SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

NATIONAL TECHNICAL SYSTEMS[1]
41039 Boyce Road
Fremont, CA 94538
Ms. Laura Bader Phone: 510 578 3500

ELECTRICAL (EMC)

Valid to: September 30, 2019 Certificate Number: 0214.26

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with A2LA's EPA ENERGY STAR® Accreditation Program requirements), accreditation is granted to this laboratory listed above, ***as well as the 2 satellite laboratories listed below***, to perform the following electromagnetic compatibility, NEBS, radio, wireless, telecom and energy producing/measuring devices, and product safety tests:

Test:	**Test Method(s)[2]:**
Emissions	
Radiated & Conducted (5 & 10 meter Semi-anechoic chambers)	Code of Federal Regulation (CFR) 47, FCC Part 15B (using ANSI C63.4:2014); FCC Part 18 (using FCC MP-5:1986); EN 55011; KN 11; CISPR 11; AS/NZS CISPR 11; ICES-001; EN 55022; KN 22; CISPR 22; AS/NZS CISPR 22; EN 55032; CISPR 32; KN 32; AS/NZS CISPR 32; ICES-003; CNS 13438 (*up to 6 GHz*); VCCI V-3 (*up to 6 GHz*); VCCI-CISPR 32:2016; ICES-005; ICES-006; TEC/EMI/TEL-001/01/FEB-09; TCVN 7189:2009; SI 961 Parts 6.1 and 6.2; IFT-008-2015
Current Harmonics	EN 61000-3-2; IEC 61000-3-2; KN 61000-3-2; AS/NZS 61000-3-2
Voltage Fluctuations	EN 61000-3-3; IEC 61000-3-3; KN 61000-3-3; AS/NZS 61000-3-3
Immunity	
Electrostatic Discharge (ESD)	EN 61000-4-2; IEC 61000-4-2; KN 61000-4-2
Radiated Immunity	EN 61000-4-3; IEC 61000-4-3; KN 61000-4-3
Electrical Fast Transient/Burst	EN 61000-4-4; IEC 61000-4-4; KN 61000-4-4
Surge Immunity	EN 61000-4-5; IEC 61000-4-5; KN 61000-4-5
Conducted Immunity	EN 61000-4-6; IEC 61000-4-6; KN 61000-4-6
Power Frequency Magnetic Field Immunity	EN 61000-4-8; IEC 61000-4-8; KN 61000-4-8

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Test:	**Test Method(s)[2]:**
Immunity (cont.)	
Pulse Magnetic Field Immunity	EN 61000-4-9; IEC 61000-4-9
Voltage Dips, Short Interruptions, and Line Voltage Variations	EN 61000-4-11; IEC 61000-4-11; KN 61000-4-11
Generic and Product Family Standards	IEEE 1613; IEEE 1613a; IEC 60533; IEC 61850-3; IEEE 37.90.1; IEC 60092-504 (*Section 5: Table 1, Items 4a, 4b, 5, 11a & 11b only*); EN 61000-6-1; KN 61000-6-1; EN 61000-6-2; KN 61000-6-2; EN 61000-6-3; KN 61000-6-3; EN 61000-6-4; KN 61000-6-4; AS/NZS 61000.6.3; AS/NZS 61000.6.4; IEC 61000-6-5; EN 61000-6-5; CISPR 13; CNS 13439; EN 50121-1; EN 50121-3-2; EN 50121-4; EN 50155; EN 55013; KN 13; CISPR 20 (*only for audio/video equipment without tuner*); EN 55020 (*only for audio/video equipment without tuner*); KN 20 (*only for audio/video equipment without tuner*); CISPR 24; EN 55024; CISPR 25 (*Section 6 only*); EN 50130-4; EN 55014-1 (*excluding click measurement*); CISPR 14-1 (*excluding click measurement*); KN 14-1 (*excluding click measurement*); CISPR 14-2; KN 14-2; EN 55014-2; EN 55103-1; EN 55103-2; CISPR 16-2-3; CISPR 16-2-4; CISPR 35; KN 35; EN 55035; EN 61326-1; EN 61326-2-1; EN 61326-2-6; IEC 60601-1-2; EN 60601-1-2; KN 60601-1-2; EN 60601-2-2 (*Section 36 only*); EN 60601-2-10 (*Section 36 only*); EN 60601-2-18; EN 60601-2-22; EN 60601-2-24 (*Section 36 only*); AS/NZS 3200.1.2; ISO 15197 (*Section 6.4 only*); EN 301 437; EN 300 386; EN 301 449 (*4.2.2.2.2, 4.2.2.2.3, 4.2.3, 4.2.4, 4.2.5, 4.2.6, and 4.2.7 only*); EU-ITU-T: K.20 (*except 2.1.5, 2.1.6, 2.2 above 600V, 4.2 above 600V, 5.1.2 & 5.2.2 above 600V*), K.21 (*except 2.1.5, 2.1.6, 2.2 above 600V, 4.1.5, 4.2 above 600V, and 5.1.2 & 5.2.2 above 600V*); British Telecommunications Standard GS7; TEC/EMI/TEL-001/01/FEB-09; Deutsche Telekom EMC Specification 1 TR 9; ANATEL Resolution 442; Enforcement Decree of MSIT NO. 1, July 26, 2017; TEC-SD-DD-EMC-221-05-OCT-16
Technical Regulations for the Republic of Korea	Notice on Conformity Assessment of Broadcasting and Communications Equipment (RRA Public Notification 2015-26, November 30, 2015); KS X 3123
Network Equipment Building Systems (NEBS**)**	Telcordia GR-1089-CORE, (*Sections 1, 2, 3, 4* (*excluding 4.6.1.3.2 and 4.6.2.1.2.2A*), *7, 9, and 10 only*)

Test:	**Test Method(s)[2]:**
Network Equipment and Power Grounding, Environmental, and Physical Design Requirements	AT&T ATT-TP-76200 (*excluding Section 2.7*)
Wireless (*Excluding HAC & SAR as applicable*)	ANSI/TIA 603-D-2010; EN 300-113-1 (*excluding Sections 8.1-8.8 and 9*); EN 300-113-2 (*excluding Sections 4.3.1 through 4.3.5*); EN 300 220-1; EN 300 220-2; EN 300 220-3; EN 300 328; EN 300 330-1; EN 300 330-2; EN 300 440-1; EN 300 440-2; EN 300 761-1; EN 300 761-2; EN 301-357-2; EN 301 893; EN 302 208-1; EN 302 208-2; EN 302 291-1; EN 302 291-2; EN 302 502; EN 301 489-1 to -27 (*except 21*); EN 301 511; EN 301 908-1; EN 301 908-5; EN 303 413; ES 203 021; KN 301 489-01; KN 301 489-17; KN 301 489-3; KN 301 489-7; KN 301 489-24; KN 301 489-27; Radiocommunications Standard 2014 (Short Range Devices); AS/NZS 4268; NOM-121-SCTI-2009; LP0002; HKCA 1039; HKCA 1049; Republic of Korea - Regulations on Radio Equipment (MSIP Public Notification 2015-89, November 11, 2015); Republic of Korea - Conformity Assessment Procedure of Radio Equipment (RRA Announce 2015-81, September 30, 2015); QCVN 18:2014/BTTTT; QCVN 47:2015/BTTTT; QCVN 55:2015/BTTTT; QCVN 73:2013/BTTTT; QCVN 74:2013/BTTTT; QCVN 88:2015/BTTTT; QCVN 94:2015/BTTTT; QCVN 95:2015/BTTTT; QCVN 96:2015/BTTTT; QCVN 54:2011/BTTTT; QCVN 65:2013/BTTTT TCN 68.242:2006; ANATEL Resolution 506; Israel - Wireless Telegraph Ordinance (Ordinance Non-application Directive) 1982; IMDA TS SRD; IMDA TS LMR
Industry Canada Radio Standards Specifications (RSS) in Category I Equipment Standards List (*Excluding HAC & SAR as applicable*)	RSS-GEN; RSS-102; RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-247; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-311

Test:	**Test Method(s)[2]:**
Intentional and Unintentional Radiators to FCC Regulations, up to 200 GHz (*Excluding HAC & SAR as applicable*)	47 CFR (FCC Rules) Parts 2 and 11; 47 CFR (FCC Rules) Part 15B (using ANSI C63.4:2014); 47 CFR (FCC Rules) Part 15C (using ANSI C63.10:2013); 47 CFR (FCC Rules) Part 15D (using ANSI C63.17:2013); 47 CFR (FCC Rules) Part 15E (using ANSI C63.10:2013, FCC KDB 789033, FCC KDB 905462 D01 (v01); 47 CFR (FCC Rules) Part 15F (using ANSI C63.10:2013); 47 CFR (FCC Rules) Part 15G (using ANSI C63.10:2013); 47 CFR (FCC Rules) Part 15H (using ANSI C63.10:2013); 47 CFR (FCC Rules) Part 18 (using FCC MP-5:1986); 47 CFR (FCC Rules) Part 20 (signal boosters) (using FCC KDB 935210 D03, KDB 935210 D04 and KDB 935210 D05); 47 CFR (FCC Rules) Parts 22 (cellular and non-cellular), 24, 25, 27, 73, 74, 80, 87, 90, 95, 96, 97 and 101 (using ANSI/TIA 603-D-2010, TIA-102.CAAA-D, and FCC KDB 971168)
CTIA / Wi-Fi Alliance	Test Plan for Wireless Devices Over-the-Air Performance, Free Space Only (*Excluding CDMA, CDMA 1xEVDO, CDMA 1xRTT, A-GPS, AGNSS, GLONASS, and LTE-CA*); Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices
PTCRB	PVG.04

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

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Newark, CA 94560

Test:	**Test Method(s)[2]:**
Product Safety • Insulation Resistance • Leakage Current • Temperature Rise • Dielectric Strength • Short Circuit Tests • Grounding Impedance • Handle Strength • Cord Anchorage • Force Test • Clearance and Creepage • Distance Measurement • Temperature/Humidity (Environmental Conditioning) • Enclosure/Material Integrity • Current/Voltage/Watts Measurement • Impact (Steel Ball and Impact Hammer) • Stability • Accessibility • Drop Tests • Overload Tests • Wall-mount Tests • Strain Relief • Abnormal Operations • Marking Durability	EN/IEC 60825-1:2014 (*excluding section 5*); CSA C22.2 No. 61010-1; EN 61010-1; IEC 61010-1; UL 61010-1; IEC 61010-2-101; CSA C22.2 No. 61010-2-81; IEC 61010-2-81; EN 61010-2-81; CSA C22.2 No. 60950-1; IEC 60950-1; EN 60950-1; UL 60950-1; AS/NZS 60950-1; CSA C22.2 No. 61010-1-12; SI 60950 Part I; TCVN 7326-1:2003

Test:	**Test Method(s)[2]:**
***ENERGY STAR Tests*[3]** (*Using* IEC 62301:2011 *Household Electrical Appliances: Measurement of Standby Power*)	
Office Equipment	
Computers	ENERGY STAR Program Requirements Product Specification for Computers, Version 6.1; ENERGY STAR Test Method for Computers, August 2014; IEC 62623:2012; EPRI Generalized Test Protocol for Calculating the Energy Efficiency of Internal AC-DC and DC-DC Power Supplies (for products that have internal, multi-output, or single output with integral cooling power supplies)
Imaging Equipment DFE with Single Voltage External Power Supply	ENERGY STAR Program Requirements, Product Specification for Imaging Equipment, Version 2.0; ENERGY STAR Imaging Test Method, September 2014; IEC 62301:2011: Household Electrical Appliances – Measurement of Standby Power; Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies, Rev. August 11, 2004 at www.efficientpowersupplies.org
Data Center Storage	ENERGY STAR Program Requirements, Product Specification for Data Center Storage, Version 1.0; ENERGY STAR Test Method for Data Center Storage Equipment, August 2013
Large Network Equipment	ENERGY STAR Program Requirements Product Specification for Large Network Equipment, Version 1.0; ENERGY STAR Test Method for Large Network Equipment, December 2015; ATIS 0600015.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting General Requirements; ATIS 0600015.03.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting for Router and Ethernet Switch Products
Enterprise Servers	ENERGY STAR Program Requirements Product Specification for Computer Servers, Version 2.1; ENERGY STAR Test Method for Computer Servers, April 2016 Standard Performance Evaluation Corporation (SPEC) Version 1.1.1, February 2016 Server Efficiency Rating Tool (SERT)

Test:	**Test Method(s)[2]:**
Emissions	
Radiated and Conducted (5 meter Semi-anechoic chambers)	Code of Federal Regulation (CFR) 47, FCC Part 15B (using ANSI C63.4:2014); EN 55011; KN 11; CISPR 11; AS/NZS CISPR 11; ICES-001; ICES-003; ICES-005; ICES-006; VCCI V-3 (*up to 6 GHz*); VCCI-CISPR 32; TEC/EMI/TEL-001/01/FEB-09; TCVN 7189:2009; CISPR 22; AS/NZS CISPR 22; EN 55022; KN 22 (*Excluding Radiated Emissions below 1 GHz*); CNS 13438 (*Excluding Radiated Emissions below 1 GHz*); EN 55032; CISPR 32; AS/NZS CISPR 32; KN 32 (*Excluding 30-1000MHz*)
Immunity	
Current Harmonics	EN 61000-3-2; IEC 61000-3-2; KN 61000-3-2; IEC 61000-3-11; EN 61000-3-11; KN 61000-3-11
Voltage Fluctuations	EN 61000-3-3; IEC 61000-3-3; KN 61000-3-3; IEC 61000-3-12, EN 61000-3-12; KN 61000-3-12
Electrostatic Discharge (ESD)	EN 61000-4-2; IEC 61000-4-2; KN 61000-4-2
Radiated Immunity	EN 61000-4-3; IEC 61000-4-3; KN 61000-4-3
Electrical Fast Transient/Burst	EN 61000-4-4; IEC 61000-4-4; KN 61000-4-4
Surge Immunity	EN 61000-4-5; IEC 61000-4-5; KN 61000-4-5
Conducted Immunity	EN 61000-4-6; IEC 61000-4-6; KN 61000-4-6
Voltage Dips and Interrupts	EN 61000-4-11; IEC 61000-4-11; KN 61000-4-11
Generic and Product Family Standards	CISPR 35; KN 35; EN 300 386; CISPR 24; EN 55024; TCVN 7317; EN 61000-6-1; KN 61000-6-1; AS/NZS 61000-6-1; EN 61000-6-2; KN 61000-6-2; AS/NZS 61000-6-2; EN 61000-6-3; KN 61000-6-3 (*Excluding 30-1000MHz*); AS/NZS 61000-6-3; EN 61000-6-4; KN 61000-6-4 (*Excluding 30-1000MHz*); AS/NZS 61000-6-4; IEC 61000-6-5; EN 61000-6-5; TEC/EMI/TEL-001/01/FEB-09; TEC-SD-DD-EMC-221-05-OCT-16
Network Equipment Building Systems (NEBS)	Telcordia GR-1089-CORE, Sections 1, 2, 3, 4.1 to 4.3, 4.5, 4.6, 4.7 (*Excluding AC Power Fault*), 7, 9, and 10; Telcordia GR-63-CORE, Sections 5.1.1.1, 5.1.1.2, 5.1.1.3, 5.1.2, 5.3.1, and 5.3.2

Test:	**Test Method(s)[2]:**
Heat Dissipation	Telcordia GR-63-CORE, Section 4.1.6
Surface Temperature	Telcordia GR-63-CORE, Section 4.1.7
Low Temperature and Thermal Shock	Telcordia GR-63-CORE, Section 5.1.1.1
High Relative Humidity	Telcordia GR-63-CORE, Section 5.1.1.2
High Temperature and Thermal Shock	Telcordia GR-63-CORE, Section 5.1.1.3
Operational Temperature and Humidity	Telcordia GR-63-CORE, Section 5.1.2
Handling Drop Tests – Unpackaged Equipment	Telcordia GR-63-CORE, Section 5.3.2
Generic and Product Family Standards	British Telecommunications Standard GS7; TEC/EMI/TEL-001/01/FEB-09; Deutsche Telekom EMC Specification 1 TR 9; EN 50121-1; EN 50121-4; IEEE 1613; IEEE 1613.a; IEC 62236-4; IEC 61850-3
Wireless (*Excluding HAC and SAR as applicable*)	ETSI EN 301 489-1; ETSI EN 301 489-24; KS X 3123
ENERGY STAR Tests[3]	
Office Equipment	ATIS 0600015.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting General Requirements
Large Network Equipment	ENERGY STAR Program Requirements Product Specification for Large Network Equipment, Version 1.0; ENERGY STAR Test Method for Large Network Equipment, December 2015; ATIS 0600015.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting General Requirements; ATIS 0600015.03.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting for Router and Ethernet Switch Products

Test:	**Test Method(s)[2]:**
ENERGY STAR Tests (cont'd)[3]	
Small Network Equipment	ENERGY STAR Program Requirements Product Specification for Small Network Equipment, Version 1.0; ENERGY STAR Test Method for Small Network Equipment, July 2013; IEC 62301:2001 "Household electrical appliances – Measurement of standby power, Section 4, General Conditions for Measurements"; ATIS-0600015.08.2016 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting for Small Network Equipment
Energy Efficiency Tests	
Transport and Optical Access	ATIS-0600015.02.2016 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting –Transport & Optical Access Requirements; ATIS 0600015.2013 Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting General Requirements

On the following types of equipment:
Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Radio Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems.

[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] A2LA provides accreditation to the U.S. EPA's *Conditions and Criteria for Recognition of Laboratories for the ENERGY STAR Program* by verifying an organization's compliance to A2LA document *R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program* and to the related test methods listed above

Accreditation by A2LA does not infer Recognition by the EPA for ENERGY STAR testing. Please verify this organization's recognition status at the EPA's website, located at http://www.energystar.gov/index.cfm?fuseaction=recognized_bodies_list.show_RCB_search_form

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[4]:

Rule Subpart/Technology	**Test Method**	**Maximum Frequency (MHz)**
Unintentional Radiators Part 15B	ANSI C63.4:2014	40000
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	40000
Intentional Radiators Part 15C	ANSI C63.10:2013	200000
Unlicensed Personal Communication Systems Devices Part 15D	ANSI C63.17:2013	40000
U-NIII without DFS Intentional Radiators Part 15E	ANSI C63.10:2013	40000
U-NIII with DFS Intentional Radiators Part 15E	FCC KDB 905462 D02 (v01)	40000
UWB Intentional Radiators Part 15F	ANSI C63.10:2013	200000
BPL Intentional Radiators Part 15G	ANSI C63.10:2013	200000
White Space Device Intentional Radiators Part 15H	ANSI C63.10:2013	200000
Commercial Mobile Services (FCC Licensed Radio Service Equipment) Parts 22 (cellular), 24, 25 (non-microwave), and 27	ANSI/TIA-603-D; TIA-102.CAAA-D	40000
General Mobile Radio Services (FCC Licensed Radio Service Equipment) Parts 22 (non-cellular), 90 (non-microwave), 95, 97, and 101 (non-microwave)	ANSI/TIA-603-D; TIA-102.CAAA-D	40000
Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment) Part 96 Maritime and Aviation Radio Services	ANSI/TIA-603-D; TIA-1-2.CAAA-D	200000
Parts 80 and 87	ANSI/TIA-603-D	200000

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1[4]:

Rule Subpart/Technology	**Test Method**	**Maximum Frequency (MHz)**
Microwave and Millimeter Bands Radio Services Parts 25, 74, 90 (90Y, 90Z, DSRC), and 101	ANSI/TIA-603-D; TIA-102.CAAA-D	200000
Broadcast Radio Services Parts 73 and 74 (non-microwave)	ANSI/TIA-603-D; TIA-102.CAAA-D	40000
Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)	FCC KDB 935210 D03 (v04); FCC KDB 935210 D04 (v02); FCC KDB 935210 D05 (v01r01)	200000

[4]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

NATIONAL TECHNICAL SYSTEMS

Fremont, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of A2LA *R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program*. 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 8 January 2009*).

Presented this 27th day of December 2017.

President and CEO
For the Accreditation Council
Certificate Number 0214.26
Valid to September 30, 2019

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