

R3267 Series OPT65

cdma2000 Measurement Option

Operation Manual

MANUAL NUMBER FOE-8350461C00

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	
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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 65, cdma2000 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.
 INTRODUCTION Product Overview Accessories Self Test Function About Calibration Explanation of the Connectors 	Includes a description of the option and its accessories and a self test error messages.
 2. MEASUREMENT EXAMPLES Measuring the Code Domain Power of Base Station Signals Mobile station (MS) Code Domain Power Measurement CCDF Measurement 	You can learn the basic operations of the option through the examples shown in this chapter.
 3. REFERENCE Menu Index Menu Map Functional Description 	Shows a list of operation keys, and describes the function of each key.
4. REMOTE CONTROLGPIB Command IndexGPIB Command Codes	Included are a list of commands necessary for programming.
 5. TECHNICAL INFORMATION Template Edit Function Measurement Parameter Settings in Due to Transient, Due to Modulation and Inband Spurious Estimated ρ in the Code Domain Power Measurement Peak Factor of Tx Power Trigger Source INTRVL (EXT) and INTRVL About Bit Reversal (Paley) Order About Complementary Filter About Equalizing Filter Null Offset Graph Block Diagram 	Describes the principle of operation nec- essary for taking measurements more accurately.
 6. PERFORMANCE VERIFICATION TEST General Performance Verification Test Procedure Performance Verification Test Record Sheet 	Describes how to test performance.

Preface

7. SPECIFICATIONS	Shows the specifications of the option.	
APPENDIX Messages 	If an error occurs during operation, an error number and its corresponding error message are displayed. The meaning of each error is explained in this section.	

(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: **TRANSIENT** Example: *T-Domain, 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 *Window ON/OFF* function, the annotation "*Window ON/OFF* (OFF)" is used.

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1.1 Product Overview

1 INTRODUCTION

1.1 Product Overview

The cdma 2000 modulation analysis option (OPT 65) software allows you to measure and evaluate the modulation accuracy specified by IS-2000.

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

This option includes the following features:

- Measures the modulation accuracy, frequency error, code domain power and so on.
- Can be used to measure OBW or ACP due to Transient specified by the communication standard with a simple key operation.

1.2 Accessories

Name of accessories	Type of name	Quantity	Remarks
R3267 Series option 65 Operation manual	ER3267/73OPT65	1	English

1.3 Self Test Function

The self test also checks the Option 65 for correct operation when the spectrum analyzer power is turned on. The message shown below will be displayed when an error related to Option 65 occurs. Contact ADVANTEST 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 1 year

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 MEASUREMENT EXAMPLES

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

2.1 Measuring the Code Domain Power of Base Station Signals

This section provides measurement examples for the code domain coefficient in FORWARD Link when it is used to analyze the base station signal

Measurement conditions:

Measured signals have an output signal with a frequency of 870.03 MHz and a level of -10 dBm based on "Base Station Test Model, Nominal" in IS-97

It is assumed that the Even Second clock, 10 MHz reference signal and measurement signals are output.

Signal specifications:

RC is 1, QOF is 0, Walsh Length is 64 and PN Offset is 0.

Channel	Walsh number
Pilot	0
Paging	1
Traffic	6
Traffic	17
Traffic	20
Sync	32
Traffic	41
Traffic	49
Traffic	58

Connecting the equipment

1. Connect the equipment as shown in Figure 2-1.



Figure 2-1 Setup for Base Station Code Domain Power Measurements

Setting the measurement conditions

This changes the analyzer setting so that the input signal displayed more clearly.

- 2. Press FREQ, 8, 7, 0, ., 0, 3 and MHz.
- 3. Press SPAN, 8 and MHz.
- 4. Press **LEVEL**, **0** and **GHz**(+**dBm**).
- 5. Press **TRANSIENT**, *STD* and *STD Setup*. The STD Measurement Parameter Set dialog box is displayed.

S	Measurement Parameter Set	
Band Class		STD
	North American Cellular Band	1
Link :	FORWARD REVERSE(RC1&2) REVERSE(RC3&	4) DC CAL
Signal Type	CONTINUOUS BURST	
Offset Level	: 0.0 dB	
Frequency Input	FREQUENCY CHANNEL	
Input	BASEBAND(1&Q)	
Baseband Input	AC DC	
IQ Inverse	NORMAL INVERSE	
Cont Auto Level Set	: ON OFF	
		⁶ Channe 1
		Setting
		7 STD
		Setup
p.		

Figure 2-2 STD-Measurement parameter set Dialog Box

6. Press the \bigtriangledown key. The cursor moves to the item Link.

7. Select *FORWARD* from *Link* using the data knob, and press the data knob (or

ENTR). The measurement mode is set to the BS measurement.

The following parameters are default settings.

Offset Level:	0.0 dB
Frequency Input:	FREQUENCY
Input:	RF
IQ Inverse:	NORMAL
Cont Auto Level Set:	OFF

8. Press **RETURN**, *Modulation*, *Code Domain Power Coef* and *Parameter Setup*. The Parameter Setup dialog box is displayed.



Figure 2-3 Parameter Setup Dialog Box

- 9. Press **1**, **2**, **8**, **0** and **Hz(ENTR)** to set *Meas Range*. The measurement range is set to 1280 chips.
- 10. Press **0** and **Hz** (ENTR) to set τ *Offset*. The measurement start position is set at a position delayed by 0.0 µs from the trigger.
- Select *ON* from *Complimentary Filter* using the data knob, and press the data knob (or ENTR).
 The receiving filter is set to the complimentary filter.
- 12. Press **0**, ., **0**, **5** and **Hz** (**ENTR**) to set *Rolloff Factor*. The roll-off factor (after passing through the complimentary filter) is set to 0.05.
- Select *ON* from *Equalizing Filter* using the data knob, and press the data knob (or ENTR).
 The phase characteristics of the complimentary filter are set to the inverse characteristics of the phase equalizer.
- 14. Select *OFF* from *PN Offset Search Mode* using the data knob, and press the data knob (or ENTR).The PN offset search mode is set to OFF.
- 15. Press **0** and **Hz** (ENTR) to set *PN Offset*. The PN offset is set to 0.
- Select 10 kHz from Carrier Freq. Search using the data knob, and press the data knob (or ENTR).
 The carrier frequency search range is set to ±10 kHz.
- 17. Select *EXT* from *Trigger Source* using the data knob, and press the data knob (or **ENTR**).

The trigger is set to the external trigger.

- 2.1 Measuring the Code Domain Power of Base Station Signals
 - 18. Select + from *EXT Trigger Slope* to + using the data knob, and press the data knob (or **ENTR**).
 - 19. Press -, 2, 7 and Hz (ENTR) to set *Threshold*.
 - 20. Select *OFF* from *Auto Rate* using the data knob, and press the data knob (or **ENTR**).
 - 21. Select *OFF* from *Channel Define* using the data knob, and press the data knob (or **ENTR**).
 - 22. Select *64* from *Walsh Code Length* using the data knob, and press the data knob (or **ENTR**).
 - 23. Select **0** from **QOF** using the data knob, and press the data knob (or **ENTR**).
 - 24. Select *OFF* from *Bit Reversal Order* to OFF using the data knob, and press the data knob (or **ENTR**).
 - 25. Press *Parameter Setup*. The dialog box is closed.
 - 26. Press *Meas Options*. The Meas Options dialog box is displayed.



Figure 2-4 Meas Options Dialog Box

27. Use the data knob to set *CDP Graph Plot Type* to *AVERAGE*, then press Hz (ENTR).

The Power values of each channel are set to the mean values of each symbol.

- 28. Select *dB* from *Power Unit* using the data knob, and press the data knob (or **ENTR**).
- 29. Select ON from $\Delta \tau$ using the data knob, and press the data knob (or ENTR).
- 30. Select ON from $\Delta \theta$ using the data knob, and press the data knob (or ENTR).

- 31. Select *ON* from *Code Domain Error* using the data knob, and press the data knob (or **ENTR**).
- 32. Select *ON* from *Signal Power* using the data knob, and press the data knob (or **ENTR**).
- 33. Select ON from EVM using the data knob, and press the data knob (or ENTR).
- 34. Select *OFF* from *Fixed Symbols Level* using the data knob, and press the data knob (or **ENTR**).
- 35. Select *ON* from *Chip Rate Error* using the data knob, and press the data knob (or **ENTR**).
- 36. Select *ON* from *IQ Gain Error* using the data knob, and press the data knob (or **ENTR**).
- 37. Select *ON* from *Quadrature Error* using the data knob, and press the data knob (or **ENTR**).
- 38. Press *Meas Options*. The dialog box is closed.
- 39. Press *Auto Level Set*.The measurement range is set to the optimum range.
- 40. Press SINGLE.

The sweep is set to a single mode and starts.



Figure 2-5 Measurement Results of the cdma 2000 Base Station Signal

 τ (Time Alignment Error): Time delay (μ s) for the trigger

Carrier Frequency Error:

Carrier frequency error (Hz, ppm) for the center frequency

Multiple p:	Waveform quality of the multiplexed signal (The waveform quality factor value must be com- pliant with the cdma2000 standard when measur- ing signals from the Pilot channel.)
PN Offset:	PN offset of the base station signal
Magnitude Error:	Magnitude error (% rms) of the multiplexed sig- nal
Phase Error:	Phase error (degree rms) of the multiplexed sig- nal
Error Vector Magnitude:	Modulation accuracy (% rms) of the multiplexed signal
I/Q Origin Offset:	Offset (dBc) of the I/Q origin
Error Signal Power Ratio:	The ratio (dB) of the error signal power to the power of the multiplexed signal at the chip judgment point
Tx Power:	Power (dBm) of the multiplexed signal before passing through the complimentary filter
AVG Power at Chip:	Power (dBm) of the multiplexed signal at the chip judgement point after passing through the complimentary filter
Peak Code Domain Error:	Maximum value (dB) of the code domain errors
Chip Rate Error:	Chip rate error (Hz and ppm) relative to 1.2288 Mcps
IQ Gain Error:	Q-axis gain error relative to the I-axis gain (%)
Quadrature Error:	Q-axis quadrature error relative to the I-axis (degree)

Displaying the graph

- 41. Press Scale Setup.
 - The Scale Setup dialog box is displayed.



Figure 2-6 Scale Setup Example

- 42. Select *GRAPH* from *Format* using the data knob, and press the data knob (or **ENTR**).
- 43. Select *SINGLE* from *Display* using the data knob, and press the data knob (or **ENTR**).
- 44. Select ρ from *Y* Scale using the data knob, and press the data knob (or ENTR).
- 45. Press 0 and GHz (dB) to set Y Scale Upper.
- 46. Select *10/div* from *Y/div* using the data knob, and press the data knob (or ENTR).
- 47. Press *Scale Setup*. The dialog box is closed.
- 48. Press **MKR**. The marker is displayed.
- 49. Select **2** from *MKR POSI*. using the data knob. The marker switches between the active channels only.





Walsh Code 1	No.:	Walsh code number of the channel specified by the marker
Walsh Code I	Len:	Walsh code length (number of chips) of the chan- nel specified by the marker
ρ:		Logarithmic value of the channel code domain power coefficient specified by the marker (dB)
Peak Δτ	CH:	Maximum value of the relative Walsh code domain time offset to the Pilot channel and its channel Walsh code number
Peak Δθ	CH:	Maximum value of the relative Walsh code domain phase offset to the Pilot channel and its channel Walsh code number

Peak inactive channel power (ρ) CH:

This indicates the maximum logarithmic value of the code domain power coefficient for the inactive channel, Walsh code number, and Walsh length for the channel.

2.2 Mobile Station (MS) Code Domain Power Measurement

Measurement conditions:

The measurement signal is output from an IS-2000-compliant unit and has a frequency of 825.03 MHz and a level of -10 dBm.

Signal specifications are as follows:

Long Code Mask: ALL 0

Reverse Traffic Channel Operation signal (which is multiplexed with the PICH, DCCH, SCH2, FCH and SCH1)

SCH1 Walsh function:	W_1^2 (M=1)
SCH2 Walsh function:	W_{2}^{4} (M=1)

The abbreviations listed above have the following meanings:

PICH:	Reverse Pilot Channel
DCCH:	Reverse Dedicated Control Channel
SCH2:	Reverse Supplemental Channel 2
FCH:	Reverse Fundamental Channel
SCH1:	Reverse Supplemental Channel 1
M:	Walsh Function Repetition Factor

Setup

1. Connect the unit under test as shown in Figure 2-8.

Spectrum Analyzer



Figure 2-8 Setup for the MS (Mobile Station) Code Domain Power Measurement

Setting the measurement conditions

This sets the measurement frequency to the center frequency of the spectrum analyzer.

- 2. Press FREQ, 8, 2, 5, ., 0, 3 and MHz.
- 3. Press **TRANSIENT**, *STD* and *STD Setup*. The STD Measurement Parameter Set dialog box is displayed.

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2.2 Mobile Station (MS) Code Domain Power Measurement



Figure 2-9 STD Measurement Parameter Set Dialog Box

- 4. Select *0* for *Band Class* using the data knob and press Hz (ENTR).
- 5. Select *REVERSE (RC3&4)* for *Link* using the data knob and press Hz (ENTR).
- 6. Press 0, ., 0 and GHz(dB) for Offset Level.
- 7. Select *FREQUENCY* for *Frequency Input* using the data knob and press Hz (ENTR).
- 8. Select *RF* for *Input* using the data knob and press Hz (ENTR).
- 9. Select *NORMAL* for *IQ Inverse* using the data knob and press Hz (ENTR).
- 10. Select OFF for Cont Auto Level Set using the data knob and press Hz (ENTR).
- 11. Press **RETURN**, *Modulation*, *Code Domain Power* and *Parameter Setup*. The Parameter Setup dialog box is displayed.

Parameter Setup				
Nassi Wode	NDRMAL			
Heas Range	: 1536 chip			
Threshold	: -23 dB			
PN Delay Search Hode	DBA DPP			
PN Delay	:			
Trigger Source	EXT			
	[INTRM_(EXT)] INTRM_			
EXT Trigger Slope	-			
EXT Trigger Delay	3 0.000 με			
Freq Meas Bange	EXPAND			
Δ τ	: ON OFF			
40	ON OFF			
Chip Rate Error	: ON OFF			
Quadrature Error	C CPF			

Figure 2-10 Parameter Setup Dialog Box

- 12. Select *PRECISE* for *Meas Mode* using the data knob and press Hz (ENTR).
- 13. Select 1536 chip for Meas Range using the data knob and press Hz (ENTR).
- 14. Press -, 2, 3 and GHz (dB) for *Threshold*.
- 15. Select ON for PN Delay Search Mode using the data knob and press Hz (ENTR).
- 16. Select *EXT* for *Trigger Source* using the data knob and press Hz (ENTR).
- 17. Select + for EXT Trigger Slope using the data knob and press Hz (ENTR).
- 18. Press 0, ., 0 and Hz (ENTR) for EXT Trigger Delay.
- 19. Select *NORMAL* for *Freq Meas Range* using the data knob and press Hz (ENTR).
- 20. Select ON for $\Delta \tau$ using the data knob and press Hz (ENTR).
- 21. Select ON for $\Delta\theta$ using the data knob and press Hz (ENTR).
- 22. Select ON for Chip Rate Error using the data knob and press Hz (ENTR).
- 23. Select ON for Quadrature Error using the data knob and press Hz (ENTR).
- 24. Press *Parameter Setup*. The dialog box is closed.
- 25. Press *Channel Setup*. The Channel Setup dialog box is displayed.



Figure 2-11 Channel Setup Dialog Box

- 26. Select TCH for Operation Mode using the data knob and press Hz (ENTR).
- 27. Select ON from DCCH using the data knob and press Hz (ENTR).
- 28. Select ON from FCH using the data knob and press Hz (ENTR).

- 29. Select W(1, 2) for SCH1 Walsh Function using the data knob and press Hz (ENTR).
- 30. Select 1 for SCH1 Repetition Factor using the data knob and press Hz (ENTR).
- 31. Select W(2, 4) for SCH2 Walsh Function using the data knob and press Hz (ENTR).
- 32. Select 1 for SCH2 Repetition Factor using the data knob and press Hz (ENTR).
- 33. Select 32 from Walsh Code Length using the data knob and press Hz (ENTR).
- 34. Press *Channel Setup*. The dialog box is closed.

Result display in CHANNEL Mode

35. Press View Setup.

The View Setup dialog box is displayed.

View Setup				
View Hode :	CHANNEL	NALSH		
Display :	P	EVH	MAG ERR	
	PHASE ERR	DEMOD	NUMERIC	
	TABLE(POMER)	TABLE(EVH)		
View Channel :	PICH			
Y/div(Ch.Graph):	25/div	5/div		
Format :	GRAPH	TABLE	NUMERIC	
Y Scole :	٥	pro & pin	p(#L1)	
	areksin(ALL)	T	PHASE	
Display div :	SIDULE	DUML.		
Table Page :	1 2			
Y/div :	10/div	5/div		

Figure 2-12 View Setup Dialog box

- 36. Select CHANNEL from View Mode using the data knob, and press Hz (ENTR).
- 37. Select NUMERIC from Display using the data knob, and press Hz (ENTR).
- 38. Select the desired channel (e.g., *PICH*) from *View Channel* using the data knob, and press Hz (ENTR).
- 39. Select 5/div from Y/div using the data knob, and press Hz (ENTR).
- 40. Press *View Setup*. The dialog box is closed.
- 41. Press *Auto Level Set*. The measurement range is optimized.
- 42. Press **SINGLE**. The single mode measurement is set and then the measurement results are displayed.



Figure 2-13 Measurement Result for REVERSE LINK (in CHANNEL Mode)

Code Power	Channel power (dB) relative to the total power. (As a result, the total power is treated as 0 dB.)
ρ	Code domain power coefficient which is a ratio between a channel and the total power
Power	Absolute channel power (dBm or W)
EVM	Modulation accuracy per channel (%rms)
Multiple p	Waveform quality of the multiplexed signal
τ (Time Alignment Error)	Time delay for the trigger (µs)
Carrier Frequency Error	(Hz)
Magnitude Error	Magnitude error of the multiplexed signal (%rms)
Phase Error	Phase error of the multiplexed signal (deg. rms)
Error Vector Magnitude	Modulation accuracy of the multiplexed signal $(\% \text{rms})$
I/Q Origin Offset	(dBc)
PN Delay	Synchronization position of pilot PN sequence. This is expressed using a value of 0 to 511.
Chip Rate Error	Chip rate error (ppm) relative to 1.2288 Mcps
Quadrature Error	Q-axis quadrature error relative to the I axis (degree)

PN Delay

Since PN Delay Search Mode was set to ON, the PN delay has been measured. The measured PN delay can be used to reduce the measurement time when the PN Delay Search Mode is set to OFF.

Make the note of the measured PN delay so you can use it for the next procedure. In the example shown below, the measured PN delay is 0.

43. Press *Parameter setup*. The Parameter Setup dialog box is displayed.

- 44. Press the \bigtriangledown key to select *PN Delay Search Mode* with the cursor.
- 45. Select *OFF* for *PN Delay Search Mode* using the data knob and press Hz (ENTR).
- 46. Press 0 and Hz (ENTR) to set a PN delay.



Figure 2-14 Parameter Setup Dialog Box (Showing PN Delay Search Mode is OFF)

- 47. Press *Parameter Setup*. The dialog box is closed.
- 48. Press SINGLE.

The single mode measurement is set and then the measurement results are displayed.

Displaying the EVM for the specified channel

This displays the Error Vector Magnitude vs. symbol graph for the specified channel.

49. Press View Setup.

The View Setup dialog box is displayed.

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2.2 Mobile Station (MS) Code Domain Power Measurement



Figure 2-15 View Setup Dialog Box

- 50. Press the ∇ key to select *Display* with the cursor.
- 51. Select EVM for *Display* using the data knob and press Hz (ENTR).
- 52. Select the desired channel (e.g., *FCH*) for *View Channel* using the data knob and press Hz (ENTR).
- 53. Select 5/div from Y/div (Ch. Graph) using the data knob, and press Hz (ENTR).
- 54. Press *View Setup*. The dialog box is closed.



Figure 2-16 EVM for the FCH

Displaying the DEMOD for the specified channel

This displays the demodulated data for the specified channel.

- 55. Press *View Setup*. The View Setup dialog box is displayed.
- 56. Press the ∇ key to select *Display* with the cursor.

- 57. Select *DEMOD* for *Display* using the data knob and press Hz (ENTR).
- 58. Select a desired channel (e.g., *FCH*) for *View Channel* using the data knob and press Hz (ENTR).
- 59. Press *View Setup*. The dialog box is closed.

Power(I-CH)	Ромег (Q-CH) Channe I Code Pc	: FCH (76.6ksps) ρ: 0.20011 ρ: 0.20011 i: 17.04 μW EVW: 0.49 % ms 2 Graphics 3 View 1 EACH CCCH
Domo	dulated Data	4
1 11 21 0000100001 0001100001 001110	31 41 0101 0101100001 10111	51 110100 1101110010 Setup
61 71 81 0010100001 0101101001 111110 121 131 141	91 101 1100 100100 101 151 161	111 5 Parameter 171 Setup
181 191 201	211 221	231 6 Demod Data
241 251 261	271 281	291 Save
301 311 321	331 341	351 ⁷ Average Times

Figure 2-17 DEMOD for the FCH

Result display in WALSH Mode

Measurement result is displayed with the horizontal axis in the Walsh function.

- 60. Press *View Setup*. The View Setup dialog box is displayed.
- 61. Select WALSH from View Mode using the data knob, and press Hz (ENTR).
- 62. Select *GRAPH* from *FORMAT* using the data knob, and press Hz (ENTR).
- 63. Select **p** from **Y** Scale using the data knob, and press Hz (ENTR).
- 64. Select SINGLE from Display div using the data knob, and press Hz (ENTR).
- 65. Select 10/div from Y/div using the data knob, and press Hz (ENTR).
- 66. Press *View Setup*. The dialog box is closed.
- 67. Press *MKR*. The marker is displayed.
- 68. Select **2** from *MKR POSI*. using the data knob. The marker moves between active channels



Figure 2-18 Measurement Result for REVERSE LINK (in WALSH Mode)

Walsh Code No.:	Walsh Code number of the channel specified by the marker	
Walsh Code Len:	Walsh Code length of the channel specified by the marker (chips)	
ρ:	Logarithmic value of the code domain power coefficient of the channel specified by the marker (dB)	
Peak Δτ CH:	The maximum time offset value relative to the pilot channel, and the Walsh code number and length of the channel	
Peak $\Delta \theta$ CH:	The maximum phase offset value relative to the pilot channel, and the Walsh code number and length of the channel	
Pk inact.p CH:	Displays the maximum power, Walsh code num- ber, Walsh code length and the real and imagi- nary components for the inactive channel when the real and imaginary components of a code domain power coefficient are measured in log scales.	

2.3 CCDF Measurement

2.3 CCDF Measurement

The CCDF (Complementary Cumulative Distribution Function) can be measured.

Setup

1. Connect the unit under test as shown in Figure 2-19.



Figure 2-19 Setup for CCDF Measurement

Setting the measurement conditions

This changes the analyzer setting so that the input signal may be displayed more clearly.

- 2. Press **FREQ**, **8**, **2**, **5**, **.**, **0**, **3** and **MHz**. A center frequency of 825.03 MHz is set.
- 3. Press **SPAN**, **2** and **MHz**. A frequency span of 2 MHz is set.
- 4. Press **COUPLE**, *RBW AUTO/MNL*(MNL), **3**, **0** and **kHz**. An RBW of 30 kHz is set.
- 5. Press *VBW AUTO/MNL*(MNL), 1, 0, 0 and kHz. A VBW of 100 kHz is set.
- 6. Press **LEVEL**, **0** and **GHz**(+**dBm**). The reference level is set to 0 dBm.

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2.3 CCDF Measurement



Figure 2-20 Spectrum of the Mobile Station Signal

CCDF Measurement

- 7. Press **TRANSIENT**, *Modulation*, *Power*, *CCDF* and *Parameter Setup*. The Parameter Setup dialog box is displayed.
- 8. Select *INT* from *Trigger Mode* using the data knob, and press the data knob (or **ENTR**).

The measurement mode is set to a mode that uses the internal trigger.

9. Press **1**, **0** and **kHz** to set *Meas Length*. The number of measurement samples is set to 10k.



Figure 2-21 CCDF Parameter Setup Dialog Box

- 10. Press *Parameter Setup*. The dialog box is removed.
- 11. Press Auto Level Set.

The measurement range is optimally set.

2.3 CCDF Measurement

12. Press SINGLE.

The measurement mode is set to the single mode and the measurement mode is displayed.



Figure 2-22 CCDF Measurement Result

Peak Factor	Peak factor
Average Power	Average power
[10%]	Power whose distribution is 10%
[1%]	Power whose distribution is 1%
[0.1%]	Power whose distribution is 0.1%
[0.01%]	Power whose distribution is 0.01%
[0.001%]	Power whose distribution is 0.001%
[0.0001%]	Power whose distribution is 0.0001%

Holding waveform

- 13. Press *Trace Write ON/OFF*(ON). The signal waveform is held.
- 14. Press SINGLE.

The measurement mode is set to SINGLE mode so that both the stored and current waveforms are displayed.

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2.3 CCDF Measurement



Figure 2-23 CCDF Measurement Result (Trace Write ON)

3.1 Menu Index

3 REFERENCE

This chapter describes the functions of the panel and soft keys for option 65 software.

3.1 Menu Index

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

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# 3.2 Menu Map

This section shows the hierarchical menu configuration on a panel key basis

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F-Domain	ON/OFF Ratio	→ P3-8
Modulation	Spurious	→ P3-9
STD		
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	OBW	→ P3-11
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	Due to Modulation	► P3-13
	Inband Spurious(1)	► P3-14
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	Outband Spurious	→ P3-16
	Code Domain Power Coef	→ P3-17
	(with FORWARD setting)	
	Waveform Quality	▶ P3-19
	(with REVERSE (RC1&2) setting)	
	Code Domain Power	→ P3-20
	(with REVERSE (RC3&4) setting)	
	Power	Tx Power P3-21
	Time & FFT	→ P3-21 CCDF → P3-21
	STD	→ P3-22
	► P3-22	





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3.2 Menu Map

CDP Graph Plot Type : AVERAGE/MAX/MIN Power Unit : dBm/dB/dBmpilot Pilot Channel Power :  $\Delta \tau$  : ON/OFF  $\Delta \theta$  : ON/OFF Code Domain Error : ON/OFF Signal Power : ON/OFF EVM : ON/OFF Fixed Symbols Level : ON/OFF Chip Rate Error : ON/OFF IQ Gain Error : ON/OFF IQuadrature Error : ON/OFF

TRANSIENT	
Modulation	
$\downarrow$	
Waveform Quality (with REVERSE (RC1&2) setting)	
Auto Level Set	
Graphics Select Type	→ Constellation
Parameter Setup Plot Type : AVG/P-P	Constellation(Line)
Average Times ON/OFF	Constellation(Dot)
Meas Range :	Constellation(Line¨)
Trigger Source : INT/EXT/INTRVL(EXT)/INTRVL	I EYE Diagram
EXT Trigger Slope : +/-	Q EYE Diagram
EXT Trigger Delay :	I/Q EYE Diagram
Freq Meas Range : NORMAL/EXPAND	Null Offset Constellation
	Null Offset Constellation(Line)
	Null Offset Constellation(Dot)
	Null Offset Constellation(Line¨)
	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 Chip







3.3 Functional Description

# **3.3 Functional Description**

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



3.3 Functional Description

#### 3.3.1 Switching 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.

*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. Press the **POWER** 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 analyze, "Comm.System" is displayed in the soft menu.
- 4. Press Comm.System.

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



Figure 3-1 Communication Systems Dialog Box

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

Saving set conditions

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

3.3 Functional Description

### 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

Sets 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** 

Sets a trigger.

	1	Frigger Setup	I	
Trigger Source	: FREE R	UN VIDEO	IF	EXT
Slope	•	-	]	
Trigger Level	: 30 %			
Trigger Position	: 8%			
Delay Time	: 0.000	ns		

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

 Trigger Source
 Selects a trigger.

 FREE RUN:
 Captures data using the internal measurement timing.

 VIDEO:
 Captures the signal in sync with the VIDEO signal.

 IF:
 Captures the signal in sync with the IF signal (the leading edge of the burst).

 EXT:
 Captures the signal in sync with the external trigger signal.

 Slope
 Selects the edge when triggering.

 +:
 Triggers at the leading edge.

-: Triggers at the trailing edge.

3.3 Functional Description

Trigger Level	Sets the level to trigger.		
Trigger Position	Sets the trigger position where it is displayed on the screen.		
Delay Time	Sets a delay time from the time a trigger signal is detected to the time the signal is captured.		
	NOTE: When Delay Time is a negative value, signals before the trigger can be captured.		
Window Setup	Sets the window used for power measurement.		
Window ON/OFF	Displays a window showing the range for power measurement. When OFF is set, the power measurement range covers all points on the display screen.		
Set to STD	Sets the window specified by the communication standard.		
Window Position	Sets the position of the window.		
Window Width	Sets the width of the window.		
	NOTE: When the window is partially outside the display, an arrow is shown next to Pose, Width or both in the area indicating the window conditions.		
Template			
- <i>cmp</i>	Sets the template. For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."		
Template ON/OFF	Sets the template. For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode." Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.		
Template ON/OFF Shift X	<ul><li>Sets the template.</li><li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li><li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li><li>Sets the amount of template movement in the X-axis direction.</li></ul>		
Template ON/OFF Shift X Shift Y	<ul> <li>Sets the template.</li> <li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li> <li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li> <li>Sets the amount of template movement in the X-axis direction.</li> <li>Sets the amount of template movement in the Y-axis direction.</li> </ul>		
Template ON/OFF Shift X Shift Y Template Edit	<ul> <li>Sets the template.</li> <li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li> <li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li> <li>Sets the amount of template movement in the X-axis direction.</li> <li>Sets the amount of template movement in the Y-axis direction.</li> <li>Edits the template.</li> </ul>		
Template ON/OFF Shift X Shift Y Template Edit Template UP/LOV	<ul> <li>Sets the template.</li> <li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li> <li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li> <li>Sets the amount of template movement in the X-axis direction.</li> <li>Sets the amount of template movement in the Y-axis direction.</li> <li>Edits the template.</li> <li>W Selects the upper template or the lower template.</li> </ul>		
Template ON/OFF Shift X Shift Y Template Edit Template UP/LON Copy from STD	<ul> <li>Sets the template.</li> <li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li> <li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li> <li>Sets the amount of template movement in the X-axis direction.</li> <li>Sets the amount of template movement in the Y-axis direction.</li> <li>Edits the template.</li> <li>W Selects the upper template or the lower template.</li> <li>Initializes the template.</li> </ul>		
Template ON/OFF Shift X Shift Y Template Edit Template UP/LON Copy from STD Insert Line	<ul> <li>Sets the template.</li> <li>For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."</li> <li>Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.</li> <li>Sets the amount of template movement in the X-axis direction.</li> <li>Sets the amount of template movement in the Y-axis direction.</li> <li>Edits the template.</li> <li>W Selects the upper template or the lower template.</li> <li>Initializes the template.</li> </ul>		

3.3 Functional Description

Sort		Sorts template data in ascending order.	
Table InitInitializes the table.		Initializes the table.	
Y Scale [dB/div] 10/5/2		Switches the display screen scale to 10, 5 or 2 dB/div.	
Average Times ON/OFF		Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.	

# Config

#### **Parameter Setup**

Sets the method of measurement, edits the template, and so forth.

Parameter Setup					
Detector		Normal	POSI	NEGA	SAMPLE
Display Unit	:	dBm	W	dBµV	
Template Couple to Power	:	ON	OFF		
Template Limit	:	-60.00 d	IBm		
Judgment	:	ON	OFF		
Upper Limit	:	100.00 d	IBm		
Lower Limit	:	-200.00	dBm		
Average Mode	:	TRACE AVG	MAX HOLD	) POWER A	VG NUMERIC

### Figure 3-3 Parameter Setup Dialog Box

Detector	NORM Sets the	NORMAL/POSI/NEGA/SAMPLE Sets the detector.		
Display Unit	dBm/W Sets the	dBm/W/dBµV Sets the display unit.		
Template Couple	to Power			
	Display	s the template that is connected to the measured power.		
	ON:	Displays 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:	Displays the template regarding the Y-axis value edited by the template as an absolute value.		
Template Limit	If the a when T this val	If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.		
Judgment	Sets ON	Sets ON/OFF for Pass/Fail judgments.		
Upper Limit	Sets the	Sets the upper limit value of power.		
Lower Limit	Sets the	Sets the lower limit value of power.		
Average Mode	Selects	Selects the processing method when Average Times is set to ON.		

3.3 Functional Description

TRACE AVG:

Calculates arithmetic average of the measured data (Log data) in the mode LOG.

MAX HOLD:

Displays the maximum value within the average counts of the swept waveforms.

#### POWER AVG:

Converts the measured data (Log data) to the linear data to take the root mean square value.

#### NUMERIC:

Converts the measured data (Log data) to the linear data to take the root mean square value.

Using POWER AVG displays the average waveforms, using NUMERIC displays the swept waveforms and takes an average of the measurement results only.

Set to STD

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

### 3.3.2.2 ON/OFF Ratio

Measures the power during the burst-on period and the one during the burst-off period, and calculate the ratio of the powers.

Captures the signal with a trigger and calculates the ratio in reference to the burst on and burst off periods (the former is defined as the period immediately before the trigger point; the latter, immediately after the trigger point).

Auto Level Set

Sets 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** 

Sets a trigger.

		Trig	ger 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

Selects a trigger. FREE RUN:

Captures data using the internal measurement timing. VIDEO: Captures the signal in sync with the VIDEO signal.

3.3 Functional Description

	IF:	Captures the signal in sync with the IF signal (the lead- ing edge of the burst).			
	EXT:	Captures the signal in sync with the external trigger signal.			
Slope	Selects	the edge when triggering.			
	+:	Triggers at the leading edge.			
	-:	Triggers at the trailing edge.			
Trigger Level	Sets the	level to trigger.			
Trigger Position	Sets wh	ere the trigger position is displayed on the screen.			
Delay Time	Sets a d time the	Sets a delay time from the time a trigger signal is detected to the time the signal is captured.			
	NOTE:	When Delay Time is a negative value, signals before the trigger can be captured.			
Window Setup	Sets the	burst ON and OFF periods.			
Window ON/OFF	Display	s a window showing the range for power measurement.			
Set to STD	Sets the cation s	value that is specified by or complies with the communi- tandard.			
ON Position	Sets the	desired position during the burst-on period.			
ON Width	Sets the	desired width during the burst-on period.			
<b>OFF</b> Position	Sets the	position during the burst-off period.			
OFF Width	Sets the	width during the burst-off period.			
	NOTE:	When the window is partially outside the display, an arrow is shown next to Pose, Width or both in the area indicating the window conditions.			
Y Scale [dB/div] 10/5/2	Selects	the display screen scale to 10, 5 or 2 dB/div.			
Average Times ON/OFF	Sets the For the in the C	averaging count. method of average processing, refer to "Average Mode" onfig $\rightarrow$ Parameter Setup.			

3.3 Functional Description

Parameter Setup		Sets measurement parameters and so on.
		Parameter Setup
		Detector NORMAL POSI NEGA SAMPLE
		Display Unit : dBm W dBµV
		Judgment : ON OFF
		Average Mode : TRACE AVG MAX HOLD DOWER AVG NUMERIC
		Figure 3-5 Parameter Setup Dialog Box
Detec	tor	NORMAL/POSI/NEGA/SAMPLE
		Selects the detector.
Displa	ay Unit	dBm/W/dBµV
		Sets the display unit of power.
		NOTE: The ON/OFF ratio is displayed in units of dB (fixed).
Judgi	nent	Sets ON/OFF of the Pass/Fail judgment for the ON/OFF ratio.
Uppel	r Limit	Enters the upper limit value.
Avera	ge Mode	Selects the processing method when Average Times is set to ON.
		TRACE AVG:
		Calculates arithmetic average of the measured data (Log data) in the mode LOG.
		MAXHOLD
		Displays the maximum value within the average counts
		FOWER AVG.
		to take the root mean square value.
		NUMERIC
		Converts the measured data (Log data) to the linear data
		to take the root mean square value
		Using POWER AVG displays the average waveforms.
		using NUMERIC displays the swept waveforms and takes an average of the measurement results only.
Set to STD		Sets measurement parameters to the values specified by the com- munication standard.

3.3 Functional Description

### 3.3.2.3 Spurious (T-Domain)

This is a function to measure power (or peak power) according to the frequency specified in the table by sweeping in the zero span mode.

Auto Level Set

Sets 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

Sets 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** Selects a trigger. FREE RUN: Captures data using the internal measurement timing. IF: Captures the signal in sync with the IF signal (the leading edge of the burst). EXT: Captures the signal in sync with the external trigger signal. Slope Selects the edge when triggering. Triggers at the leading edge. +: Triggers at the trailing edge. -: **Trigger Level** Sets the level to trigger. **Trigger Position** Sets where the trigger position is displayed on the screen. **Delay** Time Sets a delay time from the time a trigger signal is detected to the time the signal is captured. NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Selects the measurement table.

3.3 Functional Description

Load Table	Loads the measurement table.
Table Edit	Edits the measurement table.
Table No. 1/2/3	Selects the table to be edited.
Load Table	Loads the measurement table.
Save Table	Saves the measurement table.
Insert Line	Inserts additional frequency data before the selected frequency number.
Delete Line	Deletes the selected line.
Table Init	Initializes the table.
Average Times ON/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.

Config

Parameter Setup

Sets measurement conditions and so on.

Parameter Setup					
Detector	:	Normal	POSI	NEGA	SAMPLE
Result	:	PEAK	RMS		
Peak MKR Y Delta	:				
Multiplier	:	1.000	1		
Display Unit	:	dBm	W	dBµV	]
Judgment	:	ON	OFF		
Preselector	:	1.6G	3.66		
Average Mode	:	TRACE AVG	MAX HOLD	) POWER A	AVG NUMERIC

Figure 3-7 Parameter Setup Dialog Box

Detector	NORMAL/POSI/NEGA/SAMPLE Sets the detector.
Result	PEAK/RMS Sets whether to display the result using average power or peak power.
Peak MKR Y Delta	<i>t</i> Sets 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/dBµV Sets the display units.

3.3 Functional Description

Judgment	Sets ON	V/OFF of the Pass/Fail judgment for the limit value.			
Preselector	Sets the	Sets the preselector.			
	NOTE: This menu 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.			
Average Mode	Selects the processing method when Average Times is set to ON.				
	TRACE	E AVG: Calculates arithmetic average of the measured data (Log data) in the mode LOG.			
	MAXE	IOLD			
		Displays the maximum value within the average counts of the swept waveforms.			
	POWE	R AVG:			
		Converts the measured data (Log data) to the linear data to take the root mean square value.			
	NUMERIC:				
		Converts the measured data (Log data) to the linear data to take the root mean square value.			
		Using POWER AVG displays the average waveforms, using NUMERIC displays the swept waveforms and takes an average of the measurement results only.			
Set to Default	Returns	the set value to the default.			

### 3.3.3 F-Domain

Carries out a measurement according to the communication standard using the spectrum analyzer's sweep measurement method. Measurement items include power, occupied bandwidth, ACP Due To Transient, ACP Due to Modulation, Inband Spurious, and Outband 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)

This is a function to measure power in the frequency domain using the spectrum analyzer.

Auto Level Set

Sets 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.

3.3 Functional Description

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

Gate Setup

Sets the gated sweep.

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

Trigger Setup

Sets a trigger.

		Trig	ger 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	Selects a trigger.				
	FREE R	UN:			
		Captures data using the internal measurement timing.			
	VIDEO:	Captures the signal in sync with the VIDEO signal.			
	IF:	Captures the signal in sync with the IF signal (the lead- ing edge of the burst).			
	EXT:	Captures the signal in sync with the external trigger signal.			
Slope	Selects the edge when triggering.				
	+:	Triggers at the leading edge.			
	-:	Triggers at the trailing edge.			
Trigger Level	Sets the	level to trigger.			
Trigger Position	Sets where the trigger position is displayed on the screen.				
Delay Time	Sets a delay time from the time a trigger signal is detected to the time the signal is captured.				
	NOTE: V	Vhen Delay Time is a negative value, signals before the trigger an be captured.			

### Gate Source

Trigger

Sets Trigger Source specified by Trigger Setup as Gate Source.

3.3 Functional Description

	NOTE: When Trigger Source is set to IF and SPAN is set to a fre- quency higher than 6 MHz, the sweeping seems to be stopped, because the IF trigger bandwidth is approximately 6 MHz and the gate trigger is failing.			
Ext Gate	Sets the gated sweep mode using the gate signal input from the EXT GATE terminal on the rear panel.			
Gate Setup	Sets the gated sweep range when Trigger is selected for Gate Source.			
Set to STD	Sets the gate position and width to the values specified by the communication standard.			
Gate Position	Sets the gate position.			
Gate Width	Sets the gate width.			
Gated Sweep ON/OFF	Starts the gated sweep.			
Detector	NORMAL/POSI/NEGA/SAMPLE Selects the detector. Detector: Detector: NORMAL POSI NEGA SAMPLE			
	Figure 3-9 Detector Dialog Box			
Window Setup	Sets the frequency range used for power measurement.			
Window ON/OFF	Sets the window to ON or OFF. When the window is set to OFF, the power measurement range becomes a sweep band.			
Set to STD	Sets the value determined by the communication standard.			
Window Position	Sets the position of the window.			
Window Width	Sets the width of the window.			
	NOTE: When the window is partially outside the display, an arrow is shown next to Pose, Width or both in the area indicating the window conditions.			
Y Scale [dB/div] 10/5/2	Sets the display scale.			
Average Times ON/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.			

3.3 Functional Description

# Config

Parameter Setup

Sets measurement conditions and so on.

	<b>-</b>	
		Gated Sweep : ON DEF
		Display Unit : dBm W dBµV
		Judgment OFF
		Upper Limit : 100.00 dBm
		Lower Limit : -200.00 dBm
		Average Mode : TRACE AVG MAX HOLD POWER AVG NUMERIC
		Figure 3-10 Parameter Setup Dialog Box
	Detector	NORMAL/POSI/NEGA/SAMPLE
	200000	Selects the detector
	Gated Sween	Sets the gated sweep to ON or OFF.
	Survey .	
	Display Unit	dBm/W/dBuV
	1	Selects the display unit.
		1 2
	Judgment	Sets ON/OFF of the Pass/Fail judgment for measured power.
	C	
	Upper Limit	Sets the upper limit for Pass/Fail judgment.
	Lower Limit	Sets the lower limit for Pass/Fail judgment.
	Average Mode	selects the processing method when Average Times is set to ON.
		TRACE AVG:
		Calculates arithmetic average of the measured data
		(Log data) in the mode LOG.
		MAXHOLD
		MAX HOLD.
		of the swent waveforms
		POWER AVG:
		Converts the measured data (Log data) to the linear data
		to take the root mean square value.
		NUMERIC:
		Converts the measured data (Log data) to the linear data
		to take the root mean square value.
		Using POWER AVG displays the average waveforms,
		using NUMERIC displays the swept waveforms and
		takes an average of the measurement results only.
a a==		
Set to STD		Sets the measurement parameters to the values specified by the
		communication standard.

3.3 Functional Description

### 3.3.3.2 OBW

Measure an occupied bandwidth.

Auto Level Set	Sets the internal reference level to an optimum value in accor- dance with the measurement signal. The reference level is auto- matically adjusted when this key is pressed.
	NOTE: The signal level must be constant while Auto Level Set is being carried out.
OBW%	Sets the frequency, including the percentage of the total power as an occupied bandwidth, when calculating the occupied band- width.
Average Times ON/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.
Config	
Parameter Setup	Sets measurement conditions and so on.          Parameter Setup         Detector       INORMAL         Judgment       ON         Upper Limit       2.50 MHz         Lower Limit       750 kHz         Average Mode       IRACE AVG         HAX HOLD       POWER AVG         NUMERIC
Detector	NORMAL/POSI/NEGA/SAMPLE Selects the detector.
Judgment	Sets ON/OFF of the Pass/Fail judgment for the occupied band-width.
Upper Limit	Sets the upper limit for Pass/Fail judgment.
Lower Limit	Sets the lower limit for Pass/Fail judgment.

*Average Mode* selects the processing method when Average Times is set to ON.

TRACE AVG:

Calculates OBW based on the waveforms, which were generated as a result of arithmetic average of the measured data (Log data) in the log mode.

3.3 Functional Description

#### MAX HOLD:

Calculates OBW based on the waveform with the maximum value within the average counts of the measured data.

#### POWER AVG:

Calculates OBW based on the waveforms, which were calculated as a result of the conversion of the measured data (Log data) to the linear data to take the room mean square.

#### NUMERIC:

Calculates OBW by sweep and calculates arithmetic average to display the result. The displayed waveforms are not averaged.

*Set to STD* Sets the measurement parameters to the values specified by the communication standard.

### **3.3.3.3** Due to Transient

This is a function to measure the spectrum, including the rise and fall times of the burst.

Auto Level Set	Sets the internal reference level to an optimum value in accor- dance with the measurement signal. The reference level is auto- matically adjusted when this key is pressed.	
	NOTE: The signal level must be constant while Auto Level Set is being carried out.	
Template	Sets and edits the template. For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."	
Template ON/OFF	Sets ON/OFF of the template display. When Template is set to ON, the Pass/Fail judgment for the tem- plate is displayed under the sweep screen.	
Shift X	Shifts the set template in the frequency direction (X-axis).	
Shift Y	Shifts 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	Opens the template edit menu.	
Copy from STD	Copies the template defined in the communication standard.	
Insert Line	Inserts a line before the selected line.	
3.3 Functional Description

	Delete Line	Deletes the selected line.
	Sort	Sorts the tables in order of frequency.
	Table Init	Initializes the table.
Marker Edit		Sets the measurement frequency (frequency offset) and measurement band. For more information, refer to Section 5.2.1, "Marker Edit Func- tion."
Copy from	STD	Sets to the parameters specified by the communication standard.
Insert Line		Inserts a line before the selected line.
Delete Line	2	Deletes the selected line.
Sort		Sorts data in order of frequency.
Table Init		Initializes the table.
Average Times ON	V/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.

# Config

Parameter Setup

Sets measurement conditions and so on.

Parameter Setup			
Freq.Setting	:	START&STOP SPAN	
Detector	:	NORMAL POSI NEGA SAMPLE	
Result	:	MARKER RELATIVE ABS POWER	
Ref Power	:	REF MARKER MODULATION	
Display Unit	:	dDm W dBy	
Template Couple to Power	:	ONOFF	
Template Limit	:	-200.00 dBm	
Judgment	:	ON	
Symbol Rate 1/T	:	3.840 MHz	
Rolloff Factor	:	0.22	
Average Mode	:	TRACE AVG MAX HOLD POWER AVG NUMERIC	

# Figure 3-12 Parameter Setup Dialog Box

Freq. Setting	START&STOP/SPAN Selects the measurement mode.
Detector	NORMAL/POSI/NEGA/SAMPLE Selects the detector.
Result	Specifies how to display the result. For more information, refer to Section 5.2.2, "Measurement re- sults Using Due to Modulation, Due to Transient and Inband Spu- rious Modes."

	MARKER:
	Displays the marker read value. The position of the marker is set by Marker Edit.
	RELATIVE:
	Displays the marker read value using a relative value.
	ABS POWER:
	Converts the value displayed by RELATIVE into the abso- lute value using carrier power and displays it.
Ref Power	When RELATIVE is selected for Result, this selects which rela- tive value to use to display the marker read value.
	REF MARKER:
	Displays a relative value to Ref Marker set by Marker Edit.
	MODULATION:
	Displays a relative value to the measurement result of Tx power in Modulation.
Display Unit	dBm/W/dBuV
Display Ohu	Specifies the unit of the result displayed.
	~F
	NOTE: When RELATIVE is selected for Result, the unit is dB.
Template Couple t	to Power
Template Couple t	<b>b Power</b> Sets whether to raise or lower the template with the power set by Ref Power.
Template Couple t Template Limit	<b>To Power</b> Sets whether to raise or lower the template with the power set by Ref Power. If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.
Template Couple t Template Limit Judgment	<ul> <li><i>b Power</i></li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> </ul>
Template Couple t Template Limit Judgment Symbol Rate 1/T	<ul> <li>b Power</li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> </ul>
Template Couple i Template Limit Judgment Symbol Rate 1/T Rolloff Factor	<ul> <li>b Power</li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> <li>Sets the roll-off of the Root Nyquist filter.</li> </ul>
Template Couple i Template Limit Judgment Symbol Rate 1/T Rolloff Factor Average Mode	<ul> <li><i>Power</i></li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> <li>Sets the roll-off of the Root Nyquist filter.</li> <li>Selects the processing method when Average Times is set to ON.</li> </ul>
Template Couple i Template Limit Judgment Symbol Rate 1/T Rolloff Factor Average Mode	<ul> <li>b Power</li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> <li>Sets the roll-off of the Root Nyquist filter.</li> <li>Selects the processing method when Average Times is set to ON. TRACE AVG:</li> </ul>
Template Couple to Template Limit Judgment Symbol Rate 1/T Rolloff Factor Average Mode	<ul> <li>b Power</li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> <li>Sets the roll-off of the Root Nyquist filter.</li> <li>Selects the processing method when Average Times is set to ON. TRACE AVG: <ul> <li>Calculates arithmetic average of the measured data (Log data) in the mode LOG.</li> </ul> </li> </ul>
Template Couple t Template Limit Judgment Symbol Rate 1/T Rolloff Factor Average Mode	<ul> <li>b Power</li> <li>Sets whether to raise or lower the template with the power set by Ref Power.</li> <li>If the absolute value of the template is smaller than this value when Template Couple to Power is set to ON, clip the template at this value.</li> <li>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.</li> <li>Sets the symbol rate of the Root Nyquist filter.</li> <li>Sets the roll-off of the Root Nyquist filter.</li> <li>Selects the processing method when Average Times is set to ON.</li> <li>TRACE AVG: <ul> <li>Calculates arithmetic average of the measured data (Log data) in the mode LOG.</li> </ul> </li> </ul>

	POWER AVG: Converts the measured data (Log data) to the linear data to take the root mean square value.
	NUMERIC: Converts the measured data (Log data) to the linear data to take the root mean square value. Using POWER AVG displays the average waveforms, using NUMERIC displays the swept waveforms and takes an average of the measurement results only.
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.

Auto Level Set

Sets 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.* 

Gate Setup

**Trigger** Setup

Sets the gated sweep.

Sets a trigger.

	_	Trig	ger 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	Selects a trigger.			
	FREE RUN:			
		Captures data using the internal measurement timing.		
	VIDEO:	Captures the signal in sync with the VIDEO signal.		
	IF:	Captures the signal in sync with the IF signal (the lead- ing edge of the burst).		
	EXT:	Captures the signal in sync with the external trigger signal.		
Slope	Selects th	ne edge when triggering.		
	+:	Triggers at the leading edge.		
	-:	Triggers at the trailing edge.		

Trigger Level	Sets the level to trigger.
Trigger Position	Sets where the trigger position is displayed on the screen.
Delay Time	Sets a delay time from the time a trigger signal is detected 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	Sets Trigger Source specified by Trigger Setup as Gate Source.
	NOTE: When Trigger Source is set to IF and SPAN is set to a fre- quency higher than 6 MHz, the sweeping seems to be stopped, because the IF trigger bandwidth is approximately 6 MHz and the gate trigger is failing.
Ext Gate	Performs the gated sweep using the gate signal input from the EXT Gate terminal on the rear panel.
Gate Setup	Sets the gated sweep range when Trigger is selected for Gate Source.
Set to STD	Sets the gate position and width to the values specified by the communication standard.
Gate Position	Sets the gate position.
Gate Width	Sets the gate width.
Gated Sweep ON/OFF	Starts the gated sweep.
Detector	NORMAL/POSI/NEGA/SAMPLE Selects the detector.           Detector           Detector           Detector           NORMAL           POSI           NEGA           SAMPLE
	Figure 3-14 Detector Dialog Box
Template	Sets and edits the template. For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."

3.3 Functional Description

Template ON/OFF		Sets the template display to ON or OFF. When Template is set to ON, the Pass/Fail judgment for the tem- plate is displayed under the sweep screen.	
Shift X		Shifts the set template in the frequency direction (X-axis).	
Shift Y		Shifts the set template in the level direction (Y-axis).	
Margin $\Delta X$	K ON/OFF	Magnifies the template in the X-axis direction with a set template frequency 0 as the center.	
Template I	Edit		
	Copy from STD	Copies the template defined in the communication standard.	
	Insert Line	Inserts a line before the selected line.	
	Delete Line	Deletes the selected line.	
	Sort	Sorts the tables in frequency order.	
	Table Init	Initializes the table.	
Marker Edit		For more information, refer to Section 5.2.1, "Marker Edit Func- tion."	
Copy from	STD	Sets to the parameters specified by the communication standard.	
Insert Line	2	Inserts a line before the selected line.	
Delete Line		Deletes the selected line.	
Sort		Sorts data in order of frequency.	
Table Init		Initializes the table.	
Average Times ON/OFF		Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.	

Config

Parameter Setup

3.3 Functional Description

	Parameter Setup		
	Freq.Setting START&STOP SPAN		
	Detector : NORMAL POSI NEGA SAMPLE		
	Result : MARKER RELATIVE ABS POWER		
	Ref Power : REF MARKER MODULATION		
	Display Unit : dBm <u>%</u> dBy?		
	Couple to Power: ON OFF		
	Template Limit : -200.00 dBm		
	Judgment : ON OFF		
	Symbol Rate 1/T : 3.840 MHz		
	Rolloff Factor : 0.22		
	Average Mode : TRACE AVG MAX HOLD POWER AVG NUMERIC		
	Figure 3-15 Parameter Setup Dialog Box		
Freq. Setting	START&STOP/SPAN		
	Selects the measurement mode.		
Detector	NORMAL/POSI/NEGA/SAMPLE		
	Selects the detector.		
Result	Specifies how to display the results.		
	For more information, refer to Section 5.2.2, "Measurement re-		
	sults Using Due to Modulation, Due to Transient and Inband Spu-		
	rious Modes."		
	MARKER:		
	Displays the marker read value. The position of the		
	marker is set by Marker Edit.		
	RELATIVE:		
	Displays the marker read value using a relative value.		
	ADS FOWER.		
	converts the value usplayed by RELATIVE into the		
	absolute value using carrier power and displays it.		
Ref Power	When RELATIVE is selected for Result, this selects which rela-		
-	tive value to use to display the marker read value.		
	DEE MADVED.		
	REF MARKER.		
	Euit.		
	MODULATION:		
	Displays a relative value to the measurement result of		
	Tx power in Modulation.		
Display Unit	dBm/W/dBµV		
	Selects the display unit.		

Sets measurement conditions and so on.

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

3.3 Functional Description

Template Couple	Template Couple to Power		
	Sets whether or not 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 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.		
Symbol Rate 1/T	Sets the symbol rate of the Root Nyquist filter.		
Rolloff Factor	Sets the roll-off of the Root Nyquist filter.		
Average Mode	Selects the processing method when Average Times is set to ON.		
	TRACE AVG: Calculates arithmetic average of the measured data (Log data) in the mode LOG.		
	MAX HOLD: Displays the maximum value within the average counts of the swept waveforms.		
	POWER AVG: Converts the measured data (Log data) to the linear data to take the root mean square value.		
	NUMERIC:		
	Converts the measured data (Log data) to the linear data to take the root mean square value. Using POWER AVG displays the average waveforms		
	using NUMERIC displays the swept waveforms and takes an average of the measurement results only.		
Set to STD	Returns the measurement parameters to the values specified by the standard.		

# 3.3.3.5 Inband Spurious(1)

This is a function to search for a peak by sweeping the set frequency.

Auto Level Set

Sets 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.* 

# 3.3 Functional Description

Template		For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."	
Template ON/OFF		Sets the template display to ON or OFF. When Template is set to ON, the Pass/Fail judgment for the tem- plate is displayed under the sweep screen.	
Shift X		Shifts the set template in the frequency direction (X-axis).	
Shift Y		Shifts the set template in the level direction (Y-axis).	
Margin $\Delta X ON$	I/OFF	Magnifies the template in the X-axis direction with a set template frequency 0 as the center.	
Template Edit		For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."	
Cop	py from STD	Copies the template defined in the communication standard.	
Ins	sert Line	Inserts a line before the selected line.	
Del	lete Line	Deletes the selected line.	
Sor	rt	Sorts the tables in frequency order.	
Tal	ble Init	Initializes the table.	
Marker Edit		For more information, refer to Section 5.2.1, "Marker Edit Function."	
Copy from STD	)	Sets to the parameters specified by the communication standard.	
Insert Line		Inserts a line before the selected line.	
Delete Line		Deletes the selected line.	
Sort		Sorts data in order of frequency.	
Table Init		Initializes the table.	
Average Times ON/OFF		Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.	

# Config

Parameter Setup	Sets measurement conditions and so on.
	Parameter Setup
	Freq.Setting START&STOP SPAN
	Detector : NORMAL POST NEGA SAMPLE
	Peak MKR Y Delta : 0.5 div
	Result : MARKER RELATIVE ABS POWER
	Ref Power : REF MARKER HUDULATION
	Template
	Couple to Power : ON OFF
	Template Limit : <u>-100.00 dBm</u>
	Judgment : ON OFF
	HVE age mude . INTEL AVO MHA TIULD FUMER HVU
	Figure 3-16 Parameter Setup Dialog Box
Freq. Setting	START&STOP/SPAN
1 0	Selects the measurement mode.
Detector	NORMAL/POSI/NEGA/SAMPLE
	Selects the detector.
Peak MKR Y De	elta
	Sets the Y delta of the peak marker.
Result	Specifies how to display the results.
	For more information, refer to Section 5.2.3, "Measurement Re-
	sult of Inband Spurious."
	MARKER:
	Displays the marker read value. The position of the
	marker is set by Marker Edit.
	RELATIVE:
	Displays 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-
	tive value is used to display the marker read value.
	REF MARKER:
	Displays a relative value to Ref Marker set by Marker
	Edit.
	MODULATION:
	Displays a relative value to the measurement result of
	Tx power in Modulation.
Display Unit	dBm/W/dBµV
	Selects the display unit.

3.3 Functional Description

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

	Template Couple to Power			
		Sets whether or not 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 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.		
	Average Mode	Selects the processing method when Average Times is set to ON.		
		TRACE AVG: Calculates arithmetic average of the measured data (Log data) in the mode LOG.		
		MAX HOLD:		
		Displays the maximum value within the average counts of the swept waveforms.		
		POWER AVG:		
		Converts the measured data (Log data) to the linear data to take the root mean square value.		
Set to STD		Returns the measurement parameters to the values specified by the standard.		

# **3.3.3.6 Inband Spurious(2)**

Auto Level Set

Converts resolution bandwidth (RBW) to search spurious signal. When the spurious is swept with broadband RBW near the career frequency, the career signal cannot be separated, which makes the spurious search impossible. In this situation, the sweep with narrow RBW is required to calculate the bandwidth in order to search spurious signal.

> Sets 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.* 

Template

For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."

	Template ON/OFF		Sets the template display to ON or OFF. When Template is set to ON, the Pass/Fail judgment for the tem- plate is displayed under the sweep screen.
	Shift X		Shifts the set template in the frequency direction (X-axis).
	Shift Y		Shifts the set template in the level direction (Y-axis).
	Margin ∆X ON/OFF	7	Magnifies the template in the X-axis direction with a set template frequency 0 as the center.
	Template Edit		For more information, refer to Section 5.1.2, "Template Setting in the F-Domain Measuring Mode."
	Copy fro	om STD	Copies the template specified by the communication standard.
	Insert L	ine	Inserts a line before the selected line.
	Delete L	ine	Deletes the selected line.
	Sort		Sorts the tables in frequency order.
	Table In	uit (	Initializes the table.
Marke	r Edit		For more information, refer to Section 5.2.1, "Marker Edit Function."
	Copy from STD		Sets the measurement parameters specified by the communication standard.
	Insert Line		Inserts a line before the selected line.
	Delete Line		Deletes the selected line.
	Sort		Sorts data in order of frequency.
	Table Init		Initializes the table.
Averag	ge Times ON/OFF		Sets the averaging count.
Config	ŗ		
	Parameter Setup		Sets measurement conditions and so on.

	Parameter Setup
Freq.Setting :	START&STOP SPAN
Detector :	NORMAL <b>Post</b> Nega Sample
Peak MKR Y Delta∶	0.5 div
Result :	MARKER RELATIVE ABS POWER
Ref Power :	REF MARKER MODULATION
Display Unit :	<b⊨ <bnv<="" th="" w=""></b⊨>
Template Couple to Power :	ON
Template Limit :	-100.00 dBm
Judgment :	OFF
Band Conversion :	ON OFF
Integral Band :	1.000 MHz
Start Offset :	2.250 MHz
Stop Offset :	24.500 MHz
Average Mode :	POWER AVG

Figure 3-17 Parameter Setup Dialog Box

Freq. Setting	START&STOP/SPAN
	Selects the measurement mode.
Detector	NORMAL/POSI/NEGA/SAMPLE
	Selects the detector.
Peak MKR Y De	lta
	Sets the Y delta of the peak marker.
Result	Specifies how to display the results.
	For more information, refer to Section 5.2.3, "Measurement Result of Inband Spurious."
	MARKER:
	Displays the marker read value. The position of the marker is set by Marker Edit.
	RELATIVE:
	Displays 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- tive value is used to display the marker read value.
	REF MARKER:
	Displays a relative value to Ref Marker set by Marker Edit.
	MODULATION:
	Displays a relative value to the measurement result of Tx power in Modulation.
Display Unit	dBm/W/dBµV
	Selects the display unit.

3.3 Functional Description

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

	Template Couple t	o Power	
		Sets whe set by Re	ether or not to raise or lower the template with the power of Power.
	Template Limit	If the at when Te this valu	posolute value of the template is smaller than this value mplate Couple to Power is set to ON, clip the template at e.
	Judgment	Used to Marker e display s	make the Pass/Fail judgment for the limit value set by edit. The Pass/Fail judgment result is displayed under the screen together with the marker list.
	Band Conversion	This fun the swep	ction is used to calculate the resolution bandwidth using t waveforms.
		ON:	Calculates resolution bandwidth using the measured da- ta.
		OFF:	Does not calculate resolution bandwidth using the mea- sured data.
	Integral Band	Sets reso tion.	plution bandwidth that conducts the bandwidth calcula-
	Start Offset	Sets the tion, usin	starting frequency that conducts the bandwidth calcula- ng the offset frequency from the center frequency.
	Stop Offset	Sets the ing the o	ending frequency that conducts the band calculation, us- ffset frequency from the center frequency.
		NOTE:	Even when the Start Offset and Stop Offset values have been set beyond the frequency display range, data is calculated within the frequency display range.
	Average Mode	Sets the POWER	processing when Average Times is set to ON. AVG is fixed.
		POWER	AVG: Converts the measured data (Log data) to the linear data to take the root mean square
Set to STD		Returns the stand	the measurement parameters to the values specified by lard.

# 3.3.3.7 Outband Spurious

This is a function to search for a peak by sweeping the frequency according to the table.

# 3.3 Functional Description

Auto Level Set	Sets the internal reference level to an optimum value in accor- dance with the measurement signal. The reference level is auto- matically adjusted when this key is pressed.		
	NOTE: The signal level must be constant while Auto Level Set is being carried out.		
Table No. 1/2/3	Selects the table number.		
Load Table	Loads the table.		
Table Edit	Edits the table.		
Table No. 1/2/3	Selects the table number.		
Load Table	Loads the table.		
Save Table	Saves the table.		
Insert Line	Inserts a line before the selected line.		
Delete Line	Deletes the selected line.		
Table Init	Initializes the table.		
Average Times ON/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config $\rightarrow$ Parameter Setup.		

# Config

Parameter Setup

Sets measurement conditions and so on.

	Parameter Setup					
Detector		NORMAL	POSI	NEGA	SAMPLE	
Peak MKR Y Delta	:	0.5 di	v			
Display Unit	:	dBm	W	dBµV		
Judgment	:	ON	OFF			
Preselector	:	1.66	3.66			
Average Mode	:	TRACE AVG	MAX HOLD	POWER A	VG	

# Figure 3-18 Parameter Setup Dialog Box

Detector NORMAL/POSI/NEGA/SAMPLE Sets the detector.

### Peak MKR Y Delta

Sets the Y delta of a peak marker.

Display UnitdBm/W/dBµVSets the display unit.

3.3 Functional Description

Judgment	Makes the Pass/Fail judgment using the limit values set by Table Edit.		
Preselector	Sets the preselector.		
	NOTE: 2	This menu is displayed on R3267 only.	
	1.6G:	The preselector is activated for frequencies of 1.6 GHz or higher only. If the carrier frequency is less than 1.6 GHz, selecting this item allows you to measure harmonics of 1.6 GHZ or higher.	
	3.6G:	Used to set this parameter for cases other than that above.	
Average Mode	Selects	the processing method when Average Times is set to ON.	
	TRACE AVG:		
		Calculates arithmetic average of the measured data (Log data) in the mode LOG.	
	MAX H	OLD:	
		Displays the maximum value within the average counts of the swept waveforms.	
	POWEF	AVG: Converts the measured data (Log data) to the linear data to take the root mean square value.	
Set to Default	Returns	the set value to the default.	

## 3.3.4 Modulation

The modulation analysis is performed.

# 3.3.4.1 Code Domain Power Coef (when FORWARD is set)

The code domain power coefficient of a cdma2000 Forward Link signal is measured.

 Auto Level Set
 Sets an internal reference level (REF LEVEL) to the optimum value in agreement with the measurement signal.

 NOTE: The level of an input signal must be constant during the execution of Auto Level Set.

 Graphics
 Displays a constellation or an eye diagram.

 Select Type
 Sets the display format.

Constellation (Line) and Constellation (Dot) can be set at any time. Other items can be set if EVM of Meas Options is turned on.

Graphic Type of Analysis	
Constellation	
Constellation(Line)	
Constellation(Dot)	
Constellation(Line & Dot)	
I EVE Diagram	
Q EYE Diagram	
I/Q EYE Diagram	
E.V.M. vs Chip	
Mag Error vs Chip	

Figure 3-19 Graph Type of Analysis Dialog Box

	Constellation	Displays a constellation graph.
	Constellation(Line	) Display the transition between chips with a line.
	Constellation(Dot)	Display the transition between chips without a line.
	Constellation(Line	¨) Displays the transition between chips with connected lines and dots.
	I EYE Diagram	Displays the eye pattern of the I channel.
	Q EYE Diagram	Displays the eye pattern of the Q channel.
	I/Q EYE Diagram	Displays the I channel eye pattern in the upper part of the screen and the Q channel eye pattern in the lower part of the screen.
	E.V.M. vs Chip	Displays EVM for 1 chip.
	Mag Error vs Chip	Displays the magnitude error for 1 chip.
Plot Type		Displays the result of averaging or peak extraction processing in E.V.M. vs Chip or Mag Error vs Chip mode.
		AVG: Performs averaging.

AVG: Performs averaging.P-P: Performs peak extraction.

3.3 Functional Description

Scale Setup
Format       GENERIC         Display       :         SINGLE       OUAL         Y Scale       :         PHASE       CDE         Y Scale Upper       :         OdB       Y/div         Y/div       :         Table Page       :         J       :
Format dialog box is displayed.
<ul><li>GRAPH: Displays a graph for the code domain power coefficient and the power.</li><li>When Auto Rate is set to ON, Channel Define is set to ON, or Bit Reversal Order is set to ON, a blue window is displayed for a channel with a rate that differs from the symbol rate (Walsh code length) of the inactive channel.</li></ul>
TABLE: Displays a list of the code domain power coefficients.
NUMERIC: Displays the measurement result.
Switches the screen mode between Screen 1 and Screen 2 if Display Format is set to GRAPH.
SINGLE: Displays data on a single screen. $\Delta \tau$ , $\Delta \theta$ and the maximum logarithmic $\rho$ value of the inactive channel is displayed in the lower part of the screen.

Switches the result display.

Scale Setup

**Code Domain Power** Cost ۵. د ا th Code No. -180 в 35 24 32 46 48 56 a cdma2000 Code Bonain Go T (Time Alignment Errar) Carrier Prequency Errar ficient Tetal Recult 1.471 ыя В2 0.0006 pon Helliple # PS Offset Hagnitude Error Phone Error Error Vector Hagnitude 1/9 Brigin Offset To Power 5 (16) deg.rms Xrms dik: dik:

Figure 3-21 DUAL Display Example

	DUAL:	Displays data on a dual-screen; displays the graph on the upper screen and the measurement result on the lower screen. The measurement values for the time alignment error, carrier frequency error, multiple $\rho$ , PN offset, magni- tude error, phase error, error vector magnitude, I/Q origin offset and Tx power are displayed as the mea- surement result.		
Y Scale	Sets the Y Scale unit. $\rho$ , POWER and $\rho$ (ALL) can be set at any time. $\tau$ , PHASE and CDE can be set if $\Delta \tau$ , $\Delta \theta$ and Code Domain Error are turned on, respectively.			
	ρ:	The vertical axis of the graph is in logarithmic value of the code domain power coefficient. This display is used to measure the pilot power and code domain power.		
	POWER:	Displays the vertical axis of the graph in units of pow- er.		
	τ:	Displays the vertical axis of the graph as a difference in delay. This display is used to measure "Pilot Channel to Code Channel Time Tolerance."		
	PHASE:	Displays the vertical axis of the graph as a difference in phase. This display is used to measure "Pilot Channel to Code Channel Phase Tolerance."		
	CDE:	Displays the graph as a measurement value of the code domain error.		
	ρ(ALL):	The vertical axis of the graph is in logarithmic value of the code domain power coefficient.		
Y Scale Upper	Specifies	the maximum value on the vertical axis of the graph.		
Y/div	Selects the vertical axis scale of the graph.			
Table Page	Selects the page when Format is set to TABLE.			
Parameter Setup	Sets the measurement parameter.			

3.3 Functional Description



#### Figure 3-22 Setup Example for the Parameter Setup

Meas Range	Sets the measurement range. A range between 128 and 36864 chips can be set.
τOffset	Sets the value by which the trigger position is delayed. When the time alignment error value previously measured is en- tered, the value is set to zero on the next time onward.
Complementary Filter	Sets ON or OFF for the complimentary filter as specified by IS-97.
Rolloff Factor	Sets the roll-off factor used to determine the complimentary filter characteristics. A range of 0.05 to 0.2 can be set.
Equalizing Filter	Sets ON or OFF for the equalizing filter. Set to ON when the phase characteristics of the base station output are obtained after passing through the phase equalizer.
PN Offset Search Mode	Sets ON or OFF for the PN offset search. This mode is turned on if the signal satisfies all of the following conditions: QOFs are all zeros. The maximum Walsh length is 64. The PN Offset value of the base station is not known.
PN Offset	Sets the PN offset value of the base station. Values of 0 through 511 can be set.
Carrier Freq. Search	Sets the search range of the carrier frequency. The carrier frequency is searched using ranges of $\pm 500$ Hz, $\pm 10$ kHz and $\pm 500$ kHz.

Trigger Source	Sets the trigger. Input the even second time reference signal to the external trigger connector.	
	INT: Used to capture data using internal timing.	
	EXT: Used to capture data in sync with the external trigger.	
	<ul> <li>INTRVL (EXT):</li> <li>Causes the internal counter to generate a trigger signal every 26.6 ms.</li> <li>The internal counter operates in sync with the external trigger signal.</li> <li>This mode can be used if the signal consists of QOFs of all zeros and a maximum Walsh length of 64.</li> </ul>	
	INTRVL:Causes the internal counter to generate a trigger signal every 26.6 ms. The internal counter does not operate in sync with the external trigger signal. This mode can be used if the signal consists of QOFs of all zeros and a maximum Walsh length of 64.	
EXT Trigger Slope	Used to set the rise and fall times of the external trigger.	
Threshold	Sets a threshold value which is used to judge whether or not the channel is active. An active channel judgment is made for each symbol consisting of 64 chips or greater.	
	NOTE: When a large threshold value is set, an active channel is judged as passive. As a result, $\rho$ and modulation accuracy become worse than actual values, causing incorrect measurements.	
Auto Rate	<ul><li>Turned on if a measurement is made after the rate for each channel has automatically been recognized.</li><li>The automatic judgment is performed on a channel whose QOF is set to 0.</li><li>This function is used together with the Channel Define function if the signal contains special control channels such as CPCCH.</li><li>If Auto Rate and Channel Define are both turned on, the channels specified by Channel Def. Table have higher priority. The rates for other channels are automatically judged.</li><li>If Auto Rate is turned on, QOF is set to 0, and Bit Reversal Order is turned on.</li></ul>	
Channel Define	When measuring a channel set in Channel Def. Table, set this parameter to ON.	
Walsh Code Length	Sets the Walsh Code length of the channel to be measured if Auto Rate and Channel Define are turned off.	

QOF	When Channel Define is set to ON, the QOF of the channel to be displayed is set in the form of a graph or table. When the channels with different QOFs are set in Channel Def. Table, only the channel with the set QOF is displayed.
	<ul><li>When Channel Define is set to OFF, the QOF of the channel to be measured is set.</li><li>For channels other than the Pilot channel and Sync channel, only the channel with the set QOF is measured.</li><li>As a result, channels with different QOFs are regarded as noise.</li></ul>
Bit Reversal Order	Set Bit Reversal Order to ON to display the channels in the Bit Reversal (Paley). When Bit Reversal Order is set to ON while Channel Define is set to ON, bar graphs are displayed at the positions of the channels corresponding with the Bit Reversal order, depending on the Walsh lengths of each channel.
	When Bit Reversal Order is set to OFF, channels are displayed in the order set in Channel Def. Table. When Channel Define is set to OFF, bar graphs are displayed at the channel positions corresponding to the set values of the Walsh code lengths.
Channel Def. Table	Set the name of the channel to be transmitted and the properties

(data rate, QOF and Walsh code number) of the signal under measurement in Channel Def. Table. This channel definition table is enabled if Channel Define in Pa-

This channel definition table is enabled if Channel Define in Parameter Setup is set to ON.

			Channel De	fine			]
Tota	9 chanr	nel			₩alsh	Walsh	PowerCoef
Edit	Channe 1	RC	DataRate	QOF	Length	Number	1 Auto Lough
8	SCH	3	19200 bps	0	32	20	Nutu Level
							Set
No.	Channe 1	RC	Data Rate	QOF	Length	Num	2
0	PICH	-	-	-	128	0	Graphics
1	SYNCH	-	1200 bps	-	64	32	
2	PCH	-	9600 bps	0	64	1	³ Scale
3	FCH	3	9600 bps	0	64	8	Setup
4	FCH	3	9600 bps	0	64	9	<u> </u>
5	SCH	3	19200 bps	0	32	17	
6	SCH	3	19200 bps	0	32	18	
7	SCH	3	19200 bps	0	32	19	5
8	SCH	3	19200 bps	0	32	20	Parameter
							Setup
							6 Channel
							Def.
							Liable
							7 Meas
	Options						

### Figure 3-23 Setup Example for the Channel Def. Table

Set the number of channels multiplexed on the signal under measurement.

One through 128 channels can be set in the table.

Total

Edit	Specify the number of the channel in Channel Def. Table you wish to edit.
Channel	Set the name of the channel to be transmitted with the channel number specified by Edit.
	The channels that can be set are: PICH, SYNCH, PCH, BCH, CCCH, DCCH, FCH, SCCH, SCH, QPCH, CPCCH and CACH.
	The abbreviations for the channel names are as follows:
	PICH: Pilot channel
	SYNCH: Sync channel
	PCH: Paging channel
	BCH: Broadcast channel
	CCCH: Common Control channel
	DCCH: Dedicated Control channel
	FCH: Fundamental channel
	SCCH: Supplemental Code channel
	SCH: Supplemental channel
	QPCH: Quick Paging channel
	CPCCH: Common Power Control channel
	CACH: Common Assignment channel
RC	Set the radio configuration of the channel to be transmitted spec- ified by Channel.
Data Rate	Set the data rate of the channel to be transmitted specified by Channel.
	When the data rate is changed, the Walsh length is changed ac- cording to the data rate.
QOF	Set the QOF of the channel to be transmitted specified by Chan- nel.
Walsh Number	Set the Walsh code number of the channel to be transmitted spec- ified by Channel.
	NOTE: When a Walsh code number that does not meet orthogonal- ity between different channels is set, a measurement error will occur.

Sets the optional measurement items.

	Meas Opti	ons	
CDP Graph Plot Type	: AVERAGE	MAX	MIN
Power Unit	: d8n		dBnpilot
Pilot Channel Power	: 0.0 dBn		
AT.	: ON	OFF	
48	: ON	OFF	
Code Domain Error	: ON	077	
Signal Power	: ON	OFF	
EVM	: ON	077	
Fixed Symbols Level	: ON	OFF	
Chip Rate Error	: ON	OFF	
10 Gain Error	: ON	OFF	
Quadrature Error	: ON	OFF	

Figure 3-24 Meas Options Setup Example

CDP Graph Plot Type	Sets the display format for POWER and CDE of the code domain power graph. If Y Scale in Scale Setup is set to POWER and CDE, this function is used to display the average, minimum, maximum values after the code domain power for each symbol in a channel has been measured, the average values have been calculated, and then the maximum and minimum values have been extracted.		
	AVERA	GE: Averages the power of each symbol that is higher than the set threshold value and displays the averaged power as the code domain power of the channel.	
	MAX:	Displays the maximum power for each symbol.	
	MIN:	Displays the minimum power that is higher than the set threshold value for each symbol.	
Power Unit	Sets the display format for POWER and CDE of the copower graph.		
	dBm:	Displays the ratio of channel power to AVG Power at Chip measurement value in dBm for each channel.	
	dB:	Display each channel power ratio (dB) rated against the multiplex signal power.	
	dBmpilo	t:	
		Displays each channel power rated against the absolute pilot channel power which is calculated from the Pilot Channel Power setting and the channel power ratio.	
Pilot Channel Power	Sets the absolute power of the Pilot channel. This is a reference power for channel powers calculated when dBm pilot is selected.		
$\Delta  au$	Measures the delay time for each channel. Displays the direction in which the channel lags behind the Pilot channel as a plus sign.		

#### Δθ

**Code Domain Error** 

Measures the phase difference for each channel with reference to the Pilot channel.

Measures the code domain power for an error signal that is obtained by excluding an ideal signal from the measurement signal.



#### Figure 3-25 Measurement Example for the Code Domain Error

Signal Power	Measures the power of the signal within the setting range of Meas Range.
EVM	Measures the modulation accuracy. When EVM is set to ON, it measures the magnitude error, phase error, error vector magnitude and I/Q origin offset. In addition, analysis result graphs such as the EYE diagram and E.V.M. vs. Chip graph can be displayed.
Fixed Symbols Level	Measures the symbol levels by assuming that the power of each symbol in one channel is constant. When the symbol power changes in the same way as the power control bit of the Fundamental channel, the measured value be- comes worse.
Chip Rate Error	Measures chip rate error. Error in the unit Hz relative to 1.2288 MHz. Error ratio in the unit ppm relative to 1.2288 Mcps.
IQ Gain Error	Measures the gain difference between the I- and Q-axes. The IQ gain error (%) is a ratio of the Q-axis gain to the I-axis gain.
Quadrature Error	Measures the orthogonality error of an orthogonal modulator. The angle of deviation of the Q-axis in relation to the I-axis is de- fined as the angle between the Q-axis and the axis obtained by ro- tating the I-axis 90 degrees.

# 3.3.4.2 Code Domain Power (when REVERSE (RC 3 & 4) is set)

This section describes how to measure the power, modulation accuracy and demodulated data of each Walsh channel.

Auto Level Set

Adjusts the reference level automatically.

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

Graphics

Select Type

Displays a constellation or an eye diagram.

Selects a graph type.

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

## Figure 3-26 Graphic Type of Analysis Dialog Box

Constellation	Displays a constellation graph.	
Constellation(Line	) Uses a line to connect the transition between chips and displays it.	
Constellation(Dot)	Display the transition between chips without a line.	
Constellation(Line	<b>&amp;</b> <i>Dot</i> ) Displays the transition between chips with connected lines and dots.	
I EYE Diagram	Displays the eye pattern of the I channel.	
Q EYE Diagram	Displays the eye pattern of the Q channel.	
I/Q EYE Diagram	Displays the I channel eye pattern in the upper part of the screen and the Q channel eye pattern in the lower part of the screen.	
E.V.M. vs Chip	Displays EVM for each chip.	

Mag Error vs Chip Displays the magnitude error for each chip.

#### Phase Error vs Chip

Displays the phase error for each chip.

Displays the result of averaging or peak extraction processing in E.V.M. vs Chip, Mag Error vs Chip or Phase Error vs Chip mode.

AVG: Performs averaging.

P-P: Performs peak extraction.

Y/div

Plot Type

Setting up screen information.

View	Setup
------	-------

View Setup View Hode CHANNEL WILSH Display MAG ERR EVN DEXED PHASE ERR NUMERIC TABLE(PONER) TABLE(EVH) View Channel PICH 5 Y/div(Ch.Graph): Ad De Format NUMERIC TORLE \$(6U.) Y Scale * pin

brolköin(ALL)

SINGLE

10/div

: 1 2

PHASE

5/div

Allows you to select the vertical scale of a graph.

Figure 3-27 View Setup Dialog Box

: [

Display div

Table Page

Y/div

View Mode	Allows you to select a screen display mode.	
	CHANNEL: Disp axis	lays the test result as a graph with the horizontal as the channel name.
	WALSH: Disp axis	lays the test result as a graph with the horizontal as the Walsh function (for PRECISE only).
Display	Allows you to (if View Mode	select the data to be displayed on the lower screen is set to CHANNEL).
	ρ: Disp	lays the code domain power coefficient.
	EVM: Disp bol f	lays the graph of Error Vector Magnitude vs Symor the specified channel (for PRECISE only).
	MAG ERR:	
	Disp the s	lays the graph of Magnitude Error vs Symbol for pecified channel (for PRECISE only).
	PHASE ERR:	
	Disp	lays the graph of Phase Error vs Symbol for the fied channel (for PRECISE only).
	DEMOD:Disp (for 1	lays demodulated data for the specified channel PRECISE only).
	NUMERIC:	
	Disp	lays the numerical result for a multiplexed signal.

	TABLE (POW	ER):
	Disp: powe	lays the summary list as the numerical result of the er for each channel.
	TABLE (EVM	):
	Disp. ror V ror fo	lays the summary list as the numerical result of Er- vector Magnitude, Magnitude Error and Phase Er- or each channel.
View Channel	The numerical result for the selected channel is displayed on the upper screen. If Display is set to EVM, MAG ERR, PHASE ERR or DEMOD, the graph and demodulated data are displayed for each symbol of the selected channel (if View Mode is set to CHANNEL).	
	PICH:	Reverse Pilot Channel
	DCCH:	Reverse Dedicated Control Channel
	SCH2:	Reverse Supplemental Channel 2
	FCH:	Reverse Fundamental Channel
	SCH1:	Reverse Supplemental Channel 1
	For EACH mo	de, the channels listed below can be selected.
	PICH:	Reverse Pilot Channel
	EACH:	Enhanced Access Channel
	For CCCH mo	de, the channels listed below can be selected.
	PICH:	Reverse Pilot Channel
	CCCH:	Reverse Common Control Channel
Y/div(Ch.Graph)	Select the verti EVM, MAG E	ical scale for the lower screen if Display is set to RR or PHASE ERR.
Format	Allows you to set a display format (if View Mode is set WALSH).	
	GRAPH:	Displays data (such as the code domain pow- er coefficient) as a graph.
	TABLE:	Displays data (such as the code domain pow- er coefficient) as a list.
	NUMERIC:	Displays the numerical result for multiplexed signals.
Y Scale	Allows you to set the unit for the vertical axis of a graph (if V Mode is set to WALSH).	
	ρ: Disp powe	lays the vertical axis of a graph as the code domain er coefficient.
	ρ _{re} &ρ _{im} : Disp real p as ρ _{in}	lays the vertical axis on the upper screen as $\rho_{re}$ (the part of $\rho$ ), and the vertical axis on the lower screen m (the imaginary part of $\rho$ ).

	ρ(ALL): Displays the vertical axis of a graph as the code domain power coefficient. All channels can be specified using a marker.
	$\begin{array}{l} \rho_{re} \& \rho_{im}(ALL): \\ Displays the vertical axis on the upper screen as \ \rho_{re}, and \\ the vertical axis on the lower screen as \ \rho_{im}. \ All \ channels \ can be specified using a marker. \end{array}$
	τ: Displays the vertical axis of a graph as the delay differ- ence.
	PHASE: Displays the vertical axis of a graph as the phase difference.
	NOTE: If Y Select is set to $\rho_{re} \& \rho_{im}$ or to $\rho_{re} \& \rho_{im}$ (ALL), pressing MKR, and then A displays the $\rho_{re}$ marker; pressing MKR, and then B displays $\rho_{im}$ marker.
Display div	Allows you to switch the screen mode between the 1- and 2-screen modes (if View Mode is set to WALSH).
Table Page	Allows you to select a page if Format is set to TABLE (if View Mode is set to WALSH).
Y/div	Allows you to select the vertical scale of a graph.
Channel Setup	Setting up a channel for measurement.
	Channel Setup           DCCH         TON         EACH         OCCH           DCCH         :         OH         OFF         W(8, 56)           FCH         :         OH         OFF         W(8, 56)           FCH         :         OH         OFF         W(8, 56)           SCH         Wolsh Function         :         M(1, 27)         W(2, 4)         OH OFF           SCHL Repetition Factor         :         2         4         8         36         32           SCH2 Wolsh Function         :         M(2, 4)         V(6, 8)         OH OFF         SCH2         SCH2         SCH OFF         SCH2         SCH2
	Figure 3-28 Channel Setup Dialog Box
<b>Operation Mode</b>	Selects one of channels listed below for Operation mode. TCH: Traffic Channel
	EACH: Enhanced Access Channel CCCH: Common Control Channel
DCCH	Sets whether the DCCH transmission status is turned on or off when Operation Mode is set to TCH.

	ON:	Sets the conditions under which DCCH data is transmit- ted.
	OFF:	Sets the conditions under which DCCH data is not transmitted.
FCH	Sets wh Operati	ether the FCH transmission status is turned on or off when on Mode is set to TCH.
	ON:	Sets the conditions under which FCH data is transmit- ted.
	OFF:	Sets the conditions under which FCH data is not transmitted.
SCH1 Walsh Function	Selects one of the SCH1 (supplemental channel 1) Walsh functions listed below when Operation Mode is set to TCH.	
	W(1, 2)	$W_1^2$ is set.
	W(2, 4)	$W_2^4$ is set.
	CH OF	F: Sets the conditions under which SCH1 data is not transmitted.
SCH1 Repetition Factor	Sets the number of times that the SCH1 (supplemental channel 1) Walsh function is repeated when Operation Mode is set to TCH.	
SCH2 Walsh Function	Selects tions lis	one of the SCH2 (supplemental channel 2) Walsh func- sted below when Operation Mode is set to TCH.
	W(2, 4)	$W_2^4$ is set.
	W(6, 8)	$W_6^8 \text{ is set.}$
	CH OF	F: Sets the conditions under which SCH2 data is not transmitted.

NOTE: Both SCH1 and SCH2 Walsh functions cannot be set to W(2, 4). For example, if the SCH2 Walsh function is set to W(2,4), the SCH1 Walsh function cannot be set to W(2,4) as shown in Figure 3-28. If this happens, first set the SCH2 Walsh function to W(6,8) or CH OFF and then set the SCH1 Walsh function to W(2,4).

SCH2 Repetition Factor	Sets the number of times that the SCH2 (supplemental channel 2) Walsh function is repeated when Operation Mode is set to TCH.
Walsh Code Length	Sets the Walsh function length.
Parameter Setup	Sets measurement parameters.

Parameter Setup		
Heas Node	RECUSE NORMAL	
Neos Range	: 128 chip	
Threshold	: -23 40	
PN Delay Search Mode	: 001 0FF	
PN Delay	:	
Trigger Source	: DNT EXT	
	INTRAL(EXT) INTRAL	
EXT Trigger Slope	-	
EXT Trigger Delay	:	
Freq Ness Range	EXPWID	
ár	: ON OFF	
48	: ON OFF	
Chip Rate Error	: ON OFF	
Quadrature Error	: ON OFF	

# Figure 3-29 Parameter Setup Dialog Box

Meas Mode	Selects a measurement mode.		
	PRECISE	Measures the modulation accuracy and de- modulation data in addition to the $\rho$ and pow- er ratio for each channel at the same time.	
	NORMA	$\therefore$ Measures the $\rho$ and power ratio for each channel.	
Meas Range	Enters the measurement range using the number (64 $\times$ N) of chips.		
Threshold	Sets a threshold level to judge whether or not the c measured in PRECISE Mode is an active channel. Set the threshold higher than a noise floor and lower nal. In addition, this parameter is used as a reference whether or not there is a signal or a noise in the Estin surement.		
	NOTE:	For NORMAL Mode, active channels are displayed as yel- ow graphs, and inactive channels are displayed as green graphs. For PRECISE Mode: If View Mode is set to CHANNEL, only active channels are displayed. If View Mode is set to WALSH, and if Y Scale is set to $p_{0}(ALL)$ or $p_{re} \& p_{im}(ALL)$ all channels are displayed as yel- bow graphs. If View Mode is set to WALSH, and if Y Scale is set to $p$ or $p_{re} \& p_{im}$ active channels are displayed as green graphs.	

PN Delay Search Mode			
	ON:	Searches the relation put signal	for a PN delay from the captured signal when onship between the external trigger and the in- I PN delay is not clear.
	OFF:	Sets the P ternal trig known.	N delay when the relationship between the ex- gger and the input signal PN delay is already
PN Delay	Sets a va the pilot	lue betwee PN sequen	en 0 and 511 as a synchronization position for ace.
Trigger Source			
	INT:	Captures	data using the internal timing.
	EXT:	Captures	data in sync with the external trigger.
	INTRVL	(EXT): Causes th 26.6 milli with the e	he built-in counter to generate a trigger every seconds. The built-in counter operates in sync external trigger.
	INTRVL	Causes th: 26.6 milli in sync w	the built-in counter to generate a trigger every seconds. The built-in counter does not operate ith the external trigger.
EXT Trigger Slope	Sets the 1	rise and fal	l times for the external trigger.
EXT Trigger Delay	Corrects hind the	the delay t external tri	ime when the signal (the head of PN) lags be- gger.
Freq Meas Range	Set whet measurer	her or not nent.	to expand the estimated frequency range for
	NORMA	L:	Does not expand the measurement range for a frequency error.
	EXPANI	D:	Expands the estimated range of a frequency error.
$\Delta  au$	Measures channel.	s the delay	v value relative to the pilot channel for each
$\Delta  heta$	Measures each chai	s the phase nnel.	e difference relative to the pilot channel for
Chip Rate Error	Measures Error rati	s chip rate ios (ppm) 1	error relative to 1.2288 Mcps. relative to 1.2288 Mcps.
Quadrature Error	Measures rotating t	s the angle he I-axis 9	between the Q-axis and the axis obtained by 0 degrees.
Demod Data Save	Saves the CISE is s	e demodul selected).	ation data to a floppy disk (only when PRE-

3.3 Functional Description

Average Times ON/OFFAveraging is performed on the measured data.This function allows you to set the averaging count.

NOTE: Peak Inactive  $\rho$ , Peak  $\Delta \tau$ , Peak  $\Delta \theta$  in NUMERIC, and EVM PEAK, MAG PEAK, PHASE PEAK in TABLE (EVM) display the measured peak resulting from the measurement counts.

## 3.3.4.3 Waveform Quality (when REVERSE (RC1&2) is set)

Measures the waveform quality, frequency error and modulation accuracy of a OQPSK signal that is not "code multiplexed."

Auto Level Set

Adjusts the reference level automatically.

*NOTE:* Maintain the signal level constant while Auto Level Set is being executed.

Graphics

Displays constellations and eye diagrams.

Select Type

Allows you to select a graphic display format.

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

#### Figure 3-30 Graphic Type of Analysis Dialog Box

*Constellation* Displays a graph containing constellations.

Constellation(Line)

Displays the transition between two adjacent points, 0.5 chips away, using a straight line (connecting the two points).

Constellation(Dot)

Displays the transition between two adjacent points, 0.5 chips away, using dots.

, ,	Displays the transition between two adjacent points, 0.5 chip away, using dots and a line (connecting the two points).
I EYE Diagram	Displays I channel's eye pattern.
Q EYE Diagram	Displays Q channel's eye pattern.
I/Q EYE Diagram	Displays I channel's eye pattern on the upper screen, and Q channel's eye pattern on the lower screen simultaneously.
Null Offset Conste	llation
	Displays a constellation graph after I and Q offsets have been reset to zero and filtering has been performed in order to converge chips to one point.
Null Offset Conste	llation(Line)
	Displays changes between two adjacent chips using a straight line that connects the two chips.
Null Offset Conste	llation(Dot)
	Displays changes between two adjacent chips using dots onl without a line that connects the two chips.
Null Offset Conste	llation(Line¨)
	Displays changes between two adjacent chips using dots and line that connects the two chips.
Null Offset I EYE	Diagram
	Displays an eye pattern of the I channel after I and Q offsets have been reset to zero and filtering has been performed in order converge chips to one point.
Null Offset O EYE	Diagram
ojjoot <u>z</u> BIB	Displays an eye pattern of the Q channel after I and Q offsets have been reset to zero and filtering has been performed in order

Null Offset I EYE Diagram is displayed on the upper screen, and Null Offset Q EYE Diagram is displayed on the lower screen simultaneously.

*E.V.M. vs Chip* Displays EVM every half a chip.

Mag Error vs Chip Displays the magnitude error every half a chip.

# Phase Error vs Chip

Displays the phase error every half a chip.

Plot Type	Displays the result of averaging or peak extraction processing in
	E.V.M. vs Chip, Mag Error vs Chip or Phase Error vs Chip mode.

AVG: Performs averaging.

P-P: Performs peak extraction.

Parameter Setup

Meas Range

Sets the parameters used for measurements.

Parameter Setup		
Mean Range	615 chip	
Trigger Source	INT EXT	
	INTRVL(EXT) INTRVL	
EXT Trigger Slope	-	
EXT Trigger Delay	:	
Freq Mess Range	EXDWARD	

# Figure 3-31 Parameter Setup Dialog Box

Enter a measurement range in chips

Trigger Source				
	INT:	Captures data using the internal timing of the instrument.		
	EXT:	Captures data in synchronization with the ex- ternal trigger.		
	INTRVL (EXT):	The built-in counter, which is synchronized with the external trigger, generates a trigger every 26.6 ms.		
	INTRVL (INT):	The built-in counter, which is not synchro- nized with the external trigger, generates a trigger every 26.6 ms.		
EXT Trigger Slope	Sets the polarity ( ger.	positive or negative slope) of the external trig-		
EXT Trigger Delay	Compensates for external trigger.	the signal (head of PN) delay in relation to the		
Freq Meas Range	Sets 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 or when noise con	mode when signals exist in the adjacent channels, measuring a signal including a large number of mponents.		
	EXPAND:	Expands the estimated range of a frequency		

error.

Average Times ON/OFF:	Averaging is performed on the measured data.
	This function allows you to set the averaging count.

# 3.3.4.4 Power

# 3.3.4.4.1 Tx Power

Measures the power of a modulation signal.

Auto Level Set

Sets an internal reference level (REF LEVEL) to the optimum value in agreement with the measurement signal.

*NOTE:* The level of an input signal must be constant during the execution of Auto Level Set.

Parameter Setup

Sets measurement conditions and so on.

Parameter Setup				
Trigger Source	÷	INT EXT		
		DUTRVL(EXT) IF		
EXT Trigger Slope	:	+ -		
Trigger Level	:	30 %		
EXT Trigger Delay	;	0.00 µm		

### Figure 3-32 Parameter Setup Dialog Box

Trigger Source	Selects a trigger signal.	
	INT:	Sweeps in synchronization with an internal trigger signal.
	EXT:	Sweeps in synchronization with an external trigger sig- nal, which is input from the Ext Trigger connector on the rear panel.
	INTRVL (EXT):	
		The built-in counter generates triggers every 26.6 milli- seconds. The built-in counter is in sync with the exter- nal trigger.
	IF:	Captures data in synchronization with the IF signal (the leading edge of the burst).
EXT Trigger Slope	Changes the polarity of the trigger slope.	
	+:	Starts sweeping at the leading edge of the trigger.
	-:	Starts sweeping at the trailing edge of the trigger.
Trigger Level	Sets the trigger level.	
EXT Trigger Delay	Corrects the delay time when the signal (the head of PN) lags behind the external trigger.	

3.3 Functional Description

*NOTE:* When a negative value is set, a signal before the trigger can be observed.

	NOTE:	Peak Factor obtained as a result of a power measurement calculates the peak power and average power within the measurement counts.
	OFF:	Does not perform an averaging process.
	ON:	Activates the number of times of averaging and per- forms averaging the specified number of times.
Average Times ON/OFF	Selects a	an averaging process.

# 3.3.4.4.2 CCDF

The CCDF (Complementary Cumulative Distribution Function), average power and peak factor of the signal under measurement can be measured.

Auto Level Set	Automatically adjusts the reference level.
Scale Setup	Switches between measurement results.
	Scale Setup         X Scale Max       10 dB         X Scale Range       30 dB         Power Unit       RELATIVE
	Figure 3-33 Scale Setup Dialog Box
X Scale Max	Sets the maximum value along the horizontal axis between -20 $dB(m)$ and 70 $dB(m)$ in steps of 10 dB.
X Scale Range	Sets the display range along the horizontal axis between $10 \text{ dB}(m)$ and $50 \text{ dB}(m)$ in steps of $10 \text{ dB}$ .
Power Unit	Sets the unit to be displayed.
	RELATIVE: Displays the power relative to the average power.
	ABS POWER: Displays the power in absolute value.
Parameter Setup	Sets the parameters used for measurements.
Parameter Setup

3.3 Functional Description

	Trigger Slope i Trigger Delay : Neas Length :
	Figure 3-34 Parameter Setup Dialog Box
Trigger Mode	Selects the timing for retrieving data.
	INT: Captures data using the internal trigger.
	EXT: Captures data using the external trigger.
Trigger Slope	Toggles the external trigger slope between + and
	+: Captures data at the rising edge.
	-: Captures data at the falling edge.
Trigger Delay	Delays the external trigger timing.
	Can be set between -250 $\mu$ s and 250 $\mu$ s in steps of 1 $\mu$ s.
Meas Length	The number of measurement samples is set.
	Can be set between 10k sample and 100M sample in steps of 10k sample.
Trace Write ON/OFF	Sets whether or not the waveform is held.
	ON: Holds the waveform.
	OFF: Does not hold the waveform.

#### 3.3.4.5 Time & FFT

Displays a time-domain IF signal or FFT trace to confirm the input signal.

Auto Level SetSets 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 stay constant while Auto Level Set is being carried out.

Select Type

Selects the graph to be displayed.

Select Type
Tine & FFT
IQ Complex FFT
Ich Time & FFT
Qch Time & FFT
Ich & Qch Time

Figure 3-35 Select Type Dialog Box

3.3 Functional Description

#### **Parameter Setup**

**Trigger** Source

	Panae	eter Setup	
Trigger Hode		INT	EXT
Trigger Slope	:	•	-
Trigger Delay	: [		
Heas Length	:	10 k sample	•

#### Figure 3-36 Parameter Setup Dialog Box

Sets the trigger signal.

FREE RUN:

- Captures data using the internal measurement timing.
- IF: Captures the signal in sync with the IF signal (the leading edge of the burst).
- EXT: Captures the signal in sync with the external trigger signal.

*NOTE: The external trigger signal is input to the EXT TRIG connector on the rear panel.* 

Trigger Slope	Selects the polarity (leading or trailing edge) of a trigger signal.
Trigger Level	Sets the trigger level.
Trigger Delay	Sets a time period between the trigger and the data being captured.
Average Times ON/OFF	Sets the averaging count.

#### 3.3.4.6 STD

Sets parameters used for measurement and relationship between the channel number and frequency.

DC CAL	Compensates	Compensates for direct current components inside the circuit.		
Channel Setting	Sets the relation	onship between the channel number and frequency.		
Copy from STD	Sets the relationship between the channel number and specified by the communication standard.			
	Reverse:	If Link is set to Reverse, the channel number of the mobile station (MS).		
	Forward:	If Link is set to Forward, the channel number of the base station (BS).		
Edit Table 1 2 3	Displays table	s 1 through 3.		
Edit Table 456	Displays table	s 4 through 6.		
Edit Table 789	Displays table	s 7 through 9.		

3.3 Functional Description

#### STD Setup

Sets the parameters for measurement.



#### Figure 3-37 STD Measurement parameter Setup Dialog Box

Band Class	Selects a measurement frequency band, which is used to calculate a frequency from the channel number.		
Link	Sets the signal dire	ection.	
	FORWARD:	Measures the signal transferred from the base station.	
	REVERSE (RC1&	\$2):	
		Measures RC1 and RC2 signals on the mo- bile station.	
	REVERSE (RC3&	&RC4):	
		Measures RC3 and RC4 signals on the mo- bile station.	
Signal Type	Sets whether or not the signal to be measured is a burst signal if Link is REVERSE (RC1&2).		
	CONTINUOUS:	Selected when the signal to be measured is a continuous signal.	
	BURST:	Selected when the signal to be measured is a burst signal.	
		To measure F-Domain power, the gated	
		Tx Power is measured by searching for a burst wave.	
Offset Level	Sets reference lev +100 dB.	el's offset value within a range of -100 dB to	
Frequency Input	Sets the method of ment.	of entering the center frequency to the instru-	
	FREQUENCY:	Enters a frequency.	

3.3 Functional Description

	CHANNEL:	Enters a channel number.
Input	Sets the input si	gnal route.
	RF:	Selects the RF input route
	BASEBAND (I	&Q):
		Sets the IQ input path. The input signal magnitude range is from 0.25 V to 0.9 Vp-p (±0.47 V or less).
	NOTE: When tive po	the baseband is input, Tx Power is displayed in rela- wer.
Baseband Input		
	AC: Allow	vs you to select AC coupling.
	DC: Allow	ys you to select DC coupling.
IQ Inverse	Sets whether or	not the phase of the IQ signal is inverted.
	NORMAL:	The sign of the Q signal is not inverted.
	INVERSE:	The sign of the Q signal is inverted.
Cont Auto Level Set	Sets whether to	carry out the auto ranging.
	ON: The av	uto ranging is carried out on a measurement basis.
	OFF: The a	uto ranging is not carried out.
	NOTE: When RI only for Power an Use the s level.	F is selected for Input, Cont Auto Level Set takes effect Code Domain Power Coef, Code Domain Power, Tx d CCDF. Soft key Auto Level Set when adjusting the reference

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.

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#### 4.2 GPIB Command Codes

The following table list the GPIB commands by function.

**Table 4-1 Operating Mode** 

Function		Listener Code	Tall	Remarks	
		Listener Code	Code	Output Format	Kennarks
Operating mode	Spectrum analyzer mode TRANSIENT mode	SETFUNC CW SETFUNC TRAN	SETFUNC?	0:Spectrum analyzer 1:TRANSIENT	
Communica- tion system	cdma2000 mode	COMMSYS CDMA2000	COMMSYS?	12:cdma2000	*1

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

Table	4-2	ATT	Kev	(Attenuator)
I GOIC			J	(I I We maavor)

Function		Listanar Coda	Talker Request		Domarka
		Eistener Code	Code	Output Format	Kennarks
Attenuator	AT	AT *	AT?	Level	
	ATT AUTO	AA	AA?	0: Manual 1: AUTO	
	Min. ATT	ATMIN *	ATMIN?	Level	
	Min. ATT ON	ATMIN ON [*]	ATMINON?	0: OFF	
	OFF	ATMIN OFF		1: ON	

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

Function		Listener Code	Tall	Romarks	
			Code	Output Format	ixemat K5
Printer output	Execution of the command	НСОРҮ	-	-	
File output					

Function		Listener Code	Talker Request		Remarks
	Tunction	Listener Code	Code	Output Format	Remarks
Couple	RBW	RB *	RB?	Frequency	
function	RBW AUTO	BA	BA?	0:Manual 1:AUTO	
	VBW	VB *	VB?	Frequency	
	VBW AUTO	VA	VA?	0:Manual 1:AUTO	
	Sweep Time	SW * ST *	SW? ST?	Time	
	Sweep Time Auto	AS	AS?	0:Manual 1:AUTO	

# Table 4-4 COUPLE Key (Couple function)

### Table 4-5 FREQ Key (Frequency)

Function		Listener Code	Tall	Romarks	
			Code	Output Format	Kennarks
Frequency	Center frequency	CF *	CF?	Frequency	
	Start frequency	FA *	FA?	Frequency	
	Stop frequency	FB *	FB?	Frequency	

#### Table 4-6 LEVEL Key (Reference Level)

Function	Listener Code	Tal	Pemarks	
		Code	Output Format	Remarks
Reference level	RL *	RL?	Level	

	Function	Listener Code	Talker Request		Remarks
Function		Listenei Code	Code	Output Format	
Marker	ΔMarker ON	MKD [*]	-	Frequency(Time)	
	OFF	MKOFF MO	-	-	
	Reading marker frequency (time)	-	MF?	Frequency(Time)	
	Reading marker level	-	ML?	Level	
	Reading marker frequency (time) and marker level	-	MFL?	Frequency(Time), Level	
	Normal marker	MK [*] MKN [*]	-	Frequency(Time)	
	Peak search	PS	-	-	
	X-dB Down				
	X-dB Down width	MKBW *	MKBW?	Level	
	X-dB Down	XDB	-	-	
	X-dB Down Left	XDL	-	-	
	X-dB Down Right	XDR	-	-	
	Display mode REL.	DC0	DC?	0: Relative mode	
	ABS.L.	DC1		1: Absolute mode (Left side)	
	ABS.R.	DC2		2: Absolute mode (Right side)	

#### Table 4-7 MKR Key (Marker)

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

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	Remarks
Preset	Instrument preset	IP	-	-	

# Table 4-9 RCL Key (Recall)

Function	Listener Code	Tal	Domorks	
		Code	Output Format	Kellia KS
Recall	RC REG_nn RC file name	-	nn: 01 to 10 File name: Max.8 character	

Function		Listener Code	Tal	Domorka	
			Code	Output Format	Kennarks
Save	Save	SV REG_nn SV file name	-	nn: 01 to 10 File name: Max.8 character	
	Deletion	DEL REG_nn DEL file name	-	nn: 01 to 10 File name: Max.8 character	

# Table 4-10 SAVE Key (Save)

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

Function	Listener Code	Tall	Romarks	
		Code	Output Format	Kelliai KS
Frequency span	SP *	SP?	Frequency	

	Franction	Listener Cada		Talker Request	
	Function	Listener Code	Code	Output Format	<u>remarks</u>
STD	Band Class				
Setup	0 (North American Cellular)	BNDCLS 0	BNDCLS?	0: North American Cellular	
	1 (North American PCS)	BNDCLS 1		1: North American PCS	
	2 (TACS)	BNDCLS 2		2: TACS	
	3 (JTACS)	BNDCLS 3		3: JTACS	
	4 (Korean PCS)	BNDCLS 4		4: Korean PCS	
	5 (NMT-450)	BNDCLS 5		5: NMT-450	
	6 (IMT-2000)	BNDCLS 6		6: IMT-2000	
	7 (North American 700MHz Cellular)	BNDCLS 7		7: North American 700MHz Cellular	
	8 (1800MHz)	BNDCLS 8		8: 1800MHz	
	9 (900MHz)	BNDCLS 9		9: 900MHz	
	Link				1
	FORWARD	LINK FWD	LINK?	0:FORWARD	
	REVERSE(RC3&4)	LINK REV34		1:REVERSE(RC3&4)	
	REVERSE(RC1&2)	LINK REV12		2:REVERSE(RC1&2)	
S	Signal Type				
	CONTINUOUS	SIGTYP CONT	SIGTYP?	0:CONTINUOUS	
	BURST	SIGTYP BURST 1:BURST		1:BURST	
	Offset Level	RO *	RO?	Level	
	Frequency setting mode				
	Frequency input mode	FINPMD FREQ	FINPMD?	0: Frequency input	
	Channel input mode	FINPMD CHL		1: Channel input	
	Channel setting	CH *	CH?	Integer (Channel number)	
	Channel edition				
	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 #4 (FORWARD)	CHEDFR4 *,*,*,*,*	CHEDFR4?	ch1,ch2,f1,f2,chof	
	Input #5 (FORWARD)	CHEDFR5 *,*,*,*,*	CHEDFR5?	ch1,ch2,f1,f2,chof	
	Input #6 (FORWARD)	CHEDFR6 *,*,*,*,*	CHEDFR6?	ch1,ch2,f1,f2,chof	
	Input #7 (FORWARD)	CHEDFR7 *,*,*,*,*	CHEDFR7?	ch1,ch2,f1,f2,chof	
	Input #8 (FORWARD)	CHEDFR8 *,*,*,*,*	CHEDFR8?	ch1,ch2,f1,f2,chof	
	Input #9 (FORWARD)	CHEDFR9 *,*,*,*,*	CHEDFR9?	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	
	Input #4 (REVERSE)	CHEDRV4 *,*,*,*,*	CHEDRV4?	ch1,ch2,f1,f2,chof	
	Input #5 (REVERSE)	CHEDRV5 *,*,*,*,*	CHEDRV5?	ch1,ch2,f1,f2,chof	
l	Input #6 (REVERSE)	CHEDRV6 * * * * *	CHEDRV6?	ch1 ch2 f1 f2 chof	

Function		Listener Code	Tal	Domorka	
	Function	Listener Code	Code	Output Format	Remarks
STD	Input #7 (REVERSE)	CHEDRV7 *,*,*,*,*	CHEDRV7?	ch1,ch2,f1,f2,chof	
Setup	Input #8 (REVERSE)	CHEDRV8 *,*,*,*,*	CHEDRV8?	ch1,ch2,f1,f2,chof	
	Input #9 (REVERSE)	CHEDRV9 *,*,*,*,*	CHEDRV9?	ch1,ch2,f1,f2,chof	
				ch1: Start channel no. ch2: Stop channel no. f1: Base frequency(Hz) f2: Channel space(Hz) chof: Channel Offset	Units of frequency are necessary for f1 and f2.
	Channel table				
	ENABLE/DISABLE selection				
	#1 ENABLE DISABLE	CHTBL1 ENBL CHTBL1 DSBL	CHTBL1?	0: Disable 1: Enable	
	#2 ENABLE	CHTBL2 ENBL	CHTBL2?	0: Disable	
	DISABLE	CHTBL2 DSBL		1: Enable	
	#3 ENABLE	CHTBL3 ENBL	CHTBL3?	0: Disable	
	DISABLE	CHIBL3 DSBL	CUTDI 49	1: Enable	
	#4 ENABLE DISABLE	CHIBL4 ENBL CHTBL4 DSBL	CHIBL4?	0: Disable	
	#5 ENABLE	CHTBL 5 ENBL	CHTBL5?	0: Disable	
	DISABLE	CHTBL5 DSBL	CITIBLS.	1: Enable	
	#6 ENABLE	CHTBL6 ENBL	CHTBL6?	0: Disable	
	DISABLE	CHTBL6 DSBL		1: Enable	
	#7 ENABLE	CHTBL7 ENBL	CHTBL7?	0: Disable	
	DISABLE	CHTBL7 DSBL		1: Enable	
	#8 ENABLE	CHTBL8 ENBL	CHTBL8?	0: Disable	
	#0 ENABLE	CHTRI Q ENRI	CHITRI 02	1. Ellable	
	DISABLE	CHTBL9 DSBL	CITIBLY	1: Enable	
	Channel				
	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	-	-	

Function		Listener Code	Talker Request		Domarka
			Code	Output Format	Remarks
T-Domain	Auto Level Set	AUTOWFL	-	-	
Power		TDPAUTOLVL			
	Trigger Setup				
	Trigger Source				
	FREERUN	TRGSRC FREE	TRGSRC?	0:FREERUN	
		TDPTRGSRC FREE	TDPTRGSRC?	1:VIDEO	
	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?		
	Delay Time	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	Talke	Remarks	
	Function	Listenei Code	Code	Output Format	Nennai KS
T-Domain Power	Average Times	TDPAVGCNT *	TDPAVGCNT?	Integer (1:OFF.2 to 999)	
		TDPAVG *	TDPAVG?	Integer (1:OFF,2 to 999)	*1
		CAVGAT *	CAVGAT?	Integer (1:OFF,2 to 999)	*1
	Average Mode				
	TRACE AVG	TDPAVGMD TRACE	TDPAVGMD?	0: Trace Avg	
	MAX HOLD	TDPAVGMD MAX		1: Max Hold	
	POWER AVG	TDPAVGMD POWER		2: Power Avg	
	NUMERIC	TDPAVGMD NUMERIC		3: Numeric	
	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	TDPTMPLSEL UP	TDPTMPLSEL?	0:UP	
	UP/LOW select	TDPTMPLSEL LOW		1:LOW	
	Copy from STD	TDPTMPLCP	-	-	
		LMCPSL STD			
	Data entry	TDPTMPLED *,*	-	t1,11	
		TLMIN *,*		t1:Time	
				11:Level	
				$(dBm/W/dB\mu V)$	
	Init Table	TDPTMPLCLR	-	-	
	D ( )	TLMDEL			
	Parameter Setup				
	Detector	TODDET NDM	TODDET	0.N	
	Normal	IDPDEI NKM	IDPDE1?	U:INOrmal	
	Posi	TDPDET POS		1:Posi	
	Nega	TDPDET NEG		2:Nega	
	Sample	TDPDET SMP		3:Sample	

#### Table 4-12 TRANSIENT Key

*1: Average Mode is set to POWER AVG.

	Expetion	Listoper Code	Talker Request		Remarks
Function		Listener Code	Code	Output Format	Kemarks
T-Domain	Display Unit				
Power	dBm	TDPUNIT DBM	TDPUNIT?	0:dBm	
	W	TDPUNIT W		1:W	
	dBµV	TDPUNIT DBUV		2:dBµV	
	Template Couple to Power		-	-	
	ON	TDPTMPLPW ON	TDPTMPLPW?	0:OFF	
	OFF	TDPTMPLPW OFF		1:ON	
	Template Limit	TDPTMPLBTM *	TDPTMPLBTM?	Level (dBm/W/dBµV)	
	Judgment				1
	ON	TDPJDG ON	TDPJDG?	0:OFF	
	OFF	TDPJDG OFF		1:ON	
	Upper Limit	TDPJDGUP *	TDPJDGUP?	Level	1
	Lower Limit	TDPJDGLOW *	TDPJDGLOW?	Level	1
	Set to STD	TDPSETSTD	-	-	1
	Starts measurement				1
	T-Domain Power	GATEPOW	-	-	
		TDPMEAS			
	Starts measurement in the same mode	SI	-	-	]
	Measurement results				1
	T-Domain Power	-	TDPMEAS?	11,j1	
				l1:Level (dBm/W/dBmV)	
				j1:Integer (0:FAIL,1:PASS, -1:Judgment OFF)	
			GATEPOW?	11:Level (dBm)	

	Eurotion	Listanar Coda	Talker Request		Remarks
i unction		Listener Code	Code	Output Format	Kelliarks
ON/OFF	Auto Level Set	OORAUTOLVL	-	-	
Ratio	Trigger Setup				
	Trigger Source				
	FREERUN	OORTRGSRC FREE	OORTRGSRC?	0:FREERUN	
	VIDEO	OORTRGSRC VIDEO		1:VIDEO	
	IF	OORTRGSRC IF		2:IF	
	EXT	OORTRGSRC EXT		3:EXT	
	Trigger Slope				
	+	OORTRGSLP RISE	OORTRGSLP?	0:-	
	-	OORTRGSLP FALL		1:+	
	Trigger Level	OORTRGLVL *	OORTRGLVL?	Integer (0 to 100)	
	Trigger Position	OORTRGPOS *	OORTRGPOS?	Integer (0 to 100)	
	Delay Time	OORTRGDT *	OORTRGDT?	Time	
	Window Setup				
	Window				
	ON	OORWDO ON	OORWDO?	0:OFF	
	OFF	OORWDO OFF		1:ON	
	ON Position	OORWONPOS *	OORWONPOS?	Time	
	ON Width	OORWONWID *	OORWONWID?	Time	
	OFF Position	OORWOFPOS *	OORWOFPOS?	Time	
	OFF Width	OORWOFWID *	OORWOFWID?	Time	
	Y Scale				
	10dB/div	OORDIV P10DB	OORDIV?	0:10dB/div	
	5dB/div	OORDIV P5DB		1:5dB/div	
	2dB/div	OORDIV P2DB		2:2dB/div	
	Average Times	OORAVGCNT *	OORAVGCNT?	Integer (1:OFF,2 to 999)	
		OORAVG *	OORAVG?	Integer (1:OFF,2 to 999)	*1
		CAVGRAT *	CAVGRAT?	Integer (1:OFF,2 to 999)	*1
	Average Mode				
	TRACE AVG	OORAVGMD TRACE	OORAVGMD?	0: Trace Avg	
	MAX HOLD	OORAVGMD MAX		1: Max Hold	
	POWER AVG	OORAVGMD POWER		2: Power Avg	
	NUMERIC	OORAVGMD NUMERIC		3: Numeric	

### Table 4-12 TRANSIENT Key

*1: Average Mode is set to NUMERIC.

Function		Listener Code	Talker Request		Domorka
	Function		Code	Output Format	Kemarks
ON/OFF	Parameter Setup				
Ratio	Detector				
	Normal	OORDET NRM	OORDET?	0:Normal	
	Posi	OORDET POS		1:Posi	
	Nega	OORDET NEG		2:Nega	
	Sample	OORDET SMP		3:Sample	
	Display Unit				
	dBm	OORUNIT DBM	OORUNIT?	0:dBm	
	W	OORUNIT W		1:W	
	dBµV	OORUNIT DBUV		2:dBµV	
	Judgment				
	ON	OORJDG ON	OORJDG?	0:OFF	
	OFF	OORJDG OFF		1:ON	
	Upper Limit	OORJDGUP *	OORJDGUP?	Level	
	Set to STD	OORSETSTD	-	-	
	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 (dBm/W/dBµV)	
				12:OFF Level	
				$(dBm/W/dB\mu V)$	
				d1:ON/OFF Ratio (dB)	
				j1:Integer (0:FAIL,1:PASS, -1:Judgment OFF)	
			RATIO?	d1,11	
				d1:ON/OFF Ratio (dB)	
				11:Gated Power (dBm)	

Function		Lister en Cada	Talker Request		Remarks
		Listener Code	Code	Output Format	Remarks
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			
	2	TRSPMD EXT			
	Trigger Slope				
	+	TDSTRGSLP RISE	TDSTRGSLP?	0:-	
	'	TRSPSI PRISE	IDSTROSEI :	0 1:+	
		TDSTDGSLD FALL	TD CDCI D9	1.1	
	-		INSI SLI :		
	Trigger Level	TDSTDCI VI *	TDSTRCI VI 9	Integer $(0 \text{ to } 100)$	
			TDSTROLVL?	Integer (0 to 100)	
	Trigger Position	TDSTRGPUS *	TDSTRGPUS?	Integer (0 to 100)	
	Delay Time	TDSTRGDT *	TDSTRGD1?	Time	
	Table No. 1/2/3	TDSTBL *	TDSTBL?	Integer (1 to 3)	
	Table Edit	TDSTBLED *,*	-	f1,11	
				f1:Frequency	
				11:Limit Level	
	Load Table	TDSLD	-	-	
	Load Table 1/2/3	RCLTBL *	-	Integer (1 to 3)	
	Save Table	TDSSV	-	-	
	Save Table 1/2/3	SVSTBL *	-	Integer (1 to 3)	
	Init Table	TDSCLR	-	-	
		DELSTBL			
	Table Freq. Input				
	ABS	TDSTBLF ABS	TDSTBLF?	0:ABS	
	KEL	IDSIBLF KEL	TDOANCONTRO	I:KEL	
	Average Times	IDSAVGCNI *	IDSAVGCNI?	(1:OFF,2 to 999)	
		TDSAVG *	TDSAVG?	Integer (1:OFF,2 to 999)	*1

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

# 4.2 GPIB Command Codes

Function			Talker Request		Domonico
	Function	Listener Code	Code	Output Format	Remarks
T-Domain	Average Mode				
Spurious	TRACE AVG	TDSAVGMD TRACE	TDSAVGMD?	0: Trace Avg	
	MAX HOLD	TDSAVGMD MAX		1: Max Hold	
	POWER AVG	TDSAVGMD POWER		2: Power Avg	
	NUMERIC	TDSAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	TDSDET NRM	TDSDET?	0:Normal	
	Posi	TDSDET POS		1:Posi	
	Nega	TDSDET NEG		2:Nega	
	Sample	TDSDET SMP		3:Sample	
	Display Unit				
	dBm	TDSUNIT DBM	TDSUNIT?	-	
	W	TDSUNIT W			
	dBµV	TDSUNIT DBUV			
	Judgment				1
	ON	TDSJDG ON	TDSJDG?	0:OFF	
	OFF	TDSJDG OFF		1:ON	
	Result				
	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?	$\begin{array}{l} n{<}CR{+}LF{>} \\ {+}f1{,}11{,}j1{<}CR{+}LF{>} \\{+}fn{,}ln{,}jn{<}CR{+}LF{>} \end{array}$	
				n:Amount (Integer)	
				fn:Frequency	
				ln:Level (dBm/W/dBµV)	

Function		Listener Code	Talker Request		Remarks
	Function	Listener Code	Code	Output Format	Remarks
T-Domain Spurious			SPULVL?	jn:Integer (0:FAIL,1:PASS, -1:Judgment OFF) n <cr+lf> +f1,11<cr+lf>  +fn,ln<cr+lf> n:Amount (Integer)</cr+lf></cr+lf></cr+lf>	
				fn:Frequency	
				ln:Level (dBm)	
F-Domain	Auto Level Set	FDPAUTOLVL	-	-	
Power	Gate Setup ON OFF	TGTSETUP ON TGTSETUP OFF	TGTSETUP?	0:OFF 1:ON	
	Trigger Source FREERUN VIDEO IF	TGTTRG FREE TGTTRG VIDEO TGTTRG IF	TGTTRG?	0:FREERUN 1:VIDEO 2:IF	
	EXT	TGTTRG EXT		3:EXT	
	Trigger Slope - +	TGTTRGSLP FALL TGTTRGSLP RISE	TGTTRGSLP?	0:- 1:+	
	Trigger Level	TGTTRGLVL *	TGTTRGLVL?	Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Delay Time	TGTTRGDT *	TGTTRGDT?	Time	
	Gate Source Trigger Ext Gate	TGTSRC TRG TGTSRC EXT	TGTSRC?	0:Trigger 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	IGIDEI SMP		5:Sample	
	On ON	TGTSWP ON	TGTSWP?	0:OFF	
	OFF	TGTSWP OFF		1:ON	

		Lister Col	Talker	Pomarka	
	Function	Listener Code	Code	Output Format	Remarks
F-Domain	Window Setup				
Power	Window				
	ON	FDPWDO ON	FDPWDO?	0:OFF	
	OFF	FDPWDO OFF		1:ON	
	Window Position	FDPWPOS *	FDPWPOS?	Frequency	
		CPWLX *	CPWLX?		
	Window Width	FDPWWID *	FDPWWID?	Frequency	
		CPWDX *	CPWDX?		
	Y Scale				
	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	FDPAVGCNT *	FDPAVGCNT?	Integer (1:OFF,2 to 999)	
		FDPAVG *	FDPAVG?	Integer (1:OFF,2 to 999)	*1
		CAVGCHP *	CAVGCHP?	Integer (1:OFF,2 to 999)	*1
	Average Mode				
	TRACE AVG	FDPAVGMD TRACE	FDPAVGMD?	0: Trace Avg	
	MAX HOLD	FDPAVGMD MAX		1: Max Hold	
	POWER AVG	FDPAVGMD POWER		2: Power Avg	
	NUMERIC	FDPAVGMD NUMERIC		3: Numeric	
	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				
	dBm	FDPUNIT DBM	FDPUNIT?	0:dBm	
	W	FDPUNIT W		1:W	
	dBµV	FDPUNIT DBUV		2:dBµV	
	Judgment				
	ON	FDPJDG ON	FDPJDG?	0:OFF	
	OFF	FDPJDG OFF		1:ON	

# Table 4-12 TRANSIENT Key

*1: Average Mode is set to POWER AVG.

Function		Listener Code	Talke	Remarks	
			Code	Output Format	Remarks
F-Domain Power	Upper Limit	FDPJDGUP *	FDPJDGUP?	Level (dBm/W/dBµV)	
	Lower Limit	FDPJDGLOW *	FDPJDGLOW?	Level (dBm/W/dBµV)	
	Set to STD	FDPSETSTD	-	-	
	Starts measurement				
	F-Domain Power	FDPMEAS CCHPOW	-	-	
	Starts measurement in the same mode	SI	-	-	
	Measurement results				
	F-Domain Power	-	FDPMEAS?	11.j1 11:Level (dBm/W/dBmV) j1:Integer (0:FAIL,1:PASS, -1:Judgment OFF)	
			CCHPOW?	11,12 11:Level (dBm) 12:Level (dBm/Hz)	
OBW	Auto Level Set	OBWAUTOLVL	-	-	
	OBW%	OBWPER *	OBWPER?	Real number (0.5 to 99.5)	
		COBWPER *	COBWPER?		
	Average Times	OBWAVGCNT *	OBWAVGCNT?	Integer (1:OFF,2 to 999)	
		OBWAVG *	OBWAVG?	Integer (1:OFF,2 to 999)	*1
		CAVGOBW *	CAVGOBW?	Integer (1:OFF,2 to 999)	*1
	Average Mode				
	TRACE AVG	OBWAVGMD TRACE	OBWAVGMD?	0: Trace Avg	
	MAX HOLD	OBWAVGMD MAX		1: Max Hold	
	POWER AVG	OBWAVGMD POWER		2: Power Avg	
	NUMERIC	OBWAVGMD NUMERIC		3: Numeric	

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

Function		Listener Code	Talk	Domorto	
		Listener Code	Code	Output Format	Kemarks
OBW	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			
	Sample	OBWDET SMP			
	F	COBWDET SMP			
	Judgment				
	ON	OBWJDG ON	OBWJDG?	0:OFF	
	OFF	OBWJDG OFF		1:ON	
	Upper Limit	OBWJDGUP *	OBWJDGUP?	Frequency	
	Lower Limit	OBWJDGLOW *	OBWJDGLOW?	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 f1:OBW Frequency f2:Lower side frequency f3:Higher side frequency j1: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
			COBW?	f1,f2,f3 f1:OBW Frequency f2:Lower side frequency f3:Higher side frequency	

Function		Listopor Codo	Talker Request		Remarks
	Function	Listellei Code	Code	Output Format	Remarks
Due to	Auto Level Set	DTSAUTOLVL	-	-	
Transient	Template				
	Template				
	ON	DTSTMPL ON	DTSTMPL?	0: OFF	
	OFF	DTSTMPL OFF		1: ON	
	Template Shift			1	
	Shift X	DTSTMPLSX *	DTSTMPLSX?	Frequency	
	Shift Y	DTSTMPLSY *	DTSTMPLSY?	Level	
	Margin delta X	DTSTMPLDX *	DTSTMPLDX?	Frequency (0:OFF)	
	Copy from STD	DTSTMPLCP	-	-	
	Data entry	DTSTMPLED *,*	-	f1,l1 f1: Frequency l1: Level (dBm/W/dBµV)	
	Init Table	DTSTMPLCLR	-	-	
	Marker Edit	1			
	Copy from STD	DTSMKRCP	-	-	
	Data entry	DTSMKRED *,*,*,*	-	d1,f1,f2,11 d1: (0:Normal 1: Integral 2: √Nyquist) f1: Offset Frequency f2: Band width 11: Limit level	Set the reference bandwidth to f2, after initializing the table.
	Init Table	DTSMKRCLR	-	-	
	Average Times	DTSAVGCNT * DTSAVG *	DTSAVGCNT? DTSAVG?	Integer (1:OFF, 2 to 999) Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	DTSAVGMD TRACE	DTSAVGMD?	0: Trace Avg	
	MAX HOLD	DTSAVGMD MAX		1: Max Hold	
	POWER AVG	DTSAVGMD POWER		2: Power Avg	
	NUMERIC	DTSAVGMD NUMERIC		3: Numeric	

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

# 4.2 GPIB Command Codes

Function		Listanar Coda	Talker Request		Domarka
	Function		Code	Output Format	Kelliarks
Due to Transient	Parameter Setup				
1	Normal	DTSDFT NRM	DTSDFT?	0. Normal	
	Doci	DTSDET POS	DISDEL	1. Dosi	
	Nega	DTSDET NEG		2. Nega	
	Sample	DTSDET SMP		2. Nega 3. Sample	
	Dienlay Unit		+		-
	dRm	DTSUNIT DBM	DTSUNIT?	0. dBm	
	W	DISCINIT W	Disciti.	1. W	
	dBuV	DISCINIT ORIV		2. dBuV	
	Template Couple to Power			2. dbµ v	
	ON	DTSTMPLPW ON	DTSTMPLPW?	0: OFF	
	OFF	DTSTMPLPW OFF		1: ON	
	Template Limit	DTSTMPLBTM *	DTSTMPL- BTM?	Level (dBm/W/dBµV)	
	Judgment		1		1
	ON OFF	DTSJDG ON DTSJDG OFF	DTSJDG?	0: OFF 1: ON	
	Freq. Setting		1		
	CFSP STSP	DTSFRMD CFSP DTSFRMD STSP	DTSFRMD?	0: Center/Span mode 1: Start/Stop mode	
	Result				1
	ABS REL MKR	DTSRES ABS DTSRES REL DTSRES MKR	DTSRES?	0: Absolute 1: Relative 2: Marker	
	Ref Power				1
	MKR MOD	DTSREF MKR DTSREF MOD	DTSREF?	0: Reference Marker 1: Modulation	
	Symbol Rate 1/T	DTSSYMRT *	DTSSYMRT?	Frequency	1
	Rolloff Factor	DTSRFACT *	DTSRFACT?	Real number	1
	Set to STD	DTSSETSTD	-	-	1
	Starts measurement				
	Due to Transient	DTSMEAS	-	-	
	Starts measurement in the same mode	SI	-	-	

Function		Listener Code	Talker Request		Remarks
		Listener Code	Code	Output Format	Kemarks
Due to Transient	Measurement results Due to Transient	_	DTSMEAS? COBWCP?	n <cr+lf> +d1,j1<cr+lf> +dn,jn<cr+lf> n:Amount (Integer) dn: Power jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF) 11,12,d1,d2,d3,d4 11: Level (dBm: Reference power) 12: Level (W: Reference power) d1: -1st ACP(dBc) d2: +1st ACP(dBc) d3: -2nd ACP(dBc)</cr+lf></cr+lf></cr+lf>	
	Ref. Power	-	DTSREFPWR?	Level	
Due to	Auto Level Set	DTMAUTOLVL	-	-	
Modula- tion	Gate Setup ON OFF	TGTSETUP ON TGTSETUP OFF	TGTSETUP?	0: OFF 1: ON	
	Trigger Source FREERUN VIDEO IF EXT	TGTTRG FREE TGTTRG VIDEO TGTTRG IF TGTTRG EXT	TGTTRG?	0: FREERUN 1: VIDEO 2: IF 3: EXT	
	Trigger Slope - + Trigger Level	TGTTRGSLP FALL TGTTRGSLP RISE TGTTRGLVL *	TGTTRGSLP? TGTTRGLVL?	0: - 1: + Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Delay Time	TGTTRGDT *	TGTTRGDT?	Time	
	Gate Source Trigger Ext Gate Gate Position	TGTSRC TRG TGTSRC EXT TGTPOS *	TGTSRC? TGTPOS?	0: Trigger 1: EXT Time	
	Gate Width	TGTWID *	TGTWID?	Time	

Function			Talker Request		D 1 .
		Listener Code	Code	Output Format	- Remarks
Due to Modulation	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			o. sumpre	-
	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	
	Margin delta X	DTMTMPLDX *	DTMTMPLDX?	Frequency (0:OFF)	-
	Copy from STD	DTMTMPLCP		-	
	Data entry	DTMTMPLED *,*	-	f1,l1 f1: frequency l1: Level (dBm/W/dBµV)	
	Init Table	DTMTMPLCLR	-	-	
	Marker Edit				
	Copy from STD	DTMMKRCP	-	-	
	Data entry	DTMMKRED *,*,*,*	-	d1,f1,f2,l1 d1: (0:Normal 1: Integral 2: √Nyquist) f1: Offset Frequency f2: Bandwidth l1: Limit Level	Set the refer- ence band- width to f2, after initial- izing the table.
	Init Table	DTMMKRCLR		-	
	Average Times	DTMAVGCNT *	DTMAVGCNT?	Integer (1:OFF, 2 to 999)	
		DTMAVG *	DTMAVG?	Integer (1:OFF, 2 to 999)	*1

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

Function		Listopor Codo	Talker Request		Domorko
		Listenei Code	Code	Output Format	Kemarks
Due to	Average Mode				
Modulation	TRACE AVG	DTMAVGMD TRACE	DTMAVGMD?	0: Trace Avg	
	MAX HOLD	DTMAVGMD MAX		1: Max Hold	
	POWER AVG	DTMAVGMD POWER		2: Power Avg	
	NUMERIC	DTMAVGMD NUMERIC		3: Numeric	
	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				
	ON	DTMTMPLPW ON	DTMTMPLPW?	0: OFF	
	OFF	DTMTMPLPW OFF		1: ON	
	Template Limit	DTMTMPLBTM *	DTMTMPLBTM?	Level (dBm/W/dB $\mu$ V)	
	Judgment				
	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				
	ABS	DTMRES ABS	DTMRES?	0: Absolute	
	REL	DTMRES REL		1: Relative	
	MKR	DTMRES MKR		2: Marker	

Function			Tall	Domonto	
	Function	Listener Code	Code	Output Format	Kemarks
Due to Modula- tion	Ref Power MKR MOD	DTMREF MKR DTMREF MOD	DTMREF MKR?	0: Reference Marker 1: Modulation	
	Symbol Rate 1/T	DTMSYMRT *	DTMSYMRT?	Frequency	
	Rolloff Factor	DTMRFACT *	DTMRFACT?	Real number	
	Set to STD	DTMSETSTD	-	-	
	Starts measurement				
	Starts measurement in the same mode	SI	-	-	
	Measurement results Due to Modulation	-	DTMMEAS?	n <cr+lf>+d1, j1<cr+lf> +dn,jn<cr+lf> n: Amount (Integer) dn: Power jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)</cr+lf></cr+lf></cr+lf>	
	Ref. Power	-	DTMREFPWR?	Level	
Inband	Auto Level Set	SPRAUTOLVL	-	-	
(1)	Template Template ON OFF Template Shift	SPRTMPL ON SPRTMPL OFF	SPRTMPL?	0: OFF 1: ON	
l	chift X	CDDTMDI SY *	CODTMDI SX9	Eraguanov	
	Shift V	SINTMILSA CODTMOLSY *	CORTMPI SY?	Laval	
	Margin delta X	SPRTMPI DX *	SPRTMPLDX?	Frequency (0.0FF)	
l		SI KI WILDA			
	Data entry	SPRTMPLED *,*	-	- f1,11 f1: Frequency 11: Level (dBm/W/dBµV)	
l	Init Table	SPRTMPLCLR	-	-	
	Marker Edit				
	Copy from STD	SPRMKRCP			
	Data entry	SPRMKRED *,*,*,*	-	d1,f1,f2,11 d1:(0:Peak, 1:Integral) f1: Start Frequency f2: Stop Frequency 11: Limit Level	Set the refer- ence band- width to f2, after initializ- ing the table.
1	Init Table	SPRMKRCLR	-	-	
Function		Listopor Codo	Talker	Remarks	
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	Function	Listener Code	Code	Output Format	Kelliarks
Inband Spurious	Average Times	SPRAVGCNT *	SPRAVGCNT?	Integer (1:OFF, 2 to 999)	
(1)		SPRAVG *	SPRAVG?	Integer (1:OFF, 2 to 999)	*1
		CAVGSPR *	CAVGSPR?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	SPRAVGMD TRACE	SPRAVGMD?	0: Trace Avg	
	MAX HOLD	SPRAVGMD MAX		1: Max Hold	
	POWER AVG	SPRAVGMD POWER		2: Power Avg	
	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	
	Template Couple to Power				
	ON OFF	SPRTMPLPW ON SPRTMPLPW OFF	SPRTMPLPW?	0: OFF 1: ON	
	Template Limit	SPRTMPLBTM *	SPRTMPLBTM?	Level (dBm/W/dBµV)	
	Judgment				
	ON	SPRJDG ON	SPRJDG?	0: OFF	
		SPRJDG OFF		1: ON	
	CESP	SPRERMD CESP	SDRER MD9	0: Center/Span mode	
	STSP	SPRFRMD STSP	SI KI KWID (	1: Start/Stop mode	

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

Function		Listopar Codo	Talk	Remarks	
	Function	Listener Code	Code	Output Format	Remarks
Inband Spurious	Result ABS	SPRRES ABS	SPRRES?	0: Absolute	
(1)	REL	SPRMOD ABS SPRRES REL	SPRMOD?	1: Relative 2: Marker	
	MKR	SPRRES MKR SPRMOD MKR			
	Ref Power				
	MKR	SPRREF MKR SPRREF SWP	SPRREF?	0: Reference Marker 1: Modulation	
	MOD	SPRREF MOD SPRREF DSP			
	Peak Marker Y-Delta	SPRPKMKY *	SPRPKMKY?	Real number	
	Set to STD	SPRSETSTD	-	-	
	Starts measurement				
	Inband Spurious	SPRMEAS	-	-	
		CINBSPR			
	Starts measurement in the same mode	SI	-	-	
	Measurement results				
	Inband Spurious	-	SPRMEAS?	n <cr+lf> +f1,11,j1<cr+lf>  +fn,1n,jn<cr+lf> n:Amount (Integer) fn: Frequency In: Level (dBm/W/dBµV) jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)</cr+lf></cr+lf></cr+lf>	
	max.value output on the each period	-	CINBMAX?	n1,f1,l1n4,f4,l4 (4set output) nn: 0;Disable (Without data) 1; Enable (With data) fn: Frequency ln: Level (dBm)	
	Ref. Power	-	SPRREFPWR?	Level	1
Inband	Auto Level Set	SPR2AUTOLVL	-	-	
Spurious	Template				1
(2)	Template				
	ON	SPR2TMPL ON	SPR2TMPL?	0: OFF	
	OFF	SPR2TMPL OFF		1: ON	

Function		Listener Code	Talk	Remarks	
	Function	Listener Code	Code	Output Format	Kennarks
Inband Spurious	Template Shift Shift X	SPR2TMPI SX *	SPR2TMPI SX2	Frequency	
(2)	Shift Y	SPR2TMPLSY *	SPR2TMPLSY?	Level	
	Margin delta X	SPR2TMPLDX *	SPR2TMPLDX?	Frequency (0:OFF)	
	Copy from STD	SPR2TMPLCP	-	-	
	Data entry	SPR2TMPLED *,*	-	f1,11 f1: Frequency 11: Level (dBm/W/dBµV)	
	Init Table	SPR2TMPLCLR	-	-	
	Marker Edit				
	Copy from STD	SPR2MKRCP	-	-	
	Data entry	SPR2MKRED *,*,*,*	-	d1,f1,f2,l1 d1:(0:Peak, 1:Integral) f1: Start Frequency f2: Stop Frequency l1: Limit Level	Set the reference bandwidth to f2, after initializing the table.
	Init Table	SPR2MKRCLR	-	-	
	Average Times	SPR2AVGCNT *	SPR2AVGCNT?	Integer (1:OFF, 2 to 999)	
		SPR2AVG *	SPR2AVG?	Integer (1:OFF, 2 to 999)	
	Average Mode				
	POWER AVG	SPR2AVGMD POWER	SPR2AVGMD?	2: Power Avg	
	Parameter Setup				
	Detector				
	Normal	SPR2DET NRM	SPR2DET?	0: Normal	
	Posi	SPR2DET POS		1: Posi	
	Nega	SPR2DET NEG		2: Nega	
	Sample	SPR2DET SMP		3: Sample	
	Display Unit				
	dBm	SPR2UNIT DBM	SPR2UNIT?	0: dBm	
	W	SPR2UNIT W		1: W	
	dBµV	SPR2UNIT DBUV		2: dBµV	

	Function	Listener Code	Talker Request		Domontro
	Function	Listener Code	Code	Output Format	Kemarks
Inband Spurious	Template Couple to Power				
(2)	ON	SPR2TMPLPW ON	SPR2TMPLPW?	0: OFF	
	OFF	SPR2TMPLPW OFF		1: ON	
	Template Limit	SPR2TMPLBTM *	SPR2TMPLBTM?	Level (dBm/W/dBµV)	_
	Judgment				-
	ON	SPR2JDG ON	SPR2JDG?	0: OFF	
	OFF	SPR2JDG OFF		1: ON	
	Freq. Setting				
	CFSP	SPR2FRMD CFSP	SPR2FRMD?	0: Center/Span mode	
	STSP	SPR2FRMD STSP		1: Start/Stop mode	
	Result			_	
	ABS	SPR2RES ABS	SPR2RES?	0: Absolute	
	REL	SPR2RES REL		1: Relative	
	MKR	SPR2RES MKR		2: Marker	
	Ref Power				-
	MKR	SPR2REF MKR	SPR2REF?	0: Reference Marker	
	MOD	SPR2REF MOD		1: Modulation	
	Peak MKR Y-Delta	SPR2PKMKY *	SPR2PKMKY?	Real number	-
	Band Conversion				
	ON	SPR2CONV ON	SPR2CONV?	0: OFF	
	OFF	SPR2CONV OFF		1: ON	
	Integral Band	SPR2INTE *	SPR2INTE?	Frequency	
	Start Offset	SPR2OFSST *	SPR2OFSST?	Frequency	
	Stop Offset	SPR2OFSSP *	SPR2OFSSP?	Frequency	
	Set to STD	SPR2SETSTD	-	-	-
	Starts measurement				-
	Inband Spurious	SPR2MEAS	-	-	
	Starts measurement in the same mode	SI	-	-	
	Measurement results				
	Inband Spurious	-	SPR2MEAS?	n <cr+lf> +f1,11,j1<cr+lf> +fn,1n,jn<cr+lf> n:Amount (Integer) fn: Frequency ln: Level (dBm/W/dBµV) jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)</cr+lf></cr+lf></cr+lf>	
1	Ref. Power	-	SPR2REFPWR?	Level	

Function		Listener Code	Talke	Remarks	
		Listener Code	Code	Output Format	- Remarks
Outband	Auto Level Set	FDSAUTOLVL	-		
Spurious	Table				1
	Table No.1/2/3	FDSTBL *	FDSTBL?	Integer (1 to 3)	
	Table Edit	FDSTBLED *,*,*,*,*,*	-	f1,f2,f3,f4,d1,11 f1: Start frequency f2: Stop frequency f3: RBW f4: VBW d1: Sweep time 11: Limit Level	
1	Load Table	FDSLD	-	-	1
	Save Table	FDSSV	-	-	1
	Init Table	FDSCLR	-	-	1
	Average Times	FDSAVGCNT *	FDSAVGCNT?	Integer (1:OFF, 2 to 999)	
		FDSAVG *	FDSAVG?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	FDSAVGMD TRACE	FDSAVGMD?	0: Trace Avg	
	MAX HOLD	FDSAVGMD MAX		1: Max Hold	
1	POWER AVG	FDSAVGMD POWER		2: Power Avg	
1	Parameter Setup				1
	Detector				
	Normal	FDSDET NRM	FDSDET?	0: Normal	
	Posi	FDSDET POS		1: Posi	
l	Nega	FDSDET NEG		2: Nega	
	Sample	FDSDET SMP		3: Sample	
1	Display Unit				1
	dBm	FDSUNIT DBM	FDSUNIT?	0: dBm	
l	W	FDSUNIT W		1: W	
	dBµV	FDSUNIT DBUV		2: dBµV	
	Judgment				1
	ON	FDSJDG ON	FDSJDG?	0: OFF	
	OFF	FDSJDG OFF		1: ON	
	Peak Marker Y-Delta	FDSPKMKY *	FDSPKMKY?	Real number	1
	Preselector 1.6G	FDSPRE 16G	FDSPRE?	0: 1.6G	1
	3.6G	FDSPRE 36G		1: 3.6G	
	Set to Default	FDSSETSTD	-	-	1

#### Table 4-12 TRANSIENT Key

*1: When Detector is set to Positive, Average Mode is set to MAX HOLD. When Detector is set to something other than Positive, Average Mode is set to TRACE AVG.

Exection		Listener Code	Ta	Remarks	
	Function	Listener Code	Code	Output Format	Remarks
Outband Spurious	Starts measurement Outband Spurious	FDSMEAS	-		
	Starts measurement in the same mode	SI	-	-	
	Measurement results Outband Spurious	-	FDSMEAS?	n <cr+lf> +f1,11,j1<cr+lf> +fn,1n,jn<cr+lf> n:Amount (Integer) fn: Frequency ln: Level (dBm/W/dBmV) jn: Integer(0: FAIL, 1: PASS,-1: Judgment OFF)</cr+lf></cr+lf></cr+lf>	•
Code	Auto Level Set	AUTOLVL	-	-	
Domain Power Coef	Graphics Select Type				
	Constellation	C2PCGTYP CON	C2PCGTYP?	0: Constellation	
with FOR-	Constellation(Line)	C2PCGTYP CONLIN		1: Constellation(Line)	
WARD	Constellation(Dot)	C2PCGTYP CONDOT		2: Constellation(Dot)	
Link selected	Constellation (Line¨)	C2PCGTYP CONLINDOT		3: Constellation (Line¨)	
	I EYE Diagram	C2PCGTYP ICHEYE		4: I EYE Diagram	
	Q EYE Diagram	C2PCGTYP QCHEYE		5: Q EYE Diagram	
	I/Q EYE Diagram	C2PCGTYP IQCHEYE		6: I/Q EYE Diagram	
	E.V.M. vs Chip	C2PCGTYP EVM		7: E.V.M. vs Chip	
	Mag Error vs Chip	C2PCGTYP MAGERR		8: Mag Error vs Chip	
	Plot Type				1
	AVG	C2PCGPLOT AVG	C2PCGPLOT?	0:AVG	
	P-P	C2PCGPLOT PP		1:P-P	
	Scale Setup				1
	Format				
	GRAPH	C2PCFMT GRP	C2PCFMT?	0:GRAPH	
	TABLE	C2PCFMT TBL		1:TABLE	
	NUMERIC	C2PCFMT NUM		2:NUMERIC	
	Display				
	SINGLE	C2PCDISP SNGL	C2PCDISP?	0:SINGLE	
	DUAL	C2PCDISP DUAL		1:DUAL	

Exection		Listener Code	r	D 1 .	
	Function	Listener Code	Code	Output Format	Remarks
Code	Y Scale				
Domain Power	ρ	C2PCYSCL RHO	C2PCYSCL?	0: ρ	
Coef	POWER	C2PCYSCL POW		1:POWER	
	τ	C2PCYSCL TAU		2: τ	
with	PHASE	C2PCYSCL PHA		3:PHASE	
FOR- Ward	CDE	C2PCYSCL CDE		4:CDE	
Link	ρ(ALL)	C2PCYSCL RHOALL		5:p(ALL)	
selected	Y Scale Upper	C2YUPR *	C2YUPR?	Level (-50 to 70 dBm/dB/dBmpilot)	
	Y/div				
	10/div	C2PDIV P10	C2PDIV?	0:10/div	
	5/div	C2PDIV P5		1: 5/div	
	Table Page				
	1	C2PCPAGE 1	C2PCPAGE?	1: 1/2	
	2	C2PCPAGE 2		2: 2/2	
	Parameter Setup				
	Meas Range	C2PCMRNG *	C2PCMRNG?	Integer (128 to 36864 chip)	
	τ Offset	C2TOFS *	C2TOFS?	Time (-500.000 to 500.000 μsec)	
	Complementary Filter				
	ON	C2CMPFLT ON	C2CMPFLT?	0:OFF	
	OFF	C2CMPFLT OFF		1:ON	
	Rolloff Factor	C2RFACT *	C2RFACT?	Real number (0.05 to 0.20)	
	Equalizing Filter				
	ON	C2EQFLT ON	C2EQFLT?	0:OFF	
	OFF	C2EQFLT OFF		1:ON	
	PN Offset Search Mode				
	ON	C2PNMOD ON	C2PNMOD?	0:OFF	
	OFF	C2PNMOD OFF		1:ON	
	PN Offset	C2PNOFS *	C2PNOFS?	Integer (0 to 511)	
	Carrier Freq. Search				
	500Hz	C2FSRCH 500HZ	C2FSRCH?	0:500Hz	
	10kHz	C2FSRCH 10KHZ		1:10kHz	
	500kHz	C2FSRCH 500KHZ		2:500kHz	
	Trigger Source				
	INT	C2TRG INT	C2TRG?	0:INT	
	EXT	C2TRG EXT		1:EXT	
	INTRVL(EXT)	C2TRG INTRVL1		2:INTRVL(EXT)	
	INTRVL	C2TRG INTRVL2		3:INTRVL	

	E		Talker Request		D 1
	Function	Listener Code	Code	Output Format	Remarks
Code	EXT Trigger Slope				
Power Coef	+	C2TRGSLP RISE	C2TRGSLP?	0:-	
	-	C2TRGSLP FALL		1:+	
with	Threshold	C2THRSH *	C2THRSH?	Level (-50 to 0 dB)	
FORWARD	Auto Rate				
Link selected	ON	C2AUTORATE ON	C2AUTORATE?	0:OFF	
	OFF	C2AUTORATE OFF		1:ON	
	Channel Define				
	ON	C2CHDEF ON	C2CHDEF?	0:OFF	
	OFF	C2CHDEF OFF		1:ON	
	Walsh Code Length	C2WLEN *	C2WLEN?	Integer (4/8/16/32/64/128)	
	QOF	C2QOF *	C2QOF?	Integer $(0/1/2/3)$	
	Bit Reversal Order				
	ON	C2BITREV ON	C2BITREV?	0:OFF	
	OFF	C2BITREV OFF		1:ON	
	Channel Def. Table				
	Total	C2CHTOTAL *	C2CHTOTAL ?	Integer (1 to 128)	
	Edit Channel	C2CHEDIT *	C2CHEDIT?	Integer (0 to 127)	
	Channel Name				
	PICH	C2CHNAME PICH	C2CHNAME?	0:PICH	
	SYNCH	C2CHNAME SYNCH		1:SYNCH	
	РСН	C2CHNAME PCH		2:PCH	
	BCH	C2CHNAME BCH		3:BCH	
	CCCH	C2CHNAME CCCH		4:CCCH	
	DCCH	C2CHNAME DCCH		5:DCCH	
	FCH	C2CHNAME FCH		6:FCH	
	SCCH	C2CHNAME SCCH		7:SCCH	
	SCH	C2CHNAME SCH		8:SCH	
	QPCH	C2CHNAME QPCH		9:QPCH	
	СРССН	C2CHNAME CPCCH		10:CPCCH	
	CACH	C2CHNAME CACH		11:CACH	
	RC (Radio Configuration)	C2CHRC *	C2CHRC?	Integer (1/2/3/4/5)	•
	Data Rate	C2CHRATE *	C2CHRATE?	Integer (1200/1350/1500/1800 2400/2700/3600/4800 7200/9600/14400/19200 28800/38400/57600 76800/115200/153600 230400/307200) bps	-
1	QOF	C2CHQOF *	C2CHQOF?	Integer $(0/1/2/3)$	1

Function		Listoper Code	Talk	Domortes	
	runction	Listener Code	Code	Output Format	Kemarks
Code Domain	Walsh Code Number	C2CHWNUM *	C2CHWNUM?	Integer (0 to 127)	
Power Coef	Meas Options				
with	CDP Graph Plot Type				
FORWARD	AVERAGE	C2CDPLOT AVG	C2CDPLOT?	0:AVERAGE	
Link selected	MAX	C2CDPLOT MAX		1:MAX	
	MIN	C2CDPLOT MIN		2:MIN	
	Power Unit				
	dBm	C2PWRUNIT DBM	C2PWRUNIT?	0:dBm	
	dB	C2PWRUNIT DB		1:dB	
	dBmpilot	C2PWRUNIT DBMPI		2:dBmpilot	
	Pilot Channel Power	C2PIPWR *	C2PIPWR?	Level (-50 to 50 dBm)	
	$\Delta \tau$				
	ON	C2TAU ON	C2TAU?	0:OFF	
	OFF	C2TAU OFF		1:ON	
	$\Delta \theta$				
	ON	C2THETA ON	C2THETA?	0:OFF	
	OFF	C2THETA OFF		1:ON	
	Code Domain Error				
	ON	C2CDE ON	C2CDE?	0:OFF	
	OFF	C2CDE OFF		1:ON	
	Signal Power				
	ON	C2SIGPOW ON	C2SIGPOW?	0:OFF	
	OFF	C2SIGPOW OFF		1:ON	
	EVM				
	ON	C2EVM ON	C2EVM?	0:OFF	
	OFF	C2EVM OFF		1:ON	
	Fixed Symbols Level				
	ON	C2FIXSYM ON	C2FIXSYM?	0:OFF	
	OFF	C2FIXSYM OFF		1:ON	
	Chip Rate Error				
	ON	C2CHIPERR ON	C2CHIPERR?	0:OFF	
	OFF	C2CHIPERR OFF		1:ON	
	IQ Gain Error				1
	ON	C2IQGAIN ON	C2IQGAIN?	0:OFF	
	OFF	C2IQGAIN OFF		1:ON	
	Quadrature Error				1
	ON	C2QUAD ON	C2QUAD?	0:OFF	
	OFF	C2QUAD OFF		1:ON	

Function		Listoner Code	Talker Request		Remarks
		Listener Code	Code	Output Format	Kemarks
Code Domain	Starts measurement				
Power Coef	Code Domain Power Coef	C2PC	-	-	
with FORWARD	Starts measurement in the same mode	SI	-	-	
Link selected	Measurement results				
	$\tau$ (Time Alignment Error)	-	C2PCTAU?	Time (sec)	
	Carrier Frequency Error		C2PCCFER?	d1,d2 d1: Frequency(Hz) d2: Real number(ppm)	
	Multiple p		C2PCRHO?	Real number	
	PN Offset		C2PCPNOFS?	Integer	
	Magnitude Error		C2PCMAG?	Real number (%rms)	
	Phase Error		C2PCPHE?	Real number (deg.rms)	
	Error Vector Magnitude		C2PCEVM?	Real number (%rms)	
	I/Q Origin Offset		C2PCIQOFS?	Real number (dBc)	
	Error Signal Power Ratio		C2PCERPOW?	Real number (dB)	
	Tx Power		C2PCTXPOW?	Real number (dBm)	
	AVG Power at Chip		C2PCAVGPOW?	Real number (dBm)	
	Peak Code Domain Error		C2PCPKCDE?	Real number (dB)	
	Chip Rate Error		C2PCCHIPERR?	d1,d2 d1:(Hz) d2:(ppm)	
	I/Q Gain Error		C2PCIQGAIN?	Real number (%)	
	Quadrature Error		C2PCQUAD?	Real number (degree)	
	Peak Δτ	-	C2PKTAU?	d1, d2 d1: (sec) d2: (Channel number)	
	Peak Δθ		C2PKTHETA?	d1, d2 d1: (rad.) d2: (Channel number)	
	Peak inactive channel power (ρ)		C2INACTRHO?	d1,d2 d1: (dB) d2: (Channel number)	
			C2PKINACT?	d1,d2,d3 d1: (dB) d2: (Channel number) d3: (Walsh Length)	
	Marker Position	C2PCMK *	C2PCMK?	Integer (0 to 127)	
	Walsh Code Length		C2PCMKWLEN?	Integer	
	Walsh Code Number		C2PCMKWNUM?	Integer	
	ρ		C2PCMKRHO?	Real number	
	Power		C2PCMKPOW?	(dBm/dB/dBmpilot)	
	$\Delta \tau$		C2PCMKTAU?	(sec)	

Function		Listanar Coda	Tal	Domorto	
	Function	Listener Code	Code	Output Format	Kennarks
Code Domain Power Coef	$\Delta \theta$ CDE $\rho(dB)$		C2PCMKPHA? C2PCMKCDE? C2PCMKRHOLOG?	(rad.) (dBm/dB/dBmpilot) (dB)	
with FORWARD Link selected	Reads all Marker Data Walsh Code Length		C2PCGPHWLEN?	n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data</cr+cf></cr+lf></cr+lf>	•
	Walsh Code Number		C2PCGPHWNUM?	<pre>(integer) dn: Walsh Code Length (inte- ger) n<cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data   (integer) dn: Walsh Code Number</cr+cf></cr+lf></cr+lf></pre>	
	ρ		C2PCGPHRHO?	(integer) n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data</cr+cf></cr+lf></cr+lf>	
	Power		C2PCGPHPOW?	(integer) dn: ρ (real number ) n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data (integer)</cr+cf></cr+lf></cr+lf>	
	Δτ		C2PCGPHTAU?	<pre>(mteger) dn: Power (dBm/dB/dBmpi- lot) n<cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data   (integer)</cr+cf></cr+lf></cr+lf></pre>	
	Δθ		C2PCGPHPHA?	dn: $\Delta \tau$ (sec) n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data (integer) dp: $\Delta \theta$ (red.)</cr+cf></cr+lf></cr+lf>	
	CDE		C2PCGPHCDE?	n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data (integer) dn: CDE(dBm/dB/dBmpilot)</cr+cf></cr+lf></cr+lf>	
	ρ(dB)		C2PCGPHRHOLOG?	n <cr+lf>+d1<cr+lf>+ +dn<cr+cf> n: The number of output data (integer) dn: ρ(dB)</cr+cf></cr+lf></cr+lf>	

Eurotion		Listenan Cada	Tal	Domonica	
	Function	Listener Code	Code	Output Format	Kemarks
Code Domain Power Coef with FORWARD Link selected	Graphics Marker Constellation Constellation(Line) Constellation(Dot) Constella- tion(Line¨) I EYE Diagram Q EYE Diagram I/Q EYE Diagram Chip number I-Phase data O Phase data	C2MKCHIP *	C2MKCHIP? C2MKI? C2MKO?	Integer Phase Phase	
	E.V.M. vs Chip Mag Error vs Chip Marker Position Chip number	C2GMK *	C2GMK? C2MKCHIP? C2MKERR?	Integer Integer %	
Code Domain Power	Auto Level Set Graphics	AUTOLVL	-	-	-
with REVERSE (RC3&4) Link selected	Select Type Constellation Constellation (Line) Constellation (Dot) Constellation (Line¨) I EYE Diagram Q EYE Diagram I/Q EYE Diagram E.V.M. vs Chip Mag Error vs Chip Phase Error vs Chip	C2CDGTYP CON C2CDGTYP CONLIN C2CDGTYP CONDOT C2CDGTYP CONLINDOT C2CDGTYP ICHEYE C2CDGTYP QCHEYE C2CDGTYP IQCHEYE C2CDGTYP EVM C2CDGTYP MAGERR C2CDGTYP PHAERR	C2CDGTYP?	<ul> <li>0: Constellation</li> <li>1: Constellation (Line)</li> <li>2: Constellation (Dot)</li> <li>3: Constellation (Line¨)</li> <li>4: I EYE Diagram</li> <li>5: Q EYE Diagram</li> <li>6: I/Q EYE Diagram</li> <li>6: I/Q EYE Diagram</li> <li>7: E.V.M. vs Chip</li> <li>8: Mag Error vs Chip</li> <li>9: Phase Error vs Chip</li> </ul>	
	Plot Type AVG P-P Y/div 25	C2CDGPLOT AVG C2CDGPLOT PP C2CDGYDIV P25	C2CDGPLOT? C2CDGYDIV?	0:AVG 1:P-P 0:25/div	-

Function		Listener Codo	Talker Request		Remarks
	Fulletion	Listener Coue	Code	Output Format	Remarks
Code	View Setup				
Domain	View Mode				
Power	CHANNEL	C2VWMODE CHL	C2VWMODE?	0:CHANNEL	
with	WALSH	C2VWMODE WALSH		1:WALSH	
REVERSE	Display				
(RC3&4)	ρ	C2DISP RHO	C2DISP?	0:ρ	
LINK selected	EVM	C2DISP EVM		1:EVM	
serected	DEMOD	C2DISP DEMOD		2:DEMOD	
	NUMERIC	C2DISP NUM		3:NUMERIC	
	TABLE(POWER)	C2DISP TBL		4:TABLE(POWER)	
	MAG ERR	C2DISP MAGERR		5:MAG ERR	
	PHASE ERR	C2DISP PHAERR		6:PHASE ERR	
	TABLE(EVM)	C2DISP TBLEVM		7:TABLE(EVM)	
	View Channel				
	PICH	C2VWCH PICH	C2VWCH?	0:PICH	
	DCCH	C2VWCH DCCH		1:DCCH	
	SCH2	C2VWCH SCH2		2:SCH2	
	FCH	C2VWCH FCH		3:FCH	
	SCH1	C2VWCH SCH1		4:SCH1	
	EACH	C2VWCH EACH		5:EACH	
	CCCH	C2VWCH CCCH		6:CCCH	
	Y/div(Ch. Graph)				
	25/div	C2CHGYDIV P25	C2CHGYDIV?	0:25/div	
	5/div	C2CHGYDIV P5		1: 5/div	
	Format				
	GRAPH	C2CDFMT GRP	C2CDFMT?	0:GRAPH	
	TABLE	C2CDFMT TBL		1:TABLE	
	NUMERIC	C2CDFMT NUM		2:NUMERIC	
	Y Scale				
	ρ	C2CDYSCL RHO	C2CDYSCL?	0:ρ	
	pre & pim	C2CDYSCL RHORHO		1:pre & pim	
	ρ(ALL)	C2CDYSCL RHOALL		2:ρ(ALL)	
	pre & pim(ALL)	C2CDYSCL RHORHOALL		3:pre & pim(ALL)	
	τ	C2CDYSCL TAU		4:τ	
	PHASE	C2CDYSCL PHA		5:PHASE	
	Display div				
	SINGLE	C2CDDISP SNGL	C2CDDISP?	0:SINGLE	
	DUAL	C2CDDISP DUAL		1:DUAL	

	<b>F</b> and <b>i</b> an	Listered	Talker Request		D
	Function	Listener Code	Code	Output Format	- Remark
Code	Table Page				
Domain	1	C2CDPAGE 1	C2CDPAGE?	1:1/2	
Power	2	C2CDPAGE 2		2:2/2	
with	CDP Y/div				1
REVERSE	10/div	C2PDIV P10	C2PDIV?	0:10/div	
(RC3&4)	5/div	C2PDIV P5		1: 5/div	
Link	Channel Setup				-
scietted	Operation Mode				
	ТСН	C2OP TCH	C2OP?	0:TCH	
	EACH	C2OP EACH		1:EACH	
l	СССН	C2OP CCCH		2:CCCH	
	DCCH				-
	ON	C2DCCH ON	C2DCCH?	0:OFF	
	OFF	C2DCCH OFF		1:ON	
	FCH				-
	ON	C2FCH ON	C2FCH?	0:OFF	
	OFF	C2FCH OFF	021 0111	1:0N	
	SCH1 Walsh Function				-
	W(1.2)	C2SCH1WALSH W12	C2SCH1WALSH?	0:W(1,2)	
	W(2.4)	C2SCH1WALSH W24	02001111112011	$1 \cdot W(2, 4)$	
	CH OFF	C2SCH1WALSH OFF		2.CH OFF	
	SCH1 Repetition Factor	C2SCH1REP *	C2SCH1REP?	Integer $(1/2/4/8/16/32)$	-
	SCH2 Walsh Function				-
	W(2.4)	C2SCH2WALSH W24	C2SCH2WALSH?	$0 \cdot W(2 4)$	
	W(2,4) W(6.8)	C2SCH2WALSH W68	CESCIIE WILLSII.	$1 \cdot W(6.8)$	
	CH OFF	C2SCH2WALSH OFF		2:CH OFF	
	SCH2 Repetition Factor	C2SCH2REP *	C2SCH2REP?	Integer $(1/2/4/8/16)$	-
	Walsh Code Length	CZSCHZKEI	C25CH2REF :	Integer (1/2/4/0/10)	-
		C2WI SI EN W22	C2WI SI EN?	0.32	
	52	C2WLSLEN W52	C2 WESLEN?	1.64	
	04 Decemptor Setur	C2WLSLEN W04		1.04	-
	Maas Mada				
	Meas Mode	C2CDMMOD DDEC	CICDMMOD	0.DDECISE	
	PRECISE	C2CDMMOD PREC	C2CDMMOD?	U.PRECISE	
		C2CDMMOD NORM	COMPNICS	I:NORMAL	-
	Meas Range	C2MRNG *	C2MRNG?	chip)	
	Threshold	C2THRSH *	C2THRSH?	Level (-50 to 0 dBm)	]
	PN Delay Search Mode				1
	ON	C2PNMOD ON	C2PNMOD?	0:OFF	
	OFF	C2PNMOD OFF		1:ON	

Function		Listoner Code	Talker Request		Domontos
	FUNCTION	Listener Code	Code	Output Format	Remarks
Code Domain	PN Delay	C2PNDLY *	C2PNDLY?	Integer (0 to 511)	
Power	Trigger Source				
with	INT	C2TRG INT	C2TRG?	0:INT	
REVERSE	EXT	C2TRG EXT		1:EXT	
(RC3&4)	INTRVL(EXT)	C2TRG INTRVL1		2:INTRVL(EXT)	
Link selected	INTRVL	C2TRG INTRVL2		3:INTRVL	
	EXT Trigger Slope				
	+	C2TRGSLP RISE	C2TRGSLP?	0:-	
	-	C2TRGSLP FALL		1:+	
	EXT Trigger Delay	C2TRGDLY *	C2TRGDLY?	Time (-5000.000 to 6250.000 µsec)	
	Freq Meas Range				
	NORMAL	C2FRRNG NORM	C2FRRNG?	0:NORMAL	
	EXPAND	C2FRRNG EXP		1:EXPAND	
	Δτ				
	ON	C2DLTTAU ON	C2DLTTAU?	0:OFF	
	OFF	C2DLTTAU OFF		1:ON	
	$\Delta \theta$				
	ON	C2DLTTHE ON	C2DLTTHE?	0:OFF	
	OFF	C2DLTTHE OFF		1:ON	
	Chip Rate Error				
	ON	C2CHIPERR ON	C2CHIPERR?	0:OFF	
	OFF	C2CHIPERR OFF		1:ON	
	Quadrature Error				
	ON	C2QUAD ON	C2QUAD?	0:OFF	
	OFF	C2QUAD OFF		:ON	
	Demod Data Save	C2DEMODSV	-	-	
	Average Times	C2CDAVG *	C2CDAVG?	Integer (1:OFF, 2 to 32)	
	Starts measurement				
	Code Domain Power	C2CDP	-	-	
	Starts measurement in the same mode	SI	-	-	
	Measurement results				1
	When View Mode is set to CHANNEL	-			
	Code Domain Power Marker				
	Code Power		C2CDMKPOW?	Level (dB)	
	ρ		C2CDMKRHO?	Real number	

Function		Listener Code	Talker Request		Domorto
	Function		Code	Output Format	Kelharks
Code Domain Power	Power		C2CDMKPWR?	d1, d2 d1: Level(dBm) d2: Level(W)	
with	EVM		C2CDMKEVM?	Real number (%rms)	
REVERSE (RC3&4) Link selected	EVM Graph Marker Marker Position EVM	C2EVMMKSYM *	C2EVMMKSYM? C2EVMMKEVM?	Integer (Symbol) Real number (%)	
	MAG ERROR Graph Marker				
	Marker Position MAG ERROR PHASE ERROR Graph Marker	C2MAGMKSYM *	C2MAGMKSYM? C2MAGMKMAG?	Integer (Symbol) Real number (%)	
	Marker Position	C2PHAMKSYM *	C2PHAMKSYM?	Integer (Symbol)	
	PHASE ERROR		C2PHAMKPHA?	Real number (degree)	
	Switching Marker display when View Mode is set to WALSH				
	Upper screen (Upper)	C2ACTTRC A	C2ACTTRC?	0:Upper	
	Lower screen (Lower)	C2ACTTRC B		1:Lower	
	Marker Position	C2CDMK *	C2CDMK?	Integer (0 to 63)	
	Walsh Code Length		C2CDMKWLEN?	Integer	
	Walsh Code Number		C2CDMKWNUM?	Integer	
	ρ (dB)		C2CDMKWRHOLOG?	(dB)	
	ρ		C2CDMKWRHO?	Real number	
	Δτ		C2CDMKWTAU?	(sec)	
	$\Delta \theta$		C2CDMKWPHA?	(rad.)	
	Reads all Marker Data				
	Walsh Code Length		C2CDGPHWLEN?	n <cr+lf>+d1<cr+ LF&gt;++dn<cr+cf> n: The number of output data (integer) dn: Walsh Code Length (integer)</cr+cf></cr+ </cr+lf>	
	Walsh Code Number		C2CDGPHWNUM?	n <cr+lf>+d1<cr+ LF&gt;++dn<cr+cf> n: The number of output data (integer) dn: Walsh Code Number (integer)</cr+cf></cr+ </cr+lf>	

Function		Listener Code	Talker R	Domorka	
		Listener Code	Code	Output Format	Kemarks
Code Domain Power with REVERSE (RC3&4) Link selected	ρ (dB) ρ		C2CDGPHWRHOLOG? C2CDGPHWRHO?	$\begin{array}{l} n{<}CR{+}LF{>}{+}d1{<}CR{+}\\ LF{>}{+}{+}dn{<}CR{+}CF{>}\\ n: The number of output data (integer) \\ dn: \rho (dB) \\ n{<}CR{+}LF{>}{+}d1{<}CR{+}\\ LF{>}{+}{+}dn{<}CR{+}CF{>}\\ n{+}DR{+}DR{+}DR{+}DR{+}DR{+}DR{+}DR{+}DR$	
				<ul> <li>n: The number of output data (integer)</li> <li>dn: ρ (real number)</li> </ul>	
	Δτ		C2CDGPHWTAU?	n <cr+lf>+d1<cr+ LF&gt;++dn<cr+cf> n: The number of output data (integer) dn: Δτ (sec)</cr+cf></cr+ </cr+lf>	
	Δθ		C2CDGPHWPHA?	n <cr+lf>+d1<cr+ LF&gt;++dn<cr+cf> n: The number of output data (integer) dn: Δθ (rad.)</cr+cf></cr+ </cr+lf>	
	Total Result				
	Multiple $\rho$ / Estimated $\rho$	-	C2CDRHO?	d1	
	$\tau$ (Time Alignment Error)		C2CDTAU?	d2:(sec)	
	Carrier Frequency Error		C2CDCFER?	d3:(Hz)	
	Magnitude Error		C2CDMAG?	d4:(%rms)	
	Phase Error		C2CDPHE?	d5:(deg.rms)	
	Error Vector Magnitude		C2CDEVM?	d6:(%rms)	
	I/Q Origin Offset		C2CDIQOFS?	d7:(dBc)	
	PN Delay		C2CDPNDLY?	d8	
	Entire result output		C2CDTOTAL?	d1,d2,d3,d4,d5,d6,d7,d8	
	Chip Rate Error		C2CDCHIPERR?	Real number (ppm)	
	Quadrature Error		C2CDQUAD?	Real number (degree)	
	Tx Power		C2CDTXPOW?	Real number (dBm)	

Function		Listener Cad-	Talker Request		Romarks
	Function	Listener Code	Code	Output Format	Remarks
Code Domain Power with REVERSE	Peak Inactive ρ	-	C2INACTRHO?	d1, d2, d3, d4 d1: (dB) d2: (Channel number) d3: (Walsh Length) d4: (Phase) 0: re, I: im	
(RC3&4) Link selected	Peak Δτ		C2PKTAU?	d1, d2, d3 d1: (sec) d2: (Channel number) d3: (Walsh Length)	
	Peak Δθ		C2PKTHETA?	d1, d2, d3 d1: (rad.) d2: (Channel number) d3: (Walsh Length)	
ĺ	Graphics Marker				
	Constellation				
	Constellation(Line)				
	Constellation(Dot)				
	Constellation(Line¨)				
	I EYE Diagram				
	Q EYE Diagram				
	I/Q EYE Diagram				
	Chip number	C2MKCHIP *	C2MKCHIP?	Integer	
	I-Phase data		C2MKI?	Phase	
	Q-Phase data		C2MKQ?	Phase	
	E.V.M. vs Chip				
	Mag Error vs Chip				
	Marker Position	C2GMK *	C2GMK?	Integer	
	Chip number		C2MKCHIP?	Integer	
			C2MKERR?	%	
	Phase Error vs Chip				
	Marker Position	C2GMK *	C2GMK?	Integer	
	Chip number		C2MKCHIP? C2MKDEG?	Integer degree	

Function		Listen en Cada	Talker Request		Demonster
	Function	Listener Code	Code	Output Format	Remarks
Waveform	Auto Level Set	AUTOLVL			
Quality	Graphics				
with	Select Type				
REVERSE	Constellation	WFGTYP CON	WFGTYP?	0: Constellation	
(RC1&2) Link	Constellation(Line)	WFGTYP CONLIN		1: Constellation(Line)	
selected	Constellation(Dot)	WFGTYP CONDOT		2: Constellation(Dot)	
	Constellation (Line¨)	WFGTYP CONLINDOT		3: Constellation (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 Chip	
	Mag Error vs Chip	WFGTYP MAGERR		8: Mag Error vs Chip	
	Phase Error vs Chip	WFGTYP PHAERR		9: Phase Error vs Chip	
	Null Offset Constellation	WFGTYP NCON		10: Null Offset Constellation	
	Null Offset Constellation(Line)	WFGTYP NCONLIN		11: Null Offset Constellation (Line)	
	Null Offset Constellation(Dot)	WFGTYP NCONDOT		12: Null Offset Constellation (Dot)	
	Null Offset Constellation (Line¨)	WFGTYP NCONLINDOT		13: Null Offset Constellation (Line¨)	
	Null Offset I EYE Diagram	WFGTYP NICHEYE		14: Null Offset I EYE Diagram	
	Null Offset Q EYE Diagram	WFGTYP NQCHEYE		15: Null Offset Q EYE Diagram	
	Null Offset I/Q EYE Diagram	WFGTYP NIQCHEYE		16: Null Offset I/Q EYE Diagram	
	Plot Type				
	AVG	WFGPLOT AVG	WFGPLOT?	0:AVG	
	P-P	WFGPLOT PP		1:P-P	
	Parameter Setup				
	Meas Range	WMRNG *	WMRNG?	Integer (615 to 800chip)	

	<b>F</b> and <b>f</b>		Talker Request		D 1 .
	Function	Listener Code	Code	Output Format	Remarks
Waveform Quality	Trigger Source	WTRGSPC INT	WTRGSRC?	0·INT	
	EVT	WTROSKE IVI	WIROBRE!	1.EVT	
with		WTROSEC INTRVI 1		1.LAI	
REVERSE (PC1&2) Link		WTROSKC INTRVL2		2.INTRVL(EAT)	
selected		WIROSKC INTRVL2		5.IINTKVL	
	EXT Trigger Slope				
	+	WIRGSLP RISE	wIRGSLP?	0:-	
		WIRGSLP FALL		1:+	
	EXT Trigger Delay	WTRGDLY *	WTRGDLY?	11me (-5000.000 to 6250.000 μsec)	
	Freq Meas Range				
	NORMAL	WFRRNG NORM	WFRRNG?	0:NORMAL	
	EXPAND	WFRRNG EXP		1:EXPAND	
	Average Times	CAVGWF *	CAVGWF?	Integer (1:OFF, 2 to 32)	
	Starts measurement				
	Waveform Quality	WFQUA			
	Starts measurement in the same mode	SI			
	Measurement results				
	Total Result				
	ρ		WFRHO?	Real number	
	Carrier Frequency Error		WFCFER?	Hz	
	I/Q Origin Offset		WFIQOFS?	dBc	
	Magnitude Error		WFMAG?	% rms	
	Phase Error		WFPHE?	deg. rms	
	Error Vector Magnitude		WFEVM?	% rms	
	Graphics Marker				
	Constellation				
	Constellation(Line)				
	Constellation(Dot)				
	Constellation(Line¨)				
	I EYE Diagram				
	Q EYE Diagram				
	I/Q EYE Diagram				
	Null Offset Constellation				
	Null Offset Constellation (Line)				
	Null Offset Constellation (Dot)				

Function		Listoner Code	Talk	Domortes	
	FUNCTION	Listener Code	Code	Output Format	Remarks
Waveform	Null Offset Constellation				
Quality	(Line¨)				
with	Null Offset I EYE Diagram				
REVERSE	Null Offset Q EYE Diagram				
(RC1&2)Link	Null Offset I/Q EYE Diagram				
selected	Chip number	GMKCHIP *	GMKCHIP?	Integer	
	I-Phase data		GMKI?	Phase	
	Q-Phase data		GMKQ?	Phase	
	E.V.M. vs Chip				
	Mag Error vs Chip				
	Marker Position	GMK *	GMK?	Integer	
	Chip number		GMKCHIPNO? GMKERR?	Real number %	
	Phase Error vs Chip				
	Marker Position	GMK *	GMK?	Integer	
	Chip number		GMKCHIPNO? GMKDEG?	Real number degree	
Tx Power	Auto Level Set	AUTOLVL	-	-	
	Parameter Setup				
	Trigger Source				
	INT	TXTRG INT	TXTRG?	0:INT	
	EXT	TXTRG EXT		1:EXT	
	INTRVL(EXT)	TXTRG INTRVL1		2:INTRVL(EXT)	
	IF	TXTRG IF		3:IF	
	EXT Trigger Slope				-
	+	TXTRGSLP RISE	TXTRGSLP?	0:-	
	-	TXTRGSLP FALL		1:+	
	Trigger Level	TXTRLVL *	TXTRLVL?	Integer (0 to 100)	
	EXT Trigger Delay	TXTRGDLY *	TXTRGDLY?	Time	
	Average Times	TXAVG *	TXAVG?	Integer (1:OFF, 2 to 32)	
	Starts measurement				
	Tx Power	TXPWR	-	-	
	Starts measurement in the same mode	SI	-	-	-
	Measurement results Tx Power	-	TXPWR?	d1,d2,d3 d1: Tx Power(dBm/dB) d2: Tx Power(W) d3: Peak Factor(dB)	

Function     Listener Code     Talker Request       Code     Output For		er Request	Remarks		
		Listener Code	Code	Output Format	Kennarks
CCDF	Auto Level Set	AUTOLVL	-	-	
	Scale Setup				
	X Scale Max	C2CCDFXMAX *	C2CCDFXMAX?	Integer (-20 to 70 dB/ dBm)	
	X Scale Range	C2CCDFXRNG *	C2CCDFXRNG?	Integer (10 to 50 dB/ dBm)	
	Power Unit				
	RELATIVE	C2CCDFUNIT REL	C2CCDFUNIT?	0:ABS POWER	
	ABS POWER	C2CCDFUNIT ABS		1:RELATIVE	
	Parameter Setup				
	Trigger Mode				
	INT	C2CCDFTRG INT	C2CCDFTRG?	0:INT	
	EXT	C2CCDFTRG EXT		1:EXT	
	Trigger Slope				
	+	C2CCDFTRGSLP RISE	C2CCDFTRGSLP?	0:-	
	-	C2CCDFTRGSLP FALL		1:+	
	Trigger Delay	C2CCDFTRGDLY *	C2CCDFTRGDLY ?	Time	
	Meas Length	C2CCDFMLEN *	C2CCDFMLEN?	Integer (10000 to 10000000)	
	Trace Write				
	ON	C2CCDFTRC ON	C2CCDFTRC?	0:OFF	
	OFF	C2CCDFTRC OFF		1:ON	
	Starts measurement				
	CCDF	C2CCDF	-	-	
	Starts measurement in the same mode	SI	-	-	
	Measurement results				
	CCDF	-	C2CCDF?	d1,d2,d3,d4,d5,d6,d7,d8 d1:Peak Factor d2:Average Power d3:10% d4:1% d5:0.1% d6:0.01% d7:0.001% d8:0.0001%	
	Marker Position	C2CCDFMK *	-	Level	
	Distribution/Power	-	C2CCDFMK?	d1,d2 d1:Distribution d2:Power	

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4.2 GPIB Command Codes

Function		Listener Code	Talker Request		Domorks
			Code	Output Format	Remarks
Entering	0 to 9	0 to 9	-	-	
data	. (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 4-13 Numeric Keys/Step Keys/Data Knob/Unit Keys (Entering Data)

Function		Lister Cal		Talker Request		
		Listener Code	Code	Output Format	- Remarks	
Miscella- neous	Judgment result reading	-	OPF?	0: PASS 1: FAIL(Upper) 2: FAIL(Lower) 3: FAIL(Upper&Lower) 4: Error		
	Outputting error number	-	ERRNO?	Integer		
	Local	LC	-	-	1	
	Reading GPIB address	-	AD?	Integer (0 to 30)		
	Specification of the delimiter CR LF <eoi> LF</eoi>	DL0 DL1	-	-		
	<eoi></eoi>	DL2				
	CR LF	DL3				
	LF <eoi></eoi>	DL4				
	Service request interruption ON	S0	-	-		
	OFF	S1				
	Status clear	S2	-	-		
	Service request mask	RQS *	RQS?	Decimal number corresponding to the SRQ bit		
	Outputting ID of the instrument	-	*IDN?	Manufacturer name (character string), instrument type (char- acter string), 0 and revision (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 corresponding to the register bits		
	Reading or clearing the stan- dard event enable register	-	*ESR?	Decimal number corresponding to the register bits		
	Accessing the service request enable register	*SRE *	*SRE?	Decimal number corresponding to the register bits	]	
	Reading the status byte and MSS bit	-	*STB?	Decimal number corresponding to the status byte	1	
	Accessing the operation status enable register	OPR *	OPR?	Decimal number corresponding to the register bits	]	
	Reading or clearing the opera- tion status register	-	OPREVT?	Decimal number corresponding to the register bits	]	

#### Table 4-14 Miscellaneous

5.1 Template Edit Function

# **5 TECHNICAL INFORMATION**

#### 5.1 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.

#### 5.1.1 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 5-1 Template to Be Set

For example, the upper template defines the power of the signal during the burst period as +3 dB and -40 dB. To set this power to the template, use the settings shown in Figure 5-2. Set the template using the relative values with reference to the average power.

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5.1 Template Edit Function



**Figure 5-2 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 5-3 Template Shifted Using the Shift Y Function

5.1 Template Edit Function

#### 5.1.2 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 in the Shift X menu.



**Figure 5-4 Template with the Set Values** 

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



Figure 5-5 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.

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

#### 5.2 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

#### 5.2.1 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. The Normal marker, Integral marker and Root Nyquist marker are available.

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.

When Root Nyquist is selected, calculates the power of the bandwidth to which the Root Nyquist filter is applied. Set the Root Nyquist filter at Config in Parameter Setup.



#### Figure 5-6 Example of Marker Edit Setting (1)

(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.



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

Figure 5-7 Example of Marker Edit Setting (2)

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





# 5.2.2 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.

- (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.

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

To display a measured value in (1), select MARKER on the Result: MARKER/RELATIVE/ABS POWER 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, INTEGRAL or  $\sqrt{NYQUIST}$  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 be set to NORMAL.

To measure adjacent channel power, set Offset MKR Type to NORMAL, INTEGRAL or  $\sqrt{NYQUIST}$ . 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 MODULA-TION. 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.

#### 5.2.3 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).

5.3 Estimated  $\rho$  in the Code Domain Power Measurement

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

This instrument sums up the  $\rho$  of the channels greater than the threshold level set in Parameter Setup and displays the sum as Estimated  $\rho$ .

#### 5.4 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.

5.5 Trigger Source INTRVL (EXT) and INTRVL

#### 5.5 Trigger Source INTRVL (EXT) and INTRVL

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 code domain power measurement, the even second signal produced every two seconds is normally used as an external trigger.

Even when there is no external trigger, the measurement is made possible by measuring the PN delay using the INTRVL trigger and setting this delay value. In this case, however, the drift of the PN delay occurs due to the frequency reference error due to a measurement for a long time. Applying the 10 MHz reference signal in synch with the DUT signal to the instrument allows you to prevent this drift from occurring.

### 5.6 About Bit Reversal (Paley) Order

The order of the Walsh code numbers used in cdma 2000 is referred to as the Hadamard order.

There is another order, which is different from the Hadamard order. This order is known as the Bit Reversal (Paley) order.

Listing the Walsh codes in the Bit Reversal order allows you to display Walsh codes with different lengths hierarchically in a tree-structured chart.

As a practical example, a comparison between the Hadamard and Bit Reversal orders for the Walsh code length of 8 is made.

	8 x 8 matrix	Walsh code number
cdma 2000	00000000	0
Walsh code	01010101	1
Hadamard	00110011	2
Order	01100110	3
	00001111	4
	01011010	5
	00111100	6
	01101001	7
Bit Reversal (Paley) Order	00000000	0
	00001111	4
	00110011	2
	00111100	6
	01010101	1
	01011010	5
	01100110	3
	01101001	7

Next, a list showing how Walsh code numbers for Walsh code lengths of 4, 8, 16, 32, 64 and 128 are arranged in the Bit Reversal (Paley) order is presented.

W4	W8	W16	W32	W64	W128
0	0	0	0	0	0
					64
				32	32
					96
			16	16	16
					80
				48	48
					112
		8	8	8	8
					72
				40	40
					104
			24	24	24
					88
				56	56
					120
	4	4	4	4	4
					68
				36	36
					100
			20	20	20
					84
				52	52
					116
		12	12	12	12
					76
				44	44
					108
			28	28	28
					92
				60	60
					124

W4	W8	W16	W32	W64	W128
2	2	2	2	2	2
					66
				34	34
					98
			18	18	18
					82
				50	50
					114
		10	10	10	10
					74
				42	42
					106
			26	26	26
					90
				58	58
					122
	6	6	6	6	6
					70
				38	38
					102
			22	22	22
					86
				54	54
					118
		14	14	14	14
					78
				46	46
					110
			30	30	30
					94
1				62	62
					126

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W4	W8	W16	W32	W64	W128
1	1	1	1	1	1
					65
				33	33
					97
			17	17	17
					81
				49	49
					113
		9	9	9	9
					73
				41	41
					105
			25	25	25
					89
				57	57
					121
	5	5	5	5	5
					69
				37	37
					101
			21	21	21
					85
				53	53
					117
		13	13	13	13
					77
				45	45
					109
			29	29	29
					93
				61	61
					125
5.6 About Bit Reversal (Paley) Order

W4	W8	W16	W32	W64	W128
3	3	3	3	3	3
					67
				35	35
					99
			19	19	19
					83
				51	51
					115
		11	11	11	11
					75
				43	43
					107
			27	27	27
					91
				59	59
					123
	7	7	7	7	7
					71
				39	39
					103
			23	23	23
					87
				55	55
					119
		15	15	15	15
					79
				47	47
					111
			31	31	31
					95
				63	63
					127

References

"Walsh Analysis" written by Yasushi Endo and published by Tokyo Electric University Press.

"Hadamard Matrix and Its Application" written by Zenichi Kiyasu and published by Institute of Electronics and Communication Engineers of Japan. 5.7 About Complementary Filter

### 5.7 About Complementary Filter

The complementary filter is used to measure the waveform quality and code domain power specified by the IS-97(Waveform Quality Measurement Equipment) standard.

This complementary filter is used to generate a signal which is equivalent to the signal that passed through the Nyquist filter.

Since IS-97 does not specify the roll-off coefficient of the Nyquist filter, a coefficient range of 0.05 to 0.2 can be set on this instrument.

When the roll-off coefficient is changed, the bandwidth of the complementary filter is changed accordingly.

The following graph shows an example of the complementary filter bandwidth when the roll-off coefficient is changed.



### Complementary filter

5.8 About Equalizing Filter

### 5.8 About Equalizing Filter

For the IS-97 Phase Characteristics, it is specified that the base station shall equalize the phase of a signal to be transmitted through the path. The equalizing filter is defined by the following expression.

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

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 characteristics 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.

5.9 Null Offset Graph

### 5.9 Null Offset Graph

When Reverse (RC1&2) is set, the graph display function used with Waveform Quality measurements is enabled to display a graph such as Null Offset Constellation and Null Offset I(Q) Eye.

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



**Figure 5-9 Reverse Link Constellation** 

After the offset value of Offset QPSK signal has been shifted (returned to the original value) and the signal has been filtered with a reverse baseband filter specified by IS-2000, QPSK Constellation is obtained as shown in Figure 5-10 (Null Offset Constellation) in which each of symbol points converged to a point.



Figure 5-10 Null Offset Constellation

*NOTE:* Because of the interference between symbols due to baseband filter specified by IS-2000, the constellation does not converge to a point, even if the offset value is shifted using the Offset QPSK function.

5.10 Block Diagram

### 5.10 Block Diagram

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

The Figure 5-11 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 5-11 Block Diagram

## 6 PERFORMANCE VERIFICATION TEST

### 6.1 General

#### 6.1.1 Introduction

This chapter provides R3267 Series OPT65 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.	Items
1	Code Domain Power Accuracy (FORWARD Link)
2	Code Domain Power Accuracy (REVERSE Link)

### 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.

#### NOTE:

- 1. The R3267 Series with OPT65 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.
- When SMIQ03 is used as IQ modulation signal generator, set SMIQ03 controls as follows; VECTOR MOD: STATE ON IQ SWAP: ON

No.	Description	Critical Specification	Recommended Model	Manufacturer	Usage	Notes
1	Arbitrary Signal Generator	Output Channels: 3 channel required Capable to assign the output signal I-CH signal at CH1 Q-CH signal at CH2 Trigger signal (TTL) at CH3	AWG2021	Tektronix	PV	SG1
2	I/Q Modulation Signal Generator	Comply with IS-95, IS-97, IS-98 Standard: Base Station Test Model, Nominal Frequency Range: 30 MHz to 3 GHz IQ Modulation Bandwidth: > 5 MHz ρ: < 0.999	SMIQ03	Rohde&Schwarz	PV	SG2
3	RF Cable	BNC(m)-BNC(m), $50\Omega$	A01036-1500	Advantest	PV	-
4	Adapter	Type N(m)-BNC(f)	JUG-201-U	Advantest	PV	-

## Table 6-2 Equipment List

## 6.1.3 Specifications Required for Test Signals

Table 6-3 provides the specifications required for performance verification test signals based on the requirements.

No.	Name of test Signal	Specification Required			Usage	
1	Base Station	Comply with	the IS-97 Standa	rd:	Code Domain Power Accuracy	
		Dase Station	Test Model, Noli	iinai	(FORWARD LINK)	
		Cha	nnel No.	Amplitude		
		0	(Pilot)	-6.99 dB		
		1 (1	Paging)	-7.25 dB		
		6 (1	Fraffic)	-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		
2	Mobile Station	Based on IS-98			Code Domain Power Accuracy	
		Long Code Mask: ALL 0			(if REVERSE(RC3&4) is set)	
		Reverse Traffic Channel				
		Channel	Walsh Function	Amplitude		
		PICH	$W_0^{32}$	-6.99 dB		
		DCCH	W ₈ ¹⁶	-6.99 dB		
		SCH2	W ₆ ⁸ (M=2)	-6.99 dB		
		FCH	$W_4^{16}$	-6.99 dB		
		SCH1	W ₂ ⁴ (M=4)	-6.99 dB		
	M: Walsh Function Repetition Factor					

Table 6-3 Specifications Required for Test Signals

Figure 6-1 shows the timing chart of the trigger signal and No.1 Base Station and No.2 Mobile Station signals listed in Table 6-3.



Figure 6-1 Timing Chart of Trigger signal and Mobile Station Signal (Not Scaled)

### 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 is 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 Procedure

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 Example: **FREQ**, **FORMAT** 

Soft keys: Boldface and Italic 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 Test Procedure

### 6.2.1 Code Domain Power Accuracy (FORWARD Link)

(1) Description

Test a carrier frequency accuracy and code domain power accuracy in FORWARD Link measurement mode of base station.

(2) Specification

Carrier Frequency Accuracy	: ±10 Hz
Code Domain Power Accuracy	: ±0.1 dB
Equipment used	
Arbitrary Waveform Generator	: SG1
IQ Modulation Signal Generator	: SG2
RF Cable	: BNC (m)-BNC (m)
Adapter	: Type N (m)-BNC (f)

(4) Setup

(3)



#### Figure 6-2 Setup of Code Domain Power Accuracy Measurement (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 (Base Station) signal listed in Table 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	:870.03 MHz
Output Level	:0 dBm

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

Center Frequency	:870.03 MHz
Input	:RF
Link	:FORWARD



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

#### Figure 6-3 Setting of Measurement Parameters for Code Domain Power (FORWARD Link)

7. On the R3267 Series, set measurement options as shown in Figure 6-4.

Meas Options				
COP Graph Plot Type		AVERAGE	NWX	MIN
Power Unit	:[	dBn	dB	dBnoilot
Pilot Channel Power	:[			
Δ <i>τ</i>	-	ON	OFF	
40	-	014	OFF	
Code Damain Error	-	ON	OFF	
Signal Power	-	ON	OFF	
EVN		ON	OFF	
Fixed Symbols Level	:[	ON	OFF	
Chip Rate Error	- 1	ON	OFF	
10 Gain Error		ON	OFF	
Quadrature Error	-	ON	OFF	

Figure 6-4 Setting of Measurement Options for Code Domain Power (FORWARD Link)

- 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 a single sweep.
- 10. After single sweep has completed, record the measurement result in the performance verification test record sheet.

### 6.2.2 Code Domain Power Accuracy (if REVERSE(RC3&4) is set)

(1) Description

Test a carrier frequency accuracy and code domain power accuracy in REVERSE Link measurement mode of mobile station.

(2) Specification

	Carrier Frequency Accuracy	: ± 10 Hz
	Code Domain Power Accuracy	$\pm 0.1 \text{ dB}$
(3)	Equipment used	
	Arbitrary Waveform Generator	: SG1
	IQ Modulation Signal Generator	: SG2
	RF Cable	: BNC (m)-BNC (m)
	Adapter	: Type N (m)-BNC (f)

(4) Setup



#### Figure 6-5 Setup of Code Domain Power Accuracy Measurement (REVERSE Link)

- (5) Procedure
- 1. Connect equipment as shown in Figure 6-5.
- 2. On the SG1, set controls to generate the signal complied with No.2 (Mobile Station) signal listed in Table 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	: 825.03 MHz
Output Level	: 0 dBm

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

Center Frequency	: 825.03 MHz
Input	: RF
Link	: REVERSE (RC3&4)

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



Figure 6-6 Displaying the Channel Setup for Code Domain Power (REVERSE Link)

Parameter Setup				
Heas Hode	B SSIGNER NORMAL			
Nexs Range	: 1536 chip			
Threshold	-23 dB			
PN Delay Search Hode	01 0FF			
PN Delay	:			
Trigger Source	: INT EXT			
	INTRM_(EXT) INTRM_			
EXT Trigger Slope				
EXT Trigger Delay	zu, 000.0			
Freq Ness Range	: NORMAL BEIMED			
Δ <i>τ</i>	: 0H 0FF			
48	CH OFF			
Chip Rate Error	CH OFF			
Quadrature Error	CI OFF			

Figure 6-7 Setting of Measurement Parameters for Code Domain Power (REVERSE Link)

- 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 a single sweep.
- 9. After single sweep has completed, record the measurement result in the performance verification test record sheet.

6.3 Performance Verification Test Record Sheet

### 6.3 Performance Verification Test Record Sheet

Model: OPT3264/67/73+65

S/N:

### (1) FORWARD Link

Items		Specification			Result
		Min.	Measured Value	Max.	Pass/Fail
Carrier Frequency Ac	curacy	-10 Hz		+10 Hz	
Code Domain Power	CH No.			<u>.</u>	
	0	-7.09 dB		-6.89 dB	
	1	-7.35 dB		-7.15 dB	
	6	-10.36 dB		-10.16 dB	
	17	-10.36 dB		-10.16 dB	
	20	-10.36 dB		-10.16 dB	
	32	-13.37 dB		-13.17 dB	
	41	-10.36 dB		-10.16 dB	
	49	-10.36 dB		-10.16 dB	
	58	-10.36 dB		-10.16 dB	

### (2) REVERSE Link (if REVERSE(RC3&4) is set)

Items		Specification			Result
		Min.	Measured Value	Max.	Pass/Fail
Carrier Frequency Ac	curacy	-10 Hz		+10 Hz	
Code Domain Power	Channel				
	PICH	-7.09 dB		-6.89 dB	
	DCCH	-7.09 dB		-6.89 dB	
	SCH2	-7.09 dB		-6.89 dB	
	FCH	-7.09 dB		-6.89 dB	
	SCH1	-7.09 dB		-6.89 dB	

**7 SPECIFICATIONS** 

## 7 SPECIFICATIONS

RF input

• Code Domain Power (FORWARD Link)

Characteristics	Specification
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-30dBm to +30 dBm (Total power at ATT:AUTO)
POWER i	measure at 1280chip
Carrier frequency Error	Measurement accuracy : $<\pm 0.1 \text{ dB}(\text{at } \Delta \tau i=0, \Delta \theta i=0)$ $<\pm (\text{Reference frequency accuracy} \times \text{Carrier frequency} + 10 \text{ Hz})$ (Carrier frequency is within a range of $\pm 4 \text{ kHz}$ at Carrier Freq. Search 10 kHz.)
Δτi	Measurement accuracy : <±10nsec
$\Delta \theta$ i	Measurement accuracy : <±10mrad

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

- CharacteristicsSpecificationMeasurement frequency range30 MHz to 3.0 GHzInput level range-30dBm to +30 dBm<br/>(Total power at ATT:AUTO)Precise Modemeasure at 1536chip<br/>Measurement accuracy : <±0.1 dB (at  $\Delta \tau i=0, \Delta \theta i=0$ )<br/><±(Reference frequency accuracy × Carrier frequency + 10 Hz)<br/>(Carrier frequency ErrorCarrier frequency is within a range of ±4 kHz at Expand mode.)
- Code Domain Power (if REVERSE(RC3&4) is set)

Note: The measurement signal is the mobile station signal No.2 listed in Table 6-1.

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	Remarks
700	System Error. Cannot allocate the required mem- ory.	Fatal Error occurred. Data area for the calculation is insufficient on the memory. Contact a sales representative.
701	System Error. Clock is not operational.	Fatal Error occurred. System clock is not in opera- tion. Contact a sales representative.
702	Modulation Gain CAL error. Check 30 MHz CAL signal for connection.	-
703	Modulation DC CAL error. Remove input signals and try again.	-
704	Time Out! No Trigger Detected.	Time out error on the trigger signal occurred. Check the trigger settings.
705	Input Level is out of Range. Check the Ref. level.	-
706	No graph data. Execute measurement.	-
707	Input level is too low. Adjust the Ref. level.	-
708	System Error. Contact qualified engineer.	-
710	Auto Level completed !	-
711	Auto Level Set can not be suc- ceed. Signal level is not stable.	-
712	Cannot execute measurement. Because $\rho$ is too low.	-
715	Frequency Error is out of Meas. Range.	-
719	Burst signal is not detected. Check Burst length or Ref. level.	-

## A.1 Messages

Code	Messages	Remarks
721	Modulation Gain CAL error!(#100) Check 30 MHz CAL signal for connection.	-
722	Modulation Gain CAL error!(#200) Check 30 MHz CAL signal for connection.	-
723	Modulation Gain CAL error!(#300) Check 30 MHz CAL signal for connection.	-
724	Modulation Gain CAL error!(#110) Check 30 MHz CAL signal for connection.	-
725	Modulation Gain CAL error!(#120) Check 30 MHz CAL signal for connection.	-
726	Modulation Gain CAL error!(#210) Check 30 MHz CAL signal for connection.	-
727	Modulation Gain CAL error!(#220) Check 30 MHz CAL signal for connection.	-
728	Modulation Gain CAL error!(#310) Check 30 MHz CAL signal for connection.	-
729	Modulation Gain CAL error!(#320) Check 30 MHz CAL signal for connection.	-
750	Handshake error occurred to DSP. Contact qualified engineer.	-
751	Cannot Detect Mod. DSP board. Contact qualified engineer.	-

A.1 Messages

Code	Messages	Remarks
780	Cannot execute measurement. Check the QOF and Data Rate of the Channel Def. Table.	Cannot execute the measurement because multiple channels with different QOFs and high-speed data rates exist. Check the settings and adjust accord- ingly.
781	Incorrect Channel Def. Table set- tings. Check the Channel Def. Table.	The combination of the Channel Def. Table settings used is not suitable for the measurement. Check the parameters displayed in red on the Chan- nel Def. Table display and adjust accordingly.
782	Cannot synchronize to PICH. Adjust Threshold.	Cannot be synchronized with the pilot channel sig- nal. Change the threshold setting.
783	Cannot synchronize to PICH. Adjust PN Delay.	Cannot be synchronized with the pilot channel sig- nal. Change the PN delay setting.

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