FCC PART 15.247

TEST REPORT

For

ZEROTECH (Beijing) Intelligence Technology Co., Ltd.

Floor 2-203 Building No.9, Zhongguancun Software Park, Haidian District, Beijing, China 100193

FCC ID: 2AHCT105404202000

Report Type:	Product Type:
Original Report	ZEROTIME

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Report Number:	RBJ160118052-00B
Report Date:	2016-03-04
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ZEROTECH (Beijing) Intelligence Technology Co., Ltd.*'s product, model number: *ZT3024G (FCC ID: 2AHCT105404202000)* (the "EUT") in this report is named *ZEROTIME,* which was measured approximately: 8.6 cm (L) x5.6 cm (W) x 2.3 cm (H), rated input voltage: DC 8-12 V.

** All measurement and test data in this report was gathered from production sample serial number: 160118052. (Assigned by BACL.Dongguan). The EUT was received on 2016-01-20.*

Objective

This report is prepared on behalf of *ZEROTECH (Beijing) Intelligence Technology Co., Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Submitted with the part of a system with FCC ID: 2AHCT105404201000.

Test Methodology

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

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

For 2.4G band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2406	4	2446
1	2416	5	2456
2	2426	6	2466
3	2436	7	2476

3channels were tested: 2406MHz, 2436MHz and 2476MHz.

The device support MIMO mode only, SISO mode can`t support by this device.

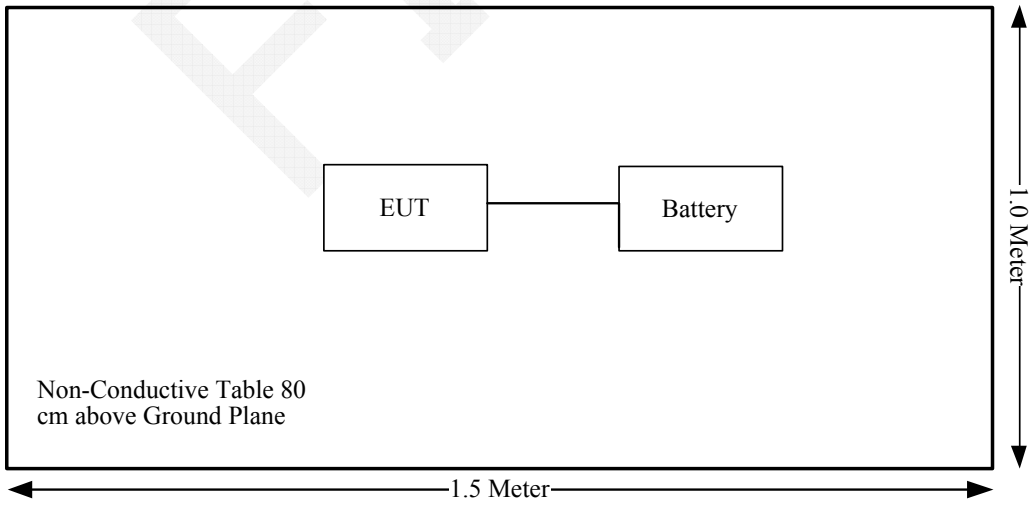
EUT Exercise Software

The software “Xsheel.exe” was used for testing, which was provided by manufacturer. The maximum power with duty cycle 100% was configured by system default setting.

Equipment Modifications

No modification was made to the EUT.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §1.1307 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1307, 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 Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	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 §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Frequency (MHz)	Antenna Gain		Maximum Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2406-2476	5.7	3.72	21	125.89	20	**0.093**	1

Note: The tune-up power is 20dBm+/-1dB, that was declared by manufacturer.

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.
c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has 2 antennas arrangement use a unique type of connector to attach to the EUT, and the antenna gain is 5.7dBi, fulfill the requirement of the item. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

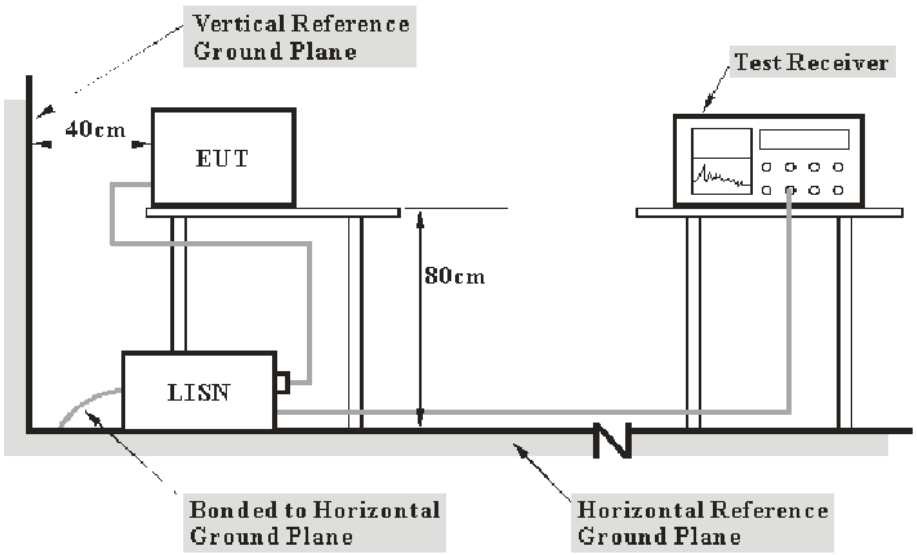
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
− compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
− non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
− compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
− non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2015-07-16	2016-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
N/A	Coaxial Cable	1.8m	N/A	2015-05-06	2016-05-06
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

7.9 dB at **0.703777 MHz** in the **Neutral** conducted mode .

Test Data

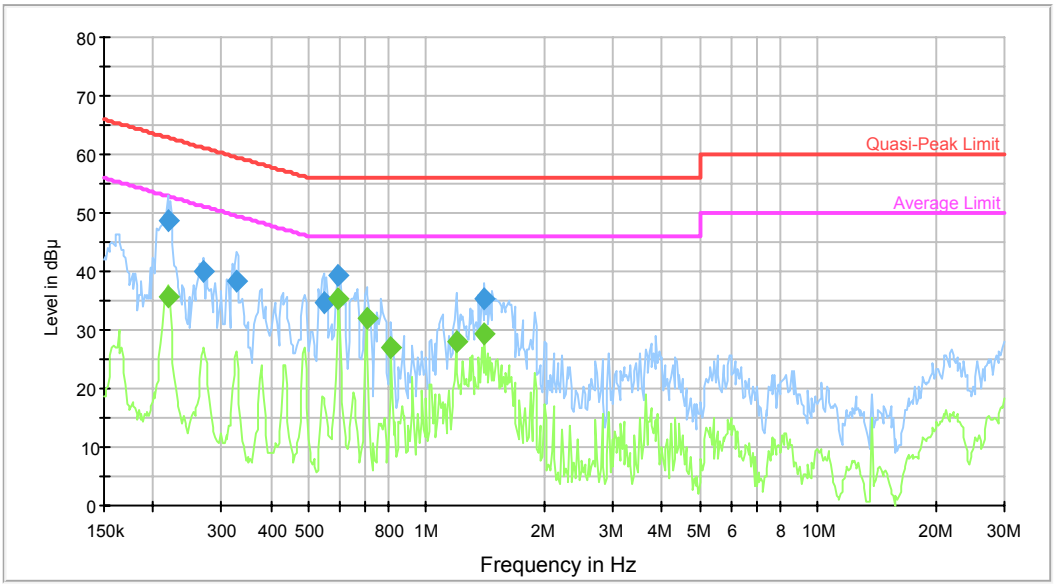
Environmental Conditions

Temperature:	22.8 °C
Relative Humidity:	42%
ATM Pressure:	101.6 kPa

The testing was performed by Allen Qiao on 2016-03-03.

Test Mode: Transmitting

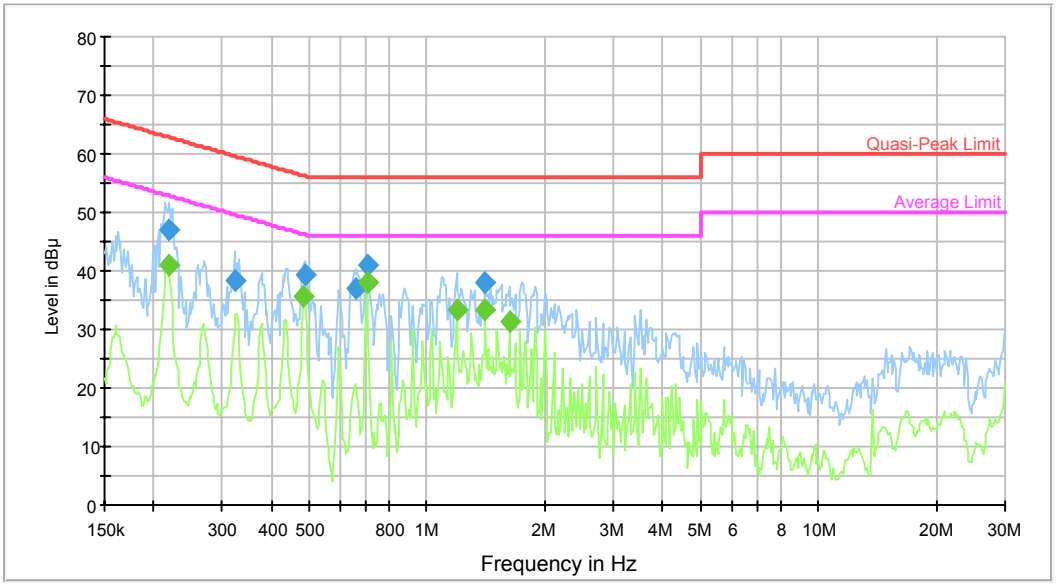
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218141	48.7	9.000	L1	9.7	14.2	62.9	Compliance
0.270502	40.1	9.000	L1	9.7	21.0	61.1	Compliance
0.327509	38.3	9.000	L1	9.7	21.2	59.5	Compliance
0.545378	34.8	9.000	L1	9.8	21.2	56.0	Compliance
0.595338	39.3	9.000	L1	9.8	16.7	56.0	Compliance
1.407671	35.3	9.000	L1	9.8	20.7	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218141	35.8	9.000	L1	9.7	17.1	52.9	Compliance
0.595338	35.4	9.000	L1	9.8	10.6	46.0	Compliance
0.703777	32.0	9.000	L1	9.8	14.0	46.0	Compliance
0.812315	26.8	9.000	L1	9.8	19.2	46.0	Compliance
1.190776	28.1	9.000	L1	9.8	17.9	46.0	Compliance
1.407671	29.3	9.000	L1	9.8	16.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.219886	47.0	9.000	N	9.7	15.8	62.8	Compliance
0.322331	38.1	9.000	N	9.7	21.5	59.6	Compliance
0.487810	39.2	9.000	N	9.7	17.0	56.2	Compliance
0.660314	37.0	9.000	N	9.7	19.0	56.0	Compliance
0.703777	41.0	9.000	N	9.7	15.0	56.0	Compliance
1.407671	37.9	9.000	N	9.8	18.1	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218141	40.8	9.000	N	9.7	12.1	52.9	Compliance
0.483938	35.7	9.000	N	9.7	10.6	46.3	Compliance
0.703777	38.1	9.000	N	9.7	7.9	46.0	Compliance
1.190776	33.3	9.000	N	9.8	12.7	46.0	Compliance
1.407671	33.5	9.000	N	9.8	12.5	46.0	Compliance
1.624765	31.2	9.000	N	9.8	14.8	46.0	Compliance

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner：

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:
− compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
− non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 2, then:
− compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
− non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

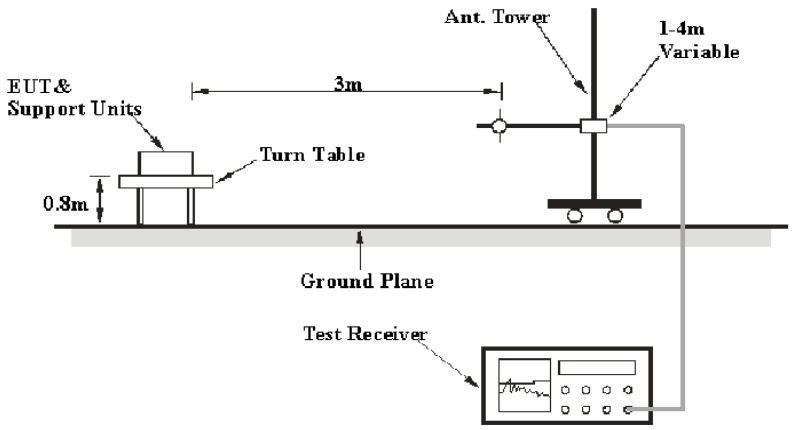
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical;
200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical;
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

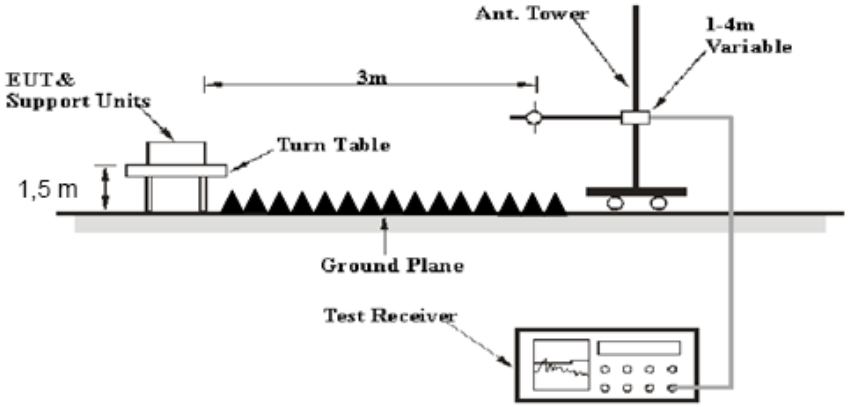
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	120 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2015-05-06	2016-05-06
N/A	Coaxial Cable	8m	N/A	2015-05-06	2016-05-06
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247, with the worst margin reading of:

1.05 dB at **2483.5 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	21.5°C
Relative Humidity:	50 %
ATM Pressure:	101.4 kPa

The testing was performed by Allen Qiao on 206-01-28.

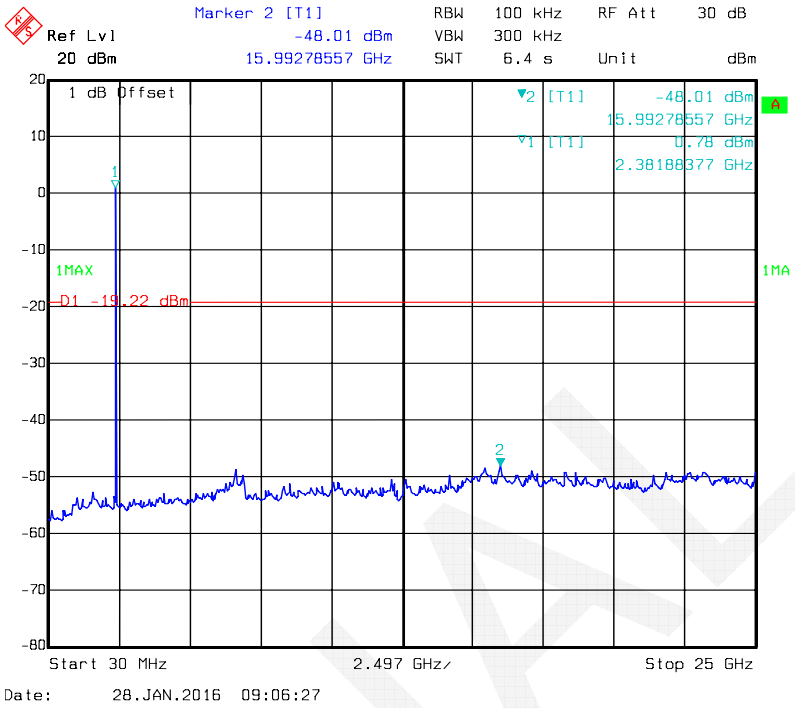
Refer to the following data;

Mode: Transmitting

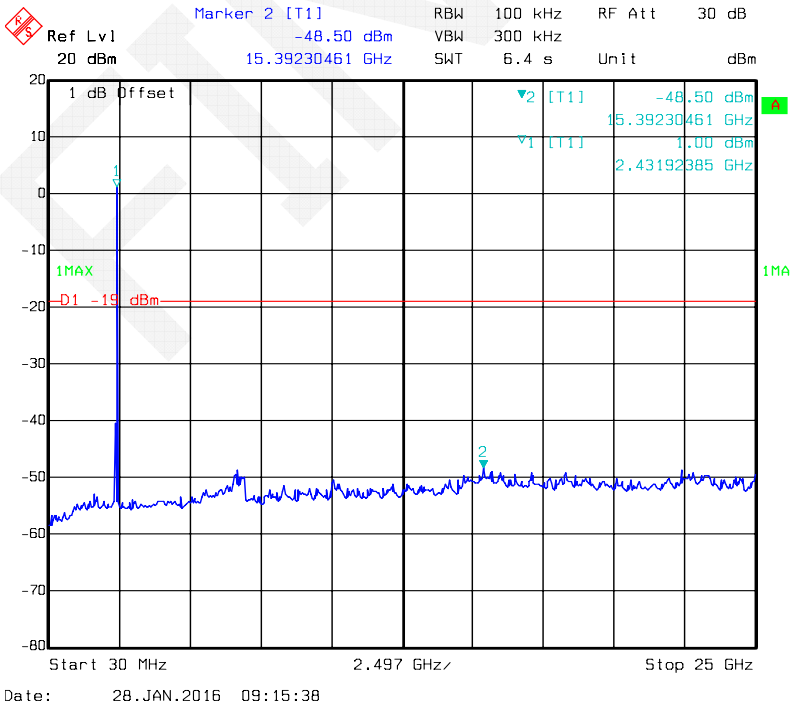
Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2406 MHz									
2406	76.19	PK	H	24.83	3.67	0.00	104.69	N/A	N/A
2406	65.48	AV	H	24.83	3.67	0.00	93.98	N/A	N/A
2406	86.49	PK	V	24.83	3.67	0.00	114.99	N/A	N/A
2406	75.91	AV	V	24.83	3.67	0.00	104.41	N/A	N/A
2390	35.01	PK	V	24.80	3.63	0.00	63.44	74.00	10.56
2390	17.51	AV	V	24.80	3.63	0.00	45.94	54.00	8.06
4812	38.17	PK	V	29.72	5.05	27.41	45.53	74.00	28.47
4812	25.67	AV	V	29.72	5.05	27.41	33.03	54.00	20.97
7218	43.89	PK	V	33.95	6.63	25.91	58.56	74.00	15.44
7218	30.48	AV	V	33.95	6.63	25.91	45.15	54.00	8.85
9624	31.58	PK	V	36.37	8.54	27.52	48.97	74.00	25.03
9624	19.09	AV	V	36.37	8.54	27.52	36.48	54.00	17.52
3205	40.58	PK	V	26.32	6.10	27.37	45.63	74.00	28.37
3205	27.84	AV	V	26.32	6.10	27.37	32.89	54.00	21.11
351.6	41.37	QP	V	15.26	2.26	21.65	37.24	46.00	8.76
Middle Channel: 2436 MHz									
2436	75.06	PK	H	24.88	3.75	0.00	103.69	N/A	N/A
2436	65.24	AV	H	24.88	3.75	0.00	93.87	N/A	N/A
2436	85.39	PK	V	24.88	3.75	0.00	114.02	N/A	N/A
2436	74.32	AV	V	24.88	3.75	0.00	102.95	N/A	N/A
4872	37.71	PK	V	29.84	5.13	27.42	45.26	74.00	28.74
4872	25.53	AV	V	29.84	5.13	27.42	33.08	54.00	20.92
7308	43.67	PK	V	34.09	6.73	25.88	58.61	74.00	15.39
7308	30.22	AV	V	34.09	6.73	25.88	45.16	54.00	8.84
9744	31.31	PK	V	36.45	8.61	27.25	49.12	74.00	24.88
9744	18.87	AV	V	36.45	8.61	27.25	36.68	54.00	17.32
3205	40.34	PK	V	26.32	6.10	27.37	45.39	74.00	28.61
3205	27.62	AV	V	26.32	6.10	27.37	32.67	54.00	21.33
4420	35.6	PK	V	28.96	4.98	26.93	42.61	74.00	31.39
4420	22.94	AV	V	28.96	4.98	26.93	29.95	54.00	24.05
351.6	40.53	QP	V	15.26	2.26	21.65	36.40	46.00	9.60
High Channel: 2476 MHz									
2476	68.92	PK	H	24.96	3.70	0.00	97.58	N/A	N/A
2476	58.03	AV	H	24.96	3.70	0.00	86.69	N/A	N/A
2476	79.91	PK	V	24.96	3.70	0.00	108.57	N/A	N/A
2476	69.26	AV	V	24.96	3.70	0.00	97.92	N/A	N/A
2483.5	40.71	PK	V	24.97	3.67	0.00	69.35	74.00	4.65
2483.5	24.31	AV	V	24.97	3.67	0.00	52.95	54.00	1.05
4952	37.5	PK	V	30.00	5.36	27.43	45.43	74.00	28.57
4952	25.14	AV	V	30.00	5.36	27.43	33.07	54.00	20.93
7428	43.35	PK	V	34.28	6.88	25.94	58.57	74.00	15.43
7428	29.73	AV	V	34.28	6.88	25.94	44.95	54.00	9.05
9904	30.92	PK	V	36.54	8.70	26.72	49.44	74.00	24.56
9904	18.54	AV	V	36.54	8.70	26.72	37.06	54.00	16.94
3205	39.88	PK	V	26.32	6.10	27.37	44.93	74.00	29.07
3205	27.22	AV	V	26.32	6.10	27.37	32.27	54.00	21.73
351.6	40.18	QP	V	15.26	2.26	21.65	36.05	46.00	9.95

Conducted Spurious Emissions at Antenna Port

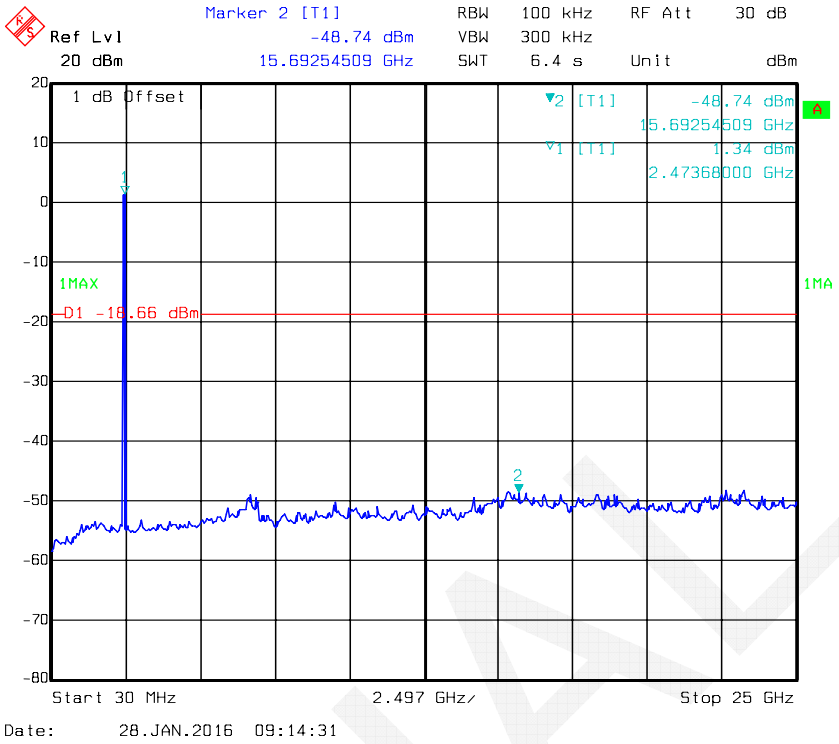
Antenna 1 Low Channel



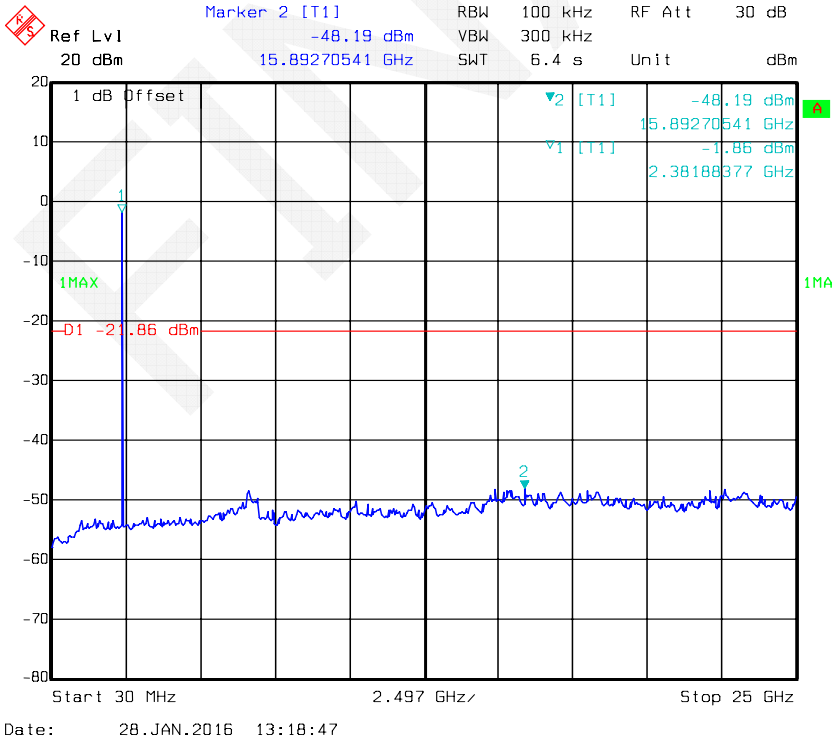
Antenna 1 Middle Channel



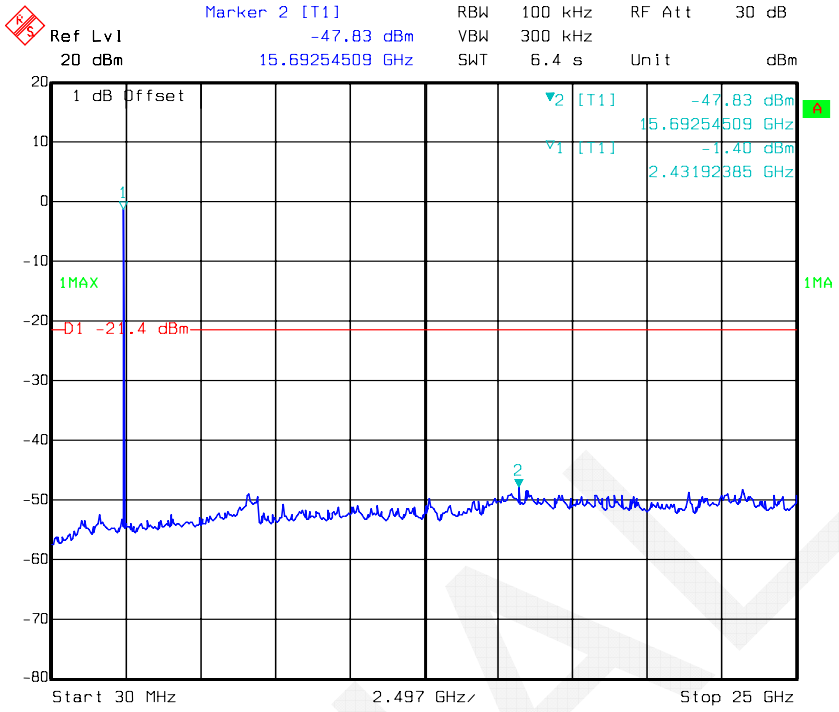
Antenna 1 High Channel



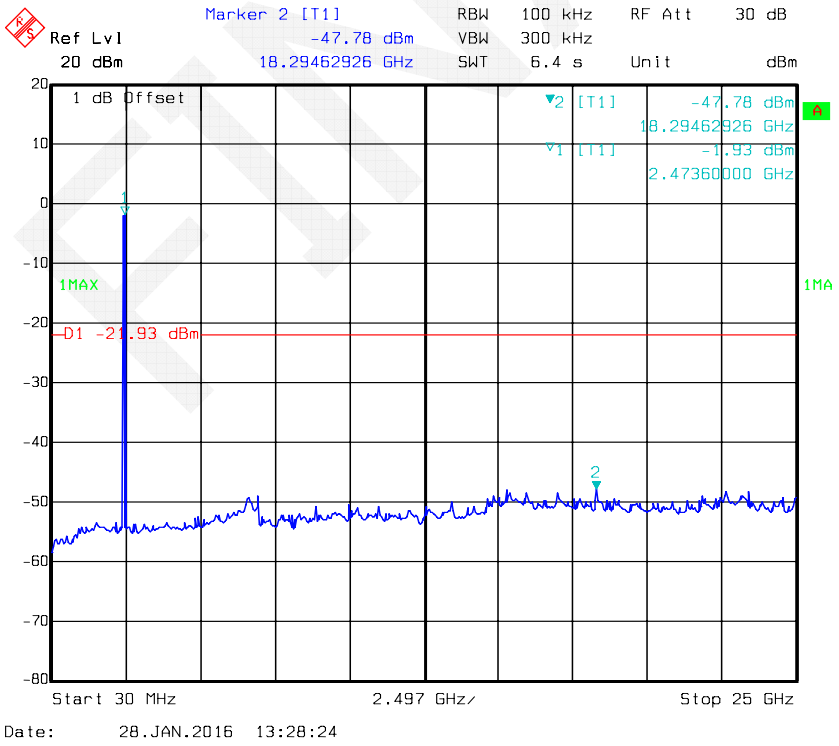
Antenna 2 Low Channel



Antenna 2 Middle Channel



Antenna 2 High Channel



FCC §15.247(a) (2) – 6dB BANDWIDTH

Applicable Standard

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.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	20.5°C
Relative Humidity:	40 %
ATM Pressure:	101.8 kPa

The testing was performed by Allen Qiao on 2016-01-27.

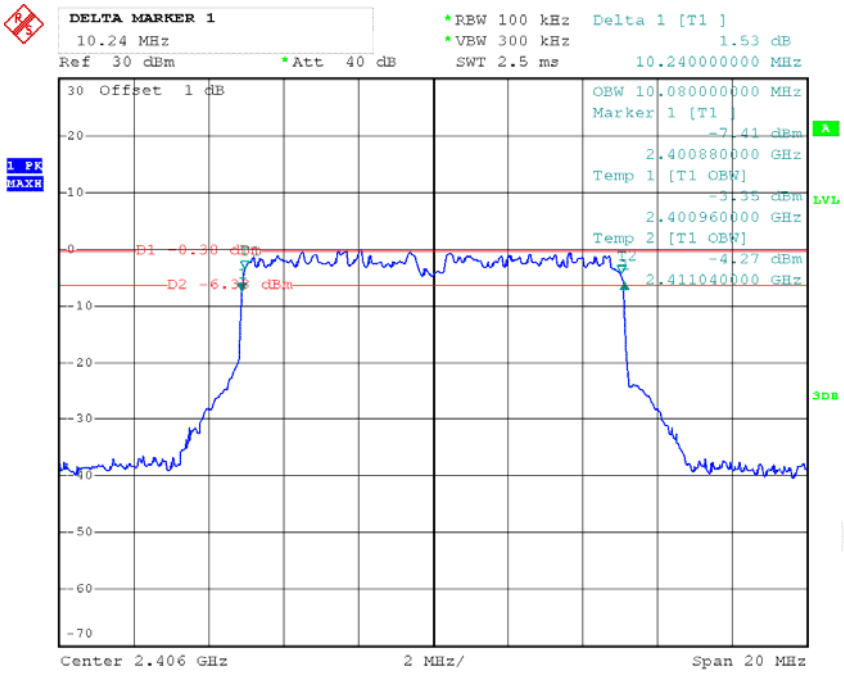
Test Result: Compliance.

Please refer to the following tables and plots.

Test Mode: Transmitting

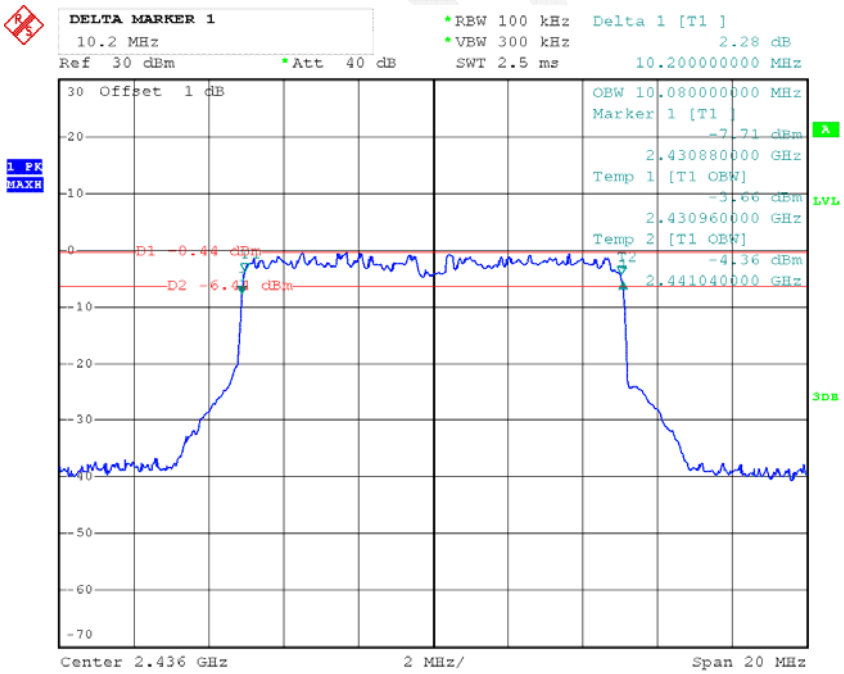
Test Mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
Antenna 1	Low	2406	10.24	0.5	Compliance
	Middle	2436	10.20	0.5	Compliance
	High	2476	10.24	0.5	Compliance
Antenna 2	Low	2406	10.24	0.5	Compliance
	Middle	2436	10.20	0.5	Compliance
	High	2476	10.24	0.5	Compliance

Antenna 1 Low Channel



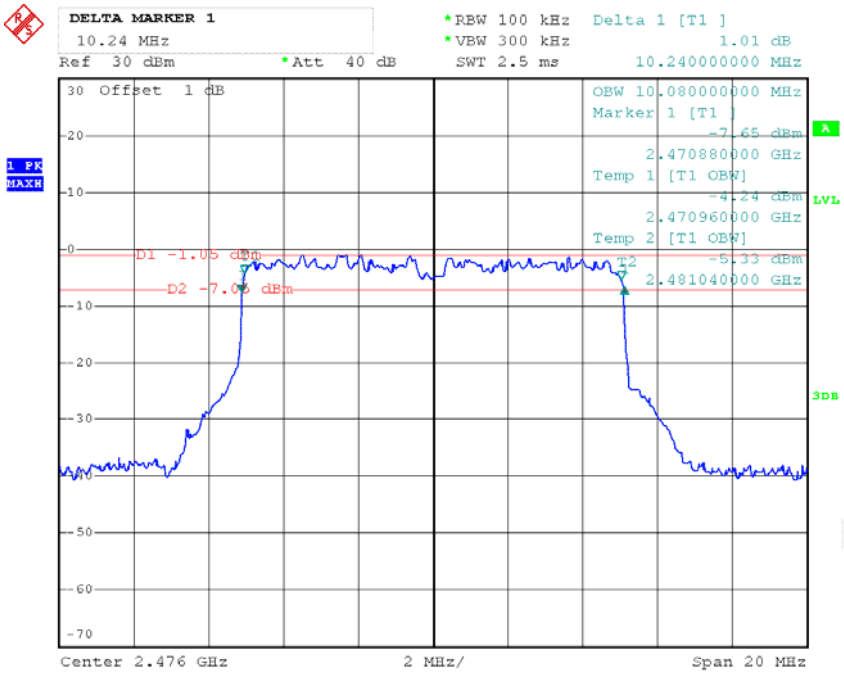
Date: 27.JAN.2016 10:38:24

Antenna 1 Middle Channel



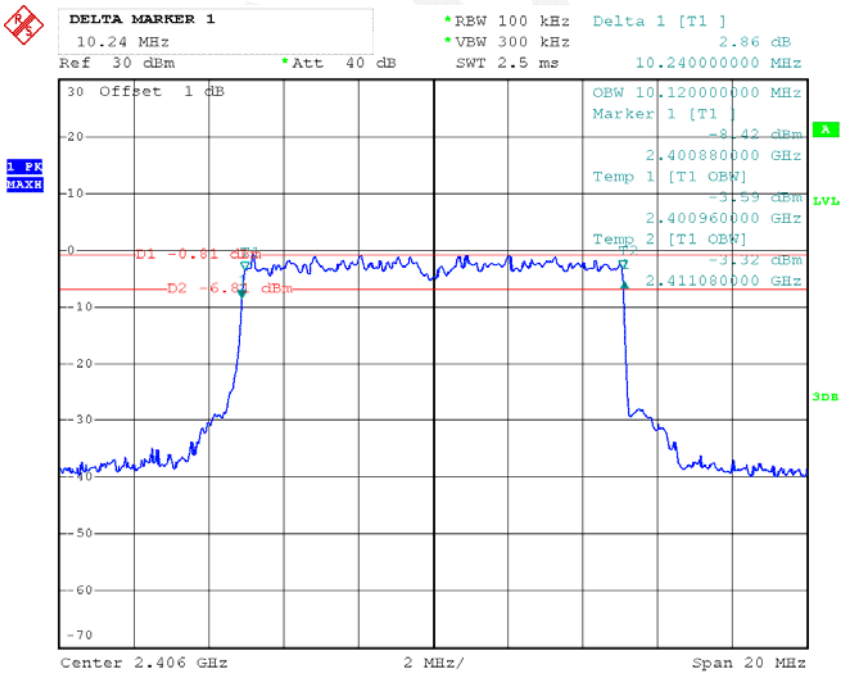
Date: 27.JAN.2016 10:37:25

Antenna 1 High Channel



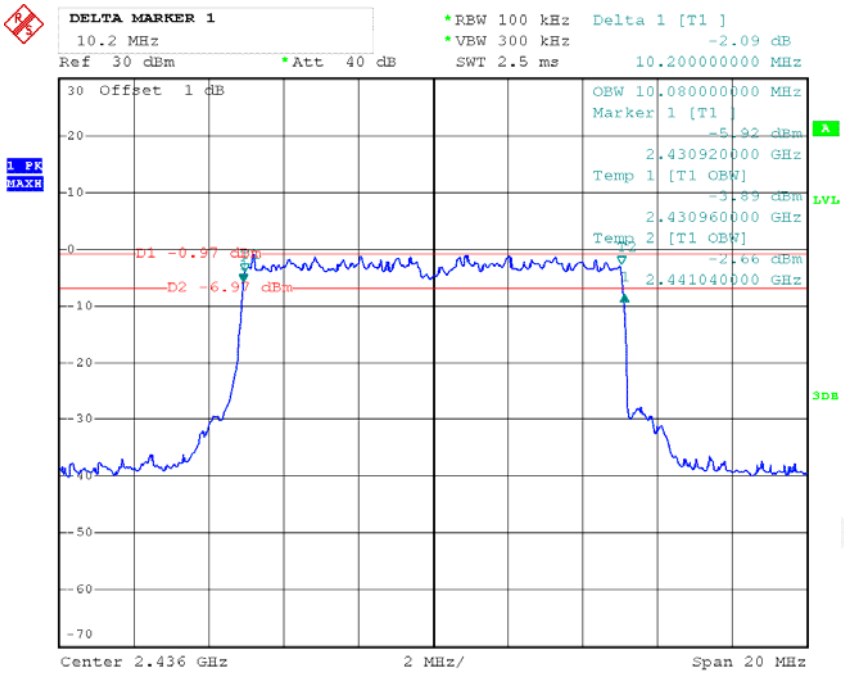
Date: 27.JAN.2016 10:36:34

Antenna 2 Low Channel



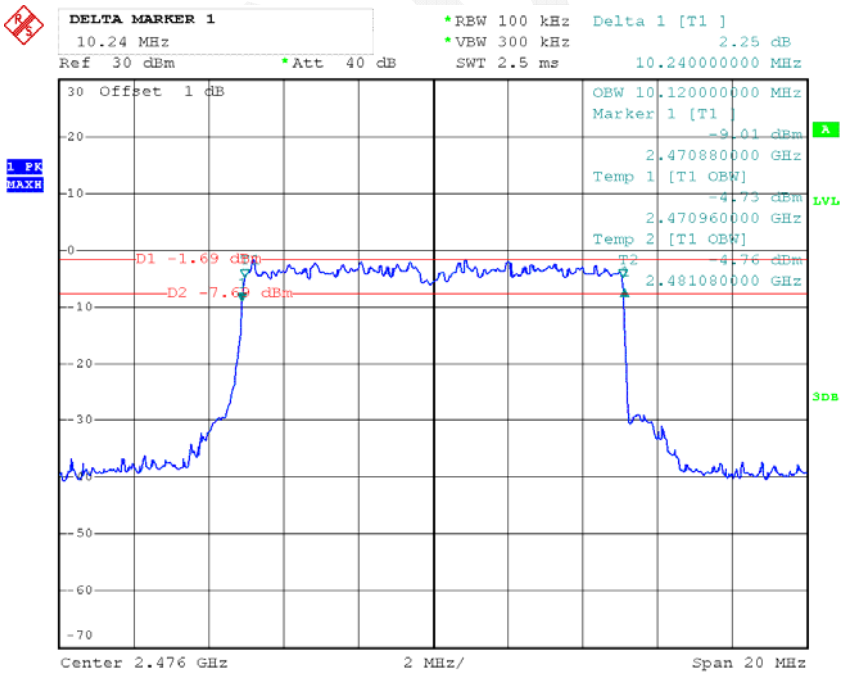
Date: 27.JAN.2016 10:32:59

Antenna 2 Middle Channel



Date: 27.JAN.2016 10:34:01

Antenna 2 High Channel



Date: 27.JAN.2016 10:34:58

FCC §15.247(b) (3) - MAXIMUM PEAK CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a Test Equipment.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2015-11-03	2016-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2015-11-03	2016-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	21.5°C
Relative Humidity:	50 %
ATM Pressure:	101.4 kPa

The testing was performed by Allen Qiao on 2016-01-28.

Test Mode: Transmitting

Channel	Frequency	Peak Conducted Output Power (dBm)			Limit	Result
	MHz	Ant. 1	Ant. 2	Total	dBm	
Low	2406	17.73	17.40	20.58	27.3	Compliance
Middle	2436	17.58	17.24	20.42	27.3	Compliance
High	2476	16.94	16.48	19.73	27.3	Compliance

Note: the two antenna gain is 5.7dBi, the directional gain is 8.7 dBi, so the power limit should reduce 2.7 dBi.

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

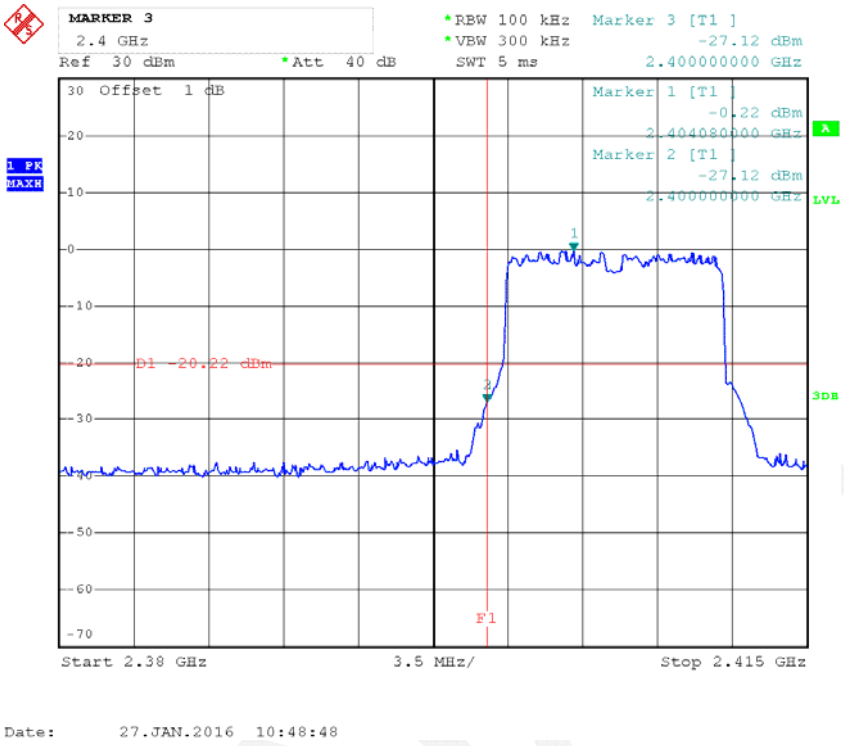
Temperature:	20.5°C
Relative Humidity:	40 %
ATM Pressure:	101.8 kPa

The testing was performed by Allen Qiao on 2016-01-27.

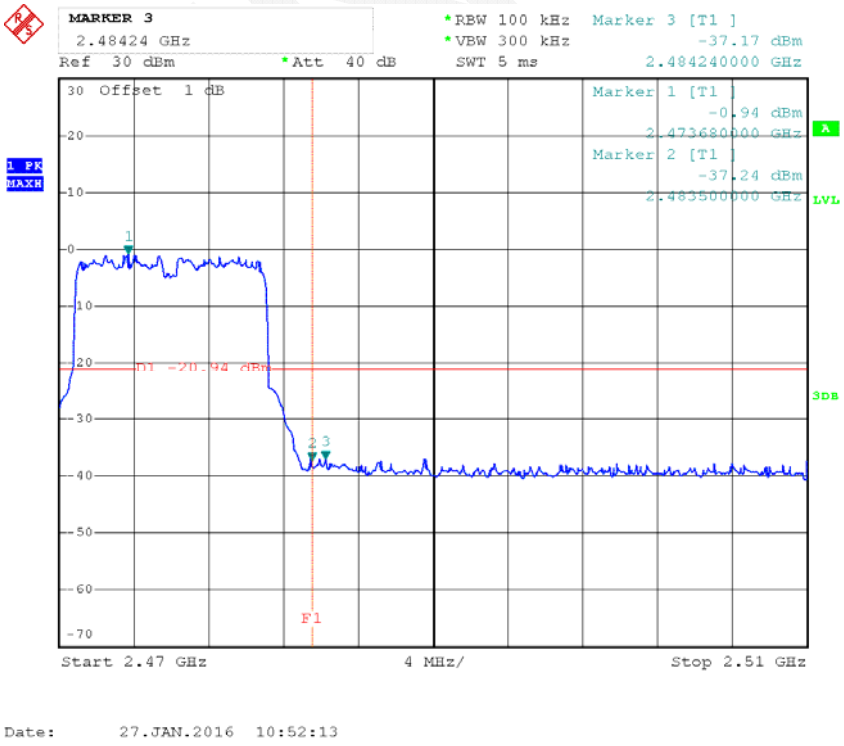
Test Result: *Compliance*

Please refer to following plots.

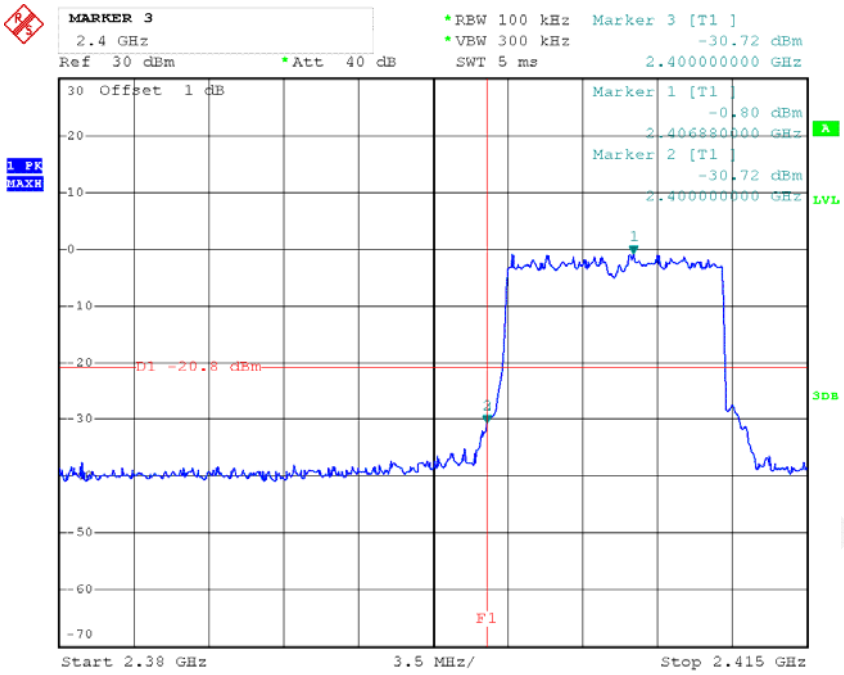
Antenna 1: Band Edge, Left Side



Antenna 1: Band Edge, Right Side



Antenna 2: Band Edge, Left Side



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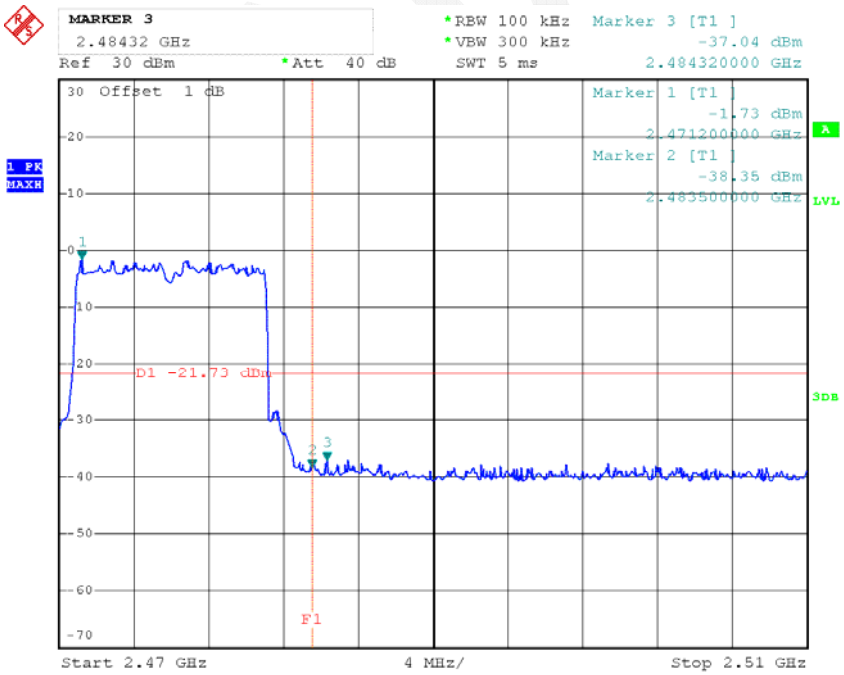
Antenna 2: Band Edge, Right Side



Date: 27.JAN.2016 10:53:18

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 3 kHz, VBW = 10 kHz, Set the span to 1.5 times the DTS bandwidth.
4. Use the peak marker function to determine the maximum amplitude level.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2015-05-06	2016-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2015-05-06	2016-05-06

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	20.5°C
Relative Humidity:	40 %
ATM Pressure:	101.8 kPa

The testing was performed by Allen Qiao on 2016-01-27.

Test Mode: Transmitting

Test Result: Compliance

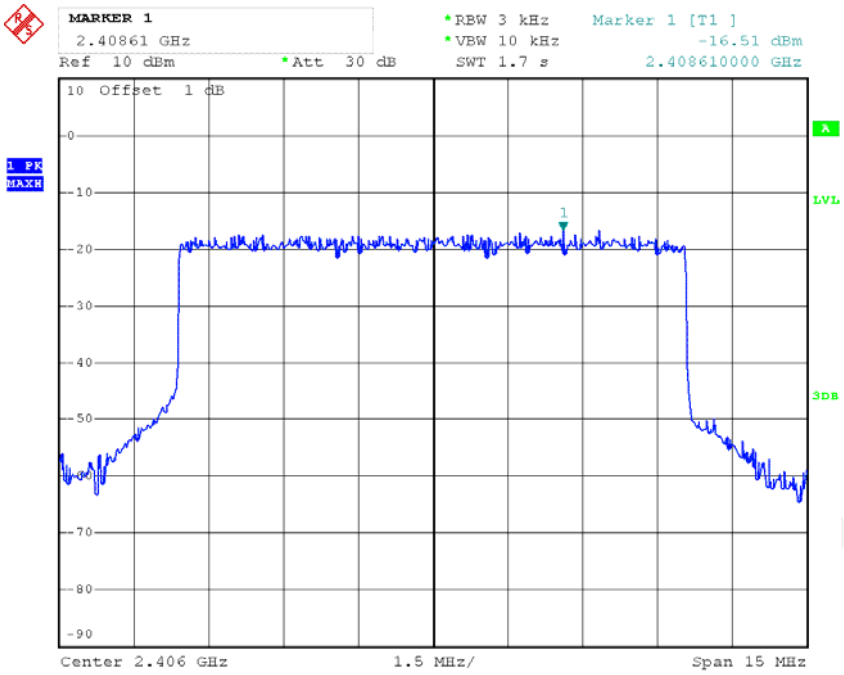
Test Mode: Transmitting

Channel	Frequency	Power Spectral Density (dBm/3kHz)			Limits
	MHz	Ant. 1	Ant. 2	Total	dBm/3kHz
Low	2406	-16.51	-17.29	-13.87	5.3
Middle	2436	-16.59	-17.47	-14.00	5.3
High	2476	-17.32	-18.22	-14.74	5.3

Note: the two antenna gain is 5.7dBi, the directional gain is 8.7 dBi, so the limit should reduce 2.7 dBi.

Please refer to the following plots

Power Spectral Density, Antenna 1 Low Channel



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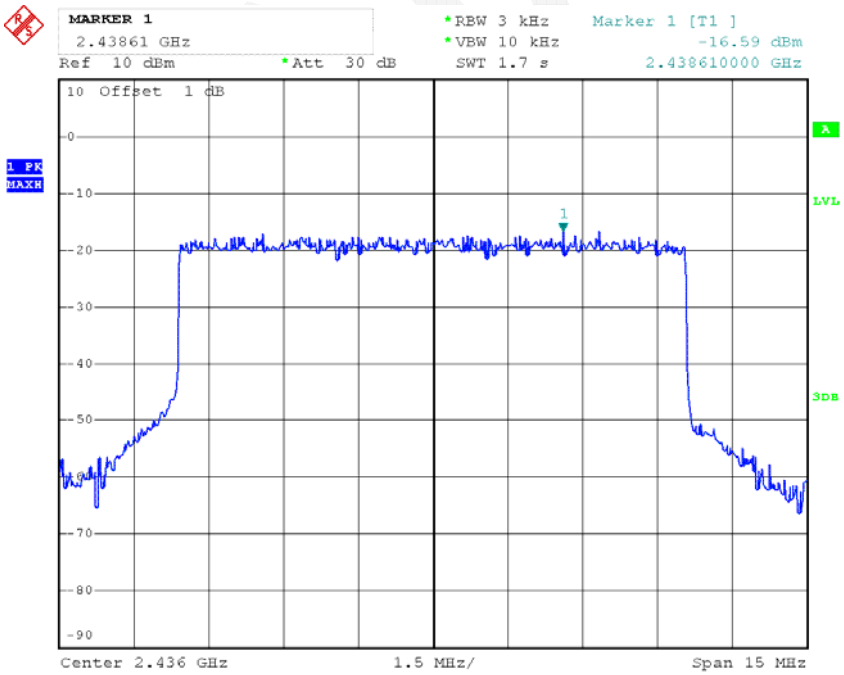
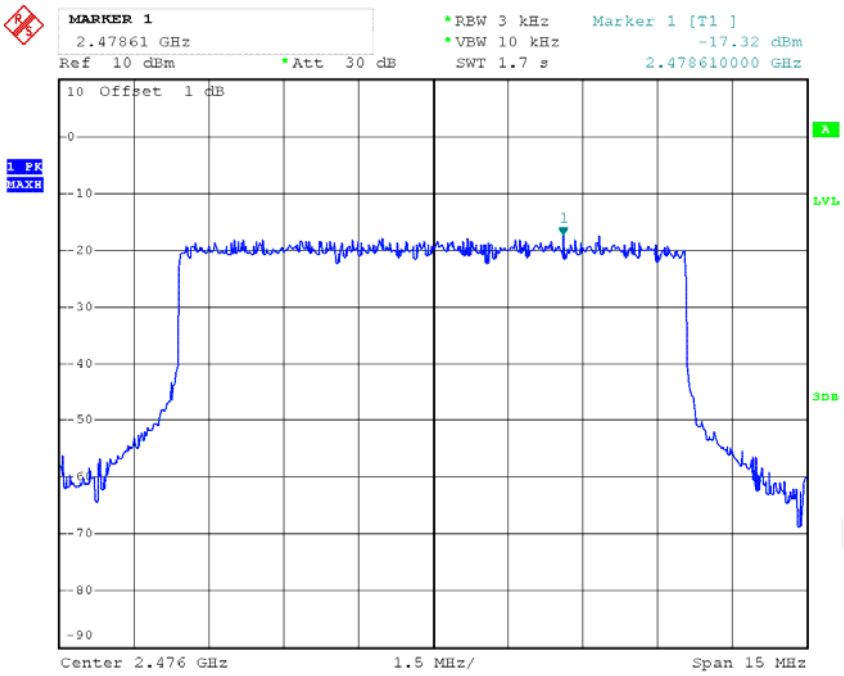
Power Spectral Density, Antenna 1 Middle Channel



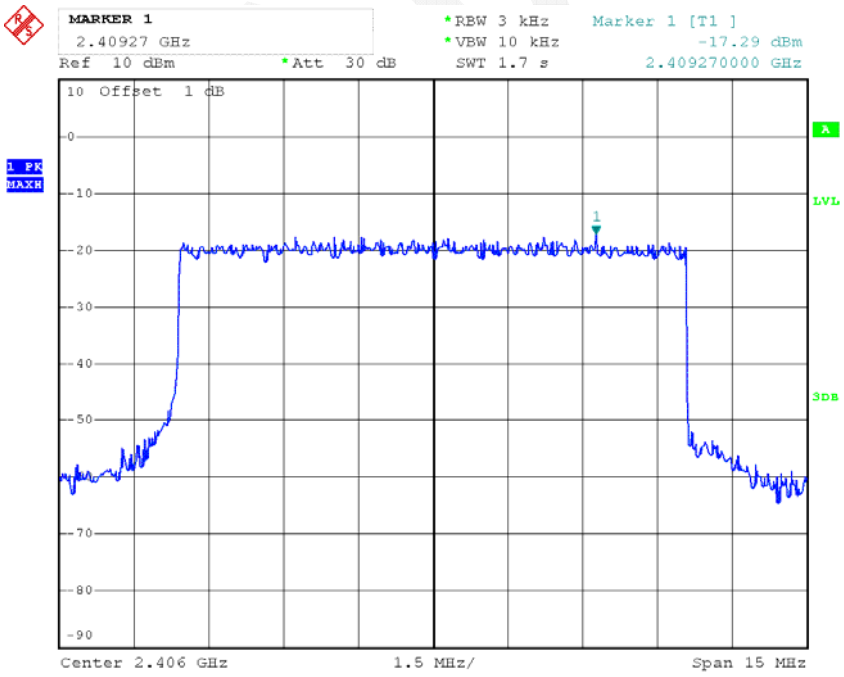
Date: 27.JAN.2016 10:58:39

Power Spectral Density, Antenna 1 High Channel



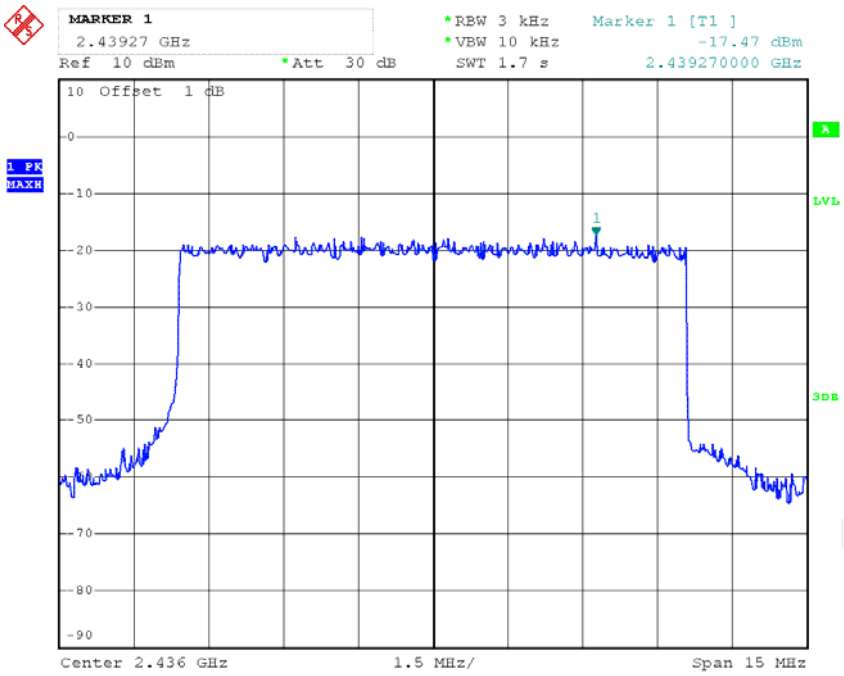
Date: 27.JAN.2016 10:59:07

Power Spectral Density, Antenna 2 Low Channel



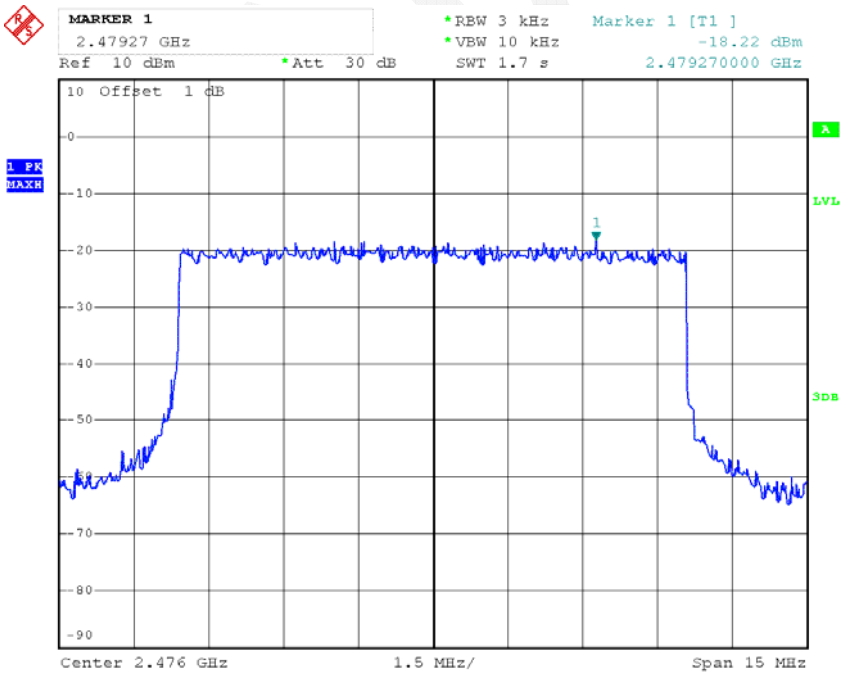
Date: 27.JAN.2016 11:00:51

Power Spectral Density, Antenna 2 Middle Channel



Date: 27.JAN.2016 11:00:24

Power Spectral Density, Antenna 2 High Channel



Date: 27.JAN.2016 10:59:44

*******END OF REPORT*******