

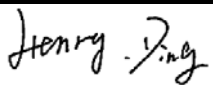
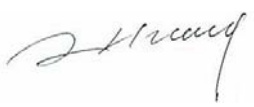
FCC PART 15.247
MEASUREMENT AND TEST REPORT

For

Shenzhen Tena Electronic CO., Ltd.

9Floor IER building, South Area, Hi-Tech Industrial Park, Shenzhen, Guangdong, China

FCC ID: SGRDGF000001

Report Type: Original Report	Product Type: Android Mini PC
Test Engineer: <u>Henry Ding</u> 	
Report Number: <u>RSZ130312001-00B</u>	
Report Date: <u>2013-04-23</u>	
Reviewed By: <u>Alvin Huang</u>  RF Leader	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Tena Electronic CO., Ltd.* 's product, model number: *AD6333 (FCC ID: SGRDGF000001)* or the "EUT" as referred to in this report was a *Android Mini PC*, which was measured approximately: 9.0 cm (L) x 3.5 cm (W) x 1.0 cm (H), rated input voltage: USB 5V or DC 5V adapter

Adapter information: Switching Adapter
Model: TPA-010610UU
Input: AC 100-240V, 50/60Hz, 0.3A
Output: DC 5.0V, 1000mA

**All measurement and test data in this report was gathered from production sample serial number: 1303025 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-03-12.*

Objective

This report is prepared on behalf of *Shenzhen Tena Electronic 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, section 15.203, 15.205, 15.207, 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 C63.4-2009, 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 at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, Shihua Road, Futian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on 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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b, 802.11g mode, 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

EUT for 802.11b, 802.11g and 802.11n-HT20 modes were tested with Channel 1, 6 and 11.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

EUT Exercise Software

Test with adb command.

The test was performed under:

802.11b: Data rate: 1 Mbps. Power level: 48

802.11g: Data rate: 6 Mbps. Power level: 46

802.11n-HT20: Data rate: MCS0. Power level: 44

Equipment Modifications

No modification was made to the EUT tested.

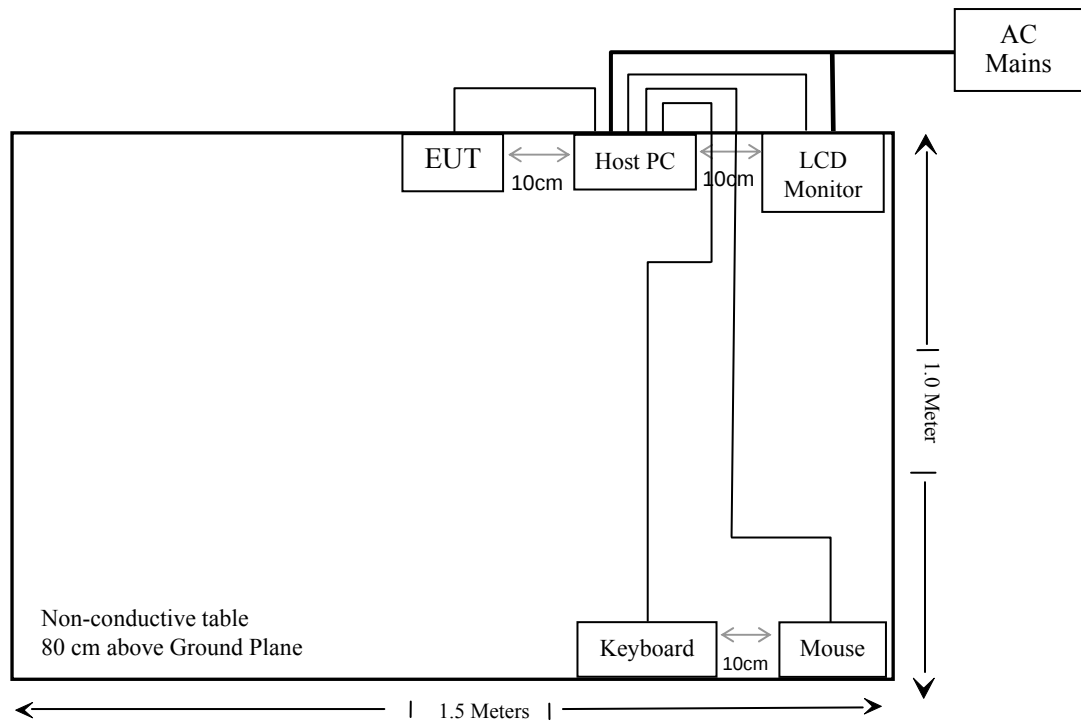
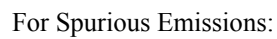
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Host PC	VOSTRO 220S	127BP2X
DELL	Keyboard	L100	CNORH656658907BL04TY
DELL	Mouse	MOC5UO	G1B0096D
DELL	LCD Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
SAGEM	Wireless ADSL Modem	SAGEM F@ST TM 2604 White	N/A
Kingston	USB Flash Disk	Data traveler 2.0GB	N/A

External I/O Cabling List and Details

Cable Description	Length (m)	From/Port	To
Shielded Detachable K/B Cable	1.5	Host PC	Keyboard
Shielded Detachable Mouse Cable	1.5	Host PC	Mouse
Shielded Detachable VGA Cable	1.5	Host PC	LCD Monitor
Shielded Detachable USB Cable	1.2	Host PC	EUT
Unshielded Detachable Power Cable	1.5	Adapter	EUT
Shielded Detachable Mouse Cable	1.5	EUT	Mouse

For Conducted Emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§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 Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

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

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2462	0	1	17.90	61.66	20	0.01227	1

FCC Radiation Exposure Statement:

To comply with FCC RF exposure requirements, a minimum separation distance of 20 cm is required between the antenna and all public persons.

Result: Compliance

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.

Antenna Connector Construction

The EUT has an integrated antenna arrangement, which was permanently attached and the gain was 0 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliance.

Applicable Standard

Measurement Uncertainty

Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is 2.4 dB (k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for the test data recorded in the report.

The diagram illustrates a test setup for an EUT (Equipment Under Test) and a LISN (Line Impedance Stabilization Network) connected to a Test Receiver. The EUT is positioned on a stand, and the LISN is connected to the EUT and the Test Receiver. The Test Receiver is also on a stand. The setup is connected to a Horizontal Reference Ground Plane. The EUT is connected to the Vertical Reference Ground Plane. The LISN is connected to the Horizontal Reference Ground Plane. The Test Receiver is connected to the Horizontal Reference Ground Plane. The diagram shows the physical layout and electrical connections of the test setup.

- The adapter was connected to a 120 V_{AC}/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:

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2012-11-24	2013-11-23
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2012-08-22	2013-08-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2012-08-09	2013-08-09
BACL	CE Test software	BACL-CE	V1.0	-	-

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter was connected to 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 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:

9.08 dB at 0.485 MHz in the Line conducted mode

Test Data

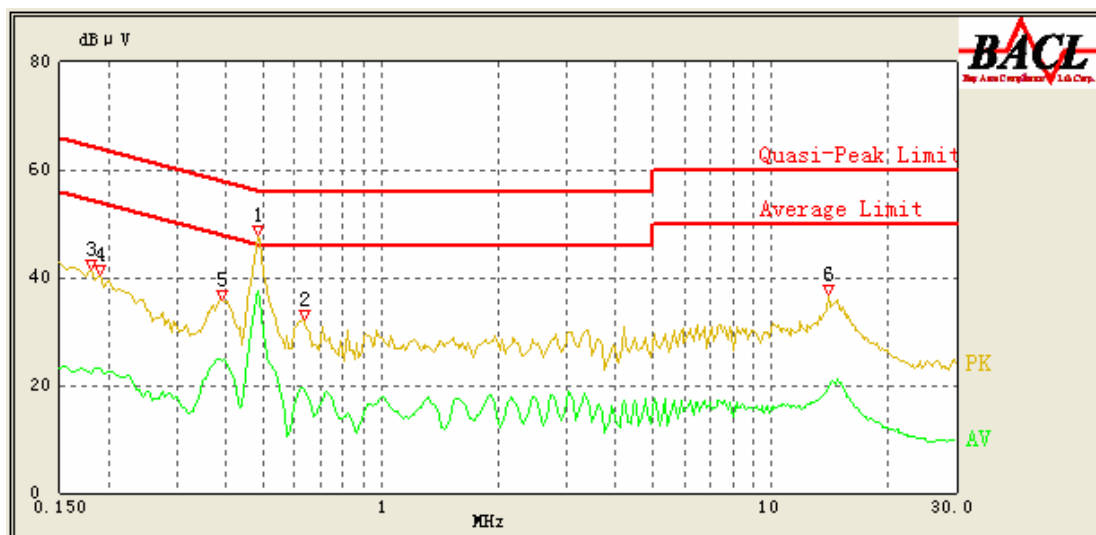
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	100.0 kPa

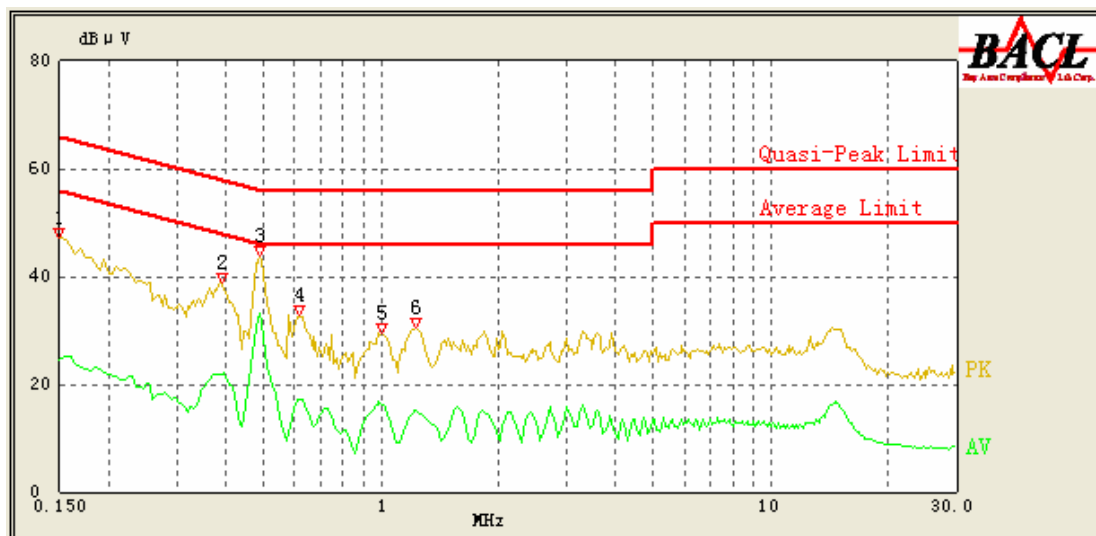
The testing was performed by Henry Ding on 2013-04-23.

EUT operation mode: Transmitting

AC 120V / 60Hz - Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK /QP/Ave.)
0.485	37.35	10.20	46.43	9.08	Ave.
0.485	43.06	10.20	56.43	13.37	QP
0.390	24.53	10.20	49.14	24.61	Ave.
0.630	19.41	10.20	46.00	26.59	Ave.
0.390	31.89	10.20	59.14	27.25	QP
0.635	27.53	10.20	56.00	28.47	QP
0.180	35.84	10.10	65.14	29.30	QP
0.190	35.05	10.10	64.86	29.81	QP
14.075	19.61	10.56	50.00	30.39	Ave.
0.190	23.14	10.10	54.86	31.72	Ave.
0.180	22.23	10.10	55.14	32.91	Ave.
14.075	26.34	10.56	60.00	33.66	QP

Neutral:

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave.)
0.490	33.04	10.19	46.29	13.25	Ave.
0.490	39.83	10.19	56.29	16.46	QP
0.390	32.41	10.10	59.14	26.73	QP
0.390	21.68	10.10	49.14	27.46	Ave.
0.615	17.25	10.20	46.00	28.75	Ave.
1.000	16.29	10.20	46.00	29.71	Ave.
0.615	25.88	10.20	56.00	30.12	QP
0.150	35.42	10.10	66.00	30.58	QP
1.010	25.31	10.20	56.00	30.69	QP
1.220	15.09	10.20	46.00	30.91	Ave.
1.230	24.54	10.20	56.00	31.46	QP
0.150	24.52	10.10	56.00	31.48	Ave.

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF + Cable Loss + Pulse Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude

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

Applicable Standard

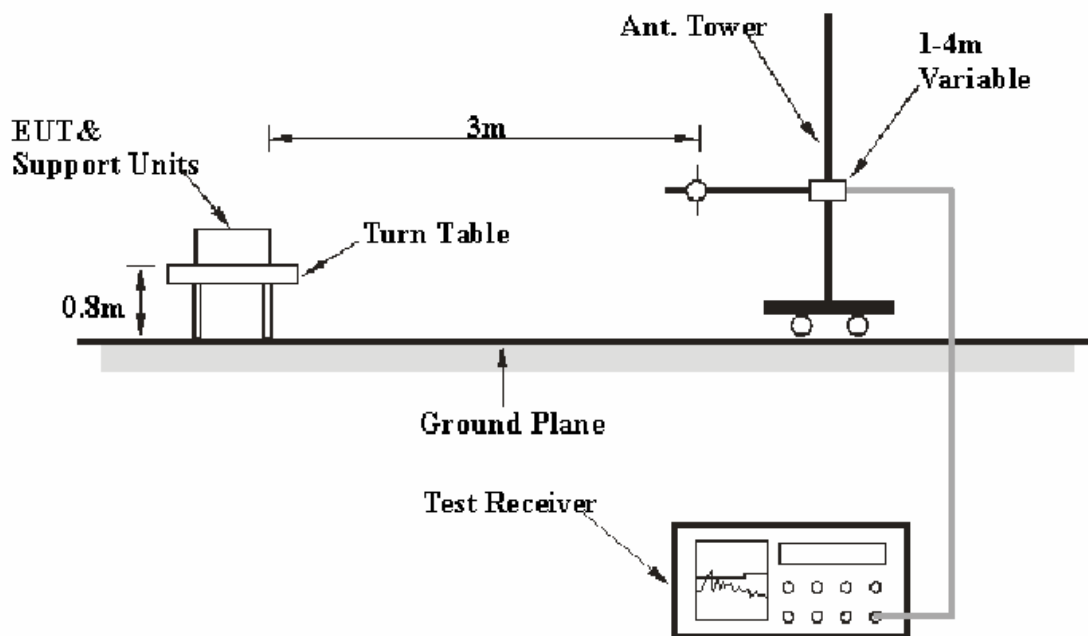
FCC §15.247 (d); §15.209; §15.205;

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 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB(k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for the test data recorded in the report.

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2012-11-24	2013-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2012-08-08	2013-08-07
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Mini-Circuits	Amplifier	ZVA-213+	N/A	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
Agilent	Spectrum Analyzer	8564E	3943A01781	2012-05-17	2013-05-17
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2010-10-14	2013-10-13

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 and 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 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 Results Summary

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

3.29dB at 4924.0 MHz in the Vertical polarization for 802.11b mode

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	100.0 kPa

The testing was performed by Henry Ding on 2013-04-23.

EUT operation mode: Transmitting

30 MHz-25 GHz**802.11b mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412.0	90.94	PK	68	1.2	H	6.13	97.07	/	/
2412.0	85.22	Ave.	68	1.2	H	6.13	91.35	/	/
2412.0	94.22	PK	113	1.1	V	6.13	100.35	/	/
2412.0	89.35	Ave.	113	1.1	V	6.13	95.48	/	/
4824.0	36.85	Ave.	93	1.4	H	12.40	49.25	54	4.75
9648.0	17.29	Ave.	51	1.3	V	19.28	36.57	54	17.43
2389.2	28.89	Ave.	25	1.1	V	6.13	35.02	54	18.98
7236.0	17.70	Ave.	66	1.5	H	17.06	34.76	54	19.24
4824.0	41.69	PK	93	1.4	H	12.40	54.09	74	19.91
9648.0	31.48	PK	51	1.3	V	19.28	50.76	74	23.24
2486.7	23.52	Ave.	331	1.0	V	7.21	30.73	54	23.27
7236.0	33.46	PK	66	1.5	H	17.06	50.52	74	23.48
2331.9	24.35	Ave.	74	1.4	V	5.48	29.83	54	24.17
2389.2	41.31	PK	25	1.1	V	6.13	47.44	74	26.56
2331.9	39.39	PK	74	1.4	V	5.48	44.87	74	29.13
2486.7	36.47	PK	331	1.0	V	7.21	43.68	74	30.32
Middle Channel (2437 MHz)									
2437.0	90.16	PK	23	1.2	H	7.21	97.37	/	/
2437.0	85.01	Ave.	23	1.2	H	7.21	92.22	/	/
2437.0	94.02	PK	44	1.1	V	7.21	101.23	/	/
2437.0	89.21	Ave.	44	1.1	V	7.21	96.42	/	/
4874.0	37.96	Ave.	76	1.3	V	12.46	50.42	54	3.58
9748.0	18.13	Ave.	33	1.2	V	19.40	37.53	54	16.47
7311.0	18.32	Ave.	98	1.1	V	16.49	34.81	54	19.19
4874.0	40.89	PK	76	1.3	V	12.46	53.35	74	20.65
2374.3	27.07	Ave.	17	1.3	V	6.13	33.20	54	20.80
9748.0	32.03	PK	33	1.2	V	19.40	51.43	74	22.57
2485.3	23.32	Ave.	58	1.2	H	7.21	30.53	54	23.47
7311.0	33.59	PK	98	1.1	V	16.49	50.08	74	23.92
2346.2	22.75	Ave.	64	1.1	H	5.48	28.23	54	25.77
2374.3	40.26	PK	17	1.3	V	6.13	46.39	74	27.61
2485.3	36.68	PK	58	1.2	H	7.21	43.89	74	30.11
2346.2	37.59	PK	64	1.1	H	5.48	43.07	74	30.93

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel(2462 MHz)									
2462.0	90.41	PK	65	1.2	H	7.21	97.62	/	/
2462.0	85.37	Ave.	65	1.2	H	7.21	92.58	/	/
2462.0	93.55	PK	11	1.1	V	7.21	100.76	/	/
2462.0	88.94	Ave.	11	1.1	V	7.21	96.15	/	/
4924.0	38.21	Ave.	93	1.3	V	12.50	50.71	54	3.29
7386.0	21.92	Ave.	88	1.2	H	15.91	37.83	54	16.17
9848.0	17.83	Ave.	21	1.1	H	19.39	37.22	54	16.78
4924.0	41.59	PK	93	1.3	V	12.50	54.09	74	19.91
2386.5	27.93	Ave.	121	1.2	V	6.13	34.06	54	19.94
9848.0	31.11	PK	21	1.1	H	19.39	50.50	74	23.50
2496.3	22.38	Ave.	87	1.1	V	7.21	29.59	54	24.41
7386.0	32.53	PK	88	1.2	H	15.91	48.44	74	25.56
2332.1	22.06	Ave.	34	1.4	H	5.48	27.54	54	26.46
2386.5	40.27	PK	121	1.2	V	6.13	46.40	74	27.60
2496.3	38.59	PK	87	1.1	V	7.21	45.80	74	28.20
2332.1	37.42	PK	34	1.4	H	5.48	42.90	74	31.10

802.11g mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel(2412 MHz)									
2412.0	86.15	PK	13	1.2	H	6.13	92.28	/	/
2412.0	74.34	Ave.	13	1.2	H	6.13	80.47	/	/
2412.0	91.10	PK	125	1.1	V	6.13	97.23	/	/
2412.0	79.32	Ave.	125	1.1	V	6.13	85.45	/	/
9648.0	19.77	Ave.	111	1.1	V	19.28	39.05	54	14.95
7236.0	20.02	Ave.	44	1.5	V	16.62	36.64	54	17.36
4824.0	21.43	Ave.	25	1.1	H	12.40	33.83	54	20.17
2390.0	25.96	Ave.	96	1.2	V	6.13	32.09	54	21.91
2333.1	25.87	Ave.	37	1.3	V	5.48	31.35	54	22.65
9648.0	31.04	PK	111	1.1	V	19.28	50.32	74	23.68
2491.3	22.60	Ave.	57	1.0	V	7.21	29.81	54	24.19
7236.0	32.16	PK	44	1.5	V	16.62	48.78	74	25.22
2390.0	42.19	PK	96	1.2	V	6.13	48.32	74	25.68
4824.0	35.57	PK	25	1.1	H	12.40	47.97	74	26.03
2333.1	38.70	PK	37	1.3	V	5.48	44.18	74	29.82
2491.3	36.14	PK	57	1.0	V	7.21	43.35	74	30.65
Middle Channel(2437 MHz)									
2437.0	86.42	PK	44	1.2	H	7.21	93.63	/	/
2437.0	74.01	Ave.	44	1.2	H	7.21	81.22	/	/
2437.0	90.55	PK	102	1.1	V	7.21	97.76	/	/
2437.0	77.23	Ave.	102	1.1	V	7.21	84.44	/	/
9748.0	19.02	Ave.	96	1.1	V	19.40	38.42	54	15.58
7311.0	20.46	Ave.	167	1.1	V	16.49	36.95	54	17.05
2377.0	28.94	Ave.	38	1.4	V	6.13	35.07	54	18.93
4874.0	21.25	Ave.	25	1.2	H	12.46	33.71	54	20.29
9748.0	31.57	PK	96	1.1	V	19.40	50.97	74	23.03
2494.4	23.10	Ave.	96	1.1	H	7.21	30.31	54	23.69
7311.0	32.96	PK	167	1.2	V	16.49	49.45	74	24.55
2377.0	41.82	PK	38	1.2	V	6.13	47.95	74	26.05
4874.0	35.22	PK	25	1.1	H	12.46	47.68	74	26.32
2494.4	38.23	PK	96	1.4	H	7.21	45.44	74	28.56
2326.8	38.39	PK	11	1.3	V	5.48	43.87	74	30.13
2326.8	13.32	Ave.	11	1.3	V	5.48	18.80	54	35.20

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
High Channel(2462 MHz)									
2462.0	86.37	PK	77	1.2	H	7.21	93.58	/	/
2462.0	74.22	Ave.	77	1.2	H	7.21	81.43	/	/
2462.0	90.79	PK	122	1.1	V	7.21	98.00	/	/
2462.0	77.58	Ave.	122	1.1	V	7.21	84.79	/	/
9848.0	19.37	Ave.	35	1.1	V	19.39	38.76	54	15.24
7386.0	20.83	Ave.	101	1.0	V	15.91	36.74	54	17.26
4924.0	21.49	Ave.	77	1.3	H	12.50	33.99	54	20.01
2386.1	26.83	Ave.	87	1.0	V	6.13	32.96	54	21.04
9848.0	31.42	PK	35	1.1	V	19.39	50.81	74	23.19
2490.7	23.47	Ave.	68	1.1	H	7.21	30.68	54	23.32
7386.0	33.57	PK	101	1.0	V	15.91	49.48	74	24.52
2347.8	23.45	Ave.	36	1.3	V	5.48	28.93	54	25.07
4924.0	36.24	PK	77	1.3	H	12.50	48.74	74	25.26
2386.1	41.33	PK	87	1.0	V	6.13	47.46	74	26.54
2490.7	39.52	PK	68	1.1	H	7.21	46.73	74	27.27
2347.8	38.22	PK	36	1.3	V	5.48	43.70	74	30.30

802.11n-HT20 mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel(2412 MHz)									
2412.0	87.89	PK	72	1.2	H	6.13	94.02	/	/
2412.0	75.49	Ave.	72	1.2	H	6.13	81.62	/	/
2412.0	89.13	PK	13	1.1	V	6.13	95.26	/	/
2412.0	76.71	Ave.	13	1.1	V	6.13	82.84	/	/
4824.0	27.83	Ave.	74	1.3	V	12.40	40.23	54	13.77
9648.0	18.03	Ave.	45	1.1	H	19.28	37.31	54	16.69
7236.0	19.23	Ave.	33	1.2	V	16.62	35.85	54	18.15
2376.0	25.73	Ave.	25	1.3	V	5.48	31.21	54	22.79
9648.0	31.24	PK	45	1.1	H	19.28	50.52	74	23.48
7236.0	32.76	PK	33	1.2	V	16.62	49.38	74	24.62
2390.0	23.22	Ave.	101	1.1	V	6.13	29.35	54	24.65
2493.5	21.59	Ave.	224	1.2	V	7.21	28.80	54	25.20
2390.0	42.39	PK	101	1.1	V	6.13	48.52	74	25.48
4824.0	36.03	PK	74	1.3	V	12.40	48.43	74	25.57
2493.5	40.53	PK	224	1.2	V	7.21	47.74	74	26.26
2376.0	40.76	PK	25	1.3	V	5.48	46.24	74	27.76
Middle Channel(2437 MHz)									
2437.0	87.93	PK	34	1.2	H	6.13	94.06	/	/
2437.0	75.59	Ave.	34	1.2	H	6.13	81.72	/	/
2437.0	89.42	PK	11	1.1	V	6.13	95.55	/	/
2437.0	76.88	Ave.	11	1.1	V	6.13	83.01	/	/
4874.0	26.07	Ave.	31	1.3	V	12.46	38.53	54	15.47
9748.0	18.88	Ave.	36	1.2	H	19.40	38.28	54	15.72
7311.0	19.76	Ave.	87	1.1	H	16.49	36.25	54	17.75
2342.5	26.33	Ave.	32	1.3	V	5.48	31.81	54	22.19
9748.0	31.85	PK	36	1.2	H	19.40	51.25	74	22.75
2388.4	23.17	Ave.	224	1.2	V	6.13	29.30	54	24.70
7311.0	32.42	PK	87	1.1	H	16.49	48.91	74	25.09
2493.2	21.38	Ave.	74	1.1	H	7.21	28.59	54	25.41
2388.4	42.11	PK	224	1.2	V	6.13	48.24	74	25.76
4874.0	35.57	PK	31	1.3	V	12.46	48.03	74	25.97
2493.2	40.11	PK	74	1.1	H	7.21	47.32	74	26.68
2342.5	40.87	PK	32	1.3	V	5.48	46.35	74	27.65

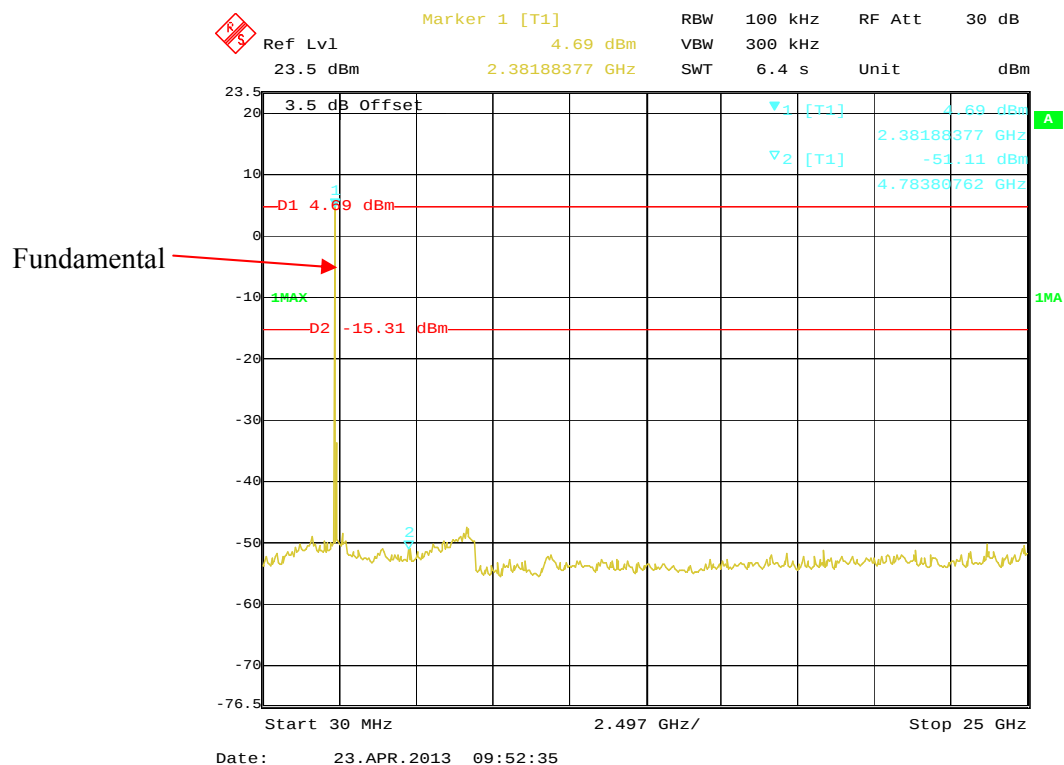
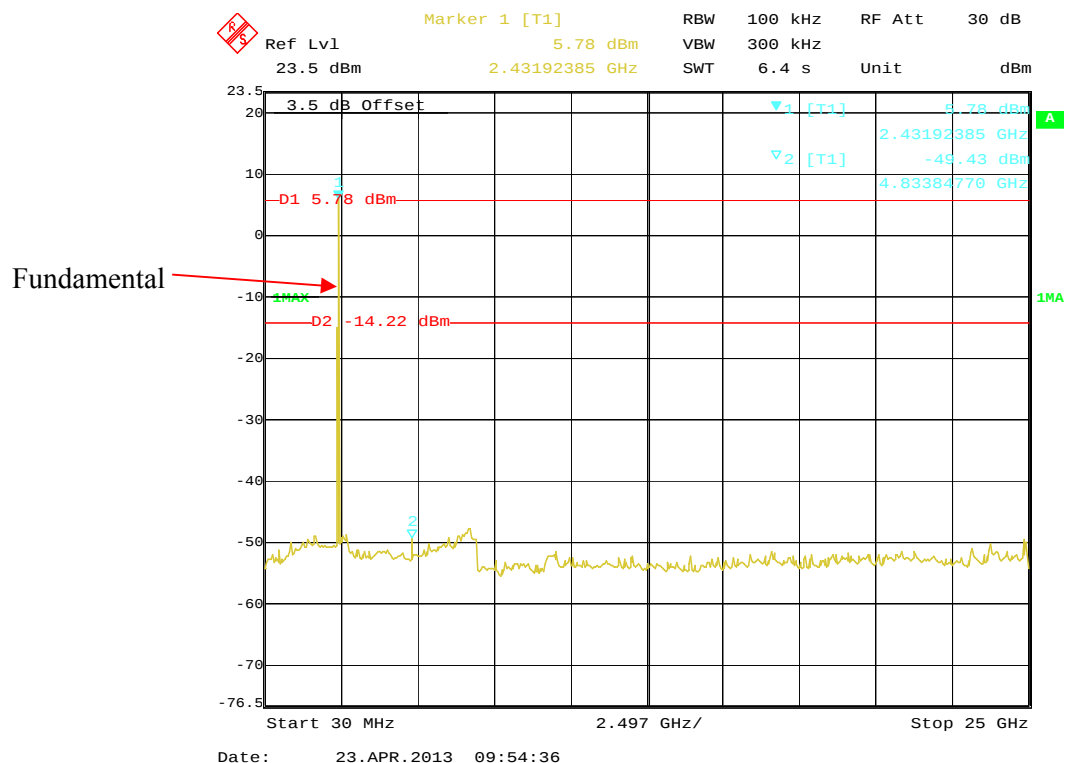
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/15.205/15.209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
High Channel(2462 MHz)									
2462.0	87.77	PK	77	1.1	H	7.21	94.98	/	/
2462.0	75.06	Ave.	77	1.1	H	7.21	82.27	/	/
2462.0	89.32	PK	158	1.3	V	7.21	96.53	/	/
2462.0	76.32	Ave.	158	1.3	V	7.21	83.53	/	/
4924.0	26.37	Ave.	35	1.1	H	12.50	38.87	54	15.13
9848.0	18.65	Ave.	74	1.2	H	19.39	38.04	54	15.96
7386.0	19.74	Ave.	63	1.3	H	15.91	35.65	54	18.35
2345.7	26.42	Ave.	35	1.2	V	5.48	31.90	54	22.10
9848.0	31.52	PK	74	1.2	H	19.39	50.91	74	23.09
2387.2	23.59	Ave.	68	1.1	V	6.13	29.72	54	24.28
4924.0	37.22	PK	35	1.1	H	12.50	49.72	74	24.28
7386.0	32.46	PK	63	1.3	H	15.91	48.37	74	25.63
2491.5	20.23	Ave.	44	1.5	V	7.21	27.44	54	26.56
2491.5	39.88	PK	44	1.5	V	7.21	47.09	74	26.91
2387.2	40.59	PK	68	1.1	V	6.13	46.72	74	27.28
2345.7	41.11	PK	35	1.2	V	5.48	46.59	74	27.41

Note:

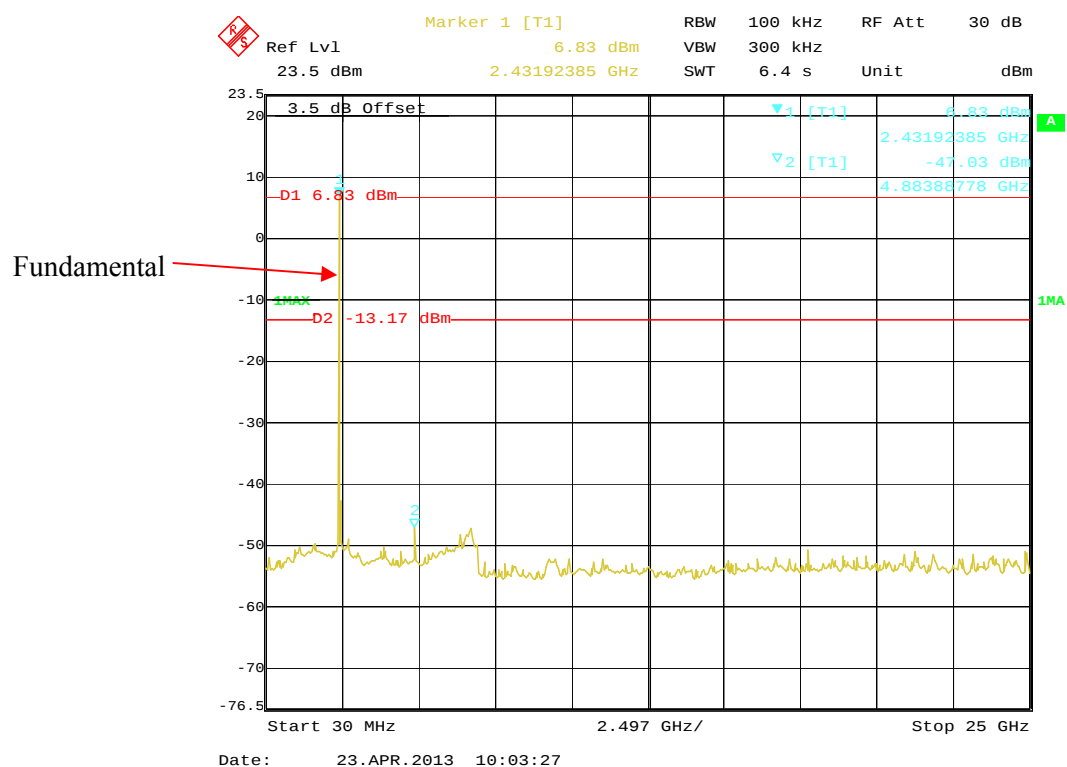
Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + cable loss – amplifier factor

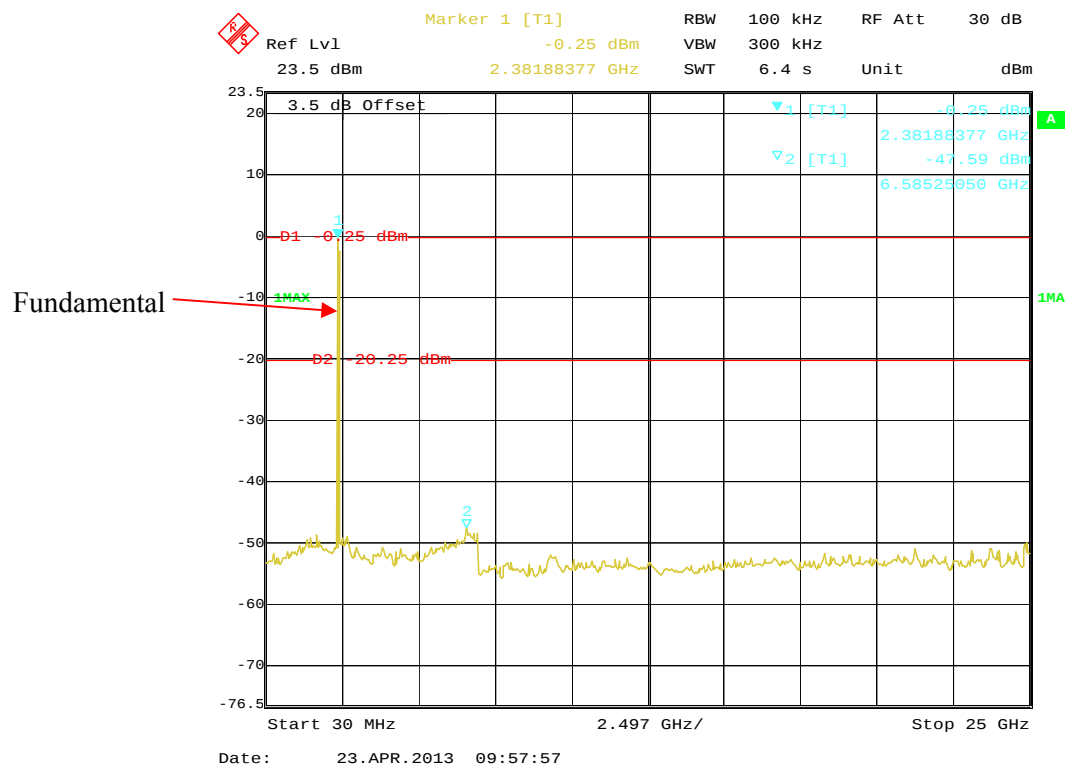
Margin = Limit- Corr. Amplitude

Conducted Spurious Emissions at Antenna Port:**802.11b Low Channel****802.11b Middle Channel**

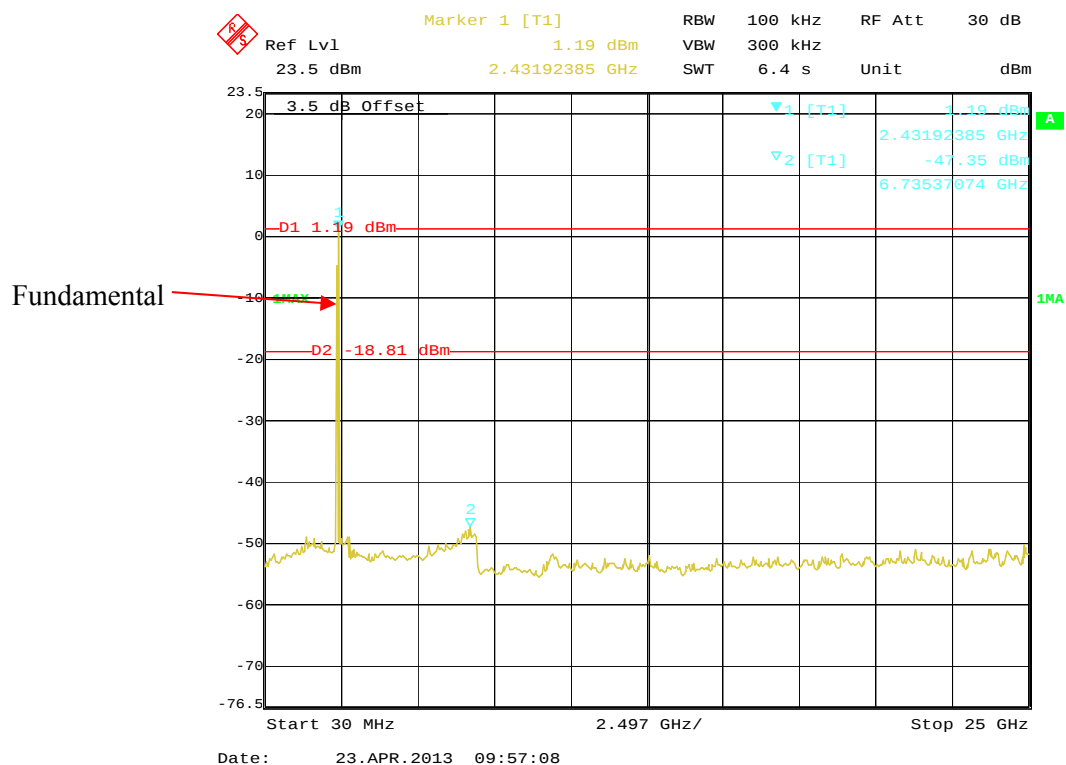
802.11b High Channel



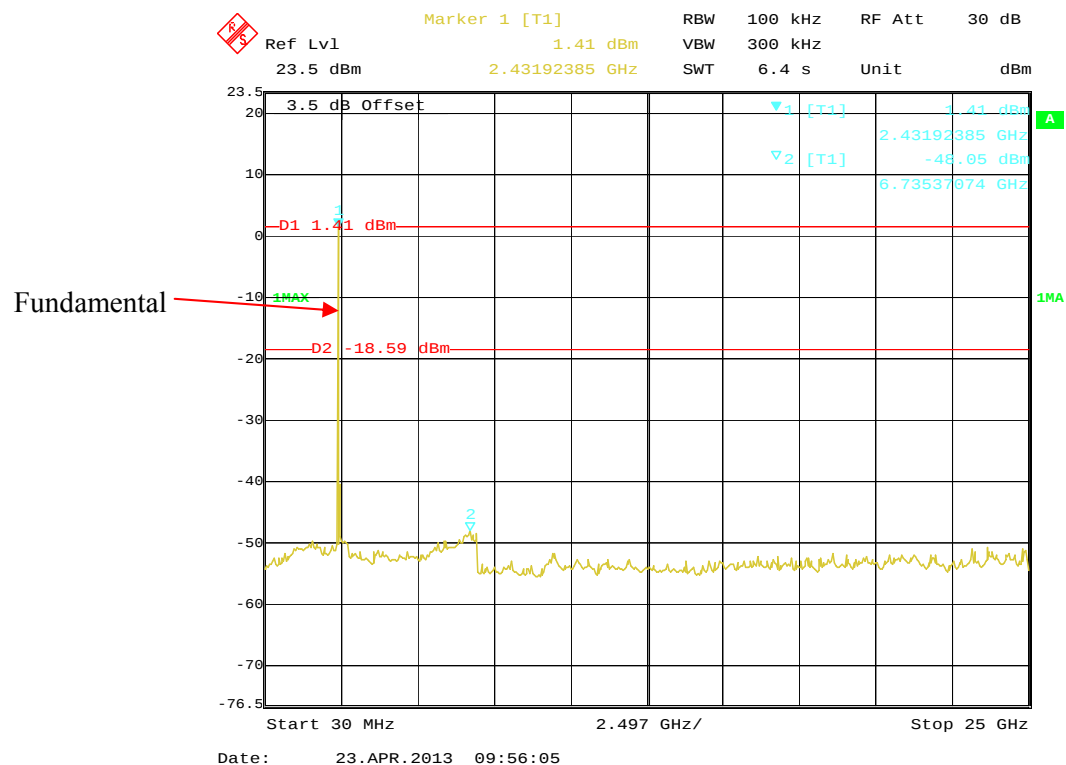
802.11g Low Channel



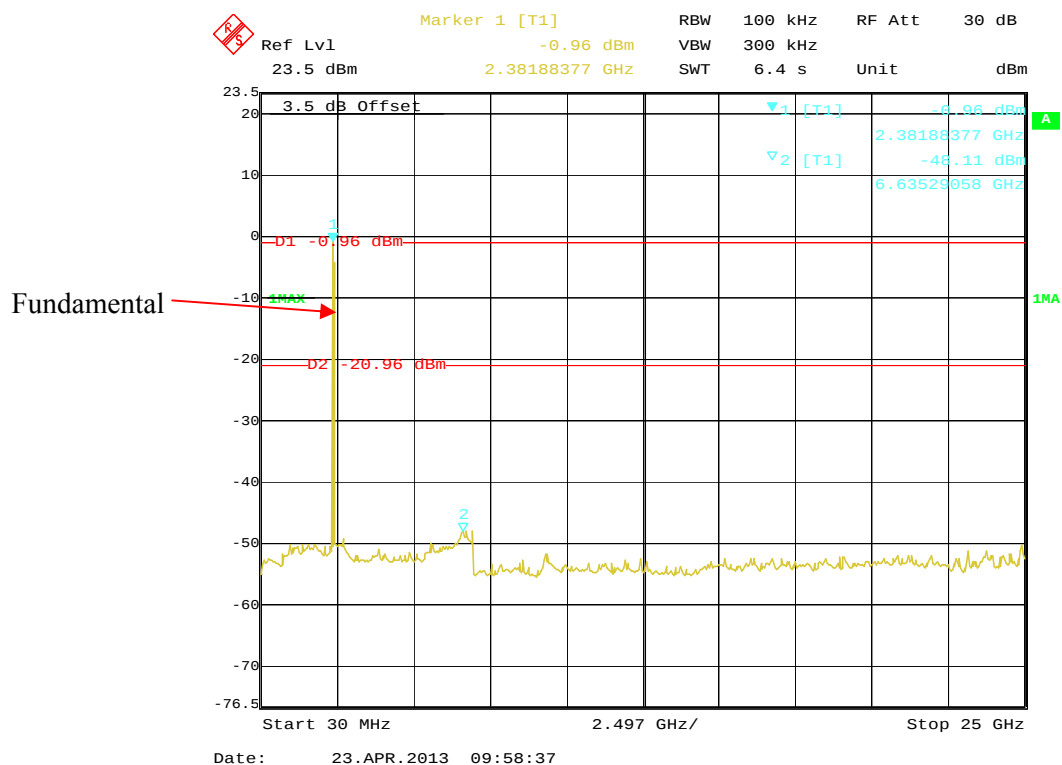
802.11g Middle Channel



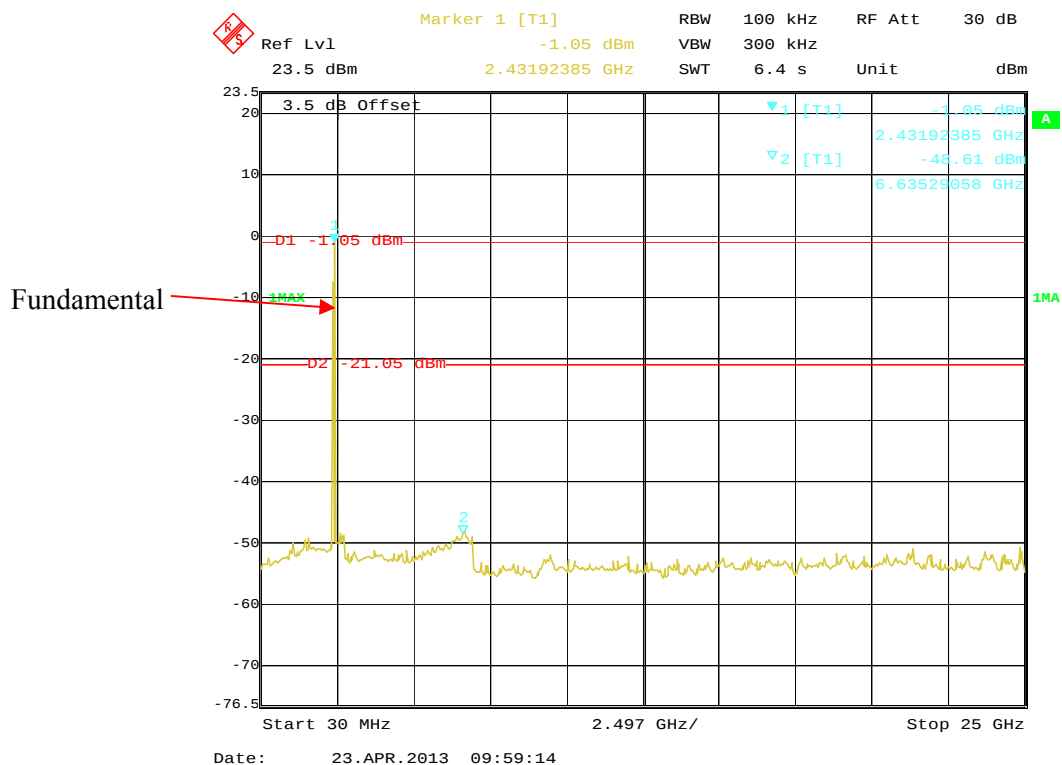
802.11g High Channel



802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel



Ref Lvl 23.5 dBm
 Marker 1 [T1] -0.82 dBm
 RBW 300 kHz
 VBW 300 kHz
 SWT 6.4 s
 RF Att 30 dB
 Unit dBm

3.5 dB Offset
 2.43192385 GHz
 6.58525050 GHz
 -0.82 dBm
 -48.25 dBm
 -20.62 dBm

D1 -0.82 dBm
 D2 -20.62 dBm
 MAX
 1MA

Start 30 MHz
 2.497 GHz/
 Stop 25 GHz

Date: 23.APR.2013 10:00:08

FCC §15.247(a) (2) – 6 dB BANDWIDTH

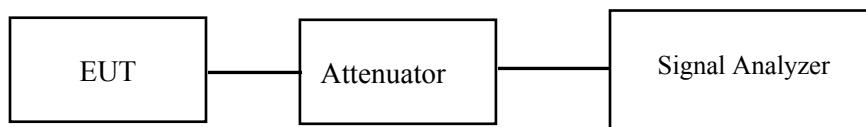
Applicable Standard

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

According to KDB 558074 D01 DTS Meas Guidance v03r01

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	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Henry Ding on 2013-04-16.

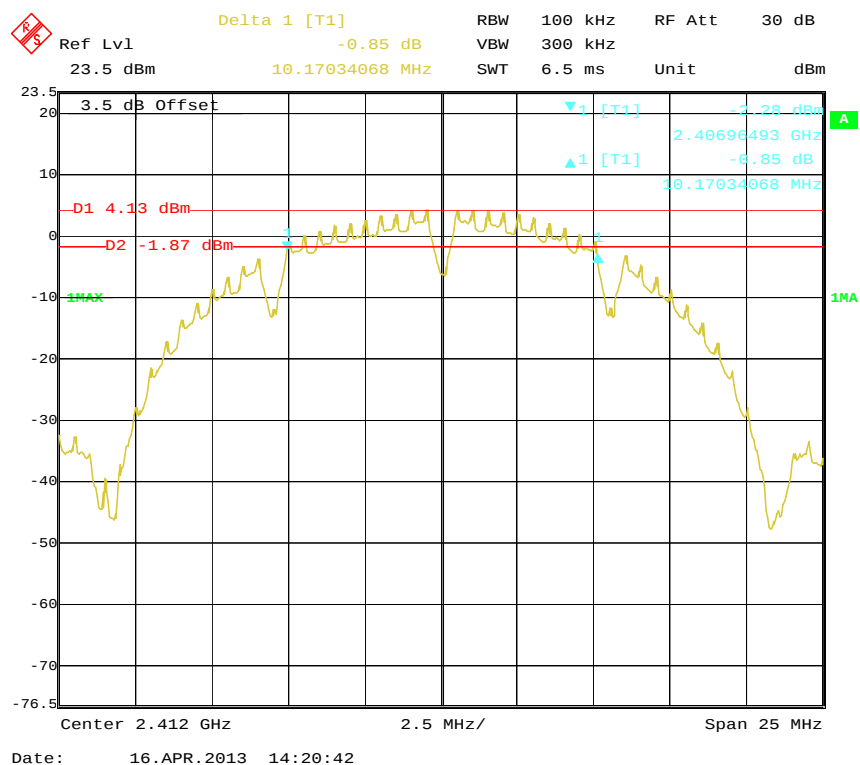
EUT operation mode: Transmitting

Test Result: Pass.

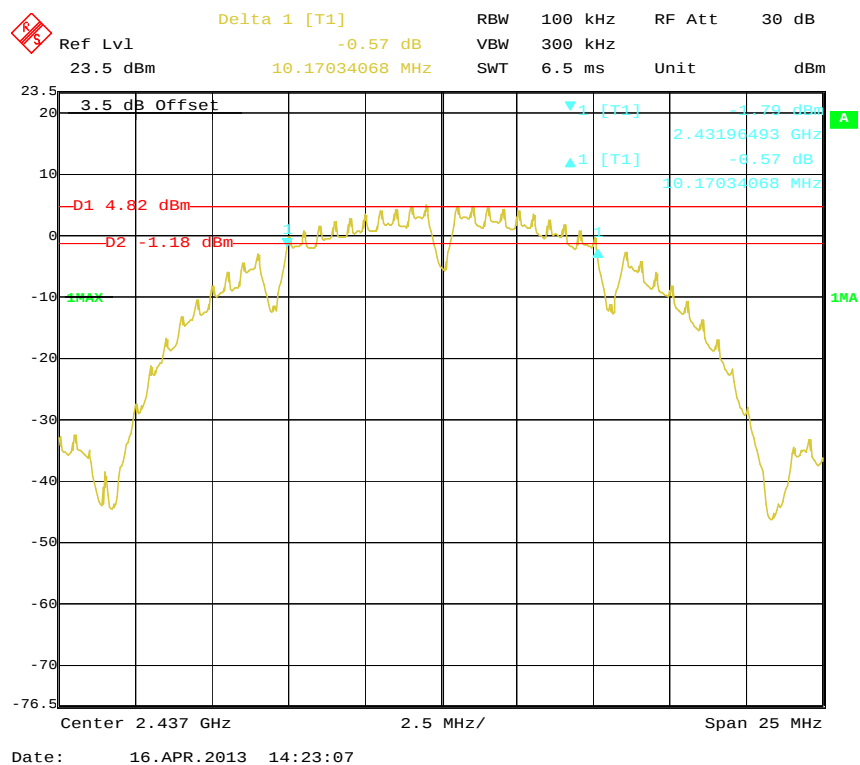
Please refer to the following tables and plots.

Channel	Frequency (MHz)	Data Rate (Mbps)	6dB bandwidth (MHz)	Limit (kHz)	Result
802.11b mode					
Low	2412	1	10.17	≥ 500	Pass
Middle	2437	1	10.17	≥ 500	Pass
High	2462	1	10.17	≥ 500	Pass
802.11g mode					
Low	2412	6	16.58	≥ 500	Pass
Middle	2437	6	16.58	≥ 500	Pass
High	2462	6	16.58	≥ 500	Pass
802.11n-HT20 mode					
Low	2412	MCS0	17.86	≥ 500	Pass
Middle	2437	MCS0	17.86	≥ 500	Pass
High	2462	MCS0	17.86	≥ 500	Pass

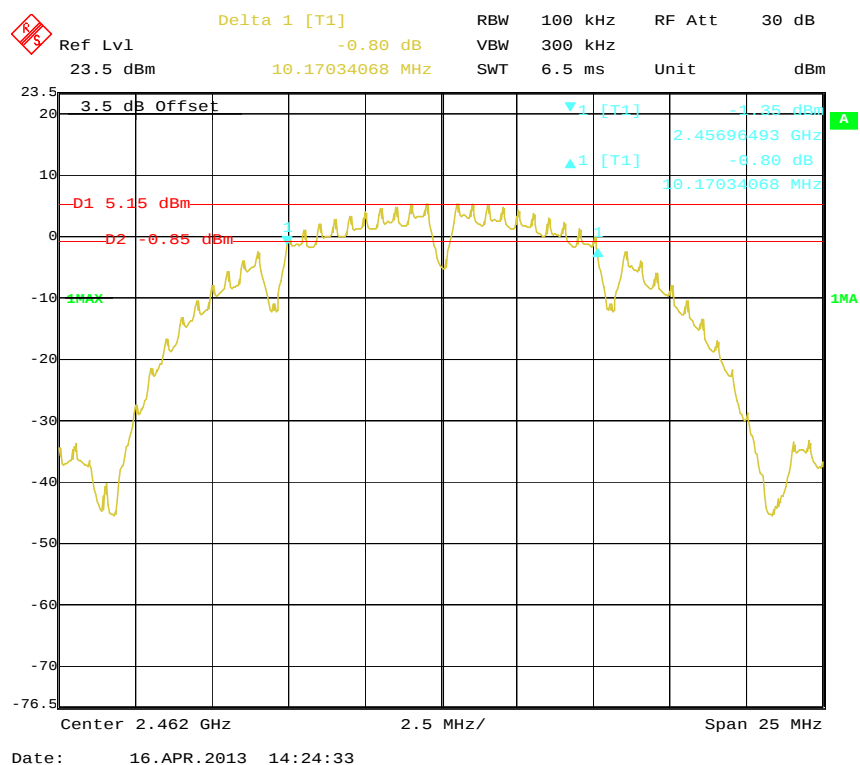
802.11b Low Channel



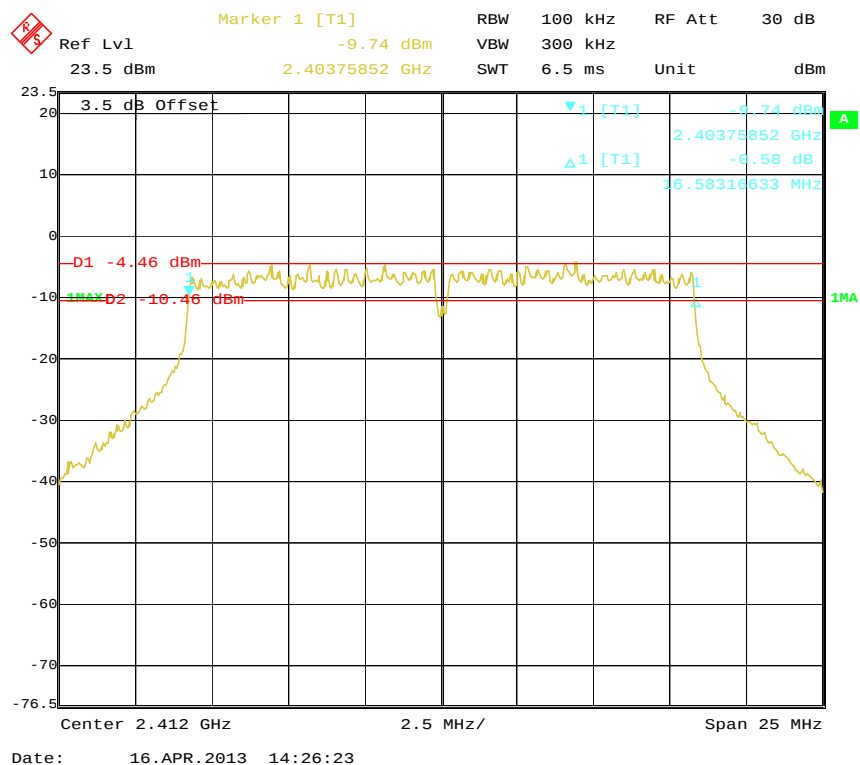
802.11b Middle Channel



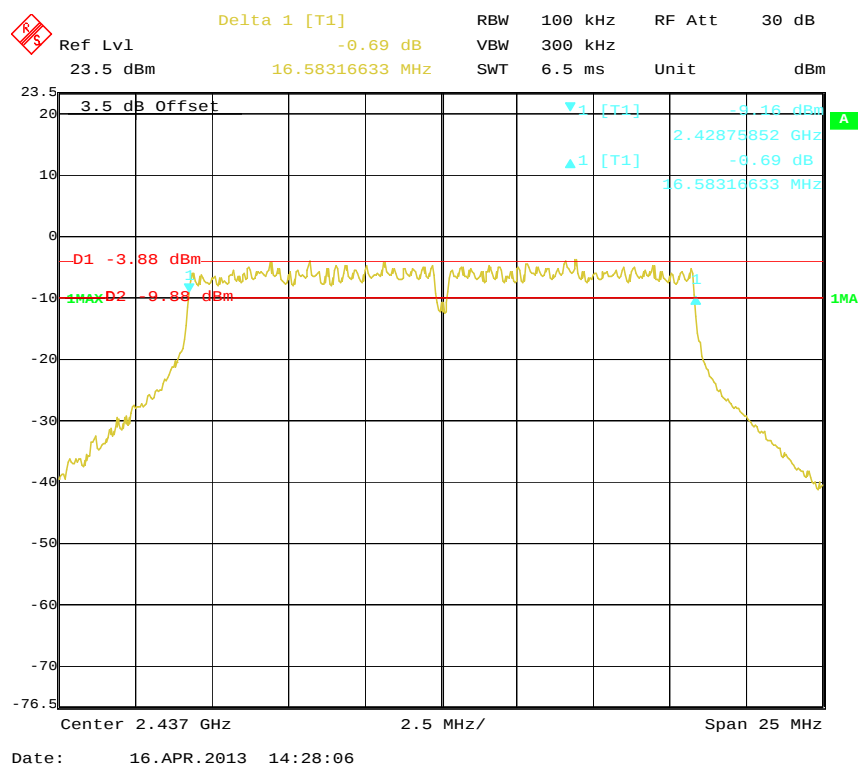
802.11b High Channel



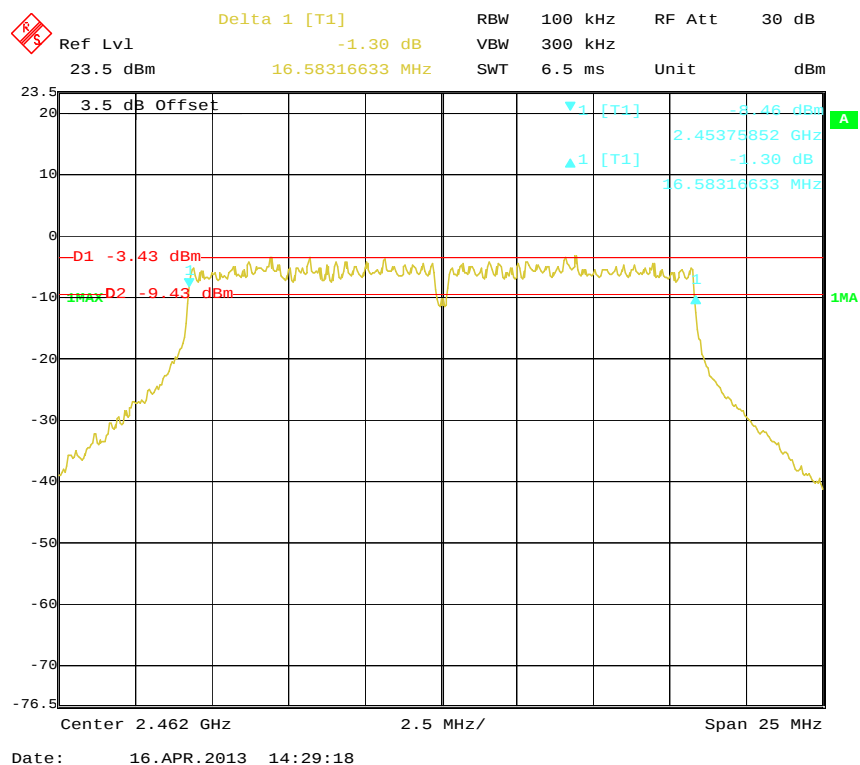
802.11g Low Channel



802.11g Middle Channel



802.11g High Channel



Ref Lvl 23.5 dBm Delta 1 [T1] 0.41 dB RBW 100 kHz RF Att 30 dB
 3.5 dB Offset 17.85571142 MHz SWT 7.5 ms Unit dBm

23.5
20
10
0
-10
-20
-30
-40
-50
-60
-70
-76.5

3.5 dB Offset

D1 -6.8 dBm
D2 -12.8 dBm

1 [T1] -12.84 dBm
1 [T1] 2.40313226 GHz
1 [T1] 0.41 dB
1 [T1] 17.85571142 MHz

Center 2.412 GHz 3 MHz/ Span 30 MHz

Date: 16.APR.2013 16:19:35

Ref Lvl 23.5 dBm Delta 1 [T1] 0.32 dB RBW 100 kHz RF Att 30 dB
 3.5 dB Offset 17.85571142 MHz VBW 300 kHz SWT 7.5 ms Unit dBm

23.5
 20
 10
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -76.5

Center 2.437 GHz 3 MHz/ Span 30 MHz

D1 -6.18 dBm
 D2 -12.18 dBm

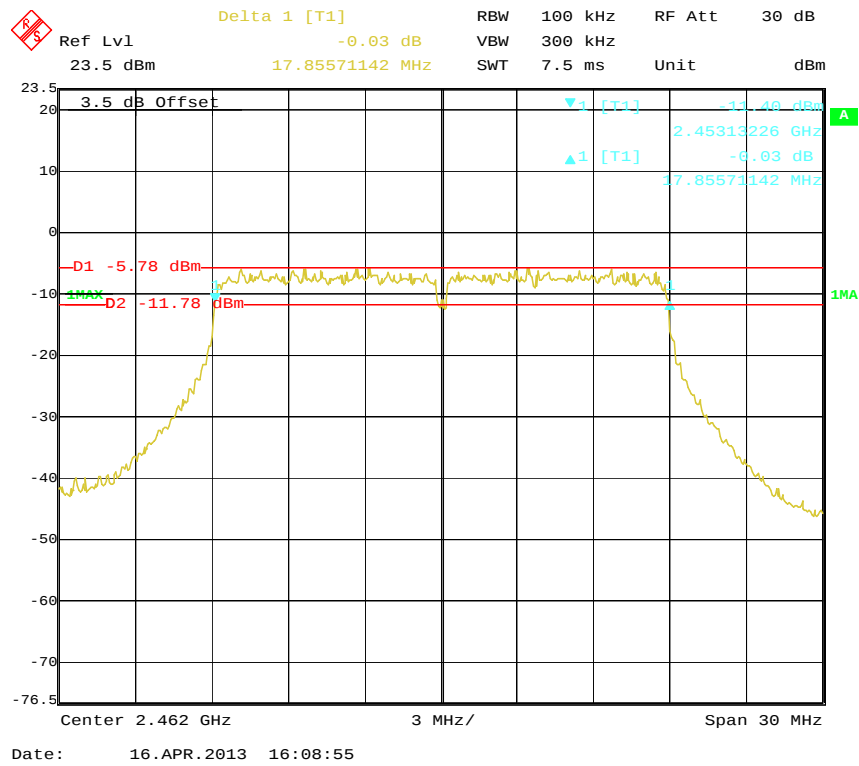
1 [T1] -12.69 dBm
 1 [T1] 0.32 dB
 17.85571142 MHz

2.42813226 GHz

1MA

Date: 16.APR.2013 16:10:51

802.11n-HT20 High Channel



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

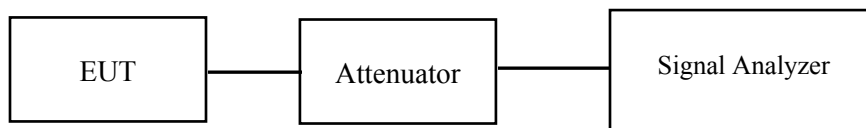
Applicable Standard

According to §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

According to KDB 558074 D01 DTS Meas Guidance v03r01

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	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

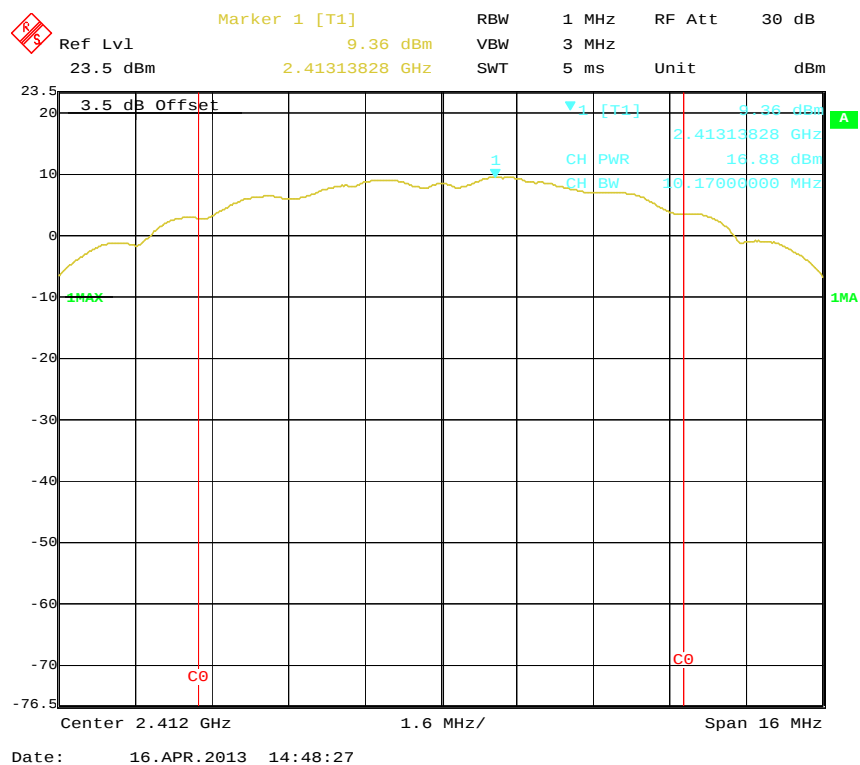
Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Henry Ding on 2013-04-16.

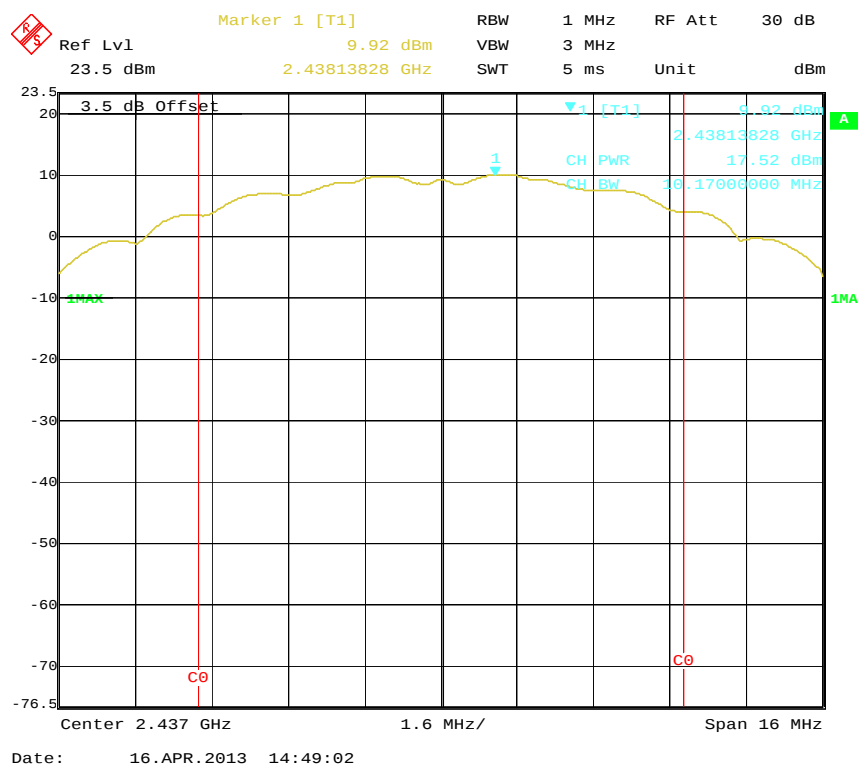
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Output Power (dBm)	Limit (dBm)	Result
802.11b mode					
Low	2412	1	16.88	30	Pass
Middle	2437	1	17.52	30	Pass
High	2462	1	17.90	30	Pass
802.11g mode					
Low	2412	6	16.31	30	Pass
Middle	2437	6	16.99	30	Pass
High	2462	6	17.46	30	Pass
802.11n-HT20 mode					
Low	2412	MCS0	15.26	30	Pass
Middle	2437	MCS0	15.90	30	Pass
High	2462	MCS0	16.25	30	Pass

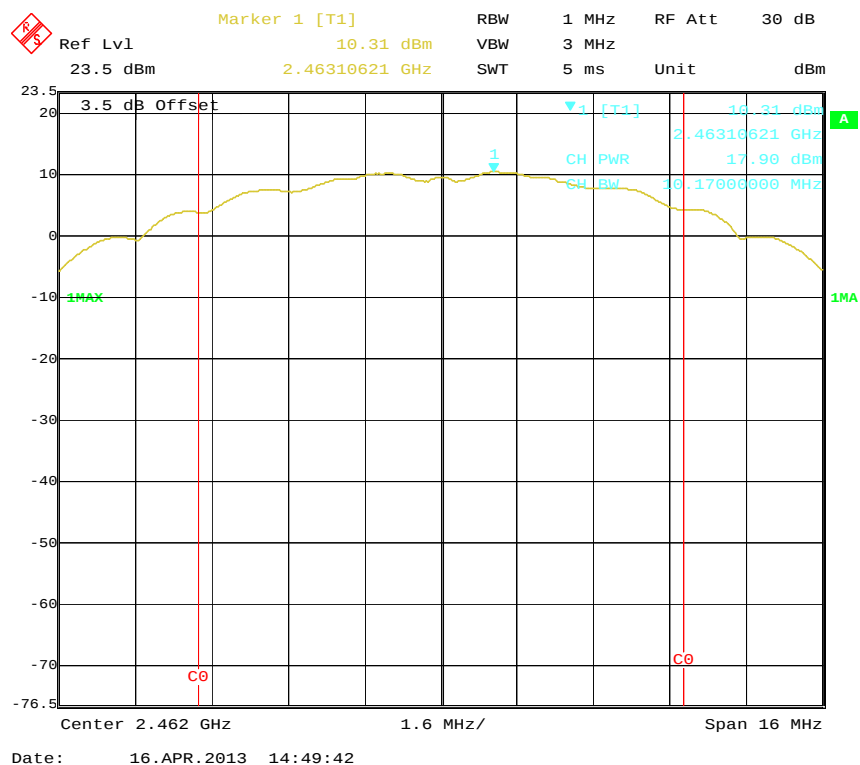
802.11b RF Output Power, Low Channel



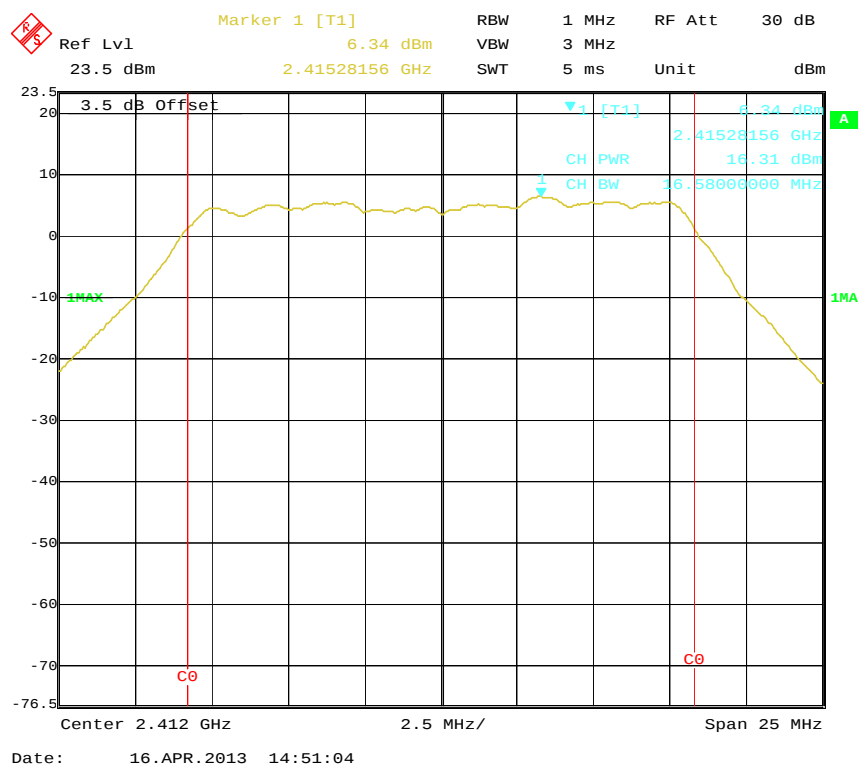
802.11b RF Output Power, Middle Channel



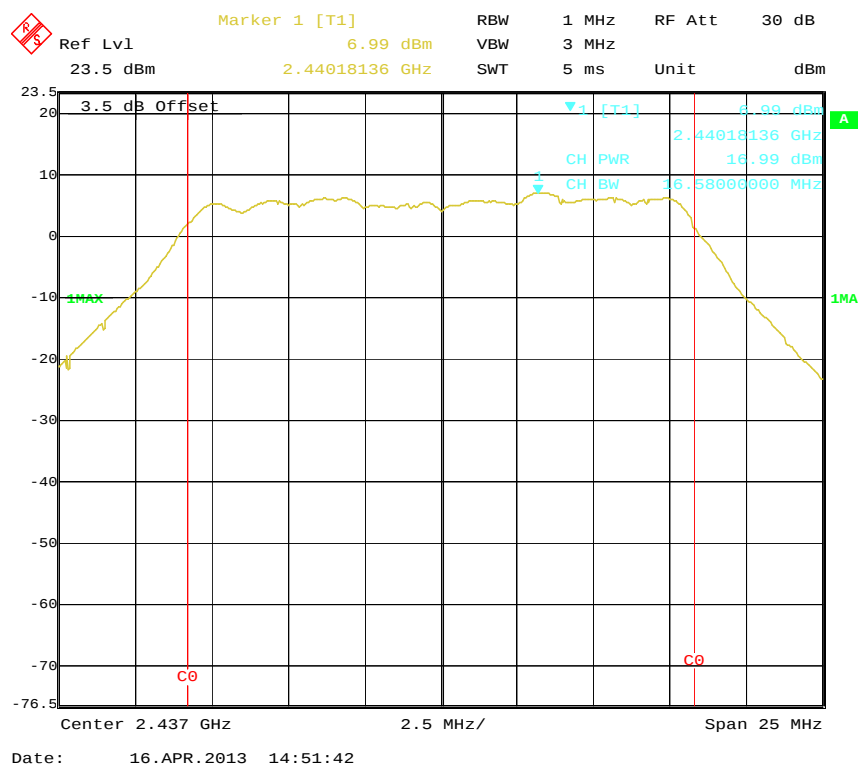
802.11b RF Output Power, High Channel



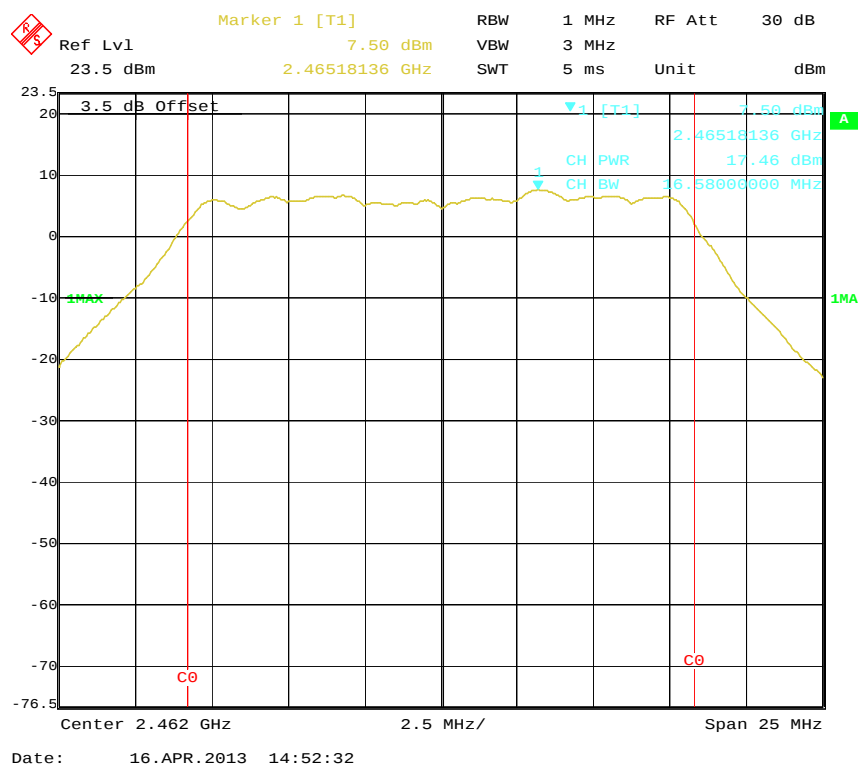
802.11g RF Output Power, Low Channel



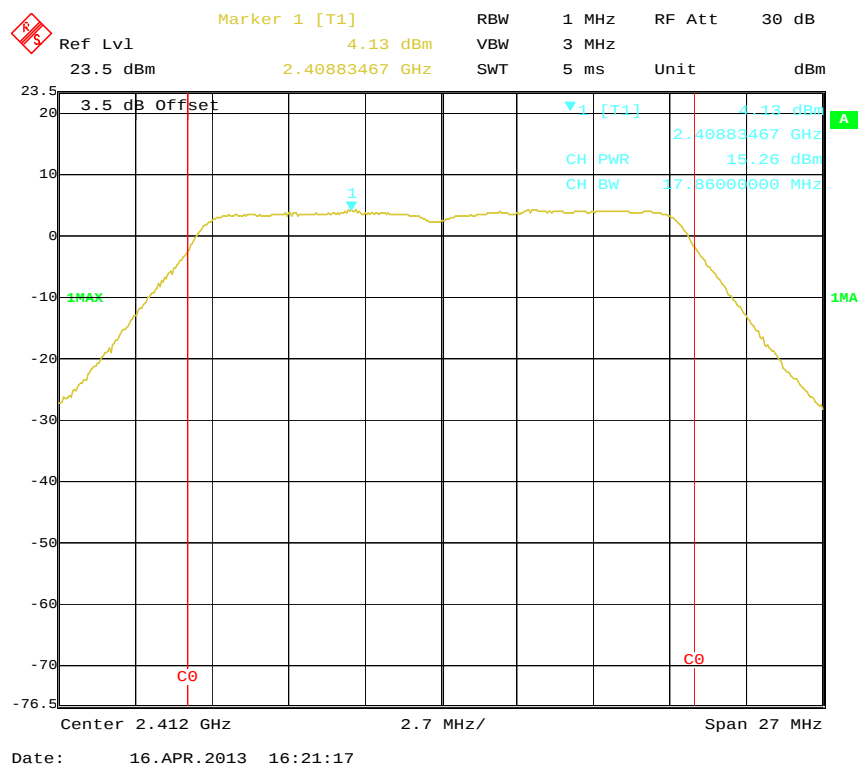
802.11g RF Output Power, Middle Channel

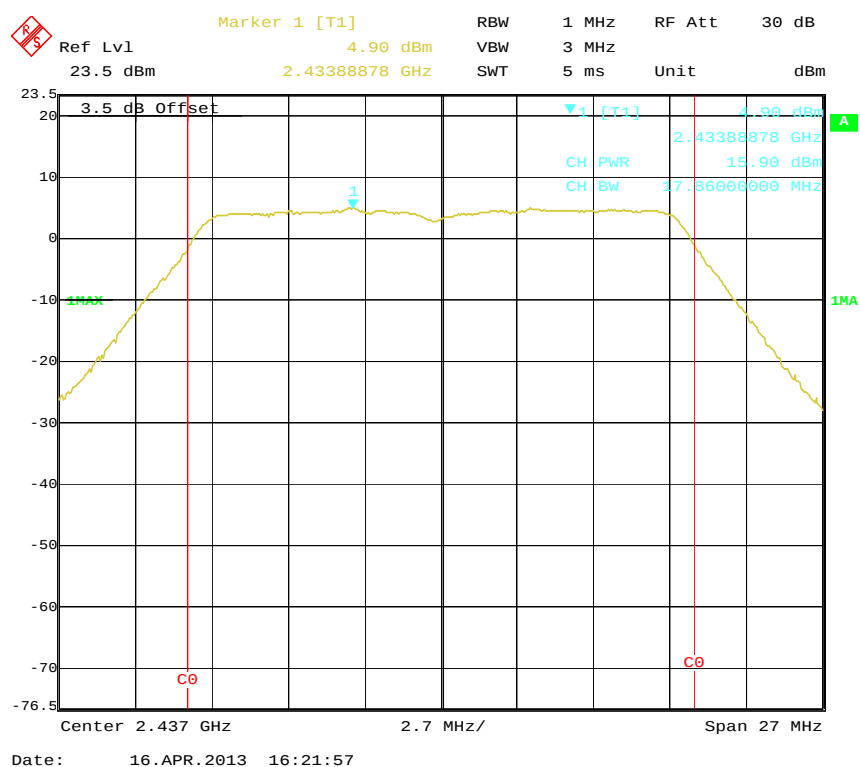
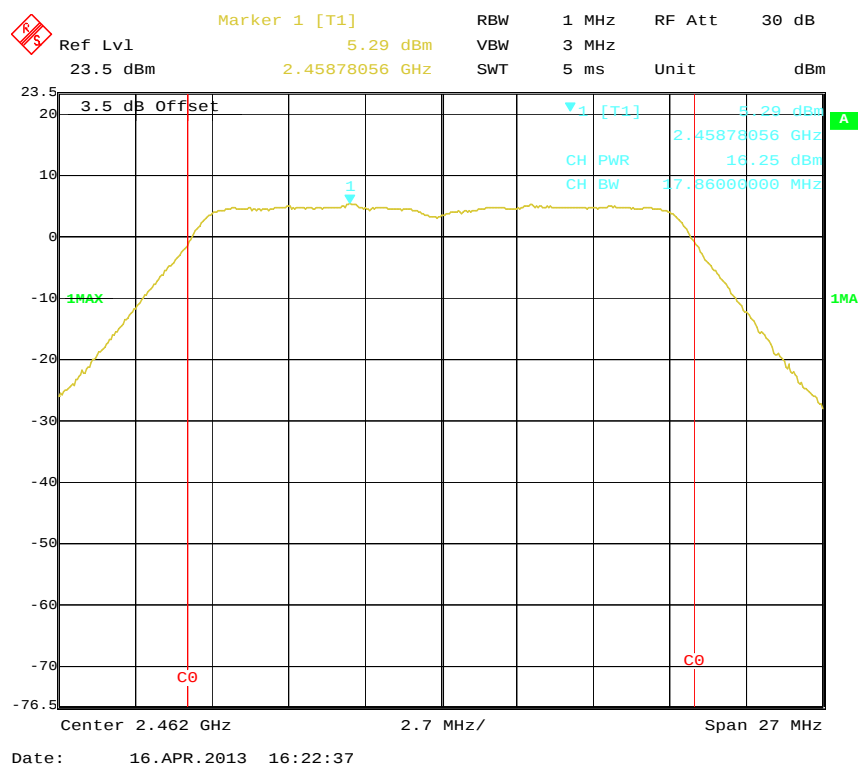


802.11g RF Output Power, High Channel



802.11n-HT20 RF Output Power, Low Channel



802.11n-HT20 RF Output Power, Middle Channel**802.11n-HT20 RF Output Power, High Channel**

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

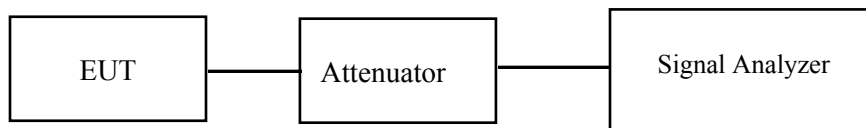
Applicable Standard

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

According to KDB 558074 D01 DTS Meas Guidance v03r01

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	FSIQ26	8386001028	2012-11-24	2013-11-23

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

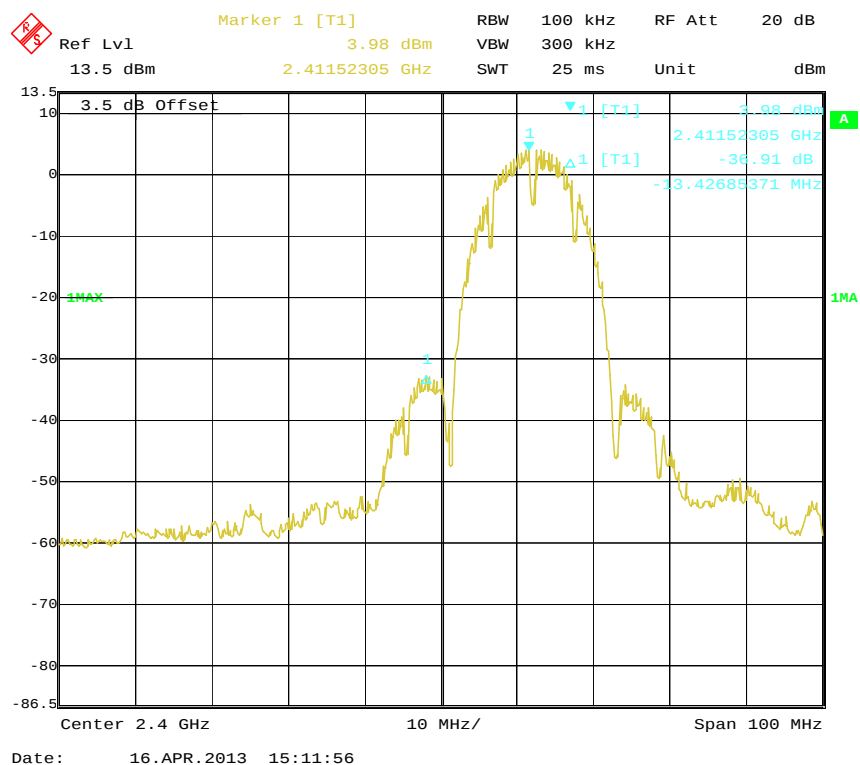
The testing was performed by Henry Ding on 2013-04-16.

EUT operation mode: Transmitting

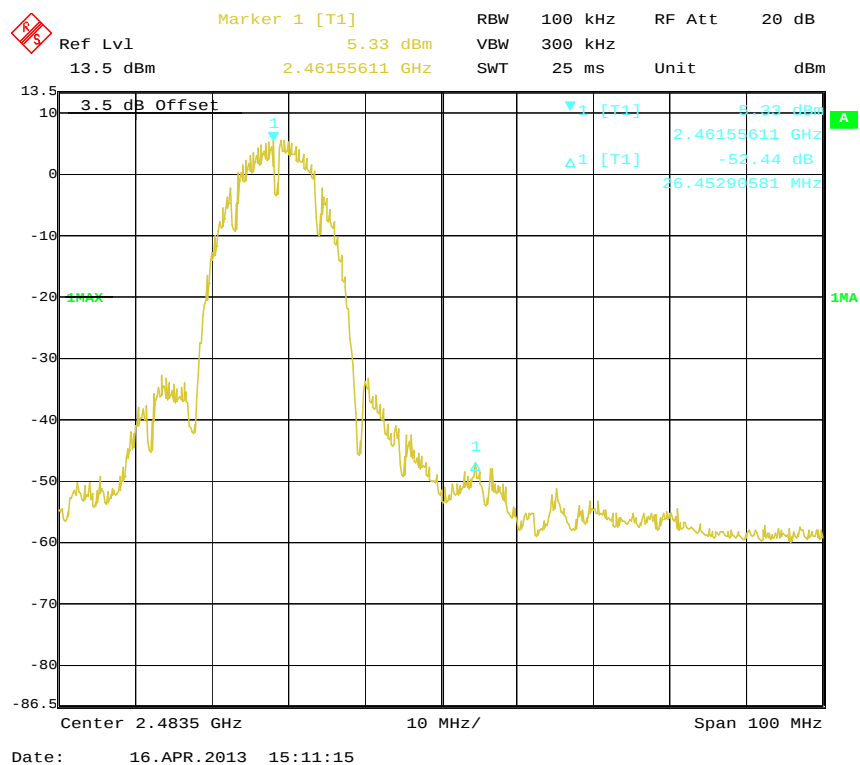
Test Result: Compliance. Please refer to following table and plots.

Frequency Band	Delta Peak to band emission (dBc)	> Delta Limit (dBc)	Result
802.11b mode			
Left Band	36.91	20	Pass
Right Band	52.44	20	Pass
802.11g mode			
Left Band	32.50	20	Pass
Right Band	46.37	20	Pass
802.11n-HT20 mode			
Left Band	33.15	20	Pass
Right Band	47.83	20	Pass

802.11b Band Edge, Left Side



802.11b Band Edge, Right Side



Ref Lvl 13.5 dBm

Marker 1 [T1] 2.40911824 GHz -5.96 dBm

RBW 100 kHz VBW 300 kHz RF Att 20 dB

SWT 25 ms Unit dBm

3.5 dB Offset

1MAX

1 [T1] -5.96 dBm

2.40911824 GHz -32.50 dB

9.21843687 MHz

Center 2.4 GHz 10 MHz/ Span 100 MHz

Date: 16.APR.2013 15:09:30

Ref Lvl 13.5 dBm
 Marker 1 [T1] 2.45915130 GHz -4.78 dBm
 RBW 100 kHz VBW 300 kHz
 3.5 dB Offset
 2.45915130 GHz
 Unit 20 dB
 13.5 dBm
 2.45915130 GHz
 25 ms
 10 MHz/
 Span 100 MHz
 Date: 16.APR.2013 15:10:25

Ref Lvl 13.5 dBm
 Marker 1 [T1] 2.41553106 GHz
 RBW 100 kHz
 VBW 300 kHz
 Unit dBm
 RF Att 20 dB
 SWT 25 ms

3.5 dB Offset
 -6.86 dBm
 2.41553106 GHz
 -33.15 dB
 -35.63126253 GHz

1 MAX
 1 MAX

Center 2.4 GHz
 10 MHz/
 Span 100 MHz

Date: 16.APR.2013 15:08:45

Ref Lvl 13.5 dBm

Marker 1 [T1] -5.67 dBm

RBW 100 kHz RF Att 20 dB

VBW 300 kHz

SWT 25 ms Unit dBm

3.5 dB Offset

2.46536373 GHz

10 MHz

Center 2.4835 GHz

Span 100 MHz

Date: 16.APR.2013 15:06:45

FCC §15.247(e) - POWER SPECTRAL DENSITY

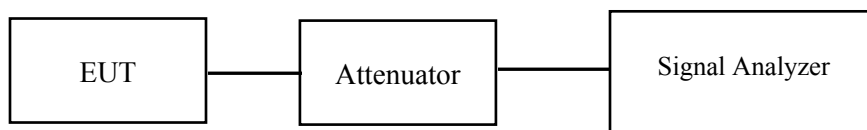
Applicable Standard

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

According to KDB 558074 D01 DTS Meas Guidance v03r01

1. Set analy center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measurement value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Henry Ding on 2013-04-16.

*EUT operation mode: Transmitting***Test Result:** Pass

Channel	Frequency (MHz)	Data Rate (Mbps)	Power spectral density (dBm/3 kHz)	≤Limit (dBm)
802.11b mode				
Low	2412	1	-15.65	8
Middle	2437	1	-14.82	8
High	2462	1	-14.35	8
802.11g mode				
Low	2412	6	-17.49	8
Middle	2437	6	-16.65	8
High	2462	6	-16.22	8
802.11n-HT20 mode				
Low	2412	MCS0	-17.49	8
Middle	2437	MCS0	-16.86	8
High	2462	MCS0	-16.28	8

Ref Lvl 13.5 dBm
Marker 1 [T1] 2.41129860 GHz -15.65 dBm
RBW 3 kHz VBW 10 kHz RF Att 20 dB
SWT 5.6 s Unit dBm

3.5 dB Offset

1 [T1] -15.65 dBm 2.41129860 GHz

1MAX

1MA

Center 2.412 GHz 2 MHz/ Span 20 MHz

Date: 16.APR.2013 14:55:11

Ref Lvl 13.5 dBm

Marker 1 [T1] -14.82 dBm

RBW 3 kHz RF Att 20 dB

VBW 10 kHz

SWT 5.6 s Unit dBm

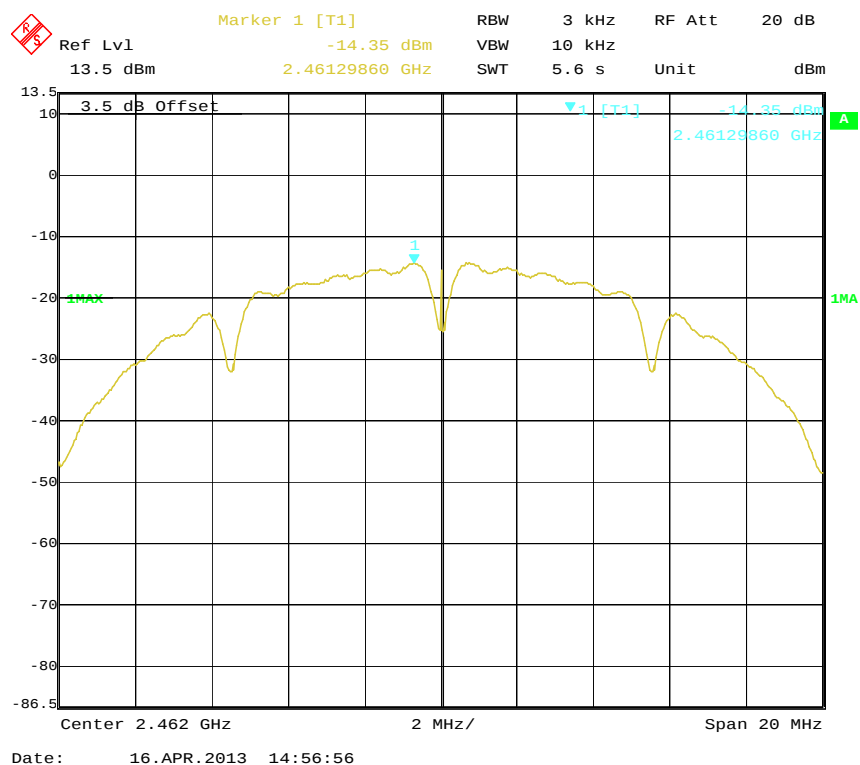
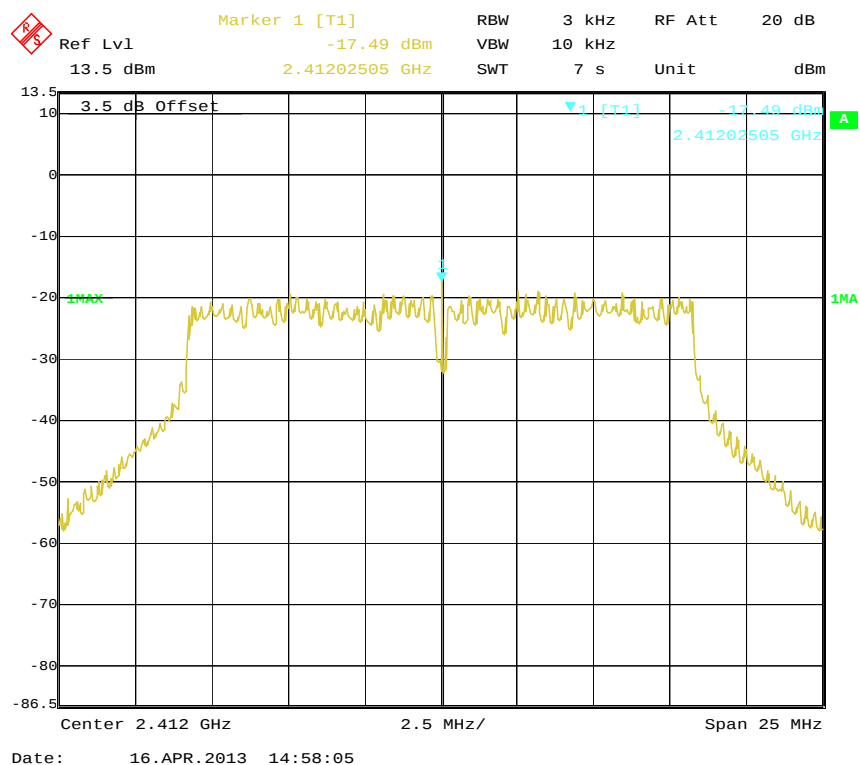
3.5 dB Offset

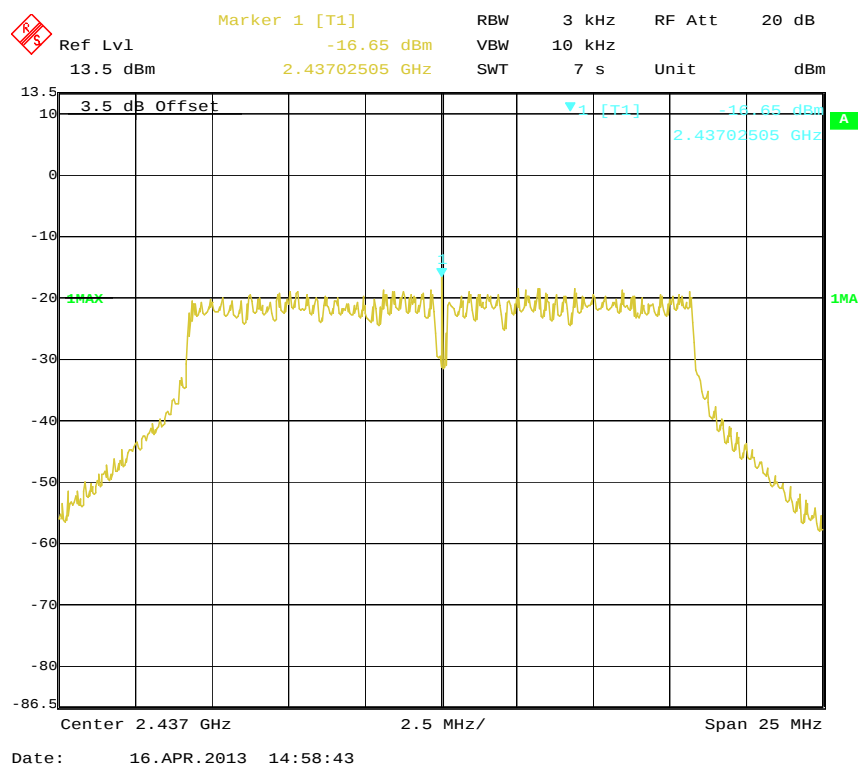
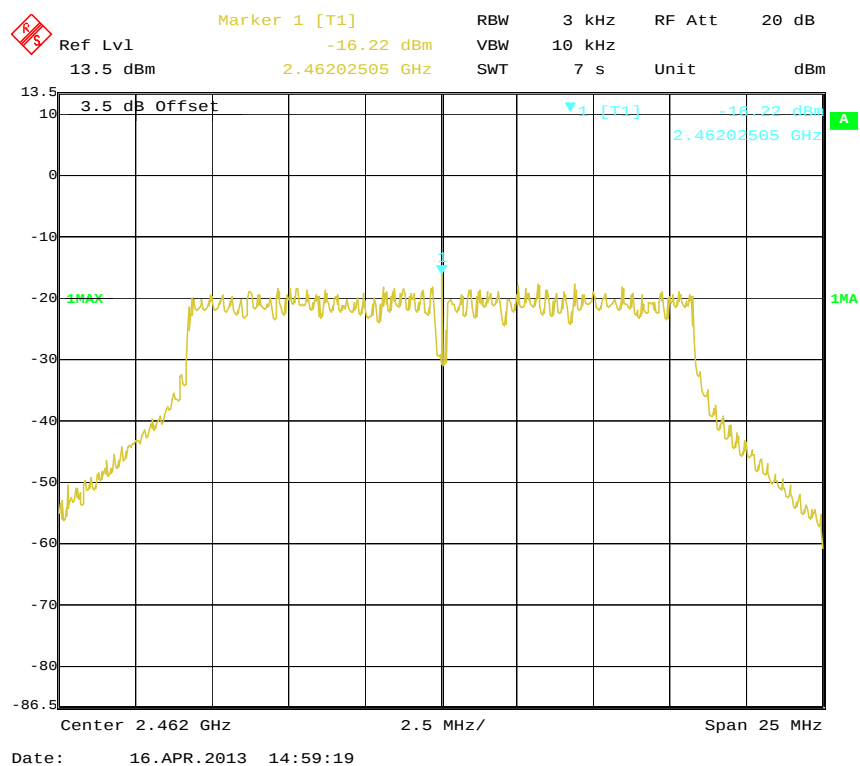
1 [T1] -14.82 dBm

2.43629860 GHz

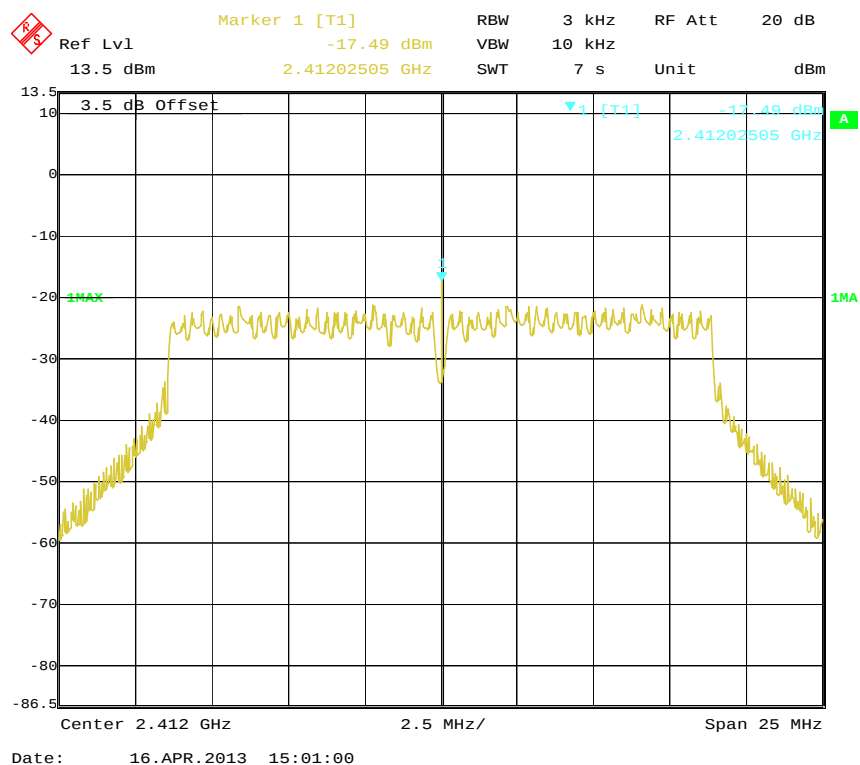
Center 2.437 GHz 2 MHz/ Span 20 MHz

Date: 16.APR.2013 14:55:49

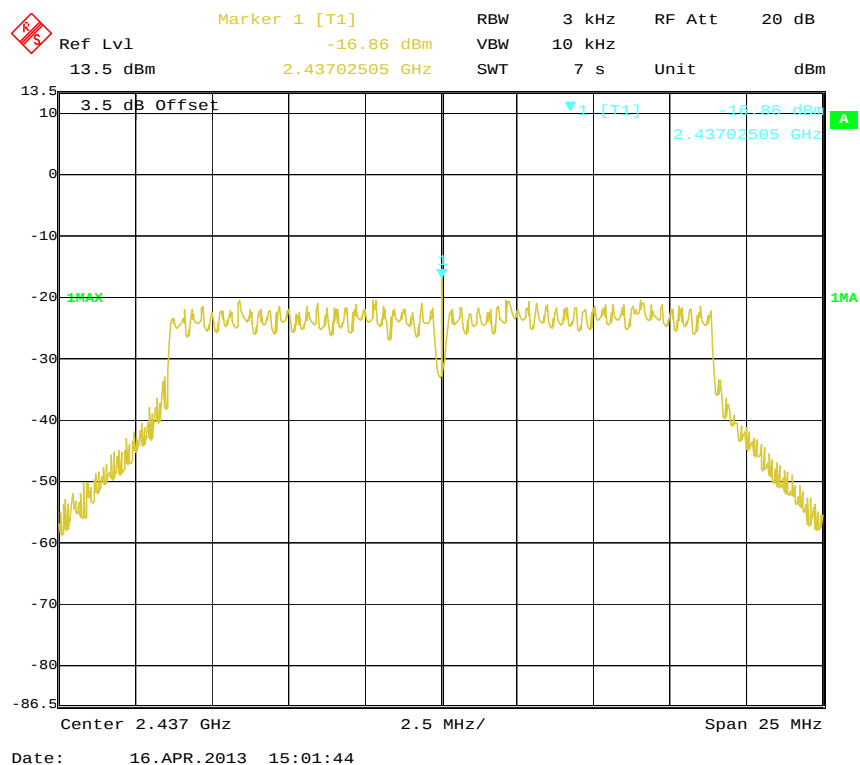
Power Spectral Density, 802.11b High Channel**Power Spectral Density, 802.11g Low Channel**

Power Spectral Density, 802.11g Middle Channel**Power Spectral Density, 802.11g High Channel**

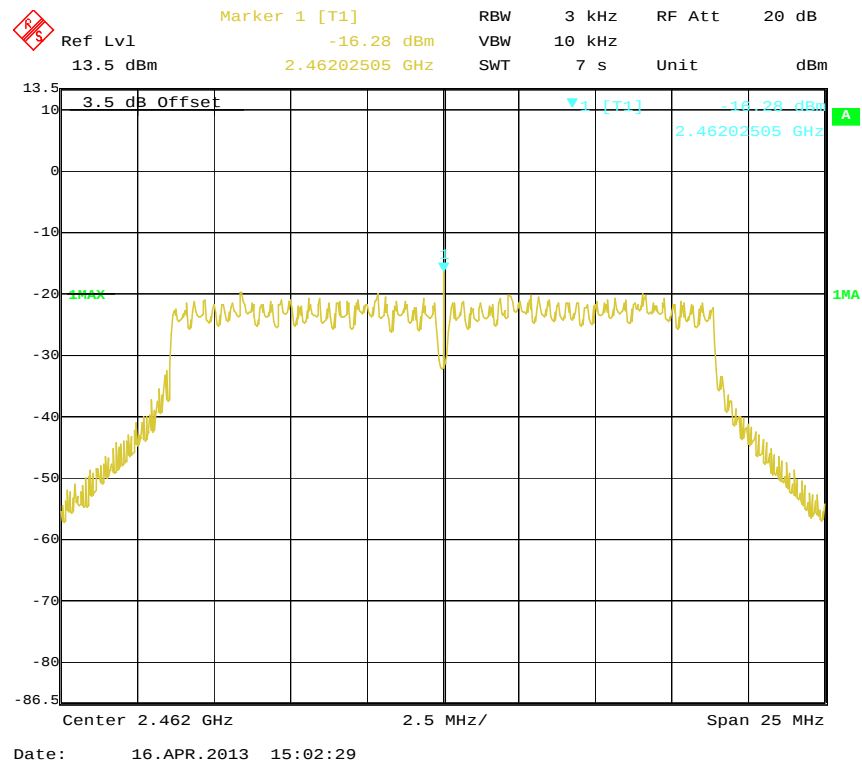
Power Spectral Density, 802.11n-HT20 Low Channel



Power Spectral Density, 802.11n-HT20 Middle Channel



Power Spectral Density, 802.11n-HT20 High Channel



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