ADVANTEST

ADVANTEST CORPORATION

R3267 Series OPT66

BLUETOOTH Measurement Option

Operation Manual

MANUAL NUMBER FOE-8370671D00

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

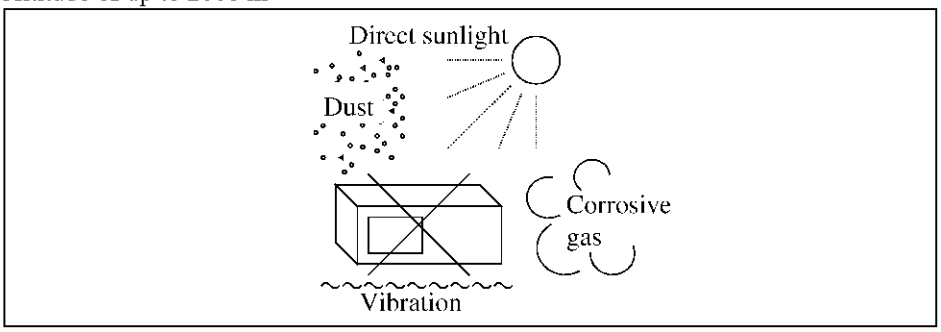


Figure-1 Environmental Conditions

- Operating position

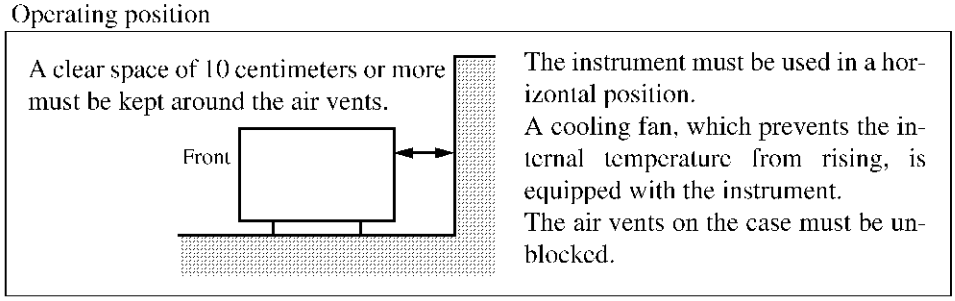


Figure-2 Operating Position

- Storage position

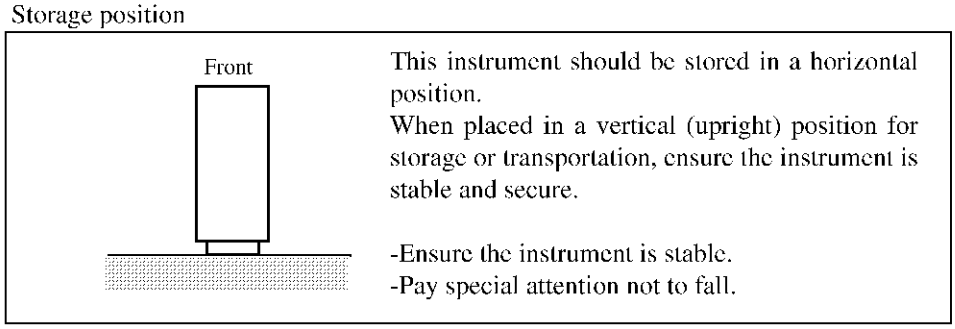


Figure-3 Storage Position

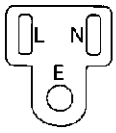
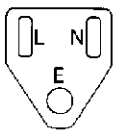
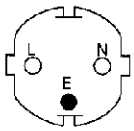
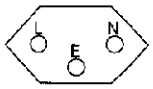
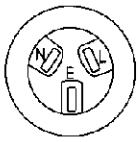
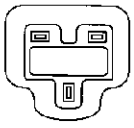
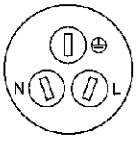
- The classification of the transient over-voltage, which exists typically in the main power supply, and the pollution degree is defined by IEC61010-1 and described below.

  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 66, BLUETOOTH 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 Overview • Accessories • Self Test Function • About Calibration • Explanation of the Connectors	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	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: **TRANSIENT**
  Soft keys: Boldface and italic type — Example: ***STD Setup, Detector***

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

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1 INTRODUCTION

1.1 Product Overview

The Bluetooth option (Option 66) is software used to evaluate Bluetooth characteristics.

This option is built into the R3267 Series spectrum analyzer before shipping.

The features are as follows:

- The frequency deviation, error and power of Bluetooth signals can be measured.
- A simple key operation allows you to measure Bluetooth signal characteristics.
- The PLL lockup time can also be measured.

1.2 Accessories

Name of accesories	Type of name	Quantitiy	Remarks
R3267 Series OPT66 Operation manual	ER3267/73OPT66	1	English

1.3 Self Test Function

The self test also checks the Option 66 for correct operation when the spectrum analyzer power is turned on. The message shown below will be displayed when an error related to Option 66 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 terminal Connector for inputting the I channel signal (Baseband).
3. INPUT Q terminal Connector for inputting the Q channel signal (Baseband).

2 OPERATION

This section, by showing examples, describes how to use the Bluetooth option.

2.1 Measuring Non-Hopping Signals

To test the Bluetooth device, set the Bluetooth device in a non-hopping state and use the HV1 packet as a measurement signal.

(A 366-bit burst is transferred in increments of two slots.)

This section uses the frequency of 2.4 GHz and LAP 111111 (Hex).

Setup

1. Connect devices as shown below.

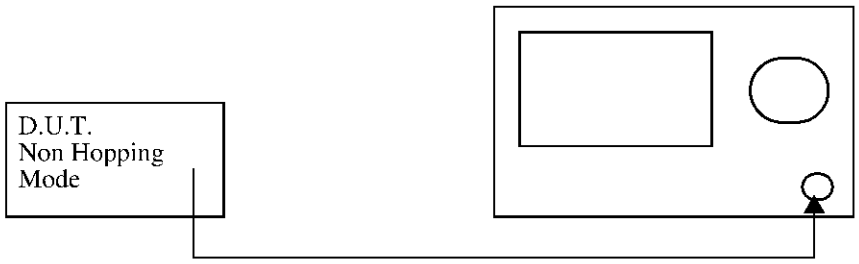


Figure 2-1 Setup

Setting up measurement conditions

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

3. Move the cursor to ***Hopping Catch*** using the arrow keys.

NOTE: ***Since the measurement frequency is specified directly, the Channel Number Assignment and Link settings are unnecessary.***

---

4. Set ***Hopping Catch*** to ***OFF*** using the data knob and then press the data knob (or **ENTR**).

5. Set ***Meas Mode*** to ***BURST*** using the data knob and then press the data knob (or **ENTR**).

6. Set ***Burst Length*** to ***366*** and press **ENTR**.

7. Set ***Search Length*** to ***5*** and press **ENTR**.

NOTE: ***The search length must include the burst length.***

---

8. Set ***Sync Type*** to ***LAP*** using the data knob and then press the data knob (or **ENTR**).

9. Set ***LAP*** to ***111111*** and press **ENTR**.

10. Set ***Delay Search*** to ***ON*** using the data knob and then press the data knob (or **ENTR**).

11. Set ***Filter Mode*** to ***WIDE*** using the data knob and then press the data knob (or **ENTR**).

12. Key in ***0dB*** for ***Offset Level***, because the RF signal is not provided with an attenuator.

13. Set ***Frequency Input*** to ***FREQUENCY*** using the data knob and then press the data knob (or **ENTR**) so that a frequency can be set directly.

14. Set ***Input*** to ***RF*** using the data knob and then press the data knob (or **ENTR**) to analyze the RF input.

15. Assuming that the IQ signal phase is not inverted, set ***IQ Inverse*** to ***NORMAL*** using the data knob. Then press the data knob (or **ENTR**).

16. The auto-ranging function is not used. Set ***Cont Auto Level Set*** to ***OFF*** using the data knob and then press the data knob (or **ENTR**).

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

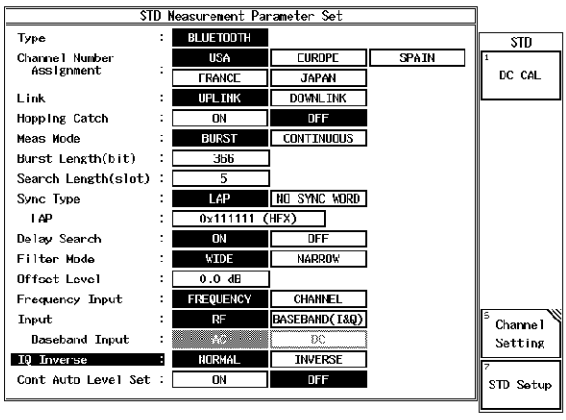


Figure 2-2 STD Measurement Parameter Set Dialog Box

18. Press ***Modulation***.

19. Press ***FM Deviation*** to display the FM Deviation measurement menu.

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

21. Set ***Trigger Source*** to ***FREE RUN*** using the data knob and then press the data knob (or **ENTR**).

22. Move the cursor to ***Search Level*** using the arrow keys.

23. Specify **-20.0dB** for Search Level to determine the threshold level for a burst search.

24. Key in **0** for Trigger Delay. (This is because ***Delay Search*** has been set to ***ON*** in the STD Measurement Parameter Set dialog box.)

25. Measurements are made, assuming that random data is included in the payload. Set ***Bit Sequence*** to ***RANDOM*** using the data knob and then press the data knob (or **ENTR**).

26. Set ***Freq Error Method*** to ***PEAK DEV*** using the data knob and press the data knob (or **ENTR**), in order to select an algorithm that will be used to calculate the frequency error from the maximum and minimum frequency deviations.

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

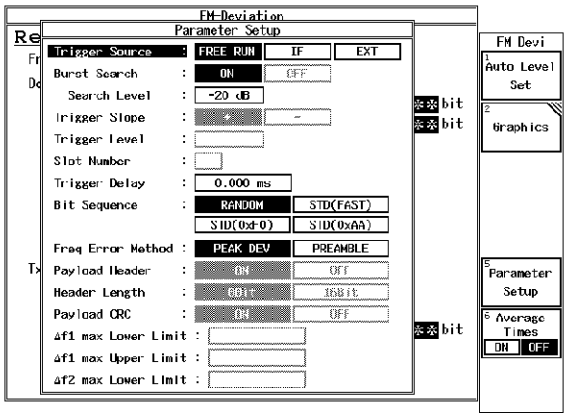


Figure 2-3 Parameter Setup Dialog Box

Setting a frequency.

28. Press **FREQ** to set the frequency to **2.4GHz**.

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

Executing Auto Level Set

30. Press ***Auto Level Set*** to activate the Auto Level Set function. The message "Auto Level completed!" is displayed.

Performing the measurement

31. Press **SINGLE** or **REPEAT** to perform the measurement. Pressing **REPEAT** (or **STOP**) stops the measurement.

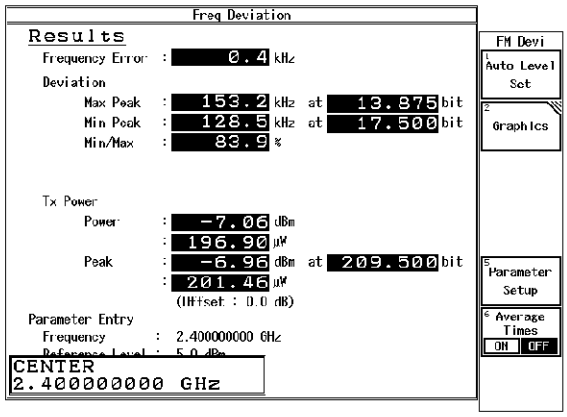


Figure 2-4 FM Deviation Measurement Result

Displaying the graph

32. Press ***Graphics***.

33. Press ***Select Type*** to display the Graphic Type of Analysis dialog box.

34. Select ***Frequency vs Bit*** using the data knob and then press the data knob (or **ENTR**).

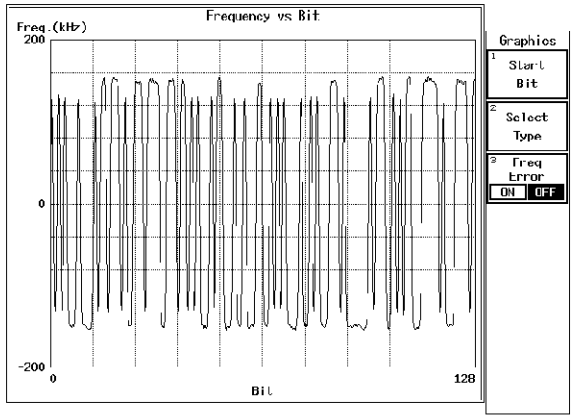


Figure 2-5 Frequency vs Bit Graph

35. Press **MKR** to display the marker. Turning the data knob moves the marker.
36. Pressing **SHIFT** and **MKR** clears the marker.
37. Press **RETURN** and **RETURN** to return to the measurement menu.

2.2 PLL Lockup Time Measurement

The Bluetooth device PLL lockup time is a period where the frequency deviation settles to the LIMIT value (specified in the Parameter Setup dialog box).

To measure the PLL lockup time, the other signal output from this device is required as an external trigger.

Setup

1. Connect devices as shown below.

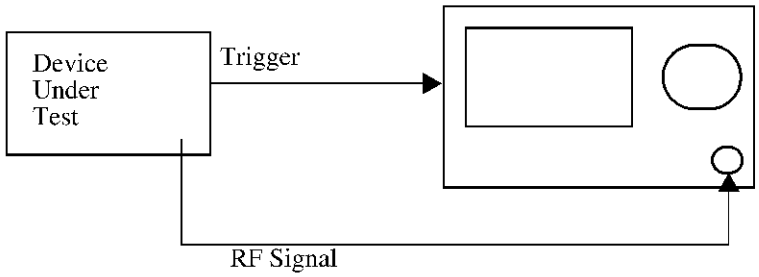


Figure 2-6 PLL Lockup Time Measurement

Setting up measurement conditions

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

3. Move the cursor to ***Search Length*** using the arrow keys.

4. Make sure that Search Length is set to **5**, and press **ENTR**.

NOTE: ***The search length is equal to the length of the data acquired when Auto Level Set is activated.***

---

5. Move the cursor to ***Frequency Input*** using the arrow keys.

6. Set ***Frequency Input*** to ***FREQUENCY*** using the data knob and then press the data knob (or **ENTR**) so that a frequency can be set manually.

7. Set ***Input*** to ***RF*** using the data knob and then press the data knob (or **ENTR**) to analyze the RF input.

8. Assuming that the IQ signal phase is not inverted, set ***IQ Inverse*** to ***NORMAL*** using the data knob. Then press the data knob (or **ENTR**).

9. The auto-ranging function is not used. Set ***Cont Auto Level Set*** to ***OFF*** using the data knob and then press the data knob (or **ENTR**).

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

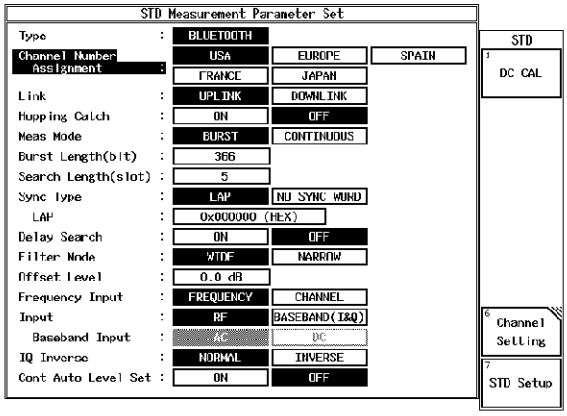


Figure 2-7 STD Measurement Parameter Set Dialog Box

11. Press ***Modulation***.

12. Press ***Lockup Time*** to display the Lockup Time measurement menu.

13. Press ***Parameter Setup*** to display the Parameter Setup dialog box.

14. Set ***Freq Range*** to ***1MHz*** using the data knob and then press the data knob (or **ENTR**).

15. Set ***Analyze Length*** to **0.1msec**.

16. Set ***Trigger Source*** to ***EXT*** using the data knob and then press the data knob (or **ENTR**).

17. Set ***Trigger Slope*** to **+** using the data knob and then press the data knob (or **ENTR**).

18. Key in **0** for ***Slot Number*** and press **ENTR**.

19. Key in **0** for ***Trigger Delay*** and press **ENTR**.

20. Key in **100kHz** for ***Limit*** and press **ENTR**.

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

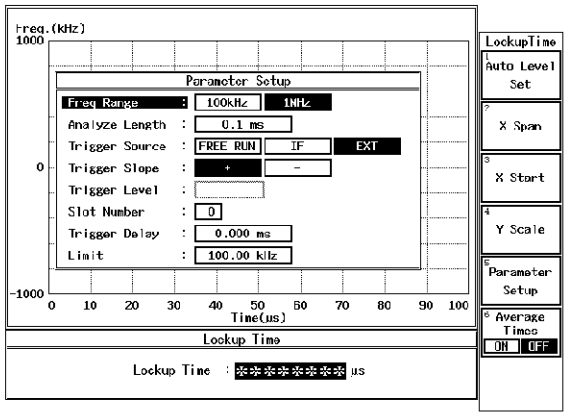


Figure 2-8 Parameter Setup Dialog Box

Setting a frequency.

22. Press **FREQ** to set the frequency to **2.4GHz**.

Setting the reference level

23. Press **LEVEL** and specify **10dBm**.

Performing the measurement

24. Press **SINGLE** or **REPEAT** to perform the measurement. Pressing **REPEAT** (or **STOP**) stops the measurement.

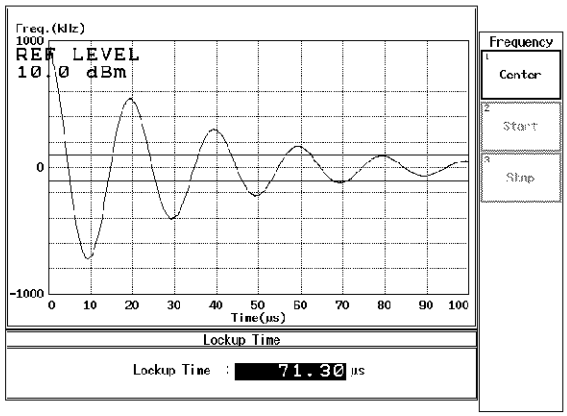


Figure 2-9 Lockup Time Measurement Result

3 REFERENCE

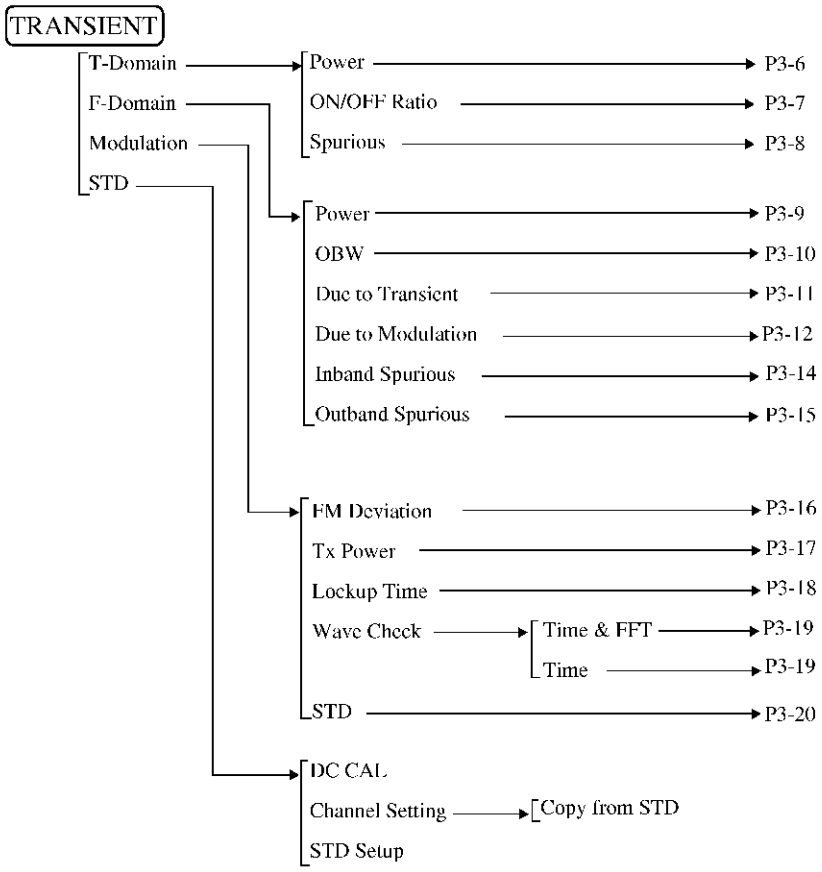
This chapter describes the functions of the panel and soft keys for option 66 software.

3.1 Menu Index

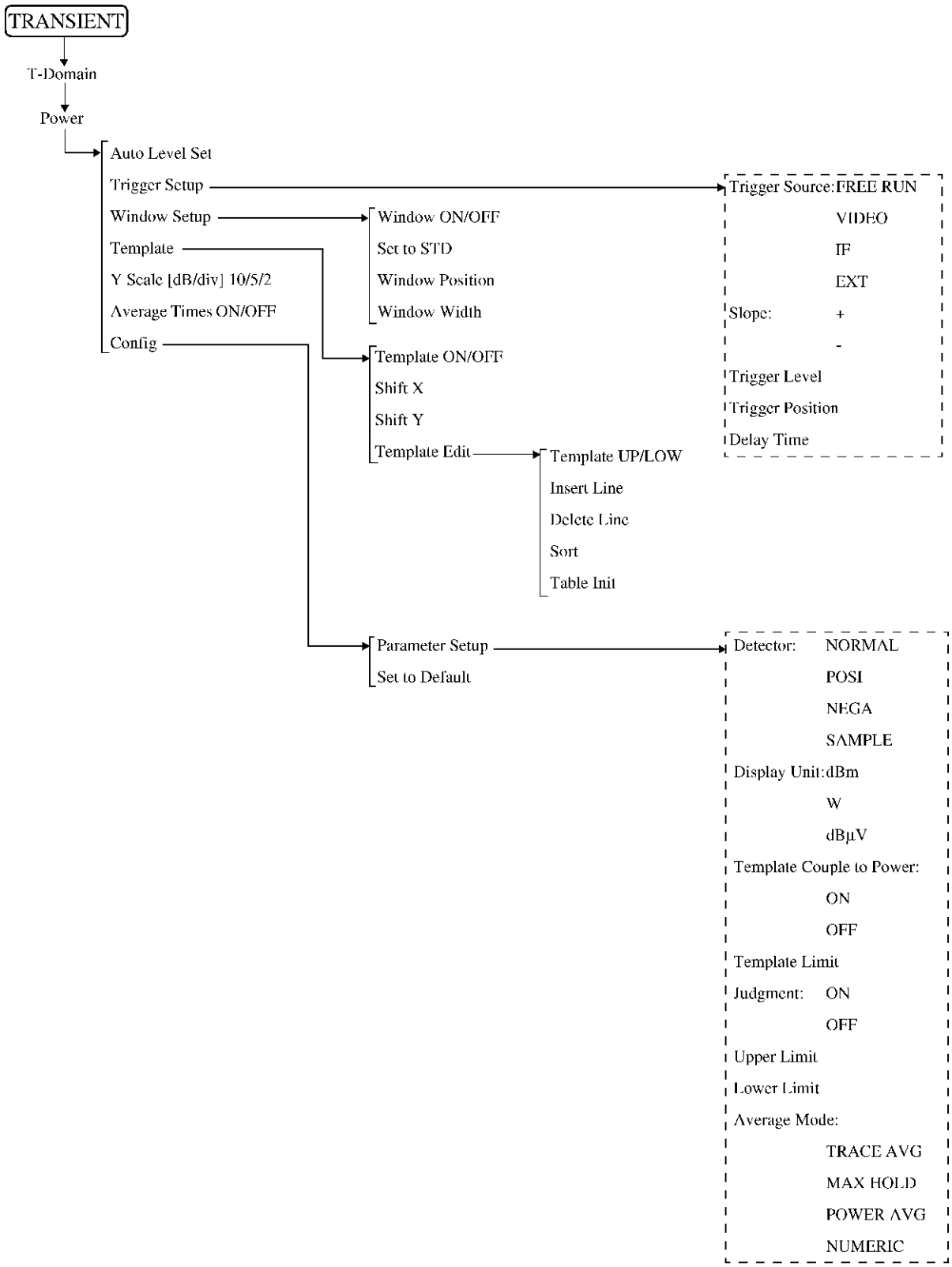
This menu index is used to easily find the keys described in Chapter 3.

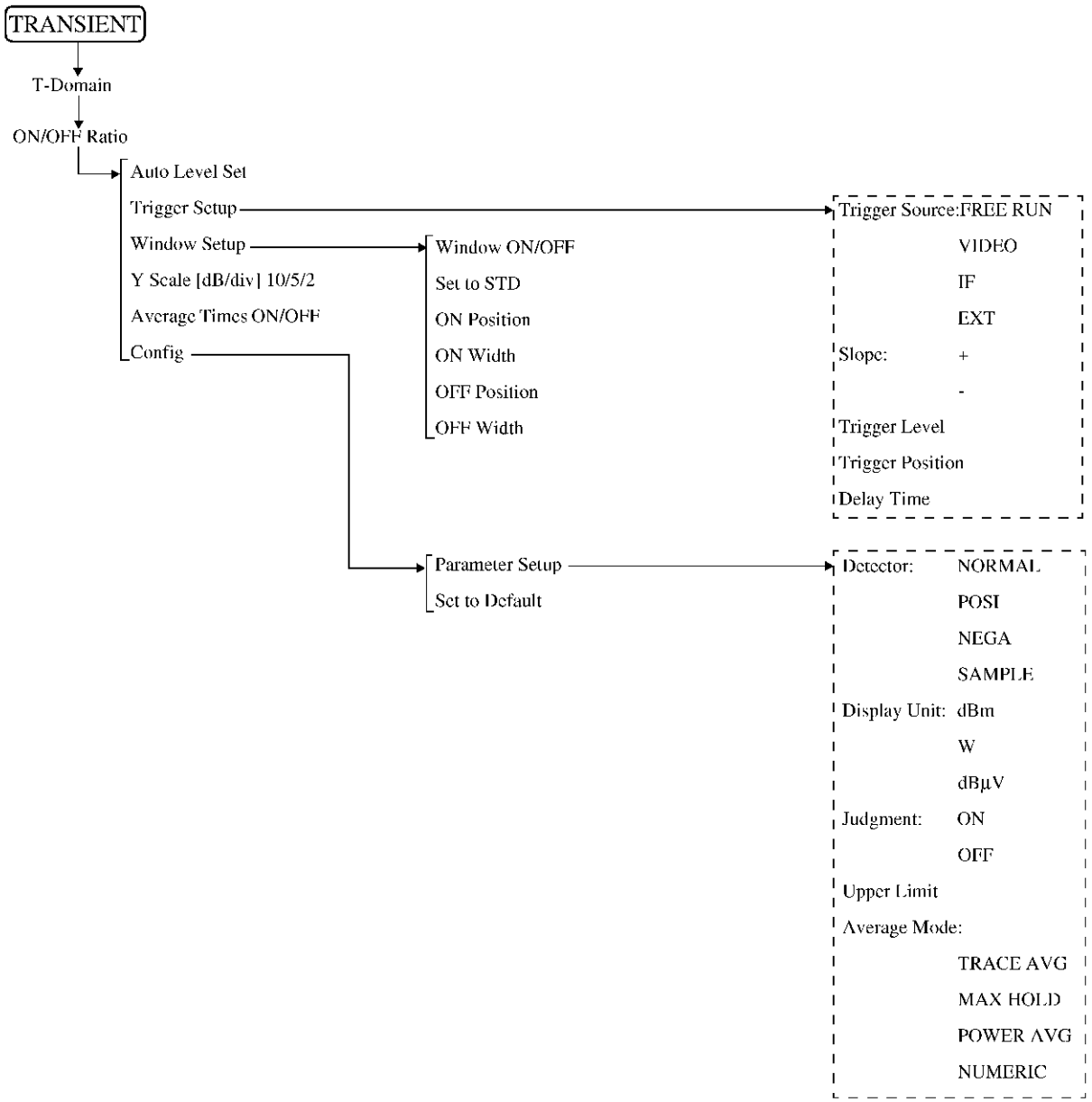
3.2 Menu Map

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

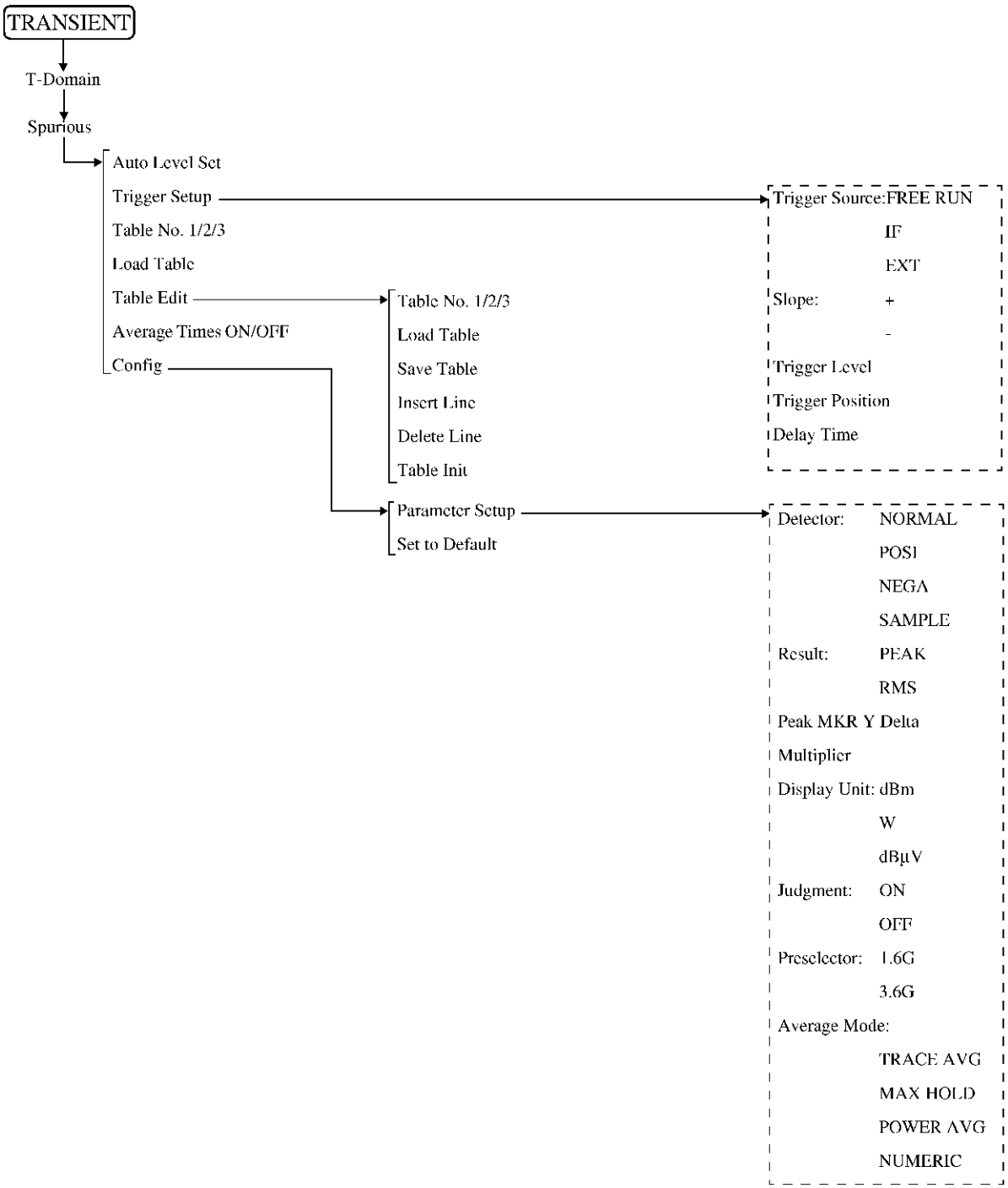


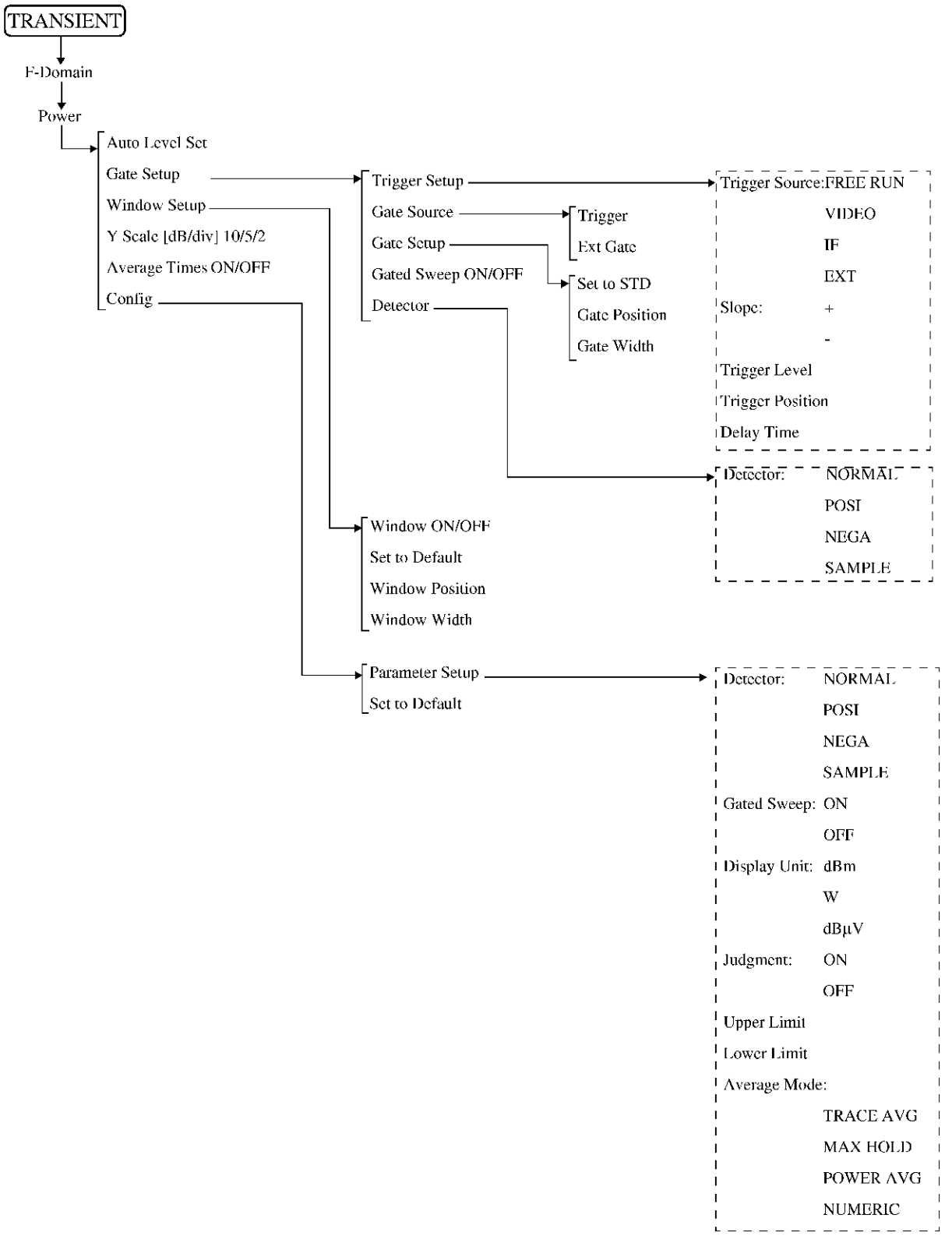
3.2 Menu Map


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
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to Default
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

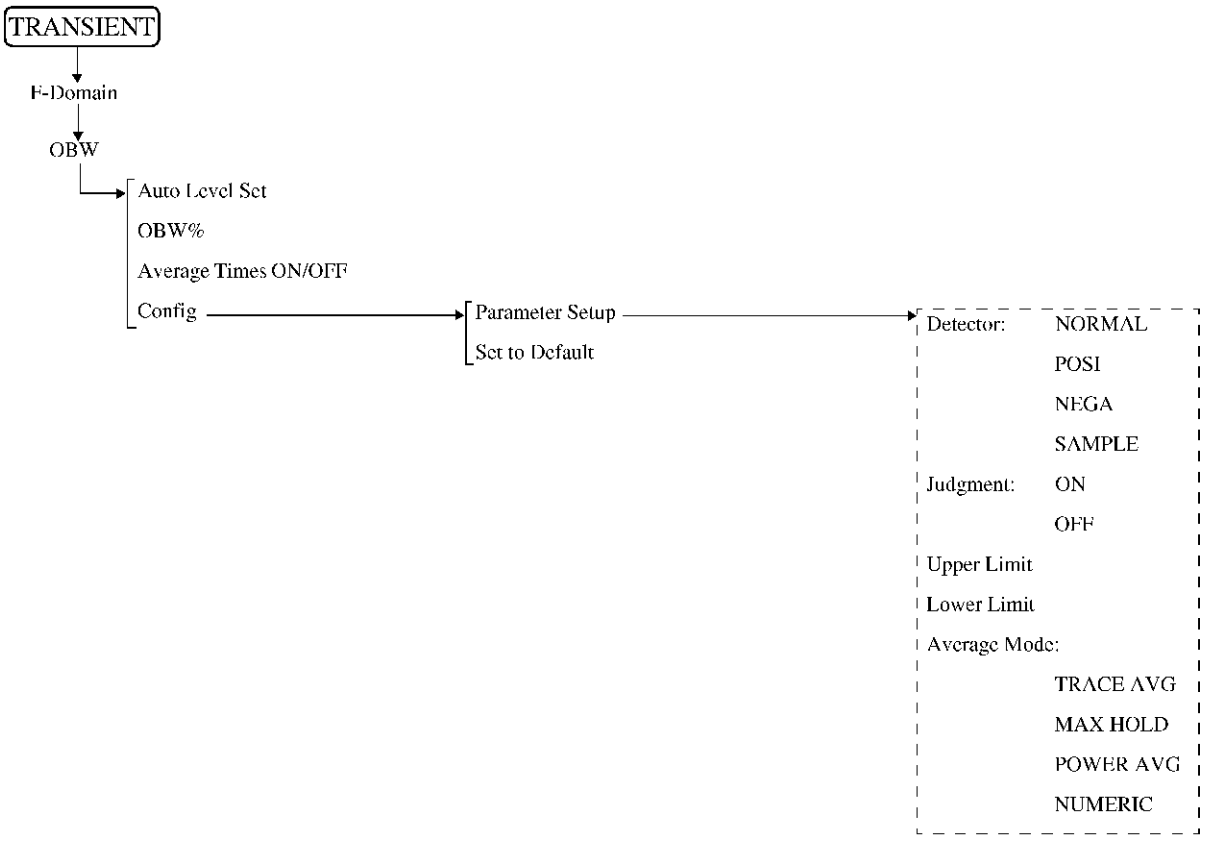

TRANSIENT
T-Domain
ON/OFF Ratio
Auto Level Set
Trigger Setup
Window Setup
Y Scale [dB/div] 10/5/2
Average Times ON/OFF
Config
Window ON/OFF
Set to STD
ON Position
ON Width
OFF Position
OFF Width
Parameter Setup
Set to Default
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position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

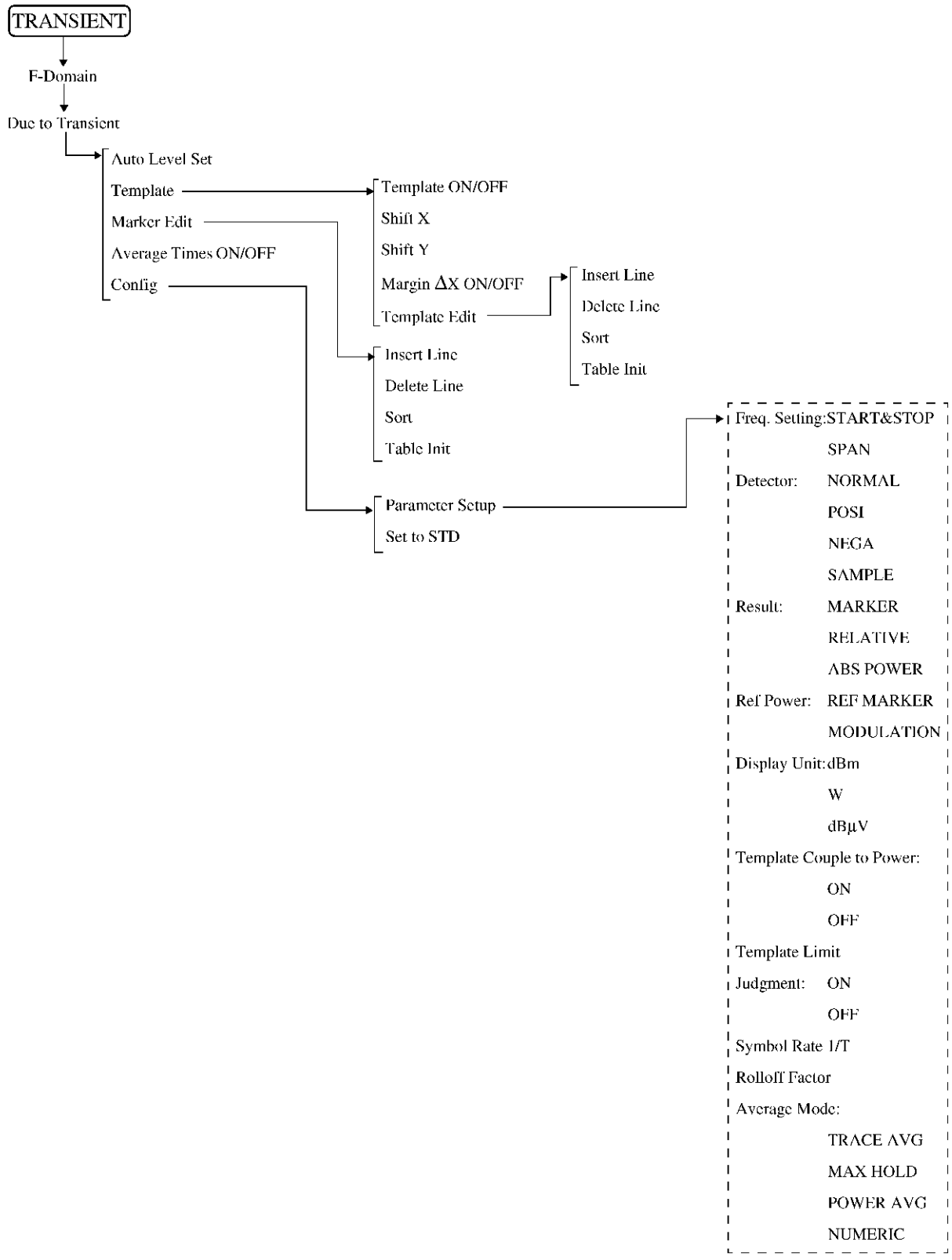
3.2 Menu Map


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

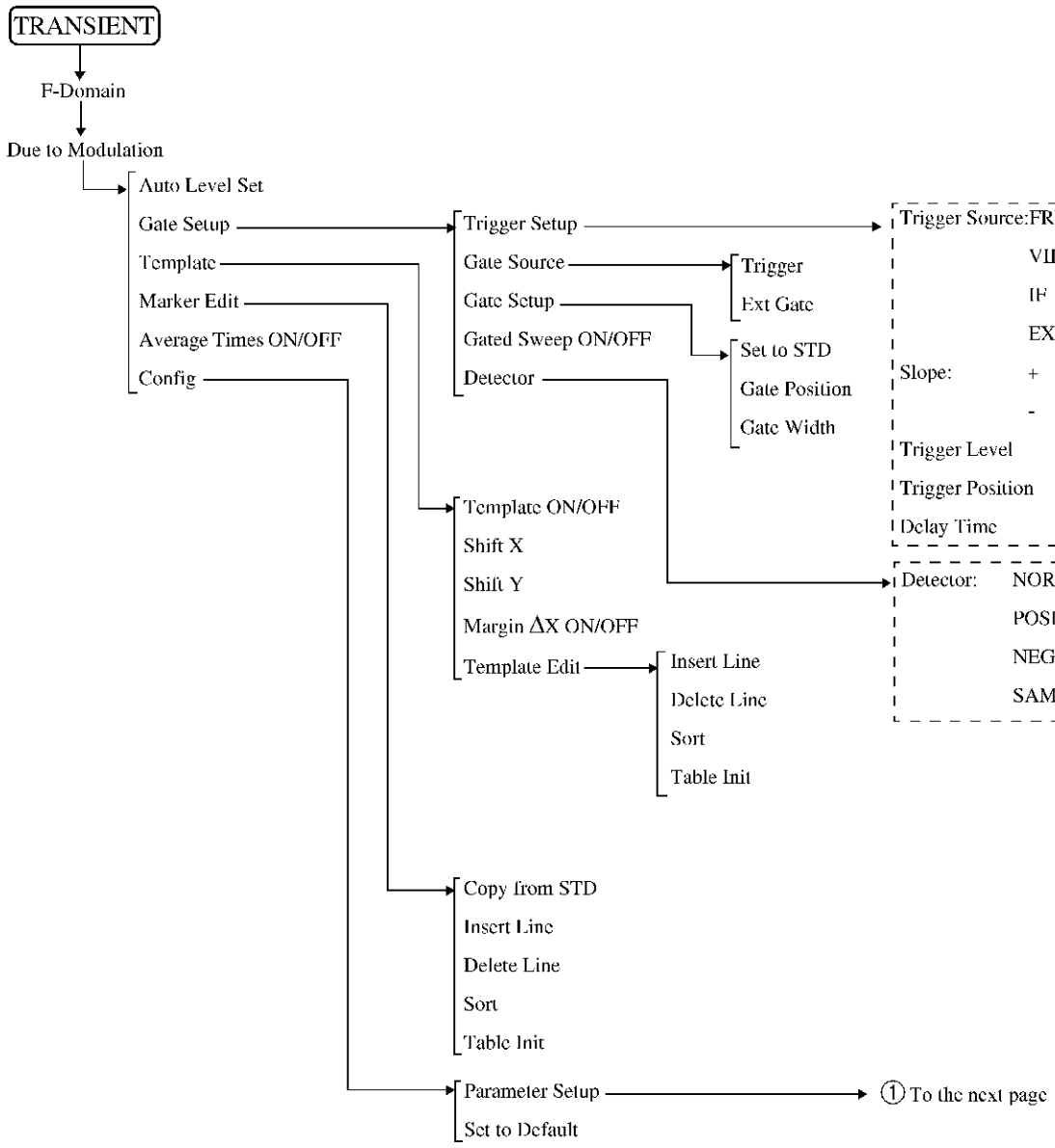

TRANSIENT
F-Domain
Power
Auto Level Set
Gate Setup
Window Setup
Y Scale [dB/div] 10/5/2
Average Times ON/OFF
Config
Trigger Setup
Gate Source
Gate Setup
Gated Sweep ON/OFF
Detector
Trigger
Ext Gate
Set to STD
Gate Position
Gate Width
Trigger Source: FREE RUN
VIDEO
IF
EXT
Slope: +
-
Trigger Level
Trigger Position
Delay Time
Detector: NORMAL
POSI
NEGA
SAMPLE
Window ON/OFF
Set to Default
Window Position
Window Width
Parameter Setup
Set to Default
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

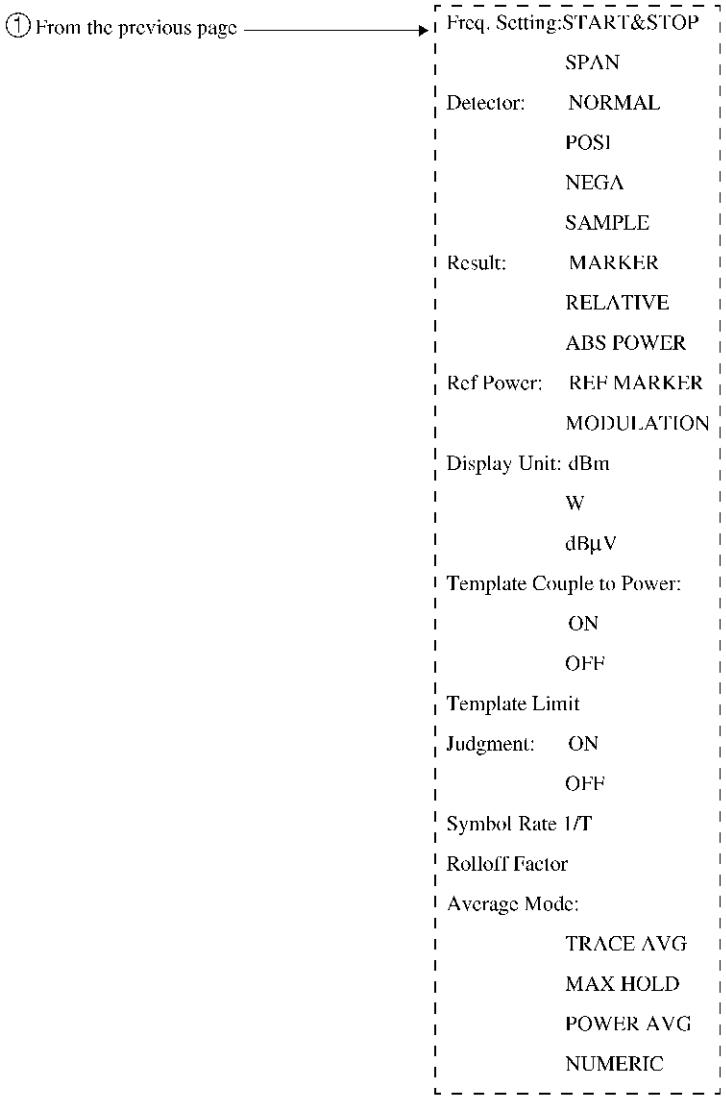
3.2 Menu Map


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

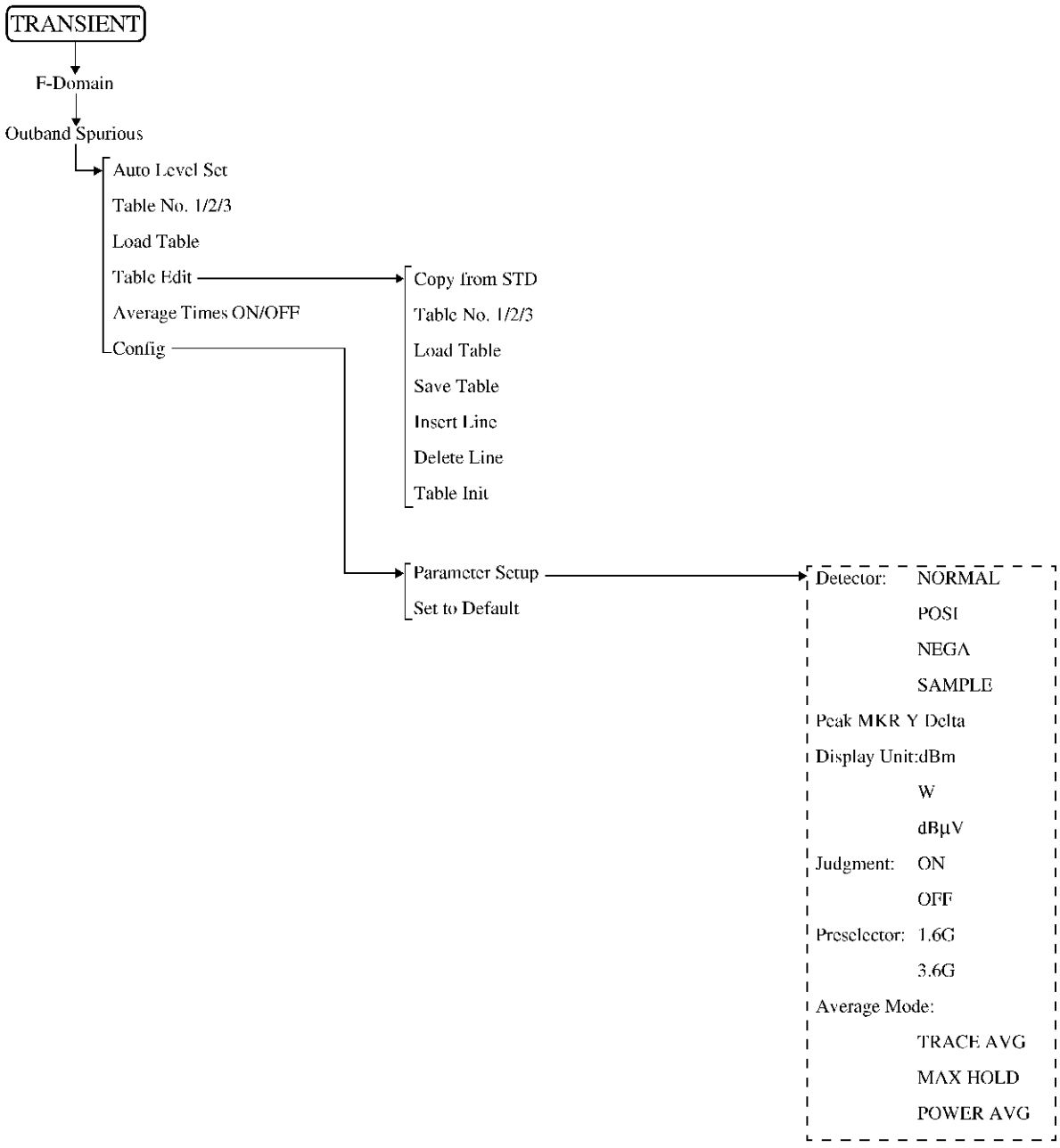

TRANSIENT
F-Domain
Duc to Transient
Auto Level Set
Template
Marker Edit
Average Times ON/OFF
Config
Template ON/OFF
Shift X
Shift Y
Margin ΔX ON/OFF
Template Edit
Insert Line
Delete Line
Sort
Table Init
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
Freq. Setting:START&STOP
SPAN
Detector:
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

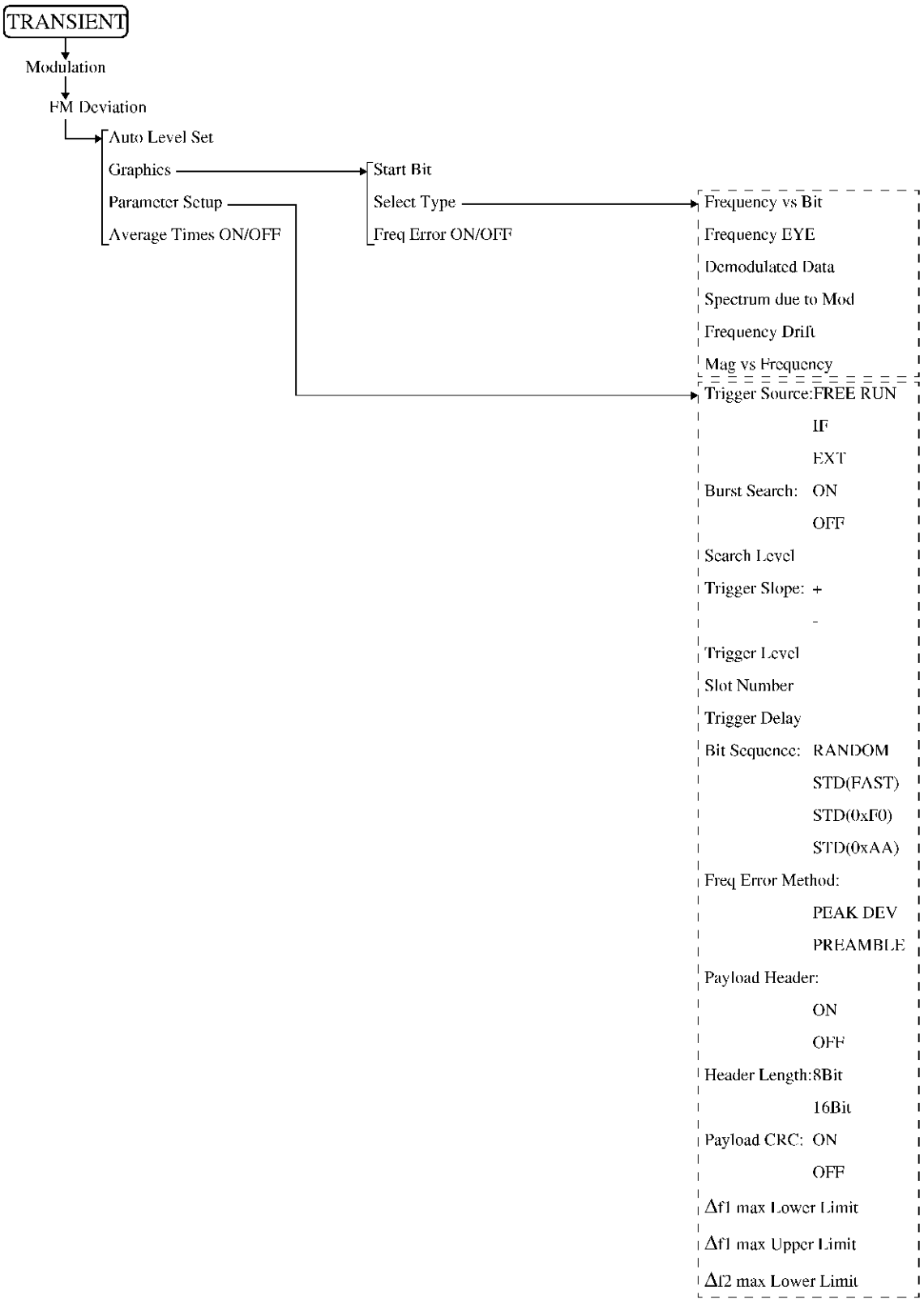
3.2 Menu Map

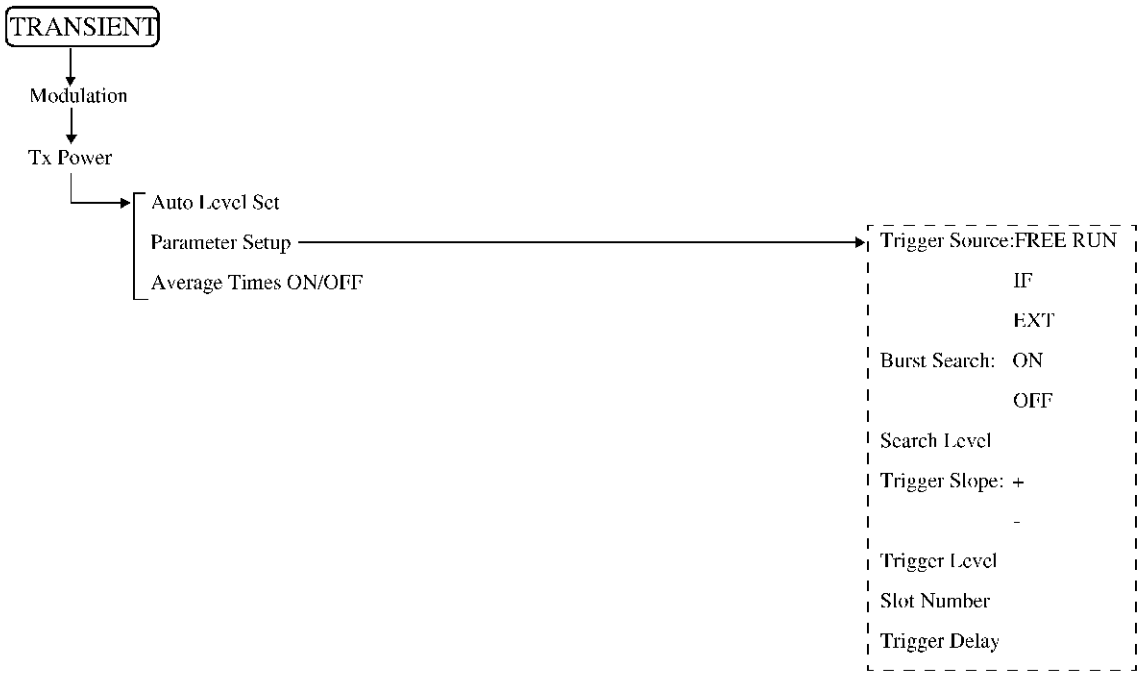

TRANSIENT
F-Domain
Due to Modulation
Auto Level Set
Gate Setup
Template
Marker Edit
Average Times ON/OFF
Config
Trigger Setup
Gate Source
Gate Setup
Gated Sweep ON/OFF
Detector
Trigger
Ext Gate
Set to STD
Gate Position
Gate Width
Trigger Source:FREE RUN
VIDEO
IF
EXT
Slope:
+
-
Trigger Level
Trigger Position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

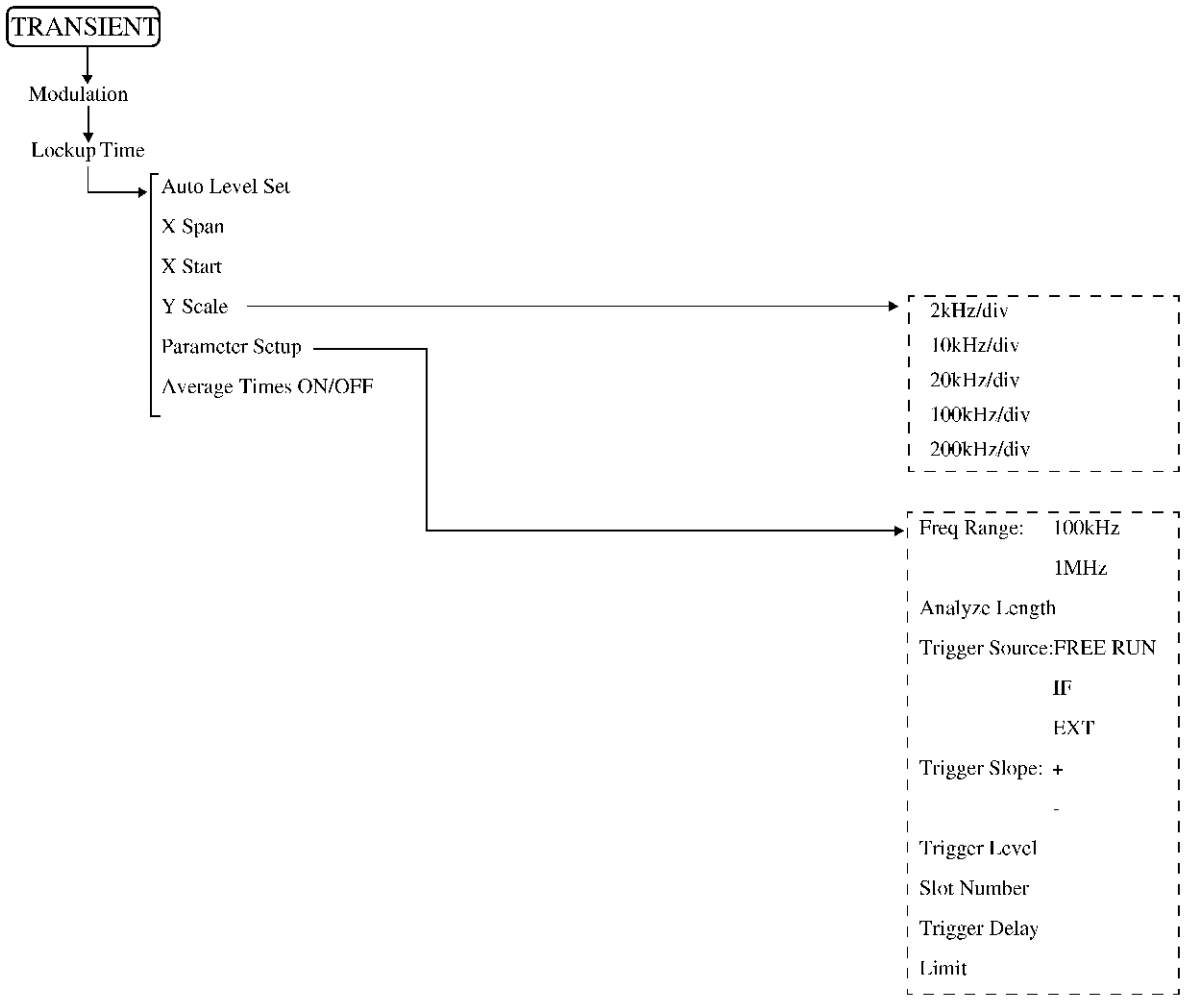

TRANSIENT
F-Domain
Inband Spurious
Auto Level Set
Template
Marker Edit
Average Times ON/OFF
Config
Template ON/OFF
Shift X
Shift Y
Margin ΔX ON/OFF
Template Edit
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Copy from STD
Insert Line
Delete Line
Sort
Table Init
Parameter Setup
Set to STD
Freq. 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

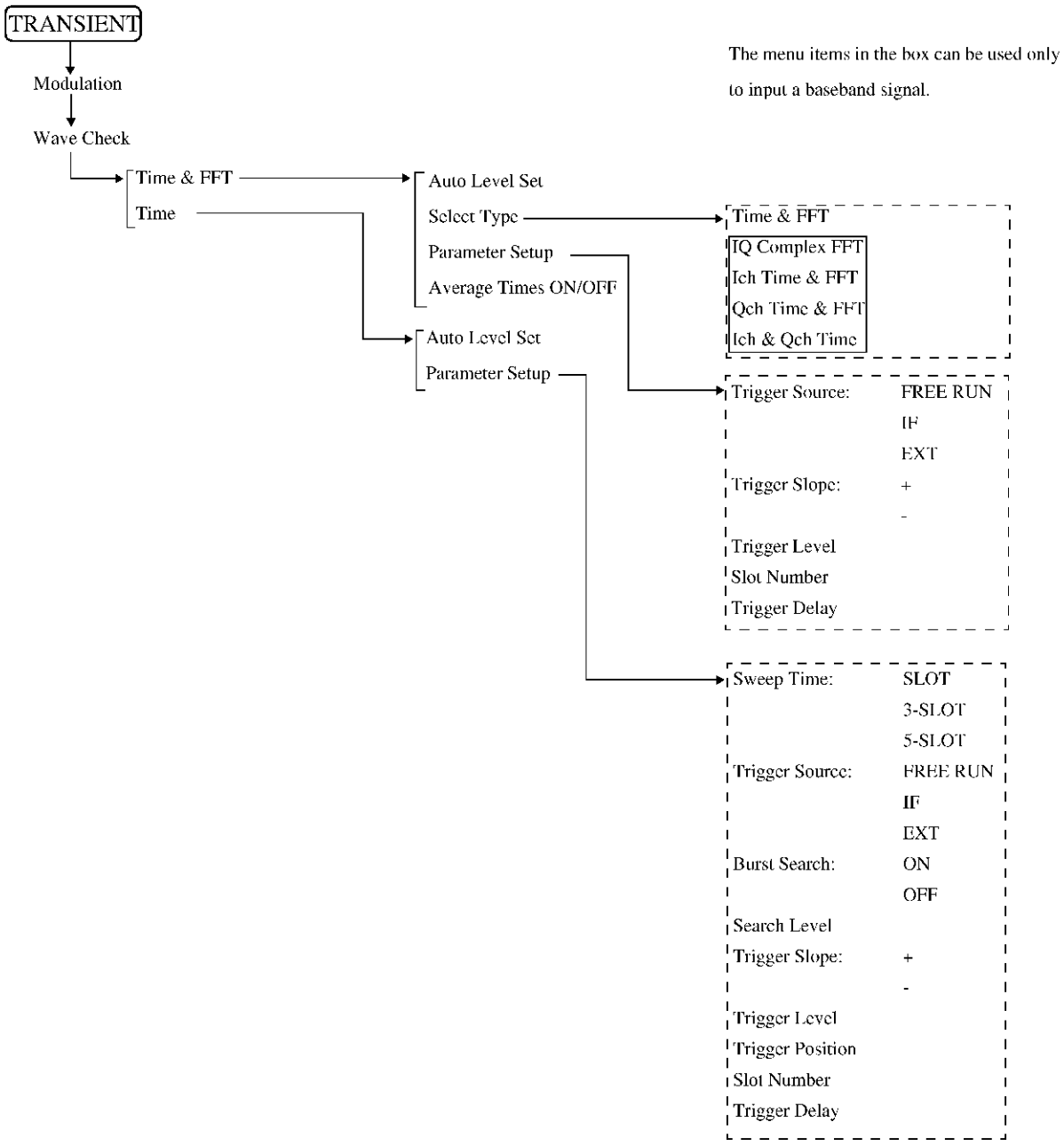

TRANSIENT
F-Domain
Outband Spurious
Auto Level Set
Table No. 1/2/3
Load Table
Table Edit
Average Times ON/OFF
Config
Copy from STD
Table No. 1/2/3
Load Table
Save Table
Insert Line
Delete Line
Table Init
Parameter Setup
Set to Default
Detector: NORMAL
POSI
NEGA
SAMPLE
Peak MKR Y Delta
Display Unit:dBm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

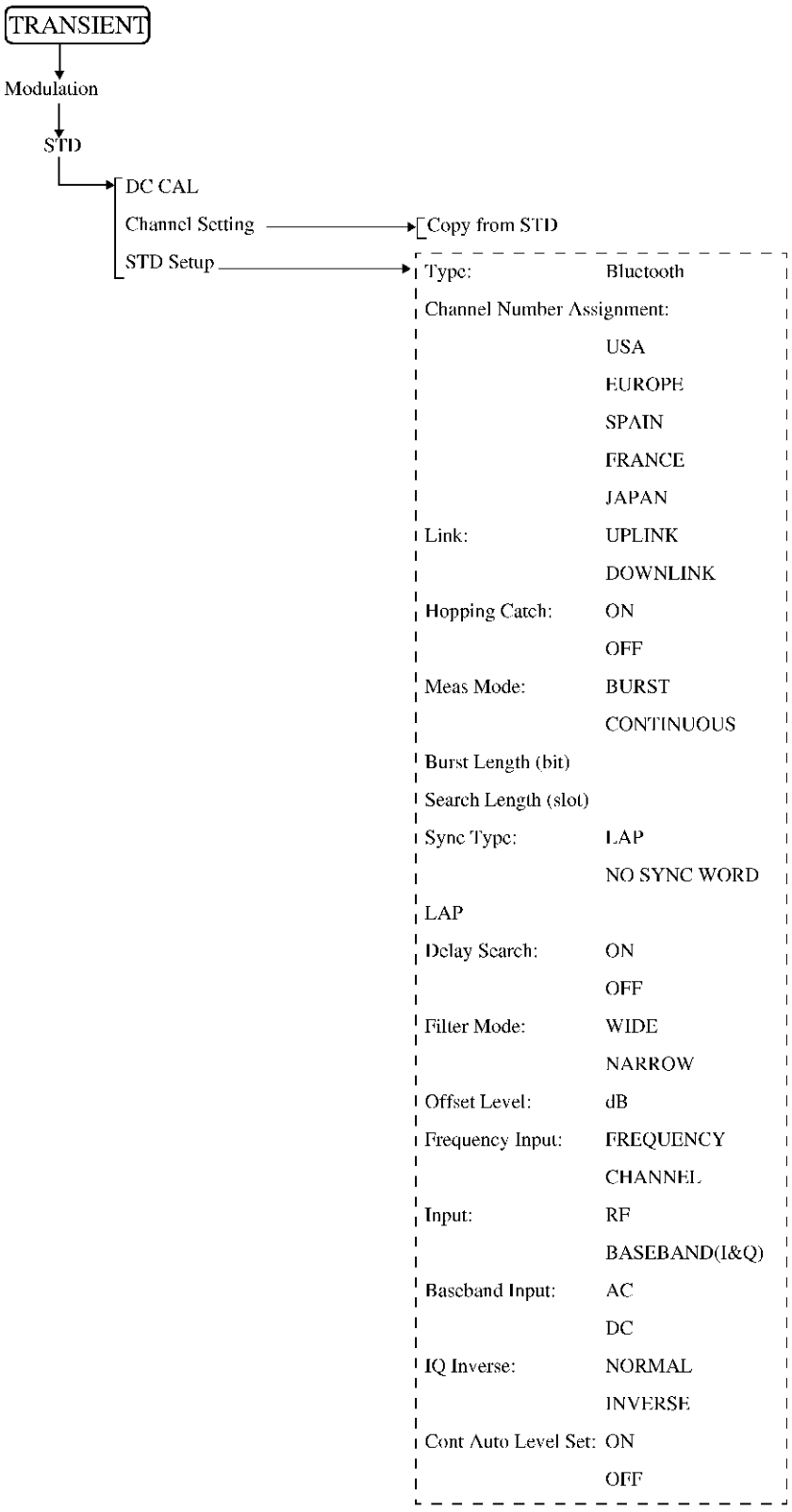

TRANSIENT
Modulation
FM Deviation
Auto Level Set
Graphics
Parameter Setup
Average Times ON/OFF
Start Bit
Select Type
Freq Error ON/OFF
Frequency vs Bit
Frequency EYE
Demodulated Data
Spectrum due to Mod
Frequency Drift
Mag vs Frequency
Trigger Source:FREE RUN
IF
EXT
Burst Search: ON
OFF
Search Level
Trigger Slope: +
-
Trigger Level
Slot Number
Trigger Delay
Bit Sequence: RANDOM
STD(FAST)
STD(0xF0)
STD(0xAA)
Freq Error Method:
PEAK DEV
PREAMBLE
Payload Header:
ON
OFF
Header Length:8Bit
16Bit
Payload CRC: ON
OFF
Δf1 max Lower Limit
Δf1 max Upper Limit
Δf2 max Lower Limit


TRANSIENT
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
Slot Number
Trigger Delay

3.2 Menu Map

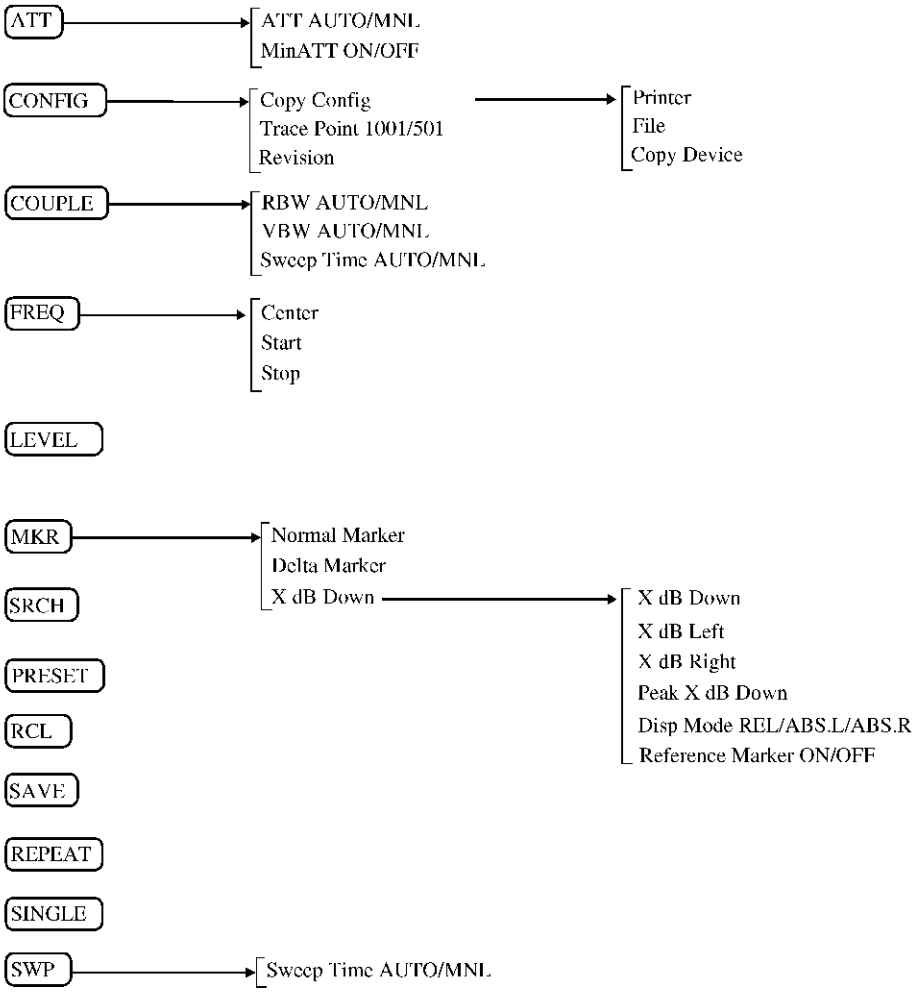

TRANSIENT
Modulation
Lockup Time
Auto Level Set
X Span
X Start
Y Scale
Parameter Setup
Average Times ON/OFF
2kHz/div
10kHz/div
20kHz/div
100kHz/div
200kHz/div
Freq Range: 100kHz
1MHz
Analyze Length
Trigger Source:FREE RUN
IF
EXT
Trigger Slope: +
-
Trigger Level
Slot Number
Trigger Delay
Limit


TRANSIENT
Modulation
Wave Check
Time & FFT
Time
Auto Level Set
Select Type
Parameter Setup
Average Times ON/OFF
Auto Level Set
Parameter Setup
The menu items in the box can be used only to input a baseband signal.
Time & FFT
IQ Complex FFT
Ich Time & FFT
Qch Time & FFT
Ich & Qch Time
Trigger Source: FREE RUN IF EXT
Trigger Slope: + -
Trigger Level
Slot Number
Trigger Delay
Sweep Time: SLOT 3-SLOT 5-SLOT
Trigger Source: FREE RUN IF EXT
Burst Search: ON OFF
Search Level
Trigger Slope: + -
Trigger Level
Trigger Position
Slot Number
Trigger Delay


TRANSIENT
Modulation
STD
DC CAL
Channel Setting
Copy from STD
STD Setup
Type: Bluetooth
Channel Number Assignment:
USA
EUROPE
SPAIN
FRANCE
JAPAN
Link: UPLINK
DOWNLINK
Hopping Catch: ON
OFF
Meas Mode: BURST
CONTINUOUS
Burst Length (bit)
Search Length (slot)
Sync Type: LAP
NO SYNC WORD
LAP
Delay Search: ON
OFF
Filter Mode: WIDE
NARROW
Offset Level: dB
Frequency Input: FREQUENCY
CHANNEL
Input: RF
BASEBAND(I&Q)
Baseband Input: AC
DC
IQ 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**).

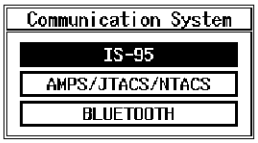


Figure 3-1 Communication Systems Dialog Box

5. When the data knob (or **ENTR**) is pressed, the message "Now 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.

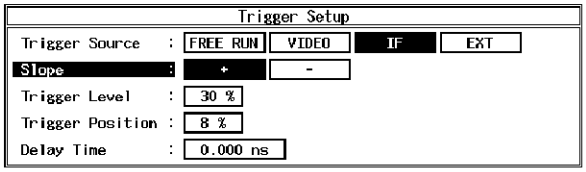


Figure 3-2 Trigger Setup Dialog Box

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: When the window is partially outside the display, an arrow is shown next to Posi, Width or both in the area indicating the window conditions.

Template Sets the template.
For more information, refer to Section 5.1.1, "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.

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.

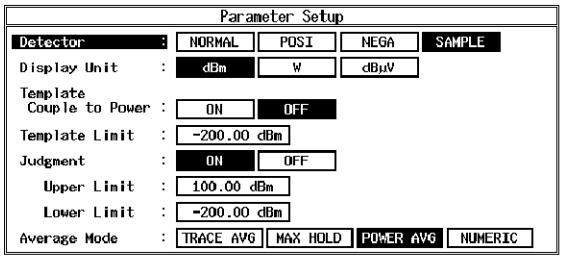


Figure 3-3 Parameter Setup Dialog Box

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 Default Resets the settings to their defaults.

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.

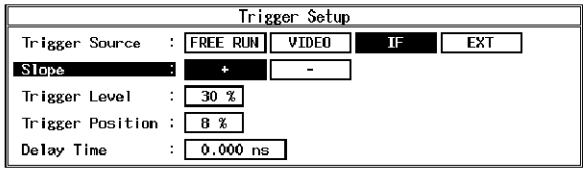


Figure 3-4 Trigger Setup Dialog Box

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: When the window is partially outside the display, an arrow is shown next to Posi, Width or both in the area indicating the window conditions.

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 measurement parameters and so on.

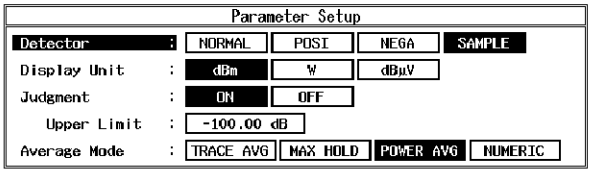


Figure 3-5 Parameter Setup Dialog Box

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 Default Resets the settings to their defaults.

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.

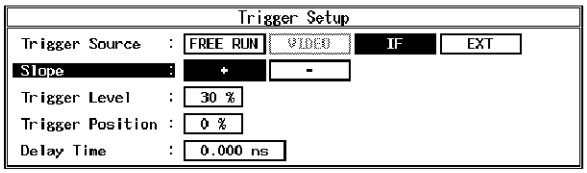


Figure 3-6 Trigger Setup Dialog Box

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 and so on.

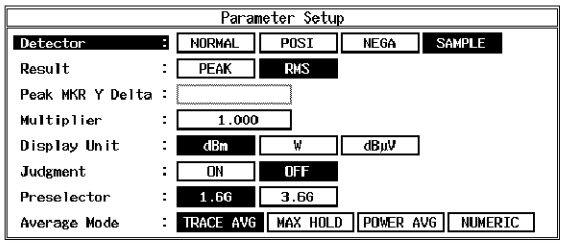


Figure 3-7 Parameter Setup Dialog Box

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.

3.3.3 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 Transient, 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.

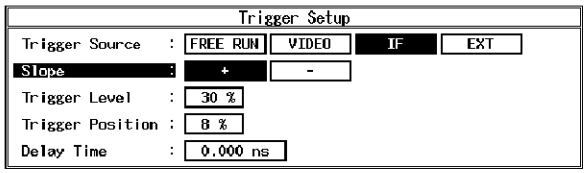


Figure 3-8 Trigger Setup Dialog Box

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 MIz, 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.

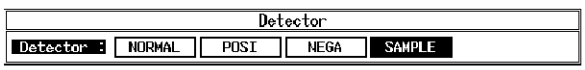


Figure 3-9 Detector Dialog Box

Window Setup Sets the frequency range used for power measurement.

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

Set to Default Resets the settings to their defaults.

Window Position Sets the position of the window.

Window Width Sets the width of the window.

NOTE: When the window is partially outside the display, an arrow is shown next to Posi, Width or both in the area indicating the window conditions.

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

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

Config

Parameter Setup Sets measurement conditions and so on.

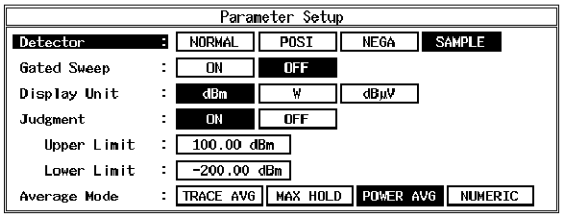


Figure 3-10 Parameter Setup Dialog Box

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 Default — Resets the settings to their defaults.

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.

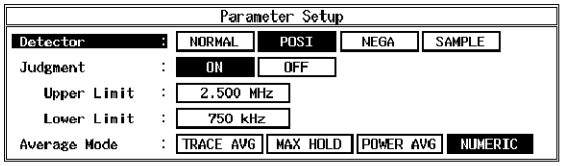


Figure 3-11 Parameter Setup Dialog Box

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 Default Resets the settings to their defaults.

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 5.1.2, "Template Setting in the F-Domain Measuring Mode."

Template ON/OFF Sets ON/OFF of the template display.
When Template is set to ON, the Pass/Fail judgment for the 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.

- ***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 5.2.1, "Marker Edit Function."

- ***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 5.2.2, "Measurement results Using Due to Modulation, Due to Transient and Inband Spurious Modes."

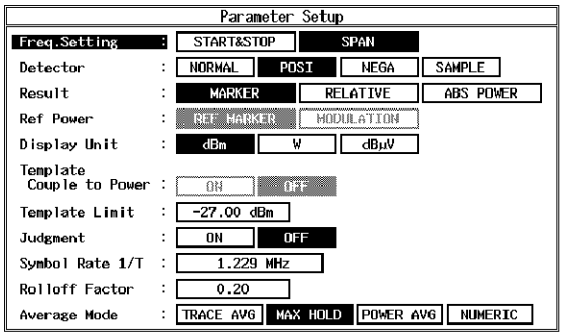


Figure 3-12 Parameter Setup Dialog Box

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

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

Result Specifies how to display the result.

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.

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.

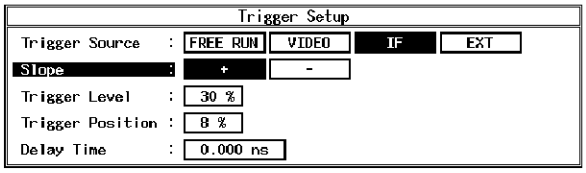


Figure 3-13 Trigger Setup Dialog Box

Trigger Source Selects a trigger.

FREE RUN: Captures data using the internal measurement timing.

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

IF: Captures the signal in sync with the IF signal (the 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 MHz and the gate trigger is failing.

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

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

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

Gate Position Sets the gate position.

Gate Width Sets the gate width.

Gated Sweep ON/OFF Starts the gated sweep.

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

Figure 3-14 Detector Dialog Box

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

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

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 5.2.1, "Marker Edit Function."

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

Insert Line Inserts a line before the selected line.

Delete Line Deletes the selected line.

Sort Sorts data in order of frequency.

Table Init Initializes the table.

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

Config

Parameter Setup

Sets measurement conditions and so on.
For more information, refer to Section 5.2.2, "Measurement results Using Due to Modulation, Due to Transient and Inband Spurious Modes."

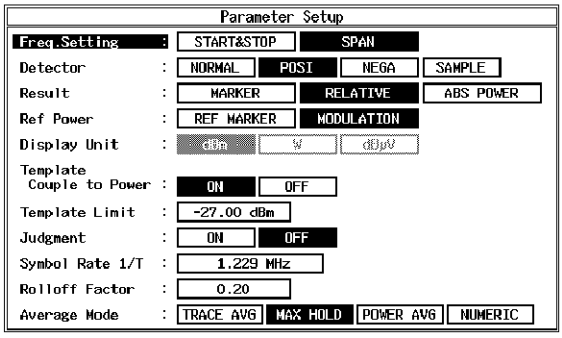


Figure 3-15 Parameter Setup Dialog Box

Freq. Setting

START&STOP/SPAN
Selects the measurement mode.

Detector

NORMAL/POSI/NEGA/SAMPLE
Selects the detector.

Result

Specifies how to display the results.

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 Default Resets the settings to their defaults.

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 5.1.2, "Template Setting in the F-Domain Measuring Mode."

- ***Template ON/OFF*** — Sets the template display to ON or OFF.
When Template is set to ON, the Pass/Fail judgment for the 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 5.2.1, "Marker Edit Function."

- ***Copy from STD*** — Sets the measurement parameters specified by the communication standard.
- ***Insert Line*** — Inserts a line before the selected line.
- ***Delete Line*** — Deletes the selected line.

Sort Sorts data in order of frequency.

Table Init Initializes the table.

Average Times ON/OFF Sets the averaging count.
For more information, refer to Section 5.1.1, "Template Setting in the T-Domain Measuring Mode."

Config

Parameter Setup Sets measurement conditions and so on.
For more information, refer to Section 5.2.3, "Measurement Result of Inband Spurious."

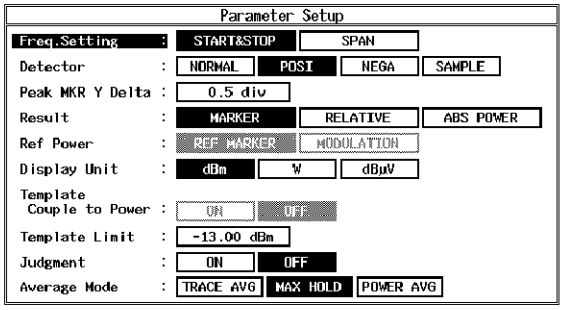


Figure 3-16 Parameter Setup Dialog Box

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*** — Sets measurement parameters as defined 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 conditions and so on.

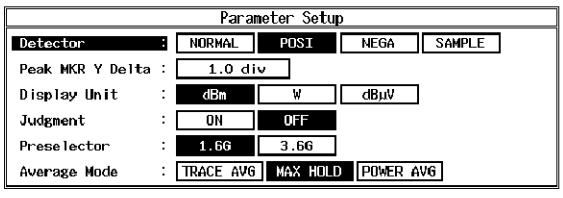


Figure 3-17 Parameter Setup Dialog Box

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

Peak MKR Y Delta
Selects 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

Performs modulation analysis using the DSP.

3.3.4.1 FM Deviation

Measures the FM deviation.

Auto Level Set

Optimizes the internal reference level according to the measurement signal. The reference level is automatically adjusted only when this key is pressed.

NOTE: The signal level must be stable while Auto level Set is activated.

Graphics

Selects a graph type.

Start Bit

Sets a start bit number for the graph. 128 bits, beginning with the start bit number, are graphed.

Select Type

Selects a graph.

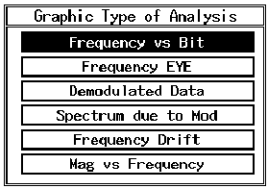


Figure 3-18 Select Type Dialog Box

Freq Error

Selects whether or not to have the frequency error show on the graph display.

ON: the frequency error is shown on the graph display.

OFF: the frequency error is corrected and therefore is not shown on the graph display.

Parameter Setup

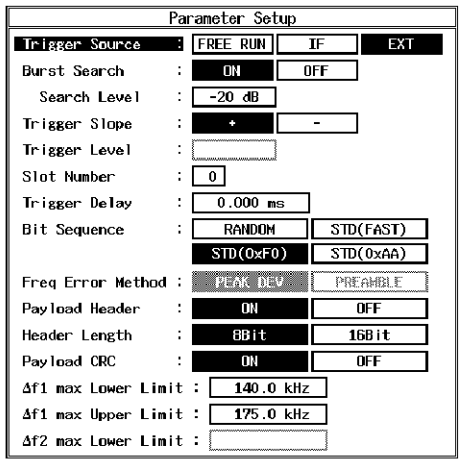


Figure 3-19 Parameter Setup Dialog Box

Trigger Source Selects a trigger used for data acquisition.

FREE RUN:
Acquires data without a trigger signal.

IF: Synchronizes with the leading edge of the burst signal, which is in the IF signal, to acquire data.

EXT: Synchronizes with the external signal to acquire data.

NOTE: The external trigger signal can be input from the EXT TRIG port on the rear panel.

Burst Search Selects whether or not to search for a burst from the acquired data using software.

ON: Searches for a burst.

OFF: Does not search for a burst.

Search Level Sets the threshold level used to search for a burst.

Trigger Slope Selects the leading or trailing edge of the trigger signal.

Trigger Level Sets the trigger level.

Slot Number Sets the slot number for the measured signal.

Trigger Delay Sets the time period from when the trigger turns the data acquisition on to when data is actually acquired.

NOTE: The trigger delay is automatically calculated using the Slot Number setting. However, the trigger delay can be adjusted when necessay.

Bit Sequence

Selects an algorithm to be used for the measurement from followings.

RANDOM: Performs a standard measurement under the assumption that the Payload contains random data.

STD (0xF0): Performs a standard measurement under the assumption that the Payload contains repeating patterns of 11110000.

STD (0XAA): Performs a measurement under the assumption that the Payload contains repeating patterns of 10.

STD (FAST): Performs a measurement under the assumption that the Payload contains the repeating patterns of 11110000 or 10. For more information, refer to Chapter 5.8, "Measurement Algorithm (When Bit Sequence is set to STD (FAST))."

Freq Error Method

Selects an algorithm to be used for the frequency error measurement.

PEAK DEV: Obtains a frequency error by averaging the maximum and minimum frequency deviation amounts.

PREAMBLE: Obtains a frequency error by averaging the preamble frequency deviation amounts.

Payload Header

Sets whether or not to include the Payload header field in the calculation target.

ON: The Payload header is excluded from the calculation target because the header field is contained in the signal to be measured.

OFF: The Payload header field is included in the calculation target because the header is not contained in the signal to be measured.

Header Length

Sets the Payload header size.

8Bit: Sets the Payload header size to 8 bits.

16Bit: Sets the Payload header size to 16 bits.

Payload CRC Sets whether or not to include the Payload CRC field in the calculation target.

ON: The Payload CRC is excluded from the calculation target because the CRC is contained in the signal to be measured.

OFF: The Payload CRC is included in the calculation target because the CRC is not contained in the signal to be measured.

Δf1 max Lower Limit Enter the lower limit value in kHz, which is used for measurements made using the STD (0xF0) setting.

Δf1 max Upper Limit Enter the upper limit value in kHz, which is used for measurements made using the STD (0xF0) setting.

Δf2 max Lower Limit Enter the lower limit value in kHz, which is used for measurements made using the STD (0xAA) setting.

Average Times ON/OFF Sets an averaging count.

3.3.4.2 Tx Power

Measures power with high accuracy because the logarithmic amplifier is not used.

Auto Level Set Optimizes the internal reference level according to the measurement signal. The reference level is automatically adjusted only when this key is pressed.

NOTE: The signal level must be stable while Auto level Set is activated.

Parameter Setup

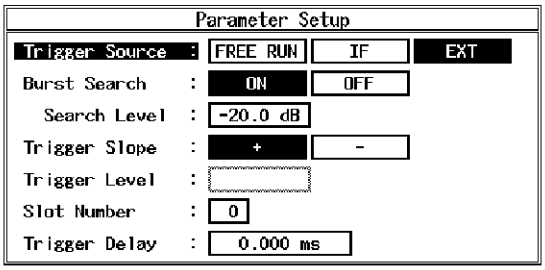


Figure 3-20 Parameter Setup Dialog Box

Trigger Source

Selects a trigger used for data acquisition.

FREE RUN: Acquires data without a trigger signal.

IF: Synchronizes with the leading edge of the burst signal, which is in the IF signal, to acquire data.

EXT: Synchronizes with the external signal to acquire data.

NOTE: The external trigger signal can be input from the EXT TRIG port on the rear panel.

Burst Search

Selects whether or not to search for a burst from the acquired data using software.

ON: Searches for a burst.

OFF: Does not search for a burst.

Search Level

Sets the threshold level used to search for a burst.

Trigger Slope

Selects the leading or trailing edge of the trigger signal.

Trigger Level

Sets the trigger level.

Slot Number

Sets the slot number for the measured signal.

Trigger Delay

Sets the time period from when the trigger turns the data acquisition on to when data is actually acquired.

NOTE: The trigger delay is automatically calculated using the Slot Number setting. However, the trigger delay can be adjusted when necessay.

Average Times ON/OFF

Sets an averaging count.

3.3.4.3 Lockup Time

Measures the PLL lockup time.

Auto Level Set Optimizes the internal reference level according to the measurement signal. The reference level is automatically adjusted only when this key is pressed.

NOTE: The signal level must be stable while Auto level Set is activated.

X Span Specifies the graph span.

X Start Specifies the start value of the graph.

Y Scale Selects a vertical axis scale of the graph.

Parameter Setup

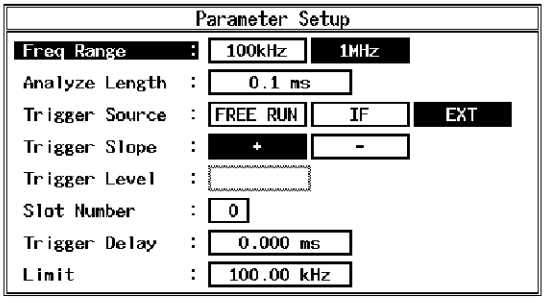


Figure 3-21 Parameter Setup Dialog Box

Freq Range Selects a frequency range for measurements.

Analyze Length Specifies a measurement time.

Trigger Source Selects a trigger used for data acquisition.

FREE RUN: Acquires data without a trigger signal.

IF: Synchronizes with the leading edge of the burst signal, which is in the IF signal, to acquire data.

EXT: Synchronizes with the external signal to acquire data.

NOTE: The external trigger signal can be input from the EXT TRIG port on the rear panel.

Trigger Slope Selects the leading or trailing edge of the trigger signal.

Trigger Level Sets the trigger level.

Slot Number Sets the slot number for the measured signal.

Trigger Delay Sets the time period from when the trigger turns the data acquisition on to when data is actually acquired.

NOTE: The trigger delay is automatically calculated using the Slot Number setting. However, the trigger delay can be adjusted when necessay.

Limit Sets a frequency threshold which is used when the lockup time is measured.
For more information on this measurement, refer to Section "5 TECHNICAL INFORMATION".

Average Times ON/OFF Sets an averaging count.

3.3.4.4 Wave Check

Opens the menu and select a time or FFT representation to display the IF or baseband signal.

Time & FFT Displays the IF or baseband signal in a time or FFT representation.

Auto Level Set Optimizes the internal reference level according to the measurement signal. The reference level is automatically adjusted only when this key is pressed.

NOTE: The signal level must stay stable while Auto level Set is activated.

Select Type Selects a graph.

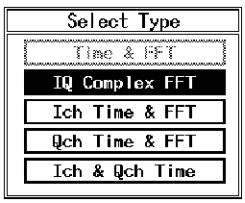


Figure 3-22 Select Type Dialog Box

Parameter Setup

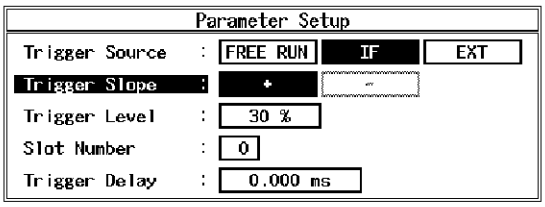


Figure 3-23 Parameter Setup Dialog Box

Trigger Source Selects a trigger used for data acquisition.

FREE RUN:
Acquires data without a trigger signal.

IF: Synchronizes with the leading edge of the burst signal, which is in the IF signal, to acquire data.

EXT: Synchronizes with the external signal to acquire data.

NOTE: The external trigger signal can be input from the EXT TRIG port on the rear panel.

Trigger Slope Selects the leading or trailing edge of the trigger signal.

Trigger Level Sets the trigger level.

Slot Number Sets the slot number for the measured signal.

Trigger Delay Sets the time period from when the trigger turns the data acquisition on to when data is actually acquired.

NOTE: The trigger delay is automatically calculated using the Slot Number setting. However, the trigger delay can be adjusted when necessay.

Average Times ON/OFF Sets an averaging count.

Time Displays the IF or baseband signal on the time domain screen.

Auto Level Set Optimizes the internal reference level according to the measurement signal. The reference level is automatically adjusted only when this key is pressed.

NOTE: The signal level varies while Auto level Set is activated.

Parameter Setup

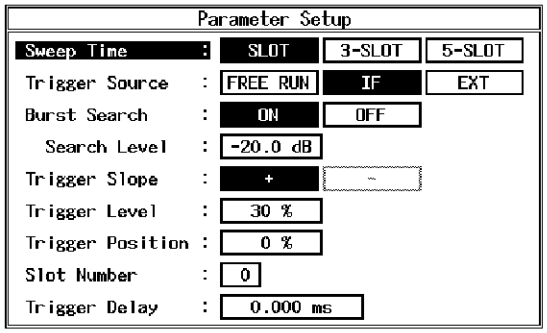


Figure 3-24 Parameter Setup Dialog Box

Sweep Time Sets the sweep time to display the time waveform.

SLOT: Displays the waveform corresponding to one slot.

3-SLOT: Displays the waveforms corresponding to three slots.

5-SLOT: Displays the waveforms corresponding to five slots.

Trigger Source Selects a trigger used for data acquisition.

FREE RUN:
Acquires data without a trigger signal.

IF: Synchronizes with the leading edge of the burst signal, which is in the IF signal, to acquire data.

EXT: Synchronizes with the external signal to acquire data.

NOTE: The external trigger signal can be input from the EXT TRIG port on the rear panel.

Burst Search Selects whether or not to search for a burst from the acquired data using software.

ON: Searches for a burst.

OFF: Does not search for a burst.

Search Level Sets the threshold level used to search for a burst.

Trigger Slope Selects the leading or trailing edge of the trigger signal.

Trigger Level Sets the trigger level.

Trigger Position Sets the trigger position for the screen.

Slot Number Sets the slot number for the measured signal.

Trigger Delay Sets the time period from when the trigger turns the data acquisition on to when data is actually acquired.

NOTE: The trigger delay is automatically calculated using the Slot Number setting. However, the trigger delay can be adjusted when necessay.

Average Times ON/OFF Sets an averaging count.

3.3.4.5 STD

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

DC CAL Compensates for direct current components inside the circuit.

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.
In Bluetooth, there is no difference between UpLink and DownLink, each of which has the same channel number.
When Link is selected from the STD Setup menu, UpLink and DownLink can use different frequency tables.

STD Setup This section describes the STD Setup menu.

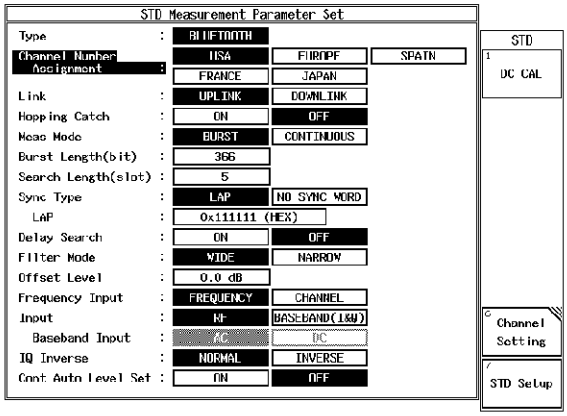


Figure 3-25 STD Setup Dialog Box

Type Selects Bluetooth as a communication standard.

Channel Number Assignment Sets the region where Bluetooth is used. This setting determines the channel number.

Link Sets the signal direction. This is used when the channel number table is displayed to select channel numbers.

Hopping Catch

Stores data in the memory for up to 93.7 ms and selects whether or not to analyze the signal having the same frequency.

ON: Measures the hopping signal. For more information, refer to Section "5 TECHNICAL INFORMATION."

OFF: Analyzes the non-hopping signal.

Meas Mode

Selects a measurement mode.

BURST: Analyzes the burst signal.

CONTINUOUS:
Measures the continuous-time signal. According to the standard, there are no continuous-time signals. However, this can be used for device tests.

Burst Length (bit)

Specifies the length of the burst to be measured in bit notation.

Search Length (slot)

Specifies the data length to be acquired in slot notation so that a burst can be included in the search length.
The specified length is also used when Auto Level Set is executed to acquire data.

Sync Type

Selects whether or not to perform measurements synchronized with SYNC WORD.

NOTE: To detect the burst location compliant with the standard, synchronization with SYNC WORD is necessary.

LAP: The measurements are synchronized with the LAP (Lower Address Part).

NO SYNC WORD:
The measurements are not synchronized with SYNC WORD.

LAP

Specifies the LAP in hexadecimal.
Use the key combinations listed below when using hexadecimal numbers.

A: Shift, 0

B: Shift, 1

C: Shift, 2

D: Shift, 3

E: Shift, 4

F: Shift, 5

Delay Search

Sets whether or not to automatically search for the delay time between the burst signal rising edge and the beginning of the preamble.

ON: Searches automatically for the delay.

OFF: Does not automatically search for the delay. In this case, specify the desired time in the Trigger Delay of the Parameter Setup dialog box.

Filter Mode

Selects a filter used to receive signals.

WIDE: Selects the wide-band filter.

NARROW: Select the narrow-band filter.

Offset Level

Offsets the reference level between -100 dB and +100 dB.

Frequency Input

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

Frequency: Specifies a frequency.

CHANNEL: Specifies a channel number.

Input

Sets input signal path.

NOTE: The Input setting affects the FM deviation and Tx Power settings. When selecting BASEBAND (I&Q), Tx Power displays the relative power.

RF: Sets the channel so that the RF can enter.

BASEBAND (I&Q):
Sets the channel so that the IQ can enter.
The input signal magnitude is from 0.25V to 0.9Vp-p (±0.47V or less).

Baseband Input

Selects how the IQ is coupled.

AC: sets an AC coupling. (The cut-off frequency is approximately 15 Hz.)

DC: sets an DC coupling.

IQ Inverse

Selects whether or not to reverse the Q signal.

NORMAL: The Q signal is not inverted.

INVERSE: The Q signal is inverted.

Cont Auto Level Set

Selects whether or not to automatically optimize the measurement range for the input signal.

NOTE: This setting is available for the RF input, FM Deviation and Tx Power measurements. To adjust the reference level, use the Auto Level Set key.

ON: The measurement range is automatically optimized for each measurement.

OFF: The measurement range is not optimized.

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 sys-tem	Bluetooth mode	COMMSYS BLUETOOTH	COMMSYS?	11: Bluetooth	*1

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

Table 4-2 ATT 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 Min. ATT ON OFF	ATMIN * ATMIN ON [*] ATMIN OFF	ATMIN? ATMINON?	Level 0: OFF 1: ON	

Table 4-3 COPY Key (Hand copy)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Printer output File output	Execution of the command	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	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	
Frequency span	SP *	SP?	Frequency	

Table 4-12 TRANSIENT Key (1 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup	Communication system				
	Bluetooth	MODTYP BLUETOOTH	MODTYP?	0: Bluetooth	
	Channel Number Assignment				
	USA	CHNOAS USA	CHNOAS?	0: USA	
	EUROPE	CHNOAS EUROPE		1: EUROPE	
	SPAIN	CHNOAS SPAIN		2: SPAIN	
	FRANCE	CHNOAS FRANCE		3: FRANCE	
	JAPAN	CHNOAS JAPAN		4: JAPAN	
	LINK				
	UPLINK	LINK UP	LINK?	0: UPLINK	
	DOWNLINK	LINK DOWN		1: DOWNLINK	
	Hopping Catch				
	OFF	HOPCATCH OFF	HOPCATCH?	0: OFF	
	ON	HOPCATCH ON		1: ON	
	Measurement mode				
	BURST	MEASMD BURST	MEASMD?	0: BURST	
	CONTINUOUS	MEASMD CONT		2: CONTINUOUS	
	Burst Length	BRSTLEN *	BRSTLEN?	Integer (Burst length)	
	Search Length	SRCHLEN *	SRCHLEN?	Integer (Search length)	
	Synchronization type				
	LAP	SYNC LAP	SYNC?	0: LAP	
	NO SYNC	SYNC NO		99: NO SYNC	
	LAP	LAP *	LAP?	Hexadecimal (0 to FFFFFF)	
	Delay Search				
	Delay Search ON	DLYSRCH ON	DLYSRCH?	0: OFF	
	Delay Search OFF	DLYSRCH OFF		1: ON	
	Filter used to receive signals				
	WIDE	MFLTMD WIDE	MFLTMD?	0: WIDE	
	NARROW	MFLTMD NARW		1: NARROW	
	Offset Level	RO *	RO?	Level	
	Frequency setting				
	Frequency entry mode	FINPMD FREQ	FINPMD?	0: Frequency	
	Channel number entry mode	FINPMD CHL		1: Channel number	
	Channel setting	CH *	CH?	Integer (Channel Number)	

Table 4-12 TRANSIENT Key (2 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
STD Setup	Channel edit				
	Input # 1 (UPLINK)	CHEDUP1 *,*,*,*,*	CHEDUP1?	ch1,ch2,f1,f2,chof	
	Input # 2 (UPLINK)	CHEDUP2 *,*,*,*,*	CHEDUP2?	ch1,ch2,f1,f2,chof	
	Input # 3 (UPLINK)	CHEDUP3 *,*,*,*,*	CHEDUP3?	ch1,ch2,f1,f2,chof	
	Input # 1 (DOWNLINK)	CHEDDN1 *,*,*,*,*	CHEDDN1?	ch1,ch2,f1,f2,chof	
	Input # 2 (DOWNLINK)	CHEDDN2 *,*,*,*,*	CHEDDN2?	ch1,ch2,f1,f2,chof	
	Input # 3 (DOWNLINK)	CHEDDN3 *,*,*,*,*	CHEDDN3?	ch1,ch2,f1,f2,chof ch1:Start channel no. ch2:Stop channel no. f1:Base freqency(Hz) f2:Channel space(Hz) chof:Channel Offset (Frequency units are required for f1 and f2.)	
	The channel table is enabled or disabled.				
	# 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 (3 of 28)

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?		
	Delay Time	TRGDT *	TRGDT?	Time	
		TDPTRGDT *	TDPTRGDT?		
	Window Setup				
	Window				
	ON	TDPWDO ON	TDPWDO?	0: OFF	
	OFF	TDPWDO OFF		1: ON	
	Window Position	TDPWPOS *	TDPWPOS?	Time	
	Window Width	TDPWWID *	TDPWWID?	Time	
	Y Scale				
	10dB/div	TDPDIV P10DB	TDPDIV?	0: 10dB/div	
	5dB/div	TDPDIV P5DB		1: 5dB/div	
	2dB/div	TDPDIV P2DB		2: 2dB/div	

Table 4-12 TRANSIENT Key (4 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Average Times	TDPAVGCNT *	TDPAVGCNT?	Integer (1: OFF, 2 to 999)	
		TDPAVG *	TDPAVG?	Integer (1: OFF, 2 to 999)	*1
	Average Mode				
	TRACE AVG	TDPAVGMD TRACE	TDPAVGMD?	0: Trace Avg	
	MAX HOLD	TDPAVGMD MAX		1: Max Hold	
	POWER AVG	TDPAVGMD POWER		2: Power Avg	
	NUMERIC	TDPAVGMD NUMERIC		3: Numeric	
	Template				
	Template				
	ON	TDPTMPL ON	TDPTMPL?	0: OFF	
	OFF	TDPTMPL OFF		1: ON	
	Template Shift				
	Shift X	TDPTMPLSX *	TDPTMPLSX?	Time	
	Shift Y	TDPTMPLSY *	TDPTMPLSY?	Level	
	Template Edit				
	Template	TDPTMPLSEL UP	TDPTMPLSEL?	0: UP	
	UP/LOW Selection	TDPTMPLSEL LOW		1: LOW	
	Template Data Input	TDPTMPLED *,*		t1,l1 t1: Time l1: Level (dBm/W/dBµV)	
	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	

*1: Average Mode is set to POWER AVG.

Table 4-12 TRANSIENT Key (5 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Power	Template Couple to Power				
	ON	TDPTMPLPW ON	TDPTMPLPW?	0: OFF	
	OFF	TDPTMPLPW OFF		1: ON	
	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	WAVEFM 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)	
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)	
	Delay Time	OORTRGDT *	OORTRGDT?	Time	

Table 4-12 TRANSIENT Key (6 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
ON/OFF Ratio	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
	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			

*1: Average Mode is set to NUMERIC.

Table 4-12 TRANSIENT Key (7 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
ON/OFF Ratio	Starts measurement ON/OFF Ratio Starts measurement in the same mode	 OORMEAS 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)	
T-Domain Spurious	Auto Level Set	TDSAUTOLVL			
	Trigger Setup Trigger Source FREERUN IF EXT 	 TDSTRGSRC FREE TRSPMD FREE TDSTRGSRC IF TRSPMD IF TDSTRGSRC EXT TRSPMD EXT	 TDSTRGSRC? TRSPMD?	 0: FREERUN 2: IF 3: EXT	
	Trigger Slope + - 	 TDSTRGSLP RISE TRSPSLP RISE TDSTRGSLP FALL TRSPSLP FALL	 TDSTRGSLP? TRSPSLP?	 0: - 1: +	
	Trigger Level	TDSTRGLVL *	TDSTRGLVL?	Integer(0 to 100)	
	Trigger Position	TDSTRGPOS *	TDSTRGPOS?	Integer(0 to 100)	
	Delay Time	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 (8 of 28)

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	
	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 MKR Y-Delta	TDSPKMKY *	TDSPKMKY?	Real Number	
	Preselector 1.6G	TDSPRE 16G	TDSPRE?	0:1.6G	
	3.6G	TDSPRE 36G		1:3.6G	

*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 (9 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
T-Domain Spurious	Set to Default	TDSSETSTD			
	Starts measurement Spurious Starts measurement in the same mode	 TDSMEAS SPUR 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)	
			SPULVL?	n<CR+LF>+f1,l1<CR+LF> ..... +fn,ln<CR+LF> n: Amount (Integer) fn: Frequency ln: Level (dBm)	
F-Domain Power	Auto Level Set	FDPAUTOLVL			
	Gate Setup ON OFF	 TGTSETUP ON TGTSETUP OFF	 TGTSETUP?	 0: OFF 1: ON	
	Trigger Source FREERUN VIDEO IF EXT	 TGTTRG FREE TGTTRG VIDEO TGTTRG IF TGTTRG EXT	 TGTTRG?	 0: FREERUN 1: VIDEO 2: IF 3: EXT	
	Trigger Slope - +	 TGTTRGSLP FALL TGTTRGSLP RISE	 TGTTRGSLP?	 0: - 1: +	
	Trigger Level	TGTTRGLVL *	TGTTRGLVL?	Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Delay Time	TGTTRGDT *	TGTTRGDT?	Time	

Table 4-12 TRANSIENT Key (10 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
F-Domain Power	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	
	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 (11 of 28)

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?	i1, j1 i1: Level (dBm/W/dBµV) j1: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
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

*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 (12 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
OBW	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			
	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)	

Table 4-12 TRANSIENT Key (13 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
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)	
	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	*1
	Init Table	DTSMKRCLR			
	Average Times	DTSAVGCNT *	DTSAVGCNT?	Integer (1:OFF, 2 to 999)	
		DTSAVG *	DTSAVG?	Integer (1:OFF, 2 to 999)	*2
	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	

*1: After the table has been initialized using an appropriate listener code, the parameters d1 and f2 defined in the first command correspond to the reference MKR type and reference band width setting, respectively (the values assigned to f1 and l1 are ignored).
The parameter d1 of the second command corresponds to the offset MKR type. Even if the setting of the command parameter d1 is changed from the third command onwards, the new settings are ignored.

*2: 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 (14 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Transient	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	
	Result				
	ABS	DTSRES ABS	DTSRES?	0: Absolute	
	REL	DTSRES REL		1: Relative	
	MKR	DTSRES MKR		2: Marker	
	Ref 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			
	Starts measurement				
	Due to Transient	DTSMEAS			
	Starts measurement in the same mode	SI			

Table 4-12 TRANSIENT Key (15 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Transient	Measurement results Due to Transient		DTSMEAS?	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)	
	Ref. Power	-	DTSREFPWR?	Level	
Due to Modula-tion	Auto Level Set	DTMAUTOLVL			
	Gate Setup				
	ON	TGTSETUP ON	TGTSETUP?	0: OFF	
	OFF	TGTSETUP OFF		1: ON	
	Trigger Source				
	FREERUN	TGTTRG FREE	TGTTRG?	0: FREERUN	
	VIDEO	TGTTRG VIDEO		1: VIDEO	
	IF	TGTTRG IF		2: IF	
	EXT	TGTTRG EXT		3: EXT	
	Trigger Slope				
	-	TGTTRGSLP FALL	TGTTRGSLP?	0: -	
	+	TGTTRGSLP RISE		1: +	
	Trigger Level	TGTTRGLVL *	TGTTRGLVL?	Integer (0 to 100)	
	Trigger Position	TGTTRGPOS *	TGTTRGPOS?	Integer (0 to 100)	
	Delay Time	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 (16 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modula-tion	Template				
	Template				
	ON	DTMTMPL ON	DTMTMPL?	0: OFF	
	OFF	DTMTMPL OFF		1:ON	
	Template Shift				
	Shift X	DTMTMPLSX *	DTMTMPLSX?	Frequency	
	Shift Y	DTMTMPLSY *	DTMTMPLSY?	Level	
	Margin delta X	DTMTMPLDX *	DTMTMPLDX?	Frequency(0:OFF)	
	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	*1
	Init Table	DTMMKRCLR			
	Average Times	DTMAVGCNT *	DTMAVGCNT?	Integer (1: OFF, 2 to 999)	
		DTMAVG *	DTMAVG?	Integer (1: OFF, 2 to 999)	*2
	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	

*1: After the table has been initialized using an appropriate listener code, the parameters d1 and f2 defined in the first command correspond to the reference MKR type and reference band width setting, respectively (the values assigned to f1 and l1 are ignored).
The parameter d1 of the second command corresponds to the offset MKR type. Even if the setting of the command parameter d1 is changed from the third command onwards, the new settings are ignored.

*2: 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 (17 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modula-tion	Parameter Setup				
	Detector				
	Normal	DTMDET NRM	DTMDET?	0: Normal	
	Posi	DTMDET POS		1: Posi	
	Nega	DTMDET NEG		2: Nega	
	Sample	DTMDET SMP		3: Sample	
	Display Unit				
	dBm	DTMUNIT DBM	DTMUNIT?	0: dBm	
	W	DTMUNIT W		1: W	
	dBµV	DTMUNIT DBUV		2: dBµV	
	Template Couple to Power				
	ON	DTMTMPLPW ON	DTMTMPLPW?	0: OFF	
	OFF	DTMTMPLPW OFF		1: ON	
	Template Limit	DTMTMPLBTM *	DTMTMPLBTM?	Level (dBm/W/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	
	Result				
	ABS	DTMRES ABS	DTMRES?	0: Absolute	
	REL	DTMRES REL		1: Relative	
	MKR	DTMRES MKR		2: Marker	
	Ref Power				
	MKR	DTMREF MKR	DTMREF?	0: Reference Marker	
	MOD	DTMREF MOD		1: Modulation	
	Symbol Rate 1/T	DTMSYMRT *	DTMSYMRT?	Frequency	
	Rolloff Factor	DTMRFACT *	DTMRFACT?	Real Number	
	Set to STD	DTMSETSTD			
	Start measurement				
	Due to Modulation	DTMMEAS			
	Starts measurement in the same mode	SI			

Table 4-12 TRANSIENT Key (18 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Due to Modulation	Measurement results Due to Modulation		DTMMEAS?	n<CR+LF>+d1, j1<CR+LF> .....+dn,jn<CR+LF> n: Amount (Integer) dn: Power jn: Integer (0: FAIL, 1: PASS, -1: Judgment OFF)	
	Ref. Power		DTMREFPWR?	Level	
Inband Spurious	Auto Level Set	SPRAUTOLVL			
	Template Template ON OFF	 SPRTMPL ON SPRTMPL OFF	 SPRTMPL?	 0: OFF 1: ON	
	Template Shift Shift X Shift Y	 SPRTMPLSX * SPRTMPLSY *	 SPRTMPLSX? SPRTMPLSY?	 Frequency 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	*1
	Init Table	SPRMKRCLR			

*1: After the table has been initialized using an appropriate listener code, the parameters d1 and f2 defined in the first command correspond to the reference MKR type and reference band width setting, respectively
Even if the setting of the command parameter d1 is changed from the next command onwards, the new settings are ignored.

Table 4-12 TRANSIENT Key (19 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Inband Spurious	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	
	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				
	ABS	SPRRES ABS	SPRRES?	0: Absolute	
	REL	SPRRES REL		1: Relative	
	MKR	SPRRES MKR		2: Marker	
	Ref Power				
	MKR	SPRREF MKR	SPRREF?	0: Reference Marker	
	MOD	SPRREF MOD		1: Modulation	

*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 (20 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Inband Spurious	Peak MKR Y-Delta	SPRPKMKY *	SPRPKMKY?	Real Number	
	Set to STD	SPRSETSTD			
	Starts measurement Inband Spurious	SPRMEAS			
	Starts measurement in the same mode	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)	
	Ref. Power		SPRREFPWR?	Level	
Outband Spurious	Auto Level Set	FDSAUTOLVL			
	Table 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 *	FDSAVGCNT?	Integer (1:OFF, 2 to 999)	
		FDSAVG *	FDSAVG?	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 (21 of 28)

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 MKR Y-Delta	FDSPKMKY *	FDSPKMKY?	Real Number	
	Preselector 1.6G	FDSPRE 16G	FDSPRE?	0: 1.6G	
	3.6G	FDSPRE 36G		1: 3.6G	
	Set to Default	FDSSETSTD			
	Starts measurement				
	Outband Spurious	FDSMEAS			
	Starts measurement in the same mode	SI			
	Measurement results				
	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)	

Table 4-12 TRANSIENT Key (22 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
FM Deviation	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
	IF	MODTRG IF		1: IF	
	EXT	MODTRG EXT		2: EXT	
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
	-	MODTRGSLP FALL		1: +	
	EXT Trigger Delay				
	Time setting	MODTRGDLY *	MODTRGDLY?		
	Slot setting	MODTRGSLT *	MODTRGSLT?	0 to 5	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer(0 to 100)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRG-BRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL *	MODBRSTLVL?	Level	
	Average Times	FMAVG *	FMAVG?	Integer (1: OFF, 2 to 32)	
	Bit Sequence				
	RANDOM	FMBITSEQ RND	FMBITSEQ?	0: RANDOM	
	STD(FAST)	FMBITSEQ STD		1: STD(FAST)	
	STD(0xF0)	FMBITSEQ STDF0		2: STD(0xF0)	
	STD(0xAA)	FMBITSEQ STDAA		3: STD(0xAA)	
	Freq Error Method				
	PEAK DEV	FMFEM PEAK	FMFEM?	0: PEAK DEV	
	PREAMBLE	FMFEM PRE		1: PREAMBLE	
	Payload Header				
	Payload Header ON	FMPLHD ON	FMPLHD?	0: OFF	
	Payload Header OFF	FMPLHD OFF		1: ON	
	Header Length				
	Header Length 8Bit	FMHDLEN 8BIT	FMHDLEN?	0: 8Bit	
	Header Length 16Bit	FMHDLEN 16BIT		1: 16Bit	

Table 4-12 TRANSIENT Key (23 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
FM Deviation	Payload CRC				
	Payload CRC ON	FMPLCRC ON	FMPLCRC?	0: OFF	
	Payload CRC OFF	FMPLCRC OFF		1: ON	
	Δf1max Lower Limit	FMF1LIML*	FMF1LIML?	Frequency	
	Δf1max Upper Limit	FMF1LIMU*	FMF1LIMU?	Frequency	
	Δf2max Lower Limit	FMF2LIML*	FMF2LIML?	Frequency	
	Starts measurement				
	Freq Deviation	FMDEV			
	Starts measurement in the same made	SI			
	Measurement results				
	FM Deviation				
	When Bit Sequence is set to RANDOM		FMDEV?	d1,d2,s1,d3,s2,d4,d5,d6,d7,s3,d8 d1: Frequency Error (Hz) d2: Max Peak Devi. (Hz) s1: Position of Max Peak Devi. d3: Min Peak Devi. (Hz) s2: Position of Min Peak Devi. d4: Min/Max Ratio (%) d5: Tx Power (dBm) d6: Tx Power (W) d7: Peak Tx Power (dBm) s3: Position of Peak Tx Power d8: Peak Tx Power (W)	
	When Bit Sequence is set to STD (FAST)		FMDEVSTD?	d1,d2,s1,d3,d4,d5,d6,d7,d8,s2,d9 d1: Frequency Error (Hz) d2: Max Peak Devi. (Hz) s1: Position of Max Peak Devi. d3: Avg Peak Devi. (Hz) d4: Frequency Drift (Hz) d5: Max Drift Rate (Hz/µs) d6: Tx Power (dBm) d7: Tx Power (W) d8: Peak Tx Power (dBm) s2: Position of Peak Tx Power d9: Peak Tx Power (W)	

Table 4-12 TRANSIENT Key (24 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
	When Bit Sequence is set to STD (0xF0)		FMDEVSTDF0?	d1,d2,s1,d3,s2,d4,d5,d6,d7,d8, s3,d9 d1: Frequency Error (Hz) d2: Max Δf1 max (Hz) s1: Position of Max Δf1 max d3: Min Δf1 max (Hz) s2: Position of Min Δf1 max d4: Pass/All Δf1 max (%) d5: Δf1 avg (Hz/μs) d6: Tx Power (dBm) d7: Tx Power (W) d8: Peak Tx Power (dBm) s3: Position of Peak Tx Power d9: Peak Tx Power (W)	
	When Bit Sequence is set to STD (0xAA)		FMDEVSTDAA?	d1,d2,s1,d3,s2,d4,d5,d6,d7,d8, d9,d10,s3,d11 d1: Frequency Error (Hz) d2: Max Δf2 max (Hz) s1: Position of Max Δf2 max d3: Min Δf2 max (Hz) s2: Position of Min Δf2 max d4: Pass/All Δf2 max (%) d5: Δf2 avg (Hz/μs) d6: Frequency Drift (Hz) d7: Max Drift Rate (Hz/50μs) d8: Tx Power (dBm) d9: Tx Power (W) d10: Peak Tx Power (dBm) s3: Position of Peak Tx Power d11: Peak Tx Power (W)	

Table 4-12 TRANSIENT Key (25 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Tx Power	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	MODTRG FREE	MODTRG?	0: FREERUN	
	IF	MODTRG IF		1: IF	
	EXT	MODTRG EXT		2: EXT	
	EXT Trigger Slope				
	+	MODTRGSLP RISE	MODTRGSLP?	0: -	
	-	MODTRGSLP FALL		1: +	
	EXT Trigger Delay				
	Time setting	MODTRGDLY *	MODTRGDLY?	Time	
	Slot setting	MODTRGSLT *	MODTRGSLT?	0 to 5	
	IF Trigger Level	MODTRGLVL *	MODTRGLVL?	Integer(0 to100)	
	Burst Search				
	Burst Search OFF	MODTRGBRST OFF	MODTRG-BRST?	0: OFF	
	Burst Search ON	MODTRGBRST ON		1: ON	
	Search Level	MODBRSTLVL *	MODBRSTLVL?	Level	
	Average Times	TXAVG *	TXAVG?	Integer(1:OFF, 2 to 32)	
		TAVGTX *	TAVGTX?		
	Starts measurement				
	Tx Power	TXPWR			
	Starts measurement in the same mode	SI			
	Measurement results				
	Tx Power		TXPWR?	d1,d2,d3,s1,d4	
				d1: Tx Power(dBm)	
				d2: Tx Power(W)	
				d3: Peak Tx Power(dBm)	
				s1: Position of Peak Tx Power	
				d4: Peak Tx Power(W)	

Table 4-12 TRANSIENT Key (26 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Lockup Time	Auto Level Set	AUTOLVL			
	Trigger Setup				
	Trigger Mode				
	FREERUN	LKUPTRG FREE	LKUPTRG?	0: FREERUN	
	IF	LKUPTRG IF		1: IF	
	EXT	LKUPTRG EXT		2: EXT	
	EXT Trigger Slope				
	+	LKUPTRGSLP RISE	LKUPTRGSLP?	0: -	
	-	LKUPTRGSLP FALL		1: +	
	EXT Trigger Delay				
	Time setting	LKUPTRGDLY *	LKUPTRGDLY?	Time	
	Slot setting	LKUPTRGSLT *	LKUPTRGSLT?	0 to 5	
	IF Trigger Level	LKUPTRGLVL *	LKUPTRGLVL?	Integer(0 to 100)	
	Average Times	LKUPAVG *	LKUPAVG?	Integer(1:OFF, 2 to 32)	
	X Span	LKUPXSP *	LKUPXSP?	Time	
	X Start	LKUPXST *	LKUPXST?	Time	
	Y Scale				
	2kHz/div	LKUPYSCL P2K	LKUPYSCL?	0:2kHz/div	
	10kHz/div	LKUPYSCL P10K		1:10kHz/div	
	20kHz/div	LKUPYSCL P20K		2:20kHz/div	
	100kHz/div	LKUPYSCL P100K		3:100kHz/div	
	200kHz/div	LKUPYSCL P200K		4:200kHz/div	
	Freq Range				
	100kHz	LKUPFRNG 100K	LKUPFRNG?	0: 100kHz	
	1MHz	LKUPFRNG 1M		1: 1MHz	
	Analyze Length	LKUPALEN *	LKUPALEN?	Time	
	Limit	LKUPLMT *	LKUPLMT?	Frequency	
	Starts measurement Lockup Time Starts measurement in the same mode	 LKUPTM SI			
	Measurement results Lockup Time		 LKUPTM?	 Lockup Time(s)	

Table 4-12 TRANSIENT Key (27 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Graphics selection	Frequency vs Bit	FMGTYP BIT	FMGTYP?	0: Frequency vs Bit	
	Frequency EYE	FMGTYP EYE		1: Frequency EYE	
	Demodulated Data	FMGTYP DEMOD		2: Demodulated Data	
	Spectrum due to Mod	FMGTYP SPECTRUM		3: Spectrum due to Mod	
	Frequency Drift	FMGTYP FREQDRIFT		4: Frequency Drift	
	Mag vs Frequency	FMGTYP MAGFREQ		5: Mag vs Frequency	
	Start Bit setting	STTBIT *	STTBIT?	Integer	
	Freq Error				
	Freq Error ON	FMGFRERR ON	FMGFRERR?	0: OFF	
	Freq Error OFF	FMGFRERR OFF		1: ON	
Data output Demodulated Data	Demodulated data output		DEMOD?	n<CR+LF>+d1$<CR+LF>+.... +dn$<CR+LF> n: Number of character string elements dn$: Character string elements(1data: 8bit)	
Data output Frequency vs Bit Frequency EYE	X-axis data (Bit number)		GPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Integer)	
	Y-axis data (Frequency)		GPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
Spectrum due to Mod	X-axis data (Frequency)		SGPHX?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
	Y-axis data (Level)		SGPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	

Table 4-12 TRANSIENT Key (28 of 28)

Function		Listener Code	Talker Request		Remarks
			Code	Output Format	
Frequency Drift	Upper screen X-axis data (Bit number)		FGPHX1?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Integer)	
	Upper screen Y-axis data (Frequency)		FGPHY1?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
	Lower screen X-axis data (Bit number)		FGPHX2?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Integer)	
	Lower screen Y-axis data (Frequency)		FGPHY2?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
Mag vs Frequency	Upper screen X-axis data (Bit number)		MGPHX1?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Integer)	
	Upper screen Y-axis data (Level)		MGPHY1?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
	Lower screen X-axis data (Bit number)		MGPHX2?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Integer)	
	Lower screen Y-axis data (Frequency)		MGPHY2?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
Lockup Time	X-axis data (Time)		LGPHX?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	
	Y-axis data (Frequency)		LGPHY?	n<CR+LF>+d1<CR+LF>+ .....+dn<CR+LF> n: Number of output values dn: Output value (Real number)	

5 TECHNICAL INFORMATION

5.1 Template Edit Function

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

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

5.1.1 Template Setting in the T-Domain Measuring Mode

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

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

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

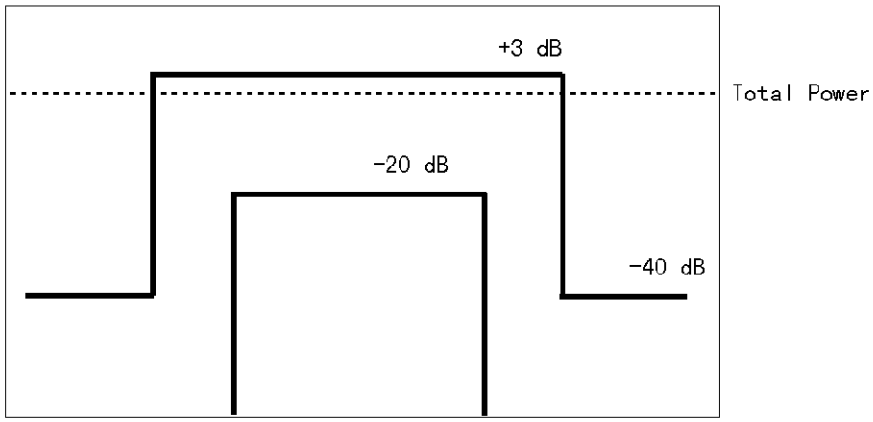


Figure 5-1 Template to Be Set

For example, the 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.

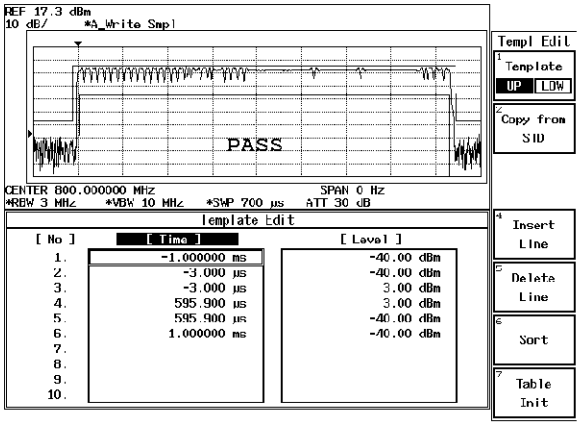


Figure 5-2 Template Settings

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

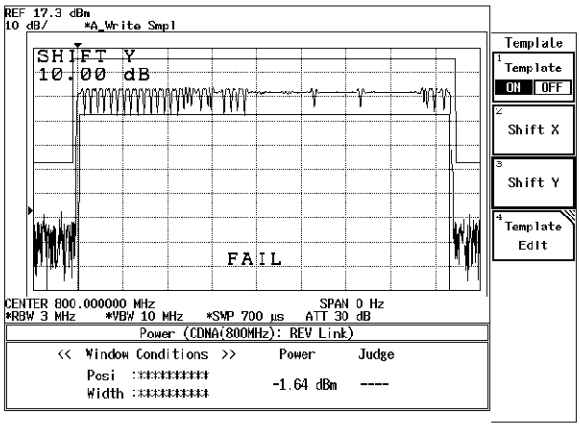


Figure 5-3 Template Shifted Using the Shift Y Function

5.1.2 Template Setting in the F-Domain Measuring Mode

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

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

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

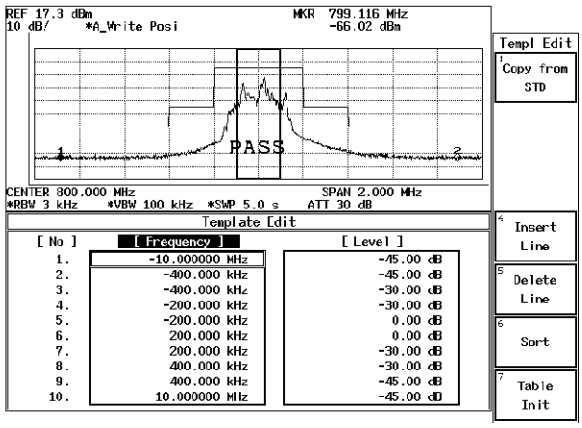


Figure 5-4 Template with the Set Values

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

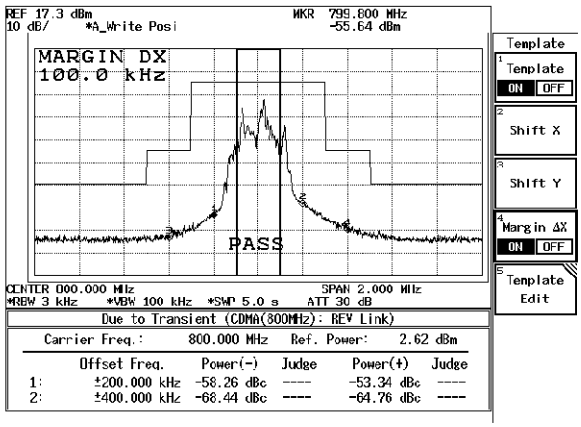


Figure 5-5 Template with Margin Delta X

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

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

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

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

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

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

5.2.1 Marker Edit Function

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

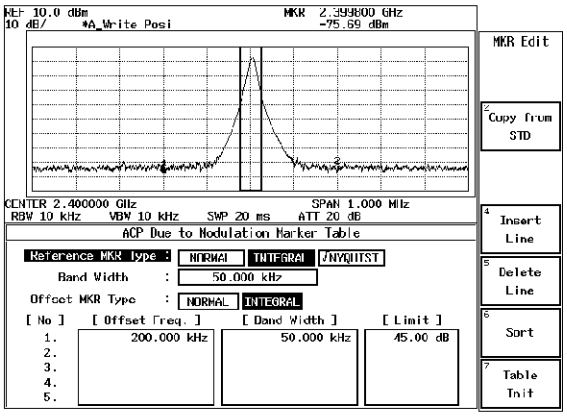


Figure 5-6 Example of Marker Edit Setting

(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.

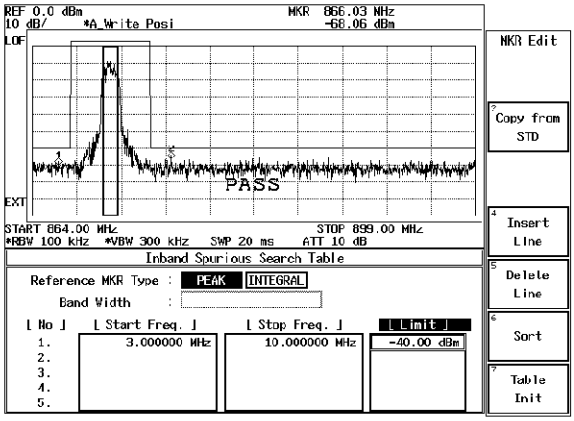


Figure 5-7 Marker Edit Setting

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

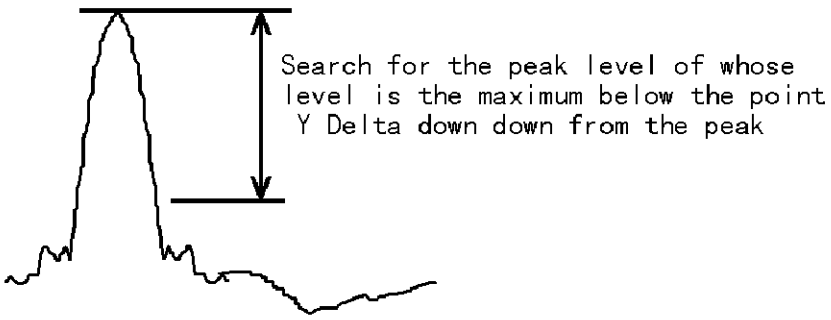


Figure 5-8 Example of Peak Marker Y Delta

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

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

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

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

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

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

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.

5.2.3 Measurement Result of Inband Spurious

In Spurious measurements, there are two methods:

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

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

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

To display the measured value in (1), select MARKER on the Result: MARKER/RELATIVE/ABS 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).

5.3 About WIDE and NARROW filter modes

The Bluetooth standard does not specify the filter used for modulation analysis.

The R3267 and R3273 filter characteristics are as follows:

WIDE: The low-pass filter whose passband is about twice wider than the bit rate capacity is used.

NARROW: The low-pass filter whose passband is close to the bit rate capacity is used.

5.4 About LAP

The Bluetooth transceiver has a 48-bit address. The first 24 bits beginning with the LSB are called the LAP (lower address part), which is appended to the 38th bit of the Bluetooth burst.

The R3267 and R3273 can synchronize the LAP and measure it.

In the STD setup, the LAP MSB enters first and the LAP LSB outputs first.

5.5 About Hopping Catch

To measure signal in a hopping state, sampled data is first stored for 93.7 msec maximum in the memory, and analysis starts using the signal containing the desired frequency because spectrum analyzer's center frequency cannot be hopped.

Differences between Burst Search and Hopping Catch are as follows:

(1) Burst Search searches for a burst from the non-hopping frequency, whereas Hopping Catch searches for a burst and checks the frequency using the FFT.

(2) Burst Search acquires data, whose length is specified by Search Len, and searches for a burst from the data acquired, whereas Hopping Catch acquires data up to ten times, whose length is specified by Search Len, and searches for a burst from the data acquired.

5.6 About Frequency Error Measurement

When the Bit Sequence is set to RANDOM and the Freq Error Method is set to PEAK DEV, the frequency error (ferror) can be obtained from the following expression (that uses the maximum (fmax) and the minimum (fmin) values of frequency deviation).

Ferror = (fmax + fmin) / 2

When Freq Error Method is set to PREAMBLE, the frequency error can be obtained by averaging the preamble frequency deviation amounts.

5.7 About Max and Min Frequency Deviations Measurement (When Bit Sequence is set to RANDOM)

Max Deviation indicates the maximum value of the calculated frequency deviations.

Min Deviation indicates the maximum value of the bit points included in the calculated frequency deviations.

5.8 Measurement Algorithm (When Bit Sequence is set to STD (FAST))

When Bit Sequence is set to STD, the characteristics shown below are calculated as follows, assuming that a repeating pattern of 01 or 00001111 is loaded in the payload.

Payload data 0000111100001111.....
Drift data Drift[0] Drift[1] Drift[2].....

The frequency error can be obtained by averaging the preamble frequency deviation amounts.

The frequency error due to drift is the frequency deviation average value for each of the eight-bit group during payload. This data train is referred to as Drift[ ].
Frequency deviation is corrected by Drift[ ].

The maximum value of frequency deviation data, whose Drift [ ]has been corrected, is searched for each of the eight-bit group.
The average peak deviation is defined as the average of the maximum values of frequency deviation for each of the eight-bit group.
The maximum peak deviation is defined as the maximum value among the maximum values of frequency deviation for each of the eight-bit group.

Frequency drift is expressed as the maximum of (Drift[1] - Ferror), and Max Drift Rate is expressed as the maximum of (Drift[I] - Drift[I + 1]). Where Ferror is the frequency error.

5.9 Frequency Draft Graph

The FM Deviation measurement function displays a frequency drift graph after frequency deviation data has passed through a low-pass filter of approximately 50 kHz.
Frequency drifts can be checked when the payload has a repeating data of 01 or 000011111.

5.10 About Lockup Time measurement

The R3267 and R3273 display the time period during which the input signal frequency deviation settles to the Limit value.

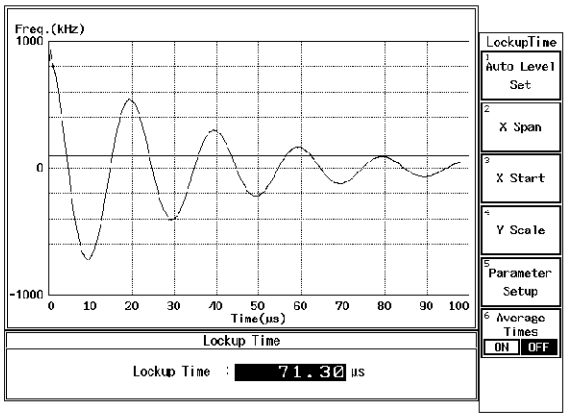


Figure 5-9 PLL Lockup Time Measurement Example

The input signal level can be used as a trigger. However, to measure the time with high accuracy, the input signal must be synchronized with an external trigger.

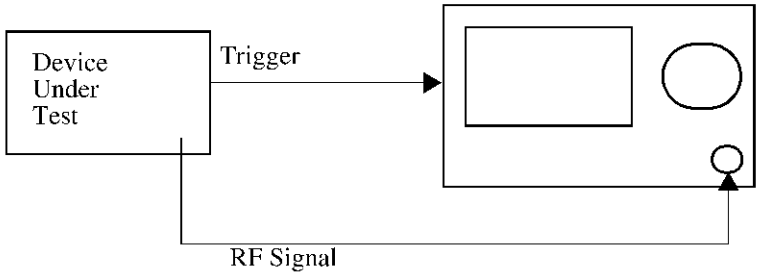


Figure 5-10 Cable Connections for PLL Lockup Time Measurement

5.11 Block Diagram

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

The Figure 5-11 shows the modulation analysis part. Therefore the spectrum analyzer part is simplified. The area inside the double lines is the block diagram for the spectrum analyzer, and the part outside that area represents the modulation analysis hardware.

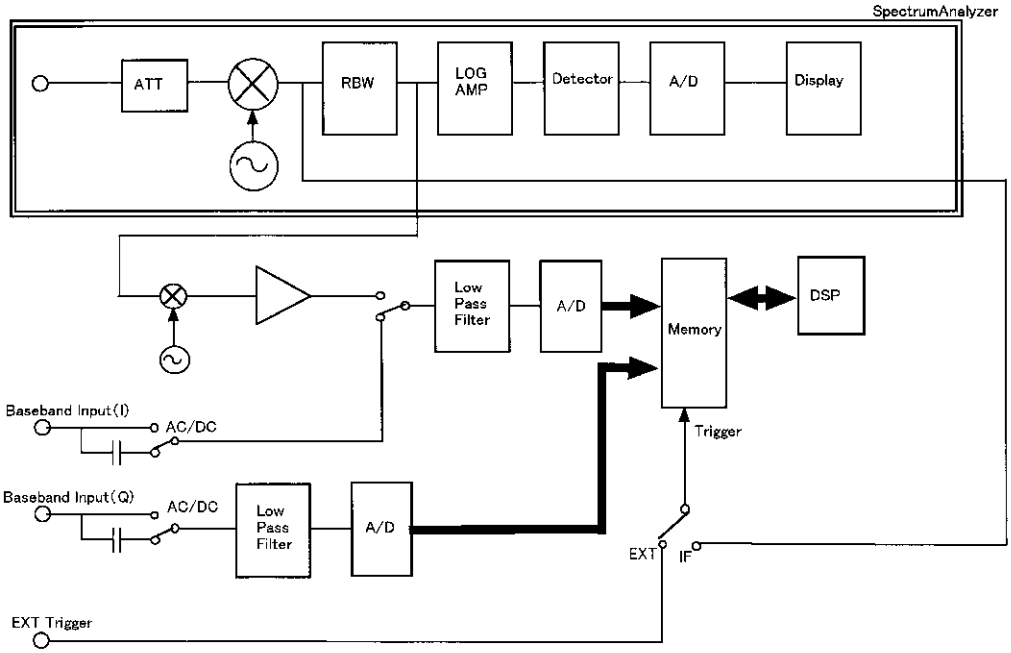


Figure 5-11 Block Diagram

6 PERFORMANCE VERIFICATION TEST

6.1 General

6.1.1 Introduction

This chapter provides R3267 Series OPT66, Bluetooth measurement option 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	FM Deviation Measurement for Bluetooth

6.1.2 Test Equipment

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

NOTE:

1. ***The R3267 Series with OPT66 to be tested should be warm up for at least 30 minutes before starting test and perform auto calibration function.***
2. ***Make sure that the test equipment used meets its own published specifications.***
3. ***Any equipment that meets the critical specifications given in the table can be substituted for recommended models.***

Table 6-2 Equipment List

No.	Description	Critical Specification	Recommended Model	Manufacturer
1	RF Cable	BNC (m)-BNC (m)	MI-09	Advantest
2	Adapter	Type N (m)- BNC (f)	JUG-201A-U	Advantest

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 sheet is provided at the end of this chapter.
The test record lists test specification and acceptable limits.
Recommend that make a copy of this table, record the complete test results on the copy, and keep the copy for calibration test record.
This record could prove invaluable in tracking gradual changes in test result over long periods of the time.

6.1.5 Performance Verification Procedures

Typeface conventions used in this manual.

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

  Panel keys: Boldface type 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 ***RBWAUTO/MNL***(MNL) is used.

6.2 Performance Verification Test Procedure

This section provides performance verification test procedure for R3267 Series OPT 66.
Built-in calibration signal is used for performance verification.

6.2.1 FM Deviation Measurement for Bluetooth

(1) Description

Test a frequency error, maximum peak and minimum peak for both wide and narrow of filter setting by using built-in calibration signal.

(2) Specification

Frequency Deviation Measurement Accuracy

Filter Mode : WIDE
< 6.0 kHz

Filter Mode : NARROW
< 10 kHz

Frequency Error Measurement Accuracy

Filter Mode : WIDE
< ± (Frequency Reference Accuracy + 6.0 kHz)

Filter Mode : NARROW
< ± (Frequency Reference Accuracy + 10 kHz)

(3) Equipment used

RF Cable : BNC (m)-BNC (m)

Adapter : Type N (m)-BNC (f)

(4) Setup

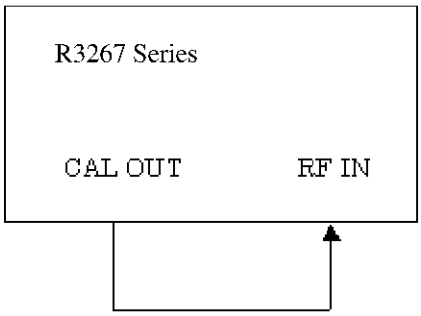


Figure 6-1 Setup of FM Deviation Test

(5) Procedure

[Filter Mode: WIDE]

1. Connect equipment as shown in Figure 6-1.

2. On the R3267 Series, after preset, set control as follow:

   Center Frequency : 30.15 MHz

3. On the R3267 Series, set the STD parameter as shown Figure 6-2.

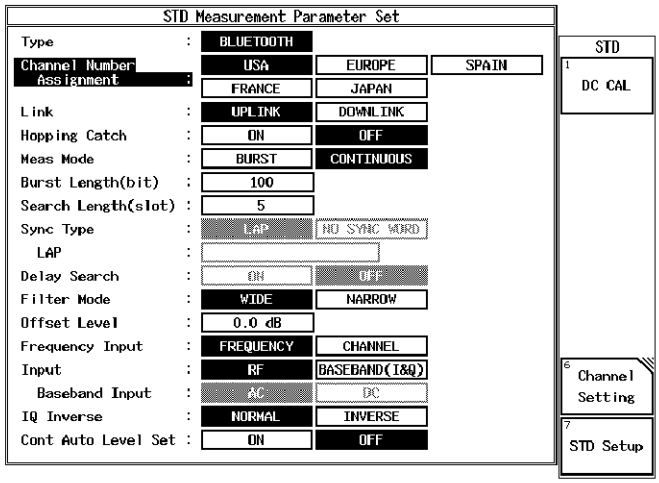


Figure 6-2 Setup of STD parameters

4. On the R3267 Series, press ***DC CAL*** to perform DC calibration.

5. On the R3267 Series, after DC calibration has completed, press ***FM-Deviation*** to set FM deviation measurement mode.

6. On the R3267 Series, press ***Parameter Setup*** to enter parameter setup display.

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

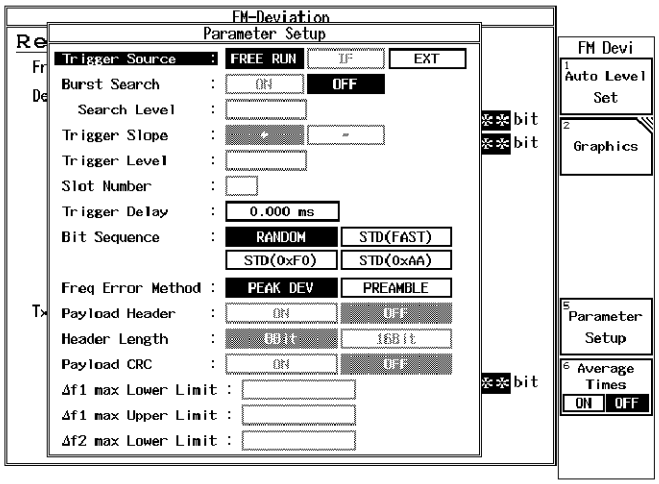


Figure 6-3 Setting of Measurement parameters

8. On the R3267 Series, press ***Auto Level Set***.

9. On the R3267 Series, press **SINGLE** for a single sweep.

10. After single sweep has completed, record the Frequency Error, Max. Peak and Min. Peak on the performance verification record sheet.

[Filter Mode: NARROW]

11. On the R3267 Series, press **STD** to return to STD Setup display as shown in Figure 6-2.

12. On the R3267 Series, set the ***Filter Mode*** to ***NARROW***.

13. On the R3267 Series, press ***FM Deviation*** to set FM deviation measurement mode.

14. Repeat steps 9 through 10.

6.3 Performance Verification Record Sheet

Model: OPT3264/67/73+66

S/N :

FM Deviation Measurement

1. Filter Mode: WIDE

Test Items	Specification			Result
	Min. [kHz]	Measured Value [kHz]	Max. [kHz]	Pass/Fail
Frequency Error	-156.0		-144.0	
Max. Peak	0.0		+6.0	
Min. Peak	0.0		+6.0	

2. Filter Mode: NARROW

Test Items	Specification			Result
	Min. [kHz]	Measured Value [kHz]	Max. [kHz]	Pass/Fail
Frequency Error	-160		-140	
Max. Peak	0.0		+10.0	
Min. Peak	0.0		+10.0	

7 SPECIFICATIONS

Characteristics	Specifications
Measurement frequency range	30 MHz to 3.0 GHz
Input level range	-10 dBm to +30 dBm
Frequency deviation accuracy	When Filter Mode is set to WIDE < +6.0kHz
	When Filter Mode is set to NARROW < +10kHz
Frequency error accuracy	When Filter Mode is set to WIDE < ± (Reference frequency accuracy + 6.0kHz)
	When Filter Mode is set to NARROW < ± (Reference frequency accuracy + 10kHz)

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.
740	Cannot measure baseband signal. This function is available to RF input only.	

Code	Messages	Description
741	Burst length is too short to measure with STD sequence. Fill the payload with the data.	
795	System Error. Memory test failed. (#0)	Contact a sales representative.
796	System Error. Memory test failed. (#1)	Contact a sales representative.
797	System Error. Memory test failed. (#2)	Contact a sales representative.
798	System Error. Memory test failed. (#3)	Contact a sales representative.

ALPHABETICAL INDEX

[M]

[O]

[P]

[Q]

[R]

[S]

[U]

[W]

[X]

[Y]

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