FCC PART 15, SUBPART C
ISEDC RSS-247, ISSUE 2, FEBRUARY 2017

TEST REPORT

For

The Detection Group, Inc.

4550 Kearny Villa Road, Suite 110
San Diego, CA 92123

FCC ID: 2AK4V-DT-502
IC: 22517-DT502

Report Type:	**Product Type:**
Original Report	Wireless Sensor

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Report Number:	R1702012-247 DTS (Sensor)
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1702012-247 DTS (Sensor)	Original Report	2017-08-14

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *The Detection Group, Inc.,* and their product model: DT-502 Wireless Sensor, FCC ID: 2AK4V-DT-502; IC: 22517-DT502 or the "EUT" as referred to in this report. The EUT was a 902 – 928 MHz band wireless sensor that detects water leakages.

1.2 Mechanical Description of EUT

The EUT measures approximately 96 mm (L) x 33 mm (W) x 92 mm (H).

The test data gathered are from typical production sample, serial number: 30 00007A assigned by ODI Innovation.

1.3 Objective

This report is prepared on behalf of *The Detection Group, Inc.,* in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communication Commission's rules and ISEDC RSS-247 Issue 2, FEBRUARY 2017.

The objective is to determine compliance with FCC Part 15.247 and ISEDC RSS-247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment DTS with FCC ID: 2AK4V-DT-500, IC: 22517-DT500
FCC Part 15, Subpart C, Equipment DTS with FCC ID: 2AK4V-DT-501, IC: 22517-DT501
FCC Part 15, Subpart C, Equipment DTS with FCC ID: 2AK4V-DT-503, IC: 22517-DT503

1.5 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 and FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

1.6 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
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 %

Type of Measurement: **ANSI C63.4-2014 Radiated Emissions (in the BACL 5 m - 3 SAC)** **Note: Measurements up to 1 GHz made using an Rand S ESCI EMI Receiver; Measurements from 1 GHz to 40 GHz made using an Rand S ESU40 EMI Receiver**	**BACL Typical U_{LAB} Value** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**	**U_{CISPR} Value** **worst-allowable values of the latest version of CISPR 16-4-2 (for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**
Radiated Electric Field Disturbance – Horizontal Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.76 dB (No Tilting)**	**5.06 dB (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions at 3 metres distance)	**5.13 dB (No Tilting)**	**5.17 dB (No Tilting)**
Radiated Electric Field Disturbance – Horizontal Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**5.29 dB (No Tilting)**	**5.34 (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**5.53 dB (No Tilting)**	**6.32 dB (No Tilting)**
Radiated Electric Field Disturbance Horizontal and Vertical Polarizations, 1 GHz – 6 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.36 dB (No Tilting)**	**5.18 dB (No Tilting)**
Radiated Electric Field Disturbance Horizontal and Vertical Polarizations, 1 GHz – 6 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.00 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal and Vertical Polarizations, 6 GHz – 18 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.23 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal and Vertical Polarizations, 18 GHz – 26.5 GHz (i.e., Radiated Emissions measured at 1 metres distance)	**4.81 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal and Vertical Polarizations, 26.5 GHz – 40 GHz (i.e., Radiated Emissions at 1 metres distance)	**5.00 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**

1.7 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.

1.8 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 3297.02),*** 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 3297.03)*** 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 and Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime and 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 3297.01)*** 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 and 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: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I and 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:
  - Radio and Teleterminal Equipment (Rand TTE) Directive 1995/5/EC
    US -EU EMC and Telecom MRA CAB
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA)
  APEC Tel MRA -Phase I and Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I and 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;
- 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 and FCC KDB 558074 D01 DTS Meas Guidance v04.

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

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PSD across all data rates bandwidths, and modulations.

2.2 EUT Exercise Software

N/A

2.3 Duty Cycle Correction Factor

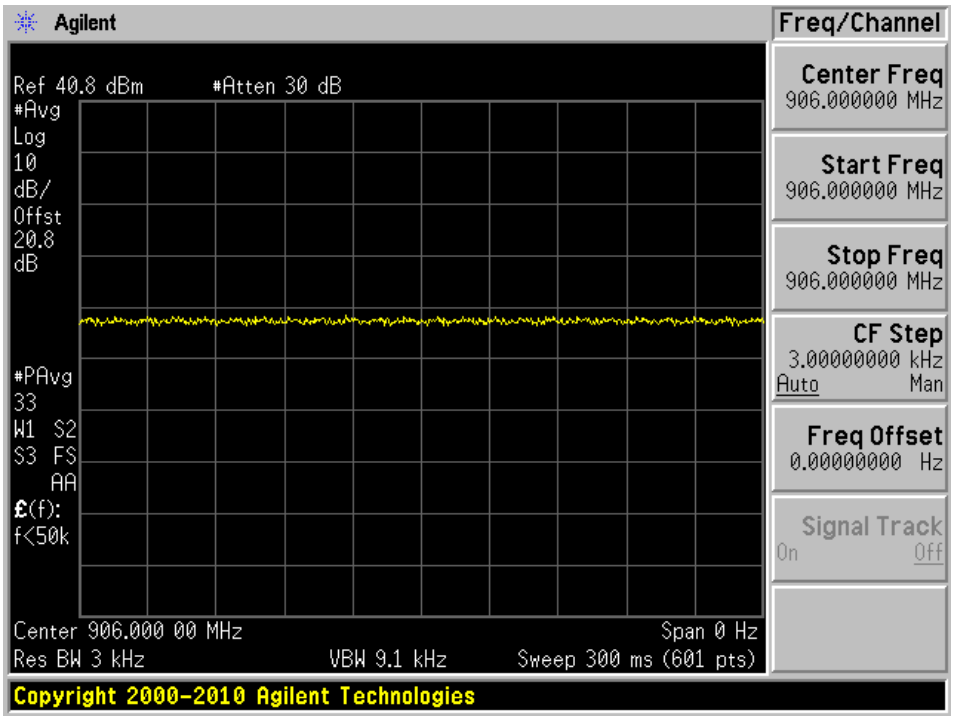
According to KDB 558074 D01 DTS Meas Guidance v04 section 6.0:

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be utilized to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data is being acquired (i.e., no transmitter off-time is to be considered).

Radio Mode	On Time (us)	Period (us)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
906 -924MHz	Continuous	Continuous	100%	0

Duty Cycle = On Time (ms)/ Period (ms)
Duty Cycle Correction Factor (dB) = 10*log(1/Duty Cycle)

Please refer to the following plots.



2.4 Test Channels

Channels	Frequency (MHz)
Low	906
Middle	914
High	924

2.5 Equipment Modifications

N/A

2.6 Local Support Equipment

Manufacturer/Product Type	Description	Model No.	Serial No.
Dell	Windows Laptop	E6410	-

2.7 Support Equipment

There was no support equipment included, or intended for use with EUT during these tests.

2.8 Interface Ports and Cabling

Cable Description	Length (m)	To	From
RF Cable	< 1 m	PSA	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC/ ISEDC Rules	Description of Test	Results
FCC §15.203 ISEDC RSS-Gen Clause 8.3	Antenna Requirement	Compliant
FCC §15.207 ISEDC RSS-Gen Clause 8.8	AC Line Conducted Emissions	N/A[1]
FCC §2.1091, §15.247(i) ISEDC RSS-102	RF Exposure	Compliant
FCC §2.1051, §15.247 (d) ISEDC RSS-247 Clause 5.5	Spurious Emissions at Antenna Port	Compliant
FCC §2.1053, §15.205, §15.209, §15.247 (d) ISEDC RSS-247 Clause 5.5 ISEDC RSS-Gen Clause 8.9 and 8.10	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) ISEDC RSS-247 Clause 5.2 (a)	6 dB and 99% Emission Bandwidth	Compliant
FCC §15.247(b)(3) ISEDC RSS-247 Clause 5.4 (d)	Maximum Peak Output Power	Compliant
FCC §15.247(d) ISEDC RSS-247 Clause 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) ISEDC RSS-247 Clause 5.2 (b)	Power Spectral Density	Compliant

Note[1]: Unit is battery drive only.

4 FCC §15.203 and ISEDC RSS-Gen Clause 8.3 - 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.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen Clause 8.3: Transmitter Antenna

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. [9] When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

4.2 Antenna Description

The antennas used by the EUT are permanent attached antennas.

Antenna usage	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
RF	906-924	1.59

5 FCC § 2.1091, §15.247(i) and ISEDC RSS-102 – RF Exposure

5.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

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

Before equipment certification is granted, the procedure of ISEDC RSS-102 must be followed concerning the exposure of humans to RF field

According to RSS-102 section 2.5.2

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 For

Targeted output power tolerance is ±1db, so we use 25 dBm as output power to calculate the MPE.

Maximum peak output power at antenna input terminal (dBm):	25
Maximum peak output power at antenna input terminal (mW):	316.23
Prediction distance (cm):	20
Prediction frequency (MHz):	914
Maximum Antenna Gain, typical (dBi):	1.59
Maximum Antenna Gain (numeric):	1.442
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.091
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.609

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.091 mW/cm^2. Limit is 0.609 mW/cm^2.

5.4 RF exposure evaluation exemption for IC

The max tune-up peak conducted output power is 25 dBm at 914 MHz and the antenna gain is 1.59 dBi, so the e.i.r.p is 26.59 dBm (0.46 W).

Exemption from Routine Evaluation Limit is:
$1.31 \times 10^{-2} f^{0.6834} = 1.31 \times 10^{-2} \times 914^{0.6834} = 1.38$ W = 31.41 dBm e.i.r.p.

Since the e.i.r.p. output power of the EUT is less than the limit, the device is exempt from Routine RF Exposure Evaluation.

6 FCC §15.205, §15.209, §15.247(d) and ISEDC RSS-247 Clause 5.5 and RSS-GEN Clause 8.9 and 8.10 - Spurious Radiated Emissions

6.1 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) 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	16.42 – 16.423		
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	4. 5 – 5. 15
2.1735 – 2.1905	25.5 – 25.67	1300 – 1427	5. 35 – 5. 46
4.125 – 4.128	37.5 – 38.25	1435 – 1626.5	7.25 – 7.75
4.17725 – 4.17775	73 – 74.6	1645.5 – 1646.5	8.025 – 8.5
4.20725 – 4.20775	74.8 – 75.2	1660 – 1710	9.0 – 9.2
6.215 – 6.218	108 – 121.94	1718.8 – 1722.2	9.3 – 9.5
6.26775 – 6.26825	123 – 138	2200 – 2300	10.6 – 12.7
6.31175 – 6.31225	149.9 – 150.05	2310 – 2390	13.25 – 13.4
8.291 – 8.294	156.52475 – 156.52525	2483.5 – 2500	14.47 – 14.5
8.362 – 8.366	156.7 – 156.9	2690 – 2900	15.35 – 16.2
8.37625 – 8.38675	162.0125 –167.17	3260 – 3267	17.7 – 21.4
8.41425 – 8.41475	167.72 – 173.2	3.332 – 3.339	22.01 – 23.12
12.29 – 12.293	240 – 285	3 3458 – 3 358	23.6 – 24.0
12.51975 – 12.52025	322 – 335.4	3.600 – 4.400	31.2 – 31.8
12.57675 – 12.57725	399.9 – 410		36.43 – 36.5
13.36 – 13.41	608 – 614		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 §15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

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 specifISEDC RSS.

As per ISEDC RSS-247 §5.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

6.2 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 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.

6.3 Test Procedure

For the radiated emissions test, 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.

The EUT was set 3 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 and 1.5 meter above the ground plane for below and 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:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

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

6.4 Corrected Amplitude and Margin Calculation

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

6.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde and Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100338	2016-02-04	2 year
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 Years
EMCO	Antenna, Horn	3115	9511-4627	2016-01-28	2 years
HP	Amplifier, Pre	8447D	2944A06639	2016-06-28	1 year
IW	Yellow High Frequency Cable	DC 1531	SPS-2303-3840-SPS	2016-08-05	1 Year
Suirong	30 ft conductive emission cable	LMR400	C0013	2017-03-21	1 Year
Suirong	30 ft conductive emission cable	LMR400	C0014	2017-03-21	1 Year
Wainwright Instruments	Band Reject Filter	WRCGV900/930-880/950-40/8SS	-	Each time1	1 year
-	SMA cable	-	C0002	Each time1	N/A
HP	Pre-Amplifier	8449B OPT HO2	3008A0113	2016-05-23	1 year
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL *attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

6.6 Test Environmental Conditions

Temperature:	20-22 ºC
Relative Humidity:	39-43 %
ATM Pressure:	101 kPa

The testing was performed by Rudy Sun from 2017-04-12 in 5m chamber 3.

6.7 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Title 47, Part 15C, ISEDC RSS-GEN, and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

906 -924 MHz

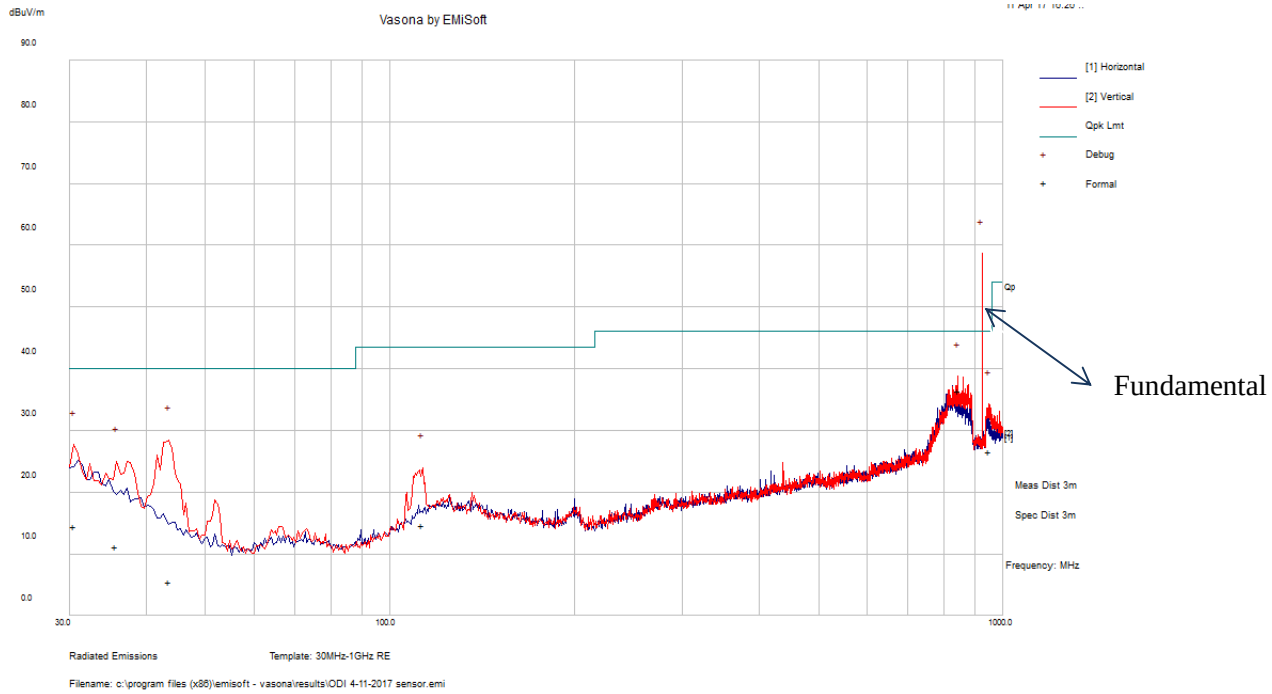
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, channel**
-3.69	4620	Vertical	924MHz

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

6.8 Radiated Emissions Test Results

1) 30 MHz – 1 GHz Worst Case, Measured at 3 meters

906 -924 MHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
844.1813	36.46	136	V	129	46	-9.54	QP
43.6355	5.52	135	V	211	40	-34.48	QP
948.5575	26.68	118	V	277	46	-19.32	QP
30.49175	14.56	120	V	69	40	-25.44	QP
35.709	11.14	242	V	278	40	-28.86	QP
113.0568	14.63	123	V	96	43.5	-28.87	QP

2) 1–10 GHz Measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)			Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 906 MHz											
906	93.67	224	170	H	24.11	2.33	0.00	120.11	-	-	PK
906	90.81	224	170	H	24.11	2.33	0.00	117.25	-	-	AV
906	86.37	74	300	V	24.11	2.33	0.00	112.81	-	-	PK
906	84.17	74	300	V	24.11	2.33	0.00	110.61	-	-	AV
1812	56.52	224	170	H	26.88	3.35	38.75	48.00	90.11	-42.11	PK
1812	50.09	224	170	H	26.88	3.35	38.75	41.57	87.25	-45.68	AV
1812	53.94	74	300	V	26.88	3.35	38.75	45.42	82.81	-37.39	PK
1812	45.50	74	300	V	26.88	3.35	38.75	36.98	80.61	-43.63	AV
2718	53.81	224	170	H	29.01	3.79	39.46	47.15	74.00	-26.85	PK
2718	48.33	224	170	H	29.01	3.79	39.46	41.67	54.00	-12.33	AV
2718	58.91	74	300	V	29.01	3.79	39.46	52.25	74.00	-21.75	PK
2718	54.76	74	300	V	29.01	3.79	39.46	48.10	54.00	-5.90	AV
3624	47.75	224	170	H	31.78	4.70	39.20	45.03	74.00	-28.97	PK
3624	41.23	224	170	H	31.78	4.70	39.20	38.51	54.00	-15.49	AV
3624	48.77	74	300	V	31.78	4.70	39.20	46.05	74.00	-27.95	PK
3624	40.62	74	300	V	31.78	4.70	39.20	37.90	54.00	-16.10	AV
4530	54.94	224	170	H	32.26	5.10	38.56	53.74	74.00	-20.26	PK
4530	45.43	224	170	H	32.26	5.10	38.56	44.23	54.00	-9.77	AV
4530	45.82	74	300	V	32.26	5.10	38.56	44.62	74.00	-29.38	PK
4530	36.32	74	300	V	32.26	5.10	38.56	35.12	54.00	-18.88	AV
5436	44.32	224	170	H	34.09	5.50	38.33	45.58	74.00	-28.42	PK
5436	34.27	224	170	H	34.09	5.50	38.33	35.53	54.00	-18.47	AV
5436	43.48	74	300	V	34.09	5.50	38.33	44.74	74.00	-29.26	PK
5436	34.02	74	300	V	34.09	5.50	38.33	35.28	54.00	-18.72	AV
6342	65.41	224	170	H	34.42	6.10	37.97	67.96	90.11	-22.15	PK
6342	61.36	224	170	H	34.42	6.10	37.97	63.91	87.25	-23.34	AV
6342	63.52	74	300	V	34.42	6.10	37.97	66.07	82.81	-16.74	PK
6342	59.07	74	300	V	34.42	6.10	37.89	61.70	80.61	-18.91	AV
7248	45.53	224	170	H	36.39	6.91	37.89	50.94	90.11	-39.17	PK
7248	36.27	224	170	H	36.39	6.91	37.89	41.68	87.25	-45.57	AV
7248	46.45	74	300	V	36.39	6.91	37.89	51.86	82.81	-30.95	PK
7248	36.27	74	300	V	36.39	6.91	39.20	40.37	80.61	-40.24	AV
8154	45.04	224	170	H	36.89	6.80	37.88	50.85	74.00	-23.15	PK
8154	35.51	224	170	H	36.89	6.80	37.88	41.32	54.00	-12.68	AV
8154	46.15	74	300	V	36.89	6.80	37.88	51.96	74.00	-22.04	PK
8154	34.87	74	300	V	36.89	6.80	37.88	40.68	54.00	-13.32	AV
9060	43.56	224	170	H	37.80	7.30	38.08	50.58	74.00	-23.42	PK
9060	34.02	224	170	H	37.80	7.30	38.08	41.04	54.00	-12.96	AV
9060	45.37	74	300	V	37.80	7.30	38.08	52.39	74.00	-21.61	PK
9060	33.90	74	300	V	37.80	7.30	38.08	40.92	54.00	-13.08	AV

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)			Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 914 MHz											
914	94.08	57	300	H	24.11	2.33	0.00	120.52	-	-	PK
914	91.76	57	300	H	24.11	2.33	0.00	118.20	-	-	AV
914	84.14	249	300	V	24.11	2.33	0.00	110.58	-	-	PK
914	81.86	249	300	V	24.11	2.33	0.00	108.30	-	-	AV
1828	55.48	57	300	H	26.88	3.35	38.75	46.96	90.52	-43.56	PK
1828	49.98	57	300	H	26.88	3.35	38.75	41.46	88.20	-46.74	AV
1828	52.88	249	300	V	26.88	3.35	38.75	44.36	80.58	-36.22	PK
1828	45.90	249	300	V	26.88	3.35	38.75	37.38	78.30	-40.92	AV
2742	57.90	57	300	H	29.01	3.79	39.46	51.24	74.00	-22.76	PK
2742	53.36	57	300	H	29.01	3.79	39.46	46.70	54.00	-7.30	AV
2742	57.43	249	300	V	29.01	3.79	39.46	50.77	74.00	-23.23	PK
2742	52.92	249	300	V	29.01	3.79	39.46	46.26	54.00	-7.74	AV
3656	48.92	57	300	H	31.78	4.70	39.20	46.20	74.00	-27.80	PK
3656	40.69	57	300	H	31.78	4.70	39.20	37.97	54.00	-16.03	AV
3656	48.01	249	300	V	31.78	4.70	39.20	45.29	74.00	-28.71	PK
3656	39.43	249	300	V	31.78	4.70	39.20	36.71	54.00	-17.29	AV
4570	47.96	57	300	H	32.26	5.10	38.56	46.76	74.00	-27.24	PK
4570	38.62	57	300	H	32.26	5.10	38.56	37.42	54.00	-16.58	AV
4570	54.71	249	300	V	32.26	5.10	38.56	53.51	74.00	-20.49	PK
4570	44.50	249	300	V	32.26	5.10	38.56	43.30	54.00	-10.70	AV
5484	44.37	57	300	H	34.09	5.50	38.33	45.63	90.52	-44.89	PK
5484	34.55	57	300	H	34.09	5.50	38.33	35.81	88.20	-52.39	AV
5484	44.98	249	300	V	34.09	5.50	38.33	46.24	80.58	-34.34	PK
5484	34.50	249	300	V	34.09	5.50	38.33	35.76	78.30	-42.54	AV
6398	63.52	57	300	H	34.42	6.10	37.97	66.07	90.52	-24.45	PK
6398	59.72	57	300	H	34.42	6.10	37.97	62.27	88.20	-25.93	AV
6398	68.38	249	300	V	34.42	6.10	37.97	70.93	80.58	-9.65	PK
6398	64.84	249	300	V	34.42	6.10	37.89	67.47	78.30	-10.83	AV
7312	47.63	57	300	H	36.39	6.91	37.89	53.04	74.00	-20.96	PK
7312	38.98	57	300	H	36.39	6.91	37.89	44.39	54.00	-9.61	AV
7312	47.86	249	300	V	36.39	6.91	37.89	53.27	74.00	-20.73	PK
7312	37.65	249	300	V	36.39	6.91	39.20	41.75	54.00	-12.25	AV
8226	44.30	57	300	H	36.89	6.80	37.88	50.11	74.00	-23.89	PK
8226	34.78	57	300	H	36.89	6.80	37.88	40.59	54.00	-13.41	AV
8226	44.94	249	300	V	36.89	6.80	37.88	50.75	74.00	-23.25	PK
8226	34.67	249	300	V	36.89	6.80	37.88	40.48	54.00	-13.52	AV
9140	46.58	57	300	H	37.80	7.30	38.08	53.60	74.00	-20.40	PK
9140	35.09	57	300	H	37.80	7.30	38.08	42.11	54.00	-11.89	AV
9140	45.50	249	300	V	37.80	7.30	38.08	52.52	74.00	-21.48	PK
9140	35.48	249	300	V	37.80	7.30	38.08	42.50	54.00	-11.50	AV

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)			Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 924 MHz											
924	93.31	46	300	H	24.11	2.33	0.00	119.75	-	-	PK
924	90.92	46	300	H	24.11	2.33	0.00	117.36	-	-	AV
924	80.75	250	300	V	24.11	2.33	0.00	107.19	-	-	PK
924	78.28	250	300	V	24.11	2.33	0.00	104.72	-	-	AV
1848	53.81	46	300	H	26.88	3.35	38.75	45.29	89.75	-44.46	PK
1848	48.18	46	300	H	26.88	3.35	38.75	39.66	87.36	-47.70	AV
1848	51.39	249	300	V	26.88	3.35	38.75	42.87	77.19	-34.32	PK
1848	44.48	249	300	V	26.88	3.35	38.75	35.96	74.72	-38.76	AV
2772	47.40	46	300	H	29.01	3.79	39.46	40.74	74.00	-33.26	PK
2772	37.78	46	300	H	29.01	3.79	39.46	31.12	54.00	-22.88	AV
2772	46.85	249	300	V	29.01	3.79	39.46	40.19	74.00	-33.81	PK
2772	36.35	249	300	V	29.01	3.79	39.46	29.69	54.00	-24.31	AV
3696	49.45	46	300	H	31.78	4.70	39.20	46.73	74.00	-27.27	PK
3696	40.79	46	300	H	31.78	4.70	39.20	38.07	54.00	-15.93	AV
3696	46.95	249	300	V	31.78	4.70	39.20	44.23	74.00	-29.77	PK
3696	37.93	249	300	V	31.78	4.70	39.20	35.21	54.00	-18.79	AV
4620	53.03	46	300	H	32.26	5.10	38.56	51.83	74.00	-22.17	PK
4620	41.68	46	300	H	32.26	5.10	38.56	40.48	54.00	-13.52	AV
4620	61.21	249	300	V	32.26	5.10	38.56	60.01	74.00	-13.99	PK
4620	51.51	249	300	V	32.26	5.10	38.56	50.31	54.00	**-3.69**	AV
5544	47.42	46	300	H	34.09	5.50	38.33	48.68	89.75	-41.07	PK
5544	40.06	46	300	H	34.09	5.50	38.33	41.32	87.36	-46.04	AV
5544	45.87	249	300	V	34.09	5.50	38.33	47.13	77.19	-30.06	PK
5544	38.02	249	300	V	34.09	5.50	38.33	39.28	74.72	-35.44	AV
6468	64.95	46	300	H	34.42	6.10	37.97	67.50	89.75	-22.25	PK
6468	60.38	46	300	H	34.42	6.10	37.97	62.93	87.36	-24.43	AV
6468	68.31	249	300	V	34.42	6.10	37.97	70.86	77.19	-6.33	PK
6468	64.43	249	300	V	34.42	6.10	37.89	67.06	74.72	-7.66	AV
7392	44.85	46	300	H	36.39	6.91	37.89	50.26	74.00	-23.74	PK
7392	35.72	46	300	H	36.39	6.91	37.89	41.13	54.00	-12.87	AV
7392	45.21	249	300	V	36.39	6.91	37.89	50.62	74.00	-23.38	PK
7392	35.28	249	300	V	36.39	6.91	39.20	39.38	54.00	-14.62	AV
8316	45.04	46	300	H	36.89	6.80	37.88	50.85	74.00	-23.15	PK
8316	35.32	46	300	H	36.89	6.80	37.88	41.13	54.00	-12.87	AV
8316	44.94	249	300	V	36.89	6.80	37.88	50.75	74.00	-23.25	PK
8316	35.39	249	300	V	36.89	6.80	37.88	41.20	54.00	-12.80	AV
9240	45.22	46	300	H	37.80	7.30	38.08	52.24	89.75	-37.51	PK
9240	35.35	46	300	H	37.80	7.30	38.08	42.37	87.36	-44.99	AV
9240	46.13	249	300	V	37.80	7.30	38.08	53.15	77.19	-24.04	PK
9240	35.05	249	300	V	37.80	7.30	38.08	42.07	74.72	-32.65	AV

7 FCC §15.247(a) (2) and ISEDC RSS-247 Clause 5.2 -Emission Bandwidth

7.1 Applicable Standards

According to FCC §15.247(a)(2) and ISEDC RSS-247 Clause 5.2, systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8: DTS bandwidth.

7.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
-	RF cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

7.4 Test Environmental Conditions

Temperature:	21º C
Relative Humidity:	38 %
ATM Pressure:	101.5 KPa

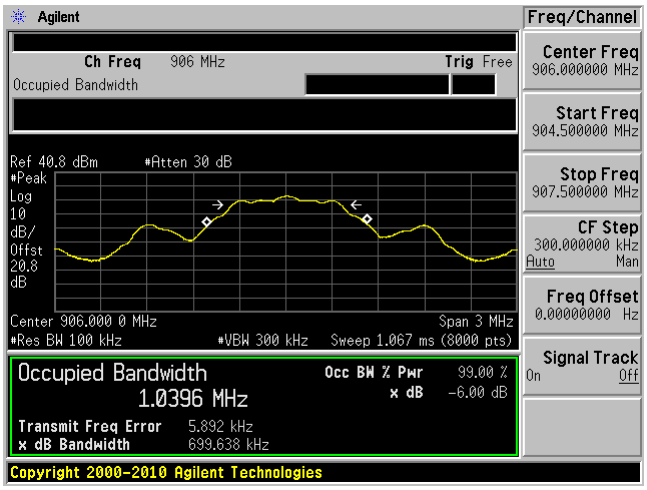
The testing was performed by Rudy Sun on 2017-03-27 in RF site.

7.5 Test Results

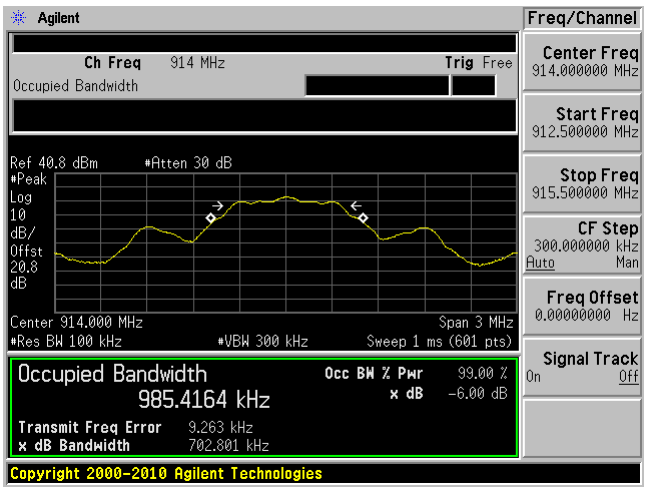
Channel	Frequency (kHz)	6 dB BW (kHz)	6 dB OBW limit (kHz)
906 -924MHz			
Low	906	699.638	500
Middle	914	702.801	500
High	924	700.540	500

Please refer to the following plots for detailed test results.

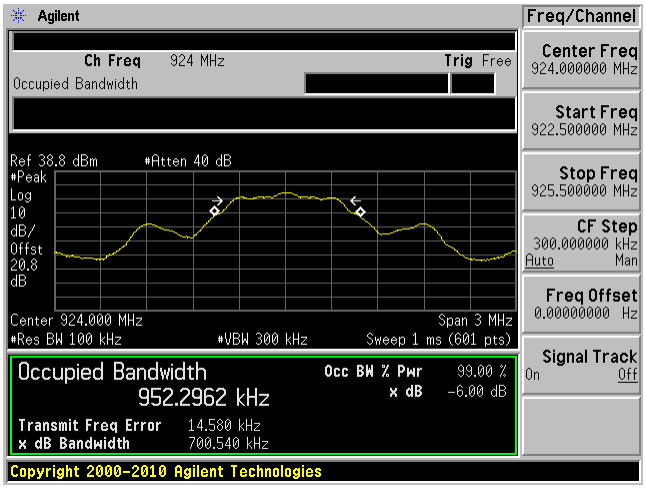
Low Channel 906 MHz



Middle Channel 914 MHz



High Channel 924 MHz



8 FCC §15.247(b) (3) and ISEDC RSS-247 Clause 5.4(d) - Output Power Measurement

8.1 Applicable Standards

According to FCC §15.247(b) (3) and ISEDC RSS-247 §5.4 (d) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

8.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 9: Fundamental emission output power.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
ETS- Lingerin	Power Sensor	7002-006	160097	2016-12-05	1 year
-	RF Cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

8.4 Test Environmental Conditions

Temperature:	21º C
Relative Humidity:	39 %
ATM Pressure:	101.5 KPa

The testing was performed by Rudy Sun on 2017-03-21 in RF site.

8.5 Test Results

906 -924 MHz Average Output Power

Frequency (MHz)	Average Power (dBm)	Limit (dBm)
906	23.90	30
914	24.02	30
924	23.95	30

Duty cycle correction factor has been added to the results.

9 FCC §15.247(d) and ISEDC RSS-247 Clause 5.5 – 100 kHz Bandwidth of Band Edges

9.1 Applicable Standards

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

9.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 13: Band-edge measurements.

9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
-	RF Cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

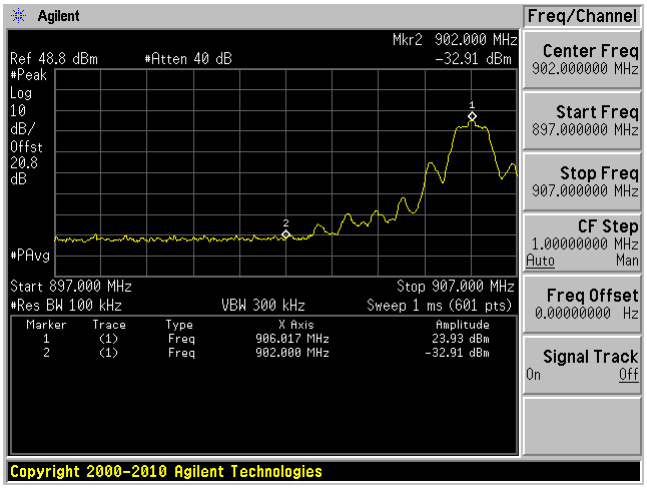
9.4 Test Environmental Conditions

Temperature:	20º C
Relative Humidity:	39 %
ATM Pressure:	101.5 KPa

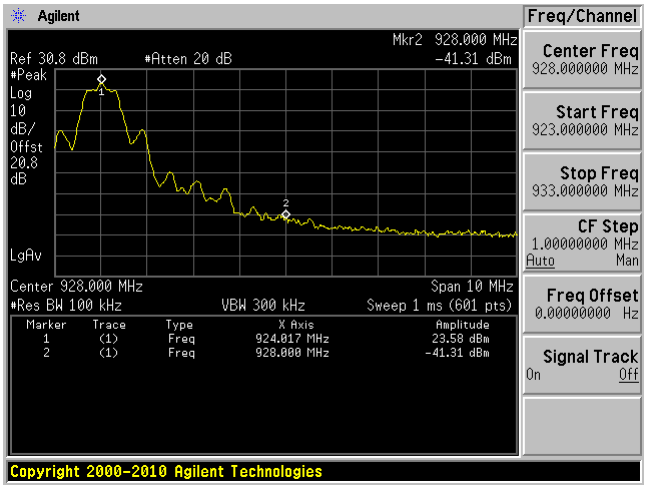
The testing was performed by Rudy Sun on 2017-03-22 in RF site.

9.5 Test Results

Low Channel 906 MHz



High Channel 924 MHz



10 FCC §15.247(e) and ISEDC RSS-247 Clause 5.2(a) – Power Spectral Density

10.1 Applicable Standards

According to FCC §15.247(e) and ISEDC RSS-247 §5.2(a), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

10.2 Measurement Procedure

The measurements are based on FCC KDB 558074 D01 DTS Meas Guidance v04: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10: Maximum power spectral density level in the fundamental emission.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
-	RF Cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

10.4 Test Environmental Conditions

Temperature:	20º C
Relative Humidity:	38 %
ATM Pressure:	101.5 KPa

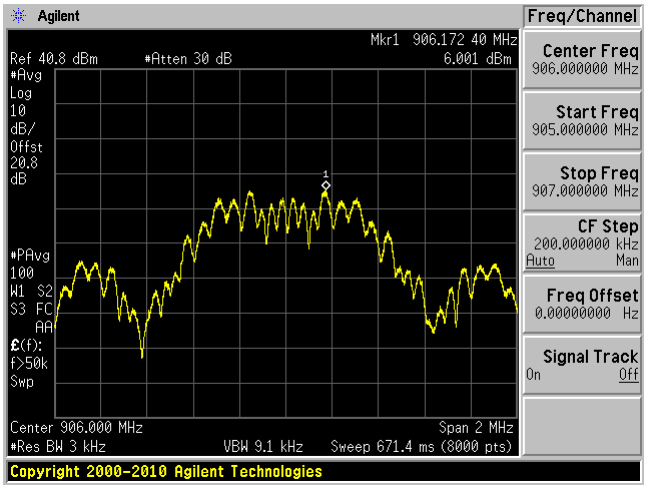
The testing was performed by Rudy Sun on 2017-03-23 in RF site.

10.5 Test Results

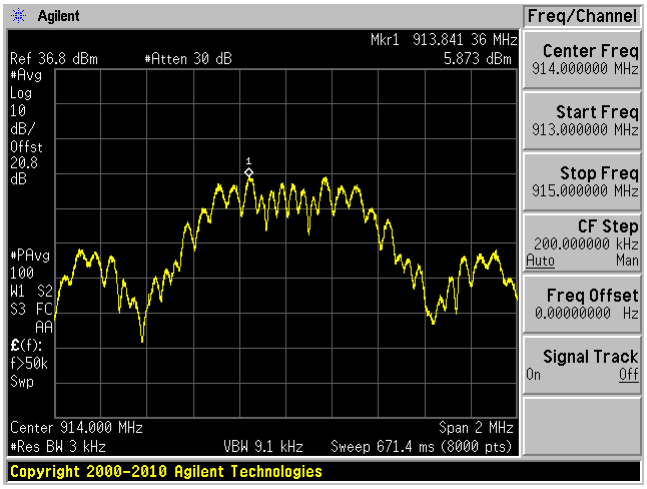
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
906 – 924 MHz			
Low	906	6.001	8
Middle	914	5.873	8
High	924	5.438	8

Duty cycle correction factor has been added to the results.
Please refer to the following plots for detailed test results.

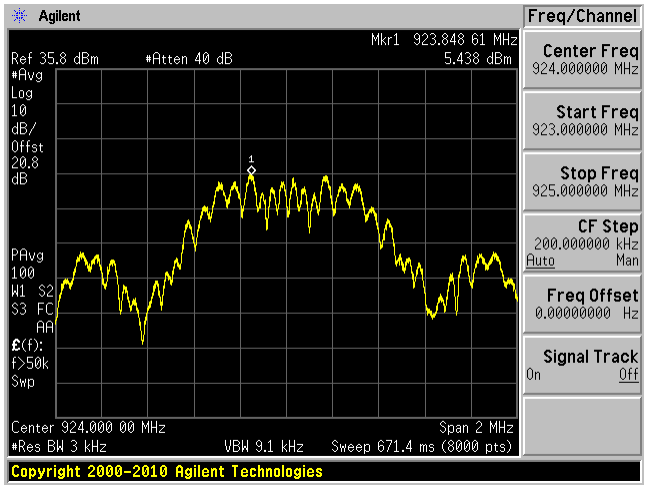
Low Channel 906 MHz



Middle Channel 914 MHz



High Channel 924 MHz



11 FCC §15.247(d), and ISEDC RSS-247 Clause 5.5 and RSS-GEN Clause 8.9 – Spurious Emissions at Antenna Terminals

11.1 Applicable Standards

For FCC §15.247(d) in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4440A	US 42221851	2016-06-10	1 year
-	RF Cable	-	-	Each time[1]	N/A
-	20dB attenuator	-	-	Each time[1]	N/A

Note[1]: cable and attenuator included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.*

11.4 Test Environmental Conditions

Temperature:	20º C
Relative Humidity:	38 %
ATM Pressure:	101.7 KPa

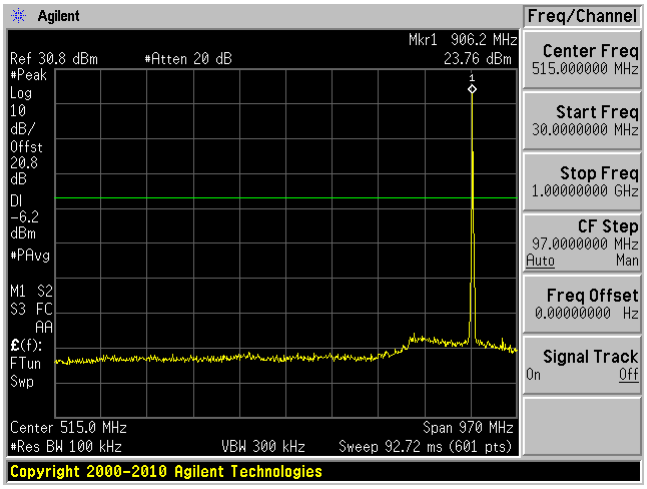
The testing was performed by Rudy Sun on 2017-03-21 in RF site.

11.5 Test Results

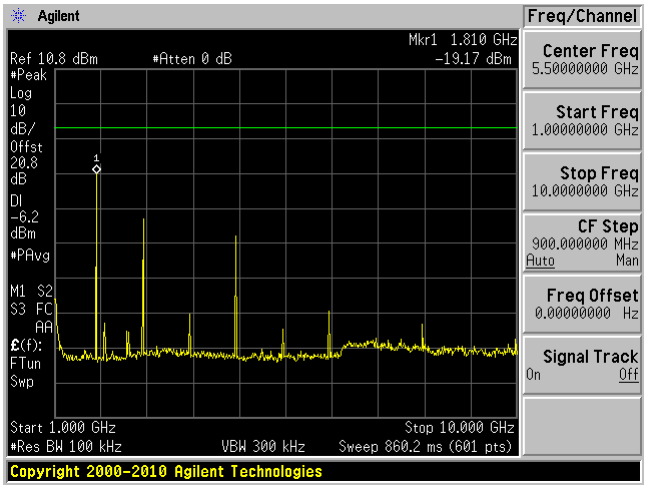
Please refer to following plots.

Low 906 MHz

30MHz – 1 GHz

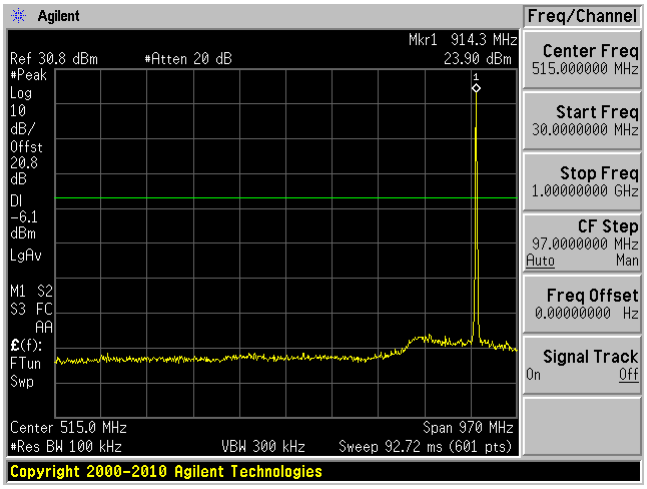


1 - 10 GHz

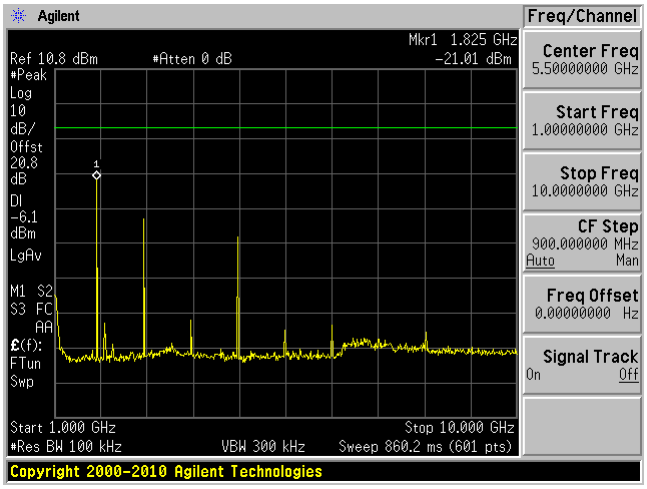


Middle 914 MHz

30 MHz – 1 GHz

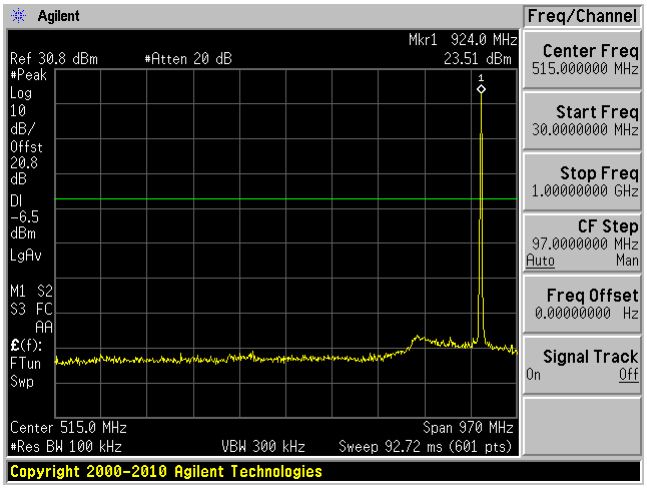


1 - 10 GHz



High 924 MHz

30 MHz – 1 GHz



1 - 10 GHz