

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

HMM Heidelberg-Medical-Marketing GmbH

Friedrichstr. 89, 69221 Dossenheim, Germany

FCC ID: YF9H80400

Report Type: Original Report	Product Type: hFon Smart Phone
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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

Product Description for Equipment under Test (EUT)

The HMM Heidelberg-Medical-Marketing GmbH's product, model number: H80400 (FCC ID: YF9H80400) or the "EUT" as referred to in this report is a *hFon smart phone*, which measures approximately: 12.0 cm (L) x 6.0 cm (W) x 1.6 cm (H), rated input voltage: DC 3.7V battery.

Frequency Range:

Cellular Band: 824 -849 MHz (Tx), 869-894 MHz (Rx)
PCS Band: 1850-1910 MHz (Tx), 1930-1990 MHz (Rx)
Bluetooth: 2400-2483.5 MHz (Tx/Rx)
Wi-Fi: 2412-2462 MHz (Tx/Rx)
ANT: 2403-2480 MHz (Tx/Rx)

Modulation Mode: GMSK (PCS/DCS); GFSK (Bluetooth); Wi-Fi (DSSS/OFDM); GFSK (ANT)

Transmitter Output Power:

Cellular Band: 33 dBm, PCS Band: 30 dBm
Bluetooth: < 4 dBm, 802.11b/g Wi-Fi: ≤10 dBm
2.4 GHz Lower Power Transceiver ANT: 0 dBm

** All measurement and test data in this report was gathered from production sample serial number: 1005063 (Assigned by BACL, Shenzhen). The EUT was received on 2010-05-21.*

Objective

This Type approval report is prepared on behalf of HMM Heidelberg-Medical-Marketing GmbH 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 22H & 24E submission with FCC ID: YF9H80400.
FCC Part 15.247 of Wi-Fi portion submission with FCC ID: YF9H80400.
FCC Part 15.249 submission with FCC ID: YF9H80400.

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 21, 2007. 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).



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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

EUT Exercise Software

N/A.

Equipment Modifications

No modification was made to the unit tested.

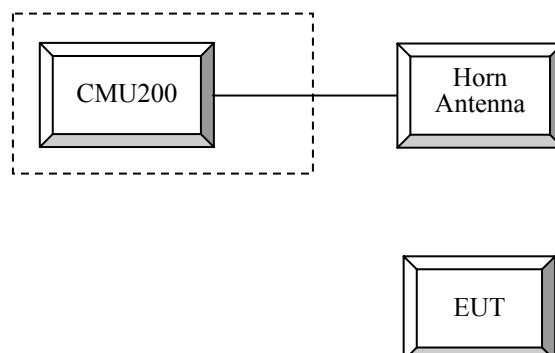
Local Support Equipment List and Details

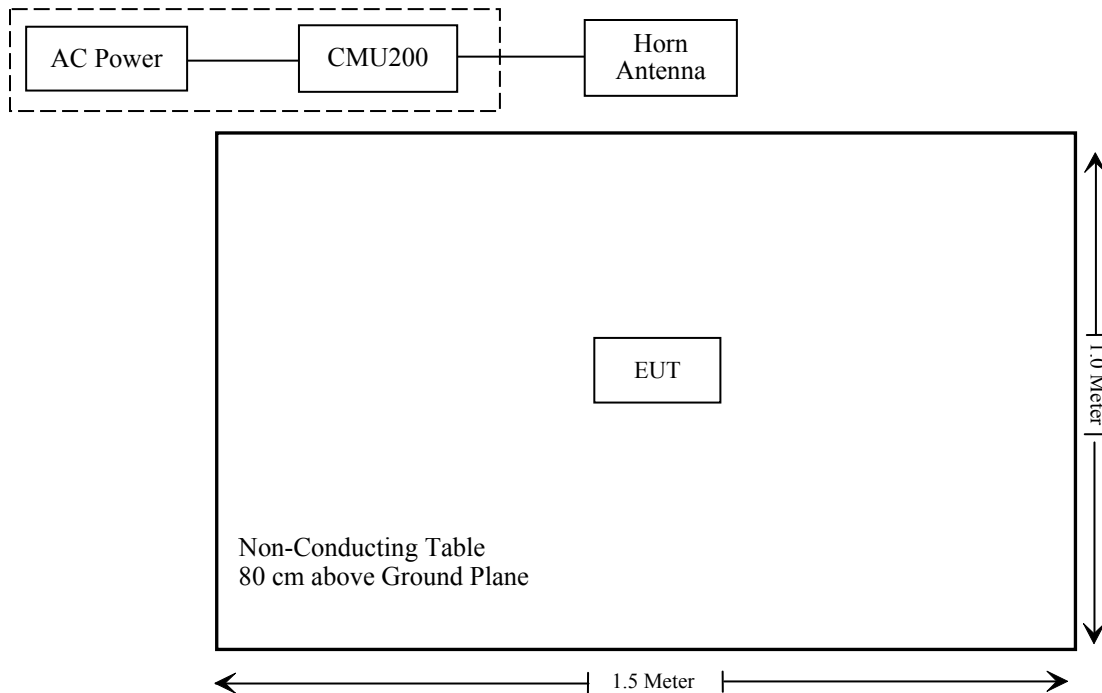
Manufacturer	Description	Model	Serial Number	FCC ID
R & S	Universal Radio Commutation Tester	CMU200	1100 0008.02	DOC
Compaq	PC	EVON610C	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Undetachable USB Cabel	1	Adapter	EUT

Configuration of Test Setup



Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF 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) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §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.

Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	<u>SAR not required:</u> <u>Unlicensed only</u>
Unlicensed Transmitters	<p><u>When there is no simultaneous transmission –</u></p> <ul style="list-style-type: none"> output ≤ 60/f: SAR not required output > 60/f: stand-alone SAR required <p><u>When there is simultaneous transmission –</u> <u>Stand-alone SAR not required when</u></p> <ul style="list-style-type: none"> output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <p><u>Otherwise stand-alone SAR is required</u></p> <p><u>When stand-alone SAR is required</u></p> <ul style="list-style-type: none"> test SAR on highest output channel for each wireless mode and exposure condition if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures 	<p><u>Licensed & Unlicensed</u></p> <ul style="list-style-type: none"> when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 <p><u>SAR required:</u> <u>Licensed & Unlicensed</u></p> <p>antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition</p> <p>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</p>
Jaw, Mouth and Nose	<p><u>Flat phantom SAR required</u></p> <ul style="list-style-type: none"> when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations 	When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.

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.

Four antennas are available for the EUT, (GSM antenna, Bluetooth antenna, 2.4 GHz Low Power Teansceiver antenna and 802.11b/g Wi-Fi antenna), The distance between Bluetooth antenna and GSM antenna is 0.6 cm, Less than 2.5 cm, and the Bluetooth power is 0.329 mW <Pref(12mW), the maximum SAR value og GSM is 0.783 W/Kg, according to KDB 648474, stand-alone SAR of Bluetooth radio is not required.

Result

Stand alone SAR measurement is exempted.

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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a Bluetooth (SMD) antenna on PCB, the gain is 0 dBi, which are in accordance to section 15.203, please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

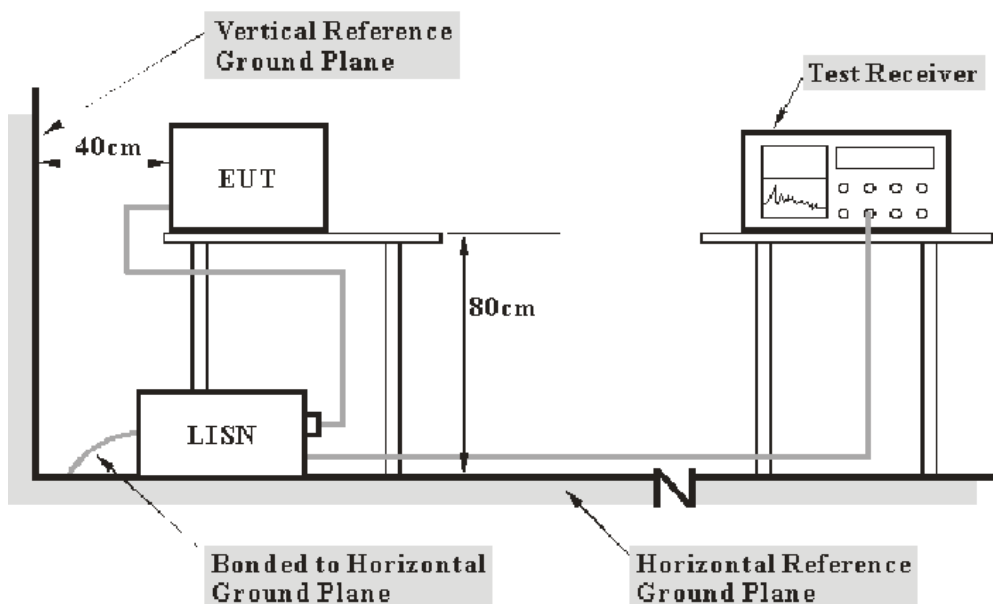
FCC §15.207

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08

* **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

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:

11.15 dB at 0.525 MHz in the Neutral conductor mode

Test Data

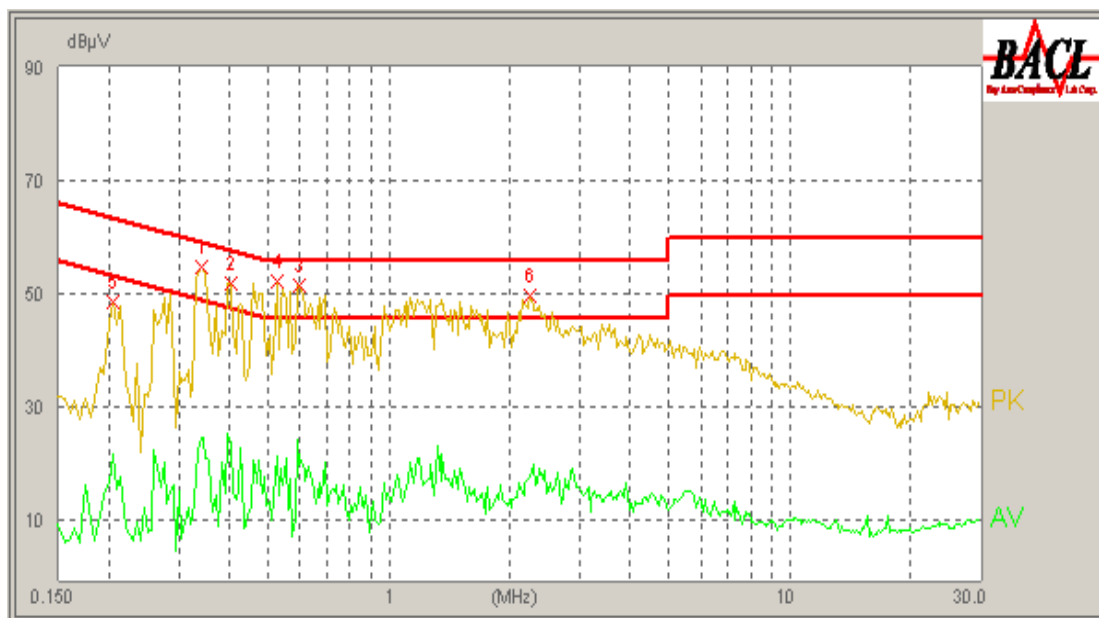
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

* *The testing was performed by Alvin Huang on 2010-09-18.*

Test Mode: Charging & Transmitting

120 V, 60 Hz, Line:



Conducted Emissions			FCC Part 15.247		
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dBμV)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave)
0.525	10.20	42.91	56.00	13.09	QP
0.405	10.00	44.83	58.71	13.88	QP
0.340	10.00	45.99	60.57	14.58	QP
2.250	10.20	41.37	56.00	14.63	QP
0.595	10.20	39.72	56.00	16.28	QP
0.205	10.10	43.68	64.43	20.75	QP
0.525	10.20	21.84	46.00	24.16	Ave.
0.405	10.00	24.37	48.71	24.34	Ave.
0.340	10.00	25.19	50.57	25.38	Ave.
0.595	10.20	20.21	46.00	25.79	Ave.
2.250	10.20	18.01	46.00	27.99	Ave.
0.205	10.10	22.24	54.43	32.19	Ave.

120V, 60 Hz, Neutral:



Conducted Emissions			FCC Part 15.247		
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dBμV)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave)
0.525	10.20	44.85	56.00	11.15	QP
0.345	10.00	48.08	60.43	12.35	QP
0.400	10.00	44.62	58.86	14.24	QP
2.365	10.20	36.76	56.00	19.24	QP
0.210	10.10	42.84	64.29	21.45	QP
0.280	10.10	40.02	62.29	22.27	QP
0.525	10.20	22.36	46.00	23.64	Ave.
0.345	10.00	26.44	50.43	23.99	Ave.
2.360	10.20	19.20	46.00	26.80	Ave.
0.400	10.00	21.20	48.86	27.66	Ave.
0.210	10.10	21.61	54.29	32.68	Ave.
0.280	10.10	17.17	52.29	35.12	Ave.

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

Applicable Standard

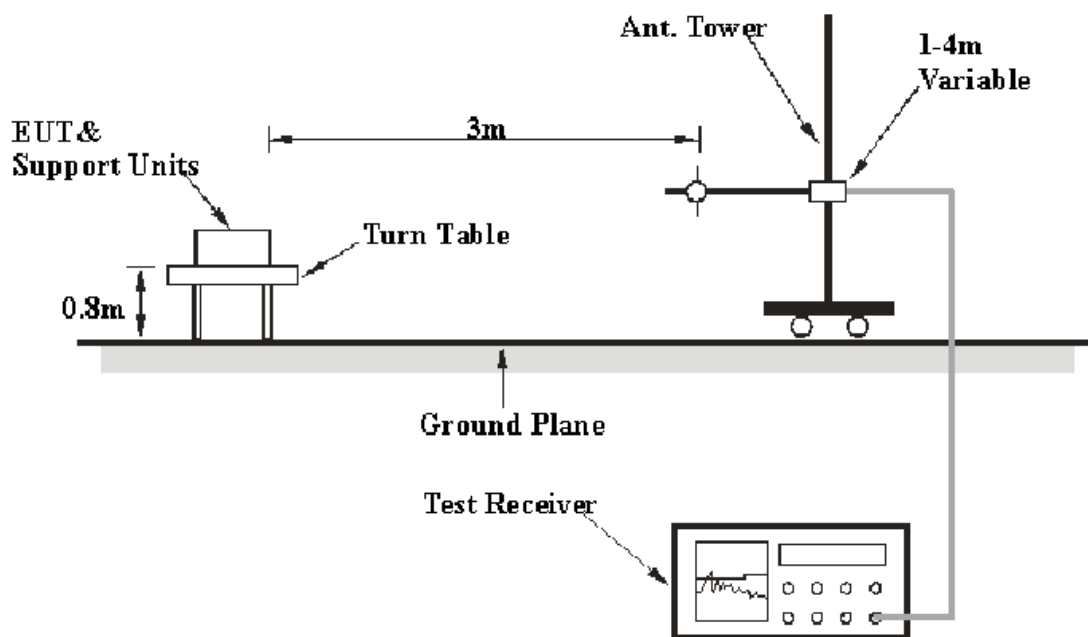
FCC §15.247 (d); §15.209; §15.205;

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 ± 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 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.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	8449B	3008A00277	2009-09-12	2010-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-08

* **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 the radiated emissions test, 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.

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 7 dB means the emission is 7 dB 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, section 15.205, 15.209 and 15.247, with the worst margin reading of:

30 -1000 MHz:

9.9 dB at **701.148500 MHz** in the **Vertical** polarization

Above 1 GHz:

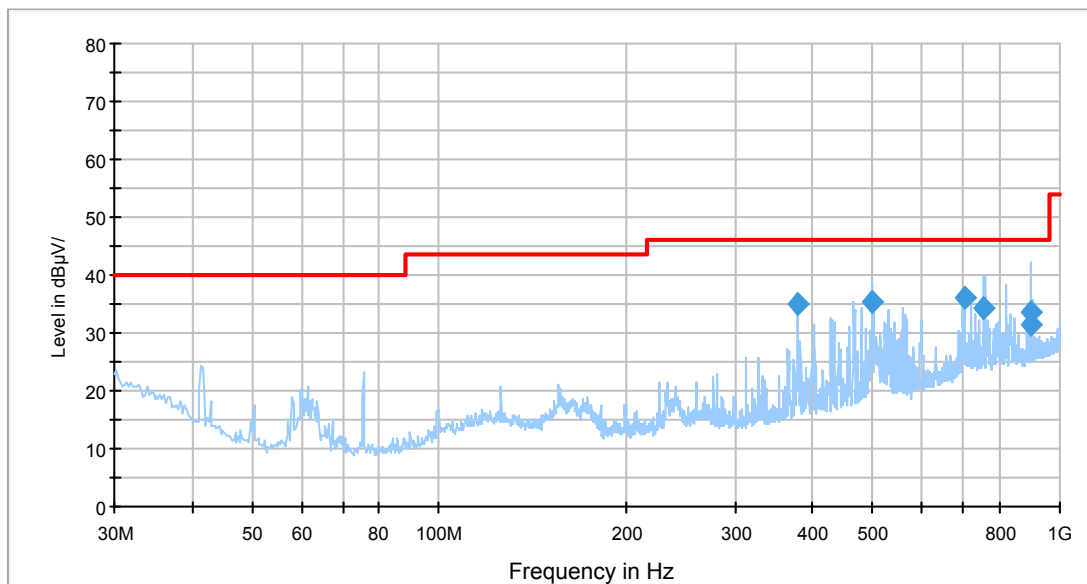
8.98 dB at **4882 MHz** in the **Horizontal** polarization

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Alvin Huang on 2010-08-23.

30-1000 MHz:*Test Mode: Transmitting*

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
701.148500	36.1	142.0	V	163.0	-3.0	46.0	9.9
496.905000	35.3	104.0	V	163.0	-8.4	46.0	10.7
377.899500	34.9	124.0	V	143.0	-10.4	46.0	11.1
755.871000	34.4	128.0	V	146.0	-2.4	46.0	11.6
901.437500	33.6	393.0	V	338.0	-0.8	46.0	24.4
898.338250	31.5	372.0	V	265.0	-0.9	46.0	24.5

Above 1 GHz:

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
Low Channel												
4804	35.42	AV	160	1.5	H	36.3	4.3	26.81	49.21	54	4.79	harmonic
4804	35.80	AV	180	1.2	V	35	4.3	26.81	48.29	54	5.71	harmonic
4804	46.36	PK	160	1.5	H	36.3	4.3	26.81	60.15	74	13.85	harmonic
4804	47.38	PK	180	1.2	V	35	4.3	26.81	59.87	74	14.13	harmonic
Middle Channel												
4882	35.62	AV	180	1.5	H	36.3	4.37	26.78	49.51	54	4.49	harmonic
4882	35.79	AV	185	1.2	V	35	4.37	26.78	48.38	54	5.62	harmonic
4882	47.82	PK	185	1.2	V	35	4.37	26.78	60.41	74	13.59	harmonic
4882	46.42	PK	180	1.5	H	36.3	4.37	26.78	60.31	74	13.69	harmonic
High Channel												
4960	33.63	AV	0	1.2	H	36.3	4.41	26.75	47.59	54	6.41	harmonic
4960	33.87	AV	20	1.2	V	35	4.41	26.75	46.53	54	7.47	harmonic
4960	46.83	PK	20	1.2	H	36.3	4.41	26.75	60.79	74	13.21	harmonic
4960	47.69	PK	0	1.2	V	35	4.41	26.75	60.35	74	13.65	harmonic

Suprious emission in restricted band:

Indicated		Detector (PK/AV)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dBμV)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
2483.92	35.45	AV	15	1.2	V	33.9	3.18	26.85	45.68	54	8.32	spurious
2483.95	34.27	AV	0	1.5	H	33.9	3.18	26.85	44.5	54	9.5	spurious
2330.50	33.60	AV	360	1.5	V	33.9	3.03	26.83	43.7	54	10.3	spurious
2320.32	33.26	AV	120	1.2	H	33.9	3.03	26.83	43.36	54	10.64	spurious
2483.92	47.75	PK	15	1.2	V	33.9	3.18	26.85	57.98	74	16.02	spurious
2483.95	45.91	PK	0	1.5	H	33.9	3.18	26.85	56.14	74	17.86	spurious
2320.32	45.61	PK	120	1.2	H	33.9	3.03	26.83	55.71	74	18.29	spurious
2330.50	44.01	PK	360	15	V	33.9	3.03	26.83	54.11	74	19.89	spurious

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 20 dB 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	2009-11-07	2010-11-06
HP	Amplifier	8449B	3008A00277	2009-09-12	2010-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-08

* **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 trace
3. Measure the channel separation.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.9kPa

* The testing was performed by Alvin Huang on 2010-08-23.

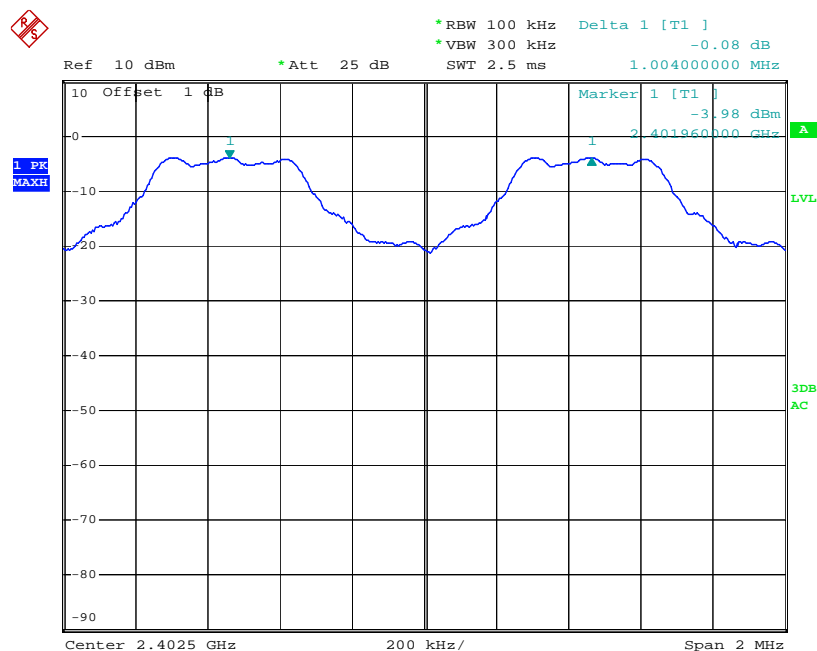
Test Result: Compliant.

Please refer to following tables and plots

Test Mode: Transmitting

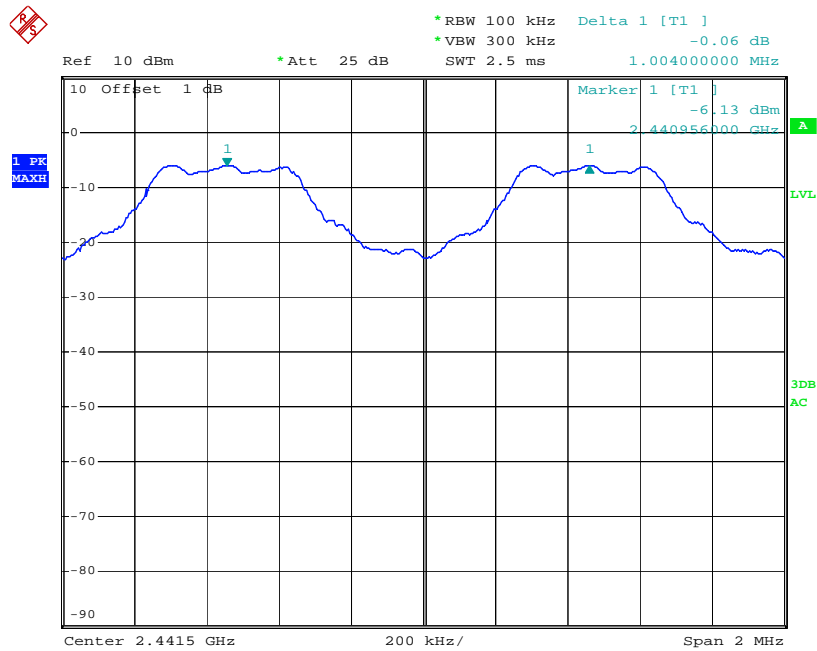
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.004	0.699	Pass
Adjacent Channel	2403			
Mid Channel	2440	1.004	0.699	Pass
Adjacent Channel	2441			
High Channel	2480	1.004	0.699	Pass
Adjacent Channel	2479			

Please refer to the following plots.

Low Channel

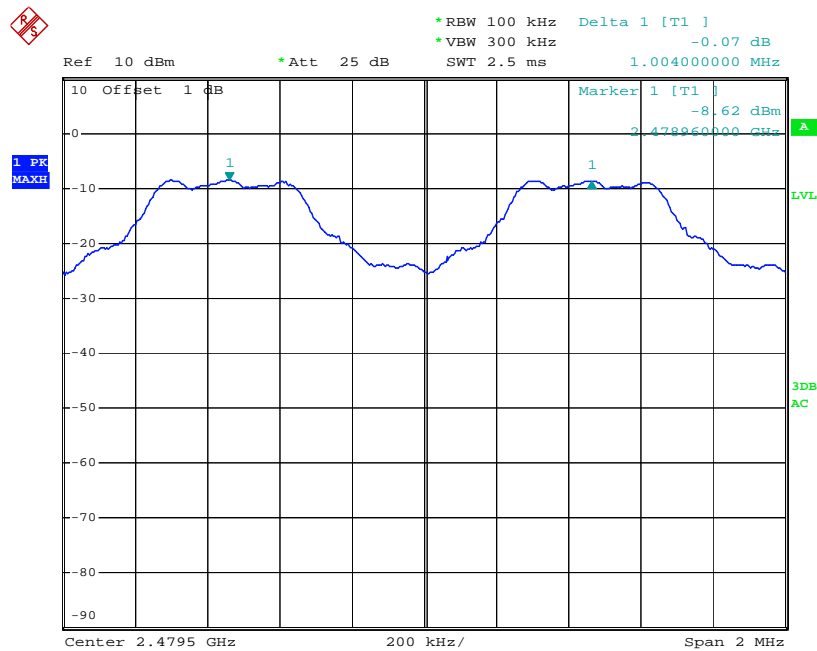
Date: 23.AUG.2010 16:05:03

Middle Channel



Date: 23.AUG.2010 16:05:59

High Channel



Date: 23.AUG.2010 16:06:55

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 125mW.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06

* **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 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 Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.9kPa

* The testing was performed by Alvin Huang on 2010-08-23.

Test Result: Compliance.

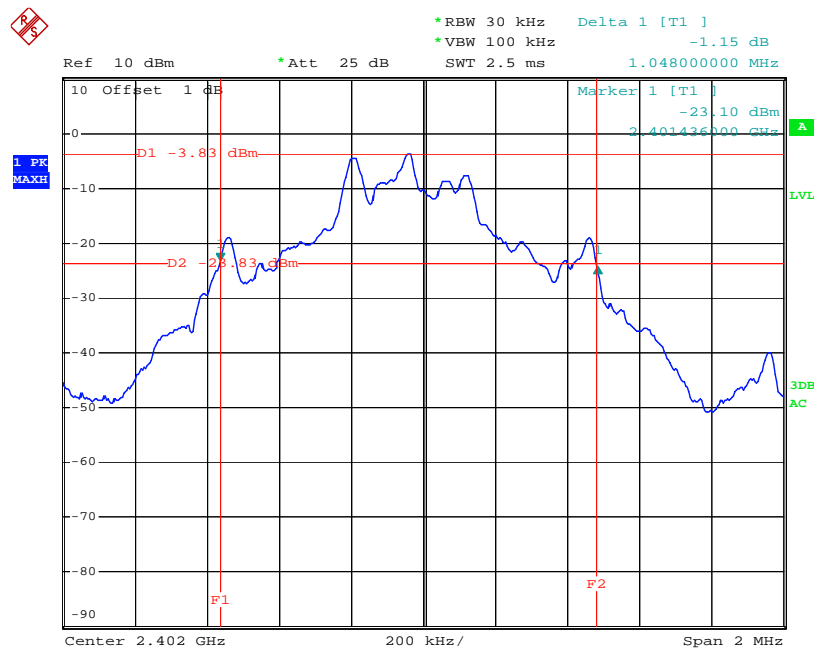
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2402	1.048
Middle	2441	1.048
High	2480	1.048

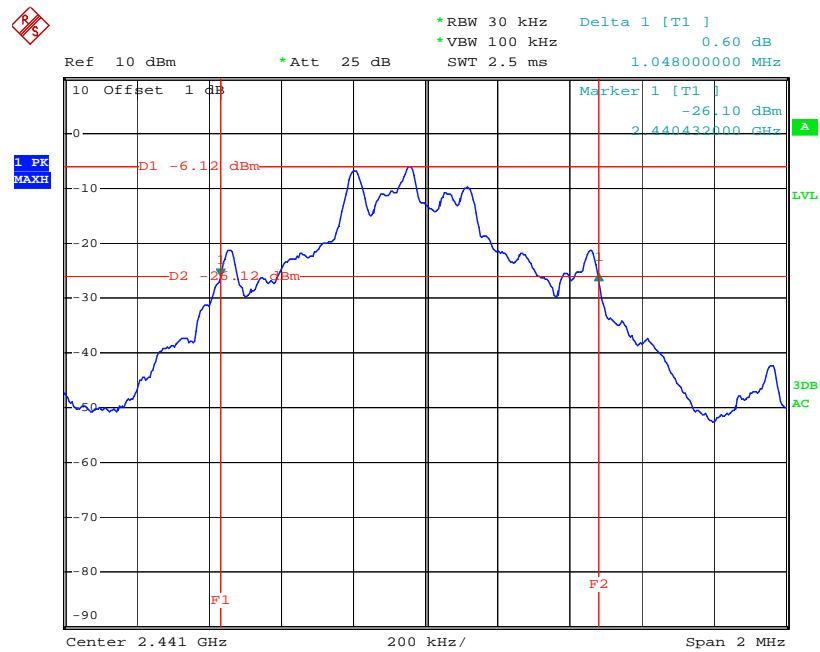
Please refer to the following plots.

Low Channel



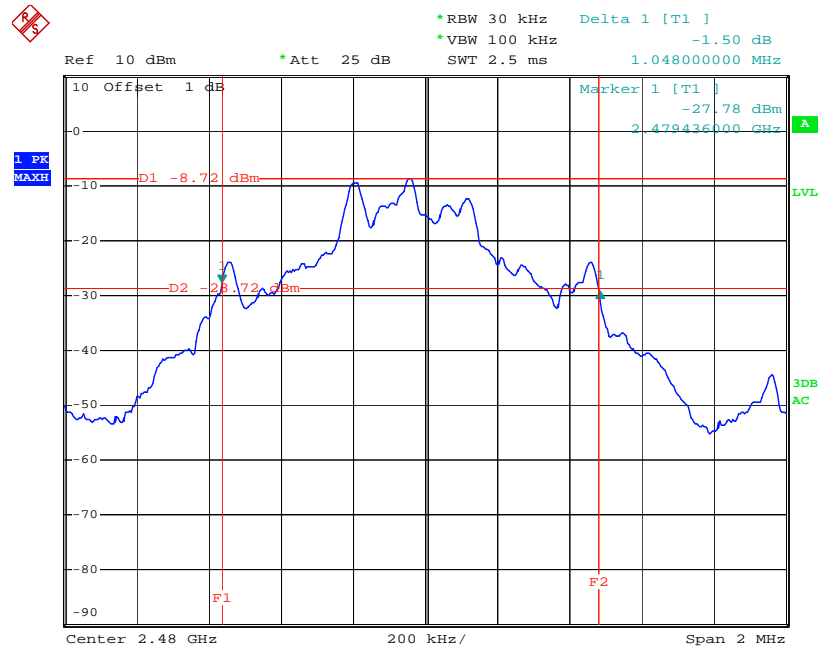
Date: 23.AUG.2010 15:56:35

Middle Channel



Date: 23.AUG.2010 15:58:58

High Channel



Date: 23.AUG.2010 16:00:21

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06

* **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:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.9kPa

The testing was performed by Alvin Huang on 2010-08-23.

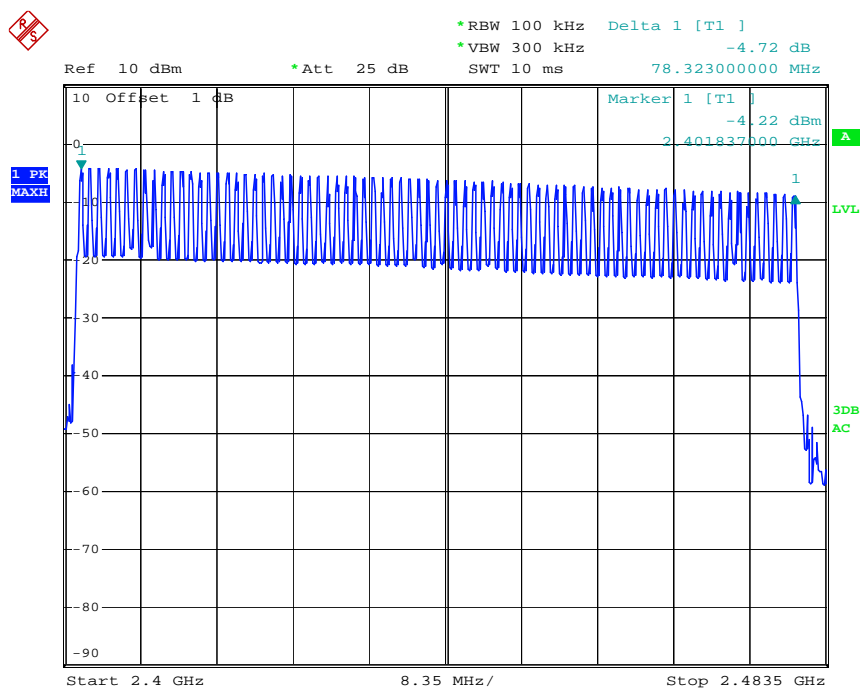
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥ 15

Number of Hopping Channels



Date: 23.AUG.2010 15:54:18

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06

* **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 * 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

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

* The testing was performed by Alvin Huang on 2010-08-23.

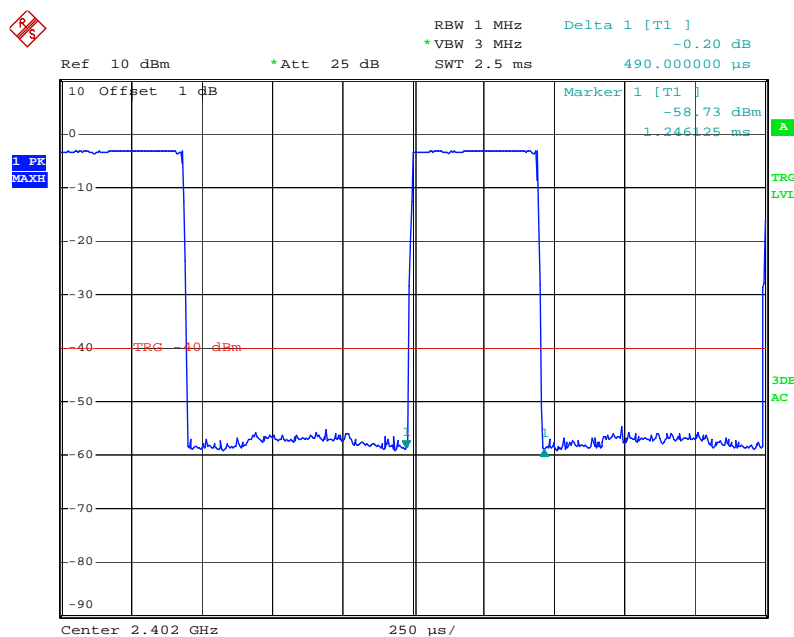
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

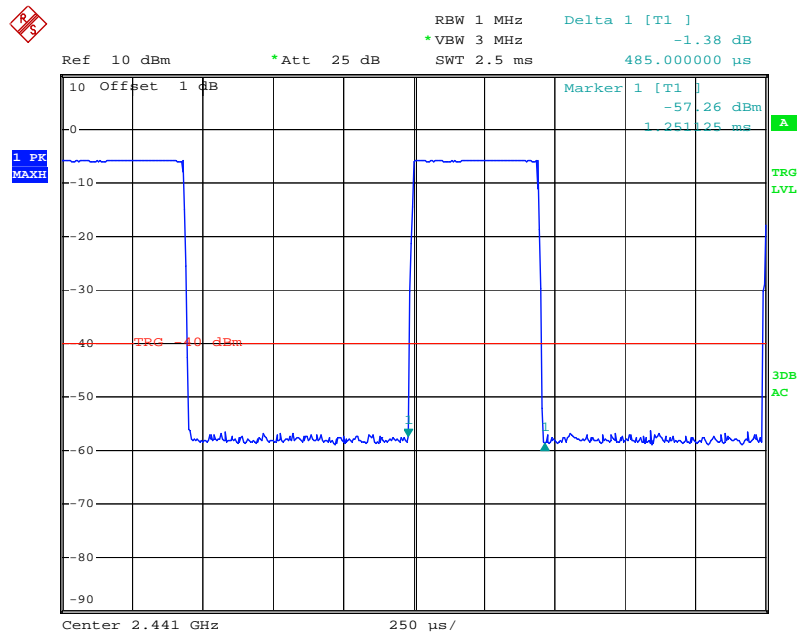
Mode	Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
DH 1	Low	0.490	0.1568	0.4	Pass
	Middle	0.485	0.1352	0.4	Pass
	High	0.490	0.1568	0.4	Pass
	Note: Dwell time=Pulse time (ms) \times (1600 \div 2 \div 79) \times 31.6 Second				
DH 3	Low	1.760	0.2816	0.4	Pass
	Middle	1.760	0.2816	0.4	Pass
	High	1.760	0.2816	0.4	Pass
	Note: Dwell time=Pulse time (ms) \times (1600 \div 4 \div 79) \times 31.6 Second				
DH 5	Low	3.040	0.3243	0.4	Pass
	Middle	3.040	0.3243	0.4	Pass
	High	3.040	0.3243	0.4	Pass
	Note: Dwell time=Pulse Time (ms) \times (1600 \div 6 \div 79) \times 31.6 Second				

Please refer to the following plots.

Low Channel for DH1

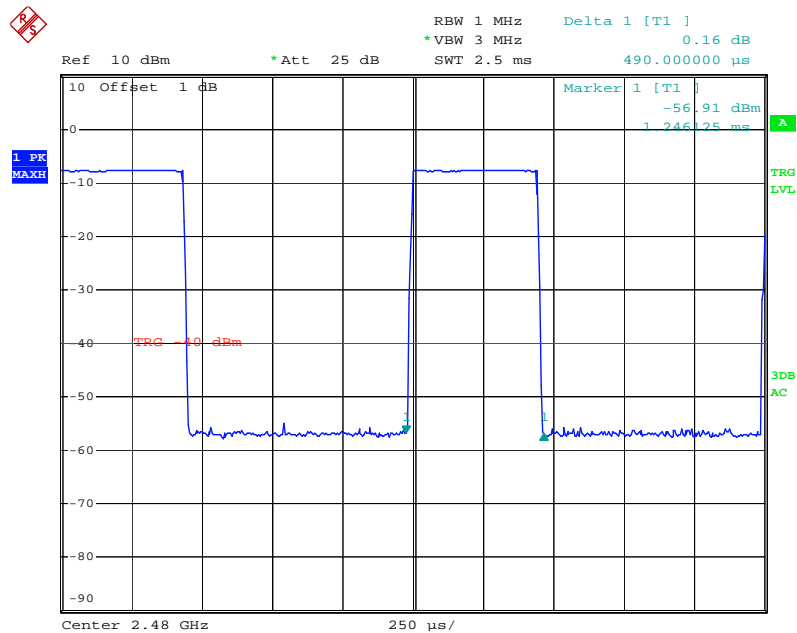
Date: 23.AUG.2010 16:16:21

Middle Channel for DH1



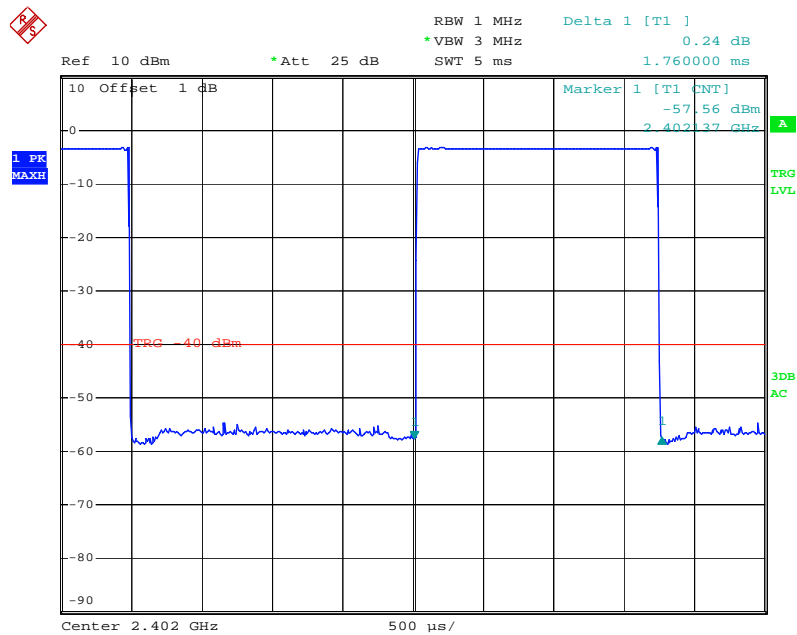
Date: 23.AUG.2010 16:10:26

High Channel for DH1



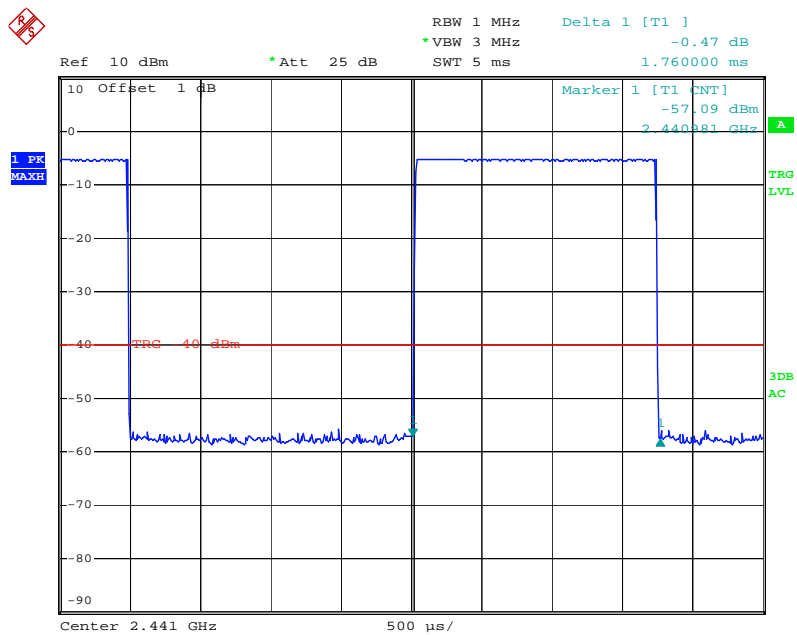
Date: 23.AUG.2010 16:16:03

Low Channel for DH3



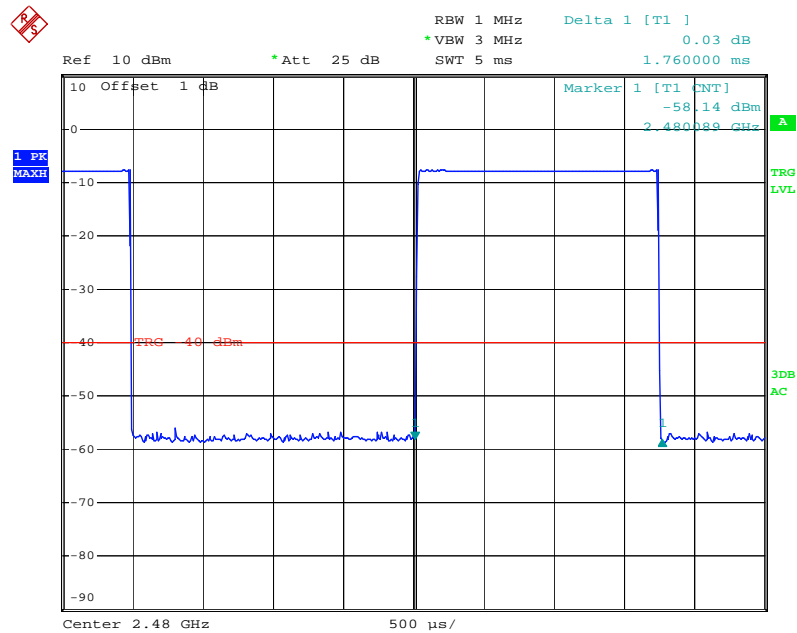
Date: 23.AUG.2010 16:18:47

Middle Channel for DH3



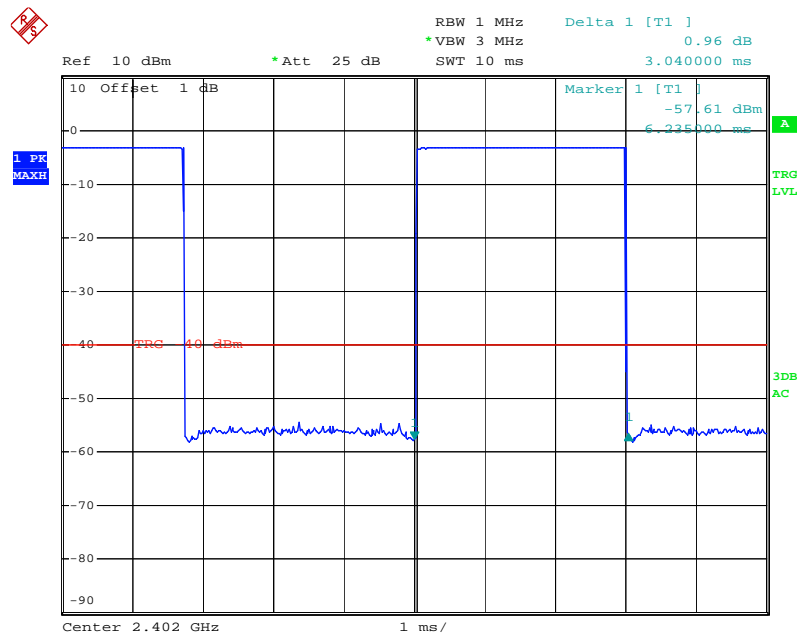
Date: 23.AUG.2010 16:17:55

High Channel for DH3



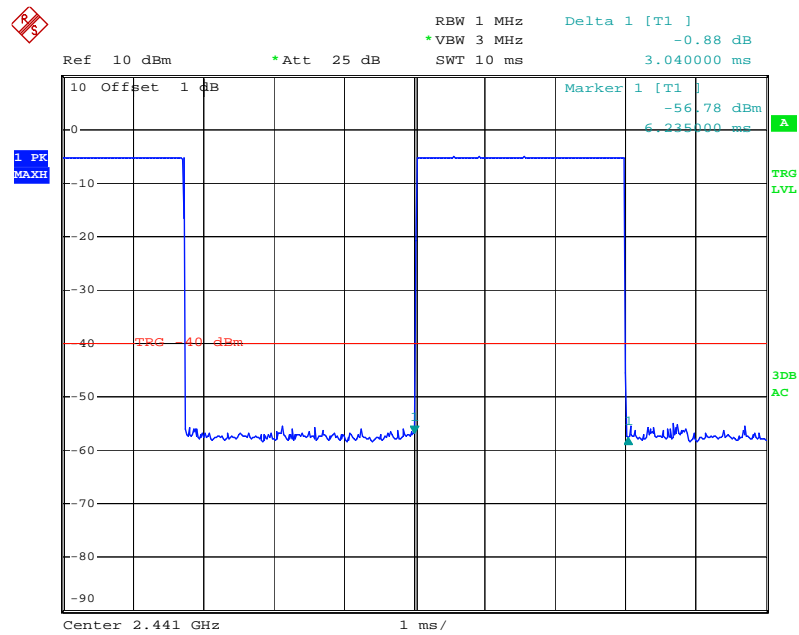
Date: 23.AUG.2010 16:18:24

Low Channel for DH5



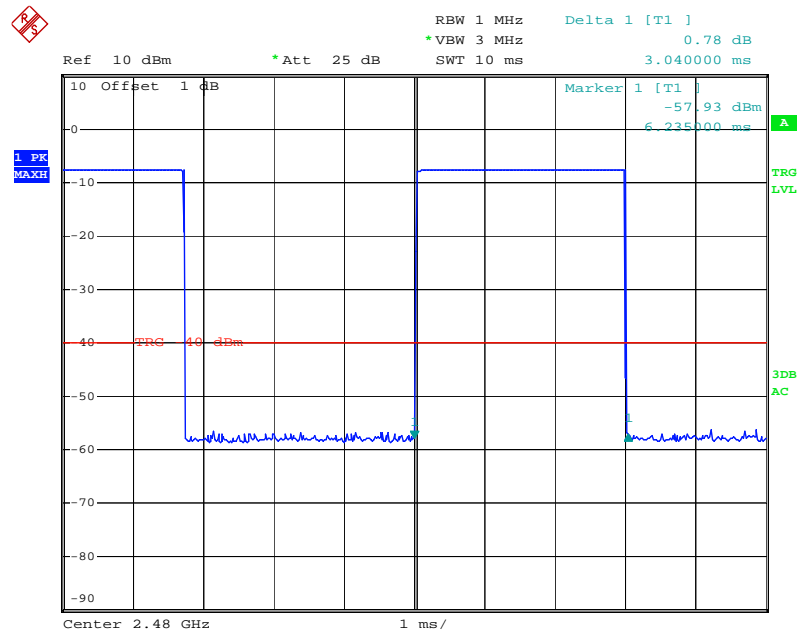
Date: 23.AUG.2010 16:19:20

Middle Channel for DH5



Date: 23.AUG.2010 16:19:53

High Channel for DH5



Date: 23.AUG.2010 16:20:15

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.

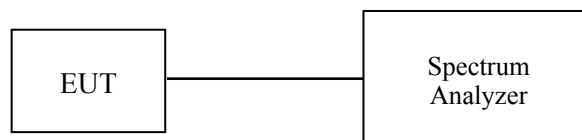
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06

* **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. Place the EUT on a bench and set it 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 Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.9kPa

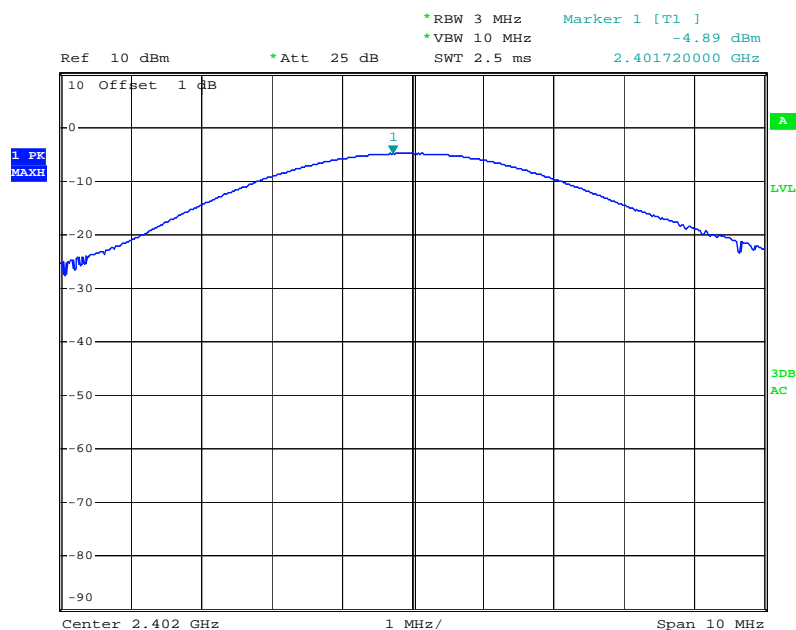
* The testing was performed by Alvin Huang on 2010-08-23.

Test Result: Compliance.

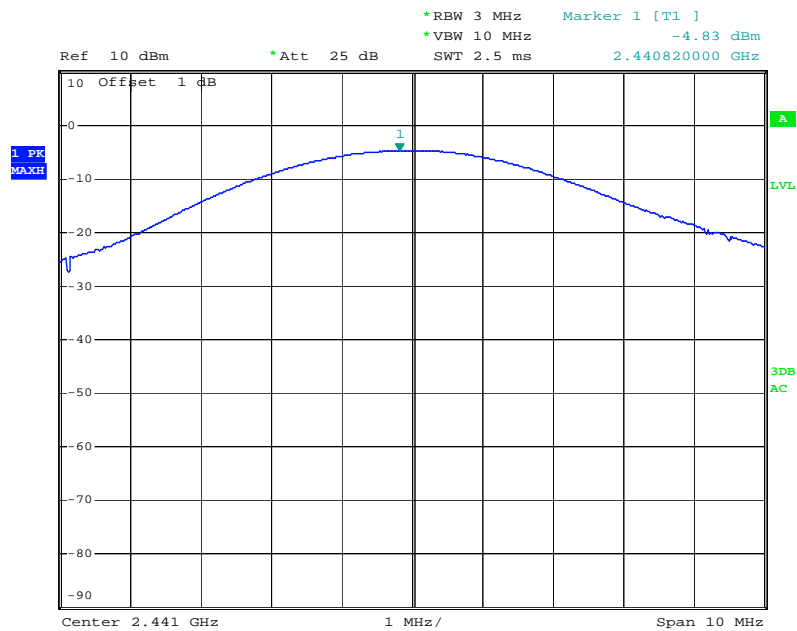
Test Mode: Transmitting

Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
		(dBm)	(mW)	
Low	2402	-4.89	0.324	1000
Middle	2441	-4.83	0.329	1000
High	2480	-5.78	0.264	1000

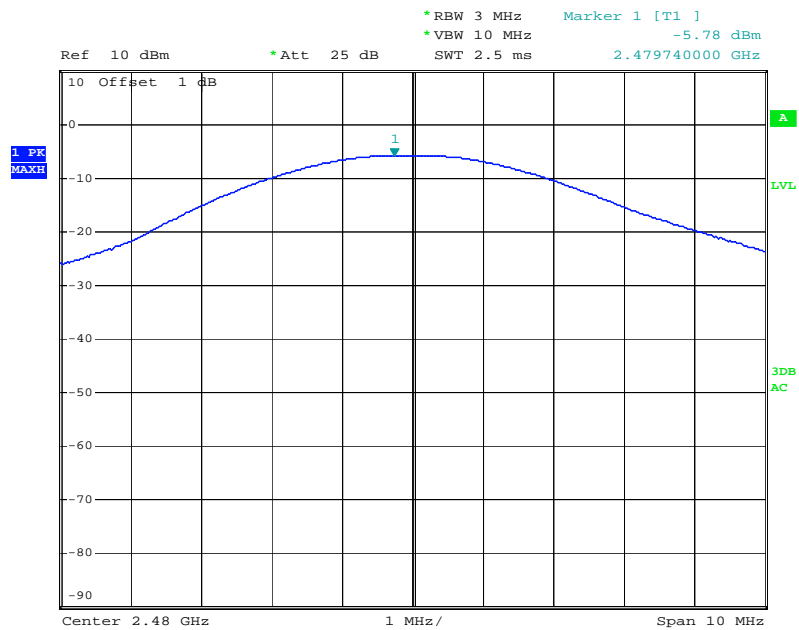
Note: The data above was tested in conducted mode.

Low Channel

Date: 23.AUG.2010 22:19:34

Middle Channel

Date: 23.AUG.2010 22:19:09

High Channel

Date: 23.AUG.2010 22:18:40

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06

* **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.

Environmental Conditions

**The testing was performed by Alvin Huang on 2010-08-23.*

Test Mode: Transmitting

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

Please refer to follow plots:

1 PK
MAXH

Ref 10 dBm *Att 25 dB

*RBW 100 kHz *VBW 300 kHz
SWT 2.5 ms

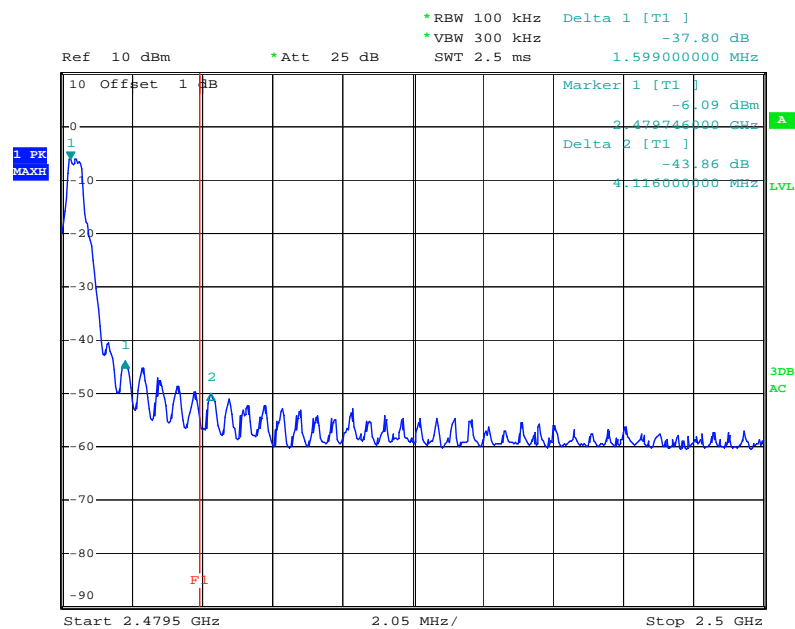
Marker 1 [T1] -5.24 dBm
2 401975000 GHz

2.399975000 GHz

Start 2.39 GHz 1.25 MHz/ Stop 2.4025 GHz

Date: 23.AUG.2010 22:21:58

Band Edge: Right Side



Date: 23.AUG.2010 22:23:14

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