SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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ELECTRICAL

Valid to: May 31, 2024 Certificate Number: 0214.39

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electrical tests:

Tests:	**Test Method(s) [1]:**
Emissions	
Radiated (5m semi-anechoic chamber)	47 CFR FCC Part 15B (using ANSI C63.4:2014); 47 CFR FCC Part 18 (using MP-5:1986); VCCI V-3 (*up to 6 GHz*); EN 55011; CISPR 11; AS/NZS CISPR 11; KS C 9811; EN 55022; CISPR 22; AS/NZS CISPR 22; EN 55032 (*excluding Annex H*); CISPR 32 (*excluding Annex H*); AS/NZS CISPR 32 (*excluding Annex H*); KS C 9832 (*excluding Annex H*); CISPR 25 (*Section 6.5*); EN/IEC 61000-6-3; EN/IEC 61000-6-4; AS/NZS 4268 +A1/A2; AS/NZS 4251-1; MIL-STD-461E, F, G (RE101, RE102, RE103); MIL-STD-462D (RE101, RE102, RE103); MIL-STD-462 (RE01, RE02); CISPR 25; SAE J1113-41; RTCA/DO-160 C, D, E, F, G, Sections 15 and 21
Conducted	47 CFR FCC Part 15B (using ANSI C63.4:2014); 47 CFR FCC Part 18 (using MP-5:1986); VCCI V-3; EN 55011; CISPR 11; AS/NZS CISPR 11; KS C 9811; EN 55022; CISPR 22; AS/NZS CISPR 22; EN 55032; CISPR 32; AS/NZS CISPR 32; KS C 9832; EN/IEC 61000-6-3; EN/IEC 61000-6-4; AS/NZS 4268 +A1/A2; AS/NZS 4251-1; AS/NZS 4250-1; AS/NZS 4250-2; MIL-STD-461E, F, G (CE101, CE102, CE106); MIL-STD-462D (CE101, CE102, CE106); MIL-STD-462 (CE01, CE03, CE07); RTCA/DO-160C, D, E, F, G, Section 21; CISPR 25 (*Sections 6.3 and 6.4*); SAE J1113-41; SAE J1113-42

Tests:	**Test Method(s) [1]:**
Emissions (cont.)	
Current Harmonics	EN/IEC 61000-3-2; AS/NZS 61000.3.2
Voltage Fluctuations	EN/IEC 61000-3-3; AS/NZS 61000.3.3
Immunity	
Electrostatic Discharge (ESD)	EN/IEC 61000-4-2; KS C 9610-4-2; AS/NZS 61000.4.2; RTCA/DO-160C, D, E, F, G (Section 25); MIL-STD-1686C; MIL-STD-461G (CS118); ISO 10605; SAE J1113-13
Radiated Immunity (*80 MHz to 2.7 GHz*)	EN/IEC 61000-4-3; KS C 9610-4-3; AS/NZS 61000.4.3; MIL-STD-461E, F, G (RS101, RS103, RS105); MIL-STD-462D (RS101, RS103); MIL-STD-462 (RS01, RS02, RS03); RTCA/DO-160C, D, E, F, G (*Section 20.5*); ISO 11452-2; ISO 11452-3; ISO 11451-2; ISO 11451-3; SAE J1113-21; SAE J1113-23; SAE J1113-24
Electrical Fast Transient/Burst	EN/IEC 61000-4-4; KS C 9610-4-4; AS/NZS 61000.4.4; ISO 7637-3; SAE J1113-12
Surge Immunity	EN/IEC 61000-4-5; KS C 9610-4-5; AS/NZS 61000.4.5; IEEE C62.41; IEEE C62.41.1; IEEE C62.41.2; ISO 16750-2 (Load Dump)
Conducted Immunity	EN/IEC 61000-4-6; KS C 9610-4-6; AS/NZS 61000.4.6; MIL-STD-461E, F, G (CS103, CS104, CS105, CS109, CS114, CS115, CS116); MIL-STD-462D (CS103, CS104, CS105, CS109, CS114, CS115, CS116); MIL-STD-462 (CS01, CS02, CS06); RTCA/DO-160C, D, E, F, G (Section 20); ISO 11452-4; ISO 11451-4; SAE J1113-4
Power Frequency Magnetic Field Immunity	EN/IEC 61000-4-8 (*excluding short duration mode*); KS C 9610-4-8 (*excluding short duration mode*); AS/NZS 61000.4.8 (*excluding short duration mode*); RTCA/DO-160C, D, E, F, G (Section 15); MIL-STD-461D, E, F, G (RS101); MIL-STD-462 (RS01); ISO 11452-8 (*Radiating Loop Method*); SAE J1113-22; SAE J1113-26
Voltage Dips, Short Interruptions, and Line Voltage Variations	EN/IEC 61000-4-11; KS C 9610-4-11

Tests:	**Test Method(s) [1]:**
Immunity (cont.)	
Voltage Spike	RTCA/DO-160C, D, E, F, G (Section 17); MIL-STD-461F (CS106); ISO 7637-2; SAE J1113-11
Power Input	RTCA/DO-160C, D, E, F, G (Section 16); MIL-STD-704A, B, C, D, E, F (with Notice 1); ISO 16750-2
Audio Frequency Conducted Susceptibility	RTCA/DO-160C, D, E, F, G (Section 18); MIL-STD-461D, E, F, G (CS101); MIL-STD-462 (CS01); ISO 11452-10; SAE J1113-2
Induced Signal Susceptibility	RTCA/DO-160C, D, E, F, G (Section 19)
Lightning Induced Transient	RTCA/DO-160C, D, E, F, G (Section 22); MIL-STD-461G (CS117)
Generic and Product Family Standards	EN/IEC 61000-6-1; AS/NZS 61000.6.1; EN/IEC 61000-6-2; AS/NZS 61000.6.2; CISPR 14-2; EN 55014-2; AS/NZS CISPR 14-2; CISPR 24; EN 55024; AS/NZS CISPR 24; KS C 9814-2; KS C 9835 (*excluding Annex A through H*); BS EN/IEC 60601-1-2; BS EN/IEC 60947-1; BS EN/IEC 60439-1; BS EN/IEC 61326-1; BS EN/IEC 61326-2; BS EN 50130-4; BS EN 50131-1; EN 61800-3; IEC 61800-3 (*up to 75A, 1000V*); BS EN 14982; ISO 14982 (*using component methods except ISO 7637 and ISO 11452-3*); ISO 13766:2006 Ed 2.0; BS EN 12895:2015; IEC 60945; ECE R10
Current Measure (*500 A DC, 1000A AC*)	USCAR 2, Sections 5.3.3 & 5.3.4; GMW3431, Section 4.2.3
Insulation Resistance (*1 kΩ to 10 TΩ*)	MIL-STD-202, Method 302; IPC-TM-650, Sections 2.5.11, 2.5.16, & 2.5.26A; USCAR-2 Section 5.5.1; GMW 3431, Section 4.1.3; ASTM D257
High Voltage/Dielectric Withstanding Voltage (*Up to 50 kV AC & 60 KV DC*)	ASTM D149 (2009) Types 1, 3, & 4; MIL-STD-202, Method 301; IPC-TM-650 Sections 2.5.6B, 2.5.6.2A, 2.5.6.3, 2.5.7D, 2.5.7.1, & 2.5.25A
Continuity Monitoring (≥ *50 ns Event Detection*)	IPC-9701A, Section 4.3.3 (2006); MIL-STD-202, Method 310; USCAR-2, Section 5.1.9

Tests:	**Test Method(s) [1]:**
Contact Resistance, Low Level Contact Resistance (LLCR) (*100 μΩ to 200 kΩ*)	MIL-STD-202, Method 307; MIL-DTL 83513G, Method 3.5.6; ASTM B539 (2002); ASTM B193; IPC-TM-650, Sections 2.5.12, 2.5.13A, 2.5.14A, 2.5.24, & 2.5.32
Dry Circuit Resistance/Resistance	USCAR-2, Section 5.3.1; MIL-STD-202, Methods 303 & 304
Voltage/Voltage Drop (*10 μV – 80 kV*)	USCAR-2, 5.3.2

On the following types of products:

Industrial Drives, Tractor Components, Automotive System and Subsystems, Consumer Electronics, Electrical Power/Distribution Equipment

[1] When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C., Section 1 of A2LA *R101 - General Requirements- Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1 [2]:

Rule Subpart/Technology:	**Test Method:**	**Maximum Frequency (MHz):**
Unintentional Radiators Part 15B	ANSI C63.4:2014	10000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5:1986	10000

[2] Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (https://apps.fcc.gov/oetcf/eas/) for a listing of FCC approved laboratories.

Accredited Laboratory

A2LA has accredited

NTS LABS, LLC CHICAGO

Mount Prospect, IL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 16th day of August 2022.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 0214.39
Valid to May 31, 2024

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.