

FCC PART 15.247

TEST REPORT

For

Voyetra Turtle Beach, Inc.

150 Clearbrook Road, Suite 162,
Elmsford, New York 10523, USA

FCC ID: XGB-TB2265

Report Type: Original Report	Product Type: EAR FORCE X32 Headset
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Report Number: R1DG111130021-00A	
Report Date: 2012-01-30	
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* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

TABLE OF CONTENTS

GENERAL INFORMATION.....4

 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....4

 OBJECTIVE4

 RELATED SUBMITTAL(S)/GRANT(S).....4

 TEST METHODOLOGY4

 TEST FACILITY5

SYSTEM TEST CONFIGURATION.....6

 DESCRIPTION OF TEST CONFIGURATION6

 EUT EXERCISE SOFTWARE6

 EQUIPMENT MODIFICATIONS6

 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS6

 BLOCK DIAGRAM OF TEST SETUP6

SUMMARY OF TEST RESULTS7

FCC §15247(i) & §2.1093 - RF EXPOSURE8

 APPLICABLE STANDARD8

FCC §15.203 - ANTENNA REQUIREMENT.....9

 APPLICABLE STANDARD9

 ANTENNA CONNECTOR CONSTRUCTION9

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....10

 APPLICABLE STANDARD10

 MEASUREMENT UNCERTAINTY10

 EUT SETUP10

 EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP11

 TEST PROCEDURE11

 CORRECTED AMPLITUDE & MARGIN CALCULATION11

 TEST EQUIPMENT LIST AND DETAILS11

 TEST RESULTS SUMMARY12

 TEST DATA12

FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....15

 APPLICABLE STANDARD15

 TEST PROCEDURE15

 TEST EQUIPMENT LIST AND DETAILS15

 TEST DATA15

FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER17

 APPLICABLE STANDARD17

 TEST PROCEDURE17

 TEST EQUIPMENT LIST AND DETAILS17

 TEST DATA17

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....19

 APPLICABLE STANDARD19

 TEST PROCEDURE19

 TEST EQUIPMENT LIST AND DETAILS19

 TEST DATA19

FCC §15.247(e) - POWER SPECTRAL DENSITY	22
APPLICABLE STANDARD	22
TEST PROCEDURE	22
TEST EQUIPMENT LIST AND DETAILS.....	22
TEST DATA	22

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Voyetra Turtle Beach, Inc.*'s product, model number: *TB300-2265-01 (FCC ID: XGB-TB2265)* ("EUT") in this report was an *EAR FORCE X32 Headset*, which was measured approximately: 18.0 cm (L) x 21.0 cm (W) x 10.0 cm (H), rated input voltage: DC 3V battery.

Item	Transmitter Specification
Operation Channel	2462 MHz
Channel Bandwidth	20 MHz
Antennas (soldered on the PCB)	-3.0 dBi
RF Output Power	2.06 dBm
Modulation	OFDM

* All measurement and test data in this report was gathered from production sample serial number: 11113021 (Assigned by Shenzhen BACL). The EUT was received on 2011-11-30.

Objective

This report is prepared on behalf of *Voyetra Turtle Beach, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, and section 15.203, 15.205, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

Part 15.407 NII submission with FCC ID: XGB-TB2265.
Part 15.247, 15.407 submissions with FCC ID: XGB-TB2266.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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.

The uncertainty of any RF tests which use conducted method measurement is ± 0.96 dB, the uncertainty of any radiation on emissions measurement is ± 4.0 dB

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by 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 EUT was configured for testing in an engineering mode which was provided by the manufacturer.

The EUT transmit at antenna 0(Chain 0) and antenna 1(Chain 1) individually. And the two RF ports of the circuit are the same; we select antenna 0 port to test.

EUT Exercise Software

Test software: Docklight scripting

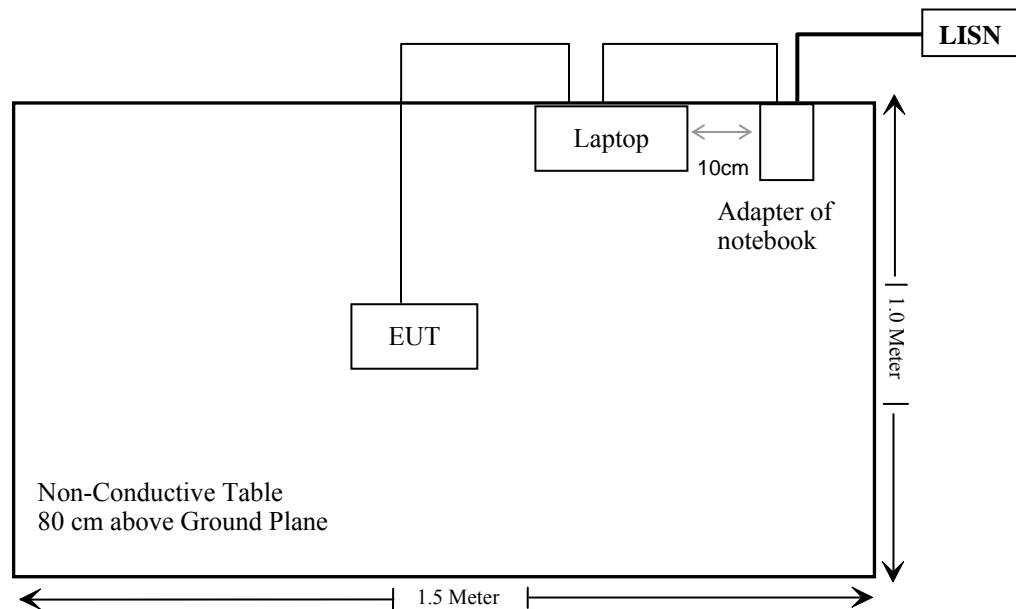
Equipment Modifications

No modification was made to the EUT tested.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	Laptop	T40	N/A

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)	AC Line Conducted Emissions	N/A*
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

Note: N/A*-Not applicable, Battery supply only.

FCC §15247(i) & §2.1093 - RF EXPOSURE

Applicable Standard

According to subpart 15.247(i) and subpart §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to KDB 447498 D01 Mobile Portable RF Exposure v03r03, no SAR required if power is lower than the flowing threshold:

When routine evaluation is required for SAR and the output power is $\leq 60/f(\text{GHz})$ mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is $\leq 60/f(\text{GHz})$ mW or all measured 1-g SAR are < 0.4 W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

Result

Conducted peak output power: 2.06 dBm

Antenna Gain: -3.0 dBi

EIRP = 2.06 - 3 = -0.94 dBm = 0.81 mW

SAR exempted threshold = $60/f_{\text{GHz}} = 60/2.462 = 24.37$ mW

The maximum output power of EUT is less than the threshold, SAR is not required.

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 (i), Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi

Antenna Connector Construction

The EUT has two patch ceramic antennas on the PCB, which in accordance to section 15.203, the maximum gain is -3 dBi; please refer to the internal photos.

Result: Compliance.

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

Applicable Standard

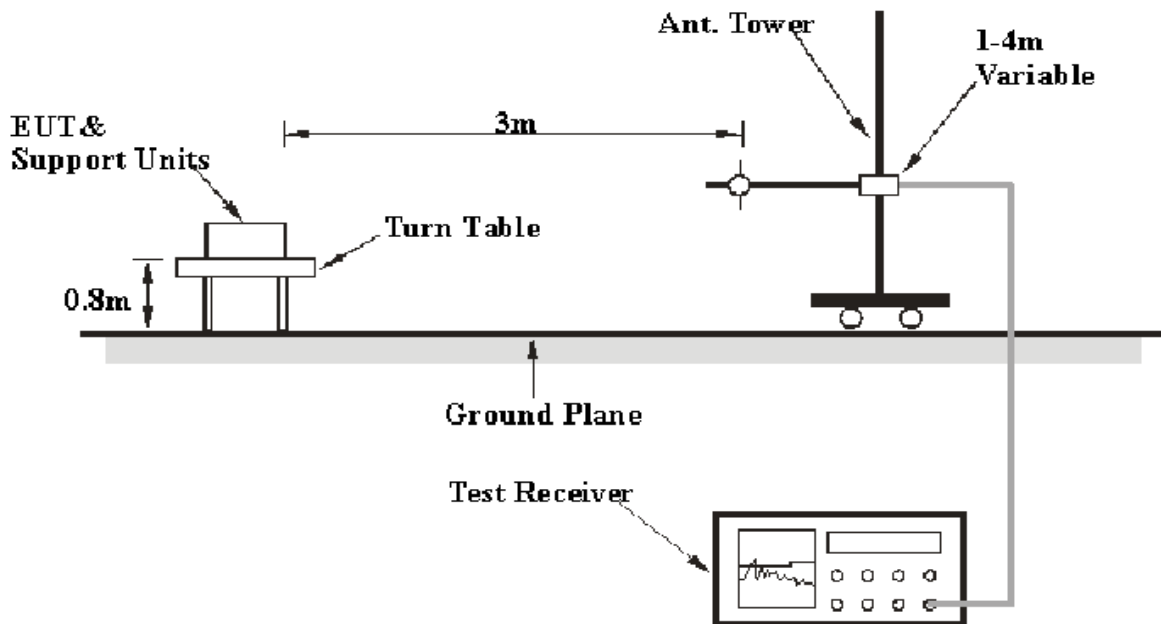
FCC §15.247 (d); §15.209; §15.205.

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 CISPR 16-4-4, 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(k=2, 95% level of confidence) .

EUT Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209,15.205 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>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave.

Test Procedure

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Pre-amplifier	HP8447D	2944A09795	2011-08-02	2012-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2011-11-11	2012-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-07-05	2012-07-04
Mini-circuits	Pre-amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07
Electro-Mechanics	Horn antenna	3116	9510-2270	2011-10-11	2012-11-10

* **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 Results Summary

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

17.03 dB at 4924 MHz in the **Vertical** polarization

Test Data

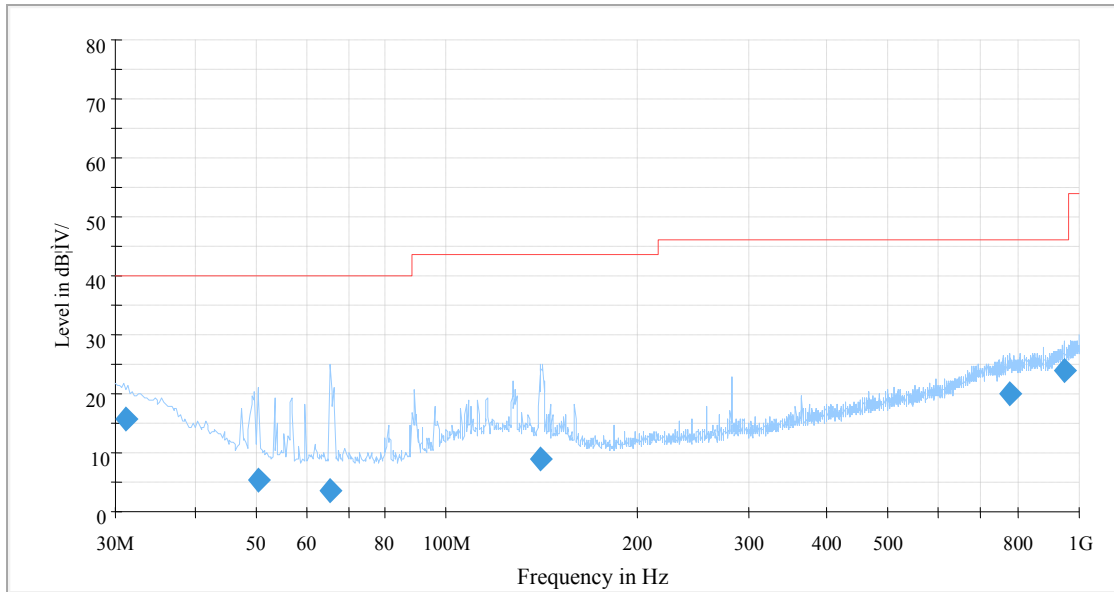
Environmental Conditions

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

The testing was performed by Felix Li on 2011-12-16.

Test Mode: Transmitting

1) 30-1000 MHz:

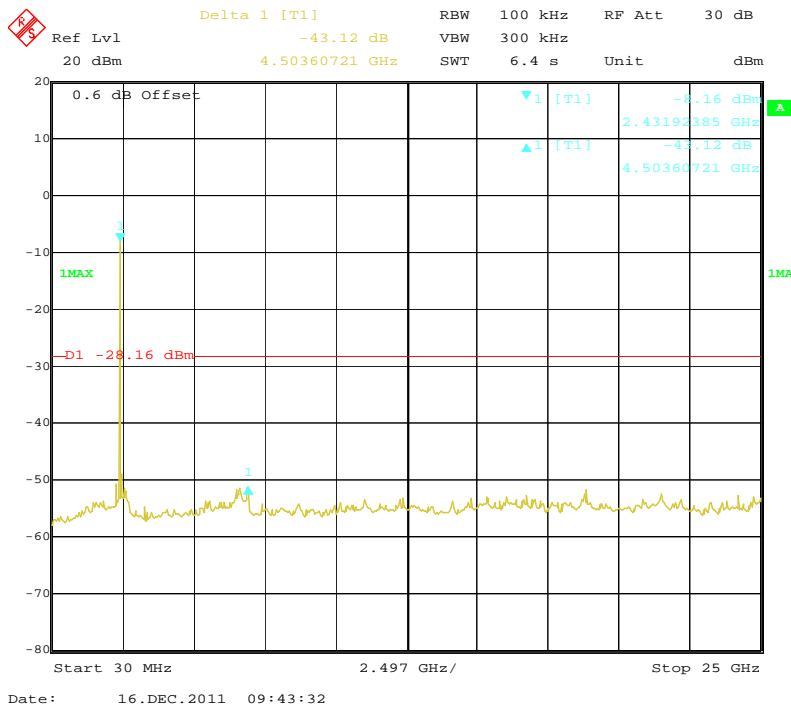


Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
949.511500	24.1	177.0	H	359.0	0.6	46.0	21.9
31.128250	15.5	200.0	V	342.0	-6.2	40.0	24.5
773.836000	20.2	389.0	V	161.0	-2.1	46.0	25.8
50.370250	5.3	355.0	H	205.0	-17.3	40.0	34.7
141.008750	8.8	291.0	H	67.0	-13.2	43.5	34.7
65.270500	3.4	376.0	H	214.0	-18.5	40.0	36.6

2) 1-25 GHz:

Indicated		Detector (PK/Ave.)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.205/15.209			
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
Channel Frequency (2462 MHz)												
4924	45.18	PK	182	1.0	V	35.00	4.3	27.51	56.97	74	17.03	harmonic
4924	22.16	Ave.	182	1.0	V	35.00	4.3	27.51	33.95	54	20.05	harmonic
4924	20.54	Ave.	191	2.0	H	36.3	4.3	27.51	33.63	54	20.37	harmonic
4924	39.91	PK	191	2.0	H	36.3	4.3	27.51	53.00	74	21.00	harmonic
2483.80	21.35	Ave.	145	1.0	V	30.30	3.03	27.54	27.14	54	26.86	spurious
2483.53	20.32	Ave.	130	1.0	H	30.9	3.03	27.54	26.71	54	27.29	spurious
2483.80	39.17	PK	145	1.0	V	30.30	3.03	27.54	44.96	74	29.04	spurious
2483.53	38.26	PK	130	1.0	H	30.9	3.03	27.54	44.65	74	29.35	spurious

3) Conducted Spurious Emissions at Antenna Port:



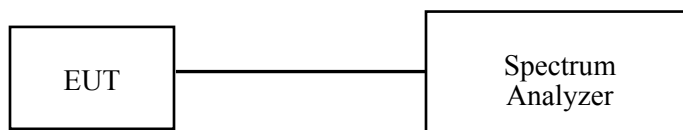
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

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 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

* **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 Data

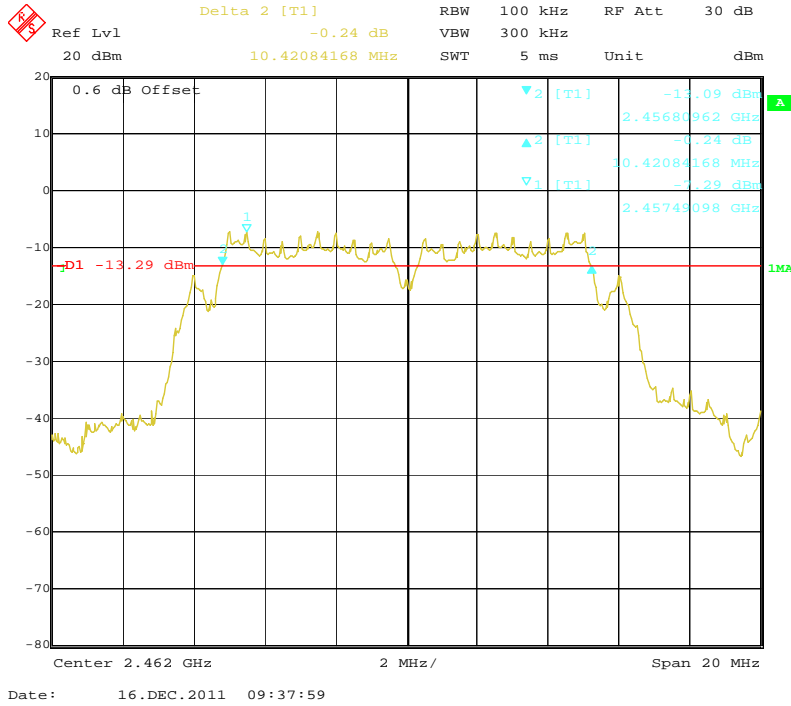
Environmental Conditions

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

The testing was performed by Felix Li on 2011-12-16.

Test Result: Pass, please refer to the following table and plot.

Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
2462	10.42	> 500	Pass



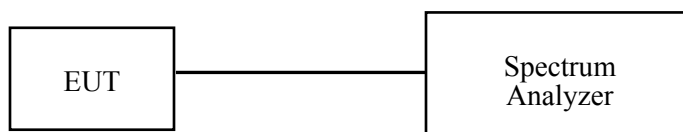
FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

* **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 Data

Environmental Conditions

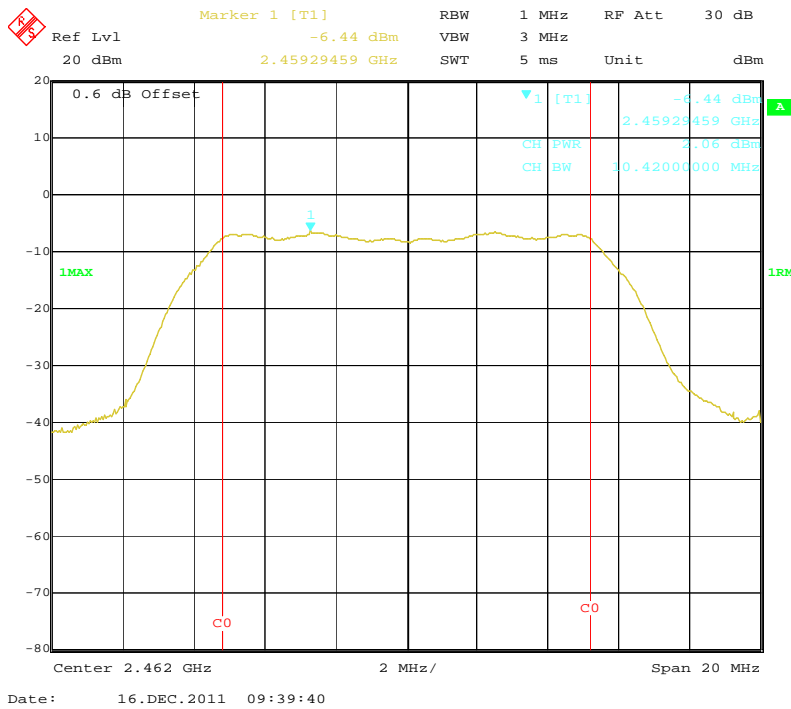
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-12-16.

Test Mode: Transmitting

Frequency (MHz)	Conducted Output Power (dBm)	FCC Limit (dBm)	Result
2462	2.06	30	pass

Output Power



FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

* **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 Data

Environmental Conditions

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

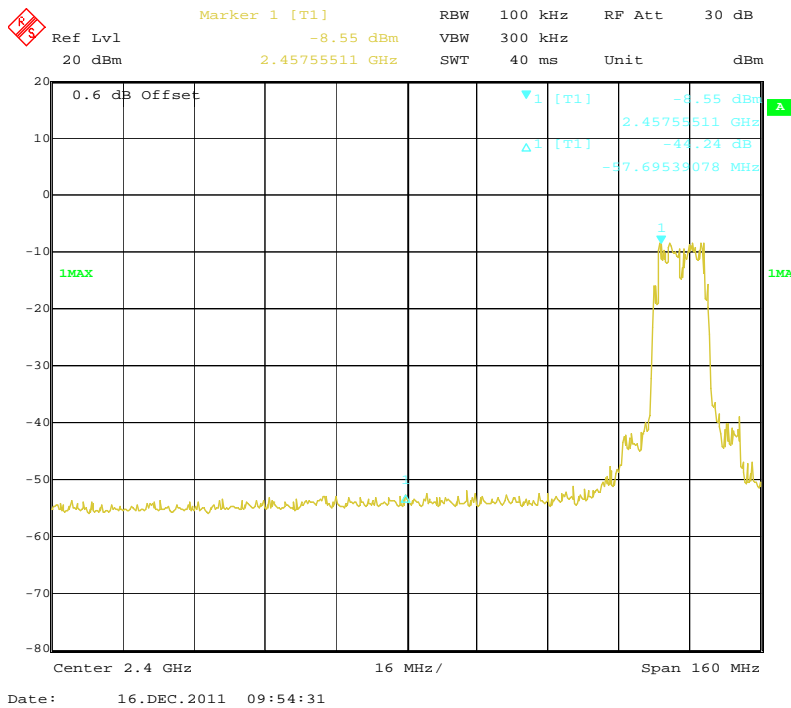
The testing was performed by Felix Li on 2011-12-16

Test Result: *Compliance*

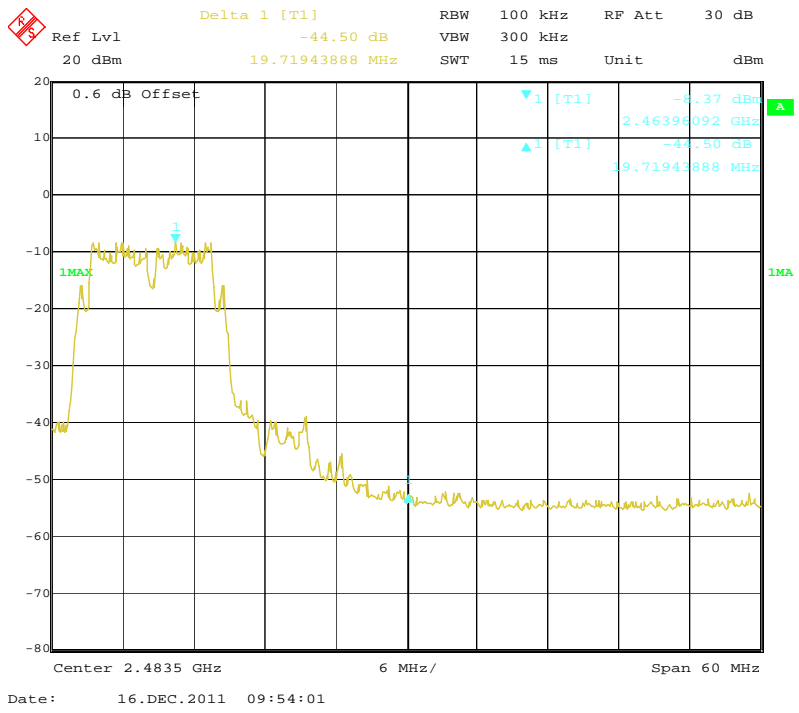
Frequency band (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
Left-band	44.24	≥ 20	Pass
Right-band	44.50	≥ 20	Pass

Please refer to following plots.

Left Band Edge



Right Band Edge



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

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 was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

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

Test Data

Environmental Conditions

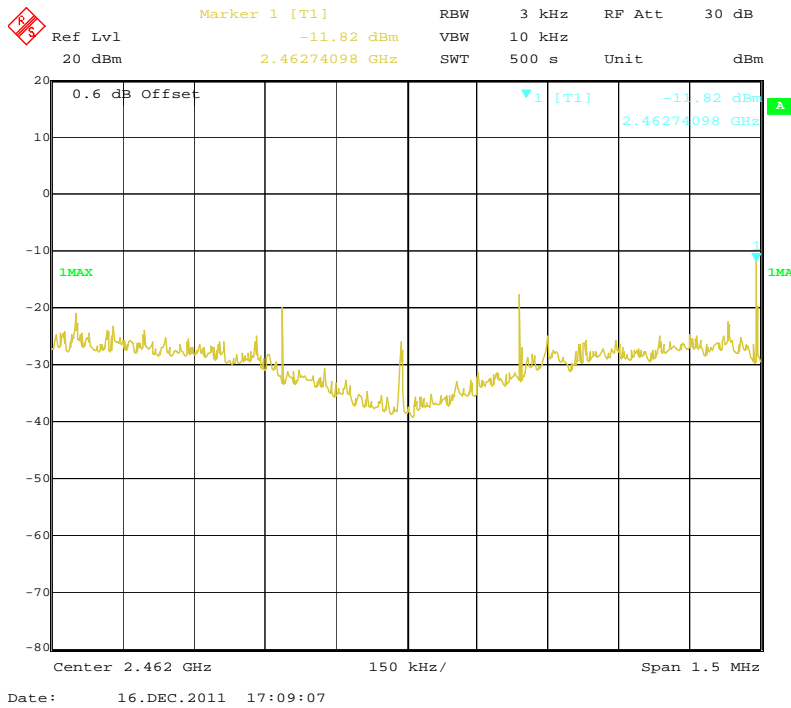
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Felix Li on 2011-12-16.

Test Mode: Transmitting

Test Result: Pass

Frequency (MHz)	Power Spectral Density (dBm)	FCC Limit (dBm)	Result
2462	-11.82	8	pass



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