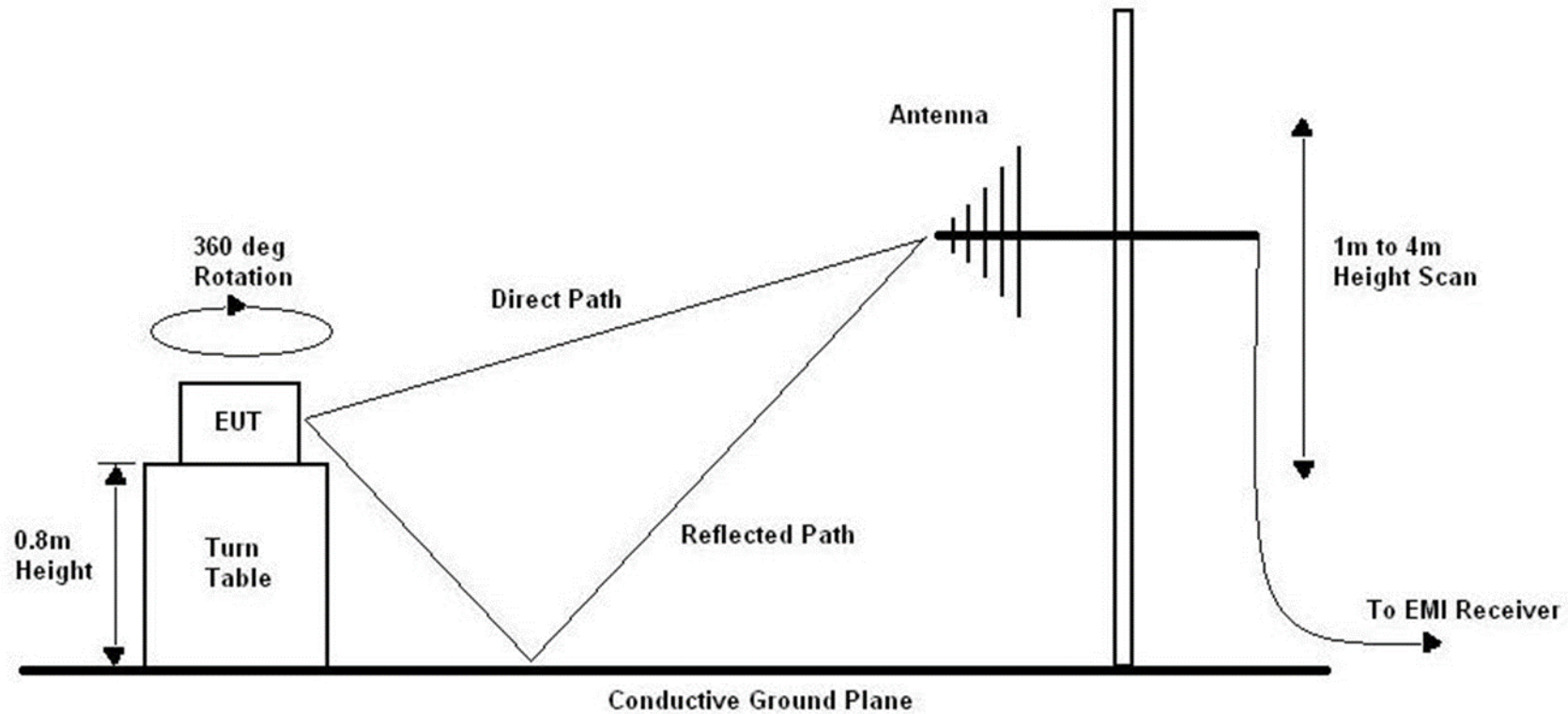


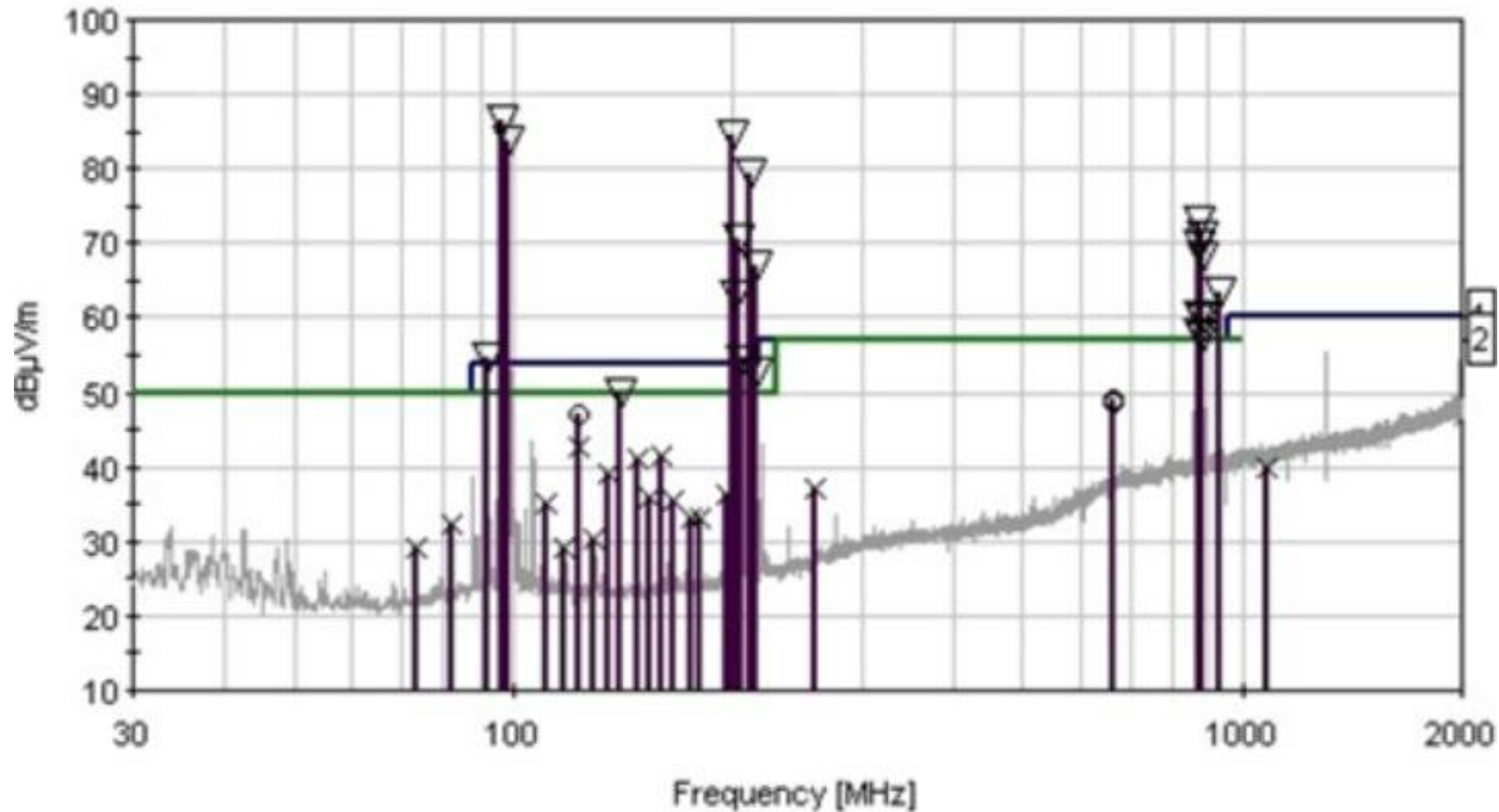
GTEM and other EMI test sites

Moshe Henig

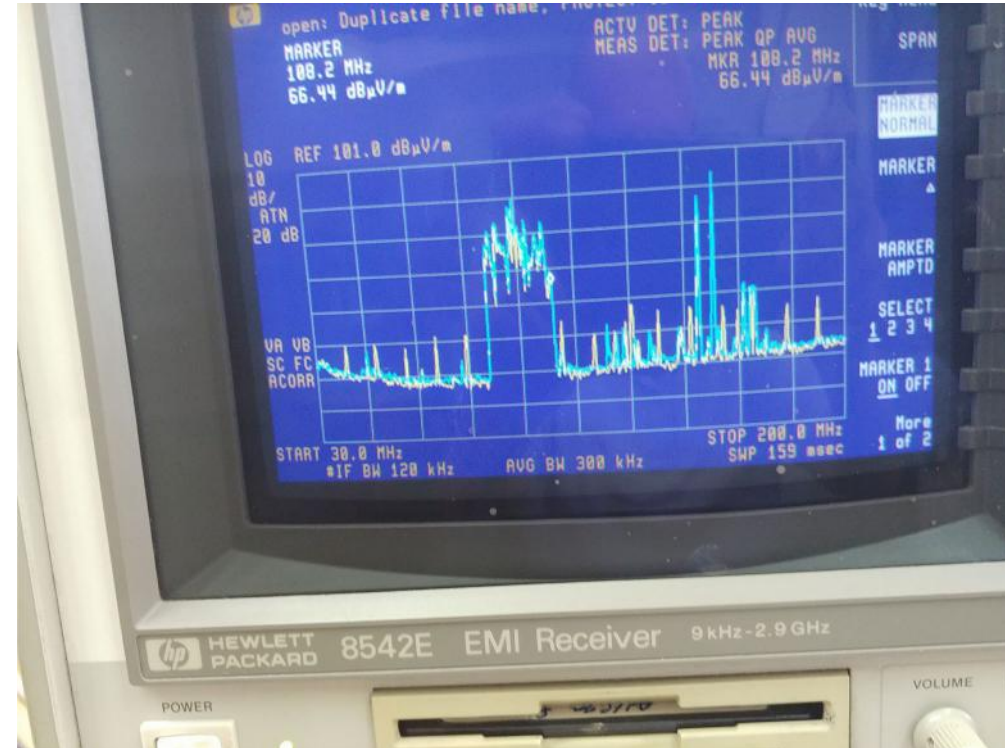
Open Area Test Site



The Electromagnetic Environment in the frequency band 30MHz – 2GHz



The electromagnetic range in the frequency range 30 -200MHz



TEM Cell invention

- The Transverse Electromagnetic (TEM) Transmission line was invented by Robert M. Barret in 1950.
- The Transverse Electromagnetic (TEM) cell (TEM wave guide) was first described by M. L. Crawford in 1974
- The GTEM cell was introduced in 1988 by BOS
- FCC accepted the TEM/GTEM the FCC KDB Publication Number: 414788
- FCC evaluated the GTEM already 1993. Data collected so far indicated good correlation with open area test site, of a variety of EUT

GTEM definitions

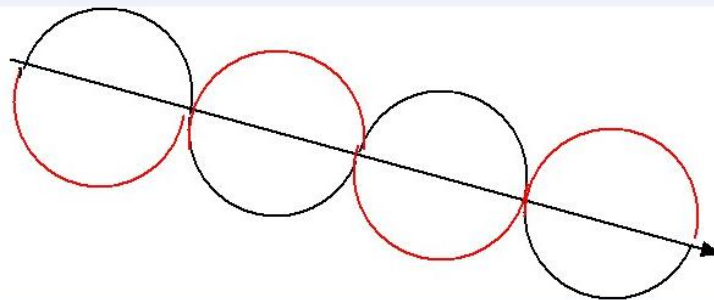
GTEM cell is a precision EMC Radiated Emissions and Radiated Immunity test cell.

Its unique characteristics allow for the performance of fast and efficient EMC radiated tests, without interference from the ambient ElectroMagnetic environment

Wave that oscillates perpendicular to the axis along which the wave travels. Electromagnetic waves are transverse waves and are perpendicular to the axis. E Electric field V/M

Perpendicular H Magnetic field H/m

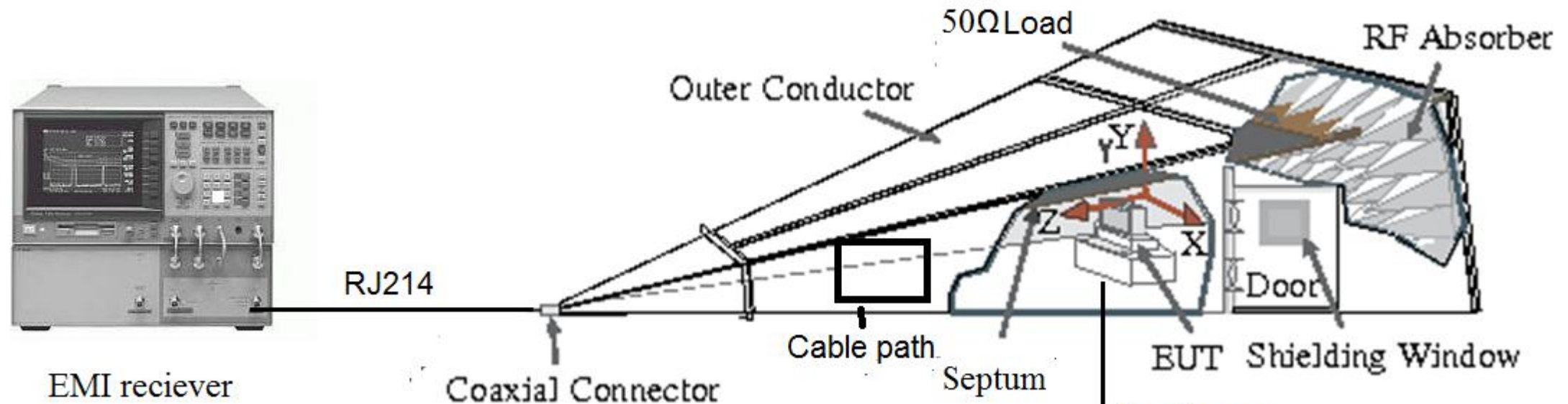
$V \div H = 377\Omega$ Equivalent to free space



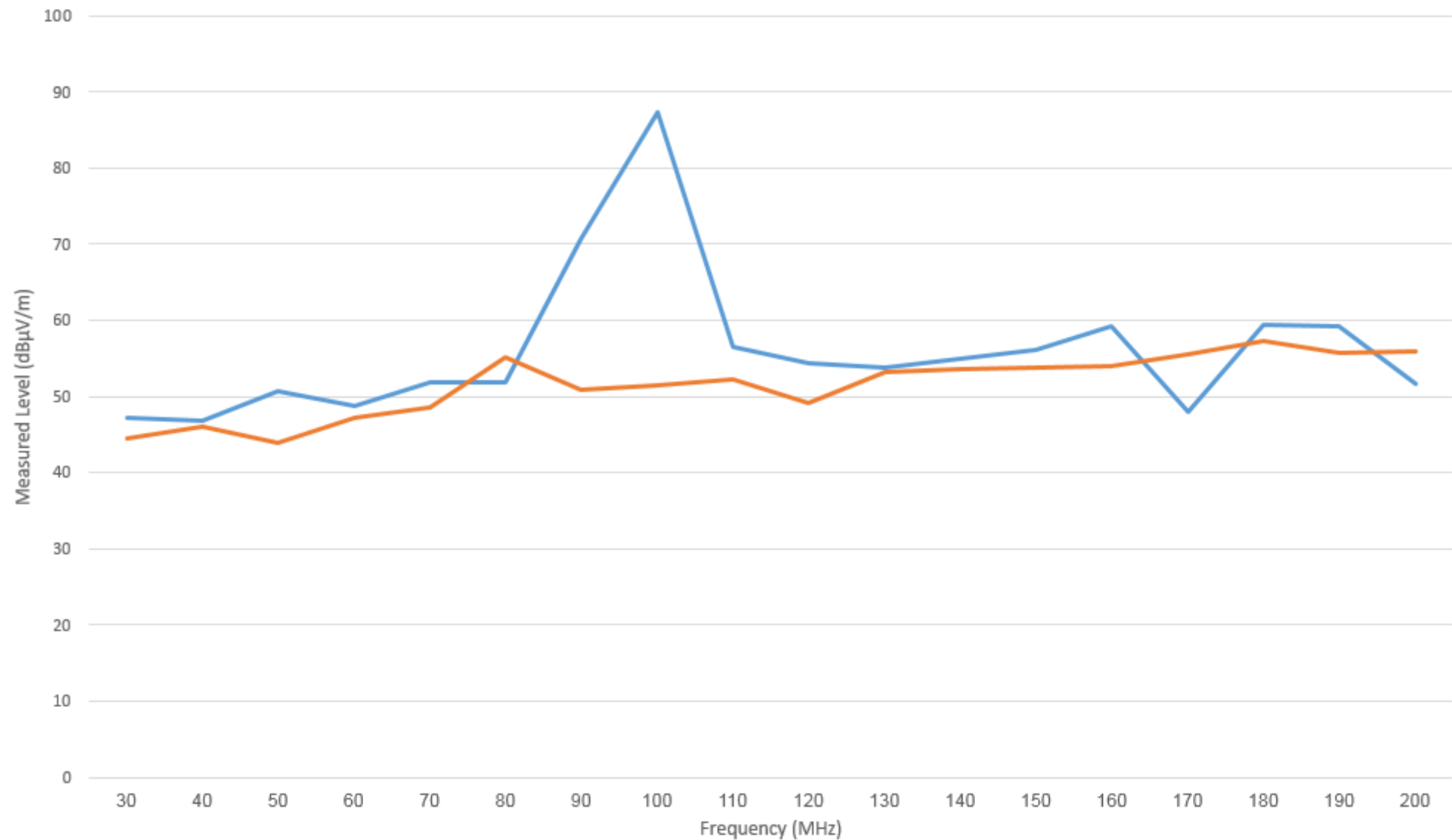
GTEM – Gigahertz Transverse Electromagnetic cell (GTEM)

GTEM cell a precision EMC Radiated Emissions and Radiated Immunity test cell.

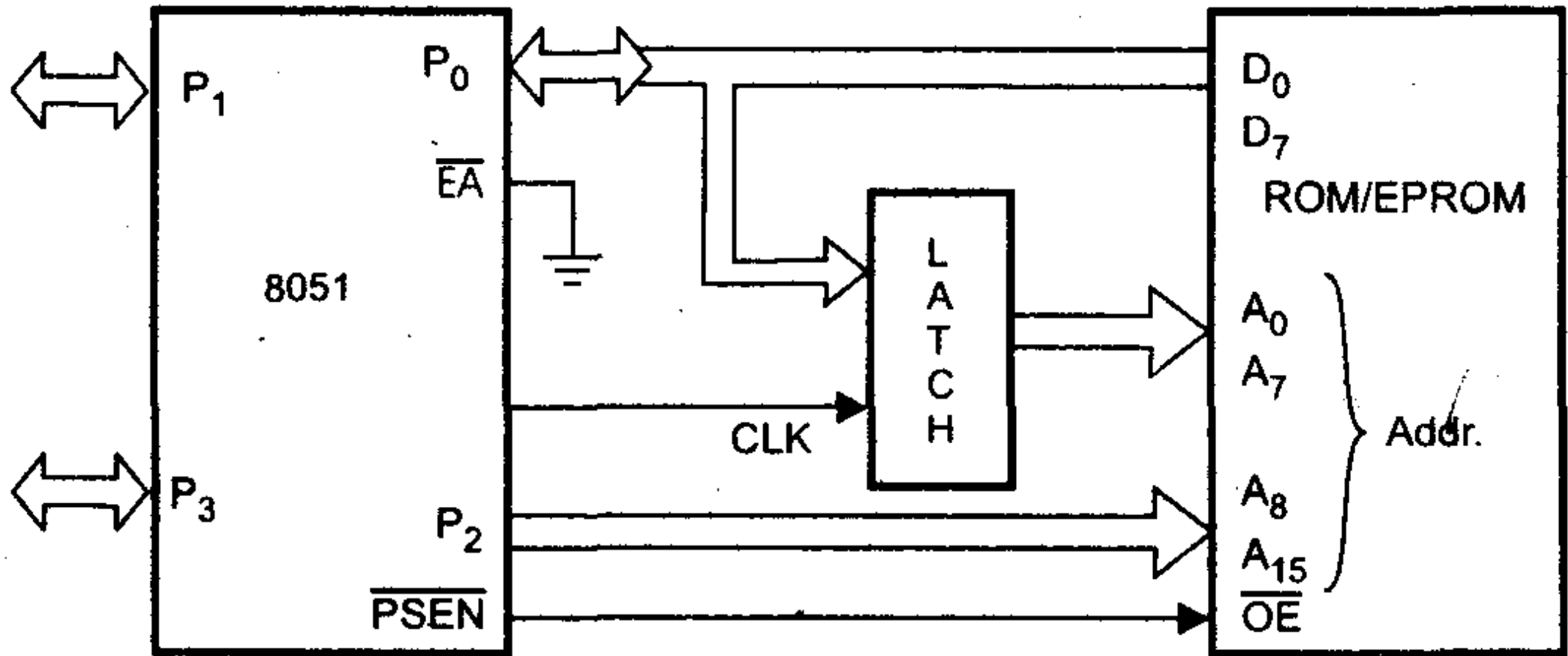
GTEM unique characteristics allow for the performance of fast, results, precise and efficient EMC radiated tests, without interference from the ElectroMagnetic environment.



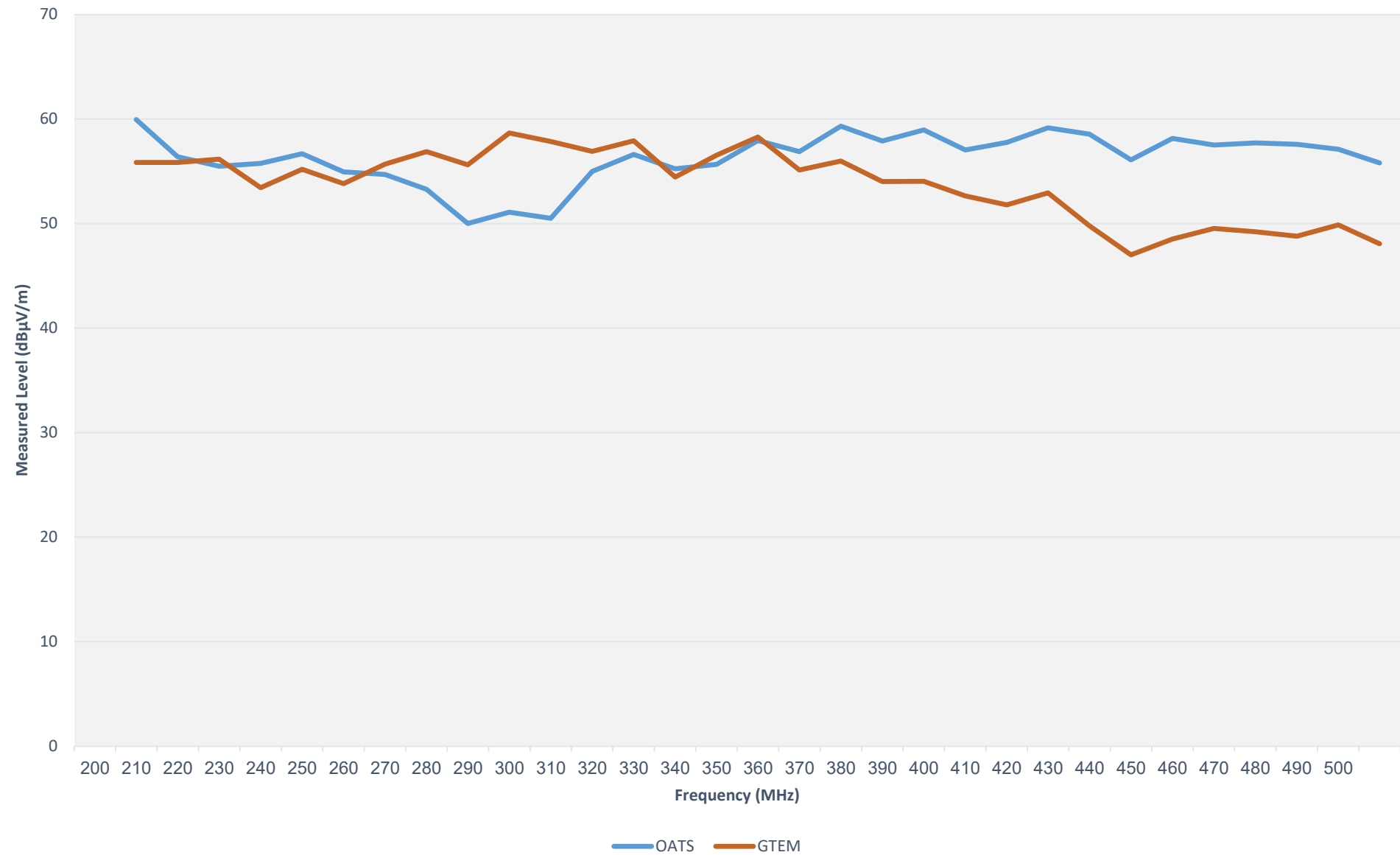
OATS vs GTEM RefRad Radiated Emission in the frequency range 30 - 200MHz



8051 μ P EPROM BUS Emissions



OATS vs GTEM Ref Rad Radiated Emissions in the frequency range 200 - 500 MHz



Comparison between GTEM and OATS Radiated Emission Measurements for different product families

**R. Guirado ¹ (LCOE), J.C. Molina (UNED), J. Carpio ¹(UNED)
Madrid, Spain**

Comparison between GTEM and OATS Radiated Emission Measurements for different product families
Keeping it in mind and considering the results of the present study, we find that there are an equivalence in the measurements of GTEM and OATS, but with a tendency in the first one to give a little higher values. This result allows to consider it is worthwhile the work to apply the proposed methodology to validate the GTEM radiated measurements due to the time saved in the tests.

The advantages of GTEM cells compared to other test environment

- For OATS free area is required with a and extensive ground plane.
- A GTEM cell requires little space and is cheaper.
- In RF environment it impossible to measure the EUT signals.
- GTEM cells are fully closed and do not suffer from ambient noise
- GTEM setup is quicky.
- GTEM cell function as receiving antenna, no antenna setup is required.
- Immunity tests have to be performed inside a screened environment, such as GTEM cell.

GTEM cells also has some advantages over the semi anechoic chamber

- An anechoic chamber requires more space and is more expensive than a GTEM cells.
- No need for Antennas. No antennas calibration.
- Less amplification is required to generate a certain field strength in a GTEM cell than in an anechoic chamber.

Disadvantages of the GTEM cell are:

- The cross-polarization performance is inferior to an anechoic chamber or OATS. Over a limited frequency band the field level of the longitudinal mode can exceed the level of the intended vertical field.
- The size of EUT is limited to approximately one third height between the septum and floor

Thank You

