FCC PART 15.247

TEST REPORT

For

ANPOSI PRODUCTS LTD.

2/F, EAST OF ZONGHE LOU, No.28 YITIAN GARDEN, FUQIANG ROAD, SHENZHEN, CHINA

FCC ID: WHTD970TH

Report Type:	**Product Type:**
Original Report	WIRELESS CAMERA

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Report Number:	R2DG140523003-00A
Report Date:	2014-06-16
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ANPOSI PRODUCTS LTD.*'s product, model number: D970TH *(FCC ID: WHTD970TH) or* ("EUT") in this report is a *WIRELESS CAMERA*, which was measured approximately: 19.5 cm (L) x 10.5 cm (H) x 9.4 cm (W), rated input voltage: DC 12.0V from adapter.

Adapter information:
Model: K18S120150U
Input: AC 100-240V, 50/60Hz, 0.5A
Output: DC 12.0V, 1.5A
Manufacturer: Dongguan Guanjin Electronics Technology Co., Ltd

** All measurement and test data in this report was gathered from production sample serial number: 140523003 (Assigned by BACL, Dongguan). The EUT was received on 2014-05-23.*

Objective

This report is prepared on behalf of *ANPOSI PRODUCTS LTD.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

No related submittal(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). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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 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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

15 hopping channels are provided by manufacturer, and EUT was tested with channel 1, 8 and 15.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2414.250	9	2441.250
2	2417.625	10	2444.625
3	2421.000	11	2448.000
4	2424.375	12	2451.375
5	2427.750	13	2454.750
6	2431.125	14	2458.125
7	2434.500	15	2461.500
8	2437.875	/	/

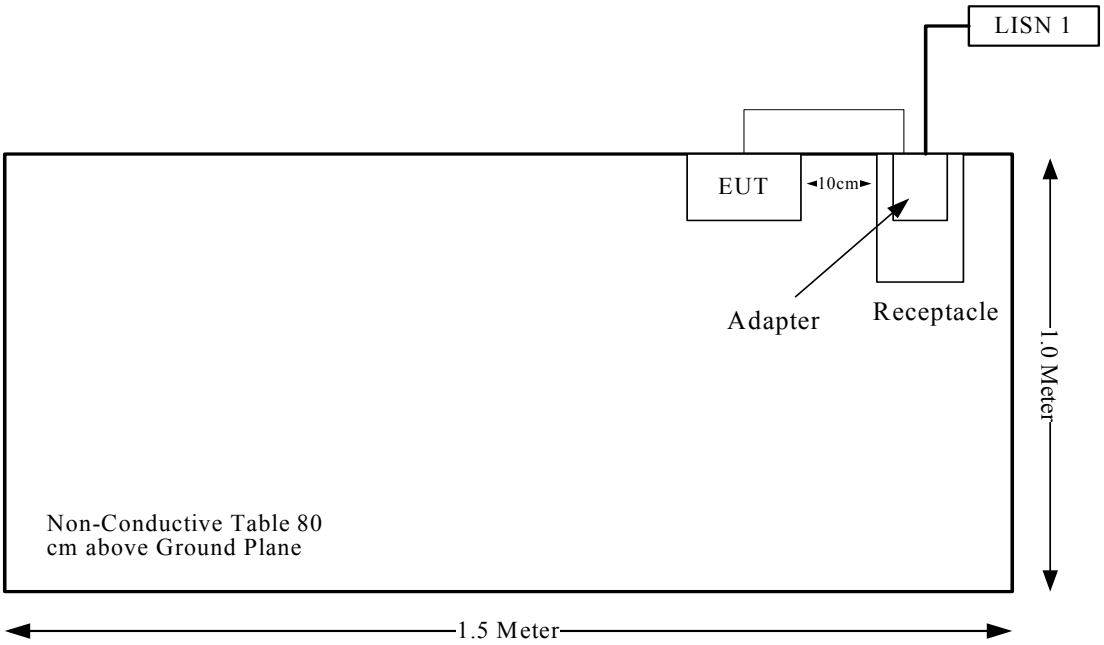
EUT Exercise Software

No EUT exercise software was used.

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307,§2.1091	Maximum Permissible Exposure	Compliace
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

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

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

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

Calculated Data:

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2414.250	2.0	1.58	16.40	43.65	20	0.0137	1.0

Result: The device meet FCC MPE at 20cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT use one external omni-directional antenna (with reversed SMA-J connector) arrangement and the maximum gain is 2.0 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

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

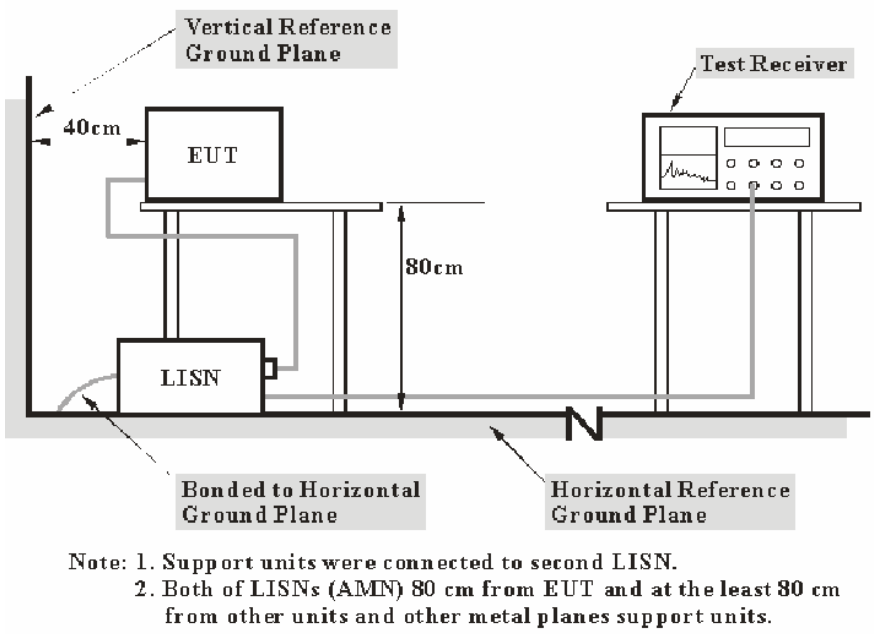
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of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

Based on CISPR 16-4-2: 2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.46 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



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 120 VAC/60 Hz power source

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

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

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

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

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2013-11-20	2014-11-19
R&S	Two-line V-network	ENV216	3560.6550.12	2014-01-22	2015-01-21
R&S	L.I.S.N	ESH3-Z5	100113	N/A	N/A
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

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

Test Results Summary

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

16.10 dB at **0.262017 MHz** in the **Neutral** conducted mode.

Test Data

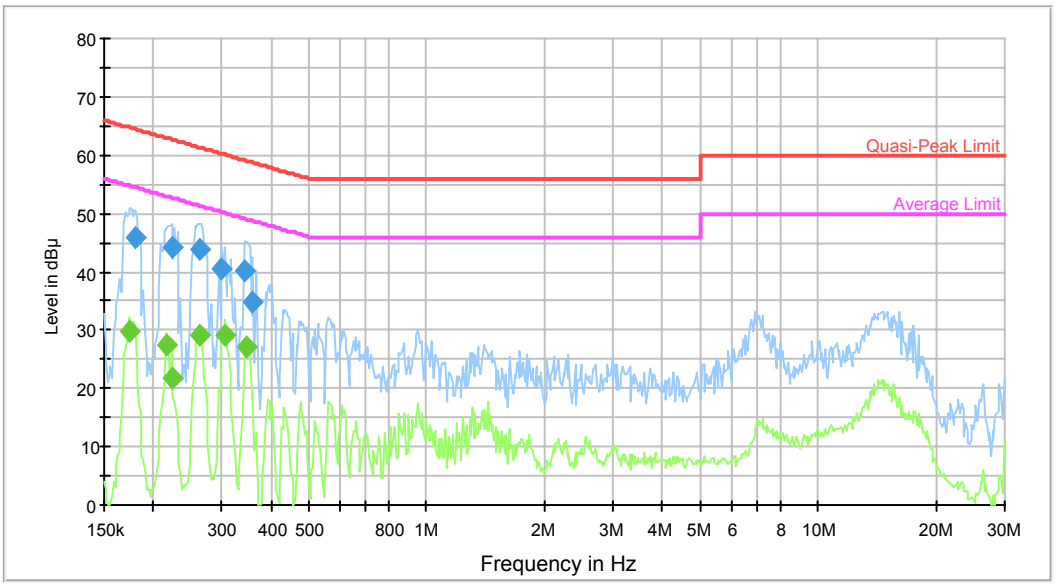
Environmental Conditions

Temperature:	28.3 °C
Relative Humidity:	50 %
ATM Pressure:	100.1 kPa

The testing was performed by Dean Liu on 2014-05-26.

Test Mode: Transmitting

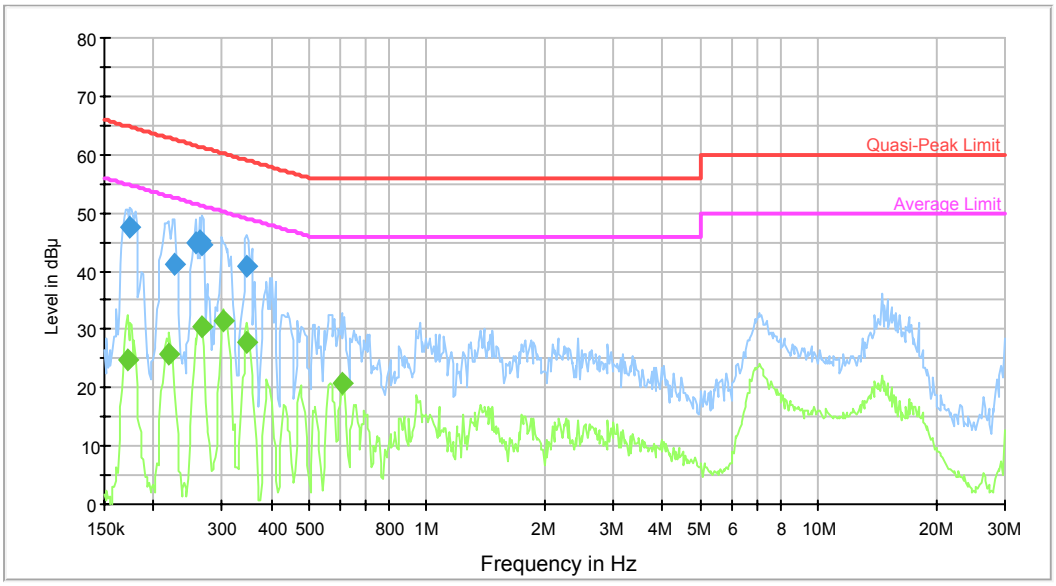
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.180171	45.8	9.000	L1	10.4	18.7	64.5	Compliance
0.223418	44.1	9.000	L1	10.7	18.6	62.7	Compliance
0.264113	44.0	9.000	L1	10.7	17.3	61.3	Compliance
0.300025	40.5	9.000	L1	10.7	19.7	60.2	Compliance
0.343548	40.2	9.000	L1	10.7	18.9	59.1	Compliance
0.360371	34.7	9.000	L1	10.7	24.0	58.7	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.173134	29.6	9.000	L1	10.3	25.2	54.8	Compliance
0.216409	27.4	9.000	L1	10.7	25.6	53.0	Compliance
0.223418	21.9	9.000	L1	10.7	30.8	52.7	Compliance
0.262017	29.1	9.000	L1	10.7	22.3	51.4	Compliance
0.304845	29.1	9.000	L1	10.7	21.0	50.1	Compliance
0.346296	27.2	9.000	L1	10.7	21.9	49.1	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.174519	47.7	9.000	N	10.8	17.0	64.7	Compliance
0.227007	41.3	9.000	N	11.3	21.3	62.6	Compliance
0.257874	44.7	9.000	N	11.2	16.8	61.5	Compliance
0.262017	45.3	9.000	N	11.2	16.1	61.4	Compliance
0.266226	44.5	9.000	N	11.2	16.7	61.2	Compliance
0.346296	41.0	9.000	N	11.1	18.1	59.1	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.171759	24.8	9.000	N	10.7	30.1	54.9	Compliance
0.219886	25.8	9.000	N	11.3	27.0	52.8	Compliance
0.266226	30.6	9.000	N	11.2	20.6	51.2	Compliance
0.302425	31.5	9.000	N	11.1	18.7	50.2	Compliance
0.346296	27.9	9.000	N	11.1	21.2	49.1	Compliance
0.604902	20.8	9.000	N	10.5	25.2	46.0	Compliance

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

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

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

If U_{lab} is greater than U_{cispr} of Table 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.

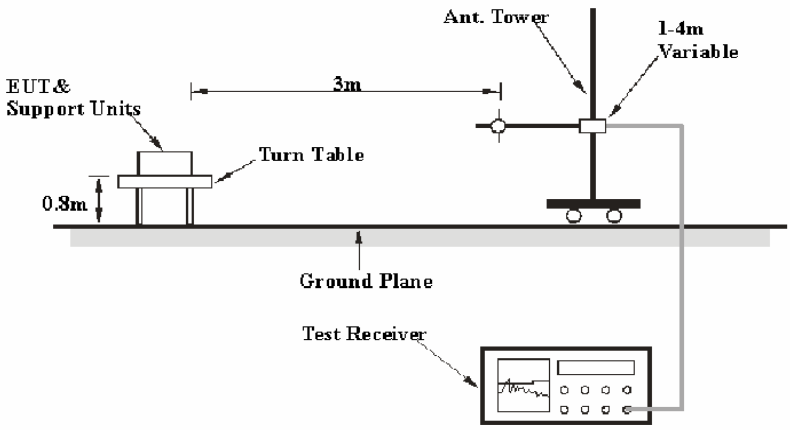
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:
30M~200MHz: 5.0 dB
200M~1GHz: 6.2 dB
1G~6GHz: 4.45 dB
6G~18GHz: 5.23 dB

Table 2 – Values of U_{cispr}

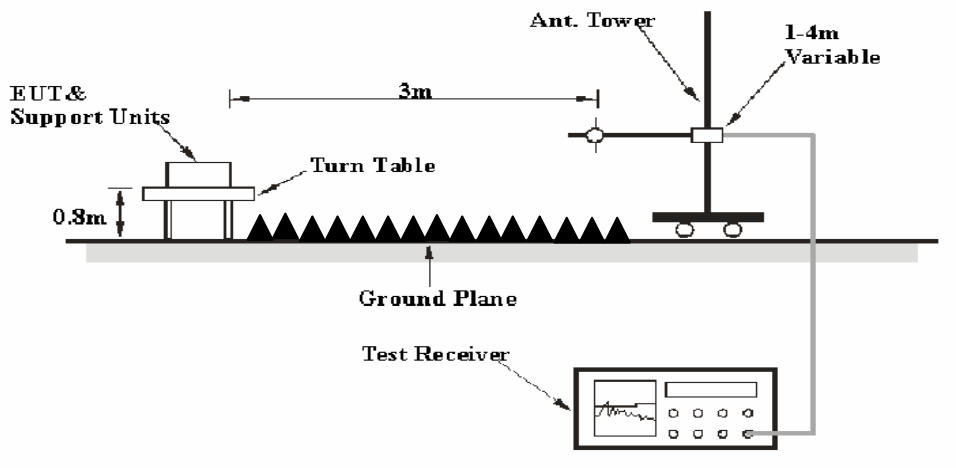
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.247 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 25 GHz.

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

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

Test Procedure

For the radiated emissions test, the adapter was connected to the 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 - 1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2014-5-9	2015-5-8
Sunol Sciences	Antenna	JB3	A060611-1	2011-09-06	2014-09-05
HP	Amplifier	8447E	2434A02181	2013-09-06	2014-09-05
R&S	Spectrum Analyzer	FSEM	DE31388	2014-05-09	2015-05-08
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2014-02-19	2015-02-18
R&S	Spectrum Analyzer	FSP 38	100478	2013-06-16	2014-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2013-06-16	2014-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2013-09-06	2014-09-05

*** 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).

Corrected Amplitude & Margin Calculation

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

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

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

Margin = Limit – Corrected Amplitude

Test Results Summary

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

0.19 dB at **4828.5 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	25.7 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

The testing was performed by Dean Liu on 2014-05-28.

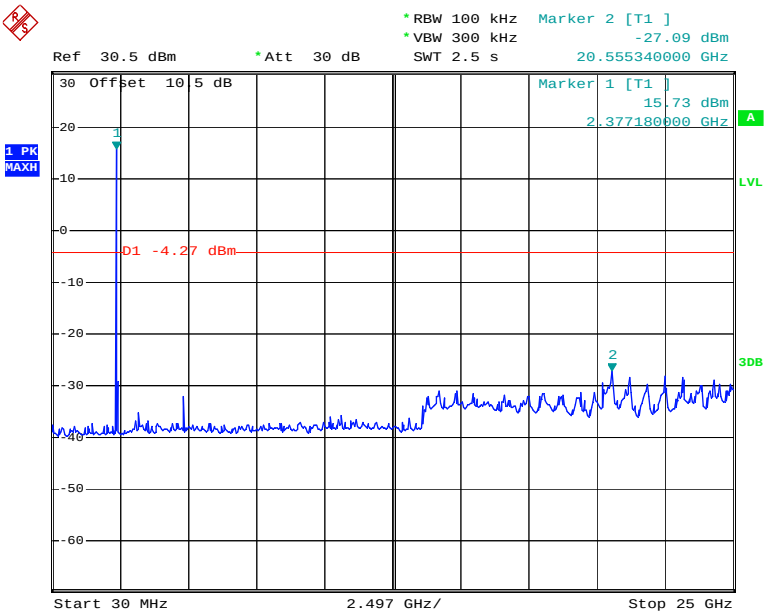
Test Mode: Tansmitting

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	FCC 15.247	
(MHz)	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	(dB)	(dB)	(dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low Channel: 2414.25(MHz)									
2414.25	75.65	PK	H	25.68	4.41	0.00	105.74	N/A	N/A
2414.25	72.63	AV	H	25.68	4.41	0.00	102.72	N/A	N/A
2414.25	82.08	PK	V	25.68	4.41	0.00	112.17	N/A	N/A
2414.25	78.68	AV	V	25.68	4.41	0.00	108.77	N/A	N/A
2390	41.16	PK	V	25.61	4.39	0.00	71.16	74.00	2.84*
2390	21.53	AV	V	25.61	4.39	0.00	51.53	54.00	2.47*
4828.5	52.06	PK	V	30.65	6.04	27.41	61.34	74.00	12.66
4828.5	44.53	AV	V	30.65	6.04	27.41	53.81	54.00	0.19*
7242.75	31.26	PK	V	34.18	7.47	25.90	47.01	74.00	26.99
7242.75	18.89	AV	V	34.18	7.47	25.90	34.64	54.00	19.36
9657	28.63	PK	V	36.08	8.81	27.44	46.08	74.00	27.92
9657	16.36	AV	V	36.08	8.81	27.44	33.81	54.00	20.19
7075	30.64	PK	V	33.78	7.38	26.12	45.68	74.00	28.32
7075	18.93	AV	V	33.78	7.38	26.12	33.97	54.00	20.03
356.89	48.25	QP	V	15.48	2.3	21.66	44.37	46.00	1.63*
Middle Channel: 2437.875(MHz)									
2437.875	76.53	PK	H	25.74	4.40	0.00	106.67	N/A	N/A
2437.875	73.5	AV	H	25.74	4.40	0.00	103.64	N/A	N/A
2437.875	83.37	PK	V	25.74	4.40	0.00	113.51	N/A	N/A
2437.875	79.98	AV	V	25.74	4.40	0.00	110.12	N/A	N/A
4875.75	50.23	PK	V	30.78	6.08	27.42	59.67	74.00	14.33
4875.75	42.32	AV	V	30.78	6.08	27.42	51.76	54.00	2.24*
7313.625	31.36	PK	V	34.35	7.51	25.88	47.34	74.00	26.66
7313.625	19.46	AV	V	34.35	7.51	25.88	35.44	54.00	18.56
9751.5	28.38	PK	V	36.30	8.83	27.23	46.28	74.00	27.72
9751.5	16.34	AV	V	36.30	8.83	27.23	34.24	54.00	19.76
7075	30.85	PK	V	33.78	7.38	26.12	45.89	74.00	28.11
7075	18.97	AV	V	33.78	7.38	26.12	34.01	54.00	19.99
356.89	48.09	QP	V	15.48	2.30	21.66	44.21	46.00	1.79*
High Channel: 2461.5(MHz)									
2461.50	76.32	PK	H	25.80	4.43	0.00	106.55	N/A	N/A
2461.50	73.35	AV	H	25.80	4.43	0.00	103.58	N/A	N/A
2461.50	81.43	PK	V	25.80	4.43	0.00	111.66	N/A	N/A
2461.50	78.56	AV	V	25.80	4.43	0.00	108.79	N/A	N/A
2483.50	41.18	PK	V	25.86	4.49	0.00	71.53	74.00	2.47*
2483.50	17.64	AV	V	25.86	4.49	0.00	47.99	54.00	6.01
4923	50.92	PK	V	30.90	5.98	27.43	60.37	74.00	13.63
4923	44.36	AV	V	30.90	5.98	27.43	53.81	54.00	0.19*
7384.5	31.89	PK	V	34.52	7.55	25.86	48.10	74.00	25.90
7384.5	19.36	AV	V	34.52	7.55	25.86	35.57	54.00	18.43
9846	28.26	PK	V	36.53	8.85	26.95	46.69	74.00	27.31
9846	16.88	AV	V	36.53	8.85	26.95	35.31	54.00	18.69
7075	30.26	PK	V	33.78	7.38	26.12	45.30	74.00	28.70
7075	18.96	AV	V	33.78	7.38	26.12	34.00	54.00	20.00
356.89	48.73	QP	V	15.48	2.30	21.66	44.85	46.00	1.15*

*Within measurement uncertainty!

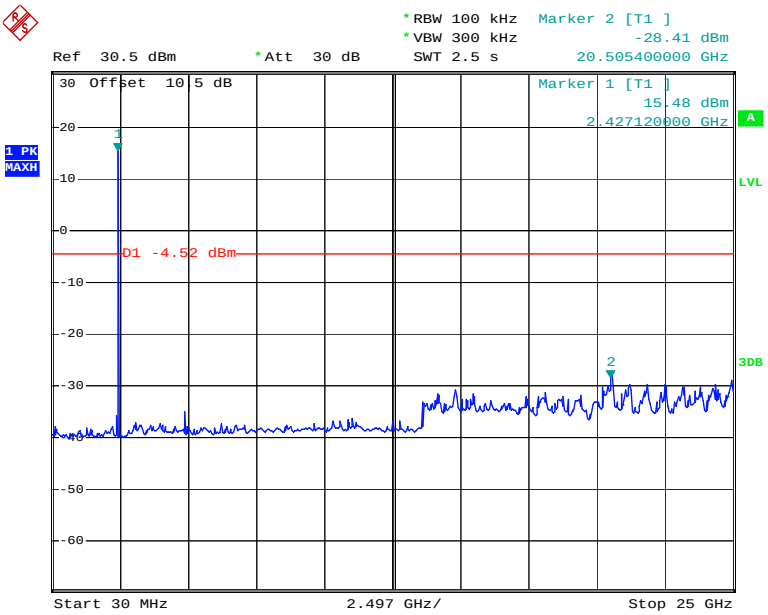
Conducted Spurious Emissions at Antenna Port

Low Channel



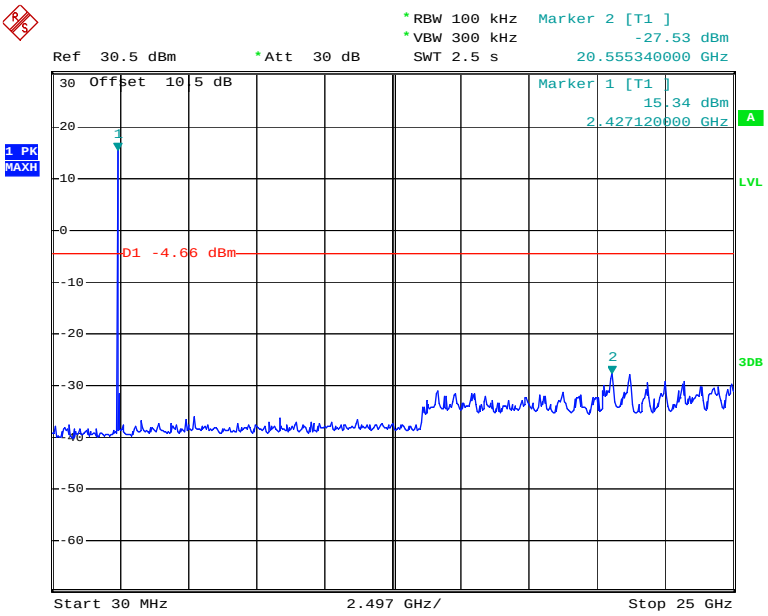
Date: 28.MAY.2014 09:52:05

Middle Channel



Date: 28.MAY.2014 09:53:27

High Channel



Date: 28.MAY.2014 09:49:22

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

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	2015-05-08

*** 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

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

Test Data

Environmental Conditions

Temperature:	28.6 °C
Relative Humidity:	67 %
ATM Pressure:	99.6 kPa

The testing was performed by Dean Liu on 2014-06-15.

Test Result: Compliance.

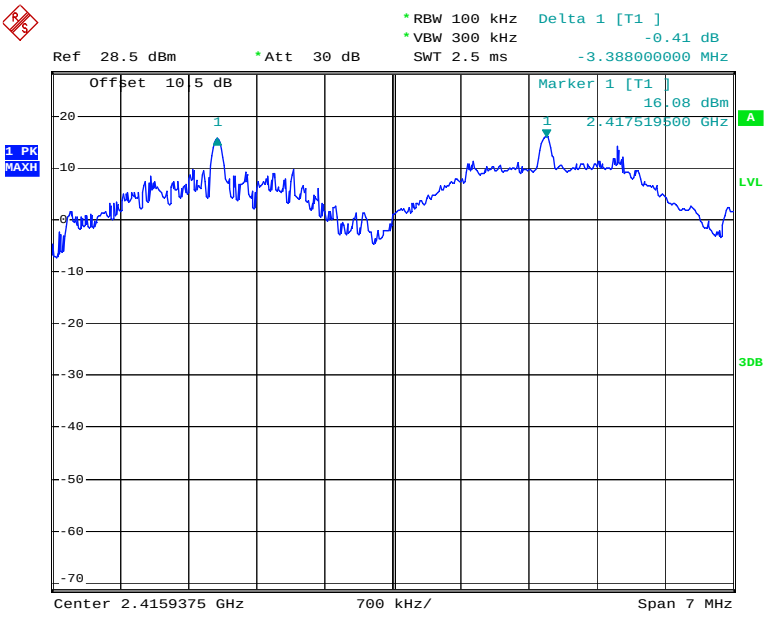
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low	2414.250	3.388	2.231	Pass
Adjacent	2417.625			
Middle	2437.875	3.388	2.240	Pass
Adjacent	2441.250			
High	2458.125	3.388	2.277	Pass
Adjacent	2461.500			

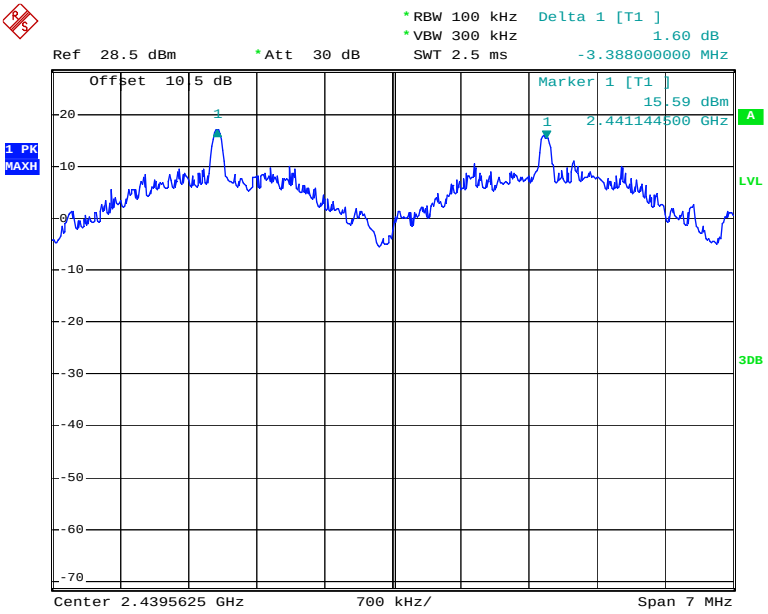
Note: Limit= (2/3) of 20 dB bandwidth

Low Channel



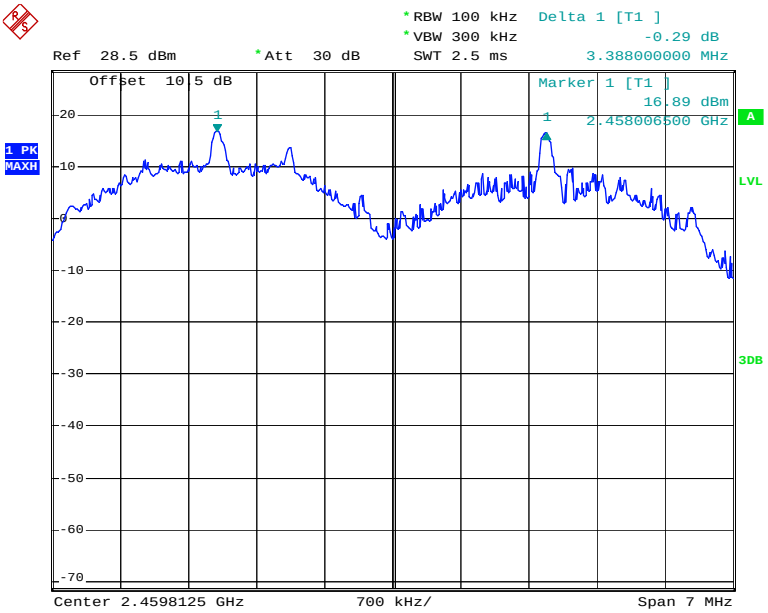
Date: 15.JUN.2014 14:34:39

Middle Channel



Date: 15.JUN.2014 14:38:33

High Channel



Date: 15.JUN.2014 14:40:39

FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-08

*** 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:	27.3~29.4 °C
Relative Humidity:	57~69 %
ATM Pressure:	99.3~100 kPa

The testing was performed by Dean Liu on 2014-06-19.

Test Result: Compliance.

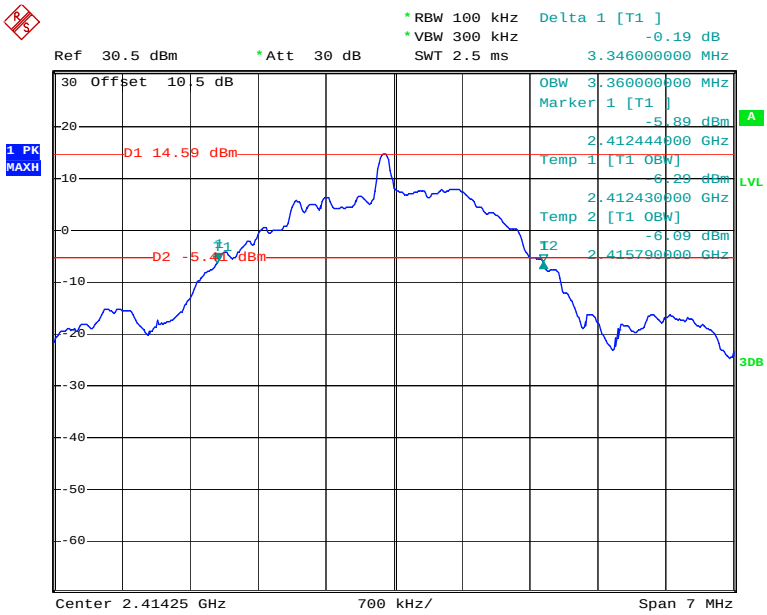
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2414.250	3.346
Middle	2437.875	3.360
High	2461.500	3.416

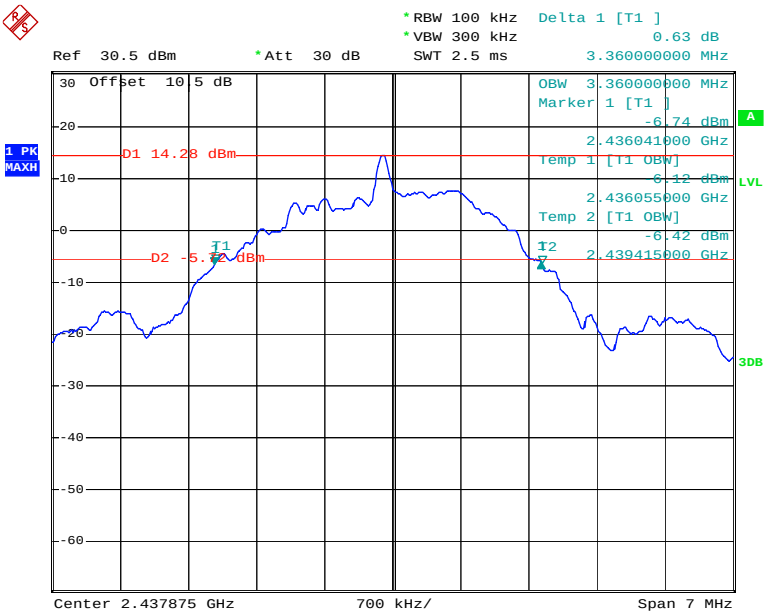
Please refer to the following plots.

Low Channel



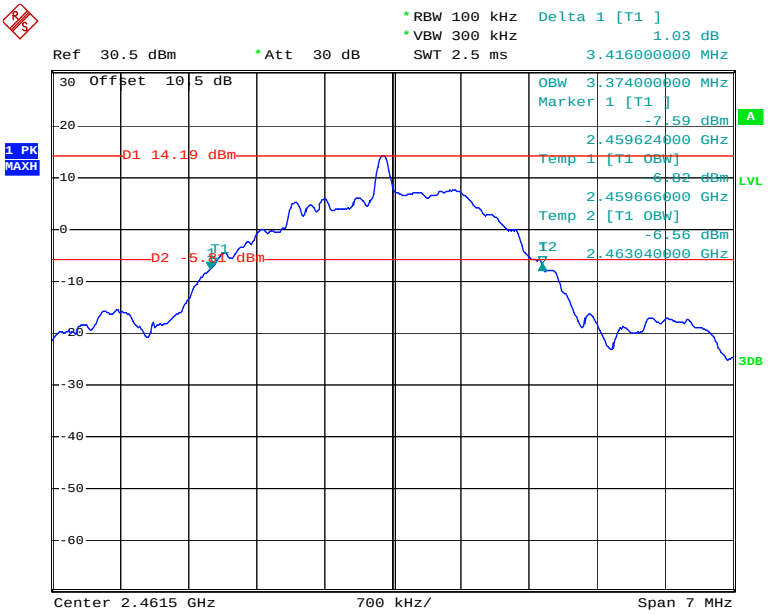
Date: 19.JUN.2014 10:09:16

Middle Channel



Date: 19.JUN.2014 10:12:24

High Channel



Date: 19.JUN.2014 10:11:05

FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

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	2015-05-08

*** 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:	28.6 °C
Relative Humidity:	67 %
ATM Pressure:	99.6 kPa

** The testing was performed by Dean Liu on 2014-06-15.*

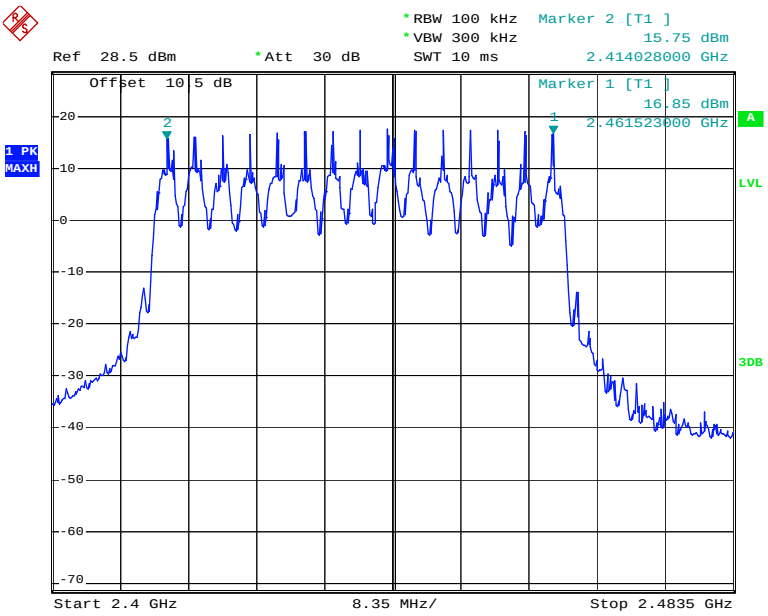
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	15	⩾15

Number of Hopping Channels



Date: 15.JUN.2014 14:32:39

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 * channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time= time slot length * hope rate/ number of hopping channels *hopping NO. * 0.4s

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	2015-05-08

*** 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:	28.6 °C
Relative Humidity:	67 %
ATM Pressure:	99.6 kPa

** The testing was performed by Dean Liu on 2014-06-15.*

Test Result: Compliance.

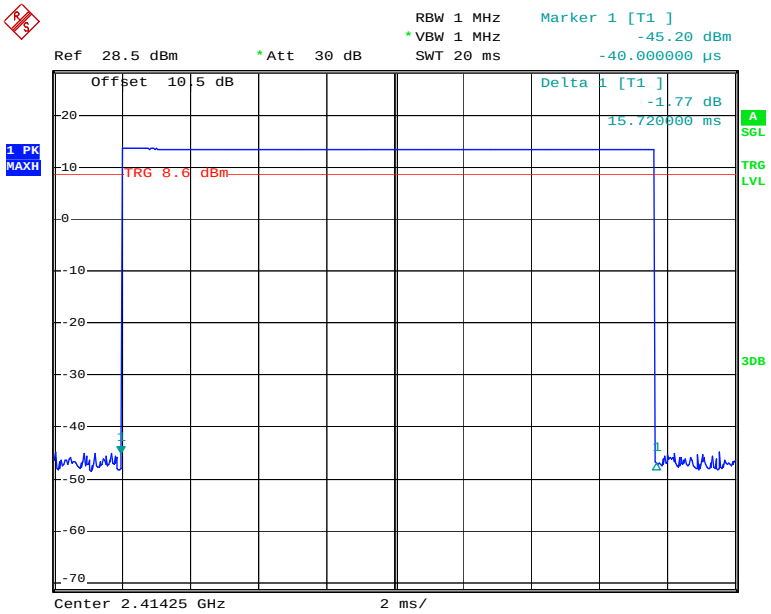
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Low	15.720	0.062	0.4	Pass
Middle	15.720	0.062	0.4	Pass
High	15.720	0.062	0.4	Pass
Dwell Time(s)= time slot length(s)* 50/15*15 * 0.4				

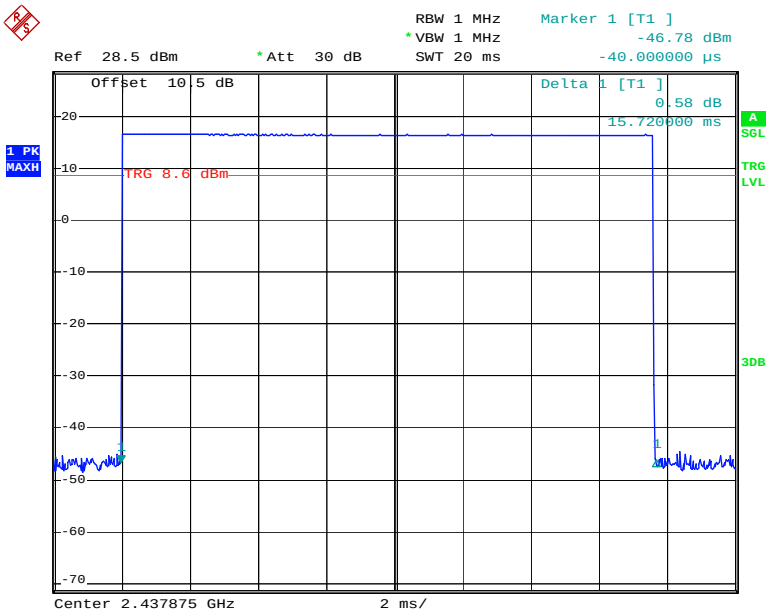
Note: The EUT hopping 50times per second，which was declared by manufacturer.

Low Channel



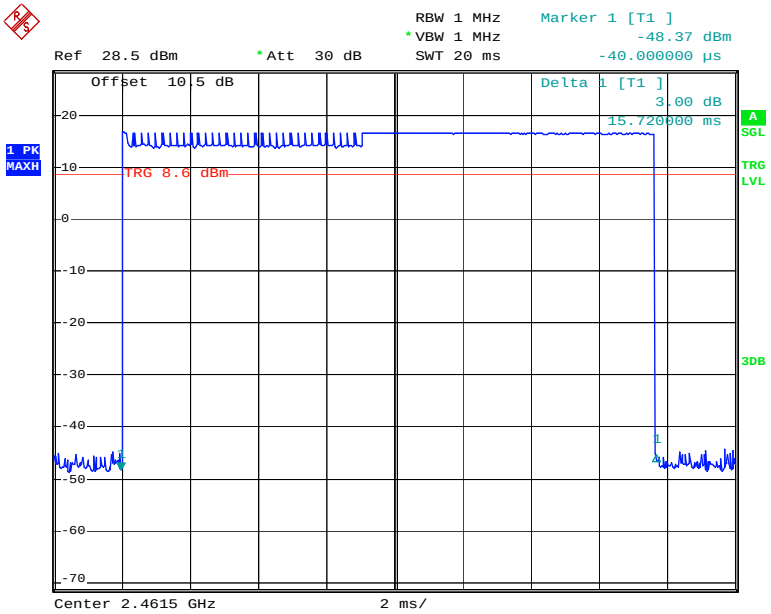
Date: 15.JUN.2014 14:41:44

Middle Channel



Date: 15.JUN.2014 14:43:19

High Channel



Date: 15.JUN.2014 14:42:36

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts

Test Procedure

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.

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	2015-05-08

*** 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:	27.3~29.4 °C
Relative Humidity:	57~69 %
ATM Pressure:	99.3~100 kPa

The testing was performed by Dean Liu on 2014-06-19.

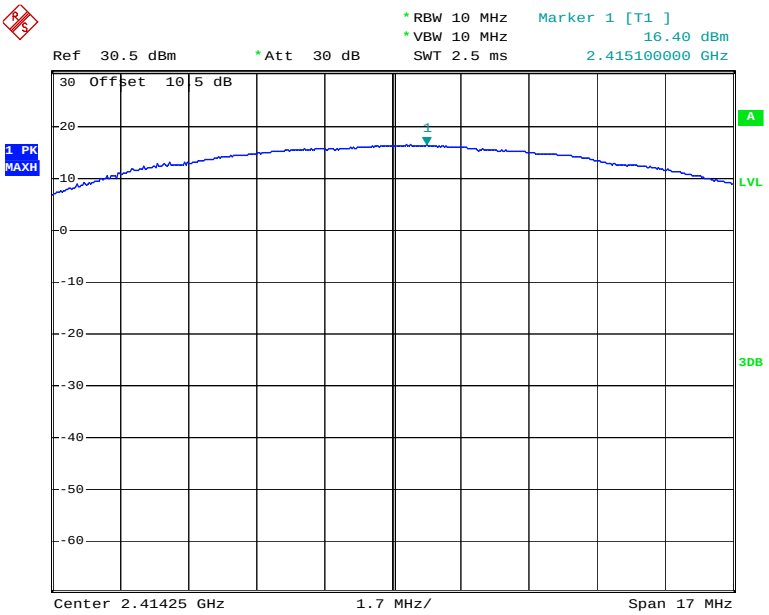
Test Result: Compliance.

Test Mode: Transmitting

Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
Low	2414.250	16.40	21
Middle	2437.875	16.12	21
High	2461.500	15.82	21

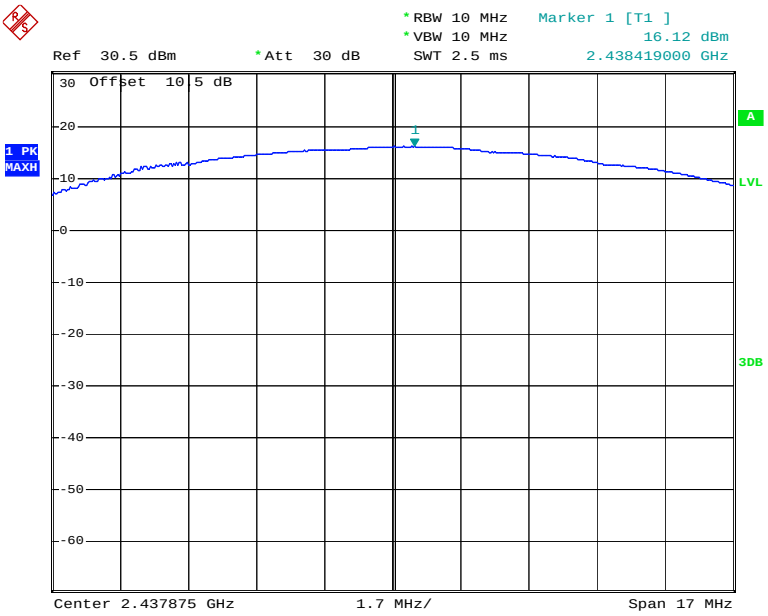
Note: The data above was tested in conducted mode.

Output Power, Low Channel



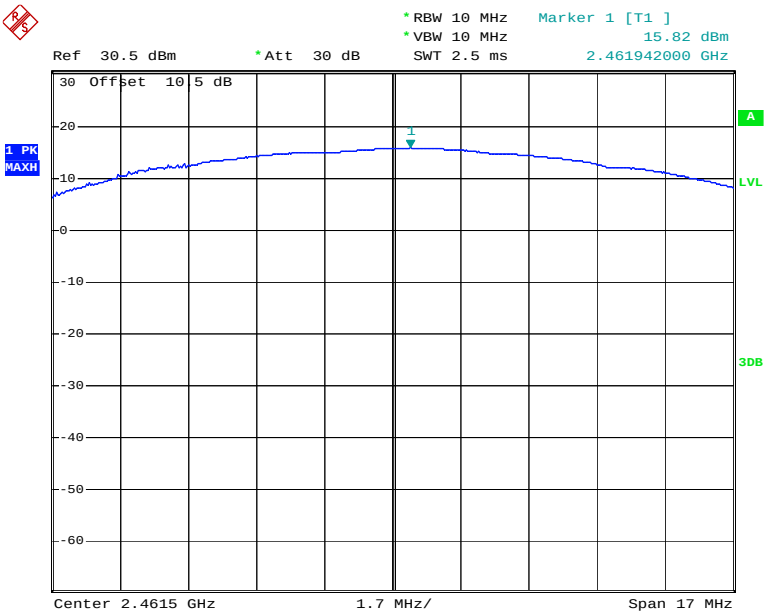
Date: 19.JUN.2014 10:20:05

Output Power, Middle Channel



Date: 19.JUN.2014 10:18:06

Output Power, High Channel



Date: 19.JUN.2014 10:19:23

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2014-05-09	2015-05-08

*** 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

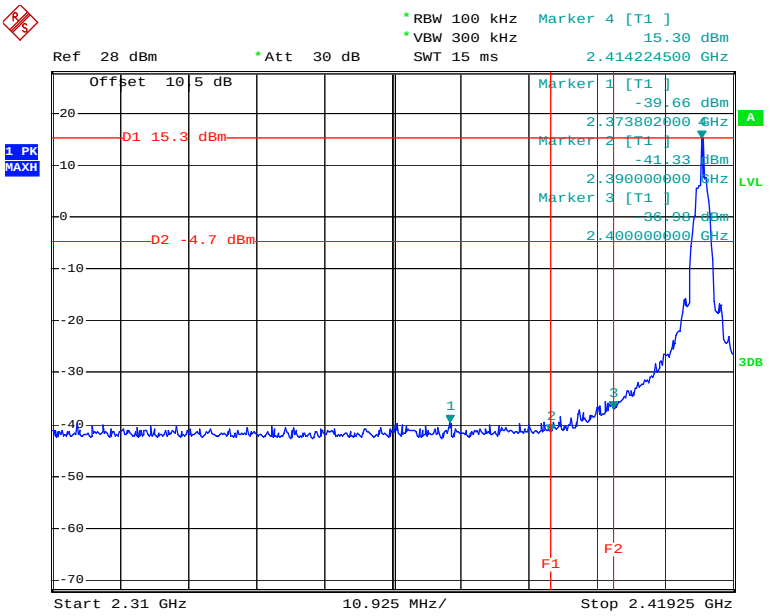
Environmental Conditions

Temperature:	28.2 °C
Relative Humidity:	66 %
ATM Pressure:	100 kPa

**The testing was performed by Dean Liu on 2014-05-28.*

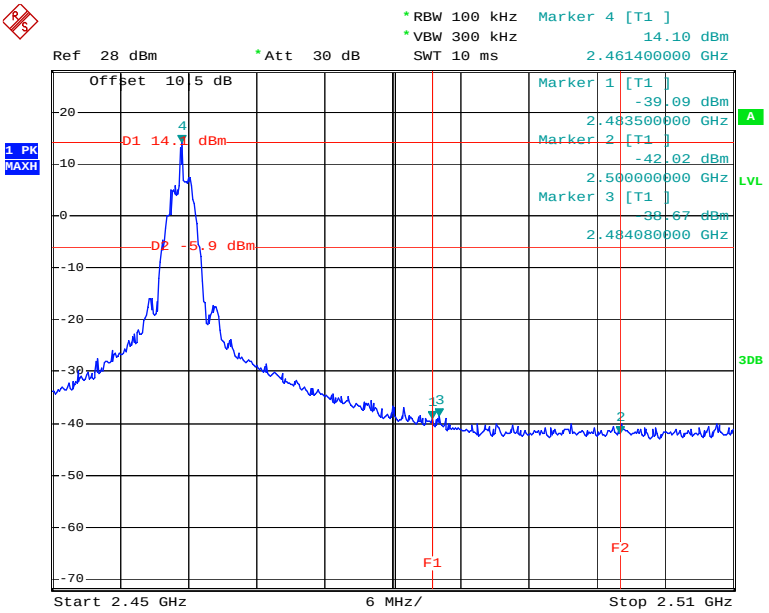
Test Result: Compliance

Band Edge, Left Side



Date: 28.MAY.2014 11:37:15

Band Edge, Right Side



Date: 28.MAY.2014 11:38:32

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