MICRONIX

3.3GHz/8.5GHz Spectrum Analyzer

MSA338(E/TG)/MSA358

Operating manual

Ver.2.0/Jun./2015

MICRONIX CORPORATION

OM-040058E

Before Starting to Use the Unit

· When you use the unit, please observe the following notes listed on the rear of the body.

· For you to use it safely

1) When abnormal sounds, abnormal smell and smoke were confirmed, remove the battery and AC adapter and stop the use.

2) Never use with hands that got wet, because doing so may cause damage, fire and electric shock to the unit.

3) Never use it under the thunder. There is a possibility of receiving a thunderbolt.

4) Never use an AC adapter other than the one specified, because doing so may cause damage to the unit. For static electricity protection, ground the unit by connecting the three cores if possible. Not grounding the unit can damage it and the object measured.

5) Never use a battery other than the one specified, because doing so may cause damage to the unit. When removing or installing the battery, be sure to do it after you turn off the unit and disconnect the AC adapter.

6) When replacing the fuse, disconnect the AC adapter, open the battery cover on the back and remove battery, and then take sufficient care to perform the replacement. Use 5A/250V fuse (IEC127-2 sheet 3, slow-blow type).
Never use a fuse not specified because doing so may cause damage to the unit.

· Guarantee of quality

Guarantee period

Guarantees that it will repair any failure free of charge if it occurs because of our responsibility within one year after delivery. However, the above guarantee does not apply to such a failure that:

1) is caused by a fire, natural disasters, etc.
2) is caused by inappropriate handling of the unit, such as dropping it while moving it after purchasing.
3) is caused by handling counter to the instructions or precautions listed in the operating manual.
4) is caused by modifying the unit or by being considered to be your responsibility because of inappropriate use.

We will not be responsible for direct or indirect damage caused by use of this product or by a failure of this product.

Warm-up time

In order to stabilize the electric performance at the time of turning on the unit, please perform warming-up for at least 10 minutes.

The LCD may flicker on conditions of the low temperature and the dark backlight.

In that case, adjust the LCD backlight control BLCTR to be bright.

However, do not be bright too much in order to keep battery operation time longer.

Precautions for storage

1) Strictly observe the storage conditions specified for this unit, such as avoiding direct sunlight and dust.
2) Store this unit in a place where -20°C to 60°C, less than 60°C/70%RH, variations in temperature and humidity are small.

After service

If you have any question about the contents of this product or how to operate it, please contact us at:

MICRONIX CORPORATION

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Contents

1. Outlines

1.1 Product outlines MSA338(E/TG)/MSA358

MSA338(E/TG)/MSA358 is an authentic spectrum analyzer providing performance and functions that are comparable to those of large-size bench type equipment, in a compact, lightweight and inexpensive model.

1) Compact and lightweight, 1.8 kg(MSA338(E/TG)/MSA358)

The external dimensions are as small as 162 (W) × 70 (H) × 260 (D) (mm), and the weight is only 1.8 kg including the battery. It is very convenient for outdoors use and while on business trips.

2)Measuring frequency bandwidth 50kHz to 3.3GHz(MSA338)/50kHz to 8.5GHz(MSA358)

This bandwidth covers those of W-CDMA, CDMA, PDC, PHS, GSM, wireless LAN, Bluetooth, etc.

3) Operation with battery for 150 minutes

When battery MB300 (optional) is fully charged, MSA338(E/TG)/MSA358 works for about 150 minutes (with the back light turned off). It is extremely convenient for outdoor use and for use in the survey of wireless LAN installation environment.

4) Performance that is comparable to that of large-size bench type equipment

MSA338(E/TG)/MSA358 guarantees a highly stable frequency axis by PLL synthesizer system. The center frequency setup resolution is 100kHz. Furthermore, the mean noise level is -110dBm or less. Thus, a broad dynamic range is secured and the reference level can be set in 1 dB steps.

5) Abundant functions

- Measuring functions··· Channel power measurement, Adjacent channel leakage power measurement, Occupied frequency bandwidth measurement, Electric field strength measurement, Magnetic field strength measurement (optional), Frequency counter (factory option).
- Electric field strength measurement: Optimum for measurement of cellular phone and wireless LAN working environment.
- Magnetic field strength measurement: Optimum for EMI design of printed circuit boards and for evaluation of signal quality.
- Calculation functions··· MAX HOLD, MIN HOLD, AVERAGE, OVER WRITE
- Marker & peak search
- Save/load

6) Auto tuning

The center frequency is set at the spectrum of the maximum level in the 3.3GHz(MSA338(E/TG)) /8.5GHz(MSA358) band, and in addition, optimum reference level, resolution bandwidth, video bandwidth and sweep time are set when the AUTO TUNE key is pressed. This function is very convenient for measurement of an unknown signal.

7) Auto range motion

The resolution bandwidth, video bandwidth and sweep time are set automatically based on the set frequency span. It is also possible to set auto range motion only one out of resolution bandwidth, video bandwidth and sweep time.

8) Hard copy of the image

Connect a printer (optional) and press the [PRINT] key on MSA338(E/TG)/MSA358. The image on the screen is printed as it is.

9) High resolution display on the PC screen

The trace is displayed at high resolution, 1001 points in the horizontal axis, on the PC screen when "PC Software MAS300" (optional) is used.

1.2 Standard accessories

1. AC adaptor MA300
2. Soft carrying case
3. Accessory pouch
4. Fuse (It has been installed in the inside)
5. Operating manual

1.3 Optional accessories

1. Antenna M301, M302, M303, M304, M305, M306, M307
   (Refer to "19.4 Electric field strength measurement" for details.)
2. Magnetic field probe CP-2S with a dedicated double shielded coaxial cable
   (Refer to "19.5 Magnetic field strength measurement" for details.)
3. Ni-MH battery MB300 (Refer to "6.4 Installing the battery" for details.)
4. PC software MAS300 (Refer to "26. PC Software" for details.)
5. Operating software for EMI test MAS230 (Refer to the operating manual of MAS230)
6. RS-232C cable MI180 (Refer to "25. RS-232C Interface" for details.)
7. Frequency counter (factory option) (Refer to "19.6 Frequency counter" for details.)
8. RS-232C/GP-IB converter ZS-61447
9. Battery charger MBC300
10. Printer with AC adaptor. 4pcs of AA batteries, a roll paper (Refer to "23. Printing" for details.)
11. Roll paper for optional printer (with 10 rolls)
12. SMA coaxial cables

Model	Connector	Cable length	Frequency range
MC301	SMA(P)/SMA(P)	0.5m	DC to 10GHz
MC302	SMA(P)/SMA(P)	1.0m	DC to 10GHz
MC303	SMA(P)/SMA(P)	1.5m	DC to 10GHz
MC304	SMA(P)/N(J)	0.2m	DC to 4GHz
MC305	SMA(P)/N(P)	0.2m	DC to 4GHz
MC306	SMA(P)/BNC(J)	0.2m	DC to 2GHz
MC307	SMA(P)/BNC(P)	0.2m	DC to 2GHz

* All impedance is 50Ω.

* Performances change by bending and deteriorate by repeating the insertion and extraction

13. Coaxial adapters

Model	Connector	Impedance	Frequency range
MA301	BNC(P)/BNC(J)	50Ω/75Ω	DC to 2GHz
MA302	BNC(P)/N(J)	75Ω/75Ω	DC to 1.8GHz
MA303	BNC(P)/N(P)	75Ω/75Ω	DC to 1.8GHz
MA304	BNC(P)/F(J)	75Ω/75Ω	DC to 1.8GHz
MA305	BNC(P)/F(P)	75Ω/75Ω	DC to 1.8GHz

2.Specifications

2.1 Performances

·Frequency section

<table>
<tr><td colspan="2"></td><td>MSA338(E/TG)</td><td colspan="3">MSA358</td></tr>
<tr><td colspan="2">Frequency range</td><td>50kHz to 3.3GHz</td><td colspan="3">50kHz to 8.5GHz</td></tr>
<tr><td colspan="2" rowspan="4"></td><td rowspan="4">——</td><td>Frequency range</td><td>Frequency band</td><td>Harmonic order</td></tr>
<tr><td>50k～3.5GHz</td><td>Base band</td><td>1</td></tr>
<tr><td>3.3G～6.3GHz</td><td>Band 1-</td><td>1</td></tr>
<tr><td>6.1G～8.5GHz</td><td>Band 1+</td><td>1</td></tr>
<tr><td colspan="2">Center frequency</td><td colspan="4"></td></tr>
<tr><td rowspan="3"></td><td>Setting resolution</td><td colspan="4">100kHz
Allows Rotary encoder, numeric key and function key</td></tr>
<tr><td>Accuracy</td><td>within ±(30+20T)kHz±1dot
@frequency span: 200kHz to 10MHz, RBW: 3kHz, 23±5°C
within ±(60+300T)kHz±1dot
@frequency span: 20MHz to 3.3GHz, RBW: 100kHz, 23±5°C
T: Sweep time(s)</td><td colspan="3">within ±(30+20T)kHz±1dot
@frequency span: 200kHz to 10MHz, RBW: 3kHz, 23±5°C
within ±(60+300T)kHz±1dot
@frequency span: 20MHz to 8.5GHz, RBW: 100kHz, 23±5°C
T: Sweep time(s)</td></tr>
<tr><td>RBW frequency error</td><td colspan="4">within ±4kHz @ RBW: 3kHz,10kHz, 30kHz
within ±20% of RBW @ RBW: 100kHz, 300kHz
within ±10% of RBW @ RBW: 1MHz, 3MHz</td></tr>
<tr><td colspan="2">Frequency span</td><td></td><td colspan="3"></td></tr>
<tr><td rowspan="2"></td><td>Setting range</td><td>0Hz(zero span),
200kHz to 2GHz(1-2-5step) and
3.3GHz(full span)</td><td colspan="3">0Hz(zero span), 200kHz to 5GHz
(1-2-5step) and 8.5GHz(full span)</td></tr>
<tr><td>Accuracy</td><td colspan="4">within ±3%±1dot
@ one step slower sweep time than AUTO, 23±5°C</td></tr>
<tr><td colspan="2">Display resolution</td><td colspan="4">Frequency span/250
Frequency span/1000 (only the measurement by RS-232C</td></tr>
<tr><td colspan="2">Display dot number</td><td colspan="4">251dots, 1001dots (only the measurement by RS-232C communication)
(The unit displays data in 251 horizontal dots, but it internally captures the trace in 1001 dots)</td></tr>
<tr><td colspan="2">Resolution bandwidth</td><td colspan="4">3dB bandwidth (6dB for MSA338E @9kHz, 120kHz)</td></tr>
</table>

	Setting range	3kHz to 3MHz(1-3step) and AUTO (MSA338E: 3kHz, 9kHz, 30kHz, 120kHz, 300kHz, 1MHz, 3MHz)
	Accuracy	within ±20%
	Selectivity	1:12 (typical)@ 3dB : 60dB
Video bandwidth		100Hz to 1MHz (1-3step), AUTO
SSB phase noise		-90dBc/Hz (typical) @100kHz offset, RBW: 3kHz, VBW: 100Hz, Sweep time: 1s
Spurious response		less than -60dBc
Harmonics		less than -40dBc@100MHz to 3.3GHz / less than -40dBc@100MHz to 8.5GHz

· Amplitude section

		MSA338(E/TG)	**MSA358**
Reference level			
	Setting range	+10 to -60dBm (1dB step)	
	Accuracy	within ±0.8dB±1dot @center frequency: 100MHz, RBW: 3MHz, VBW: 1MHz, ATT: 0dB, 23±5°C	
	Unit	dBm, dBV, dBmV, dBμV, dBμV/m, dBμA/m (dBμV/m and dBμA/m is used in the measuring function)	
Average noise level		-117dBm (typical) @center freq: 1GHz, RBW: 3kHz, VBW: 100Hz	
Frequency Characteristic		Within ±2.0dB±1dot@50kHz to100MHz Within ±1.0dB±1dot@100MHz to 3.3GHz	Within ±2.0dB±1dot@50kHz to 100MHz Within ±1.0dB±1dot@100MHz to 8.5GHz
Input impedance		50Ω	
Input VSWR		less than 2.0	
Input attenuator			
	Operating range	0 to 25dB (1dB step), coupled with reference level	
	Switching error	within ±0.6dB@100MHz	
RBW switching error		within ±0.6dB	
Display dot number		201dots	
Display scale	**Scale**	10dB/div, 2dB/div	
	Accuracy	within ±0.8dB/10dB±1dot within ±0.2dB/2dB±1dot within ±1.6dB/70dB±1dot	
Input damage level		+27dBm(CW average power), 25VDC	

· Sweep section

		MSA338(E/TG)	**MSA358**
Sweep time			
	Setting range	10ms to 30s and AUTO(1-3step) @frequency span: 0 to 2GHz	10ms to 30s and AUTO (1-3step) @frequency span: 0 to 2GHz

		30ms to 30s and AUTO (1-3step) @frequency span: full span	30ms to 30s and AUTO (1-3step) @frequency span: 5GHz, full span
	Accuracy	within ±0.1%±1dot@ frequency span: 0 to 2GHz within ±1.5%±1dot@ frequency span: full span	within ±0.1%±1dot@frequency span: 0 to 5GHz within ±2.5%±1dot@frequency span: full span
Trigger mode		AUTO(frequency span: zero span)	
Detection mode		Positive peak, Negative peak, Sample MSA338E only: Quasi peak, Average	

· Functions

		MSA338(E/TG)	**MSA358**
Marker		NORM: displays frequency (7digits max) and level (4digits max) at marker point. DELTA: displays differential frequency and level between 2 markers.	
Peak search		NORM: searches a peak point within 10div. Available NEXT peak (10max). ZONE: searches a peak point within a zone designated by center and width. Marker moves to a peak point each sweep.	
Calculation		NORM, MAX HOLD, MIN HOLD, AVERAGE, OVER WRITE MAX/MIN HOLD: 2 to 1024 times, AVERAGE: 2 to 256	
Measuring		Channel power, Adjacent channel leakage power, Occupied frequency bandwidth, Electric field strength (needs antenna), Magnetic field strength (needs optional magnetic field probe) measurement, Frequency counter.	
AUTO tuning		When pushing AUTO TUNE key, the maximum level spectrum within 3.3GHz bandwidth is adjusted to center, and reference level, RBW, VBW and sweep time are adjusted to optimum values.	When pushing AUTO TUNE key, the maximum level spectrum within 8.5GHz bandwidth is adjusted to center, and reference level, RBW, VBW and sweep time are adjusted to optimum values.
Save/ Load	**Save**	Saves 100 traces and 100 setups	
	Load	Loads 1 trace and 1 setup	

· General

	MSA338(E/TG)/358 common
Immunity of radiated interference **Level display at 10V/m**	Less than -35dBc (reference level: 10dBm)
Immunity to cabled interference **Level display at transient interference of 4.0kV**	Less than -30dBc (reference level: 10dBm)
Input connector	SMA(J)

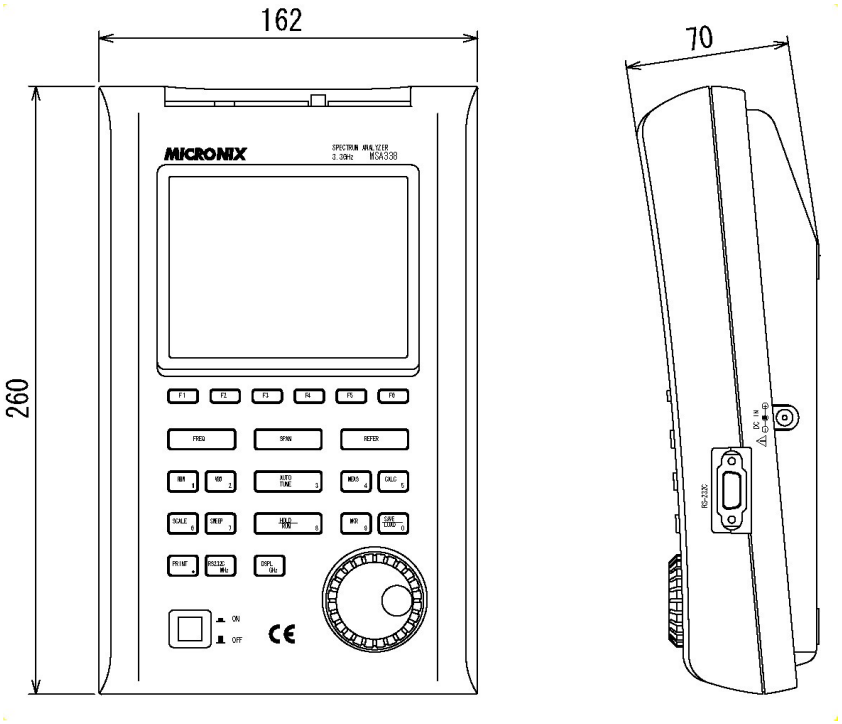
Communication		
	Interface	RS-232C
	Baud rate	2,400 to 38,400bps
Hard copy		Allows direct hard copy with an optional printer.
Display	**Display**	LCD
	Backlight	CFL backlight
	Resolution	320 (H) × 240 (V) dots
Power source		
	Battery	Ni-MH battery (optional)
	External DC source	DC jack, +4.75 to +5.25VDC/4A

· Other

	MSA338(E/TG)/358 common
Operating temperature	0 to 50°C (Guaranteed at 23±10°C, without soft carrying case)
Operating humidity	less than 40°C/80%RH (Guaranteed at less than 33°C /70%RH, without soft carrying case)
Storage temperature	-20 to 60°C, less than 60°C/70%RH
Dimensions	162 (W) × 70 (H) × 260 (D) mm (exclude projections and stand)
Weight	approx. 1.8kg (include battery), approx. 1.5kg (without battery)

*Refer to ”22.Tracking Generator Mode” for T.G. Specification

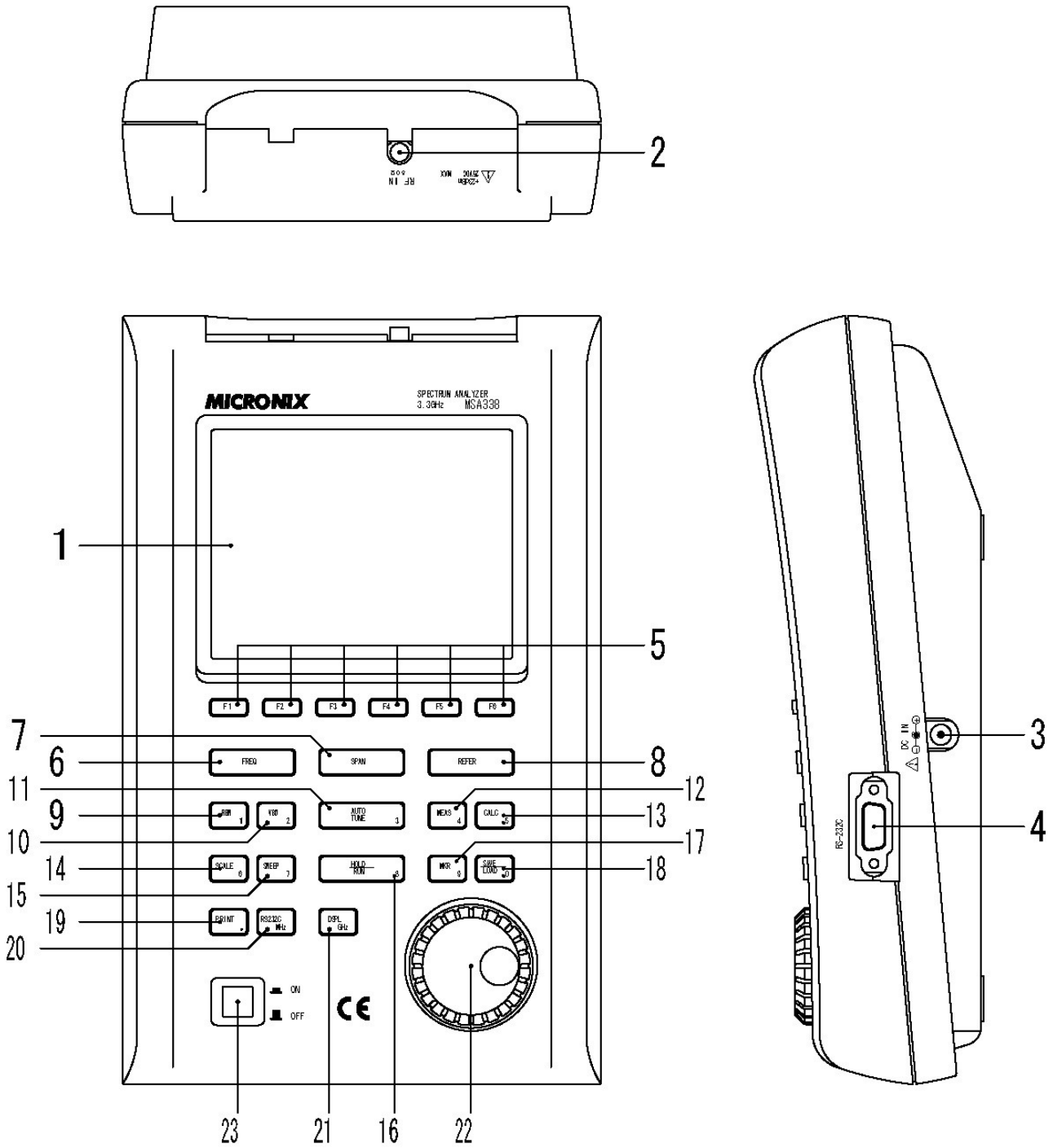
2.3 Outline



[Unit: mm]

* MICRONIX Corporation reserves the right to make changes in design, specification and other information without prior notice.

3. Description of Panel



1) LCD screen

This is a large liquid crystal display with 240 (V) × 320 (H) dots. It simultaneously displays traces (8 div × 10 div), various setting values, measured values, etc.

2) Input connector

SMA (J) connector.

3) Input connector for DC power source

Connects AC adaptor MA300.

4) RS-232C connector

Connects PC and printer, by using RS-232C cable MI180.

5) Function keys (F1 to F6)

Functions change according to operation. Have functions corresponding to the on-screen displays.

6) Center frequency key

MSA338(E/TG): Use this key to set the center frequency. It can set between 0 to 3.3GHz (100kHz step).
MSA358: Use this key to set the center frequency. It can set between 0 to 8.5GHz (100kHz step).

7) Frequency span key

MSA338(E/TG): Use this key to set the frequency span. It can set between 200kHz to 2GHz, ZERO SPAN and FULL SPAN (3.3GHz).
MSA358: Use this key to set the frequency span. It can set between 200kHz to 5GHz, ZERO SPAN and FULL SPAN (8.5GHz).

8) Reference level key

Set the reference level, etc. Reference level can set between +10dBm and -60dBm (1dB step).

9) Resolution bandwidth key

Use this key to set the resolution bandwidth. It can set between 3kHz and 3MHz.

10) Video bandwidth key

Use this key to set the video bandwidth. It can set between 100Hz and 1MHz.

11) AUTO tuning key

Tune up to the maximum level in 3.3GHz(MSA338(E/TG))/8.5GHz(MSA358) zones, and display by the optimal setup. This does not operate normally when the signal level is lower than -40dBm , or when the input frequency is below 50MHz, or when the frequency span is ZERO SPAN or FULL SPAN.

12) Measuring function key

Available for Channel power, Adjacent channel leakage power, Occupied frequency bandwidth, Electric field strength and Magnetic field strength measurement (optional), Frequency counter (factory option)

13) Calculation function key

Available for Max hold, Min hold, Average and Over write.

14) Display scale key

Use this key to select the display scale of amplitude axis from 2dB/div or 10dB/div.

15) Sweep key

Use this key to set the sweep time between 10ms to 30s or set the detection mode.

16) Hold/Run key

Stops or restarts the measurement.

17) Marker & Peak search key

Use this key to set and move a marker.

18) Save/Load key

Saves 100traces and 100setups, and loads 1trace and 1setup.

19) Print key

When pressing this key, the image is printed with a printer (optional) as it is.

20) RS-232C key

Sets baud rate and transfers a current or saved trace.

21) Display control key

Sets contrast, backlight ON/OFF, brightness of backlight, invert display and buzzer ON/OFF.

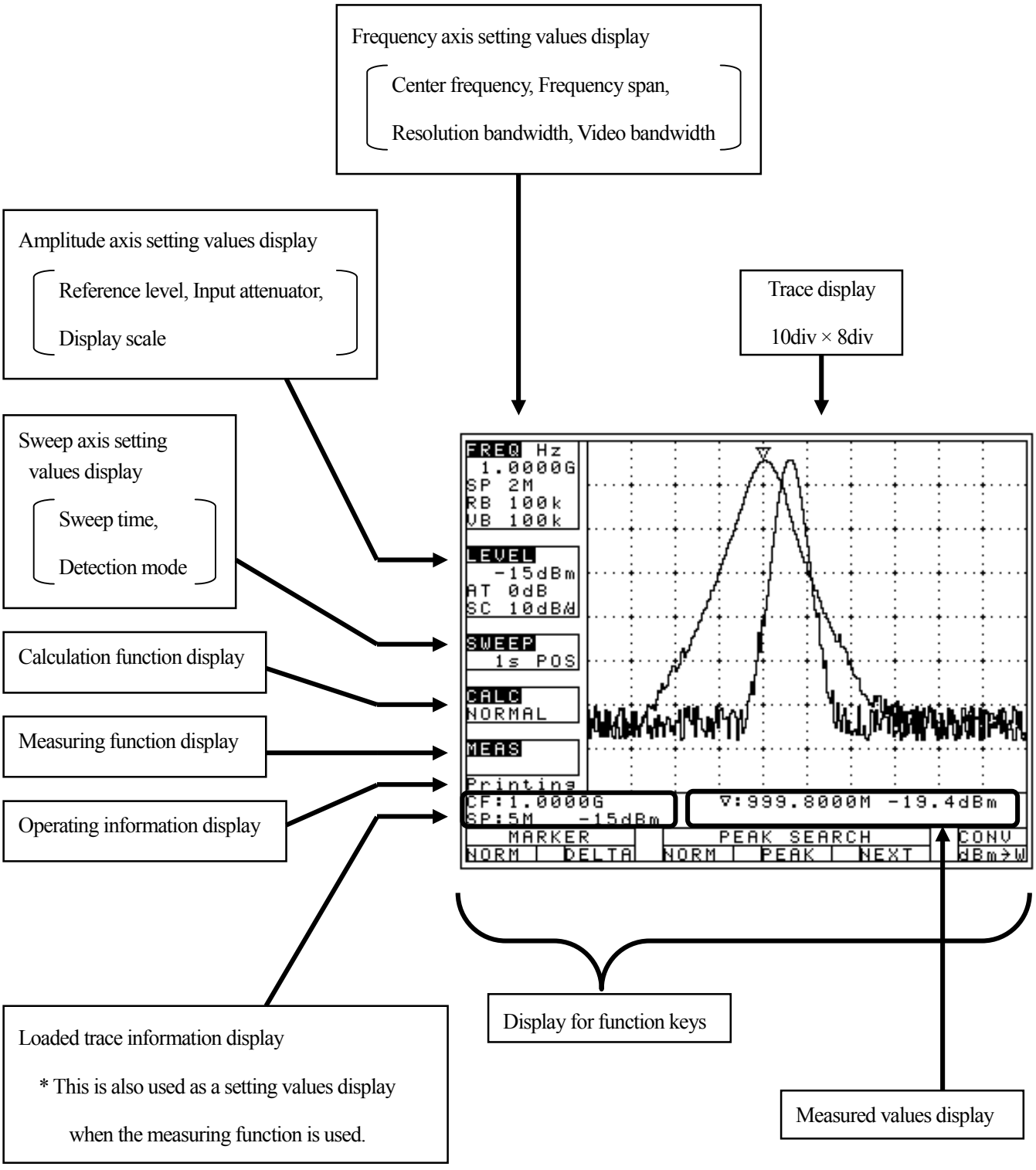
22) Rotary encoder

Use this to make various settings.

23) Power switch

Use this to turn the power ON or OFF.

4. Description of Screen



5. Function Key Menu

5.1 List of the Function key menus

The types of function keys are shown in the table below. For description of each function, see the detailed pages. For the flow of change in the function key display, refer to "5.2 Menu tree".

	Function key menus	Key flow	Detailed page
A)	Adj Ch OFS	MEAS→(F2)→F2	38
	Adj Ch Pw	MEAS→F2	38
	Adj Ch WIDTH	MEAS→(F2)→F3	38
	ANT	MEAS→(F4)→F1	41
	AVER	CALC→F4	28
B)	B. L.	DSPL→F2	52
	BACK SPACE	FREQ→F5→F6	20
	BAND CNTR	MEAS→(F1)→(F1)→F2	37
	BAND WIDTH	MEAS→(F1)→(F1)→F3	37
	BAUD	RS232C→F2	54
	BLCTR	DSPL→F3	52
	BUZZR	DSPL→F5	52
C)	CENTER FREQ →	FREQ→F1	19
	CENTER FREQ ←	FREQ→F2	19
	Ch Power	MEAS→F1	37
	CLEAR	FREQ→F5→F5	19
	CLEAR	SAVE／LOAD→F3	33
	CONV	MKR→F6	31
	CTRS	DSPL→F1	52
D)	DET	SWEEP→F4	27
	DISP CLEAR	SAVE／LOAD→F4	33
E)	E／F ANT	MEAS→F4	40
	EncST	FREQ→F4	19
	EXEC	RS232C→F3	56
	EMI-C ※1	SAVE/LOAD→F6→F2	49
	EMI-R ※1	SAVE/LOAD→F6→F3	49
F)	Freq COUNT	MEAS→F6	47
I)	IMP	REFER→F6	24
	INVT	DSPL→F4	52
K)	KeyST	FREQ→F3	19
L)	LOAD	SAVE／LOAD→F2	32
M)	M／F PROBE	MEAS→F5	45
	MAXHD	CALC→F2	28
	MEAS OFF	MEAS→(F1～5)→F6	36
	MINHD	CALC→F3	28
	MKR DELTA	MKR→F2	30
	MKR NORM	MKR→F1	30

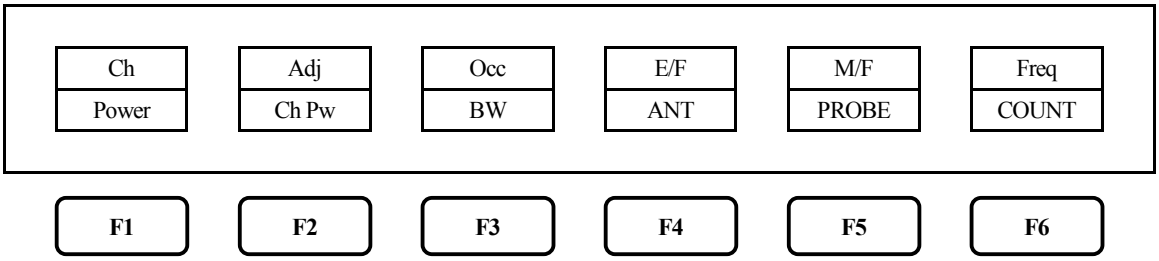
	Function key menus	Key flow	Detailed Page
M)	MODE	MEAS→(F1～3)→F1	37, 38 39
N)	NORM	CALC→F1	28
	NORM ※1	SAVE／LOAD→F6→F1	48
	NUM	FREQ→F5	19
O)	Occ BW	MEAS→F3	39
	OFSdB	REFER→F5	23
	OVRWR	CALC→F5	29
P)	PEAK SEARCH CNTR	MKR→(F3)→F4	31
	PEAK SEARCH NEXT	MKR→(F3)→F5	31
	PEAK SEARCH NORM	MKR→(F3)→F3	31
	PEAK SEARCH PEAK	MKR→(F3)→F4	31
	PEAK SEARCH WIDTH	MKR→(F3)→F5	31
	PEAK SEARCH ZONE	MKR→(F3)→F3	31
	PRE SET	SAVE／LOAD→F6	33
	PROBE	MEAS→(F5)→F1	45
R)	RATIO	MEAS→(F3)→F2	39
	RBW ALL	RBW→F3	25
	RBW AUTO	RBW→F2	25
	RBW MANU	RBW→F1	25
	REFERENCE CNTR	MEAS→(F2)→F4	38
	REFERENCE WIDTH	MEAS→(F2)→F5	38
S)	SAVE	SAVE／LOAD→F1	32
	SCALE 10dB	SCALE→F1	24
	SCALE 2dB	SCALE→F2	24
	SET MKR	FREQ→F6	20
	SPURI ※2	CALC→F6	29
	SWEEP ALL	SWEEP→F3	27
	SWEEP AUTO	SWEEP→F2	26
	SWEEP MANU	SWEEP→F1	26
T)	T. G. MODE	SWEEP→F6	53
	TRACE	RS232C→F1	56
U)	UNIT	REFER→F1～4	22
V)	VBW ALL	VBW→F3	26
	VBW AUTO	VBW→F2	26
	VBW MANU	VBW→F1	26

※1 MSA338E only ※2 MSA358 only ※3 MSA338TG only

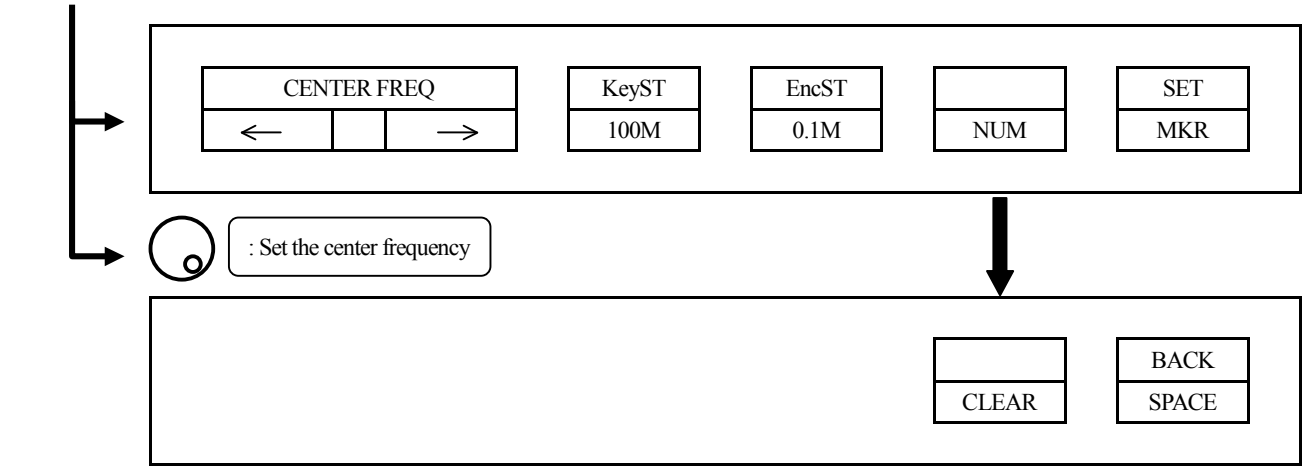
5.2 Menu tree

The displayed items on the bottom of the screen correspond to the function keys under them, as shown in the figure below:

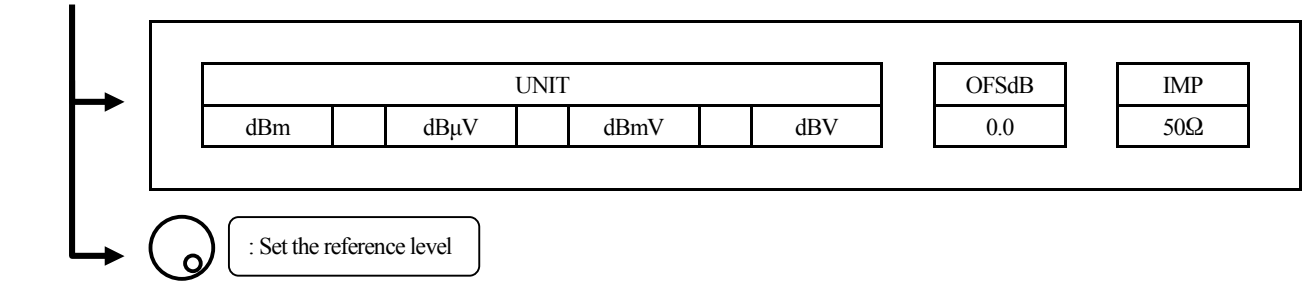
"Displayed items on the bottom of the screen"



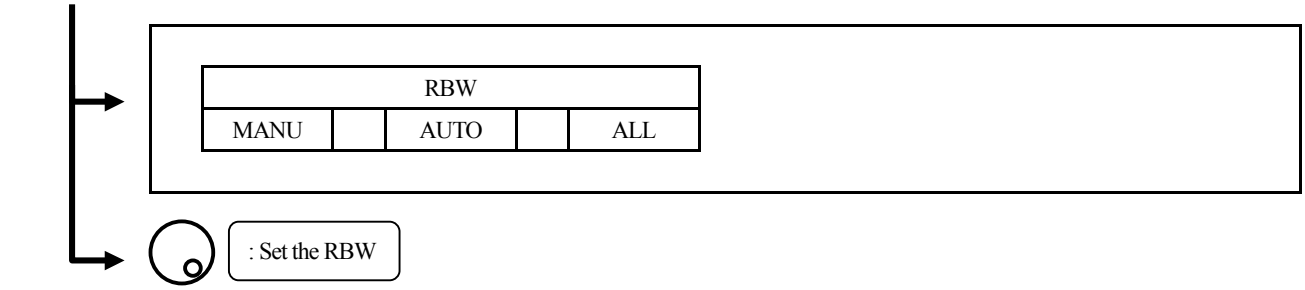
FREQ * Refer to "7. Center Frequency" for details



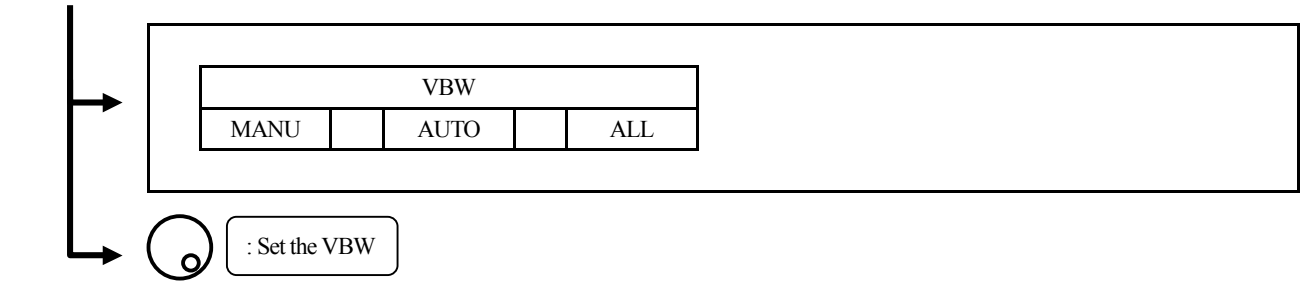
REFER * Refer to "9. Reference Level" for details



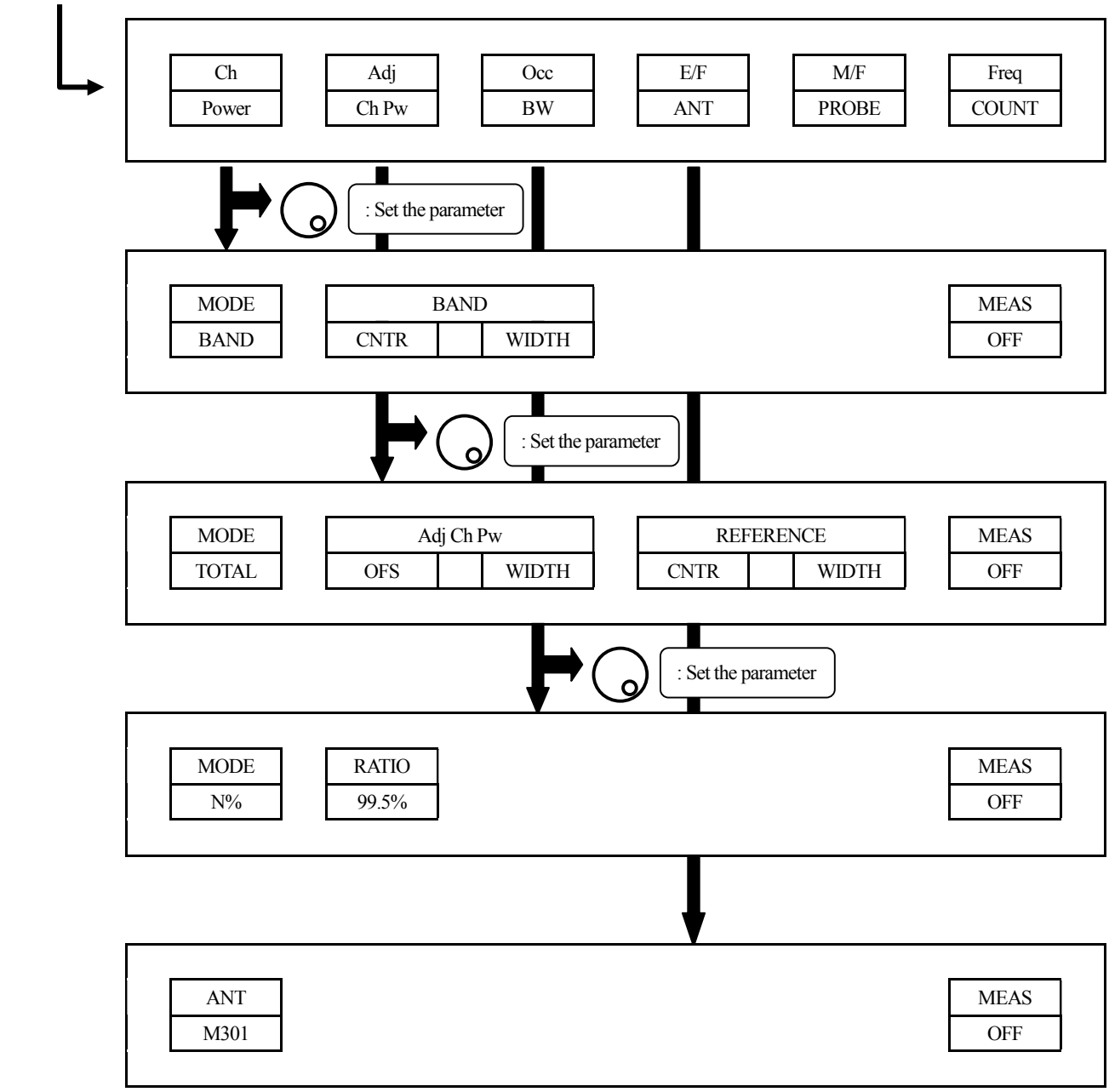
RBW * Refer to "11. Resolution Bandwidth" for details



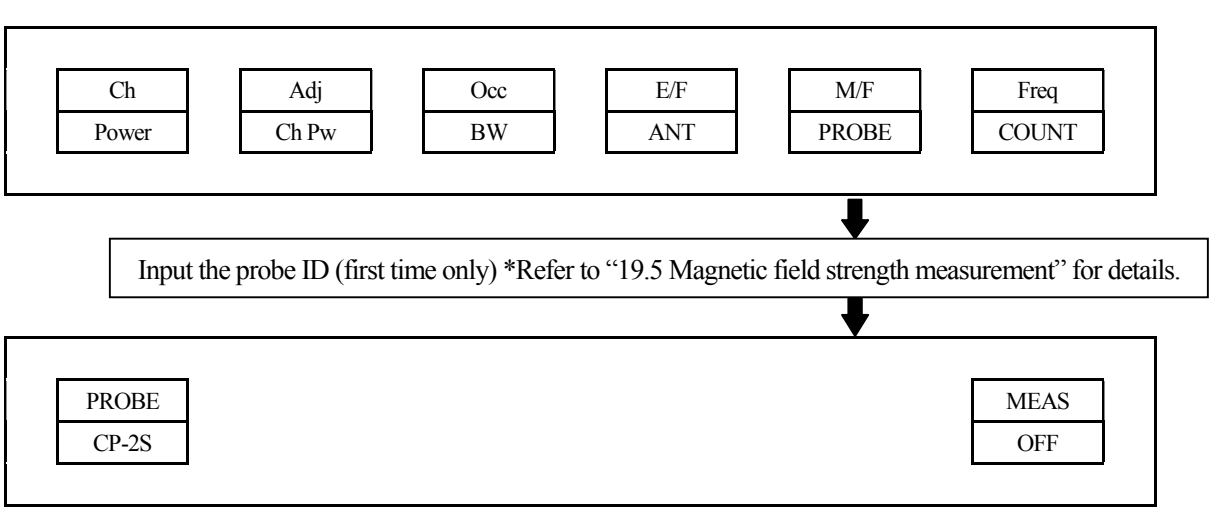
VBW * Refer to “12. Video Bandwidth” for details



MEAS (1/2) * Refer to “19. Measuring Function” for details

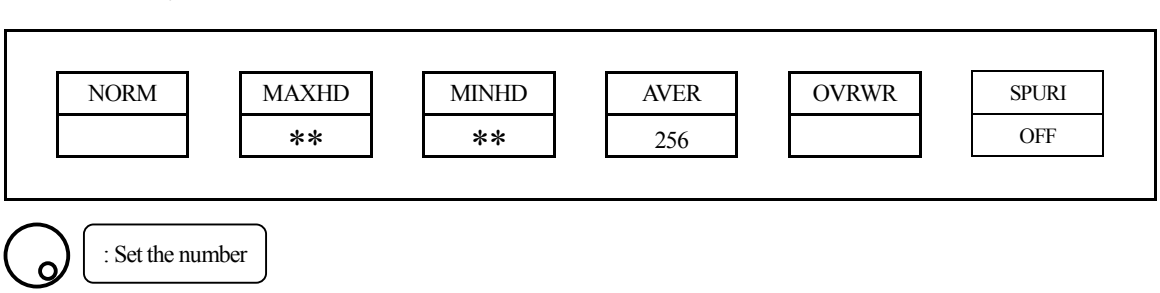


MEAS (2/2)



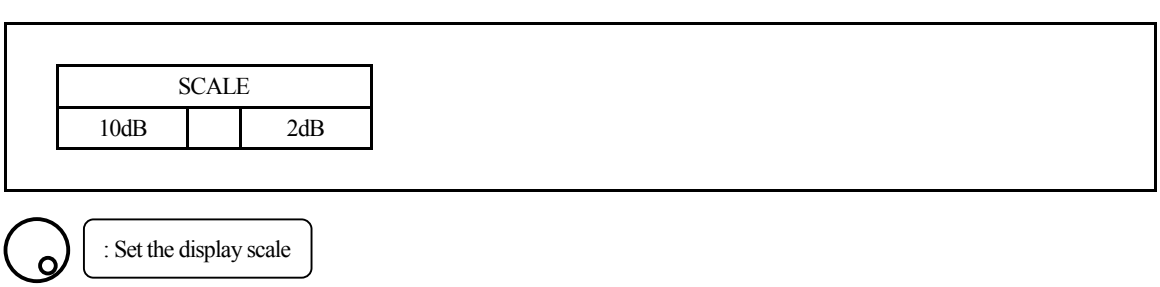
CALC

* Refer to "16. Calculation Function" for details
* SUPRI is only for MSA358



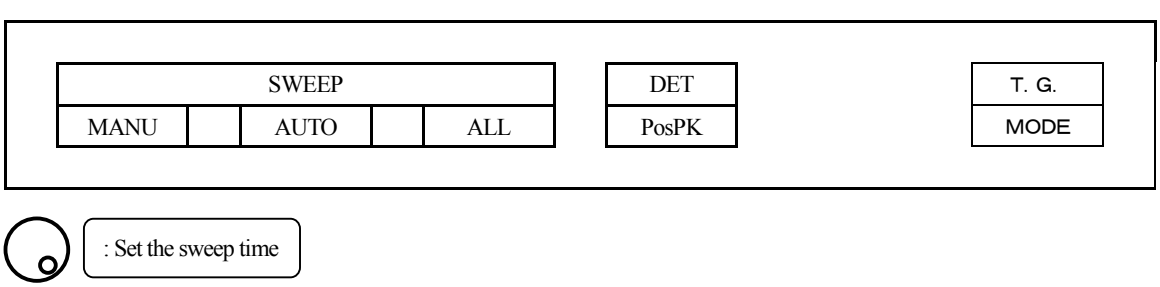
SCALE

* Refer to "16. Display Scale" for details



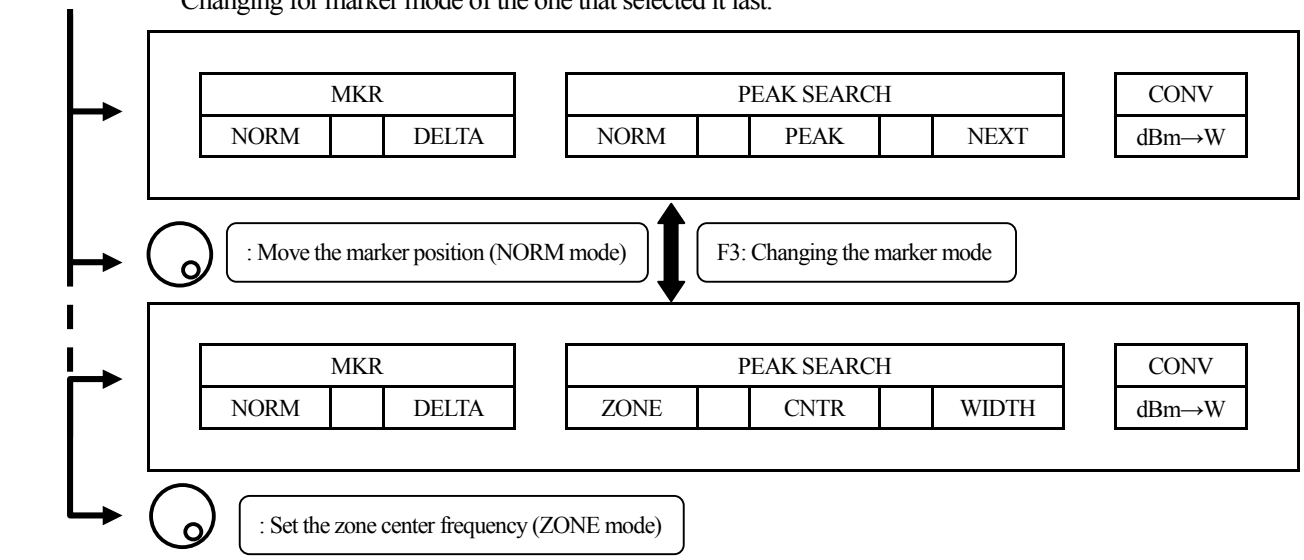
SWEEP

* Refer to "13. Sweep Axis・Detection Mode" for details
* T.G. MODE is only for MSA338TG

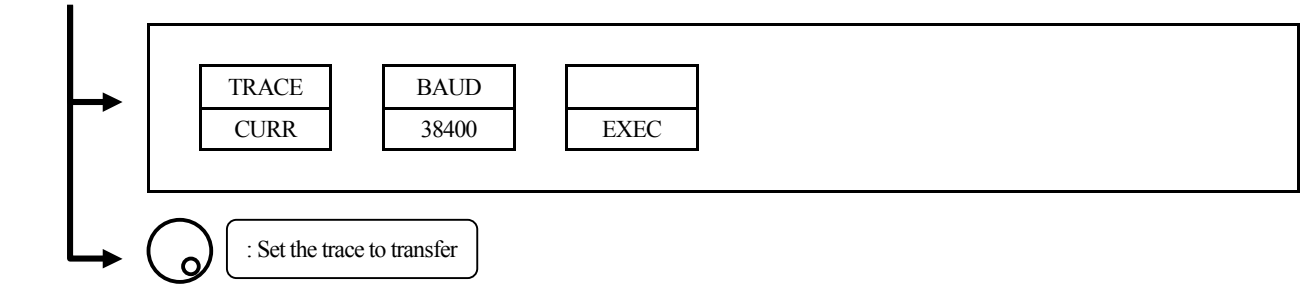


MKR * Refer to "17. Marker · Peak Search" for details

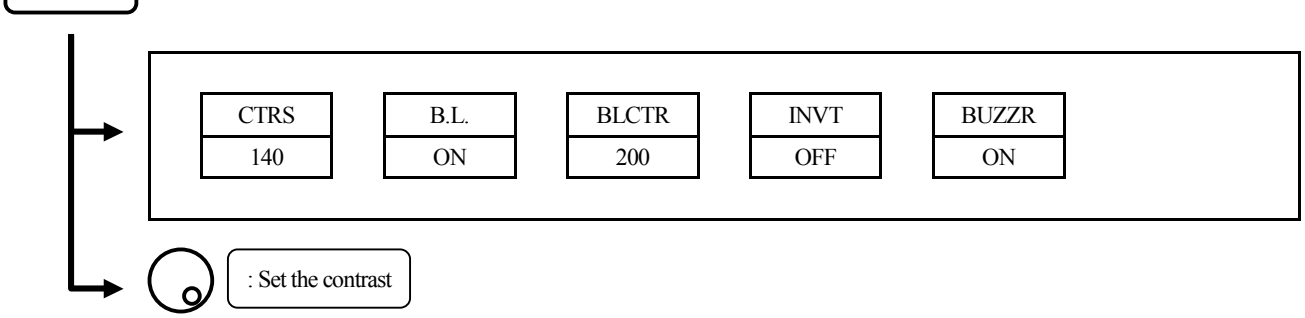
Changing for marker mode of the one that selected it last.



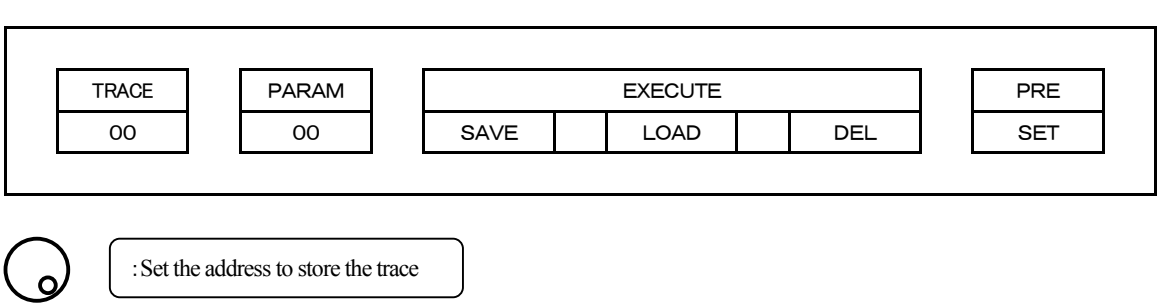
RS232C * Refer to "23. Data Output" for details



DSPL * Refer to "21. Screen Control" for details



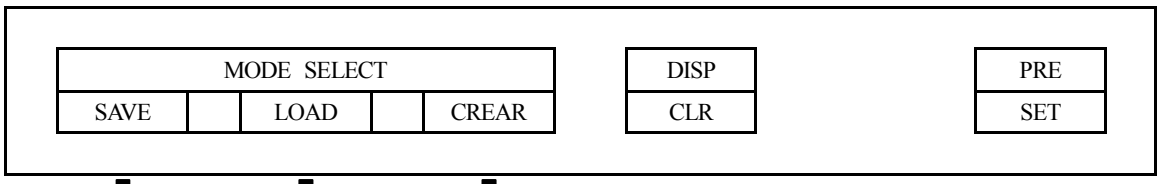
SAVE/LOAD * Refer to "18.1 Save/Load (MSA338 (E/TG))" for details



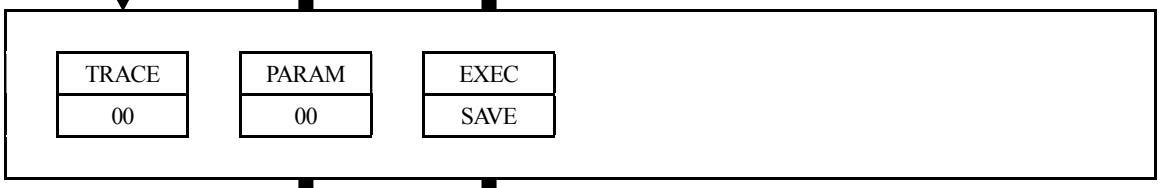
: Set the address to store the trace

SAVE/LOAD * Refer to "18.2 Save/Load (MSA358)" for details

Main menu

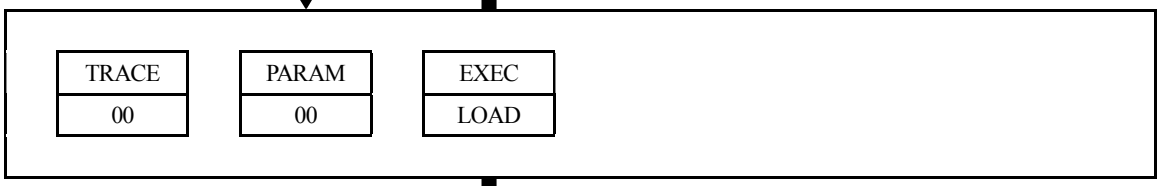


Save menu



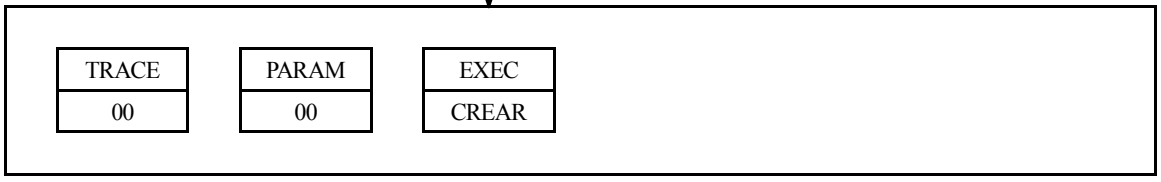
: Set the address to store the trace or parameter

Load menu



: Set the address to call the trace or parameter

Delete menu

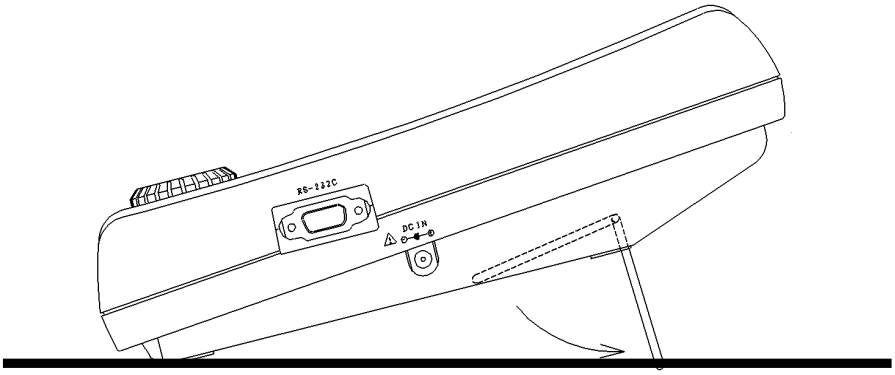


: Set the address to elimination the trace or parameter

6. Preparing for Operation

6.1 Stand

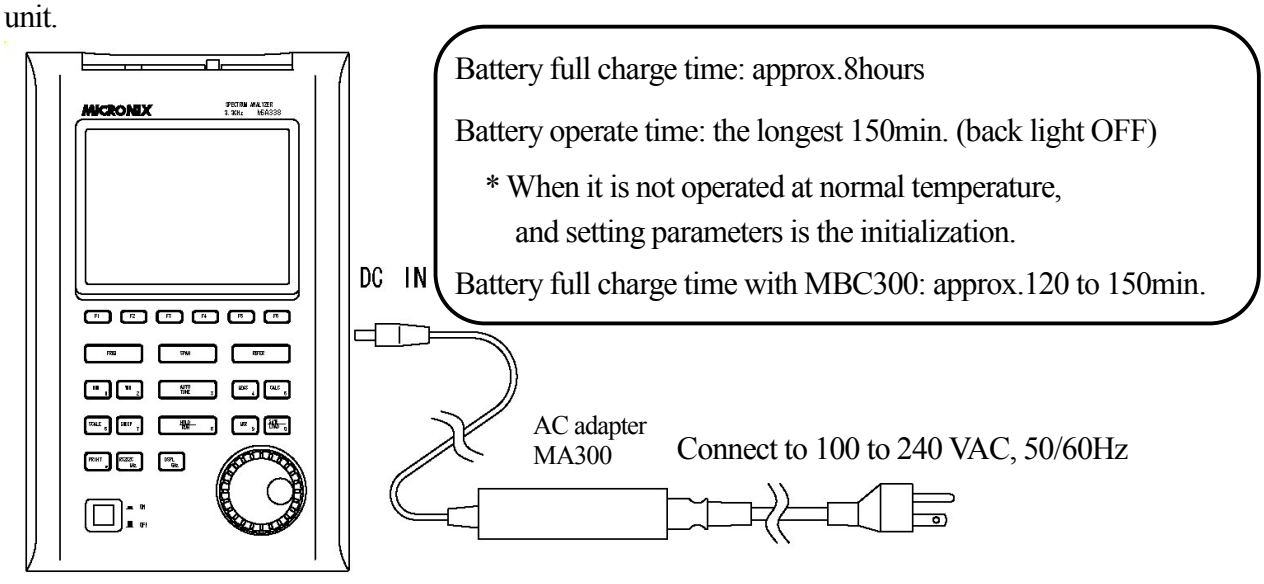
Utilize the stand on the back to use the screen in an easier-to-see angle on the desk.



6.2 Connection to power supply

The MA300 AC adapter is both for the use with AC power supply and for charging the MB300 built-in battery (optional). (charge is started automatically if AC adapter is connected)

Connect the adapter as in the figure below and connect the AC plug to the power line (100-240 VAC, 50/60 Hz). For static electricity protection, ground the unit by connecting the three cores if possible. Not grounding the unit can damage it and the object measured. Do not use an AC adapter other than the MA300 supplied with the unit. Using an AC adapter other than the MA300 may cause damage to the unit.



* If the voltage of a battery becomes low at the time of battery operation, it will be displayed on a screen as "Low Batt", and a buzzer will sound (it sounds, even if it is set up so that a buzzer may not sound), and a power supply will be shut off within several minutes. At that time, since the switch is the position of "ON", please push once and return to the position of "OFF". If it is with the position of "ON" after a power supply is shut off, it discharges inside, will be in electric overdischarge state, and becomes the cause of contracting the life of a battery. Please take care.

* Moreover, under low temperature (near 0°C), since a battery performance falls and voltage becomes low, even when capacity remains enough, it may display on a screen as "Low Batt".

* When a battery repeats charge and electric discharge, the fall (the fall of capacity and increase in internal resistance) of a battery performance begins from about 200 times, and capacity falls to the original half by about 500 times also under good conditions. On bad conditions (high temperature, etc.), the life of battery will be shorter than this.

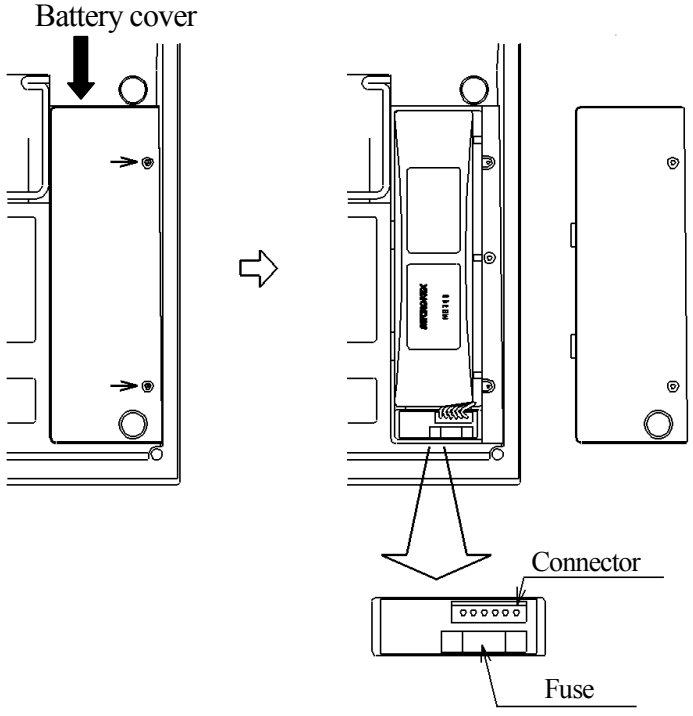
6.3 Replacing the fuse

5A/250V fuse (IEC127-2 sheet3, slow-blow type) is used for the battery power supply. When replacing it, turn the power off first, disconnect the AC adapter, remove the battery cover and on the back as shown in the figure below, remove the battery, and then take sufficient care to perform the replacement.

Be sure to use the fuse supplied with the unit, or specified one.

6.4 Installing the battery

When installing the battery, turn the power off first, disconnect the AC adapter, open the battery cover on the back of the unit after removing the two screws as shown in the figure below, and then take sufficient care to perform the installation. Be sure to use the specified battery, MB300.



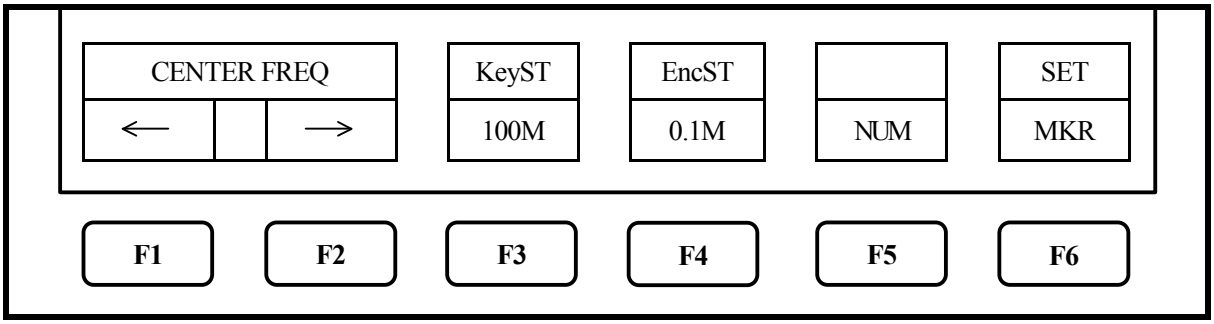
6.5 Soft carrying case

When carrying the unit or using it outdoors, the soft carrying case is convenient. You can also carry the AC adapter and printer with it, putting them in the accessory pouch.

* Avoid using the unit in the soft carrying case in places where temperature is high because, with the soft carrying case, the temperature inside becomes higher than the ambient temperature.

7. Center Frequency <FREQ>

Press **FREQ** to switch over to the function screen shown below:



* Center frequency can be set between 0 to 3.3GHz.(MSA338 (E/TG))

* Center frequency can be set between 0 to 8.5GHz.(MSA358)

* Center frequency may shift for the time being (1 to 10 sec.), after changing a setting.

7.1 Setting with the step keys ([F1], [F2])

1. Each time **F1** is pressed, the center frequency decreases in the set step size.
2. Each time **F2** is pressed, the center frequency increases in the set step size.
3. Setting the step size:

   Each time **F3** is pressed, it is set in the following order:

→ 0.1MHz → 1MHz → 10MHz → 100MHz →

7.2 Setting with the encoder

1. When ◯ is turned, the center frequency changes in the set step size.
2. Setting the step size:

   Each time **F4** is pressed, it is set in the following order:

→ 0.1MHz → 1MHz → 10MHz → 100MHz →

7.3 Setting with the numeric keys

1. Press **F5** to enter into the numeric key input mode.

   * [F5] functions as the <CLEAR> key. [F6] functions as the <BACK SPACE> key.

   * In this mode, setting with [F1], [F2] or the encoder is not accepted.

2. The center frequency can be directly input according to the "Numeric Key Mapping Diagram".
3. The value is entered by pressing a unit key, [MHz (RS232C)] or [GHz (DSPL)].

   * Any figures below the resolution (100 kHz) will be discarded.

4. Changing the setting:

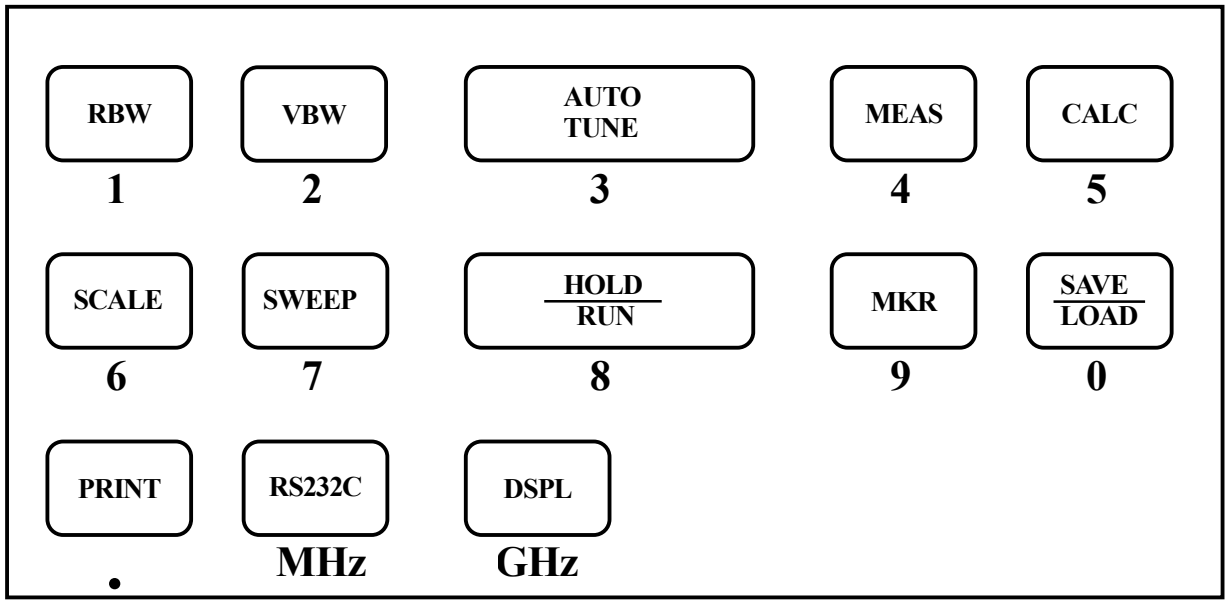
F5 : Deletes the entire value and allows you to input one from the beginning.

F6 : Deletes the last input figure.

5. Canceling the numeric key mode:

FREO : Enables setting with step keys ([F1], [F2]) or the encoder again.

"Numeric Key Mapping Diagram"



7.4 According to the Marker position

1. When F6 is pressed, the center frequency is set according to the frequency of current marker position.

   * Any figures below the resolution (100 kHz) will be discarded.

   * This does not operate when the marker is not displayed. (and the function display disappears.)

8. Frequency Span <SPAN>

Press SPAN → Use ◯ to set the frequency span.

*The frequency span can be set only with the encoder. Function keys are not available.

MSA338(E/TG): When ◯ is turned, the frequency span changes in the specified step.

ZERO ↔ 200k ↔ 500k ↔ 1M ↔ 2M ↔ 5M ↔ 10M ↔ 20M ↔ 50M ↔ 100M ↔ 500M ↔ 1G ↔ 2G ↔ FULL (3.3G) [Hz]

MSA358: When  is turned, the frequency span changes in the specified step.

ZERO ↔ 200k ↔ 500k ↔ 1M ↔ 2M ↔ 5M ↔ 10M ↔ 20M ↔ 50M ↔ 100M ↔ 500M ↔ 1G ↔ 2G ↔ 5G ↔ FULL (8.5G) [Hz]

■ Switching frequency band

MSA358 consists of the following three bands.

Frequency band	Measured frequency range
Base band	50kHz to 3.5GHz
Band 1 -	3.3GHz to 6.3GHz
Band 1 +	6. 2GHz to 8.5GHz

The frequency band is selected to be the least band number, based on Center frequency and Span.

(At the span less than 200MHz, only one band is used.)

When the setting frequency range belongs to two bands, the lower band has priority.

Note: Switch frequency band allows only to automatic setting.

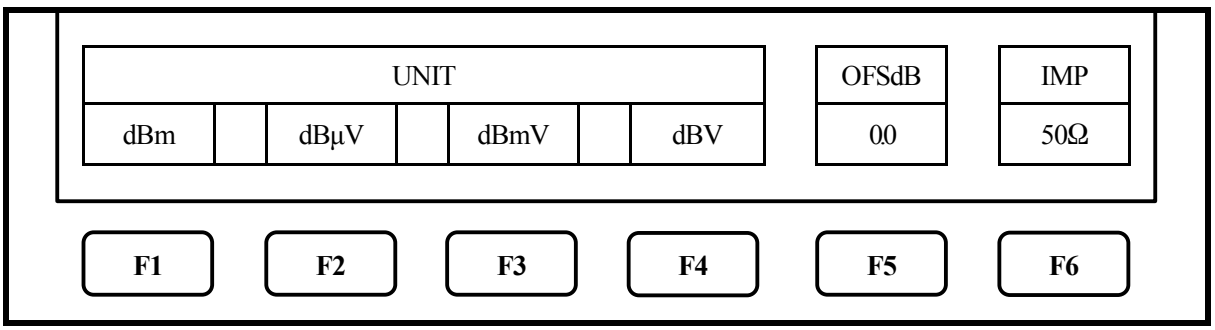
The frequency connection point of two bands is fixed as below table.

Two bands	Frequency connection point
Base band and band 1 -	3.4GHz
Band 1 − and band 1 +	6.2GHz

Note: The trace may fall into disorder just a little at the frequency connection point. For the precise measurement is needed, Center frequency or Span should be set so that the measured frequency range is in one band.

9. Reference Level <REFER>

Press **REFER** to switch over to the function screen shown below:



9.1 Setting the Reference level

1. When  is turned, the reference level changes.

(Refer to "9.3 Reference level setting range for each unit" for details.)

9.2 Switching units of amplitude axis

(Refer to "19.4 Electric field strength measurement" and "19.5 Magnetic field strength measurement" for dBμV/m and dBμA/m .)

1. Press **F1** to switching units to dBm.
   Press **F2** to switching units to dBμV
   Press **F3** to switching units to dBmV
   Press **F4** to switching units to dBV

9.3 Reference level setting range for each unit

UNIT	dBm	dBμV	dBmV	dBV
MAXIMUM	10	117	57	-3
MINIMUM	-40	67	7	-53
MINIMUM (shifted trace data)	-60	47	-13	-73

"Unit that is able to use it with the measuring function"

UNIT	dBμV/m (Electric filed strength measurement)							dBμA/m (Magnetic field trength measurement)
Setting	M301	M302	M303	M304	M305	M306	M307	CP-2S
MAXIMUM	143	146	148	150	137	159	141	160 to 203
MINIMUM	93	96	98	100	87	109	91	110 to 153
MINIMUM (shifted trace data)	73	76	78	80	67	89	71	90 to 133

* When the reference level is set between the "MINIMUM" and "MINIMUM (shifted trace data)", the trace in "MINIMUM" is shifted and displayed on a screen. When the reference level is set below to the "MINIMUM", the ATT display area is displayed as "S/W AMP".

Calculation expression (conversion formula to and from dBm)

· A [dBμV] = 107+X [dBm] · B [dBmV] = 47+X [dBm] · C [dBV] = -13+X [dBm]

· D [dBμV/m] = 68.8/λ×√(X/Gar) [dBm] λ: Wavelength[m] Gar: Antenna absolute gain [times]

· E [dBμA/m] = 107+X+F [dBm] F: probe calibration coefficient * changes by frequency

9.4 Relation between the reference level and ATT · AMP (in dBm indication)

The programmable attenuator (ATT) and the input amplifier (AMP) inside MSA338/MSA358 are a automatically set according to the setting value of the reference level (REFER). (ATT cannot be set independently.)

REFER (dBm)	ATT (dB)	AMP (dB)
10	25	0
9	24	0
8	23	0
7	22	0
6	21	0
5	20	0
4	19	0
3	18	0
2	17	0
1	16	0
0	15	0
-1	14	0
-2	13	0

REFER (dBm)	ATT (dB)	AMP (dB)
-3	12	0
-4	11	0
-5	10	0
-6	9	0
-7	8	0
-8	7	0
-9	6	0
-10	5	0
-11	4	0
-12	3	0
-13	2	0
-14	1	0
-15	0	0

REFER (dBm)	ATT (dB)	AMP (dB)
-16	20	21
-17	19	21
-18	18	21
-19	17	21
-20	16	21
-21	15	21
-22	14	21
-23	13	21
-24	12	21
-25	11	21
-26	10	21
-27	9	21
-28	8	21

REFER (dBm)	ATT (dB)	AMP (dB)
-29	7	21
-30	6	21
-31	5	21
-32	4	21
-33	3	21
-34	2	21
-35	1	21
-36	5	26
-37	4	26
-38	3	26
-39	2	26
-40	1	26

* When the input signal level is higher than the suitable level for 1st mixer's terminal, it generates harmonics distortion and spurious. MSA338/MSA358 is designed so that the input signal level of 1st mixer is determined to proper level by the reference level.

9.5 Setting the offset level

1. **F5** →  to set the offset of reference level.

When amplifier and attenuator are used externally, display level can be matched by offset.

The setting range is from -50.0 to 50.0dB (0.1dB step).

Offset is calculated to the reference level, and it is displayed.

* When offset is set, it is displayed on LEVEL display area as "OFS".

Furthermore, the value of a marker point is displayed reflecting the calculated offset.

* Offset of dBμV, dBmV, dBV, W, etc. are changed automatically.

9.6 Setting the input impedance compensation

1. F6 → ◯ to select the input impedance compensation.

50Ω ↔ 75Ω

When coaxial adaptor MA301 (50Ω/75Ω impedance converter) is attached, and choose "75Ω", then offset is calculated to the reference level, and it changes for the measured value as 75Ω system, and display it.

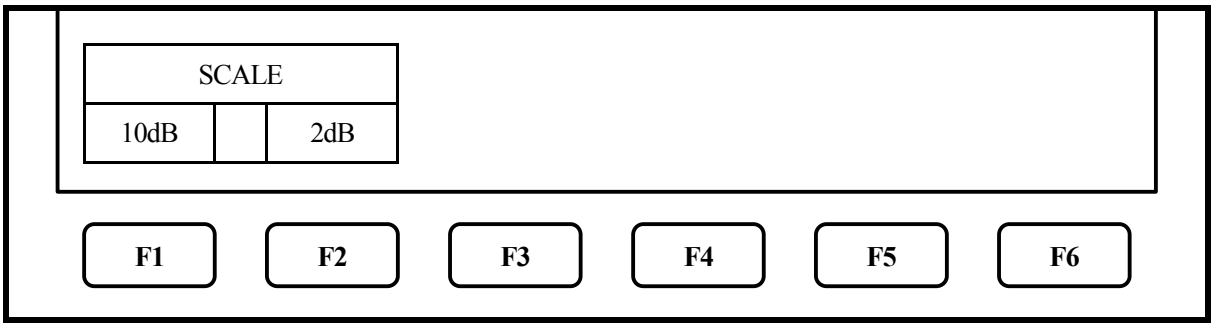
* When "75Ω" is selected, "75Ω" is displayed in the LEVEL area on the screen. When "75Ω" is selected, the offset is set to 5.7dB (insertion loss of MA301).
  Moreover, can set offset.

Moreover, while setting the unit of the marker point to [W, V, V/m] etc, it changes from dBm correctly.

* When you set it as "75Ω", please be sure to attach coaxial adapter MA301 (50Ω/75Ω impedance converter).

10. Display Scale <SCALE>

Press SCALE to switch over to the function screen shown below:



10.1 Setting with the keys ([F1], [F2])

1. Press **F1** to set the 10dB/div display scale.
2. Press **F2** to set the 2dB/div display scale.

10.2 Setting with the encoder

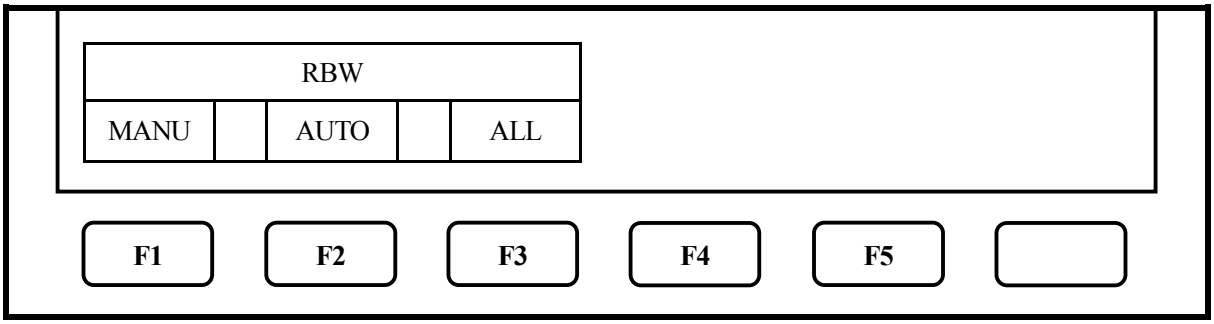
1. Turn ◯ to switch between the 10dB/div and 2dB/div display scale.

10dB ↔ 2dB

* In 2dB/div, display level may not become smaller than fixed level, by frequency compensation.

11. Resolution Bandwidth <RBW>

Press **RBW** to switch over to the function screen shown below:



* Any selected parts of MANU, AUTO and ALL become inverted display.

11.1 MANUAL mode

1. Press **F1** or turn the ◯ to enter MANUAL mode. Use ◯ to set the RBW.

MSA338(TG)/358: 3kHz◆▶ 10kHz◆▶ 30kHz◆▶ 100kHz◆▶ 300kHz◆▶ 1MHz◆▶ 3MHz

MSA338(E): 3kHz◆▶ 9kHz ◆▶ 30kHz ◆▶ 120kHz ◆▶ 300kHz ◆▶ 1MHz ◆▶ 3MHz

11.2 AUTO mode

1. When **F2** is pressed, optimum RBW is set according to the settings of SPAN and SWEEP.

* Since "*" is displayed on the right end of RBW setting value display portion of a screen when set as AUTO mode, it can check being set as AUTO mode.

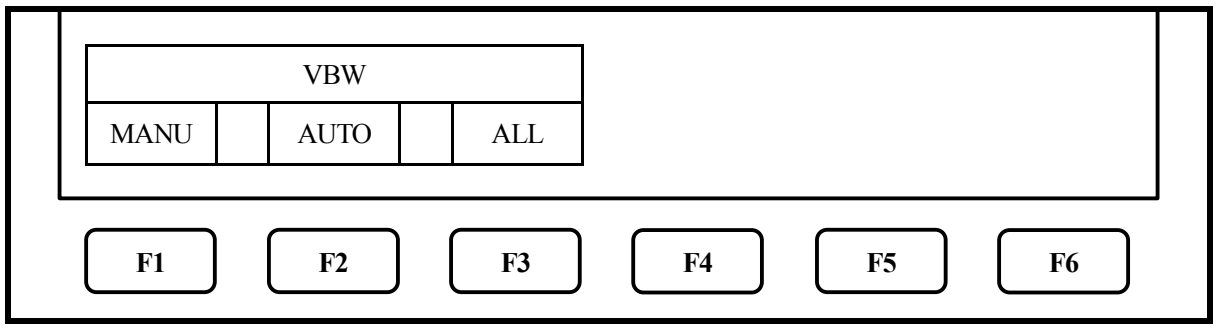
11.3 ALL AUTO mode

1. When **F3** is pressed, optimum RBW, VBW and SWEEP are set according to the setting of SPAN.

* Since "*" will be displayed on the right end of each setting value display portion of RBW, VBW, and SWEEP if ALL AUTO mode is set up, it can check being set as ALL AUTO mode.
* When RBW is set as 3kHz to 30kHz, selectivity (60dBc) becomes larger than an actual value, by influence of SSB phase noise.

12. Video Bandwidth <VBW>

Press [VBW] to switch over to the function screen shown below:



* Any selected parts of MANU, AUTO and ALL become inverted display.

12.1 MANUAL mode

1. Press [F1] or turn the ◎ to enter MANUAL mode. Use ◎ to set the VBW.

100Hz ↔ 300Hz ↔ 1kHz ↔ 3kHz ↔ 10kHz ↔ 30kHz ↔ 100kHz ↔ 300kHz ↔ 1MHz

12.2 AUTO mode

1. When [F2] is pressed, VBW is set according to the settings of SPAN and SWEEP.

* Since "∗" is displayed on the right end of VBW setting value display portion of a screen when set as AUTO mode, it can check being set as AUTO mode.

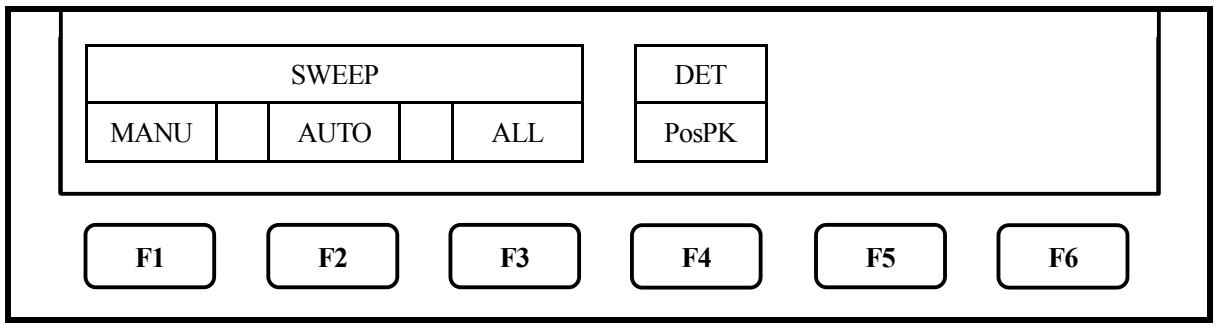
12.3 ALL AUTO mode

1. When [F3] is pressed, RBW, VBW and SWEEP are set according to the setting of SPAN.

* Since "*" will be displayed on the right end of each setting value display portion of RBW, VBW, and SWEEP if ALL AUTO mode is set up, it can check being set as ALL AUTO mode.

13. Sweep Axis · Detection Mode <SWEEP>

Press [SWEEP] to switch over to the function screen shown below:



* Any selected parts of MANU, AUTO and ALL become inverted display.
When [F4] is pressed, the part of DET become inverted display.
For MSA338TG [F6] refer to "22. Tracking Generator Mode"

13.1 MANUAL mode

1. Press [F1] or turn the  to enter MANUAL mode. Use  to set the SWEEP.

10ms ↔ 30ms ↔ 0.1s ↔ 0.3s ↔ 1s ↔ 3s ↔ 10s ↔ 30s

* MSA338 (E/TG): Can't set 10ms at the FULLSPAN.
* MSA358: 30ms to 30s and AUTO @Span 0 to 5GHz , Full span

13.2 AUTO mode

1. When [F2] is pressed, SWEEP is set according to the settings of SPAN and RBW.

* Since "*" is displayed on the right end of SWEEP setting value display portion of a screen when set as AUTO mode, it can check being set as AUTO mode.

13.3 ALL AUTO mode

1. When [F3] is pressed, RBW, VBW and SWEEP are set according to the setting of SPAN.

* Since "*" will be displayed on the right end of each setting value display portion of RBW, VBW, and SWEEP if ALL AUTO mode is set up, it can check being set as ALL AUTO mode.

13.4 Setting the Detection mode (For MSA338E, refer to "20. EMI test")

1. Pressing [F4] allows you to change the method to capture the trace.

→ PosPK → SMPL → NegPK →

· PosPK (Positive Peak) : Traces the maximum value of the sample points.

· SMPL (Sample) : Traces the momentary value of the sample points.

· NegPK (Negative Peak) : Traces the minimum value of the sample points.

14. AUTO Tuning <AUTO TUNE>

When [AUTO TUNE] is pressed, center frequency is set at the spectrum of the maximum level in the 3.3GHz(MSA338(E/TG))/8.5GHz(MSA358) band, and in addition, optimum reference level, RBW, VBW and SWEEP are set according to the setting of SPAN.

* The AUTO tuning does not operate normally, at the time of the following 4 conditions.
  1) ZERO SPAN
  2) FULL SPAN
  3) Signal level is -40dBm or lower
  4) Signal frequency is 50MHz or lower

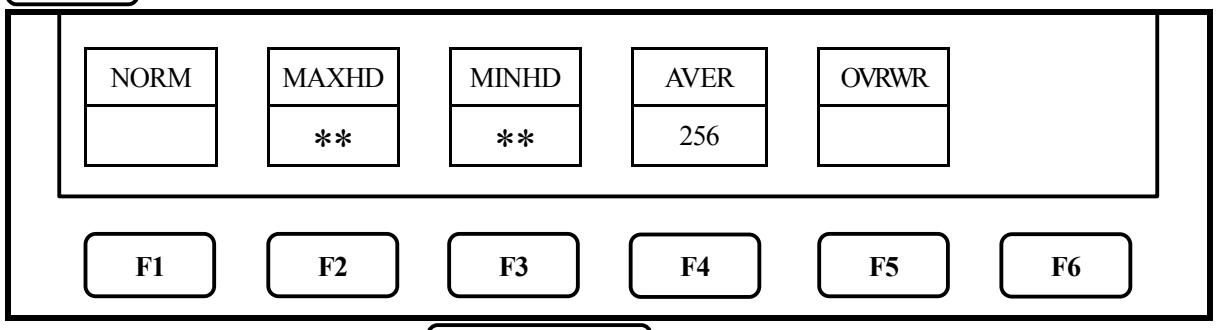
15. Hold/Run <HOLD/RUN>

Press [HOLD/RUN] to switch to between sweep halt and continuous sweep.

* This operates only with the key press, with no function indication.

16. Calculation Function <CALC>

Press **CALC** to switch over to the function screen shown below:



* After sweeps stops, press **HOLD/RUN** to restart sweep.

* Press [F1] to [F5] to set the CALC mode.

* Use ◎ to set the number of sweeps.

16.1 NORM mode

1. Press **F1** Calculation is not performed in this mode. The number of sweeps is always unlimited.

   * Usually, please choose this mode.

   * "NORMAL" is displayed in the CALC area on the LCD screen.

   (Refer to "4. Description of Display" for details)

16.2 MAX HOLD mode

1. Press **F2** → Use ◎ to set the number of sweeps.

2. Sweeps are performed the set number of times, the maximum value of each point of trace data is displayed as a trace, and then sweep is halted.

   2 ↔ 4 ↔ 8 ↔ 16 ↔ 32 ↔ 64 ↔ 128 ↔
   256 ↔ 512 ↔ 1024 ↔ ** (unlimited)

   * "MAX --- (number of sweeps)" is displayed in the CALC area on the LCD screen.

   (Refer to "4. Description of Display" for details)

16.3 MIN HOLD mode

1. Press **F3** → Use ◎ to set the number of sweeps.

2. Sweeps are performed the set number of times, the minimum value of each point of trace data is displayed as a trace, and then sweep is halted.

   2 ↔ 4 ↔ 8 ↔ 16 ↔ 32 ↔ 64 ↔ 128 ↔
   256 ↔ 512 ↔ 1024 ↔ ** (unlimited)

   * "MIN --- (number of sweeps)" is displayed in the CALC area on the LCD screen.

   (Refer to "4. Description of Display" for details)

16.4 AVERAGE mode

1. Press **F4** → Use  to set the number of sweeps.

2. Sweeps are performed the set number of times, average value of each point of trace data is displayed as a trace, and then sweep is halted.

2 ↔ 4 ↔ 8 ↔ 16 ↔ 32 ↔ 64 ↔ 128 ↔ 256

* "AVG --- (number of sweeps)" is displayed in the CALC area on the LCD screen.

(Refer to "4. Description of Display" for details)

16.5 OVER WRITE mode

1. Press **F5** to enter into the OVER WRITE mode, where traces are written one over another. The number of sweeps is unlimited.

* "OVER WR" is displayed in the CALC area on the LCD screen.

(Refer to "4. Description of Display" for details)

* Only the last one trace is saved.

16.6 SPURIOUS FREE mode (MSA358 only)

1. By pushing **F6** it will become the SPURIOUS FREE mode which simply deletes spurious characteristic at band 1+.

* "SPR." is displayed beside CALC in liquid crystal screen CALC area.

(Refer to "4. Description of Display" for details)

* The SPURIOUS characteristic at band 1+ is a spurious calculated by the following formula for a input signal over 6.76GHz, in case of measurement at band 1+.

(Refer to "8. Frequency Span" for details)

Spurious characteristic at band 1+ [GHz] = (Input signal [GHz] +5.64GHz) /2

* SPURIOUS FREE mode

1. SPURIOUS FREE mode is the mode which simply deletes SPURIOUS characteristic at band 1+.
2. SPURIOUS FREE mode has a special effect in measurement of a regular wave.
3. If SPURIOUS FREE mode is used in measurement of a signal with level change or frequency change, the phenomenon will happen that an amplitude level falls.

* How to discriminate SPURIOUS characteristic at band 1+ in manual operation

The procedure for discriminating SPURIOUS characteristic at band 1+ is as follows.

1. Set to SPAN = 10MHz.
2. Set the frequency of SPECTRUM to be discriminated to the center frequency of MSA358.

3. Verify that SPECTRUM to be discriminated is at the center of a screen, and change the main frequency by +1MHz.

4. Judge by measured trace data.

The same frequency as the frequency set up first. → Measurement data.

2MHz over Main frequency changed by +1MHz → Spurious characteristic at band 1+

Example: Discriminate SPECTRUM displayed on 7GHz.

1. Set MSA358 to SPAN = 10MHz and main frequency = 7 GHz.
2. Verify that SPECTRUM is at 7 GHz.
3. Set MSA358 to Main frequency = 7.001 GHz.
4. Measure spectrum and distinguish as follows.

Spectrum is at 7GHz. → Measurement data.

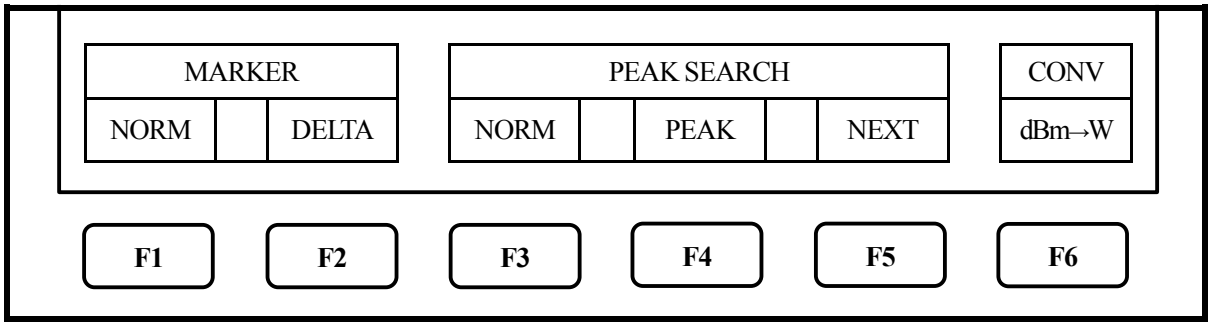
Spectrum is at 7.003 GHz. → SPURIOUS characteristic at band 1+.

17. Marker · Peak Search <MKR>

Press **MKR** to switch over to the function screen shown below:

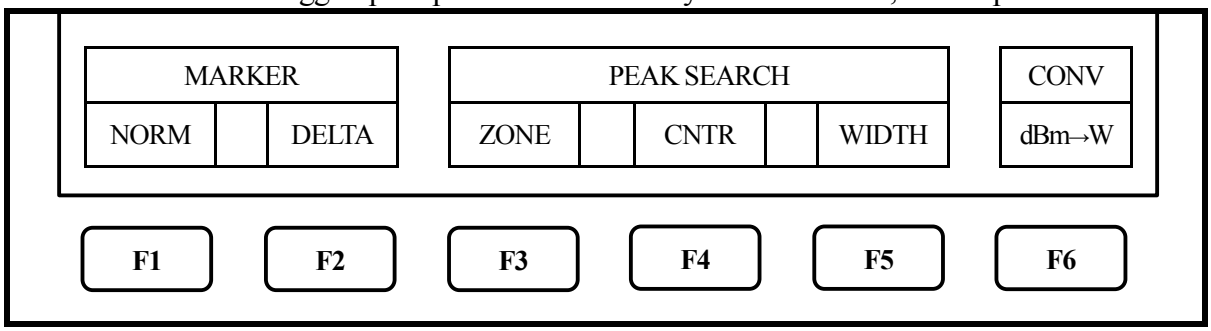
· The display when a NORM marker is selected.

The marker is manually moved at NORM mode. Peak search function, NEXT peak search function is available.



· The display when a ZONE marker is selected.

The marker moves to the biggest peak position automatically at ZONE mode, inside specified zone.



17.1 Moving the marker

Use **F1** →  to move the marker.

Use **F2** to put DELTA REF at the current marker position.

17.2 Setting the peak search <PEAK SEARCH>

· NORM mode (Use **F3** to select NORM.)

Use **F4** to move the marker to the maximum peak position.

Use **F5** to move the marker successively from higher to lower peak positions other than the maximum peak. (The marker moves to 10 peaks.)

* When you move the marker to the 10th peak or moving the marker, the NEXT peak search function stops and the function display disappears.

· ZONE mode (Use **F3** to select ZONE.)

Use **F4** →  to move the center position.

Use **F5** →  to change the width.

17.3 Changing the unit of marker point

Press **F6** to change the unit of marker point.

When unit of reference level is dBm, the unit is changed from [dBm] to [W].

When unit of reference level is dBμV, the unit is changed from [dBμV, dBmV, dBV] to [V].

When unit of reference level is dBμV/m, the unit is changed from [dBμV/m] to [V/m].

When unit of reference level is dBμA/m, the unit is changed from [dBμA/m] to [A/m].

Moreover, according to each unit, it is displayed as follows.

[W] → [W, mW, μW, nW, pW, fW]

[V] → [V, mV, μV, nV]

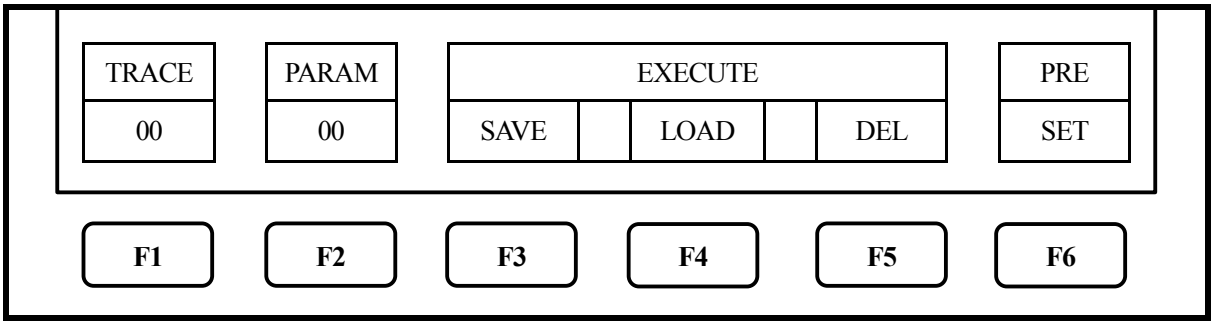
[V/m] → [V/m, mV/m, μV/m, nV/m]

[A/m] → [A/m, mA/m, μA/m, nA/m]

18. Save/Load <SAVE/LOAD>

18.1 Save/Load (MSA338(E/TG))

Press **SAVE/LOAD** to switch over to the function screen shown below:



18.1.1 Setting the location to store the trace

1. Pressing **F1** allows you to set the number of location to store the trace.
2. Use ◯ to set the number of location.

00 ↔ 01 ↔ 02 ↔ 03 ↔ 04 ↔ ··· ↔ 98 ↔ 99

* The part of TRACE become inverted display after it is selected.

18.1.2 Setting the location to store the parameter

1. Pressing **F2** allows you to set the number of location to store the parameter.
2. Use ◯ to set the number of location.

00 ↔ 01 ↔ 02 ↔ 03 ↔ 04 ↔ ··· ↔ 98 ↔ 99

* The part of PARAM become inverted display after it is selected.

18.1.3 Saving the data

1. Press **F3** to save the data at the set number.

* This saves the trace when TRACE is selected, or the setting parameters when PARAM is selected.

* "*" is displayed on the right end of the number of location place at which data is saved.

* It can be overwritten, too

18.1.4 Loading the data

1. Press **F4** to read out the data at the set number.

* This reads out the trace when TRACE is selected. The setting parameter of the loaded trace is displayed in the loaded trace information display area.

(Refer to "4. Description of Display" for details)

* This reads out the setting parameters when PARAM is selected.

* When you load a trace, the current trace disappears, the HOLD state is set, and the loaded trace is displayed. For the loaded trace, you can use the marker, but cannot use a measuring function. When you press the HOLD/RUN key, the loaded and the current traces are displayed overlapping each other.

* "*" is displayed on the right end of the number of location place at which data is saved.

* When you search the trace or setting parameters to be read out, repeat

···, and load the trace or setting parameters in turn.

18.1.5 Clearing the loaded trace

1. Press **F5** to clear the loaded trace that has been displayed.

18.1.6 Presetting (Initialization)

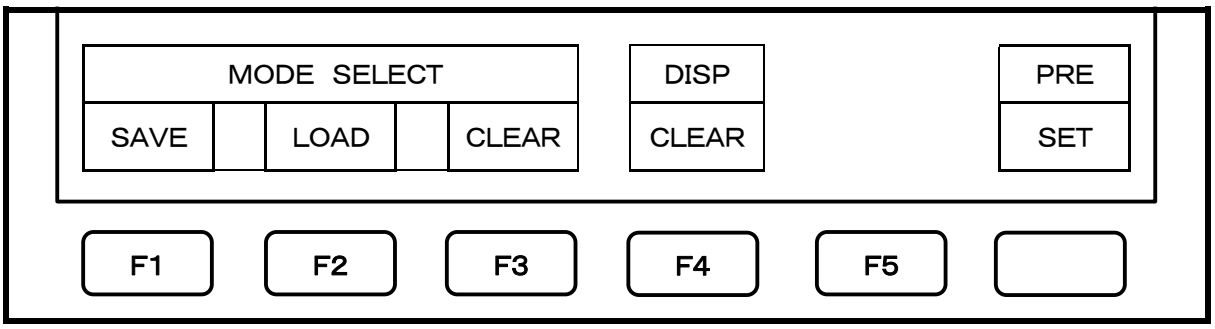
1. Press **F6** to preset the setting parameters as the Initialization shown below:

"Initialization"

Items	Parameter
Center frequency	1GHz
Frequency span	20MHz
Reference level	10dBm
Offset	0.0dB
Impedance	50Ω
Sweep time	0.3s
Detection mode	Positive peak mode
RBW	100kHz
VBW	10kHz
Display scale	10dB/div

18.2 Save/Load (MSA358)

Press [SAVE/LOAD] to switch over to the function screen shown below:



18.2.1 Saving the data

1. Press [ ] to move to a save menu.
2. Operating [ ] or [ ] chooses objects (trace or parameter).
3. Use ◯ to set the number of location.

   00 ↔ 01 ↔ 02 ↔ 03 ↔ 04 ↔ ··· ↔ 98 ↔ 99

4. Press [ ] to save the data.

   * This saves the trace when TRACE is selected, or the setting parameters when PARAM is selected.

   * "*" is displayed on the right end of the number of location place at which data is saved.

   * It can be overwritten, too

18.2.2 Loading the data

1. Press [ ] to move to a load menu.
2. Operating [ ] or [ ] chooses objects (trace or parameter).
3. Use ◯ to set the number of location.

   00 ↔ 01 ↔ 02 ↔ 03 ↔ 04 ↔ ··· ↔ 98 ↔ 99

4. Press [F3] to load the data.

   * This reads out the trace when TRACE is selected. The setting parameter of the loaded trace is displayed in the loaded trace information display area.

   (Refer to "4. Description of Display" for details)

   * This reads out the setting parameters when PARAM is selected.

   * When you load a trace, the current trace disappears, the HOLD state is set, and the loaded trace is displayed. For the loaded trace, you can use the marker, but cannot use a measuring function.

When you press the HOLD/RUN key, the loaded and the current traces are displayed overlapping each other.

* "*" is displayed on the right end of the number of location place at which data is saved.

18.2.3 Clearing the data

1. Press **F3** to move to a clear menu.
2. Operating **F1** or **F2** chooses objects (trace or parameter).
3. Use  to set the number of clear.

   00 ↔ 01 ↔ 02 ↔ 03 ↔ 04 ↔ ··· ↔ 98 ↔ 99
4. Press **F3** to clear the data.

18.2.4 Clearing the loaded trace

1. Press **F5** to clear the loaded trace that has been displayed.

18.2.5 Presetting (Initialization)

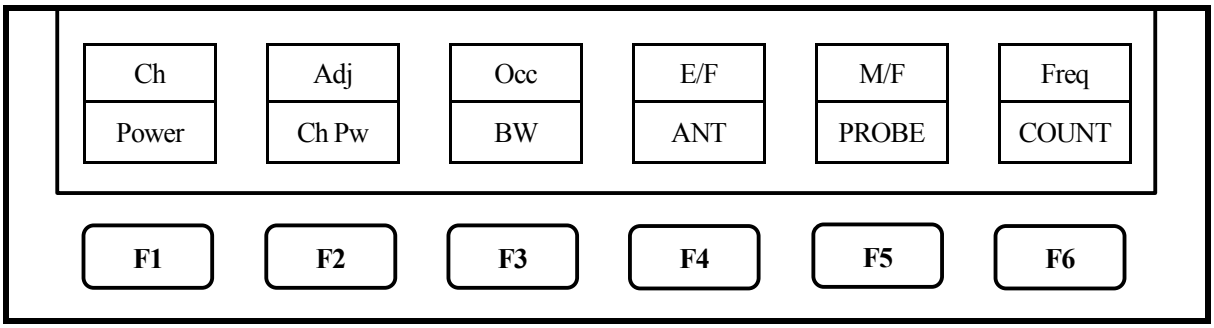
1. Press **F6** to preset the setting parameters as the Initialization shown below:

"Initialization"

Items	Parameter
Center frequency	1GHz
Frequency span	20MHz
Reference level	10dBm
Offset	0.0dB
Impedance	50Ω
Sweep time	0.3s
Detection mode	Positive peak mode
RBW	100kHz
VBW	10Hz
Display scale	10dB/div

19. Measuring Function<MEAS>

Press **MEAS** to switch over to the function screen shown below:



Select the measuring function:

F1 **Ch Power** · · · · · · · · · · · · · · Channel power measurement

F2 **Adj Ch Pw** · · · · · · · · · · · · · Adjacent channel leakage power measurement

F3 **Occ BW** · · · · · · · · · · · · · · · · Occupied frequency bandwidth measurement

F4 **E/F ANT** · · · · · · · · · · · · · · · Electric field strength measurement

F5 **M/F PROBE** · · · · · · · · · · · Magnetic field strength measurement

F6 **Freq COUNT** · · · · · · · · · · Frequency counter (factory option)

* Once you select the measuring function, pressing **MEAS** next time will directly bring up the function screen for the function you selected the last time. If you want to stop the measuring function, or if you want to select another measuring function, press [F6] (MEAS OFF). This stops the measuring function and switches to the above screen, which allows you to select the measuring function.

* The measuring function is stops, when push **MKR** while these 4 functions (Channel power, Adjacent channel leakage power, Occupied frequency bandwidth, Frequency counter) are selected. Because each 4 functions and marker operation cannot be used simultaneously. Similarly, the function of the marker stops, when the functions of these 4 measurements are selected while using the marker.

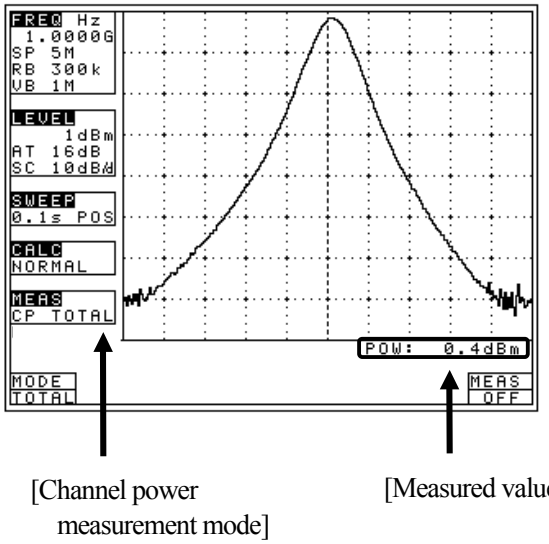
* The unit displays data in 251 horizontal dots, but it internally captures the trace and calculates the measured value (Channel power measurement, Adjacent channel leakage power measurement and Occupied frequency bandwidth measurement) in 1004 dots.

19.1 Channel power measurement <Ch Power> F1

Measures the sum of the power in the zone specified. Two modes, TOTAL and BAND, are available.

· TOTAL mode [Use F1 (MODE) to select TOTAL.]

Measure the sum of the power in the zone specified by the center frequency and frequency span (whole range of the screen).



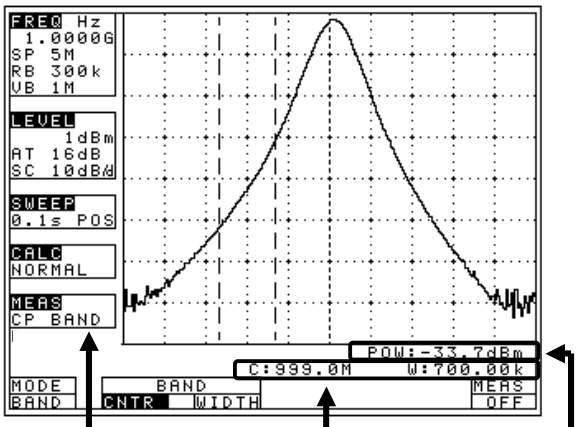
[Channel power measurement mode]

[Measured value]

* It is shown on MEAS area of LCD as "CP TOTAL"
* The measured value is displayed at the right lower corner on the screen.

· BAND mode [Use F1 (MODE) to select BAND.]

Measure the sum of the power in the zone specified by the zone center frequency and zone width.



[Channel power Measurement mode]

[Parameter]

[Measured value]

* It is shown on MEAS area of LCD as "CP BAND".
* The measured value and setting parameter are displayed at the right lower corner on the screen.

1. Use F2 (CNTR) → ◯ to set the zone center frequency.
2. Use F3 (WIDTH) → ◯ to set the zone width.

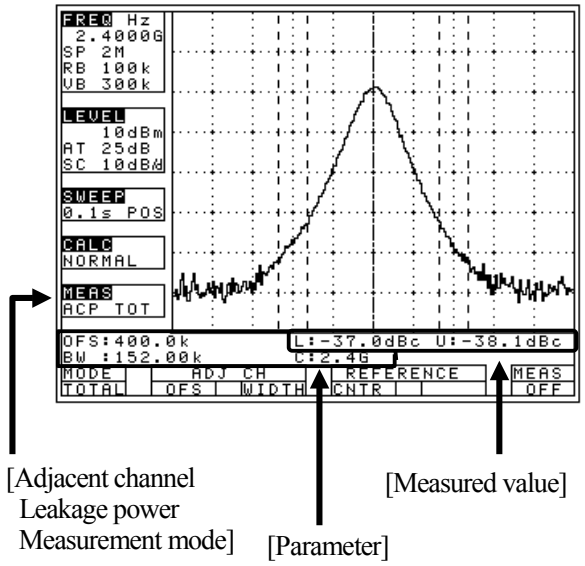
19.2 Adjacent channel leakage power measurement <Adj Ch Pw> F2

Measures the adjacent channel leakage power as the ratio of the power in the range specified by the offset frequency against the reference frequency (reference carrier frequency) and the bandwidth, to the carrier wave power. Two channels of adjacent waves on the upper and lower sides of the same offset frequency are measured. In addition, you can select from three modes, TOTAL (total power method), REF BAND (in-band method) and PEAK (reference level method), according to the classification of definitions of carrier wave.

· Mode selection and measurement [Use F1 (MODE) to select a mode: TOTAL, BAND or PEAK.]

* It is each shown on MEAS area of LCD as "ACP TOT", "ACP BAND" or "ACP PK".

* The measured value and setting parameter are displayed at the right lower corner on the screen.



1. Use F2 (Adj Ch OFS) → ◎ to set the offset frequency of adjacent channel.

   * The offset is from the center of the reference carrier wave.

2. Use F3 (Adj Ch WIDTH) → ◎ to set the band width of adjacent channel.

3. Use F4 (REFERENCE CNTR) → ◎ to set the center frequency of reference carrier.

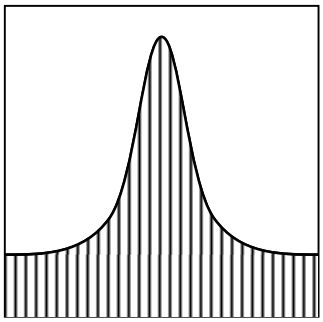
   * [F4] is only for the TOTAL and BAND mode.

4. Use F5 (REFERENCE WIDTH) → ◎ to set the band width of reference carrier.

   * [F5] is only for the BAND mode.

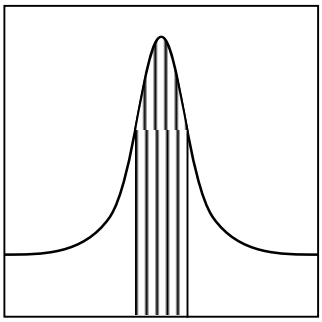
· Definition of the reference carrier for each mode

TOTAL (total power method)



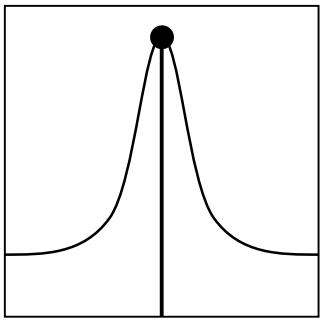
This is based on the sum total of the power of whole range on the screen. Use [F4] to set center frequency of the reference carrier wave.

BAND (in-band method)



This is based on the sum total of the power within the set bandwidth. Use [F4] to set center frequency of the reference carrier wave.

PEAK (reference level method)



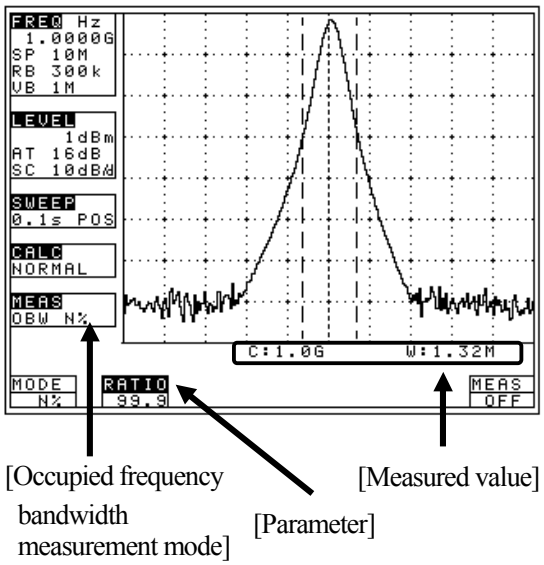
This is based on the power of the peak on the screen. Center frequency of the reference carrier wave is set up to the peak inside the screen automatically.

19.3 Occupied frequency bandwidth measurement <Occ BW> F3

Measures the bandwidth at the point of N [%] of total power (N% POWER) or the bandwidth at the point X [dB] down from the peak level (XdB DOWN). Two modes are available.

• N% POWER mode [Use F1 (MODE) to select N%.]

Measures the bandwidth at the point of N [%] of total power displayed on the screen.



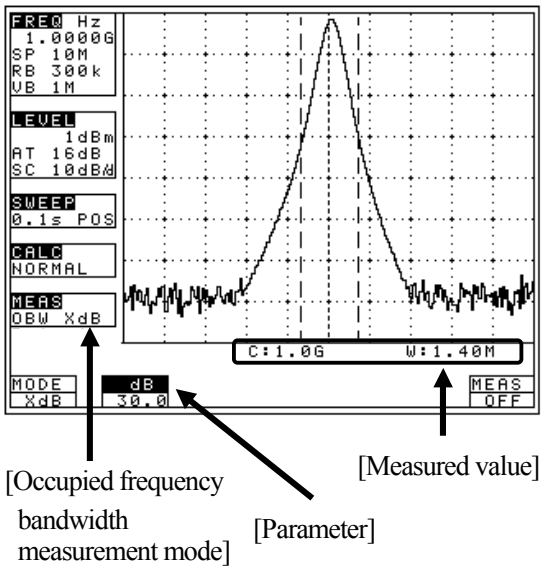
* It is shown on MEAS area of LCD as "OBW N%"
* The measured value is displayed at the right lower corner on the screen.

1. Use F2 (RATIO) → ◎ to set the percentage to total power.

   * Setting range: 80.0 to 99.9%

• XdB DOWN mode [Use F1 (MODE) to select XdB.]

Measures the bandwidth at the point X [dB] down from the peak level,



* It is shown on MEAS area of LCD as "OBW XdB"
* The measured value is displayed at the right lower corner on the screen.

1. Use F2 (dB) → ◎ to set the down level from peak level.

   * Setting range: 0.1 to 80.0dB

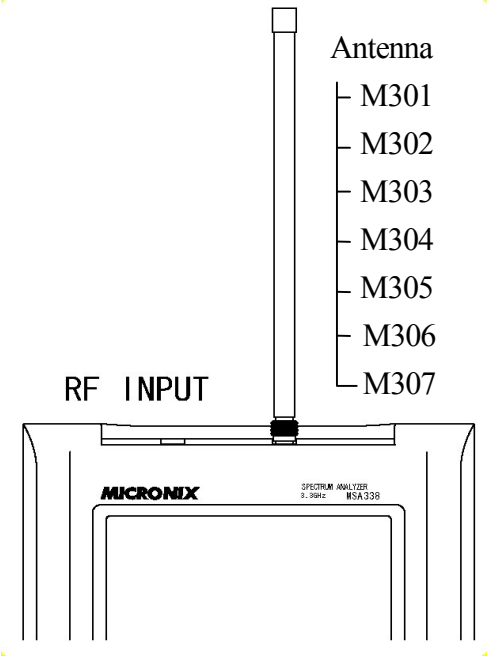
19.4 Electric field strength measurement <E/F ANT> F4

Measures electric field strength by connecting an optional antenna.

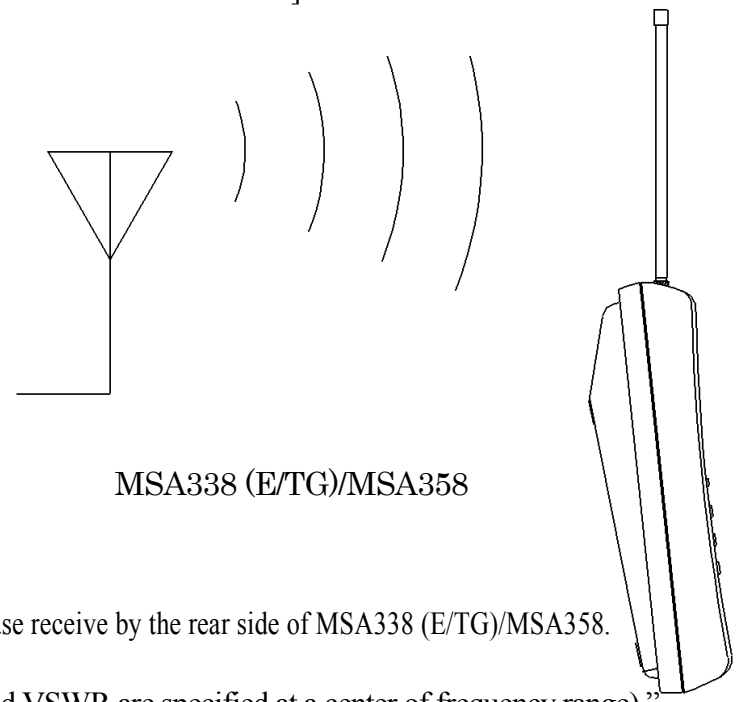
Allows using an antenna other than options by creating and inputting the original compensation table.

(Refer to "25.6 Writing of original compensation data" for how to create and write)

[Antenna connection]



[Measurement environment]



* Please receive by the rear side of MSA338 (E/TG)/MSA358.

"Specifications of the antenna (antenna gain and VSWR are specified at a center of frequency range)."

Items	M301	M302	M303	M304	M305	M306	M307
Type	Sleeve	Sleeve	Sleeve	Sleeve	1/4 λ whip	Sleeve	1/4 λ whip
Frequency range	0.8 to 1.0GHz	1.25 to 1.65GHz	1.70 to 2.20GHz	2.25 to 2.65GHz	300 to 500 MHz	4.7 to 6.2 GHz	470 to 770 MHz
Antenna gain	+1dBi or higher	+1dBi or higher	+1dBi or higher	+1dBi or higher	+1dBi or higher	+1dBi or higher	+1dBi or higher
VSWR	1.5 or lower	1.5 or lower	1.5 or lower	1.5 or lower	1.5 or lower	1.5 or lower	1.5 or lower
Dimensions	7.5φ×250 mm	7.5φ×250 mm	7.5φ×180 mm	7.5φ×180 mm	8.0φ×195 mm	7.5φ×120 mm	8.0φ×123 mm
Weight	approx.20g	approx.20g	approx. 15g	approx.15g	approx.30g	approx.10g	approx.15g
Reference level setting range (except for the minimum value in screen shift)	93 to 143dBμV/m	96 to 146dBμV/m	98 to 148dBμV/m	100 to 150dBμV/m	87 to 137dBμV/m	109 to 159dBμV/m	91 to 141dBuV/m

* Measured value varies depending on how to have MSA338(E/TG)/358 main unit. Moreover, if the person who has is different, measured value will vary. Because M305/307 is 1/4 λ whip antenna. Therefore, in the measurement used an antenna M305/307, measurement errors occurs. The error value is several dB or 10dB or more. In order to lessen the error value, use it, separating from the body as much as possible so that there is no influence of human body.

・Mode selection and measurement

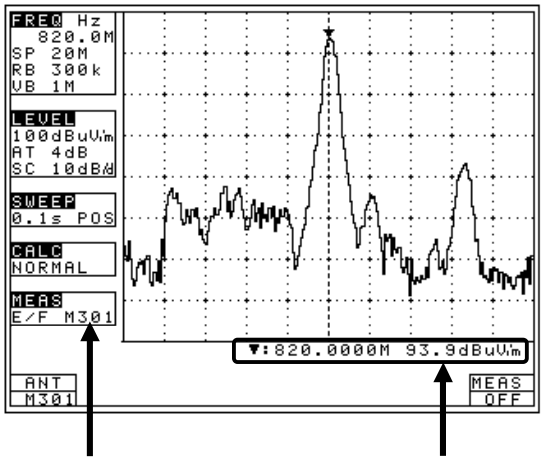
Use **F1** (ANT) to select an antenna, M301, M302, M303, M304, M305, M306 ,M307or USER.

As soon as the antenna is entered, the measurement is taken.

* It is each shown on MEAS area of LCD as “E/F M301”, “E/F M302”, “E/F M303”, “E/F M304”, “E/F M305”, “E/F M306” , “E/F M307” or “E/F USER”.

* “USER” is an original compensation table the user crates.
(Refer to “25.3 Command description” for details.)

* Trace may exceed from a screen by antenna gain compensation.



[Electric field strength [Measured value]

Unit of amplitude axis changes to [dBμV/m]

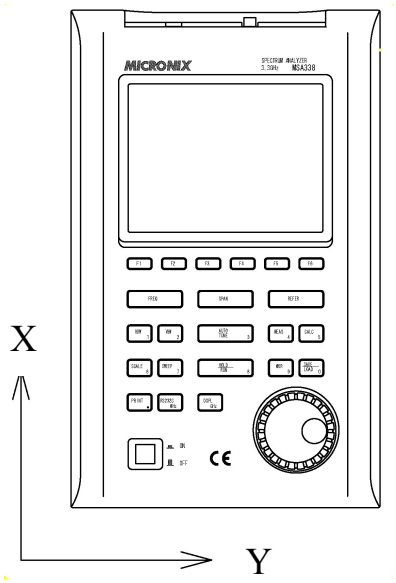
* Optimum center frequency and frequency span are set according to the antenna.
In addition, a trace is not displayed for frequencies outside those supported by the antenna.

Example) case of M301

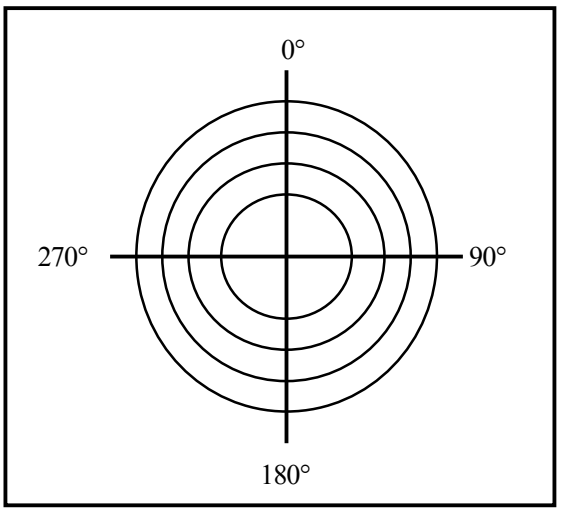
Center frequency: 900MHz

Frequency span: 200MHz

・Antenna directivity (reference data)



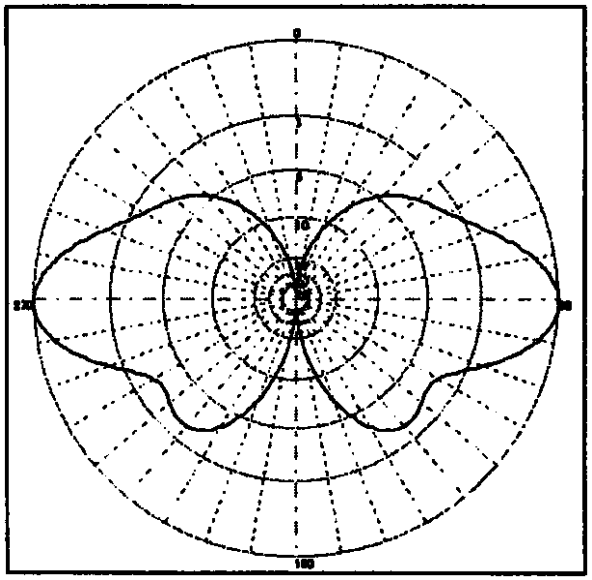
E plane: X-Y axis (X direction=0°)



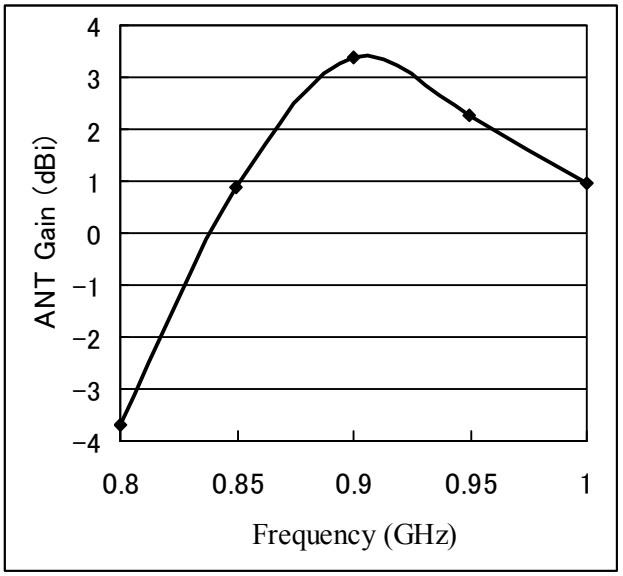
* All the data are those when the antenna is connected to the RF input with no obstacles around.

* However, data of M305/307 is reference data of the conditions in which people have MSA338(E/TG) /MSA358 attached M305/307.
So, the directivity changes in practice, because, for example, the unit is carried by people.

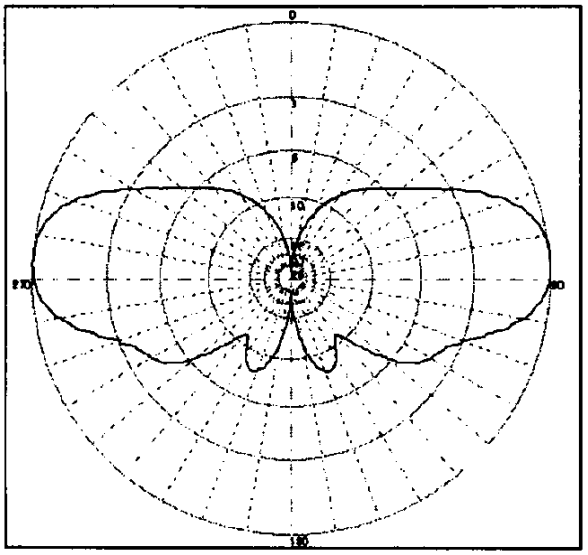
M301 (900MHz, E plane)



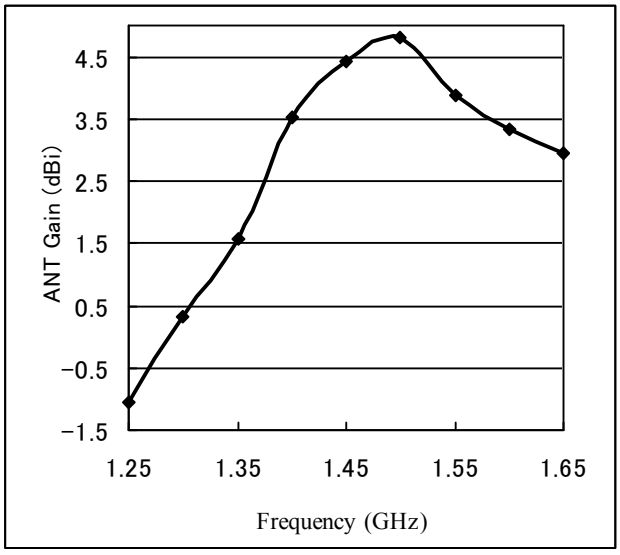
Antenna gain vs Frequency



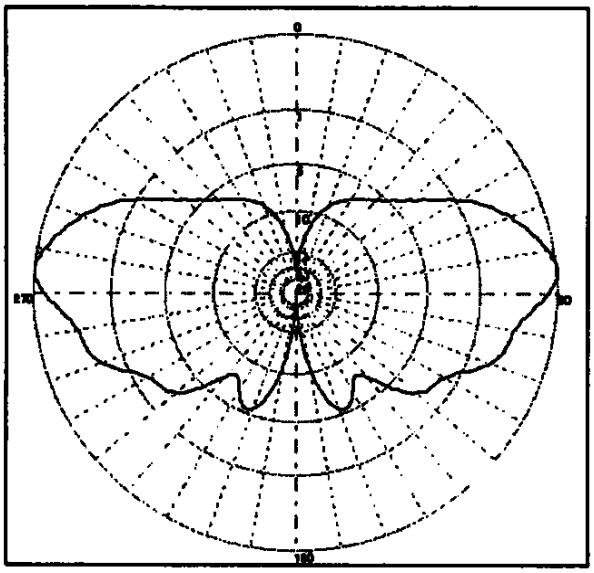
M302 (1.5GHz, E plane)



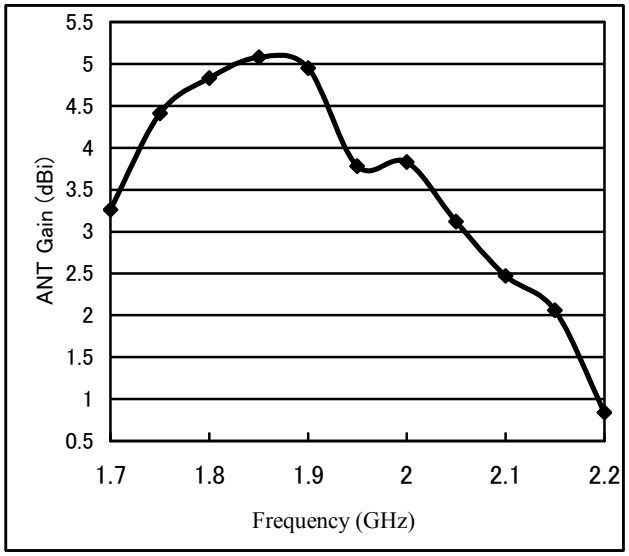
Antenna gain vs Frequency



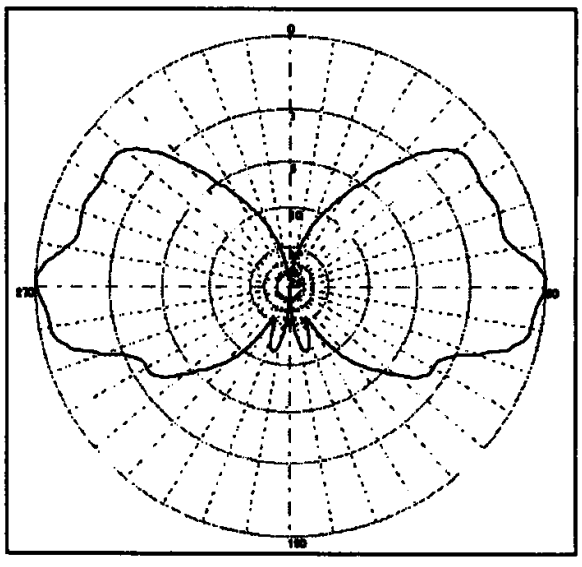
M303 (2.0GHz, E plane)



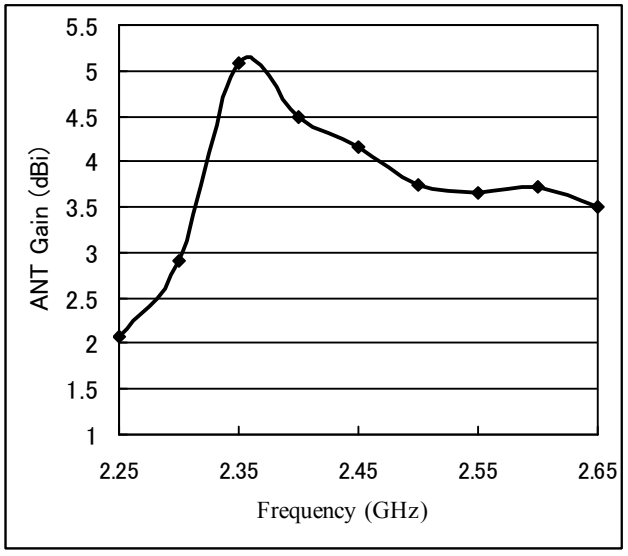
Antenna gain vs Frequency



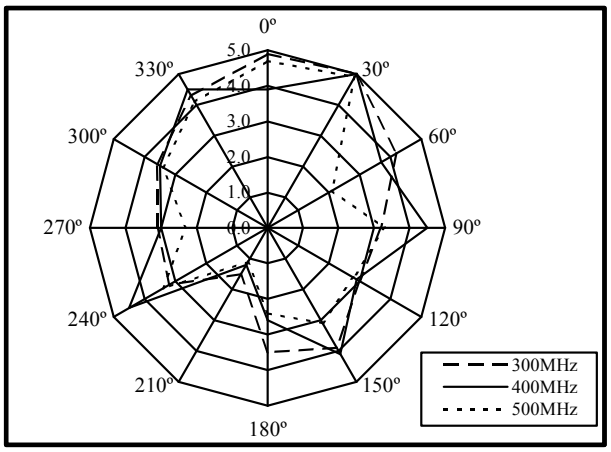
M304 (2.4GHz, E plane)



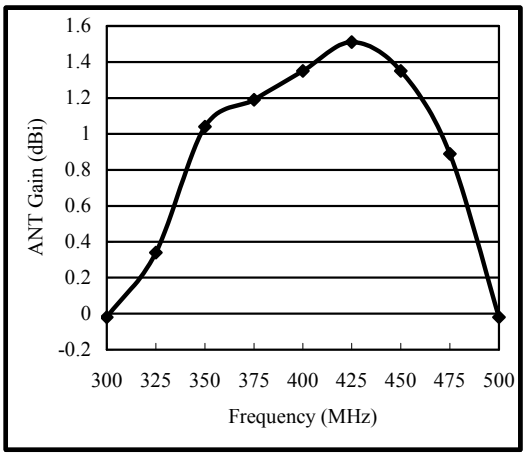
Antenna gain vs Frequency



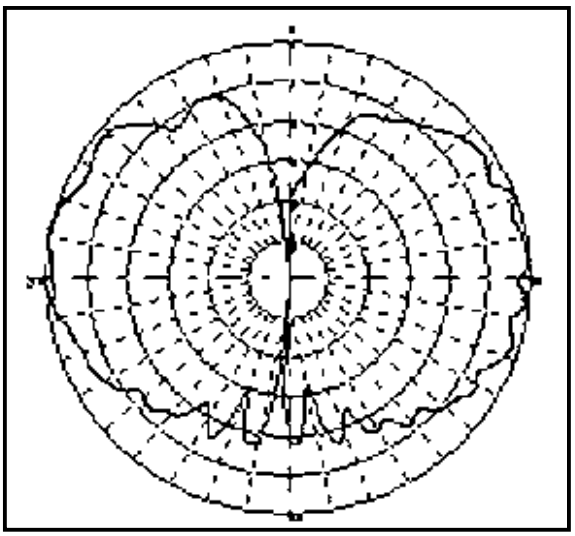
M305 (horizontal plane)



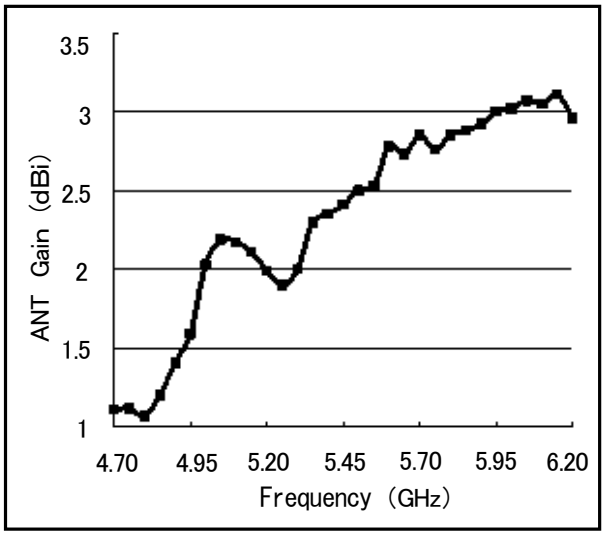
Antenna gain vs Frequency



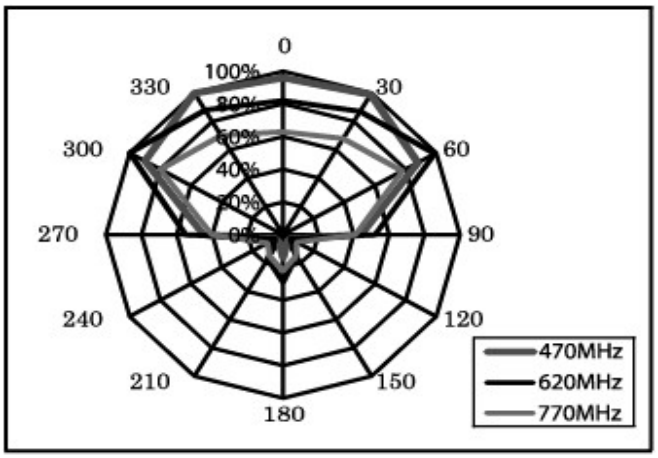
M306 (5.4GHz, E plane)



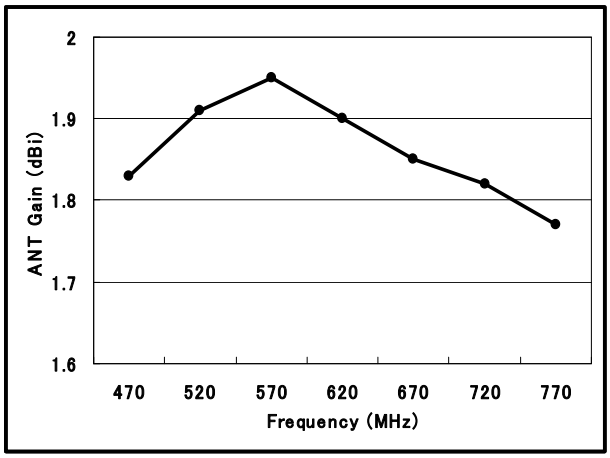
Antenna gain vs Frequency



M307 (horizontal plane)



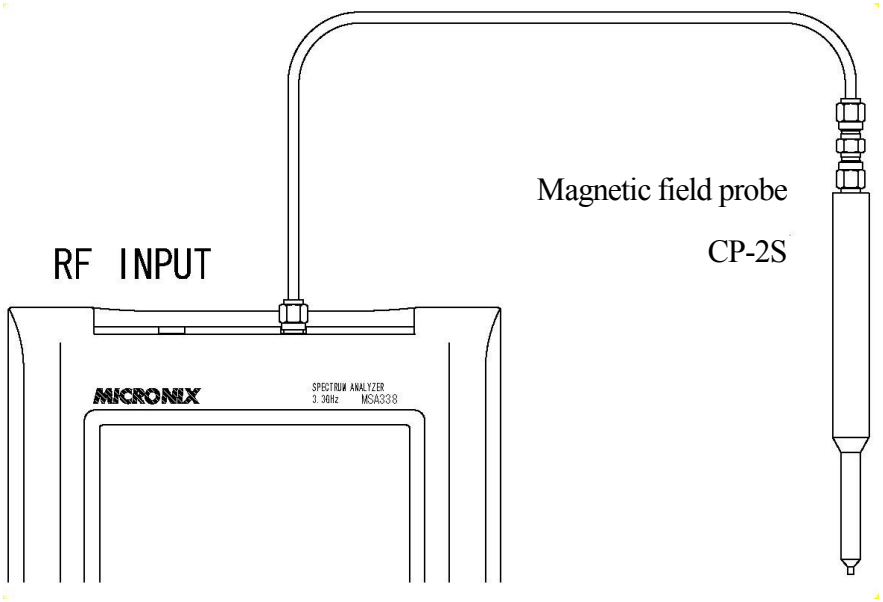
Antenna gain vs Frequency



19.5 Magnetic field strength measurement <M/F PROBE>

F5

Measures the magnetic field strength using the optional magnetic field probe CP-2S.



"Specifications of magnetic field probe CP-2S"

Items	Specifications
Frequency range	10MHz to 3GHz
Space resolution (-6dB)	approx.0.25 mm (Depending on objects)
Dimensions	Outside: 12φ×135mm probe tip: 2mm(W)×1mm(T)
Connector	SMA (P)
Reference level setting range (maximum)	160 to 203dBμA/m
Reference level setting range (except for the minimum value in screen shift)	110 to 153dBμA/m
Measurement error	approx.±1dB (Probe simple substance)

The tip of the optional magnetic field probe CP-2S is made of glass-ceramic board. Take care when handling the probe even though the strength of the glass-ceramic board is sufficiently ensured under normal operation.

(Refer to the operating manual for CP-2S for details.)

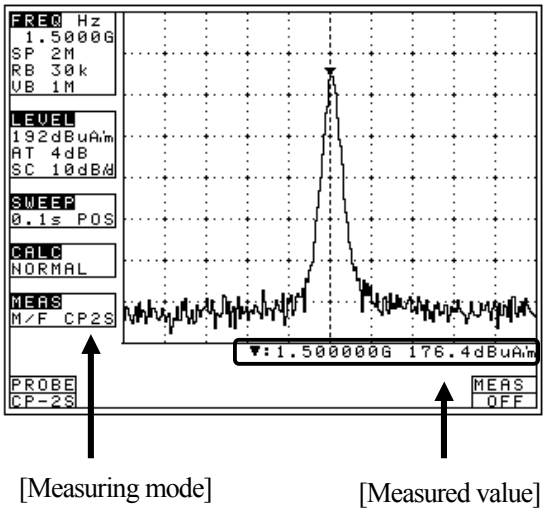
・Mode selection and measurement

Use **F1** (PROBE) to select a probe, CP-2S or USER. As soon as the probe is entered, the measurement is taken.

* It is each shown on MEAS area of LCD as “M/F CP2S” or “M/F USER”.

* “USER” is an original calibration table the user creates.

(Refer to “25.3 Command description” for details.)



[Measuring mode] [Measured value]

Unit of amplitude axis are changing to [dBμA/m]

* A trace is not displayed for frequencies outside those supported by the probe.

19.6 Frequency counter <Freq COUNT> (factory option) F6

Measure the frequency that is displayed on the spectrum of center on screen, at high accuracy. Set frequency roughly, as center frequency. And adjust the center frequency and the reference level so that the level of the center on screen becomes as high as possible.

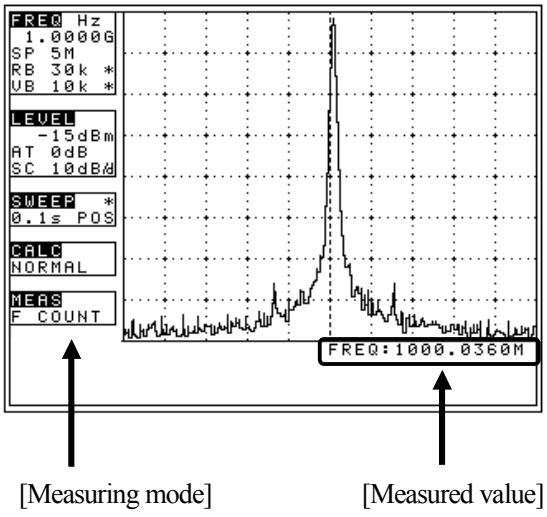
"Specifications"

Items	Specifications
Measurement frequency range	1MHz to 3.3GHz(MSA338(E/TG))/1MHz to 8.5GHz(MSA358)
Measured level	+10 to -70dBm (CF: 1MHz to 2GHz, RBW:100kHz) +10 to -60dBm (CF: 2GHz to 8.5GHz, RBW: 100kHz)
Measured resolution	100Hz
Display digits	8 digits max
Reference X'tal	Accuracy: ±2ppm (23˚C), Temp. characteristics: ±5ppm (0 to 40˚C)

* Setting range of sweep time is 0.1s or more.

* It does not correspond to FULL SPAN.

· Measurement



1. Press F6 to enter frequency counter mode.

* It is shown on MEAS area of LCD as "F COUNT".

Since the frequency of spectrum of a screen center is measured, please set up spectrum of frequency to measure roughly to become the center of a screen. The measured value is displayed on the lower right of a screen.

* When the level of spectrum is small and cannot measure, it is displayed as "Non signal".

* If frequency counter (factory option) is not mounting, it is always displayed as "Invalid for F/C".

20. EMI Test (MSA338E)

20.1 Additional function for EMI test

● Detection mode（Refer to "13.4 Setting the Detection mode"）

Changing of the detection mode is performed with pressing **SWEEP** → **F4**

Pos PK → SMPL → NegPK → QP → AV

In MSA338E, the QP detection and the AV detection are added for the EMI test.

- PosPK (Positive Peak) : Trace the maximum value of the sample points.
- SMPL (Sample) : Trace the momentary value of the sample points.
- Neg PK (Negative Peak) : Trace the minimum value of the sample points.
- QP (Quasi Peak) : Trace the quasi peak value of the sample points.
- AV (Average) : Trace the average value of the sample points.

As for the QP detection, the following characteristics are chosen from the setting of RBW.(based on CISPR16)

RBW	charging time constant	dis-charging time constant	meter time constant
9kHz	1ms	160ms	160ms
120kHz	1ms	550ms	100ms

● Presetting (Initialization)（ Refer to "18. Save/Load" ）

In MSA338E, the default settings of the radiated disturbance measurement and the conducted disturbance measurement are added to the preset.

Menu is displayed with pressing **SAVE/LOAD** → **F6**

Press **F1** [NORM] to preset the setting parameters as the normal initialization.

Press **F2** [EMI-C] to preset the setting parameters for the conducted disturbance measurement.

Press **F3** [EMI-R] to preset the setting parameters for the radiated disturbance measurement.

In the radiated disturbance measurement,【USER】is selected as an antenna.

It is necessary to input the antenna calibration data beforehand.

20.2 EMI test

Limits of disturbance use QP or AV detection value.

It takes much time to measure the QP or AV detection values.

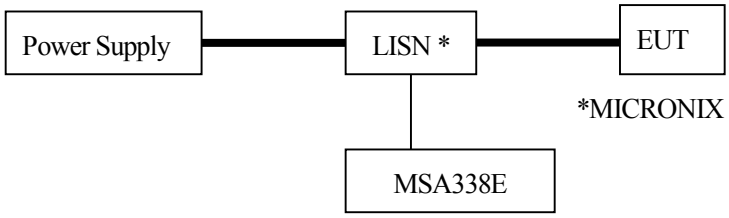
To save time, measure all band using the peak detection and then measure the QP or AV values of the frequency where the peak detection values exceed the QP or AV limits.

●Conducted disturbance at mains ports measurement

Conduction disturbance voltage induced at an AC power terminal of Equipment Under Test (EUT).

LISN* (Line Impedance Stabilization Network) device is needed. The connection is shown in the figure below.

Please refer to the manual of LISN for details of the connection and notes.



*MICRONIX provides the LISN product（MPW201）.

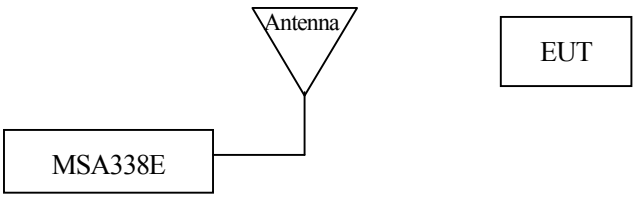
1. Turn on the MSA338E after connection.
2. Press **SAVE/LOAD** → **F6** → **F2** to preset the setting parameters for the conducted disturbance measurement. The settings are as follows.

Center Frequency	:15MHz
Frequency span	:50MHz
RBW:	:9kHz
VBW	:1MHz
Sweep time	:3sec
Detection mode	:Positive peak mode

3. Confirm that the connections and operations are correct with supplying the power to the EUT and measuring.
4. Press **CALC** → **F2** to set the MAX-HOLD count.
   Set the count that can catch impulse disturbance, such as "256". It depends on impulse disturbance cycle.
5. Search the frequency where the disturbance exceeds the AV or QP limits using the Marker-Peak-Search function..
6. Set the CENTER-FREQUENCY to the near frequency where the disturbance exceeds the limits, and set the SPAN to 2MHz and set the SWEEP to 0.1sec. And measure the disturbance frequency accurately.
7. Measure the disturbance with QP or AV detection, SPAN200KHz and SWEEP10sec at the frequency selected in item-6 .

●Radiated disturbance measurement

The electric field strength of radio disturbance from the EUT.



1. Set the antenna calibration data beforehand if unsetting.

   Refer to " 24.5 Writing original compensation data" for the setting method.

2. Turn on the MSA338E after connection.

3. Press **SAVE/LOAD** → **F6** → **F3** to preset the setting parameters for the radiated disturbance measurement. The settings are as follows.

Center Frequency	:515MHz
Frequency span	:1GHz
RBW:	:120kHz
VBW	:1MHz
Sweep time	:0.3sec
Detection mode	:Positive peak mode

4. Confirm that the connections and operations are correct with supplying the power to the EUT and measuring.

5. Press **CALC** → **F2** to set the MAX-HOLD count.

   Set the count that can catch impulse disturbance, such as "256". It depends on impulse disturbance cycle.

6. Search the frequency where the disturbance exceeds the QP limits using the Marker-Peak-Search function..

7. Set the CENTER-FREQUENCY to the near frequency where the disturbance exceeds the limits,

   and set the SPAN to 50MHz and set the SWEEP to 30msec. And measure the disturbance frequency accurately.

8. Measure the disturbance with QP detection, SPAN1MHz and SWEEP30sec at the frequency selected in item-7.

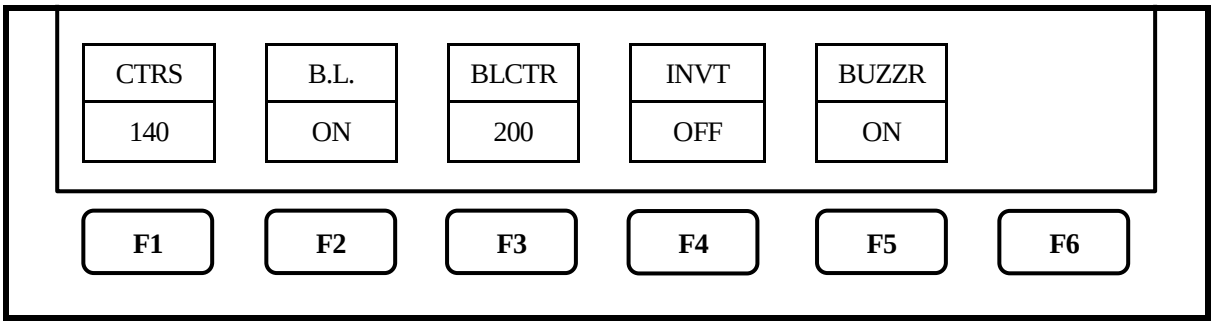
EMI standards (selected) (As of June 2005)

	Frequency	Quasi Peak	Average	
CISPR22 class A Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 30MHz	79dBuV 73dBuV	66dBuV 60dBuV	
CISPR22 class B Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 5MHz 5MHz ～ 30MHz	66～56dBuV 56dBuV 60dBuV	56～46dBuV 46dBuV 50dBuV	Decreasing linearly with the logarithm of the frequency
CISPR22 class A Limits of radiated disturbance	30MHz ～ 230MHz 230MHz ～ 1000MHz	40dBuV/m 47dBuV/m	--- ---	Measurement distance 10 m
CISPR22 class B Limits of radiated disturbance	30MHz ～ 230MHz 230MHz ～ 1000MHz	30dBuV/m 37dBuV/m	--- ---	Measurement distance 10 m
VCCI class A Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 30MHz	79dBuV 73dBuV	66dBuV 60dBuV	
VCCI class B Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 5MHz 5MHz ～ 30MHz	66～56dBuV 56dBuV 60dBuV	56～46dBuV 46dBuV 50dBuV	Decreasing linearly with the logarithm of the frequency.
VCCI class A Limits of radiated disturbance	30MHz ～ 230MHz 230MHz ～ 1000MHz	40dBuV/m 47dBuV/m	--- ---	Measurement distance 10 m
VCCI class B Limits of radiated disturbance	30MHz ～ 230MHz 230MHz ～ 1000MHz	30dBuV/m 37dBuV/m	--- ---	Measurement distance 10 m
FCC part15 subpartB class B Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 30MHz	79dBuV 73dBuV	66dBuV 60dBuV	
FCC part15 subpartB class A Limits of conducted disturbance at mains ports	0.15MHz ～ 0.50MHz 0.50MHz ～ 5MHz 5MHz ～ 30MHz	66～56dBuV 56dBuV 60dBuV	56～46dBuV 46dBuV 50dBuV	Decreasing linearly with the logarithm of the frequency.
FCC part15 subpartB class B Limits of radiated disturbance	30MHz ～ 88MHz 88MHz ～ 216MHz 216MHz ～ 960MHz 960MHz ～	40dBuV/m 43.5dBuV/m 46dBuV/m 54dBuV/m	--- --- --- ---	Measurement distance 3 m
FCC part15 subpartB class A Limits of radiated disturbance	30MHz ～ 88MHz 88MHz ～ 216MHz 216MHz ～ 960MHz 960MHz ～	39dBuV/m 43.5dBuV/m 46.4dBuV/m 49.5dBuV/m	--- --- --- ---	Measurement distance 10 m

(Attention) This table is a background information. Micronix is not liable to you for any damages due to the mistake of the content of the description.

21. Screen Control <DSPL>

Press **DSPL** to switch over to the function screen shown below:



21.1 Adjusting the contrast (*1)

Use **F1** → ◯ to adjust the contrast.

(*1 There is a product to which contrast adjustment is not necessary to perform for component change.

In that case, this menu CTRS 140 is not displayed.)

21.2 Switching ON and OFF the LCD backlight

Each time **F2** is pressed, the LCD backlight is alternately switched to ON or OFF.

21.3 Adjusting the brightness of the LCD backlight

Use **F3** → ◯ to set the brightness.

21.4 Inverting the display

Press **F4** to invert the screen display. Press **F4** again to return it to the previous state.

21.5 Enabling or disabling the beep

Pressing **F5** allows you to disable the beep that sounds when you operate a key or the encoder.

Press **F5** again to return it to the previous state.

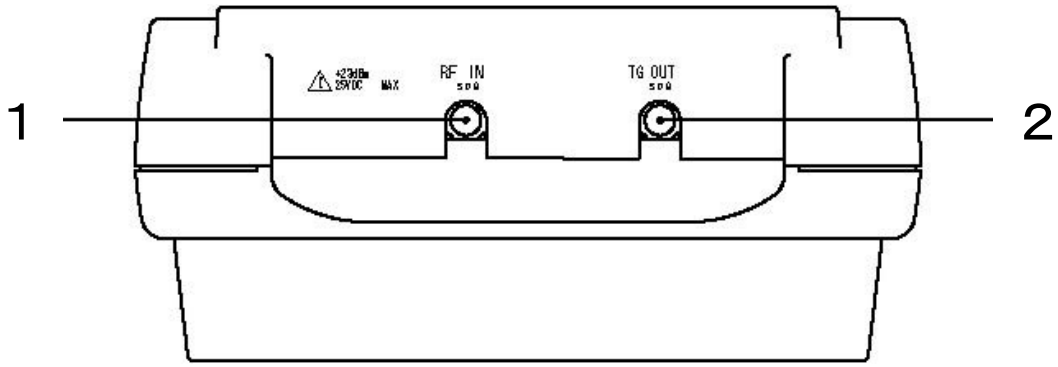
* If the voltage of a battery becomes low at the time of battery operation, it will be displayed on a screen as “Low Batt”, and a buzzer will sound (it sounds, even if it is set up so that a buzzer may not sound), and a power supply will be shut off within several minutes.

22. Tracking Generator Mode(MSA338TG)

22.1 Specification for T.G. function

Item	Limit
Frequency range	**5MHz to 3.3GHz**
Output Level	**-10dBm±1dB @1GHz(Fixed value)**
Output flatness	**±1.5dB**
Output impedance	**50Ω**
Output VSWR	**Less than 2.0**
Output connector	**SMA (J)**

22.2 Description of I/O connector



1) Input connector

SMA (J) connector.

Input for an external signal.

Make sure that the total power of all signals at the analyzer input dose not exceeds +23dBm.

2) Output connector

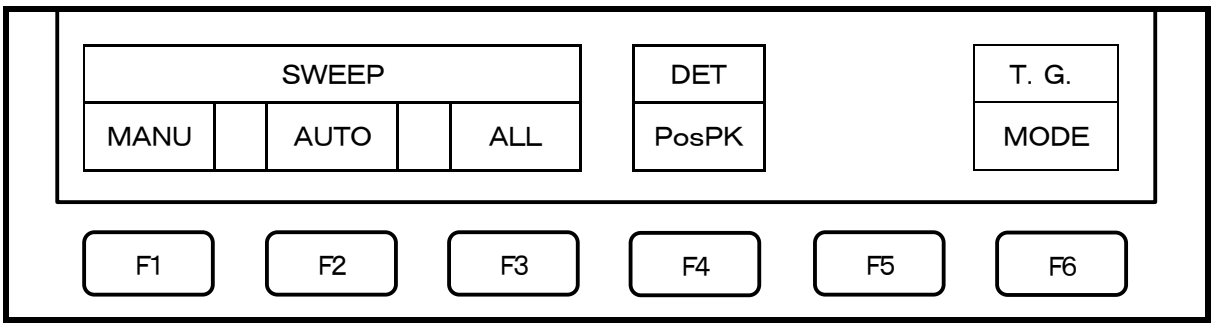
SMA (J) connector.

It is an output terminal of Tracking Generator.

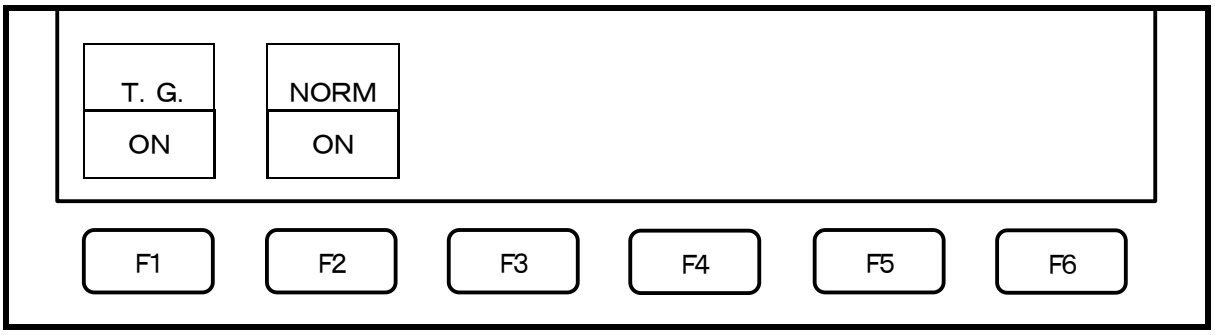
※ **Please set to "TG: OFF" to prevent from the influence of the leak from the Tracking Generator in case of disuse of the T.G. function.**

22.3 Switching ON and OFF the T.G. function

SWEEP to switch over to the function screen shown below :



1. Press F6 to set the T.G.. Mode screen.



2. Each time F1 is pressed, the T.G.. output is alternately switched to ON or OFF.
   If the T.G. output is switched to ON, it will be displayed on a screen as "TG: ON".
   If the T.G. output is switched to OFF, it will be displayed on a screen as "TG: OFF".

22.4 Normalizing of waveform

NORM ON : To become smooth at a dotted line position on the screen, the waveform of the input signal is normalized.

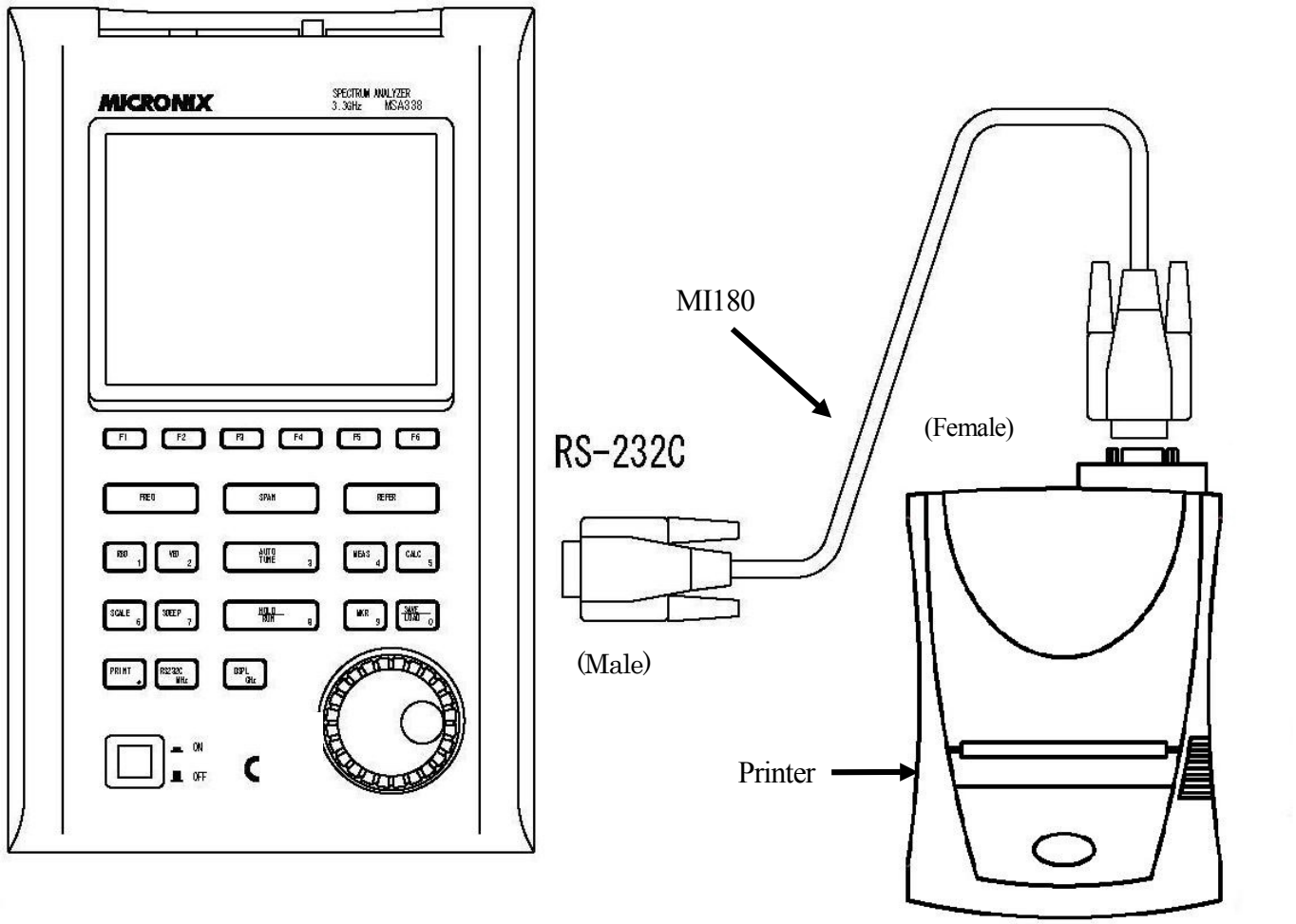
1. SWEEP to switch over to the function screen shown similar to the preceding clause.
2. Press F6 to set the T.G.. Mode screen.
3. Each time F2 is pressed, the normalizing of waveform is alternately switched to ON or OFF.
   If the normalizing of waveform is switched to ON, it will be displayed on a screen as "NORM: ON".

※ If the following setting changes are done, the normalizing of waveform is automatically turned off.
・The span is expanded. ・The central frequency is changed over the range of the screen.
(When SPAN is changed from FULL SPAN according to the setting of a center frequency, the setting is released.)
・The magnetic field strength measurement or the frequency counter(factory optional) is selected.
・The AUTO tuning is executed. ・The presetting is executed. ・The power supply is turned off.

※ It cannot be normalized that the shape of waves is not displayed at a proper position on the screen when the setting of the scale is 2dB.

23. Printing <PRINT> (optional)

When using the optional printer, connect the RS-232C cable MI180 (optional) as shown in the figure below.



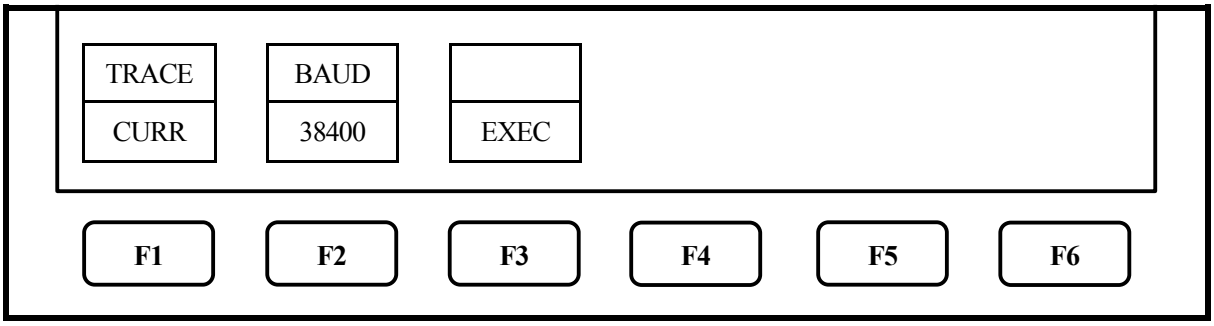
23.1 Hard copy of the screen

When you press the **PRINT** with the printer (optional) connected to the unit, it is set to the HOLD state and starts printing. It remains in the HOLD state after the printing is finished. It stops printing if you press the **PRINT** again during printing.

Since the printer operates with power supply from either the AC adapter or dry batteries, you can easily produce a hard copy of measured data even when outdoors where no AC power supply is available. When battery-powered, the printer operates for approximately 30 minutes (continuous use), allowing you to produce about 80 hard copies of the screen image.

24. Data Output <RS232C>

Press **RS232C** to switch over to the function screen shown below:



*Refer to "23. RS-232C" for "How to connect" and "RS-232C specifications"

24.1 Selecting the trace to transfer

Use **F1** → ◯ to select a trace.

CURR ↔ 00 ↔ 01 ↔ 02 ↔ 03 ↔ ··· ↔ 98 ↔ 99

*An asterisk (∗) appears when there is a saved trace at the selected number as well as "SAVE/LOAD".

* The trace currently displayed on the screen is transmitted when "CURR" is selected.

24.2 Selecting the communication speed (baud rate)

Use **F2** → ◯ to select a baud rate.

2400 ↔ 4800 ↔ 9600 ↔ 19200 ↔ 38400

24.3 Transfer the data

Press **F3** to start the transfer.

The data are transmitted as ASCII cord character strings.

· Contents of data *"CR(0D[HEX])+LF(0A[HEX])" is added to the tail of every data.

Character strings	Description	Example
PARAM	This means that the data from the next line are "setting parameters".	PARAM
CF **	Center frequency Refer to 1	CF 2.5140G
SP **	Frequency span Refer to 2	SP 20M
RF **	Reference level Refer to 3	RF 10dBm
ST ** ##	Sweep time and detection mode Refer to 4	ST 30ms SMP
RB **	Resolution bandwidth Refer to 5	RB 300k
VB **	Video bandwidth Refer to 6	VB 1M
SC **	Display scale (**=10dB/d or 2dB/d)	SC 10dB/d
TRACE	This means that the data from the next line are "trace data".	TRACE
**, **, ···	These are trace data. Ten two-digit hexadecimal characters separated by commas make a line, and there are 26 lines (251data) of data in total. For Trace 1001 data transfer, there are 101 lines (1001 data) of data in total.	24, 20, 1f, 1f, 1e, ··· ... 23

1: Center frequency

MSA338(E/TG): CF ** [**=0.0M, 0.1M to 999.9M (0.1step), 0.0001G to 3.3G(0.0001step)]

MSA358: CF ** [**=0.0M, 0.1M to 999.9M (0.1step), 0.0001G to 8.5G(0.0001step)]

2: Frequency span

MSA338(E/TG):

SP**[**=ZERO,200k,500k,1M,2M,5M,10M,20M,50M,100M,200M,500M,1G,2G,FULL]

MSA358: SP ** [**=ZERO, 200k, 500k, 1M, 2M, 5M, 10M, 20M, 50M, 100M, 200M, 500M, 1G, 2G, 5G, FULL]

3: Reference level

RF ** [**=-60 to 10dBm, 47 to 117dBμV, -13 to 57dBmV, -73 to -3dBv,
72 to 149dBμV/m, 89 to 203dBμA/m (all 1step)]

4: Sweep time and Detection mode

ST ** ## [**=10ms, 30ms, 0.1s, 0.3s, 1s, 3s, 10s, 30s]

[##=POS, NEG, SMP]

5: Resolution bandwidth

MSA338(TG)/358: RB ** [**=3k, 10k, 30k, 100k, 300k, 1M, 3M]

MSA338E: RB ** [**=3k, 9k, 30k, 120k, 300k, 1M, 3M]

6: Video bandwidth

VB ** [**=100, 300, 1k, 3k, 10k, 30k, 100k, 300k, 1M]

25. RS-232C Interface

25.1 RS-232C specifications

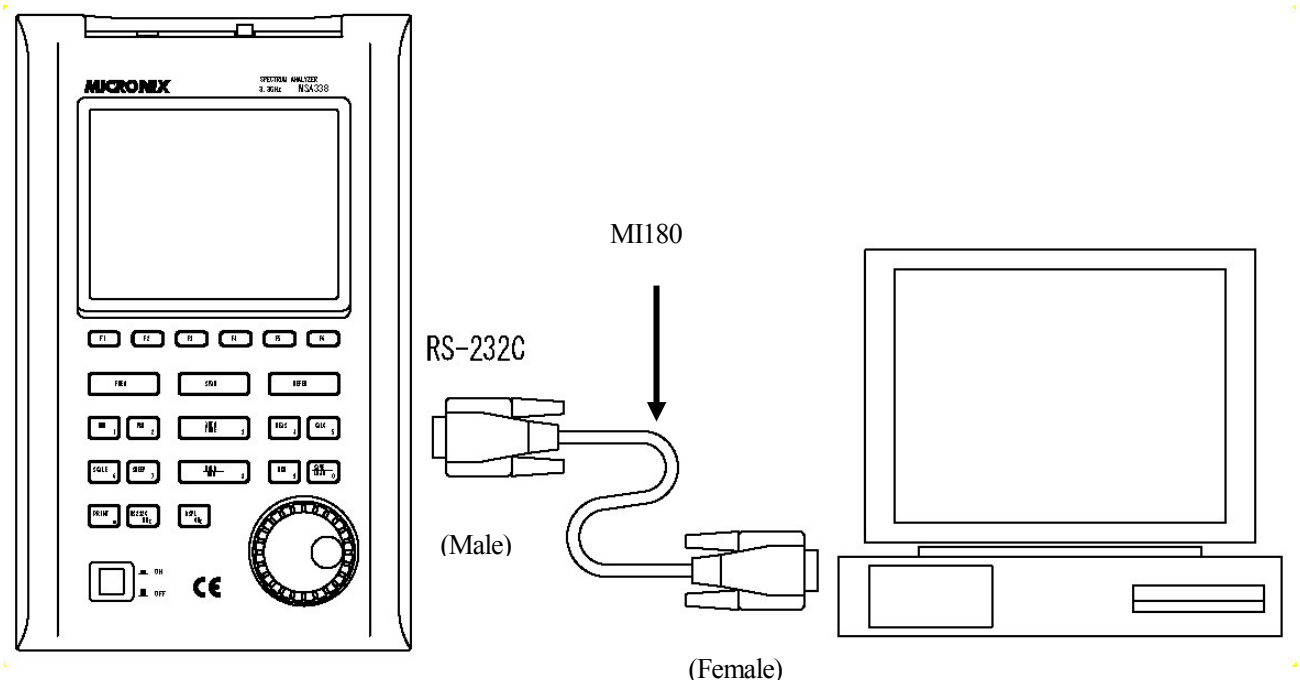
·Transfer rate : 2400/4800/9600/19200/38400bps
·Date bit length : 8bit
·Stop bit : 1bit
·Parity check : none

25.2 How to connect

When using the RS-232C interface, connect the RS-232C cable MI180 (optional) as shown in the figure below.

* RS-232C interface cable MI180 specifications · · · Cable length: approx. 1.5m
Connector: D-sub 9pin male / D-sub 9pin female
Wiring: straight

* Refer to "23. Data Output" about changing baud rate.



COM PORT (D-sub 9pin, male)
*Use the conversion connector, in the case that is D-sub 25pin (male)

25.3 Command description

* "CR(0D[HEX])+ LF(0A[HEX])" is added to the tail of every command. When you send a command from your PC, MSA338(E/TG)/MSA358 returns a response. Responses include "OK" + CR + LF, "ERR" + CR + LF and "(response to command)" + CR + LF.

*By inputting "?" instead of "**" for each command, the current setting parameters are returned. Except for "····Request" command and command for inputting corrected data.

1) Set the center frequency

Command: FREQ*******

(*******=Refer to [25.4 Input the frequency])

2) Request the set marker

Command: FREQSETMKR *The center frequency is set according to the frequency of current marker position.

3) Set the span

MSA338(E/TG): Command: SPAN****

(****=ZERO, 200K, 500K, 1M, 2M, 5M, 10M, 20M, 50M, 100M,500M, 1G, 2G, FULL[unit: Hz])

MSA358: Command: SPAN****

(****=ZERO, 200K, 500K, 1M, 2M, 5M, 10M, 20M, 50M, 100M,500M, 1G, 2G, 5G, FULL[unit: Hz])

4) Set the reference level

Command: REF***

(***=-60 to 10[1step, unit: dBm])

*For units other than dBm, use the conversion formulas in "9.3 Refference level setting range for each unit" to convert them into dBm before inputting the value.

5) Set the reference unit

Command: UNIT***

(***=DBM, DBVU, DBMV, DBV)

Command	Unit
DBM	dBm
DBUV	dBμV
DBMV	dBmV
DBV	dBV

6) Set the RBW

Command: RBW****

MSA338(TG)/358 (****=3K, 10K, 30K, 100K, 300K, 1M, 3M, AUTO, ALL[unit: Hz])

MSA338E (****=3K, 9K, 30K, 120K, 300K, 1M, 3M, AUTO, ALL[unit: Hz])

7) Set the VBW

Command: VBW****

(****=100, 300, 1K, 3K, 10K, 30K, 100K, 300K, 1M AUTO, ALL[unit: Hz])

8) Start/Stop the measuring function

Command: MEAS***

(***=CP, ACP, OBW,
EF, MF, FC, OFF)

Command	Measuring function
CP	Channel power measurement
ACP	Adjacent channel leakage power measurement
OBW	Occupied frequency bandwidth measurement
EF	Electric field strangth measurement
MF	Magnetic field strangth measurement
FC	Frequency counter (factory option)
OFF	OFF

9) Request the result of measuring function

Command: MEASRES

*Example of the return data

Case of channel power measurement··· POW: -25.5dBm

Case of adjacent channel power measurement··· L: -44.7dBc U: -48.3dBc

Case of occupied bandwidth measurement··· C: 1.45G W: 20.00k

Case of frequency counter··· FC:2400.0000M

* When the level of spectrum is small and cannot measure, it is returned as "Non signal".

* If frequency counter (factory option) is not mounting, it is returned as "Invalid for F/C".

10) Set the mode of channel power measurement

Command: CPMODE*****

(*****=TOTAL. BAND)

Command	Mode
TOTAL	Measure the power of whole range on the screen
BAND	Measure the power within zone set

11) Set the zone center frequency of channel power measurement

Command: CPCNTR*******

(*******=Refer to [25.4 Input the frequency])

12) Set the zone width of channel power measurement

Command: CPWIDTH*******

(*******=Refer to [25.4 Input the frequency])

13) Set the mode of adjacent channel power mesurement

Command: ACPMODE*****

(*****=TOTAL, REF, PEAK)

Command	Mode
TOTAL	TOTAL(total power method)
BAND	BAND(in-band method)
PEAK	PEAK(reference level method)

14) Set the band offset of adjacent channel power mesurement

Command: ACPOFS*******

(*******=Refer to [25.4 Input the frequency])

15) Set the bandwidth of adjacent channel power mesurement

Command: ACPCHBW*******

(*******=Refer to [25.4 Input the frequency])

16) Set the reference band center frequency of adjacent channel power mesurement

Command: ACPREF*******

(*******=Refer to [25.4 Input the frequency])

17) Set the reference bandwidth of adjacent channel power measurement

Command: ACPREFBW*******

(*******=Refer to [25.4 Input the frequency])

18) Set the mode of occupied bandwidth measurement

Command: OBWMODE**

(**=N%, DB)

Command	Mode
N%	N% POWER mode
DB	XdB DOWN mode

19) Set the N% ratio of occupied bandwidth mesurement

Command: OBWRATIO***

(***=80.0 to 99.9[0.1step, unit: %])

20) Set the XdB down of occupied bandwidth mesurement

Command: OBWDB***

(***=0.1 to 40.0[0.1step, unit: dB])

21) Set the antenna of electric field strength measurement

Command: EFANT****

(****=M301, M302, M303, M304, M305,M306, USER)

Command	Antenna
M301	Setting data for M301
M302	Setting data for M302
M303	Setting data for M303
M304	Setting data for M304
M305	Setting data for M305
M306	Setting data for M306
USER	Setting date for user's original antenna

22) Transfer the user-compensation data of electric field strength measurement

Command: EFUSER*****

Example of the compensation data: *****=2.25G:2.08DBI,···2.65G:3.5DBI

*If the compensation coefficient is -0.3dBi at 2.5GHz, the compensation data is "2.5G:-0.3DBI"

Set apart by "," between data and input from lower frequency. 10data are available.

23) Set the probe of magnetic field strength measurement

Command: MFPROBE****

(****=CP2S, USER)

Command	Probe
. CP2S	Setting data for CP-2S
USER	Setting data for user's original probe

24) Transfer the user-compensation date for magnetic field strength measurement

Command: MFUSER*****

Example of the compensation data: *****=10M:86.7DB, 100M:69.2DB,···3G:40dB

*If the compensation coefficient is 86.7dB at 10MHz, the compensation data is "10M:86.7DB"

Set apart by "," between data and input from lower frequency. 10data are available.

25) Start/Stop Calculation

Command: CALC***

(***=OFF, MAX, MIN, AVE, OVR)

Command	Calculation
OFF	OFF
MAX	MAX HOLD
MIN	MIN HOLD
AVE	AVERAGE
OVR	OVER WRITE

26) Set the number of MAX HOLD

Command: MAXNO****

(****=2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 0) * Command: 0 = unlimited

27) Set the number of MIN HOLD

Command: MINNO****

(****=2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 0) * Command: 0 = unlimited

28) Set the number of AVERAGE

Command: AVENO***

(***=2, 4, 8, 16, 32, 64, 128, 256)

29) Set the display scale of amplitude axis

Command: SCALE** (**=2, 10)

Command	Display scale
2	2dB/div
10	10dB/div

30) Set the sweep time

Command: SWEEP****

(****=10M, 30M, 0.1S, 0.3S, 1S, 3S, 10S, 30S, AUTO, ALL)

Command	Sweep time
10M	10ms
30M	30ms
0.1S	0.1s
0.3S	0.3s
1S	1s

Command	Sweep time
3S	3s
10S	10s
30S	30s
AUTO	AUTO
ALL	ALL AUTO

31) Set the detection mode

Command: DET***

(***=POS, NEG, SMP)

Command	Detection mode
POS	Positive peak mode
NEG	Negative peak mode
SMP	Sample mode

32) Request the AUTOTUNE

Command: AUTO

*Returns the response after tuning.

33) Request the action

Command: HOLD/RUN

34) Request the marker information

Command: MKRRES

*Example of returned data: 1.42G -15dBm

35) Set the marker mode

Command: MKR*****

(*****=NORM, DELTA)

Command	Marker mode
NORM,	Normal marker
DELTA	Delta marker

36) Set the marker position

Command: NORMMKR*******

(*******=Refer to [24.4 Input the frequency])

37) Set the peak search mode

Command: PEAK****

(****=NORM, ZONE)

Command	Peak search mode
NORM	Normal peak search
ZONE	Zone peak search

38) Request the peak search

Command: PKSEARCH**

(**=01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11)

Command	Position to where the marker moves
01	Position of the maximum peak on the screen
02	Position of the 2nd highest peak on the screen
...	...
11	Position of the 11th highest peak on the screen

39) Set the zone center frequency of peak search

Command: PKCNTR*******

(*******=Refer to [25.4 Input the frequency])

40) Set the zone width of peak search

Command: PKWIDTH*******

(*******=Refer to [25.4 Input the frequency])

41) Set the unit of marker

Command: CONV***

(***=DBM, M, DBV, V, DBUVM, VM)

Command	Unit of marker
DBM	dBm
W	W
DBV	dBV
V	V
DBUVM	dBμV/m
VM	V/m

42) Request the transfer of hard copy

Command: PRT

*When transferring the returned data to optional printer, hard copy is performed.

43) Request to transfer trace

Command: SRS****

(****=CURR, 00 to 99)

44) Request to transfer 1001 date of trace

Command: SRSF Decimal data

SRSHF 4bit Hexadecimal data (Refer to "24.3 Transfer the data" about returned data.)

Command	Trace that is transferd
CURR	Trace of Current
00	Trace of save data 1
...	...
99	Trace of save data 100

45) Request the preset

Command: PRESET

46) Set the remote control

Command: REMOTE***

(***=ON, OFF)

* When remote control is ON, "REMOTE" is displayed in the operating information display area on the LCD screen. (Refer to "4. Description Of Screen" for details)

Command	Remote control
ON	Any operation from the keys or the encoder of the main body will not be accepted. Control the unit with RS-232C commands.
OFF	The operation from the keys or the encoder of the main body and RS-232C commands will be accepted.

47) Single sweep

Command: CAPT

* It sweeps only once and will be in a HOLD state.

48) Setting of the offset level

Command: OFFSET****

(****=-50.0 to 50.0 [0.1step, unit:dB])

49) Setting the input impedance

Command: IMP**

(**=50, 75)

Command	Offset level
50	Offset level is set to 0dB.
75	Offset level is set to 5.7dB.

* When selecting of "75Ω", please attach the coaxial connector (impedance converter) MA301 (optional) to an input connector.

50) Clearing of saved trace-data and parameter

Command: MCLR***

(***=WALL, SALL, W00 to W99, S00 to S99)

Command	Clearing data
WALL	All of saved trace-data
SALL	All of saved-parameter
W00	Trace-data of save-No. 00
...	...
W99	Trace-data of save-No. 99
S00	Parameter of save-No. 00
...	...
S99	Parameter of save-No. 99

51) Request save of setting parameter

Command: SVST

* return command : OK

25.4 Input the frequency

For the items written (*******=Refer to [25.4 Input the frequency]) in [25.3 Command description] above, enter a frequency as follows.

*******=0.0k to 999.9k[0.1step, unit: Hz]

0.0M to 999.9M[0.1step, unit: Hz]

MSA338(E/TG): 0.0000G to 3.3G[0.0001step, unit: Hz]

MSA358: 0.0000G to 8.5G[0.0001step, unit: Hz]

* However, the offset frequency and zone width can be input only in the range decided by the center frequency and frequency span. The value out of the range becomes error.
* Values of the offset frequency and the zone width will change as you alter the frequency span.

25.5 Writing of original compensation data

On the case of electric field strength measurement used the antenna prepared by the user, or, on the case of magnetic field strength measurement used the magnetic field probe prepared by the user, it is necessary to write the data of the antenna gain or the magnetic probe field compensation coefficient to MSA338(E/TG)/MSA358 main unit. Please write the antenna gain or the magnetic probe field compensation coefficient according to the following description. There are two kinds of methods, "method 1: use PC software MAS300 (optional)" and "method 2: use communication program which is prepared by user".

1) Preparation things

· RS-232C interface cable MI180

· Windows® PC (with RS-232C interface) * It is not writable with MSA338/MSA358 main unit only.

· PC software MAS300 (case of "Method 1 of writing data")

2) Write-in data

As example, the compensation data (antenna gain) of antenna M305 and the compensation data (compensation coefficient) of magnetic field probe CP-2S are shown below.

· Compensation data (antenna gain) of antenna M305.

Frequency	300MHz	350MHz	400MHz	450MHz	500MHz
Antenna gain	0.0dBi	1.0dBi	1.4dBi	1.4dBi	0.0dBi

· Compensation data (compensation coefficient) of magnetic field probe CP-2S.

Frequency	10MHz	100MHz	1GHz	2GHz	3GHz
Compensation coefficient	86.7dB	69.2dB	50.7dB	44.9dB	40.1dB

* Here, although the number of data is five points, it is possible to write even the data of maximum of ten points. Data cannot be written in 0Hz.

3) Method 1 of writing data

The method which used the optional PC software MAS300.

* Please use MAS300 of the version more than 1.03b.
The software can be updated from our website.

1. Write the antenna gain to text file.

Please create a new text file by new creation of a personal computer, and open by the text editor.

· Format

"Frequency":"Antenna gain","Frequency":"Antenna gain","Frequency":"Antenna gain", ···

Example) case of M305

300M:0.0DBI,350M:1.0DBI,400M:1.4DBI,450M:1.4DBI,500M:0.0DBI

* Please write unit with a capital letter. Moreover, Frequency can also use G (GHz).

2. It writes in by PC software MAS300.

Connect the personal computer to MSA338(E/TG)/MSA358 by MI180. Turn on the power of MSA338(E/TG)/MSA358. Start the PC software MAS300. Please set the same baud rate of MSA338(E/TG)/MSA358 and MAS300. (Refer to "24. Data Output" for details)

On the case of electric field strength measurement, please choose [File] → [Write E/F User Data], on the case of magnetic field strength measurement, please choose [File] → [Write M/F User Data], from the upper menu of software, and select the text file which made some time ago. Then, data is written.

4) Method 2 of writing data

It is method of writing in which does not use MAS300. A user needs to prepare communication program.

1. Prepare the RS-232C communication software.

Connect the personal computer to MSA338(E/TG)/MSA358 by MI180. Turn on the power of MSA338(E/TG)/MSA358.Start the RS-232C communication software. Please set the same baud rate of MSA338(E/TG)/MSA358 and software, and unite the setting of communication. (Refer to "24. Data Output" for details.)

2. Write the data

Please transmit data of the following format to MSA338(E/TG)/MSA358 from RS-232C communication software.

· Format

Case of compensation data of electric field strength measurement.

EFUSER"Frequency":"Antenna gain","Frequency":"Antenna gain", ···

Case of compensation data of magnetic field strength measurement.

MFUSER"Frequency":"Compensation coefficient","Frequency":"Compensation coefficient", ···

Example) case of CP-2S

MFUSER10M:86.7DB,100M:69.2DB,1G:50.7DB,2G:44.9DB,3G:40.1DB

* Please write unit with a capital letter.

3. After writing is completed correctly, "OK" is returned from MSA338(E/TG)/MSA358.

5) How to use

1. Please set the measuring function of MSA338(E/TG)/MSA358 to electric field strength measurement mode or magnetic field strength measurement mode.

On the case of electric field strength measurement, please select [MEAS] → [E/F ANT],
on the case of magnetic field strength measurement, please select [MEAS] → [M/F PROBE],
Please push [F1] and display [USER] on the upper of [F1].
Now, electric field strength measurement or magnetic field strength measurement by the written compensation data can be performed.

* When the power supply of MSA338(E/TG)/MSA358 is turned off at once and turned on again it returns from electric field strength measurement mode or magnetic field strength measurement mode to the usual measurement mode. Then if it goes into electric field measurement mode or magnetic field strength measurement mode once again, it can measure in the same state.

6) About the antenna gain

In this contents, the antenna gain is meaning absolute gain [dBi].
When antenna gain is relative gain, it can change into absolute gain by adding +2.15dB.

· Absolute gain [dBi] = Relative gain [dBd] + 2.15dB

As reference, the conversion formula to electric field strength is using the following.

· $E=\sqrt{(480\pi^2 \times Pa \div (Ga \times \lambda^2)}$

E: Electric field strength [V/m]
Pa: Received electric power [W]
Ga: Antenna gain [times] = $10^{(\text{antenna gain [dBi]} \div 10)}$
λ: Wavelength [m] = $(3 \times 10^8) \div$ frequency [Hz]

25.6 Sample program

An example program to send following setting with RS-232C is shown below:

Setting: Center frequency 1GHz

```
10                                      'FREQ SETTING
20      OPEN "COM1:N81N" AS #1
30      PRINT #1 "FREQ1G";              '"FREQ1G" OUTPUT
40      INPUT #1 A$                     '"OK" READ
50      CLOSE #1
```

26. PC Software (optional)

This is the software MAS300 that controls MSA338(E/TG)/MSA358 by RS-232C. All setting can be performed from PC. Although the 251 points of trace data is displayed on horizontal axis in the screen of the MSA338(E/TG)/MSA358,1001 points of trace data are taken per sweep. When this software is used, all of these 1001 points data are transformed to a PC and trace is displayed at high resolution.

Corresponding OS

Hardware Requirements

Computer that is able to act normally Windows®, and able to use the COM port and CD-ROM drive.

Screen size 1024x768 or more computers.

Operating system

Windows® 2000/Me/NT 4.0/XP/Vista/7

Communication method

Bidirectional communication by RS-232C.

Installation procedure

1. Start windows®.
2. Insert the MAS300 software CD into the CD-ROM drive.

   The setup will start automatically and the initial screen will appear.
3. Follow the instructions on the screen.

* If the setup does not start,

1. Double-click on the My Computer icon.
2. Double-click on the CD-ROM icon.
3. Double-click on “setup.exe”.
4. Follow the instructions on the screen.

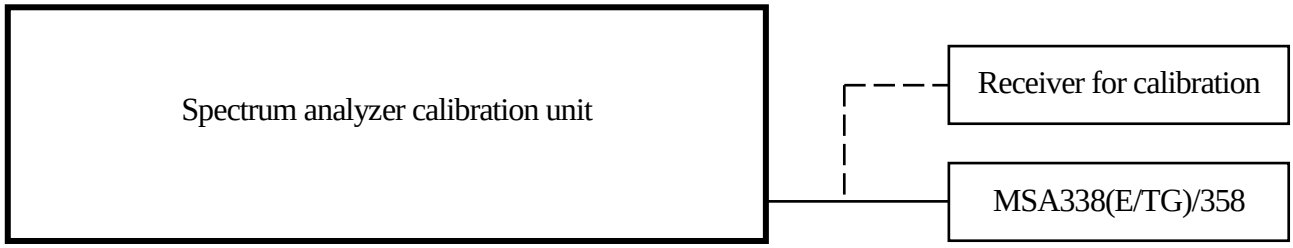
Refer to the “README” in the MAS300 for details.

* Please inquire of our sales agent about the update of software.

27. Basis Performance Test (MSA338(E/TG)/358)

To keep the quality of the unit, regular performance testing is recommended. This section describes a method and specification of basic performance testing. If a problem is found in the results of basic performance testing, or formal testing is needed, please contact the dealership where you purchased the product, or contact us.

[Connection diagram]



27.1 Frequency characteristics

Adjust the output level of the spectrum analyzer calibration unit (thereafter, "calibration unit") so that the displayed power value is -15dBm at each frequency for this unit, and measure the absolute value with a receiver for calibration (microwave power meter, etc.).

Setting of MSA338(E/TG)/358			Specifications	Measurement value	Judgment
Center frequency	Frequency span	RBW			
10MHz	10MHz	3MHz	Within Reference±2.0dB±1dot		
100MHz	10MHz	3MHz	Reference		
1GHz	10MHz	3MHz	Within Reference±1.0dB±1dot		
2GHz	10MHz	3MHz	Within Reference±1.0dB±1dot		
3.3GHz	10MHz	3MHz	Within Reference±1.0dB±1dot		
6.2GHz *1	10MHz	3MHz	Within Reference±1.0dB±1dot		
8.5GHz *1	10MHz	3MHz	Within Reference±1.0dB±1dot		

*1 MSA358 only

· Setting of MSA338(E/TG)/358

Reference level : -15dBm
VBW : 1MHz
Sweep time : 1s
Detection mode : SMPL
Display scale : 2dB/div

· Setting of calibration unit

Frequency : Same as a center frequency of MSA338(E/TG)/358.

Output power : Adjust the power indication of MSA338(E/TG)/358 to -15dBm.

27.2 Accuracy of reference level

Adjust the output level of the calibration unit so that the displayed value of this unit is the 0th div from the top, and calibrate the absolute value with the receiver for calibration (microwave power meter, etc.).

Setting of MSA338(E/TG)/358 Reference level	Specifications	Measurement value	Judgment
+10dBm	within ±1.4dB±1dot		
0dBm	within ±1.4dB±1dot		
-10dBm	within ±1.4dB±1dot		
-15dBm	within ±0.8dB±1dot		
-20dBm	within ±1.4dB±1dot		
-30dBm	within ±1.4dB±1dot		
-40dBm	within ±1.4dB±1dot		

* Input attenuator switching error is included at the reference level other than -15dBm.

· Setting of MSA338(E/TG)/358

Center frequency : 100MHz
Frequency span : 10MHz
RBW : 3MHz
VBW : 1MHz
Sweep time : 1s
Detection mode : SMPL
Display scale : 2dB/div

· Setting of calibration unit

Frequency : 100MHz
Output power : Adjust it so that the indicated value of MSA338(E/TG)/358 is at the 0th div from the top.

27.3 The display accuracy of the center frequency

Measure the frequency with the peak search function of MSA338(E/TG)/358.

Setting of MSA338(E/TG)/358			Specifications	Measurement value	Judgment
Center frequency	Frequency span	RBW			
100MHz	200kHz	3kHz	within ±50kHz±1dot		
100MHz	10MHz	30kHz	±4kHz		
100MHz	20MHz	100kHz	within ±360kHz±1dot ±RBW × 20%		
100MHz	200MHz	100kHz			
1GHz	20MHz	100kHz			
2GHz	20MHz	100kHz			
3.3GHz *1	20MHz	100kHz			
6.1GHz *2	20MHz	100kHz			
8.5GHz *2	20MHz	100kHz			

*1 MSA338(E/TG) only *2 MSA358 only

· Setting of MSA338(E/TG)/358

Reference level : -15dBm
VBW : AUTO
Sweep time : 1s
Detection mode : SMPL
Display scale : 10dB/div

· Setting of calibration unit

Frequency : Same as a center frequency of MSA338(E/TG)/358.
Output power : -15dBm
* However, calibrate the signal generator in advance.

27.4 The display accuracy of the frequency span

Adjust the frequency of the calibration equipment so that the peaks are at the positions of f_1 and f_9, and measure the frequencies of f_1 and f_9. Calculate from f_1 and f_9 the display accuracy of the frequency span.

* f_1: 1st div from the left on the trace screen f_9: 9th div from the left on the trace screen

Setting of MSA338(E/TG)/358			Specifications	f_1 Measurement value	f_9 Measurement value	(f_9 - f_1)	Judgment
Frequency span	Center Frequency	RBW					
200kHz	1GHz	3kHz	within ±160kHz ×3%±1dot				
10MHz	1GHz	100kHz	within ±8MHz ×3%±1dot				
20MHz	1GHz	300kHz	within ±16MHz ×3%±1dot				
200MHz	1GHz	3MHz	within ±160MHz ×3%±1dot				
500MHz	1GHz	3MHz	within ±400MHz ×3%±1dot				
2GHz	1GHz	3MHz	within ±1.6GHz ×3%±1dot				
FULL(3.3GHz)*1	1.65GHz	3MHz	within ±2.64GHz ×3%±1dot				
2GHz *2	4.8GHz	3MHz	within ±1.6GHz ×3%±1dot				
2GHz *2	7.4GHz	3MHz	within ±1.6GHz ×3%±1dot				
FULL(8.5GHz)*2	4.25GHz	3MHz	within ±6.8kHz ×3%±1dot				

*1 MSA338(E/TG) only *2 MSA358 only

· Setting of MSA338(E/TG)/358

Reference level : -15dBm
VBW : AUTO
Sweep time : One step slower than AUTO
Detection mode : SMPL
Display scale : 10dB/div

· Setting of calibration unit

Frequency : Adjust it to the positions of f_1 and f_9.
Output power : -15dBm

27.5 Linearity of the amplitude axis

Adjust the level of the calibration unit so that the peak is at the top of the amplitude axis (0th div), and regard the point set at that time as the reference. Gradually lower the output, starting from the reference, and measure the amplitude value of MSA338(E/TG)/358.

Setting of MSA338(E/TG)/358 Display scales	Output of calibration unit	Specifications	Measurement value	Judgment
10dB/div	**X**dBm (adjust it to the 0th div)	Reference(-15dBm)	(-15dBm)	
	X-10dBm	Within -25dBm±0.8dB±1dot		
	X-70dBm	Within -85dBm±1.6dB±1dot		
2dB/div	**X**dBm (adjust it to the 0th div)	Reference(-15dBm)	(-15dBm)	
	X-2dB	Within -17dBm±0.2dB±1dot		
	X-10dB	Within -25dBm±0.8dB±1dot		

· Setting of MSA338(E/TG)/358

Center frequency : 100MHz
Frequency span : 200kHz
RBW : 30kHz
VBW : 300Hz
Sweep time : 0.3s
Detection mode POS

· Setting of calibration unit

Frequency : 100MHz

MICRONIX

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