SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

QAI LABORATORIES LTD. [1]
3980 North Fraser Way
Burnaby, BC, Canada, V5J 5K5
Contact: Parminder Singh Phone: (604) 527-8378

ELECTRICAL

Valid to: October 31, 2020 Certificate Number: 3657.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory at the location listed above, ***as well as the satellite laboratory location listed below***, to perform the following tests:

Test Technology:	**Test Method(s)** [2, 3]**:**	
Emissions		
Conducted and Radiated [4] *(3m semi-anechoic chambers, up to 40 GHz)*	ANSI C63.4 ANSI C63.4:2014 ANSI C63.10 ANSI C63.17:2013 FCC MP-5:1986 CISPR 11 EN 55011 AS/NZS CISPR 11 AS/NZS CISPR 11 (2011) KN 11 CISPR 13 EN 55013 AS/NZS CISPR 13 AS/NZS CISPR 13 (2013) KN 13 CISPR 14-1 EN 55014-1 CISPR 15 EN 55015 AS/NZS CISPR 15 AS/NZS CISPR 15 (2011) KN 15 CISPR 22 EN 55022 AS/NZS CISPR 22 AS/NZS CISPR 22 (2009+A1:2010)	CISPR 32 EN 55032 AS/NZS 32 AS/NZS 32 (2015) KN 32 ICES-001 ICES-003 ICES-004 ICES-005 ICES-006 ICES-008 CNS 13803 CNS 13439 CNS 13783-1 EN 61000-6-3 IEC 61000-6-3 AS/NZS 61000.6.3 KN 61000-6-3 AS/NZS CISPR 14-1 AS/NZS CISPR 14-1 (2013) KN 14-1 KN 61000-6-4 IEC 61000-6-4 EN 61000-6-4 AS/NZS 61000.6.4 AS/NZS 61000.6.4 (2012)

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Test Technology:	**Test Method(s)** [2, 3]**:**	
Emissions [4] *(cont.)*	KN 22 TCVN 7189 (2009) TCVN 7317 (2003)	KN 61000-6-4 CNS 13438 (*up to 6 GHz*) VCCI V-1 VCCI V-2 VCCI V-3 (*up to 6 GHz*) VCCI V-4 VCCI V-15
Harmonics [4]	IEC 61000-3-2 EN 61000-3-2 JIS C 61000-3-2 KN 61000-3-2	IEC 61000-3-12 EN 61000-3-12 KN 61000-3-12
Flicker [4]	IEC 61000-3-3 EN 61000-3-3 IEC 61000-3-11	KN 61000-3-11 EN 61000-3-11 KN 61000-3-3
Immunity		
Electrostatic Discharge (ESD) [4]	IEC 61000-4-2 EN 61000-4-2 KN 61000-4-2 IEC 60255-22-2	IEEE C37.90.3 ISO 10605 JIS C 61000-4-2
Radiated Immunity	IEC 61000-4-3 KN 61000-4-3 EN 61000-4-3 IEEE Std. C37.90.2	IEC 60255-22-3 JIS C 1000-4-3 CNS 13306
Electrical Fast Transient (EFT) [4]	IEC 61000-4-4 KN 61000-4-4 EN 61000-4-4 JIS C 1000-4-4	JIS C 61000-4-4 KN 61000-4-4 IEC 60255-22-4
Surge [4]	IEC 61000-4-5 KN 61000-4-5 EN 61000-4-5 IEC C37.90.1 IEEE C62.45 IEEE C37.90.1	IEEE C62.41.1 IEEE C62.41.2 JIS C 1000-4-5 JIS C 61000-4-5 IEC 60255-22-5
Conducted Immunity [4]	IEC 61000-4-6 KN 61000-4-6 EN 61000-4-6 JIS C 1000-4-6 JIS C 61000-4-6	IEC 61000-4-16 IEC 61000-2-4 EN 61000-2-4 KN 61000-2-4

Test Technology:	**Test Method(s)** [2, 3]**:**	
Magnetic Field Immunity	IEC 61000-4-8 KN 61000-4-8	EN 61000-4-8 JIS C 1000-4-8
Pulse Magnetic Field	IEC 61000-4-9 EN 61000-4-9	KN 61000-4-9
Damped Oscillatory Magnetic Field	IEC 61000-4-10 EN 61000-4-10	
Dips, Short Interrupts Voltage Variations [4]	IEC 61000-4-11 EN 61000 4-11	KN 61000-4-11 JIS C 1000-4-11
Ring Wave [4]	IEC 61000-4-12 EN 61000-4-12	ANSI/IEEE C37.90 ANSI/IEEE C62.41
Harmonics and Interharmonics [4]	IEC 61000-4-13 EN 61000-4-13	
Immunity to Common Mode Disturbances [4]	IEC 61000-4-16 EN 61000-4-16	
Damped Oscillatory Wave Immunity	IEC 61000-4-18	
Automotive EMC (*EMC only*)	ISO 11451-1 ISO 11451-2 ISO 11451-3 ISO 11451-4 [4] ISO 11452-1 ISO 11452-2 ISO 11452-3 ISO 11452-4 ISO 11452-5 ISO 11452-7 ISO 11452-8 ISO 11452-9 ISO 11452-10 ISO 10605 ISO 13766 [4] ISO 14982 [4] UNECE R10 [4]	CISPR 12 [4] EN 55012 [4] AS/NZS CISPR 12 [4] AS/NZS CISPR 12:2013 [4] ISO 7637-1 ISO 7637-2 [4] ISO 7637-3 [4] ISO 7637-4 [4] ISO 7637-5 [4] ISO 16750-2 CISPR 25 EN 55025 AS/NZS 25 AS/NZS 25:2010 ICES-002 [4]

Test Technology:	**Test Method(s)** [2, 3]**:**	
Generic, Product Family and Industry Standards (*EMC only*) [2]	IEC 61000-6-1 EN 61000-6-1 AS/NZS 61000.6.1 KN 61000-6-1 IEC 61000-6-2 EN 61000-6-2 AS/NZS 61000-6-2 KN 61000-6-2 IEC 61547 EN 61547 KN 61547 EN 50121-1 EN 50121-2 EN 50121-3-1 EN 50121-3-2 EN 50121-4 EN 50121-5 EN 50130-4 EN 55014-2 AS/NZS 14-2 CISPR 14-2 KN 14-2 CISPR 20 EN 55020 CISPR 24 EN 55024 KN 24 CISPR 35 EN 55035 KN 35 EN 50083-2 EN 50155 GR-1089 CNS 14674-1 to -3 ETSI EN 300 386 ETSI EN 301 489-01 to -26 ETSI EN 301 489-27 to -34 KN 301 489-01 to -26 KN 301 489-27 to -32 EN 50131-5-3 EN 62040-2 IEC 62040-2	EN 50293 IEC 61000-2-2 EN 61000-2-2 KN 61000-2-2 EN 55103-2 EN 50270 IEC 60945 EN 60945 KN 60945 IEC 60947-1 DNVGL-CG-0339 (Section 3, Clause 14) Lloyd's Register Type Approval System Test Specification Number 1 (Sections 21 to 30) ABS-Rules for Building and Classing – Steel Vessels (Sections 11 to 18) KN 60974-10 EN 60974-1
Electric Meter EMC	ANSI C12.1 ANSI C12.20	ANSI/IEEE C37.90

Test Technology:	**Test Method(s)** [2, 3]**:**	
RF Exposure (*Excluding SAR*) [4]	ANSI/IEEE C95 IEC 62233 EN 62233 EN 50364 Health Code 6	EN 62479 EN 62311 EN 62493 AS/NZS 2772.2 ARPANSA RPS3
Medical and Laboratory (*EMC only*) [2, 4]	KN 60601-1-2 IEC 60601-1-2 EN 60601-1-2 JIS T 0601-1-2 IEC 61326-1 EN 61326-1 IEC 61326-2-1 EN 61326-2-1 IEC 61326-2-2	EN 61326-2-2 IEC 61326-2-3 EN 61326-2-3 IEC 61326-2-4 EN 61326-2-4 IEC 61326-2-5 EN 61326-2-5 IEC 61326-2-6 EN 61326-2-6 JIS C 1806-1
Radio Communications (*Excluding Protocol Testing*)	ETSI EN 300 086 ETSI EN 300 113 ETSI EN 300 220-1 ETSI EN 300 220-2 ETSI EN 300 220-3-1 ETSI EN 300 220-3-2 ETSI EN 300 220-4 ETSI EN 300 296 ETSI EN 300 328 ETSI EN 300 330 ETSI EN 300 373-1 ETSI EN 300 373-2 ETSI EN 300 373-3 ETSI EN 300 390 ETSI EN 300 440 ETSI EN 300 440-2 ETSI EN 300 433 ETSI EN 300 683 ETSI EN 301 178 ETSI EN 301 360 ETSI EN 301 426 ETSI EN 301 427	ETSI EN 301 428 ETSI EN 301 430 ETSI EN 301 502 ETSI EN 301 511 ETSI EN 301 459 ETSI EN 301 908-1 to -22 ETSI EN 301 893 ETSI EN 302 017 ETSI EN 302 018 ETSI EN 302 208 ETSI EN 302 065-1 to -4 ETSI EN 303 098-2 ETSI EN 303 132 ETSI EN 303 135 ETSI EN 303 609 3GPP TS 37.113 C-IS2031-0 (IS2031-0) C-IS2034-1 (IS2034-1) LP 0001 LP 0002 RTTE01 BETS-6

<table>
<tr><th>Test Technology:</th><th>Test Method(s) [2, 3]:</th></tr>
<tr><td>Radio Communications (cont.)</td><td>

AS/NZS 4268: 2017 - Radio equipment and systems - Short Range Devices) - Limits and methods of measurement.
AS/NZS 4280.1 (2017) - 406 MHz satellite distress beacons – Marine emergency position-indicating radio beacons (EPIRB) (IEC61097-2, Ed.3.0(2008), MOD)
AS/NZS 4280.2 (2016) - 406 MHz satellite distress beacons – Personal locator beacons (PLBs)
AS/NZS 4281 (2007) - Radiocommunications (Cordless Telephone) Standard 2008, Radiocommunications requirements for cordless telephones operating in the 1.7 MHz and between 30 and 41 MHz frequency band
AS/NZS 4295:2015 - Analogue speech (angle modulated) equipment operating in land mobile and fixed service bands in the frequency range 29.7 MHz to 1 GHz.
AS/NZS 4330 (2006) - Radiocommunications (121.5 MHz and 243.0 MHz Emergency Position Indicating Radio Beacons) Standard 2014
AS/NZS 4770 (2000) - Radiocommunications (MF and HF equipment - Land Mobile Service) Standard 2003 and 2014

<table>
<tr><td>ARIB Standard STD-T57
ARIB Standard STD-T66
ARIB Standard STD-T67</td><td>ARIB Standard STD-T70
ARIB Standard STD-T81
ARIB Standard STD-T82</td></tr>
</table>
Article 2 paragraph 1, Item 19 = 2.4 GHz;
Article 2 paragraph 1, Item 19-2 = 2.4 GHz;
Article 2 paragraph 1, Item 19-3 = 5 GHz;
Article 2 paragraph 1, Item 19-5 = 4.9 GHz;
Article 2 paragraph 1, Item 19-6 = 4.9 GHz;
Article 2 paragraph 1, Item 19-9 = 4.9 GHz;
Article 2 paragraph 1, Item 19-10 = 4.9 GHz

Regulations on Radio Equipment
(Enforcement Decree of MSIT NO. 1, Jul 26, 2017);
Unlicensed Radio Equipment Established Without Notice
(MSIP Public Notification 2017-21, Mar 31, 2017);
Technical Requirements for the Human Protection Against Electromagnetic Waves
(MSIP Public Notification 2015-18, Mar 25, 2015);
Technical Requirements for Measurement of Electromagnetic Field Strength (RRA Public Notification 2014-2, Feb 4, 2014);
Conformity Assessment Procedure of Radio Equipment
(KS X 3123);
Technical Requirements of Other Service Radio Equipment for Simple Radio Station, Space Station, and Earth Station
(RRA Public Notification 2016-21, Sep 30, 2016)
</td></tr>
</table>

Test Technology:	**Test Method(s)** [2, 3]**:**	
Radio Communications) (*cont.*)	HKCA 1007 HKCA 1016 HKCA 1033 HKCA 1039 HKCA 1042 HKCA 1049 HKCA 1061 HKCA 1065 IMDA TS SRD IMDA TS AR IMDA TS WBA IMDA TS LMR IMDA TS RPG IMDA TS CBS IMDA TS UWB IMDA TS EMC IMDA TS GMPCS IMDA TS CMT RSS-GEN RSS-102 (*RF Exposure only*) RSS-111	RSS-112 RSS-117 RSS-119 RSS-123 RSS-125 RSS-130 RSS-131 RSS-132 RSS-133 RSS-134 RSS-135 RSS-137 RSS-139 RSS-182 RSS-210 RSS-211 RSS-216 RSS-220 RSS-222 RSS-236 RSS-247 RSS-287
	PLMN01 PLMN04 PLMN05	PLMN06 PLMN08

Product Family:	**Supporting Standard(s)/Method(s)** [2, 3]**:**	
FCC Radio Testing		
Scope	**Test Method(s)**	**Maximum Frequency (MHz)**
Unintentional Radiators (FCC Part 15B)	ANSI C63.4-2014	40000
Industrial, Scientific, and Medical Equipment (FCC Part 18)	FCC MP-5 (February 1986)	220000
Intentional Radiators (FCC Part 15C)	ANSI C63.10-2013	220000
Unlicensed Personal Communication Systems Devices (FCC Part 15D)	ANSI C63.17-2013	220000
U-NII without DFS Intentional Radiators (FCC Part 15E)	ANSI C63.10-2013	220000
U-NII with DFS Intentional Radiators (FCC Part 15E)	FCC KDB Publication 905462 D02 UNII DFS Compliance Procedures New Rules	220000
UWB Intentional Radiators (FCC Part 15F)	ANSI C63.10-2013	220000
BPL Intentional Radiators (FCC Part 15G)	ANSI C63.10-2013	40000
White Space Device Intentional Radiators (FCC Part 15H)	ANSI C63.10-2013	220000
Commercial Mobile Services (FCC Licensed Radio Service Equipment) Part 22 (cellular) Part 24 Part 25 (below 3 GHz) Part 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26-2015	220000
General Mobile Radio Services (FCC Licensed Radio Service Equipment) Part 22 (non-cellular) Part 90 (below 3 GHz) Part 95 Part 97 (below 3 GHz) Part 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26-2015	220000
Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment) Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26-2015	220000

Product Family:	**Supporting Standard(s)/Method(s)** [2, 3]**:**	
Maritime and Avionics Radio Services (FCC Licensed Radio Service Equipment) Part 80 Part 87	ANSI/TIA-603-E; ANSI C63.26-2015	220000
Microwave and Millimeter Bands Radio Services (FCC Licensed Radio Service Equipment) Part 25 Part 30 Part 74 Part 90 (M, DSRC, Y, Z) Part 95 (M and L) Part 101	ANSI/TIA-603-E TIA-102.CAAA-E ANSI C63.26-2015	220000
Broadcast Radio Services (FCC Licensed Radio Service Equipment) Part 73 Part 74 (below 3 GHz)	ANSI/TIA-603-E TIA-102.CAAA-E ANSI C63.26-2015	220000
Signal Boosters (Part 20) - Wideband Consumer Signal Boosters, - Provider-specific signal boosters - Industrial Signal Boosters	ANSI C63.26-2015 FCC KDB Publication 935210 D03, D04 and D05	220000

Product Family:	**Supporting Standard(s)/Method(s)** [2, 3]**:**	
RTCA/DO 160 D/E/F/G	Sections 15, to 22, & 25 only	
MIL STD 1275 B/C/D/E	All Sections	
MIL-STD-461 D/E/F/G	CE101 CE102 RS101 RS103 (*20 V/m at 1 metre distance from 10 kHz to 18 GHz*) RS105 CE106 RE101 RE102 RE103 CS101	CS102 CS103 CS104 CS105 CS109 CS114 (*maximum of Curve 4 from 10 kHz to 400 MHz*) CS115 CS116 CS117 CS118

Product Family:	**Supporting Standard(s)/Method(s)** [2, 3]**:**	
MIL-STD-461A/B/C/462	CE01 CE02 CE03 CE04 CE06 CE07 RS01 RS03 RE01	RE02 RE03 CS01 CS02 CS03 CS04 CS05 CS06
MIL-STD- 461D / 461E / 462D / 462G	CE101 CE102 CE106 RS101 RS103 RE101 RE102 RE103	CS101 CS103 CS104 CS105 CS109 CS114 CS115 CS116
MIL-STD-461F	CE101 CE102 CE106 RS101 RS103 RE101 RE102 RE103 CS101	CS103 CS104 CS105 CS106 CS109 CS114 CS115 CS116
Product Family:	**Supporting Standard(s)/Method(s)** [2, 3]**:**	
DEF STAN 59-411 Part 3 Section 3 Issue 1 Amdt 1 (dated 16 May 2003) Tests, per the following DEF STAN 59-411 Part 3 Section 3 Amdt 1 Test Methods.	DCE01.B, DCE02.A/B, DCE03.B DRE01.A/B, DRE02.A/B, DRE03.A/B	DRS01.A/B, DRS02.A/B, DRS03.B, DCS01.B, DCS02.A/B, DCS03.B, DCS04.B, DCS05.B, DCS06.B, DCS08.B, DCS09.B, DCS10.A/B, DCS12.B
MIL-STD-704F	28 VDC Power Test Methods specified in MIL-HDBK-704-1 (dated 9 April 2004) and MIL-HDBK-704-8 (dated 9 April 2004) Single Phase 115 VAC 60 Hz Power Test Methods specified in MIL-HDBK-704-1 (dated 9 April 2004) and MIL-HDBK-704-6 (09 April 2004)	
MIL-STD-1399/300B	ELECTRIC POWER, ALTERNATING CURRENT	

[1] *This accreditation covers testing performed at the main laboratory listed above, and the satellite laboratory listed below*:

UBC Malcom Knapp Research Forest
QAI Laboratories EMC Test Facility
14500 Silver Valley Road
Maple Ridge, BC, Canada, V4R 2R3

<table>
<tr><th>Test Technology:</th><th colspan="2">Test Method(s) [2, 3]:</th></tr>
<tr><td>Emissions</td><td colspan="2"></td></tr>
<tr><td rowspan="2">Conducted and Radiated
(10m OATS, up to 1 GHz)</td><td colspan="2">47 CFR FCC Part 18 (using FCC OST/MP-5:1986)
47 CFR FCC Part 15, Subpart B (using ANSI C63.4:2014)</td></tr>
<tr><td>FCC MP-5:1986
CISPR 11
EN 55011
AS/NZS CISPR 11
AS/NZS CISPR 11 (2011)
KN 11
CISPR 12
EN 55012
AS/NZS CISPR 12
AS/NZS CISPR 12 (2013)</td><td>CISPR 22
EN 55022
AS/NZS CISPR 22 2
AS/NZS CISPR 22 (2009+A1:2010)
KN 22
CISPR 32
EN 55032
AS/NZS 32 (2015)
KN 32
VCCI V-15
ICES-001
ICES-003
ICES-005
ICES-006</td></tr>
</table>

[2] The laboratory is only accredited for testing activities outlined within the test methods listed above. Reference to any other activity within these standards, such as risk management or risk assessment, does not fall within the laboratory's accredited capabilities.

[3] 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*.

[4] This laboratory meets A2LA R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories for these tests.

<u>On the following systems and products:</u>
Wireless/radio devices and electromechanical and electronic equipment for: information technology (ITE); industrial, scientific, and medical (ISM) applications; residential service; household appliances, small tools and similar apparatus; receivers; licensed and unlicensed transmitters/transceivers; UPS systems; alarm/security systems; central office telephone equipment; heavy industrial equipment; marine equipment; consumer audio/video equipment; professional audio/video equipment; arc welders; PLC controllers; lifts, escalators and passenger conveyers; land vehicles and electrical subassemblies/components for: commercial and military land vehicles, commercial aircraft, military and naval ships, submarines and small craft, commercial ships, yachts and small craft; and scientific and laboratory apparatus.

Accredited Laboratory

A2LA has accredited

QAI LABORATORIES LTD.

Burnaby, British Columbia, Canada

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 11th day of February 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3657.02
Valid to October 31, 2020

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