EM TEST

THE UCS 500M ULTRA COMPACT SIMULATOR

THE MOST ECOMONIC WAY TO DEAL WITH EMC IMMUNITY TESTS

NATURAL PHENOMENA . . .

SINCE THE EARLY DAYS OF OUR PLANET, THE FLORA, THE FAUNA AND LATER THE HUMAN RACE, HAVE BEEN EXPOSED TO THE LIVELY AND DESTRUCTIVE FORCES OF MOTHER NATURE. FLOODS, STORMS, EARTHQUAKES AND HEAVY THUNDERSTORMS HAVE ALWAYS BEEN PERILOUS AND A SOURCE OF SUBSTANTIAL DAMAGE.

THE GOOD NEWS IS THAT THERE IS A SOLUTION FOR MOST OF THESE PROBLEMS

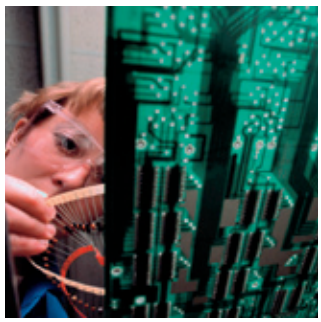
THE LIGHTNING CONDUCTOR MANIFESTS THAT DESTRUCTIVE FORCES CAN BE HANDLED AND CONTROLLED. THIS REQUIRES INTELLIGENCE AND KNOWLEDGE ALONG WITH AN ONGOING SEARCH FOR NEW SOLUTIONS AND POSSIBILITIES.

. . . AND 'SELF-MADE' PROBLEMS

TECHNOLOGICAL PROGRESS NOT ONLY BRINGS NEW POSSIBILITIES BUT ALSO CREATES NEW PROBLEMS

Disastrous natural forces are no longer so terrifying as we can measure, predict and control them. The new problems of today's environment are created by ourselves. With important technological developments to save and make our lives easier, we have to face increasing danger due to technical malfunctions.

The almost unlimited use of microelectronics – who would have imagined this some years ago – causes a tremendous growth in EMC problems. Mobile phones, walkie-talkies and CD players are disturbing the avionic control system or life-saving medical devices.



Electrostatic discharges are destroying modems and computers. Far away lightning strikes stop an entire production line. Imagine a car-audio system that is disturbed by the motor system – goodbye to the pure digital HI-FI sound experience. Only correct immunity precautions can mean a safer environment.
Conformance to EMC requirements in development is no longer a theoretical exercise to fill pages and pages of standards books. It has become a matter of complex requirements for every industrially used device as well as all of our beloved daily-used household appliances.

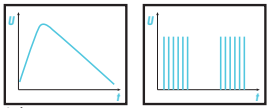
Growing immunity requirements for electrical and electronic devices demand a more innovative and more efficient test generator. The most used standard test procedures should be an integral part of a state-of-the-art generator.
EM TEST, a leading and experienced company in developing and manufacturing EMC test generators for many years, has adopted these customer requirements and turned them into its own philosophy. With our latest innovation we offer you a universal test generator that meets your actual application requirements. It can be upgraded at any time and its outstanding performance prepares you well for the future

aBuilt up as a modular system, this intelligent solution offers exactly what you need.

FULL COMPLIANCE

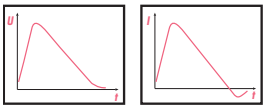
The UCS500M is a modular built test generator that covers all the present and future standards for CE marking. The customer can select between the actual Burst standard and the new edition (IEC 61000-4-4, published in July 2004). He can select also between the precedent and the new edition of the Power Fail Standard (IEC 61000-4-11, published in March 2004).

The UCS500M4 is designed to fullfil the IEC standards whereas the UCS500M6B is designed to comply to the IEC as well as to the ANSI standards.
The built-in coupling/decoupling network incorporates as well the components specified in the IEC as in the IEEE/ANSI standards.



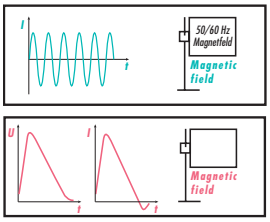
Switching of an inductive load in the public power supply system causes fast transient disturbances of a low energy content. These fast transients with a fast rise time of some nanoseconds are simulated with the burst generator and are superposed to the power supply of the device under test.

Burst
EN 61000-4-4, IEC 61000-4-4
Fast transient immunity



Atmospheric lightning discharges can cause the malfunction of electrical and electronic devices. To prove the immunity to such disturbances, with high energy content, a test is mandatory.

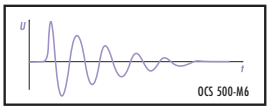
Surge
EN 61000-4-5, IEC 61000-4-5
Surge immunity



Electrical and electronic devices, both in household and industrial environments, may be exposed to low-frequency magnetic fields. Due to lightning strikes or transients caused by failures in power supply systems pulsed magnetic fields can occur. With the generator and the magnetic field coil (optional) all these phenomena can be simulated and the immunity to them can be proven.

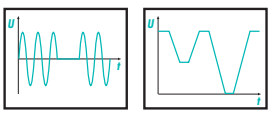
Magnetic field
EN 61000-4-8, IEC 61000-4-8
Immunity to power-frequency magnetic fields

EN 61000-4-9, IEC 61000-4-9
Immunity to pulsed magnetic fields



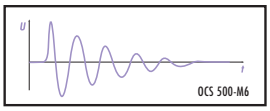
This international standard relates to the immunity requirements to damped oscillatory magnetic disturbances related to medium voltage and high voltage sub-stations.

Damped oscillatory magnetic field
EN 61000-4-10, IEC61000-4-10
Immunity to damped oscillatory magnetic fields



Dips and short interruptions of the supply voltage occur because of short-circuits and switching of big reactive loads in the power supply system. When such dips or short interruptions affect an electrical or electronic device this device must not fall into an unsafe operation state. This fact needs to be proven.

Dips
EN 61000-4-11, IEC 61000-4-11
Immunity to dips and short interruptions on AC power supplies



Lightning events, short circuits and the switching of reactive loads result in oscillatory transient waveforms – the so-called Ringwave. Both AC/DC supply lines, as well as data/signal lines, shall be tested to prove the immunity to this phenomenon.

Ringwave
EN 61000-4-12, IEC 61000-4-12
Oscillatory waves immunity test

HIGHLIGHT MODULARITY

We offer the UCS 500M in two different versions:

- **UCS 500M4** for requirements according to EN 61000-4-x and IEC 61000-4-x (EN/IEC 61000-4-4, -5, -8, -9, -11, -29)
- **UCS 500M6B** for requirements according to EN/IEC 61000-4-x and ANSI C62.41. The UCS 500M6 can be delivered with an optional built-in Ringwave module according EN/IEC 61000-4-12 and ANSI C62.41.

Complementary equipment are:

- **dito** for ESD testing according to EN/IEC 61000-4-2
- **OCS 500M6** Oscillatory Compact Simulator for tests according to EN/IEC 61000-4-10, EN/IEC 61000-4-12, EN/IEC 61000-4-18, ANSI C62.41 and ANSI C37.90

CONVENIENCE THAT MAKES TESTING EASIER THAN EVER BEFORE

THE MODULAR DESIGNED SYSTEM OF THE UCS 500M OFFERS TODAY ALL THE FEATURES REQUIRED FOR TOMORROW.

Two things were considered to be the most important when we began developing the UCS 500M. It shall be future-oriented and customer-focused in every detail. This resulted in two different versions, each consisting of up to six modules. With such performance, the UCS 500M is the ideal generator for application-oriented testing. Its technical data surpasses the actual standard levels.

All test parameters can be individually set. This enables the design engineer to select the most suitable EMC filter and protection devices in the most efficient way. In addition to this, and important for quality assurance, all standard test routines are pre-programmed and can be started by pressing only a few keys. As a result, all necessary tests can be carried out quickly and most effectively.

EM TEST ISM IEC

All functions of the Ultra-Compact Simulator can be controlled with the included easy-to-use Windows software **ISM IEC**.
The iteration of the different parameters during the test can be individually selected. All tests can be specified according to any requirements.

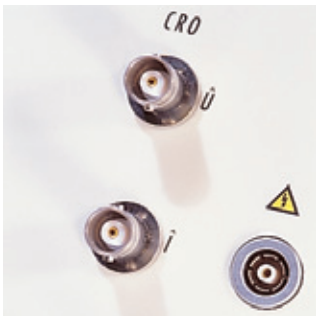
Test report generation:
Test data is directly converted into rtf-file format.
Create your own test report as per your needs.

For a state-of-the-art and innovative test generator it is important to offer **integrated communication ports** as standard. The UCS 500M has built-in RS232 and an GPIB interface. A special interface connector is available to control an additional automatic three-phase coupling network.
Two fail input connectors are provided for EUT surveillance during the tests.

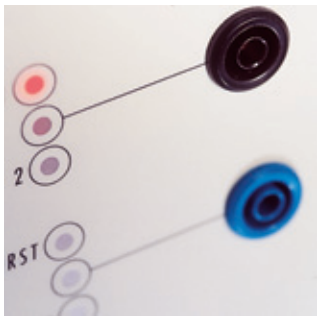
The **rotary knob** optimises the setting of parameters. A parameter setting can be changed quickly and precisely during an active test.

A clearly arranged set of **function keys** makes operation easy. The TEST ON key serves as a security switch. The EUT power supply is switched on and off with this key.

A floating contact is available to control a **warning lamp**. The warning lamp will be switched on when TEST ON is activated.

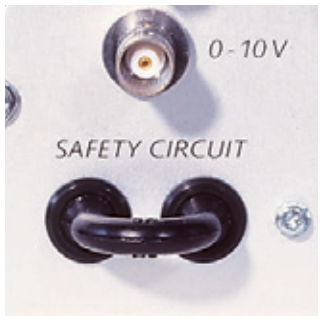


Built-in sensors with dividers provide relative output signals at BNC sockets to allow measurements of surge voltage and current during test.

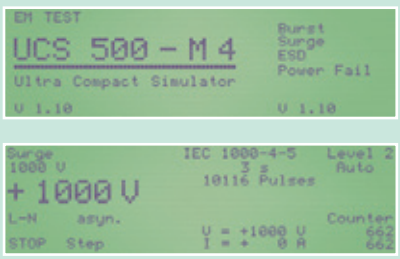


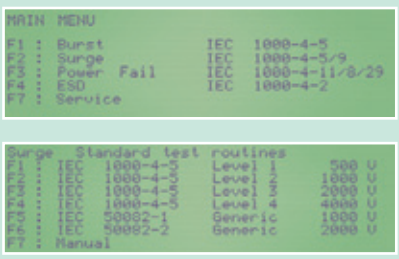
The **built-in single-phase coupling/ decoupling network** can be used for both AC and DC power supplies. The operator can easily recognise which test mode is selected and which coupling mode is active by means of LED indicators.

The generator offers a number of important **signal outputs** available at BNC sockets. They provide measuring signals corresponding to the EUT power supply voltage and current. The inrush current can be measured by an oscilloscope. Additionally, a motorised variac can be driven by a DC signal 0…10V.



Safety first! The test area can be closed to unauthorised admission. A **safety circuit loop** can be connected to the generator. The connected warning lamp indicates a test in progress.





The easy-to-follow menu structure (available in English and German) makes operation very convenient. Every window offers the necessary information to see what is going on.
Where parameters are to be adjusted, the possible range is displayed. Wrong settings are impossible. Every parameter is strictly named according to the standard and is therefore easily identified.

OPTIONS FOR CUSTOMISED APPLICATIONS

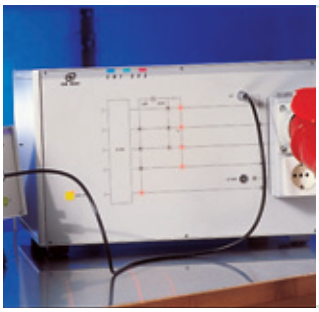
The **magnetic field coil** not only allows magnetic field testing according to the standard but may also be used to simulate field stress. For this purpose we offer set-ups for power-frequency magnetic fields of up to 1000 A/m.

Magnetic field coil 1x1m acc. to IEC/EN61000-4-8/-9/-10
Type: MS100

ONE COMPACT TESTER FOR MANY APPLICATIONS

A test engineer is often faced with many different requirements. Guided by this experience the designers of the UCS 500M have added a number of accessories.

With these versatile options, you can extend the capabilities of your compact tester any time according to your needs and applications. Therefore we claim the right to say: Use a UCS 500M and you are well-equipped for all EMC test requirements.

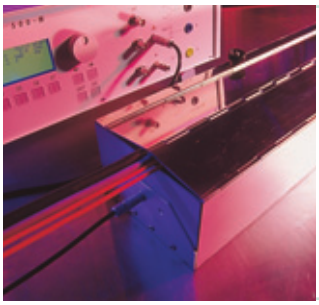


The fully automatic three-phase coupling network CNI 503 is designed to couple burst and surge pulses to the three-phase power supply. The current range can vary from 16 to 100 A (other currents on request).
A UCS 500M combined with a three-phase Power Fail generator (PFS503) signifies the optimum solution to test three-phase power supplied appliances fully compliant and most effective from the application point of view.

Fully automatic three-phase coupling network for Burst and Surge tests acc. to IEC61000-4-4/-5, EN61000-4-4/-5
Type CNI 503-16: 3 x 440 V, 16 A
Type CNI 503-32: 3 x 440 V, 32 A
Type CNI 503-63: 3 x 440 V, 63 A
Type CNI 503-100: 3 x 440 V, 100 A

E- and H-field probes for investigation and localisation. In the development stage the user can localise weak immunity areas quite easily. This helps to save time and money. The probes can be used on PCBs and for enclosure development.

E and H-field probes to look for weak immunity areas
Type ITP: Broadband probes for E-fields
Type ITP/H: Probes for H-fields



The normative capacitive coupling clamp, type HFK, is used to induce the burst pulses onto signal and data lines.

Capacitive coupling clamp
Type HFK; acc. to IEC61000-4-4, EN61000-4-4

Calibration set
To check the generator at the direct output as well as on the output of the coupling network, as required in IEC/EN61000-4-4 Edition 2.

Calibration set
The calibration kit includes the attenuators KW50 and KW1000
as well as an adapter.

Tapped transformers and motor variacs
Tapped transformers are available as options for voltage dips and short interruptions as per IEC 61000-4-11. To support voltage variation (IEC 61000-4-11) and power-frequency magnetic field tests (IEC 61000-4-8) motor variacs are offered optionally.

Transformers and variacs
Type V 4780
Type V 4780S2
Type MV 2616

UCS 500M4

TECHNICAL DATA

BURST MODULE, EFT/4

ELECTRICAL FAST TRANSIENT SIMULATOR

Test Level Output	**acc. to EN/IEC 61000-4-4 and EN 61000-6-1, -6-2**
Test voltage	200 V – 4,400 V ± 10%
Wave shape	5 ns ± 30%, 50 ns ± 30% into 50 Ω
	5 ns ± 30%, 50 ns -15/+100 ns into 1,000 Ω
	5 ns ± 30%, 50 ns ± 30% into 50 Ω at the
	EUT output port with all couplings set
Source impedance	Zq = 50 Ω
Polarity	Positive/negative

Trigger Circuit	
Trigger of bursts	Automatic, manual, external
Synchronization	0° – 360°, resolution 1° (16 – 500 Hz)
Burst duration	td = 0.10 ms – 999.9 ms
Burst repetition rate	tr = 10 ms – 9,999 ms
Spike frequency	f = 0.1 kHz – 1,000 kHz
Test duration	T = 0:01 min – 99:59 min or endless

Outputs	
Direct	Via 50 Ω-coaxial connector
Coupling mode	L, N, PE; all combinations
EUT supply	AC: 250 V/16 A; 50/60 Hz
	DC: 250 V/10 A
CRO trigger	5 V trigger signal for oscilloscope

SURGE MODULE, VCS/4

COMBINATION WAVE SIMULATOR

Test Level Output	**acc. to EN/IEC 61000-4-5 and EN 61000-6-1; -6-2**
Voltage (open circuit)	160 V – 4,000 V ± 10%
Pulse front time	1.2 µs ± 30%
Pulse time to half value	50 µs ± 20%
Current (short-circuit)	max. 2,000 A ± 10%
Pulse front time	8 µs ± 20%
Pulse time to half value	20 µs ± 20%
Polarity	Positive/negative/alternating
Event counter select	1 – 30,000 or endless
Pulse counter	1 – 1,000,000

Trigger Circuit	
Release of pulses	Automatic, manual, external
Synchronization	0° – 360°, resolution 1°
Pulse repetition rate	max. 0.5 Hz (2s – 100 s)

Outputs	
Direct	Via HV-coaxial connector, Zi = 2 Ω
Coupling mode	Line to line
	Line(s) to ground (PE)
EUT supply	AC: 250 V/16 A; 50/60 Hz
	DC: 250 V/10 A
CRO trigger	5 V trigger signal for oscilloscope

Measurements	
CRO Û-monitor	10 Vp at 4,000 V
CRO Î-monitor	10 Vp at 2,000 A
Peak voltage	4,000 V in the LCD display
Peak current	2,000 A in the LCD display

POWER FAIL MODULE, PFS/4

POWER FAIL SIMULATOR, DIPS & INTERRUPTIONS, VOLTAGE VARIATIONS

Voltage Dips & Interruptions and Variations	
acc. to EN/IEC 61000-4-11 and EN 61000-6-1, -6-2	
Channel PF1 and PF2	AC voltage: max. 250 V
	AC current: max. 16 A
Frequency	16 – 500 Hz
	DC voltage: max. 250 V
	DC current: max. 10 A
Switching Off time	< 5 µs on a 100 Ω resistive load
Inrush current	> 500 A
	Electronic overload protection. Both channels are
	protected against short-circuit conditions.

Trigger Circuit	
Trigger of events	Automatic, manual, external
Synchronization	0° – 360°, resolution 1° (16 – 500 Hz)
Repetition rate	10 ms – 99 s
Event duration	100 µs – 9,900 ms

Outputs	
EUT terminals	L, N and PE
CRO trigger	5 V trigger signal for oscilloscope

Measurements	
EUT voltage	In the LCD display
EUT current	In the LCD display
MON V	Measurement of the EUT voltage; built-in 100:1 divider
MON I	Measurement of the EUT current; 10 mV/A; max. 1,000 A

GENERAL DATA

Interfaces	
Serial interface	Serial RS232 interface with baud rate of 1,200 – 19,200 baud
Parallel interface	IEEE bus parallel interface, selectable device addresses 1 – 30
Analog output	Analog control output with 0 – 10 VDC to control an
	external transformer
CN interface	CNI interface with 15pin SubD to control an external
	coupling network
Fail inputs	EUT monitoring via Fail1 and Fail2 input (one each)

Dimensions	
Housing	19", 3 HU, L = 532 mm
Weight	approx. 25 kg

Safety	
Safety standard	EN/IEC 61010
Security circuit	Control input (24 VDC)
Warning lamp	Floating contact (max. 230 V/max. 6 A)

Compact tester for EFT/burst, surge and powerfail

UCS 500M6

TECHNICAL DATA

BURST MODULE, EFT/6

ELECTRICAL FAST TRANSIENT SIMULATOR

Test Level Output	**acc. to EN/IEC 61000-4-4 and EN 61000-6-1, -6-2**
Test voltage	200 V - 5,500 V ± 10%
Wave shape	5 ns ± 30%, 50 ns ± 30% into 50 Ω
	5 ns ± 30%, 50 ns -15/+100 ns into 1,000 Ω
	5 ns ± 30%, 50 ns ± 30% into 50 Ω at the
	EUT output port with all couplings set
Source impedance	Zq = 50 Ω
Polarity	Positive/negative

Trigger Circuit	
Trigger of bursts	Automatic, manual, external
Synchronization	0° - 360°, resolution 1°
Burst duration	td = 0.1 ms – 999.9 ms
Burst repetition rate	tr = 10 ms – 9,999 ms
Spike frequency	f = 0.1 kHz – 1,000 kHz
Test duration	T = 0:01 min – 99:59 min or endless

Outputs	
Direct	Via 50 Ω-coaxial connector
Coupling mode	L, N, PE; all combinations
EUT supply	AC: 250 V/16 A; 50/60 Hz
	DC: 250 V/10 A
CRO trigger	5 V trigger signal for oscilloscope

SURGE MODULE, VCS/6

COMBINATION WAVE SIMULATOR

Test level output	**acc. to EN/IEC 61000-4-5 and EN 61000-6-1; -6-2**
Voltage (open circuit)	250 V – 6,600 V ± 10%
Pulse front time	1.2 µs ± 30%
Pulse time to half value	50 µs ± 20%
Current (short-circuit)	max. 3,300 A ± 10%
Pulse front time	8 µs ± 20%
Pulse time to half value	20 µs ± 20%
Polarity	Positive/negative
Event counter select	1 – 30,000 or endless
Pulse counter	1 – 1,000,000

Trigger Circuit	
Release of pulses	Automatic, manual, external
Synchronization	0° – 360°, resolution 1°
Pulse repetition rate	max. 0.5 Hz (2 s - 100 s)

Outputs	
Direct	Via HV-safety lab connectors, Zi = 2 Ω
Coupling mode	
IEC 61000-4-5	Line to line with 2 Ω
	Line(s) to ground (PE) with 12 Ω
ANSI C62-41	Line(s) to ground (PE) and line to line with 2 Ω
EUT supply	AC: 250 V/16 A; 50/60 Hz
	DC: 250 V/10 A
CRO trigger	5 V trigger signal for oscilloscope

Measurements	
CRO Û-monitor	10 Vp at 6,600 V
CRO Î-monitor	10 Vp at 3,300 A
Peak voltage	6,600 V in the LCD display
Peak current	3,300 A in the LCD display

POWER FAIL MODULE, PFS/6

POWER FAIL SIMULATOR, DIPS & INTERRUPTIONS, VOLTAGE VARIATIONS

Voltage Dips & Interruptions and Variations	
acc. to EN/IEC 61000-4-11 and EN 61000-6-1, -6-2	
Channel PF1 and PF2	AC voltage: max. 250 V
	AC current: max. 16 A
Frequency	50 / 60Hz
	DC voltage: max. 250 V
	DC current: max. 10 A
Switching Off time	< 5 µs on a 100 √ resistive load
Inrush current	> 500 A
	Electronic overload protection. Both channels are
	protected against short-circuit conditions.

Trigger Circuit	
Trigger of events	Automatic, manual, external
Synchronization	0° – 360°, resolution 1° (16 - 500 Hz)
Repetition rate	10 ms – 99 s
Event duration	100 µs – 9,900 ms

Outputs	
EUT terminals	L, N and PE
CRO trigger	5 V trigger signal for oscilloscope

Measurements	
EUT voltage	In the LCD display
EUT current	In the LCD display
MON V	Measurement of the EUT voltage; built-in 100:1 divider
MON I	Measurement of the EUT current; 10 mV/A; max. 1,000 A

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Analog output	Analogue control output with 0 – 10 VDC to control an
	external transformer
CN interface	CNI interface with 15pin SubD to control an external
	coupling network
Fail inputs	EUT monitoring via Fail1 and Fail2 input (one each)

Dimensions	
Housing	19“, 6 HU, L = 532 mm
Weight	approx. 25 kg

Safety	
Safety standard	EN/IEC 61010
Security circuit	Control input (24 VDC)
Warning lamp	Floating contact (max. 230 V/max. 6 A)

RINGWAVE MODULE, RWG/6

RINGWAVE SIMULATOR

Test Level Output	**acc. to ANSI/IEEE C62.41 and EN/IEC 61000-4-12**
Test voltage	250 V – 6,000 V ± 10%
Voltage wave shape (open circuit)	
Rise time (first peak)	0.5 µs ± 30%
Oscillatory frequency	100 kHz ± 20%
Decaying	Peak 2 to peak 1 = 40 - 110%
	Peak 3 to peak 2 = 40 - 80%
	Peak 4 to peak 3 = 40 - 80%
Current wave shape (short circuit)	
Rise time	1.0 µs
Oscillatory frequency	100 kHz ± 20%
Source impedances	12 √and 30 √
Short circuit peak current	acc. to selected source impedance
Polarity	Positive/negative

Trigger Circuit	
Release of pulses	Automatic, manual, external
Synchronization	0° - 360°, resolution 1°
Pulse repetition rate	max. 1 Hz (1 s – 100 s)

Outputs	
Direct	Via HV-coaxial connector
Coupling mode	L, N, PE; line to line and line to ground
EUT supply	AC: 250 V/16 A; 50/60 Hz
	DC: 250 V/10 A
CRO trigger	5 V trigger signal for oscilloscope

Compact tester for EFT/burst, surge, ringwave and powerfail

EM TEST

THE UCS 500M ULTRA-COMPACT SIMULATOR

THE MOST ECONOMIC WAY TO DEAL WITH EMC IMMUNITY TESTS

Switzerland:

EM TEST AG
Sternenhofstraße 15
4153 Reinach
Phone: +41 (0)61/717 91 91
Fax: +41 (0)61/717 91 99
E-mail: sales@emtest.com
URL: www.emtest.com

Germany:

EM TEST GmbH
Lünener Straße 211
59174 Kamen
Phone: +49 (0)2307/260 700
Fax: +49 (0)2307/170 50
E-mail: info@emtest.de
URL: www.emtest.de

France:

EM TEST S.A.R.L.
1, Avenue de Pierre Pflimlin,
Actipolis III,
68390 Sausheim
Phone: +33 (0)3 89 31 23 50
Fax: +33 (0)3 89 31 23 55
E-mail: info@emtest.fr
URL: www.emtest.fr

China:

EM TEST Representative Office Beijing
Rm 913, Leftbank,
No. 68 Bei Si Huan Xi Lu,
Haidian District,
Beijing 100080, P.R. China
Phone: +86 (0)10 826 76027-29
(three lines)
Fax: +86 (0)10 826 76238
E-mail: emtestbj@public.bta.net.cn
URL: www.emtest.com

Malaysia:

EM TEST (M) SDN BHD
Unit B2-6, Jalan Dataran SD2
Dataran SD2, PJU9
Bandar Sri Damansara
52200 Kuala Lumpur
Malaysia
Phone: +60 (03)6273 2201
Fax: +60 (03)6274 2201
E-mail: sales@emtest.com.my
URL: www.emtest.com

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