ADVANTEST®

ADVANTEST CORPORATION

R3267/73 OPT62

W-CDMA Measurement Option

Operation Manual

MANUAL NUMBER FOE-8335036B01

Applicable models
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.
  - Connect the power cable to a power outlet that is connected to a protected ground terminal. Grounding will be defeated if you use an extension cord which does not include a protected 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 anything on the product and do not apply excessive pressure to the 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.

 : ATTENTION - Refer to manual.

 : Protective ground (earth) terminal.

 : DANGER - High voltage.

 : 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 before their expected lifespan has expired to maintain the performance and function of the instrument.
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.

Each product may use parts with limited life.
For more information, refer to the section in this document where the parts with limited life are described.

Main Parts with Limited Life

Part name	Life
Unit power supply	5 years
Fan motor	5 years
Electrolytic capacitor	5 years
LCD display	6 years
LCD backlight	2.5 years
Floppy disk drive	5 years
Memory backup battery	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 solder).

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
- Altitude of up to 2000 m

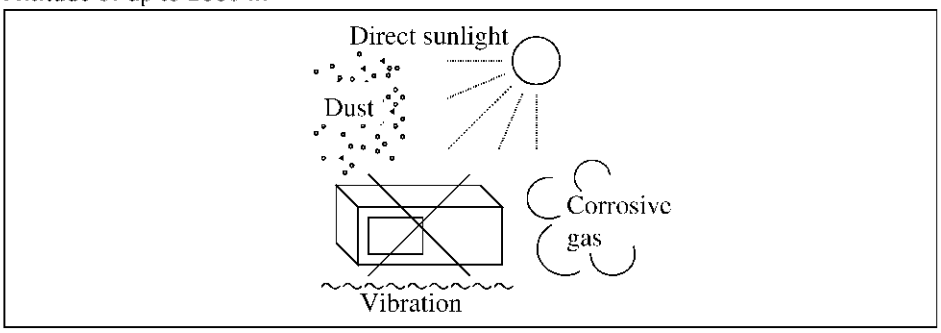


Figure-1 Environmental Conditions

- Operating position

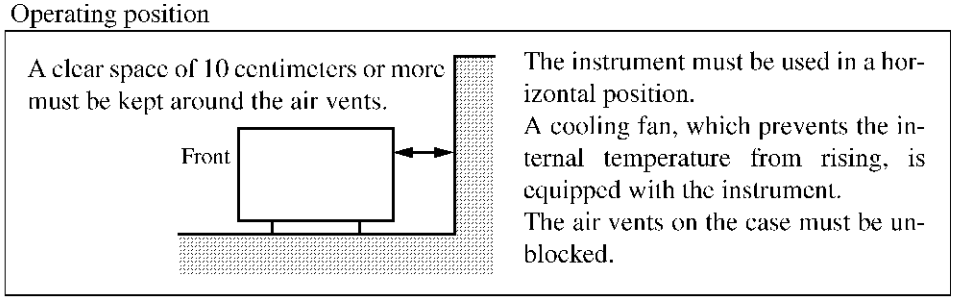


Figure-2 Operating Position

- Storage position

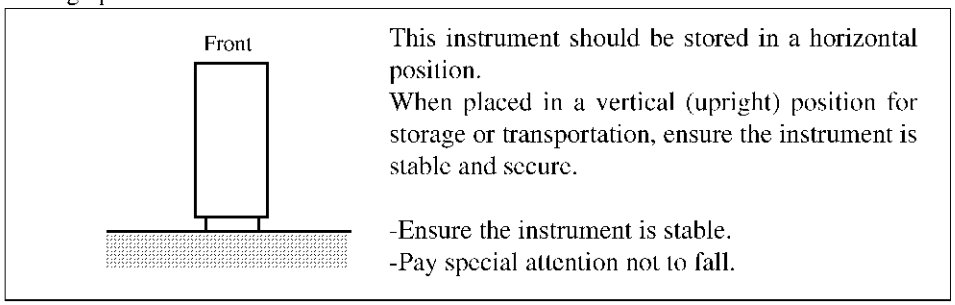


Figure-3 Storage Position

- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  Impulse withstand voltage (over-voltage) category II defined by IEC60364-4-443

  Pollution Degree 2

Types of Power Cable

Replace any references to the power cable type, according to the following table, with the appropriate power cable type for your country.

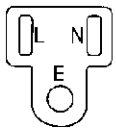
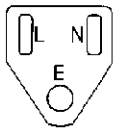
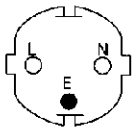
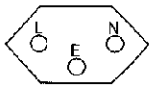
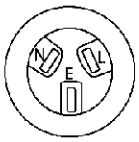
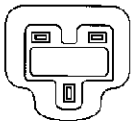
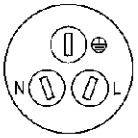
Plug configuration	Standards	Rating, color and length	Model number (Option number)
	PSE: Japan Electrical Appliance and Material Safety Law	125 V at 7 A Black 2 m (6 ft)	Straight: A01402 Angled: A01412
	UL: United States of America CSA: Canada	125 V at 7 A Black 2 m (6 ft)	Straight: A01403 (Option 95) Angled: A01413
	CEE: Europe DEMKO: Denmark NEMKO: Norway VDE: Germany KEMA: The Netherlands CEBEC: Belgium OVE: Austria FIMKO: Finland SEMKO: Sweden	250 V at 6 A Gray 2 m (6 ft)	Straight: A01404 (Option 96) Angled: A01414
	SEV: Switzerland	250 V at 6 A Gray 2 m (6 ft)	Straight: A01405 (Option 97) Angled: A01415
	SAA: Australia, New Zealand	250 V at 6 A Gray 2 m (6 ft)	Straight: A01406 (Option 98) Angled: ---------
	BS: United Kingdom	250 V at 6 A Black 2 m (6 ft)	Straight: A01407 (Option 99) Angled: A01417
	CCC:China	250 V at 10 A Black 2 m (6 ft)	Straight: A114009 (Option 94) Angled: A114109

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

List of Illustrations

LIST OF TABLES

1 INTRODUCTION

1.1 Product Overview

This W-CDMA analysis option software allows you to measure the waveform quality and resolution accuracy of a W-CDMA signal.

This option is a factory option which is incorporated into the R3267/R3273 Spectrum Analyzer prior to shipment.

This option includes the following features:

- Can measure the modulation accuracy, waveform quality, frequency error, and magnitude error of the base station (BTS) and mobile station (MS) signals.
- Can measure the code domain power of the BTS and MS signals.
- Can measure the burst ON/OFF ratio of "OBW ACP due to Transient" specified by the communication standard using a simple key operation.

1.2 Accessories

Name of accesories	Type of name	Quantitiy	Remarks
R3267/73 option 62 Operation manual	JR3267/73OPT62	1	Japanese
	ER3267/73OPT62		English

1.3 Self Test Function

The self test also checks the Option 62 for correct operation when the spectrum analyzer power is turned on. The message shown below will be displayed when an error related to Option 62 occurs. Contact ADVANTEST Corp. for repair.

Error Message
Handshake error occurred to DSP

1.4 About Calibration

When you want to calibrate the R3267/73, please contact a sales representative.

Desirable Period	One 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	GATE IN terminal	Connector for inputting the long code phases signal on the modulation analysis. It is connected to long code data or the SFN signal of the receiver test set (Optionally available) in the MS waveform quality measurement.
③	I channel terminal	Connector for inputting the I channel signal (Baseband).
④	Q channel terminal	Connector for inputting the Q channel signal (Baseband).

2 MEASUREMENT EXAMPLES

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

2.1 Measuring the BTS W-CDMA Signals

By measuring the BTS signals with the W-CDMA mode, you can measure the code domain power that separates speech channels multiplexed on a perch channel into each channel.

Measurement conditions:

The signal to be measured is as follows:

the output signal of a unit to be measured in the W-CDMA mode with a frequency of 2112.5 MHz and a level of -10 dBm.

Signal specifications are as follows:

Long code number 80 [HEX]

Channel	Class	Code Number
Perch channel	8(16 ksps)	0
Channel 1	7(32 ksps)	1
Channel 2	7(32 ksps)	14
Channel 3	7(32 ksps)	24

2.1.1 When an External Trigger Signal is not Used:

2.1.1.1 Measurement with Mask Search Mode

Setup

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

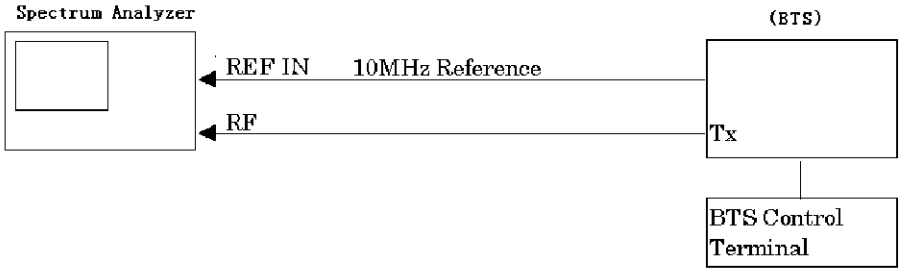


Figure 2-1 Setup for the measurement of the W-CDMA signal (Mask Search Mode)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE,** ***RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

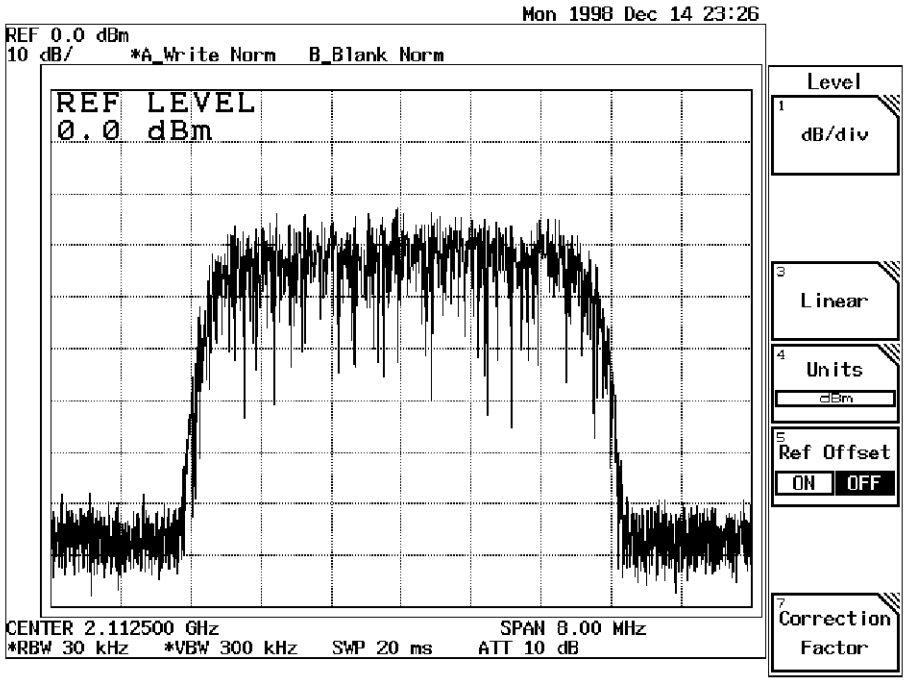


Figure 2-2 W-CDMA Signal's Spectrum

Measurement with Mask Search Mode

7. Press **TRANSIENT** and ***STD Setup***.
   The STD Measurement Parameter Set dialog box is displayed.

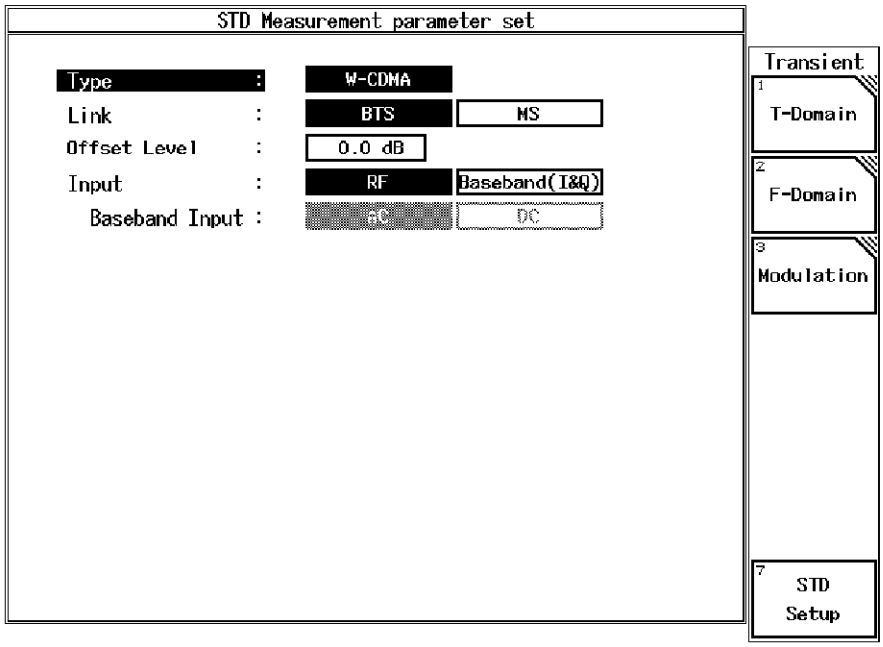


Figure 2-3 STD-Measurement parameter set dialog box

8. Press the ▽ key.
   The cursor moves to the item Link.

9. Use the data knob to set Link to ***BTS***, then press **Hz(ENTR)**.
   The measurement mode is set to the BTS measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   INPUT: RF

10. Press ***Modulation, W-CDMA*** and ***Parameter Setup***.
    The W-CDMA Measurement parameter set dialog box is displayed.

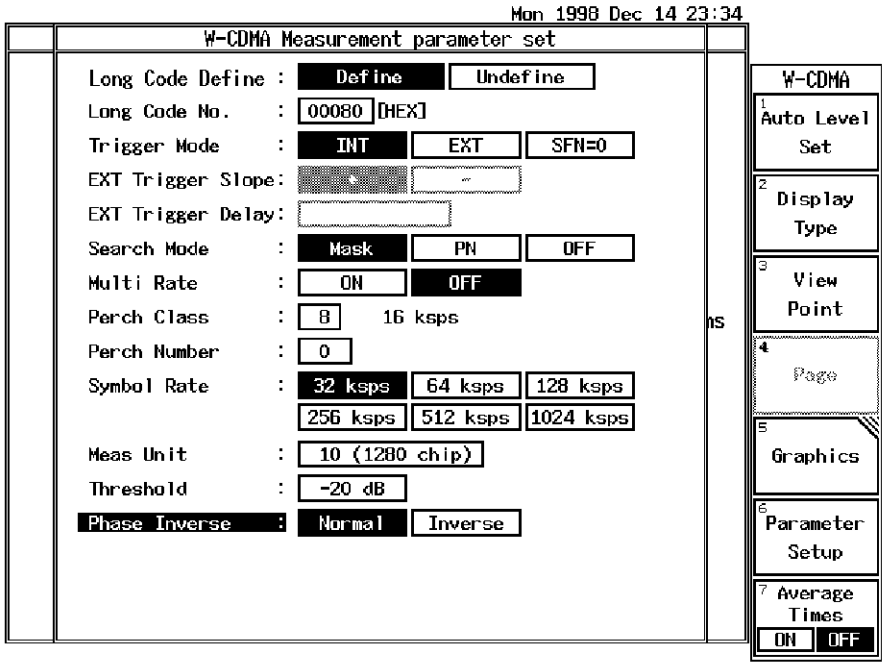


Figure 2-4 W-CDMA Measurement parameter set dialog box

11. Use the data knob to set ***Long code Define*** to ***Define***, then press **Hz(ENTR)**.
    A long code number becomes active.

12. Use the data knob to set **Long code No.** to **8, 0,** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

13. Use the data knob to set ***Trigger Mode*** to ***INT***, then press **Hz(ENTR)**.
    The trigger is set to the internal trigger.

14. Use the data knob to set ***Search Mode*** to ***Mask,*** then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

15. Use the data knob to set ***Multi Rate*** to ***OFF,*** then press **Hz(ENTR)**.
    The measurement of a signal without Multi Rate is set.

16. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is set to 8 (the rate is set to 16 ksps).

17. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

18. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with a symbol rate of 32 ksps is set.

19. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips)***, then press **Hz(ENTR)**.
The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

20. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
The threshold value of an active channel is set to -20 dB.

21. Use the data knob to set ***Phase Inverse*** to ***Normal***, then press **Hz(ENTR)**.
The IQ phase is set to a normal phase.

22. Press ***Parameter Setup***.
The dialog box is closed.

23. Press ***Auto Level Set***.
The measurement range is set to the optimum range.

24. Press **SINGLE**.
The sweep is set to a single mode and starts.

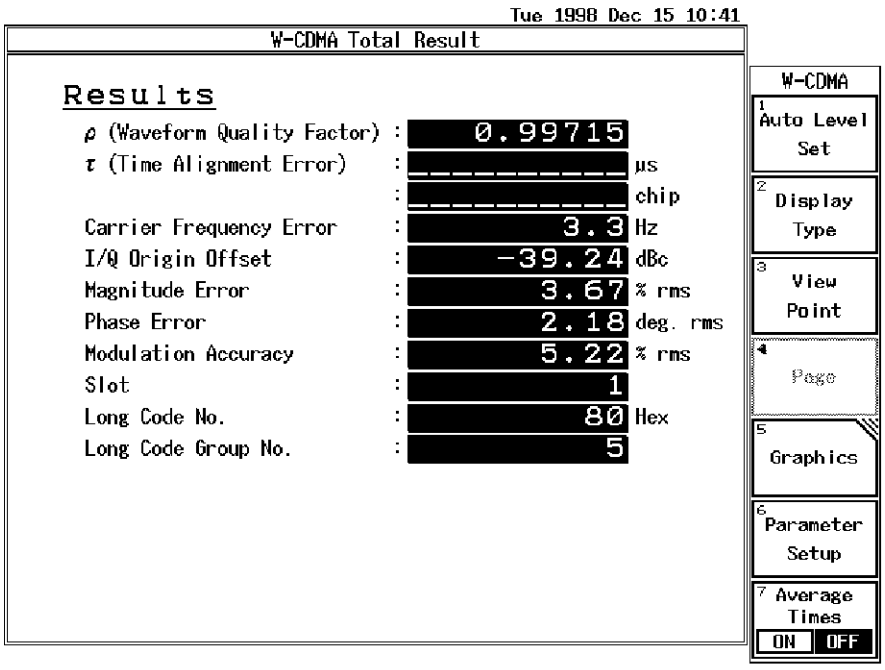


Figure 2-5 Measurement Result of W-CDMA Signal (BTS mode)

ρ(Waveform Quality Factor): The waveform quality of the signal to be measured The maximum measurement length is 1280 chips. Always starts measurement beginning with the head of a slot.

τ(Time Alignment Error): A delay time (µs or chip)

NOTE: When the Trigger Mode is set to INT, the τ(Time Alignment Error) cannot be measured.

Carrier Frequency Error:	A carrier frequency error (Hz)
I/Q Origin Offset:	An I or Q origin offset (dBc)
Magnitude Error:	A magnitude error (% rms)
Phase Error:	A phase error (deg.rms)
Modulation Accuracy:	A modulation accuracy (% rms)
Slot:	A measurement slot number
Long Code No.:	A long code number
Long Code Group No.:	A long code group number

2.1.1.2 Measurement with PN Search Mode

Setup

1. Connect the unit under test as shown in Figure 2-6.

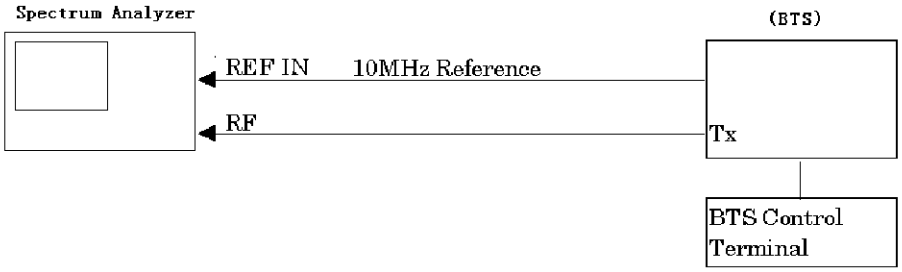


Figure 2-6 Setup for the measurement of the W-CDMA signal (PN Search Mode)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE,** ***RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

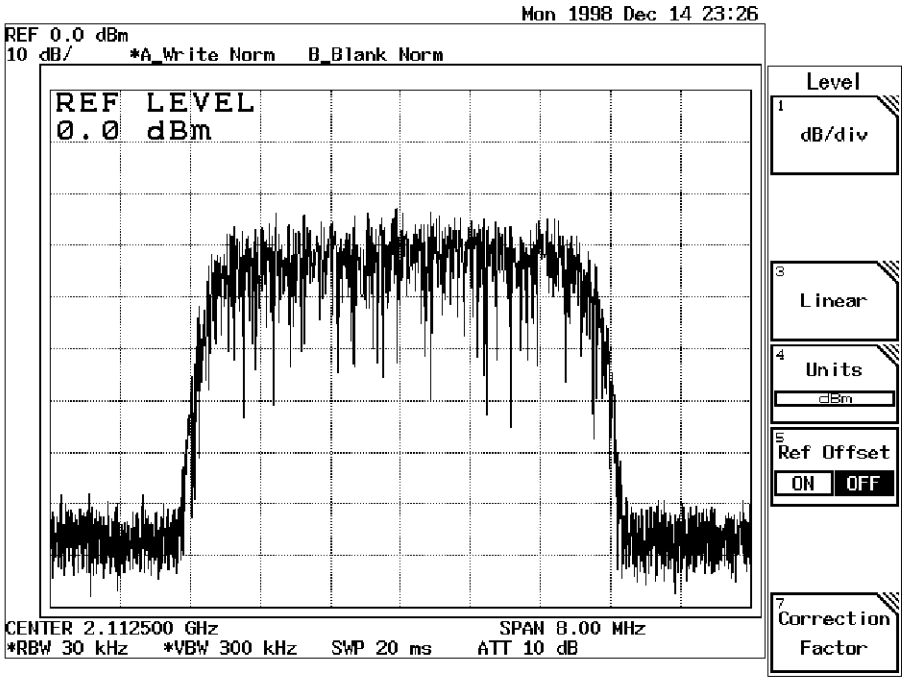


Figure 2-7 W-CDMA Signal's Spectrum

Measurement with PN Search Mode

7. Press **TRANSIENT** and ***STD Setup***.
   The STD Measurement Set dialog box is displayed.

8. Press the ▽ key.
   The cursor moves to the item Link.

9. Use the data knob to set Link to ***BTS***, then press **Hz(ENTR)**.
   The measurement mode is set to the BTS measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   INPUT: RF

10. Press ***Modulation, W-CDMA*** and ***Parameter Setup***.
    The W-CDMA Parameter Measurement parameter set dialog box is displayed.

11. Use the data knob to set ***Long code Define*** to ***Define***, then press **Hz(ENTR)**.
    A long code number becomes active.

12. Use the data knob to set **Long code No.** to **8, 0** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

13. Use the data knob to set ***Trigger Mode*** to ***INT***, then press **Hz(ENTR)**.
    The trigger is set to the internal trigger.

14. Use the data knob to set ***Search Mode*** to ***PN***, then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

15. Use the data knob to set ***Multi Rate*** to ***OFF***, then press **Hz(ENTR)**.
    The measurement of a signal without Multi Rate is set.

16. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is se to 8 (the rate is set to 16 ksps).

17. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

18. Use the data knob to set ***Symbol Rate*** to ***32 ksps***, then press **Hz(ENTR)**.
    The symbol rate is set to 32 ksps.

19. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips)***, then press **Hz(ENTR)**.
    The measurement range is set to 10 symbols (1280 chips: 1/2 slot).

20. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

21. Use the data knob to set ***Phase Inverse*** to ***Normal***, then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

22. Press ***Parameter Setup***.
    The dialog box is closed.

23. Press ***Auto Level Set***.
    The measurement range is set to the optimum range.

24. Press **SINGLE**.
    The sweep is set to a single mode and starts.

2.1.2 If the Long Code Number Cannot Be Determined

Setup

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

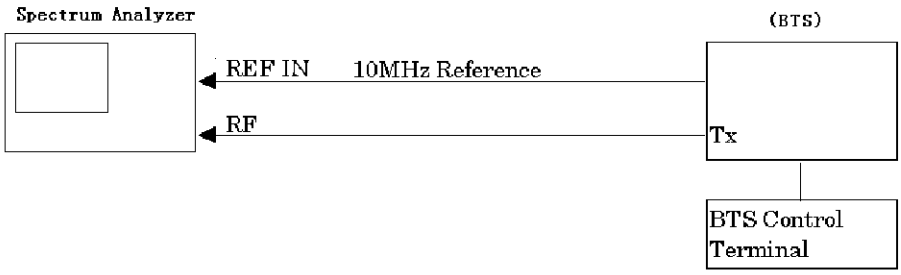


Figure 2-8 Setup for the measurement of the W-CDMA signal

Setting measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE, *RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

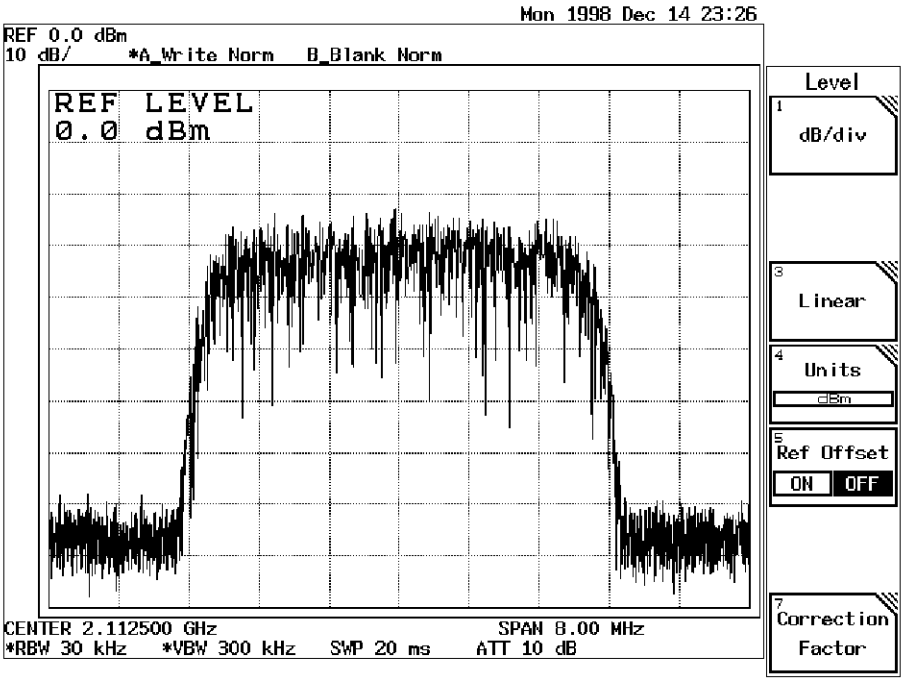


Figure 2-9 W-CDMA Signal's Spectrum

7. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

8. Press the ▽ key.
   The cursor moves to the item Link.

9. Use the data knob to set Link to **BTS**, then press **Hz(ENTR)**.
   The measurement mode is set to the BTS measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   INPUT: RF

10. Press ***Modulation, W-CDMA*** and ***Parameter Setup.***
    The W-CDMA Measurement parameter set dialog box is displayed.

11. Use the data knob to set ***Long code Define*** to ***Undefine,*** then press **Hz(ENTR)**.
    Searches for a long code number to perform measurement.

12. Use the data knob to set ***Trigger Mode*** to ***INT,*** then press **Hz(ENTR)**.
    The trigger is set to the internal trigger.

13. Use the data knob to set ***Search Mode*** to ***Mask,*** then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

14. Use the data knob to set ***Multi Rate*** to ***OFF,*** then press **Hz(ENTR)**.
    The measurement of a signal without Multi Rate is set.

15. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is set to 8 (the rate is set to 16 ksps).

16. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

17. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with a symbol rate of 32 ksps is set.

18. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips),*** then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

19. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

20. Use the data knob to set ***Phase Inverse*** to Normal, then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

21. Press ***Parameter Setup.***
    The dialog box is closed.

22. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

23. Press **SINGLE**.
    The sweep is set to a single mode and starts.

2.1.3 When Using an External Trigger Signal

2.1.3.1 Measurement with Multi Rate Set to OFF

Setup

1. Connect the unit under test as shown in Figure 2-10.

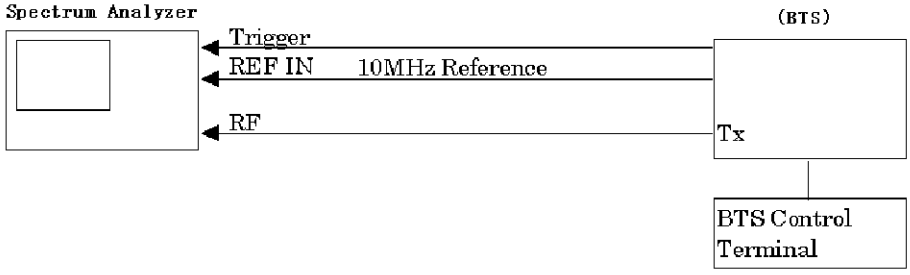


Figure 2-10 Setup for the measurement of the W-CDMA signal (Multi Rate OFF)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE,** ***RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

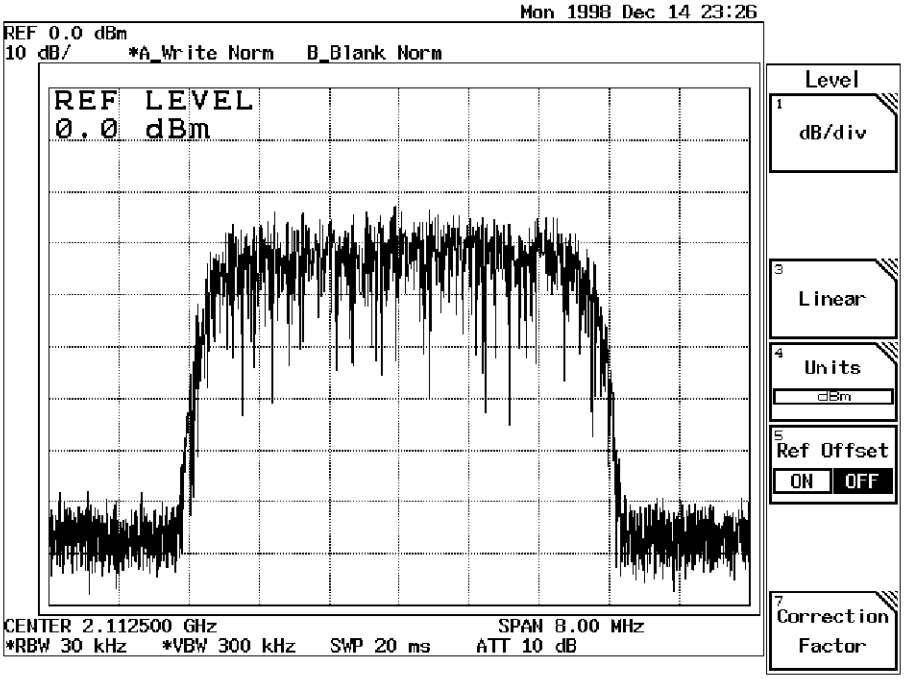


Figure 2-11 W-CDMA Signal's Spectrum

Measurement with Multi Rate Set to OFF

7. Press **TRANSIENT** and ***STD Setup***.
   The STD Measurement parameter set dialog box is displayed.

8. Press the ▽ key.
   The cursor moves to the item Link.

9. Use the data knob to set Link to ***BTS,*** then press **Hz(ENTR).**
The measurement mode is set to the BTS measurement.

The following parameters are defualt settings.
Offset: 0.0 dB
INPUT: RF

10. Press ***Modulation, W-CDMA*** and ***Parameter Setup.***
The W-CDMA Measurement parameter set dialog box is displayed.

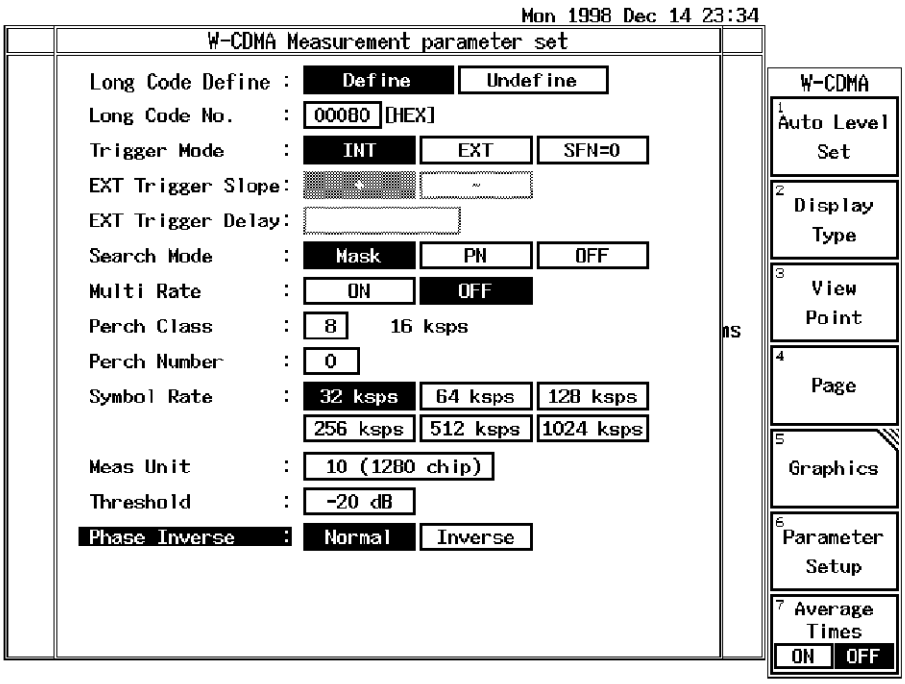


Figure 2-12 W-CDMA Measurement parameter set dialog box

11. Use the data knob to set ***Long code Define*** to ***Define,*** then press **Hz(ENTR).**
A long code number becomes active.

12. Use the data knob to set ***Long code No.*** to **8, 0,** then press **Hz(ENTR).**
The Long code No. is set to 80 [HEX].

13. Use the data knob to set ***Trigger Mode*** to ***EXT,*** then press **Hz(ENTR).**
The measurement mode using an external trigger signal is set.

14. Use the data knob to set ***EXT Trigger Slope*** to +, then press **Hz(ENTR).**
The trigger slope is set to a leading edge.

15. Use the data knob to set ***EXT Trigger Delay*** to **0, ., 0,** then press **Hz(ENTR).**
The trigger delay is set to 0 chip.

16. Use the data knob to set ***Search Mode*** to ***Mask,*** then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

17. Use the data knob to set ***Multi Rate*** to ***OFF,*** then press **Hz(ENTR)**.
    The measurement of a signal without Multi Rate is set.

18. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is se to 8 (the rate is set to 16 ksps).

19. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

20. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with a symbol rate of 32 ksps is set.

21. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips),*** then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

22. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

23. Use the data knob to set ***Phase Inverse*** to ***Normal,*** then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

24. Press ***Parameter Setup.***
    The dialog box is closed.

25. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

26. Press **SINGLE.**
    The sweep is set to a single mode and starts.

2.1.3.2 Measurement with Multi Rate ON

Setup

1. Connect the unit under test as shown in Figure 2-13.

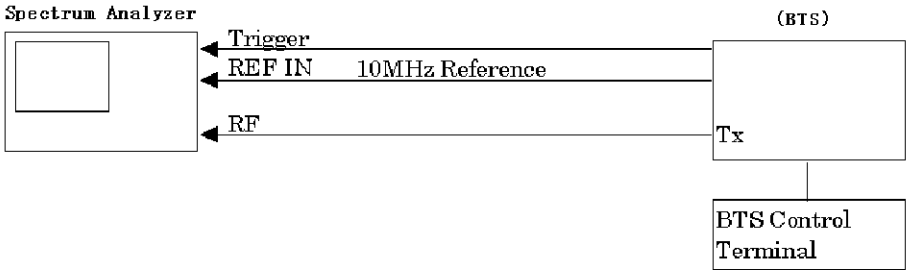


Figure 2-13 Setup for the measurement of the W-CDMA signal (Multi Rate ON)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE, *RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

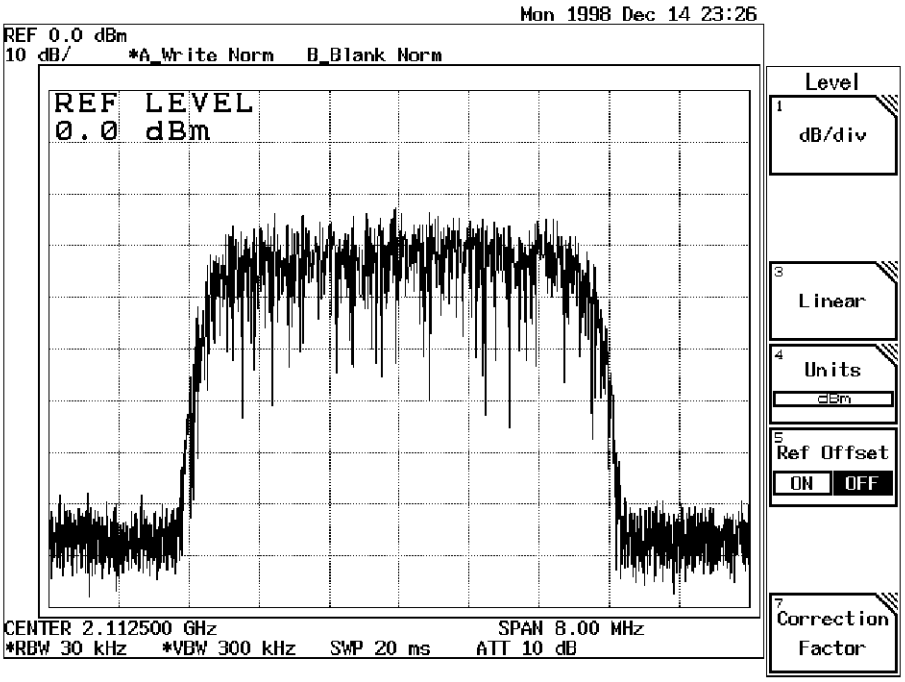


Figure 2-14 W-CDMA Signal's Spectrum

Measurement with Multi Rate ON

7. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

8. Press the ▽ key.
   The cursor moves to the item Link.

9. Use the data knob to set Link to **BTS**, then press Hz(ENTR).
   The measurement mode is set to the BTS measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   Input: RF

10. Press ***Modulation, W-CDMA*** and ***Parameter Setup***.
    The W-CDMA Measurement parameter set dialog box is displayed.

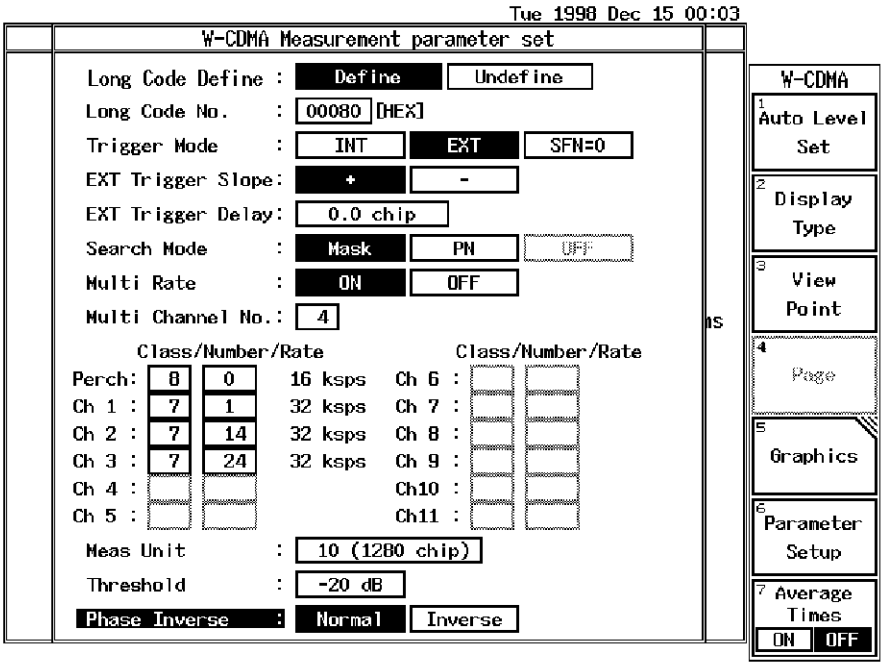


Figure 2-15 Multi Rate ON Setting

11. Use the data knob to set ***Long code Define*** to ***Define,*** then press **Hz(ENTR)**.
    A long code number becomes active.

12. Use the data knob to set ***Long code No.*** to **8, 0,** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

13. Use the data knob to set ***Trigger Mode*** to ***EXT,*** then press **Hz(ENTR)**.
    The measurement mode using an external trigger signal is set.

14. Use the data knob to set ***EXT Trigger Slope*** to +, then press **Hz(ENTR)**.
    The trigger slope is set to a leading edge.

15. Use the data knob to set ***EXT Trigger Delay*** to **0, ., 0,** then press **Hz(ENTR)**.
    The trigger delay is set to 0 chip.

16. Use the data knob to set ***Search Mode*** to ***Mask,*** then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

17. Use the data knob to set ***Multi Rate*** to ***ON,*** then press **Hz(ENTR)**.
    The measurement of a signal with Multi Rate is set.

18. Use the data knob to set ***Multi Channel No.*** to **4**, then press **Hz(ENTR)**.
    The number of multiplexed channels is set to 4.

19. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is se to 8 (the rate is set to 16 ksps).

20. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

21. Use the data knob to set ***Ch 1*** to 7, then press **Hz(ENTR)**.
    The signal class of the channel 1 is set to 7 (the rate is set to 32 ksps).

22. Use the data knob to set ***Ch 1*** to **1**, then press **Hz(ENTR)**.
    The code number of the channel 1 signal is set to 1.

23. Use the data knob to set ***Ch 2*** to 7, then press **Hz(ENTR)**.
    The signal class of the channel 2 is set to 7 (the rate is set to 32 ksps).

24. Use the data knob to set ***Ch 2*** to **14**, then press **Hz(ENTR)**.
    The code number of the channel 2 signal is set to 14.

25. Use the data knob to set ***Ch 3*** to 7, then press **Hz(ENTR)**.
    The signal class of the channel 3 is set to 7 (the rate is set to 32 ksps).

26. Use the data knob to set ***Ch 3*** to **24**, then press **Hz(ENTR)**.
    The code number of the channel 3 signal is set to 24.

27. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips)***, then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

28. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

29. Use the data knob to set ***Phase Inverse*** to ***Normal***, then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

30. Press ***Parameter Setup.***
    The dialog box is closed.

31. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

32. Press **SINGLE**.
    The sweep is set to a single mode and starts.

2.1.3.3 Measurement Using the BS Standard SFN (System frame Number) Reset Signal

NOTE: Since a trigger signal with a period of approx. 11 minutes is used in the measurement using the BS standard SFN reset signal, Auto Level Set cannot be used.

Setup

1. Connect the unit under test as shown in Figure 2-16.

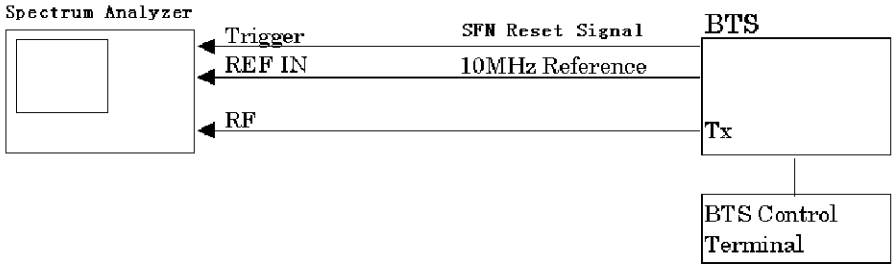


Figure 2-16 Setup for the measurement of the W-CDMA signal (SFN Reset Signal)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE, *RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

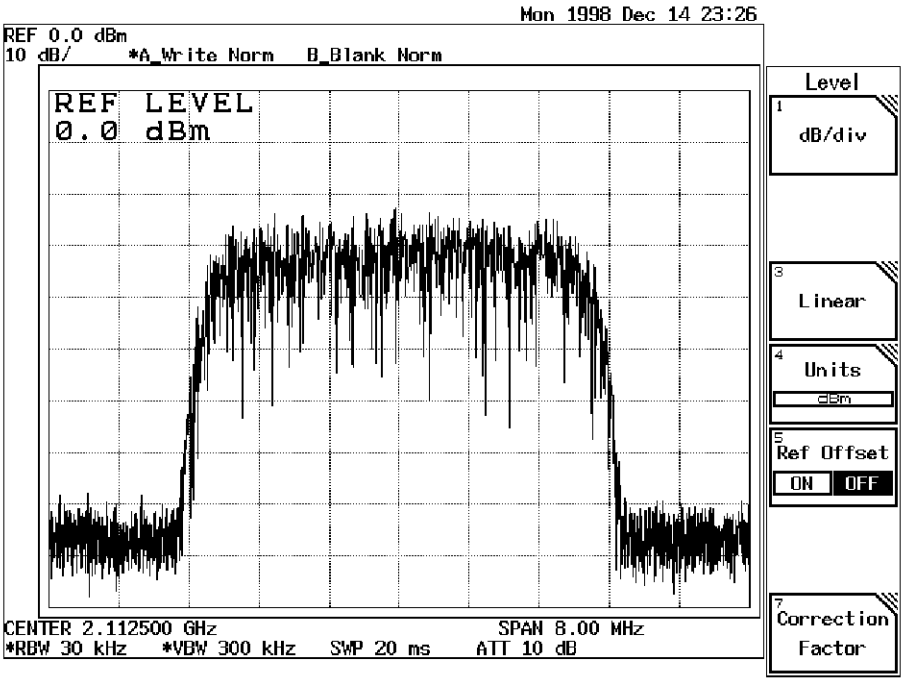


Figure 2-17 W-CDMA Signal's Spectrum

7. Make sure the measurement result in the state where an external trigger signal is not used.

Measurement Using the BS Standard SFN (System frame Number) Reset Signal

8. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

9. Press the ▽ key.
   The cursor moves to the item Link.

10. Use the data knob to set Link to ***BTS,*** then press **Hz(ENTR).**
    The measurement mode is set to the BTS measurement.

    The following parameters are default settings.
    Offset: 0.0 dB
    Input: RF

11. Press ***Modulation, W-CDMA*** and ***Parameter Setup.***
    The W-CDMA Measurement parameter set dialog box is displayed.

12. Use the data knob to set ***Long code Define*** to ***Define,*** then press **Hz(ENTR).**
    A long code number becomes active.

13. Use the data knob to set ***Long code No.*** to **8, 0,** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

14. Use the data knob to set ***Trigger Mode*** to ***SFN=0,*** then press **Hz(ENTR)**.
    The measurement mode using the SFN reset signal is set.

15. Use the data knob to set ***EXT Trigger Slope*** to **-**, then press **Hz(ENTR)**.
    The trigger slope is set to a trailing edge.

16. Use the data knob to set ***EXT Trigger Delay*** to **0, ., 0,** then press **Hz(ENTR)**.
    The trigger delay is set to 0 chip.

17. Use the data knob to set ***Search Mode*** to ***Mask,*** then press **Hz(ENTR)**.
    A synchronization mode using a long code mask is set.

18. Use the data knob to set ***Multi Rate*** to ***OFF,*** then press **Hz(ENTR)**.
    The measurement of a signal without Multi Rate is set.

19. Use the data knob to set ***Perch Class*** to **8**, then press **Hz(ENTR)**.
    The class of the first perch channel is set to 8 (the rate is set to 16 ksps)

20. Use the data knob to set ***Perch Number*** to **0**, then press **Hz(ENTR)**.
    The code number of the first perch channel is set to 0.

21. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with the symbol rate of 32 ksps is set.

22. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips),*** then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

23. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

24. Use the data knob to set ***Phase Inverse*** to ***Normal,*** then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

25. Press ***Parameter Setup.***
    The dialog box is closed.

26. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

27. Press **SINGLE**.
    The sweep is set to a single mode and starts.

2.2 Measuring the MS W-CDMA Signal

The waveform quality of a mobile unit can be measured in combination with a receiver test set (an option).

Measurement conditions:

The signal to be measured is as follows: the output signal of a unit to be measured in the W-CDMA mode with a frequency of 1922.5 MHz and a level of -10 dBm.

Signal specifications are as follows:

Long Code Number 80[HEX]

Class	Code number
7 (32 ksps)	1

2.2.1 Synchronous Measurement Using the Receiver Test Set SFN Signal

Setup

1. Connect the unit under test as shown in Figure 2-18.

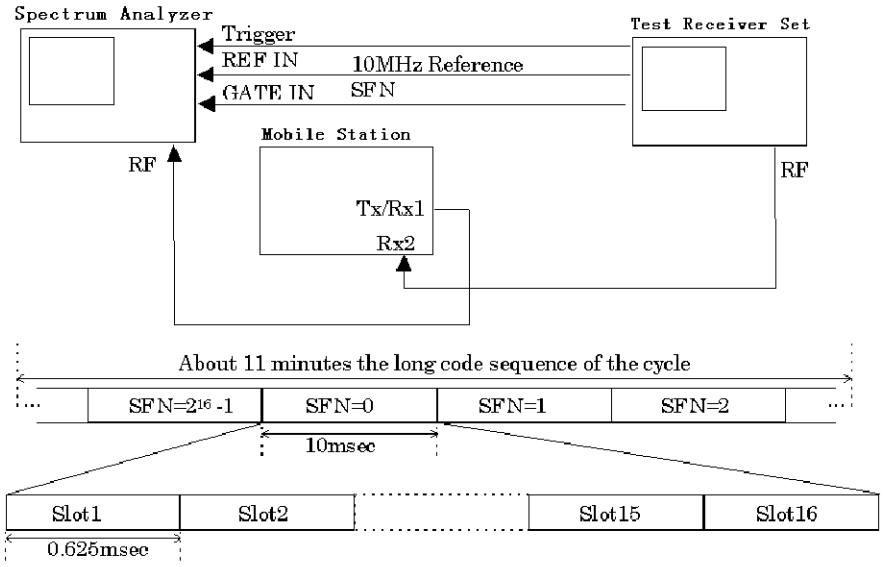


Figure 2-18 Setup for the measurement of the W-CDMA signal (MS Mode:SFN Signal)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE,** ***RBW AUTO/MNL***(MNL), **3, 0,** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

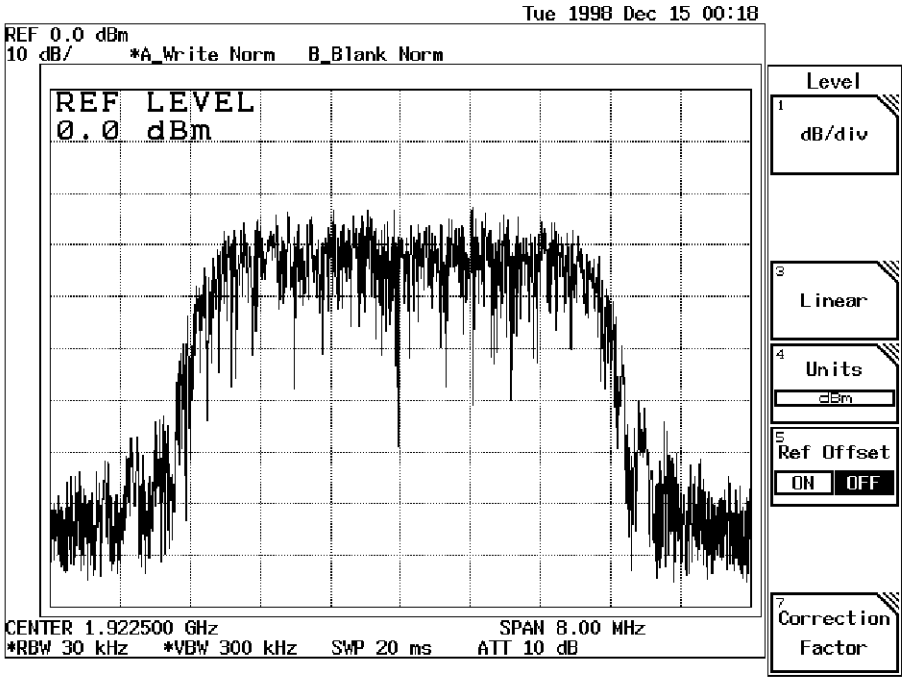


Figure 2-19 W-CDMA Signal's Spectrum

Synchronous Measurement Using the Receiver Test Set SFN Signal

7. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

8. Use the data knob to set Link to ***MS,*** then press **Hz(ENTR)**.
   The measurement mode is set to the mobile unit signal measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   INPUT: RF

9. Press ***Modulation, W-CDMA*** and ***Parameter Setup.***
   The W-CDMA Measurement parameter set dialog box is displayed.

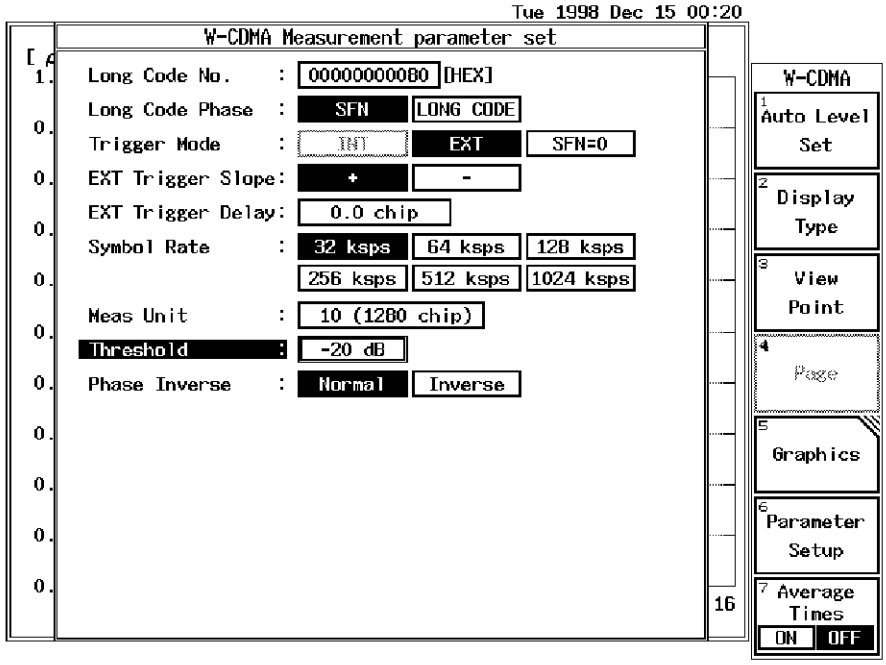


Figure 2-20 W-CDMA Measure parameter set dialog box

10. Use the data knob to set ***Long code No.*** to **8, 0,** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

11. Use the data knob to set ***Long code Phase*** to ***SFN,*** then press **Hz(ENTR)**.
    The synchronous measurement using the receiver test set is set.

12. Use the data knob to set ***Trigger Mode*** to ***EXT,*** then press **Hz(ENTR)**.
    The measurement mode using the external BS standard reset signal as a trigger signal is set.

13. Use the data knob to set ***EXT Trigger Slope*** to **-**, then press **Hz(ENTR)**.
    The trigger slope is set to a trailing edge.

14. Use the data knob to set ***EXT Trigger Delay*** to **0, ., 0,** then press **Hz(ENTR)**.
    The trigger delay is set to 0 chip.

15. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with the symbol rate of 32 ksps is set.

16. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips),*** then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

17. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

18. Use the data knob to set ***Phase Inverse*** to ***Normal,*** then press **Hz(ENTR)**.
The IQ phase is set to a normal phase.

19. Press ***Parameter Setup.***
The dialog box is closed.

20. Press ***Auto Level Set.***
The measurement range is set to the optimum range.

21. Press **SINGLE**.
The sweep is set to a single mode and starts.

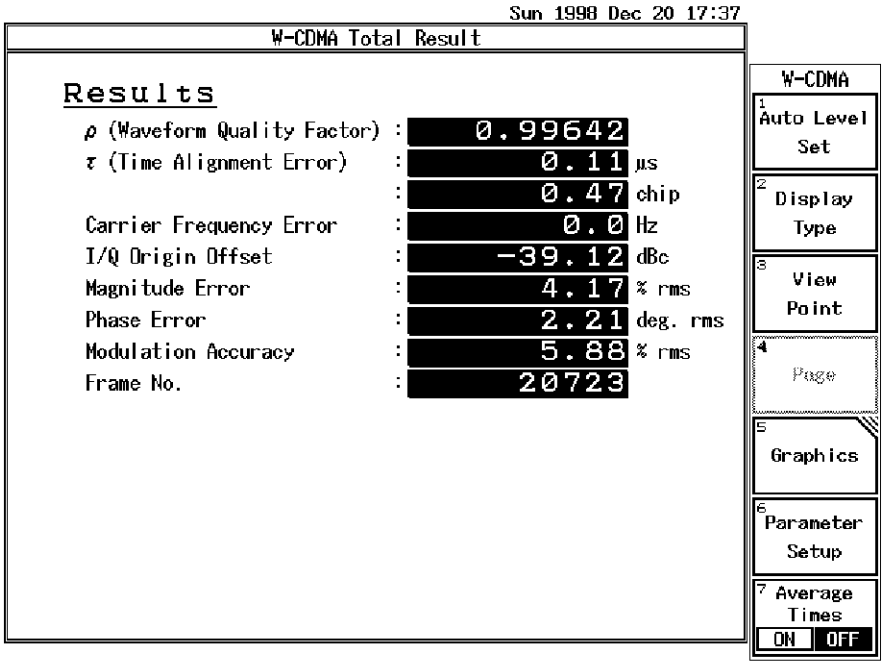


Figure 2-21 Measurement Result of W-CDMA Signal (MS mode)

ρ(Waveform Quality Factor): The waveform quality of the signal to be measured The maximum measurement length is 1280 chips. Always starts measurement beginning with the head of a slot.

τ(Time Alignment Error): A delay time (µs or chip)

Carrier Frequency Error: A carrier frequency error (Hz)

I/Q Origin Offset: An I or Q origin offset (dBc)

Magnitude Error: A magnitude error (% rms)

Phase Error: A phase error (deg.rms)

Modulation Accuracy: A modulation accuracy (% rms)

Frame No.: Measured frame number

2.2.2 Measurement with the Long Code Signal of Mobile Unit

NOTE: For a long code signal, input the I signal of a mobile unit long code.

Setup

1. Connect the unit under test as shown in Figure 2-22.

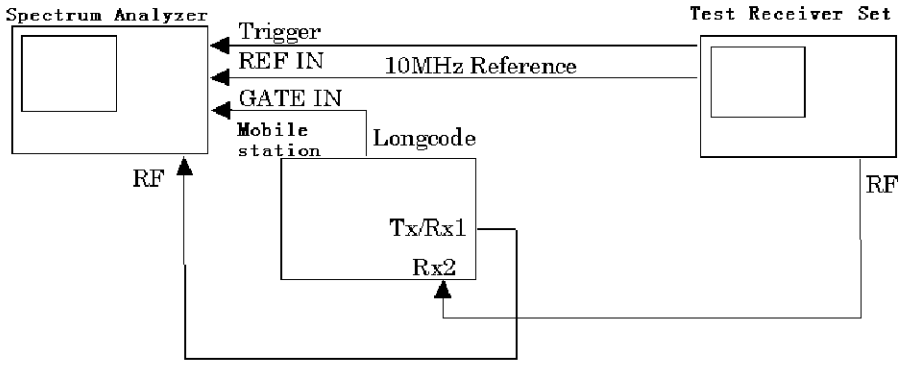


Figure 2-22 Setup for the measurement of the W-CDMA signal (MS Mode:Long Code Signal)

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE, *RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

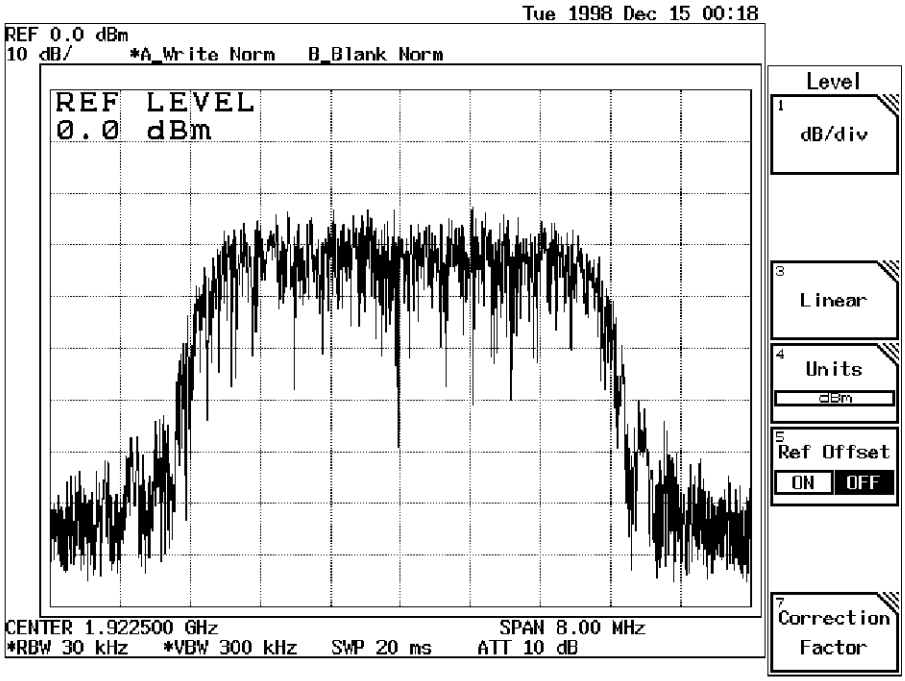


Figure 2-23 W-CDMA Signal's Spectrum

7. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

8. Use the data knob to set Link to ***MS,*** then press **Hz(ENTR)**.
   The measurement mode is set to the mobile unit signal measurement.

   The following parameters are default settings.
   Offset: 0.0 dB
   Input: RF

9. Press ***Modulation, W-CDMA*** and ***Parameter Setup.***
   The W-CDMA Measurement parameter set dialog box is displayed.

10. Use the data knob to set ***Long code No.*** to **8, 0,** then press **Hz(ENTR)**.
    The Long code No. is set to 80 [HEX].

11. Use the data knob to set ***Long code Phase*** to Long Code, then press **Hz(ENTR)**.
    The synchronous measurement with a mobile unit long code signal is set.

12. Use the data knob to set ***Trigger Mode*** to ***EXT,*** then press **Hz(ENTR)**.
    The measurement mode using the external BS standard reset signal as a trigger signal is set.

13. Use the data knob to set ***EXT Trigger Slope*** to +, then press **Hz(ENTR)**.
    The trigger slope is set to a leading edge.

14. Use the data knob to set ***EXT Trigger Delay*** to **0, ., 0**, then press **Hz(ENTR)**.
    The trigger delay is set to 0 chip.

15. Use the data knob to set ***Symbol Rate*** to ***32 ksps,*** then press **Hz(ENTR)**.
    The measurement of a signal with the symbol rate of 32 ksps is set.

16. Use the data knob to set ***Meas Unit*** to ***10 (1280 chips),*** then press **Hz(ENTR)**.
    The measurement with the range of 10 symbols (1280 chips:1/2 slot) is set.

17. Press **-, 2, 0** and **GHz(dB)** to set the threshold.
    The threshold value of an active channel is set to -20 dB.

18. Use the data knob to set ***Phase Inverse*** to ***Normal,*** then press **Hz(ENTR)**.
    The IQ phase is set to a normal phase.

19. Press ***Parameter Setup.***
    The dialog box is closed.

20. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

21. Press **SINGLE.**
    The sweep is set to a single mode and starts.

2.3 Graphical Display of W-CDMA Measurements

The resultant graphs can be displayed. This chapter describes how to display the graphs.

Displaying a Graph for the Code Domain Power Coefficient

1. Press **TRANSIENT**, **Modulation**, ***W-CDMA***, ***Display Type.***
   The W-CDMA display Type dialog box is displayed.

2. Use the data knob to set ***Format*** to ***Graph***, then press **Hz(ENTR)**.
   The Graphic Type of Analysis dialog box is displayed.

3. Press ***Display Type.***
   The dialog box is closed. Code Domain Power is displayed.

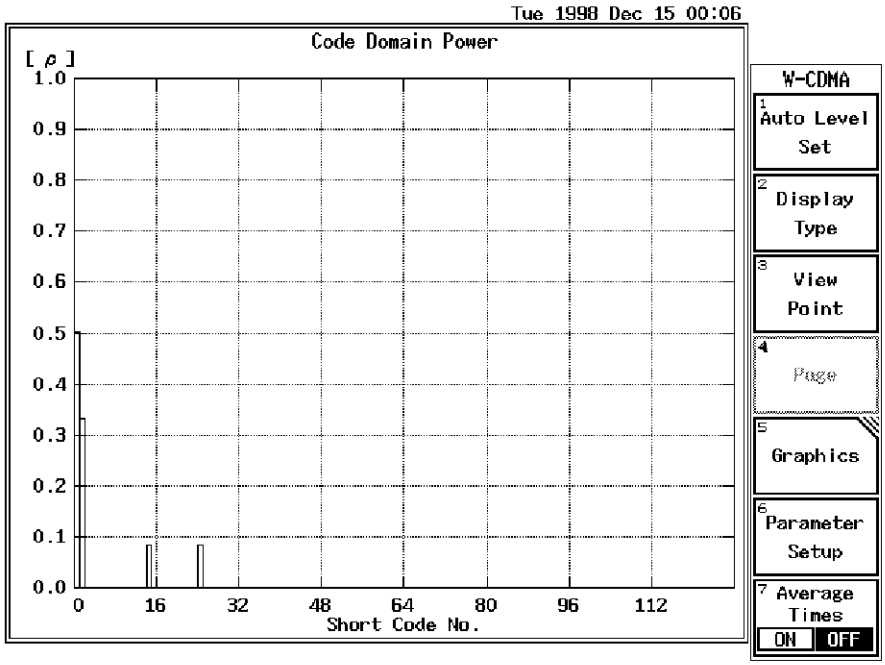


Figure 2-24 Code Domain Power Coefficient

Measuring the Code Domain Power Coefficients for Each Symbol

4. Press **TRANSIENT**, ***Modulation***, ***W-CDMA*** and ***Parameter Setup***.
   The W-CDMA Measurement parameter set dialog box is displayed.

5. Use the data knob to set ***Meas Unit*** to ***1 (128 chips)***, then press **Hz(ENTR)**.
   The measurement with the range of 1 symbols (1280 chips) is set.

6. Press ***Parameter Setup.***
   The dialog box is closed.

7. Press **View Point**.
   The screen for setting Short Code No. in a time-axis direction is displayed.

8. Use the data knob to set a value.
   The power of each Short Code No. in an arbitrary time-axis is displayed.

Displaying Variation over Time in the Code Domain Power Coefficient in the Channel 1

9. Press **TRANSIENT**, ***Modulation***, ***W-CDMA*** and ***Display type.***
   The W-CDMA Display Type dialog box is displayed.

10. Use the data knob to set ***X Scale*** to ***Time,*** then press **Hz(ENTR)**.
    Time Code Domain Power is displayed.

11. Press ***View Point,*** then press **1, Hz(ENTR)** to set the power of channel 1 (Short Code No.).

12. Press **View Point**.
    The screen for setting each channel (Short Code No.) in a time-axis direction is displayed.

13. Use the data knob to set a value.
    The power of an arbitrary channel in a time-axis direction is displayed.

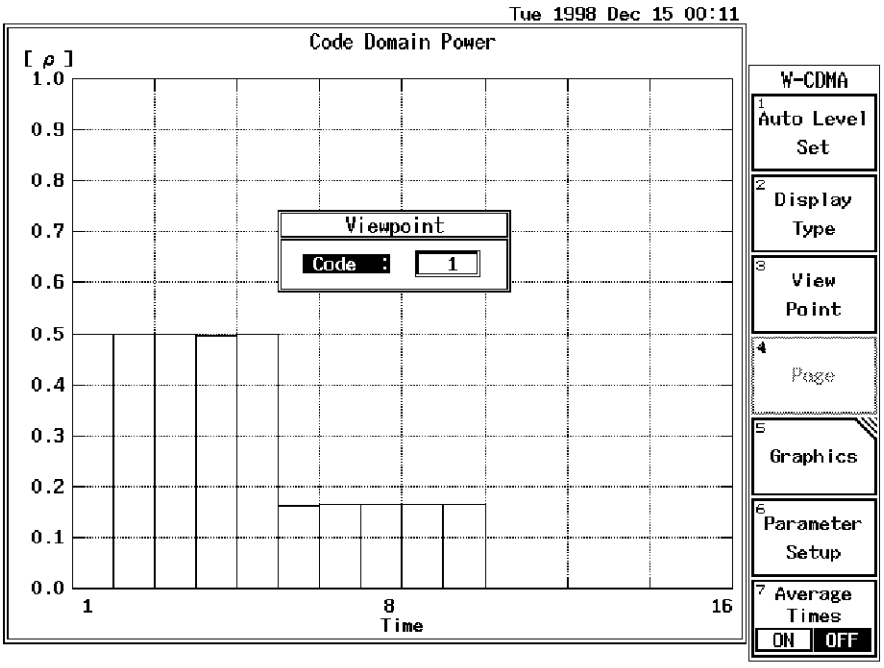


Figure 2-25 Variation over Time in the Code Domain Power Coefficient

Displaying a Graph for a Constellation

14. Press **TRANSIENT**, **Modulation,** ***W-CDMA*** and ***Graphics.***
    The Graphic menu is displayed.

15. Press ***Select type.***
    The Graphic Type of Analysis dialog box is displayed.

16. Use the data knob to set to ***Constellation,*** then press **Hz(ENTR)**.
    The constellation screen is displayed.

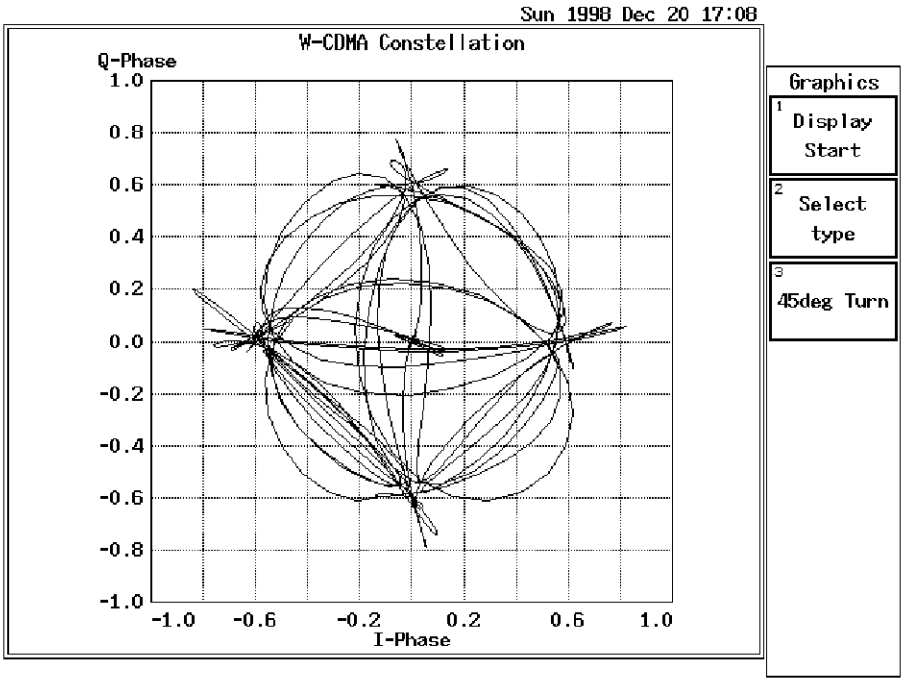


Figure 2-26 Constellation

Displaying the I channel Eye Diagram

17. Press **TRANSIENT**, **Modulation**, ***W-CDMA***, and ***Graphics***.
    The graphic menu is displayed.

18. Press ***Select type***.
    The Graphic Type of Analysis dialog box is displayed.

19. Use the data knob to set to ***I EYE Diagram***, then press **Hz(ENTR)**.
    The eye diagram of I channel is displayed.

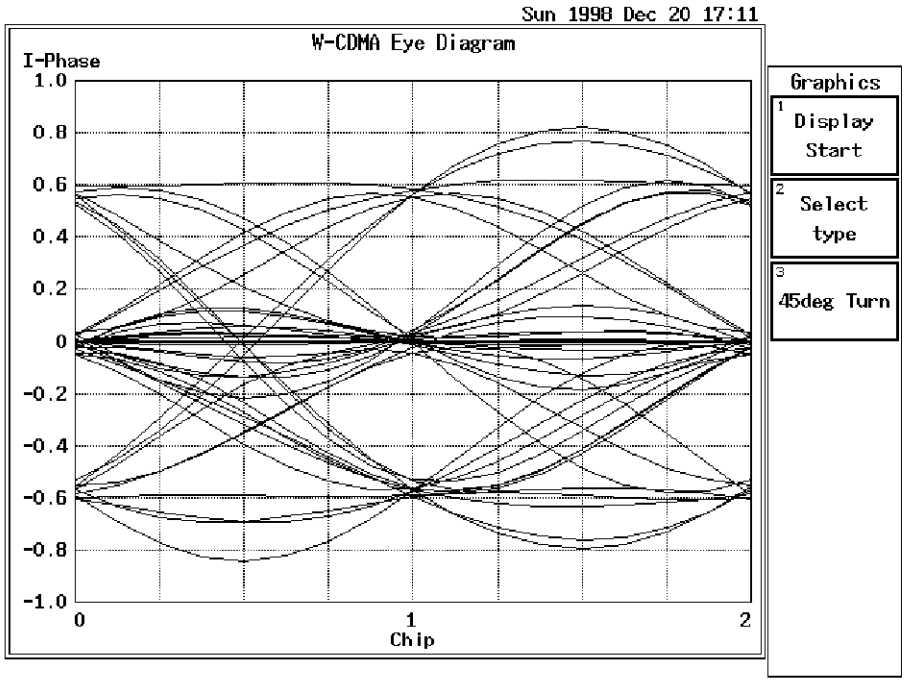


Figure 2-27 Eye Pattern

Displaying Diagrams of I channel and Q channel

20. Press **TRANSIENT**, **Modulation,** ***W-CDMA*** and ***Graphics.***
    The Graphic menu is displayed.

21. Press ***Select type***.
    The Graphic Type of Analysis dialog box is displayed.

22. Use the data knob to set to ***I/Q EYE Diagram,*** then press **Hz(ENTR)**.
    The eye diagrams of Ich and Qch are displayed.

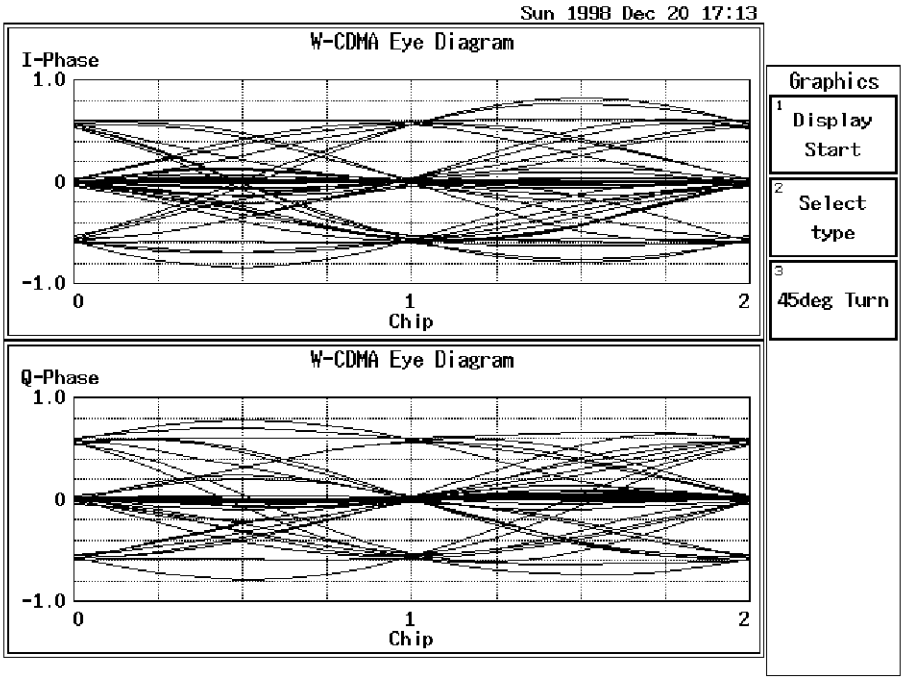


Figure 2-28 Eye Pattern (Dual Screen Display)

2.4 Measuring a QPSK Signal

Uses an external trigger signal of a leading edge to apply a Root Nyquist filter within the measurement length of 1280 chips, which starts at the 10th chip from the trigger.

Setup

1. Connect the unit under test as shown in Figure 2-29.

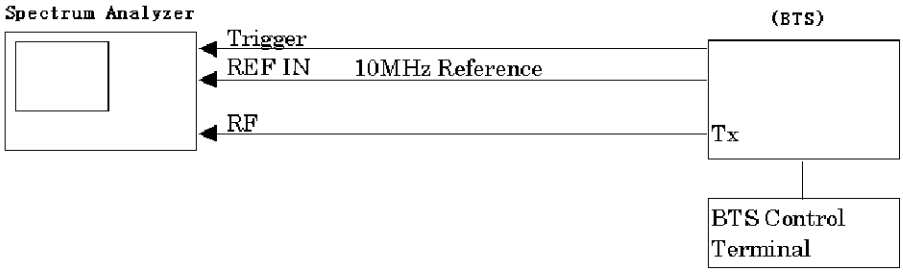


Figure 2-29 Setup for the measurement of the QPSK signal

Setting the measurement conditions

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

2. Press **FREQ, 2, 1, 1, 2, ., 5** and **MHz**.
   A center frequency of 2112.5 MHz is set.

3. Press **SPAN, 8** and **MHz**.
   A frequency span of 8 MHz is set.

4. Press **COUPLE, *RBW AUTO/MNL***(MNL), **3, 0** and **kHz**.
   The RBW is set to 30 kHz.

5. Press ***VBW AUTO/MNL***(MNL), **3, 0, 0** and **kHz**.
   The VBW is set to 300 kHz.

6. Press **LEVEL, 0** and **GHz(+dBm)**.
   The reference level is set to 0 dBm.
   The following spectrum can be observed.

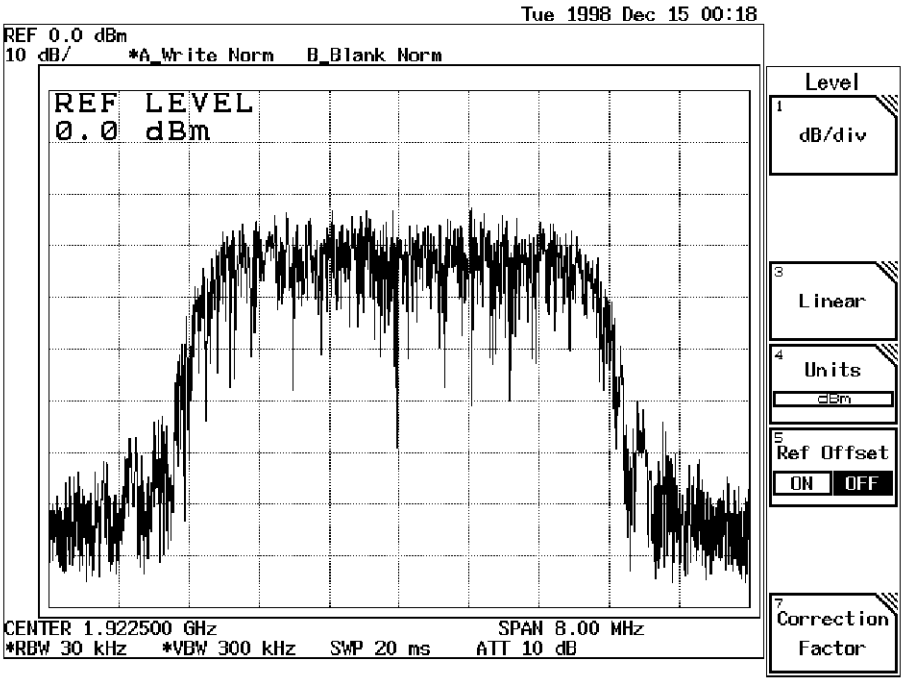


Figure 2-30 QPSK Signal's Spectrum

7. Press **TRANSIENT** and ***STD Setup.***
   The STD Measurement parameter set dialog box is displayed.

8. Use the data knob to set ***Input*** to ***RF,*** then press **Hz(ENTR)**.
   The measurement mode is set to the RF signal input.

   The following parameters are default settings.
   Offset: 0.0 dB
   Link: BTS

9. Press ***Modulation, QPSK*** and ***Parameter Setup.***
   The QPSK Measurement parameter set dialog box is displayed.

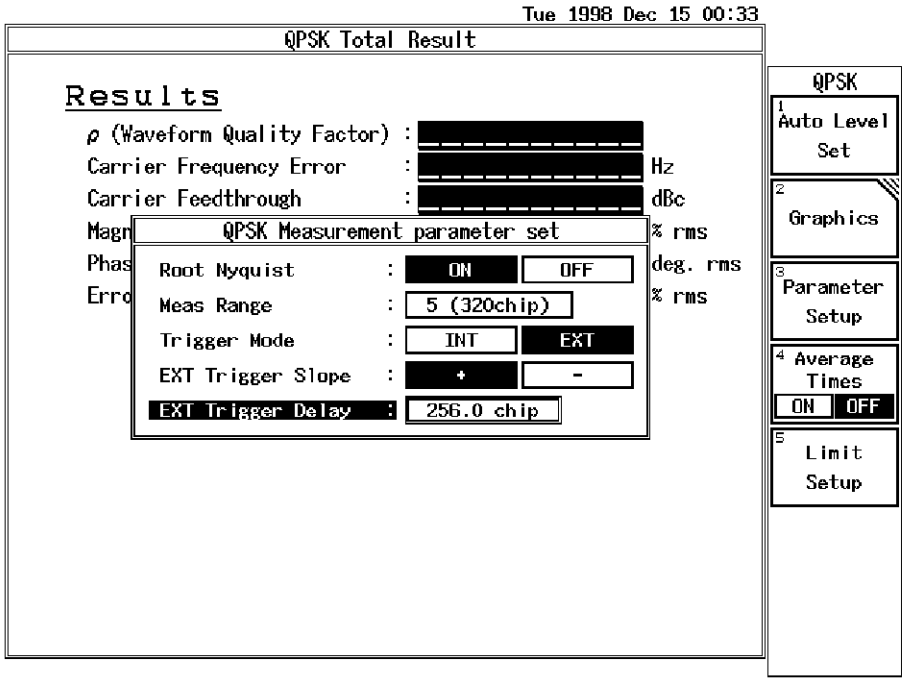


Figure 2-31 QPSK Measurement parameter set dialog box

10. Use the data knob to set ***Root Nyquist*** to ***ON,*** then press **Hz(ENTR)**.
    The root Nyquist filter becomes active.

11. Use the data knob to set ***Meas Range*** to **5**, then press **Hz(ENTR)**.
    The Meas Range is set to 5 x 320 chips.

12. Use the data knob to set ***Trigger Mode*** to ***EXT,*** then press **Hz(ENTR)**.
    The measurement mode using an external trigger signal is set.

13. Use the data knob to set ***EXT Trigger Slope*** to +, then press **Hz(ENTR)**.
    The trigger slope is set to a leading edge.

14. Use the data knob to set ***EXT Trigger Delay*** to **2, 5, 6,** then press **Hz(ENTR)**.
    The trigger delay is set to 256.0 chips.

15. Press ***Parameter Setup.***
    The dialog box is closed.

16. Press ***Auto Level Set.***
    The measurement range is set to the optimum range.

17. Press **SINGLE**.
    The sweep is set to a the single mode and starts.

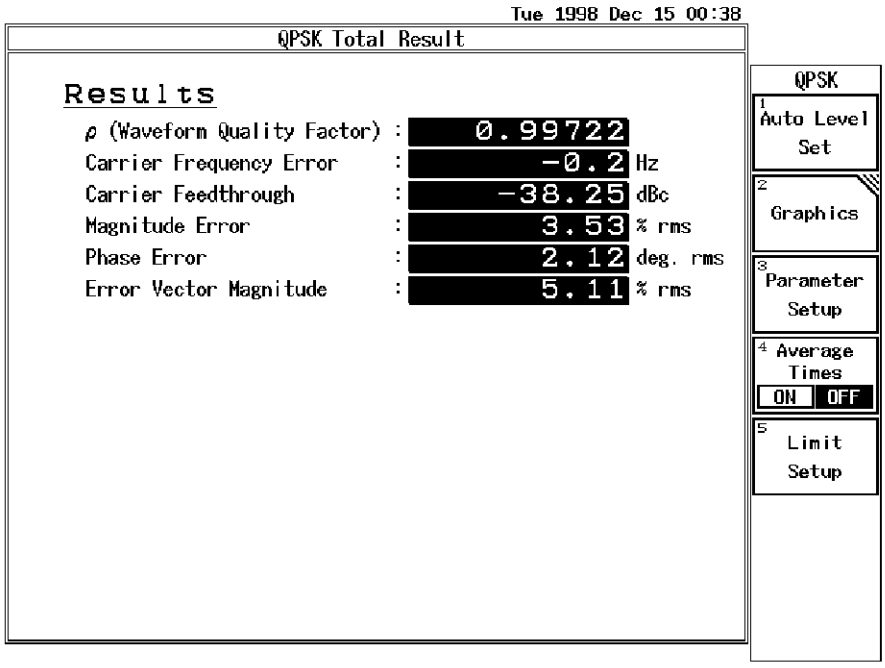


Figure 2-32 QPSK Signal Measurement Result

ρ(Waveform Quality Factor): the waveform quality of the signal to be measured.

Carrier Frequency Error: A carrier frequency error (Hz)

Carrier Feedthrough: An I or Q origin offset (dBc)

Magnitude Error: A magnitude error (% rms)

Phase Error: A phase error (deg. rms)

Error Vector Magnitude: A modulation accuracy (% rms)

3 REFERENCE

This chapter describes the functions of the panel and soft keys for option 62 software.

Menu index: Use this index as a key index to Chapter 3.

Menu Map: Shows a kist of hierarchical menus on a panel key basis.

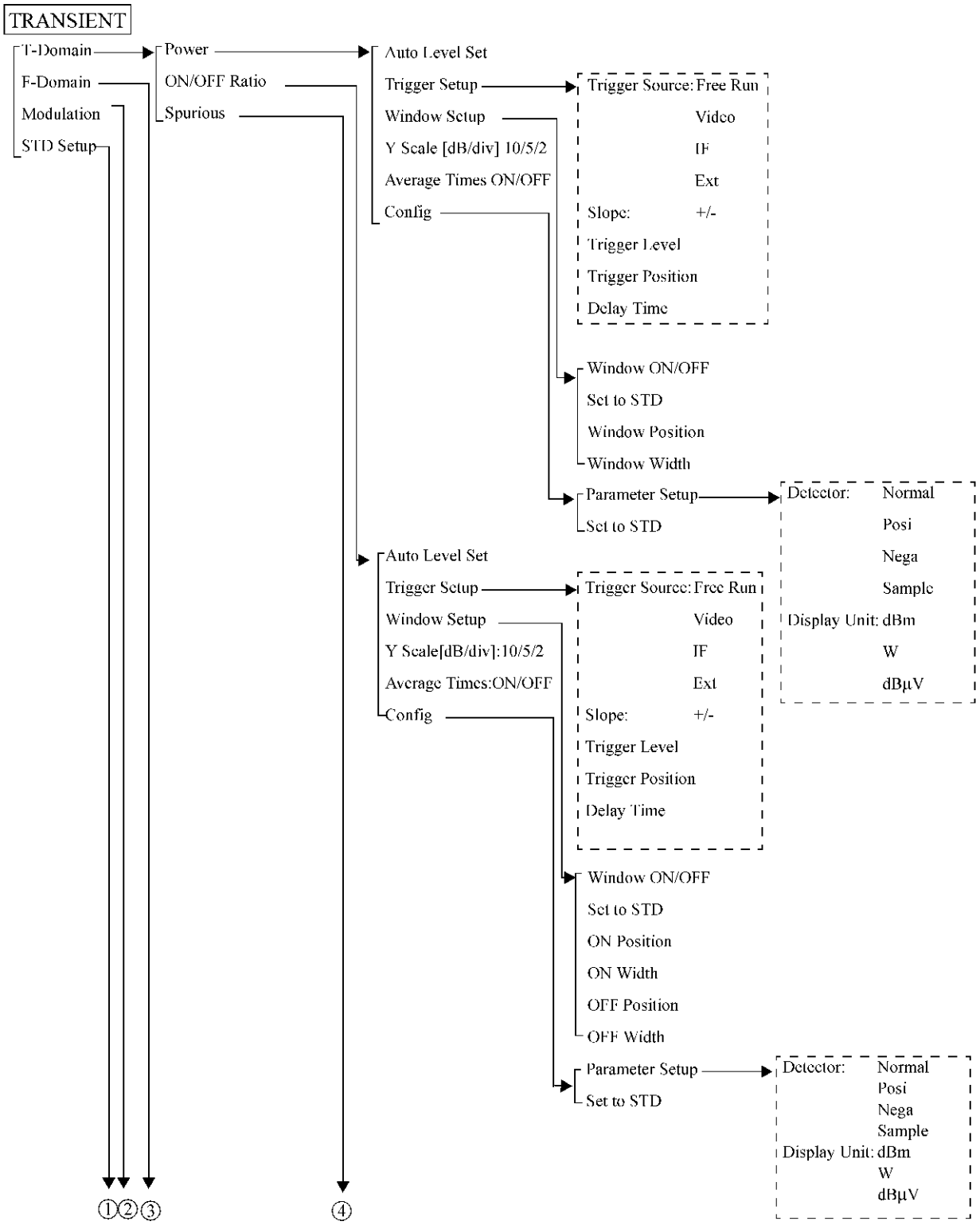
Function descriptions: Explains the functions of the panel and soft keys.

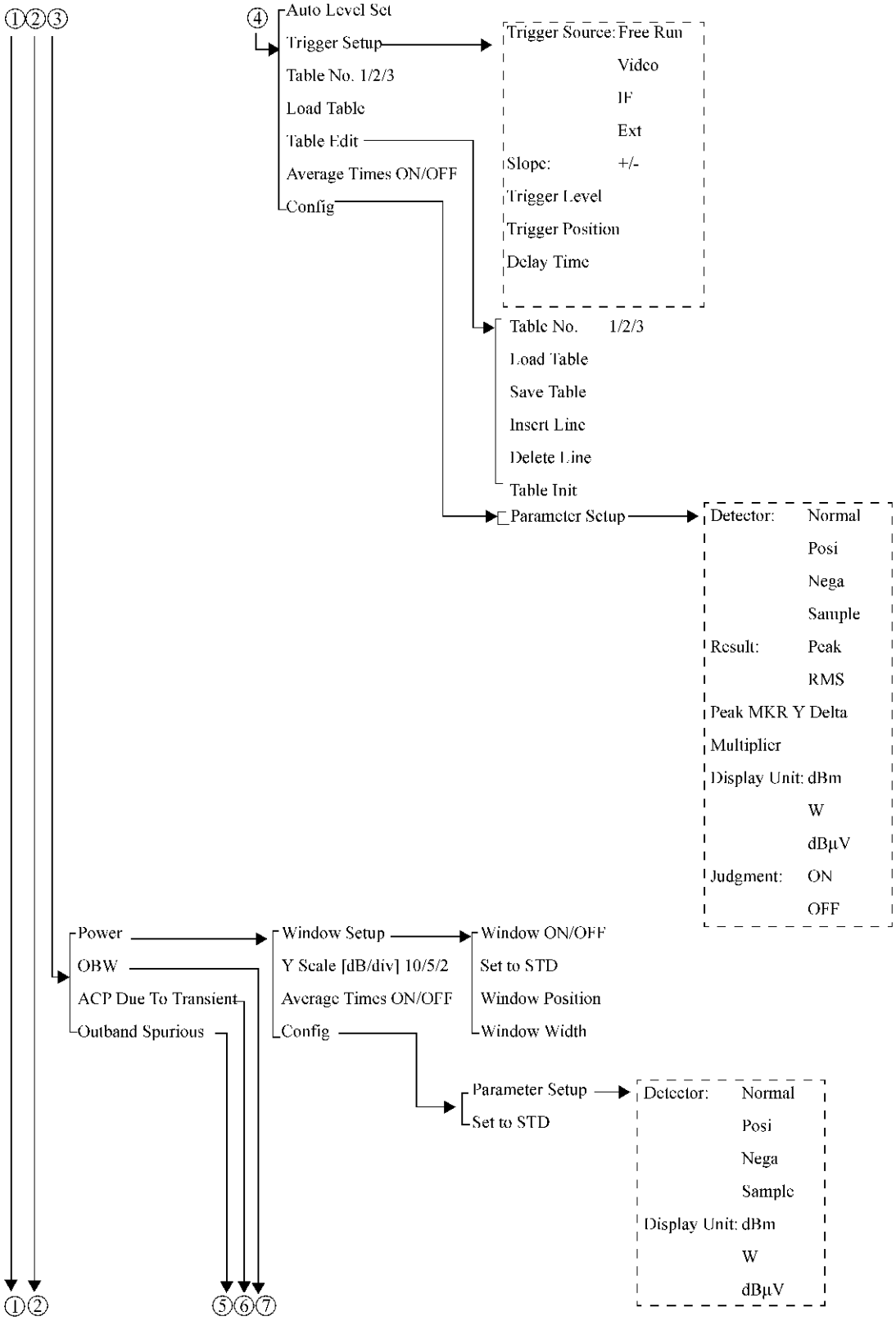
The keys are arranged in alphabetical order.

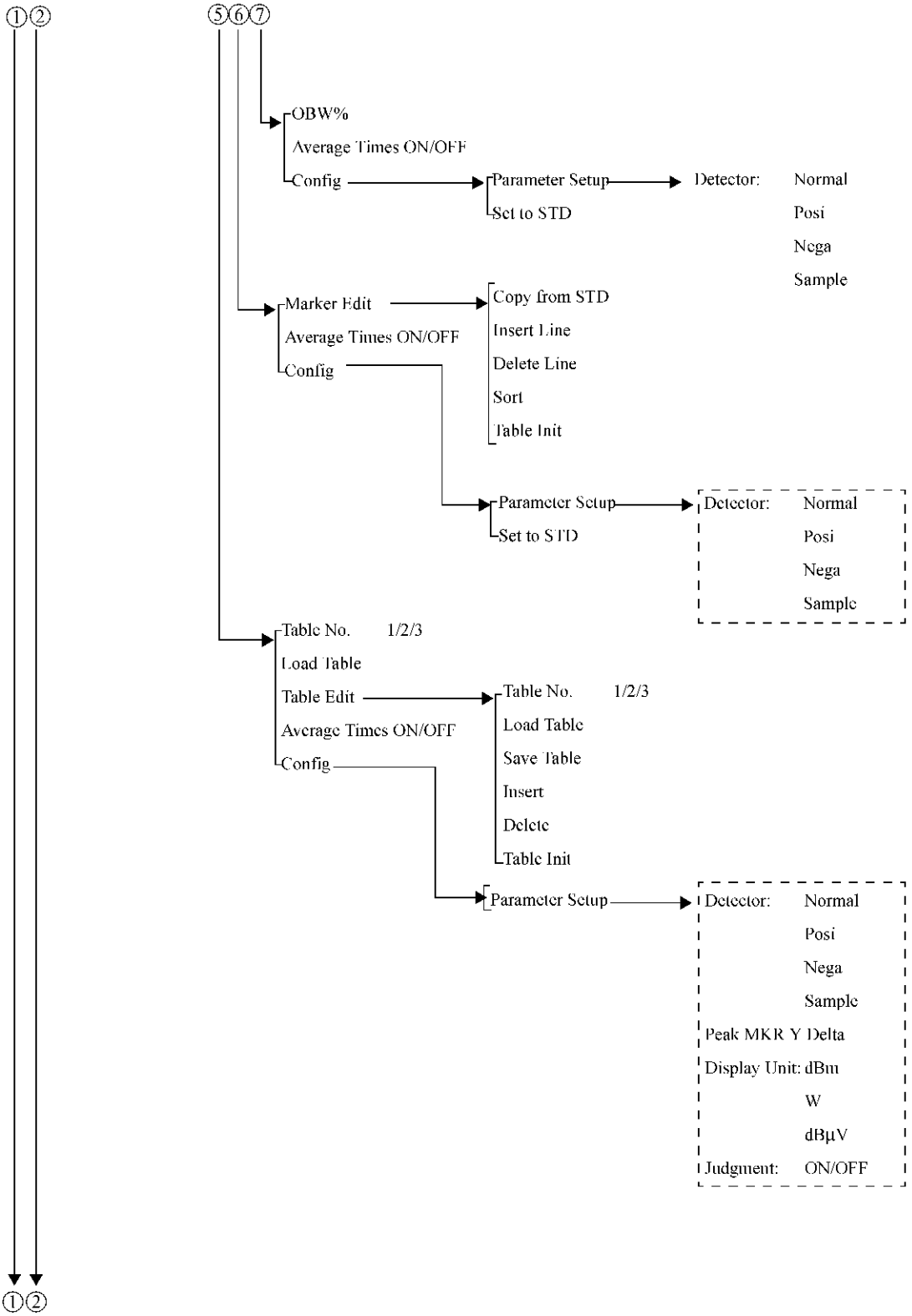
3.1 Menu Index

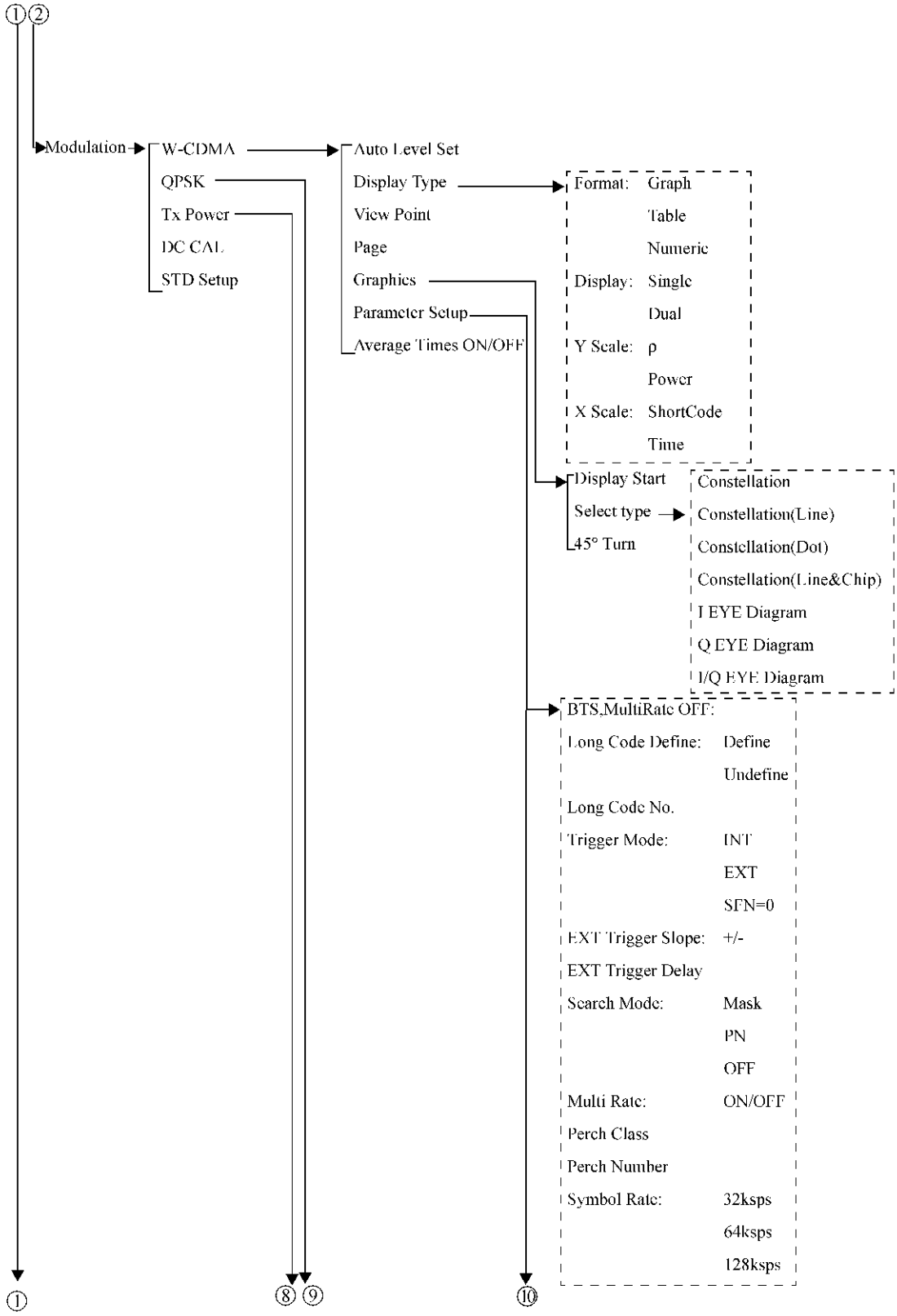
3.2 Menu Map

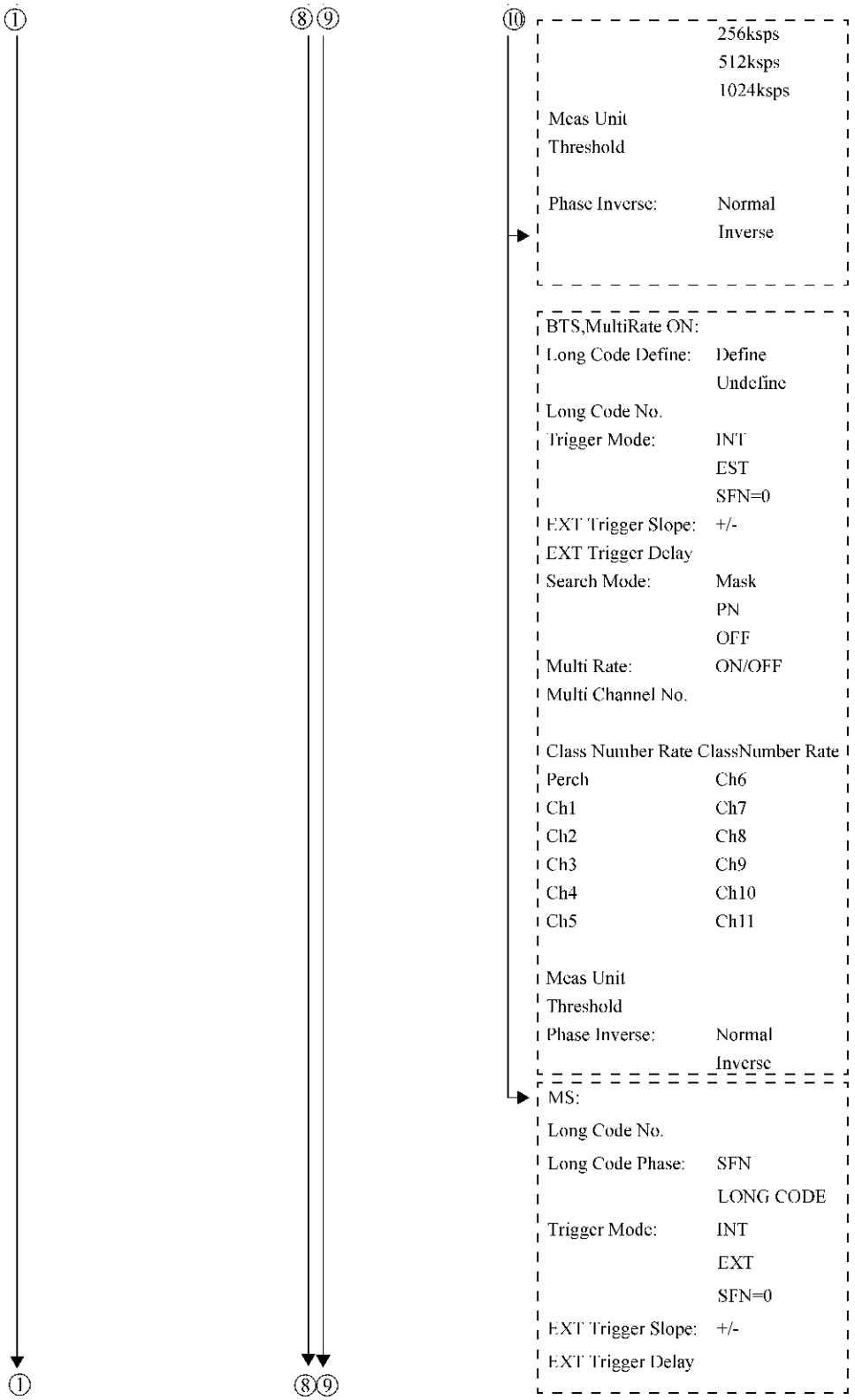
This section shows the hierarchical menu configuration on a panel key basis.

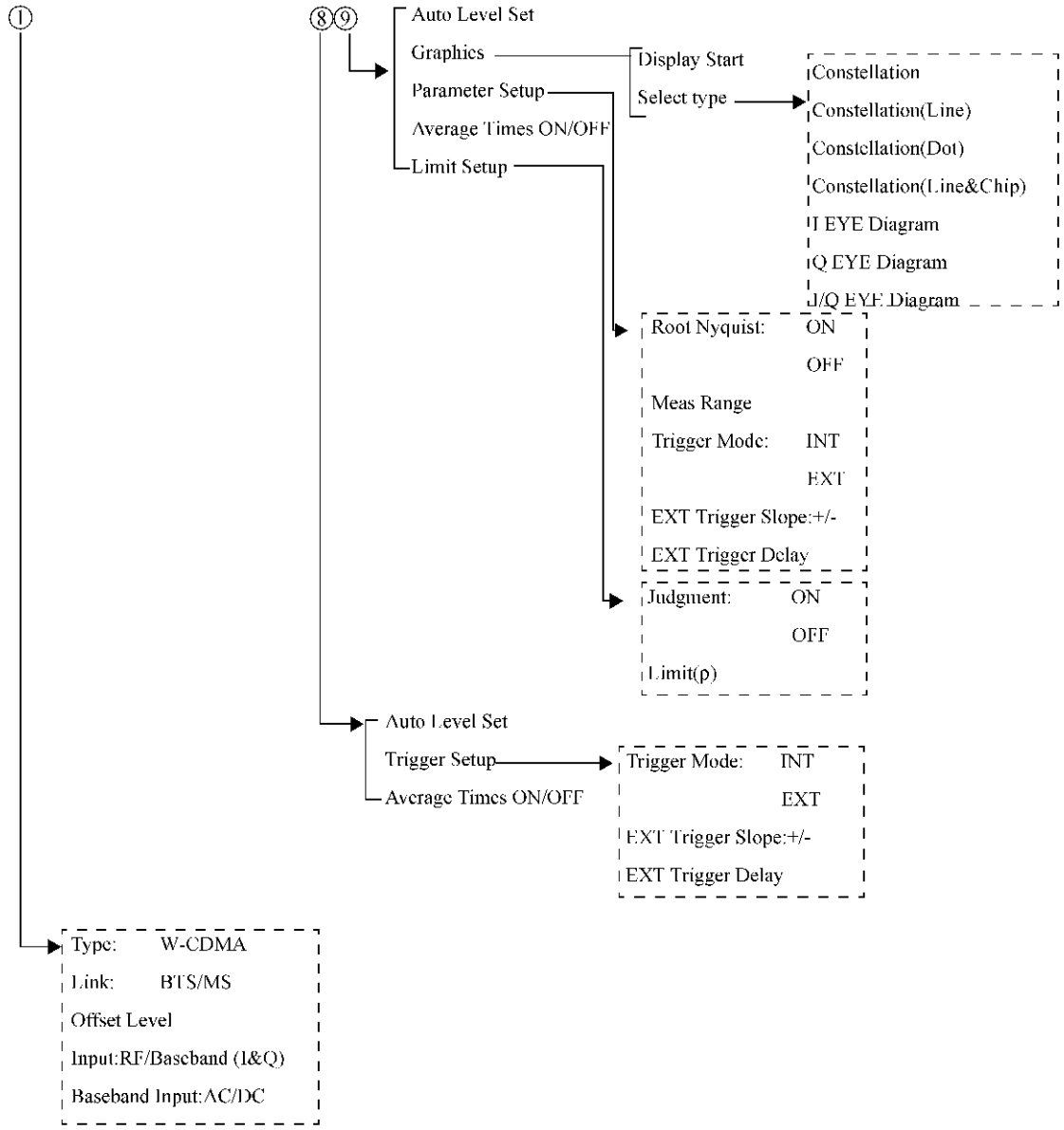



①②③
④
Auto Level Set
Trigger Setup
Table No. 1/2/3
Load Table
Table Edit
Average Times ON/OFF
Config
Trigger Source: Free Run
Video
IF
Ext
Slope: +/-
Trigger Level
Trigger Position
Delay Time
Table No. 1/2/3
Load Table
Save Table
Insert Line
Delete Line
Table Init
Parameter Setup
Detector: Normal
Posi
Nega
Sample
Result: Peak
RMS
Peak MKR Y Delta
Multiplier
Display Unit: dBm
W
dBµV
Judgment: ON
OFF
Power
OBW
ACP Due To Transient
Outband Spurious
Window Setup
Y Scale [dB/div] 10/5/2
Average Times ON/OFF
Config
Window ON/OFF
Set to STD
Window Position
Window Width
Parameter Setup
Set to STD
Detector: Normal
Posi
Nega
Sample
Display Unit: dBm
W
dBµV
①②
⑤⑥⑦


①②
⑤⑥⑦
OBW%
Average Times ON/OFF
Config
Parameter Setup
Detector: Normal
Posi
Nega
Sample
Set to STD
Marker Edit
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Average Times ON/OFF
Config
Parameter Setup
Detector: Normal
Posi
Nega
Sample
Set to STD
Table No. 1/2/3
Load Table
Table Edit
Table No. 1/2/3
Load Table
Save Table
Insert
Delete
Table Init
Average Times ON/OFF
Config
Parameter Setup
Detector: Normal
Posi
Nega
Sample
Peak MKR Y Delta
Display Unit: dBm
W
dBµV
Judgment: ON/OFF
①②


①②
Modulation
W-CDMA
QPSK
Tx Power
DC CAL
STD Setup
Auto Level Set
Display Type
View Point
Page
Graphics
Parameter Setup
Average Times ON/OFF
Format: Graph
Table
Numeric
Display: Single
Dual
Y Scale: ρ
Power
X Scale: ShortCode
Time
Display Start
Select type
45° Turn
Constellation
Constellation(Line)
Constellation(Dot)
Constellation(Line&Chip)
I EYE Diagram
Q EYE Diagram
I/Q EYE Diagram
BTS,MultiRate OFF:
Long Code Define: Define
Undefine
Long Code No.
Trigger Mode: INT
EXT
SFN=0
EXT Trigger Slope: +/-
EXT Trigger Delay
Search Mode: Mask
PN
OFF
Multi Rate: ON/OFF
Perch Class
Perch Number
Symbol Rate: 32ksps
64ksps
128ksps
①
⑧⑨
⑩


①
⑧⑨
⑩
256ksps
512ksps
1024ksps
Meas Unit
Threshold
Phase Inverse: Normal
Inverse
BTS,MultiRate ON:
Long Code Define: Define
Undefine
Long Code No.
Trigger Mode: INT
EST
SFN=0
EXT Trigger Slope: +/-
EXT Trigger Delay
Search Mode: Mask
PN
OFF
Multi Rate: ON/OFF
Multi Channel No.
Class Number Rate ClassNumber Rate
Perch Ch6
Ch1 Ch7
Ch2 Ch8
Ch3 Ch9
Ch4 Ch10
Ch5 Ch11
Meas Unit
Threshold
Phase Inverse: Normal
Inverse
MS:
Long Code No.
Long Code Phase: SFN
LONG CODE
Trigger Mode: INT
EXT
SFN=0
EXT Trigger Slope: +/-
EXT Trigger Delay
①
⑧⑨


①
⑧⑨
Auto Level Set
Graphics
Parameter Setup
Average Times ON/OFF
Limit Setup
Display Start
Select type
Constellation
Constellation(Line)
Constellation(Dot)
Constellation(Line&Chip)
I EYE Diagram
Q EYE Diagram
I/Q EYE Diagram
Root Nyquist: ON
OFF
Meas Range
Trigger Mode: INT
EXT
EXT Trigger Slope:+/-
EXT Trigger Delay
Judgment: ON
OFF
Limit(ρ)
Auto Level Set
Trigger Setup
Average Times ON/OFF
Trigger Mode: INT
EXT
EXT Trigger Slope:+/-
EXT Trigger Delay
Type: W-CDMA
Link: BTS/MS
Offset Level
Input:RF/Baseband (I&Q)
Baseband Input:AC/DC

3.3 Function Description

This section describes the panel key and the soft menus.

TRANSIENT

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

T-Domain Uses the zero-span of this instrument to make measurements corresponding to the standard. The measurement items are as follows: the power measurement in the time domain, ON/OFF ratio measurement of a burst signal, and spurious measurement with a frequency specified.

NOTE: The settings of RBW, VBW, Sweep Time, and Detector are saved when a measurement item is changed and they are read out when setting the measurement item.

Power Measures the power in the time domain.

Auto Level Set Automatically adjusts the reference level.

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

Trigger Setup Sets a trigger signal.

Trigger Source

Selects a trigger signal.

Free Run: Automatically repeats the sweep.

Video: Sweeps in synchronization with a video signal.

IF: Sweeps in synchronization with an IF signal.

EXT: Sweeps in synchronization with an external trigger signal, which is input from the Ext Trigger connector on the rear panel.

Slope Toggles the polarity between "+" and "-."

+: Starts sweeping at the leading edge of the trigger.

-: Starts sweeping at the trailing edge of the trigger.

Trigger Level

Sets the threshold level of the trigger.

Trigger Position

Sets the position of the trigger point.

Delay Time

Sets the delay time from the trigger point.

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

Window Setup Sets the range in the power measurement.

Window ON/OFF

Sets whether or not to display the window showing the range of the power measurement.

ON: Displays the window.

The range of the power measurement is for points in the window.

OFF: Does not display the window.

The range of the power measurement is for all points of the display screen.

Set to STD

Sets the window specified by the 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

Changes the vertical scale of the display screen.

10: Sets 10 dB/div.

5: Sets 5 dB/div.

2: Sets 2 dB/div.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup

Sets the measurement conditions.

Detector

Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.

Posi: Detects a signal at a positive peak.

Nega: Detects a signal at a negative peak.

Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Display Unit

Sets the display unit of power.

dBm: Sets the display unit to dBm.

W: Sets the display unit to W.

dB μ V: Sets the display unit to dB μ V.

Set to STD

Returns the parameter to the value specified by the standard

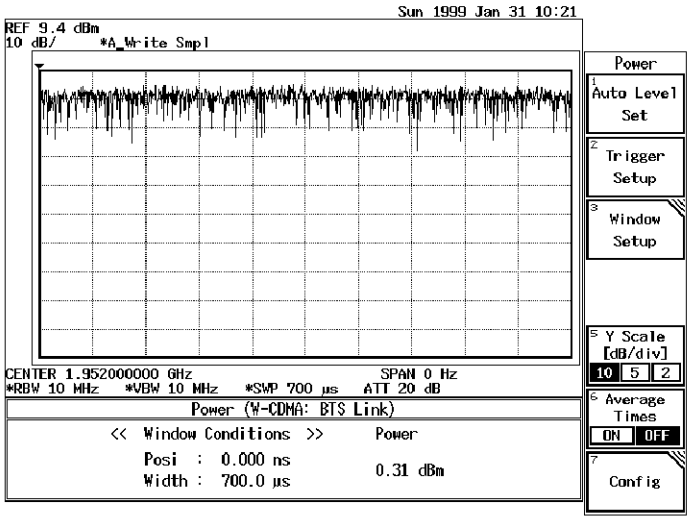


Figure 3-1 Example of T-Domain Power Measurement

ON/OFF Ratio Displays the power ratio of the on period to off period of a burst signal.
It is assumed that the burst off period is a period before the trigger point and the burst on period is a period after the trigger point.

Auto Level Set Automatically adjusts the reference level.

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

Trigger Setup Sets a trigger signal.

Trigger Source
Selects a trigger signal.

Free Run: Automatically repeats the sweep.

Video: Sweeps in synchronization with a video signal.

IF: Sweeps in synchronization with an IF signal.

EXT: Sweeps in synchronization with an external trigger signal, which is input from the Ext Trigger connector on the rear panel.

Slope Toggles the polarity between "+" and "-".

+: Starts sweeping at the leading edge of the trigger.

-: Starts sweeping at the trailing edge of the trigger.

Trigger Level

Sets the threshold level of the trigger.

Trigger Position

Sets the position of the trigger point.

Delay Time

Sets the delay time from the trigger point.

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

Window Setup Sets the range in the power measurement.

Window ON/OFF

Sets whether or not to display the window showing the range of the power measurement.

ON: Displays the window. The range of the power measurement is for points in the window.

OFF: Does not display the window. The range of the power measurement is for all points of the display screen.

Set to STD

Sets the window specified by the standard.

ON Position

Sets the burst on position with a relative value from the trigger position.

ON Width

Sets the width of burst on.

OFF Position

Sets the burst off position with a relative value from the trigger position.

OFF Width

Sets the width of burst off.

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

Changes the vertical scale of the display screen.

10: Sets 10 dB/div.

5: Sets 5 dB/div.

2: Sets 2 dB/div.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup

Sets the measurement conditions.

Detector

Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.

Posi: Detects a signal at a positive peak.

Nega: Detects a signal at a negative peak.

Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Display Unit

Sets the display unit of power.

dBm: Sets the display unit to dBm.

W: Sets the display unit to W.

dB μ V: Sets the display unit to dB μ V.

NOTE: The power ON/OFF ratio is displayed in units of dB.

Set to STD

Returns the parameter to the value specified by the standard.

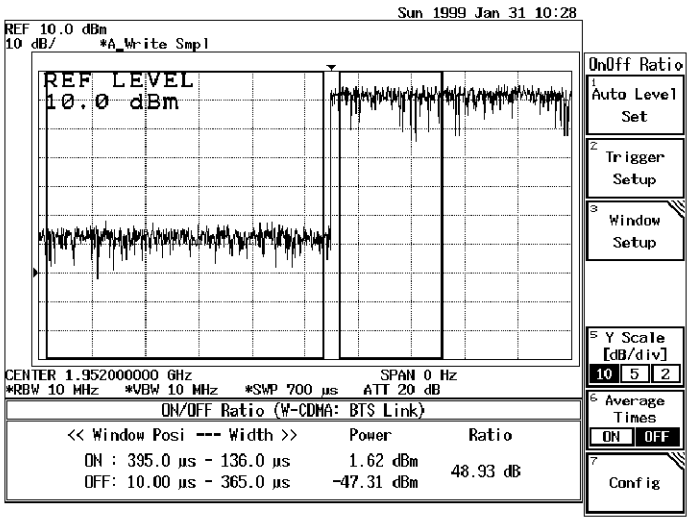


Figure 3-2 Example of T-Domain Power ON/OFF Ratio Measurement

Spurious Measures the power (or a peak level) by sweeping with a zero span according to the frequency specified by the table.

Auto Level Set Automatically adjusts the reference level.

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

Trigger Setup Sets a trigger signal.

Trigger Source

Selects a trigger signal.

Free Run: Automatically repeats the sweep.

EXT: Sweeps in synchronization with an external trigger signal, which is input from the Ext Trigger connector on the rear panel.

Slope Toggles the polarity between "+" and "-".

+: Starts sweeping at the leading edge of the trigger.

-: Starts sweeping at the trailing edge of the trigger.

Trigger Position

Sets the position of the trigger point.

Delay Time

Sets the delay time from the trigger point.

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

Table No. Selects the measurement table number.

1: Selects the measurement table 1.

2: Selects the measurement table 2.

3: Selects the measurement table 3.

Load Table Loads the measurement data into the specified measurement table.

Table Edit Edits the measurement table.

Table No.

Selects the measurement table to be edited.

1: Selects the measurement table 1.

2: Selects the measurement table 2.

3: Selects the measurement table 3.

Load Table

Loads the measurement data into the specified measurement table.

Save Table

Saves the measurement data of the specified measurement table.

Insert Line

Inserts additional frequency data before the selected frequency number.

Delete Line

Deletes the selected line.

Table Init

Deletes all of the table data.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup
Sets the measurement conditions.

Detector
Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.
Posi: Detects a signal at a positive peak.
Nega: Detects a signal at a negative peak.
Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Result
Switches the power measurement result between an average and a peak value.

Peak: Sets the display to a peak power.
RMS: Sets the display to a root mean square value.

Peak MKR Y Delta
Activates the setting of a level difference used for a peak search.

Multiplier
Activates the coefficient of the measurement result.
The measurement result multiplied by the set value is displayed.

Display Unit
Sets the display unit of power.

dBm: Sets the display unit to dBm.
W: Sets the display unit to W.
dB μ V: Sets the display unit to dB μ V.

NOTE: The power ON/OFF ratio is displayed in units of dB.

Judgment

Switches the judgment on the limit value between ON and OFF.

ON: Makes the judgment.

OFF: Does not make the judgement.

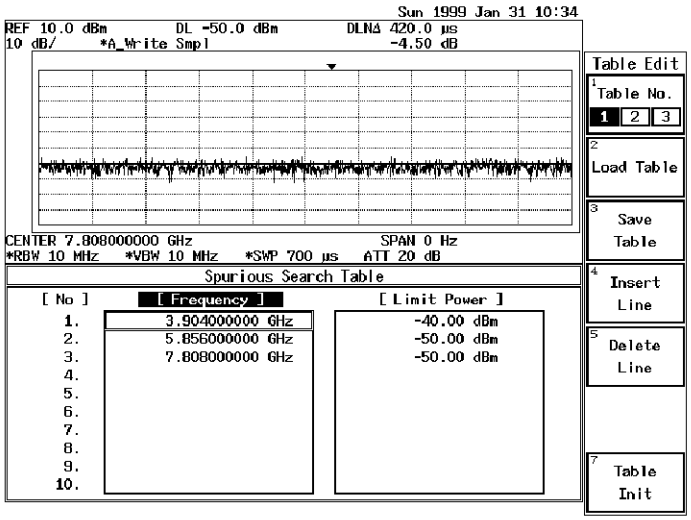


Figure 3-3 Example of Editing the T-Domain Spurious Table

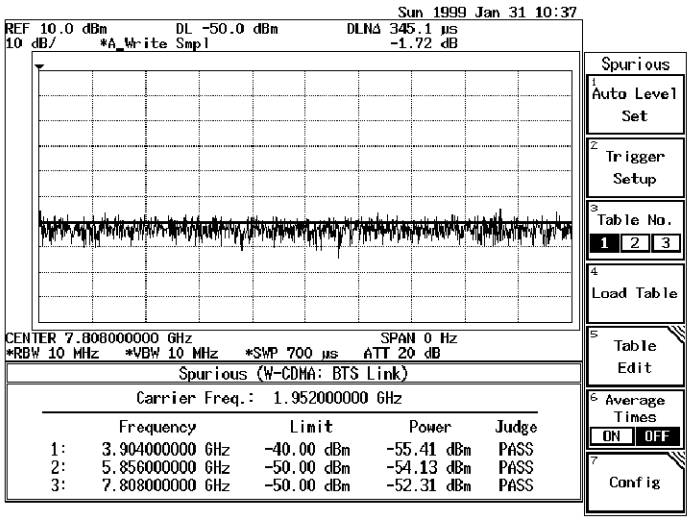


Figure 3-4 Example of T-Domain Spurious Measurement

F-Domain

Uses the sweep measurement of this instrument to make measurements corresponding to the standard.
The measurement items include: the power measurement in the frequency domain, an occupied bandwidth, ACP due To Transient, and Out Band Spurious.

Power

Measures the power in the frequency domain. This function can measure the power at more limited frequencies than the power measurement in the time domain.
When measuring the power, it is necessary to set the trace detector to the Sample mode in order to average the measurements many times.

Window Setup

Sets the range in the power measurement.

Window ON/OFF

Sets whether or not to display the window showing the range of the power measurement.

ON: Displays the window.

The range of the power measurement is for points in the window.

OFF: Does not display the window.

The range of the power measurement is for all points of the display screen.

Set to STD

Sets the window specified by the 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

Changes the vertical scale of the display screen.

10: Sets 10 dB/div.

5: Sets 5 dB/div.

2: Sets 2 dB/div.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method, or edits the template, etc.

Parameter Setup

Sets the measurement conditions.

Detector

Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.

Posi: Detects a signal at a positive peak.

Nega: Detects a signal at a negative peak.

Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Display Unit

Sets the display unit of power.

dBm: Sets the display unit to dBm.

W: Sets the display unit to W.

dB μ V: Sets the display unit to dB μ V.

NOTE: The power ON/OFF ratio is displayed in units of dB.

Set to STD

Returns the parameter to the value specified by the standard.

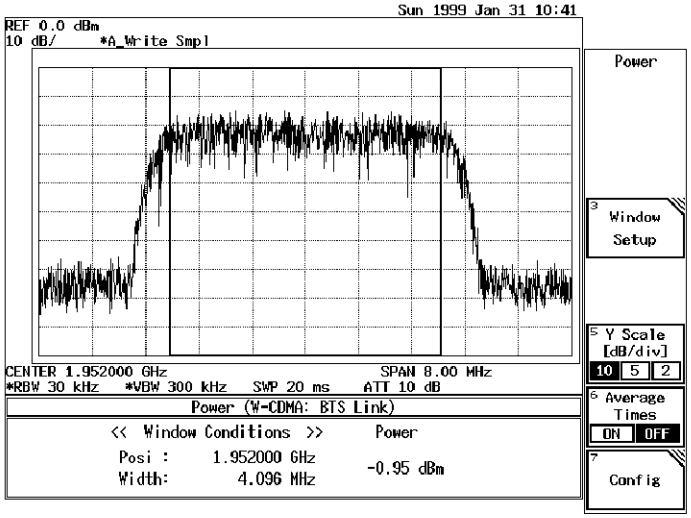


Figure 3-5 Example of F-Domain Power Measurement

OBW Measures an occupied bandwidth.

OBW% Sets the ratio of the occupied band power to the entire power on a percentage basis.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup

Sets the measurement conditions.

Detector

Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.

Posi: Detects a signal at a positive peak.

Nega: Detects a signal at a negative peak.

Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Set to STD

Returns the parameter to the value specified by the standard.

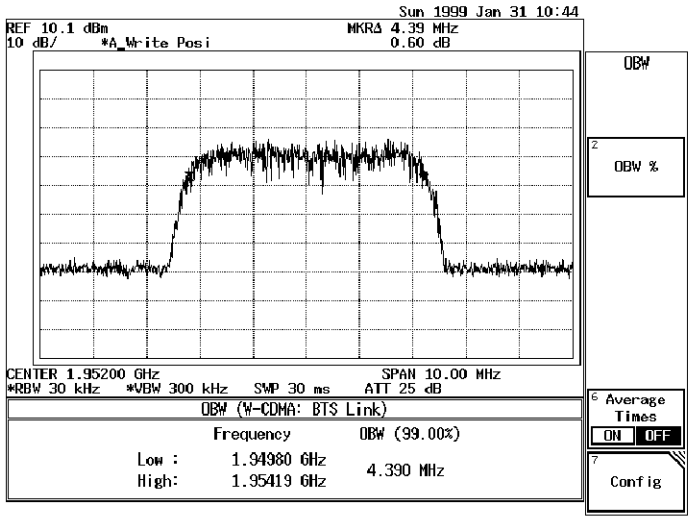


Figure 3-6 Example of Occupied Bandwidth Measurement

ACP Due To Transient Measures a spectrum including the leading and trailing edges of a burst signal.

Marker Edit Marker Edit dialog box is displayed.

Copy from STD
Sets to the value specified by the communication standard.

Insert Line
Inserts a line before the selected line.

Delete Line
Deletes the selected line.

Sort
Sorts data in frequency order.

Table Init
Initializes a table to zeros.

Average Times ON/OFF
Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup
Sets the measurement conditions.

Detector
Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.
Posi: Detects a signal at a positive peak.
Nega: Detects a signal at a negative peak.
Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Set to STD
Returns the parameter to the value specified by the standard.

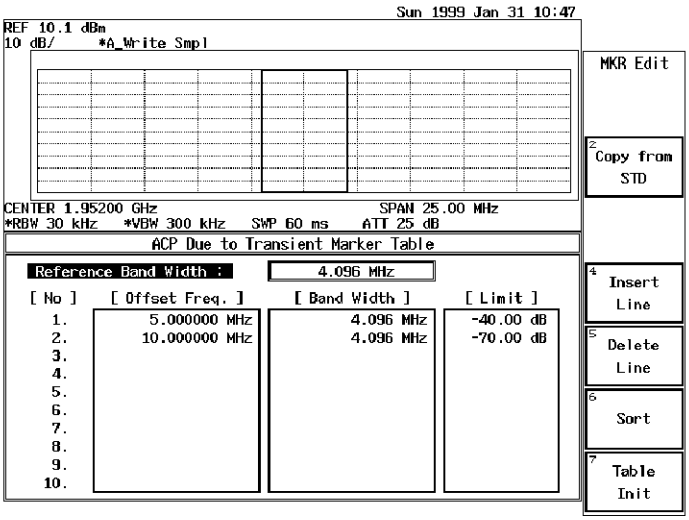


Figure 3-7 Example of Marker Edit Input

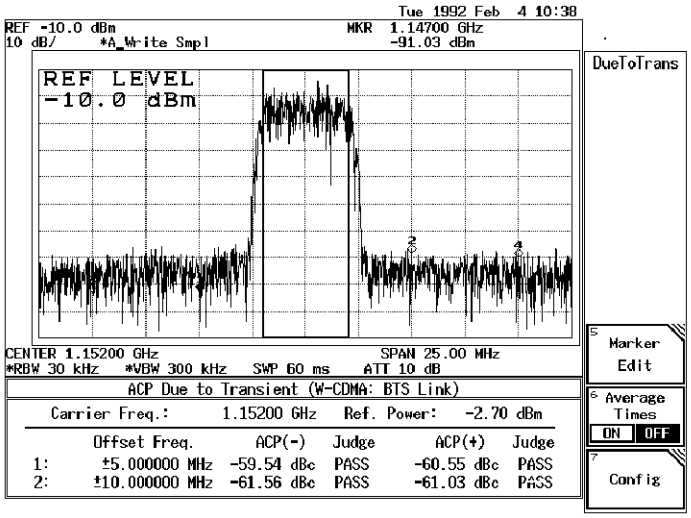


Figure 3-8 Example of ACP Due To Transient Measurement

Outband Spurious Searches for a peak value by sweeping the frequency according to the table.

Table No. Selects the measurement table number.

1: Selects the measurement table 1.

2: Selects the measurement table 2.

3: Selects the measurement table 3.

Load Table Loads the measurement data into the specified measurement table.

Table Edit Edits the measurement table.

Table No.

Selects the measurement table to be edited.

1: Selects the measurement table 1.

2: Selects the measurement table 2.

3: Selects the measurement table 3.

Load Table

Loads the measurement data into the specified measurement table.

Save Table

Saves the measurement data of the specified measurement table.

Insert Inserts additional frequency data before the selected frequency number.

Delete Deletes the selected line.

Table Init
Deletes all of the table data.

Average Times ON/OFF
Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Config Sets the measurement method.

Parameter Setup
Sets the measurement conditions.

Detector
Sets the trace detector.

Normal: Detects a signal at a positive or a negative peak.

Posi: Detects a signal at a positive peak.

Nega: Detects a signal at a negative peak.

Sample: Detects a signal with the Sample mode.

NOTE: When the sweep time becomes equal to or less than 20 ms, the trace detector is automatically set to the Sample mode.

Peak MKR Y Delta
Sets Delta-Y when searching for a peak.

Display Unit

Sets the display unit of power.

dBm: Sets the display unit to dBm.

W: Sets the display unit to W.

dB μ V: Sets the display unit to dB μ V.

NOTE: The ratio of the power on to power off is displayed in units of dB (fixed).

Judgment

Toggles the judgment ON and OFF.

ON: Makes judgment.

OFF: Does not make judgement.

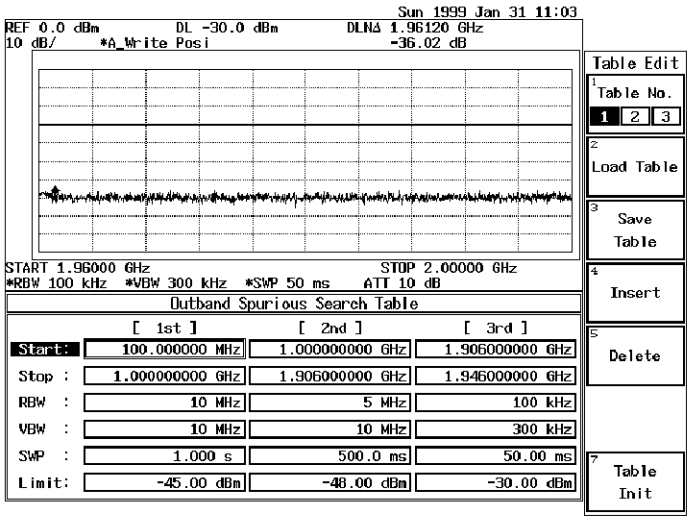


Figure 3-9 Example of Setting the Outband Spurious Table

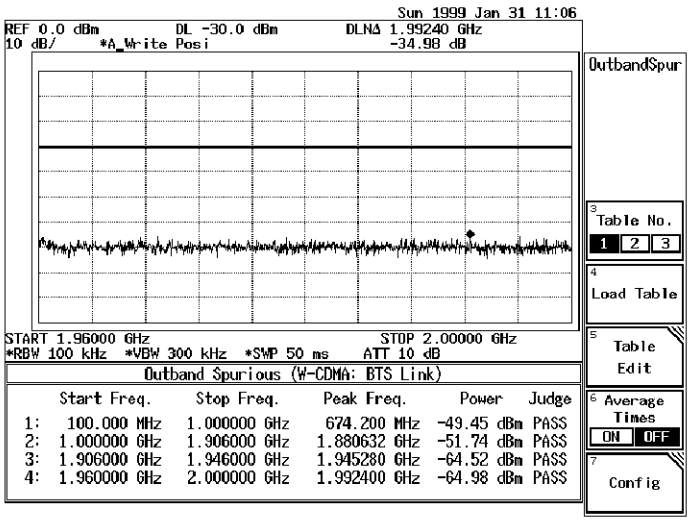


Figure 3-10 Outband Spurious Measurement

Modulation Performs the modulation analysis using a DSP.

W-CDMA Perform measurements by inversely spreading the measurement signal as a W-CDMA signal.
Can measure the code domain power coefficient.

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.

Display Type Switches the result display.

Format Format dialog box is displayed.

Graph: Displays a graph for the code domain power coefficient and the power.

Table: Displays a list of the code domain power coefficients.

Numeric: Displays the measurement result.

Display Toggles the display mode between Single and Dual.

Single: Displays data on a one-screen.

Dual: Displays data on a dual-screen; displays the graph on the upper screen and the measurement result on the lower screen.

Y Scale Sets the Y scale unit.

ρ: Displays the vertical axis of the graph in the code domain power coefficients.
When displaying the code domain power coefficient in the Multi Rate OFF mode, the sum of the code domain power coefficients for each channel is 1.

Power: Displays the vertical axis of the graph in units of power.
When displaying the power, the power per slot of the signal to be measured is 0 dB.

X Scale Sets the X scale unit.

Short Code: Displays the horizontal axis of the graph in channel numbers (Short codes).
A ρ for each channel with an arbitrary time width or a graph for the power is displayed. Set the time width to be displayed using View Point.

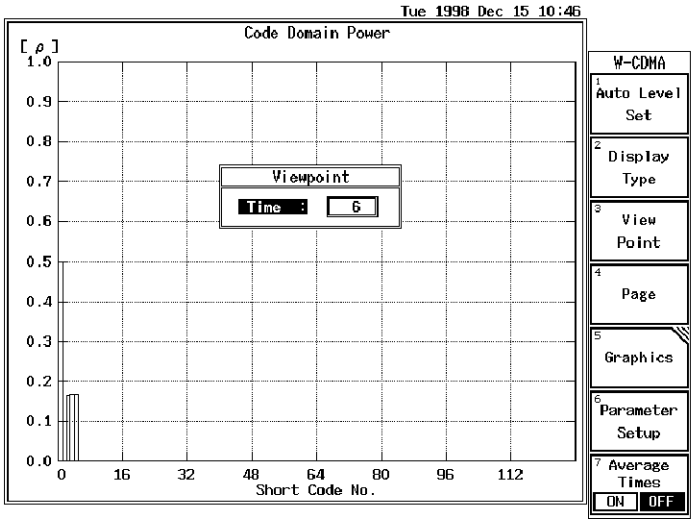


Figure 3-11 Selecting the Channel Number

Time: Displays the horizontal axis of the graph in units of time. Displays a ρ in a specific Short Code or a graph for a variation over time of the power. Set the Short Code to be displayed using View Point. One division of time is the number of symbols specified by Meas Unit of Parameter Setup and the maximum measurement length is 2560 chips.

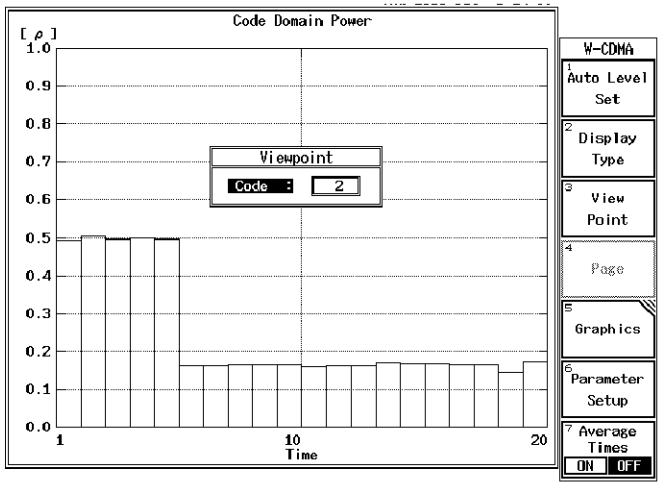


Figure 3-12 Selecting the Time

View Point Selects the X scale for a graphical display.

Page Switches the screen if the data cannot be displayed on a one-screen when Table is selected in Display Type.

Graphics Displays a constellation or an eye diagram.

Display Start

Sets the display starting position. Setting values, 0 through 2432 chips, are available.

Select type

Graphic Type of Analysis dialog box is displayed.

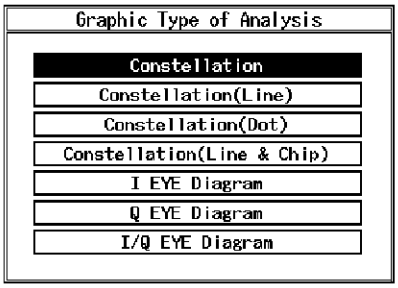


Figure 3-13 Graphic Type of Analysis Dialog Box

Constellation:

Displays a graph for a constellation.

Constellation(Line):

Displays the transition between symbol points connected with lines.

Constellation(Dot):
Displays the transition between symbol points with dots.

Constellation(Line&Chip):
Displays the transition between symbol points connected with lines and with dots.

I EYE Diagram:
Displays the eye pattern for I channel.

Q EYE Diagram:
Displays the eye pattern for Q channel.

I/Q EYE Diagram:
Displays the eye patterns for I and Q simultaneously.

45° Turn

Displays the I and Q patterns turned by 45°.

Parameter Setup Sets the measurement parameter.
The displayed Parameter Setup dialog box is different on the Multi Rate ON, Multi Rate OFF or MS.

When Multi Rate is OFF

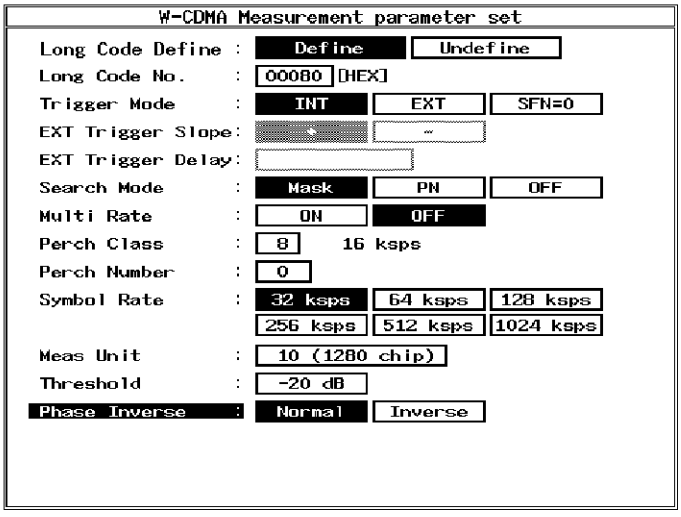


Figure 3-14 W-CDMA Measurement parameter set dialog box (Multi Rate OFF)

Long Code Define

Selects whether to perform measurements with a long code previously set or to search for a long code number from the second perch channel.

Define: Perform measurements with a long code previously set.

Undefine: Searches for a long code number from the second perch channel to perform measurements. This function is used when the long code number cannot be determined.

Long Code No.

Sets the long code number when performing measurements with a long code previously set. Numbers 0 through 3FFF (HEX) can be set.

How to input hexadecimal codes:

hexadecimal code	Key Operation
A	SHIFT, 0
B	SHIFT, 1
C	SHIFT, 2
D	SHIFT, 3
E	SHIFT, 4
F	SHIFT, 5

Trigger Mode

Selects the timing at which data is stored.

INT: Stores data at the timing of the internal trigger.

EXT: Stores data at the timing of the external trigger.

SFN=0: Stores data with the BS reference reset signal.

EXT Trigger Slope

Selects the slope of timing at which data is stored.

+: Stores data at the leading edge.

-: Stores data at the trailing edge.

EXT Trigger Delay

Sets a delay to the timing of the external trigger.
Delay times -5120.0 through 5120.0 (chips) can be set.

Search Mode

Selects the mode of acquiring synchronization.

Mask: Searches for a long code mask to acquire synchronization.

PN: Searches for one period of long codes to acquire synchronization.

OFF: Search for the first long code within the range of 64 chips before and after the trigger to acquire synchronization.

Multi Rate

Sets the channel numbers multiplexed on the signal to be measured and their classes (symbol rates).

ON: Sets all of the combinations of the channel numbers multiplexed on the signal to be measured and their classes.

OFF: Used when the signal to be measured is multiplexed by the channels of only one type of class except the perch channel.
Selects the channel number and class of the first perch channel and one class of other channels that are multiplexed on the signal to be measured.

Perch Class

Sets the class (rate) of the first perch channel. A value of 2 to 8 can be set.

Perch Number

Sets the short code number of the first perch channel.

Symbol Rate

Selects the rates of the channels except the perch channel multiplexed on the signal to be measured.

32 ksps: Performs measurement by assuming the channels excluding the perch channel as 32 ksps.

64 ksps: Performs measurement by assuming the channels excluding the perch channel as 64 ksps.

128 ksps: Performs measurement by assuming the channels excluding the perch channel as 128 ksps.

256 ksps: Performs measurement by assuming the channels excluding the perch channel as 256 ksps.

512 ksps: Performs measurement by assuming the channels excluding the perch channel as 512 ksps.

1024 ksps: Performs measurement by assuming the channels excluding the perch channel as 1024 ksps.

Meas Unit

Sets the range (number of symbols) in which the code domain power coefficient and the power will be measured. The signal to be measured is divided into lengths of the set number of symbols. The code domain power coefficient and the power are measured for each time range. A value of between 1 and (2560/S) can be set. However, S is a short record length (number of chips) selected as Symbol Rate.

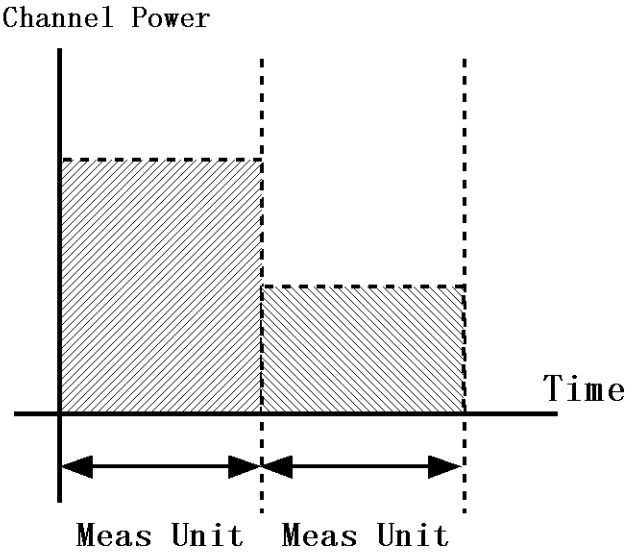


Figure 3-15 Explanation Diagram of MEAS Unit

Threshold

Sets a threshold value to judge whether or not the channel is active. A reference value is the mean power of the perch channel. The judgement of the active channel is made for each symbol. As a result, the symbol having the mean power equal to or greater than (the mean power of the perch channel) + (CDP threshold) is judged as active.
The setting range of a threshold value is between -10 dB and -40 dB.

NOTE: When a large threshold value is set, an active channel is judged as passive. As a result, Éœ and modulation accuracy become worse than actual values, causing incorrect measurements. On the other hand when a small threshold value is set, a passive channel is judged as active. As a result, Éœ and modulation accuracy become better than actual values, causing incorrect measurements.

Phase Inverse

Selects whether or not to invert the phase of IQ signals.

Normal: Does not invert the sign of Q signal.

Inverse: Inverts the sign of Q signal.

When Multi Rate Is ON:

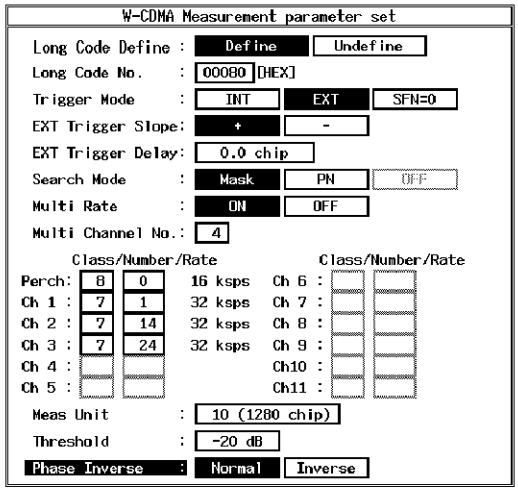


Figure 3-16 W-CDMA Measurement parameter set dialog box (Multi Rate ON)

Long Code Define

Selects whether to perform measurements with a long code previously set or to search for a long code number from the second perch channel.

Define: Perform measurements with a long code previously set.

Undefine: Searches for a long code number from the second perch channel to perform measurements. This function is used when the long code number cannot be determined.

Long Code No.

Sets the long code number when performing measurements with a long code previously set. Numbers 0 through 3FFF (HEX) can be set.

How to input hexadecimal codes:

hexadecimal code	Key Operation
A	SHIFT, 0
B	SHIFT, 1
C	SHIFT, 2
D	SHIFT, 3
E	SHIFT, 4
F	SHIFT, 5

Trigger Mode

Selects the timing at which data is stored.

INT: Stores data at the timing of the internal trigger.

EXT: Stores data at the timing of the external trigger.

SFN=0: Stores data with the BS reference reset signal.

EXT Trigger Slope

Selects the slope of timing at which data is stored.

+: Stores data at the leading edge.

-: Stores data at the trailing edge.

EXT Trigger Delay

Sets a delay to the timing of the external trigger.
Delay times -5120.0 through 5120.0 (chips) can be set.

Search Mode

Selects the mode of acquiring synchronization.

Mask: Searches for a long code mask to acquire synchronization.

PN: Searches for one period of long codes to acquire synchronization.

OFF: Search for the first long code within the range of 64 chips before and after the trigger to acquire synchronization.

Multi Rate

Sets the channel numbers multiplexed on the signal to be measured and their classes (symbol rates).

ON: Sets all of the combinations of the channel numbers multiplexed on the signal to be measured and their classes.

OFF: Used when the signal to be measured is multiplexed by the channels of only one type of class except the perch channel.
Selects the channel number and class of the first perch channel that are multiplexed on the signal to be measured, and one class of other channels.

Multi Channel No.

Sets the number of channels multiplexed on the signal to be measured.
The number of channels 1 through 12 can be set.

Class/Number/Rate

Sets the combinations of channel numbers and classes (rates) for the channels set as Multi Channel No.

Perch: Sets the class and code number of the first perch channel.

Ch N: Sets the class and code number of the channel N.
N is 1 to (the number of channels set as Multi Channel No. - 1).

NOTE: If the code number that does not meet orthogonality between different channels is set, a measurement error will result.

Meas Unit

Sets the range (number of symbols) in which the code domain power coefficient and the power will be measured. The signal to be measured is divided into lengths of the set number of symbols. The code domain power coefficient and the power are measured for each time range. A value of between 1 and (2560/S) can be set. However, S is a short record length (number of chips) selected as Symbol Rate.

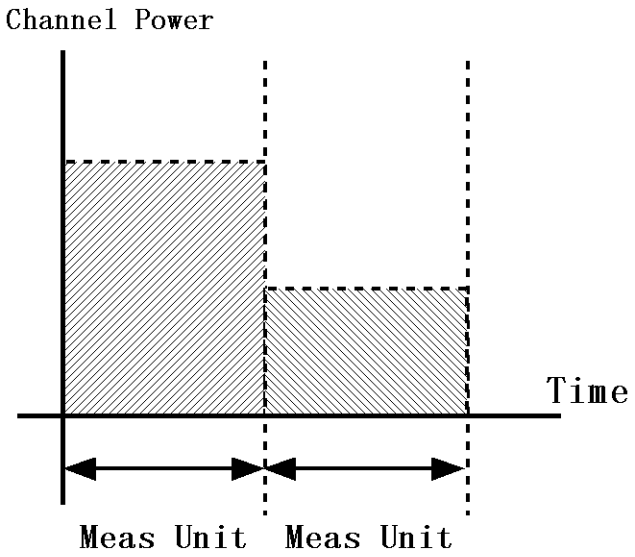


Figure 3-17 Explanation Diagram of MEAS Unit

Threshold

Sets a threshold value to judge whether or not the channel is active. A reference value is the mean power of the perch channel. The judgement of the active channel is made for each symbol. As a result, the symbol having the mean power equal to or greater than (the mean power of the perch channel) + (CDP threshold) is judged as active.

The setting range of a threshold value is between -10 dB and -40 dB.

NOTE: When a large threshold value is set, an active channel is judged as passive. As a result, Éœ and modulation accuracy become worse than actual values, causing incorrect measurements. On the other hand when a small threshold value is set, a passive channel is judged as active. As a result, Éœ and modulation accuracy become better than actual values, causing incorrect measurements.

Phase Inverse

Selects whether or not to invert the phase of IQ signals.

Normal: Does not invert the sign of Q signal.

Inverse: Inverts the sign of Q signal.

In the case of MS

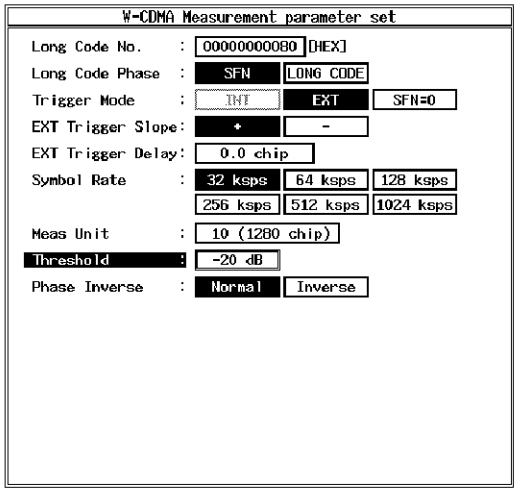


Figure 3-18 W-CDMA Measurement parameter set dialog box

Long Code No.

Sets the long code number. Numbers 0 through 1FFFFFFFFF (HEX) can be set.

How to input hexadecimal codes:

hexadecimal code	Key Operation
A	SHIFT, 0
B	SHIFT, 1
C	SHIFT, 2
D	SHIFT, 3
E	SHIFT, 4
F	SHIFT, 5

Long Code Phase

Togles the long code data between SFn and LONG CODE. The long code data is inputed by the Gate In connector on the rear panel.

SFN: Gets the frame number on the position of the trigger, which is decided by the trigger setting.

LONG CODE:
Gets the long code.

Trigger Mode

Selects the timing at which data is stored.

INT: Stores data at the timing of the internal trigger.

EXT: Stores data at the timing of the external trigger.

SFN=0: Stores data with the BTS reference reset signal.

EXT Trigger Slope

Selects the slope of timing at which data is stored.

+: Stores data at the leading edge.

-: Stores data at the trailing edge.

EXT Trigger Delay

Sets a delay to the timing of the external trigger.
Delay times -5120.0 through 5120.0 (chips) can be set.

Symbol Rate

Selects the rates of the signal to be measured.

32 ksps: Set to 32 ksps.

64 ksps: Set to 64 ksps.

128 ksps: Set to 128 ksps.

256 ksps: Set to 256 ksps.

512 ksps: Set to 512 ksps.

1024 ksps: Set to 1024 ksps.

Meas Unit

Sets the range (number of symbols) in which the code domain power coefficient and the power will be measured. The signal to be measured is divided into lengths of the set number of symbols. The code domain power coefficient and the power are measured for each time range. A value of between 1 and (2560/S) can be set. However, S is a short record length (number of chips) selected as Symbol Rate.

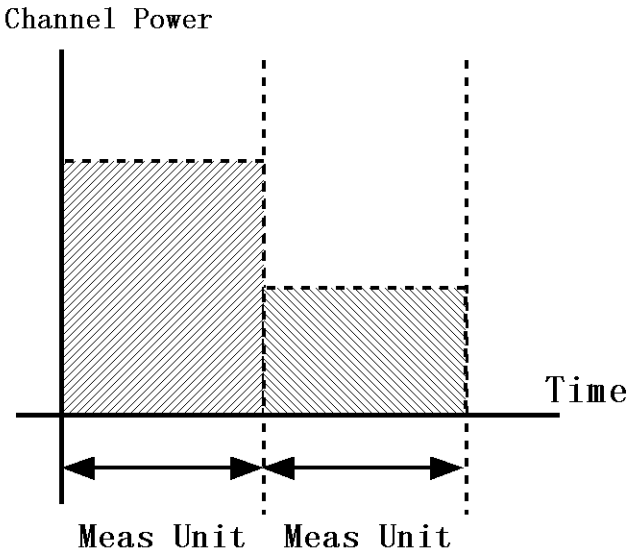


Figure 3-19 Explanation Diagram of MEAS Unit

Threshold

Sets a threshold value to judge if the channel is active. A reference value is the mean power of the channel having the maximum power. The active channel judgment is made for each symbol. As a result, the symbol with the mean power equal to or greater than {(the mean power of the maximum power channel) + (CDP threshold)} is judged as active.

The setting range of a threshold value is between -10 dB and -40 dB.

NOTE: When a large threshold value is set, an active channel is judged as passive. As a result, Éœ and modulation accuracy become worse than actual values, causing incorrect measurements. On the other hand when a small threshold value is set, a passive channel is judged as active. As a result, Éœ and modulation accuracy become better than actual values, causing incorrect measurements.

Phase Inverse

Selects whether or not to invert the phase of IQ signals.

Normal: Does not invert the sign of Q signal.

Inverse: Inverts the sign of Q signal.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the Code Domain Power Graph display.

QPSK

Assumes the measurement signal as a QPSK signal to perform measurement.

NOTE: This is compatible with 4.096 Mcps.

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.

Display Start

Sets the display starting position.

Select Type

Graphic Type of Analysis dialog box is displayed.

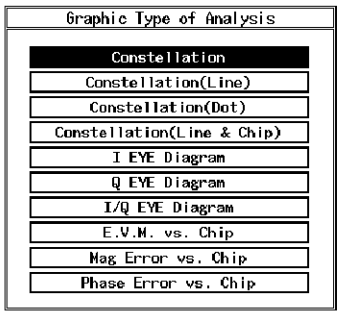


Figure 3-20 Graphic Type of Analisys dialog box

Constellation:
Displays a graph for a constellation.

Constellation(Line):
Displays the transition between symbol points connected with lines.

Constellation(Dot):
Displays the transition between symbol points with dots.

Constellation(Line&Chip):
Displays the transition between symbol points connected with lines and with dots.

I EYE Diagram:
Displays the eye pattern for I channel.

Q EYE Diagram:
Displays the eye pattern for Q channel.

I/Q EYE Diagram:
Displays the eye patterns for I and Q simultaneously.

E.V.M vs. Chip:
Displays a graph of the magnitude of error vectors for each symbol.

Mag Error vs. Chip:
Displays a graph of magnitude errors for each symbol.

Phase Error vs. Chip:
Displays a graph of phase errors for each symbol.

Parameter Setup Sets the measurement parameter.

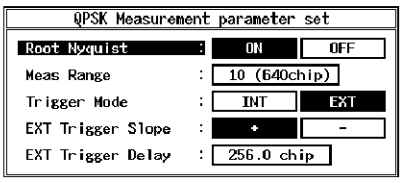


Figure 3-21 QPSK Measurement parameter set dialog box

Root Nyquist

Switches the Root Nyquist filter between ON and OFF.

ON: Enables the Root Nyquist filter.

OFF: Does not use the Root Nyquist filter.

Meas Range

Sets the measurement length for modulation accuracy and so on. The range is 4 through 20. One measurement length is 64 chips.

Trigger Mode

Selects the timing at which the data is stored.

INT: Stores data at the timing of the internal trigger.

EXT: Stores data at the leading edge of the external trigger. At this moment, a trigger delay can be set.

EXT Trigger Slope

Selects the slope of timing at which data is stored.

+: Stores data at the leading edge.

-: Stores data at the trailing edge.

EXT Trigger Delay

Sets a delay to the timing of the external trigger.
Delay times -5120.0 through 5120.0 (chips) can be set.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Limit Setup

Seta the limit values.

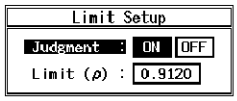


Figure 3-22 Limit Setup dialog box

Judgment

Toggles the judgment ON and OFF.

ON: Makes judgment.

OFF: Does not make judgment.

Limit(ρ)

Enter a numeric value used for judgement.

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.

Trigger Setup Sets a trigger signal.

Trigger Source

Selects a trigger signal.

INT: Sweeps in synchronization with an internal trigger signal.

EXT: Sweeps in synchronization with an external trigger signal, which is input from the Ext Trigger connector on the rear panel.

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.

Ext Trigger Delay

Sets the delay time from the trigger point.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

Average Times ON/OFF

Selects an averaging process.

ON: Activates the number of times of averaging and performs averaging the specified number of times.

OFF: Does not perform an averaging process.

NOTE: Although the averaging of the power is performed, the average is not shown on the trace display.

DC CAL Calibrates direct current components in the circuit.

STD Setup Makes setting for the communication standard.

STD Setup Display the STD Measurement parameter set dialog box.

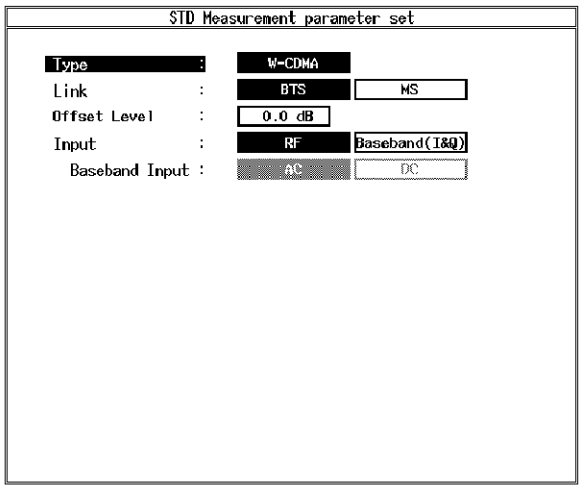


Figure 3-23 I/Q Input Signals Setting Screen

Type W-CMDA Set the measurement mode to W-CDMA.

Link BTS/MS Selects the signal to be measured.

BTS: Measures the base station signal.

MS: Measures the mobile unit signal.

Offset Level Sets the offset level for the reference level.
The setting range is 0 through ±100.0 dB.

Input RF/Baseband(I&Q)

Selects the input signal to be measured.

NOTE: In a high-power signal measurement, this function allows you to read the signal directly when a fixed attenuator is connected to the input signal.

RF: Measures the RF signal at the INPUT connector on the front panel.

Baseband(I&Q): Measures the Base band signal at the I/Q connector on the rear panel.
Can measure signals with a bandwidth of 2.5 MHz or less at the I or Q input terminal.

Baseband Input

Selects the coupling of signals.
Effective for Base band (I & Q) only

AC: Sets an alternate current coupling. (A cutoff frequency is approx. 15 Hz)

DC: Sets a direct current coupling.

4 REMOTE PROGRAMMING

4.1 GPIB Command Index

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

4.2 GPIB Command Codes

The following table list the GPIB commands by function.

Table 4-1 Operating Mode

Function		Listener Code	Talker Request	
			Code	Output Format
Operating mode	Spectrum analyzer mode	SETFUNC CW	—	—
	TRANSIENT mode	SETFUNC TRAN	—	—

Table 4-2 ATT Key (Attenuator)

Function		Listener Code	Talker Request	
			Code	Output Format
Attenuator	ATT	AT *	AT?	Level
	ATT AUTO	AA	AA?	0: MNL 1: AUTO

Table 4-3 COPY Key (Hard Copy)

Function		Listener Code	Talker Request	
			Code	Output Format
Printer or file output	Execution of the command	HCOPY	—	—

Table 4-4 COUPLE Key (Couple Function)

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

Table 4-5 FREQ Key (Frequency)

Function		Listener Code	Talker Request	
			Code	Output Format
Frequency	Center frequency	CF *	CF?	Frequency
	Start frequency	FA*	FA?	Frequency
	Stop frequency	FB*	FB?	Frequency

Table 4-6 LEVEL Key

Function	Listener Code	Talker Request	
		Code	Output Format
Reference level	RL *	RL?	Level

Table 4-7 MKR key

Function		Listener Code	Talker Request	
			Code	Output Format
Marker	OFF	MKOFF MO	— —	
	Delta marker ON	MKD[*]	—	Frequency (Time)
	Reading Marker frequency (time)	—	MF?	Frequency (Time)
	Reading marker level	—	ML?	Level
	Reading marker frequency (time) and marker level	—	MFL?	Marker frequency (time) and marker level
	Normal marker	MK[*] MKN[*]	— —	Frequency (Time)

Table 4-8 PRESET Key(Initialization)

Function		Listener Code	Talker Request	
			Code	Output Format
Preset	Instrument preset	IP	—	—

Table 4-9 RCL Key (Reading Data)

Function	Listener Code	Talker Request	
		Code	Output Format
Recall	RC REG_nn RC file name	— —	— —

Table 4-10 SAVE Key (Saving Data)

Function		Listener Code	Talker Request	
			Code	Output Format
Save	Save	SV REG_nn	—	—
		SV file name	—	—
	Deletion	DEL REG_nn	—	—
		DEL file name	—	—

Table 4-11 SPAN Key (Frequency Span)

Function	Listener Code	Talker Request	
		Code	Output Format
Frequency span	SP *	SP?	Frequency

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (1 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
STD Setup	LINK			
	BTS	LINK BTS	LINK?	0:MS
	MS	LINK MS		1:BTS
	Offset Level	RO *	RO?	Level
	Input			
	RF	INPUT RF	INPUT?	0:RF
	Baseband(I&Q)	INPUT IQ		1:IQ
	Baseband Input			
	AC	BBINPUT AC	BBINPUT?	0:AC
	DC	BBINPUT DC		1:DC
Calibration	DC CAL	CLDC	-	-
T-Domain Power	Auto Level Set	WTPAUTOLVL	-	-
	Trigger Setup			
	Trigger Source			
	FreeRun	WTPTRG FREE	WTPTRG?	0:FREE
	Video	WTPTRG VIDEO		1:VIDEO
	IF	WTPTRG IF		2:IF
	EXT	WTPTRG EXT		3:EXT

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (2 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
T-Domain Power	Slope			
	+	WTPTRGSLP RISE	WTPTRGSLP?	0:-
	-	WTPTRGSLP FALL		1:+
	Trigger Level	WTPTRGLVL *	WTPTRGLVL?	Integer(0 to 100)
	Trigger Position	WTPTRGPOS *	WTPTRGPOS?	Integer(0 to 100)
	Delay Time	WTPTRGDT *	WTPTRGDT?	Time
	Window Setup			
	Window			
	ON	WTPWDO ON	WTPWDO?	0:OFF
	OFF	WTPWDO OFF		1:ON
	Window Position	WTPWPOS *	WTPWPOS?	Time
	Window Width	WTPWW *	WTPWW ?	Time
	Y Scale			
	10dB/div	WTPDIV P10DB	WTPDIV?	0:10dB/div
	5dB/div	WTPDIV P5DB		1:5dB/div
	2dB/div	WTPDIV P2DB		2:2dB/div
	Average Times	WTPAVG *	WTPAVG?	Integer (1:OFF, 2 to 999)
	Parameter Setup			
	Detector			
	Normal	WTPDET NRM	WTPDET?	0:Normal
	Posi	WTPDET POS		1:Posi
	Nega	WTPDET NEG		2:Nega
	Sample	WTPDET SMP		3:Sample
	Display Unit			
	dBm	WTPUNIT DBM	WTPUNIT?	0:dBm
	W	WTPUNIT W		1:W
	dBμV	WTPUNIT DBUV		2:dBμV
	Set to STD	WTPSETSTD	-	-
	Starting the Measurement on the same mode	SI	-	-
	Starting the Measurement T-Domain Power	WTPOWER	-	-

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (3 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
T-Domain Power	Results T-Domain Power	-	WTPOWER?	I1,j1 I1:Level (dBm/W/dBμV) j1:-1
ON/OFF Ratio	Auto Level Set	WTRAUTOLVL	-	-
	Trigger Setup Trigger Source			
	FreeRun	WTRTRG FREE	WTRTRG?	0:Free Run
	Video	WTRTRG VIDEO		1:Video
	IF	WTRTRG IF		2:IF
	EXT	WTRTRG EXT		3:EXT
	Slope			
	+	WTRTRGSLP RISE	WTRTRGSLP?	0:-
	-	WTRTRGSLP FALL		1:+
	Trigger Level	WTRTRGLVL *	WTRTRGLVL?	Integer (0 to 100)
	Trigger Position	WTRTRGPOS *	WTRTRGPOS?	Integer (0 to 100)
	Delay Time	WTRTRGDT *	WTRTRGDT?	Time
	Window Setup Window			
	ON	WTRWDO ON	WTRWDO?	0:OFF
	OFF	WTRWDO OFF		1:ON
	ON Position	WTRWONPOS *	WTRWONPOS?	Time
	ON Width	WTRWONW *	WTRWONW?	Time
	OFF Position	WTRWOFPOS *	WTRWOFPOS?	Time
	OFF Width	WTRWOFW *	WTRWOFW?	Time
	Y Scale			
	10dB/div	WTRDIV P10DB	WTRDIV?	0:10dB/div
	5dB/div	WTRDIV P5DB		1:5dB/div
	2dB/div	WTRDIV P2DB		2:2dB/div
	Average Times	WTRAVG *	WTRAVG?	Integer (1:OFF, 2 to 999)

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (4 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
ON/OFF Ratio	Parameter Setup			
	Detector			
	Normal	WTRDET NRM	WTRDET?	0:Normal
	Posi	WTRDET POS		1:Posi
	Nega	WTRDET NEG		2:Nega
	Sample	WTRDET SMP		3:Sample
	Display Unit			
	dBm	WTRUNIT DBM	WTRUNIT?	0:dBm
	W	WTRUNIT W		1:W
	dBμV	WTRUNIT DBUV		2:dBμV
	Set to STD	WTRSETSTD	-	-
	Starting the Masurement ON/OFF Ratio	WTRATIO	-	-
	Starting the Measurement on the same mode	SI	-	-
	Results ON/OFF Ratio	-	WTRATIO?	I1,I2,d1,j1 I1:ON Level (dBm/W/dBuV) I2:OFF Level (dBm/W/dBuV) d1:ON/OFF Ratio (J(dB) j1:Integer (0:FAIL/,1:PASS)
Spurious	Auto Level Set	WTSAUTOLVL	-	-
	Trigger Setup			
	Trigger Source			
	FreeRun	WTSTRG FREE	WTSTRG?	0:Free Run
	EXT	WTSTRG EXT		3:EXT
	Slope			
	+	WTSTRGSLP RISE	WTSTRGSLP?	0:-
	-	WTSTRGSLP FALL		1:+

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (5 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
Spurious	Trigger Position	WTSTRGPOS	WTSTRGPOS?	Integer (0 to 100)
	Delay Time	WTSTRGDT	WTSTRGDT?	Time
	Table			
	Table No.1/2/3	WTSTBL *	WTSTBL?	Integer (1 to 3)
	Table Edit	WTSEDIT *,*	-	f1,l1 f1:Frequency l1:Limit Level
	Load Table	WTSLD	-	-
	Save Table	WTSSV	-	-
	Clear Table	WTSCLR	-	-
	Average Times	WTSAVG *	WTSAVG?	Integer (1:OFF, 2 to 999)
	Parameter Setup			
	Detector			
	Normal	WTSDET NRM	WTSDET?	0:Normal
	Posi	WTSDET POS		1:Posi
	Nega	WTSDET NEG		2:Nega
	Sample	WTSDET SMP		3:Sample
	Result			
	Peak	WTSRESTYP PK	WTSRESTYP?	0:Peak
	RMS	WTSRESTYP RMS		1:RMS
	Peak MKR Y Delta	WTSPKMKY *	WTSPKMKY?	Integer
	Multiplier	WTSMULTI *	WTSMULTI?	Integer
	Display Unit			
	dBm	WTSUNIT DBM	WTSUNIT?	0:dBm
	W	WTSUNIT W		1:W
	dBμV	WTSUNIT DBUV		2:dBμV
	Judgment			
	ON	WTSJDG ON	WTSJDG?	0:OFF
	OFF	WTSJDG OFF		1:ON
	Starting the Measurement			
	Spurious	WTSUPRI	-	-
	Starting the Measurement on the same mode	SI	-	-

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (6 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
Spurious	Results Spurious	-	WTSUPRI?	n<CRLF>+ f1,l1,j1<CRLF>+ ...+fn,ln,jn<CRLF> n:Amount (Integer) fn:Frequency ln:Level jn:Integer (0:FAIL,1:PASS, -1:Judgment OFF)
F-Domain Power	Window Setup Window			
	ON	WFPWDO ON	WFPWDO?	0:OFF
	OFF	WFPWDO OFF		1:ON
	Window Position	WFPWPOS *	WFPWPOS?	Frequency
	Window Width	WFPWW *	WFPWW?	Frequency
	Y Scale			
	10dB/div	WFPDIV P10DB	WFPDIV?	0:10dB/div
	5dB/div	WFPDIV P5DB		1:5dB/div
	2dB/div	WFPDIV P2DB		2:2dB/div
	Average Times	WFPAVG *	WFPAVG?	Integer (1:OFF, 2 to 999)
	Parameter Setup Detector			
	Normal	WFPDET NRM	WFPDET?	0:Normal
	Posi	WFPDET POS		1:Posi
	Nega	WFPDET NEG		2:Nega
	Sample	WFPDET SMP		3:Sample
	Display Unit			
	dBm	WFPUNIT DBM	WFPUNIT?	0:dBm
	W	WFPUNIT W		1:W
	dBμV	WFPUNIT DBUV		2:dBμV
	Set to STD	WFPSETSTD	-	-
	Starting the Measurement F-Domain Power	WFPOWER	-	-
	Starting the Measurement on the same mode	SI	-	-

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (7 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
F-Domain Power	Results F-Domain Power	-	WFPOWER?	I1,j1 I1:Level (dBm/W/dBuV) j1:-1
OBW	OBW%	WFOPER *	WFOPER?	Real number (0.5 to 99.5%)
	Average Times	WFOAVG *	WFOAVG?	Integer (1:OFF, 2 to 999)
	Parameter Setup Detector Normal Posi Nega Sample	 WFODET NRM WFODET POS WFODET NEG WFODET SMP	 WFODET?	 0:Normal 1:Posi 2:Nega 3:Sample
	Set to STD	WFOSETSTD	-	-
	Starting the Measurement OBW	 WFOBW	 -	 -
	Starting the Measurement on the same mode	SI	-	-
	Results OBW	-	WFOBW?	f1,f2,f3,j1 f1:OBW Frequency (Hz) f2:Low Frequency (Hz) f3:High Frequency (Hz) j1:-1

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (8 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
ACP Due To Transient	Average Times	WFTAVG *	WFTAVG?	Integer (1:OFF to 999)
	Marker			
	Marker Edit	WFTEDIT *,*,*,*	-	0,f1,f2,l1 f1:Offset frequency f2:Bandwidth l1:Limit Level To set the reference bandwidth f2, execute the WFTECLR command to clear the table, and then send: WFTEDIT0, 0, f2, 0.
	Copy from STD	WFTCPSTD	-	-
	Clear Marker	WFTCLR	-	-
	Parameter Setup			
	Detector			
	Normal	WFTDET NRM	WFTDET?	0:Normal
	Posi	WFTDET POS		1:Posi
	Nega	WFTDET NEG		2:Nega
	Sample	WFTDET SMP		3:Sample
	Set to STD	WFTSETSTD	-	-
	Starting the Measurement			
	ACP due to Transient	WFDUTTRA	-	-
	Starting the Measurement on the same mode	SI	-	-
	Results			
	ACP due to Transient	-	WFDUTTRA?	n<CR+LF>+ d1,j1<CR+LF>+ ...+dn,jn<CR+LF> n :Amount (Integer) dn :ACP jn :Integer (0:FAIL,1:PASS)

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (9 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
Outband Spurious	Table			
	Tabel No.1/2/3	WOSTBL *	WOSTBL?	Integer (1 to 3)
	Table Edit	WOSEDIT *,*,*,*,*,*	-	f1,f2,f3,f4,d1,l1 f1:Start frequency f2:Stop frequency f3:RBW f4:VBW d1:Sweep time l1:Limit Level
	Load Table	WOSLD	-	-
	Save Table	WOSSV	-	-
	Clear Table	WOSCLR	-	-
	Average Times	WOSAVG *	WOSAVG?	Integer (1:OFF to 999)
	Parameter Setup			
	Detector			
	Normal	WOSDET NRM	WOSDET?	0:Normal
	Posi	WOSDET POS		1:Posi
	Nega	WOSDET NEG		2:Nega
	Sample	WOSDET SMP		3:Sample
	Peak MKR YDelta	WOSPKMKY *	WOSPKMKY?	Real number
	Display Unit			
	dBm	WOSUNIT DBM	WOSUNIT	0:dBm
	W	WOSUNIT W		1:W
	dBµV	WOSUNIT DBUV		2:dBµV
	Judgment			
	ON	WOSJDG_ON	WOSJDG?	0:OFF
	OFF	WOSJDG_OFF		1:ON
	Starting the Measure-ment			
	Outband Spurious	WOTBSPR	-	-

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (10 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
Outband Spurious	Starting the Measurement on the same mode	SI	-	-
	Results			
	Outband Spurious	-	WOTBSPR?	n<CRLF>+ f1,l1,j1<CRLF>+ ...+fn,ln,jn<CRLF> n:Amount (Integer) fn:Frequency ln:Level jn:Integer (0:FAIL,1:PASS, -1:Judgment OFF)
W-CDMA	Measurement Mode			
	W-CDMA	WCDMA	-	-
	Auto Level Set	WCAUTOLVL	-	-
	Display Type			
	Format			
	Graph	WCFMT GRP	WCFMT?	0:Graph
	Table	WCFMT TBL		1:Table
	Numeric	WCFMT NUM		2:Numeric
	Display			
	Single	WCDISP SNGL	WCDISP?	0:Single
	Dual	WCDISP DUAL		1:Dual
	Y Scale			
	Rho	WCYSCL RHO	WCYSCL?	0:ρ
	Power	WCYSCL POW		1:Power
	X Scale			
	ShortCode	WCXSCL SC	WCXSCL?	0:Short Code
	Time	WCXSCL TIM		1:Time
	View Point	WCVWPT *	WCVWPT?	Integer (Time or Code)
	Graphics			
	Display Start	WCDSPST *	WCDSPST?	Integer (0 to 1152)
	Select Type			
	Constellation	WCGTYP CON	WCGTYP?	0:Constellation
	Constellation (Line)	WCGTYP CONLIN		1:Constellation (Line)
	Constellation(Dot)	WCGTYP CONDOT		2:Constellation(Dot)

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (11 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
W-CDMA	Constellation (Line & Chip)	WCGTYP CONLINCHP		3:Constellation (Line & Chip)
	I EYE Diagram	WCGTYP ICHEYE		4:I EYE Diagram
	Q EYE Diagram	WCGTYP QCHEYE		5:Q EYE Diagram
	I/Q EYE Diagram	WCGTYP IQCHEYE		6:I/Q EYE Diagram
	45deg. Turn			
	ON	WCTURN ON	WCTURN?	0:OFF
	OFF	WCTURN OFF		1:ON
	Parameter Setup			
	Link BTS Setting			
	Long Code Define			
	Define	WCLCDEF DEF	WCLCDEF?	0:Define
	Undefine	WCLCDEF UNDEF		1:Undefine
	Long Code No.	WCBSLCNO *	WCBSLCNO?	Hexadecimal digit (0 to 3FFFF)
	Trigger Mode			
	INT	WCBSTRG INT	WCBSTRG?	0:INT
	EXT	WCBSTRG EXT		1:EXT
	SFN=0	WCBSTRG SFN		2:SFN=0
	EXT Trigger Slope			
	+	WCBSTRGSLP RISE	WCBSTRGSLP ?	0:-
	-	WCBSTRGSLP FALL		1:+
	EXT Trigger Delay	WCBSTRGDLY *	WCBSTRGDLY ?	Real number (-5120.0 to 5120.0)
	Search Mode			
	Mask	WCSRCH MASK	WCSRCH?	0:Mask
	PN	WCSRCH PN		1:PN
	OFF	WCSRCH OFF		2:OFF
	Multi Rate			
	ON	WCMLTRATE ON	WCMLTRATE?	0:OFF
	OFF	WCMLTRATE OFF		1:ON

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (12 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
W-CDMA	Perch Class	WCPCLS *	WCPCLS?	Integer (2 to 8)
	Perch Number	WCPNUM *	WCPNUM?	Integer
	Meas Unit	WCBSMUNIT *	WCBSMUNIT?	Integer
	Threshold	WCBSTHRSH *	WCBSTHRSH?	Integer (-40 to -10)
	Phase Inverse			
	Normal	WCBSPHASE NORM	WCBSPHASE?	0:Normal
	Inverse	WCBSPHASE INV		1:Inverse
	Link BTS MultiRate OFF Setting			
	Symbol Rate			
	32ksps	WCBSRATE 32K	WCBSRATE?	0:32Ksps
	64ksps	WCBSRATE 64K		1:64Ksps
	128ksps	WCBSRATE 128K		2:128Ksps
	256ksps	WCBSRATE 256K		3:256Ksps
	512ksps	WCBSRATE 512K		4:512Ksps
	1024ksps	WCBSRATE 1024K		5:1024Ksps
	Link BTS MultiRate ON Setting			
	Multi Channel No.	WCMLTNUM *	WCMLTNUM?	Integer (1 to 12)
	Ch1 Class	WC1CLS *	WC1CLS?	Integer (2 to 8)
	Ch1 Number	WC1NUM *	WC1NUM?	Integer
	Ch2 Class	WC2CLS *	WC2CLS?	Integer (2 to 8)
	Ch2 Number	WC2NUM *	WC2NUM?	Integer
	Ch3 Class	WC3CLS *	WC3CLS?	Integer (2 to 8)
	Ch3 Number	WC3NUM *	WC3NUM?	Integer
	Ch4 Class	WC4CLS *	WC4CLS?	Integer (2 to 8)
	Ch4 Number	WC4NUM *	WC4NUM?	Integer
	Ch5 Class	WC5CLS *	WC5CLS?	Integer (2 to 8)
	Ch5 Number	WC5NUM *	WC5NUM?	Integer
	Ch6 Class	WC6CLS *	WC6CLS?	Integer (2 to 8)
	Ch6 Number	WC6NUM *	WC6NUM?	Integer
	Ch7 Class	WC7CLS *	WC7CLS?	Integer (2 to 8)

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (13 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
W-CDMA	Ch7 Number	WC7NUM *	WC7NUM?	Integer
	Ch8 Class	WC8CLS *	WC8CLS?	Integer (2 to 8)
	Ch8 Number	WC8NUM *	WC8NUM?	Integer
	Ch9 Class	WC9CLS *	WC9CLS?	Integer (2 to 8)
	Ch9 Number	WC9NUM *	WC9NUM?	Integer
	Ch10 Class	WC10CLS *	WC10CLS?	Integer (2 to 8)
	Ch10 Number	WC10NUM *	WC10NUM?	Integer
	Ch11 Class	WC11CLS *	WC11CLS?	Integer (2 to 8)
	Ch11 Number	WC11NUM *	WC11NUM?	Integer
	Link MS Setting Long Code No.	WCMSLCNO *	WCMSLCNO?	Hexdecimal digit (0 to 1FFFFFFFFF)
	Long Code Phase SFN LONG CODE	 WCLCPHASE SFN WCLCPHASE LC	WCLCPHASE?	 0:SFN 1:Long Code
	Trigger Mode INT EXT SFN=0	 WCMSTRG INT WCMSTRG EXT WCMSTRG SFN	WCMSTRG?	 0:INT 1:EXT 2:SFN=0
	EXT Trigger Slope + -	 WCMSTRGSLP RISE WCMSTRGSLP FALL	WCMSTRGSLP?	 0:- 1:+
	EXT Trigger Delay	WCMSTRGDLY *	WCMSTRGDLY?	Real number (-5120.0 to 5120.0)
	Symbol Rate 32ksps 64ksps 128ksps 256ksps 512ksps 1024ksps	 WCMSRATE 32K WCMSRATE 64K WCMSRATE 128K WCMSRATE 256K WCMSRATE 512K WCMSRATE 1024K	WCMSRATE?	 0:32Ksps 1:64Ksps 2:128Ksps 3:256Ksps 4:512Ksps 5:1024Ksps

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (14 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
W-CDMA	Meas Unit	WCMSMUNIT *	WCMSMUNIT?	Integer
	Threshold	WCMSTHRSH *	WCMSTHRSH?	Integer (-40 to -10)
	Phase Inverse			
	Normal	WCMSPHASE NORM	WCMSPHASE?	0:Normal
	Inverse	WCMSPHASE INV		1:Inverse
	AverageTimes	WCAVG *	WCAVG?	Integer (1:OFF, 2 to 32)
	Starting the Measurement			
	W-CDMA	WCDMA	-	-
	Starting the Measurement on the same mode	SI	-	-
	Results			
	Total Result			
	ρ	-	WCRHO?	ρ
	τ	-	WCTAU?	Time (sec)
	τ(chip)	-	WCTAUCHIP?	Integer (chip)
	Carrier Freq. Error	-	WCFER?	Frequency (Hz)
	I/Q Origin Offset	-	WCIQOFS?	Level (dBc)
	Magnitude Error	-	WCMAG?	% rms
	Phase Error	-	WCPHSE?	degree rms
	Modulation Accuracy	-	WCMOD?	% rms
	Slot (BTS)	-	WCSLOT?	Integer
	Long Code No. (BTS)	-	WCLNGCD?	Hexdecimal digit
	Long Code Group No. (BTS)	-	WCLCGRP?	Integer
	Frame No. (MS)	-	WCFRAME?	Integer
	Code Domain Power			
	Short Code No.	WCMKSC *	WCMKSC?	ShortCode(Channel)
	Time	WCMKTIM *	WCMKTIM?	Time

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (15 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
W-CDMA	Marker Y data (ρ)	-	WCMKRHO?	ρ
	Marker Y data (Power)	-	WCMKPOW?	Level (dB)
	Readout the results of graphics			
	Constellation			
	Constellation(Line)			
	Constellation(Dot)			
	Constellation (Line & Symbol)			
	I EYE Diagram			
	Q EYE Diagram			
	I/Q EYE Diagram			
	Chip No.	WCMKCHIP *	WCMKCHIP?	DispStart to +255
	data	-	WCMKI?	Phase
	Q data	-	WCMKQ?	Phase
QPSK	Auto Level Set	QPAUTOLVL	-	-
	Graphics			
	Display Start	QPDSPST	QPDSPST?	0:STD
	Select Type			
	Constellation	QPGTYP CON	QPGTYP?	0:Constellation
	Constellation(Line)	QPGTYP CONLIN		1:Constellation(Line)
	Constellation(Dot)	QPGTYP CONDOT		2:Constellation(Dot)
	Constellation (Line & Chip)	QPGTYP CONLINCHP		3:Constellation (Line & Chip)
	I EYE Diagram	QPGTYP ICHEYE		4:I EYE Diagram
	Q EYE Diagram	QPGTYP QCHEYE		5:Q EYE Diagram
	I/Q EYE Diagram	QPGTYP IQCHEYE		6:I/Q EYE Diagram
	E.V.M vs. Chip	QPGTYP EVM		7:E.V.M vs. Chip
	Mag Error vs. Chip	QPGTYP MAGERR		8:Mag Error vs. Chip

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (16 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
QPSK	Phase Error vs. Chip	QPGTYP PHAERR		9:Phase Error vs. Chip
	Parameter Setup			
	Root Nyquist			
	ON	QPRNYQ ON	QPRNYQ?	0:OFF
	OFF	QPRNYQ OFF		1:ON
	Meas Range	QPMRNG *	QPMRNG?	Integer
	Trigger Mode			
	INT	QPTRG INT	QPTRG?	0:INT
	EXT	QPTRG EXT		1:EXT
	EXT Trigger Slope			
	+	QPTRGSLP RISE	QPTRGSLP?	0:-
	-	QPTRGSLP FALL		1:+
	EXT Trigger Delay	QPTRGDLY *	QPTRGDLY?	Real number(-512.0 to 512.0)
	Average Times	QPAVG *	QPAVG?	Integer (1:OFF, 2 to 32)
	Limit Setup			
	Judgment			
	ON	QPLMJDG ON	QPLMJDG?	0:OFF
	OFF	QPLMJDG OFF		1:ON
	Limit(ρ)	QPLMRHO *	QPLMRHO?	Real number (0.0001 to 1.0000)
	Starting Measurement			
	QPSK	QPSK	-	-
	Starting the Measurement on the same mode	SI	-	-
	Results			
	Total Result			
	ρ	-	QPRHO?	ρ
	Carrier Frequency Error	-	QPFER?	Frequency (Hz)
	Carrier Feedthrough	-	QPIQOFS?	Level (dBc)
	Magnitude Error	-	QPMAG?	% rms
	Phase Error	-	QPPHSE?	degree rms
	Error Vector Magnitude	-	QPMOD?	% rms
	Readout the results of graphics			
	Constellation			

Table 4-12 TRANSIENT Key (option 62: W-CDMA) (17 of 17)

Function		Listener Code	Talker Request	
			Code	Output Format
QPSK	Constellation(Line)			
	Constellation(Dot)			
	Constellation(Line & Symbol)			
	I EYE Diagram			
	Q EYE Diagram			
	I/Q EYE Diagram			
	Chip No.	QPMKCHIP *	QPMKCHIP?	DispStart to +255
	I data	-	QPMKI?	Phase
	Q data	-	QPMKQ?	Phase
	Error Vector Magnitude			
	Magnitude Error			
	Chip No.	QPMKCHIP *	QPMKCHIP?	DispStart to +255
	Marker Y data	-	QPMKERR?	%
	Phase Error			
	Chip No.	QPMKCHIP *	QPMKCHIP?	DispStart to +255
	Marker Y data	-	QPMKDEG?	degree
Tx Power	Auto Level Set	TXAUTOLVL	-	-
	Trigger Set up			
	Trigger Mode			
	INT	TXTRG INT	TXTRG?	0:INT
	EXT	TXTRG EXT		1:EXT
	EXT Trigger Slope			
	+	TXTRGSLP RISE	TXTRGSLP?	0:-
	-	TXTRGSLP FALL		1:+
	EXT Trigger Delay	TXTRGDLY *	TXTRGDLY?	Real number (-5120.0 to 5120.0)
	Average Times	TXAVG *	TXAVG?	Integer (1:OFF to 32)
	Starting the Measurement			
	Tx Power	TXPWR	-	-
	Starting the Measurement on the same mode	SI	-	-
	Results			
	Tx Power	-	TXPWR?	d1,d2,d3 d1:Tx Power(dBm) d2:Tx Power(W) d3:Peak Factor (dB)

Table 4-13 Numeric keys/Step keys/Data knob/Unit keys (Entering data)

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

Table 4-14 Miscellaneous

Function		Listener Code	Talker Request	
			Code	Output Format
Miscel-laneous	Outputting error number	—	ERRNO?	Integer
	Local	LC	—	—
	Reading GPIB address	—	AD?	Integer (0 to 30)
	Specification of the delimiter CR LF <EOL> LF <EOI> CR LF LF <EOI>	DL0 DL1 DL2 DL3 DL4	— — — — —	— — — — —
	Service request interruption ON OFF	S0 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 (character 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 standard 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
	Accessing the operation status enable register	OPR	OPR?	Decimal number corresponding to the register bits
	Reading or clearing the operation status register	—	OPREVT?	Decimal number corresponding to the register bits

4.3 Examples Program

This section describes remote control examples used with GPIB port.

CAUTION: ***Visual Basic 4.0(refferd to as VB henceforth) is used in the samples programs shown here. Also, National Instruments-made GPIB board(reffered to as NI-mode of brevity henceforth) is used for the GPIB control board; NI-mode driver is used for the control driver.***

Example VB-1. Setting the Marker Edit in ACP Due To Transient mode.

```
Call ibwrt(spa, "WFTCLR")                    'Clear the marker.
Call ibwrt(spa, "WFTEDIT 1,0,21KZ,0")        'Reference Bandwidth 21kHz
Call ibwrt(spa, "WFTEDIT 1,25KZ,21KZ,-45DB") 'Set the paramters 25 kHz deviated from the carrier to BW21kHz and Limit-45dB.
Call ibwrt(spa, "WFTEDIT 1,50KZ,21KZ,-70DB") 'Set the paramters 50kHz deviated from the carrierto BW21kHz and Limit-70dB
```

Example-2. Measuring the W-CDMA BTS Signal and reading the waveform quality.

```
Call ibclr(spa)     'Perform a device clear.
Call ibwrt(spa,"SETFUNC TRAN")               'Set the TRANSIENT mode.

Call ibwrt(spa,"CF 2112.5MZ")                'Set a center frequency of 2112.5 MHz
Call ibwrt(spa,"SP 8MZ")                     'Set a frequency span of 8 MHz
Call ibwrt(spa,"RB 30KZ")                    'Set an RBW of 30 kHz
Call ibwrt(spa,"VB 300KZ")                   'Set a VBW of 300 kHz
Call ibwrt(spa,"RL 0DB")                     'Set the reference level to 0 dBm

Call ibwrt(spa, "LINK BTS")                  'Set the item link to BTS.
Call ibwrt(spa, "RO 0DB")                    'Set the offset level to 0 dB
Call ibwrt(spa, "INPUT RF")                  'Set the INPUT to RF.
Call ibwrt(spa, "WCLCDEF DEF")               'Use the long code.
Call ibwrt(spa, "WCBSLCNO 80")               'Set the long code number to 80[HEX]
Call ibwrt(spa, "WCBSTRG INT")               'Use the internal trigger.
Call ibwrt(spa, "WCSRCH MASK")               'Set the parameter to Long Code Mask.
Call ibwrt(spa, "WCMLTRATE OFF")             'Turn off the multi rate.
Call ibwrt(spa, "WCPCLS 8")                  'Set the perch class to 8.
Call ibwrt(spa, "WCPNUM 0")                  'Set the perch number to 0.
Call ibwrt(spa, "WCBSRATE 32K")              'Set the symbol rate to 32 ksps.
Call ibwrt(spa, "WCBSMUNIT 10")              'Set the measurement range to 10 symbols.
Call ibwrt(spa, "WCBSTHRSH -20DB")           'Set the threshold level to -20 dB.
Call ibwrt(spa, "WCBSPHASE NORM")            'Set the IQ phase to Normal.

Call ibwrt(spa, "OPR 16")                    'Enable the measuring bit on the operation register.
Call ibwrt(spa, "*SRE 128")                  'Enable the Operation status bit on the status byte.
Call ibwrt(spa, "S0")                        'Enable the Service Request mode.
Call ibwrt(spa, "*CLS")                      'Clear the status byte.

Call ibwrt(spa, "WCDMA")                     'Begin the measurement.
Call WaitSRQ(0, res%)
```

```
Call ibwrt(spa,"WCRHO?")                'Obtain the measurement result of the waveform quality.
Rdbuff$ = Space(21)                     'Allocate the buffer memory space to 21 bytes.
Call ibrd(spa, Rdbuff$)                 'Read the data

Text1.Text = "Waveform Quality Factor=" & Rdbuff$ 'Display the data on the screen.
```

5 SPECIFICATIONS

(1) Modulation Analysis Compliance

Based on the following volumes of the W-CDMA mobile communication system experimental specifications (first edition) published by NTT DoCoMo.

Volume 2: Mobile Station Equipment Specifications, Edition 1.1, February 22, 1998

Volume 3: Base Station Equipment Specifications, Edition 1.1, March 2, 1998

(2) System Parameters

Characteristics	Specification
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-30 dBm to +30 dBm (Total power in ATT AUTO)
Carrier frequency accuracy	±(Reference accuracy x Carrier frequency + 30 Hz) (Within Carrier frequency ±1 kHz)
Modulation accuracy	Residual vector error: < 3%
Chip rate	4.096 Mcps
Rolloff factor	0.22
Available level offset setting	0 to 100.0 dB
Channel power measurement	Integrating power over the set window zone

- QPSK modulation analysis mode

Characteristics	Specification
Waveform quality	Measurement accuracy : < 0.001
Result display	ρ (Waveform Quality Factor) Carrier Frequency Error Carrier Feedthrough Magnitude Error Phase Error Error Vector Magnitude
Waveform display	Constellation display (Line, Dot or Line & Chip) EYE Diagram (I, Q or I&Q) Vector error, magnitude error, Phase error vs. Chip number display

- W-CDMA modulation analysis mode (BTS)

Characteristics	Specification
Waveform quality	Measurement accuracy : < 0.002
Code domain power	Measurement accuracy : < ± 0.1 dBm
Result display	ρ (Waveform Quality Factor) τ (Time Alignment Error) Carrier Frequency Error I/Q Origin Offset Magnitude Error Phase Error Error Vector Magnitude Code Domain Power
Waveform display	Constellation display (Line, Dot, Line & Chip) EYE Diagram (I, Q or I&Q) Constellation and EYE Diagram turned by 45°
Display of others	slot, Long Code No., Long Code Group

(For each DTCH signal of -5.44 dBc, the level ratios of the perch channel to each DTCH are 1:2:2:2.)

- W-CDMA modulation analysis mode (MS)

Characteristics	Specification
Waveform quality	Measurement accuracy : <0.001
Result display	ρ (Waveform Quality Factor) Carrier Frequency Error I/Q Origin Offset Magnitude Error Phase Error Error Vector Magnitude Code Domain Power
Woreform display	Constellation display (Line, Dot, Line & Dot or Symbol) EYE Diagram (I, Q or I&Q) Constellation and EYE Diagram turned by 45°
Display of others	slot, CLong Code No., CFrame No.

- I/Q input

Characteristics	Specification
Conenectors	BNC female (rear panel)
Input Impecance	50Ω (nomianl)
Coupling	DC or AC coupling
Input lebel range	0.25V - 0.9Vp-p (± 0.47V or less)
Modulation accuracy	Residula vector error:< 3%
Result display and waveform display	Both comply with the modulation analysis

6 PERFORMANCE VERIFICATION TEST

6.1 General

6.1.1 Introduction

This chapter provides R3267/73 performance verification test procedures, item by item as listed in Table 6-1.
Performance verification test will be carried out under following condition.

Temperature range: 20 °C to 30 °C

Relative Humidity: 85 % or less

Table 6-1 Performance Verification Items

No.	Test Items
6.2.1	BTS Measurement on RF Input
6.2.2	MS Measurement on RF Input
6.2.3	QPSK Measurement on RF Input
6.2.4	BTS Measurement on IQ Input
6.2.5	MS Measurement on IQ Input
6.2.6	QPSK Measurement on IQ Input
6.3	Simplified Performance Check

6.1.2 Test Equipment

The Table 6-2 lists recommended test equipment.
The equipment needed to perform all of the performance test.
Equipment lists for individual tests are provided in each performance verification test.
In the table, PV is abbreviation of performance verification.

NOTE: 1. ***The R3267/73 with OPT62 to be tested should be warm up for at least 30 minutesbefore 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.***

Table 6-2 Equipment List

No.	Description	Critical Specification	Recommended Model	Manufacturer	Usage	Notes
1	Arbitrary Wave-form Generator	Output Channels: 4 channel required Capable to assign the output signal I-CH signal at CH1, Q-CH signal at CH2, Trigger signal(TTL) at CH3, SFN(TTL) at CH4	AWG2021	Tektronix	PV	SG1
2	I/Q Modulation Signal Generator	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), 50Ω	MI-09	Advantest	PV	-
4	Adapter	Type N(m)-BNC(f), 50Ω	JUG-201-U	Advantest	PV	-

NOTE: ***The IQ level and DC offset of both SG1 and SG2 must be matched.***
Total performance of SG1 with SG2 must cover the R3267/73 tested specification.

6.1.3 Specification of Test Signal

Following the condition is required to generate test signal for verification.
The each specification is based on the W-CDMA mobile communication system experimental specifications (first edition) published by NTT DoCoMo.
Refer to

- Volume 2: Mobile Station Equipment Specifications, Edition 1.1, February 22, 1998.
- Volume 3: Base Station Equipment Specifications, Edition 1.1, March 2. 1998.

(1) Test Signal for Base Transmit Station(BTS)

The specification required for test signal is listed in Table 6-3.
Figure 6-1 is shown timing chart of output signal and trigger signal.

Table 6-3 Specification for BTS Test Signal

No.	Name of Signal	Critical Specification				Usage
1	BTS	Long Code No. 128				BTS measurement on RF input BTS measurement on IQ input
		Channel Name	Transmission Rate	Short Code No.	Level	
		Perch	16ksps	#0	-8.44dB	
		DTCH	32ksps	#1	-5.44dB	
		DTCH	32ksps	#14	-5.44dB	
		DTCH	32ksps	#24	-5.44dB	

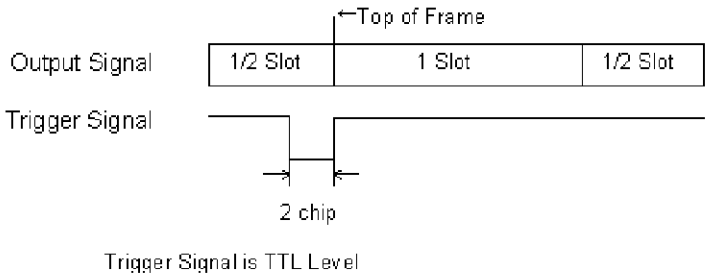


Figure 6-1 Timing Chart of BTS Test Signal

(2) Test Signal for MS and QPSK.

The specification required for the test signal is listed in Table 6-4.
Figure 6-2 is shown timing chart of output signal, SFN and Long code.

Table 6-4 Specification for SFN Test Signal

No.	Name of Signal	Critical Specification				Usage
2	BTS, QPSK	Long Code No. 1				MS measurement on RF input MS measurement on IQ input QPSK measurement on RF input QPSK measurement on IQ input
		Channel Name	Transmission Rate	Short Code No.	Level	
		DTCH	32ksps	#0	0dB	

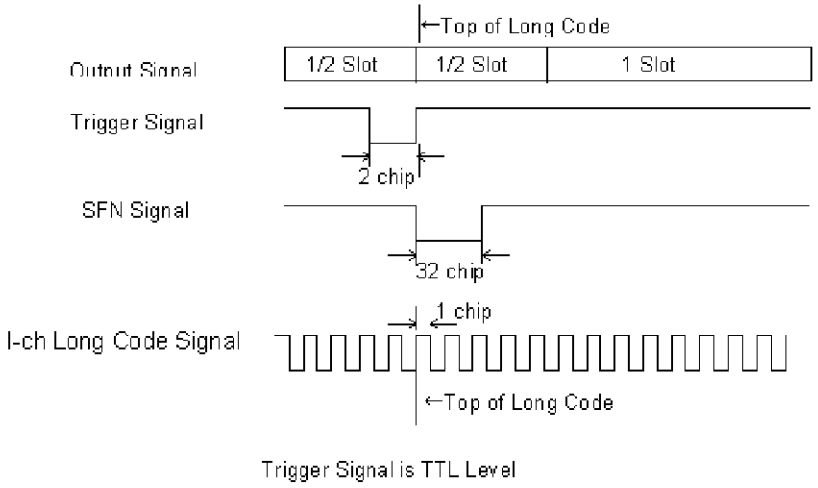


Figure 6-2 Timing Chart of SFN Test Signal

6.2 Performance Verification Procedures

6.2.1 BTS Measurement on RF Input

(1) Description

Verify Carrier Frequency Accuracy, Waveform Quality Accuracy, Modulation Accuracy and Code Domain Power Accuracy at frequency 2GHz for BTS, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Wave form Quality Accuracy	> 0.998
Modulation Accuracy	< 3%
Code Domain Power Accuracy	< ± 0.1dB

(3) Equipment Used

Arbitrary Signal Generator	SG1
I/Q Modulation Signal Generator	SG2

(4) Setup

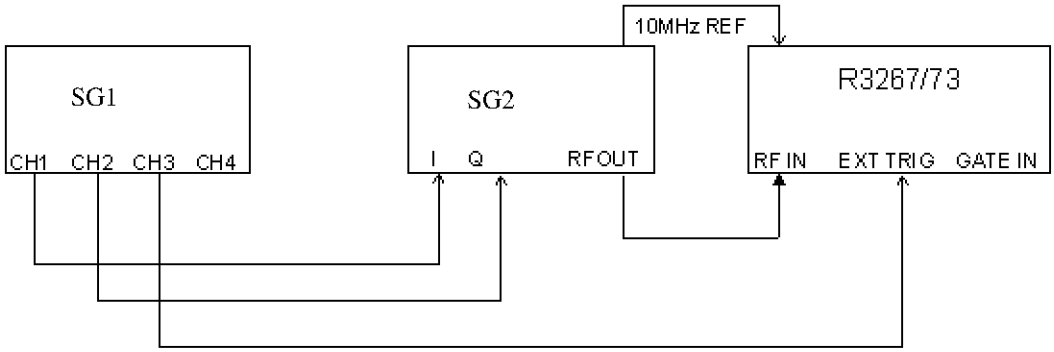


Figure 6-3 Setup of BTS Measurement Test

(5) Procedure

1. Connect equipment is shown as Figure 6-3.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-3 and Figure 6-1.
3. On the SG1, set output for CH1,CH2 and trigger output for CH3.
4. On the SG2,set controls as follows:

I/Q Modulation	External
Center Frequency	2GHz
Output Level	0dBm

5. On the R3267/73, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	BTS

6. On the R3267/73, set the parameter referring Figure 6-4.

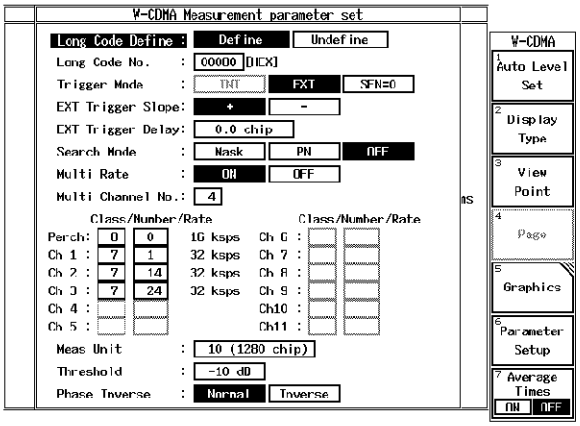


Figure 6-4 Setting of Parameter for W-CDMA Measurement

7. On the R3267/73, perform ***DC CAL*** and ***AUTO LEVEL***.

8. Press **SINGLE** for single sweep.

9. Record the result on the performance verification record sheet.

6.2.2 MS Measurement on RF Input

(1) Description

Verify MS measurement Carrier Frequency Accuracy, Waveform Quality Accuracy and Modulation Accuracy for MS measurement, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Waveform Generator	SG1
IQ Modulation Signal Generator	SG2

(4) Setup

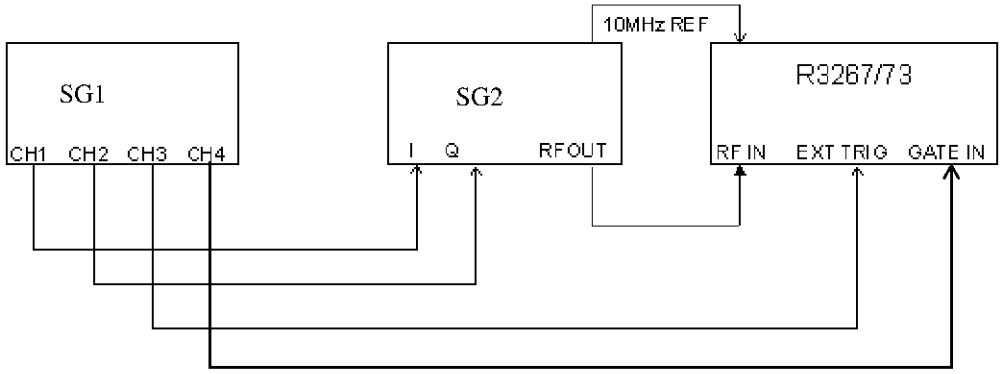


Figure 6-5 Setup of MS Measurement Test

(5) Procedure

1. Connect equipment as shown in Figure 6-5.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-3 and Figure 6-1.
3. On the SG1, set output for CH1,CH2, trigger output for CH3 and SFN signal for CH4.
4. On the SG2, set controls as follows:

I/Q Modulation	External
Center Frequency	2GHz
Output Level	0dBm

5. On the R3267/73, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	MS

6. On the R3267/73, set the parameter referring Figure 6-6.

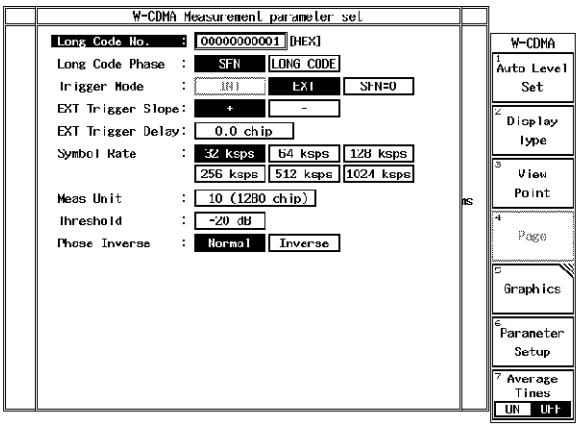


Figure 6-6 Setting of Parameter for W-CDMA Measurement Test

7. On the R3267/73, perform ***DC CAL*** and ***AUTO LEVEL***.

8. Press **SINGLE** for single sweep.

9. Record the result on the performance verification record sheet.

6.2.3 QPSK Measurement on RF Input

(1) Description

Verify Waveform Quality Accuracy, Modulation Accuracy and Code Domain power for QPSK measurement, RF input.

(2) Specification

Carrier Frequency Accuracy	< ± 90Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG1
I/Q Modulation Signal Generator	SG2

(4) Setup

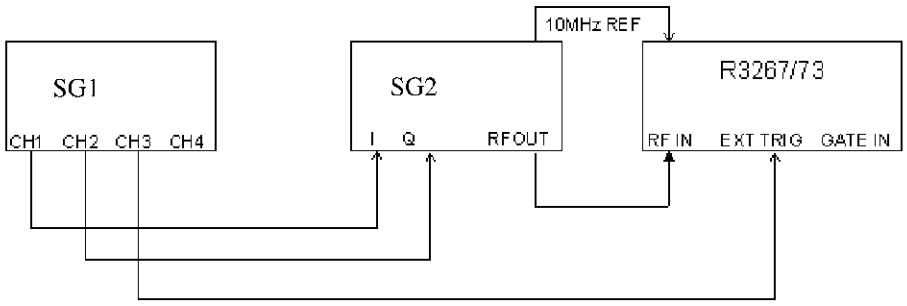


Figure 6-7 Setup of QPSK Measurement Test

(5) Procedure

1. Connect equipment as shown Figure 6-7.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-4 and Figure 6-2.
3. On the SG1, set output for CH1,CH2 and trigger output for CH3.
4. On the SG2, set controls as follows:

IQ Modulation	External
Center Frequency	2GHz
Output level	0dBm

5. On the R3267/73, set controls as follows:

Center Frequency	2GHz
Input	RF
Measurement Mode	QPSK

6. On the R3267/73, set the parameter referring Figure 6-8.

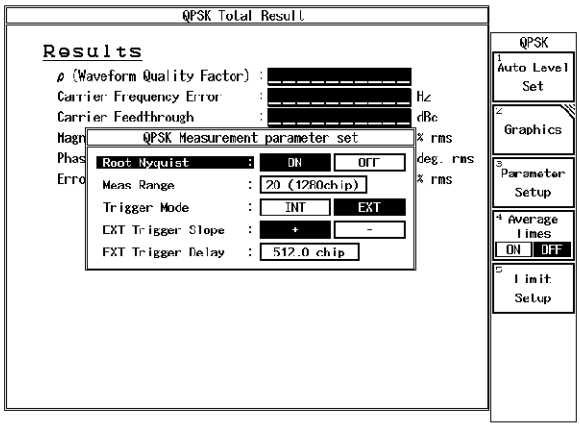


Figure 6-8 Setting of Parameter for W-CDMA Measurement Test

7. On the R3267/73, perform ***DC CAL*** and ***AUTO LEVEL***.

8. Press **SINGLE** for single sweep.

9. Record the result on the performance verification record sheet.

6.2.4 BTS Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation Accuracy and Code Domain Power Accuracy for BTS measurement, IQ input.

(2) Specification

Modulation Accuracy	< 3%
Equipment Used	
Arbitrary Signal Generator	SG1

(3) Setup

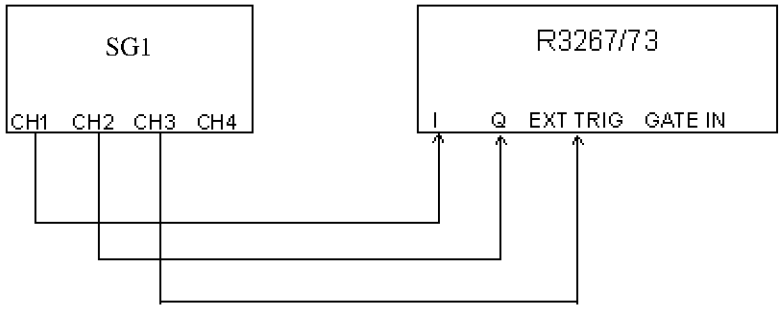


Figure 6-9 Setup of BTS Measurement Test

(4) Procedure

1. Connect equipment as shown Figure 6-9.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-4 and Figure 6-2.
3. On the SG1, set output for CH1,CH2 and trigger output for CH3.
   Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/73, set controls as follows:

Center Frequency	2GHz
Input	IQ
Measurement Mode	BTS

5. On the R3267/73, set the parameter referring Figure 6-10.

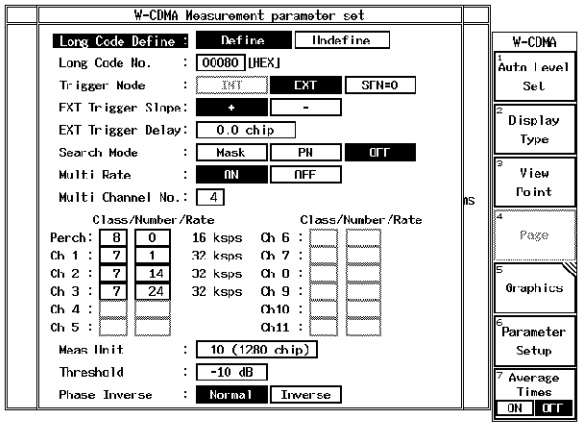


Figure 6-10 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/73, perform ***DC CAL*** and ***AUTO LEVEL***.

7. Press **SINGLE** for single sweep.

8. Record the result on the performance verification record sheet.

6.2.5 MS Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation and for MS measurement, IQ input.

(2) Specification

Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG1

(4) Setup

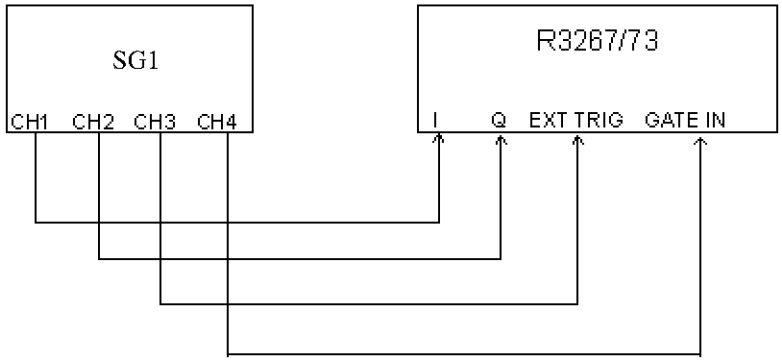


Figure 6-11 Setup of MS Measurement Test

(5) Procedure

1. Connect equipment as shown Figure 6-11.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-4 and Figure 6-2.
3. On the SG1, set output signal for CH1,CH2, trigger output for CH3 and SFN signal for CH4.
   Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/73, set controls as follows:

Input	IQ
Measurement Mode	MS

5. On the R3267/73, set the parameter referring Figure 6-12.

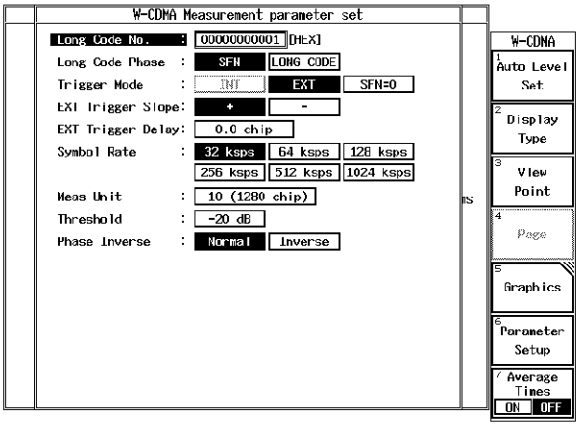


Figure 6-12 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/73, perform ***DC CAL***.

7. Press **SINGLE** for single sweep.

8. Record the result on the performance verification record sheet.

6.2.6 QPSK Measurement on IQ Input

(1) Description

Verify Waveform Quality Accuracy, Modulation and for QPSK measurement, IQ input.

(2) Specification

Waveform Quality Accuracy	< 0.001
Modulation Accuracy	< 3%

(3) Equipment Used

Arbitrary Signal Generator	SG1

(4) Setup

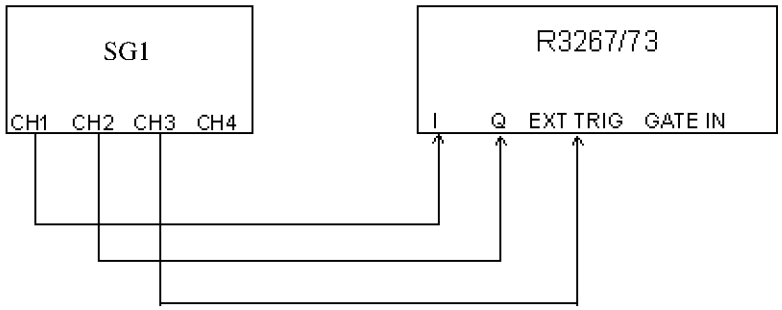


Figure 6-13 Setup of MS Measurement

(5) Procedure

1. Connect equipment as shown Figure 6-13.
2. On the SG1, set the data to generate the signal complied the requirement, refer to Table 6-4 and Figure 6-2.
3. On the SG1, set output signal for CH1,CH2 and trigger output for CH3. Output level set 0.8Vp-p for CH1 and CH2, both signal must be balanced.
4. On the R3267/73, set controls as follows:

Input	IQ
Measurement Mode	QPSK

5. On the R3267/73, set the parameter referring Figure 6-14.

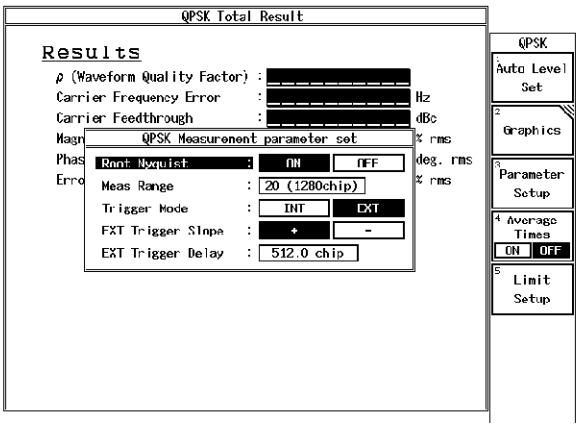


Figure 6-14 Setting of Parameter for W-CDMA Measurement Test

6. On the R3267/73, perform ***DC CAL***.

7. Press **SINGLE** for single sweep.

8. Record the result on the performance verification record sheet.

6.3 Simplified Performance Check

This section provides simplified performance check procedure.

(1) Description

It uses QPSK signal complied W-CDMA specification.

(2) Specification

Carrier Frequency Accuracy	< ± 90 Hz
Waveform Quality Accuracy	> 0.999
Modulation Accuracy	< 3 %

(3) Equipment used

Signal Generator	SG2

(4) Setup

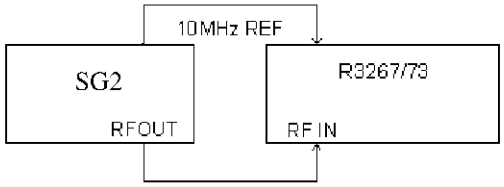


Figure 6-15 Setup of Simplified Performance Check

(5) Procedure

1. Connect equipment as shown Figure 6-15.

2. On the SG2, set controls as follows:

Modulation	QPSK
Symbol Rate	4.096 Msymbol/sec
Filter Type	Nyquist
Roll Off	α=0.22
Frequency	2 GHz
Output Level	0 dBm

On the R3267/73, set controls as follows:

Center Frequency	2 GHz
Input	RF
Measurement Mode	QPSK

3. On the R3267/73, set measurement parameter as shown Figure 6-16.

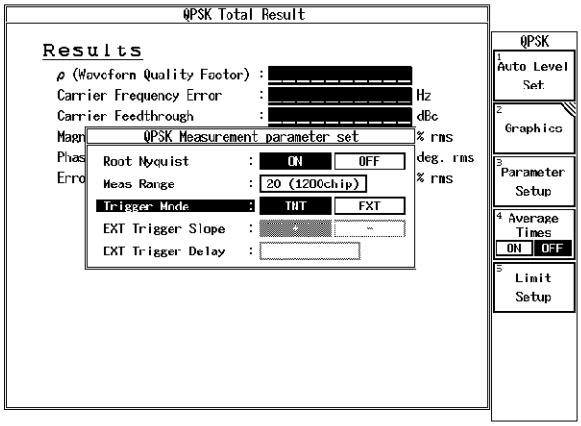


Figure 6-16 Setting of Parameter for Simplified Performance Check

4. On the R3267/73, perform ***DC CAL*** and ***AUTO LEVEL***.

5. On the R3267/73, press **SINGLE** for single sweep.

6. Record the result on the performance check record sheet.

6.4 Performance Verification Record Sheet for W-CDMA Measurement

No.	Measurement Mode	Input	Test Item	Specification			Result
				Min.	Measured Value	Max.	Pass/Fail
1	BTS	RF	Carrier Frequency Accuracy	-90 Hz		+90 Hz	
			Waveform Quality Accuracy	0.998		N/A	
			Modulation Accuracy	N/A		3 %	
			Code Domain Power Accuracy				
			Short Code No.=0	-11.54 dB		-11.34 dB	
			Short Code No.=1	-8.54 dB		-8.34 dB	
			Short Code No.=14	-8.54 dB		-8.34 dB	
			Short Code No.=24	-8.54 dB		-8.34 dB	
2	MS	RF	Carrier Frequency Accuracy	-90 Hz		90 Hz	
			Waveform Quality Accuracy	0.999		N/A	
			Modulation Accuracy	N/A		3 %	
3	QPSK	RF	Carrier Frequency Accuracy	-90 Hz		+90 Hz	
			Waveform Quality Accuracy	0.999		N/A	
			Modulation Accuracy	N/A		3 %	
4	BTS	IQ	Modulation Accuracy	N/A		3 %	
5	MS	IQ	Modulation Accuracy	N/A		3 %	
6	QPSK	IQ	Modulation Accuracy	N/A		3 %	

6.5 Performance Check Record Sheet for W-CDMA

No.	Items	Specification			Result
		Min.	Measured Value	Max.	Pass/Fail
1	Carrier frequency Accuracy	-90 Hz		+ 90 Hz	
2	Waveform Quality Accuracy	0.999		N/A	
3	Modulation Accuracy	N/A		3 %	

APPENDIX

A.1 Displayed Value of the Code Domain Power

The code domain power, which is displayed when measuring a W-CDMA signal, is described hereunder.

A transmitter used with W-CDMA transmits signals for multiple channels after the signal for each channel has been dispersed using an appropriate code complying with the spread spectrum wireless data communication, and it has been multiplexed with signals for other channels. To analyze this type of signals, the power must be measured for each channel. As a result, the transmission power level for each channel is displayed as a graph because the code domain power is measured on a channel basis.

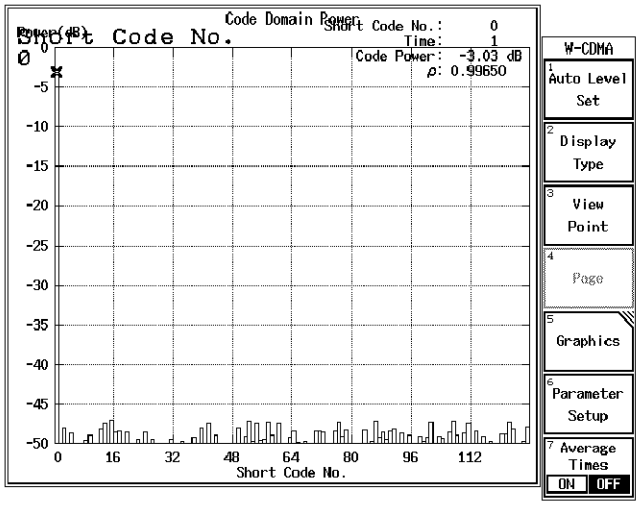


Figure A-1 Graphic Display When Measuring One Channel Only

In addition, the measurement range of the code domain power can be set using Meas Unit. For example, when the measurement range is set to 1280 chips using Meas Unit, the power is measured using 1280 chips.

Displaying changes in the code domain power (with respect to time)

The power of a channel in W-CDMA communications may vary with respect to time. If this happens, the change must be measured. To measure the code domain power, the input signal is divided into blocks. A block consists of the number of chips which is specified by Meas Unit, and has a predetermined duration of time. As a result, the code domain power is measured on a block basis. The changes in the code domain power with respect to time can be measured foe each channel using this function.

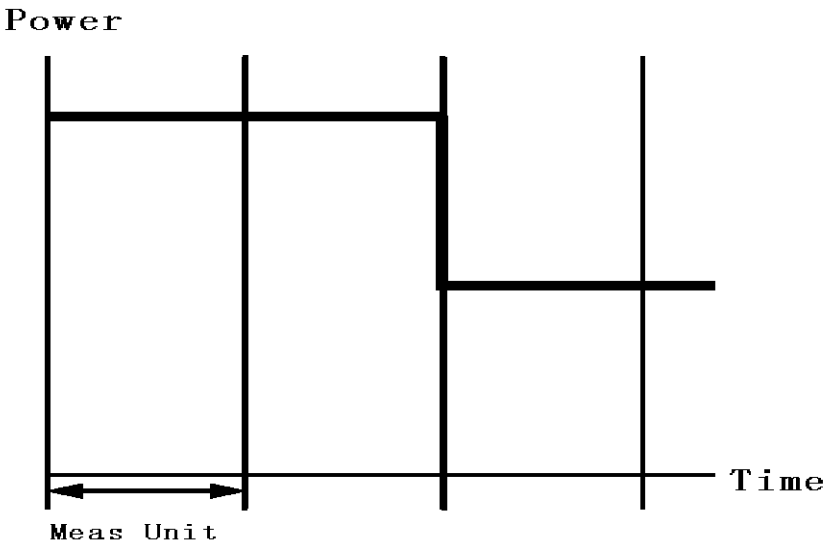


Figure A-2 Channel Having a Power Change with Respect to Time

The measured value is the power corresponding to the measurement range previously set, since the code domain power is measured on a block basis. Therefore, the larger the number of blocks is (or the narrower the measurement range is), the smaller the measured value is.

For example, assuming that a code domain power of -3 dB is obtained using 1280 chips, it becomes -10 dB when one fifth of the original measurement range (256 chips in this example) is used.

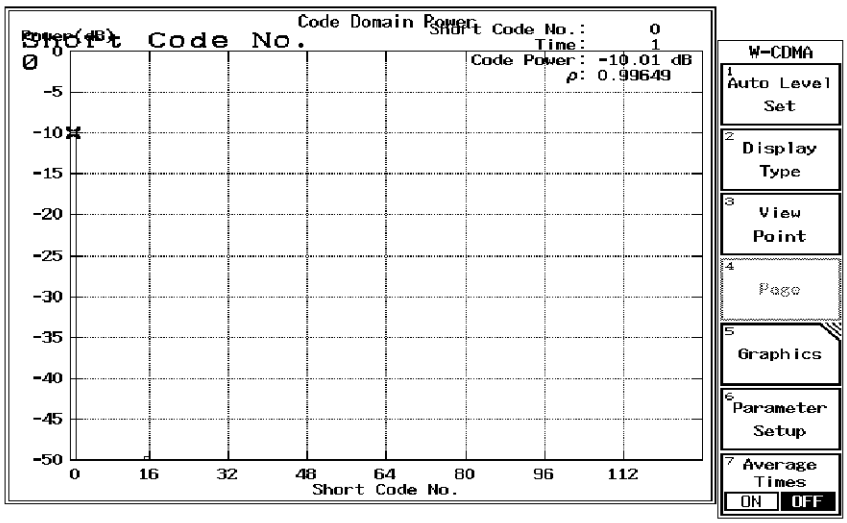


Figure A-3 Graphical Display of the Code Domain Power (Measurement Range: 256 Chips)

The code domain power is a ratio of the power corresponding to the specified measurement range to the signal power per slot.

(P0[W] is the total power for a slot.)

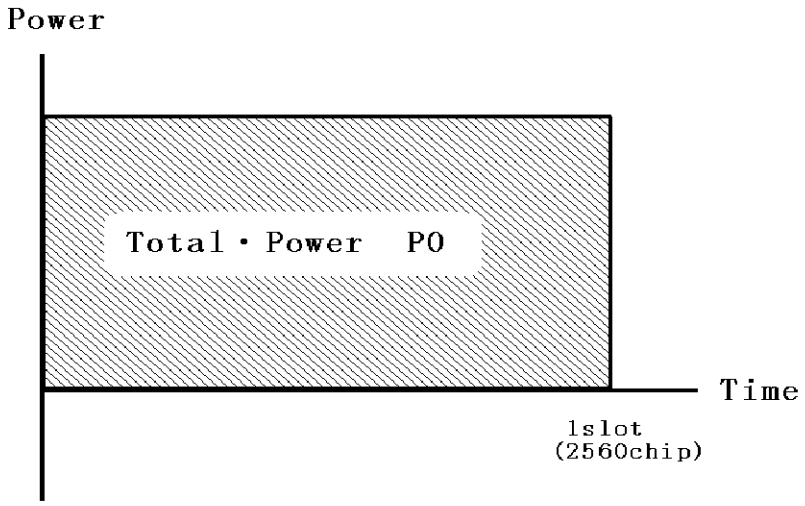


Figure A-4 Total Power P0 for a Channel

If the measurement range is set to 1280 chips, P1 (using 1280 chips) is half the P0 (using 2560 chips), and the displayed power P is given by the equation shown below.

$$P=10\log_{10}\left(\frac{P1}{P0}\right)=10\log_{10}\left(\frac{P0/2}{P0}\right)=-3.01[dB]$$

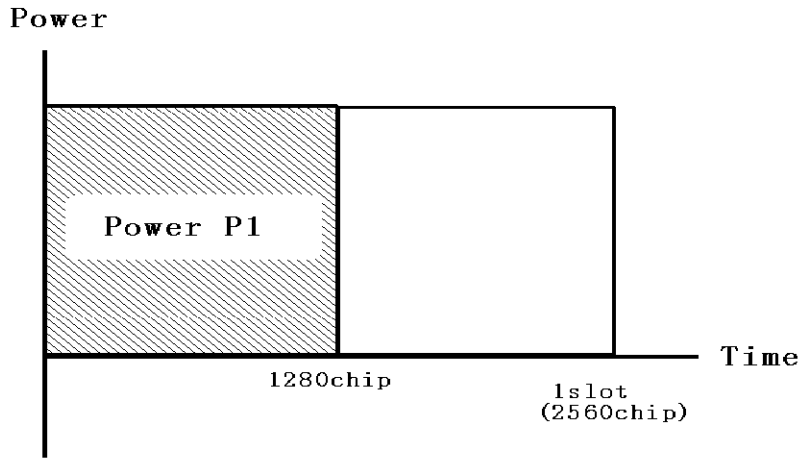


Figure A-5 Measurement Using 1280 Chips

In the same way, if the measurement range is set to 256, P2 (using 256 chips) is one tenth of the P0 (using 2560 chips), and the displayed power P is given by the equation shown below.

$$P=10\log_{10}\left(\frac{P2}{P0}\right)=10\log_{10}\left(\frac{P0/10}{P0}\right)=-10[dB]$$

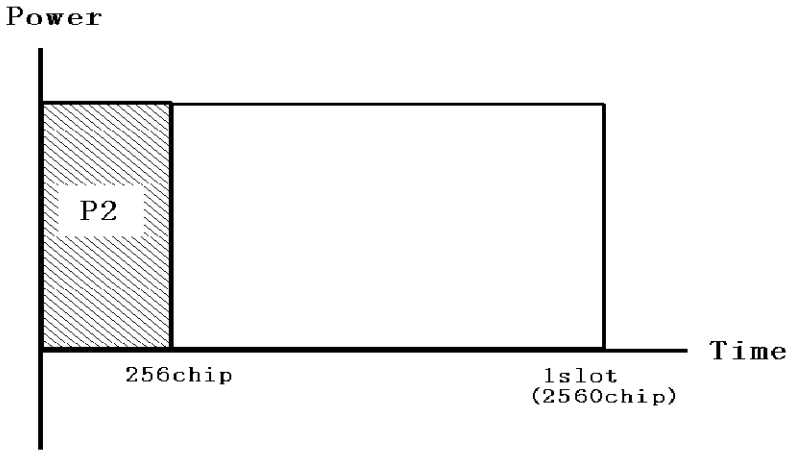


Figure A-6 Measurement Using 1280 Chips

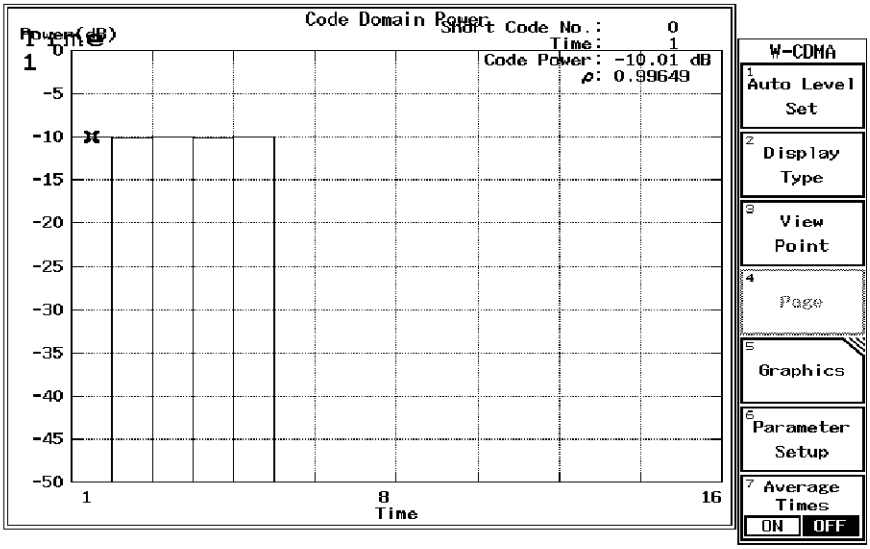


Figure A-7 Graphical Display of the Code Domain Power Transmitted without Changes for a Channel (Measurement Range: 256 Chips, Vertical Axis: Time)

(P1 = P0/2 where P0[W] is the total power of a slot and P1 is the power of a slot for a channel.)

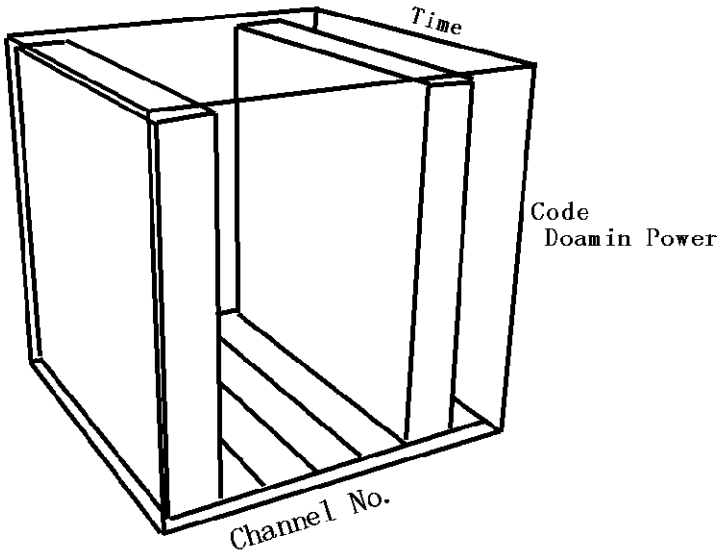


Figure A-8 Relationship the Code Domain Power and the Time on Each Channels

If the measurement range is set to 1280, P2 (of a channel using 1280 chips) is a quarter of the P0 (total power of multiple signal using 2560 chips), and the displayed power P is given by the equation shown below.

$$P=10\log_{10}\left(\frac{P2}{P0}\right)=10\log_{10}\left(\frac{P0/4}{P0}\right)=-6.02[dB]$$

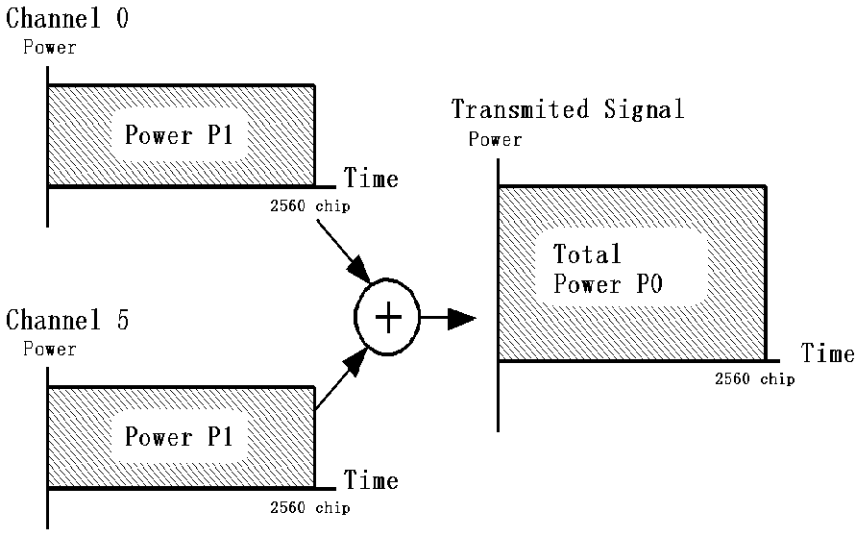


Figure A-9 Power of 2 Channels Multiplexed into 1 Data Circuit

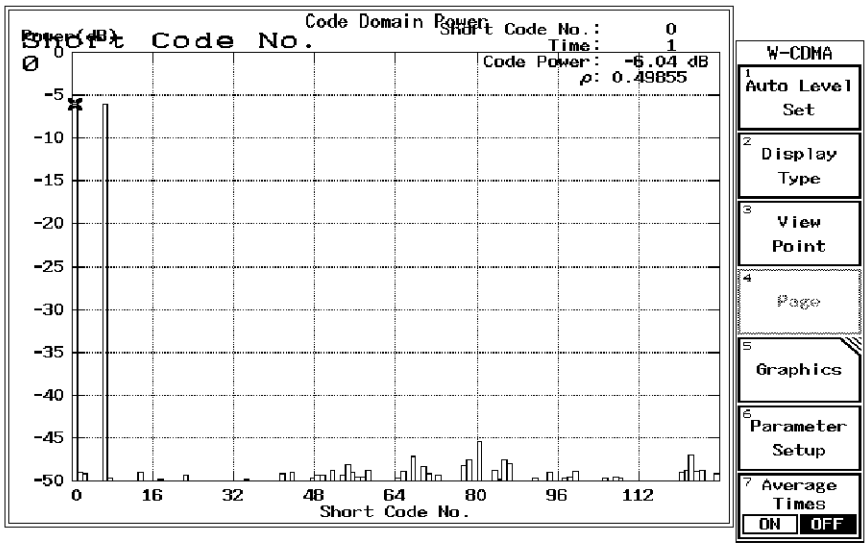


Figure A-10 Graphical Display of Code Domain Power (Consisting of Two Channels Which Have the Same Power and Are Multiplexed into a Data Circuit) (Measurement Range: 1280 Chips)

A.2 Messages

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

Code	Messages	Description
700	System Error. Cannot allocate the required memory.	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 operation. 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.	
709	Incorrect channel settings. Reset the channel class and number.	The channel class and data rate is set incorrectly. Check the pair of data rate and channel class.
710	Auto Level completed !	
711	Auto Level Set can not be succeed. Signal level is not stable.	
750	Handshake error occurred to DSP. Contact qualified engineer.	
751	Cannot Detect Mod. DSP board. Contact qualified engineer.	

ALPHABETICAL INDEX

[X]

[Y]

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