ADVANTEST

ADVANTEST CORPORATION

R3267 Series OPT63
GSM/DECT
Measurement Option
Operation Manual

MANUAL NUMBER FOE-8335241F00

Applicable models

R3264
R3267
R3273

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Printed in Japan

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

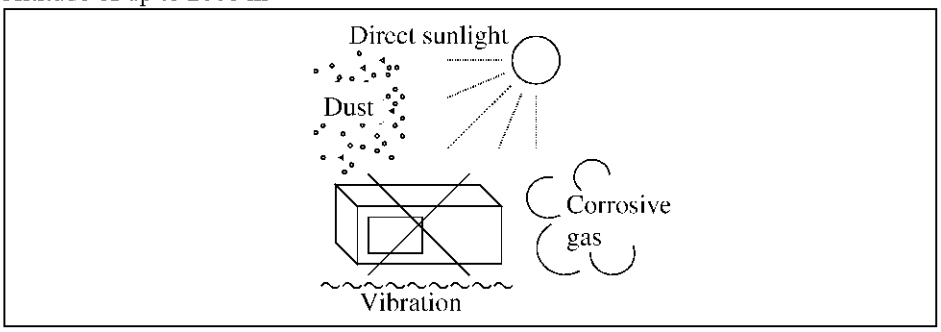


Figure-1 Environmental Conditions

- Operating position

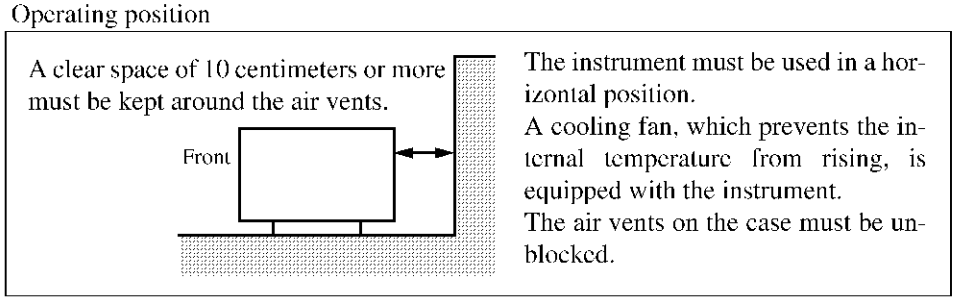


Figure-2 Operating Position

- Storage position

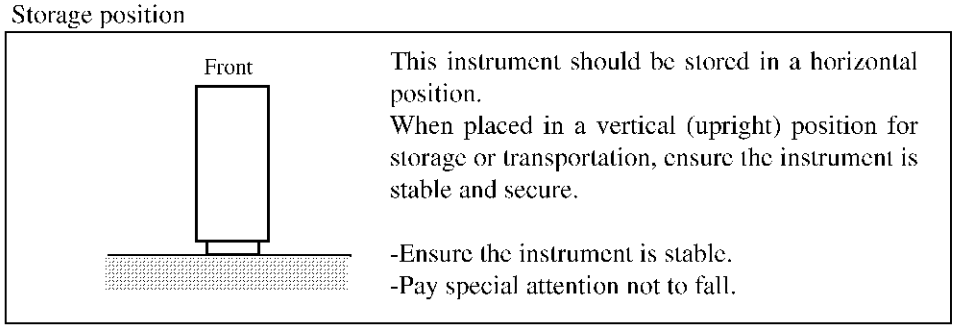


Figure-3 Storage Position

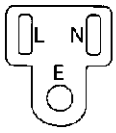
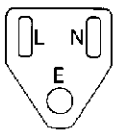
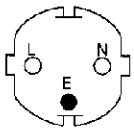
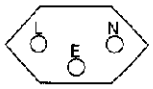
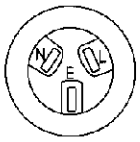
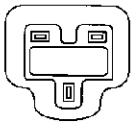
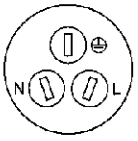
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  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

PREFACE

This manual provides the information necessary to check functionality, operate and program the R3267 Series Option 63, GSM/DECT measurement.

1. Organization of this manual

This manual consists of the following chapters:

Safety Summary	To use the analyzer safely, be sure to read this manual first.
1. Introduction • Product Description (Option) • Standard Accessories • Self Test Error • Connectors on the rear panel	Includes a description of the option and its' parts and a self test error.
2. Operation	You can learn the basic operations of the option through the examples shown in this chapter.
3. Reference • Menu Index • Menu Map • Functional Description	Shows a list of operation keys, and describes the function of each key.
4. Remote Control • GPIB	Included are a list of commands necessary for programming.
5. Technical Information • Filter settings on GSM/DECT. • On DECT, Bit Sequence setting and a measurement of UP/DOWN LINK Signal. • On GSM, measurements of MULTI-BURST Signal and Phase Error. • Template function • Block diagram	Describes the principle of operation necessary for taking measurements more accurately.
6. Performance Verification Test	Describes how to test performance.
7. Specifications	Shows the specifications of the option.
APPENDIX • Messages	If an error occurs during operation, an error number and its corresponding error message are displayed. The meaning of each error is explained in this section.

2. Typeface conventions used in this manual

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

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

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

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1 INTRODUCTION

1.1 Product Overview

The GSM/EDGE/DECT option (Option 63) is the software designed to measure and evaluate frequency errors in GSM/DECT as well as characteristics of burst waveform's leading and trailing edges.

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

The key features of this option allow the user to:

- Measure the signals used in the GSM, EDGE and DECT digital wireless communication systems by simply switching between the two.
- Analyze signal characteristics compliant with GSM such as phase errors, frequency errors, and leading or trailing edges of burst signals.
- Leading and trailing burst waveforms and error vector magnitudes (EVM) can be analyzed according to the EDGE standards.
- Analyze signal characteristics compliant with DECT such as frequency deviations, frequency errors, jitters, and leading or trailing edges of burst signals.
- Make measurements compliant the communication standard with simple key operations.

1.2 Accessories

Name of accesories	Type of name	Quantitiy	Remarks
R3267 Series OPT63 Operation manual	ER3267/73 OPT63	1	English

1.3 Self Test Function

The self test also checks the Option 63 for correct operation when the spectrum analyzer power is turned on. The message shown below will be displayed when an error related to Option 63 occurs. Contact ADVANTEST Corp. for repair.

Error Message
Handshake error occurred to DSP

1.4 About Calibration

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

Desirable Period	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 INPUT I channel terminal Connector for inputting the I channel signal (Baseband).

③ INPUT Q channel terminal Connector for inputting the Q channel signal (Baseband).

2 OPERATION

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

2.1 Measuring Multi-burst Signals (No External Triggers Available)

This section describes how to measure the signals (from GSM mobile station or the base station) which contain multiple bursts in one frame. It is assumed that no external triggers are available.

Measurement specifications: Up link frequency: 945 MHz and Sync word TSC 0

Setup

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

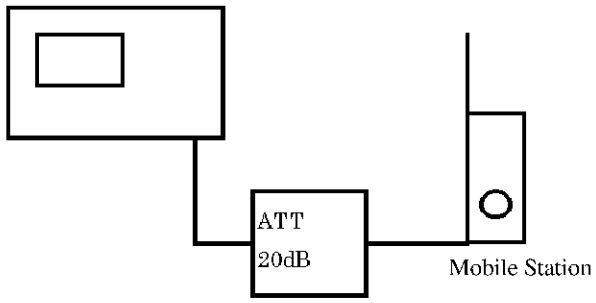


Figure 2-1 Connections for GSM Measurements

2. Press **TRANSIENT**, ***STD*** and ***STD Setup*** to open the STD Measurement Parameter Set menu.

3. Select ***GMSK*** from ***Modulation*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

4. Select ***GSM900*** from ***Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

5. Select ***MULTI-BURST*** from ***Meas Mode*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

6. Select ***MS*** from ***Link*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

7. Select ***148 BIT*** from ***Burst Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

8. Select ***SYNC WORD*** from ***Sync Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

9. Select ***0*** from ***TSC*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

10. Select ***WIDE*** from ***Filter Mode*** using the data knob, and press the data knob (or **ENTR**) to register the parameter. For the definition of the filter, refer to Section 5.1 "NARROW/WIDE in the GSM filter mode."

11. Select ***OTHER*** from ***Power Control Level*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

12. Enter 20 dB for ***Offset Level*** using the data knob, because the RF signal is already provided with an attenuation of 20 dB.

13. To directly enter the frequency, select ***FREQUENCY*** from ***Frequency Input*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

14. To analyze signal with an RF input, select ***RF*** from ***Input*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

15. Assuming that the phase of the input signal is not inverted, select ***NORMAL*** in ***IQ Inverse*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

16. Select ***OFF*** from ***Cont Auto Level Set*** using the data knob when the auto ranging function is not used, and press the data knob (or **ENTR**) to register the parameter.

17. Press **RETURN** to close the dialog box.

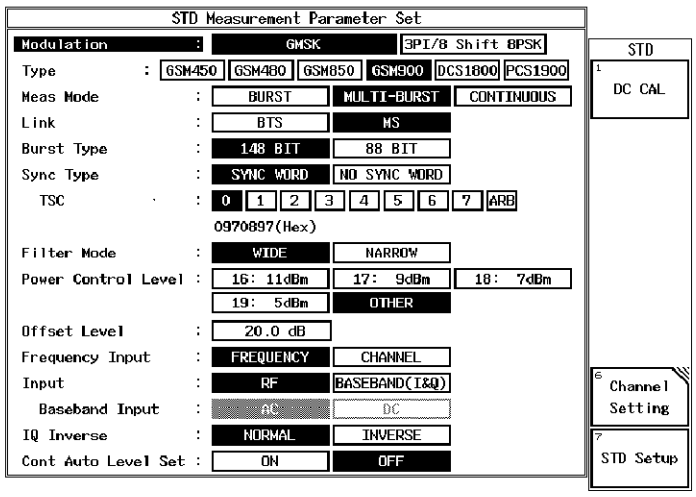


Figure 2-2 STD Measurement Parameter Set Dialog Box

18. Press ***Modulation***.

19. Press ***Phase Error*** to open the phase error measurement menu.

20. Press ***Parameter Setup*** to open the Parameter Setup dialog box.

21. Select ***FREE RUN*** from ***Trigger Source*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

22. Press the arrow key↓ to shift the cursor to Search Level and enter -25 dB.

23. Select ***OFF*** from ***Half Symbol Shift*** using the data knob, and press the data knob (or **ENTR**) to determine the parameter.

24. Press ***Parameter Setup*** to close the dialog box.

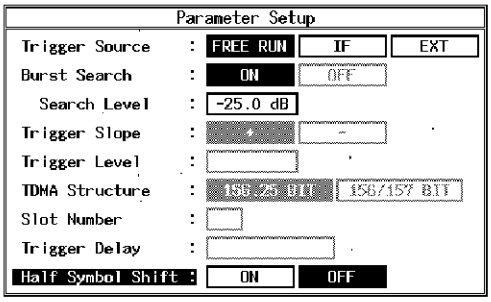


Figure 2-3 Parameter Setup Dialog Box

Setting the frequency

25. Press **FREQ, 945** and **MHz** to set the frequency.

26. Press **RETURN** to return to the measurement menu.

Executing Auto Level Set

27. Press ***Auto Level Set***, and wait until the "Auto Level Completed!" is displayed.

Measuring

28. Press **SINGLE** or **REPEAT** to start the measurement.
    Press **REPEAT** (**STOP**) again to terminate the measurement.

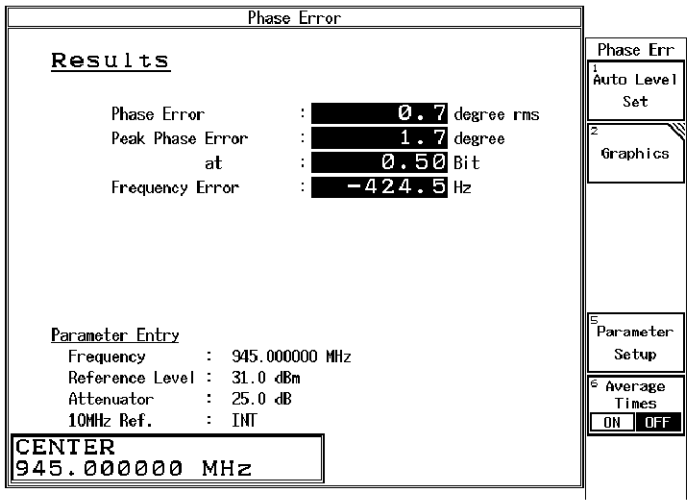


Figure 2-4 Phase Error Measurement Results

Displaying the graphics

Phase Error vs Bit graph is displayed.

29. Press ***Graphics***.

30. Press ***Select Type*** to open Graphic Type of Analysis dialog box.

31. Select ***Phase Error vs Bit*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

Figure 2-5 Displaying Phase Error vs Bit Graph

32. Press **MKR** to display the marker. Move the marker by turning the data knob.

33. Press **SHIFT** and **MKR** to delete the marker.

34. Press **RETURN** and **RETURN** (**RETURN** twice) to return to the measurement menu.

2.2 Measuring the Multi-Burst Signals (Using an External Trigger)

This section describes how to measure a MULTI-BURST signal, which consist of multiple bursts in one frame, at mobile station or the base station that are used in the GSM system. It is assumed that a frame is in sync with the trigger signal at its beginning.

Specification: Down link channel of 945 MHz, and the sync word TSC 2.

Setup

1. Connect the instruments as shown in Figure 2-6.

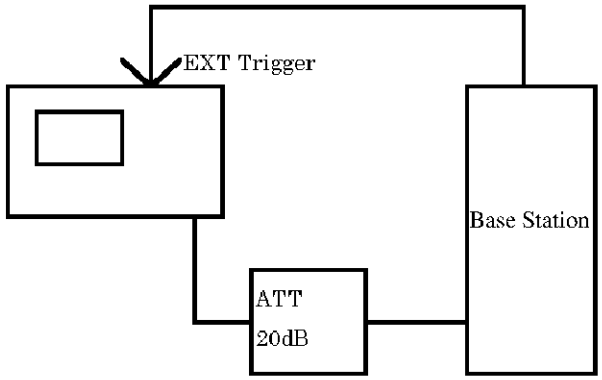


Figure 2-6 Connections for GSM Measurements

2. Press **TRANSIENT**, ***STD*** and ***STD Setup*** to open the STD Measurement Parameter Set menu.

3. Select ***GMSK*** from ***Modulation*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

4. Select ***GSM900*** from ***Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

5. Select ***BURST*** from ***Meas Mode*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

6. Select ***BTS*** from ***Link*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

7. Select ***148 BIT*** from ***Burst Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

8. Select ***SYNC WORD*** from ***Sync Type*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

9. Select ***2*** from ***TSC*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

10. Select ***WIDE*** from ***Filter Mode*** using the data knob, and press the data knob (or **ENTR**) to register the parameter. For the definition of the filter, refer to Section 5.1 "NARROW/WIDE in the GSM filter mode."

11. Enter 20 dB for ***Offset Level*** using the data knob, because the RF signal is already provided with an attenuation of 20 dB.

12. To directly enter the frequency, select ***FREQUENCY*** from ***Frequency Input*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

13. To analyze signal with an RF input, select ***RF*** from ***Input*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

14. Assuming that the IQ signal is not inverted, select ***NORMAL*** in ***IQ Inverse*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

15. Select ***OFF*** from ***Cont Auto Level Set*** using the data knob when the auto ranging function is not used, and press the data knob (or **ENTR**) to register the parameter.

16. Press **RETURN** to close the dialog box.

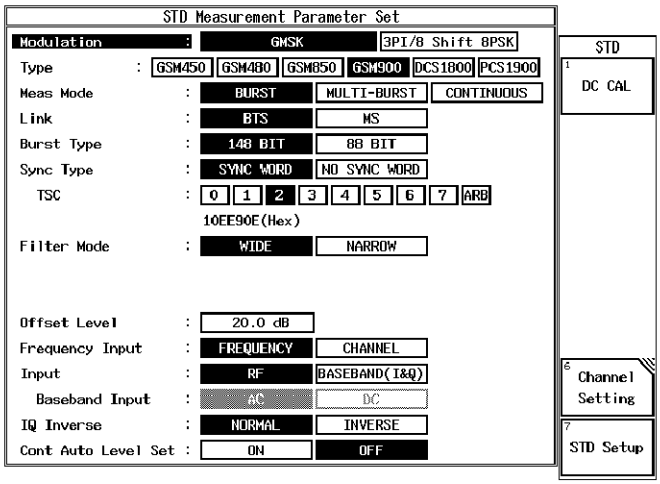


Figure 2-7 STD Measurement Parameter Set Dialog Box

17. Press ***Modulation***.

18. Press ***Phase Error*** to open the phase error measurement menu.

19. Press ***Parameter Setup*** to open the Parameter Setup dialog box.

20. Select ***EXT*** from ***Trigger Source*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

21. Select ***OFF*** from ***Burst Search*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

22. Select **+** from ***Trigger Slope*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

23. Select **156.25 BIT** from ***TDMA Structure*** using the data knob, and press the data knob (or **ENTR**) to register the parameter. (all slots in GSM are assumed to be 156.25 bits)

24. Enter ***2*** in ***Slot Number*** using the numeric key and press **ENTR** to measure Slot 2. Trigger delay will be automatically calculated and displayed when Slot Number is set.

25. Move the cursor to ***Half Symbol Shift*** using the arrow key↓, and press the data knob (or **ENTR**) to determine the parameter.

26. Press ***Parameter Setup*** to close the dialog box.

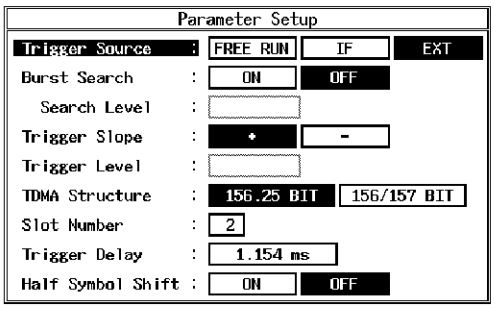


Figure 2-8 Parameter Setup Dialog box

Setting the frequency

27. Press **FREQ, 945** and **MHz** to set the frequency.

28. Press **RETURN** to return to the measurement menu.

Executing Auto Level Set

29. Press ***Auto Level Set***, and wait until the "Auto Level Completed !" is displayed.

Measuring

30. Press **SINGLE** or **REPEAT** to start the measurement.
Press **REPEAT(STOP)** again to terminate the measurement.

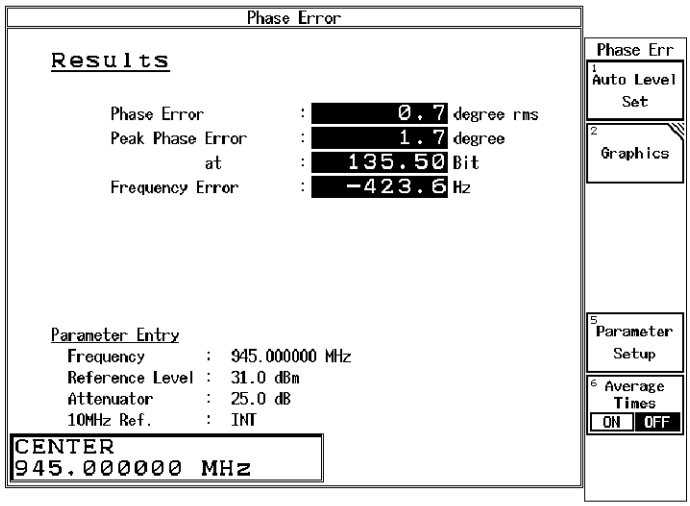


Figure 2-9 Phase Error measurement results

Displaying the graphics

Constellation graph is displayed.

31. Press ***Graphics***.

32. Press ***Select Type*** to open Graphic Type of Analysis dailog box.

33. Select ***Constellation*** using the data knob, and press the data knob (or **ENTR**) to register the parameter.

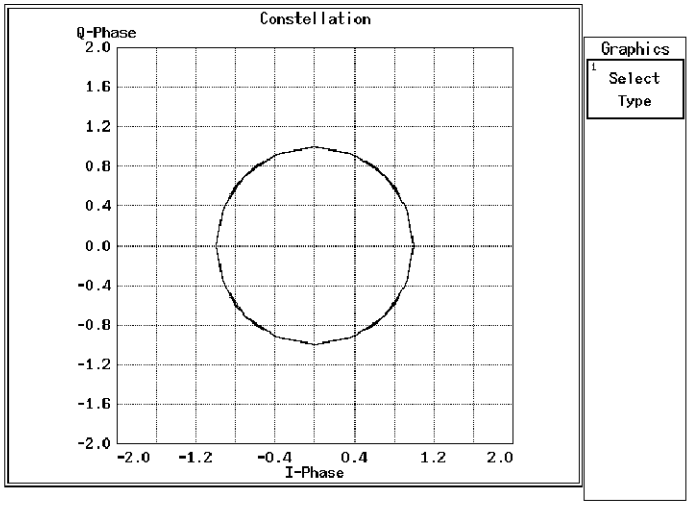


Figure 2-10 Displaying Constellation Graph

34. Press **MKR** to display the marker. Turn the data knob to move the marker.
35. Press **SHIFT** and **MKR** to make the marker to go out.
36. Press **RETURN** and **RETURN** to return to the measurement menu.

3 REFERENCE

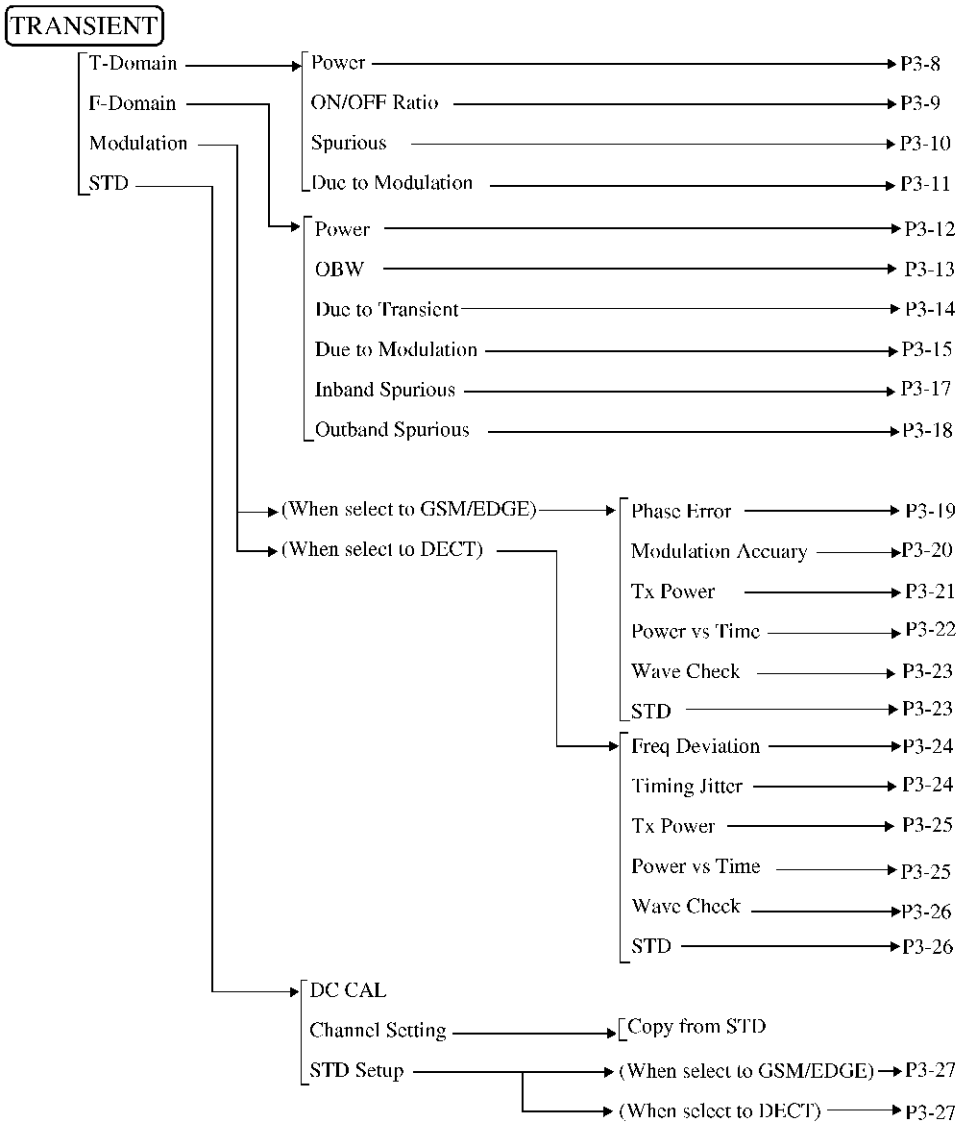
This chapter describes the functions of the panel and soft keys for option 63 software.

3.1 Menu Index

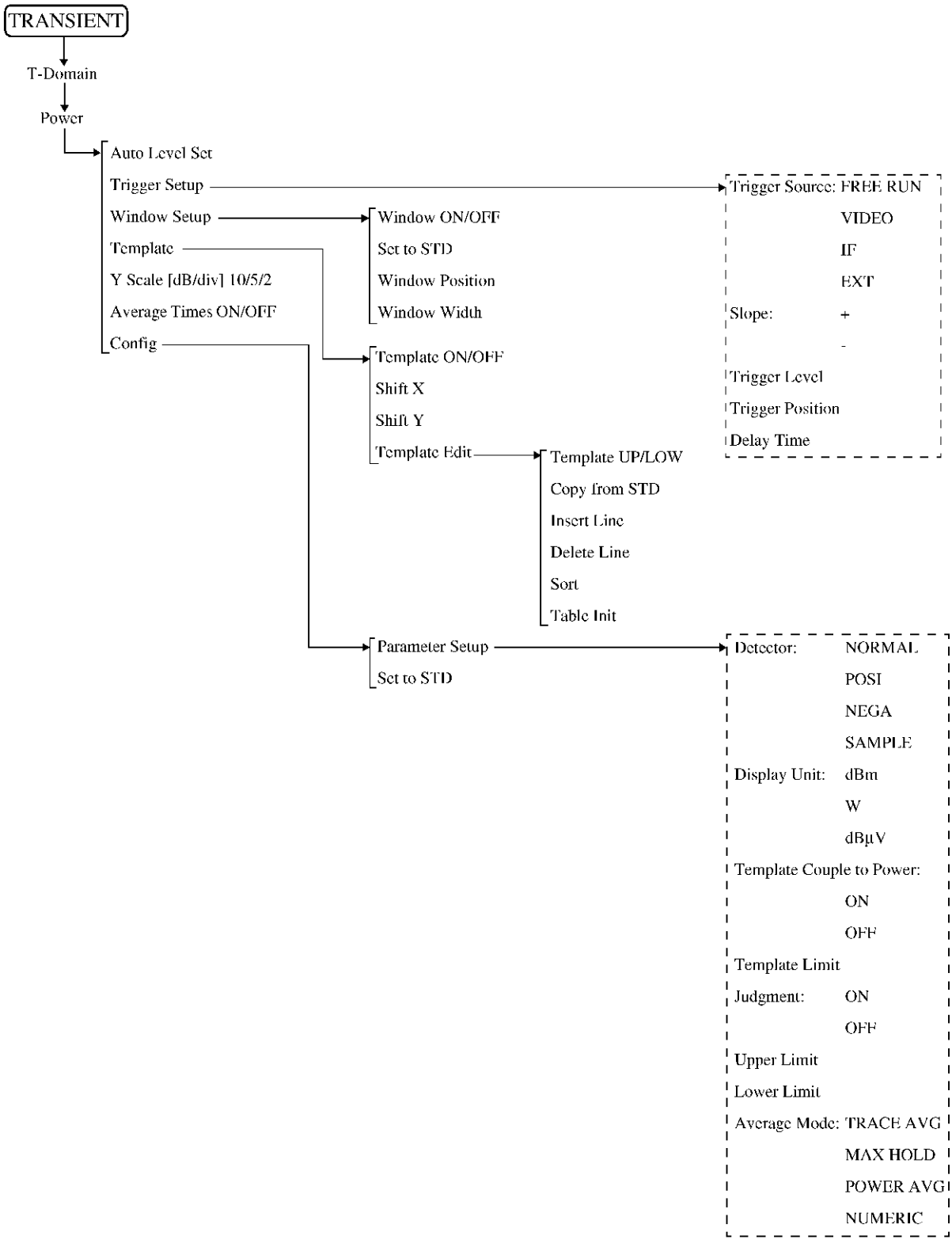
This menu index is used to easily find the keys described in Chapter 3.

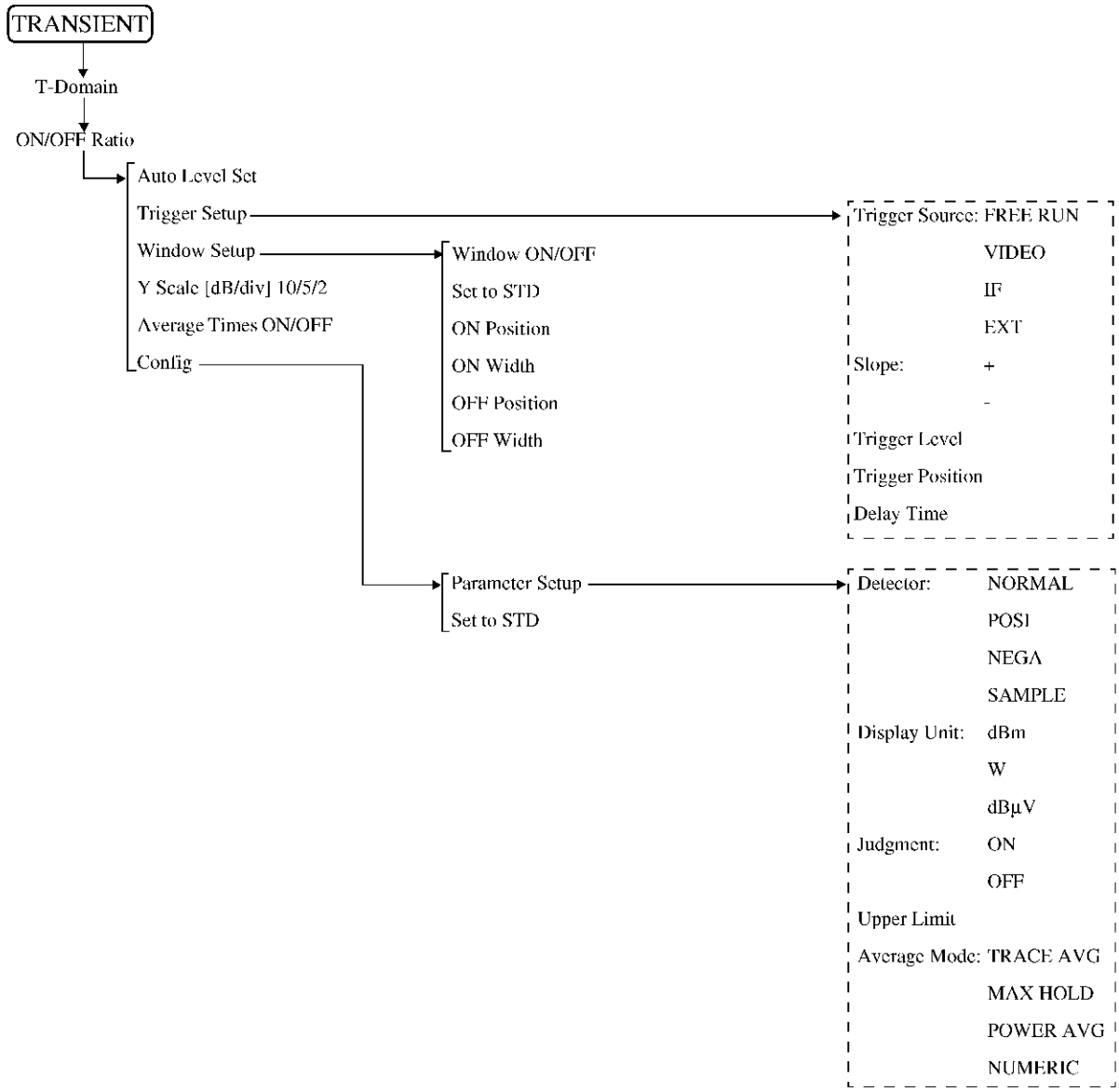
3.2 Menu Map

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

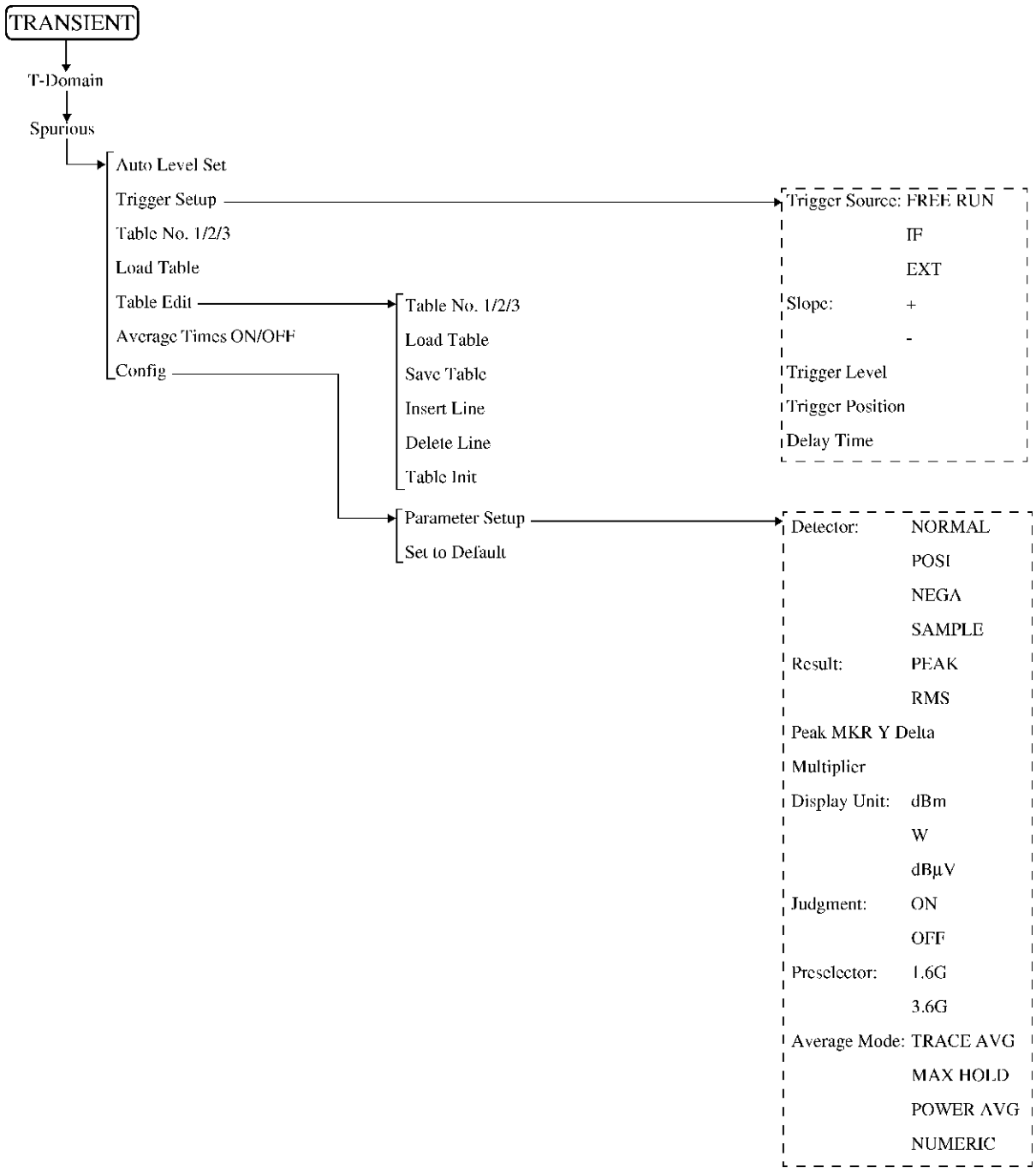


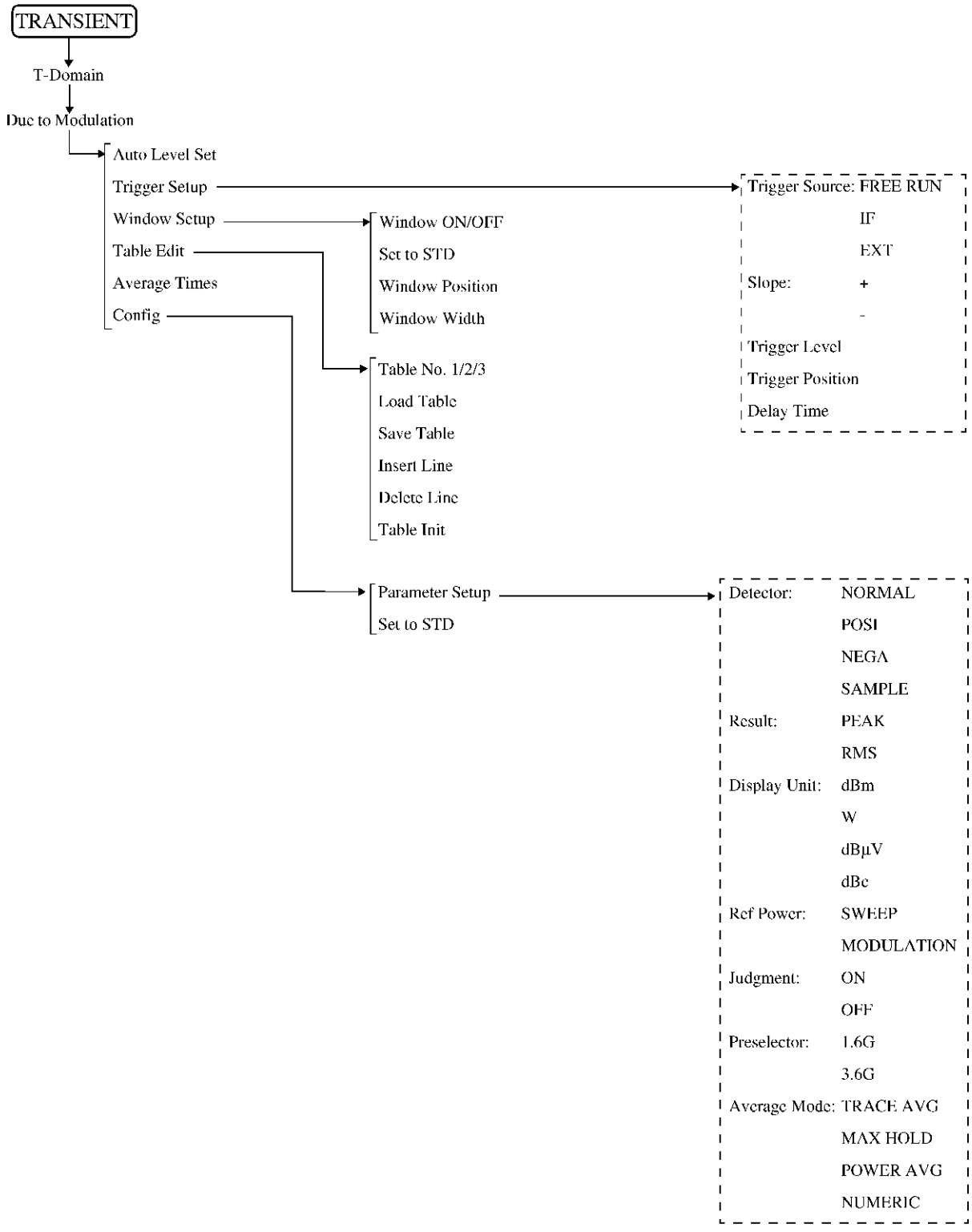
3.2 Menu Map


TRANSIENT
T-Domain
Power
Auto Level Set
Trigger Setup
Window Setup
Template
Y Scale [dB/div] 10/5/2
Average Times ON/OFF
Config
Window ON/OFF
Set to STD
Window Position
Window Width
Template ON/OFF
Shift X
Shift Y
Template Edit
Template UP/LOW
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Display Unit: dBm
W
dBµV
Template Couple to Power:
ON
OFF
Template Limit
Judgment: ON
OFF
Upper Limit
Lower Limit
Average Mode: TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

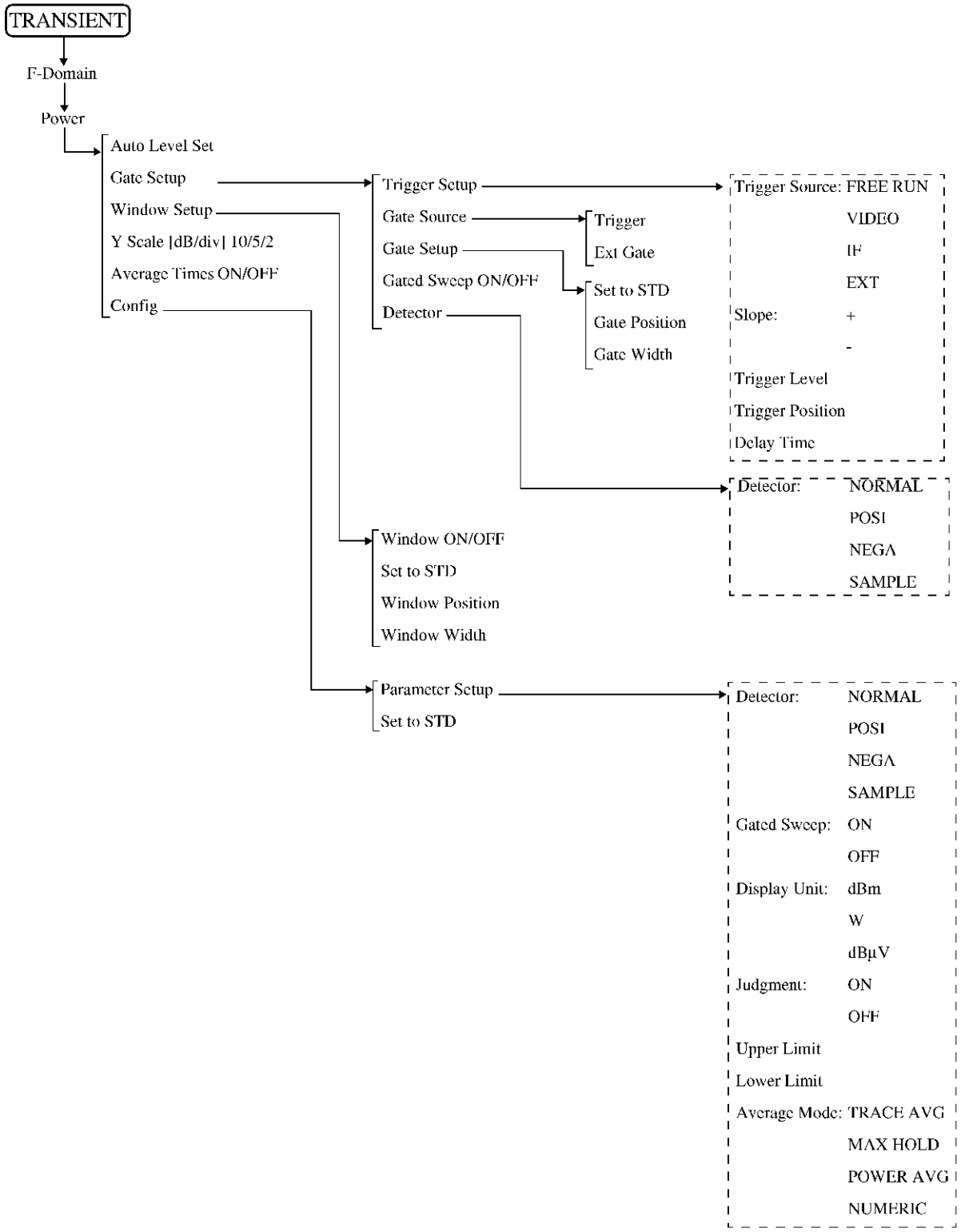

TRANSIENT
T-Domain
ON/OFF Ratio
Auto Level Set
Trigger Setup
Window Setup
Y Scale [dB/div] 10/5/2
Average Times ON/OFF
Config
Window ON/OFF
Set to STD
ON Position
ON Width
OFF Position
OFF Width
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Parameter Setup
Set to STD
Detector: NORMAL
POSI
NEGA
SAMPLE
Display Unit: dBm
W
dBµV
Judgment: ON
OFF
Upper Limit
Average Mode: TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

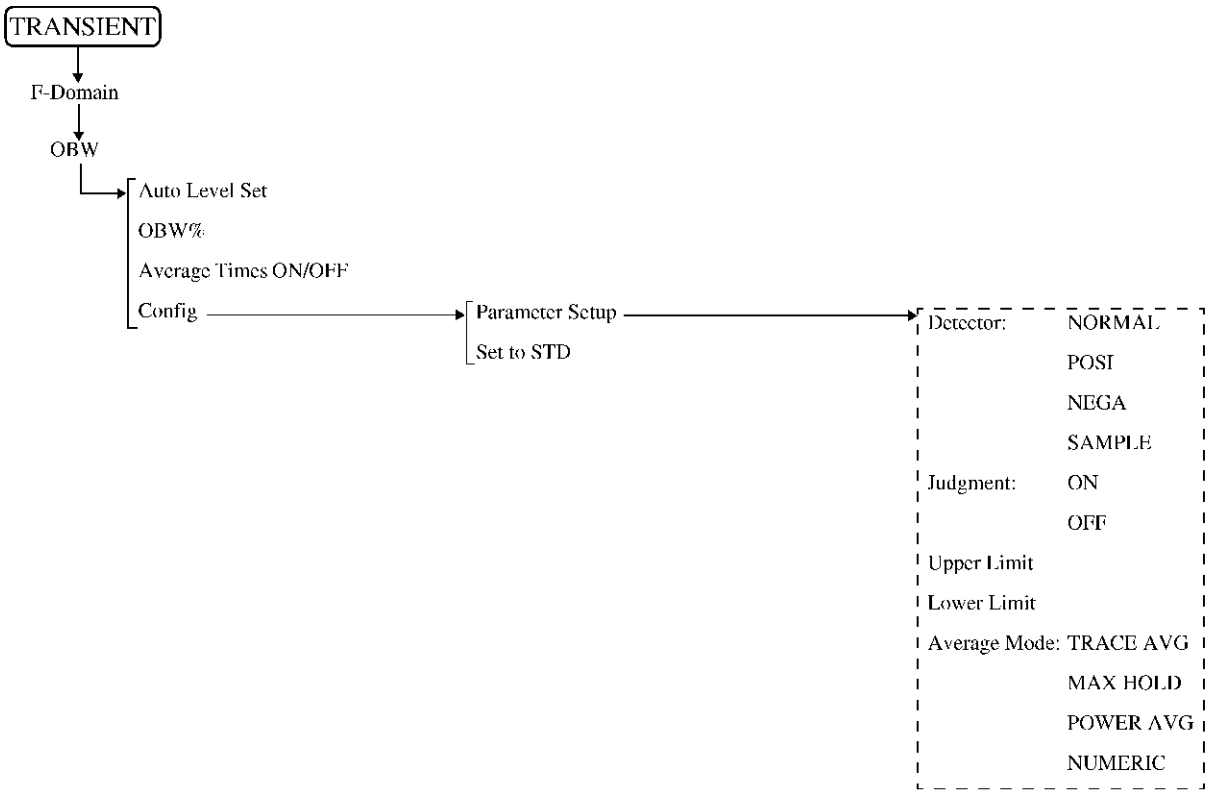
3.2 Menu Map


TRANSIENT
T-Domain
Spurious
Auto Level Set
Trigger Setup
Table No. 1/2/3
Load Table
Table Edit
Average Times ON/OFF
Config
Table No. 1/2/3
Load Table
Save Table
Insert Line
Delete Line
Table Init
Parameter Setup
Set to Default
Trigger Source: FREE RUN
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Result: PEAK
RMS
Peak MKR Y Delta
Multiplier
Display Unit: dBm
W
dBµV
Judgment: ON
OFF
Preselector: 1.6G
3.6G
Average Mode: TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

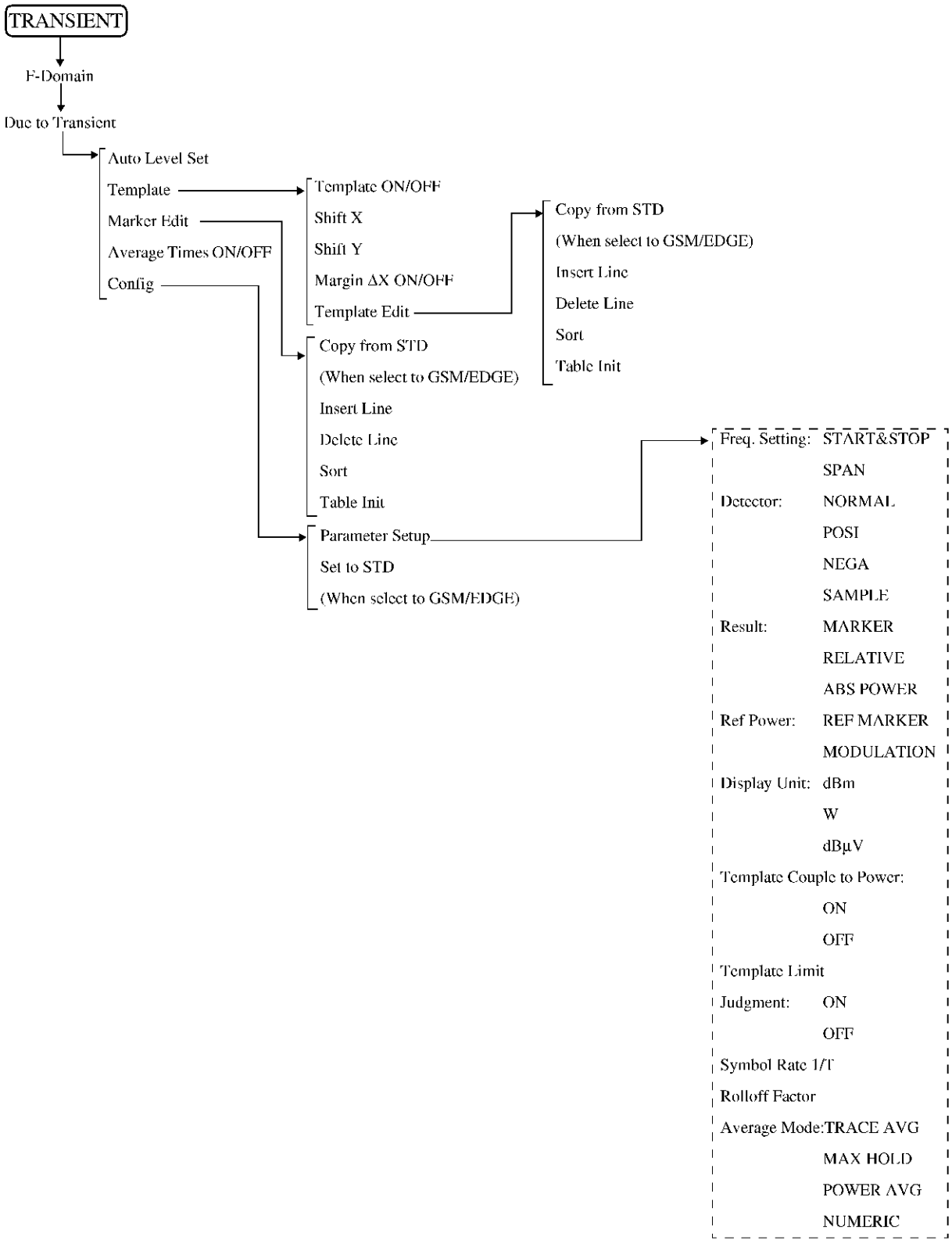

TRANSIENT
T-Domain
Due to Modulation
Auto Level Set
Trigger Setup
Window Setup
Table Edit
Average Times
Config
Window ON/OFF
Set to STD
Window Position
Window Width
Table No. 1/2/3
Load Table
Save Table
Insert Line
Delete Line
Table Init
Parameter Setup
Set to STD
Trigger Source: FREE RUN
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Result: PEAK
RMS
Display Unit: dBm
W
dBµV
dBc
Ref Power: SWEEP
MODULATION
Judgment: ON
OFF
Preselector: 1.6G
3.6G
Average Mode: TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

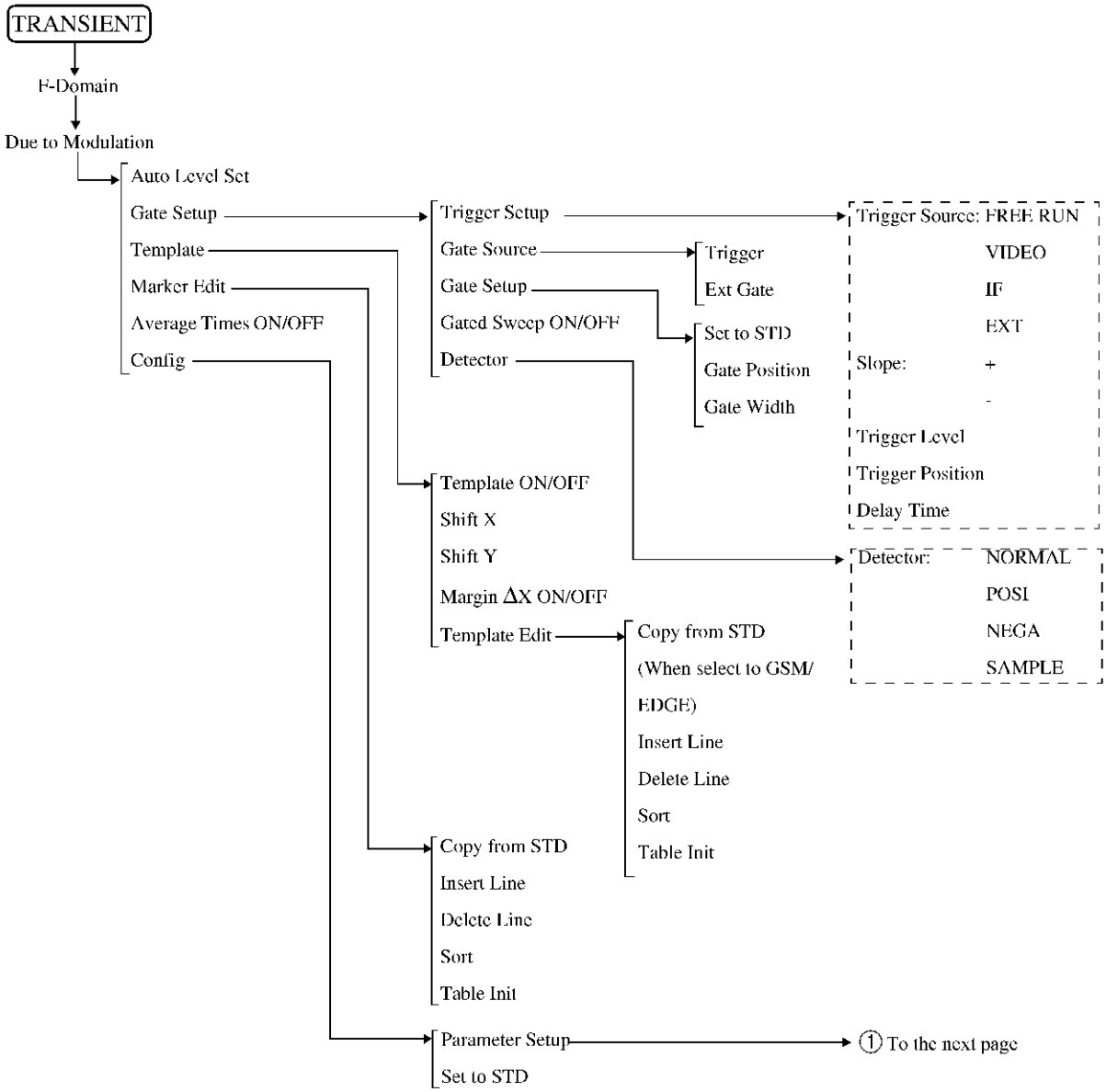
3.2 Menu Map

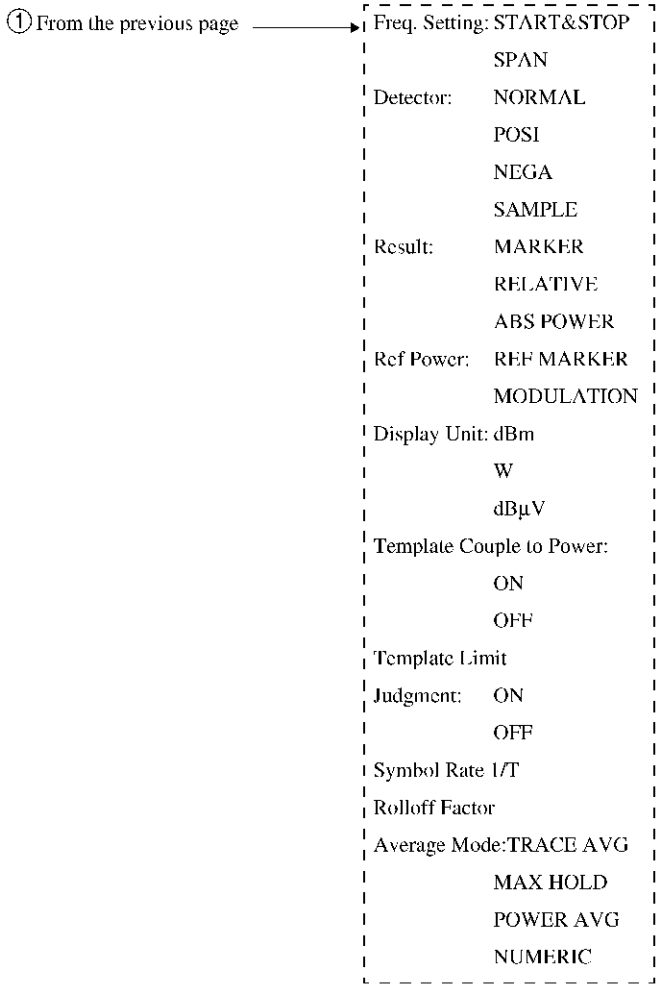

TRANSIENT
F-Domain
Power
Auto Level Set
Gate Setup
Window Setup
Y Scale |dB/div| 10/5/2
Average Times ON/OFF
Config
Trigger Setup
Gate Source
Gate Setup
Gated Sweep ON/OFF
Detector
Trigger
Ext Gate
Set to STD
Gate Position
Gate Width
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Window ON/OFF
Set to STD
Window Position
Window Width
Parameter Setup
Set to STD
Detector: NORMAL
POSI
NEGA
SAMPLE
Gated Sweep: ON
OFF
Display Unit: dBm
W
dBµV
Judgment: ON
OFF
Upper Limit
Lower Limit
Average Mode: TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

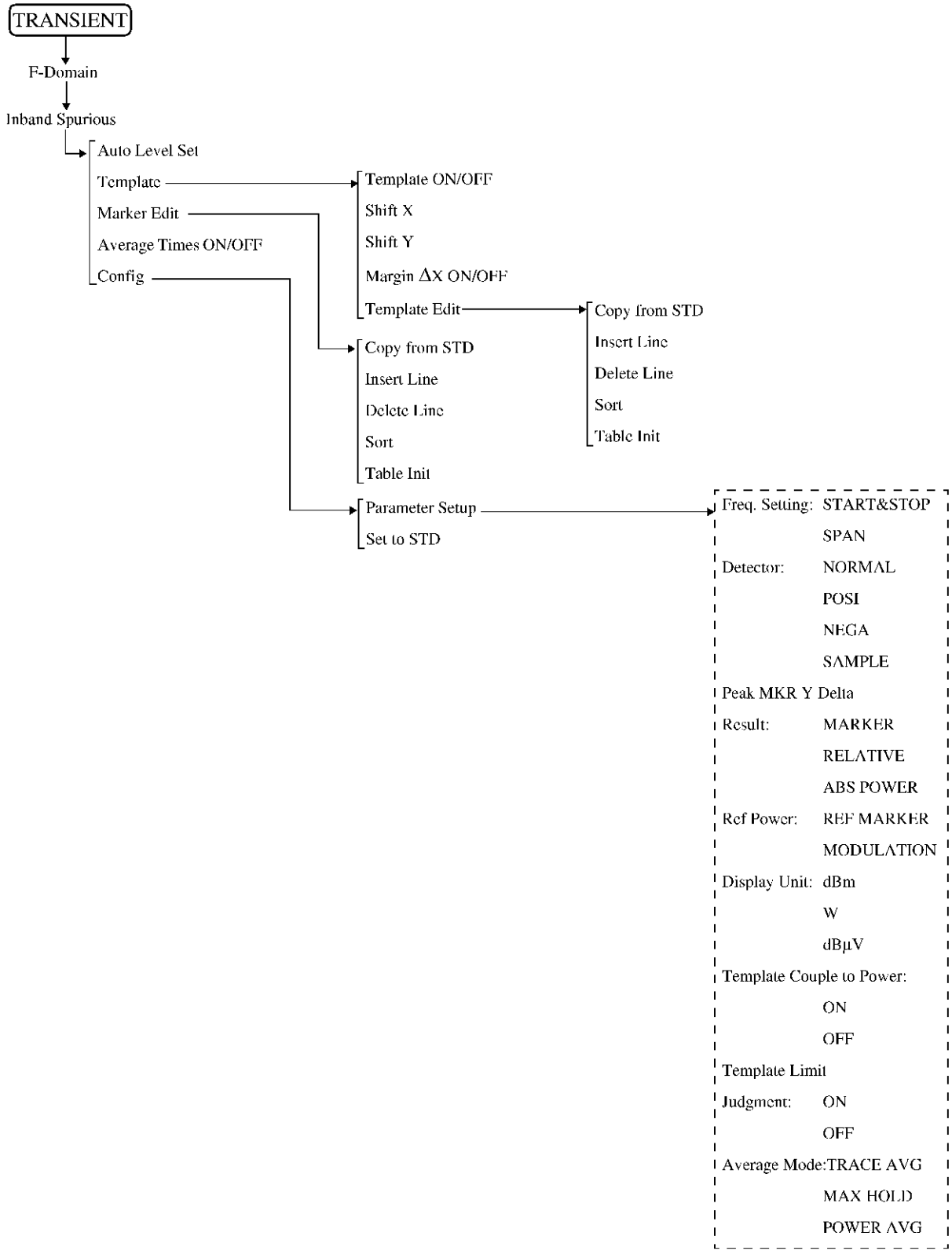

TRANSIENT
F-Domain
OBW
Auto Level Set
OBW%
Average Times ON/OFF
Config
Parameter Setup
Set to STD
Detector:
NORMAL
POSI
NEGA
SAMPLE
Judgment:
ON
OFF
Upper Limit
Lower Limit
Average Mode:
TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

3.2 Menu Map

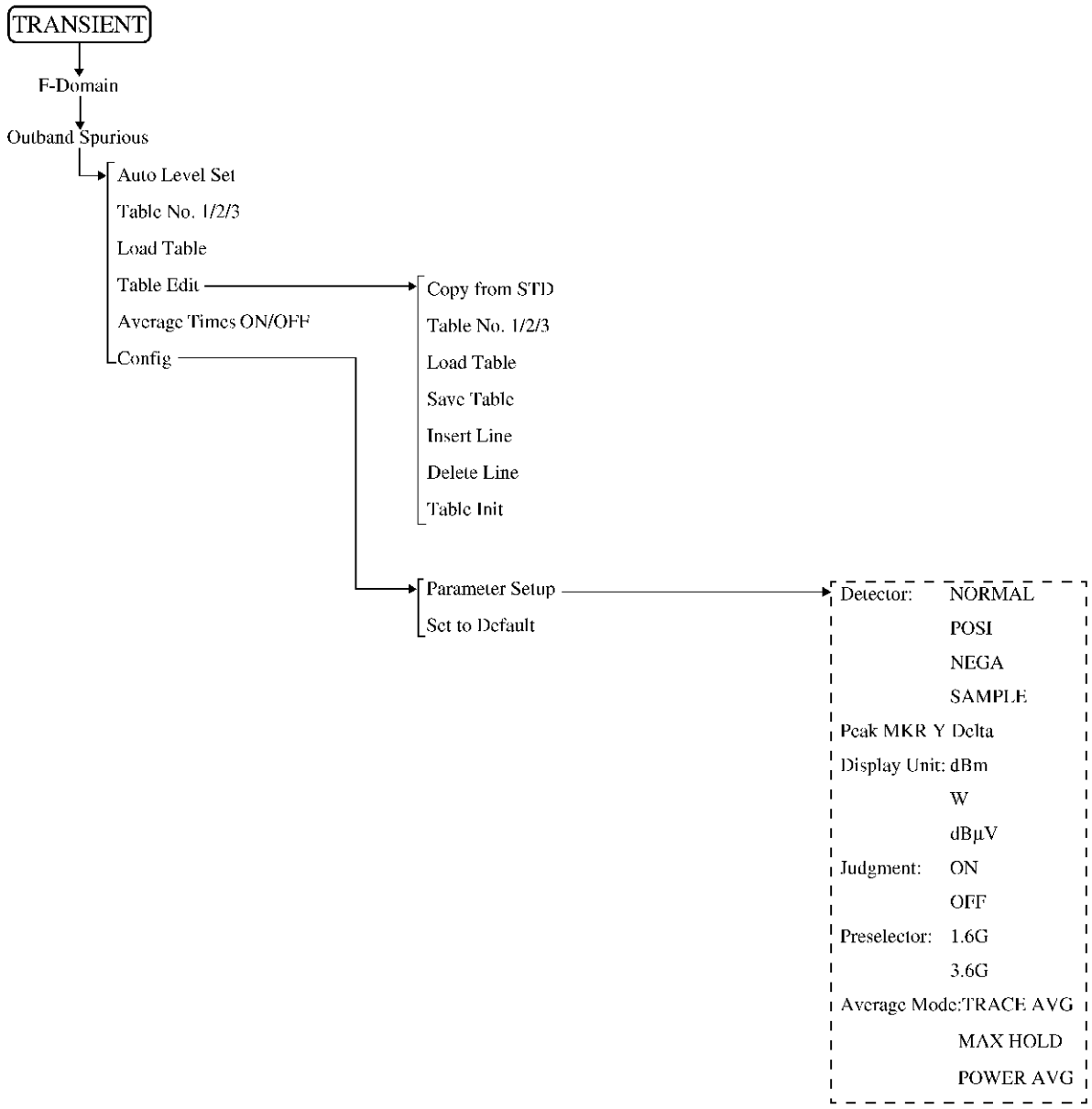

TRANSIENT
F-Domain
Due to Transient
Auto Level Set
Template
Marker Edit
Average Times ON/OFF
Config
Template ON/OFF
Shift X
Shift Y
Margin ΔX ON/OFF
Template Edit
Copy from STD
(When select to GSM/EDGE)
Insert Line
Delete Line
Sort
Table Init
Copy from STD
(When select to GSM/EDGE)
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
(When select to GSM/EDGE)
Freq. Setting: START&STOP
SPAN
Detector: NORMAL
POSI
NEGA
SAMPLE
Result: MARKER
RELATIVE
ABS POWER
Ref Power: REF MARKER
MODULATION
Display Unit: dBm
W
dBμV
Template Couple to Power:
ON
OFF
Template Limit
Judgment: ON
OFF
Symbol Rate 1/T
Rolloff Factor
Average Mode:TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

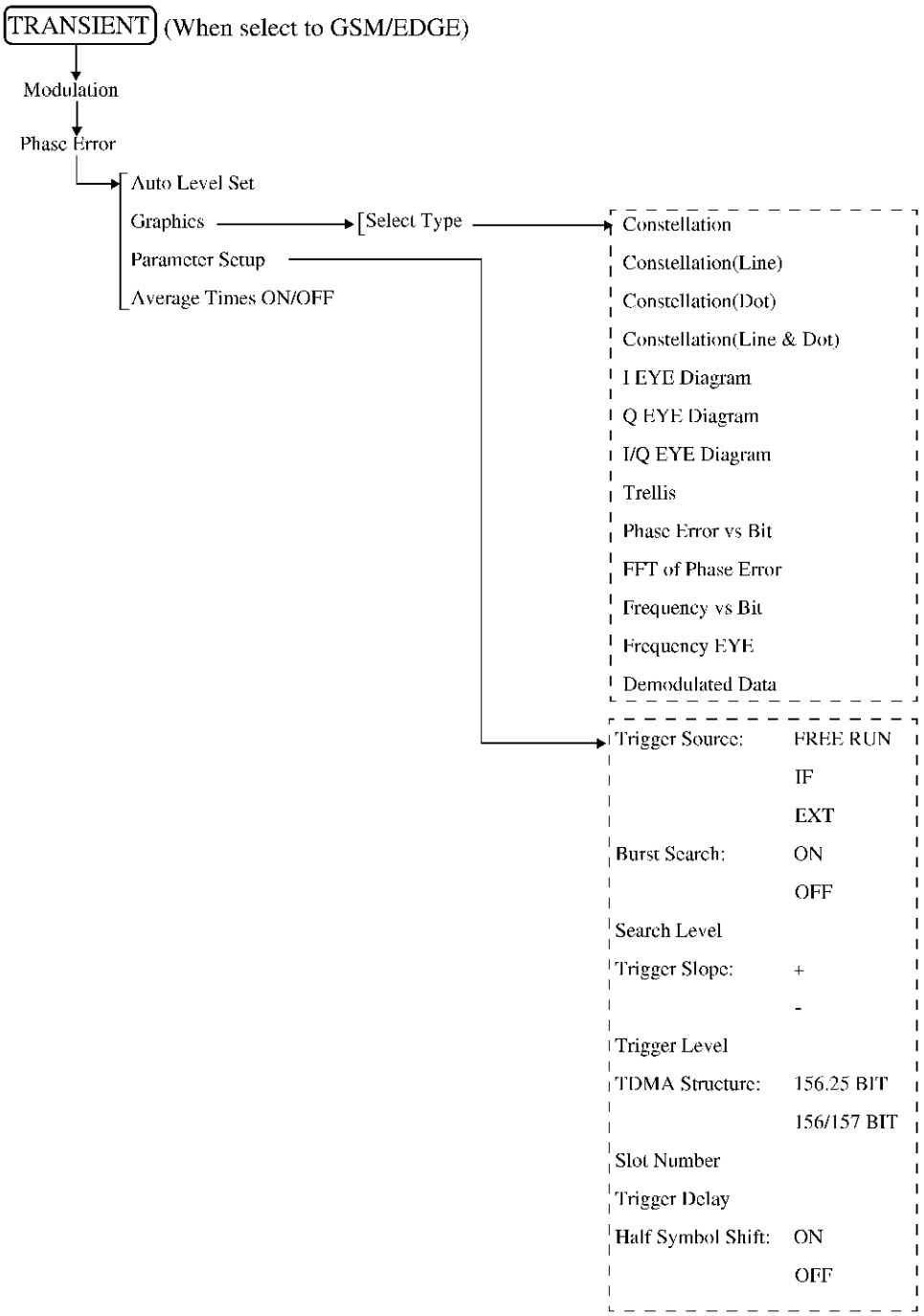

TRANSIENT
F-Domain
Due to Modulation
Auto Level Set
Gate Setup
Template
Marker Edit
Average Times ON/OFF
Config
Trigger Setup
Gate Source
Gate Setup
Gated Sweep ON/OFF
Detector
Trigger
Ext Gate
Set to STD
Gate Position
Gate Width
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Template ON/OFF
Shift X
Shift Y
Margin ΔX ON/OFF
Template Edit
Copy from STD
(When select to GSM/ EDGE)
Insert Line
Delete Line
Sort
Table Init
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
① To the next page


① From the previous page
Freq. Setting: START&STOP
SPAN
Detector: NORMAL
POSI
NEGA
SAMPLE
Result: MARKER
RELATIVE
ABS POWER
Ref Power: REF MARKER
MODULATION
Display Unit: dBm
W
dBμV
Template Couple to Power:
ON
OFF
Template Limit
Judgment: ON
OFF
Symbol Rate 1/T
Rolloff Factor
Average Mode:TRACE AVG
MAX HOLD
POWER AVG
NUMERIC

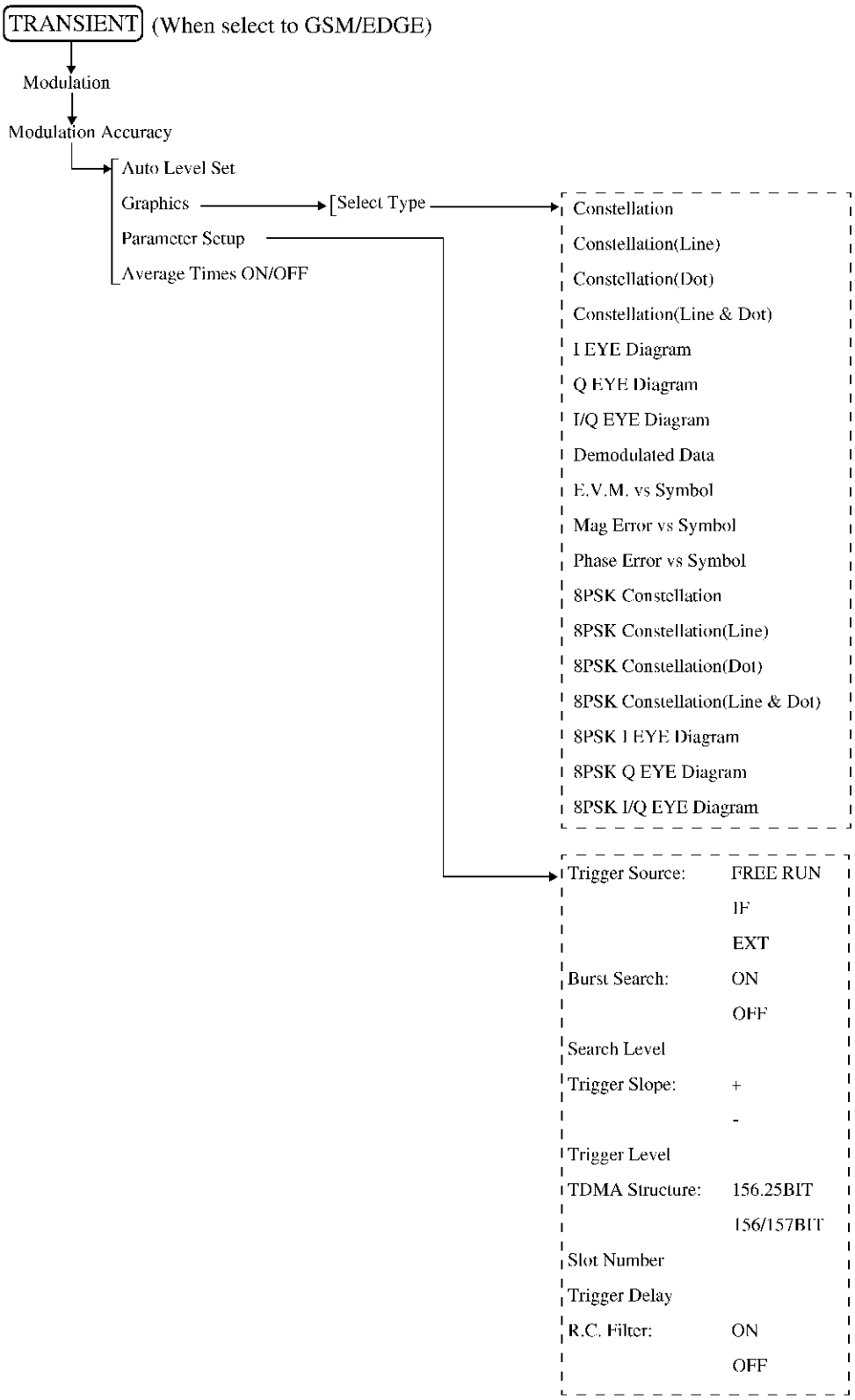

TRANSIENT
F-Domain
Inband Spurious
Auto Level Set
Template
Marker Edit
Average Times ON/OFF
Config
Template ON/OFF
Shift X
Shift Y
Margin ΔX ON/OFF
Template Edit
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
Freq. Setting: START&STOP
SPAN
Detector: NORMAL
POSI
NEGA
SAMPLE
Peak MKR Y Delta
Result: MARKER
RELATIVE
ABS POWER
Ref Power: REF MARKER
MODULATION
Display Unit: dBm
W
dBμV
Template Couple to Power:
ON
OFF
Template Limit
Judgment: ON
OFF
Average Mode:TRACE AVG
MAX HOLD
POWER AVG

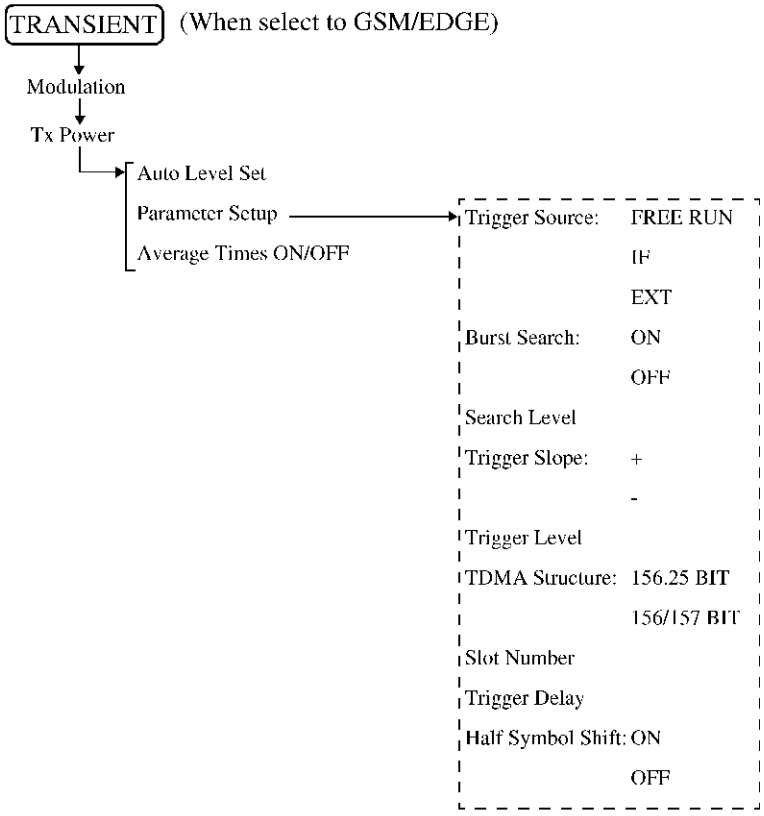
3.2 Menu Map

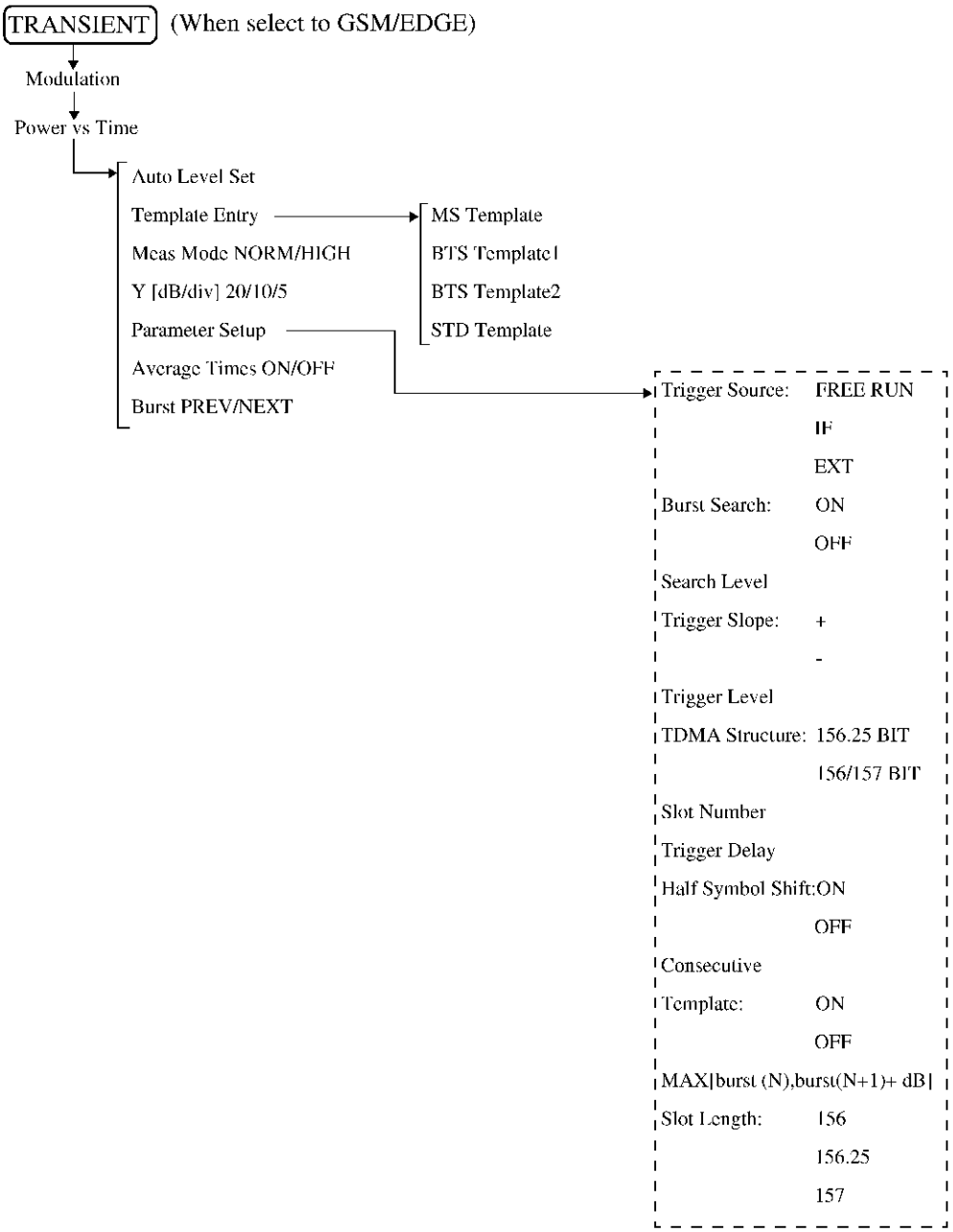

TRANSIENT
F-Domain
Outband Spurious
Auto Level Set
Table No. 1/2/3
Load Table
Table Edit
Average Times ON/OFF
Config
Copy from STD
Table No. 1/2/3
Load Table
Save Table
Insert Line
Delete Line
Table Init
Parameter Setup
Set to Default
Detector: NORMAL
POSI
NEGA
SAMPLE
Peak MKR Y Delta
Display Unit: dBm
W
dBµV
Judgment: ON
OFF
Preselector: 1.6G
3.6G
Average Mode:TRACE AVG
MAX HOLD
POWER AVG

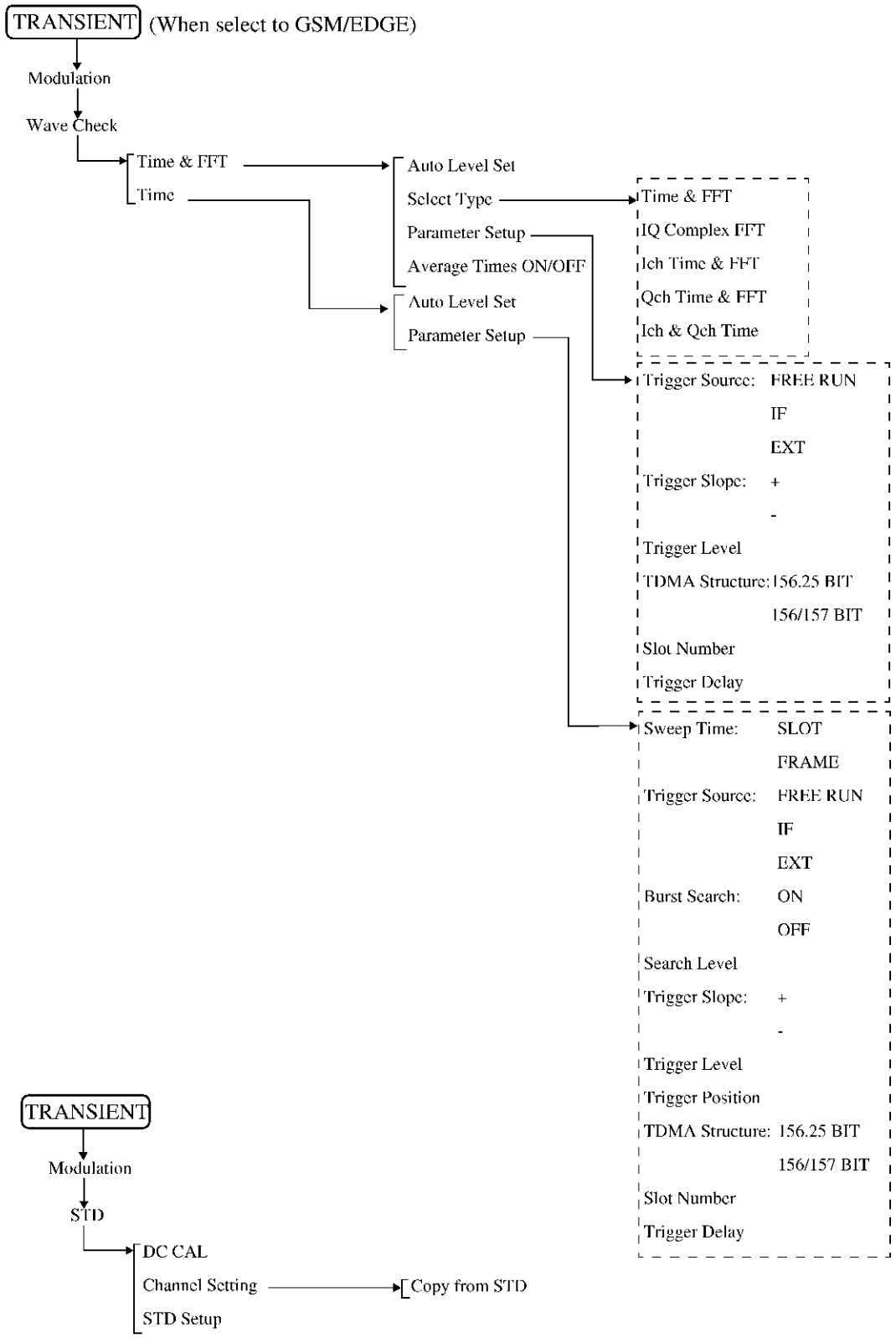

TRANSIENT
(When select to GSM/EDGE)
Modulation
Phase Error
Auto Level Set
Graphics
Select Type
Parameter Setup
Average Times ON/OFF
Constellation
Constellation(Line)
Constellation(Dot)
Constellation(Line & Dot)
I EYE Diagram
Q EYE Diagram
I/Q EYE Diagram
Trellis
Phase Error vs Bit
FFT of Phase Error
Frequency vs Bit
Frequency EYE
Demodulated Data
Trigger Source:
FREE RUN
IF
EXT
Burst Search:
ON
OFF
Search Level
Trigger Slope:
+
-
Trigger Level
TDMA Structure:
156.25 BIT
156/157 BIT
Slot Number
Trigger Delay
Half Symbol Shift:
ON
OFF

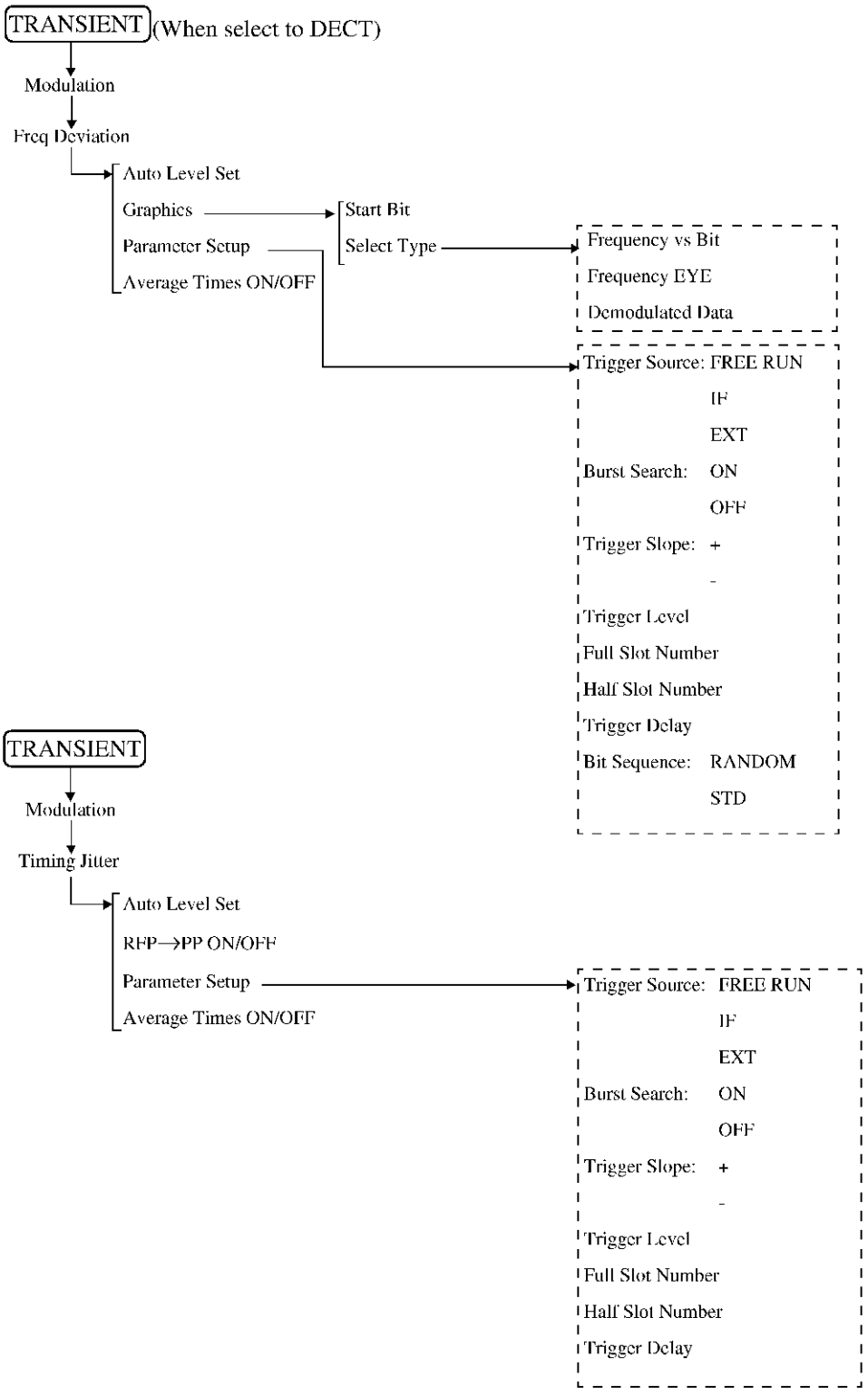
3.2 Menu Map

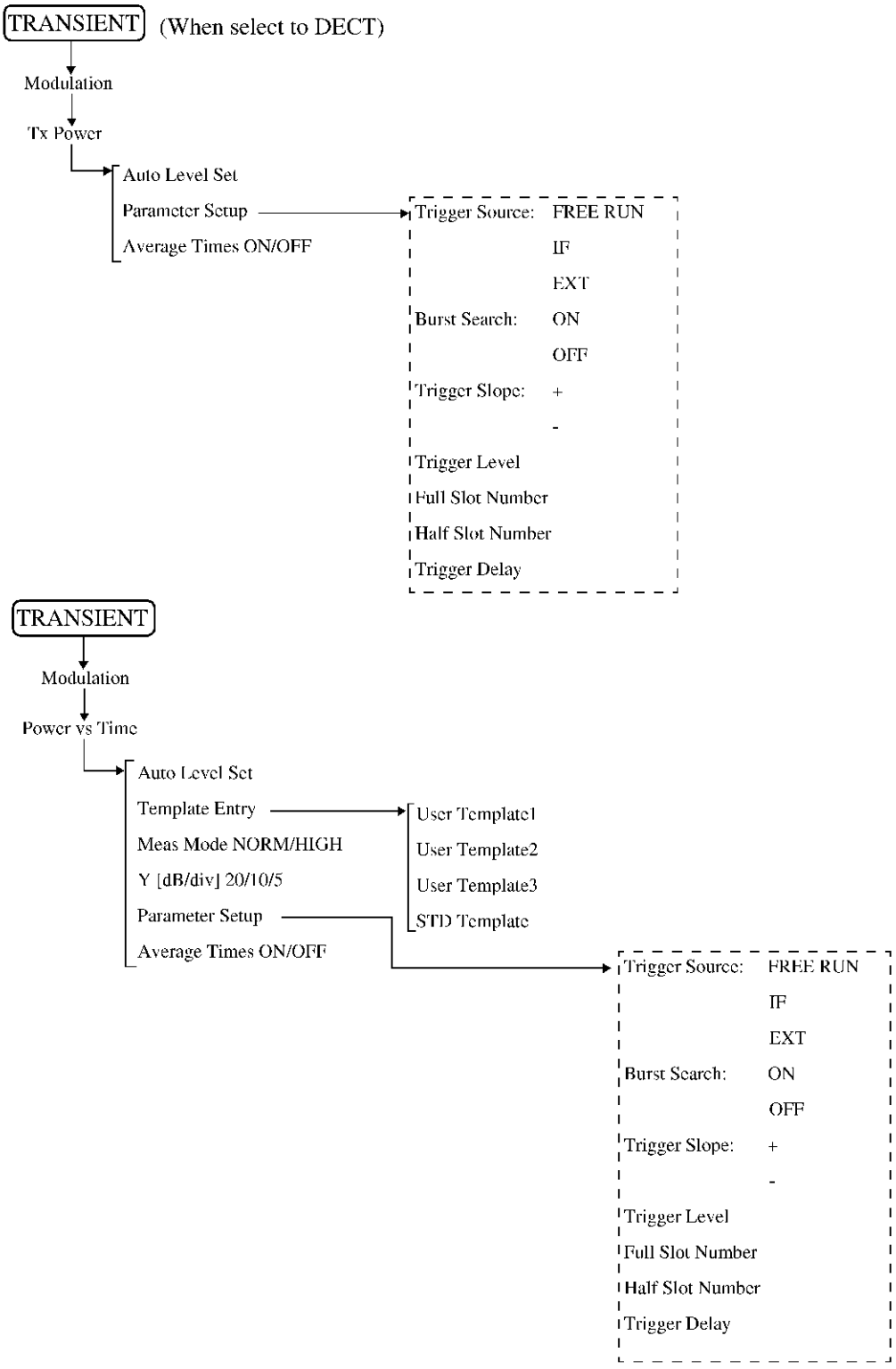

TRANSIENT
(When select to GSM/EDGE)
Modulation
Modulation Accuracy
Auto Level Set
Graphics
Select Type
Parameter Setup
Average Times ON/OFF
Constellation
Constellation(Line)
Constellation(Dot)
Constellation(Line & Dot)
I EYE Diagram
Q EYE Diagram
I/Q EYE Diagram
Demodulated Data
E.V.M. vs Symbol
Mag Error vs Symbol
Phase Error vs Symbol
8PSK Constellation
8PSK Constellation(Line)
8PSK Constellation(Dot)
8PSK Constellation(Line & Dot)
8PSK I EYE Diagram
8PSK Q EYE Diagram
8PSK I/Q EYE Diagram
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Search Level
Trigger Slope: +
-
Trigger Level
TDMA Structure: 156.25BIT
156/157BIT
Slot Number
Trigger Delay
R.C. Filter: ON
OFF

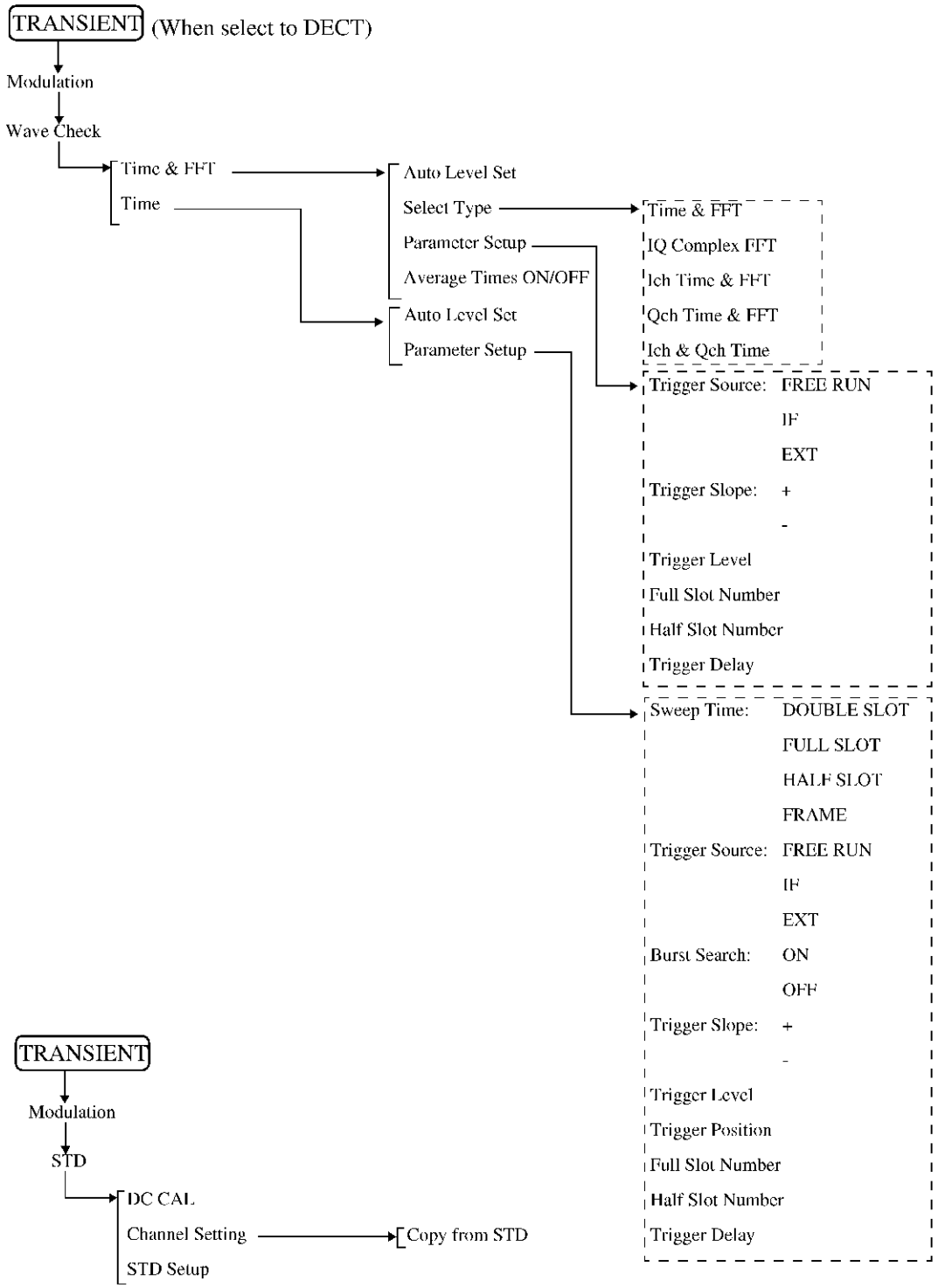

TRANSIENT
(When select to GSM/EDGE)
Modulation
Tx Power
Auto Level Set
Parameter Setup
Average Times ON/OFF
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Search Level
Trigger Slope: +
-
Trigger Level
TDMA Structure: 156.25 BIT
156/157 BIT
Slot Number
Trigger Delay
Half Symbol Shift: ON
OFF


TRANSIENT
(When select to GSM/EDGE)
Modulation
Power vs Time
Auto Level Set
Template Entry
Meas Mode NORM/HIGH
Y [dB/div] 20/10/5
Parameter Setup
Average Times ON/OFF
Burst PREV/NEXT
MS Template
BTS Template1
BTS Template2
STD Template
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Search Level
Trigger Slope: +
-
Trigger Level
TDMA Structure: 156.25 BIT
156/157 BIT
Slot Number
Trigger Delay
Half Symbol Shift:ON
OFF
Consecutive
Template: ON
OFF
MAX[burst (N),burst(N+1)+ dB]
Slot Length: 156
156.25
157


TRANSIENT
(When select to GSM/EDGE)
Modulation
Wave Check
Time & FFT
Time
Auto Level Set
Select Type
Parameter Setup
Average Times ON/OFF
Auto Level Set
Parameter Setup
Time & FFT
IQ Complex FFT
Ich Time & FFT
Qch Time & FFT
Ich & Qch Time
Trigger Source: FREE RUN
IF
EXT
Trigger Slope: +
-
Trigger Level
TDMA Structure: 156.25 BIT
156/157 BIT
Slot Number
Trigger Delay
Sweep Time: SLOT
FRAME
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Search Level
Trigger Slope: +
-
Trigger Level
Trigger Position
TDMA Structure: 156.25 BIT
156/157 BIT
Slot Number
Trigger Delay
TRANSIENT
Modulation
STD
DC CAL
Channel Setting
STD Setup
Copy from STD


TRANSIENT
(When select to DECT)
Modulation
Freq Deviation
Auto Level Set
Graphics
Start Bit
Parameter Setup
Select Type
Frequency vs Bit
Frequency EYE
Demodulated Data
Average Times ON/OFF
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Trigger Slope: +
-
Trigger Level
Full Slot Number
Half Slot Number
Trigger Delay
Bit Sequence: RANDOM
STD
TRANSIENT
Modulation
Timing Jitter
Auto Level Set
RFP→PP ON/OFF
Parameter Setup
Average Times ON/OFF
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Trigger Slope: +
-
Trigger Level
Full Slot Number
Half Slot Number
Trigger Delay

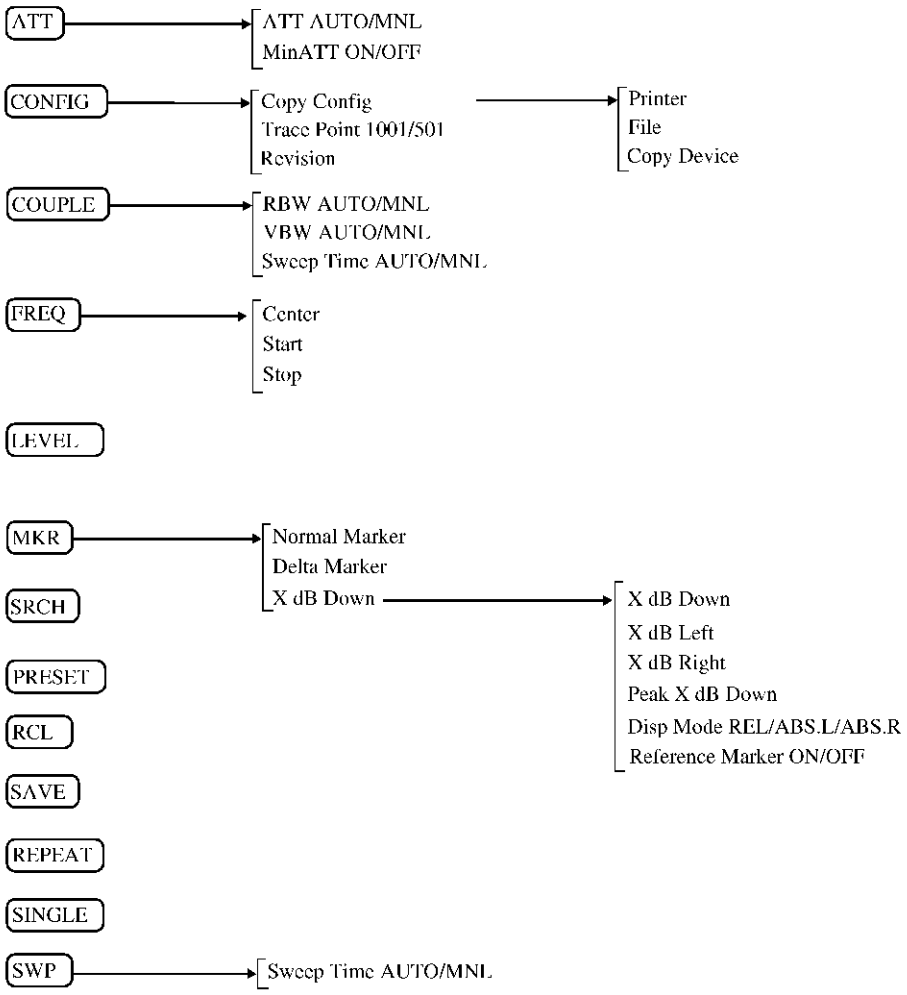

TRANSIENT
(When select to DECT)
Modulation
Tx Power
Auto Level Set
Parameter Setup
Average Times ON/OFF
Trigger Source:
FREE RUN
IF
EXT
Burst Search:
ON
OFF
Trigger Slope:
+
-
Trigger Level
Full Slot Number
Half Slot Number
Trigger Delay
TRANSIENT
Modulation
Power vs Time
Auto Level Set
Template Entry
Meas Mode NORM/HIGH
Y [dB/div] 20/10/5
Parameter Setup
Average Times ON/OFF
User Template1
User Template2
User Template3
STD Template
Trigger Source:
FREE RUN
IF
EXT
Burst Search:
ON
OFF
Trigger Slope:
+
-
Trigger Level
Full Slot Number
Half Slot Number
Trigger Delay


TRANSIENT
(When select to DECT)
Modulation
Wave Check
Time & FFT
Time
Auto Level Set
Select Type
Parameter Setup
Average Times ON/OFF
Auto Level Set
Parameter Setup
Time & FFT
IQ Complex FFT
Ich Time & FFT
Qch Time & FFT
Ich & Qch Time
Trigger Source: FREE RUN
IF
EXT
Trigger Slope: +
-
Trigger Level
Full Slot Number
Half Slot Number
Trigger Delay
Sweep Time: DOUBLE SLOT
FULL SLOT
HALF SLOT
FRAME
Trigger Source: FREE RUN
IF
EXT
Burst Search: ON
OFF
Trigger Slope: +
-
Trigger Level
Trigger Position
Full Slot Number
Half Slot Number
Trigger Delay
TRANSIENT
Modulation
STD
DC CAL
Channel Setting
Copy from STD
STD Setup


TRANSIENT
STD
STD Setup
(When select to GSM/EDGE)
Modulation: GMSK
3PI/8 Shift 8PSK
Type: GSM450
GSM480
GSM850
GSM900
DCS1800
PCS1900
Meas Mode: BURST
MULTI-BURST
CONTINUOUS
Link: BTS
MS
Burst Type: 148 BIT
88 BIT
Sync Type: SYNC WORD
NO SYNC WORD
TSC: 0/1/2/3/4/5/6/7/ARB
Filter Mode: WIDE
NARROW
Power Control Level
Offset Level
Frequency Input: FREQUENCY
CHANNEL
Input: RF
BASEBAND(I&Q)
Baseband Input: AC
DC
IQ Inverse: NORMAL
INVERSE
Cont Auto Level Set: ON
OFF
(When select to DECT)
Type: DECT
Meas Mode: BURST
CONTINUOUS
Link: RFP
PP
Physical Packet: P00
P32
P08j
P80
Z-Field: ON
OFF
Sync Type: SYNC WORD
NO SYNC WORD
Filter Mode: WIDE
NARROW
Power Level: LEVEL1
LEVEL2
Offset Level
Frequency Input: FREQUENCY
CHANNEL
Input: RF
BASEBAND(I&Q)
Baseband Input: AC
DC
Phase Inverse: NORMAL
INVERSE
Cont Auto Level Set: ON
OFF

3.3 Functional Description

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



3.3.1 Switching Communication Systems

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

NOTE: ***After the communication system has been switched, the parameters previously set for the former communication system will be cleared. If necessary, save the old parameters, before switching the communication system to another.***

Switching communication systems

1. Press the **POWER** to enter the SPA mode.
2. Press **CONFIG**.
3. Press ***more 1/2***.
   If there are other communication systems installed, with which this instrument can analyze, "Comm.System" is displayed in the soft menu.
4. Press ***Comm.System.***
   Select the communication system you wish using the data knob, and press the knob (or **ENTR**).

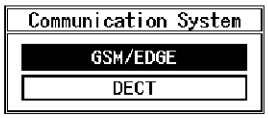


Figure 3-1 Dialog Box Used for the Communication Systems

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

Saving set conditions

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

3.3.2 T-Domain

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

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

3.3.2.1 Power (T-Domain)

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

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

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

Auto Level Set

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

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

Trigger Setup

Sets a trigger.

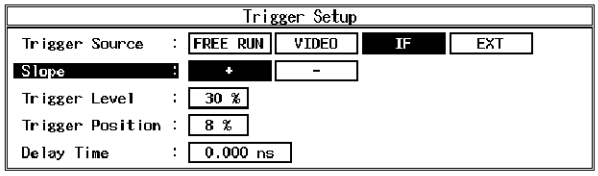


Figure 3-2 Trigger Setup Dialog Box

Trigger Source

Selects a trigger.

FREE RUN: Captures data using the internal measurement timing.

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

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

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

Slope

Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level

Sets the level to trigger.

Trigger Position

Sets the trigger position where it is displayed on the screen.

Delay Time

Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Window Setup Sets the window used for power measurement.

- ***Window ON/OFF*** Displays a window showing the range for power measurement. When OFF is set, the power measurement range covers all points on the display screen.
- ***Set to STD*** Sets the window specified by the communication standard.
- ***Window Position*** Sets the position of the window.
- ***Window Width*** Sets the width of the window.

NOTE: In the result screen, an arrow is displayed as appropriate when the entered Window position or Window width value exceeds its limit value.

Template Sets the template.
For more information, refer to Section 5.8.1, "Template Setting in the T-Domain Measuring Mode."

- ***Template ON/OFF*** Sets whether to display the template and to toggles the Pass/Fail judgment function on or off.
- ***Shift X*** Sets the amount of template movement in the X-axis direction.
- ***Shift Y*** Sets the amount of template movement in the Y-axis direction.
- ***Template Edit*** Edits the template.
  - ***Template UP/LOW*** Selects the upper template or the lower template.
  - ***Copy from STD*** Copies the template specified by the communication standard.
  - ***Insert Line*** Inserts a line.
  - ***Delete Line*** Deletes a line.
  - ***Sort*** Sorts template data in ascending order.
  - ***Table Init*** Initializes the table.

Y Scale [dB/div] 10/5/2 Switches the display screen scale to 10, 5 or 2 dB/div.

Average Times ON/OFF Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

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

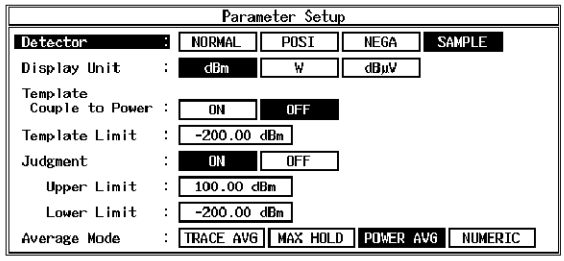


Figure 3-3 Parameter Setup Dialog Box

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

Display Unit dBm/W/dBµV
Selects the display unit of power.

Template Couple to Power
Displays the template that is connected to the measured power.

ON: Displays the template that is connected to the measured power.
On the template edit screen, set the template level to the portion linked with the power value set to 0 dB.

OFF: Displays the template regarding the Y-axis value edited by the template as an absolute value.

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

Judgment Sets ON/OFF for Pass/Fail judgments.

Upper Limit Sets the upper limit value of power.

Lower Limit Sets the lower limit value of power.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

NOTE: ***Using POWER AVG display the average waveforms, using NUMERIC display the swept waveforms and takes an average of the measurement results only.***

Set to STD

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

3.3.2.2 ON/OFF Ratio

Measures the power during the burst-on period and the one during the burst-off period, and calculate the ratio of the powers.
Captures the signal with a trigger and calculates the ratio in reference to the burst on and burst off periods (the former is defined as the period immediately before the trigger point; the latter, immediately after the trigger point).

Auto Level Set

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

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

Trigger Setup

Sets a trigger.

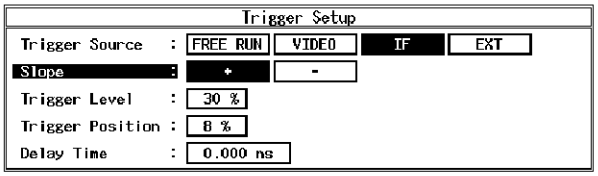


Figure 3-4 Trigger Setup Dialog Box

Trigger Source

Selects a trigger

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Slope — Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level — Sets the level to trigger.

Trigger Position — Sets where the trigger position is displayed on the screen.

Delay Time — Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Window Setup — Sets the burst ON and OFF periods.

Window ON/OFF — Displays a window showing the range for power measurement.

Set to STD — Sets the value that is specified by or complies with the communication standard.

ON Position — Sets the desired position during the burst-on period.

ON Width — Sets the desired width during the burst-on period.

OFF Position — Sets the position during the burst-off period.

OFF Width — Sets the width during the burst-off period.

NOTE: In the result screen, an arrow is displayed as appropriate when the entered Window position or Window width value exceeds its limit value.

Y Scale [dB/div] 10/5/2 — Selects the display screen scale to 10, 5 or 2 dB/div.

Average Times ON/OFF — Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets the measurement parameters.

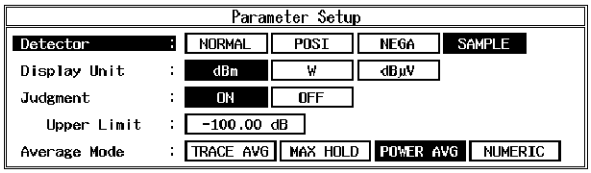


Figure 3-5 Parameter Setup Dialog Box

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

Display Unit dBm/W/dBµV
Selects the display unit of power.

NOTE: The ON/OFF ratio is displayed in units of dB (fixed).

Judgment Sets ON/OFF of the Pass/Fail judgment for the ON/OFF ratio.

Upper Limit Enters the upper limit value.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

NOTE: ***Using POWER AVG display the average waveforms, using NUMERIC display the swept waveforms and takes an average of the measurement results only.***

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

3.3.2.3 Spurious (T-Domain)

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

Auto Level Set

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

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

Trigger Setup

Sets a trigger.

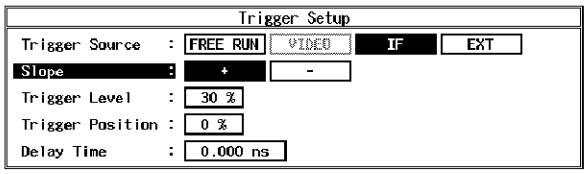


Figure 3-6 Trigger Setup Dialog Box

Trigger Source

Selects a trigger

FREE RUN:
Captures data using the internal measurement timing.

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

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

Slope

Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level

Sets the level to trigger.

Trigger Position

Sets where the trigger position is displayed on the screen.

Delay Time

Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Table No. 1/2/3

Selects the measurement table.

Load Table Loads the measurement table.

Table Edit Edits the measurement table.

Table No. 1/2/3 Selects the table to be edited.

Load Table Loads the measurement table.

Save Table Saves the measurement table.

Insert Line Inserts additional frequency data before the selected frequency number.

Delete Line Deletes the selected line.

Table Init Initializes the table

Average Times ON/OFF Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets measurement conditions.

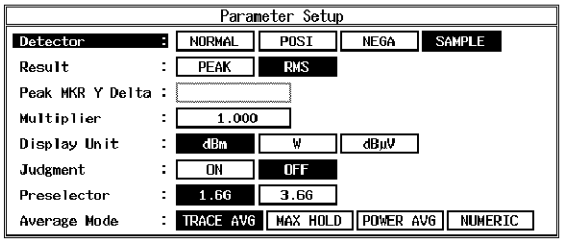


Figure 3-7 Parameter Setup Dialog Box

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

Result PEAK/RMS
Selects whether to display the result using average power or peak power.

Peak MKR Y Delta
Sets the Y delta of the peak marker.

Multiplier Multiplies the measurement result by the set value, then displays the resultant value.

Display Unit dBm/W/dBµV
Selects the display units.

Judgment Sets ON/OFF of the Pass/Fail judgment for the limit value.

Preselector Sets the preselector.

NOTE: This menu is displayed on R3267 only.

1.6G: Used to measure harmonics of more than 1.6 GHz or spurious signals when the carrier frequency is lower than 1.6 GHz.

3.6G: Used to set this parameter for cases other than that above.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

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

Set to Default Returns the set value to the default.

3.3.2.4 Due to Modulation (T-Domain)

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

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal.
The reference level is automatically adjusted when this key is pressed.

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

Trigger Setup Sets a trigger.

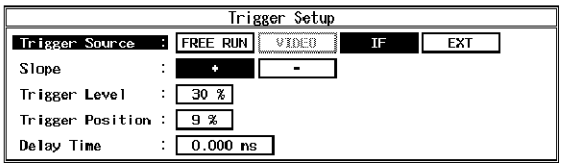


Figure 3-8 Trigger Setup Dialog Box

Trigger Source Selects a trigger.

FREE RUN:
Captures data using the internal measurement timing.

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

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

Slope Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level Sets the level to trigger.

Trigger Position Sets where the trigger position is displayed on the screen.

Delay Time Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

Window Setup Sets the window used for power measurement (or peak search).

Window ON/OFF Displays a window showing the range for power measurement (or peak search).
When OFF is set, the power measurement (or peak search) range covers all points on the display screen.

Set to STD Sets the window specified by the communication standard.

Window Position Sets the position of the window.

Window Width Sets the width of the window.

Table Edit Edits the measurement table.

Table No. 1/2/3 Selects the table to be edited.

Load Table Loads the measurement table.

Save Table Saves the measurement table.

Insert Line Inserts additional frequency data before the selected frequency number.

Delete Line Delete the selected line.

Table Init Initialize the table.

Average Times ON/OFF Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets the measurement parameters.

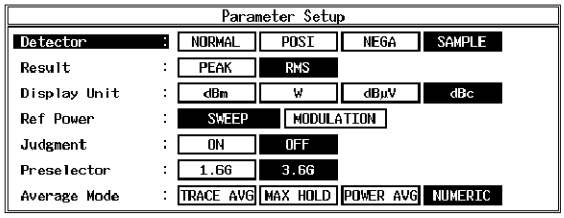


Figure 3-9 Parameter Setup Dialog Box

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

Result PEAK/RMS
Selects whether to display the result using average power or peak power.

Display Unit dBm/W/dBµV/dBc
Selects the display units.

Ref Power When the dBc is selected for Result, this selects which relative value to use to display the result value.

SWEEP: Displays a relative value to averaged power of swept data.

MODULATION:
Displays a relative value to the measurement result of Tx Power in the Modulation.

Judgment Sets the ON/OFF of the Pass/Fail judgment for the limit value.

Preselector Sets the preselector.

NOTE: This menu is displayed on R3267 only.

1.6G: Used to measure harmonics of more than 1.6Ghz or spurious signal when the carrier frequency is lower than 1.6GHz.

3.6G: Used to set this parameter for cases other than that above.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

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

Set to STD Sets the window specified by the communication standard.

3.3.3 F-Domain

Carries out a measurement according to the communication standard using the spectrum analyzer's sweep measurement method. Measurement items include power, occupied bandwidth, Due To Switching, Due to Modulation, Inband Spurious, and Outband Spurious measurements is the frequency domain.

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

3.3.3.1 Power (F-Domain)

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

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Gate Setup

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

Trigger Setup

Sets a trigger.

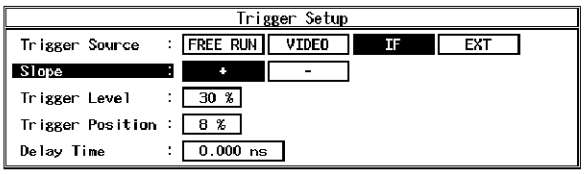


Figure 3-10 Trigger Setup Dialog Box

Trigger Source

Selects a trigger

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Slope

Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level

Sets the level to trigger.

Trigger Position

Sets where the trigger position is displayed on the screen.

Delay Time

Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Gate Source

Trigger

Sets Trigger Source specified by Trigger Setup as Gate Source.

NOTE: When Trigger Source is set to IF and SPAN is set to a frequency higher than 6 MIIz, the sweeping seems to be stopped, because the IF trigger bandwidth is approximately 6 MHz and the gate trigger is failing.

Ext Gate — Sets the gated sweep mode using the gate signal input from the EXT GATE terminal on the rear panel.

Gate Setup — Sets the gated sweep range when Trigger is selected for Gate Source.

Set to STD — Sets the gate position and width to the values specified by the communication standard.

Gate Position — Sets the gate position.

Gate Width — Sets the gate width.

Gated Sweep ON/OFF — Starts the gated sweep.

Detector — NORMAL/POSI/NEGA/SAMPLE
Selects the detector.

Figure 3-11 Detector Dialog Box

Window Setup — Sets the frequency range used for power measurement.

Window ON/OFF — Sets the window to ON or OFF. When the window is set to OFF, the power measurement range becomes a sweep band.

Set to STD — Sets the value determined by the communication standard.

Window Position — Sets the position of the window.

Window Width — Sets the width of the window.

NOTE: In the result screen, an arrow is displayed as appropriate when the entered Window position or Window width value exceeds its limit value.

Y Scale [dB/div] 10/5/2 — Sets the display scale.

Average Times ON/OFF — Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets measurement conditions.

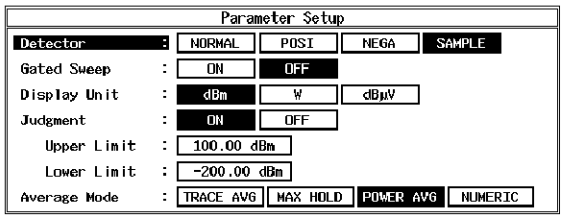


Figure 3-12 Parameter Setup Dialog Box

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

Gated Sweep Sets the gated sweep to ON or OFF.

Display Unit dBm/W/dBµV
Selects the display unit.

Judgment Sets ON/OFF of the Pass/Fail judgment for measured power.

Upper Limit Sets the upper limit for Pass/Fail judgment.

Lower Limit Sets the lower limit for Pass/Fail judgment.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

NOTE: ***Using POWER AVG display the average waveforms, using NUMERIC display the swept waveforms and takes an average of the measurement results only.***

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

3.3.3.2 OBW

Measure an occupied bandwidth.

Auto Level Set — Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

OBW% — Sets the frequency, including the percentage of the total power as an occupied bandwidth, when calculating the occupied bandwidth.

Average Times ON/OFF — Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup — Sets measurement conditions and so on.

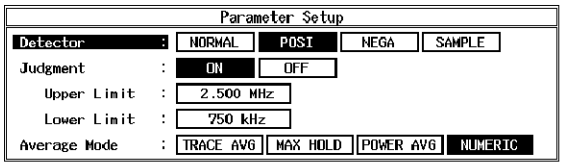


Figure 3-13 Parameter Setup Dialog Box

Detector — NORMAL/POSI/NEGA/SAMPLE
Selects the detector.

Judgment — Sets ON/OFF of the Pass/Fail judgment for the occupied bandwidth.

Upper Limit — Sets the upper limit for Pass/Fail judgment.

Lower Limit — Sets the lower limit for Pass/Fail judgment.

Average Mode — Selects the processing method when Average Times is set to ON.

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

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

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

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

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

3.3.3.3 Due to Transient

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

Auto Level Set — Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Template — Sets and edits the template.
For more information, refer to Section 5.8.2, "Template Setting in the F-Domain Measuring Mode."

Template ON/OFF — Sets ON/OFF of the template display.
When Template is set to ON, the Pass/Fail judgment for the template is displayed under the sweep screen.

Shift X — Shifts the set template in the frequency direction (X-axis).

Shift Y — Shifts the set template in the level direction (Y-axis).

Margin ΔX ON/OFF — Magnifies the template in the X-axis direction with a set template frequency 0 as the center.

Template Edit — Opens the template edit menu.

Copy from STD — Copies the template of the communication standard.
(Displayed only when GSM/EDGE is selected.)

Insert Line — Inserts a line before the selected line.

Delete Line Deletes the selected line.

Sort Sorts the tables in order of frequency.

Table Init Initializes the table.

Marker Edit Sets the measurement frequency (frequency offset) and measurement band.
For more information, refer to Section 5.9.1, "Marker Edit Function."

Copy from STD Sets to the parameters specified by the communication standard. (Displayed only when GSM/EDGE is selected.)

Insert Line Inserts a line before the selected line.

Delete Line Deletes the selected line.

Sort Sorts data in order of frequency.

Table Init Initializes the table.

Average Times ON/OFF Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets measurement conditions and so on.
For more information, refer to Section 5.9.2, "Measurement results Using Due to Modulation, Due to Transient and Inband Spurious Modes."

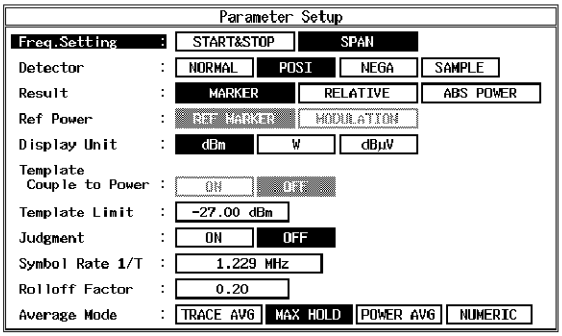


Figure 3-14 Parameter Setup Dialog Box

Freq. Setting START&STOP/SPAN
Selects the measurement mode.

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

Result Specifies how to display the result.

MARKER:
Displays the marker read value. The position of the marker is set by Marker Edit.

RELATIVE:
Displays the marker read value using a relative value.

ABS POWER:
Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it.

Ref Power When RELATIVE is selected for Result, this selects which relative value to use to display the marker read value.

REF MARKER:
Displays a relative value to Ref Marker set by Marker Edit.

MODULATION:
Displays a relative value to the measurement result of Tx power in Modulation.

Display Unit dBm/W/dBμV
Selects the unit of the result displayed.

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

Template Couple to Power
Sets whether to raise or lower the template with the power set by Ref Power.

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

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

Symbol Rate 1/T Sets the symbol rate for the Root Nyquist filter.

Rolloff Factor Sets the roll-off factor for the Root Nyquist filter.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

NOTE: ***Using POWER AVG display the average waveforms, using NUMERIC display the swept waveforms and takes an average of the measurement results only.***

Set to STD

Returns the measurement parameters to the values specified by the standard.
(Displayed only when GSM/EDGE is selected.)
For the method of switching between the systems, refer to Section 3.3.1, "Switching Communication Systems."

3.3.3.4 Due to Modulation

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

Auto Level Set

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

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

Gate Setup

Sets the gated sweep.

Trigger Setup

Sets a trigger.

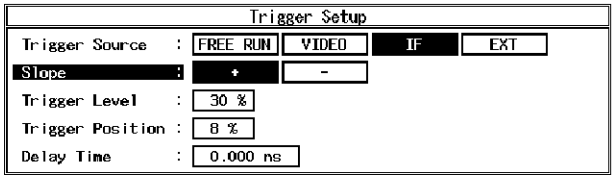


Figure 3-15 Trigger Setup Dialog Box

Trigger Source

Selects a trigger.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Slope Selects the edge when triggering.

+: Triggers at the leading edge.

-: Triggers at the trailing edge.

Trigger Level Sets the level to trigger.

Trigger Position Sets where the trigger position is displayed on the screen.

Delay Time Sets a delay time from the time a trigger signal is detected to the time the signal is captured.

NOTE: When Delay Time is a negative value, signals before the trigger can be captured.

Gate Source

Trigger Sets Trigger Source specified by Trigger Setup as Gate Source.

NOTE: When Trigger Source is set to IF and SPAN is set to a frequency higher than 6 MHz, the sweeping seems to be stopped, because the IF trigger bandwidth is approximately 6 MIIz and the gate trigger is failing.

Ext Gate Performs the gated sweep using the gate signal input from the EXT Gate terminal on the rear panel.

Gate Setup Sets the gated sweep range when Trigger is selected for Gate Source.

Set to STD Sets the gate position and width to the values specified by the communication standard.

Gate Position Sets the gate position.

Gate Width Sets the gate width.

Gated Sweep ON/OFF Starts the gated sweep.

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

Figure 3-16 Detector Dialog Box

Template	Sets and edits the template. For more information, refer to Section 5.8.2, "Template Setting in the F-Domain Measuring Mode."
Template ON/OFF	Sets the template display to ON or OFF. When Template is set to ON, the Pass/Fail judgment for the template is displayed under the sweep screen.
Shift X	Shifts the set template in the frequency direction (X-axis).
Shift Y	Shifts the set template in the level direction (Y-axis).
Margin ΔX ON/OFF	Magnifies the template in the X-axis direction with a set template frequency 0 as the center.
Template Edit	
Copy from STD	Copies the template specified by the communication standard.
Insert Line	Inserts a line before the selected line.
Delete Line	Deletes the selected line.
Sort	Sorts the tables in frequency order.
Table Init	Initializes the table.
Marker Edit	Sets the measurement frequency (frequency offset) and measurement band. For more information, refer to Section 5.9.1, "Marker Edit Function."
Copy from STD	Sets to the parameters specified by the communication standard.
Insert Line	Inserts a line before the selected line.
Delete Line	Deletes the selected line.
Sort	Sorts data in order of frequency.
Table Init	Initializes the table.
Average Times ON/OFF	Sets the averaging count. For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.
Config	

Parameter Setup

Sets measurement conditions and so on.
For more information, refer to Section 5.9.2, "Measurement results Using Due to Modulation, Due to Transient and Inband Spurious Modes."

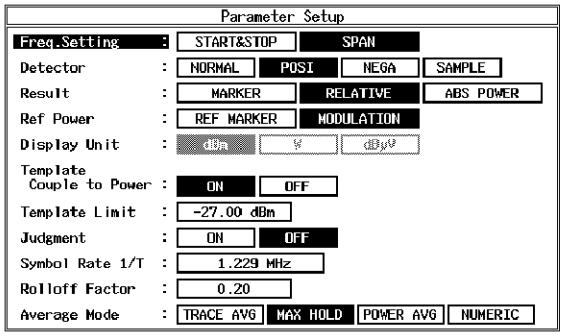


Figure 3-17 Parameter Setup Dialog Box

Freq. Setting

START&STOP/SPAN
Selects the measurement mode.

Detector

NORMAL/POSI/NEGA/SAMPLE
Selects the detector.

Result

Specifies how to display the results.

MARKER:
Displays the marker read value. The position of the marker is set by Marker Edit.

RELATIVE:
Displays the marker read value using a relative value.

ABS POWER:
Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it.

Ref Power

When RELATIVE is selected for Result, this selects which relative value to use to display the marker read value.

REF MARKER:
Displays a relative value to Ref Marker set by Marker Edit.

MODULATION:
Displays a relative value to the measurement result of Tx power in Modulation.

Display Unit

dBm/W/dBµV
Selects the display unit.

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

Template Couple to Power

Sets whether or not to raise or lower the template with the power set by Ref Power.

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

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

Symbol Rate 1/T Sets the symbol rate for the Root Nyquist filter.

Rolloff Factor Sets the roll-off factor for the Root Nyquist filter.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

NOTE: ***Using POWER AVG display the average waveforms, using NUMERIC display the swept waveforms and takes an average of the measurement results only.***

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

3.3.3.5 Inband Spurious

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

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Template	Sets and edits the template. For more information, refer to Section 5.8.2, "Template Setting in the F-Domain Measuring Mode."
Template ON/OFF	Sets the template display to ON or OFF. When Template is set to ON, the Pass/Fail judgment for the template is displayed under the sweep screen.
Shift X	Shifts the set template in the frequency direction (X-axis).
Shift Y	Shifts the set template in the level direction (Y-axis).
Margin ΔX ON/OFF	Magnifies the template in the X-axis direction with a set template frequency 0 as the center.
Template Edit	
Copy from STD	Copies the template specified by the communication standard.
Insert Line	Inserts a line before the selected line.
Delete Line	Deletes the selected line.
Sort	Sorts the tables in frequency order.
Table Init	Initializes the table.
Marker Edit	Sets the measurement frequency (frequency offset) and measurement band. For more information, refer to Section 5.9.1, "Marker Edit Function."
Copy from STD	Sets the measurement parameters specified by the communication standard.
Insert Line	Inserts a line before the selected line.
Delete Line	Deletes the selected line.
Sort	Sorts data in order of frequency.
Table Init	Initializes the table.

Average Times ON/OFF Sets the averaging count.
For more information, refer to Section 5.8.1, "Template Setting in the T-Domain Measuring Mode."

Config

Parameter Setup Sets measurement conditions and so on.
For more information, refer to Section 5.9.3, "Measurement Result of Inband Spurious."

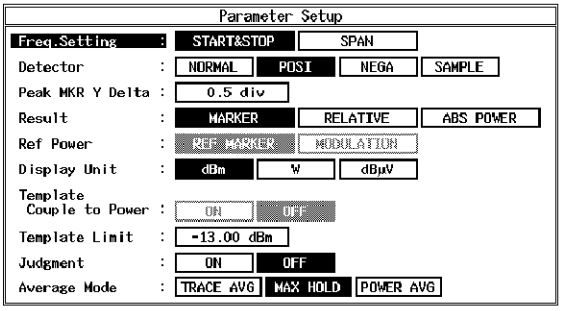


Figure 3-18 Parameter Setup Dialog Box

Freq. Setting START&STOP/SPAN
Selects the measurement mode.

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

Peak MKR Y Delta
Sets the Y delta of the peak marker.

Result Specifies how to display the results.

MARKER:
Displays the marker read value. The position of the marker is set by Marker Edit.

RELATIVE:
Displays the marker read value using a relative value.

ABS POWER:
Converts the value displayed by RELATIVE into the absolute value using carrier power and displays it.

Ref Power When RELATIVE is selected for Result, this selects which relative value is used to display the marker read value.

REF MARKER:
Displays a relative value to Ref Marker set by Marker Edit.

MODULATION:
Displays a relative value to the measurement result of Tx power in Modulation.

Display Unit dBm/W/dBμV
Selects the display unit.

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

Template Couple to Power
Sets whether or not to raise or lower the template with the power set by Ref Power.

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

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

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

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

3.3.3.6 Outband Spurious

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

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Table No. 1/2/3 Selects the table number.

Load Table Loads the table.

Table Edit Edits the table.

Copy from STD Copies the template specified by the communication standard.

Table No. 1/2/3 Selects the table number.

Load Table Loads the table.

Save Table Saves the table.

Insert Line Inserts a line before the selected line.

Delete Line Deletes the selected line.

Table Init Initializes the table

Average Times ON/OFF Sets the averaging count.
For the method of average processing, refer to "Average Mode" in the Config → Parameter Setup.

Config

Parameter Setup Sets measurement parameters.

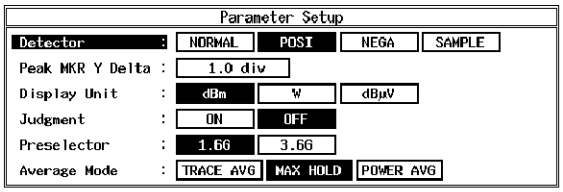


Figure 3-19 Parameter Setup Dialog Box

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

Peak MKR Y Delta
Sets the Y delta of a peak marker.

Display Unit dBm/W/dBµV
Selects the display unit.

Judgment Makes the Pass/Fail judgment using the limit values set by Table Edit.

Preselector Sets the preselector.

NOTE: This menu is displayed on R3267 only.

1.6G: Used to measure harmonics of more than 1.6 GHz or spurious signals when the carrier frequency is lower than 1.6 GHz.

3.6G: Used to set this parameter for cases other than that above.

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

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

MAX HOLD:
Displays the maximum value within the average counts of the swept waveforms.

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

Set to Default Returns the set value to the default.

3.3.4 Modulation (When select to GSM/EDGE)

Modulation analysis by the DSP.

3.3.4.1 Phase Error

This function is used to measure and phase errors. Only GSM signals can be analyzed.

Auto Level Set

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

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

Graphics

Selects the type of graph to be displayed.

Select Type

Selects the type of graph on the window.

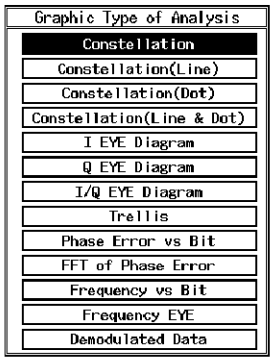


Figure 3-20 Select Type Dialog Box

Parameter Setup

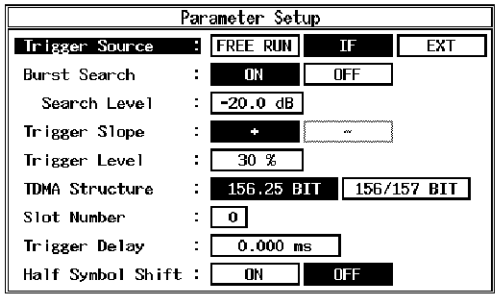


Figure 3-21 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:

Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Search Level

Sets the threshold level used to search for a burst if Burst Search is set to ON.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level

Sets the trigger level.

TDMA Structure

Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number

Sets the slot number.

Trigger Delay

Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

Half Symbol Shift

Performs the analysis after the symbol points (bit points) definition has been shifted by half a symbol.

Average Times ON/OFF

Sets the averaging count.

3.3.4.2 Modulation Accuracy

Performs the modulation analysis of 3PI/8 shift 8PSK.

Auto Level Set

Sets the internal reference level to an optimum value which depends on the measurement signal. Pressing this key executes the Auto Level Set function.

NOTE: While the Auto Level Set function is being executed, the measurement signal level must be constant.

Graphics

Select Type

Selects the type of graph on the window.

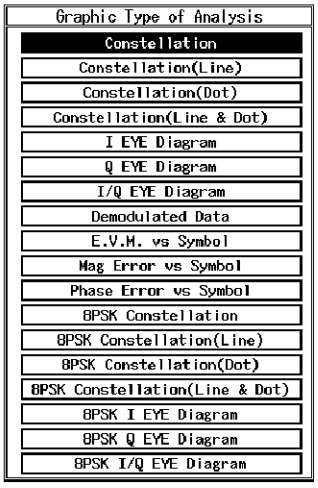


Figure 3-22 Graphic Type of Analysis Dialog Box

Parameter Setup

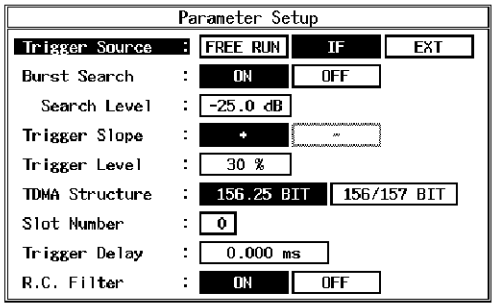


Figure 3-23 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:

Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Search Level

Sets the threshold level used to search for a burst if Burst Search is set to ON.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level

Sets the trigger level.

TDMA Structure

Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number

Sets the slot number.

Trigger Delay

Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

R.C. Filter

Sets whether or not the Raised Cosine Filter (with a rolloff of 0.25 and a single-sideband bandwidth of 90 kHz) is used as a receiving filter.

ON: Uses the Raised Cosine Filter as the receiving filter.

OFF: Does not use the Raised Cosine Filter.

Average Times ON/OFF

Sets the averaging count.

3.3.4.3 Tx Power

Auto Level Set

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

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

Parameter Setup

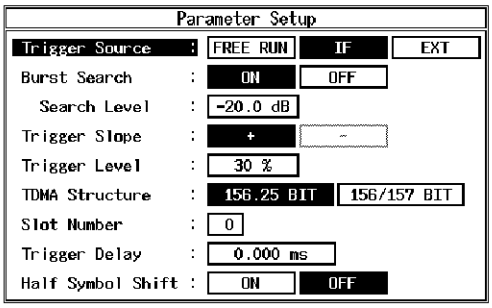


Figure 3-24 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Search Level

Sets the threshold level used to search for a burst if Burst Search is set to ON.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level

Sets the trigger level.

TDMA Structure Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number Sets the slot number.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

Half Symbol Shift Performs the analysis after the symbol points (bit points) definition has been shifted by half a symbol.

Average Times ON/OFF Sets the averaging count.

3.3.4.4 Power vs Time

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Template Entry Displays the menu used to set the template.

MS Template The limit value can be set using the MS template.

BTS Template1 The limit value can be set using the GSM450,GSM480,GSM850 GSM900 or DCS1800 BTS template.

BTS Template2 The limit value can be set using the PCS1900 template.

STD Template Selects the template compliant with the standard. The limit value cannot be edited.

Meas Mode NORM/HIGH Selects the measurement mode.

NORM: Measures using data captured with one command.

HIGH: The synthesized waveform is displayed after the upper and lower parts of the burst signal have separately been measured.

NOTE:

1. ***HIGH mode cannot be selected when set to the multi burst mode.***
2. ***There is a possibility that measurements are not made in IIHGII mode when a multi burst signal (which contains multiple bursts in a single frame) is input.***

Y [dB/div] 20/10/5

Switches the vertical scale display.

Parameter Setup

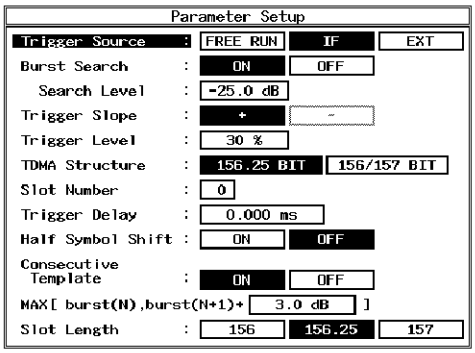


Figure 3-25 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Search Level

Sets the threshold level used to search for a burst if Burst Search is set to ON.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

TDMA Structure Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number Sets the slot number.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

Half Symbol Shift Performs the analysis after the symbol points (bit points) definition has been shifted by half a symbol.

Consecutive Template Selects whether the two consecutive bursts are measured using templates. This function is enabled only when MULTI-BURST is selected from Meas Mode in the STD Setup window.

MAX[burst(N),burst(N+1)+ dB]
Sets the guard section template when templates are set for the two consecutive bursts. Use (the first burst power) or (the first burst power + X), whichever is larger as the guard section template. Sets the value X.

Slot Length Sets the slot length of the first burst, when templates are set for the two consecutive bursts.
The position of the second template is changed due to this setting.

Average Times ON/OFF Sets the averaging count.

Burst PREV/NEXT Sets which of the two consecutive bursts is displayed on the lower screen.
PREV: The first burst is displayed with the template.
NEXT: The second burst is displayed with the template.

3.3.4.5 Wave Check

Opens the menu used to display an IF or base-band signal waveform in time domain or FFT waveform.

Time & FFT Displays an IF or base-band signal waveform in time domain or FFT waveform. This function is used to check an input signal.

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Select Type Selects the type of graph on the window.

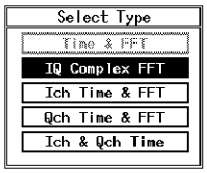


Figure 3-26 Select Type Dialog Box

Parameter Setup

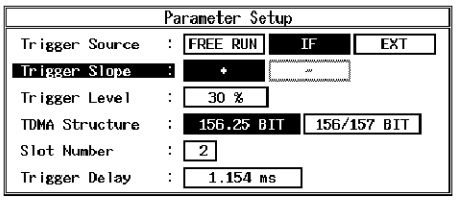


Figure 3-27 Parameter Setup Dialog Box

Trigger Source Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Trigger Slope Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

TDMA Structure Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number Sets the slot number.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

Average Times ON/OFF Sets the averaging count.

Time An IF or base-band signal is displayed using the slot length and frame length. This function is used to verify the settings such as Trigger level and Trigger Delay, as well as the input signals.

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Parameter Setup

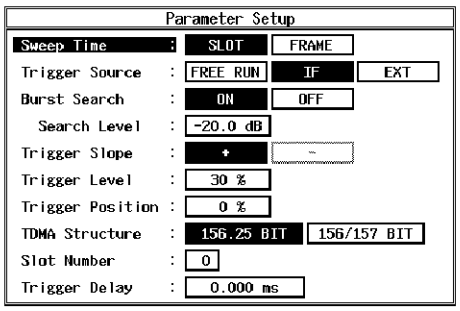


Figure 3-28 Parameter Setup Dialog Box

Sweep Time Sets the sweep time when displaying waveform in time domain.

SLOT: Displays the waveform of one slot.

FRAME: Displays the waveform of one frame.

Trigger Source Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Search Level Sets the threshold level used to search for a burst if Burst Search is set to ON.

Trigger Slope Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

Trigger Position Determines where the triggered position must be displayed on the screen.

TDMA Structure Selects the frame format.
The value used with Trigger Delay is automatically calculated from the settings TDMA Structure and Slot Number.

156.25 BIT: Selects the format in which all slots consist of 156.25 bits.

156/157 BIT: Selects the format in which Slots 0 and 4 are 157 bits, and any slots other than Slots 0 and 4 are 156 bits.

Slot Number Sets the slot number.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings TDMA Structure and Slot Number, adjust it when necessary.

3.3.5 Modulation (When select to DECT)

3.3.5.1 Freq Deviation

This function is used to measure frequency deviations. Only the signals compliant with DECT can be analyzed.

Auto Level Set

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

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

Graphics

Selects the type of graph to be displayed.

Start Bit

Sets bit number from which the graphic display is started. A graphic display of 128 bits is displayed starting from the bit number.

Select Type

Selects the type of graph on the window.

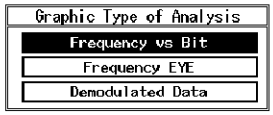


Figure 3-29 Select Type Dialog Box

Parameter Setup

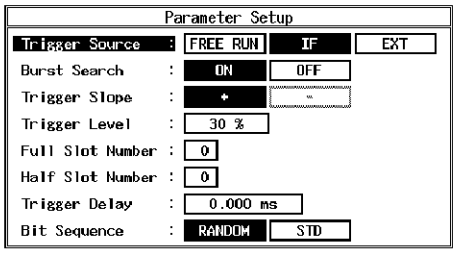


Figure 3-30 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level

Sets the trigger level.

Full Slot Number

Sets the full slot number of the signal to be measured.

Half Slot Number

Sets the half slot number of the signal to be measured.

Trigger Delay

Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings Full Slot Number and Half Slot Number, adjust it when necessary.

Bit Sequence

Selects the algorithm of the measurement.

RANDOM: The formula shown below is used to calculate the frequency error using the maximum and minimum frequencies, assuming that the bit data is on a random basis.
Frequency error = (Maximum frequency + Minimum frequency) / 2

STD Measurement is made compliant with TBR06 standard. Refer to "5.3 RANDOM/STD in the DECT bit sequence".

Average Times ON/OFF

Sets the averaging count.

3.3.5.2 Timing Jitter

Auto Level Set

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

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

RFP→PP ON/OFF

ON: Measures the jitter between Radio Fixed Part and Portable Part.

OFF: Measures the jitters of a signal set to Link.
For example, when Setup STD is set to PP, the jitters are measured using the two bursts the PP has sent.

Parameter Setup

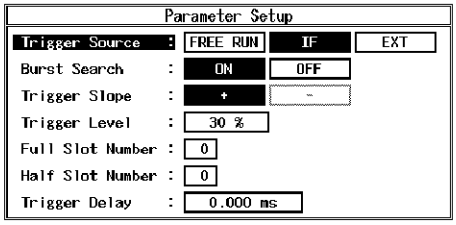


Figure 3-31 Parameter Setup Dialog Box

Trigger Source

Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search

Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Trigger Slope

Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

Full Slot Number Sets the full slot number of the signal to be measured

Half Slot Number Sets the half slot number of the signal to be measured.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings Full Slot Number and Half Slot Number, adjust it when necessary.

Average Times ON/OFF Sets the averaging count.

3.3.5.3 Tx Power

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Parameter Setup

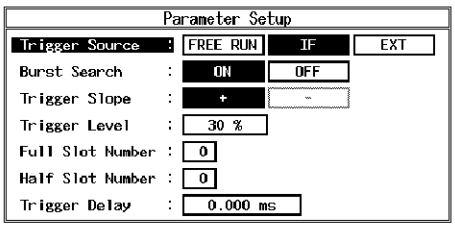


Figure 3-32 Parameter Setup Dialog Box

Trigger Source Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search — Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Trigger Slope — Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level — Sets the trigger level.

Full Slot Number — Sets the full slot number of the signal to be measured.

Half Slot Number — Sets the half slot number of the signal to be measured.

Trigger Delay — Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings Full Slot Number and Half Slot Number, adjust it when necessary.

Average Times ON/OFF — Sets the averaging count.

3.3.5.4 Power vs Time

Auto Level Set — Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Template Entry — Displays the menu used to set the template.

User Template1 — Selects the user-specified template.

User Template2 — Selects the user-specified template.

User Template3 — Selects the user-specified template.

STD Template — Selects the template compliant with the standard.

Meas Mode NORM/HIGH — Selects the measurement mode.

NORM: Measures using data captured with one command.

HIGH: The synthesized waveform is displayed after the upper and lower parts of the burst signal have separately been measured.

Y [dB/div] 20/10/5 — Switches the vertical scale display.

Parameter Setup

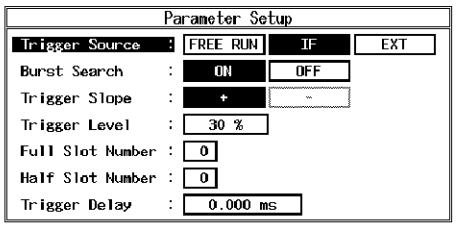


Figure 3-33 Parameter Setup Dialog Box

Trigger Source Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Trigger Slope Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

Full Slot Number Sets the full slot number of the signal to be measured.

Half Slot Number Sets the half slot number of the signal to be measured.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the Full Slot number and Half Slot Number, adjust it when necessary.

Average Times ON/OFF Sets the averaging count.

3.3.5.5 Wave Check

Opens the menu used to display an IF or base-band signal waveform in time domain or FFT waveform.

Time & FFT — An IF or base-band signal waveform in time domain and FFT waveform are displayed. This function is used to verify input signals.

Auto Level Set — Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Select Type — Selects a graph to be displayed.

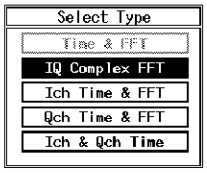


Figure 3-34 Display Dialog Box

Parameter Setup

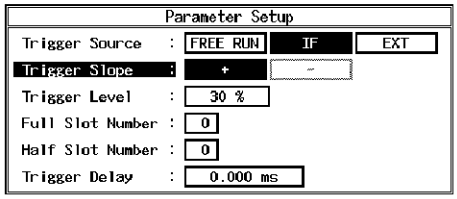


Figure 3-35 Parameter Setup Dialog Box

Trigger Source — Sets the trigger signal.

FREE RUN: Captures data using the internal measurement timing.

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

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

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

Trigger Slope Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

Full Slot Number Sets the full slot number.

Half Slot Number Sets the half slot number.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings Full Slot Number and Half Slot Number, adjust it when necessary.

Average Times ON/OFF Sets the averaging count.

Time An IF or base-band signal is displayed using the slot length and frame length. This function is used to verify the settings such as Trigger level and Trigger Delay, as well as the input signals.

Auto Level Set Sets the internal reference level to an optimum value in accordance with the measurement signal. The reference level is automatically adjusted when this key is pressed.

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

Parameter Setup

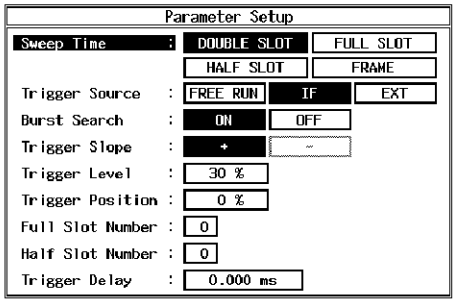


Figure 3-36 Parameter Setup Dialog Box

Sweep Time Sets the sweep time when displaying waveform in time domain.

DOUBLE SLOT: Displays a waveform corresponding to one double slot.

FULL SLOT: Displays a waveform corresponding to one full slot.

HALF SLOT: Displays a waveform corresponding to one half slot.

FRAME: Displays a waveform corresponding to one frame.

Trigger Source Sets the trigger signal.

FREE RUN:
Captures data using the internal measurement timing.

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

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

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

Burst Search Toggles the burst search function (which uses the Software) on or off.

ON: Searches for a burst using the Software.

OFF: Does not search for a burst using the Software.

Trigger Slope Selects the polarity (leading or trailing edge) of a trigger signal.

Trigger Level Sets the trigger level.

Trigger Position Determines where the triggered position must be displayed on the screen.

Full Slot Number Sets the full slot number of the signal to be measured.

Half Slot Number Sets the half slot number of the signal to be measured.

Trigger Delay Sets the delay time from when the trigger signal is generated to capture data to when the data is actually captured.
Although the value used with Trigger Delay is automatically calculated based on the settings Full Slot Number and Half Slot Number, adjust it when necessary.

3.3.6 STD

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

3.3.6.1 DC CAL

Compensates for direct current components inside the circuit.

3.3.6.2 Channel Setting

Sets the relationship between the channel number and frequency.

Copy from STD

Sets the relationship between the channel number and frequency specified by the communication standard. Sets the relationship between the channel number and frequency in the band specified by Type of STD Setup.

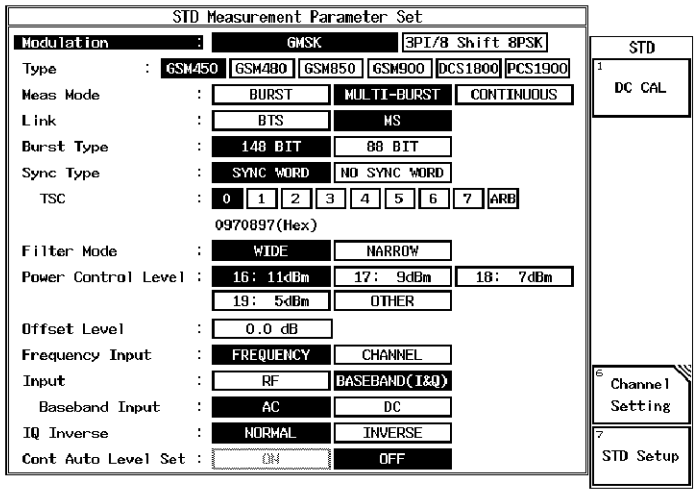
UpLink: Sets the channel number of the mobile station (MS). When set to DECT, the channel number of PP (Portable Part) is set.

DownLink:
Sets the channel number of the base station (BTS). When set to DECT, the channel number of RFP (Radio Fixed Part) is set.

3.3.6.3 STD Setup

This section describes the STD Setup menu.

- When selected to GSM/EDGE



Modulation

Selects a modulation to analyze.

Type

GSM450/GSM480/GSM850/GSM900/DCS1800/PCS1900
Selects the communication standard. The channel number, spurious measurement range which are specified for the default template are displayed.

Meas Mode

Selects the measurement mode.

BURST: Selected when there is one burst in one frame.

MULTI-BURST: Selected when there are multiple bursts in one frame.

CONTINUOUS: Measures a continuous wave. Although no continuous waves are defined in the standard, this position is used to test a continuous signal.

Link

Sets the direction of signal.

BTS: Measures signals from the base station.

MS: Measures signals from mobile station.

Burst Type

148 BIT/88 BIT
Sets the bit length of a burst.

Sync Type

Sets whether to measure in sync with the sync word.

NOTE: To detect the position of a burst compliant with the standard, measure the burst in sync with the sync word.

SYNC WORD: Measures the signal in sync with the sync word.

NO SYNC WORD: Measures the signal without using the sync word.

TSC

0/1/2/3/4/5/6/7: Selects the training sequence code.

ARB: Sets any of the training sequence code.

The training sequence code is set in hexadecimal number when GMSK is selected from Modulation. The following keys are used to enter data in hexadecimal number.

A: SHIFT, 0
B: SHIFT, 1
C: SHIFT, 2
D: SHIFT, 3
E: SHIFT, 4
F: SHIFT, 5

The training sequence code is set in octal number when 3PI/8 Shift 8PSK is selected from Modulation.

Filter Mode

Selects the receiving filter.
Refer to Section "5.1 NARROW/WIDE in the GSM filter mode".

NOTE: Select WIDE, when measuring a signal with a large frequency error; and select NARROW when measuring one carrier selected from multiple carriers.

WIDE: Selects the filter with a wide bandwidth.

NARROW: Selects the filter with a narrow bandwidth.

Power Control Level

Sets the Power Control Level. A template which is used to measure the leading and trailing edges is created.

Offset Level

Sets reference level's offset value within a range of -100 dB to +100 dB.

Frequency Input

Sets the method of entering the center frequency to the instrument.

FREQUENCY: Enters a frequency.

CHANNEL: Enters a channel number.

Input

Sets an input signal route.

NOTE: Settings using Input are valid only for: Phase Error, Modulation Accuracy, Power vs Time, and Tx Power. When entering BASEBAND, Power vs Time, and Tx Power are displayed in relative power.

RF: The RF input route is set.

BASEBAND (I&Q): The IQ input route is set.
The input signal magnitude is from 0.25V to 0.9Vp-p (±0.47V or less).

Baseband Input

Selects the coupling of signals.

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

DC: Sets a direct current coupling.

IQ Inverse

Sets whether to invert the sign of the Q signal.

NORMAL: The sign of the Q signal is not inverted.

INVERSE: The sign of the Q signal is inverted.

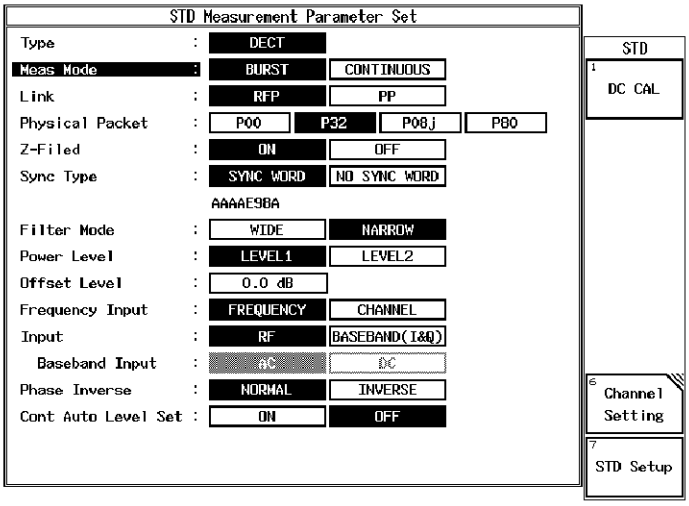
Cont Auto Level Set

Sets whether to carry out the auto ranging.

NOTE: When RF is selected for Input, Cont Auto Level Set takes effect only for Phase Error, Power vs Time, and Tx Power. Use the soft key Auto Level Set when adjusting the reference level.

ON: The auto ranging is carried out on a measurement basis.
OFF: The auto ranging is not carried out.

- When selected to DECT



Type Selects the communication standard.
For the DECT, only the DECT is used.

Meas Mode Selects the measurement mode.

BURST: Selected when there is one burst in one frame.

CONTINUOUS: Measures a continuous wave. Although no continuous waves are defined in the standard, this position is used to test a continuous signal.

Link Sets the direction of signal.

RFP: Measures Radio Fixed Part signals.

PP: Measures Portable Part signals.

Physical Packet P00/P32/P08j/P80
Selects a communication packet.

Z-Field Toggles the Z-Field on or off.

Sync Type Sets whether to measure in sync with the sync word.

NOTE: To detect the position of a burst compliant with the standard, measure the burst in sync with the sync word.

SYNC WORD: Measures the signal in sync with the sync word.

NO SYNC WORD: Measures the signal without using the sync word.

Filter Mode

Selects the receiving filter.
Refer to Section "5.2 NARROW/WIDE in the DECT filter mode".

NOTE: Select WIDE, when measuring a signal with a large frequency error; and select NARROW when measuring one carrier selected from multiple carriers.

WIDE: Selects the filter with a wide bandwidth.

NARROW: Selects the filter with a narrow bandwidth.

Power Level

Selects the power level.

LEVEL1: Selects LEVEL1 (2.5 mW).

LEVEL2: Selects LEVEL1 (250 mW).

Offset Level

Sets reference level's offset value within a range of -100 dB to +100 dB.

NOTE: In a high-power signal measurement, entering an offset value of the reference level allows you to read the power when a fixed attenuator is used for the input signal.

Frequency Input

Sets the method of entering the center frequency to the instrument.

FREQUENCY: Enters a frequency.

CHANNEL: Enters a channel number.

Input

Sets an input signal route.

NOTE: Settings using Input are valid only for: Freq Deviation, Timing Jitter, Power vs Time, and Tx Power. When entering BASEBAND, Power vs Time, and Tx Power are displayed in relative power.

RF: The RF input route is set.

BASEBAND (I&Q): The IQ input route is set. The input signal magnitude is from 0.25V to 0.9Vp-p (±0.47V or less).

Baseband Input

Selects the coupling of signals.

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

DC: Sets a direct current coupling.

Phase Inverse

Sets whether to invert the phase of demodulation.

NORMAL: The phases are not inverted.

INVERSE: The phases are inverted.

Cont Auto Level Set

Sets whether or not to carry out the auto ranging with reference to the input signal.

NOTE: When RF is selected for Input, Cont Auto Level Set takes effect only for Freq Deviation, Timing Jitter, Power vs Time, and Tx Power. Use the soft key Auto Level Set when adjusting the reference level.

ON: The auto ranging is carried out on a measurement basis.

OFF: The auto ranging is not carried out.

4 REMOTE CONTROL

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		Remarks
			Code	Output Format	
Operating mode	Spectrum analyzer mode TRANSIENT mode	SETFUNC CW SETFUNC TRAN	SETFUNC?	0: Spectrum analyzer 1: TRANSIENT	
Communi-cation System	WCDMA mode	COMMSYS WCDMA	COMMSYS?	1: W CDMA	*1
	IS-95 mode	COMMSYS IS95		2: IS-95	
	PDC mode	COMMSYS PDC		3: PDC	
	PHS mode	COMMSYS PHS		4: PHS	
	IS-136 mode	COMMSYS IS136		5: IS-136	
	GSM mode	COMMSYS GSM		6: GSM	
	DECT mode	COMMSYS DECT		7: DECT	

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

Table 4-2 ATT key (Attenuator)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Attenuator	AT	AT *	AT?	Level	
	ATT AUTO	AA	AA?	0: Manual 1: AUTO	
	Min. ATT	ATMIN *	ATMIN?	Level	
	Min. ATT ON	ATMIN ON [*]	ATMINON?	0: OFF	
	OFF	ATMIN OFF		1: ON	

Table 4-3 COPY key (Hand copy)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Printer output File output		HCOPY	-	-	

Table 4-4 COUPLE key (Couple function)

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

Table 4-5 FREQ key (Frequency)

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

Table 4-6 LEVEL key (Reference Level)

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

Table 4-7 MKR key (Marker)

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

Table 4-8 PRESET Key (Initialization)

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

Table 4-9 RCL Key (Recall)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Recall		RC REG_nn RC file name	- -	nn: 01 to 10 File name: Max.8 character	

Table 4-10 SAVE Key (Save)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Save	Save	SV REG_nn SV file name	- -	nn: 01 to 10 File name: Max.8 character	
	Deletion	DEL REG_nn DEL file name	- -	nn: 01 to 10 File name: Max.8 character	

Table 4-11 SPAN Key (Frequency span)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Fre- quency Span	-	SP *	SP?	Frequency	

Table 4-12 TRANSIENT Key (1 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (GSM)	Modulation Method				
	GMSK	MODSYS GMSK	MODSYS?	0:GMSK	
	3PI/8 Shift 8PSK	MODSYS 8PSK		1: 3PI/8 Shift 8PSK	
	Communication System				
	GSM450	MODTYP GSM450	MODTYP?	0: GSM450	
	GSM480	MODTYP GSM480		1: GSM480	
	GSM850	MODTYP GSM850		2: GSM850	
	GSM900	MODTYP GSM900		3:GSM900	
	DCS1800	MODTYP DCS1800		4: DCS1800	
	PCS1900	MODTYP PCS1900		5: PCS1900	
	Meas. Mode				
	BURST	MEASMD BURST	MEASMD?	0: BURST	
	MULTI-BURST	MEASMD MBURST		1: MULTI-BURST	
	CONTINUOUS	MEASMD CONT		2: CONTINUOUS	
	Link				
	MS	LINK MS	LINK?	0: MS	
	BTS	LINK BTS		1: BTS	
	Burst Type				
	148bits	BTYP B148	BTYP?	0: 148bits	
	88bits	BTYP B88		1: 88bits	

Table 4-12 TRANSIENT Key (2 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (GSM)	Sync.Type&Sync.Word				
	Training Sequence Code Sync. (When select to Burst Type, 148BIT)				
	TSC0	SYNC TSC0	SYNC?	0:TSC0 or BIT	
	TSC1	SYNC TSC1		1:TSC1	
	TSC2	SYNC TSC2		2:TSC2	
	TSC3	SYNC TSC3		3:TSC3	
	TSC4	SYNC TSC4		4:TSC4	
	TSC5	SYNC TSC5		5:TSC5	
	TSC6	SYNC TSC6		6:TSC6	
	TSC7	SYNC TSC7		7:TSC7	
	ARB	SYNC ARB		8:ARB	
	Sync. Bit Sync. (When select to Burst Type, 88BIT)	SYNC BIT		99:NO SYNC WORD	
	SYNC. WORD Not using	SYNC NO			
	Sync. Arbitration (The data type varies according to the modulation format.)	SYNCARB *	SYNCARB?	Hexadecimal number (0 thru 2FFFFFF) (Modulation method: when set to GMSK) Octal (26 symbols) (Modulation method: when set to 3PI/8 Shift 8PSK)	

Table 4-12 TRANSIENT Key (3 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (GSM)	Receiving Filter mode				
	WIDE	MFLTMD WIDE	MFLTMD?	0: WIDE	
	NARROW	MFLTMD NARW		1: NARROW	
	Power Control Level				
	GSM450	PWCTL n	PWCTL?	16: 11dBm, 17: 9dBm	
	GSM480	(n: 16 to 19, 99)		18: 7dBm, 19: 5dBm	
	GSM900			99: Other	
	DCS1800	PWCTL n	PWCTL?	11: 8dBm, 12: 6dBm	
		(n: 11 to 15, 99)		13: 4dBm, 14: 2dBm	
				15: 0dBm, 99: Other	
	Offset Level	RO *	RO?	Level	
	Freq.Setting mode				
	Freq. Input mode	FINPMD FREQ	FINPMD?	0: Freq. Input	
	Channel Input mode	FINPMD CHL		1: Channel Input	
	Channel Setting	CH *	CH?	Integer (Channel No.)	
	Channel Edit				
	Input #1 (MS)	CHEDUP1 *,*,*,*,*	CHEDUP1?	ch1, ch2, f1, f2, chof	
	Input #2 (MS)	CHEDUP2 *,*,*,*,*	CHEDUP2?	ch1, ch2, f1, f2, chof	
	Input #3 (MS)	CHEDUP3 *,*,*,*,*	CHEDUP3?	ch1, ch2, f1, f2, chof	
	Input #1 (BTS)	CHEDDN1 *,*,*,*,*	CHEDDN1?	ch1, ch2, f1, f2, chof	
	Input #2 (BTS)	CHEDDN2 *,*,*,*,*	CHEDDN2?	ch1, ch2, f1, f2, chof	
	Input #3 (BTS)	CHEDDN3 *,*,*,*,*	CHEDDN3?	ch1, ch2, f1, f2, chof	
				ch1: Start channel no.	
				ch2: Stop channel no.	
				f1: Base frequency(Hz)	Units of frequency are necessary for f1 and f2.
				f2: Channel space(Hz)	
				chof: Channel offset	

Table 4-12 TRANSIENT Key (4 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (GSM)	Selection of ENABLE or DISABLE for channel table				
	#1 ENABLE	CHTBL1 ENBL	CHTBL1?	0: Disable	
	DISABLE	CHTBL1 DSBL		1: Enable	
	#2 ENABLE	CHTBL2 ENBL	CHTBL2?	0: Disable	
	DISABLE	CHTBL2 DSBL		1: Enable	
	#3 ENABLE	CHTBL3 ENBL	CHTBL3?	0: Disable	
	DISABLE	CHTBL3 DSBL		1: Enable	
	Channel				
	Copy from STD	CHSETSTD			
	Input				
	RF	INPUT RF	INPUT?	0: RF	
	Baseband(I&Q)	INPUT IQ		1: Baseband(I&Q)	
	BaseBand Input				
	AC	BBINPUT AC	BBINPUT?	0: AC	
	DC	BBINPUT DC		1: DC	
	IQ Inverse				
	NORMAL	IQMD NORM	IQMD?	0: NORMAL	
	INVERSE	IQMD INV		1: INVERSE	
	Auto Level Setting				
	Auto Level OFF	ALS OFF	ALS?	0: OFF	
	Auto Level ON	ALS ON		1: ON	
	DC CAL	CLDC			

Table 4-12 TRANSIENT Key (5 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (DECT)	Meas. Mode				
	BURST	MEASMD BURST	MEASMD?	0: BURST	
	CONTINUOUS	MEASMD CONT		2: CONTINUOUS	
	Link				
	RFP	LINK RFP	LINK?	0: RFP	
	PP	LINK PP		1: PP	
	Sync.Type				
	SYNC WORD	SYNC SYNC	SYNC?	0: SYNC WORD	
	NO SYNC WORD	SYNC NO		1: NO SYNC WORD	
	Physical Packet				
	P00	PHYPKT P00	PHYPKT?	0: P00	
	P32	PHYPKT P32		1: P32	
	P08j	PHYPKT P08		2: P08j	
	P80	PHYPKT P80		3: P80	
	Z-Field				
	OFF	ZFILD OFF	ZFILD?	0: OFF	
	ON	ZFILD ON		1: ON	
	Receiving filter mode				
	WIDE	MFLTMD WIDE	MFLTMD?	0: WIDE	
	NARROW	MFLTMD NARW		1: NARROW	
	Power Level				
	LEVEL1: 2.5mW	PWRLVL *	PWRLVL?	1: LEVEL1	
	LEVEL2: 250mW			2: LEVEL2	
				(Integer)	
	Offset Level	RO *	RO?	Level	
	Frequency Setting Mode				
	Frequency Input Mode	FINPMD FREQ	FINPMD?	0: Freq. Input	
	Channel Input Mode	FINPMD CHL		1: Channel Input	

Table 4-12 TRANSIENT Key (6 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (DECT)	Channel Setting	CH *	CH?	Integer (Channel No.)	
	Channel Edit				
	Input #1(PP)	CHEDUP1 *,*,*,*,*	CHEDUP1?	ch1, ch2, f1, f2, chof	
	Input #2(PP)	CHEDUP2 *,*,*,*,*	CHEDUP2?	ch1, ch2, f1, f2, chof	
	Input #3(PP)	CHEDUP3 *,*,*,*,*	CHEDUP3?	ch1, ch2, f1, f2, chof	
	Input #1(RFP)	CHEDDN1 *,*,*,*,*	CHEDDN1?	ch1, ch2, f1, f2, chof	
	Input #2(RFP)	CHEDDN2 *,*,*,*,*	CHEDDN2?	ch1, ch2, f1, f2, chof	
	Input #3(RFP)	CHEDDN3 *,*,*,*,*	CHEDDN3?	ch1, ch2, f1, f2, chof	
				ch1: Start channel no.	
				ch2: Stop channel no.	
				f1: Base frequency(Hz)	Units of frequency are necessary for f1 and f2.
				f2: Channel space(Hz)	
				chof: Channel offset	
	Channel Table Enable/Disable				
	#1 ENABLE	CHTBL1 ENBL	CHTBL1?	0: Disable	
	DISABLE	CHTBL1 DSBL		1: Enable	
	#2 ENABLE	CHTBL2 ENBL	CHTBL2?	0: Disable	
	DISABLE	CHTBL2 DSBL		1: Enable	
	#3 ENABLE	CHTBL3 ENBL	CHTBL3?	0: Disable	
	DISABLE	CHTBL3 DSBL		1: Enable	
	Channel				
	Copy from STD	CHSETSTD			
	Input				
	RF	INPUT RF	INPUT?	0: RF	
	Baseband(I&Q)	INPUT IQ		1: Baseband(I&Q)	

Table 4-12 TRANSIENT Key (7 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup (DECT)	BaseBand Input				
	AC	BBINPUT AC	BBINPUT?	0: AC	
	DC	BBINPUT DC		1: DC	
	IQ Inverse				
	NORMAL	IQMD NORM	IQMD?	0: NORMAL	
	INVERSE	IQMD INV		1: INVERSE	
	Auto Level Setting				
	Auto Level OFF	ALS OFF	ALS?	0: OFF	
	Auto Level ON	ALS ON		1: ON	
	DC CAL	CLDC			

Table 4-12 TRANSIENT Key (8 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Auto Level Set	AUTOWFL TDPAUTOLVL			
	Trigger Setup				
	Trigger Source				
	FREERUN	TRGSRC FREE	TRGSRC?	0: FREERUN	
		TDPTRGSRC FREE	TDPTRGSRC?	1: VIDEO	
	VIDEO	TRGSRC VIDEO		2: IF	
		TDPTRGSRC VIDEO		3: EXT	
	IF	TRGSRC IF			
		TDPTRGSRC IF			
	EXT	TRGSRC EXT			
		TDPTRGSRC EXT			
	Trigger Slope				
	+	TRGSLP RISE	TRGSLP?	0: -	
		TDPTRGSLP RISE	TDPTRGSLP?	1: +	
	-	TRGSLP FALL			
		TDPTRGSLP FALL			
	Trigger Level	TRGLVL *	TRGLVL?	Integer (0 to 100)	
		TDPTRGLVL *	TDPTRGLVL?		
	Trigger Position	TRGPOS *	TRGPOS?	Integer (0 to 100)	
		TDPTRGPOS *	TDPTRGPOS?		
	Trigger Delay				
		TRGDT *	TRGDT?	Time	
		TDPTRGDT *	TDPTRGDT?		

Table 4-12 TRANSIENT Key (9 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Window Setup				
	Window				
	ON	TDPWDO ON	TDPWDO?	0: OFF	
		TWDO ON	TWDO?		
	OFF	TDPWDO OFF		1: ON	
		TWDO OFF			
	Window Position	TDPWPOS *	TDPWPOS?	Time	
		TWLX *	TWLX?		
	Window Width	TDPWWID *	TDPWWID?	Time	
		TWDX *	TWDX?		
	Y Scale				
	10dB/div	TDPDIV P10DB	TDPDIV?	0: 10dB/div	
		DCPDIV P10DB	DCPDIV?		
	5dB/div	TDPDIV P5DB		1: 5dB/div	
		DCPDIV P5DB			
	2dB/div	TDPDIV P2DB		2: 2dB/div	
		DCPDIV P2DB			
	Average Times	TDPAVGCNT *	TDPAVGCNT?	Integer (1:OFF, 2 to 999)	
		TDPAVG *	TDPAVG?	Integer (1:OFF, 2 to 999)	*1
		TPWTM *	TPWTM?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	TDPAVGMD TRACE	TDPAVGMD?	0: Trace Avg	
	MAX HOLD	TDPAVGMD MAX		1: Max Hold	
	POWER AVG	TDPAVGMD POWER		2: Power Avg	
	NUMERIC	TDPAVGMD NUMERIC		3: Numeric	

*1: Average Mode is set to POWER AVG.

Table 4-12 TRANSIENT Key (10 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Template				
	Template				
	ON	TDPTMPL ON	TDPTMPL?	0: OFF	
	OFF	TDPTMPL OFF		1: ON	
	Template Shift				
	Shift X	TDPTMPLSX *	TDPTMPLSX?	Time	
	Shift Y	TDPTMPLSY *	TDPTMPLSY?	Level	
	Template Edit				
	Template UP/LOW Select	TDPTMPLSEL UP	TDPTMPLSEL?	0: UP	
		TDPTMPLSEL LOW		1: LOW	
	Copy from STD Template	TDPTMPLCP			
	Data Input	TDPTMPLED *,*		t1, l1	
				t1: Time	
				l1: Level	
	Init Table	TDPTMPLCLR			
	Parameter Setup				
	Detector				
	Normal	TDPDET NRM	TDPDET?	0: Normal	
	Posi	TDPDET POS		1: Posi	
	Nega	TDPDET NEG		2: Nega	
	Sample	TDPDET SMP		3: Sample	
	Display Unit				
	dBm	TDPUNIT DBM	TDPUNIT?	0: dBm	
	W	TDPUNIT W		1: W	
	dBµV	TDPUNIT DBUV		2: dBµV	
	Template Couple to Power				
	ON	TDPTMPLPW ON	TDPTMPLPW?	0: OFF	
	OFF	TDPTMPLPW OFF		1: ON	

Table 4-12 TRANSIENT Key (11 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Template Limit	TDPTMPLBTM *	TDPTMPLBTM?	Level (dBm/W/dBµV)	
	Judgment				
	ON	TDPJDG ON	TDPJDG?	0: OFF	
	OFF	TDPJDG OFF		1: ON	
	Upper Limit	TDPJDGUP *	TDPJDGUP?	Level	
	Lower Limit	TDPJDGLOW *	TDPJDGLOW?	Level	
	Set to STD	TDPSETSTD			
	Starts measurement				
	T-Domain Power	TPWAVG			
		TDPMEAS			
	Starts measurement in the same mode	SI			
	Measurement results				
	T-Domain Power		TDPMEAS?	l1, j1	
				l1: Level (dBm/W/dBµV)	
				j1: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
			TPWAVG?	Level	

Table 4-12 TRANSIENT Key (12 of 56)

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

*1: Average Mode is set to NUMERIC.

Table 4-12 TRANSIENT Key (13 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
ON/OFF Ratio	Average Mode				
	TRACE AVG	OORAVGMD TRACE	OORAVGMD?	0: Trace Avg	
	MAX HOLD	OORAVGMD MAX		1: Max Hold	
	POWER AVG	OORAVGMD POWER		2: Power Avg	
	NUMERIC	OORAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	OORDET NRM	OORDET?	0: Normal	
	Posi	OORDET POS		1: Posi	
	Nega	OORDET NEG		2: Nega	
	Sample	OORDET SMP		3: Sample	
	Display Unit				
	dBm	OORUNIT DBM	OORUNIT?	0: dBm	
	W	OORUNIT W		1: W	
	dBµV	OORUNIT DBUV		2: dBµV	
	Judgment				
	ON	OORJDG ON	OORJDG?	0: OFF	
	OFF	OORJDG OFF		1: ON	
	Upper Limit	OORJDGUP *	OORJDGUP?	Level	
	Set to STD	OORSETSTD			
	Starts measurement				
	ON/OFF Ratio	OORMEAS			
	Starts measurement in the same mode	SI			
	Measurement results				
	ON/OFF Ratio		OORMEAS?	l1, l2, d1, j1 l1: ON Level (dBm/W/dBµV) l2: OFF Level (dBm/W/dBµV) d1: ON/OFF Ratio(dB) j1: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	

Table 4-12 TRANSIENT Key (14 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Spurious	Auto Level Set	TDSAUTOLVL			
	Trigger Setup				
	Trigger Source				
	FREERUN	TDSTRGSRC FREE	TDSTRGSRC?	0: FREERUN	
		TRSPMD FREE			
	IF	TDSTRGSRC IF	TRSPMD?	2: IF	
		TRSPMD IF			
	EXT	TDSTRGSRC EXT		3: EXT	
		TRSPMD EXT			
	Trigger Slope				
	+	TDSTRGSLP RISE	TDSTRGSLP?	0: -	
		TRSPSLP RISE		1: +	
	-	TDSTRGSLP FALL	TRSPSLP?		
		TRSPSLP FALL			
	Trigger Level	TDSTRGLVL *	TDSTRGLVL?	Integer (0 to 100)	
	Trigger Position	TDSTRGPOS *	TDSTRGPOS?	Integer (0 to 100)	
	Trigger Delay	TDSTRGDT *	TDSTRGDT?	Time	
	Table				
	Table No. 1/2/3	TDSTBL *	TDSTBL?	Integer (1 to 3)	
	Table Edit	TDSTBLED *,*		f1, l1	
				f1: Frequency	
				l1: Limit Level	
	Load Table	TDSLD			
		RCLTBL *		Integer (1 to 3)	

Table 4-12 TRANSIENT Key (15 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Spurious	Save Table	TDSSV			
		SVSTBL *		Integer (1 to 3)	
	Init Table	TDSCLR			
		DELSTBL			
	Table Freq. Input				
	ABS	TDSTBLF ABS	TDSTBLF?	0: ABS	
	REL	TDSTBLF REL		1: REL	
	Average Times	TDSAVGCNT *	TDSAVGCNT?	Integer (1:OFF, 2 to 999)	
		TDSAVG *	TDSAVG?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	TDSAVGMD TRACE	TDSAVGMD?	0: Trace Avg	
	MAX HOLD	TDSAVGMD MAX		1: Max Hold	
	POWER AVG	TDSAVGMD POWER		2: Power Avg	
	NUMERIC	TDSAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	TDSDET NRM	TDSDET?	0: Normal	
	Posi	TDSDET POS		1: Posi	
	Nega	TDSDET NEG		2: Nega	
	Sample	TDSDET SMP		3: Sample	
	Display Unit				
	dBm	TDSUNIT DBM	TDSUNIT?	0: dBm	
	W	TDSUNIT W		1: W	
	dBμV	TDSUNIT DBUV		2: dBμV	

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

Table 4-12 TRANSIENT Key (16 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Spurious	Judgment				
	ON	TDSJDG ON	TDSJDG?	0: OFF	
	OFF	TDSJDG OFF		1: ON	
	Result				
	Peak	TDSRES PK	TDSRES?	0: Peak	
	RMS	TDSRES RMS		1: RMS	
	Multiplier	TDSMULTI *	TDSMULTI?	Real Number	
	Peak Marker Y-Delta	TDSPKMKY *	TDSPKMKY?	Real Number	
	Preselector 1.6G	TDSPRE 16G	TDSPRE?	0: 1.6G	
	3.6G	TDSPRE 36G		1: 3.6G	
	Set to Default	TDSSETSTD			
	Starts measurement				
	Spurious	TDSMEAS SPUR			
	Starts measurement in the same mode	SI			
	Measurement results				
	Spurious		TDSMEAS?	n<CR+LF>+f1,l1,j1<CR+LF> ..... +fn,ln,jn<CR+LF> n: Amount (Integer) fn: Frequency ln: Level (dBm/W/dBµV) jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	

Table 4-12 TRANSIENT Key (17 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Due to Modula-tion	Auto Level Set	TDMAUTOLVL			
	Trigger Setup				
	Trigger Source				
	FREE RUN	TDMTRGSRC FREE	TDMTRGSRC?	0: FREE RUN	
	IF	TDMTRGSRC IF		2: IF	
	EXT	TDMTRGSRC EXT		3: EXT	
	Trigger Slope				
	+	TDMTRGSLP RISE	TDMTRGSLP?	0: -	
	-	TDMTRGSLP FALL		1: +	
	Trigger Level	TDMTRGLVL *	TDMTRGLVL?	Integer (0 to 100)	
	Trigger Position	TDMTRGPOS *	TDMTRGPOS?	Integer (0 to 100)	
	Delay Time	TDMTRGDT *	TDMTRGDT?	Time	
	Window Setup				
	Window				
	ON	TDMWDO ON	TDMWDO?	0: OFF	
	OFF	TDMWDO OFF		1: ON	
	Window Position	TDMWPOS *	TDMWPOS?	Time	
	Window Width	TDMWWID *	TDMWWID?	Time	
	Table Edit				
	Table No. 1/2/3	TDMTBL *	TDMTBL?	Integer (1 to 3)	
	Load Table	TDMLD			
	Save Table	TDMSV			
	Table Init	TDMCLR			
	Table Edit	TDMTBLED *,*		f1,l1 f1: Frequency l1: Limit Level	

Table 4-12 TRANSIENT Key (18 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Due to Modula-tion	Average Times	TDMAVGCNT *	TDMAVGCNT?	Integer (1:OFF, 2 to 999)	
	Average Mode				
	TRACE AVG	TDMAVGMD TRACE	TDMAVGMD?	0: Trace Avg	
	MAX HOLD	TDMAVGMD MAX		1: Max Hold	
	POWER AVG	TDMAVGMD POWER		2: Power Avg	
	NUMERIC	TDMAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	TDMDET NRM	TDMDET?	0: Normal	
	Posi	TDMDET POS		1: Positive	
	Nega	TDMDET NEG		2: Negative	
	Sample	TDMDET SMP		3: Sample	
	Result				
	PEAK	TDMRES PK	TDMRES?	0: Peak	
	RMS	TDMRES RMS		1: RMS	
	Display Unit				
	dBm	TDMUNIT DBM	TDMUNIT?	0: dBm	
	W	TDMUNIT W		1: W	
	dbμV	TDMUNIT DBUV		2: dbμV	
	dBc	TDMUNIT DBC		3: dBc	
	Ref Power				
	SWEEP	TDMREFPW SWP	TDMREFPW?	0: Sweep	
	MODULATION	TDMREFPW MOD		1: Modulation	
	Judgment				
	ON	TDMJDG ON	TDMJDG?	0: OFF	
	OFF	TDMJDG OFF		1: ON	
	Pleselector				
	1.6G	TDMPRE 16G	TDMPRE?	0: 1.6G	
	3.6G	TDMPRE 36G		1: 3.6G	
	Set to STD	TDMSETSTD			

Table 4-12 TRANSIENT Key (19 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Due to Modula-tion	Starts measurement Due to Modulation	TDMMEAS	TDMMEAS?	n<CR+LF>,f1,lp1,up1, j1<CR+LF>,.....fn,lpn, upn,jn<CR+LF> n: Amount (0 to 10) fx: Frequency lpx: Lower side power (dBm/W/dBµV) upx: Upper side power (dBm/W/dBµV) jx: Integer (0:FAIL, 1:PASS, -1:Judgment OFF)	
	Starts measurement in the same mode	SI			
	Ref.Power		TDMREFPWR?	Level	
F-Domain Power	Auto Level Set	FDPAUTOLVL			
	Gate Setup				
	ON	TGTSETUP ON	TGTSETUP?	0: OFF	
	OFF	TGTSETUP OFF		1: ON	
	Trigger Source				
	FREE RUN	TGTTRG FREE	TGTTRG?	0: FREERUN	
	VIDEO	TGTTRG VIDEO		1: VIDEO	
	IF	TGTTRG IF		2: IF	
	EXT	TGTTRG EXT		3: EXT	
	Trigger Slope				
	-	TGTTRGSLP FALL	TGTTRGSLP?	0: -	
	+	TGTTRGSLP RISE		1: +	
	Trigger Level	TGTTRGLVL *	TGTTRGLVL?	Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Trigger Delay	TGTTRGDT *	TGTTRGDT?	Time	
	Gate Source				
	Trigger	TGTSRC TRG	TGTSRC?	0: Trigger	
	Ext Gate	TGTSRC EXT		1: EXT	
	Gate Position	TGTPOS *	TGTPOS?	Time	
	Gate Width	TGTWID *	TGTWID?	Time	

Table 4-12 TRANSIENT Key (20 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
F-Domain Power	Detector				
	Normal	TGTDET NRM	TGTDET?	0: Normal	
	Posi	TGTDET POS		1: Posi	
	Nega	TGTDET NEG		2: Nega	
	Sample	TGTDET SMP		3: Sample	
	Gated Sweep ON/OFF				
	ON	TGTSWP ON	TGTSWP?	0: OFF	
	OFF	TGTSWP OFF		1: ON	
	Window Setup				
	Window				
	ON	FDPWDO ON	FDPWDO?	0: OFF	
	OFF	FDPWDO OFF		1: ON	
	Window Position	FDPWPOS *	FDPWPOS?	Frequency	
	Window Width	FDPWWID *	FDPWWID?	Frequency	
	Y Scale				
	10dB/div	FDPDIV P10DB	FDPDIV?	0: 10dB/div	
	5dB/div	FDPDIV P5DB		1: 5dB/div	
	2dB/div	FDPDIV P2DB		2: 2dB/div	
	Average Times	FDPAVGCNT *	FDPAVGCNT?	Integer (1:OFF, 2 to 999)	
		FDPAVG *	FDPAVG?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	FDPAVGMD TRACE	FDPAVGMD?	0: Trace Avg	
	MAX HOLD	FDPAVGMD MAX		1: Max Hold	
	POWER AVG	FDPAVGMD POWER		2: Power Avg	
	NUMERIC	FDPAVGMD NUMERIC		3: Numeric	

*1: Average Mode is set to POWER AVG.

Table 4-12 TRANSIENT Key (21 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
F-Domain Power	Parameter Setup				
	Detector				
	Normal	FDPDET NRM	FDPDET?	0: Normal	
	Posi	FDPDET POS		1: Posi	
	Nega	FDPDET NEG		2: Nega	
	Sample	FDPDET SMP		3: Sample	
	Display Unit				
	dBm	FDPUNIT DBM	FDPUNIT?	0: dBm	
	W	FDPUNIT W		1: W	
	dBµV	FDPUNIT DBUV		2: dBµV	
	Judgment				
	ON	FDPJDG ON	FDPJDG?	0: OFF	
	OFF	FDPJDG OFF		1: ON	
	Upper Limit	FDPJDGUP *	FDPJDGUP?	Level (dBm/W/dBµV)	
	Lower Limit	FDPJDGLOW *	FDPJDGLOW?	Level (dBm/W/dBµV)	
	Set to STD	FDPSETSTD			
	Starts measurement				
	F-Domain Power	FDPMEAS			
	Starts measurement in the same mode	SI			
	Measurement results				
	F-Domain Power		FDPMEAS?	l1, j1 l1: Level (dBm/W/dBµV) j1: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	

Table 4-12 TRANSIENT Key (22 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
OBW	Auto Level Set	OBWAUTOLVL			
	OBW%	OBWPER *	OBWPER?	Real Number (0.5 to 99.5)	
	Average Times	OBWAVGCNT *	OBWAVGCNT?	Integer (1:OFF, 2 to 999)	
		OBWAVG *	OBWAVG?	Integer (1:OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	OBWAVGMD TRACE	OBWAVGMD?	0: Trace Avg	
	MAX HOLD	OBWAVGMD MAX		1: Max Hold	
	POWER AVG	OBWAVGMD POWER		2: Power Avg	
	NUMERIC	OBWAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	OBWDET NRM	OBWDET?	0: Normal	
	Posi	OBWDET POS		1: Pos	
	Nega	OBWDET NEG		2: Nega	
	Sample	OBWDET SMP		3: Sample	
	Judgment				
	ON	OBWJDG ON	OBWJDG?	0: OFF	
	OFF	OBWJDG OFF		1: ON	
	Upper Limit	OBWJDGUP *	OBWJDGUP?	Frequency	
	Lower Limit	OBWJDGLOW *	OBWJDGLOW?	Frequency	
	Set to STD	OBWSETSTD			
	Starts measurement				
	OBW	OBWMEAS			
	Starts measurement in the same mode	SI			

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

Table 4-12 TRANSIENT Key (23 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
OBW	Measurement results OBW		OBWMEAS?	f1, f2, f3, j1 f1: OBW Frequency f2: Lower side Frequency f3: Higher side Frequency j1: Integer (0: FAIL, 1: PASS,-1: Judgment OFF)	
Due to Transient	Auto Level Set	DTSAUTOLVL			
	Template Template				
	ON	DTSTMPL ON	DTSTMPL?	0: OFF	
	OFF	DTSTMPL OFF		1: ON	
	Template Shift				
	Shift X	DTSTMPLSX *	DTSTMPLSX?	Frequency	
	Shift Y	DTSTMPLSY *	DTSTMPLSY?	Level	
	Margin delta X	DTSTMPLDX *	DTSTMPLDX?	Frequency (0: OFF)	
	Copy from STD	DTSTMPLCP			
	Data Input	DTSTMPLED *,*		f1, l1 f1: Frequency l1: Level (dBm/W/dBµV)	
	Init Table	DTSTMPLCLR			
	Marker Edit Copy from STD	DTSMKRCP			
	Data Input	DTSMKRED *,*,*,*		d1, f1, f2, l1 d1: (0: Normal, 1: Integral, 2:√Nyquist) f1: Offset frequency f2: Bandwidth l1: Limit Level	Set the reference bandwidth to f2, after initializing the table.
	Init Table	DTSMKRCLR			

Table 4-12 TRANSIENT Key (24 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Transient	Average Times	DTSAVGCNT *	DTSAVGCNT?	Integer (1: OFF, 2 to 999)	
		DTSAVG *	DTSAVG?	Integer (1: OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	DTSAVGMD TRACE	DTSAVGMD?	0: Trace Avg	
	MAX HOLD	DTSAVGMD MAX		1: Max Hold	
	POWER AVG	DTSAVGMD POWER		2: Power Avg	
	NUMERIC	DTSAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	DTSDET NRM	DTSDET?	0: Normal	
	Posi	DTSDET POS		1: Posi	
	Nega	DTSDET NEG		2: Nega	
	Sample	DTSDET SMP		3: Sample	
	Display Unit				
	dBm	DTSUNIT DBM	DTSUNIT?	0: dBm	
	W	DTSUNIT W		1: W	
	dBµV	DTSUNIT DBUV		2: dBµV	
	Template Couple to Power				
	ON	DTSTMPLPW ON	DTSTMPLPW?	0: OFF	
	OFF	DTSTMPLPW OFF		1: ON	
	Template Limit	DTSTMPLBTM *	DTSTMPLBTM?	Level (dBm/W/dBµV)	
	Judgment				
	ON	DTSJDG ON	DTSJDG?	0: OFF	
	OFF	DTSJDG OFF		1: ON	
	Freq. Setting				
	CFSP	DTSFRMD CFSP	DTSFRMD?	0: Center/Span Mode	
	STSP	DTSFRMD STSP		1: Start/Stop Mode	

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

Table 4-12 TRANSIENT Key (25 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Transient	Result Type				
	ABS	DTSRES ABS	DTSRES?	0: Absolute	
	REL	DTSRES REL		1: Relative	
	MKR	DTSRES MKR		2: Marker	
	Reference Power				
	MKR	DTSREF MKR	DTSREF?	0: Reference Marker	
	MOD	DTSREF MOD		1: Modulation	
	Symbol Rate 1/T	DTSSYMRT *	DTSSYMRT?	Frequency	
	Rolloff Factor	DTSRFACT *	DTSRFACT?	Real Number	
	Set to STD	DTSSETSTD			(GSM only)
	Starts measurement Due to Transient	DTSMEAS DUESWT			
	Starts measurement in the same mode	SI			
	Measurement results Due to Transient		DTSMEAS? DUESWT?	n<CR+LF>+d1,j1 <CR+LF> ..... +dn,jn<CR+LF> n: Amount (Integer) dn: Power jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	

Table 4-12 TRANSIENT Key (26 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modulation	Auto Level Set	DTMAUTOLVL			
	Gate Setup				
	ON	TGTSETUP ON	TGTSETUP?	0: OFF	
	OFF	TGTSETUP OFF		1: ON	
	Trigger Source				
	FREE RUN	TGTTRG FREE	TGTTRG?	0: FREERUN	
	VIDEO	TGTTRG VIDEO		1: VIDEO	
	IF	TGTTRG IF		2: IF	
	EXT	TGTTRG EXT		3: EXT	
	Trigger Slope				
	-	TGTTRGSLP FALL	TGTTRGSLP?	0: -	
	+	TGTTRGSLP RISE		1: +	
	Trigger Level	TGTTRGLVL *	TGTTRGLVL?	Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Trigger Delay	TGTTRGDT *	TGTTRGDT?	Time	
	Gate Source				
	Trigger	TGTSRC TRG	TGTSRC?	0: Trigger	
	Ext Gate	TGTSRC EXT		1: EXT	
	Gate Position	TGTPOS *	TGTPOS?	Time	
	Gate Width	TGTWID *	TGTWID?	Time	
	Detector				
	Normal	TGTDET NRM	TGTDET?	0: Normal	
	Posi	TGTDET POS		1: Posi	
	Nega	TGTDET NEG		2: Nega	
	Sample	TGTDET SMP		3: Sample	
	Gated Sweep ON/OFF				
	ON	TGTSWP ON	TGTSWP?	0: OFF	
	OFF	TGTSWP OFF		1: ON	

Table 4-12 TRANSIENT Key (27 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modulation	Template				
	Template				
	ON	DTMTMPL ON	DTMTMPL?	0: OFF	
	OFF	DTMTMPL OFF		1: ON	
	Template Shift				
	Shift X	DTMTMPLSX *	DTMTMPLSX?	Frequency	
	Shift Y	DTMTMPLSY *	DTMTMPLSY?	Level	
	Margin delta X	DTMTMPLDX * LIMMRG *	DTMTMPLDX? LIMMRG?	Frequency (0: OFF)	
	Copy from STD	DTMTMPLCP			
	Data Input	DTMTMPLED *,*		f1, l1 f1: Frequency l1: Level (dBm/W/dBμV)	
	Init Table	DTMTMPLCLR			
	Marker Edit				
	Copy from STD	DTMMKRCP			
	Data Input	DTMMKRED *,*,*,*		d1, f1, f2, l1 d1: (0:Normal, 1: Integral, 2:√Nyquist) f1: Offset Frequency f2: Bandwidth l1: Limit Level	Set the reference bandwidth to f2, after initializing the table.
	Init Table	DTMMKRCLR			

Table 4-12 TRANSIENT Key (28 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modulation	Average Times	DTMAVGCNT *	DTMAVGCNT?	Integer (1: OFF, 2 to 999)	
		DTMAVG *	DTMAVG?	Integer (1: OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	DTMAVGMD TRACE	DTMAVGMD?	0: Trace Avg	
	MAX HOLD	DTMAVGMD MAX		1: Max Hold	
	POWER AVG	DTMAVGMD POWER		2: Power Avg	
	NUMERIC	DTMAVGMD NUMERIC		3: Numeric	
	Parameter Setup				
	Detector				
	Normal	DTMDET NRM	DTMDET?	0: Normal	
	Posi	DTMDET POS		1: Posi	
	Nega	DTMDET NEG		2: Nega	
	Sample	DTMDET SMP		3: Sample	
	Display Unit				
	dBm	DTMUNIT DBM	DTMUNIT?	0: dBm	
	W	DTMUNIT W		1: W	
	dBµV	DTMUNIT DBUV		2: dBµV	
	Template Couple to Power				
	ON	DTMTMPLPW ON	DTMTMPLPW?	0: OFF	
	OFF	DTMTMPLPW OFF		1: ON	
	Template Limit	DTMTMPLBTM *	DTMTMPL-BTM?	Level (dBm/W/dBµV)	
	Judgment				
	ON	DTMJDG ON	DTMJDG?	0: OFF	
	OFF	DTMJDG OFF		1: ON	
	Freq. Setting				
	CFSP	DTMFRMD CFSP	DTMFRMD?	0: Center/Span Mode	
	STSP	DTMFRMD STSP		1: Start/Stop Mode	

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

Table 4-12 TRANSIENT Key (29 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modulation	Result Type				
	ABS	DTMRES ABS	DTMRES?	0: Absolute	
	REL	DTMRES REL		1: Relative	
	MKR	DTMRES MKR		2: Marker	
	Reference Power				
	MKR	DTMREF MKR	DTMREF?	0: Reference Marker	
		REFPWR SWP	REFPWR?		
	MOD	DTMREF MOD		1: Modulation	
		REFPWR DSP			
	Symbol Rate 1/T	DTMSYMRT *	DTMSYMRT?	Frequency	
	Rolloff Factor	DTMRFACT *	DTMRFACT?	Real Number	
	Set to STD	DTMSETSTD			
	Start Measurement				
	Due to Modulation	DTMMEAS			
		DUEMOD			
	Starts measurement in the same mode	SI			
	Measurement results				
	Due to Modulation		DTMMEAS? DUEMOD?	n<CR+LF>+d1, j1<CR+LF> .....+dn,jn<CR+LF>	
				n: Amount (Integer)	
				dn: Power	
				jn: Integer(0: FAIL, 1: PASS, -1: Judgment OFF)	

Table 4-12 TRANSIENT Key (30 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Inband Spurious	Auto Level Set	SPRAUTOLVL			
	Template				
	Template				
	ON	SPRTMPL ON	SPRTMPL?	0: OFF	
	OFF	SPRTMPL OFF		1: ON	
	Template Shift				
	Shift X	SPRTMPLSX *	SPRTMPLSX?	Frequency	
	Shift Y	SPRTMPLSY *	SPRTMPLSY?	Level	
	Margin delta X	SPRTMPLDX *	SPRTMPLDX?	Frequency (0: OFF)	
	Copy from STD	SPRTMPLCP			
	Data Input	SPRTMPLED *,*		f1, l1 f1: Frequency l1: Level (dBm/W/dBµV)	
	Init Table	SPRTMPLCLR			
	Marker Edit				
	Copy from STD	SPRMKRCP			
	Data Input	SPRMKRED *,*,*,*		d1, f1, f2, l1 d1: (0: Peak, 1: Integral) f1: Start Frequency f2: Stop Frequency l1: Limit Level	Set the reference bandwidth to f2, after initializing the table.
	Init Table	SPRMKRCLR			
	Average Times	SPRAVGCNT *	SPRAVGCNT?	Integer (1: OFF, 2 to 999)	
		SPRAVG *	SPRAVG?	Integer (1: OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	SPRAVGMD TRACE	SPRAVGMD?	0: Trace Avg	
	MAX HOLD	SPRAVGMD MAX		1: Max Hold	
	POWER AVG	SPRAVGMD POWER		2: Power Avg	

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

Table 4-12 TRANSIENT Key (31 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Inband Spurious	Parameter Setup				
	Detector				
	Normal	SPRDET NRM	SPRDET?	0: Normal	
	Posi	SPRDET POS		1: Posi	
	Nega	SPRDET NEG		2: Nega	
	Sample	SPRDET SMP		3: Sample	
	Display Unit				
	dBm	SPRUNIT DBM	SPRUNIT?	0: dBm	
	W	SPRUNIT W		1: W	
	dBµV	SPRUNIT DBUV		2: dBµV	
	Template Couple to Power				
	ON	SPRTMPLPW ON	SPRTMPLPW?	0: OFF	
	OFF	SPRTMPLPW OFF		1: ON	
	Template Limit	SPRTMPLBTM *	SPRTMPLBTM?	Level (dBm/W/dBµV)	
	Judgment				
	ON	SPRJDG ON	SPRJDG?	0: OFF	
	OFF	SPRJDG OFF		1: ON	
	Freq. Setting				
	CFSP	SPRFRMD CFSP	SPRFRMD?	0: Center/Span Mode	
	STSP	SPRFRMD STSP		1: Start/Stop Mode	
	Result Type				
	ABS	SPRRES ABS	SPRRES?	0: Absolute	
	REL	SPRRES REL		1: Relative	
	MKR	SPRRES MKR		2: Marker	
	Reference Power				
	MKR	SPRREF MKR	SPRREF?	0: Reference Marker	
	MOD	SPRREF MOD		1: Modulation	
	Peak Marker Y-Delta	SPRPKMKY *	SPRPKMKY?	Real Number	
	Set to STD	SPRSETSTD			

Table 4-12 TRANSIENT Key (32 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Inband Spurious	Starts measurement Inband Spurious Starts measurement in the same mode	 SPRMEAS SI			
	Measurement results Inband Spurious		SPRMEAS?	n<CR+LF>+f1,l1,j1<CR+LF> ..... +fn,ln,jn<CR+LF> n: Amount (Integer) fn: Frequency ln: Level (dBm/W/dBμV) jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
Outband Spurious	Auto Level Set	FDSAUTOLVL			
	Table Copy from STD	 FDSCP			
	Table No.1/2/3	FDSTBL *	FDSTBL?	Integer (1 to 3)	
	Table Edit	FDSTBLED *,*,*,*,*,*		f1, f2, f3, f4, d1, l1 f1: Start Frequency f2: Stop Frequency f3: RBW f4: VBW d1: Sweep Time l1: Limit Level	
	Load Table	FDSLD			
	Save Table	FDSSV			
	Init Table	FDSCLR			
	Average Times	FDSAVGCNT * FDSAVG *	FDSAVGCNT? FDSAVG?	Integer (1:OFF, 2 to 999) Integer (1:OFF, 2 to 999)	 *1

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

Table 4-12 TRANSIENT Key (33 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Outband Spurious	Average Mode				
	TRACE AVG	FDSAVGMD TRACE	FDSAVGMD?	0: Trace Avg	
	MAX HOLD	FDSAVGMD MAX		1: Max Hold	
	POWER AVG	FDSAVGMD POWER		2: Power Avg	
	Parameter Setup				
	Detector				
	Normal	FDSDET NRM	FDSDET?	0: Normal	
	Posi	FDSDET POS		1: Posi	
	Nega	FDSDET NEG		2: Nega	
	Sample	FDSDET SMP		3: Sample	
	Display Unit				
	dBm	FDSUNIT DBM	FDSUNIT?	0: dBm	
	W	FDSUNIT W		1: W	
	dBµV	FDSUNIT DBUV		2: dBµV	
	Judgment				
	ON	FDSJDG ON	FDSJDG?	0: OFF	
	OFF	FDSJDG OFF		1: ON	
	Peak Marker Y-Delta	FDSPKMKY *	FDSPKMKY?	Real Number	
	Preselector 1.6G	FDSPRE 16G	FDSPRE?	0: 1.6G	
	3.6G	FDSPRE 36G		1: 3.6G	
	Set to Default	FDSSETSTD			
	Starts measurement				
	Outband Spurious	FDSMEAS			
	Starts measurement in the same mode	SI			

Table 4-12 TRANSIENT Key (34 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Outband Spurious	Measurement results Outband Spurious		FDSMEAS?	n<CR+LF>+f1,l1,j1<CR+LF> ..... +fn,ln,jn<CR+LF> n: Amount (Integer) fn: Frequency ln: Level (dBm/W/dBμV) jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
Tx Power (GSM)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode	MODTRG FREE	MODTRG?	0: FREERUN	
	FREERUN	TRGMODE FREE	TRGMODE?		
	IF	MODTRG IF		1: IF	
		TRGMODE IF			
	EXT	MODTRG EXT		2: EXT	
		TRGMODE EXT			
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		TRGMSLP RISE	TRGMSLP?		
	-	MODTRGSLP FALL		1: +	
		TRGMSLP FALL			
	TDMA Structure				
	156.25 bit	TRGSTR TYP1	TRGSTR?	0: 156.25 bit	
	156/157 bit	TRGSTR TYP2		1: 156/157 bit	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	Slot Setting	MODTRGSLT *	MODTRGSLT?	0 to 7	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (0 to 100)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL *	MODBRSTLVL?	Level	
	Half Symbol Shift				
	Half Symbol Shift ON	MODHSS ON	MODHSS?	0: OFF	
	Half Symbol Shift OFF	MODHSS OFF		1: ON	

Table 4-12 TRANSIENT Key (35 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Tx Power (GSM)	Average Times	TXAVG *	TXAVG?	Integer (1: OFF, 2 to 32)	
		TAVGTX *	TAVGTX?		
		TAVGAP *	TAVGAP?		
	Starts measurement Tx Power	TXPWR			
	Starts measurement in the same mode	SI			
	Measurement results Tx Power	Modulation:For GMSK	TXPWR?	d1, d2 d1: Tx Power(dBm) d2: Tx Power(W)	
		Modulation:For 3PI/8 Shift 8PSK	TXPWR?	d1,d2,d3 d1: Tx Power(dB) d2: Tx Power(W) d3: Peak Factor(dB)	

Table 4-12 TRANSIENT Key (36 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs. Time (GSM)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		TRGMODE FREE	TRGMODE?		
	IF	MODTRG IF		1: IF	
		TRGMODE IF			
	EXT	MODTRG EXT		2: EXT	
		TRGMODE EXT			
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		TRGMSLP RISE	TRGMSLP?	1: +	
	-	MODTRGSLP FALL			
		TRGMSLP FALL			
	TDMA Structure				
	156.25 bit	TRGSTR TYP1	TRGSTR?	0: 156.25 bit	
	156/157 bit	TRGSTR TYP2		1: 156/157 bit	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	Slot Setting	MODTRGSLT *	MODTRGSLT?	0 to 7	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (%)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL *	MODBRSTLVL?	Level	
	Half Symbol Shift				
	Half Symbol Shift ON	MODHSS ON	MODHSS?	0: OFF	
	Half Symbol Shift OFF	MODHSS OFF		1: ON	
	Consecutive Template				
	Consecutive Template ON	PTCONSTM ON	PTCONSTM?	0: OFF	
	Consecutive Template OFF	PTCONSTM OFF		1: ON	
	Max dB+	PTMAXDB *	PTMAXDB?	Level	
	Slot Length				
	Slot Length 156 Slot Length 156.25 Slot Length 157	PTSLTLEN 156 PTSLTLEN 15625 PTSLTLEN 157	PTSLTLEN?	0:156 1:156.25 2:157	

Table 4-12 TRANSIENT Key (37 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs. Time (GSM)	Average Times	GPTAVG * PTAVG *	GPTAVG? PTAVG?	Integer (1: OFF, 2 to 32)	
	Measurement Mode Normal High dynamic range	 PTMOD NORM PTMOD HIGH	 PTMOD?	 0: NORM 1: HIGH	
	Y Scale 20dB/div 10dB/div 5dB/div	 GPTDIV P20DB PTDIV P20DB GPTDIV P10DB PTDIV P10DB GPTDIV P5DB PTDIV P5DB	 GPTDIV? PTDIV?	 0: 20dB/div 1: 10dB/div 2: 5dB/div	
	Template Template Select	 GPTTYP * PTTYP *	 GPTTYP? PTTYP?	 Integer (Template No.: 1, 2, 3, 4) 1: MS Template 2: BTS Template 1	
	Template Edit	GPTENT d0,d1,d2,d3,d4,d5,d6 PTENT d0,d1,d2,d3,d4,d5,d6		d0 to d6: Level(dB) (OffLev Unit is set to DB.)	If the number of data is less than 7, enter a 0 in each position.
		GPTENT2 d0,d1,d2,d3,d4,d5,d6,d7 PTENT2 d0,d1,d2,d3,d4,d5,d6,d7		d0 to d7: Level(dB) (OffLev Unit is set to DB.)	If the number of data is less than 8, enter a 0 in each position.
	Level Edit #0 #1 #2 #3 #4 #5 #6 #1'	 GPTLV0 * GPTLV1 * GPTLV2 * GPTLV3 * GPTLV4 * GPTLV5 * GPTLV6 * GPTLV7 *	 GPTLV0? GPTLV1? GPTLV2? GPTLV3? GPTLV4? GPTLV5? GPTLV6? GPTLV7?	 Level Level Level Level Level Level Level Level	

Table 4-12 TRANSIENT Key (38 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs. Time (GSM)	OffLev Unit Edit				
	#0 dBm	GPTUNIT0 DBM	GPTUNIT0?	0: dBm 1: dB	
	dB	GPTUNIT0 DB			
	#1 dBm	GPTUNIT1 DBM	GPTUNIT1?	0: dBm 1: dB	
	dB	GPTUNIT1 DB			
	#2 dBm	GPTUNIT2 DBM	GPTUNIT2?	0: dBm 1: dB	
	dB	GPTUNIT2 DB			
	#3 dBm	GPTUNIT3 DBM	GPTUNIT3?	0: dBm 1: dB	
	dB	GPTUNIT3 DB			
	#4 dBm	GPTUNIT4 DBM	GPTUNIT4?	0: dBm 1: dB	
	dB	GPTUNIT4 DB			
	#5 dBm	GPTUNIT5 DBM	GPTUNIT5?	0: dBm 1: dB	
	dB	GPTUNIT5 DB			
	#6 dBm	GPTUNIT6 DBM	GPTUNIT6?	0: dBm 1: dB	
	dB	GPTUNIT6 DB			
	#1' dBm	GPTUNIT7 DBM	GPTUNIT7?	0:dBm 1: dB	
	dB	GPTUNIT7 DB			
	Time Edit				
	#0	GPTTM0 *	GPTTM0?	Time	
	#1	GPTTM1 *	GPTTM1?	Time	
	#2	GPTTM2 *	GPTTM2?	Time	
	#3	GPTTM3 *	GPTTM3?	Time	
	#4	GPTTM4 *	GPTTM4?	Time	
	#0'	GPTTM5 *	GPTTM5?	Time	
	Entering a set of levels	GPTLVENT d0,u0,d1,u1,d2,u2, d3,u3,d4,u4,d5,u5,d6,u6		d0 to d6: Level(dB) (DB is the unit of levels) u0 to u6: (0: dBm 1: dB)	If the number of data is less than 7, enter a 0 in each position.
		GPTLVENT2 d0,u0,d1,u1,d2,u2,d3,u3, d4,u4,d5,u5,d6,u6,d7,u7		d0 to d7: Level(dB) (DB is the unit of levels) u0 to u7: (0: dBm 1: dB)	If the number of data is less than 8, enter a 0 in each position.

Table 4-12 TRANSIENT Key (39 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs. Time (GSM)	Entering a set of times	GPTTMENT t0,t1,t2,t3,t4		t0 to t4: Time	If the number of data is less than 5, enter a 0 in each position.
		GPTTMENT2 t0,t1,t2,t3,t4,t5		t0 to t5: Time	If the number of data is less than 6, enter a 0 in each position.
	Average Times	GPTAVG * PTAVG *	GPTAVG? PTAVG?	Integer (1: OFF, 2 to 32)	
	Starts measurement Power vs. Time Starts measurement in the same mode	 GPWRTM PWRTM SI			
	Measurement results Power vs. Time PASS/FAIL		 GPWRTM? PWRTM? GPWRTM2? PWRTM2? GPTJDG? PTJDG?	 Level (dBm) Level (dBm) d1,d2,d3 d1: Tx Power1 (dBm) d2: Tx Power2 (dBm) d3: Δ Power (dB) 0/1 0: FAIL 1: PASS	

Table 4-12 TRANSIENT Key (40 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Phase Error (GSM)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		TRGMODE FREE	TRGMODE?		
	IF	MODTRG IF		1: IF	
		TRGMODE IF			
	EXT	MODTRG EXT		2: EXT	
		TRGMODE EXT			
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		TRGMSLP RISE	TRGMSLP?		
	-	MODTRGSLP FALL		1: +	
		TRGMSLP FALL			
	TDMA Structure				
	156.25 bit	TRGSTR TYP1	TRGSTR?	0: 156.25 bit	
	156/157 bit	TRGSTR TYP2		1: 156/157 bit	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	Slot Setting	MODTRGSLT *	MODTRGSLT?	0 to 7	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (0 to 100)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL *	MODBRSTLVL?	Level	
	Half Symbol Shift				
	Half Symbol Shift ON	MODHSS ON	MODHSS?	0:OFF	
	Half Symbol Shift OFF	MODHSS OFF		1:ON	
	Average Times	TAVGPH *	TAVGPH?	Integer (1: OFF, 2 to 200)	

Table 4-12 TRANSIENT Key (41 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Phase Error (GSM)	Starts measurement Phase Error Starts measurement in the same mode	 PHACC SI			
	Measurement results Phase Error		 PHACC? PHACC2?	 Pk, Ph, Fr Pk: Phase (degree) Ph: Phase (degree rms) Fr: Frequency(Hz) Ph, Pk, Bit, Fr Ph: Phase (degree rms) Pk: Phase (degree) Bit: Peak Phase error position (bit) Fr: Frequency (Hz)	

Table 4-12 TRANSIENT Key (42 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Modulatin Accuracy (GSM)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		TRGMODE FREE	TRGMODE?		
	IF	MODTRG IF		1: IF	
		TRGMODE IF			
	EXT	MODTRG EXT		2: EXT	
		TRGMODE EXT			
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		TRGMSLP RISE	TRGMSLP?	1: +	
	-	MODTRGSLP FALL			
		TRGMSLP FALL			
	TDMA Structure				
	156.25 bit	TRGSTR TYP1	TRGSTR?	0: 156.25 bit	
	156/157 bit	TRGSTR TYP2		1: 156/157 bit	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	Slot Setting	MODTRGSLT *	MODTRGSLT?	0 to 7	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer(%)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL	MODBRSTLVL?	Level	
	R.C. Filter				
	R.C. Filter ON	MODRCFLT ON	MODRCFLT?	0: OFF	
		MODRNYQ ON	MODRNYQ?	1: ON	
	R.C. Filter OFF	MODRCFLT OFF			
		MODRNYQ OFF			

Table 4-12 TRANSIENT Key (43 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Modulation Accuracy (GSM)	Average Times	TAVGMOD *	TAVGMOD?	Integer(1:OFF,2 to 200)	
	Starts measurement Modulation Accuracy Starts measurement in the same mode	 MODACC SI			
	Measurement results Modulation accuracy (1 symbol)		MODACC?	d1,d2,d3,d4,d5,d6,d7,d8 d1:Burst Amplitude Droop(dB/symbol) d2:Carrier Frequency Error(Hz) d3:I/Q origin offset(dBc) d4:Magnitude Error(% rms) d5:Phase Error(deg. rms) d6:Error Vector Magnitude(% rms) d7:95:th percentile(%) d8:Peak EVM(Avg) (% rms)	
	Modulation accuracy(Peak)		MODAC-CPK?	d1,s1,d2,s2,d3,s3 d1: Peak Magnitude Error(%rms) s1: Position of Peak Mag. Error d2: Peak Phase Error(deg.rms) s2: Position of Peak Phase Error d3: Peak E.V.M(%rms) s3: Position of Peak E.V.M	

Table 4-12 TRANSIENT Key (44 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Graphics Selection Phase Error	Constellation	GGPTYP INP	GGPTYP?	0: Constellation	
	Constellation(Line)	GGPTYP LIN		1: Constellation(Line)	
	Constellation(Dot)	GGPTYP DOT		2: Constellation(Dot)	
	Constellation(Line&Dot)	GGPTYP CON		3: Constella-tion(Line&Dot)	
	I EYE Diagram	GGPTYP IEYE		4: I EYE Diagram	
	Q EYE Diagram	GGPTYP QEYE		5: Q EYE Diagram	
	I/Q EYE Diagram	GGPTYP IQEYE		6: I/Q EYE Diagram	
	Trellis	GGPTYP TR		7: Trellis	
	Phase Error vs Bit	GGPTYP PE		8: Phase Error vs Bit	
	FFT of Phase Error	GGPTYP FPE		9: FFT of Phase Error	
	Frequency vs Bit	GGPTYP BF		10: Frequency vs Bit	
	Frequency EYE	GGPTYP FREYE		11: Frequency EYE	
	Demodulated Data	GGPTYP DE		12: Demodulated Data	
Data Output Constellation Constella-tion(Line) Constellation(Dot) Constella-tion(Line&Dot)	I-channel data output	GPHI?		n<CR+LF>+d1<CR+LF>+.....+dn<CR+LF> n: Number of output dn: Data (Real Number)	
I EYE Diagram Q EYE Diagram I/Q EYE Diagram	Q-channel data output	GPHQ?		n<CR+LF>+d1<CR+LF>+.....+dn<CR+LF> n: Number of output dn: Data (Real Number)	

Table 4-12 TRANSIENT Key (45 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Demodulated Data	Demodulated data output		DEMOD?	n<CR+LF>+d1$<CR+LF> +....+dn$<CR+LF> n: Number of output character string data dn$: Character string data (1 Data: 10 bit)	
Trellis Phase Error vs Bit Frequency vs Bit Frequency EYE	X data		GPHX?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output dn: Data (Integer)	
	Y data		GPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output dn: Data (Real Number)	
FFT of Phase Error	X data		GPHX?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output dn: Data (Real Number)	
	Y data		GPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output dn: Data (Real Number)	

Table 4-12 TRANSIENT Key (46 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Graphics Selection Modulation Accuracy	Constellation	EGPTYP INP	EGPTYP?	0: Constellation	
	Constellation(Line)	EGPTYP LIN		1: Constellation(Line)	
	Constellation(Dot)	EGPTYP DOT		2: Constellation(Dot)	
	Constellation(Line&Dot)	EGPTYP CON		3: Constella-tion(Line&Dot)	
	I EYE Diagram	EGPTYP IEYE		4: I EYE Diagram	
	Q EYE Diagram	EGPTYP QEYE		5: Q EYE Diagram	
	I/Q EYE Diagram	EGPTYP IQEYE		6: I/Q EYE Diagram	
	Demodulated Data	EGPTYP DEMOD		7: Demodulated Data	
	E.V.M. vs. Symbol	EGPTYP EVM		8: E.V.M. vs. Symbol	
	Mag. Error vs. Symbol	EGPTYP ME		9: Mag. Error vs. Sym-bol	
	Phase Error vs. Symbol	EGPTYP PFE		10: Phase Error vs. Symbol	
	8PSK Constellation	EGPTYP 8INP		11: 8PSK Constella-tion	
	8PSK Constellation(Line)	EGPTYP 8LIN		12: 8PSK Constella-tion(Line)	
	8PSK Constellation(Dot)	EGPTYP 8DOT		13: 8PSK Constella-tion(Dot)	
	8PSK Constella-tion(Line&Dot)	EGPTYP 8CON		14: 8PSK Constella-tion(Line&Dot)	
	8PSK I EYE Diagram	EGPTYP 8IEYE		15: 8PSK I EYE Dia-gram	
	8PSK Q EYE Diagram	EGPTYP 8QEYE		16: 8PSK Q EYE Dia-gram	
	8PSK I/Q EYE Diagram	EGPTYP 8IQEYE		17: 8PSK I/Q EYE Diagram	

Table 4-12 TRANSIENT Key (47 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Data Output					
Constellation	I-channel data output		EGPHI?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF>	
Constellation (Line)				n: Number of output	
Constellation (Dot)				dn: Data (Real Number)	
Constellation (Line&Dot)					
I EYE Diagram	Q-channel data output		EGPHQ?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF>	
Q EYE Diagram				n: Number of output	
I/Q EYE Diagram				dn: Data (Real Number)	
Demodulated Data	Demodulated data output		EDEMOD?	n<CR+LF>+d1$<CR+LF> +....+dn$<CR+LF>	
				n: Number of output character string data	
				dn$: Character string data (1 Data: 10 bit)	
E.V.M. vs. Symbol Mag. Error vs. Symbol Phase Error vs. Symbol	X data(Symbol Number)		EGPHX?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF>	
				n: Number of output	
				dn: Data (Integer)	
	Y data		EGPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF>	
				n: Number of output	
				dn: Data (Real Number)	

Table 4-12 TRANSIENT Key (48 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Freq Deviation (DECT)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		DCAPTRG FREE	DCAPTRG?		
	IF	MODTRG IF		1: IF	
		DCAPTRG IF			
	EXT	MODTRG EXT		2: EXT	
		DCAPTRG EXT			
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		DTRGSLP RISE	DTRGSLP?	1: +	
	-	MODTRGSLP FALL			
		DTRGSLP FALL			
	Slot No.				
	Full Slot Number	FULSLT *	FULSLT?	Integer (0 to 23)	
	Half Slot Number	HAFSLT *	HAFSLT?	Integer (0 to 1)	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (0 to 100)	
	Bit Sequence				
	RANDOM	DFMBITSEQ RND	DFMBITSEQ?	0: RANDOM	
	STD	DFMBITSEQ STD		1: STD	
	Average Times	DFMAVG *	DFMAVG?	Integer (1: OFF, 2 to 32)	
	Starts measurement				
	Freq Deviation	DFMDEV			
	Starts measurement in the same mode	SI			

Table 4-12 TRANSIENT Key (49 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Freq Deviation (DECT)	Measurement results Freq Deviation When Bit Sequence is using a RANDOM pattern.		DFMDEV?	Pk1, Pk2, Fr Pk1: Max. Peak Devi.(Hz) Pk2: Min. Peak Devi.(Hz) Fr: Frequency Error (Hz)	
	When Bit Sequence is set the STD pattern.		DFMDEVSTD ?	Pk1, Pk2, Pk3, Pk4, Fr Pk1: Sync Field Max. Peak Devi.(Hz) Pk2: Sync Field Min. Peak Devi.(Hz) Pk3: Loopback Field Max. Peak Devi.(Hz) Pk4: Loopback Field Min. Peak Devi.(Hz) Fr: Frequency Error (Hz)	

Table 4-12 TRANSIENT Key (50 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Timing Jitter (DECT)	Auto Level Set	AUTOLVL			
	RFP→PP				
	ON	DTJLNK ON	DTJLNK?	0: OFF	
	OFF	DTJLNK OFF		1: ON	
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		DCAPTRG FREE	DCAPTRG?		
	IF	MODTRG IF		1: IF	
		DCAPTRG IF			
	EXT	MODTRG EXT		2: EXT	
		DCAPTRG EXT			
	Burst Search				
	Burst Search ON	MODTRGBRST ON	MODTRGBRST?	0: OFF	
	Burst Search OFF	MODTRGBRST OFF		1: ON	
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		DTRGSLP RISE	DTRGSLP?	1: +	
	-	MODTRGSLP FALL			
		DTRGSLP FALL			
	Slot No.				
	Full Slot Number	FULSLT *	FULSLT?	Integer (0 to 23)	
	Half Slot Number	HAFSLT *	HAFSLT?	Integer (0 to 1)	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (0 to 100)	
	Average Times	DTJAVG *	DTJAVG?	Integer (1: OFF, 2 to 32)	

Table 4-12 TRANSIENT Key (51 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Timing Jitter (DECT)	Starts measurement Timing Jitter Starts measurement in the same mode	 DTJIT SI			
	Measurement results Timing Jitter		DTJIT?	d1, d2, d3 d1: Max. Peak Jitter(sec) d2: Min. Peak Jitter(sec) d3: Average Jitter(sec)	

Table 4-12 TRANSIENT Key (52 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Tx Power (DECT)	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
		DCAPTRG FREE	DCAPTRG?		
	IF	MODTRG IF		1: IF	
		DCAPTRG IF			
	EXT	MODTRG EXT		2: EXT	
		DCAPTRG EXT			
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
		DTRGSLP RISE	DTRGSLP?	1: +	
	-	MODTRGSLP FALL			
		DTRGSLP FALL			
	Slot No.				
	Full Slot Number	FULSLT *	FULSLT?	Integer (0 to 23)	
	Half Slot Number	HAFSLT *	HAFSLT?	Integer (0 to 1)	
	EXT Trigger Delay				
	Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (0 to 100)	
	Average Times	TXAVG *	TXAVG?	Integer (1: OFF, 2 to 32)	
		TAVGTX *	TAVGTX?		
		DTXAVG *	DTXAVG?		
	Starts measurement				
	Tx Power	TXPWR			
		DTXPOW			
	Starts measurement in the same mode	SI			

Table 4-12 TRANSIENT Key (53 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Tx Power (DECT)	Measurement results Tx Power		TXPWR? DTXPOW?	d1, d2 d1: Tx Power(dBm) d2: Tx Power(W)	
Power vs Time (DECT)	Auto Level Set	AUTOLVL			
	Trigger Setup Trigger Mode FREERUN	MODTRG FREE DCAPTRG FREE	MODTRG? DCAPTRG?	0: FREERUN	
	IF	MODTRG IF DCAPTRG IF		1: IF	
	EXT	MODTRG EXT DCAPTRG EXT		2: EXT	
	Burst Search Burst Search OFF	MODTRGBRST OFF	MODTRGBRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	EXT Trigger Slope +	MODTRGSLP RISE DTRGSLP RISE	MODTRGSLP? DTRGSLP?	0: - 1: +	
	-	MODTRGSLP FALL DTRGSLP FALL			
	Slot No. Full Slot Number	FULSLT *	FULSLT?	Integer (0 to 23)	
	Half Slot Number	HAFSLT *	HAFSLT?	Integer (0 to 1)	
	EXT Trigger Delay Time Setting	MODTRGDLY *	MODTRGDLY?	Time	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer (%)	

Table 4-12 TRANSIENT Key (54 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs Time (DECT)	Measurement Mode				
	Normal	PTMOD NORM	PTMOD?	0: NORM	
	High dynamic range	PTMOD HIGH		1: HIGH	
	Y Scale				
	20dB/div	DPTDIV P20DB	DPTDIV?	0: 20dB/div	
		PTDIV P20DB	PTDIV?		
	10dB/div	DPTDIV P10DB		1: 10dB/div	
		PTDIV P10DB			
	5dB/div	DPTDIV P5DB		2: 5dB/div	
		PTDIV P5DB			
	Template				
	Template Select	DPTTYP *	DPTTYP?	Integer	
		PTTYP *	PTTYP?	(Template No.: 1, 2, 3, 4) 1: User Template 1 2: User Template 2 3: User Template 3 4: STD Template	
	Template Edit	DPTENT d0,d1,d2,d3,d4,d5 PTENT d0,d1,d2,d3,d4,d5		d0 to d5: Level(dB) (Unit of level, dB, is necessary)	OffLev Unit is set to dB.
	Level Edit				
	#0	DPTLV0 *	DPTLV0?	Level	
	#1	DPTLV1 *	DPTLV1?	Level	
	#2	DPTLV2 *	DPTLV2?	Level	
	#3	DPTLV3 *	DPTLV3?	Level	
	#4	DPTLV4 *	DPTLV4?	Level	
	#5	DPTLV5 *	DPTLV5?	Level	

Table 4-12 TRANSIENT Key (55 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Power vs Time (DECT)	OffLev Unit Edit				
	#0 W	DPTUNIT0 W	DPTUNIT0?	0: W 1: dB	
	dB	DPTUNIT0 DB			
	#1 W	DPTUNIT1 W	DPTUNIT1?	0: W 1: dB	
	dB	DPTUNIT1 DB			
	#2 W	DPTUNIT2 W	DPTUNIT2?	0: W 1: dB	
	dB	DPTUNIT2 DB			
	#3 W	DPTUNIT3 W	DPTUNIT3?	0: W 1: dB	
	dB	DPTUNIT3 DB			
	#4 W	DPTUNIT4 W	DPTUNIT4?	0: W 1: dB	
	dB	DPTUNIT4 DB			
	#5 W	DPTUNIT5 W	DPTUNIT5?	0: W 1: dB	
	dB	DPTUNIT5 DB			
	Entering a set of levels	DPTLVENT d0,u0,d1,u1, d2,u2,d3,u3,d4,u4,d5, u5		d0 to d5: Level(dB) (Unit of level, dB, is necessary) u0 to u5: (0:W 1:dB)	
	Average Times	DPTAVG *	DPTAVG?	Integer (1: OFF, 2 to 32)	
		PTAVG *	PTAVG?		
	Starts measurement				
	Power vs Time	DPWRTM			
		PWRTM			
	Starts measurement in the same mode	SI			
	Measurement results				
	Power vs Time		DPWRTM?	Level (W)	
			PWRTM?	Level (W)	
	PASS/FAIL		DPTJDG?	0/1	
			PTJDG?	0: FAIL	
				1: PASS	

Table 4-12 TRANSIENT Key (56 of 56)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Graphics Selection (DECT)	Frequency vs Bit	DFMGTYP BIT	DFMGTYP?	0: Frequency vs Bit	
	Frequency EYE	DFMGTYP EYE		1: Frequency EYE	
	Demodulated Data	DFMGTYP DEMOD		2: Demodulated Data	
	Start Bit setting	DSTTBIT *	DSTTBIT?	Integer	
Data Output					
Demodulated Data	Demodulated data output		DEMOD?	n<CR+LF>+d1$<CR+LF>+ ....+dn$<CR+LF> n: Number of output character string data dn$: Character string data (1 Data: 10 bit)	
Frequency vs Bit Frequency EYE	X data (Bit Number)		GPHX?	n<CR+LF>+d1<CR+LF>+.....+dn<CR+LF> n: Number of output data dn: Data (Integer)	
	Y data (Frequency)		GPHY?	n<CR+LF>+d1<CR+LF>+.....+dn<CR+LF> n: Number of output data dn: Data (Real Number)	

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

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

Table 4-14 Miscellaneous

Function		Listener Code	Talker Request	
			Code	Output Format
Miscella-neous	Outputting error number	-	ERRNO?	Integer
	Local	LC	-	-
	Reading GPIB address	-	AD?	Integer (0 to 30)
	Specification of the delimiter			
	CR LF <EOI>	DL0	-	-
	LF	DL1	-	-
	<EOI>	DL2	-	-
	CR LF	DL3	-	-
	LF <EOI>	DL4	-	-
	Service request interruption			
	ON	S0	-	-
	OFF	S1	-	-
	Status clear	S2	-	-
	Service request mask	RQS *	RQS?	Decimal number corresponding to the SRQ bit
	Outputting ID of the instrument	-	*IDN?	Manufacturer name (character string), instrument type (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

5 TECHNICAL INFORMATION

5.1 NARROW/WIDE in the GSM filter mode

The characteristics of a filter used for signal reception (referred to as a receiving filter hereafter) are not explicitly specified in the GSM standard. In this standard, data must be sampled for further analysis at a rate twice or more as fast as the actual bit rate is. The bandwidth of receiving filters can be interpreted as the bit rate from the standard cited above.

The sampling rate used in the instrument is four times the bit rate currently used.

"NARROW" filter refers to a low-pass filter whose bandpass is almost same as the bit rate currently used; and "WIDE" filter is a low-pass filter whose bandpass is almost two times the bit rate currently used.

5.2 NARROW/WIDE in the DECT filter mode

The characteristics of a receiving filter are not explicitly specified in the DECT standard.

The characteristics of the filter used in the instrument are:

NARROW Filter: A low-pass filter whose bandpass is almost same as the bit rate currently used.

NARROW: A low-pass filter whose bandpass is almost two times the bit rate currently used.

5.3 RANDOM/STD in the DECT bit sequence

In the TBR 06 standard, the frequency error is measured by averaging the frequency deviations of a loopback field of the packet after a test pattern is transmitted in the loopback field.

Select the STD mode to measure frequency errors according to the standard. The input signal, however, must already contain the test pattern in the loopback field.

Select the Random mode when the data pattern in a packet is random.

Frequency error (Ferror) is calculated from the formula below using the maximum frequency deviation (fmax) and the minimum frequency deviation (fmin).

Ferror = (fmax + fmin) / 2

5.4 Measurement of a Signal Containing Multiple Bursts in a Frame (IN GSM)

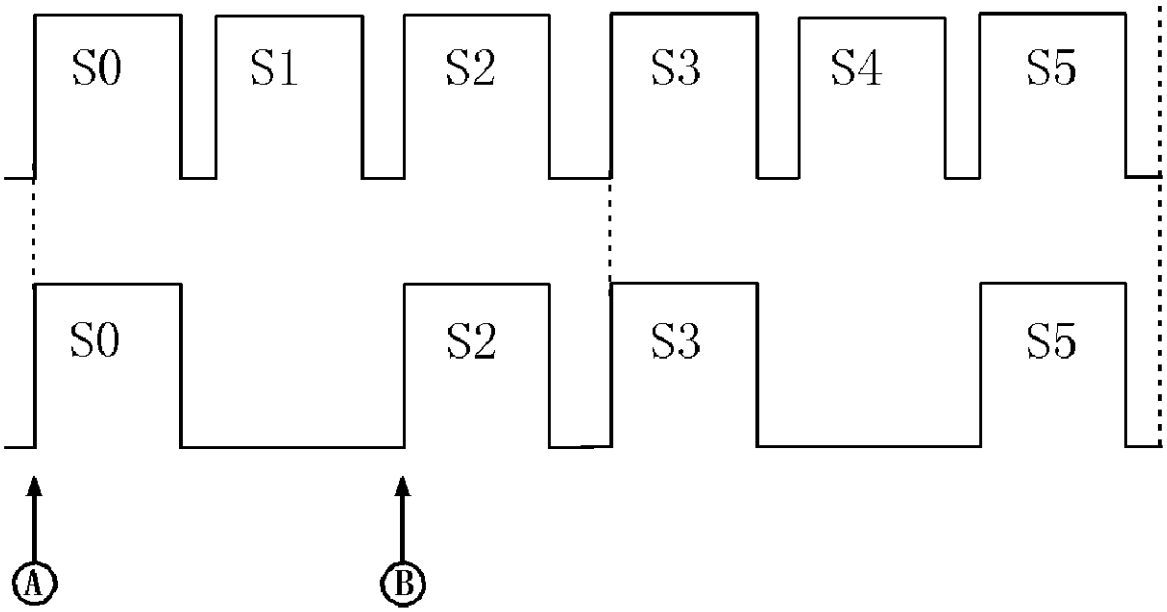


Figure 5-1 A Signal Containing Multiple Bursts in a Frame

In GSM, the targeted slot of a signal, which contains multiple bursts in a frame as shown in Figure 5-1, can be measured by setting Meas Mode (in STD Setup) to MULTI-BURST.

STD Setup is set as follows:

Sync Type: SYNC WORD

Sync Word: TSC 0

When Meas Mode is set to BURST and the circuit in the instrument is triggered at point A on the signal, the measurement is valid. When triggered at point B, however, the measurement is not valid.

When Meas mode is set to MULTI-BURST, measurements are always valid regardless of the triggering point.

In this mode, even if the sync word of the first burst does not coincide with TSC0, the measurement can be repeated up to 16 times until the sync word coincides with TSC0 by automatically capturing the next slot data. This can be applied to a signal having the Super Frame structure. Once the rise of a burst is correctly detected, a slot with TSC0 sync word can be measured regardless of the frame position in which TSC0 sync word is contained.

5.5 Measurement of a Signal Containing UP LINK/DOWN LINK Bursts in a Frame (IN DECT)

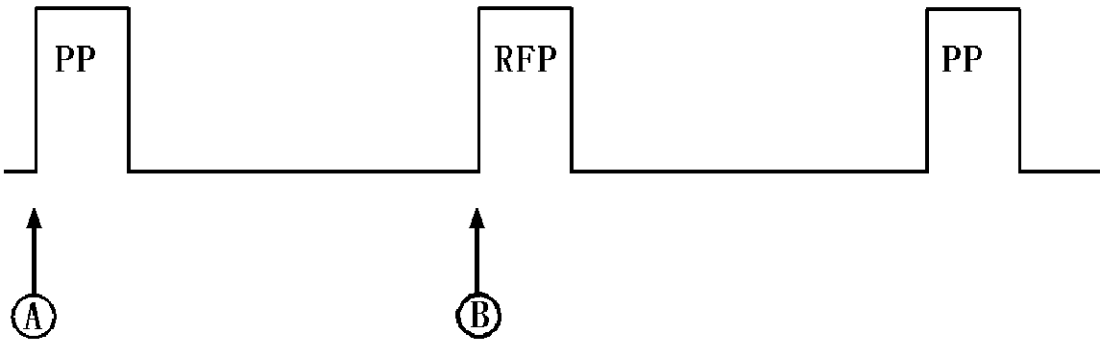


Figure 5-2 A Signal Containing Up Link/Down Link Bursts in a Frame

In DECT, a signal, which contains uplink/downlink signals in a frame as shown in Figure 5-2, can be measured.

STD Setup is set as follows:

Sync Type: SYNC WORD

Link: PP

(1) When the trigger position is at A:

The measurement is made using this slot as uplink.

(2) When the trigger position is at B:

As this slot is a downlink slot, the sync word will not coincide with PP when demodulated. When the synch word does not coincide with PP, the instrument automatically capture the 13th slot data after skipping the subsequent 12 slots, and takes a measurement using the slot as a uplink slot.

As a result, the measurement for the set signal can be made even if the signal contains both uplink and downlink signals.

NOTE: When Link is set to RFP, slots with downlink can be measured.

5.6 T-DOMAIN Power

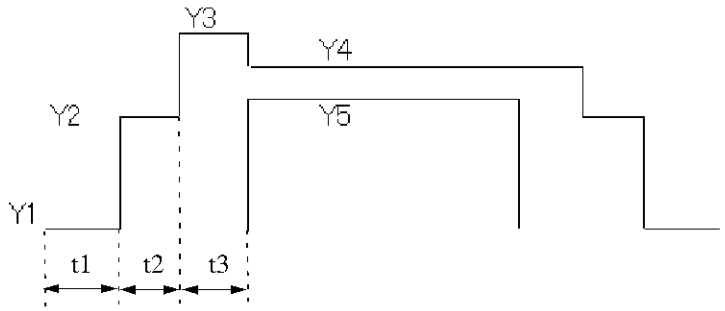
5.6.1 Default values of Time Template

The templates, which are used with T-Domain power measurements of the signals containing raising/falling edges, are set as follows depending on communication systems and their power control levels:

5.6.1.1 GSM Template

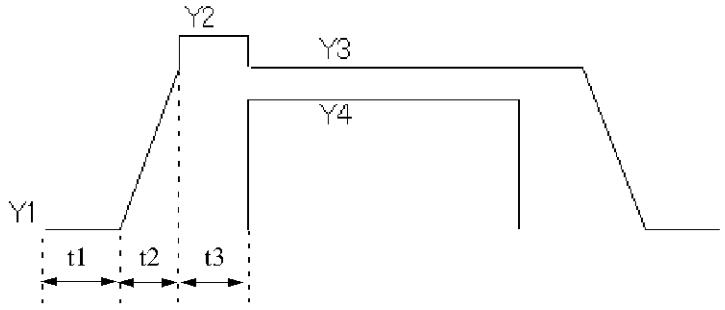
Modulation:When select to GMSK

(1) GSM450,GSM480,GSM850,GSM900,DCS1800BTS



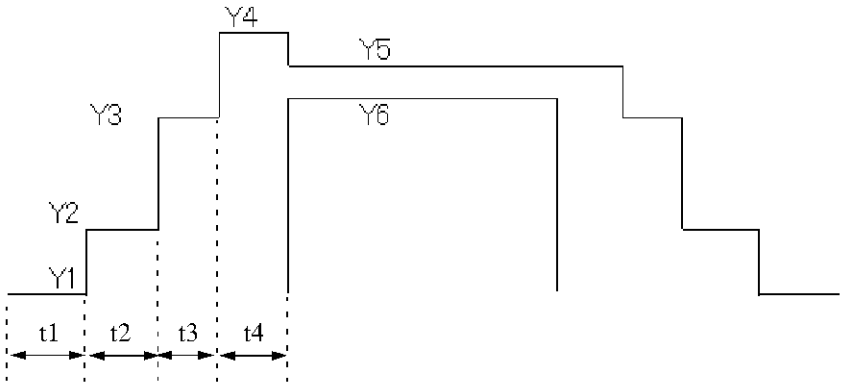
Y1	Y2	Y3	Y4	Y5	t1	t2	t3
-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10μs	8μs	10μs

(2) PCS1900BTS



Y1	Y2	Y3	Y4	t1	t2	t3
-30dBc	+4dBc	+1dBc	-1dBc	10μs	8μs	10μs

(3) GSM450,GSM480,GSM850,GSM900,DCS1800,PCS1900MS

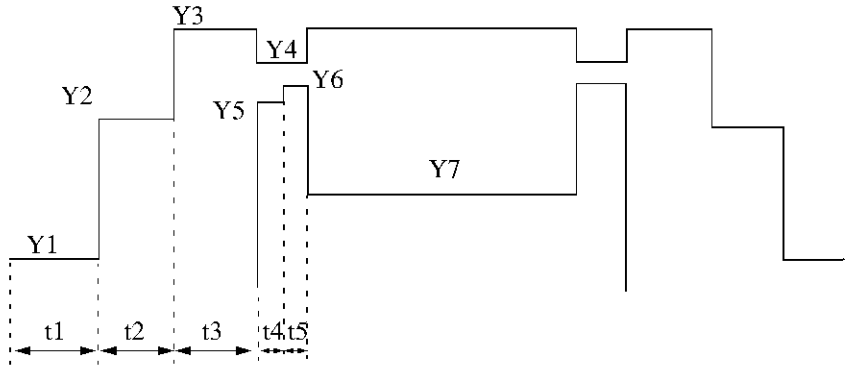


	Pwr Ctrl Lvl	Y1	Y2	Y3	Y4	Y5	Y6	t1	t2	t3	t4
GSM450		MAX[-59dBc,-54dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
GSM480		MAX[-59dBc,-54dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
GSM850		MAX[-59dBc,-54dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
GSM900	16	MAX[-59dBc,-54dBm]	-28dBc	-4dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	17	MAX[-59dBc,-54dBm]	-26dBc	-2dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	18	MAX[-59dBc,-54dBm]	-24dBc	-1dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	19	MAX[-59dBc,-54dBm]	-22dBc	-1dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	Other	MAX[-59dBc,-54dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
DCS1800	11	MAX[-48dBc,-48dBm]	-28dBc	-4dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	12	MAX[-48dBc,-48dBm]	-26dBc	-2dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	13	MAX[-48dBc,-48dBm]	-24dBc	-1dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	14	MAX[-48dBc,-48dBm]	-22dBc	-1dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	15	MAX[-48dBc,-48dBm]	-20dBc	-1dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
	other	MAX[-48dBc,-48dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs
PCS1900		MAX[-48dBc,-48dBm]	-30dBc	-6dBc	+4dBc	+1dBc	-1dBc	10µs	10µs	8µs	10µs

Pwr Ctrl Lvl:Power Control Level

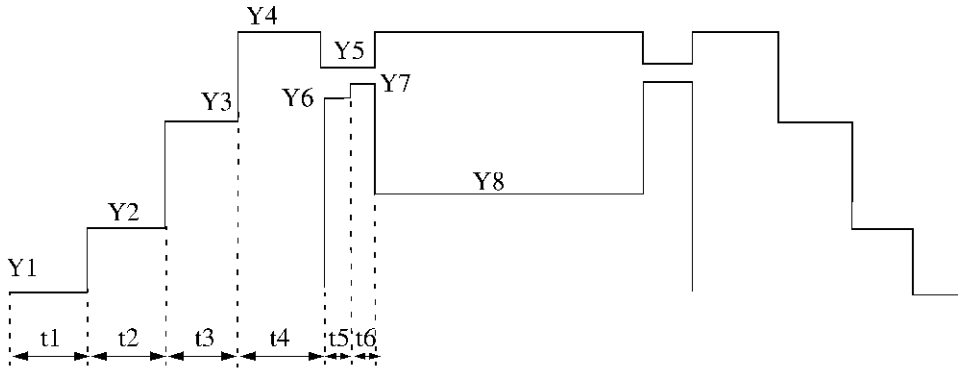
Modulation:When select to 3PI/8 shift 8PSK

(4) GSM450,GSM480,GSM850,GSM900,DCS1800,PCS1900BTS



Y1	Y2	Y3	Y4	Y5	Y6	Y7	t1	t2	t3	t4	t5
-30dBc	-6dBc	+4dBc	+2.4dBc	-2dBc	0dBc	-15dBc	10μs	8μs	10μs	2μs	2μs

(5) GSM450,GSM480,GSM850,GSM900,DCS1800,PCS1900MS

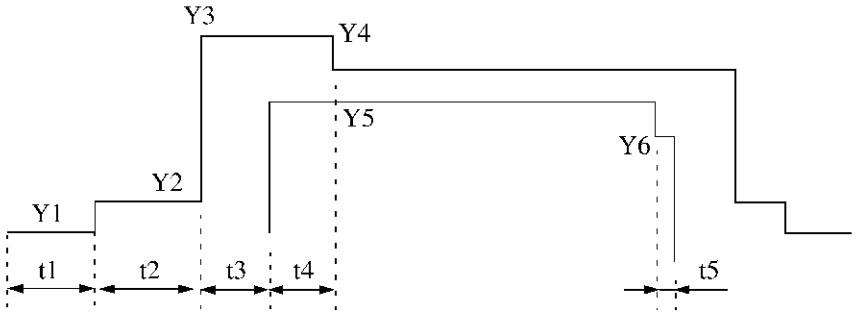


	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
GSM450/GSM480/ GSM850/GSM900	MAX[-59dBc, -54dBm]	-30dBc	-6dBc	+4dBc	+2.4dBc	-2dBc	0dBc	-15dBc
DCS1800/PCS1900	MAX[-48dBc, -48dBm]	-30dBc	-6dBc	+4dBc	+2.4dBc	-2dBc	0dBc	-15dBc

	t1	t2	t3	t4	t5	t6
GSM450/GSM480/ GSM850/GSM900	10µs	10µs	8µs	10µs	2µs	2µs
DCS1800/PCS1900	10µs	10µs	8µs	10µs	2µs	2µs

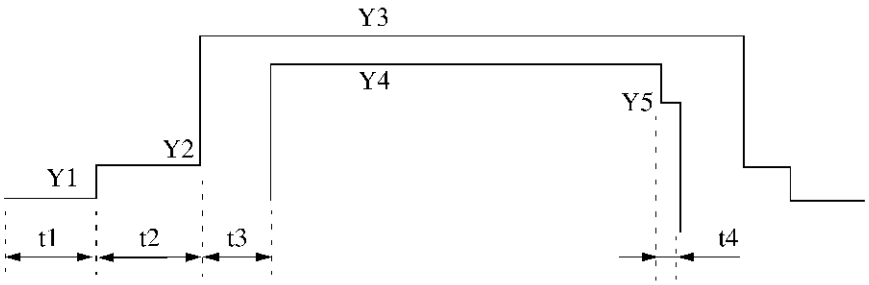
5.6.1.2 DECT Template

Power Level1



Y1	Y2	Y3	Y4	Y5	Y6	t1	t2	t3	t4	t5
20nW	-20dBc	+4dBc	+1dBc	-1dBc	-6dBc	10µs	17µs	10µs	10µs	0.5µs

Power Level2



Y1	Y2	Y3	Y4	Y5	t1	t2	t3	t4
20nW	-20dBc	+1 Bc	-1dBc	-6dBc	10µs	17µs	10µs	0.5µs

5.7 Phase Error Measurements Compliant With GSM

Graphic Display Ranges

The GSM standard recommends that only the useful part should be measured in phase error measurements.

The useful part is defined as follows: for a 148-bit slot, the useful part is 147 bits, because the leading and trailing bursts each lose 1/2 bit; for a 88-bit slot, the useful part is 87 bits, because of the same reason as in the former.

If the bit point, which is the converged point displayed when a constellation is displayed, is considered as the reference point, Graphic Display part is "Useful part ±1/2 bit," because display begins the time corresponding to 1/2 bit time later (or + 1/2 bit time) and finishes 1/2 bit earlier (or - 1/2 bit time).

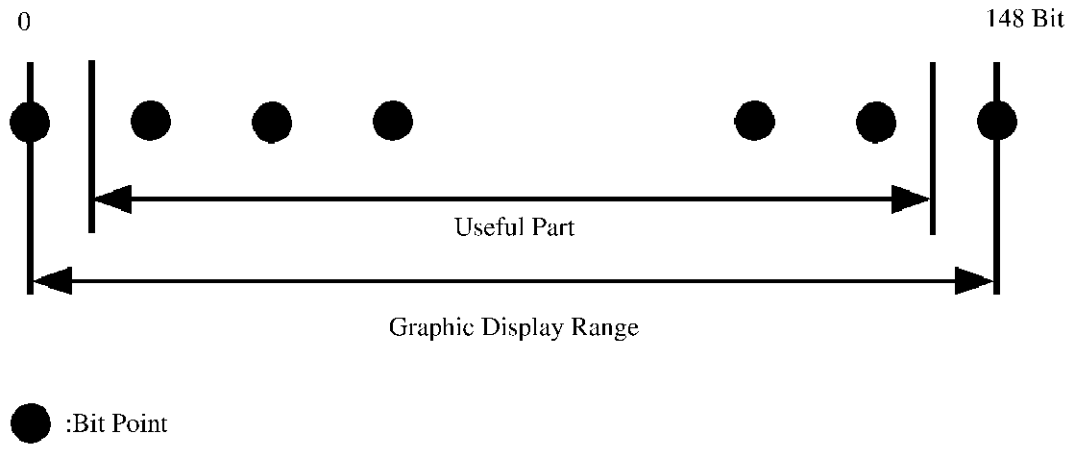


Figure 5-3 Relationship Between Useful Part and Graphic Display Range

Numeric values displayed for the phase errors or peak phase errors are targeted for the useful part.

5.8 Template Edit Function

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

The PASS/FAIL judgment is performed and then the result is displayed on the screen, when Template ON/OFF in the Template menu is set to ON.
The setting values are retained even if a preset is executed.

5.8.1 Template Setting in the T-Domain Measuring Mode

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

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

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

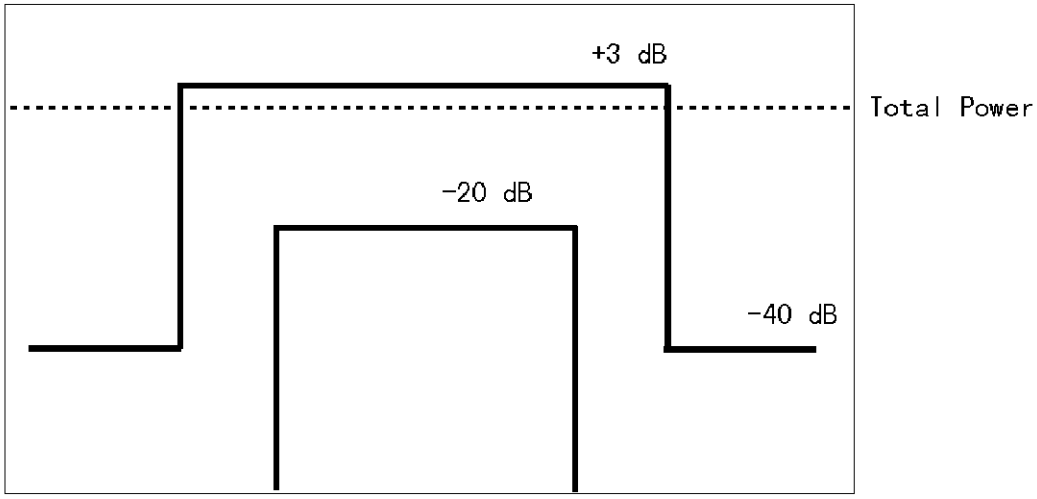


Figure 5-4 Template to Be Set

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

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

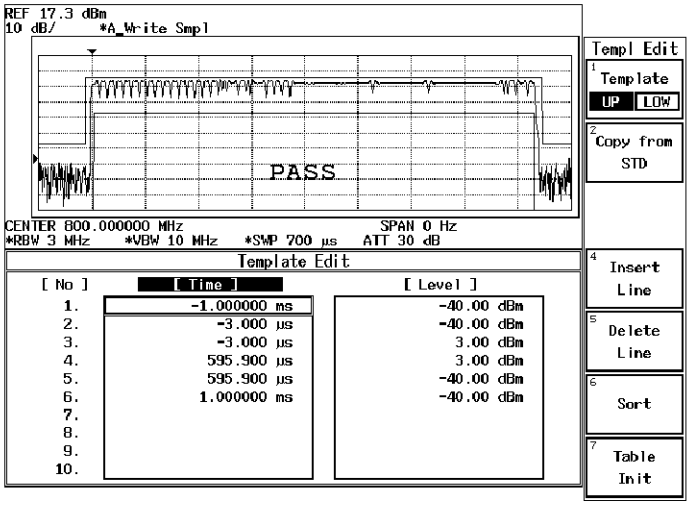


Figure 5-5 Template settings

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

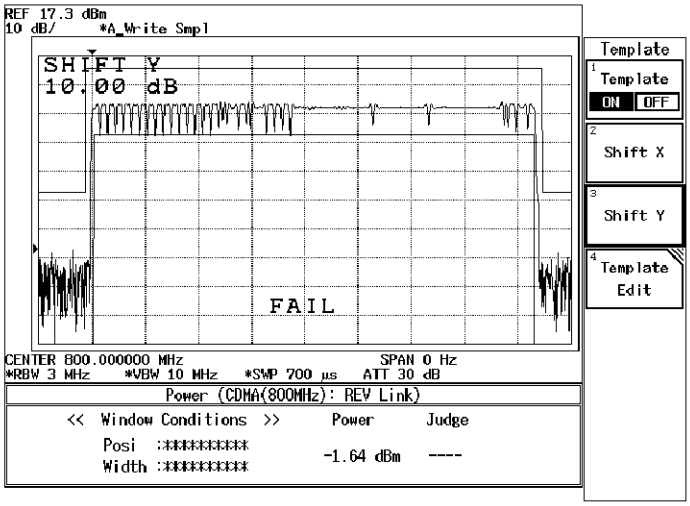


Figure 5-6 Template Shifted Using the Shift Y Function

5.8.2 Template Setting in the F-Domain Measuring Mode

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

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

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

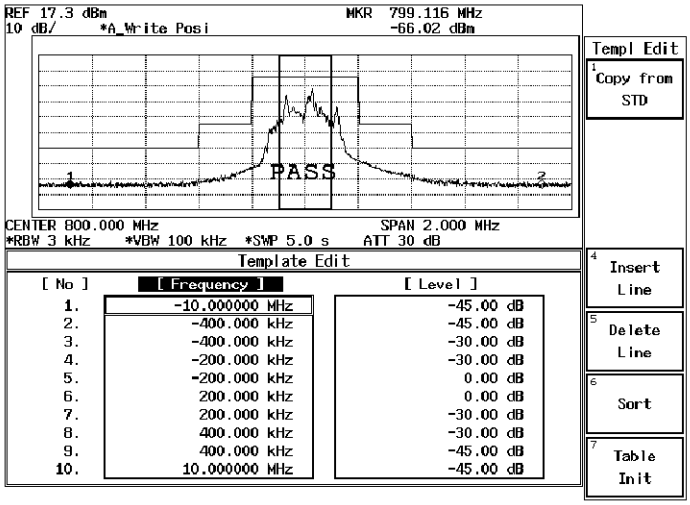


Figure 5-7 Template with the Set Values

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

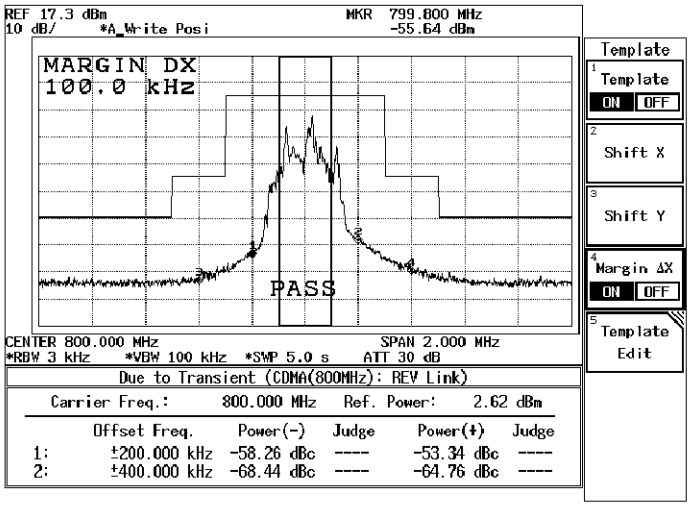


Figure 5-8 Template with Margin Delta X

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

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

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

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

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

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

5.9.1 Marker Edit Function

Measurement frequency can be set using Marker Edit in Due to Transient, Due to Modulation or Inband Spurious function (these three functions are found within the Transient mode). In addition, each limit level can be set using Marker Edit.
The setting values are retained even if a preset is executed.

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

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

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

When the Root Nyquist marker is selected, the power of the frequencies, which passed through the Root Nyquist filter, is calculated. To set the Root Nyquist filter parameters, press Config and Parameter Setup.

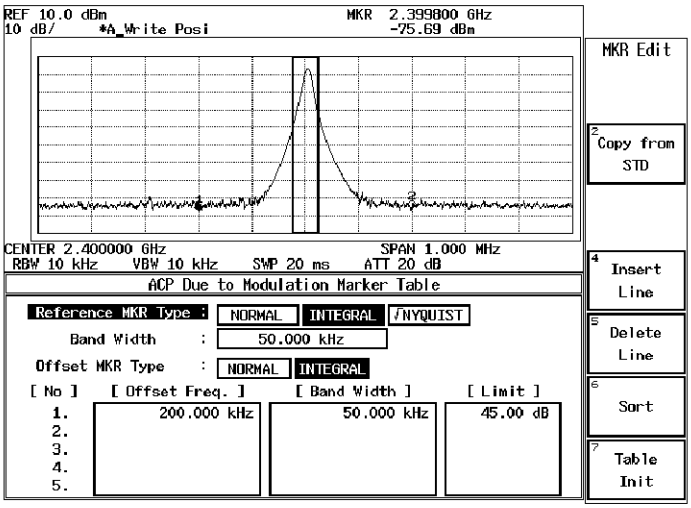


Figure 5-9 Example of Marker Edit Setting

(2) Marker Edit used in the Inband Spurious

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

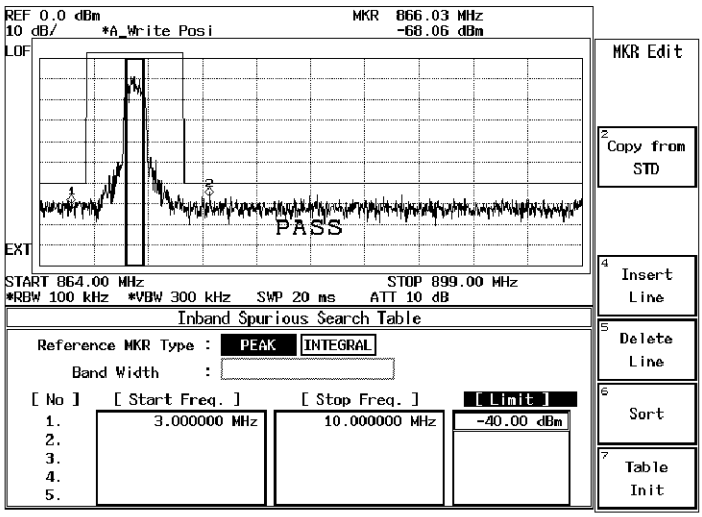


Figure 5-10 Marker Edit Setting

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

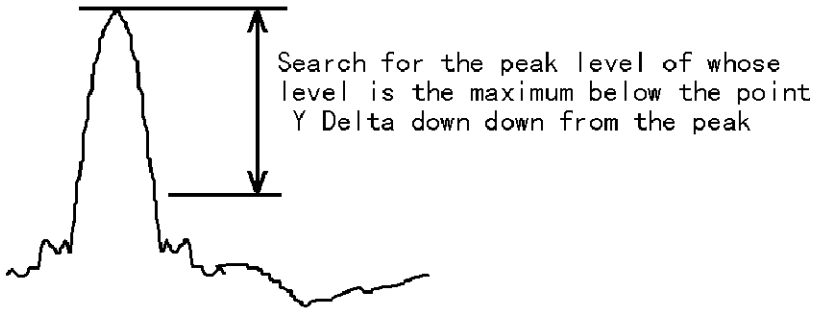


Figure 5-11 Example of Peak Marker Y Delta

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

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

(1) The measured value displays the absolute level of the marker, which is located at an offset frequency from the carrier frequency.

(2) The ratio of the absolute level of the marker to the absolute level of the carrier is displayed. The marker point is located at an offset frequency from the carrier frequency.

(3) The value obtained in (2) is multiplied by the level by the power meter. The calculated value is then displayed.

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

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

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

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

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

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

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

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

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

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

5.9.3 Measurement Result of Inband Spurious

In Spurious measurements, there are two methods:

(1) After searching for the peak on the trace, the frequency and level at the marker are displayed.

(2) After searching for the peak on the trace, the ratio of the marker level to the carrier level is displayed.

(3) The calculated level, which is calculated using the result obtained in (2) and the level on the power meter is displayed.

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

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

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

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

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

5.10 Phase Error

Phase Error is defined as shown in Figure 5-12, and the value is calculated using the following formula.

$$\text{Phase Error}(i) = \tan^{-1}\left(Qm(i)/Im(i)\right) - \tan^{-1}\left(Qr(i)/Ir(i)\right)$$

Im(i), Qm(i) : measured value
Ir(i), Qr(i) : Reference value
i : Symbol number

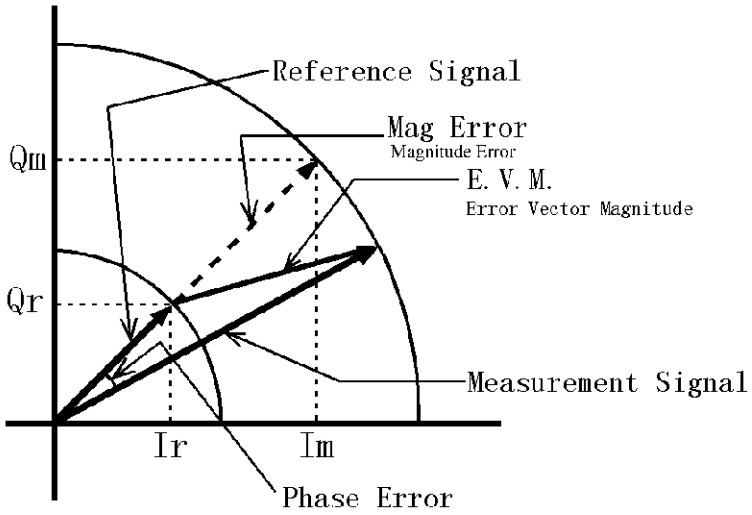


Figure 5-12 Mag Error, Phase Error, E.V.M.

5.11 8 PSK Graph

When 3 pai/8 Shift 8PSK is selected to analyze EDGE signal modulation, 8PSK Constellation or 8PSK I(Q) Eye can be selected from the Modulation Accuracy menu.

The symbol points of the EDGE signal vary due to the baseband signal characteristic.

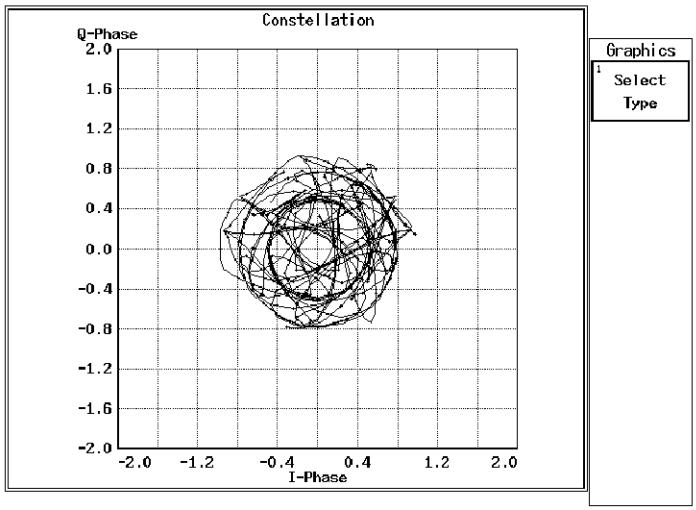


Figure 5-13 EDGE Signal Constellation

An 8 PSK signal with convergent symbol points can be obtained using a filter whose characteristics are opposite to the EDGE baseband filter characteristics. An 8 PSK signal with convergent symbol points is referred to as 8 PSK Constellation.

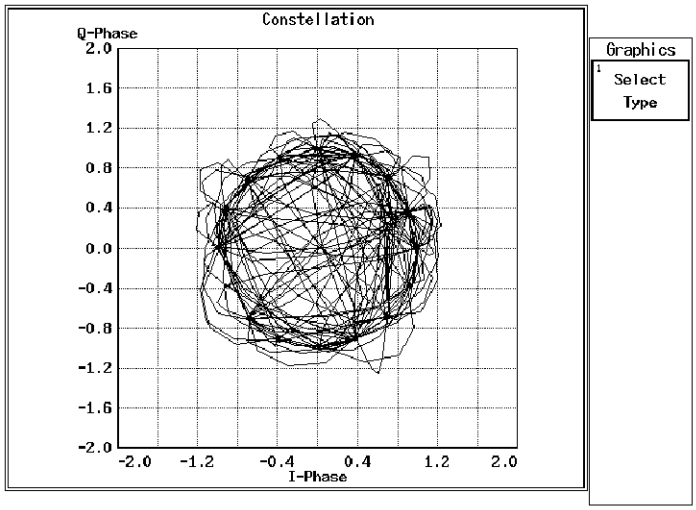


Figure 5-14 EDGE Signal 8 PSK Constellation

5.12 Tx Power Peak Factor

When 3 PI/8 Shift 8PSK is selected to analyze EDGE signal modulation, measuring the Tx power displays the peak factor, which is calculated using the equation shown below.

Peak factor = Peak power / Average power

The input signal is down-converted to the baseband signal to calculate the peak and average powers from the baseband signal envelope.

Make sure this Peak Factor is not equal to Peak Amplitude of IF or RF status.

5.13 Block Diagram

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

The Figure 5-15 shows the modulation analysis part. Therefore the spectrum analyzer part is simplified. The area inside the double lines is the block diagram for the spectrum analyzer, and the part outside that area represents the modulation analysis hardware.

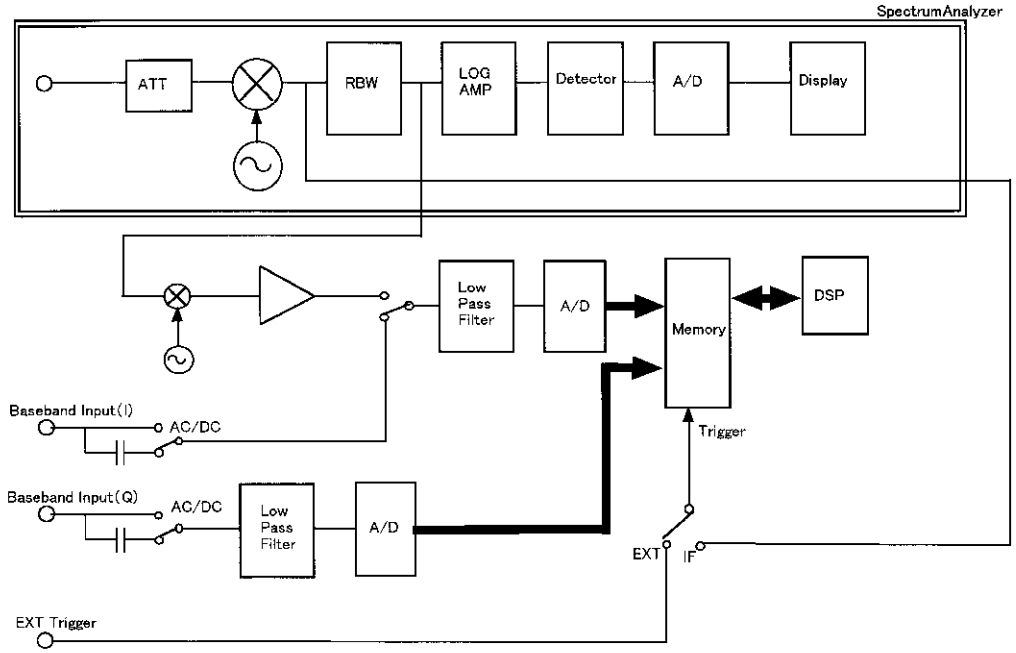


Figure 5-15 Block Diagram

6 PERFORMANCE VERIFICATION TEST

6.1 General

6.1.1 Introduction

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

Performance verification test will be carried out under following condition.

Temperature range: 20°C to 30°C

Relative Humidity: 85% or less

Table 6-1 Performance Verification Items

No.	Test Items
6.2.1	Phase Error Measurement Accuracy for GSM
6.2.2	Modulation Accuracy Measurement for EDGE
6.2.3	Frequency Deviation Accuracy Measurement for DECT

6.1.2 Test Equipment

The Table 6-2 lists recommended test equipment.

The equipment needed to perform all of the performance test.

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

In the table, PV is abbreviation of performance verification.

NOTE:
1. ***The R3267 Series with OPT63 to be tested should be warm up for at least 30 minutes before starting test.***
2. ***Make sure that the test equipment used meets its own published specifications.***
3. ***Any equipment that meets the critical specifications given in the table can be substituted for recommended models.***

Table 6-2 Equipment List

No.	Description	Specification required	Recommended Model	Manufacturer	Usage
1	RF Cable	BNC(m)-BNC(m), 50Ω	MI-09	Advantest	PV
2	Adapter	Type N(m)-BNC(f), 50Ω	JUG-201A-U	Advantest	PV

6.1.3 Calibration Cycle

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

6.1.4 Performance Verification Test Record Sheet

The performance verification test record sheets are provided at the end of this chapter.

The test record lists test specification and acceptable limits.

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

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

6.1.5 Performance Verification Procedures

Typeface conventions used in this manual.

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

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

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

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

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

6.2 Performance Verification Test Procedure

This section provides performance verification test procedure for R3267 Series OPT 63.

Built-in calibration signal is used for performance verification.

6.2.1 Phase Error Measurement Accuracy for GSM

(1) Description

Test phase error measurement accuracy in rms and peak mode and carrier frequency accuracy for GSM.

(2) Specification

Phase Error Measurement Accuracy(rms) : < 1°

Phase Error Measurement Accuracy(peak) : < 5°

Carrier Frequency Accuracy : < ±5 Hz

(3) Equipment used

RF Cable : BNC(m)-BNC(m)

Adapter : N(m)-BNC(f)

(4) Setup

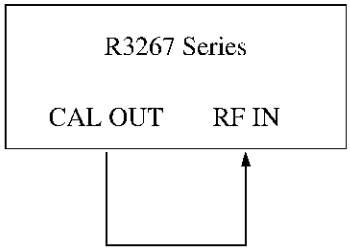


Figure 6-1 Setup of Phase Error Measurement Accuracy for GSM

(5) Procedure

1. Connect equipment as shown in Figure 6-1.
2. On the R3267 Series, after preset, set control as follow;
   Center Frequency: 30.067708 MHz

3. On the R3267 Series, set the STD parameter as shown Figure 6-2.

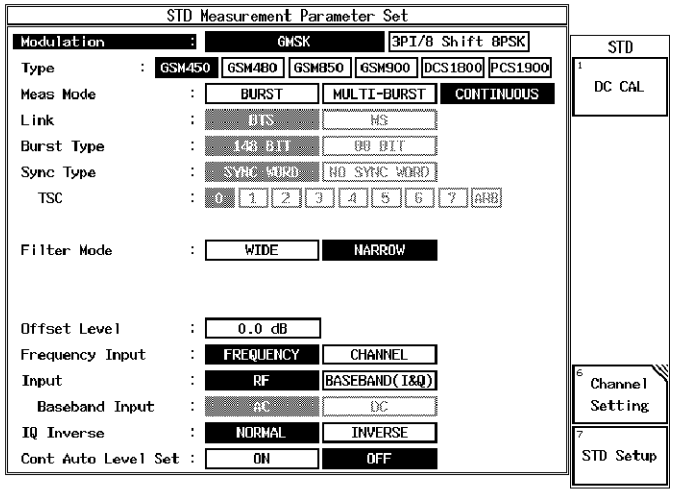


Figure 6-2 Setting of STD Parameter for Phase Error Accuracy Measurement (GSM)

4. On the R3267 Series, press ***DC CAL***, ***Phase Error*** and ***AUTO LEVEL***.

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

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

6.2.2 Modulation Accuracy Measurement for EDGE

(1) Description

Test modulation accuracy and carrier frequency accuracy in EDGE mode.

(2) Specification

Modulation Accuracy (rms) : ≤ 1.8 %

Carrier Frequency Accuracy : ≤ ± 10 Hz

(3) Equipment used

RF Cable :BNC (m)-BNC (m)

Adapter :N (m)-BNC (f)

(4) Setup

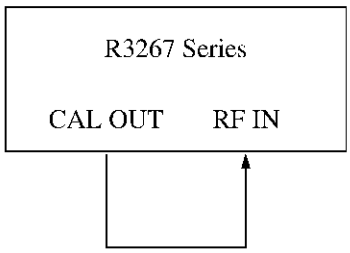


Figure 6-3 Setup of Modulation Accuracy for EDGE

(5) Procedure

1. Connect equipment as shown in Figure 6-3.
2. On the R3267 Series, after preset, set control as follow:

   Center Frequency :30.050781 MHz
3. On the R3267 Series, set the measurement parameter as shown in Figure 6-4.

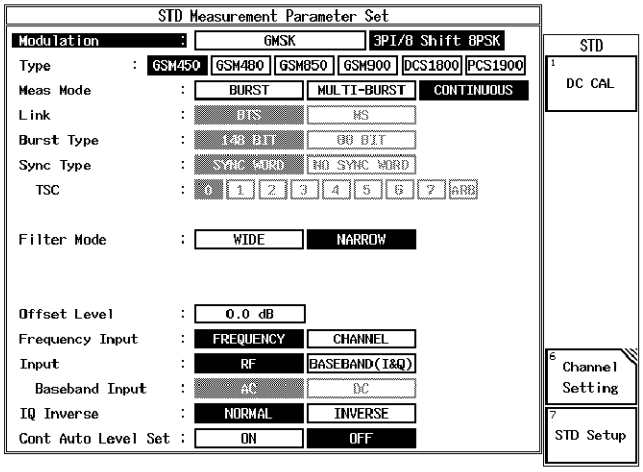


Figure 6-4 Setting of STD Parameter for Modulation Accuracy Measurement (EDGE)

4. On the R3267 Series, press ***DC CAL*** to perform dc calibration.
5. On the R3267 Series, press ***Modulation Accuracy*** and **Parameter Setup** to set R.C. filter to on as shown in Figure 6-5.

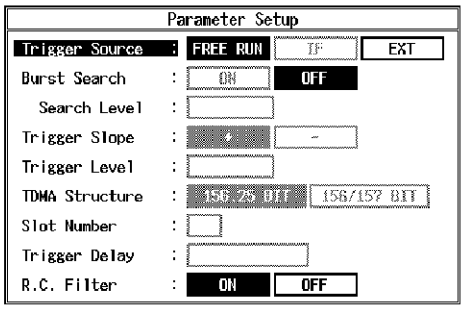


Figure 6-5 Setting of Parameter Setup

6. On the R3267 Series, press keys as follows to perform auto level.
   Parameter Setup*, *AUTO LEVEL

7. On the R3267 Series, press **SINGLE** for a single sweep.

8. On the R3267 Series, after the single sweep has completed, record the result on the performance verification test record sheet.

6.2.3 Frequency Deviation Accuracy Measurement for DECT

(1) Description

Test carrier frequency accuracy, frequency deviation (± peak) frequency deviation for DECT.

(2) Specification

Carrier Frequency Accuracy : < -288 kHz ±10 kHz
Frequency Deviation Accuracy (+peak) : < -288 kHz ±10 kHz
Frequency Deviation Accuracy (-peak) : < -288 kHz ±10 kHz

(3) Equipment used

RF Cable : BNC(m)-BNC(m)
Adapter : N (m)-BNC (f)

(4) Setup

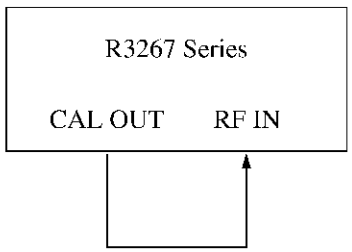


Figure 6-6 Setup of Frequency Deviation Accuracy Measurement for DECT

(5) Procedure

1. Connect equipment as shown in Figure 6-6.
2. On the R3267 Series, after preset, set control as follow:

   Center Frequency : 30.228 MHz

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

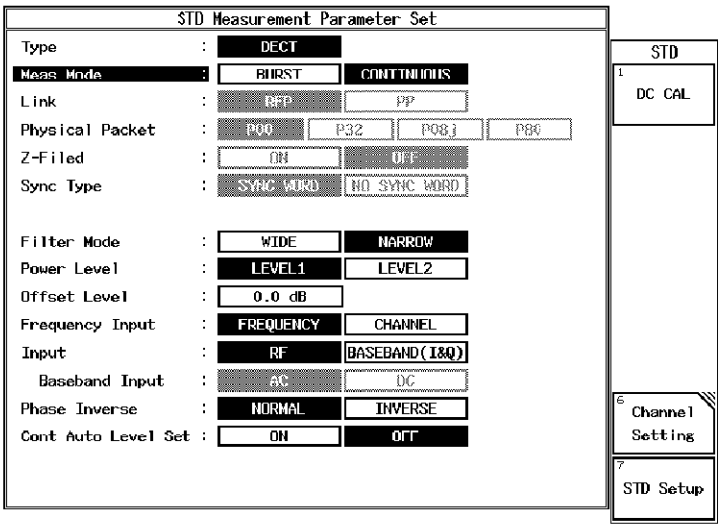


Figure 6-7 Setting of Measurement parameter for Frequency Deviation Accuracy Measurement (DECT)

4. On the R3267 Series, press ***DC CAL***, ***Freq Deviation*** and ***AUTO LEVEL***.
5. On the R3267 Series, press **SINGLE** for single sweep,
6. After single sweep has completed, record the measurement result in the performance verification test record sheet.

6.3 Performance Verification Test Record Sheet

Model : OPT3264/67/73+63

S/N :

(1) Phase Error Measurement Accuracy for GSM

Items	Specification			Result
	Min.	Measured Value	Max.	Pass/ Fail
Phase Error Accuracy (rms)	N/A		1	
Phase Error Accuracy (peak)	N/A		5°	
Carrier Frequency Accuracy	-5 Hz		+5 Hz	

(2) Modulation Accuracy Measurement for EDGE

Items	Specification			Result
	Min.	Measured Value	Max.	Pass/ Fail
Modulation Accuracy (rms)	N/A		1.8% rms	
Carrier Frequency Accuracy	-10 Hz		+10 Hz	

(3) Frequency Deviation Accuracy Measurement for DECT

Test Items	Specification			Result
	Min.	Measured Value	Max.	Pass/ Fail
Carrier Frequency Accuracy	-298 kHz		-278 kHz	
Frequency Deviation Accuracy (+peak)	-298 kHz		-278 kHz	
Frequency Deviation Accuracy (-peak)	-298 kHz		-278 kHz	

7 SPECIFICATIONS

RF input

- GSM Phase Error Measurement

Characteristics	Specification
Target modulation system	GMSK
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-30 dBm to +30 dBm
Frequency/phase error measurements	
Frequency error range	< ±10 kHz
Accuracy	< ± (Reference frequency accuracy × Carrier frequency + 5 Hz)
Phase error range	≤ ±30°(peak)
Accuracy	≤ ±5°(peak) ±1°(rms)

- EDGE measurement

Characteristics	Specification
Target modulation system	3PI/8 Shift 8PSK (Linearized Gaussinan Filter)
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-30 dBm to +30 dBm
Frequency error measurement	
Measurement accuracy	< ± (Reference frequency accuracy × Carrier Frequency + 10 Hz)
Modulation accuracy measurement	
Residual vector error	<1.8% rms

- DECT measurement

Characteristics	Specification
Target modulation system	GFSK
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-30 dBm to +30 dBm
Frequency deviation accuracy	< ±(Reference frequency accuracy × Carrier frequency + 10 kHz) (For the maximum and minimum deviations)
Frequency error accuracy	< ±(Reference frequency accuracy×Carrier frequency +10 kHz)
Jitter accuracy	< ±0.1μsec A jitter between bursts (such as "PP to PP," "RFP to RFP," and "RFP to PP") is measured.

APPENDIX

A.1 Messages

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

Code	Messages	Description
700	System Error. 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.	
708	System Error. Contact qualified engineer.	
710	Auto Level completed !	
711	Auto Level Set can not be succeed. Signal level is not stable.	
719	Burst signal is not detected. Check Burst length or Ref. level.	
721	Modulation Gain CAL error!(#100) Check 30 MHz CAL signal for connection.	

Code	Messages	Description
722	Modulation Gain CAL error!(#200) Check 30 MHz CAL signal for connection.	
723	Modulation Gain CAL error!(#300) Check 30 MHz CAL signal for connection.	
724	Modulation Gain CAL error!(#110) Check 30 MHz CAL signal for connection.	
725	Modulation Gain CAL error!(#120) Check 30 MHz CAL signal for connection.	
726	Modulation Gain CAL error!(#210) Check 30 MHz CAL signal for connection.	
730	Cannot measure Multi-Burst/Continuous Signal. Set Meas Mode to BURST.	
731	Cannot detect Sync Word. Check link or syncword number.	
732	Sync Word position is different from STD.	
733	Input Level is too Low. Adjust Ref. level, trigger delay, burst type.	
734	Result Error. Check input signal or settings.	The measured value is outside the measurement range. Check the input signal and the instruments for the correct settings.
736	Cannot measure GMSK signal. Set Modulation Type to 3PI/8 Shift 8PSK.	This measurement function cannot be used to analyze GMSK signals. To enable this measurement function, set Modulation Type to 3PI/8 Shift 8PSK.

Code	Messages	Description
737	Cannot measure 3PI/8 Shift 8PSK signal. Set Modulation Type to GMSK.	This measurement function cannot be used to analyze 3PI/8 Shift 8PSK signals. To enable this measurement function, set Modulation Type to GMSK.
795	System Error. Memory test failed. (#0)	
796	System Error. Memory test failed. (#1)	
797	System Error. Memory test failed. (#2)	
798	System Error. Memory test failed. (#3)	

ALPHABETICAL INDEX

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