NVLAP LAB CODE 200707-0

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

Tech-Way (Shanghai) Computer Co., Ltd

3F Building B, No.68, Rongjiang Rd, Songjiang Export Processing Zone,
Shanghai, P.R of China

FCC ID: VIOAEVB1USA019

This Report Concerns: ☒ Original Report	**Equipment Type:** Bluetooth foldable keyboard
Test Engineer:	Andy Yan
Report No.:	RSH07070552
Test Date:	2007-07-26 to 2007-07-31
Report Date:	2007-08-22
Reviewed By:	EMC Manager: Boni Baniqued
Prepared By:	Bay Area Compliance Laboratory Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
TEST FACILITY 4
SYSTEM TEST CONFIGURATION **5**
DESCRIPTION OF TEST CONFIGURATION 5
EUT EXERCISE SOFTWARE 5
SPECIAL ACCESSORIES 5
EQUIPMENT MODIFICATIONS 5
HOST SYSTEM CONFIGURATION LIST AND DETAILS 5
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 5
EXTERNAL I/O CABLE 6
CONFIGURATION OF TEST SETUP 7
BLOCK DIAGRAM OF TEST SETUP 7
SUMMARY OF TEST RESULTS **8**
§15.247 (i) and §1.1307 (b) (1) - MAXIMUN PERMISSIBLE EXPOSURE (MPE) **9**
APPLICABLE STANDARD 9
TEST DATA 9
§15.203 - ANTENNA REQUIREMENT **10**
STANDARD APPLICABLE 10
ANTENNA CONNECTOR CONSTRUCTION 10
§15.109, §15.205, §15.209, §15.247 - RADIATED EMISSIONS **11**
APPLICABLE STANDARD 11
MEASUREMENT UNCERTAINTY 11
EUT SETUP 11
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 12
TEST EQUIPMENT LIST AND DETAILS 12
TEST PROCEDURE 12
CORRECTED AMPLITUDE & MARGIN CALCULATION 12
TEST RESULTS SUMMARY 13
TEST DATA 13
§15.247(a) (1)-CHANNEL SEPARATION **16**
APPLICABLE STANDARD 16
TEST EQUIPMENT LIST AND DETAILS 16
TEST PROCEDURE 16
TEST DATA 16
§15.247(a) (1) –20dB BANDWIDTH **20**
APPLICABLE STANDARD 20
TEST EQUIPMENT LIST AND DETAILS 20
TEST PROCEDURE 20
TEST DATA 20
§15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL **24**

APPLICABLE STANDARD 24
TEST EQUIPMENT LIST AND DETAILS 24
TEST PROCEDURE 24
TEST DATA 24

§15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME) 26

APPLICABLE STANDARD 26
TEST EQUIPMENT LIST AND DETAILS 26
TEST PROCEDURE 26
TEST DATA 26

§15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT 30

APPLICABLE STANDARD 30
TEST EQUIPMENT LIST AND DETAILS 30
TEST PROCEDURE 30
TEST DATA 30

§15.247(d) - BAND EDGES TESTING 34

APPLICABLE STANDARD 34
TEST EQUIPMENT LIST AND DETAILS 34
TEST PROCEDURE 34
TEST DATA 34

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Tech-Way (Shanghai) Computer Co., Ltd* 's product, model number: *VB1* or the "EUT" as referred to in this report is a *Bluetooth foldable keyboard*, which measures approximately: 13.2 cm L x 9.0 cm W x 1.7 cm H, rated input voltage: DC 3.0V Battery.

** The test data gathered are from production sample, serial number: 0707005 provided by the manufacturer, we receive the EUT on 2007-07-05.*

Objective

This Type approval report is prepared on behalf of *Tech-Way (Shanghai) Computer Co., Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine 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 Laboratory 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 Laboratory 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 Laboratory 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 Laboratory 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/ts/htdocs/210/214/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 Laboratory Corp. (Shenzhen).

Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the EUT.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	PC	DELL 170L	CN-0TC670-70821-560-F4WQ	DoC
DELL	Keyboard	SK-8110	CN07N244-71616-56I-1I0O	DoC
DELL	Mouse	M071KC	519046820	DoC
DELL	LCD Monitor	1505FP	Y4287-7168-574-GBSH	DoC
Intel	CPU	Celeron D-2533	N/A	DoC
ProMOS	Memory	V826632K24SATG-C0	0525-K1933700	DoC

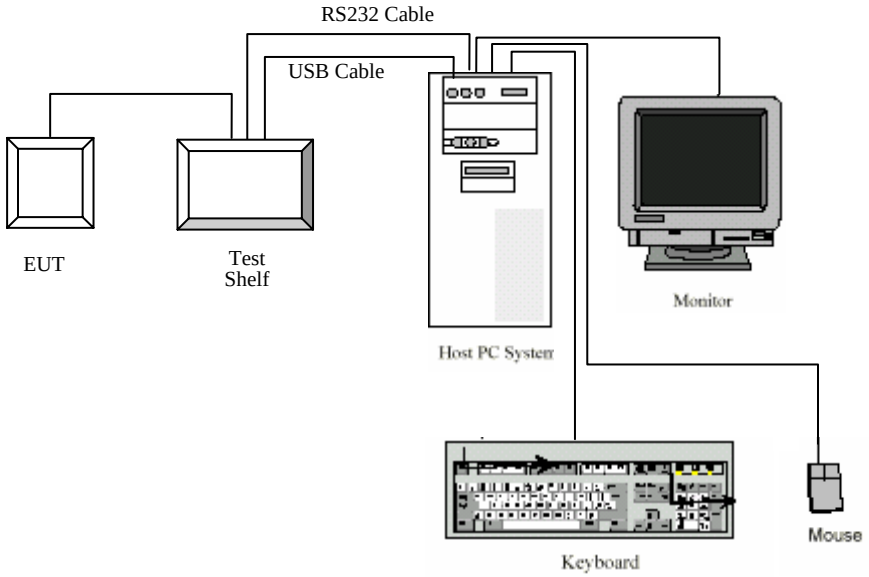
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
DELL	Motherboard	OWC297	CN-OWC297-70821-566-02BR	DoC
DELL	Power	NPS-250KB D	CN-0H2678-17972-56E8NBM	DoC
Seagate	Hard Disk	ST340014A	5JXK3NAD	DoC
DELL	3.5' Floppy	N/A	CN-0N8893-69802-54Q-02OZ	DoC
Lite-ON	CD-Rom	LTN-489S	N/A	DoC
Intel	Ethernet	PRO 10/100 VE	N/A	DoC

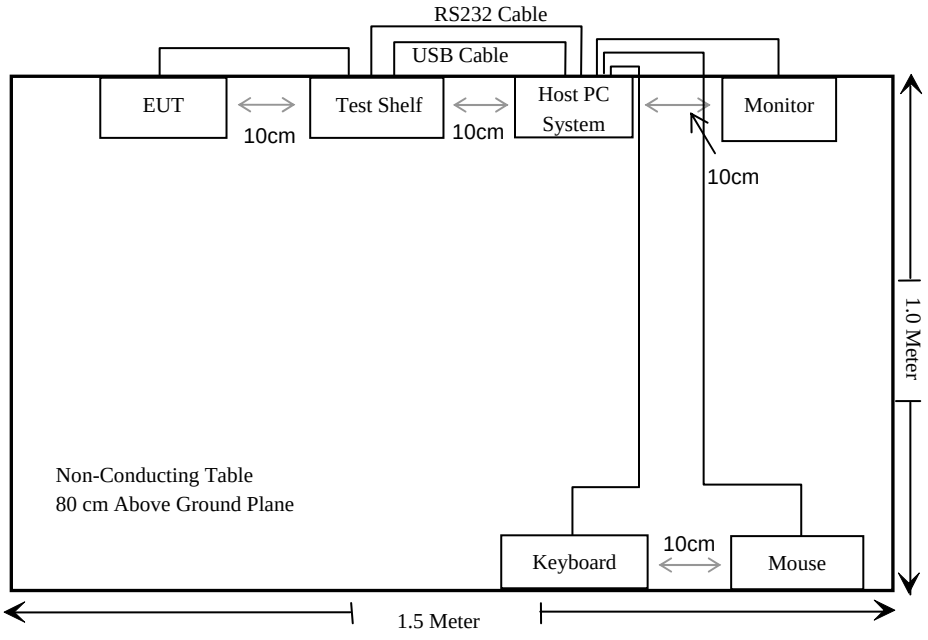
External I/O Cable

Cable Description	Length (M)	From Port	To
Shielded Detachable K/B Cable	1.5	K/B Port /Host	K/B
Shielded Detachable Mouse Cable	1.5	Mouse Port /Host	Mouse
Shielded Detachable VGA Cable	1.5	VGA Port/Host	Monitor
Shielded Detachable RS232 Cable	1.0	Test Shelf	Host PC
Shielded Detachable USB Cable	0.8	Test Shelf	Host PC

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1)	Maximum Permissible exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emissions	N/A*
§15.205	Restricted Band	Compliant
§15.109, §15.205, §15.209, §15.247(d)	Radiated Emission	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 testing	Compliant

Note: * Battery operation.

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

Applicable Standard

According to §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.

Radio frequency radiation exposure was calculated based on § 1.1310 limits.

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

Prediction of MPE limit at a given distance.

Equation from page 18 of OET Bulletin 65, Edition 97-01.

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

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Maximum peak output power at antenna input terminal: 2.64(dBm)
Maximum peak output power at antenna input terminal: 1.8365 (mW)
Safety distance: 20 (cm)
Prediction frequency: 2440(MHz)
Antenna Gain (typical): 1.87 (dBi)
Antenna Gain (Numeric): 1.538
Power density at prediction frequency at 20 cm = 0.0005622 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)

Result: Compliant at 20 cm distance.

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

According to § 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 uses PCB printed antenna. The maximum gain is 1.87 dBi; please refer to the EUT internal photos.

Result: Compliant.

§15.109, §15.205, §15.209, §15.247 - RADIATED EMISSIONS

Applicable Standard

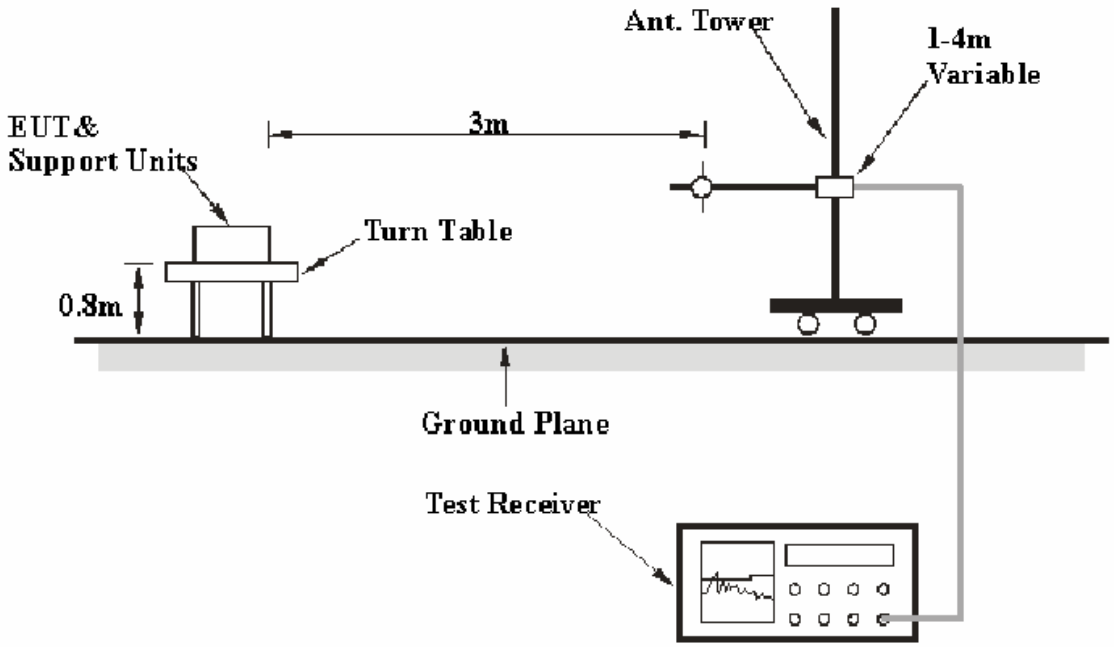
According to FCC §15.247 (d)

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 Laboratory 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 host PC was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	***RBW***	***Video B/W***
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	2006-11-15	2007-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2006-08-14	2007-08-14
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-09-25	2007-09-25
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22

*** 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

For the radiated emissions test, the host PC 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:

Corr. Amp. = Meter Reading + Antenna Factor + Cable Loss- Amplifier Gain

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

Margin = Limit - Corr. Amp.

Test Results Summary

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

2.0 dB at **144.005825 MHz** in the **Horizontal** polarization, **for 30 MHz-1000MHz**
7.77 dB at **4804 MHz** in the **Vertical** polarization, **for above 1GHz (Low Channel)**
7.68 dB at **4882 MHz** in the **Horizontal** polarization, **for above 1GHz (Middle Channel)**
8.74 dB at **4960 MHz** in the **Vertical** polarization, **for above 1GHz (High Channel)**

Test Data

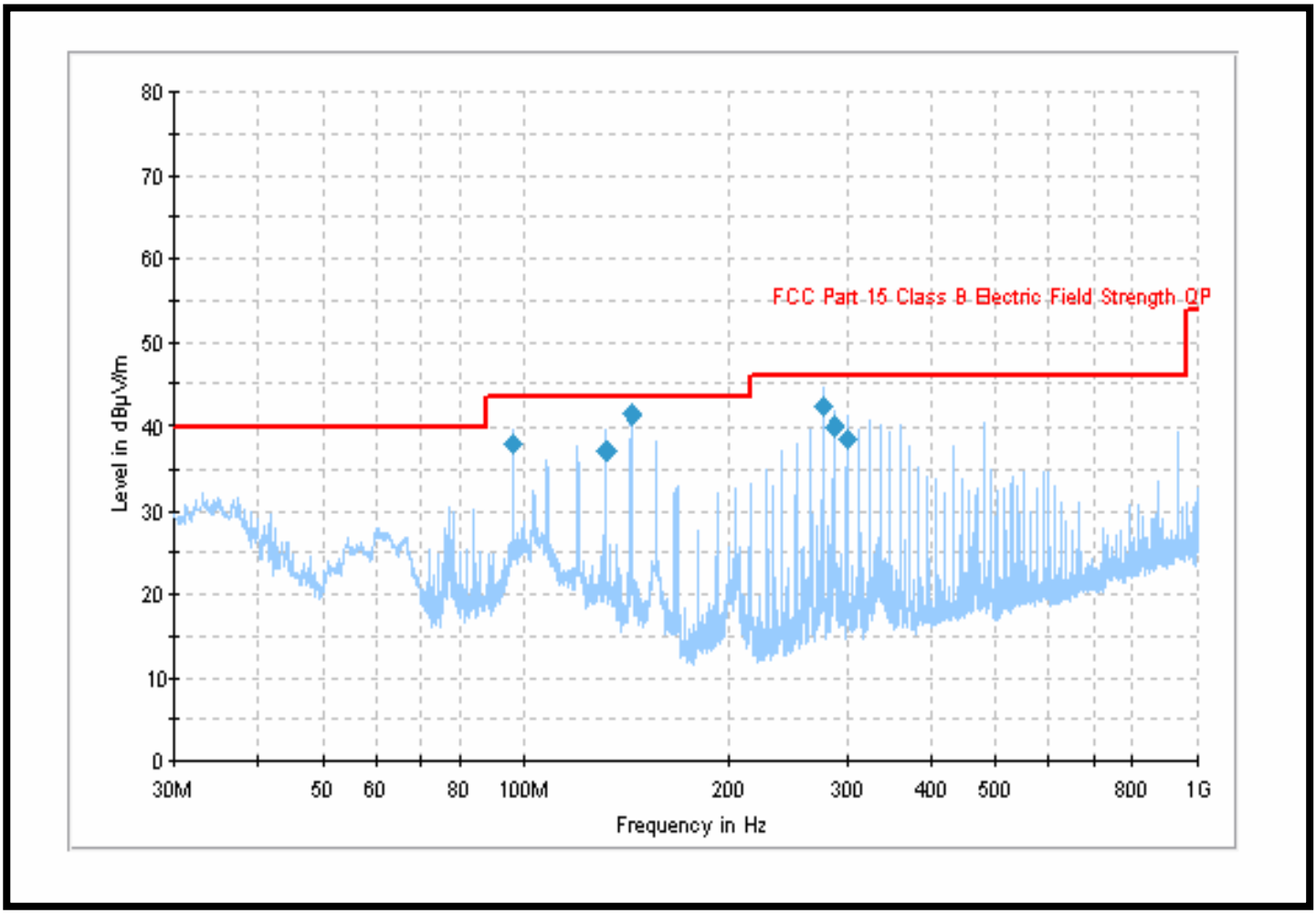
Environmental Conditions

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

The testing was performed by Andy Yan on 2007-07-26

Please refer to the following plot and tables.

Transmitting (30-1000MHz)



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (deg)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
144.005825	41.5	214.0	H	85.0	-11.4	43.5	2.0
275.983250	42.3	99.0	H	74.0	-9.9	46.0	3.7
96.009500	37.9	205.0	H	274.0	-17.6	43.5	5.6
287.995700	39.9	99.0	H	57.0	-9.8	46.0	6.1
131.991650	37.1	193.0	H	91.0	-10.5	43.5	6.4
299.996325	38.6	99.0	H	71.0	-9.4	46.0	7.4

Transmitting (Above 1GHz)

Frequency (MHz)	Meter Reading (dBuV)	Detector PK/QP/AV	Direction Degree	Ant. Height (m)	Ant. Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amplifer Gain (dB)	Corr. Amp. (dBuV/m)	FCC Part 15.247/209 Limit (dBuV/m)	FCC Part 15.247/209 Margin (dB)	Remarks
Low Channel												
2402	94.00	PK	90	1.0	H	28.9	3.61	35	91.51			Fund.
2402	93.51	AV	45	1.0	H	28.9	3.61	35	91.02			Fund.
2402	94.78	PK	90	1.0	V	29.1	3.61	35	92.49			Fund.
2402	94.20	AV	45	1.0	V	29.1	3.61	35	91.91			Fund.
4804	40.39	AV	90	1.0	H	34.6	4.64	33.4	46.23	54	7.77	Harmonic
4804	38.61	AV	90	1.0	V	34.7	4.64	33.4	44.55	54	9.45	Harmonic
4804	51.70	PK	180	1.2	V	34.7	4.64	33.4	57.64	74	16.36	Harmonic
4804	50.71	PK	180	1.2	H	34.6	4.64	33.4	56.55	74	17.45	Harmonic
1505	42.92	AV	180	1.2	H	25.3	2.77	35.0	35.99	54	18.01	Spurious
1203	40.91	AV	180	1.2	V	25.5	2.5	35.0	33.91	54	20.09	Spurious
1330	38.13	AV	90	1.0	V	25.5	2.79	36.0	30.42	54	23.58	Spurious
1130	41.01	AV	180	1.2	H	23.6	1.19	36.0	29.8	54	24.2	Spurious
1505	53.66	PK	45	1.2	H	25.3	2.77	35.0	46.73	74	27.27	Spurious
1330	52.05	PK	180	1.2	V	25.5	2.79	36.0	44.34	74	29.66	Spurious
1130	54.18	PK	45	1.2	H	23.6	1.19	36.0	42.97	74	31.03	Spurious
1203	50.90	PK	45	1.2	V	25.5	2.5	35.0	43.9	74	31.03	Spurious
Middle Channel												
2441	94.98	PK	60	1.4	V	29.1	3.61	35	92.69			Fund.
2441	92.79	AV	152	1.3	V	29.1	3.61	35	90.5			Fund.
2441	93.78	PK	128	1.5	H	28.9	3.61	35.0	91.29			Fund.
2441	89.82	AV	156	1.2	H	28.9	3.61	35.0	87.33			Fund.
4882	40.48	AV	243	1.4	H	34.6	4.64	33.4	46.32	54	7.68	Harmonic
4882	40.30	AV	142	1.6	V	34.7	4.64	33.4	46.24	54	7.76	Harmonic
4882	51.79	PK	153	1.5	H	34.6	4.64	33.4	57.63	74	16.37	Harmonic
4882	51.04	PK	234	1.8	V	34.7	4.64	33.4	56.98	74	17.02	Harmonic
1505	41.09	AV	85	1.5	H	25.3	2.77	35.0	34.16	54	19.84	Spurious
1505	38.53	AV	135	1.3	V	25.5	2.77	35.0	31.8	54	22.2	Spurious
1505	53.22	PK	265	1.4	H	25.3	2.77	35.0	46.29	74	27.71	Spurious
1505	51.22	PK	156	1.4	V	25.5	2.77	35.0	44.49	74	29.51	Spurious
High Channel												
2480	94.88	PK	89	1.5	H	28.9	3.61	35.0	92.39			Fund.
2480	93.01	AV	65	1.5	H	28.9	3.61	35.0	90.52			Fund.
2480	94.65	PK	65	1.4	V	30.6	3.61	35.0	93.86			Fund.
2480	92.97	AV	65	1.6	V	30.6	3.61	35.0	92.18			Fund.
4960	38.71	AV	142	1.5	V	35.4	4.55	33.4	45.26	54	8.74	Harmonic
4960	38.94	AV	256	1.8	H	34.6	4.55	33.4	44.69	54	9.31	Harmonic
4960	49.96	PK	142	1.4	V	35.4	4.55	33.4	56.51	74	17.49	Harmonic
4960	50.20	PK	145	1.4	H	34.6	4.55	33.4	55.95	74	18.05	Harmonic
1505	38.89	AV	324	1.2	V	26.0	2.77	35.0	32.66	54	21.34	Spurious
1354	39.01	AV	156	1.2	H	25.3	2.79	36.0	31.1	54	22.9	Spurious
1330	37.77	AV	210	1.2	V	26.0	2.79	36.0	30.56	54	23.44	Spurious
1354	53.10	PK	128	1.5	H	25.3	2.79	36.0	45.19	74	28.81	Spurious
1505	50.70	PK	324	1.3	V	26.0	2.77	35.0	44.47	74	29.53	Spurious
1330	50.20	PK	240	1.4	V	26.0	2.79	36.0	42.99	74	31.01	Spurious

§15.247(a) (1)-CHANNEL SEPARATION

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 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	2006-09-29	2007-09-29

*** 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

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

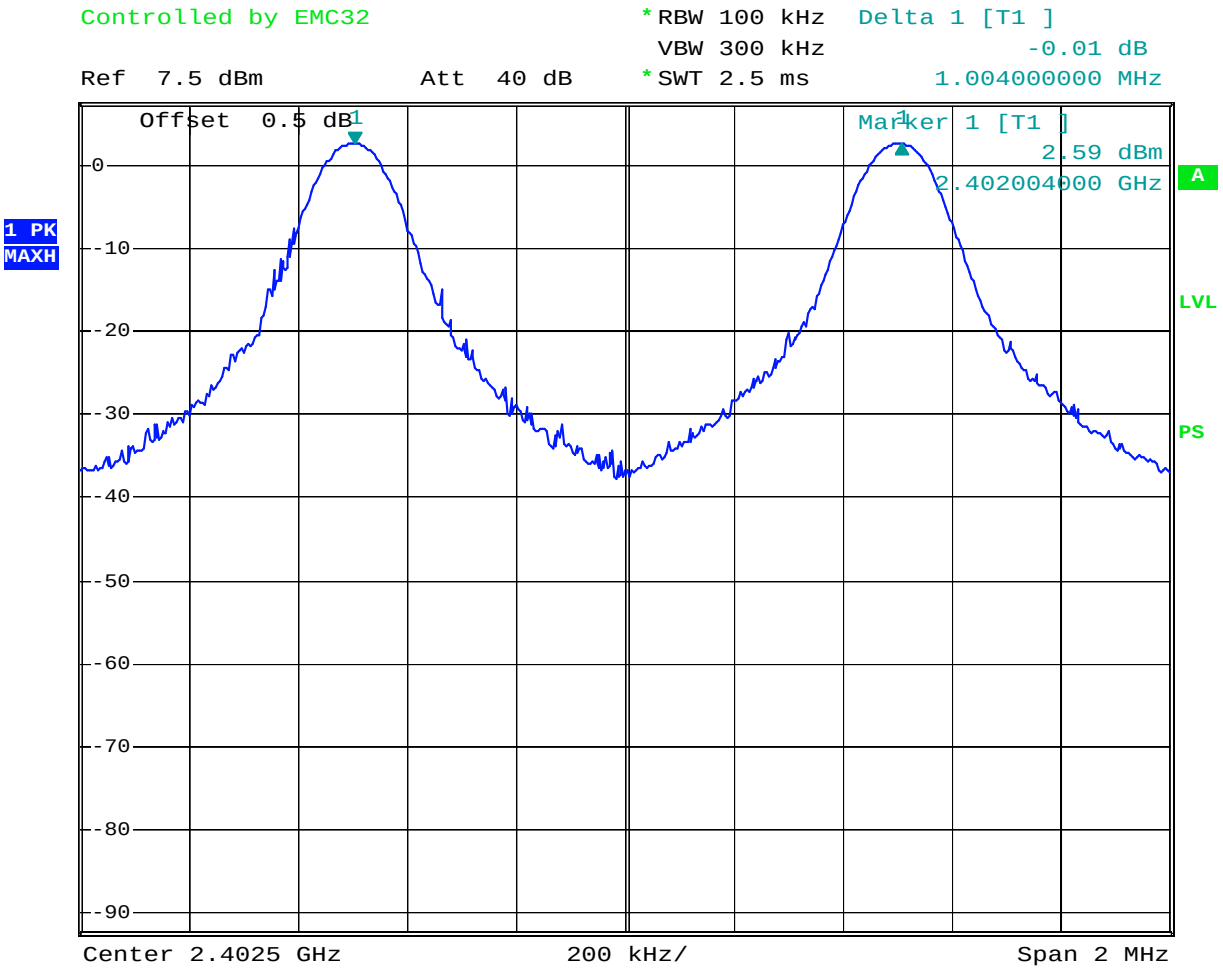
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-31.

Channel	Channel Frequency (MHz)	Channel Separation (kHz)	Limit (kHz)	Result
Low Channel	2402	1004	214.67	Pass
Adjacency Channel	2403			
Mid Channel	2441	1004	221.33	Pass
Adjacency Channel	2442			
High Channel	2480	1004	205.33	Pass
Adjacency Channel	2479			

Test Result: Compliant. Please refer to following plots

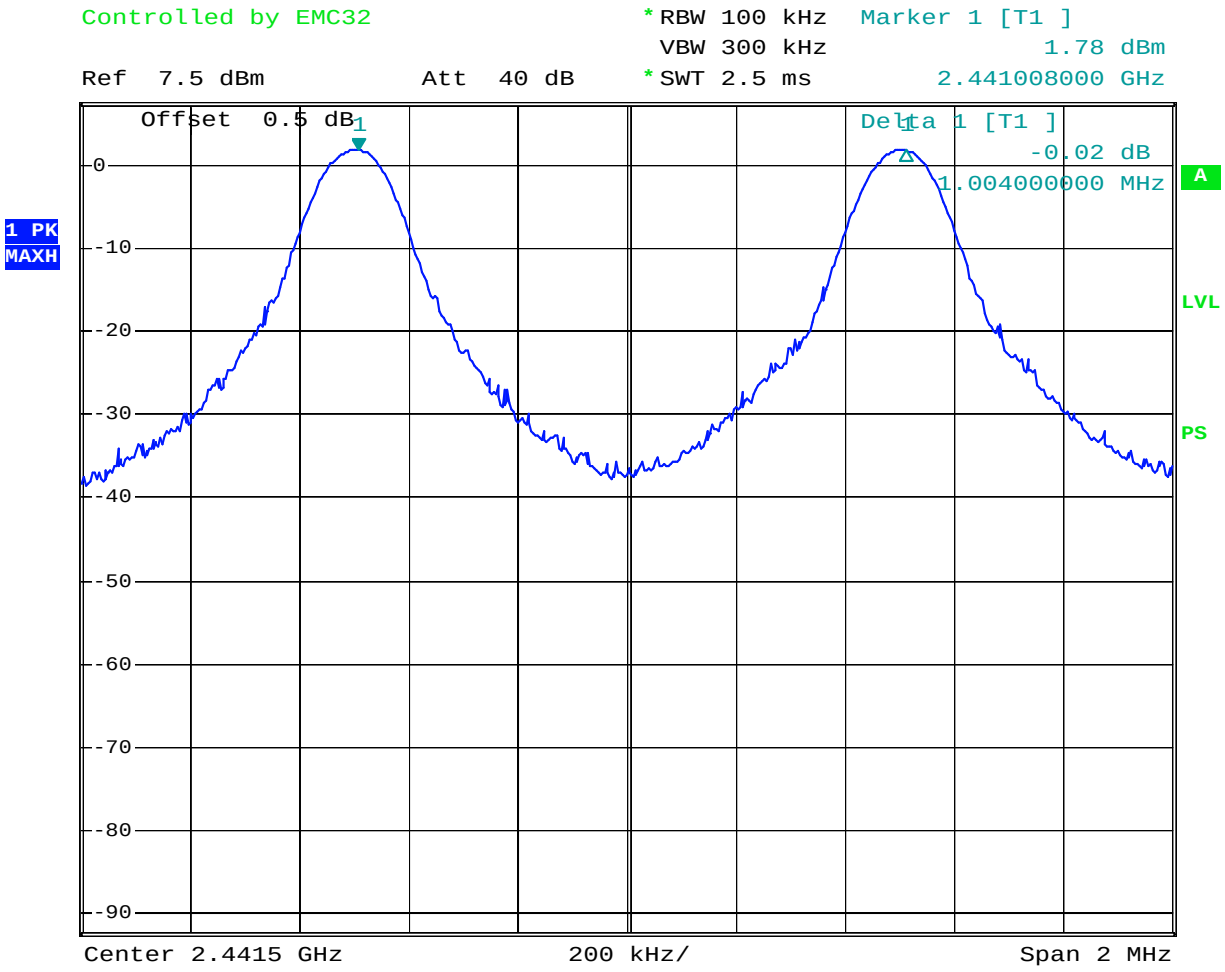
Low Channel



Tech-way VB1 channel seperation,low channel

Date: 31.JUL.2007 11:49:57

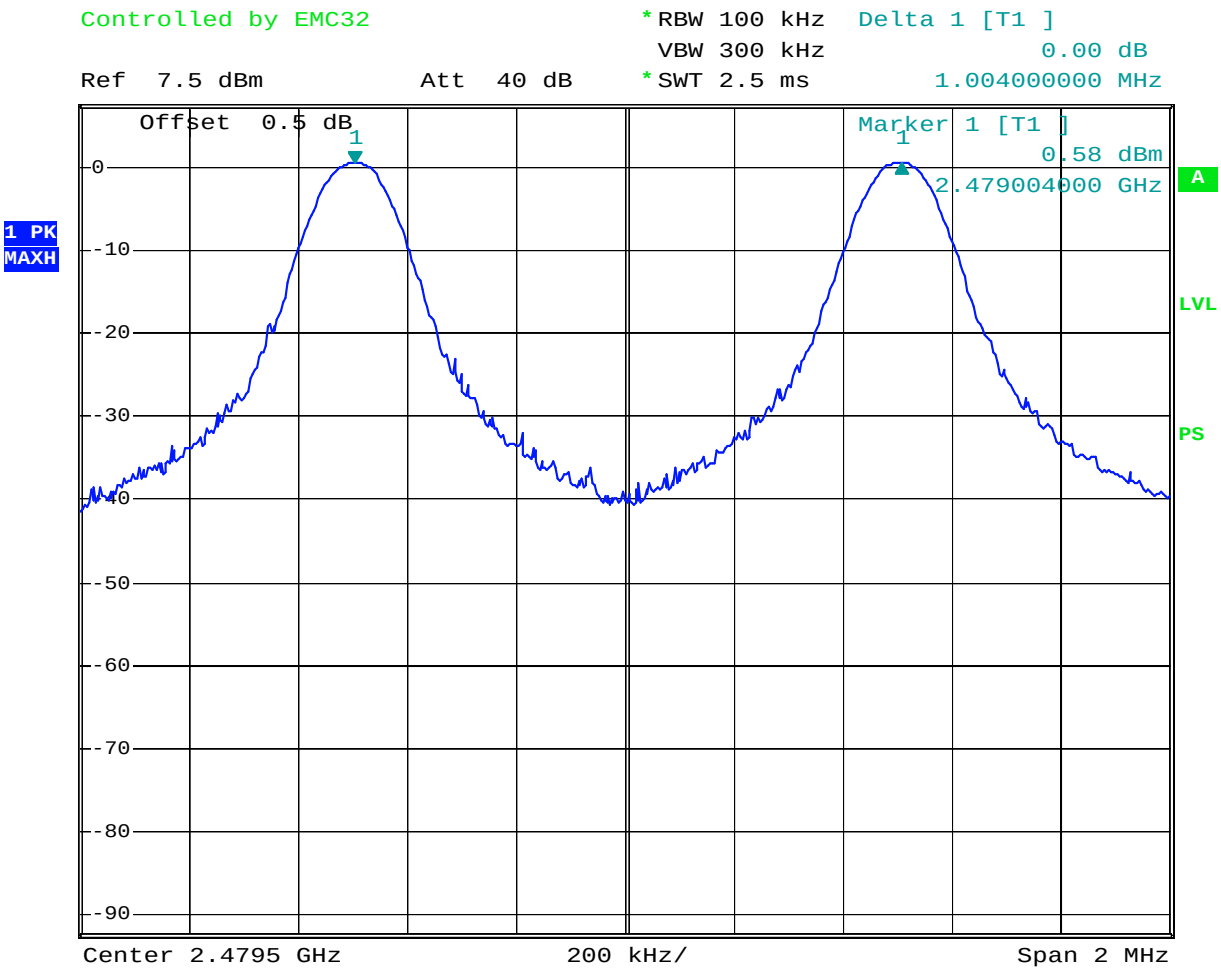
Middle Channel



Tech-way VB1 channel seperation, middle channel

Date: 31.JUL.2007 11:52:52

High Channel



Tech-way VB1 channel seperation, high channel

Date: 31.JUL.2007 11:45:01

§15.247(a) (1) –20dB BANDWIDTH

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	2006-09-29	2007-09-29

*** 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

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

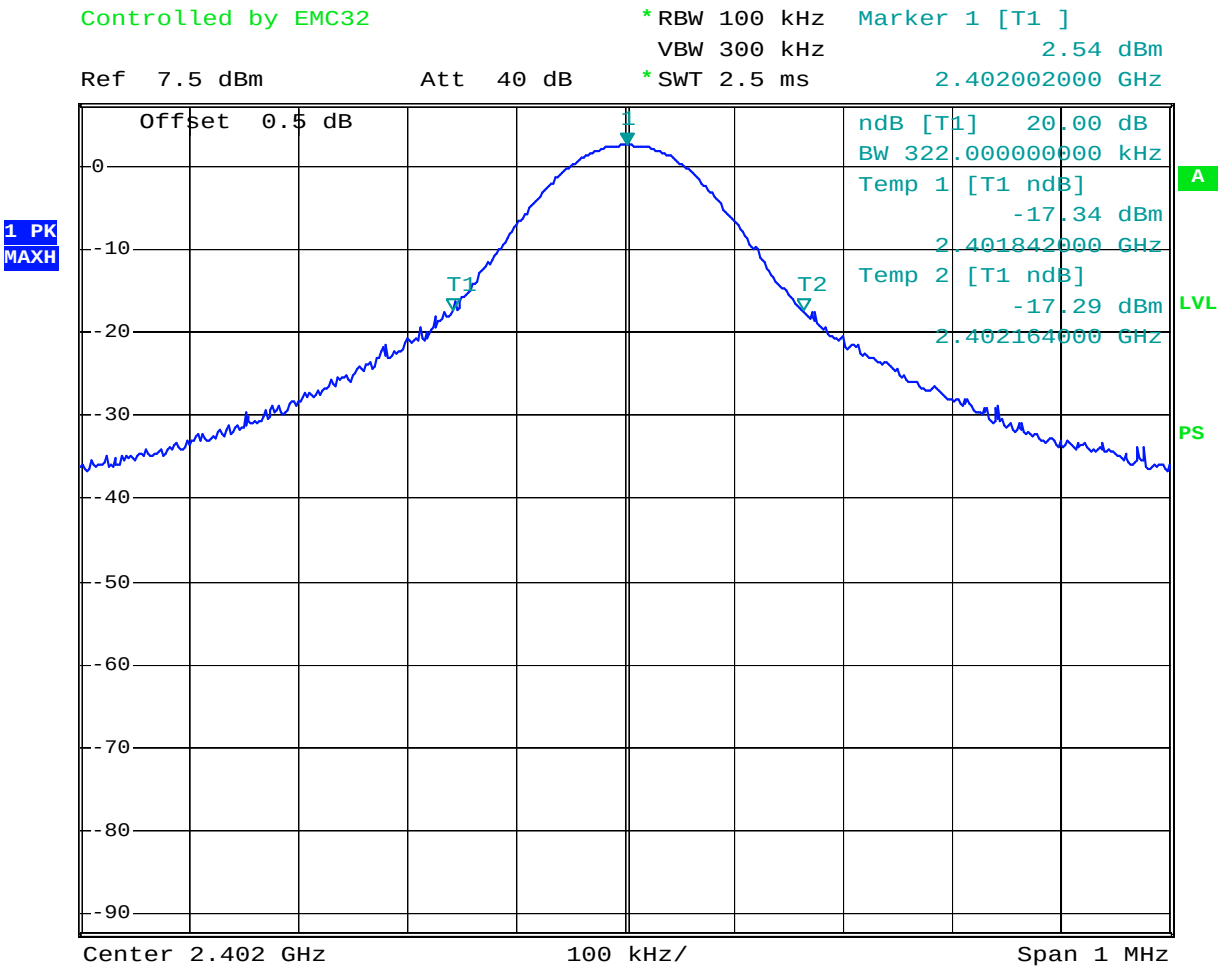
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-31.

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)
Low	2402	322
Mid	2441	332
High	2480	308

Please refer to following plots.

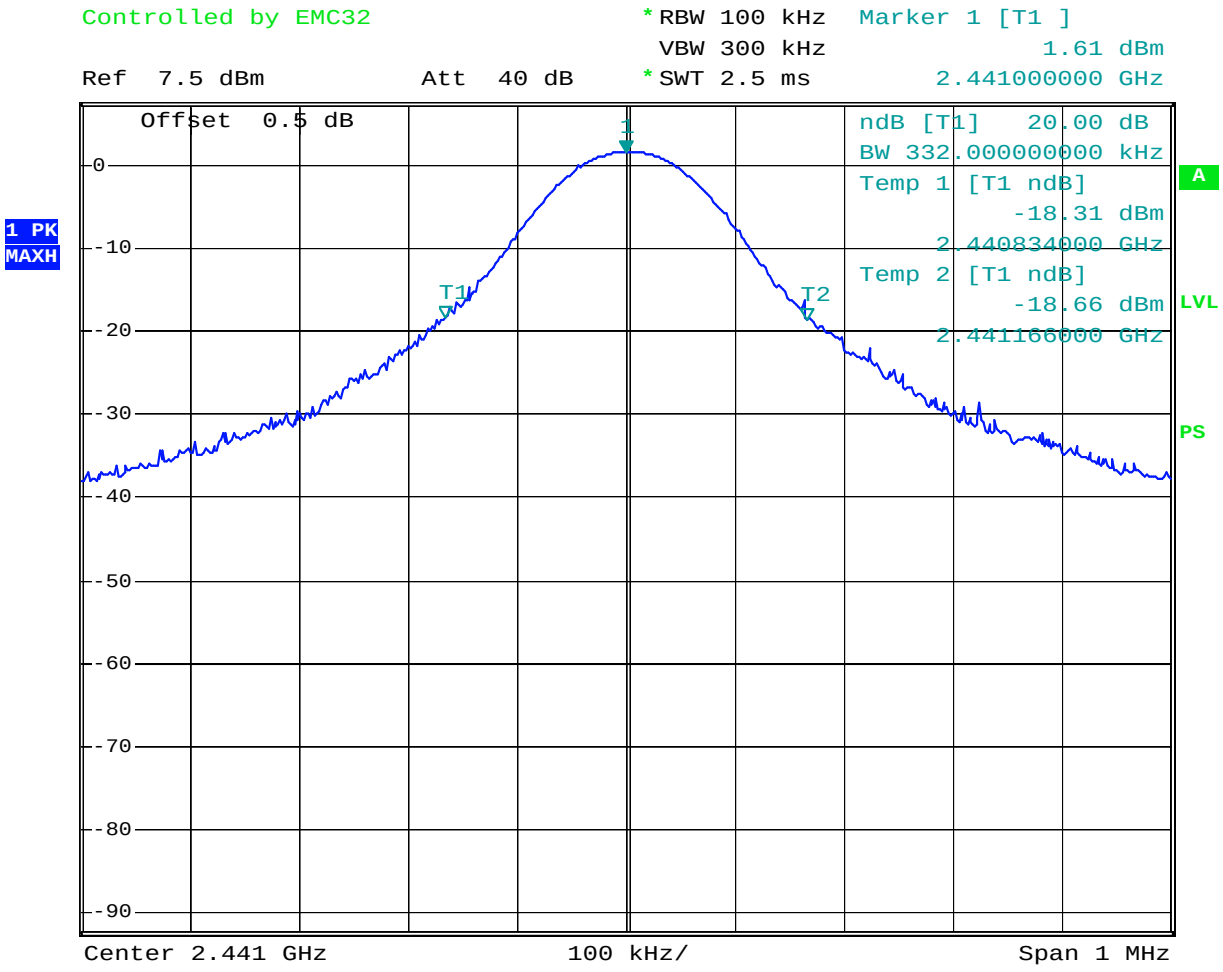
Low Channel



Tech-way VB1 20dB bandwidth, low channel

Date: 31.JUL.2007 11:27:18

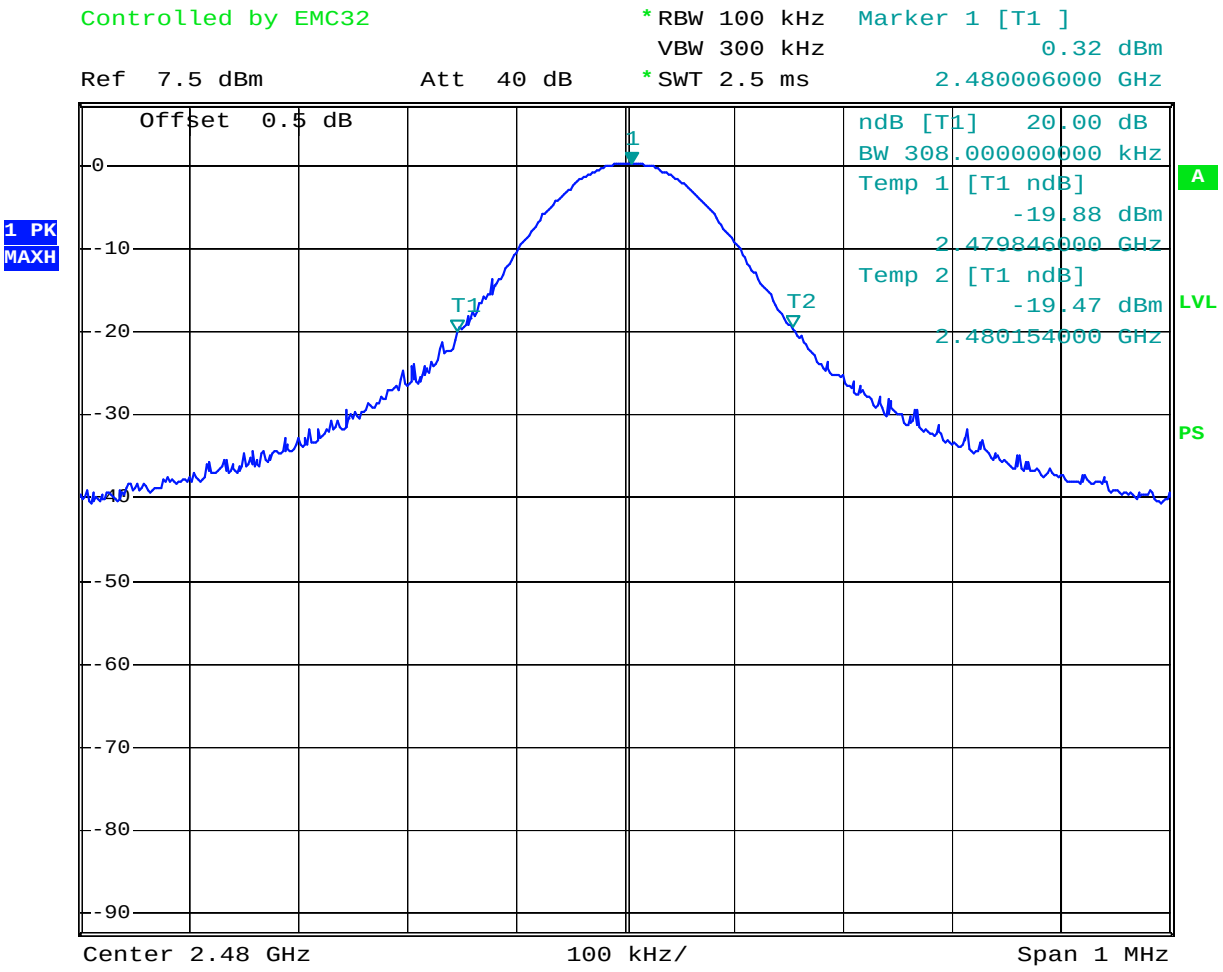
Middle Channel



Tech-way VB1 20dB bandwidth, middle channel

Date: 31.JUL.2007 11:29:12

High Channel



Tech-way VB1 20dB bandwidth, high channel

Date: 31.JUL.2007 11:31:22

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

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	2006-09-29	2007-09-29

*** 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

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.

Test Data

Environmental Conditions

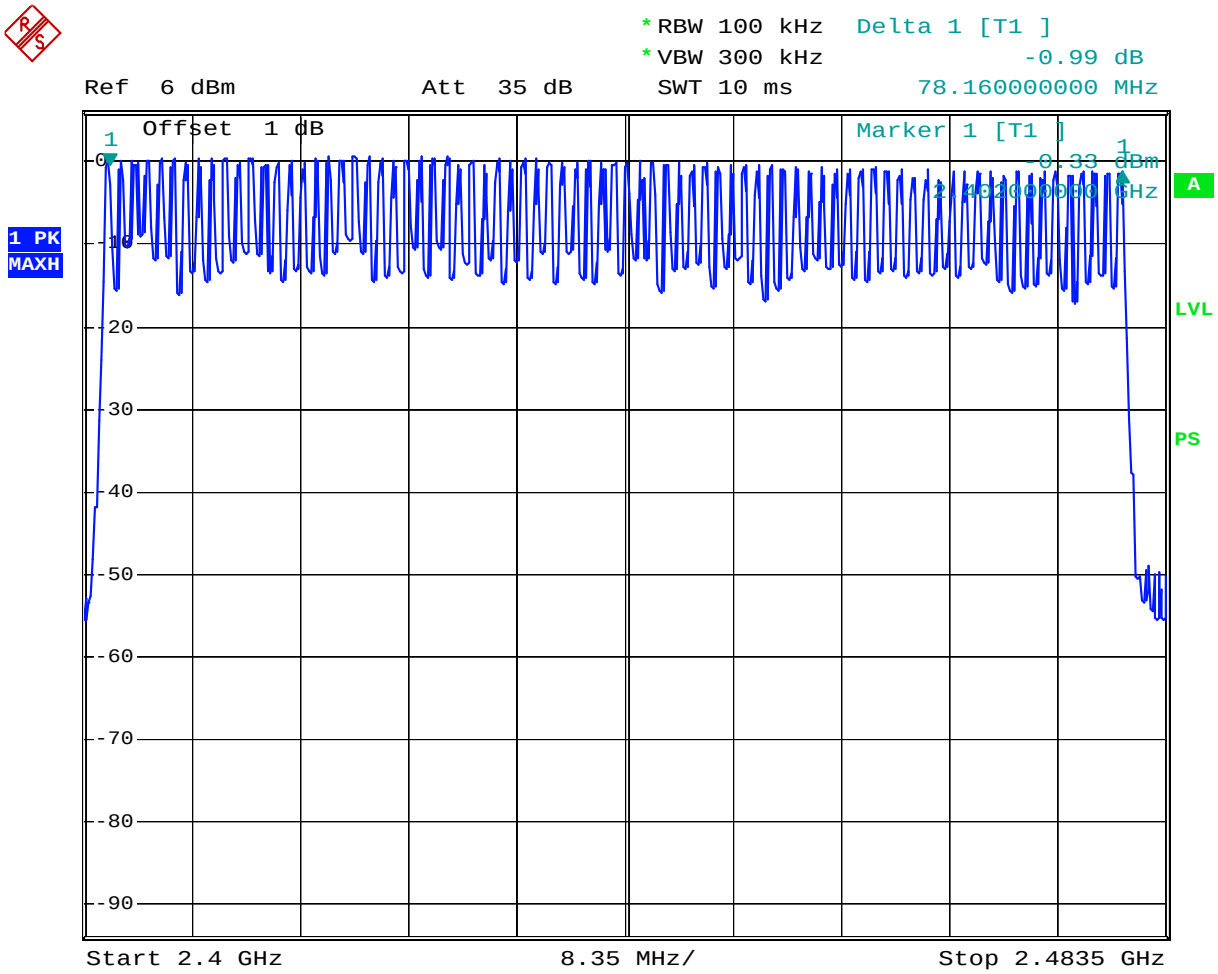
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-31.

Test Mode: Transmitting

Test Result: 79 channels, Compliant. Please refer to following plot.

Hopping Channel Number



§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	2006-09-29	2007-09-29

*** 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

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

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

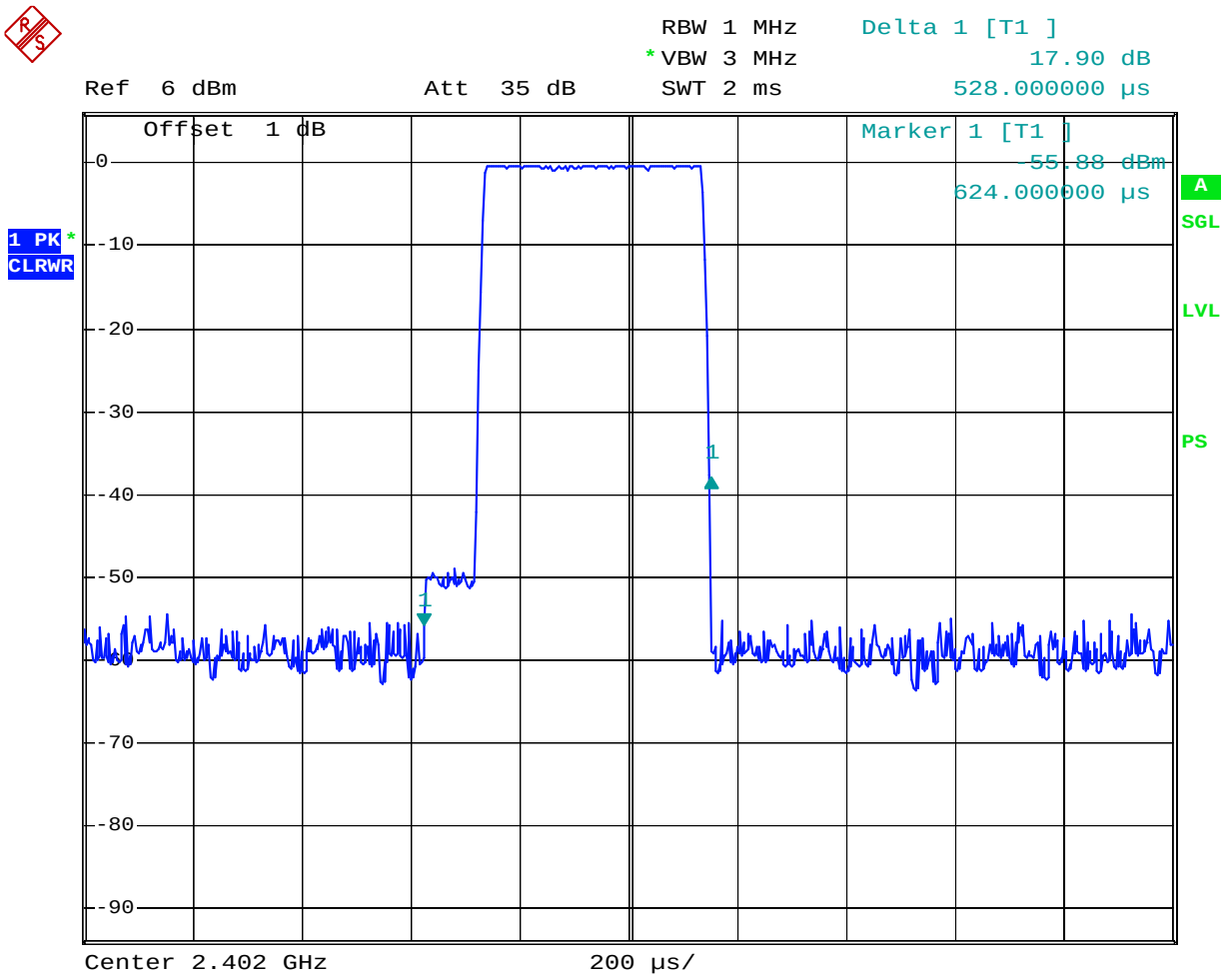
The testing was performed by Andy Yan on 2007-07-31.

Channel	Pulse width (msec)	Dwell time (sec)	Limit (sec)	Result
Low Channel	0.528	0.16896	0.4	Pass
Mid Channel	0.528	0.16896	0.4	Pass
High Channel	0.524	0.16768	0.4	Pass

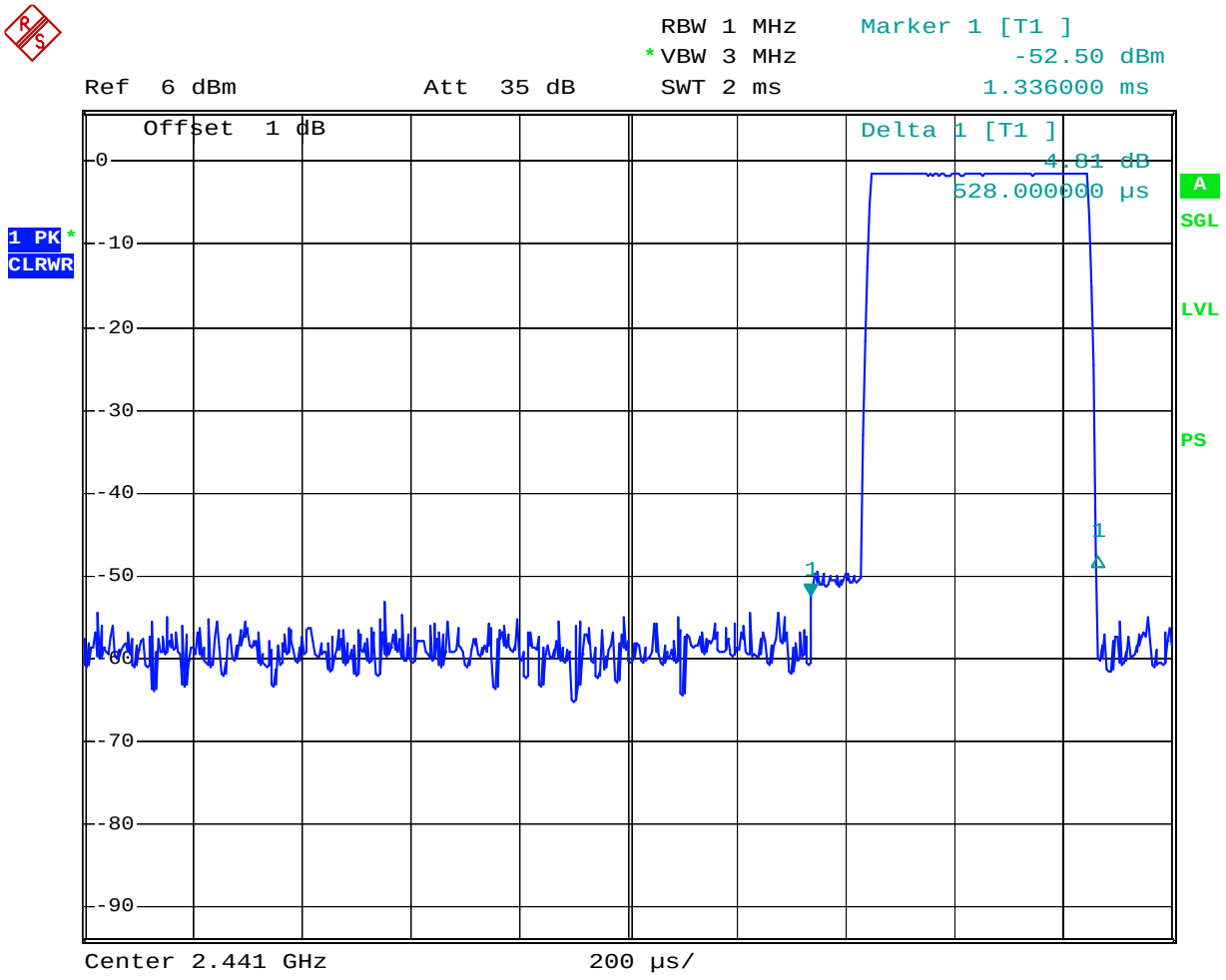
NOTE: Dwell time=Pulse width (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second

Test Result: Compliant. Please refer to following plots

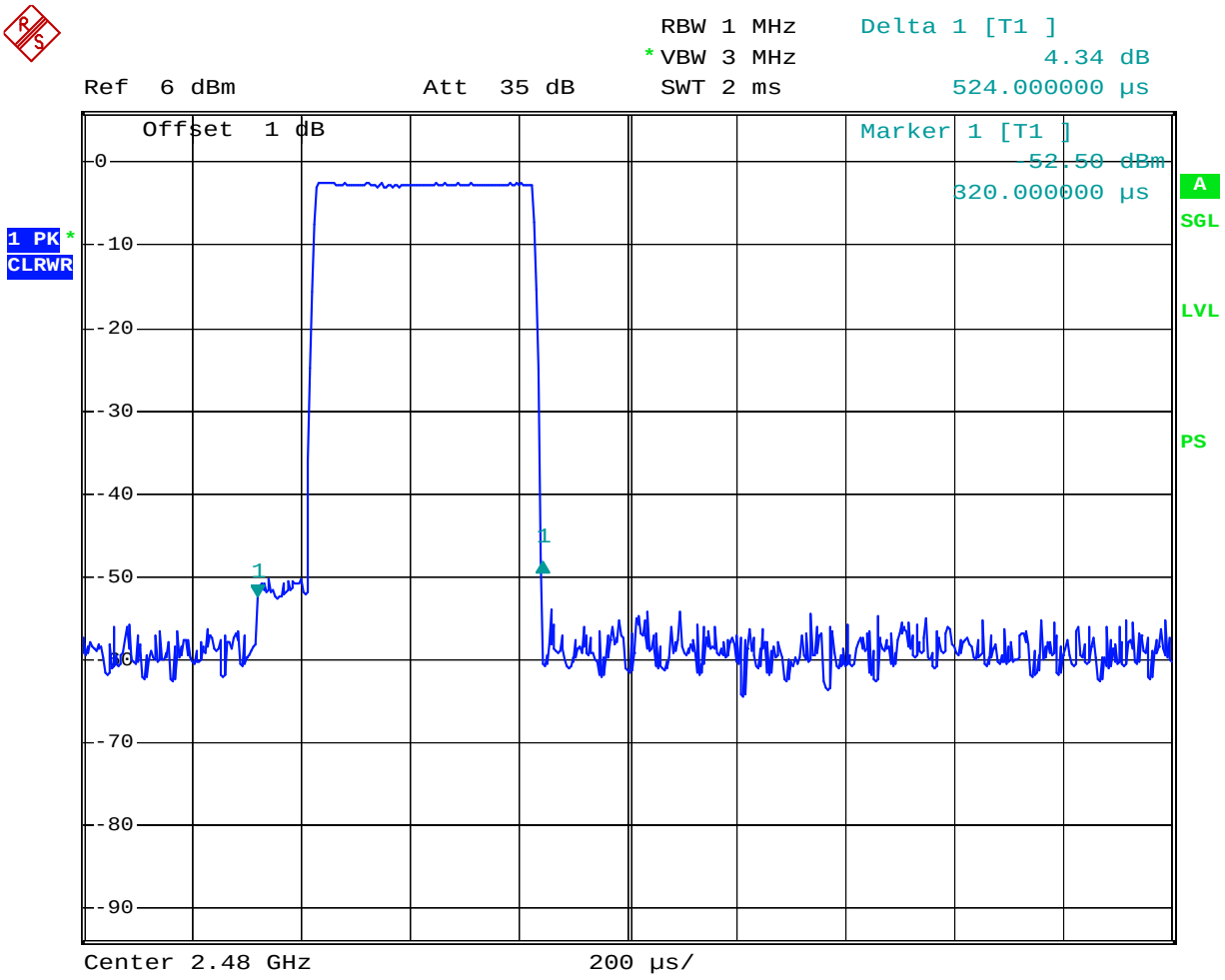
Low Channel


RBW 1 MHz
*VBW 3 MHz
SWT 2 ms
Delta 1 [T1]
17.90 dB
528.000000 µs
Ref 6 dBm
Att 35 dB
Offset 1 dB
Marker 1 [T1]
-55.88 dBm
624.000000 µs
1 PK *
CLRWR
A
SGL
LVL
PS
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 2.402 GHz
200 µs/

Middle Channel



High Channel



§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.

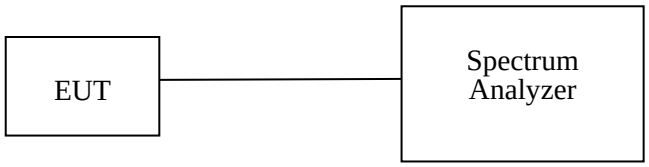
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2006-09-29	2007-09-29

*** 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

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

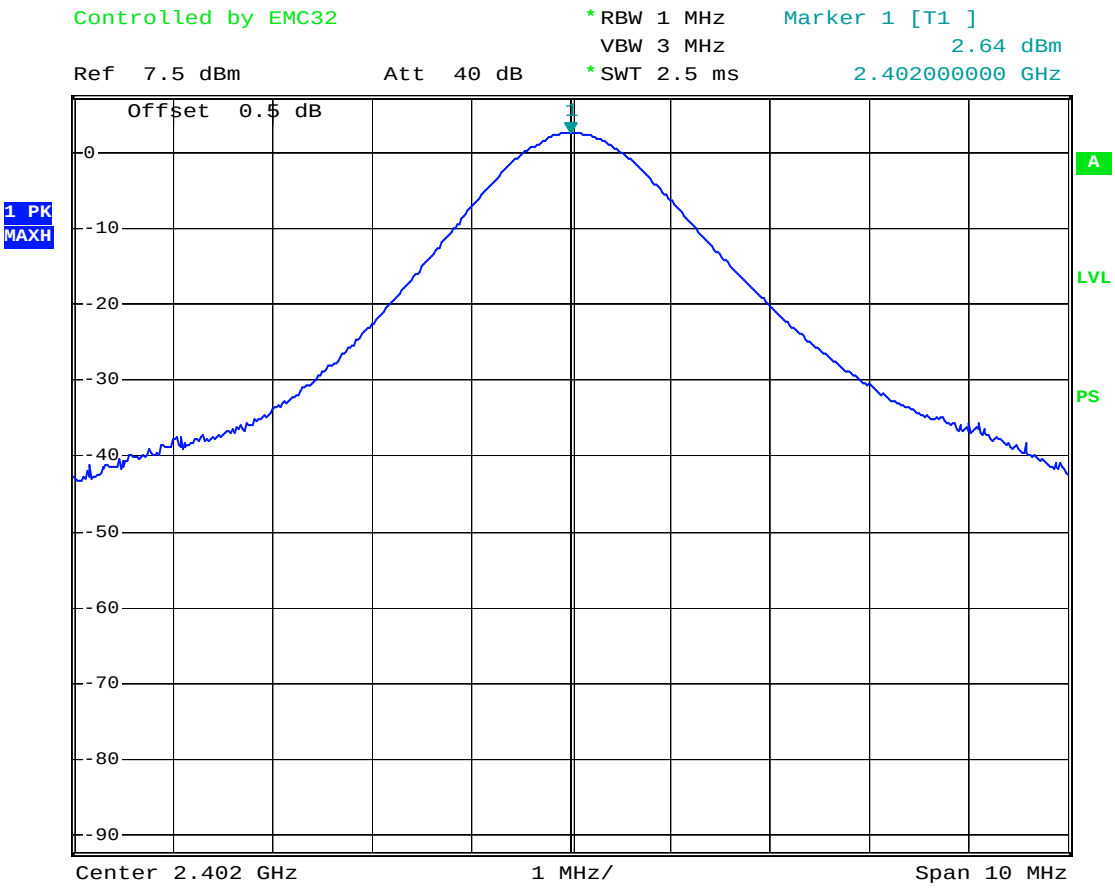
Temperature:	27 °C
Relative Humidity:	50 %
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-07-31.

Channel	Channel Frequency (MHz)	Reading Power (dBm)	Power Output (mW)	Limit (w)
Low Channel	2402	2.64	1.8365	1
Mid Channel	2441	1.69	1.4757	1
High Channel	2480	0.27	1.0641	1

Test Result: Compliant. Please refer to the following plots.

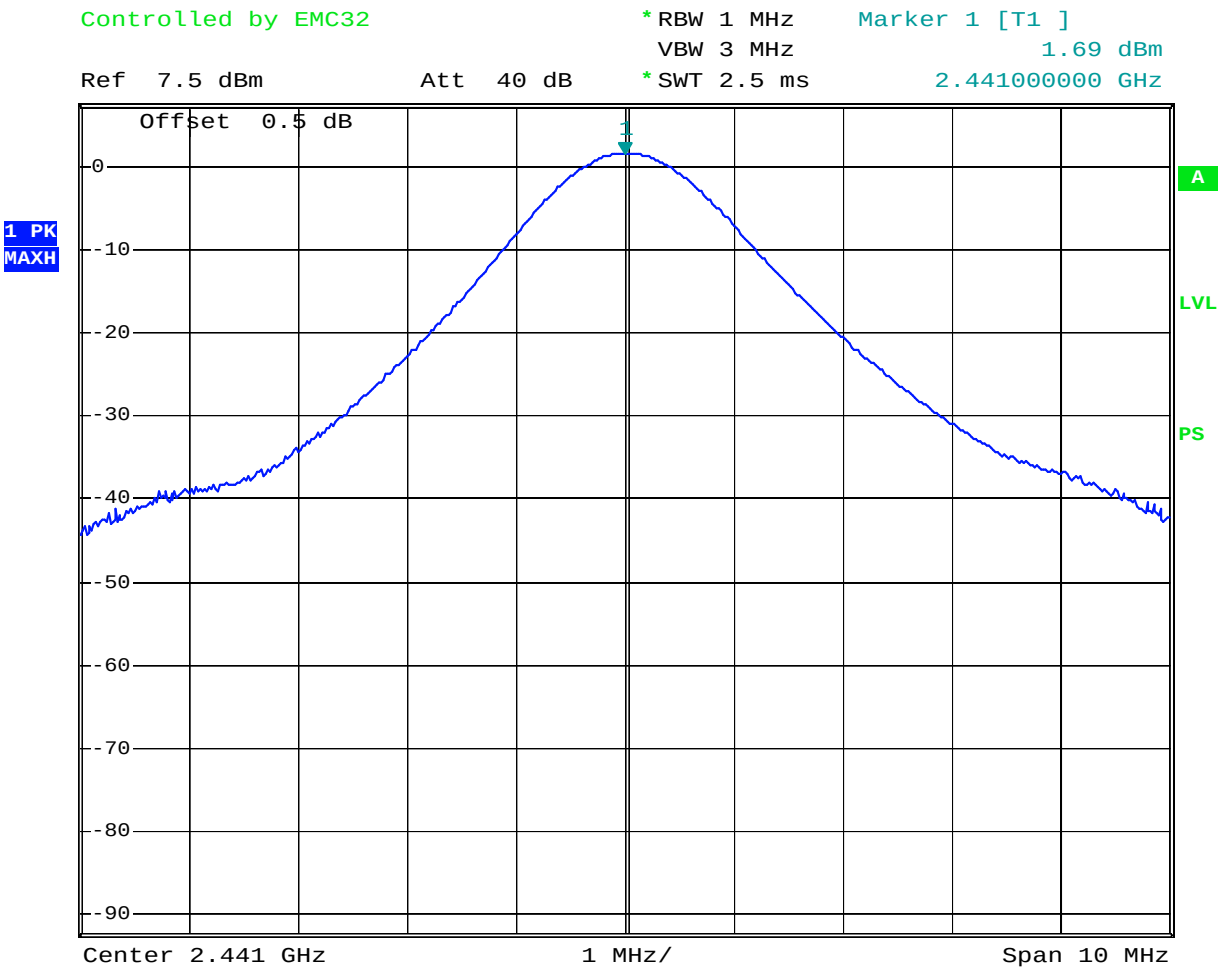
Low Channel



Tech-way VB1 peak output power, low channel

Date: 31.JUL.2007 11:22:19

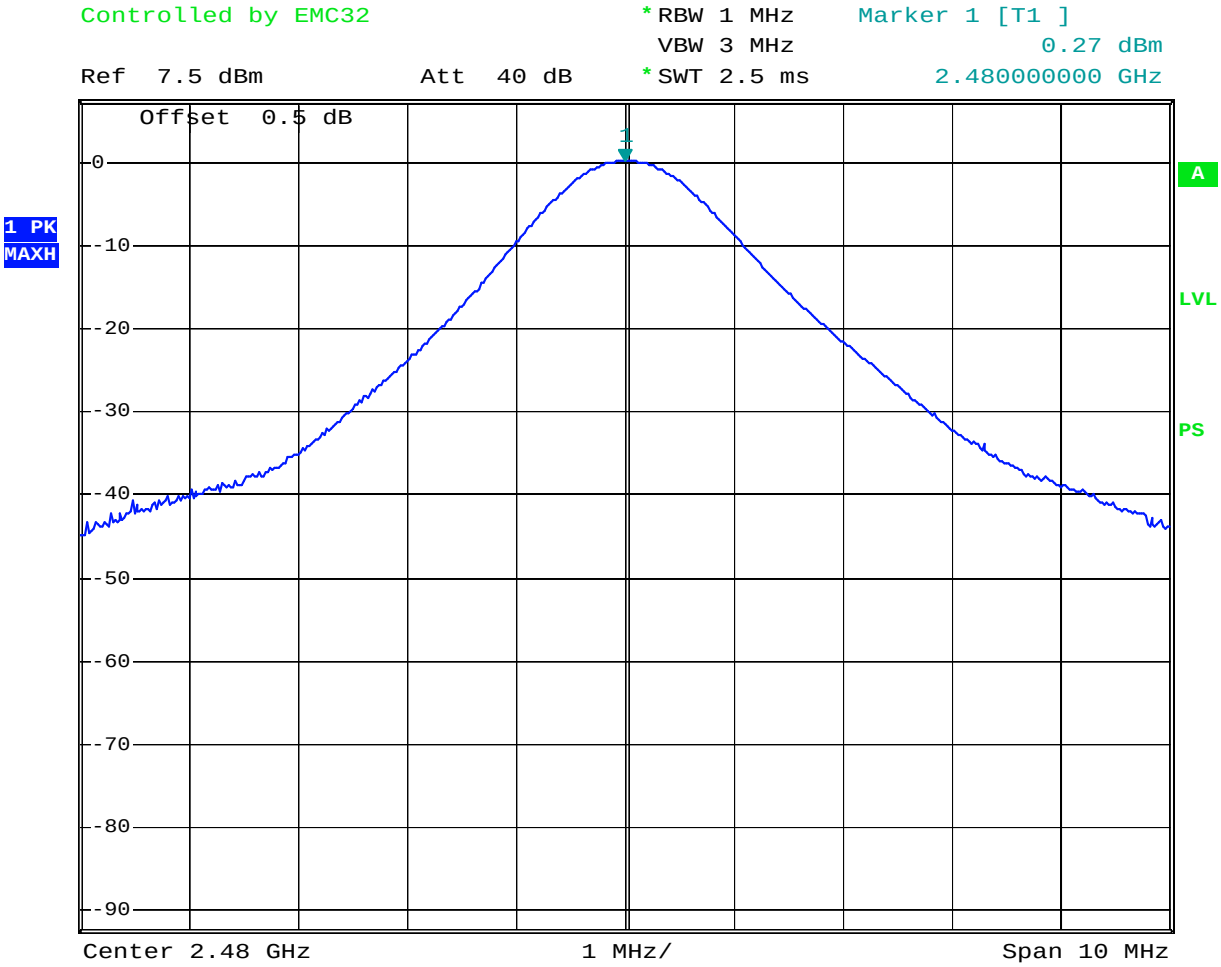
Middle Channel



Tech-way VB1 peak output power, middle channel

Date: 31.JUL.2007 11:20:55

High Channel



Tech-way VB1 peak output power, high channel

Date: 31.JUL.2007 11:19:48

§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	2006-09-29	2007-09-29

*** 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

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

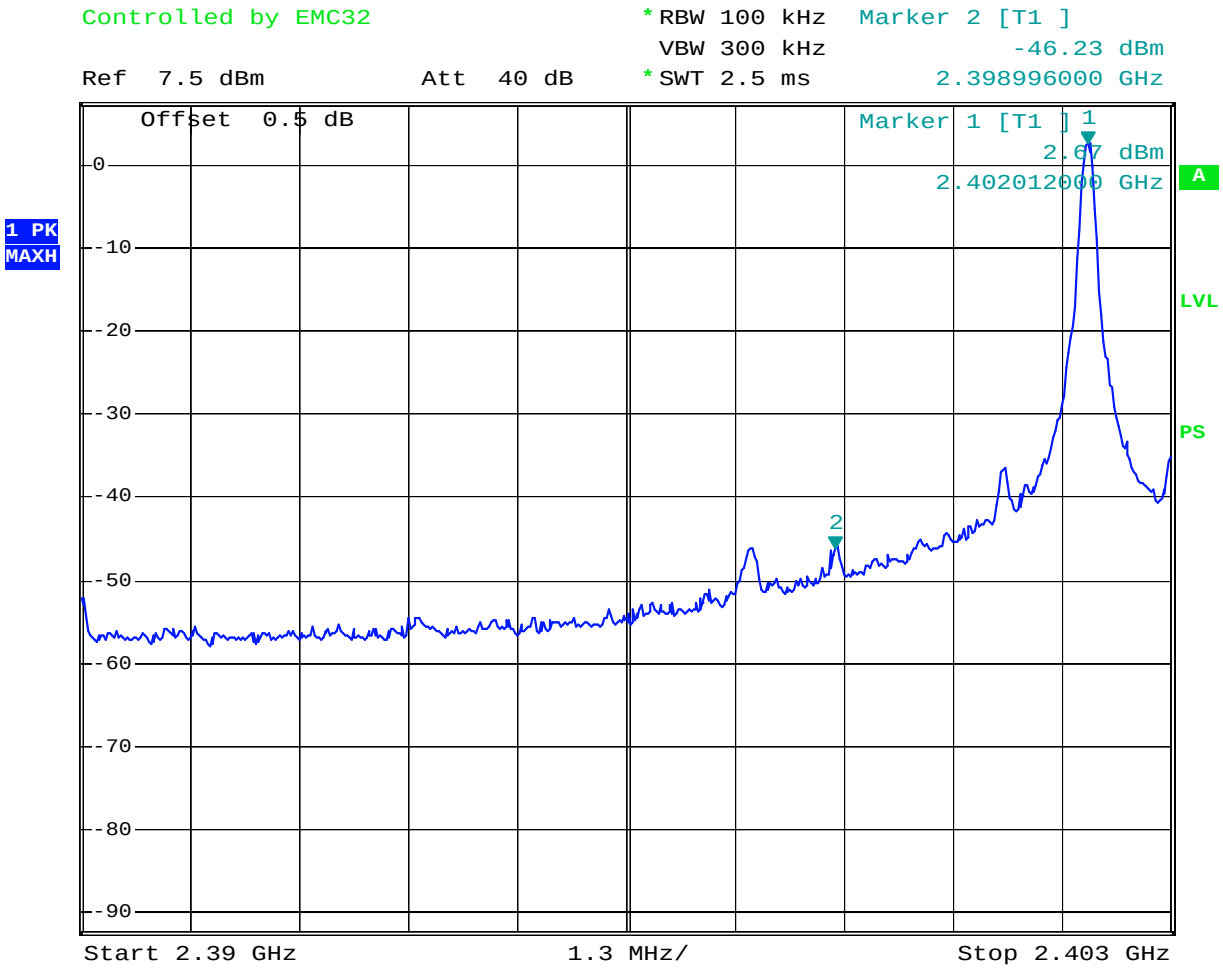
Environmental Conditions

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

The testing was performed by Andy Yan on 2007-07-31.

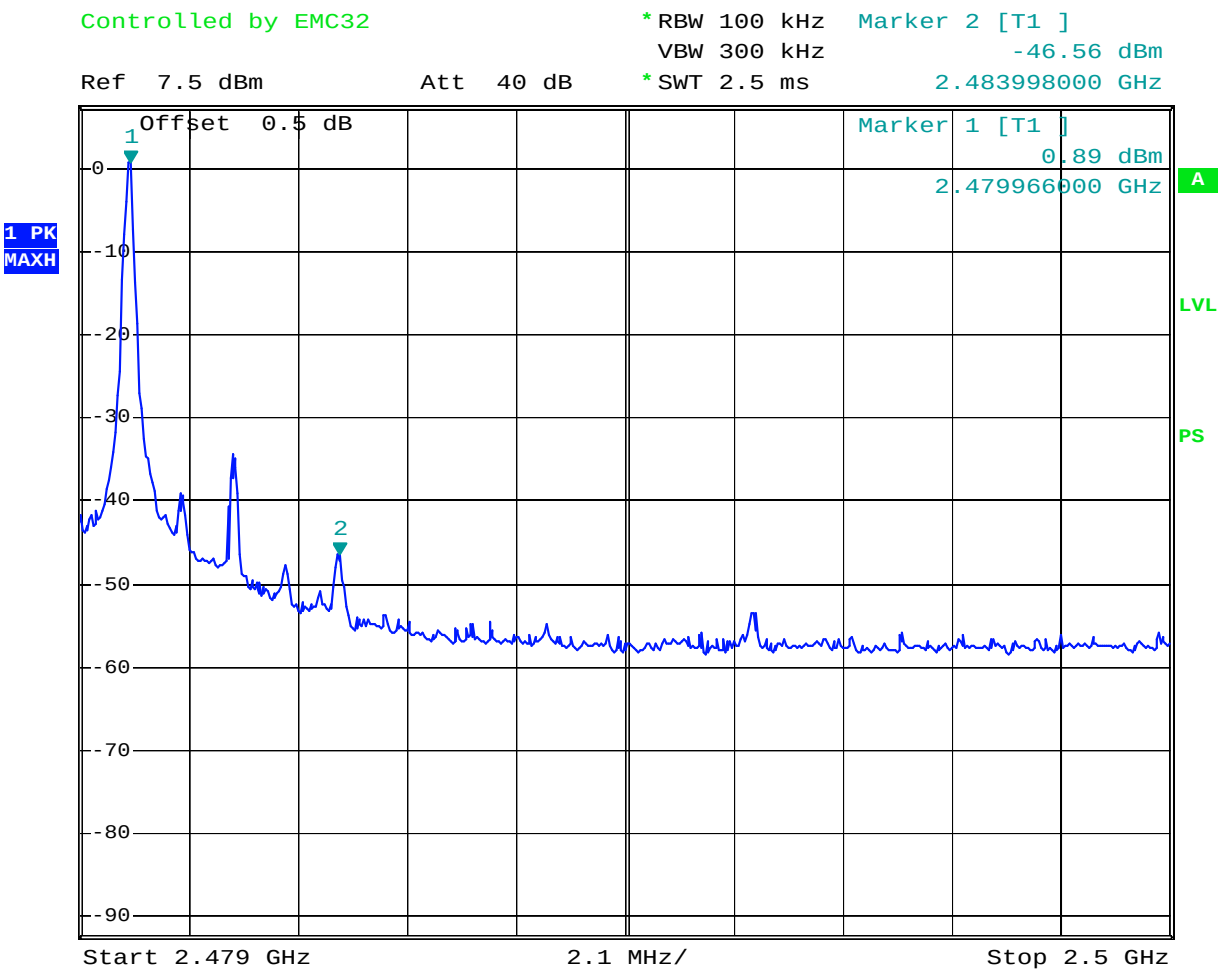
Frequency (MHz)	Band Edge (dBc)	Limit (dBc)
2398.996	48.90	20
2483.998	47.45	20

Test Result: Compliant. Please refer to the following plots.



Tech-way VB1 out of bandedge emission, left

Date: 31.JUL.2007 12:02:11



Tech-way VB1 out of bandedge emission, right

Date: 31.JUL.2007 12:06:17

Radiated Emissions in restricted band

Spurious emission in restricted band: (RBW=1MHz, VBW=3MHz)

Frequency (MHz)	Reading (dBuV)	Detector PK/QP/AV	Table Direction Degree	Ant. Height (m)	Ant. Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Corrected Amplitude (dBuV/m)	FCC 15.209	
										Limit (dBuV/m)	Margin (dB)
(2310MHz-2390MHz)											
2392.44	51.92	PK	180	1.2	V	30.6	3.61	35	51.13	54	2.87
2336.50	50.85	PK	45	1.2	V	30.6	3.61	35	50.06	54	3.94
2396.00	50.6	PK	180	1.2	H	30.6	3.61	35	49.81	54	4.19
2375.32	49.98	PK	90	1	V	30.6	3.61	35	49.19	54	4.81
2345.46	49.87	PK	90	1.1	H	30.6	3.61	35	49.08	54	4.92
(2483.5MHz-2500MHz)											
2484.00	50.95	PK	234	1.8	V	30.6	3.61	35	50.16	54	3.84
2484.60	49.85	PK	153	1.5	H	30.6	3.61	35	49.06	54	4.94
2493.40	47.52	PK	156	1.4	V	30.6	3.61	35	46.73	54	7.27
2490.93	46.52	PK	243	1.4	H	30.6	3.61	35	45.73	54	8.27

Note: Above Peak spurious emission levels are below the Average spurious emission limit of 54 dBuV/m, thus Average measurement has been omitted.

END OF REPORT