Lightning Tests: Avionics Test System

Studies by the Federal Aviation Administration (FAA) reveal that the average civil aircraft is struck by lightning every 1000 flight hours. It is therefore imperative that all aircraft should be tested to withstand the effects of lightning.

Lightning events differ mainly in current amplitude, in the transferred charge and in the impulse shape of the lightning current. Two lightning events need to be simulated:
- the direct strike (current and voltage) and
- the induced currents and voltages within an aircraft resulting from a direct strike.

Induced lightning current, voltage waveforms and impulse generator impedance values required to create these waveforms have been measured on avionic systems within aircraft subjected to direct strike events.

Test standards including MIL-464 and DO-160 specify both direct and induced strike pulse sequences and levels. RTCA/DO-160 section 22 mandates that three sequences of pulses shall be used for induced lightning testing of avionics:
- single stroke (SS),
- multiple stroke (MS) and
- multiple burst (MB).

SS events are used for damage assessment on avionics subsystems and equipment. MS and MB events are applied to determine the electromagnetic compatibility of system, subsystems, and equipment. Multiple stroke and multiple burst events were specified for the first time in Revision 3 of DO-160 D; although they have been anticipated for a number of years and even recommended by the FAA Advisory Circular AC 20-136 and manufacturer specific testing protocols.

In addition to the lightning induced transients, lower level transients caused by switching and other platform related phenomena are also a disturbance source within the avionic system. These phenomena are described in DO160 section 17, 19 and 25. For section 25 test equipment see our brochure “ESD Testers”.

EMC PARTNER aircraft generators can replicate the following phenomena:

- **Single Stroke**
  Single stroke events are used for damage assessment on avionic sub-systems and equipment. They can be divided into PIN injection and Cable bundle tests. PIN transients are applied directly to the system interface circuits and are used to assess the dielectric withstand voltage or damage tolerance of the interface components. Cable bundle tests are performed using an injection probe to couple transients. Tests are performed on fully configured functioning equipment to determine equipment survivability.

- **Multiple Stroke**
  Typical lightning events include several high current strokes following the first return stroke. These occur at intervals of several milliseconds as different pockets in the cloud feed their charge into the lightning channel. Another source is the swept channel process. If a fast moving aircraft experiences a direct strike, the points of arc attachment are likely to be swept backward along the aircraft since the lightning channel tends to remain stationary relative to the surrounding air.

- **Multiple Burst**
  These pulses may result from lightning leader progression or branching. The pulses appear to be most intense at the time of initial leader attachment to the aircraft. Transient responses arising from the magnetic field of the external environment (component H) of the multiple burst waveform set will also occur in the induced multiple burst sequence. The predominant waveform responses are the damped sinusoidal waveform 3 in a frequency range between 1 to 10 MHz.
Lightning Tests: Avionics Test System

- **Voltage Spike**
  Voltage spikes can appear on the AC or DC power supply interfaces due to platform power supply switching transients. These are transmitted by interconnecting cables and appear at an equipment interface on the power supply pins. Disturbances on AC power lines could be synchronised to particular phase angles of the 400Hz supply.

- **Induced Signal Susceptibility**
  These transients result from inductive switching and similar events within the installation, that are transmitted through interconnecting cables to an equipment interface.
  Such transients are mostly derived from the on-board power equipment and relate to the power supply frequencies and harmonics.

- **Electrostatic Discharge**
  The low relative humidity and temperature in an aircraft together with extensive use of synthetic materials for floor and seat covering and plastic structures all contribute to the likelihood of persons becoming electrostatically charged. Personnel can become charged to several tens of kilovolts. During normal operation or servicing, discharges from personnel could result in damage to electronic equipment.

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**Applicable Standards**

**Radio Technical Commission for Aeronautics (RTCA)**

DO-160 : Environmental Conditions and Test Procedure for Airborne Equipment.
- Section 17: Voltage Spike.
- Section 19: Induced Signal Susceptibility.
- Section 22: Lightning Induced Transient Susceptibility.
- Section 25: Electrostatic Discharge (ESD).

**European Organisation for Civil Aviation Equipment (EUROCAE)**


**US Department of Transportation, Federal Aviation Authority (FAA)**


**International Standards Organisation (ISO)**

Test System Features
- Full level 5 capability for all waveforms
- Clean reproducible waveforms
- Modular construction allows for future expansion
- Simple operation
- Parameter change during operation (+/-)
- Internal program memory
- Electronic polarity change
- Compact designs
- Fulfills ALL transient requirements
- Remote control and software upgrade through standard interface
- Full range of accessories
- 2 year warranty

User Benefits
The technical excellence and many unique features of EMC PARTNER avionics generators translate directly into benefits for the user:
- Cost effective solutions to meet many test requirements
- Simple extension to meet higher test levels or new requirements
- Increase quality of test object
- Real time parameter change, ideal development tool
- Save operator time with the automated test routines and test report facility
- Unparalleled reliability and system up-time

Generators
The EMC PARTNER family of avionics test generators simulate EMC events that have been observed in aircraft systems and cabling. These events are due to external lightning events and internal platform generated transients. EMC PARTNER avionics generators are available in a number of versions which can be upgraded to give enhanced test capability at a later date.

A wide range of accessories are available to facilitate testing. Coupling transformers for cable diameters up to 7.5cm and Line Impedance Stabilisation Networks (LISNs) complete the system.

- **MIG0600SS and MIG0600MS**
  Waveforms WF1, WF4, WF5A & WF5B. Used for PIN injection and single stroke cable bundle testing up to level 4. The MIG0600MS is an extension to the MIG0600SS which adds multiple stroke capability.
  MIG0600SS & MS generators share the same basic construction so, while they are not completely modular, the single stroke can be easily upgraded to multiple stroke. Multiple stroke patterns are pre-programmed that cover all current requirements. Additionally, user defined patterns can be assembled on a PC using the EMC PARTNER FW-Load software and uploaded into the MIG0600MS. A maximum of 24 pulses can be programmed in each stroke with the amplitude of the subsequent strokes variable under user control.
- **MIG0618SS**
  Wavesforms WF1, WF4 & WF5A. This is a stand-alone generator that delivers single stroke waveforms in excess of the level 5 cable bundle requirement.

  Extending the single stroke system to achieve test levels of 5 and above, is possible using the MIG0618SS. This stand alone unit generates WF1, WF4 and WF5A as a compliment to the MIG0600SS.

- **MIG-OS-MB**
  Wavesforms WF2 & WF3 (1MHz & 10MHz). Used for WF2 multiple stroke and WF3 multiple burst tests on cable bundles.

  Unique in it's class, MIG-OS-MB is factory programmed to perform all current multiple stroke and multiple burst patterns. Additionally, users can define and upload any new pattern, making MIG-OS-MB the most flexible system available.

- **MIG-OS-MB-EXT**
  Wavesforms WF2, WF3 (1MHz & 10MHz) & WF6H. Used for WF2 multiple stroke and WF3 and WF6H multiple burst tests on cable bundles.

  The MIG-OS-MB generator can be further enhanced by addition of the MIG-OS-MB-EXT which increases the test level of impulses including waveform 2 (WF2) single and multiple strokes, waveform 3 (WF3) single and multiple strokes and adds the EUROCAE waveform 6H multiple burst.

- **MIG2000-6**
  Special modules are available for section 17 (voltage spike) and section 19 (induced signal susceptibility).

  The system is completed with couplers and spike synchronisation on the power supply frequency up to 400Hz.

  Please refer to the Military Test System brochure for further information.

- **ESD3000**
  Special modules are available for section 25 (Electrostatic Discharge).

  ESD3000 is a light weight, hand-held battery operated tester. A range of changeable Discharge Modules (DMs) and Discharge Networks (DNs) are available. ESD3000 architecture allows customer specific requirements to be simply and quickly realised.

Remote control of EMC PARTNER avionics test systems is possible using the EMC PARTNER TEMA software package. This is greatly enhanced by the free to download DATABASE software which provides additional hints and contains predefined generator setup files.

EMC PARTNER has test equipment to simulate four component tests on complete aircraft. For further information please contact EMC PARTNER directly.

### System Flowcharts for WF1, WF4, WF5A and WF5B

The following flowcharts illustrate EMC PARTNER equipment configurations necessary to perform single stroke, multiple stroke and PIN injection tests in accordance with DO160 section 22.

- **Cable Induction**
  The CN-GI-CI coupler is used to inject waveform 1, 5A and 5B into EUT cabling.

  Waveforms are induced into interconnecting cables and power leads.

- **Ground Injection**
  The CN-GI-CI coupler is used to inject waveforms 4 and 5 into cable grounds.

  The injected waveforms are applied between cable shields and any return path to the local ground plane.

- **PIN Injection**
  Waveforms 3, 4 and 5A are applied directly from the generator output to designated pins on an EUT connector, usually between each pin and case ground.
Single Stroke

DATABASE on EMCP Website
- easy use, no test programming, just carry out tests

Immunity

TEMA TEST MANAGER
- customized solution

MIG0618SS

MIG0600SS
- NW-MS-LEVEL 1

CN-GI-CI

I-PROBE-MS

EUT

EUT Power
- DN-LISN160-32

Multiple Stroke

DATABASE on EMCP Website
- easy use, no test programming, just carry out tests

Immunity

TEMA TEST MANAGER
- customized solution

MIG0600MS
- NW-MS-LEVEL 1

CN-GI-CI

CN-GI-CI-V

I-PROBE-MS

EUT

EUT Power
- DN-LISN160-32

I-measurement

V-measurement
**PIN Injection**

- **PIN Injection**
  Waveform 3 is applied directly from the generator output using the CN-MIG-TT to designated pins on an EUT connector, usually between each pin and case ground. For powered PIN testing the CDN-BDBC should be used.

- **Cable Induction**
  The CN-MIG-BT, -BT1 or -BT3 A are used to inject waveforms 2 and 3 into interconnecting cables and power leads.

**PIN Injection**
For testing up to level 3, the CN-MIG-TT with AC/DC decoupler is provided. Level 4 and 5 require the MIG-OS-MB-EXT with special AC/DC decoupler.

**System Flowcharts for WF2 and WF3**

The following flowcharts illustrate EMC PARTNER equipment configurations necessary to perform multiple burst, multiple stroke and PIN injection tests in accordance with DO160 section 22.

- **PIN Injection**
  Waveform 3 is applied directly from the generator output using the CN-MIG-TT to designated pins on an EUT connector, usually between each pin and case ground. For powered PIN testing the CDN-BDBC should be used.

- **Cable Induction**
  The CN-MIG-BT, -BT1 or -BT3 A are used to inject waveforms 2 and 3 into interconnecting cables and power leads.
Multiple Burst

DATABASE on EMCP Website
easy use, no test programming, just carry out tests

Immunity

TEMA TEST MANAGER
customized solution

DSO Option
control TEK DSO

MI-G-OS-MB

CN-MIG-BT  CN-MIG-BT1/BT3

I-PROBE-MB-P1

EUT

EUT Power  DN-LISN160-32

Single Stroke and Multiple Stroke

DATABASE on EMCP Website
easy use, no test programming, just carry out tests

Immunity

TEMA TEST MANAGER
customized solution

DSO Option
control TEK DSO

MIG-OS-MB-EXT  MIG-OS-MB

CN-MIG-BT/BT3  CN-MIG-BT

I-PROBE-MB-P1  I-PROBE-MB-P1

EUT

EUT Power  DN-LISN160-32
Flowchart for Voltage Spike and Induced Susceptibility Tests

The following EMC PARTNER equipment is used to perform tests in accordance with DO160 section 17 and 19.

ESD Test Equipment for DO160 section 25
# Generator Specifications

## MIG0600SS and MIG0600MS

<table>
<thead>
<tr>
<th>DO160 Waveforms</th>
<th>W1, W4, W5A &amp; W5B</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 - 6.4/70μs</td>
<td>15A up to 1600A (3200A) ¹</td>
</tr>
<tr>
<td>W4 - 6.4/70μs</td>
<td>75V up to 1600V</td>
</tr>
<tr>
<td>W5A - 40/120μs</td>
<td>75A up to 2000A (10000A) ¹</td>
</tr>
<tr>
<td>W5B - 50/500μs</td>
<td>75A up to 2000A (5000A) ¹</td>
</tr>
</tbody>
</table>

### MIG0600MS only

- **Multiple Stroke**
  - Pulse spacing: 10ms up to 500ms
  - Duration: 0.01 up to 50s
  - Repetition: 60 up to 999s
  - Maximum pulses: 25 every 10s
  - First peak A1: 160V up to 3200V
  - Subsequent peaks A2: 50V up to 400V
  - Multiple stroke pattern: user programmable

## MIG0618SS (Level 4 and 5 Extension)

<table>
<thead>
<tr>
<th>DO160 Waveforms</th>
<th>W1, W4 &amp; W5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 - 6.4/70μs</td>
<td>15A up to 1600A</td>
</tr>
<tr>
<td>W4 - 6.4/70μs</td>
<td>75V up to 1600V</td>
</tr>
<tr>
<td>W5A - 40/120μs</td>
<td>75A up to 2000A (10000A) ¹</td>
</tr>
<tr>
<td>W5B - 50/500μs</td>
<td>400A up to 6000A (10000A) ¹</td>
</tr>
</tbody>
</table>

### MIG-OS-MB

<table>
<thead>
<tr>
<th>DO160 Waveforms</th>
<th>W2 &amp; W3</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2 - 0.1/6.4us</td>
<td>40 up to 1600V</td>
</tr>
<tr>
<td>W3 - 1MHz</td>
<td>80 up to 3200V</td>
</tr>
<tr>
<td>W3 - 10MHz</td>
<td>80 up to 3200V</td>
</tr>
</tbody>
</table>

### MIG-OS-MB-EXT (Level 4 and 5 Extension)

| W2 - 0.1/6.4us  | 750 up to 5000V |
| W3 - 1MHz       | 1000 up to 5700V |
| W3 - 10MHz      | 1000 up to 4500V |

## Multiple Stroke

- **Pulse spacing**: 10ms up to 500ms
- **Duration**: 0.01 up to 2s
- **Repetition**: 2 up to 999s
- **Maximum pulses**: 30 every 2s
- **Multiple stroke pattern**: user programmable

## Multiple Burst

- **WF3 - 1MHz**: 50 up to 3200V
- **WF3 - 10MHz**: 50 up to 3200V
- **Pulse spacing**: 10μs up to 10ms
- **Burst duration**: 0.001 up to 2s
- **Burst pattern**: user programmable

¹ Figures in brackets indicate system level with coupler.
### Fx-DO160-S17
DO160 Section 17 waveform | Voltage Spikes
--- | ---
Amplitude range | 100 to 1100V
Source Impedance | 500hm
Risetime | 1 to 2μs
Duration | 10μs ± 20%
Repetition | up to 2Hz
Synchronisation | 50/60/400Hz
Coupling | Serial injection using CN-MIG-BT

### Fx-DO160-S19
DO160 Section 19 waveform | Induced Signal Susceptibility
--- | ---
Amplitude range | 100 to 1000V
Spike duration | 4μs
Burst duration | 250μs
Coupling | Serial using wire coil

### Fx-AMD24C
ABD0100.1.8 waveform | Voltage Spikes
--- | ---
Test Supply Voltage | 115V
Risetime | < 2μs
Source Impedance | 500hm
Spike Duration | 10μs
Amplitude Range | 200 to 1200V
Source Impedance | 50ohm
Spike Duration | 50μs
Amplitude Range | 100 to 650V
Spike Duration | 100μs
Amplitude Range | 100 to 500V
Spike Duration | 200μs
Amplitude Range | 50 to 150V
Spike Duration | 400μs
Amplitude Range | 50 to 200V
Coupling | Serial injection using CN-MIG-BT4

### ESD3000
Please refer to ESD Test System brochure for further information.
## Accessories and Options

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DN-LISN160-32</strong></td>
<td>Decoupling network for cable bundle and ground injection tests. Application: To provide a defined system impedance for impulse tests according to DO160 section 22.</td>
<td></td>
</tr>
<tr>
<td><strong>CDN-BDBC</strong></td>
<td>Blocking device (BD) and bypass circuitry (BC). Application: For power pin testing in accordance with DO160 section 22.</td>
<td></td>
</tr>
<tr>
<td><strong>MIG0600SS, -MS and MIG0618SS only</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CN-GI-CI</strong></td>
<td>Current coupling transformer used with WF1, WF5A and WF5B. Application: For cable bundle and ground injection in accordance with DO160 section 22.</td>
<td></td>
</tr>
<tr>
<td><strong>NW-MS-LEVEL1</strong></td>
<td>External attenuation box to reach level 1 voltages and currents. Application: For all single or multiple stroke waveforms in accordance with DO160 section 22.</td>
<td></td>
</tr>
<tr>
<td><strong>I-PROBE-MS</strong></td>
<td>High bandwidth current transducer. Clamp-on type with large opening. Application: Measurement of current amplitudes for WF1, WF5A and WF5B in the EUT cables in accordance with the DO160 section 22.</td>
<td></td>
</tr>
</tbody>
</table>
CN-GI-CI-V
Voltage coupling transformer used with WF4, WF5A and WF5B.
Application: For cable bundle and ground injection in accordance with DO160 section 22.

OPTION-V to CN-GI-CI
Extends current coupling transformer CN-GI-CI for voltage testing up to level 3 used with WF4 and WF5A.
Application: For cable bundle and ground injection in accordance with DO160 section 22.

CN-CI-CI
Coupling Transformer for cable induced tests, applicable for the following waveforms WF1, WF5A, WF5B up to 5000A. **EUT cable only one turn**, aperture 6 x 15 cm

CN-CI-VI
Voltage coupling transformer for voltage waveform WF4 and WF5A coupling for SS and for MS up to L3
**EUT cable only one turn**
Aperture 6 x 15 cm
**CN-CI-VI (2x)**
Voltage coupling transformer for voltage waveform WF4, WF5A and WF5B.
WF4 SS up to L5, MS up to L4
WF5A SS up to L4, MS up to L4
WF5B SS up to L2
**EUT cable only one turn**
Aperture 6 x 15 cm

**CN-CI-VI (2x) + CN-CI-I1**
Voltage coupling transformer for voltage waveform WF4, WF5A and WF5B.
WF4 MS up to L4
WF5A SS up to L5, MS up to L5
WF5B SS up to L3
**EUT cable only one turn**
Aperture 6 x 15 cm
MIG-OS-MB

MIG-OS-MB-EXT
This extension enhances MIG-OS-MB’s capability by increasing test levels and including additional waveforms. The extension is automatically recognised and controlled by the MIG-OS-MB firmware. The following plug-ins are available for the extension:

NW-WF2-FS
Waveform WF2: 0.1/6.4μs extends the MIG-OS-MB to level 5 for single stroke or first stroke testing.

NW-WF2-SS
Waveform WF2: 0.1/6.4μs extends the MIG-OS-MB to level 5 for subsequent stroke testing.
MS definition: 1A 100%, 23D/2 50% within 2 seconds randomly distributed from 50ms up to 110ms. Requires NW-WF2-FS.

NW-WF3-1M-FS
Waveform WF3: 1MHz extends the MIG-OS-MB to level 5 for single stroke and first stroke testing. No burst possible.

NW-WF3-1M-SS
Waveform WF3: 1MHz extends the MIG-OS-MB to level 5 subsequent stroke testing. No burst possible.  
MS definition: 1A 100%, 13D/2 50% within 1.5 seconds randomly distributed from 50ms up to 110ms. Requires NW-WF3-1M-FS.

NW-WF3-10M-FS
Waveform WF3: 10MHz extends the MIG-OS-MB for single stroke and first stroke testing. No burst possible.

NW-WF3-10M-SS
Waveform WF3: 10MHz extends the MIG-OS-MB for subsequent stroke testing. No burst possible. 
MS definition: 1A 100%, 13D/2 50% within 1.5 seconds randomly distributed from 50ms up to 110ms. Requires NW-WF3-10M-FS.

NW-WF6H-MB
Waveform 6H: 0.224/4μs impulse. 14 pulses multiple burst only.

CN-MIG-BT
Coupling transformer for cable bundles up to 3.5 x 6cm.
Application: For WF2 and WF3 up to level 3 in accordance with DO160 section 22.
16 Lightning Tests: Avionics Test System

**AC-DC Decoupler Level 4 & 5**

Decoupler for use with MIG-OS-MB-EXT.

Application: PIN injection testing at level 4 and 5 using WF3 1MHz in accordance with DO160 section 22.

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**CN-MIG-BT1**

Coupling transformer for cable bundles up to 3.5 x 6cm. Includes 0.1ohm calibration shunt.

Application: For all multiple stroke and multiple burst waveforms in accordance with DO160 section 22.

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**CN-MIG-BT3**

Coupling transformer for cable bundles up to 8cm diameter. Includes 0.1ohm calibration shunt.

Application: For all multiple stroke and multiple burst waveforms in accordance with DO160 section 22.

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**CN-MIG-TT**

Coaxial test tip for PIN injection. Provides AC/DC decoupling. Set includes verification equipment and measurement adapter.

Application: For use with MIG-OS-MB (WF2 & WF3) in accordance with DO160 section 22.

---

**I-PROBE-MB-P1**

High bandwidth current waveform transducer. Opens to cause minimum disruption to the circuit under test.

Application: To measure the current waveform and amplitude for WF2 and WF3 in the EUT cable in accordance with DO160 section 22.
<table>
<thead>
<tr>
<th><strong>RES10-400M</strong></th>
<th><img src="image1" alt="RES10-400M" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>10ohm resistor for lightning voltage damage tests with WF2.</td>
<td></td>
</tr>
<tr>
<td>Application: PIN injection testing according to M00RP0400435.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RES20-400M</strong></th>
<th><img src="image2" alt="RES20-400M" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>20ohm resistor for lightning voltage damage tests with WF2.</td>
<td></td>
</tr>
<tr>
<td>Application: PIN injection testing according to M00RP0400435.</td>
<td></td>
</tr>
</tbody>
</table>

### **MIG2000-6 only**

**CN-MIG-BT with three turned calibration loop**

- Coupling transformer for cable bundles up to 3.5 x 6cm.
- Application: Voltage spike tests in accordance with DO160 Section 17.

For further accessories, please refer to the Military Test System brochure.
For remote control of EMC PARTNER avionics generators, one of the following software packages is needed:

- GENECS-MIG: This is a relatively simple program that reproduces generator front panel functions on a PC. In addition to remote programming and control of the generators, test report information is available to word processing or other evaluation programs such as EXCEL.

- TEMA Software: Comfortable control of EMC PARTNER generators from a PC. Enables several generator types to be included in the same test sequence. Generates an enhanced level of test report.

EMC PARTNER provide a FREE downloadable software which adds another dimension to testing. The DATABASE software is a high level program that provides hints and tips for users unfamiliar with avionics testing or the EMC PARTNER generators. Generator parameters are automatically downloaded into the corresponding instrument simply be selecting the test you wish to perform.
EMC PARTNER’s Product Range

The Largest Range of Impulse Test Equipment up to 100kA and 100kV.

Immunity Tests

Transient Test System can be used to performs all EMC tests on electronic equipment. ESD, EFT, surge, AC dips, AC magnetic field, surge magnetic field, common mode, damped oscillatory and DC dips tests are available as stand-alone or combined test instruments. A large range of accessories for different applications is available: three phase couplers up to 690V/100A, telecom and data line couplers, verification sets, magnetic field coils. Immunity test systems fulfills IEC and EN 61000-4-2, -4, -5, -8, -9, -11, -12, -16, -18, -29.

Lightning Tests

A range of test equipment and accessories for aircraft, military and telecom applications. Complete solutions including all hardware and software to meet the requirements of RTCA / EUROCAE DO160 / ED14 for indirect lighting on aircraft systems, MIL-STD-461 tests CS106, CS115, CS116, for military vehicles, ITU-T K44 basic and enhanced tests for impulse, power contact and power induction, FCC part 68 for telecom equipment testing.

Component Tests

Modular impulse generators (MIG) for transient component testing on: varistors, gas discharge tubes (GDT), surge protective devices (SPD), X Y capacitors, circuit breakers, watt-hour meters, protection relays, insulation material, suppressor diodes, connectors, chokes, fuses, resistors, emc-gaskets, cables, etc. Manual or fully automated solutions are available up to 100kA (8/20us) and 144kV (1.2/50us).

Emission Measurements

One unit performs all measurements on the power supplies of electronic equipment and products for the CE-Mark. HAR1000 uses a novel techniques to deliver clean power source for the EUT in a compact and lightweight form. The system includes all hardware and software including line impedance networks, control and evaluation software. A basic 1-phase system can be easily extended to 3-phase by adding 2 further phases. HARCS Immunity software further expands the system by adding interharmonic tests, voltage variation and ripple on DC tests. Complies with IEC / EN 61000-3-2, -3, IEC / EN 61000-4-13, -14.

System Automation

As addition to the basic generators, a range of accessories are available to enhance capability. Test cabinets, test pistols, adapters and software, simplify interfacing with the EUT.

PS3 programmable source is an EMC hardened supply for frequencies form 16.7Hz to 400Hz. Frequency variation tests can be made using the PS3-SOFT-EXT. Complies with IEC / EN 61000-4-28.
For further information please do not hesitate to contact EMC PARTNER's represen-
tative in your region. You will find a complete list of our representatives and a lot of other 
useful information on our website:

www.emc-partner.com

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Your local representative