



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC
(formerly PCTEST)
7185 Oakland Mills Road
Columbia, MD 21046
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ELECTRICAL

Valid To: May 31, 2026

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 one satellite laboratory locations listed below*, to perform the following Electromagnetic Compatibility, SAR, HAC, Telecommunications, OTA, RF, and Conformance and Protocol testing of wireless devices:

Test Technology:

Emissions

Radiated and Conducted

Test Method(s):

CFR 47, FCC Part 15B (using ANSI C63.4:2014);
CFR 47, FCC Part 18 (using MP-5:1986);
CFR 47, FCC Parts 15/C/E (without DFS)/F/G/H
(using ANSI C63.10:2013);
CFR 47, FCC Part 15E (with DFS)
(using FCC KDB 905462 D02 (v02));
CFR 47, FCC Part 15D (using ANSI C63.17:2013);
ANSI C63.10:2020; KDB 987594;
ETSI TS 134 124 Universal Mobile Telecommunications System
(UMTS); (3GPP TS 34.124); (3GPP TS38.124 NR;
Electromagnetic Compatibility (EMC) Requirements for Mobile
Terminals and Ancillary Equipment);
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); EN55011; EN 55032;
CNS 15936 (up to 6 GHz) (2016); AS/NZS CISPR 11;
IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003;
KS C 9811; KS C 9832;
VCCI V-3(2016.11);
VCCI V-3 (2015.04); VCCI 32-1: VCCI-CISPR 32

Test Technology:**Test Method(s):**

Transmitter/Receiver

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-198; 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-246; RSS-247; RSS-248; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-Gen

SAR/RF Exposure

IEEE 1528-2013; RSS-102;
EN 50360-2017; EN 62209-1:2016; EN 62209-2:2010/A1:2019;
IEC 62209-1 2nd Edition 2016; IEC 62209-2 2010;
IEC PAS 63083-2017; EN 50566-2017; IEC 62209-2 AMD 1;
Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 2014;
ARPANSA RPS S-1(Rev.1):2021; Australia Radiocommunications Equipment (General) Rules 2021;
FCC KDB 447498 D01, D02, D03 and D04;
FCC KDB 616217 D04;
FCC KDB 643646 D01;
FCC KDB 865664 D01 and D02;
FCC KDB 941225 D01, D05, D05A, D06, and D07;
EN 50401:2017; EN 50385:2017; IEC 62311:2008;
IEC 62479:2010; EN 62479:2010; EN 50663:2017;
EN 62311:2007; EN 62232:2017; IEC 62232:2017;
IEEE C95.1-1992; IEEE C95.1-2005; IEEE C95.1: 2019;
IEEE C95.3-2002; IEEE C95.3-2021; IEC/IEEE 63195-1:2022;
RSS-102.SAR.MEAS; RSS-102.NS.MEAS; RSS-102.IPD.MEAS;
SPR-003;
SPR-002; SPR-001; SPR-004; SPR-APD;
IEC TR 62630:2010; IEEE C95.3.1:2010; IEC TR 63170:2018;
AS/NZS 2772.2:2016; EN 62209-3: 2019; IEC 62209-3:2019;
ICNIRP (100kHz – 300 GHz):2020;
IEC 62311:2019; EN 62311:2020; IEC/IEEE 62209-1528:2020;
EN IEC/IEEE 62209-1528; IEC PAS 63184:2021;
RRA Public Notification 2018-18, December 7, 2018
KS C 3370-1, KS C 3370-2

Hearing Aid Compatibility

ANSI C63.19:2019;
CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017);
RSS-HAC; ANSI/TIA-5050-2018

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)

Test Technology:

European Radio

Taiwan Radio

Korean Radio

Australia/New Zealand Radio

Vietnam Radio

RF, Protocol, and RRM Conformance

5G NR

Test Method(s):

ETSI EN 302 065-1; ETSI EN 302 065-2; ETSI EN 302 065-3;
ETSI EN 302 065-4; ETSI EN 302 291-1; ETSI EN 302 291-2;
ETSI EN 302 502; ETSI EN 302 510-1; ETSI EN 302 510-2;
ETSI EN 302 537; ETSI EN 301 511; ETSI EN 301 839;
ETSI EN 301 893; ETSI EN 301 908-1;
ETSI EN 301 908-13; ETSI EN 300 220-2;
ETSI EN 300 220-3-1; ETSI EN 300 220-3-2;
ETSI EN 300 220-4; ETSI EN 300 328; ETSI EN 300 328;
ETSI EN 300 330; ETSI EN 300 440; ETSI EN 300 440-2;
ETSI EN 303 687

LP0002 (2020); DGT LP0002

Regulations on Radio Equipment

(MSIT Ordinance MSIT No. 86, Jan. 4, 2022);

Unlicensed Radio Equipment Established Without Notice

(MSIT Public Notification 2023-18, Jun 20, 2023);

Technical Requirements for the Human Protection against
Electromagnetic Waves

(MSIT Public Notification 2019-4, January 16, 2019);

Equipment to be Subject of the Test Procedure for Electromagnetic
Field Strength and Specific Absorption Rate

(RRA Public Notification 2023-12, Jun 30, 2023);

Technical Requirements for Radio Equipment for
Telecommunication Services

(Public Notification 2023-22, Dec 8, 2023);

Technical Requirements for Measurement and Test Procedure of
Specific Absorption Rate

(RRA Public Notification 2018-18, Dec 7, 2018);

Technical Requirements for Measurement of Electromagnetic Field
Strength (RRA Public Notification 2023-11, Jun 30, 2023);

KS X 3123; KS X 3142; KS X 3270; KS X 3271

AS/NZS 4268:2017

QCVN 127 (2021): BTTTT;

QCVN 129 (2021): BTTTT

3GPP 37.571-1; 3GPP 37.571-2 ;

3GPP TS 38.508-1; 3GPP TS 38.508-2; 3GPP TS 38.521-1;

3GPP TS 38.521-2; 3GPP TS 38.521-3; 3GPP TS 38.521-4;

3GPP TS 38.522; 3GPP TS 38.523-1; 3GPP TS 38.523-2;

3GPP TS 38.523-3; 3GPP TS 38.533; 3GPP TS 34.229-5;

VZW 5G NR FR2 RFOTA;

VZW 5G Protocol Pre-Conformance (TS 38.523-1);

VZW 5G NR FR1 Supp RF;

VZW 5G NR RF Pre Conformance (TS 38.521-3);

VZW 5G NR Radio Resource Management (RRM)

Test Technology:**Test Method(s):**

5G NR (*continued*)

Pre-Conformance (TS 38.533); 5G NR FR1 Performance/DEMOM
Pre Conformance (TS 38.521-4); VZW 5G NR SA Data Retry;
VZW 5G NR SA Voice Services Fallback;
VZW 5G NR SA Voice, Video and Messaging;
VZW 5G NR SA System Selection; VZW 5G WEA TP;
VZW 5G Test Cases -LTE Voice over WiFi;
VZW 5G Iconography; VZW 5G NR NSA SA THERMAL LC TP;
VZW 5G Supplemental UICC; 5GNRAPPLAYERDATATHRU;
VZW 5G E911; VZW 5G NR SA SMS; 5GSASUPSIGCONF;
VZW 5G Test Cases-PCO;
AT&T 10776 Test Plans(5G/4G/3G/2G);
T-Mobile Protocol_5G SA Emergency EPS Fall back;
T-Mobile Protocol_UC_Icon; T-Mobile Protocol_5G_SA

LTE

3GPP TS 36.521-1; 3GPP TS 36.521-3; 3GPP TS 36.523-1;
3GPP 37.571-1; 3GPP 37.571-2; 3GPP TS 34.229-1;
ETSI EN 301 908-13 Version 13.1.1 (2019-11);
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); 3GPP Cat-NB & Cat-M;
Lab Conformance; AT&T LTE Conformance;
AT&T IoT Accelerator Conformance, 19263;
VZW Lab Conformance; VZW Supl RF;
VZW FR2 Supplementary RF, VZW FR1 Supplementary RF;
VZW Supl Signaling Conformance;
VZW Supl RRM;
VZW LTE LBS Performance;
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;
USCC Lab Conformance;
KDDI LTE Device Testing; SoftBank LTE Testing; GSMA TS.35;
T-Mobile Protocol_IR94; T-Mobile Protocol_RTT

WCDMA (UTRA)

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

SVLTE / Multimode

E911 Data Call Processing;
Stress Testing; RSSI for MM Devices;
LTE LBS Performance; VZW Multimode Supl Signaling;
VZW Multimode SMS; VZW Multimode Data Retry

Test Technology:**Test Method(s):**

VoLTE

IMS VoIP; Rich Communication Services (RCS);
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 Throughout

UICC

USIM/USAT/CSIM/ISIM Interaction Test Plan
(LTE/WCDMA/GSM/CDMA/MM);
3GPP TS 31.121; 3GPP TS 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 - OnGo/WinnForum

OnGo Alliance Certification Test Plan;
WinnForum Conformance and Performance Test Technical
Specification, WINNF-TS-0122

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Test Technology:**Test Method(s):*****Emissions***

Radiated and Conducted

CFR 47, FCC Part 15B (using ANSI C63.4:2014);
CFR 47, FCC Part 18 (using MP-5:1986);
CFR 47, FCC Parts 15/C/E (without DFS)/F/G/H
(using ANSI C63.10:2013)
CFR 47, FCC Part 15E (with DFS)
(using FCC KDB 905462 D02 (v02));
CFR 47, FCC Part 15D (using ANSI C63.17:2013);
ANSI C63.10:2020; KDB 987594;
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); (3GPP TS38.124 NR; Electromagnetic
Compatibility (EMC) Requirements for Mobile Terminals and
Ancillary Equipment);
ETSI TS 151 010-1 Digital Cellular Telecommunications System
(Phase 2+) (GSM); 3GPP TS 51.010-1, Section 12 (Conducted
and Radiated Spurious Emissions); EN55011; EN 55032

Test Technology:**Test Method(s):**

Radiated and Conducted (*cont.*)

CNS 15936 (up to 6 GHz) (2016); AS/NZS CISPR 11;
IEC/CISPR 11; CISPR 32; FCC OET/MP-5; ICES-003;
KS C 9811; KS C 9832;
VCCI V-3(2016.11); VCCI V-3 (2015.04); VCCI 32-1;
VCCI-CISPR 32

Transmitter/Receiver

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-198; 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-246; RSS-247;
RSS-248; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310;
RSS-Gen; No IS

Hearing Aid Compatibility

ANSI C63.19:2019;
CTIA Test Plan for Hearing Aid Compatibility v.3.1.1 (2017);
RSS-HAC; ANSI/TIA-5050-2018

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)

European Radio

ETSI EN 302 065-1; ETSI EN 302 065-2; ETSI EN 302 065-3;
ETSI EN 302 065-4; ETSI EN 302 291-1; ETSI EN 302 291-2;
ETSI EN 302 502; ETSI EN 302 510-1; ETSI EN 302 510-2;
ETSI EN 302 537; ETSI EN 301 511; ETSI EN 301 839;
ETSI EN 301 893; ETSI EN 301 893; ETSI EN 301 908-1;
ETSI EN 301 908-13; ETSI EN 300 220-1; ETSI EN 300 220-2;
ETSI EN 300 328; ETSI EN 300 328; ETSI EN 300 330;
ETSI EN 300 440; ETSI EN 300 440-2

Taiwan Radio

LP0002 (2020); DGT LP0002

Korean Radio

Regulations on Radio Equipment
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Electromagnetic Field Strength and Specific Absorption Rate
(RRA Public Notification 2023-12, Jun 30, 2023);
Technical Requirements for Radio Equipment for
Telecommunication Services
(RRA Public Notification 2023-22, Dec 8, 2023)

Test Technology:**Test Method(s):**

Korean Radio (cont.)

Technical Requirements for Measurement and Test Procedure of Specific Absorption Rate
(RRA Public Notification 2018-18, Dec 7, 2018);
Technical Requirements for Measurement of Electromagnetic Field Strength (RRA Public Notification 2023-11, Jun 30, 2023);
KS X 3123; KS X 3142; KS X 3270; KS X 3271

Australia/New Zealand Radio

AS/NZS 4268:2017

OTA

CTIA Test Plan for Wireless Device Over-the-Air Performance ¹
CTIA 01.20 Test Methodology, SISO, Anechoic Chamber;
CTIA 01.40 Test Methodology, MIMO, Static Channel Model, Multi-Probe Anechoic Chamber;
PTCRB NAPRD03; PTCRB PPMD;
VZW OTA Radiated Performance for CDMA & LTE Multimode Devices;
VZW LTE Over the Air Radiated Performance Test Plan
VZW Location Determination Test Plan;
VZW LTE-LBS Performance Test Plan;
T-Mobile Radiated Performance TRD;
AT&T 13340 OTA;
AT&T IoT Accelerator;
USCC CDMA Over The Air Radiated Test Plan;
USCC LTE Over The Air Radiated Test Plan;
CTIA Test Plan for RF Performance Evaluation of Wi-Fi Mobile Converged Devices (Wi-Fi Alliance);
GSMA TS.24 Operator Acceptance Values for Device Antenna Performance;
3GPP TS 34.114 Technical Specification UE/MS OTA Antenna Performance;
3GPP TS 37.544 Technical Specification UTRA & E-UTRA UE OTA Antenna Performance; QCVN 117:2023/BTTTT

Wired and Wireless Conformance

CTIA IoT Security

CTIA Cybersecurity Certification Test Plan for IoT Devices*

CBRS - OnGo/WinnForum

OnGo Alliance Certification Test Plan;
WinnForum Conformance and Performance Test Technical Specification, WINNF-TS-0122

Military and Airborne Equipment

MIL-STD-461G, RE102; AFI91-208

¹ CTIA 01.01 Test Scope Requirements and Applicability is used in support of the CTIA Test Plan for Wireless Device Over-the-Air Performance³ and should not be considered its own test method.

*Accreditation to the requirements of the CTIA Certification Test Plan does not imply authorization by the CTIA Certification program. Please see the CTIA website <https://ctiacertification.org/test-labs/> for a listing of Authorized Test Labs (ATLs).

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

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Unintentional Radiators</u> Part 15B	ANSI C63.4:2014	40000
<u>Industrial, Scientific, and Medical Equipment</u> Part 18	FCC MP-5 (February 1986)	330000
<u>Intentional Radiators</u> Part 15C	ANSI C63.10:2013	330000
<u>Unlicensed Personal Communication Systems Devices</u> Part 15D	ANSI C63.17:2013	20000
<u>U-NII without DFS Intentional Radiators</u> Part 15E	ANSI C63.10:2013	40000
<u>U-NII with DFS Intentional Radiators</u> Part 15E	FCC KDB 905462 D02 (v02)	40000
<u>UWB Intentional Radiators</u> Part 15F	ANSI C63.10:2013	200000
<u>BPL Intentional Radiators</u> Part 15G	ANSI C63.10:2013	40000
<u>White Space Device Intentional Radiators</u> Part 15H	ANSI C63.10:2013	40000
<u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u> Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000
<u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u> Parts 22 (non-cellular), 90 (below 3 GHz), 95 (below 3 GHz), 97 (below 3 GHz), and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000

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

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u> Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000
<u>Maritime and Aviation Radio Services</u> Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	330000
<u>Microwave and Millimeter Bands Radio Services</u> Parts 25, 30, 74, 90 (above 3 GHz), 95 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000
<u>Broadcast Radio Services</u> Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	330000
<u>RF Exposure</u> Devices Subject to SAR Requirements	IEEE Std 1528:2013	6000
<u>Hearing Aid Compatibility</u> Part 20 (HAC for Commercial Mobile Services)	ANSI C63.19:2019 (incorporation of reference)	6000
<u>Signal Boosters</u> Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26:2015	330000

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

ELEMENT MATERIALS TECHNOLOGY WASHINGTON DC LLC

Columbia, MD

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *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 13th day of June 2024.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2041.01
Valid to May 31, 2026

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