rf/microwave instrumentation

EMC Immunity Testing Standards Overview

EMC (ElectroMagnetic Compatibility) Radiated and Conducted Immunity testing is used in many product industries. Different test standards are used by various industries, and the variety of test configurations and requirements can feel overwhelming to people new to the industry.

To help become familiar with some of these tests, several of the more common EMC Radiated and Conducted Immunity (also called Susceptibility) standards are listed below. These tables allow comparing some similarities and differences between various test standards. Note that these tables illustrate basic parameters, however, they do not reflect the full scope and details of the standard. Consult the applicable test standard for full details of the test requirements.

Radiated Immunity

Standard	Industry	Frequency	Test Level	Modulation	Leveling	Distance
IEC61000-4-3 ed 4.0	Commercial Products	> 80 MHz (Upper frequency limit determined by appropriate product family committee)	1 V/m - 30 V/m. Calibrate CW at 1.8x target field level	1 kHz AM, 80% Depth Typical	Substitution	1 m minimum; 3 m recommended
MIL-STD_461E/F/G RS103	Military Components and Subsystems	30 MHz - 18 GHz required 10 kHk - 40 GHz optional	5 - 200 V/m, application dependent	1 kHz PM, 50% Duty Cycle	Closed loop	1 m minimum
MIL-STD-464C External RF EME	Military Systems	10 kHk - 50 GHz	1 V/m - 27k V/m; application and frequency dependent	CW, PM	User - defined	User - defined
RTCA/DO - 160D/E/F/G Section 20.5 (Anechoic Chamber Method)	Commercial Aviation Equipment	100 MHz - 18 GHz	1 V/m - 490 V/m CW, 150 - 7200 V/m PM; Category and frequency dependent	CW, PM	Substitution	1 m minimum
ISO 11451-2:2015 Fourth Edition	Automotive Full Vehicle	10 kHk - 18 GHz	User defined; 25 - 100 V/m suggested test levels	CW, AM 1 kHz 80% Depth, PM Frequency dependent Peak Conservation/ Constant Peak	Substitution. 4 field probe method used from 20/30 MHz - 2 GHz, single probe elsewhere	2 m or greater horizontally from the reference point; no part of antenna closer than 0.5 m to the vehicle surface
ISO 11452-2:2019 Third Edition	Automotive Components	80 MHz - 18 GHz	User defined; 25 - 100 V/m suggested test levels	CW, AM 1 kHz 80% Depth, PMFrequency Dependent Peak Conservation/Constant Peak	Substitution	1 m

Conducted Immunity

Standard	Industry	Frequency	Test Level	Modulation	Leveling
IEC61000-4-6:2013	Commercial Products	150 kHz - 230 MHz	1 - 10 V, or Special	1 kHz 80% Depth AM Typical	Substitution (with secondary limiting)
MIL-STD-461D CS114	Military Components and Subsystems	10 kHz - 200 MHz primary; 200 MHz - 400 MHz optional	Multiple test curve levels	1 kHz 50% Duty Cycle PM	Substitution (with secondary limiting)
MIL-STD-461E/F/G CS114	Military Components and Subsystems	10 kHz - 200 MHz primary 4 kHz - 1 MHz for some usages	Multiple test curve levels	1 kHz 50% Duty Cycle PM	Substitution (with secondary limiting)
DO-160D/E/F/G section 20.4	Commercial Aviation Equipment	10 kHz - 400 MHz	Multiple test curve levels; up to 300 mA	CW, 1 kHz 50% Duty Cycle PM	Substitution
ISO11452-4:2011 4th edition	Automotive Components	1 MHz - 400 MHz BCI 400 MHz - 3 GHz TWC	User defined; 60 - 200 mA typical, frequency and Test Level Category dependent	CW, AM 1 kHz 80%, Depth PM Calibration CW Peak Conservation/ Constant Peak	BCI method allows substitution or closed - loop. TWC method uses substitution. Secondary limiting optional.