FCC PART 15, SUBPART C
ISEDC RSS-210, ISSUE 9, AUGUST 2016

TEST REPORT

For

Keyssa Inc.

655 Campbell Technology Parkway, Suite 125,

Campbell, CA 95008, United States

FCC ID: 2AS2O-MT104RD
IC: 25155-MT104RD

Report Type: Original Report	**Product Type:** Short Range Transceiver

Zhao Zhao

Prepared By: Test Engineer

Report Number: R1906124-255 Rev A

Report Date: 2019-09-12

Simon Ma

Reviewed By: RF Supervisor

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Ave.,
Sunnyvale, CA 94089, USA
Tel: (408) 732-9162, Fax: (408) 732 9164

ACCREDITED
CERTIFICATE #3297.02

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1906124-225	Original Report	2019-09-03
1	R1906124-225 Rev A	Remeasured e.i.r.p based on applicant's request Updated e.i.r.p measurement in Section 9.5	2019-09-12

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Keyssa Inc.,* and their product model; MT104RD*, FCC ID: 2AS2O-MT104RD, IC: 25155-MT104RD,* or the "EUT" as referred to in this report. The equipment under test (EUT) was a transceiver set of chips operating at 60 GHz band (57-64 GHz). The source device (MT104RD-SR) has two input connectors: USB type A-SS (superspeed) and DisplayPort. The sink device (MT104RD-SK) has two output connectors: USB type B-SS (superspeed) and DisplayPort. There is a slide switch to select between the two streaming modes. Source streaming can be either be USB-SS (superspeed) operating at 5.0 Gbps, or DisplayPort HBR2 (High Bit-Rate 2) operating at 5.4 Gbps.

The EUT measures approximately 7.8 cm (L) x 6.0 cm (W) x 1.4 cm (H) and weighs approximately 0.05 kg.

Serial Number: MT104RD-SR-002 (source) and MTD104RD-SK-002 (sink)

1.2 Objective

This report is prepared on behalf of *Keyssa Inc.,* in accordance with Part 2, Subpart J, and Part 15, Subpart C of the Federal Communication Commission's rules and ISEDC RSS-210 Issue 9, August 2016.

The objective is to determine compliance with FCC Part 15.255 and ISEDC RSS-210 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, 20 dB Bandwidth, Fundamental EIRP Output Power, and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

N/A

1.4 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.5 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.6 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.7 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices,

Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)

- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;-+`----------
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT contains SR and SK. SR was configured to transmit, and SK was configured to receive for testing purposes. Please refer to circuit description for more details.

For USB mode, the SR was configured by POGO pins to enable transmitting, and the SK's USB port was connected to a laptop. For DP Mode, the SR was connected to a source laptop to transmit data, and the SK's display port was connected to a monitor. The SK's USB port was connected to an external power bank. The laptop was playing a sample video during the testing for DP mode.

Mode	Frequency (MHz)	Power Setting
USB	61030	Default
DP	61350	Default

Data Rates Tested:
8B10B: 5.0 Gbps
HBR2: 5.4 Gbps

2.3 Equipment Modifications

No equipment modifications are made to the EUT

2.4 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E6410	3CKRAQ1

2.5 Support Equipment

Manufacturer	Description	Model
Rhode and Schwarz	Spectrum Analyzer	FSU67
Korad	Power Supply	KA3005P
Analogix	DisplayPort Eval Board	ANX7816
ASUS	Laptop	N550JX-DS74T
ASUS	DisplayPort Monitor	PB287Q

2.6 Interface Ports and Cabling

Cable Description	Length (m)	To	From
Power/Ground Cable	1.36	Power Supply	DUT (USB)
DisplayPort Cable	1.83	Monitor	DUT (DP)
DisplayPort Cable	1.83	DUT(DP)	DisplayPort Eval Board
HDMI Cable	0.91	DisplayPort Eval Board	Laptop
Power/Ground Cables	1.48	Power Supply	DUT (DP)

3 Summary of Test Results

Results reported relate only to the product tested.

FCC and ISEDC Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen §6.8	Antenna Requirement	Compliant
FCC §2.1091, §15.255(g) ISEDC RSS-102	RF Exposure	Compliant
FCC §15.207 ISEDC RSS-Gen §8.8 LP0002-2018 §2.3	AC Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, §15.255(d) ISEDC RSS-210 J.3 ISEDC RSS-Gen §8.9 and §8.10	Radiated Spurious Emissions	Compliant
FCC §15.255(e)(1), §15.215 ISEDC RSS-210 J.4, ISEDC RSS-Gen	Emission Bandwidth	Compliant
FCC §15.255(c)(1)(i), §15.255(e) ISEDC RSS-210 J.2.2	Fundamental EIRP Output Power	Compliant
FCC §15.255(c)(1)(i), §15.255(e) ISEDC RSS-210 J.2.2	Conducted Peak Output Power	N/T[1]
FCC §15.255(f) ISEDC RSS-210 J.6	Frequency Stability	Compliant

Note[1]: Conducted Peak Output Power was not tested because the EUT does not have a conducted antenna port. The conducted output power used in this report to compare with the limit was derived from the measured e.i.r.p. and antenna gain.

4 FCC §15.203 & ISEDC RSS-Gen §6.8 - Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.2 Antenna Description

Antenna usage	Band of Operation (GHz)	Maximum Antenna Gain (dBi)
Integral antenna within the Integrated Circuit package	57-71	5.3

5 FCC §2.1091, §15.255(g) & ISEDC RSS-102 - RF Exposure

5.1 Applicable Standards

According to FCC §15.255(g) Regardless of the power density levels permitted under this section, devices operating under the provisions of this section are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

5.3 MPE Results

Maximum E.I.R.P (dBm):	13.11
Maximum E.I.R.P (mW):	20.46
Prediction distance (cm):	20
Prediction frequency (MHz):	61030
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0041
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0041 mW/cm^2. Limit is 1.0 mW/cm^2.

5.4 RF exposure evaluation exemption for IC

According to RSS-102 Issue 5 Section 3, devices operating above 6 GHz regardless of the separation distance shall undergo an RF exposure evaluation.

13.11 dBm < 5W = 36.9897 dBm

Therefore the RF exposure evaluation is not required.

6 FCC §15.207 & ISED RSS-Gen §8.8 - AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS-Gen §8.8 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used were FCC §15.207 and ISEDC RSS-Gen §8.8 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data were recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Corrected Amplitude and Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL), the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

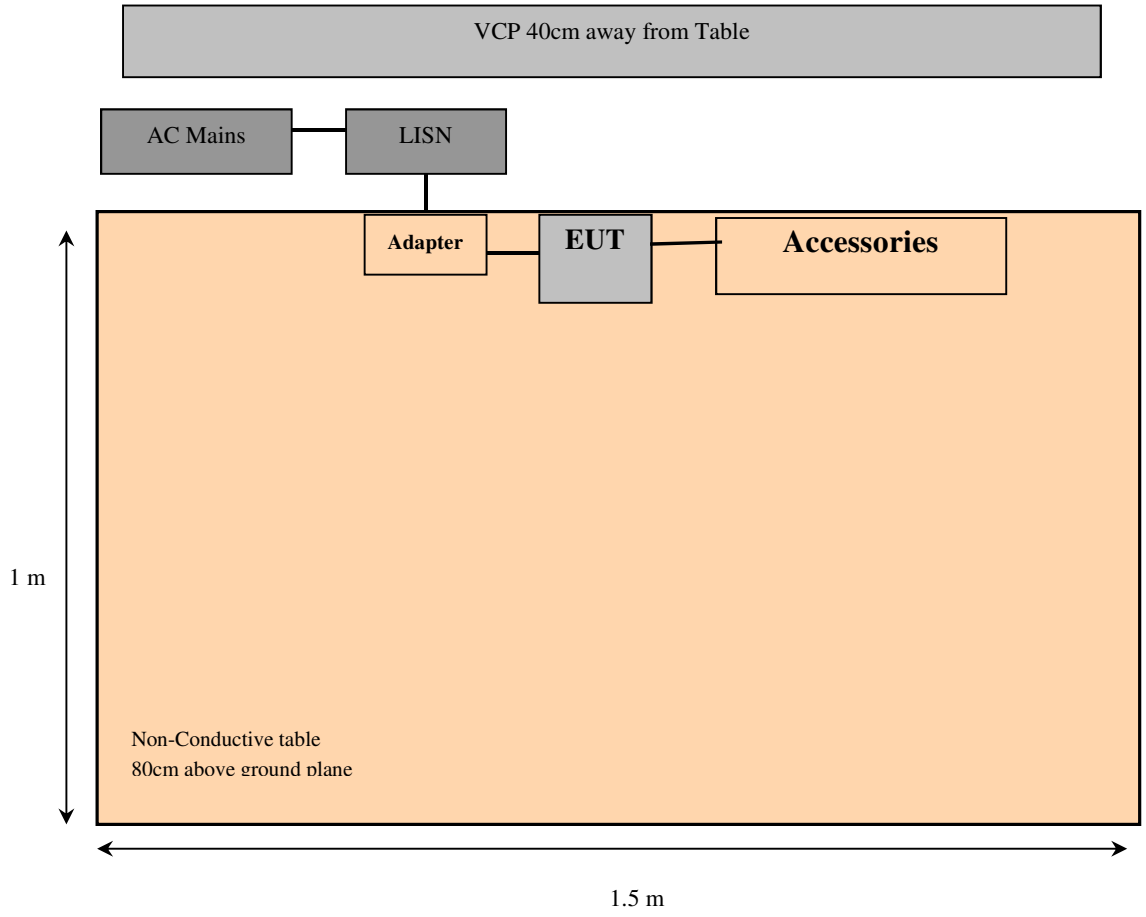
CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

6.5 Test Setup Block Diagram



6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2018-07-05	2 years
Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101964	2019-07-31	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150202	2019-02-25	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2019-04-11	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

6.7 Test Environmental Conditions

Temperature:	24º C
Relative Humidity:	48 %
ATM Pressure:	102.1 kPa

The testing was performed by Zhao Zhao on 2019-08-28 at ground plane test site.

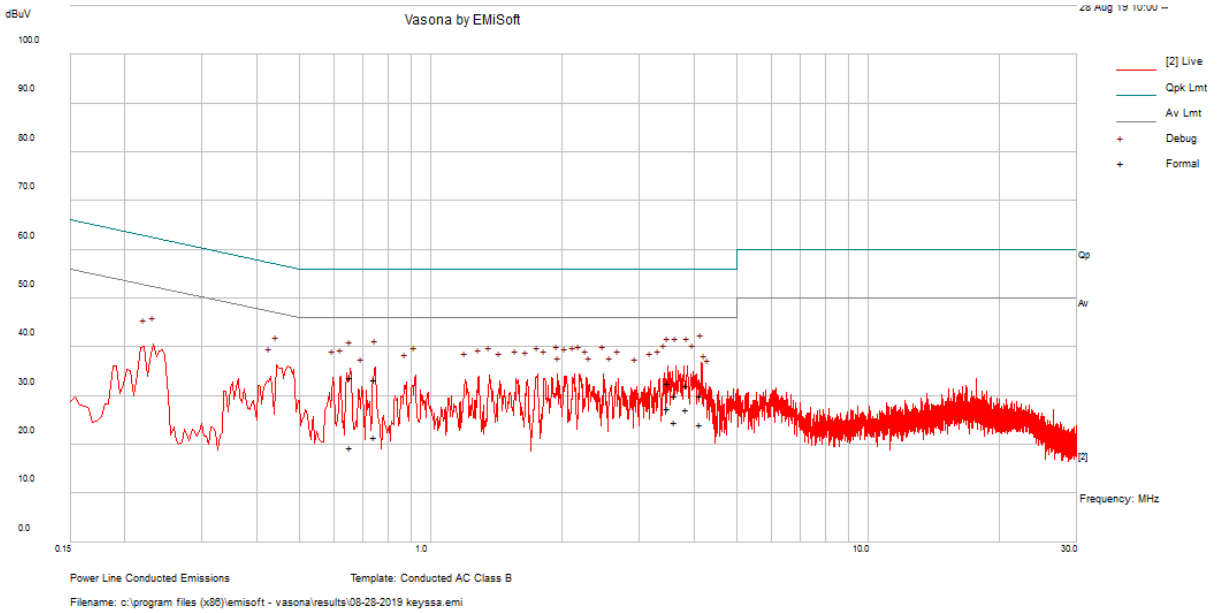
6.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC 15.207 and ISEDC RSS-Gen standard's conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-17.29	3.787282	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

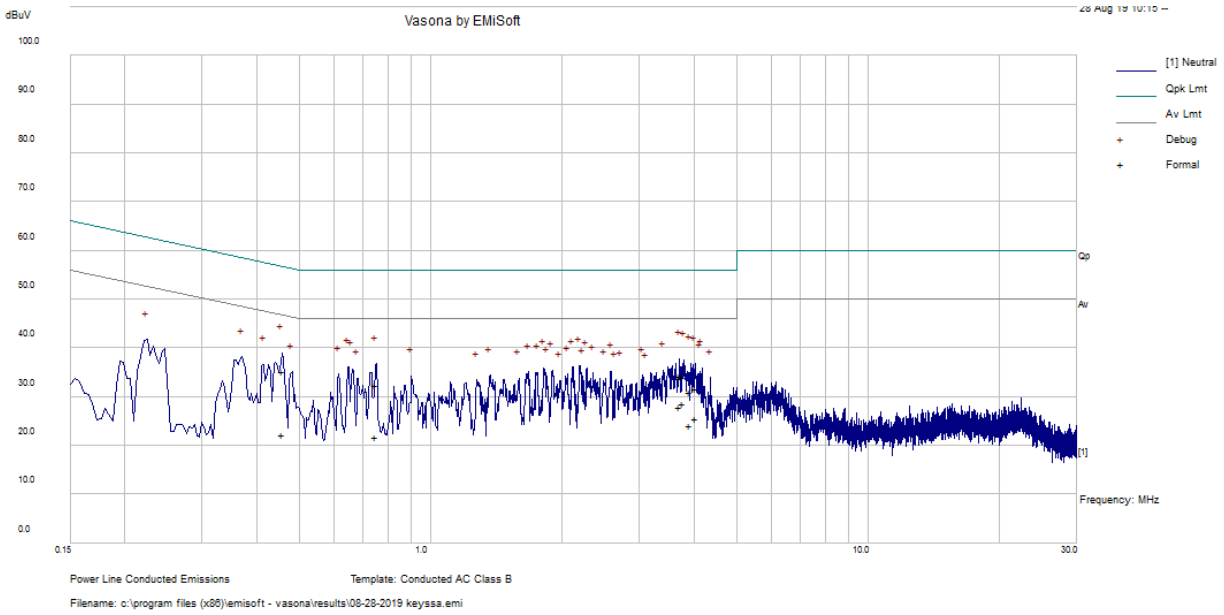
120 V, 60 Hz – Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
4.146261	30.13	Line	56	-25.87	QP
3.481431	32.55	Line	56	-23.45	QP
3.621073	30.09	Line	56	-25.91	QP
3.851508	32.24	Line	56	-23.76	QP
0.74569	33.35	Line	56	-22.65	QP
0.654149	33.71	Line	56	-22.29	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
4.146261	24.18	Line	46	-21.82	Ave.
3.481431	27.37	Line	46	-18.63	Ave.
3.621073	24.59	Line	46	-21.41	Ave.
3.851508	27.16	Line	46	-18.84	Ave.
0.74569	21.52	Line	46	-24.48	Ave.
0.654149	19.31	Line	46	-26.69	Ave.

120 V, 60 Hz – Neutral



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.459277	35.3	Neutral	56.71	-21.41	QP
3.700594	34.34	Neutral	56	-21.66	QP
3.787282	33.97	Neutral	56	-22.03	QP
3.910811	31.04	Neutral	56	-24.96	QP
0.749692	32.3	Neutral	56	-23.7	QP
4.033935	31.61	Neutral	56	-24.39	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (Line/Neutral)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
0.459277	22.14	Neutral	46.71	-24.56	Ave.
3.700594	27.98	Neutral	46	-18.02	Ave.
3.787282	28.71	Neutral	46	-17.29	Ave.
3.910811	24.03	Neutral	46	-21.97	Ave.
0.749692	21.82	Neutral	46	-24.18	Ave.
4.033935	25.45	Neutral	46	-20.55	Ave.

7 FCC §15.209, §15.255(d) & ISEDC RSS-210 J.3, RSS-Gen §8.9, §8.10 - Spurious Radiated Emissions

7.1 Applicable Standards

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) and RSS-Gen except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.255(d):

(1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
(2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.
(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

As per ISEDC RSS-Gen 8.9,

> Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for license-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

As per ISEDC RSS-210 J.2:

a. The power of any emissions outside the band 57-64 GHz shall consist solely of spurious emissions and shall not exceed:
   i. the general field strength limits specified in RSS-Gen for emissions below 40 GHz; and
   ii. 90 pW/cm^2 at a distance of 3 m for emissions between 40 GHz and 200 GHz;
b. The levels of spurious emissions shall not exceed fundamental emission levels.

7.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C and ISEDC RSS-210 Section J limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Procedure

The EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

For radiated testing the EUT was set at 1 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter above the ground plane for above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna's polarity should be changed between horizontal and vertical.

The spectrum analyzer or receiver was set as:

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100 ms
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude and Margin Calculation

For the emissions from 30 MHz to 40 GHz:

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + AF + CL + Atten - Ga$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$Margin = Corrected\ Amplitude - Limit$$

For the emissions from 40 GHz to 200 GHz:

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

After got the field strength corrected reading, calculate the e.i.r.p. using the formula

EIRP = E-meas + 20log(d-meas) – 104.7
Where:
EIRP: is the equivalent isotropically radiated power in dBm
E-meas: is the field strength of the emission at the measurement distance, in dBuV/m
d-meas: is the measurement distance, in m

Finally, use the formula below to calculate the power density and compare the result with the limit.

$$PD = \frac{EIRP_{Linear}}{4\pi d^2}$$

where

PD	is the power density at the distance specified by the limit, in W/m^2
$EIRP_{Linear}$	is the equivalent isotropically radiated power, in watts
d	is the distance at which the power density limit is specified, in m

The Specified distance is 3m.

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2018-05-08	1 year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100338	2018-07-05	2 years
OML	Harmonic Mixer and Horn Antenna Set	M03HWA; M05HWA; M08HWA; M12HWA; M19HWA	170615-1	N/R	N/R
Agilent	Amplifier, Pre	8447D	2944A06639	2018-02-04	1 year
IW	AOBOR Hi frequency Co AX Cable	KPS-1501A3960KPS	DC 1531	2017-08-05	1 year
-	RF cable	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A
Agilent	Pre-Amplifier	8449B	3147A00400	2018-02-02	1 year
Agilent	Amplifier, Pre	8447D	2944A10187	2019-04-11	1 year
Sunol Sciences	Antenna, Biconi-Log	JB1	A013105-3	2018-02-26	2 years
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2017-12-15	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2017-12-15	2 years
AH Systems	18-40GHz Pre-Amplifier	PAM-1840VH	170	2018-03-17	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2017-03-27	2 years

Note[1]: cables included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

7.6 Test Environmental Conditions

Temperature:	23 ºC
Relative Humidity:	42-50 %
ATM Pressure:	102.7 kPa

The testing was performed by Vincent Licata from 2018-07-05 to 2018-07-23 in 5m chamber 3.
The testing from 30MHz to 1GHz was performed by Zhao Zhao on 2019-03-06 in 5m chamber 3.

7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C and ISEDC RSS-210 standard's radiated emissions limits, and had the worst margin of:

Mode: Transmitting		
Margin (dB)	**Frequency (MHz)**	**Mode**
-1.39	1040	DP mode

Please refer to the following table and plots for specific test result details

7.8 Spurious Emissions Test Results

1) 30 MHz to 1GHz measured at 3 meters.

USB Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Corr'd Reading (dBµV/m)	FCC/ISEDC		Comments[1]
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
94.7	35.87	54	115	H	15.0	0.58	28.26	22.61	43.52	-20.91	Peak
485.4	36.32	54	115	H	24.1	0.99	28.56	31.86	46.02	-14.16	Peak
595.8	37.88	54	115	H	24.9	1.33	28.80	33.98	46.02	-12.04	Peak
47.8	44.27	43	103	V	14.9	0.52	28.33	30.84	40	-9.16	Peak
85	43.74	43	103	V	13.6	0.58	28.27	29.07	40	-10.93	Peak
445.5	40.82	43	103	V	23.1	1.33	28.41	35.51	46.02	-10.51	Peak

DP Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Corr'd. Reading (dBµV/m)	FCC/ISEDC		Comments[1]
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
94.7	35.87	241	131	H	15.0	0.58	28.26	22.61	43.52	-20.91	Peak
433.3	42.96	241	131	H	22.9	0.99	28.33	37.53	46.02	-8.49	Peak
595.8	37.88	241	131	H	24.9	1.33	28.80	33.98	46.02	-12.04	Peak
89.4	40.22	43	103	V	13.7	0.58	28.27	25.65	43.52	-17.87	Peak
353.6	42.44	43	103	V	20.9	0.99	27.73	35.61	46.02	-10.41	Peak
536	45.24	43	103	V	24.5	1.33	28.77	40.97	46.022	-5.052	Peak

Note: peak value was recorded to show compliance with Quasi Peak limit.

2) 1–40 GHz Measured at 1 meter

USB Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Corr'd. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1085	49.92	0	200	H	24.33	4.65	31.71	47.19	84.00	-36.81	PK
1085	37.00	0	200	H	24.33	4.65	31.71	34.27	64.00	-29.73	AV
1085	49.26	0	100	V	24.33	4.65	31.71	46.53	84.00	-37.47	PK
1085	34.55	0	100	V	24.33	4.65	31.71	31.82	64.00	-32.18	AV
2983	45.66	0	200	H	30.55	7.41	32.41	51.21	84.00	-32.79	PK
2983	34.18	0	200	H	30.55	7.41	32.41	39.73	64.00	-24.27	AV
2983	46.83	0	100	V	30.55	7.41	32.41	52.38	84.00	-31.62	PK
2983	34.12	0	100	V	30.55	7.41	32.41	39.67	64.00	-24.33	AV
25919	36.12	0	150	H	35.78	16.85	30.05	58.70	84.00	-25.30	PK
25919	24.00	0	150	H	35.78	16.85	30.05	46.58	64.00	-17.42	PK
25919	35.47	0	150	V	35.78	16.85	30.05	58.05	84.00	-25.95	PK
25919	23.05	0	150	V	35.78	16.85	30.05	45.63	64.00	-18.37	AV
38627	49.04	0	150	H	41.36	16.85	35.24	72.01	84.00	-11.99	PK
38627	35.49	0	150	H	41.36	16.85	35.24	58.46	64.00	-5.54	PK
38627	48.30	0	100	V	41.36	16.85	35.24	71.27	84.00	-12.73	PK
38627	34.40	0	100	V	41.36	16.85	35.24	57.37	64.00	-6.63	AV

DP Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Corr'd. Reading (dBµV/m)	FCC/ISEDC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1040	74.10	0	150	H	24.33	4.65	31.71	71.37	84.00	-12.63	PK
1040	64.72	0	150	H	24.33	4.65	31.71	61.99	64.00	-2.01	AV
1040	74.79	0	150	V	24.33	4.65	31.71	72.06	84.00	-11.94	PK
1040	**65.34**	**0**	**150**	**V**	**24.33**	**4.65**	**31.71**	**62.61**	**64.00**	**-1.39**	**AV**
2245	63.47	0	150	H	30.55	7.41	32.41	69.02	84.00	-14.98	PK
2245	51.63	0	150	H	30.55	7.41	32.41	57.18	64.00	-6.82	AV
2245	64.44	0	150	V	30.55	7.41	32.41	69.99	84.00	-14.01	PK
2245	52.06	0	150	V	30.55	7.41	32.41	57.61	64.00	-6.39	AV
25948	37.77	0	150	H	35.78	16.85	30.05	60.35	84.00	-23.65	PK
25948	26.34	0	150	H	35.78	16.85	30.05	48.92	64.00	-15.08	PK
25948	37.39	0	150	V	35.78	16.85	30.05	59.97	84.00	-24.03	PK
25948	26.16	0	150	V	35.78	16.85	30.05	48.74	64.00	-15.26	AV
38717	49.41	0	150	H	41.36	16.85	35.24	72.38	84.00	-11.62	PK
38717	38.21	0	150	H	41.36	16.85	35.24	61.18	64.00	-2.82	PK
38717	48.99	0	100	V	41.36	16.85	35.24	71.96	84.00	-12.04	PK
38717	38.00	0	100	V	41.36	16.85	35.24	60.97	64.00	-3.03	AV

3) 40-200 GHz Measured at 1 meter

USB Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna		Corr'd. Reading (dBµV/m)	EIRP (dBm)	Power Density (pW/cm²) @3m	FCC/ISEDC	
			Height (cm)	Factor (dB/m)				Limit (pW/cm²)	Margin (pW/cm²)
50265	28.00	0	150	38.21	66.21	-38.49	0.1252	90	-89.8748
64819	26.40	0	150	40.52	66.92	-37.78	0.1474	90	-89.8526
92401	29.03	0	150	47.52	76.55	-28.15	1.3538	90	-88.6462
142976	27.07	0	150	55.99	83.06	-21.64	6.0610	90	-83.9390

DP Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna		Corr'd. Reading (dBµV/m)	EIRP (dBm)	Power Density (pW/cm²) @3m	FCC/ISEDC	
			Height (cm)	Factor (dB/m)				Limit (pW/cm²)	Margin (pW/cm²)
50363	27.65	0	150	38.21	65.86	-38.84	0.1155	90	-89.8845
64677	26.06	0	150	40.52	66.58	-38.12	0.1363	90	-89.8637
92250	27.96	0	150	47.52	75.48	-29.22	1.0582	90	-88.9418
142880	26.87	0	150	55.99	82.86	-21.84	5.7883	90	-84.2117

8 FCC §15.255(e)(1), §15.215 & ISEDC RSS-210 J.4 - Emission Bandwidth

8.1 Applicable Standards

According to ECFR §15.255(e)(1) Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation.

According to ECFR §15.215 Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

According to ISEDC RSS-210 J.4:

a. For devices with an emission bandwidth greater than or equal to 100 MHz, the peak transmitter output power shall not exceed 500 mW. For devices with an emission bandwidth less than 100 MHz, the peak transmitter output power shall be less than the product of 500 mW times their emission bandwidth divided by 100 MHz.
b. For the purposes of demonstrating compliance with this RSS, corrections to the transmitter output power may be made to compensate for antenna and circuit loss.
c. For the purpose of this standard, emission bandwidth is defined as the instantaneous frequency range occupied by a steady radiated signal with modulation, outside which the radiated power spectral density shall be 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth. The center frequency must be stationary during the measurement interval, even if not stationary normally.

8.2 Measurement Procedure

The measurements are based on ANSI C63.10-2013.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rhode and Schwarz	Analyzer, Spectrum	FSU67	101360	2018-06-04	2 years
JUNKOSHA JUNFLOW MXW	RF cable	MWX261/B	1608T001	Each time[1]	N/A
LNF	Low Noise Amplifier 44 GHz to 77 GHz	LNR4577WA	022A	N/R	N/R
Millitech	Antenna Horn	56H-15-RA000	A17928	N/R	N/R

Note[1]: cable included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

Temperature:	23 ºC
Relative Humidity:	42 %
ATM Pressure:	102.7 kPa

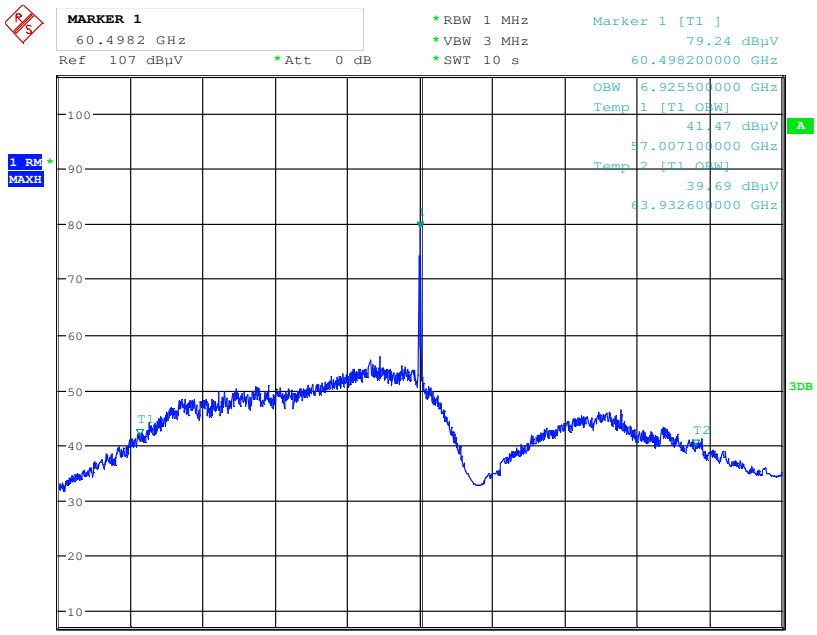
The testing was performed by Vincent Licata on 2018-07-24 in 5m chamber 3.

8.5 Test Results

Mode	99% OBW (GHz)
USB	6.9255
DP	6.6435

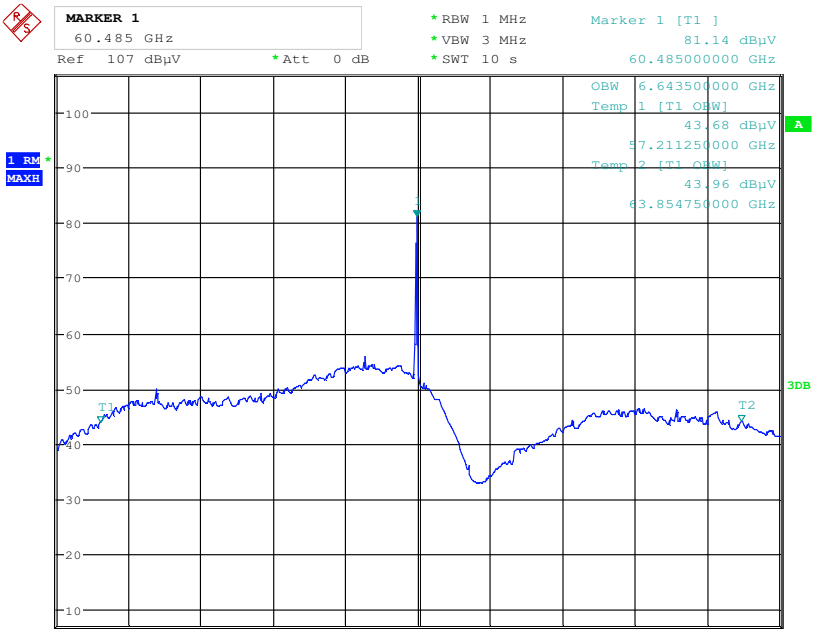
Please refer to the following plots.

USB mode



Date: 24.JUL.2018 00:05:56

DP mode



Date: 24.JUL.2018 00:50:21

9 FCC §15.255(c) (1) (i), §15.255(e) & ISEDC RSS-210 J.2.2 – Fundamental EIRP Output Power Measurement

9.1 Applicable Standards

According to ECFR §15.255 (c) (1) (i) the average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm.
According to ISEDC RSS-210 J.2.2 For other devices, the average and peak e.i.r.p., of any emission shall not exceed 40 dBm and 43 dBm, respectively.

9.2 Measurement Procedure

Per *Keyssa Inc.* measurements for Fundamental E.I.R.P Output Power where done by following the procedure in ANSI C63.10-2013 Clause 9.11Measurement of the fundamental emission using an RF detector.

The Setup was performed as follows:

1) The measurement instrument shall be a mm-wave RF detector that has an RF bandwidth encompassing the entire authorized frequency band. The input VSWT of the mm-wave detector shall be less than 3:1.
2) For radiated emissions measurements of transmitter output power, connect the test antenna for the fundamental frequency band to the mm-wave RF detector. Place the test horn in the main beam of the EUT at a distance that will provide a signal within the operating range of the RF detector.
3) Connect the video output of the detector to the 50 Ω input of a DSO.
4) Set the sampling rate of the DSO to at least twice the cutoff frequency of any LPF used or to at least twice the signal bandwidth without a LPF. Adjust the memory depth, the triggering, and the sweep speed to obtain a display that is representative of the signal considering the type of modulation.
5) Determine the maximum measurement distance and set the EUT within the distance.

The Test procedure was performed as follows:

1) Record the average and peak voltages from the DSO.
2) Disconnect the test antenna or EUT (as applicable for radiated or conducted tests) from the RF input port of the instrumentation system.
3) Connect an mm-wave source to the RF input port of the instrumentation system via a waveguide variable attenuator.
4) The mm-wave source shall be unmodulated.
5) Adjust the frequency of the mm-wave source to the center of the frequency range occupied by the transmitter.
6) Adjust the amplitude of the mm-wave source and/or the variable attenuator such that the DSO indicates a voltage equal to the peak voltage recorded
7) Disconnect the waveguide variable attenuator from the RF input port of the instrumentation system.
8) Without changing any settings, connect the waveguide variable attenuator to a wideband mm-wave power meter with a thermocouple detector or equivalent.
9) Measure and note the power.
10) Repeat the measurement for the average voltage.
11) Do calculation using the equations in ANSI C63010-2013 Clause 9

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rhode and Schwarz	Analyzer, Spectrum	FSU67	101360	2018-06-04	2 years
Agilent	Power Meter	N1914A	MY5000822	2017-07-28	2 years
HP	Power Sensor	V8488A	US39010099	2017-10-12	2 years
OML	Harmonic Mixer/Multiplier	S12MS	130423-1	N/A	N/A
Vaunix	Signal Generator 6 GHz to 18 GHz	LMS-183DX	19760	2018-08-05	2 years
A-InfoMW	20 dBi Standard Gain Horn Antenna	LB-15-20-A	5202062579	N/R	N/R
LNF	Low Noise Amplifier 44 GHz to 77 GHz	LNR4577WA	022A	N/R	N/R
Millitech	Variable Level Set Attenuator 0 to 25 dBm	LSA-15-R0000	248-A17928	Each time1	N/R
Tektronix	Oscilloscope	TDS2024B	C047044	2018-10-11	1 year
Millitech	RF Detector	DET-15	-	N/R	N/R
JUNKOSHA JUNFLOW MXW	RF cable	MWX261/B	1608T001	Each time1	N/A

Note[1]: cable included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

Temperature:	23-24º C
Relative Humidity:	37-42 %
ATM Pressure:	101.4-101.7 KPa

The testing was performed by Zhao Zhao from 2019-05-07 to 2019-05-08 in 5m chamber 3.

9.5 Test Results

DSO Reading (mV)	Substitution (dBm)	Ant Gain (dBi)	Pre-amp (dB)	Correct Reading (dBm)	E-field (dBuV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Detector
DP Mode									
7.6	-7.90	20	31.27	-39.17	113.72	9.02	43	-33.98	Peak
5.2	-8.89	20	31.27	-40.16	112.73	8.03	43	-34.97	Ave.
USB Mode									
7.2	-8.01	20	31.27	-39.28	113.61	8.91	43	-34.09	Peak
5.6	-8.80	20	31.27	-40.07	112.82	8.12	43	-34.88	Ave.

Note:

$$E = 126.8 - 20\log(\lambda) + P - G \quad (19)$$

where

E is the field strength of the emission at the measurement distance, in dBμV/m
P is the power measured at the output of the test antenna, in dBm
λ is the wavelength of the emission under investigation [$300/f_{MHz}$], in m
G is the gain of the test antenna, in dBi

NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the test antenna.

$$\text{EIRP} = E_{Meas} + 20\log(d_{Meas}) - 104.7 \quad (22)$$

where

EIRP is the equivalent isotropically radiated power, in dBm
E_{Meas} is the field strength of the emission at the measurement distance, in dBμV/m
d_{Meas} is the measurement distance, in m

NOTE—Because this equation yields the identical result whether the field strength is extrapolated using the default 20 dB/decade of distance extrapolation factor, or the field strength is not extrapolated for distance, this equation can generally be applied directly (with no further correction) to determine EIRP. In some cases, a different distance correction factor may be required; see 9.1.

Peak Conducted Output Power

Mode	Peak EIRP (dBm)	Antenna Gain (dBi)	Peak Conducted Output Power (mW)	6 dB Bandwidth (MHz)	Limit (mW)	Result
DP	9.02	5.3	2.36	9.04	45.2	Pass
USB	8.91	5.3	2.30	7.48	37.4	Pass

10 FCC §15.255(f) & ISEDC RSS-210 J.6 - Frequency Stability

10.1 Applicable Standards

According to FCC §15.255(f) *Frequency stability.* Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range −20 to + 50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

According to ISEDC RSS-210 J.6 Fundamental emissions shall be contained within the frequency bands specified in this section during all conditions of operation.

10.2 Measurement Procedure

The measurements are based on ANSI C63.10-2013.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rhode and Schwarz	Analyzer, Spectrum	FSU67	101360	2018-06-04	2 years
JUNKOSHA JUNFLOW MXW	RF cable	MWX261/B	1608T001	Each time1	N/A
A-InfoMW	20 dBi Standard Gain Horn Antenna	LB-15-20-A	5202062579	N/R	N/R
LNF	Low Noise Amplifier 44 GHz to 77 GHz	LNR4577WA	022A	N/R	N/R
Espec	Chamber, Humidity	ESL-4CA	18010	2019-04-25	1 year

Note[1]: cable included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

10.4 Test Environmental Conditions

Temperature:	23-24º C
Relative Humidity:	37-42 %
ATM Pressure:	101.4-101.7 KPa

The testing was performed by Zhao Zhao from 201-05-07 to 2019-05-08 in bench.

10.5 Test Results

FCC

Extreme Temperature

DP Mode

Voltage (V_{DC})	Temperature (°C)	Low Frequency (GHz)	High Frequency (GHz)	Limit (GHz)	Results
5.00	-20	57.5	63.8	57-71	pass
	-10	57.5	64.0	57-71	pass
	0	57.5	63.9	57-71	pass
	10	57.4	63.9	57-71	pass
	20	57.6	63.9	57-71	pass
	30	57.4	63.9	57-71	pass
	40	57.3	64.0	57-71	pass
	50	57.1	63.8	57-71	pass

USB Mode

Voltage (V_{DC})	Temperature (°C)	Low Frequency (GHz)	High Frequency (GHz)	Limit	Results
5.00	-20	57.6	63.8	57-71	pass
	-10	57.5	63.9	57-71	pass
	0	57.5	63.9	57-71	pass
	10	57.5	64.0	57-71	pass
	20	57.6	63.7	57-71	pass
	30	57.6	63.8	57-71	pass
	40	57.5	63.8	57-71	pass
	50	57.5	63.9	57-71	pass

ISEDC

Low Temperature

Mode	Frequency Range (GHz)	Low Frequency (GHz)	High Frequency (GHz)	Results
USB	57-64	57.6	63.8	pass
DP	57-64	57.5	63.8	pass

Nominal Temperature

Mode	Frequency Range (GHz)	Low Frequency (GHz)	High Frequency (GHz)	Results
USB	57-64	57.6	63.7	pass
DP	57-64	57.6	63.9	pass

High Temperature

Mode	Frequency Range (GHz)	Low Frequency (GHz)	High Frequency (GHz)	Results
USB	57-64	57.5	63.9	pass
DP	57-64	57.1	63.8	pass

11 Annex A- EUT Test Setup Photographs

Please refer to the attachment.

12 Annex B- EUT External Photographs

Please refer to the attachment.

13 Annex C- EUT Internal Photographs

Please refer to the attachment.

14 Annex D (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, 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 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 April 2017*).

Presented this 2nd day of October 2018.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2020
Revised June 5, 2019

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

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

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