EMCtools

Manual for

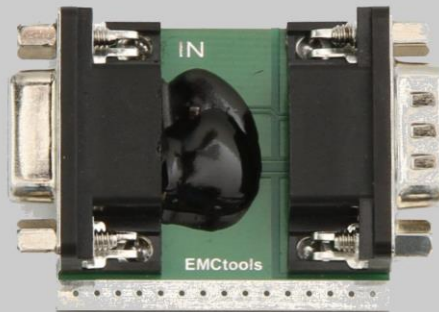# ESD-Protector
ESD-Protector Tester

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ESD-Protector

for Microbox fiber optic
FlexRay, HS/LS-CAN and LIN transceivers

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Introduction and use:
Electro-Static-Discharge (ESD) tests in test-labs often require galvanic insulated busses like FlexRay, CAN FD, HS-CAN, LS-CAN (Controller Area Network) and LIN-busses (Local Interconnect Network) to control the device under test (DUT). For this purpose the *EMCtools* ESD-Protector and our standard fiber optic bus transceivers (*EMCtools* Microbox) are available. They allow data transmission of bus via fiber optic cables and can be used during ESD tests to protect Computers or Notebooks from the ESD discharge.

The combination of ESD-Protector and *EMCtools* Microbox was designed for ESD discharges up to 30kV (HBM).
The ESD-Protector does not affect the max. Bitrate and the shaping of the used bus system and can be used in combination with:

1. *EMCtools* Microbox FlexRay
2. *EMCtools* Microbox CAN FD
3. *EMCtools* Microbox High Speed CAN
4. *EMCtools* Microbox Low Speed CAN
5. *EMCtools* Microbox LIN (12V-LIN)

Typical Test Setup:
To protect the bus simulator (Personal Computer or Laptop) the bus line has to be isolated with a pair of *EMCtools* Microbox fiber optic bus transceivers.
Connect the ESD-Protector with the DUT and the Microbox as shown in the photo below. Use a piece of conductive glue copper foil to make a low impedant ground connection from the ESD Protector grounding area to the metal groundplane of the ESD test table. **Use a new copper foil for every setup – do not reuse it.**
Do not use different fiber optic bus transceivers than *EMCtools* Microboxes, as different fiber optic bus transceivers may be built with bus transceivers with different max. bus voltages and could be damaged.
Keep the bus simulator away from the ESD test environment as ESD discharges cause very strong magnetic and electric field transients and may influence the test result.

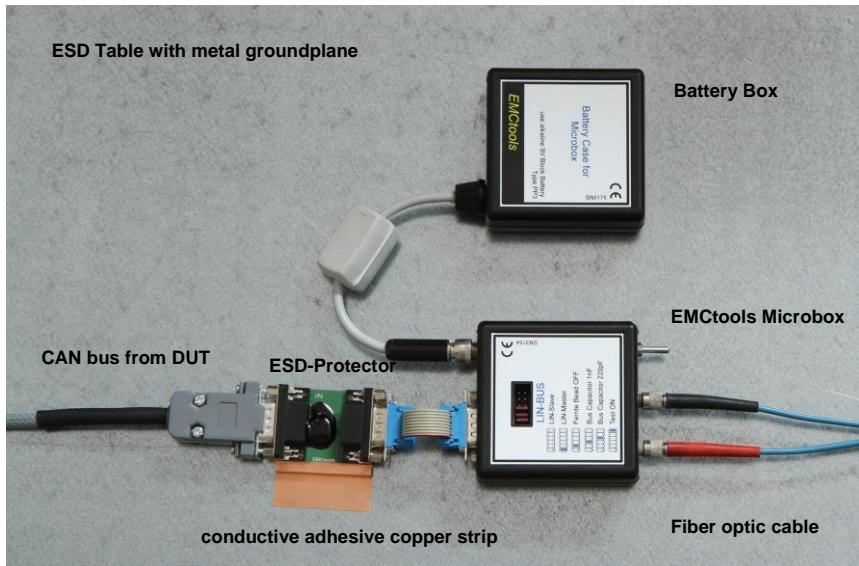**Never place the 2nd Microbox or the Personal Computer/Laptop on top of the ESD table during ESD-tests.**

Figure: Setup on the ESD test table

Caution: The performance of the ESD-Protector depends on the correct setup and is critical.
***EMCtools* can not be made liable for any defects caused by wrong setup.**

Theory of operation:

The *EMCtools* ESD-Protector limtis the positive and negative discharges on the bus lines to a safe voltage level for a combination with *EMCtools* Microbox.

The *EMCtools* ESD-Protector does not affect the transmission levels and shapes on the bus lines and adds only a few Pico-Farads of capacitance to the bus.

If used in typical Test Setup the ESD-Protector will not derate with age.

Test of ESD-Protector:

To insure, that the ESD-Protector is working properly and to avoid further damage, perform this test every time before you perform an ESD test.

Test with ESD-Protector Tester:

Connect the ESD-Protector SUB-D to the ESD-Protector Tester and press the test button. All tests are performed automatically. Performance of all 4 suppressors is displayed with 4 LEDs. In addition the capacitance of the blocking capacitor is tested.
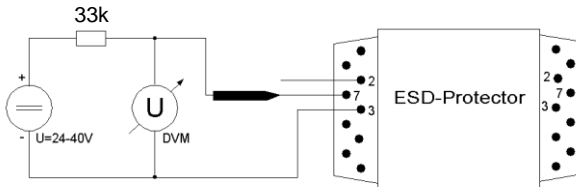
To perform the test manually you need:
1. A simple regulated power supply 24-40V DC – current draw < 2 mA
2. A standard resistor 33kOhm, > 1/16 Watt
3. A standard Digital Voltmeter (DVM) – Input resistance ≥ 10MOhm
4. Cables for wiring

The test is made in 4 steps for pos./neg. protection level on CAN-high and CAN-low line:

Test Step 1:
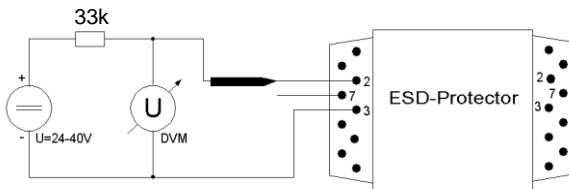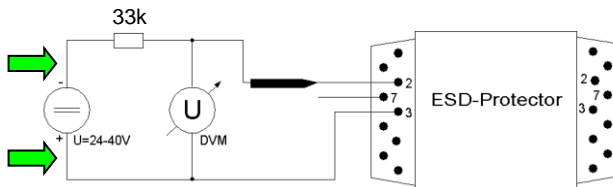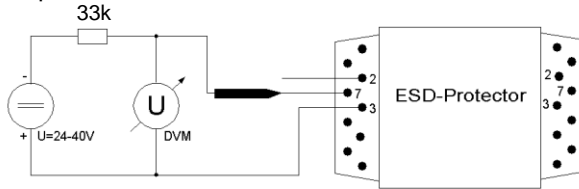

Test Step 2:

Test Step 3 – change power supply polarity:

Test Step 4:

During each step the voltage reading of the DVM should be 14 – 17 Volts.
If the reading should exceed 17 Volts the ESD-Protector is defective and has to be replaced.

Delivered devices of the system and accessories

1pcs	*EMCtools* ESD-Protector
1pcs	Printed manual
1pcs	5cm - Cable 9 pin D-SUB (F) / 9 pin D-SUB (M) for the connection ESD-Protector/Microbox
1m	copper foil conductive adhesive tape – Type Advance Tapes AT526 – RS 542-5511

Replacement Parts

copper foil conductive adhesive tape
– Type Advance Tapes AT526 - RS 542-5511
– Type WÜRTH Elektronik Part - No: 300 332 5A

Technical data:

Added bus capacitance:	max. 10pF @ 0V, 1MHz
ESD-Clamping voltage:	< 30 V
Power supply	none
Bus-connector:	9-pin Sub-D (female) input – connection to DUT/EUT
	9-pin Sub-D (male) output – connection to *EMCtools* Microbox
Ambient temperature:	storage/operation: -40°C – 85°C (-40 - 185 ^{o}F)
Compatibility:	1. *EMCtools* Microbox CAN FD
	2. *EMCtools* Microbox High Speed CAN
	3. *EMCtools* Microbox Low Speed CAN
	4. *EMCtools* Microbox LIN (12V-Bus)
	5. *EMCtools* Microbox Flexray
Size:	approx. 52 x 35 x 17 mm
Weight:	approx. 23g

Production test certificate:

Test Voltage: 40 V   Test Resistor: 33k

Serial-No:	DVM voltage [Volts]
Test Step 1:	
Test Step 2:	
Test Step 3:	
Test Step 4:	

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ESD-Protector Tester
for *EMCtools* ESD-Protector

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Introduction:

ESD tests in test labs often require galvanic insulated busses like FlexRay, CAN- (Controller Area Network) and LIN-busses (Local Interconnect Network) to control the device under test. For this purpose the *EMCtools* ESD-Protector and our standard fiber optic bus transceivers (*EMCtools* Microbox) are available. They allow bidirectional data transmission of CAN/LIN-signals via fiber optic cables and can be used during ESD tests to protect Computers or Notebooks from the ESD discharge.
The combination of ESD-Protector and EMCtools Microbox were designed for ESD discharges up to 30kV (HBM).
The ESD-Protectors have to be tested prior to every ESD test to ensure proper function. This can be done either by using a simply test setup with power supply, a single resistor and a digital voltmeter as described in the ESD-Protector manual or the ESD-Protector Tester. It displays function/malfunction within a few seconds.

Operation:

Take the ESD-Protector tester and connect one ESD-Protector PCB:

ESD-Protector
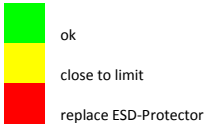
ESD-Protector Tester

Press the "Push to test" button of the ESD-Protector Tester.

The ESD-Protector Tester checks the suppressor positive voltage level, the suppressor negative voltage level, suppressor shorts and the blocking capacitor on the ESD-Protector PCB automatically.
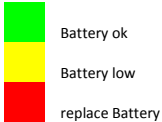
The test result is displayed using 5 LEDs:

LED 1	CAN_H	suppressor positive voltage level
LED 2	CAN_L	suppressor positive voltage level
LED 3	blocking cap.	capacitance
LED 4	CAN_H	suppressor negative voltage level
LED 5	CAN_L	suppressor negative voltage level

ESD-Protector
ESD-Protector Tester

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LED 1-5 colors:

ok

close to limit

replace ESD-Protector

Bat LED:

Battery ok

Battery low

replace Battery

The ESD-Protector Tester will switch off automatically after each test sequence.

Repeat test twice

Technical data:

Power supply	9V Block battery PP3 (internal)
Connector:	9-pin Sub-D (female) – fits to *EMCtools* Microbox ESD-Protector
Ambient temperature:	storage: -40°C – 85°C (-40 - 185 °F)
	operation: 0°C – 60°C (-40 - 185 °F)
Size:	97 x 67 x 31 mm (l x w x h)
Weight:	approx. 150g
Test current:	1 mA

Delivered devices of the system and accessories

1pcs	*EMCtools* ESD-Protector Tester
1pcs	Printed manual
1pcs	9V Block battery alkaline PP3

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