



Mini Burst Field Generators P1 set

Operating instructions



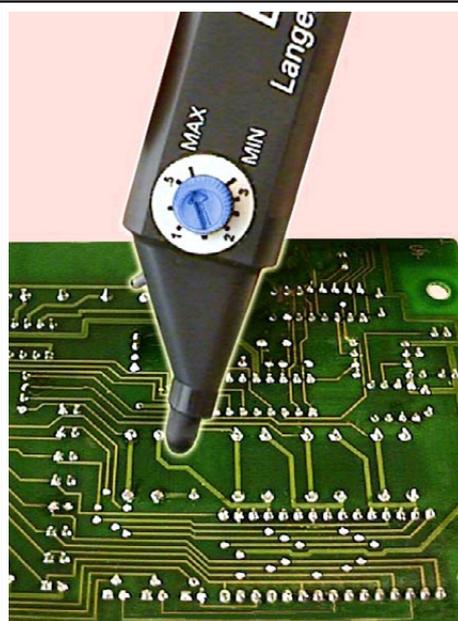
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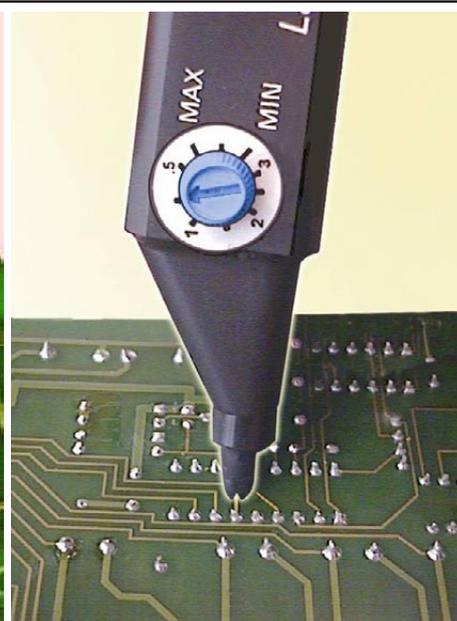
1. Disturbance mechanisms

- > Electronic modules have differing disturbance immunities, related to their Layout and IC-sensitivity.
- > Weak spots, which can be exactly pinpointed, are the cause of burst and ESD- sensitivity. The formation of the weak spots is largely dependent upon the GND/Vcc-geometry and type/ manufacturer of the installed IC's.
- > Disturbance pulse current enters the electronic module via conductors or capacitance and produces electrical and magnetic disturbance fields. The fields, which radiate on the surface of the module, act upon the track structures and components.
- > Magnetic or electrical pulse fields are the essential physical quantities, which have an effect upon the flat modules.
- > As a rule, a weak spot is either only magnetically or only electrically sensitive.
- > From a practical point of view, both types of weak spots are relevant. For example, electrical fields can occur, during disturbance events, which influence electrically-sensitive weak spots. The currents, which are driven by the electrical field produce magnetic fields, which, in turn, influence magnetically-sensitive weak spots.
- > The disturbance effects of both mechanisms overlay one another and are difficult to separate.
- > Both types of weak spots require different EMC measures, due to their differing physical mechanisms.
- > The localization of the weak spots and separation according to type takes place with the E- or B-field sources of the Mini Burst field generators.

B-pulser P11



B-pulser P12



E-pulser P21

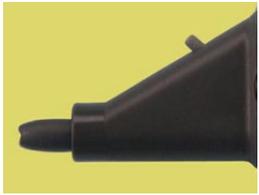


2. Use

The Mini burst field generators facilitate the development-accompanying analysis of the disturbance immunity of flat modules.

The field source of the generator produces ESD/burst-similar pulse-shaped fields, which are limited to a few square millimeters. The mini burst field generators are guided by hand, with their field-producing points (field source) close to the surface of the unit under test (flat module). This makes it possible to precisely influence GND/Vcc- structures, individual tracks, and IC's on the flat module, in order to determine the presence of weak spots by means of function failures.

By means of the adjustable intensity of the disturbance quantity, one can compare the weak spots with one another and evaluate the effectiveness of the EMC-measures. The separation of magnetic disturbance (B-pulser P11, red) and electrical disturbance (E-pulser P21, blue) makes it possible to differentiate between magnetic and electrical weak spots. With the sensitivity tester (P12, yellow) the sensitivity of IC-inputs and tracks can be tested.

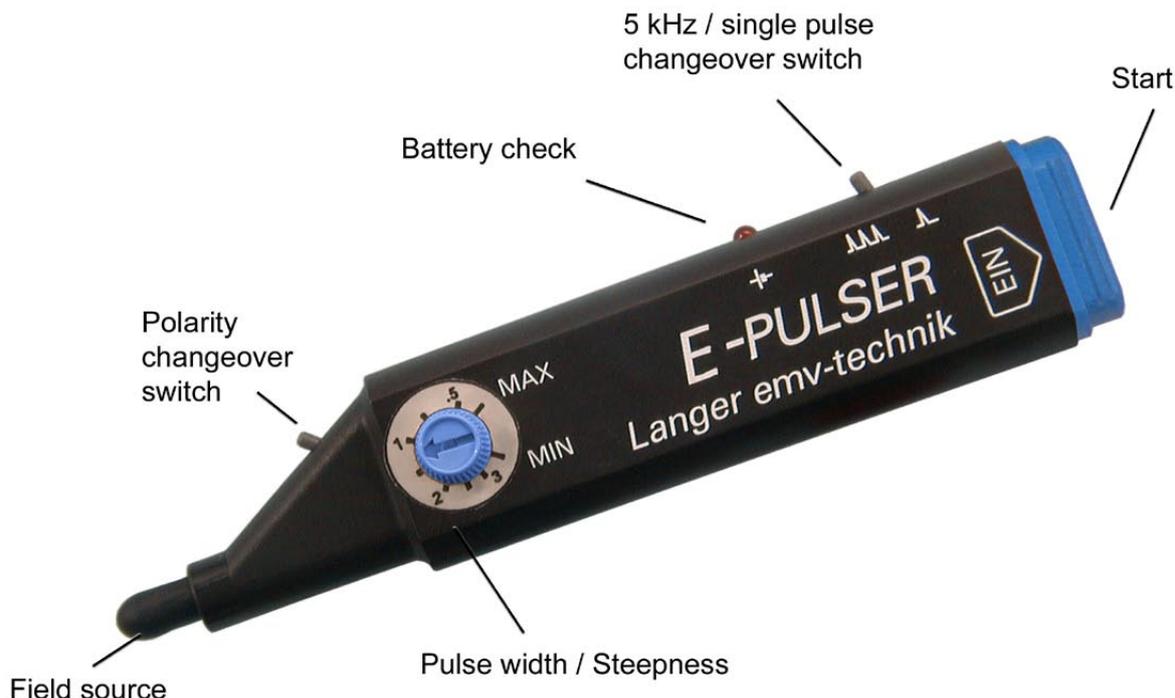
<p>B-pulser type P11 Weak spot tester RED</p>	<p>- produces a limited, radial magnetic field at its tip, for the localization of B-field-sensitive circuit areas.</p>	
<p>B-pulser type P12 Sensitivity tester GELB</p>	<p>- produces a circular, magnetic field, which allows single tracks or IC-pins to be covered. - serves to determine sensitive IC-pins and tracks.</p>	
<p>E-pulser type P21 Weak spot tester BLUE</p>	<p>- produces a limited, radial electrical field at its tip, for the localization of E-field-sensitive circuit areas.</p>	

Regulation testing cannot be carried out with the mini burst field generators. Measurements at regulation testing sites are necessary for the determination of regulation disturbance immunity values. Experience, however, makes it possible to make estimates

In order to achieve the level of disturbance immunity, as defined in regulations, during developmental examinations, it is advisable to make comparative measurements with regulation disturbance quantities on a random basis.

3. Design

- > The MINI burst generator consists of a battery-operated disturbance quantity generator, which feeds an E- or B-field source.
- > Upon activation of the generator, either a single pulse or a continual pulse sequence is given off, depending on the setting.



4. Operation

ON pushbutton:	The device is only active with the button pressed (no closed-circuit current)
Single pulse:	A pulse is triggered each time the ON pushbutton is pressed.
Pulse sequence:	Pulses are produced at a repetition frequency of approx. 5 kHz as long as the ON pushbutton is pressed.
Intensity: B field	Max: wide pulse Min: narrow pulse
Intensity: E field	Max: steep edge - high steepness Min: steep edge - reduced steepness
Polarity:	The polarity of the disturbance can be switched over.
LED:	„Voltage monitoring“ The battery has to be changed if the LED comes on permanently

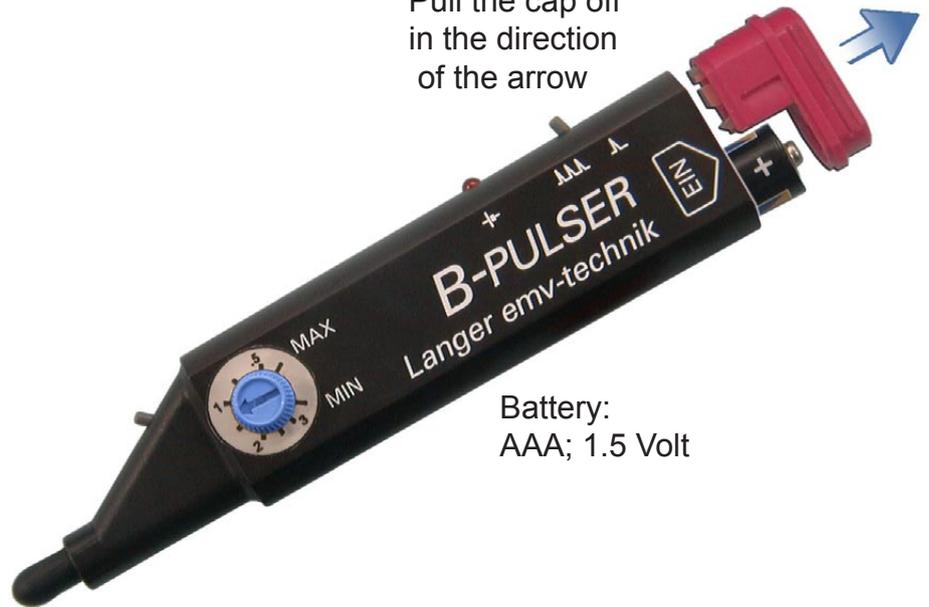
Note: The tips of the mini burst field generators are sensitive to mechanical stress.

5. Battery change

By removing the rear cap:

- > Plus pole (+) of battery on the cap side
- > Replace the cap in the reverse order

Pull the cap off in the direction of the arrow



Battery:
AAA; 1.5 Volt

6. Setting the pulse parameters

ADJUSTABILITY OF THE PULSE PARAMETERS: B-pulser P11 / red
B-pulser P12 / yellow

POLARITY: The direction of the magnetic pulse field can be adjusted with the „Polarity“ button.

INTENSITY: The pulse width can be adjusted with the „Intensity“ controller.

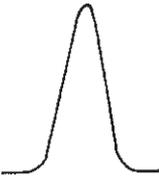
Adjustment of the Intensity

Setting	Impulse width
MAX	approx. 8 ns
MIN	approx. 2 ns

The scale is divided into ten parts, for orientation.

Narrow pulses (setting MIN, approx. 2 ns) influence sensitive IC's. Nonsensitive IC's are not influenced by these pulses.

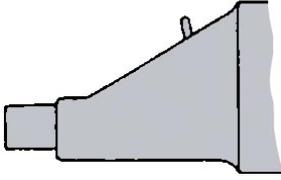
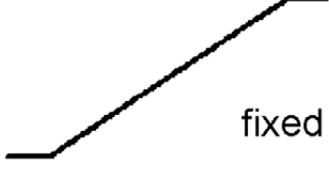
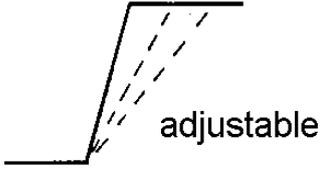
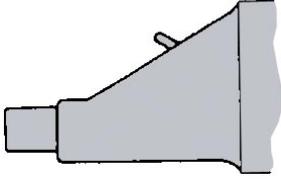
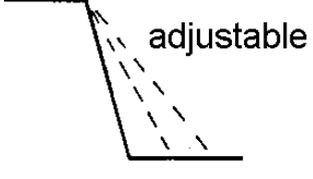
Wide pulses (setting MAX, approx. 8 ns) influence sensitive and nonsensitive IC's.

Pulse parameter		Setting	Quantity	Value	Unit
	Pulse width	MIN MAX	T T	approx. 2 approx. 8	ns ns
	Amplitude (voltage induction in a loop)		\hat{u}	max 20	V
	Repeating frequency	Pulse sequence	f	5	kHz

ADJUSTABILITY OF THE PULSE PARAMETERS: E-pulser P21/blue

POLARITY: The direction of the steep edge can be adjusted with the „Polarity“ button.

INTENSITY: The pulse width / height can be adjusted with the „Intensity“ controller.

Pulse parameter	Change of the electric field strength	
Polarity	Positive edge	Negative edge
Switch position 	FLAT constant approx. 1kV/mm μ s  fixed	STEEP MAX setting: approx. 1kV/mm ns  adjustable
Switch position 	STEEP MAX setting: approx. 1kV/mm ns  adjustable	
Repetition frequency	5 kHz	

Use

STEEP
1 kV/mm ns

- only fast IC (digital technology)
- high-resistance and low-resistance structures

FLAT
1 kV/mm μ s

- slow and fast IC
- high-resistance structures

The STEEP edge can be adjusted with the „Intensity“ controller. The maximum value of the field strength change $E=1$ kV/mm ns corresponds to the MAX setting and can be reduced with the controller. This allows the evaluation of the susceptibility of weak spots and / or the sensitivity of the IC concerned. The scale is divided into ten parts for a better orientation.

7. Tests

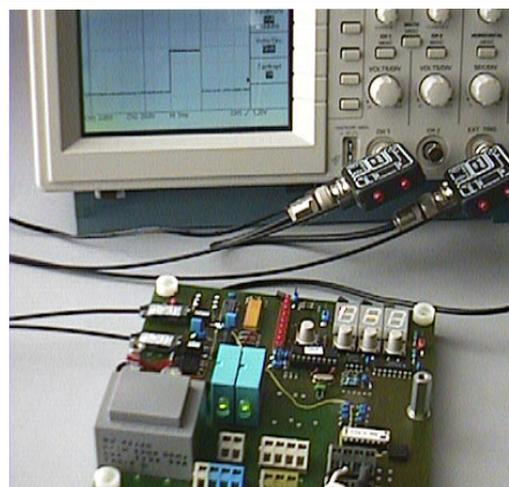
7.1 Start-up

- > Single pulses / pulse sequences are triggered by pressing the ON pushbutton (please refer to Point 4 for operation and Point 6 for setting the pulse parameters).
- > Functional check using the „Voltage monitoring“ LED
 - Flashes briefly if the „ON“ pushbutton is pressed - system is operational
 - Steady light: batteries are empty.

7.2 Preparation

ATTENTION! Make sure that internal functional faults are visible from outside. The unit under test may be destroyed by an increase to coupling if the faults are not visible outside. Take the following measures as necessary:

- > Monitoring of representative signals with EMC sensors (connect EMC sensor to counter via optical fibre)
- > Special test software
- > Visible reaction of the UUT to the input procedure



7.3 Search for weak spots

The search for weak spots is carried out in two parts, for example, first the magnetically (B-pulser/red) and then the electrically (E-pulser/blue) sensitive weak spots are sought out.

Procedure:

- Set the maximum intensity (MAX), pulse sequence 5 kHz.
- Begin examining the surface of the UUT, with approx. 5 cm separation.
- Hold pulser vertically, so that the field stream contacts the surface of the module.
- Switch the polarity over and repeat the process.
- Gradually approach the surface of the UUT, repeat procedure.
- If function failures occur, reduce intensity. Pinpoint weak spots by further approach of the surface of the module (track runs/components).
- If no function failures have yet occurred, place the pulser vertically on the surface of the UUT and examine the surface.
- The highest level of resolution and disturbance is reached, when the pulser is placed on the surface of the UUT (flat module) with the appropriate intensity setting.

Susceptibility of the module:

- The denser the GND system is in an area of the module the less susceptible this area is.
- Large surface areas normally react to pulse disturbances if the module has a weak GND system (pulser separation 3 cm).
- Weak spots are mostly concentrated in small areas of modules which have a strong GND system (place pulser on the surface).
- Signaltrack loops, with low-ohmic drivers (standard output of digital IC's) are especially sensitive to magnetic fields. > B-pulser/red
- High-resistance signal line structures (quartzes, pull-up's) are especially susceptible to E-fields. > E-pulser/blue

Single pulses:

- These pulses are used to determine edge-sensitive signal lines and components. One pulse is normally enough to trigger a functional fault.
- Example: RESET lines and components

7.4 Sensitivity test P12 / yellow

The sensitivity test can be carried out on IC-inputs, which are connected to a low-ohmic driver, GND or Vcc. The Sensitivity tester P12/yellow works like a B-pulser P11/red, except for the fact that the pulse magnetic field is formed radially. Track runs or IC-pins can be selectively grasped by the circular magnetic field.

Procedure

- The point of the sensitivity tester P12/yellow is placed on the track / IC-pin, which is to be examined.
- The notch of the pulser point must be placed upon the track / IC-Pin.
- The pulser is then activated. If function failures in the UUT occur, the intensity can be adjusted back to the function failure occurrence point.
- Sensitive tracks and IC-connections can be investigated and selectively protected with EMC-measures.

8. Safety and warranty

When using the LANGER EMV-Technik product please observe the following basic safety instructions to protect yourself against electric shock and the risk of injury.

8.1 Safety instructions

- Read and comply with the operating manual and keep the it in a safe place for subsequent use.
- Always perform a visual check of the LANGER EMV-Technik product before use. Damaged or defected pulsers should not be used.
- When in use, mini burst field generators create functional electrical or magnetic pulse fields in the surrounding area.
Only personnel who are qualified in the field of EMC and fit for working under the influence of disturbance voltages and magnetic as well as electric fields may use the device.
- The LANGER EMV-Technik product is **only** in use in applications it has been designed for. Any other use is not permitted.
- Do not leave the LANGER EMV-Technik product unsupervised.
- Due to their function, the pulse fields, which are injected into the modules, can lead to destruction, if the level of radiation is too high (latch-up).
Protection: - gradual increase of the disturbance quantity, abort in case of a function failure
 - interruption of the power supply of the unit under test (UUT) in case of a latch-up
- **Attention!**
When the mini burst field generator E-pulser P21/blue is utilized in living quarters, business areas, commercial areas, or small factories, abnormally high disturbance transmissions may occur.
It is the task of the user, to take measures to ensure that the proper operation of all products, which are installed separately from the in-house EMC-environment, are not impaired (especially by means of disturbance transmissions).
This can be achieved by: - observance of the necessary safety distance
 - Use of screened rooms or rooms providing screening
- **Attention!**
No liability is assumed for the destruction of any UUT's!

8.2 Warranty

We will remedy any defect which is due to defective materials or defective manufacture, either by replacement, repair or supply of spare parts, during the legal warranty period. The warranty period is subject to the applicable law of the country where the LANGER EMV-Technik product was purchased.

Warranty is only granted on condition that:

- the LANGER EMV-Technik product is handled with care and properly maintained.
- the operating instructions are observed.
- only original spare parts are used.
- external components such as power supply units, connecting cable, etc. have separate warranty terms and conditions which apply for the respective manufacturer.

The warranty is forfeited if:

- unauthorized repairs have been made on the LANGER EMV-Technik product.
- the LANGER EMV-Technik product has been modified.
- the LANGER EMV-Technik product has not been used correctly.

9. Technical data

Pulser	
Dimensions (width/height/depth)	118 x 24 x 13 (mm)
Weight (incl. battery)	30 g
Pulse parameters	see Point 6
Pulse sequence	Single pulse / 5 kHz, can be switched over
Polarity	can be switched over
Supply voltage - battery	AAA; 1.5 Volt
Standards used as a basis for CE mark test :	Emission: EN 50 081-1 / -2 Immunity: EN 50 082-1 / -2

10. Scope of delivery

Mini burst field generators P1 set

Item.	Designation	Type	Quantity
01	B-pulser / red	P11	1
02	B-pulser / yellow	P12	1
03	E-pulser / blue	P21	1
04	Case		1
05	Quick guide		1
06	Operating instructions		1

