



DO-160 & MIL-STD-461G

Indirect Lightning Test SystemAVI-LV3







Smart navigation through technical specifications. Click the green links.





Accredited Calibration

Quality at EMC PARTNER is based on an ISO 9001 management system. This is the foundation for an ISO/IEC 17025 accreditation verified by the Swiss Calibration Service (SCS). SCS No. 146 is the accreditation number of EMC PARTNER AG. Locally accredited but recognized worldwide through affilia-tion with the ILAC organisation



WHEN GETTING RESULTS MATTERS

THERE IS ONLY ONE CHOICE

Military and avionic testing is all about quality and precision. AVI-LV3 brilliantly fulfills these requirements.

A flexible solution that includes:

- > MIL-STD-461: CS117, Level 1 (internal equipment)
- > RTCA DO-160: SECTION 22, Level 3
- > EUROCAE ED-14: SECTION 22, Level 3

Ease of use, compact size and large aperture coupler makes AVIL-LV3 the most efficient and technically advanced instrument in this category.

MULTI TALENTED SOLUTION

The first System to fully integrate all waveforms from MIL-STD-461G and DO-160. Combined with a single coupler where the EUT cable passes only once, AVI-LV3 is a compact and resourceful solution to indirect lightning testing needs.



AVI-LV3 Test System

AVI3000 compact unit

Test Accessories

CN-BT7

Only one couplter for all 5 waveforms. No change of the EUT cable. Aperture (55x80mm)

CN-GI-CI-V

Voltage coupler for WF4 cable bundle testing. Aperture (60x120mm)

Included Benefits

StablePulse reproducibility during test cyclePreciseRepeatable test results over long timeFastMinimum setup and calibration timeFlexibleUser selectable MS and MB timing

Polarity Maintain test integrity by electronic switching

Automated Save and repeat test routines.

Pre-programmed Multiple Stroke (MS) and Multiple Burst (MB) functions

AVAILABLE CIRCUITS

AVI-LV3 is a compact unit that includes all waveforms for RTCA DO-160: Section 22 and MIL-STD-461G: CS117 testing. All event types are available: PIN Injection, Cable Injection and Ground Injection



Waveform 1 (6.4/69µs)

MIL-STD-461 / CS117

Current Impulse

- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke



Waveform 2 (0.1 and 0.3/6.4µs)

RTCA DO-160 / S.22

MIL-STD-461 / CS117



Voltage Impulse

- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke



Waveform 3 (1MHz & 10MHz)

RTCA DO-160 / S.22

MIL-STD-461 / CS117



Voltage & Current Impulse

- PIN injection
- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke
- Cable Bundle Multiple Burst



Waveform 4 (6.4/69µs)

RTCA DO-160 / S.22

MIL-STD-461 / CS117



Voltage Impulse

- PIN Injection
- Ground Injection Single Stroke
- Ground Injection Multiple Stroke



Waveform 5A (40/120μs)

RTCA DO-160 / S.22

MIL-STD-461 / CS117



Current Impulse

- PIN Injection
- Cable Bundle Single Stroke
- Cable Bundle Multiple Stroke



Waveform 6 (0.25/4μs)

RTCA DO-160 / S.22 MIL-STD-461 / CS117

Current Impulse

Cable Bundle Multiple Burst

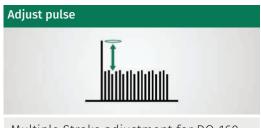


UNIQUE FEATURES

Leading technology - New designs take advantage of latest innovations.



No generator or coupler adjustments required. System is ready for calibration and long duration testing.



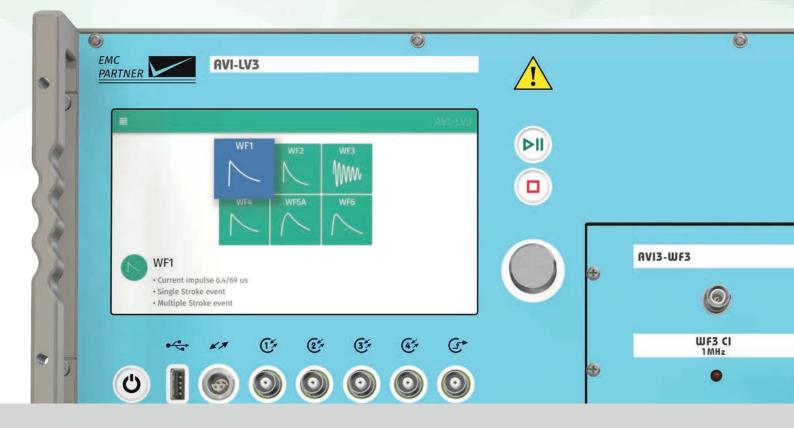
Multiple Stroke adjustment for DO-160 and MIL-STD-461.



Latest technology used in electronic circuits and coupler design.

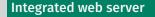


No external couplers needed to decouple powered EUTs for PIN Injection or ground injection testing.



EPOS - TOUCH THE FUTURE

EMC PARTNER Operating System (EPOS) is an independent software with free-of-charge updates for lifetime. EPOS is based on a full colour graphic interface and easy to follow on-screen graphics. Pop-up help gives information when needed, directly during the setting process. EPOS is full of features found only in top of the range instrumentation.





Use any browser to access test reports from the generator via ethernet.

Interactive interface



User interface adapted to specific circuits.

Simple touch screen navigation



Save time with the latest in intuitive menu structures.

We speak your language



Select between English, German, French, Italian, Spanish, Russian, Chinese (simplified + traditional)



TEMA3000 SOFTWARE SUITE

The best solution for professional EMC Test Labs enables comfortable test setups, easy parameter changes and customizable test reports and DSO integration.

Customizable test reports



- > Customize & edit your protocols
- > Export to multiple file formats
- > Integrate DSO measurements

Productive workflow



- Minimal learning time
- > Integrated assistant function

Manage tests and sequences



- > Predefined test setups
- Save and load own tests and sequences

Smart connectivity



- > Transfer tests / reports to PC
- > Remote control from computer

Other systems for indirect lightning PIN injection & Cable bundle tests

DO-160 section 22
MIL-STD-461 CS117
Aircraft OEM specific standards
Established worldwide

www.emc-partner.com



Technical Specifications

TEST SYSTEM

DO-160 G SECTION 22 LEVEL 3 & MIL-STD-461G CS117 LEVEL 1 (INTERNAL EQUIPMENT)

Test equipment	DO-160G Section 22 level 3	MIL-STD-461G CS117 level 1 (internal equip.)	Manufacturers (Airbus, Boeing, etc)
AVI-LV3	✓	✓	✓
Accessories & coupling devices			
DN-LISN160-32	✓	✓	✓
SHUNT0E1	✓	✓	✓
V-PROBE-SI	✓	✓	✓
I-PROBE-MB-P1	✓	✓	✓
CN-BT7	✓	✓	✓
CN-GI-CI-V	optional	✓	optional
WARNING-LAMP	optional	optional	optional
EMERGENCY-STOP	optional	optional	optional
Software		•	
TEMA3000 & Modules	✓	✓	✓

TEST SYSTEM

1. AVI-LV3 TEST SYSTEM

AVI-LV3 circuit: WF1 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF1	6.4 μs ± 20 % / 69 μs ± 20 %
Test level	specified at coupler output
Test level single stroke	25 A – 900 A +20%, -0%
Test level multiple stroke	25 A – 900 A +20%, -0% (first stroke)
	20 A – 300 A +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 25 A, 1 / 7 s @ 900 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT7



AVI-LV3 circuit: WF2 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage waveform WF2	rise time: < 100 ns or < 340 ns selectable
	pulse duration: 6.4 μs ± 20 %
Test level	specified at coupler output
Test level single stroke	25 V – 1600 V +20%, -0%
Test level multiple stroke	25 V – 700 V +20%, -0% (first stroke)
	25 V – 350 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 25 V, 1 / 1.5 s @ 1600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT7

AVI-LV3 circuit: WF3, 1 MHz, pin injection

Standards	DO-160G S22, other
Coupling mode	pin injection / direct application
Output impedance	25 Ω
Voltage, current WF3	frequency: 1 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at application point
Test level single stroke	50 V – 750 V +10%, -0%
	2 A – 30 A +10%, -0% in short circuit
	100 V - 750 V +10%, -0%
	4 A – 30 A +10%, -0% in short circuit
Pulse repet. single stroke	up to 2 / 1 s @ 100 V - 750 V
Polarity	positive, negative, alternating
Synchronization	automatic on power peak or 0 – 359°, step 1°
Programmable ramp	voltage
EUT max. AC-voltage	230 V

EUT max. supply frequency	800 Hz	
EUT max. DC-voltage	± 50 V	

AVI-LV3 circuit: WF3, 1 MHz, cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage, current WF3	frequency: 1 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at coupler output
Test level single stroke	10 V - 1900 V +20%, -0%
Test level multiple stroke	10 V - 1900 V +20%, -0% (first stroke)
	10 V - 1000 V +50%,-0% (subseq. stroke)
Test level multiple burst	10 V – 700 V +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 100 V - 750 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT7

AVI-LV3 circuit: WF3, 10 MHz, cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage, current WF3	frequency: 10 MHz ± 20 %
	damping: 25 – 75 % (1st to 5th peak)
Test level	specified at coupler output
Test level single stroke	50 V – 1100 V +20%, -0%
Test level multiple stroke	50 V – 1100 V +20%, -0% (first stroke)
	50 V – 800 V +50%, -0% (subsequent stroke)
Test level multiple burst	50 V - 800 V +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 100 V - 1100 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-BT7

AVI-LV3 circuit: WF4, pin injection

Standards	DO-160G S22, other
Coupling mode	pin injection / direct application
Output impedance	5 Ω
Voltage, current WF4	6.4 μs ± 20 % / 69 μs ± 20 %
Test level	specified at application point
Test level single stroke	50 V - 500 V +10%, -0%
	10 A – 100 A +10%, -0% in short circuit
Pulse repet. single stroke	up to 2 / 1 s @ 50 V, 1 / 3 s @ 500 V
Polarity	positive, negative, alternating
Synchronization	automatic on power peak
Programmable ramp	voltage
EUT max. AC-voltage	230 V
EUT max. supply frequency	800 Hz
EUT max. DC-voltage	± 50 V

AVI-LV3 circuit: WF4 ground injection

Standards	DO-160G S22
Coupling mode	Ground Injection (GI)
Voltage waveform WF4	6.4 μs ± 20 % / 69 μs ± 20 %
Test level	specified at application point
Test level single stroke	10 V – 1600 V +20%, -0%
Test level multiple stroke	10 V - 800 V +20%, -0% (first stroke)
	10 V – 400 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 50 V, 1 / 9 s @ 1600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
EUT max. power	230 V / 16 A AC 50 – 800 Hz and DC

AVI-LV3 circuit: WF4 cable induction

Standards	MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Voltage waveform WF4	6.4 µs ± 20 % / 69 µs ± 20 %
Test level	specified at coupler output
Test level single stroke	max. 10 V - 600 V +20%, -0%
Test level multiple stroke	max. 10 V - 300 V +20%, -0% (first stroke)
	max. 10 V – 150 V +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 1 / 8 s @ 600 V
Polarity	positive, negative, alternating
Programmable ramp	voltage
Requires	CN-GI-CI-V

AVI-LV3 circuit: WF5A, pin injection

DO-160G S22, other
pin injection / direct application
1 Ω
40 μs ± 20 % / 120 μs ± 20 %
specified at application point
25 V – 50 V +20%, -0%
25 A – 50 A +20%, -0% in short circuit
50 V - 500 V +10%, -0%
50 A – 500 A +10%, -0% in short circuit
up to 2 / 1 s @ 50 V, 1 / 5 s @ 500 V
positive, negative, alternating
automatic on power peak
voltage
230 V
800 Hz
± 50 V

AVI-LV3 circuit: WF5A cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF5A	40 μs ± 20 % / 120 μs ± 20 %
Test level	specified at coupler output
Test level single stroke	20 A - 1800 A +20%, -0%
Test level multiple stroke	20 A – 1800 A +20%, -0% (first stroke)
	20 A – 390 A +50%, -0% (subsequent stroke)
Pulse repet. single stroke	up to 2 / 1 s @ 50 A, 1 / 14 s @ 1800 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT7

AVI-LV3 circuit: WF6 cable induction

Standards	DO-160G S22, MIL-STD-461G CS117, other
Coupling mode	Cable Induction (CI)
Current waveform WF6	0.25 μs ± 20 % / 4 μs ± 20 %
Test level	specified at coupler output
Test level single stroke	2.5 A – 75 A +20%, -0%
Test level multiple burst	2.5 A – 75 A +20%, -0%
Pulse repet. single stroke	up to 2 / 1 s @ 5 A - 75 A
Polarity	positive, negative, alternating
Programmable ramp	current
Requires	CN-BT7

AVI-LV3 control features

Operating system	EPOS propietary firmware
Languages	8 menu languages, selectable
User interface	7" capacitive touch display
Connectivity	gigabit ethernet, USB, RS485
Programmable patterns	DO-160, multiple stroke, multiple burst, custom
	Airbus ABD patterns, Boeing D6 patterns for
	multiple stroke, multiple burst (waveforms 3, 4, 5A)
Synchronization on signals	40 – 800 Hz
Synchronization source	EUT Power
Synchronization angle	automatic peak synchronization as per standard
Impulse polarity	positive, negative, electronic switching
Automatic ramp	test level
Trigger out	BNC, max. 6 V
Programmable connectors	6 BNC connectors (inputs/outputs) as follows
Programmable input functions	Trigger input, Start Test, Stop Test, EUT Fail, EUT Mark, Emergency Stop
Programmable input max. voltage	low range: 0 – 1.5 V, high range: 2.3 – 24 V
Programmable output functions	Running State, Safety Circuit State

Programmable output max. U, I	max. 24 V, max. 300 mA
Safety features (standard)	Emergency stop button on front panel red/yellow as per IEC 60947-5-5, IEC 60204-1,
Safety accessories (optional)	ISO 13850, Safety circuit WARNING LAMP (24 V, max. 2.4 W),
	Remote EMERGENCY STOP button

AVI-LV3 supply, weight, dimensions, climatic conditions

Avi Evo Suppty, weigh	c, annensions, cumatic contactions	
Operating voltage	100 V - 240 V ± 10% (50/60 Hz)	
Power consumption	ON < 400 VA, standby < 15 VA	
Weight	50 kg	
Wxdxh	45 x 60 x 37 cm	
Version	19" unit, 8 UH	
Temperature range	10 - 35 °C	
Humidity	< 80 % non-condensing	
Air pressure	86 – 106 kPa	
Included articles		
Power cord	with country plug	
User manual	with conformity declaration	
Calibration certificate	factory calibration	

AVI-LV3 accessories

DN-LISN160-32
SHUNT0E1, for WF2 and WF3 short circuit
V-PROBE-SI, common and differential mode
I-PROBE-MB-P1
CN-BT7, for WF 1, 2, 3, 5A, 6
CN-GI-CI-V, for WF4 in MIL-STD-461G, CS117
TEMA3000 and modules

COUPLING DEVICES

CN-BT7

Application	coupling device for AVI-LV3 / cable induction
Suitable for waveforms	WF1, WF2, WF3, WF5A, WF6
Turn ratio	1:1
EUT voltage max.	500 V AC or DC
EUT current max.	16 A / 800 Hz (when testing WF2)
	32 A / 400 Hz (when testing WF2)
	32 A / 800 Hz (when testing all other WFs)
	426 A / 50-60 Hz (when testing all other WFs)
Aperture	5.5 x 8 cm
Dimensions	34 x 18 x 21 cm
Weight	18 kg
For generator	AVI-LV3



CN-GI-CI-V

Standards	MIL-STD-461G CS117, DO-160G S22, other
Application	injection probe for WF4, WF5A (voltage) in
	cable induction mode
Test level WF4 (CI)	max. 600 V with AVI-LV3
Test level WF5A (CI)	max. 600 V with AVI-LV3
EUT supply	max. 130 A @ 50-60 Hz with AVI-LV3
	max. 20 A @ 400 Hz with AVI-LV3
	max. 10 A @ 400 Hz with AVI-LV3
Aperture	6 x 12 cm
Dimensions	53 x 65 x 50 cm
Weight	190 kg
For generators	AVI-LV3, MIG0600MS, MIG0618SS
Included	connection cables



ACCESSORIES

SHUNT0E1

calibration of WF2, WF3 short circuit current
0.1 Ω ± 2 %
100 mV/A
WF2: 1600 V, WF3: 1900 V
0.15 kg
12 x 2.5 x 2.5 cm
AVI-LV3, CN-BT7



V-PROBE-SI

Standards	DO-160G S22, MIL-STD-461G CS117, other
Type of probe	differential (can measure CM as well)
Input voltage	max. 7 kV DC + peak, max. 2.5 kV r.m.s.
Waveforms	all AVI-LV3 waveforms and voltage test levels
Bandwidth	DC – 70 MHz (-3 dB)
Accuracy	± 2 %
Input impedance	10 MΩ 10 pF
Attenuation ratio	1:100 or 1:1000
Power supply	4 x AA batteries and/or mains adapter
Weight	1.5 kg (packed)
Dimensions	29 x 34 x 8 cm (packed)
For generator	AVI-LV3
Included	carrying case, mains adapter, AA batteries



I-PROBE-MB-P1

Standards	DO-160G S22, MIL-STD-461G CS117, other
Application	measurement of SC current / clamp on probe
Output impedance	50 Ω (BNC connector)
Input current	max. 100 A r.m.s., max. 5 kA impulse
Waveforms	all AVI-LV3 current waveforms
Bandwidth (-3 dB)	5 Hz – 15 MHz
Sensitivity	0.1 V/A into 1 MΩ
Accuracy	+ 1 / - 0 %
Current time product	0.5 As
I/f	3.5 A/Hz
Usable rise time	25 ns
DSO input selection	1 ΜΩ ΑС
Weight	1.68 kg
Dimensions	12 x 13 x 4 cm (inner diameter 5 cm)
For generators	AVI-LV3, MIG-OS-MB, other



Included	carrying case
metadea	currying case
DN-LISN160-32	
Standards	DO-160G S22, MIL-STD-461G CS117, other
Application	Line Impedance Stabilization Network (5 μΗ)
Inductance	5 μH per line (for both AC and DC lines)
Capacitance	10 μF included, 33000 μF included
	LISN is calibrated with capacitors connected
Number of lines	2 AC lines (L, N or L1, L2), 2 DC lines (+ / -)
AC voltage max.	L-N: 480 V @50/60 Hz, L-PE: 280 V @50/60 Hz
	L-N: 150 V @ 400 Hz, L-PE: 85 V @ 400 Hz
AC current max.	32 A
DC voltage max.	50 V
DC current max.	32 A
EUT protection	yes, at 275 V
Weight	13 kg
Dimensions	45 x 57 x 19 cm, 19" unit, 4 UH
For generators	AVI-LV3,MIG0600MS,MIG0618 SS,MIG-OS-MB
Requirements	for 3-phase EUTs, two pieces are required



WARNING-LAMP

Cable length	5 m
Dimensions	diameter 7x cm x 25 cm
Weight	0.5 kg



EMERGENCY-STOP

Cable length	5 m
Dimensions	8 cm x 8 cm x 10cm
Weight	0.3 kg



SOFTWARE

TEMA3000

Suitable for generator	AVI-LV3
Type of license	modular:
	TEMA3000 basic license (remote control)
	TEMA3000 REPORT (automatic test report)
	TEMA3000 DSO (DSO control, supports most
	current oscilloscopes on Ethernet)
	TEMA3000 LIBRARY (pre-programmed
	test levels according to standards)
Operating system required	Windows, latest
Communication port	ethernet
Updates	lifetime updates at no additional cost
Latest version	available on EMC PARTNER website

Tradition meets Technology

Over 25 years devoted to combining latest technologies into the best products.



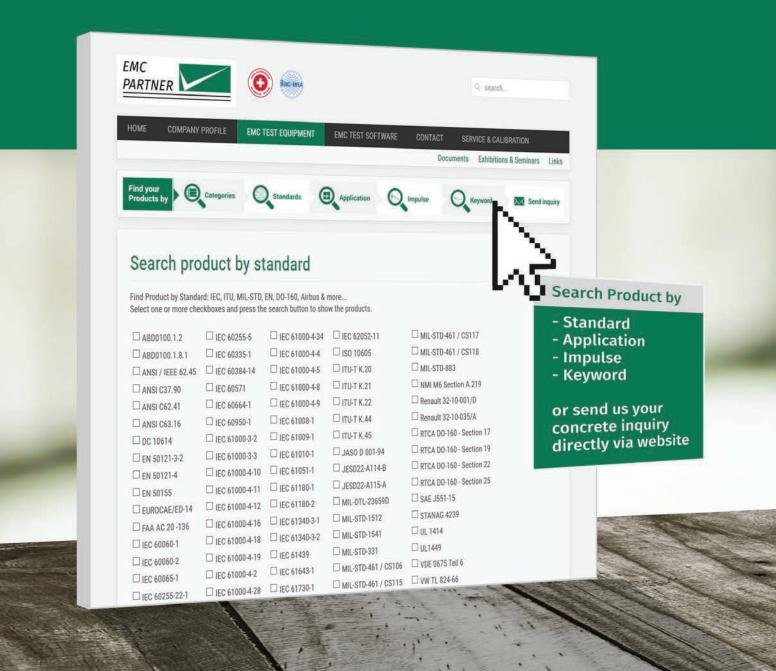
100% Swiss made products



Specific EMC test requirements?

Search & find your required test equipment with our powerful **QUICK SELECTOR** tool at

www.emc-partner.com



THE EMC PARTNER PRODUCT RANGE

Find further brochures on our website emc-partner.com/brochures or contact your local representative for a hardcopy.

IMMUNITY TESTS

Transient Test Systems for all EMC tests on electronic equipment. ESD, EFT, surge, AC dips, AC magnetic field, surge magnetic field, common mode, damped oscillatory and DC dips. According to IEC and EN 61000-4-2, -4, -5, -8, -9, -10, -11, -12, -13, -14, -16, -18, -19, -29.



LIGHTNING TESTS

Impulse test equipment and accessories for aircraft, military and telecom applications. Complete solutions for RTCA / DO-160 and EURO-CAE / ED-14 for indirect lighting on aircraft systems, MIL-STD-461 tests CS106, CS115, CS116, CS117, CS118 and Telecom, ITU-T .K44 basic and enhanced tests for impulse, power contact and power induction.



COMPONENT TESTS

Impulse generators for testing varistors, gas discharge tubes (GDT), surge protective devices (SPDs), X / Y capacitors, circuit breakers, electricity meters, protection relays, insulation material, suppressor diodes, connectors, chokes, fuses, resistors, emc-gaskets, cables, etc.



EMISSION MEASUREMENTS

Measurement of Harmonics and Flicker in 1-phase and 3-phase electrical and electronic products according to IEC /EN 61000-3-2 and 61000-3-3. HARCS Immunity software adds interharmonic tests, voltage variation according to IEC/EN 61000-4-13, -4-14.



SYSTEM AUTOMATION

A full range of accessories enhance the test systems. Test cabinets, test pistols, adapters and remote control software, simplify interfacing with the EUT. Programmable PSU, EMC hardened for frequencies from 16.7Hz to 400Hz. PS3-SOFT-EXT complies with IEC / EN 61000-4-14 and -4-28.



SERVICE

Our committment starts with a quality management system backing up our ISO 17025 accreditation. With the SCS number 146, EMC PARTNER provides accredited calibration and repairs. Our customer support team is at your service!



For further information please do not hesitate to contact your local EMC PARTNER AG representative. Visit our website for more information and contact details.

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