB Memory, so upgrade should be started after recognition is finished. Usually, you can check it using the LED lamp of USB memory.
[Case 3]: Even if you cannot upgrade using above cases, perform following steps for Emergency Upgrade.

1. Turn off the TC3000C.
2. Locate the “DOWNLOAD/NORMAL switch” at rear panel and set it to DOWNLOAD.
3. Turn on the TC-3000C and repeat the upgrade procedure above.
4. When the upgrade is completed, turn off TC-3000C and return the download switch to NORMAL position.
5. Turn on TC-3000C

2.6 Cleaning, Storage and Shipment

2.6.1 Cleaning

Periodically wipe the case with a damp cloth mild detergent; do not use abrasives or solvents.
Keep the power supply free of dust. Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.

Clean the input terminal as follows:
1) Turn the TC-3000C off and remove all test leads.
2) Shake out any dirt that be in the terminals.
3) Soak a new swab with alcohol and work around in each terminal.

2.6.2 Storage

The storage temperature range for this equipment is –20 °C to 70 °C. When this equipment is not used for a long period of time, covered with vinyl or placed in a cardboard box, store it in a dry place away from direct sunlight.

2.6.3 Shipment

When shipping this equipment, use the original packing materials. If they are not available, pack the equipment as follows:

1) Wrap this equipment, in appropriate shock absorbing materials and put it in a corrugated cardboard box at least 5 mm thick. (If shipping to a TESCOM Service Office, attach a tag indicating the type of service required, return address, model number and full serial number.)
2) Wrap its accessories separately in the same shock absorbing material and put

them in the same corrugated cardboard box together with this equipment.

3) Fasten the corrugated cardboard box with packing strings.
4) Mark the shipping container FRAGILE to assume careful handing.

CAUTION

Never use any chemical cleaner other than alcohol for the maintenance of this equipment. Organic solvent such as benzene, toluene or acetone may spoil the plastic parts of this equipment

Chapter

3

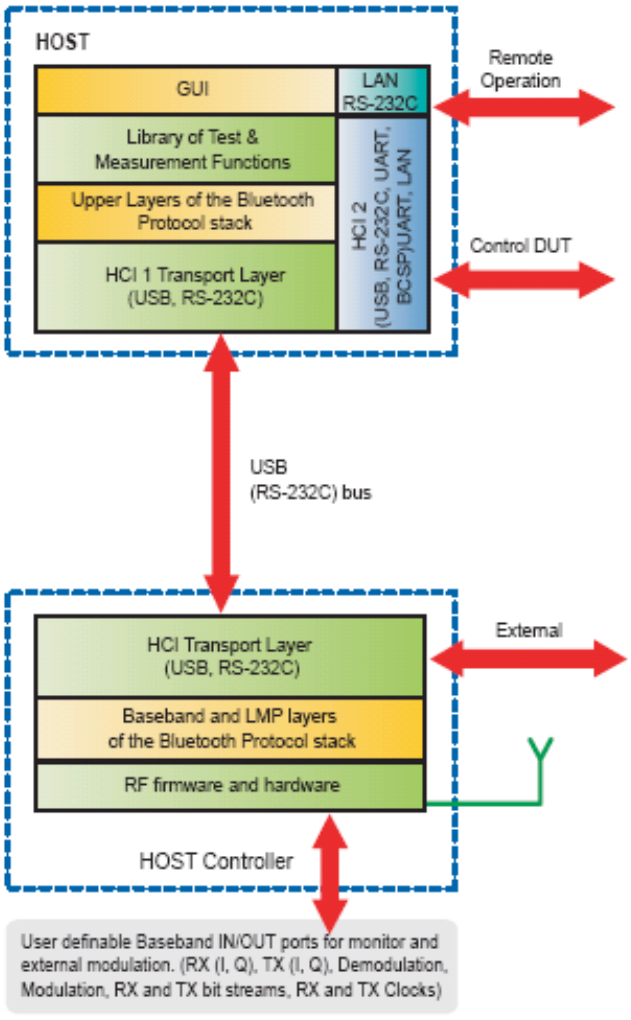
Operation

This section describes the basic concepts and details of operating TC-3000C Bluetooth Tester. Understanding the basic concepts of TC-3000C helps you use it effectively. *Operation Overview* quickly shows you how TC-3000C is organized and gives some very general operating instructions. After you read *Operating Overview* you can use *Operation Procedure* for detail information.

3.1 Overview

The Overview section contains illustrations of the display, the front and rear panels, and the menu system. These illustrations will help you understand and operate the TC-3000C.

3.1.1 TC-3000C System Architecture



TC-3000C is made up of two main blocks, a RF/DSP module and host CPU module, and is connected by a host controller interface (HCI) that is identical to Bluetooth system architecture. The RF/DSP module provides an RF interface to DUT, performs physical measurements and manages the Bluetooth link. The internal host CPU (PC), which runs on Linux platform, takes care of user interface (UI) functions including display, key input and I/O controls for RS-232C, USB, LAN and other standard peripheral devices. The adoption of open OS minimizes unnecessary constraints on system optimization. This simple, elegant system architecture takes advantage of both power of DSP and convenience of PC.

Note

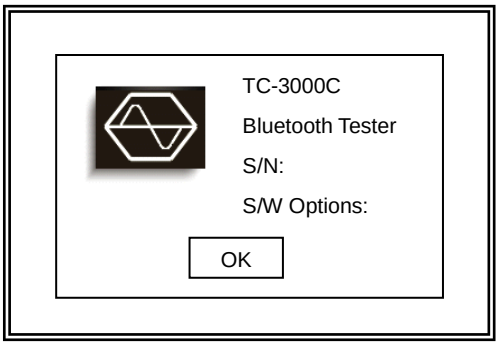
HOST and HOST controller must be connected to each other by USB except for a case when TC-3000C uses an external HOST or HOST controller.

3.1.2 Start-up Screen

When power on, the start-up screen will be displayed after booting process and will change to initial screen 10 seconds later. Pressing any key will change the display immediately.

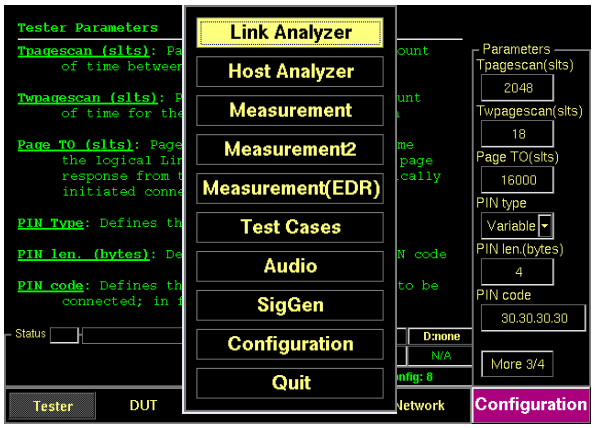
Note

When TC-3000C is turned on, the instrument does not return to the power-off condition –except for the Test Cases parameters which were saved - but recalls the settings from the most recently saved memory location (STORE Number).



3.1.3 Shutdown Screen

In order to power off, press **Menu** → select “Quit” from the pop-up menu on the screen → press “Yes” . Or you can turn off the TC-3000C using the front panel soft switch



3.1.4 Display Color Scheme

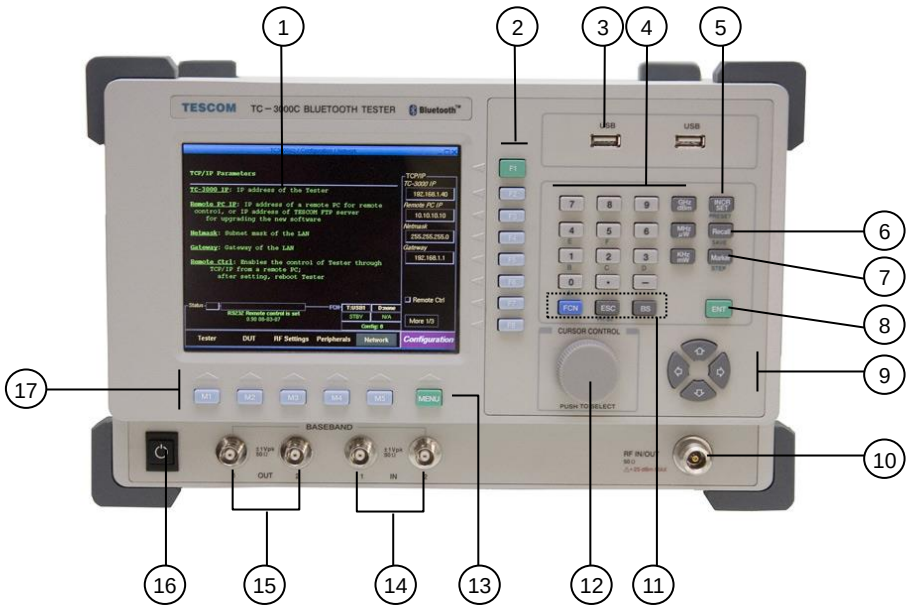
The display color option allows you to change the display color scheme for the front panel display. To change the color scheme, press **Menu** → select “Configuration” from the pop-up menu on the screen → **M4** (“Peripherals”) → **F5** (“color scheme”) → select the color scheme which you want to use.

3.1.5 System Information

In order to check system information of TC-3000C,
press **Menu** → select “Configuration” from the pop-up menu on the screen → **M4** (“Peripherals”) → **F8** (“System Info”) → Verify: Serial Number, Version, Core Version, DSP Version, FPGA Version, Software Options

3.1.6 Front Panel View

The front panel controls and connector are illustrated below; and the detailed descriptions are as follows:



[Figure 2] Front Panel View

① **Color Graphic LCD**
The LCD display color is configured in the Peripherals of the Configuration screen.

② **F1** ~ **F8**: Soft keys. Soft keys select submenus.

③ **USB port :** It is used for testing the BT USB Dongle, storing the test result, capturing screen or system upgrade.

④ **Data Input keypad**. Provides the means for entering data.

⑤ **INCR SET**: Defining data increasing step. The default value is 1.

⑥ **Recall**: Recall stored data.

⑦ **Marker**: Enable a line-shaped marker on the Measurement screen to activate.

⑧ **ENT**: It is used to enter your chosen function or accept input.

⑨ ⇧ ⇩ ⇦ ⇨: Cursor movement.

⑩ **RF IN/OUT Port**: N type RF connector

⑪ **BS**: Back space key

ESC: Return to the previous state.

FCN: Access second functions

⑫ **Rotary knob:** Move cursor. Push to accept data or function such as **ENT**.

⑬ **MENU**: Main menu key. When this key is pressed the pop-up menu is displayed on the center of screen. This menu presents seven options including main functions.

⑭ **Baseband Input Ports:** I-Rx, Q-Rx, I-Tx, Q-Tx, Rx-bit, Tx-bit. For using external baseband signals. It is used for stereo headset test using A2DP

⑮ **Baseband OUT ports:** Rx (I, Q), Tx (I, Q), Demodulation, Modulation, RX and TX bit streams, RX and TX Clocks. It is used for stereo headset test using A2DP.

⑯ **Soft switch.**

⑰ **M1 thru M8**: Soft keys. Soft keys select test screen.

Second Functions (Blue Label Functions)

Additional functions available by **FCN** key.

FCN **INCR SET** **(= PRESET)**: Preset the instrument to a predefined state.

FCN **Recall** **(= SAVE)**: Store the current instrument settings into memory (1 to 7)

FCN **Marker** **(= STEP)**: Defining moving step of the line markers in the measurement screens.

FCN **0** , **1** , **2** , **3** , **4** , **5** **(=** A,B,C,D,E,F**)** : It is used when you enter hexadecimal data.

FCN **ESC** (=Screenshot): Capturing current displayed screen.

Note

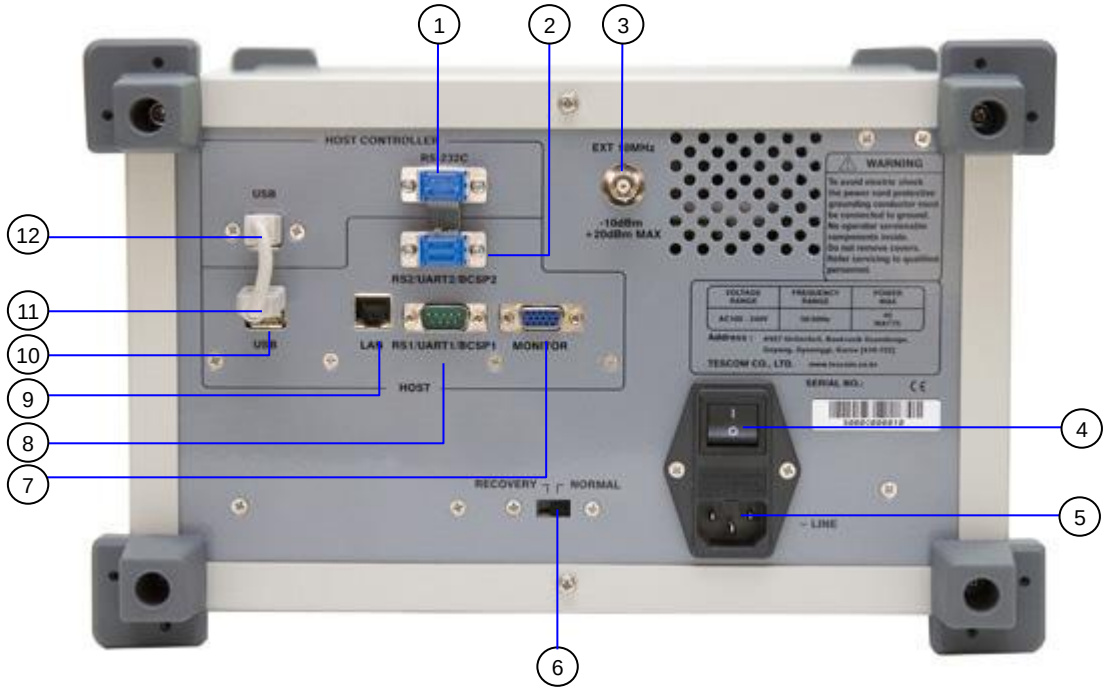
Purpose of the front panel USB port

① for Bluetooth USB Dongle testing
② for copying test case report file, screen capture or firmware upgrade
③ When the USB memory stick is used, it should be used after the device is recognized (2 ~ 3 sec).
Some USB memories could not be recognized. (For normal operation, the USB device should support LINUX OS and composed only one drive.)

④ If the USB memory were removed during Reading/Writing operation, the TC3000C could be shut down. Previous operation should be finished before doing next operation.

3.1.7 Rear Panel View

The Rear panel connectors are illustrated below; detailed descriptions are as follows:



[Figure 3] Rear Panel View

① **RS-232C:** This port is a serial port to Host Controller.

② **RS2/UART2/BCSP2:** This port is a RS2/UART2/BCSP2/ port to Host.

③ **EXT 10 MHz:** This port is an external 10 MHz reference signal.

④ **Power switch**

⑤ **AC Power Input:** 100-240 VAC, 50/60 Hz

⑥ **Emergency Firmware download switch:** For upgrading firmware when Host Controller doesn't boot. This switch is not used after normal firmware upgrading

⑦ **Monitor connector:** For using an external monitor.

⑧ **RS-232C/UART 1/BCSP1 connector:** This port is the first serial port to Host. It can be used for the remote control.

⑨ **LAN connector**

⑩ **USB :** This port is a USB port to Host.

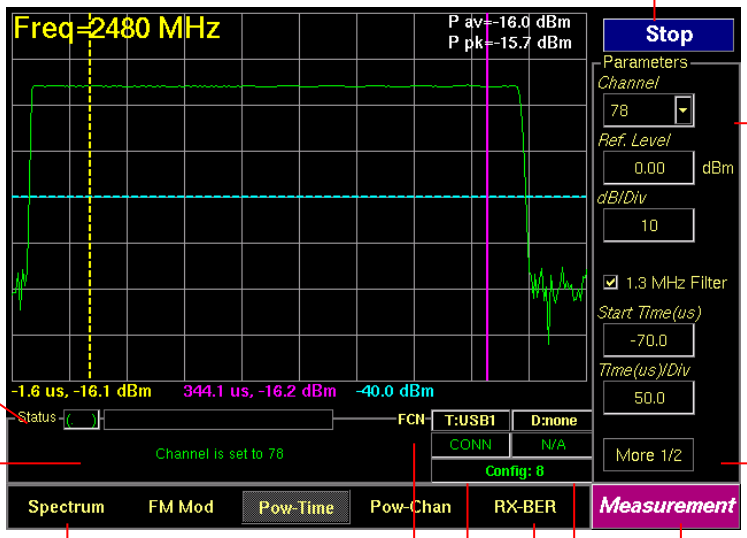
⑪ **USB :** This port is a USB port to Host.

⑫ **USB :** This port is a USB port to Host controller. It is for the remote control with DLL.

3.1.8 Display Screen

Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.

Test progress Indicator:
This progressive bar indicates the status of test proceeding.



Submenus related to soft keys, F1 ~ F8

Status window: Some messages are displayed to help you to understand current status easily.

FCN Key Indicator:
When FCN key is pressed the indicator is brightened.

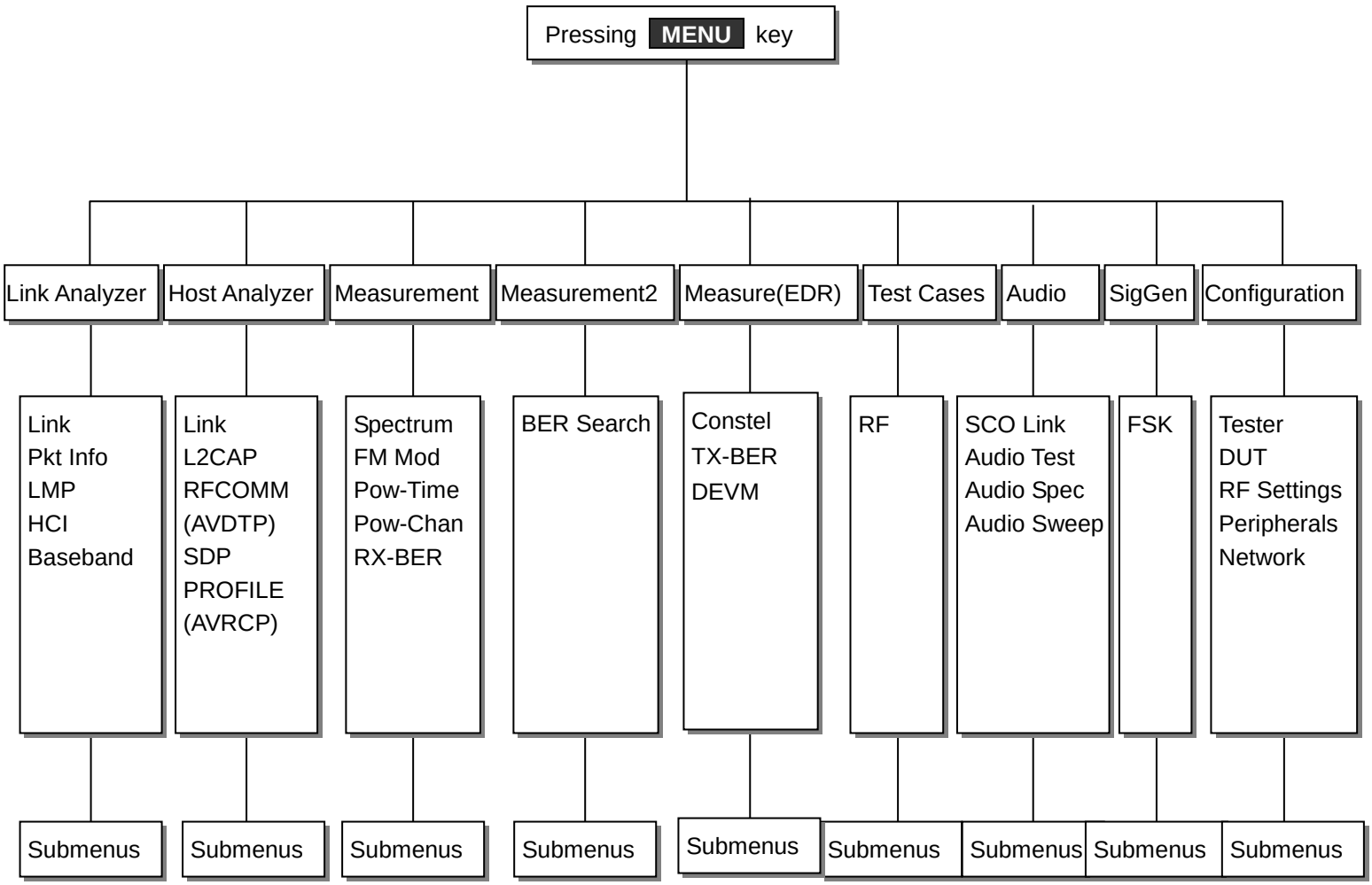
Main function menu related to hard key, MENU. This menu always displays the selected function.

Screen menus related to soft keys, M1 ~ M5

Link Status Indicator: It presents link status, a HCI type that is connected to Host and the number of current configuration.

3.1.9 Menu Structure

TC-3000C has tree-like structure. 9 main functions have subcategories (screen menus) respectively. Each subcategory has several submenus for setting up test parameters.



3.1.10 Access Main Functions

The TC-3000C Bluetooth Tester contains key RF and protocol test & measurement functions in one package. Controls for these functions are arranged on several screens. The Link Analyzer, Host Analyzer, Measurement, EDR Measurement, Audio Test, Signal Generator, Test Cases, and Configuration screens contain most of the functions and fields associated with testing Bluetooth receivers and transmitters. The screens are accessed using the MENU key and soft keys, **M1** ~ **M5**.

Main Function (**MENU** key)	Test Screen (**MI** ~ **M5**)
Link Analyzer	Basic Actions – Discover/Connect/Discoverable Tx/Rx Packet Information – Inquiry/Page/Channel LMP Messages HCI Commands / Events Baseband Packets Analysis
Host Analyzer	Basic Actions – Discover/Connect/Pairable L2CAP RFCOMM (AVDTP) SDP PROFILE (AVRCP)
Measurement	Spectrum FM Modulation Power vs. Time Power vs. Channel RX-Bit Error Rate (RX-BER)
Measurement2	BER Search
Measurement(EDR)	Constellation TX-BER DEVM
Test Cases	RF (13 test cases, “Quick Test Function”, BER/FER, 7 EDR test cases for EDR option) RF (7 test cases for BT LE option)
Audio	SCO Link / SCO Loopback Test Audio Test Audio Spectrum Audio Sweep
RF Signal Generator	FSK Modulation
Configuration	Tester DUT RF Settings Peripherals Network

[Table 3] Access Main Functions

3.1.11 Data Input and Change

1) Press soft key related to the desired input menu.
2) The cursor indicates data input position.
3) Change value with Rotary Knob or ⇧ ⇩ keys. Or enter data with Key Pad.
4) Push Rotary Knob or ENT to confirm the inputted value.
5) BS (Back Space) key be used, if necessary.
6) Many menus display a list of choices when selected. Select a new setting from the list.

3.1.12 Enter and Change the Unit-of-Measure

When the unit is implied, the current unit is used. For example; if the present Reference Level is 0dBm, and you want to change it to 10 dBm, you would enter this sequence:

1 0 ENT

When the unit is specified, the units change to whatever you specify. For example; if the present Reference Level is 0 dBm, and you want to change it to 10 mW, you would enter this sequence:

1 0 mW

To change the present unit-of-measure, position the cursor in front of current unit and press the key labeled with the desired unit

Available units:

Field	Unit
Frequency	MHz, kHz, GHz
Power	dBm, uW, mW

3.1.13 Interaction Between Screens

Some menus operate globally; changing the setting in any screen automatically changes that setting in all screens where it is available. Test Mode is an example of this menu type.

Ex) Configuration: DUT: Test Mode: Transmitter → MEASUREMENT: Spectrum: Test Mode: Transmitter →MEASUREMENT: FM Modul.: Test Mode: Transmitter → MEASUREMENT: Pow-Time: Test Mode: Transmitter → MEASUREMENT: Pow-Chan: Test Mode: Transmitter → Link Analyzer: LINK: Test Mode: Transmitter

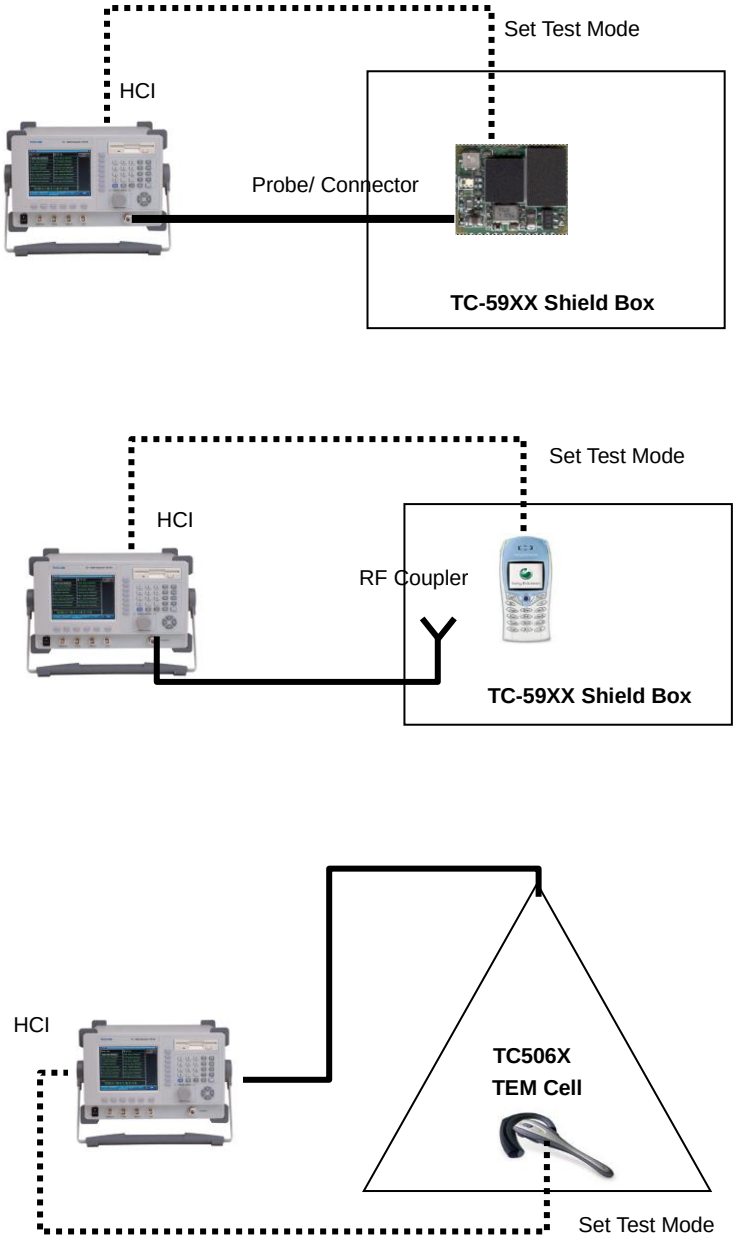
3.1.14 Tool Tips

Throughout the GUI, tool tips provide useful information.

To display a tool tip, press FCN and Soft keys related to a menu. The tool tip disappears when any key is pressed.

3.1.15 Typical Test Configurations

Diagrams below are an ideal set up for testing Bluetooth devices. Since most Bluetooth devices use sealed antenna due to their size, final RF tests must be done over the air (OTA). In case of module or PCB testing, contact probes may also be used. In either case, testing must be completed under an adequately RF isolated condition with reliable RF coupling.
If the DUT has a standard HCI, the TC-3000C can communicate with the DUT via USB(HCI) of TC-3000C for control DUT.



[Figure 4] Typical Test Configurations

3.2 Basic Operation Procedure

The following steps should be formed before other operation procedure to take measurements.

3.2.1 Step 1. Getting Started

1. Make sure the connections have been made between HOST and HOST Controller on the rear panel of the TC-3000C via RS-232C or USB.
2. Connect the RF port of theTC-3000C to the DUT using RF cable or the 2.4GHz antenna.

Caution

To maintain regulatory compliance, OTA (over to air) connection to the DUT must be carried out within an adequately RF isolated environment with reliable RF coupling.

3. If DUT has the HCI port, connect the DUT to the USB ports on the front panel of the TC-3000C.
4. **Set DUT to the Inquiry/Page scanning mode** with test mode enabled. If the DUT is connected to the TC-3000C by using a standard USB(HCI), you don't need to do this step because the TC-3000C can control the DUT automatically.

Caution

Before running a test the DUT must be initialized so that it is Inquiry/Page scanning. If test mode is not enabled, the TC-3000C will use null packet mode for measurement and test.

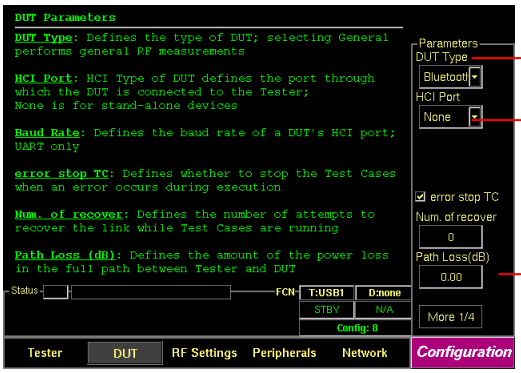
5. Press the soft switch (Item #16 in the figure on page 24) on the front panel. After the system booting process, the TC-3000C display the Start-up screen that is going to be changed to initial test screen 10 seconds later.
6. **Make sure the "HCI Port" of DUT configuration**: Press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M2** (DUT) → **F3** (HCI port). Make sure the "HCI Port" of DUT configuration is correct for the HCI port of the TC- 3000C in use. If the DUT is not connected to the HCI port of the TC-3000C, "None" must be selected.

When TC-3000C is turned on, the instrument always recalls the settings from the most recently saved register. But if the TC-3000C can't find any DUT in the preset HCI port while the TC-3000C is turned on, "HCI Port" of DUT configuration is set to "None"..

7. **Make sure the "DUT Type" of DUT configuration**: Press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M2** (DUT) → **F2** (DUT Type). Make sure the "DUT Type" of DUT configuration is correct.

8. **Input the Path Loss**: Press **Menu** → Select "Configuration" from the pop-up menu on the screen **M2** (DUT) → **F7** (Path Loss). Input the path loss value from the TC-3000C to the DUT.

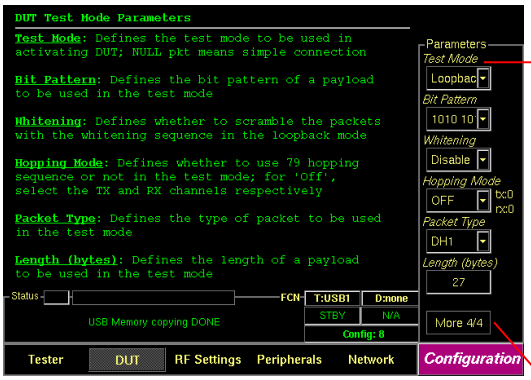
9. **Select the Test mode (Transmitter, Loop back or Null Packet)**: Press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M2** (DUT) → Press **F8** three times for "More 4/4" menu → Press **F2** and select a test mode from the drop down menu.



DUT Type: Select DUT Type from General, BT and BT LE

HCI Port: The HCI port on the rear panel of the TC-3000C, which the DUT is connected.

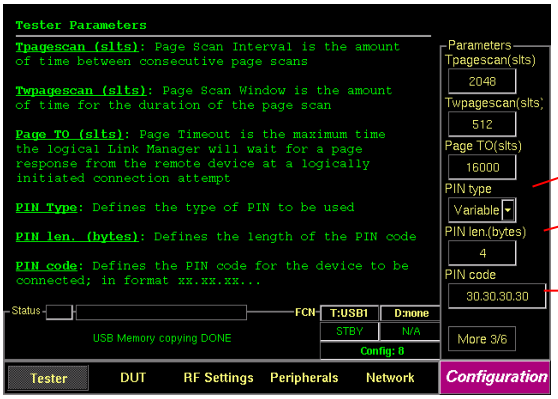
Path Loss: The path loss between the TC-3000C and the DUT.



Test Mode: You can choose Loopback or Transmitter or Null Packet. Null Packet mode is used to test DUT that has no test mode support. In this mode, the TC-3000C uses the packets without payloads and measurements are not performed in accordance with the Bluetooth Test specification and some test cases can't be carried out. A NULL packet has no payload but can be used for power, initial frequency, and spectrum without having to activate test mode.

More 4/5: Press **F8** in sequence to access "More 4/5" screen.

10 Input the PIN code: In case DUT requires authentication to connect, press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M1** (Tester) → Press **F8** two times for "More 3/5" menu. Configure PIN type, PIN length, and PIN code.



PIN Type: Fixed or Variable

PIN len. (Byte): Length of PIN code in bytes

PIN code

11 If you want to configure the TC-3000C, the DUT, and RF conditions more in detail, press **Menu** → Select "Configuration" from the pop-up menu on the screen.

Skip pairing by using Link Key

Bluetooth encryption is a multi-staged process that provides devices with secure, encrypted communications. The process begins with a device prompting the user for a *Personal identification Number* (PIN). When the right PIN is entered, the DUT begins an encryption setup dialogue with the TC-3000C. At the beginning of this dialogue, the DUT and the TC-3000C agree on a *Link Key*. A Link Key is a 128-bit value that the two devices use for authentication. When the DUT and TC-3000C agree on a Link Key, the DUT then negotiates for the transfer of the Encryption Key from the TC-3000C. The Encryption Key is used to encrypt and decrypt messages. If you know the Link Key, you can skip the process with PIN code and reduce the test time. To enter Lin key, press Menu → Select “Configuration” from the pop-up menu on the screen → M1 (Tester) → Press F8 three times for “More 4/6” menu. → Press F6, to check Skip Paring menu → Press F7 and enter Link key.

Note

Skip the inquiry procedure

The inquiry procedure enables a Bluetooth Device to discover which units are in range, and what their device addresses and clocks are. It take 5 ~ 10 seconds to complete. If you already know the BD address of DUT, you can skip the inquiry procedure. To enter BD address, press Menu → Select “Configuration” from the pop-up menu on the screen → M2 (DUT) → Press F8 one times for “More 2/4” menu.→ Press F2, to uncheck “Inq. Supported” menu → Press F8 again for “More3/4” menu → Press F2 and enter the BD address.

3.3 Operation Procedure (Link Analyzer)

3.3.1 Step 2. Creating Connection to DUT

Note

If you want to view higher protocol data; L2CAP, RFCOMM, SDP, and Profile, use the Host Analyzer screen to create connection to DUT. In the Link Analyzer screen, higher protocols do not use to make a connection to DUT.

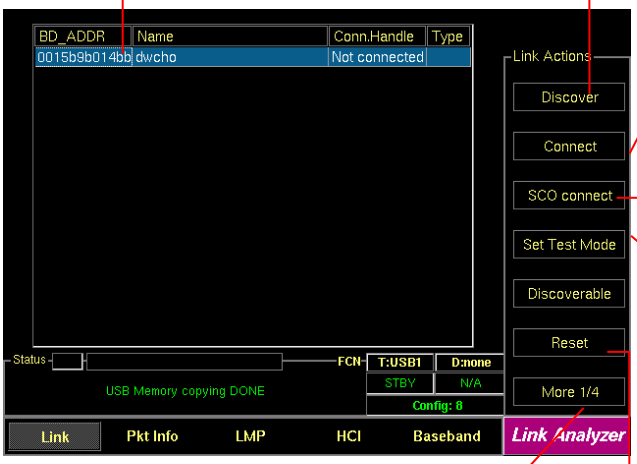
Note

" 3.2 Basic Operation Procedure" should be performed before following steps.

1. Selecting the Link Analyzer Screen: Link Analyzer screen can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select "Link Analyzer" from the pop-up menu on the screen → Press **ENT**.

Discover: Searches for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure.

Show Devices Found: This window display details about the found devices.



Connect/Disconnect: Creating connection to highlighted DUT on the screen through the Page procedure or disconnecting. This menu is displayed when a DUT is discovered and listed on the screen. If the highlighted DUT is connected, this menu is changed to "Disconnect".

SCO connect: Create SCO connection to a highlighted DUT on the screen.

Set Test Mode: Activate Baseband link with a DUT in test mode

Discoverable: Enables the TC-3000C to the Inquiry/Page Scan Mode.

Change submenus: For setting up Inquiry, Page, and test mode parameters.

Reset: Resets the TC-3000C. In case DUT is connected to the TC-3000C with HCI, the DUT is reset simultaneously.

2. **Setting up # Inq. Response**: You can set the Inquiry to end after the "# Inq. Responses" (1 to 16). If there are several DUT that have to respond to Inquiry, set the number of Inquiry response to more than 1. But if there is only one DUT, set the number of Inquiry response to 1 for testing speed. TC-3000C will stop discovering when receives this number of inquiry responses or the Inquiry Timeout is expired. Press **F8** one times for "More 2/4" menu → Press **F4**
3. **Search for DUT**: Press **F8** three times for "More 1/4" menu → press **F2** key to search for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure. If the DUT is connected to the TC-3000C through the HCI port, the TC-3000C read the Bluetooth device (BD) address and controls the DUT directly through USB(HCI). If you want to stop Inquiry process, press **F2** key again.
4. **Select a DUT**: Select a DUT that you want to test in the found devices by using Rotary Knob or ⇧ ⇩ keys.
5. **Connect/Disconnect**: Create connection to highlighted DUT on the screen through the Page procedure by pressing **F3**. When the highlighted DUT is connected, this menu changes to "Disconnect". If you want make a SCO connection, press **F4**.
6. **Set DUT to Test Mode:** Enable DUT to the test mode by pressing **F5**. If DUT is not connected, the page procedure will be performed. If there is no DUT found, the discovering (inquiry) procedure will start first.

Note

If you want to edit test configuration in detail, you can access to configuration menus by pressing **F8** in sequence. These menus operate globally; changing the settings in this screen automatically changes that setting in all screens where it is available. Refer to "3.9 Configuration"

[Inquiry Parameters]

Parameters	Range	Default	Descriptions
Inq. TO (1.28s)	1 ~ 48	*48*	Refer to *Tester* in *Configuration*
Page TO (slts)	1 ~ 65535	*16000*	Refer to *Tester* in *Configuration*
# responses	0 ~ 16	*1*	Refer to *Tester* in *Configuration*
HCI TO (ms)	1 ~ 65535	*2000*	Refer to *Tester* in *Configuration*

[Scan Parameters]

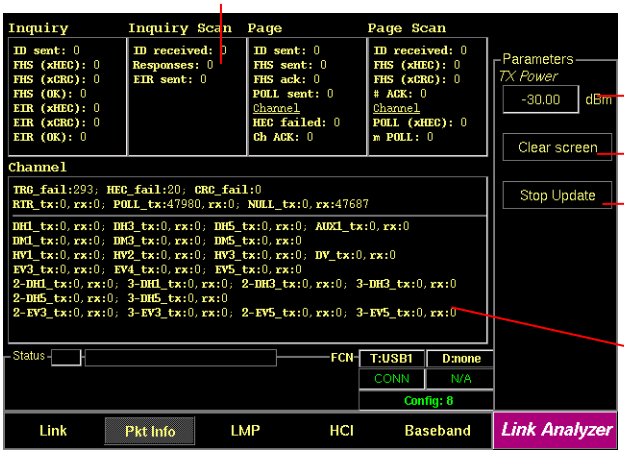
Parameters	Range	Default	Descriptions
Access Type	Discoverable Connectable Full Access	*Full Access*	*Accessibility to Tester as a slave*
T inqscan (slts)	18 ~ 4096	*2048*	Refer to *Tester* in *Configuration*
T winqscan (slts)	18 ~ 4096	*18*	Refer to *Tester* in *Configuration*
T pagescan (slts)	18 ~ 4096	*2048*	Refer to *Tester* in *Configuration*
T wpagescan (slts)	18 ~ 4096	*18*	Refer to *Tester* in *Configuration*
Scan TO (ms)	10000 ~	*600000*	*Inquiry/Page Scan Timeout of Tester*

[Table 4] Test Parameters Refer to DUT in Configuration.

3.3.2 Step 3. Viewing the Recorded Data

1. **Packet Information:** This screen shows how many packets received and transmitted for each packet type. To access Pkt Info screen, press **M2** soft key.

Inquiry/Page packet information: These windows display how many packets are received and transmitted during Inquiry/Page/Inquiry Scan/Page Scan procedure.



TX Power: Defines TX power of the Tester

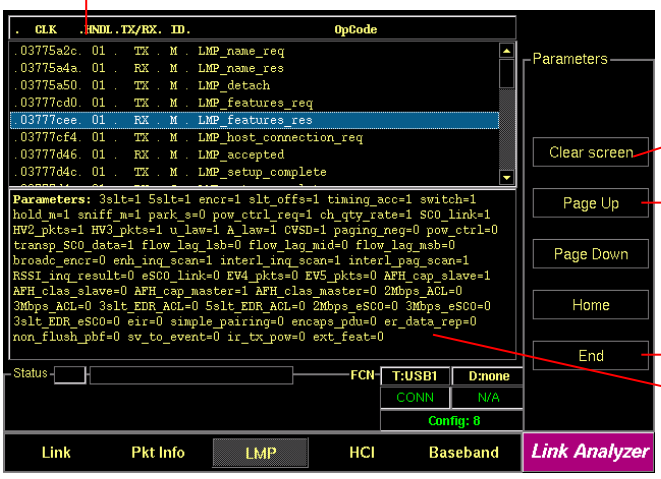
Clear screen: Resets all values to 0

Stop Update/Restart Update: It stops or restarts updating of the tx/rx packet information.

Channel Information: This window displays the channel traffic information.

2. **LMP messages**: This screen shows the LMP messages exchanged between the TC-3000C and the DUT. To access LMP screen, press **M3** soft key.

LMP Messages: This window displays the LMP messages exchanged between the TC-3000C and the DUT.



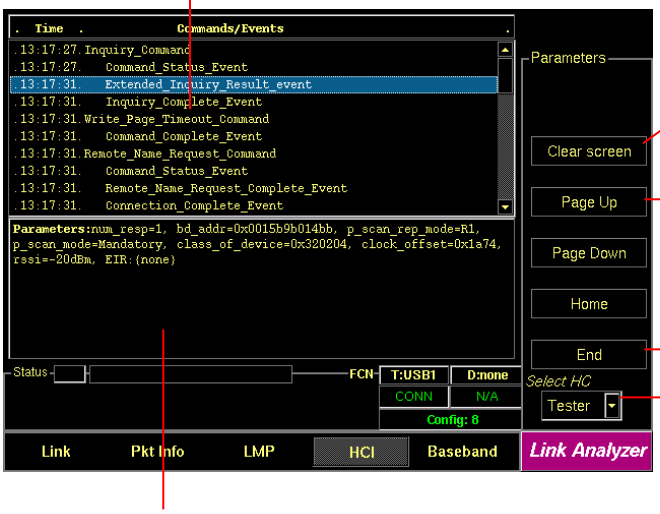
Clear Screen: Clears all messages

Cursor movement functions: For easy scrolling the messages.

Parameters window: This window shows detail parameters about the highlighted LMP message.

3. **HCI commands and events**: This screen shows the HCI commands and events sent between the TC-3000C and the DUT, both from TC-3000C's side and DUT's side. To access HCI screen, press
M4 soft key.

Commands/Events: This window displays the HCI commands/events sent between the TC-3000C Host and Host controllers (TC-3000C and DUT).



Clear Screen: Clear all messages

Cursor movement functions: For easy scrolling the messages

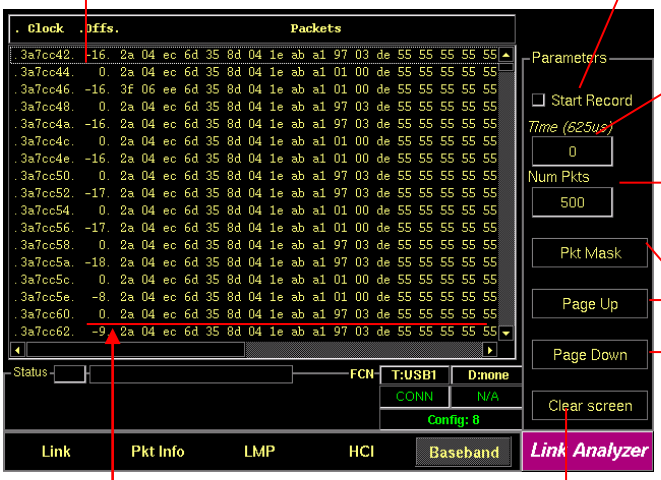
Select Source: Select TC-3000C or DUT as the reference side to display commands and events

Parameters window: This window shows detail parameters about the highlighted HCI commands or event.

4. **Baseband Packets**: This screen shows the Baseband Packets transmitted between the TC-3000C and the DUT in hexadecimal. To access Baseband screen, press **M5** soft key.

Baseband Packets: This window displays the master clock, time offset from start of Rx slot in hundreds nano-seconds, and the Baseband Packets transmitted between the TC-3000C and the DUT in hexadecimal.

Start Record: When this menu is checked the TC-3000C begins to record the Baseband packets during the record time or until getting as many packets as specified in the Num Pkts menu. When the recording is finished this menu is set to unchecked.



Record time: The TC-3000C records the Baseband packets during this time. "0" mean unlimited time.

Number of packets: The TC-3000C records the Baseband packets until getting as many packets as specified in the menu.

Packet Mask: This menu lets you select the packet categories for triggering.

Access code / Header / Payload
First 9 bytes represent an Access code, next 3 bytes represent a Header after FEC (only 18 bytes are meaningful. Payload starts from 13th byte.

Cursor movement functions: For easy scrolling the messages

Clear Screen: Clear all packet information

3.4 Operation Procedure (Host Analyzer)

3.4.1 Step 2. Creating Connection to DUT

NOTE " 3.2 Basic Operation Procedure" should be performed before following steps

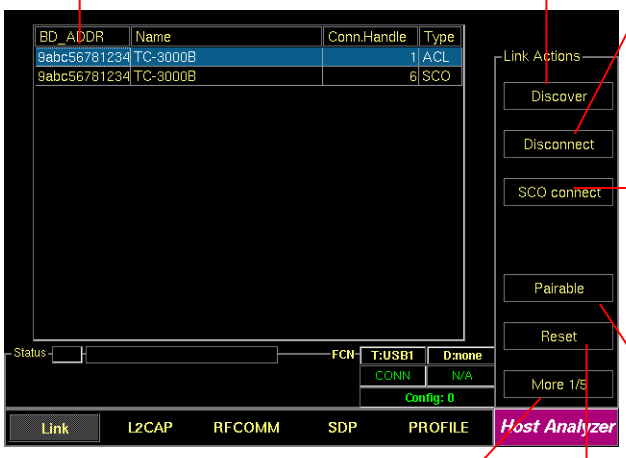
Higher protocol data can be recorded in the Host Analyzer screen. In this screen, TC-3000C also uses upper layer protocols; L2CAP, RFCOMM (AVDTP), SDP, and Profiles (AVRCP) to make a connection to a DUT.

1. Selecting the Host Analyzer Screen: Host Analyzer screen can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select "Host Analyzer" from the pop-up menu on the screen → Press **ENT**.

Discover: Searches for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure.

Show Devices Found: This window display details about the found devices.

Connect/Disconnect: Creating connection to highlighted DUT on the screen through the Page procedure or disconnecting. This menu is displayed when a DUT is discovered and listed on the screen. If the highlighted DUT is connected, this menu is changed to "Disconnect".



SCO connect: Create SCO connection to a highlighted DUT on the screen.

Pairable: Enables the TC-3000C to be responder in scanning and pairing procedure.

Change submenus: For setting up Inquiry, Page, and test mode parameters.

Reset: Resets the TC-3000C. In case DUT is connected to the TC-3000C with HCI, the DUT is reset simultaneously.

2. **Setting up # Inq. Response**: You can set the Inquiry to end after the "# Inq. Responses" (1 to 16). If there are several DUT that have to respond to Inquiry, set the number of Inquiry response to more than 1. But if there is only one DUT, set the number of Inquiry response to 1 for testing speed. TC-3000C will stop discovering when receives this number of inquiry responses or the Inquiry Timeout is expired. Press **F8** one times for "More 2/5" menu → Press **F4**
3. **Setting up the profile type of DUT**: You should define the profile type of DUT, before beginning tests. To select the profile type, press **F8** three times for "More 5/5" menu in the Host Analyzer screen.→ press **F2** and select the profile type of DUT.
4. **Search for DUT**: Press **F8** for "More 1/5" menu → press **F2** key to search for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure. If the DUT is connected to the TC-3000C through the USB(HCI) port, the TC-3000C read the Bluetooth device (BD) address and controls the DUT directly through HCI. If you want to stop Inquiry process, press **F2** key again.
5. **Select a DUT**: Select a DUT that you want to test in the found devices by using Rotary Knob or ⇧ ⇩ keys.
6. **Connect/Disconnect**: Create connection to highlighted DUT on the screen through the Page procedure by pressing **F3**. When the highlighted DUT is connected, this menu changes to "Disconnect". To make a SCO connection, press **F4**.

NOTE

If you want to edit test configuration in detail, you can access to configuration menus by pressing **F8** in sequence. These menus operate globally; changing the settings in this screen automatically changes that setting in all screens where it is available. Refer to "3.9 Configuration.

[Inquiry Parameters]

Parameters	Range	Default	Descriptions
Inq. TO (1.28s)	1 ~ 48	*48*	Refer to *Tester* in *Configuration*
Page TO (slts)	1 ~ 65535	*16000*	Refer to *Tester* in *Configuration*
# responses	0 ~ 16	*1*	Refer to *Tester* in *Configuration*
HCI TO (ms)	1 ~ 65535	*2000*	Refer to *Tester* in *Configuration*

[Scan Parameters]

Parameters	Range	Default	Descriptions
Access Type	Discoverable Connectable Full Access	*Full Access*	*Accessibility to Tester as a slave*
T inqscan (slts)	18 ~ 4096	*2048*	Refer to *Tester* in *Configuration*
T winqscan (slts)	18 ~ 4096	*18*	Refer to *Tester* in *Configuration*
T pagescan (slts)	18 ~ 4096	*2048*	Refer to *Tester* in *Configuration*
T wpagescan (slts)	18 ~ 4096	*18*	Refer to *Tester* in *Configuration*
Scan TO (ms)	10000 ~	*600000*	*Inquiry/Page Scan Timeout of Tester*

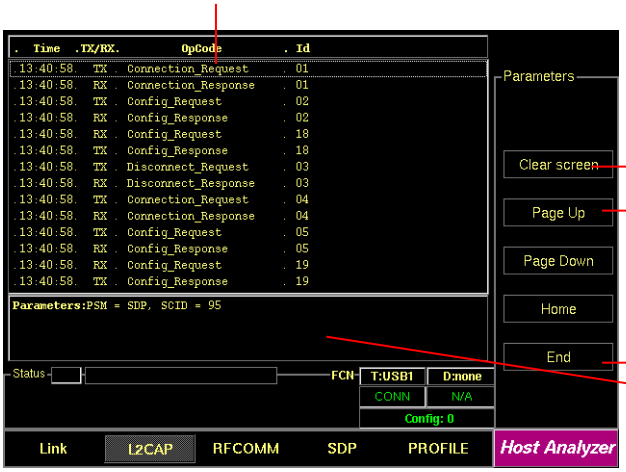
[Profile Parameters]

Parameters	Range	Default	Descriptions
L2CAP TO (ms)	1 ~ 65535	*2000*	*L2CAP Timeout* Defines the timeout of L2CAP commands execution
RFCOMM TO (ms)	1 ~ 65535	*2000*	*RFCOMM Timeout* Defines the timeout of RFCOMM commands execution
SDP TO (ms)	1 ~ 65535	*2000*	*SDP Timeout* Defines the timeout of SDP commands execution
Profile TO (ms)	1 ~ 65535	*2000*	*Profile Timeout* Defines the timeout of Profile commands execution
Type of Profiles	None Headset Handsfree AudioGateway	*Handsfree*	*Type of Profiles* Defines the profile type of DUT. If you select “None”, only the lower layers of protocol are used to make a connection with DUT in the same way as Link Analyzer.
Gain control		*Unchecked*	If the DUT support the microphone and speaker gain controls, checking this option enable TC-3000C to control the volume of it. Checking this menu causes “Speaker Volume” and “Mic Volume” menu to be showed below.
Speaker Volume	0 ~ 15	*15*	*Speaker Volume* Specifies the volume of DUT speaker in consideration of the gain.
Mic Volume	0 ~ 15	*15*	*Microphone Volume* Specifies the volume of DUT microphone in consideration of the gain.

3.4.2 Step 3. Viewing the Recorded Data

1. **L2CAP Messages:** This screen shows the L2CAP messages exchanged between the TC-3000C and the DUT. To access L2CAP screen, press **M2** soft key.

L2CAP Messages: This window displays the L2CAP messages exchanged between the TC-3000C and the DUT.



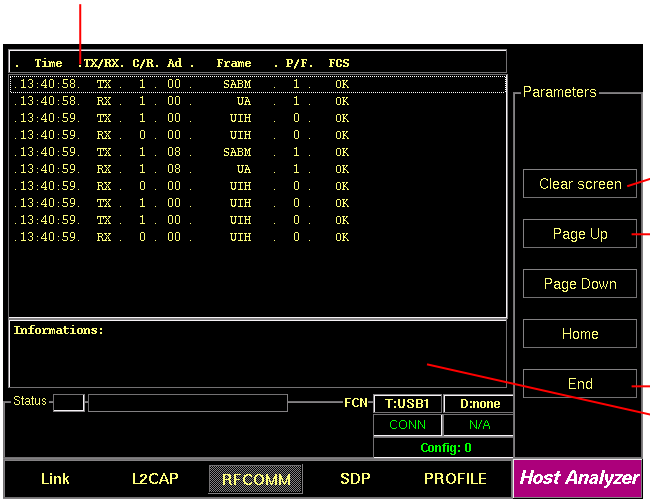
Clear screen: Clears all messages

Cursor movement functions: For easy scrolling the messages.

Parameters window: This window shows detail parameters about the highlighted L2CAP message.

2. **RFCOMM messages:** This screen shows the RFCOMM messages exchanged between the TC-3000C and the DUT. To access RFCOMM screen, press M3 soft key.

RFCOMM Messages: This window displays the RFCOMM messages exchanged between the TC-3000C and the DUT.



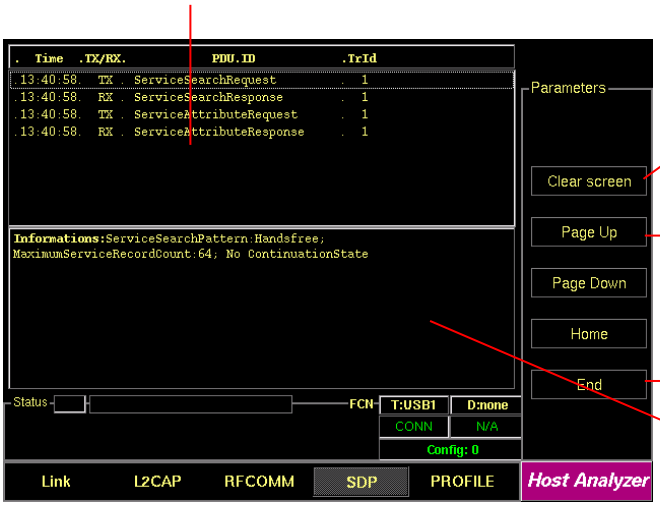
Clear screen: Clears all messages

Cursor movement functions: For easy scrolling the messages.

Parameters window: This window shows detail parameters about the highlighted RFCOMM message.

3. **SDP Messages:** This screen shows the SDP messages exchanged between the TC-3000C and the DUT. To access SDP screen, press **M4** soft key.

SDP Messages: This window displays the SDP messages exchanged between the TC-3000C and the DUT.

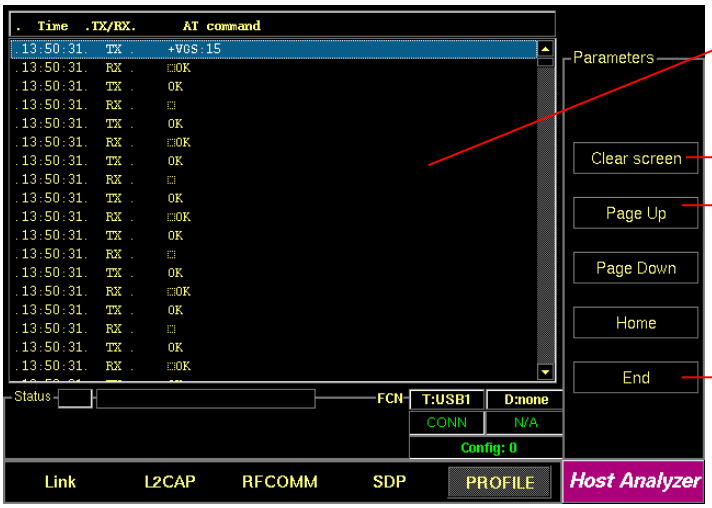


Clear screen: Clears all messages

Cursor movement functions: For easy scrolling the messages

Parameters window: This window shows detail parameters about the highlighted SDP message.

4. **Profiles**: This screen shows AT Commands transmitted between the TC-3000C and the DUT .
   To access Profile screen, press **M5** soft key.



Profile Messages: This window displays the Profile messages exchanged between the TC-3000C and the DUT.

Clear screen: Clears all messages

Cursor movement functions: For easy scrolling the messages

3.5 Operation Procedure (Measurement/Measurement2)

This chapter describes the operation procedure of RF Measurement.

When you select the measurement screen or run the test cases, the TC-3000C makes a connection to DUT that is discovered firstly and begins to test automatically although there are several BT devices nearby. If you want to test a specific device in several devices, go through the step 2 in the Link Analyzer screen or Host Analyzer screen in advance.

If there is a connection with DUT already, the TC-3000C begins the test immediately without the connection procedure.

NOTE

3.2 “Basic Operation Procedure” should be performed before following steps.

3.5.1 Step 3. Selecting the Measurement Screen

Measurement can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select “Measurement” from the pop-up menu on the screen → **ENT**

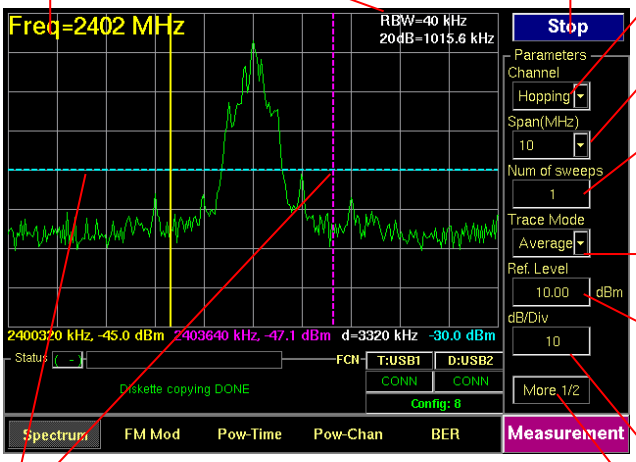
When you select the measurement screen, the TC-3000C makes a connection to DUT that is discovered firstly and begins to measure RF signals automatically.

3.5.2 Step 4. Measuring RF Characteristics of DUT

1. **Spectrum Analyzer:** To access the spectrum analyzer screen, press **M 1** soft key. This screen shows the spectrum of a channel in single channel or hopping mode.

Center Frequency
Resolution Band Width
20dB Band Width

Start/Stop: When this menu is pressed the tests will run once. When the menu is pressed again while the tests are running, the tests will stop.



Channel: Selects the carrier frequency channel, one of 79 channels or Hopping mode. (Channel 0-78 : 2.402 – 2.480 GHz)

Span: Selects full screen frequency span width.

Num of sweep: Specifies the number of times that the analyzer sweeps the displayed frequency span. This value directly affects how long it takes to complete a measurement.

Trace Mode: Selects tracing mode, Average or Maximum hold.

Ref. Level: Specifies the amplitude reference level. The top line of the display is the reference level. All signals displayed are reference to this line.

dB/div: Sets the vertical amplitude per division

Test mode: Configures Bluetooth Test Mode connection with the DUT

Line Markers: You can place line-shaped markers on the screen to find the signal's frequency and amplitude. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

Readouts of markers amplitude and frequency: The marker readouts have the same color as the marker respectively. "d" displays a frequency difference between yellow and red marker.

Parameters	Range	Default
Channel	0 ~ 78, Hopping	Hopping
Span (MHz)	1, 1.25, 2, 2.5, 5, 10	10
Num of sweeps	1 ~ 50	1
Trace Mode	Average / Maxhold	Average
Ref. Level (dBm)	-80 ~ 40	-80 + Path Loss ~ 40 + Path Loss
dB/div	1 ~ 20	10

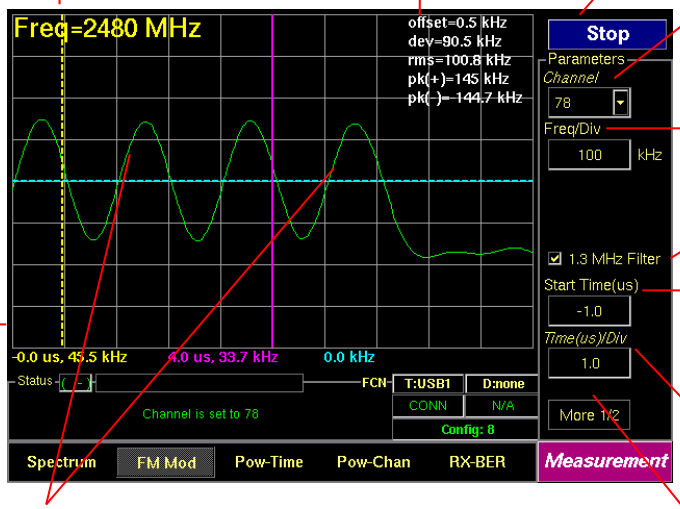
2. FM Modulation: To access FM Modulation screen, press **M2** soft key. This screen shows the modulation characteristics of a channel in single channel or hopping mode.

All following values are measured between yellow and blue marker.
offset: Carrier Frequency offset
dev: Average of absolute deviation values
rms: RMS value of deviation
pk(+): Positive maximum deviation
pk(-): Negative maximum deviation

Center Frequency: Displays channel frequency.

Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.

Channel: Select the carrier frequency channel, one of 79 channels or Hopping mode. (Channel 0-78: 2.402 – 2.480 GHz)



Freq/Div: frequency value of one vertical grid on screen

1.3 MHz Filter: Enables 1.3 MHz Low Pass

Start Time: Specifies the start point to display the measured signals. “0” means the start point of a slot time (625 uS).

Time (us)/div: Sets the horizontal time per division

Test mode: Configures Bluetooth Test Mode connection with DUT

Line Markers: You can place line-shaped markers on the screen to find the signal’s frequency and time. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

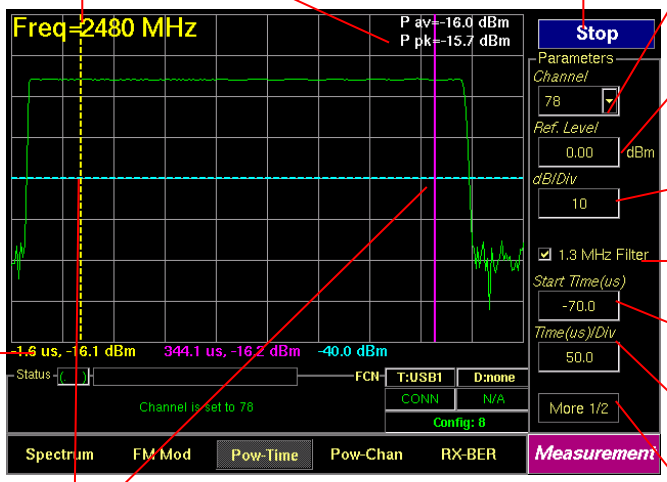
Readouts of markers time and frequency: The marker readouts have the same color as the marker respectively.

Parameters	Range	Default
Channel	0 ~ 78	Hopping
1 Ver Div. (kHz)	10 ~ 1000	100
1.3 MHz Filter		Checked
Start Time. (us)	-70~ 3124	
Time(us)/div	0.1~ 60 @ 1 slot packet 0.1~ 180 @ 3 slots packet 0.1 ~ 300 @ 5 slots packet	

3. **Power versus Time**: To access Pow-Time screen, press **M3** soft key. This screen shows the channel power measure of a channel in single channel or hopping mode.

Channel Frequency
Average Power
Peak

Start/Stop: When this menu is pressed the tests will run once. When the menu is pressed again while the tests are running, the tests will stop.



Channel: Selects the channel, one of 79 channels or Hopping mode. (Channel 0-78 : 2.402 – 2.480GHz)

Ref. Level: Specifies the amplitude reference level. The top line of the display is the reference level. All signals displayed are reference to this line.

dB/Div: Sets the vertical amplitude per division

1.3 MHz Filter: Enables 1.3 MHz Low Pass Filter

Start Time: Specifies the start point to display the measured signals. "0" means the start point of a slot time (625 us).

Time(us)/div: Sets the horizontal time per division

Test mode: Configures Bluetooth test Mode connection with DUT

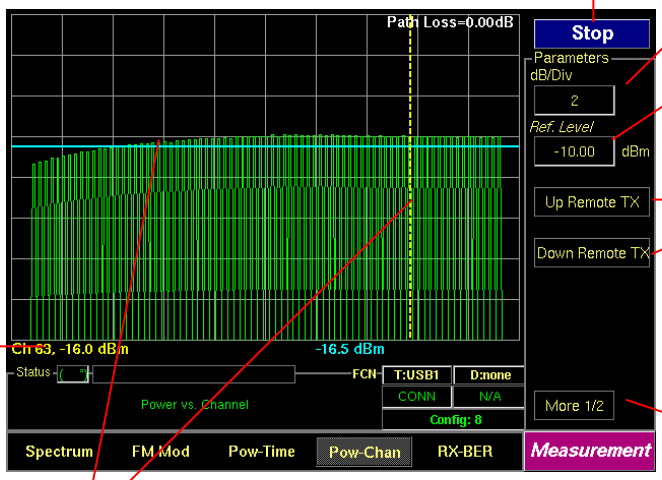
Line Markers: You can place line-shaped markers on the screen to find the signal's amplitude and time. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

Readouts of cursors time and frequency: The marker readouts have the same color as the marker respectively.

Parameters	Range	Default
Channel	0 ~ 78, Hopping	Hopping
Ref. Level (dBm)	-80 ~ 40	-80 + Path Loss ~ 40 + Path Loss
dB/div	1 ~ 20	10
1.3 MHz Filter		Checked
Start Time (us)	-70 ~ 3124	
Time(us)/div	0.1 ~ 60 @ 1 slot packet 0.1 ~ 180 @ 3 slots packet 0.1 ~ 300 @ 5 slots pakcet	

4. **Power versus Channel**: To access Pow-Chan screen, press **M4** soft key. This screen shows the channel power measures of every channels, 0~78.

Start/Stop: When this menu is pressed the tests will run once. When the menu is pressed again while the tests are running, the tests will stop.



dB/Div: Sets the vertical amplitude per division

Ref. Level: Specifies the amplitude reference level. The top line of the display is the reference level. All signals displayed are reference to this line.

Up/Down Remote Tx: Increasing/Decreasing the DUT TX power. This function is available only when the DUT supports the power control option. The step size depends on the DUT specification (2~ 8 dB).

Test mode: Configures Bluetooth Test Mode connection with DUT

Line Markers: You can place line-shaped markers on the screen to find the channel's amplitude and set reference amplitude. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

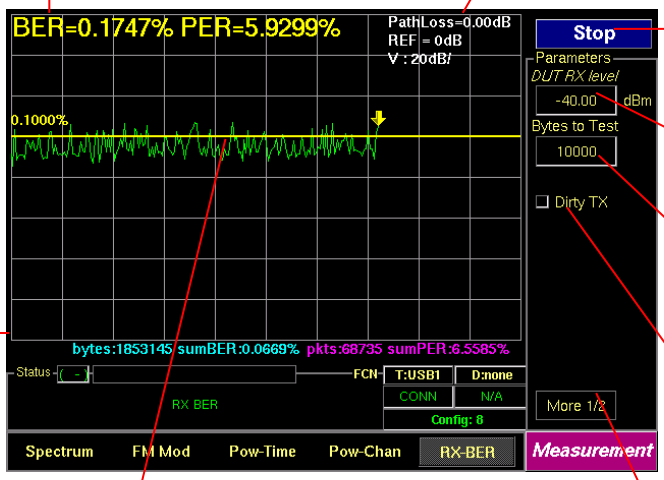
Readouts of markers channel and amplitude: The marker readouts have the same color as the marker respectively.

Parameters	Range	Default
dB/div	0 ~ 20	10
Ref. Level (dBm)	-80 ~ 40	-80 + Path Loss ~ 40 + Path Loss

5. **BER (Bit Error Rate)**: To access BER screen, press **M5** soft key. The DUT sensitivity is determined by using a Bit Error Rate (BER). This screen shows the BER measurements that are carried out by comparing data in the payload fields transmitted by the TC-3000C with data in the payload fields received from the DUT. This test is performed in Loopback test mode without regard to the preset test mode.

BER: Displays the BER measure to the sent bytes that are specified in "Length" menu.

The top line of the display is the reference level 100%. The vertical percent per division go down by one tenth.



Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.

DUT RX level: Sets expected value of DUT Rx Power.

Bytes to Test: Specifies the length of data to measure.

Dirty TX: Enables "Dirty Transmission mode" TC-3000C transmits the dirty transmitter signal in accordance to the Bluetooth Test Specification.

Line Markers: You can place line-shaped marker on the screen to set reference BER. Turn the knob to place the marker at the screen.

Test mode: Configures Bluetooth Test Mode connection with DUT

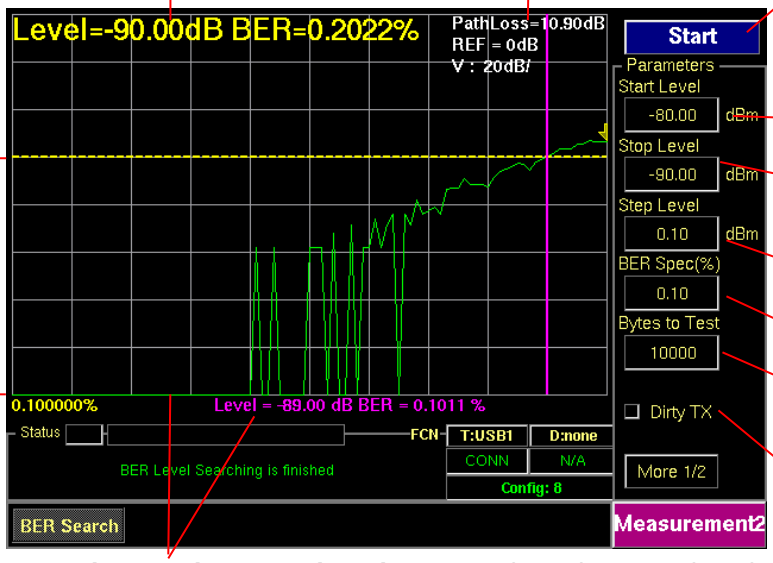
Readouts of marker BER and bit stream information: The cursor BER, the total sent bytes, the Error bits, and the cumulated BER are displayed. The cumBER (cumulated BER) displays BER measure to total sent bytes.

Parameters	Range	Default
DUT RX level (dBm)	-80 ~ 0	0
Bites to Test	0 ~ 500000	10000
Dirty TX		Unchecked

6. BER Search : This function will automatically find the sensitivity level for BER Spec (ex 0.1%). To execute BER Level Search function, the DUT must support loopback test mode.

Display currently executing RF level and BER

The most top line means 100% and next lines mean 1/10 of above line (Log scale)



Start/Stop: When this menu is pressed the tests will run once. When the menu is pressed again while the tests are running, the tests will stop.

Start Level: Set start power for BER Level Search

Stop Level: Set last power for BER Level Search

Step Level: Set step Power of BER Search

BER Spec: Set BER Spec.

Bytes to Test: Specifies the length of data to measure

Dirty TX: Enables "Dirty Transmission mode" TC-3000C transmits the dirty transmitter signal in accordance to the Bluetooth Test Specification.

Line marker, Level and BER: When the start key is pressed to run BER search function, the TC3000C will fine sensitivity level and the Line marker will be placed that sensitivity level position. Press the marker key to make it active and display BER value of marker line.

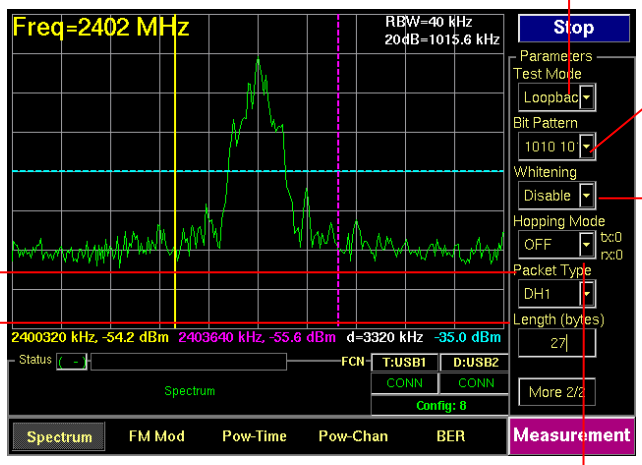
Line marker and BER Spec(%) value: When the start key is pressed, it will display target BER spec value. If the marker is activated, it will display the BER value of marker line.

Parameters	Range	Default
Start Level(dBm)	-80 ~ 0	-45
Stop Level(dBm)	-80 ~ 0	-50
Step Level(dBm)	0.01 ~ 80	0.10
BER Spec(%)	0 ~ 100	0.10
Bytes to Test	1 ~ 500000	10000

3.5.3 Step 5. Setting Up Test Mode and Parameters

The Test Parameters let you configure Test mode, Bit pattern, Whitening, Hopping mode, Packet Type, and Packet length. This menus can be accessed by pressing **F8** in every measurement screen.

Test Mode: You can choose Loopback or Transmitter or Null Packet. Null Packet mode is used to test DUTs that have no test mode support. In this mode, the TC-3000C uses the packets without payloads and measurements are not performed in accordance with the Bluetooth Test specification and some test cases can't be carried out. A NULL packet has no payload but can be used for power, initial frequency, and spectrum without having to activate test mode.



Bit Pattern: Select the bit pattern being transmitted. Supported patterns are 0000 0000, 11111111, 10101010, 11110000, and PRBS9.

Whitening: Enable or disable whitening. In transmitter test mode, the packets exchanged between TC-3000C and DUT are not scrambled with the whitening sequence. This parameter is ignored in transmitter test mode.

Hopping Mode: Choose to make measurement on a specific channel or in Bluetooth frequency hopping mode. The "Off" require specifying Tx and Rx channel.

Packet Type: Select a Bluetooth specific single or multi slot packet. The following packet types are available: DM1, DH1, HV1, HV2, HV3, AUX1, DM3, DH3, DM5, DH5, EV3, EV4, EV5, 2-DH1, 3-DH1, 2-DH3, 3-DH3, 2-DH5, 3-DH5, 2-EV3, 3-EV3, 2-EV5, 3-EV5. For the transmitter test mode, only packets without FEC should be used; i.e. HV3, DH1, DH3, DH5 and AUX1 packets.

Length: the length of packets can be adjusted from 1 to 27 for 1slot packets, 1 to 183 for 3 slot packets and 1 to 339 for 5 slot packets.

3.6 Operation Procedure (EDR Measurement)

This chapter describes the operation procedure of EDR Measurement.

When you select the EDR measurement screen or run the test cases, the TC-3000C makes a connection to DUT that is discovered firstly and begins to test automatically although there are several BT devices nearby. If you want to test a specific device in several devices, go through the step 2 in the Link Analyzer screen or Host Analyzer screen in advance.

If there is a connection with DUT already, the TC-3000C begins the test immediately without preceding connection procedure.

NOTE "Basic Operation Procedure" on page 3-12 should be performed before following steps.

3.6.1 Step 3. Selecting the EDR Measurement Screen

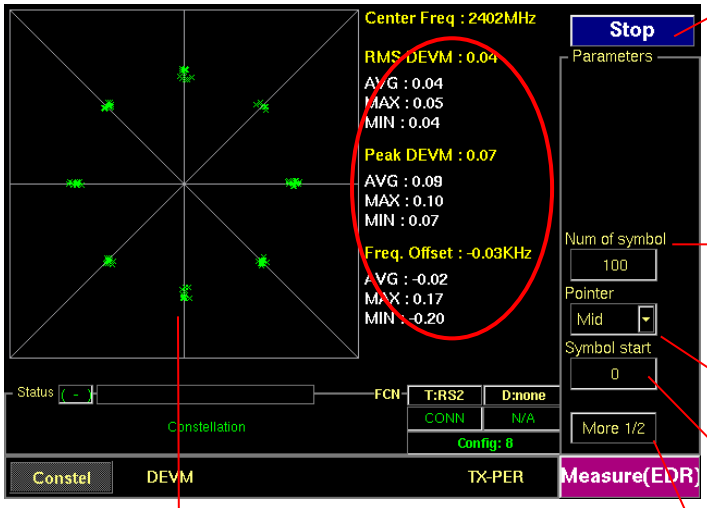
EDR Measurement can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select "EDR Measurement" from the pop-up menu on the screen → **ENT**

When you select the measurement screen, the TC-3000C makes a connection to DUT that is discovered firstly and begins to measure RF signals automatically.

3.6.2 Step 4. Measuring EDR Characteristics of DUT

1. Constellation: To access the constellation, press **M1** soft key. This screen shows the I-Q constellation spectrum of a channel in single channel or hopping mode.

RMS DEVM: Variance of DEVM(Differential Error Vector Magnitude)
Peak DEVM: maximum DEVM
Freq. Offset: carrier frequency offset of PSK



Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.

Num of symbol : Number of PSK symbols displayed on screen, To see more symbol, increase this value

Pointer : Graphical size of symbol

Symbol start : Specifies the start point to display PSK symbol. “0” means the start point of PSK Payload

Test mode: Configures Bluetooth Test Mode connection with DUT

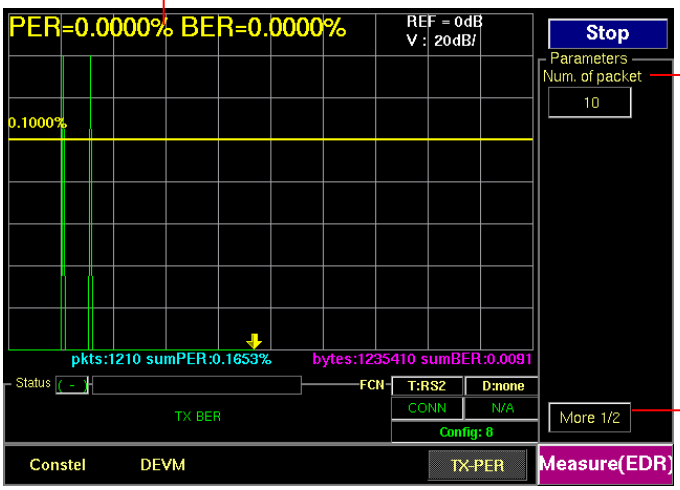
Transmitted PSK symbol from DUT

Parameters	Range	Default
Max of X-axis	1~ 50000	5000
Max. Of X-axis	1 ~ 50000	5000
Num of symbol	1 ~ 200	100
Pointer	Small, Mid, Large	Mid
Symbol start		0

2. TX-BER (Bit Error Rate): To access TX-BER screen, press **M2** soft key. The purpose of this measurement is to test DUT's PSK modulation quality. This test is not the DUT's RX sensitivity so output power of TC-3000C should be set enough high. This screen shows the TX-BER measurements that are carried out by checking data in PSK payload fields received from the DUT. This test is performed in Transmitter test mode only.

BER: Displays the TX-BER measure to the sent bytes that are specified in "Length" menu.

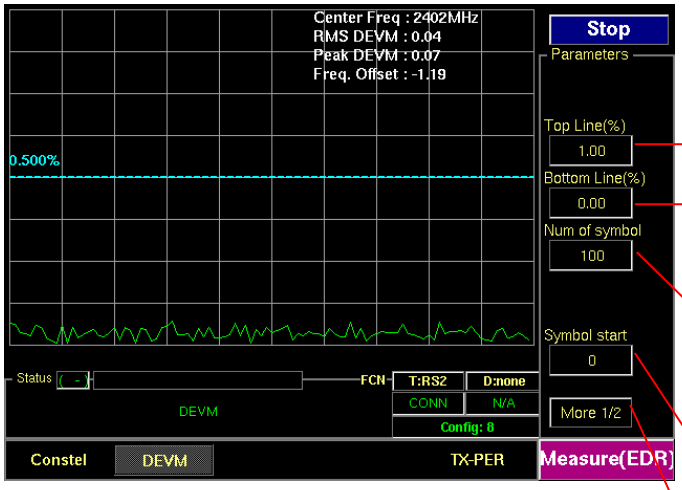
PER: Displays the TX-PER(Packet Error Rate) measure



Num. Of packet: specifies the number of packet to measure

Test mode: Configures Bluetooth Test Mode connection with DUT

3. DEVM: To access DEVM screen, press **M3** soft key. This screen shows the DEVM according to PSK payload position. X-axis means position of PSK payload.



Top Line : Specifies the amplitude of top line

Bottom Line : Specifies the amplitude of Bottom line

Num of symbol : Number of PSK symbols displayed on screen, To see more symbol, increase this value

Symbol start : Specifies the start point to display PSK symbol. “0” means the start point of PSK Payload

Test mode: Configures Bluetooth Test Mode connection with the DUT

Parameters	Range	Default
Top Line	0.9 ~ 100	1.00
Bottom Line	0 ~ 0.1	0.00
Num of symbol	1 ~ 200	100
Symbol start	0 ~ 145	0

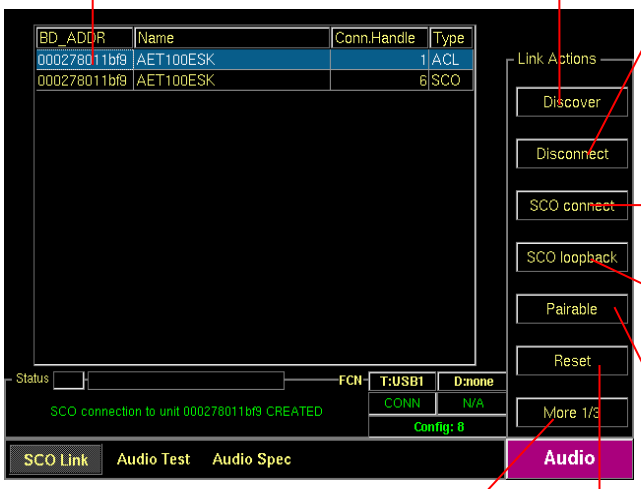
3.7 Operation Procedure (Audio Analyzer)

3.7.1 Step 2. Creating Connection to DUT

1. Selecting the Audio Screen: Audio screen can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select "Audio" from the pop-up menu on the screen → Press **ENT**.

Discover: Searches for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure.

Show Devices Found: This window display details about the found devices.



Connect/Disconnect: Creating connection to highlighted DUT on the screen through the Page procedure or disconnecting. This menu is displayed when a DUT is discovered and listed on the screen. If the highlighted DUT is connected, this menu is changed to "Disconnect".

SCO connect: Create SCO connection to a highlighted DUT on the screen.

SCO loopback: Enables the SCO loopback test.

Pairable: Enables the TC-3000C to be responder in pairing procedure.

Change submenus: For setting up Inquiry, Page, and test mode parameters.

Reset: Resets the TC-3000C. In case DUT is connected to the TC-3000C with HCI, the DUT is reset simultaneously.

2. **Setting up the profile type of DUT**: You should define the profile type of DUT, before beginning tests. To select the profile type, press **F8** two times for “More 3/3” menu in the Audio screen.→ press **F2** and select the profile type of DUT.
3. **Setting up the parameters for DUT**: Specify the parameters related to Signal Source. Press **F8** for “More 2/3 or 3/3” menu → press **F2** ~ **F4** key.
4. **Search for DUT**: Press **F8** for “More 1/3” menu → press **F2** key to search for all Bluetooth devices that are in range and in Inquiry Scan Mode through the Inquiry procedure. If the DUT is connected to the TC-3000C through the HCI port, the TC-3000C read the Bluetooth device (BD) address and controls the DUT directly through HCI. If you want to stop Inquiry process, press **F2** key again.
5. **Select a DUT**: Select a DUT that you want to test in the found devices by using Rotary Knob or ⇧ ⇩ keys.
6. **Connect/Disconnect**: Create connection to highlighted DUT on the screen through the Page procedure by pressing **F3**. When the highlighted DUT is connected, this menu changes to “Disconnect”. To make a SCO connection, press **F4**.

NOTE

Selecting Audio Gate as the profile type causes “Talk” menu to be showed and "Discover” menu to disappear. In case of Audio Gate (HS-AG or HF-AG), TC-3000C discovers DUT and creates ACL / SCO connection at in a time by pressing **F2** (Talk).

[Voice Parameters]

Parameters	Range	Default	Descriptions
Packet Type	HV1, HV2, HV3	*HV3*	Defines the packet type of SCO Link
Air Coding	CVSD, u-law, A-law	*CVSD*	Defines voice coding type
Delay (s)	0, 2, 5	*2*	Defines the delay time that TC-3000C loopback the SCO Data received from DUT.

[Profile Parameters]

Parameters	Range	Default	Descriptions
Type of Profile	None Headset Hands free HS-AG HF-AG Audio-SNK Audio-SRC	*Hands free*	*Type of Profiles* Defines the profile type of DUT
Send Ring		*Unchecked*	When it is “checked” TC-3000C transmits RING with AT command.
Gain control		*Unchecked*	If the DUT support the microphone and speaker gain controls, checking this option enable TC-3000C to control the volume of it. Checking this menu causes “Speaker Volume” and “Mic Volume” menu to be showed below.
Speaker Volume	0 ~ 15	*15*	*Speaker Volume* Specifies the volume of DUT speaker.
Mic Volume	0 ~ 15	*15*	*Microphone Volume* Specifies the volume of DUT microphone .
Transfer Type	Built-in User File	*Built-in*	Select to transmit the internal audio tone or the external source which user saved.
Copy Source			Copy an audio source file from USB Memory to TC-3000C. The name of file must be “tc3000.sbc” and only a file can be saved.
Sample Frequency	16000 32000 44100 48000	32000	The sample frequency of the audio source (SBC)
Subbands	4, 8	8	The Subband of the audio source (SBC)
Bitpool	2 ~ 250	32	The Bitpool of the audio source (SBC)

3.7.2 Step 3. Verification of Speech Loopback for Mono Headset

Pressing **F5** enable TC-3000C to SCO loopback mode. In this test, TC-3000C loopback all SCO Data received from DUT. You can listen to your voice from Headset speaker after the delay time specified and verify the performance (howling, echo, noise) of microphone and speaker simply.

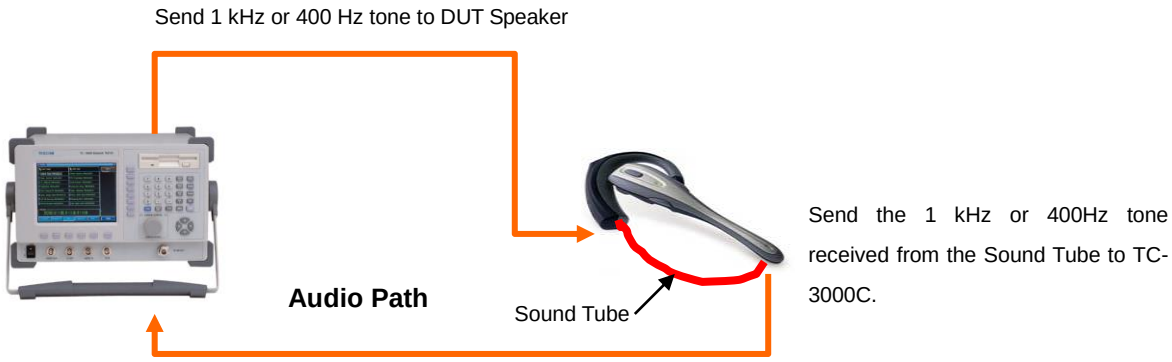
To stop the SCO loopback, press **F5** again.

Time Delay: You can specify this value in the Delay (s) menu. Press **F8** for "More 2/3" menu → Press **F4**.

3.7.3 Step 4. Measuring Audio Characteristics of DUT

1. Audio Test: The following parameters are displayed in the Audio Test screen during the test: Audio Frequency, Fundamental Power, RMS, SINAD, ICF (Initial Carrier Frequency Tolerance) and Distortion**.**

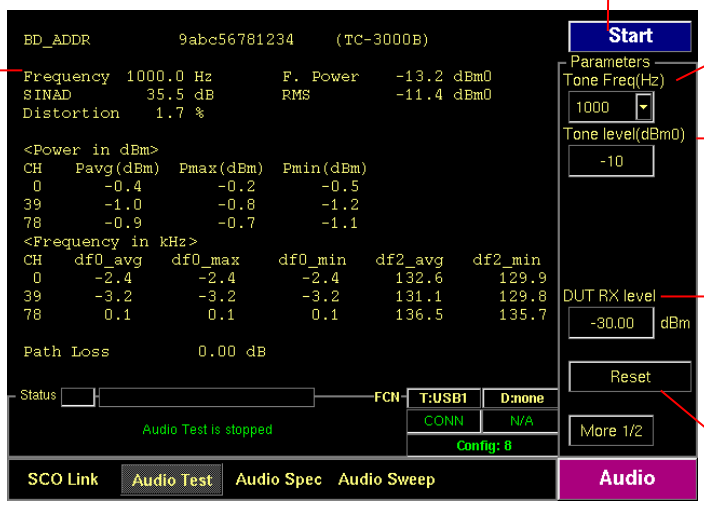
[Typical Mono Headset test configuration]
TC-3000C sends an internally generated 1 kHz or 400 Hz tone to Headset speaker as a diagram below. The tone signal is transmitted from the speaker to the microphone through a sound tube. (In case of mobile phone, it is transmitted via internal audio path between the speaker and the microphone). The TC-3000C receives the tone signal from DUT and the audio spectrum and distortion of the signal are computed. To access the Audio Test screen, press **M2** soft key.



[Typical Stereo Headset test configuration]
TC-3000C sends an internally generated 1 kHz and 400 Hz tone to left and right of Headset speaker as a diagram below. The tone signal is transmitted from the speaker to the Base Band IN 1 or 2 port of TC-3000C through the audio cable connected to the microphone. The TC-3000C receives the tone signal from DUT and the audio spectrum and distortion of the signal are computed. To access the Audio Test screen, press **M2** soft key. Before starting the test, .press **M2** → **F8** "More 2/2" → **F4** and make sure if "Audio Inport" is set correctly.

. Send 1 kHz (Left) and 400 Hz (Right) tone to DUT Speaker

Start/Stop: When this menu is pressed the tests will run once. When the menu is pressed again while the tests are running, the tests will stop.



Tone Freq (Hz): Defines the tone frequency for the test.

Tone level (dBm0): Specifies the power of the TX audio signal.

DUT RX level: Specifies the DUT RX level. TC-3000C controls the TX level for DUT to receive the level specified in consideration of the Path Loss.

Reset: Clears all values

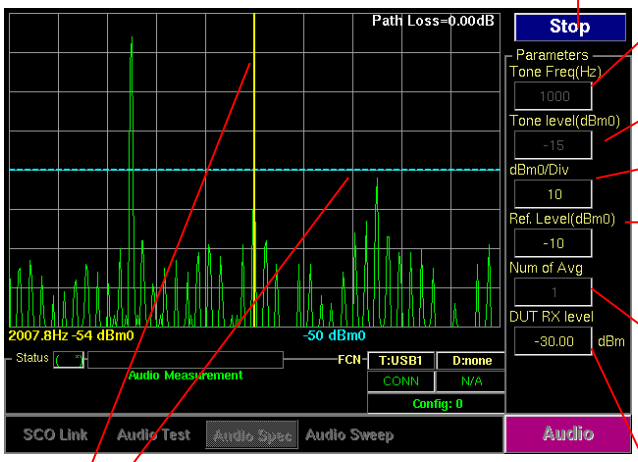
Measurement Window:

- **BD_ADDR:** Bluetooth Address of DUT
- **Name:** The friendly name of DUT
- **Frequency:** The frequency of fundamental waveform
- **F. Power:** The magnitude of fundamental waveform
- **RMS:** the RMS magnitude of the signal
- **SINAD:** This is a way that expresses total harmonic distortion plus noise. It is the RMS magnitude of the signal divided by the RMS magnitude of the difference between the signal and the fundamental. This measurement is expressed only in dB.
- **Distortion:** Total harmonic distortion (THD) plus noise.

Parameters	Range	Default
Tone Freq (Hz)	1000, 400	1000
Tone level (dBm0)	-70 ~ 3	-10
CH1 Freq(Hz)	20~20000	1000
CH2 Freq(Hz)	20~20000	400
CH1 level(dBm0)	-70~3	-3
CH2 level(dBm0)	-70~3	-3
DUT RX level	-80 ~ 0	-30.00
Channel(3)		0-39-78
Meas.Mode	Continuous, Single	Continuous
Audio In (Hz)	1000, 400	1000
Audio Inport	Port1(BB IN1), Port2(BB IN2)	Port1(BB IN1)
Num of Avg	1 ~ 100	1
Lower Freq(Hz)	20~4000	200
Upper Freq(Hz)	20~4000	3500

2. Audio Spectrum: TC-3000C has the ability to analyze the frequency spectrum of an audio signal. You can measure frequency, amplitude, and harmonics of the audio signal in this screen. The frequency range of spectrum is from 0 Hz to 4 kHz (sampling frequency = 8 kHz). To access Audio spectrum screen, press **M3** soft key.

Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.



Tone Freq (Hz): Defines the tone frequency for the test.

Tone level (dBm0): Specifies the power of the TX audio signal.

dBm0/div: Sets the vertical amplitude per division.

Ref. Level: Specifies the amplitude reference level. The top line of the display is the reference level. All signals displayed are reference to this line.

Number of Average: Measurement Averaging. The signal averaging improves the signal to noise ratio. The noise, i.e., the measurement error, decreases by 1/SQRT(N) for N averages, but the measurement time increases by N times. Increasing averaging will reduce the measurement fluctuation.

DUT RX level: Specifies the DUT RX level. TC-3000C controls the TX level in consideration of the Path Loss so that the DUT can receive the level specified

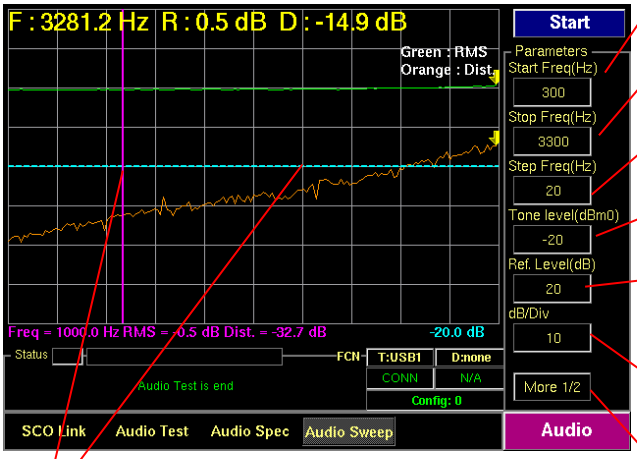
Line Markers: You can place line-shaped markers on the screen to find the signal's frequency and time. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

Readouts of markers Frequency and Level: The marker readouts have the same color as the marker respectively.

Parameters	Range	Default
Tone Freq (Hz)	1000, 400	1000
Tone level (dBm0)	-70 ~ 3	-10
dBm0/div	1 ~ 20	10
Ref. Level (dBm0)	-80 ~ 40	0
Num of Avg	1 ~ 100	1
DUT RX level	-80 ~ 0	-30.00

3. Audio Sweep: TC-3000C's internal audio tone source can be set to sweep up to 3900 Hz (minimum 100 Hz step) and then return the distortion and RMS volts for each frequency. Sweep results are displayed on the screen To access Audio spectrum screen, press **M4** soft key.

Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.



Start Freq (Hz): Specifies the start

Stop Freq (Hz): Specifies the stop frequency to sweep.

Step Freq (Hz): Specifies the frequency step to sweep.

Tone level (dBm0): Specifies the power of the TX audio signal.

Ref. Level: Specifies the amplitude reference level. The top line of the display is the reference level. All signals displayed are reference to this line.

dB/Div: Sets the vertical amplitude per division

Number of Average: Measurement Averaging. The signal averaging improves the signal to noise ratio. The noise, i.e., the measurement error, decreases by 1/SQRT(N) for N averages, but the measurement time increases by N times. Increasing averaging will reduce the measurement fluctuation.

Measurement Delay: Specifies the source delay time (the time between setting the source and taking the measurement) in milliseconds.

Line Markers: You can place line-shaped markers on the screen to find the signal's frequency and time. To activate a maker, press the **Marker** key in sequence. An activated marker changes to a solid line. Turn the knob to place the marker at the signal.

Readouts of markers RMS, Distortion, and frequency: The marker readouts have the same color as the marker respectively.

Parameters	Range	Default
Start Freq (Hz)	30 ~ 3900	300
Stop Freq (Hz)	30 ~ 3900	3300
Step Freq (Hz)	15 ~ 3870	100
Tone level (dBm0)	-70 ~ 3	-10
Ref. Level (dBm0)	-80 ~ 40	0
dB/Div	0.1 ~ 20	10
Num of Avg	1 ~ 100	1
Meas Delay (ms)	30 ~ 1000	100

3.8 Operation Procedure (Bluetooth Conformance Test)

This chapter describes the operation procedure of Bluetooth Conformance Test. You can test BT device with only a single keystroke. When the **Start** key is pressed, the TC-3000C instates a link, activates Test Mode, performs the measurements and reports the results with batch processing. Under the Test Mode (Transmitter or Loop back), tests are made exactly as defined in the Bluetooth Test Specification. The tables below represent the supported test cases.

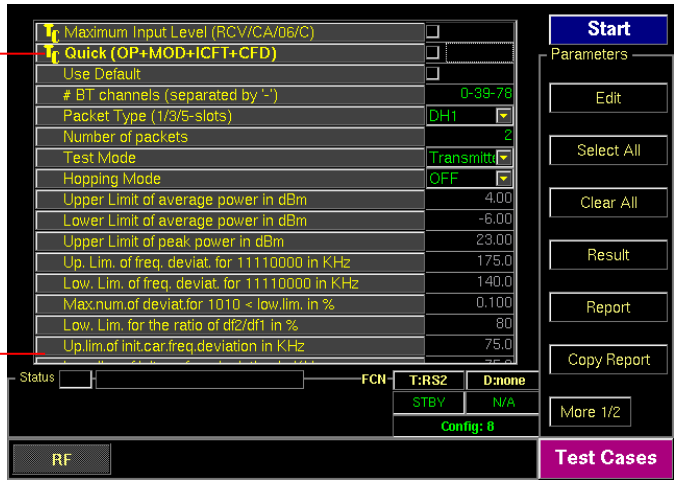
Category	TC identifier	Description	Test Mode
RF (Transmitter)	TRM/CA/01/C	Output power	TX, Loopback, Null packet
	TRM/CA/02/C	Power Density	TX, Loopback, Null packet
	TRM/CA/03/C	Power Control	TX, Loopback, Null packet
	TRM/CA/04/C	TX Output Spectrum – Frequency range	TX, Loopback, Null packet
	TRM/CA/05/C	TX Output Spectrum – 20dB Bandwidth	TX, Loopback, Null packet
	TRM/CA/06/C	TX Output Spectrum – Adjacent channel power	TX, Loopback
	TRM/CA/07/C	Modulation Characteristics	TX, Loopback
	TRM/CA/08/C	Initial Carrier Frequency Tolerance	TX, Loopback, Null packet
	TRM/CA/09/C	Carrier Frequency Drift	TX, Loopback
RF (Receiver)	RCV/CA/01/C	Sensitivity – Single slot packets	Loopback
	RCV/CA/02/C	Sensitivity – Multi-slot packets	Loopback
	RCV/CA/06/C	Maximum Input Level	Loopback
		BER + FER	
		Quick (OP+MOD+ICFT+CFD)	
BT LE	TRM-LE/CA/01/C	Output power	
	TRM-LE/CA/03/C	In-Band Emissions	
	TRM-LE/CA/05/C	Modulation Characteristics	
	TRM-LE/CA/06/C	Carrier Frequency Offset and Drift	
	RCV-LE/CA/01/C	Receiver Sensitivity	
	RCV-LE/CA/06/C	Maximum Input Signal Level	
	RCV-LE/CA/07/C	PER Report integrity	
		Quick (OP+MOD+CFOD)	
EDR (Enhanced Data Rate)	TRM/CA/10/C	EDR Relative Transmit Power	TX, Loopback
	TRM/CA/11/C	EDR Carrier Frequency Stability & Modulation Accuracy	TX, Loopback
	TRM/CA/12/C	EDR Differential Phase Encoding	TX
	TRM/CA/13/C	EDR In-band Spurious Emissions	TX, Loopback

	RCV/CA/07/C	EDR Sensitivity	Loopback
	RCV/CA/08/C	EDR BER Floor Performance	Loopback
	RCV/CA/09//C	EDR Maximum Input Level	Loopback

Combined Test Case for "Quick Test"

To reduce test time, TC-3000C combine several test cases into one menu. In this Test Case, all default values of parameters are optimized in consideration of the test time. You can perform four Test Cases (Output Power, Modulation Characteristics, Initial Carrier Frequency Tolerance, and Carrier Frequency Drift) at once.

Combined Test Case: Output Power, Modulation Characteristics, Initial Carrier Frequency Tolerance, and Carrier Frequency Drift are combined in this menu.



NOTE

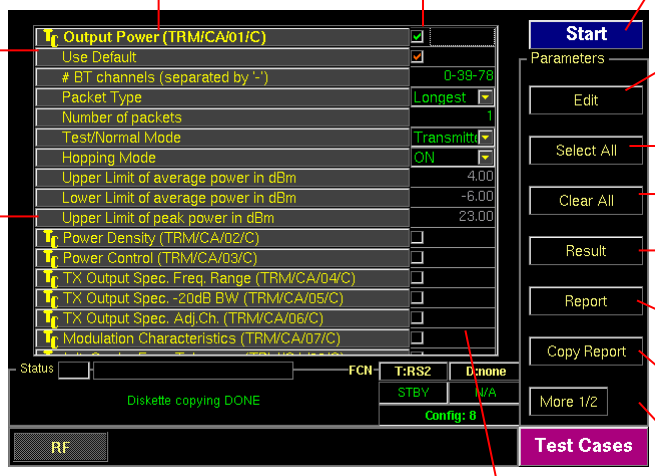
"Basic Operation Procedure" on page 3-12 should be performed before following steps.

3.8.1 Step 3. Selecting the Test Cases Screen

Test Cases screen can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧ ⇩ → Select "Test Cases" from the pop-up menu on the screen → **ENT** . Test cases and parameters can be accessed by using Rotary Knob or ⇧ ⇩ keys.

Test Case: To select test cases, use Rotary Knob or ⇧ ⇩ keys

Check Box: Indicates if a test case is selected or not.



Start/Stop: When this menu is pressed the tests will run once. When pressed again while the tests are running, the testing will stop.

Edit: When this menu is pressed, you can edit the various parameters of a highlighted test case.

Select All: Selects all test case

Clear All: Clear all test case

Result: Shows the test result of a highlighted test case.

Report: Shows the report that record test results and logs from the latest clearing to now.

Copy Report: Copies test cases report to diskette

Auto detach: Disconnect DUT after tests are done automatically.

Parameters: This parameters is displayed when Edit is pressed. The changing parameter turns the text color red.

Status window: Indicates status of test case as follows:
"Run…": Running the test.
"PASSED": Pass this test case for test limits set.
"FAILED": Fail this test case for test limits set.
"Not yet": Test is not completed.

3.8.2 Step 4. Selecting the Test Cases and Setting Up Test Parameters

Selecting test case:

1) Press soft key (**M1** ~ **M5**) related to a test case screen.
2) Move the box-shaped cursor to a test case that you want to perform using Rotary Knob or ⇧ ⇩ keys.
3) Press Rotary knob or **ENT** key and confirm that the check box related to the test case is checked.
4) To unselect test case, press Rotary knob or **ENT** key again.

Changing test parameters:

1) Move the box-shaped cursor to a test case that you want to change test parameters using Rotary Knob or ⇧ ⇩ keys.
2) Press **F2** soft key to expand parameter menus.
3) Move the box-shaped cursor to a parameter using Rotary Knob or ⇧ ⇩ keys.
4) Push Rotary knob for data input mode. The input cursor indicates data input position or a drop down menu is driven.
5) Enter the value using keypad or choose the new setting from the drop down menu.
6) Press **ENT** key.
7) **BS** key can be used, if necessary during keypad entry.

NOTE To apply the changed values to test, "Use Default" must be unchecked. If "Use Default" is selected, all of displayed values are ignored and the default values will be assigned automatically.

3.8.3 Step 5. Running the Test Cases and Viewing the Test Results

Pass or fail in results are displayed on the status window related to the test case as soon as tests are finished. The details of measurement can be shown by two methods, pressing Result or Report. While the Result screen shows the measures of each test case, the Report screen displays the measures of all test case performed and test logs (test conditions, test time, and so on) in a screen. The test report can be copy to 3.5" diskette by pressing **F7** soft key.

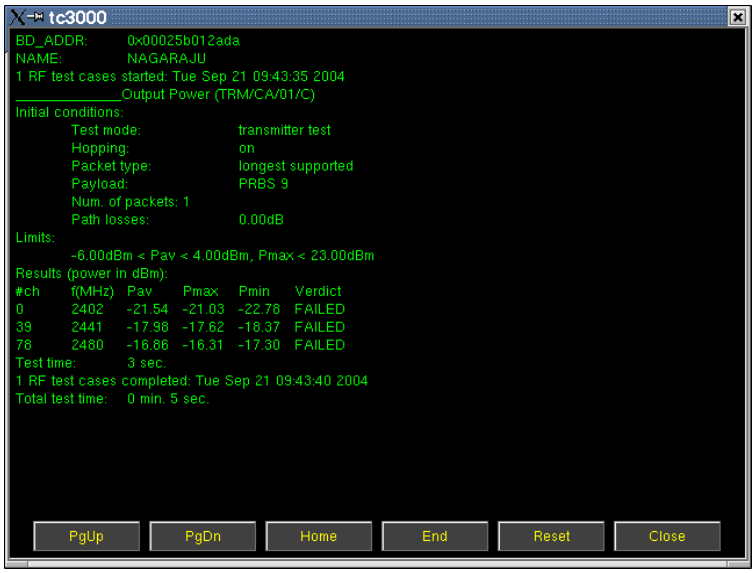
Test Result screen:

1) Move the box-shaped cursor to a test case that you want to see results using Rotary Knob.
2) Press **F5** soft key (Result), to display the pop-up screen including test results as below.

Test Report screen:

Press **F6** soft key (Report), to display the report screen. The report format and mode can be changed in the Test Configuration screen. (Press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M1** (Tester) → Press **F6** or **F7**.

Parameters	Option	Description
Report Format	txt	Text
	csv	Coma Separate Value
Report Mode	Overwrite	Overwrite the existing report
	Append	Append a new report to the end of existing one. The buffer size is 10M bytes. Some warning messages are appeared continuously after the report size is over 1M bytes. In this case, you should define whether save it to a diskette or not.



PgUp (M1): Page UP
PgDn (M2): Page Down
Home (M3): Go to the home of report
End (M4): Go to the end of report
Reset (M5): Clears the screen
Close (MENU): Closes the screen

Copy the test report to diskette:

1) Insert an USB Memory into USB port on the front panel.
2) Press **F7** soft key (“Copy Report”).
3) Follow the instruction of the pop-up message.

NOTE Refer to Appendix 2, “RF Test Cases” for details.

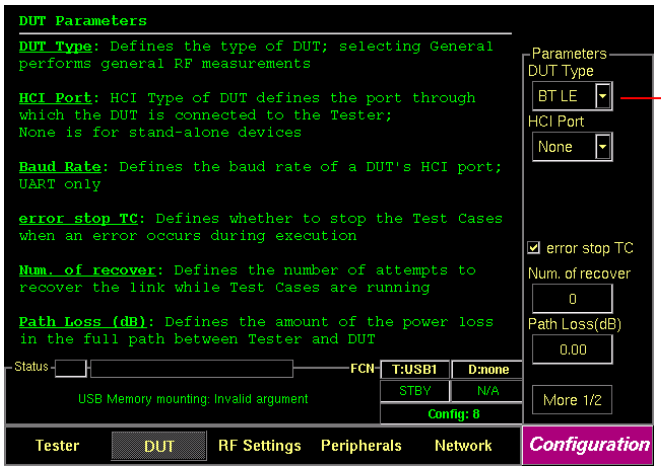
3.9 Setting up for Bluetooth LE(Low Energy) Testing

This chapter describes how to set up TC-3000C for Bluetooth LE (Low Energy) Testing. The 3000-50 option should be purchased for BT LE Testing. 3000-20 option should be ordered together if RF measurement is necessary

You can start BT LE testing by setting the DUT type as “BT LE” in the DUT configuration. All

method on how to access test screens and set up parameters are same as General Bluetooth DUT testing.

1) Press **MENU** key and select the configuration screen.
2) Press **M2** (DUT) → **F2** (DUT Type) .
3) Select “BT LE” from the list.
4) Press **MENU** key and select a test screen.



DUT Type: Select BT LE

3.10 Configuration of the TC-3000C

The TC-3000C is configured in the Configuration function accessed by pressing **MENU** key. The configuration screens are used to configure the DUT, the TC-3000C and RF conditions. The table below represents the configuration parameters for DUT and TC-3000C.

3.10.1 Tester

Parameters	Range	Default	Descriptions
HCI TO (ms)	1 ~ 65535	*2000*	*Timeout of HCI commands execution* Defines a period of time when a Host will wait events from a Host controller after sending a command. It normally doesn’t need any modification. If DUT, however, has slow HCI port then increase the value as much as it is necessary.
SupervisionTO (s)	1~20	*2*	Link Supervision Timeout – used for monitoring of link loss
Modulation Index	0.28~0.35	*0.32*	Modulation Index is the index of FSK modulation
Link before Meas	Passive Active	*Active*	Defines whether to activate DUT before starting measurement or not
Report Format	txt or csv	*txt*	Defines the format of Test Cases report file; [txt] or [csv]

Report Mode	Append Overwrite	*Append*	Defines the save-mode of Test Cases report file; [Append] or [Overwrite]
BD_ADDR	-	*9abc56781234*	*Bluetooth Device Address of the tester's Host Controller* Must be entered in little ending format (LSB in the right side) in hexadecimal notation.
LAP for IAC	9e8b00 ~ 9e8b3f	*9e8b33*	Lower Address Part (3 bytes) of BD_ADDR, from which the Inquiry Access Code will be derived when the inquiry procedure is performed; 9e8b33 is GIAC
T inqscan (slts)	18 ~ 4096	*2048*	*Inquiry Scan Interval* Defines the amount of time between consecutive inquiry scans, i.e., the time interval from the time when the Host Controller starts its last inquiry scan to the time when it begins the next inquiry scan.
T winqscan (slts)	18 ~ 4096	*512*	*Inquiry Scan Window* Defines the amount of time for the duration of the inquiry scan, and *T winqscan* must be less than or equal to the *T inqscan*.
Inq. TO (1.28s)	1 ~ 48	*48*	*Inquiry Timeout* Defines the maximum amount of time specified before the Inquiry is halted.
# Inq. Responses	0 ~ 16	*1*	Defines the maximum number of responses from the Inquiry before the Inquiry is halted; 0 means unlimited number of responses
T pagescan (slts)	18 ~ 4096	*2048*	*Page Scan Interval* Defines the amount of time between consecutive page scans, i.e., the time interval from the time when the Host Controller starts its last page scan to the time when it begins the next page scan.
T wpagescan (slts)	18 ~ 4096	*512*	*Page Scan window* Defines the amount of time for the duration of the page scan, and *T wpagescan* must be less than or equal to the *T pagescan*.
Page TO (slts)	1 ~ 65535	*16000*	*Page Timeout* Defines the maximum time the local Link Manager will wait for a Baseband page response from the remote device at a locally initiated connection attempt. If this time expires and the remote device has not responded to the page at baseband level, the connection attempt will be considered as failure.
PIN Type	Variable Fixed	*Variable*	Defines the type of PIN to be used
PIN Length	0~16 bytes	*4*	Defines the length of the PIN code (in bytes)
PIN Code		*30.30.30.30*	Defines the PIN code for the device to be connected; each byte should be separated by a point. For example, if the PIN Code is "1234", type 31,32,33,34
L2CAP TO (ms)	1 ~ 65535	*30000*	*L2CAP Timeout* Defines the timeout of L2CAP commands execution
RFCOMM TO (ms)	1 ~ 65535	*30000*	*RFCOMM Timeout* Defines the timeout of RFCOMM commands execution

SDP TO (ms)	1 ~ 65535	*30000*	*SDP Timeout* Defines the timeout of SDP commands execution
Profile TO (ms)	1 ~ 65535	*30000*	*Profile Timeout* Defines the timeout of Profile commands execution
Skip Pairing		*Unchecked*	*This option will cause the TC-3000C to skip the pairing process with DUT. To skip pairing, Link Key should be entered.*
Link Key			*Specifies Link Keys*
AFH	Enable Disable	*Disable*	Defines AFH (Adapted Frequency Hopping) enabled. Enabling this option causes the “Select Channel” menu to display below.
Select Channel			Selects the AFH channels
Encryption	Enable Disable	*Enable*	Defines Encryption enabled in the Tester’s LMP features.
Name Discovery		*Checked*	Defines whether to read DUT’s name after inquiry procedure. (When the DUT use Broadcom chip, it is highly recommended that this parameter is unchecked.
CSR HS1.2		*Unchecked*	To test CSR Head Set 1.2, check this option. Enabling this option causes the TC-3000C to skip encryption before activating test mode.
Friendly Name			Friendly Name is used for easy understandable name (ex “TC-3000C”) of the device instead of Bluetooth device address (ex “9ABC56781234”). It could be edited any name.
Initiate Authentication		*Unchecked*	In case of Checked, the Tester will request Authentication procedure from the DUT.
Delay for TC	1 ~ 65535	*ms*	Time delay between Test mode setting using LMP message and real measurement in Test case
Pause test		*Unchecked*	When you send a message about the control to the DUT in the TC-3000C, you can set whether or not to use the ‘PAUSE’ between the message and the message. In case of Checked, Pause between the message and the message.
BCM20780		*Unchecked*	Check if you want to test ‘BCM 20780’ chip of ‘Broadcom’

3.10.2 DUT

Parameters	Range	Default	Descriptions
DUT Type	General BT BT Le	*BT*	*Type of DUT* To perform general RF measurements, select *General*.
HCI Port	None USB1 USB2 RS1 RS2 UART1 UART2 BCSP1 BCSP2 2WIRE1 2WIRE2		*Type of HCI port* If DUT has HCI port, select the type of it. Otherwise select None. If UART selected, determine the Baud Rate. If DUT is plugged into HCI port of TC-3000C in Preparation, the type of port will be automatically selected. This parameter MUST NOT be the same as HCI port setting of Tester.
error stop TC	-	*Checked*	Defines whether to stop the Test Cases when an error occurs during execution
Num. of recover	0 ~ 10	*0*	Defines the number of attempts to recover the link lost while Test Cases are running
Path Loss (dB)	0 ~ 80	*0*	Defines the amount of the power loss in the full path between Tester and DUT (in dB)
Inq. supported	-	*Checked*	*Flag indicating whether the DUT supports inquiry* When Bluetooth devices want to make a connection between them, they take two steps: Inquiry and Page. Master (Tester) gets the BD_ADDR of slave (DUT) in Inquiry procedure and then uses it in Page procedure. If you want to test according to the above two procedures, let this box checked. But if you already know BD_ADDR of DUT, uncheck this box and write down parts of BD_ADDR of DUT in *LAP for DAC*. Then it will start from Page.
LAP for IAC	9e8b00 ~ 9e8b3f	*9e8b33*	Lower Address Part (3 bytes) of BD_ADDR, from which the Inquiry Access Code will be derived when the inquiry procedure is performed; 9e8b33 is GIAC
T inqscan (slts)	18 ~ 4096	*2048*	*Inquiry Scan Interval* Defines the amount of time between consecutive inquiry scans, i.e., the time interval from the time when the Host Controller starts its last inquiry scan to the time when it begins the next inquiry scan.
T winqscan (slts)	18 ~ 4096	*18*	*Inquiry Scan Window* Defines the amount of time for the duration of the inquiry scan, and *T winqscan* must be less than or equal to the *T inqscan*.
Inq. TO (1.28s)	1 ~ 48	*48*	*Inquiry Timeout* Defines the maximum amount of time specified before the Inquiry is halted.
# Inq. Responses	0 ~ 16	*1*	Defines the maximum number of responses from the Inquiry before the Inquiry is halted; 0 means unlimited number of responses

BD_ADDR	-	*0*	*Bluetooth Device Address of the DUT* Must be entered in little ending format (LSB in the right side) in hexadecimal notation. 6 bytes Bluetooth Device Address of the DUT, from which the Device Access Code will be derived when the page procedure is performed; the parameter is used only when 'Inq. supported' is not checked
T pagescan (slts)	18 ~ 4096	*2048*	*Page Scan Interval* Defines the amount of time between consecutive page scans, i.e., the time interval from the time when the Host Controller starts its last page scan to the time when it begins the next page scan.
T wpagescan (slts)	18 ~ 4096	*18*	*Page Scan window* Defines the amount of time for the duration of the page scan, and *T wpagescan* must be less than or equal to the *T pagescan*.
Page TO (slts)	1 ~ 65535	*16000*	*Page Timeout* Defines the maximum time the local Link Manager will wait for a baseband page response from the remote device at a locally initiated connection attempt. If this time expires and the remote device has not responded to the page at baseband level, the connection attempt will be considered as failure.
Pow. SetTime (ms)	1 ~ 65535	*1000*	*Power setting time of DUT* Defines the interval of time Tester must wait until the DUT will reach the new power step.
Conn. for Test		*Checked*	Defines whether LMP connection should be created before activating DUT's test mode
Test Mode	NULL Pkt Transmitter Loopback	*Loopback*	Defines the test mode to be used in activating DUT's test mode; NULL pkt means simple connection
Bit Pattern	0000 0000 1111 1111 1010 1010 1111 0000 PRBS9	*10101010*	*Bit pattern of payload* PRBS : Pseudo Random Binary Sequence Defines the bit pattern of a payload to be used in the test mode
Whitening	Disable Enable	*Disable*	*Enable/Disable of Whitening* Defines whether to scramble the packets with the whitening sequence or not in the loopback test mode
Hopping Mode	ON OFF	*OFF* *tx:0* *rx:0*	Defines whether to use 79 hopping sequence or not in the test mode; for 'Off', select the TX and RX channels respectively

Packet Type	DM1, DH1 HV1, HV2 HV3, AUX1 DM3, DH3 DM5, DH5 EV3, EV4 EV5, 2-DH1 3-DH1, 2-DH3 3-DH3, 2-DH5 3-DH5, 2-EV3 3-EV3, 2-EV5 3-EV5	*2-DM1*	Defines the type of packet to be used in the test mode
Length (bytes)	0 ~ MAX	*MAX*	Defines the length of a payload to be used in the test mode (in bytes). MAX is changed according to Packet Type

3.10.3 RF Settings

Parameters	Range	Default	Descriptions
TX Power (dBm)	-80 ~ 0	*0*	Defines TX power of the Tester. Prohibited to change if any ACL link exists
RX Attenuator	On Off	*Off*	Defines the setting of the RX attenuator of the Tester; The dynamic range of Tester's receiver is –80 ~ -10 dBm for 'On', but –30 ~ +20 dBm for 'Off'
AGC	On Off	*On*	*Automatic Gain Control Setting of Tester* Controls IF power level inside Tester's receiver.
RX Power (dBm)	10 ~ 70	-	Defines the input range of the Tester's receive available only in case AGC is Off
10MHz Ref.	Int Ext	*Int*	Defines whether 10MHz Reference Oscillator is internal or external

3.10.4 Peripherals

Parameters	Range	Default	Descriptions
Ext Outport 1	I-RX, Q-RX, I-TX, Q-TX, RX bit, RX clk TX bit, TX clk FSK Demod, FSK Mod, RX Mag, Audio, Loop Back	*FSK Demod*	Defines the signal going out through the BASEBAND OUT port 1 on the front panel. During operation, you can see the Baseband signals by connecting to oscilloscope. If you want to make a connection through Baseband, not RF, select what you want.

Ext Outport 2	See Ext Outport 1	*FSK Mod*	Defines the signal going out through the BASEBAND OUT port 2 on the front panel
Ext Inports	1:Off 2:Off 1:I-TX 2:Q-TX	*1:Off* *2:Off*	Defines the signal coming in through the BASEBAND IN ports 1 and 2 on the front panel. By default, it must be "*1:Off 2:Off*" if you will connect through RF. If you want to make a connection through Baseband, not RF, select what you want.
Color Scheme	Dark B-W	*Dark*	Defines the color scheme to be used for Tester's screen
Use mouse		*Unchecked*	Defines whether to use the mouse or not
Set Time			Sets the date and time of the system
System Info			See the system information; Serial Number, Version, Software Options.

3.10.5 Network

Parameters	Range	Default	Descriptions
TC-3000 IP			IP address of the Tester
Remote IP			IP address of a remote PC
Netmask			Subnet mask
Gateway			Gateway
Remote Ctrl		*Unchecked*	To enable the control from a remote PC, check this box and reboot Tester.
Port	None RS1 RS2	*RS1*	TC-3000C is equipped with two serial RS-232C interfaces. The settings None, RS1, or RS2 are allowed.
Baudrate		115200	TC-3000C allows baud rates between 2400 and 115200 baud to be set.
Data bit	*5,6,7,8*	*8*	Data transmission is in the 5, 6, 7, or 8 bit ASCII code, starting with the least significant bit (LSB).
Parity	*None* *Odd* *Even*	*None*	A parity bit can be transmitted for error protection. The settings No parity, even or odd parity are allowed.
Stop Bit	*1,2*	*1*	Transmission of a data byte is terminated by one or two stop bits.
Flow Ctrl	*None* *RTSCTS*	*RTSCTS*	Define Flow Control. The settings None or RTSCTS (Request To Send, Clear To Send) are allowed.
Upgrade IP		*64.33.6.108*	IP address of FTP server for upgrading software.
Upgrade S/W			Upgrades the software from USB Memory

3.11 General Purpose Communication Analyzer

3.11.1 Signal Generator

TC-3000C provides a general purpose RF source for ISM band receiver test.

Measurement can be accessed by pressing the **Menu** hard key. Press **Menu** → Rotary Knob or ⇧,

⇩ → Select “SigGen” from the pop-up menu on the screen → **ENT**

Start/Stop: When this menu is pressed the modulated signal will be transmitted. When the menu is pressed again while the signal is transmitting, the transmission will stop.

Frequency: Set Carrier frequency.
Range: 2.4 ~ 2.5 GHz

Power: Set RF output level.
Range: -80 ~ 0 dBm

Bit Pattern : Set FSK modulation Pattern
Range: 0 ~ 0×FFFFFFFF

FM Deviation: Set FM deviation.
Range: 0 ~ 1000 kHz

Parameters	Range	Default
Frequency	2.4~2.5 GHz	2.45 GHz
Power	-80~0 dBm	*0*
Bit Pattern	0 ~ 0×FFFFFFFF	*55555555*
FM Deviation	0~1000 kHz	*150*

0 × 00000000	0 × FFFFFFFF	0 × 55555555	0 × F0F0F0F0
			

[Table 5] Pattern Example

3.11.2 Signal Analyzer

TC-3000C provides general purpose RF signal analyzer for ISM band transmitter test. In this mode you can use Spectrum, FM Modulation and Power-Time screen in Measurement function.

1) To set the TC-3000C to general test mode, press **Menu** → Select "Configuration" from the pop-up menu on the screen → **M2** (DUT) → press **F1** (DUT Type) and select "General" from the drop down lists.
2) To access "Measurement'' function, press **Menu** → Select "Measurement" from the pop-up menu on the screen → **ENT**
3) To access Spectrum, FM Modulation, or Power-Time screen, press **M1**, **M2**, or **M3** key.

Operations are the same as the test screens in Bluetooth test mode except parameters below.

- **M1** (Spectrum) → **F8** → **F2** **(Detector)**: Allows you to select detector modes, which include Peak or Average. Peak mode is good for seeing signals that are very close to the noise floor. Average mode is the default mode.
- **M1** (Spectrum) → **F8** → **F3** **(Sweep time (ms))**: Specifies the 0.1 to 3.2 ms Sweep time.
- **Frequency:** Specifies the 2.4 to 2.5 GHz frequency.

Spectrum

Parameters	Range	Default
Center	2.4~2.5 GHz	2.45
Span (MHz)	1, 1.25, 2, 2.5, 5, 10	10
Num of sweeps	1 ~ 50	1
Trace Mode	Average / Maxhold	Average
Ref. Level (dBm)	-80 ~ 40	-80 + Path Loss ~ 40 + Path Loss
dB/Div	1 ~ 20	10
Detector	Peak / Average	Peak
Sweep Time (ms)	0.1~3.2	0.1

FM Modulation

Parameters	Range	Default
Frequency	2.4~2.5 GHz	
Freq/Div (kHz)	10 ~ 1000	100
1 MHz Filter		Checked
Start Time (us)	-70 ~ 624	-15
Time(us)/Div	0.1 ~ 60	10

Power vs. Time

Parameters	Range	Default
Frequency	2.4~2.5 GHz	
Ref. Level (dBm)	-80 ~ 40	-80 + Path Loss ~ 40 + Path Loss
dB/Div	1 ~ 20	*10*
1 MHz Filter		*Checked*
Time(us)/Div	0.1 ~ 60	

3.12 Store/Recall/Preset Instrument Settings

The SAVE and Recall functions allow you to store different instrument setups and retrieve them later. By saving test setups, you can save time by eliminating the task of re-configuring the TC-3000C and DUT.
The Preset function restores the default settings (register number 8).

SAVE

1) Make any changes to the instrument that you want to SAVE in a register.
2) Press **FCN** + **Recall**.
3) Push Rotary Knob and select a register number (0 through 7).
4) Press the Knob or **ENT** key.

Recall

1) Press **Recall** key.
2) Push Rotary Knob and select a desired register number.
3) Press the Knob or **ENT** key.

Preset

1) Press **FCN** + **INCR SET**.
2) Select “Yes” and Press **ENT** key.

NOTE

Refer to Appendix C “The list of Save/Recall parameters” for details

3.13 Checking List for Common Problems

This section provides a brief check lists of common failures. Before troubleshooting or repairing the TC-3000C, make sure the failure is in the instrument rather than any external connections. Also make sure that the instrument is accurately calibrated.

3.13.1 Unit is inoperative

1. Verify that the AC power cord is connected to the TC-3000C

Make sure that the power cord is firmly plugged into the power module on the rear panel. You should also make sure that the power source you plugged the TC-3000C into is energized.

2. Verify that the front-panel power switch is depressed.

Verify that the TC-3000C's power switch is in the "I" position.

3. Verify line voltage.

The available line voltage is 100 ~ 240 VAC

3.13.2 Failure of testing

1. **Check whether Host and Host Controller of TC-3000C is connected with USB or RS-232C cable.**
2. **Check primary parameters:**
   - Configuration → DUT → HCI Port
   - Configuration → DUT → Path Loss
   - Configuration → Tester → PIN code
   - Configuration → DUT → Test Mode
   - Configuration → DUT → DUT Type
3. **Check Level.**
   If the RF level is lower or higher than the receiver sensitivity allows, the DUT may not respond.
4. **Check if DUT is set to Inquiry/Page scan mode**

Chapter

4

Performance Test

This section contains information for keeping the instrument in good working order and checking its overall performance.

4.1 General Information

The procedures in this chapter allow the verification of the electrical performance of TC-3000C. It contains procedures suitable for determining if TC-3000C functions, is adjusted properly, and meets the performance characteristics as warranted. These tests do not require access to the interior of the instrument.

The set-up drawings at the beginning of each test procedure show the test configuration needed for each test. To perform the test procedures you need to know basic TC-3000C operation. You should be familiar with the front panel, the various test screens, and knob operation. The test procedures give critical instrument settings and connections, but they don’t tell the manufacture test specification.

4.1.1 Recommended test equipment

Equipment required for the performance tests is listed in below table. Any equipment that satisfies the critical specifications in the table may be substituted for the recommended model.

The performance tests are based on the assumption that the recommended test equipment is used. Substituting alternate test equipment may require modification of some procedures.

Description	Minimum specification	Model
Power meter	-20 to 27dBm, 100 kHz to 4 GHz	HP-437B/8482A
Spectrum analyzer	100 kHz to 6.5 GHz, up to –120 dBm	HP-8561E
Measuring receiver	0.15 to 1300 MHz, 0 to –130dBm, Freq Counter	HP-8902A
Signal Generator	100 kHz ~ 1 GHz, +/- 0.5 dB, +20 ~ -120 dBm	HP-8648C
Frequency Counter	+/- 0.1 ppm, 10 Hz ~ 3 GHz, 9 digit	HP-53181A
Sensor Module	50 ohm, 10 uW ~ 1W	HP-11722A
Mixer	VSWR <= 1.2, with 10 dB attenuator	Mini-Circuits, JCIR-25

4.1.2 Calibration Cycle

This instrument requires periodic verification of performance. Depending on the use and environmental conditions, the instrument should be checked using the following performance tests at least once every year.

NOTE

Unless otherwise noted, a warm-up period of 2 hours is required for these tests.

4.1.3 TC-3000C Initial Set Up

NOTE

Before perform the tests, TC-3000C should be initialized as follow procedure.
In the signal generator mode, the cable loss is ignored (Path Loss = 0).

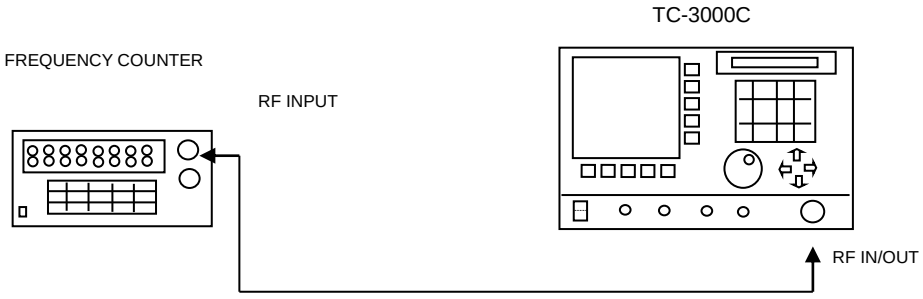
1) Power on
2) Allow 2 hour warm-up time for the TC-3000C
3) Press **MENU** key → Select "Configuration" from pop-up menu
4) Press **M2** (DUT)
5) Press **F2** (DUT Type) → Select "General" from pop-up menu
6) Press **F7** (Path Loss) → Set "Path Loss" by the cable loss. (Typically, RG400 cable loss is 1dB/m)
7) Press **M3** (RF Settings)
8) Press **F4** (AGC) → Select "ON"
9) Press **F3** (Rx Attenuator) → Select "30dB"

4.2 Signal Generator

4.2.1 Frequency Accuracy

Specification: 2496 MHz ± 1 ppm
Equipment: Frequency Counter, HP53181A

1. Test Setup : Connect equipment as shown in the figure below



[Figure 5] Carrier frequency accuracy test

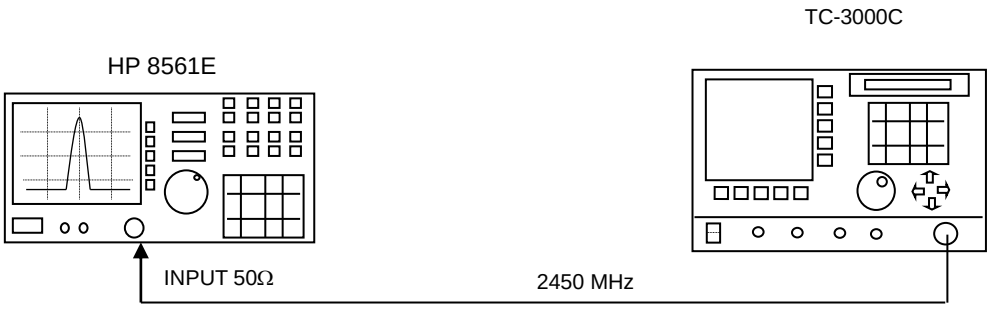
2. Set controls of TC-3000C as follows :
Set TC-3000C to "Signal Generator" mode. (**MENU** → Select "SigGen")
- Frequency: 2496 MHz
- Power: 0dBm
- Bit Patten: 0
- FM Deviation: 0

3. Press "Start" to begin the test and read the frequency from the frequency counter.

4.2.2 I/Q modulation calibration

Equipment: Spectrum Analyzer, HP8561E

1. Test Setup: Connect equipment as shown in the figure below



[Figure 6] I/Q modulation calibration test

2. Set controls of TC-3000C as follows:

Set TC-3000C to “Signal Generator” mode. (**MENU** → Select “SigGen”)

- Power: 0dBm
- Bit Patten: 0
- FM Deviation:150 kHz

3. Set controls of Spectrum Analyzer as follows:

Span: 1 MHz
RBW: 10 kHz
VBW 210 kHz

4. Set TC-3000C output frequency according to the table below. At each setting, press “Start” (F1) to begin the test.

5. Record the level in the table for each setting. The limits for this frequency are given in the table.

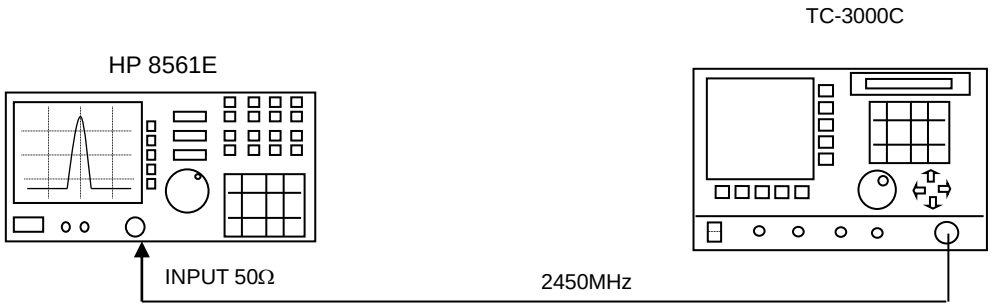
Fc / Spectrum Marker	2400 MHz		2420 MHz		2440 MHz		2460 MHz		2480 MHz		2500 MHz	
		Spec.		Spec.		Spec.		Spec.		Spec.		Spec.
Fc-300kHz		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm
Fc-150kHzt		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm
Fc		1>=, >=-1		1>=, >=-1		1>=, >=-1		1>=, >=-1		1>=, >=-1		1>=, >=-1
Fc+150kHz		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm
Fc+300kHz		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm		<=-31dBm

4.2.3 PLL phase noise

Equipment: Spectrum Analyzer, HP8561E

Specification: M1=0 dBm, M2 <= -60 dBm

1. Test Setup: Connect equipment as shown in the figure below



[Figure 7] PLL phase noise test

2. Set controls of TC-3000C as follows:

Set TC-3000C to “Signal Generator” mode. (**MENU** → Select “SigGen”)

- Frequency: 2450 MHz
- Power: 0dBm
- Bit Patten: 0
- FM Deviation: 0

3. Set controls of Spectrum Analyzer as follows:

Center Frequency: 2450 MHz
RBW: 30 kHz
VBW 3 kHz

4. Press “Start” (F1) to begin the test.

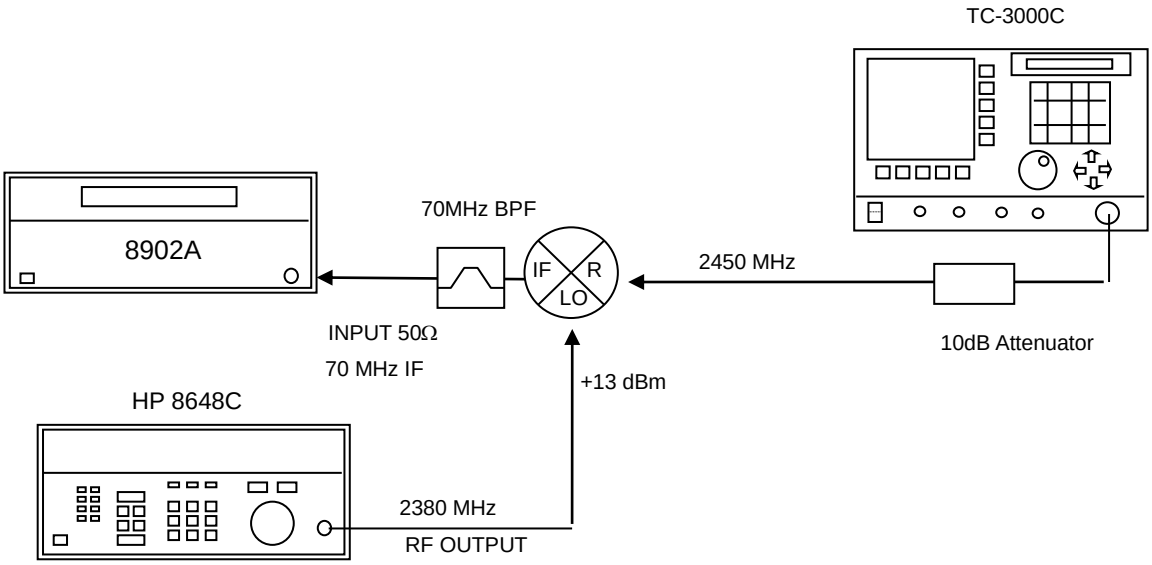
5. Record the center frequency level (M1) on the spectrum analyzer.

6. Record the center frequency + 500KHz level (M2) on the spectrum analyzer.

4.2.4 FM accuracy

Equipment: Spectrum Analyzer, HP8561E
Signal Generator, HP 8648C
Mixer
Specification: 140 kHz ±10 kHz at rms FM demodulation. filter : 20 Hz ~ 200 kHz

1. Test Setup: Connect equipment as shown in the figure below



[Figure 8] FM accuracy test

2. Set controls of TC-3000C as follows:
Set TC-3000C to “Signal Generator” mode. (MENU → Select “SigGen”)
- Frequency: 2450 MHz
- Power: 0dBm
- Bit Patten: FFFF0000
- FM Deviation: 150

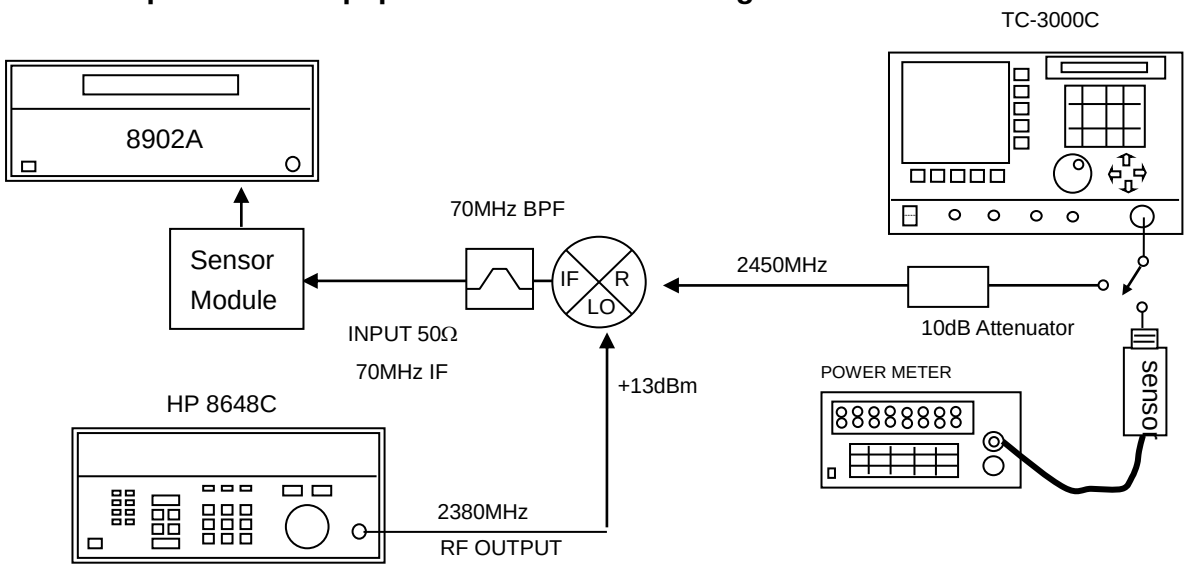
3. Press “Start” (F1) to begin the test.
4. Record the FM demodulation on the HP8902.

4.2.5 Output level accuracy test

Equipment: Spectrum Analyzer, HP8561E
Signal Generator, HP 8648C
Mixer
Power Sensor

Specification: Power error <= ±1 dB

1. Test Setup: Connect equipment as shown in the figure below



[Figure 9] Output level accuracy test

2. Set controls of TC-3000C as follows:

Set TC-3000C to “Signal Generator” mode. (**MENU** → Select “SigGen”)

- Frequency: 2400 MHz
- Power: 0dBm
- Bit Patten: 0
- FM Deviation: 0

3. Connect the power sensor to TC-3000C

4. Set TC-3000C output frequency and level according to the table below. At each setting, press “Start” (F1) to begin the test.

5. Record the power in the table for each setting.

Frequency / Level	2400 MHz	2420 MHz	2440 MHz	2460 MHz	2480 MHz	2500 MHz
0 dBm						

6. Remove the power sensor and connect the TC-3000C to the mixer.
7. Be sure that the measuring receiver is calibrated in Turned RF mode.
8.Set TC-3000C output frequency and level according to the table below. Set the RF frequency of the HP 8648C to equal the TC-3000C output frequency minus 70MHz. At all 0dBm level settings, set the readings on the HP 8902A to the ratio reference for subsequent measurements by pressing "RATIO" key. At each setting, press "Start" (F1) on the TC-3000C to begin the test.
9. Record the power in the table for each setting.

Frequency / Level	2400 MHz	2420 MHz	2440 MHz	2460 MHz	2480 MHz	2500 MHz
0 dBm	$0dB_{ref}$	$0dB_{ref}$	$0dB_{ref}$	$0dB_{ref}$	$0dB_{ref}$	$0dB_{ref}$
-20 dBm						
-40 dBm						
-60 dBm						
-80 dBm						

4.3 Testing Receiver

4.3.1 Power measurement accuracy

Equipment: Signal Generator, HP8648C

Specification:

- Power measurement error : <= ±1.0 dB at +20 dBm ~ -30 dBm , RX Attenuator 0 dBm
- Power measurement error : <= ±1.0 dB at –10 dBm ~ -80 dBm , RX Attenuator 30 dBm

1. Test Setup: Connect equipment as shown in the figure below

[Figure 10] Power measurement accuracy test

2. Set controls of TC-3000C as follows:

Make sure “RX Attenuator” is 0 dB. (MENU → Select “Configuration” → M3 → F3)

Set TC-3000C to ”Pow-Time” screen mode. (MENU → Select “Measurement” → M3)

- Ref. Level: 0dBm

3. Set Signal Generator output frequency and level according to the table below. At each setting, set TC-3000C input frequency according to the signal generator output frequency.

4. Record Pav (average power) in the table for each setting.

	2400 MHz	2420 MHz	2440 MHz	2460 MHz	2480 MHz	2500 MHz
-10 dBm						
-20 dBm						
-30 dBm						
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm						
-80 dBm						

5. Change controls of TC-3000C as follows:

Set “RX Attenuator” to 30 dB. (MENU → Select “Configuration” → M3 → F3)

Set TC-3000C to ”Pow-Time” screen mode. (MENU → Select “Measurement” → M3)

- Ref. Level: 20 dBm

6. Set Signal Generator output frequency and level according to the table below. At each setting, set TC-3000C input frequency according to the signal generator output frequency.

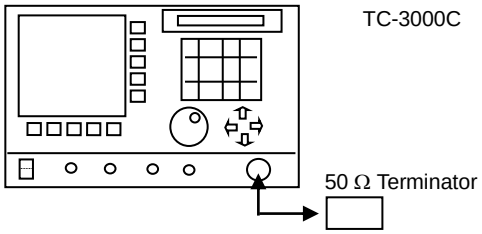
7. Record Pav (average power) in the table for each setting.

	2400 MHz	2420 MHz	2440 MHz	2460 MHz	2480 MHz	2500 MHz
+14 dBm						
+10 dBm						
0 dBm						
-10 dBm						
-20 dBm						
-30 dBm						
-40 dBm						
-50 dBm						

4.3.2 Maximum sensitivity

Specification: Maximum value <= -100 dBm @ resolution BW = 40 kHz

1. Test Setup: Connect equipment as shown in the figure below



[Figure 11] Maximum sensitivity test

2. Set controls of TC-3000C as follows:

Make sure “RX Attenuator” is 0dB. (**MENU** → Select “Configuration” → **M3** → **F3**)

Set TC-3000C to ”Spectrum” screen mode. (**MENU** → Select “Measurement” → **M1**)

- Frequency: 2450 MHz
- Ref. Level: -50 dBm
- Span: 10 MHz
- Num of sweeps: 50

3. Read the peak level on the screen.

4.3.3 Gain Roll-off

Equipment: Signal Generator, HP8648C

1. Test Setup: Connect equipment as shown in the figure below

[Figure 12] Gain Roll-off test

2. Set controls of TC-3000C as follows:

Set TC-3000C to ”Pow-Time” screen mode. (**MENU** → Select “Measurement” → **M3**)

- Frequency: 2450 MHz
- Ref. Level: 0 dBm
- 1.3 MHz Filter: OFF
- Time(us)/Div: 15

3. Set Signal Generator output level to –10 dBm

4. Set Signal Generator output frequency according to the table below. At each setting, read Peak power on the TC-3000C and record the level in the table. The limits for this frequency are given in the table.

SG output frequency	Peak Power	Specification
2445 MHz		<= -10 dBm ± 4 dB
2446 MHz		<= -10 dBm ± 4 dB
2447 MHz		<= -10 dBm ± 1 dB
2448 MHz		<= -10 dBm ± 1 dB
2449 MHz		<= -10 dBm ± 1 dB
2450 MHz		<= -10 dBm ± 1 dB
2451 MHz		<= -10 dBm ± 1 dB
2452 MHz		<=-10 dBm ± 1 dB
2453 MHz		<=-10 dBm ± 1 dB
2454 MHz		<=-10 dBm ± 4 dB
2455 MHz		<= -10 dBm ± 4 dB

Chapter

5

Programming Guide

There are two major ways to control TC-3000C remotely. One is to use Dynamic Link Library (DLL) file in order to make your own Bluetooth test application programs. The DLL provided by TESCOM is used to communicate with TC-3000C through TCP/IP, USB, or RS-232C interface. And it is independently supplied in accordance with firmware version of TC-3000C. Another is to use RS-232C commands without any other additional file contrary to the DLL.

5.1 Introduction

The purpose of this chapter is to help you develop test applications of your Bluetooth product in the test executive you intend to use. TC-3000C supports Ethernet(Host) / USB(Host Controller) / RS-232C(Host, Host Controller) port located at the rear panel for remote operation under PC control.

System Requirements: To develop test applications, your development platform should meet the following requirement.

- Operating System: Microsoft Windows 98, ME, 2000, XP.
- Development Tool: Microsoft Visual C++.NET, Visual C++, Visual Basic, Boland C++ Bulider, National Instrument LabWindows/CVI, LabView, etc

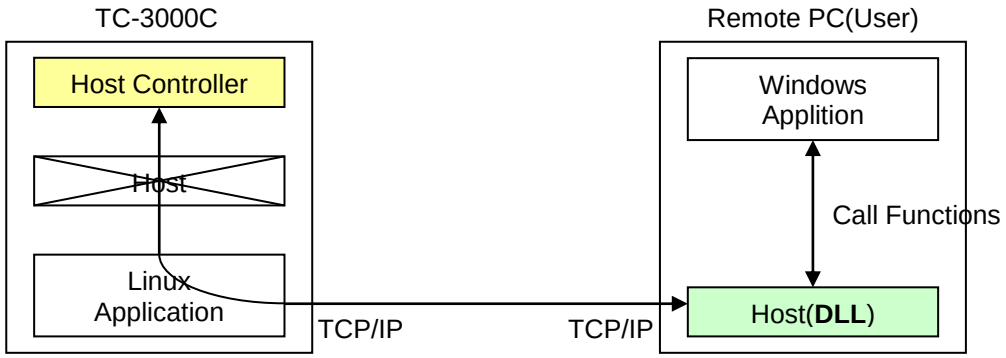
Support scope: You can control following functions of TC-3000C.

- Test Configuration
- RF Test Case
- Measurement(DLL only)
- Audio Test

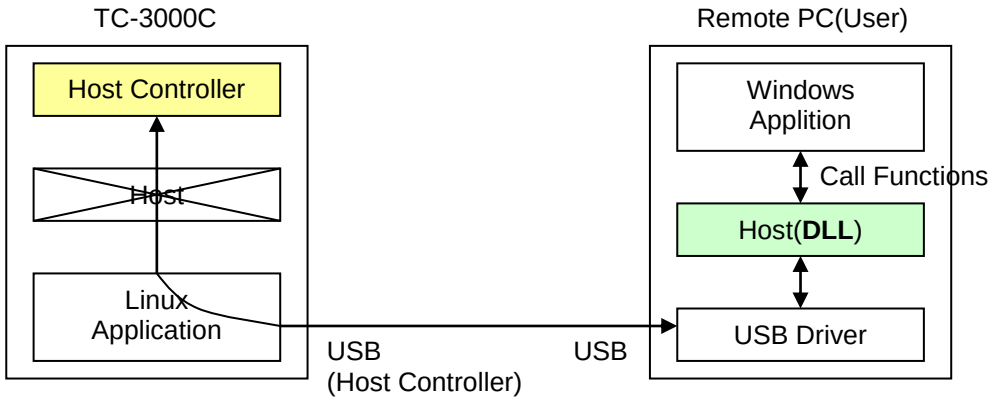
5.2 Getting Started

Take a closer look at two kinds of TC-3000C remote control method. One is to use Dynamic Link Library (DLL). According to your need you can choose and use Ethernet(Host), USB(Host Controller) or RS-232C(Host Controller) port. And you are able to call some functions of DLL("tc3k.dll") for your testing goal. By the way, you have a trouble controlling two or more TC-3000Cs in this case. That is why DLL containing Host program occupies most of CPU resources of your PC like the following figures.

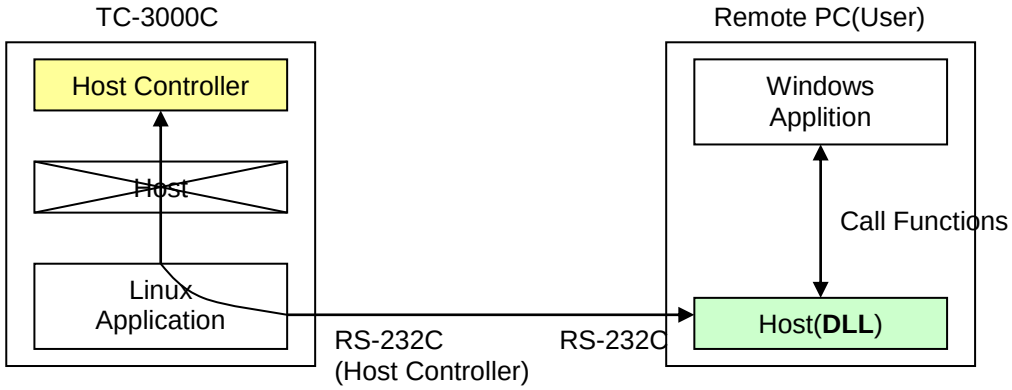
- **Remote control diagram using Ethernet (Host)**



- **Remote control diagram using USB (Host Controller)**

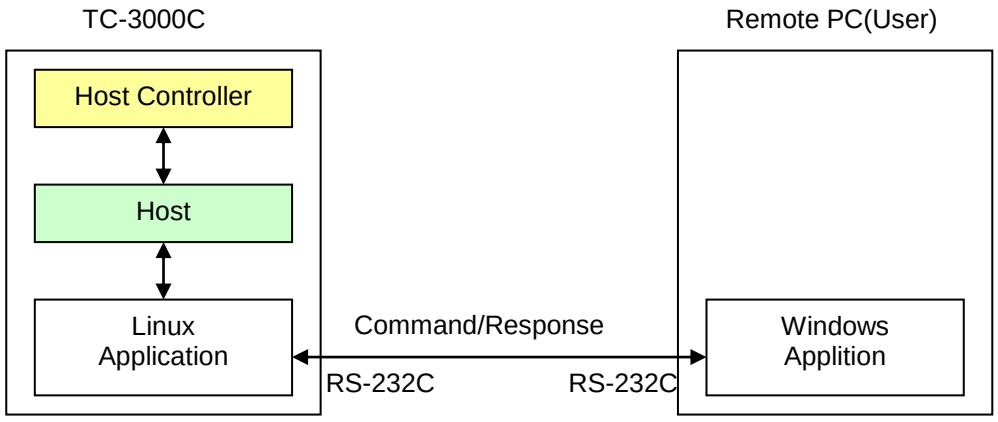


- **Remote control diagram using RS-232C (Host Controller)**



Another is to send RS-232C commands. At present, you can utilize the command through only RS-232C(Host) port. In this case, you don't have any limitation to control several TC-3000Cs at the same time contrary to DLL.

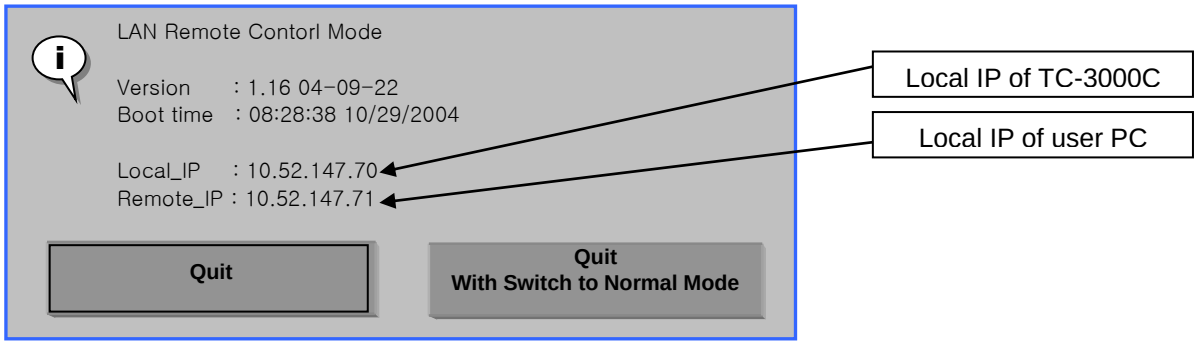
- **Remote control diagram using RS-232C (Host)**



In order to successfully perform the remote control, the following configuration settings need to be done.

5.2.1 Settings for Ethernet(Host) remote control using DLL

1. Setting up Netwok Parameters: Press **Menu** → Select “Configuration” from the pop-up menu on the screen → **M5** (Network) → Setting up Network Parameters
2. Enable Remote Control: Press **F7** on the above screen to set Remote Ctrl to “Checked”.
3. Reboot TC-3000C.
4. If you have the following screen, the setting has been done successfully.



5. Execute “PING” command on you PC so as to see if TC-3000C is operating and also to see if network connections are intact.

NOTE Make sure the Local IP and Remote IP is correct on the above screen.

6. Call the following functions in your application to make Ethernet remote control program using DLL.
   (1) write_tester_hci_tl(16); // TCP/IP : 16
   (2) write_local_ip(“10.52.147.71”); // “Local IP” of user PC is “Remote IP” of TC-3000C.
   (3) wirte_remote_ip(“10.52.147.70”); // “Remote IP” of user PC is “Local IP” of TC-3000C

5.2.2 Settings for USB(Host Controller) remote control using DLL

1. Copy following files to your system directory.
   - Files required : tc_terter.sys, tc_tester.inf
   - System Directory : C:/WINDOWS/system32(Windows XP)

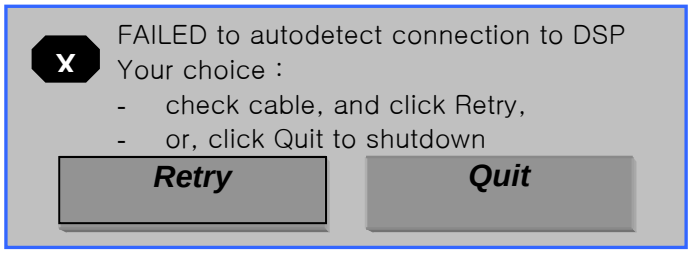
2. Connect USB port of TC-3000C Host Controller with USB port of your PC, and then use the “Found New Hardware Wizard”. Even If our driver has not passed Windows Logo testing, Ignore it and push the “ContinueAnyway” button. Our driver will be installed successfully.

3. Call the following functions in your application to make USB remote control program using DLL.

(1) write_tester_hci_tl(1); // 1:USB
(2) write_tester_hc_port(0); // 0:USB1

5.2.3 Settings for RS-232C(Host Controller) remote control using DLL

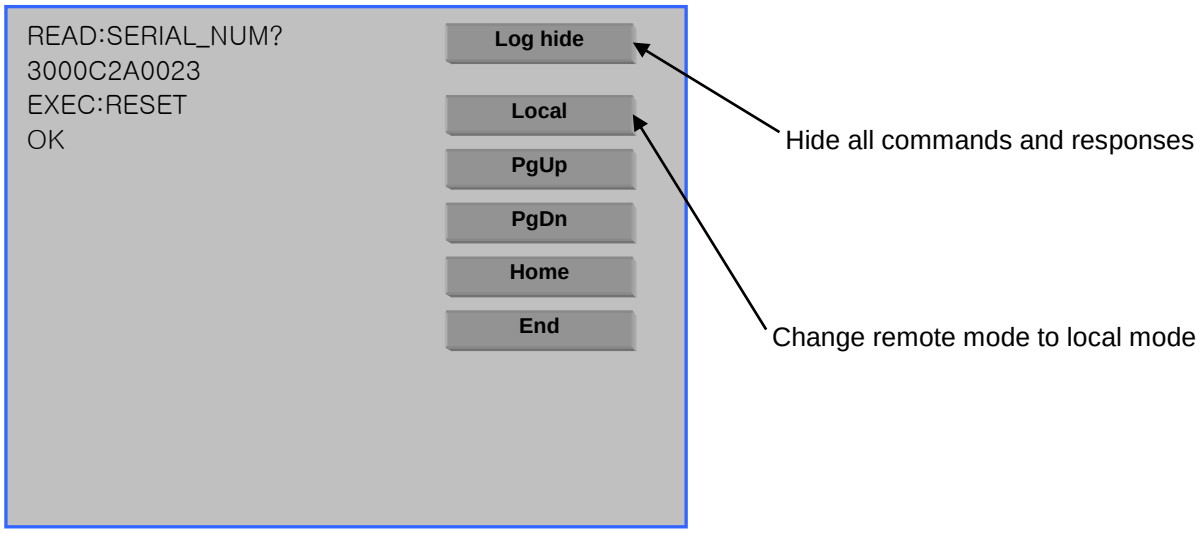
1. The supplied RS-232C cable is used to connect RS-232C port of TC-3000C Host Controller with serial port of user PC.
2. Turn on TC-3000C.



3. Call the following functions in your application to make RS-232C remote control program using DLL.
   (1) write_tester_hci_tl(2); // 2: RS-232C
   (2) write_tester_hc_port(0); // 0 : COM1

5.2.4 Settings for the RS-232C(Host) remote control without using DLL

1. Setting up RS-232C Parameters: Press **Menu** → Select “Configuration” from the pop-up menu on the screen → **M5** (Network) → **F8** (More 1/3) → Setting up RS-232C Parameters.
2. You can ascertain whether your RS-232C settings including cable connection state is correct through Hyper Terminal on your PC.
3. If your RS-232C settings are right, the screen of TC-3000C will be changed as follows.



5.2.5 Preparing for your application using DLL

1. Insert library Disk in a floppy disk drive of Remote Control Computer.
2. Copy following files to your application directory from the library Disk.

tc3k.dll, tc3k.lib, tester_dll.h, platform.h


NOTE

You must use the library files correspond to TC-3000C version. When TC-3000C is upgraded the library files should be changed with the new version files. You can download the library files from Tescom website(www.tescom.co.kr).

5.3 Reference Guide using RS-232C commands

5.3.1 Configuration Command

READ:SYS:TESTER:HCI_TO?

Description
This command reads the timeout of HCI commands execution in miliseconds.

CONF:SYS:TESTER:HCI_TO <Value>

Description
This command set the timeout of HCI commands execution in miliseconds.

Value
HCI Timeout : 1 ~ 65535, 2000(default)


NOTE

If you set this to improper value so as to reduce timeout, you may have a trouble measuring. Accordingly, be careful of a change of this value.

READ:SYS:TESTER:L2CAP_TO?

Description
This command reads the timeout of L2CAP commands execution in milliseconds.

CONF:SYS:TESTER:L2CAP_TO <Value>

Description
This command set the timeout of L2CAP commands execution in milliseconds.

Value
L2CAP Timeout : 1 ~ 65535, 5000(default)

READ:SYS:TESTER:RFCOMM_TO?

Description
This command reads the timeout of RFCOMM commands execution in milliseconds.

CONF:SYS:TESTER:RFCOMM_TO <Value>

Description

This command set the timeout of RFCOMM commands execution in milliseconds.
Value
RFComm Timeout : 1 ~ 65535, 5000(default)

READ:SYS:TESTER:SDP_TO?

Description
This command reads the timeout of SDP commands execution in milliseconds.

CONF:SYS:TESTER:SDP_TO <Value>

Description
This command set the timeout of SDP commands execution in milliseconds.

Value
SDP Timeout : 1 ~ 65535, 5000(default)

READ:SYS:TESTER:PROFILE_TO?

Description
This command reads the timeout of PROFILE commands execution in milliseconds.

CONF:SYS:TESTER:PROFILE_TO <Value>

Description
This command set the timeout of PROFILE commands execution in milliseconds.

Value
Profile Timeout : 1 ~ 65535, 5000(default)

READ:SYS:TESTER:FRIENDLY_NAME?

Description
This command reads the Friendly Name of the tester.

CONF:SYS:TESTER:FRIENDLY_NAME <Value>

Description
This command set the Friendly Name of the tester.

Value
Friendly Name : 54.43.2D.33.30.30.30.42
(ex) In case of “TC-3000C”, input “54.43.2D.33.30.30.30.42”

READ:SYS:TESTER:NUM_RESP?

Description
This command reads maximum number of response during the inquiry of a tester

CONF:SYS:TESTER:NUM_RESP <Value>

Description
This command sets maximum number of responses from the Inquiry of a tester.
For example, if this value is set 1, TC-3000C will find only one DUT and finish immediately the inquiry procedure.

Value
Inquiry Responses : 0 ~ 16, 1(default)

READ:SYS:TESTER:PINCODE?

Description
This command reads PIN code(passkey) of the tester.

CONF:SYS:TESTER:PINCODE <Value>

Description
This command writes PIN code(passkey) of the tester. The PIN is used to authenticate two Bluetooth

devices(that have not previously exchanged link keys) to each other and create a trusted relationship between then and is used in pairing procedure to generate the initial link key that is used for further authentication.

Value
PIN code : 16 bytes as a hexadeciamal notation
(ex) In case of “1234”, input “31.32.33.34.30.30.30.30.30.30.30.30.30.30.30.30”

READ:SYS:TESTER:SKIP_PAIR?

Description
This command reads the flag to skip pairing procedure.

CONF:SYS:TESTER:SKIP_PAIR <Value>

Description
This command writes the flag to skip pairing procedure. If the flag to skip pairing is ON, the link key, which is defined by “CONF:SYS:TESTER:LINK_KEY” will be used for authentication procedure.

Value
the flag to skip pairing procedure : ON, OFF(default)

READ:SYS:TESTER:LINK_KEY?

Description
This command reads the link key which is used for authentication procedure if the flag to skip pairing is ON.

CONF:SYS:TESTER:LINK_KEY <Value>

Description
This command writes the link key which is used for authentication procedure if the flag to skip pairing is ON.

Value
Link key : 16 bytes as a hexadeciamal notation
For example, input “C3.82.92.B4.C5.F2.39.79.24.4A.F0.96.55.1A.E8.98”.

READ:SYS:TESTER:BD_ADDR?

Description
This command reads Bluetooth Device ADDRess(BD_ADDR) of a tester.

CONF:SYS:TESTER:BD_ADDR <Value>

Description
This command writes Bluetooth Device ADDRess(BD_ADDR) of a tester.

Value
Bluetooth device address : 9abc56781234(default)

READ:SYS:TESTER:MOD_INDEX?

Description
This command reads FSK modulation index.

CONF:SYS:TESTER:MOD_INDEX <Value>

Description
This command writes FSK modulation index.

Value
modulation index : 0.28 ~ 0.35, 0.32(default)

READ:SYS:TESTER:ENCRYPTION?

Discription
This command reads Encryption parameter of LMP features.

CONF:SYS:TESTER:ENCRYPTION <Value>

Description
This command sets Encryption parameter of LMP feature. If this value is set ‘ON’, ‘encr’ of LMP feature is displayed as ‘1’.

Value
encryption : ON(default), OFF

READ:SYS:TESTER:NAME_DISCOVERY?

Discription
This command reads the User Friendly Name which is got during Discovery procedure.

CONF:SYS:TESTER:NAME_DISCOVERY <Value>

Description
This command sets whether the User Friendly Name is read or not by tester.

Value
Name_discovery : ON(default), OFF

READ:SYS:TESTER:PAUSE_TEST?

Discription
This command reads the Pause parameter.

CONF:SYS:TESTER:PAUSE_TEST <Value>

Description
This command sets Pause parameter.

Value
Pause_test : ON, OFF(default)

READ:SYS:TESTER:INIT_AUTHN?

Discription
This command reads the setting parameter of Init authentication.

CONF:SYS:TESTER:INIT_AUTHN <Value>

Description
This command to set whether to enable or disable the ‘Init authentication’ parameter.

Value
Pause_test : ON, OFF(default)

READ:SYS:DUT:HCI_TYPE?

Description
This command reads the number of ports and the type of HCI transport layer of a DUT.

CONF:SYS:DUT:HCI_TYPE <Value>

Description
This command writes the number of ports and the type of HCI transport layer of a DUT

Value
HCI Type : NONE(default), USB1, USB2, RS1, RS2, UART1, UART2, BCSP1, BCSP2, 2WIRE1, 2WIRE2


NOTE

If you would like to change the number of ports and the type of HCI transport layer, you must send “EXEC:NEW_DUT” command after sending this command.

READ:SYS:DUT:PATH_LOSS?

Description
This command reads the path loss.

CONF:SYS:DUT:PATH_LOSS <Value>

Description
This command writes the path loss. In order to find a proper path loss, make use of power-channel.

Value
path loss : 0 ~ 80, 0(default)

READ:SYS:DUT:INQ_SUPPORTED?

Description
This command reads the flag whether the DUT supports inquiry.

CONF:SYS:DUT:INQ_SUPPORTED <Value>

Description
This command writes the flag whether the DUT supports inquiry. If you already know the BD address of DUT, you can set BD address using “CONF:SYS:DUT:BD_ADDR command and set this value as ‘ OFF’ to skip the Inquiry procedure.

Value
Inquiry Supported : ON(default), OFF

READ:SYS:DUT:BD_ADDR?

Description
This command reads Bluetooth Device ADDRess(BD_ADDR) of a DUT.

CONF:SYS:DUT:BD_ADDR <Value>

Description
This command wirtes Bluetooth Device ADDRess(BD_ADDR) of a DUT. This should be meaningful only in the case if the DUT does not support inquiry. Use the command “CONF:SYS:DUT:INQ_SUPPORTED OFF” to set the flag that the DUT does not support inquiry.

Value
Bluetooth Device Address of DUT

READ:SYS:DUT:CONN_FOR_TEST?

Description
This command reads the flag which defines whether connection(LMP level) should be created before activation the test mode of the DUT.

CONF:SYS:DUT:CONN_FOR_TEST <Value>

Description
This command writes the flag which defines whether connection(LMP level) should be created before activation the test mode of the DUT.

Value
Connection for test mode : ON(default), OFF


NOTE

If you want to enter test mode without LMP connection, you must set this value to OFF. That is to say, if your test aim is just to measure RF test cases, set OFF.

READ:SYS:DUT:BAUDRATE?

Description
This command reads baud rate depending on the type of HCI transport layer of a DUT.

CONF:SYS:DUT:BAUDRATE <Value>

Description
This command writes baud rate depending on the type of HCI transport layer of a DUT. It is available for UART or BCSP.

Value
baud rate : 2400, 4800, 9600, 19200, 38400, 57600, 115200

READ:SYS:DUT:TEST_MODE?

Description
This command reads the test mode of the DUT.

CONF:SYS:DUT:TEST_MODE <Value>

Description
This command writes the test mode of the DUT. The test mode supports testing of the Bluetooth transmitter and receiver. It is intended mainly for certification/compliance testing of the radio and baseband layer and may also be used for regulatory approval or acceptance on a HW or SW interface shall be allowed.

Value
test mode : LOOPBACK_TEST(default), TRANSMITTER_TEST, NULL_PKT_TEST


NOTE

In general, test mode must be loopback or transmitter mode except for audio test.

READ:SYS:DUT:POW_SET_TIME?

Description
This command reads interval of time when the tester must to wait after until the DUT will reach the new power step in milliseconds.

CONF:SYS:DUT:POW_SET_TIME <Value>

Description
This command writes interval of time when the tester must to wait after until the DUT will reach the new power step in milliseconds.

Value
power set time : 1 ~ 65535, 1000(default)

READ:SYS:RF:TX_POW?

Description

This command reads the transmitter power of a tester.

CONF:SYS:RF:TX_POW <Value>

Description
This command writes the transmitter power of a tester.

Value
TX Power : 0 ~ -80, -30(default)

READ:SYS:RF:ATT?

Description
This command reads the “30dB RX Attenuator” state of a tester.

CONF:SYS:RF:ATT <Value>

Description
This command writes the “30dB RX Attenuator” state of a tester.

Value
30dB RX Attenuator : ON(default), OFF

READ:SYS:RF:AGC?

Description
This command reads the RX AGC(Automatic Gain Control) value of a tester.

CONF:SYS:RF:AGC <Value>

Description
This command writes the RX AGC(Automatic Gain Control) value of a tester.

Value
AGC : ON(default), OFF

READ:SYS:RF:RX_GAIN?

Description
This command reads the gain of RX amplifier of a tester.

CONF:SYS:RF:RX_GAIN <Value>

Description
This command writes the gain of RX amplifier of a tester. To make use of this command, send “CONF:SYS:RF:AGC OFF” command prior to this command.

Value
RX gain : 10dB, 20dB(default), 30dB, 40dB, 50dB, 60dB, 70dB

READ:SYS:RF:10M_REF?

Description
This command reads the type of reference oscillator of a tester.

CONF:SYS:RF:10M_REF <Value>

Description
This command writes whether reference oscillator of a tester is internal or external. In order to use your 10MHz reference oscillator, user has to call this function with external reference oscillator parameter.

Value
Type of reference oscillator : INT(default), EXT

READ:SYS:DUT:PACK_TYPE?

Description

This command reads the packet type of DUT.

CONF:SYS:DUT:PACK_TYPE <Value>

Description
This command writes packet type of DUT.

Value
Packet_type : DH1(default), HV1, HV3, AUX1, DM3, DH3, DM5, DH5, EV3, EV4, EV5, 2-DH1, 3-DH1, 2-DH3, 3-DH3, 2-DH5, 3-DH5, 2-EV3, 3-EV3, 2-EM5, 3-EV5

READ:SYS:DUT:BIT_PATTERN?

Description
This command reads the bit pattern of DUT.

CONF:SYS:DUT:BIT_PATTERN <Value>

Description
This command writes bit pattern of DUT.

Value
Bit_pattern : 00000000, 11111111, 10101010(default), 11110000, PRBS9

READ:SYS:DUT:HOP?

Description
This command reads hopping mode of DUT.

CONF:SYS:DUT:HOP <Value>

Description
This command writes hopping mode of DUT.

Value
hopping mode : ON, OFF(default)

READ:SYS:DUT:TX_CH?

Description
This command reads TX channel of a tester. (RX for DUT)

CONF:SYS:DUT:TX_CH <Value>

Description
This command writes TX channel of a tester.

Value
Tx_ch : 0(default) ~ 78

READ:SYS:DUT:RX_CH?

Description
This command reads RX channel of a tester. (TX for DUT)

CONF:SYS:DUT:RX_CH <Value>

Description
This command writes RX channel of a tester.

Value
Tx_ch : 0(default) ~ 78

READ:SYS:DUT:Link?

Description
This command checks whether a RF link with a DUT exists.

Return Value
Link : ON, OFF

5.3.2 Access Command

EXEC:RESET

Description
This command sets “Standby” state of the tester’s Host controller and clears databases of discovered DUTs and links (ACL and SCO) at both Host and Host controller.

EXEC:NEW_DUT

Description
This command reinitializes (creates) HCI transport layer to the DUT (if necessary) and resets the tester.

EXEC:STOP

Description
This command stops execution of running commands.

EXEC:PRESET

Description
This command is used to reset most of parameters of TC-3000C to default value.

EXEC:LOCAL

Description
This command is used to change remote mode to local mode.

EXEC:DISCOVERABLE

Description
This command is used to make TC-3000C a Bluetooth device in range that will respond to an inquiry/page message.

READ:SERIAL_NUM?

Description
This command reads serial number of TC-3000C.

READ:GUI_VERSION?

Description
This command reads firmware version of TC-3000C.

READ:CONN_DUT_BD_ADDR?

Description
This command reads Bluetooth device address from DUT under connection state.

READ:CONN_DUT_NAME?

Description
This command reads Bluetooth device name from DUT under connection state.

EXEC:DISCOVER

Description
This command find Bluetooth device of circumference.

READ:DISCOVERED_BD_ADDR?

Description

This command reads the BD addresses which are discovered during the Discover procedure.

5.3.3 RF Test Cases Command

EXEC:RFTC:STOP

Description
This command stops measurement of test cases in progress.

EXEC:RFTC:CONN

Description
This command executes connection(LMP level).

EXEC:RFTC:DISC

Description
This command executes disconnection if connection exists.

5.3.4 Output Power(OP)

EXEC:RFTC:OP:RUN

Description
This command executes measurement of the maximum peak and average output power(TRM/CA/01/C).

EXEC:RFTC:OP:STOP

Description
This command stops execution of output power measurement.

READ:RFTC:OP:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:OP:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:OP:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:OP:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : LONGEST(default), DM1, DH1, AUX1, DM3, DH3, DM5, DH5

READ:RFTC:OP:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:OP:PACK_NUM <Value>

Description

This command writes number of packets.

Value
number of packet : 1(default), 0 ~ 65535

READ:RFTC:OP:HOP?

Description
This command reads hopping mode.

CONF:RFTC:OP:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON(default), OFF

READ:RFTC:OP:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:OP:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST, NULL_PKT_TEST

READ:RFTC:OP:P_AVG?

Description
This command reads the average power.

READ:RFTC:OP:P_MIN?

Description
This command reads minimum power.

READ:RFTC:OP:P_MAX?

Description
This command writes maximum power.

5.3.5 Power Density(PD)

EXEC:RFTC:PD:RUN

Description
This command executes measurement of the lowest and highest frequencies below and above the operating frequencies at which spectral power density drops below the level of 80dBm/Hz e.i.r.p(-30dBm if measured in a 100kHz bandwidth). This can be used for the power density test case(TRM/CA/02/C).

EXEC:RFTC:PD:STOP

Description
This command stops execution of power density measurement.

READ:RFTC:PD:DATA_LEN?

Description
This command reads length of payload’s data.

CONF:RFTC:PD:DATA_LEN <Value>

Description
This command writes length of payload's data.

Value
data length : 0 ~ 339, 0(default-longest supported length)

READ:RFTC:PD:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:PD:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:PD:P_DEN?

Description
This command reads maximum value of the power density per 100kHz EIRP.

READ:RFTC:PD:F_MAX?

Description
This command reads center frequency at which the power density reached the maximum value.

5.3.6 Power Control(PC)

EXEC:RFTC:PC:RUN

Description
This command executes measurement of the minimum RF output power and the step of power controlled by the DUT at the given TX frequency. This can be used for power control test case(TRM/CA/03/C).

EXEC:RFTC:PC:STOP

Description
This command stops execution of power control measurement.

READ:RFTC:PC:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:PC:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:PC:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:PC:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : LONGEST, DM1, DH1(default), AUX1, DM3, DH3, DM5, DH5

READ:RFTC:PC:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:PC:PACK_NUM <Value>

Description
This command wrties number of packets.

Value
number of packet : 1(default), 0 ~ 65535

READ:RFTC:PC:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:PC:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:PC:P_MIN?

Description
This command reads the minimum power in 0.01dBm.

READ:RFTC:PC:P_MAX?

Description
This command reads the maximum power in 0.01 dBm.

READ:RFTC:PC:P_ST_MIN?

Description
This command reads the minimum power step in 0.01 dBm.

READ:RFTC:PC:P_ST_MAX?

Description
This command reads the maximum power step in 0.01 dBm.

5.3.7 Enhances Power Control(EPC)

EXEC:RFTC:EPC:RUN

Description
This can be used for Enhanced power control test case(TRM/CA/14/C).

EXEC:RFTC:EPC:STOP

Description
This command stops execution of Enhanced power control measurement.

READ:RFTC:EPC:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:EPC:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:EPC:PACK_SLOT?

Description
This command reads packet slot.

CONF:RFTC:EPC:PACK_SLOT <Value>

Description
This command writes packet slot.

Value
packet slot : 1(default, DH1,2-DH1,3-DH1), 3(DH3,2-DH3,3-DH3), 5(DH5, 2-DH5, 3-DH5)

READ:RFTC:EPC:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:EPC:PACK_NUM <Value>

Description
This command wrties number of packets.

Value
number of packet : 1(default), 0 ~ 65535

READ:RFTC:EPC:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:EPC:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:EPC:P_MIN?

Description
This command reads the minimum power in 0.01dBm.

READ:RFTC:EPC:P_MAX?

Description
This command reads the maximum power in 0.01 dBm.

READ:RFTC:EPC:P_ST_MIN?

Description
This command reads the minimum power step in 0.01 dBm.

READ:RFTC:EPC:P_ST_MAX?

Description
This command reads the maximum power step in 0.01 dBm.

5.3.8 Frequency Range(FR)

EXEC:RFTC:FR:RUN

Description
This command executes measurement of lowest and highest frequencies below and above the operating frequencies at which spectral power density drops below the level of 80dBm/Hz e.i.r.p(-30 dBm if measured in a 100 kHz bandwidth). This can be used for the frequency range test case(TRM/CA/04/C).

EXEC:RFTC:FR:STOP

Description
This command stops execution of frequency range measurement.

READ:RFTC:FR:DATA_LEN?

Description
This command reads length of payload's data of frequency range.

CONF:RFTC:FR:DATA_LEN <Value>

Description
This command writes length of payload's data.

Value
length of payload's data : 0 ~ 339, 1(default)

READ:RFTC:FR:SWP_NUM?

Description
This command reads number of sweeps.

CONF:RFTC:FR:SWP_NUM <Value>

Description
This command wirtes number of sweeps.

Value
Number of sweeps : 1 ~ 65535, 1(default)

READ:RFTC:FR:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:FR:TEST_MODE

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:FR:F_L?

Description
This command reads lowest frequency below the operating frequencies at which spectral power density drops below the level of 80 dBm/Hz e.i.r.p(-30 dBm if measured in a 100kHz bandwidth)

READ:RFTC:FR:F_H?

Description
This command reads highest frequency above the operating frequencies at which spectral power density drops below the level of 80 dBm/Hz e.i.r.p(-30 dBm if measured in a 100kHz bandwidth)

5.3.9 20dB Bandwidth(20BW)

EXEC:RFTC:20BW:RUN

Description
This command executes the measurement of the lowest and highest frequencies below and above the operating frequency at which transmit power drops 20dB below the highest power value in the transmit channel at the given TX frequency. This can be used for TX Output Spectrum -20dB Bandwidth test case(TRM/Ca/05/C).

EXEC:RFTC:20BW:STOP

Description
This command stops execution of measurement of 20 dB bandwidth.

READ:RFTC:20BW:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:20BW:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:20BW:DATA_LEN?

Description
This command reads length of payload’s data.

CONF:RFTC:20BW:DATA_LEN <Value>

Description
This command writes length of payload’s data.

Value
length of payload’s data : 0 ~ 339, 1(default)

READ:RFTC:20BW:SWP_NUM?

Description
This command reads number of sweeps.

CONF:RFTC:20BW:SWP_NUM <Value>

Description
This command writes number of sweeps.

Value
Number of sweeps : 1 ~ 65535, 1(default)

READ:RFTC:20BW:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:20BW:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:20BW:BW?

Description
This command reads the difference between f_l and f_h. f_l is lowest frequency in Ha below the operating frequency at which transmit power derops 20dB below the highest power value in the transmit channel. f_h is highest frequency in Hz above the operating frequencies at which transmit power drops 20dB below the highest power value in the transmit channel.

5.3.10 Adjacent Channel Power(ACP)

EXEC:RFTC:ACP:RUN

Description
This command executes measurement of power in adjacent channels. This can be used for TX output spectrum – Adjacent Channel Power test case(TRM/CA/06/C).

EXEC:RFTC:ACP:STOP

Description
This command reads execution of adjacent channel power.

READ:RFTC:ACP:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:ACP:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:ACP:DATA_LEN?

Description
This command reads length of payload’s data.

CONF:RFTC:ACP:DATA_LEN <Value>

Description
This command writes length of payload’s data.

Value
length of payload’s data : 0 ~ 339, 27(default)

READ:RFTC:ACP:SWP_NUM?

Description
This command reads number of sweeps.

CONF:RFTC:ACP:SWP_NUM <Value>

Description
This command writes number of sweeps.

Value
Number of sweeps : 1 ~ 65535, 1(default)

READ:RFTC:ACP:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:ACP:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:ACP:P_TX?

Description
This command reads power in adjacent channel.

5.3.11 Modulation Characteristics(MOD)

EXEC:RFTC:MOD:RUN

Description
This command executes measurement of the modulation index for 11110000 and 10101010 bit patterns at the given TX frequency. This can be used for the Modulation Characteristics test case(TRM/CA/07/C).

EXEC:RFTC:MOD:STOP

Description
This command stops execution of modulation characteristics.

READ:RFTC:MOD:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:MOD:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:MOD:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:MOD:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : LONGEST(default), DM1, DH1, AUX1, DM3, DH3, DM5, DH5

READ:RFTC:MOD:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:MOD:PACK_NUM <Value>

Description
This command writes number of packets.

Value
number of packet : 10(default), 0 ~ 65535

READ:RFTC:MOD:HOP?

Description
This command reads hopping mode.

CONF:RFTC:MOD:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON(default), OFF

READ:RFTC:MOD:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:MOD:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:MOD:DF1_AVG?

Description
This command reads average of all maximum frequency deviations from the average frequency for the 11110000 pattern in HZ divided by 100.

READ:RFTC:MOD:DF2_AVG?

Description
This command reads average of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:RFTC:MOD:DF2_MIN?

Description
This command reads minimum of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:RFTC:MOD:DF2_RATE?

Description
This command reads pass rate of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

5.3.12 Initial Carrier Frequency Tolerance(ICFT)

EXEC:RFTC:ICFT:RUN

Description
This command executes measurement of the transmitter carrier frequency accuracy at the given TX frequency. This can be used for the initial carrier frequency tolerance test case(TRM/CA/08/C).

EXEC:RFTC:ICFT:STOP

Description
This command stops execution of initial carrier frequency tolerance.

READ:RFTC:ICFT:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:ICFT:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:ICFT:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:ICFT:PACK_NUM <Value>

Description
This command writes number of packets.

Value
number of packet : 10(default), 0 ~ 65535

READ:RFTC:ICFT:HOP?

Description
This command reads hopping mode.

CONF:RFTC:ICFT:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON(default), OFF

READ:RFTC:ICFT:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:ICFT:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:ICFT:DF0_MIN?

Description
This command reads minimal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:RFTC:ICFT:DF0_MAX?

Description
This command reads maximal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:RFTC:ICFT:DF0_AVG?

Description

This command reads average deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

5.3.13 Carrier Frequency Drift(CFD)

EXEC:RFTC:CFD:RUN

Description
This command executes measurement of the transmitter center frequency drift within a packet the given TX frequency. This can be used for the carrier frequency drift test case(TRM/CA/09/C).

EXEC:RFTC:CFD:STOP

Description
This command stops execution of carrier frequency drift.

READ:RFTC:CFD:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:CFD:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:CFD:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:CFD:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : LONGEST(default), DM1, DH1, AUX1, DM3, DH3, DM5, DH5

READ:RFTC:CFD:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:CFD:PACK_NUM <Value>

Description
This command writes number of packets.

Value
number of packet : 10(default), 0 ~ 65535

READ:RFTC:CFD:HOP?

Description
This command reads hopping mode.

CONF:RFTC:CFD:HOP <Value>

Description
This command writes hopping mode.

Value

hopping mode : ON(default), OFF

READ:RFTC:CFD:TEST_MODE?

Description
This command reads test mode.

CONF:RFTC:CFD:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:CFD:DRIFT_MAX?

Description
This command reads maximal frequency drift in hundreds Hz.

READ:RFTC:CFD:RATE_MAX?

Description
This command reads maximal drift rate in hundreds Hz per 50 us.

5.3.14 Single Slot Sensitivity(SS)

EXEC:RFTC:SS:RUN

Description
This command executes measurement of single slot sensitivity test case(RCV/CA/01/C).

EXEC:RFTC:SS:STOP

Description
This command stops execution of single slot sensitivity.

READ:RFTC:SS:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:SS:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:SS:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:SS:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : DH1(default), AUX1

READ:RFTC:SS:HOP?

Description

This command reads hopping mode.

CONF:RFTC:SS:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON, OFF(default)

READ:RFTC:SS:RX_LEV?

Description
This command reads RX power at the receiver input of the DUT in dBm.

CONF:RFTC:SS:RX_LEV <Value>

Description
This command writes RX power at the receiver input of the DUT in dBm.

Value
DUT RX Level : -327.68 ~ 20

READ:RFTC:SS:BYTES?

Description
This command reads minimum number of samples(returned payload bytes) to measure BER.

CONF:RFTC:SS:BYTES <Value>

Description
This command writes minimum number of samples(returned payload bytes) to measure BER.

Value
minimum number of samples : 0 ~ 2147000000, 200000(default)

READ:RFTC:SS:DIRTY_TX?

Description
This command reads dirty transmitter mode.

CONF:RFTC:SS:DIRTY_TX <Value>

Description
This command writes dirty transmitter mode.

Value
dirty transmitter mode : ON(default), OFF

READ:RFTC:SS:BER?

Description
This command reads bit error rate.

5.3.15 Multi Slot Sensitivity(SM)

EXEC:RFTC:SM:RUN

Description
This command executes measurement of multi slot sensitivity test case(RCV/CA/02/C).

EXEC:RFTC:SM:STOP

Description
This command stops execution of multi slot sensitivity.

READ:RFTC:SM:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:SM:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:SM:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:SM:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : DH3, DH5(default)

READ:RFTC:SM:HOP?

Description
This command reads hopping mode.

CONF:RFTC:SM:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON, OFF(default)

READ:RFTC:SM:RX_LEV?

Description
This command reads power at the receiver input of the DUT in dBm.

CONF:RFTC:SM:RX_LEV <Value>

Description
This command writes RX power at the receiver input of the DUT in dBm.

Value
DUT RX Level : -327.68 ~ 20

READ:RFTC:SM:BYTES?

Description
This command reads minimum number of samples(returned payload bytes) to measure BER.

CONF:RFTC:SM:BYTES <Value>

Description
This command writes minimum number of samples(returned payload bytes) to measure BER.

Value
minimum number of samples : 0 ~ 2147000000, 200000(default)

READ:RFTC:SM:DIRTY_TX?

Description
This command reads dirty transmitter mode.

CONF:RFTC:SM:DIRTY_TX <Value>

Description
This command writes dirty transmitter mode.

Value
dirty transmitter mode : ON(default), OFF

READ:RFTC:SM:BER?

Description
This command reads bit error rate.

5.3.16 Maximum Input Level(ML)

EXEC:RFTC:ML:RUN

Description
This command executes measurement of maximum input level test case(RCV/CA/06/C).

EXEC:RFTC:ML:STOP

Description
This command stops execution of maximum input level.

READ:RFTC:ML:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:ML:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:ML:HOP?

Description
This command reads hopping mode.

CONF:RFTC:ML:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON, OFF(default)

READ:RFTC:ML:RX_LEV?

Description
This command reads RX power at the receiver input of the DUT in dBm.

CONF:RFTC:ML:RX_LEV <Value>

Description
This command writes RX power at the receiver input of the DUT in dBm.

Value
DUT RX Level : -327.68 ~ 20, -20(default)

READ:RFTC:ML:BYTES?

Description
This command reads minimum number of samples(returned payload bytes) to measure BER.

CONF:RFTC:ML:BYTES <Value>

Description
This command writes minimum number of samples(returned payload bytes) to measure BER.

Value
minimum number of samples : 0 ~ 2147000000, 200000(default)

READ:RFTC:ML:BER?

Description
This command reads bit error rate.

5.3.17 Quick Test(OPMOD)

EXEC:RFTC:OPMOD:RUN

Description
This command executes measurement of quick test containg output power, modulation characteristics, initial carrier frequency, and carrier frequency drift at a time.

EXEC:RFTC:OPMOD:STOP

Description
This command stops execution of quick test(EXEC:RFTC:OPMOD:RUN).

READ:RFTC:OPMOD:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:OPMOD:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:OPMOD:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:OPMOD:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : LONGEST, DH1(default), AUX1, DH3, DH5

READ:RFTC:OPMOD:PACK_NUM?

Description
This command reads number of packets.

CONF:RFTC:OPMOD:PACK_NUM <Value>

Description
This command writes number of packets.

Value
number of packet : 0 ~ 65535, 2(default)

READ:RFTC:OPMOD:HOP?

Description
This command reads hopping mode.

CONF:RFTC:OPMOD:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON, OFF(default)

READ:RFTC:OPMOD:TEST_MODE?

Description
This command sets test mode.

CONF:RFTC:OPMOD:TEST_MODE <Value>

Description
This command writes test mode.

Value
Test mode : LOOPBACK_TEST, TRANSMITTER_TEST(default), NULL_PKT_TEST

READ:RFTC:OPMOD:P_AVG?

Description
This command reads the average power.

READ:RFTC:OPMOD:P_MAX?

Description
This command reads the maximum power.

READ:RFTC:OPMOD:P_MIN?

Description
This command reads the minimum power.

READ:RFTC:OPMOD:DF1_AVG?

Description
This command reads average of all maximum frequency deviations from the average frequency for the 11110000 pattern in HZ divided by 100.

READ:RFTC:OPMOD:DF2_AVG?

Description
This command reads average of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:RFTC:OPMOD:DF2_MIN?

Description

This command reads minimum of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:RFTC:OPMOD:DF2_RATE?

Description
This command reads pass rate of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:RFTC:OPMOD:DF0_MIN?

Description
This command reads minimal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:RFTC:OPMOD:DF0_MAX?

Description
This command reads maximal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:RFTC:OPMOD:DRIFT_MAX?

Description
This command reads maximal frequency drift in hundreds Hz.

READ:RFTC:OPMOD:RATE_MAX?

Description
This command reads maximal drift rate in hundreds Hz per 50 us.

5.3.18 BER & FER

NOTE

BER & FER Test provides measurement of the Bit Error Rate and the Packet Error Rate at the given RX frequency. BER & FER test measure BER & FER value based on transmitted packets whilst Single Shot Sensitivity (SS) and Multi Slot Sensitivity (MS) do the measurement on received packets base. This method is prone to incur packet loss during the packet exchange as the tester will not re-transmit the concerned packet even though DUT fails to receive it. According to BT specification, a precise measurement should be accomplished through Single Shot Sensitivity (SS) and Multi Slot Sensitivity (MS) test case.

EXEC:RFTC:BERFER:RUN

Description
This command executes measurement of BER & FER test.

EXEC:RFTC:BERFER:STOP

Description
This command stops execution of BER & FER test.

READ:RFTC:BERFER:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:RFTC:BERFER:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value

channel : RX frequency of a tester (TX for a DUT), 0 ~ 78, 0-39-78(default)

READ:RFTC:BERFER:PACK_TYPE?

Description
This command reads packet type.

CONF:RFTC:BERFER:PACK_TYPE <Value>

Description
This command writes packet type.

Value
packet type : DH3, DH5(default)

READ:RFTC:BERFER:HOP?

Description
This command reads hopping mode.

CONF:RFTC:BERFER:HOP <Value>

Description
This command writes hopping mode.

Value
hopping mode : ON, OFF(default)

READ:RFTC:BERFER:RX_LEV?

Description
This command reads power at the receiver input of the DUT in dBm.

CONF:RFTC:BERFER:RX_LEV <Value>

Description
This command writes RX power at the receiver input of the DUT in dBm.

Value
DUT RX Level : -327.68 ~ 20

READ:RFTC:BERFER:BYTES?

Description
This command reads minimum number of packets to measure BER & FER.

CONF:RFTC:BERFER:BYTES <Value>

Description
This command writes minimum number of packets to measure BER & FER.

Value
minimum number of samples : 0 ~ 2147000000, 500(default)

READ:RFTC:BERFER:DIRTY_TX?

Description
This command reads dirty transmitter mode.

CONF:RFTC:BERFER:DIRTY_TX <Value>

Description
This command writes dirty transmitter mode.

Value
dirty transmitter mode : ON(default), OFF

READ:RFTC:BERFER:BER?

Description
This command reads bit error rate from BER & FER test

Returned Value
- The measurement returns BER values of each channel established in accordance with the sequence and quantities.
  ・A delimiter “ ,” is used to separate the measured values over the channels set.
- nan: This value returns when no effective measurement value exists or no packet is received.

READ:RFTC:BERFER:PER?

Description
This command reads packet error rate from BER & FER test.

Returned Value
- The measurement returns PER values of each channel established in accordance with the sequence and quantities.
  ・A delimiter “ ,” is used to separate the measured values over the channels set.
- nan: This value returns when no effective measurement value exists or no packet is received.

5.3.19 EDR Relative Transmitter Power(ETP)

EXEC:RFTC:ETP:RUN

Description
This command executes EDR Relative Transmit Power(TRM/CA/10/C)

EXEC:RFTC:ETP:STOP

Description
This command stops execution of running EDR Relative Transmit Power(TRM/CA/10/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:ETP:RUN” command.

READ:RFTC:ETP:CH?

Description
This command reads channl value for EDR Relative Transmit Power(TRM/CA/10/C) measurement

CONF:RFTC:ETP:CH <Value>

Description
This command sets channel for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

Value
channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:ETP:CH 0
In case of setting channel0, 39, 78 : CONF:RFTC:ETP:CH 0-39-78

READ:RFTC:ETP:PACK_TYPE?

Description
This command reads packet type for EDR Relative Transmit Power(TRM/CA/10/C) measurement

CONF:RFTC:ETP:PACK_TYPE <Value>

Description
This command sets packet type for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

Value

Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:ETP:PACK_NUM?

Description
This command reads number of packet for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

CONF:RFTC:ETP:PACK_NUM <Value>

Description
This command sets number of packet for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

Value
Number of packets : 0~65535, 1(default)

READ:RFTC:ETP:TEST_MODE?

Description
This command reads test mode for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

CONF:RFTC:ETP:TEST_MODE <Value>

Description
This command sets test mode for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

Value
Test Mode : TRANSMITTER_TEST(default), LOOPBACK_TEST

READ:RFTC:ETP:HOP?

Description
This command reads hopping mode for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

CONF:RFTC:ETP:HOP <Value>

Description
This command sets hopping mode for EDR Relative Transmit Power(TRM/CA/10/C) measurement.

Value
Hopping Mode : OFF(default), ON

READ:RFTC:ETP:PAV_FSK?

Description
This command reads GFSK average output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PAV_FSK?" command, " EXEC:RFTC:ETP:RUN " command should be exected to update measurement value.

READ:RFTC:ETP:PAV_PSK?

Description
This command reads DPSK average output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PAV_PSK? " command, " EXEC:RFTC:ETP:RUN" command should be exected to update measurement value.

READ:RFTC:ETP:PMAX_FSK?

Description
This command reads GFSK maximum output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PMAX_FSK?" command, " EXEC:RFTC:ETP:RUN" command should be exected to update measurement value.

READ:RFTC:ETP:PMAX_PSK?

Description
This command reads DPSK maximum output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PMAX_PSK?" command, "

EXEC:RFTC:ETP:RUN" command should be exected to update measurement value.

READ:RFTC:ETP:PMIN_FSK?

Description

This command reads GFSK minimum output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PMIN_FSK?" command, " EXEC:RFTC:ETP:RUN" command should be exected to update measurement value.

READ:RFTC:ETP:PMIN_PSK?

Description

This command reads DPSK minimum output power of EDR Relative Transmit Power(TRM/CA/10/C) measurement. Before reading this value by " READ:RFTC:ETP:PMIN_PSK?" command, " EXEC:RFTC:ETP:RUN" command should be exected to update measurement value.

5.3.20 EDR Carrier Frequency Stability & Modulation Accuracy(EFSMA)

EXEC:RFTC:EFSMA:RUN

Description

This command executes measurement of EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

EXEC:RFTC:EFSMA:STOP

Description

This command stops execution of EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:EFSMA:RUN” command.

READ:RFTC:EFSMA:CH?

Description

This command reads channel value for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

CONF:RFTC:EFSMA:CH <Value>

Description

This command checks channel for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

Value

channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:EFSMA:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:EFSMA:CH 0-39-78

READ:RFTC:EFSMA:PACK_TYPE?

Description

This command reads packet type for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

CONF:RFTC:EFSMA:PACK_TYPE <Value>

Description

This command sets packet type for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/11/C) measurement

Value

Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:EFSMA:PACK_NUM?

Description
This command reads number of packets for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

CONF:RFTC:EFSMA:PACK_NUM <Value>

Description
This command sets number of packet for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement

Value
Number of packets : 0~65535, 10(default)

READ:RFTC:EFSMA:TEST_MODE?

Description
This command reads testmode for EDR Carrier Frequency Stablility & Modulation Accuracy(TRM/CA/11/C) measurement.

CONF:RFTC:EFSMA:TEST_MODE <Value>

Description
This command sets test mode for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

Value
Test Mode : TRANSMITTER_TEST(default), LOOPBACK_TEST

READ:RFTC:EFSMA:HOP?

Description
This command reads hopping mode for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

CONF:RFTC:EFSMA:HOP <value>

Description
This command sets hopping mode for EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement

Value
Hopping Mode : OFF(default), ON

READ:RFTC:EFSMA:WI_MAX?

Description
This command reads maximum value of initial frequency error(Wi) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by "EAD:RFTC:EFSMA:WI_MAX?" command, "EXEC:RFTC:EFSMA:RUN" command should be exected to update measurement value.

READ:RFTC:EFSMA:W0_MAX?

Description
This command reads Maximum value of Block Frequency Error(Wo) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:W0_MAX?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:W0I_MAX?

Description
This command reads maximum value of Initial Frequency Error and sum of Block Frequency Error(Wi+W0) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement.

Before reading this value by “READ:RFTC:EFSMA:W01_MAX?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:RMS_DEVM_MAX?

Description

This command reads Maximum value of RMS DEVM freom EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:RMS_DEVM_MAX?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:PEAK_DEVM_MAX?

Description

This command reads maximum value of PEAK DEVM from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:PEAK_DEVM_MAX?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:DEVM_RATE?

Description

This command reads DEVM Rate value from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:DEVM_RATE?” command, “EXEC:RFTC:EFSMA:RUN “ command be exected to update measurement value.

READ:RFTC:EFSMA:WI_MIN?

Description

This command reads minimum value of Initial Frequency Error(Wi) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) command. Before reading this value by “READ:RFTC:EFSMA:WI_MIN?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:W0_MIN?

Description

This command reads minimum value of Block Frequency Error(W0) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:W0_MIN?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:W0I_MIN?

Description

This command reads minimum value of sum(Wi+W0) of Block Frequency Error and Initial Frequency Error from EDR Carrier Frequency Stability & Modulation Accuracy (TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:W01_MIN?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:WI_AV?

Description

This command reads average value of Initial Frequency Error and sum of Block Frequency Error(Wi+W0) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:WI_AV?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:WO_AV?

Description

This command reads average value of Block Frequency Error(W0) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:W0_AV?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:WOI_AV?

Description
This command reads average value of Initial Frequency Error and sum of Block Frequency Error(Wi+W0) from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:W0I_AV?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

READ:RFTC:EFSMA:RMS_DEVM_MIN?

Description
This command reads minimum value of RMS DEVM from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:RMS_DEVM_MIN?” command, “EXEC:RFTC:EFSMA:RUN“ command be exected to update measurement value.

READ:RFTC:EFSMA:PEAK_DEVM_MIN?

Description
This command reads minimum value of PEAK DEVM from EDR Carrier Frequency Stability & Modulation Accuracy(TRM/CA/11/C) measurement. Before reading this value by “READ:RFTC:EFSMA:PEAK_DEVM_MIN?” command, “EXEC:RFTC:EFSMA:RUN” command be exected to update measurement value.

5.3.21 EDR Differential Phase Encoding(EDPE)

EXEC:RFTC:EDPE:RUN

Description
This command executes EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

EXEC:RFTC:EDPE:STOP

Description
This command stops execution of EDR Differential Phase Encoding(TRM/CA/12/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:EDE:RUN” command.

READ:RFTC:EDPE:CH?

Description
This command reads channel value for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

CONF:RFTC:EDPE:CH <Value>

Description
This command sets channel for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

Value
channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:EDPE:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:EDPE:CH 0-39-78

READ:RFTC:EDPE:PACK_TYPE?

Description
This command reads packet type for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

CONF:RFTC:EDPE:PACK_TYPE <Value>

Description
This command sets packet type for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

Value
Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:EDPE:PACK_NUM?

Description
This command reads number of packet for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

CONF:RFTC:EDPE:PACK_NUM <Value>

Description
This command sets number of packet for EDR Differential Phase Encoding(TRM/CA/12/C) measurement

Value
Number of packets : 0~65535, 100(default)

READ:RFTC:EDPE:HOP?

Description
This command reads hopping mode for EDR Differential Phase Encoding(TRM/CA/12/C) measurement.

CONF:RFTC:EDPE:HOP <Value>

Description
This command sets hopping mode for EDR differential phase encoding(TRM/CA/12/C) measurement.

value
Hopping Mode : OFF(default), ON

READ:RFTC:EDPE:BER?

Description
This command reads BER value for EDR Differential Phase Encoding(TRM/CA/12/C) measurement. Before reading this value using “READ:RFTC:EDPE:BER?” command, RF test case should be executed to update this value by sending “EXEC:RFTC:EDPE:RUN”.

READ:RFTC:EDPE:PER?

Description
This command reads PER value for EDR Differential Phase Encoding(TRM/CA/12/C) measurement. Before reading this value use “READ:RFTC:EDPE:PER? Command, RF test case should be executed to update this value by sending “EXEC:RFTC:EDPE:RUN”.

5.3.22 EDR In-band Spurious Emission(ETP)

EXEC:RFTC:ESE:RUN

Description
This command executes EDR In-band Spurius Emission(TRM/CA/13/C) measurement.

EXEC:RFTC:ESE:STOP

Description
This command stops execution of EDR In-band Spurious Emission(TRM/CA/13/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:ESE:RUN” command.

READ:RFTC:ESE:CH?

Description
This command reads channel value for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

CONF:RFTC:ESE:CH <value>

Description
This command sets channel for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

value

channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:ESE:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:ESE:CH 0-39-78

READ:RFTC:ESE:PACK_TYPE?

Description
This command reads packet type for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

CONF:RFTC:ESE:PACK_TYPE <Value>

Description
This command sets packet type for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

Value
Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:ESE:TEST_MODE?

Description
This command reads test mode for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

CONF:RFTC:ESE:TEST_MODE <값>

Description
This command sets test mode for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

Value
Test Mode : TRANSMITTER_TEST(default), LOOPBACK_TEST

READ:RFTC:ESE:SWP_NUM?

Description
This command reads number of sweep for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

CONF:RFTC:ESE:SWP_NUM <Value>

Description
This command sets number of sweep for EDR In-band Spurious Emission(TRM/CA/13/C) measurement.

Value
Number of sweeps : 1~65535, 10(default)

READ:RFTC:ESE:P_TX?

Description
This command reads adjacent channel power from EDR In-band Spurious Emission(TRM/CA/13/C) measurement. Before reading this value use “READ:RFTC:ESE:P_TX?” Command, RF test case should be executed to update this value by sending “EXEC:RFTC:ESE:RUN”.

5.3.23 EDR Sensitivity(ES)

EXEC:RFTC:ES:RUN

Description
This command executes EDR Sensitivity(RCV/CA/07/C) measurement.

EXEC:RFTC:ES:STOP

Description
This command stops execution of running EDR Sensitivity(RCV/CA/07/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:ES:RUN” command.

READ:RFTC:ES:CH?

Description
This command reads channel value for EDR Sensitivity(RCV/CA/07/C) measurement.

CONF:RFTC:ES:CH <Value>

Description
This command sets channel for EDR Sensitivity(RCV/CA/07/C) measurement.

Value
channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:ES:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:ES:CH 0-39-78

READ:RFTC:ES:PACK_TYPE?

Description
This command reads packet type for EDR Sensitivity (RCV/CA/07/C) measurement

CONF:RFTC:ES:PACK_TYPE <Value>

Description
This command sets packet type for EDR Sensitivity(RCV/CA/07/C) measurement

Value
Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:ES:HOP?

Description
This command reads hopping mode for EDR Sensitivity(RCV/CA/07/C) measurement.

CONF:RFTC:ES:HOP <Value>

Description
This command sets hopping mode for EDR Sensitivity(RCV/CA/07/C) measurement.

Value
Hopping Mode : OFF(default), ON

READ:RFTC:ES:DIRTY_TX?

Description
This command reads Dirty Transmitter value for EDR Sensitivity(RCV/CA/07/C) measurement.

CONF:RFTC:ES:DIRTY_TX <Value>

Description
This command sets Dirty Transmitter for EDR Sensitivity(RCV/CA/07/C) measurement.

Value
Dirty Transmitter Mode : OFF, ON(default)

READ:RFTC:ES:RX_LEV?

Description
This command reads DUT RX Level value for EDR Sensitivity(RCV/CA/07/C) measurement.

CONF:RFTC:ES:RX_LEV <Value>

Description
This command sets DUT RX Level for EDR Sensitivity (RCV/CA/07/C) measurement.

Value
DUT RX Level : -327~20, -70(default)

READ:RFTC:ES:BYTES?

Description
This command reads number of received byte for EDR Sensitivity(RCV/CA/07/C) measurement.

CONF:RFTC:ES:BYTES <Value>

Description
This command sets number of received byte for EDR Sensitivity(RCV/CA/07/C) measurement.

Value
DUT RX Level : 0 ~ 2147000000, 200000(default)

READ:RFTC:ES:BER?

Description
This command reads BER value from EDR Sensitivity(RCV/CA/07/C) measurement. Before reading this value use “READ:RFTC:ES:BER?” Command, RF test case should be executed to update this value by sending “EXEC:RFTC:ES:RUN”.

5.3.24 EDR BER Floor Performance(EBP)

EXECRFTC:EBP:RUN

Description
This command executes EDR BER Floor Performance(RCV/CA/08/C) measurement.

EXEC:RFTC:EBP:STOP

Description
This command stops exection of running EDR BER Floor Performance(RCV/CA/08/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:EBP:RUN” command.

READ:RFTC:EBP:CH?

Description
This command reads channel value for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:CH <Value>

Description
This command sets channel for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
channel : 0-39-78(default)
(ex) In case of setting channel 0 : CONF:RFTC:EBP:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:EBP:CH 0-39-78

READ:RFTC:EBP:PACK_TYPE?

Description
This command reads packet type for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:PACK_TYPE <Value>

Description
This command sets packet type for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:EBP:HOP?

Description
This command reads hopping mode for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:HOP <Value>

Description
This command sets hopping mode for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
Hopping Mode : OFF(default), ON

READ:RFTC:EBP:DIRTY_TX?

Description
This command reads Dirty Transmitter value for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:DIRTY_TX <Value>

Description
This command sets Dirty Transmitter for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
Dirty Transmitter Mode : OFF(default), ON

READ:RFTC:EBP:RX_LEV?

Description
This command reads DUT RX Level value for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:RX_LEV <Value>

Description
This command sets DUT RX Level for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
DUT RX Level : -327~20, -60(default)

READ:RFTC:EBP:BYTES?

Description
This command reads number of received byte for EDR BER Floor Performance(RCV/CA/08/C) measurement.

CONF:RFTC:EBP:BYTES <Value>

Description
This command sets number of received byte for EDR BER Floor Performance(RCV/CA/08/C) measurement.

Value
Number of samples : 0 ~ 2147000000, 1000000(default)

READ:RFTC:EBP:BER?

Description
This command reads BER value from EDR BER Floor Performance(RCV/CA/08/C) measurement.
Before reading this value use “READ:RFTC:EBP:BER?” Command, RF test case should be executed to update this value by sending “EXEC:RFTC:EBP:RUN ”.

5.3.25 EDR Maximum Input Level(EML)

EXEC:RFTC:EML:RUN

Description
This command executes EDR Maximum Input Level(RCV/CA/10/C) measurement.

EXEC:RFTC:EML:STOP

Description
This command stops execution of running EDR Maximum Input Level(RCV/CA/10/C) measurement. It is used to cancel the running RF test case which is started by “EXE:RFTC:EML:RUN” command.

READ:RFTC:EML:CH?

Description
This command reads setting channel for EDR Maxmim Input Level(RCV/CA/10/C) measurement.

CONF:RFTC:EML:CH <Value>

Description
This command sets channel for EDR Maximum Input Level(RCV/CA.10) measurement.

Value
channel : 0-39-78(default)
(예) In case of setting channel 0 : CONF:RFTC:EML:CH 0
In case of setting channel 0, 39, 78 : CONF:RFTC:EML:CH 0-39-78

READ:RFTC:EML:PACK_TYPE?

Description
This command reads packet type fro EDR Maximum Input Level(RCV/CA/10/C) measurement.

CONF:RFTC:EML:PACK_TYPE <Value>

Description
This command sets packet type for EDR Maximum Input Level(RCV/CA/10/C) measurement

Value
Packet type : 2-LONGEST(default),3-LONGEST,2-DH1,3-DH1,2-DH3,3-DH3,2-DH5,3-DH5,2-EV3,3-EV3,2-EV5,3-2V5

READ:RFTC:EML:HOP?

Description
This command reads hopping mode for EDR Maximum Input Level(RCV/CA/10/C) measurement.

CONF:RFTC:EML:HOP <Value>

Description
This command sets hopping mode for EDR Maximum Input Level(CV/CA/10/C) measurement.

Value
Hopping Mode : OFF(default), ON

READ:RFTC:EML:RX_LEV?

Description
This command reads DUT RX Level value for EDR Maximum Input Level(RCV/CA/10/C) measurement.

CONF:RFTC:EML:RX_LEV <Value>

Description
This command sets DUT RX Level for EDR Maximum Input Level(RCV/CA/10/C) measurement.

Value
DUT RX Level : -327~20, -20(default)

READ:RFTC:EML:BYTES?

Description
This command reads number of received byte for EDR Masimum Input Level(RCV/CA/10/C) measurement.

CONF:RFTC:EML:BYTES <Value>

Description
This command sets number of received byte for EDR Maximum Input Level(RCV/CA/10/C) measurement.

Value
Number of samples : 0 ~ 2147000000, 200000(default)

READ:RFTC:EML:BER?

Description
This command reads BER value for EDR Maximum Input Level(RCV/CA/10/C) measurement. Before reading this value use “READ:RFTC:EML:BER?” Command, RF test case should be executed to update this value by sending “EXEC:RFTC:EML:RUN ”.

5.3.26 Audio Test Command

EXEC:AUDIO:CONN

Description
This command executes ACL connection with profile.

EXEC:AUDIO:DISC

Description
This command executes disconnection after closing profile.

EXEC:AUDIO:TONE_INIT

Description
This command executes tone initialization before tone generation.

EXEC:AUDIO:TONE_START

Description
This command starts sending of audio tone signal to the DUT.

EXEC:AUDIO:TONE_STOP

Description
This command stops sending of audio tone signal to the DUT.

EXEC:AUDIO:INCOMING_CALL

Description
Tester shall send a sequence of unsolicited RING alerts to the HF(DUT). The HF shall produce a local alerting in reaction to the RING.

Response
<Incoming_call> : OK | Disconnected Profile State | unknown command error

READ:AUDIO:PROFILE_TYPE?

Description
This command reads the type of the DUT profile.

CONF:AUDIO:PROFILE_TYPE

Description
This command writes the type of the DUT profile.

Value
profile type : NONE, HEADSET, HANDSFREE(default), AUDIOGATEWAY

READ:AUDIO:TONE_FREQ?

Description
This command reads the frequency of the tone signal which would be sent by a tester.

CONF:AUDIO:TONE_FREQ

Description
This command writes the frequency of the tone signal which would be sent by a tester.

Value
tone frequency : 400 ~ 1000, 1000(default)

READ:AUDIO:TONE_LEV?

Description
This command reads the amplitude of the tone signal which would be sent by a tester.

CONF:AUDIO:TONE_LEV <Value>

Description
This command writes the amplitude of the tone signal which would be sent by a tester.

Value
tone frequency : -70 ~ 3, -10(default)

READ:AUDIO:TEST:AUDIO_IN?

Description
This command reads notch filter value.

CONF:AUDIO:TEST:AUDIO_IN <Value>

Description
This command writes notch filter value in accordance with received audio signal.

Value
notch filter : 400, 1000(default)

READ:AUDIO:GAIN_CTRL?

Description
This command reads the parameter which decides whether it controls a mike or speaker gain during connection procedure with Profiles.

CONF:AUDIO:GAIN_CTRL <Value>

Description
This command sets the parameter which decides whether it controls a mike or speaker gain during connection procedure with Profiles.

Value
Gain Control : ON, OFF(default)

READ:AUDIO:VGS?

Description
This command reads speaker gain during connection procedure with Profiles.

CONF:AUDIO:VGS <Value>

Description
This command sets speaker gain during connection procedure with Profiles.

Value
VGS : 0~15, 15(default)

READ:AUDIO:VGM?

Description
This command reads mike gain during connection procedure with Profiles.

CONF:AUDIO:VGM <Value>

Description
This command sets gain of a mike gain during connection procedure with Profiles.

Value
VGM : 0~15, 15(default)

EXEC:AUDIO:TEST:RUN

Description
This command executes measurement of the parameter of RX audio signal.

READ:AUDIO:TEST:FREQ?

Description
This command reads frequency of the audio signal's power density maximum.

READ:AUDIO:TEST:F_POW?

Description
This command reads peak value of the power in audio spectrum characteristic.

READ:AUDIO:TEST:RMS?

Description
This command reads RMS value of the audio signal.

READ:AUDIO:TEST:SINAD?

Description
This command reads SINAD value of the audio signal.

READ:AUDIO:TEST:DIST?

Description
This command reads distortion of the audio signal.

EXEC:AUDIO:SCOC

Description
This command executes SCO link with a DUT.

EXEC:AUDIO:PAIRABLE

Description
This command executes TC-3000C as slave mode. This differently works depending on profile type.

EXEC:AUDIO:TALK

Description
This command creates ACL(or “ACL and SCO”) link under Audio Gateway Profile. Accordingly user must send “CONF:AUDIO:PROFILE_TYPE AUDIOGATEWAY” command before this.

EXEC:AUDIO:STOP

Description
This command stops the execution of “EXEC:AUDIO:TALK” command.

READ:AUDIO:PACK_TYPE?

Description
This command reads the packet type the tester shall use for the SCO connection.

CONF:AUDIO:PACK_TYPE <Value>

Description
This command writes the packet type the tester shall use for the SCO connection.

Value
packet type : HV1, HV2, HV3(default)

READ:AUDIO:AIR_CODING?

Description
This command reads air coding format for SCO links.

CONF:AUDIO:AIR_CODING <Value>

Description
This command writes air coding format for SCO links.

Value
air coding format : CVSD(default), U-LAW, A-LAW

EXEC:AUDIO:LB_START

Description
This command executes entering the SCO loopback mode to send all SCO data back to the DUT.

EXEC:AUDIO:LB_STOP

Description
This command stops the SCO loopback mode to send all SCO data back to the DUT.

READ:AUDIO:LB_DELAY?

Description
This command reads the delay of SCO loopback in milliseconds.

CONF:AUDIO:LB_DELAY <Value>

Description
This command writes the delay of SCO loopback in milliseconds.

Value
delay time : 0, 2, 5

READ:AUDIO:TEST_OP_ICFT:AUDIO_IN?

Description
This command reads required filter value.

CONF:AUDIO:TEST_OP_ICFT:AUDIO_IN <Value>

Description
This command writes proper filter value in accordance with received audio signal.

Value
filter : 400, 1000(default)

EXEC:AUDIO:TEST_OP_ICFT:RUN

Description
This command executes measurement in the audio spectrum.

READ:AUDIO:TEST_OP_ICFT:FREQ?

Description
This command reads frequency of the audio signal's power density maximum.

READ:AUDIO:TEST_OP_ICFT:F_POW?

Description
This command reads peak value of the power in the audio spectrum.

READ:AUDIO:TEST_OP_ICFT:RMS?

Description
This command reads RMS value of the power in the audio spectrum.

READ:AUDIO:TEST_OP_ICFT:SINAD?

Description
This command reads SINAD value in the audio spectrum.

READ:AUDIO:TEST_OP_ICFT:DIST?

Description
This command reads distortion in the audio spectrum.

READ:AUDIO:TEST_OP_ICFT:CH?

Description
This command reads RX frequency of a tester(TX for a DUT).

CONF:AUDIO:TEST_OP_ICFT:CH <Value>

Description
This command writes RX frequency of a tester(TX for a DUT).

Value
Tchannel : RX frequency of a tester(TX for a DUT), 0~78, 0-39-78(default)

READ:AUDIO:TEST_OP_ICFT:P_AVG?

Description
This command reads the average power.

READ:AUDIO:TEST_OP_ICFT:P_MIN?

Description
This command reads minimum power.

READ:AUDIO:TEST_OP_ICFT:P_MAX?

Description
This command writes maximum power.

READ:AUDIO:TEST_OP_ICFT:DF0_MIN?

Description
This command reads minimal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:AUDIO:TEST_OP_ICFT:DF0_MAX?

Description
This command reads minimal deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:AUDIO:TEST_OP_ICFT:DF0_AVG?

Description
This command reads average deviation of carrier frequencies from (2402+frequency) MHz in hundreds Hz.

READ:AUDIO:TEST_OP_ICFT:DF2_AVG?

Description
This command reads average of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

READ:AUDIO:TEST_OP_ICFT:DF2_MIN?

Description

This command reads minimum of all maximum frequency deviations from the average frequency for the 10101010 pattern in Hz divided by 100.

5.4 Example using command

☞ EDR Relative Transmit Power(TRM/CA/10/C)

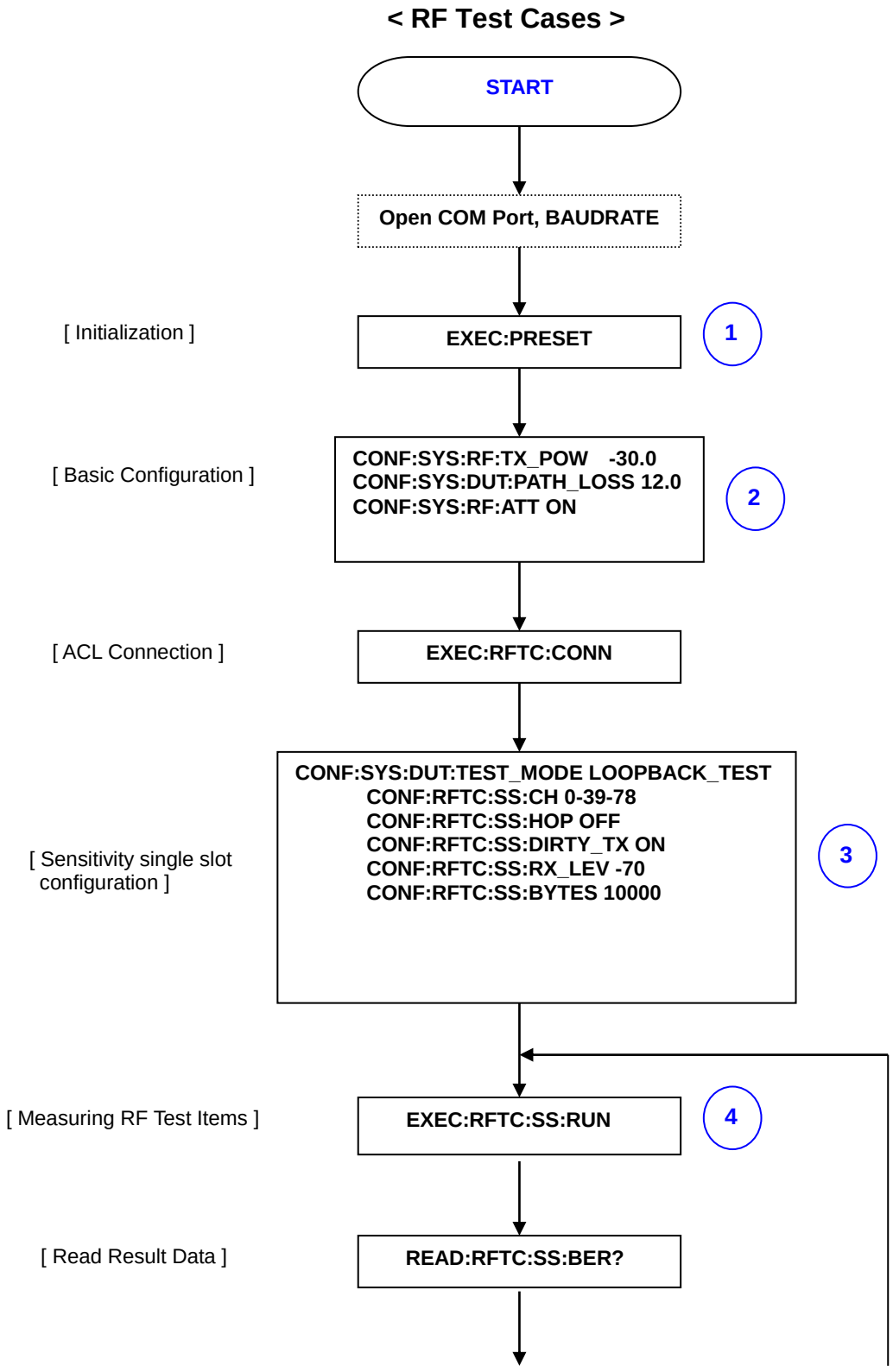
Default setting (to use default value, folling commands can be skipped)
- CONF:RFTC:ETP:CH 0-39-78
- CONF:RFTC:ETP:PACK_TYPE 2-LONGEST
- CONF:RFTC:ETP:PACK_NUM 1
- CONF:RFTC:ETP:TEST_MODE TRANSMITTER_TEST
- CONF:RFTC:ETP:HOP OFF

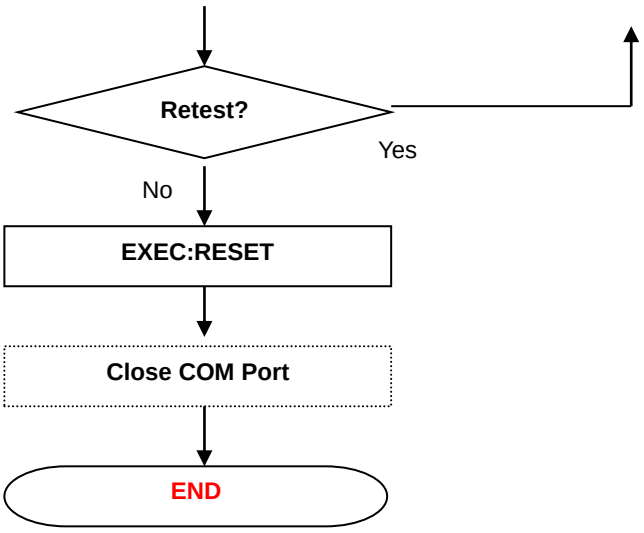
Start Measurement
- EXEC:RFTC:ETP:RUN

Read measurement result
- READ:RFTC:ETP:PAV_FSK?
- READ:RFTC:ETP:PAV_PSK?
- READ:RFTC:ETP:PMIN_FSK?
- READ:RFTC:ETP:PMIN_PSK?
- READ:RFTC:ETP:PMAX_FSK?
- READ:RFTC:ETP:PMAX_PSK?

To measure once again, execute again the commands as follow
- EXEC:RFTC:ETP:RUN
- READ:RFTC:ETP:PAV_FSK?
- READ:RFTC:ETP:PAV_PSK?
- READ:RFTC:ETP:PMIN_FSK?
- READ:RFTC:ETP:PMIN_PSK?
- READ:RFTC:ETP:PMAX_FSK?
- READ:RFTC:ETP:PMAX_PSK?

5.5 Flow Chart for RS-232C Commands





1. Set parametes of RF test cases complying with Bluetooth specification.
2. Set “TX Power”, “RX ATT”, and “Path Loss” depending on user environments.
3. Set user specific parameter.
4. Start test.

* In case of OUTPUT POWER TEST 2 ~3 procedure.

[Output power configuration]

```
CONF:SYS:DUT:TEST_MODE TRANSMITTER_TEST
CONF:RFTC:OP:CH 0-39-78
CONF:RFTC:OP:PACK_TYPE LONGEST
CONF:RFTC:OP:PACK_NUM 1
CONF:RFTC:OP:HOP ON
```

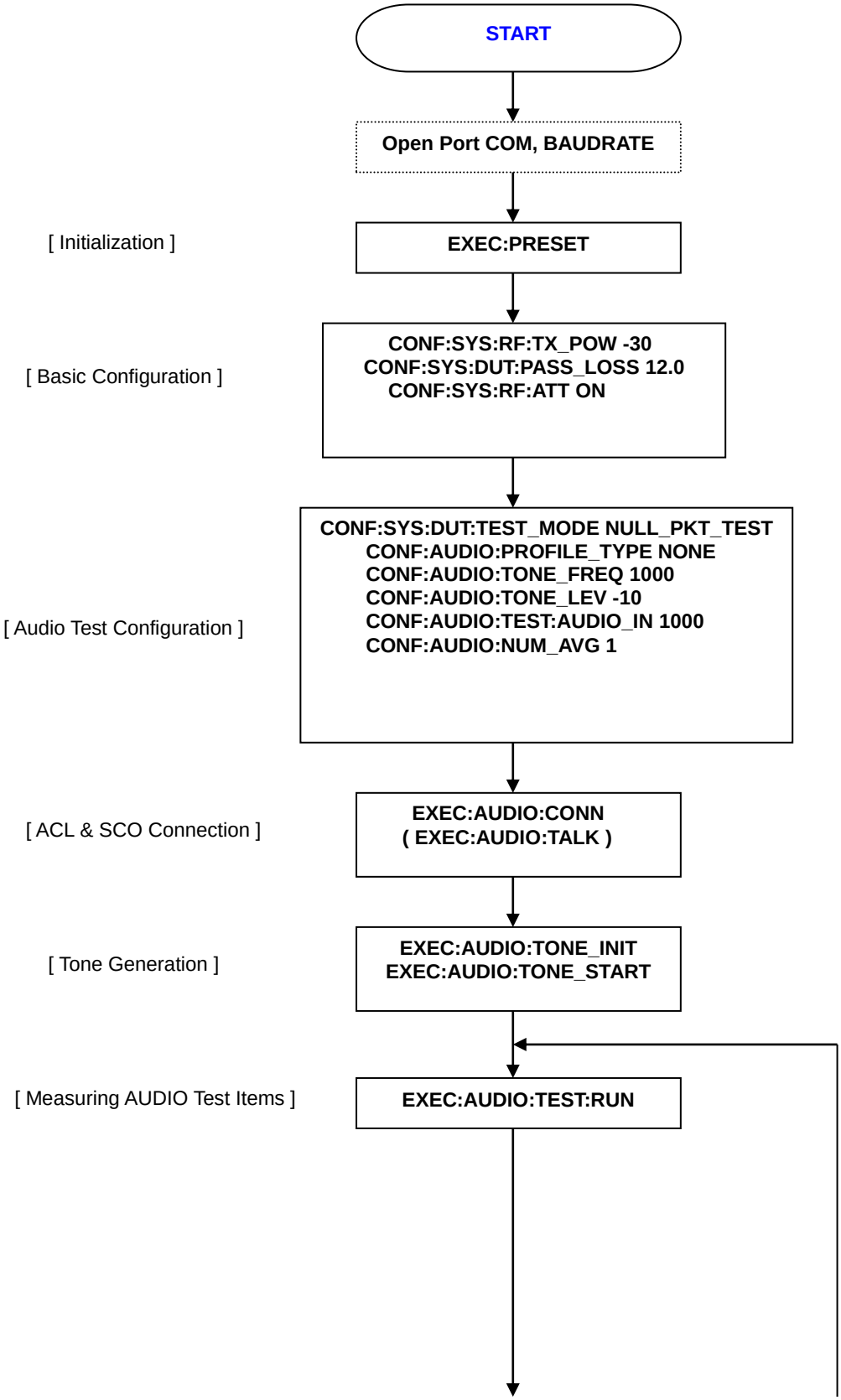
[Measuring RF Test Items]

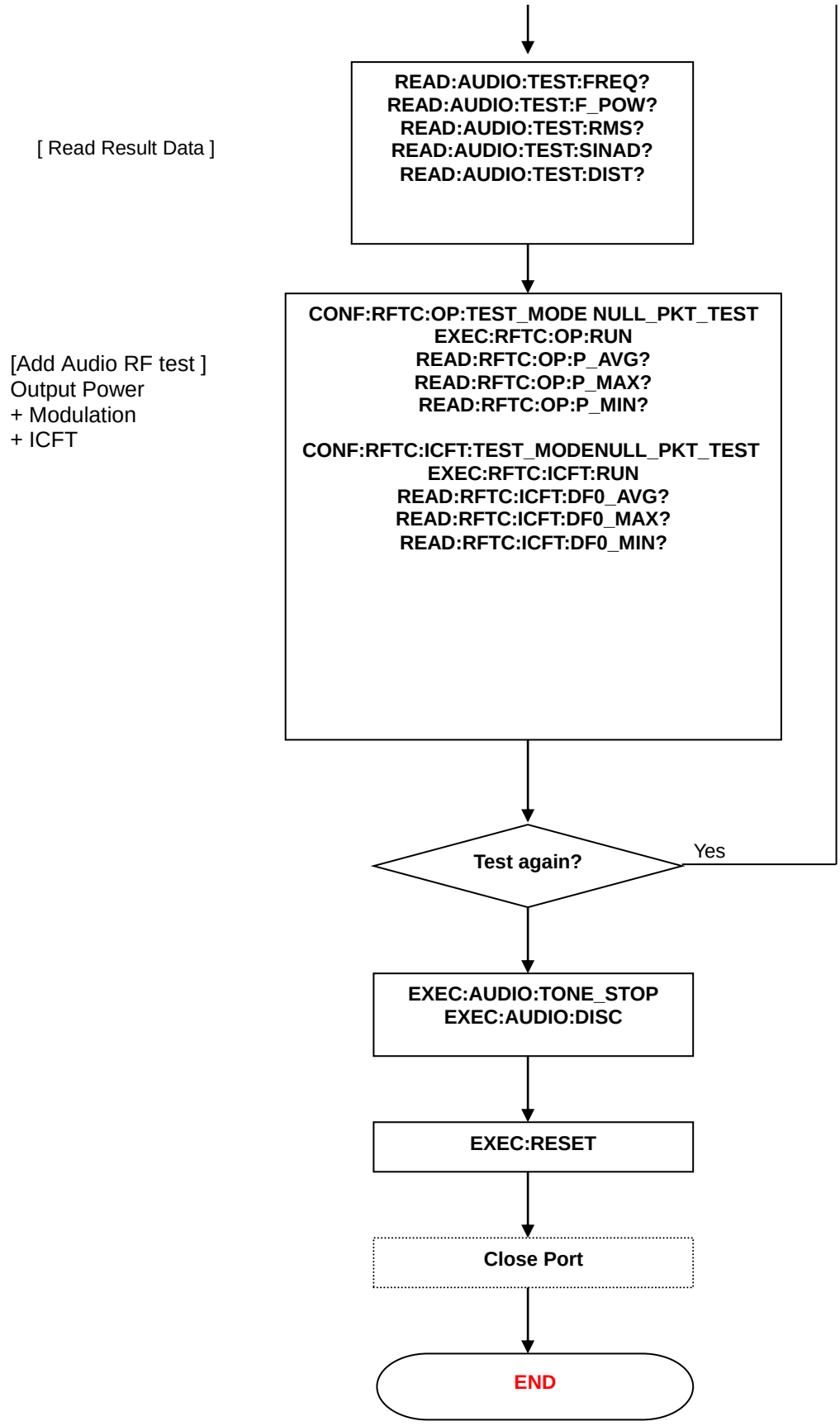
```
EXEC:RFTC:OP:RUN
```

[Read Result Data]

```
READ:RFTC:OP:P_AVG?
READ:RFTC:OP:P_MIN?
READ:RFTC:OP:P_MAX?
```

< Audio Test >


START
Open Port COM, BAUDRATE
[Initialization]
EXEC:PRESET
[Basic Configuration]
CONF:SYS:RF:TX_POW -30
CONF:SYS:DUT:PASS_LOSS 12.0
CONF:SYS:RF:ATT ON
[Audio Test Configuration]
CONF:SYS:DUT:TEST_MODE NULL_PKT_TEST
CONF:AUDIO:PROFILE_TYPE NONE
CONF:AUDIO:TONE_FREQ 1000
CONF:AUDIO:TONE_LEV -10
CONF:AUDIO:TEST:AUDIO_IN 1000
CONF:AUDIO:NUM_AVG 1
[ACL & SCO Connection]
EXEC:AUDIO:CONN
(EXEC:AUDIO:TALK)
[Tone Generation]
EXEC:AUDIO:TONE_INIT
EXEC:AUDIO:TONE_START
[Measuring AUDIO Test Items]
EXEC:AUDIO:TEST:RUN


[Read Result Data]
READ:AUDIO:TEST:FREQ?
READ:AUDIO:TEST:F_POW?
READ:AUDIO:TEST:RMS?
READ:AUDIO:TEST:SINAD?
READ:AUDIO:TEST:DIST?
[Add Audio RF test]
Output Power
+ Modulation
+ ICFT
CONF:RFTC:OP:TEST_MODE NULL_PKT_TEST
EXEC:RFTC:OP:RUN
READ:RFTC:OP:P_AVG?
READ:RFTC:OP:P_MAX?
READ:RFTC:OP:P_MIN?
CONF:RFTC:ICFT:TEST_MODENULL_PKT_TEST
EXEC:RFTC:ICFT:RUN
READ:RFTC:ICFT:DF0_AVG?
READ:RFTC:ICFT:DF0_MAX?
READ:RFTC:ICFT:DF0_MIN?
Test again?
Yes
EXEC:AUDIO:TONE_STOP
EXEC:AUDIO:DISC
EXEC:RESET
Close Port
END

5.6 Sample Code(VC++) for RS-232C remote control

(1). Basic Function

1. To open RS-232C Port

```
/*-------------------------------------------------------------------------*/
/* Open RS-232 COM Port                                                    */
/*-------------------------------------------------------------------------*/
BOOL CRFTC::open_port()
{
    OVERLAPPED overlapped = {0,0,0,0};
    COMMTIMEOUTS cto = {0, 0, 0, 0, 0 };

    handle = CreateFile(com,
                GENERIC_WRITE          // Generic access, read/write.
                | GENERIC_READ,
                FILE_SHARE_READ        // Share both read and write.
                | FILE_SHARE_WRITE ,
                NULL,                  // No security.
                OPEN_EXISTING,         // Fail if not existing.
                NULL,
                NULL);

    if (handle == INVALID_HANDLE_VALUE)
    {
        AfxMessageBox("Error: RS-232 Port Open");
        return FALSE;
    }

    overlapped.hEvent = CreateEvent(NULL,
                                    TRUE,  // manual reset
                                    FALSE, // initially non-signalled
                                    NULL);
    if (overlapped.hEvent == NULL)
    {
        CloseHandle(handle);
        AfxMessageBox("Error to create event");
        return FALSE;
    }

    // Obtain the DCB structure for the device
    DCB dcb;

    if (!::GetCommState(handle,&dcb))
        AfxMessageBox("Error: Badd Rate Setting");

    dcb.DCBlength = sizeof(dcb);

    dcb.BaudRate = CBR_115200;
    dcb.fBinary = FALSE;
    dcb.fParity = FALSE;
    dcb.fOutxCtsFlow = FALSE;
    dcb.fOutxDsrFlow = FALSE;
    dcb.fDtrControl = DTR_CONTROL_DISABLE;
```

```
    dcb.fDsrSensitivity = FALSE;
    dcb.fOutX = FALSE;
    dcb.fInX = FALSE;
    dcb.fErrorChar = FALSE;
    dcb.fNull = FALSE;
    dcb.fRtsControl = RTS_CONTROL_DISABLE;
    dcb.fAbortOnError = FALSE;
    dcb.ByteSize = 8;
    dcb.Parity = NOPARITY;
    dcb.StopBits = ONESTOPBIT;      // In windows 0,1,2 ==> 1, 1.5, 2

    if (handle    != INVALID_HANDLE_VALUE)
    {
        if(!SetCommMask(handle, 0))
        {
            AfxMessageBox("Error: SetCommMask");
            return FALSE;
        }

        // set timeouts
        if(!SetCommTimeouts(handle,&cto))
        {
            AfxMessageBox("Error: SetCommTimeouts");
            return FALSE;
        }

        // set DCB
        if(!SetCommState(handle,&dcb))
        {
            AfxMessageBox("Error: SetCommState");
            return FALSE;
        }
    }
    else
        return FALSE;

    return TRUE;
}
```

2. To receive RS-232C response

```
/*-------------------------------------------------------------------------*/
/* Receive From the Data from Remote Control                               */
/*-------------------------------------------------------------------------*/
int CRFTC::recv_data_from_dev(void)
{
     COMMTIMEOUTS CommTimeouts;
     COMSTAT Stat;
     DWORD dwErrors;
     DWORD dwRet;
     int ret = 0;

     strncpy(read_data,"W0",300);
     Sleep(100);

     GetCommTimeouts (handle, &CommTimeouts);
     CommTimeouts.ReadIntervalTimeout = MAXDWORD;
     CommTimeouts.ReadTotalTimeoutMultiplier = 0;
     CommTimeouts.ReadTotalTimeoutConstant = 0;  //Read timeout at 50msec
     SetCommTimeouts (handle, &CommTimeouts);

     SetCommMask (handle, EV_RXCHAR | EV_CTS | EV_DSR | EV_RLSD | EV_RING);
     bool v_bStop = 0;

     while (!v_bStop)
     {
        // Reset the comm Mask
        SetCommMask (handle, EV_RXCHAR | EV_CTS | EV_DSR | EV_RING);

       // Loop getting data.

        // Need to loop because To check any buffer is remains
        while (TRUE)
        {
            ClearCommError( handle,&dwErrors,&Stat);
            if (!Stat.cbInQue)
```

```
            {
                v_bStop = 1;
                break;
            }
            else
            {
                ret = ReadFile(handle, &read_data , Stat.cbInQue , &dwRet, NULL);
                // do something with data
            //  Sleep(10);    // jjh com test

            }
           // Loop around and check for more data
           // In case additional byte has arrived while reading.
        }
     }

     return ret;
}
```

3. To send RS-232C commands

```
/*-------------------------------------------------------------------------*/
/* Write To the Data from Remote Control                                   */
/*-------------------------------------------------------------------------*/
int CRFTC::send_data_to_dev(char *data)
{
    int size;
    DWORD dwWritten;
    COMSTAT ComStat = {0};
    DWORD dwError = 0;

    size = strlen(data);

    strncpy(read_data,"W0",300);

    if (!WriteFile(handle, data, size, &dwWritten, NULL))
    {
        if (GetLastError() == ERROR_IO_PENDING)
        {
            // We've been deferred, wait for it.
            while (WaitForSingleObject(handle, 1000) != WAIT_OBJECT_0)
            {
                ClearCommError(handle,&dwError,&ComStat);
                if(ComStat.cbOutQue == 0 )
                {
                    // if its empty, check one last time for the signal from the
                    // serial operation
                    if( WAIT_OBJECT_0 == WaitForSingleObject( handle, 0) )
                    {
                        break;
                    }
                }
            }
        }
    }

    return 0;
}
```

4. Variables

```
HANDLE handle = 0;

char read_data[300];
char recv_data[50];
char send_data[50];
double  result[300];

int pos = 0;
```

5. “Convert String To Number” Function

```
/*-------------------------------------------------------------------------------*/
/*  Convert String to Number(Channels & Max or Min Power)                        */
/*  Parameters:                                                                  */
/*      *s    - Data                                                             */
/*      flag  - 1 - Channel Numbers                                              */
/*              0 - Max or Avg Power                                             */
/*-------------------------------------------------------------------------------*/
void CRFTC::convert_Num(char *s, int flag)
{
    char t[100] = {'₩0'};
    int i = 0;
    int j = 0;
    double ret;
    char ch = '₩0';

    // check the flag.,
    if(flag)
        ch = '-';
    else
        ch = ',';

    // end jjh
    while(s[i] != '₩0')
    {
        if(s[i] == ch)
        {
            t[j] = '₩0';
            ret = atof(t);
            result[pos] = ret;
            pos++;
            j = 0;
            i++;
        }
        else
        {
            t[j] = s[i];
            j++;
            i++;
        }

    }
    if(s[i] == '₩0')
    {
        t[j] = '₩0';
        ret = atof(t);
        result[pos] = ret;
        pos++;
    }
}
```

6. To measure “Output Power”

```
void CBlueyesDlg::OnOutputRun()
{
    bool flag = 1;
    int ret = 0;
    start = 1;
    pos = 0;
    char *send_data;
    COMSTAT Stat;
    DWORD dwErrors;

    send_data = (char *)malloc(sizeof(char *));

    if(!handle)
        open_port();

    // Check Whether Remote has any buffer value
    ClearCommError( handle,&dwErrors,&Stat);
    if (Stat.cbInQue)
        ret = recv_data_from_dev();
```

```
    if(handle)
    {
        strncpy(read_data,"¥0",50);

        send_data= "EXEC:RFTC:OP:RUN¥n";
        send_data_to_dev(send_data);

        Sleep(4000);

        do{
            ret = recv_data_from_dev();

        }while(!ret);

        if(!strcmp(read_data,"OK¥r¥n"))
        {
            send_data= "READ:RFTC:OP:CH?¥n";
            send_data_to_dev(send_data);

            do
            {
                ret = recv_data_from_dev();

                if(!strcmp(read_data,"¥0"))
                    ret = 0;

            }while(!ret);
            convert_Num(read_data,1);

            send_data= "READ:RFTC:OP:P_AVG?¥n";
            send_data_to_dev(send_data);
            do
            {
                ret = recv_data_from_dev();

                if(!strcmp(read_data,"¥0"))
                    ret = 0;
           }while(!ret);

           convert_Num(read_data,0);

           send_data= "READ:RFTC:OP:P_MAX?¥n";
           send_data_to_dev(send_data);
           do
           {
               ret = recv_data_from_dev();

               if(!strcmp(read_data,"¥0"))
                   ret = 0;

           }while(!ret);
           convert_Num(read_data,0);

           send_data= "EXEC:RESET¥n";
           send_data_to_dev(send_data);
           do
           {
               ret = recv_data_from_dev();

               if(!strcmp(read_data,"¥0"))
                   ret = 0;

           }while(!ret);
       }
       else
       {
           CString s;
           s.Format("Error: %s",read_data);
           AfxMessageBox(s);
           flag = 0;
       }
   }
}
```

5.7 Reference Guide for using DLL

5.7.1 General Function

read_dll_version_string

Description
This function reads version of “blueyes.dll” file.


NOTE

The version derived from “blueyes.dll” file must be the same with firmware version of TC-3000C.

Syntax
unsigned long read_dll_version_string(char *dll_vers);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
dll_vers // the whole version of “blueyes.dll” file

5.7.2 Tester Configuration

read_tester_serial_number

Description
This function reads serial number of TC-3000C.

Syntax
unsigned long read_tester_serial_number (char *serial_number);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
serial_number // serial number of TC-3000C bluetooth tester.

read_local_ip

Description
This function reads the IP address of a local unit. It is meaningful that the HCI transport layer of a tester is only for TCP/IP.

Syntax
unsigned long read_local_ip(char *local_ip);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
local_ip // IP address of user PC. The size could be up to 16 bytes.

write_local_ip

Description
This function writes the IP address of a local unit. It is meaningful that the HCI transport layer of a tester is only for TCP/IP.

Syntax
unsigned long write_local_ip(char *local_ip);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
local_ip // IP address of user PC. The size could be up to 16 bytes.

read_remote_ip

Description
This function reads the IP address of a remote unit. It is meaningful that the HCI transport layer of a tester is only for TCP/IP.

Syntax
unsigned long read_remote_ip(char *remote_ip);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
remote_ip // local IP address of TC-3000C. The size could be up to 16 bytes.

write_remote_ip

Description
This function writes the IP address of a remote unit. It is meaningful that the HCI transport layer of a tester is only for TCP/IP.

Syntax
unsigned long write_remote_ip(char*remote_ip);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
remote_ip // local IP address of TC-3000C. The size could be up to 16 bytes.

read_meas_to

Description
This function writes the timeout of the Measurement command execution in baseband slots (625 us). Refer to write_meas_to for more details.

Syntax
unsigned long read_meas_to(unsigned short *meas_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
meas_timeout // Range : 500 ~ 65535, Time Range : 312.5ms ~ 40.96s.

write_meas_to

Description
This function reads the timeout of the measurement command execution in baseband slots (625 us). If the measurement is not finished during 'meas_timeout' period of time, the Host Controller stops the measurement and sends the Process Timeout Error code in the Command Complete event.

Syntax
unsigned long write_meas_to(nsigned short meas_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
meas_timeout // Range : 500 ~ 65535, Default : 2048, Time Range : 312.5ms ~ 40.96s.

read_link_supervision_to

Description
This function writes the link supervision timeout in baseband slots (625 us). Refer to write_link_supervision_to for more details.

Syntax
unsigned long read_link_supervision_to(unsigned short link_supervision_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
link_supervision_timeout // Range : 1 ~ 65535, Time Range : 0.625ms ~ 40.9s.
// For TC-3000 the link_supervision_timeout should be greater than 1600 (1 s).

write_link_supervision_to

Description
This function reads the link supervision timeout in baseband slots (625 us). The link_supervision_timeout parameter is used by the master or slave Bluetooth device to monitor link loss. If, for any reason, no Baseband packets are received from the DUT for a duration longer than the link_supervision_timeout, the connection is disconnected.

Syntax
unsigned long write_link_supervision_to(unsigned short link_supervision_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
link_supervision_timeout // Range : 1 ~ 65535, Default : 3200, Time Range : 0.625ms ~ 40.9s.
// For TC-3000C the link_supervision_timeout should be greater than 1600 (1 s).

read_tester_bdaddr

Description
This function reads Bluetooth Device Address (bdaddr)of a tester. Refer to write_tester_bdaddr for more details.

Syntax
unsigned long read_tester_bdaddr(unsigned char *bdaddr);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
bdaddr // Bluetooth Device Address of a tester.

write_tester_bdaddr

Description
This function writes Bluetooth Device Address (bdaddr) of a tester. The 6 bytes address used to identify each Bluetooth Device. LSB (least significant bit) of each byte of the array is rightmost. Byte's ordering of the bdaddr is from left to right. I.e. the first byte (bdaddr[0]) is the least significant byte of LAP (lower address part) and the last byte (bdaddr[5]) is the most significant byte of NAP (non-significant address).

Syntax
unsigned long write_tester_bdaddr(unsigned char *bdaddr);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
bdaddr // Bluetooth Device Address of a tester

read_tester_version_information

Description
This function reads the local version information of a tester.

Syntax
unsigned long read_tester_version_information(unsigned short *comp_id, unsigned char *lmp_vers, unsigned short *lmp_subvers, unsigned char *hci_vers, unsigned short *hci_rev);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
comp_id // Company ID. Manufacturer Name of the Bluetooth Hardware.
lmp_vers // Version of the Current LMP in the Bluetooth Hardware.
lmp_subvers // Subversion of the Current LMP in the Bluetooth Hardware. Defined by each company.
hci_vers // Version of the Current HCI in the Bluetooth Hardware.
hci_rev // Revision of the Current HCI in the Bluetooth hardware. Defined by each company.

read_tester_version_string

Description
This function reads the local version information of a tester.

Syntax
unsigned long read_tester_version_string(char *tester_vers);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

tester_vers // The local version information of a tester.

read_tester_pin_code

Description
This function writes the PIN length and PIN code(passkey) of a tester. Refer to write_tester_pin_code for more details.

Syntax
unsigned long read_tester_pin_code(unsigned char *pin_length, unsigned char *pin);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
pin_length // The PIN code length specifics the length, in bytes, of the PIN code to be used.
// Range : 0 ~ 16
pin // PIN code for the DUT.
// Endianess does therefore not apply to the PIN code Parameter.
// The first byte of the PIN code should be transmitted first.
// Default Value is “30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30”.

write_tester_pin_code

Description
This function reads the PIN length and PIN code(passkey) of a tester. Then PIN is used to authenticate two Bluetooth Devices(that have not previously exchanged link keys) to each other and create a trusted relationship between them and is used in pairing precedure to generate the initial link key that is used for further authentication.

Syntax
unsigned long write_tester_pin_code(unsigned char pin_length, unsigned char *pin);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
pin_length // The PIN code length specifics the length, in bytes, of the PIN code to be used.
// Range : 0 ~ 16, Default : 4.
pin // PIN code for the DUT.
// Endianess does therefore not apply to the PIN code Parameter.
// The first byte of the PIN code should be transmitted first.
// Default Value is “30 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30”.

read_tester_pin_type

Description
This function reads the PIN type of a tester. Tester uses the PIN type information during pairing.

Syntax
unsigned long read_tester_pin_type(unsigned char *pin_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
pin_type // 0: Variable PIN, 1:Fixed PIN

write_tester_pin_type

Description
This function writes the PIN type of a tester. Tester uses the PIN type information during pairing.

Syntax
unsigned long write_tester_pin_type(unsigned char pin_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
pin_type // 0: Variable PIN(default), 1:Fixed PIN

read_skip_pairing

Description
This function writes the flag to skip pairing procedure. Refer to write_skip_pairing for more details.

Syntax
unsigned long read_skip_pairing(unsigned char *skip_pairing);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
skip_pairing // 0:Not skip, 1:Skip.

write_skip_pairing

Description
This function reads the flag to skip pairing procedure. If the flag to skip pairing is 1, the Link Key, which is defined by write_link_key function will be used for authentication procedure.

Syntax
unsigned long write_skip_pairing(unsigned char skip_pairing);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
skip_pairing // 0:Not skip(default), 1:Skip.

read_auth_link_key

Description
This function reads the Link Key which is used for authentication procedure if the flag to skip pairing is 1.

Syntax
unsigned long read_auth_link_key(unsigned char *link_key);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
link_key // the first byte of 16-bytes array of the link key for the associated BD_ADDR

write_auth_link_key

Description
This function writes the Link Key which is used for authentication procedure if the flag to skip pairing is 1.

Syntax
unsigned long write_auth_link_key(unsigned char *link_key);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
link_key // the first byte of 16-bytes array of the link key for the associated BD_ADDR
// Default value is “00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00”.

read_tester_tone_freq

Description
This function reads the tone frequency of the audio signal in Hz which would be send by a tester.

Syntax
unsigned long read_tester_tone_freq(unsigned short *tone_freq);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
tone_freq // Range : 1 ~ 4000

write_tester_tone_freq

Description
This function writes the tone frequency of the audio signal in Hz which would be send by a tester.

Syntax
unsigned long write_tester_tone_freq(unsigned short tone_freq);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
tone_freq // Range : 1 ~ 4000, Default : 1000.

read_tester_tone_ampl

Descriptionis function reads the tone amplitude of the audio signal which would be send by a tester. Refer to write_tester_tone_ampl for more details.

Syntax
unsigned long read_tester_tone_ampl(unsigned short *tone_ampl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
tone_ampl // Range : 0 ~ 32767.

write_tester_tone_ampl

Description
This function writes the tone amplitude of the audio signal which would be send by a tester.

[Note] How to calculate tone_ampl in relation to Tone Level(dBm0) of TC-3000C GUI ?

$tone\_ampl = 32767 * 10^{\frac{ToneLevel-3}{20}}$ (-70 <= Tone Level(dBm0) <= 3)

Syntax
unsigned long write_tester_tone_ampl(unsigned short tone_ampl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
tone_ampl // Range : 0 ~ 32767, Default : 7336(-10dBm0).

read_sco_air_codding_format

Description
This function reads the air coding format for SCO links.

Syntax
unsigned long read_sco_air_codding_format(unsigned char *air_coding_format);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
air_coding_format // 0:CVSD, 1:u_law, 2: A_law

write_sco_air_codding_format

Description
This function writes the air coding format for SCO links.

Syntax
unsigned long write_sco_air_codding_format(unsigned char air_coding_format);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
air_coding_format // 0:CVSD(default), 1:u_law, 2:A_law

read_sco_pkt_type

Description
This function reads the packet type the tester shall use for the SCO connection.

Syntax
unsigned long read_sco_pkt_type(unsigned char *sco_pkt_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
sco_pkt_type // 5:HV1, 6:HV2, 7:HV3

write_sco_pkt_type

Description
This function writes the packet type the tester shall use for the SCO connection.

Syntax
unsigned long write_sco_pkt_type(unsigned char sco_pkt_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
sco_pkt_type // 5:HV1, 6:HV2, 7:HV3(default)

read_sco_loopback_delay

Description
This function reads the delay of SCO loopback in milliseconds.

Syntax
unsigned long read_sco_loopback_delay(unsigned short *sco_loopback_delay);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
sco_loopback_delay // Range : 0 ~ 65535.

write_sco_loopback_delay

Description
This function writes the delay of SCO loopback in milliseconds

Syntax
unsigned long write_sco_loopback_delay(unsigned short sco_loopback_delay);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
sco_loopback_delay // Range : 0 ~ 65535. Default : 2000(2 s).

start_sco_loopback

Description
This function enters the SCO loopback mode to send all SCO data back to the DUT.

Syntax
unsigned long start_sco_loopback(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // the connection handle of the SCO link to send tone signal

stop_sco_loopback

Description
This function stops the SCO loopback mode to send all SCO data back to the DUT.

Syntax
unsigned long stop_sco_loopback(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // the connection handle of the SCO link to send tone signal

upgrade_tester_licence

Description
This function upgrades the tester licence.

Syntax
unsigned long upgrade_tester_licence(char *file_name);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
file_name // name of the file which stores the tester licence

read_hci_to

Description
This function reads the timeout of HCI commands execution in miliseconds

Syntax
unsigned long read_hci_to (unsigned short *hci_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_timeout // Range : 1 ~ 65535

write_hci_to

Description
This function writes the timeout of HCI command execution in milliseconds.

Syntax
unsigned long write_hci_to(unsigned short hci_timeout);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_timeout // Range : 1 ~ 65535, Default : 2000(2 s).

read_tester_agc

Description
This function reads the RX AGC(Automatic Gain Control) value of a tester.

Syntax
unsigned long read_tester_agc(unsigned char *agc);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be

an error code.

Parameter
agc // 0: OFF, 1: ON

write_tester_agc

Description
This function writes the RX AGC(Automatic Gain Control) value of a tester.

Syntax
unsigned long write_tester_agc(unsigned char agc);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
agc // 0: OFF, 1: ON(default)

read_tester_hc_port

Description
This function reads the number of the device's port (USB, RS-232C...) of a tester to communicate with a HC.

Syntax
unsigned long read_tester_hc_port (unsigned short *hc_port);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hc_port // the number of the device's port of a tester
// If the device’s port of a tester is USB and its number is 0, it means USB1 of rear panel.

write_tester_hc_port

Description
This function writes the number of ports (USB, RS-232C...) of a tester to communicate with a HC.

Syntax
unsigned long write_tester_hc_port (unsigned short hc_port);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hc_port // the number of the device's port of a tester
// If the device’s port of a tester is USB and its number is 0, it means USB1 of rear panel.

read_tester_hci_tl

Description
This function reads the type of HCI transport layer of a tester.

Syntax
unsigned long read_tester_hci_tl (unsigned char *hci_tl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_tl // 0:Autodetect, 1:USB, 2:RS-232C, 16:TCPIP

write_tester_hci_tl

Description
This function writes the type of HCI transport layer of a tester.

Syntax
unsigned long write_tester_hci_tl (unsigned char hci_tl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_tl // 0:Autodetect(default), 1:USB, 2:RS-232C, 16:TCPIP

read_tester_iac

Description
This function reads the LAP to derive IAC(Inquiry Access Code) of a tester.

Syntax
unsigned long read_tester_iac (unsigned long *iac);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
Iac // LAP to derive Inquiry Access Code

write_tester_iac

Description
This function writes the LAP to derive IAC(Inquiry Access Code) of a tester.

Syntax
unsigned long write_tester_iac (unsigned long iac);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
Iac // LAP to derive Inquiry Access Code

read_tester_inquiry_to

Description
This function reads the Inquiry timeout of a tester.

Syntax
unsigned long read_tester_inquiry_to (unsigned char *inquiry_to);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_to // Maximum amount of time specified before the Inquiry is halted.

// Inquiry Time = inquiry_to * 1.28 sec

write_tester_inquiry_to

Description
This function writes the Inquiry timeout of a tester.

Syntax
unsigned long write_tester_inquiry_to (unsigned char inquiry_to);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_to // Maximum amount of time specified before the Inquiry is halted.
// Inquiry Time = inquiry_to * 1.28 sec

read_tester_num_resp

Description
This function reads the maximum number of responses from the Inquiry of a tester before the Inquiry is halted.

Syntax
unsigned long read_tester_num_resp (unsigned char *num_resp);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
num_resp

write_tester_num_resp

Description
This function writes the maximum number of responses from the Inquiry of a tester before the Inquiry is halted.

Syntax
unsigned long write_tester_num_resp(unsigned char num_resp);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
num_resp

read_tester_page_to

Description
This function reads the page timeout of a tester. Refer to write_tester_page_to for more details.

Syntax
unsigned long read_tester_page_to (unsigned short *page_to);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

page_to // Range : 1 ~ 65535, Time Range: 0.625 ms ~ 40.9 s.

write_tester_page_to

Description
This function writes the page timeout of a tester. The page timeout defines the maximum time the local Link Manager will wait for a baseband page response from the remote device at a locally initiated connection attempt. If this time expires and the remote device has not responded to the page at baseband level, the connection attempt will be considered to have failed.

Syntax
unsigned long write_tester_page_to(unsigned short page_to);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
page_to // Range : 1 ~ 65535, Time Range: 0.625 ms ~ 40.9 s.

read_tester_port_conf

Description
This function reads the external port configuration of a tester.

Syntax
unsigned long read_tester_port_conf (unsigned char port_num, unsigned char *port_conf);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
port_num // 0:OUT1, 1:OUT2, 3:IN1, 4:IN2
port_conf // For OUT1/OUT2, 0:I_RX, 1:Q_RX, 2:I_TX, 3:Q_TX, 4:RX_BITS, 5:TX_BITS, 6:MOD, 7:DEMOD.
// For In1/In2, 0:OFF1_OFF2,3:RX_IQ_IN, 4:RX_EXT_BIT_1,
// 8:RX_EXT_BIT_2, 48:TX_IQ_IN, 64:TX_EXT_BIT_1,128:TX_EXT_BIT_2

write_tester_port_conf

Description
This function writes the external port configuration of a tester.

Syntax
unsigned long write_tester_port_conf(unsigned char port_num, unsigned char port_conf);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
port_num // 0:OUT1, 1:OUT2, 3:IN1, 4:IN2
port_conf // For OUT1/OUT2, 0:I_RX,1:Q_RX, 2:I_TX, 3:Q_TX, 4:RX_BITS, 5:TX_BITS, 6:MOD, 7:DEMOD.
// For In1/In2, 0:OFF1_OFF2, 3:RX_IQ_IN, 4:RX_EXT_BIT_1,
// 8:RX_EXT_BIT_2, 48:TX_IQ_IN, 64:TX_EXT_BIT_1, 128:TX_EXT_BIT_2

read_tester_rx_gain

Description
This function reads the gain of RX amplifier of a tester.

Syntax

unsigned long read_tester_rx_gain(unsigned char *rx_gain);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
rx_gain // 0:10 dB, 1:20 dB, 2:30 dB ... 6:70 dB

write_tester_rx_gain

Description
This function writes the gain of RX amplifier of a tester.

Syntax
unsigned long write_tester_rx_gain(unsigned char rx_gain);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
rx_gain // 0:10 dB, 1:20 dB, 2:30 dB ... 6:70 dB

read_tester_rx_att

Description
This function reads the “30 dB RX attenuator” state of a tester.

Syntax
unsigned long read_tester_rx_att(unsigned char *rx_att);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
rx_att // 0: OFF, 1: ON

write_tester_rx_att

Description
This function writes the “30 dB RX attenuator” state of a tester.

Syntax
unsigned long write_tester_rx_att(unsigned char rx_att);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
rx_att // 0: OFF, 1 : ON(default).

read_tester_tx_pow

Description

This function reads the transmitter power of a tester in 0.01 dBm.

Syntax

unsigned long read_tester_tx_pow(short *tx_pow);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

tx_pow // Range : 0 ~ –8000(0 ~ -80 dBm)

write_tester_tx_pow

Description
This function writes the transmitter power of a tester in 0.01 dBm.

Syntax
unsigned long write_tester_tx_pow(short tx_pow);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
tx_pow // Range : 0 ~ –8000(0 ~ -80 dBm), Default : -3000.

save_tester_param

Description
This function writes parameters of a tester to a file "tester.cnf". If user wants to save all tester parameter's value, user has to call this function. If so, the user can reuse previously saved parameters.

Syntax
unsigned long save_tester_param(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

set_default_tx_pow

Description
This function provides setting of default tester power.

NOTE

If there is active link and required power can not be set during the link, the DUT will be detached.

Syntax
unsigned long set_default_tx_pow(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

void

tester_close

Description
This function stops a thread, created by the function tester_init() and frees memory allocated during remote control operations.


NOTE

Normally the function should be called at the end of the remote control program. For GUI applications call of the function should be added to a destructor of the main object.

Syntax
unsigned long tester_close(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

tester_init

Description

This function allocates memory for the tester structure to store tester's data and parameters and reads the parameters from the file 'tester.cnf'. If the file either does not exist or has incorrect data format, then new file 'tester.cnf' will be created with default parameters. The function creates a thread, which supports exchange of data between remote PC and tester and processing of the data. The function remotely configures a tester according to tester's parameters as well.


NOTE

Normally the function should be called only once. For GUI applications call of the function should be added to a constructor of the main object.

Syntax

unsigned long tester_init(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

void

tester_reset

Description
This function sets Standby state of the tester's Host controller and clears databases of discovered DUTs and

links (ACL and SCO) at both Host and Host controller.

Syntax
unsigned long tester_reset(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

void

write_reference_oscillator_type

Description
This function switches between internal and external reference oscillators of a tester. In order to use your 10 MHz reference oscillator, user has to call this function with external reference oscillator parameter.

Syntax
unsigned long write_reference_oscillator_type(unsigned char type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
type // 0:internal reference oscillator(default), 1:external reference oscillator.

5.7.3 DUT Configuration

read_dut_test_mode

Description
This function reads the test mode of the DUT. Refer to write_dut_test_mode for more details.

Syntax
unsigned long read_dut_test_mode(unsigned char *test_mode);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
test_mode // 1:Transmitter test, 2:Loopback test, 4: Null packet test

write_dut_test_mode

Description
This function writes the test mode of the DUT. The test mode supports testing of the Bluetooth Transmitter and Receiver. It is intended mainly for certification/compliance testing of the radio and baseband layer and may also be used for regulatory approval or acceptance on a HW or SW interface shall be allowed.

NOTE

For audio testing, test mode parameter of write_DUT_test_mode must be 4(NULL packet test).

Syntax
unsigned long write_dut_test_mode(unsigned char test_mode);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
test_mode // 1:Transmitter test, 2:Loopback test, 4: Null packet test

read_connect_before_test

Description
This function reads the flag which defines whether connection (LMP level) should be created before activation the test mode of the DUT.

Syntax
unsigned long read_connect_before_test(char *cr_con);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
cr_con // 0:Set test mode at once after paging, 1: Create connection.

write_connect_before_test

Description
This function writes the flag which defines whether connection (LMP level) should be created before activation the test mode of the DUT.

Syntax
unsigned long write_connect_before_test(char cr_con);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
cr_con // 0:Set test mode at once after paging, 1: Create connection.

read_dut_bdaddr

Description
This function reads Bluetooth Device Address (bdaddr)of a DUT. Refer to write_tester_bdaddr for more details.

Syntax
unsigned long read_dut_bdaddr(unsigned char *bdaddr);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
bdaddr // Bluetooth Device Address of a DUT.

write_dut_bdaddr

Description
This function writes Bluetooth Device Address (bdaddr)of a DUT. The function should be called only in the case if the DUT does not support inquiry. Use the function write_dut_inq_sup()to set the flag that the DUT

does not support inquiry. Refer to write_tester_bdaddr for more details.

Syntax
unsigned long write_dut_bdaddr(unsigned char *bdaddr);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
bdaddr // Bluetooth Device Address of a DUT.

read_dut_profile_type

Description
This function reads the type of the pfofile. If user want to use BT cell phone with upper layer profile for audio test, the type of the profile must be audiogateway.

Syntax
unsigned long read_dut_profile_type(char *prof_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
prof_type // 0:No profile type, 6: Headset, 14: Handsfree, 20: AudioGateWay

write_dut_profile_type

Description
This function writes the type of the profile. If user want to use BT cell phone with upper layer profile for audio test, the type of the profile must be audiogateway.

Syntax
unsigned long write_dut_profile_type(char prof_type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
prof_type // 0: No profile type, 6: Headset, 14: Handsfree(default), 20: AudioGateWay

read_dut_profile_role

Description
This function reads the flag, which defines whether role(either master or slave) should behave the tester during initialization the AudioGateway profile.

Syntax
unsigned long read_dut_profile_role(char *prof_role);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
prof_role // the role of the profile 0:master, 1:slave.

write_dut_profile_role

Description

This function writes the flag, which defines whether role(either master or slave) should behave the tester during initialization the AudioGateway profile.

Syntax
unsigned long write_dut_profile_role(char prof_role);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
prof_role // 0:master, 1:slave.

read_dut_s_m_gain_ctrl

Description
This function reads the flag, which defines whether gain control of the speaker or mikrophone of the DUT (Headset or Handsfree) should be controlled from a tester.

Syntax
unsigned long read_dut_s_m_gain_ctrl(char *gain_ctrl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
gain_ctrl // 0:Disable, 1:Enable.

write_dut_s_m_gain_ctrl

Description
This function writes the flag, which defines whether gain control of the speaker or mikrophone of the DUT (Headset or Handsfree) should be controlled from a tester.

Syntax
unsigned long write_dut_s_m_gain_ctrl(char gain_ctrl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
gain_ctrl // 0:Disable(default), 1:Enable.

read_dut_speaker_volume_gain

Description
This function reads default value of the speaker volume gain of the DUT.

Syntax
unsigned long read_dut_speaker_volume_gain(char * vgs);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
vgs // speaker volume gain of a headset or a handsfree. Range 0...15

write_dut_speaker_volume_gain

Description

This function writes default value of the speaker volume gain of the DUT.

Syntax
unsigned long write_dut_speaker_volume_gain(char vgs);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
vgs // speaker volume gain of a headset or a handsfree. Range 0...15

read_dut_microphone_volume_gain

Description
This function reads default value of the microphone volume gain of the DUT.

Syntax
unsigned long read_dut_microphone_volume_gain(char * vgm);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
vgm // microphone volume gain of a headset or a handsfree. Range 0...15

write_dut_microphone_volume_gain

Description
This function writes default value of the microphone volume gain of the DUT.

Syntax
unsigned long write_dut_microphone_volume_gain(char vgm);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
vgm // microphone volume gain of a headset or a handsfree. Range 0...15

read_dut_name

Description
This function reads userfriendly name associated with the Bluetooth device and consists of a maximum of 248 bytes coded according to the UTF-8 standard. Size of the string should be sufficient to store the name.

Syntax
unsigned long read_dut_name(char *name);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
name // userfriendly name associated with the Bluetooth device.

open_remote_hci_tl

Description
This function opens remote HCI transport layer of DUT.

Syntax
unsigned long open_remote_hci_tl(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

close_remote_hci_tl

Description
This function closes remote HCI transport layer of DUT.

Syntax
unsigned long close_remote_hci_tl(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

dut_close

Description
This function calls the dut_detach() function and frees memory allocated for DUT structure during remote control operations.


NOTE

Normally the function should be called at the end of the remote control program. For GUI applications call of the function should be added to a destructor of the main object

Syntax
unsigned long dut_close(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

dut_detach

Description
This function detaches the DUT from local link manager. That is to say, if a baseband link with the DUT exists, then this function disconnects the DUT. Also the function closes HCI transport layer (if it exists) for the DUT.

Syntax
unsigned long dut_detach(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

dut_init

Description
This function creates new DUT structure. For more details, the function allocates memory for the DUT structure to store tester's data and parameters and reads the parameters from the file 'dut.cnf'. If the file either does not exist or has incorrect data format, then new file 'dut.cnf' will be created with default parameters.


NOTE

Normally the function should be called only once. For GUI applications call of the function should be added to a constructor of the main object.

Syntax
unsigned long dut_init(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

new_dut

Description
The function reinitializes (creates) HCI transport layer to the DUT (if necessary) and resets the tester.


NOTE

Normally the function should be called after every unplugging or replacing of a DUT.

Syntax
unsigned long new_dut(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

read_dut_hc_port

Description
This function reads the number of ports (USB, RS-232C...) of a DUT.

Syntax
unsigned long read_dut_hc_port(unsigned char *hc_port);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be

an error code.

Parameter
hc_port // the number of the device's port of a DUT.

write_dut_hc_port

Description
This function writes the number of the device's port (USB, RS-232C...) of a DUT.

Syntax
unsigned long write_dut_hc_port(unsigned char hc_port);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hc_port // the number of the device's port of a DUT.

read_dut_hci_tl

Description
This function reads the type of HCI transport layer of a DUT.

Syntax
unsigned long read_dut_hci_tl(unsigned char*hci_tl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_tl // 0:None, 1:USB, 2:RS-232C, 4:UART, 8:PCMCIA, 16:TCP/IP

write_dut_hci_tl

Description
This function writes the type of HCI transport layer of a DUT.

Syntax
unsigned long write_dut_hci_tl(unsigned char hci_tl);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hci_tl // 0:None, 1:USB, 2:RS-232C, 4:UART, 8:PCMCIA, 16:TCP/IP

read_dut_inq_sup

Description
This function reads the flag whether the DUT supports inquiry. If parameter of this function is 0(the DUT does not support inquiry), use the function write_dut_bdaddr.

Syntax
unsigned long read_dut_inq_sup(unsigned char *inq_sup);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inq_sup // 0:Not support, 1:support

write_dut_inq_sup

Description
This function writes the flag whether the DUT supports inquiry. If parameter of this function is 0(the DUT does not support inquiry), use the function write_dut_bdaddr.

Syntax
unsigned long write_dut_inq_sup(unsigned char inq_sup);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inq_sup // 0:Not support, 1:support(default)

read_dut_inquiry_scan_interval

Description
This function reads the inquiry scan interval of the DUT measured in number of Baseband slots. Refer to write_dut_inquiry_scan_interval for more details.

Syntax
unsigned long read_dut_inquiry_scan_interval(unsigned short *inquiry_scan_interval);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_scan_interval // Range : 18 ~ 4096.

write_dut_inquiry_scan_interval

Description
This function writes the inquiry scan interval of the DUT measured in number of Baseband slots. The inquiry_scan_interval configuration parameter defines the amount of time between consecutive inquiry scans. This is defined as the time interval from when the Host Controller started its last inquiry scan until it begins the next inquiry scan.

Syntax
unsigned long write_dut_inquiry_scan_interval(unsigned short inquiry_scan_interval);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_scan_interval // Range : 18 ~ 4096. Default : 2048.

read_dut_inquiry_scan_window

Description
This function reads the inquiry scan window of the DUT measured in nmber of Baseband slots. Refer to write_dut_inquiry_scan_window for more details.

Syntax
unsigned long read_dut_inquiry_scan_window(unsigned short *inquiry_scan_window);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_scan_window // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms.

write_dut_inquiry_scan_window

Description
This function writes the inquiry scan window of the DUT measured in nmber of Baseband slots. The inquiry_scan_window configuration parameter defines the amount of time for the duration of the inquiry scan. The inquiry_scan_window can only be less than or equal to the inquiry_scan_interval.


NOTE

Inquiry Scan is only performed when Inquiry_Scan is enabled (the device is DISCOVERABLE)..

Syntax
unsigned long write_dut_inquiry_scan_window(unsigned short inquiry_scan_window);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
inquiry_scan_window // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms. Default : 18.

read_dut_page_scan_interval

Description
This function reads the page scan interval of the DUT measured in Number of Baseband slots. Refer to write_dut_page_scan_interval for more details.

Syntax
unsigned long read_dut_page_scan_interval(unsigned short *page_scan_interval);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
page_scan_interval // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms.

write_dut_page_scan_interval

Description
This function writes the page scan interval of the DUT measured in Number of Baseband slots. The page_scan_interval configuration parameter defines the amount of time between consecutive page scans This time interval is defined from when the Host Controller started its last page scan until it begins the next page scan.

Syntax
unsigned long write_dut_page_scan_interval(unsigned short page_scan_interval);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
page_scan_interval // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms. Default : 2048.

read_dut_page_scan_window

Description
This function reads the page scan window of the DUT measured in Number of Baseband slots. Refer to write_dut_page_scan_window for more details.

Syntax
unsigned long read_dut_page_scan_window(unsigned short *page_scan_window);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
page_scan_window // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms.

write_dut_page_scan_window

Description
This function writes the page scan window of the DUT measured in Number of Baseband slots. The pge_san_window configuration parameter defines the amount of time for the duration of the page scan. The page_scan_window can only be less than or equal to the page_scan_interval.


NOTE

Page Scan is only performed when Page_Scan is enabled(the device is CONNECTABLE)

Syntax
unsigned long write_dut_page_scan_window(unsigned short page_scan_window);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
page_scan_window // Range : 18 ~ 4096. Time Range : 11.25 ms ~ 2560 ms. Default : 18.

read_dut_path_loss

Description
This function reads the path losses from the DUT's transmitter to the teser's transmitter in 0.01 dB.

Syntax
unsigned long read_dut_path_loss(unsigned short *path_loss);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
path_loss // Range : 0 ~ 8000.

write_dut_path_loss

Description

This function writes the path losses from the DUT's transmitter to the teser's transmitter in 0.01 dB.

NOTE

Be careful about unit. If you want to set path loss to 20 dBm, you have to input 2000 in parameter

Syntax
unsigned long write_dut_path_loss(unsigned short path_loss);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
path_loss // Range : 0 ~ 8000. Default : 0.

read_dut_t_pow_step

Description
This function reads the interval of time when the tester must wait until the DUT will reach the new power step in milliseconds. The user can decrease this parameter value for the purpose of reducing testing time according to RF characteristics of DUT.

Syntax
unsigned long read_dut_t_pow_step(unsigned short *t_pow_step);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
t_pow_step // Range : 1 ~ 65535.

write_dut_t_pow_step

Description
This function writes the interval of time when the tester must wait until the DUT will reach the new power step in milliseconds. The user can decrease this parameter value for the purpose of reducing testing time according to RF characteristics of DUT.

Syntax
unsigned long write_dut_t_pow_step(unsigned short t_pow_step);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
t_pow_step // Range : 1 ~ 65535. Default : 1000(1 s).

save_dut_param

Description
This function writes parameters of a DUT to a file "dut.cnf".

Syntax
unsigned long save_dut_param(void);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

set_dut_general_type

Description
This function sets the type of a DUT. If type is set to 0(UNKNOWN_DUT), this function can be used to measure or generate the normal signal of 2.4~2.5 GHz.

Syntax
set_dut_general_type(unsigned char type);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
type // 0:Unknown DUT, 1:Bluetooth DUT(default)

read_dut_baud_rate

Description
This function reads the baud rate of HCI transport layer of a DUT. It is meaningful only for UART, BCSP and RS-232C.

Syntax
unsigned long read_dut_baud_rate(long int *baud_rate);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
baud_rate // 9600(default) /19200 /38400 /56000 /57600 /115200 /128000 /256000.

write_dut_baud_rate

Description
This function writes the baud rate of HCI transport layer of a DUT. It is meaningful only for UART, BCSP and RS-232C.

Syntax
unsigned long write_dut_baud_rate(long int baud_rate);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
baud_rate // 9600(default) /19200 /38400 /56000 /57600 /115200 /128000 /256000.

5.7.4 Access Fucntions

activate_dut

Description
This function checks whether a RF link with a DUT exists; and if not, the function will create connection and set test mode id it is necessary.

Syntax
unsigned long activate_dut(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

connect_dut

Description
This function checks whether a RF link with a DUT exists; and if not, the function will create connection and set test mode id it is necessary

Syntax
unsigned long connect_dut(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

disconnect_dut

Description
This function checks whether a RF link with a DUT exists and if so, the function will disconnect the DUT.

Syntax
unsigned long disconnect_dut(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

create_dut_sco_link

Description
This function creates SCO link with a DUT.

Syntax
unsigned long create_dut_sco_link(unsigned short *connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // the connection handle of created SCO link

remove_dut_sco_link

Description
This function removess SCO link with a DUT.

Syntax

unsigned long remove_dut_sco_link(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // connection handle of the SCO link to remove

is_dut_sco_link

Description
This function verifies whether SCO link with the DUT exists.

Syntax
unsigned long is_dut_sco_link(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

5.7.5 Security Fucntions

authenticate_dut

Description
This function provides authentication of the DUT.

Syntax
unsigned long authenticate_dut(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

5.7.6 Profile Fucntions

dut_profile_init

Description
This function initializes the profile.

Syntax
unsigned long dut_profile_init(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

dut_profile_close

Description
This function closes the profile.

Syntax
unsigned long dut_profile_close(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

send_at_command

Description
This function sends an AT command to a headset, a handsfree or audiogateway depending on DUT profile type.

Syntax
unsigned long send_at_command(char *at_cmd);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
at_cmd // NULL terminated string of the AT command.

read_num_profile_msg

Description
This function calculates how many profile messages were sent to a DUT and received from the DUT.

Syntax
unsigned long read_num_profile_msg(int *num_prfl_msgs);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
num_prfl_msgs // a total number of sent and received profile messages.

read_profile_msg

Description
This function reads a profile message which was sent to a DUT or received from the DUT.

Syntax
unsigned long read_profile_msg(char *time, char *tx_rx, char *msg);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
time // a string of the time when the message was sent/received.
// The size of the string must not be lees than 8.
tx_rx // direction of the message. 0: sent to a DUT, 1: received from a DUT
msg // a string of the message. The size of the string must be sufficient to store full message

5.7.7 Audio Fucntions

start_tone_sig

Description
This function starts sending of audio tone signal to the DUT.

Syntax
unsigned long start_tone_sig(unsigned short *connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // the connection handle of the SCO link to send tone signal

stop_tone_sig

Description
This function stops sending of audio tone signal to the DUT.

Syntax
unsigned long stop_tone_sig(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // connection handle of the SCO link to send tone signal

audio_test

Description
This function measures the parameters of RX audio signal. This is a useful function on DUT that do not have test mode support, by measuring SINAD and Distortion corresponding to RX test(Sensitivity).

Syntax
unsigned long audio_test(unsigned short connection_handle, short dut_tone_freq, float *pow_peak, float *frequency, float *rms, float*sinad, float *dist);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // connection handle of the SCO link to test the parameters of RX audio signal
dut_tone_freq // frequency of the tone signal, with the DUT sends to the tester
pow_peak // peak value of the power in audio spectrum characteristic
frequency // frequency of the audio signal's power density maximum
rms // RMS value of the audio signal
sinad // sinad value of the audio signal
dist // distortion of the audio signal

start_sco_loopback

Description
This function enters the SCO loopback mode to send all SCO data back to the DUT.

Syntax

unsigned long start_sco_loopback(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // poiner to the connection handle of the SCO link to send tone signal

stop_sco_loopback

Description
This function stops the SCO loopback mode to send all SCO data back to the DUT.

Syntax
unsigned long stop_sco_loopback(unsigned short connection_handle);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
connection_handle // poiner to the connection handle of the SCO link to send tone signal

5.7.8 Signal Generator

start_sig_gen

Description
This function turns on the signal generator

Syntax
unsigned long start_sig_gen(unsigned long frequency,float power,unsigned longbit_pattern, short fm_dev);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
frequency // in KHz. The range is from 2400000 to 2500000
power // TX power in dBm. The range is fom -80dBm to 0dBm
bit_pattern // bit pattern of the signal generator
fm_dev // FM deviation in KHz. The range is from 0KHz to 500KHz. Resolution is 5KHz

stop_sig_gen

Description
This function turns off the signal generator

Syntax
Unsigned long stop_sig_gen(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

5.7.9 RF Test Cases

outp_pow

Description

This function provides measurement of the maximum peak and average RF output power of the DUT at the given TX frequency. The frequency is RX frequency of a tester. The function can be used for the TRM/CA/01/C (Output Power) test case.

Syntax

unsigned long outp_pow(unsigned char freq, unsigned char hop_mode, unsigned char pkt_type, unsigned short num_pkts, unsigned char one_mhz_f, short *power_av, short*power_max,short *power_min);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

freq // RX frequency of a tester (TX for a DUT). 0:2402 MHz, 1:2403 MHz, ... , 78:2480 MHz
hop_mode // Hopping, 1: OFF, 79: ON(default)
pkt_type // packet type. 0:Longest(default), 3:DM1, 4:DH1, 9:AUX1, 10:DM3, 11:DH3, 14:DM5, 15:DH5
num_pkts // number of packets, Default:1
one_mhz_f // 1MHz filter 0: OFF(default), 1: ON
power_av // the average power in dBm multiplied by 100 (1 unit = 0.01dBm)
power_max // maximum peak power in dBm multiplied by 100 (1 unit = 0.01dBm)
power_min // minimum power in dBm multiplied by 100 (1 unit = 0.01dBm).

pow_dens

Description

This function provides measurement of the lowest and highest frequencies below and above the operating frequencies at which spectral power density drops below the level of 80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHzbandwidth). The function can be used for the TRM/CA/02/C (Power Density) test case.

Syntax

unsigned long pow_dens(unsigned char hop_mode, unsigned short data_length, short *p_dens, unsigned long *f_max);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

hop_mode // Hopping 1: OFF, 79: ON
data_length// length of payload's data. Default:0(longest supported length).
p_dens // maximum value of the power density per 100KHz EIRP
f_max // center frequency at which the power density reaches the maximum value

pow_ctrl

Description

This function provides measurement of the minimum RF-output power and the step of power controllby the DUT at the given TX frequency. The frequency is RX frequency of a tester. The function can be used for the TRM/CA/03/C (Power Control) test case.

Syntax

unsigned long pow_ctrl(unsigned char freq, unsigned char pkt_type, unsigned short num_pkts, unsigned char one_mhz_f, short *power_min, short *power_max, unsigned short *power_step_max, unsigned short *power_step_min);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
freq // RX frequency of a tester (TX for a DUT). 0(2402 MHz), 1(2403 MHz) ..., 78(2480 MHz)
pkt_type // packet type. 0:Longest, 3:DM1, 4:DH1(default), 9:AUX1, 10:DM3, 11:DH3, 14:DM5, 15:DH5
num_pkts // number of packets, Default:1
one_mhz_f // 1MHz filter 0: OFF(default), 1: ON
power_min // the minimum power (in average) 1 unit = 0.01dBm.
power_max // the maximum power 1 unit = 0.01dBm
power_step_max // maximum power step (1 unit = 0.01dBm).
power_step_min // minimum power step (1 unit = 0.01dBm).

spec_fr_range

Description
This function provides measurement of the the lowest and highest frequencies below and above the operating frequencies at which spectral power density drops below the level of 80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth). The function can be used for the TRM/CA/04/C (TX Output Spectrum Frequency range) test case.

Syntax
unsigned long spec_fr_range(unsigned char hop_mode, unsigned short data_length, unsigned long*f_l, unsigned long *f_h);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
hop_mode// Hopping 1: OFF, 79: ON
data_length// length of payload's data. Default:0
f_l // lowest frequency below the operating frequencies at which spectral power density drops
// below the level of 80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth).
f_h // highest frequency above the operating frequencies at which spectral power density drops
// below the level of 80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth).

spec_20_db

Description
The 'spec_20_db' function provides measurement of the lowest and highest frequencies below and above the operating frequency at which transmit power drops 20 dB below the highest power value in the transmit channel at the given TX frequency. The frequency is RX frequency of a tester. The function can be used for TRM/CA/05/C (TX Output Spectrum -20 dB Bandwidth) test case.

Syntax
unsigned long spec_20_db(unsigned char freq,unsigned char hop_mode, unsigned short data_length, unsigned long *f_l, unsigned long*f_h);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
freq // RX frequency of a tester (TX for a DUT). 0:2402 MHz, 1:2403 MHz, ... , 78:2480 MHz
hop_mode// Hopping 1: OFF, 79: ON
data_length// length of payload's data. Default:0
f_l // lowest frequency in Hz below the operating frequency at which
// transmit power drops 20 dB below the highest power value in the transmit channel

f_h // highest frequency in Hz above the operating frequencies at which
// transmit power drops 20 dB below thehighest power value in the transmit channel

adj_ch_pow

Description

This function provides measurement of power in adjacent channels.The function can be used for TRM/CA/06/C (TX Output Spectrum Adjacent channel power)) test case.

Syntax

unsigned long adj_ch_pow(unsigned char freq,unsigned char hop_mode, unsigned short num_sweeps,unsigned short data_length, short ptx[79]);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

freq // RX frequency of a tester (TX for a DUT). 0:2402 MHz, 1:2403 MHz, ... , 78:2480 MHz
hop_mode // Hopping 1: OFF, 79: ON
num_sweeps // number of sweeps at each adjacent channel, Default:1
data_length // length of payload's data. Default:27
ptx[79] // power in adjacent channels

modul_char

Description

This function provides measurement of the modulation index for 11110000 and 1010 bit paterns at the given TX frequency. The frequency is RX frequency of a tester. The function can be used for the TRM/CA/07/C:(Modulation Characteristics) test case.

Syntax

unsigned long modul_char(unsigned char test_mode, unsigned char freq,unsigned char hop_mode,unsigned char pkt_type,unsigned short num_pkts,unsigned char one_mhz_f, unsigned shortdf2_avg_low_lim, unsigned short*df1_avg,unsigned short *bytes_2, unsigned short *num_df2_l, unsigned short *df2_avg,unsigned short*df2_min);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

test_mode// Test Mode. 1:TRANSMITTER_TEST(default), 2:LOOPBACK_TEST
freq // frequency. 0:2402 MHz, 1:2403 MHz, ... 78:2480 MHz
hop_mode // Hopping 1: OFF(default), 79: ON
pkt_type // packet type. 0:Longest(default), 4:DH1, 9:AUX1, 11:DH3, 15:DH5
one_mhz_f // 1MHz filter 0: OFF, 1: ON
df2_avg_low_lim // lower limit for average of all maximum frequency deviations from the average frequency
// for the 1010 pattern in Hz divided by 100 (1unit = 100 Hz)
df1_avg // average of all maximum frequency deviations from the average frequency
// for the 11110000 pattern in Hz divided by 100. (1unit = 100 Hz)
bytes_2 // number of checked bits with pattern 1010
num_df2_l // number of deviations from the average frequency for the 10101010
// pattern less then low limit (115 KHz)
df2_avg // average of all maximum frequency deviations from the average frequency
// for the 1010 pattern in Hz divided by 100. (1unit = 100 Hz)
df2_min // minimum of all maximum frequency deviations from the average frequency
// for the 1010 pattern in Hz divided by 100. (1unit = 100 Hz)

init_car_freq

Description

This function provides measurement of the transmitter carrier frequency accuracy at the given TX frequency. The frequency is RX frequency of a tester The function can be used for the TRM/CA/08/C (Initial Carrier Frequency Tolerance) test case.

Syntax
unsigned long init_car_freq(unsigned char test_mode, unsigned char freq, unsigned charhop_mode,unsigned short num_pkts,unsigned char one_mhz_f, short *df0_max, short*df0_min);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
test_mode // Test Mode. 1:TRANSMITTER_TEST(default), 2:LOOPBACK_TEST
freq // frequency. 0:2402 MHz, 1:2403 MHz, ... , 78:2480 MHz
hop_mode // Hopping 1: OFF, 79: ON(default)
num_pkts // number of packets, Default:10
one_mhz_f // 1MHz filter 0: OFF, 1: ON
df0_max // maximal deviation of carrier frequencies from (2402+'freq') MHz in hundreds Hz
df0_min // minimal deviation of carrier frequencies from (2402+'freq') MHz in hundreds Hz

car_freq_drift

Description
This function provides measurement of the transmitter centre frequency drift within a packet at the given TX frequency. The frequency is RX frequency of a tester. The function can be used for the TRM/CA/09/C (Carrier Frequency Drift) test case.

Syntax
unsigned long car_freq_drift(unsigned char test_mode, unsigned char freq, unsigned char hop_mode,unsigned char pkt_type, unsigned short num_pkts, unsigned charone_mhz_f, unsigned charmod_1010, unsigned short df2_avg_low_lim, short *f_drift_max, short *drift_rate_max, unsigned short *df2_avg, unsigned short *df2_min, unsigned short *bytes_2, unsigned short *num_df2_l);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
test_mode// Test Mode. 1:TRANSMITTER_TEST(default), 2:LOOPBACK_TEST
freq// frequency. 0:2402 MHz, 1:2403 MHz, ... , 78:2480 MHz
hop_mode// Hopping 1: OFF, 79: ON(default)
pkt_type // packet type. 0:Longest(default), 4:DH1, 9:AUX1, 11:DH3, 15:DH5
num_pkts// number of packets, Default:10
one_mhz_f// 1MHz filter 0: OFF, 1: ON
char mod_1010// Flag whether Modulation characteristic for 1010 bit pattern must
// be calculated at the same time
df2_avg_low_lim // lower limit for average of all maximum frequency deviations
// from the average frequency for the 1010 pattern in Hz
// divided by 100 (1unit = 100 Hz). This parameter is meningful only if mod_1010 == 1
f_drift_max // maximal frequency drift in hundreds Hz. The frequency drift
// limits apply to the difference between the average frequency of
// the 4 preamble bits f0 and the average frequency of any 10 bits
// in the payload field of the returned packets fk.
drift_rate_max// maximal drift rate in hundreds Hz per 50 us.
// The maximum drift rate applies to the difference between any two adjacent 10 bit groups
// separated by 50 us within the payload field of the returned packets.
df2_avg // average of all maximum frequency deviations from
// the average frequency for the 1010 pattern in Hz divided by 100. (1unit = 100 Hz)
df2_min // minimum of all maximum frequency deviations from
// the average frequency for the 1010 pattern in Hz divided by 100. (1unit = 100 Hz)

bytes_2 // number of checked bits with pattern 1010
num_df2_l // number of deviations from the average frequency for the 10101010
// pattern less then low limit (115 KHz)

ber

Description

This function provides measurement of the Bit Error Rate at the given RX frequency. The frequency is TX frequency of a tester. The function can be used for the RCV/CA/01(02,06)/C (Sensittivity single/multi slot packets, Maximum Input Level) test cases.

Syntax

unsigned long ber(unsigned char bit_pattern, unsigned char hop_mode, unsigned char freq_tx, unsigned char freq_rx, unsigned char dirty_tx,unsigned char pkt_type, short power, unsigned long num_bytes_to_check, unsigned long *bytes_received,unsigned long *bits_with_error);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

bit_pattern // 0:CONSTANT_ZERO, 1:CONSTANT_ONE, 2:ALTERNATING_1010,
// 3:ALTERNATING_11110000, 4:PSEUDORANDOM
hop_mode // hopping mode, 1:SINGLE_FREQUENCY(default), 2:REDUCED_HOPPING_23
// 5:REDUCED_HOPPING_79, 23:HOP_23, 79:HOP_79
freq_tx // TX frequency of a tester (RX for DUT). 0 - 2402 MHz, 1 - 2403 MHz ...
// 78 - 2480 MHz. Ignored if hopping is ON
freq_rx // RX frequency of a tester (TX for DUT). 0 - 2402 MHz, 1 - 2403 MHz ...
// 78 - 2480 MHz. Ignored if hopping is ON
dirty_tx // dirty transmitter mode. 0: OFF, 1:ON(default)
pkt_type // packet type. If zero, then longest supported packet type.
// The only DH1/3/5 or AUX1 types are supported.
Power // RX power at the receiver input of the DUT in dBm multiplied by 100 (in 0.01dBm)
num_bytes_to_check // minimum number of samples (returned payload bytes) to measure BER
bytes_received // actual number of checked bytes
bits_with_error // number of bits with error

ber_per

Description

This function provides measurement of the Bit Error Rate and the Packet Error Rate at the given RX frequency. The frequency is TX frequency of a tester. The function can be used for the RCV/CA/01(02,06)/C(Sensittivity single/multi slot packets, Maximum Input Level) test cases.

Syntax

unsigned long ber_per(unsigned charbit_pattern,unsigned char hop_mode,unsigned char freq_tx, unsigned char freq_rx, unsigned char dirty_tx,unsigned char pkt_type, short power, unsigned long num_bytes_to_check, unsigned long *bytes_received,unsigned long *bits_with_error, unsigned long *pkts_received, unsigned long *pkts_with_error);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

bit_pattern // CONSTANT_ZERO = 0, CONSTANT_ONE = 1, ALTERNATING_1010 = 2,
// ALTERNATING_11110000 = 3, PSEUDORANDOM = 4
hop_mode // hopping mode: SINGLE_FREQUENCY=1, REDUCED_HOPPING_23=2,
// REDUCED_HOPPING_79=5, HOP_23=23, HOP_79=79
freq_tx// TX frequency of a tester (RX for DUT).
// 0 - 2402 MHz, 1 - 2403 MHz ... 78 - 2480 MHz. Ignored if hopping is ON

freq_rx // RX frequency of a tester (TX for DUT).
// 0 - 2402 MHz, 1 - 2403 MHz ... 78 - 2480 MHz. Ignored if hopping is ON
dirty_tx // dirty transmitter mode. 0: OFF, 1:ON
pkt_type // packet type(according to Baseband Specification).
// If zero, then longest supported packet type. The only DH1/3/5 or AUX1 types are supported.
power // RX power at the receiver input of the DUT in dBm multiplied by 100 (in 0.01dBm)
num_bytes_to_check // minimum number of samples (returned payload bytes) to measure BER
bytes_received // actual number of checked bytes
bits_with_error // number of the bits with error
pkts_received // actual number of received packets
pkts_with_error // number of the packets with error

mod_outp_pow

Description

This function can be used for combination of the Output Power, Modulation Characteristics, Initial Carrier Frequency Tolerance, and Carrier Frequency Drift. You can make use of this function for “Quick Test”.

Syntax

unsigned long mod_outp_pow(unsigned chartest_mode, unsigned char hop_mode, unsigned char freq, unsigned char pkt_type, unsigned short num_pkts, short *power_av, short *power_max, short *power_min, short *df0_max, short *df0_min, unsigned short *df1_avg, unsigned short *df2_avg,unsigned short *df2_min, unsigned short *num_df2, unsigned short *num_df2_l, short *f_drift_max, short *drift_rate_max);

Return Value

The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

test_mode // Test Mode. 1:TRANSMITTER_TEST, 2:LOOPBACK_TEST
hop_mode // hopping mode: SINGLE_FREQUENCY=1, HOP_79=79
freq // RX frequency of a tester (TX for DUT).
// The parameter is meaningful only if hopping mode == SINGLE_FREQUENCY
pkt_type // packet type(according to Baseband Specification).
// If zero, then longest supported packet type. The only DH1/3/5 or AUX1 types are supported.
num_pkts // number of packets to measure Output Power
power_av // pointer to the average power in dBm multiplied by 100 (1 unit = 0.01dBm).
power_max // pointer to maximum peak power in dBm multiplied by 100 (1 unit = 0.01dBm).
power_min // pointer to minimum power in dBm multiplied by 100 (1 unit = 0.01dBm).
df0_max // maximal deviation of carrier frequencies from (2402+'freq') MHz in hundreds Hertzs
df0_min // minimal deviation of carrier frequencies from (2402+'freq') MHz in hundreds Hertzs
df1_avg // average of all maximum frequency deviations from
// the average frequency for the 11110000 pattern in Hertzs divided by 100. (1unit = 100 Hz)
df2_avg // average of all maximum frequency deviations from
// the average frequency for the 1010 pattern in Hertzs divided by 100. (1unit = 100 Hz)
df2_min // minimum of all maximum frequency deviations from
// the average frequency for the 1010 pattern in Hertzs divided by 100. (1unit = 100 Hz)
num_df2 // number of checked bits with pattern 1010
num_df2_l // number of deviations from the average frequency for the 10101010 pattern
// less then low limit (115 KHz)
f_drift_max // maximal frequency drift in hundreds Hertzs.
// This apply to the difference between the average frequency of the 4 preamble bits f0 and the // average frequency of any 10 bits in the payload field of the returned packets fk.
drift_rate_max // maximal drift rate in hundreds Hertzs per 50microseconds.
// The maximum drift rate applies to the difference between any two adjacent 10 bit groups
// separated by 50 us within the payload field of the returned packets.

rf_tc

Description

This function executes RF test cases as batch process.

Syntax
unsigned long rf_tc(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

rf_tc_thread

Description
This function executes RF test cases as batch process using thread.

Syntax
unsigned long rf_tc_thread(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

set_max_dut_power

Description
This function provides setting maximum TX power of the DUT.

Syntax
unsigned long set_max_dut_power(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

exec_stop

Description
This function stops execution of running functions.

Syntax
unsigned long exec_stop(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

5.7.10 Measurement Functions

spectrum

Description

This function provides measurement of the Spectrum.

Syntax
unsigned long spectrum(unsigned long center_frequency, unsigned short span, unsigned short num_points, unsigned char trigger, unsigned short threshold, unsigned char acc_type, unsigned long lap, unsigned short num_sweeps, unsigned char mode, short *data, unsigned short *act_span, unsigned long *act_frequency);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
center_frequency // center frequency in Hz
span // required span in KHz
num_points // number of points. The value must be power of two.
trigger // If 'trigger' == TRIGGERING_OFF (0x00) then Trigger is off.
// Measurement should to start immediately after receiving by
// a Host Controller the Read_Spectrum command.
// If 'trigger' == TRIGGERING_ON (0x01) then Trigger is on.
// Measurement will start only after receiving RF signal with power
// more than Threshold level.
// If 'trigger' == TRIGGERING_SYNC (0x03) then measurement
// will start if the access code correlator exceeds the trigger threshold
// If 'trigger' == TRIGGERING_RX_SLOT (0x04) measurement will
// start at start time of RX slot
Threshold // Threshold level for triggering in dB multiplied by 100. (1 unit = 0.01dBm)
// The value is meaningfull only if Trigger is on.
acc_type // type of access code. 0:custom, 1:IAC, 2:DAC, 3:CAC.
// Meaningful only if 'trigger' = TRIGGERING_SYNC.
Lap // LAP of BD_ADDR to derive an access code.
// Meaningful only if 'trigger' = TRIGGERING_SYNC and acc_type == 0 (custom) num_sweeps
// number of sweeps
mode // mode (AVERAGE_MODE / MAXHOLD_MODE). Meaningful if 'num_sweeps' > 1.
data// measurement data. The size must not be less than 'num_points'.
act_span // actual span in KHz
act_frequency // actual measurement frequency in Hz

modul_time

Description
This function provides measurement of the Modulation vs. Time characteristic.

Syntax
unsigned long modul_time(unsigned long carier_frequency, unsigned short resolution, unsigned shortnum_points, unsigned char trigger, short start_time, short *freq_dev, unsigned short *act_resolution, unsigned long *act_frequency);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
carier_frequency // carier frequency in Hertzs. If zero then any frequency.
resolution // Time resolution (time interval between two nearest samples of data) in nanoseconds.
num_points // number of points
trigger // If 'trigger' = TRIGGERING_OFF (0x00) then Trigger is off.
// Measurement should to start immediately after receiving by a Host Controller
// the Read_Modulation_Time_Data command.
// If 'trigger' = TRIGGERING_SYNC (0x02) then measurement will start
// if the access code correlator exceeds the trigger threshold

start_time // Time offset in hundreds of nanoseconds from the triggering point.
freq_dev // pointer to initialized array to write the measured data of frequency deviation
// from 'carier_frequency' in Hertzs divided by 100. (1unit = 100 Hz)
act_resolution // actual resolution value in nanoseconds
act_frequency // actual measurement frequency value in Hertzs

power_time

Description
This function provides measurement of the Power-Time characteristic.

Syntax
unsigned long power_time(unsigned char meas_mode, unsigned long frequency, unsigned short resolution,unsigned short num_points, unsigned chartrigger, short threshold, unsigned char acc_type, unsigned long lap, short start_time, unsigned short num_sweeps, unsigned char sweep_mode, unsigned char cal, short *power, unsigned short *act_resolution, unsigned long *act_frequency);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
meas_mode // measurement mode: 0: passive (connectionless), 1: active
frequency // unit : Hz
resolution // time interval between two nearest samples of data in nanoseconds.
num_points // number of points
trigger // If 'trigger' = TRIGGERING_OFF (0x00) then Trigger is off.
// Measurement starts immediately after receiving by a HC the Read_Power_Time_Data command.
// If 'trigger' = TRIGGERING_ON (0x01) then Trigger is on. Measurement will
// start only after receiving RF signal with power more than Threshold level.
// If 'trigger' = TRIGGERING_SYNC (0x02) then measurement will
// start if the access code correlator exceeds the trigger threshold
Threshold // Threshold level for triggering in dB multiplied by 100.
// (1 unit = 0.01dBm). The value is meaningfull only if Trigger is on.
acc_type // type of access code. 0 - custom, 1 - IAC, 2 - DAC, 3 - CAC.
// Meaningful only if 'trigger' = TRIGGERING_SYNC.
lap // LAP of BD_ADDR to derive an access code.
// Meaningful only if 'trigger' = TRIGGERING_SYNC and acc_type == 0 (custom)
start_time // Time offset in hundreds of nanoseconds from the triggering point.
// This parameter will be ignored if Trigger is off.
num_sweeps // number of sweeps
sweep_mode // sweep mode (AVERAGE_MODE / MAXHOLD_MODE). Meaningful if 'num_sweeps' > 1.
cal // flag whether calibration must be done. 0:skip calibration, 1:calibrate power data
power // measurement data
act_resolution // actual span in KHz
act_frequency // actual measurement frequency in Hz

power_channel

Description
This function provides measurement of the Power vs Channel characteristic.

Syntax
unsigned long power_channel(short power[79]);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter

power[79] // channel's power data

BB Test Cases

bb_tc

Description
This function executes Baseband test cases as batch process.

Syntax
unsigned long bb_tc(void);

Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
void

Error Check

errorcode_2_str

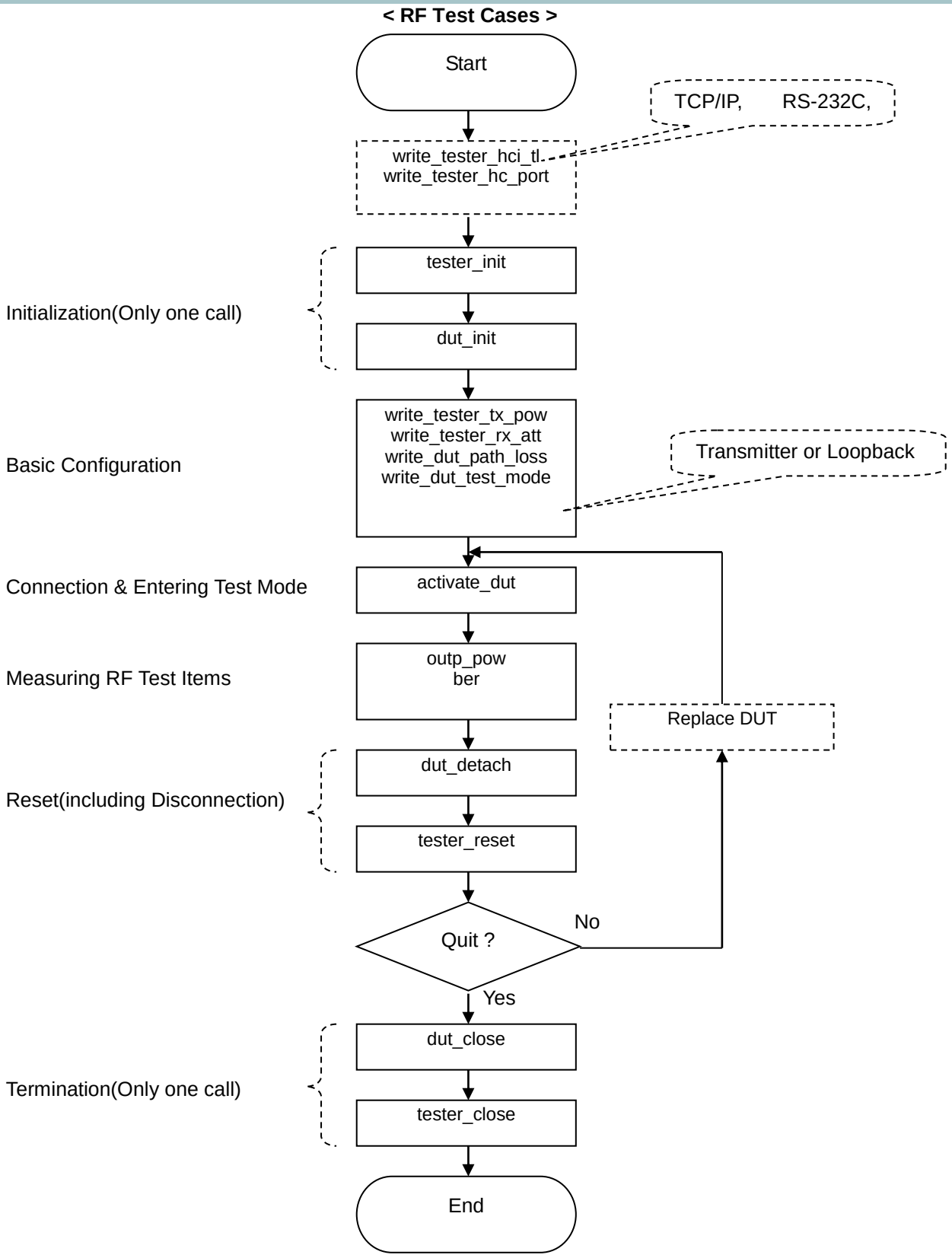
Description
Every API function returns an error code after execution. If the function succeeds, the error code is equal to zero. When a API function fails, the error code is returned to indicate the reason for the error. This function can be used to check the error with the pertinent description.

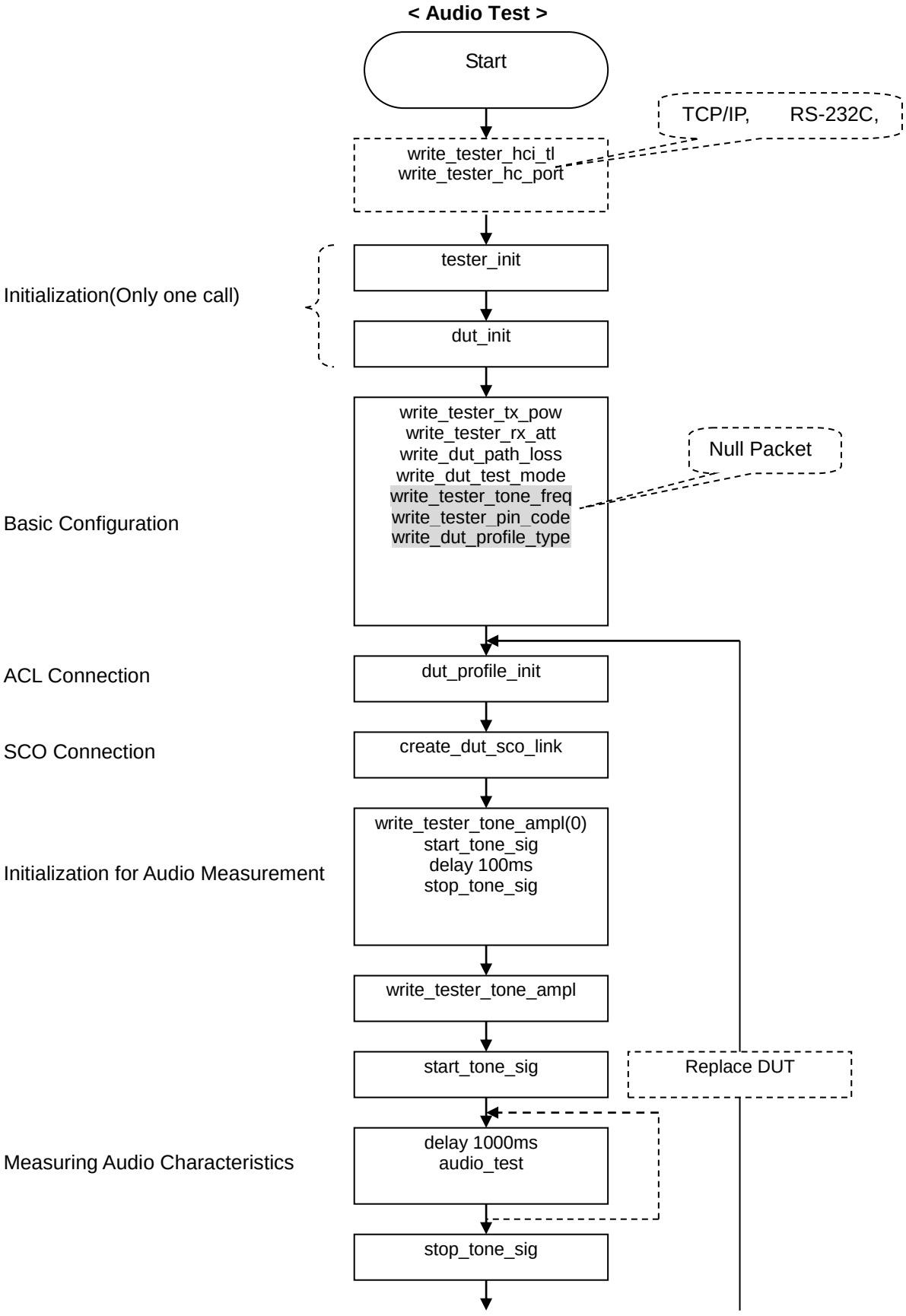
Syntax
unsigned long errorcode_2_str(unsigned long error, char *str);

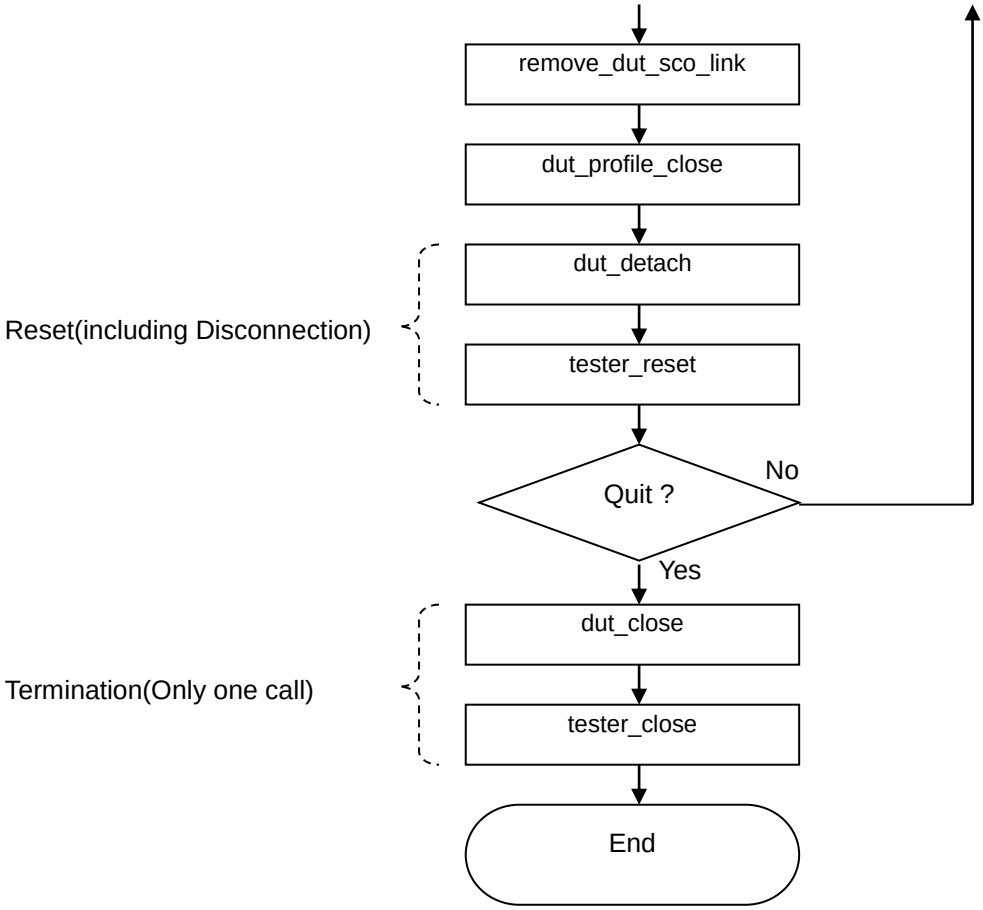
Return Value
The return value of this function will be zero if the function is successful. Otherwise, the return value will be an error code.

Parameter
Error // error code
Str // error code description, recommended size : 128 bytes.

5.8 Flow Chart for DLL functions




< Audio Test >
Start
TCP/IP, RS-232C,
write_tester_hci_tl
write_tester_hc_port
Initialization(Only one call)
tester_init
dut_init
Basic Configuration
write_tester_tx_pow
write_tester_rx_att
write_dut_path_loss
write_dut_test_mode
write_tester_tone_freq
write_tester_pin_code
write_dut_profile_type
Null Packet
ACL Connection
dut_profile_init
SCO Connection
create_dut_sco_link
Initialization for Audio Measurement
write_tester_tone_ampl(0)
start_tone_sig
delay 100ms
stop_tone_sig
write_tester_tone_ampl
start_tone_sig
Replace DUT
Measuring Audio Characteristics
delay 1000ms
audio_test
stop_tone_sig


remove_dut_sco_link
dut_profile_close
dut_detach
Reset(including Disconnection)
tester_reset
Quit ?
No
Yes
dut_close
Termination(Only one call)
tester_close
End

5.9 Example using DLL

5.9.1 Measuring Output Power

```
#include <stdio.h>
#include "tester_dll.h"

int main(void)
{
unsigned long int error;      // Error code
char err_str[128]; // Error string
int i; // counter
char c = 0;
unsigned short dll_version; // the version of the dll file
unsigned short dll_subversion; // the subversion of the dll file
unsigned short nap;
unsigned long ulap;

// Check DLL version
read_dll_version(&dll_version, &dll_subversion);
if((dll_version != DLL_VERSION) || (dll_subversion != DLL_SUBVERSION))
{
printf("Incorrect version of DLL-file\n");
getchar();
return -1;
}

// Initialization
error = tester_init();
if(error)
{
errorcode_2_str(error, err_str);
printf("Error initialization of the tester. %s\n", err_str);
getchar();
return -1;
}

      error = dut_init();
if(error)
{
errorcode_2_str(error, err_str);
printf("Error initialization of the tester. %s\n", err_str);
tester_close();
getchar();
return -1;
}
// End of initialization

// This is main test routines
while((c != '0') && (c != 'q') && (c != 'Q'))
{
while(new_dut())
{
printf(" ! DUT is not plugged in. Check and try again.\nPress 'q' and ENTER to quit or ENTER to continue: ");
c = getchar();
if(c == 'q')
{
tester_reset();
```

```
dut_close();
tester_close();
return -1;
}
}

// Activate the DUT. The code will discover the DUT and create connection.
// Actualy the activation is not neccessary because all of functions of the 2nd level of API
// will activate the DUT automatically. We use this code just to check whther everything is OK
// with the DUT.
printf("DUT is activating...");
error = activate_dut();
while(error)
{
errorcode_2_str(error, err_str),
printf("FAILED. %s\n", err_str);
printf("Press, please:\n");
printf(" - q: quit\n");
printf(" - r: try again\n");
printf("Your choice: ");
c = getchar();
switch(c)
{
case 'q':
case 'Q':
tester_reset();
dut_close();
tester_close();
return -1;
default:
printf("DUT is activating...");
error = activate_dut();
}
}
printf("OK\n");
printf("------------------------------------------------------>\n");
error = read_dut_bd_addr(&ulap, &nap);
if(error)
{
errorcode_2_str(error, err_str);
printf("Error reading DUT BD_ADDR. %s\n", err_str);
}
else printf("DUT BD_ADDR: 0x%.2x%.8lx\n", nap, ulap);

// Output Power (TRM/CA/O1/C)
{
// Parameters of the test case
unsigned char      freq[3] ={0,39,78};
// RX frequency of a tester (TX for a DUT). 0 - 2402 MHz, 1 - 2403 MHz ... 78 - 2480 MHz
unsigned char hop_mode = 79;
// 1: Hopping OFF, 79: Hopping ON unsigned char pkt_type = 4;
// packet type (according to Baseband Specification). If zero, then
// longest supported packet type. 4 is DH1 packet unsigned short num_pkts = 1;
// number of packets to test
// Result of the test case short power_av;
// the average power in dBm multiplied by 100 (1 unit = 0.01dBm).short power_max;
// the peak power in dBm multiplied by 100 (1 unit = 0.01dBm) short power_min;
// the minimum power in dBm multiplied by 100 (1 unit = 0.01dBm).
printf(" -- Output Power (TRM/CA/O1/C)\n");
printf("channel f(MHz)\tPav\tPmax\tPmin\tErrors\n");
```

```
i = 0;
while( i < 3)// Execute for 3 frequency channel
{
error = outp_pow( freq[i], hop_mode, pkt_type, num_pkts, 0, &power_av, &power_max, &power_min);
errorcode_2_str(error, err_str),
printf("%d\t%d\t%.2f\t%.2f\t%.2f\t%s\n",
freq[i], 2402+freq[i], (float) power_av*0.01, (float) power_max * 0.01,
(float) power_min * 0.01, err_str);
++i;        // Next frequency
}
}

disconnect_dut();
printf("<-----------------------------------------------------\n");
printf("RF test cases are completed.\nPress 'q' and ENTER to quit or ENTER to continue for another DUT: ");
c = getchar();
}
// End of main test routines
// Reset
dut_detach();
tester_reset();

// Termination
dut_close();
tester_close();
return 0;
}
```

Chapter

5

Appendices

A. Specifications

B. RF Test Cases of the TC-3000C Bluetooth Tester

C. The list of Save/Recall parameters

Appendix A. Specification

5.1.1 RF SOURCE

Output Frequency

Range: 2400 MHz ~ 2500 MHz
Accuracy: ± 46 Hz + Frequency Reference Drift
Resolution: 1 kHz
Switching Time: < 160 us, ± 75 kHz of the final frequency

Output Level

Range: 0 ~ -80 dBm
Accuracy: ±1 dB
Resolution: 0.1 dB

GFSK Modulation

GFSK bit rate : 1 Mbps, B X T = 0.5
Modulation index : 0.32
Modulation index range : 0.28 ~ 0.35 (Frequency deviation range : 140 kHz ~ 175 kHz)
Modulation index resolution : 0.01

GFSK Modulation

π /4 DQPSK bit rate : 2 Mbps
π /8 DQPSK bit rate : 3 Mbps

GFSK Modulation (Low Energy)

GFSK bit rate : 1 Mbps, B X T = 0.5
Modulation index : 0.5
Modulation index range : 0.45 ~ 0.55 (Frequency deviation range : 225 kHz ~ 275 kHz)
Modulation index resolution : 0.01

5.1.2 RF ANALYZER

Input Frequency

Range: 2400 MHz ~ 2500 MHz
Accuracy: ±46 Hz + Frequency Reference Drift
Resolution: 1 kHz
LO Switching time: < 160 us, ± 75 kHz of the final frequency

Input Level

Range: -10 ~ -80 dBm (20 dBm ~ -30 dBm with 30 dB attenuator ON)
Absolute Max: 25 dBm
Accuracy: ±1 dB,
Resolution: 0.1 dB

Intermediate Frequency

IF Frequency: 70 MHz
Filter BW: 10 MHz Max,
Sampling Rate: 40 MHz
1 MHz Digital Filter ON/OFF

5.1.3 SPECTRUM ANALYZER

Frequency Range: 2400 MHz ~2500 mHz
Max Span: 1,1.25,2,2.5,5,10 MHz
Resolution BW: ~40 kHz at 10 MHz Span.
Averaging: 1~50

5.1.4 FM MODULATION ANALYZER

Modulation: FM, GFSK
Frequency Response: 1.3 MHz with channel filter selected
Deviation range: 0~4 MHz
Resolution: 0.1 kHz
Frequency Accuracy: ±1 kHz

5.1.5 POWER-TIME

Level Accuracy: ± 1 dB
Resolution: 0.1 dB
Trigger Method: Access Code (BT), Power Level

5.1.6 POWER-CHANNEL (BT Mode)

Level Accuracy: ± 1 dB
Resolution: 0.1 dB
DUT Mode: Null Packet or Test Mode

5.1.7 RX BER TEST (BT Mode)

DUT Mode: Requires Loopback Test Mode
Graph: Log Scale BER-Time or BER-RX Power(TBD)
Reading: %, Instantaneous, Cumulative
Parameters: RX Power, Measurement Data Length, Packet Length/Type

5.1.8 I-Q CONSTELLATION (EDR BT Mode)

DUT Mode: Requires EDR Test Mode
Graph: Display I-Q symbol of DPSK
Parameters: Symbol start point, Number of symbol

5.1.9 TX BER TEST (BT Mode)

DUT Mode: Requires EDR Transmitter Test Mode
Graph: Log Scale TX BER-Time and PER (Packet Error Rate)
Reading: %, Instantaneous, Cumulative
Parameters: Number of packet

5.1.10 DEVM (Differential Error Vector Magnitude)

DUT Mode: Requires EDR Test Mode
Graph: Display DEVM on time axis.

Useful test for measuring DEVM variance in a packet.

5.1.11 FREQUENCY REFERENCE

Internal Reference Stability: ± 1 ppm vs. at -20 ~ 70℃, ±1 ppm/first year
External Reference: 10 MHz

5.1.12 FRONT PANEL

RF In/Out Port: N-type, 50 ohm, VSWR <1.6
Baseband In/Out ports: 4 BNC
- RX (I, Q), TX (I, Q), Demodulation, Modulation, RX and TX Bit streams, RX and TX Clocks, Audio

5.1.13 REAR PANEL

HCI Interface for DUT: RS-232C, USB, PCMCIA
Remote Programming Interface: TCP/IP (LAN)

5.1.14 MISCELLANEOUS

Operating temperature: 5 ~ 40℃
Line Voltage: 100 to 240 VAC, 50/60 Hz
Dimension: 375(w) x 432(d) x 220(h) mm
Weight: 10 Kg
Packing Size: 445(w) x 515(d) x 310(h) mm
Packing Weight: approx.13 kg

Appendix B. RF Test Cases of the TC-3000C

5.2.1 Output Power (TRM/CA/01/C)

Goal
Verification of the maximum peak and average RF-output power

Parameters
1. **Test mode**: Transmitter test, Loop back, Null packets (simple connection).
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to 'longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case.
   Note. This parameter is ignored in Null packets test mode.
4. **Number of packets** parameter specifies how many packets will be used to find the maximum peak and average RF-output power.
5. **Hopping mode** parameter specifies whether hopping will be used or not for the test.
   Note. This parameter is ignored in Null packets test mode.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values are assigned automatically:

Test/Normal Mode: Transmitter
BT channels: 0-39-78
Packet type: longest
Number of packets: 1
Hopping mode: 79 (Hopping is on)

Additional test conditions
In Transmitter test and Loop back test mode whitening is disabled and the payload's bit pattern is PRBS9.

Test Procedure
1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to "Transmitter test" or "Loop back" then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Packet type* and *Hopping mode*. The LMP_test_control command is used to set the parameters in the DUT.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT

supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).

4. For the given channel frequency the tester records output power of the DUT from the start to the end of a packet. Tester records the highest and the lowest power value in the trace and calculates average power from 20% to 80% of the trace. The path losses value is added to the results. To set the path losses value, use: Menu → Configuration → DUT → More 1/5 → Path Loss. This step is repeating for specified number of packets (see the "Number of packets" parameter) and for each frequency channel. If the frequency channel is changed and the hoping mode is the single frequency mode, the tester sets new parameters of the test mode using LMP_test_control command**.**

Test Results

Pav is the average RF-output power of the DUT for given frequency channel, measured in dBm.

Pmax is the maximum peak RF-output power of the DUT for given frequency channel, measured in dBm.

Pmin is the minimum RF-output power of the DUT for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.

To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of average power"

"Lower Limit of average power"

"Upper Limit of peak power"

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.2 Power Density (TRM/CA/02/C)

Goal

Verification of the maximum RF-output power density

Parameters

1. **Test mode**: Transmitter test, Loop back, Null packets (simple connection).
2. **Data length** parameter specifies which length of the packet's payload will be used for the test case. If the parameter is equal to 0 then the tester will read LMP features of the DUT

and the longest supported length of a packet will be chosen for the test case.
Note. This parameter is ignored in Null packets test mode.

If the flag “Use Default” is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Data length: 0 (longest supported length)

Additional test conditions

Hopping is on. In Transmitter test and Loop back test mode whitening is disabled, the payload’s bit pattern is PRBS9.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to “Transmitter test” or “Loop back” then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Packet type* and *Hopping mode*. The LMP_test_control command is used to set the parameters in the DUT.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The tester measures spectrum. The spectrum analyzer settings are:
   Spectrum measurement method: FFT
   Center frequency: 2450 MHz
   Span: 100 MHz
   Resolution Bandwidth: 10 kHz
   Detector: Peak
   Mode: Maxhold
   Trigger: start time of the tester’s RX slot
   Sweeptime: tester’s RX slot
   Number of sweeps: 255

Tester integrates the spectrum data for each 100KHz bandwidth frequency domain and scans within the span to find peak value of the calculated power. The peak power and related the center frequency of 100KHz interval is recorded. The path losses value is added to the results of the peak power. To set the path losses value use: Menu→Configuration→ DUT→More 1/5 →Path Loss.

Test Results

P_density is the peak value of power measured in dBm within 100KHz frequency bandwidth.
freq is the center frequency of the 100KHz frequency bandwidth where the peak value of the power density was detected measured in MHz.
To reach a verdict the test result is compared with the limit parameter:
“Upper Limit of power density”
To change the parameter, use the Edit menu of the test case. If the flag “Use Default” is

selected then the displayed value of the parameter is ignored and the value according to RF Test Specification [1] is assigned automatically.

Requirement to Initial Condition of a DUT
If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu→Configuration→DUT→HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.3 Power Control (TRM/CA/03/C)

Goal
Verification of the TX power control

Parameters
1. **Test mode**: Transmitter test, Loop back, Null packets (simple connection).
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to 'longest' then the tester will read LMP features of the DUT and the longest supported packet will be chosen for the test case.
   Note. This parameter is ignored in Null packets test mode.
4. **Number of packets** parameter specifies how many packets will be used to find the average RF-output power for each power step.
5. **Measurement method** specifies the algorithm, which will be used for the test case. If the parameter is equal to 0 then the algorithm, described in [1] is used. If the parameter is equal to 1 then fast algorithm is used.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal Mode: Transmitter
BT channels: 0-39-78
Packet type: DH1
Number of packets: 1
Measurement method: 0 (BT Spec)

Additional test conditions
In Transmitter test and Loop back test mode whitening is disabled, the payload's bit pattern is PRBS9. If the *Measurement method* = 0, then in Transmitter test and Loop back test mode the

hopping is off. The hopping is on in all of another cases.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to “Transmitter test” or “Loop back” then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Packet type* and *Measurement method*. The LMP_test_control command is used to set the parameters in the DUT.
3. For the given frequency channel the tester measures average power from the start to end of a packet (see details in the Output Power (TRM/CA/01/C) test case). If the *Measurement method* = 1, the tester measures the average power for all of frequency channels, described in the *BT channels* parameter.
4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
5. The tester repeats step 3 until minimum possible output power step of the DUT is reached (LMP_min_power response is received from the DUT). The tester records the power step size (difference between two nearest output power measurements) and the power at the minimum power step. The path losses value is added to the last result. To set the path losses value use Menu → Configuration → DUT → More 1/5 → Path Loss.
6. The tester increases DUT's output power one step using LMP_incr_power_req command. The output power at the given power step is measured and step size is recorded by the tester.
7. The tester repeats step 6 to the maximum possible output power setting of the DUT. The tester measures and records the maximum power.
8. If the *Measurement method* = 0, then the tester repeats steps 3 to 6 for each frequency channel (see the “BT channels” parameter).

Test Results

Pmin is the minimum average output power of the DUT for given frequency channel, measured in dBm.

Pmax is the maximum average output power of the DUT for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.

Pst_min is the minimum power step size for given frequency channel, measured in dB.

Pst_max is the maximum power step size for given frequency channel, measured in dBm.

To reach a verdict the test results are compared with the limit parameters:

“Upper Limit of the minimum power”

“Upper Limit of maximum power step size”

“Lower Limit of the minimum power step size”

To change the parameters, use the Edit menu of the test case. If the flag “Use Default” is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT
If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.4 TX Output Spectrum – Frequency range (TRM/CA/04/C)

Goal
Verification if the emissions inside the operating frequency range are within the limits.

Parameters
1. **Test mode**: Transmitter test, Loop back, Null packets (simple connection).
2. **Data length** parameter specifies which length of the packet's payload will be used for the test case. If the parameter is equal to 0 then the tester will read LMP features of the DUT and the longest supported length of a packet will be chosen for the test case.
   Note. This parameter is ignored in Null packets test mode.
3. **Number of sweeps** is the number of sweeps parameter of spectrum analyzer.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Data length: *0 (longest supported length)*
Number of sweeps: 1

Additional test conditions
In Transmitter test and Loop back test mode the hopping is off, whitening is disabled, the payload's bit pattern is PRBS9.

Test Procedure
1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to "Transmitter test" or "Loop back" then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. If the Test Mode parameter is equal to "Transmitter test" or "Loop back" then the DUT is set to lowest TX frequency. The tester measures spectrum. The spectrum analyzer settings are:
   - Spectrum measurement method: FFT

- Center frequency: 2402 MHz
- Span: 10 MHz (1 slot packets), 6.667 MHz (3,5 slot packets)
- Resolution Bandwidth: 100 kHz
- Detector: Peak
- Mode: Average
- Trigger: start of the RX packet
- Sweep time: duration of the RX packet
- Number of sweeps: defined by a user in the *Number of sweeps* test case parameter.

The path losses value is added to the results. To set the path losses value, use Menu → Configuration → DUT → More 1/5 → Path Loss. Tester searches the lowest frequency below the operating frequencies at which spectral power density drops below the level of –80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth). This frequency is called f_l and is recorded in the test report.

5. If the Test Mode parameter is equal to “Transmitter test” or “Loop back” then the tester sets the DUT to transmit on highest TX frequency. The tester measures spectrum. The spectrum analyzer settings are:
   - Spectrum measurement method: FFT
   - Center frequency: 2480 MHz
   - Span: 10 MHz (1 slot packets), 6.667 MHz (3,5 slot packets)
   - Resolution Bandwidth: 100 kHz
   - Detector: Peak
   - Mode: Average
   - Trigger: start of the RX packet
   - Sweep time: duration of the RX packet
   - Number of sweeps: defined by a user in the *Number of sweeps* test case parameter.

   The path losses value is added to the results. Tester searches the highest frequency above the operating frequencies at which spectral power density drops below the level of –80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth). This frequency is called f_h and is recorded in the test report.

Test Results

f_l is the lowest frequency, measured in MHz, below the operating frequencies at which spectral power density drops below the level of –80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth).

f_h is the highest frequency, measured in MHz, above the operating frequencies at which spectral power density drops below the level of –80 dBm/Hz e.i.r.p (-30 dBm if measured in a 100 kHz bandwidth).

To reach a verdict the test results are compared with the limit parameters:

“Lower Limit of the lowest frequency”

“Upper Limit of the highest frequency”

To change the parameters, use the Edit menu of the test case. If the flag “Use Default” is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI

port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.5 TX Output Spectrum – 20 dB Bandwidth (TRM/CA/05/C)

Goal
Verification if the emissions inside the operating frequency range are within the limits.

Parameters
1. **Test mode**: Transmitter test, Loop back, Null packets (simple connection).
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
3. **Data length** parameter specifies which length of the packet's payload will be used for the test case. If the parameter is equal to 0 then the tester will read LMP features of the DUT and the longest supported length of a packet will be chosen for the test case.
   Note. This parameter is ignored in Null packets test mode.
4. **Number of sweeps** is the number of sweeps parameter of spectrum analyzer.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 0-39-78
Data length: 0 (longest supported length)
Number of sweeps: 1

Additional test conditions
In Transmitter test and Loop back test mode the hopping is off, whitening is disabled, the payload's bit pattern is PRBS9.

Test Procedure
1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to "Transmitter test" or "Loop back" then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req

requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).

4. If the Test Mode parameter is equal to “Transmitter test” or “Loop back” then the DUT is set to given channel TX frequency. The tester measures spectrum. The spectrum analyzer settings are:
   - Spectrum measurement method: FFT
   - Center frequency: channel frequency
   - Span: 2.5 MHz
   - Resolution Bandwidth: 10 kHz
   - Detector: Peak
   - Mode: Maxhold
   - Trigger: start of the RX packet
   - Sweep time: duration of the RX packet

- Number of sweeps: defined by a user in the *Number of sweeps* test case parameter

5. Tester searches the highest power value in the transmit channel (peak of the emission).
6. Tester searches lowest frequency below the operating frequency, at which transmit power drops 20 dB below the level measured in step 5. This frequency is called f_l and is recorded in the test report.
   Tester searches highest frequency above the operating frequencies, at which transmit power drops 20 dB below the level measured in step 5. This frequency is called f_h and is recorded in the test report.
7. The difference between the frequencies f_h-f_l measured in the former steps is the 20 dB bandwidth and is recorded in the test report.
8. Tester repeats the steps 4 to 7 for each channel frequency (see the “BT channels” parameter).

Test Results

f_l is the lowest frequency, measured in MHz, below the operating frequency, at which transmit power drops 20 dB below the highest power value in the transmit channel.
f_h is the is the highest frequency, measured in MHz, below the operating frequency, at which transmit power drops 20 dB below the highest power value in the transmit channel..
f_h-f_l is the 20 dB bandwidth for the transmit channel, measured in MHz.
To reach a verdict the test results is compared with the limit parameter:

“Upper Limit of 20 dB bandwidth”

To change the parameter, use the Edit menu of the test case. If the flag “Use Default” is selected then all of displayed values of the parameters are ignored and the value according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.6 TX Output Spectrum – Adjacent channel power (TRM/CA/06/C)

Goal

Verification if the emissions inside the operating frequency range are within the limits.

Parameters

1. **Test mode**: Transmitter test, Loop back.
   Note. The test case cannot be executed in Null packets Test mode.
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "20-40-60" means that the test case must be executed for four frequency channels: 20, 40 and 60, that is for the frequencies 2422MHz, 2442MHz and 2462MHz.
3. **Data length** parameter specifies which length of the packet's payload will be used for the test case. If the parameter is equal to 0 then the tester will read LMP features of the DUT and the longest supported length of a packet will be chosen for the test case.
   Note. This parameter is ignored in Null packets test mode.
4. **Number of sweeps** is the number of sweeps parameter of spectrum analyzer.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 3-39-75
Data length: 27 (the longest length of DH1 packet)
Number of sweeps: 1

Additional test conditions

Hopping is off, whitening is disabled and the payload's bit pattern is PRBS9.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Data length*.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit on the given frequency channel. The transmit frequency is defined by the index M (f(M)=(2402+*ch*)MHz). In the same way the measurement frequency is defined by the index N.

5. Tester sets N := 0.
6. Tester sets j := 0.
7. The tester measures spectrum. The spectrum analyzer settings are:
   - Spectrum measurement method: FFT
   - Center frequency: f(N)
   - Span: 2.5 MHz
   - Resolution Bandwidth: 10 kHz
   - Trigger: start time of the RX slot
   - Detector: Average
   - Mode: Maxhold
   - Trigger: start time of the tester's RX slot
   - Sweeptime: tester's RX slot
   - Number of sweeps: 1

   Tester integrates the spectrum data from f(N)-500KHz to f(N)+500KHz for each 100KHz bandwidth and each calculated power is recorded as P_{ij}.
8. Tester increments *j* and repeats step 7 until *j* < *Number of sweeps*.
9. For each *i* the tester searches maximum value of the power within sweeps: $P_{maxi} = \max(P_{ij})$.
10. Tester calculates and records the power of N channel: $P(N)=\sum_{i=1}^{10} P_{\max i}$. The path losses value is added to the result. To set the path losses value, use Menu Configuration DUT More 1/4 Path Loss.
11. Tester increments N and repeats step 6 to 10 for 79 channels, $N=\overline{0,78}$.
12. Steps 4 to 11 are repeated for each specified TX frequency channels of the DUT (see the "BT channels" parameter).

Test Results

M is the number of the TX frequency channels of the DUT

P(N) is the power, measured in dBm, in the N^{th} adjacent channel for given TX frequency channels of the DUT

To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of the power in a channel M-N=2" (in dBm)
"Upper Limit of the power in a channel M-N>=3" (in dBm)
"Max. number of excepted channels"
"Upper Limit of the power in excepted channels" (in dBm)

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.7 Modulation Characteristics (TRM/CA/07/C)

Goal
Verification of the modulation index

Parameters
1. **Test mode**: Transmitter test, Loop back.
   Note. The test case cannot be executed in Null packets Test mode.
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to 'longest' then the tester will read LMP features of the DUT and the longest supported packet will be chosen for the test case.
4. **Number of packets** parameter specifies how many packets will be used to calculate modulation characteristics.
5. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   79 - hopping is on

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 0-39-78
Packet type: longest
Number of packets: 10
Hopping mode: 1 (Hopping is off)

Additional test conditions
Whitening is disabled.

Test Procedure
1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the *Test Mode*, *Packet type* and *Hopping mode* parameters.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).

4. The DUT is set to transmit on the given frequency channel.
5. The DUT is set to transmit the 11110000 bit pattern as payload. Tester measures demodulation characteristics. Each bit is over sampled 10 times for one-slot packets and 8 times for 3,5-slot packets. Tester calculates for each "00001111" 8 bit sequence in the payload the average frequency over the frequency values of the 8 bits. Then tester takes the average over all bit samples as the deviation for each bit. For each second, third, sixth and seventh of the 8 bits the deviation from the average frequency within the bit period is recorded as df1_max. The average of all the df1_max deviation values measured before is calculated, and recorded as df1_avg.
6. The DUT is set to transmit the 10101010 bit pattern as payload. Tester measures demodulation characteristics and calculates for each "01010101" 8 bit sequence in the payload the average frequency over these 8 bits. For each of the 8 bits the maximum deviation from this average within the bit period is recorded as df2_max. The average of all the maximum deviation values measured before is calculated, and recorded as df2_avg. The minimum value of all deviations df2_max is recorded as df2_min. The rate of the deviations df2_max, which are less than 115KHz, is recorded as df2_rate.
7. Steps 5 and 6 id repeated for required number of packets (see the *Number of packets* parameter).
8. Steps 4 to 8 are repeated for each TX frequency channels of the DUT (see the *BT channels* parameter).

Test Results

df1_avg is the average of all frequency deviations for 11110000 bit pattern as payload, measured in KHz.

df2_avg is the average of all frequency deviations for 10101010 bit pattern as payload, measured in KHz.

df2_min is the minimum value of all frequency deviations for 10101010 bit pattern as payload, measured in KHz. The result has only informative character and is not used to reach a verdict.

df2_rate is the rate of the bits with deviation df2_max less than 115 KHz in percents.

df2/df1 is the ratio of all frequency deviations df2_avg and df1_avg.

To reach a verdict the test results are compared with the limit parameters:

“Up. Lim. of freq. deviat. for 11110000” (in KHz)
“Low. Lim. of freq. deviat. for 11110000” (in KHz)
“Low. Lim. of freq. deviat. for 1010” (in KHz)
“Max.num.of deviat.for 1010 < low.lim.” (in percents)
“Low. Lim. for the ratio of df2/df1” (in percents)

To change the parameters, use the Edit menu of the test case. If the flag “Use Default” is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.8 Initial Carrier Frequency Tolerance (TRM/CA/08/C)

Goal

Verification of the transmitter carrier frequency accuracy

Parameters

1. **Test mode**: Transmitter test, Loop back.
   To choose the test mode in GUI, use: Menu Configuration DUT More 4/4 Test Mode.
   Note. The test case cannot be executed in Null packets Test mode.
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
3. **Number of packets** parameter specifies how many packets will be used to calculate initial carrier frequency.
4. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   79 - hopping is on

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:
BT channels: 0-39-78
Number of packets: 10
Hopping mode: 79 (hopping is on)

Additional test conditions

Whitening is disabled, Packet type is DH1, the payload's bit pattern is PRBS9 and payload data length is 27 bytes.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit on the given frequency channel.
5. Tester measures demodulation characteristics. Each bit is over sampled 20 times. The tester makes an integration of the packets' 4 preamble bits and the first bit after 4th

preamble bit. The calculation starts at the centre of the first preamble bit until the centre of the first bit following the 4th preamble bit. The DUT's carrier frequency is assumed to be the result of this integration and is named f_0.

6. Steps 5 and 6 id repeated for required number of packets (see the *Number of packets* parameter). Maximum and minimum values of the f_0 are recorded as f0_max, f0_min.
7. Steps 5 and 6 are repeated for each TX frequency channels of the DUT (see the *BT channels* parameter).

Test Results

f0_max is the maximum value of the initial carrier frequency deviation, measured in KHz.
f0_min is the minimum value of the initial carrier frequency deviation, measured in KHz.
To reach a verdict the test results are compared with the limit parameters:

"Up.lim.of init.car.freq.deviation" (in KHz)
"Up.lim.of init.car.freq.deviation" (in KHz)

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.9 Carrier Frequency Drift (TRM/CA/09/C)

Goal

Verification of the transmitter centre frequency drift within a packet

Parameters

1. **Test mode**: Transmitter test, Loop back.
   Note. The test case cannot be executed in Null packets Test mode.
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to 'longest' then the tester will read LMP features of the DUT and the longest supported packet will be chosen for the test case.
4. **Number of packets** parameter specifies how many packets will be used to measure carrier frequency drift characteristics.
5. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:

1 - single frequency (hopping is off)
79 - hopping is on

If the flag “Use Default” is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 0-39-78
Packet type: longest
Number of packets: 10
Hopping mode: 79 (hopping is on)

Note. If all of parameters of the test case will be matched with the parameters of the Modulation Characteristics (TRM/CA/07/C) test case, then both of test cases will be executed simultaneously. It will reduce the measurement time.

Additional test conditions

Whitening is disabled and the payload’s bit pattern is 10101010.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the *Test Mode*, *Packet type* and *Hopping mode* parameters.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (To modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit the 10101010 bit pattern as payload on the given frequency channel.
5. Tester measures demodulation characteristics. Each bit is over sampled 10 times for one-slot packets and 8 times for 3,5-slot packets. The tester makes an integration of the packets' 4 preamble bits and the first bit after 4th preamble bit. The calculation starts at the centre of the first preamble bit until the centre of the first bit following the 4th preamble bit. The DUT's carrier frequency is assumed to be the result of this integration and is named f_0. Tester integrates frequency deviations for every 10 bit symbols in the payload body. The calculation starts from the 2nd payload bit. The results are recorded as f_k.
6. Step 5 and 6 id repeated for required number of packets (see the *Number of packets* parameter). Tester records the maximum frequency drift as f_drift_max = max(abs(f_k-f_0)) and the maximum drift rate as drift_rate_max = max(abs(f_{k+5}-f_k)).
7. Steps 4 to 6 are repeated for each TX frequency channels of the DUT (see the *BT channels* parameter).

Test Results

f_drift_max is the maximum frequency drift, measured in KHz
drift_rate_max is the maximum drift rate, measured in KHz/50us.
To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of the maximum frequency drift" (in KHz)
"Upper Limit of the maximum drift rate" (in KHz/50us)

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.10 EDR Relative Transmit Power (TRM/CA/10/C)

Goal

This test ensures the difference in average transmit power during frequency modulated [GFSK] and phase modulated [DPSK] portions of a packet is within an acceptable range.

Parameters

1. **Test mode**: Transmitter test, Loop back.
2. Note. The test case cannot be executed in Null packets Test mode.
3. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402MHz, 2422MHz, 2442MHz and 2462MHz.
4. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
5. **Number of packets** parameter specifies how many packets will be used to find the maximum peak and average RF-output power.
6. **Hopping mode** parameter specifies whether hopping will be used or not for the test.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values are assigned automatically:

Test/Normal Mode: Transmitter
BT channels: 0-39-78
Packet type: 2-longest
Number of packets: 1
Hopping mode: OFF

Additional test conditions

In Transmitter test and Loop back test mode whitening is disabled and the payload's bit pattern is PRBS9.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. If the Test Mode parameter is equal to "Transmitter test" or "Loop back" then the tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Packet type* and *Hopping mode*. The LMP_test_control command is used to set the parameters in the DUT.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. For the given channel frequency the tester records the average power P_{GFSK} over at least 80% of the GFSK portion of the packet and records the average power P_{DPSK} over at least 80% of the DPSK portion of the packet. The path losses value is added to the results. To set the path losses value, use: Menu → Configuration → DUT → More 1/5 → Path Loss. This step is repeating for specified number of packets (see the "Number of packets" parameter) and for each frequency channel. If the frequency channel is changed and the hoping mode is the single frequency mode, the tester sets new parameters of the test mode using LMP_test_control command**.**

Test Results

Pavfsk is the average RF-output power of the GFSK portion of the packet for given frequency channel, measured in dBm.
Pminfsk is the minimum RF-output power of the GFSK portion of the packet for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.
Pmaxfsk is the minimum RF-output power of the GFSK portion of the packet for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.
Pavpsk is the average RF-output power of the DPSK portion of the packet for given frequency channel, measured in dBm.
Pminpsk is the minimum RF-output power of the DPSK portion of the packet for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.
Pmaxpsk is the minimum RF-output power of the DPSK portion of the packet for given frequency channel, measured in dBm. The result has only informative character and is not used to reach a verdict.

To reach a verdict the test results are compared with the limit parameters:
"Upper Limit of DPSK and GFSK average power difference in dB"
"Lower Limit of DPSK and GFSK average power difference in dB"
To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT
If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode should be enabled (for Transmitter Test and Loop back Test Modes).

5.2.11 EDR Carrier Frequency Stability and Modulation Accuracy (TRM/CA/11/C)

Goal
This test verifies the transmitter carrier frequency stability and modulation accuracy.

Parameters
1. **Test mode**: Transmitter test, Loop back.
2. Note. The test case cannot be executed in Null packets Test mode.
3. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
4. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
5. **Number of packets** parameter specifies how many packets will be used to calculate EDR carrier frequency stability and modulation accuracy.
6. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   A. 1 - single frequency (hopping is off)
   79 - hopping is on

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 0-39-78
Packet type: 2-longest
Number of packets: 10
Hopping mode: 1 (Hopping is off)

Additional test conditions
Whitening is disabled.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the *Test Mode*, *Packet type* and *Hopping mode* parameters.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit on the given frequency channel.
5. Tester measures the initial frequency error. To measure it, tester selects those bits from the header that have the same value as both the previous and following bits so are not significantly affected by inter-symbol interference. Tester calculates Δw1 of those selected packet header bits that represent a transmitted '1'. Tester calculates Δw2 of those selected packet header bits that represent a transmitted '0'. The initial frequency error is Δwi = (Δw1 + Δw2)/2.
6. Tester partitions the payload into non-overlapping blocks of 50usecs beginning at the normal start of the synchronization symbol following the reference symbol and finishing at the nominal end of the final payload CRC symbol. For each block, tester calculates the frequency error w0 for the RMS DEVM for the block. The frequency error w0 and the RMS DEVM for each block are recorded.
7. Steps 5 and 6 are repeated for required number of packets (see the *Number of packets* parameter).
8. Steps 4 to 7 are repeated for each TX frequency channels of the DUT (see the *BT channels* parameter).

Test Results

wi is the initial carrier frequency error measured form packet header.

W0 is the frequency error of 50-usec DPSK portion.

RMSDEVM is RMS value of Differential Error Vector Magnitude.

PeakDEVM is maximum peak value of Differential Error Vector Magnitude.

df2_rate is the rate of the bits with deviation df2_max less than 115 kHz in percents.

df2/df1 is the ratio of all frequency deviations df2_avg and df1_avg.

To reach a verdict the test results are compared with the limit parameters:

"Upper limit of requency error w0 for 50us DPSK blocks in kHz"
"Upper limit of initial frequency error wi in kHz"
"Upper limit of frequency error sum w0 + wi in kHz"
"Upper limit of RMS DEVM"
"Upper limit of Peak DEVM"
"Upper limit of DEVM"
"Lower limit for symbol with DEVM < upper limit in percents"

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT
If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.12 EDR Differential Phase Encoding (TRM/CA/12/C)

Goal
Verification that the modulator correctly differential phase encodes the data.

Parameters
1. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
2. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
3. **Number of packets** parameter specifies how many packets will be used to calculate EDR carrier frequency stability and modulation accuracy.
4. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   79 - hopping is on

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

BT channels: 0-39-78
Packet type: 2-longest
Number of packets: 100
Hopping mode: 1 (Hopping is off)

Additional test conditions
Whitening is disabled. The test case is executed in Transmitter Test mode only.

Test Procedure
1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the *Packet type* and *Hopping mode*

parameters.

3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit on the given frequency channel.
5. The DUT transmits packet to the tester with maximum length payload containing PRBS9.
6. Tester demodulates packet and compares each payload with the expected PRBS9 data.
7. Steps 5 and 6 are repeated for required number of packets (see the *Number of packets* parameter).
8. Steps 4 to 7 are repeated for each TX frequency channels of the DUT (see the *BT channels* parameter).

Test Results

Bit_err is the bit error rate measured by comparing each payload with the expected PRBS9 data. The result has only informative character and is not used to reach a verdict.

Pkt_err is the packet error rate measured by comparing each payload with the expected PRBS9 data. The result has only informative character and is not used to reach a verdict.

BER(%) is bit error rate in percent. The result has only informative character and is not used to reach a verdict.

PER(%) is packet error rate in percent.

To reach a verdict the test results are compared with the limit parameters:

"Upper limit the PER"

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.13 EDR In-band Spurious Emissions (TRM/CA/13/C)

Goal

Verification that the level of unwanted signals from the DPSK transmitter, within the frequency range used by the devices, is below the required level.

Parameters

1. **Test mode**: Transmitter test, Loop back.
2. Note. The test case cannot be executed in Null packets Test mode.
3. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
4. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
5. **Number of sweeps** is the number of sweeps parameter of spectrum analyzer.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Test/Normal mode: Transmitter
BT channels: 3-39-75
Packet type: 2-longest
Number of sweeps: 1

Additional test conditions

Hopping is off.

Test Procedure

1. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
2. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode depending on the parameters *Test Mode*, *Data length*.
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
4. The DUT is set to transmit on the given frequency channel. The transmit frequency is defined by the index M (f(M)=(2402+*ch*)MHz). In the same way the measurement frequency is defined by the index N.
5. Tester sets N := 0.
6. Tester sets j := 0.
7. The tester measures spectrum. The spectrum analyzer settings are:
   - Spectrum measurement method: FFT
   - Center frequency: f(N)
   - Span: 2.5 MHz
   - Resolution Bandwidth: 10 kHz

- Trigger: start time of the RX slot
- Detector: Average
- Mode: Maxhold
- Trigger: start time of the tester's RX slot
- Sweeptime: tester's RX slot
- Number of sweeps: 1

Tester integrates the spectrum data from f(N)-500KHz to f(N)+500KHz for each 100KHz bandwidth and each calculated power is recorded as P_{ij}.

8. Tester increments *j* and repeats step 7 until *j* < *Number of sweeps*.
9. For each *i* the tester searches maximum value of the power within sweeps: $P_{maxi} = \max(P_{ij})$.
10. Tester calculates and records the power of N channel: $P(N)=\sum_{i=1}^{10} P_{\max i}$. The path losses value is added to the result. To set the path losses value, use Menu -> Configuration -> DUT -> More 1/4 -> Path Loss.
11. Tester increments N and repeats step 6 to 10 for 79 channels, $N=\overline{0,78}$.
12. Steps 4 to 11 are repeated for each specified TX frequency channels of the DUT (see the "BT channels" parameter).

Test Results

M is the number of the TX frequency channels of the DUT

P(N) is the power, measured in dBm, in the N^{th} adjacent channel for given TX frequency channels of the DUT

To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of the power in a channel |M-N|=1" (in dBm)
"Upper Limit of the power in a channel M-N=2" (in dBm)
"Upper Limit of the power in a channel M-N>=3" (in dBm)
"Max. number of excepted channels"
"Upper Limit of the power in excepted channels" (in dBm)

To change the parameters, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the values according to RF Test Specification [1] are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port).

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.14 Sensitivity – single slot packets (RCV/CA/01/C)

Goal

The sensitivity is tested using a non-ideal transmitter. The EUT must meet the required sensitivity for this non-ideal signal.

Parameters

1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   5 - reduced hopping sequence
   79 - hopping is on
2. **BT channels** are the RX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz. This parameter is meaningful only if the *Hopping mode* parameter is equal to 1 (hoping is off).
3. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
4. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
RX Power: -70 dBm
Number of samples: 200,000 bytes

Additional test conditions

Test mode is Loop back, hopping is off, whitening is disabled, the packet type is DH1, the payload's bit pattern is PRBS9.

Test Procedure

1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 1/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).).
5. The DUT is set to receive at the given channel frequency. The tester continuously sends DH1 packets to the DUT at the given channel frequency.
6. The tester enters dirty transmitter mode [1] and starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see the *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.
7. Tester stops dirty transmitter mode.

8. Steps 5 to 7 are repeated for each channel frequency (see the *BT channels* parameter).

Test Results

bytes is actual number of returned payload which were processed during BER measurement.
error_bits is the number of bits with error.
BER it the bit error rate in percents.

To reach a verdict the test results are compared with the limit parameters: "Upper Limit of the BER"

To change the parameter, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the value, according to RF Test Specification, are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.15 Sensitivity - multi-slot packets (RCV/CA/02/C)

Goal

Multi-slot packets are sent to the EUT at the sensitivity level. The EUT must meet the required sensitivity for this non-ideal signal.

Parameters

1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   5 - reduced hopping sequence
   79 - hopping is on
2. **BT channels** are the RX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz. This parameter is meaningful only if the *Hopping mode* parameter is equal to 1 (hoping is off).
3. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
4. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to 'longest' then the tester will read LMP features of the DUT and the longest supported packet will be chosen for the test case.
5. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
Packet type: longest
RX Power: -70 dBm
Number of samples: 200,000 bytes

Additional test conditions

Test mode is Loop back, hopping is off, whitening is disabled, the payload's bit pattern is PRBS9.

Test Procedure

1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 1/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
5. The DUT is set to receive at the given channel frequency. The tester continuously sends packets to the DUT at the given channel frequency.
6. Tester enters dirty transmitter mode [1] and starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see the *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.
7. Tester stops dirty transmitter mode.
8. Steps 5 to 7 are repeated for each channel frequency (see the *BT channels* parameter).

Test Results

bytes is actual number of returned payload which were processed during BER measurement.
error_bits is the number of bits with error.
BER it the bit error rate in percents.
To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of the BER"

To change the parameter, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the value, according to RF Test Specification, are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT

configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.16 Maximum Input Level (RCV/CA/06/C)

Goal
Verification of the receiver performance

Parameters
1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   5 - reduced hopping sequence
   79 - hopping is on
2. **BT channels** are the RX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz. This parameter is meaningful only if the *Hopping mode* parameter is equal to 1 (hoping is off)
3. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
4. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:
Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
RX Power: -20 dBm
Number of samples: 200,000 bytes

Additional test conditions
Test mode is Loop back, hopping is off, whitening is disabled, the packet type is DH1, the payload's bit pattern is PRBS9.

Test Procedure
1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 2/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.

4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
5. The DUT is set to receive at the given channel frequency. The tester continuously sends DH1 packets to the DUT at the given channel frequency.
6. Tester starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.
7. Steps 5 and 6 are repeated for each channel frequency (see the *BT channels* parameter).

Test Results

bytes is actual number of returned payload which were processed during BER measurement.
error_bits is the number of bits with error.
BER it the bit error rate in percents.
To reach a verdict the test results are compared with the limit parameters:

"Upper Limit of the BER"

To change the parameter, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the value, according to RF Test Specification, are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.17 EDR Sensitivity (RCV/CA/07/C)

Goal

Verification of the receiver sensitivity for the 10^{-4} bit error rate using a non-ideal transmitter.

Parameters

1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   5 - reduced hopping sequence
   79 - hopping is on
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be

separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.

3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
4. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
5. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
RX Power: -70 dBm
Packet type: 2-longest
Number of samples: 200,000 bytes

Additional test conditions

Test mode is Loop back, hopping is off, whitening is disabled, the payload's bit pattern is PRBS9.

Test Procedure

1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 1/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).).
5. The DUT is set to receive at the given channel frequency. The tester continuously sends DPSK packets to the DUT at the given channel frequency.
6. The tester enters dirty transmitter mode [1] and starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see the *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.
7. Tester stops dirty transmitter mode.
8. Steps 5 to 7 are repeated for each channel frequency (see the *BT channels* parameter).

Test Results

bytes is actual number of returned payload which were processed during BER measurement.
error_bits is the number of bits with error.

BER it the bit error rate in percents.

To reach a verdict the test results are compared with the limit parameters: "Upper Limit of the BER"

To change the parameter, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the value, according to RF Test Specification, are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)

If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.18 EDR BER Floor Performance (RCV/CA/08/C)

Goal

Verification of the receiver performance for the 10^{-5} bit error rate.

Parameters

1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:
   1 - single frequency (hopping is off)
   5 - reduced hopping sequence
   79 - hopping is on
2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected.
4. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
5. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
RX Power: -70 dBm
Packet type: 2-longest
Number of samples: 200,000 bytes

Additional test conditions

Test mode is Loop back, hopping is off, whitening is disabled, the payload's bit pattern is PRBS9.

Test Procedure

1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 1/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).).
4. The DUT is set to receive at the given channel frequency. The tester continuously sends DPSK packets to the DUT at the given channel frequency.
5. The tester starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see the *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.
6. Steps 4 to 5 are repeated for each channel frequency (see the *BT channels* parameter).

Test Results

bytes is actual number of returned payload which were processed during BER measurement.
error_bits is the number of bits with error.
BER it the bit error rate in percents.

To reach a verdict the test results are compared with the limit parameters: "Upper Limit of the BER"

To change the parameter, use the Edit menu of the test case. If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the value, according to RF Test Specification, are assigned automatically.

Requirement to Initial Condition of a DUT

If the DUT can be controlled through HCI, the DUT must be connected to an appropriate HCI port of the tester and correct value of the HCI Port parameter must be specified in DUT configuration (Menu → Configuration → DUT → More 1/5 → HCI Port)
If the DUT does not have HCI then the DUT must be in the Inquiry Scan/Page Scan state (maximum activity of the scan mode is desirable) and Test Mode must be enabled.

5.2.19 EDR Maximum Input Level (RCV/CA/10/C)

Goal

Verification of the receiver performance at the maximum specified input signal level

Parameters

1. **Hopping mode** parameter specifies which hopping sequence will be used for the test. Allowed values of the parameter are:

1 - single frequency (hopping is off)
5 - reduced hopping sequence
79 - hopping is on

2. **BT channels** are the TX frequency channels of the DUT, which are selected to test. The frequency for each channel is calculated as (2402+*ch*) MHz, where *ch* is the frequency channel. The frequency channel is the value from 0 to 78. Any quantity of the frequency channels can be selected in the TC-3000C. The list of selected channels must be separated by "-". For instance, the record "0-20-40-60" means that the test case must be executed for four frequency channels: 0, 20, 40 and 60, that is for the frequencies 2402 MHz, 2422 MHz, 2442 MHz and 2462 MHz.
3. **Packet type** parameter specifies which packet type will be used for the test case. If the parameter is equal to '2-longest' or '3-longest' then the tester will read LMP features of the DUT and the longest supported packet will be selected for the test case. Only EDR packet can be selected
4. **RX power** is expected power at the input of the DUT's receiver, measured in dBm.
5. **Number of samples** is the minimum number of returned payload bytes from the DUT.

If the flag "Use Default" is selected then all of displayed values of parameters are ignored and the listed above values will be assigned automatically:

Hopping mode: 1 (Hopping is off)
BT channels: 0-39-78
RX Power: -20 dBm
Number of samples: 200,000 bytes

Additional test conditions

Test mode is Loop back, hopping is off, whitening is disabled, the packet type is 2-Longest, the payload's bit pattern is PRBS9.

Test Procedure

1. The tester calculates and sets the TX power to satisfy requirement of expected power at the input of the DUT's receiver. The TX power is calculated as $P_{TX} = P_{RX\ DUT} + PL$, where P_{TX} is the TX power of the tester, $P_{RX\ DUT}$ is the expected power at the input of the DUT's receiver and PL is the path losses. To set the path losses value use Menu → Configuration → DUT → More 2/5 → Path Loss.
2. If the DUT is not connected then the tester creates connection via access procedures (paging and inquiry if necessary).
3. The tester will activate test mode (if the test mode is not activated yet) and will set all necessary parameters of the test mode.
4. The tester checks whether the DUT transmits at maximum power. If not and the DUT supports power control, then the tester will consecutively send LMP_incr_power_req requests until the LMP_max_power response would be received from the DUT. The time delay between two consequential LMP_incr_power_req requests depends on the Pow.SetTime parameter (to modify the value use: Menu → Configuration → DUT → More 3/5 → Pow.SetTime, default value is equal to 1 second).
5. The DUT is set to receive at the given channel frequency. The tester continuously sends DPSK packets to the DUT at the given channel frequency.
6. Tester starts the bit error rate measurement. Tester stops the measurement if the number of returned and processed payload bytes exceeds required number (see *Number of samples* parameter). Tester records actual number of processed samples and number of bitts with error.

7. Steps 5 and 6 are repeated for each channel frequency (see the *BT channels* parameter).

5.2.20 List of abbreviations

BT – Bluetooth
BER – Bit Error Rate
DEVM – Differential Error Vector Magnitude
DUT – Device Under Test
EDR – Enhanced Data Rate
FFT – Fast Fourier Transform
GUI – Graphic User Interface
HCI – Host Controller Interface
RF – Radio Frequency
RX – Receiver
TX – Transmitter

5.2.21 References

1. Test Specification. RF. Specification 1.2/2.0/2.0+EDR. Revision 2.0.E.2. Bluetooth SIG. November, 4th, 2004.

Appendix C. The list of Save/Recall parameters

Location in GUI	Parameters	Initial Values
Configuration		
Tester		
	HCI TO	2000
	SupervisionTO	2
	Modulation Index	0.32
	Link before Meas	Active
	Report Format	txt
	Report Mode	Append
	BD_ADDR	9abc56781234
	LAP for IAC	9e8b33
	Tinqscan	2048
	Twinqscan	512
	Inq. TO	48
	# Inq. Responses	1
	Tpagescan	2048
	Twpagescan	512
	Page TO	16000
	PIN type	Variable
	PIN len.	4
	PIN code	30.30.30.30
	L2CAP TO	30000
	RFComm TO	30000
	SDP TO	30000
	Profile TO	30000
	Skip Pairing	unchecked
	Link key	00.00.00.00……(16 bytes)
	AFH	Disable
	Encryption	Enable
	Name Discovery	Checked
	CSR HS1.2	Unchecked
	Friendly Name	54.43.2D.33.30.30.30.43
	Init. Authen.	Unchecked
	Delay for TC(ms)	0
DUT		
	DUT Type	Bluetooth
	HCI Port	None
	Baud Rate(Invisible)	9600
	error stop TC	checked
	Num. Of recover	0
	Path Loss	0.00
	Inq. Supported	checked

Location in GUI	Parameters	Initial Values
	LAP for IAC	9e8b33
	Tinqscan	2048
	Twinqscan	18
	Inp. TO	48
	#Inq. Responses	1
	BD_ADDR	000000000000
	Tpagescan	2048
	Twpagescan	18
	Page TO	16000
	Pow. SetTime	1000
	Conn.for Test	Unchecked
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27
RF setting		
	TX Power	-30.00
	RX ATT	ON
	AGC	ON
	RX Gain	0~10
Peripherals		
	Ext Outport1	FSK Demod
	Ext Outport2	FSK Mod
	Ext Inports	1:off 1:off
Network		
	Remote Ctrl	unchecked
Audio		
SCO Link		
	Packet Type	HV3
	Air Coding	CVSD
	Delay	2
	Type of Profile	HandsFree
	Send RING	Unchecked
	Gain control	unchecked
	Speaker Volume	15
	Mic Volume	15
	Transfer Type	Built-in
	Sample Frequency	32000
	Subbands	8
	Bitpool	32
Audio Test		
	Tone Freq	1000
	Tone level	-10
	Lower Freq(Hz)	200

Location in GUI	Parameters	Initial Values
	Upper Freq(Hz)	3500
	CH1 Freq(Hz)	1000
	CH2 Freq(Hz)	400
	CH1 level(dBm0)	-3
	CH2 level(dBm0)	-3
Audio Spec		
	Tone Freq	1000
	Tone level	-10
	CH1 Freq(Hz)	1000
	CH2 Freq(Hz)	400
	CH1 level(dBm0)	-3
	CH2 level(dBm0)	-3
Test Cases		
RF		
	Autodetach	checked
Output power		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	Longest
	Number of packets	1
	Test/Normal Mode	Transmitter
	Hopping Mode	ON
	Upper Limit of average power in dBm	4.00
	Lower Limit of average power in dBm	-6.00
	Upper Limit of peak power in dBm	23.00
Power Density		
	Use Default	unchecked
	Data Length	0
	Test/Normal Mode	Transmitter
	Upper Limit of power density in dBm	20.00
Power Control		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	DH1
	Number of packets	1
	Measurement method	0
	Test/Normal Mode	Transmitter
	Upper Limit of the minimum power	4.00
	Upper Limit of the maximum power step	8.00
	Lower Limit of the minimum power step	2.00
Frequency Range		
	Use Default	unchecked
	Data Length	0
	Test/Normal Mode	Transmitter
	Number of sweeps	1
	Lower Limit of the lowest frequency	2400.00

Location in GUI	Parameters	Initial Values
	Upper Limit of the highest frequency	2483.50
20dB Bandwidth		
	Use Default	unchecked
	# BT channels	0-39-78
	Data Length	0
	Test/Normal Mode	Transmitter
	Number of sweeps	1
	Upper Limit of the 20 dB bandwidth	1000.0
ACP		
	Use Default	unchecked
	# BT channels	3-39-75
	Data Length	27
	Test Mode	Transmitter
	Number of sweeps	1
	Upper Limit of the power in a channel M-N=2	-20.00
	Upper Limit of the power in a channel M-N>=3	-40.00
	Max. number of excepted channels	3
	Upper Limit of the power in excepted channels	-20.00
Modulation		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	Longest
	Number of packets	10
	Test Mode	Transmitter
	Hopping Mode	OFF
	Up. Lim. of freq. deviat. For 11110000	175.0
	Low. Lim. of freq. deviat. For 11110000	140.0
	Max. num. of deviat. for1010<low.lim.	0.100
	Low. Lim. for the ratio of df2/df1	80
Init. Carrier Freq. Tolerance		
	Use Default	unchecked
	# BT channels	0-39-78
	Number of packets	10
	Test Mode	Transmitter
	Hopping Mode	ON
	Up. lim. of init. car. freq. deviation	75.0
	Low. lim. of init. car. freq. deviation	-75.0
Carrier Frequency Drift		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	Longest
	Number of packets	10
	Test Mode	Transmitter
	Hopping Mode	ON
	Up. Lim. Of max. freq. Drift	40.00

Location in GUI	Parameters	Initial Values
	Up. Lim. Of max. drift rate	20.00
Sensitivity single slot		
	Use Default	unchecked
	# BT channels	0-39-78
	Hopping Mode	OFF
	Dirty Tx Mode	ON
	Packet Type	DH1
	RX power in dBm	-70.00
	Number of samples in bytes	200000
	Upper limit of the BER in %	0.100
Sensitivity muli slot		
	Use Default	unchecked
	# BT channels	0-39-78
	Hopping Mode	OFF
	Dirty Tx Mode	ON
	Packet Type	DH5
	RX power in dBm	-70.00
	Number of samples in bytes	200000
	Upper limit of the BER in %	0.100
Maxmum Input Level		
	Use Default	unchecked
	# BT channels	0-39-78
	Hopping Mode	OFF
	RX power in dBm	-20.00
	Number of samples in bytes	200000
	Upper limit of the BER in %	0.100
Quick		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	DH1
	Number of packets	2
	Test Mode	Transmitter
	Hopping Mode	OFF
	Upper Limit of average power in dBm	4.00
	Lower Limit of average power in dBm	-6.00
	Upper Limit of peak power in dBm	23.00
	Up. Lim. of freq. deviat. For 11110000 in kHz	175.0
	Low. Lim. of freq. deviat. For 11110000 in kHz	140.0
	Max. num. of deviat. for1010<low.lim. in %	0.100
	Low. Lim. for the ratio of df2/df1 in %	80
	Up. lim. of init. car. freq. deviation in kHz	75.0
	Low. lim. of init. car. freq. deviation in kHz	-75.0
	Up. Lim. Of max. freq. Drift in kHz	25.00
	Up. Lim. Of max. drift rate in kHz/50 us	20.00
BER & FER		
	Use Default	Unchecked

Location in GUI	Parameters	Initial Values
	#BT channels	0-39-78
	Hopping Mode	OFF
	Dirty TX Mode	ON
	Packet Type(including EDR)	DH1
	RX power in dBm	-70.00
	Number of packets to be sent	500
	Upper limit of the BER in %	0.100
	Upper limit of the FER in %	100.00
EDR Relative Transmit Power		
	Use Default	unchecked
	# BT channels	0-39-78
	Packet Type	2-longest
	Number of packets	1
	Test Mode	Transmitter
	Hopping Mode	OFF
	Upper lim. of DPSK and GFSK av. power off. In dB	1.00
	Lower lim. of DPSK and GFSK av. power dif. In dB	-4.00
EDR Car. Freq. Stab. & Mod. Acc.		
	Use Default	0
	# BT channels	0-39-78
	Packet Type	2-longest
	Number of packets	10
	Test Mode	Transmitter
	Hopping Mode	OFF
	Up. lim. of freq. er. W0 for 50 us DPSK bloks in kHz	10.00
	Up. lim. of initial frequency error wi in kHz	75.00
	Up. lim. of frequency error sum w0+wi in kHz	75.00
	Upper limit of RMS DEVM for 2 Mbps pkts	0.20
	Upper limit of RMS DEVM for 3 Mbps pkts	0.13
	Upper limit of Peak DEVM for 2 Mbps pkts	0.35
	Upper limit of Peak DEVM for 3 Mbps pkts	0.25
	Upper limit of DEVM for 2 Mbps pkts	0.30
	Upper limit of DEVM for 3 Mbps pkts	0.20
	Low. lim. for symbols with DEVM < up. lim. in %	99.00
EDR Differential Phase Encoding		
	Use Default	0
	# BT channels	0-39-78
	Hopping Mode	OFF
	Packet Type	2-longest
	Number of packets	100

Location in GUI	Parameters	Initial Values
	Upper limit of the PER in %	1.000
EDR In-band Spurious Emissions		
	Use Default	0
	# BT channels	3-39-75
	Packet Type	2-longest
	Test Mode	Transmitter
	Number of sweeps	10
	Up. lim. of the pow. dif. for chan. abs in dB	-26.00
	Up. lim. of the power in a channel M-N=2 in dBm	-20.00
	Up. lim. of the power in a channel M-N>=3 in dBm	-40.00
	Max. number of excepted channels	3
	Up. lim of the power in excepted channels in dBm	-20.00
EDR Sensitivity		
	Use default	0
	# BT channels	0-39-78
	Hopping Mode	OFF
	Dirty TX Mode	ON
	Packet Type	2-longest
	RX power in dBm,	-70.00
	Number of samples for 1st threshold in bytes	200000
	Upper limit of the BER for 1st threshold in %	0.0070
	Number of samples for 2nd threshold in bytes	2000000
	Upper limit of the BER for 2nd threshold in %	0.0100
EDR BER Floor Performance		
	Use Default	0
	# BT channels	0-39-78
	Hopping Mode	OFF
	Dirty TX Mode	OFF
	Packet Type	2-longest
	RX power in dBm	-60.00
	Number of samples for 1st threshold in bytes	1000000
	Upper limit of the BER for 1st threshold in %	0.0007
	Number of samples for 2nd threshold in bytes	20000000
	Upper limit of the BER for 2nd threshold in %	0.001
EDR Maximum Input Level		
	Use Default	0
	# BT channels	0-39-78
	Hopping Mode	OFF
	Packet Type	2-longest
	RX power in dBm	-20.00
	Number of samples in bytes	200000

Location in GUI	Parameters	Initial Values
	Upper limit of the BER in %	0.1
Measurement		
spectrum(bluetooth)		
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27
FM Mod(bluetooth)		
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27
Pow-Time(bluetooth)		
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27
Pow-Chan		
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27
BER		
	Bit Pattern	PRBS9
	Whitening	Disable
	Hopping Mode	ON
	Packet Type	DH1
Host Analyzer		
Link		
	Inq. TO	48
	Page To	16000
	# Inq. Responses	1
	HCI TO	2000
	Access Type	Full Access
	Tinqscan	2048
	Twinqscan	512
	Tpagescan	2048
	Twpagescan	512

Location in GUI	Parameters	Initial Values
	Scan TO	600000
	L2CAP TO	30000
	RFComm TO	30000
	SDP TO	30000
	Profile TO	30000
	Type of Profile	Handsfree
	Gain control	unchecked
Link Analyzer		
Link		
	Inq. TO	48
	Page To	16000
	# Inq. Responses	1
	HCI TO	2000
	Access Type	Full Access
	Tinqscan	2048
	Twinqscan	512
	Tpagescan	2048
	Twpagescan	512
	Scan TO	600000
	Test Mode	Loopback
	Bit Pattern	10101010
	Whitening	Disable
	Hopping Mode	OFF
	Packet Type	DH1
	Length	27