

## 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: WHTD816TH**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 2.4G Digital wireless camera
<b>Test Engineer:</b> Ares Liu	
<b>Report Number:</b> R1DG121205002-00A	
<b>Report Date:</b> 2013-03-05	
<b>Reviewed By:</b> Ivan Cao RF Leader	
<b>Test Laboratory:</b>	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *ANPOSI PRODUCTS LTD.*'s product, model number: D816TH (*FCC ID: WHTD816TH*) or ("EUT") in this report is a *2.4G Digital wireless camera*, which was measured approximately: 16.6 cm (L) x 15.2 cm (H) x 5.8 cm (W), rated input voltage: DC 5.0V from adapter.

Adapter information: Swtec  
Model: SWN006S050100U1  
Input: AC 100-240V, 50/60Hz, 0.2A  
Output: DC 5.0V, 1.0A

*\* All measurement and test data in this report was gathered from production sample serial number: 121205002 (Assigned by BACL, Dongguan). The EUT was received on 2012-12-06.*

### 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 Communication Commissions 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.

The uncertainty of any RF tests which use conducted method measurement is  $\pm 0.96$  dB, the uncertainty of any radiation on emissions measurement is: 30M~200MHz: 5.0 dB; 200M~1GHz: 6.2 dB; 1G~6GHz: 4.45 dB; 6G~18GHz: 5.23 dB.

## **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	/	/

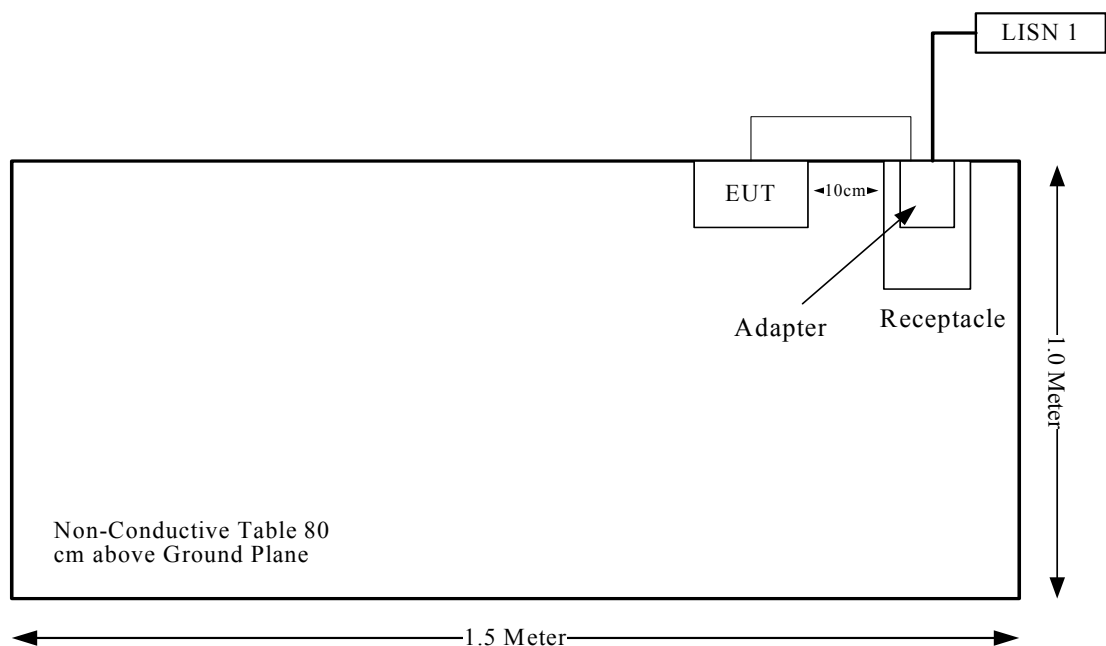
### EUT Exercise Software

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	Compliance
§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 <sup>2</sup> )	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	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<sup>2</sup>);

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 <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
2437.875	2	1.58	16.36	43.25	20.00	0.01364	1.0

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

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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **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 has a dipole antenna, which was using unique type of connector to attach to the EUT, which complied with 15.203, the maximum gain is 2.0 dBi, 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:

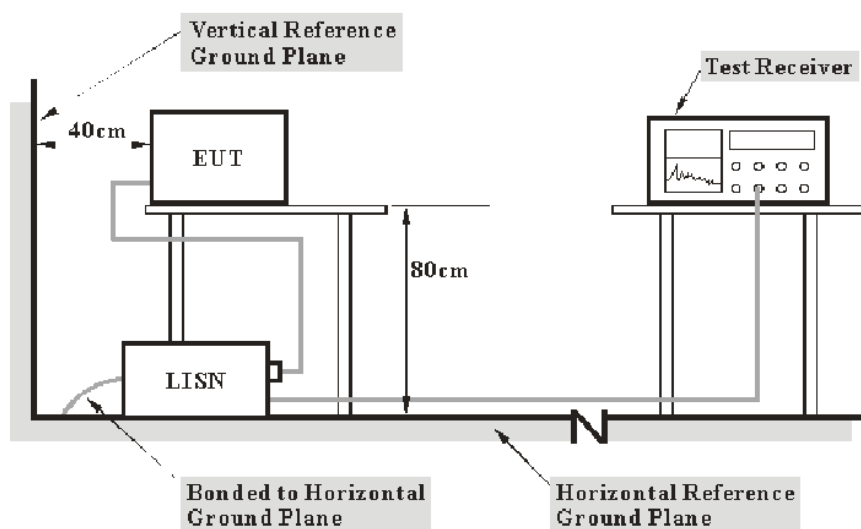
- compliance is deemed to occur if no measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by  $(U_{lab} - U_{cispr})$ , exceeds the disturbance limit.

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



- 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 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:

<i><b>Frequency Range</b></i>	<i><b>IF B/W</b></i>
150 kHz – 30 MHz	9 kHz

### Test Procedure

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

### 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	2012-11-29	2013-11-28
R&S	LISN1	ESH3-Z5	843331/015	2012-09-17	2013-09-16
R&S	LISN2	ESH3-Z5	100113	2012-11-29	2013-11-28
BACL	Test Software	BACL-EMC	V1.0-2010	N/A	N/A

**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:

**13.13 dB at 27.120 MHz in the Line conducted mode.**

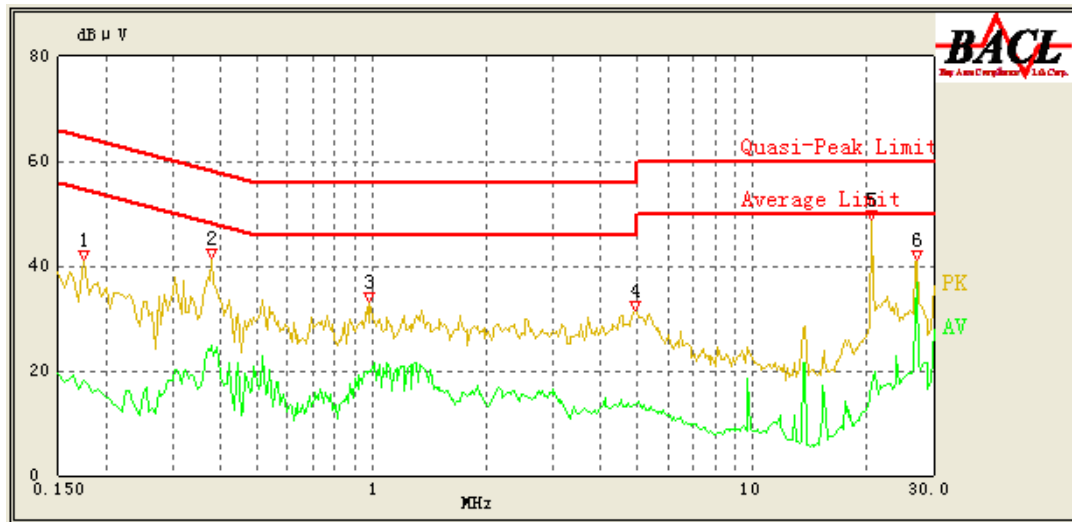
**Test Data****Environmental Conditions**

<b>Temperature:</b>	25° C
<b>Relative Humidity:</b>	51 %
<b>ATM Pressure:</b>	101.2 kPa

*The testing was performed by Ares Liu on 2012-12-11.*

*Test Mode: Transmitting*

## AC 120V/60 Hz, Line



Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.175	32.68	0.43	65.29	32.61	QP
0.175	18.19	0.43	55.29	37.10	AV
0.380	35.91	0.33	59.43	23.52	QP
0.380	24.69	0.33	49.43	24.74	AV
0.985	24.48	0.32	56.00	31.52	QP
0.995	19.79	0.32	46.00	26.21	AV
4.915	24.07	0.46	56.00	31.93	QP
4.900	13.66	0.46	46.00	32.34	AV
20.615	22.01	2.61	60.00	37.99	QP
20.615	17.38	2.61	50.00	32.62	AV
27.025	40.56	2.33	60.00	19.44	QP
27.120	36.87	2.33	50.00	13.13	AV

**AC 120V/60 Hz, Neutral**

Frequency (MHz)	Cord. Reading (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/AV/QP)
0.165	33.20	0.24	65.57	32.37	QP
0.165	19.56	0.24	55.57	36.01	AV
0.375	38.83	0.23	59.57	20.74	QP
0.375	31.10	0.23	49.57	18.47	AV
0.775	26.91	0.22	56.00	29.09	QP
0.775	18.54	0.22	46.00	27.46	AV
1.335	30.54	0.24	56.00	25.46	QP
1.335	23.64	0.24	46.00	22.36	AV
22.120	25.38	1.75	60.00	34.62	QP
22.120	15.86	1.75	50.00	34.14	AV
26.975	41.19	2.34	60.00	18.81	QP
26.975	33.84	2.34	50.00	16.16	AV

## 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  $U_{cisp}$  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  $U_{cisp}$  of Table 1, then:

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

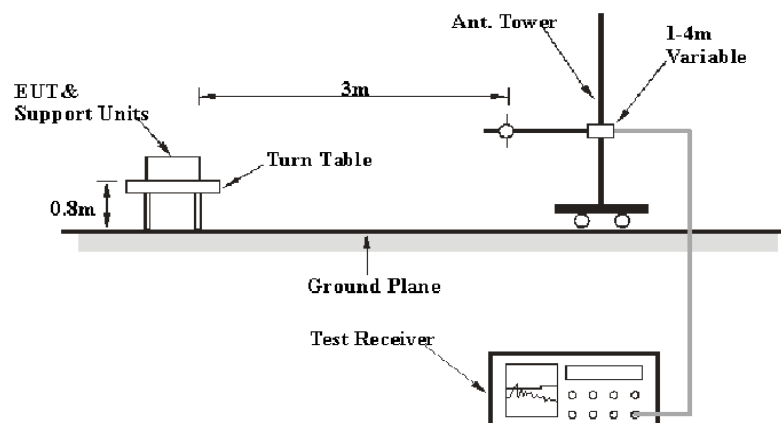
6G~18GHz: 5.23 dB

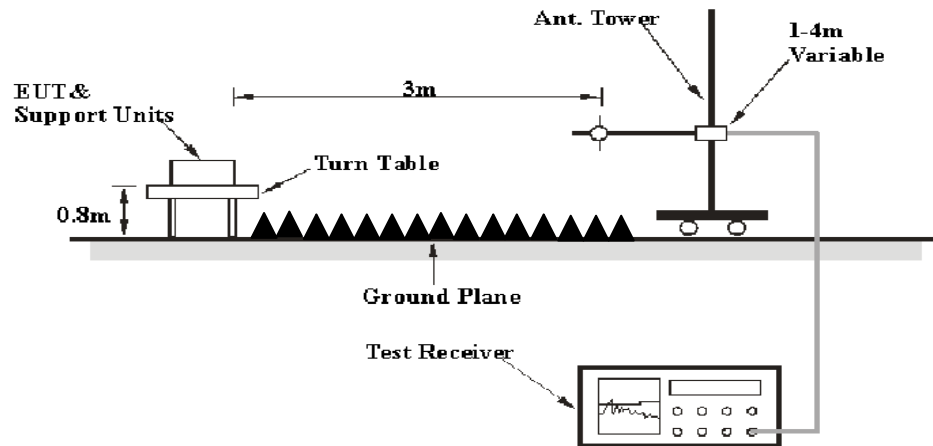
Table 2 – Values of  $U_{cisp}$

Measurement	$U_{cisp}$
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.

**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:

<i><b>Frequency Range</b></i>	<i><b>RBW</b></i>	<i><b>Video BW</b></i>	<i><b>Detector</b></i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave.

**Test Procedure**

For the radiated emissions test, the adapter was connected to the first 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
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2012-05-14	2013-05-13
Sunol Sciences	Hybrid Antennas	JB3	A060611-1	2011-09-06	2013-09-05
HP	Pre-amplifier	8447E	2434A02181	2012-10-08	2013-10-07
R&S	Spectrum Analyzer	FSEM 30	DE31388	2012-03-15	2013-03-14
ETS-LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2014-09-05
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2013-01-30	2014-01-29

**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:

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

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 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:

**2.13 dB at 4828.36 MHz in the Horizontal polarization**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	22°C
<b>Relative Humidity:</b>	55%
<b>ATM Pressure:</b>	101.5 kPa

*The testing was performed by Ares Liu on 2013-01-31.*

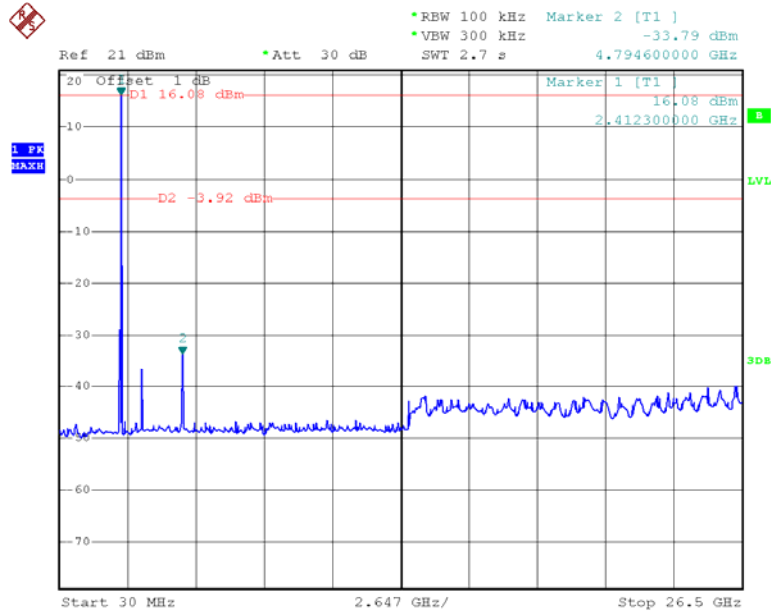
*Test Mode: Transmitting*

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel: 2414.25"MHz									
2414.18	68.19	AV	H	25.68	3.93	0.00	97.80	N/A	N/A
2414.18	72.37	PK	H	25.68	3.93	0.00	101.98	N/A	N/A
2414.18	73.58	AV	V	25.68	3.93	0.00	103.19	N/A	N/A
2414.18	79.31	PK	V	25.68	3.93	0.00	108.92	N/A	N/A
4828.36	43.74	AV	H	30.65	4.74	27.26	51.87	54.00	2.13*
2390	39.92	PK	V	25.61	3.84	0.00	69.37	74.00	4.63
2390	17.12	AV	V	25.61	3.84	0.00	46.57	54.00	7.43
4828.36	55.14	PK	H	30.65	4.74	27.26	63.27	74.00	10.73
9656.72	18.46	AV	V	36.08	8.69	26.03	37.20	54.00	16.80
372.46	32.11	QP	V	15.69	2.34	21.70	28.44	46.00	17.56
7242.54	18.31	AV	V	34.18	6.57	26.37	32.69	54.00	21.31
9656.72	32.41	PK	V	36.08	8.69	26.03	51.15	74.00	22.85
7242.54	32.53	PK	V	34.18	6.57	26.37	46.91	74.00	27.09
Middle Channel: 2437.875"MHz									
2437.875	67.59	AV	H	25.74	3.98	0.00	97.31	N/A	N/A
2437.875	72.42	PK	H	25.74	3.98	0.00	102.14	N/A	N/A
2437.875	75.89	AV	V	25.74	3.98	0.00	105.61	N/A	N/A
2437.875	81.02	PK	V	25.74	3.98	0.00	110.74	N/A	N/A
4875.75	42.74	AV	H	30.78	4.76	27.26	51.02	54.00	2.98*
4875.75	53.19	PK	H	30.78	4.76	27.26	61.47	74.00	12.53
9751.5	18.57	AV	H	36.30	8.59	25.67	37.79	54.00	16.21
373.51	29.52	QP	H	15.71	2.34	21.70	25.87	46.00	20.13
7313.625	18.46	AV	H	34.35	6.71	26.52	33.00	54.00	21.00
9751.5	31.85	PK	H	36.30	8.59	25.67	51.07	74.00	22.93
7313.625	31.09	PK	H	34.35	6.71	26.52	45.63	74.00	28.37
High Channel: 2461.52"MHz									
2461.5	69.04	AV	H	25.80	3.94	0.00	98.78	N/A	N/A
2461.5	72.88	PK	H	25.80	3.94	0.00	102.62	N/A	N/A
2461.5	74.57	AV	V	25.80	3.94	0.00	104.31	N/A	N/A
2461.5	79.24	PK	V	25.80	3.94	0.00	108.98	N/A	N/A
4923	42.08	AV	H	30.90	4.70	27.27	50.41	54.00	3.59*
2483.5	39.99	PK	V	25.86	3.80	0.00	69.65	74.00	4.35
2483.5	18.54	AV	V	25.86	3.80	0.00	48.20	54.00	5.80
4923	54.76	PK	H	30.90	4.70	27.27	63.09	74.00	10.91
9846	18.53	AV	H	36.53	8.49	25.49	38.06	54.00	15.94
376.19	31.41	QP	H	15.73	2.35	21.71	27.78	46.00	18.22
7384.5	17.86	AV	H	34.52	6.84	26.66	32.56	54.00	21.44
9846	31.67	PK	H	36.53	8.49	25.49	51.20	74.00	22.80
7384.5	30.19	PK	H	34.52	6.84	26.66	44.89	74.00	29.11

\*Within measurement uncertainty!

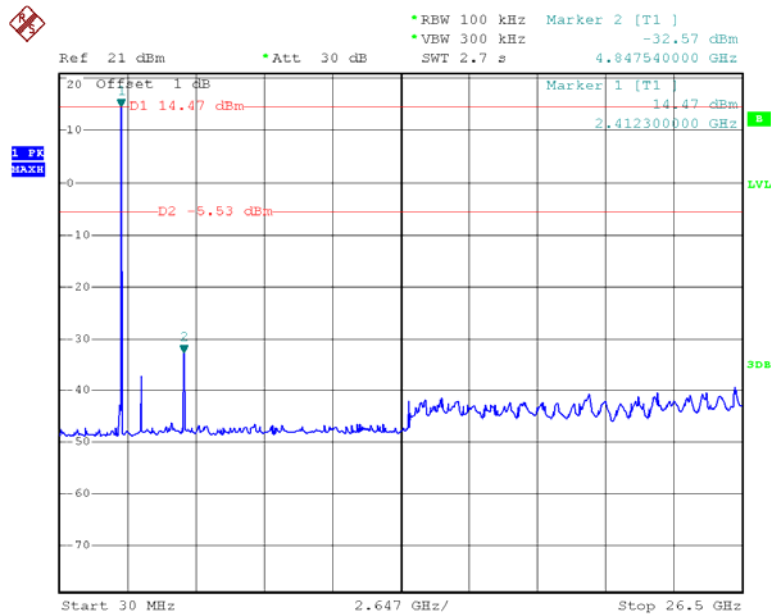
## Conducted Spurious Emissions at Antenna Port

### Low Channel



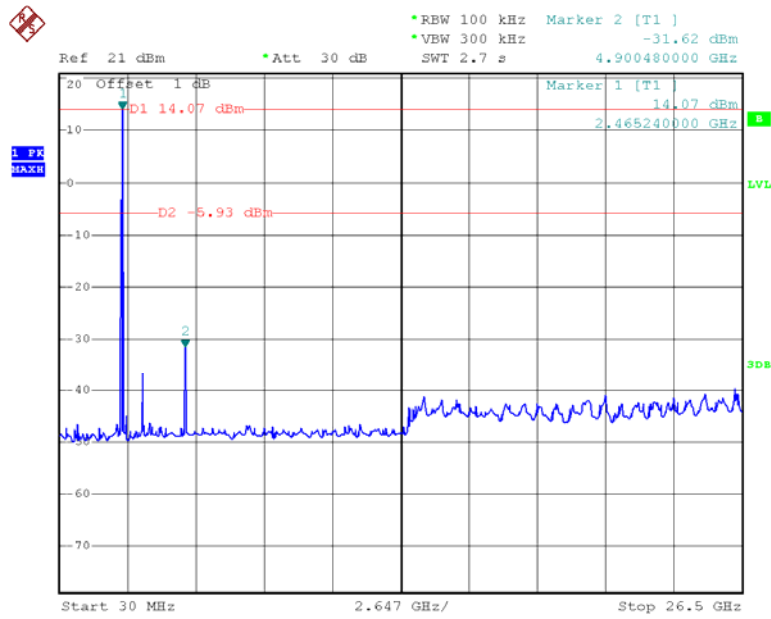
Date: 31.JAN.2013 14:20:54

### Middle Channel



Date: 31.JAN.2013 14:23:15

# High Channel



Date: 31.JAN.2013 14:33:34

**FCC §15.247(a) (1) - CHANNEL SEPARATION TEST****Applicable Standard**

Frequency hopping systems shall have hopping 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
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

**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**

<b>Temperature:</b>	24.1°C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.5kPa

*The testing was performed by Ares Liu on 2013-02-01.*

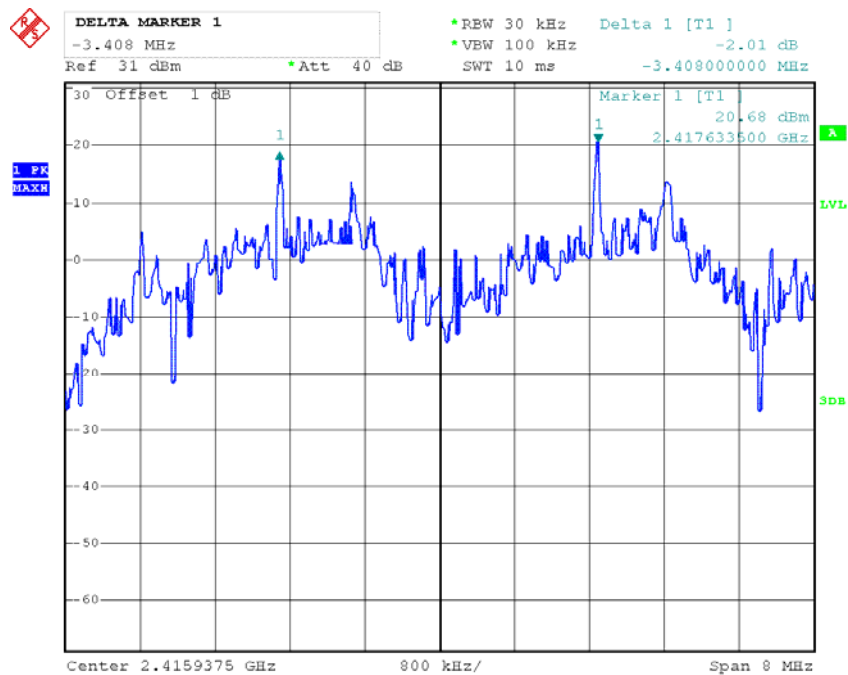
**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

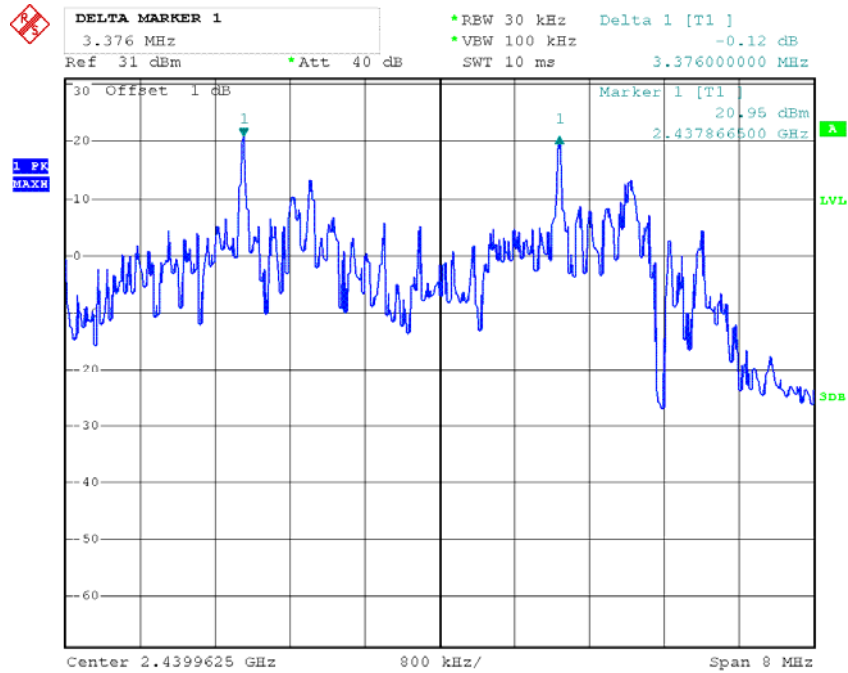
Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low	2414.25	3.408	1.90	Pass
Adjacent	2417.625			
Middle	2437.875	3.376	2.22	Pass
Adjacent	2441.25			
High	2458.125	3.360	1.80	Pass
Adjacent	2461.5			

### Low Channel



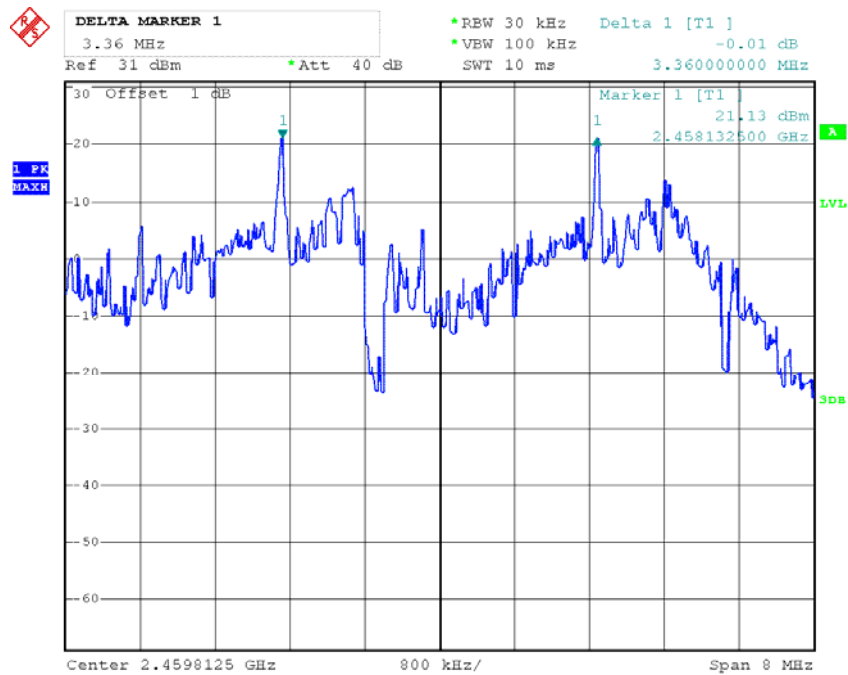
Date: 1.FEB.2013 14:31:35

### Middle Channel



Date: 1.FEB.2013 14:35:51

### High Channel



Date: 1.FEB.2013 14:42:23

**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
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

**Test Data****Environmental Conditions**

Temperature:	23.5 °C
Relative Humidity:	48 %
ATM Pressure:	101.5kPa

*\* The testing was performed by Ares Liu on 2013-01-31.*

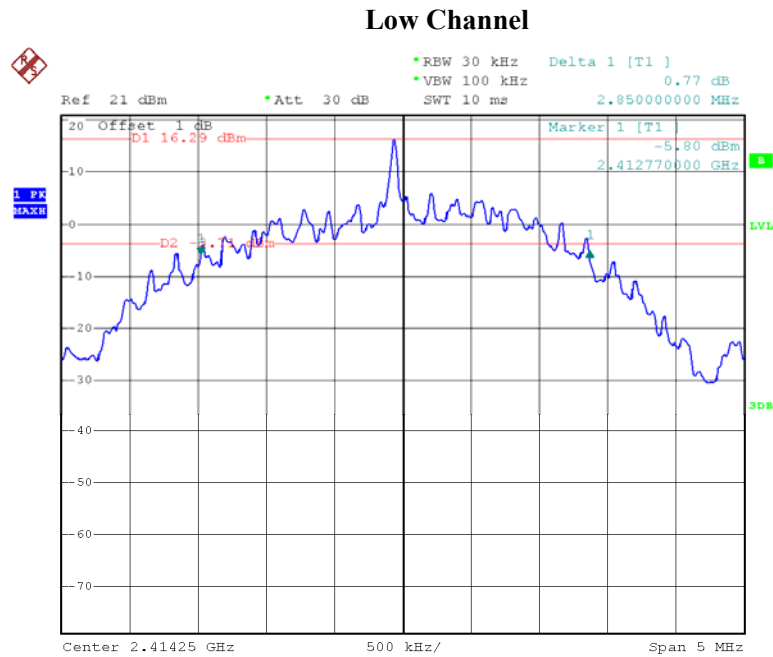
**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

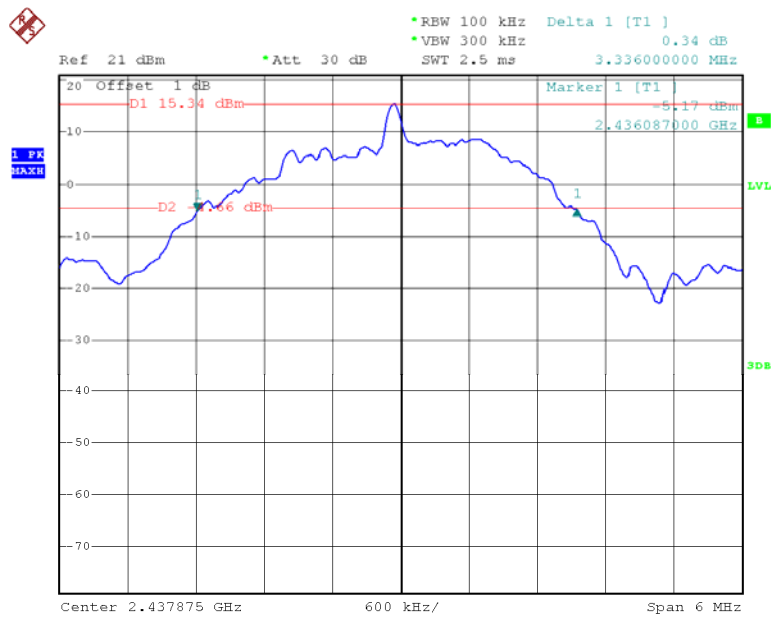
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2414.25	2.850
Middle	2437.875	3.336
High	2461.5	2.700

Please refer to the following plots.



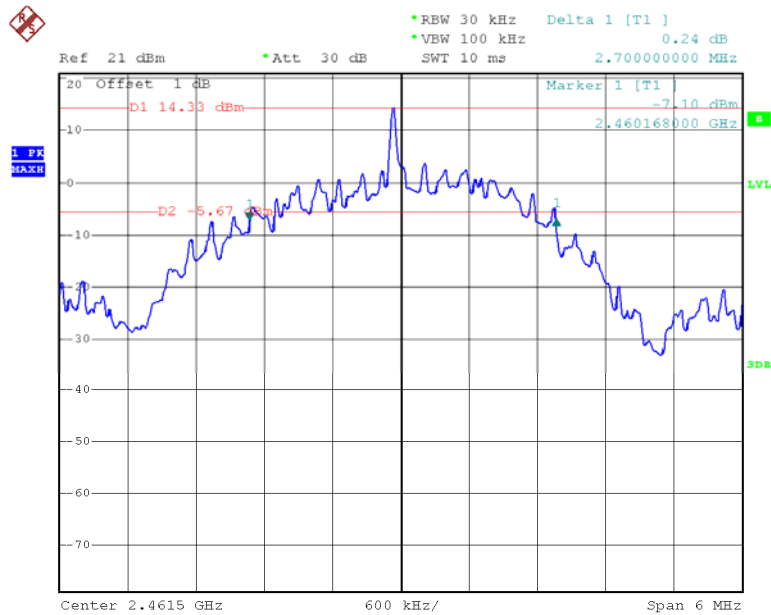
Date: 31.JAN.2013 14:17:39

### Middle Channel



Date: 31.JAN.2013 14:28:00

### High Channel



Date: 31.JAN.2013 14:29:25

**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
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

**Test Data****Environmental Conditions**

Temperature:	23.5 °C
Relative Humidity:	48 %
ATM Pressure:	101.5kPa

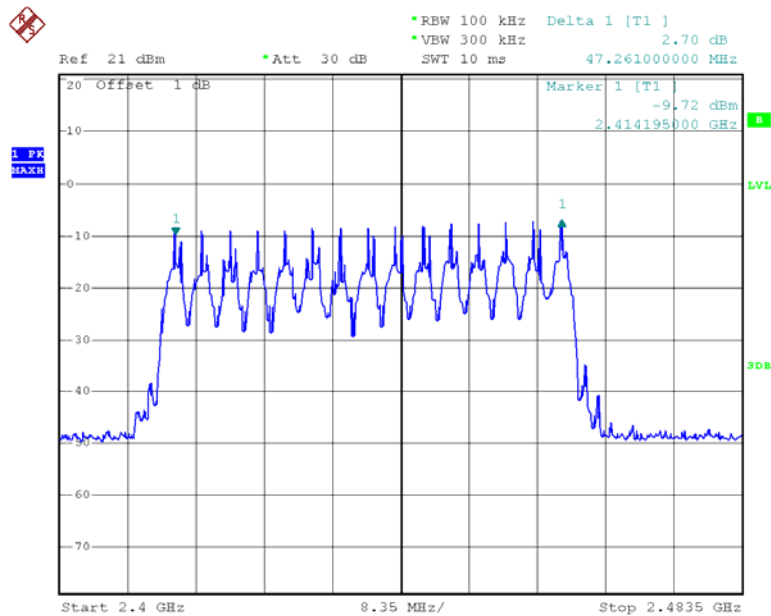
*\* The testing was performed by Ares Liu on 2013-01-31.*

**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	$\geq 15$

**Number of Hopping Channels**

Date: 31.JAN.2013 15:54:28

**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
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

**Test Data****Environmental Conditions**

Temperature:	24.1°C
Relative Humidity:	50 %
ATM Pressure:	101.5kPa

\* The testing was performed by Ares Liu on 2013-02-01.

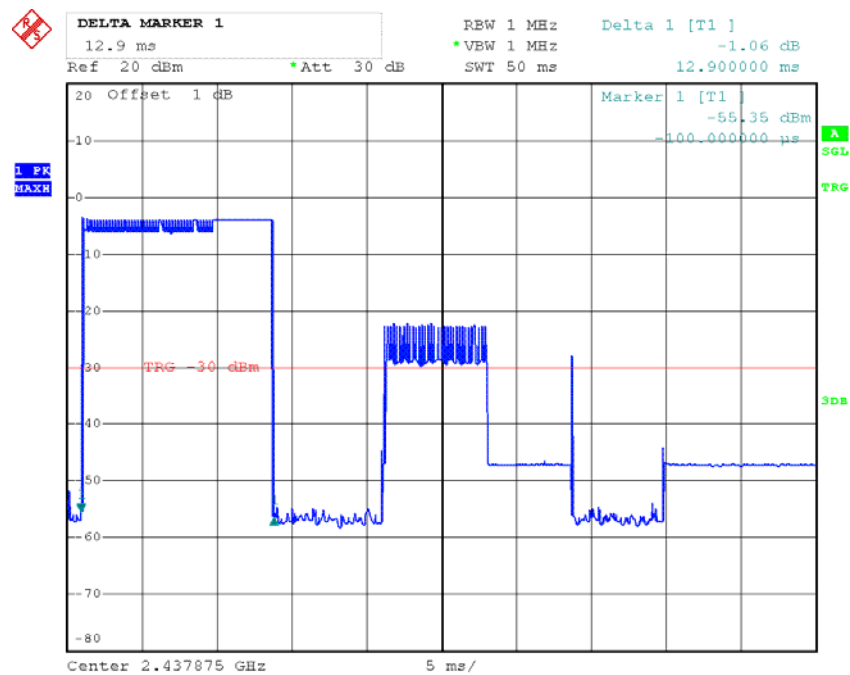
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Middle	12.900	0.258	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.



Date: 1.FEB.2013 13:59:22

**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 an EMI test receiver.
3. Add a correction factor to the display.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

**Test Data****Environmental Conditions**

Temperature:	23.5°C
Relative Humidity:	48%
ATM Pressure:	101.5kPa

*\* The testing was performed by Ares Liu on 2013-01-31.*

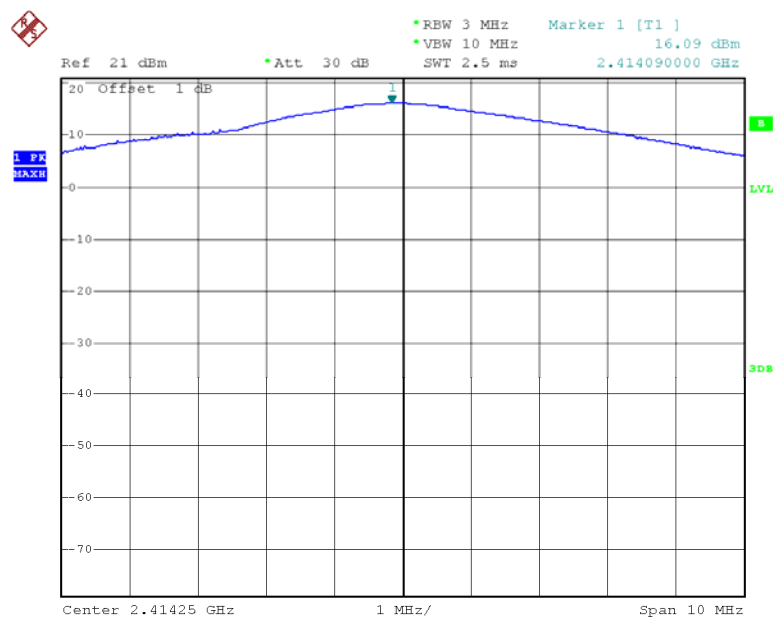
**Test Result:** Compliance.

Test Mode: Transmitting

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2414.25	16.09	21
Middle	2437.875	16.36	21
High	2461.5	14.22	21

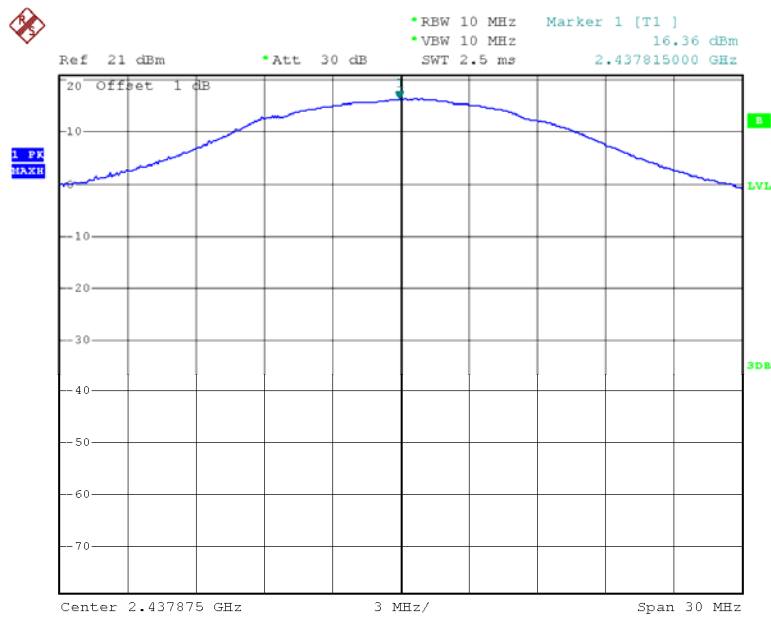
Note: The data above was tested in conducted mode.

### Output Power, Low



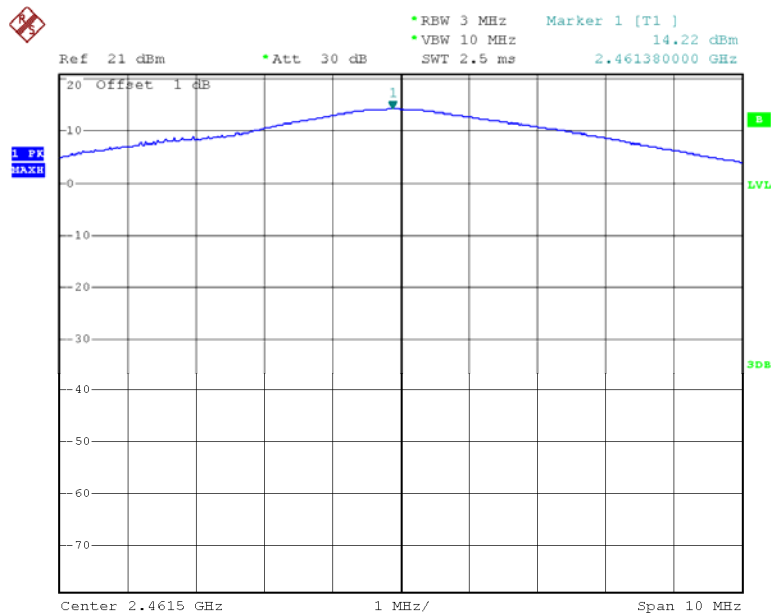
Date: 31.JAN.2013 14:18:32

### Output Power, Middle



Date: 31.JAN.2013 14:26:06

### Output Power, High



Date: 31.JAN.2013 14:29:56

## 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

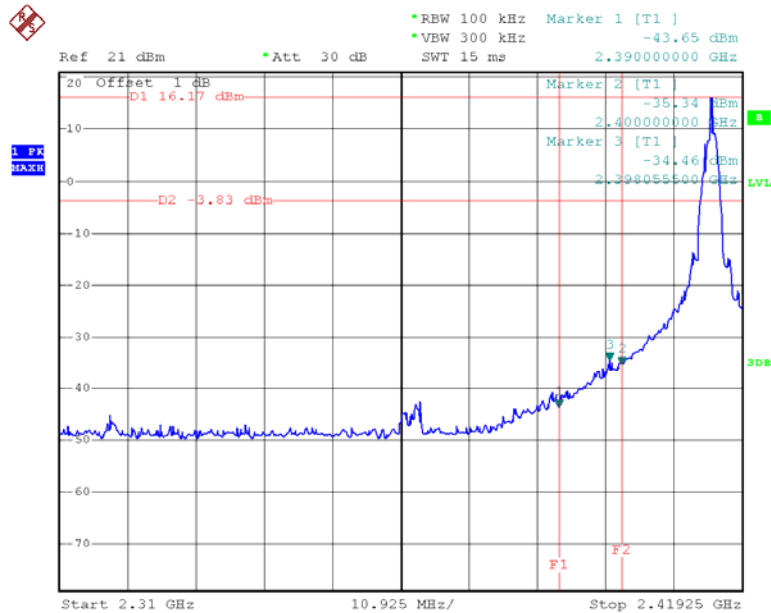
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

### Test Data

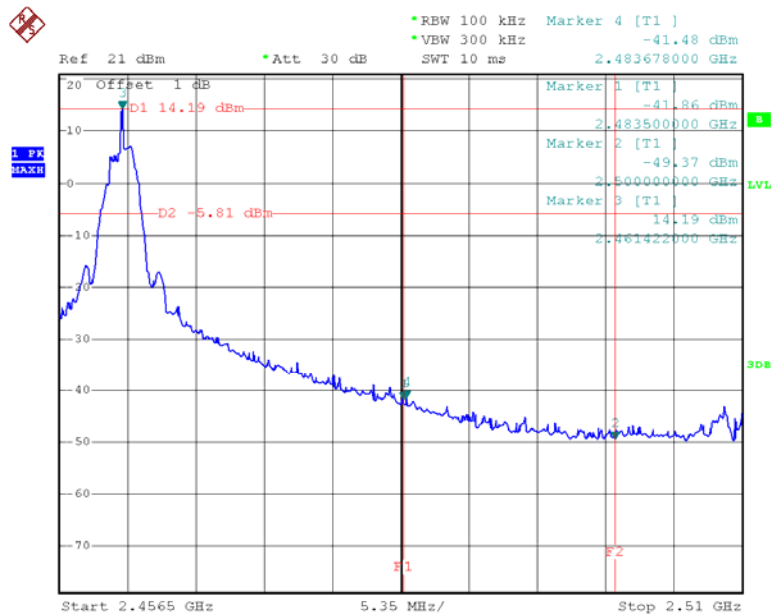
#### Environmental Conditions

Temperature:	23.5°C
Relative Humidity:	48%
ATM Pressure:	101.5kPa

*\*The testing was performed by Ares Liu on 2013-01-31.*

**Test Result: Compliance****Band Edge, Left Side**

Date: 31.JAN.2013 14:20:04

**Band Edge, Right Side**

Date: 31.JAN.2013 14:31:10

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