

GTEM 1250

**For emission and immunity testing according to
IEC/EN 61000-4-20 (CEI 210-78)**



Introduction

The GTEM cell is a TEM waveguide with the upper frequency limit extended to the GHz range. It is a low-cost alternative measurement facility for both radiated emission and immunity measurements. It is included in the recently published standard IEC/EN 61000-4-20 "Emission and Immunity Testing in Transverse Electromagnetic (TEM) Waveguides". Compared to other measuring methods like EMC test in anechoic chambers or OATS (Open Area Test Sites), GTEM-cells offer some significant advantages for the testing of small and medium sized EUT's (Equipment Under Test) up to a frequency range of 20 GHz. Quick turnarounds of the EUT as well as numerous testing variations are easy and fast to handle. Switching from emission to immunity testing requires only simple adjustments from receiver input to amplifier output.



You are irrespective of long waiting times associated with off-site test labs or weather and ambient delays that can occur at OATS facilities. Whether you are at the design qualification, pre-compliance, compliance, or production sampling stage, the GTEM is the right choice for you!.

| G T E M 1 2 5 0 | | |
|--|--|--------------------------------|
| Height of septum in the back of cell | Hh=1500 mm | |
| Distance of the testing section from back of cell along z axis | L _S =1250 mm | |
| Testing section dimensions [mm] | a=2540, b=1375, h=1000, w=1250 | |
| Maximum testing volume | 850 x 1800 x 5000 mm | (h-2h _{EUT}) x w x L |
| Maximum testing volume (IEC 61000-4-20) | 417 x 1530 x 3000 mm | h/3 x 0.6w x 0.6L |
| Max. EUT volume | 950 x 950 x 700mm | |
| Maximum EUT testing volume (0-3 dB) | 700 x 750 x 450 mm | measurement results |
| h_{EUT} | 417mm. | |
| Door (LxH) | 800x1100 mm | |
| RF input connector | N Type | |
| Frequency range | DC to 20 GHz | |
| Max. Input Power | 1000W | (depending from frequency) |
| Applications | Measuring of radiating emission and radio frequency immunity tests , calibrations of antennas and field probes, test and measuring of mobile phones, shielding effectiveness of materials. | |
| Technical Specifications GTEM-1250 | | |
| Frequency range : 0,01 MHz - 20GHz* Septum Height [mm]: 1250mm. Max EUT Size (LxWxH)cm 95x95x70cm Defined test Vol. +3dB : 75x75x42cm Typical VSWR: 1:1,2 Typical VSWR at critical frequency: <1:1,6 Max Input power, W continuous/*pulsed 1000/*2Kw Input connector: N UG-21 Nominal impedance: 50 Ohm | | |

| | |
|--------------------------|--|
| <p>Mechanical</p> | <p>Window in the door: Diam. 200 mm. Empty Technical panel: N.3 Diam. 200 mm. Outer LxWxH [cm]: 610x306x252cm. Door WxH [cm]: 80x110 Weight Kg. Approx.: 1200 Wheeled undercarriage: 25cm. high</p> |
| <p>Electrical</p> | <p>Mains connectors: Fix/CEE Main Switch: magneto-thermal 10Amp. mono phase, Input Socket plug: 16Aac (Mono Phase + Ground) Output Socket EUT tape: 16 Aac Mono phase + ground. Additional EUT sockets: Optional Ground connection: M6 bolt Always connected. AC filter wires (Mono phase +Ground) 10Amp. 2 poles. Channel for fibre optic leads: 2 couple RF feed-thru connectors: N. 2 N type RF feed-thru SMA type connectors: N. 2 SMA type</p> |
| <p>OPTIONS</p> | <p>Electrical safety interlock: Optional Indoor lighting 50W: Optional 9-poles signal filter (DB9): Optional 25-poles signal filter (DB25): Optional Channel for fibre optic leads (6 couple):- Optional Additional RF feed-thru N type connector:- Optional Additional RF feed-thru SMA type connector:- Optional RJ11 (RJ9) feed-thru connector: Optional Technical panel pre-drilled for options - Supplied</p> |

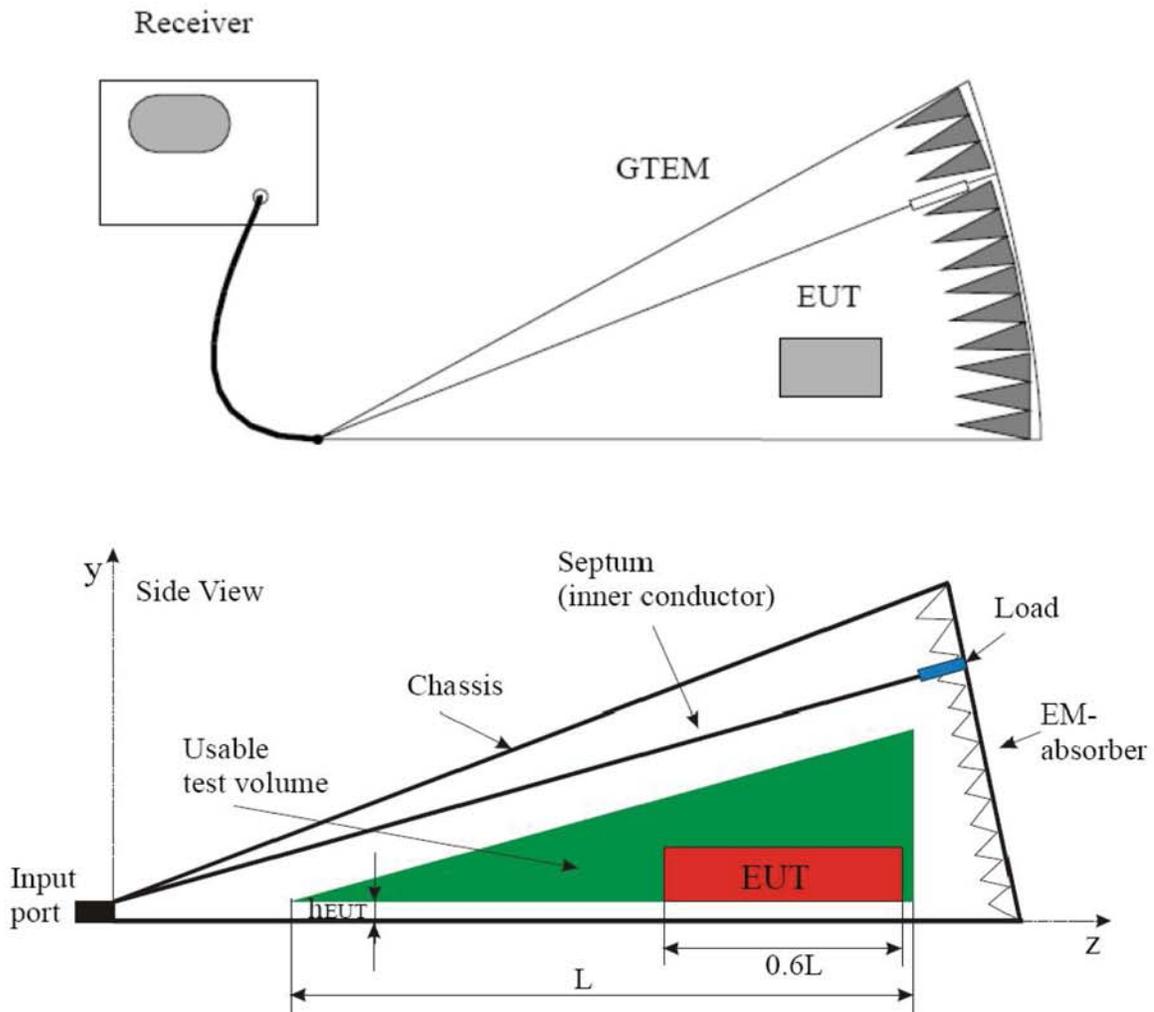
Installation manual and general safety instructions

The GTEM (GigaHertz Transverse Electromagnetic) cell is a precision electromagnetic compatibility (EMC) test instrument primarily intended for use as radiated immunity and radiated emission test facility without environmental electromagnetic interference.

The cell is electrically similar to a coaxial cable with one side open (the apex) and other side closed on the impedance of the generator or receiver connected. In this case with a multi-meter appears as 50 Ohm resistance.

Measurement setup

The setup for emission measurements in a GTEM cell is shown in Fig.1. the EUT is placed inside the GTEM and its radiation is measured with a receiver. The receiver can be software controlled, and some software that includes the GTEM to OATS correlation is commercially available.



TESTING VOLUME

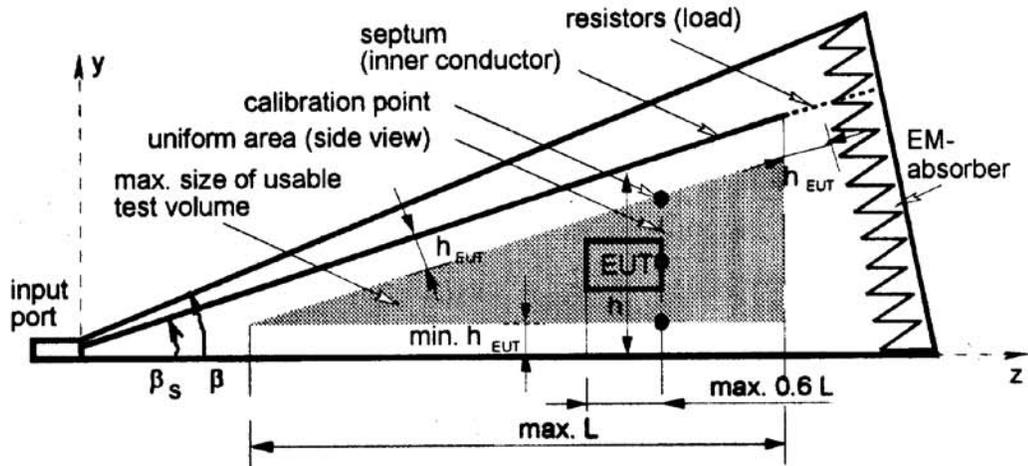
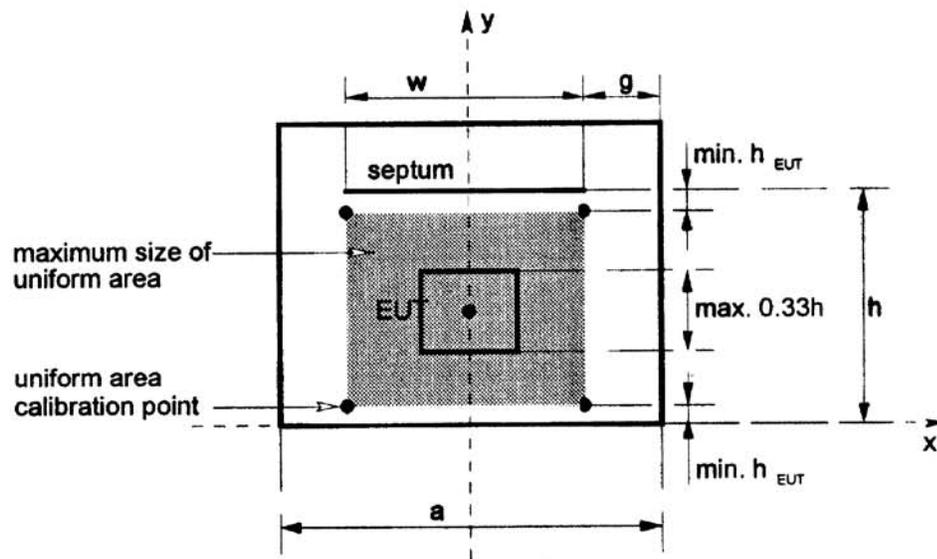


Fig.2 - Maximum EUT size and maximum size of the usable test volume in a GTEM cell, longitudinal sec-



tion

Fig.3 Maximum EUT size and maximum size of the usable test volume in a GTEM cell, cross section

CALCULATING POWER REQUIRED – (Theory)

Basically, we consider the volts per meter, the height of the septum, the allowance of voltage peaks caused by amplitude modulation and the flatness with frequency. Generally allowed flatness is 3 dB, this only takes effect after the first resonance point.

The example below shows 10 V/m with a GTEM 1250

GTEM 1250

Septum height = 1,250 m

Flatness = 3 dB = 2

Power Required = $(E \times h)^2 / R \times Flatness \times Modulation Allowance$

Where E = required field strength: h = septum height: R = GTEM input impedance (50Ohm)

Power Required = $(10 \times 1,250)^2 / 50 \times 2 \times 3.24 = 20,25 \text{ Watt}$

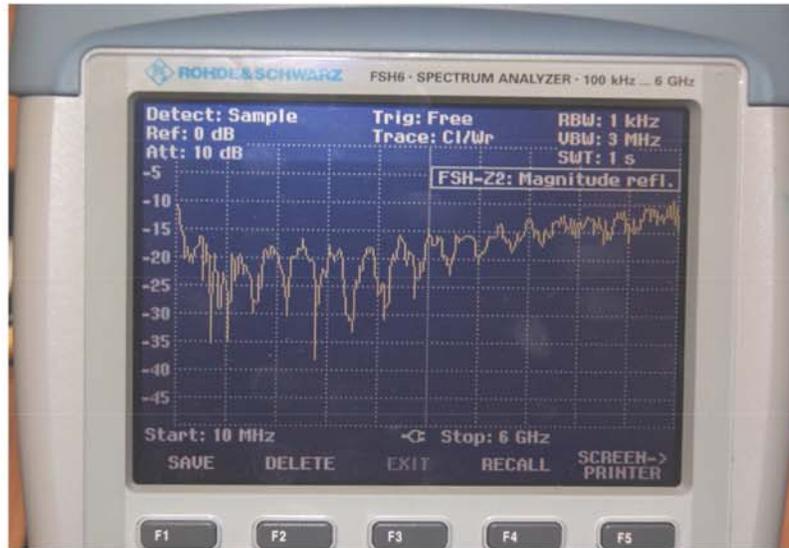
| G T E M 1 2 5 0 - Power requirements | | | | |
|--------------------------------------|----------|----------------------|--------------------------|-------------------|
| Field Strenght [E] | Flatness | Modulation allowance | Required power modulated | Required power CW |
| V/m | 3dB = 2 | 80% AM | Watts | Watts |
| 3 | 2 | 3,24 | 1,8 | 0,56 |
| 10 | 2 | 3,24 | 20,25 | 5,6 |
| 30 | 2 | 3,24 | 182,25 | 50,6 |
| 100 | 2 | 3,24 | 2025 | 562 |

Factory controls:

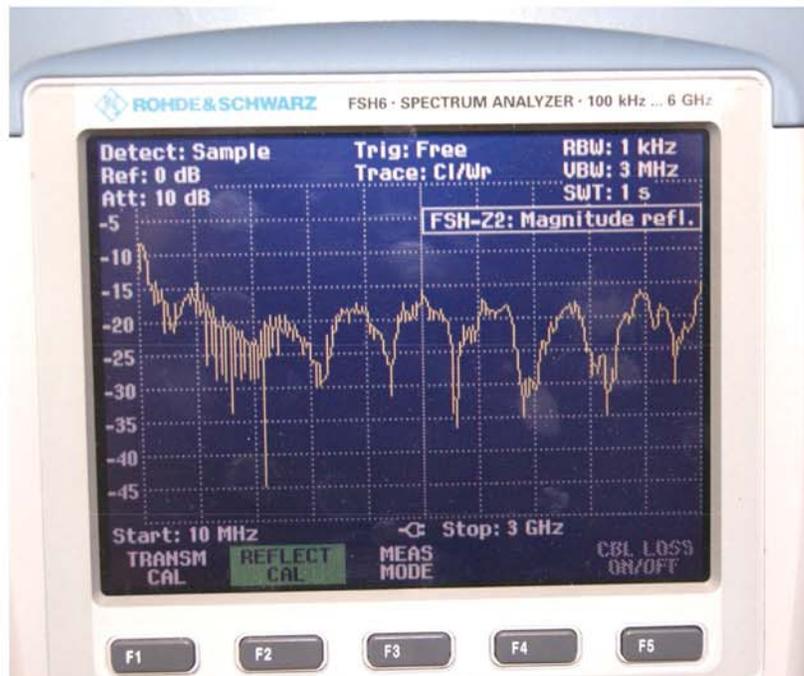
Performance test.

A verification test was performed on site of the installation with a Rohde e Schwarz FSH6 spectrum analyzer and its SWR bridge accessory.

REFLECTION COEFFICIENT: S11 magnitude of GTEM 1250 in the range 10-6000MHz



REFLECTION COEFFICIENT: S11 magnitude of GTEM 1250 in the range 10-3000MHz



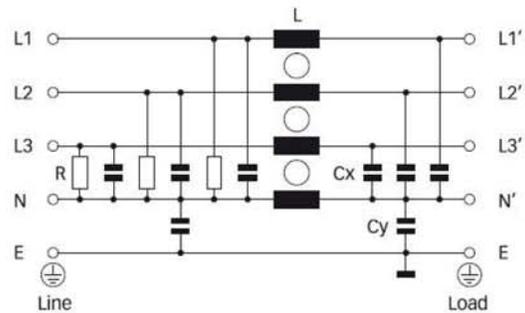
Tab.1 Guaranteed reflection coefficient S11

| G T E M 1 2 5 0 | |
|-----------------------------------|-------------------------------------|
| Reflection coefficient S11 | S11 accuracy magnitude/phase |
| <-14 dB in 100 MHz-3,8 GHz | ± 2 dB / 1 degrees |

OPTIONAL 30A 400V AC THREE-PHASE LINE FILTER



Typical electrical schematic



Component List

COGEMA Minipulse Mod. 830.130.S

400Vac 4x30A (25°C) , 4x25A (45°C)

L=1,4mH, Cx=840nF, Cy=0,22uF, R=250KOhm

Magnet-thermally switch B-Ticino Mod. C-20 20Amp.

Lamp: 250Vac connected between N (Neutral) and L1

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