

# FCC PART 15.247

## MEASUREMENT AND TEST REPORT

For

### Shanghai Simcom Limited

Building A, SIM Technology Building, No.633 Jinzhong Road,  
Changning District, Shanghai, P.R.of China

**FCC ID: VO4SP01POTTER**

<b>Report Type:</b> Original Report	<b>Product Type:</b> GSM/GPRS Digital Mobile Phone
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<b>Report Number:</b> <u>RSH08120151</u>	
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\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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## GENERAL INFORMATION

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

The *Shanghai Simcom Limited's* product, model number: *SH6010C* or the "EUT" as referred to in this report is a *GSM/GPRS Digital Mobile Phone with Bluetooth*, which measures approximately: 10.0 cm L x 5.0 cm W x 1.5 cm H, input voltage: 5.0V Adapter.

Frequency Band: GSM900: 880-915 MHz (Tx); 925-960 MHz (Rx)  
DCS1800: 1710-1785 MHz (Tx); 1805-1880 MHz (Rx)  
PCS1900: 1850-1910 MHz (Tx); 1930-1990 MHz (Rx)  
Bluetooth: 2402-2480 MHz (Tx/Rx)

Adapter:  
Model: P-032B;  
Input: 100-240V 50/60Hz 0.2A;  
Output: 5.0V 500mA.

*\* All measurement and test data in this report was gathered from production sample serial number: 0812026 (Assigned by BACL, Shenzhen). The EUT was received on 2008-12-01.*

### Objective

This Type approval report is prepared on behalf of *Shanghai Simcom Limited* 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 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)

FCC Part 24E submission with FCC ID: VO4SP01POTTER.

### 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. (Shenzhen). 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. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 November 04, 2004. 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.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at  
<http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

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### Description of Test Configuration

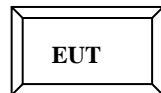
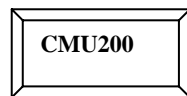
The system was configured for testing in a typical fashion (as normally used by a typical user).

### Equipment Modifications

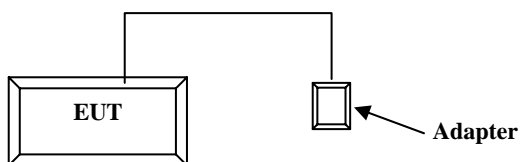
No modification was made to the unit tested.

### Configuration of Test Setup

For Transmitting:

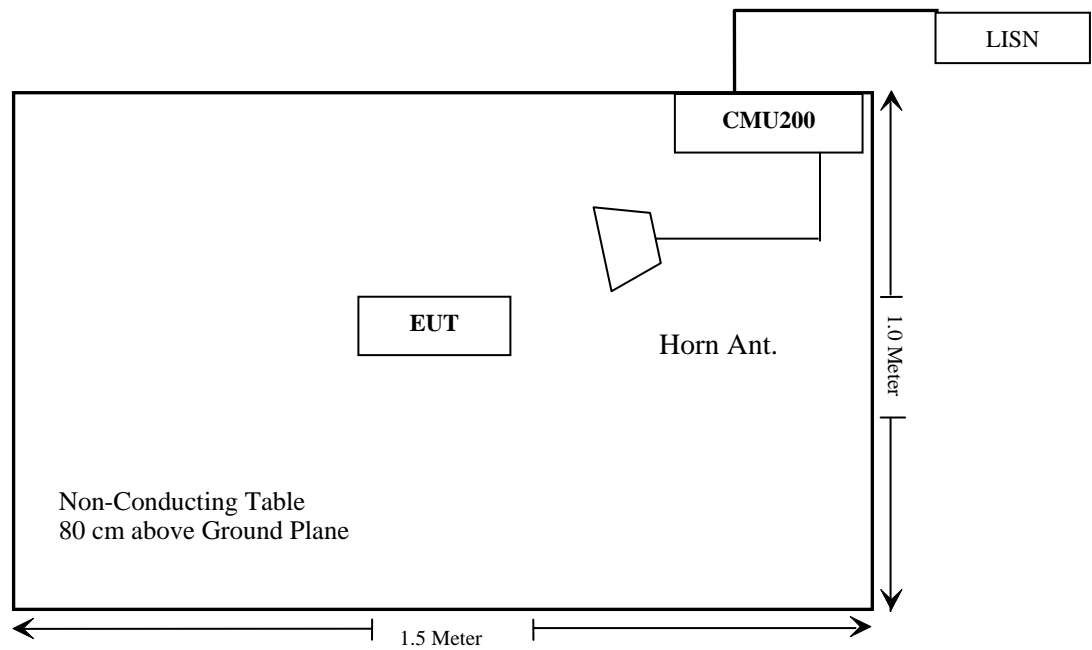


For Charging:

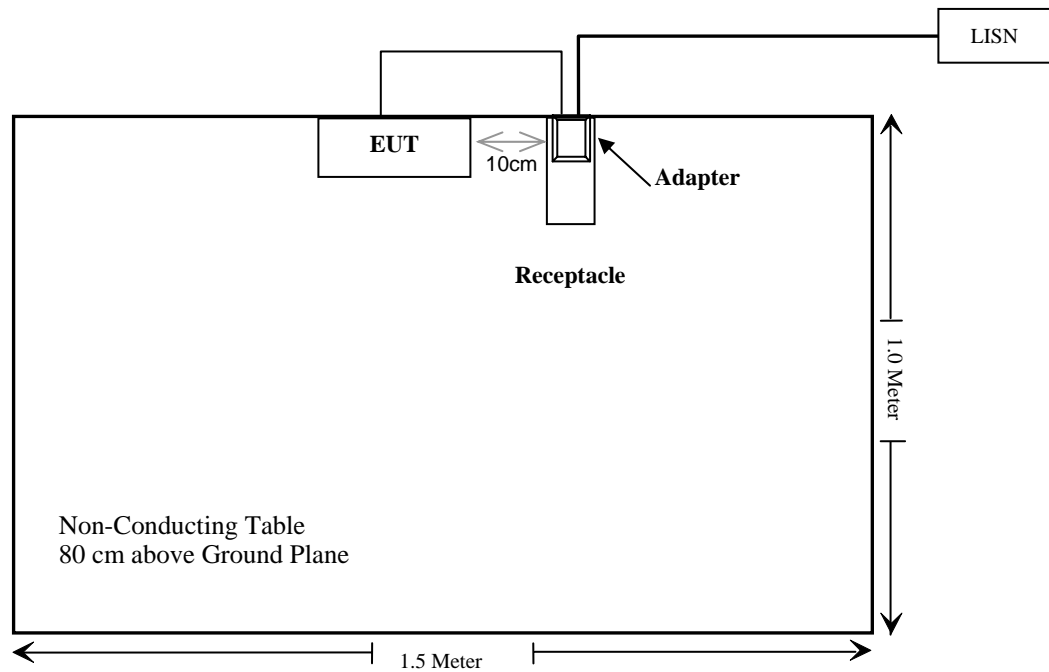


**Block Diagram of Test Setup**

For Transmitting:



For Charging:



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.205, §15.209, §15.109, §15.247(d)	Radiated Emissions	Compliant
§15.247 (a)(1)	20 dB Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant



**CFR47 §15.247 (i) and §2.1093 - RF EXPOSURE****Standard Applicable**

According to §15.247 (i) and §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 General Population/Uncontrolled Exposure**

According to FCC Exclusion list, In the following table,  $f_{\text{GHz}}$  is mid-band frequency in GHz, and  $d$  is the distance to a person's body, excluding hands, wrists, feet, and ankles.

Exposure category	<u>low threshold</u>	<u>high threshold</u>
general population	$(60/f_{\text{GHz}}) \text{ mW}, d < 2.5 \text{ cm}$ $(120/f_{\text{GHz}}) \text{ mW}, d \geq 2.5 \text{ cm}$	$(900/f_{\text{GHz}}) \text{ mW}, d < 20 \text{ cm}$
occupational	$(375/f_{\text{GHz}}) \text{ mW}, d < 2.5 \text{ cm}$ $(900/f_{\text{GHz}}) \text{ mW}, d \geq 2.5 \text{ cm}$	$(2250/f_{\text{GHz}}) \text{ mW}, d < 20 \text{ cm}$

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

**Result:**

Two antennas are available for the EUT, one is GSM/PCS antenna and the other is Bluetooth antenna, the distance between them is more than 5 cm, according to FCC KDB 648474 D01 SAR Handsets Multi Xmitter and ant. V01r05 released on September 2008, the Max peak output power is  $0.75 \text{ mW} < 24.58 = (60/2.441 \text{ GHz}) \text{ mW}$ , stand-alone SAR is not required for Bluetooth antenna.

The SAR measurement for Bluetooth is exempt.

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**CFR47 §15.203 - ANTENNA REQUIREMENT**

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**Standard Applicable**

According to CFR47 § 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 an integral antenna built on PCB and ANT gain is 2dBi end-user can not access; please refer to the EUT internal photos.

**Result:** Compliant.

## CFR47 §15.207 (a) - CONDUCTED EMISSIONS

### Applicable Standard

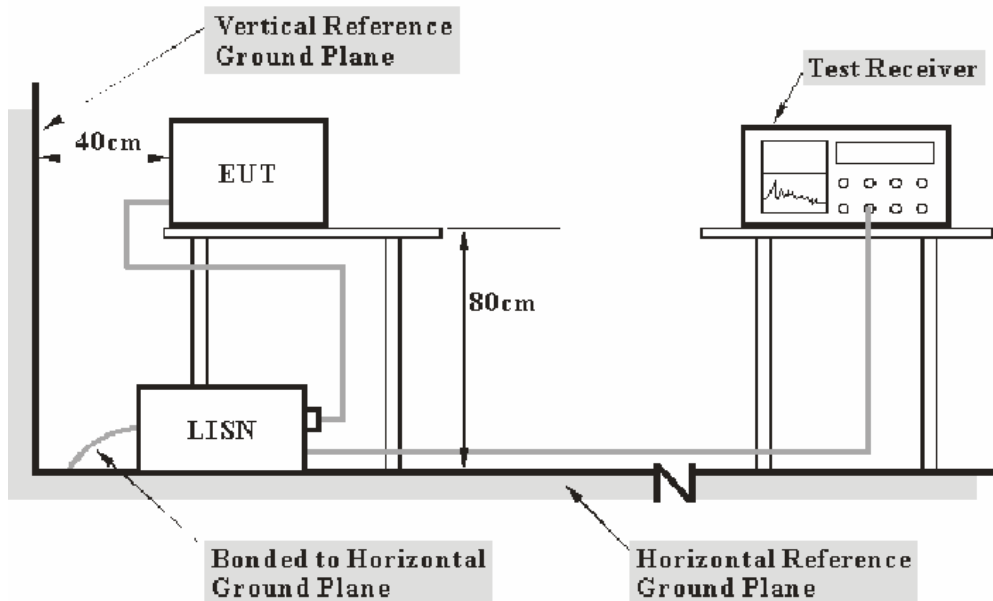
CFR47 §15.207

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is  $\pm 2.4$  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 Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2008-03-25	2009-03-25
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2008-03-25	2009-03-25
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## 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.

## 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:

**4.50 dB at 0.705 MHz** in the **Neutral** conductor mode

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

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

\* The testing was performed by Alvin Huang on 2008-12-08.

Test Mode: Charging & Transmitting

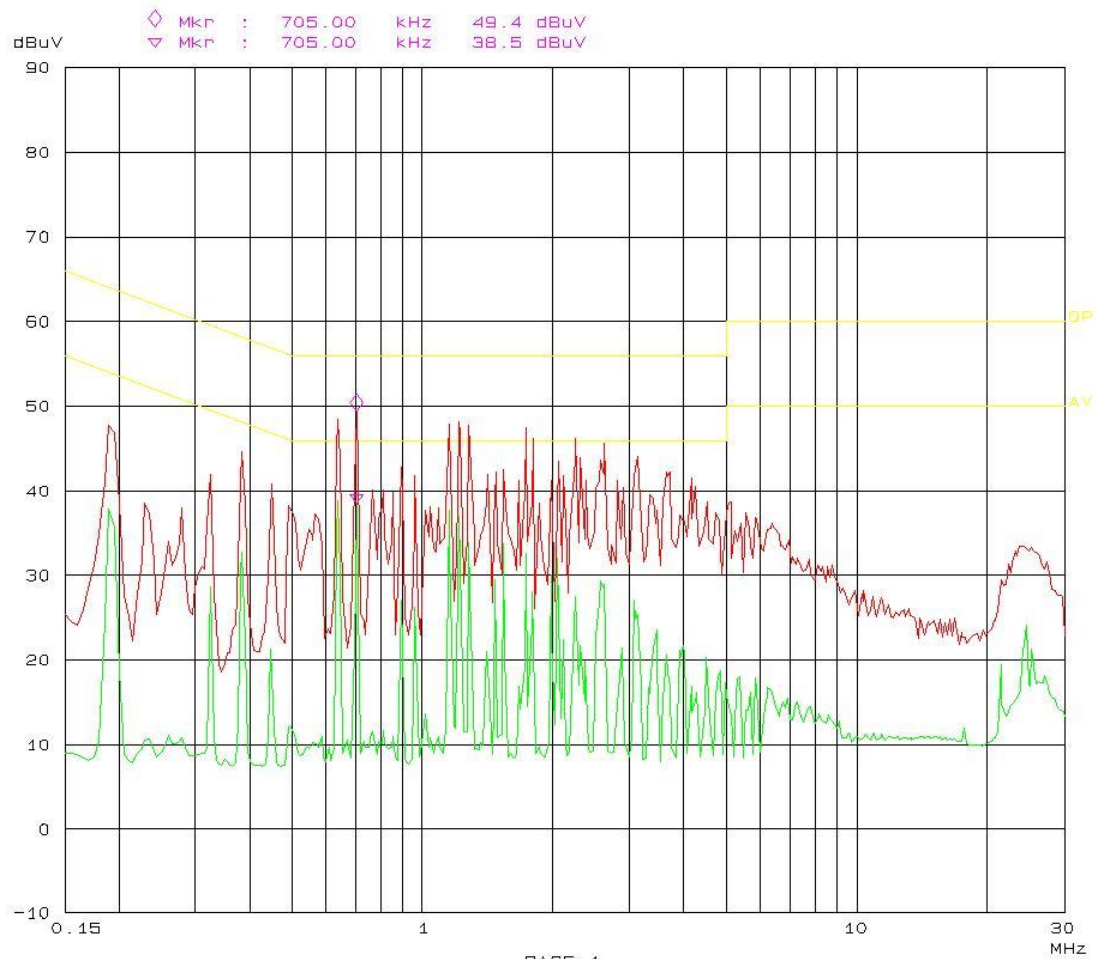
Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)
0.705	41.50	AV	Neutral	46.00	4.50
0.700	50.40	QP	Neutral	56.00	5.60
1.150	40.10	AV	Neutral	46.00	5.90
1.145	50.00	QP	Neutral	56.00	6.00
0.765	39.80	AV	Neutral	46.00	6.20
0.705	49.40	QP	Line	56.00	6.60
0.765	49.20	QP	Neutral	56.00	6.80
0.640	38.90	AV	Line	46.00	7.10
0.640	48.50	QP	Line	56.00	7.50
0.705	38.50	AV	Line	46.00	7.50
0.520	41.20	AV	Neutral	49.70	8.50
1.155	47.40	QP	Line	56.00	8.60
1.280	47.40	QP	Line	56.00	8.60
0.255	42.40	AV	Neutral	51.60	9.20
0.520	48.60	QP	Neutral	59.70	11.10
0.255	50.40	QP	Neutral	61.60	11.20
1.280	33.90	AV	Line	46.00	12.10
0.190	41.80	AV	Neutral	54.00	12.20
1.155	32.90	AV	Line	46.00	13.10
0.385	44.70	QP	Line	58.20	13.50
0.190	49.40	QP	Neutral	64.00	14.60
0.385	32.80	AV	Line	48.20	15.40
0.190	37.90	AV	Line	54.00	16.10
0.190	47.70	QP	Line	64.00	16.30

**Plot(s) of Test Data**

Plot(s) of Test Data is presented hereinafter as reference.

# Conducted emission fcc 15

EUT: GSM/GPRS/Digital Mobilephone M/N: SH6010C  
Op Cond: Charging and transmitting  
Operator: alvin  
Test Spec: AC 120V/60Hz L  
Comment: Temp: 25 Hum: 56%  
BACL



# Conducted emission fcc 15

EUT: GSM/GPRS/Digital Mobilephone M/N: SH6010C

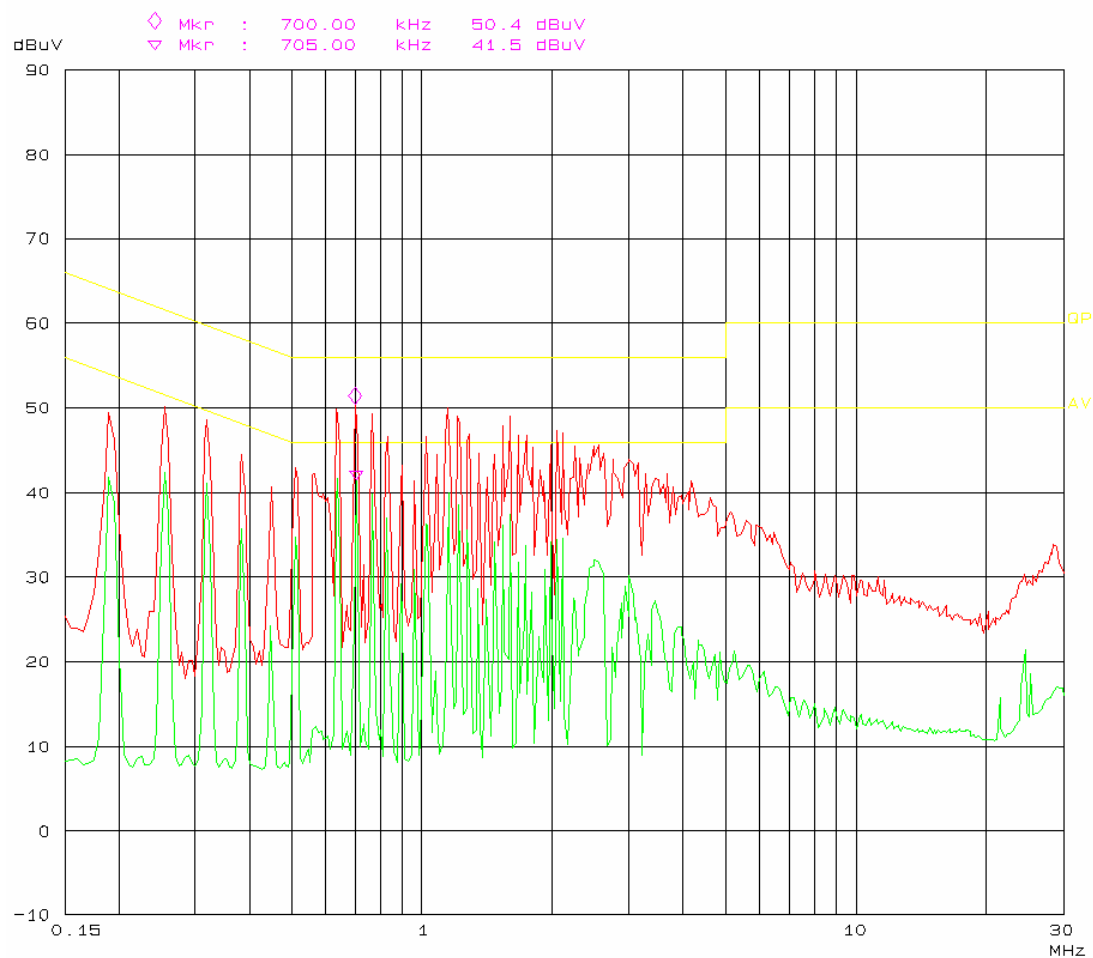
Op Cond: Charging and transmitting

Operator: alvin

Test Spec: AC 120V/60Hz N

Comment: Temp: 25 Hum: 56%

BACL



## CFR47 §15.205, §15.209, §15.247 - RADIATED EMISSIONS

### Applicable Standard

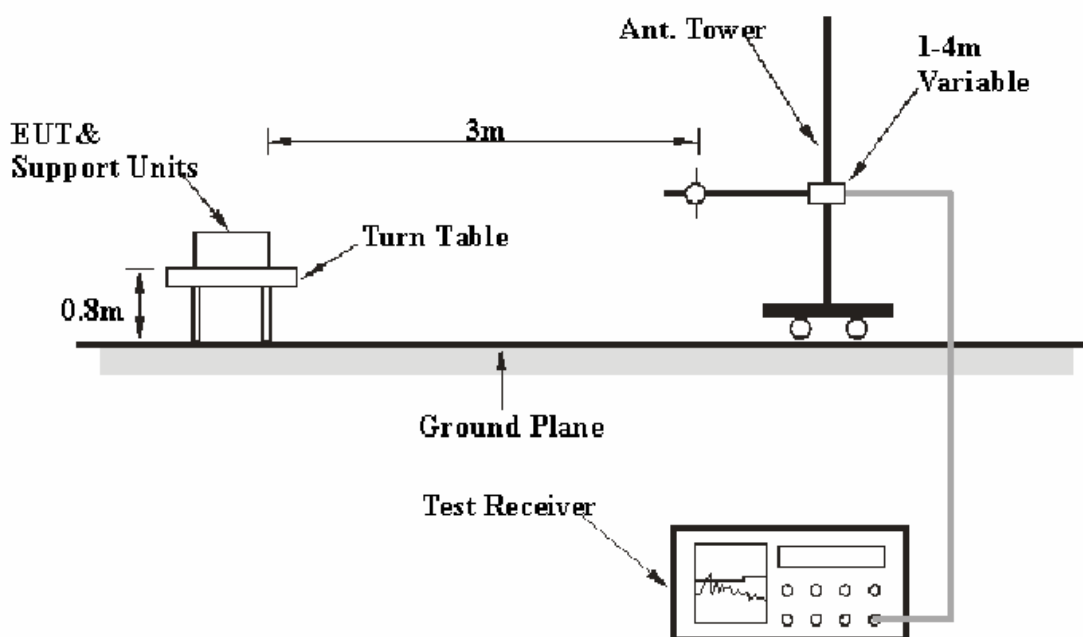
CFR47 §15.205; §15.109; §15.247 (d).

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is  $\pm 4.0$  dB.

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber B 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 spacing between the peripherals was 10 cm.

For transmitting:

The CMU200 was connected to a 120 VAC/60 Hz power source.

For Charging:

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:

<i><b>Frequency Range</b></i>	<i><b>RBW</b></i>	<i><b>Video B/W</b></i>
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25 GHz	1 MHz	3 MHz

## Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
HP	Amplifier	HP8447D	2944A09795	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

For transmitting mode:

For the radiated emissions test, the CMU200 was connected to the AC floor outlet.

For charging mode:

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

## 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 maximum 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, section 15.205, 15.209 and 15.247, with the worst margin reading of:

#### Transmitting mode (Below 1GHz):

10.8 dB at 819.131675 MHz in the Vertical polarization

#### Transmitting mode (Above 1 GHz):

7.76 dB at 4804 MHz in the Horizontal polarization (Low Channel)

7.25 dB at 4882 MHz in the Horizontal polarization (Middle Channel)

6.61 dB at 4960 MHz in the Horizontal polarization (High Channel)

#### Charging mode:

21.9 dB at 39.668975 MHz in the Vertical polarization

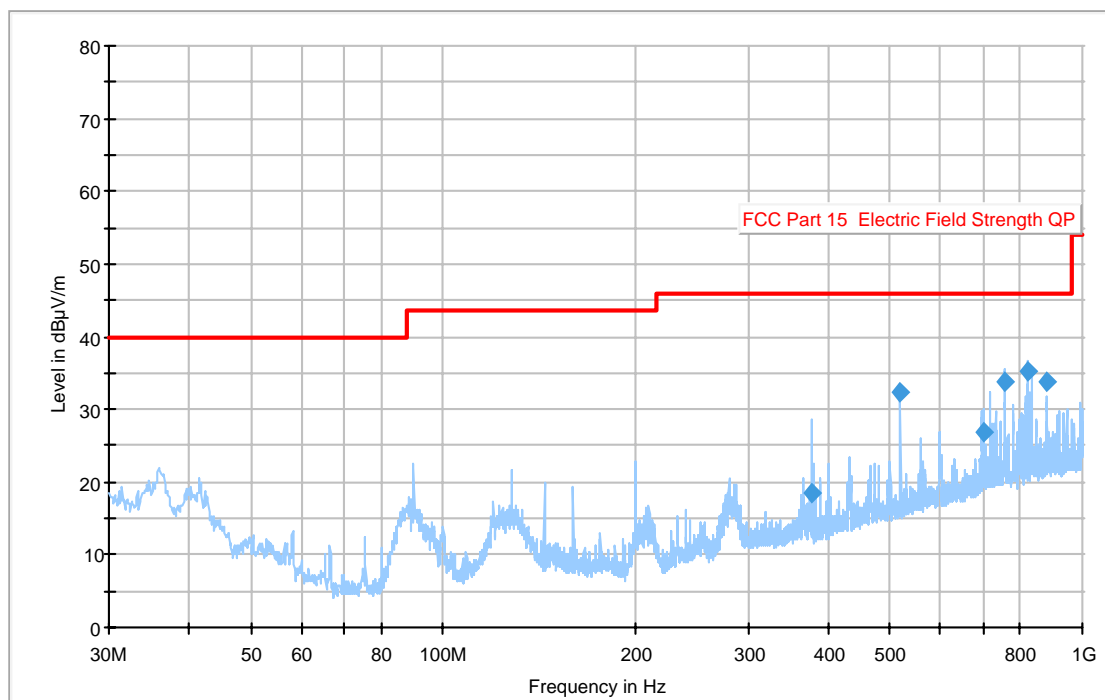
### Test Data

#### Environmental Conditions

Temperature:	23 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

*\* The testing was performed by Alvin Huang on 2008-12-08*

Test Mode: Transmitting (worse-case below 1GHz)



Frequency (MHz)	Corrected Amp. (dBμV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
819.131675	35.2	110.0	V	216.0	-4.9	46.0	10.8
755.988575	33.9	110.0	V	212.0	-5.9	46.0	12.1
882.026700	33.7	110.0	V	199.0	-4.3	46.0	12.3
520.018950	32.3	110.0	V	52.0	-10.2	46.0	13.7
701.132125	26.8	110.0	V	215.0	-6.9	46.0	19.2
378.000175	18.6	110.0	H	329.0	-12.9	46.0	27.4

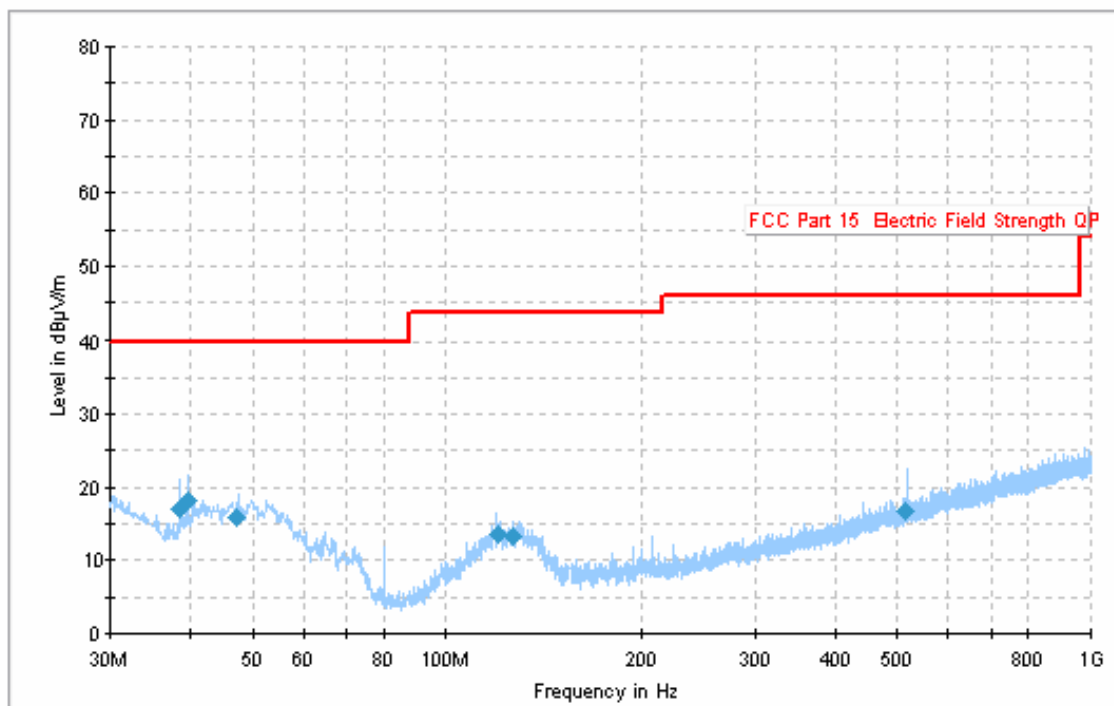
Test Mode: Transmitting (Above 1GHz)

Freq. (MHz)	S.A. Reading (dBμV)	Detector PK/QP/AV	Direction Degree	Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBuV/m)	FCC Part 15.247/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)	Remarks
Low Channel (2402 MHz)												
4804	36.08	AV	240	1.02	H	36.3	7.56	33.7	46.24	54	7.76	Harmonic
4804	36.77	AV	180	1.05	V	35.0	7.56	33.7	45.63	54	8.37	Harmonic
4804	46.05	PK	240	1.02	H	36.3	7.56	33.7	56.21	74	17.79	Harmonic
4804	46.78	PK	180	1.05	V	35.0	7.56	33.7	55.64	74	18.36	Harmonic
1128	37.87	AV	175	1.55	V	24.0	4.90	34.8	31.97	54	22.03	Spurious
1128	36.40	AV	225	1.40	H	25.2	4.90	34.8	31.70	54	22.3	Spurious
1128	52.41	PK	175	1.55	V	24.0	4.90	34.8	46.51	74	27.49	Spurious
1128	49.52	PK	225	1.40	H	25.2	4.90	34.8	44.82	74	29.18	Spurious
Middle Channel (2441 MHz)												
4882	36.45	AV	250	1.00	H	36.3	7.7	33.7	46.75	54	7.25	Harmonic
4882	36.15	AV	283	1.13	V	35.0	7.7	33.7	45.15	54	8.85	Harmonic
4882	46.67	PK	250	1.00	H	36.3	7.7	33.7	56.97	74	17.03	Harmonic
4882	45.98	PK	283	1.13	V	35.0	7.7	33.7	54.98	74	19.02	Harmonic
1128	38.02	AV	130	1.07	V	24.0	4.9	34.8	32.12	54	21.88	Spurious
1128	36.72	AV	175	1.37	H	25.2	4.9	34.8	32.02	54	21.98	Spurious
1128	53.16	PK	130	1.07	V	24.0	4.9	34.8	47.26	74	26.74	Spurious
1128	49.98	PK	175	1.37	H	25.2	4.9	34.8	45.28	74	28.72	Spurious
High Channel (2480 MHz)												
4960	36.89	AV	35.0	1.1	H	36.4	7.9	33.8	47.39	54	6.61	Harmonic
4960	36.03	AV	355	1.1	V	35.2	7.9	33.8	45.33	54	8.67	Harmonic
4960	47.16	PK	35.0	1.1	H	36.4	7.9	33.8	57.66	74	16.34	Harmonic
4960	46.52	PK	355	1.1	V	35.2	7.9	33.8	55.82	74	18.18	Harmonic
1402	35.64	AV	150	1.15	H	26.7	5.37	34.6	33.11	54	20.89	Spurious
1402	34.69	AV	280	1.2	V	25.8	5.37	34.6	31.26	54	22.74	Spurious
1402	49.10	PK	150	1.15	H	26.7	5.37	34.6	46.57	74	27.43	Spurious
1402	47.53	PK	280	1.2	V	25.8	5.37	34.6	44.10	74	29.90	Spurious

**Spurious Emission in Restricted Band**

Freq. (MHz)	S.A. Reading (dBμV)	Detector PK/QP/AV	Direction Degree	Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBuV/m)	FCC Part 15.247/209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)
Out of left side band (2310 – 2390 MHz)											
2388.08	55.52	PK	180	1.6	H	30.9	7.6	33.9	60.12	74	13.88
2388.08	34.46	AV	180	1.6	H	30.9	7.6	33.9	39.06	54	14.94
2389.67	51.66	PK	354	1.2	V	30.3	7.6	33.9	55.66	74	18.34
2389.67	34.39	AV	354	1.2	V	30.3	7.6	33.9	38.39	54	15.61
Out of left side band (2483.5 – 2500 MHz)											
2486.14	47.26	PK	0	1.8	H	30.9	8	33.9	52.26	74	21.74
2486.14	34.25	AV	0	1.8	H	30.9	8	33.9	39.25	54	14.75
2484.79	47.39	PK	360	1.2	V	30.3	8	33.9	51.79	74	22.21
2484.79	34.28	AV	360	1.2	V	30.3	8	33.9	38.68	54	15.32

Test Mode: Charging



Frequency (MHz)	Corrected Amp. (dBμV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
39.668975	18.1	401.0	V	80.0	-15.2	40.0	21.9
38.608750	17.1	123.0	V	360.0	-15.1	40.0	22.9
47.217540	16.0	110.0	V	180.0	-18.5	40.0	24.0
513.908751	16.8	189.0	V	0.0	-10.6	43.5	26.7
120.088751	13.5	109.0	V	270.0	-18.9	43.5	30.0
127.121250	13.4	128.0	H	180.0	-18.7	46.0	32.6

## CFR47 §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 2400-2483.5 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	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### 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 truce
3. Measure the channel separation.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	23°C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

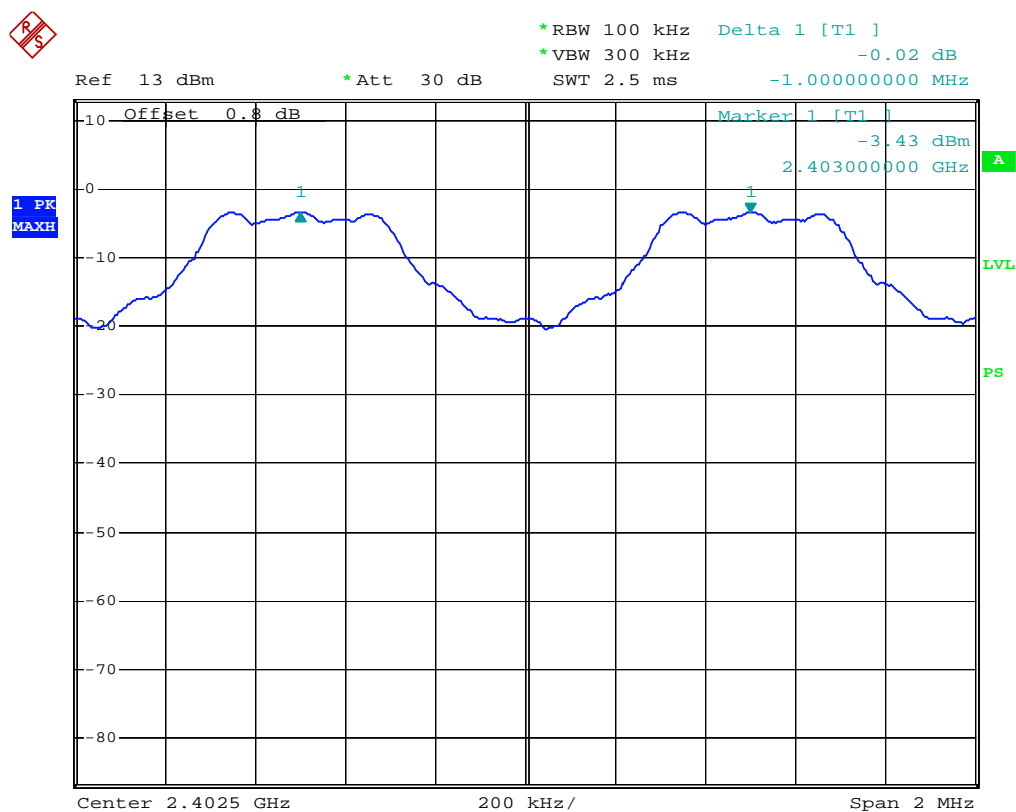
\* The testing was performed by Alvin Huang on 2008-12-02.

**Test Result:** Compliant.

Please refer to following tables and plots

*Test Mode: Transmitting*

Channel	Channel Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
Low Channel	2402	1000	482.6	Pass
Adjacent Channel	2403			
Mid Channel	2441	1000	488.0	Pass
Adjacent Channel	2442			
High Channel	2480	1004	485.3	Pass
Adjacent Channel	2479			

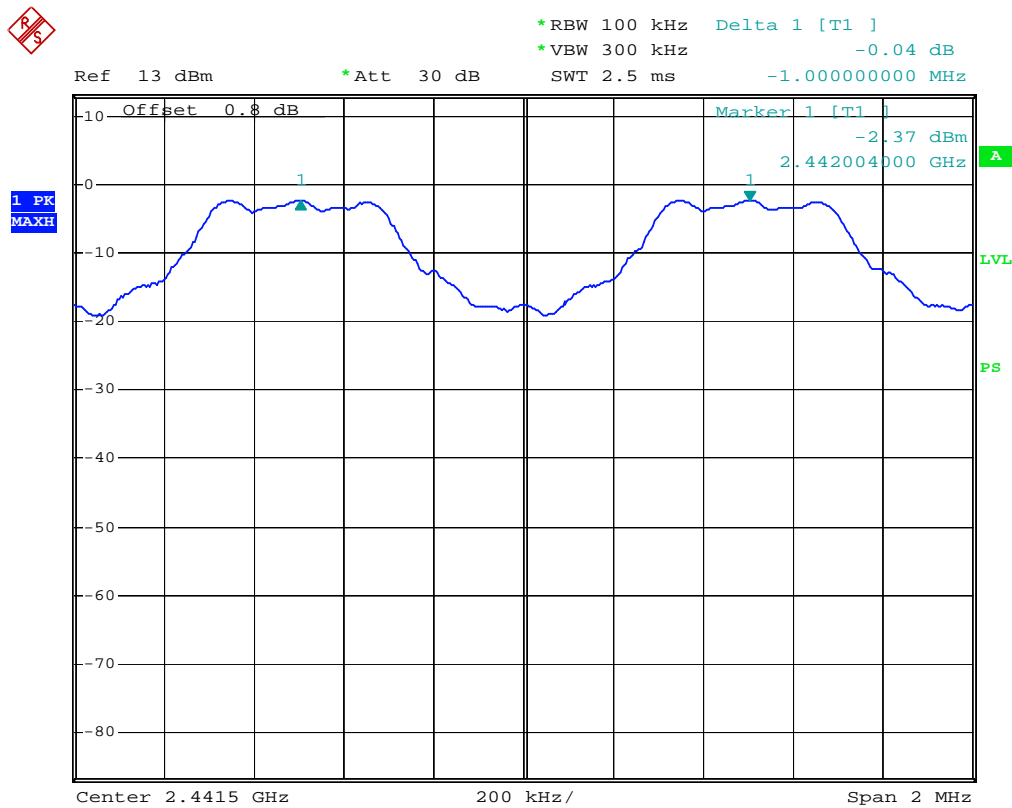
**Low Channel**

channel separation low channel

Date: 2.DEC.2008 20:34:15



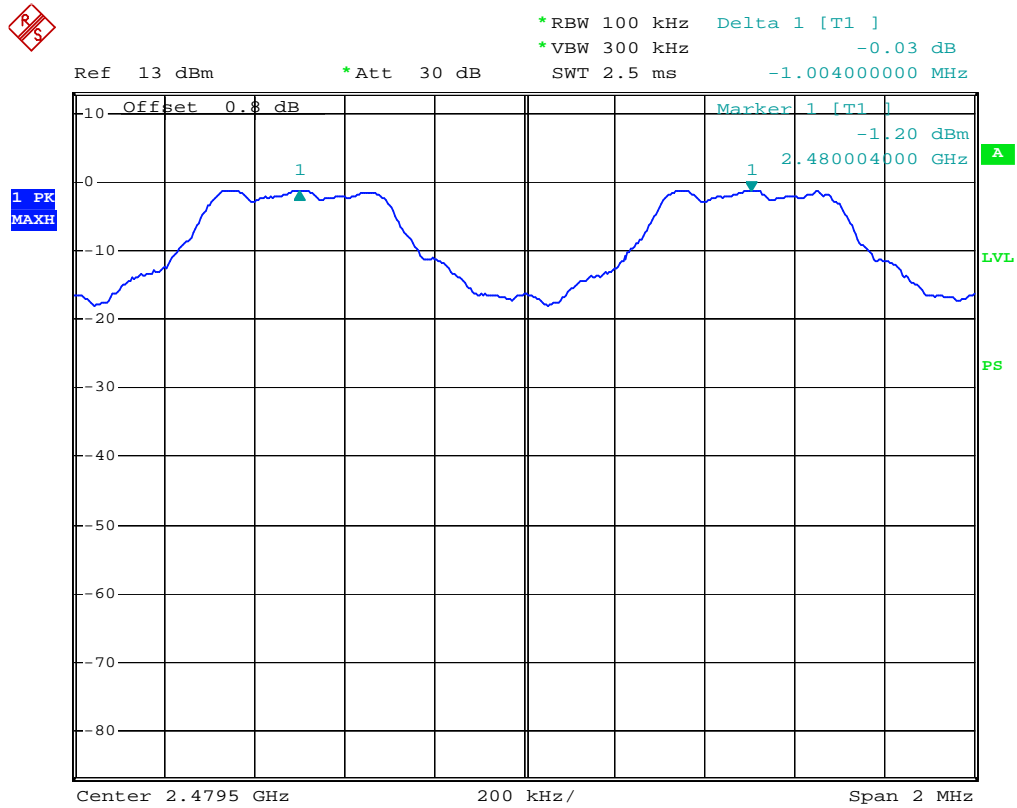
Middle Channel



channel separation middle channel

Date: 2.DEC.2008 20:32:09

## High Channel



channel separation high channel

Date: 2.DEC.2008 20:29:38

## CFR47 §15.247(a) (1) – 20dB 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 125mW.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 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 Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	100.7 kPa

\* The testing was performed by Alvin Huang on 2008-12-10.

**Test Result:** Compliant.

Please refer to following tables and plots

Channel	Frequency (MHz)	20dB Bandwidth (kHz)
Low	2402	724
Middle	2441	732
High	2480	728

Ref 13 dBm      \*Att 30 dB      SWT 2.5 ms      2.402000000 GHz

\*RBW 30 kHz      Marker 1 [T1]      -3.28 dBm  
 \*VBW 100 kHz

Offset 0.8 dB

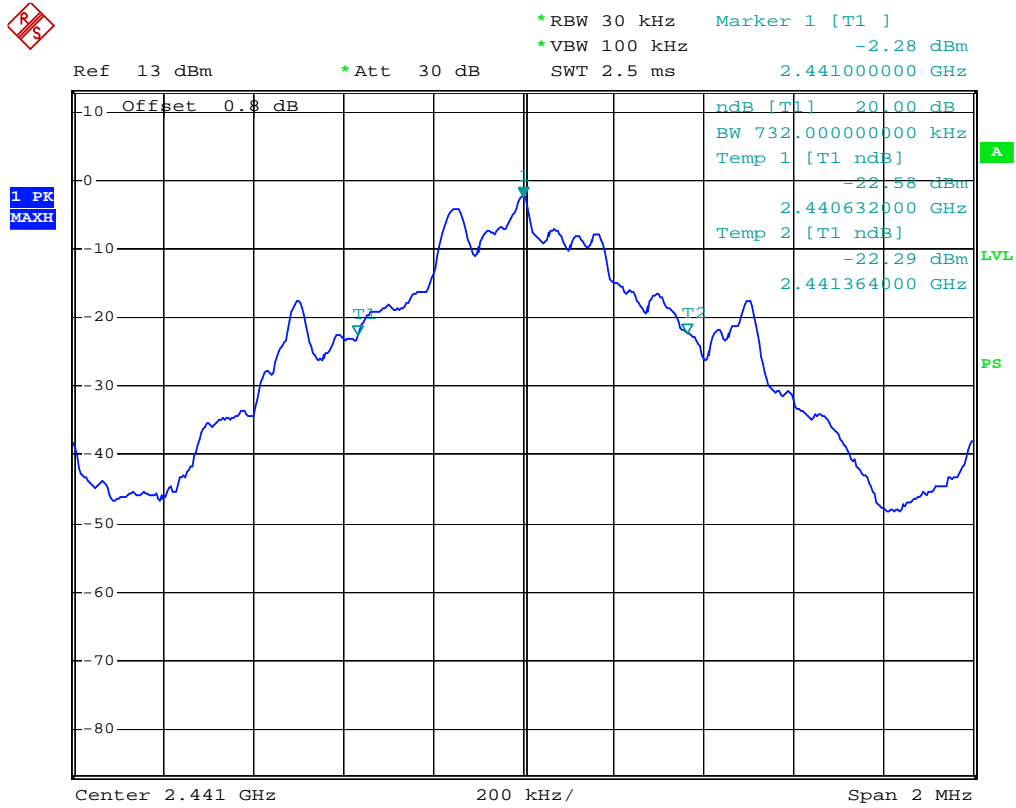
1 PK  
MAXH

ndB [T1] 20.00 dB  
 BW 724.000000000 kHz  
 Temp 1 [T1 ndB] -22.99 dBm  
 2.401640000 GHz  
 Temp 2 [T1 ndB] -23.28 dBm  
 2.402364000 GHz

Center 2.402 GHz      200 kHz/      Span 2 MHz

Date: 10.DEC.2008 19:11:00

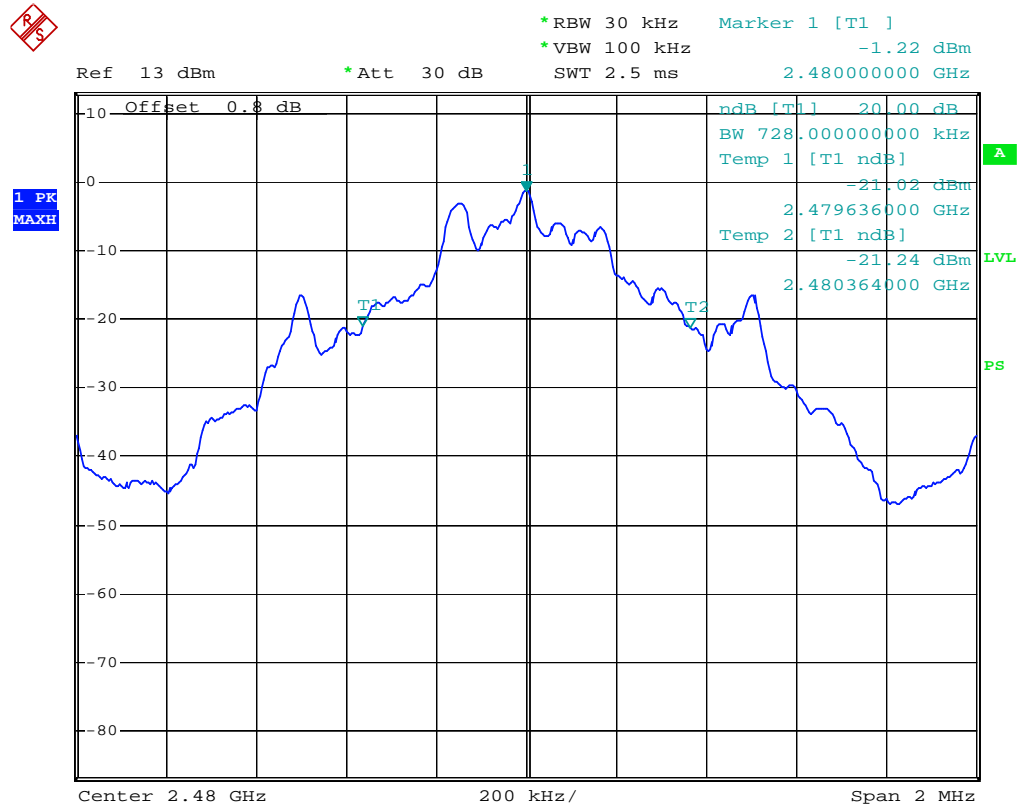
## Middle Channel



20db bandwidth-middle channel

Date: 10.DEC.2008 19:12:31

## High Channel



20db bandwidth-high channel

Date: 10.DEC.2008 19:13:52

**CFR47 §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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**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 Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	54 %
ATM Pressure:	100.6 kPa

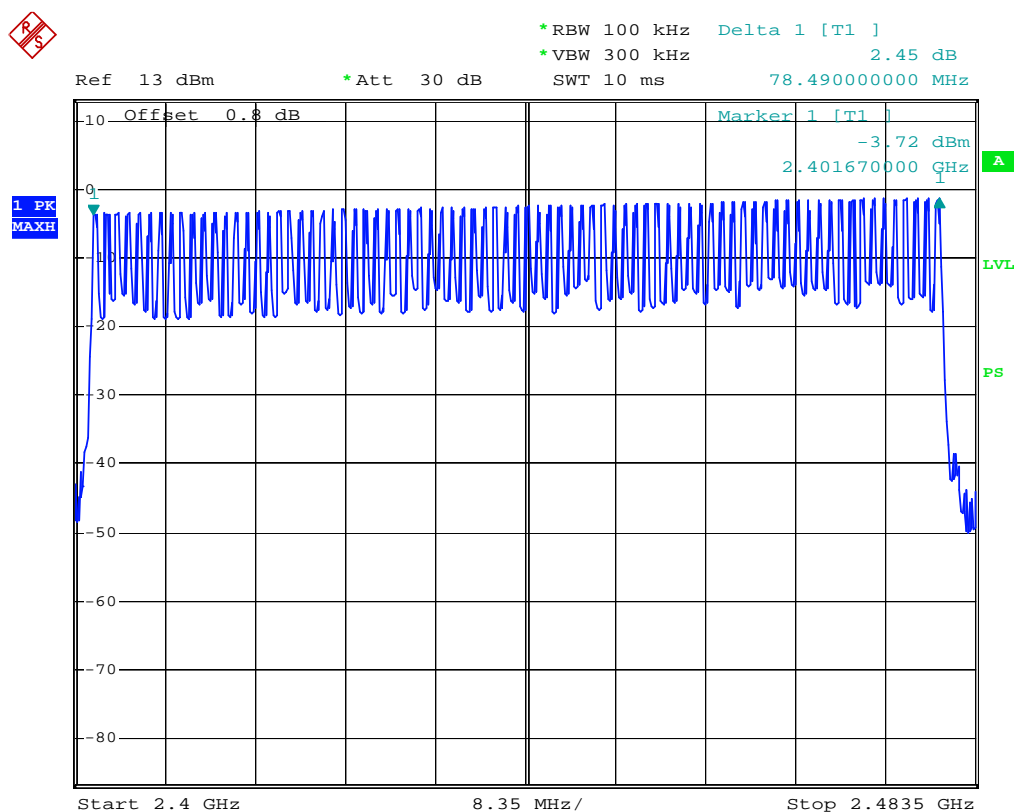
*The testing was performed by Alvin Huang on 2008-12-02.*

**Test Result:** Compliant.

Please refer to following tables and plots

*Test Mode: Transmitting*

Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
2402-2480	79	$\geq 15$

**Number of Hopping Channels**

quantity of channel

Date: 2.DEC.2008 20:58:03



**CFR47 §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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Procedure**

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X 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 \* 31.6s

Hop rate=1600/s

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

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	54 %
<b>ATM Pressure:</b>	100.7 kPa

\* The testing was performed by Alvin Huang on 2008-12-02.

**Test Result:** Compliant.

Please refer to following tables and plots

*Test Mode: Transmitting***DH 1 Mode:**

Channel	Pulse Width (ms)	Dwell Time (Sec)	Limit (Sec)	Result
Low	0.485	0.155	0.4	Pass
Middle	0.485	0.155	0.4	Pass
High	0.490	0.157	0.4	Pass

**Note:** Dwell time=Pulse width (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$  31.6 Second

**DH 3 Mode:**

Channel	Pulse Width (ms)	Dwell Time (Sec)	Limit (Sec)	Result
Low	1.765	0.283	0.4	Pass
Middle	1.765	0.283	0.4	Pass
High	1.770	0.284	0.4	Pass

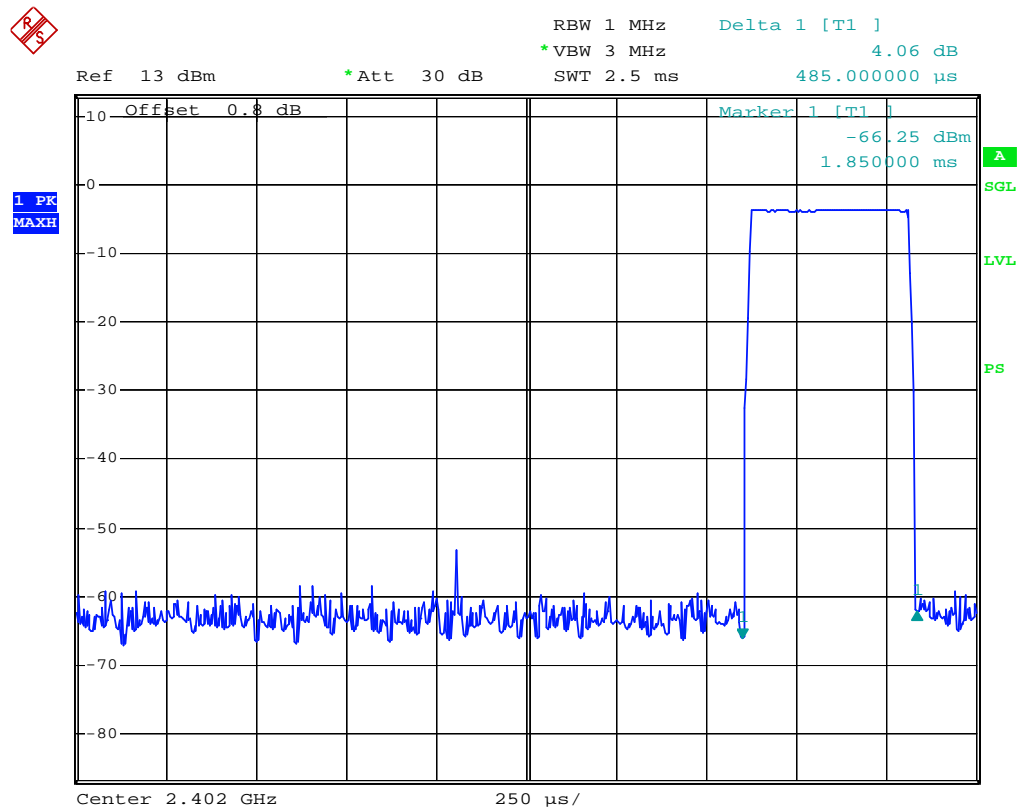
**Note:** Dwell time=Pulse width (ms)  $\times$  (1600  $\div$  4  $\div$  79)  $\times$  31.6 Second

**DH 5 Mode:**

Channel	Pulse Width (ms)	Dwell Time (Sec)	Limit (Sec)	Result
Low	3.025	0.323	0.4	Pass
Middle	3.025	0.323	0.4	Pass
High	3.005	0.321	0.4	Pass

**Note:** Dwell time=Pulse width (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$  31.6 Second

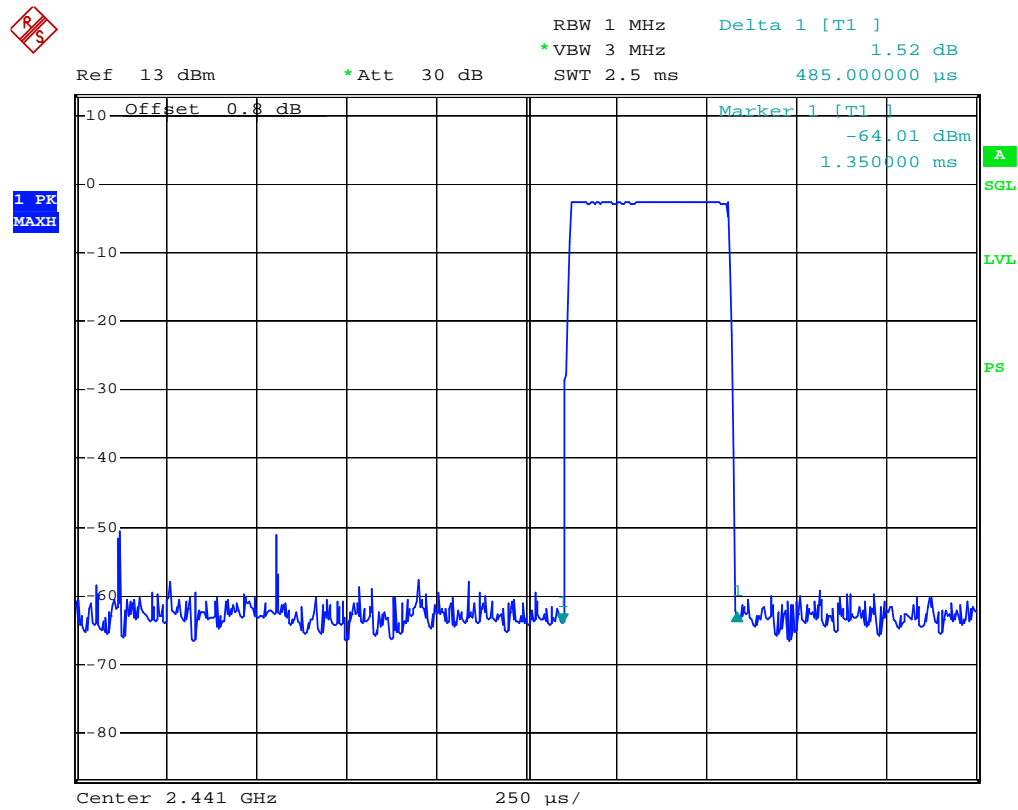
## Low Channel for DH1



DH1 Dwell time-low channel

Date: 2.DEC.2008 21:04:41

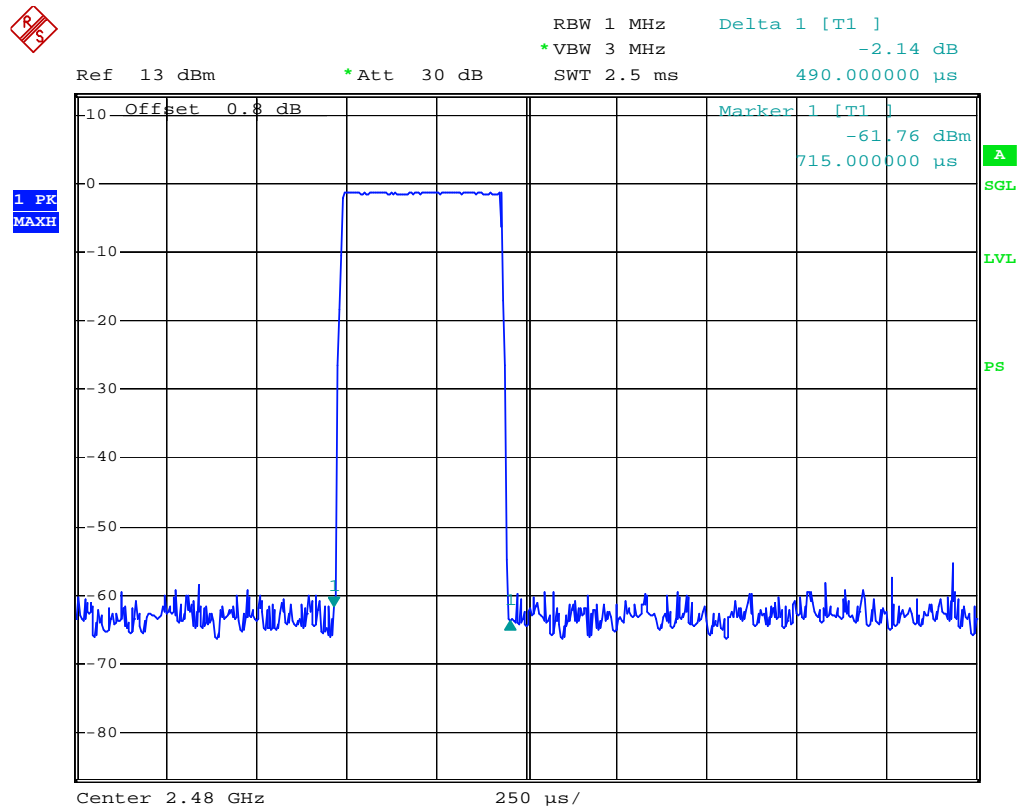
## Middle Channel for DH1



DH1 Dwell time-middle channel

Date: 2.DEC.2008 21:07:49

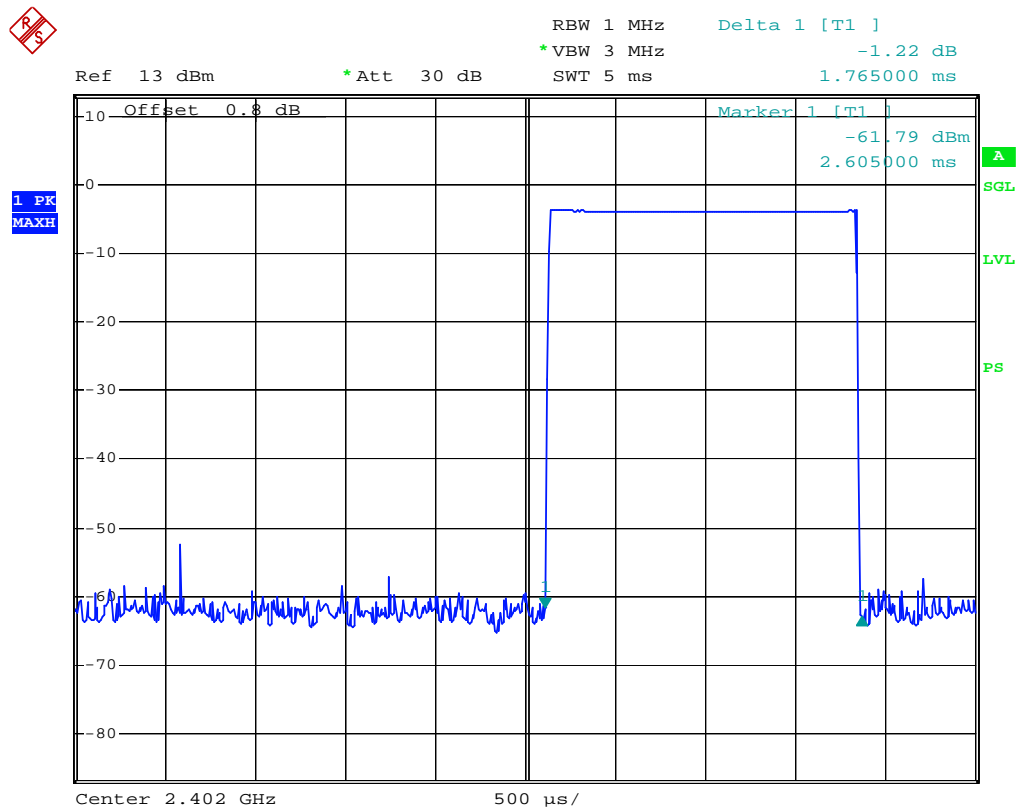
## High Channel for DH1



DH1 Dwell time-high channel

Date: 2.DEC.2008 21:09:13

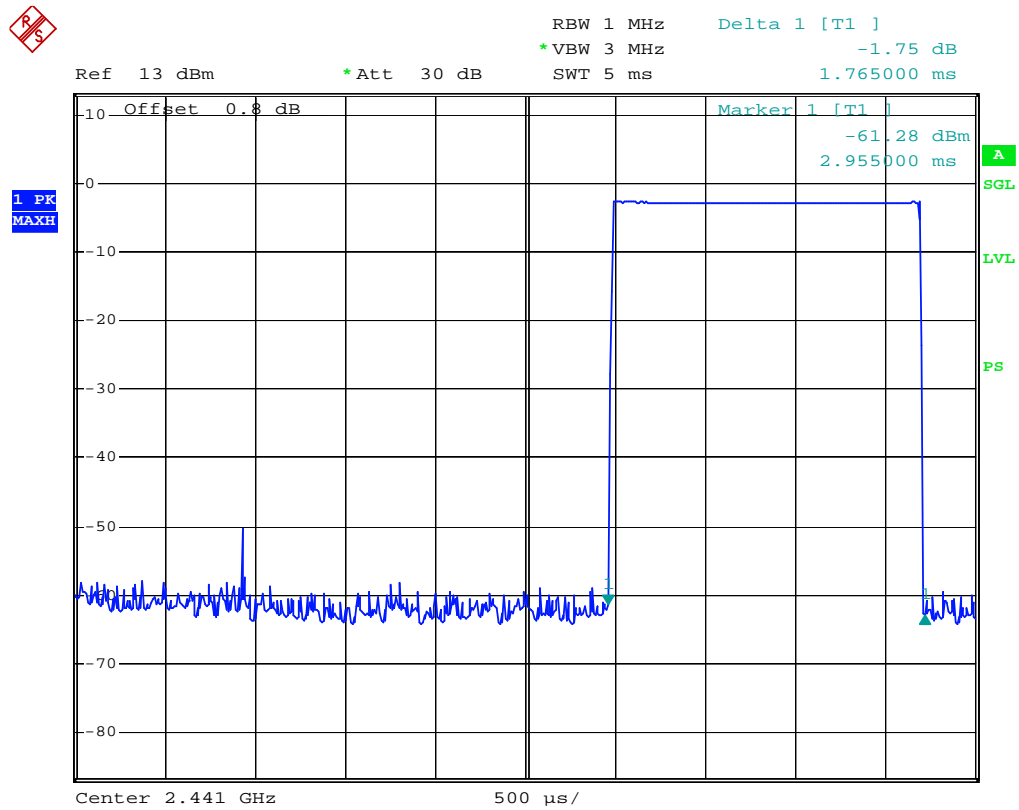
## Low Channel for DH3



DH3 Dwell time-low channel

Date: 2.DEC.2008 21:13:09

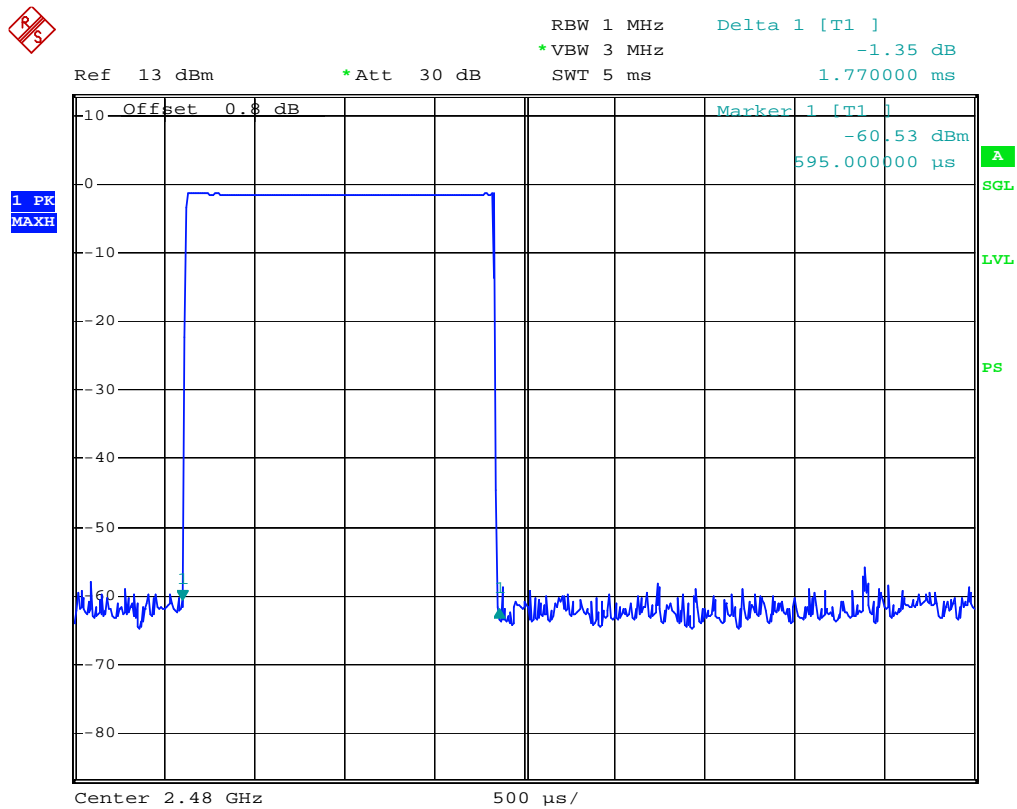
## Middle Channel for DH3



DH3 Dwell time-middle channel

Date: 2.DEC.2008 21:12:26

## High Channel for DH3

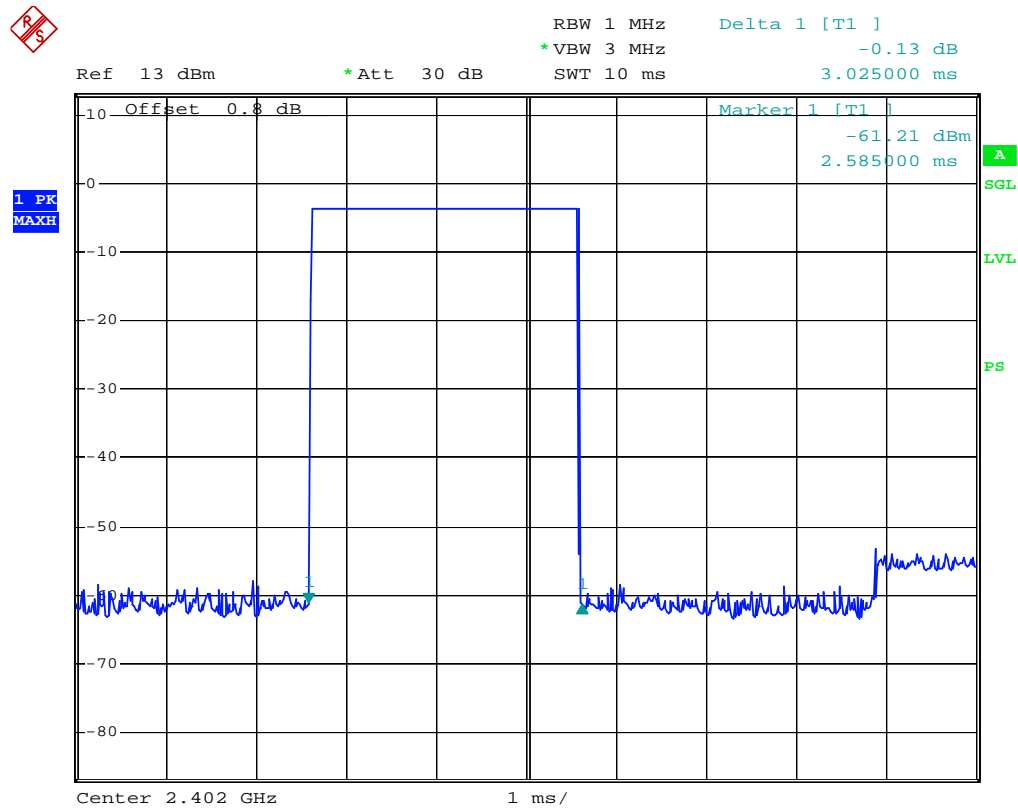


DH3 Dwell time-high channel

Date: 2.DEC.2008 21:10:24



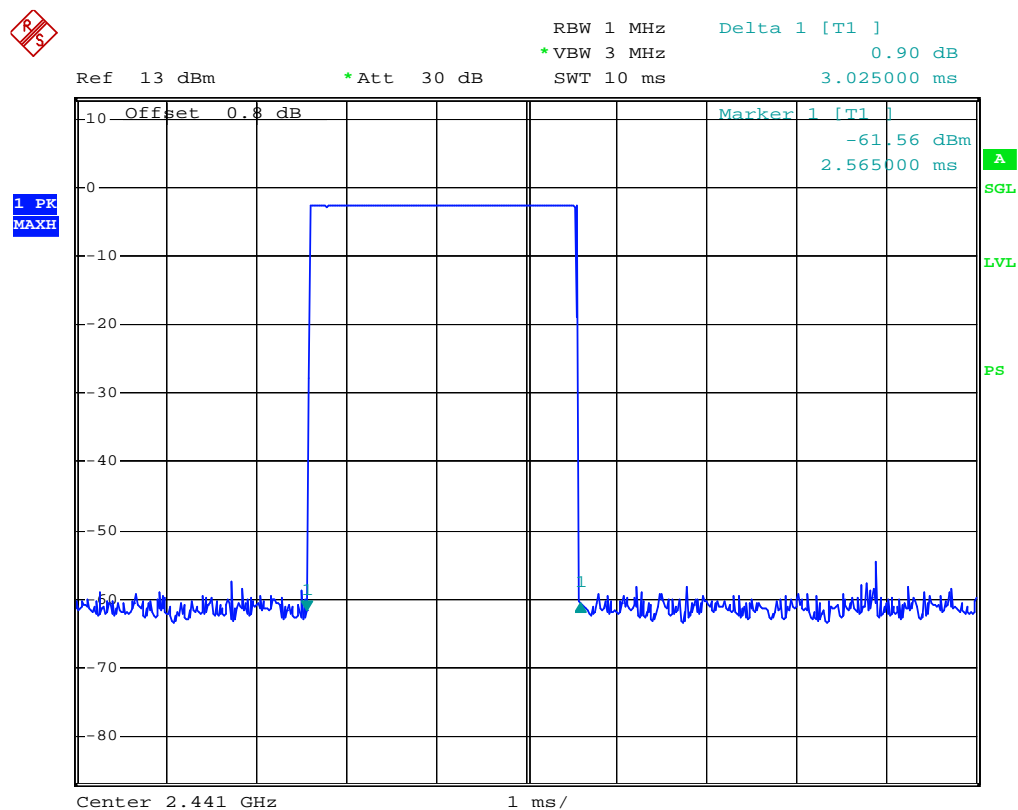
## Low Channel for DH5



DH5 Dwell time-low channel

Date: 2.DEC.2008 21:16:13

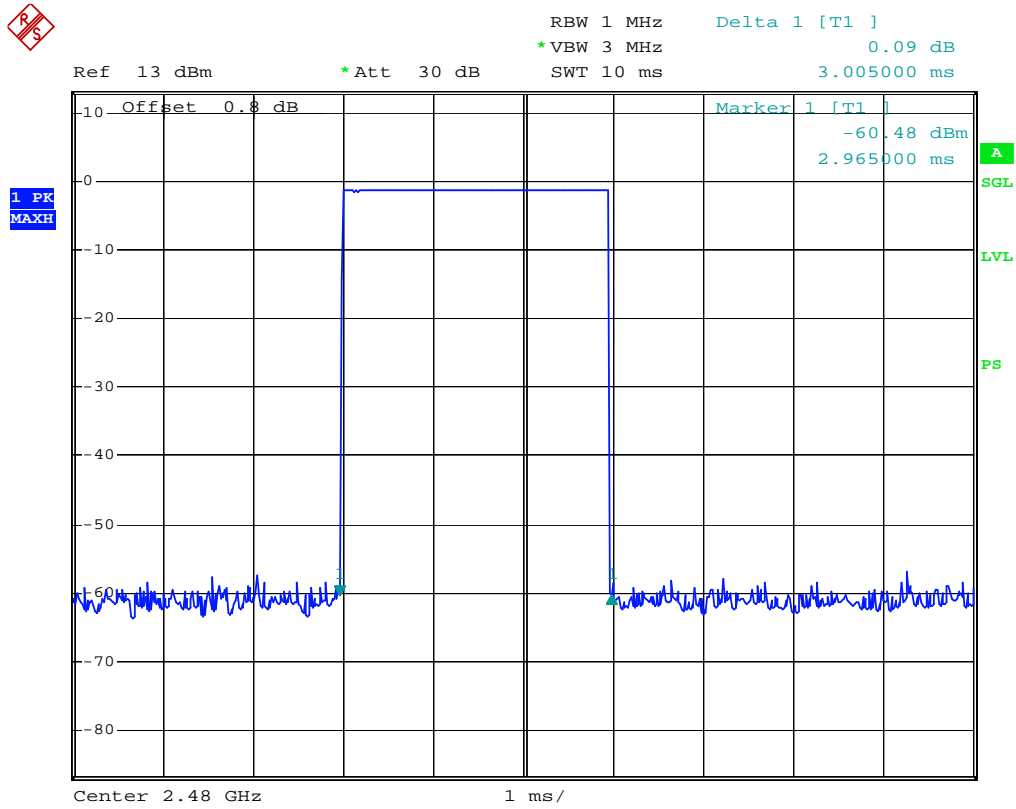
## Middle Channel for DH5



DH5 Dwell time-middle channel

Date: 2.DEC.2008 21:17:33

## High Channel for DH5



DH5 Dwell time-high channel

Date: 2.DEC.2008 21:18:43

## CFR47 §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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

The antenna was integrated; radiated test method will be applied.

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:

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

### Test Data

#### Environmental Conditions

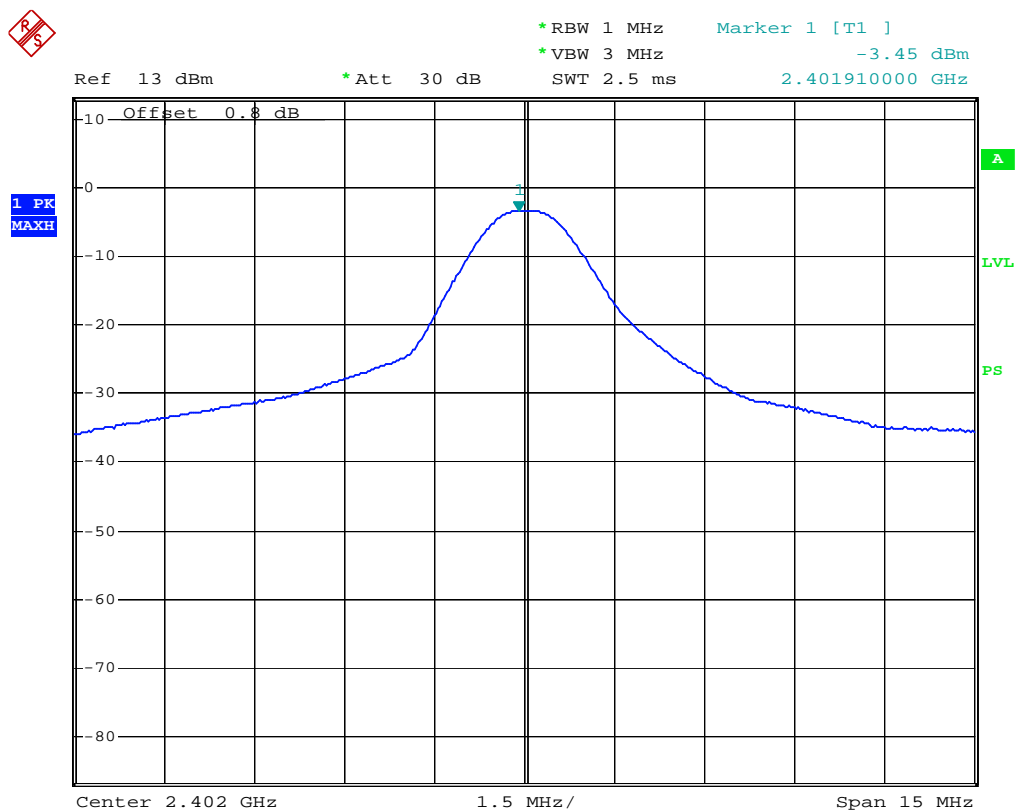
<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	54 %
<b>ATM Pressure:</b>	100.7 kPa

\* The testing was performed by Alvin Huang on 2008-12-02.

**Test Result:** Compliant.

*Test Mode: Transmitting*

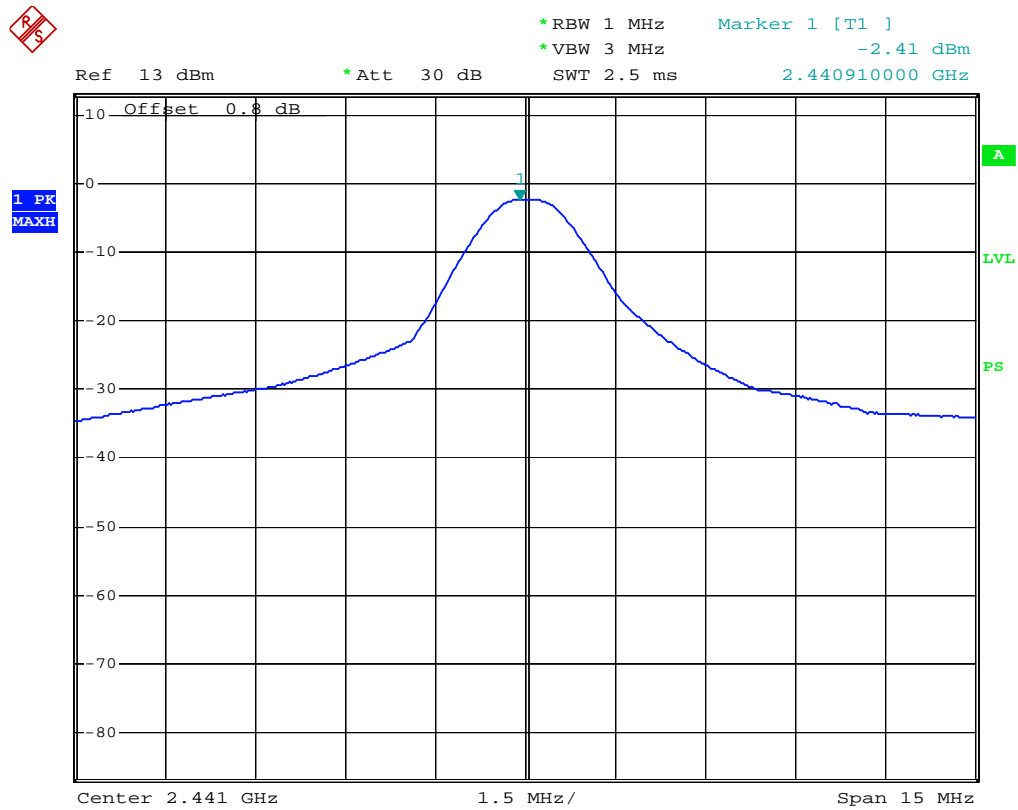
channel	Channel frequency (MHz)	Reading power (dBm)	Power Output (mw)	Limit (mw)
Low	2402	-3.45	0.45	125
Middle	2441	-2.41	0.57	125
High	2480	-1.24	0.75	125

**Low Channel**

peak output power-low channel

Date: 2.DEC.2008 21:27:41

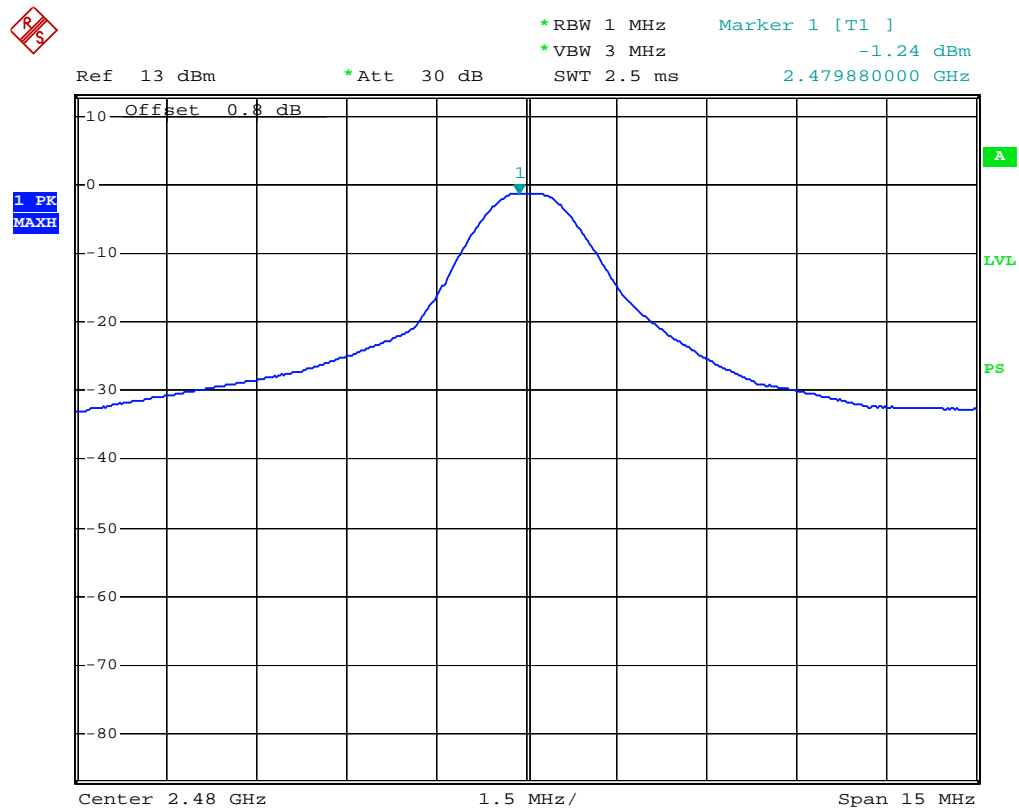
## Middle Channel



peak output power-middle channel

Date: 2.DEC.2008 21:26:38

## High Channel



peak output power-high channel

Date: 2.DEC.2008 21:24:16

## CFR47 §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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-10-16	2009-10-16
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and 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 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
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 Data****Environmental Conditions**

<b>Temperature:</b>	24 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	100.9 kPa

*\*The testing was performed by Alvin Huang on 2008-12-12.*

**Test Result:** Compliant

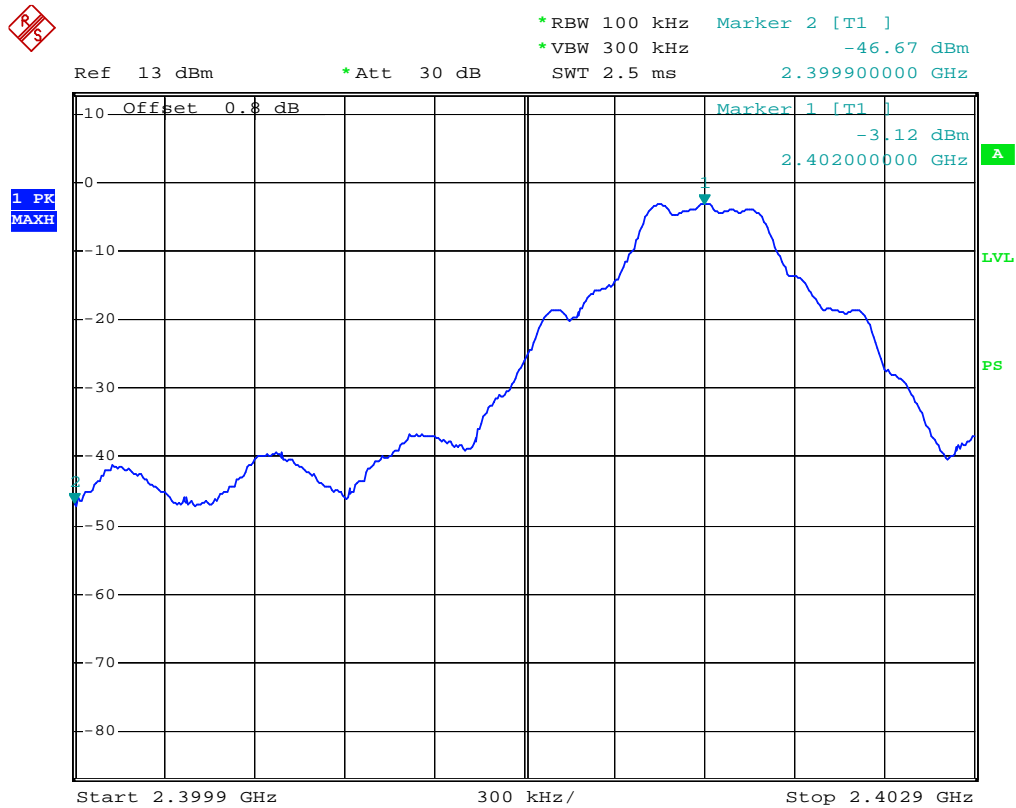
Please refer to the following table and plots.

*Test Mode: Transmitting*

<b>Frequency (MHz)</b>	<b>Delta Peak to Band Emission (dBc)</b>	<b>Limit (dBc)</b>
2399.9	43.55	20
2483.6	45.03	20

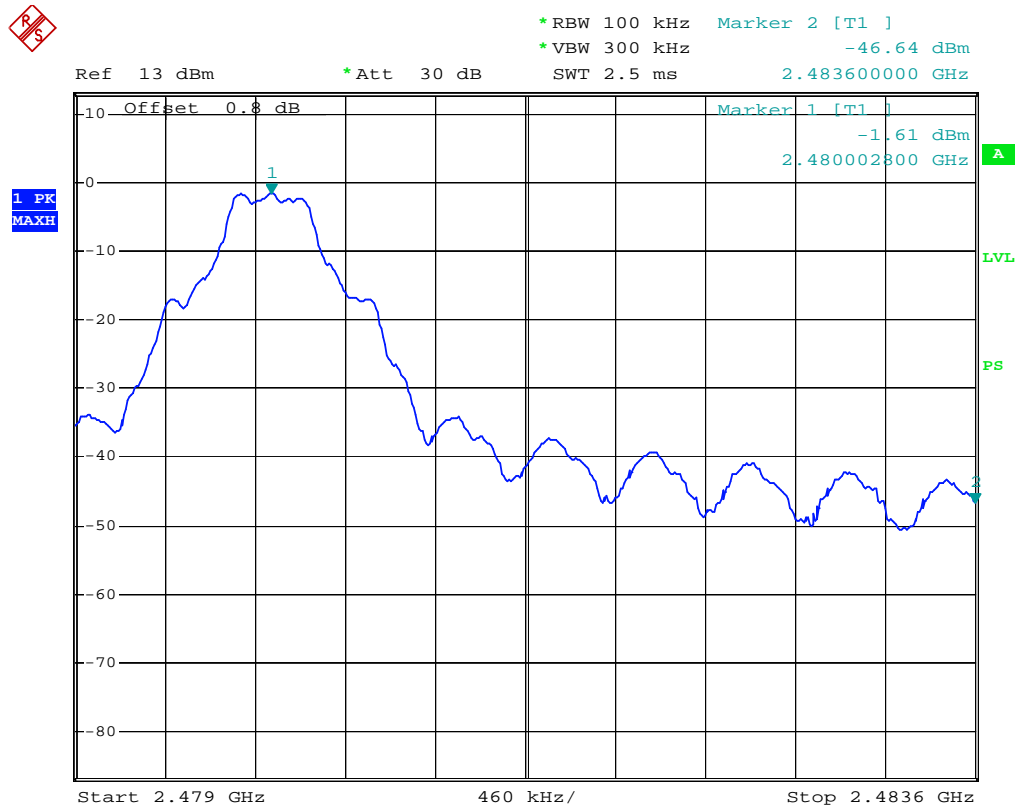
*Note: The point fall into the stricted band was in FCC 15.209, please refer to the restrict band testing.*

## Band Edge: Left Side



bandedgr-left

Date: 12.DEC.2008 17:28:15

**Band Edge: Right Side**

bandedgr-right

Date: 12.DEC.2008 17:25:25

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