LANGER
EMV-Technik

User manual

H2 set and H3 set

E- and B-field sources

- Translation of the original user manual -

Index **Seite**

1 Declaration of Conformity

Manufacturer:
Langer EMV-Technik GmbH

Nöthnitzer Hang 31
01728 Bannewitz
Germany

Langer EMV-Technik GmbH herewith declares that the

H2 / H3 set, E-Feld- und B-Feldquellen including
BS 02-h, BS 04DB-h, BS 05DB-h, BS 05DU-h, ES 00-H, ES 01-h, ES 02-h, ES 05D-h, ES 08D-h

conforms with the following relevant regulations:

- Restriction of certain Hazardous Substances 2011/65/EU

The following applicable standards were used to implement the requirements specified by the a forementioned directives:

- IEC 60502-2 – Power cables with extruded insulation for rated voltages 1 kV up to 30 kV
- DIN EN IEC 63000:2019-05 (Restriction of hazardous substances)

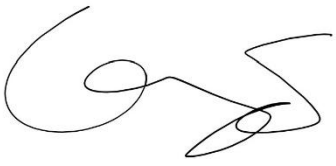
Note: This product is not covered by the Low Voltage Directive (2014/35/EU), as the operating voltage exceeds 1000 V AC.

Name of the person authorized to compile the technical

Katja Langer

Bannewitz, 2025-09-08

Signature:



K. Langer, Managing Director

2 Description

2.1 Usage

With the field sources from the sets, it is possible to simulate fast transient electric and magnetic pulse fields in electronic equipment and on electronic modules for development-accompanying investigations of disturbance immunity.
The aim of its utilization is the location of disturbance immunity weak spots (Burst, ESD) in electronic equipment so that preventive measures can be taken.

The field sources can only be used in conjunction with a burst generator complying with IEC 61000-4-4.

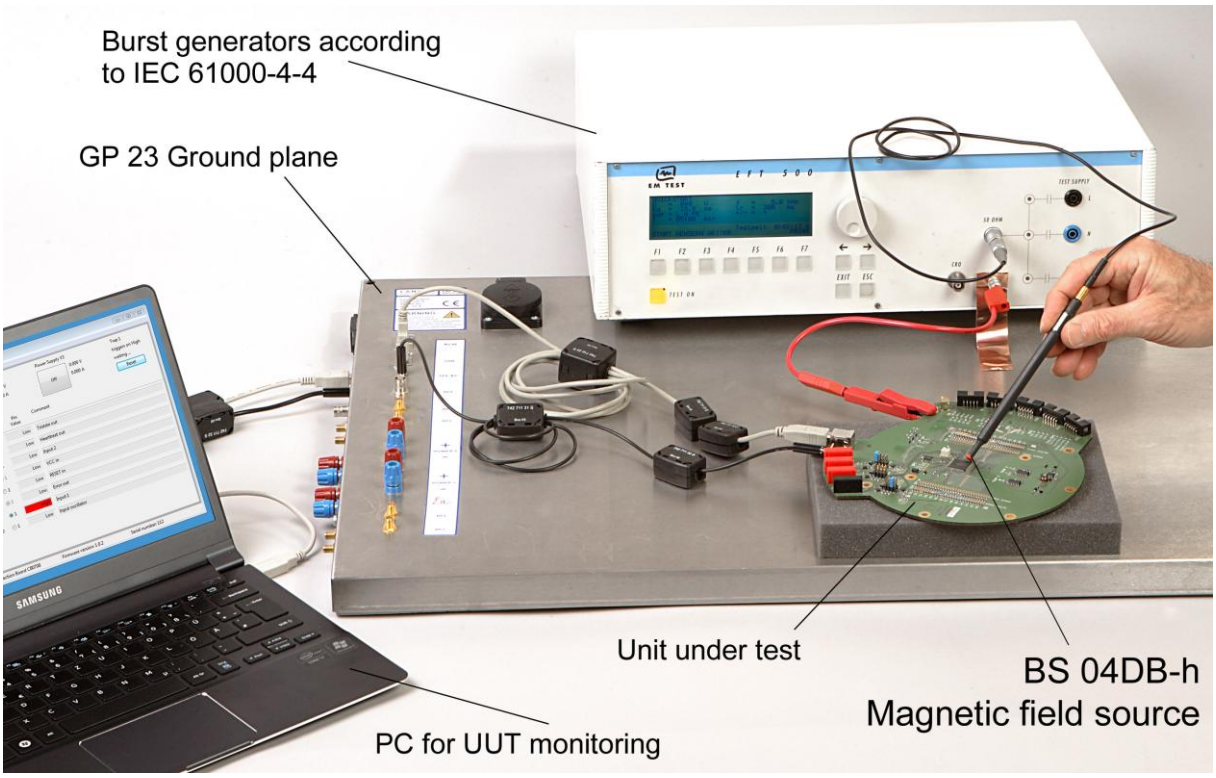


Figure 1 Measurement set-up with burst generator and UUT

2.2 Connection to burst generators

The field sources are fed with disturbance signal quantities from a burst generator via the high-voltage cable contained in the field source set.
Only burst generators complying with IEC 61000-4-4 may be used. The maximum feed voltage to the field source is 4.4 kV (peak value).

The fixing of the field source into the miniature snap-connector on the high-tension cable should only be carried out under a no-voltage condition. The high-voltage plug connector is connected to the burst output socket on the burst generator.

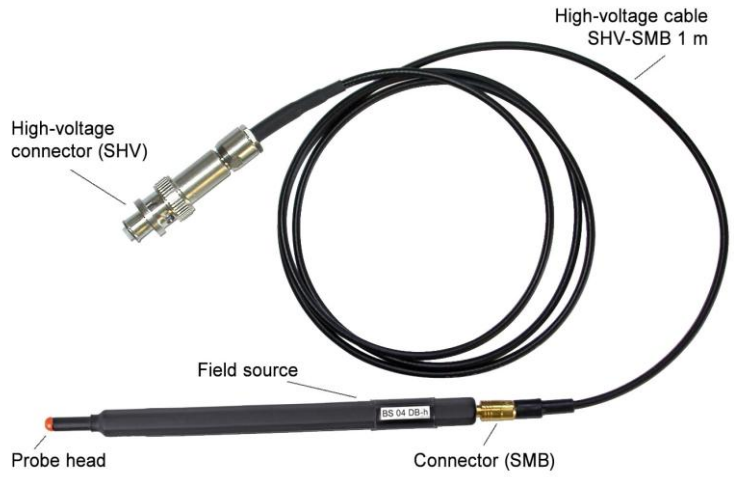


Figure 2 Field source with high-voltage cable

2.3 Function

2.3.1 B-field sources

The burst generator feeds, via the high-voltage cable, a pulse current to the induction coil located in the tip (field source). A magnetic pulse field is generated in the induction coil. This magnetic field pulse exits the field source and, with appropriate proximity, influences the unit under test.

2.3.2 E-field sources

The burst generator feeds, via the high-voltage cable, pulse voltages to the couple-electrode located in the field source tip. A pulse-shaped electric field is generated in the field source tip through the voltage transient.

2.4 Handling

The field sources are manually moved over the unit under test. Corresponding to field source size and spacing, the pulse field influences through the surface of the part being tested.

Tracks and components are selectively pulsed using appropriate usage methods. Function failures in the tested part indicate a disturbance immunity weak spot. The part being tested can be damaged through an excessive level of disturbance.

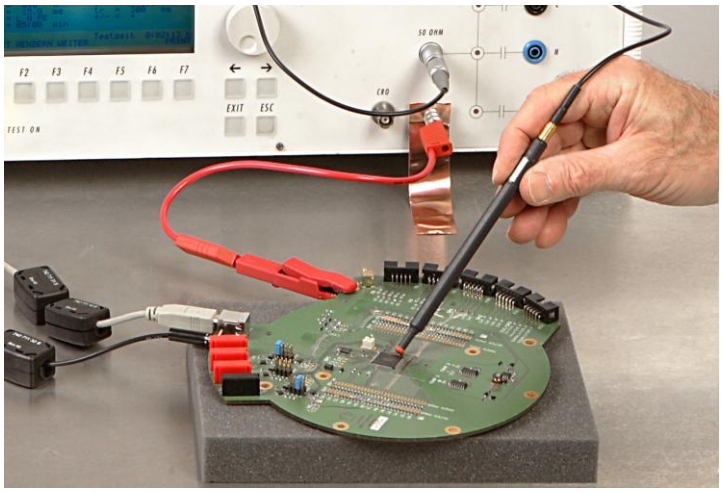


Figure 3 Handling a field source

3 Disturbance mechanisms

- Electronic modules have different levels of disturbance immunity depending on layout and IC sensitivity
- Precisely definable weak spots are the cause of Burst and ESD sensitivity. The formation of such weak spots depends mainly on the GND/Vcc/signal track geometry and the type/manufacturer of the IC's utilized.
- Disturbance pulse current (I_{IP}) infiltrates electronic modules via conductors or capacitance. Electric disturbance fields (electric field strength E) or magnetic disturbance fields (magnetic flux density B) caused by the disturbance current radiate the surface of the modules.
- Magnetic pulse fields (B) or electric pulse fields (E) are the major physical quantities which cause flat modules to be influenced.
- A weak spot is normally only magnetic-sensitive or only electric-sensitive.
- In practice, both weak spot types are relevant. For example, in disturbance events, electric fields which influence electric-sensitive weak spots can occur.
- The currents caused by the electric field can produce magnetic fields which themselves influence magnetic-sensitive weak spots (**see illustration below**).
- The disturbance effects of the two mechanisms overlap and are difficult to separate.
- Due to the different physical mechanisms each of the two weak-spot types requires different EMC measures.
- Usually, only a few disturbance immunity weak spots exist on one module and these are often confined to small surface areas.
- The module is immune to disturbance when these weak spots are located and corrected.
- The burst magnetic fields radiating on the module surface or within equipment spaces can be measured with special magnetic field probes without reverse reaction (S2 set).
- With the EMC sensors, reference disturbance thresholds can be modeled and influenced logical signals captured (E1, OSE).

3.1 Field distributions

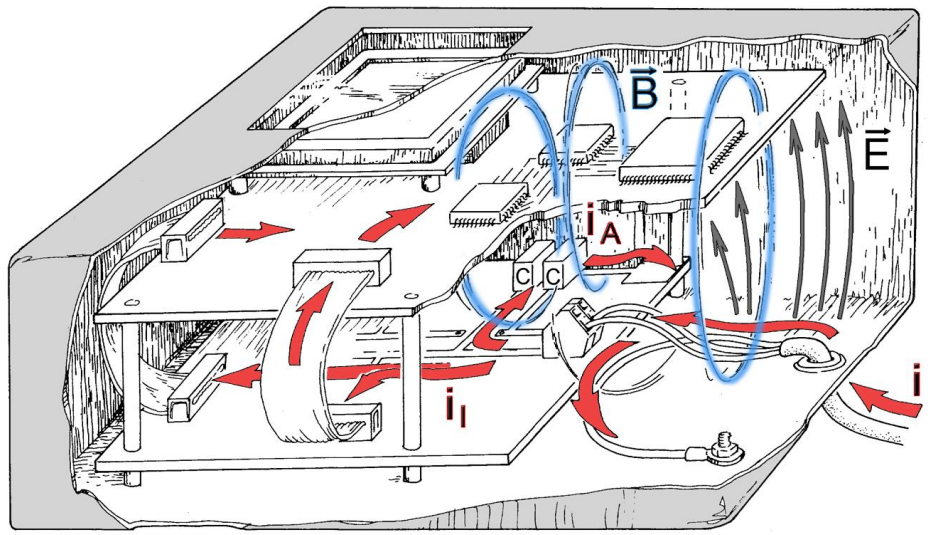


Figure 4 Field distributions

Disturbance current (i) infiltrates the unit via the input cable. The internal disturbance current (i_I) is reduced by the bypass current part (i_A) leaving the unit via the bypass capacitor current paths (C). The magnetic fields B shown in the illustration can influence electronic modules located within some decimeters. Not all B-fields infiltrating the module surface have an influencing effect. Usually, only small areas are B-field sensitive. To be observed is that magnetic fields are not only produced in the area of feed cables and protective earth connections by disturbance currents (i). Participating to a large extent are also bypass capacitor (C) current paths and internal GND and Vcc connections.

Electric pulse fields (E) are radiated from the cables carrying the disturbance current and these mainly influence signal connections which have a high-impedance signal source.

4 Measurement principle

4.1 Reference point

During disturbance immunity testing according to standard, the unit under test (UUT) is externally subjected to disturbance quantities.
The disturbance quantities infiltrate the UUT and are distributed over the electronic modules in an unknown manner.
The entire module surface is subjected to electric and magnetic pulse fields.
The weak spots, usually confined to a small area (**in illustration, for example, the quartz oscillator**), cannot be located with these distributed disturbance quantities.

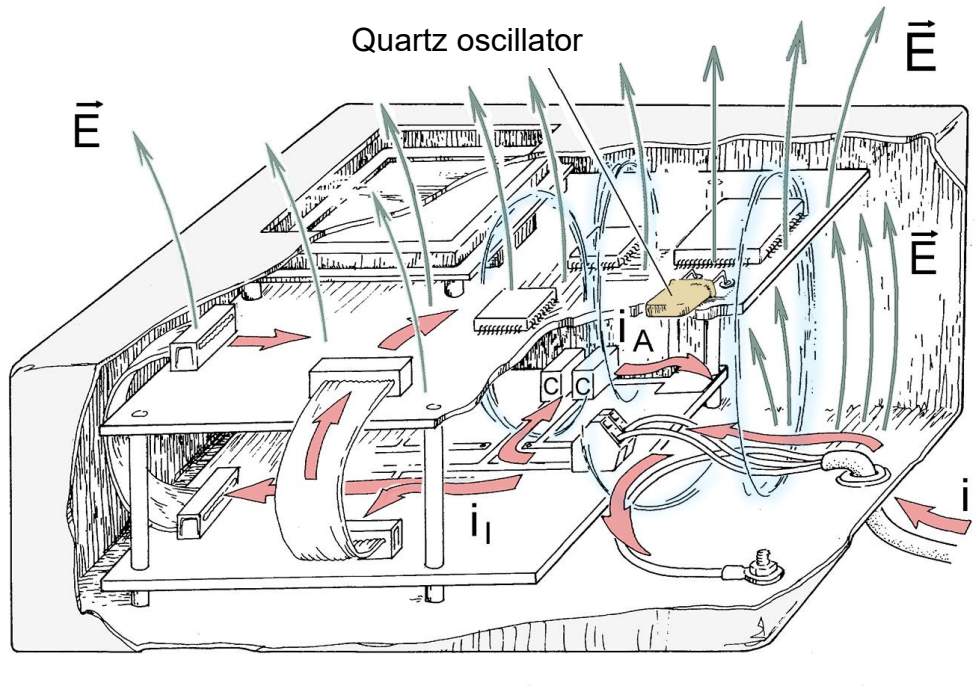


Figure 5 Quartz oscillator cannot be detected

It cannot be ascertained which component or which track run causes the immunity failure. If the failure spot in the module is not known, it is not possible to take on-target corrective action to the layout, the circuitry or components used.

4.2 Strategy

The field sources contained in the field source set produce an area-limited electric or magnetic pulse field
This pulse field has, at the point of influence, the same pulse parameters (slope, peak value, pulse width) as that field, produced during testing according to standard, which is distributed over the entire module.
The magnetic flux density B of the probe's field source causes the same inductive-effects on signal connections (track runs) as that caused by testing according to standard.
The pulse field produced by the E-field probe's field source causes the same influence to high-resistance signal connections and components (e.g. in illustration, the quartz oscillator) as that field produced during testing to standard.
Signal connections or components are selectively pulsed with the field at the field source tip.
A weak spot is located when a function failure is caused.

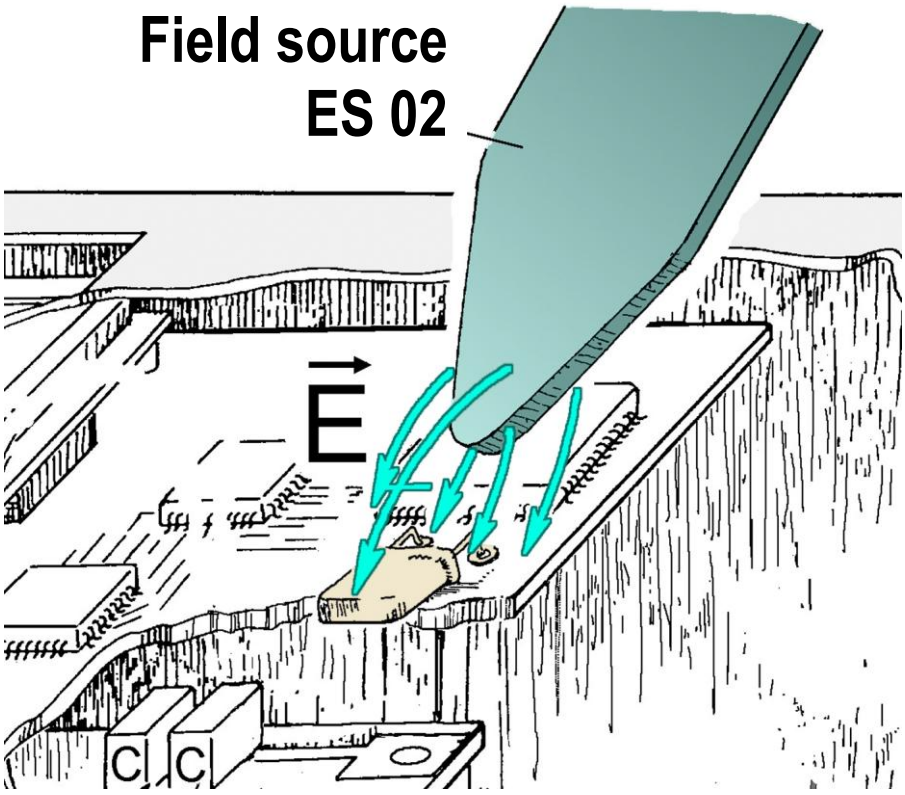


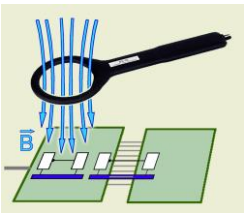
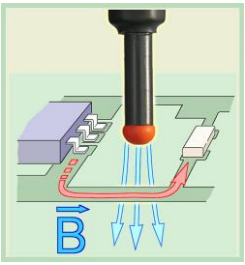
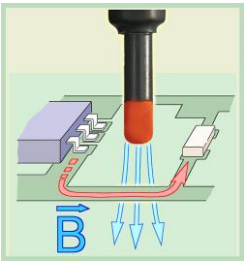
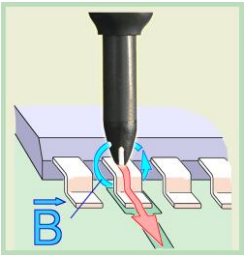
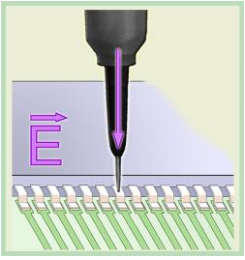
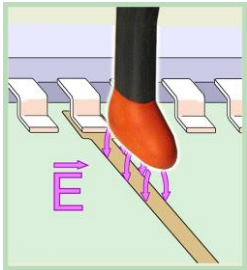
Figure 6 Influencing the quartz oscillator

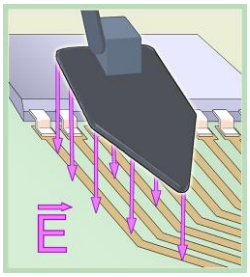
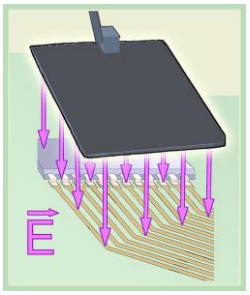
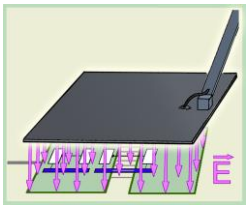
4.3 Particularity

The failure pictures for the located weak spots must be evaluated. Critical weak spots are those having a failure picture identical with the failure picture seen during testing according to standard.

It should be observed that the triggering of the function failure with the probes disturbing quantities involves a hardware and software dependent hit-probability. This hit-probability is formed by a disturbing pulse occurring at the same time as a critical phase of the unit function used. Different test times are required for different module functions. When, for example, a RESET function is affected, the hit-probability is 1 - the unit reacts immediately with a function failure. When a bus function is affected, the reaction time can take minutes.

5 Field source types

Usage	Description	Type
	**BS 02-h** 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 field source 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-h** The magnetic field source generates a B field beam of millimeter size (> 3 mm). The field beam exiting from the face side of the field source 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 05DB-h** The magnetic field source produces a very fine B field beam (Ø > 1 mm) at the tip of the field source and is therefore suitable for locating of point-shaped weak spots. The field beam is used to sense the surfaces of pcb's and components. The small diameter and the concentrated bundling of the beam make a high resolution possible. Before using the BS 05DB-h field source, the weak spot should be approximately located with the BS 02-h or BS 04DB-h field source.	
	**BS 05DU-h** 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. A module (UUT) often has an insensitive major part and only a few sensitive signal connections (track runs, IC pins). The sensitive themselves to be quickly found with this field source and protected through changes in the layout.	
	**ES 08D-h** This magnetic field source is designed to quantify the immunity of IC-Pin and tracks – especially at very small structures. The tip of the field source 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 tip by a capacitor (ca. 1pF).	
	**ES 05D-h** This E-field source has a narrow line-shaped probe head and is envisaged for the searching of weak spots in track run and component areas. It is suitable for coupling E-field into track runs, wires, component connections (pins) and components, particularly single SMD components like resistors and capacitors. For E-field coupling, the head or rather tip is positioned onto single tracks, SMD components or wired components. Single plug contacts or single cores of ribbon cables can also be investigated.	

	**ES 02-h** The E-field source can, with its pointed end, be used for locating small E-field sensitive weak spots (track runs, quartz oscillators, pull-up resistors, IC's). The area of the field source allows large-area coupling into case surfaces and inner areas, connectors, and modules with track run structures and IC's (e.g. bus systems and LCD displays).	
	**ES 01-h** The E-field source makes the coupling of an electric field into large areas possible. The field source is suitable for pulsing area and line-shaped weak spots ranging from 5 to 10 cm expansion and, in the field source range, fits between the ES 02-h and ES 00-h field sources (see corresponding description) because for some applications the ES 02-h source can be too small and the ES 00-h source too large.	
	**ES 00-h** With the E-field source, large-area or line-form electric field coupling is possible (1.5 dm²). Electric-sensitive weak spots can often stretch 10 to 15 cm across a module (LCD display, Bus system). These weak spots do not react to small field sources. Large-area field sources, like the ES 00-h, are necessary to locate these types of weak spots. The source can also be used for coupling into cases.	

5.1 Designation key

Example:	BS 04DB-h			
Field type	**Size**	**Attenuation**	**Special field formation**	**Version**
BS: Magnetic field source **ES**: E-field source	**00** (biggest) **01** **02** etc.	**D**: common-mode attenuation	**B**: field bundling **U**: circular field	**-h**: for connection to burst generators according to IEC 61000-4-4 (is not printed on the field source)

6 Usage

6.1 Searching for weak spots on modules

6.1.1 Magnetic

Magnetic-sensitive surface areas (weak spots) on pcb's are formed from signal tracks which have their potential increased by GND or Vcc inductive loops. When a pulse field infiltrates the inductive loop area, a voltage pulse is induced in the signal track and this pulse may influence the connected IC inputs.
To be observed is that the pulse should not be injected on the track but beside the track in the loop cross-section area. The BS 02-h, BS 04DB-h and BS 05DB-h magnetic field source produce a field bundle (or beam) for the localization of these induction loops. The field sources produce field bundles of different diameters. The field bundle size must be chosen to fit the opening of the induction loop.
The largest field bundle diameter is produced by the BS 02-h field source and the smallest diameter by the BS 05DB-h.

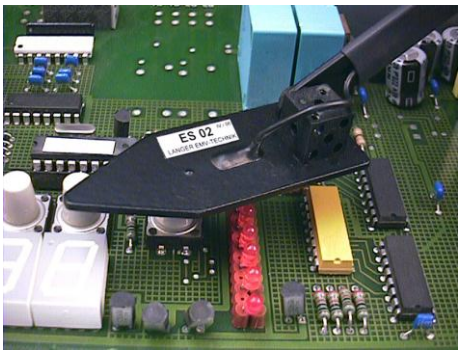
Figure 7 Magnetic field sources

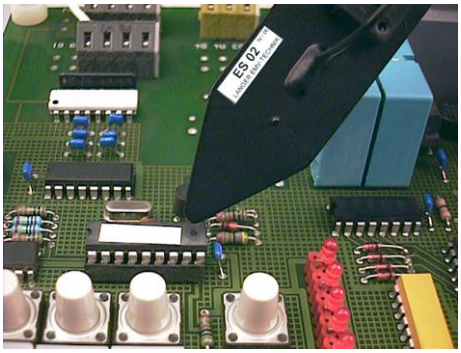
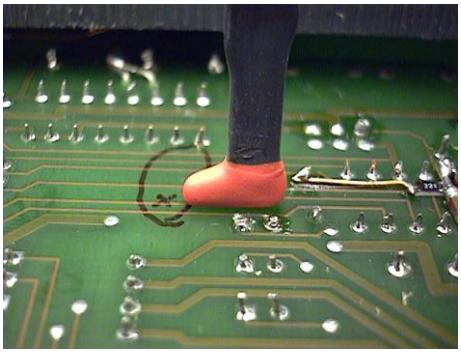
	The BS 02-h is suited for: - locating large weak spots (> 2 cm) on pcb's with little GND surface area. - rough localization of smaller weak spots (< 2 cm).
	The BS 04DB-h and BS 05DB-h field sources are used for locating weak spots < 2 cm.

6.1.2 Electric

Electric-sensitive surface areas of pcb's are primarily formed by tracks and components which have a high-resistance driving source. The sensitivity of these weak spots is lowered when the track surface area and/or the driver resistance is reduced.
The ES 02-h, ES 01-h and ES 00-h E-field sources allow the subjection of area sizes ranging from 1 cm² to 1.5 dm². The three field sources are graded in size. Dependent on source size the corresponding area can be pulsed with an E-field.

Figure 8 Searching for weak spots with E-field sources

	To subject the module to E-field, the flat side of the field source is moved parallel to the module. The area subjected corresponds to the surface of the field source. The electric field strength can be increased by reducing the spacing. Components raised from the surface are subjected to greater field strength.
	The nearing, or laying on, of the edge produces, in contrast to the flat side of the source, a line-shaped influence. Laying the field source's edge on a conductor will cause it to be particularly subjected to the electric field.

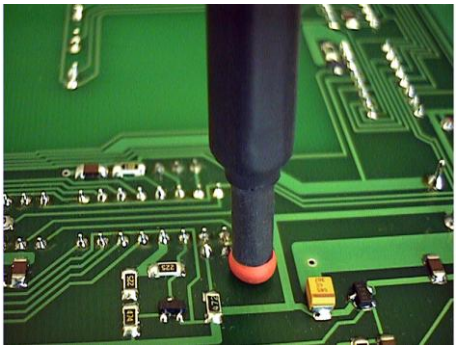
	The tip of the ES 02-h field source allows a square centimeter area to be pulsed. Sensitive components of this size (IC's, quartz oscillators) are locatable.
	With the ES 05D-h field source, SMD and small wired components as well as pcb tracks can be selectively pulsed. The field source permits an exact localization of the weak spot. An evaluation and rough localization can be made by particularly sensitive components and conducting lines with the ES 00-h, ES 01-h or ES 02-h field source. The pin-point locating is carried out with the ES 05D-h field source.

Connecting module GND to generator GND increases the effectiveness of the field sources.

6.1.3 Work sequence

- In two stages, first the magnetic-sensitive and then the electric-sensitive weak spots are located
- Determination of a sesitivity (magnetic or electric) occurs in two steps:
  - **In a first step**, a large surface probe is used for quick searching over the module (magnetic: BS 02-h or electric: ES 00-h, ES 01-h, ES 02-h)
  - **In a second step**, the identified sensitive area is searched with a field source having a smaller head or a tip to permit exact localization of the weak spot (magnetic: BS 04DB-h, BS 05DB-h or electric: ES 05D-h, tip of ES 02-h)
- The field source is moved over the surface of the module. At the same time, the generator voltage is increased in steps or the spacing reduced in steps. The spacing for the large field source (BS 02-h, ES 00-h, ES 01-h, ES 02-h) should be between 2 and 10 cm, for the small field source (BS 04DB-h, BS 05DB-h, ES 05D-h or the tip of ES 02-h) between 0 and 3 cm.
- When the field sources (BS 04DB-h, BS 05DB-h, ES 05D-h) are placed vertically on the module surface, the highest possible resolution and therefore selectivity regarding sensitive components and tracks is obtained.
- The weak spot is located when the function failure occurs. No further reduction of the spacing or increase of the generator voltage should be made.
- Weak spots are already recognizable with a 500 V generator output voltage.
- The effect of the E-field source is increased when the generator earth is connected to the GND of the unit under test.
- Usually larger areas are sensitive in one or two-layer modules when they have a GDN and Vcc conducting system.

Figure 9 Getting closer…



and making contact (here: BS 04DB-h)

6.2 Disturbance immunity of signal inputs

Signal paths and signal inputs can be selectively tested for disturbance immunity with the special circle-shaped field of the BS 05DU-h field source.Sensitive inputs can be potential weak points and can be treated with corrective measures. The signal conductors, either on the module or between the modules, leading to the signal inputs are selectively encompassed with the circular magnetic pulse field of this field source.

A voltage is induced in the encompassed conductor which has an influencing effect on the corresponding electronic input.

The BS 05DU-h field source is used for coupling on pcb tracks, IC pins, cores of flat ribbon cable, plug pins, small SMD components, etc.

To be noted is, magnetic field coupling with the BS 05DU-h field source particularly affects signal connections with a driver having a low resistance (TTL, HC, HCT, AC, ACT ...).

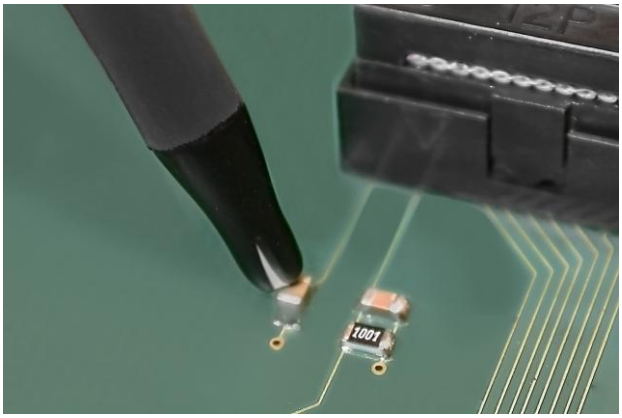
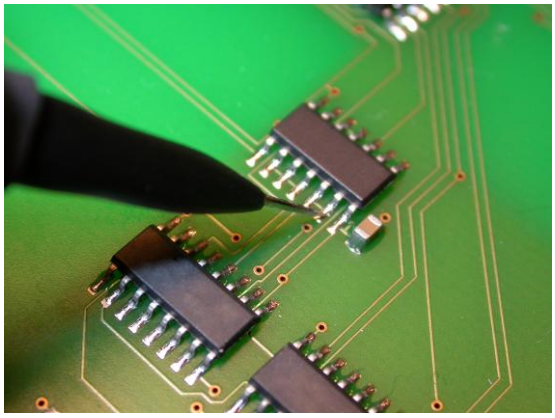


Figure 10 BS 05DU-h magnetic field source



ES 08D-h E-field source

Signal connections having a high resistance driver (Pull-up, Quartz oscillators ...) can be tested with the E-field source ES 05D-h or ES 08D-h.

6.3 Evaluation of modules

The disturbance immunity of modules can be divided into two parts:

1. Disturbance field immunity of the module surface.
2. Conductor disturbance immunity of connections / plug and socket connectors.

The disturbance field immunity of the module surface can be ascertained through pulsing with homogeneous pulse fields.

The module is subjected, either entirely or in sections, to a homogeneous pulse field having defined pulse shape and defined peak value. The field strength at the module surface is gradually increased until function failure occurs.

The disturbance field immunity is separately ascertained for both field types with probes:

- ES 00-h electric pulse field
- BS 02-h magnetic pulse field

6.3.1 Electric pulse field

The ES 00-h E-field source is positioned over the module surface with approx. 2 cm spacing.

The generator voltage is slowly increased until function failure occurs.
The generator voltage at failure is a measure of the module's E-field disturbance immunity.

Figure 11 ES 00-h E-field source

6.3.2 Magnetic pulse field

The BS 02-h magnetic field source is positioned over the module surface with approx. 3 cm spacing.

Beginning with the lowest generator voltage, the BS 02-h field source is guided over the module with constant spacing so that all areas are similarly subjected.

The generator voltage is increased by one step (approx. 100 - 500 V) if no function failure has occurred.

The generator voltage reached is a measure of the module's B field disturbance immunity.

- Both sides of the module are pulsed with positive and negative polarity.
- The generator voltage should not be further increased after function failure has occured.
- Each function failure type can be allocated on disturbance threshold.

6.4 Capacitive coupling of pulse current

Capacitive coupling of pulse current is achieved by laying the **ES 02-h, ES 01-h** or **ES 00-h** field sources onto metallic surfaces of modules, cases or construction parts. The size of the induced pulse current is relative to the coupling surface area and field source spacing. A selection can be made by laying on the source's edge. The pulse current can influence components and conductors directly. An indirect influence exists through magnetic field coupling and magnetic-sensitive weak spots.

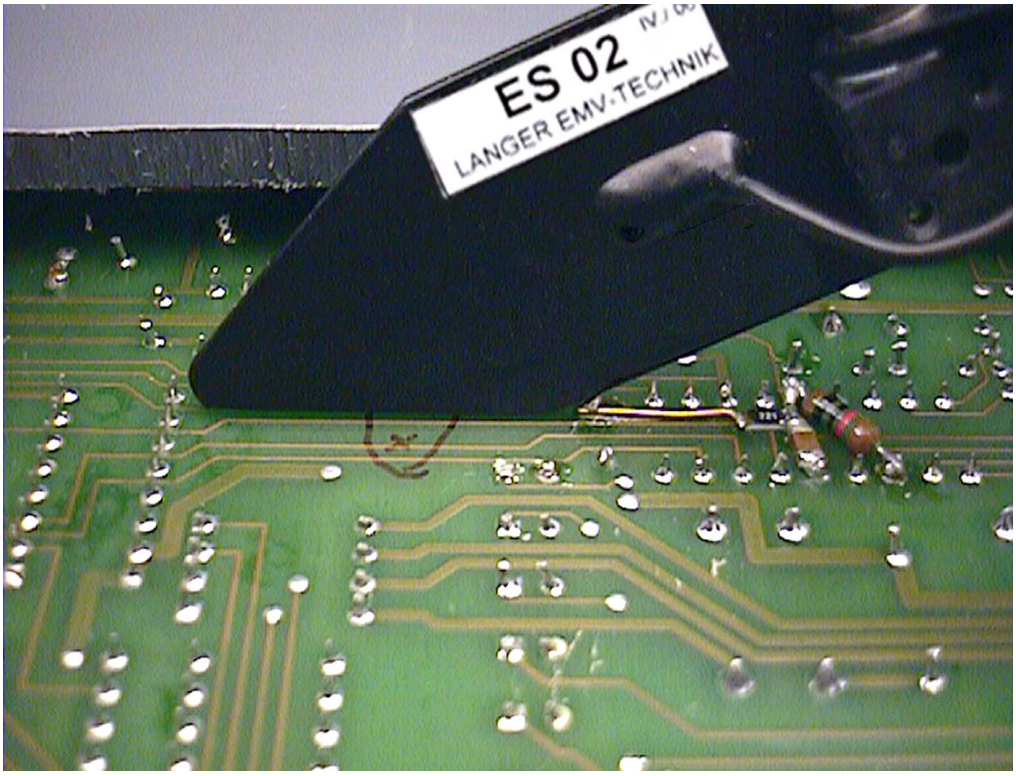


Figure 12 ES 02-h E-field source

7 Measurement set-up

7.1 Requirements of the unit under test

The field sources are used to evaluate disturbance immunity weak spots on or between (connector, cable) electronic modules. As these weak spots are identified through function failure, it is necessary for the module to be tested in a functioning condition. When the module is not capable of functioning separately, it must be tested in conjunction with an appropriate electronic environment. This could be the equipment of which the module is a part of, parts of the equipment or a simulation environment.

For development-accompanying investigations, the surface of the module must be accessible to the field sources. This can be achieved when:

a) The module can be driven when it is laid out separately (with auxiliary supply)
b) Access with field sources to the module is possible in its built-in condition.
c) Special openings can be made in the equipment case.
d) The equipment can be driven when disassembled.
e) The module can be driven with an adapter.

During the investigations, regardless of possible disassembly:

1. The function failure must be able to be seen or heard.
2. An emergency OFF for the unit under test must be accessible.

7.2 Measurement set-up according to IEC 61000-4-4

A layout according to standard (IEC 61000-4-4) can be used when modules within functioning equipment are to be investigated. The 10 cm separated metal surface and special PE-connections are not prerequisites for working with field sources. The magnetic field sources BS-h are very much independent of such environment.
The effectiveness of the E- field sources ES-h are affected by metallic connections between the equipment and surroundings and by a metallic background. Generally, these increase the effect of the E-field sources.
When the surface of the module is to be pulsed, the equipment must possibly be driven in a disassembled condition. When E-field sources are then used, it is possible that the metal environment of the standard layout results in undesired influences so that the layout on a wooden table is preferable. However, when specific disturbance current paths of the equipment and the equipment surroundings play a role in the investigation, a measuring place layout according to standard is to be favored.

7.3 Set-up on wodden table

The use of a wooden table is recommended when distortion of the E-field by metal surrounding is to be prevented. Large metal objects within a circumference of approx. 1 meter should be removed.
Furthermore, the effect of the E-field sources is dependent on the connection between generator GND and the unit under test. An HF-advantaged connection normally strengthens the effectiveness of the E-field sources. In special cases, the GND of a module can be connected directly to the generator GND.
The effectiveness of the magnetic field sources BS-h is very much independent of the surroundings of the unit under test.

7.4 Set-up in other environment

During the use of E-field sources the effect of metal parts, which are not part of the module or are outside of the immediate vicinity (30 cm), on the measuring result can generally be ignored. A check for occurrence of unallowable falsifications should be made.

8 Examples of usage

8.1 ES 05D-h E-Field source

The head of this field source has the shape of a shoe. The sole of the shoe and the tip emit vertical electric pulse fields.

The field sources is designed for pulsing smaller objects (< 10 mm).

Figure 13 ES 05D-h E-field source

Beginning with a spacing of approx. 5 cm, the sole of the field source is brought closer to the component or track run to be tested. The initial generator voltage should not exceed 1000 V. The field source must not be brought closer after function failure. Before the investigation is continued, the generator voltage should first be reduced and thereafter the spacing reduced. This sequence is repeated step-like until the sensitive component/track has been exactly located.

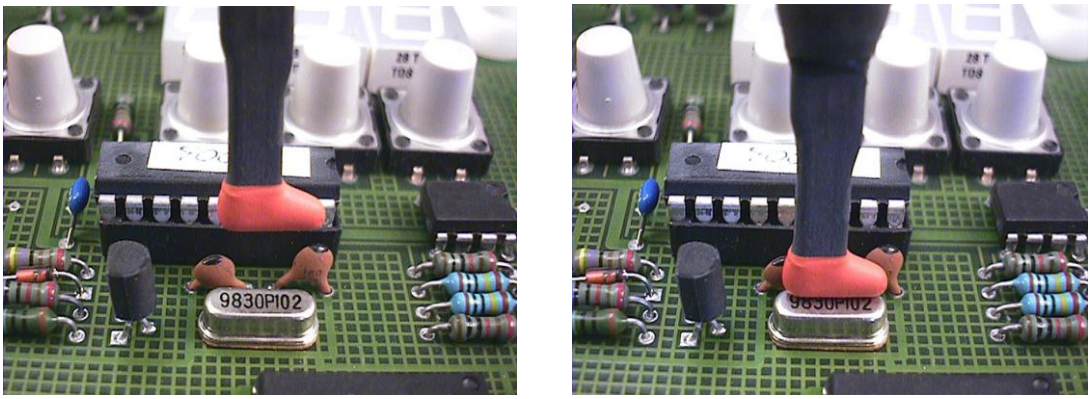


Figure 14 Careful approach and contact with ES 05D-h E-Field source

The highest selectivity can be obtained by placing the probe head onto the component or track. The electric field emerging from the sole then has the shortest coupling path to the tested area. For this, the sole must make full contact.

The setting of the generator voltage should be so that the influencing ceases as soon as the probe is slightly moved away from the tested object.

Contact with the field source tip allows small E-field sensitive SMD components to be located (1206, 0805, 0603).

When making contact with insensitive components, the generator voltage can be in the kV range. Highly sensitive areas react at 200 V with a 1 cm spacing.

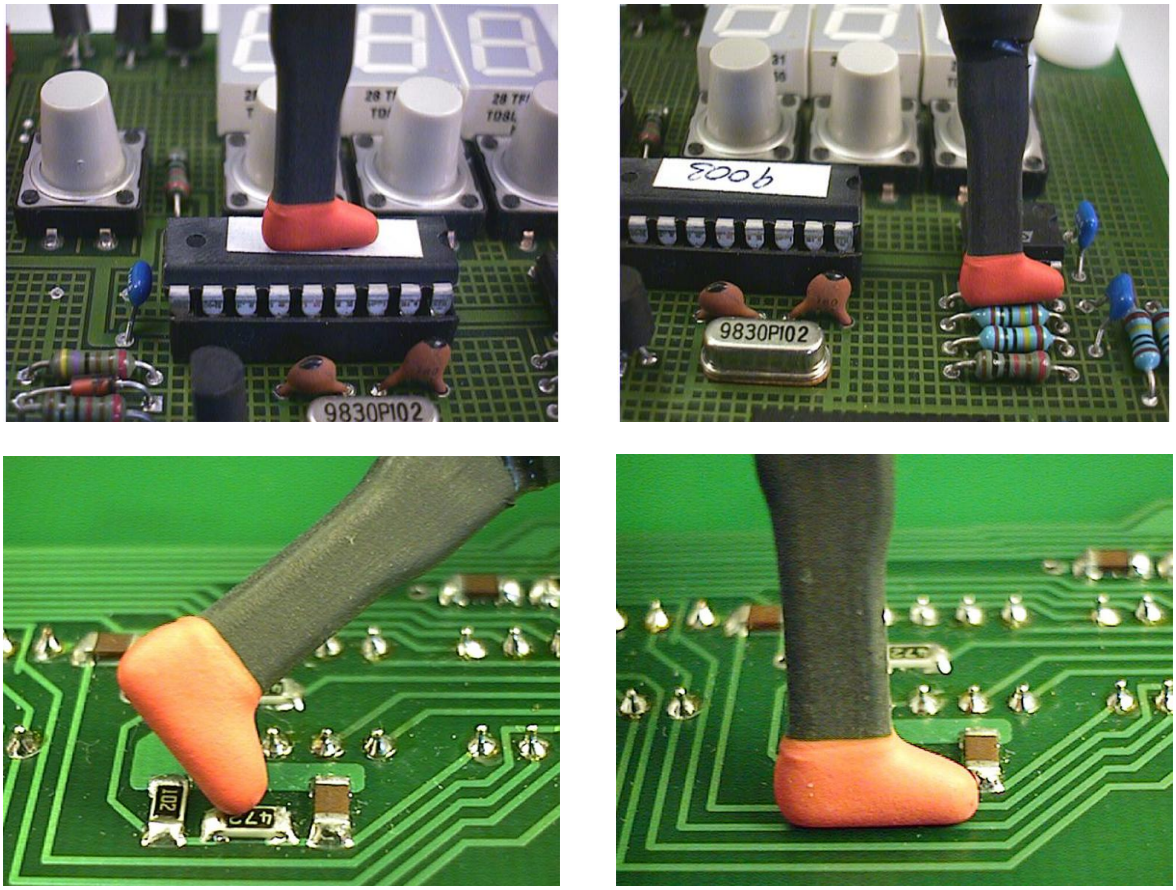


Figure 15 Examples of usage with ES 05D-h E-field source

The probe has current displacement compensation (common-mode attenuation) so that parasitic couple current and magnetic fields are suppressed. To maintain the effect of the common-mode attenuation, it is advantageous to RF-isolate the generator GND from the GND of the module. A connection between GND and the generator increases the E-field effect but also negatively affect the current displacement compensation.

Preferable use on: pcb tracks, SMD or wired resistors and capacitors, IC's, plug connector pins, cable cores, Quartz oscillators, resonators.

8.2 Flat ribbon cable

Single cores of a ribbon cable, e.g. located between two modules of equipment, can show electric or magnetic field sensitivity.

8.2.1 Magnetic pulse field

a) Global evaluation

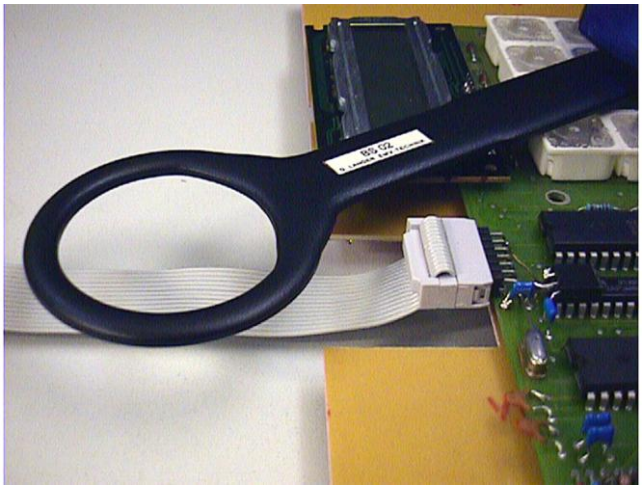


Figure 16 Global evaluation of the flat ribbon cable with BS 02-h magnetic field source

A global evaluation of magnetic weak spots is possible through coupling in a B-field with the BS 02-h field source. The entire ribbon cable can be radiated with the source's field bundle. Furthermore, the edge of the field source can be placed on the cable so that areas are encompassed by the field (see photo). A response definitely confirms a magnetic field sensitivity.

b) Local evaluation

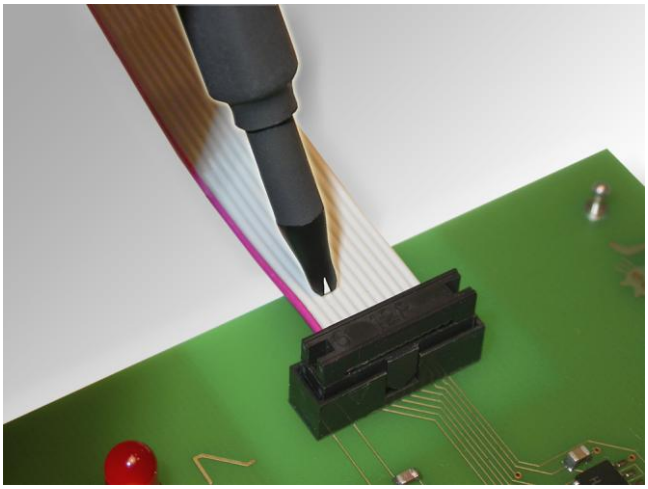


Figure 17 Local evaluation of the flat ribbon cable with BS 05DU-h magnetic field source

Higher resolutions can be obtained with the BS 05DU-h field source. Single cores can be selectively pulsed with the BS 05DU-h field source. It will be possible to identify critical signal paths.

8.2.2 Electric pulse field

a) Global evaluation

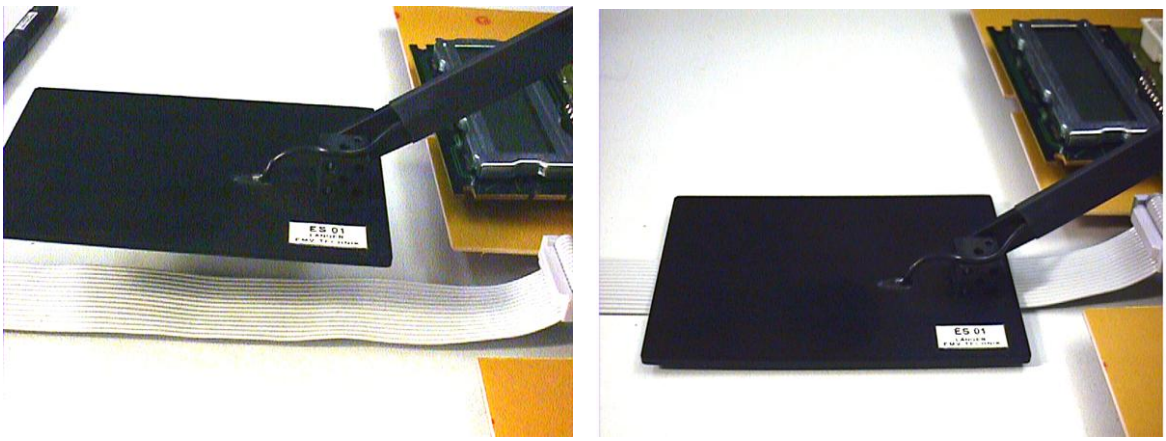


Figure 18 Global evaluation of the flat ribbon cable with ES 00-hE-field source

With the ES 00-h to ES 02-h field sources, different size surface areas of a ribbon cable can be pulsed. The chosen field source is brought closer to the cable. The maximum electric field strength and the maximum interference current coupling is obtained when the flat area of the field sources is laid on the cable. The effect is increased when module GND system is connected to burst generator GND. Both of the modules connected with the ribbon cable may, one after the other, be connected to the burst generator GND.

b) Local evaluation

Figure 19 Local evaluation with ES 00-h and ES 05D-hE-field sources

The full-surface contact allows a global evaluation of the E-field sensitivity. Areas with sensitive cores (if present) may be localized by making contact with the edge of the field sources.

Higher resolutions can be obtained with the ES 05D-h field source. However, the field source has a lower intensity because of its smaller couple surface.

8.3 Bypass capacitors and screen connections

Inserted in a 24 V auxiliary supply feed are, for example, bypass capacitors.
The BS 05DU-h magnetic field source is used as a current coupling clamp for selective coupling. The field source is placed on the conductor. The magnetic field encompassing the conductor drives the interference current.
For coupling at the external feed side, the bypass capacitor meets its protective function when no function failure occurs. A condition is that the circuit is made with little inductance. This can be achieved with an additional capacitor against bypass potential.
For coupling in the 24 V supply beyond the bypass, function failures indicates a weak spot inside the module when the bypass capacitor meets its function.

Screen bypass paths can be interference-sensitive. These paths can be selectively tested with the BS 04DB-h field source.

Especially for big structures the magnetic field probe BS 02-h should be used.

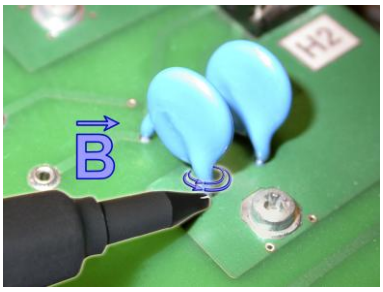
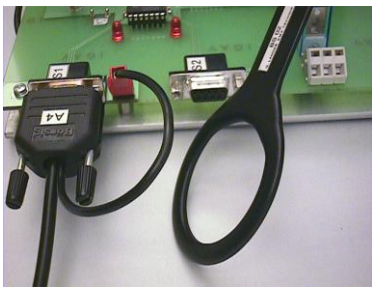
BS 05DU-h	BS 04DB-h	BS 02-h
		

Figure 20 Examples of usage

8.4 Investigating magnetic-sensitive conuctors

Signal and supply conductors possess different sensitivities to magnetic pulse fields. Particularly sensitive conductors can be preventively protected in the layout.

The sensitivity of conductors can be ascertained with the magnetic field source BS 05DU-h.

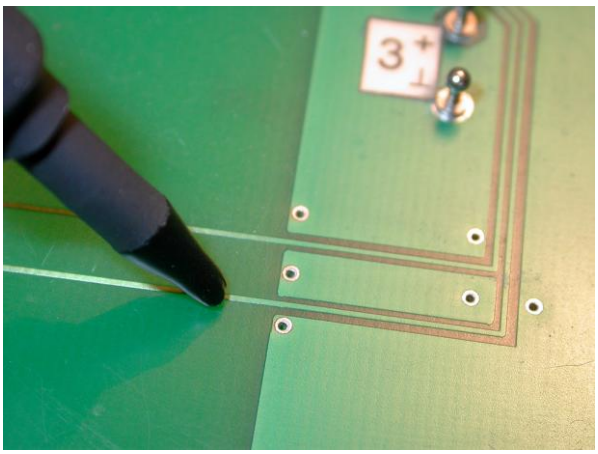
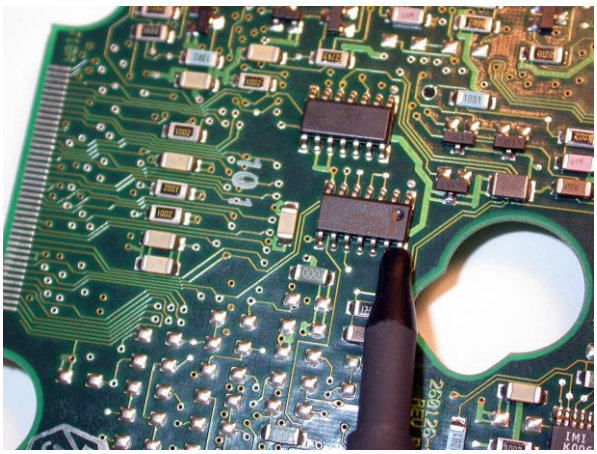



Figure 21 Examples of usage with BS 05DU-h magnetic field source

9 Safety instructions

When using a product from LANGER EMV Technik, please observe the following safety instructions to protect yourself from electric shock or the risk of injuries.
Read and follow the operating instructions and keep them in a safe place for later consultation. The device may only be used by personnel who are qualified in the field of EMC and who are fit to work under the influence of disturbance voltages and (electric and magnetic) burst fields.

- Never use any damaged or defective devices.
  Carry out a visual check before using a measurement set-up with a Langer EMV-Technik GmbH product. Replace any damaged connecting cables before starting the product.
- Never leave a Langer EMV-Technik GmbH product unattended whilst this is in operation.
- The Langer EMV-Technik GmbH product may only be used for its intended purpose. Any other use is prohibited.
- Observe the operating and safety instructions for all devices used in the set-up.
- People with a pace-maker are not allowed to work with this device.
- The test set-up should always be operated via a filtered power supply.

Attention! Functional near fields and interference emissions may occur when operating Pulse- and RF generators or in connection with field sources. The user is responsible for taking measures to protect the correct function of products outside the EMC environment of the test set-up (in particular against interference).

This can be achieved by:

- observing an appropriate safety distance,

- use of shielded or shielding rooms.

- The disturbances that are injected into the modules can destroy the device under test (latch-up) if their intensity is too high. Protect the device under test by:
  - increasing the disturbance gradually and stopping when a functional fault occurs,
  - interrupting the power supply to the device under test in the event of a latch-up.

Attention! Make sure that internal functional faults are visible from outside. The device under test may be destroyed due to an increase in the injection intensity if the faults are not visible from outside. Take the following measures as necessary:

- monitor representative signals in the device under test with optical sensors
- special test software
- visible reaction of the device under test to inputs (reaction test of the device under test).

We cannot assume any liability for the destruction of devices under test!

10 Scope of delivery

10.1 H2 set

No.	Designation	Type	Pcs.
01	Magnetic field source	BS 02-h	1
02	Magnetic field source	BS 04DB-h	1
03	Magnetic field source	BS 05DB-h	1
04	E-Field source	ES 00-h	1
05	E-Field source	ES 02-h	1
06	E-Field source	ES 05D-h	1
07	High-voltage cable	HV SHV-SMB 1 m	1
08	User manual	H3 m	1
09	Quickguide	H qg	1
10	System case	H case	1

Figure 22 Case H2 set

10.2 H3 set

No.	Designation	Type	Pcs.
01	Magnetic field source	BS 02-h	1
02	Magnetic field source	BS 04DB-h	1
03	Magnetic field source	BS 05DB-h	1
04	Magnetic field source	BS 05DU-h	1
04	E-Field source	ES 00-h	1
05	E-Field source	ES 01-h	1
05	E-Field source	ES 02-h	1
06	E-Field source	ES 05D-h	1
05	E-Field source	ES 08D-h	1
07	High-voltage cable	HV SHV-SMB 1 m	1
07	User manual	H3 m	1
08	Laminated quickguide	H3 qg	1
09	System case	H case	1

Figure 23 Case H3 set

11 Information on Recycling and Disposal

In accordance with the WEEE Directive 2012/19/EU (Waste of Electrical and Electronic Equipment), the following must be observed:

At the end of its service life, this product should be taken to a suitable disposal facility for recycling and disposal. Do not dispose of with household waste.

12 Customer service

Please contact us if you have any questions, comments or suggestions.

You can contact us:

Monday – Friday
8:00 - 15:00 (CET)

Contact us at:

Address: Langer EMV-Technik GmbH
Nöthnitzer Hang 31
01728 Bannewitz
Germany

Internet: https://www.langer-emv.com/
E-mail: sales@langer-emv.de
Phone: +49 (0) 351-430093-0
Fax: +49 (0) 351-430093-22

Calibration

We recommend having the product calibrated every two years by the manufacturer Langer EMV-Technik GmbH or by a certified distributor.

13 Warranty

Langer EMV-Technik GmbH shall remedy all defects attributable to material or manufacturing faults within the statutory warranty period by repairing the product or supplying replacement parts.

This guarantee is only granted on condition that:

- the information and instructions in the operating instructions are observed.

The guarantee expires if:

- an unauthorized repair is carried out on the product
- the product is modified
- the product is not used as intended