

Technical Specification

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1 Tester Type ESD3000-System

The ESD3000 is the newly designed hand held ESD discharge tester from EMC Partner. The ESD3000 simulates different discharges such as contact and air discharges in accordance with IEC 61000-4-2 and several other standards. When discharge modules or relay module with discharge networks are added the ESD3000 can be expanded to comply with test standards up to 30 kV.

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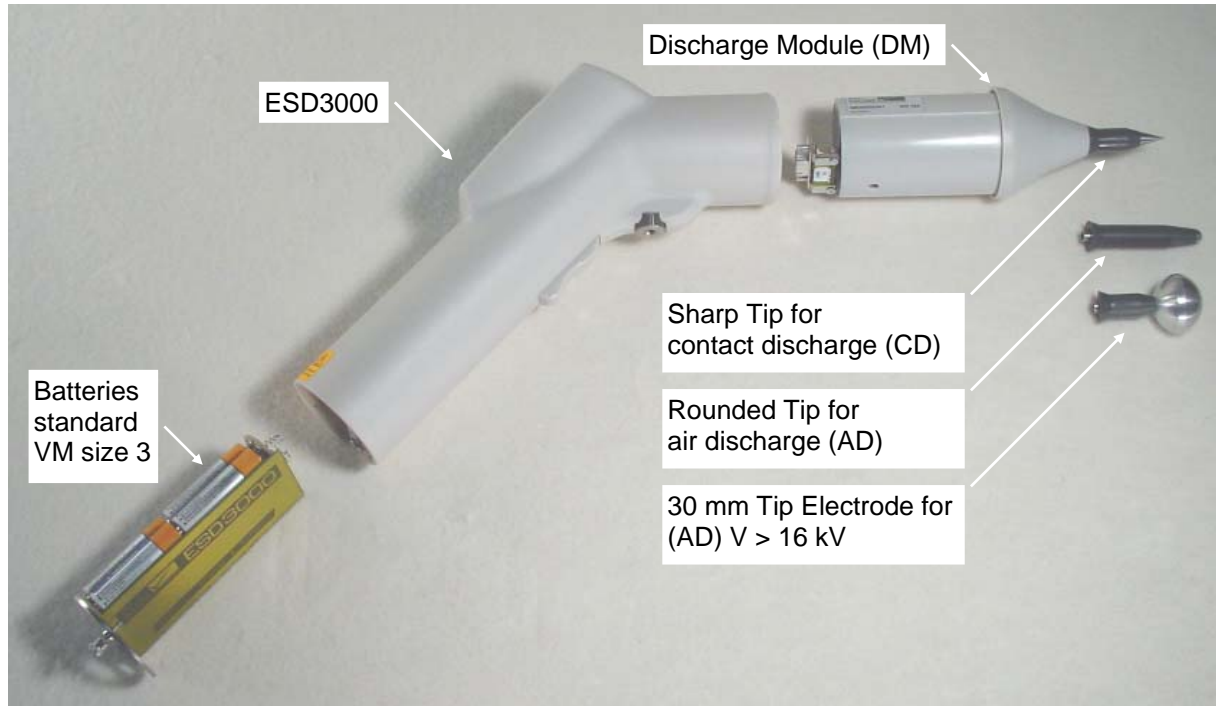
Introduction

The ESD3000 can be operated as stand alone or together with the TRA2000 from EMCP. The TEMA software to the ESD3000 is the most sophisticated software for Transient Immunity tests. The ESD3000 generator is compact and has an excellent value for money.

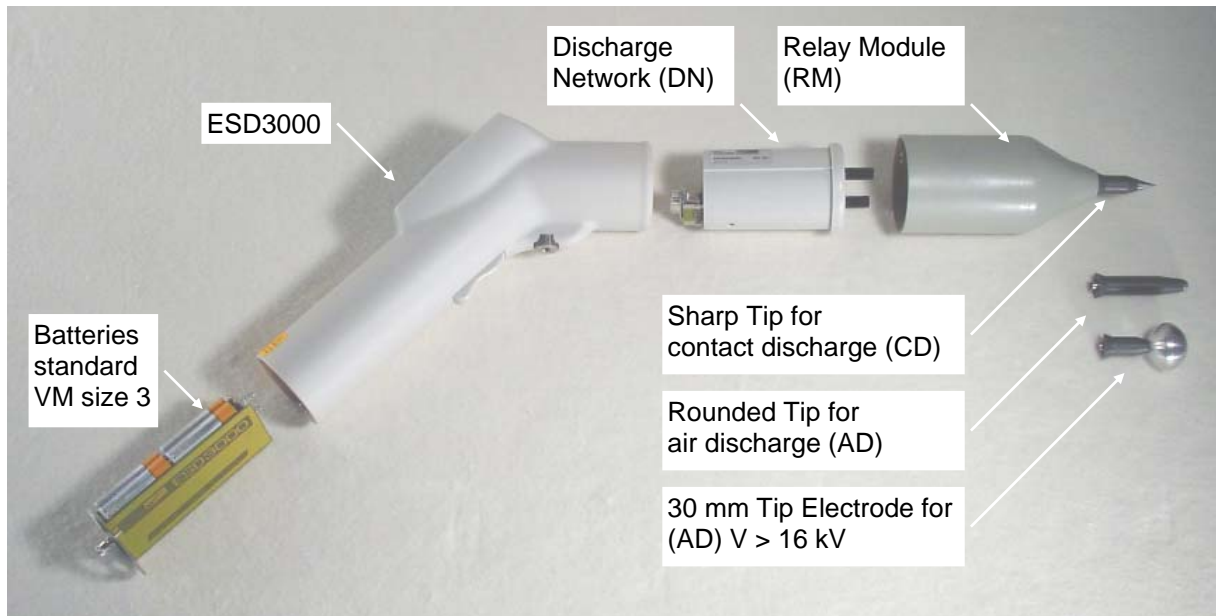
- All relevant parameters in one display
- Easy parameter changes during operation
- Voltage generation up to 30 kV positive and negative
- Commercially available standard rechargeable or non-rechargeable batteries can be used
- Low weight only 870 grams
- Ergonomic form of the ESD3000
- The additional module can be easily interchanged

2 General ESD3000 System of EMC-PARTNER

2.1 Overview on ESD3000 system



2.1.1 ESD3000 Contact Discharge (CD) up to max. 10kV with Discharge Module (DM)



2.1.2 ESD3000 Contact Discharge (CD) up to 30 kV) with Relay Module (RM), Discharge Network (DN)

2.2 ESD3000 with Discharge Modules (DM). Voltages: Contact Discharge (CD) up to 10 kV and Air Discharge (AD) up to 30 kV

- The equipment ESD3000 include a rechargeable battery pack and a charger. The battery capacity is designed to operate at highest level and 1 Hz repetition one full work day (8 hours).
- For long term ESD evaluation the ESD3000 can be set on top of a support (standard M5 thread).
- The discharge modules must be selected from the list below. For contact discharge a sharp tip and for air discharge a rounded tip is included.

2.2.1 Accessories Discharge Modules (DM)

The modules contain the high voltage source and the impulse network, therefore the discharge modules are in an optimum way designed to specified voltage range and impulse shaping network of standards. The modules can be easily interchanged. Discharge Module (DM) include waveform calibration according the listed standard. All DM will be shipped with calibration report. At any time DM's can be ordered after the first delivery with a calibration report.

2.2.2 Overview Discharge Module (DM) - Standards - C, R, Voltage ranges

DM-Modules	Standards	Cap /Res.	Voltage range (CD) Contact Discharge	Voltage range (AD) Air Discharge
DM1	IEC 61000-4-2	150 pF / 330 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM2	ISO TR10605	330 pF / 2000 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM3	ISO TR10605	150 pF / 2000 Ohm	no CD	+ and -1 up to 30 kV
DM4	MIL-STD-464 MIL-STD-883 GR78-CORE	100 pF / 1500 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM5	RTCA/DO-160	150 pF / 330 Ohm	no CD	+ and -1 up to 30 kV
DM6	IEC 61340-3-1 JEDEC 22-A114 MIL-STD-750D	100 pF / 1500 Ohm	+/- 0.2 up to 8 kV	no AD
DM7	IEC 61340-3-2 JEDEC 22-A115	200 pF / 0 Ohm	+/- 0.08 up to 2.5 kV	no AD
DM8	IEC 60571 EN50155	rise time < 0.05us duration 0.1us	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV

2.2.3 Discharge Modules DM – for special applications

DM-Modules	Standards	Cap / Res.	Voltage range CD	Voltage range AD
DM16-CAR3	ISO TR 10605	330pF / 330 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM16-CAR4	ISO TR 10605	150pF / 2000 Ohm	+/- 0.2 up to 10 kV	+/- 0.2 up to 16 kV
DM16-C63-HAND	ANSI C63.16	330pF / 150 Ohm	no CD	+/- 0.2 up to 16 kV
DM16-C63-HAND	ANSI C63.16	330pF / 150 Ohm	+/- 0.2 up to 8 kV	No AD

2.3 ESD3000 with Relay Module (RM), Contact Discharge (CD) up to 30 kV and Air Discharge (AD) up to 30 kV

- For the 30 kV contact application the discharge module are divided into two part the relay module and the discharge networks. The relay module include the discharge and the polarity switch. The relay module generates the first current peak. The discharge networks generate the second part of the wave mainly determined by the C and R value and the charging voltage.
- The discharge network includes the impulse capacitor, the discharge resistor and the high voltage generation.
- The discharge networks must be selected from the list below.
- The relay module includes a sharp tip for contact discharge and a rounded tip for air discharge.

2.3.1 Accessories Discharge Networks DN

The Discharge Network contain the high voltage source and the impulse network, therefore the discharge modules are designed specifically to requirements of voltage range and impulse shaping network of applicable standards. The networks are easily interchanged. RM and DN networks include waveform calibrations according to the listed standard. All RM plus DN will be shipped with calibration report. At any time Discharge Networks (DN) can be ordered after the first delivery with a calibration report.

2.3.2 RM32 - DN - Standards - C, R, Voltage ranges

RM-Module	Rise time first current peak	Cap /Res.	Voltage range CD	Voltage range AD
RM32	0.7 up to 1 ns	no specific components	+/- 1 up to 30 kV	+/- 1 up to 30 kV

Available networks that can be used together with the RM32 relay module are listed below. When the rise time 0.7 to 1 ns differs in a standard or an additional safety switch is required (e.g. explosive system testing) a filter network FN must be added. Customised FN on demand.

DN-Module	Standard	Cap /Res.	Voltage range CD	Voltage range AD
DN1	IEC 61000-4-2 RTCA/DO-160 GMW 3100	150pF / 330 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN2	ISO TR10605 SAEJSSI-IS FORD AB/AC GMW3100	330pF / 2000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN3	ISO TR10605 SAEJSSI-IS FORD AB/AC	150pF / 2000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN4	MIL-STD-331B STANAG 4239 ISO14304	500pF / 5000 Ohm	+/- 1 up to 30 kV	+/- 1 up to 30 kV
DN5	MIL-STD-331 MIL-DTL-23659D STANAG 4239	500pF / 500 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
DN6	ISO TR10605	330pF / 330 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV

2.3.3 Discharge Network DN - for Special Applications

DN-Module	Standards	Cap / Res. Range	Voltage range CD	Voltage range AD
CAR1	JASO D 001-94	150pF / 500 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
CAR5	Renault 32-10-001/D	330pF / 0 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
IND1	IEC801-2	150pF / 150 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
MIL2	?	400pF / 150 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV
MIL3	MIL-STD-1576	500pF / 0 Ohm	+/- 2 up to 30 kV	+/- 2 up to 30 kV

3 Generator, Technical Data

3.1 Mechanical dimensions, climatic conditions

The Tester ESD3000 is a hand held equipment

Type	Dimension L x D x H [mm]	Weight [g]	Remarks
ESD3000 with DM	340 x 70 x 190 mm	870	with batteries 1050 g
DM alone	340 x 70 x 190 mm	355	
RM alone	138 x diameter 68	350	
DN alone	131 x diameter 57 mm	270	
Case	450 x 350 x 120 mm	3000	

Power adapter	95 up to 250 V (50 /60 Hz)	
Power consumption	operation mode < 20 VA Standby < 0 VA	

Environment conditions		
Temperature range	°C	0 to 40 °C
Humidity	rh %	30 to 60%
Pressure	kPa	86 to 106



Accessories included with ESD3000:

- Power adapter with Lemo plug (type 1s 7 4 pin FFP.1s.304.CLAC47)
- Earth connection cable (length 2 m)
- One set of rechargeable batteries (NIMH)
- User manual (1 pce)
- EMCP E3Loader software
- Verification Report

3.2 Technical data

3.2.1 ESD high voltage circuit - Example ESD3000DM1

Energy storage capacitance	150 pF	± 10%
Discharge resistance	330 Ω	± 10%
Charging resistance	> 50 MΩ	
holding time (drop to 95%)	better than 5 s	
Current rise time, 2 Ω load	0,7 to 1 ns	
Definition of current waveform:		
Current amplitude at 30 ns	2 A / kV	± 30%
Current amplitude at 60 ns	1 A / kV	± 30%
Voltage range „air discharge“	0.5 to 16 kV	± 10%
Voltage range „contact discharge“	0.5 to 10 kV	± 10%
First current amplitude into 2 Ω „contact discharge“	3.75 A / kV	± 10%

ESD3000 with DM



ESD3000 with RM+DN



3.2.2 ESD control circuit

Polarity	positive / negative; automatic switchover
Number of discharges Detection of the number of discharges	-preselectable 1 up to 30000 -count every pulse or count discharge only. Only the impulses whereas the voltage of the discharge capacitor drops lower than 10% of the charging voltage are counted.
Ramps	voltage amplitude or polarity change after a predefined number of discharges
Reporting	test sequence with the number of discharges -Voltage amplitude -Polarity
Discharge modes:	-Air discharge (AD) -Contact discharge (CD)
Repetition of the discharges	0.055 up to 99 s or single discharge



Note: The repetition rates are applicable to IEC61000-4-2 only. For all other modules or applications consult the relevant DM (Discharge Module) or DN (Discharge Network) specific Instruction sheets.

4 ESD3000 Accessories

ESD-STAND3:



Height adjustable from 0.4 m up to 1.75 m
Application:
long term tests in contact and air discharge mode

ESD-VERI-V:



20 G divider for high voltage measurement on the ESD3000 up to 25 kV.
Ratio is determined by 1 M Ohm input of the oscilloscope.
Ration approximate 20'000

ESD-TARGET1:



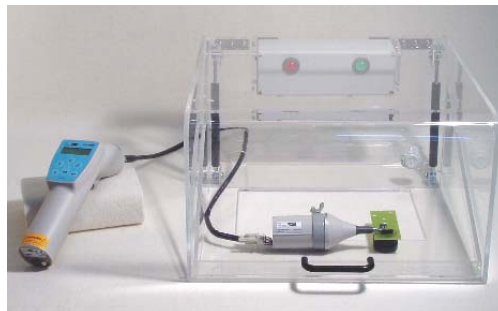
2 Ohm target with N connector and N-BNC adapter, upper limit approximately 2 GHz

VCP05:



Vertical coupling plate.
Mechanical dimension: 0.5 x 0.5 m
Application indirect ESD discharge with contact tip.

ESD3000DM-EXT



Testing of EUTs that could spontaneously explode or rapidly change state, such as airbags or munitions fuses

CNH12



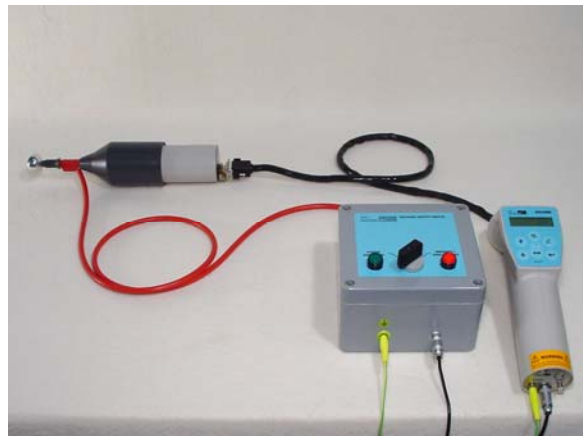
Accessory to ESD3000 with RM32 and DN1 to simulate rapidly changing H-field as generated at real ESD discharge.

TC-MIG24ED



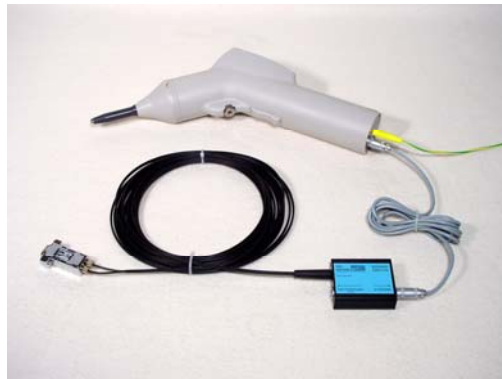
Test cabinet to protect operators when testing explosive devices such as air bag initiators or fuses.

Safety Switch



Accessory to ESD3000 with RM32 to make sure the generator is discharged fully before connecting explosive devices.

ESD-OPTOLINK



Accessory to ESD3000 with RM32 and DN1 to simulate rapidly changing H-field as generated at real ESD discharge.

4.1.1 ESD3000 Remote control Software

The ESD3000 is controlled via the „E3Loader“ software for basic control functions or can be fully integrated into a test suite using „TEMA“ software.



E3Loader software provided with each ESD3000

TEMA software for full EMC test integration

