

FCC PART 15.407

TEST REPORT

For

Shenzhen Crystal Video Technology Co., LTD.

F13, F518 Idea Land, Baoyuan Road, Baoan Central Area, Shenzhen, China

FCC ID: Y3HCB882220140601

Report Type: Original Report	Product Type: HD wireless video transmitter
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Crystal Video Technology Co., LTD.*'s product, model number: *CB8822 (FCC ID: Y3HCB882220140601)* or ("EUT") in this report is a *HD wireless video transmitter*, which was measured approximately: 11.7 cm (L) x 5.2 cm (W) x 4.3 cm (T), rated input voltage: 12VDC from adapter.

Adapter information: GOSPELL
Model: GP302U-120-100
Input: 100-240Vac, 50/60Hz, 0.5A
Output: DC 12V, 1A

Note: The series product, model CB8822, CB8833 are electrically identical, the difference between them is just the model name, we selected CB8822 for fully testing, and the details was explained in the attached declaration letter.

All measurement and test data in this report was gathered from production sample serial number: 140623003 (Assigned by BACL, Dongguan). The EUT was received on 2014-06-24.

Antenna information

Chain	Manufacturer	Antenna Type	Max. Antenna Gain
0	dongguan chuangcheng dianzi	omni-directional	2dBi
1	dongguan chuangcheng dianzi	omni-directional	2dBi

Objective

This type approval report is prepared on behalf of *Shenzhen Crystal Video Technology Co., LTD.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and E of the Federal Communication Commissions 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)

No Related Submittal(s)/Grant(s).

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, Puxihu 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 Communication 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.

FINAL

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, Channel 5190MHz, 5230MHz were tested.

For 5725~5850 MHz band, Channel 5755MHz, 5795MHz were tested.

EUT Exercise Software

The software “AppCom_3.0.3.16” was used for testing, which was provided by manufacturer. The worst condition (maximum power) was setting by the software as following table:

Test Software Version	AppCom_3.0.3.16			
Test Frequency	5190MHz	5230MHz	5755MHz	5795MHz
Power Level Setting Chain0	50	50	50	50
Power Level Setting Chain1	50	50	50	50

Equipment Modifications

Used copper foil to cover HDMI port and bottom of the main board, please refer to the internal photos.

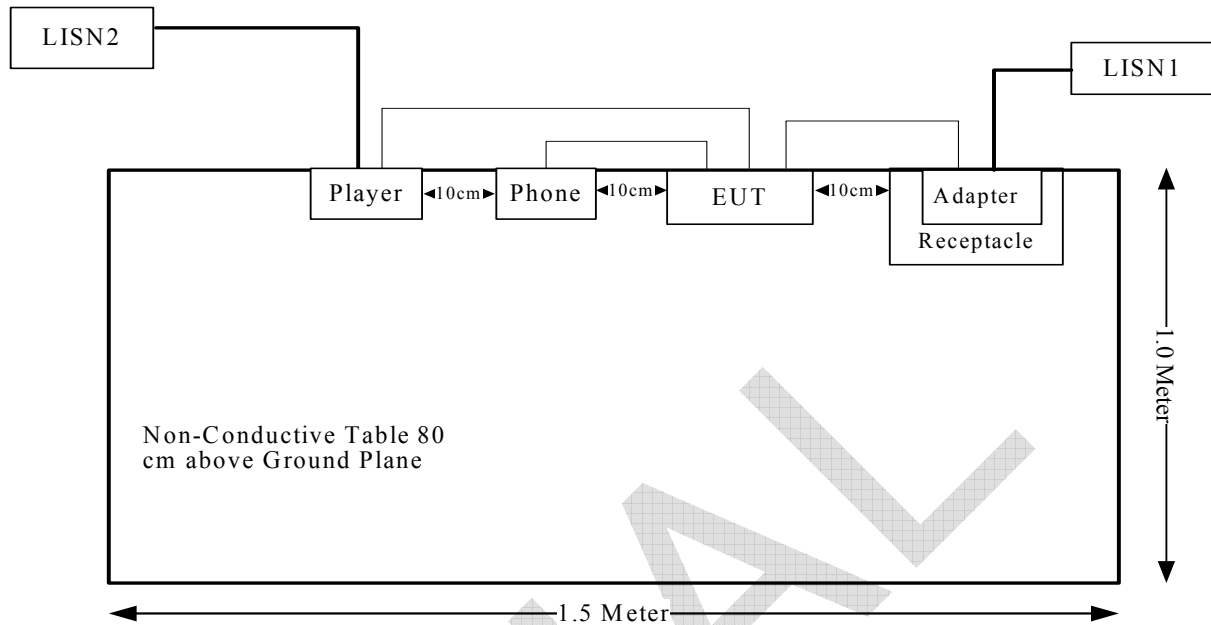
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Sony	Phone	L39U	/
/	Player	CH-A1	/

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
HDMI cable	Yes	No	1.0	EUT	Player
Audio cable	No	No	1.0	EUT	Phone
Adapter line	No	No	2.0	EUT	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1307 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1),(4)	Unwanted Emission	Compliance
§15.407(b) (1),(4)	Band Edge	Compliance
§15.407(e)	Emission Bandwidth & Occupied Bandwidth	Compliance
§15.407(a)(1),(3)	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(3)	Power Spectral Density	Compliance
§15.407(g)	Frequency Stability	Compliance

FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

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= 11.99 dBm (15.81 mW) at 5190 MHz
 $[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 $= 15.81/5 \cdot (\sqrt{5.19}) = 7.2 < 7.5$

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.

Antenna Connector Construction

This product used two dipole antennas which used a unique coupling, the maximum gain is 2.0 dBi, which fulfill the requirement of this section, and please refer to the EUT photos.

Result: Compliance.

FCC §15.407 (b) (6) §15.207 – 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:

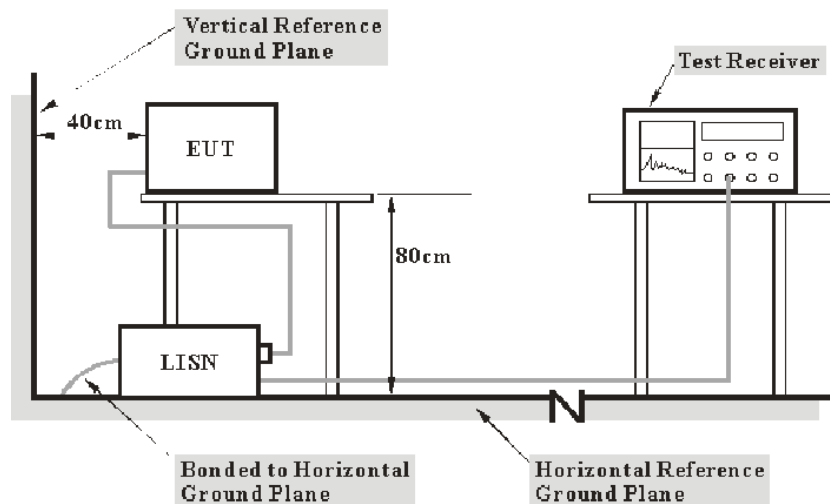
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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	2013-11-20	2014-11-20
R&S	L.I.S.N	ESH3-Z5	843331/015	2013-09-25	2014-09-25
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:

2.4 dB at 0.536756 MHz in the Neutral conducted mode

Test Data

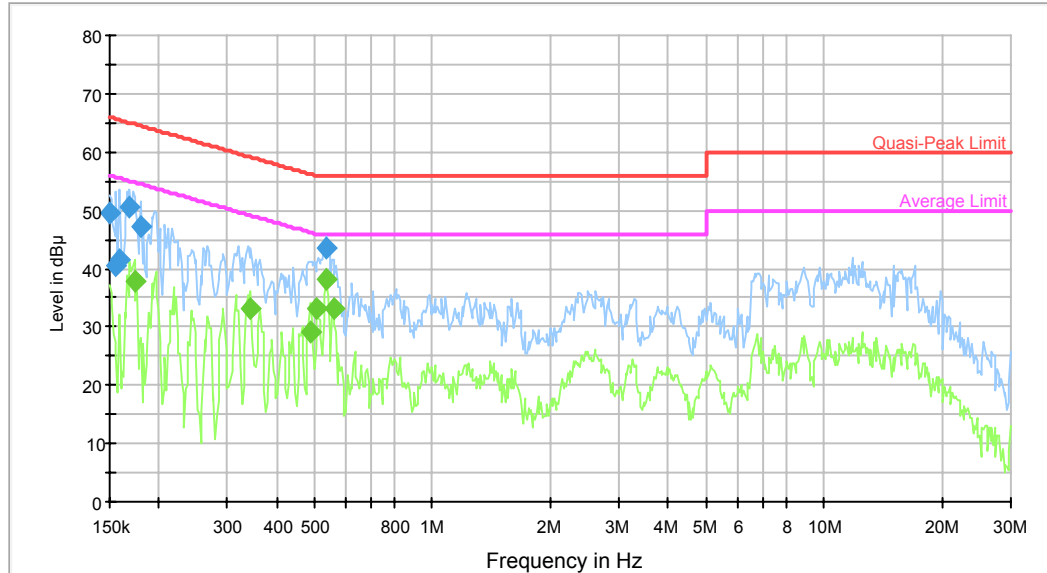
Environmental Conditions

Temperature:	27.2 °C
Relative Humidity:	55 %
ATM Pressure:	100.3 kPa

The testing was performed by Dean Liu on 2014-07-01.

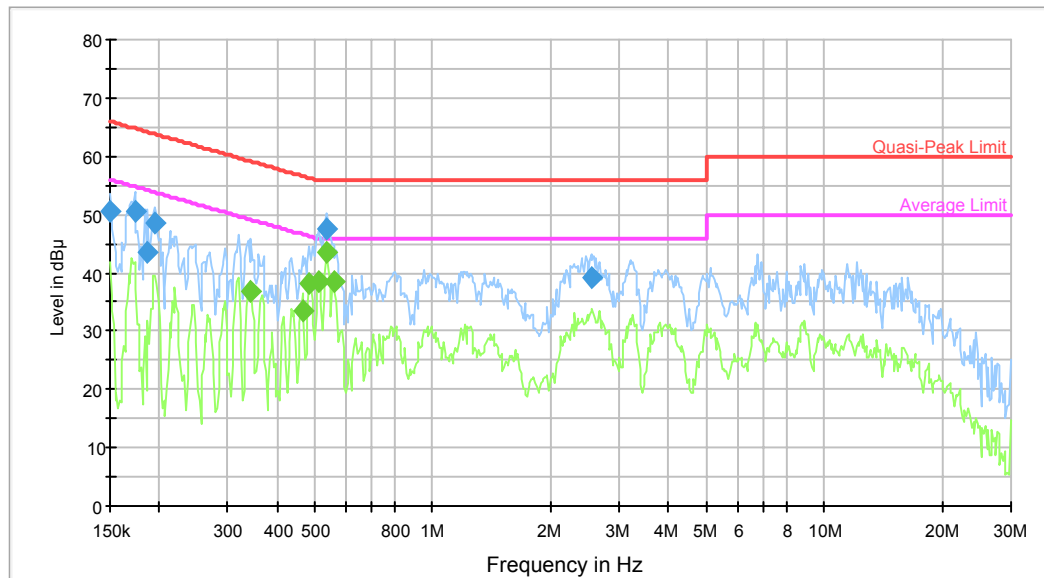
Test Mode: Transmitting

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	49.6	9.000	L1	10.1	16.4	66.0	Compliance
0.156097	40.6	9.000	L1	10.1	25.0	65.7	Compliance
0.158604	41.5	9.000	L1	10.2	24.1	65.5	Compliance
0.169044	50.7	9.000	L1	10.3	14.4	65.0	Compliance
0.180171	47.3	9.000	L1	10.4	17.2	64.5	Compliance
0.536756	43.5	9.000	L1	10.4	12.5	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.173134	37.8	9.000	L1	10.3	17.0	54.8	Compliance
0.343548	33.0	9.000	L1	10.7	16.1	49.1	Compliance
0.487810	29.1	9.000	L1	10.4	17.1	46.2	Compliance
0.507637	33.2	9.000	L1	10.4	12.8	46.0	Compliance
0.536756	38.3	9.000	L1	10.4	7.7	46.0	Compliance
0.558572	33.1	9.000	L1	10.4	12.9	46.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	50.6	9.000	N	10.3	15.4	66.0	Compliance
0.173134	50.5	9.000	N	10.7	14.3	64.8	Compliance
0.187494	43.6	9.000	N	11.1	20.6	64.1	Compliance
0.195114	48.5	9.000	N	11.2	15.3	63.8	Compliance
0.536756	47.4	9.000	N	10.4	8.6	56.0	Compliance
2.538519	39.1	9.000	N	10.5	16.9	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.343548	36.8	9.000	N	11.1	12.3	49.1	Compliance
0.465037	33.6	9.000	N	10.5	13.0	46.6	Compliance
0.483938	38.1	9.000	N	10.5	8.1	46.3	Compliance
0.511698	38.6	9.000	N	10.4	7.4	46.0	Compliance
0.536756	43.6	9.000	N	10.4	2.4*	46.0	Compliance
0.558572	38.6	9.000	N	10.4	7.4	46.0	Compliance

*Within measurement uncertainty!

FCC §15.209, §15.205 & §15.407(b) (1) (4) – UNWANTED EMISSION

Applicable Standard

FCC §15.407 (b) (1), (4), (7); §15.209; §15.205;

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 EIRP of –27dBm/MHz

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

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

According to KDB 789033 D02 General UNII Test Procedures New Rules v01, emission shall be computed as: $E [dB\mu V/m] = EIRP[dBm] + 95.2$, for $d = 3$ meters.

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

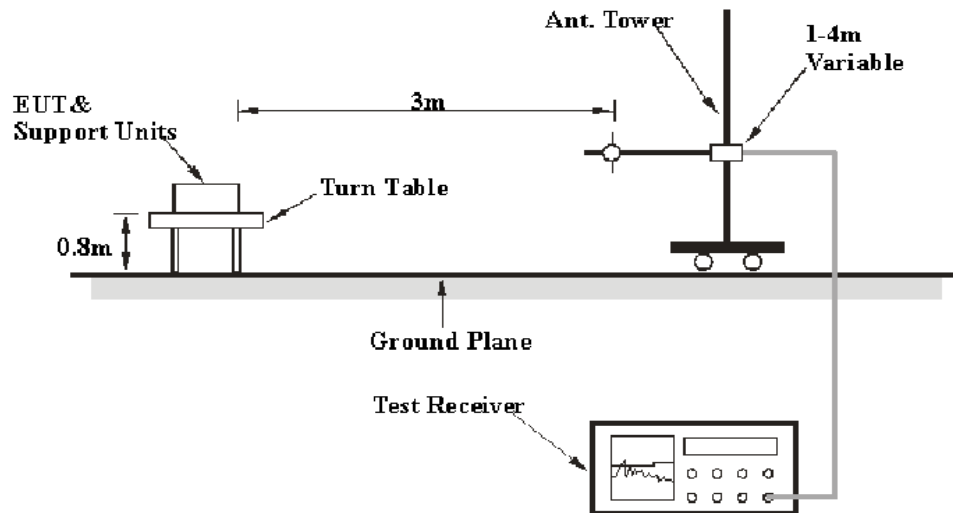
6G~18GHz: 5.23 dB

Table 1 – Values of U_{cispr}

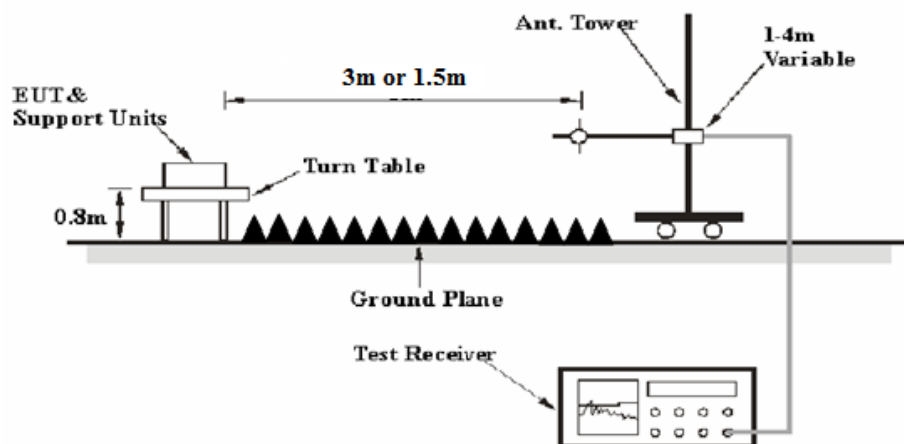
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 G:



Above 1 G:



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 was 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.

The Radiated measurements was performed, The EIRP converted to field strength as follows:

According to C63.4, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]})$ dB

Extrapolation result = Corrected Amplitude (dBμV/m) - distance extrapolation factor (6dB)

or Limit line = Specific limits(dBμV) + distance extrapolation factor (6dB)

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:

$$\text{Margin} = \text{Limit} - \text{Extrapolation result}$$

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	A060611-1	2011-09-06	2014-09-05
HP	Amplifier	8447E	2434A02181	2013-09-06	2014-09-06
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	2013-09-06	2014-09-06

* **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:

7.48 dB at 446 MHz in the Vertical polarization for 5150-5250 MHz band

Test Data**Environmental Conditions**

Temperature:	26.8 °C
Relative Humidity:	62 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-06-27.

Mode: Transmitting

Note: For above 1GHz, the test distance is 1.5m.

5150-5250 MHz band:

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel:5190 MHz										
5190	85.62	PK	H	31.48	5.91	27.11	95.90	89.90	N/A	N/A
5190	72.44	AV	H	31.48	5.91	27.11	82.72	76.72	N/A	N/A
5190	96.89	PK	V	31.48	5.91	27.11	107.17	101.17	N/A	N/A
5190	82.97	AV	V	31.48	5.91	27.11	93.25	87.25	N/A	N/A
5150	33.53	PK	V	31.40	6.03	27.18	43.78	37.78	68.20	30.42
5150	20.25	AV	V	31.40	6.03	27.18	30.50	24.50	54.00	29.50
10380	28.41	PK	V	36.98	8.59	25.51	48.47	42.47	68.20	25.73
10380	15.87	AV	V	36.98	8.59	25.51	35.93	29.93	54.00	24.07
15570	29.98	PK	V	37.37	14.66	24.83	57.18	51.18	68.20	17.02
15570	18.85	AV	V	37.37	14.66	24.83	46.05	40.05	54.00	13.95
1886.34	31.22	PK	V	24.37	3.65	27.51	31.73	25.73	68.20	42.47
1886.34	19.43	AV	V	24.37	3.65	27.51	19.94	13.94	54.00	40.06
7490	32.78	PK	V	34.78	7.60	26.11	49.05	43.05	68.20	25.15
7490	20.48	AV	V	34.78	7.60	26.11	36.75	30.75	54.00	23.25
446	40.70	QP	V	17.06	2.55	21.89	38.42	/	46.00	7.58
Middle Channel:5230 MHz										
5230	83.39	PK	H	31.56	5.84	27.08	93.71	87.71	N/A	N/A
5230	70.12	AV	H	31.56	5.84	27.08	80.44	74.44	N/A	N/A
5230	94.96	PK	V	31.56	5.84	27.08	105.28	99.28	N/A	N/A
5230	81.55	AV	V	31.56	5.84	27.08	91.87	85.87	N/A	N/A
5350	31.16	PK	V	31.80	6.11	27.02	42.05	36.05	68.20	32.15
5350	21.85	AV	V	31.80	6.11	27.02	32.74	26.74	54.00	27.26
10460	29.96	PK	V	36.99	8.52	25.88	49.59	43.59	68.20	24.61
10460	16.53	AV	V	36.99	8.52	25.88	36.16	30.16	54.00	23.84
15690	30.89	PK	V	37.16	14.47	24.87	57.65	51.65	68.20	16.55
15690	18.88	AV	V	37.16	14.47	24.87	45.64	39.64	54.00	14.36
1886.34	31.08	PK	V	24.37	3.65	27.51	31.59	25.59	74.00	48.41
1886.34	19.26	AV	V	24.37	3.65	27.51	19.77	13.77	54.00	40.23
7490	32.03	PK	V	34.78	7.60	26.11	48.30	42.30	68.20	25.90
7490	20.13	AV	V	34.78	7.60	26.11	36.40	30.40	54.00	23.60
446	40.80	QP	V	17.06	2.55	21.89	38.52	/	46.00	7.48

5725-5850 MHz band:

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel:5755 MHz										
5755	91.01	PK	H	32.15	6.11	26.59	102.68	96.68	N/A	N/A
5755	77.96	AV	H	32.15	6.11	26.59	89.63	83.63	N/A	N/A
5755	93.16	PK	V	32.15	6.11	26.59	104.83	98.83	N/A	N/A
5755	82.09	AV	V	32.15	6.11	26.59	93.76	87.76	N/A	N/A
5725	47.66	PK	V	32.15	6.04	26.63	59.22	53.22	78.20	24.98
5725	30.31	AV	V	32.15	6.04	26.63	41.87	35.87	54.00	18.13
11510	29.78	PK	V	37.90	9.86	26.12	51.42	45.42	68.20	22.78
11510	16.92	AV	V	37.90	9.86	26.12	38.56	32.56	54.00	21.44
17265	30.63	PK	V	41.09	13.86	25.63	59.95	53.95	68.20	14.25
17265	18.93	AV	V	41.09	13.86	25.63	48.25	42.25	54.00	11.75
1886.34	32.35	PK	V	24.37	3.65	27.51	32.86	26.86	74.00	47.14
1886.34	20.06	AV	V	24.37	3.65	27.51	20.57	14.57	54.00	39.43
7490	31.07	PK	V	34.78	7.60	26.11	47.34	41.34	68.20	26.86
7490	18.89	AV	V	34.78	7.60	26.11	35.16	29.16	54.00	24.84
446	40.80	QP	V	17.06	2.55	21.89	38.52	/	46.00	7.48
Middle Channel:5795 MHz										
5795	86.78	PK	H	32.16	6.13	26.55	98.52	92.52	N/A	N/A
5795	75.32	AV	H	32.16	6.13	26.55	87.06	81.06	N/A	N/A
5795	94.91	PK	V	32.16	6.13	26.55	106.65	100.65	N/A	N/A
5795	82.29	AV	V	32.16	6.13	26.55	94.03	88.03	N/A	N/A
5850	40.28	PK	V	32.17	6.34	26.68	52.11	46.11	78.20	32.09
5850	28.63	AV	V	32.17	6.34	26.68	40.46	34.46	54.00	19.54
11590	29.47	PK	V	37.90	9.73	26.06	51.04	45.04	68.20	23.16
11590	17.98	AV	V	37.90	9.73	26.06	39.55	33.55	54.00	20.45
17385	30.90	PK	V	41.81	13.21	25.63	60.29	54.29	68.20	13.91
17385	18.92	AV	V	41.81	13.21	25.63	48.31	42.31	54.00	11.69
1886.34	32.18	PK	V	24.37	3.65	27.51	32.69	26.69	74.00	47.31
1886.34	19.67	AV	V	24.37	3.65	27.51	20.18	14.18	54.00	39.82
7490	31.40	PK	V	34.78	7.60	26.11	47.67	41.67	68.20	26.53
7490	18.96	AV	V	34.78	7.60	26.11	35.23	29.23	54.00	24.77
446	40.60	QP	V	17.06	2.55	21.89	38.32		46.00	7.68

Conducted Spurious Emission at Antenna Port

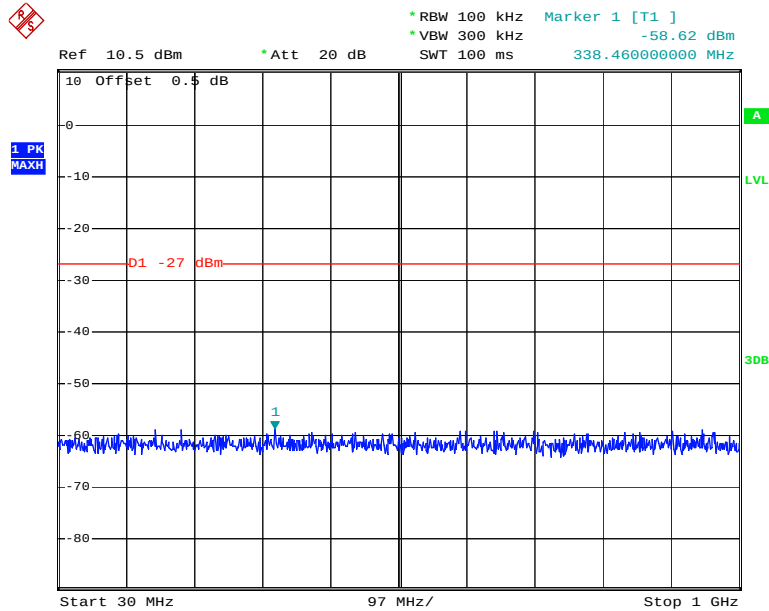
Please refer to the following table and plots:

Band	Channel (MHz)	Conducted Spurious Emissions (dBm/MHz)					Result
		Chain 0	Chain 1	Directional gain (dB)	Total	Limits	
5150-5250 MHz	5190	-38.09	-36.91	5	-29.45	-27	PASS
	5230	-38.92	-39.15	5	-31.02	-27	PASS
5725-5850 MHz	5755	-38.54	-38.40	5	-30.46	-27	PASS
	5795	-37.74	-38.77	5	-30.21	-27	PASS

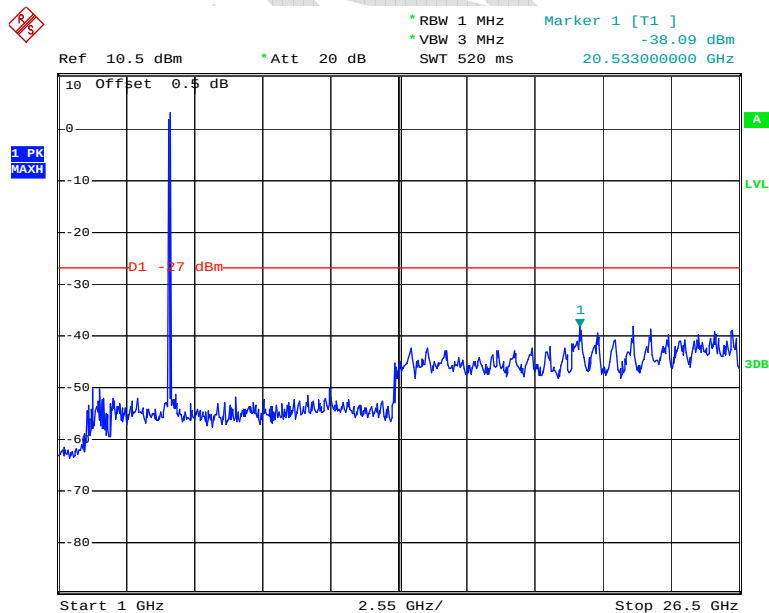
Note1: Directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi ($G_{ANT} = 2$ dBi, $N_{ANT}=2$).

Note2: the transmitting duty cycle is 100%

5150-5250MHz band:

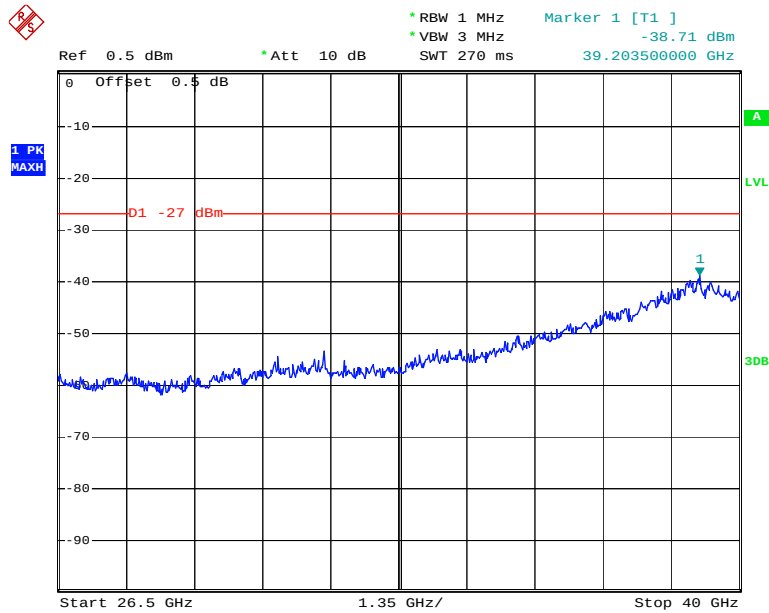
Chain 0: 5190MHz, 30MHz-1GHz

Date: 27.JUN.2014 04:22:39

Chain 0: 5190MHz, 1GHz-26.5GHz

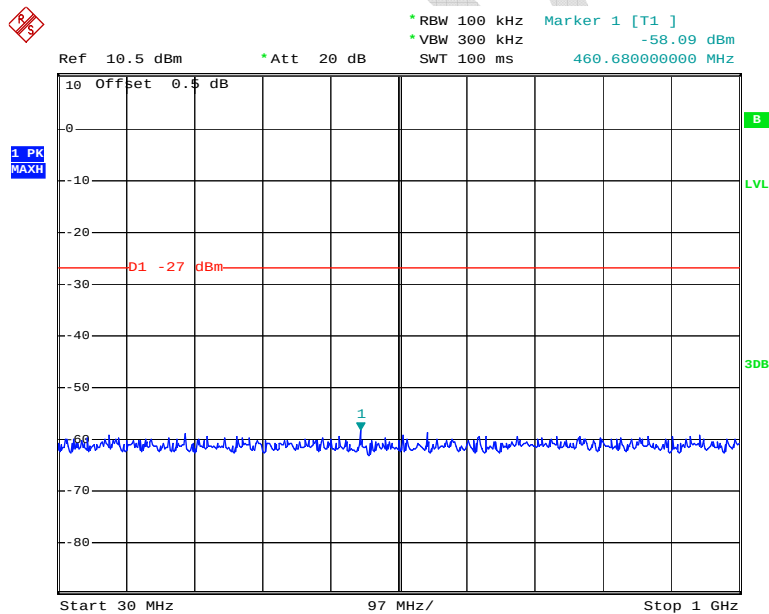
Date: 27.JUN.2014 04:22:26

Chain 0: 5190MHz, 26.5GHz-40GHz



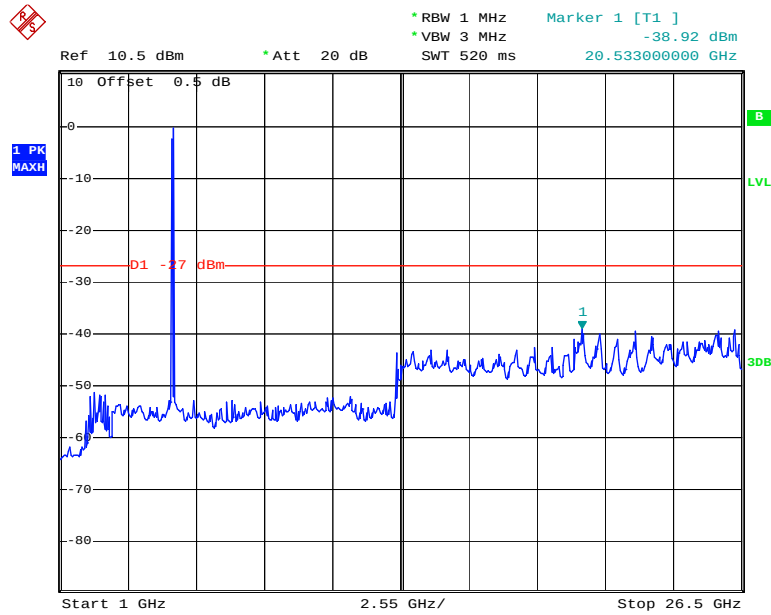
Date: 27.JUN.2014 04:21:13

Chain 0: 5230MHz, 30MHz-1GHz



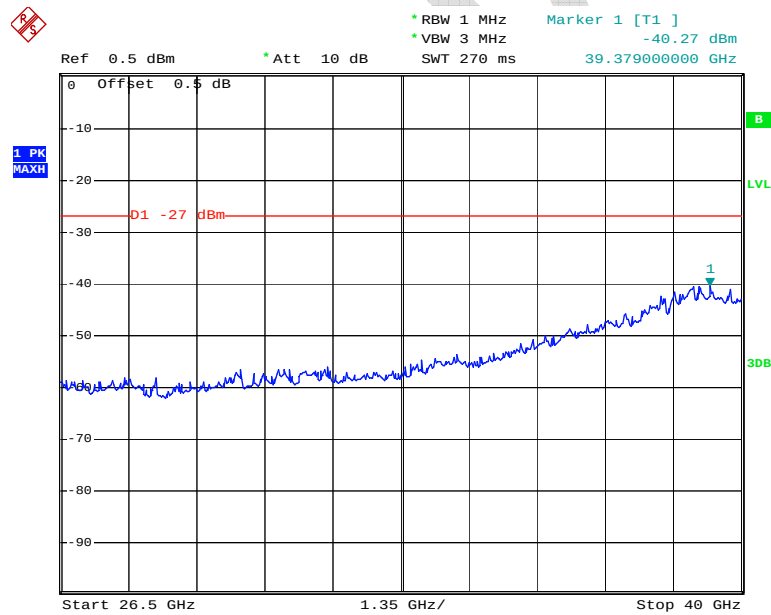
Date: 27.JUN.2014 04:33:11

Chain 0: 5230MHz, 1GHz-26.5GHz



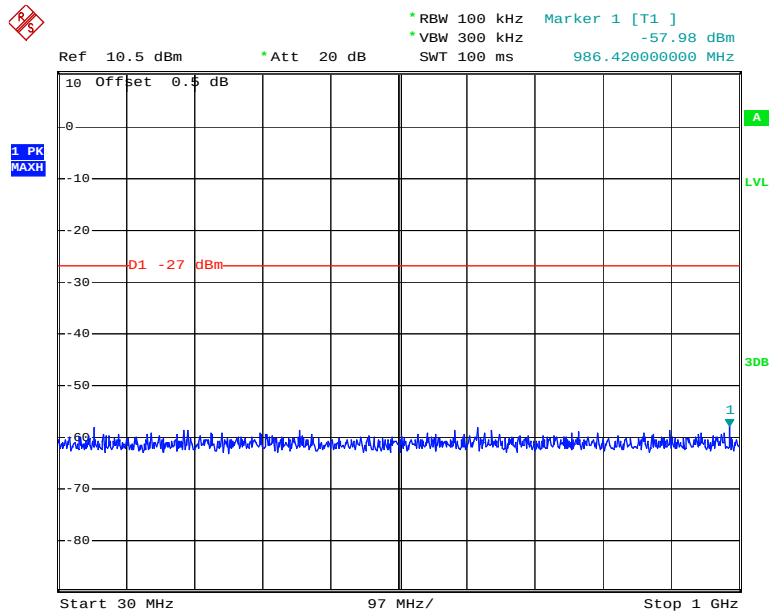
Date: 27.JUN.2014 04:33:42

Chain 0: 5230MHz, 26.5GHz-40GHz



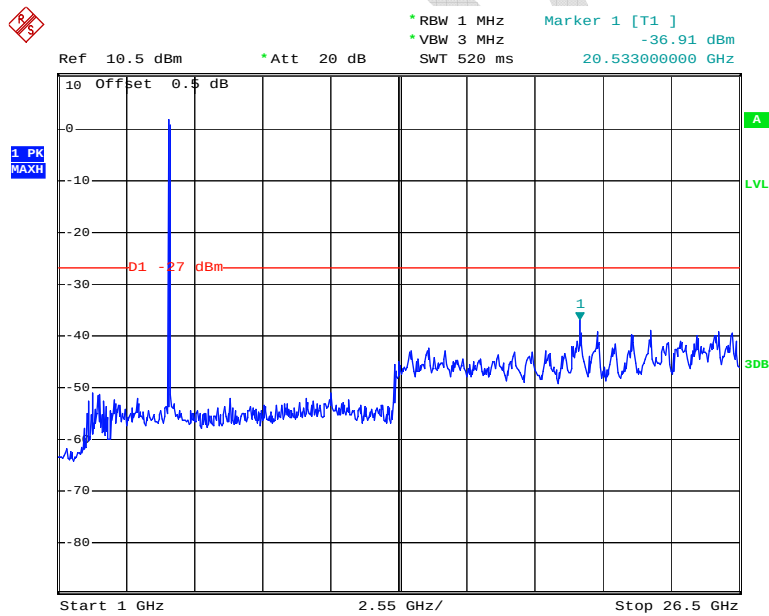
Date: 27.JUN.2014 04:33:58

Chain 1: 5190MHz, 30MHz-1GHz



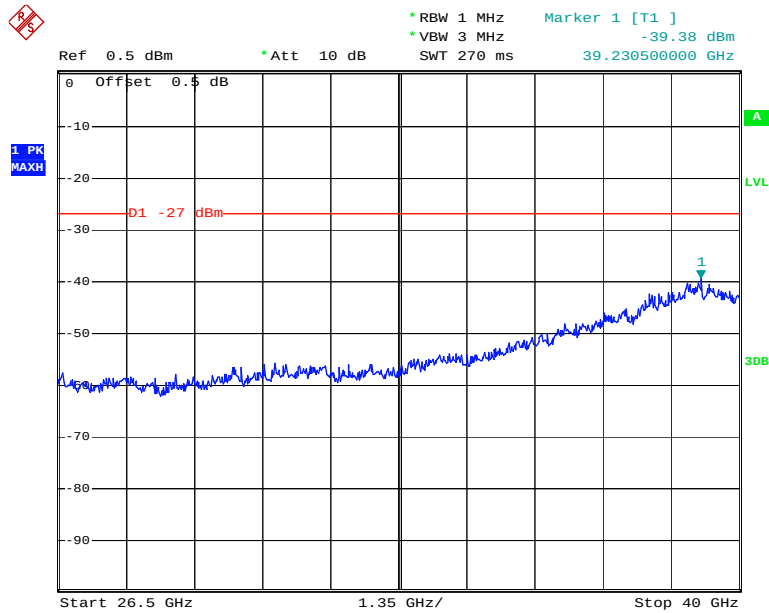
Date: 27.JUN.2014 04:19:57

Chain 1: 5190MHz, 1GHz-26.5GHz



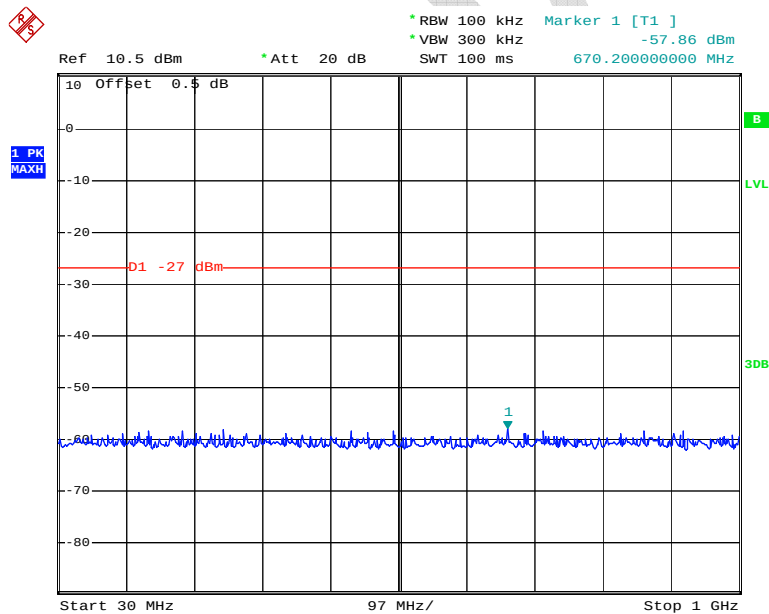
Date: 27.JUN.2014 04:20:21

Chain 1: 5190MHz, 26.5GHz-40GHz



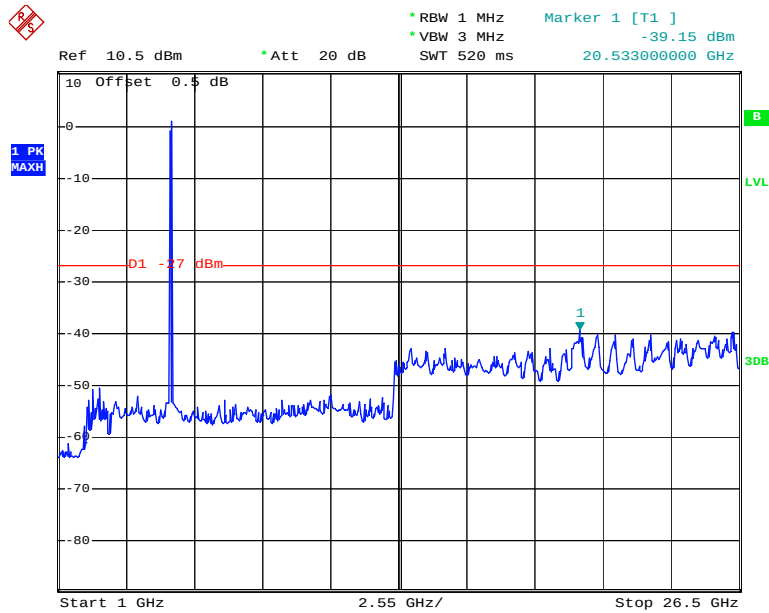
Date: 27.JUN.2014 04:20:46

Chain 1: 5230MHz, 30MHz-1GHz



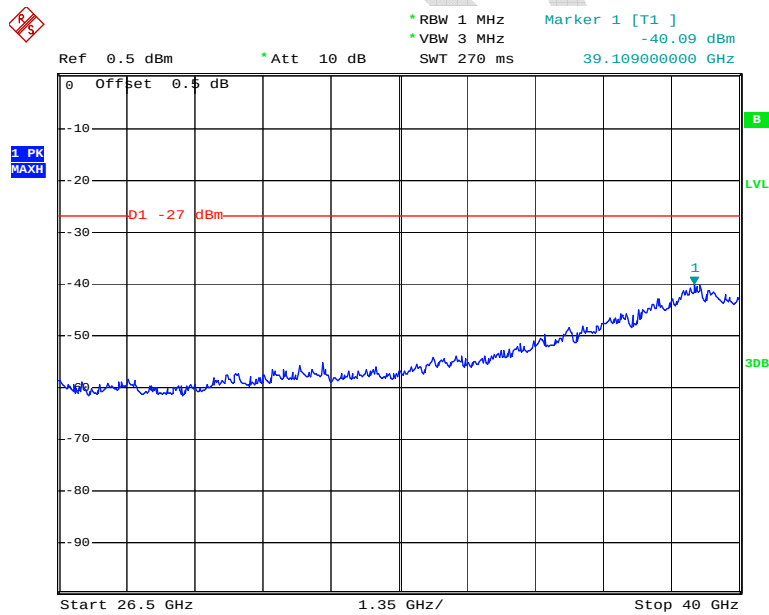
Date: 27.JUN.2014 04:38:00

Chain 1: 5230MHz, 1GHz-26.5GHz



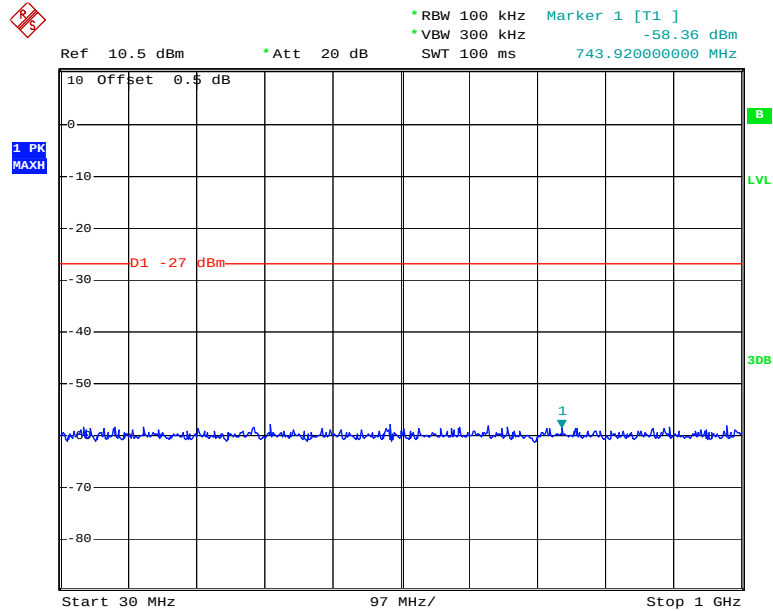
Date: 27.JUN.2014 04:38:17

Chain 1: 5230MHz, 26.5GHz-40GHz

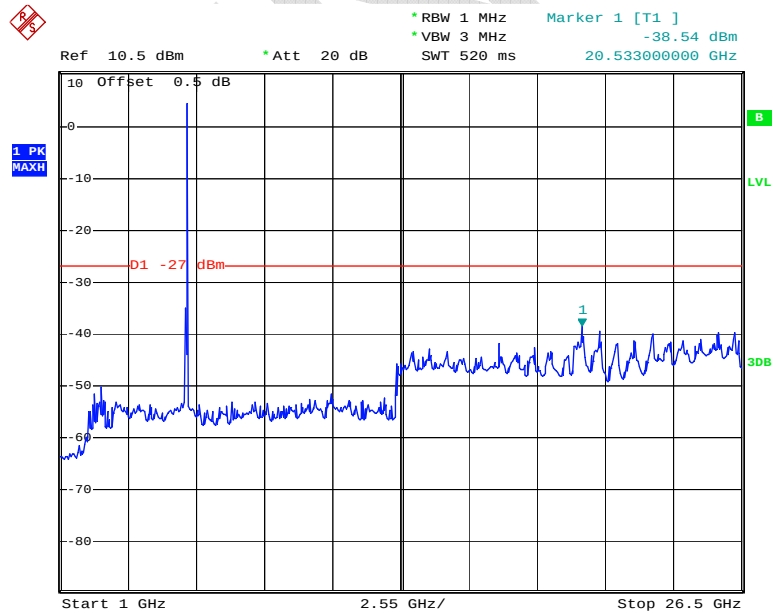


Date: 27.JUN.2014 04:38:33

5725-5850MHz band:

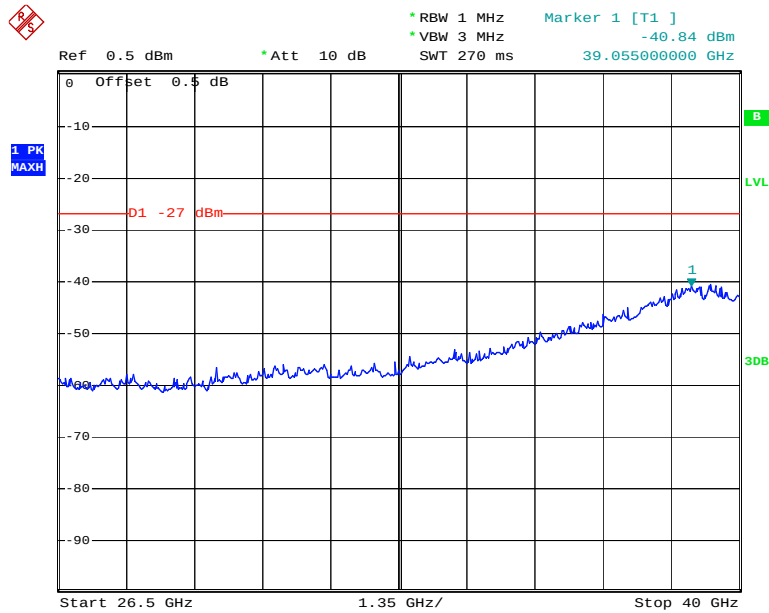
Chain 0: 5755MHz, 30MHz-1GHz

Date: 27.JUN.2014 05:10:35

Chain 0: 5755MHz, 1GHz-26.5GHz

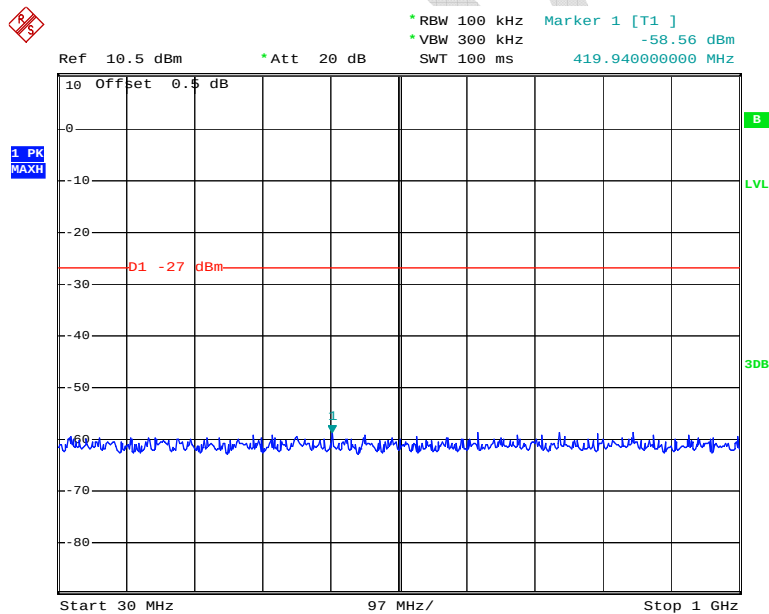
Date: 27.JUN.2014 05:10:52

Chain 0: 5755MHz, 26.5GHz-40GHz



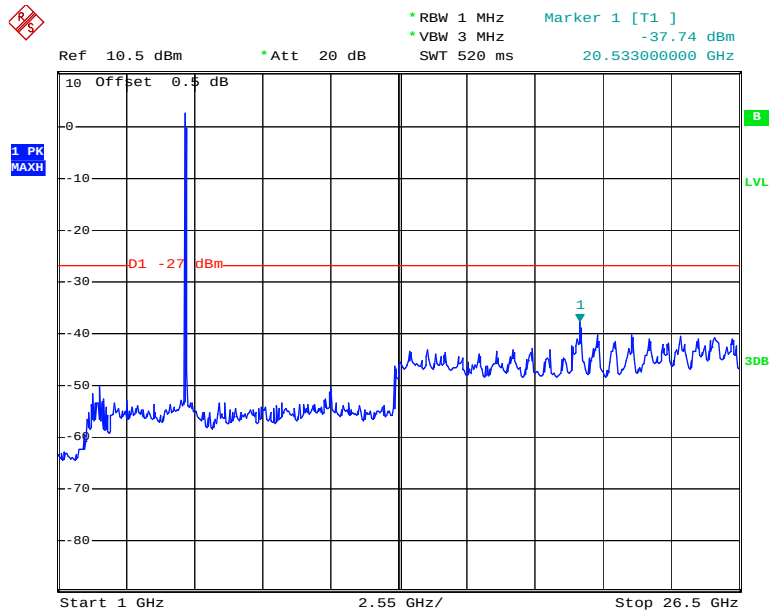
Date: 27.JUN.2014 05:13:18

Chain 0: 5795MHz, 30MHz-1GHz



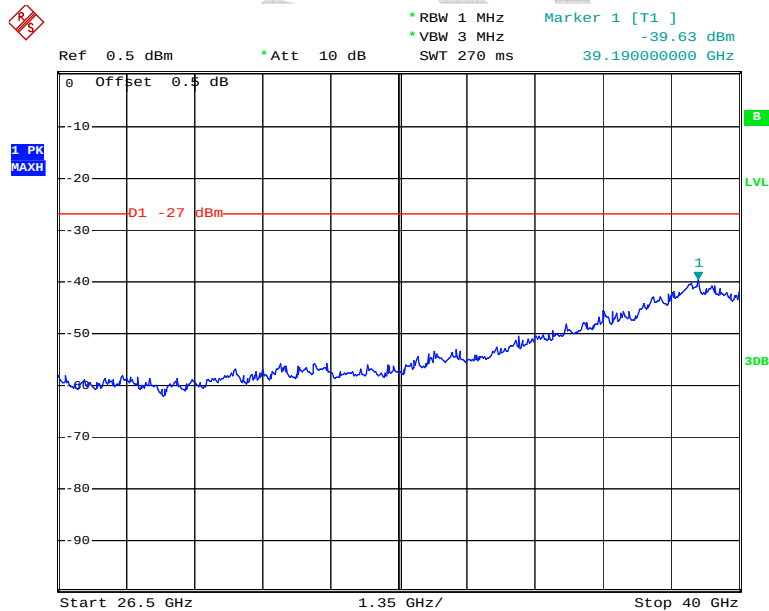
Date: 27.JUN.2014 05:30:52

Chain 0: 5795MHz, 1GHz-26.5GHz



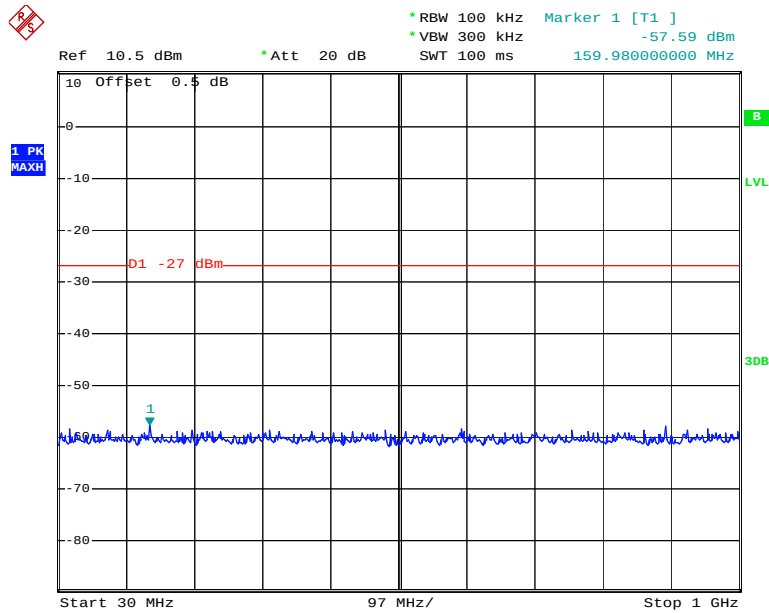
Date: 27.JUN.2014 05:30:40

Chain 0: 5795MHz, 26.5GHz-40GHz



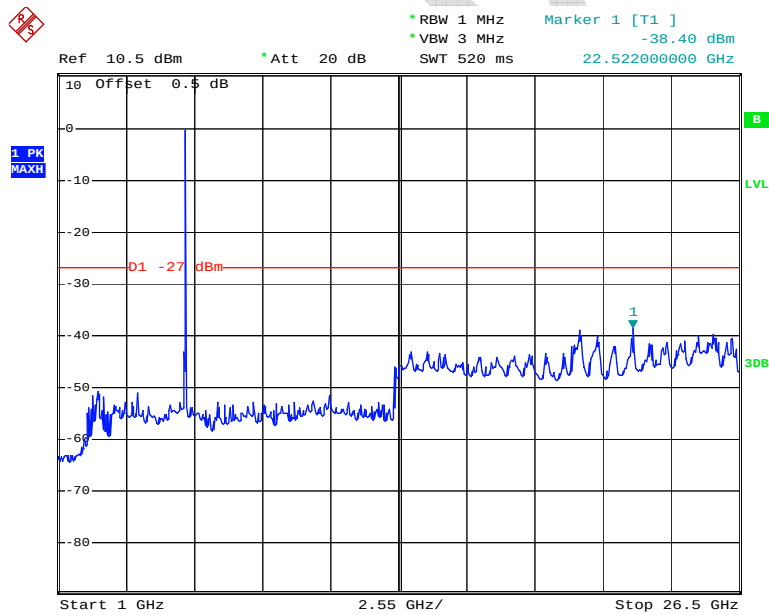
Date: 27.JUN.2014 05:33:47

Chain 1: 5755MHz, 30MHz-1GHz



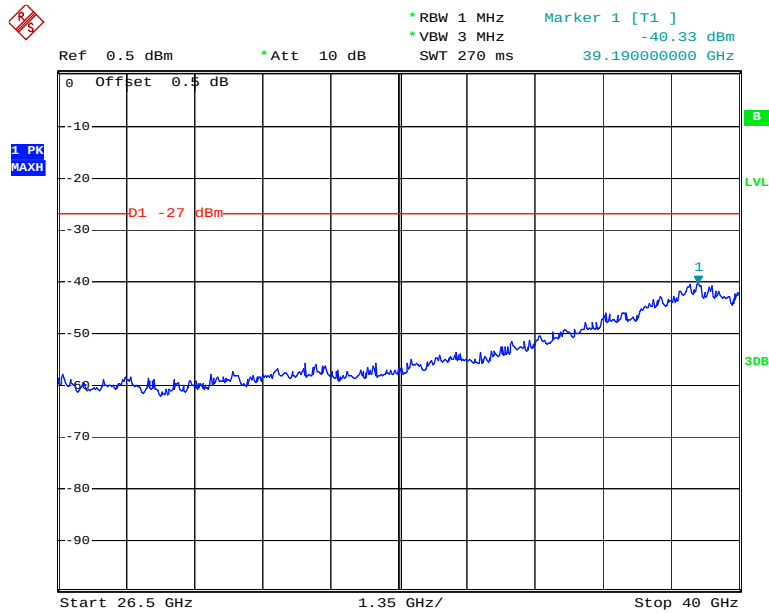
Date: 27.JUN.2014 05:21:24

Chain 1: 5755MHz, 1GHz-26.5GHz



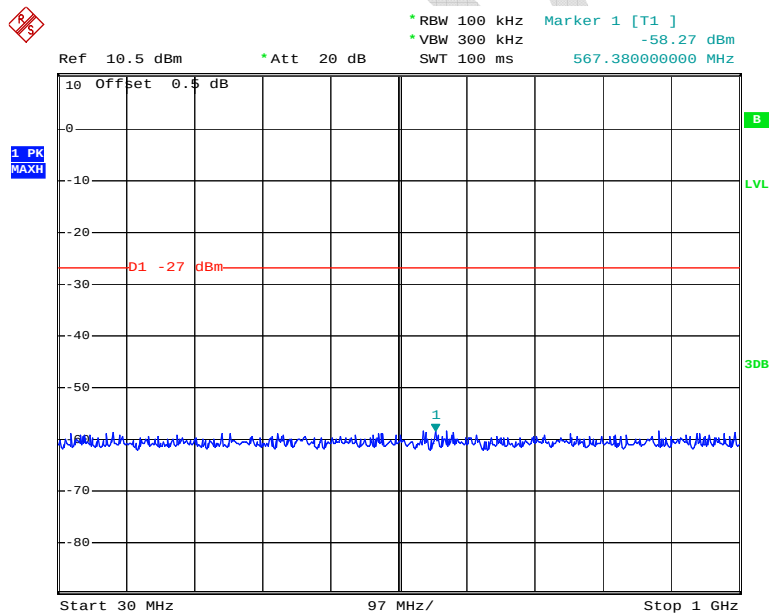
Date: 27.JUN.2014 05:21:40

Chain 1: 5755MHz, 26.5GHz-40GHz



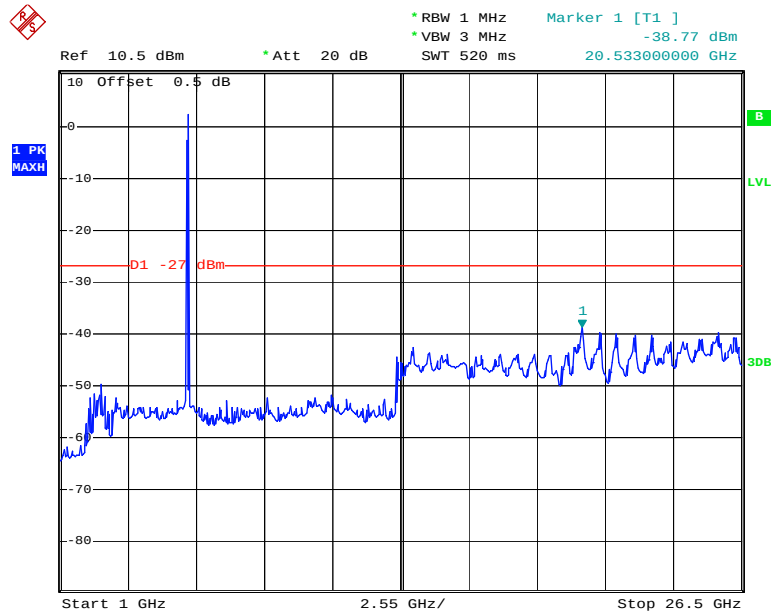
Date: 27.JUN.2014 05:22:56

Chain 1: 5795MHz, 30MHz-1GHz



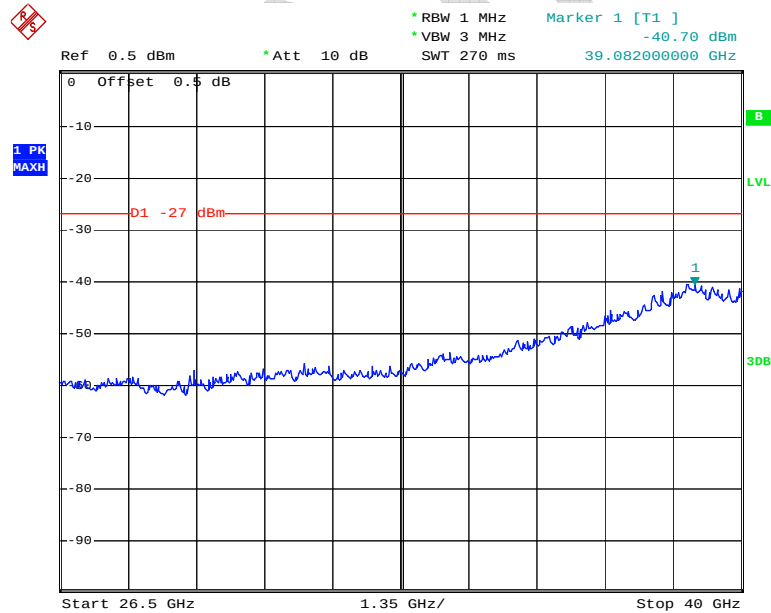
Date: 27.JUN.2014 05:40:23

Chain 1: 5795MHz, 1GHz-26.5GHz



Date: 27.JUN.2014 05:40:36

Chain 1: 5795MHz, 26.5GHz-40GHz



Date: 27.JUN.2014 05:41:40

FCC §15.407(b) (1) (4) –BAND EDGE**Applicable Standard**

FCC §15.407 (b) (1) (4),

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 EIRP of -27dBm/MHz

For transmitters operating in the 5.725–5.850 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 EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibration 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 1 MHz and VBW to 3MHz of spectrum analyzer. Offset the antenna gain and cable loss.
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	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:	27.5 °C
Relative Humidity:	60 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-06-27.

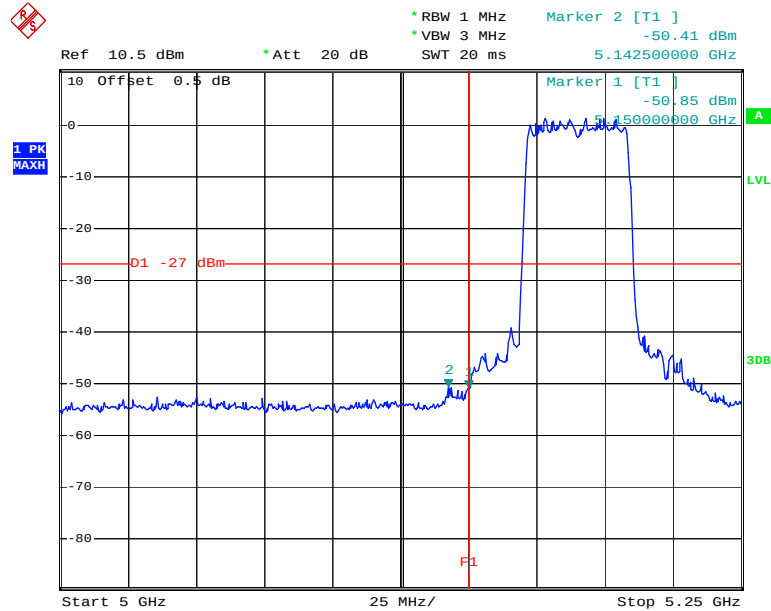
Please refer to the following table and plots.

Band	Channel (MHz)	Conducted Spurious Emissions (dBm/MHz)					Result
		Chain 0	Chain 1	Directional gain (dB)	Total	Limits	
5150-5250MHz	5190	-50.41	-49.74	5	-42.25	-27	PASS
	5230	-51.86	-52.77	5	-44.28	-27	PASS
5725-5850MHz	5755	-38.25	-39.00	5	-30.75	-17	PASS
	5795	-46.20	-45.99	5	-39.3	-17	PASS

Note: Directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi ($G_{ANT} = 2$ dBi, $N_{ANT}=2$).

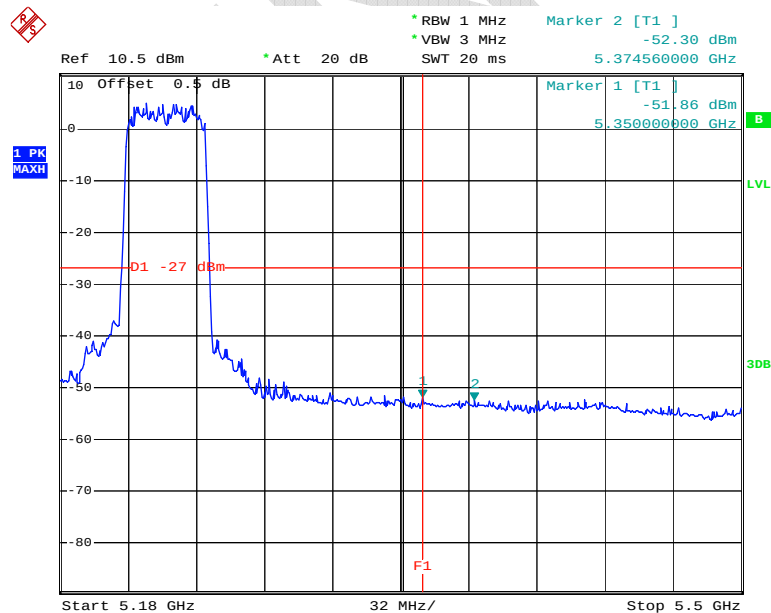
5150-5250MHz band:

Chain 0: Band Edge, Left Side



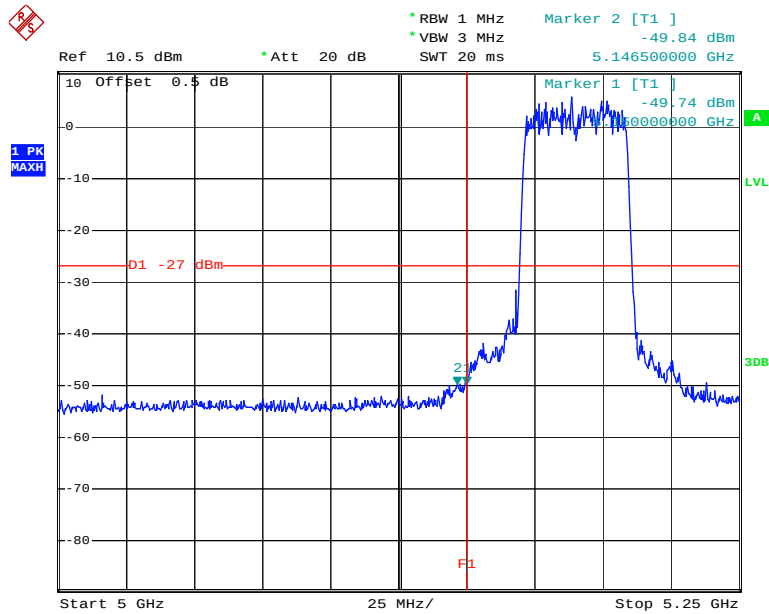
Date: 27.JUN.2014 15:21:52

Chain 0: Band Edge, Right Side



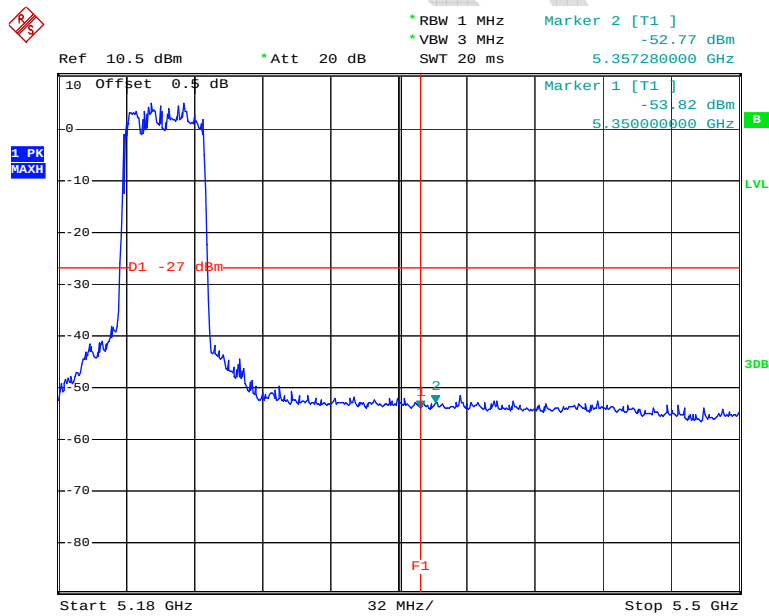
Date: 27.JUN.2014 04:32:55

Chain 1: Band Edge, Left Side



Date: 27.JUN.2014 04:19:39

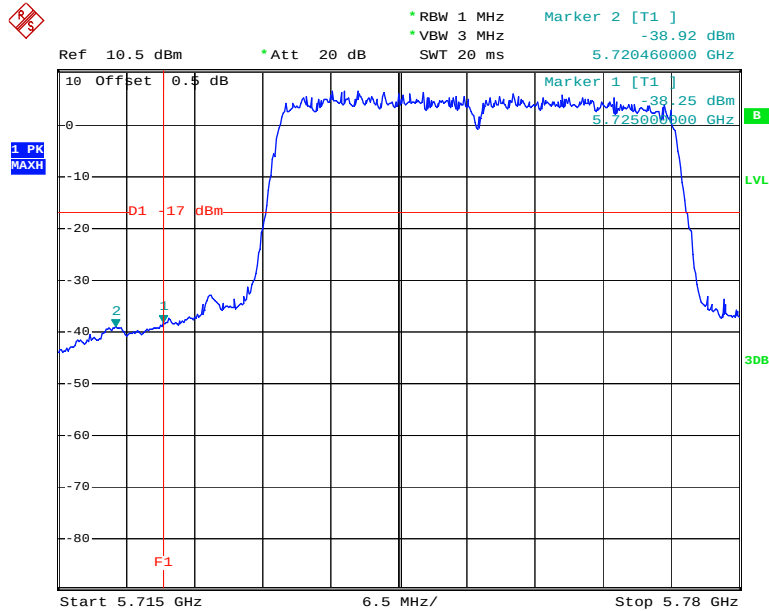
Chain 1: Band Edge, Right Side



Date: 27.JUN.2014 04:37:23

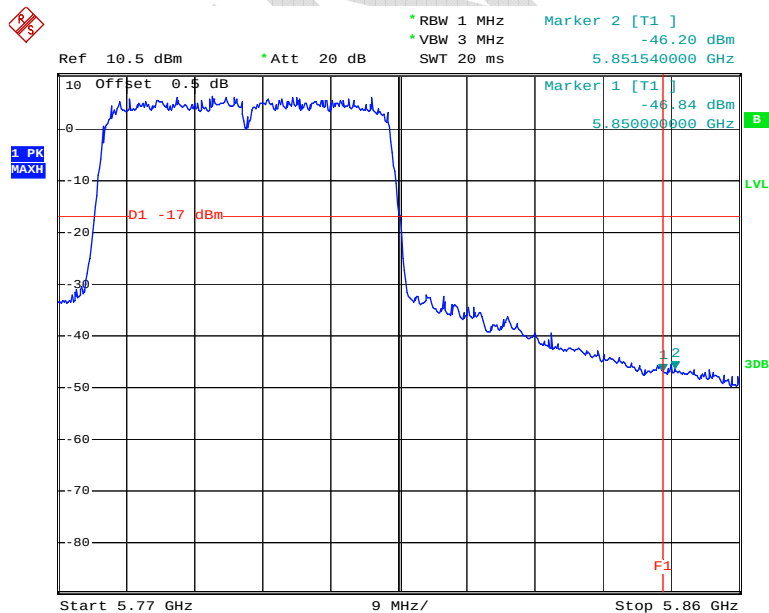
5725-5850 MHz band:

Chain 0: Band Edge, Left Side



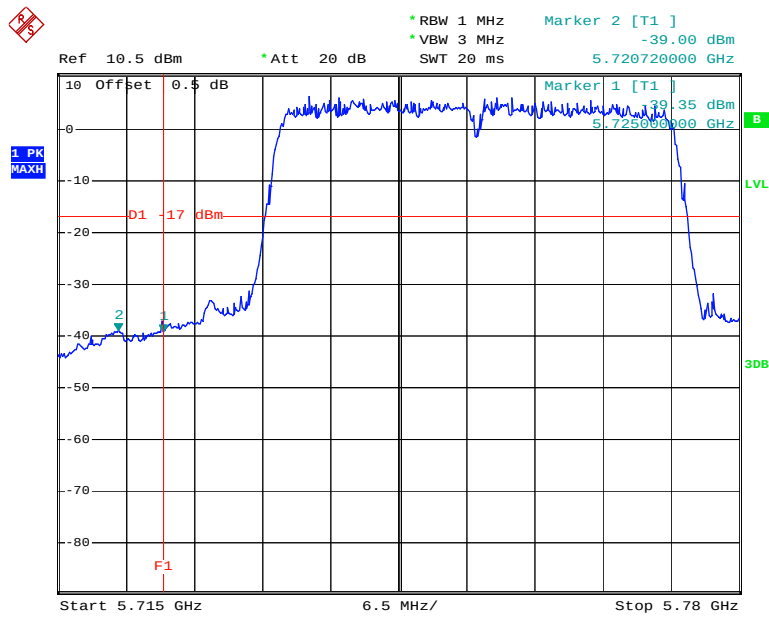
Date: 27.JUN.2014 05:12:01

Chain 0: Band Edge, Right Side



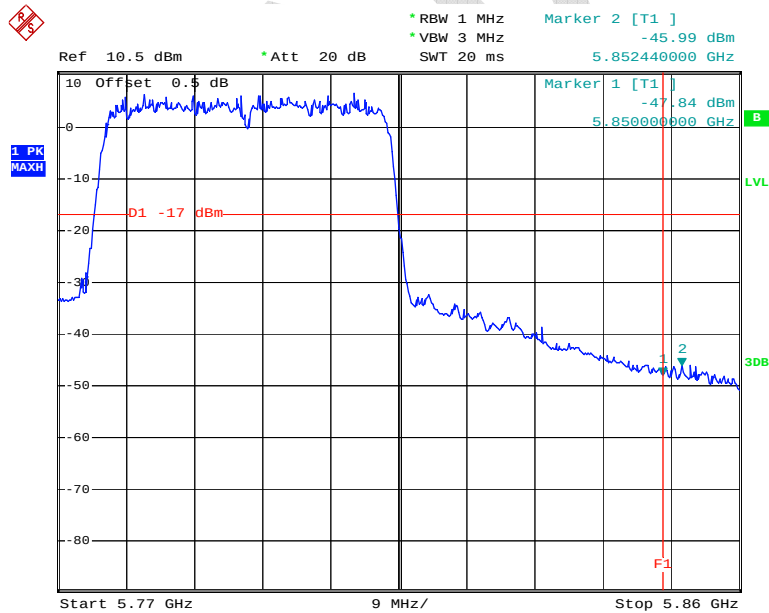
Date: 27.JUN.2014 05:33:23

Chain 1: Band Edge, Left Side



Date: 27.JUN.2014 05:22:32

Chain 1: Band Edge, Right Side



Date: 27.JUN.2014 05:41:13

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

Applicable Standard

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

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:	27.5 °C
Relative Humidity:	60 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-06-27.

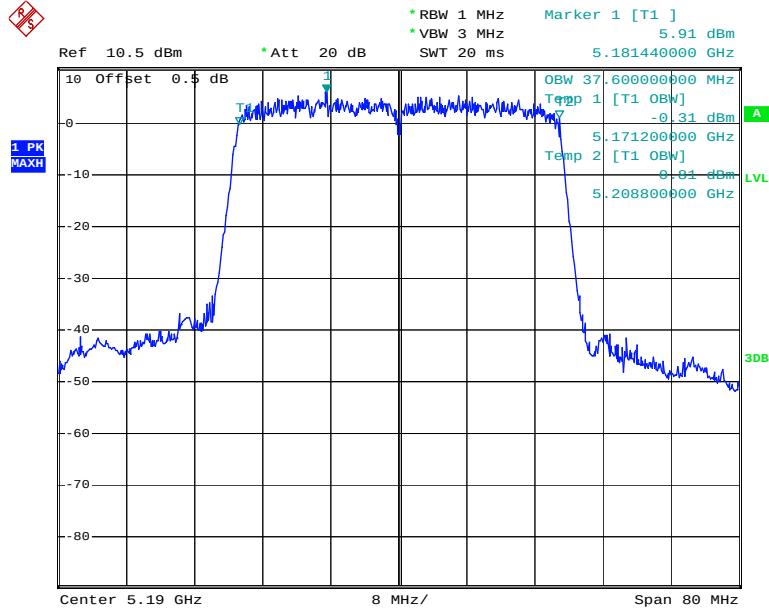
Test Result: Pass.

Please refer to the following tables and plots.

Band	Channel (MHz)	Emission Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 0	Chain 1	Chain 0	Chain 1
5150-5250MHz	5190	36.8	36.8	37.6	37.6
	5230	36	36	37.6	37.76
5725-5850MHz	5755	39.12	39.2	37.6	37.6
	5795	39.28	39.36	37.68	37.6

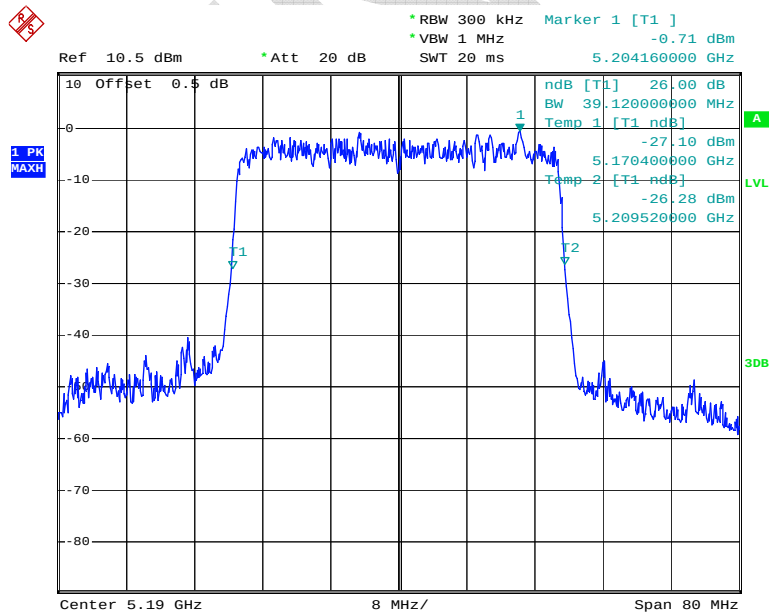
5150-5250MHz band:

Chain 0: 5190MHz, Occupied Bandwidth



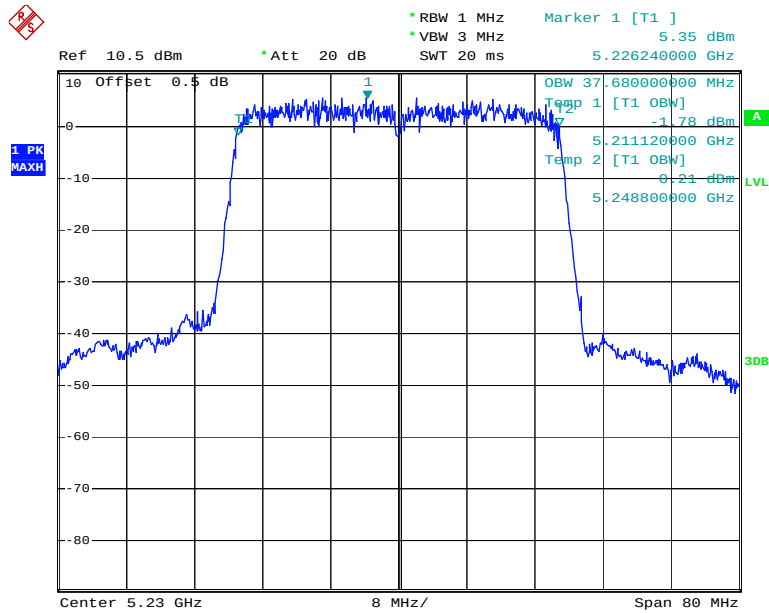
Date: 27.JUN.2014 03:31:55

Chain 0: 5190MHz, Emission Bandwidth



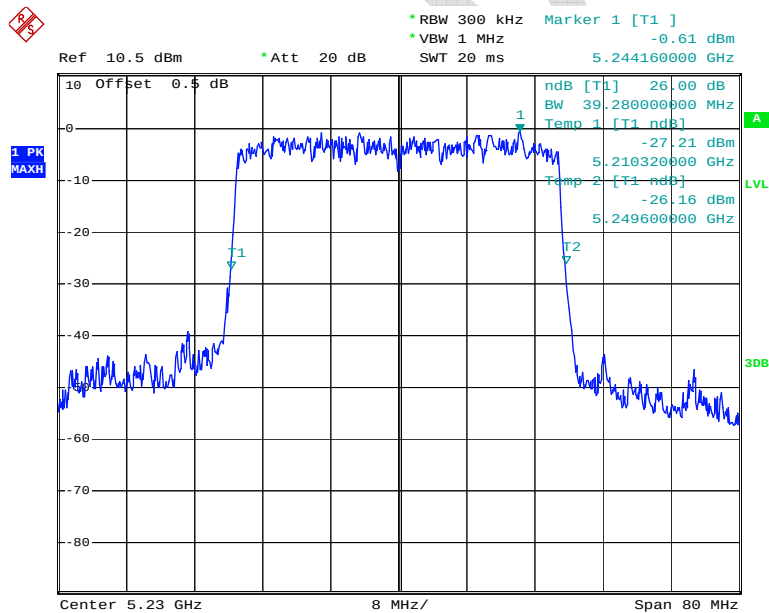
Date: 27.JUN.2014 03:31:07

Chain 0: 5230MHz, Occupied Bandwidth



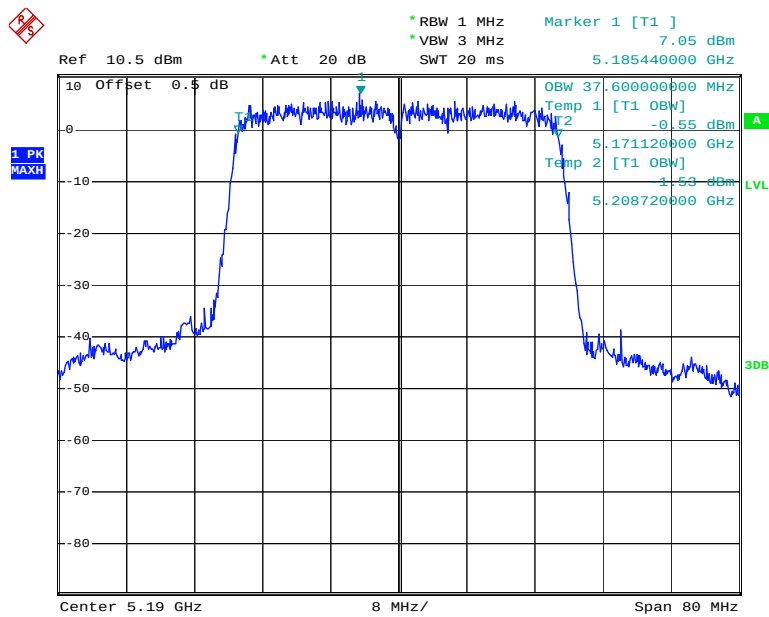
Date: 27.JUN.2014 04:26:09

Chain 0: 5230MHz, Emission Bandwidth



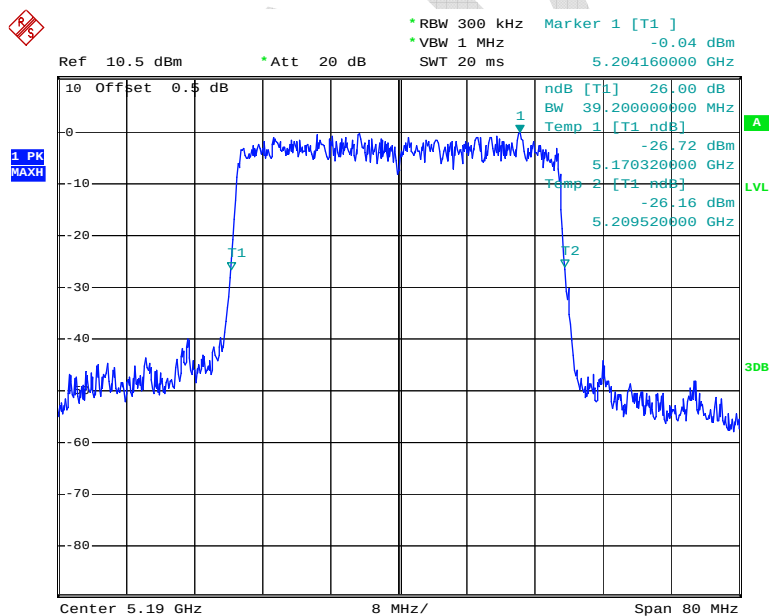
Date: 27.JUN.2014 04:25:07

Chain 1: 5190MHz, Occupied Bandwidth



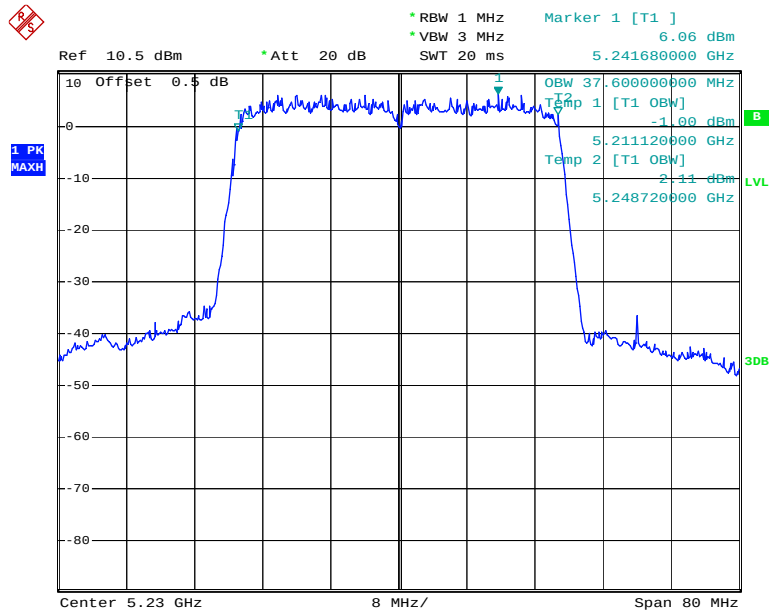
Date: 27.JUN.2014 04:17:01

Chain 1: 5190MHz, Emission Bandwidth



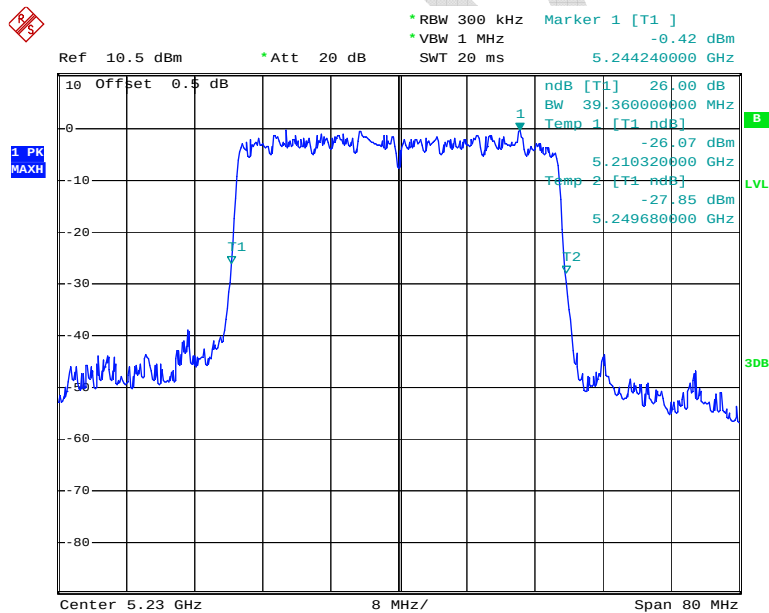
Date: 27.JUN.2014 04:16:14

Chain 1: 5230MHz, Occupied Bandwidth



Date: 27.JUN.2014 04:35:18

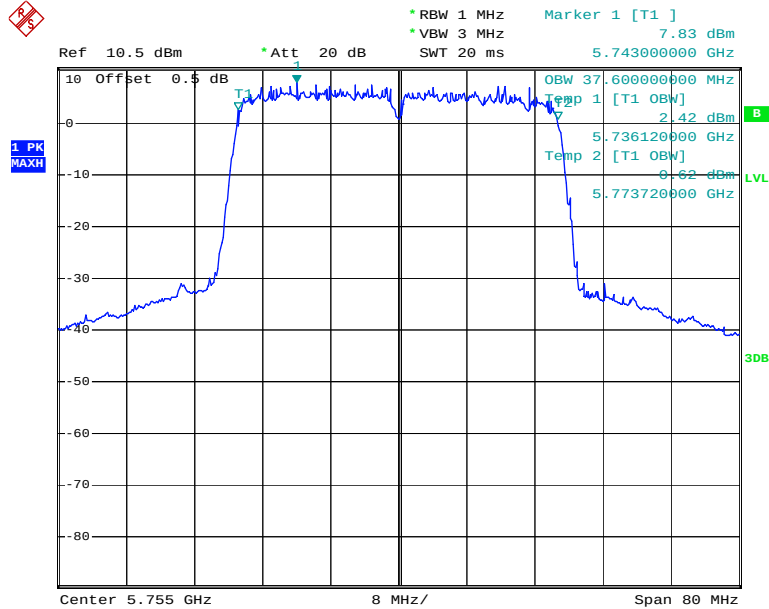
Chain 1: 5230MHz, Emission Bandwidth



Date: 27.JUN.2014 04:35:55

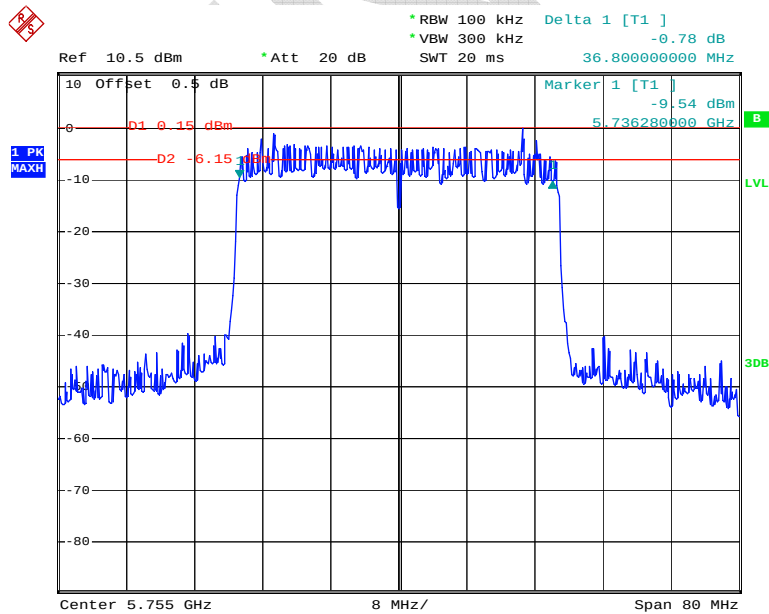
5725-5850 MHz, band:

Chain 0: 5755MHz, Occupied Bandwidth



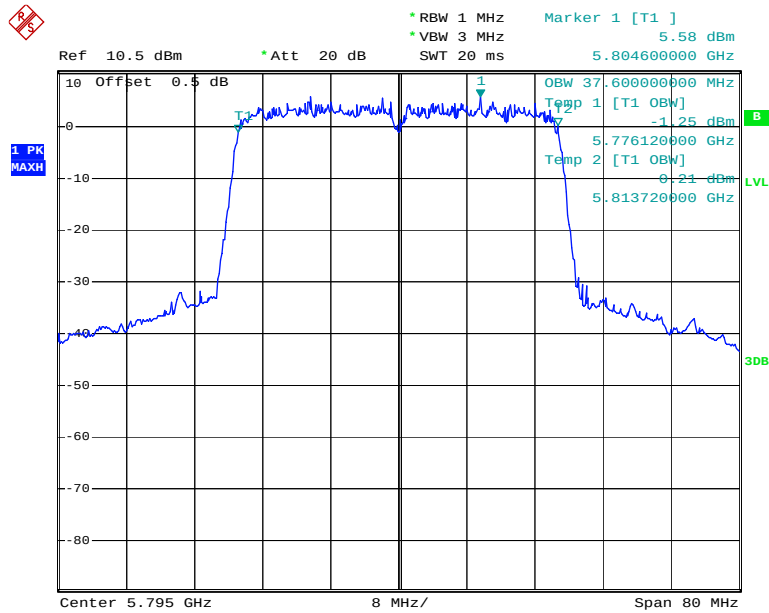
Date: 27.JUN.2014 04:58:37

Chain 0: 5755MHz, Emission Bandwidth



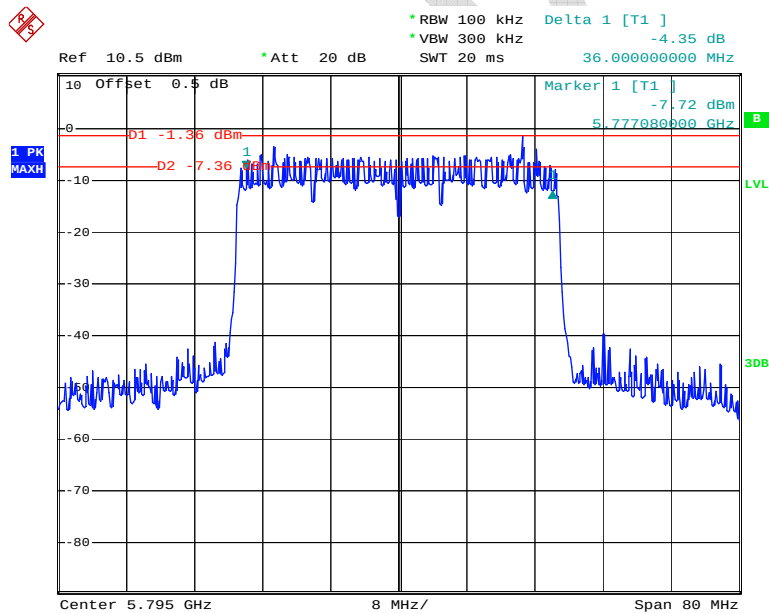
Date: 27.JUN.2014 05:00:14

Chain 0: 5795MHz, Occupied Bandwidth



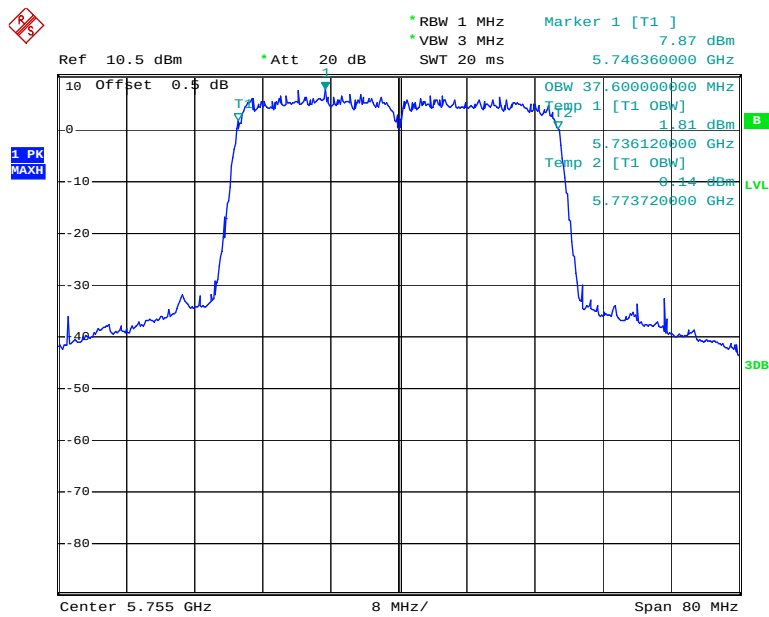
Date: 27.JUN.2014 05:24:01

Chain 0: 5795MHz, Emission Bandwidth



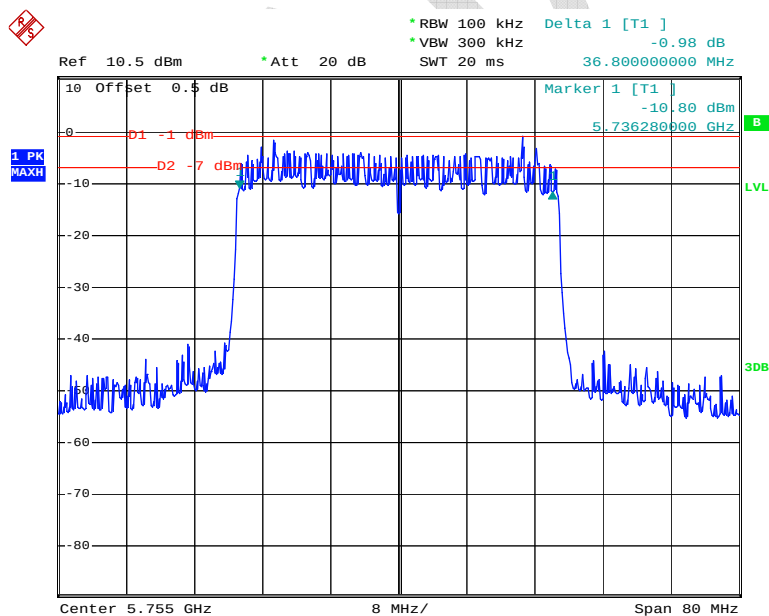
Date: 27.JUN.2014 05:26:07

Chain 1: 5755MHz, Occupied Bandwidth



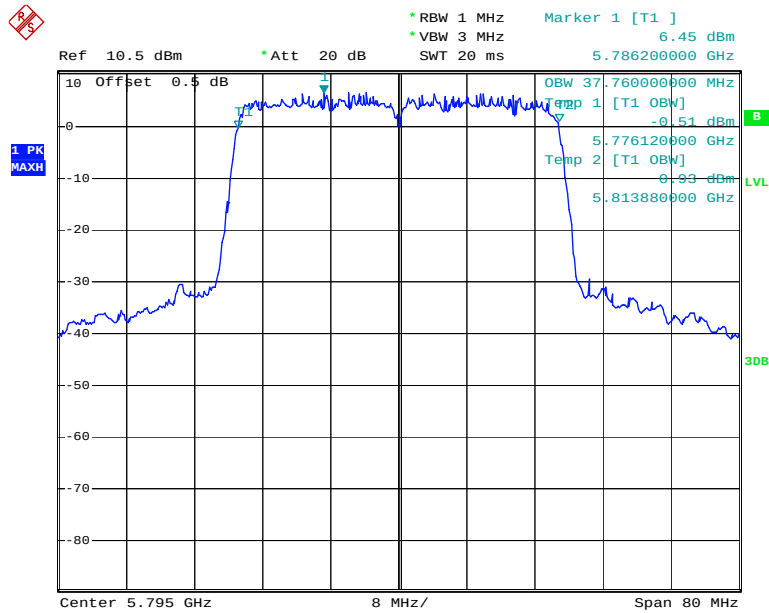
Date: 27.JUN.2014 05:16:35

Chain 1: 5755MHz, Emission Bandwidth



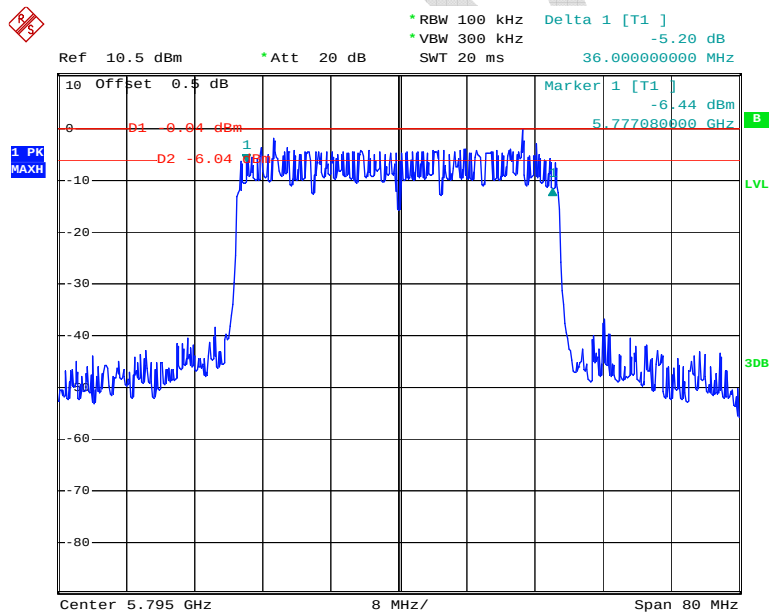
Date: 27.JUN.2014 05:17:19

Chain 1: 5795MHz, Occupied Bandwidth



Date: 27.JUN.2014 05:34:58

Chain 1: 5795MHz, Emission Bandwidth



Date: 27.JUN.2014 05:36:14

FCC §15.407(a) (1) (3) – MAXIMUM CONDUCTED OUTPUT POWER**Applicable Standard**

For the band 5.15-5.25 GHz

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.

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 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:	27.5 °C
Relative Humidity:	60 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-06-27.

Test Mode: Transmitting

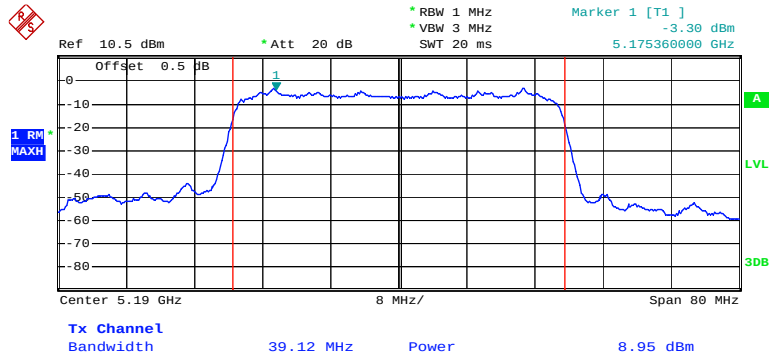
Band	Channel (MHz)	Maximum Conducted Output Power (dBm)				Result
		Chain0	Chain1	Chain0+1	Limit	
5150-5250MHz	5190	8.95	9.01	11.99	30	PASS
	5230	8.87	8.58	11.74	30	PASS
5725-5850MHz	5755	9.00	8.89	11.96	30	PASS
	5795	8.89	8.83	11.87	30	PASS

Note1: Directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi ($G_{ANT} = 2$ dBi, $N_{ANT}=2$).

Note2: the transmitting duty cycle is 100%.

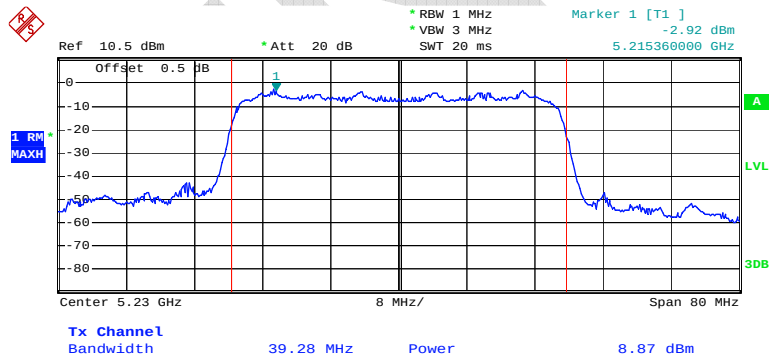
5150-5250MHz band:

Chain 0: RF Output Power, 5190MHz



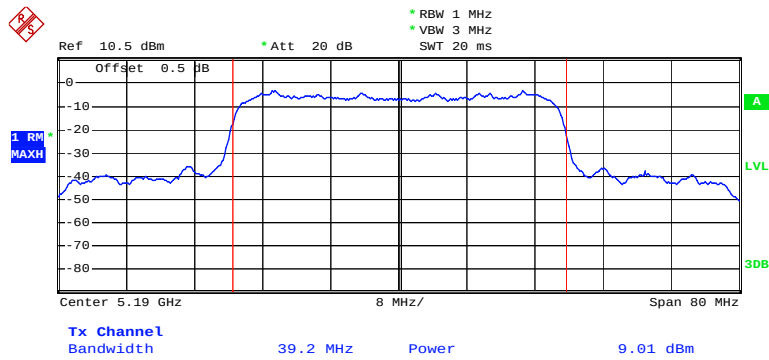
Date: 27.JUN.2014 03:36:44

Chain 0: RF Output Power, 5230MHz



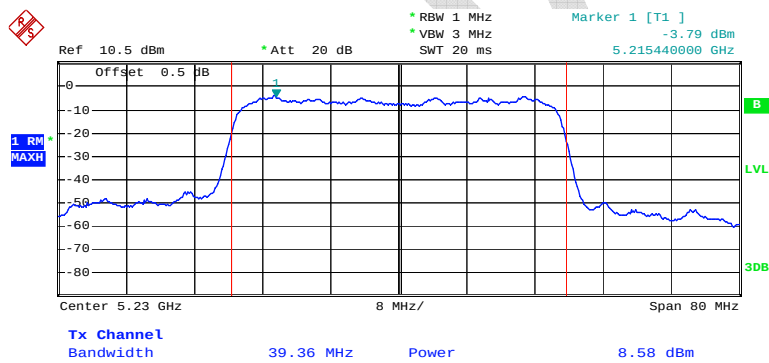
Date: 27.JUN.2014 04:26:44

Chain 1: RF Output Power, 5190MHz



Date: 27.JUN.2014 15:31:07

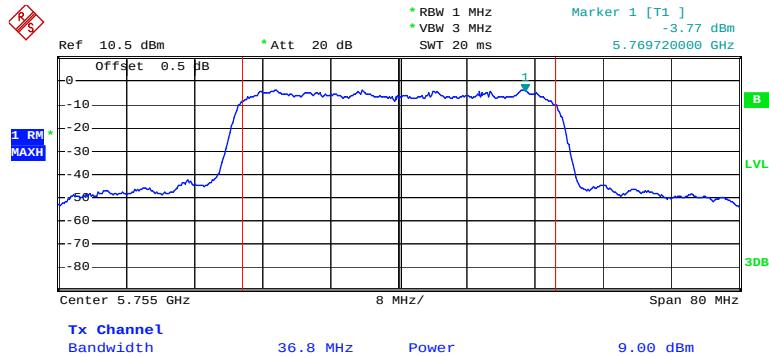
Chain 1: RF Output Power, 5230MHz



Date: 27.JUN.2014 04:36:27

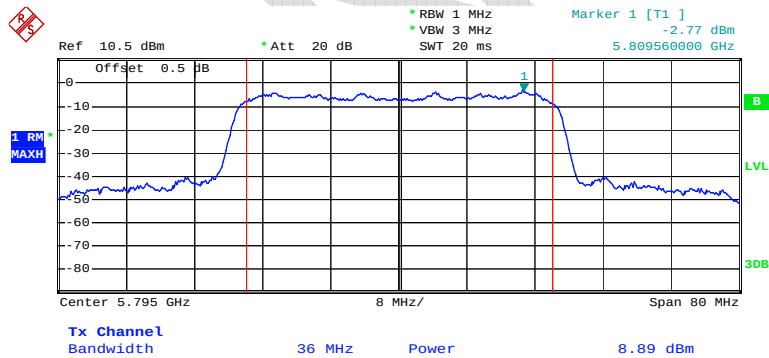
5725-5850MHz band:

Chain 0: RF Output Power, 5755MHz



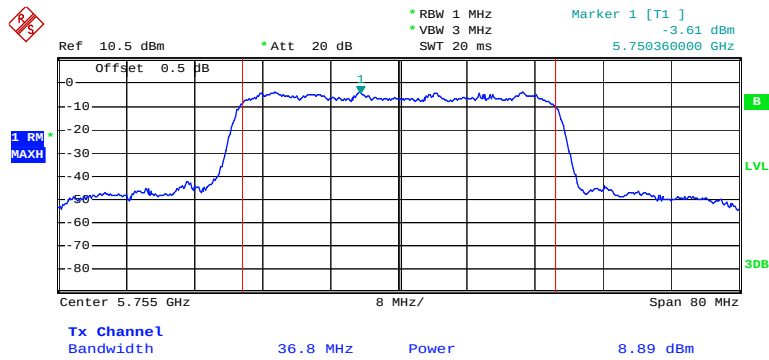
Date: 27.JUN.2014 05:07:47

Chain 0: RF Output Power, 5795MHz



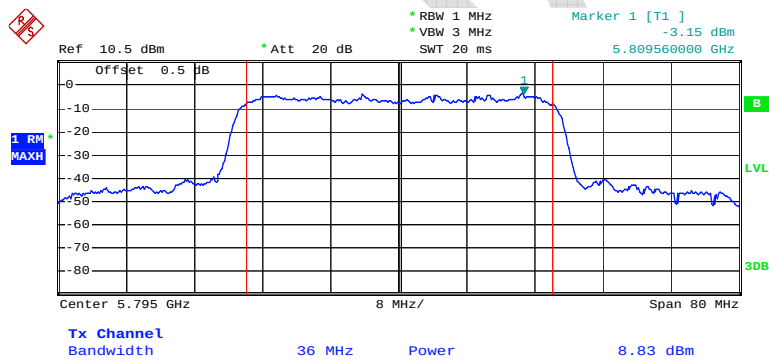
Date: 27.JUN.2014 05:28:54

Chain 1: RF Output Power, 5755MHz



Date: 27.JUN.2014 05:18:06

Chain 1: RF Output Power, 5795MHz



Date: 27.JUN.2014 05:39:20

FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY**Applicable Standard**

For the band 5.15-5.25 GHz

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.

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:	27.5 °C
Relative Humidity:	60 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-06-27.

Test Mode: Transmitting

Band	Channel	Power Spectral Density					Result
		Chain 0	Chain 1	Total	correction result	Limits	
5150-5250MHz	5190	-3.3	-2.74	0	/	17dBm/MHz	PASS
	5230	-4.22	-4.01	-1.1	/	17dBm/MHz	PASS
5725-5850MHz	5755	-7.41	-7.35	-4.37	2.62	30dBm/500kHz	PASS
	5795	-6.77	-7.08	-3.91	3.08	30dBm/500kHz	PASS

Note1: For the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz, but a narrower RBW (100 kHz) was used.

The correction factor should be added to the measured result

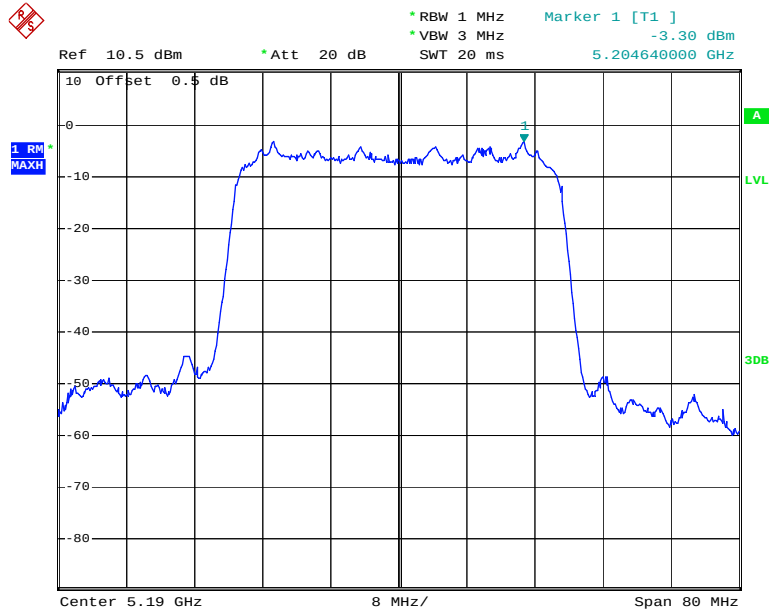
The correction factor = $10\log(500\text{kHz}/100\text{kHz}) = 6.99$

Note2: Directional gain = $G_{\text{ANT}} + 10\log(N_{\text{ANT}})$ dBi ($G_{\text{ANT}} = 2$ dBi, $N_{\text{ANT}}=2$).

Note3: the transmitting duty cycle is 100%.

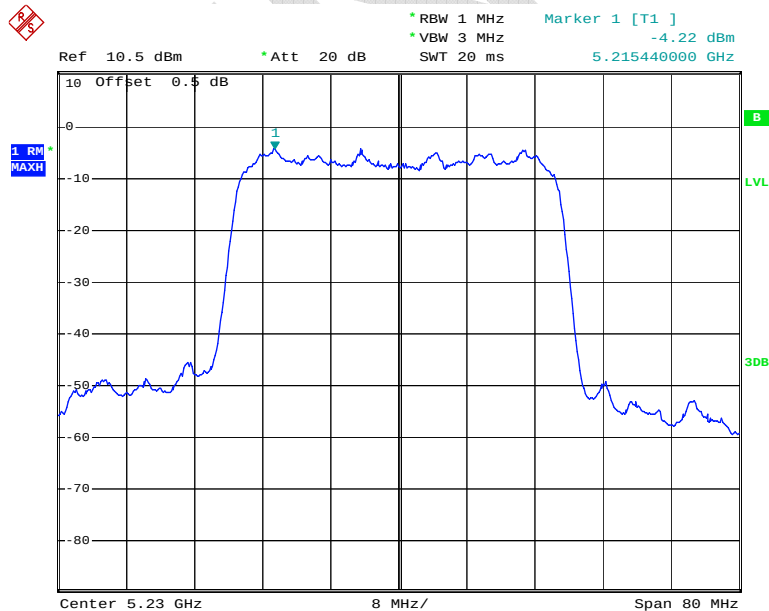
5150-5250MHz band:

Chain 0: Power Spectral Density, 5190MHz



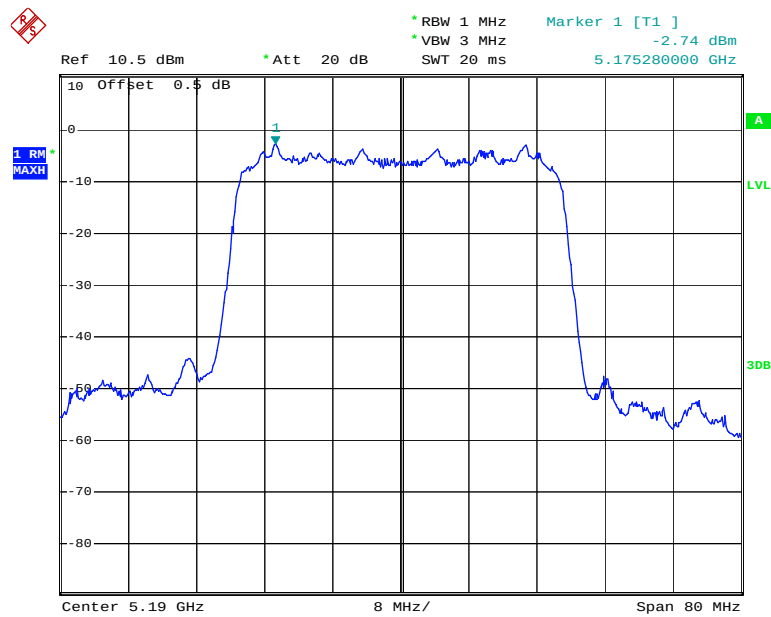
Date: 27.JUN.2014 03:39:07

Chain 0: Power Spectral Density, 5230MHz



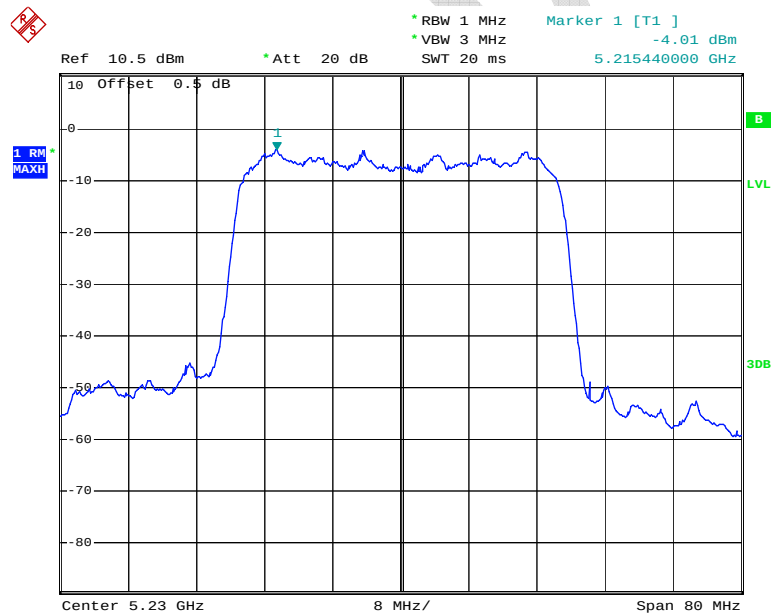
Date: 27.JUN.2014 04:28:42

Chain 1: Power Spectral Density, 5190MHz



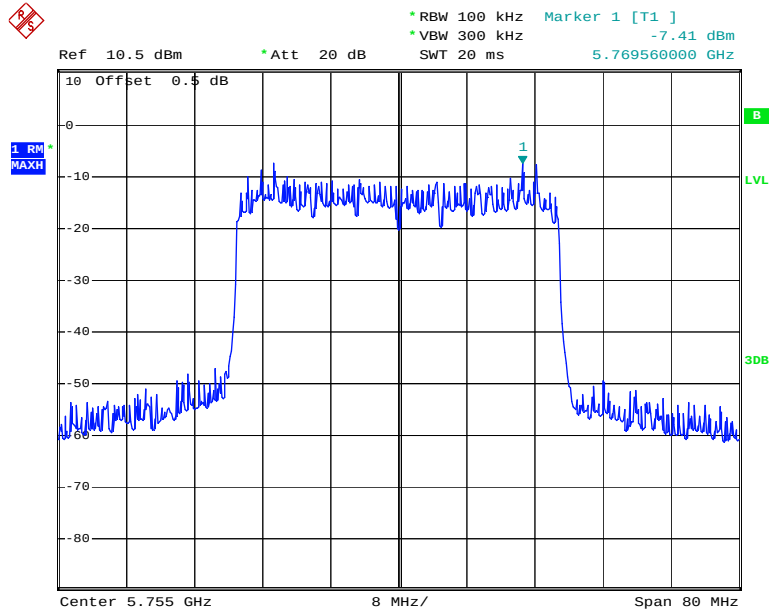
Date: 27.JUN.2014 04:18:42

Chain 1: Power Spectral Density, 5230MHz

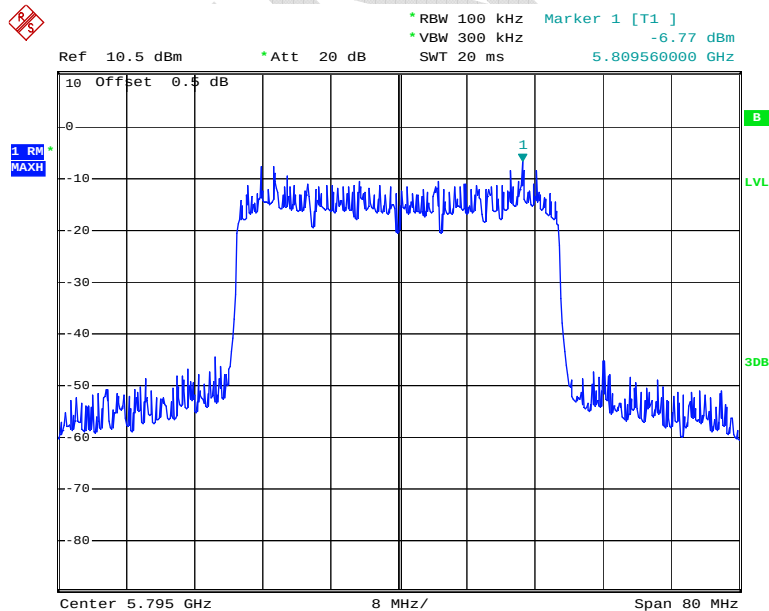


Date: 27.JUN.2014 04:36:50

5725-5850 MHz band:

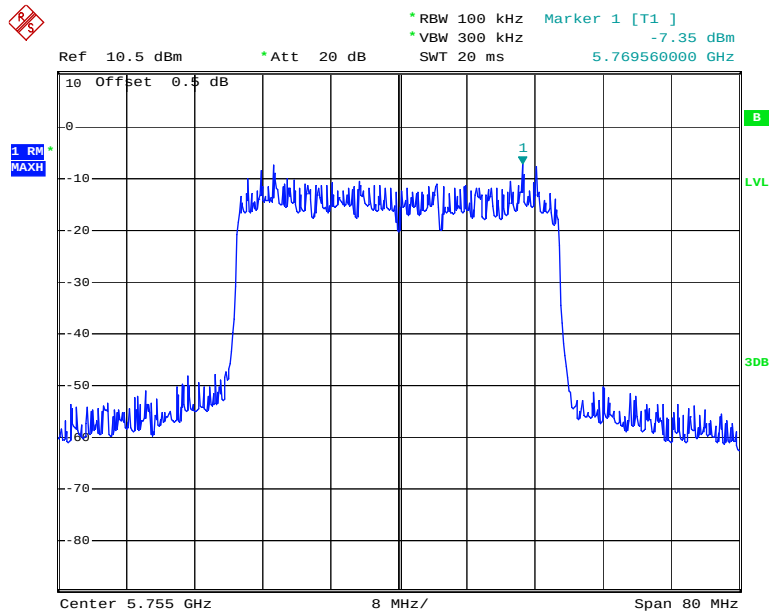
Chain 0:Power Spectral Density, 5755MHz

Date: 27.JUN.2014 05:09:45

Chain 0:Power Spectral Density, 5795MHz

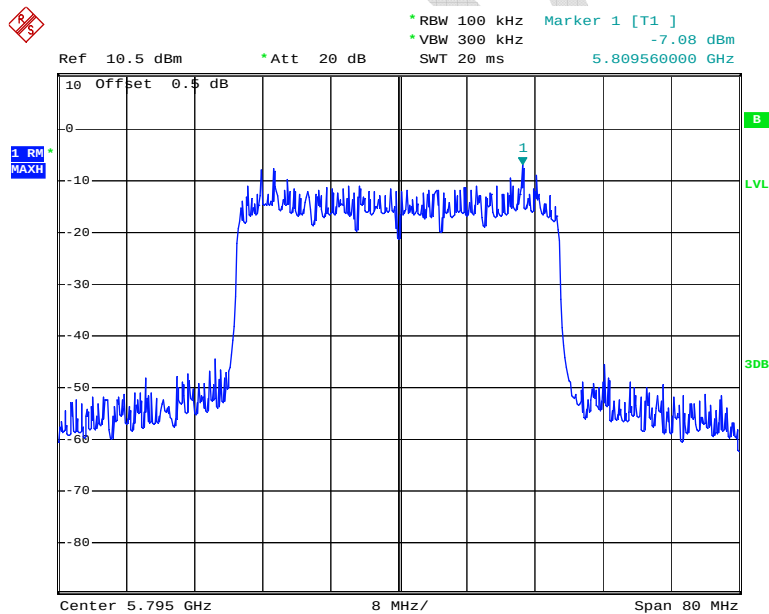
Date: 27.JUN.2014 05:30:04

Chain 1:Power Spectral Density, 5755MHz



Date: 27.JUN.2014 05:21:00

Chain 1:Power Spectral Density, 5795MHz



Date: 27.JUN.2014 05:40:05

FCC §407(g) - FREQUENCY STABILITY

Applicable Standards

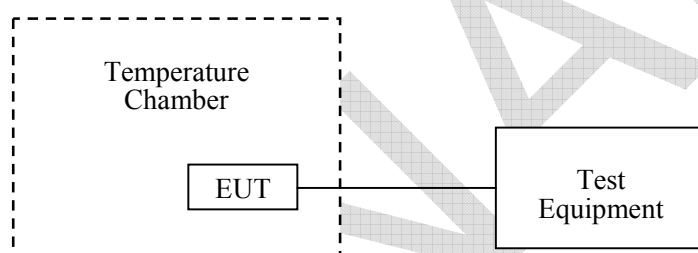
FCC§407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable AC power supply was connected to the adaptor terminals of the equipment under test. The voltage was set to 85% and 115% of the nominal value; the output frequency was recorded for each 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
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-3	2013-08-01	2014-08-01

* **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:	27.5 °C
Relative Humidity:	60 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2014-07-27.

Test Mode: Transmitting

Channel Frequency (MHz)	Power supply (V _{AC})	Temperature (°C)	Measurement Frequency (MHz)
5190	120	-10	5189.962239
		+0	5189.962227
		+10	5189.962236
		+20	5189.962214
		+30	5189.962255
		+40	5189.962252
		+50	5189.962244
	138	+20	5189.962251
	102	+20	5189.962248

Channel Frequency (MHz)	Power supply (V _{AC})	Temperature (°C)	Measurement Frequency (MHz)
5755	120	-10	5754.961819
		+0	5754.961808
		+10	5754.961836
		+20	5754.961842
		+30	5754.961840
		+40	5754.961823
		+50	5754.961808
	138	+20	5754.961825
	102	+20	5754.961833

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