

FCC PART 15.247
MEASUREMENT AND TEST REPORT
For
TE Group

Kapelse straat 61 - 2950 Kapellen – Belgium

FCC ID: TQGBLEASYVOICE

Report Type: Original Report	Product Type: MrHandsfree Blue Easy / Blue Voice
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Test Date:	2008-08-08 to 2008-08-14
Report Date:	2008-08-22
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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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DOCUMENT REVISION HISTORY

Revision #	Report Number	Description of Revision	Date of Revision
0	RSZ08080409	Original Report	2008-08-15
1	RSZ08080409	Revised MPE	2008-08-22

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *TE Group* 's product, model number: *MH102* or the "EUT" as referred to in this report is a *MrHandsfree Blue Easy / Blue Voice*, which measures approximately: 12.0 cm L x 5.0 cm W x 1.5 cm H, rated input voltage: AC 120VAC/60Hz.

**Note: The series products, model MH101, MH102, we select MH102 to test, the all model have same circuit diagram, PCB, only appearance have differences, which was explained in the attached Declaration Letter.*

** All measurement and test data in this report was gathered from production sample serial number: 0808012 (Assigned by BACL, Shenzhen). The EUT was received on 2008-08-04.*

Objective

This Type approval report is prepared on behalf of *TE Group* 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, 15.209 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. (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

Description of Test Configuration

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

EUT Exercise Software

N/A.

Special Accessories

The special accessories were provided by Bay Area Compliance Laboratories Corp. (Shenzhen).

Equipment Modifications

No modification was made to the unit tested.

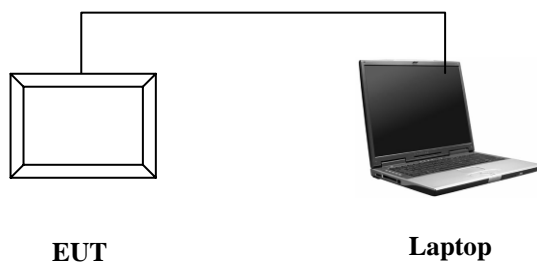
Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
RX-7336	Laptop	N/A	96F46W00004Q51900304	DoC

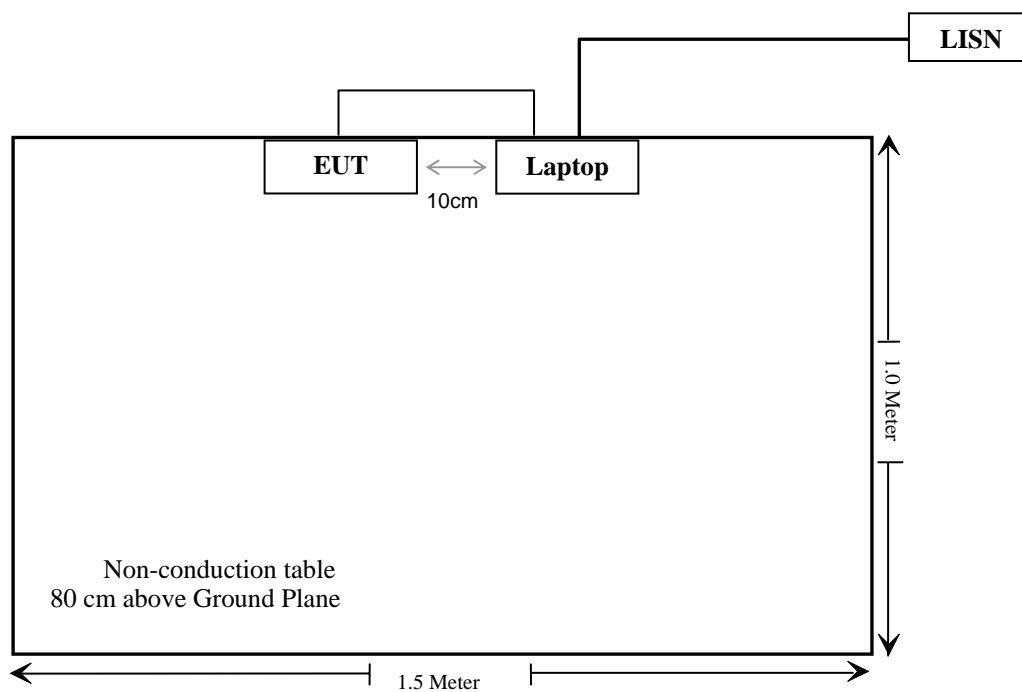
External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielded Detachable USB Cable	1.0	Laptop	EUT

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
CFR47 §15.203	Antenna Requirement	Compliant
CFR47 §15.207 (a)	Conducted Emissions	Compliant
CFR47 §15.205	Restricted Band	Compliant
CFR47 §15.205, §15.209, §15.247(d)	Radiated Emission	Compliant
CFR47 §15.247 (a)(1)	20 dB Bandwidth	Compliant
CFR47 §15.247(a)(1)	Channel Separation Test	Compliant
CFR47 §15.247(a)(1)(iii)	Time of occupancy (Dwell Time)	Compliant
CFR47 §15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
CFR47 §15.247(b)(1)	Peak Output Power Measurement	Compliant
CFR47 §15.247(d)	Band edges	Compliant

CFR47 §15.203 - ANTENNA REQUIREMENT

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 a printed antenna on PCB. The maximum gain is below 2 dBi.

Result: Compliance.

Please refer to the EUT internal photos.

§15.247 (i) and §1.1307 (b) (1) - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Standard Applicable

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 the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	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

Test Data

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

S = power density (in appropriate units, e.g. mW/cm²)

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)

Maximum peak output power at antenna input terminal: 5.32 (dBm)

Maximum peak output power at antenna input terminal: 3.404 (mW)

Prediction distance: >20 (cm)

Predication frequency: 2441(MHz)

Antenna Gain (typical): 2 (dBi)

Antenna Gain (typical): 1.585 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.001 (mW/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mW/cm²)

$$0.001(\text{mW}/\text{cm}^2) < 1 (\text{mW}/\text{cm}^2)$$

Result: Compliant at 20 cm.

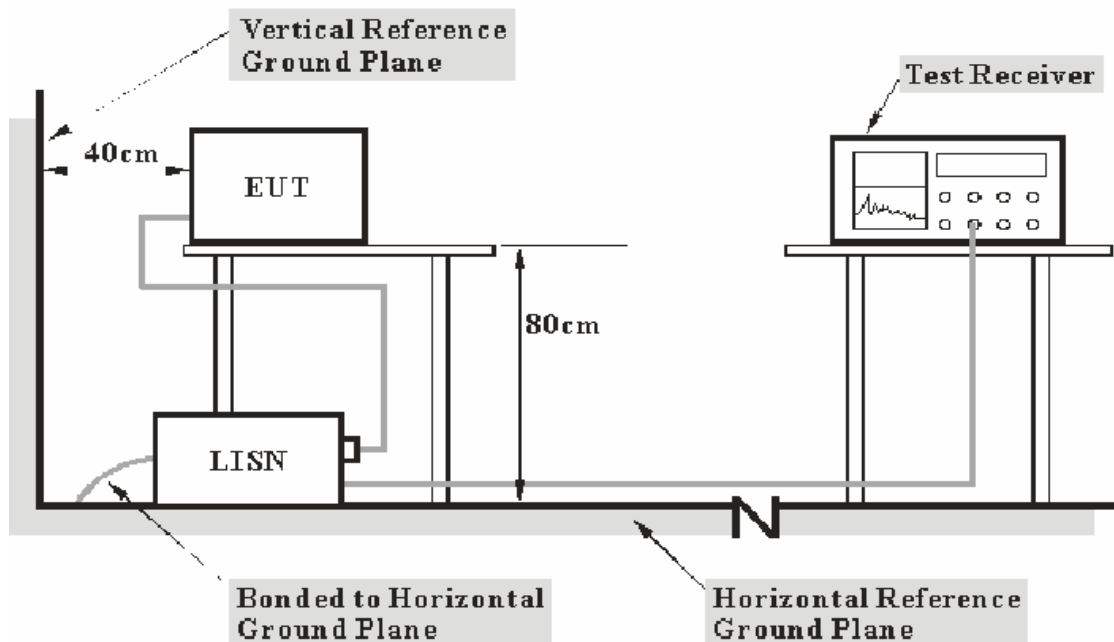
CFR47 §15.207 (a) - CONDUCTED EMISSIONS

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 Laboratories 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 Class B limits.

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

The spacing between the peripherals was 10 cm.

The Laptop 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:

<u>Frequency Range</u>	<u>IF B/W</u>
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	DE25330	2008-03-25	2009-03-25
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2008-03-25	2009-03-25

* Com-Power's LISN were used as the supporting equipment.

* **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

During the conducted emission test, the Laptop 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.

Environmental Conditions

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

The testing was performed by Andy Huang on 2008-08-08.

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:

7.70 dB at 0.5350 MHz in the **Line** conductor mode.

Test Data

Line Conducted Emissions				FCC Part15.207	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)
0.5350	38.30	AV	Line	46.00	7.70
0.5350	45.50	QP	Line	56.00	10.50
1.8650	45.50	QP	Line	56.00	10.50
0.5150	44.70	QP	Neutral	56.00	11.30
1.8650	34.30	AV	Line	46.00	11.70
0.9650	44.00	QP	Neutral	56.00	12.00
0.5150	32.10	AV	Neutral	46.00	13.90
0.3950	43.40	QP	Neutral	57.96	14.56
1.9700	31.30	AV	Neutral	46.00	14.70
0.1800	49.60	QP	Line	64.49	14.89
0.2650	46.10	QP	Line	61.27	15.17
5.1750	43.30	QP	Line	60.00	16.70
0.3950	40.80	AV	Neutral	58.00	17.20
0.1500	48.20	QP	Neutral	66.00	17.80
7.2000	41.30	QP	Neutral	60.00	18.70
0.2650	42.20	AV	Line	61.30	19.10
5.1750	30.90	AV	Line	50.00	19.10
7.2050	29.60	AV	Neutral	50.00	20.40
6.0000	37.90	QP	Neutral	60.00	22.10
8.7700	37.60	QP	Line	60.00	22.40
6.0150	26.10	AV	Neutral	50.00	23.90
0.1800	40.30	AV	Line	64.50	24.20
8.7900	24.60	AV	Line	50.00	25.40
0.1500	28.70	AV	Neutral	66.00	37.30

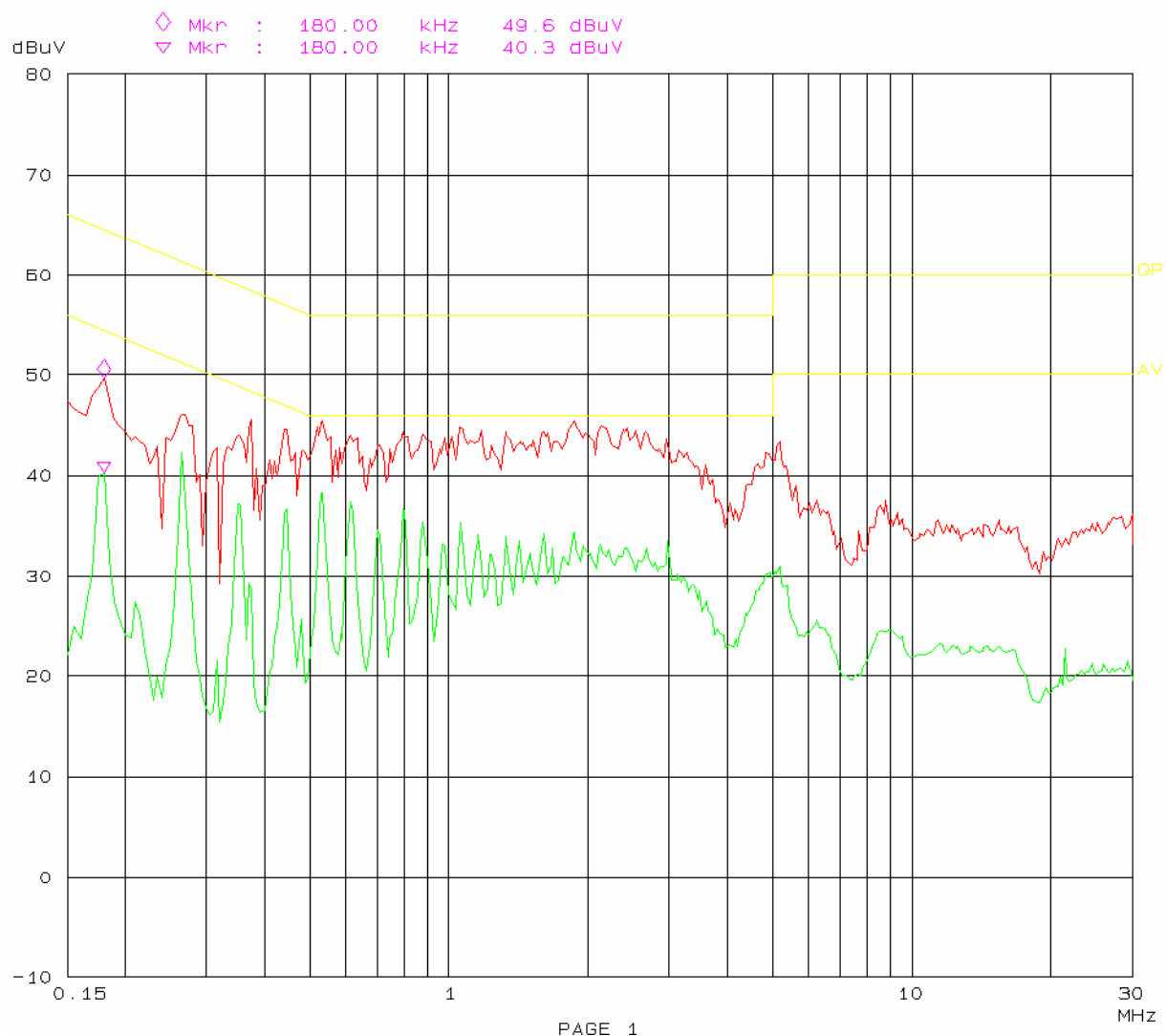
Plot(s) of Test Data

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

Conducted Emission
FCC PART15.207

08. Aug 08 10:01

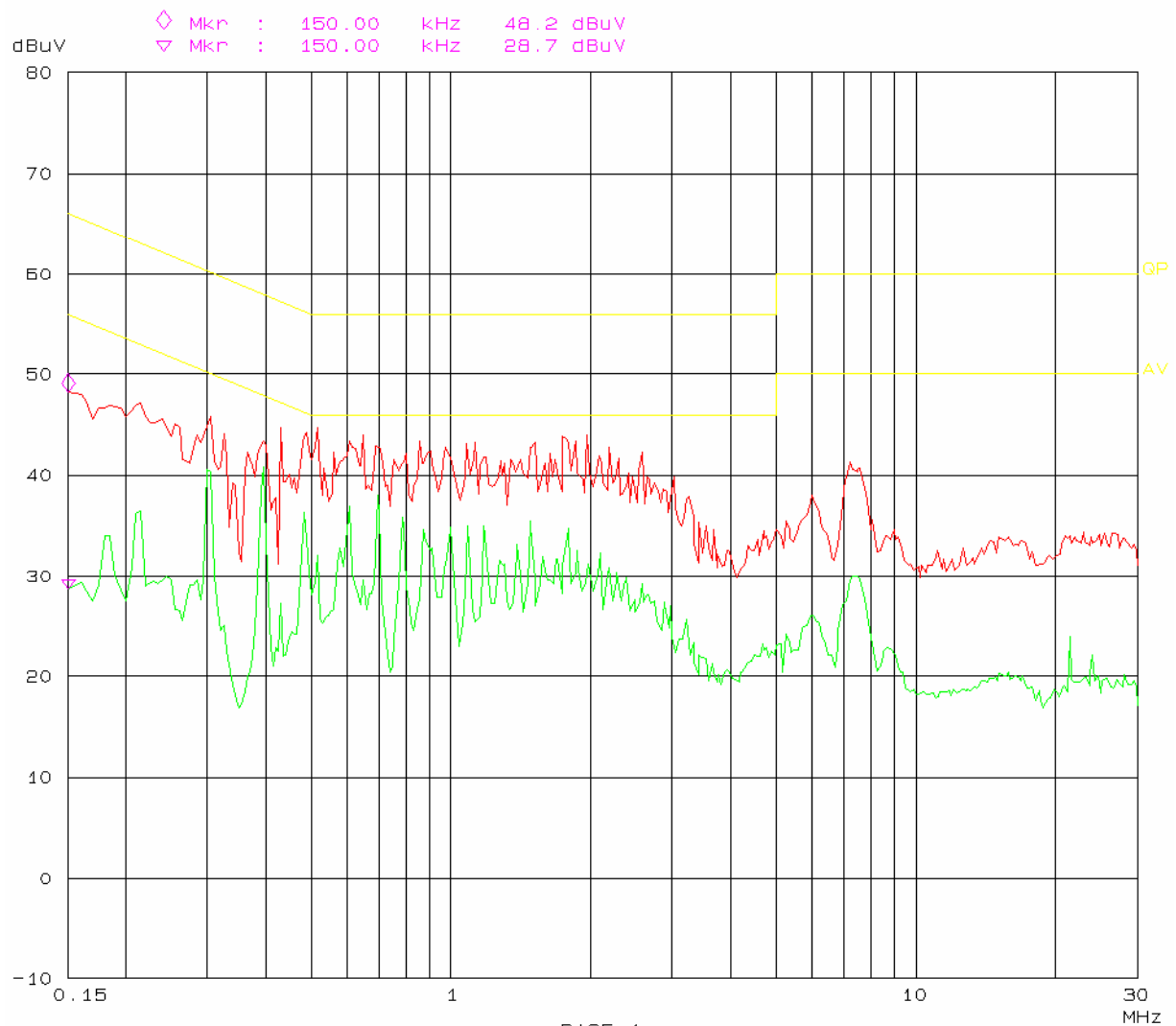
EUT: MH102
Manuf: TE Group M/N: 0808012
Op Cond: Transmitting
Operator: Andy
Test Spec: AC 120V/60Hz line
Comment: Temp: 25 Hum: 56%



Conducted Emission
FCC PART15.207

08. Aug 08 10:34

EUT: McHandfree Blue Easy/Blue Voice MH102
Manuf: TE Group M/N: 0808012
Op Cond: Transmitting
Operator: Andy
Test Spec: AC 120V/60Hz neutral
Comment: Temp: 25 Hum: 56%



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

Applicable Standard

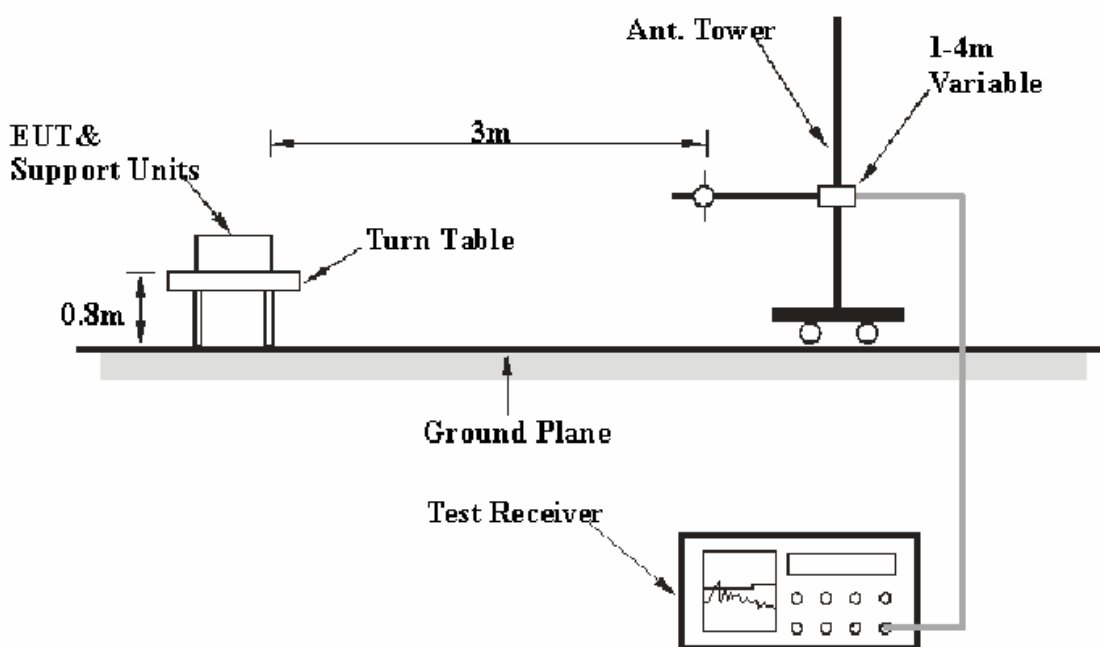
CFR47 §15.205; §15.209; §15.247 (d).

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 ± 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 15.109, FCC 15.209 and FCC 15.247 limits.

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

The spacing between the peripherals was 10 cm.

The Laptop 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>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	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2007-08-14	2008-08-14
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
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 the radiated emissions test, the Laptop 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.

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	52%
ATM Pressure:	100.9kPa

The testing was performed by Andy Huang on 2008-08-11.

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

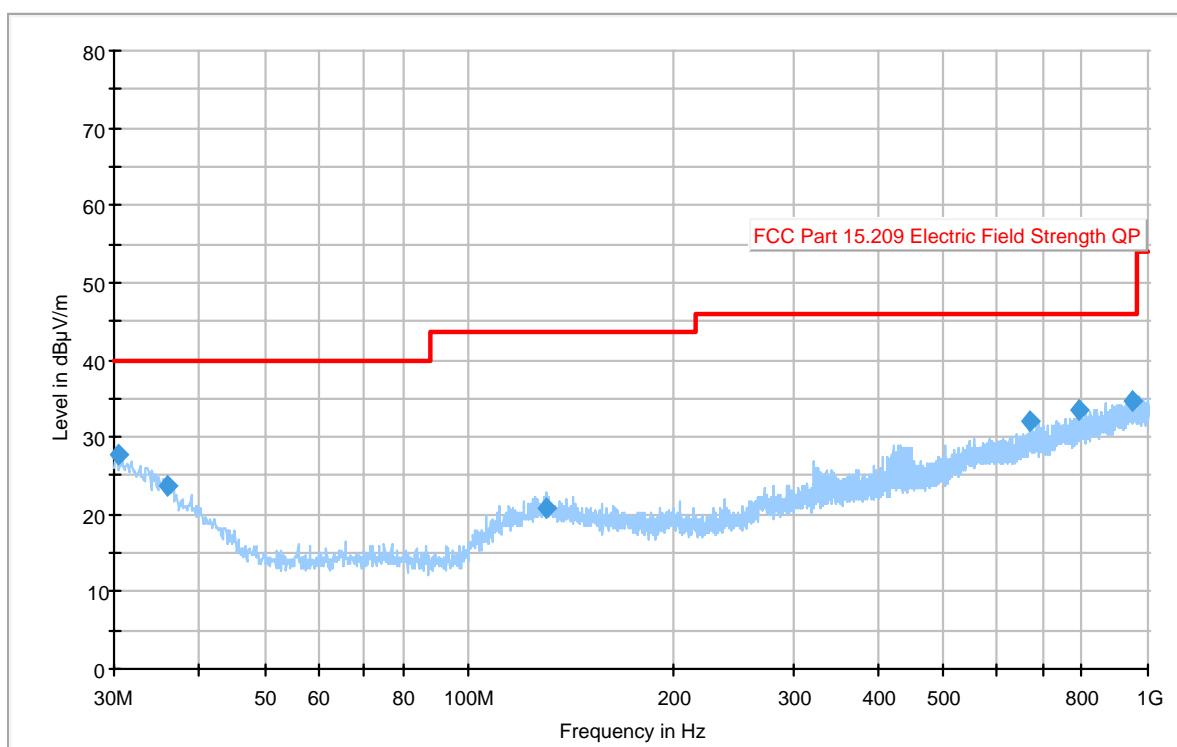
Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.109, 15.205, 15.209, and 15.247, with the worst margin reading of:

11.30 dB at 947.682000 MHz in the Vertical polarization, for Below 1 GHz
6.73 dB at 1602 MHz in the Vertical polarization, for above 1GHz (Low Channel)
9.12 dB at 1628 MHz in the Horizontal polarization, for above 1GHz (Middle Channel)
7.78 dB at 1654 MHz in the Vertical polarization, for above 1GHz (High Channel)

Test Data

Test Mode: Transmitting (Blow 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)
947.682000	34.7	263.0	V	146.0	1.9	46.0	11.3
30.368144	27.7	370.0	V	224.0	-4.2	40.0	12.3
790.052062	33.5	395.0	V	53.0	-0.5	46.0	12.5
668.922000	32.1	352.0	V	158.0	-2.3	46.0	13.9
35.961875	23.7	383.0	V	54.0	-8.2	40.0	16.3
129.689375	20.9	203.0	H	294.0	-10.3	43.5	22.6

Test Mode: Transmitting (Above 1GHz)

Freq. (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Corr. Amp. (dBuV/m)	FCC Part 15.247/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)	Remarks
Low Channel												
1602	48.25	AV	180	1.3	V	27.80	5.62	34.40	47.27	54	6.73	Spurious
1602	46.14	AV	120	1.2	H	27.8	5.62	34.4	45.16	54	8.84	Spurious
4804	23.16	AV	90	1.0	V	34.7	7.56	33.7	40.79	54	13.21	Harmonic
1602	61.58	PK	180	1.3	V	27.80	5.62	34.40	60.6	74	13.4	Spurious
1602	59.47	PK	120	1.0	H	27.8	5.62	34.4	58.49	74	16.3	Spurious
4804	36.49	PK	90	1.2	V	34.7	7.56	33.7	54.12	74	19.88	Harmonic
4804	23.74	AV	90	1.0	H	35.00	7.56	33.70	32.6	54	21.4	Harmonic
4804	37.07	PK	180	1.3	H	35.00	7.56	33.70	45.93	74	24.12	Harmonic
Middle Channel												
1628	45.87	AV	135	1.3	H	27.80	5.62	34.40	44.89	54	9.12	Spurious
1628	45.53	AV	85	1.0	V	27.80	5.62	34.40	44.55	54	9.45	Spurious
1628	59.2	PK	156	1.2	H	27.80	5.62	34.40	58.22	74	15.78	Spurious
1628	58.86	PK	265	1.4	V	27.80	5.62	34.40	57.88	74	16.12	Spurious
4882	23.25	AV	142	1.1	H	35.00	7.56	33.70	32.11	54	21.89	Harmonic
4882	23.2	AV	243	1.0	V	35.00	7.56	33.70	32.06	54	21.94	Harmonic
4882	36.58	PK	234	1.0	H	35.00	7.56	33.70	45.44	74	28.56	Harmonic
4882	36.53	PK	153	1.5	V	35.00	7.56	33.70	45.39	74	28.61	Harmonic
High Channel												
1654	47.2	AV	156	1.2	V	27.80	5.62	34.40	46.22	54	7.78	Spurious
1654	47.05	AV	156	1.2	H	27.80	5.62	34.40	46.07	54	7.93	Spurious
1654	60.53	PK	128	1.5	V	27.80	5.62	34.40	59.55	74	14.45	Spurious
1654	60.38	PK	128	1.5	H	27.80	5.62	34.40	59.4	74	14.6	Spurious
4334	23.31	AV	142	1.1	V	33.50	5.76	33.70	28.87	54	25.13	Harmonic
4350	22.95	AV	256	1.3	H	33.50	5.76	33.70	28.51	54	25.49	Harmonic
4334	36.64	PK	142	1.4	V	33.50	5.76	33.70	42.2	74	31.8	Harmonic
4350	36.28	PK	145	1.2	H	33.50	5.76	33.70	41.84	74	32.16	Harmonic

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	2007-10-16	2008-10-16

* **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 true
3. Measure the channel separation.

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Huang on 2008-08-11.

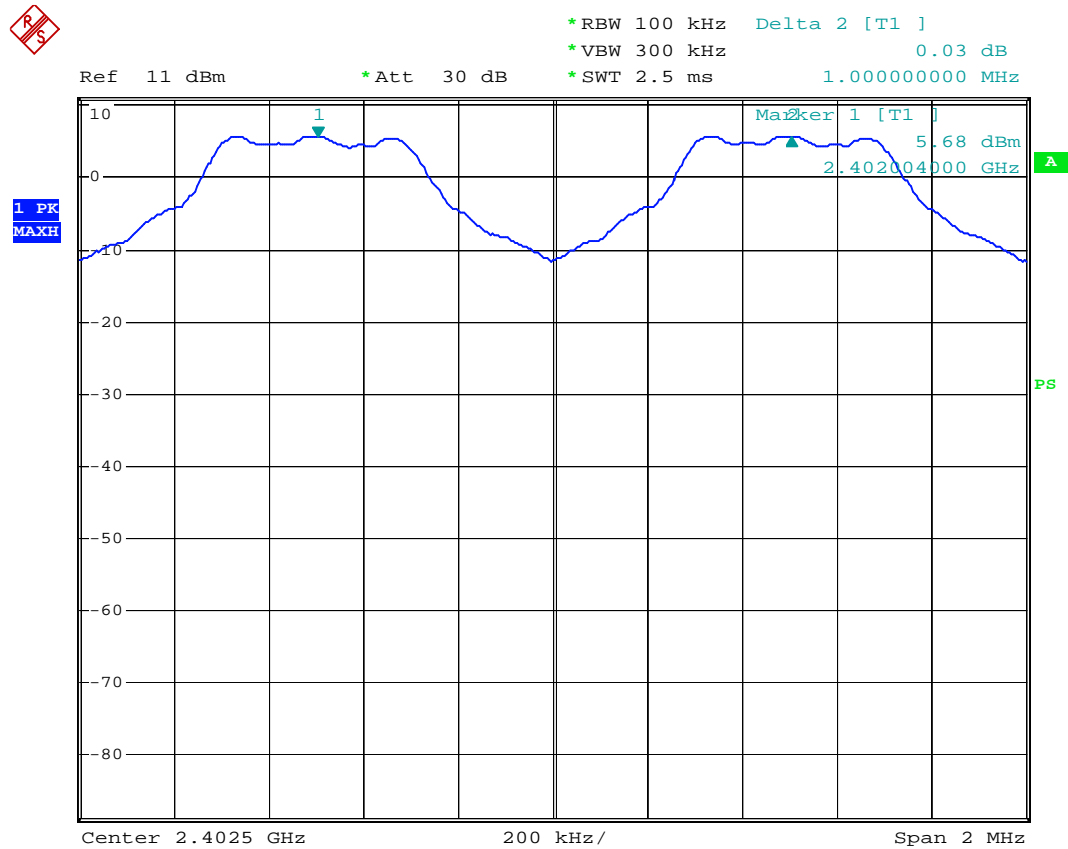
Test Data

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.000	0.530	Pass
Adjacency Channel	2403			
Middle Channel	2441	1.004	0.536	Pass
Adjacency Channel	2442			
High Channel	2480	1.000	0.539	Pass
Adjacency Channel	2479			

Test Result: Compliance.

Please refer to following plots

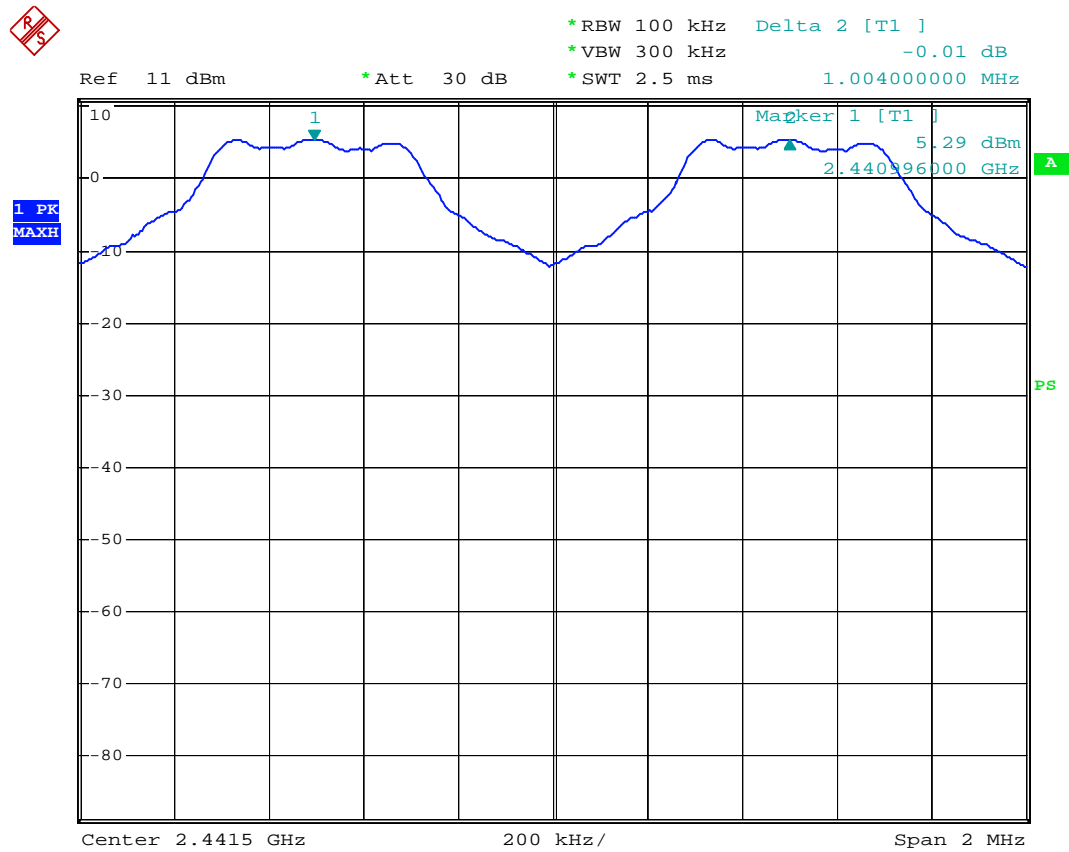
Low Channel



Channel separation low channel

Date: 11.AUG.2008 10:39:01

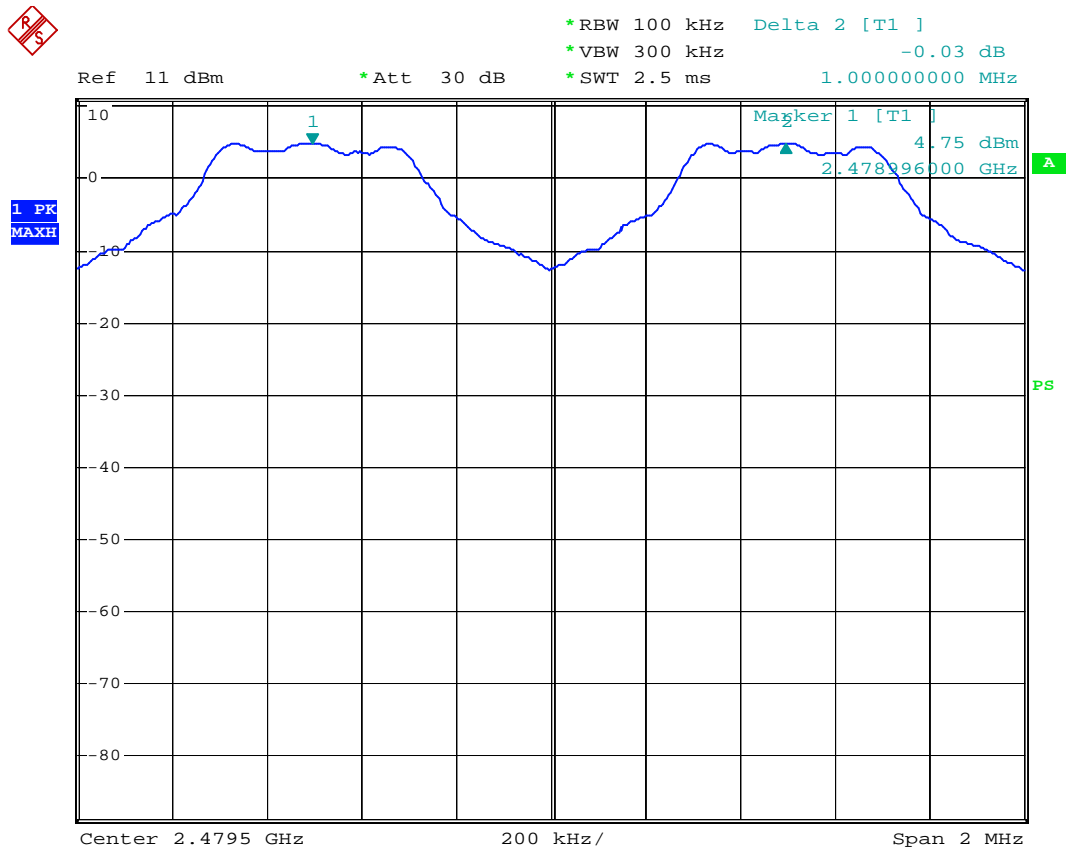
Middle Channel



Channel separation middle channel

Date: 11.AUG.2008 10:41:44

High Channel



Channel separation high channel

Date: 11.AUG.2008 10:45:09

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	2007-10-16	2008-10-16

* **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.

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

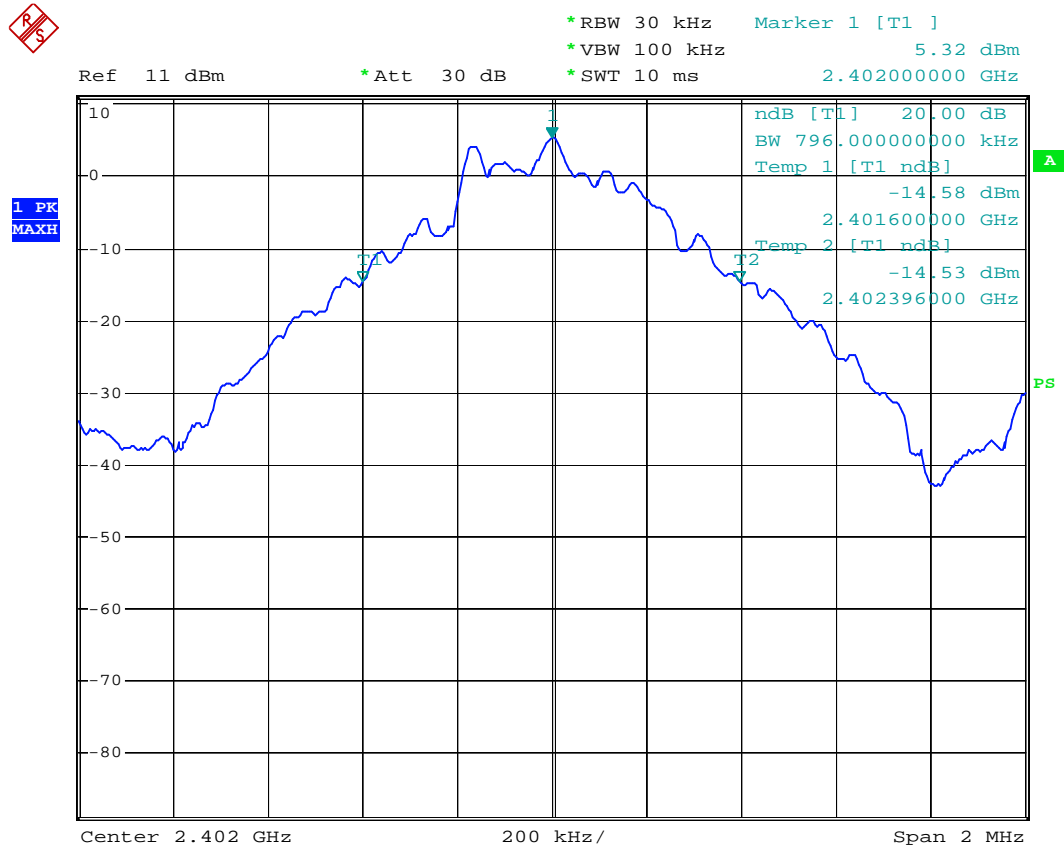
The testing was performed by Andy Huang on 2008-08-11.

Test Data

Please refer to the following table and plots.

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	0.796
Middle	2441	0.804
High	2480	0.808

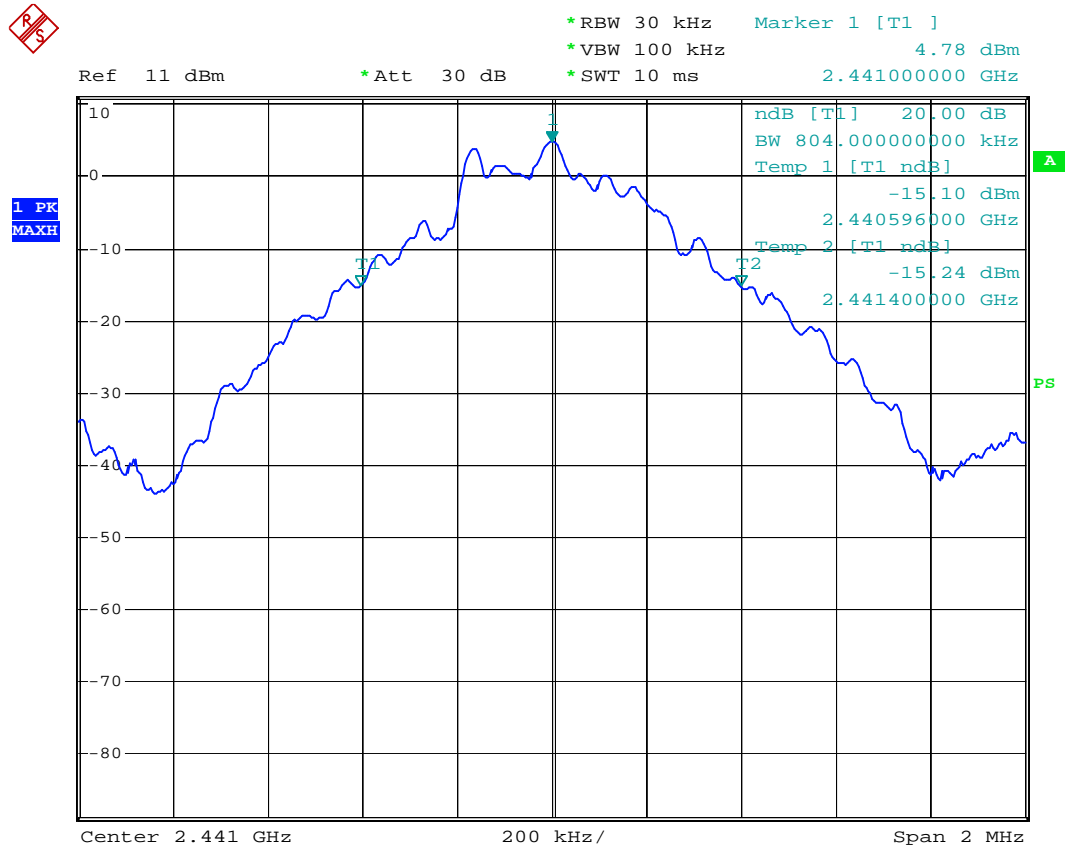
Low Channel



20db low channel

Date: 11.AUG.2008 11:16:17

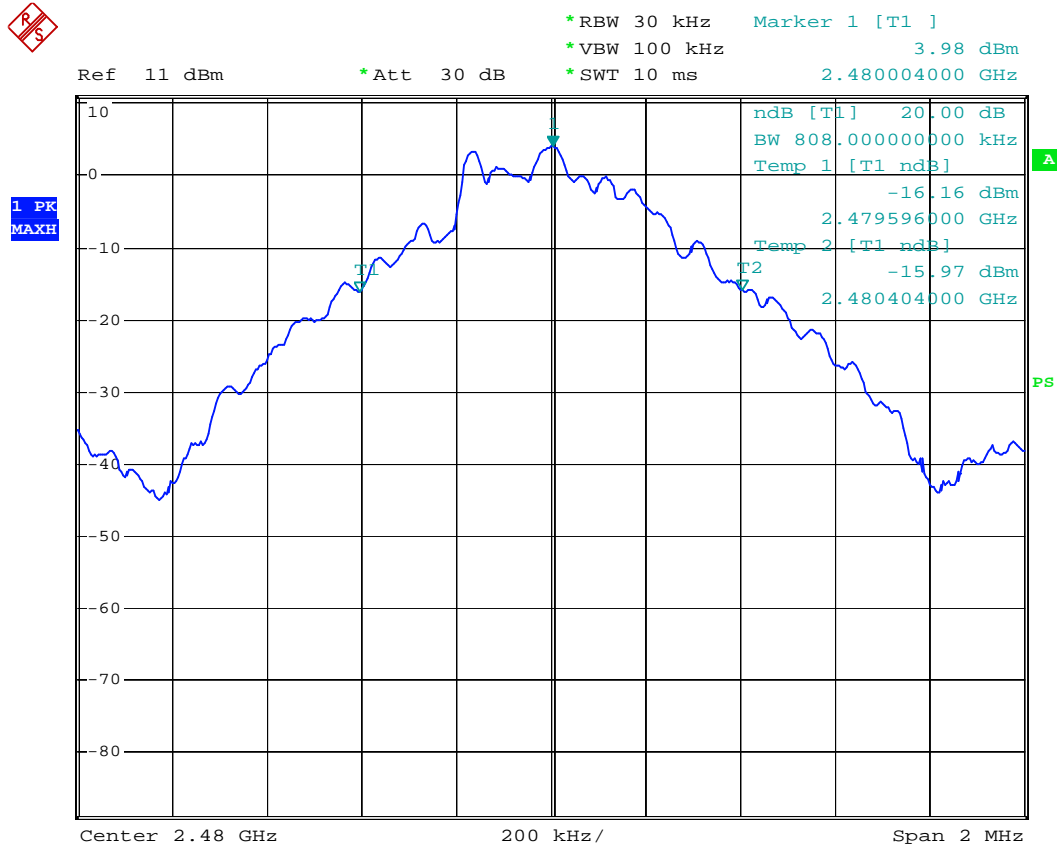
Middle Channel



20db middle channel

Date: 11.AUG.2008 11:19:08

High Channel



20db high channel

Date: 11.AUG.2008 11:20:48

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	2007-10-16	2008-10-16

* **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 transmitting mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Huang on 2008-08-14.

Test Data

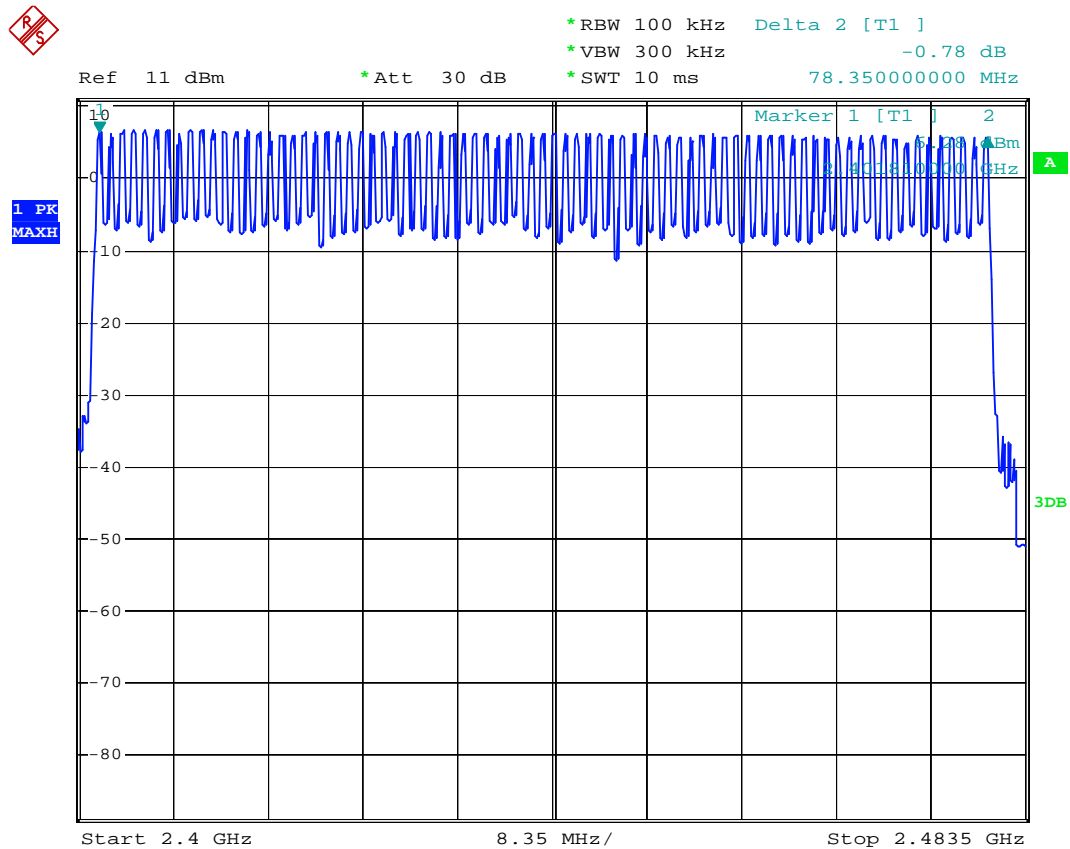
Test Mode: Transmitting

Frequency Range (MHz)	Quantity of Hopping Channel (CH)	Limit (CH)
2400-2483.5	79	>15

Test Result: Compliance.

Please refer to following plot.

Number of Hopping Channels



HOPPING CHANNEL

Date: 14.AUG.2008 11:38:35

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	2007-10-16	2008-10-16

* **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

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Huang on 2008-08-11.

Test Data

Test Mode: Transmitting

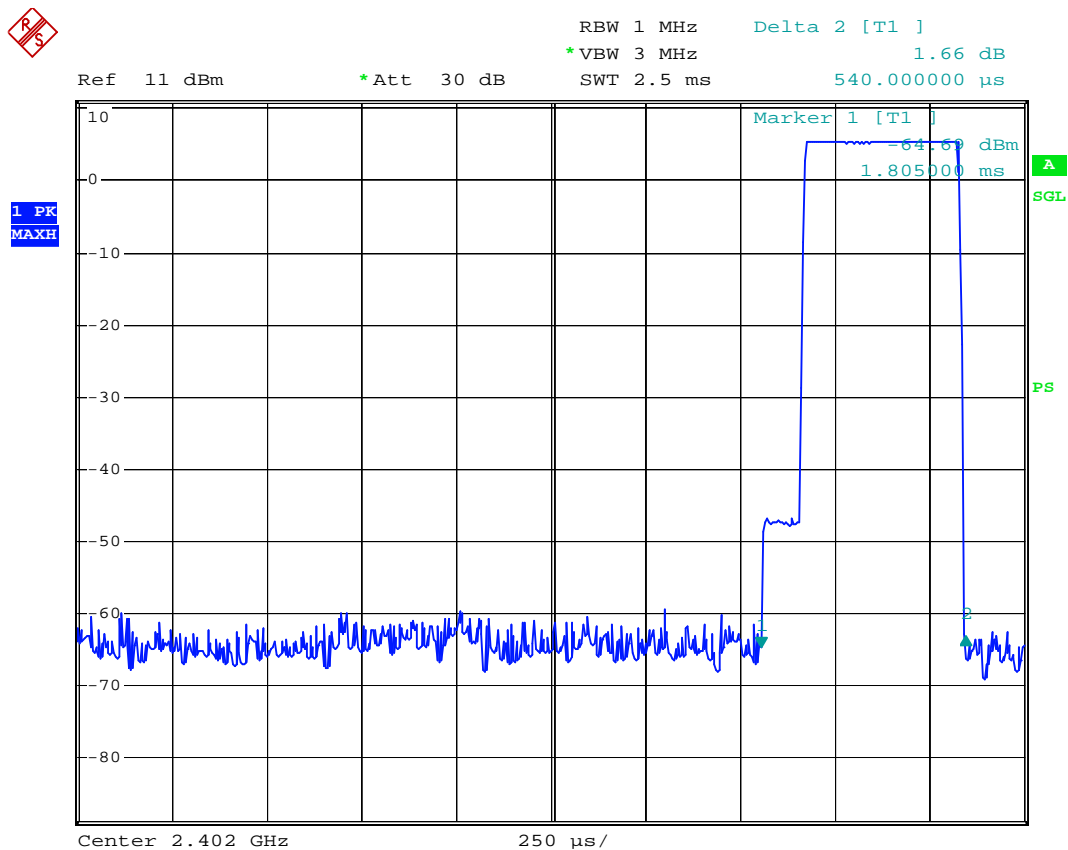
Test Result: Compliance.

Please refer to following tables and plots

DH1

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	0.540	0.173	0.4	Pass
Middle	0.540	0.173	0.4	Pass
High	0.540	0.173	0.4	Pass

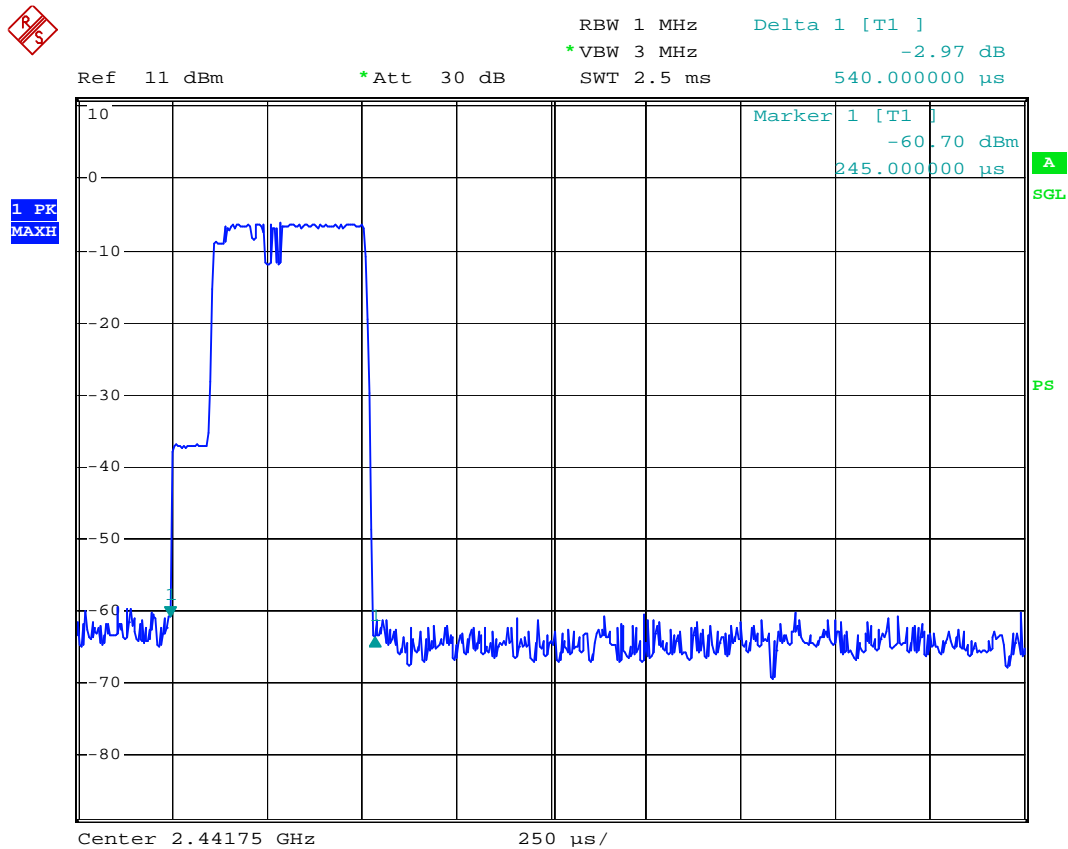
NOTE: Pulse time*(1600/2/79)*31.6S

Low Channel

dwell time DH1 low channel

Date: 11.AUG.2008 13:24:01

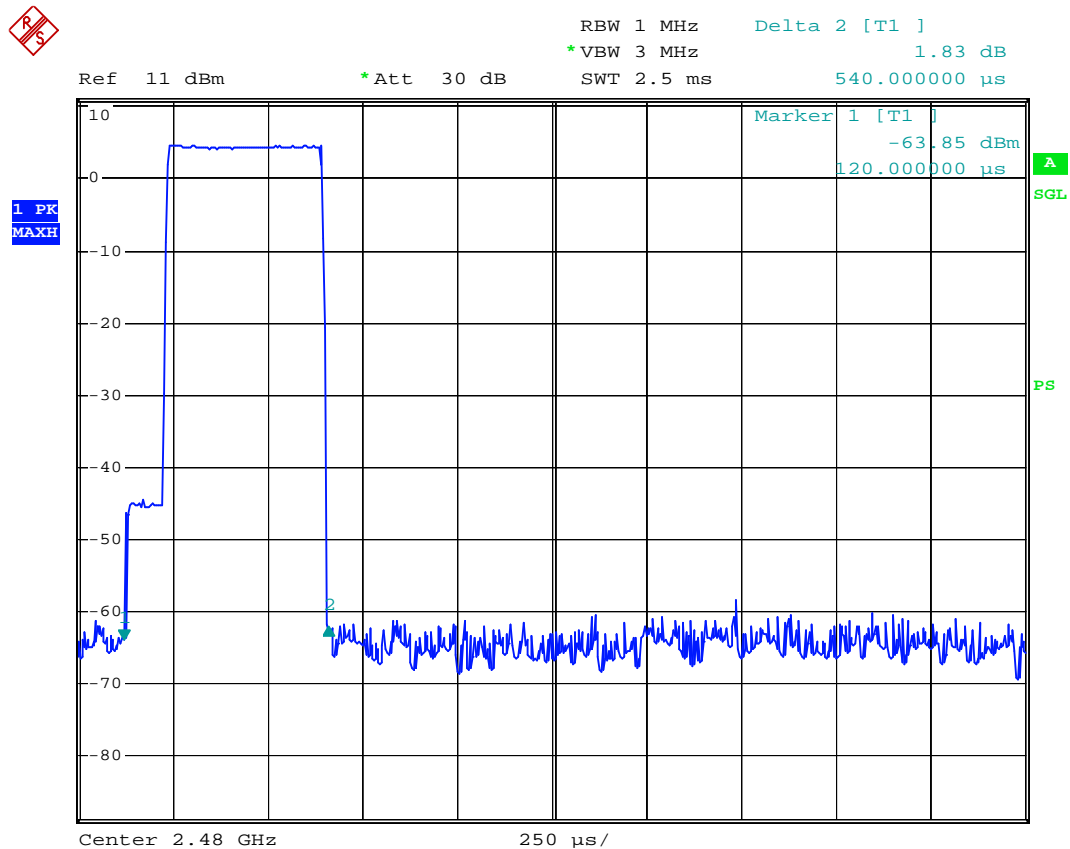
Middle Channel



dwell time DH1 middle channel

Date: 11.AUG.2008 11:50:02

High Channel



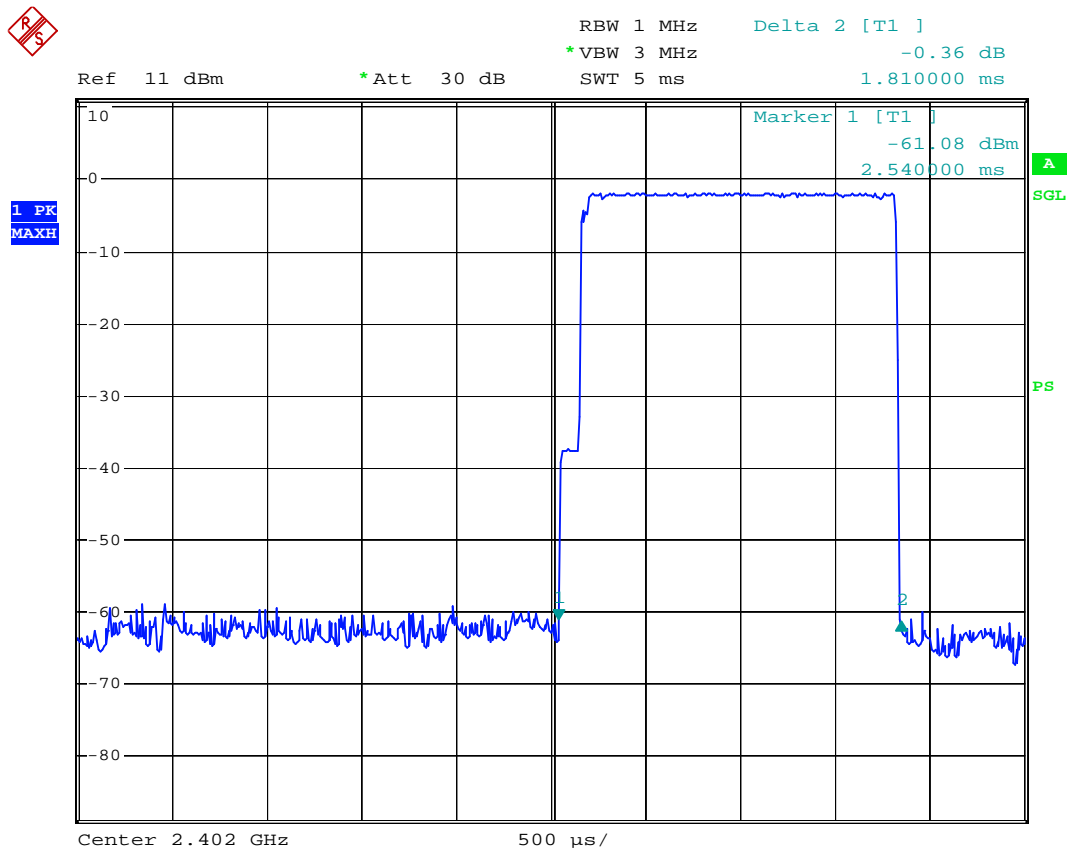
dwell time DH1 high channel

Date: 11.AUG.2008 13:38:55

DH3

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	1.810	0.290	0.4	Pass
Middle	1.805	0.289	0.4	Pass
High	1.810	0.290	0.4	Pass

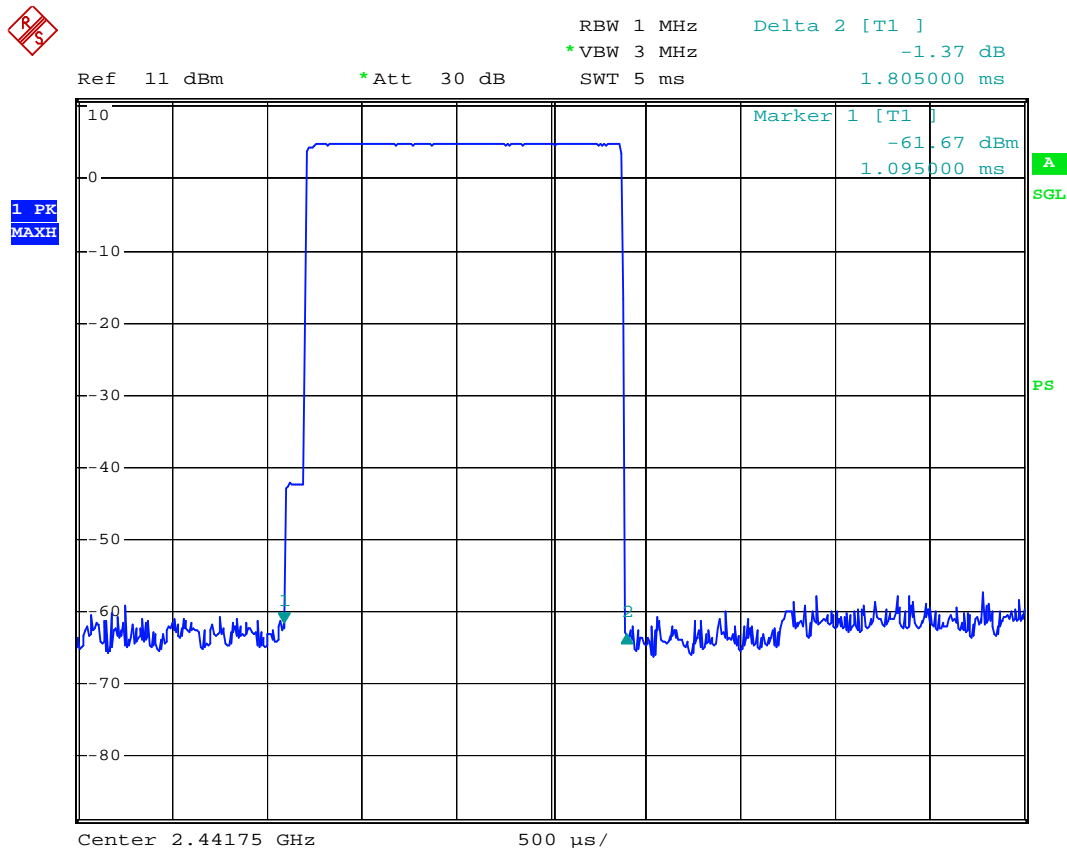
NOTE: Pulse time*(1600/4/79)*31.6S

Low Channel

dwell time DH3 low channel

Date: 11.AUG.2008 13:26:10

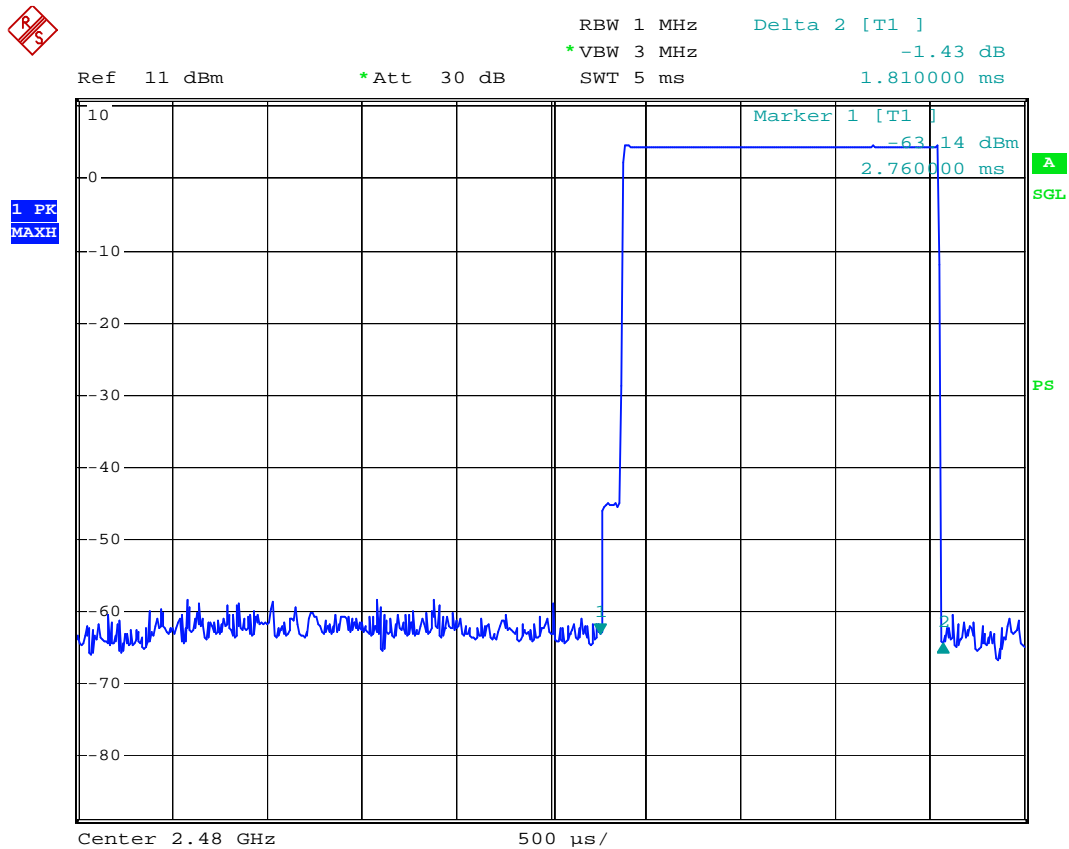
Middle Channel



dwell time DH3 middle channel

Date: 11.AUG.2008 12:01:54

High Channel



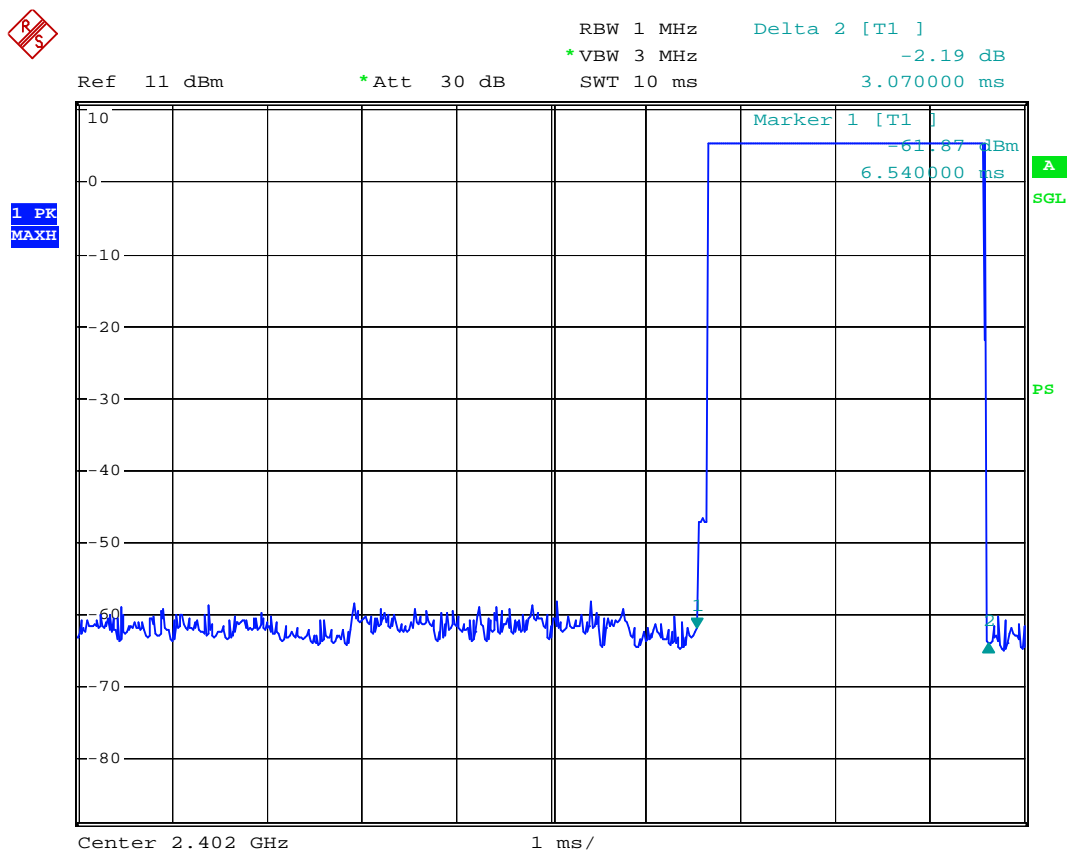
dwell time DH3 high channel

Date: 11.AUG.2008 13:32:51

DH5

Channel	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
Low	3.070	0.328	0.4	Pass
Middle	3.085	0.330	0.4	Pass
High	3.090	0.330	0.4	Pass

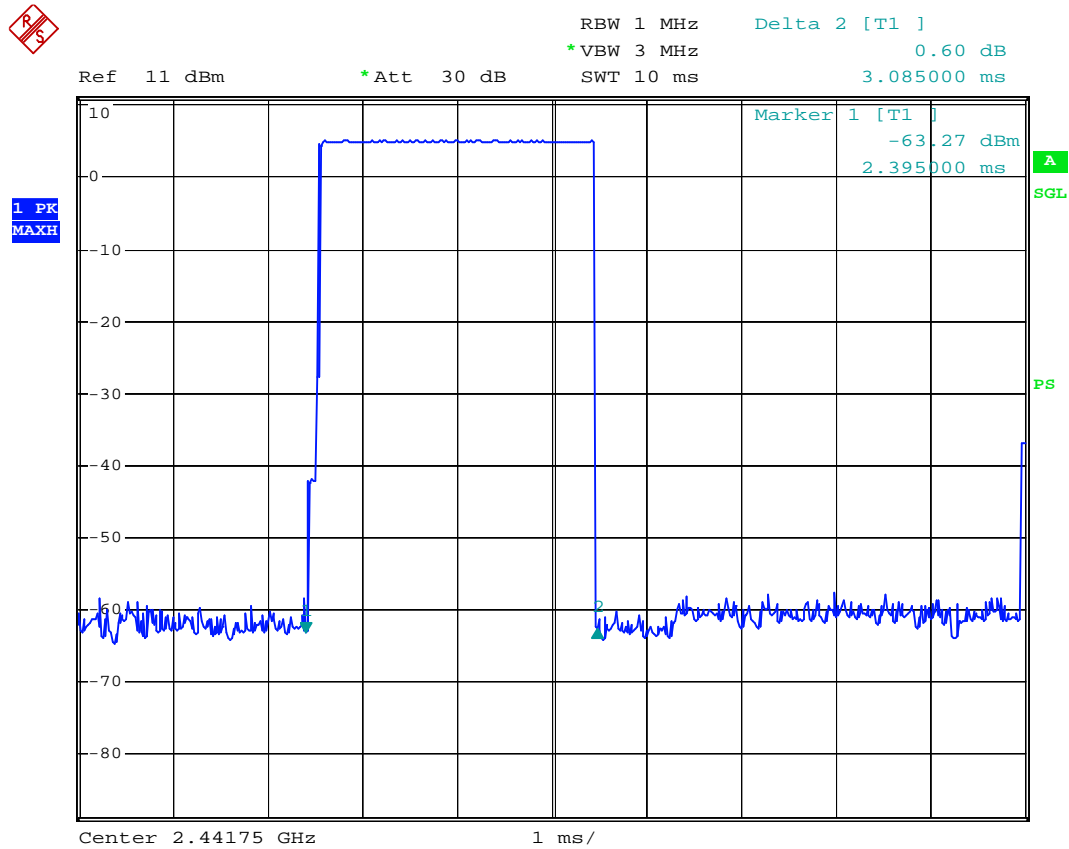
NOTE: Pulse time*(1600/6/79)*31.6S

Low Channel

dwell time DH5 low channel

Date: 11.AUG.2008 13:28:16

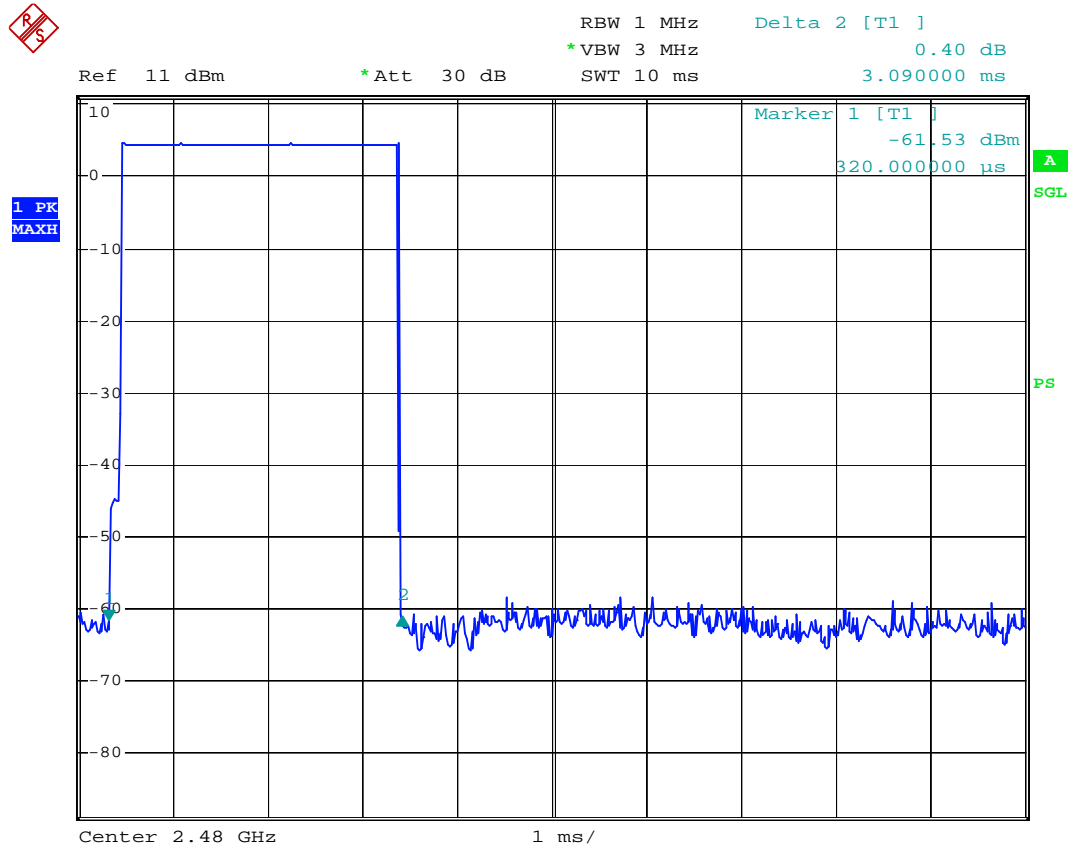
Middle Channel



dwell time DH5 middle channel

Date: 11.AUG.2008 13:12:27

High Channel



dwell time DH5 high channel

Date: 11.AUG.2008 13:31:07

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
HP	Amplifier	HP8447D	2944A09795	2007-11-15	2008-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-10-16	2008-10-16
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
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.

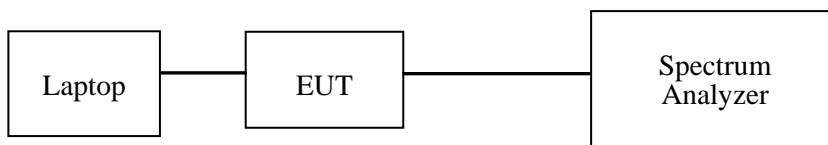
Test Procedure

Place the EUT on a wood table and set it in transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.

Add a correction factor to the display.

Measure the Peak Output Power of the EUT at appropriate RF operating channels of each band at a data rate which get the maximum power level.



Environmental Conditions

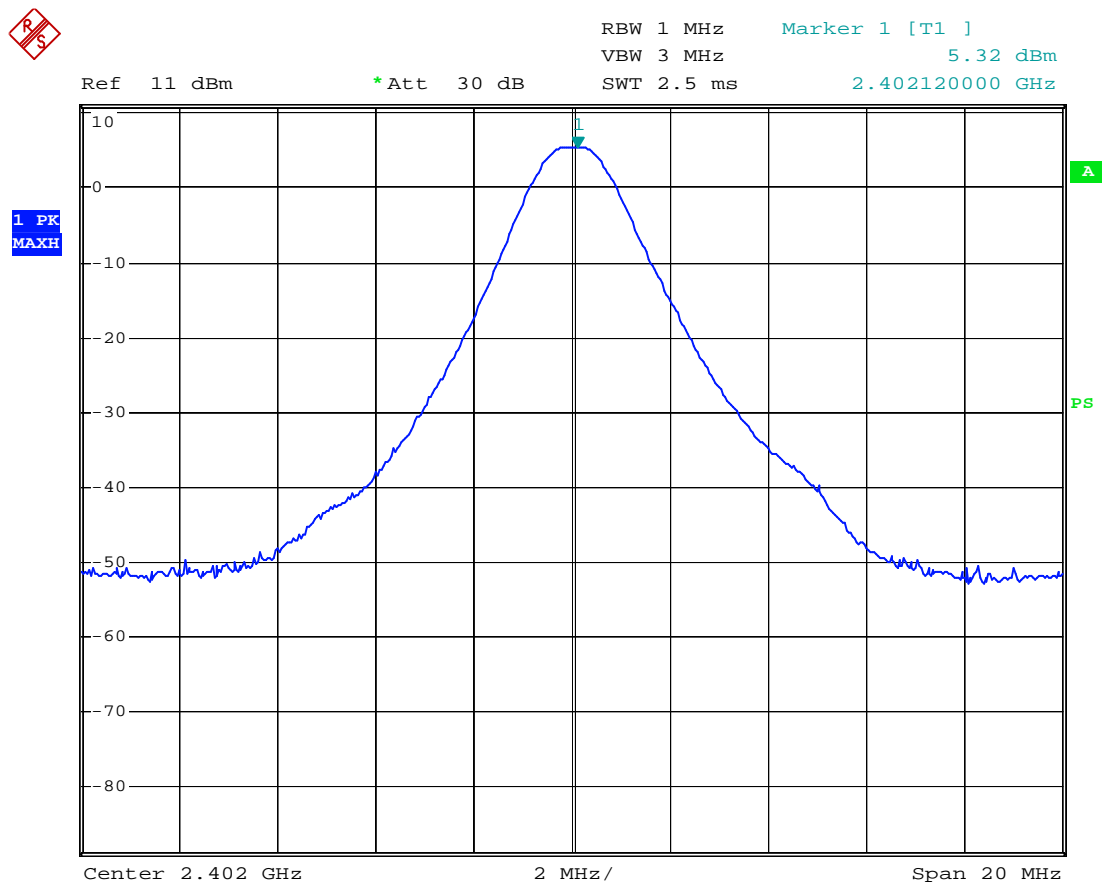
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Huang on 2008-08-11.

Test Data*Test Mode: Transmitting*

Channel	Channel Frequency (MHz)	Power Output		Limit (mW)
		(dBm)	(mW)	
Low	2402	5.32	3.404	1000
Mid	2441	5.06	3.206	1000
High	2480	4.46	2.792	1000

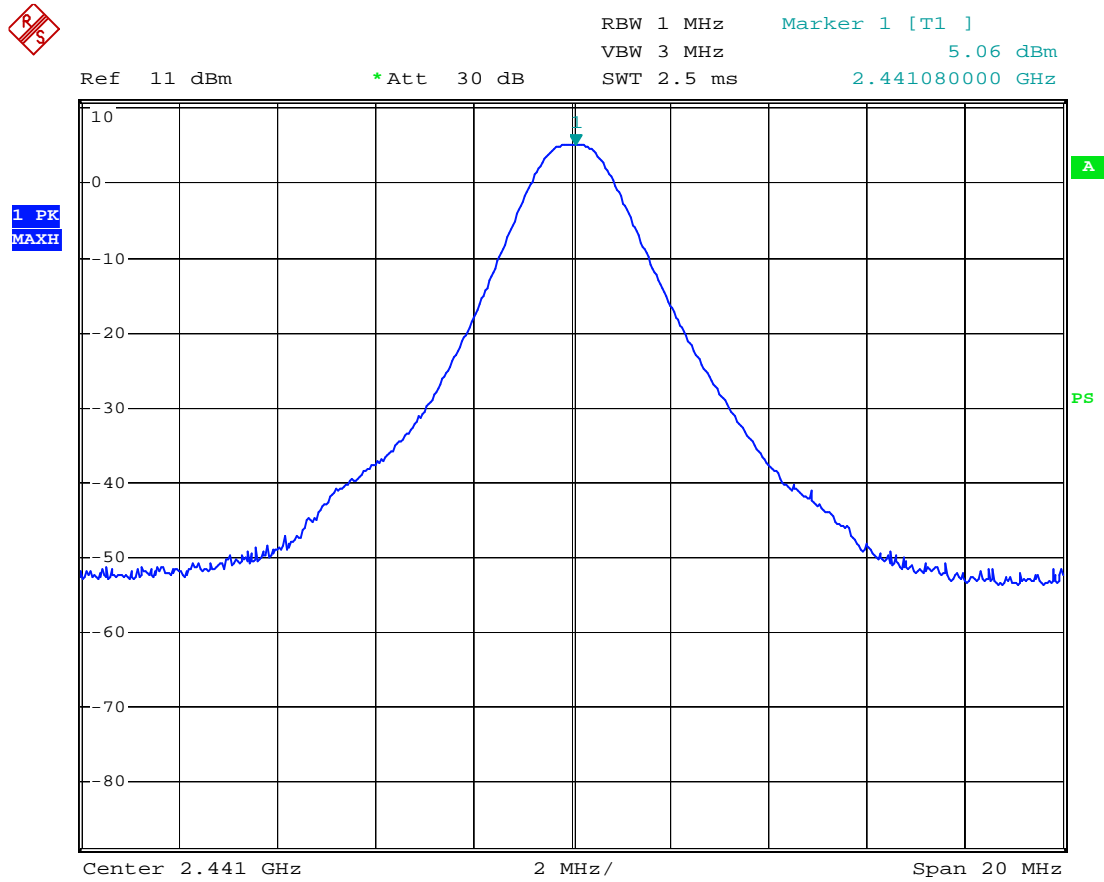
Low Channel



Peak output power low channel

Date: 11.AUG.2008 10:11:16

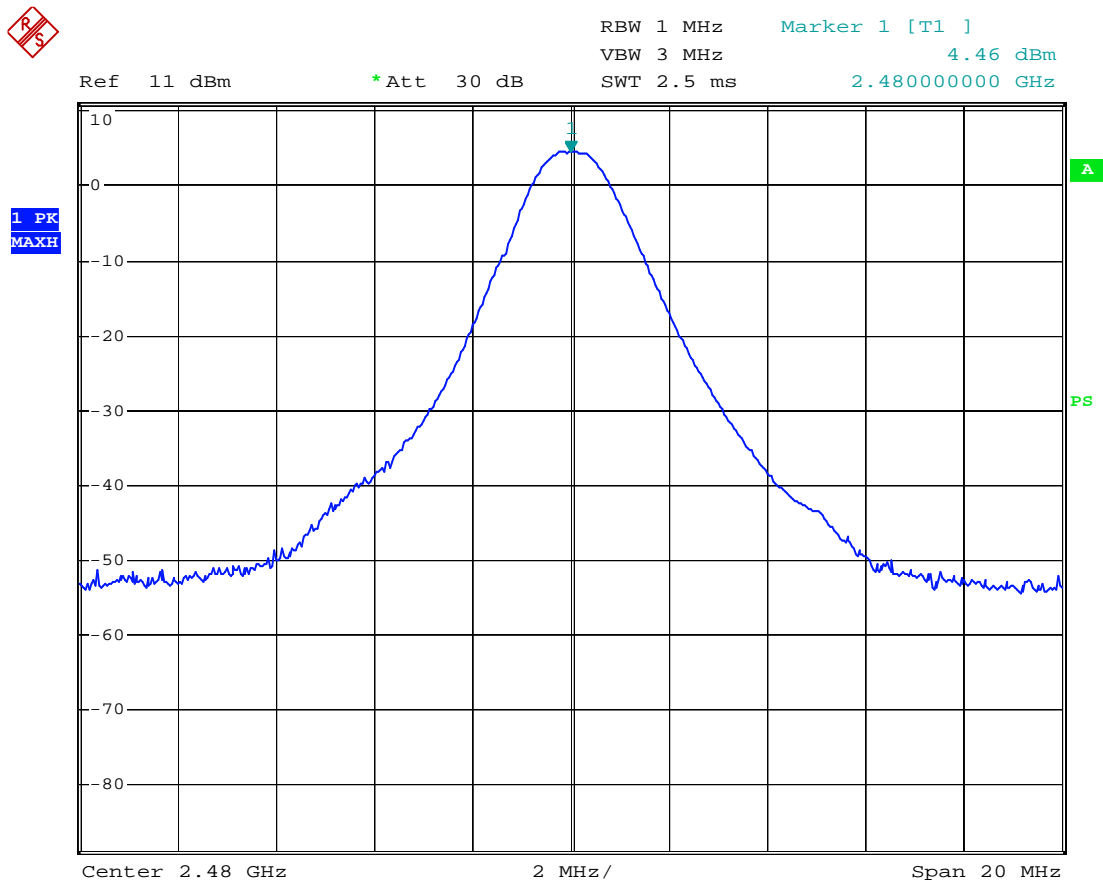
Middle Channel



Peak output power middle channel

Date: 11.AUG.2008 10:13:23

High Channel



Peak output power high channel

Date: 11.AUG.2008 10:14:43

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	2007-10-16	2008-10-16

* **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. 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

Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

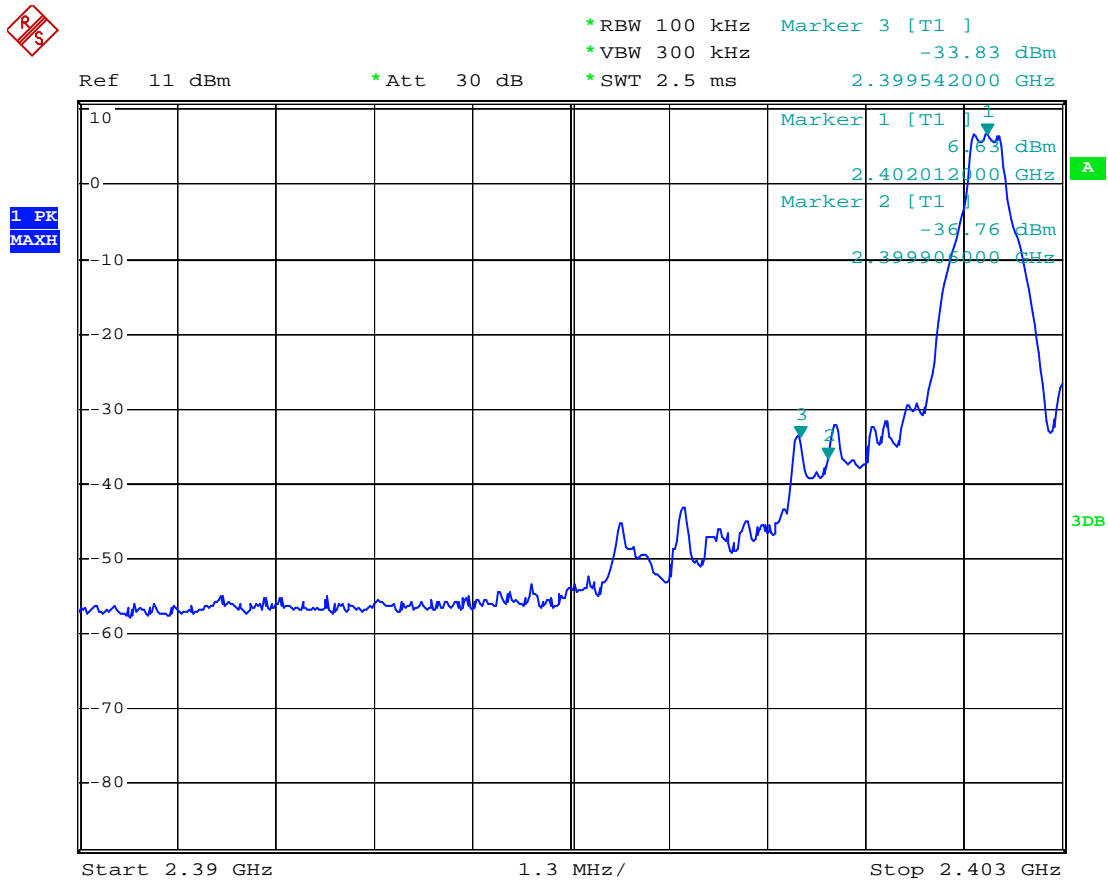
The testing was performed by Andy Huang on 2008-08-14.

Test Data*Test Mode: Transmitting*

Frequency (MHz)	Delta Peak to band emission (dBc)	Limit (dBc)
2399.542	40.46	20
2483.956	50.67	20

Please refer to the following plots.

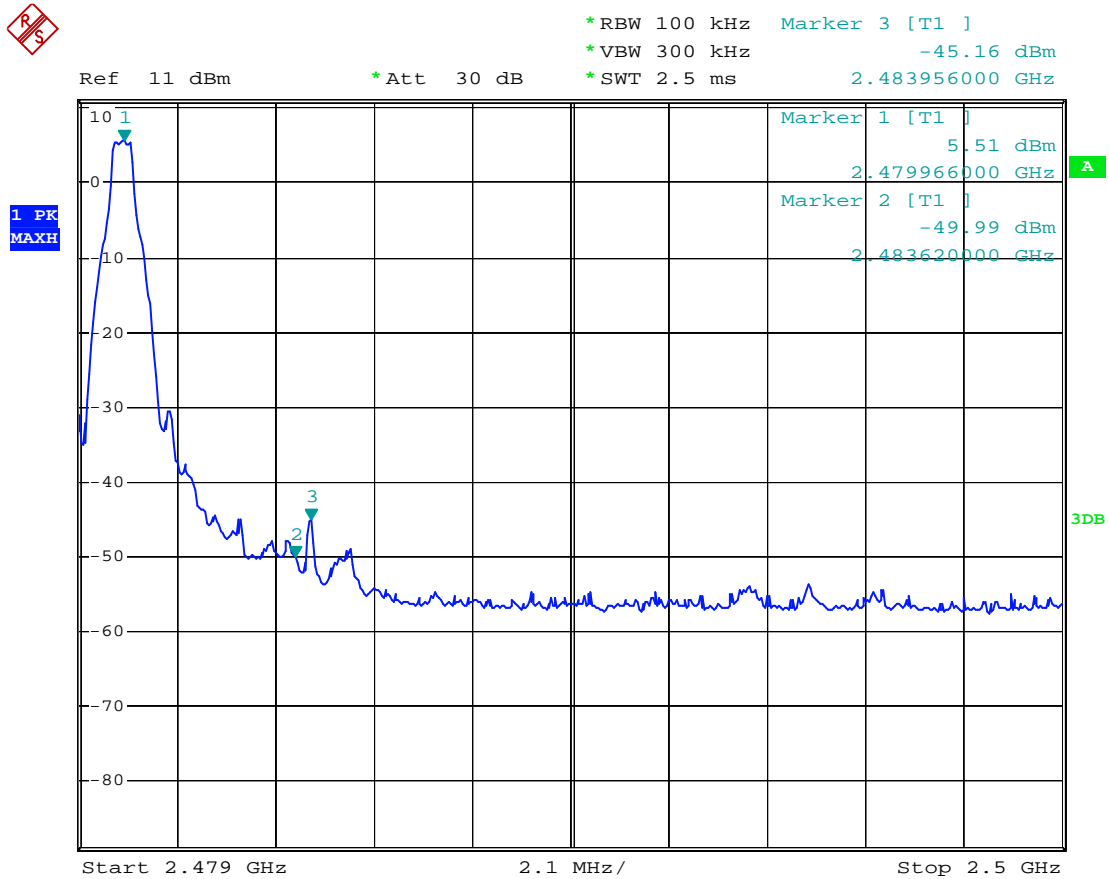
Low Band Edge



BAND EDGE LEFT

Date: 14.AUG.2008 11:59:05

High Band Edge



BAND EDGE RIGHT

Date: 14.AUG.2008 11:30:02

DECLARATION LETTER



Address: Kapelse straat 61-2950 Kapellen-Belgium

Tel: 32-3660-2244

Fax: 32-3660-2245

To: Bay Area Compliance Laboratories Corp

Difference declaration letter

To whom it may concern:

For our business issue and marketing requirement, we would like to list MH101 and MH102 model numbers on the FCC certificates and reports.

We declare that there is no any change has been made. The difference of these models is the model numbers.

Signature:

A handwritten signature in black ink, appearing to be 'Johan C. van Os', written over a light blue horizontal line.

Printed name/ title: Mr. Johan C. van Os / Product Manager

Tel: 32-3660-2244

Fax: 32-3660-2245

Address: Kapelse straat 61-2950 Kapellen-Belgium

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