

FCC PART 15.407

TEST REPORT

For

Shenzhen Rapoo Technology Co., Ltd.

22, Jinxiu Road East, Pingshan District, Shenzhen, China

FCC ID: PP2H600

Report Type: Original Report	Product Type: Wireless Home Entertainment Headphone
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Rapoo Technology Co., Ltd.*'s product, model number: *H600 (FCC ID: PP2H600)* or ("EUT") in this report is a *Wireless Home Entertainment Headphone*, which was measured approximately: 20.0 cm (L) x 19.5 cm (W) x 9.6 cm (H), rated input voltage: DC 3.7V from lithium battery or DC 5.0V from charger.

All measurement and test data in this report was gathered from production sample serial number: 140311002 (Assigned by BACL, Dongguan). The EUT was received on 2014-03-12.

Objective

This type approval report is prepared on behalf of *Shenzhen Rapoo Technology Co., Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

N/A.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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 EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5150~5250 MHz band, 4 channels are provided to test:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

Channel 36, 40 and 48 were tested.

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

EUT Exercise Software

The software “UTF-8 TeraTerm Pro” was used for testing, and the commands were provided by manufacturer. The worst condition (maximum power) was setting by the software as following table:

5150~5250MHz Band:

Test Mode	Test Software Version	UTF-8 TeraTerm Pro		
OFDM	Test Frequency	5180MHz	5200MHz	5240MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	0	0	0

Equipment Modifications

No modification was made to the EUT.

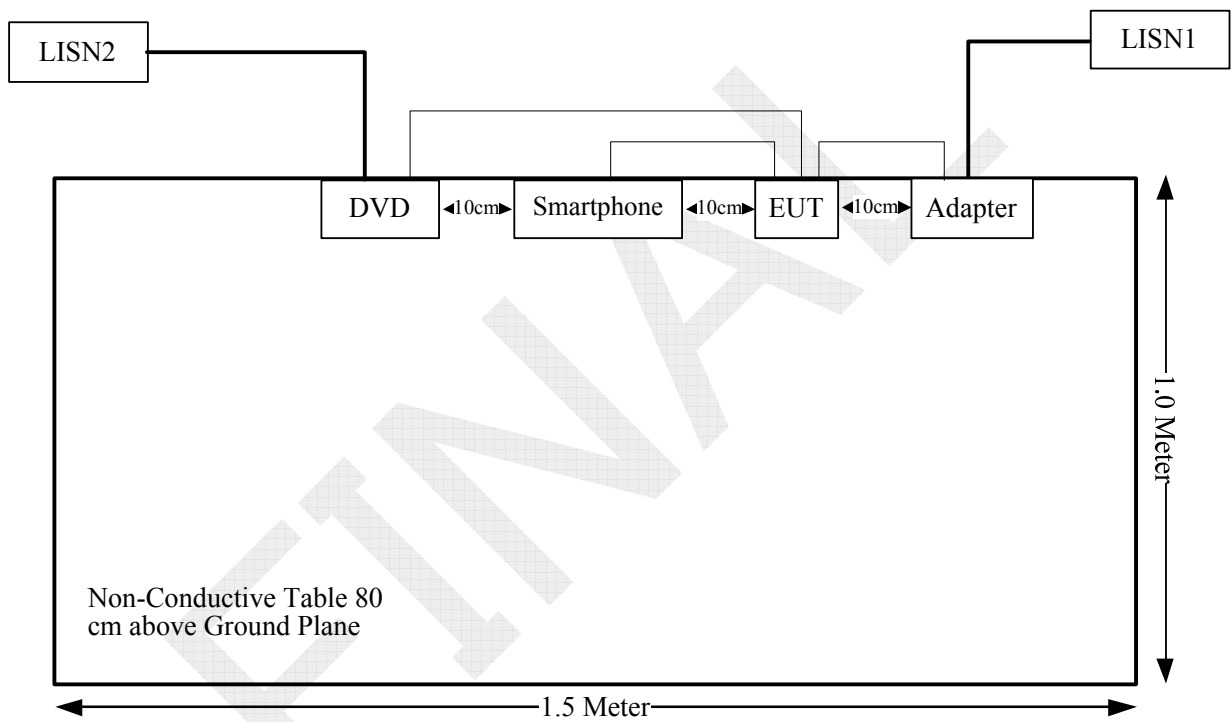
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
PHILIPS	DVD	DVP3560K/93	KX1C1108079973
Meizu	smartphone	M040	N/A
Rapoo	Wireless Home Entertainment Headphone seat	07005	N/A

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Audio Cable	Yes	No	1.5	Audio Port Of Phone	Seat
Power Cable	No	No	1.5	DC Port Of Adapter	Seat
Audio Cable	No	No	1.5	Audio Port Of DVD	Seat

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1),(6),(7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(b) (1),(2),(3),(4)	Out Of Band Emissions	Compliance
§15.407(a) (1)	26 dB Bandwidth	Compliance
§15.407(a)(1),	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(5)	Power Spectral Density	Compliance

FCC §15.407 (f) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to subpart 15.407(f) and subpart §1.1310, 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.

According to KDB447498 D01 General RF Exposure Guidance v05r02:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

The maximum conducted output power= 0.52 dBm=1.13mW at 5180MHz

$[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 $= 1.13/5 \cdot (\sqrt{5180}) = 0.51 < 3.0$

So the stand-alone SAR evaluation is not necessary.

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 use of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.407 (a)(1),if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT have two integral printed antennas,the system configure antenna 1 or antenna 2 for transeiving, the antenna gain is -3.35dBi for antenna 1 and 0.97dBi for antenna 2. Fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

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:

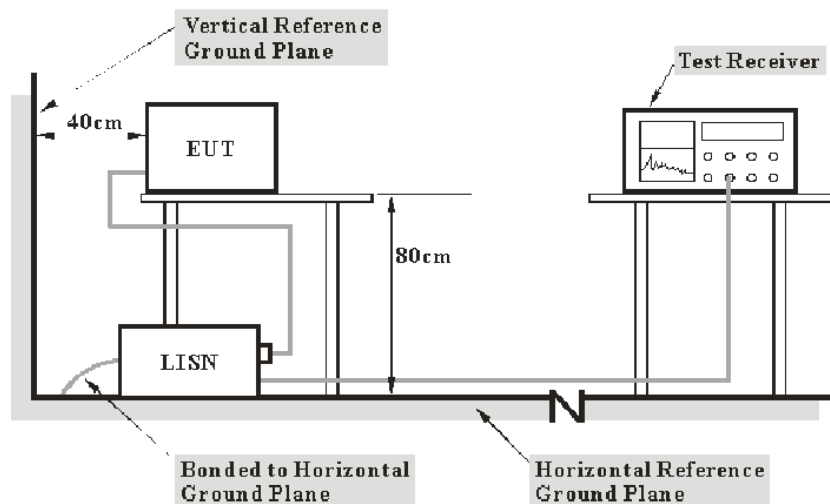
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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 3.46 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 C63.4-2003 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 120VAC/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

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2014-10-16	2015-10-16
R&S	L.I.S.N	ESH3-Z5	843331/015	N/A	N/A
R&S	Two-line V-network	ENV 216	3560.6550.12	2014-01-22	2015-01-22
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 Procedure

During the conducted emission test, the adapter was connected to the first LISN and the other support equipments were connected to the outlet of the second 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.

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:

9.80 dB at 11.910327 MHz in the Neutral conducted mode

Test Data

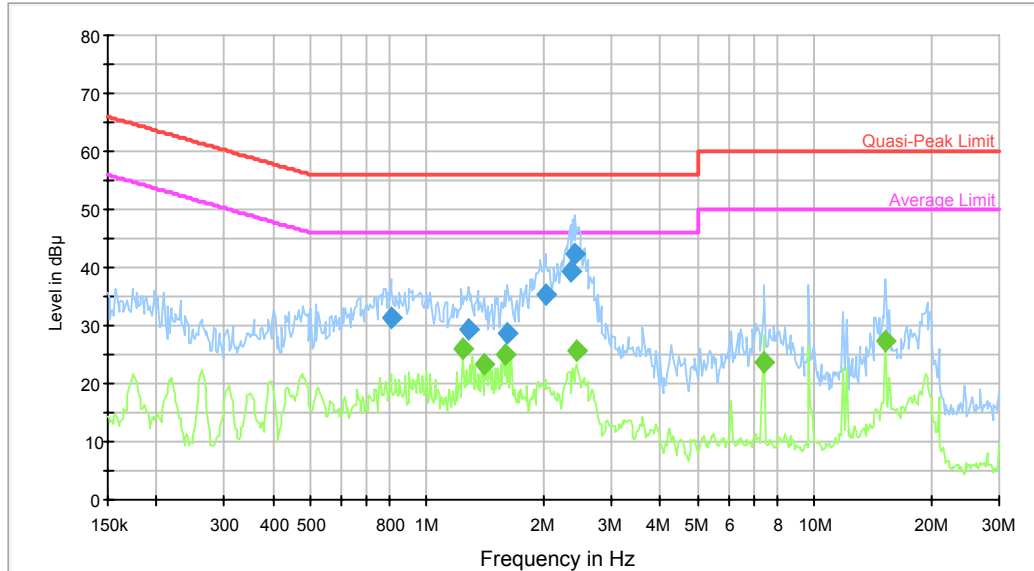
Environmental Conditions

Temperature:	26.7 °C
Relative Humidity:	46 %
ATM Pressure:	101.2 kPa

The testing was performed by Allen Qiao on 2014-10-23.

Test Mode: Transmitting

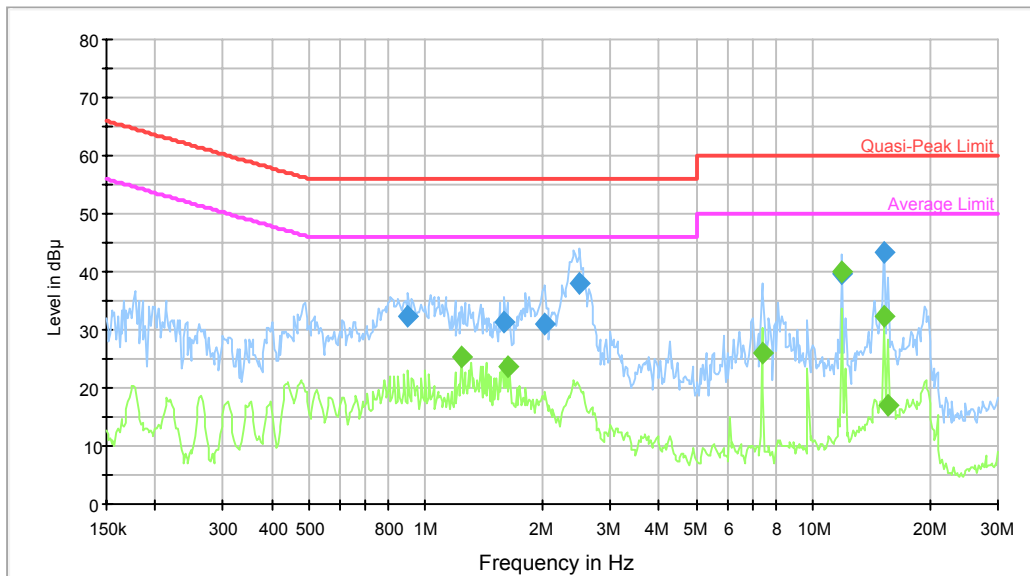
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.805868	31.5	9.000	L1	10.5	24.5	56.0	Compliance
1.279307	29.5	9.000	L1	10.4	26.5	56.0	Compliance
1.611870	28.8	9.000	L1	10.4	27.2	56.0	Compliance
2.014768	35.2	9.000	L1	10.5	20.8	56.0	Compliance
2.344095	39.4	9.000	L1	10.5	16.6	56.0	Compliance
2.420011	42.2	9.000	L1	10.5	13.8	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
1.239175	25.9	9.000	L1	10.4	20.1	46.0	Compliance
1.407671	23.3	9.000	L1	10.4	22.7	46.0	Compliance
1.599078	25.1	9.000	L1	10.4	20.9	46.0	Compliance
2.439371	25.7	9.000	L1	10.5	20.3	46.0	Compliance
7.443073	23.5	9.000	L1	10.7	26.5	50.0	Compliance
15.247554	27.5	9.000	L1	10.6	22.5	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.900972	32.4	9.000	N	10.6	23.6	56.0	Compliance
1.599078	31.4	9.000	N	10.5	24.6	56.0	Compliance
2.030886	30.9	9.000	N	10.5	25.1	56.0	Compliance
2.498385	37.9	9.000	N	10.5	18.1	56.0	Compliance
11.910327	39.6	9.000	N	10.6	20.4	60.0	Compliance
15.247554	43.2	9.000	N	10.6	16.8	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.239175	25.3	9.000	N	10.5	20.7	46.0	Compliance
1.624765	23.6	9.000	N	10.5	22.4	46.0	Compliance
7.384001	26.1	9.000	N	10.7	23.9	50.0	Compliance
11.910327	40.2	9.000	N	10.6	9.8	50.0	Compliance
15.247554	32.3	9.000	N	10.6	17.7	50.0	Compliance
15.616430	17.1	9.000	N	10.6	32.9	50.0	Compliance

FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) –UNWANTED EMISSION

Applicable Standard

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

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 radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:

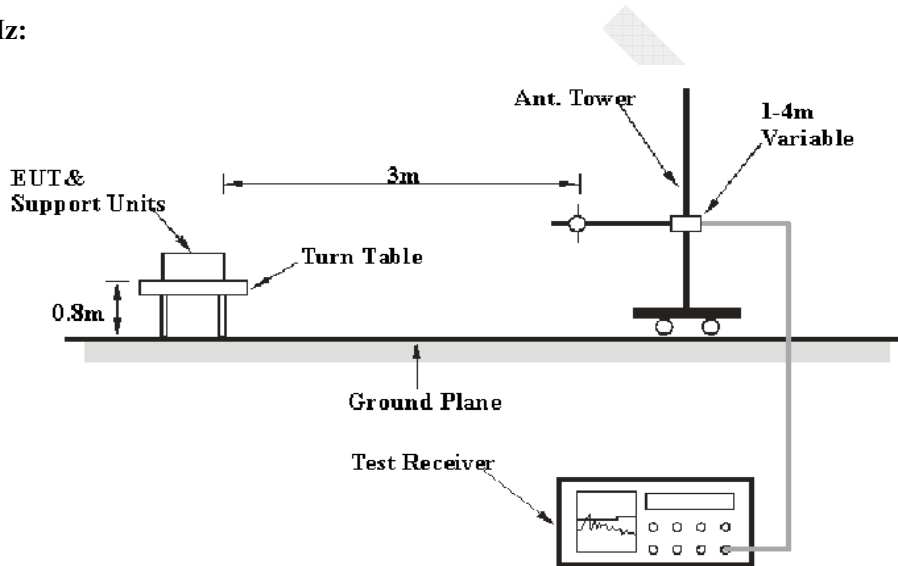
- 30M~200MHz: 5.0 dB
- 200M~1GHz: 6.2 dB
- 1G~6GHz: 4.45 dB
- 6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

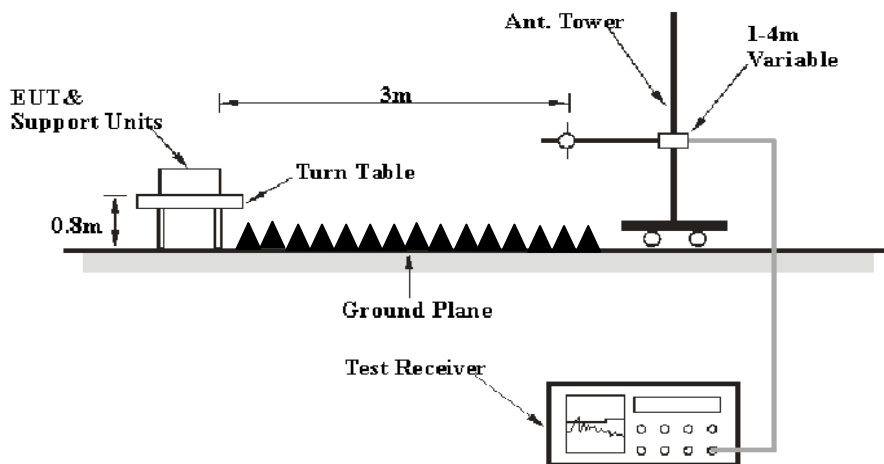
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

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

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 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
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

During the radiated emission test, the adapter was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

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-1GHz, peak and Average detection modes for frequencies above 1GHz.

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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-05-09	2015-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2014-09-06	2015-09-06

* **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, Subpart C, Section 15.205, 15.209 and 15.407, with the worst margin reading of:

6.13 dB at 15540 MHz in the Vertical polarization for ANT2

Test Data

Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	51 %
ATM Pressure:	101.7 kPa

The testing was performed by Allen Qiao on 2014-11-18.

Mode: Transmitting

ANT 1:

Frequency MHz	Receiver		Rx Antenna		Cable loss dB	Amplifier Gain dB	Corrected Amplitude dBμV/m	Limit dBμV/m	Margin dB
	Reading dBμV	Detector PK/QP/AV	Polar H/V	Factor dB(1/m)					
Frequency:5180MHz									
5180	82.01	PK	H	31.46	5.40	27.13	91.74	N/A	N/A
5180	62.13	AV	H	31.46	5.40	27.13	71.86	N/A	N/A
5180	83.89	PK	V	31.46	5.40	27.13	93.62	N/A	N/A
5180	63.68	AV	V	31.46	5.40	27.13	73.41	N/A	N/A
5150	37.88	PK	V	31.40	5.26	27.18	47.36	74.00	26.64
5150	22.86	AV	V	31.40	5.26	27.18	32.34	54.00	21.66
10360	37.43	PK	V	36.97	8.36	25.52	57.24	74.00	16.76
10360	21.25	AV	V	36.97	8.36	25.52	41.06	54.00	12.94
15540	33.32	PK	V	37.43	14.94	24.98	60.71	74.00	13.29
15540	20.35	AV	V	37.43	14.94	24.98	47.74	54.00	6.26
4982.5	39.82	PK	H	31.05	5.27	27.44	48.70	74.00	25.30
4982.5	24.63	AV	H	31.05	5.27	27.44	33.51	54.00	20.49
5395.1	34.93	PK	H	31.89	5.51	26.99	45.34	74.00	28.66
5395.1	20.77	AV	H	31.89	5.51	26.99	31.18	54.00	22.82
248.1	43.3	QP	V	12.19	1.90	21.49	35.90	46.00	10.10
Frequency:5200MHz									
5200	84.06	PK	H	31.50	5.49	27.09	93.96	N/A	N/A
5200	63.05	AV	H	31.50	5.49	27.09	72.95	N/A	N/A
5200	84.24	PK	V	31.50	5.49	27.09	94.14	N/A	N/A
5200	66.6	AV	V	31.50	5.49	27.09	76.50	N/A	N/A
10400	36.98	PK	V	36.98	8.32	25.50	56.78	74.00	17.22
10400	22.95	AV	V	36.98	8.32	25.50	42.75	54.00	11.25
15600	32.18	PK	V	37.32	14.69	24.69	59.50	74.00	14.50
15600	20.17	AV	V	37.32	14.69	24.69	47.49	54.00	6.51
1659.35	35.63	PK	H	23.92	2.90	27.73	34.72	74.00	39.28
1659.35	25.11	AV	H	23.92	2.90	27.73	24.20	54.00	29.80
4982.5	39.66	PK	H	31.05	5.27	27.44	48.54	74.00	25.46
4982.5	24.51	AV	H	31.05	5.27	27.44	33.39	54.00	20.61
5395.1	34.89	PK	H	31.89	5.51	26.99	45.30	74.00	28.70
5395.1	20.71	AV	H	31.89	5.51	26.99	31.12	54.00	22.88
248.1	43.8	QP	V	12.19	1.90	21.49	36.40	46.00	9.60
Frequency:5240MHz									
5240	84.48	PK	H	31.58	5.28	27.07	94.27	N/A	N/A
5240	63.49	AV	H	31.58	5.28	27.07	73.28	N/A	N/A
5240	85.93	PK	V	31.58	5.28	27.07	95.72	N/A	N/A
5240	66.17	AV	V	31.58	5.28	27.07	75.96	N/A	N/A
5350	38.74	PK	V	31.80	5.61	27.02	49.13	74.00	24.87
5350	22.37	AV	V	31.80	5.61	27.02	32.76	54.00	21.24
10480	35.83	PK	V	37.00	8.23	26.01	55.05	74.00	18.95
10480	22.51	AV	V	37.00	8.23	26.01	41.73	54.00	12.27
15720	31.66	PK	V	37.10	14.20	24.92	58.04	74.00	15.96
15720	19.75	AV	V	37.10	14.20	24.92	46.13	54.00	7.87
4982.5	39.76	PK	H	31.05	5.27	27.44	48.64	74.00	25.36
4982.5	34.52	AV	H	31.05	5.27	27.44	43.40	54.00	10.60
5395.1	34.85	PK	H	31.89	5.51	26.99	45.26	74.00	28.74
5395.1	20.68	AV	H	31.89	5.51	26.99	31.09	54.00	22.91
248.1	43.1	QP	V	12.19	1.90	21.49	35.70	46.00	10.30

ANT 2:

Frequency MHz	Receiver		Rx Antenna		Cable loss dB	Amplifier Gain dB	Corrected Amplitude dBμV/m	Limit dBμV/m	Margin dB
	Reading dBμV	Detector PK/QP/AV	Polar H/V	Factor dB(1/m)					
Frequency:5180MHz									
5180	81.96	PK	H	31.46	5.40	27.13	91.69	N/A	N/A
5180	62.21	AV	H	31.46	5.40	27.13	71.94	N/A	N/A
5180	83.83	PK	V	31.46	5.40	27.13	93.56	N/A	N/A
5180	63.56	AV	V	31.46	5.40	27.13	73.29	N/A	N/A
5150	37.71	PK	V	31.40	5.26	27.18	47.19	74.00	26.81
5150	22.71	AV	V	31.40	5.26	27.18	32.19	54.00	21.81
10360	37.37	PK	V	36.97	8.36	25.52	57.18	74.00	16.82
10360	21.39	AV	V	36.97	8.36	25.52	41.20	54.00	12.80
15540	33.37	PK	V	37.43	14.94	24.98	60.76	74.00	13.24
15540	20.48	AV	V	37.43	14.94	24.98	47.87	54.00	6.13
4982.5	39.84	PK	H	31.05	5.27	27.44	48.72	74.00	25.28
4982.5	24.62	AV	H	31.05	5.27	27.44	33.50	54.00	20.50
5395.1	35.03	PK	H	31.89	5.51	26.99	45.44	74.00	28.56
5395.1	20.88	AV	H	31.89	5.51	26.99	31.29	54.00	22.71
248.1	43.21	QP	V	12.19	1.90	21.49	35.81	46.00	10.19
Frequency:5200MHz									
5200	83.99	PK	H	31.50	5.49	27.09	93.89	N/A	N/A
5200	63.25	AV	H	31.50	5.49	27.09	73.15	N/A	N/A
5200	84.39	PK	V	31.50	5.49	27.09	94.29	N/A	N/A
5200	66.59	AV	V	31.50	5.49	27.09	76.49	N/A	N/A
10400	37.09	PK	V	36.98	8.32	25.50	56.89	74.00	17.11
10400	22.81	AV	V	36.98	8.32	25.50	42.61	54.00	11.39
15600	32.31	PK	V	37.32	14.69	24.69	59.63	74.00	14.37
15600	20.04	AV	V	37.32	14.69	24.69	47.36	54.00	6.64
1659.35	35.70	PK	H	23.92	2.90	27.73	34.79	74.00	39.21
1659.35	25.02	AV	H	23.92	2.90	27.73	24.11	54.00	29.89
4982.5	39.67	PK	H	31.05	5.27	27.44	48.55	74.00	25.45
4982.5	24.37	AV	H	31.05	5.27	27.44	33.25	54.00	20.75
5395.1	34.99	PK	H	31.89	5.51	26.99	45.40	74.00	28.60
5395.1	20.75	AV	H	31.89	5.51	26.99	31.16	54.00	22.84
248.1	43.98	QP	V	12.19	1.90	21.49	36.58	46.00	9.42
Frequency:5240MHz									
5240	84.33	PK	H	31.58	5.28	27.07	94.12	N/A	N/A
5240	63.43	AV	H	31.58	5.28	27.07	73.22	N/A	N/A
5240	85.74	PK	V	31.58	5.28	27.07	95.53	N/A	N/A
5240	66.31	AV	V	31.58	5.28	27.07	76.10	N/A	N/A
5350	38.82	PK	V	31.80	5.61	27.02	49.21	74.00	24.79
5350	22.50	AV	V	31.80	5.61	27.02	32.89	54.00	21.11
10480	35.83	PK	V	37.00	8.23	26.01	55.05	74.00	18.95
10480	22.34	AV	V	37.00	8.23	26.01	41.56	54.00	12.44
15720	31.67	PK	V	37.10	14.20	24.92	58.05	74.00	15.95
15720	19.93	AV	V	37.10	14.20	24.92	46.31	54.00	7.69
4982.5	39.77	PK	H	31.05	5.27	27.44	48.65	74.00	25.35
4982.5	34.67	AV	H	31.05	5.27	27.44	43.55	54.00	10.45
5395.1	34.80	PK	H	31.89	5.51	26.99	45.21	74.00	28.79
5395.1	20.68	AV	H	31.89	5.51	26.99	31.09	54.00	22.91
248.1	42.94	QP	V	12.19	1.90	21.49	35.54	46.00	10.46

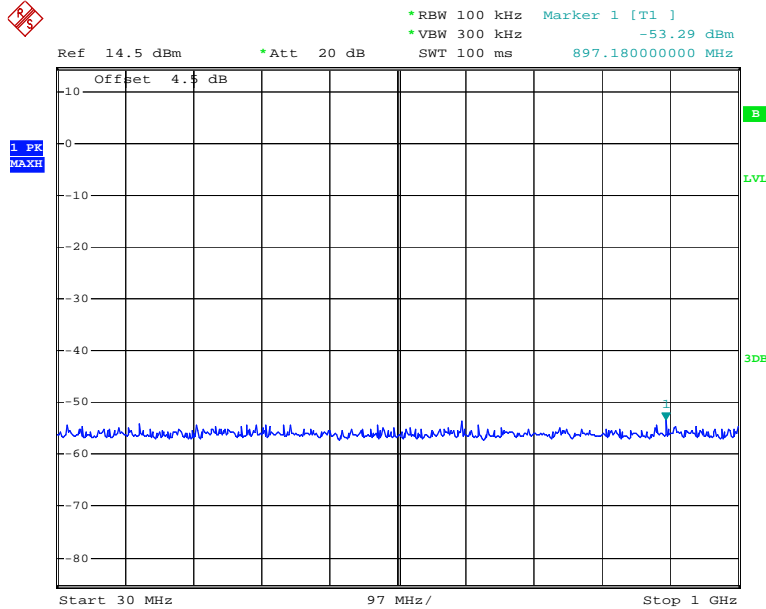
Conducted Spurious Emission at Antenna Port

Channel	Conducted Emissions (dBm/MHz)		Ant Gain (dBi)		EIRP Emission (dBm/MHz)		Limits (dBm/MHz)	Result
	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2		
Low	-33.71	-34.54	-3.35	0.97	-37.06	-33.57	-27	PASS
Middle	-35.06	-33.94	-3.35	0.97	-38.41	-32.97	-27	PASS
High	-34.51	-34.51	-3.35	0.97	-37.86	-33.54	-27	PASS

FEMVA

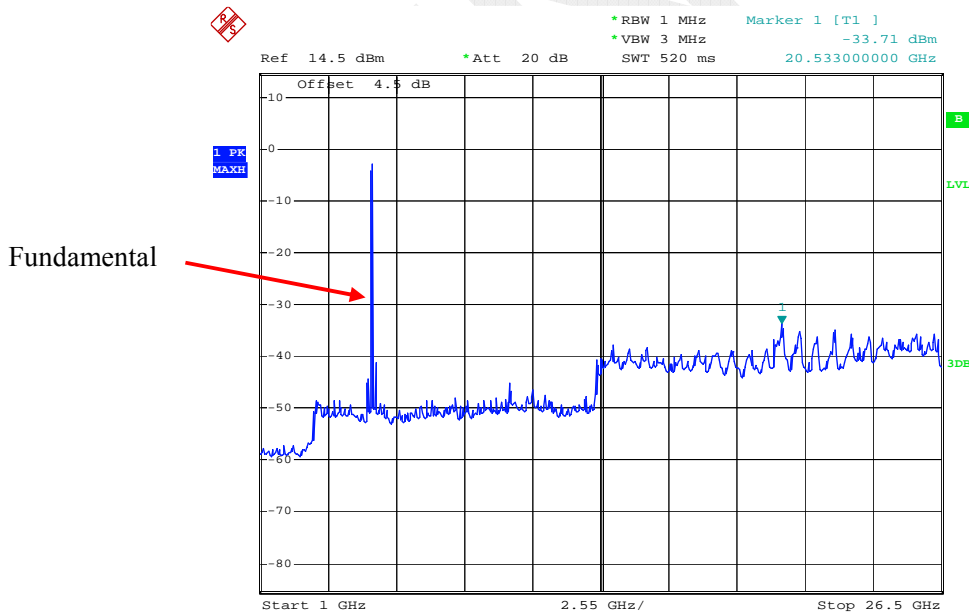
ANT 1:

Low Channel 30MHz-1GHz



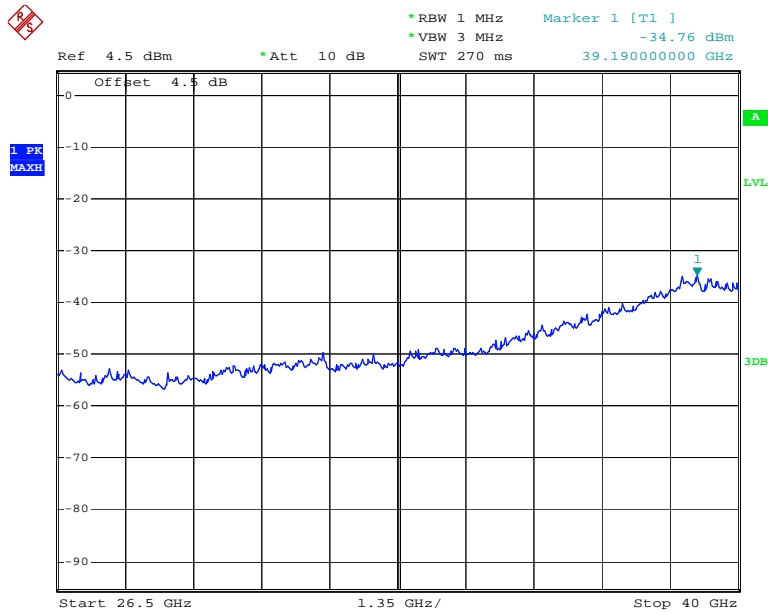
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Low Channel 1GHz-26.5GHz



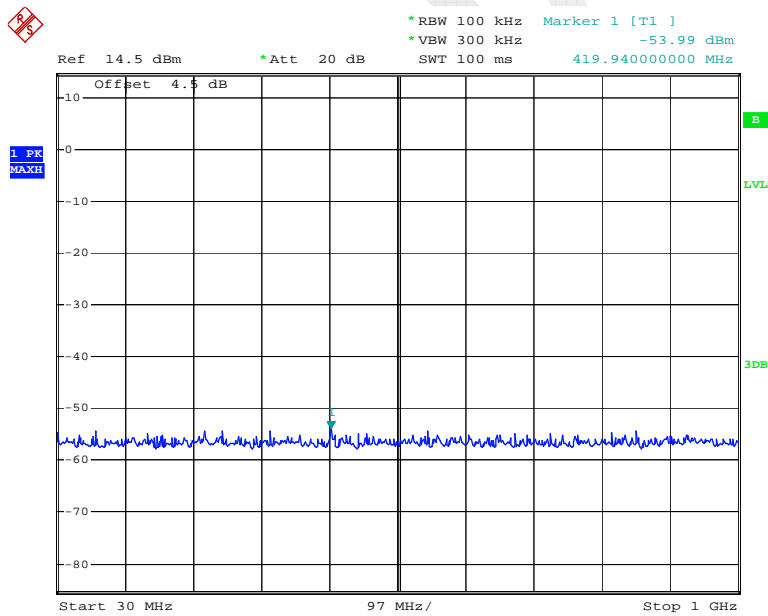
Date: 18.NOV.2014 21:52:00

Low Channel 26.5GHz-40GHz



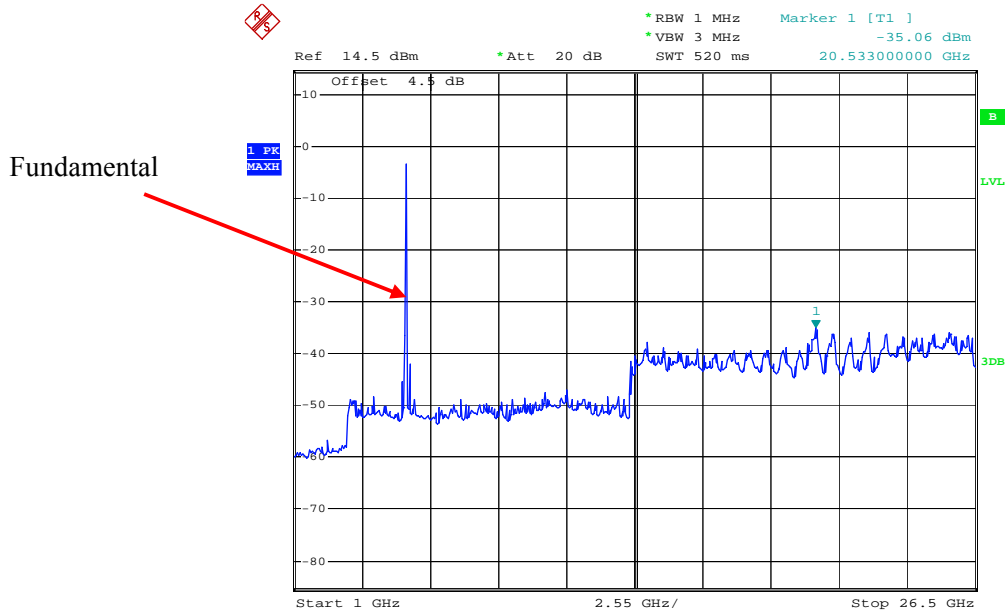
Date: 18.NOV.2014 22:02:15

Middle Channel 30MHz-1GHz



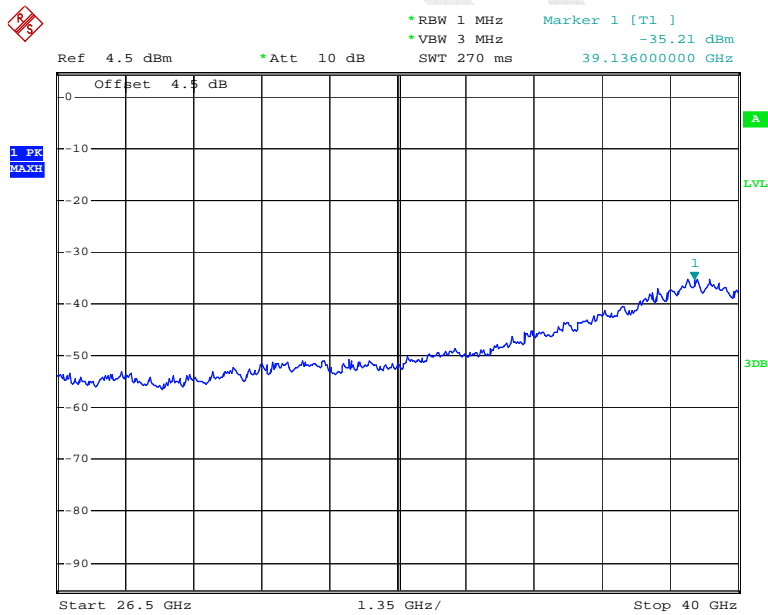
Date: 18.NOV.2014 21:48:32

Middle Channel 1GHz -26.5GHz



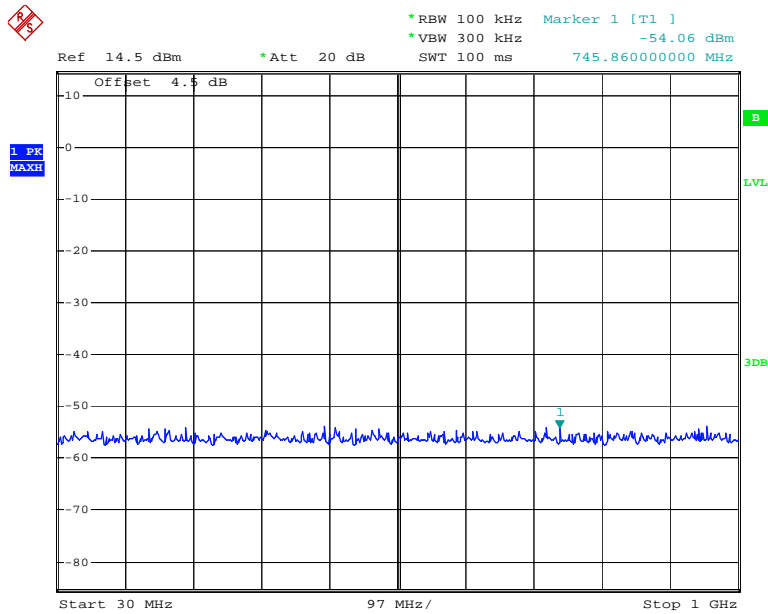
Date: 18.NOV.2014 21:48:01

Middle Channel 26.5GHz-40GHz



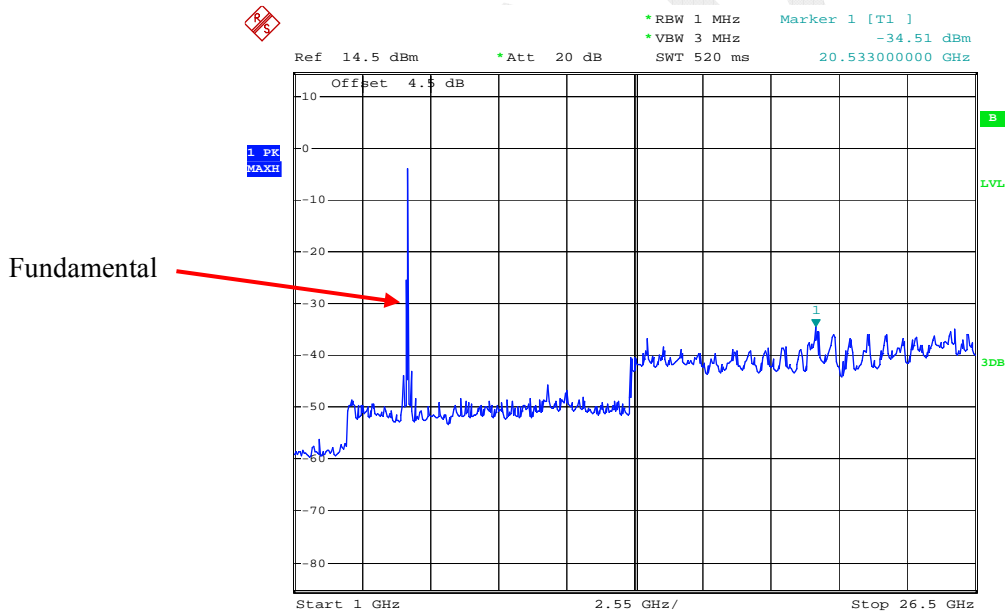
Date: 18.NOV.2014 22:01:10

High Channel 30MHz-1GHz



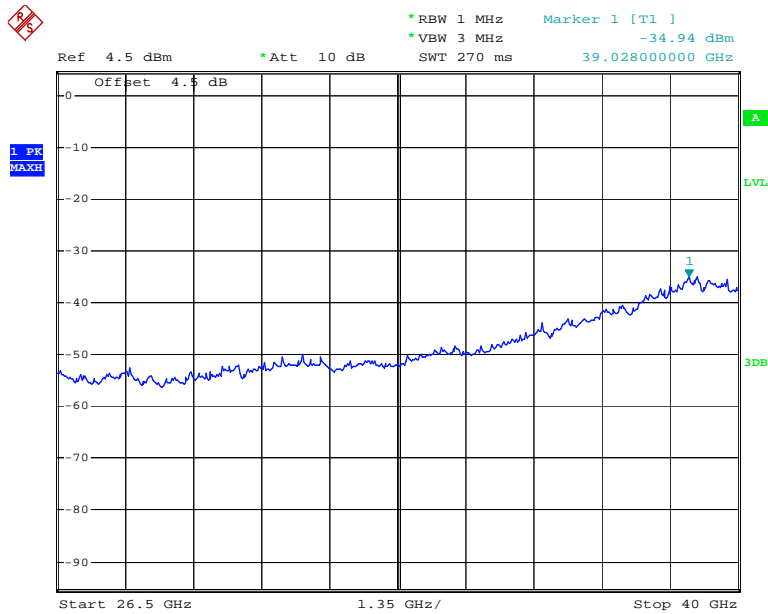
Date: 18.NOV.2014 21:46:08

High Channel 1GHz-26.5GHz



Date: 18.NOV.2014 21:47:03

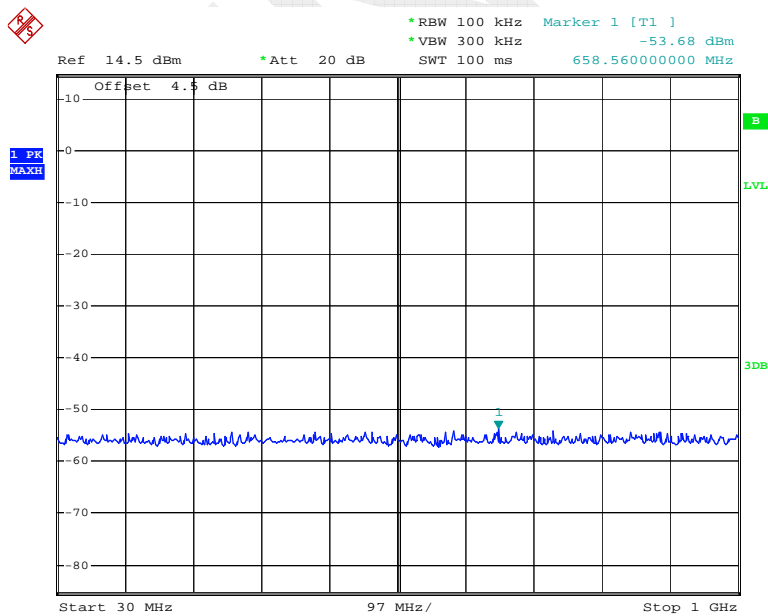
High Channel 26.5GHz-40GHz



Date: 18.NOV.2014 22:00:10

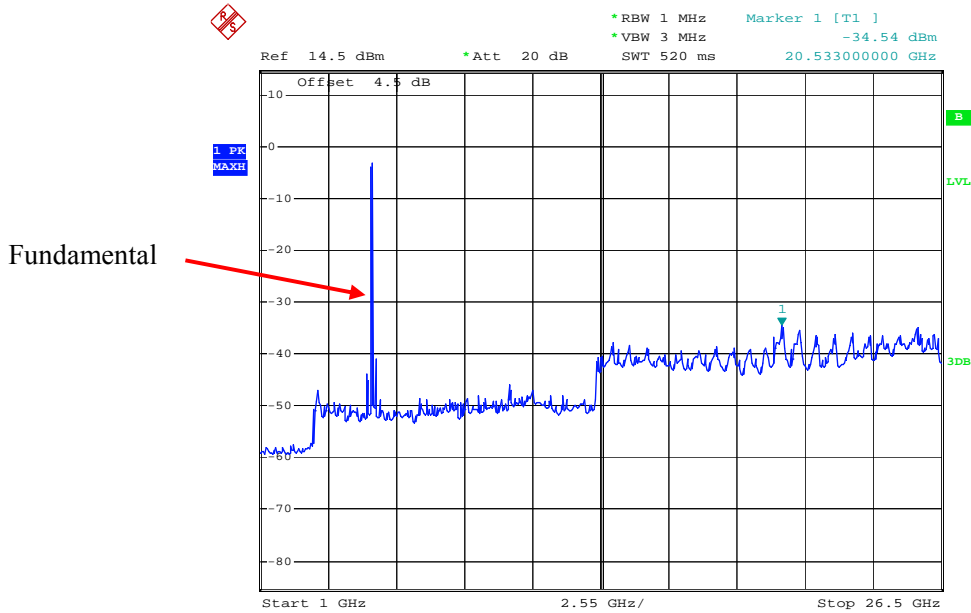
ANT 2:

Low Channel 30MHz-1GHz



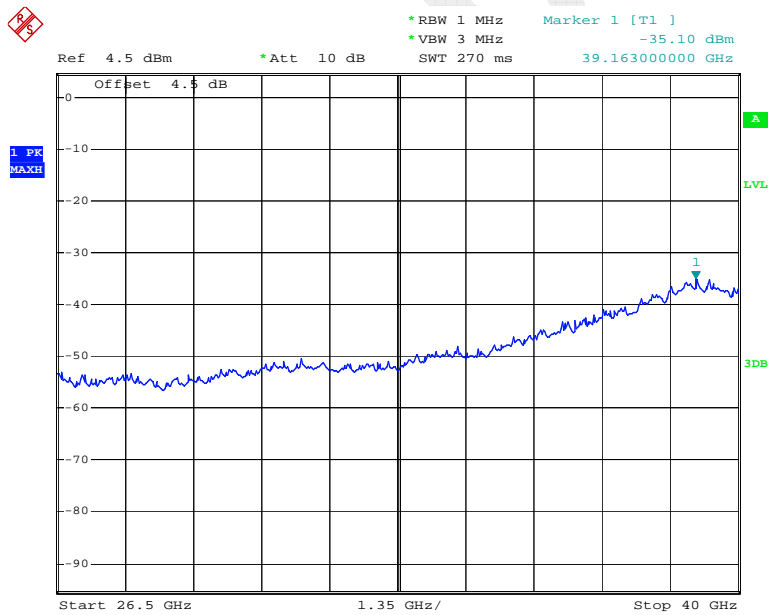
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Low Channel 1GHz-26.5GHz



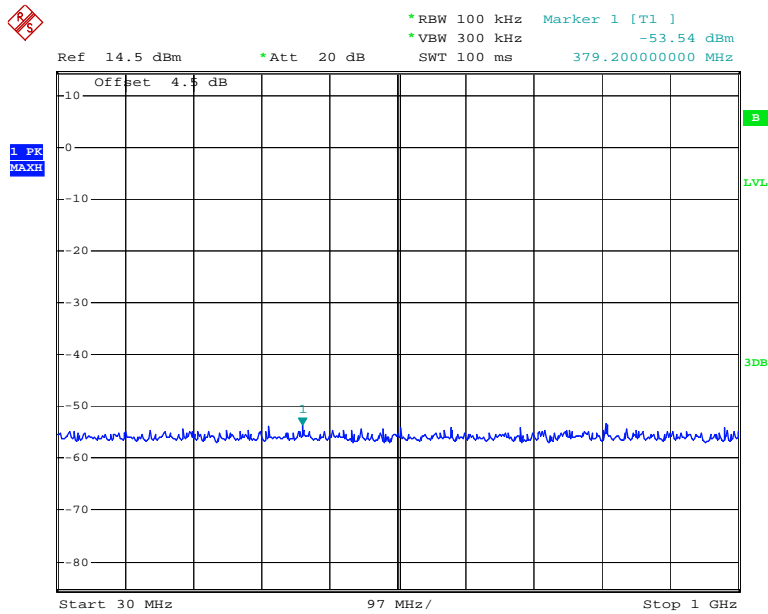
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Low Channel 26.5GHz-40GHz



Date: 18.NOV.2014 22:02:49

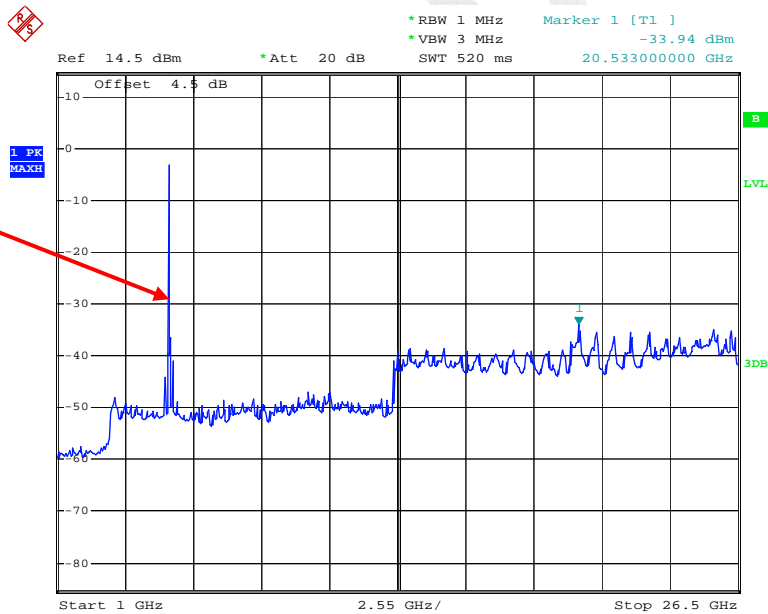
Middle Channel 30MHz-1GHz



Date: 18.NOV.2014 21:48:56

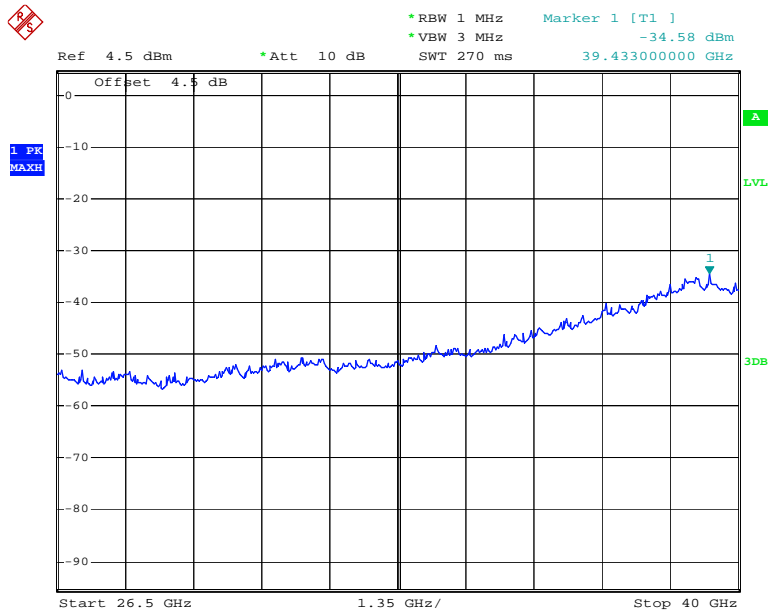
Middle Channel 1GHz-26.5GHz

Fundamental



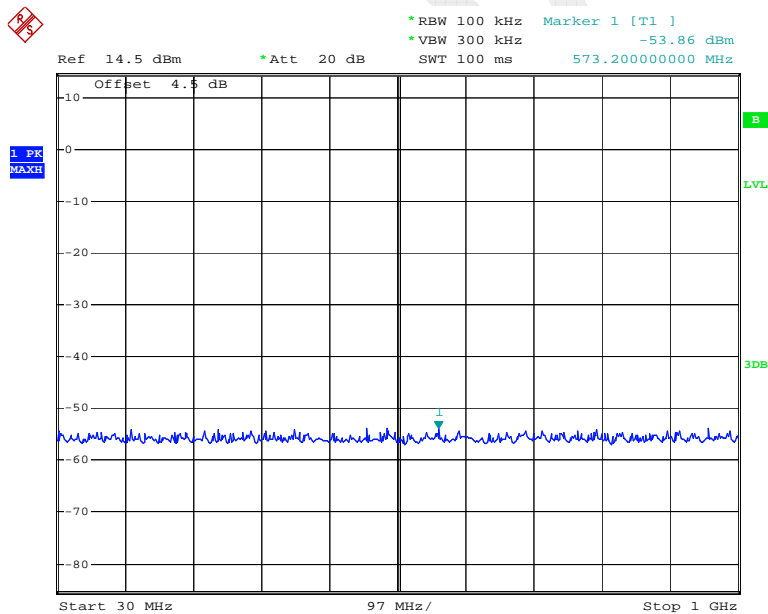
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Middle Channel 26.5GHz-40GHz



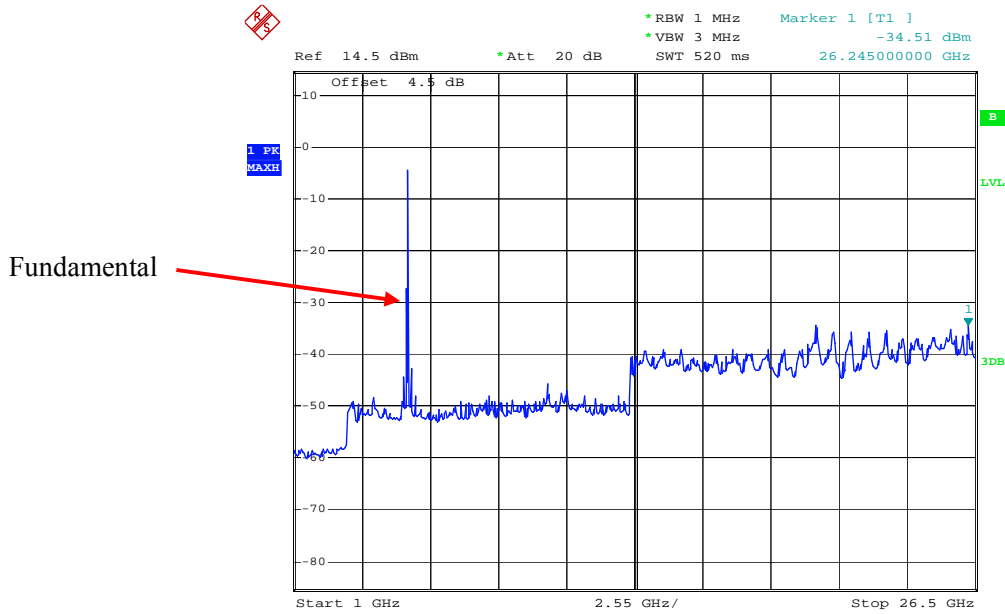
Date: 18.NOV.2014 22:01:37

High Channel 30MHz-1GHz



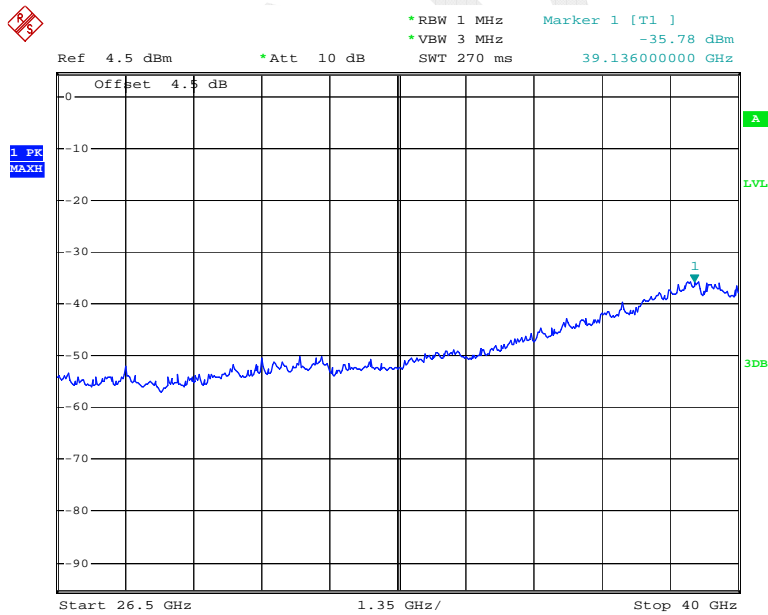
Date: 18.NOV.2014 21:46:40

High Channel 1GHz-26.5GHz



Date: 18.NOV.2014 21:47:13

High Channel 26.5GHz-40GHz



Date: 18.NOV.2014 22:00:37

FCC §15.407(b) (1) –BAND EDGE

Applicable Standard

FCC §15.407 (b) (1), (2), (3), (4);

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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:	25.9 °C
Relative Humidity:	44 %
ATM Pressure:	101.7 kPa

The testing was performed by Allen Qiao on 2014-11-18.

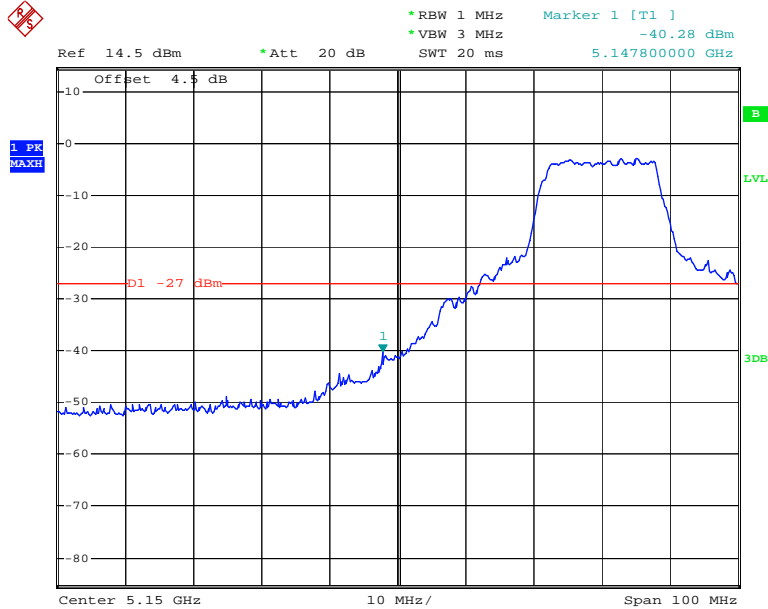
Please refer to the following table and plots.

5150MHz-5250MHz:

Channel	Conducted Emissions		Ant Gain		EIRP Emission		Limits	Result
	(dBm/MHz)		(dBi)		(dBm/MHz)			
	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	(dBm/MHz)	
Low	-40.28	-40.47	-3.35	0.97	-43.63	-39.50	-27	PASS
High	-41.98	-41.20	-3.35	0.97	-45.33	-40.23	-27	PASS

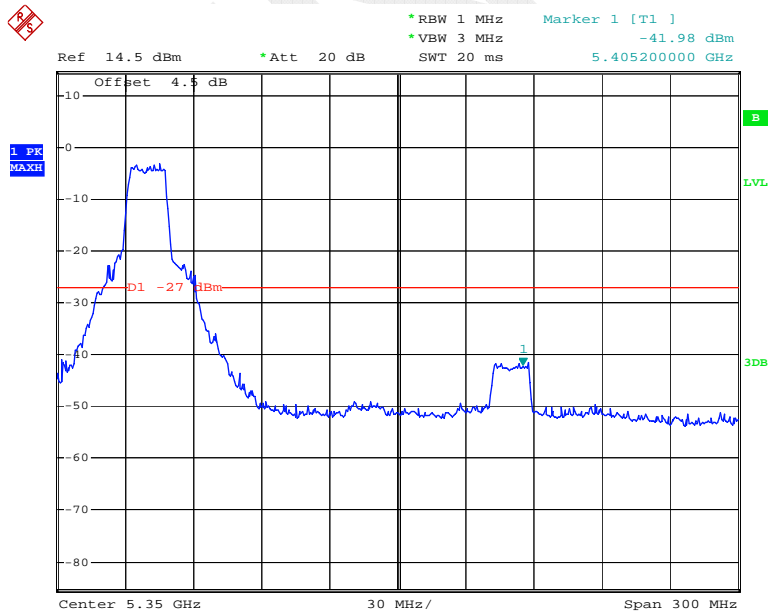
ANT 1:

Band Edge, Left Side



Date: 18.NOV.2014 21:40:01

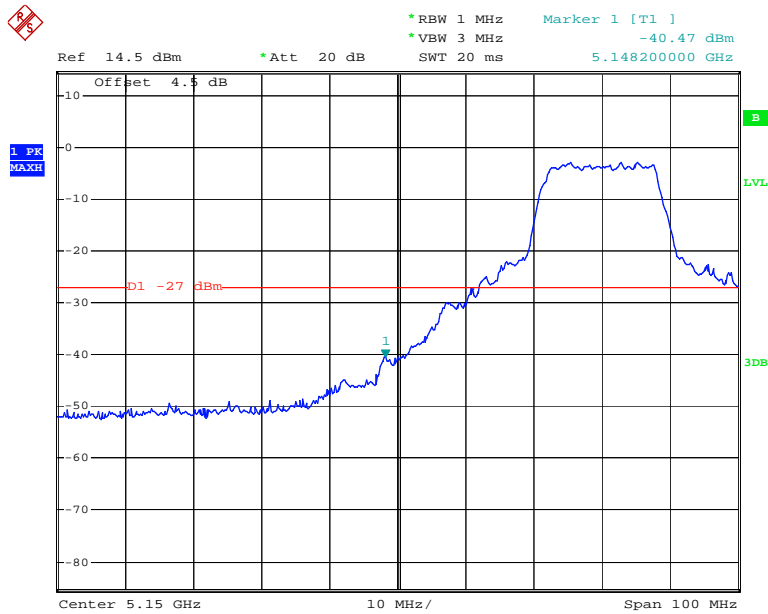
Band Edge, Right Side



Date: 18.NOV.2014 21:44:54

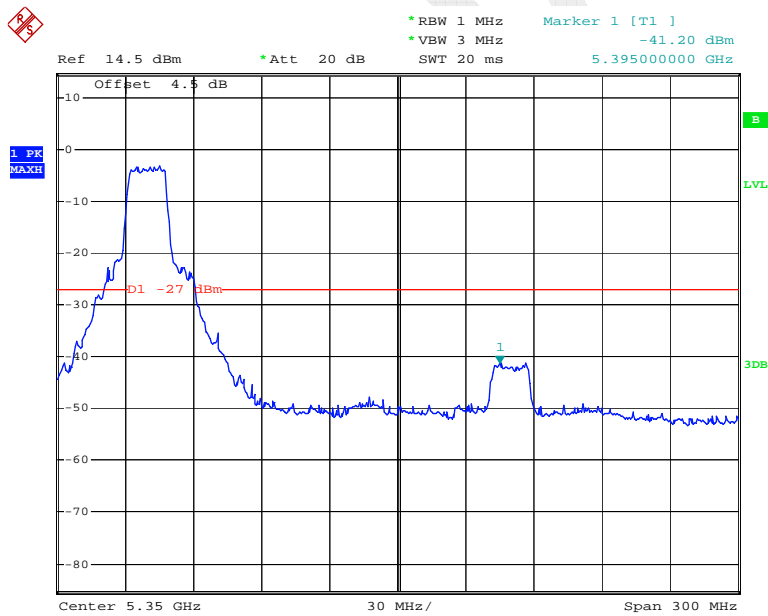
ANT 2:

Band Edge, Left Side



Date: 18.NOV.2014 21:40:29

Band Edge, Right Side



Date: 18.NOV.2014 21:45:26

FCC §15.407(a) –EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH

Applicable Standard

15.407(a)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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 Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01

Test Data

Environmental Conditions

Temperature:	25.9 °C
Relative Humidity:	44 %
ATM Pressure:	101.7 kPa

The testing was performed by Allen Qiao on 2014-11-18.

Test Result: Pass.

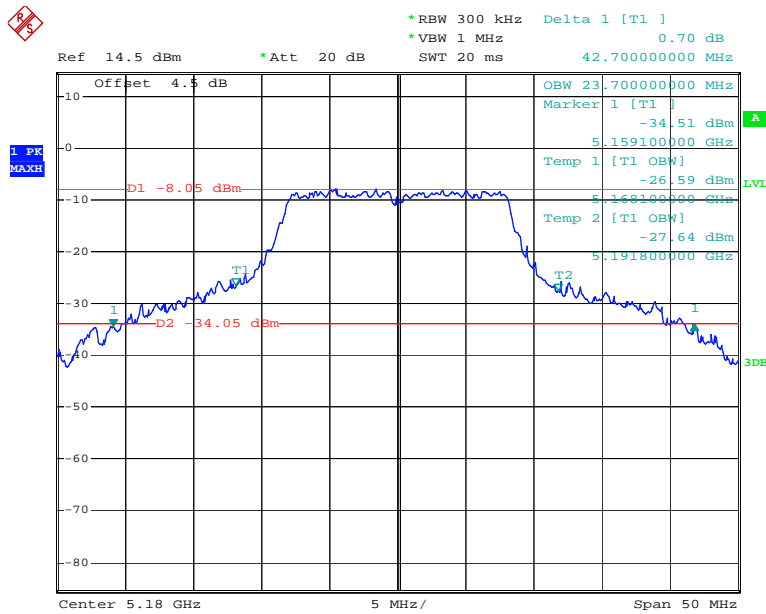
Please refer to the following tables and plots.

Test mode: Transmitting

Channel	Frequency (MHz)	Test Results (MHz)			
		Antenna 1		Antenna 2	
		26dB Bandwidth	99% occupied bandwidth	26dB Bandwidth	99% occupied bandwidth
Low	5180	42.7	23.7	42.2	23.5
Middle	5200	41.8	24.4	40.9	24.0
High	5240	45.0	26.4	44.0	26.5

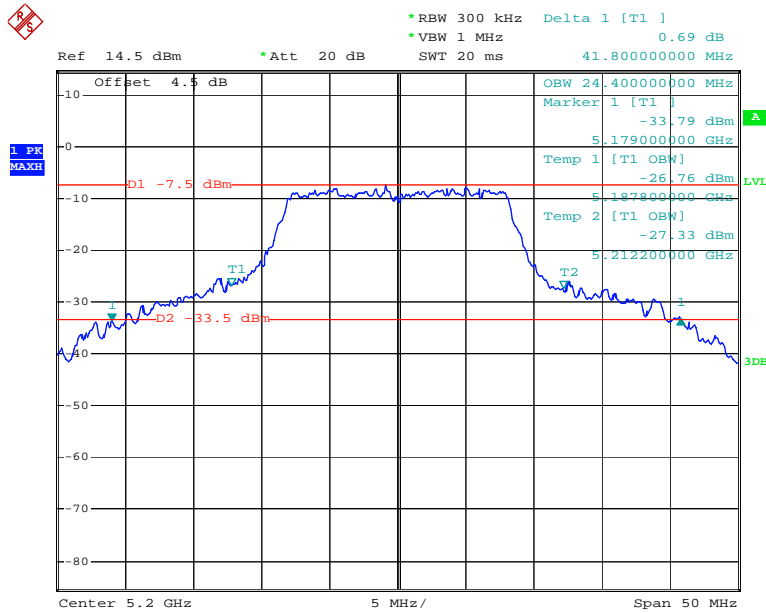
ANT 1:

Low Channel



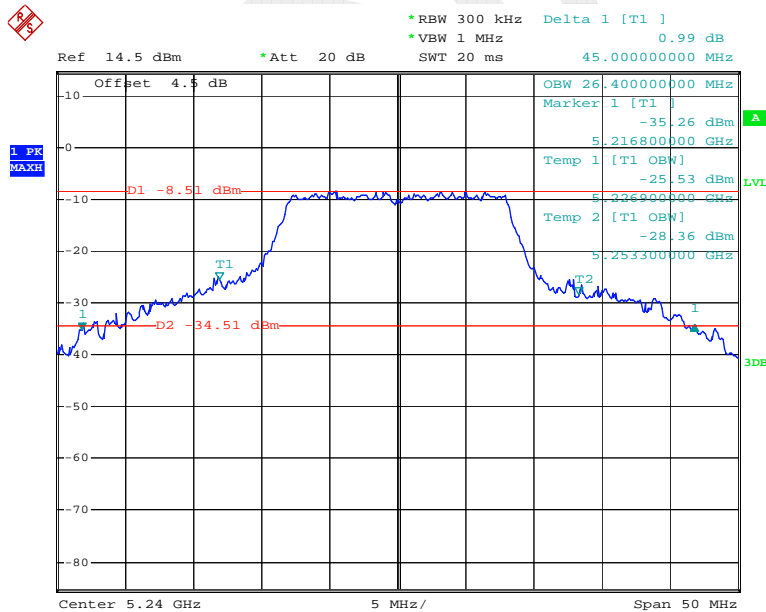
Date: 18.NOV.2014 21:36:26

Middle Channel



Date: 18.NOV.2014 21:33:48

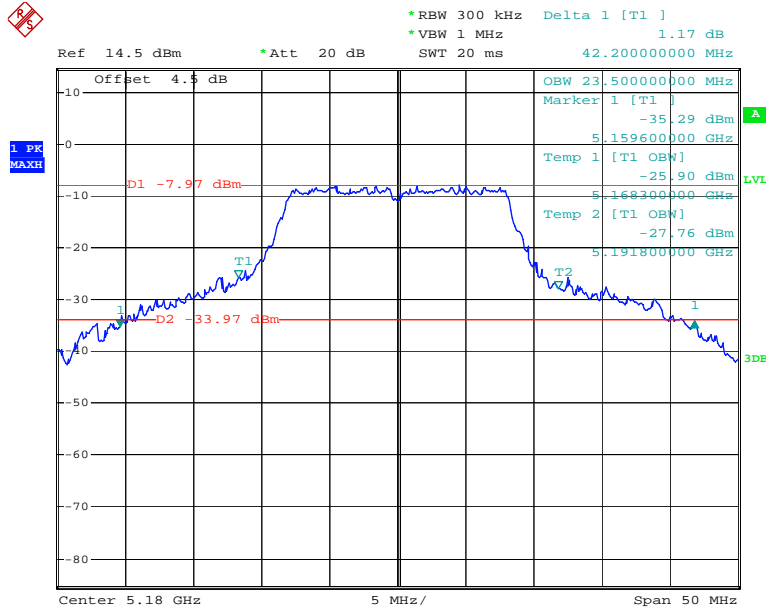
High Channel



Date: 18.NOV.2014 21:21:29

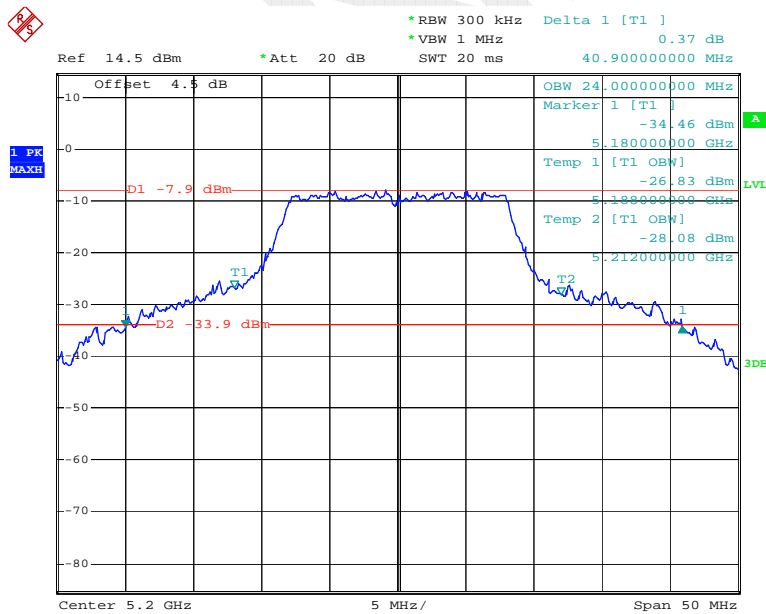
ANT 2:

Low Channel



Date: 18.NOV.2014 21:37:07

Middle Channel



Date: 18.NOV.2014 21:34:43

FCC §15.407(a) (1) (ii) (4) –MAXIMUM CONDUCTED OUTPUT POWER**Applicable Standard**

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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 Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01.

Test Data

Environmental Conditions

Temperature:	25.9 °C
Relative Humidity:	44 %
ATM Pressure:	101.7 kPa

The testing was performed by Allen Qiao on 2014-11-18.

Test Mode: Transmitting

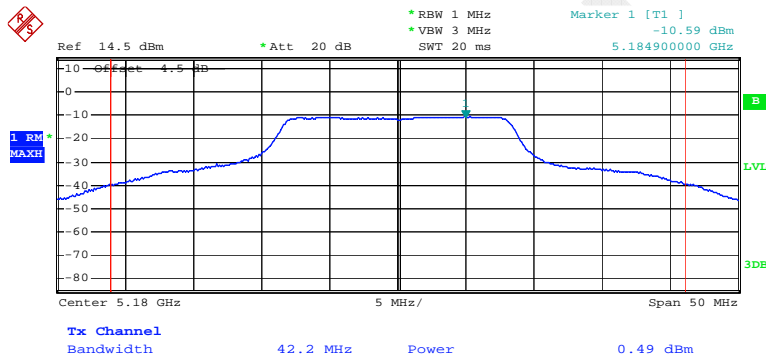
5150MHz-5250MHz:

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Limit (dBm)	Result
		Antenna 1	Antenna 2		
Low	5180	0.49	0.52	30	PASS
Middle	5200	0.35	0.37	30	PASS
High	5240	0.05	0.02	30	PASS

Note: The duty cycle is 100%.

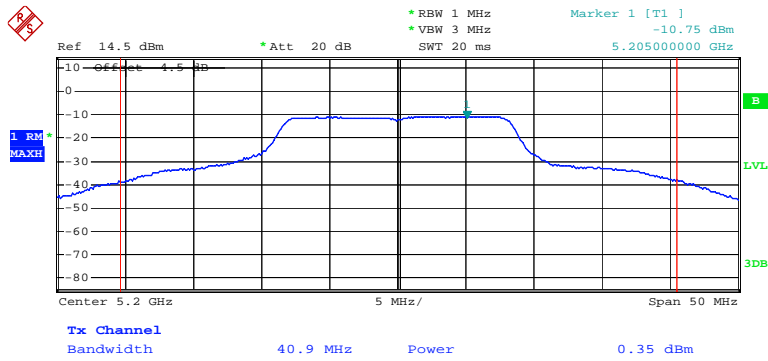
ANT 1:

RF Output Power, Low Channel



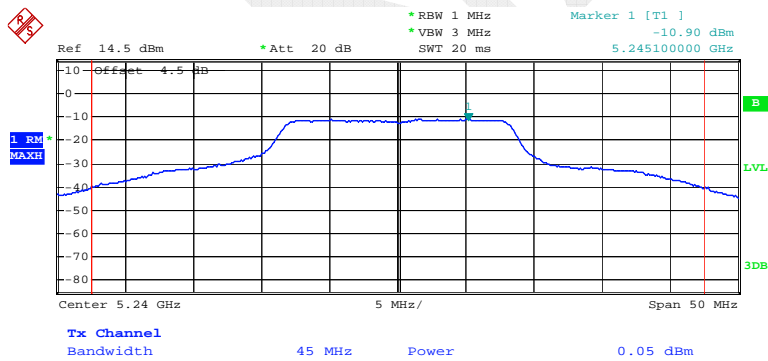
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RF Output Power, Middle Channel



Date: 18.NOV.2014 21:34:52

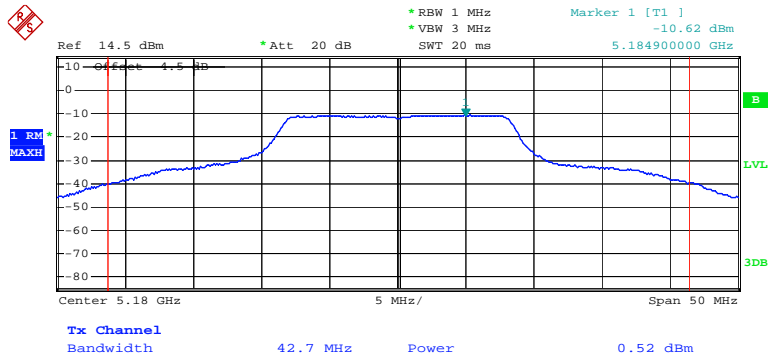
RF Output Power, High Channel



Date: 18.NOV.2014 21:22:41

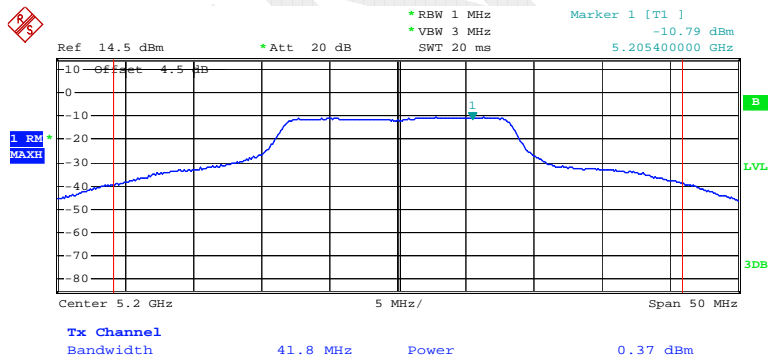
ANT 2:

RF Output Power, Low Channel



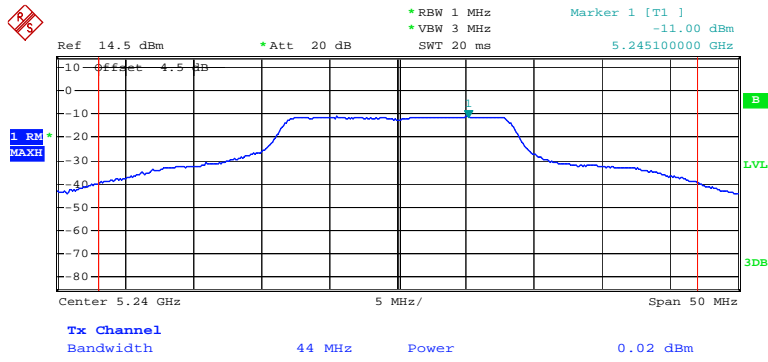
Date: 18.NOV.2014 21:37:34

RF Output Power, Middle Channel



Date: 18.NOV.2014 21:35:10

RF Output Power, High Channel



Date: 18.NOV.2014 21:22:50

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-09

* **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:	25.9 °C
Relative Humidity:	44 %
ATM Pressure:	101.7 kPa

The testing was performed by Allen Qiao on 2014-11-18.

Test Mode: Transmitting

Test Result: Compliance. Please refer to the following table and plot.

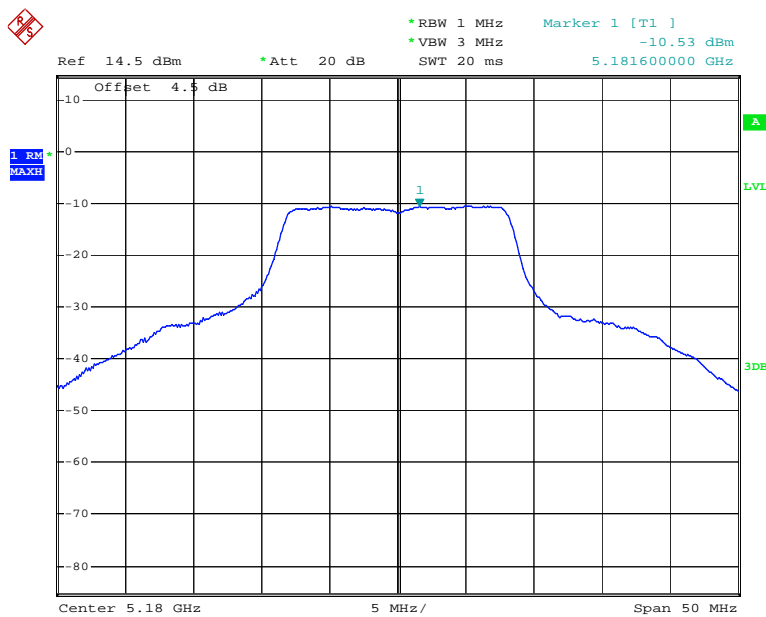
5150MHz-5250MHz:

Channel	Frequency (MHz)	PSD (dBm/MHz)		Limit (dBm/MHz)	Result
		Antenna 1	Antenna 2		
Low	5180	-10.53	-10.51	17	PASS
Middle	5200	-10.42	-10.40	17	PASS
High	5240	-10.83	-10.92	17	PASS

Note: the duty cycle is 100%.

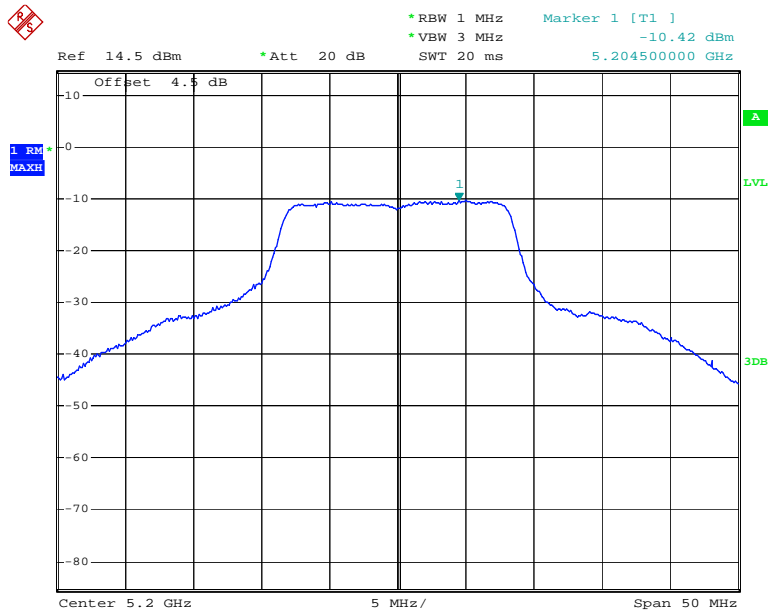
ANT 1:

Power Spectral Density, Low Channel



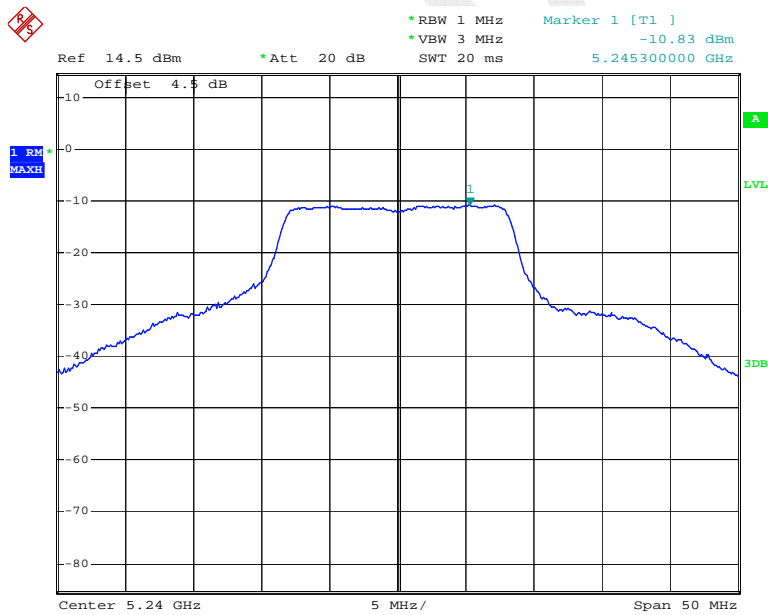
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Power Spectral Density, Middle Channel



Date: 18.NOV.2014 21:42:07

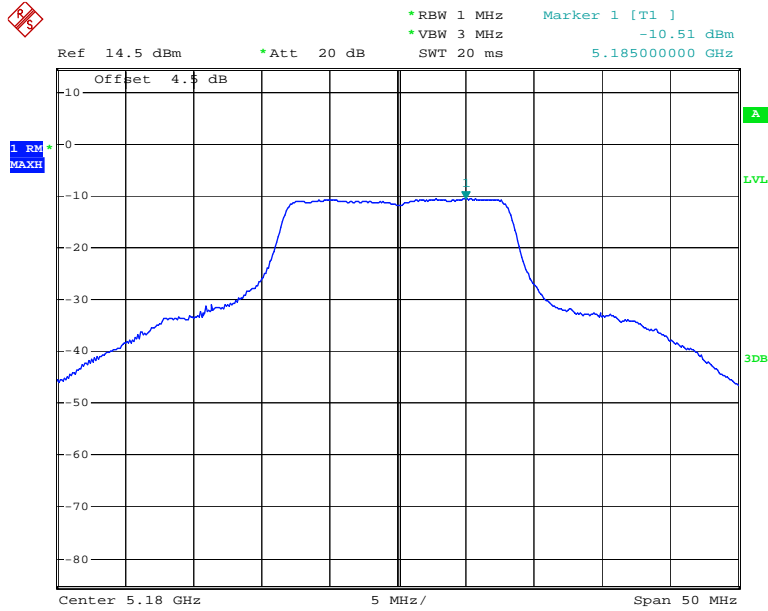
Power Spectral Density, High Channel



Date: 18.NOV.2014 21:44:00

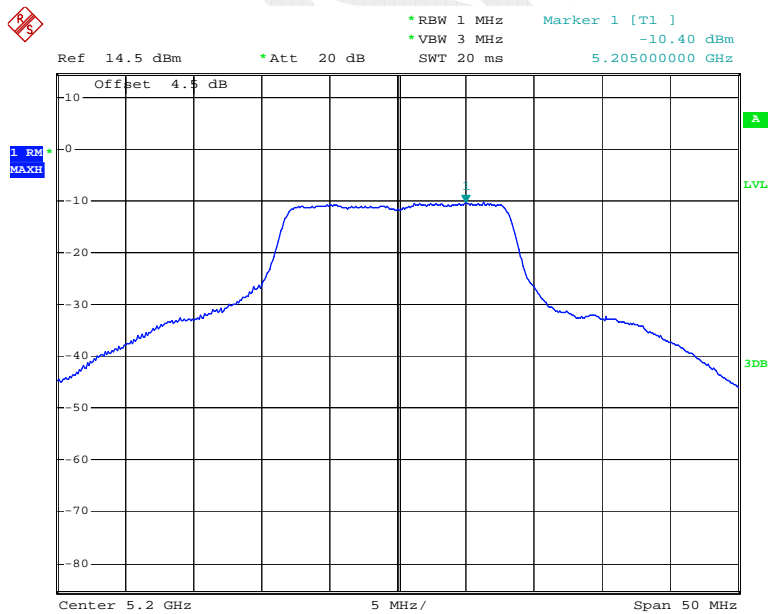
ANT 2:

Power Spectral Density, Low Channel



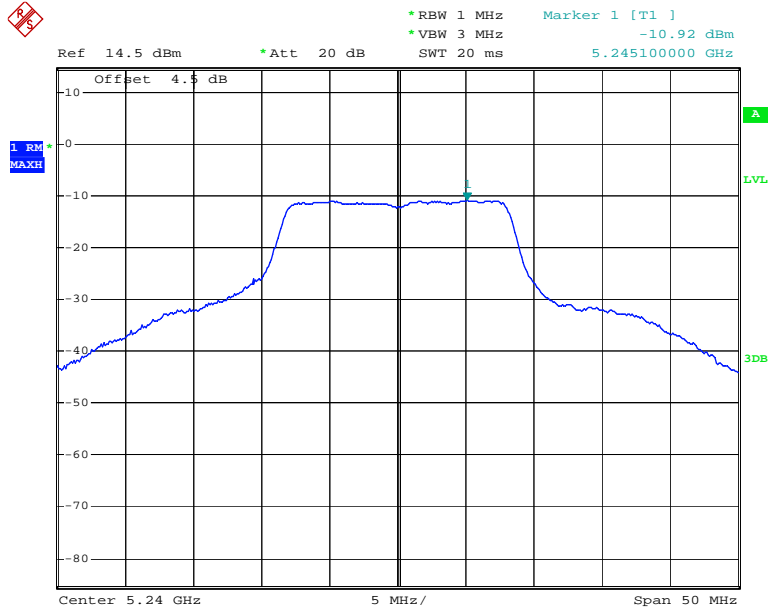
Date: 18.NOV.2014 21:39:18

Power Spectral Density, Middle Channel



Date: 18.NOV.2014 21:43:14

Power Spectral Density, High Channel



Date: 18.NOV.2014 21:44:33

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