



**INSTRUCTION MANUAL**

**TEM CELL**

**MODEL EM-7302**

# INSTRUCTION MANUAL

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**TEM CELL**

**ELECTRO-METRICS**

**MODEL EM-7302**

**SERIAL NO: N/A**

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# **WARRANTY**

**This Model EM-7302 TEM Cell is warranted for a period of 12 months (USA only) from date of shipment against defective materials and workmanship. This warranty is limited to the repair or replacement of defective parts and is void if unauthorized repair or modification is attempted. Repairs for damage due to misuse or abnormal operating conditions will be performed at the factory and will be billed at our commercial hourly rates. Our estimate will be provided before the work is started.**

**DESCRIPTION AND USE  
TEM CELL  
ELECTRO-METRICS MODEL EM-7302**

## 1.0 Introduction

The Electro-Metrics Model EM-7302 TEM (Transverse ElectroMagnetic) Cell is used to perform radiated electromagnetic susceptibility testing from DC to 500 MHz.

The EM-7302 is fundamentally a large rectangular section of coaxial cable with pyramid-shaped transitional sections at each end containing Type N connectors. The center conductor or septum is a flat sheet of metal supported by non-conductive delrin rods. The equipment under test (EUT) is normally placed on the cell floor for testing. The septum *is not used* for placement of test items since it is not design to handle heavy items.

The cell and septum are constructed of 0.090 aluminum with the external shell screwed together. A hinged door provides access to the interior of the cell. Four (4) pivot latches secure the door during tests. A removable access plate is located on the door to allow cabling and monitor access to the item under test. Four (4) pivot latches secure the access plate.

## 2.0 Specifications

### 2.1 Electrical

Frequency Range:	DC to 500 MHz.
Insertion Loss:	0.5 dB (DC-230 MHz).
Impedance:	50Ω nominal.
VSWR:	1.2:1 max.
Maximum Power Input:	1000 Watts.
Transition Connectors:	Type "N", female.

### 2.2 Mechanical

Height:	33.0 cm (13.0 inches).
Width:	33.0 cm (13.0 inches).
Length (Tip-to-Tip):	63.5 cm (25.0 inches).
Access Door Opening:	Height: 26.7 cm (10.5 inches).

	Width:	21.6 cm (8.5 inches).
Access Plate Opening:	Height:	5.1 cm (2.0 inches).
	Width:	7.6 cm (3.0 inches).
Weight:		5.9 kg (13.0 lbs).

### 3.0 Theory Of Operation

The EM-7302 is fundamentally a large rectangular section of coaxial cable that propagates a transverse electromagnetic wave. The TEM wave is characterized by orthogonal electric (E) and magnetic (H) fields that are perpendicular to the direction of wave propagation along the length of the transmission line.

Within the cell, the E and H field components of the TEM mode field structure are essentially uniform over a large percentage of the volume between the septum and outer conductor (shell of the cell). This simulates a planar field in free space where a wave impedance of 377 ohms exists.

There is no low frequency cutoff in the TEM mode, the lower limit being determined by the magnetic shielding effectiveness of the material used for constructing the cell. In the case of the EM-7302, this essentially sets the lower limit of the cell at DC.

The upper frequency limit is determined by the physical size of the rectangular section of the cell. As the frequency of the test signal increases, distortions will occur caused by resonances and multimoding. The result is an increasingly distorted and non-uniform field within the cell test area. For the EM-7302, the cell size and size of the septum set an usable upper limit of 500 MHz.

## 4.0 Description Cell Input/Output Connectors

### 4.1 Transition End Connectors

**Type:** Type "N" female.

**Number:** Two.

**Location:** One on each transition end section.

**Function:** Interfacing the Cell with the external field producing source.

**NOTE:** **Either end connector can be used as the input. Since the cell is symmetrical in design and electrical function, there is no designated input or output.**

## 5.0 Setups Caveats and Precautions

The following are several setup caveats and precautions to observe when using the EM-7302 TEM Cell. No setup diagrams or specific equipment usage information is provided. Test setups and equipment usage is dependent on the test standard and specification requirement being used.

### 5.1 General Setup Information

The following should be observed when using the EM-7302 TEM Cell:

- a. Either transition end connector can be used as the input. Since the cell is symmetrical in design and electrical function, there is no designated input or output.
- b. Maximum size of the EUT:
 

Length:	10.2 cm (4 inches).
Width:	10.2 cm (4 inches).
Height:	5.1 cm (2 inches).

Keeping the EUT at the maximum size or below will result in maintaining a uniform field within the test area of the cell. Euts' larger than the maximum stated will distort the characteristics of the radiated field, thus uniformity cannot be determined with any degree of accuracy.

- c. *Do not place Test Items on the septum.* It is not designed to handle heavy items.

*Always* use the Cell floor for placement of the Equipment Under Test.

- d. The EM-7302 TEM Cell can only be used to perform radiated electromagnetic susceptibility testing from DC to 500 MHz.

#### NOTICE

**The EM-7302 TEM Cell cannot be used for "valid" radiated emissions testing since the data obtained cannot be correlated with known radiated emission standards or test methods.**

## 5.2 Precautions

The following precautions should be observed when using the EM-7302 TEM Cell:

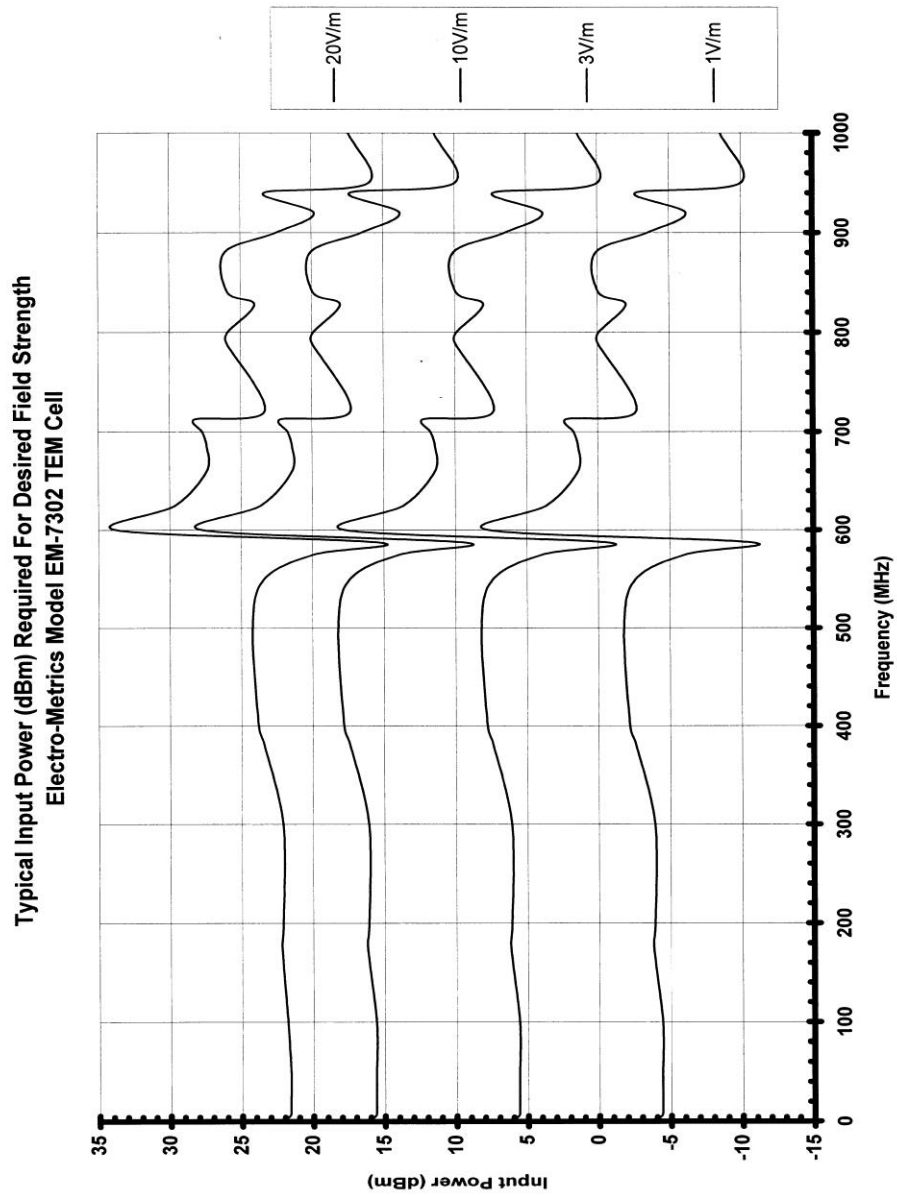
- a. The Cell by itself *does not* present a 50-ohm load to the signal source. Do not operate the Cell without a 50-ohm load (termination) connected to the unused transition end connector.  
  
Failure to do so, may result in damage to the amplifier being used to drive the susceptibility test system.
- b. The access door should be properly latched and secured before any radiated susceptibility testing is performed.
- c. Unless required by the test standard or specification, the EUT should be insulated from the cell floor. The material used should be transparent to the radiated field. Plastic foam type material is suggested.
- d. Keep all internal cabling and wiring to the EUT on the cell floor or as low to the cell floor as possible. This will keep any potential disturbance to radiated field to a minimum.

### 5.3 Field Strength Vs Input Power

Figure 1.0 indicates the input power required to produce the resulting field strength within the actual serialized EM-7302 TEM Cell at 1 V/m, 3 V/m, 10 V/m, and 20 V/m.

### 6.0 VSWR Chart

The VSWR chart for the actual serialized EM-7302 TEM Cell is provided in Figure 2.0.



**Figure 1.0**  
**Electro-Metrics Model EM-7302**  
**TEM Cell**  
**Input (Forward) Power Required For Desired Field Strength**  
**At**  
**1 V/m, 3 V/m, 10 V/m, 20 V/m**



**Figure 2.0**  
**Electro-Metrics Model EM-7302**  
**TEM Cell**  
**VSWR Chart**

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