Detectus SCN-500 series

EMC-Scanners

DATA SHEET

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Detectus

- Detect EMC problems before the test lab does. Save time and money by avoiding revisits
- Repetitive consistent measurements enables easy comparative measurements between design alternatives
- Improve quality of design, by eliminating internal EMI hot spots
- Powerful visualization of EMI sources, for any frequency, in the powerful and easy-to-use SW
- Scan in step sizes down to 0.1 mm in 4D (3D plus probe rotation), for frequencies up to 10 GHz with Pendulum probe kits
- Available options include e.g. EMI susceptibility test SW, and a laser distance meter for fully automatic constant probe height over the DUT and automatic DUT photos
- OUTSTANDING PERFOMANCE/PRICE RATIO

The Pendulum/Detectus SCN-500 series of EMC-Scanners are powerful and affordable pre-compliance tools for measurement and analysis of Electromagnetic Interference (EMI). The models in the SCN series feature repetitive high-resolution 4D (3D movement plus rotation of the probe head) scanning of radiation, down to 100 µm steps, and up to 10 GHz frequency range, with an outstanding powerful, yet easy-to-use, scanning SW for visualization and documentation.

Detect your EMC noise sources early during development, while the cost for remedy still is low!

World leading Detectus EMC-Scanners are now Pendulum

The Swedish company Detectus is a world-leading supplier of EMC-Scanner products, since the 1990's. As from July 2020, the Detectus company is an integral part of Pendulum Instruments.

Advantages of an EMC scanner

In R&D

Using the EMC-Scanner during the early stages of design enables you to detect potential emission problems before they become integrated into the product and expensive to correct.

A failed test at a test house, will tell you which frequency failed, not the location of the noise source. The EMC-Scanner can help you locate the source, and repeated measurements while redesigning your product helps you lower the emission levels.

You can compare different design solutions and make comparative measurements of electromagnetic emissions.

In Q&A

The EMC-Scanner can help you maintain a high quality in the production line. You can make measurements on samples from the production line and easily compare them with a reference. That way you can make sure that, for example, a change of supplier of a component doesn't affect the emission spectra in a negative way.

How do you perform EMC-scanning?

A complete scanner system consists of the EMC-Scanner Hardware package, the Detectus Scanning SW (DSS), a Spectrum Analyzer and a PC to run the scanner SW. Pendulum Instruments can supply everything if required, but normally the user already possesses a PC and a Spectrum Analyzer.

The test object is put on the Scanner table and a small near field probe is moved in a controlled and repetitive path above the test object, registering the field strength of emissions. The probe output signal in every position is measured by the Spectrum Analyzer, and transferred to the scanner SW. The smart SW combines the spatial information (X,Y,Z) with the spectrum in that position, and presents detailed results.

Drivers for almost all Spectrum Analyzers

Pendulum/Detectus has a SW driver library with hundreds of Spectrum Analyzers models for all major manufacturers, from the 1980:ies HP analyzers to the most modern Analyzers. When a new Spectrum Analyzer model is introduced, we quickly create a driver, provided they have a VISA compatible communication port (GPIB, USB or LAN) for remote control.

Your investment in a Detectus EMC-Scanner is safeguarded, even if you upgrade your Spectrum Analyzer to a newer model.

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Leading Performance from the Detectus designers

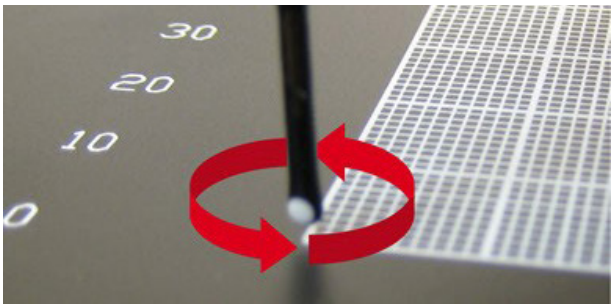
- With 0.1 mm step size of the scanner, you can pinpoint emission sources in densely packed designs.
- You can scan emissions up to 10 GHz, with the standard Pendulum Probe kits. If the user has near field probes going up to higher frequencies, e.g. 70 GHz, then these can normally be attached and used for EMC-scanning. The SW has no limits, but you must of course use a Spectrum Analyzer that support the frequency range.
- Within the Detectus SCN series you can choose from three different sizes, either in 2D or 4D (3D plus probe rotation), to fit most test object sizes. The scan areas (WxDxH) are:
    - 200x100x100 mm (2D or 4D*)
    - 300x200x100 mm (4D*)
    - 600x400x300 mm (4D*)

** 4D = 3D xyz movement, plus rotation around the probe axis*

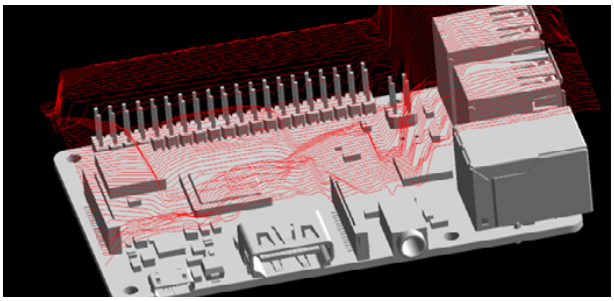
4D Scanning = 3D movement + rotation

During measurement, all 4D Scanner models can rotate the probe and find the "worst case" angle and then store the amplitude. This procedure is performed in every measuring position.

The probe rotation resolution is one degree. The ability to rotate the probe means that you no longer have to worry about missing sources of radiation due to the fact that your probe has different sensitivity in different angles. It will also enable you to more easily follow cables, traces on PCBs and even bonding wires inside a chip.



Import 3D surface models

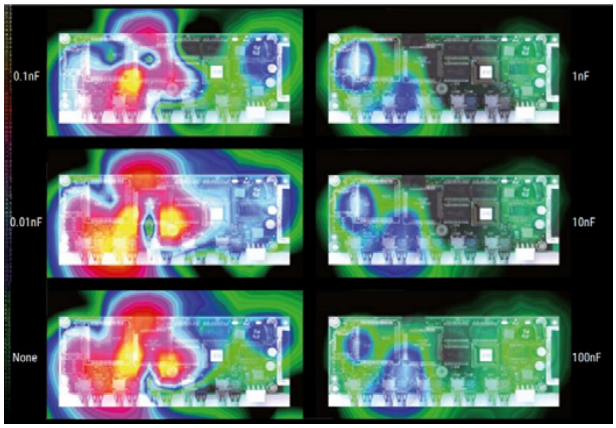


You can import 3D surface models in STL file format into the powerful and easy-to-use SW and create 3D EMI radiation measuring points that follow the surface at a fixed distance. 3D surface models can easily be aligned to the measurement using the 3-point alignment feature in the SW.

World class SW lets you SEE electromagnetic fields

The easy-to-use and feature-rich SW let you measure and visualize the intensity and the location of a radiation source at a component level - or even inside a component. The results of such a measurement can be shown as two- or three-dimensional colored maps. The measurements can easily be repeated creating objective, comparative measurement results.

Measurements can be saved and later compared with any changes of the circuit board, thanks to the exact repetitive scanning. The SW even allows to subtract two scanning results to emphasize the true difference of any change of board layout, or components.

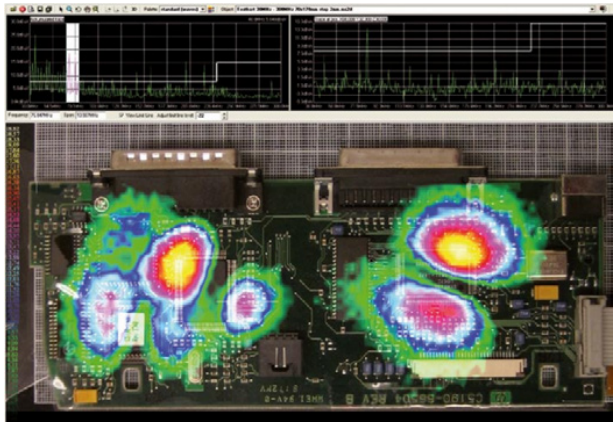


Comparative measurements of EMI for six different IC de-coupling capacitor alternatives

MultiScan

The MultiScan measurement enables field plots from any frequency within the measured wide band span. This powerful feature gives the user a huge amount of information.

In the screen dump below, the main part of the screen shows the field plot of the frequency selected in the top left graph. The upper right graph shows the full spectrum from a user selectable position.



MultiScan measurement. The top left graph shows the accumulated trace (a max hold spectrum of all measuring points). The top right graph shows the wide band spectrum from a user selectable spot on the field plot.

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Accurate probe frequency response calibration to Strip line

The strip line calibration option enables you to accurately measure the field strength of the magnetic near field and to compare measurements made with different probes and setups.

The probe calibration uses a well-defined strip line board and a spectrum analyzer with built in tracking generator to automatically generate probe correction factors in the Scanner Software, to compensate for imperfections in probes, cables, connectors and pre-amplifier.

The calibration procedure only takes a few minutes and is very easy to perform. A step-by-step wizard includes detailed instructions on how to connect everything and setup the calibration measurement. Calibration can be made on any magnetic near field probe and covers a frequency range from 10 MHz to 6 GHz.

Accurate probe position calibration to beacon

The Scanners in the SCN-series can be equipped with a calibration option with accurately positioned beacons, for automatic and very accurate probe position calibration. The option SBCN is attached in a precise position on the Scanner table and provides radiation sources, for the probes to align to.

This automatic position calibration before scanning, is valuable when you want to do repetitive measurements on the same test object, to make sure that the corresponding emission color maps overlap exactly.

The SBCN option will save time and take away all the uncertainty that comes from manually aligning the probe.

Probe & Pre-amplifier kit to 10 GHz

The EMC-Scanners come upon delivery with a probe set to either 3 or 6 GHz. There is an optional extension to 10 GHz, that could easily be retrofitted.

The standard probe sets contain:

- E-field 30MHz-3/6GHz
- Vert. H-field, 30MHz-3/6GHz
- Horiz. H-field, 30MHz-3/6GHz
- Horiz. H-field 100kHz-50MHz
- Preamplifier to 3/6 GHz

Why is 3D scanning important?

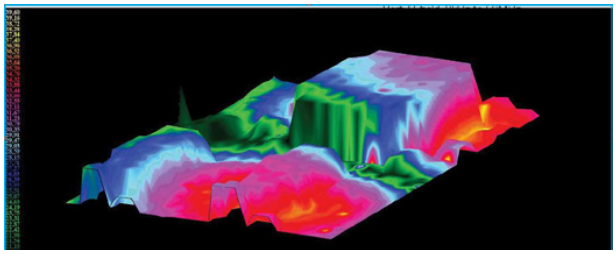
Many EMC-scanners on the market measures in 2D only, letting the near field probe move at a fixed distance above, or below, the DUT. This is only effective for test objects having very small variation of height.

3D-scanning enables you to follow the shape of the surface at a constant distance over the DUT and to measure small components closely, and therefore more accurately, even if they are surrounded by other tall components like electrolytic capacitors or heatsinks.

3D gives you freedom. You are not limited to measure PCBs, you can measure anywhere inside the scanning volume. For example inside boxes, in between racked PCBs, on cables, connectors or on all sides of a shielding box.

Laser distance meter follows topology of DUT

The optional Laser Distance Meter allows an easy and fully automatic setup of your 3D measurements. You no longer have to import CAD files and align them, or manually measure the height of components.

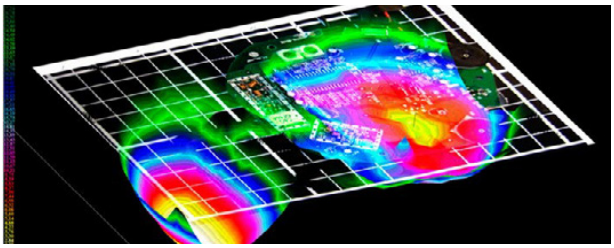


This option will automatically create a 3D model of the DUT and let you measure at a fixed distance from the DUT surface. This feature saves time, increases reliability, and improves ease-of-setup.

Immunity software option

The Immunity software option uses a Detectus EMC-Scanner system, a signal generator with a small antenna and any kind (e.g. multimeter or timer/counter) of Error Detection Device (EDD) with a communication interface to transmit the results from the device under test (DUT), caused by radiated electromag-netic interference. The DUT may be components, cables, PCB's or products. The measurements are easily interpreted and can be repeated for objective comparison.

During measurement the EMC-scanner moves the antenna to predetermined measuring positions above the test object. In each position the signal generator sweeps in frequency and amplitude while the EDD measures for test object failure. You can also test immunity for modulated signals like FM, AM and Pulse.



The Scanner SW can produce two- or three- dimension color maps showing sensitive hot spots at any frequency plus printable reports.

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Near-field probe kits

The probe kits for 3 GHz and 6 GHz are standardly included in the SCN-5xx/3G respectively SCN-5xx/6G product packages. The probe upgrade kits for 10 GHz are purchased as an upgrade option.

3 GHz probe kit (standard in 3G models)

LF-B 3: Vertical H-field 100kHz - 50MHz
RF-B 0.3-3: Vertical H-field 30 MHz - 3 GHz
RF-R 0.3-3: Horizontal H-field 30 MHz - 3 GHz
RF-E 03: E-field 30 MHz - 3 GHz
PA 303 Preamplifier: 30dB, 100kHz - 3GHz

6 GHz probe kit (standard in 6G models)

LF-B 3: Vertical H-field 100 kHz - 50 MHz
XF-B 3-1: Vertical H-field 30 MHz - 6 GHz
XF-R 3-1: Horizontal H-field 30 MHz - 6 GHz
XF-E 04s: E-field 30 MHz - 6 GHz
PA 306 Preamplifier: 30dB, 100kHz - 6GHz

10 GHz upgrade kit from 3 GHz (option S310)

SX-B 3-1: Vertical H-field 1 GHz - 10 GHz
SX-R 3-1: Horizontal H-field 1 GHz - 10 GHz
SX-E 03: E-field 1 GHz - 10 GHz
PA 3010 Preamplifier: 30dB, 10MHz - 10GHz

Coordinate table

Step size (X, Y, Z): down to 0,1 mm

Scan area (X, Y, Z):
SCN-522: 200x100 mm (2D)
SCN-524: 200x100x100 (4D)
SCN-534: 300x200x100 (4D)
SCN-564: 600x400x300 (4D)

Speed: The SCN scanner scans an area of 100 x 100 mm with a step size of 10 mm, in 2 min 45 sec.

Rear Panel Inputs and Outputs

USB port: Type B; USB 2.0; for communication with PC.

Scanner Software

System requirements: Runs on Windows operating systems. Requires Windows 10 or later
Spectrum Analyzers supported: Most models with a Visa compatible communication interface (RS232, USB, GPIB*, LAN). A list of 100+ models is available at the Pendulum Instruments web site
** requires National Instruments GPIB adapter in PC*

3D modelling

Height parameters (Z) entry modes

Manual: Measure manually the height of components over the board and enter into the DSS SW
File import: Import 3D surface models in STL file format into the DSS SW
Automatic: The option SLDM, Laser Distance Meter, communicates with the DSS SW and creates automatically a 3D model of the DUT in the SW

Calibration

Probe frequency response

Mode: Semi-automatic procedure using the strip line calibration option, and the control SW in option SPCK. Requires an SA with built in TG.

Probe position accuracy

Mode: Semi-automatic procedure using the beacon option SBCN

General Specifications

Environmental Data

Operating Temp: +10°C to +35°C
Storage Temp: -40°C to +71°C
Humidity: 20% to 80% (+10°C to +35°C)
Safety: EN 61010-1:2011, pollution degree 2, meas cat I, CE
EMC: EN 61000-6-1:2019, EN 61000-6-3:2007 and A1, FCC Part 15 subpart B, ICES-001 Issue 4, CE

Power Requirements

Line Voltage: 100 - 240 Vac.
Frequency: 50/60 Hz
Power consumption: 45 W

Dimensions and Weight

Width x Depth x Height:
SCN-522: 550x470x630 mm (21.7x18.5x24.8")
SCN-524: 550x470x630 mm (21.7x18.5x24.8")
SCN-534: 550x470x630 mm (21.7x18.5x24.8")
SCN-564: 850x670x830 mm (33.5x26.4x32.7")

Net Weight:
SCN-522: approx. 13 kg (24 lbs)
SCN-524: approx. 15 kg (29 lbs)
SCN-534: approx. 15 kg (33 lbs)
SCN-564: approx. 23 kg (51 lbs)

Shipping Weight (incl. pallet):
SCN-522: approx. 23 kg (46 lbs)
SCN-524: approx. 25 kg (51 lbs)
SCN-534: approx. 25 kg (55 lbs)
SCN-564: approx. 33 kg (73 lbs)

Ordering Information

Basic Models

SCN-522/3G, SCN-522/6G: EMC scanner system in 2D including probe kit for 3 GHz or 6 GHz. Test object size (WxDxH):270x<inf>x100 mm Scan area (WxD): 200x100 mm (2D)

SCN-524/3G, SCN-524/6G: EMC scanner system in 4D including probe kit for 3 GHz or 6 GHz. Test object size (WxDxH):270x<inf>x100 mm Scan area (WxDxH): 200x100x100 mm

SCN-534/3G, SCN-534/6G: EMC scanner system in 4D including probe kit for 3 GHz or 6 GHz. Test object size (WxDxH):470x<inf>x100 mm Scan area (WxDxH): 300x200x100 mm

SCN-564/3G, SCN-564/6G: EMC scanner system in 4D including probe kit for 3 GHz or 6 GHz. Test object size (WxDxH):770x<inf>x300 mm Scan area (WxDxH): 600x400x300 mm

Included with Instrument: 2 years product warranty*, line cord, Scanner SW, User Documentation on USB-stick, and Certificate of Calibration

** The warranty period may be extended to 3 years by registering the product on Pendulum Instrument's web page.*

Options and SW

Option SDCM: DUT Camera for overlay photos

Option S310: 10 GHz upgrade probe kit

Option SSWU: SW for immunity measurements

Option SBCN: Beacon option for probe position calibration

Option SZRA: ZR-axis for field upgrade of SCN- 522 to SCN-524

Option SLDM: Laser distance meter for easy measurement setup and measuring at a constant height over DUT

Option SUSS: Subscription of Support and Scanner SW updates for one year

Optional Accessories

Option STEN: Shielding Tent option for SCN-52x or 534 series without I/O Panel

Option SIOP: I/O Panel for optimal shielding together with Tent (Option STEN)

Option SPCK: Probe field strength calibration kit incl. strip line, 50 ohm termination and SW

Option 27S: Heavy duty Transport case for SCN-524/534

Option SNSA: N-male to SMA-female adapter

Option RSA-R306B: Spectrum Analyzer RSA R306B from Tektronix, USB instrument, 9 kHz to 6,2 GHz

Calibration & Maintenance

Option 90/05: Calibration and Maintenance

Order numbers:

The EMC-Scanners are ordered using the following system:

SCN-xxx/yG
xxx = model name; 522, 524, 534 or 564
y = frequency bandwidth in GHz; 3 or 6

Examples
SCN-522/3G
SCN-564/6G

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Specifications subject to change
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