EMC MEASUREMENT SOLUTIONS

ANECHOIC SYSTEMS
REVERB SYSTEMS
GTEM!™ SYSTEMS

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THE SUREST SOLUTION BY ANY MEASURE™

ETS·LINDGREN®
An ESCO Technologies Company

ets-lindgren.com

SOLUTIONS THAT OFFER MORE REWARD, LESS RISK

AN EXPERIENCED PARTNER YOU CAN TRUST

With ETS-Lindgren, there's no need to deal with multiple vendors or incompatible hardware issues. With us, you work alongside a single, accountable partner with a proven track record of success.

If your organization is global, you have the advantage of a partner with support facilities in the Americas, Europe, and Asia, staffed by experienced people who operate in your time zone and speak your language.

At all locations, our objective is the same: listen carefully to our client's requirements, and then respond with proven solutions that minimize risk and assure success.

PHOTO COURTESY OF OTOKAR

WE DO THE HEAVY LIFTING

The hardest thing about building an RF test system is – everything. That's why we've lightened the load by doing the heavy lifting for you.

At project level, our in-house capabilities smooth the way with RF, mechanical and architectural engineering (including BIM), site surveys, local permitting (MEP), project management, system performance verification, operator training, assistance with agency certification, and ongoing support.

At systems level, our integrated RF measurement solutions are specifically designed to meet the requirements of a particular test standard. They can include a complete turnkey system including the test environment (chamber, test cell, etc.) or just an integration of hardware and software for a chamber (or test cell) you may already have.

SIMPLE AND EASY TO USE

Make things simple and people will use them. It's a very basic concept that seems to be missing in many RF test systems, but not ours.

TILE!™ lab management software for example, includes an Executive function that lets administration level users run tests and print final data submission reports with just a few clicks of a mouse. Of course some engineers prefer a more hands-on approach, or the ability to create their own test routines. TILE! lets you do that too using a simple drag-and-drop interface that does away with coding or cryptic commands.

THE RIGHT CHOICE

Selecting the right system can be a career-defining event. Things that look good on paper might seem fine in theory, but then not work in the real world conditions of your lab. Be confident that your next system will meet your expectations. Start with a solution from a partner you can trust – ETS-Lindgren.

The surest solution is the best solution.
By any measure that's ETS-Lindgren.

Is a Semi-Anechoic Chamber right for you?

Semi-anechoic chambers are best for making measurements that require directional information about the signal source. When RE and RI measurements are being made, semi-anechoic chambers will require the addition of antennas, antenna towers (or tripods) and turntables. Semi-anechoic chambers usually have the necessary interior volume to test larger EUTs.

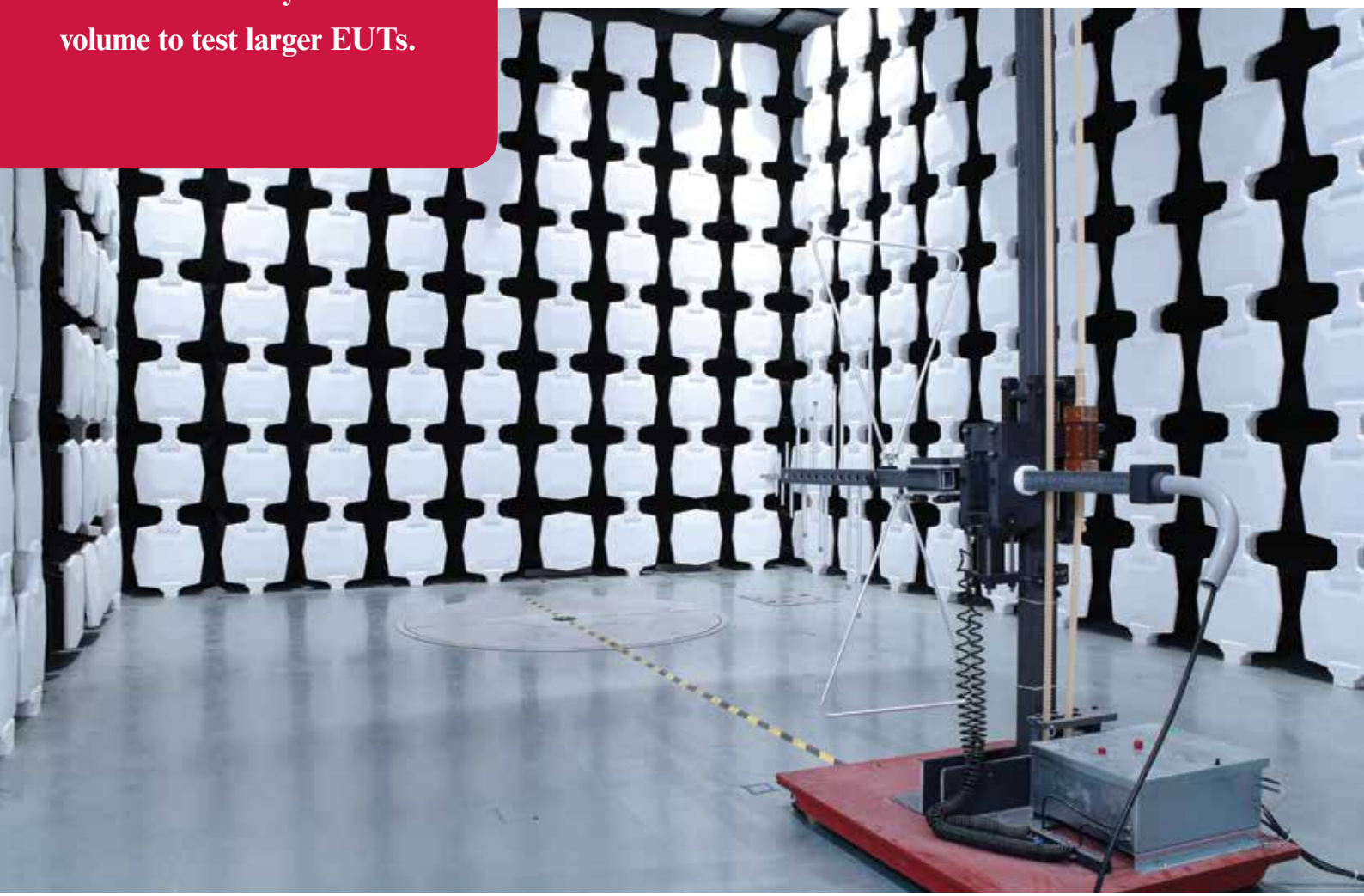
SEMI-ANECHOIC CHAMBERS

FACT™ AND SPACESAVER™ SEMI-ANECHOIC CHAMBERS

FACT (Free-space Anechoic Chamber Test-site) 3 and 10 meter chambers provide the test environment you need for meeting most international emissions and immunity standards such as CISPR, IEC, VCCI, ANSI, FCC, SAE, etc. SpaceSaver chambers are smaller sized anechoic chambers that work well for design verification and precompliance applications, but are not suitable for most final compliance measurements.

SEMI-ANECHOIC CHAMBER ADVANTAGES:

- Can be used to make both Radiated Emissions and Radiated Immunity measurements
- Ideal environment for testing to many international standards
- Can demonstrate correlation to OATS (FACT Chambers)
- Measurements are directional and determinate
- Anechoic surfaces reduce reflections
- Capable of testing large EUTs



SMART™ REVERBERATION CHAMBERS

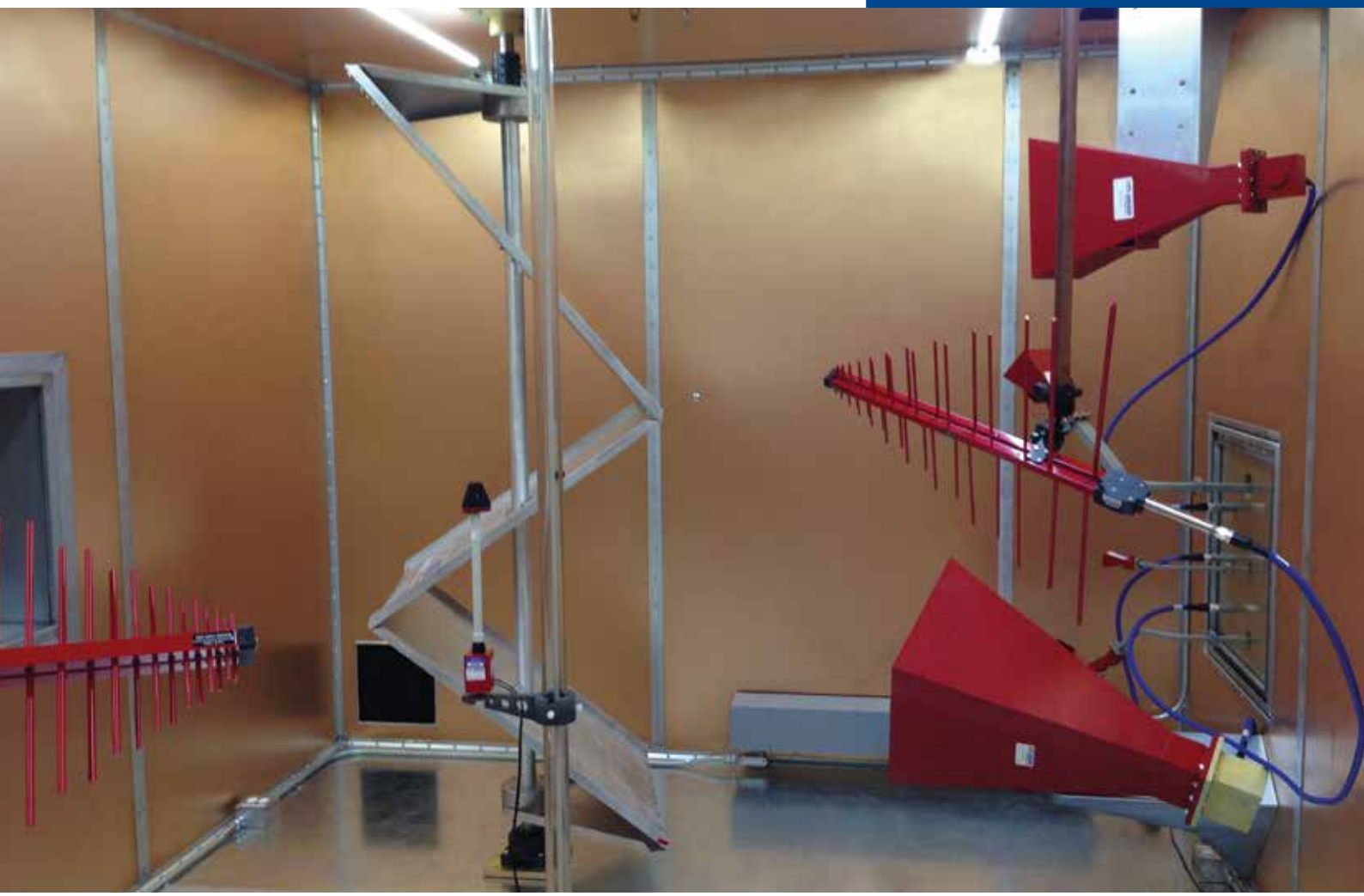
SMART (Statistical Mode Averaging Reverberation Test-site) reverberation chambers were primarily used for military and automotive testing. Today, they are increasingly used for new and diverse applications because of their inherent efficiency, cost effectiveness, and dynamic performance attributes. Benefits include high field to input power ratios, homogeneous fields, and large EUT size-to-chamber-volume ratios.

SMART ADVANTAGES:

- Can be used to make both Radiated Emissions and Radiated Immunity measurements
- Creates high field strengths with relatively modest power input
- Measures total radiated power (Emissions)
- Illuminates in all directions (Immunity)
- Does not require anechoic surface treatments
- Requires no facility resources other than power (smaller volume models)
- Movable (smaller volume models roll on wheels)

Is a SMART Reverberation Chamber right for you?

Reverberation chambers are best suited for measurements that do not require directional information about the signal source. Measurement results are statistical rather than determinate. The chamber's interior dimensions will determine the lowest attainable frequency and the largest allowable EUT sizes.



Is a GTEM! right for you?

The GTEM! works best for testing small to midsized battery powered equipment that is not gravity dependent. The EUT must be rotated in the X,Y,Z axes for optimal mode coupling when making both radiated emission and immunity measurements.[1]

GTEM!™ TEST CELLS

The GTEM! (Gigahertz Transverse Electromagnetic) cell is an all-in-one RF shielded test environment that lets you go from radiated emissions to radiated immunity testing with just a change at the input connector (attaching a receiver for radiated emission testing, to attaching an amp and signal generator for radiated immunity testing). Electrically, the GTEM! is a flared 50 ohm coax transmission line, so there is no need for antennas and no stopping for band breaks. Just close the door and test!

GTEM! ADVANTAGES:

- Can be used to make both Radiated Emissions and Radiated Immunity measurements
- Creates high field strengths with relatively modest power input
- Generates fields that are typically homogeneous and uniform
- Operates over a very broad frequency range
- Requires no antennas, antenna setup, or stopping for band breaks
- Can demonstrate correlation to OATS
- Requires no facility resources other than power
- Movable (rolls on wheels)
- Provides 50 ohm characteristic impedance
- Exhibits excellent VSWR over frequency

[1] AUTOMATED EUT POSITIONER IS AVAILABLE AS AN OPTION

RF MEASUREMENT PLATFORM

EMCENTER™

EMCenter is a flexible RF test platform that includes an integrated microcontroller, touch screen, and space for up to seven mix-or-match plug-in card modules. Each card module is an instrument that has been optimized for RF measurement. Card modules are easily inserted into the chassis' rear card bay, and are recognized when the system initializes. Included I/O capability expands EMCenter's connectivity with ports for Ethernet, RS-232, USB, and IEEE-488[2]. For even more expansion, EMCenters can be linked together to form a scalable system.

W: 19" H: 3U

The EMCenter can be manually controlled through a front panel TFT touch screen. For automated testing, EMCenter can be controlled with RF test software, including TILE!.

INCLUDED PLUG-IN CARD MODULES:

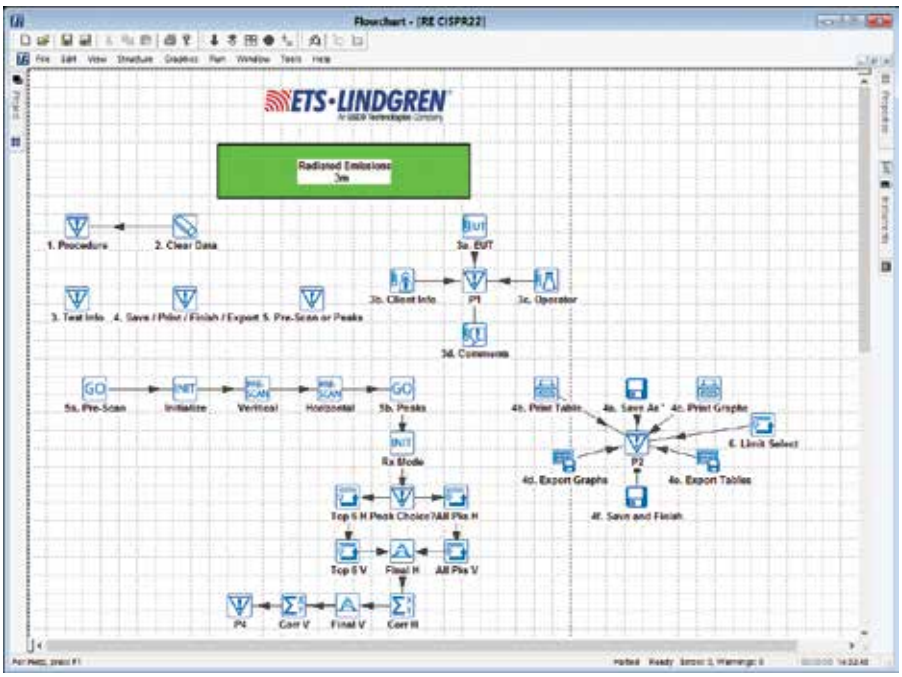
- I/O Card Module with
  - Ethernet (1)
  - RS-232 (1)
  - USB (3)
  - IEEE-488 (1)[2]
- Power Module with:
  - Safety Interlock
  - Power Switch
  - IEC Power Cord Receptacle

OPTIONAL PLUG-IN CARD MODULES:

- EMGen™ Signal Generator
- EMPower™ RF Power Meter
- EMPower Pulse™ RF Burst/Pulse Power Meter
- EMSwitch™ Switch Matrix
- EMLink™ Analog Fiber Optic Link
- EMControl™ Tower and Turntable Controller
- EMSense™ E-field Laser and Battery Operated Probe Controller
- EMField™ E-field Generator

[2] IEEE-488 IS AVAILABLE AS AN OPTION

LAB MANAGEMENT SOFTWARE



TILE!

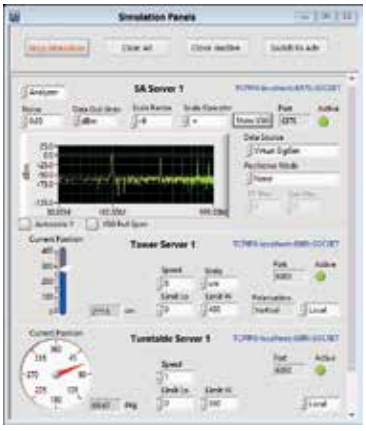
TILE! (Total Integrated Lab Environment) is a software environment for performing Electromagnetic Compatibility (EMC) Tests in any environment – GTEM! cell, SMART reverb chamber or FACT and SpaceSaver semi-anechoic chambers. An optional library of predefined test routines called "Profiles" perform executive test functions and control instrumentation in the hardware loop. Test-specific Profiles are available for most common tests (ANSI, IEC, CISPR, etc.) and can be password protected to prevent unauthorized modification. In a systems environment, TILE! runs on a PC that is connected to and controls an EMCenter RF test platform.

TILE!'s unique visual interface also offers the ability to create your own test Profiles with drag-and-drop simplicity in a familiar Microsoft Windows® environment. Each step in the test sequence is represented as a unique icon. Right clicking on the icon opens a dialog box for customizing the settings of that particular action. Icons are dragged and dropped into place on the screen, with the entire test sequence resembling a flowchart.

UNIQUE TILE! FEATURES

TILE! EXECUTIVE

Executive is an easy-to-use interface which enables administrative level users to run predefined Profiles with a few clicks of a mouse. This allows engineering resources to focus on more high value tasks.



TILE! SIMULATOR

This powerful tool enables users to create simulated test environments without tying up valuable lab resources. Users select virtual instruments to substitute for actual instruments, then develop Profiles, see how various instrument configurations might interact, perform training and customer demos or validation testing – all without using (or damaging) valuable equipment.

TILE! REPORT GENERATOR

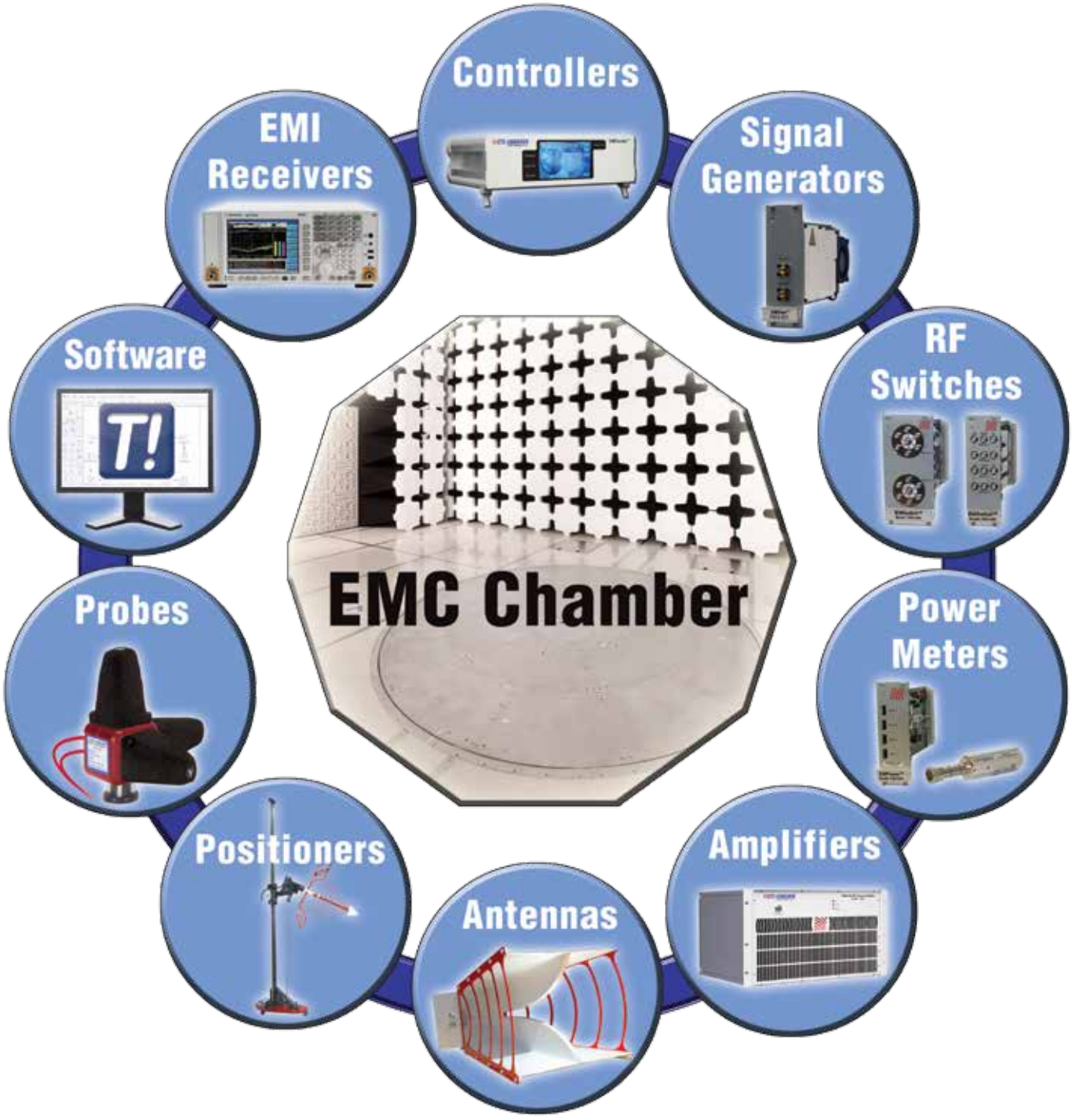
The new report generator has expanded capabilities, including a fully customizable, predefined MS Word® document template with test data, tables, and both graphics and photographs of the test set-up. Reports produced are customer-ready within seconds.

TILE! USER SUPPORT

TILE! users have 24/7 access to a web portal exclusively for them. Users can ask questions, submit service requests, download the latest software enhancements, or access our equipment driver library. Users can connect to the TILE! LinkedIn page, where ideas can be exchanged with other TILE! users. TILE! users are also invited to attend the TILE! User's Group (TUG) meeting held annually during IEEE EMC Symposium.

INSTRUMENTATION

Your RF test system can be ordered with the carefully selected EMC instrumentation we provide or integrated with equipment you may already have in your lab. Adding or combining equipment is made easier with our large library of equipment drivers that support most popular brands of instrumentation, both new and legacy.



SYSTEM CONFIGURATIONS

	GTEM!	REVERB	SEMI-ANECHOIC CHAMBER
SYSTEM	**EMC-5402**	**EMC-4000**	**EMC-3100**
Cell/Chamber	GTEM! Model 5402	SMART 1000	SpaceSaver PC
Recommended EUT Size	76mm W x 76mm H	0.6m L x 0.5m W x 0.4m H	1.2m Dia. x 2m H (Quiet Zone)
Radiated Emissions			
Frequency Range	30 MHz to typical 18 GHz	1 to 40 GHz	80 MHz to 40 GHz
Applicable Standards[3]	IEC 61000-4-20 Annex A; ANSI C63.4-2009 Annex F	IEC 61000-4-21 Annex E; RTCA DO-160	Pre-compliance CISPR 11, 22; FCC Part 15
Radiated Immunity			
Frequency Range	30 MHz to typical 18 GHz	1 to 40 GHz	80 MHz to 40 GHz
Applicable Standards	IEC 61000-4-20 Annex B	MIL-STD 461 F; RTCA DO-160	EN/IEC 61000-4-3
Specifications	10 V/m (80% AM)	200 V/m	10 V/m (80% AM)
SYSTEM	**EMC-5405**	**EMC-4700**	**EMC-3200**
Cell/Chamber	GTEM! Model 5405	SMART 700	SpaceSaver 26/26H
Recommended EUT Size	300mm W x 300mm H	0.9m L x 0.6m W x 0.6m H	1.2m Dia. x 2m H (Quiet Zone)
Radiated Emissions			
Frequency Range	30 MHz to typical 18 GHz	700 MHz to 18 GHz	80 MHz to 40 GHz
Applicable Standards[3]	IEC 61000-4-20 Annex A; ANSI C63.4-2009 Annex F	IEC 61000-4-21 Annex E; RTCA DO-160	Pre-compliance CISPR 11, 22; FCC Part 15
Radiated Immunity			
Frequency Range	30 MHz to typical 18 GHz	700 MHz to 18 GHz	80 MHz to 40 GHz
Applicable Standards	IEC 61000-4-20 Annex B	MIL-STD 461 F; RTCA DO-160	EN/IEC 61000-4-3
Specifications	10 V/m (80% AM)	200 V/m	10 V/m (80% AM)
SYSTEM	**EMC-5407**	**EMC-4200**	**EMC-3300**
Cell/Chamber	GTEM! Model 5407	SMART 200	FACT 3
Recommended EUT Size	400mm W x 400mm H	2.2m L x 1.6m W x 1.5 m H	1.2m or 1.5m Dia. x 2m H (Quiet Zone)
Radiated Emissions			
Frequency Range	30 MHz to typical 18 GHz	200 MHz to 18 GHz	26 MHz to 18 GHz
Applicable Standards[3]	IEC 61000-4-20 Annex A; ANSI C63.4-2009 Annex F	IEC 61000-4-21 Annex E; RTCA DO-160	CISPR 11, 22; FCC Part 15
Radiated Immunity			
Frequency Range	30 MHz to typical 18 GHz	200 MHz to 18 GHz	80 MHz to 18 GHz
Applicable Standards	IEC 61000-4-20 Annex B	MIL-STD 461 F; RTCA DO-160	EN/IEC 61000-4-3
Specifications	10 V/m (80% AM)	200 V/m	10 V/m (80% AM)
SYSTEM	**EMC-5411**	**EMC-4080**	**EMC-3400**
Cell/Chamber	GTEM! Model 5411	SMART 80	FACT 10
Recommended EUT Size	550mm W x 366mm H	4.5m L x 4.0m W x 2.2m H	2.0m, 4.0m, or 6.0m Dia. x 2m H (Quiet Zone)
Radiated Emissions			
Frequency Range	30 MHz to typical 18 GHz	80 MHz to 18 GHz	26 MHz to 18 GHz
Applicable Standards[3]	IEC 61000-4-20 Annex A; ANSI C63.4-2009 Annex F	IEC 61000-4-21 Annex E; RTCA DO-160	CISPR 12, 22; FCC Part 15; MIL-STD 461; ISO 11451-2; Automotive
Radiated Immunity			
Frequency Range	30 MHz to typical 18 GHz	700 MHz to 18 GHz	26 MHz to 18 GHz
Applicable Standards	IEC 61000-4-20 Annex B	MIL-STD 461 F; RTCA DO-160	EN/IEC 61000-4-3
Specifications	10 V/m (80% AM)	200 V/m	10 V/m (80% AM)

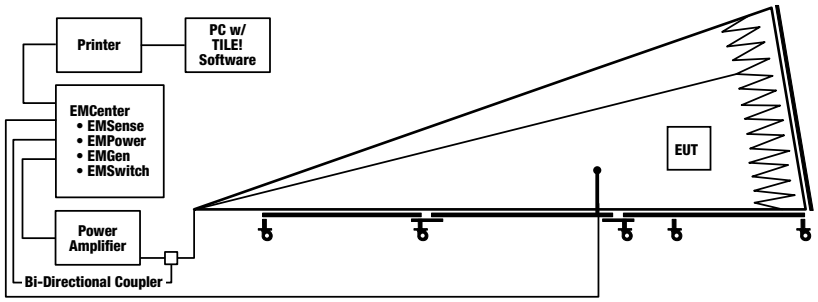
[3]

GTEM EUT measurements < = 1 GHz	Test an EUT with attached cables	Test a battery powered EUT with no attached cables
C 63.4 Annex F	Yes	Yes
61000-4-20	Yes	Yes

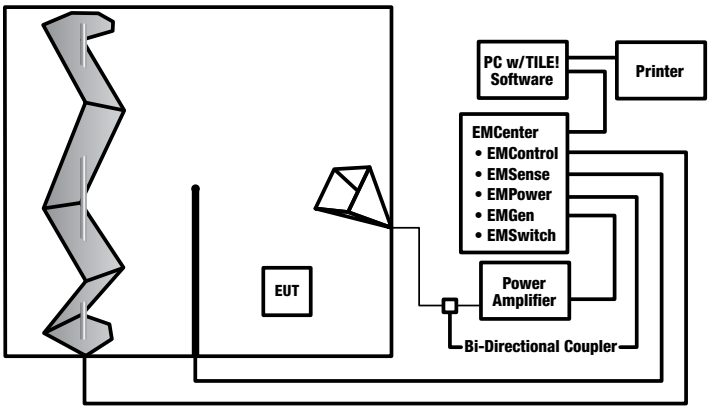
GTEM EUT measurements > 1 GHz	Test an EUT with attached cables	Test a battery powered EUT with no attached cables
C 63.4 Annex F	No	No
61000-4-20	Yes	Yes

TYPICAL TEST CONFIGURATIONS

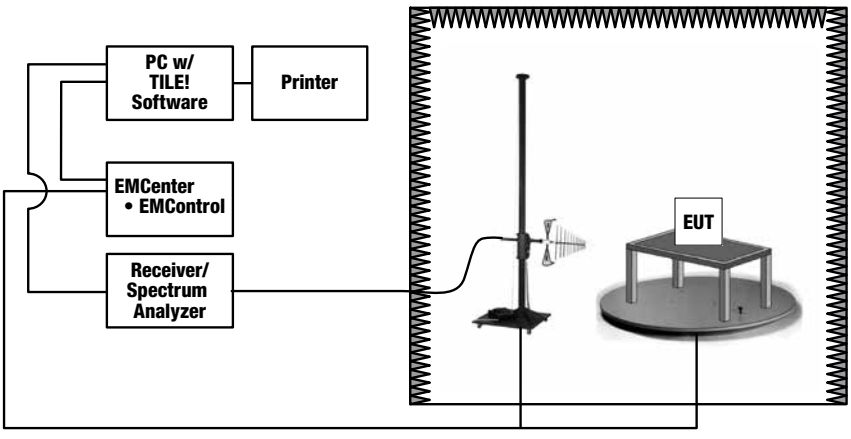
GTEM! –
TYPICAL RADIATED IMMUNITY TEST SETUP



SMART REVERB ROOM –
TYPICAL RADIATED IMMUNITY TEST SETUP



FACT AND SPACESAVER SEMI-ANECHOIC CHAMBERS –
TYPICAL RADIATED EMISSIONS TEST SETUP



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