

Magnetic Field Probe

MMP500

9kHz to 100MHz



**Conducted disturbance noise measurement
up to 9kHz low frequency
-Precompliance-**

Joint development with Tokyo Metropolitan Industrial Technology Research Institute

MICRONIX

The LISN (Line Impedance Stabilization Network) is used for conducted disturbance noise test.

However, the magnetic field probe MMP500 was born based on the desire to perform this test more easily or to identify the noise source.

This conducted disturbance noise can be easily measured with MMP500 and signal analyzer MSA538E/558E.

MMP500 was completed through joint development with the Tokyo Metropolitan Industrial Technology Research Institute.

Feature 1

Using this measurement system, it is possible to measure the conducted disturbance noise of the power supply line without electrical contact and without using LISN. In addition, the disturbance noise on PCB can be measured without contact.

Optimum for measuring power electronics equipment used in such as automotive industry.

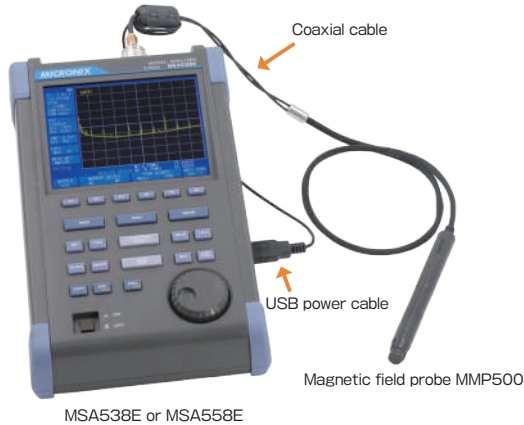
Feature2

Precompliance conducted disturbance noise measurement

- If this system is used, the problem will be solved in the laboratory or outdoors. Save time and money.
- The signal analyzer MSA538E/558E can operate on battery (4 hours operating time), so no AC power supply is required.
- The formal test may be performed once with the official test system (LISN) at the end.

Feature3

The conducted disturbance noise which the level is calibrated can be measured by a simple system with only the magnetic field probe MMP500 and signal analyzer MSA538E/558E. However, the lower limit of measurement frequency is 20kHz.



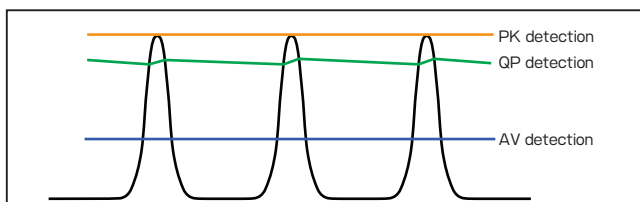
MSA538E or MSA558E

Feature4

This probe can handle large current of DC and AC.

Feature5

This measurement system has three detection modes of PosPK (positive peak), QP (quasi-peak) and AV (average).



Measurement of conducted disturbance noise

The following is an example of measuring conducted disturbance noise of a power supply line as a DUT (Device Under Test).

Measure placing the probe as perpendicular to the power supply line as possible, aligning the marker of the probe with the power supply line and making contact with the power supply line.

It affects the rotation sensitivity and distance sensitivity described on the next page.

In this measurement example, the sheath's thickness of the power supply line affects the distance sensitivity.

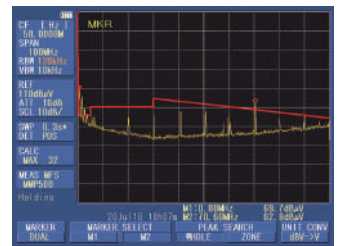
Assuming that the thickness of sheath is 0.5 mm, the disturbance noise is measured as 1.25dB lower because the distance sensitivity is 2.5dB/mm.



- REF : Reference level. By lowering REF, the difference between the average noise level and the limit value can be increased.
- RBW : Resolution bandwidth.
- VBW : Video bandwidth. By using VBW, the average noise level is lowered, and the measurement dynamic range is expanded.
- MaxHold : Max Hold function. By using MaxHold, the noise that occurs intermittently can be captured.

[Fig.1] Full measurement range [PosPK detection]
Grasp the noise generation situation in the full measurement range.

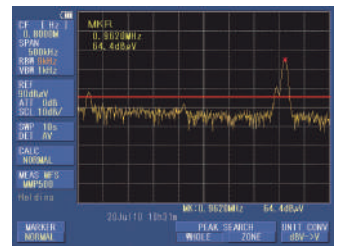
Setting items	Setting value
REF	110dB μ V
RBW	120kHz
VBW	10kHz
MaxHold	32 times



[Fig.1] Full measurement range [PosPK detection]

[Fig.2] 962kHz noise [AV detection]
Measure the AV detection value of 962kHz noise that exceeds the limit line at PosPK.

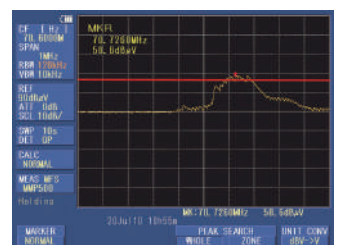
Setting items	Setting value
REF	90dB μ V
RBW	9kHz
VBW	1kHz
MaxHold	off



[Fig.2] 962kHz noise [AV detection]

[Fig.3] 70.7MHz noise [QP detection]
Measure the QP detection value of 70.7MHz noise that exceeds the limit line at PosPK.

Setting items	Setting value
REF	90dB μ V
RBW	120kHz
VBW	10kHz
MaxHold	off



[Fig.3] 70.7MHz noise [QP detection]

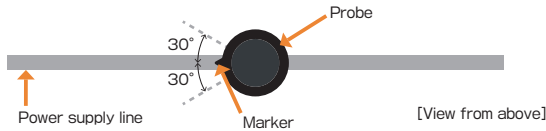
*The limit line (red line) is not displayed on the screen.

[Example of standard value]

Frequency	Limit value	RBW
9 to 50kHz	110dB μ V	300Hz(6dB)
50 to 150kHz	90 to 80dB μ V	
150 to 500kHz	66 to 56dB μ V	9kHz(6dB)
0.5 to 5MHz	56dB μ V	
5 to 30MHz	60dB μ V	120kHz(6dB)
30 to 100MHz	64 to 54 dB μ V	

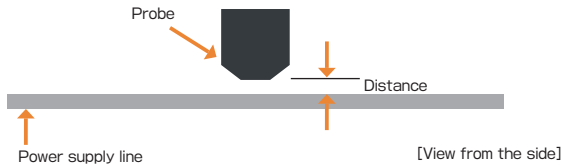
Rotation sensitivity

The marker position of the probe shows 0°. An error of approx. ± 1dB occurs in the range of 0 to ± 30°.



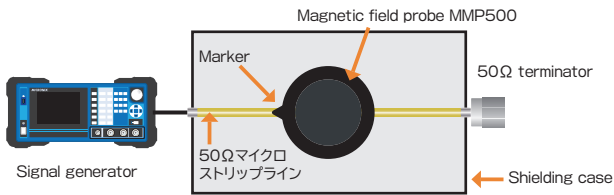
Distance sensitivity

As the probe moves away from the power supply line, the level of the disturbing noise decreases. "approx. 2.5dB/mm@1 to 2mm, approx. 6.8dB@3mm and approx. 8.5dB@4mm".



Level calibration method

The level is calibrated by the 50Ω microstrip line method. The level is measured aligning the marker of magnetic field probe with the 50 Ω microstrip line and contacting with it.



■ Level calibration points: 10 points (linear interpolation is performed at frequencies other than the calibration points)

■ Two kinds of calibration coefficients

① Typical calibration coefficient

Typical values of calibration coefficient are installed in the signal analyzer MSA538E/558E. Usually, the measurement can be done using this values (select "MMP500").

② Calibration coefficient attached to MMP500

Input the calibration coefficient attached to MMP500 from the PC using the command, and install it in "USER B" of MSA538E/558E. When using this, select "USER B". More accurate measurements will be done.

The frequency characteristics of the MMP500 are calibrated in the signal analyzer MSA538E/558E, so that the correct measurement values can be observed on the screen.

※When using a spectrum analyzer other than MSA538E/558E, calibrate the measured level based on the attached calibration coefficient data.



Storage case

How to use signal analyzer

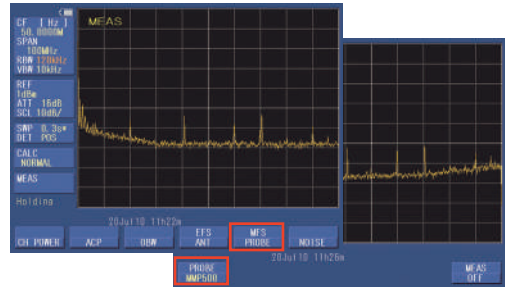
1 Selection of measurement with MMP500

Select "Magnetic field measurement with MMP500" using MSA538E/558E function keys.



MEAS : Measuring function
MFS : Magnetic field strength measurement
PROBE : Probe selection
CP-2SA : 10MHz-3GHz magnetic field probe

MMP500 : 9kHz-100MHz magnetic field probe
USER : Calibration coefficient of CP-2SA
USER B : Calibration coefficient of MMP500



2 If the limit line of the standard is close to the average noise level, set to a lower REF.

Specifications

Frequency range 9kHz to 100MHz (20kHz to 100MHz@MSA538E/558E)

Maximum measurement level 119dB μV

Analysis and display equipment MSA538E and MSA558E

Detection method PosPK(Positive peak), QP(Quasi-peak), AV(Average) detection

Resolution bandwidth 300Hz(3dB)@9 to 150kHz
9kHz(6dB)@0.15 to 30MHz
120kHz(6dB)@30 to 100MHz

QP detection time constant

Time constant	RBW		
	300Hz	9kHz	120kHz
Charge	—	1ms	1ms
Discharge	—	160ms	550ms

Note RBW = 300Hz:3dB bandwidth and PosPK (positive peak) only

Level calibration method 50Ω microstrip line method

Rotation sensitivity Deviation from 0° (marker position) approx. ±1.2dB@0 to ±30°

Distance sensitivity Attenuation by distance from microstrip line (detector surface reference) approx. 2.5dB/mm@1 to 2mm, approx. 6.8dB@3mm, approx. 8.5dB@4mm

Operating temperature 0 to 50°C (guaranteed at 23 ± 10°C)

Operating humidity less than 40°C/80%RH (guaranteed at less than 33°C/70%RH)

Storage temperature -20 to 50°C

Dimensions 14.5Φ×140mm (probe part) @excluding projections
10.5Φmm (detection portion)
Total length: approx. 1.2m

Weight approx. 70g (including cable)

Standard accessories Storage case, Adapter MA306, Calibration coefficient data, Operating manual

Options PC software MAS500
Logging software MAS510
PC software for EMI MAS530

Software (option)

■ PC software MAS500

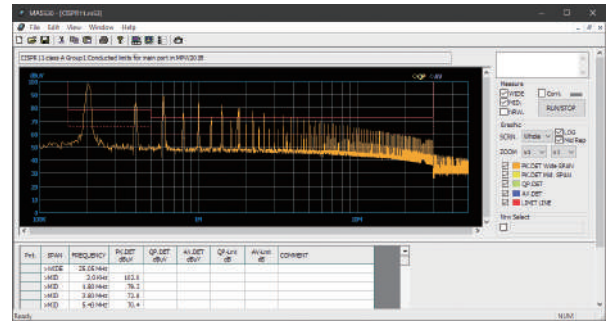
MAS500 is a software that controls the signal analyzer by the PC and displays the spectrum waveform on PC screen. MMP500 or USER B can be selected in M/F Probe of Measuring function, and the measurement results can be checked on the PC screen and saved.

■ Logging software MAS510

MAS510 is a logging software that collects the measurement data by uninhabited. It is optimum for watching an abnormal signal at night and recording the data by uninhabited for a long time.

■ PC software for EMI MAS530

MAS530 is a software used for conducted disturbance noise test. The frequency axis can also be displayed logarithmically. This is used in the "Conducted EMI test system MR2150" described in Related products.



PC screen of EMI software MAS530

Related products

■ Handheld Signal Analyzer MSA538E



Equipped with EMI measurement functionality (QP detection, 6dB RBW). A handheld signal analyzer using both real-time and sweep methods, combining high-speed Fourier transform (FFT) real-time processing and conventional sweep methods to utilize the advantages of both. Its small size and light weight make it ideal for on-the-go measurements.

Detection modes	PK (Peak), QP (Quasi-Peak), AV (Average)
Resolution bandwidth (6dB)	9kHz, 120kHz, 1MHz
Measurement Frequency	20kHz ~ 3.3GHz

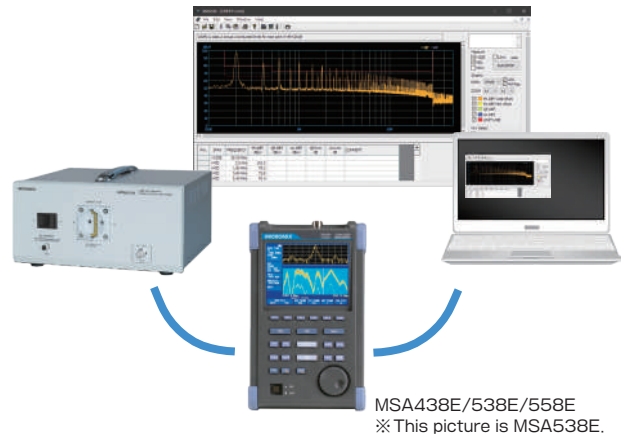
■ LISN (Line impedance stabilization network) MPW201B



When measuring the conducted disturbance noise discharged through the power supply line of EUT, the LISN is used to make constant the impedance of the power source observed from EUT side and to do measurement with reproducibility.

Frequency range	150kHz to 30MHz
Circuit type	50Ω/50μH and V type based on CISPR16-1
Rated current	15A
Power supply	Single phase, 50/60Hz, 250VACmax
Applicable models	MSA438E/538E/558E

■ Conducted EMI test system MR2150



MR2150 is a pre-compliance test system for conducted EMI. The development cost can be significantly reduced by debugging and evaluating EUT using this system before testing in the formal EMC site.

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

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