

FCC PART 15.407

TEST REPORT

For

Voyetra Turtle Beach, Inc.

100 Summit Lake Drive, Suite 100, Valhalla, New York, United States 10595

FCC ID: XGB-TB2291

Report Type: Original Report	Product Type: EAR FORCE TANGO Wireless LAN AP
Test Engineer: Leon Chen	<i>Leon Chen</i>
Report Number: R1DG120808004-00B	
Report Date: 2012-08-21	
Reviewed By: EMC Engineer	Ivan Cao <i>Ivan Cao</i>
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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

 EQUIPMENT MODIFICATIONS6

 EUT EXERCISE SOFTWARE6

 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS6

 EXTERNAL CABLE.....6

 EUT6

 EUT6

 BLOCK DIAGRAM OF TEST SETUP7

SUMMARY OF TEST RESULTS8

FCC §15.407(f) & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)9

 APPLICABLE STANDARD9

FCC §15.203 – ANTENNA REQUIREMENT10

 APPLICABLE STANDARD10

 ANTENNA CONNECTOR CONSTRUCTION10

FCC §15.207 - CONDUCTED EMISSIONS11

 MEASUREMENT UNCERTAINTY11

 EUT SETUP.....11

 EMI TEST RECEIVER SETUP.....12

 TEST PROCEDURE12

 TEST EQUIPMENT LIST AND DETAILS.....12

 TEST RESULTS SUMMARY.....12

 TEST DATA12

FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) – UNDESIRABLE EMISSION & RESTRICTED BANDS15

 APPLICABLE STANDARD15

 MEASUREMENT UNCERTAINTY15

 EUT SETUP.....15

 EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP16

 TEST PROCEDURE16

 CORRECTED AMPLITUDE & MARGIN CALCULATION16

 TEST EQUIPMENT LIST AND DETAILS.....17

 TEST RESULTS SUMMARY.....17

 TEST DATA17

 CONDUCTED SPURIOUS EMISSION AT ANTENNA PORT.....19

FCC §15.407(a) (1) – 26 dB BANDWIDTH.....24

 APPLICABLE STANDARD24

 TEST EQUIPMENT LIST AND DETAILS.....24

 TEST PROCEDURE24

TEST DATA25

FCC §15.407(a) (1) – CONDUCTED TRANSMITTER OUTPUT POWER.....27

 APPLICABLE STANDARD27

 TEST PROCEDURE27

 TEST EQUIPMENT LIST AND DETAILS.....27

 TEST DATA27

FCC §15.407(a) (1) (5) - POWER SPECTRAL DENSITY30

 APPLICABLE STANDARD30

 TEST PROCEDURE30

 TEST EQUIPMENT LIST AND DETAILS.....30

 TEST DATA31

FCC §15.407(a) (6) – PEAK EXCURSION RATIO33

 APPLICABLE STANDARD33

 TEST PROCEDURE33

 TEST EQUIPMENT LIST AND DETAILS.....33

 TEST DATA33

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Voyetra Turtle Beach, Inc.*'s product, model number: *TB300-4291-01 (FCC ID: XGB-TB2291)* ("EUT") in this report was a *EAR FORCE TANGO Wireless LAN AP*, which was measured approximately: 9.0 cm (L) x 11 cm (W) x 23 cm (H), rated input voltage: DC 5V from USB port of system.

Frequency Range:

2.4 GHz band: 2462 MHz
5.2 GHz band: 5180-5240 MHz

Antenna Gain:

2.4 GHz band: -1.5 dBi
5.2 GHz band: 3.3 dBi

Output Power:

2.4 GHz band: 3.0 dBm
5.2 GHz band: 3.78 dBm

** All measurement and test data in this report was gathered from production sample serial number: 120808004 (Assigned by Dongguan BA CL). The EUT was received on 2012-08-10.*

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, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

15.247 DTS submissions with ID: XGB-TB2291

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. (Dongguan). 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. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) 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 February 02, 2012. 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.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which is provided by manufacture. The operating frequency band is 5150-5250 MHz; 4 channels are provided:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5180	3	5220
2	5200	4	5240

EUT was tested with Channel 1, 2 and 4.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Test software: Docklight scripting

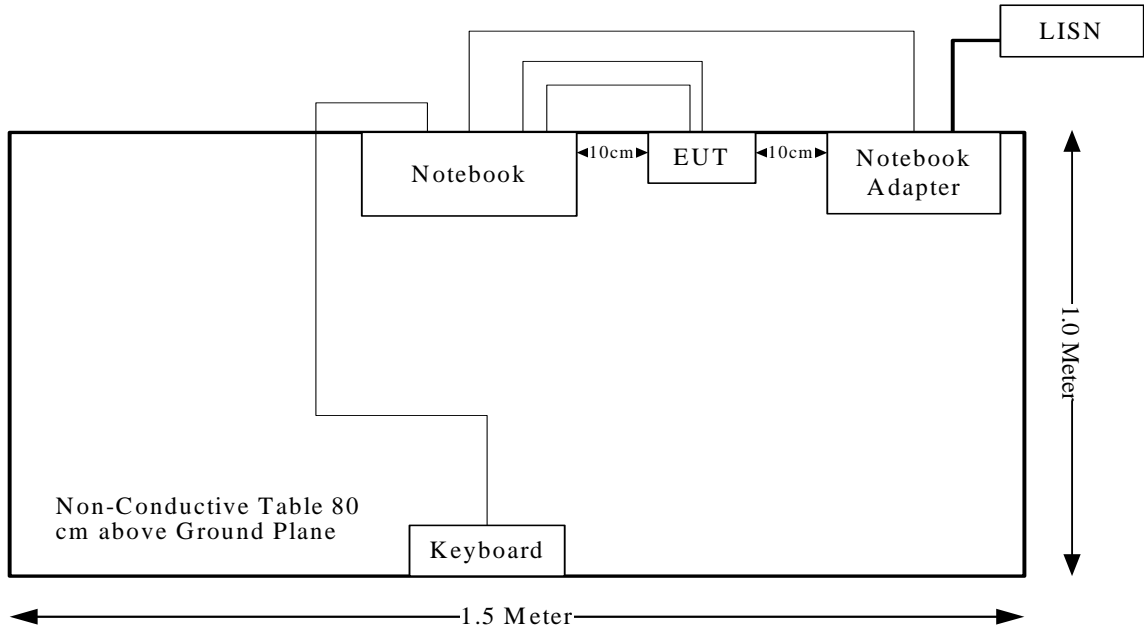
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Dell	Notebook	PP11L	N/A
Dell	keyboard	L100	CNORH656658907BL05D C

External Cable

Cable Description	Length (m)	From Port	To
Unshielded USB Cable	1.2	USB Port of Notebook	EUT
Unshielded Audio Cable	1.5	Audio output Port of Notebook	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§2.1091, §1.1307(b)(1)	Maximum Permissible Exposure	Compliance
§15.407, §15.203	Antenna Requirement	Compliance
§15.407(b)(6) & §15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209 & §15.407(b) (1),(6),(7)	Undesirable Emission & Restricted Bands	Compliance
§15.407(a) (1)	26 dB Bandwidth	Compliance
§15.407(a)(1)	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(5)	Power Spectral Density	Compliance
§15.407(a)(6)	Peak Excursion Ratio	Compliance

FCC §15.407(f) & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.407(f) 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.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	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;

According to §1.1310 and §2.1091 RF exposure is calculated.

MPE Calculation

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

Where S= power density (in appropriate units, e.g. mW/cm²);
 P = power input to the antenna (in appropriate units, e.g., mW);
 G = Antenna Gain;
 R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
	(dBi)	(numeric)	(dBm)	(mW)			
5180	3.3	2.14	3.78	2.39	20	0.0010	1.0

Result: The device meets FCC MPE at 20cm distance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

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 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.

According to § 15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two ceramic antennas permanently soldered on the printed circuit boards, which complied with 15.203, the maximum gain is 3.3 dBi in frequency 5150-5250 MHz; please refer to the internal photos.

Result: Compliance.

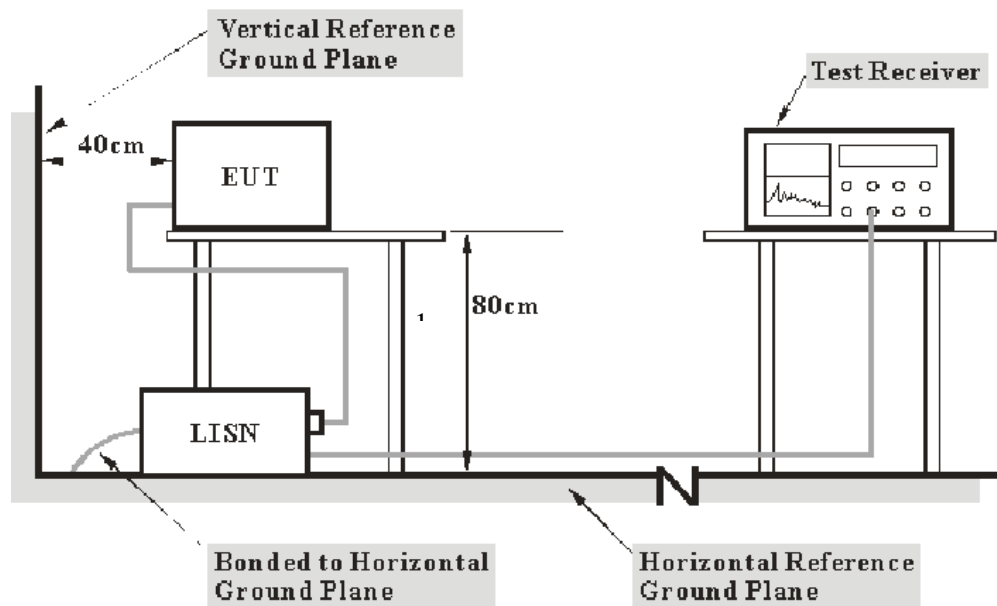
FCC §15.207 - CONDUCTED EMISSIONS

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 CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is 2.4 dB (k=2, 95% level of confidence).

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 C63.4-2009 measurement procedure. The specification used was with the FCC 15.207 limits.

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

The spacing between the peripherals was 10 cm.

The adapter of notebook was connected to an AC 120V/60 Hz power source

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

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

Test Procedure

During the conducted emission test, the adapter of notebook was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	830245/006	2011-10-8	2012-10-7
Rohde & Schwarz	LISN	ESH3-Z5	843331/015	2011-10-8	2012-10-7

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:

5.53 dB at 0.290 MHz in the Line conducted mode.

Test Data

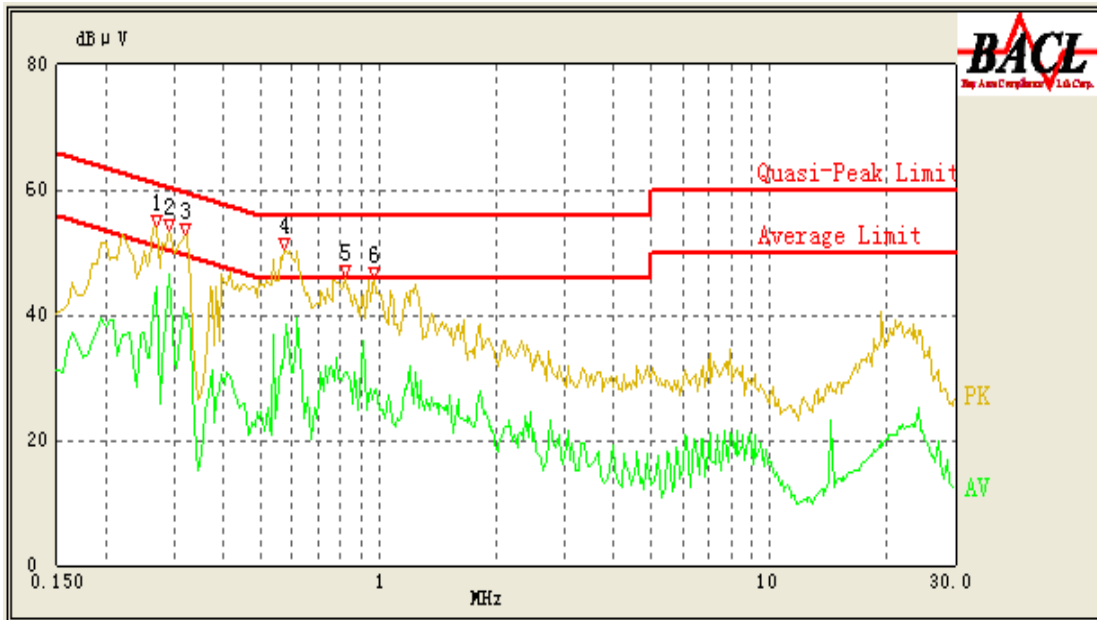
Environmental Conditions

Temperature:	20 ° C
Relative Humidity:	48 %
ATM Pressure:	100.0 kPa

The testing was performed by Leon Chen on 2012-08-13.

EUT Operation Mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
0.290	46.47	0.42	52.00	5.53	Ave.
0.270	44.58	0.42	52.57	7.99	Ave.
0.320	50.78	0.42	61.14	10.36	QP
0.575	44.86	0.43	56.00	11.14	QP
0.575	34.64	0.43	46.00	11.36	Ave.
0.320	39.64	0.42	51.14	11.50	Ave.
0.290	50.27	0.42	62.00	11.73	QP
0.825	30.71	0.44	46.00	15.29	Ave.
0.975	39.43	0.45	56.00	16.57	QP
0.270	45.02	0.42	62.57	17.55	QP
0.975	27.79	0.45	46.00	18.21	Ave.
0.825	37.67	0.44	56.00	18.33	QP

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
0.295	45.17	0.42	51.86	6.69	Ave.
0.335	53.46	0.42	60.71	7.25	QP
0.590	48.06	0.43	56.00	7.94	QP
0.295	52.57	0.42	61.86	9.29	QP
0.335	39.93	0.42	50.71	10.78	Ave.
0.590	34.25	0.43	46.00	11.75	Ave.
0.810	41.30	0.44	56.00	14.70	QP
0.215	39.20	0.42	54.14	14.94	Ave.
0.995	40.23	0.45	56.00	15.77	QP
0.810	28.77	0.44	46.00	17.23	Ave.
0.215	46.21	0.42	64.14	17.93	QP
0.985	27.00	0.45	46.00	19.00	Ave.

FCC §15.209, §15.205 & §15.407(b) (1) (6) (7) – UNDESIRABLE EMISSION & RESTRICTED BANDS

Applicable Standard

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

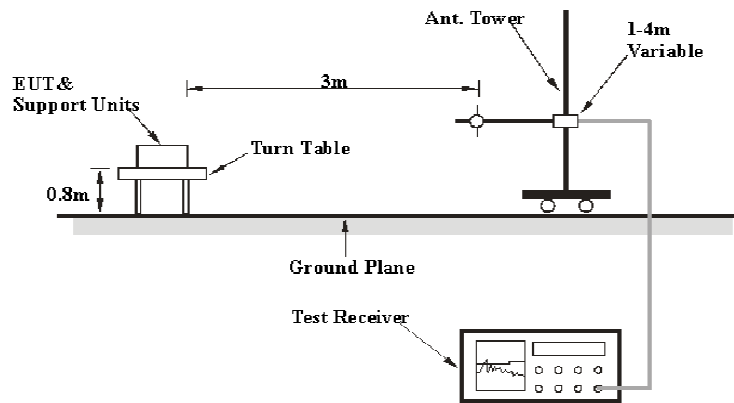
Measurement Uncertainty

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.

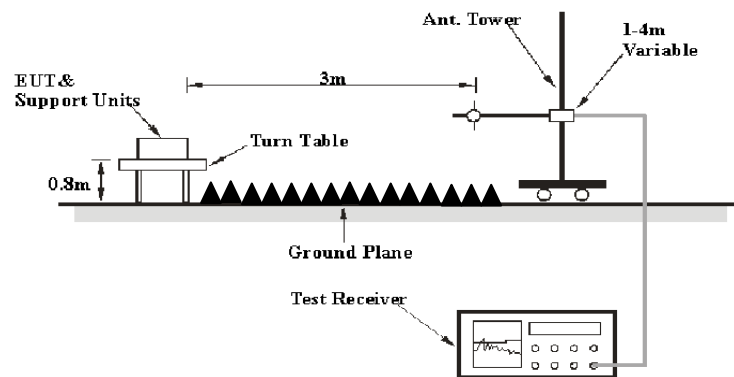
Based on CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is 4.0 dB.

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.407 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 adapter of notebook was connected to a 120 VAC/60 Hz power source,

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 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 – 40 GHz	1 MHz	3 MHz	PK
1000 MHz – 40 GHz	1 MHz	10 Hz	Ave.

Test Procedure

During the radiated emission test, the adapter of notebook 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, peak and Average detection modes for frequencies above 1GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the 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
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2012-5-13	2013-5-12
Sunol Sciences	Hybrid Antennas	JB3	A060611-1	2011-9-6	2012-9-5
HP	Pre-amplifier	8447E	2434A02181	2011-10-8	2012-10-7
Rohde & Schwarz	Spectrum Analyzer	FSEM	1079 8500	2011-10-9	2012-10-8
Dayang	Horn Antenna	OMCDH10180	10279001B	2011-7-30	2013-7-29
mini-circuits	Wideband Amplifier	ZVA-183-S+	96901149	2012-4-24	2013-4-23
Electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2010-10-14	2013-10-13
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-13	2013-5-12

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205, 15.209 and 15.407, with the worst margin reading of:

3.68 dB at 15720 MHz in the Vertical polarization

Test Data

Environmental Conditions

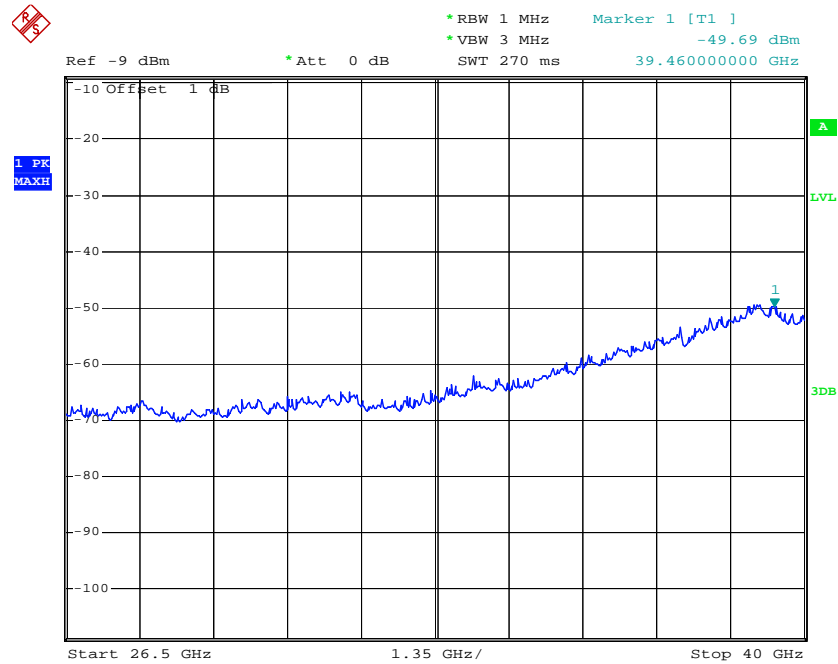
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Leon Chen on 2012-08-13.

1): Test Mode: Transmitting

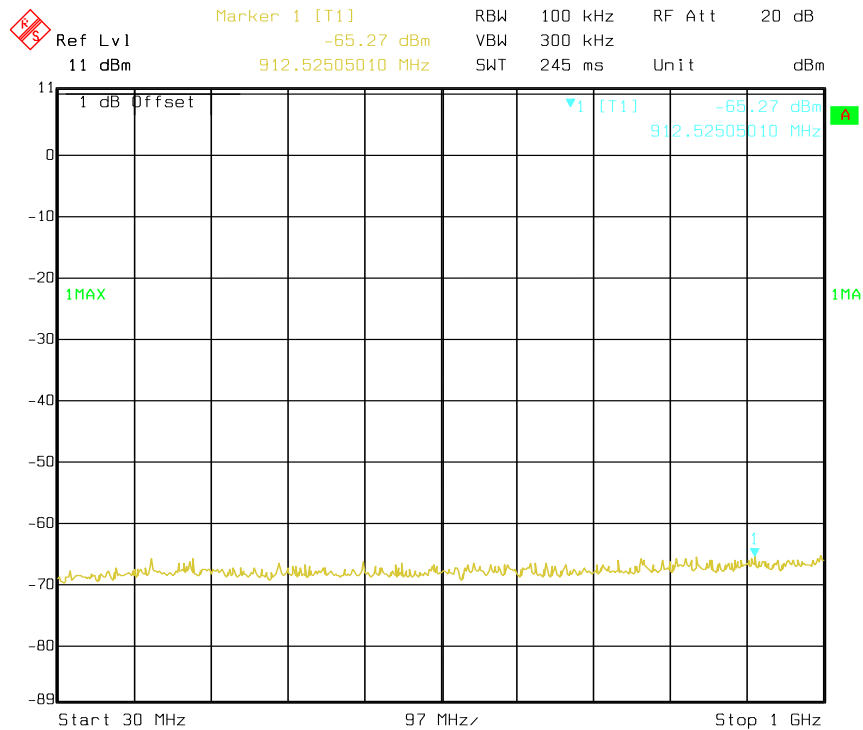
Frequency (MHz)	Receiver.S.A.		Rx Antenna		Cable Loss (dB)	Amplifier Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.407	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel: 5180 MHz									
15540	18.18	AV	H	44.51	11.42	24.45	49.66	54.00	4.34
15540	31.3	PK	H	44.51	11.42	24.45	62.78	68.20	5.42
5150	45.96	PK	V	33.87	5.45	26.98	58.30	68.20	9.90
10360	30.59	PK	V	39.80	8.34	26.81	51.92	68.20	16.28
5150	25.34	AV	V	33.87	5.45	26.98	37.68	54.00	16.32
387.21	29.67	QP	V	15.86	2.38	21.74	26.17	46.00	19.83
2231	32.29	PK	H	28.97	3.65	27.56	37.35	68.20	30.85
2231	15.99	AV	H	28.97	3.65	27.56	21.05	54.00	32.95
5180	42.53	AV	H	33.92	5.49	0.00	81.94	N/A	N/A
5180	54.14	PK	H	33.92	5.49	0.00	93.55	N/A	N/A
5180	43.01	AV	V	33.92	5.49	0.00	82.42	N/A	N/A
5180	55.39	PK	V	33.92	5.49	0.00	94.80	N/A	N/A
Middle Channel: 5200 MHz									
15600	32.61	PK	H	44.38	11.46	24.41	64.04	68.20	4.16
15600	17.48	AV	H	44.38	11.46	24.41	48.91	54.00	5.09
10400	31.38	PK	V	39.86	8.34	26.81	52.77	68.20	15.43
564.2	28.99	QP	V	18.97	2.88	22.18	28.66	46.00	17.34
5200	41.91	AV	H	33.96	5.51	0.00	81.38	N/A	N/A
5200	54.48	PK	H	33.96	5.51	0.00	93.95	N/A	N/A
5200	42.27	AV	V	33.96	5.51	0.00	81.74	N/A	N/A
5200	54.16	PK	V	33.96	5.51	0.00	93.63	N/A	N/A
High Channel: 5240 MHz									
15720	33.18	PK	H	44.12	11.54	24.32	64.52	68.20	3.68*
15720	18.58	AV	H	44.12	11.54	24.32	49.92	54.00	4.08
5350	45.38	PK	V	34.23	4.58	27.01	57.18	68.20	11.02
10480	32.61	PK	V	39.97	8.34	26.82	54.10	68.20	14.10
672.3	29.78	QP	V	20.19	3.15	22.30	30.82	46.00	15.18
5350	25.19	AV	V	34.23	4.58	27.01	36.99	54.00	17.01
5240	43.04	AV	H	34.03	5.09	0.00	82.17	N/A	N/A
5240	55.52	PK	H	34.03	5.09	0.00	94.65	N/A	N/A
5240	43.4	AV	V	34.03	5.09	0.00	82.53	N/A	N/A
5240	55.25	PK	V	34.03	5.09	0.00	94.38	N/A	N/A

26.5G~40GHz at frequency 5180 MHz



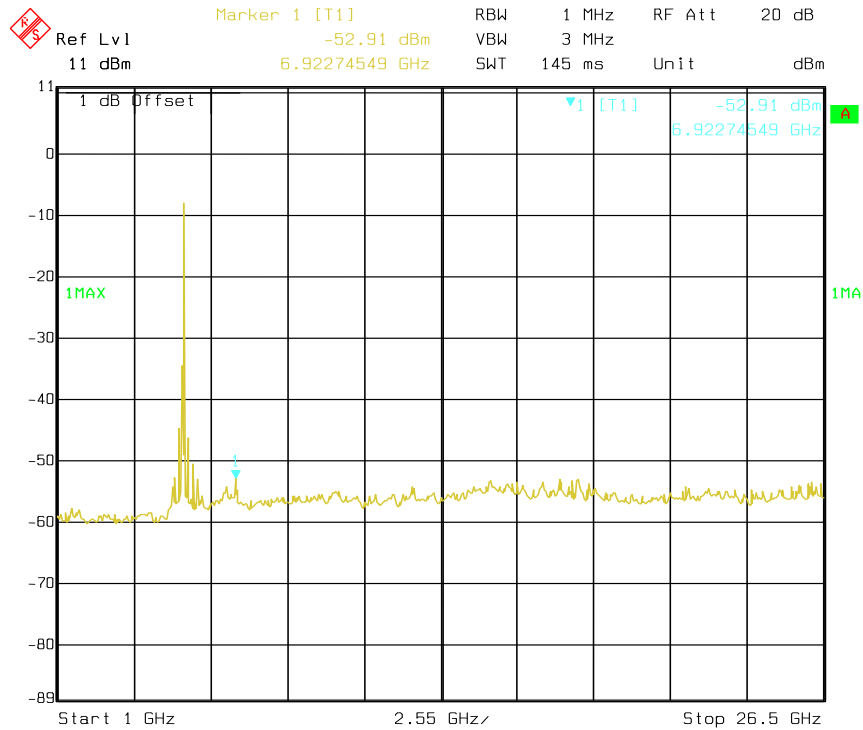
Date: 15.AUG.2012 19:54:07

30MHz~1GHz at frequency 5200 MHz



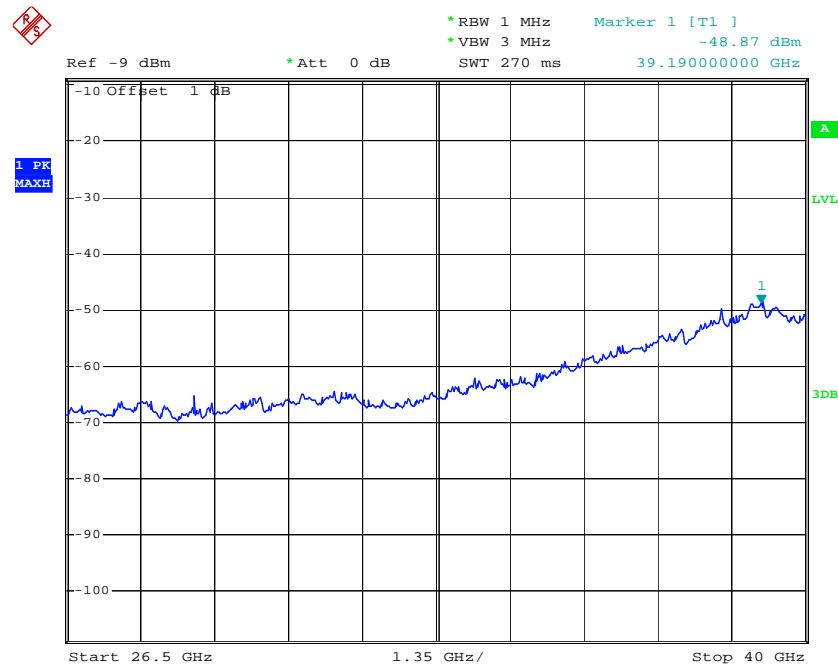
Date: 15.AUG.2012 21:22:18

1GHz~26.5 MHz at frequency 5200 MHz



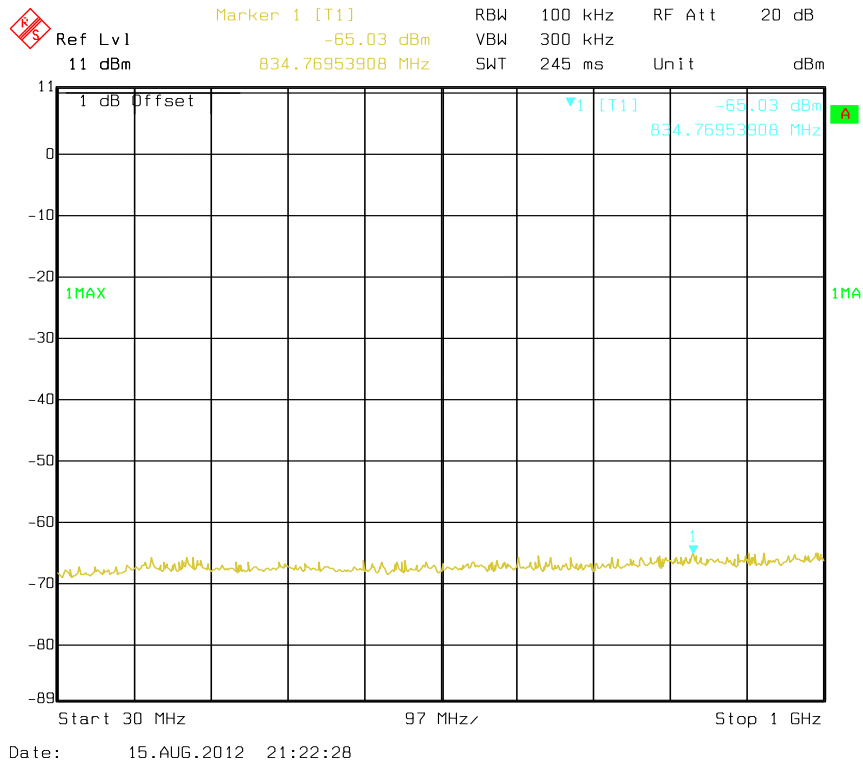
Date: 15.AUG.2012 20:06:47

26.5GHz~40GHz at frequency 5200 MHz

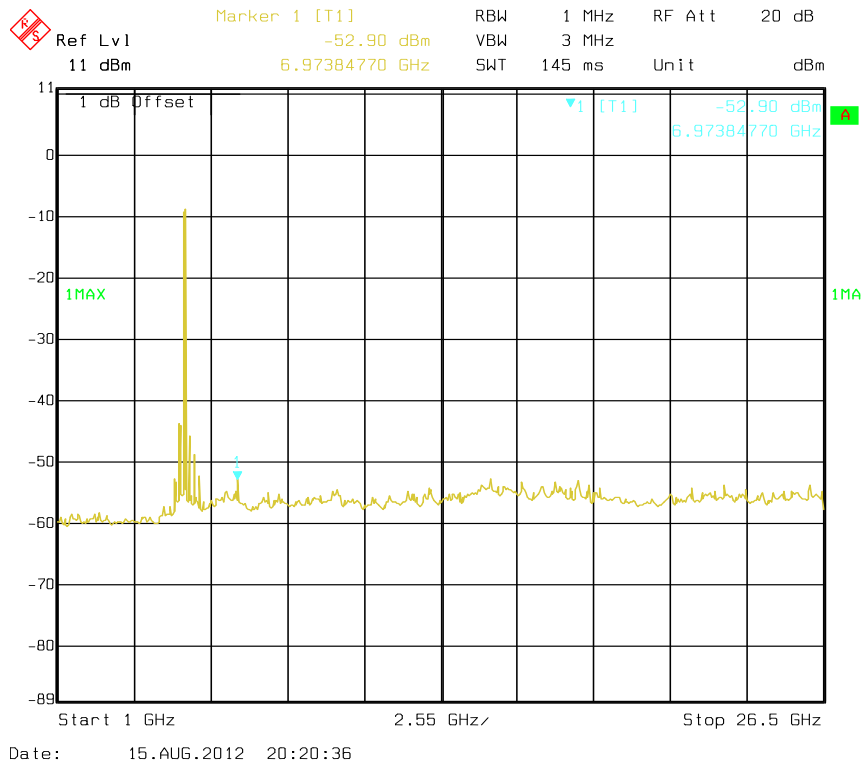


Date: 15.AUG.2012 19:54:30

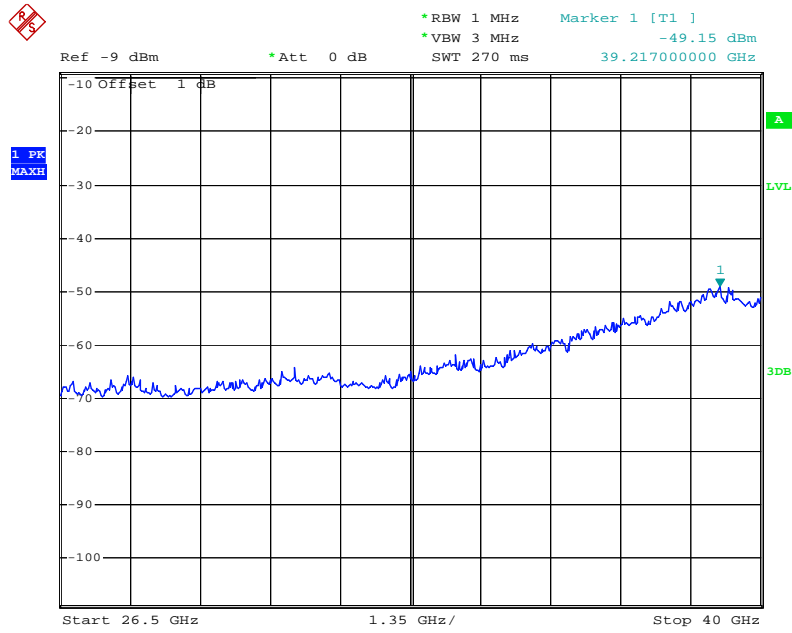
30MHz~1GHz at frequency 5240 MHz



1GHz~26.5GHz at frequency 5240 MHz



26.5GHz~40GHz at frequency 5240 MHz



Date: 15.AUG.2012 19:54:47

FCC §15.407(a) (1) – 26 dB BANDWIDTH

Applicable Standard

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-13	2013-5-12

Test Procedure

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test Data

Environmental Conditions

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

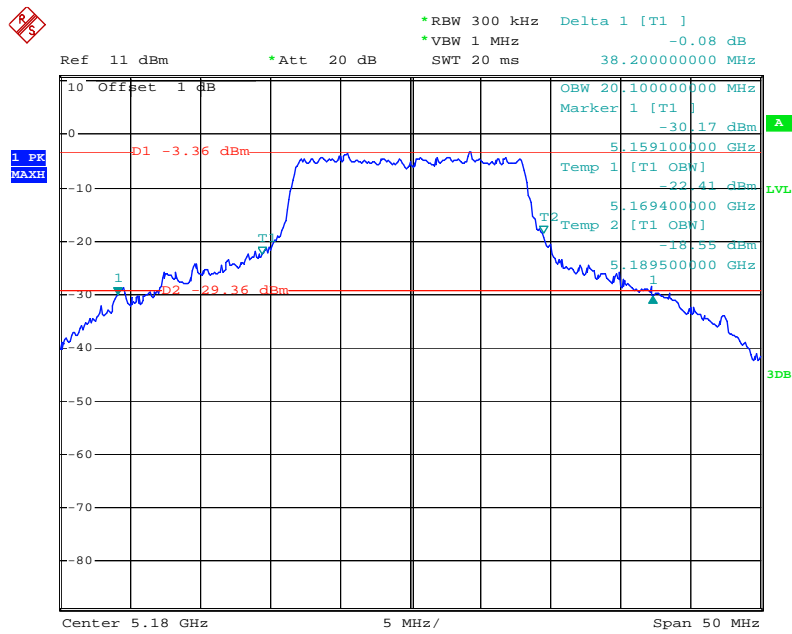
The testing was performed by Leon Chen on 2012-08-16

Test Result: Pass.

Please refer to the following tables and plots.

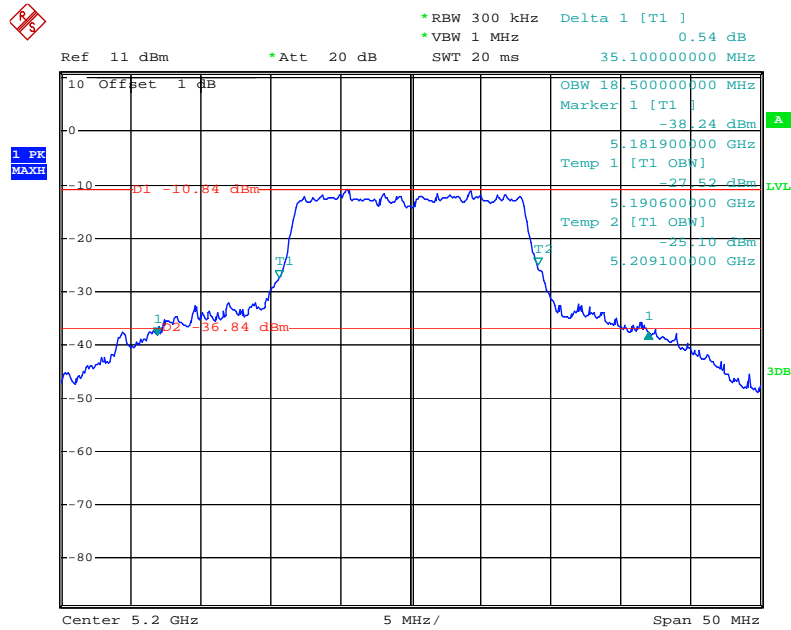
Frequency (MHz)	26 dB Bandwidth (MHz)
5180	38.2
5200	35.1
5240	36.5

Channel Frequency 5180 MHz



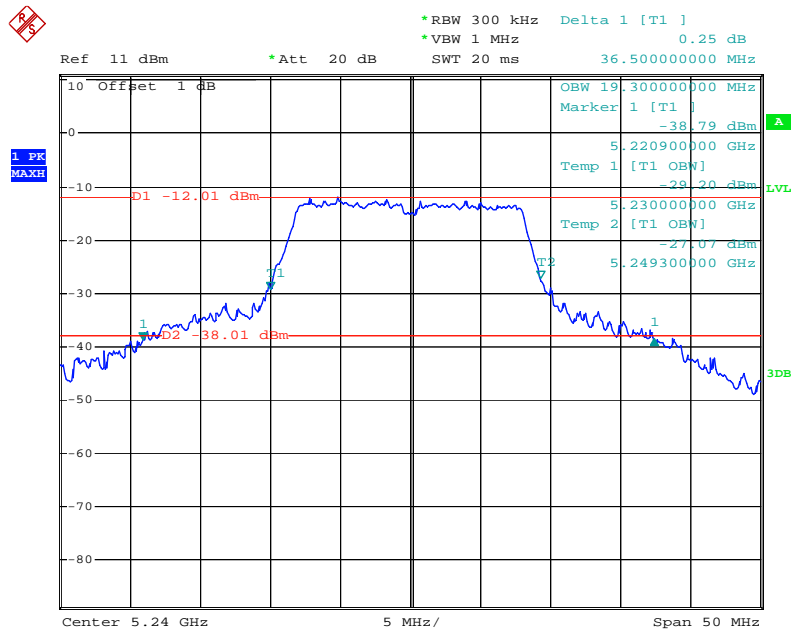
Date: 16.AUG.2012 16:06:47

Channel Frequency 5200 MHz



Date: 16.AUG.2012 13:06:13

Channel Frequency 5240 MHz



Date: 16.AUG.2012 11:56:45

FCC §15.407(a) (1) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW \geq 3 MHz.
4. Number of points in sweep \geq 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq BW/2, so that narrowband signals are not lost between frequency bins.)
5. Sweep time = auto.
6. Detector = sample.
7. If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle \geq 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
8. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
9. Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	1079 8500	2011-10-9	2012-10-8

Test Data

Environmental Conditions

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

The testing was performed by Leon Chen on 2012-08-21.

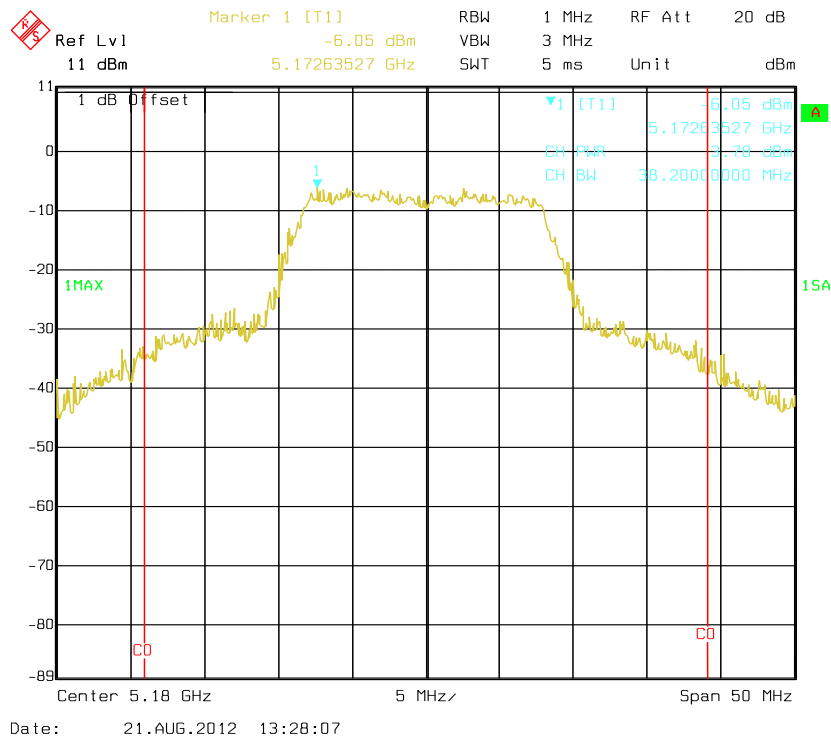
Test Mode: Transmitting

Test Result: Pass

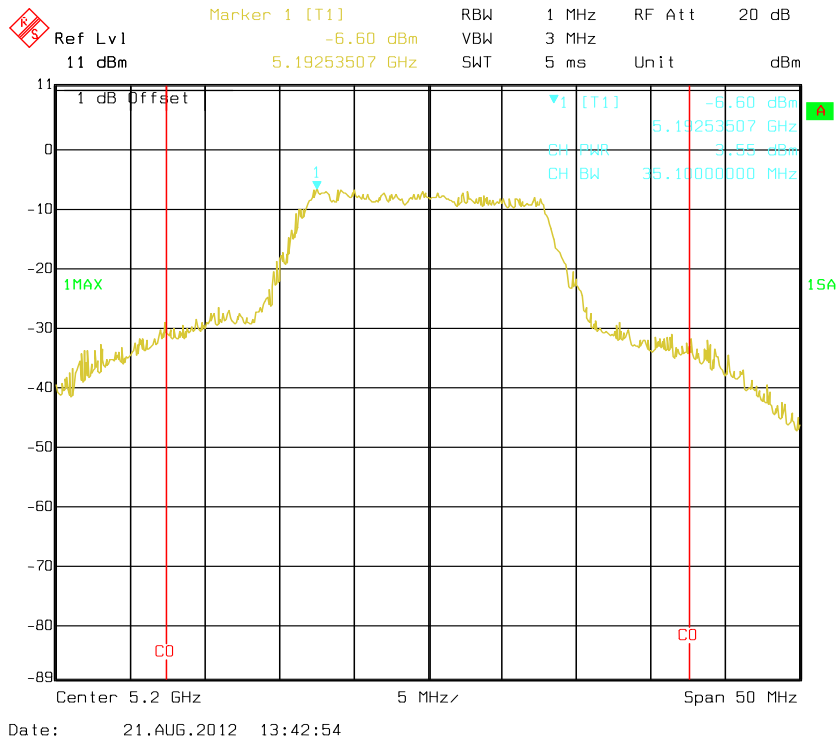
Please refer to the following tables and plots.

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Result
5180	3.78	17	PASS
5200	3.55	17	PASS
5240	3.06	17	PASS

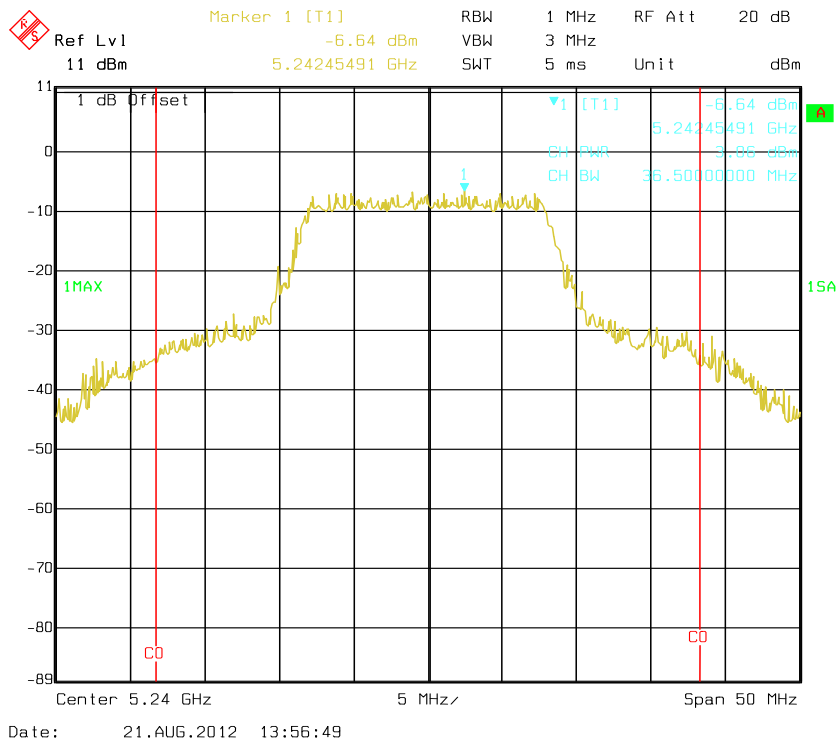
Output Power - 5180 MHz



Output Power - 5200 MHz



Output Power - 5240 MHz



FCC §15.407(a) (1) (5) - POWER SPECTRAL DENSITY

Applicable Standard

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The peak power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A resolution bandwidth less than the measurement bandwidth can be used, provided that the measured power is integrated to show total power over the measurement bandwidth. If the resolution bandwidth is approximately equal to the measurement bandwidth, and much less than the emission bandwidth of the equipment under test, the measured results shall be corrected to account for any difference between the resolution bandwidth of the test instrument and its actual noise bandwidth.

Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW \geq 3 MHz.
4. Number of points in sweep \geq 2 Span / RBW. (This ensures that bin-to-bin spacing is \leq BW/2, so that narrowband signals are not lost between frequency bins.)
5. Sweep time = auto.
6. Detector = sample.
7. If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle \geq 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
8. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	1079 8500	2011-10-9	2012-10-8

Test Data

Environmental Conditions

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

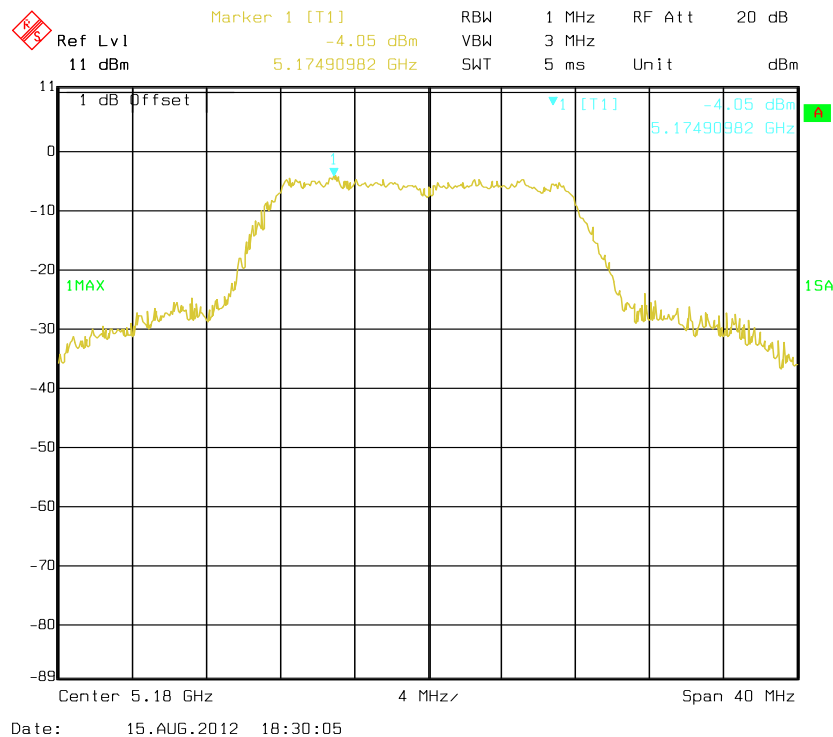
The testing was performed by Leon Chen on 2012-08-15.

Test Mode: Transmitting

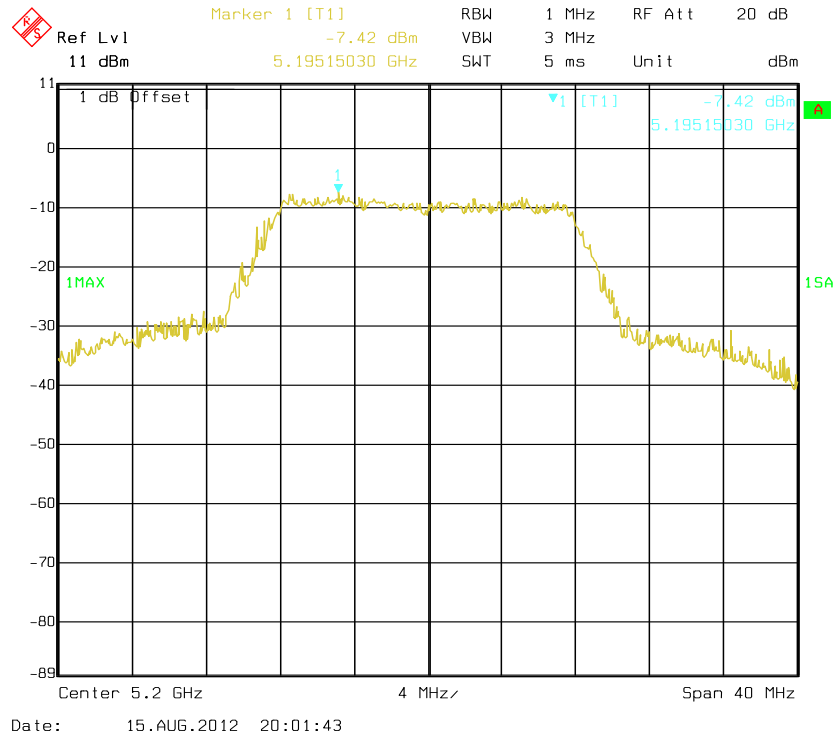
Test Result: Pass

Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
5180	-4.05	4
5200	-7.42	4
5240	-8.28	4

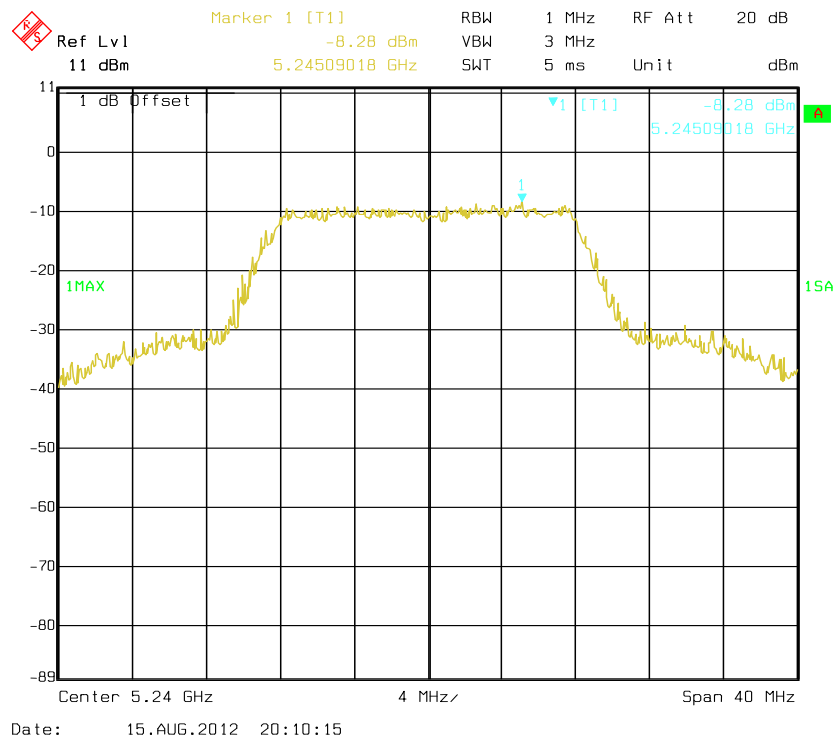
Channel Frequency 5180 MHz



Channel Frequency 5200 MHz



Channel Frequency 5240 MHz



FCC §15.407(a) (6) – PEAK EXCURSION RATIO

Applicable Standard

According to §15.407(a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Procedure

1. Set the spectrum analyzer span to view the entire emission bandwidth.
2. Set RBW = 1 MHz.
3. VBW \geq 3 MHz.
4. Detector = peak.
5. Trace mode = max-hold.
6. Allow the sweeps to continue until the trace stabilizes.
7. Use the peak search function to find the peak of the spectrum.
8. Use the procedure found under E) to measure the PPSD.
9. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM	1079 8500	2011-10-9	2012-10-8

Test Data

Environmental Conditions

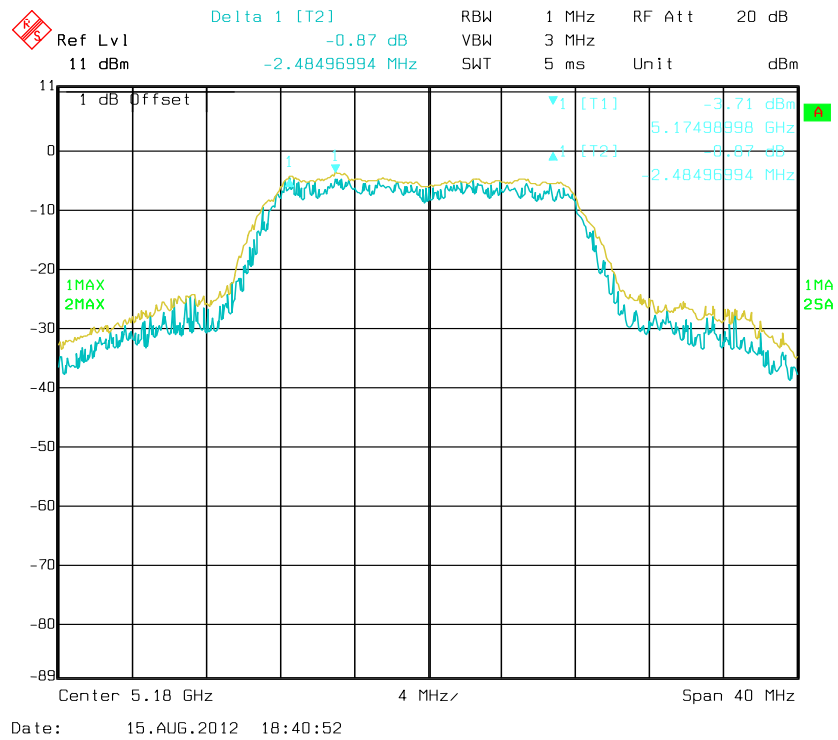
Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Leon Chen on 2012-08-15.

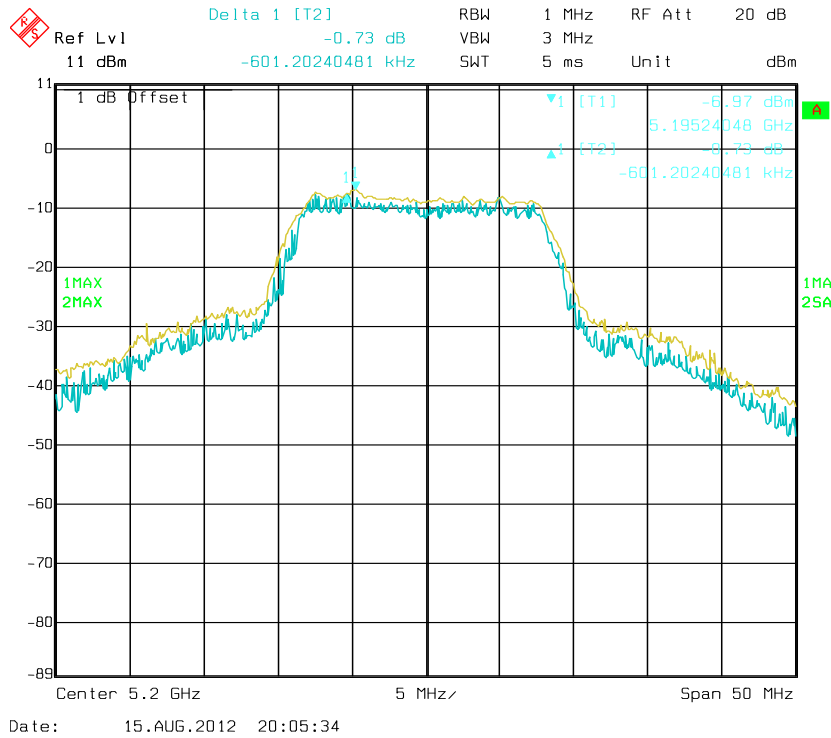
Test Mode: Transmitting

Frequency (MHz)	Peak Excursion Ratio (dB)	Limit (dB)
5180	0.87	13
5200	0.73	13
5240	0.48	13

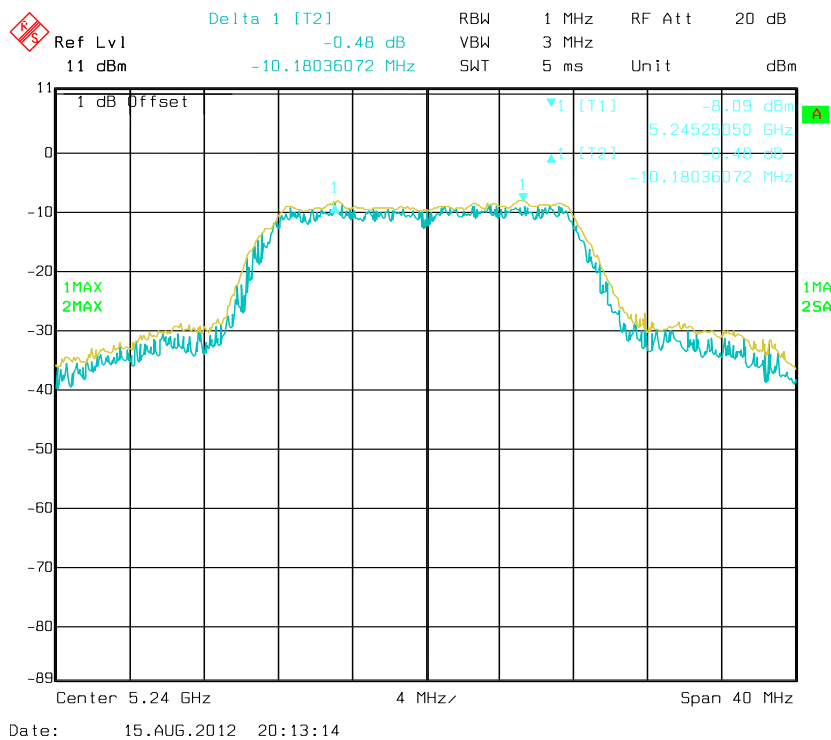
Channel Frequency 5180 MHz



Channel Frequency 5200 MHz



Channel Frequency 5240 MHz



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