

# Interpreting Radiated Emission Specifications

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**Abstract:** Emission specifications such as those published by the FCC in the United States and CISPR for much of the world are intended to prevent interference to broadcast services such as radio and television. Implications are discussed for interference to other types of equipment. Such interference is shown to be extremely unlikely.

## Introduction

Emission specifications for equipment are intended to prevent interference to radio services. Services such as radio and television broadcasts require the reception of weak signals. These signals can be subject to disruption by very weak sources of emissions if these emissions occupy the same frequencies.

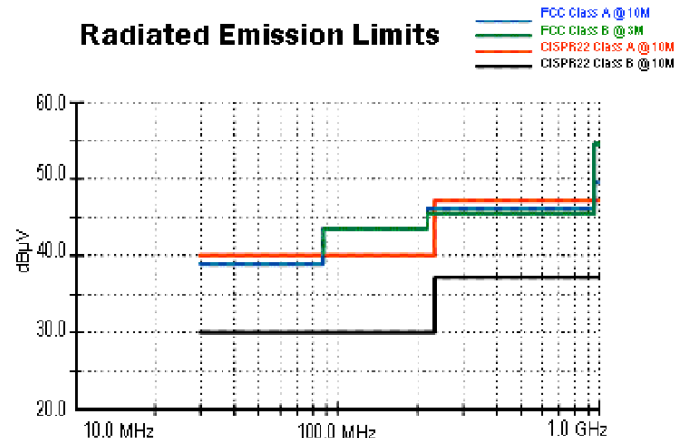
Immunity specifications are based on equipment performance in the face of environmental stimulus such as electrostatic discharge, ESD, and signals from radio transmitters at close range. The stimuli applied to equipment for immunity tests, such as those described in the IEC 61000-4 series of tests are much stronger than levels measured in emissions testing. The immunity testing levels can be one millions times larger or more than levels used for emissions testing.

## Emission and Immunity Compared

Figure 1 shows CISPR22 and FCC limits used for emissions testing. In the frequency range between about 100 MHz and 1000MHz, the CISPR22 limits rise to as high as about 47 dB $\mu$ V/m. Converted to Volts/m, the number becomes about 200  $\mu$ V/m.

By comparison, typical radiated immunity tests call for application of fields at levels on the order of 2 Volts/m, an amount 10,000 times stronger than the emission limits! This is the difference between the emissions levels required to interfere with radio signals and the amount that might cause equipment operational problems. Impulsive testing, such as

ESD, often involve field strengths measured in thousands of Volts/m.



**Figure 1.** CISPR22 and FCC Emission Limits  
(courtesy of [www.emclab2000.com](http://www.emclab2000.com))

## Test Application

Emissions and immunity testing are time consuming and expensive. This is necessary to make the required measurements accurately enough to be useful.

The intent of such testing is to test a sample of the product. The tests are not suited for testing every unit in production. The costs associated with doing this may exceed the costs to manufacture many types of electronic equipment.

## Conclusion

Emission testing and immunity testing are performed on sample units of production. The levels of signals used in these two types of tests are different by factors ranging from tens of thousands to millions or more. Emissions test results have no application to equipment immunity and should not be used to predict effects on nearby equipment from the equipment tested.

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