



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

PCTEST ENGINEERING LABORATORY, INC.¹
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San Jose, CA 95138
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ELECTRICAL

Valid To: May 31, 2020

Certificate Number: 2041.02

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 EMC, SAR, HAC, and OTA testing of wireless devices:

Test Technology:

Test Method(s):

RF Exposure / SAR (Specific Absorption Rate)

IEEE 1528-2013; RSS 102; RSS-102 SPR-002;
EN 50566-2017; EN 50360-2017;
EN 62209-1:2016; EN 62209-2:2010;
IEC 62209-1:2016; IEC 62209-2:2010; IEC PAS 63083:2017;
Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 2014;
FCC KDB 447498 D01, D02, D03; FCC KDB 248227 D01;
FCC KDB 941225 D01, D05, D05A, D06, D07;
FCC KDB 616217 D04; FCC KDB 643646 D01;
FCC KDB 648474 D03, D04; FCC KDB 865664 D01, D02;
FCC KDB 615223 D01; FCC KDB 680106 D01;
EN 62479:2010; IEC 62479:2010; EN 50663:2017; EN 62311:2008

Hearing Aid Compatibility

ANSI C63.19:2011; CTIA Test Plan for Hearing Aid Compatibility;
FCC KDB 285076 D01, D02

OTA

CTIA Test Plan for Wireless Device Over-the-Air Performance for CDMA, 1xEVDO Rev0/A, GSM, GPRS, EGPRS, UMTS (WCDMA), LTE CDMA aGPS, GSM aGPS, UMTS (WCDMA) aGPS; CTIA Test Plan for 2x2 Downlink MIMO and Transmit Diversity Over-the-Air Performance; PTCRB NAPRD.03; PTCRB PPMD; OTA Carrier Aggregation; OTA ECC Measurements; VZW OTA Radiated Performance for CDMA & LTE Multimode Devices; VZW Location Determination Test Plan; SPRINT OTA Antenna Performance Test Plan; SPRINT aGPS; AT&T 13340 OTA, AT&T IoT Accelerator; CTIA Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices

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

18855 Adams Court
Morgan Hill, CA 95037

Test Technology:

Test Method(s):

Emissions

Radiated and Conducted

47 CFR, FCC Parts 15B/C/E/F/G/H (using ANSI C63.4:2014, ANSI C63.10:2013, and/or FCC KDB 905462 D02 (v02)), and 18 (using MP-5:1986); IEC/CISPR 11; EN 55011; KN 11; CISPR 14-1; IEC/EN 55014-1; KN 14-1; IEC/CISPR 22; EN 55022; AS/NZS CISPR 22:2009 + A1:2010; EN 55032; CISPR 32; KN 32 (*Excluding Radiated Emissions below 1 GHz*); AS.NZS CISPR 32; ICES-001; ICES-003; VCCI V-3 (up to 6 GHz); CNS 13803; CNS13783-1; CNS 13438 (up to 6 GHz) (*excluding Radiated Emissions below 1 GHz*); TCVN 7189 (2009)

Harmonic Current

IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2

Flicker and Fluctuations

IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3

Immunity

Electrostatic Discharge (ESD)

EN 61000-4-2; IEC 61000-4-2; KN 61000-4-2

Radiated Immunity

IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3

Electrical Fast Transient/Burst

IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4

Surge Immunity

IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5

Conducted Immunity

IEC 61000-4-6; EN 61000-4-6; KN 61000-4-6

Power Frequency Magnetic Field Immunity

IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8

Voltage Dips, Short Interrupts, and Line Voltage Variations

IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11

Harmonics and Inter-harmonics

EN 61000-4-13; IEC 61000-4-13

Voltage Fluctuations

EN 61000-4-14; IEC 61000-4-14

Voltage Frequency Variations

EN 61000-4-28; IEC 61000-4-28

Voltage Dips, Short Interruptions and Voltage Variations on DC Input Power Port

EN 61000-4-29; IEC 61000-4-29



Test Technology:

Test Method(s):

**Generic or Product Specific
EMC Standards**

Laboratory

IEC/EN 61326-1; IEC/EN 61326-2; IEC/EN 61326-3-1;
IEC/EN 61326-3-2

Medical

IEC/EN 60601-1-2; KN 60601-1-2

Generic or Product Specific Immunity
Standards

EN/IEC 61000-6-1; EN/IEC 61000-6-2;
EN/IEC 61000-6-3; EN/IEC 61000-6-4;
KN 61000-6-1; KN 61000-6-2;
KN 61000-6-3; KN 61000-6-4;
IEC/EN 61204-3;
EN/IEC 61547; KN 61547;
EN 62233; EN 55103-1; EN 55103-2;
EN/IEC 61800-3; KN 61800-3;
CISPR 24; EN 55024; KN 24
EN 50121-1; EN 50130-4;
EN 55103-2; EN 50121-4; EN 50121-3-2; EN/IEC 50155;
EN 50270; EN 50293;
EN/IEC 55014-2; IEC/CISPR 14-2; KN 14-2;
EN 50370-1; EN 50370-2; EN 50361; EN 50364; EN 50371;
KN 15; KN 35

**EMC for Radio Equipment and
Services**

ETSI EN 301 489-1; ETSI EN 301 489-3; ETSI EN 301 489-4;
ETSI EN 301 489-5; ETSI EN 301 489-6; ETSI EN 301 489-7;
ETSI EN 301 489-8; ETSI EN 301 489-9; ETSI EN 301 489-10;
ETSI EN 301 489-12; ETSI EN 301 489-15; ETSI EN 301 489-16;
ETSI EN 301 489-17; ETSI EN 301 489-18; ETSI EN 301 489-19;
ETSI EN 301 489-20; ETSI EN 301 489-23; ETSI EN 301 489-24;
ETSI EN 301 489-25; ETSI EN 301 489-26; ETSI EN 301489-52;
ETSI EN 300 386 V1.5.1/ V1.6.1;
KN 301 489-01; KN 301 489-03; KN 301 489-07; KN 301 489-17

RF Exposure / SAR (Specific
Absorption Rate)

IEEE 1528-2013; RSS 102; RSS-102 SPR-002
EN 50566-2017; EN 50360-2017;
EN 62209-1:2016; EN 62209-2:2010;
IEC 62209-1:2016; IEC 62209-2:2010; IEC PAS 63083:2017;
Australian Communications Authority Radio Communications
(Electromagnetic Radiation – Human Exposure) Standard 2014;
FCC KDB 447498 D01, D02, D03; FCC KDB 248227 D01;
FCC KDB 941225 D01, D05, D05A, D06, D07;
FCC KDB 616217 D04; FCC KDB 643646 D01;
FCC KDB 648474 D03, D04; FCC KDB 865664 D01, D02;
FCC KDB 615223 D01; FCC KDB 680106 D01;
EN 62479:2010; IEC 62479:2010; EN 50663:2017;
EN 62311:2008; ANSI/IEEE C95.1-2005; ANSI/IEEE C95.1-1992;
ANSI/IEEE C95.3-2002; ANSI/IEEE C95.3.1-2010



Test Technology:

Test Method(s):

Radio

Licensed Transmitter / Receiver Emissions

47 CFR Parts 2, 11, 20, 21, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, and 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E or ANSI C63.26-2015, FCC KDB 935210 D03 (v04), FCC KDB 935210 D04 (v02), FCC KDB 935210 D05 (v01r01)); ANSI/TIA-603-C, ANSI/TIA-603-D, ANSI C63.4-2014; EN 301 126-1; EN 301 390; EN 301 751; EN 302 217-1; EN 302 217-2-1; EN 302 217-2-2; EN 302 217-2; EN 302 217-3; EN 302 326-2

Land Mobile

CFR 47 Part 90 (using ANSI/TIA 603-D, ANSI/TIA 603-E); EN 300 224; EN 300 224-2; EN 300 341 EN 300 113; EN 301 166; EN 300 390; EN 300 471-1; EN 300 471-2

Short Range

EN 300 330; EN 300 220-2; EN 300 220-3-1; EN 300 220-3-2; EN 300 220-4; EN 300 440; EN 300 440-2; EN 300 328; EN 302 536-2; EN 302 571; EN 305 550-2 EN 301 893 (*Includes on-site DFS*); EN 302 502 (*Includes on-site DFS*); EN 301 559; EN 301 598; EN 302 544-1; EN 302 544-2; EN 301 091-1; EN 301 091-2; EN 302 208; EN 302 291-1; EN 302 291-2; EN 303 204; EN 302 065-1; EN 302 065-2; EN 302 065-3; EN 302 065-4

Cellular/PCS

EN 300 433; EN 301 502; EN 301 511; EN 301 908-1; EN 301 908-2; EN 301 908-3; EN 301 908-10; EN 301 908-11; EN 301 908-12; EN 301 908-13; EN 301 908-14; EN 301 908-15; EN 301 908-16; EN 301 908-17; EN 301 908-18; EN 301 908-19; EN 301 908-20; EN 301 908-21; EN 301 908-22

Licensed Wireless Devices

ANSI C63.26:2015; ANSI/TIA-603-D; TIA-102.CAAA-D; ANSI/TIA-603-E

Transmitter/Receiver

Output Power

Conducted Spurious Emissions

Radiated Spurious Emissions

Occupied Bandwidth

Frequency Stability

ERP/EIRP

Audio Frequency Response

LP Filter Frequency Response

Modulation Limiting

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 287; RSS 288; RSS 310; RSS Gen



Test Technology:

Test Method(s):

Country Specific Requirements

Korea

Regulations on Radio Equipment

Enforcement Decree of MSIP No. 78, August 12, 2016

Unlicensed Radio Equipment
Established Without Notice

MSIP Public Notification 2016-127, December 6, 2016

Conformity Assessment Procedure of
Radio Equipment

RRA Announce 2015-135, January 5, 2016 (effective July 1, 2016);
KS X 3123

Technical Requirements for
Measurement of Electromagnetic Field
Strength

RRA Public Notification 2014-2, February 4, 2014

Technical Requirements for Radio
Equipment for Telecommunication
Services

RRA Public Notification 2016-11, June 13, 2016

Technical Requirements for
Telecommunications Terminal
Equipment

RRA Public Notification 2016-12, June 20, 2016

Technical Requirements for
Electromagnetic Compatibility

RRA Public Notification 2015-27, December 3, 2015

Test Methods for Electromagnetic
Compatibility

RRA Announce 2015-110, December 3, 2015

Hong Kong

HKCA 1039; HKCA 1042; HKCA 1049; HKCA 1053;
HKCA 1054; HKCA 1056; HKCA 1057; HKCA 1061

Singapore

IMDA TS WBA (October 2016); IMDA TS SRD (October 2016);
IMDA TS LMR (October 2016)

Taiwan

DGT C-IS2031-0; DGT C-IS2034-0; DGT LP0001; DGT LP0002;
CNS 13438 (up to 6 GHz)

Australia

ACMA Radiocommunications
(Short range devices) Standard
2014

AS/NZS 4268:2017



Test Technology:

Vietnam

QCVN 54:2011/BTTTT

QCVN 65:2013/BTTTT

TCVN 7317:2003

TCVN 7189:2009

TCVN 7317:2003

QCVN 14:2010/BTTTT

QCVN 15:2015/BTTTT

QCVN 16:2010/BTTTT

QCVN 18:2014/BTTTT

QCVN 23:2011/BTTTT

QCVN 25:2011/BTTTT

QCVN 41:2011/BTTTT

QCVN 42:2011/BTTTT

QCVN 43:2011/BTTTT

QCVN 44:2011/BTTTT

QCVN 45:2011/BTTTT

QCVN 46:2011/BTTTT

QCVN 48:2011/BTTTT

QCVN 49:2011/BTTTT

QCVN 54:2011/BTTTT

QCVN 65:2013/BTTTT

QCVN 66:2013/BTTTT

QCVN 18:2014/BTTTT

QCVN 55:2011/BTTTT

QCVN 53:2011/BTTTT

QCVN 11:2010/BTTTT

QCVN 73:2013/BTTTT

QCVN 74:2013/BTTTT

QCVN 95:2015/BTTTT

QCVN 96:2015/BTTTT

Test Method(s):

RF 2.4 GHz Spread Spectrum

National technical regulation on radio access equipment operating in the 5 GHz band

TTE Immunity Requirements

Vietnam CISPR 22 Requirements

Radio equipment for fixed or land portable services

RFID Equipment

Point-to-point SDH radio equipment

Mobile Station

Technical Regulation on Short Range Devices (SRD) - Radio Equipment to be used in the 25 MHz to 1 GHz Frequency Range

Technical Regulation on Short Range Devices (SRD) - Radio Equipment to be used in the 1 GHz to 40 GHz Frequency Range

Technical Regulation on Radio Frequency Identification Equipment (RFID) Operating in the band 866 MHz to 868 MHz

Technical Regulation on the Electromagnetic Compatibility for Short Range Devices (SRD) Operating on Frequencies between 9 kHz and 40 GHz



Test Technology:

Japan

Test Method(s):

(Specified Radio Equipment Article 38-2-2, paragraph 1), Item 1 of Radio Law; (Specified Radio Equipment Article 38-2-2, paragraph 1), Item 2 of Radio Law; (Specified Radio Equipment Article 38-2-2, paragraph 1), Item 3 of Radio Law; ARIB Standard STD-T29 ; STD-T53 ; STD-T56 ; STD-T57 ; STD-T64 ; STD-T66 ; STD-T70 ; STD-T71 ; STD-T81 ; STD-T90, STD-T106, STD-T107, STD-T108

Mexico

Radiated Emission

NOM-084-SCT1-2002 Sections: 5.1, 5.2, 5.3, 5.4 & 5.5 (includes all subsections) NOM-088/2-SCT1-2002 Sections: 6.1, 6.2 ,6.3 & 6.4 (includes all subsections) IFT-008-2015 Sections: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 & 5.7 (includes all subsections except 5.3.4 and 5.3.5)

Conducted Emission

IFT-008-2015 Subsections: 5.1.4.1, 5.2.1, 5.2.2.1, 5.2.3, 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.3,5.4.1.M1, 5.4.1.M2, 5.4.2. A1-M1, 5.4.2. A2, 5.4.2. A2-M2, 5.4.2. A2-M3, 5.4.2. A2-M4,5.4.3, 5.5.1, 5.5.2, 5.6.1, 5.6.1.1, 5.6.1.2, 5.6.2

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.1²:

Rule Subpart/Technology	Test Method	Maximum Frequency
Unintentional Radiators Part 15B	ANSI C63.4:2014	40 GHz
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	220 GHz
Intentional Radiators Part 15C	ANSI C63.10:2013	220 GHz
U-NII without DFS Intentional Radiators Part 15E	ANSI C63.10:2013	40 GHz
U-NII with DFS Intentional Radiators Part 15E	FCC KDB 905462 D02 (v02)	40 GHz
UWB Intentional Radiators Part 15F	ANSI C63.10:2013	200 GHz
BPL Intentional Radiators Part 15G	ANSI C63.10:2013	40 GHz

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.1²:

Rule Subpart/Technology	Test Method	Maximum Frequency
White Space Device Intentional Radiators Part 15H	ANSI C63.10:2013	40 GHz
Commercial Mobile Services (FCC Licensed Radio Service Equipment) Parts 22 (cellular), 24, 25 (below 3GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E	220 GHz
General Mobile Radio Services (FCC Licensed Radio Service Equipment) Parts 22 (non-cellular), 90 (below 3GHz), 95, 97, and 101 (below 3GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E or ANSI C63.26-2015	220 GHz
Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment) Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E or ANSI C63.26-2015	220 GHz
Maritime and Aviation Radio Services Parts 80 and 87	ANSI/TIA-603-E or ANSI C63.26-2015	220 GHz
Microwave and Millimeter Bands Radio Services Parts 25, 30 74, 90, (M DSRC, Y, Z), 95 (M and L) and 101	ANSI/TIA-603-E; TIA-102.CAAA-E or ANSI C63.26-2015	220 GHz
Broadcast Radio Services Parts 73 and 74 (non-microwave)	ANSI/TIA-603-E; TIA-102.CAAA-E or ANSI C63.26-2015	220 GHz
RF Exposure Devices Subject to SAR Requirements	IEEE Std 1528:2013	6 GHz
Hearing Aid Compatibility Part 20 (HAC for Commercial Mobile Services)	ANSI C63.19:2011	6 GHz
Signal Boosters Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26-2015; FCC KDB 935210 D03 (v04); FCC KDB 935210 D04 (v02); FCC KDB 935210 D05 (v01r01)	220 GHz

²Accreditation 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

PCTEST ENGINEERING LABORATORY, INC.

San Jose, 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 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 December 2018.

A handwritten signature in black ink, written over a horizontal line.

President and CEO
For the Accreditation Council
Certificate Number 2041.02
Valid to May 31, 2020

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