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EMV-Technik

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Usage:

The E1 immunity development system simulates interference processes within the device. Disturbance currents, electric and magnetic fields are injected directly into the electronic modules in different ways to determine the susceptible structures on the circuit board, understand the coupling mechanism and enable the implementation of the optimum modifications.

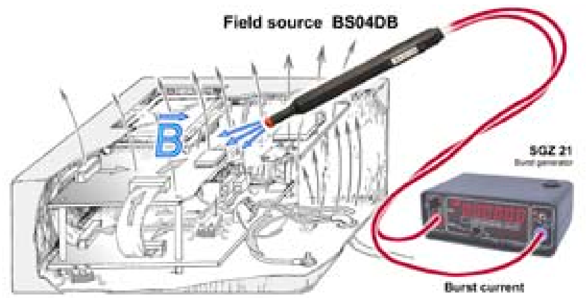
E1 immunity development system

Measuring set-up | **Measuring strategies**

SGZ 21
Burst current

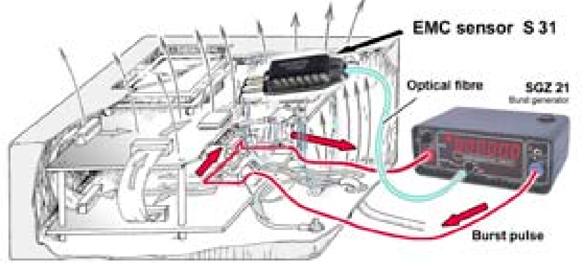
1. Analysis of disturbance current paths

Disturbance currents flow through the modules of an EUT during burst tests. The corresponding magnetic fields generate voltage differences in the GND system and/or induce voltages in signal loops.
When a functional fault is produced in the EUT, the first step of the subsequent fault localization is to examine individual parts of the EUT such as individual modules, individual cable connections, small areas of a large module.



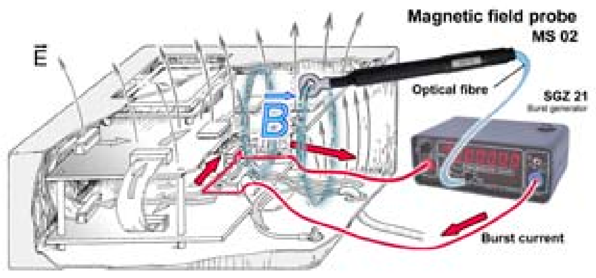
2. Fault localization with field sources

The functional fault is often caused by magnetic fields of the disturbance current or by electric fields (inductive coupling). In order to pinpoint the place of interference, these fields are now injected with field sources which generate a magnetic or electric field in a small space.
If a functional fault occurs when conducted disturbance current flows into and out of the EUT, magnetic field sources are used for fault localization.
E field sources are used in the event that the fault occurs during inductive coupling.



3. Monitoring of EUT logic signals

Signals are monitored when disturbances are coupled in so as to recognize disturbed logic signals and test the efficiency of EMC measures. These measurements allow statements with regard to the instantaneous operating state of EUTs if an interference is not immediately recognizable or not at all from outside.
A sensor S31 is installed in the EUT for signal monitoring. This sensor transmits a signal which is significant for the EUT function without interacting with the EUT to the SGZ 21 via optical fibre.



4. Measuring burst magnetic fields

The E1 allows measurements of burst magnetic fields in the EUT with hardly any interaction with the EUT, thus indicating the run of burst currents.
Each measurement of burst magnetic fields provides two results: the amount of the magnetic field and the direction of the magnetic field. The direction of the magnetic field lines - the current involved flows at an angle of 90° to them - can be easily determined by turning the probe. It is thus possible to obtain a precise idea of the magnetic field in the EUT and to assess which structures are particularly at risk.

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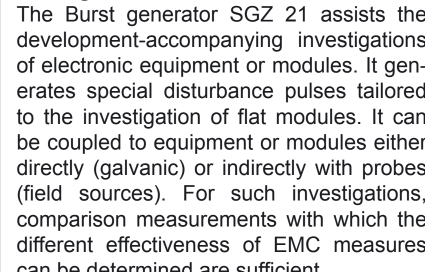
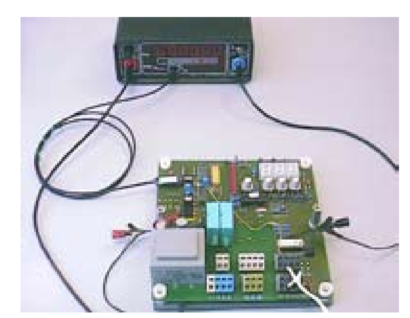
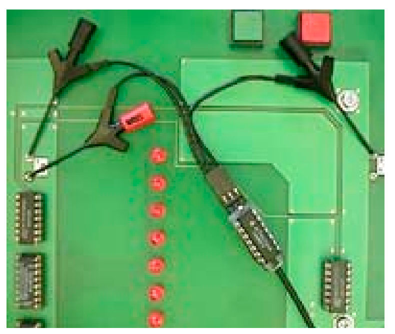
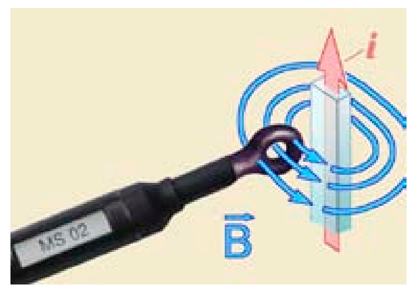
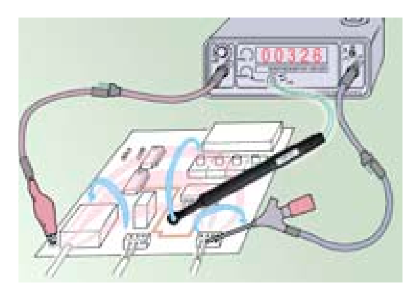
System components:
Burst generator SGZ 21
EMC sensor S31 with optical fibre
B-field source MS 02

Usage:

E1 immunity development system

Design	Description	Application
	**Burst generator SGZ 21** The Burst generator SGZ 21 assists the development-accompanying investigations of electronic equipment or modules. It generates special disturbance pulses tailored to the investigation of flat modules. It can be coupled to equipment or modules either directly (galvanic) or indirectly with probes (field sources). For such investigations, comparison measurements with the different effectiveness of EMC measures can be determined are sufficient.	
	Sensor S31 The S31 sensor which is included in E1 is able to detect fast transient disturbances on signal lines, for example, and to transfer them to the SGZ 21 via optical fibre without interacting with the UUT. This measuring procedure aims at recognis ing disturbed logic signals and/or checking EMC measures for their effectiveness. The plugged-on IC, which determines the sensor's susceptibility, can be easily replaced thanks to the plug-in mount.	
	**MS 02** Der bei einer Burstprüfung erzeugte Störstrom fließt durch den Prüfling. Mit der Sonde MS02 werden die Magnetfelder dieses Stromes gemessen und damit Größe und Richtung des Störstromes ermittelt. Sie wird über LWL mit dem Eingang des SGZ 21 verbunden - Gegenmaßnahmen können so gezielt dimensioniert werden.	

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Magnetic field sources:

B-field source BS 02
B-field source BS 04DB
B-field source BS 05DU
B-field source BS 05D

Usage:

Four field sources for magnetic fields are available for locating circuit areas and components which are susceptible to burst fields.Their size is adjusted to the potential field-susceptible objects. These probes can only be used in conjunction with the burst generator SGZ 21.

Magnet field soures — E1 set

Design	Description	Application
	BS 02 The magnetic field source produces a B field beam of > 5 cm diameter. It has the same suitability for investigations of complete units and modules. The size of the probe allows location of magnetic-sensitive weak spots through large-area radiation of, case surface and inner areas, connectors, modules with track run structures and IC's.	
	BS 04DB The magnetic field source generates a B field beam of millimeter size (> 3 mm). The field beam exiting from the face side of the probe is used to sense the pcb surfaces. This makes it possible to locate weak spots in layout and pcb component areas. Critical track run sections, components and component connections can be located.	
	BS 05DU This magnetic field source produces a circular magnetic pulse field in the millimeter range. By placing it on single pcb tracks, IC pins, SMD components or flat conductors (flat ribbon cable) it can be used as a mini current-couple clamp to selectively induce disturbance current and voltage. The sensitive signal connections to be quickly found with this probe and protected through changes in the layout. .	
	BS 05D The magnetic field probe generates a B field bundle of approx. 3 mm in diameter similar to the BS 04 DB probe. However, the field lines run at 90° to the probe shaft. The probe is thus particularly suitable for localizing weak points in hardly accessible regions of modules. Before using the BS 05 D field probe you should roughly localize the weak point with the BS 02 or BS 04 DB probe.	

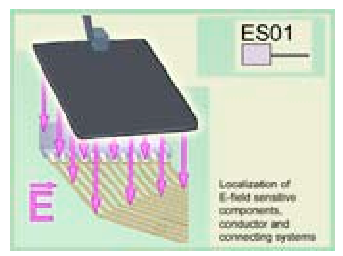
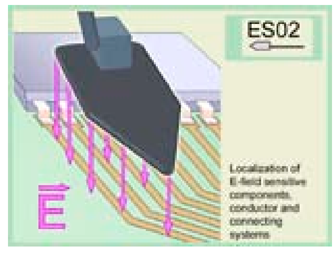
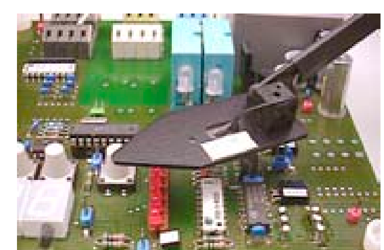
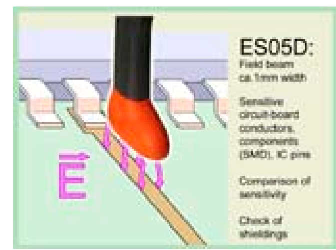
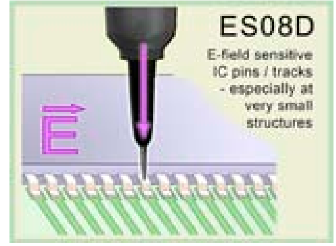
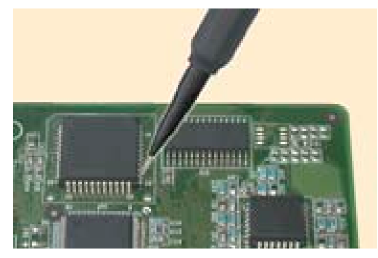
E-field sources:

E-field source ES 00
E-field source ES 01
E-field source ES 02
E-field source ES 05D
E-field source ES 08D

Usage:

Four field sources for electric fields are available for locating circuit areas and components which are susceptible to burst fields. Their size is adjusted to the potential field-susceptible objects. Susceptible conductors and IC pins can be selectively determined with small probes. These probes can only be used in conjunction with the burst generator SGZ 21.

E-field sources

Design	Description	Application
ES00 Localization of E-field sensitive components, conductor and connecting systems	**ES 00** This field source can be used for electrical coupling into large areas or line-shaped regions (1.5 dm²). Electrically susceptible weak points often extend over areas of 10 to 15 cm of a module (LCD display, bus systems). These weak points do not respond to small field sources. You need large-area field sources such as the ES 00 to localize such weak points. You can also use the source for coupling into housings.	
	**ES 01** This field source can be used for large-area electrical coupling. The probe is suitable for applying disturbances to area- or line-shaped weak points with a size between 5 and 10 cm. It ranges between the field sources ES 02 and ES 00 (see relevant description) because the ES 02 source may be too small and the ES 00 source too big for various applications.	
	**ES 02** The E field source with its tip can be used to localize E field susceptible small-space weak points (conducting tracks, quartzes, pull-up resistors, ICs). The area of the field source allows coupling into large areas of housing surfaces and inner sections, connecting material and components with conducting track structures and ICs (e.g. bus systems, LCD displays).	
	**ES 05D** The E field source has a narrow line-shaped probe head and is designed for weak point localization in the conducting track and component area of modules. It is suitable for coupling E fields into conducting tracks, components and their connectors, wires and particularly into individual SMD components such as resistors and capacitors. Place the probe's head on individual conducting tracks, SMD or wired components for E field coupling.	
	**ES 08D** This E-field source is designed to quantify the immunity of IC-Pin and tracks – especially at very small structures. The tip of the probe has to be connected to the Pin or track. By changing the intensity of the burst generator the sensitivity can be defined. Inside of the field source the burst pulse couples to the probe tip by a capacitor (ca. 1pF).	

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