

Electromagnetic Field Visualization System

New
Functions!

EPS-02Ev3

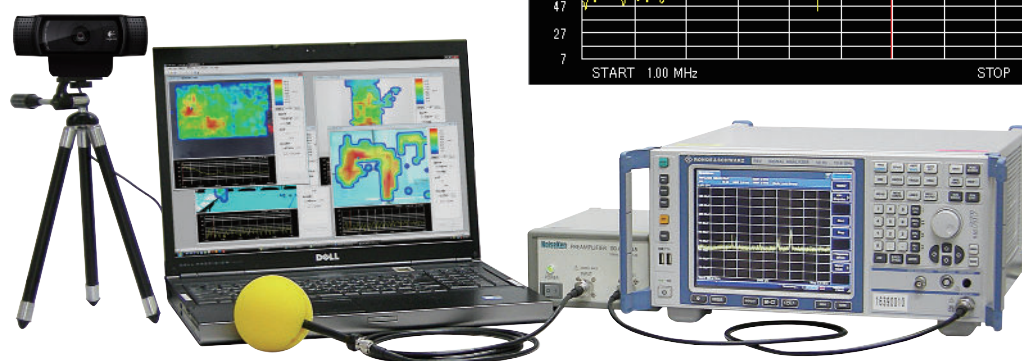
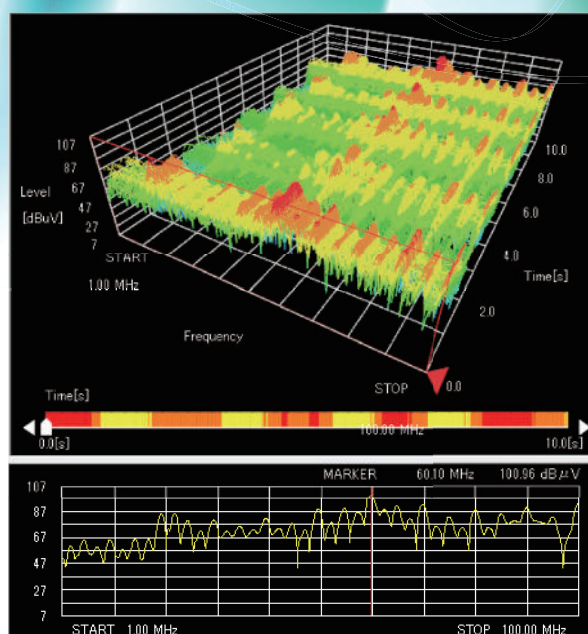
(High frequency electromagnetic field)

EPS-02EMFv2 (Low frequency magnetic field)

EPS-02Hv2 (Low frequency magnetic field [Simple])

EPS-02Sv2 (Sound Source)

3D display (time, frequency, intensity)
Easier analysis of noise generation factors!



Make EMC Test Easier !

www.noiseken.co.jp

EPS-02Ev3

Electromagnetic Field Visualization System

For effective EMI debugging

EPS is an EMC/EMI debugging tool enabling designers to rapidly perform pre-measurement, failure point identification, and improvement efficiency confirmation in EMC/EMI countermeasure process of product design.

The software detects location of the probe by color detection* through the camera image, performs real-time frequency analysis of the measured signal and displays the electromagnetic field strength superimposed on the actual image of the measured object in form of a heat map.

* Proprietary position detection method to patent application No. 2007-223275 by Kanazawa University and patent No. 5205547 by Noise Laboratory Co., Ltd.

- A real-time diagnostic tool supporting EMC/EMI debugging.
- Swift visualization and analysis of EMC/EMI problems.
- Easy comparison of countermeasures before and after.
- Capable of measurement from entire products to single components.
- User-friendly compact design.
- A system can be constructed using the customer's spectrum analyzer and electromagnetic field probe. (consultation required)

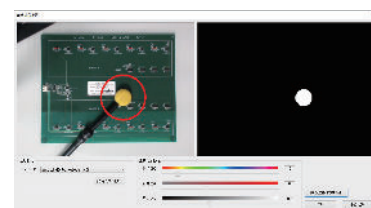
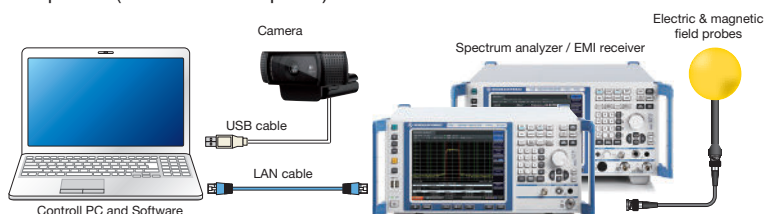


Image recognition (probe tip yellow color recognition)



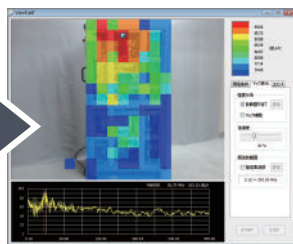
Easy to carry at a lower price!



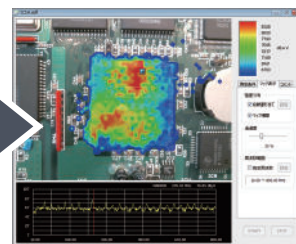
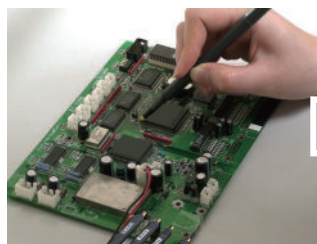
RSA306B spectrum analyzer is convenient to carry around for on-site measurements. In addition, the system can be constructed at a lower cost.

Various product sizes measurement Various probes applicable

Various types of electromagnetic field probes can be used regardless of the manufacturer. Therefore, by interchanging electromagnetic field probes, it is possible to measure various sizes, from small items such as parts and circuit boards to large equipment such as stationary equipment. In addition, objects with complicated shapes can also be measured by positioning the camera.



- Big-size probes -
Large equipment EM field measurement



- Small precision probes -
Small components and PCB EM field measurement

A wide variety of standard-compliant spectrum analyzer drivers

Added additional spectrum analyzers possible to use, making it easier to use your current spectrum analyzer.

Rohde & Schwarz	Spectrum analyzer	FSV series, FSV3000 series, FPL series
	EMI receiver	ESR series, ESRP series
Keysight Technology	Signal analyzer	N9010A, N9010B
Tektronix	Oscilloscope	MDO4000 series
	Spectrum analyzer	RSA306B

Please inquire about other spectrum analyzers.

Tektronix MDO4000 series



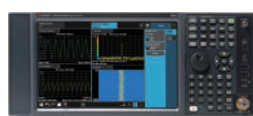
Tektronix RSA306B



Keysight Technology N9010A



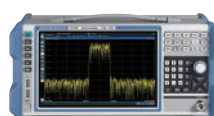
Keysight Technology N9010B



Rohde & Schwarz FSV



Rohde & Schwarz FPL



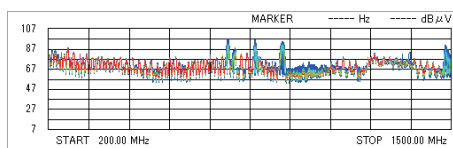
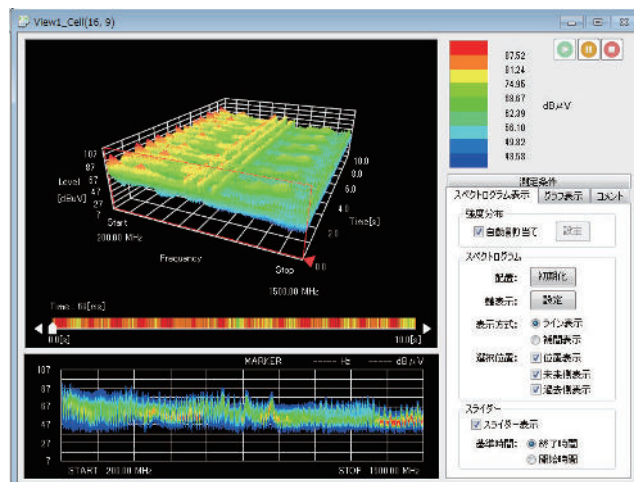
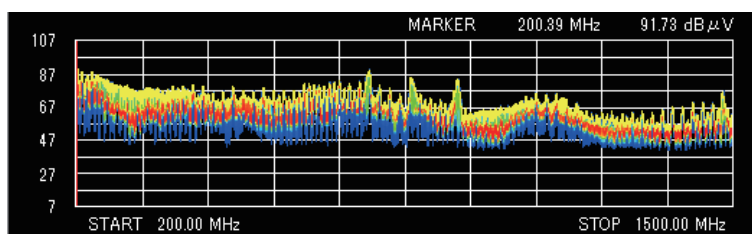
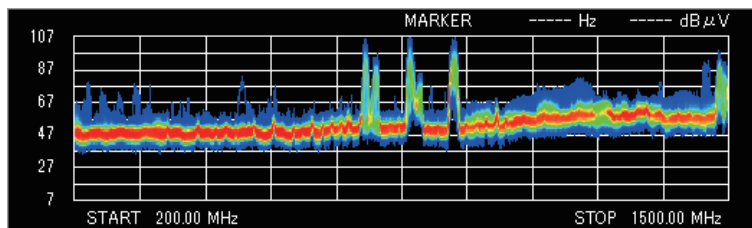
Rohde & Schwarz ESR



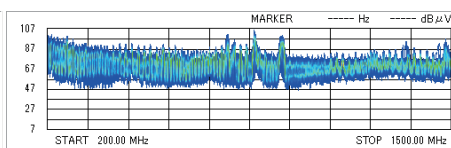
Easily Check the Noise Occurrence Frequency

The density display function expands the range of analysis

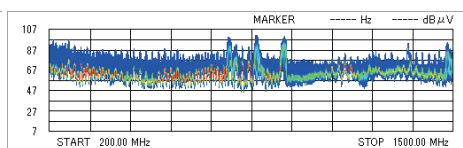
Added a function to display colors according to the frequency of occurrence (density display function) to the conventional spectrum display function. This makes it possible to easily check the noise occurrence frequency and the amplitude at the measurement frequency. A wide range of analysis is available, from checking the noise amplitude in regular measurements (using the density display function), to checking the details of areas of concern (noise with large amplitude, intermittent noise, etc.) by spectrogram measurement.



Example of noise with little change



Example of noise with large fluctuation

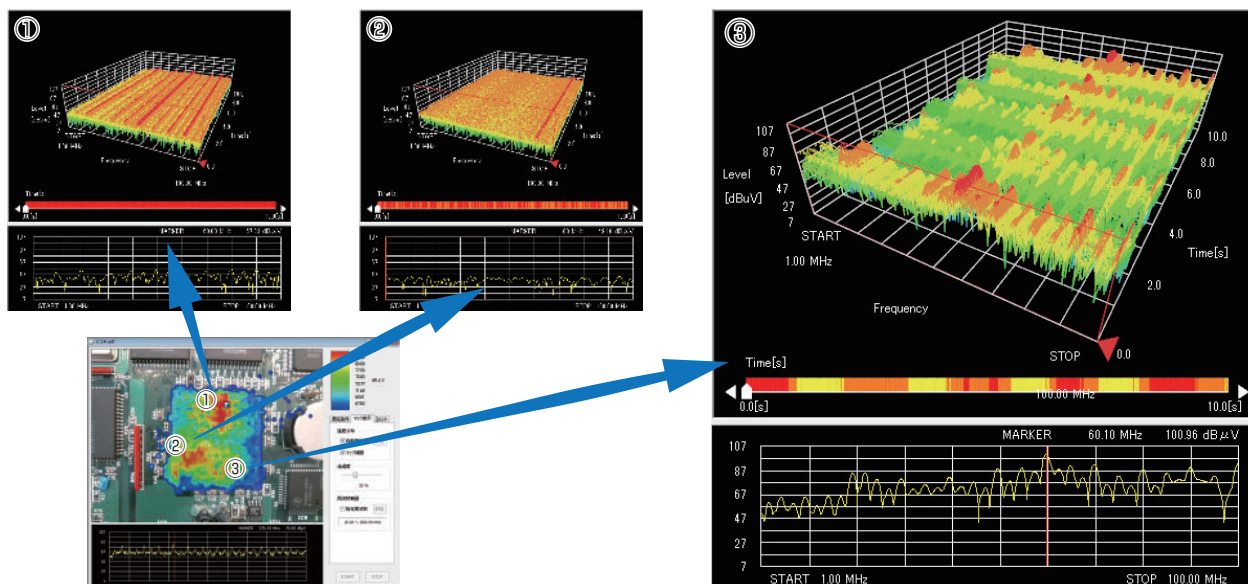


Example of intermittent noise

Simplified EMC/EMI Debugging

Three-Dimensional Indication (Time, Frequency, Amplitude)

In addition to conventional two-dimensional (frequency and level) measurement, three-dimensional (frequency, level, time) measurement is now possible for the space electromagnetic field visualization system that has been well received. This makes it possible to visually confirm changes in noise over time, and analyze noise causing factors such as discovering discontinuous noise.

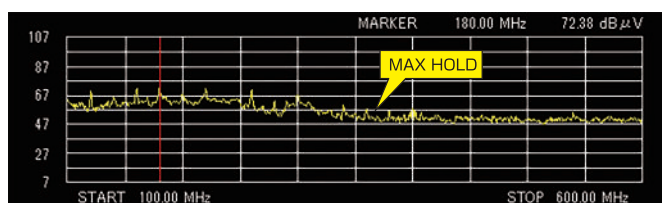


EPS-02Ev3

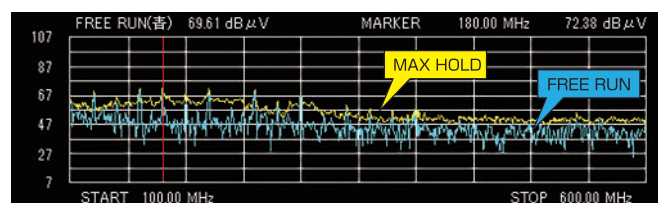
Simultaneous waveform display function newly added Real-time spectrum data can be checked at the same time

NEW Function
Ver.3.2.0.0

It is now possible to display FREE RUN waveforms simultaneously when displaying MAX HOLD or MAX PEAK DATA waveforms.



Before

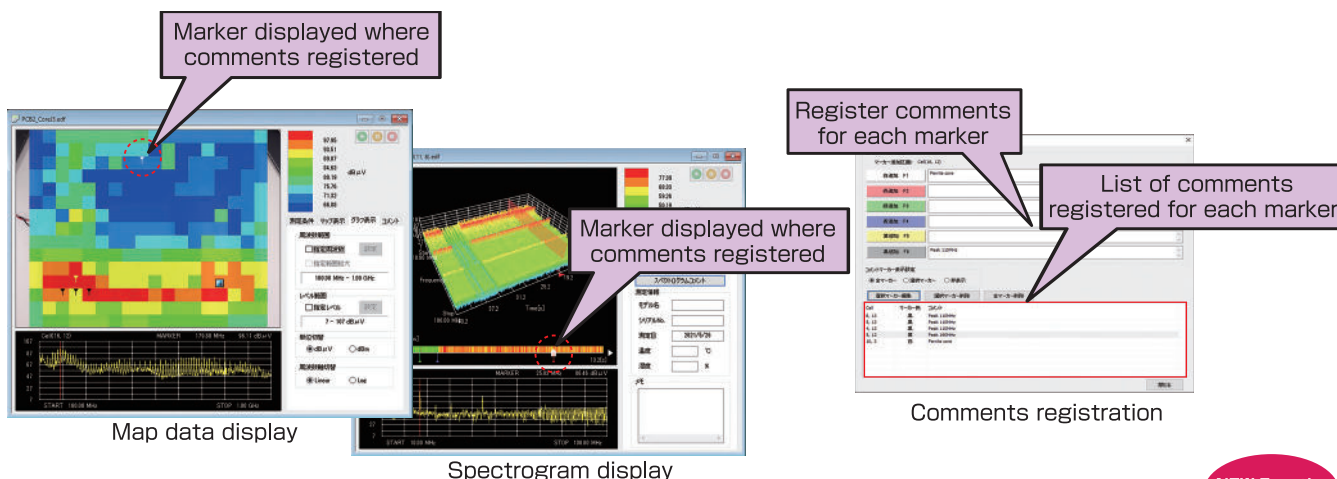


Simultaneous display with the new function !

Enhanced comment functionality Check the records of countermeasures locations

NEW Function
Ver.3.2.0.0

A function has been added that allows you to display a marker at the position where you want to register a comment such as countermeasure location or notes, and to register comments on the time axis of map data and spectrograms. By registering comments for countermeasure locations in each colored marker, you can trace the countermeasure record.



Map data display

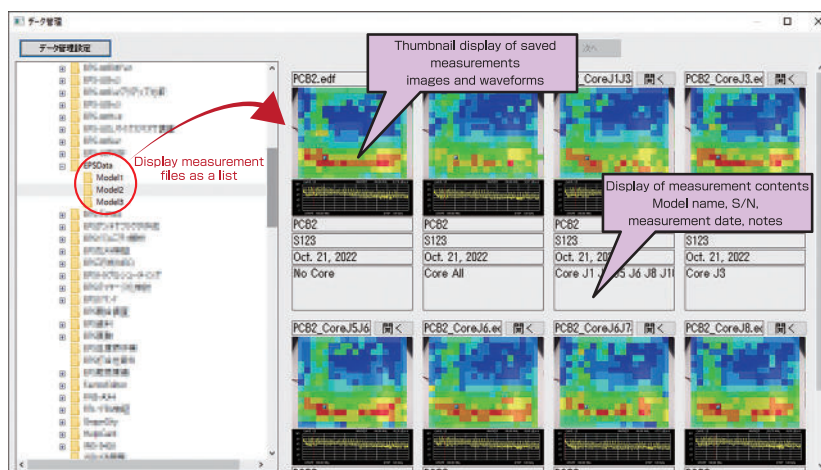
Spectrogram display

Comments registration

"Measurement files List Display" new function added Accumulated measurement files displayed to check countermeasures history

NEW Function
Ver.3.2.0.0

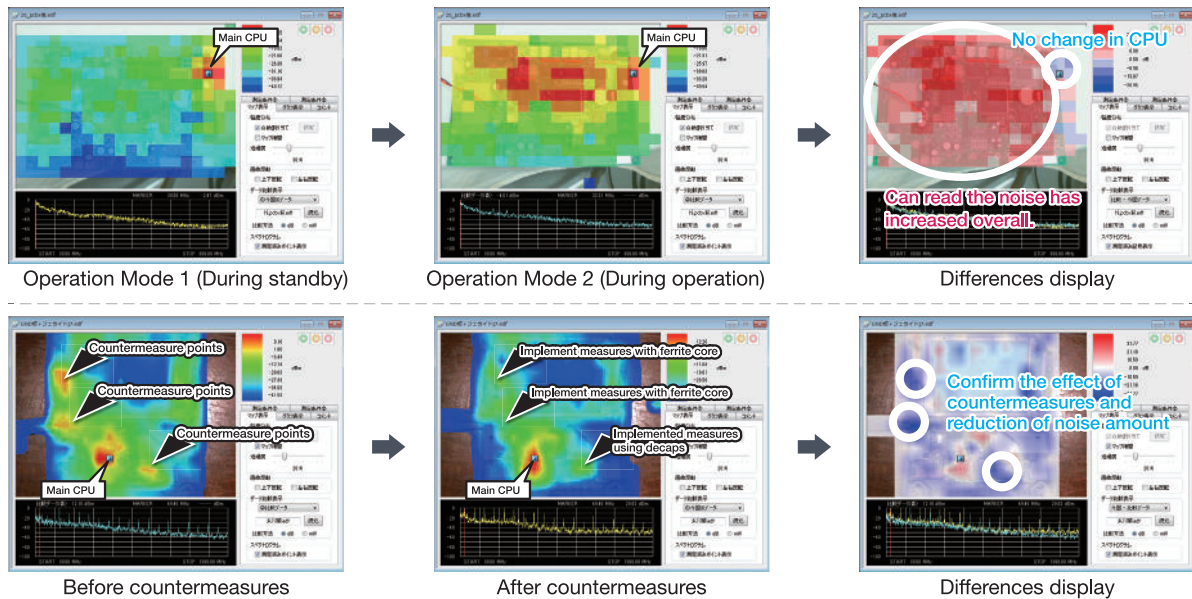
A function to display a list of measurement files has been added, making it possible to display a list of saved measurement files. By displaying the accumulated measurement files as a list, you can comprehensively compare the countermeasures history.



List display of measurement files (4 columns)

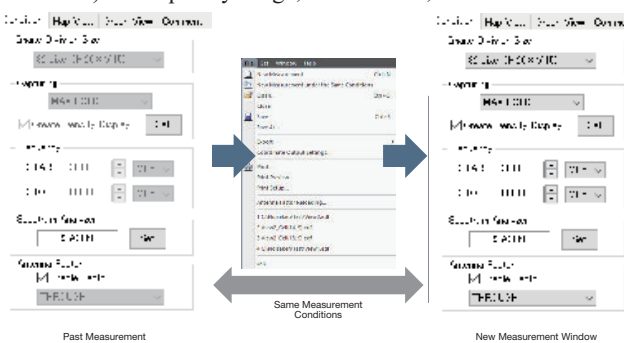
Easy comparison before and after countermeasures Equipped with a difference display function

In addition to the conventional method of comparing measured data side by side, it is now possible to compare in the same range by loading a comparison target file into the same file. Also, the data difference display function allows to compare differences in measurement data by color.



Easy measurement under the same conditions as past data

Added a new function, so that a new measurement can be performed under the same measurement conditions as the previous measurement. By loading the past measurement data, it is possible to conduct measurement under the same settings (conditions) of frequency range, RBW/VBW, etc.

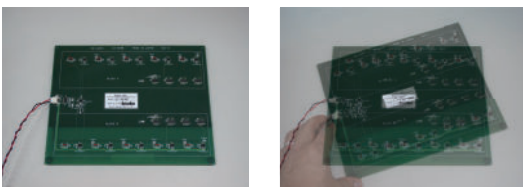


Camera image ghost function

Previously taken images can be displayed overlaid for position alignment.

Usage example 1: aligning the camera position with the previously taken image before the test

Usage example 2: realigning the camera position when it got misaligned during the test



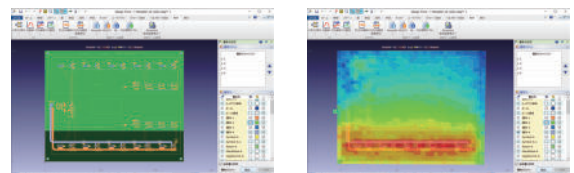
Simplified image recognition settings

By clicking on the part of the screen where you want to recognize the color (tip of the probe), the software automatically adjusts the hue, saturation, and brightness optimal for color recognition.



Specified coordinate output function

Measurement results can be imported to external CAD software and CAD drawings and actual measurement data can be superimposed and displayed.



Example of actual measurement results displayed on Zuken CR-8000 Design Force

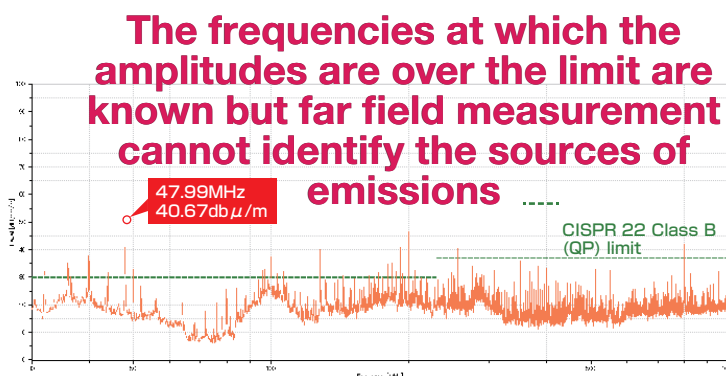
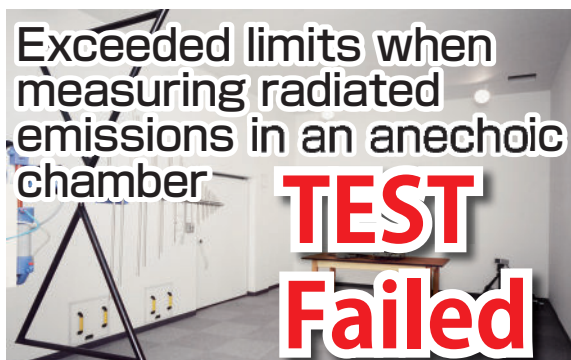
Others

- Highlighting unmeasured points: unmeasured areas highlighted by flashing black and white, preventing measurement leaks.

EPS-02Ev3

Locates possible interference sources for pre- and post-compliance measurements

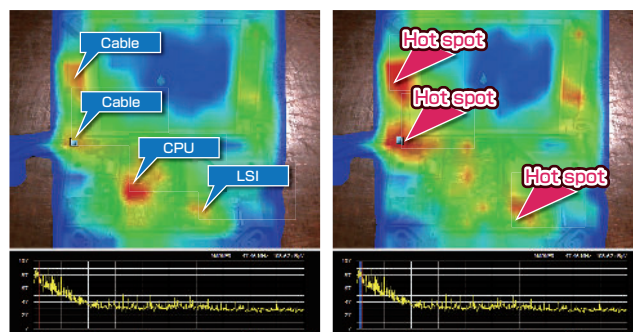
① Conducting radiated emission measurements in an anechoic chamber



② Near-field measurement by EPS-02Ev3

A intensity distribution map shows red "hot spots", which are the countermeasures target areas. Furthermore, narrowing down to the desired range of frequencies lets you know the relevant spots of the frequencies in interest.

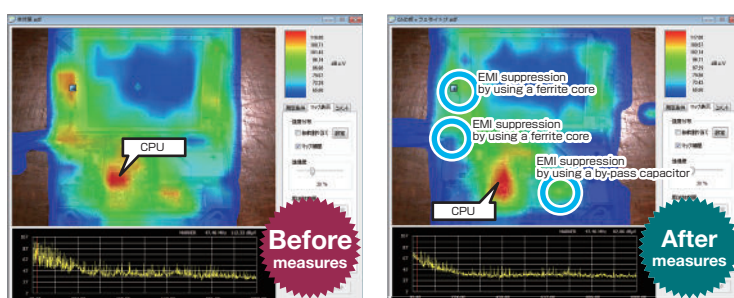
- Identify the "hot spots" locations for countermeasures
- Identify the root cause



③ Incorporating suppression measures and verifying their effectiveness

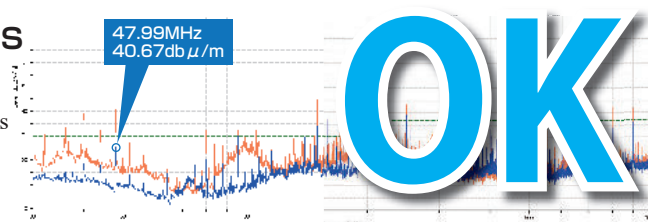
Measurement after the noise countermeasures indicated that the emission level lowered. This makes it easier to establish the countermeasure strategy for problem areas such as circuit traces, components, cables and housing.

- Evaluate different countermeasures techniques
- Verify the effectiveness of the selected countermeasure technique



④ Re-measure radiated emissions in an anechoic chamber

After the noise countermeasures, measured the radiated emissions again in the anechoic chamber, verifying that the noise level was kept below the limit. The data can be saved as a reference for the next countermeasures, allowing the know-how to be shared and accumulated.



Accumulated measurement data can be the basis of optimized design and debugging method rules, and improving and sharing know-hows, which contributes to engineering time and cost reduction, and reliability and safety improvements.

EPS-02Ev3

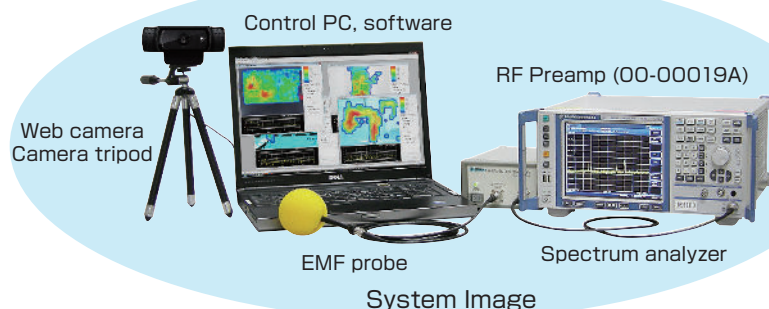
Specifications

Frequency range	Depends on electromagnetic field probe, preamplifier and spectrum analyzer specifications
Measurement unit	$\text{dB}\mu\text{V}$, dBm
Data recording method	Single / Free Run / Max Hold / Max Peak Data*
Auxiliary functions	Save / load / export / comment input / factor reload / camera image retake / up-down & right-left inversion of camera image / ghost display of camera image / screen enlargement-reduction
Compatible operating system	Microsoft® Windows® 10 / 11 (English or Japanese ver.)

*Max Peak Data: Displays the trace data with the largest peak value from the trace data measured at each measurement point.

System

System configuration example	Electromagnetic field probe, BNC(P)-N(P) connector coaxial cable (02-000150A), 3-color probe head covers, RF preamplifier (00-00019A), spectrum analyzer, control PC
Accessories	Web camera, camera tripod, USB extension cable for camera (2m), extension pole, LAN cable (2m), setup media (software), USB protection key, quick start guide



EMF Probes

Type	Electric / Magnetic fields	Structure
6cm Loop	magnetic field antenna	shielded loop
3cm Loop		shielded loop
1cm Loop		shielded loop
3.6cm Ball	electric field antenna	spherical dipole
6mm Stub Tip		short monopole

■ Magnetic field probes



■ Electric field probes



System requirements

Parameter	EPS-02Ev3
OS	Microsoft® Windows® 10 / 11 (English or Japanese versions)
CPU	Intel Core™ i5 or higher (i7 or higher recommended)
RAM	8 GB or more recommended
HDD	min. 10 GB of free space
Display	WXGA resolution (1366 x 768) or higher required Full HD resolution (1920 x 1080) recommended

In addition to the conditions on the left, the following conditions apply.

- Operation cannot be guaranteed when using software that uses cloud services or online storage.
- A DVD drive is required to install the upgraded version and minor upgraded version.
- Make sure there is a free USB port. (Occupies 2 or 3 ports, not including mouse)

EPS-02Ev3 Options

Pre-amplifier MODELS : 00-00012A/14A/16A/19A



High-performance preamplifiers that can be used for various purposes including for the EPS-02 series.

Parameter	Specifications / Performance
Operating Frequency Range	00-00012A : 9kHz ~ 1GHz 00-00014A : 500MHz ~ 8GHz 00-00016A : 9kHz ~ 1GHz 00-00019A : 10kHz ~ 3GHz
GAIN	00-00012A : 36dB (typ) 00-00014A : 47dB (typ) 00-00016A : 46dB (typ) 00-00019A : 43dB (typ)
Input / Output Connector	N-Female
Dimensions / Weight	W160 × D230 × H88mm / approx. 3kg * protrusions excluded
Accessories	N(P)-N(P) connector coaxial cable 1 m (00-00013A only)

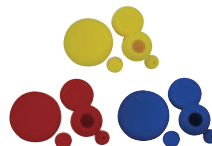
EPS-02Ev3 Options

Three Color Probe Head Cover



A set of head covers for various probe tips. Attaching to the tip of the probe facilitates image recognition of the EPS-02 series camera. The electromagnetic field probes can be stored in the case with the probe head covers attached, and unused probe cover heads can also be stored.

Replacement Three Color Probe Head Cover



Replacement probe head covers for the 3-color probe head cover set.

Software upgrade **MODEL : EPS-02Ev3-UG**

Version upgrade to EPS-02Ev3 software. Accessories: disk media (software), USB protection key, quick start guide

EPS-02Ev3 Software minor version upgrade **MODEL : EPS-02Ev3-MUG**

Minor version upgrade of EPS-02Ev3 software. Accessories: disk media (software), quick start guide

EPS-02EMFv2 / EPS-02Hv2

(low frequency magnetic field)

Spatial Magnetic Field Visualization System

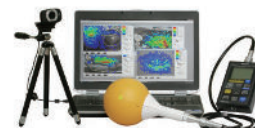
EPS-02EMFv2 can save the frequency data of the measured magnetic field, so you can easily identify the countermeasure points.

EPS-02Hv2 can directly read and visualize the data from the magnetic field sensor measurement part. It is very compact and easy to carry, and is convenient for on-site measurement.

- The direction of the magnetic field can be determined by acquiring data on the X, Y, Z axes and the combined effective values of the three axes.
- Measurements required by ICNIRP 2010, IEC 62233 and JIS TS C 0044 can be performed.



EPS-02EMFv2



EPS-02Hv2

Specifications

Model	EPS-02EMFv2	EPS-02Hv2
Frequency Range	10Hz ~ 400kHz	10Hz ~ 400kHz, 10Hz ~ 2kHz, 2kHz ~ 400kHz
Frequency selection	available	not available
Measurement mode	magnetic field	Magnetic field (magnetic flux density) / exposure level
Measurement unit	dBμV, dBm	T, G, A/m, %
Measured axis	X, Y, Z	X, Y, Z, combined effective values
Data recording method	Single / Free Run / Max Hold / Peak Hold*	Peak Hold
Auxiliary functions	Save / load / export / comment input	
Compatible OS	Microsoft® Windows® 10 / 11 (English or Japanese ver.)	

*Max Peak Data: Displays the trace data with the largest peak value from the trace data measured at each measurement point.

System

Model	EPS-02EMFv2	EPS-02Hv2
System configuration	Magnetic field measuring instrument (FT3470-91/92: manufactured by Hioki Electric Co., Ltd.), oscilloscope (RTO2004-NSL or RTO6: manufactured by Rohde & Schwarz Japan Ltd.), control PC, probe extension cable 5m (dedicated cable)	Magnetic field measuring instrument (FT3470-91/92): manufactured by Hioki Electric Co., Ltd.), control PC, 5m probe extension cable (dedicated cable)
	* FT3470-91 / 92 and RTO2004-NSL are specifically adjusted for this system, and their specifications differ from that of general products.	
Accessories	Web camera, camera tripod, USB extension cable for camera (2m), extension pole, LAN cable (2m) *EPS-02EMFv2, setup media (software)* EPS-02EMFv2 includes EPS-02Hv2, USB protection key and the quick start guide	

* Please contact us for the recommended PC system requirements.

Software upgrade **MODELS : EPS-02EMFv2-UG / EPS-02Hv2-UG**

Software upgrade to EPS-02EMFv2 and EPS-02Hv2. Accessories: Web camera, disk media (software), quick start guide

Introduction of LANGER's Near-Field Probes

The EPS-02Ev3 system can be used in combination with various types of electromagnetic field probes.

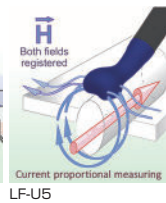
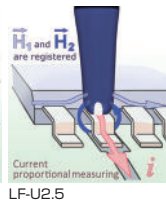
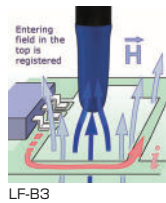
The electromagnetic field probes introduced below are near-field probes manufactured by LANGER, Germany, with various probes available for measurements ranging from a single pin level of parts to large components and assemblies.

We also offer probes for low frequencies and for measurements in higher frequency bands to use in combination with our EPS-02Ev3.

Please contact our sales representatives for detailed specifications of various near-field probes and combination with EPS-02Ev3.

Near-Field Probes Model: LF1 set

100 kHz - 50 MHz Magnetic Field



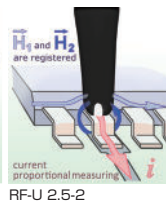
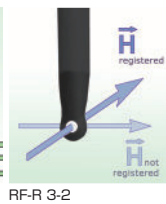
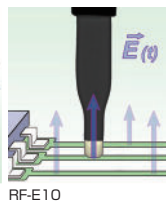
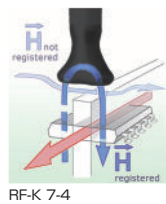
The LF1 set is a set of 4 types of shielded near-field probes for measuring magnetic fields from 100kHz to 50MHz on electronic assemblies.

The probe heads are designed for detection of electromagnetic interference sources at single pins, larger components and on assemblies. First, identify the large-scale sources with the LF-R 400 probe, and then use high-resolution probes such as LF-B 3, LF-U 5 and LF-U 2. 5 These magnetic field probes have a structure suppressing electric field components (electrically shielded).

* A conversion connector (MODEL: 02-00050A) is required to connect these probes to EPS-02Ev3.

Near-Field Probes Model : RF1 set

30 MHz - 3 GHz Electric / Magnetic Fields

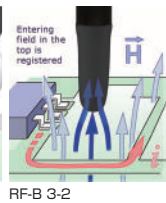
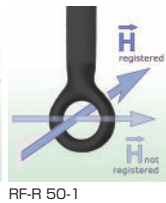


RF1 set is a set of 4 passive near-field probes for measuring electric and magnetic fields from 30 MHz to 3 GHz on electronic assemblies. Each probe is suitable for measurements very close to the electronic assembly, e.g. on single IC pins, conductive paths, components and connectors to identify electromagnetic interference sources. By using these probes one can detect the orientation of the magnetic field and the electric field distribution. These near-field probes have a structure suppressing electric field components (electrically shielded).

* A conversion connector (MODEL: 02-00050A) is required to connect these probes to EPS-02Ev3.

Near-Field Probes Model : RF2 set

30 MHz - 3 GHz Magnetic Fields

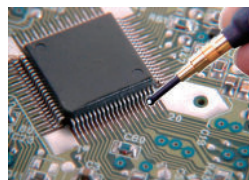
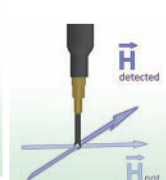
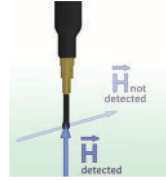


RF2 set is a set of 4 passive near-field probes for measuring magnetic fields from 30 MHz to 3 GHz on electronic assemblies. These probe heads allow for the step by step localization of the sources of interference from the RF magnetic-field on the assembly. Initially, RF-R 400-1 and RF-R 50-1 probes can be used to detect far-field electromagnetic interference. Next, the higher resolution RF-B 3-2 and RF-U 5-2 probes allow for more accurate detection of interference sources. By using these probe one can detect the orientation of the magnetic field and the electric field distribution. These near-field probes have a structure suppressing electric field components (electrically shielded).

* A conversion connector (MODEL: 02-00050A) is required to connect these probes to EPS-02Ev3.

Near-Field Probes Model : RF3 mini set

30 MHz - 3 GHz Magnetic Field



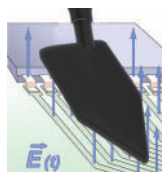
The RF3 mini set consists of two passive near-field probes with a resolution under 1 mm to measure magnetic field of 30 MHz to 3 GHz on electronic assemblies at the development stage. These probes have special miniature heads which are designed for detailed measurements of magnetic field and disturbance currents and can be used to detect the orientation and distribution of the magnetic field on the electronic assembly. These probes have a sheath structure and are electrically shielded. It is recommended to use a 20 dB or 30 dB pre-amplifier when measuring with these probes.

* A conversion connector (MODEL: 02-00050A) is required to connect these probes to EPS-02Ev3.

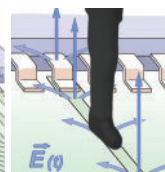
Introduction of LANGER's Near-Field Probes

Near-Field Probes Model : RF4-E set

30 MHz - 3 GHz Electric Field



RF-E 02



RF-E 05



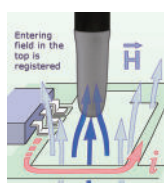
RF-E 05 Application

The RF4-E set is a set of two passive E field probes for measuring electric fields in the frequency range of 30 MHz to 3 GHz. These probes detect electric field by capacitive coupling and the steep rise and falls of digital pulse of signal pin (foot and lead) of the IC, and detects a sharp switching (voltage) component generated on the power supply pin of the IC. These probes have a function to suppress detection of current components (magnetic field components).

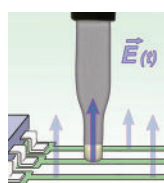
* A conversion connector (MODEL: 02-00050A) is required to connect these probes to EPS-02Ev3.

Near-Field Probes Model : XF1 set

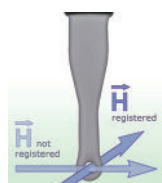
30 MHz - 6 GHz Electric / Magnetic Fields



XF-B 3-1



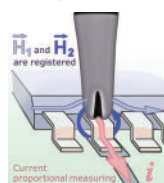
XF-E 10



XF-R 3-1



XF-R 400-1



XF-U 2.5-2

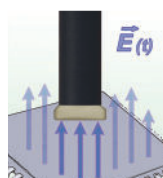
The XF1 set consists of four magnetic field probes and one E-field probe for measuring E-fields and magnetic fields from 30 MHz to 6 GHz on electronic assemblies. The probe head enables step-by-step localization of magnetic field interference sources on the assembly.

First, use the XF-R 400-1 probe to detect electromagnetic interference from a distance. Second, you can use a high-resolution probe to detect interference sources more accurately. The E-field probe is used to detect electrical interference fields near the assembly. By using these probes, it is possible to detect the orientation of the magnetic field and the electric field distribution on the electronic assembly. These near-field probes have a structure suppressing the electric field components (electrically shielded).

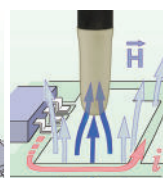
* A conversion connector (MODEL: 02-00137A) is required to connect these probes to EPS-02Ev3.

Near-Field Probes Model : SX1 set

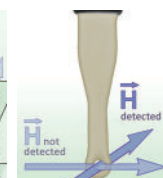
1 GHz - 10 GHz Electric Field/ Magnetic Field



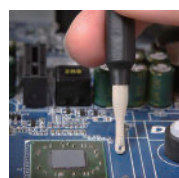
SX-E 03



SX-B 3-1



SX-R 3-1



The SX1 set consists of three passive type near-field probes for measuring electric fields and magnetic fields with high clock frequencies of 1 GHz to 10 GHz on electronic components and ICs at development stage. The different probe heads allow measurements at distances very close to the electronic assembly. They can be used on single IC pins, conductive paths, components and connectors to identify sources of interference. By using these probes, the orientation of the magnetic field and the electric field distribution of the electronic assembly can be detected.

* A conversion connector (MODEL: 02-00137A) is required to connect these probes to EPS-02Ev3.

*LANGER near-field probes are not equipped with probe head covers.
Wrap vinyl tape around the probe tips when using to enable color recognition.
Coaxial conversion connectors (described below) are also required to connect with EPS-02Ev3.
Please contact our sales representative for more details.*

Conversion Connectors Models : 02-00050A/137A

Conversion connector for connecting LANGER near-field probes to EPS-02Ev3.



Model	Connector	Supported Models
02-00050A	N(P)-BNC(J)	LF1 set, RF1 set, RF2 set, RF3 mini set, RF4-E set
02-00137A	N(P)-SMA(J)	XF1 set, SX1 set

Sound source visualization system "KANON" EPS-02Sv2



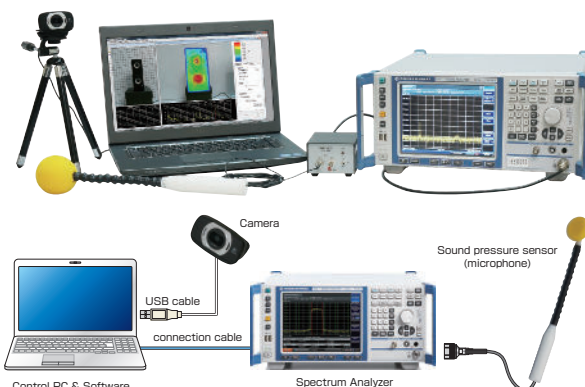
EPS-02Sv2 is a system that detects the position of the sound pressure sensor from the image of the camera by color recognition and analyzes the frequency of the signal measured by the sensor in real time. The intensity level of the measured sound pressure can be superimposed on the actual image of the object to be measured and displayed in color on a computer monitor in the form of a heat map. Measurements for sound countermeasures are usually performed using sound source detection equipment in a soundproof facility, but the facility and the equipment itself are very expensive.

In addition, since most sound source detectors pick up various sounds over a wide range, it is difficult to use and measure them on-site in the field.

The Sound Source Visualization System "KANON" makes it possible to easily measure the sound which is usually done in a soundproof facility on-site, by using an omnidirectional microphone with a structure giving it directivity.

Allows to easily identify the sound source and take countermeasures on site before the final check at a soundproof facility. Contributes to soundproofing cost and man-hours reduction by reducing the frequency of using of the soundproof facilities and equipment.

- Improved microphone directivity allows for easy sound measurement even in non-soundproof sites.
- Measurement is conducted by simply tracing the space with the sensor, so anyone can easily operate it.
- The intensity level of the measured sound can be superimposed on the actual image of the object to be measured and displayed in color on a heat map on a computer monitor.
- Easily identify the sound source by visualizing the measurement results.
- Recognition settings can be made according to the color of the sensor, enabling image tracking supporting a variety of colors.
- Simple noise measurement is available.



測定条件

区画サイズ
20 pixel

データの記録
測定完了通知 ☒ Z特性 ☐ A特性 ☐ C特性
PEAK HOLD

測定時間経過通知
時間経過通知 0.00 s

周波数
START 20.00 Hz
STOP 20.00 kHz

スペクトラムアナライザ
FSV 設定

マイク感度
-31.00 dB

GAIN
0.00 dB

GAIN欄にはマイク用電源のGAIN設定値を入力してください。(推奨0dB)

EPS-02Sv2 Specific Functions; Software Specifications

EPS-02Sv2 can perform simple noise measurement by digital frequency weighting (Z/A/C) of the measured sound pressure level.

Frequency weighting sound pressure level display	Z-weighting	Flat frequency weighting
	A-weighting	Frequency weighting that approximates the audibility of small sounds
	C-weighting	Frequency weighting that approximates the audibility of loud sounds
Color coding of map diagrams by overall level (also possible to color-code the map diagram by peak level)	Overall level	Sound pressure levels composite value
Microphone sensitivity input function	Microphone sensitivity	Microphone-specific sensitivity calibration value
GAIN input function	GAIN	Microphone power supply amplification (GAIN) setting value

Specifications

Model	EPS-02Sv2
Frequency Range	20Hz ~ 20kHz
Frequency Selection	available
Measurement Mode	sound pressure level
Measurement Unit	dB
Measurement Axes	N/A
Sensor	1/2 inch microphone
Microphone cable	BNC coaxial cable
Data recording method	Single / Free Run / Max Hold / Peak Hold
Auxiliary functions	Save / Load / Print / Export / Comments Input
Supported OS	Windows 10 / 11
Accessories	USB camera, USB extension cable for camera (2m), tripod for camera, Software, USB protection key, quick start guide, microphone head covers (yellow, red, blue - 1pc each color), microphone arm, microphone + preamp, microphone power supply, AC adapter, BNC-P ⇄ BNC-P 50 Ω coaxial cable (3m), BNC-P ⇄ N-P 50 Ω coaxial cable (1.5m), LAN cable.

Options

Microphone head covers (yellow, red, blue) **MODEL : 03-00100A**



Probe tip head covers set.
Makes EPS-02Sv2 camera image recognition easier by attaching to the probe tip.
*Yellow, red, blue - 1pc each color.

Microphone check kit **MODEL : 19-00147A**



Check kit outputting 1kHz 94dB sound for diagnosing microphone malfunctions.

International Sales & Marketing Section

1-4-4 Chiyoda, Chuo-ku, Sagami City, Kanagawa Pref. 252-0237 Japan

TEL: +81-(0)42-712-2051 FAX: +81-(0)42-712-2050

E-mail : sales@noiseken.com



[Note] ● It is prohibited to copy or reprint all or part of this catalog without permission. ● Product specifications and appearance are subject to change without notice. ● The model name and price may change or production may be discontinued due to various reasons. ● Please contact our sales representative for any questions regarding your order or contract. ● We may not be liable for any responsibilities or liabilities that arise without confirmation. ● Company names and brand names listed in the catalog are trademarks or registered trademarks. ● Our products listed in the catalog are commercial equipment and devices that are supposed to be used under the supervision of a supervisor who has sufficient knowledge in use. ● It is not a product designed and manufactured for general households and consumers. ● Due to printing reasons, there may be differences in color and texture between the photos listed in the catalog and the actual product. ● We make our best efforts to provide accurate information about the contents of this catalog, but if you notice any typographical errors, please contact our sales office.

Authorized representative