



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

PCTEST ENGINEERING LABORATORY, INC.™
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Columbia, MD 21046
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ELECTRICAL¹

Valid To: May 31, 2020

Certificate Number: 2041.01

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 two satellite laboratory locations listed below*, to perform the following Electromagnetic Compatibility, SAR, HAC, Telecommunications, OTA, Battery, and Wireless testing of LTE, WCDMA, GSM, CDMA and AMPS wireless devices.

Test Technology:

Test Method(s)²:

Emissions
Radiated and Conducted

CFR 47, FCC Parts 15B/C/D/E/F/G/H (using ANSI C63.4:2014, ANSI C63.10:2013, ANSI C63.17:2013, and FCC KDB 905462 D02 (v02)), 18 (MP-5:1986);
ANSI C63.4:2003; ANSI C63.4:2009; ANSI C63.10:2009;
ETSI TS 134 124 Universal Mobile Telecommunications System (UMTS); (3GPP TS 34.124);
ETSI TS 136 124 LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); (3GPP TS 36.124);
ETSI TS 151 010-1 Digital Cellular Telecommunications System (Phase 2+) (GSM);
3GPP TS 51.010-1, Section 12 (Conducted and Radiated Spurious Emissions)

Accessibility

CFR 47, FCC Part 14

Transmitter/Receiver
Output Power
Conducted Spurious Emissions
Radiated Spurious Emissions
Occupied Bandwidth
Frequency Stability
ERP/EIRP
Audio Freq Response
LP Filter Freq 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 140; 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 Gen

Test Technology:

Test Method(s) ²:

SAR (Specific Absorption Rate)

IEEE 1528-2013; RSS 102 Issue 5 (2015);
EN 50566-2013; EN 50360-2017; EN 62209-1; EN 62209-2;
IEC 62209-1 2nd Edition 2016; IEC 62209-2 2010 2nd Edition 2016;
IEC PAS 63083-2017; EN 50566-2017;
Australian Communications Authority Radio Communications
(Electromagnetic Radiation – Human Exposure) Standard 2014;
FCC KDB 248227 D01; FCC KDB 447498 D01, D02, and D03;
FCC KDB 615223 D01; FCC KDB 616217 D04;
FCC KDB 643646 D01; FCC KDB 648474 D01, D03 and D04;
FCC KDB 680106 D01; FCC KDB 865664 D01 and D02;
FCC KDB 941225 D01, D05, D05A, D06, and D07

RF Exposure (Maximum Permissible Exposure)

IEEE C95.1-2005; IEEE C95.1-1999; IEEE C95.3-2002;
RSS-102 Issue 5 (2015), SPR-002 (2016)

Hearing Aid Compatibility

ANSI C63.19:2007; ANSI C63.19:2011;
CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017);
FCC KDB 285076, D01 & D02

United States Radio

47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95,
96, 97, 101 (using ANSI/TIA-603-E, TIA-102.CAAA-E, ANSI
C63.26:2015); ANSI/TIA-603-D; TIA-102.CAAA-D;
FCC KDB 935210 D03 (v04); FCC KDB 935210 D04 (v02);
FCC KDB 935210 D05 (v01r01)

European Radio

ETSI EN 302 291-1 Version 1.1.1 (2005-07);
ETSI EN 302 291-2 Version 1.1.1 (2005-07);
ETSI EN 300 328 Version 2.1.1 (2016-11);
ETSI EN 301 893 Version 2.1.1 (2017-05)

Australia/New Zealand Radio

AS/NZS 4268:2017

Licensed Wireless Devices

ANSI C63.26:2015

LTE ³

3GPP TS 36.521-1; 3GPP TS 36.521-3; 3GPP TS 36.523-1;
3GPP 37.571-1; 3GPP 37.571-2; 3GPP Carrier Aggregation;
PTCRB NAPRD.03; PTCRB PPMD;
PTCRB Cat-M (per RFT132 eMTC);
PVG.09 LTE Data Throughput & TR 37.901 Data Throughput
Performance;
PVG.04 PTCRB Radiated Spurious Emissions;
Global Certification Forum (GCF-CC) Certification / LTE Field
Test (TS.11) ³;
3GPP Cat-NB & Cat-M;
MetroPCS Lab Conformance; AT&T LTE Conformance;
AT&T IoT Accelerator (IoT MBA) Conformance, 19263;
VZW Lab Conformance; VZW Supl RF;
VZW Supl Signaling Conformance; VZW Supl RRM;
VZW LTE LBS Performance;



Test Technology:

Test Method(s) ²:

LTE ³ (continued)

VZW Safe for Network (SFN), VZW Phase 1, VZW Open Development and Field Interoperability Testing (FIT) ³; VZW Network Extender; VZW PCO; VZW Data Retry; VZW Data Throughput; VZW SMS; VZW AT Commands; VZW CMAS; VZW eMBMS; VZW APN; VZW Cat-M VoLTE; Live Network Extender and Android Test Plan; Sprint LTE Test Plan; Sprint LTE Safe for Network (SFN); Sprint LTE Conformance; Sprint LTE IoT; Sprint Lab Conformance; USCC Lab Conformance; KDDI LTE Device Testing; SoftBank LTE Testing

WCDMA (UTRA)

3GPP TS 34.121-1; 3GPP TS 34.123-1; SoftBank Mobile WCDMA Testing

SVLTE / Multimode

CDMA-LTE Inter-RAT (iRAT); CDMA-LTE Inter-RAT SVD; SVLTE: 1x RF with LTE Data Cal; SVLTE: LTE RF with 1x Voice Call; SVD and SVLTE: LTE Data Throughput with 1x Voice Call; eHRPD; GMSS; SVD GMSS; E911 Data Call Processing; Stress Testing; RSSI for MM Devices; SVD Interband; LTE LBS Performance; VZW Multimode Supl Signaling; VZW Multimode SMS; VZW Multimode Data Retry

VoLTE

IMS VoIP; Rich Communication Services (RCS); VoLTE to 1xRTT Fallback for SVLTE (1xRTT Fallback); IMS Registration and Retry; ePDG Live Network; E911 for VoLTE; VZW hVoLTE; VZW VoIP and VT Performance; VZW Interband RRM and Protocol

Carrier Aggregation

VZW Carrier Aggregation Supplementary RF; VZW Carrier Aggregation Data Throughput

UICC

USIM/USAT/CSIM/ISIM Interaction Test Plan (LTE/WCDMA/GSM/CDMA/MM); 3GPP 31.121; 3GPP 31.124; ETSI TS 102 230; SIM Application Interaction Test Plan; UICC USIM ISIM Electrical; UICC USIM ISIM Protocol (LTE/WCDMA/GSM/CDMA); SWP/HCI ETSI TS 102 694-1; ETSI TS 102 695-1

CBRS / WInnForum

CBRS Alliance Certification Test Plan; WInnForum Conformance and Performance Test Technical Standards

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



Test Technology:

Test Method(s) ²:

Wireless

3GPP2 C.S0011-C 20-Feb-2006 (TIA-98D/E/F)
(excluding Sections 3.2.1.3, 3.2.3.2, 3.3.3, 3.3.4, 3.3.5, 3.3.6,
3.4.6, 3.4.8, 3.4.10, 3.4.11, 3.4.12, 3.4.13, 3.7.2, 4.4.8, 4.4.9.2.1,
4.4.10, 4.4.11);
3GPP2 C.S0043-0 24-Sep-2004 (TIA-1035);
3GPP2 C.S0036-0 11-Mar-2002 (TIA-916);
3GPP2 C.S0036-A 23-May-2011 (TIA-916-A);
3GPP2 C.S0037-0 19-Apr-2002 (TIA-918);
3GPP2 C.S0056-0 22-Jul-2005 (TIA-1042);
3GPP2 C.S0059-0 20-Aug-2008 (TIA-1038);
3GPP2 C.S0060-0 06-Dec-2005 (TIA-1044);
3GPP2 C.S0061-0 22-Jun-2005 (TIA-1045);
3GPP2 C.S0062-0 14-May-2007 (TIA-1046);
3GPP2 C.S0073-0 26-Sep-2005 (TIA-1084);
3GPP2 C.S0073-B 21-Aug-2009 (TIA n/a);
3GPP2 C.S0094-0 30-Oct-2008 (TIA-1157);
CTIA Conformance Test Plan for CDMA Wireless Devices;
GCF Certification Criteria 2 (CAG2) Test Plan;
VZW Wireless Priority Services (WPS);
VZW Safe for Network (SFN);
VZW Open Development (OD) Device Specifications;
VZW Location Based Services (LBS);
VZW CMAS; VZW NBPCD; VZW Phase 1

EVDO ³

3GPP2 C.S0033-0 12-Dec-2003 (TIA-866);
3GPP2 C.S0033-A 14-Dec-2005 (TIA-866);
3GPP2 C.S0038-0 19-Apr-2002 (TIA-919);
3GPP2 C.S0038-A 26-Sep-2005 (TIA-919);
3GPP2 C.S0038-B 30-Mar-2009 (TIA n/a);
3GPP2 C.S0037-0 19-Apr-2002 (TIA-918);
CTIA Conformance Test Plan for CDMA Wireless Devices;
GCF Certification Criteria 2 (CAG2) Test Plan

OTA
OTA Anechoic Chambers

CTIA Test Plan for Wireless Device Over-the-Air Performance
for CDMA, 1xEVDO Rev0/A, GSM, GPRS, EGPRS, UMTS
(W-CDMA), LTE, CDMA aGPS, GSM ULTS, WCDMA ULTS;
LTE aGPS A-Glonass and SIB8;
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; AT&T 13340
OTA Device Requirements CTIA Test Plan for RF Performance
Evaluation of Wi-Fi Mobile Converged Devices (Wi-Fi Alliance)



Test Technology:

Test Method(s) 2:

TTY

ANSI-136, IS-95 Generic Inter-vendor TTY Test Plan Ver. 1.2

Hearing Aid Compatibility

ANSI C63.19; CTIA Test Plan for Hearing Aid Compatibility;
FCC KDB 285076

SAR (Specific Absorption Rate)

IEEE 1528-2013;
RSS-102; EN 50566-2013; EN 50360; EN 62209-1; EN 62209-2;
FCC KDB 248227 D01; FCC KDB 447498 D01, D02, and D03;
FCC KDB 615223 D01;
FCC KDB 616217 D04; FCC KDB 643646 D01;
FCC KDB 648474 D03 and D04; FCC KDB 680106 D01;
FCC KDB 865664 D01 and D02;
FCC KDB 941225 D01, D05, D05a, D06, D07;
IEC 62209-1; IEC 62209-2; IEC/PAS 63083;
Australian Communications Authority Radio Communications
(Electromagnetic Radiation – Human Exposure) Standard 2014

RF Exposure (Maximum Permissible
Exposure)

IEEE C95.1-1999; IEEE C95.1-2005; IEEE C95.3-2002;
RSS-102, SPR-002

Transmitter/Receiver

Output Power
Conducted Spurious Emissions
Radiated Spurious Emissions
Occupied Bandwidth
Frequency Stability
ERP/EIRP
Audio Freq Response
LP Filter Freq Response
Modulation Limiting

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 140; 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 Gen

Emissions

Radiated and Conducted

ANSI C63.4:2014; ANSI C63.10:2013

Test Technology:

Test Method(s) ²:

Battery Safety
Altitude Simulation
Temperature Cycling
Mechanical Shock
Vibration
Short Circuit
Overcharge
Impact
Forced Discharge

IEEE 1725 Standard for Rechargeable Batteries for Cellular
Telephones;
CTIA Certification Requirements for Battery System Compliance
to IEEE 1725;
IEEE 1625 Standard for Rechargeable Batteries for Multi-Cell
Mobile Computing Devices;
CTIA Certification Requirements for Battery System Compliance
to IEEE 1625

UNDOT

United Nations Document ST/SG/AC.10/11/Rev.5,
Recommendations on the Transport of Dangerous Goods;
Manual of Tests and Criteria, Fifth Revised Edition;
IEC 62281 – Safety of Primary and Secondary Lithium Cells and
Batteries During Transport

Hardware Reliability

CTIA Device Hardware Reliability Test Plan

Determining Battery Life

CTIA Battery Life Test Plan, Version 1.0

Electric Vehicle Battery

SAE-J2929

Safety Requirement for Portable Sealed
Secondary Cells

IEC 62133:2012; EN 62133:2013

CEC: Energy Efficient Battery Charger
System

EEBC System Test Procedure Version 2.2 (11/2008)

² 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*.

³ This laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these tests.

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.1⁴:

Rule Subpart/Technology	Test Method	Maximum Frequency
Unintentional Radiators Part 15B	ANSI C63.4:2014	40000 MHz
Industrial, Scientific, and Medical Equipment Part 18	FCC MP-5 (February 1986)	220000 MHz
Intentional Radiators Part 15C	ANSI C63.10:2013	220000 MHz
Unlicensed Personal Communication Systems Devices Part 15D	ANSI C63.17:2013	20000 MHz
U-NIII without DFS Intentional Radiators Part 15E	ANSI C63.10:2013	40000 MHz
U-NIII with DFS Intentional Radiators Part 15E	FCC KDB 905462 D02 (v02)	40000 MHz
UWB Intentional Radiators Part 15F	ANSI C63.10:2013	200000 MHz
BPL Intentional Radiators Part 15G	ANSI C63.10:2013	40000 MHz
White Space Device Intentional Radiators Part 15H	ANSI C63.10:2013	40000 MHz
Commercial Mobile Services (FCC Licensed Radio Service Equipment) Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	220000 MHz
General Mobile Radio Services (FCC Licensed Radio Service Equipment) Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97 (below 3 GHz), and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	220000 MHz
Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment) Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	220000 MHz
Maritime and Aviation Radio Services Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	220000 MHz



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.1⁴:

Rule Subpart/Technology	Test Method	Maximum Frequency
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; ANSI C63.26:2015	220000 MHz
Broadcast Radio Services Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	220000 MHz
RF Exposure Devices Subject to SAR Requirements	IEEE Std 1528:2013	6000 MHz
Hearing Aid Compatibility Part 20 (HAC for Commercial Mobile Services)	ANSI C63.19:2011	6000 MHz
Signal Boosters Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)	ANSI C63.26:2015	220000 MHz

⁴Accreditation 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.™

Columbia, MD

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 6th day of September 2018.

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

President and CEO
For the Accreditation Council
Certificate Number 2041.01
Valid to May 31, 2020

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