testforce™

MEASUREMENT EXPERTS GUIDE

EMC

Your source for EMC solutions

Radiated Standards

Radiated Immunity: IEC 61000-4-3 & Medical/Avionics/Military/Automotive

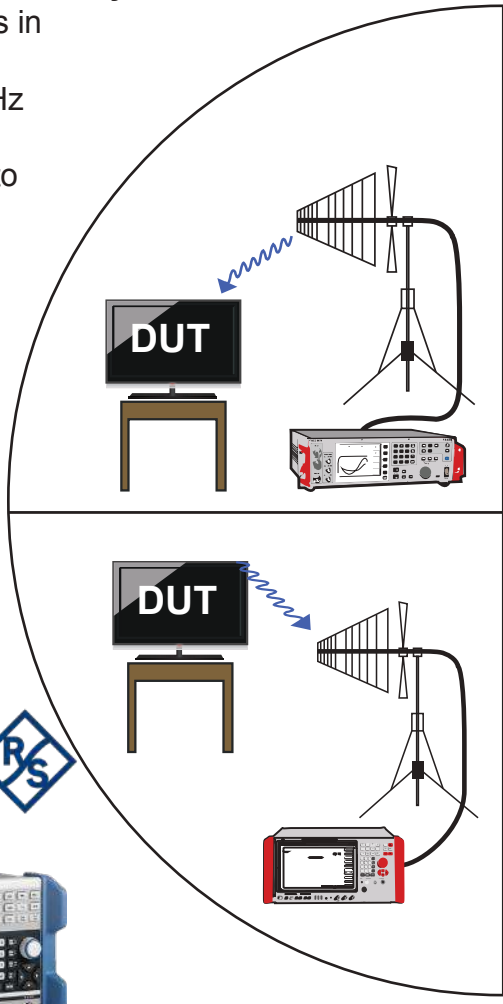
The ability of the device under testing (DUT) to operate in the immediate vicinity of systems or equipment emitting electromagnetic radiation.

TESEQ
Advanced Test Solutions for EMC

NSG 4070C

Test System for Conducted & Radiated Immunity

- Multi-functional device for immunity tests in accordance to IEC/EN 61000-4-6
- Integrated signal generator 4 kHz - 1 GHz
- 3 power meter inputs 4 kHz - 1 GHz
- ntegrated Class A amplifier module, up to 110 W
- Support for external amplifier provides additional flexibility



Radiated Emissions: Various CISPR and IEC Standards

The DTU must not emit over the air an amount of RF power over a specific frequency range. Each industry has a CISPR and IEC standard that will dictate what these values are.

FPL1000 & Elektra Software

ROHDE&SCHWARZ
Make ideas real

EMC Radiated Emissions Pre-Compliance

- Frequency range: 5 kHz - 7.5 GHz
- Pre-compliance version of Elektra software used by EMC labs around the world
- Test templates with limit lines and transducer factors, simplify setup
- Complies with all commercial/military emissions standards
- Works with almost entire range of R&S spectrum analyzers

Conducted Immunity: IEC 61000-4 - 4/5/6/11/12 (Burst, Power Fall, Ringwave)

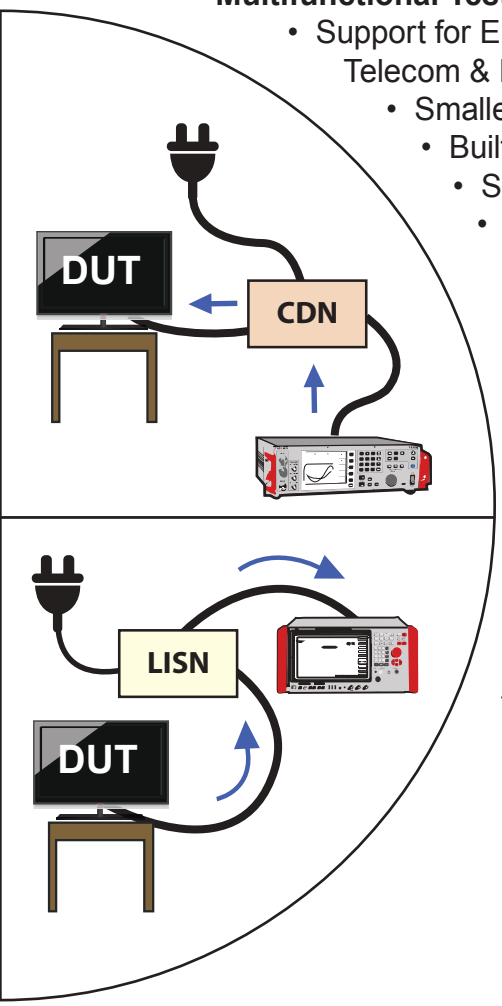
The ability of the DUT to operate under **conducted radio-frequency disturbances** which occur from intended RF transmitters affecting cables such as mains supply lines, signal lines or earth connections between different parts of an electrical or electronic system.

NX7

emtest
the benchmark for emc

Multifunctional Test Generator for Transients

- Support for EFT/Burst, Surge, Power Fail, Telecom & Ringwave up to 7 kV
- Smallest compact generator with 7” touchscreen
- Built-in single phase CDN 400 V/32 A
- Separate key for START/STOP operation with LED
- Selective test library adapted for the EUT settings



Electro-Static Discharge (ESD): IEC 61000-4-2

ESD occurs when the static electric field between two objects exceed the dielectric strength of the air between them.

TESEQ
Advanced Test Solutions for EMC

NSG 437

30 kV ESD Simulator

- Air and contact-discharge up to 30 kV
- Colour touchscreen display
- Fully compliant with international standards and mos OEM standards
- Pre-programmed setting for IEC 61000-4-2 and ISO 10605
- Easy interchangeable discharge networks available

Conducted Emissions - Tested to Various CISPR and EN Standards

The DUT must not emit over any cables, supply, signal or earth connections an amount of power over a specific frequency range.

Automotive

The automotive EMC standards are primarily designed by SAE (North America), ISO (international), and CISPR (International). In addition to these standards, each automotive OEM tends to have their own individual standards which they and their suppliers must meet in order to be used in their vehicles. Test equipment used for automotive testing should adhere to these OEM standards as well as the international standards.

emtest
the benchmark for emc

UCS200N Series

Ultra Compact Simulators for Automotive Transients

- Support for all international standards and most automotive manufacturers
- Pulses 1, 2 and 3A/3B
- Built-in EFT/Burst generator module
- Built-in micro pulse generator module (ISO 7637 JASO, SAE and more)
- Built-in coupling network 80 V, up to 200 A

VDS200Q Series

4 -Quadrant Voltage Drop Simulators

- Simulate various battery supply waveforms
- Support for most OEM and international standards
- Support up to 80 V and 200 A (600 A peak)
- Full 4 quadrant, bipolar operation
- High bandwidth up to 250 kHz with fast rise times

emtest
the benchmark for emc

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LD200N Series

Load Dump Generator with Clipping Module

- Load dump pulses simulate battery disconnection
- Built-in 0.5 to 38 Ω source impedance
- Pulse duration up to 1,200 ms
- Built-in coupler 80 V/30 A, extendable to 200 A
- Generates pulses as per ISO 7637, ISO 16750-2, SAE J1113, SAE J1455, JASO and many more manufacturer specifications

EMC amplifiers are used for radiated and conducted immunity testing to produce an output signal identical to the input signal but with increased amplitude. They are typically selected based on the following criteria:

- **Rated output power:** factor in headroom to overcome all of the system losses (coax cables, antenna VSWR).
- **P1dB output power:** output power at 1 dB compression point.
- **Frequency range:** solid state typically used under 6 GHz. TWT at higher frequencies.
- **Class:** % of time the amplifier is amplifying: A, B, or AB. Typically A or AB.
- **Linearity:** bandwidth over which the output power is sustained.

AS0860 Series

MILMEGA
RF/Microwave Amplifiers

Class A Solid State Amplifiers

- Frequency range: 800 MHz – 6 GHz
- P1dB power output range: 25 W – 200 W
- Modern GAN design with colour touchscreen
- Calibrated dual directional coupler
- Ethernet, USB, or GPIB and RS232
- 5 year warranty on parts and labour

TESEQ
Advanced Test Solutions for EMC

CBA Series

Class A Solid State Amplifiers

- Frequency range: 1 MHz – 6 GHz
- P1dB power output range: 25 W – 1200 W
- Modern compact design with colour touchscreen
- Built-in calibrated directional coupler
- Available USB, ethernet, GPIB, and RS232 interfaces
- 3 year warranty on parts and labour

IFI (TWT) Series

IFI
RF/Microwave Amplifiers

Traveling Wave Tube Amplifiers

- Frequency range: 2 GHz – 40 GHz
- P1dB power output range: 10 W – 10 kW
- Available in CW (continuous wave), gated pulse CW, and pulse TWT
- TWT amplifiers provide reliable power at extended frequency ranges
- Available ethernet, GPIB, and RS232 interfaces

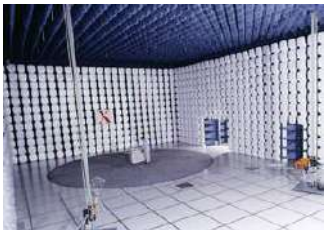
See More in Amplifiers

Chambers & Enclosures

Chambers are used for **radiated emissions** and **immunity testing**. They provide a repeatable environment, free from external RF interference. Chamber dimensions determines the lowest frequency and largest EUT size.

- **Semi-Anechoic** chambers are best used when directional information about the signal source is required for making measurements. Reflections are reduced using anechoic surfaces.
- **Reverberation** chambers are best used when directional information about the source is not required.
- **GTEM Test cells** are a portable alternative to larger chambers.
- **OATS** (open air test sites) no walls minimize/eliminate reflections in the measurement area.

ETS-LINDGREN
An ESCO Technologies Company



FACT Series

Fully Compliant Semi & Fully-anechoic EMC Chambers

- Frequency range: 26 MHz – 18 GHz
- Used for Radiated Emissions and Radiated Immunity testing
- Compliant to various ANSI, CISPR, IEC, SAE, and EN international standards
- Eligible for FCC 3 m and 10 m test methods
- Full turn-key solution available upon request

SMART Series

Fully Compliant Reverberation Chambers

- Frequency range: 200 MHz – 40 GHz
- Creates a suitable electromagnetic environment (EME) for immunity and emissions esting
- Compliant to various SAE, IEC, and military (STD 461D) industry and OEM standards
- One or more rotating paddles or tuners reflect RF energy internally
- High isotropy and homogenous properties ensure consistent results
- Simulate complex EMC environments like medical rooms, vehicle engines, avionics bays

ETS-LINDGREN
An ESCO Technologies Company

ETS-LINDGREN
An ESCO Technologies Company

S81 Series

Modular EMC Shielded enclosures

- Frequency range: 1 kHz – 10 GHz
- Excellent RFI and EMI shielding performance
- Standard and custom sizes available
- More than 10,000 installations worldwide
- Manual/automatic RF door options

See More ETS Chambers

5G Lineup

ETS 5G Selection Guide

	MS-5700	MS-5701	MS-5702	MS-5703	MS-5704	MS-5705
Target Application	Manufacturing QA, receiver/ transmitter calibration, 2D or fixed beam applications	5G conformance and performance testing (EIRP, TRP, EIS, TIS), radio interoperability	5G conformance and performance testing (EIRP, TRP, EIS, TIS), radio interoperability. flexible system with variable path length to adjust for wide range of array sizes and optimized dynamic range	5G conformance and performance testing (EIRP, TRP, EIS, TIS), radio interoperability	60 GHz device/ antenna performance testing	5G conformance and performance testing (EIRP, TRP, EIS, TIS), radio interoperability
Measurment System Description	Azimuth-axis antenna	Distributed-axis antenna	Combined-axis antenna	Compact range (CATR), combined-axis antenna	Distributed-axis antenna	Compact range (CATR), combined-axis antenna
Typical Test Device Type	Module, phone			Phone, tablet, cmall cells, CPE, laptop, gNB base station	Module, phone, computer peripherals	Module, phone, tablet, small cells
Compliance Standard/ Technology	R & D	3GPP			WiGig, 802.11ad, 802.11ay	3GPP
Frequency Range	5G FR2 / 24 GHz - 44 GHz				50 GHz - 75 GHz	5G FR2 / 24 GHz - 44 GHz
Physical Format	Tabletop	Mobile/wheels		Chamber/non-mobile	Mobile/wheels	
Testing Methodology	Direct Far-Field (DFF)			Indirect Far-Field (IFF)	Direct Far-Field (DFF)	Indirect Far-Field (IFF)
Rotation Axis	Single axis turntable	Single axis turntable with theta arm (spherical)	Dual axis positioner (spherical) with variable range length linear slide	Dual axis positioner (spherical)	Single axis turntable with theta arm (spherical)	Dual axis positioner (spherical)
Maximum Antenna Array Size GHz = cm	24 = 7.8 28 = 7.2 39 = 6.2 44 = 5.8	24 = 6.8 28 = 6.2 39 = 5.2 44 = 5.0	24 = 5.6 - 9.6 28 = 5.0 - 8.8 39 = 4.4 - 7.6 44 = 4.0 - 7.0	24 = 60.0 28 = 60.0 39 = 60.0 44 = 60.0	50 = 4.7 60 = 4.3 70 = 4.0 75 = 3.8	24 = 30.0 28 = 30.0 39 = 30.0 44 = 30.0
Exterior Chamber Nomial Size m (ft)	1.5 x 0.7 x 0.9 (4.9 x 2.3 x 3.0)	2.1 x 1.4 x 2.2 (6.9 x 4.6 x 7.2)	2.5 x 1.4 x 1.8 (8.2 x 4.6 x 5.9)	4.6 x 3.4 x 3.4 (15.0 x 11.0 x 11.0)	2.1 x 1.4 x 2.2 (6.9 x 4.6 x 7.2)	2.5 x 1.5 x 2.2 (8.2 x 4.9 x 7.2)

Accessories

ETS 3180C - Mini-Bicon Antenna

30 MHz - 1 GHz (cage elements), 30 MHz - 3 GHz (cone elements), 250 mW

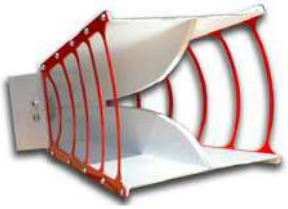
ETS 3142E – Biconilog Antenna

30 MHz - 6 GHz, used for both immunity and emission testing

ETS 3148B – Log Periodic Antenna

200 MHz – 2 GHz, 1.3 kW, Log-Periodic Dipole Array for making CISPR 16.1/25 measurements

ETS 3115-PA – Double Ridged Guide Antenna



750 MHz – 18 GHz, 300 W – 500 W, compact (9.6 in length), excellent gain and VSWR

ETS 3164 – Open Boundary Quad-Ridged Horn Antenna

700 MHz – 10 GHz, 100 W - 300 W, excellent gain and VSWR

Ametek CTS – Line Impedance Stabilization Networks

CISPR and IEC compliant LISNs to measure distortion signal of DUT mains cord

Ametek CTS – Couple Distribution Networks

Single and three phase CDNs for conducted immunity testing

Maury Microwave – Stability Plus RF Cables

Industry's best phase-stable cables for the most critical measurements

Maury Microwave – ColorConnect™ RF Adapters

Color coded adapters to ensure ease of identification and usage

Maury Microwave – Calibration Kits

Everyday use to metrology grade calibration kits for all connectors 50 Ω and 75 Ω

Tektronix – Pre-compliance Spectrum Analyzer

Price effective turnkey solutions for emissions testing

Ikonik – Electrical Safety Test Equipment

HiPot, ground bond, insulation resistance, and leakage current testers

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