

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Retlif Testing Laboratories

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TESTING

Valid to: **September 02, 2022**

Certificate Number: **L2320**

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Acceleration	MIL-STD 202F (212A); MIL-STD 202G (212A); MIL-STD 750D (2006); MIL-STD 750E (2006); MIL-STD 810B (513); MIL-STD 810C (513.2); MIL-STD 810D (513.3); MIL-STD 810E (513.4); MIL-STD 810F (513.5); MIL-STD 810G (513.6); MIL-STD 883E (2001.2); MIL-STD 883F (2001.2); RTCA-DO 160C (7); RTCA-DO 160D (7); RTCA-DO 160E (7); RTCA-DO 160F (7); RTCA-DO 160G (7)	(0 to 400) g	Centrifuge
Altitude / Barometric Pressure (Including Explosive Decompression)	MIL-STD 202F (105C); MIL-STD 202G (105C); MIL-STD 750D (1001.1); MIL-STD 750E (1001.2); MIL-STD 810B (500); MIL-STD 810C (500.1); MIL-STD 810D (500.2); MIL-STD 810E (500.3); MIL-STD 810F (500.4); MIL-STD 810G (500.5); MIL-STD 883E (1001); MIL-STD 883F (1001);	(up to 150,000) ft (up to 400 000) ft (5 X 10E ⁻⁶)	Altitude Chamber Thermal Vacuum Chamber



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Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Altitude / Barometric Pressure (Including Explosive Decompression)	RTCA-DO 160C (4); RTCA-DO 160D (4); RTCA-DO 160E (4); RTCA-DO 160F (4); RTCA-DO 160G (4); GR-63-CORE (4.1.3) SAE J1211 (4.6.3)	(up to 150,000) ft (up to 400 000) ft (5 X 10E ⁻⁶)	Altitude Chamber Thermal Vacuum Chamber
High / Low Temperature	MIL-STD 202F (108A); MIL-STD 202G (108A); MIL-STD 810B (501); MIL-STD 810B (502); MIL-STD 810C (501.1); MIL-STD 810C (502.1); MIL-STD 810D (501.2); MIL-STD 810D (502.2); MIL-STD 810E (501.3); MIL-STD 810E (502.3); MIL-STD 810F (501.4); MIL-STD 810F (502.4); MIL-STD 810G (501.5); MIL-STD 810G (502.5); MIL-STD 883E (1010.7); MIL-STD 883F (1010.8); RTCA-DO 160C (4); RTCA-DO 160C (5); RTCA-DO 160D (4); RTCA-DO 160D (5); RTCA-DO 160E (4); RTCA-DO 160E (5); RTCA-DO 160F (4); RTCA-DO 160F (5); RTCA-DO 160G (4); RTCA-DO 160G (5);	Chamber Volumes: (up to 1 000) ft ³ (10' X 10' X 10') Temperature Range: (-200 to 1 200) °C Transition Rate: (up to 20) °C/Min	Temperature Chambers

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
High / Low Temperature	EN 60068-2-1; EN 60068-2-2; GR-63-CORE (5.1.1.1); GR-63-CORE (5.1.1.2); IEC 60945 (8.2); IEC 60945 (8.4); IEC 68-2-14; IEC 60068-2-14; Lloyds Register 1996 (17); Lloyds Register 1996 (18); SAE J1455 (4.1) SAE J1211 (4.1.3.1) ISO 16750-4:2006 (5.2)	Chamber Volumes: (up to 1 000) ft ³ (10' X 10' X 10') Temperature Range: (-200 to 1 200) °C Transition Rate: (up to 20) °C/Min	Temperature Chambers
Humidity / Moisture Resistance	MIL-STD 202F (103B); MIL-STD 202F (106F); MIL-STD 202G (103B); MIL-STD 202G (106G); MIL-STD 750D (1021.2); MIL-STD 750E (1021.3); MIL-STD 810B (507); MIL-STD 810C (507.1); MIL-STD 810D (507.2); MIL-STD 810E (507.3); MIL-STD 810F (507.4); MIL-STD 810G (507.5); MIL-STD 883E (1004.7); MIL-STD 883F (1004.7); RTCA-DO 160C (6); RTCA-DO 160D (6); RTCA-DO 160E (6); RTCA-DO 160F (6); RTCA-DO 160G (6); EN 60068-2-30; GR-63-CORE (5.1.1.3); GR-63-CORE (5.1.2); IEC 60945 (8.3); Lloyds Register 1996 (14); Lloyds Register 1996 (15); SAE J1455 (4.2) SAE J1211 (4.2) IEC 60068-2-78	(2 to 98) %RH	Humidity Chambers

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Shock – Mechanical	MIL-STD 202F (207A); MIL-STD 202F (213B); MIL-STD 202G (207B); MIL-STD 202G (213B); MIL-STD 750D (2016.2); MIL-STD 750E (2016.2); MIL-STD 810B (516); MIL-STD 810C (516.2); MIL-STD 810D (516.3); MIL-STD 810E (516.4); MIL-STD 810F (516.5); MIL-STD 810G (516.6); MIL-S-901C; MIL-S-901D; MIL-STD 883E (2002.3); MIL-STD 883E (2007.2); MIL-STD 883E (2026); MIL-STD 883F (2002.4); MIL-STD 883F (2007.3); MIL-STD 883F (2026); RTCA-DO 160C (7); RTCA-DO 160D (7); RTCA-DO 160E (7); RTCA-DO 160F (7); RTCA-DO 160G (7); EN 60068-2-27; IEC 60945 (8.6); SAE J1455 (4.10) SAE J1211 (4.8.2)	Force: Up to 40 000 lbf Waveforms: Half Sine, Sawtooth (Terminal Peak), Trapezoidal, Square Wave, Haversine, Triangle, SRS Maximum Level: (1 to 5 000) g's	Drop Shock Machine Electrodynamic Shaker MIL-DTL-901E Light Weight Hammer
Shock – Thermal	MIL-STD 202F (107G); MIL-STD 202G (107G); MIL-STD 750D (1051.5); MIL-STD 750E (1051.6); MIL-STD 810B (503); MIL-STD 810C (503.1); MIL-STD 810D (503.2); MIL-STD 810E (503.3); MIL-STD 810F (503.4); MIL-STD 810G (503.5); MIL-STD 883E (1011.9); MIL-STD 883F (1011.9); SAE J1445 (4.1.3.2)	High Temperature: Up to 180 °C Low Temperature: Down to -80 °C	Thermal Shock Chamber



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Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Fungus	MIL-STD 810B (508); MIL-STD 810C (508.1); MIL-STD 810D (508.3); MIL-STD 810E (508.4); MIL-STD 810F (508.5); MIL-STD 810G (508.6); RTCA-DO 160C (13); RTCA-DO 160D (13); RTCA-DO 160E (13); RTCA-DO 160F (13); RTCA-DO 160G (13)	Test Area: (up to 27) ft ³ (3' X 3' X 3')	Fungus Sources: USDA QM 380, QM 432, QM 474, QM 459, QM 386 ATCC 9642, 9643, 11730, 11797, 6205 Humidity Chamber
Rain / Waterproofness	MIL-STD 810B (506); MIL-STD 810C (506.1); MIL-STD 810D (506.2); MIL-STD 810E (506.3); MIL-STD 810F (506.4); MIL-STD 810G (506.5); RTCA-DO 160C (10); RTCA-DO 160D (10); RTCA-DO 160E (10); RTCA-DO 160F (10); RTCA-DO 160G (10); IEC 60529 (14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.2.5, 14.2.6); IEC 60945 (8.8); NEMA 250 (5.3); NEMA 250 (5.4); UL 50 (30)	(0 to 100) mph (0.2 to 10) in/hour IPX0 through IPX6 (1 mm/min to 100 l/min)	Drip Fixture Oscillating Tube Wind Source Spray Nozzles and Jets 6.3 mm Nozzle 12.5 mm Nozzle
Ballistic Shock	MIL-STD 810F (522); MIL-STD 810G (522.1);	-	-
901 Shock	MIL-S 901C; MIL-S 901D MIL-DTL-901E	(1 to 5) foot drops	MIL-S/DTL-901 Light Weight Shock Hammer



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Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Salt Spray / Fog	MIL-STD 202F (101D); MIL-STD 202G (101E); MIL-STD 750D (1041.3); MIL-STD 750D (1046.2); MIL-STD 750E (1041.3); MIL-STD 750E (1046.3); MIL-STD 810B (509); MIL-STD 810C (509.1); MIL-STD 810D (509.2); MIL-STD 810E (509.3); MIL-STD 810F (509.4); MIL-STD 810G (509.5); MIL-STD 883E (1009.8); MIL-STD 883F (1009.8); RTCA-DO160C (14); RTCA-DO 160D (14); RTCA-DO 160E (14); RTCA-DO 160F (14); RTCA-DO 160G (14); ASTM B117; ASTM G85-02; IEC 60945 (8.12); Lloyds Register 1996 (16); NEMA 250 (5.8); NEMA 250 (5.9); SAE J1455 (4.3); UL 50 (38); UL 50 (39)	Chamber Size: (up to 256) ft ³ (8' X 4' X 8') Salt Environment (0 to 20) % SO2 Environment (0 to 5) %	Salt Fog/Corrosion Chambers
Icing / Freezing Rain	MIL-STD 810D (521); MIL-STD 810E (521.1); MIL-STD 810F (521.2); MIL-STD 810G (521.3);	(0 to 100) mph (0.2 to 10) in/hour	Temperature Chambers Humidity Chambers Pressure Vessels



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Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Icing / Freezing Rain	RTCA-DO 160C - (24); RTCA-DO 160C - (A, B, C); RTCA-DO 160D - (24); RTCA-DO 160D - (A, B, C) RTCA-DO 160E - (24); RTCA-DO 160E - (A, B, C); RTCA-DO 160F - (24); RTCA-DO 160F - (A, B, C); RTCA-DO 160G - (24); RTCA-DO 160G - (A, B, C); GR-63-CORE (34); NEMA 250 (5.6)	(0 to 100) mph (0.2 to 10) in/hour	Temperature Chambers Humidity Chambers Pressure Vessels
Immersion	MIL-STD 202F (104A); MIL-STD 202G (104A); MIL-STD 750D (1011); MIL-STD 750E (1011.1); MIL-STD 810B (512); MIL-STD 810C (512.1); MIL-STD 810D (512.2); MIL-STD 810E (512.3); MIL-STD 810F (512.4); MIL-STD 810G (512.5); MIL-STD 883E (1002); MIL-STD 883F (1002); IEC 60945 (8.9) IEC 60529 (14.2.7, 14.2.8)	(0 to 10) ft (0 to 500) ft IPX7, IPX8	Open Immersion Tanks Sealed Pressure Vessel
Explosive Atmosphere	MIL-STD 202F (109B); MIL-STD 202G (109C); MIL-STD 810B (511); MIL-STD 810C (511.1); MIL-STD 810D (511.2); MIL-STD 810E (511.3); MIL-STD 810F (511.4); MIL-STD 810G (511.5); RTCA-DO 160C (9); RTCA-DO 160D (9); RTCA-DO 160E (9); RTCA-DO 160F (9); RTCA-DO 160G (9);	Chamber Volume: 77 ft ³ Altitude: Up to 60 000 ft	Explosive Atmosphere Chamber



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Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Sand & Dust	MIL-STD 810B (510); MIL-STD 810C (510.1); MIL-STD 810D (510.2); MIL-STD 810E (510.3); MIL-STD 810F (510.4); MIL-STD 810G (510.5); MIL-STD 202F (110A); MIL-STD 202G (110A); RTCA-DO 160C (12); RTCA-DO 160D (12); RTCA-DO 160E (12); RTCA-DO 160F (12); RTCA-DO 160G (12); IEC 60529; 2001 Para 13 IPX6; NEMA 250 (5.5.1.3) SAE J1211 (4.5) ISO 16750-4:2006 (5.1) ISO 20653	Sand Chamber: Test Area - Up to 5 X 5 ft ² Velocities: Up to 5 700 ft / min Dust Chamber: Test Area – Up to 4 X 4 ft ²	Sand Chamber Metal Dust Chamber Dust Chamber IEC Dust Chamber SAE Agitated Dust Chamber
Terminal Strength	MIL-STD 202F (211A); MIL-STD 202G (211A); MIL-STD 750D (2036.4); MIL-STD 750E (2036.4)	(0 to 100) lbf	Force Gauge
Resistance to Solvents	MIL-STD 202F (215J); MIL-STD 202G (215K); MIL-STD 750D (1022.5); MIL-STD 750E (1022.5); MIL-STD 810G (504.1)	Solvents Identified by Customer	Temperature Chamber
Fluid Susceptibility	RTCA-DO 160C (11); RTCA-DO 160D (11); RTCA-DO 160E (11); RTCA-DO 160F (11); RTCA-DO 160G (12); IEC 60945 (8.11) ISO16750-5:2003 ISO 20653	Fluids Identified by Customer	Hot Plate Fume Hood Friction Aire Oven
Insulation Resistance	MIL-STD 202F (302); MIL-STD 202G (302); MIL-STD 750D (1016); MIL-STD 750E (1016);	(0 to 600) V 0.01 M Ohm to 10 G Ohm	IR Tester



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Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Solderability	MIL-STD 202F (208H); MIL-STD 750D (2026.10); MIL-STD 750E (2026.11)	N/A	Solderability Tester
Inclination	46-CFR-162.060-30	6' x 6' Table (up to 3 000) lb Static & Dynamic	2 Axis Dynamic Inclination Table
Hi Potential Testing	MIL-STD 202G (301)	Up to 5 000 V AC/DC	Hi-Pot Tester
Pyrotechnic Shock	MIL-STD 810F (517); MIL-STD 810G (517.1)	Level: (10 to 17 000) g Frequency Range: (10 to 10 000) Hz Displacement: 2 in Peak-to-Peak	Electrodynamic Shaker Drop Shock Machine MIL-S-901 Shock Machine

Vibration

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Vibration – Random and Sinusoidal	MIL-STD 202F (201A); MIL-STD 202F (204D); MIL-STD 202F (214A); MIL-STD 202G (201A); MIL-STD 202G (204D) MIL-STD 202G (214A); MIL-STD 750D (2046.1); MIL-STD 750D (2056); MIL-STD 750D (2057.1); MIL-STD 750E (2046.2); MIL-STD 750E (2056); MIL-STD 750E (2057.2); MIL-STD 810B (514); MIL-STD 810B (519); MIL-STD 810C (514.2); MIL-STD 810C (519.2); MIL-STD 810D (514.3); MIL-STD 810D (519.3);	Force Rating: 20 000 lbf Displacement: 2 in Peak-to-Peak Frequency Range: <i>Random</i> (4 to 3 000) Hz <i>Sinusoidal</i> (4 to 10 000) Hz Maximum Level: <i>Random</i> 100 g rms <i>Sinusoidal</i> 160 g Sine Velocity: <i>Intermittent Duty</i> 100 in/sec <i>Continuous Duty</i> 80 in/sec	Electrodynamic Shakers Vibration Controllers



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Vibration

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Range	Key Equipment or Technology
Vibration – Random and Sinusoidal	MIL-STD 810E (514.4); MIL-STD 810E (519.4); MIL-STD 810F (514.5); MIL-STD 810F (519.5); MIL-STD 810G (514.6); MIL-STD 810G (519.6); MIL-STD 883E (2005.2); MIL-STD 883F (2005.2); MIL-STD 167-1A; RTCA-DO 160C (8); RTCA-DO 160D (8); RTCA-DO 160E (8); RTCA-DO 160F (8); RTCA-DO 160G (8); EN 60068-2-6; GR-63-CORE (5.4.2); GR-63-CORE (5.4.3); IEC 60945 (8.7); Lloyds Register 1996 (12); Lloyds Register 1996 (13); SAE J1455 (4.9), SAE J1211 (4.7.3) IEC 60068-2-59, EN 60068-2-64	Force Rating: 20 000 lbf Displacement: 2 in Peak-to-Peak Frequency Range: <i>Random</i> (4 to 3 000) Hz <i>Sinusoidal</i> (4 to 10 000) Hz Maximum Level: <i>Random</i> 100 g rms <i>Sinusoidal</i> 160 g Sine Velocity: <i>Intermittent Duty</i> 100 in/sec <i>Continuous Duty</i> 80 in/sec	Electrodynamic Shakers Vibration Controllers

Military EMC Methods

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
General	MIL-STD-464A, B, C MIL-STD-704A, B, C, D, E, F	-	-
Bonding and Grounding	MIL-STD-1310G, H	-	-
Conducted Emissions, Current	MIL-STD-462, CE01 MIL-STD-462, CE02 MIL-STD-462, CE03 MIL-STD-462, CE04 MIL-STD-462D, CE101 MIL-STD-461E, CE101 MIL-STD-461F, CE101 MIL-STD-461G, CE101	DC to 400 MHz	-
Conducted Emissions, RF Port	MIL-STD-462, CE06 MIL-STD-462D, CE106 MIL-STD-461E, CE106 MIL-STD-461F, CE106 MIL-STD-461G, CE106	10 kHz to 100 GHz	-



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Military EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Conducted Emissions, Transient	MIL-STD-462, CE07	Time Domain	-
Conducted Emissions, Voltage	MIL-STD-462D, CE102 MIL-STD-461E, CE102 MIL-STD-461F, CE102 MIL-STD-461G, CE102	10 kHz to 1 GHz	-
Conducted Susceptibility, AF	MIL-STD-462, CS01 MIL-STD-462, CS09 MIL-STD-462D, CS101 MIL-STD-462D, CS109 MIL-STD-461E, CS101 MIL-STD-461E, CS109 MIL-STD-461F, CS101 MIL-STD-461F, CS109 MIL-STD-461G, CS101 MIL-STD-461G, CS109	DC to 250 kHz	-
Conducted Susceptibility, RF	MIL-STD-462, CS02 MIL-STD-462D, CS114 MIL-STD-461E, CS114 MIL-STD-461F, CS114 MIL-STD-461G, CS114	4 kHz to 400 MHz	-
Conducted Susceptibility, RF Port	MIL-STD-462, CS03 MIL-STD-462, CS04 MIL-STD-462, CS05 MIL-STD-462, CS07 MIL-STD-462D, CS103 MIL-STD-462D, CS104 MIL-STD-462D, CS105 MIL-STD-461E, CS103 MIL-STD-461E, CS104 MIL-STD-461E, CS105 MIL-STD-461F, CS103 MIL-STD-461F, CS104 MIL-STD-461F, CS105 MIL-STD-461G, CS103 MIL-STD-461G, CS104 MIL-STD-461G, CS105	30 Hz to 40 GHz	-



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Military EMC Methods			
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Conducted Susceptibility, Transient	MIL-STD-462, CS06 MIL-STD-462, CS10 MIL-STD-462, CS11 MIL-STD-462, CS12 MIL-STD-462, CS13 MIL-STD-462D, CS115 MIL-STD-462D, CS116 MIL-STD-461E, CS115 MIL-STD-461E, CS116 MIL-STD-461F, CS106 MIL-STD-461F, CS115 MIL-STD-461F, CS116 MIL-STD-461G, CS115 MIL-STD-461G, CS116	CS115: 5 Amperes CS116: 10 Amperes	-
EMP	MIL-STD-462, RS05 MIL-STD-462D, RS105 MIL-STD-461E, RS105 MIL-STD-461F, RS105 MIL-STD-461G, RS105	50 000 V/M	-
ESD	MIL-STD-1686C MIL-STD-461G, CS118	25 kV	-
Lightning	MIL-STD-461G, CS117	Single Stroke, Multiple Stroke and Multiple Burst Waveforms 1, 2, 3, 4, 5A, 6	-
Power Input	MIL-STD-1275A, B, C, D, E MIL-STD-1399, Section 300A MIL-STD-1399, Section 300B MIL-STD-704A-F Utilizing: MIL-HDBK-704-2, SAC101, SAC102, SAC103, SAC104, SAC105, SAC106, SAC107, SAC108, SAC109, SAC110, SAC201, SAC301, SAC302, SAC303, SAC401, SAC601, SAC603	-	-



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Power Input	<p>MIL-HDBK-704-3, TAC101, TAC102, TAC103, TAC104, TAC105, TAC106, TAC107, TAC108, TAC109, TAC110, TAC201, TAC301, TAC302, TAC303, TAC401, TAC601, TAC602, TAC603</p> <p>MIL-HDBK-704-4, SVF101, SVF102, SVF104, SVF105, SVF106, SVF107, SVF108, SVF109, SVF110, SVF201, SVF301, SVF302, SVF303, SVF401, SVF601, SVF603</p> <p>MIL-HDBK-704-5, TVF101, TVF102, TVF103, TVF104, TVF105, TVF106, TVF107, TVF108, TVF109, TVF110, TVF201, TVF301, TVF302, TVF303, TVF401, TVF601, TVF602, TVF603</p> <p>MIL-HDBK-704-6, SXF101, SXF102, SXF104, SXF105, SXF106, SXF107, SXF108, SXF109, SXF110, SXF201, SXF301, SXF302, SXF303, SXF401, SXF601, SXF603</p> <p>MIL-HDBK-704-7, HDC101, HDC102, HDC103, HDC104, HDC105, HDC201, HDC301, HDC302, HDC303, HDC401, HDC501, HDC601, HDC602</p> <p>MIL-HDBK-704-8, LDC101, LDC102, LDC103, LDC104, LDC105, LDC201, LDC301, LDC302, LDC401, LDC501, LDC601, LDC602</p>		



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Radiated Emissions, E-Field	MIL-STD-462, RE02 MIL-STD-462, RE04 MIL-STD-462D, RE102 MIL-STD-461E, RE102 MIL-STD-461F, RE102 MIL-STD-461G, RE102	10 kHz to 40 GHz	-
Radiated Emissions, H-Field	MIL-STD-462, RE01 MIL-STD-462D, RE101 MIL-STD-461E, RE101 MIL-STD-461F, RE101 MIL-STD-461G, RE101	30 Hz to 150 kHz	-
Radiated Emissions, RF Spurious	MIL-STD-462, RE03 MIL-STD-461E, RE103 MIL-STD-461F, RE103 MIL-STD-461G, RE103	10 kHz to 40 GHz	-
Radiated Susceptibility, E-Field	MIL-STD-462, RS03 MIL-STD-462D, RS103 MIL-STD-461E, RS103 MIL-STD-461F, RS103 MIL-STD-461G, RS103	10 kHz to 40 GHz	-
Radiated Susceptibility, H-Field	DOD-STD-1399, (NAVY) - Section 070 MIL-STD-1399, Section 070 MIL-STD-461E, RS101 MIL-STD-461F, RS101 MIL-STD-461G, RS101 MIL-STD-462, RS01 MIL-STD-462, RS02 MIL-STD-462, RS06 MIL-STD-462D, RS101	DC to 250 kHz	-

Commercial Aviation EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Magnetic Effects	RTCA/DO-160A, B, C, D, E, F, G, Section 15 ABD01001.2 Rev E, F, G Section 3.4.1	DC	-



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Commercial Aviation EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Power Input	RTCA/DO-160A, B, C, D, E, F, G, Section 16 D6-16050-4 Rev C, D, F Section 7.5.3	-	-
Conducted Susceptibility, Transient	RTCA/DO-160A, B, C, D, E, F, G, Section 17 D6-16050-4 Rev C, D, F Section 7.5.1 ABD01001.2 Rev E, F, G Section 3.4.2	600 Volts	-
Conducted Susceptibility, AF	RTCA/DO-160A, B, C, D, E, F, G, Section 18 D6-16050-4 Rev C, D, F Section 7.2 ABD01001.2 Rev E, F, G Section 3.4.3	DC to 250 kHz	-
Radiated Susceptibility, H-Field	RTCA/DO-160A, B, C, D, E, F, G, Section 19 D6-16050-4 Rev C, D, F D6-16050-5 Rev A, B, C Section 7.2, 7.5 ABD01001.2 Rev E, F, G Section 3.4.4	DC to 250 kHz	-
Conducted Susceptibility, RF	RTCA/DO-160A, B, C, D, E, F, G, Section 20 D6-16050-4 Rev C, D, F D6-16050-5 Rev A, B, C Section 7.3 ABD01001.2 Rev E, F, G Section 3.3.2	10 kHz to 400 MHz	-
Radiated Susceptibility, E-Field	RTCA/DO-160A, B, C, D, E, F, G, Section 20 D6-16050-4 Rev C, D, F D6-16050-5 Rev A, B, C Section 7.3 ABD01001.2 Rev E, F, G Section 3.3.3, 3.3.4	150 kHz to 40 GHz	-



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Commercial Aviation EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Conducted Emissions, Current	RTCA/DO-160A, B, C, D, E, F, G, Section 21 D6-16050-4 Rev C, D, F Section 8.3.2, 8.4 D6-16050-5 Rev A, B, C Section 8.1,8.2.1 ABD01001.2 Rev E, F, G Section 3.4.5	DC to 400 MHz	-
Conducted Emissions, Transient	D6-16050-4 Rev D, F Section 8.1,8.3.1 D6-16050-5 Rev A, B, C Section 8.1	Time Domain	-
Radiated Emissions	RTCA/DO-160A, B, C, D, E, F, G, Section 21 D6-16050-4 Rev C, D, F Section 8.4 D6-16050-5 Rev A, B, C Section 8.2.2 ABD01001.2 Rev E, F, G Section 3.4.5	150 kHz to 40 GHz	-
Lightning	RTCA/DO-160A, B, C, D, E, F, G, Section 22 D6-16050-4 Rev C, D, F D6-16050-5 Rev A, B, C Section 7.4 ABD01001.2 Rev E, F, G Section 3.2	Single Stroke, Multiple Stroke and Multiple Burst Waveforms: 1,2 ,3 ,4 ,5A ,5B, 6 Levels: 1 through 5	-
ESD	RTCA/DO-160A, B, C, D, E, F, G, Section 25 D6-16050-4 Rev C, D, F D6-16050-5 Rev A, B, C Section 7.1 ABD01001.2 Rev E, F, G Section 3.5	25 kV	-



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Product Family EMC Standards			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Electromagnetic Compatibility Emissions & Immunity	ETSI EN 301 489-1 V1.9.2: 2011	Radio Equipment	-
	CISPR 11 ED 4.0: 2003 IEC/CISPR 11 ED 5.0: 2009 + A1: 2010 IEC/CISPR 11 ED 5.1: 2010 IEC/CISPR 11 ED 6.0: 2015 IEC/CISPR 11 ED 6.1: 2016 IEC/CISPR 12 ED 6.1: 2009 EN 55011: 2009 +A1: 2010 ICES-001 Issue 4: 2006- Updated Nov 2014	Industrial, Scientific and Medical Equipment	-
	EN 55014-2:1997 + A1:2001 + A2:2008 EN 55014-1:2006 + A1:2009 + A2:2011 EN 55014-2: 2015 IEC/CISPR 14-1 ED 5.0: 2005 IEC/CISPR 14-1 ED 6.0: 2016 + ISH1: 2017 IEC/CISPR 14-2 ED 2.0: 2015	Household Appliances, Electric Tools and Similar Apparatus	-
	EN 55015: 2013 ICES-005 Issue 4: 2015	Lightning Equipment	-
	IEC/CISPR 22, Edition 5:2005-04 EN 55022:2006 + A1:2007 EN 55022: 2010 + AC: 2011 EN 55024: 2010 ICES-003 Issue 6: 2016 Updated Apr 2017 Agreement of VCCI V-3: 2015.04	Information Technology Equipment	-
	IEC/CISPR 25: 2002 IEC/CISPR 25: 2008 IEC/CISPR 25: 2016	Automotive Components	-
	EN 55032: 2012 + AC: 2013 IEC/CISPR 32 ED 2.0: 2015 VCCI-CISPR 32: 2016	Multimedia Equipment	-
	EN/CISPR 55035:2017	Multimedia Equipment	-
	EN 50083-2: 2012 +A1:2015	Cable Networks for Television Signals, Sound Signals and Interactive Services	-
	EN 50121-1: 2006 + AC:2008 EN 50121-1: 2017 IEC 62236-1: 2018	Railway Applications	-



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Product Family EMC Standards			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Electromagnetic Compatibility Emissions & Immunity	EN 50121-2:2006 + AC:2008 EN 50121-2: 2017 IEC 62236-2: 2018	Railway Applications – Whole Railway System	-
	EN 50121-3-1:2006 + AC:2008 EN 50121-3-1: 2017 IEC 62236-3-1: 2018	Railway Applications – Rolling Stock – Train and Complete Vehicle	-
	EN 50121-3-2:2006 + AC:2008 EN 50121-3-2: 2016 IEC 62236-3-2: 2018	Railway Applications – Rolling Stock - Apparatus	-
	EN 50121-4:2006 + AC:2008 EN 50121-4: 2016 IEC 62236-4: 2018	Railway Applications – Signaling and Telecommunications Apparatus	-
	EN 50121-5:2006 + AC:2008 EN 50121-5: 2017 IEC 62236-5: 2018	Railway Applications – Fixed Power Supply Installations and Apparatus	-
	EN 50130-4: 2011	Fire, Intruder Hold Up, CCTV, Access Control and Social Alarm Systems	-
	EN 50498:2010	Aftermarket Electronic Equipment in Vehicles	-
	EN 55103-1: 2009 + A1: 2012 EN 55103-2: 2009	Audio, video, audio-visual and entertainment lighting control apparatus for professional use	-
	EN 60034-1: 2010/AC: 2010	Rotating Machines	-
	EN 60255-26: 2013 + AC:2013 IEC 60255-26: 2013-05	Measuring Relays and Protection Equipment	-
	IEC 60601-1-2: ED 3.0: 2007 IEC 60601-1-2: ED 4.0: 2014 EN 60601-1-2: ED 3.0: 2007 EN 60601-1-2: ED 4.0: 2014	Medical Electrical Equipment	-
	EN 60945: 2002	Maritime Navigation and Radio communication Equipment and Systems	-
	EN 60974-10: 2014	Arc Welding Equipment	-
EN 61000-6-1: 2007 EN 61000-6-3: 2007+ A1: 2011+AC: 2012	Generic Standard for Residential, Commercial and Light Industrial Environments	-	



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Product Family EMC Standards			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Electromagnetic Compatibility Emissions & Immunity	EN 61000-6-2: 2005 + AC: 2005 EN 61000-6-4: 2007 + A1: 2011	Generic Standard for Industrial Environments	-
	IEC 61326-1:2005-12 IEC 61326-1, Ed. 2.0:2012 EN 61326-1:2013	Electrical Equipment for Measurement, Control and Laboratory Use	-
	EN 62040-2: 2006 +AC: 2006	Uninterruptible Power Systems (UPS)	-
	MTA-NYCT EMC Standard for non-third rail powered work cars, Rev. 1.0	Railway Applications	-
	MTA-NYCT AC Train EMC Standards, Rev. 2.0	Railway Applications	-
	MTA-NYCT AC Train EMC Standards, Rev. 2.0	Railway Applications	-
	NYCT Specification Section 16ES	Railway Applications	-
	NYCT Specification Section 1N	Railway Applications	-
	OIML R-76-1: 2006	Non-Automatic Weighing Systems	-
	ABS Rules for Building and Classing Steel Vessels: 2018	Maritime Equipment	-
	Lloyd's Register LR Type Approval Test Specification #1: 2015	Maritime Equipment	-
	ISO 7176-21: 2009 ANSI/RESNA WC-2: 2009	Electrically Powered Wheelchairs, Scooters and Battery Chargers	-
	ISO 7637-1: 2015 ISO 7637-2: 2011 ISO 7637-3: 2016 ISO 11451-1:2015 ISO 11452-1:2015 ISO 16750-1:2006 ISO 16750-2:2012 SAE J1113-1: 2006 SAE J1113-1: 2013	Road Vehicles	-
	ISO 13766: 2006 ISO 13766-1: 2018 ISO 13766-2:2018	Earth-Moving and Building and Construction Machinery	-



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Commercial EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Conducted Emissions, Transient	IEC/CISPR 16-2-1: 2014 IEC/CISPR 25:2016 IEC/CISPR 25, Ed. 1:1995-09 IEC/CISPR 25, 2 nd Ed.:2002-08 IEC/CISPR 25, Ed. 3.0:2008-03 IEC/CISPR 22, Edition 5:2005-04 SAE J1113-42: 2010	Time Domain	-
Conducted Emissions, Current	IEC/CISPR 16-2-1: 2014 IEC/CISPR 25:2016 IEC/CISPR 25, Ed. 1:1995-09 IEC/CISPR 25, 2 nd Ed.:2002-08 IEC/CISPR 25, Ed. 3.0:2008-03 IEC/CISPR 22, Edition 5:2005-04 EN 55022:2006 IEC/CISPR 22, Ed. 6.0:2008-09, EN 61000-3-2: 2014 IEC 61000-3-2, Ed. 4.0:2014-05 IEC 61000-3-2, Ed. 3.0:2005-11 IEC 61000-3-2, Ed. 3.0:2005 +A1:2008 + A2:2009 IEC 61000-3-2, Ed. 3.2:2009 EN 61000-3-3: 2013 IEC 61000-3-3:2013 +A1:2017 IEC 61000-3-11: 2017 IEC 61000-3-11: 2000-08 EN 61000-3-11: 2000 IEC 61000-3-12: 2004 EN 61000-3-12: 2011 IEC 61000-3-12: 2011-05 UMTA-MA-06-0153-87-2 UMTA-MA-06-0153-85-8	9 kHz to 30 MHz	-



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Commercial EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Conducted Emissions, Voltage	IEC/CISPR 16-2-1: 2014 EN 55011:2009 + A1:2010 EN 55014-1:2006 + A1:2009 + A2:2011 EN 55022:2006 + A1:2007 EN 55022:2010 + AC:2011 EN 55032:2012 + AC:2013 EN 55032:2012-05 ANSI C63.4:2014 ANSI C63.4:2003 IEC/CISPR 25:2016 IEC 61000-3-3 Ed.2.0:2008 IEC 61000-3-3 Ed.3.0:2013-05 UMTA-MA-06-0153-87-2 UMTA-MA-06-0153-85-8	9 kHz to 30 MHz	-
Conducted Immunity, AF	ISO 11452-10:2009 SAE J1113-2: 1996 SAE J1113-2: 2004 SAE J1113-2: 2010	DC to 250 kHz	-
Conducted Immunity, RF	IEC 61000-4-6, Ed. 2.0:2003-05 IEC 61000-4-6, Ed. 2.1:2004 IEC 61000-4-6, Ed. 2.2:2006 IEC 61000-4-6, Ed. 3.0:2008 IEC 61000-4-6, Ed. 4.0:2013 IEC 61000-4-6:1996 EN 61000-4-6:2009 IEC 61000-4-16: Ed. 2.0: 2015 IEC 61000-4-17 Ed. 1.2: 2009 ISO 11452-4: 2011 ISO 11452-7:2003 + A1:2013 SAE J1113-3: 2006 SAE J1113-3: 2010 SAE J1113-4: 2004 SAE J1113-4: 2014	9 kHz to 230 MHz	-
EFT/Chattering Relay	IEC 61000-4-4, Ed. 2.0:2004-07 EN 61000-4-4:2004 + A1:2010 IEC 61000-4-4:1995 IEC 61000-4-4, Ed. 2.1:2011 IEC 61000-4-4:2012-04 SAE J1113-12: 2006 SAE J1113-12: 2017	4 kV	-



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Commercial EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
ESD	IEC 61000-4-2, Ed. 2.0:2008-12 EN 61000-4-2:2009-05 ISO 10605:2008 + A1:2014 SAE J1113-13: 2004 SAE J1113-13: 2015	25 kV	-
Power Input	IEC 61000-4-11:2004 + A1:2017 EN 61000-4-11:2004 IEC 61000-4-11:2004 IEC 61000-4-11:1994 IEC 61000-4-29: 2000 IEC 61000-4-34: 2005 + A1: 2009	-	-
Radiated Emissions, E-Field	IEC/CISPR 16-2-3: 2016 EN 55011 EN 55012:2007 + A1:2009 EN 55014-1:2006 + A1:2009 + A2:2011 EN 55022:2006 + A1:2007 EN 55022:2010 + AC:2011 EN 55032:2012 + AC:2013 EN 55032:2012-05 ANSI C63.4: 2014 SAE J1113-41: 2006 UMTA-MA-06-0153-85-11	10 kHz to 40 GHz	-
Radiated Immunity, E-Field	IEC 61000-4-3:1995 IEC 61000-4-3, Ed. 3.0:2006-02 EN 61000-4-3:2006 + A1:2008 + A2:2010 IEC 61000-4-3, Ed. 3.1:2008-04 IEC 61000-4-3, Ed. 3.2:2010 ISO 11451-2: 2015 ISO 11451-3: 2015 ISO 11452-2: 2004 ISO 11452-3: 2016 ISO 11452-5:2002 ISO 11452-9:2012 SAE J1113-21: 2005 SAE J1113-21: 2013 SAE J1113-23: 2002 SAE J1113-24: 2010 SAE J1113-26: 2006 SAE J1113-26: 2014	10 kHz to 18 GHz	-



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Commercial EMC Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Radiated Immunity, H-Field	IEC 61000-4-8:1993 IEC 61000-4-8:2009 IEC 61000-4-9: 2016 IEC 61000-4-10: 2016 ISO 11452-8:2015 SAE J1113-22: 2003 SAE J1113-22: 2010	DC to 250 kHz	-
Surge/Transients	IEC 61000-4-5, Ed. 3.0: 2014 + A1:2017 IEC 61000-4-5, Ed. 2.0:2005-11 IEC 61000-4-5, Ed. 1.1:2005-11 EN 61000-4-5: 2006 IEC 61000-4-5:1995 IEC 61000-4-12: 2017 SAE J1113-11: 2006 SAE J1113-11: 2011 SAE J1113-11: 2012 SAE J1113-11: 2017	6 kV	-

Product Family Radio Standards			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Radio Parameters	RSS-210 Issue 9, August 2016, Amendment November 2017	License Exempt Radio Apparatus – Category I	-
	RSS-247, Issue 2, Feb 2017, Updated March 2017 (without DFS)	Digital Transmissions Systems, Frequency Hopping Systems and LE-LAN	-
	RSS-310, Issue 4, July 2015	License Exempt Radio Apparatus – Category II	-
	RSS-GEN, Issue 5, Amendment 1, March 2019	General Requirements for Compliance of Radio Apparatus	-

Radio Test Methods			
Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Frequency / Range of Test	Key Equipment or Technology
Conducted Emissions, Voltage	ANSI C63.10, 6.2:2013 AC Line Conducted TIA-603-D, 2.1.3 Power Line Conducted	9 kHz to 30 MHz	-
Transmitter, Adjacent Channel Power	ANSI C63.10, 6.10:2013 Band Edge	10 kHz to 40 GHz	-
Transmitter, DSS, Spectral Density	ANSI C63.10, 11.10 PSD	10 kHz to 40 GHz	-
Transmitter, Duty Cycle	ANSI C63.10, 11.6:2013 DTS Duty Cycle	-	-
Transmitter, Frequency Stability, Temperature	ANSI C63.10, 6.8:2013 Frequency Stability, Tempe	10 kHz to 40 GHz	-
Transmitter, Frequency Stability, Voltage	ANSI C63.10, 6.9:2013 Frequency Stability, Voltage	10 kHz to 40 GHz	-
Transmitter, Modulation Bandwidth	ANSI C63.10, 11.8:2013 DTS Bandwidth ANSI C63.10, 11.13:2013 Band Edge	-	-
Transmitter, RF Power Output, Conducted	ANSI C63.10, 11.9:2013 Fundamental Output Power	10 kHz to 40 GHz	-
Transmitter, Unwanted Emissions	ANSI C63.10, 6.4:2013, < 30 MHz ANSI C63.10, 6.5:2013 Radiated Emissions, (30 to 1 000) MHz ANSI C63.10, 6.6:2013 Radiated Emissions, > 1 GHz ANSI C63.10, 6.7:2013 Antenna Conducted ANSI C63.10, 11.11:2013 Non- Restricted Bands ANSI C63.10, 11.12:2013 Restricted Bands	10 kHz to 40 GHz	-

Testing performed in support of FCC approval procedures for certification

Type of Device Examples	Scope of Accreditation	Supporting FCC Guidance	Comments/Maximum Frequency Tested
Unintentional Radiators (FCC Part 15, Subpart B)	ANSI C63.4-2014	-	40 GHz
Industrial, Scientific, and Medical Equipment (FCC Part 18) Consumer ISM equipment	FCC MP-5, (February 1986)	-	120 GHz

Testing performed in support of FCC approval procedures for certification

Type of Device Examples	Scope of Accreditation	Supporting FCC Guidance	Comments/Maximum Frequency Tested
Intentional Radiators (FCC Part 15, Subpart C)	ANSI C63.10-2013	-	120 GHz

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L2320.



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