

R3267 Series OPT61

**IS-95 Measurement Option** 

**Operation Manual** 

MANUAL NUMBER FOE-8335218C00

Applicable Models R3264 R3267 R3273

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# **Safety Summary**

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

• Warning Labels

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

- **DANGER**: Indicates an imminently hazardous situation which will result in death or serious personal injury.
- **WARNING**: Indicates a potentially hazardous situation which will result in death or serious personal injury.
- **CAUTION**: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

## Basic Precautions

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which does not include a safety ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.
- Do not place objects on top of this product. Also, do not place flower pots or other containers containing liquid such as chemicals near this product.

- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

#### Caution Symbols Used Within this Manual

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

- **DANGER**: Indicates an item where there is a danger of serious personal injury (death or serious injury).
- WARNING: Indicates an item relating to personal safety or health.
- **CAUTION**: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

## Safety Marks on the Product

The following safety marks can be found on Advantest products.





Protective ground (earth) terminal.





CAUTION - Risk of electric shock.

## Replacing Parts with Limited Life

The following parts used in the instrument are main parts with limited life.

Replace the parts listed below after their expected lifespan has expired.

Note that the estimated lifespan for the parts listed below may be shortened by factors such as the environment where the instrument is stored or used, and how often the instrument is used. The parts inside are not user-replaceable. For a part replacement, please contact the Advantest sales office for servicing.

There is a possibility that each product uses different parts with limited life. For more information, refer to Chapter 1.

| Main Parts | with | Limited Life |  |
|------------|------|--------------|--|
|------------|------|--------------|--|

| Part name              | Life      |  |
|------------------------|-----------|--|
| Unit power supply      | 5 years   |  |
| Fan motor              | 5 years   |  |
| Electrolytic capacitor | 5 years   |  |
| LCD display            | 6 years   |  |
| LCD backlight          | 2.5 years |  |
| Floppy disk drive      | 5 years   |  |

## • Hard Disk Mounted Products

The operational warnings are listed below.

- Do not move, shock and vibrate the product while the power is turned on. Reading or writing data in the hard disk unit is performed with the memory disk turning at a high speed. It is a very delicate process.
- Store and operate the products under the following environmental conditions. An area with no sudden temperature changes. An area away from shock or vibrations. An area free from moisture, dirt, or dust. An area away from magnets or an instrument which generates a magnetic field.
- Make back-ups of important data. The data stored in the disk may become damaged if the product is mishandled. The hard disc has a limited life span which depends on the operational conditions. Note that there is no guarantee for any loss of data.

## • Precautions when Disposing of this Instrument

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances: (1) PCB (polycarbon biphenyl)

- (2) Mercury
- (3) Ni-Cd (nickel cadmium)
- (4) Other

Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in sol der).

Example: fluorescent tubes, batteries

# **Environmental Conditions**

This instrument should be only be used in an area which satisfies the following conditions:

- An area free from corrosive gas
- An area away from direct sunlight
- A dust-free area
- An area free from vibrations



## **Figure-1 Environmental Conditions**

• Operating position



## **Figure-2 Operating Position**

• Storage position



## **Figure-3 Storage Position**

This instrument can be used safely under the following conditions:

- Altitude of up to 2000 m
- Installation Categories II
- Pollution Degree 2

# PREFACE

This manual provides the information necessary to check functionality, operate and program the R3267 Series Option 61, IS-95 measurement.

# (1) Organization of this manual

This manual consists of the following chapters:

| Safety Summary   | To use the analyzer safely, be sure to read this manual first.   |  |
|--|--|--|
| <ol> <li>Introduction</li> <li>Product Description (Option)</li> <li>Standard Accessories</li> <li>Self Test Error</li> <li>Conectors on the rear Panel</li> </ol> | Includes a description of the option and its' parts and a self test error.   |  |
| 2. Operation   | You can learn the basic operations of the option through the examples shown in this chapter.   |  |
| <ul> <li>3. Reference</li> <li>Menu Index</li> <li>Menu Map</li> <li>Functional Description</li> </ul>   | Shows a list of operation keys, and describes the function of each key.  |  |
| <ul><li>4. Remote Control</li><li>GPIB</li></ul>   | Included are a list of commands necessary for programming.   |  |
| <ul> <li>5. Technical Notes</li> <li>BTS, MS signals</li> <li>Equalizing filter</li> <li>Code Domain Power</li> <li>Tx Power</li> <li>Trigger Source</li> </ul>    | Describes the principle of operation nec-<br>essary for taking measurements more<br>accurately.  |  |
| 6. Performance Verification Test   | Describes how to test performance.   |  |
| 7. Specifications  | Shows the specifications of the option.  |  |
| APPENDIX <ul> <li>Messages</li> </ul>  | If an error occurs during operation, an<br>error number and its corresponding error<br>message are displayed. The meaning of<br>each error is explained in this section. |  |

Preface

## (2) Typeface conventions used in this manual

• Panel keys and soft keys are printed in a contrasting typeface to make them stand out from the text as follows:

Panel keys: Boldface type Soft keys: Boldface and italic type Example: **FREQ**, **TRANSIENT** Example: *Center*, *Detector* 

- When a series of key operations are described using a comma between two keys.
- There are various soft menus used to switch between two states such as ON/OFF and AUTO/MNL.
   For example, when turning off the *Average Times ON/OFF* function, the annotation "*Average Times ON/OFF*(OFF)" is used.
   When switching the *RBW AUTO/MNL* function to MNL, the annotation "*RBW AUTO/MNL*(MNL)" is used.

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1.1 Product Overview

# **1 INTRODUCTION**

# 1.1 Product Overview

This IS-95 analysis option software(Option 61) allows you to measure the waveform quality and modulation accuracy of a IS-95 signal.

This option is a factory option which is incorporated into the R3267 Series Spectrum Analyzer prior to shipment.

This option includes the following features:

- For the Cellular and PCS base station(BTS) or the mobile station(MS), this option use to measure the modulation accuracy, waveform quality, frequency error.
- Used to measure the code domain power of the BTS signals.
- Use to measure the channel power, spurious and gated output power specified by the communication standard using a simple key operation.

1.2 Accessories

# 1.2 Accessories

| Name of accesories                     | Type of name   | Quantitiy | Remarks |
|--|----------------|-----------|---------|
| R3267 Series OPT61<br>Operation manual | ER3267/73OPT61 | 1         | English |

1.3 Self Test Function

# **1.3** Self Test Function

The self test also checks the Option 61 for correct operation when the spectrum analyzer power is turned on. The message shown below will be displayed when an error related to Option 61 occurs. Contact AD-VANTEST Corp. for repair.

| Error Message                   |  |
|---------------------------------|--|
| Handshake error occurred to DSP |  |

# **1.4 About Calibration**

When you want to calibrate the R3267 Series, please contact a sales representative.

Desirable Period One year

1.5 Explanation of the Connectors

# **1.5** Explanation of the Connectors

Connectors used for this option are described as follows:

- ① EXT TRIG terminal Connector for inputting the external trigger signal.
- ② I channel terminal Connector for inputting the I channel signal (Baseband).
- ③ Q channel terminal Connector for inputting the Q channel signal (Baseband).

# **2 OPERATION**

This chapter describes how to use this option using practical measurement examples.

## 2.1 A measurement Example of BTS (base station) Code Domain Power

When connecting Even Second Clock from the BTS to the instrument:

A measurement example of the BTS code domain power is shown below.

It is assumed that a reference signal of 10 MHz, Even Second Clock, and a signal to be measured is received from the BTS and that the signal corresponds toone channel of the US Cellular system.



Figure 2-1 Setup for Code Domain Power Measurement

Set the STD menu

Set measurement parameters. Select a parameter using the data knob, then press the data knob (or **ENTR**) to register the parameter.Set parameters as shown below.

| ST                  | D | Measurement Parameter Set              |                       |
|---------------------|---|--|-----------------------|
| Туре                | : | CDMA(800MHz) CDMA(1.86Hz) CDMA(1.96Hz) | STD                   |
|                     |   | JAPAN(800MHz) CHINA(800MHz)            | 1                     |
| Link                | : | FORWARD REVERSE                        | DC CAL                |
| Rate                | : | 9600/14400 4800/7200                   | <b></b>               |
|                     |   | 2400/3500 1200/1900                    |                       |
| Offset Level        | : | 20.0 dB                                |                       |
| Frequency Input     | : | FREQUENCY CHANNEL                      |                       |
| Input               | : | RF BASEBAND(1&Q)                       |                       |
| Baseband Input      | : | AC DC                                  |                       |
| IQ Inverse          | : | NORMAL INVERSE                         |                       |
| Cont Auto Level Set | : | ON OFF                                 |                       |
|                     |   |  |                       |
|                     |   |  |                       |
|                     |   |  | <sup>6</sup> Channe I |
|                     |   |  | Setting               |
|                     |   |  | 7 STD                 |
|                     |   |  | Setup                 |
|                     |   |  |                       |

Figure 2-2 STD Setup

### R3267 Series OPT61 IS-95 Measurement Option Operation Manual

- 2.1 A measurement Example of BTS (base station) Code Domain Power
  - 1. Press TRANSIENT, STD and STD Setup to open the STD Setup window.
  - 2. Select *CDMA* (*800 MHz*) for *Type* using the data knob since the measurement target is a US Cellular system signal, then press the data knob (or **ENTR**) to register the parameter.
  - 3. Select *FORWARD* using the data knob to measure the BTS signal, then press the data knob (or **ENTR**) to register the parameter.
  - 4. Enter **2**, **0**, and +**dBm** using the numeric keys since the signal is attenuated by the ATT of 20 dB.
  - 5. Select *CHANNEL* for *Frequency Input* using the data knob to set a center frequency using a channel number, then press the data knob (or **ENTR**) to register the parameter.
  - 6. Select RF for *Input* using the data knob since an *RF* signal is input, then press the data knob (or **ENTR**) to register the parameter.
  - 7. Select *NORMAL* for *IQ Inverse* using the data knob when the phase of the input signal is not inverted, then press the data knob (or **ENTR**) to register the parameter.
  - 8. Select *OFF* for *Cont. Auto Level Set* using the data knob when the auto ranging function is not used, then press the data knob (or **ENTR**) to register the parameter.
  - 9. Press **RETURN** to exit the STD Setup window.

#### Parameter Setup

10. Press *Modulation* and *Code Domain Power* to enter the Code Domain Power measurement menu.

Start measurement, when the PN Offset number is unknown.

When the PN Offset number is unknown, it is necessary to search for the PN Offset number by setting PN Offset Search Mode to ON.

To connect Even Second Clock to the instrument as a trigger signal, set parameters as shown below. Proceed with the following procedure.



**Figure 2-3 Parameter Setup** 

- 11. Press Parameter Setup to open the Parameter Setup window.
- 12. Select *NORMAL* for *Meas Mode* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 13. *Meas Range* is set to 20 by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
- 14. τ *Offset* is set to *DEFAULT* by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
- 15. Select *ON* for *Equalizing Filter* using the data knob when a signal to be measured is filtered by an equalizing filter, then press the data knob (or **ENTR**) to register the parameter.
- 16. *Threshold* is set to -25 dB by default. Pressing  $\bigtriangledown$  key moves the cursor to the next item.
- 17. Select *ON* for *PN Offset Search Mode* using the data knob, then press the data knob (or **ENTR**) to register the parameter.

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- 2.1 A measurement Example of BTS (base station) Code Domain Power
  - 18. Select *INTRVL (EXT)* using the data knob to connect Even Clock to the instrument as Trigger, then press the data knob (or **ENTR**) to register the parameter.
  - 19. *EXT Trigger Slope* is set to + by default. Pressing the data knob (or ENTR) moves the cursor to the next item.
  - 20. *EXT Trigger Delay* is set to 0.000 by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
  - 21. Set the display unit of the absolute power for each channel to W. W is set by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
  - Set *EXPAND* to widen the measurement range of frequency errors. *EXPAND* is set by default.Then press the data knob (or ENTR) to register the parameter.
  - 23. Press *Parameter Setup* to close the Parameter Setup window.

Setting the Frequency and Reference Level

Press FREQ, 1 and ENTR to set the frequency using the channel number.

24. Press **RETURN** to change the soft menu to the measurement menu. Press *Auto Level Set*.

Wait until the following message is displayed:

Auto Level Completed !



**Figure 2-4 Auto Level Completed** 

The reference level is automatically set.

#### Measurement Result Display

25. Press the SINGLE key to carry out measurement.

Set parameters as shown below to display the power ratios of each channel to the total power on the upper part of the screen and the time alignment error, frequency error, and PN Offset on the lower part of the screen.



Figure 2-5 Scale Setup

- 26. Press Scale Setup to open the Scale Setup window.
- 27. Select *GRAPH* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 28. Select *DUAL* from Display using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 29. Select *POWER* from Y Scale using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 30. Select *5/div* from *Y/div* using the data knob, then press the data knob (or **ENTR**) to register the parameter.



31. Press *Scale Setup* to close the Scale Setup window.

**Figure 2-6 Measurement Results** 

Setting PN Offset

PN Offset of the signal can be determined when PN Offset Search Mode is set to ON. Next, set PN Offset Search Mode to OFF using the PN Offset value to make the repetition time shorter.

Read the PN Offset value from the measurement results.

In this example, the PN Offset value is 0.

Set parameters as shown below.

(Set PN Offset Search Mode to OFF and PN offset to 0.)



Figure 2-7 Parameter Setup (PN Offset Search Mode OFF)

- 32. Press Parameter Setup to open the Parameter Setup window.
- 33. Press  $\nabla$  key to align the cursor with the selected item in *PN Offset Search Mode*.
- 34. Turn the data knob to switch the cursor to *OFF*, then press the data knob (or **ENTR**) to register the parameter.
- 35. Enter 0 and ENTR to PN Offset.
- 36. Press Parameter Setup to close the Parameter Setup window.
- 37. Press the **REPEAT** or **SINGLE** key to start measurement. Press the **STOP** key to stop measurement.

#### Marker

- 38. Pressing the **MKR** key displays a marker. Moving the marker using the data knob allows you to read Code Power,  $\rho$ , and Power together with the channel number.
- Press SHIFT and MKR to turn the marker OFF.
   Press RETURN to change the soft menu to the measurement menu.

Measuring the Tau and Phase

Measure time alignment errors and phase errors for each channel based on the Pilot signal.

Change Meas Mode to PRECISE.



Figure 2-8 PRECISE Mode

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2.1 A measurement Example of BTS (base station) Code Domain Power

- 40. Press Parameter Setup to open the Parameter Setup window.
- 41. Used to set *Meas Mode* to *PRECISE* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 42. Press Parameter Setup to close the Parameter Setup window.
- 43. Press the **REPEAT** or **SINGLE** key to start measurement. Press the **STOP** key to stop measurement.

#### Displaying a $\tau$ Graph

Set parameters to display a graph with a time alignment error (Tau) set to the vertical axis.

Set parameters as shown below.

A single screen display can show a graph with a time alignment error on the vertical axis and a channel on the horizontal axis.



#### Figure 2-9 Graphics Display Setting Example of Scale Setup $\tau$

- 44. Press Scale Setup to open the Scale Setup window.
- 45. Select *GRAPH* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 46. Select *SINGLE* from *Display* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 47. Select  $\tau$  from *Y Scale* using the data knob, then press the data knob (or ENTR) to register the parameter.
- 48. Select *5/div* from *Y/div* using the data knob, then press the data knob (or **ENTR**) to register the parameter.



49. Press Scale Setup to close the Scale Setup window.

## Figure 2-10 Display Example of $\tau$ Graph

Displaying a  $\theta$  Table

| A Phase difference l | based on the | Pilot signal | is displayed | l in table format. |
|----------------------|--------------|--------------|--------------|--------------------|
| Set parameters as sh | own below.   |              |              |                    |

| Code Domain Рожег [Ө]                         |   |   |   |  |  |   |
|---|---|---|---|--|--|---|
| 0:<br>1:<br>2:<br>3:<br>4:                    | 0.00 deg.<br>0.04 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.                           | 21:<br>22:<br>23:<br>24:<br>25:<br>26:        | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.              | 42:<br>43:<br>44:<br>45:<br>46:<br>47:               | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | Code Domain<br><sup>1</sup><br>Auto Level<br>Set<br><sup>2</sup><br>Scale |
| 6:  |   |   | Scale Setup   | )  |  | Setup   |
| 7:<br>8:<br>9:<br>10:<br>11:<br>12:<br>13:    | Format :<br>Display :<br>Y Scale :<br>Y/div :   | GRAPH<br>SINGLE<br>P<br>20/div<br>1/div       | TABLE           DUAL           POWER           10/div           0.5/div                 | T           5/div           0.25/div                 | PHASE  | <sup>3</sup> Parameter<br>Setup<br><sup>4</sup> Marker<br>Setup           |
| 14:<br>15:<br>16:<br>17:<br>18:<br>19:<br>20: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 35:<br>36:<br>37:<br>38:<br>39:<br>40:<br>41: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 50:<br>57:<br>58:<br>59:<br>60:<br>61:<br>62:<br>63: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>-0.48 deg.<br>-0.39 deg.<br>-0.38 deg.<br>0.29 deg.<br>-0.22 deg. | <sup>5</sup> Average<br>Times<br>ON OFF                                   |

Figure 2-11 Setting Example of Display

- 50. Press *Scale Setup* to open the Scale Setup window.
- 51. Select *TABLE* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 52. Select PHASE from Y Scale using the data knob, then press the data knob (or

**ENTR**) to register the parameter.

53. Press *Scale Setup* to close the Scale Setup window.

Figure 2-12 Display Example

# 2.2 Code Domain Power on the Base Station (BTS)

A measurement example of BTS (base station) code domain power

When Even Second Clock cannot be received from the BTS a measurement example of the BTS code domain power is given below.

The signal is one channel of US Cellular system.



Figure 2-13 Setup for Code Domain Power Measurement

Set the STD menu

| STD Measurement Parameter Set |   |  |                       |  |
|-------------------------------|---|--|-----------------------|--|
| Туре                          | ł | CDMA(800MHz) CDMA(1.8GHz) CDMA(1.9GHz) | STD                   |  |
|                               |   | JAPAN(800MHz) CHINA(800MHz)            | 1                     |  |
| Link                          | : | FORWARD REVERSE                        | DC CAL                |  |
| Rate                          | : | 9600/14400 4800/7200                   |                       |  |
|                               |   | 2400/3600 1200/1900                    |                       |  |
| Offset Level                  | : | 20.0 dB                                |                       |  |
| Frequency Input               | : | FREQUENCY CHANNEL                      |                       |  |
| Input                         | : | RF BASEBAND(I&Q)                       |                       |  |
| Baseband Input                | : | AC DC                                  |                       |  |
| IQ Inverse                    | : | NORMAL INVERSE                         |                       |  |
| Cont Auto Level Set           | : | ON OFF                                 |                       |  |
|                               |   |  |                       |  |
|                               |   |  |                       |  |
|                               |   |  | <sup>6</sup> Channe 1 |  |
|                               |   |  | Setting               |  |
|                               |   |  | 7 sm                  |  |
|                               |   |  | Setup                 |  |
|                               |   |  | Setup                 |  |

Figure 2-14 Setting Example of STD Setup

- 1. Press **TRANSIENT**, *STD* and *STD Setup* to open the STD Setup window.
- 2. Select *CDMA* (*800 MHz*) for Type using the data knob since a measurement target is a US Cellular, then press the data knob (or **ENTR**) to register the parameter.
- 3. Select *FORWARD* using the data knob to measure the BTS signal, then press the data knob (or **ENTR**) to register the parameter.
- 4. Enter **2**, **0** using the numeric keys, and +**dBm** since the signal is attenuated by the ATT of 20 dB.
- 5. Select *CHANNEL* for *Frequency Input* using the data knob to set a center frequency using a channel number, then press the data knob (or **ENTR**) to register the parameter.
- 6. Select RF for *Input* using the data knob since an *RF* signal is input, then press the data knob (or **ENTR**) to register the parameter.
- 7. Select *NORMAL* for *IQ Inverse* using the data knob when the phase of the input signal is not inverted, then press the data knob (or **ENTR**) to register the parameter.
- 8. Select *OFF* for *Cont Auto Level Set* using the data knob when the auto ranging function is not used, then press the data knob (or **ENTR**) to register the parameter.
- 9. Press **RETURN** to exit from the STD Setup window.

#### Parameter Setup

10. Press *Modulation* and *Code Domain Power* to enter the Code Domain Power measurement menu.



11. Set parameters as shown below. Proceed with the following procedure.

#### Figure 2-15 Setting Example of Parameter Setup

- 12. Press Parameter Setup to open the Parameter Setup window.
- 13. Select *NORMAL* for *Meas Mode* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 14. *Meas Range* is set to 20 by default. Pressing the data knob (or ENTR) moves the cursor to the next item.
- 15.  $\tau$  *Offset* is set to *DEFAULT* by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
- 16. Select *ON* for *Equalizing Filter* using the data knob when a signal to be measured is filtered by an equalizing filter, then press the data knob (or **ENTR**) to register the parameter.
- 17. *Threshold* is set to -25 dB by default. Pressing  $\nabla$  key moves the cursor to the next item.
- 18. Select *ON* for *PN Offset Search Mode* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 19. Select *INTRVL* using the data knob, then press the data knob (or **ENTR**) to register the parameter. (Because nothing is connected as the external trigger.)

- 20. Set the display unit of the absolute power for each channel to W. W is set by default. Pressing the data knob (or **ENTR**) moves the cursor to the next item.
- Set *EXPAND* to widen the measurement range of frequency errors. *EXPAND* is set by default.
   And press the data knob (or ENTR) to resister the parameter.
- 22. Press Parameter Setup to close the Parameter Setup window.

Setting the Frequency and Reference Level

- 23. Press **FREQ**, **1** and **ENTR** to set the frequency using the channel number. Press **RETURN** to change the soft menu to the measurement menu.
- 24. Press Auto Level Set.

Wait until the following message is displayed:

Auto Level Completed !

The reference level is automatically set.

Measurement Result Display.

25. Press the **SINGLE** key to carry out measurement.

Set parameters as shown below to display the power ratios of each channel to the total power on the upper part of the screen and the time alignment error, frequency error, and PN Offset on the lower part of the screen.



## Figure 2-16 Setting Example of Scale Setup

- 26. Press Scale Setup to open the Scale Setup window.
- 27. Select *GRAPH* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 28. Select *DUAL* from *Display* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 29. Select *POWER* from *Y Scale* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 30. Select *5/div* from *Y/div* using the data knob, then press the data knob (or **ENTR**) to register the parameter.



31. Press *Scale Setup* to close the Scale Setup window.

Figure 2-17 Display Example of Measurement Results

## Setting PN Offset

PN Offset of the signal has been determined by measuring the signal with PN Offset Search Mode set to ON.

Next, set PN Offset Search Mode to OFF using the PN Offset value to make the repetition time faster.

Read the PN Offset value from the measurement results.

In this example, the PN Offset value is 301.

32. Set parameters as shown below. (Set PN Offset Search Mode to OFF and PN offset to 301.)



Figure 2-18 Setting Example of Parameter Setup (PN Offset Search Mode OFF)

- 33. Press Parameter Setup to open the Parameter Setup window.
- 34. Press  $\bigtriangledown$  key to align the cursor with the selection item of *PN Offset Search Mode*.
- 35. Turn the data knob to move the cursor to *OFF*, then press the data knob (or **ENTR**) to register the parameter.
- 36. Enter 3, 0, 1 and ENTR to PN Offset.
- 37. Press Parameter Setup to close the Parameter Setup window.
- 38. Press the **REPEAT** or **SINGLE** key to start measurement. Press the **STOP** key to stop measurement.

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2.2 Code Domain Power on the Base Station (BTS)

CAUTION: When making a measurement for long hours, PN Offset may drift and the measurement may not be successful, because the 10 MHz reference signal of this instrument is not in synchronization with the BTS 10 MHz.

### Marker

- Pressing the MKR key displays a marker. Moving the marker using the data knob allows you to read Code Power, ρ, and Power together with the channel number.
- 40. Press **SHIFT** and **MKR** to turn the marker OFF. Press **RETURN** to change the soft menu to the measurement menu.

Measuring Tau and Phase

Measure time alignment errors and phase errors for each channel based on the Pilot signal. Change *Meas Mode* to *PRECISE*.



#### Figure 2-19 Setting Parameter Setup PRECISE Mode

- 41. Press Parameter Setup to open the Parameter Setup window.
- 42. Used to set *Meas Mode* to *PRECISE* using the data knob, then press the data knob (or *ENTR*) to register the parameter.
- 43. Press *Parameter Setup* to close the Parameter Setup window.
- 44. Press the **REPEAT** or **SINGLE** key to start measurement. Press the **STOP** key to stop measurement.

## Displaying a $\tau$ Graph

Set parameters to display a graph with a time alignment error (Tau) set to the vertical axis.

45. Set parameters as shown below. Proceed with the following procedure. A single screen display can show a graph with an time alignment error on the vertical axis and a channel on the horizontal axis.



#### Figure 2-20 Graphics Display Setting Example of Scale Setup $\tau$

- 46. Press Scale Setup to open the Scale Setup window.
- 47. Select *GRAPH* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 48. Select *SINGLE* from *Display* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 49. Select  $\tau$  from the *Y Scale* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 50. Select *5/div* from *Y/div* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
2.2 Code Domain Power on the Base Station (BTS)



51. Press Scale Setup to close the Scale Setup window.

Figure 2-21 Display Example of  $\tau$  Graph

Displaying a  $\theta$  Table

A Phase difference based on the Pilot signal is displayed in table format.

52. Set parameters as shown below. Proceed with the following procedure.

|   |   | Code Doma                                     | in Power [0   |  |   |  |
|---|---|---|---|--|---|--|
| 0:<br>1:<br>2:<br>3:                          | 0.00 deg.<br>0.04 deg.<br>0.00 deg.<br>0.00 deg.  | 21:<br>22:<br>23:<br>24:                      | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | 42:<br>43:<br>44:<br>45:                             | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | Code Domain<br><sup>1</sup><br>Auto Level<br>Set |
| 4:  | 0.00 deg.   | 25:   | 0.00 deg.   | 46:  | 0.00 deg.   | <sup>2</sup> Scale                               |
| 5.<br>6:                                      |   |   | Scale Setu  | <u>д</u> и.<br>р                                     |   | Setup  |
| 7:<br>8:<br>9:<br>10:                         | Format :<br>Display :<br>X Scale :  | GRAPH<br>SINGLE                               | DUAL  |  | DHASE   | 3<br>Parameter<br>Setup                          |
| 11:<br>12:<br>13:                             | Y/div :   | 20/dfv<br>1/div                               | 10/div<br>0.5/div   | 5/dív<br>0.25/div                                    | THISE   | <sup>4</sup> Marker<br>Setup                     |
| 14:<br>15:<br>16:<br>17:<br>18:<br>19:<br>20: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 33:<br>36:<br>37:<br>38:<br>39:<br>40:<br>41: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 50:<br>57:<br>58:<br>59:<br>60:<br>61:<br>62:<br>63: | 0.00 deg.<br>0.00 deg.<br>-0.48 deg.<br>-0.39 deg.<br>-0.38 deg.<br>0.29 deg.<br>-0.22 deg. | <sup>5</sup> Average<br>Times<br>ON OFF          |

#### Figure 2-22 Setting Example of Display

- 53. Press Scale Setup to open the Scale Setup window.
- 54. Select *TABLE* from *Format* using the data knob, then press the data knob (or **ENTR**) to register the parameter.

2.2 Code Domain Power on the Base Station (BTS)

- 55. Select *PHASE* from *Y Scale* using the data knob, then press the data knob (or **ENTR**) to register the parameter.
- 56. Press *Scale Setup* to close the Scale Setup window.

|                          |  | Code Dor                        | nain Power [0]                                    |                          |  | ]                                |
|--------------------------|--|---------------------------------|---|--------------------------|--|----------------------------------|
| 0:<br>1:<br>2:           | 0.00 deg.<br>0.04 deg.<br>0.00 deg.              | 21 :<br>22:<br>23:              | 0.00 deg.<br>0.00 deg.<br>0.00 deg.               | 42:<br>43:<br>44:        | 0.00 deg.<br>0.00 deg.<br>0.00 deg.                | Code Domain<br>Auto Level<br>Set |
| 3:<br>4:<br>5:<br>6:     | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 24:<br>25:<br>26:<br>27:        | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | 45:<br>46:<br>47:<br>48: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.   | <sup>2</sup> Scale<br>Setup      |
| 7:<br>8:<br>9:<br>10:    | 0.00 deg.<br>0.19 deg.<br>0.00 deg.<br>0.00 deg. | 28:<br>29:<br>30:<br>31:<br>22: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | 49:<br>50:<br>51:<br>52: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.   | <sup>3</sup> Parameter<br>Setup  |
| 11:<br>12:<br>13:<br>14: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 32:<br>33:<br>34:<br>35:        | -0.07 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 53:<br>54:<br>55:<br>56: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.   | <sup>4</sup> Marker<br>Setup     |
| 15:<br>16:<br>17:<br>18: | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg. | 36:<br>37:<br>38:<br>39:        | 0.00 deg.<br>0.00 deg.<br>0.00 deg.<br>0.00 deg.  | 57:<br>58:<br>59:<br>60: | 0.00 deg.<br>0.00 deg.<br>-0.48 deg.<br>-0.39 deg. | Times                            |
| 19:<br>20:               | 0.00 deg.<br>0.00 deg.                           | 40:<br>41:                      | 0.00 deg.<br>0.00 deg.                            | 61:<br>62:<br>63:        | -0.38 deg.<br>0.29 deg.<br>-0.22 deg.              |                                  |
|                          |  |                                 |   |                          |  | J                                |

Figure 2-23 Display Example

## 2.3 ACP Measurement on the Base Station (BTS)

This section describes how to measure the ACP of the signal (continuous wave) received from the base station assign to US Cellular channel 5, which has a carrier frequency of 1.98 MHz, an output level of 0 dBm, an ACP offset of 3.125 MHz.





STD menu settings

Set measurement parameters as follows. To set each parameter, turn the data knob, and press the data knob (or **ENTR**) to register the parameter.

| ST                       | D | Measurement Parameter Set              |                       |
|--------------------------|---|--|-----------------------|
| Туре                     | : | CDMA(800MHz) CDMA(1.8GHz) CDMA(1.9GHz) | STD                   |
| Link                     | : | FORWARD REVERSE                        | DC CAL                |
| Rate                     | : | 9600/14400 4800/7200                   | J                     |
| Offset Level             | : | 20.0 dB                                |                       |
| Frequency Input<br>Input | : | RF BASEBAND(1&Q)                       |                       |
| Baseband Input           | : | AC DC                                  |                       |
| IQ Inverse               | : | NORMAL INVERSE                         |                       |
| Cont Auto Level Set      | : | ONOFF                                  |                       |
|                          |   |  |                       |
|                          |   |  | <sup>6</sup> Channe I |
|                          |   |  | Setting               |
|                          |   |  | <sup>7</sup> STD      |
|                          |   |  | Setup                 |

Figure 2-25 STD Setup Setting

1. Press TRANSIENT, STD and STD Setup to open the STD Setup window.

- 2. As a measurement target is a US cellular signal, select *CDMA* (800 *MHz*) in *Type* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 3. To measure the BTS signal, select *FORWARD* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 4. As the signal is attenuated by the 20 dB ATT, enter **2**, **0**, and +**dBm** using the numeric keys.
- 5. To set the center frequency of a channel, select *CHANNEL* in *Frequency Input* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 6. As an RF signal is input, select *RF* in *Input* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 7. Assuming that the phase of the input signal is not inverted, select *NORMAL* in *IQ Inverse* using the data knob, and press the data knob (or ENTR) to register the parameter.
- 8. Assuming that the auto ranging function is not used, select *OFF* in *Cont Auto Level Set* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 9. Press **RETURN** to exit from the STD Setup window.
- 10. Press *F-Domain* and *Due to Transient* to enter the Due to Transient measurement menu.
- 11. As the template is not used, turn off the setting. Select the *Template OFF* in the Template menu using the data knob, and press the data knob (or ENTR) to resister the parameter. Press **RETURN** to exit from the menu.
- 12. Setting the channel and channel bandwidth to measure the ACP. Press *Marker Edit* to open the marker setting menu.
- 13. Press *Table Init* to initialize the table.
- 14. Select *INTEGRAL* in *Reference MKR Type* using the data knob, and press the data knob (or ENTR) to resister the parameter.
- 15. Enter 1, ., 2, 2, 8, 8 and MHz using the numeric keys in *Band Width*.
- 16. Select *INTEGRAL* in *Offset MKR Type* using the data knob, and press the data knob (or **ENTR**) to resister the parameter.
- 17. Enter 1, ., 9, 8 and MHz using the numeric keys in Offset Freq.
- 18. Enter 1, ., 2, 2, 8, 8 and MHz using the numeric keys in *Band Width*.
- 19. Enter 6, 0 and -dBm using the numeric keys in *Limit*.

- 20. Enter 3, ., 1, ., 2, 5 and MHz using the numeric keys in Offset Freq.
- 21. Enter 1, ., 2, 2, 8, 8 and MHz using the numeric keys in Band Width.
- 22. Enter 6, 0 and -dBm using the numeric keys in *Limit*.
- 23. Press **RETURN** to exit from the editor.

| REF 20.0 dBm<br>10 dB/ *A_Write Posi  |                               |
|---|-------------------------------|
|   | MKR Edit                      |
|   | <sup>2</sup> Copy from<br>STD |
| CENTER 4 000000 GHz SPAN 5 250 MHz  |                               |
| KHZ *VBW 30 kHz SWP 20 ms ATT 10 dB   ACP Due to Transient Marker Table   | - <sup>4</sup> Insert<br>Line |
| Band Width : <u>1.228800 MHz</u><br>Offset MKR Type : NORMAL INTEGRAL   | 5<br>Delete<br>Line           |
| [ No ]     [ Offset Freq. ]     [ Band Width ]     [ Limit]       1.     1.980000 MHz     1.228800 MHz     -60.00 dB       2.     3.125000 MHz     1.228800 MHz     -60.00 dB | 6<br>Sort                     |
| 3.<br>4.<br>5.  | <sup>7</sup> Table<br>Init    |

Figure 2-26 Marker Edit Setting

- 24. Press Config and Parameter Setup to open the Parameter Setup window.
- 25. Select *SPAN* in *Freq. Settings* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 26. Select *SAMPLE* in *Detector* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 27. Set the unit so that the result can be displayed in dBc.Select *RELATIVE* in *Result* using the data knob, and press the data knob (or ENTR) to register the parameter.
- 28. Set the base value to the Ref MKR to calculate the result in dBc. Select *REF MARKER* in *Ref Power* using the data knob, and press the data knob (or **ENTR**) to register the parameter.
- 29. Select *OFF* in *Judgment* using the data knob, and press the data knob (or **ENTR**) to register the parameter.

| REF 20.0 dBm<br>10 dB/     *A_Writ     | Smp1   |                                 |
|--|--|---------------------------------|
|  |  | Config                          |
|  |  | <sup>1</sup> Parameter<br>Setup |
|  | PASS   | <sup>2</sup> Set to<br>STD      |
| CENTER 4.000000 GH<br>*RBW 30 kHz *VBW | SPAN 6.250 MHz<br>30 kHz SWP 20 ms ATT 10 dB |                                 |
|  | Parameter Setup                              |                                 |
| Freq.Setting                           | : START&STOP SPAN                            |                                 |
| Detector                               | : NORMAL POSI NEGA SAMPLE                    |                                 |
| Result                                 | : MARKER RELATIVE ABS POWER                  |                                 |
| Ref Power                              | : REF MARKER MODULATION                      |                                 |
| Display Unit                           | tildBm لا طBy                                |                                 |
| Template<br>Couple to Power            | : OH OFF                                     |                                 |
| Template Limit                         | :  |                                 |
| Judgment                               | : ON OFF                                     |                                 |

30. Press **RETURN** to exit the Parameter Setup menu.

Figure 2-27 Parameter Setup Setting for the ACP Measurement

- 31. As the signal power is 0 dBm, the reference level is set to 0 dBm. Press **LEVEL**, **0** and +**dBm**.
- 32. The frequency span is set to 8 MHz. Press SPAN, 8 and MHz.
- 33. Press FREQ, 5 and ENTR to assign the channel to 5.
- 34. Press **RETURN** to change the soft menu to the measurement menu.
- 35. Press SINGLE or REPEAT to start the measurement.



**Figure 2-28 Measurement Results** 

3.1 Menu Index

# **3 REFERENCE**

This chapter describes the functions of the panel and soft keys for option 61 software.

# 3.1 Menu Index

This menu index is used to easily find the keys described in Chapter 3.

| Auto Level Set            | 3-6,  | 3-7,  | Delay Time        | 3-6,  | 3-7,  |
|---------------------------|-------|-------|-------------------|-------|-------|
|                           | 3-8,  | 3-15, |                   | 3-8,  | 3-9,  |
|                           | 3-16, | 3-17, |                   | 3-12, | 3-22, |
|                           | 3-21, | 3-24, |                   | 3-25, | 3-27, |
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| TRANSIENT<br>Modulation<br>Tx Power |                     |
|-------------------------------------|---------------------|
| Auto Level Set                      |                     |
| Parameter Setup                     | Trigger Source:     |
| Average Times ON/OFF                | INT                 |
|                                     | EXT                 |
|                                     | INTRVL(EXT)         |
|                                     | EXT Trigger Slope:  |
|                                     | +                   |
|                                     | -                   |
|                                     | EXT Trigger Delay   |
|                                     | Meas Filter: NARROW |
|                                     | WIDE                |

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3.3 Function Description

# **3.3** Function Description

When modulation analysis hardware and software are installed, the following menus are assigned to the **TRANSIENT** key.



### 3.3.1 SWITCHING BETWEEN COMMUNICATION SYSTEMS

This section describes how to switch the communication systems. The analyzer must be set to the SPA mode to switch between the communication systems,.

- 1. Press the **POWER** key to enter the SPA mode.
- 2. Press CONFIG.
- 3. Press more 1/2.

If there are other communication systems installed, with which this instrument can communicate, "Comm.System" is displayed in the soft menu. Press *Comm.System*.

Select the communication system you wish using the data knob, and press the knob (or **ENTR**).



#### Figure 3-1 Dialog Box Used for the Communication Systems

- 4. When the data knob (or **ENTR**) is pressed, the message "LOADING" is displayed. After the message disappears, the switchover to another system is complete.
- 5. Press the **TRANSIENT** key to confirm that the menu has been changed.

*NOTE:* After the communication system has been switched, the parameters previously set for the former communication system will be cleared.

If necessary, save the old parameters, before switching the communication system to another.

- 1. To save the parameters, press SHIFT and RCL.
- 2. Set the SAVE FILE number and press Save.

# 3.3.2 T-Domain

Carries out a measurement according to the standard using the zero span of the spectrum analyzer. Measurement items include power, ON/OFF ratio of a burst signal, and spurious measurements in the time domain with a specified frequency.

In the T-Domain measurement, the setting for the RBW, VBW, Sweep Time, or Detector is saved when exiting from each measurement and recalled when entering each measurement again. To return the setting to the value specified by the standard, press *Config* and *Set to STD*.

## 3.3.2.1 Power (T-Domain)

This is a function to measure power in the time domain (zero span).

There are two Pass/Fail judgment functions: a judgment function for the template and a judgment function for power.

NOTE: The RBW must be set wider than the modulation band.

Auto Level Set

Used to set the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

*NOTE: The input signal level must be constant while Auto Level Set is being carried out.* 

**Trigger Setup** 

Used to set a trigger.

| Trigger Setup    |   |          |       |    |     |  |
|------------------|---|----------|-------|----|-----|--|
| Trigger Source   | : | FREE RUN | VIDEO | IF | EXT |  |
| Slope            | : | +        | -     |    |     |  |
| Trigger Level    | : | 30 %     |       |    |     |  |
| Trigger Position | : | 8%       |       |    |     |  |
| Delay Time       | : | 0.000 ns |       |    |     |  |

#### Figure 3-2 Trigger Setup Dialog Box

| Used to select a | a trigger.   |
|------------------|--|
| FREE RUN:        | Used to capture the signal using internal timing.  |
| VIDEO:           | Used to trigger the signal using the video signal.   |
| IF:              | Used to trigger the signal using the IF signal (approximately 6 MHz band).   |
| EXT:             | Used to trigger the signal using the external sig-<br>nal, which is input from the EXT TRIG terminal<br>on the rear panel. |
|                  | Used to select a<br>FREE RUN:<br>VIDEO:<br>IF:<br>EXT:   |

Used to select the edge when triggering.

Slope

|                  | +: Used to trigger at the leading edge.   |
|------------------|---|
|                  | -: Used to trigger at the trailing edge.  |
| Trigger Level    | Used to set the level to trigger.   |
| Trigger Position | Used to set the trigger position where it is displayed on the screen.   |
| Delay Time       | Used to set a delay time from the time a trigger signal is detected<br>to the time the signal is captured.  |
|                  | NOTE: When Delay Time is a negative value, signals before the trigger can be captured.  |
| Window Setup     | Used to set the window used for power measurement.  |
| Window ON/OFF    | Used to display a window showing the range for power measure-<br>ment. When OFF is set, the power measurement range covers all<br>points on the display screen. |
| Set to STD       | Used to set the window specified by the communication standard.   |
| Window Position  | Used to set the position of the window.   |
| Window Width     | Used to set the width of the window.  |
|                  | NOTE: When the window is partially outside the display, an arrow is shown next to Posi, Width or both in the area indicating the window conditions.             |
| Template         | Used to set the template.   |
| Template ON/OFF  | Used to set whether to display the templateor to toggles the Pass/<br>Fail judgment function on or off.   |
| Shift X          | Used to set the amount of template movement in the X-axis direction.  |
| Shift Y          | Used to set the amount of template movement in the Y-axis direction.  |
| Template Edit    | Edits the template.   |
| Template UP/LOV  | <i>W</i> Used to select the upper template or the lower template.   |
| Copy from STD    | Used to copy the template specified by the communication stan-<br>dard.   |

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3.3 Function Description

|                                      | Insert Line | Used to insert a line.   |  |
|--------------------------------------|-------------|--|--|
| Delete Line                          |             | Used to delete a line.   |  |
| Sort                                 |             | Used to sort template data in ascending order.   |  |
|                                      | Table Init  | Used to initialize the table.  |  |
| <i>Y Scale [dB/div] 10/5/2</i> Swite |             | Switches the display screen scale to 10, 5 or 2 dB/div.  |  |
| Average Times ON/OFF                 |             | Used to set the averaging count.<br>Used to perform averaging of both display screen and power at the<br>same time.<br>(This is because a large error results when calculating power from<br>the averaged display screen since the display screen is logarith- |  |
|                                      |             | mically compressed.)   |  |

### Config

Parameter Setup

Used to set the method of measurement, edits the template, and so forth.

| Parameter Setup             |   |          |      |      |        |
|-----------------------------|---|----------|------|------|--------|
| Detector                    | : | NORMAL   | POSI | NEGA | SAMPLE |
| Display Unit                | : | dBm      | W    | dBµV | ]      |
| Template<br>Couple to Power | : | ON       | OFF  |      |        |
| Template Limit              | : | -200.00  | dBm  |      |        |
| Judgment                    | : | ON       | OFF  |      |        |
| Upper Limit                 | : | 100.00 d | Bm   |      |        |
| Lower Limit                 | : | -200.00  | dBm  |      |        |

#### Figure 3-3 Parameter Setup Dialog Box

| Detector | NORMAL/POSI/NEGA/SAMPLE Used to set the detector. |
|----------|---|
|          |   |

*Display Unit* dBm/W/dBµV Used to set the display unit of power.

Template Couple to Power

Used to display the template that is connected to the measured power.

- ON: Used to display the template that is connected to the measured power. On the template edit screen, set the template level to the portion linked with the power value set to 0 dB.
  - OFF: Used to display the template regarding the Y-axis value edited by the template as an absolute value.
- *Template Limit* If the absolute value of the template is smaller than the this value when Template Couple to Power is set to ON, clip the template at this value.

| Judgment    | Used to set ON/OFF for Pass/Fail judgments.  |  |
|-------------|--|--|
| Upper Limit | Used to enter the upper limit value of power.  |  |
| Lower Limit | Used to enter the lower limit value of power.  |  |
| Set to STD  | Used to return measurement parameters to the values specified by the communication standard. |  |

# 3.3.2.2 ON/OFF Ratio

Calculates the power while the burst signal is on and off, then displays the ratio of power.

Auto Level Set

Used to set the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

*NOTE: The signal level must remain constant while Auto Level Set is being carried out.* 

Trigger Setup

Used to set a trigger.

|                  | Trigger Setup         |
|------------------|-----------------------|
| Trigger Source   | FREE RUN VIDEO IF EXT |
| Slope            | -                     |
| Trigger Level    | : 30 %                |
| Trigger Position | : 8 %                 |
| Delay Time       | : 0.000 ns            |

#### Figure 3-4 Trigger Setup Dialog Box

| Trigger Source | Used to select a trigger                 |  |
|----------------|--|--|
|                | FREE RUN:                                | Used to capture the signal using internal timing.  |
|                | VIDEO:                                   | Used to trigger the signal using the video signal.   |
|                | IF:                                      | Used to trigger the signal using the IF signal (approximately 6 MHz band).                               |
|                | EXT:                                     | Selected when triggering an external signal which is input from the EXT TRIG terminal on the rear panel. |
| Slope          | Used to select the edge when triggering. |  |
|                | +: Us                                    | ed to trigger at the leading edge.   |
|                | -: Us                                    | ed to trigger at the trailing edge.  |
| Trigger Level  | Used to set the level to trigger.        |  |

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3.3 Function Description

| Trigger Position        | Used to set where the trigger position is displayed on the screen.  |  |  |  |
|-------------------------|---|--|--|--|
| Delay Time              | Used to set a delay time from the time a trigger signal is detected<br>to the time the signal is captured.  |  |  |  |
|                         | NOTE: When Delay Time is a negative value, signals before the trigger can be captured.  |  |  |  |
| Window Setup            | Used to set the burst ON and OFF periods.<br>Used to display a window showing the range for power measure-<br>ment.<br>Used to set the value that is specified by or complies with the<br>communication standard.<br>Used to set the desired position when the burst is on.<br>Used to set the desired width when the burst is on.<br>Used to set the position when the burst is off.<br>Used to set the width when the burst is off. |  |  |  |
| Window ON/OFF           |   |  |  |  |
| Set to STD              |   |  |  |  |
| <b>ON Position</b>      |   |  |  |  |
| ON Width                |   |  |  |  |
| <b>OFF</b> Position     |   |  |  |  |
| OFF Width               |   |  |  |  |
|                         | NOTE: When the window is partially outside the display, an arrow is<br>shown next to Posi, Width or both in the area indicating the<br>window conditions.   |  |  |  |
| Y Scale [dB/div] 10/5/2 | Switches the display screen scale to 10, 5 or 2 dB/div.   |  |  |  |
| Average Times ON/OFF    | Used to set the averaging count.  |  |  |  |
| Config                  |   |  |  |  |
| Parameter Setup         | Used to set the measurement parameters.   |  |  |  |
|                         | Parameter Setup     Detector   NORMAL   POSI   NEGA   SAMPLE     Display Unit   :   dBm   W   dB \mu V     Judgment   :   ON   OFF     Upper Limit   :   100.00 dB  |  |  |  |

## Figure 3-5 Parameter Setup Dialog Box

Detector NORMAL/POSI/NEGA/SAMPLE Used to select the detector.

Display Unit

 $dBm/W/dB\mu V$  Used to set the display unit of power.

|             | NOTE: The ON/OFF ratio is displayed in units of dB (fixed).                               |  |  |
|-------------|---|--|--|
| Judgment    | Used to set ON/OFF of the Pass/Fail judgment for the ON/OFF ratio.                        |  |  |
| Upper Limit | Enters the upper limit value.   |  |  |
| STD         | Used to set measurement parameters to the values specified by the communication standard. |  |  |

## 3.3.2.3 Spurious (T-Domain)

Set to

Used to measure power (or peak power) according to the frequency specified in the table by sweeping in the zero span mode.

Auto Level Set

Used to set the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

*NOTE: The signal level must be constant while Auto Level Set is being carried out.* 

Trigger Setup

Used to set a trigger.

| Trigger Setup    |   |                       |  |
|------------------|---|-----------------------|--|
| Trigger Source   | : | FREE RUN VIDEO IF EXT |  |
| Slope            | : | + -                   |  |
| Trigger Level    | : | 30 %                  |  |
| Trigger Position | : | 0 %                   |  |
| Delay Time       | : | 0.000 ns              |  |

#### Figure 3-6 Trigger Setup Dialog Box

| Trigger Source | Trigger Source | Used to select a trigger |   |  |
|----------------|----------------|--------------------------|---|--|
|                |                | FREE RUN:                | Used to capture the signal using internal timing.   |  |
|                |                | IF:                      | Triggers the signal using the IF signal (approximately 6 MHz band).   |  |
|                |                | EXT:                     | Selected when triggering with the external signal, which is input from the EXT TRIG terminal on the rear panel. |  |
|                | Slope          | Used to selec            | t the edge when triggering.   |  |
|                |                | +: Use                   | ed to trigger at the leading edge.  |  |
|                |                |                          |   |  |

-: Used to trigger at the trailing edge.

| Trigger Position     | Used to set where the trigger position is displayed on the screen.   |  |  |
|----------------------|--|--|--|
| Delay Time           | Used to set a delay time from the time a trigger signal is detected<br>to the time the signal is captured. |  |  |
|                      | <i>NOTE:</i> When Delay Time is a negative value, signals before the trigger can be captured.              |  |  |
| Table No. 1/2/3      | Used to select the measurement table.  |  |  |
| Load Table           | Loads the measurement table.   |  |  |
| Table Edit           | Edits the measurement table.   |  |  |
| Table No. 1/2/3      | Used to select the table to be edited.   |  |  |
| Load Table           | Loads the measurement table.   |  |  |
| Save Table           | Saves the measurement table.   |  |  |
| Insert Line          | Used to insert additional frequency data before the selected fre-<br>quency number.                        |  |  |
| Delete Line          | Used to delete the selected line.  |  |  |
| Table Init           | Used to initialize the table   |  |  |
| Average Times ON/OFF | Used to set the averaging count. Max Hold is set when the detector is set to Posi.                         |  |  |

# Config

Parameter Setup

Used to set measurement conditions.

| Parameter Setup |    |        |      |      |        |  |
|-----------------|----|--------|------|------|--------|--|
| Detector        | :  | Normal | POSI | NEGA | SAMPLE |  |
| Result          | :  | PEAK   | RMS  | ]    |        |  |
| Peak MKR Y Delt | a: | 1.0 di | v    |      |        |  |
| Multiplier      | :  | 1.000  |      |      |        |  |
| Display Unit    | :  | dBm    | W    | dBµV |        |  |
| Judgment        | :  | ON     | OFF  |      |        |  |
| Preselector     | :  | 1.66   | 3.66 | ]    |        |  |

### **Figure 3-7 Parameter Setup Dialog Box**

Detector NORMAL/POSI/NEGA/SAMPLE Used to set the detector.

Result

PEAK/RMS Used to set whether to display the result using average power or peak power.

| Peak MKR Y Delta | ı  |  |
|------------------|--|--|
|                  | Used to set the Y delta of the peak marker.  |  |
| Multiplier       | Multiplies the measurement result by the set value, then displays the resultant value.                                     |  |
| Display Unit     | $dBm/W/dB\mu V$ Used to set the display units.   |  |
| Judgment         | Used to set ON/OFF of the Pass/Fail judgment for the limit value.  |  |
| Preselector      | Used to set the preselector.   |  |
|                  |  |  |
|                  | NOTE: This selection is displayed on R3267 only.   |  |
|                  | 1.6G: Used to measure harmonics of more than 1.6 GHz or spurious signals when the carrier frequency is lower than 1.6 GHz. |  |
|                  | 3.6G: Used to set this parameter for cases other than that above.  |  |
| Set to Default   | Returns the set value to the default.  |  |

## 3.3.3 F-Domain

Used to perform measurements according to the communication standard using the spectrum analyzer's sweep measurement method. Measurement items include power, occupied bandwidth, ACP Due to Switching, ACP Due to Modulation, In Band Spurious, and Out Bang Spurious measurements is the frequency domain.

In F-Domain measurement, the setting for the RBW, VBW, Sweep Time, or Detector is saved when exiting each measurement and recalled when entering each measurement again. To return the setting to the value specified by the standard, press *Config* and *Set to STD*.

## 3.3.3.1 Power (F-Domain)

Used to measure power in the frequency domain using the spectrum analyzer.

Gate Setup

Used to set the gated sweep.

This setting is required when the input signal is a burst signal and Sample Detector is used.

Trigger Setup

Used to set a trigger.

| Trigger Setup    |   |                       |  |
|------------------|---|-----------------------|--|
| Trigger Source   | : | FREE RUN VIDEO IF EXT |  |
| Slope            | : | + -                   |  |
| Trigger Level    | : | 30 %                  |  |
| Trigger Position | : | 8%                    |  |
| Delay Time       | : | 0.000 ns              |  |

#### Figure 3-8 Trigger Setup Dialog Box

| Trigger Source   | Used to select a trigger   |   |
|------------------|--|---|
|                  | FREE RUN:  | Used to capture the signal using internal timing.   |
|                  | VIDEO:   | Used to trigger the signal using the video signal (displayed signal).   |
|                  | IF:  | Used to trigger the signal using the IF signal (approximately 6 MHz band).  |
|                  | EXT:   | Selected when triggering the signal using the exter-<br>nal signal, which is input from the EXT TRIG ter-<br>minal on the rear panel. |
| Slope            | Used to selec  | t the edge when triggering.   |
|                  | +: Use   | ed to trigger at the leading edge.  |
|                  | -: Use   | ed to trigger at the trailing edge.   |
| Trigger Level    | Used to set the level to trigger.                                  |   |
| Trigger Position | Used to set where the trigger position is displayed on the screen. |   |

| Delay Time         | Used to set a delay time from the time a trigger signal is detected<br>to the time the signal is captured.   |
|--------------------|--|
|                    | NOTE: When Delay Time is a negative value, signals before the trigger can be captured.   |
| Gate Source        |  |
| Trigger            | Used to set Trigger Source specified by Trigger Setup as Gate Source.  |
|                    | NOTE: When Trigger Source is set to IF and SPAN is set to a fre-<br>quency higher than 6 MHz, the sweeping seems to be stopped,<br>because the IF trigger bandwidth is approximately 6 MHz and<br>the gate trigger is failing. |
| EXT Gate           | Used to perform the gated sweep using the gate signal input from the EXT GATE terminal on the rear panel.  |
| Gate Setup         | Used to set the gated sweep range when Trigger is selected for Gate Source.  |
| Set to STD         | Used to set the gate position and width to the values specified by the communication standard.   |
| Gate Position      | Used to set the gate position.   |
| Gate Width         | Used to set the gate width.  |
| Gated Sweep ON/OFF | Starts the gated sweep.  |
| Detector           | NORMAL/POSI/NEGA/SAMPLE Used to select the detector.       Detector       Detector:     NORMAL       POSI     NEGA   |
|                    | Figure 3-9 Detector Dialog Box   |
| Window Setup       | Used to set the frequency range used for power measurement.  |
| Window ON/OFF      | Used to set the window to ON or OFF. When the window is set to OFF, the power measurement range becomes a sweep band.  |
| Set to STD         | Used to set the value determined by the communication standard.  |
| Window Position    | Used to set the position of the window.  |
3.3 Function Description

| Window Width | Used to set the width of the window.  |
|--------------|---|
|              | NOTE: When the window is partially outside the display, an arrow is<br>shown next to Posi, Width or both in the area indicating the<br>window conditions. |

*Y Scale [dB/div] 10/5/2* 

Used to set the display scale.

Used to set the averaging count.

Average Times ON/OFF

#### Config

Parameter Setup

Used to set measurement conditions.

| Parameter Setup |   |               |      |      |        |
|-----------------|---|---------------|------|------|--------|
| Detector        | : | Normal        | POSI | NEGA | SAMPLE |
| Gated Sweep     | : | ON            | OFF  |      |        |
| Display Unit    | : | dBm           | W    | dBµV |        |
| Judgment        | : | ON            | OFF  | ]    |        |
| Upper Limit     | : | 100.00 c      | IBm  |      |        |
| Lower Limit     | : | : -200.00 dBm |      |      |        |

#### Figure 3-10 Parameter Setup Dialog Box

|            | Detector     | NORMAL/POSI/NEGA/SAMPLE Used to select the detector.  |
|------------|--------------|---|
|            | Gated Sweep  | Used to set the gated sweep to ON or OFF.   |
|            | Display Unit | $dBm/W/dB\mu V$ Used to select the display unit.  |
|            | Judgment     | Used to set ON/OFF of the Pass/Fail judgment for measured power.                              |
|            | Upper Limit  | Used to set the upper limit for Pass/Fail judgment.   |
|            | Lower Limit  | Used to set the lower limit for Pass/Fail judgment.   |
| Set to STD |              | Used to set the measurement parameters to the values specified by the communication standard. |

### 3.3.3.2 OBW

Used to measure an occupied bandwidth.

Detector

OBW%Used to set the frequency, including the percentage of the total<br/>power as an occupied bandwidth, when calculating the occupied<br/>bandwidth.Average Times ON/OFFUsed to set the averaging count.ConfigUsed to set measurement conditions and so on.

| Parameter Setup |                           |  |  |
|-----------------|---------------------------|--|--|
| Detector        | : NORMAL POST NEGA SAMPLE |  |  |
| Judgment        | : ON OFF                  |  |  |
| Upper Limit     | 2.500 MHz                 |  |  |
| Lower Limit     | : 750 kHz                 |  |  |

#### Figure 3-11 Parameter Setup Dialog Box

NORMAL/POSI/NEGA/SAMPLE Used to select the detector.

*Judgment* Used to set ON/OFF of the Pass/Fail judgment for the occupied bandwidth.

*Upper Limit* Used to set the upper limit for Pass/Fail judgment.

*Lower Limit* Used to set the lower limit for Pass/Fail judgment.

Used to set the measurement parameters to the values specified by the communication standard.

## **3.3.3.3** Due to Transient

Set to STD

Used to measure the spectrum, including the rise and fall times of the burst.

| Template         | Used to set and edits the template.  |
|------------------|--|
| Template ON/OFF  | Used to set ON/OFF of the template display.<br>When Template is set to ON, the Pass/Fail judgment for the tem-<br>plate is displayed under the sweep screen. |
| Shift X          | Used to shift the set template in the frequency direction (X-axis).  |
| Shift Y          | Used to shift the set template in the level direction (Y-axis).  |
| Margin ∆X ON/OFF | Magnifies the template in the X-axis direction with a set template frequency 0 as the center.  |
| Template Edit    | Opens the template edit menu.  |

3.3 Function Description

|            | Copy from STD | Used to copy the template of the communication standard.                       |
|------------|---------------|--|
|            | Insert Line   | Used to insert a line before the selected line.                                |
|            | Delete Line   | Used to delete the selected line.  |
|            | Sort          | Used to sort the tables in order of frequency.                                 |
|            | Table Init    | Used to initialize the table.  |
| Marker Ed  | lit           | Used to set the measurement frequency (frequency offset) and measurement band. |
|            | Copy from STD | Used to set to the parameters specified by the communication standard.         |
|            | Insert Line   | Used to insert a line before the selected line.                                |
|            | Delete Line   | Used to delete the selected line.  |
|            | Sort          | Used to sort data in order of frequency.                                       |
|            | Table Init    | Used to initialize the table.  |
| Average Ti | imes ON/OFF   | Used to set the averaging count.   |
|            |               |  |

Config

Parameter Setup

| Parameter Setup             |   |                           |  |  |
|-----------------------------|---|---------------------------|--|--|
| Freq.Setting                | : | START&STOP SPAN           |  |  |
| Detector                    | : | NORMAL POSI NEGA SAMPLE   |  |  |
| Result                      | : | MARKER RELATIVE ABS POWER |  |  |
| Ref Power                   | : | REF MARKER MODULATION     |  |  |
| Display Unit                | : | dBn ₩ dBµV                |  |  |
| Template<br>Couple to Power | : | ON OFF                    |  |  |
| Template Limit              | : | -27.00 dBm                |  |  |
| Judgment                    | : | ON                        |  |  |

### Figure 3-12 Parameter Setup Dialog Box

#### Freq. Setting

START&STOP/SPAN Used to select the measurement mode.

Detector NORMAL/POSI/NEGA/SAMPLE Used to select the detector.

| Result    | Specifies how to display the result.  |   |  |
|-----------|---|---|--|
|           | MARKER:   | Used to display the marker read value. The po-<br>sition of the marker is set by Marker Edit.         |  |
|           | RELATIVE:   | Used to display the marker read value using a relative value.   |  |
|           | ABS POWER:  | Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it. |  |
| Ref Powe  | <i>wer</i><br>When RELATIVE is selected for Result, this selects which rela-<br>tive value to use to display the marker read value. |   |  |
|           | REF MARKER:   | Used to display a relative value to Ref Marker set by Marker Edit.                                    |  |
|           | MODULATION:   | Display a relative value to the measurement re-<br>sult of Tx power in Modulation.                    |  |
| Display U | U <b>nit</b><br>dBm/W/dBμV S <sub>I</sub>   | pecifies the unit of the result displayed.  |  |

NOTE: When RELATIVE is selected for Result, the unit is dB.

#### Template Couple to Power

Set whether to raise or lower the template with the power set by Ref Power.

#### **Template Limit**

If the absolute value of the template is smaller than the this value when Template Couple to Power is set to ON, clip the template at this value.

#### Judgment

Used to make the Pass/fail judgment for the limit value set by Marker edit. The Pass/Fail judgment result is displayed under the display screen together with the marker list.

Set to STD

Returns the measurement parameters to the values specified by the standard.

## **3.3.3.4** Due to Modulation

Measure the modulation spectrum excluding the rise and fall of the burst.

Gate Setup

Used to set the gated sweep.

Trigger Setup

Used to set a trigger.

| Trigger Setup    |   |          |       |    |     |  |
|------------------|---|----------|-------|----|-----|--|
| Trigger Source   | : | FREE RUN | VIDEO | IF | EXT |  |
| Slope            | : | +        | -     |    |     |  |
| Trigger Level    | : | 30 %     |       |    |     |  |
| Trigger Position | : | 8%       |       |    |     |  |
| Delay Time       | : | 0.000 ns |       |    |     |  |

#### Figure 3-13 Trigger Setup Dialog Box

| Trigger Source   | Used to select a trigger.   |   |  |
|------------------|---|---|--|
|                  | FREE RUN:   | Used to capture the signal using internal timing.   |  |
|                  | VIDEO:  | Used to trigger the signal using the video signal.  |  |
|                  | IF:   | Used to trigger the signal using the IF signal (approximately 6 MHz band).  |  |
|                  | EXT:  | Selected when triggering the signal using the exter-<br>nal signal, which is input from the EXT TRIG ter-<br>minal on the rear panel. |  |
| Slope            | Used to selec   | t the edge when triggering.   |  |
|                  | +: Use  | ed to trigger at the leading edge.  |  |
|                  | -: Us   | ed to trigger at the trailing edge.   |  |
| Trigger Level    | Used to set the   | ne level to trigger.  |  |
| Trigger Position | Used to set w   | where the trigger position is displayed on the screen.  |  |
| Delay Time       | Used to set a to the time th  | delay time from the time a trigger signal is detected<br>the signal is captured.  |  |
|                  | Delay Time is a negative value, signals before the trigger<br>e captured. |   |  |
|                  |   |   |  |

Gate Source

Trigger

Used to set Trigger Source specified by Trigger Setup as Gate Source.

|                          | NOTE: When Trigger Source is set to IF and SPAN is set to a fre-<br>quency higher than 6 MHz, the sweeping seems to be stopped,<br>because the IF trigger bandwidth is approximately 6 MHz and<br>the gate trigger is failing. |
|--------------------------|--|
| EXT Gate                 | Used to perform the gated sweep using the gate signal input from<br>the EXT Gate terminal on the rear panel.   |
| Gate Setup               | Used to set the gated sweep range when Trigger is selected for Gate Source.  |
| Set to STD               | Used to set the gate position and width to the values specified by the communication standard.   |
| Gate Position            | Set the gate position.   |
| Gate Width               | Used to set the gate width.  |
| Gated Sweep ON/OFF       | Starts the gated sweep.  |
| Detector                 | NORMAL/POSI/NEGA/SAMPLE Used to select the detector.   |
|                          | Detector Detector NORMAL POSI NEGA SAMPLE  |
|                          | Figure 3-14 Detector Dialog Box  |
| Template                 | Used to set and edits the template.  |
| Template ON/OFF          | Used to set the template display to ON or OFF.<br>When Template is set to ON, the Pass/Fail judgment for the tem-<br>plate is displayed under the sweep screen.  |
| Shift X                  | Used to shift the set template in the frequency direction (X-axis).  |
| Shift Y                  | Used to shift the set template in the level direction (Y-axis).  |
| Margin $\Delta X ON/OFF$ | Magnifies the template in the X-axis direction with a set template frequency 0 as the center.  |
| Template Edit            |  |
| Copy from STD            | Used to copy the template specified by the communication stan-<br>dard.  |
| Insert Line              | Used to insert a line before the selected line.  |
| Delete Line              | Used to delete the selected line.  |

|                  | Sort       | Used to sort the tables in frequency order.                            |
|------------------|------------|--|
|                  | Table Init | Used to initialize the table.  |
| Marker Edit      |            |  |
| Copy from        | STD        | Used to set to the parameters specified by the communication standard. |
| Insert Line      |            | Used to insert a line before the selected line.                        |
| Delete Line      | 2          | Used to delete the selected line.                                      |
| Sort             |            | Used to sort data in order of frequency.                               |
| Table Init       |            | Used to initialize the table.  |
| Average Times ON | N/OFF      | Used to set the averaging count.                                       |
| <i>a b</i>       |            |  |

Config

Parameter Setup

| Parameter Setup             |   |                           |  |  |
|-----------------------------|---|---------------------------|--|--|
| Freq.Setting                | : | START&STOP SPAN           |  |  |
| Detector                    | : | NORMAL POST NEGA SAMPLE   |  |  |
| Result                      | : | MARKER RELATIVE ABS POWER |  |  |
| Ref Power                   | : | REF MARKER MODULATION     |  |  |
| Display Unit                | : | dÐm ₩ dÐyQ                |  |  |
| Template<br>Couple to Power | : | ON OFF                    |  |  |
| Template Limit              | : | -27.00 dBm                |  |  |
| Judgment                    | : | ON                        |  |  |

## Figure 3-15 Parameter Setup Dialog Box

| Freq. Setting | START&STOP/SPAN Used to select the measurement mode. |   |  |  |
|---------------|--|---|--|--|
| Detector      | NORMAL/POSI/NEGA/SAMPLE Used to select the detector. |   |  |  |
| Result        | Specifies how to display the results.                |   |  |  |
|               | MARKER:  | Used to display the marker read value. The po-<br>sition of the marker is set by Marker Edit.         |  |  |
|               | RELATIVE:  | Used to display the marker read value using a relative value.   |  |  |
|               | ABS POWER:   | Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it. |  |  |

|              | Ref Power       | When RELATIVE is selected for Result, this selects which rela-<br>tive value to use to display the marker read value. |   |  |
|--------------|-----------------|---|---|--|
|              |                 | REF MARKER:   | Used to display a relative value to Ref Marker set by Marker Edit.  |  |
|              |                 | MODULATION:   | Used to display a relative value to the measure-<br>ment result of Tx power in Modulation.  |  |
| Display Unit |                 | $dBm/W/dB\mu V$ Used to select the display unit.  |   |  |
|              |                 | NOTE: When RELATIVE is selected for Result, the unit is dB.   |   |  |
|              | Template Couple | to Power  |   |  |
|              |                 | Sets whether or no set by Ref Power.  | ot to raise or lower the template with the power  |  |
|              | Template Limit  | If the absolute val<br>when Template C<br>this value.   | ue of the template is smaller than the this value<br>ouple to Power is set to ON, clip the template at                              |  |
|              | Judgment        | Used to make the<br>Marker edit. The<br>display screen tog  | e Pass/Fail judgment for the limit value set by<br>Pass/Fail judgment result is displayed under the<br>gether with the marker list. |  |
| Set to STD   |                 | Returns the meas the standard.  | urement parameters to the values specified by   |  |

# 3.3.3.5 Inband Spurious

Used to search for a peak by sweeping the set frequency.

### Template

| Template ON/OFF  | Used to set the template display to ON or OFF.<br>When Template is set to ON, the Pass/Fail judgment for the tem-<br>plate is displayed under the sweep screen. |
|------------------|---|
| Shift X          | Used to shift the set template in the frequency direction (X-axis).   |
| Shift Y          | Used to shift the set template in the level direction (Y-axis).   |
| Margin ∆X ON/OFF | Magnifies the template in the X-axis direction with a set template frequency 0 as the center.   |
| Template Edit    |   |
| Copy from STD    | Used to copy the template specified by the communication stan-<br>dard.   |

3.3 Function Description

| Insert Line          | Used to insert a line before the selected line.                                      |  |
|----------------------|--|--|
| Delete Line          | Used to delete the selected line.  |  |
| Sort                 | Used to sort the tables in frequency order.  |  |
| Table Init           | Used to initialize the table.  |  |
| Marker Edit          |  |  |
| Copy from STD        | Used to set the measurement parameters specified by the commu-<br>nication standard. |  |
| Insert Line          | Used to insert a line before the selected line.                                      |  |
| Delete Line          | Used to delete the selected line.  |  |
| Sort                 | Used to sort data in order of frequency.   |  |
| Table Init           | Used to initialize the table.  |  |
| Average Times ON/OFF | Used to set the averaging count.   |  |

#### Config

Parameter Setup

|                             |   | Parameter Setup       |           |
|-----------------------------|---|-----------------------|-----------|
| Freq.Setting                | : | START&STOP SPAN       |           |
| Detector                    | : | NORMAL POST NEGA      | SAMPLE    |
| Peak MKR Y Delta            | : | 1.0 div               |           |
| Result                      | : | MARKER RELATIVE       | ABS POWER |
| Ref Power                   | : | REF MARKER MODULATION |           |
| Display Unit                | : | dBm ₩ dBµV            |           |
| Template<br>Couple to Power | : | ON                    |           |
| Template Limit              | : | -13.00 dBm            |           |
| Judgment                    | : | ONOFF                 |           |

### Figure 3-16 Parameter Setup Dialog Box

| Freq. Setting | START&STO               | P/SPAN Used to select the measurement mode.   |
|---------------|-------------------------|---|
| Detector      | NORMAL/PO               | SI/NEGA/SAMPLE Used to select the detector.   |
| Peak MKR Y De | elta<br>Used to set the | Y delta of the peak marker.   |
| Result        | Specifies how           | to display the results.   |
|               | MARKER:                 | Used to display the marker read value. The po-<br>sition of the marker is set by Marker Edit. |

3.3 Function Description

|  | RELATIVE:  | Used to display the marker read value using a relative value.  |
|--|--|--|
|  | ABS POWER:   | Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it.  |
| Ref Power                                  | When RELATIVE is selected for Result, this selects which<br>tive value is used to display the marker read value. |  |
|  | REF MARKER:  | Used to display a relative value to Ref Marker set by Marker Edit.   |
|  | MODULATION:  | Used to display a relative value to the measure-<br>ment result of Tx power in Modulation.   |
| Display Unit                               | dBm/W/dBµV U   | sed to select the display unit.  |
|  | NOTE: When RELATIVE is selected for Result, the unit is dB.  |  |
| Template Couple                            | to <b>Power</b><br>Sets whether or no<br>set by Ref Power.   | ot to raise or lower the template with the power   |
| Template Limit                             | If the absolute val<br>when Template C<br>this value.  | ue of the template is smaller than the this value<br>ouple to Power is set to ON, clip the template at   |
|  |  | Deer (Eril indement for the limit relate set her   |
| Judgment                                   | Used to make the<br>Marker edit. The<br>display screen tog   | Pass/Fail judgment for the finit value set by<br>Pass/Fail judgment result is displayed under the<br>gether with the marker list.  |
| Judgment<br>Set to STD                     | Used to make the<br>Marker edit. The<br>display screen tog<br>Returns the meas<br>the standard.                  | Pass/Fail judgment for the limit value set by<br>Pass/Fail judgment result is displayed under the<br>gether with the marker list.<br>urement parameters to the values specified by |
| Judgment<br>Set to STD<br>Outband Spurious | Used to make the<br>Marker edit. The<br>display screen tog<br>Returns the meas<br>the standard.                  | Pass/Fail judgment for the limit value set by<br>Pass/Fail judgment result is displayed under the<br>gether with the marker list.<br>urement parameters to the values specified by |

| <i>Table No. 1/2/3</i> | Used to select the table number. |  |
|------------------------|----------------------------------|--|
| Load Table             | Loads the table.                 |  |
| Table Edit             | Edits the table.                 |  |
| Table No. 1/2/3        | Used to select the table number. |  |
| Load Table             | Loads the table.                 |  |

3.3.3.6 Outband

3.3 Function Description

| Save Table           | Saves the table.                                |
|----------------------|---|
| Insert Line          | Used to insert a line before the selected line. |
| Delete Line          | Used to delete the selected line.               |
| Table Init           | Used to initialize the table                    |
| Average Times ON/OFF | Used to set the averaging count                 |

Config

**Parameter Setup** 

Used to set measurement parameters.

|                  |     | Para   | meter Setu | up          |  |
|------------------|-----|--------|------------|-------------|--|
| Detector         | :   | Normal | POSI       | NEGA SAMPLE |  |
| Peak MKR Y Delta | a : | 1.0 di | v          |             |  |
| Display Unit     | :   | dBm    | W          | dBµV        |  |
| Judgment         | :   | ON     | OFF        |             |  |
| Preselector      | :   | 1.66   | 3.66       | ]           |  |

### Figure 3-17 Parameter Setup Dialog Box

| Detector       | NORMAL/POSI/NEGA/SAMPLE Used to set the detector.  |  |  |
|----------------|--|--|--|
| Peak MKR Y De  | <i>Ita</i> Used to set the Y delta of a peak marker.   |  |  |
| Display Unit   | $dBm/W/dB\mu V$ Used to set the display unit.  |  |  |
| Judgment       | Makes the Pass/Fail judgment using the limit values set by Table Edit.   |  |  |
| Preselector    | Used to set the preselector.   |  |  |
|                | NOTE: This selection is displayed on R3267 only.   |  |  |
|                | 1.6G: Used to measure harmonics of more than 1.6 GHz or spurious signals when the carrier frequency is lower than 1.6 GHz. |  |  |
|                | 3.6G: Set this parameter for cases other than that above.  |  |  |
| Set to Default | Returns the set value to the default.  |  |  |

### 3.3.4 Modulation

Describes the modulation analysis menu using a DSP.

## 3.3.4.1 Waveform Quality

Used to measure the waveform quality ( $\rho$ ), frequency error, and modulation accuracy of non-code-multiplexed signals.

Auto Level Set

This is used to automatically set the reference level. Level adjustment is made only when this key is pressed.

*NOTE: The signal level must remain constant while Auto level Set is being executed.* 

Graphics

Used to display the menu associated with graphics display.

Used to set the starting chip to execute the graphics display.

Used to display a graph of 128 chips from the set chip.

Display Start

Select Type

Open the graphics selection window.

| Graphic Type of Analysis              |
|---------------------------------------|
| Constellation                         |
| Constellation(Line)                   |
| Constellation(Dot)                    |
| Constellation(Line & Dot)             |
| I EYE Diagram                         |
| Q EYE Diagram                         |
| I/Q EYE Diagram                       |
| Null Offset Constellation             |
| Null Offset Constellation(Line)       |
| Null Offset Constellation(Dot)        |
| Null Offset Constellation(Line & Dot) |
| Null Offset I EYE Diagram             |
| Null Offset Q EYE Diagram             |
| Null Offset I/Q EYE Diagram           |
| E.V.M. vs Chip                        |
| Mag Error vs Chip                     |
| Phase Error vs Chin                   |

Figure 3-18 Select Type Dialog Box

| Parameter Setup       | Used to set parameters used for measuring.   |                                  |  |  |
|-----------------------|--|----------------------------------|--|--|
|                       | Parameter Setup  |                                  |  |  |
|                       | Meas Mo<br>Meas Ra   | nde<br>Inge                      | E PILOT NON ZERO   |  |
|                       | ₹ Offse  | et .                             | : DEFAULT USER   |  |
|                       | τ  |                                  |  |  |
|                       | Equaliz<br>PN Offe   | ing Filter<br>at Search Mo       |  |  |
|                       | PN Offs  | et                               |  |  |
|                       | Trigger  | Source                           | : INT EXT  |  |
|                       |  |                                  |  |  |
|                       | EXT T  | rigger Slope<br>rigger Delay     | · • • • • • • • • • • • • • • • • • • •  |  |
|                       | Freq Me  | as Range                         | NORHAL EXPAND  |  |
|                       | <b>E!</b>  | 2 10 D                           |  |  |
|                       | Figure .   | 3-19 Para                        | meter Setup Dialog Box   |  |
| Meas Mode             | Used to  | select the                       | measurement mode.  |  |
|                       | PILOT:   |                                  | Used to measure a signal with data of all zeros (pilot signal).  |  |
|                       | NON ZI   | ERO:                             | This mode can measure a signal with data of non-zeros, but cannot measure a $\tau$ .   |  |
| Meas Range            | Enters the measurement range in chips.   |                                  |  |  |
|                       | and whe  | nk is set i<br>en link is s      | to Forward in the Setup STD menu, set $64 \times N$ , et to Reverse, set the range in chips.   |  |
| τ Offset              | Corrects the delay between the external trigger and the head of PN signal in the measurement path. |                                  | between the external trigger and the head of the neasurement path.   |  |
|                       | DEFAU  | ILT:                             | Used to set internal correction values.  |  |
|                       | USER:  |                                  | Enters the correction value.   |  |
| τ                     | Used to  | set the co                       | rrection value.  |  |
| Equalizing Filter     | Used to<br>to ON w<br>ter.   | set the eq<br>while the B        | ualizing filter to ON or OFF. Set this parameter TS output is passing through the equalizing fil-                                    |  |
| PN Offset Search Mode |  |                                  |  |  |
|                       | ON:  | Used to<br>the rela<br>Offset o  | search the captured signal for PN Offset when<br>tionship between the external trigger and PN<br>f the input signal is undetermined. |  |
|                       | OFF:   | Used to<br>tween th<br>signal is | e set the PN Offset when the relationship be-<br>ne external trigger and PN Offset of the input<br>determined in advance.            |  |
| PN Offset             | Used to  | set the sy                       | nchronization position of PN.  |  |

NOTE: This parameter can be set only when PN Offset Search Mode is set to OFF.

### **Trigger** Source

|                      | INT:  | Used to capture data using internal timing.   |
|----------------------|---|---|
|                      | EXT:  | Used to capture data in sync with the external trigger.   |
|                      | INTRVL (EXT):   | The built-in counter generates triggers every 26.6 milliseconds. The built-in counter is in sync with the external trigger.     |
|                      | INTRVL:   | The built-in counter generates triggers every 26.6 milliseconds. The built-in counter is not in sync with the external trigger. |
| EXT Trigger Slope    | Used to set the ri  | se and fall times of the external trigger.  |
| EXT Trigger Delay    | Corrects the delay time when the signal (the head of PN) lags behind the external trigger.  |   |
| Freq Meas Range      | Set whether or not to expand the estimated frequency range for measurement.   |   |
|                      | NORMAL:   | Does not expand the measurement range of a frequency error.   |
|                      | NOTE: Use this mode when signals exist in the adjacent channels, or<br>when measuring a signal including a large number of noise<br>components. |   |
|                      | EXPAND:   | Expands the estimated range of a frequency error.   |
| Average Times ON/OFF | Used to set the av  | veraging count.   |

## 3.3.4.2 Code Domain Power

Used to measure power, a time alignment error  $(\tau)$ , and a phase difference for each Walsh channel.

Auto Level Set

Used to automatically set the reference level. Level adjustment is made only when this key is pressed.

*NOTE: The signal level must be constant while Auto Level Set is being executed.* 

|         | Y Scale : p                                    | POWER T PHASE   |
|---------|--|---|
|         | 1/dix  | / 0.5/div 0.25/div  |
|         | Figure 3-20 Sca                                | le Setup Dialog Box   |
| Format  |  |   |
|         | GRAPH:   | Used to display data using a bar graph.   |
|         | TABLE:   | Used to display data in table format.   |
|         | NUMERIC:                                       | Used to display a frequency error and others in numeric values.   |
| Display |  |   |
|         | SINGLE:  | Used to display a single screen.  |
|         | DUAL:  | Used to display two screens: a graph screen and a numeric screen.   |
| Y Scale | ρ/POWER/τ/PH<br>When the NORM<br>and POWER car | IASE Used to select which data to display.<br>MAL mode is selected in Parameter Setup, only ρ<br>n be selected. |
| Y/div   | Used to select th                              | ne vertical axis scale of graphic display.  |

Scale Setup

Used to set the display screen.

Display : SINGLE DUAL

Format : GRAPH TABLE NUMERIC

Scale Setup

| Parameter Setup   | Used to set param  | neters for measurement.   |
|-------------------|--|---|
|                   | Paramete         Meas       Mode         Meas       Range       [ $\tau$ [       [ $\tau$ [       [         Equalizing Filter       [         Threshold       [         PN Offset       [         PN Offset       [         EXT Trigger Source       [         EXT Trigger Delay       [         Phase Unit       :         Power Unit       :         Freq Meas Range       : | r Setup<br>PRECISE NURMAL<br>20 (1280chip)<br>DEFAULT USER<br>0N OFF<br>-25 dB<br>0N OFF<br>-25 dB<br>1HT EXT<br>1HT EXT<br>1HTRVL(EXT) INTRVL<br>4 -<br>0.000 chip<br>degree n rad<br>dBm M<br>NRMAL EXPAND          |
| Meas Mode         | <b>Figure 3-21 Para</b><br>Used to select the  | ameter Setup Dialog Box   |
|                   | PRECISE:   | Used to measure the time alignment error and phase error in addition to the $\rho$ and power ratio for each channel at the same time.   |
|                   | NORMAL:  | Used to measure the $\boldsymbol{\rho}$ and power ratio for each channel.   |
| Meas Range        | Enters the measure $\times$ N.   | rement range in chips. Enters the range using 64  |
| τ Offset          | Corrects the delay<br>PN signal in the r   | between the external trigger and the head of the neasurement path.  |
|                   | DEFAULT:   | Used to set internal correction values.   |
|                   | USER:  | Enters the correction value.  |
| τ                 | Used to set the co   | prrection value.  |
| Equalizing Filter | Used to set the eq<br>to ON while the H<br>ter.  | ualizing filter to ON or OFF. Set this parameter<br>3TS output is passing through the equalizing fil-   |
| Threshold         | Used to set the th<br>the PRECISE mo<br>and lower than th<br>reference for judg<br>the $\tau$ measurement  | reshold of demodulation during measurement in<br>ode. Set the threshold higher than a noise floor<br>e signal. In addition, this parameter is used as a<br>ging whether or not there is a signal or a noise in<br>nt. |

| PN Offset Search Mode |                                       |  |  |  |
|-----------------------|---------------------------------------|--|--|--|
|                       | ON: Used to<br>the rela<br>Offset o   | o search the captured signal for PN Offset when<br>ationship between the external trigger and PN<br>of the input signal is undetermined. |  |  |
|                       | OFF: Used to<br>tween to<br>signal i  | o set the PN Offset when the relationship be-<br>the external trigger and PN Offset of the input<br>s determined in advance.             |  |  |
| PN Offset             | Used to set the sy                    | nchronization position of PN.  |  |  |
|                       | NOTE: This paran<br>is set to Ol      | neter can be set only when PN Offset Search Mode<br>FF.  |  |  |
| Trigger Source        |                                       |  |  |  |
|                       | INT:                                  | Used to capture data using internal timing.  |  |  |
|                       | EXT:                                  | Used to capture data in synchronization with the external trigger.   |  |  |
|                       | INTRVL (EXT):                         | The built-in counter generates triggers every 26.6 milliseconds. The built-in counter is in sync with the external trigger.              |  |  |
|                       | INTRVL:                               | The built-in counter generates triggers every 26.6 milliseconds. The built-in counter is not in sync with the external trigger.          |  |  |
| EXT Trigger Slope     | Used to set the ri                    | Used to set the rise and fall times of the external trigger.   |  |  |
| EXT Trigger Delay     | Corrects the delay hind the external  | Corrects the delay time when the signal (the head of PN) lags behind the external trigger.   |  |  |
| Phase Unit            | Used to set a unit the pilot signal a | when measuring the phase differences between ad other channels.  |  |  |
|                       | degree: Used to                       | o display a phase difference in degrees.   |  |  |
|                       | m rad: Used to                        | display a phase difference in milliradians.  |  |  |
| Power Unit            | Used to set a uni channel.            | t of dBm or W when displaying power for each   |  |  |

| Freq Meas Range      | Set whether or not to expand the estimated frequency range for measurement.  |  |  |
|----------------------|--|--|--|
|                      | NORMAL:  | Does not expand the measurement range for a frequency error. |  |
|                      | NOTE: Use this mode when signals exist in the adjacent channels, or<br>when measuring a signal including a large number of noise<br>components.                                    |  |  |
|                      | EXPAND:  | Expands the estimated range of a frequency error.            |  |
| Marker Setup         | Paging Ch / Traffic Ch Used to display the pilot signal and relative values of paging channel and traffic channel under the graph screen. Used to select which channel to display. |  |  |
| Average Times ON/OFF | Used to set the av   | eraging count.   |  |

3.3 Function Description

## 3.3.4.3 Tx Power

Used to measure power and a peak factor.

Auto Level Set

Used to automatically set the reference level. Level adjustment is made only when this key is pressed.

*NOTE: The signal level must be constant while Auto level Set is being executed.* 

Parameter Setup

Used to set parameters used for measuring.

| Parameter Setup     |                     |  |  |  |
|---------------------|---------------------|--|--|--|
| Trigger Source :    | INT EXT INTRVL(EXT) |  |  |  |
| EXT Trigger Slope : | + –                 |  |  |  |
| EXT Trigger Delay : | 0.000 chip          |  |  |  |
| Meas Filter :       | NARROW              |  |  |  |

#### Figure 3-22 Parameter Setup Dialog Box

| Trigger Source |  |   |
|----------------|--|---|
|                | INT:   | Used to capture data using internal timing.   |
|                | EXT:   | Used to capture data in sync with the external trigger.   |
|                | INTRVL (EXT):  | The built-in counter generates triggers every 26.6 milliseconds. The built-in counter is in sync with the external trigger. |
| Trigger Slope  | Used to set the ris  | e and fall times with the external trigger.   |
| Trigger Delay  | Corrects the signa   | l delay time to the external trigger.   |
| Meas Filter    | Used to select the band of the receiving filter.<br>This selection is possible only when Link is set to Forward in Set-<br>up STD. When Link is set to REVERSE, the filter band is fixed to<br>WIDE.   |   |
|                | NARROW:  | Select the receiving filter whose pass band-<br>width is almost the same as that of the transmit-<br>ted signal.            |
|                | NOTE: Select this provide the select the sel | parameter when signals exist in the adjacent chan-  |

3.3 Function Description

Since the band of the filter is narrow, the measured value of power is less than the measured value of the power meter.
WIDE: Used to select a filter band wider than the transmission signal band. Even when the transmission signal includes a frequency error, the value close to that measured by the power meter can be measured.

Average Times ON/OFF

Used to set the averaging count.

## 3.3.5 STD

Used to display menus used for setting signals and channel numbers.

## 3.3.5.1 Setup STD

Used to set the frequency band, direction, chip rate of the measurement signal.

| STD Measurement Parameter Set |  |  |  |
|-------------------------------|--|--|--|
| Туре                          | : CDMA(800MHz) CDMA(1.8GHz) CDMA(1.9GHz) |  |  |
|                               | JAPAN(800MHz) CHINA(800MHz)              |  |  |
| Link                          | FORWARD REVERSE                          |  |  |
| Rate                          | : 9600/14400 4800/7200                   |  |  |
|                               | 2400/3600 1200/1800                      |  |  |
| Offset Level                  | : 0.0 dB                                 |  |  |
| Frequency Input               | : FREQUENCY CHANNEL                      |  |  |
| Input                         | : RF BASEBAND(1&Q)                       |  |  |
| Baseband Input                | : AC DC                                  |  |  |
| IQ Inverse                    | : NORMAL INVERSE                         |  |  |
| Cont Auto Level Set           | : ON OFF                                 |  |  |
|                               |  |  |  |
|                               |  |  |  |
|                               |  |  |  |
|                               |  |  |  |
|                               |  |  |  |
|                               |  |  |  |

#### Figure 3-23 STD Set Dialog Box

| Туре         | CDMA (800 MHz)/CDMA (1.8 GHz)/CDMA (1.9 GHz)/JAPAN (800 MHz)/CHINA (800 MHz):   |  |
|--------------|---|--|
|              | Used to select the  | e frequency band of the measurement signal.  |
|              | The standard valutermined by this   | ae and the band for spurious measurement are de-<br>selection.   |
|              | In addition, this s<br>the channel num  | selection is used to calculate the frequency using per.  |
| Link         | Used to set the di  | irection of the measurement signal.  |
|              | FORWARD:  | Used to measure the signal from the BTS.   |
|              | REVERSE:  | Used to measure the signal from the MS (ter-<br>minal).  |
| Rate         | The transfer rate<br>The analyzer det<br>burst. When the r<br>gated sweep in th<br>Tx Power measur<br>er, after searching | must be set, when Link is set to REVERSE.<br>termines whether or not the measured signal is<br>measured signal is a burst, the analyzer starts the<br>he F-Domain Power measurement mode. In the<br>rement mode, the analyzer measures the Tx Pow-<br>g for a burst. |
| Offset Level | This parameter ca<br>in the range of ±  | an set the offset value of the reference level with-<br>100 dB. Used to display the power to which the   |

|                     | offset value is added.  |   |  |
|---------------------|---|---|--|
| Frequency Input     | Sets whether or not a frequency or a channel number is used to in-<br>put the center frequency of the instrument.   |   |  |
| Input               | Set the input path of a signal.   |   |  |
|                     | RF:   | Used to set the RF connector to Input.  |  |
|                     | BASEBAND  | <ul> <li>Q (I &amp; Q):<br/>Used to set the I and Q connectors on the rear<br/>panel to Input.</li> <li>Code Domain Power, Waveform Quality, and<br/>Tx Power can be analyzed using the Baseband<br/>IQ input. For Tx Power, only relative power is<br/>displayed.</li> </ul> |  |
| Baseband Input      | Selects the co<br>only  | oupling of signals. Effective for BASEBAND(I & Q)   |  |
|                     | AC:   | Sets an alternate current coupling. (A cutoff frequency is approx. 15 Hz)   |  |
|                     | DC:   | Sets a direct current coupling.   |  |
| IQ Inverse          | Used to set the phases I and Q.   |   |  |
|                     | NORMAL:<br>The phases I and O do not change.  |   |  |
|                     | INVERSE:  |   |  |
|                     | The phases I and Q are inverted.  |   |  |
| Cont Auto Level Set | Used to select ON or OFF from the mode which automatical sets the internal reference level (REF LEVEL) to an optimum value in accordance with the measurement signal. |   |  |
|                     | ON: Used to automatically set the reference level to an optimum value. Always check the level before startin measurement and set an optimum value.                    |   |  |
|                     | OFF: The ma   | e reference level is fixed at the set level. Set the level<br>nually or using "Auto Level Set" soft key.  |  |
|                     | NOTE: The input signal level must remain constant while executher the auto ranging.   |   |  |

## 3.3.5.2 Channel Setting

Used to set the relationship between the channel number and frequency.

*Copy from STD* Used to copy the values specified by the standard to the channel number and frequency editor.

## 3.3.5.3 DC CAL

Corrects direct current components inside the circuit.

4.1 GPIB Command Index

# **4 REMOTE CONTROL**

## 4.1 GPIB Command Index

This GPIB command index can be used as the index for Chapter 4.

| *CLS  | GPIB Command Key    | Reference Pages | CDPPNOFS    | 4-35 |
|---|---------------------|-----------------|-------------|------|
| *ESE       441       CDPRHO.       4-36         *ESR       441       CDPUNT UBM.       4-35         *IDN       4-41       CDPUNT VW.       4-35         *RST       4-41       CDPUNT WW.       4-35         *STB       4-41       CEQFLT OFF.       4-34         *STB       4-41       CEQFLT ON       4-34         *Government       4-40       CF       4-41         Cupert       4-40       CFMT GRP.       4-33         AA       4-41       CFMT TBL       4-33         ALS OFF.       4-11       CFRRNG NORM       4-35         AS       4-41       CFMT TBL       4-33         ALS OFF.       4-11       CFRRNG NORM       4-35         AS       4-41       CFMT RNORM       4-35         AS       4-47       CHEDFR1       4-10         AT       4-7       CHEDFR2       4-10         ATMIN       4-7       CHEDFR2       4-10         ATMIN OFF       4-7       CHEDRV1       4-10         AUTOUVL       4-31, 4-33, CHEDRV2       4-10         AUTOWFL       4-11       CHTBL1 DSBL       4-11         BBINPUT AC       4-11   | *CLS                | 4-41            | CDPRES      | 4-35 |
| *ESR       4-41       CDPTAU       4-35         *IDN       4-41       CDPUNT DBM       4-35         *RST       4-41       CDPUNT W       4-35         *SRE       4-41       CEQFLT OFF       4-34         *STB       4-41       CEQFLT ON       4-34         *STB       4-40       CF       4-83         AA       4-40       CFMT GRP       4-33         AA       4-7       CFMT NUM       4-33         AD       4-41       CFMT NUM       4-33         ALS OFF       4-11       CFRRNG EXP       4-35         ALS ON       4-11       CFRRNG NORM       4-35         AS  | *ESE                | 4-41            | CDPRHO      | 4-36 |
| *IDN  | *ESR                | 4-41            | CDPTAU      | 4-35 |
| *RST       4-41       CDPUNT W       4-35         *SRE       4-41       CEQFLT OFF       4-34         *STB       4-40       CF       4-34   | *IDN                | 4-41            | CDPUNT DBM  | 4-35 |
| *SRE       4-41       CEQFLT OFF       4-34         *STB       4-41       CEQFLT ON       4-34         *STB       4-40       CF       4-33         AA       4-7       CFMT GRP       4-33         AA       4-7       CFMT NUM       4-33         AD       4-41       CFMT TBL       4-33         AD       4-41       CFMT TBL       4-35         ALS OFF       4-11       CFRRNG NORM       4-35         ALS ON       4-11       CFRRNG NORM       4-35         AS       4-8       CH       4-10         ATININ       4-7       CHEDFR1       4-10         ATMIN OFF       4-7       CHEDFR2       4-10         ATMIN ON       4-7       CHEDRV1       4-10         AUTOUVL       4-31, 4-33, CHEDRV2       4-10         AUTOWFL       4-11, 4-15       CHEDRV3       4-10         AUTOWFL       4-11       CHEDRV1       4-11         BBINPUT AC       4-11       CHTBL1 DSBL       4-11         CAVGAT       4-10       CHTBL2 DSBL       4-11         CAVGCDP       4-35       CHTBL3 DSBL       4-11         CAVGGDP       4-35       <   | *RST                | 4-41            | CDPUNT W    | 4-35 |
| *STB       4-41       CEQFLT ON       4-34  | *SRE                | 4-41            | CEQFLT OFF  | 4-34 |
| 440       CF  | *STB                | 4-41            | CEQFLT ON   | 4-34 |
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| SPRDET POS                               | 4-28          |            |
| SPRDET SMP                               | 4-28          |            |
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| SPRJDG ON                                | 4-29          |            |
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| SPRREF MKR                               | 4-29          |            |
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| TDPMEAS         | 4-14 |
| TDPSETSTD       | 4-14 |
| TDPTMPL OFF     | 4-13 |
| TDPTMPL ON      | 4-13 |
| TDPTMPLBTM      | 4-14 |
| TDPTMPLCLR      | 4-13 |
| TDPTMPLCP       | 4-13 |
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| TDPTRGSLP RISE  | 4-12 |
| TDPTRGSRC EXT   | 4-12 |
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| TDPWDO ON      | 4-12  |      |
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| TDSDET NEG     | 4-18  |      |
| TDSDET NRM     | 4-18  |      |
| TDSDET POS     | 4-18  |      |
| TDSDET SMP     | 4-18  |      |
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| TDSJDG ON      | 4-18  |      |
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| TDSMEAS        | 4-18  |      |
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| TDSTBLF REL    | 4-17  |      |
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| TDSTRGLVL      | 4-17  |      |
| TDSTRGPOS      | 4-17  |      |
| TDSTRGSLP FALL | 4-17  |      |
| TDSTRGSLP RISE | 4-17  |      |
| TDSTRGSRC EXT  | 4-17  |      |
| TDSTRGSRC FREE | 4-17  |      |
| TDSTRGSRC IF   | 4-17  |      |
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| TDSUNIT DBUV   | 4-18  |      |
| TDSUNIT W      | 4-18  |      |
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| TGTDET NRM     | 4-19, | 4-25 |
| TGTDET POS     | 4-19, | 4-25 |
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| TGTSETUP ON    | 4-19, | 4-24 |
| TGTSRC EXT     | 4-19, | 4-25 |
| TGTSRC TRG     | 4-19, | 4-25 |
| TGTSWP OFF     | 4-20, | 4-25 |
| TGTSWP ON      | 4-20, | 4-25 |
| TGTTRG EXT     | 4-19, | 4-25 |
| TGTTRG FREE    | 4-19, | 4-24 |
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| TRGLVL           | 4-12       |
| TRGPOS           | 4-12       |
| TRGSLP FALL      | 4-12       |
| TRGSLP RISE      | 4-12       |
| TRGSRC EXT       | 4-12       |
| TRGSRC FREE      | 4-11       |
| TRGSRC IF        | 4-12       |
| TRGSRC VIDEO     | 4-12       |
| TRSPMD EXT       | 4-17       |
| TRSPMD FREE      | 4-17       |
| TRSPMD IF        | 4-17       |
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| TRSPSLP RISE     | 4-17       |
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| TTRGSLP FALL     | 4-36       |
| TTRGSLP RISE     | 4-36       |
| TTRGSRC EXT      | 4-36       |
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| VA               | 4-8        |
| VB               | 4-8        |
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| WEQFLT ON        | 4-32       |
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| WFGTYP CONDOT    | 4-37       |
| WFGTYP CONLIN    | 4-37       |
| WFGTYP CONLINDOT | 4-37       |
| WFGTYP EVM       | 4-37       |

| WFGTYP ICHEYE     | 4-37 |
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| WFGTYP ME         | 4-37 |
| WFGTYP NCON       | 4-37 |
| WFGTYP NCONDOT    | 4-37 |
| WFGTYP NCONLIN    | 4-37 |
| WFGTYP NCONLINDOT | 4-37 |
| WFGTYP NICHEYE    | 4-37 |
| WFGTYP NIQCHEYE   | 4-37 |
| WFGTYP NQCHEYE    | 4-37 |
| WFGTYP PHAERR     | 4-37 |
| WFGTYP QCHEYE     | 4-37 |
| WFIQOFS           | 4-32 |
| WFMAG             | 4-32 |
| WFMOD             | 4-33 |
| WFPHSE            | 4-32 |
| WFPNOFS           | 4-33 |
| WFQUA             | 4-32 |
| WFRHO             | 4-32 |
| WFRRNG EXP        | 4-32 |
| WFRRNG NORM       | 4-32 |
| WFTAU             | 4-32 |
| WMMOD NZERO       | 4-31 |
| WMMOD PILOT       | 4-31 |
| WMRNG             | 4-31 |
| WPNMOD OFF        | 4-32 |
| WPNMOD ON         | 4-32 |
| WPNOFS            | 4-32 |
| WTOFS DFLT        | 4-31 |
| WTOFS USER        | 4-31 |
| WTOFSDT           | 4-31 |
| WTRGDLY           | 4-32 |
| WTRGSLP FALL      | 4-32 |
| WTRGSLP RISE      | 4-32 |
| WTRGSRC EXT       | 4-32 |
| WTRGSRC INT       | 4-32 |
| WTRGSRC INTRVL1   | 4-32 |
| WTRGSRC INTRVL2   | 4-32 |
|                   |      |

## 4.2 GPIB Command Codes

The following table list the GPIB commands by function.

|                     | Function                                 | Listener Code              | Talker Request |   |
|---------------------|--|----------------------------|----------------|---|
|                     | Tunetion                                 | Listener Code              | Code           | Output Format   |
| Operating mode      | Spectrum analyzer mode<br>TRANSIENT mode | SETFUNC CW<br>SETFUNC TRAN | SETFUNC?       | <ul><li>0: Spectrum analyzer</li><li>1: TRANSIENT</li></ul> |
| Communi-            | WCDMA mode                               | COMMSYS WCDMA              | COMMSYS?       | 1:WCDMA   |
| cation<br>system *1 | IS-95 mode                               | COMMSYS IS95               |                | 2:IS-95   |
|                     | PDC mode                                 | COMMSYS PDC                |                | 3:PDC   |
|                     | PHS mode                                 | COMMSYS PHS                |                | 4:PHS   |
|                     | IS-136 mode                              | COMMSYS IS136              |                | 5:IS-136  |

### Table 4-1 Operating Mode

\*1: Lisnter code is available only when the analyzer is set to the CW mode. The codes within the talker request are avalable for both the CW and TRANSIENT modes.

### Table 4-2 ATT Key (Attenuator)

|            | Function           | Listener Code             | 1        | alker Request     |
|------------|--------------------|---------------------------|----------|-------------------|
| Function   |                    | Listener Code             | Code     | Output Format     |
| Attenuator | AT                 | AT *                      | AT?      | Level             |
|            | ATT AUTO           | АА                        | AA?      | 0: MNL<br>1: AUTO |
|            | Min. ATT           | ATMIN *                   | ATMIN?   | Level             |
|            | Min. ATT ON<br>OFF | ATMIN ON [*]<br>ATMIN OFF | ATMINON? | 0: OFF<br>1: ON   |

#### Table 4-3 COPY Key (Hard Copy)

| Function        |                          | Listener Code | Т    | alker Request |
|-----------------|--------------------------|---------------|------|---------------|
|                 |                          | Listener Code | Code | Output Format |
| Printer or file |                          |               |      |               |
| output          | Execution of the command | НСОРҮ         | -    | -             |

|          | Function        | Listener Code Talker |            | alker Request     |
|----------|-----------------|----------------------|------------|-------------------|
| Function |                 | Eistener Code        | Code       | Output Format     |
| Couple   | RBW             | RB *                 | RB?        | Frequency         |
| function | RBW AUTO        | BA                   | BA?        | 0: MNL<br>1: AUTO |
|          | VBW             | VB *                 | VB?        | Frequency         |
|          | VBW AUTO        | VA                   | VA?        | 0: MNL<br>1: AUTO |
|          | Sweep Time      | SW *<br>ST *         | SW?<br>ST? | Time              |
|          | Sweep Time Auto | AS                   | AS?        | 0: MNL<br>1: AUTO |

## Table 4-4 COUPLE Key (Couple Function)

## Table 4-5 FREQ Key (Frequency)

| Function  |                  | Listener Code | T    | alker Request |
|-----------|------------------|---------------|------|---------------|
|           |                  | Listener Code | Code | Output Format |
| Frequency | Center frequency | CF *          | CF?  | Frequency     |
|           | Start frequency  | FA *          | FA?  | Frequency     |
|           | Stop frequency   | FB *          | FB?  | Frequency     |

## Table 4-6 LEVEL Key

| Function           |                 | Listener Code | Т    | alker Request |
|--------------------|-----------------|---------------|------|---------------|
|                    |                 | Listener Code | Code | Output Format |
| Reference<br>level | Reference level | RL *          | RL?  | Level         |

|          | Function  | Listener Code     | Та   | lker Request               |
|----------|---|-------------------|------|----------------------------|
| Function |   | Eistener Code     | Code | Output Format              |
| Marker   | ∆Marker ON  | MKD [*]           | -    | Frequency (Time)           |
|          | OFF   | MKOFF<br>MO       | -    | -                          |
|          | Reading marker frequency (time)                     | -                 | MF?  | Frequency (Time)           |
|          | Reading marker level                                | -                 | ML?  | Level                      |
|          | Reading marker frequency (time)<br>and marker level | -                 | MFL? | Frequency (Time),<br>Level |
|          | Normal marker                                       | MK [*]<br>MKN [*] | -    | Frequency (Time)           |
|          | Peak search   | PS                | -    | -                          |

#### Table 4-7 MKR key

### Table 4-8 PRESET Key(Initialization)

| Function |                   | Listener Code | Та   | lker Request  |
|----------|-------------------|---------------|------|---------------|
|          |                   | Listener Code | Code | Output Format |
| Preset   | Instrument preset | IP            | -    | -             |

## Table 4-9 RCL Key (Reading Data)

| Function |  | Listener Code             | Г | alker Request                           |
|----------|--|---------------------------|---|---|
|          |  | Code                      |   | Output Format                           |
| Recall   |  | RC REG_nn<br>RC file name | - | nn: 01 to 10<br>file name:Max 8 strings |

#### Table 4-10 SAVE Key (Saving Data)

| Function |          | Listener Code               | Та   | lker Request                            |
|----------|----------|-----------------------------|------|---|
|          |          | Eistener Code               | Code | Output Format                           |
| Save     | Save     | SV REG_nn<br>SV file name   | -    | nn: 01 to 10<br>file name:Max 8 strings |
|          | Deletion | DEL REG_nn<br>DEL file name | -    | nn: 01 to 10<br>file name:Max 8 strings |

### Table 4-11 SPAN Key (Frequency Span)

| Function       | Listener Code  | Ta   | alker Request |
|----------------|----------------|------|---------------|
| T unction      | Ensteller Code | Code | Output Format |
| Frequency span | SP *           | SP?  | Frequency     |

| Function |                        | Listener Code         | Talker Request |                             | Remarks   |
|----------|------------------------|-----------------------|----------------|-----------------------------|-----------|
|          |                        |                       | Code           | Output Format               | Kelliarks |
| STD      | Communication System   |                       |                |                             |           |
| Setup    | 800MHz band            | MODTYP CDMA800M       | MODTYP?        | 0:CDMA<br>(800MHz band)     |           |
|          | 1.8GHz band            | MODTYP CDMA1700M      |                | 1:CDMA<br>(1.8GHz band)     |           |
|          | 1.9GHz band            | MODTYP CDMA1900M      |                | 2:CDMA<br>(1.9GHz band)     |           |
|          | Japan                  | MODTYP CDMAJA-<br>PAN |                | 3:CDMA (JAPAN)              |           |
|          | China                  | MODTYP<br>CDMACHINA   |                | 4:CDMA (CHINA)              |           |
|          | Link                   |                       |                |                             |           |
|          | FORWARD                | LINK FWD              | LINK?          | 0:FORWARD                   |           |
|          | REVERSE                | LINK REV              |                | 1:REVERSE                   |           |
|          | Transfer rate          |                       |                |                             |           |
|          | 9600/14400             | RATE9600              | RATE?          | 0:9600/14400                |           |
|          | 4800/7200              | RATE4800              |                | 1:4800/7200                 |           |
|          | 2400/3600              | RATE2400              |                | 2:2400/3600                 |           |
|          | 1200/1800              | RATE1200              |                | 3:1200/1800                 |           |
|          | Offset Level           | RO *                  | RO?            | Level                       |           |
|          | Frequency setting mode |                       |                |                             |           |
| 1        | Frequency entry mode   | FINPMD FREQ           | FINPMD?        | 0:Frequency                 |           |
| 1        | Channel entry mode     | FINPMD CHL            |                | 1:Channel input             |           |
|          | Channel setting        | CH *                  | CH?            | Integer<br>(Channel number) |           |
| l        | Channel Edit           |                       |                |                             |           |
|          | Input #1 (FORWARD)     | CHEDFR1 *,*,*,*,*     | CHEDFR1?       | ch1,ch2,f1,f2,chof          |           |
|          | Input #2 (FORWARD)     | CHEDFR2 *,*,*,*,*     | CHEDFR2?       | ch1,ch2,f1,f2,chof          |           |
|          | Input #3 (FORWARD)     | CHEDFR3 *,*,*,*,*     | CHEDFR3?       | ch1,ch2,f1,f2,chof          |           |
|          | Input #1 (REVERSE)     | CHEDRV1 *,*,*,*,*     | CHEDRV1?       | ch1,ch2,f1,f2,chof          |           |
|          | Input #2 (REVERSE)     | CHEDRV2 *,*,*,*,*     | CHEDRV2?       | ch1,ch2,f1,f2,chof          |           |
|          | Input #3 (REVERSE)     | CHEDRV3 *,*,*,*,*     | CHEDRV3?       | ch1,ch2,f1,f2,chof          |           |

| Function |  | Listener Code  | Ta         | Remarks               |                         |
|----------|--|----------------|------------|-----------------------|-------------------------|
|          |  |                | Code       | Output Format         | Kelliarks               |
| STD      |  |                |            | ch1:Start channel no. |                         |
| Setup    |  |                |            | ch2:Stop channel no.  |                         |
| 1        |  |                |            | f1:Base freqency(Hz)  | Units of                |
| ĺ        |  |                |            | f2:Channel space(Hz)  | frequency<br>are neces- |
| 1        |  |                |            | chof:Channel offset   | sary for f1             |
|          | Selection of ENABLE or DISABLE for channel table |                |            |                       | and t2.                 |
|          | #1 ENABLE  | CHTBL1 ENBL    | CHTBL1?    | 0:Disable             | !                       |
|          | DISABLE  | CHTBL1 DSBL    |            | 1:Enable              |                         |
|          | #2 ENABLE  | CHTBL2 ENBL    | CHTBL2?    | 0:Disable             |                         |
|          | DISABLE  | CHTBL2 DSBL    |            | 1:Enable              | !                       |
|          | #3 ENABLE  | CHTBL3 ENBL    | CHTBL3?    | 0:Disable             |                         |
|          | DISABLE  | CHTBL3 DSBL    |            | 1:Enable              |                         |
|          | Channel<br>Copy from STD                         | CHSETSTD       |            |                       |                         |
|          | Input  |                |            |                       |                         |
|          | RF   | INPUT RF       | INPUT?     | 0:RF                  |                         |
|          | Baseband(I&Q)                                    | INPUT IQ       |            | 1:Baseband(I&Q)       |                         |
|          | BaseBand Input                                   |                |            |                       |                         |
|          | AC   | BBINPUT AC     | BBINPUT?   | 0:AC                  |                         |
|          | DC   | BBINPUT DC     |            | 1:DC                  |                         |
|          | IQ Inverse                                       |                |            |                       |                         |
|          | NORMAL   | IQMD NORM      | IQMD?      | 0:NORMAL              |                         |
|          | INVERSE  | IQMD INV       |            | 1:INVERSE             |                         |
|          | Auto Level setting                               |                |            |                       |                         |
|          | Auto Level OFF                                   | ALS OFF        | ALS?       | 0:OFF                 |                         |
|          | Auto Level ON                                    | ALS ON         |            | 1:ON                  |                         |
|          | DC CAL   | CLDC           |            |                       | <u> </u>                |
| T-Domain | Auto Level Set                                   | AUTOWFL        |            |                       |                         |
| Power    |  | TDPAUTOLVL     |            |                       |                         |
|          | Trigger Setup                                    |                |            |                       |                         |
|          | Trigger Source                                   |                |            |                       |                         |
|          | FREERUN  | TRGSRC FREE    | TRGSRC?    | 0:FREERUN             |                         |
|          |  | TDPTRGSRC FREE | TDPTRGSRC? | 1:VIDEO               |                         |

| Function          |                  | Listener Code   | Talker Request |                    | Remarks |
|-------------------|------------------|-----------------|----------------|--------------------|---------|
|                   |                  |                 | Code           | Output Format      | Remarks |
| T-Domain<br>Power | VIDEO            | TRGSRC VIDEO    |                | 2:IF               |         |
|                   |                  | TDPTRGSRC VIDEO |                | 3:EXT              |         |
|                   | IF               | TRGSRC IF       |                |                    |         |
|                   |                  | TDPTRGSRC IF    |                |                    |         |
|                   | EXT              | TRGSRC EXT      |                |                    |         |
|                   |                  | TDPTRGSRC EXT   |                |                    |         |
|                   | Trigger Slope    |                 |                |                    |         |
|                   | +                | TRGSLP RISE     | TRGSLP?        | 0:-                |         |
|                   |                  | TDPTRGSLP RISE  | TDPTRGSLP?     | 1:+                |         |
|                   | -                | TRGSLP FALL     |                |                    |         |
|                   |                  | TDPTRGSLP FALL  |                |                    |         |
|                   | Trigger Level    | TRGLVL *        | TRGLVL?        | Integer (0 to 100) |         |
|                   |                  | TDPTRGLVL *     | TDPTRGLVL?     |                    |         |
|                   | Trigger Position | TRGPOS *        | TRGPOS?        | Integer (0 to 100) |         |
|                   |                  | TDPTRGPOS *     | TDPTRGPOS?     |                    |         |
|                   | Trigger Delay    |                 |                |                    | -       |
|                   |                  | TRGDT *         | TRGDT?         | Time               |         |
|                   |                  | TDPTRGDT *      | TDPTRGDT?      |                    |         |
|                   | Window Setup     |                 |                |                    |         |
|                   | Window           |                 |                |                    |         |
|                   | ON               | TDPWDO ON       | TDPWDO?        | 0:OFF              |         |
|                   |                  | TWDO ON         | TWDO?          | 1:ON               |         |
|                   | OFF              | TDPWDO OFF      |                |                    |         |
|                   |                  | TWDO OFF        |                |                    |         |
|                   | Window Position  | TDPWPOS *       | TDPWPOS?       | Time               | -       |
|                   |                  | TWLX *          | TWLX?          |                    |         |
|                   | Window Width     | TDPWWID *       | TDPWWID?       | Time               |         |
|                   |                  | TWDX *          | TWDX?          |                    |         |
|                   | Y Scale          |                 |                |                    |         |
|                   | 10dB/div         | TDPDIV P10DB    | TDPDIV?        | 0:10dB/div         |         |
|                   | 5dB/div          | TDPDIV P5DB     |                | 1: 5dB/div         |         |
|                   | 2dB/div          | TDPDIV P2DB     |                | 2: 2dB/div         |         |

| Function          |                           | Listener Code  | Talker Request |                             | Remarks |
|-------------------|---------------------------|----------------|----------------|-----------------------------|---------|
|                   |                           |                | Code           | Output Format               | Kemarks |
| T-Domain<br>Power | Average Times             | TDPAVG *       | TDPAVG?        | Integer<br>(1:OFF,2 to 999) |         |
|                   |                           | CAVGAT *       | CAVGAT?        | Integer<br>(1:OFF,2 to 999) |         |
|                   | Template                  |                |                |                             |         |
|                   | Template                  |                |                |                             |         |
|                   | ON                        | TDPTMPL ON     | TDPTMPL?       | 0:OFF                       |         |
|                   |                           | TLMT ON        | TLMT?          | 1:ON                        |         |
|                   | OFF                       | TDPTMPL OFF    |                |                             |         |
|                   |                           | TLMT OFF       |                |                             |         |
|                   | Template Shift            |                |                |                             |         |
|                   | Shift X                   | TDPTMPLSX *    | TDPTMPLSX?     | Time                        |         |
|                   |                           | TLMSFT *       | TLMSFT?        | Time                        |         |
|                   | Shift Y                   | TDPTMPLSY *    | TDPTMPLSY?     | Level                       |         |
|                   |                           | TLMASFT *      | TLMASFT?       | Level                       |         |
|                   | Template Edit             |                |                |                             |         |
|                   | Template<br>UP/LOW select | TDPTMPLSEL UP  | TDPTMPLSEL?    | 0:UP                        |         |
|                   |                           | TDPTMPLSEL LOW |                | 1:LOW                       |         |
|                   | Copy from STD             | TDPTMPLCP      |                |                             |         |
|                   |                           | LMCPSL STD     |                |                             |         |
|                   | Data entry                | TDPTMPLED *,*  |                | t1,11                       |         |
|                   |                           | TLMIN *,*      |                | t1:Time                     |         |
|                   |                           |                |                | l1:Level<br>(dBm/W/dBµV)    |         |
|                   | Init Table                | TDPTMPLCLR     |                |                             |         |
|                   |                           | TLMDEL         |                |                             |         |
|                   | Parameter Setup           |                |                |                             |         |
|                   | Detector                  |                |                |                             |         |
|                   | Normal                    | TDPDET NRM     | TDPDET?        | 0:Normal                    |         |
|                   | Posi                      | TDPDET POS     |                | 1:Posi                      |         |
| Function |                                     | Listener Code | Talker Request |  | Remarks  |
|----------|-------------------------------------|---------------|----------------|--|----------|
|          | Fullcuon                            |               | Code           | Output Format                                      | Kelliars |
| T-Domain | Nega                                | TDPDET NEG    |                | 2:Nega   |          |
| Power    | Sample                              | TDPDET SMP    |                | 3:Sample   |          |
|          | Display Unit                        |               |                |  |          |
|          | dBm                                 | TDPUNIT DBM   | TDPUNIT?       | 0:dBm  |          |
| 1        | W                                   | TDPUNIT W     |                | 1:W  |          |
|          | dBµV                                | TDPUNIT DBUV  |                | 2:dBµV   |          |
|          | Template Couple to<br>Power         |               |                |  |          |
|          | ON                                  | TDPTMPLPW ON  | TDPTMPLPW?     | 0:OFF  |          |
| 1        | OFF                                 | TDPTMPLPW OFF |                | 1:ON   |          |
|          |                                     |               |                |  |          |
|          | Template Limit                      | TDPTMPLBTM *  | TDPTMPLBTM?    | Level<br>(dBm/W/dBµV)                              |          |
|          | Judgement                           | 1             |                |  |          |
|          | ON                                  | TDPJDG ON     | TDPJDG?        | 0:OFF  |          |
|          | OFF                                 | TDPJDG OFF    |                | 1:ON   |          |
|          | Upper Limit                         | TDPJDGUP *    | TDPJDGUP?      | Level  |          |
|          | Lower Limit                         | TDPJDGLOW *   | TDPJDGLOW?     | Level  |          |
|          | Set toSTD                           | TDPSETSTD     |                |  |          |
|          | Starts measurement                  |               |                |  |          |
|          | T-Domain Power                      | GATEPOW       |                |  |          |
|          |                                     | TDPMEAS       |                |  |          |
|          | Starts measurement in the same mode | SI            |                |  |          |
|          | Measurement results                 |               |                |  |          |
|          | T-Domain Power                      |               | TDPMEAS?       | 11,j1  |          |
|          |                                     |               |                | l1:Level<br>(dBm/W/dBmV)                           |          |
|          |                                     |               |                | j1:Integer<br>(0:FAIL,1:PASS,<br>-1:Judgement OFF) |          |
|          |                                     |               | GATEPOW?       | 11:Level (dBm)                                     |          |

| Function |                  | Listener Code   | Talker Request |                             | Remarks   |
|----------|------------------|-----------------|----------------|-----------------------------|-----------|
|          |                  |                 | Code           | Output Format               | Kelliarks |
| ON/OFF   | Auto Level Set   | OORAUTOLVL      |                |                             |           |
| Ratio    |                  | AUTOWFL         |                |                             |           |
|          | Trigger Setup    |                 |                |                             |           |
|          | Trigger Source   |                 |                |                             |           |
|          | FREERUN          | OORTRGSRC FREE  | OORTRGSRC?     | 0:FREERUN                   |           |
|          | VIDEO            | OORTRGSRC VIDEO |                | 1:VIDEO                     |           |
|          | IF               | OORTRGSRC IF    |                | 2:IF                        |           |
| ĺ        | EXT              | OORTRGSRC EXT   |                | 3:EXT                       |           |
|          | Trigger Slope    |                 |                |                             |           |
| 1        | +                | OORTRGSLP RISE  | OORTRGSLP?     | 0:-                         |           |
| 1        | -                | OORTRGSLP FALL  |                | 1:+                         |           |
| 1        | Trigger Level    | OORTRGLVL *     | OORTRGLVL?     | Integer (0 to 100)          |           |
| 1        | Trigger Position | OORTRGPOS *     | OORTRGPOS?     | Integer (0 to 100)          | 1         |
| 1        | Trigger Delay    | OORTRGDT *      | OORTRGDT?      | Time                        |           |
|          | Window Setup     |                 |                |                             |           |
| 1        | Window           |                 |                |                             |           |
| 1        | ON               | OORWDO ON       | OORWDO?        | 0:OFF                       |           |
| 1        | OFF              | OORWDO OFF      |                | 1:ON                        |           |
| 1        | ON Position      | OORWONPOS *     | OORWONPOS?     | Time                        |           |
| 1        | ON Width         | OORWONWID *     | OORWONWID?     | Time                        |           |
| 1        | OFF Position     | OORWOFPOS *     | OORWOFPOS?     | Time                        | 1         |
| 1        | OFF Width        | OORWOFWID *     | OORWOFWID?     | Time                        |           |
| 1        | Y Scale          |                 |                |                             |           |
| 1        | 10dB/div         | OORDIV P10DB    | OORDIV?        | 0:10dB/div                  |           |
| 1        | 5dB/div          | OORDIV P5DB     |                | 1:5dB/div                   |           |
| 1        | 2dB/div          | OORDIV P2DB     |                | 2:2dB/div                   |           |
|          | Average Times    | OORAVG *        | OORAVG?        | Integer<br>(1:OFF,2 to 999) |           |

| Function |                                     | Listanan Cada | Talker Request |   | Romarks |
|----------|-------------------------------------|---------------|----------------|---|---------|
|          | Function                            | Listener Coue | Code           | Output Format   | Kemarks |
| ON/OFF   |                                     | CAVGRAT *     | CAVGRAT?       | Integer   |         |
| Ratio    |                                     |               |                | (1:OFF,2 to 999)                                      |         |
|          | Parameter Setup                     |               |                |   |         |
|          | Detector                            |               |                |   |         |
|          | Normal                              | OORDET NRM    | OORDET?        | 0:Normal  |         |
|          | Posi                                | OORDET POS    |                | 1:Posi  |         |
|          | Nega                                | OORDET NEG    |                | 2:Nega  |         |
|          | Sample                              | OORDET SMP    |                | 3:Sample  |         |
|          | Display Unit                        | 1             |                | 1   | •       |
|          | dBm                                 | OORUNIT DBM   | OORUNIT?       | 0:dBm   |         |
|          | W                                   | OORUNIT W     |                | 1:W   |         |
|          | dBµV                                | OORUNIT DBUV  |                | 2:dBµV  |         |
|          | Judgement                           |               |                |   |         |
|          | ON                                  | OORJDG ON     | OORJDG?        | 0:OFF   |         |
|          | OFF                                 | OORJDG OFF    |                | 1:ON  |         |
|          | Upper Limit                         | OORJDGUP *    | OORJDGUP?      | Level   |         |
|          | Set to STD                          | OORSETSTD     |                |   | 1       |
|          | Starts measurement                  |               |                |   |         |
|          | ON/OFF Ratio                        | OORMEAS       |                |   |         |
|          |                                     | RATIO         |                |   |         |
|          | Starts measurement in the same mode | SI            |                |   |         |
|          | Measurement results                 |               |                |   |         |
|          | ON/OFF Ratio                        |               | OORMEAS?       | 11,12,d1,j1   |         |
|          |                                     |               |                | l1:ON Level<br>(dBm/W/dBµV)                           |         |
|          |                                     |               |                | l2:OFF Level<br>(dBm/W/dBµV)                          |         |
|          |                                     |               |                | d1:ON/OFF Ratio (dB)                                  |         |
|          |                                     |               |                | j1:Integer<br>(0:FAIL,1:PASS,<br>-1:Judgement<br>OFF) |         |
|          |                                     |               | RATIO?         | d1,11   |         |

| Function |                          | Listener Code  | Talker Request |                      | Remarks  |
|----------|--------------------------|----------------|----------------|----------------------|----------|
|          | Punction                 | Listener Code  | Code           | Output Format        | Kennarks |
| ON/OFF   |                          |                |                | d1:ON/OFF Ratio (dB) |          |
| Ratio    |                          |                |                | 11:Gated Power (dBm) |          |
| T-Domain | Auto Level Set           | TDSAUTOLVL     |                |                      |          |
| Spurious | Trigger Setup            |                |                |                      |          |
|          | Trigger Source           |                |                |                      |          |
|          | FREERUN                  | TDSTRGSRC FREE | TDSTRGSRC?     | 0:FREERUN            |          |
|          |                          | TRSPMD FREE    | TRSPMD?        | 2:IF                 |          |
|          | IF                       | TDSTRGSRC IF   |                | 3:EXT                |          |
|          |                          | TRSPMD IF      |                |                      |          |
|          | EXT                      | TDSTRGSRC EXT  |                |                      |          |
|          |                          | TRSPMD EXT     |                |                      |          |
|          | Trigger Slope            |                |                |                      |          |
|          | +                        | TDSTRGSLP RISE | TDSTRGSLP?     | 0:-                  |          |
|          |                          | TRSPSLP RISE   |                | 1:+                  |          |
|          | -                        | TDSTRGSLP FALL | TRSPSLP?       |                      |          |
|          |                          | TRSPSLP FALL   |                |                      |          |
|          | Trigger Level            | TDSTRGLVL *    | TDSTRGLVL?     | Integer (0 to 100)   |          |
|          | Trigger Position         | TDSTRGPOS *    | TDSTRGPOS?     | Integer (0 to 100)   |          |
|          | Trigger Delay            | TDSTRGDT *     | TDSTRGDT?      | Time                 |          |
|          | Table                    |                |                |                      |          |
|          | Table No. 1/2/3          | TDSTBL *       | TDSTBL?        | Integer (1 to 3)     |          |
|          | Table Edit               | TDSTBLED *,*   |                | f1,l1                |          |
|          |                          |                |                | f1:Frequency         |          |
|          |                          |                |                | 11:Limit Level       |          |
|          | Load Table               | TDSLD          |                |                      |          |
|          |                          | RCLTBL *       |                | Integer (1 to 3)     |          |
|          | Save Table               | TDSSV          |                |                      |          |
|          |                          | SVSTBL *       |                | Integer (1 to 3)     |          |
|          | Init Table               | TDSCLR         |                |                      |          |
|          |                          | DELSTBL        |                |                      |          |
|          | Table Freq. Input<br>ABS | TDSTBLF ABS    | TDSTBLF?       | 0:ABS                |          |
|          | REL                      | TDSTBLF REL    |                | 1:REL                |          |

| Function             |                                     | Lister en Cada | Ta        | Talker Request   |         |
|----------------------|-------------------------------------|----------------|-----------|--|---------|
|                      |                                     | Listener Code  | Code      | Output Format  | Kemarks |
| T-Domain<br>Spurious | Average Times                       | TDSAVG *       | TDSAVG?   | Integer<br>(1:OFF,2 to 999)  |         |
|                      | Parameter Setup                     | 1              |           |  | •       |
|                      | Detector                            |                |           |  |         |
|                      | Normal                              | TDSDET NRM     | TDSDET?   | 0:Normal   |         |
|                      | Posi                                | TDSDET POS     |           | 1:Posi   |         |
|                      | Nega                                | TDSDET NEG     |           | 2:Nega   |         |
|                      | Sample                              | TDSDET SMP     |           | 3:Sample   |         |
|                      | Display Unit                        | 1              |           |  |         |
|                      | dBm                                 | TDSUNIT DBM    | TDSUNIT?  |  |         |
|                      | W                                   | TDSUNIT W      |           |  |         |
|                      | dBµV                                | TDSUNIT DBUV   |           |  |         |
|                      | Judgement                           | 1              |           |  |         |
|                      | ON                                  | TDSJDG ON      | TDSJDG?   | 0:OFF  |         |
|                      | OFF                                 | TDSJDG OFF     |           | 1:ON   |         |
|                      | Result                              | 1              |           |  |         |
|                      | Peak                                | TDSRES PK      | TDSRES?   | 0:Peak   |         |
|                      | RMS                                 | TDSRES RMS     |           | 1:RMS  |         |
|                      | Multiplier                          | TDSMULTI *     | TDSMULTI? | Real number  | •       |
|                      | Peak Marker Y-Delta                 | TDSPKMKY *     | TDSPKMKY? | Real number  | •       |
|                      | Preselector 1.6G                    | TDSPRE 16G     | TDSPRE?   | 0:1.6G   | •       |
|                      | 3.6G                                | TDSPRE 36G     |           | 1:3.6G   |         |
|                      | Set to Default                      | TDSSETSTD      |           |  | •       |
|                      | Starts measurement                  |                |           |  |         |
|                      | Spurious                            | TDSMEAS        |           |  |         |
|                      |                                     | SPUR           |           |  |         |
|                      | Starts measurement in the same mode | SI             |           |  |         |
|                      | Measurement results                 |                |           |  |         |
|                      | Spurious                            |                | TDSMEAS?  | n <cr+lf>+f1,11,j1<cr<br>+LF&gt;<br/>+fn,ln,jn<cr+lf><br/>n:Amount (Integer)</cr+lf></cr<br></cr+lf> |         |
|                      |                                     |                |           | ln:Level<br>(dBm/W/dBµV)   |         |

| Function             |                  | Listener Code               | Talker Request |   | Remarks  |
|----------------------|------------------|-----------------------------|----------------|---|----------|
|                      |                  |                             | Code           | Output Format   | Kennarks |
| T-Domain<br>Spurious |                  |                             |                | jn:Integer<br>(0:FAIL,1:PASS,<br>-1:Judgement<br>OFF)                     |          |
|                      |                  |                             | SPULVL?        | n <cr+lf>+f1,l1<cr+<br>LF&gt;<br/> +fn,ln<cr+lf></cr+lf></cr+<br></cr+lf> |          |
|                      |                  |                             |                | n:Amount (Integer)  |          |
|                      |                  |                             |                | fn:Frequency  |          |
|                      |                  |                             |                | ln:Level (dBm)  |          |
| F-Domain             | Gate Setup       |                             |                |   |          |
| Power                | ON<br>OFF        | TGTSETUP ON<br>TGTSETUP OFF | TGTSETUP?      | 0:OFF<br>1:ON   |          |
|                      | Trigger Source   |                             |                |   |          |
|                      | FREERUN          | TGTTRG FREE                 | TGTTRG?        | 0:FREERUN   |          |
|                      | VIDEO            | TGTTRG VIDEO                |                | 1:VIDEO   |          |
|                      | IF               | TGTTRG IF                   |                | 2:IF  |          |
|                      | EXT              | TGTTRG EXT                  |                | 3:EXT   |          |
|                      | Trigger Slope    |                             |                |   |          |
|                      | -                | TGTTRGSLP FALL              | TGTTRGSLP?     | 0:-   |          |
|                      | +                | TGTTRGSLP RISE              |                | 1:+   |          |
|                      | Trigger Level    | TGTTRGLVL *                 | TGTTRGLVL?     | Integer (0 to 100)  |          |
|                      | Trigger Position | TGTTRGPOS *                 | TGTTRGPOS?     | Integer (0 to 100)  |          |
|                      | Trigger Delay    | TGTTRGDT *                  | TGTTRGDT?      | Time  |          |
|                      | Gate Source      |                             |                |   |          |
|                      | Trigger          | TGTSRC TRG                  | TGTSRC?        | 0:Trigger   |          |
|                      | Ext Gate         | TGTSRC EXT                  |                | 1:EXT   |          |
|                      | Gate Position    | TGTPOS *                    | TGTPOS?        | Time  |          |
|                      | Gate Width       | TGTWID *                    | TGTWID?        | Time  |          |
|                      | Detector         |                             |                |   |          |
|                      | Normal           | TGTDET NRM                  | TGTDET?        | 0:Normal  |          |
|                      | Posi             | TGTDET POS                  |                | 1:Posi  |          |
|                      | Nega             | TGTDET NEG                  |                | 2:Nega  |          |
|                      | Sample           | TGTDET SMP                  |                | 3:Sample  |          |

| Function |                    | Listopor Codo | Talker Request |                             | Remarks   |
|----------|--------------------|---------------|----------------|-----------------------------|-----------|
|          | Function           |               | Code           | Output Format               | Kelliarks |
| F-Domain | Gated Sweep ON/OFF |               |                |                             |           |
| Power    | ON                 | TGTSWP ON     | TGTSWP?        | 0:OFF                       |           |
|          | OFF                | TGTSWP OFF    |                | 1:ON                        |           |
|          | Window Setup       |               |                |                             | 1         |
|          | Window             |               |                |                             |           |
|          | ON                 | FDPWDO ON     | FDPWDO?        | 0:OFF                       |           |
|          | OFF                | FDPWDO OFF    |                | 1:ON                        |           |
|          | Window Position    | FDPWPOS *     | FDPWPOS?       | Frequency                   | 1         |
|          |                    | CPWLX *       | CPWLX?         |                             |           |
|          | Window Width       | FDPWWID *     | FDPWWID?       | Frequency                   | 1         |
|          |                    | CPWDX *       | CPWDX?         |                             |           |
|          | Y Scale            |               |                |                             | 1         |
|          | 10dB/div           | FDPDIV P10DB  | FDPDIV?        | 0:10dB/div                  |           |
|          |                    | CPWDIV P10DB  | CPWDIV?        | 1:5dB/div                   |           |
|          | 5dB/div            | FDPDIV P5DB   |                | 2:2dB/div                   |           |
|          |                    | CPWDIV P5DB   |                |                             |           |
|          | 2dB/div            | FDPDIV P2DB   |                |                             |           |
|          |                    | CPWDIV P2DB   |                |                             |           |
|          | Average Times      | FDPAVG *      | FDPAVG?        | Integer<br>(1:OFF,2 to 999) |           |
|          |                    | CAVGCHP *     | CAVGCHP?       | Integer<br>(1:OFF,2 to 999) |           |
|          | Parameter Setup    |               |                |                             |           |
|          | Detector           |               |                |                             |           |
|          | Normal             | FDPDET NRM    | FDPDET?        | 0:Normal                    |           |
|          | Posi               | FDPDET POS    |                | 1:Posi                      |           |
|          | Nega               | FDPDET NEG    |                | 2:Nega                      |           |
|          | Sample             | FDPDET SMP    |                | 3:Sample                    |           |
|          | Display Unit       |               |                |                             | 1         |
|          | dBm                | FDPUNIT DBM   | FDPUNIT?       | 0:dBm                       |           |
|          | W                  | FDPUNIT W     |                | 1:W                         |           |
|          | dBµV               | FDPUNIT DBUV  |                | 2:dBµV                      |           |
|          | Judgement          |               |                |                             | 1         |

| Function |                                     | Listener Code     | Talker Request |  | Remarks   |
|----------|-------------------------------------|-------------------|----------------|--|-----------|
|          | Function                            | Listener Code     | Code           | Output Format  | Kelliarks |
| F-Domain | ON                                  | FDPJDG ON         | FDPJDG?        | 0:OFF  |           |
| Power    | OFF                                 | FDPJDG OFF        |                | 1:ON   |           |
|          | Upper Limit                         | FDPJDGUP *        | FDPJDGUP?      | Level<br>(dBm/W/dBµV)  |           |
|          | Lower Limit                         | FDPJDGLOW *       | FDPJDGLOW?     | Level<br>(dBm/W/dBµV)  |           |
|          | Set to STD                          | FDPSETSTD         |                |  |           |
|          | Starts measurement                  |                   |                |  |           |
|          | F-Domain Power                      | FDPMEAS<br>CCHPOW |                |  |           |
|          | Starts measurement in the same mode | SI                |                |  |           |
|          | Measurement results                 |                   |                |  |           |
|          | F-Domain Power                      |                   | FDPMEAS?       | 11.j1<br>11:Level<br>(dBm/W/dBmV)<br>j1:Integer<br>(0:FAIL,1:PASS,<br>-1:Judgement<br>OFF) |           |
|          |                                     |                   | CCHPOW?        | 11,12<br>11:Level (dBm)<br>12:Level (dBm/Hz)   |           |
| OBW      | OBW%                                | OBWPER *          | OBWPER?        | Real number<br>(0.5 to 99.5)   |           |
|          |                                     | COBWPER *         | COBWPER?       |  |           |
|          | Average Times                       | OBWAVG *          | OBWAVG?        | Integer<br>(1:OFF,2 to 999)  |           |
|          |                                     | CAVGOBW *         | CAVGOBW?       | Integer<br>(1:OFF,2 to 999)  |           |
|          | Parameter Setup                     |                   |                |  |           |
|          | Detector                            |                   |                |  |           |
|          | Normal                              | OBWDET NRM        | OBWDET?        | 0:Normal   |           |
|          |                                     | COBWDET NRM       | COBWDET?       | 1:Posi   |           |
|          | Posi                                | OBWDET POS        |                | 2:Nega   |           |
|          |                                     | COBWDET POS       |                | 3:Sample   |           |
|          | Nega                                | OBWDET NEG        |                |  |           |
|          |                                     | COBWDET NEG       |                |  |           |

| Function  |                                     | Listener Code | Talker Request  |  | Remarks  |
|-----------|-------------------------------------|---------------|-----------------|--|----------|
|           | Function                            | Listener Code | Code            | Output Format  | Kennarks |
| OBW       | Sample                              | OBWDET SMP    |                 |  |          |
|           |                                     | COBWDET SMP   |                 |  |          |
|           | Judgement                           |               |                 |  |          |
|           | ON                                  | OBWJDG ON     | OBWJDG?         | 0:OFF  |          |
|           | OFF                                 | OBWJDG OFF    |                 | 1:ON   |          |
|           | Upper Limit                         | OBWJDGUP *    | OBWJDGUP?       | Frequency  |          |
|           | Lower Limit                         | OBWJDGLOW *   | OBWJDG-<br>LOW? | Frequency  |          |
|           | Set to STD                          | OBWSETSTD     |                 |  |          |
|           | Starts measurement                  |               |                 |  |          |
|           | OBW                                 | OBWMEAS       |                 |  |          |
|           |                                     | COBW          |                 |  |          |
|           | Starts measurement in the same mode | SI            |                 |  |          |
|           | Measurement results                 |               |                 |  |          |
|           | OBW                                 |               | OBWMEAS?        | f1,f2,f3,j1<br>f1:OBW Frequency<br>f2:Lower side frequency<br>f3:Higher side frequency<br>j1: Frequency<br>(0: FAIL, 1: PASS,-1:<br>Judgement OFF) |          |
|           |                                     |               | COBW?           | f1,f2,f3<br>f1:OBW Frequency<br>f2:Lower side frequency<br>f3:Higher side frequency  |          |
| Due to    | Template                            |               |                 |  |          |
| Transient | Template                            |               |                 |  |          |
|           | ON                                  | DTSTMPL ON    | DTSTMPL?        | 0: OFF   |          |
|           | OFF                                 | DTSTMPL OFF   |                 | 1: ON  |          |
|           | Template Shift                      |               |                 |  |          |
|           | Shift X                             | DTSTMPLSX *   | DTSTMPLSX?      | Frequency  |          |
|           | Shift Y                             | DTSTMPLSY *   | DTSTMPLSY?      | Level  |          |
|           | Margin delta X                      | DTSTMPLDX *   | DTSTMPLDX?      | Frequency (0:OFF)  |          |
|           | Copy from STD                       | DTSTMPLCP     |                 |  |          |

| Function            |                             | Listener Code    | Ta          | Talker Request   |   |
|---------------------|-----------------------------|------------------|-------------|--|---|
|                     |                             | Listener Code    | Code        | Output Format  | Remarks   |
| Due to<br>Transient | Data entry                  | DTSTMPLED *,*    |             | f1,11<br>f1: Frequency<br>l1: Level<br>(dBm/W/dBµV)        |   |
|                     | Init Table                  | DTSTMPLCLR       |             |  | -   |
|                     | Marker Edit                 |                  |             |  |   |
|                     | Copy from STD               | DTSMKRCP         |             |  |   |
|                     | Data entry                  | DTSMKRED *,*,*,* |             | d1,f1,f2,l1<br>d1:<br>(0:Normal 1: Integral)               |   |
|                     |                             |                  |             | f1: Off set Frequency<br>f2: Band width<br>11: Limit level | Set the ref-<br>erence<br>bandwidth<br>to f2, after<br>initializing<br>the table. |
|                     | Init Table                  | DTSMKRCLR        |             |  | -   |
|                     | Average Times               | DTSAVG *         | DTSAVG?     | Integer<br>(1:OFF, 2 to 999)                               |   |
|                     | Parameter Setup             |                  |             |  |   |
|                     | Detector                    |                  |             |  |   |
|                     | Normal                      | DTSDET NRM       | DTSDET?     | 0: Normal  |   |
|                     | Posi                        | DTSDET POS       |             | 1: Posi  |   |
|                     | Nega                        | DTSDET NEG       |             | 2: Nega  |   |
|                     | Sample                      | DTSDET SMP       |             | 3: Sample  |   |
|                     | Display Unit                |                  |             |  |   |
|                     | dBm                         | DTSUNIT DBM      | DTSUNIT?    | 0: dBm   |   |
|                     | W                           | DTSUNIT W        |             | 1: W   |   |
|                     | dBµV                        | DTSUNIT DBUV     |             | 2: dBµV  |   |
|                     | Template Couple to<br>Power |                  |             |  |   |
|                     | ON                          | DTSTMPLPW ON     | DTSTMPLPW?  | 0: OFF   |   |
|                     | OFF                         | DTSTMPLPW OFF    |             | 1: ON  |   |
|                     | Template Limit              | DTSTMPLBTM *     | DTSTMPLBTM? | Level<br>(dBm/W/dBµV)                                      |   |

| Function            |                                     | Listanar Coda                          | Talker Request      |   | Remarks   |
|---------------------|-------------------------------------|--|---------------------|---|-----------|
|                     | Function                            | Listener Code                          | Code                | Output Format   | Kelliarks |
| Due to<br>Transient | Judgement<br>ON<br>OFF              | DTSJDG ON<br>DTSJDG OFF                | DTSJDG?             | 0: OFF<br>1: ON   |           |
|                     | Freq. Setting                       |  |                     |   |           |
|                     | CFSP<br>STSP                        | DTSFRMD CFSP<br>DTSFRMD STSP           | DTSFRMD?            | 0: Center/Span mode<br>1: Start/Stop mode   |           |
|                     | Result Type                         |  |                     |   |           |
|                     | ABS<br>REL<br>MKR                   | DTSRES ABS<br>DTSRES REL<br>DTSRES MKR | DTSRES?             | 0: Absolute<br>1: Relative<br>2: Marker   |           |
|                     | Reference Power                     |  |                     |   |           |
|                     | MKR<br>MOD                          | DTSREF MKR<br>DTSREF MOD               | DTSREF?             | 0: Reference Marker<br>1: Modulation  |           |
|                     | Set to STD                          | DTSSETSTD                              |                     |   |           |
|                     | Starts measurement                  |  |                     |   |           |
|                     | Due to Transient                    | DTSMEAS                                |                     |   |           |
|                     | Starts measurement in the same mode | SI                                     |                     |   |           |
|                     | Measurement results                 |  |                     |   |           |
|                     | Due to Transient                    |  | DTSMEAS?<br>COBWCP? | n <cr+lf>+d1,j1<cr+<br>LF&gt;"<br/>+dn,jn<cr+lf><br/>n:Amount (Integer)<br/>dn: Power<br/>jn: Integer<br/>(0: FAIL, 1: PASS,-1:<br/>Judgement OFF)<br/>11,12,d1,d2,d3,d4<br/>11: Level (dBm: Refer-<br/>ence power)<br/>12: Level<br/>(W: Reference power)<br/>d1: -1st ACP(dBc)<br/>d2: +1st ACP(dBc)<br/>d3: -2nd ACP(dBc)<br/>d4: +2nd ACP(dBc)</cr+lf></cr+<br></cr+lf> |           |
| Due to              | Gate Setup                          |  |                     |   |           |
| Modulation          | ON<br>OFF<br>Trigger Source         | TGTSETUP ON<br>TGTSETUP OFF            | TGTSETUP?           | 0: OFF<br>1: ON   |           |
|                     | FREERUN                             | TGTTRG FREE                            | TGTTRG?             | 0: FREERUN  |           |

| Function   |                    | Listener Code  | Talker Request |                    | Remarks |
|------------|--------------------|----------------|----------------|--------------------|---------|
|            |                    |                | Code           | Output Format      | Remarks |
| Due to     | VIDEO              | TGTTRG VIDEO   |                | 1: VIDEO           |         |
| Modulation | IF                 | TGTTRG IF      |                | 2: IF              |         |
|            | EXT                | TGTTRG EXT     |                | 3: EXT             |         |
|            | Trigger Slope      |                |                |                    |         |
|            | -                  | TGTTRGSLP FALL | TGTTRGSLP?     | 0: -               |         |
|            | +                  | TGTTRGSLP RISE |                | 1:+                |         |
|            | Trigger Level      | TGTTRGLVL *    | TGTTRGLVL?     | Integer (0 to 100) |         |
|            | Trigger Position   | TGTTRGPOS *    | TGTTRGPOS?     | Integer (0 to 100) |         |
|            | Trigger Delay      | TGTTRGDT *     | TGTTRGDT?      | Time               |         |
|            | Gate Source        |                |                |                    |         |
|            | Trigger            | TGTSRC TRG     | TGTSRC?        | 0: Trigger         |         |
|            | Ext Gate           | TGTSRC EXT     |                | 1: EXT             |         |
|            | Gate Position      | TGTPOS *       | TGTPOS?        | Time               |         |
|            | Gate Width         | TGTWID *       | TGTWID?        | Time               |         |
|            | Detector           |                |                |                    |         |
|            | Normal             | TGTDET NRM     | TGTDET?        | 0: Normal          |         |
|            | Posi               | TGTDET POS     |                | 1: Posi            |         |
|            | Nega               | TGTDET NEG     |                | 2: Nega            |         |
|            | Sample             | TGTDET SMP     |                | 3: Sample          |         |
|            | Gated Sweep ON/OFF |                |                |                    |         |
|            | ON                 | TGTSWP ON      | TGTSWP?        | 0: OFF             |         |
|            | OFF                | TGTSWP OFF     |                | 1: ON              |         |
|            | Template           |                |                |                    |         |
|            | Template           |                |                |                    |         |
|            | ON                 | DTMTMPL ON     | DTMTMPL?       | 0: OFF             |         |
|            | OFF                | DTMTMPL OFF    |                | 1: ON              |         |
|            | Template Shift     |                |                |                    |         |
|            | Shift X            | DTMTMPLSX *    | DTMTMPLSX?     | Frequency          |         |
|            | Shift Y            | DTMTMPLSY *    | DTMTMPLSY?     | Level              |         |

| Function   |                          | Listener Code    | Talker Request |  | Remarks   |
|------------|--------------------------|------------------|----------------|--|---|
|            | Tunction                 | Listener Code    | Code           | Output Format  | Kennarks  |
| Due to     | Margin delta X           | DTMTMPLDX *      | DTMTMPLDX?     | Frequency (0:OFF)  |   |
| Modulation | Copy from STD            | DTMTMPLCP        |                |  |   |
|            | Data entry               | DTMTMPLED *,*    |                | f1,11<br>f1: frequency<br>11: Level<br>(dBm/W/dBµV)      |   |
|            | Init Table               | DTMTMPLCLR       |                |  |   |
|            | Marker Edit              |                  |                |  |   |
|            | Copy from STD            | DTMMKRCP         |                |  |   |
|            | Data entry               | DTMMKRED *,*,*,* |                | d1,f1,f2,l1<br>d1:<br>(0:Normal 1: Integral)             |   |
|            |                          |                  |                | f1: Offset Frequency<br>f2: Bandwidth<br>11: Limit Level | Set the ref-<br>erence<br>bandwidth<br>to f2, after<br>initializing<br>the table. |
|            | Init Table               | DTMMKRCLR        |                |  |   |
|            | Average Times            | DTMAVG *         | DTMAVG?        | Integer  |   |
|            |                          | CAVGSPR *        | CAVGSPR?       | (1:OFF, 2 to 999)<br>Integer<br>(1:OFF, 2 to 999)        |   |
|            | Parameter Setup          |                  |                |  |   |
|            | Detector                 |                  |                |  |   |
|            | Normal                   | DTMDET NRM       | DTMDET?        | 0: Normal  |   |
|            | Posi                     | DTMDET POS       |                | 1: Posi  |   |
|            | Nega                     | DTMDET NEG       |                | 2: Nega  |   |
|            | Sample                   | DTMDET SMP       |                | 3: Sample  |   |
|            | Display Unit             |                  |                |  |   |
|            | dBm                      | DTMUNIT DBM      | DTMUNIT?       | 0: dBm   |   |
|            | W                        | DTMUNIT W        |                | 1: W   |   |
|            | dBµV                     | DTMUNIT DBUV     |                | 2: dBµV  |   |
|            | Template Couple to Power |                  |                |  | 1   |
|            | ON                       | DTMTMPLPW ON     | DTMTMPLPW?     | 0: OFF   |   |
|            | OFF                      | DTMTMPLPW OFF    |                | 1: ON  |   |

| Function             |                                     | Listener Code | Talker Request |   | Remarks   |
|----------------------|-------------------------------------|---------------|----------------|---|-----------|
|                      |                                     |               | Code           | Output Format   | Kennar KS |
| Due to<br>Modulation | Template Limit                      | DTMTMPLBTM *  | DTMTMPLBTM?    | Level<br>(dBm/W/dBµV)   |           |
|                      | Judgement                           |               |                |   |           |
|                      | ON                                  | DTMJDG ON     | DTMJDG?        | 0: OFF  |           |
|                      | OFF                                 | DTMJDG OFF    |                | 1: ON   |           |
|                      | Freq. Setting                       |               |                |   |           |
|                      | CFSP                                | DTMFRMD CFSP  | DTMFRMD?       | 0: Center/Span mode   |           |
|                      | STSP                                | DTMFRMD STSP  |                | 1: Start/Stop mode  |           |
|                      | Result Type                         |               |                |   |           |
|                      | ABS                                 | DTMRES ABS    | DTMRES?        | 0: Absolute   |           |
|                      | REL                                 | DTMRES REL    |                | 1: Relative   |           |
|                      | MKR                                 | DTMRES MKR    |                | 2: Marker   |           |
|                      | Reference Power                     |               |                |   |           |
|                      | MKR                                 | DTMREF MKR    | DTMREF?        | 0: Reference Marker   |           |
|                      | MOD                                 | DTMREF MOD    |                | 1: Modulation   |           |
|                      | Set to STD                          | DTMSETSTD     |                |   |           |
|                      | Starts measurement                  |               |                |   |           |
|                      | Due to Modulation                   | DTMMEAS       |                |   |           |
|                      | Starts measurement in the same mode | SI            |                |   |           |
|                      | Measurement results                 |               |                |   |           |
|                      | Due to Modulation                   |               | DTMMEAS?       | n <cr+lf>+d1,<br/>j1<cr+lf><br/>+dn,jn<cr+lf><br/>n:Amount (Integer)<br/>dn: Power<br/>jn: Integer(0: FAIL, 1:<br/>PASS, -1: Judgement<br/>OFF)</cr+lf></cr+lf></cr+lf> |           |
| Inband               | Template                            |               |                |   |           |
| Spurious             | Template                            |               |                |   |           |
|                      | ON                                  | SPRTMPL ON    | SPRTMPL?       | 0: OFF  |           |
|                      | OFF                                 | SPRTMPL OFF   |                | 1: ON   |           |
|                      | Template Shift                      |               |                |   |           |
|                      | Shift X                             | SPRTMPLSX *   | SPRTMPLSX?     | Frequency   |           |
|                      | Shift Y                             | SPRTMPLSY *   | SPRTMPLSY?     | Level   |           |

| Function |                 | Listener Code    | Talker Request |   | Remarks   |
|----------|-----------------|------------------|----------------|---|---|
|          |                 | Listener Code    | Code           | Output Format   | Remarks   |
| Inband   | Margin delta X  | SPRTMPLDX *      | SPRTMPLDX?     | Frequency (0:OFF)   |   |
| Spurious | Copy from STD   | SPRTMPLCP        |                |   |   |
|          | Data entry      | SPRTMPLED *,*    |                | f1,11<br>f1: Frequency<br>11: Level<br>(dBm/W/dBµV)                                     |   |
|          | Init Table      | SPRTMPLCLR       |                |   |   |
|          | Marker Edit     |                  |                |   |   |
|          | Copy from STD   | SPRMKRCP         |                |   |   |
|          | Data entry      | SPRMKRED *,*,*,* |                | d1,f1,f2,l1   |   |
|          |                 |                  |                | d1:(0:Peak, 1:Integral)<br>f1: Start Frequency<br>f2: Stop Frequency<br>11: Limit Level | Set the ref-<br>erence<br>bandwidth<br>to f2, after<br>initializing<br>the table. |
|          | Init Table      | SPRMKRCLR        |                |   |   |
|          | Average Times   | SPRAVG *         | SPRAVG?        | Integer<br>(1:OFF, 2 to 999)  |   |
|          |                 | CAVGSPR *        | CAVGSPR?       | Integer<br>(1:OFF, 2 to 999)  |   |
|          | Parameter Setup |                  |                |   |   |
|          | Detector        |                  |                |   |   |
|          | Normal          | SPRDET NRM       | SPRDET?        | 0: Normal   |   |
|          | Posi            | SPRDET POS       |                | 1: Posi   |   |
|          | Nega            | SPRDET NEG       |                | 2: Nega   |   |
|          | Sample          | SPRDET SMP       |                | 3: Sample   |   |
|          | Display Unit    |                  |                |   |   |
|          | dBm             | SPRUNIT DBM      | SPRUNIT?       | 0: dBm  |   |
|          | W               | SPRUNIT W        |                | 1: W  |   |
|          | dBµV            | SPRUNIT DBUV     |                | 2: dBµV   |   |

| Function           |                                     | Listener Code                 | Talker Request     |  | Remarks  |
|--------------------|-------------------------------------|-------------------------------|--------------------|--|----------|
|                    |                                     |                               | Code               | Output Format  | Kennarks |
| Inband<br>Spurious | Template Couple to<br>Power         |                               |                    |  |          |
|                    | ON<br>OFF                           | SPRTMPLPW ON<br>SPRTMPLPW OFF | SPRTMPLPW?         | 0: OFF<br>1: ON  |          |
|                    | Template Limit                      | SPRTMPLBTM *                  | SPRTMPLBTM?        | Level<br>(dBm/W/dBµV)  |          |
|                    | Judgement                           |                               |                    |  |          |
|                    | ON<br>OFF                           | SPRJDG ON<br>SPRJDG OFF       | SPRJDG?            | 0: OFF<br>1: ON  |          |
|                    | Freq. Setting                       |                               |                    |  |          |
|                    | CFSP<br>STSP                        | SPRFRMD CFSP<br>SPRFRMD STSP  | SPRFRMD?           | 0: Center/Span mode<br>1: Start/Stop mode                                      |          |
|                    | Result Type                         |                               |                    |  |          |
|                    | ABS                                 | SPRRES ABS<br>SPRMOD ABS      | SPRRES?<br>SPRMOD? | 0: Absolute<br>1: Relative   |          |
|                    | REL                                 | SPRRES REL<br>SPRMOD REL      |                    | 2: Marker  |          |
|                    | MKR                                 | SPRRES MKR<br>SPRMOD MKR      |                    |  |          |
|                    | Reference Power                     |                               |                    |  |          |
|                    | MKR                                 | SPRREF MKR<br>SPRREF SWP      | SPRREF?            | 0: Reference Marker<br>1: Modulation   |          |
|                    | MOD                                 | SPRREF MOD<br>SPRREF DSP      |                    |  |          |
|                    | Peak Marker Y-Delta                 | SPRPKMKY *                    | SPRPKMKY?          | Real number  |          |
|                    | Set to STD                          | SPRSETSTD                     |                    |  |          |
|                    | Starts measurement                  |                               |                    |  |          |
|                    | Inband Spurious                     | SPRMEAS<br>CINBSPR            |                    |  |          |
|                    | Starts measurement in the same mode | SI                            |                    |  |          |
|                    | Measurement results                 |                               |                    |  |          |
|                    | Inband Spurious                     |                               | SPRMEAS?           | n <cr+lf>+f1,l1,j1<cr<br>+LF&gt;<br/> +fn,ln,jn<cr+lf></cr+lf></cr<br></cr+lf> |          |
|                    |                                     |                               |                    | n:Amount (Integer)   |          |

|          | Function                            | Listener Code        | Talker Request |   | Remarks   |
|----------|-------------------------------------|----------------------|----------------|---|-----------|
|          |                                     |                      | Code           | Output Format   | Kelliarks |
| Inband   |                                     |                      |                | fn: Frequency   |           |
| Spurious |                                     |                      |                | ln: Level<br>(dBm/W/dBµV)   |           |
|          |                                     |                      |                | jn: Integer (0: FAIL, 1:<br>PASS, -1: Judgement<br>OFF)   |           |
|          | max.value output on the each period |                      | CINBMAX?       | n1,f1,l1n4,f4,l4<br>(4set output)<br>nn: 0;Disable (Without<br>data)<br>1; Enable (With data)<br>fn: Frequency<br>ln: Level (dBm) |           |
| Outband  | Table                               |                      |                |   |           |
| Spurious | Table No.1/2/3                      | FDSTBL *             | FDSTBL?        | Integer (1 to 3)  |           |
|          | Table Edit                          | FDSTBLED *,*,*,*,*,* |                | f1,f2,f3,f4,d1,l1<br>f1: Start frequency<br>f2: Stop frequency<br>f3: RBW<br>f4: VBW<br>d1: Sweep time<br>l1: Limit Level         |           |
|          | Load Table                          | FDSLD                |                |   |           |
|          | Save Table                          | FDSSV                |                |   |           |
|          | Init Table                          | FDSCLR               |                |   |           |
|          | Average Times                       | FDSAVG *             | FDSAVG?        | Integer<br>(1:OFF, 2 to 999)  |           |
|          | Parameter Setup                     |                      |                |   |           |
|          | Detector                            |                      |                |   |           |
|          | Normal                              | FDSDET NRM           | FDSDET?        | 0: Normal   |           |
|          | Posi                                | FDSDET POS           |                | 1: Posi   |           |
|          | Nega                                | FDSDET NEG           |                | 2: Nega   |           |
|          | Sample                              | FDSDET SMP           |                | 3: Sample   |           |
|          | Display Unit                        |                      |                |   |           |
|          | dBm                                 | FDSUNIT DBM          | FDSUNIT?       | 0: dBm  |           |
|          | W                                   | FDSUNIT W            |                | 1: W  |           |
|          | dBµV                                | FDSUNIT DBUV         |                | 2: dBµV   |           |

| Function        |   | Listener Code | Talker Request |   | Remarks  |
|-----------------|---|---------------|----------------|---|----------|
|                 | i uncuon                                |               | Code           | Output Format   | Kennarks |
| Outband         | Judgement                               |               |                |   |          |
| Spurious        | ON                                      | FDSJDG ON     | FDSJDG?        | 0: OFF  |          |
|                 | OFF                                     | FDSJDG OFF    |                | 1: ON   |          |
|                 | Peak Marker Y-Delta                     | FDSPKMKY *    | FDSPKMKY?      | Real number   |          |
|                 | Preselector 1.6G                        | FDSPRE 16G    | FDSPRE?        | 0: 1.6G   |          |
|                 | 3.6G                                    | FDSPRE 36G    |                | 1: 3.6G   |          |
|                 | Set to Default                          | FDSSETSTD     |                |   |          |
|                 | Starts measurement                      |               |                |   |          |
|                 | Outband Spurious                        | FDSMEAS       |                |   |          |
|                 | Starts measurement in the same mode     | SI            |                |   |          |
|                 | Measurement results<br>Outband Spurious |               | FDSMEAS?       | n <cr+lf>+f1,11,j1<cr<br>+LF&gt;<br/> +fn,ln,jn<cr+lf><br/>n:Amount (Integer)<br/>fn: Frequency<br/>ln: Level (dBm/W/<br/>dBmV)<br/>jn: Integer(0: FAIL, 1:<br/>PASS,-1: Judgement<br/>OFF)</cr+lf></cr<br></cr+lf> |          |
| Wave-           | Auto Level Set                          | AUTOLVL       |                |   |          |
| form<br>Quality | Parameter Setup<br>Meas Mode            | WAMAOD DIL OT | WMMOD?         | 0. Bilet  |          |
|                 | Filot                                   |               | w winnOD?      |   |          |
|                 | Meas Range                              | WMMOD NZERO   | WMRNG?         | 1: Non Zero<br>Integer 5 to 25  |          |
|                 |   |               |                | (REVERSE LINK)<br>615 to 800<br>(FORWARD LINK)  |          |
|                 | τ Offset                                |               |                |   |          |
|                 | Default                                 | WTOFS DFLT    | WTOFS?         | 0: DEFAULT  |          |
|                 | User                                    | WTOFS USER    |                | 1: USER   |          |
|                 | $\tau$ offset value                     | WTOFSDT *     | WTOFSDT?       | Time<br>(-100.0 to 100.0 µsec)  |          |
|                 | Equalizing Filter                       |               |                |   |          |

| Function        |                                     | Listopor Codo   | Talker Request |   | Remarks |
|-----------------|-------------------------------------|-----------------|----------------|---|---------|
|                 | Function                            | Listener Code   | Code           | Output Format   | Kemarks |
| Wave-           | Filter OFF                          | WEQFLT OFF      | WEQFLT?        | 0: OFF  |         |
| form<br>Ouality | Filter ON                           | WEQFLT ON       |                | 1: ON   |         |
|                 | PN Offset Search mode               |                 | 1              |   | 1       |
|                 | Search mode<br>OFF                  | WPNMOD OFF      | WPNMOD?        | 0: OFF  |         |
|                 | Search mode ON                      | WPNMOD ON       |                | 1: ON   |         |
|                 | PN Offset                           | WPNOFS *        | WPNOFS?        | Integer (0 to 511)  | 1 !     |
|                 | Trigger Source                      |                 | 1              |   | 1 !     |
|                 | INT                                 | WTRGSRC INT     | WTRGSRC?       | 0: INT  |         |
|                 | EXT                                 | WTRGSRC EXT     |                | 1: EXT  |         |
|                 | Interval(EXT)                       | WTRGSRC INTRVL1 |                | 2: Interval(EXT)  |         |
|                 | Interval                            | WTRGSRC INTRVL2 |                | 3: Interval   |         |
|                 | Trigger Slope                       |                 |                |   | 1       |
|                 | +                                   | WTRGSLP RISE    | WTRGSLP?       | 0: -  |         |
|                 | -                                   | WTRGSLP FALL    |                | 1:+   |         |
|                 | Trigger Delay                       | WTRGDLY *       | WTRGDLY?       | Real number (Chip)Å@<br>-16384 to 16384<br>Resolution : 0.125 |         |
|                 | Freq. Meas. Mode                    | WFRRNG NORM     | WFRRNG?        | 0: NORM   | 1       |
|                 |                                     | WFRRNG EXP      |                | 1: EXP  |         |
|                 | Average Times                       | CAVGWF *        | CAVGWF?        | Integer<br>(1:OFF, 2 to 32)                                   | 1       |
|                 | Starts measurement                  |                 | 1              |   | 1       |
|                 | Waveform Quality                    | WFQUA           |                |   |         |
|                 | Starts measurement in the same mode | SI              |                |   |         |
|                 | Measurement results                 |                 |                |   | 1       |
|                 | All result                          |                 | WFQUA?         | d1,d2,d3,d4,d5,d6,d7,<br>d8,d9                                |         |
|                 | ρ                                   |                 | WFRHO?         | d1  |         |
|                 | τ                                   |                 | WFTAU?         | d2,d3   |         |
|                 | Carrier Freq. Error                 |                 | WFCFER?        | d4  |         |
|                 | Carrier Feedthrough                 |                 | WFIQOFS?       | d5  |         |
|                 | Magnitude Error                     |                 | WFMAG?         | d6  |         |
|                 | Phase Error                         |                 | WFPHSE?        | d7  |         |

| Function        |                        | Listener Code | Talker Request |                      | Remarks  |
|-----------------|------------------------|---------------|----------------|----------------------|----------|
|                 |                        | Listener Code | Code           | Output Format        | Kennarks |
| Wave-           | Error Vector Magnitude |               | WFMOD?         | d8                   |          |
| form<br>Ouality | PN Offset              |               | WFPNOFS?       | d9                   |          |
|                 |                        |               |                | d1: p                |          |
|                 |                        |               |                | d2: Time (sec)       |          |
|                 |                        |               |                | d3: Integer (chip)   |          |
|                 |                        |               |                | d4: Frequency (chip) |          |
|                 |                        |               |                | d5: Level (dBc)      |          |
|                 |                        |               |                | d6: %rms             |          |
|                 |                        |               |                | d7: degree rms       |          |
|                 |                        |               |                | d8: %rms             |          |
|                 |                        |               |                | d9: chip             |          |
|                 |                        |               |                |                      |          |
| Code            | Auto Level Set         | AUTOLVL       |                |                      |          |
| Domain<br>Power | Scale Setup            |               |                |                      |          |
|                 | Format Graph           | CFMT GRP      | CFMT?          | 0: Graph             |          |
|                 | Table                  | CFMT TBL      |                | 1: Table             |          |
|                 | Numeric                | CFMT NUM      |                | 2: Numeric           |          |
|                 | Display                |               |                |                      |          |
|                 | Single                 | CDISP SNGL    | CDISP?         | 0: Single            |          |
|                 | Dual                   | CDISP DUAL    |                | 1: Dual              |          |
|                 | Y Scale                |               |                |                      |          |
|                 | Rho                    | CYSCL RHO     | CYSCL?         | 0: Rho               |          |
|                 | Power                  | CYSCL POW     |                | 1: Power             |          |
|                 | Tau                    | CYSCL TAU     |                | 2: Tau               |          |
|                 | Phase                  | CYSCL PHA     |                | 3: Phase             |          |
|                 | Y Scale/div            |               |                |                      |          |
|                 | 20/div                 | CPDIV P20DB   | CPDIV?         | 0: 20/div            |          |
|                 | 10/div                 | CPDIV P10DB   |                | 1: 10/div            |          |
|                 | 5/div                  | CPDIV P5DB    |                | 2: 5/div             |          |
|                 | 1/div                  | CPDIV P1DB    |                | 3: 1/div             |          |
|                 | 0.5/div                | CPDIV P05DB   |                | 4:0.5/div            |          |
|                 | 0.25/div               | CPDIV P025DB  |                | 5:0.25/div           |          |

|                 | Function                    | Listener Code   | Ta       | Talker Request  |                          |
|-----------------|-----------------------------|-----------------|----------|---|--------------------------|
|                 | Function                    |                 | Code     | Output Format   | Remarks                  |
| Code            | Parameter Setup             |                 |          |   |                          |
| Domain<br>Power | Meas Mode                   |                 |          |   |                          |
|                 | PRECISE                     | CMMOD PREC      | CMMOD?   | 0: Precise  |                          |
|                 | NORMAL                      | CMMOD NORM      |          | 1: Normal   |                          |
|                 | Meas Range                  | CMRNG *         | CMRNG?   | Integer 5 to 25   |                          |
|                 | τOffset                     |                 |          |   |                          |
|                 | Default                     | CTOFS DFLT      | CTOFS?   | 0: DEFAULT  |                          |
|                 | User                        | CTOFS USER      |          | 1: USER   |                          |
|                 | $\tau$ offset value         | CTOFSDT *       | CTOFSDT? | Time<br>(-100.0 to 100.0 µsec)                                |                          |
|                 | Equalizing Filter           |                 |          |   |                          |
|                 | Filter OFF                  | CEQFLT OFF      | CEQFLT?  | 0: OFF  |                          |
|                 | Filter ON                   | CEQFLT ON       |          | 1: ON   |                          |
|                 | Threshold                   | CTHRSH *        | CTHRSH?  | Level<br>(-40 to -10dB)                                       | Unit of<br>level, dB, is |
|                 | PN Offset Search mode       |                 |          |   | necessary.               |
|                 | Search mode<br>OFF          | CPNMOD OFF      | CPNMOD?  | 0: OFF  |                          |
|                 | Search mode ON              | CPNMOD ON       |          | 1: ON   |                          |
|                 | PN Offset                   | CPNOFS *        | CPNOFS?  | Integer<br>(0 to 511)   |                          |
|                 | Trigger Source              |                 |          |   |                          |
|                 | INT                         | CTRGSRC INT     | CTRGSRC? | 0: INT  |                          |
|                 | EXT                         | CTRGSRC EXT     |          | 1: EXT  |                          |
|                 | Interval(EXT)               | CTRGSRC INTRVL1 |          | 2: Interval(EXT)  |                          |
|                 | Interval                    | CTRGSRC INTRVL2 |          | 3: Interval   |                          |
|                 | Trigger Slope               |                 |          |   |                          |
|                 | +                           | CTRGSLP RISE    | CTRGSLP? | 0: -  |                          |
|                 | -                           | CTRGSLP FALL    |          | 1:+   |                          |
|                 | Trigger Delay<br>Phase Unit | CTRGDLY *       | CTRGDLY? | Real number (Chip)Å@<br>-16384 to 16384<br>Resolution : 0.125 |                          |
|                 | Degree                      | CPHUNT DEG      | CPHUNT?  | 0: degree   |                          |
|                 | Radian                      | CPHUNT RAD      |          | 1: m radian   |                          |

| Function        |                                     | Listener Code | Talker Request |                              | Remarks |
|-----------------|-------------------------------------|---------------|----------------|------------------------------|---------|
|                 | 1 unetion                           | Listener Code | Code           | Output Format                | Kemarks |
| Code            | Power Unit                          |               |                |                              |         |
| Domain<br>Power | W                                   | CDPUNT W      | CDPUNT?        | 0: W                         |         |
|                 | dBm                                 | CDPUNT DBM    |                | 1: dBm                       |         |
|                 | Freq. Meas. Mode                    | CFRRNG NORM   | CFRRNG?        | 0: NORM                      |         |
|                 |                                     | CFRRNG EXP    |                | 1: EXP                       |         |
|                 | Marker Setup                        |               |                |                              |         |
|                 | Paging Channel                      | PAGECH *      | PAGECH?        | Integer<br>(Channel 0 to 63) |         |
|                 | Traffic Channel                     | TRFCCH *      | TRFCCH?        | Integer<br>(Channel 0 to 63) |         |
|                 | Average Times                       | CAVGCDP *     | CAVGCDP?       | Integer<br>(1:OFF, 2 to 32)  |         |
|                 | Starts measurement                  |               |                |                              |         |
|                 | Code Domain<br>Power(Graph)         | CDPGPH        |                |                              |         |
|                 | Code Domain<br>Power(Total Result)  | CDPRES        |                |                              |         |
|                 | Starts measurement in the same mode | SI            |                |                              |         |
|                 | Measurement results                 |               |                |                              |         |
|                 | All result                          |               | CDPRES?        | d1,d2,d3,d4,d5,d6,d7,d8      |         |
|                 | τ                                   |               | CDPTAU?        | d1,d2                        |         |
|                 | Carrier Freq. Error                 |               | CDPCFER?       | d3                           |         |
|                 | Carrier Feedthrough                 |               | CDPIQOFS?      | d4                           |         |
|                 | Magnitude Error                     |               | CDPMAG?        | d5                           |         |
|                 | Phase Error                         |               | CDPPHSE?       | d6                           |         |
|                 | Error Vector Magnitude              |               | CDPMOD?        | d7                           |         |
|                 | PN Offset                           |               | CDPPNOFS?      | d8                           |         |
|                 |                                     |               |                | d1: Time (sec)               |         |
|                 |                                     |               |                | d2: Integer (chip)           |         |
|                 |                                     |               |                | d3: Frequency (chip)         |         |
|                 |                                     |               |                | d4: Level (dBc)              |         |
|                 |                                     |               |                | d5: %rms                     |         |
|                 |                                     |               |                | d6: degree rms               |         |

| Function           |                                     | Listopor Codo   | Ta       | Talker Request   |           |
|--------------------|-------------------------------------|-----------------|----------|--|-----------|
|                    | Function                            | Listeller Code  | Code     | Output Format  | Kelliarks |
| Code               |                                     |                 |          | d7: %rms   |           |
| Domain<br>Power    |                                     |                 |          | d8: chip   |           |
|                    | Estimated Rho                       |                 | CDPRHO?  | Real number $(\rho)$   |           |
|                    | Channel maker output                |                 | CMKLVL?  | d1,d2,d3,d4<br>d1: Pilot channel(dB)<br>d2: Sync. channel(dB)<br>d3: Paging channel(dB)<br>d4: Traffic Channel(dB) |           |
| Tx Power           | Auto Level Set                      | AUTOLVL         |          |  |           |
|                    | Parameter Setup                     |                 |          |  |           |
|                    | Trigger Source                      |                 |          |  |           |
|                    | INT                                 | TTRGSRC INT     | TTRGSRC? | 0: INT   |           |
|                    | EXT                                 | TTRGSRC EXT     |          | 1: EXT   |           |
|                    | Interval(EXT)                       | TTRGSRC INTRVL1 |          | 2: Interval(EXT)   |           |
|                    | Trigger Slope                       | 1               |          | +  |           |
|                    | +                                   | TTRGSLP RISE    | TTRGSLP? | 0: -   |           |
|                    | -                                   | TTRGSLP FALL    |          | 1:+  |           |
|                    | Trigger Delay                       | TTRGDLY *       | TTRGDLY? | Real number (Chip)<br>-16384 to 16384<br>Resolution : 0.125 chip   |           |
|                    | Meas. Filter                        |                 |          |  |           |
|                    | Narrow                              | TMESFLT NARW    | TMESFLT? | 0: Narrow  |           |
|                    | Wide                                | TMESFLT WIDE    |          | 1: Wide  |           |
|                    | Average Times                       | CTXAVG *        | CTXAVG?  | Integer<br>(1:OFF, 2 to 32)  |           |
|                    | Starts measurement                  | 1               |          |  |           |
|                    | Tx Power                            | CTXPOW          |          |  |           |
|                    | Starts measurement in the same mode | SI              |          |  |           |
|                    | Measurement results                 |                 |          |  |           |
|                    | Tx Power                            |                 | CTXPOW?  | d1,d2,d3   |           |
|                    |                                     |                 |          | d1: Level (dBm)  |           |
|                    |                                     |                 |          | d2: Level (W)  |           |
|                    |                                     |                 |          | d3: Level (dB)   |           |
| Graphics<br>Select | Constellation                       | WFGTYP CON      | WFGTYP?  | 0: Constellation   |           |

| Function                 |                                       | Listener Code     | Talker Request |  | Remarks   |
|--------------------------|---------------------------------------|-------------------|----------------|--|-----------|
|                          | Tunction                              | Listener Code     | Code           | Output Format  | Kelliarks |
| Graphics select          | Constellation(Line)                   | WFGTYP CONLIN     |                | 1: Constellation(Line)   |           |
|                          | Constellation(Dot)                    | WFGTYP CONDOT     |                | 2: Constellation(Dot)  |           |
|                          | Constellation(Line¨)                  | WFGTYP CONLINDOT  |                | 3: Constellation<br>(Line¨)                                      |           |
|                          | I EYE Diagram                         | WFGTYP ICHEYE     |                | 4: I EYE Diagram   |           |
|                          | Q EYE Diagram                         | WFGTYP QCHEYE     |                | 5: Q EYE Diagram   |           |
|                          | I/Q EYE Diagram                       | WFGTYP IQCHEYE    |                | 6: I/Q EYE Diagram   |           |
|                          | E.V.M. vs Chip                        | WFGTYP EVM        |                | 7: E.V.M. vs Symbol  |           |
|                          | Mag. Error vs Chip                    | WFGTYP MAGERR     |                | 8: Mag. Error vs Symbol  |           |
|                          | Phase Error vs Chip                   | WFGTYP PHAERR     |                | 9: Phase Error vs Symbol   |           |
|                          | Null Offset Constellation             | WFGTYP NCON       |                | 10: Null offset Constella-<br>tion                               |           |
|                          | Null Offset Constella-<br>tion(Line)  | WFGTYP NCONLIN    |                | 11: Null offset Constella-<br>tion(Line)                         |           |
|                          | Null Offset Constella-<br>tion(Dot)   | WFGTYP NCONDOT    |                | 12: Null offset Constella-<br>tion(Dot)                          |           |
|                          | Null Offset Constella-<br>tion(Line¨) | WFGTYP NCONLINDOT |                | 13: Null offset Constella-<br>tion(Line¨)                        |           |
|                          | Null Offset I EYE Diagram             | WFGTYP NICHEYE    |                | 14: Null offset I EYE<br>Diagram                                 |           |
|                          | Null Offset Q EYE Diagram             | WFGTYP NQCHEYE    |                | 15: Null offset Q EYE<br>Diagram                                 |           |
|                          | Null Offset I/Q EYE Dia-<br>gram      | WFGTYP NIQCHEYE   |                | 16: Null offset I/Q EYE<br>Diagram                               |           |
| Data<br>output           |                                       |                   |                |  |           |
| Constella-<br>tion       | I-channel data output                 |                   | GPHI?          | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |           |
| Constella-<br>tion(Line) |                                       |                   |                | n: Amount of output data<br>(Integer)                            |           |
| Constella-<br>tion(Dot)  |                                       |                   |                | dn: Data (Real number)   |           |

| Function                      |                       | Listener Code | Та       | Domarka   |         |
|-------------------------------|-----------------------|---------------|----------|---|---------|
|                               |                       | Listener Code | Code     | Output Format   | Remarks |
| Constella-<br>tion(Line<br>¨) |                       |               |          |   |         |
| I EYE<br>Diagram              | Q-channel data output |               | GPHQ?    | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf>    |         |
| Q EYE<br>Diagram              |                       |               |          | n: Amount of output data<br>(Integer)                               |         |
| I/Q EYE<br>Diagram            |                       |               |          | dn: Data (Real number)  |         |
| I EYE<br>Diagram              | X data (Chip)         |               | GPHCHIP? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf>    |         |
| Q EYE<br>Diagram              |                       |               | GPHX?    | n: Amount of output data<br>(Integer)                               |         |
| I/Q EYE<br>Diagram            |                       |               |          | dn: Chip data<br>(Integer)  |         |
| E.V.M. vs<br>Symbol           | X data (Chip)         |               | GPHCHIP? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf>    |         |
| Mag.<br>Error vs<br>Symbol    |                       |               | GPHX?    | n: Amount of output data<br>(Integer)                               |         |
|                               |                       |               |          | dn: Chip data<br>(Integer)  |         |
| Phase<br>Error vs<br>Symbol   |                       |               |          |   |         |
|                               | Y data (Chip)         |               | GPHY?    | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf>    |         |
|                               |                       |               |          | n: Amount of output data<br>(Integer)                               |         |
|                               |                       | 1             |          | dn: Data (Integer)  |         |
| Code<br>Domain<br>Power       | X data (Channel)      |               | GPHCH?   | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf>    |         |
|                               |                       |               |          | n: Amount of output data<br>(Integer)<br>dn: Channel<br>Å@(Integer) |         |

| Function               |                         | Listener Code | Та      | Remarks  |         |
|------------------------|-------------------------|---------------|---------|--|---------|
|                        |                         |               | Code    | Output Format  | Remarks |
| Code<br>Doman<br>Power | Y data (Rho)            |               | GPHRHO? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |         |
|                        |                         |               |         | n:Amount of output data<br>(Integer)                             |         |
|                        |                         |               |         | dn: Rho (Real number)  |         |
|                        | Y data (Power)          |               | GPHPOW? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |         |
|                        |                         |               |         | n: Amount of output data<br>(Integer)                            |         |
|                        |                         |               |         | dn: Level (dB)<br>(Real number)                                  |         |
|                        | Y data (Tau)            |               | GPHTAU? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |         |
|                        |                         |               |         | n:Amount of output data<br>(Integer)                             |         |
|                        |                         |               |         | dn: Tau(sec)<br>(Real number)                                    |         |
|                        | Y data (Phase)          |               | GPHPHA? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |         |
|                        |                         |               |         | n: Amount of output data<br>(Integer)                            |         |
|                        |                         |               |         | dn: θ (degree/m<br>rad)(Real number)                             |         |
|                        | Y data<br>(Walsh Power) |               | GPHWSH? | n <cr+lf>+d1<br/><cr+lf>+<br/>+dn<cr+lf></cr+lf></cr+lf></cr+lf> |         |
|                        |                         |               |         | n:Amount of output data<br>(Integer)                             |         |
|                        |                         |               |         | dn: Level (W/dBm)<br>(Real number)                               |         |

|               | Function          | Listoper Code | Talker Request |               |  |
|---------------|-------------------|---------------|----------------|---------------|--|
| Function      |                   | Listener Code | Code           | Output Format |  |
| Entering data | 0 to 9            | 0 to 9        |                |               |  |
|               | . (Decimal point) |               |                |               |  |
|               | GHz               | GZ            |                |               |  |
|               | MHz               | MZ            |                |               |  |
|               | kHz               | KZ            |                |               |  |
|               | Hz                | HZ            |                |               |  |
|               | mV                | MV            |                |               |  |
|               | mW                | MW            |                |               |  |
|               | dB                | DB            |                |               |  |
|               | mA                | MA            |                |               |  |
|               | sec               | SC            |                |               |  |
|               | ms                | MS            |                |               |  |
|               | μs                | US            |                |               |  |
|               | ENTER             | ENT           |                |               |  |

| Table 4 | 12  | Numerie | Irorya/Stor | Irora/Data | Imah/IImit  | Iroria | Entoring  | data) |
|---------|-----|---------|-------------|------------|-------------|--------|-----------|-------|
| Table 4 | -13 | Numeric | Keys/Step   | KEYS/Data  | KHOD/ UIIIt | KCYS I | Lintering | uata) |

| Function |   | Listanar Coda | Talker Request |  |  |  |
|----------|---|---------------|----------------|--|--|--|
|          |   | Listener Code | Code           | Output Format  |  |  |
| Miscel-  | Outputting error number                                     |               | ERRNO?         | Integer  |  |  |
| laneous  | Local   | LC            |                |  |  |  |
|          | Reading GPIB address  |               | AD?            | Integer (0 to 30)  |  |  |
|          | Specification of the delimiter                              |               |                |  |  |  |
|          | CR LF <eoi></eoi>   | DL0           |                |  |  |  |
|          | LF  | DL1           |                |  |  |  |
|          | <eoi></eoi>   | DL2           |                |  |  |  |
|          | CR LF   | DL3           |                |  |  |  |
|          | LF <eoi></eoi>  | DL4           |                |  |  |  |
|          | Service request interruption                                |               |                |  |  |  |
|          | ON  | SO            |                |  |  |  |
|          | OFF   | S1            |                |  |  |  |
|          | Status clear  | S2            |                |  |  |  |
|          | Service request mask  | RQS *         | RQS?           | Decimal number correspond-   |  |  |
|          |   |               |                | ing to the SRQ bit   |  |  |
|          | Outputting ID of the instrument                             |               | *IDN?          | Manufacturer name (character<br>string), instrument type (char-<br>acter string), 0 and revision<br>(character string) |  |  |
|          | Initializing the instrument                                 | *RST          |                |  |  |  |
|          | Clearing the queues related to the status byte              | *CLS          |                |  |  |  |
|          | Accessing the standard event enable register                | *ESE          | *ESE?          | Decimal number correspond-<br>ing to the register bits   |  |  |
|          | Reading or clearing the stan-<br>dard event enable register |               | *ESR?          | Decimal number correspond-<br>ing to the register bits   |  |  |
|          | Accessing the service request<br>enable register            | *SRE          | *SRE?          | Decimal number correspond-<br>ing to the register bits   |  |  |
|          | Reading the status byte and MSS bit                         |               | *STB?          | Decimal number correspond-<br>ing to the status byte   |  |  |
|          | Accessing the operation status enable register              | OPR *         | OPR?           | Decimal number correspond-<br>ing to the register bits   |  |  |
|          | Reading or clearing the opera-<br>tion status register      |               | OPREVT?        | Decimal number correspond-<br>ing to the register bits   |  |  |

Table 4-14 Miscellaneous

# **5 TECHNICAL NOTES**

#### 5.1 Waveform Quality measurement of Modulation Signal

The signal to be measured in Pilot mode assumes the following signals.

(1) In Forward Link mode

The Pilot signal output from the BTS is assumed to be the object.



#### **Figure 5-1 Foward Link**

The tirgger signal placed at the head of I/Q Channel Pilot PN Sequence is input to R3267 Series as the external trigger signal.

The time drift betwen the trigger signal and the head of I/Q Channel Pilot PN Sequence, Obtained from the Pilot signal input to R3267 Series, is calculated as  $\tau$ .

(2) In Reverse Link mode

The test signal output from the MS is assumed to be the object.



#### **Figure 5-2 Reverse Link**

The trigger signal placed at the head of I/Q Channel Pilot PN Sequence is input to R3267 Series as external trigger signal.

The time drift between the trigger signal and the head of I/Q Channel Pilot PN Sequence, obtained from the Pilot signal input to R3267 Series, is calculated as  $\tau$ .

#### 5.2 About Equalizing Filter

According to IS-95 7.1.3.1.11.2 Phase Characteristics, the base station must equalize the signal phase outputs using the Equalizing Filter. This is defined by the following formula.

$$H(W) = k \frac{W^{2} + j \alpha WW_{0} - W_{0}^{2}}{W^{2} - j \alpha WW_{0} - W_{0}^{2}} \begin{cases} k & : \text{ Arbitrary gain} \\ j & : \sqrt{-1} \\ \alpha & : 1.36 \\ W_{0} & : 2 \pi \times 3.15 \times 10^{5} \\ W & : \text{ Radian frequency} \end{cases}$$

When a signal sent from the base station passes through the Equalizing Filter, the R3267 Series can analyze the waveform using a filter with the inverted charcteristics of the Equalizing Filter.

To do this, set the Equalizing Filter setting in the Parameter Setup soft menu to ON.

To analyze a signal which is not passing through the Equaling Filter, set the Filter to OFF.

#### 5.3 Null Offset Graph

In Reverse Link mode, the analyzer has graph display functions, such as a Null Offset Constellation and Null Offset I(Q) Eye to display graphs obtained in Waveform Quality measurement mode.

In this mode, Constellation graphs do not converge to a point, because Offset QPSK modulation method is used.



**Figure 5-3 Reverse Link Constellation** 

QPSK Constellation graph can be converged to a point as shown in Figure 5-4 after the effect of the Offset QPSK function has been cancelled and the signal is then passed through a baseband filter whose characteristics are inverse to the filter compliant with IS-95,. The graph obtained through this method is referred to as Null Offset Constellation.



**Figure 5-4 Null Offset Constellation** 

*NOTE:* Because of the interference between two adjacent symbols, the constellation graph cannot be converged to a point, even if the offset value is shifted using the Offset QPSK function

#### 5.4 Displaying the Absolute Power

The Absolute power which is displayed in the code domain power measurement function is the power of the symbol point, and does not neccessarily coincide with the power measured by the power meter or the Tx power measurement mode.

The code domain power is defined at symbol points, therefore, the absolute power displayed on this measurement is the power of the symbol points

#### 5.5 Estimated $\rho$ in the Code Domain Power Measurement

For the estimated  $\rho$  measurement, the instrument sum each the  $\rho$  of the Walsh channel that is greater than the threshold level set by Parameter Setup.

#### 5.6 Peak Factor of Tx Power

The calculation of a peak factor is made using the following equation:

Peak Factor = Peak power/Average power.

The peak power and average power are obtained from the envelope after down-converting the input signal into the base band.

Make sure the RF status of the input signal is not the peak power of IF.

### 5.7 Trigger Source INTVL (EXT) and INTVL

The instrument has the internal trigger generated every 26.6 milliseconds (PN Sequence repetition rate). For this internal trigger, there are two modes: one sets the trigger to Free Run state and the other makes the signal synchronize with the external trigger.

In the Waveform Quality and Code Domain Power measurements, the Even Second signals generated every 2 seconds are normally used as the external trigger, while the measurement refresh rate can be made faster than 2 seconds when Trigger Source is set to INTVL (EXT).

In addition, measurement is possible without using the external trigger signal if you measure the PN Offset in INTRVL trigger mode and set the measured value. If this happens, however, the PN Offset drift occurs in a long measurement because of the frequency reference error.

It is possible to prevent the drift from occurring by applying the 10 MHz reference signal in synchronization with the DUT signal to the instrument. (For more information, refer to Chapter 2 "Measurement Example 2.")

#### 5.8 Template Edit Function

In TRANSIENT mode, the user can change template. It is necessary to pay attention when entering template, because the data can be interpreted as a relative or absolute value, depending on the setting of Template Couple to Power ON/OFF in the Config menu.

The PASS/FAIL judgment is performed and then the result is displayed on the screen, when Template ON/ OFF in the Template menu is set to ON.

#### 5.8.1 Template Setting in the T-Domain Measuring Mode

When Template Couple to Power is set to OFF, template (Y axis data) is interpreted as an absolute value. As a result, the template consists of the data you entered.

Use the Shift X/Y keys to adjust the template position over the measured value.

When Template Couple to Power is set to ON, template (Y axis data) is interpreted as a relative value to the average power.



**Figure 5-5 Template to Be Set** 

For example, the above template gives +3 dB and -40 dB of the power during the burst period of the signal. To prepare this template, follow the procedure shown below.

REF 17.3 dBm 10 <u>dB/ \*A\_Write Smpl</u> Templ Edit Template under and the second WYYY UP LOW Copy from STD **WHM** PASS 槲 CENTER 800.000000 MHz \*RBW 3 MHz \*VBW 10 MHz SPAN 0 Hz ATT 30 dB \*SWP 700 µs Template Edit Insert [ No ] [Time] [Level] l ine -40.00 dBm -40.00 dBm 3.00 dBm 3.00 dBm -40.00 dBm -1.000000 ms -3.000 μs -3.000 μs 1. 2. 3. 4. Delete Line 595.900 µs 595.900 µs 5. 6. 7. 1.000000 ms -40.00 dBm Sort 8. 9. Table 10. Init

Set the template using the relative value to the average power.

#### Figure 5-6 Template settings

When you shift the template to the direction of Y axis using Shift X/Y function while the Template Couple to Power is set to ON, the relative value to the average power is: Relative value (set on the template) + Shifted data on Y axis.



Figure 5-7 Template Shifted Using the Shift Y Function

#### 5.8.2 Template Setting in the F-Domain Measuring Mode

In F-Domain measurement mode, the carrier frequencies depend on the channel numbers. As a result, use the offset frequency from the carrier frequency for template's X axis data.

Set the carrier frequency on the template to 0 Hz so that you can use plus or minus values for the offset frequencies.

The analyzer sets the template by adding the center frequency currently used to X value.



Figure 5-8 Template with the Set Values

Soft menu Margin delta X expands the template frequency by  $\Delta X/2$  to both sides (toward plus and minus frequency directions) from the 0 Hz on the template.



Figure 5-9 Template with Margin Delta X

When Template Couple to Power is set to OFF, template (Y axis data) is interpreted as an absolute value. As a result, the template is made up of the data you entered.

Use the Shift X/Y keys to adjust the template position over the measured value.

When Template Couple to Power is set to ON, template (Y axis data) is interpreted as a relative value to the average power.

When the template is shifted on Y axis using the Shift X/Y function, the relative value to the average power is: Relative value (set on the template) + Shifted data on Y axis.

#### 5.9 Measurement Parameter Settings in Due to Transient, Due to Modulation and Inband Spurious

In TRANSIENT mode, any parameters are compliant with the communication standard when you specify the communication standard. You can also change the measuring frequency and the secondary processing of the measured results.

For the method of changing these, refer to the following.

#### 5.9.1 Marker Edit Function

Measurement frequency can be set using Marker Edit in Due to Transient, Due to Modulation or Inband Spurious function (these three functions are found within the Transient mode). In addition, each limit level can be set using Marker Edit.

(1) Marker Edit used in the Due to Transient and Due to Modulation

The measuring frequency is set using the offset frequency from a carrier frequency. If you set the offset frequency to 200 kHz, the offset frequencies (+200 kHz and -200 kHz) can be measured. In addition, two types of marker are available: the Normal marker and the Integral marker.

Normal marker is used to read the level of the frequency previously set, and the Integral marker is used to calculate the power of the bandwidth whose center frequency is specified by Marker Edit.



Figure 5-10 Example of Marker Edit Setting
(2) Marker Edit used in the Inband Spurious

Measuring frequency range is set using the offset frequency form the carrier frequency. If you set 3 MHz and 10 MHz, the peak search is performed for two ranges: one of the two offset frequency range is between -3 MHz and -10 MHz; another range is between +3 MHz and +10 MHz.



Figure 5-11 Marker Edit Setting

Peak marker is set using the Peak Marker Y Delta soft key in the Config menu.



Figure 5-12 Example of Peak Marker Y Delta

# 5.9.2 Measurement results Using Due to Modulation, Due to Transient and Inband Spurious Modes

In spectrum measurements, there are three methods for displaying results of adjacent or alternate adjacent channel leakage power measurements.

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### **5 TECHNICAL NOTES**

# *NOTE:* As for the absolute level of adjacent channel power and the absolute level of carrier frequency, each of these can be defined in two modes:

- Level at a specific frequency where the marker is located (the marker level is read in such a case)
- Level calculated from integration to the specified frequency band
- (1) The measured value displays the absolute level of the marker, which is located at an offset frequency from the carrier frequency.
- (2) The ratio of the absolute level of the marker to the absolute level of the carrier is displayed. The marker point is located at an offset frequency from the carrier frequency.
- (3) The value obtained in (2) is multiplied by the level by the power meter. The calculated value is then displayed.

This method is used when the absolute value of the adjacent channel power cannot be measured., The ratio of the adjacent channel power to the carrier power can be measured only when Detector is set to Posi. However, the absolute level cannot be measured.

To display a measured value in (1), select MARKER on the Result : MARKER/RELATIVE/ABS POW-ER menu in the Parameter Setup dialog box.

To display the measured value in (2), select RELATIVE.

To display a measured value in (3), select ABS POWER. In addition, use the Marker Edit menu to set up measurement conditions for the carrier power. Set the MKR Type to NORMAL or INTEGRAL in the Reference Marker in order to measure the carrier power.

To measure the power of the bandwidth by integration, Reference MKR Type must be set to INTEGRAL.

To measure a point level (marker reading), Reference MKR Type must set to NORMAL.

To measure adjacent channel power, set Offset MKR Type to NORMAL or INTEGRAL. To measure the carrier power in (2) or (3), there are two methods: one is by setting the Marker Edit to the Reference MKR type (set the Ref Power to REF MARKER. Ref Power is in the Parameter Setup dialog box on the config menu); another is to measure power using the DSP (set the Ref Power to MODULATION. Ref Power is in the Parameter Setup dialog box on the config menu).

When REF MARKER is selected, the carrier power is measured by setting Reference MKR Type in the Marker Edit menu.

When MODULATION is selected, the carrier power is measured by Tx Power (Modulation, Tx Power).

When ABS POWER of the Result is selected from the Parameter Setup dialog box in the Config Menu, the ratio of Offset MKR to Reference MKR is calculated, the measurement value from Tx Power is multiplied by this ratio. Then, the result will be displayed.

### 5.9.3 Measurement Result of Inband Spurious

In Spurious measurements, there are two methods:

- (1) After searching for the peak on the trace, the frequency and level at the marker are displayed.
- (2) After searching for the peak on the trace, the ratio of the marker level to the carrier level is displayed.
- (3) The calculated level, which is calculated using the result obtained in (2) and the level on the power meter is displayed.

To display the measured value in (1), select MARKER on the Result : MARKER/RELATIVE/ABS POW-ER menu in the Parameter Setup dialog box. And also, to display the measured value in (2), select REL-ATIVE; for the (3), select ABS POWER. The measurement conditions for the carrier power is set up using the Marker Edit menu. To measure the carrier power, set Reference MKR Type to PEAK or NORMAL.

To measure the carrier power at the specified frequency, NORMAL is set; and to measure the carrier power at the peak on the trace, PEAK is set.

To measure the carrier power in (2) or (3), there are two methods: one is by setting the instrument to the Reference MKR type in the Marker Edit menu; another is by the DSP.

When Ref Power is set to REF MARKER, the carrier power is measured by Reference MKR Type in the Marker Edit menu.

When Ref Power is set to MODULATION, the carrier power is measured by the Tx Power(Modulation, Tx Power).

### 5.10 Mag Error (Magnitude Error)

Mag Error is defined as shown in Figure 5-13, and the value is calculated using the following formula.

### 5.11 Phase Error

Phase Error is defined as shown in Figure 5-13, and the value is calculated using the following formula.

Phase Error(i) =  $\tan^{-1}(Qm(i)/Im(i)) - \tan^{-1}(Qr(i)/Ir(i))$  Im(i), Qm(i) :Measured Value Ir(i), Qr(i) :Reference Value i : Symbol Number

### 5.12 E.V.M .(Error Vector Magnitude)

E.V.M. is defined as shown in Figure 5-13, and the value is calculated using the following formula.



Figure 5-13 Mag Error, Phase Error, E.V.M.

## 5.13 Block Diagram

This section shows the block diagram for the modulation analysis hardware.

The Figure 5-14 shows the modulation analysis part. Therefore the spectrum analyzer part is simplified. The area inside the double lines is the block diagram for the spectrum analyzer, and the part outside that area represents the modulation analysis hardware.



**Figure 5-14 Block Diagram** 

## 6 **PERFORMANCE VERIFICATION TEST**

## 6.1 General

### 6.1.1 Introduction

This chapter provides R3267 Series performance verification test procedures, item by item as listed in Table 6-1.

Performance verification test will be carried out under following condition.

Temperature range: 20°C to 30°C

Relative Humidity: 85% or less

### **Table 6-1 Performance Verification Items**

| No.   | Test Items                       |
|-------|----------------------------------|
| 6.2.1 | Waveform Quality in Forward Link |
| 6.2.2 | Waveform Quality in Reverse Link |
| 6.2.3 | Code Domain Power                |
| 6.2.4 | Simplified Performance Check     |

### 6.1.2 Test Equipment

The Table 6-2 lists recommended test equipment.

The equipment needed to perform all of the performance test.

Equipment lists for individual tests are provided in each performance verification test.

In the table, PV is abbreviation of performance verification.

*NOTE:* 1. The R3267 Series with OPT61 to be tested should be warm up for at least 30 minutes before starting test.

- 2. Make sure that the test equipment used meets its own published specifications.
- 3. Any equipment that meets the critical specifications given in the table can be substituted for recommended models.

| No. | Description                             | Critical Specification  | Recommended<br>Model | Manufacturer       | Usage | Notes |
|-----|---|---|----------------------|--------------------|-------|-------|
| 1   | Arbitrary<br>Waveform<br>Generator      | Output Channels: 3 channel required<br>Capable to assign the output signal<br>I-CH signal at CH1<br>Q-CHsignal at CH2<br>Trigger signal(TTL) at CH3 | AWG2021              | Tektronix          | PV    | SG1*  |
| 2   | I/Q Modula-<br>tion Signal<br>Generator | Comply with IS-95,IS-97 and IS-98<br>Standard<br>Frequency Range: 30 MHz to 3 GHz<br>IQ Modulation Bandwidth: $> 5$ MHz<br>$\rho$ : $>0.999$        | SMIQ03               | Rohde<br>&Schwarts | PV    | SG2*  |
| 3   | RF Cable                                | BNC(m)-BNC(m), 50 $\Omega$  | MI-09                | Advantest          | PV    | -     |
| 4   | Adapter                                 | Type N(m)-BNC(f), 50 $\Omega$   | JUG-201-U            | Advantest          | PV    | -     |

### Table 6-2 Equipment List

NOTE: \*The IQ level and DC offset of both SG1 and SG2 must be matched.

Total performance of SG1 with SG2 must cover the R3267 Series tested specification.

## 6.1.3 Specifications Required for Test Signals

Table 6-3 provides the specifications required for performance verification test signals based on IS-95, IS-97 and IS-98 standard.

| No. | Name of test<br>Signal | Specification Required  |           | Usage  |
|-----|------------------------|---|-----------|--|
| 1   | Base Station           | Pilot Channel   |           | Waveform Quality Accuracy<br>(Forward Link)  |
| 2   | Mobile Station         | Comply with IS-98 Standard<br>Reverse Traffic Channel<br>Information Bits: All 0<br>9.6 kbps<br>Long Code Mask: All 0 |           | Waveform Quality Accuracy<br>(Reverse Link)  |
| 3   | Base Station           | Comply with the Chapter 12 of IS-97, and IS-98<br>Standard: Base Station Test Model, Norminal                         |           | Code Domain Power<br>Accuracy (Forward Link) |
|     |                        | Channel No.   | Amplitude |  |
|     |                        | 0 (Pilot)   | -6.99 dB  |  |
|     |                        | 1 (Paging)  | -7.25 dB  |  |
|     |                        | 6 (Traffic)   | -10.26 dB |  |
|     |                        | 17 (Traffic)  | -10.26 dB |  |
|     |                        | 20 (Traffic)  | -10.26 dB |  |
|     |                        | 32 (Sync)   | -13.27 dB |  |
|     |                        | 41 (Traffic)  | -10.26 dB |  |
|     |                        | 49 (Traffic)  | -10.26 dB |  |
|     |                        | 58 (Traffic)  | -10.26 dB |  |
| 4   | CW                     | CAL OUT Signal of R3267 Series<br>Frequency: 30 MHz, Level: -10 dBm)  |           | Simplified Performance<br>Check              |

|           | ~              |            |          | ~ ~      |
|-----------|----------------|------------|----------|----------|
| Tahle 6.3 | Specifications | Required f | for Test | Signale  |
| Table 0-5 | opermeations   | Required   | IOI IUSI | orginals |

Figure 6-1 shows the timing chart of trigger signal with No.1, N0.2 and No.3 listed in Table 6-3.



**Figure 6-1 Timing Chart** 

### 6.1.4 Calibration Cycle

The performance verifications test should be used to check the spectrum analyzer against its specifications once a year recommended.

### 6.1.5 Performance Verification Test Record Sheet

The performance verification test record sheet and performance check record sheet are provided at the end of this chapter.

The test record lists test specification and acceptable limits.

Recommend that make a copy of this table, record the complete test results on the copy, and keep the copy for calibration test record.

This record could prove invaluable in tracking gradual changes in test result over long periods of the time.

### 6.1.6 Performance Verification Procedures

Typeface conventions used in this manual.

• Panel keys and soft keys are printed in a contrasting typestyle to make them stand out form the text as follows:

Panel keys: Boldface type Soft keys: Boldface and Italic Example: **FREQ**, **FORMAT** Example: *Center*, *Trace Detector* 

- When a series of key operations are described using a comma between two keys.
- There are various soft menus used to switch between two states such as ON/OFF and AUTO/MNL.

For example, when turning off the *Display ON/OFF* function, the annotation "*Display ON/OFF* (OFF)" is used.

When switching the *RBW AUTO/MNL* function to MNL, the annotation "*RBW AUTO/MNL* (MNL)" is used.

## 6.2 Performance Verification Tests Procedure

## 6.2.1 Waveform Quality Accuracy (Forward Link)

- Description
   Test waveform quality in Forward Link Mode.
- (2)Specification Waveform Quality Accuracy(p) : > 0.9985 Time Alignment Accuracy( $\tau$ )  $: < \pm 300 \text{ ns}$ **Carrier Frequency Accuracy**  $: < \pm 34 \text{ Hz}$ Equipment used (3) Arbitrary Waveform Generator : SG1 IO Madulatia . C: . 10 0.00

| IQ Modulation Signal Generator | : \$62          |
|--------------------------------|-----------------|
| RF Cable                       | : BNC(m)-BNC(m) |
| Adapter                        | : N(m)-BNC(f)   |

(4) Setup



### Figure 6-2 Setup of Waveform Quality Test for Forward Link

#### (5) Procedure

- 1. Connect equipment as shown in Figure 6-2.
- 2. On the SG1, set controls to generate the signal complied with No.1 signal listed in Table 6-3 at CH1 and CH2.
- 3. On the SG1, set controls to generate trigger signal at CH3.
- 4. On the SG2, set controls as follows;

| Modulation   | : External IQ Modulation |
|--------------|--------------------------|
| Frequency    | : 800 MHz                |
| Output Level | : 0 dBm                  |

5. On the R3267 Series, set controls as follows;

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| Center Frequency | : 800 MHz      |
|------------------|----------------|
| Input            | : RF           |
| Link             | : Forward Link |

6. On the R3267 Series, set the measurement parameter as shown in Figure 6-3.



#### Figure 6-3 Setting of Measurement Parameter for Forward Link Waveform Quality Test

- 7. On the R3267 Series, press *DC CAL* and *AUTO LEVEL* to perform dc calibration and auto level.
- 8. On the R3267 Series, press SINGLE for single sweep.
- 9. After single sweep has completed, record the measurement result in the performance verification test record sheet.

## 6.2.2 Waveform Quality Accuracy (Reverse Link)

(1) Description

Test waveform quality in reverse link

### (2) Specification

|     | Waveform Quality $(\rho)$        | : > 0.997                |
|-----|----------------------------------|--------------------------|
|     | Time Alignment Accuracy $(\tau)$ | $: < \pm 300 \text{ ns}$ |
|     | Carrier Frequency Accuracy:      | : < ±34 Hz               |
| (3) | Equipment used                   |                          |
|     | Arbitrary Waveform Generator     | : SG1                    |
|     | IQ Modulation Signal Generator   | : SG2                    |
|     | RF Cable                         | : BNC(m)-BNC(m)          |
|     | Adapter                          | : N(m)-BNC(f)            |

### (4) Setup



#### Figure 6-4 Setup of Waveform Quality Test for Reverse Link

#### (5) Procedure

- 1. Connect equipment as shown in Figure 6-4.
- 2. On the SG1, set controls to generate the signal complied with No.2 signal listed in Table 6-3 at CH1 and CH2.
- 3. On the SG1, set controls to generate trigger signal at CH3.
- 4. After single sweep has completed, record the measurement result in the performance verification test record sheet.
- 5. On the SG2, set controls as follows;

| Modulation   | : External IQ Modulation |
|--------------|--------------------------|
| Frequency    | : 800 MHz                |
| Output Level | : 0 dBm                  |

6. On the R3267 Series, set controls as follows;

| Center Frequency | : 800 MHz      |
|------------------|----------------|
| Input            | : RF           |
| Link             | : Reverse Link |



7. On the R3267 Series, set the measurement parameter as shown in Figure 6-5.

### Figure 6-5 Setting of Measurement Parameter for Reverse Link Waveform Quality Test

- 8. On the R3267 Series, press *DC CAL* and *AUTO LEVEL* to perform dc calibration and auto level.
- 9. On the R3267 Series, press SINGLE for single sweep.
- 10. After single sweep has completed, record the measurement result in the performance verification test record sheet.

### 6.2.3 Code Domain Power

(1) Description

Test code domain power accuracy.

Test signal in used should be complied with IS-97 and IS-98 standard

(2) Specification

|     | Carrier Frequency Accuracy          | : < ±34 Hz                |
|-----|-------------------------------------|---------------------------|
|     | Code Domain Power                   | $: < \pm 0.1 \text{ dB}$  |
|     | Time Alignment Accuracy( $\tau$ )   | $: < \pm 10 \text{ ns}$   |
|     | Phase Accuracy: ( $\Delta \theta$ ) | $: < \pm 10 \text{ mrad}$ |
| (3) | Equipment used                      |                           |
|     | Arbitrary Waveform Generator        | : SG1                     |
|     | IQ Modulation Signal Generator      | : SG2                     |
|     | RF Cable                            | : BNC(m)-BNC(m)           |
|     | Adapter                             | : N(m)-BNC(f)             |
|     |                                     |                           |

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### (4) Setup



### Figure 6-6 Setup of Code Domain Power Test

### (5) Procedure

- 1. Connect equipment as shown in Figure 6-6.
- 2. On the SG1, set controls to generate the signal complied with No.3 signal listed in Table 6-3.
- 3. On the SG1, set controls to generate trigger signal at CH3.
- 4. On the SG2, set controls as follows;

| Modulation   | : External IQ Modulation |
|--------------|--------------------------|
| Frequency    | : 800 MHz                |
| Output Level | : 0 dBm                  |

5. On the R3267 Series, set controls as follows;

| Center Frequency | : 800 MHz      |
|------------------|----------------|
| Input            | : RF           |
| Link             | : Forward Link |



6. On the R3267 Series, set the measurement parameter as shown in Figure 6-7.

#### Figure 6-7 Setting of Measurement Parameter for Code Domain Power Test

- 7. On the R3267 Series, press *DC CAL* and *AUTO LEVEL* to perform dc calibration and auto level.
- 8. On the R3267 Series, press **SINGLE** for single sweep.
- 9. After single sweep has completed, record the measurement result in the performance verification test record sheet.

## 6.2.4 Simplified Performance Check by Using Calibration Signal

(1) Description

This section provides performance check procedure for OPT61 by using built-in calibration signal. Measure carrier frequency accuracy and waveform quality.

| (2) | Specification              |                 |
|-----|----------------------------|-----------------|
|     | Carrier Frequency Accuracy | : < ±34 Hz      |
|     | Waveform Quality $(\rho)$  | : > 0.9985      |
| (3) | Equipment used             |                 |
|     | RF Cable                   | : BNC(m)-BNC(m) |
|     | Adapter                    | : N(m)-BNC(f)   |

### (4) Setup



### Figure 6-8 Setup of Simplified Performance Check

(5) Procedure

- 1. Connect equipment as shown in Figure 6-8.
- 2. On the R3267 Series, set controls as follows;

| Center Frequency | : 30.3072 MHz  |
|------------------|----------------|
| Input            | : RF           |
| Link             | : Forward Link |

3. On the R3267 Series, set the measurement parameter as shown in Figure 6-9.

|                 | Yaveform Q            | ue) | lity            |                    |
|-----------------|-----------------------|-----|-----------------|--------------------|
| Resu            | lts                   |     |                 | Nave@uality        |
| (Na[            | Para                  | et  | ter Setup       | Auto Level         |
| 3 (Ti           | Meas Mode             | ł   | PILOT NON ZEND  | Set                |
| I               | Meas Range            | =   | 20 (1280chip)   | 2                  |
| Carri           | r Offset              | 1   | DEFAULT USER    | uraphics           |
| Carri           | r                     | ÷   |                 | 20                 |
| Hagni           | Equalizing Filter     | :   | ON OFF          | Setup              |
| Phase           | PN Offset Search Hode | 1   | DH DFT          | Jerep 1            |
| Error<br>pel de | PN Offset             | :   |                 | * Average<br>Times |
| Ext. 1          | Trigger Source        | ;   | INT EXT         | ON OFF             |
| Paranet         |                       |     | DALLAND DALLAND |                    |
| Frequ           | EXT Trigger Slope     | ;   | -               |                    |
| Befer           | EXT Trigger Delay     | ÷   |                 |                    |
| Atten           | Freq Meas Range       | 1   | NUSWI, EXPAND   |                    |
| 10HH24          | ****                  | -   |                 |                    |
|                 |                       |     |                 |                    |
|                 |                       | _   |                 | l I                |

#### Figure 6-9 Setting of Measurement Parameter for Simplified Performance Check

- 4. On the R3267 Series, press *DC CAL* and *AUTO LEVEL* to perform dc calibration and auto level.
- 5. On the R3267 Series, press SINGLE for single sweep.
- 6. After single sweep has completed, record the result in the performance check record sheet.

6.3 Performance Verification Test Record Sheet

## 6.3 Performance Verification Test Record Sheet

Model : OPT3264/67/73+61

S/N :

(1) Waveform Quality (Forward Link)

| Test Items                          |         | Result         |         |           |
|-------------------------------------|---------|----------------|---------|-----------|
| Test Rellis                         | Min.    | Measured Value | Max.    | Pass/Fail |
| Waveform Quality Accuracy( $\rho$ ) | 0.9985  |                | N/A     |           |
| Time Alignment Accuracy( $\tau$ )   | -300 ns |                | +300 ns |           |
| Carrier Frequency Accuracy          | -34 Hz  |                | +34 Hz  |           |

## (2) Waveform Quality (Reverse Link)

| Test Items                          |         | Result         |         |           |
|-------------------------------------|---------|----------------|---------|-----------|
| Test items                          | Min.    | Measured Value | Max.    | Pass/Fail |
| Waveform Quality Accuracy( $\rho$ ) | 0.997   |                | N/A     |           |
| Time Alignment Accuracy( $\tau$ )   | -300 ns |                | +300 ns |           |
| Carrier Frequency Accuracy          | -34 Hz  |                | +34 Hz  |           |

## 6.3 Performance Verification Test Record Sheet

| Test Items                         |        | Specification |                |          | Result    |
|------------------------------------|--------|---------------|----------------|----------|-----------|
|                                    |        | Min.          | Measured Value | Max.     | Pass/Fail |
| Carrier Frequency Accuracy         |        | -34 Hz        |                | +34 Hz   |           |
| Code Domain Power Accuracy         | Ch No. |               | •              |          |           |
| (POWER <sub>i</sub> )              | 0      | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 1      | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 6      | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 17     | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 20     | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 32     | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 41     | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 49     | -0.1 dB       |                | +0.1 dB  |           |
|                                    | 58     | -0.1 dB       |                | +0.1 dB  |           |
| Time Alignment Accuracy $(\tau_i)$ | Ch No. |               |                |          |           |
|                                    | 0      | -10 ns        |                | +10 ns   |           |
|                                    | 1      | -10 ns        |                | +10 ns   |           |
|                                    | 6      | -10 ns        |                | +10 ns   |           |
|                                    | 17     | -10 ns        |                | +10 ns   |           |
|                                    | 20     | -10 ns        |                | +10 ns   |           |
|                                    | 32     | -10 ns        |                | +10 ns   |           |
|                                    | 41     | -10 ns        |                | +10 ns   |           |
|                                    | 49     | -10 ns        |                | +10 ns   |           |
|                                    | 58     | -10 ns        |                | +10 ns   |           |
| Phase Accuracy $(\Delta \theta_i)$ | Ch No. |               |                |          |           |
|                                    | 0      | +10 mrad      |                | +10 mrad |           |
|                                    | 1      | +10 mrad      |                | +10 mrad |           |
|                                    | 6      | +10 mrad      |                | +10 mrad |           |
|                                    | 17     | +10 mrad      |                | +10 mrad |           |
|                                    | 20     | +10 mrad      |                | +10 mrad |           |
|                                    | 32     | +10 mrad      |                | +10 mrad |           |
|                                    | 41     | +10 mrad      |                | +10 mrad |           |
|                                    | 49     | +10 mrad      |                | +10 mrad |           |
|                                    | 58     | +10 mrad      |                | +10 mrad |           |

(3) Code Domain Power

6.4 Simplified Performance Check Record Sheet

## 6.4 Simplified Performance Check Record Sheet

Model : OPT3264/67/73+61

S/N:

| Tast Itams                          |        | Result         |        |           |
|-------------------------------------|--------|----------------|--------|-----------|
| Test items                          | Min.   | Measured Value | Max.   | Pass/Fail |
| Waveform Quality Accuracy( $\rho$ ) | 0.9985 |                | N/A    |           |
| Carrier Frequency Accuracy          | -34 Hz |                | +34 Hz |           |

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**7 SPECIFICATIONS** 

## 7 SPECIFICATIONS

RF input

• Waveform quality measurement

| Characteristics                | Specification  |  |
|--------------------------------|--|--|
| Measurement frequency range    | 30 MHz to 3.0 GHz  |  |
| Input level range              | -30dBm to +30 dBm  |  |
|                                | (Total power at ATT:AUTO)  |  |
| Forward Link                   |  |  |
| Waveform quality( $\rho$ )     | Measurement accuracy : <±0.0015  |  |
| Time alignment Error( $\tau$ ) | Measurement accuracy : <±300 nsec  |  |
| Carrier frequency Error        | $<\pm$ (Reference frequency accuracy $\times$ Carrier frequency $+$ 10 Hz) |  |
|                                | (Expand mode:carrier frequency ±4 kHz)                                     |  |
| Reverse Link                   |  |  |
| Waveform quality(p)            | Measurement accuracy : <±0.003   |  |
| Time alignment $Error(\tau)$   | Measurement accuracy : <±300 nsec  |  |
| Carrier frequency Error        | $<\pm$ (Reference frequency accuracy × Carrier frequency + 10 Hz)          |  |
|                                | (Carrier frequency ±4 kHz)   |  |

### Code Domain Power

| Characteristics             | Specification   |
|-----------------------------|---|
| Measurement frequency range | 30 MHz to 3.0 GHz   |
| Input level range           | -30dBm to +30 dBm   |
|                             | (Total power at ATT:AUTO)   |
| Precise Mode                | measure at 64*20chip  |
| POWER i                     | Measurement accuracy : $<\pm 0.1 \text{ dB}(\text{at } \tau i=0)$         |
| Carrier frequency Error     | Measurement accuracy : <±300 nsec   |
|                             | $< \pm$ (Reference frequency accuracy $\times$ Carrier frequency + 10 Hz) |
| τi                          | Measurement accuracy : <±10nsec   |
| $\Delta \theta$ i           | Measurement accuracy : <±10mrad   |
| Normal Mode                 | measure at 64*20chip  |
| POWER i                     | Measurement accuracy : $<\pm 0.1 \text{ dB}(\text{at } \tau i=0)$         |
| Carrier frequency Error     | Measurement accuracy : <±300 nsec   |
|                             | $< \pm$ (Reference frequency accuracy $\times$ Carrier frequency + 10 Hz) |
|                             | (Expand mode:carrier frequency ±4 kHz)                                    |

Note: The measurement signal is specified by IS-97 "Base Station Test Model".

A.1 Messages

## APPENDIX

## A.1 Messages

In this section, the messages that are displayed while the analyzer is being used are described.

| Code | Messages   | Description  |
|------|--|--|
| 700  | System Error.<br>Cannot allocate the required memory.                      | Fatal Error occurred. Data area for the calcula-<br>tion is insufficient on the memory.<br>Contact a sales representative. |
| 701  | System Error.<br>Clock is not operational.                                 | Fatal Error occurred. System clock is not in operation.<br>Contact a sales representative.                                 |
| 702  | Modulation Gain CAL error.<br>Check 30 MHz CAL signal for con-<br>nection. |  |
| 703  | Modulation DC CAL error.<br>Remove input signals and try again.            |  |
| 704  | Time Out!<br>No Trigger Detected   | Time out error on the trigger signal occurred.<br>Check the trigger settings.  |
| 705  | Input Level is out of Range.<br>Check the Ref. level.                      |  |
| 706  | No graph data.<br>Execute measurement.                                     |  |
| 708  | System Error.<br>Contact qualified engineer.                               |  |
| 710  | Auto Level completed !   |  |
| 711  | Auto Level Set can not be succeed.<br>Signal level is not stable.          |  |
| 712  | Cannot execute measureent.<br>Because is too low.                          |  |
| 713  | Cannot synchronize to Pilot.<br>Adjust PN Offset.                          |  |
| 714  | Cannot converge equation.<br>Adjust threshold.                             |  |
| 715  | Frequency Error is out of Meas.<br>Range.                                  |  |

A.1 Messages

| Code | Messages   | Description |
|------|--|-------------|
| 719  | Burst signal is not detected.<br>Check Burst length or Ref. level.               |             |
| 721  | Frequency Error is out of Meas.<br>Range.  |             |
| 722  | Modulation Gain CAL error!(#200)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 723  | Modulation Gain CAL error!(#300)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 724  | Modulation Gain CAL error!(#110)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 725  | Modulation Gain CAL error!(#120)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 726  | Modulation Gain CAL error!(#210)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 727  | Modulation Gain CAL error!(#220)<br>Check 30 MHz CAL signal for con-<br>nection. |             |
| 728  | Handshake error occurred to DSP.<br>Contact qualified engineer.                  |             |
| 729  | Cannot Detect Mod. DSP board.<br>Contact qualified engineer.                     |             |
| 750  | Handshake error occurred to DSP.<br>Contact qualified engineer.                  |             |
| 751  | Cannot Detect Mod. DSP board.<br>Contact qualified engineer.                     |             |

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