

FCC PART 15.247

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD

6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China.
518052

FCC ID: V7TV300

Report Type: Original Report	Product Type: 300Mbps Wireless N VDSL2 Modem Router
Test Engineer: Robin Zheng	<i>Robin Zheng</i>
Report Number: RDG160809001-00	
Report Date: 2016-08-29	
Reviewed By: Dean Liu RF Engineer	<i>Dean Liu</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
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS	8
FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE).....	9
APPLICABLE STANDARD	9
FCC §15.203 - ANTENNA REQUIREMENT.....	10
APPLICABLE STANDARD	10
ANTENNA CONNECTOR CONSTRUCTION	10
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	11
APPLICABLE STANDARD	11
MEASUREMENT UNCERTAINTY.....	11
EUT SETUP.....	11
EMI TEST RECEIVER SETUP.....	12
TEST PROCEDURE	12
CORRECTED AMPLITUDE & MARGIN CALCULATION	12
TEST EQUIPMENT LIST AND DETAILS.....	13
TEST DATA	13
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	16
APPLICABLE STANDARD	16
MEASUREMENT UNCERTAINTY.....	16
EUT SETUP	16
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	17
TEST PROCEDURE	17
CORRECTED AMPLITUDE & MARGIN CALCULATION	18
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST DATA	18
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....	25
APPLICABLE STANDARD	25
TEST PROCEDURE	25
TEST EQUIPMENT LIST AND DETAILS.....	25
TEST DATA	25
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER.....	33
APPLICABLE STANDARD	33

TEST PROCEDURE	33
TEST EQUIPMENT LIST AND DETAILS.....	33
TEST DATA	33
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....	35
APPLICABLE STANDARD	35
TEST PROCEDURE	35
TEST EQUIPMENT LIST AND DETAILS.....	35
TEST DATA	35
FCC §15.247(e) - POWER SPECTRAL DENSITY	44
APPLICABLE STANDARD	44
TEST PROCEDURE	44
TEST EQUIPMENT LIST AND DETAILS.....	44
TEST DATA	44

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *SHENZHEN TENDA TECHNOLOGY CO.,LTD* 's product, model number: *V300 (FCC ID: V7TV300)* (the "EUT") in this report was a *300Mbps Wireless N VDSL2 Modem Router*, which was measured approximately: 15.8 cm (L) x 10.6 cm (W) x 3.6 cm (H), rated input voltage: DC12V from adapter.

Adapter information:
Model: BN036-A12012U
Input: 100-240V~ 50/60Hz 0.4A
Output: DC 12V, 1.0A

All measurement and test data in this report was gathered from production sample serial number: 160809001 (Assigned by BACL, Dongguan). The EUT was received on 2016-08-09

Objective

This report is prepared on behalf of *SHENZHEN TENDA TECHNOLOGY CO.,LTD* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's 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 15.247 rules.

Related Submittal(s)/Grant(s)

N/A.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

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 Communications 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 06, 2015.

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 testing mode, which was provided by manufacturer. For 2.4GHz band, the device supports SISO mode at 802.11b and g mode, Supports SISO and MIMO mode at 802.11n ht20 /ht40mode, 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	/	/

For 802.11b, 802.11g, and 802.11n ht20 modes were tested with channel 1, 6 and 11.

For 802.11n ht40 mode were tested with Channel 3, 6 and 9.

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.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The worst condition (maximum power with 100% duty cycle) was setting by the software as following table:

Test Mode	Test Software Version	MTool2.0.0.3		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting Chain0	71	71	69
	Power Level Setting Chain1	71	71	69
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting Chain0	50	50	50
	Power Level Setting Chain1	50	50	50
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS8	MCS8	MCS8
	Power Level Setting Chain0	40	40	40
	Power Level Setting Chain1	40	40	40
802.11n ht40	Test Frequency	2422MHz	2437MHz	2452MHz
	Data Rate	MCS8	MCS8	MCS8
	Power Level Setting Chain0	42	42	40
	Power Level Setting Chain1	42	42	40

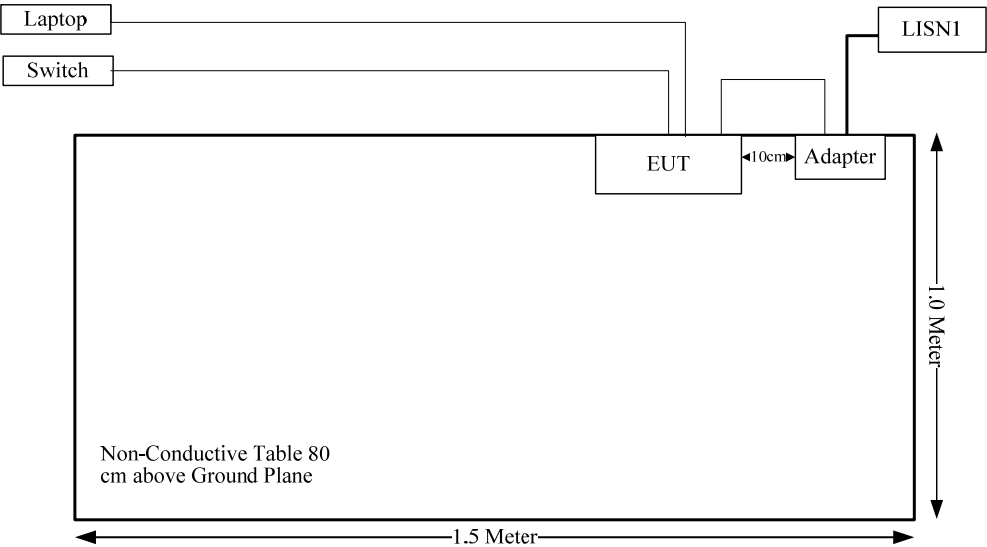
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
I.T.E	Switch	C0548B-480-050	N/A

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	no	no	10	EUT	Laptop
RJ11 Cable	no	no	10	EUT	Switch

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line 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 Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum conducted output power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, 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/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;

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

Calculated Formulary:

Predication of MPE limit at a given distance

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

Calculated Data:

Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2462	5.00	3.16	23	199.53	20.00	0.1256	1.0

Note: The tune-up power is 21+/-2dBm, that declared by manufacturer.

Result: The device meet FCC MPE at 20 cm 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.

Antenna Connector Construction

The EUT has two omni-directional antennas, which were permanently attached and the antenna gain is 5dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 1, then:

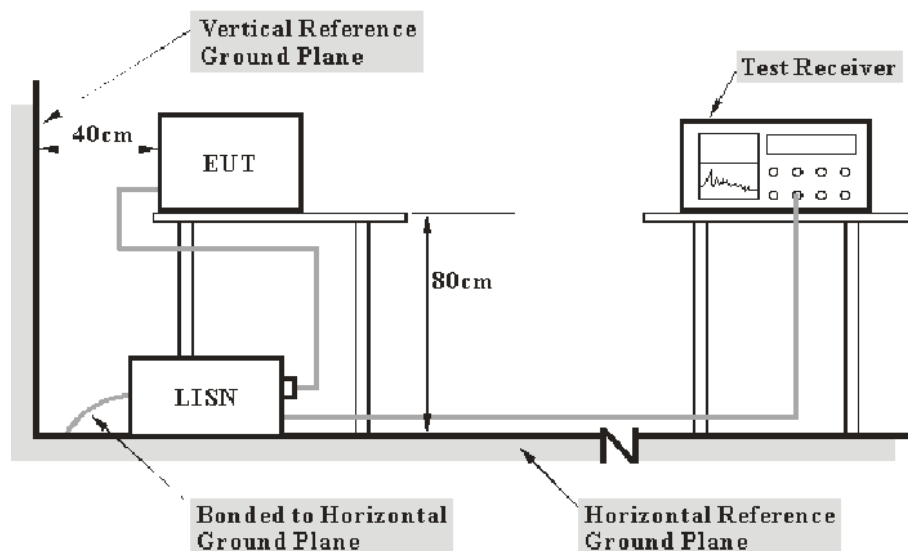
- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cisp}

Measurement	U_{cisp}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source

EMI Test Receiver Setup

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

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

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

Test Procedure

During the conducted emission test, the adapter was connected to the first 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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2015-12-10	2016-12-09
R&S	L.I.S.N	ESH2-Z5	892107/021	2016-07-16	2017-07-15
R&S	Two-line V-network	ENV 216	3560.6550.12	2015-11-26	2016-11-25
N/A	Coaxial Cable	1.8m	N/A	2016-05-06	2017-05-06
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

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

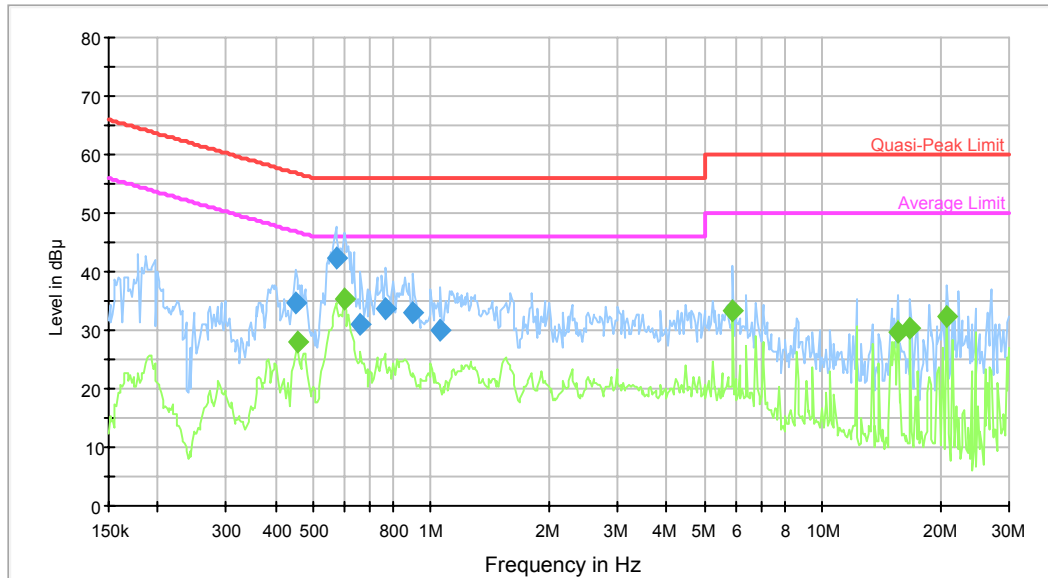
Test Data**Environmental Conditions**

Temperature:	27.1°C
Relative Humidity:	63 %
ATM Pressure:	99.2kPa

The testing was performed by Robin Zheng on 2016-08-15.

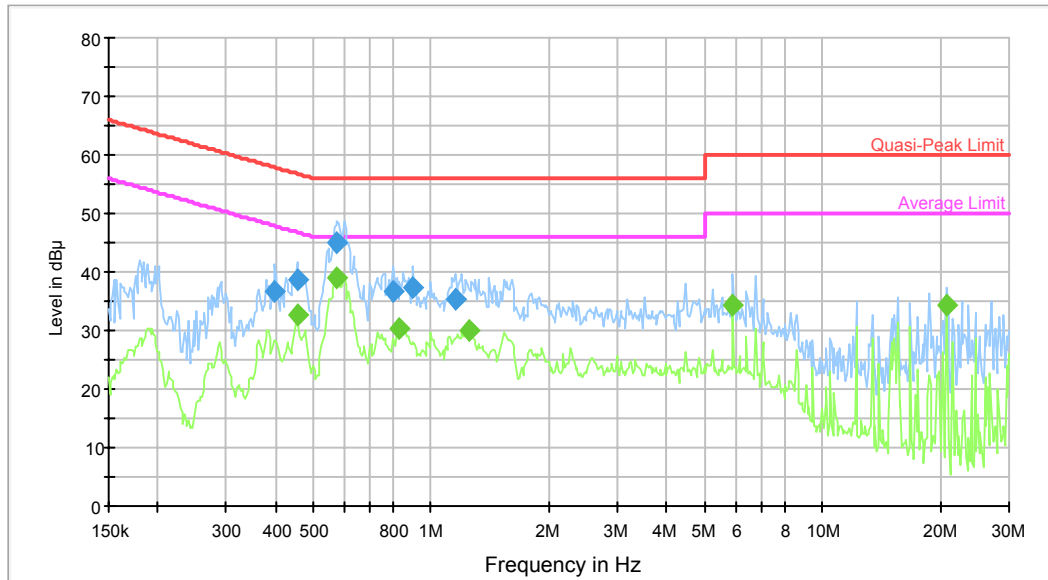
Test Mode: Transmitting

AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.450448	34.7	9.000	L1	10.1	22.2	56.9	Compliance
0.572086	42.3	9.000	L1	10.2	13.7	56.0	Compliance
0.660314	31.0	9.000	L1	10.4	25.0	56.0	Compliance
0.768247	33.6	9.000	L1	10.4	22.4	56.0	Compliance
0.900972	33.0	9.000	L1	10.4	23.0	56.0	Compliance
1.056628	29.9	9.000	L1	10.4	26.1	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.454052	28.1	9.000	L1	10.1	18.7	46.8	Compliance
0.600101	35.3	9.000	L1	10.2	10.7	46.0	Compliance
5.907406	33.4	9.000	L1	10.7	16.6	50.0	Compliance
15.616430	29.6	9.000	L1	10.7	20.4	50.0	Compliance
16.777473	30.4	9.000	L1	10.7	19.6	50.0	Compliance
20.804674	32.3	9.000	L1	10.9	17.7	50.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.399703	36.7	9.000	N	10.2	21.2	57.9	Compliance
0.454052	38.7	9.000	N	10.1	18.1	56.8	Compliance
0.576662	45.1	9.000	N	10.2	10.9	56.0	Compliance
0.799472	36.6	9.000	N	10.3	19.4	56.0	Compliance
0.900972	37.4	9.000	N	10.4	18.6	56.0	Compliance
1.153421	35.4	9.000	N	10.4	20.6	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.454052	32.6	9.000	N	10.1	14.2	46.8	Compliance
0.572086	39.0	9.000	N	10.1	7.0	46.0	Compliance
0.831967	30.4	9.000	N	10.3	15.6	46.0	Compliance
1.249088	30.0	9.000	N	10.4	16.0	46.0	Compliance
5.907406	34.5	9.000	N	10.7	15.5	50.0	Compliance
20.804674	34.3	9.000	N	10.9	15.7	50.0	Compliance

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 2, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

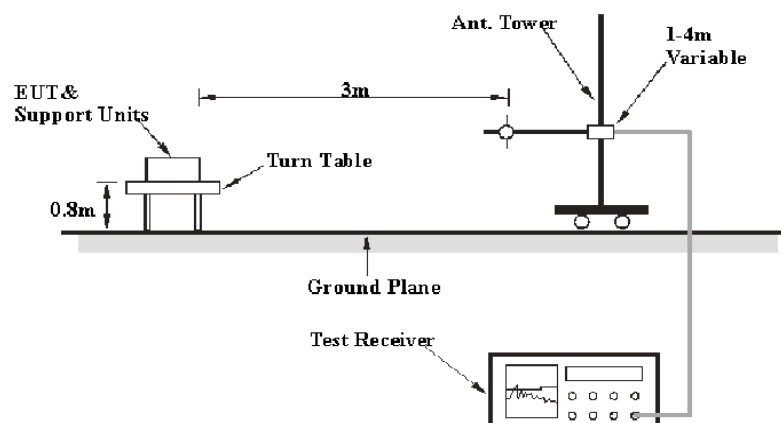
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

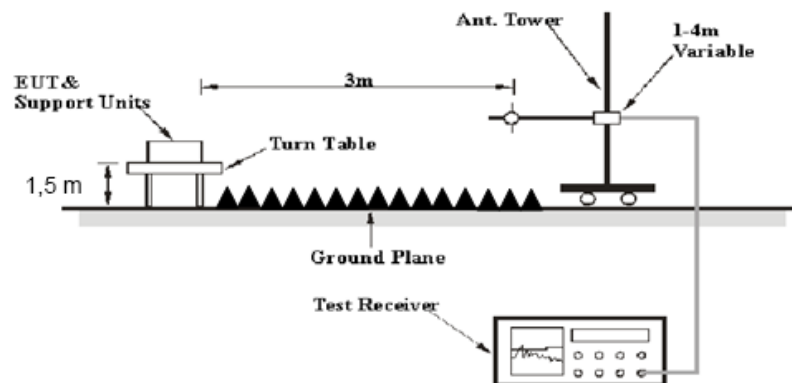
Table 2 – Values of U_{cisp}

Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. 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	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

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 Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

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

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
R&S	EMI Test Receiver	ESCI	100224	2016-08-03	2017-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2016-02-19	2017-02-19
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

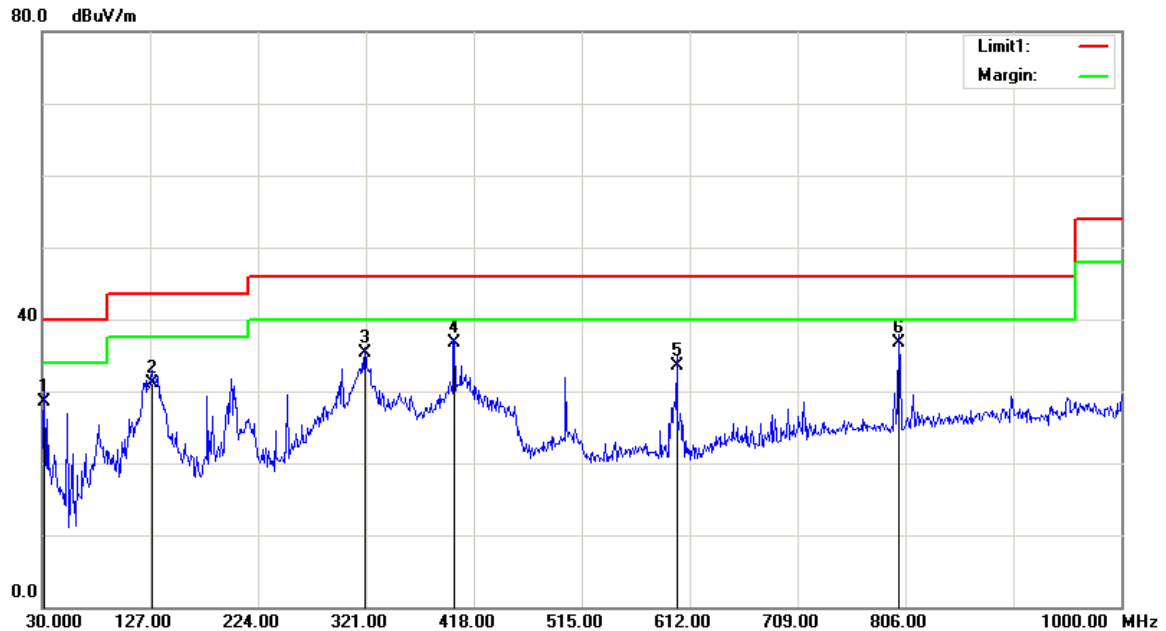
Temperature:	27.1°C
Relative Humidity:	63 %
ATM Pressure:	99.2 kPa

* The testing was performed by Robin Zheng on 2016-08-14.

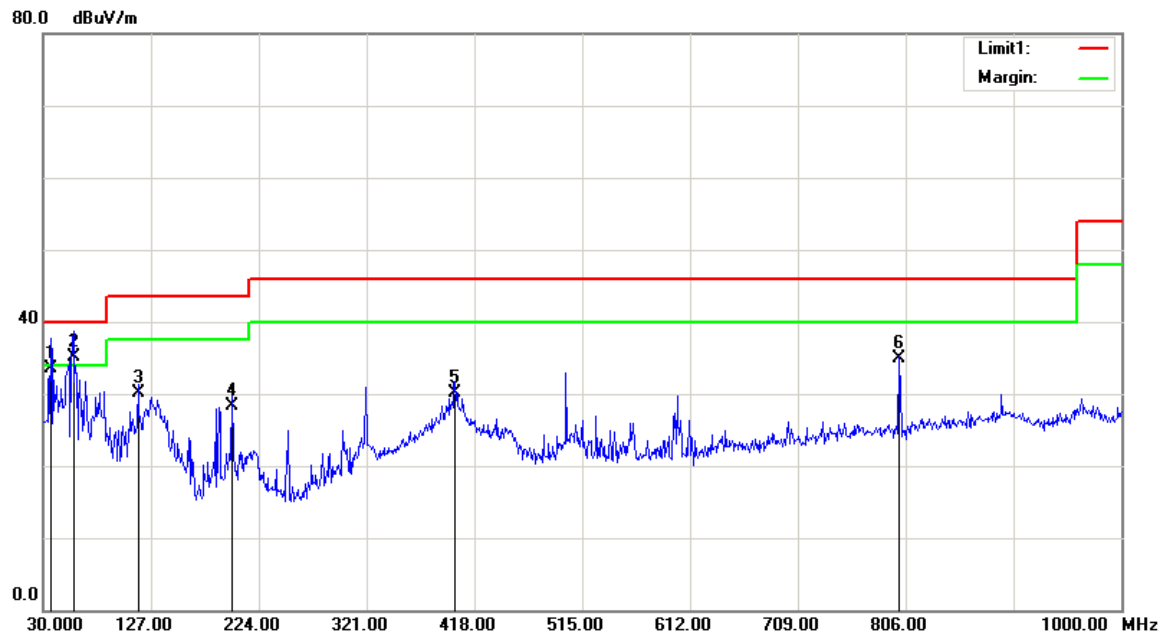
Test Mode: Transmitting

1) Below 1GHz(802.11b mode middle channel was the worst case):

Horizontal



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
31.9400	29.00	QP	-0.50	28.50	40.00	11.50
128.9400	36.86	QP	-5.66	31.20	43.50	12.30
320.0300	40.90	QP	-5.50	35.40	46.00	10.60
400.5400	40.27	QP	-3.57	36.70	46.00	9.30
600.3600	34.27	QP	-0.67	33.60	46.00	12.40
800.1800	33.65	QP	3.15	36.80	46.00	9.20

Vertical

Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
36.7900	37.65	QP	-4.05	33.60	40.00	6.40
57.1600	48.13	QP	-13.03	35.10	40.00	4.90
115.3600	36.26	QP	-6.16	30.10	43.50	13.40
199.7500	35.62	QP	-7.32	28.30	43.50	15.20
400.5400	33.77	QP	-3.57	30.20	46.00	15.80
800.1800	31.75	QP	3.15	34.90	46.00	11.10

2) 1-25GHz:

802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	65.63	PK	H	25.67	3.68	0.00	94.98	N/A	N/A
2412	61.3	AV	H	25.67	3.68	0.00	90.65	N/A	N/A
2412	79.71	PK	V	25.67	3.68	0.00	109.06	N/A	N/A
2412	76.06	AV	V	25.67	3.68	0.00	105.41	N/A	N/A
2390	31.97	PK	V	25.61	3.63	0.00	61.21	74.00	12.79
2390	23.69	AV	V	25.61	3.63	0.00	52.93	54.00	1.07
4824	37.66	PK	V	30.64	5.03	27.41	45.92	74.00	28.08
4824	32.4	AV	V	30.64	5.03	27.41	40.66	54.00	13.34
7236	34.13	PK	V	34.17	6.65	25.90	49.05	74.00	24.95
7236	29.51	AV	V	34.17	6.65	25.90	44.43	54.00	9.57
3215	47.68	PK	V	27.89	6.15	27.36	54.36	74.00	19.64
3215	44.37	AV	V	27.89	6.15	27.36	51.05	54.00	2.95
Middle Channel: 2437 MHz									
2437	68.22	PK	H	25.74	3.75	0.00	97.71	N/A	N/A
2437	64.02	AV	H	25.74	3.75	0.00	93.51	N/A	N/A
2437	79.21	PK	V	25.74	3.75	0.00	108.70	N/A	N/A
2437	75.15	AV	V	25.74	3.75	0.00	104.64	N/A	N/A
4874	38.2	PK	V	30.77	5.14	27.42	46.69	74.00	27.31
4874	33.35	AV	V	30.77	5.14	27.42	41.84	54.00	12.16
7311	33.95	PK	V	34.35	6.74	25.88	49.16	74.00	24.84
7311	28.42	AV	V	34.35	6.74	25.88	43.63	54.00	10.37
2504	31.87	PK	V	25.91	3.67	27.37	34.08	74.00	39.92
2504	20.45	AV	V	25.91	3.67	27.37	22.66	54.00	31.34
3249	47.51	PK	V	28.00	6.31	27.33	54.49	74.00	19.51
3249	44.24	AV	V	28.00	6.31	27.33	51.22	54.00	2.78
High Channel: 2462 MHz									
2462	66.1	PK	H	25.80	3.75	0.00	95.65	N/A	N/A
2462	63.03	AV	H	25.80	3.75	0.00	92.58	N/A	N/A
2462	78.03	PK	V	25.80	3.75	0.00	107.58	N/A	N/A
2462	74.43	AV	V	25.80	3.75	0.00	103.98	N/A	N/A
2483.5	32.28	PK	V	25.86	3.67	0.00	61.81	74.00	12.19
2483.5	23.31	AV	V	25.86	3.67	0.00	52.84	54.00	1.16
4924	38.57	PK	V	30.90	5.34	27.43	47.38	74.00	26.62
4924	33.12	AV	V	30.90	5.34	27.43	41.93	54.00	12.07
7386	34.24	PK	V	34.53	6.83	25.86	49.74	74.00	24.26
7386	29.35	AV	V	34.53	6.83	25.86	44.85	54.00	9.15
3296	45.5	PK	V	28.15	5.23	27.29	51.59	74.00	22.41
3296	41.32	AV	V	28.15	5.23	27.29	47.41	54.00	6.59

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	64.6	PK	H	25.67	3.68	0.00	93.95	N/A	N/A
2412	54.18	AV	H	25.67	3.68	0.00	83.53	N/A	N/A
2412	77.67	PK	V	25.67	3.68	0.00	107.02	N/A	N/A
2412	67.59	AV	V	25.67	3.68	0.00	96.94	N/A	N/A
2400	42.66	PK	V	25.64	3.65	0.00	71.95	74.00	2.05
2400	23.11	AV	V	25.64	3.65	0.00	52.40	54.00	1.60
4824	33.27	PK	V	30.64	5.03	27.41	41.53	74.00	32.47
4824	21.21	AV	V	30.64	5.03	27.41	29.47	54.00	24.53
7236	32.54	PK	V	34.17	6.65	25.90	47.46	74.00	26.54
7236	20.13	AV	V	34.17	6.65	25.90	35.05	54.00	18.95
3215	45.32	PK	V	27.89	6.15	27.36	52.00	74.00	22.00
3215	42.71	AV	V	27.89	6.15	27.36	49.39	54.00	4.61
Middle Channel: 2437 MHz									
2437	65.36	PK	H	25.74	3.75	0.00	94.85	N/A	N/A
2437	55.21	AV	H	25.74	3.75	0.00	84.70	N/A	N/A
2437	78.83	PK	V	25.74	3.75	0.00	108.32	N/A	N/A
2437	68.75	AV	V	25.74	3.75	0.00	98.24	N/A	N/A
4874	33.15	PK	V	30.77	5.14	27.42	41.64	74.00	32.36
4874	21.07	AV	V	30.77	5.14	27.42	29.56	54.00	24.44
7311	32.24	PK	V	34.35	6.74	25.88	47.45	74.00	26.55
7311	20.42	AV	V	34.35	6.74	25.88	35.63	54.00	18.37
3249	44.9	PK	V	28.00	6.31	27.33	51.88	74.00	22.12
3249	42.06	AV	V	28.00	6.31	27.33	49.04	54.00	4.96
3041	31.56	PK	V	27.33	6.67	27.50	38.06	74.00	35.94
3041	20.41	AV	V	27.33	6.67	27.50	26.91	54.00	27.09
High Channel: 2462 MHz									
2462	66.23	PK	H	25.80	3.75	0.00	95.78	N/A	N/A
2462	56.45	AV	H	25.80	3.75	0.00	86.00	N/A	N/A
2462	77.66	PK	V	25.80	3.75	0.00	107.21	N/A	N/A
2462	67.23	AV	V	25.80	3.75	0.00	96.78	N/A	N/A
2483.5	41.5	PK	V	25.86	3.67	0.00	71.03	74.00	2.97
2483.5	22.99	AV	V	25.86	3.67	0.00	52.52	54.00	1.48
4924	32.9	PK	V	30.90	5.34	27.43	41.71	74.00	32.29
4924	20.06	AV	V	30.90	5.34	27.43	28.87	54.00	25.13
7386	32.65	PK	V	34.53	6.83	25.86	48.15	74.00	25.85
7386	20.11	AV	V	34.53	6.83	25.86	35.61	54.00	18.39
3296	43.12	PK	V	28.15	5.23	27.29	49.21	74.00	24.79
3296	40.65	AV	V	28.15	5.23	27.29	46.74	54.00	7.26

802.11 n ht20 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	69.39	PK	H	25.67	3.68	0.00	98.74	N/A	N/A
2412	35.78	AV	H	25.67	3.68	0.00	65.13	N/A	N/A
2412	76.65	PK	V	25.67	3.68	0.00	106.00	N/A	N/A
2412	65.56	AV	V	25.67	3.68	0.00	94.91	N/A	N/A
2390	40.22	PK	V	25.61	3.63	0.00	69.46	74.00	4.54
2390	22.6	AV	V	25.61	3.63	0.00	51.84	54.00	2.16
4824	31.25	PK	V	30.64	5.03	27.41	39.51	74.00	34.49
4824	20.24	AV	V	30.64	5.03	27.41	28.50	54.00	25.50
7236	32.64	PK	V	34.17	6.65	25.90	47.56	74.00	26.44
7236	21.32	AV	V	34.17	6.65	25.90	36.24	54.00	17.76
3215	44.53	PK	V	27.89	6.15	27.36	51.21	74.00	22.79
3215	41.55	AV	V	27.89	6.15	27.36	48.23	54.00	5.77
Middle Channel: 2437 MHz									
2437	68.43	PK	H	25.74	3.75	0.00	97.92	N/A	N/A
2437	67.21	AV	H	25.74	3.75	0.00	96.70	N/A	N/A
2437	77.06	PK	V	25.74	3.75	0.00	106.55	N/A	N/A
2437	66.12	AV	V	25.74	3.75	0.00	95.61	N/A	N/A
4874	32.74	PK	V	30.77	5.14	27.42	41.23	74.00	32.77
4874	20.15	AV	V	30.77	5.14	27.42	28.64	54.00	25.36
7311	32.58	PK	V	34.35	6.74	25.88	47.79	74.00	26.21
7311	20.03	AV	V	34.35	6.74	25.88	35.24	54.00	18.76
3024	31.02	PK	V	27.28	6.72	27.51	37.51	74.00	36.49
3024	20.05	AV	V	27.28	6.72	27.51	26.54	54.00	27.46
3249	44.82	PK	V	28.00	6.31	27.33	51.80	74.00	22.20
3249	41.46	AV	V	28.00	6.31	27.33	48.44	54.00	5.56
High Channel: 2462 MHz									
2462	68.74	PK	H	25.80	3.75	0.00	98.29	N/A	N/A
2462	57.46	AV	H	25.80	3.75	0.00	87.01	N/A	N/A
2462	77.97	PK	V	25.80	3.75	0.00	107.52	N/A	N/A
2462	66.68	AV	V	25.80	3.75	0.00	96.23	N/A	N/A
2483.5	39.66	PK	V	25.86	3.67	0.00	69.19	74.00	4.81
2483.5	23.47	AV	V	25.86	3.67	0.00	53.00	54.00	1.00
4924	32.86	PK	V	30.90	5.34	27.43	41.67	74.00	32.33
4924	20.32	AV	V	30.90	5.34	27.43	29.13	54.00	24.87
7386	32.54	PK	V	34.53	6.83	25.86	48.04	74.00	25.96
7386	20.14	AV	V	34.53	6.83	25.86	35.64	54.00	18.36
3296	44.62	PK	V	28.15	5.23	27.29	50.71	74.00	23.29
3296	41.45	AV	V	28.15	5.23	27.29	47.54	54.00	6.46

802.11 n ht40 Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
Low Channel: 2422 MHz									
2422	67.42	PK	H	25.70	3.71	0.00	96.83	N/A	N/A
2422	56.22	AV	H	25.70	3.71	0.00	85.63	N/A	N/A
2422	73.72	PK	V	25.70	3.71	0.00	103.13	N/A	N/A
2422	61.55	AV	V	25.70	3.71	0.00	90.96	N/A	N/A
2390	40.43	PK	V	25.61	3.63	0.00	69.67	74.00	4.33
2390	23.02	AV	V	25.61	3.63	0.00	52.26	54.00	1.74
4844	32.44	PK	V	30.69	4.99	27.42	40.70	74.00	33.30
4844	20.18	AV	V	30.69	4.99	27.42	28.44	54.00	25.56
7266	33.62	PK	V	34.24	6.68	25.89	48.65	74.00	25.35
7266	20.21	AV	V	34.24	6.68	25.89	35.24	54.00	18.76
3230	45.44	PK	V	27.94	6.22	27.34	52.26	74.00	21.74
3230	42.23	AV	V	27.94	6.22	27.34	49.05	54.00	4.95
Middle Channel: 2437 MHz									
2437	65.71	PK	H	25.74	3.75	0.00	95.20	N/A	N/A
2437	53.24	AV	H	25.74	3.75	0.00	82.73	N/A	N/A
2437	74.17	PK	V	25.74	3.75	0.00	103.66	N/A	N/A
2437	62.51	AV	V	25.74	3.75	0.00	92.00	N/A	N/A
4874	32.06	PK	V	30.77	5.14	27.42	40.55	74.00	33.45
4874	20.54	AV	V	30.77	5.14	27.42	29.03	54.00	24.97
7311	32.82	PK	V	34.35	6.74	25.88	48.03	74.00	25.97
7311	20.41	AV	V	34.35	6.74	25.88	35.62	54.00	18.38
3249	44.12	PK	V	28.00	6.31	27.33	51.10	74.00	22.90
3249	40.48	AV	V	28.00	6.31	27.33	47.46	54.00	6.54
3610	31.26	PK	V	29.04	4.61	27.28	37.63	74.00	36.37
3610	20.11	AV	V	29.04	4.61	27.28	26.48	54.00	27.52
High Channel: 2452 MHz									
2452	65.27	PK	H	25.78	3.78	0.00	94.83	N/A	N/A
2452	53.16	AV	H	25.78	3.78	0.00	82.72	N/A	N/A
2452	74.12	PK	V	25.78	3.78	0.00	103.68	N/A	N/A
2452	62.58	AV	V	25.78	3.78	0.00	92.14	N/A	N/A
2483.5	40.89	PK	V	25.86	3.67	0.00	70.42	74.00	3.58
2483.5	23.34	AV	V	25.86	3.67	0.00	52.87	54.00	1.13
4904	32.25	PK	V	30.85	5.31	27.43	40.98	74.00	33.02
4904	20.03	AV	V	30.85	5.31	27.43	28.76	54.00	25.24
7356	33.84	PK	V	34.45	6.79	25.87	49.21	74.00	24.79
7356	21.36	AV	V	34.45	6.79	25.87	36.73	54.00	17.27
3269	42.79	PK	V	28.06	5.87	27.31	49.41	74.00	24.59
3269	38.88	AV	V	28.06	5.87	27.31	45.50	54.00	8.50

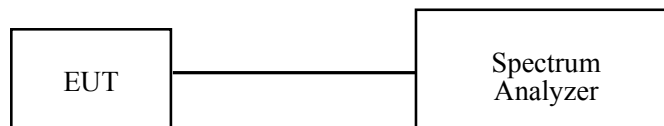
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	DE23437	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

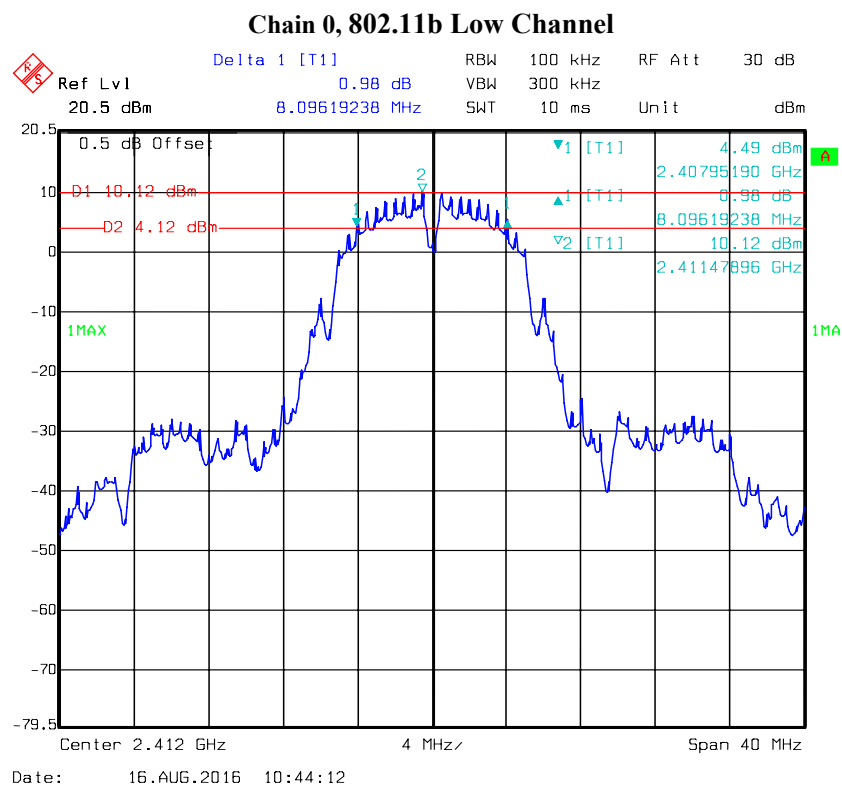
Environmental Conditions

Temperature:	27.8~28 °C
Relative Humidity:	64~66 %
ATM Pressure:	98.9~99kPa

* The testing was performed by Robin Zheng from 2016-08-16 to 2016-08-17.

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

Test mode	Channel	Frequency	6 dB Bandwidth	Limit
		(MHz)	(MHz)	(MHz)
802.11b	Low	2412	8.1	≥0.5
	Middle	2437	8.1	≥0.5
	High	2462	8.1	≥0.5
802.11g	Low	2412	15.15	≥0.5
	Middle	2437	15.14	≥0.5
	High	2462	15.15	≥0.5
802.11n20	Low	2412	15.23	≥0.5
	Middle	2437	15.23	≥0.5
	High	2462	15.15	≥0.5
802.11 n40	Low	2422	35.43	≥0.5
	Middle	2437	35.43	≥0.5
	High	2452	35.27	≥0.5



Delta 1 [T1]

RBW 100 kHz RF Att 30 dB

Ref Lvl 20.5 dBm

1.09 dB

8.09619238 MHz

SWT 10 ms Unit dBm

0.5 dB Offset

D1 9.37 dBm

D2 3.37 dBm

1MAX

1 [T1] 3.75 dBm

2 [T1] 2.437190 GHz

3 [T1] 1.09 dB

4 [T1] 8.09619238 MHz

5 [T1] 9.37 dBm

6 [T1] 2.43647896 GHz

Center 2.437 GHz 4 MHz/ Span 40 MHz

Date: 16.AUG.2016 10:53:01

Delta 1 [T1] 0.44 dB RBW 100 kHz RF Att 30 dB

Ref Lvl 20.5 dBm 8.09619238 MHz VBW 300 kHz Unit dBm

0.5 dB Offset

D1 9.47 dBm D2 3.47 dBm

1 [T1] 3.64 dBm 2.45795190 GHz

2 [T1] 8.44 dBm 8.09619238 MHz

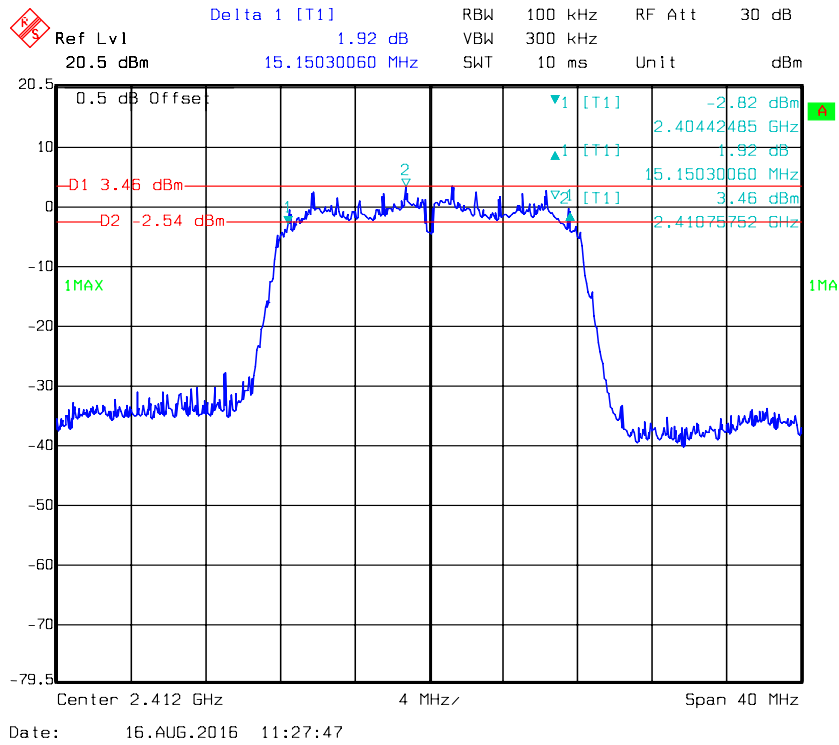
9.47 dBm 2.46147896 GHz

1MAX 1MAX

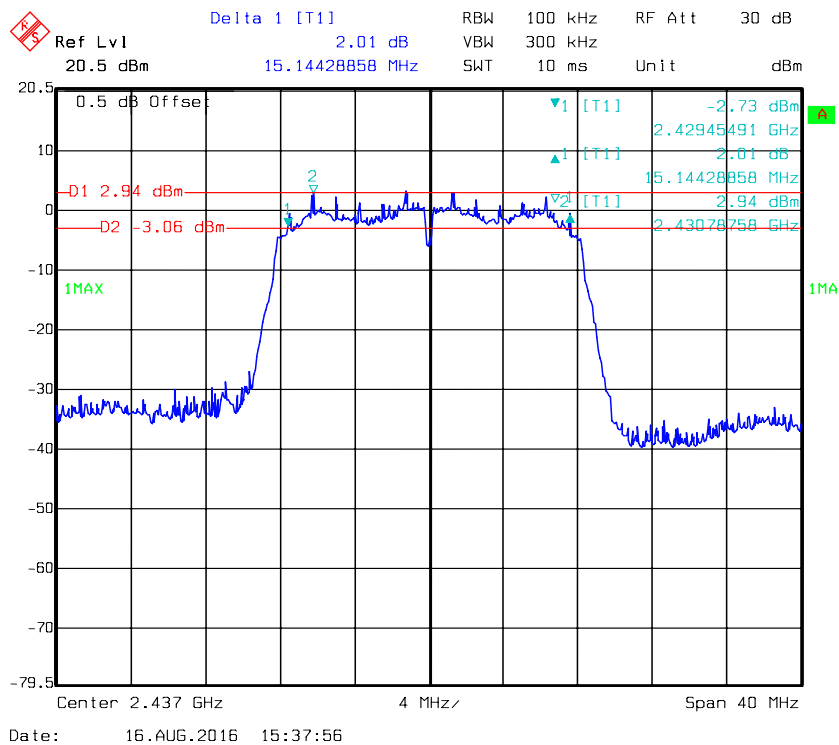
Center 2.462 GHz 4 MHz/ Span 40 MHz

Date: 16.AUG.2016 10:47:53

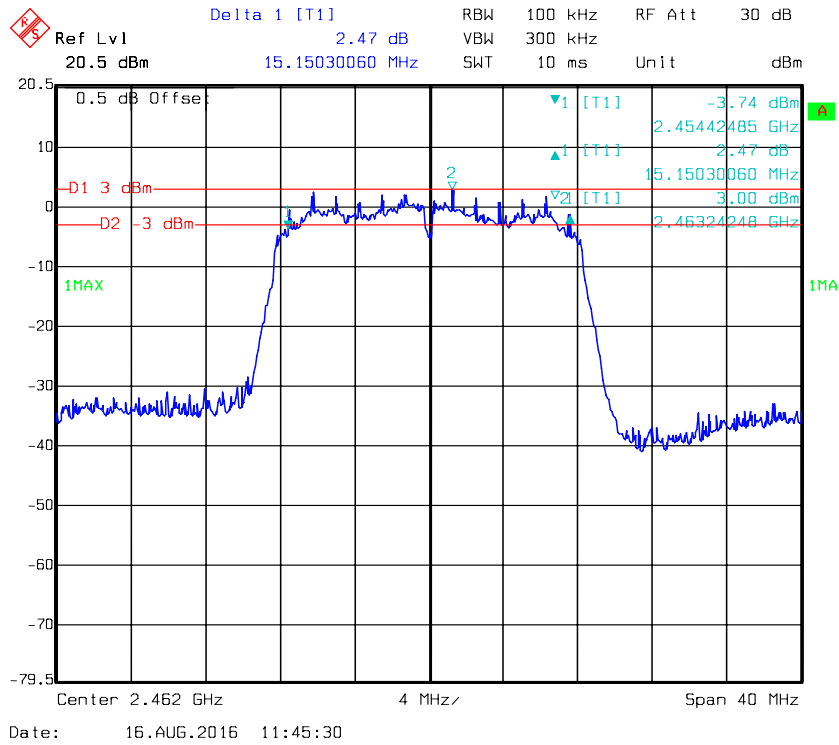
Chain 0, 802.11g Low Channel



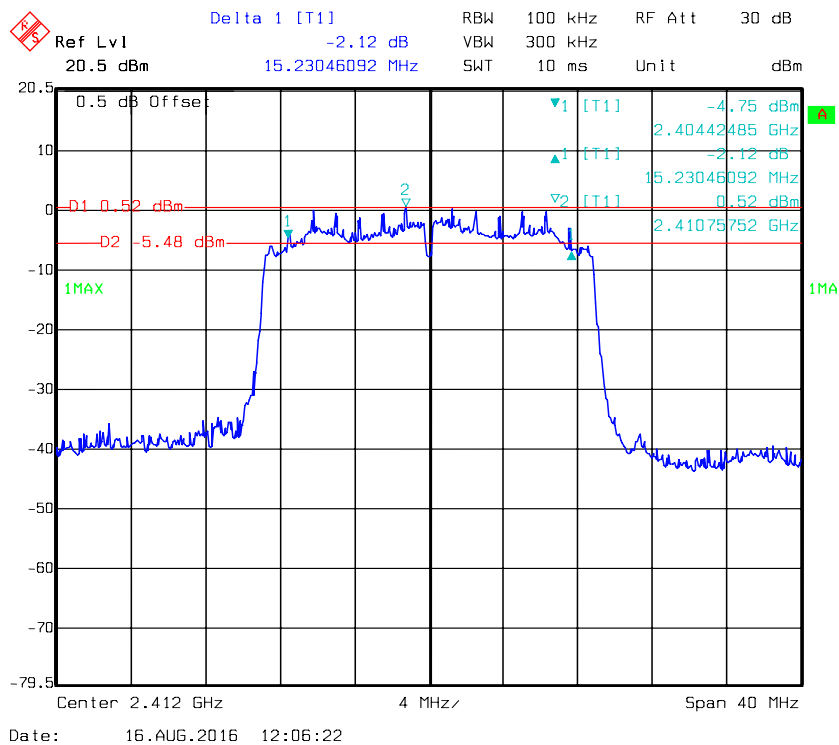
Chain 0, 802.11g Middle Channel



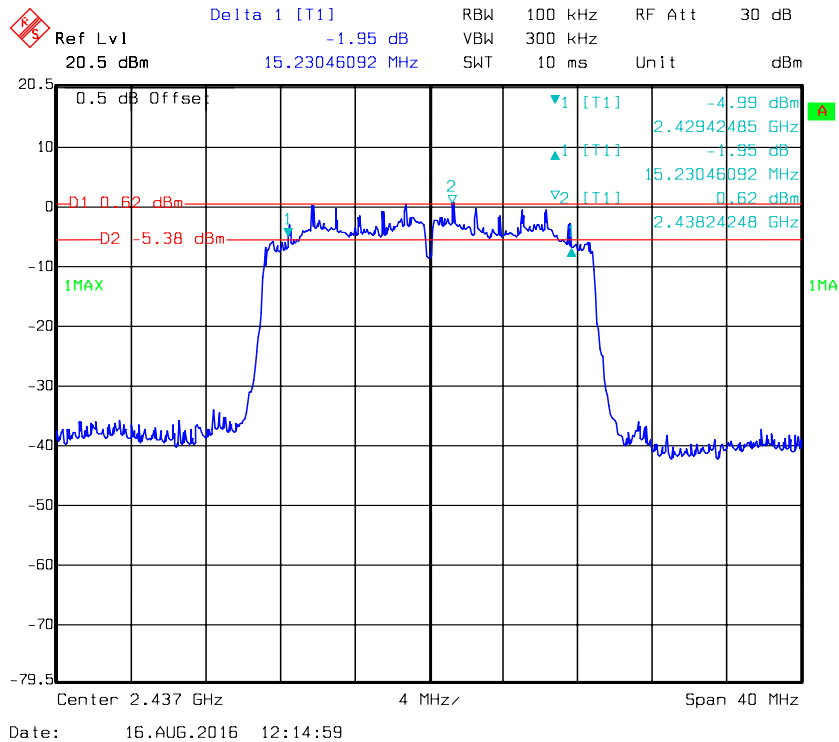
Chain 0, 802.11g High Channel



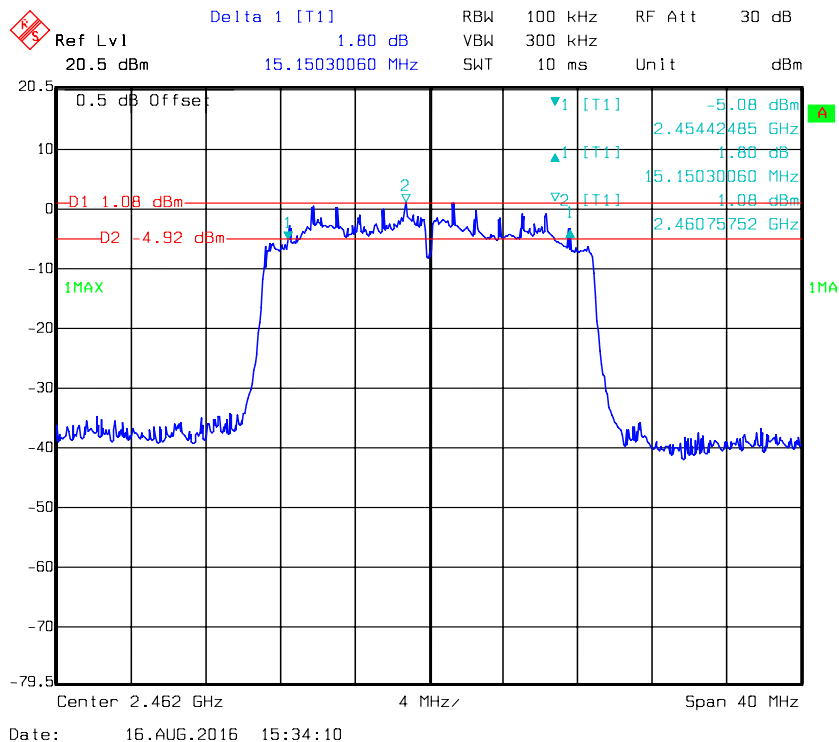
Chain 0, 802.11n ht20 Low Channel



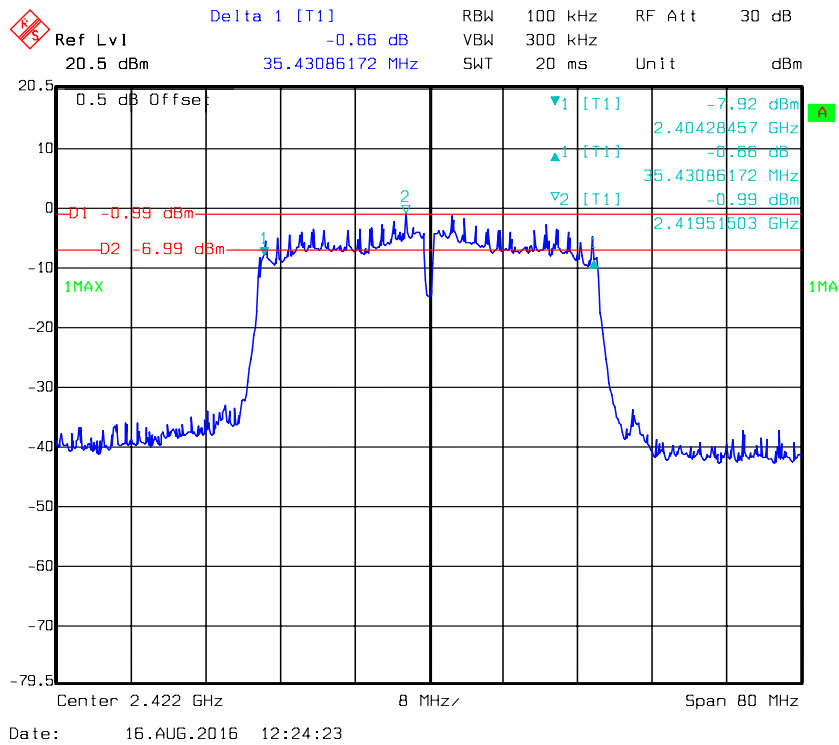
Chain 0, 802.11n ht20 Middle Channel



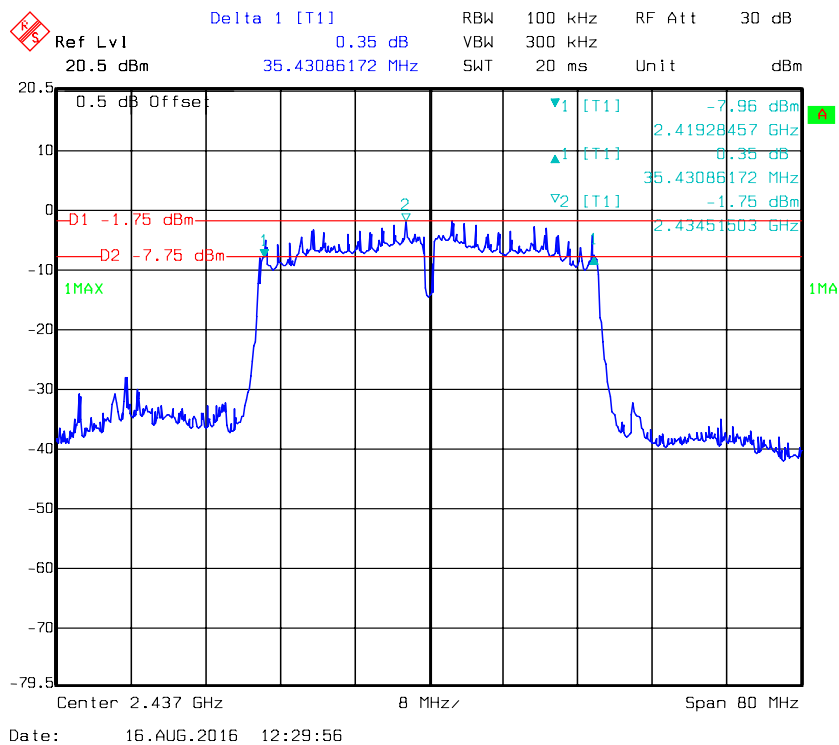
Chain 0, 802.11n ht20 High Channel



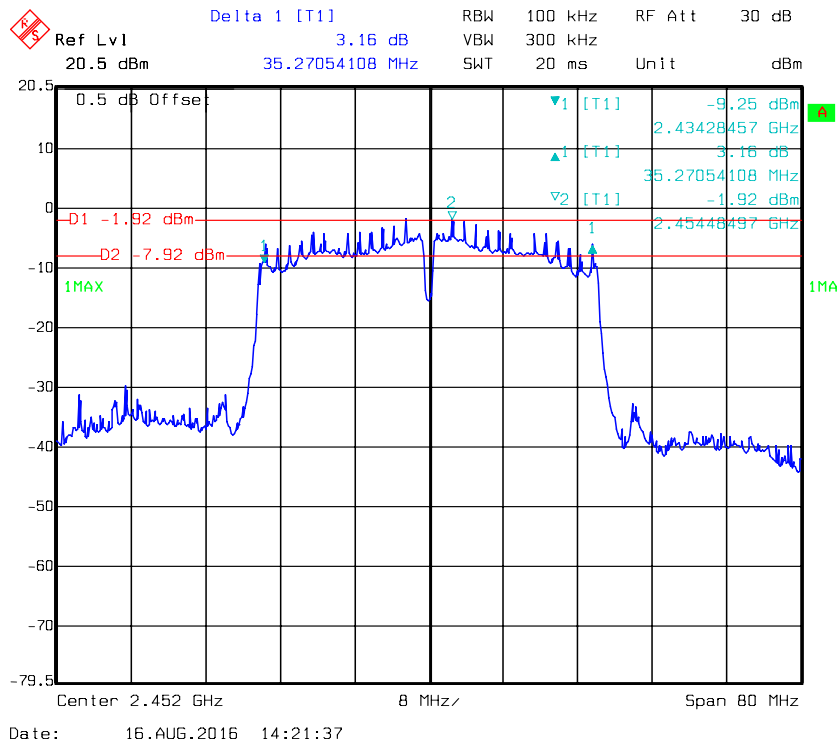
Chain 0, 802.11n ht40 Low Channel



Chain 0, 802.11n ht40 Middle Channel



Chain 0, 802.11n ht40 High Channel



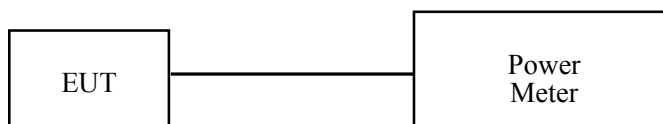
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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 test equipment.
3. Add a correction factor to the display.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54210016	2015-11-03	2016-11-03
Agilent	Wideband Power Sensor	N1921A	MY54170013	2015-11-03	2016-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2015-11-03	2016-11-03
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	27.2 °C
Relative Humidity:	67 %
ATM Pressure:	98.9kPa

* The testing was performed by Robin Zheng on 2016-08-18

Test Mode: Transmitting

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

Test mode	Channel	Frequency	Max Peak Conducted Output Power (dBm)		Total	Limit
		(MHz)	Chain 0	Chain 1	(dBm)	(dBm)
802.11b	Low	2412	22.34	21.77	/	30
	Middle	2437	22.26	21.49	/	30
	High	2462	21.67	21.42	/	30
802.11g	Low	2412	20.75	20.05	/	30
	Middle	2437	20.16	20.16	/	30
	High	2462	20.48	20.37	/	30
802.11n20	Low	2412	19.04	18.27	21.68	30
	Middle	2437	17.92	18.04	20.99	30
	High	2462	18.9	18.8	21.86	30
802.11n40	Low	2422	19.45	19.77	22.62	30
	Middle	2437	19.34	19.77	22.57	30
	High	2452	18.92	19.44	22.2	30

Note: the device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

So:

Directional gain = GANT + Array Gain = 5.0dBi < 6dBi

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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	27.8~28 °C
Relative Humidity:	64~66 %
ATM Pressure:	98.9~99kPa

* The testing was performed by Robin Zheng from 2016-08-16 to 2016-08-17.

Test Result: Compliant. Please refer to following plots.

Ref Lvl 20.5 dBm

Marker 2 [T1] -27.78 dBm

2.39850902 GHz

RBW 100 kHz

RF Att 30 dB

VBW 300 kHz

SWT 12 ms

Unit dBm

0.5 dB Offset

10.07 dBm

1MAX

2 [T1] -27.78 dBm

2.39850902 GHz

9.93 dBm

2.41101403 GHz

Center 2.4 GHz

4.8 MHz

Span 48 MHz

Date: 16.AUG.2016 10:43:35

Ref Lvl 20.5 dBm

Marker 2 [T1] -37.95 dBm

RBW 100 kHz

VBW 300 kHz

SWT 21.5 ms

RF Att 30 dB

Unit dBm

0.5 dB Offset

1MAX

2 [T1] -37.95 dBm

2.48358617 GHz

9.26 dBm

2.46238778 GHz

-10.74 dBm

1MA

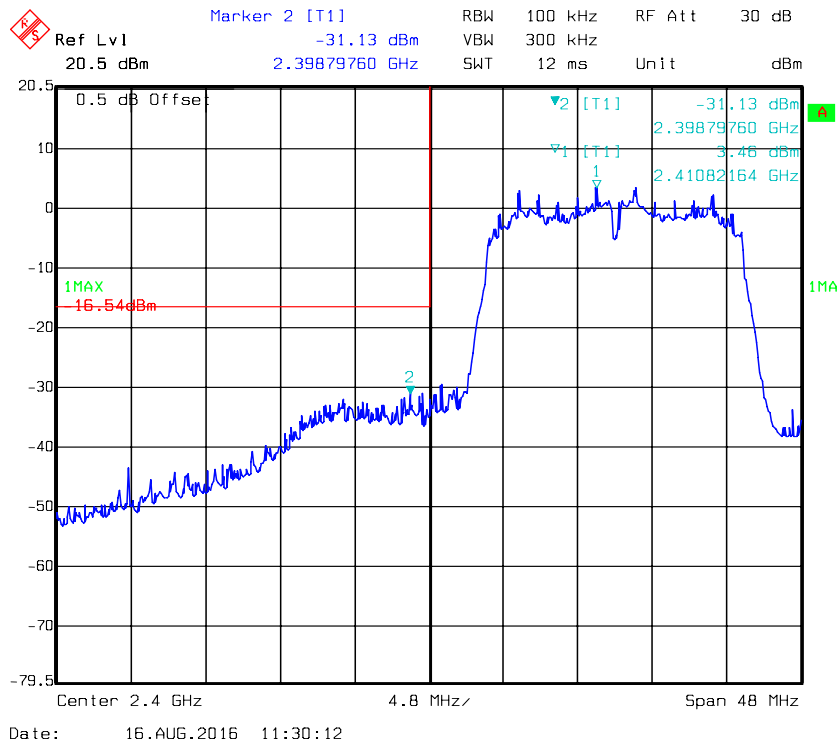
Center 2.4835 GHz

8.6 MHz

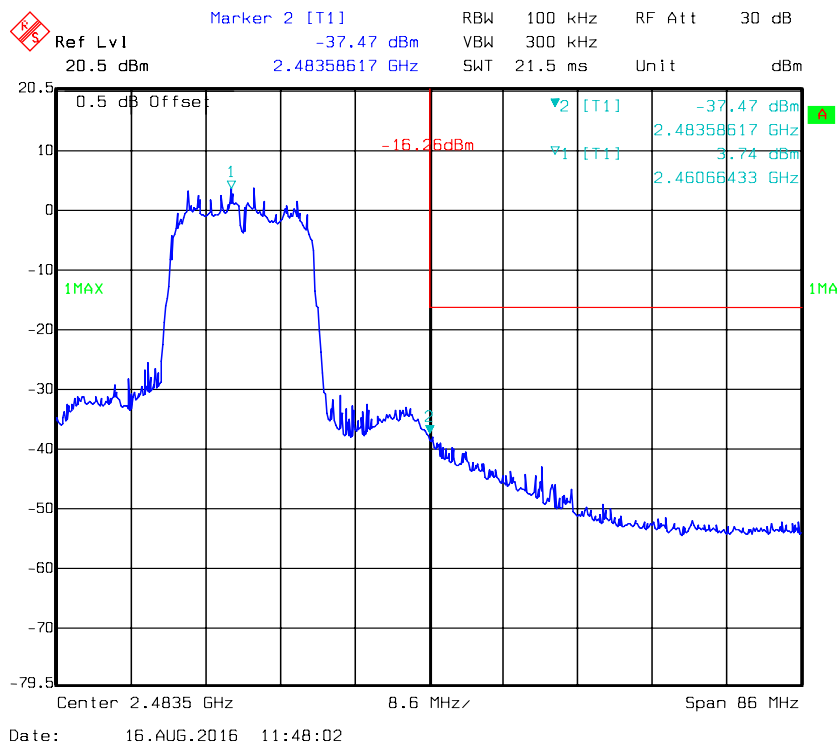
Span 86 MHz

Date: 16.AUG.2016 10:50:01

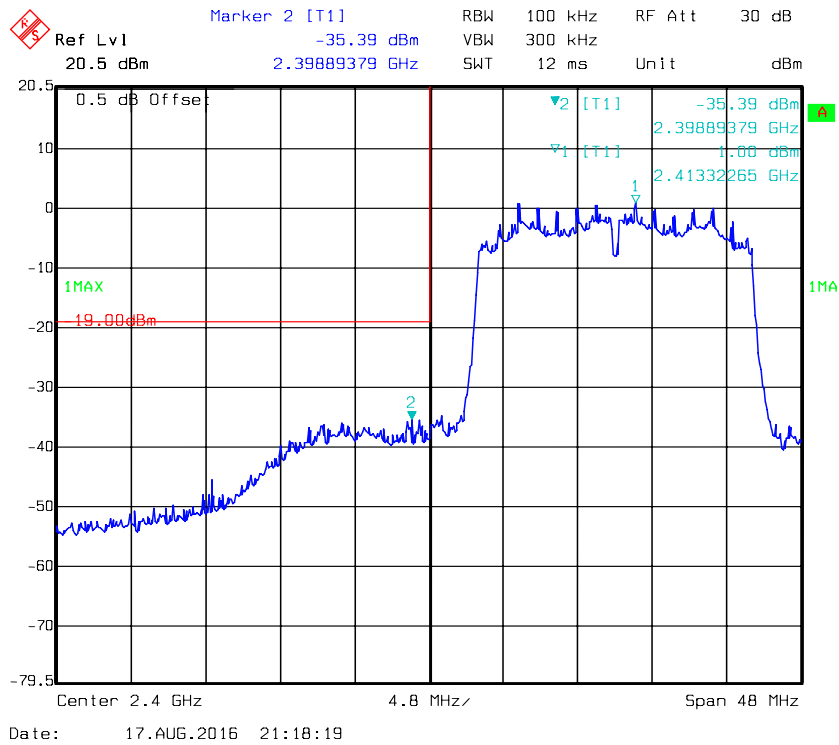
Chain 0, 802.11g: Band Edge, Left Side



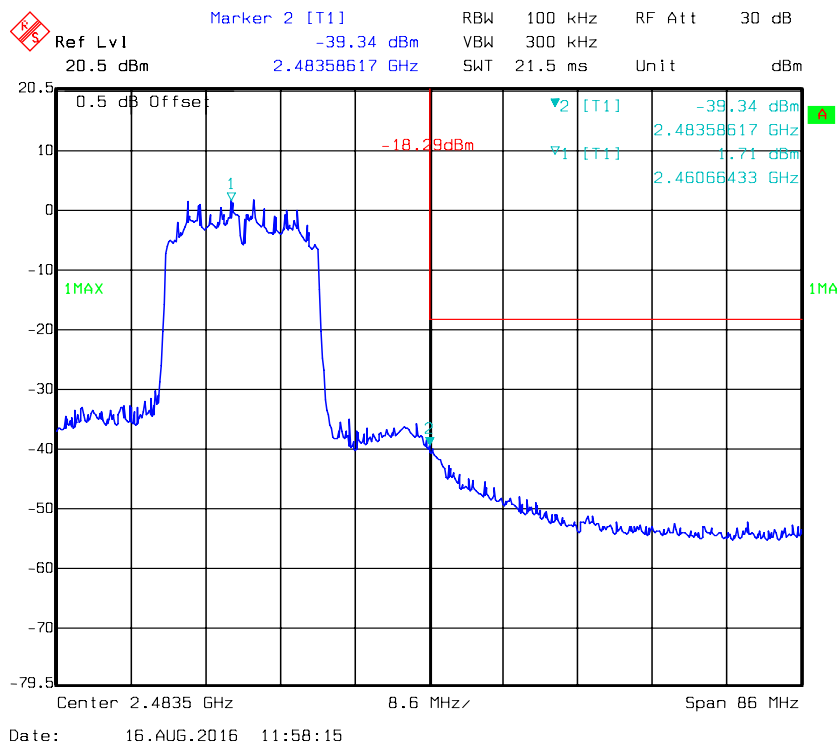
Chain 0, 802.11g: Band Edge, Right Side



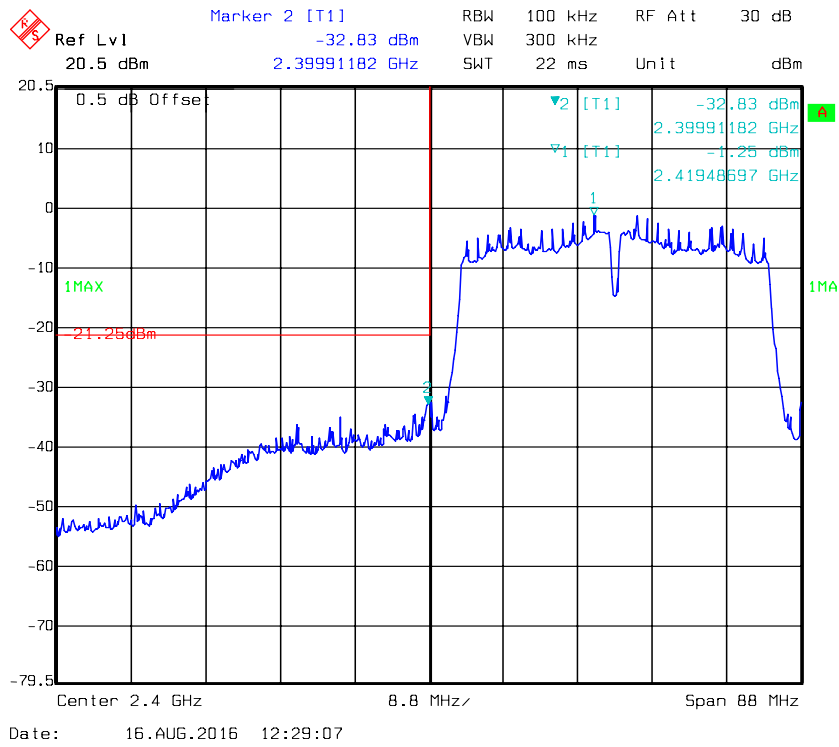
Chain 0, 802.11n ht20 Band Edge, Left Side



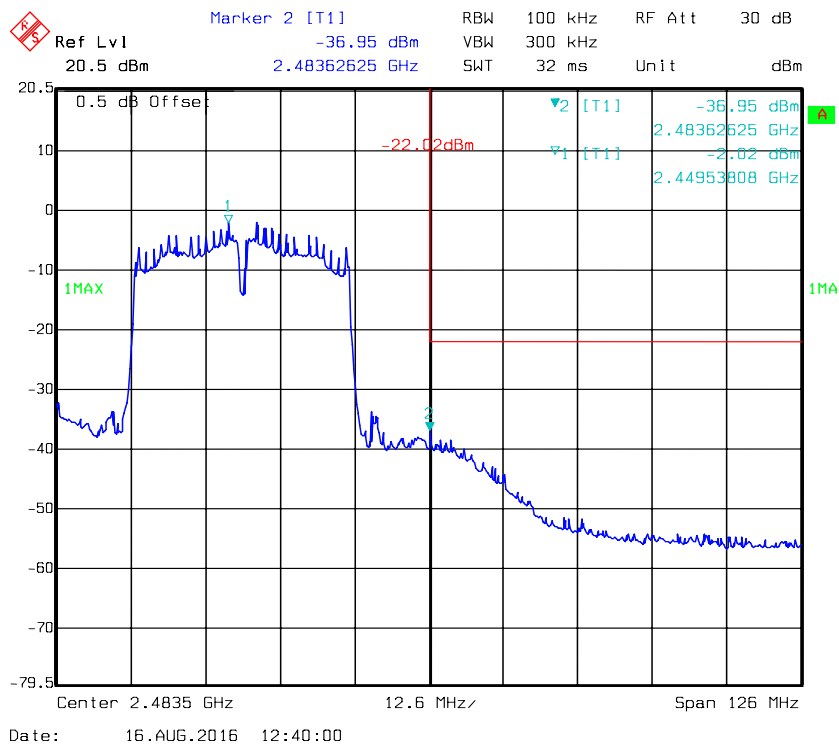
Chain 0, 802.11n ht20 Band Edge, Right Side



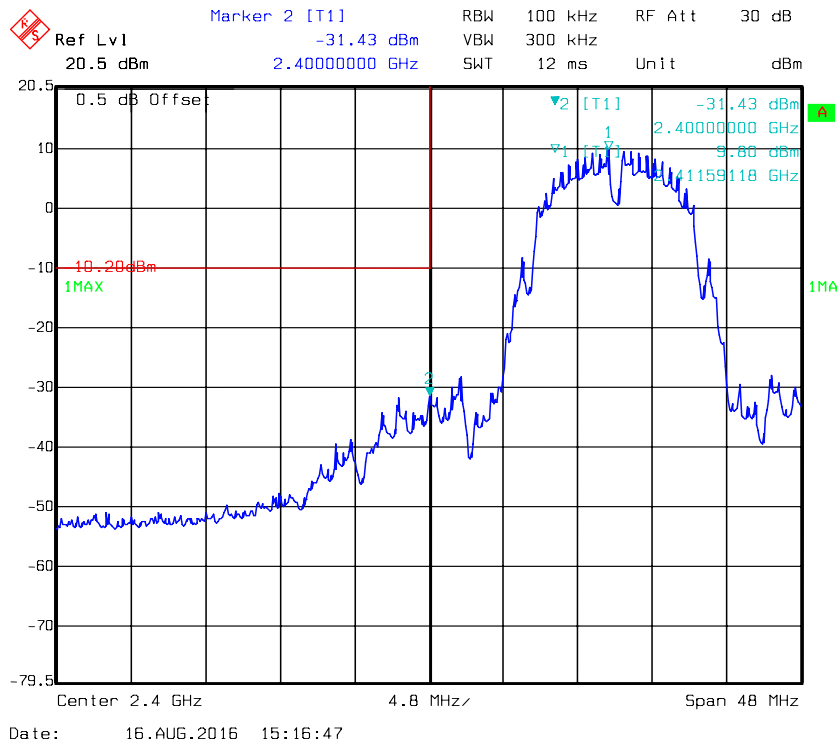
Chain 0, 802.11n ht40 Band Edge, Left Side



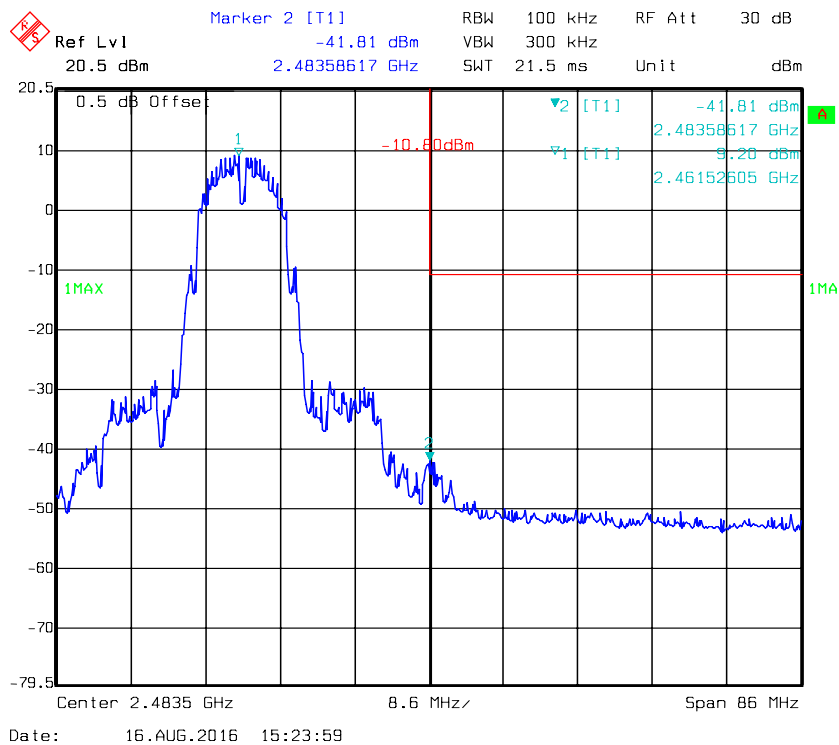
Chain 0, 802.11n ht40 Band Edge, Right Side



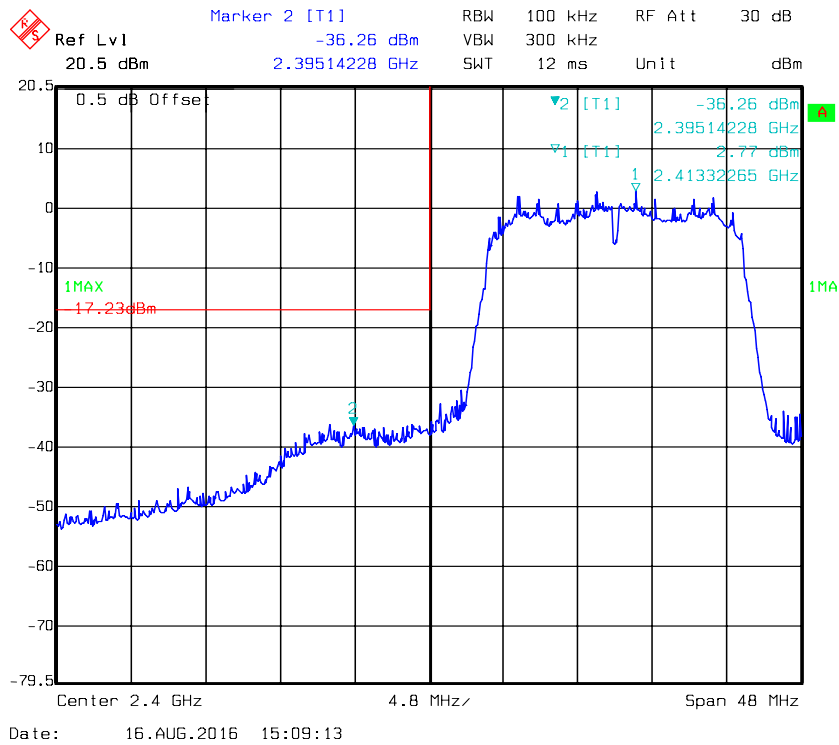
Chain 1, 802.11b: Band Edge, Left Side



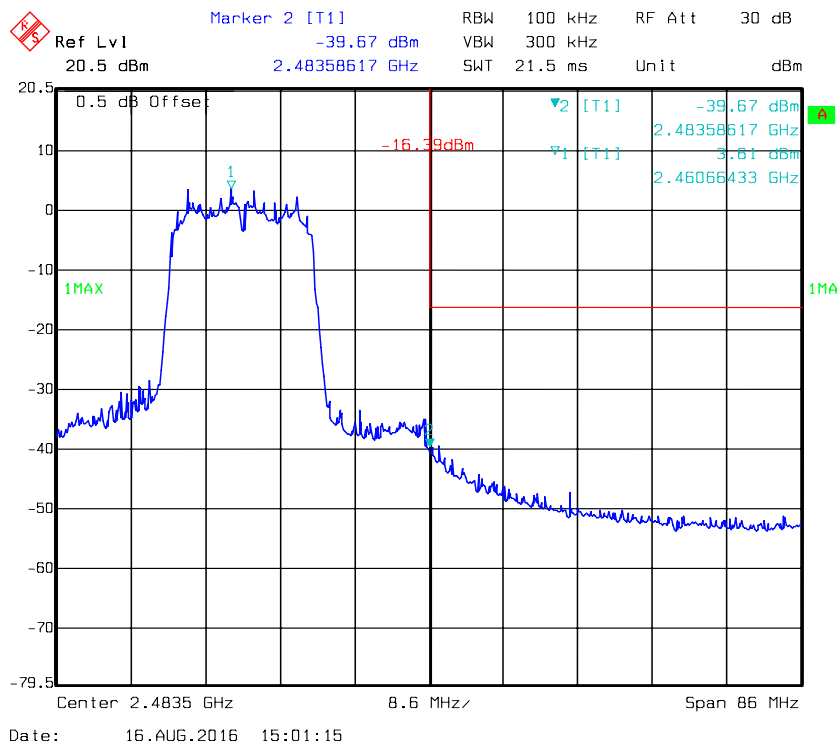
Chain 1, 802.11b: Band Edge, Right Side



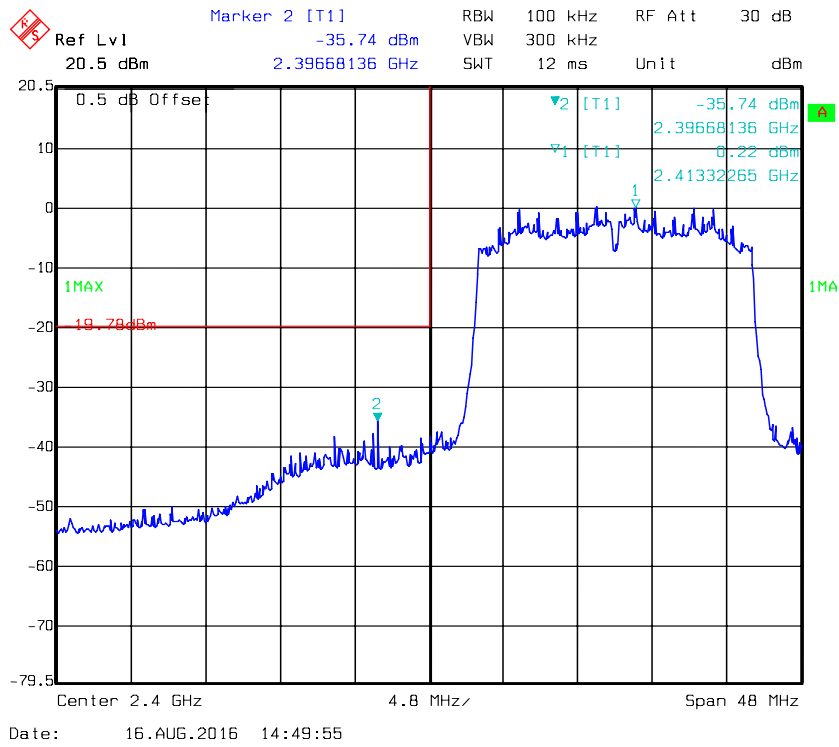
Chain 1, 802.11g: Band Edge, Left Side



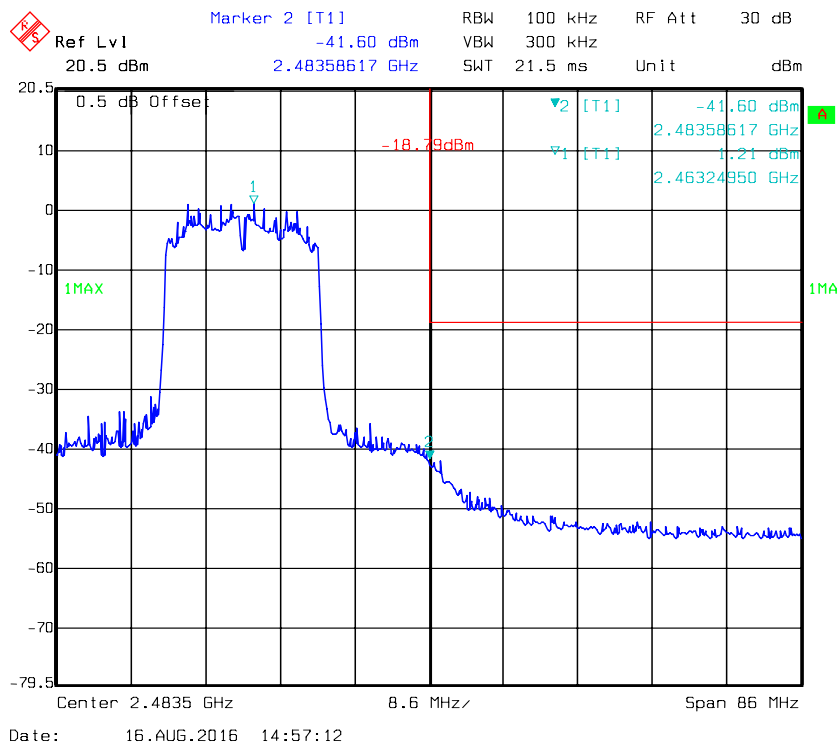
Chain 1, 802.11g: Band Edge, Right Side



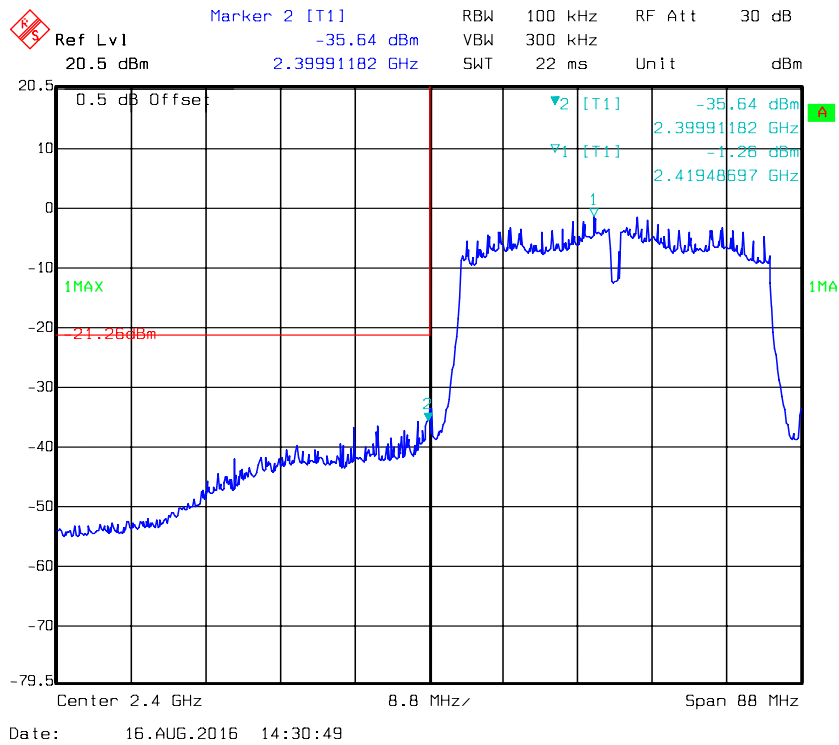
Chain 1, 802.11n ht20 Band Edge, Left Side



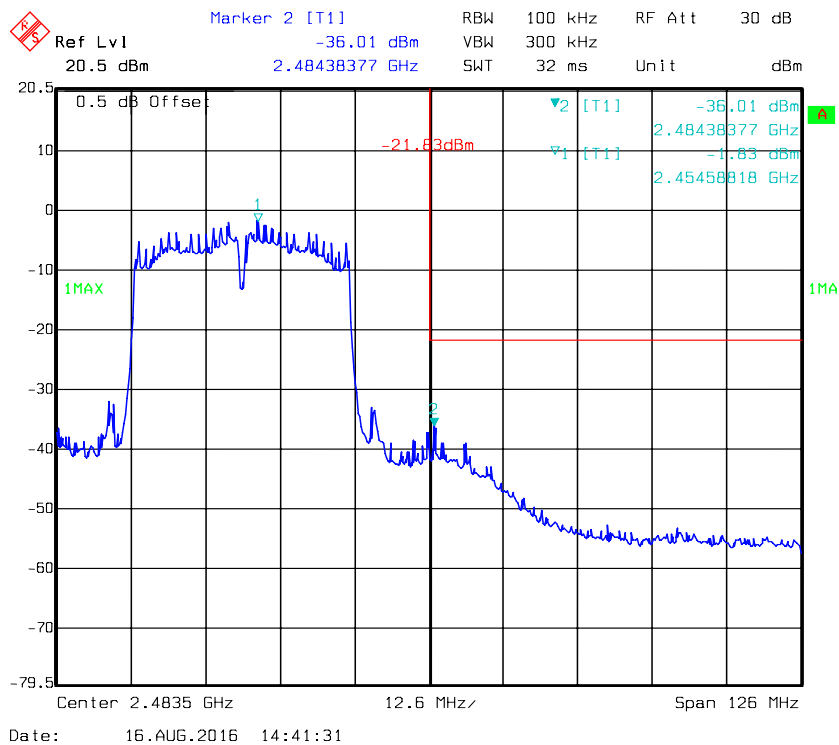
Chain 1, 802.11n ht20 Band Edge, Right Side



Chain 1, 802.11n ht40 Band Edge, Left Side



Chain 1, 802.11n ht40 Band Edge, Right Side



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

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured 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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Data

Environmental Conditions

Temperature:	27.8~28 °C
Relative Humidity:	64~66 %
ATM Pressure:	98.9~99kPa

* The testing was performed by Robin Zheng from 2016-08-16 to 2016-08-17.

Test Mode: Transmitting

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

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)		Total (dBm/3kHz)	Limit (dBm/3kHz)
			Chain 0	Chain 1		
802.11b	Low	2412	-3.66	-4.51	/	≤8
	Middle	2437	-4.96	-4.13	/	≤8
	High	2462	-5.25	-4.51	/	≤8
802.11g	Low	2412	-10.77	-10.96	/	≤8
	Middle	2437	-11.59	-11.22	/	≤8
	High	2462	-11.49	-11.14	/	≤8
802.11n20	Low	2412	-11.94	-13.66	-9.71	≤6
	Middle	2437	-13.68	-14.2	-10.92	≤6
	High	2462	-12.24	-13.03	-9.61	≤6
802.11n40	Low	2422	-15.37	-15.78	-12.56	≤6
	Middle	2437	-16.71	-15.33	-12.96	≤6
	High	2452	-16.21	-15.81	-13	≤6

Note: the device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:

$$\text{Array Gain} = 10 \log(\text{NANT}/\text{NSS}) \text{ dB.}$$

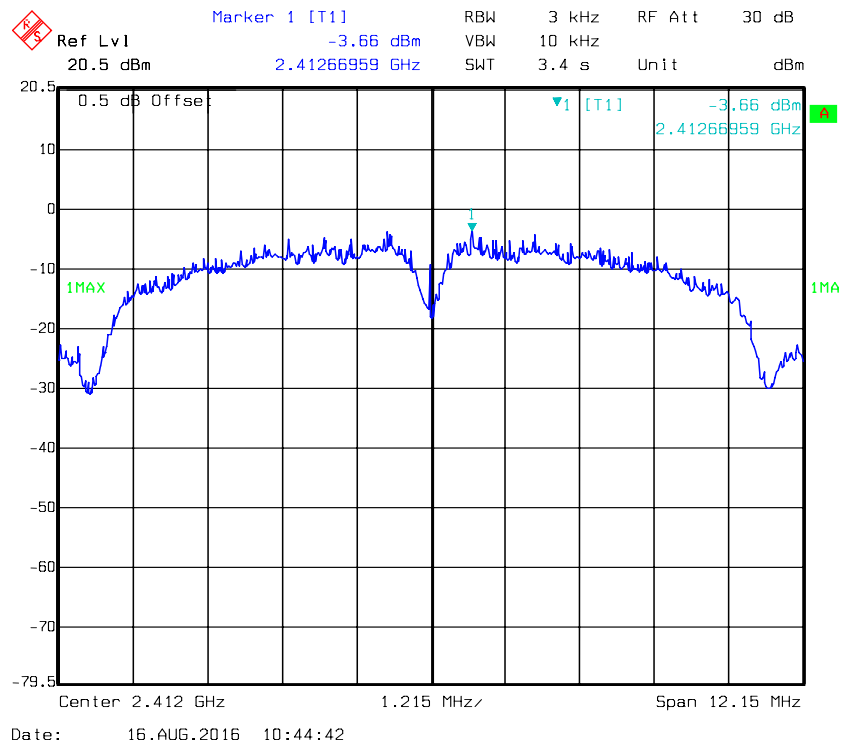
So:

$$\text{Directional gain} = \text{GANT} + \text{Array Gain} = 5.0 + 10 \cdot \log(2) = 8 \text{ dBi}$$

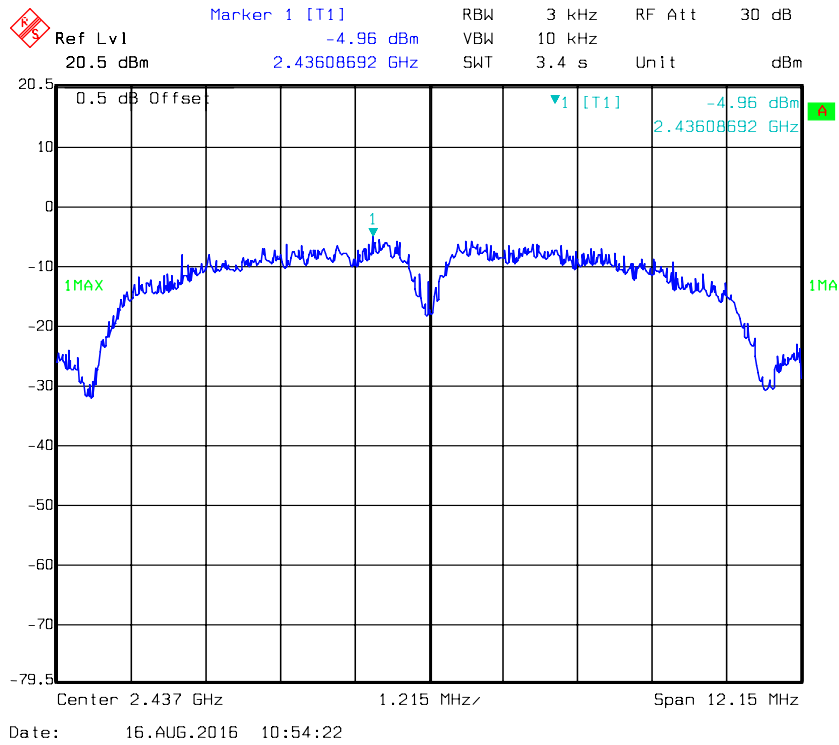
The Power density Limits was reduce 2dB in MIMO mode

Chain 0

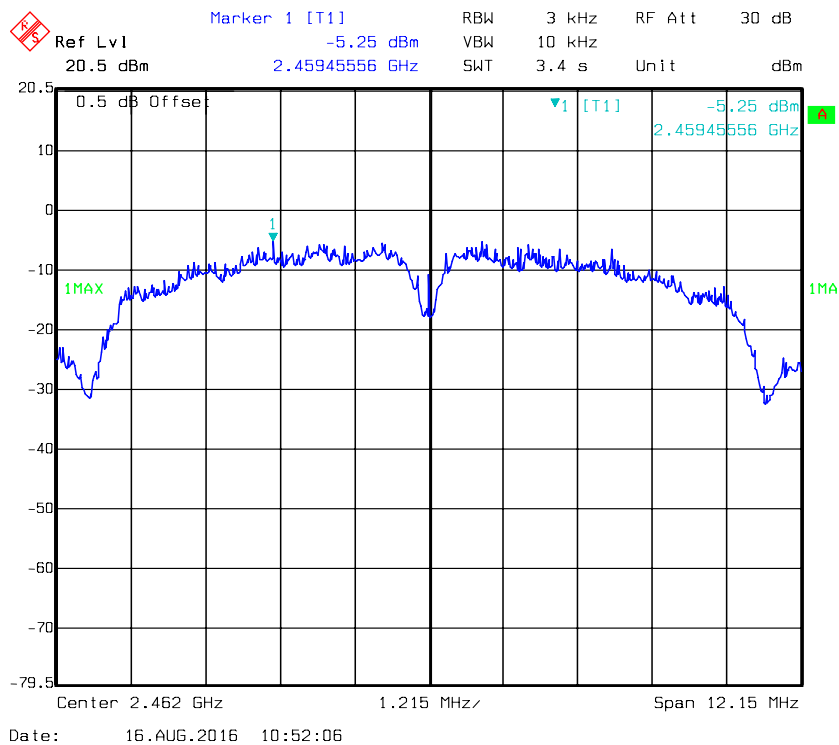
Power Spectral Density, 802.11b Low Channel



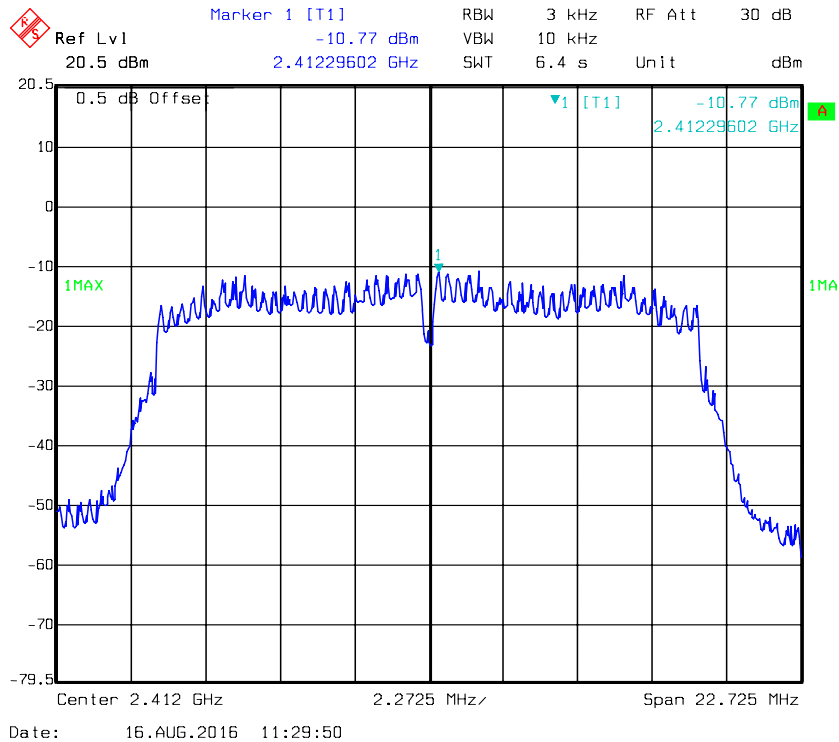
Power Spectral Density, 802.11b Middle Channel



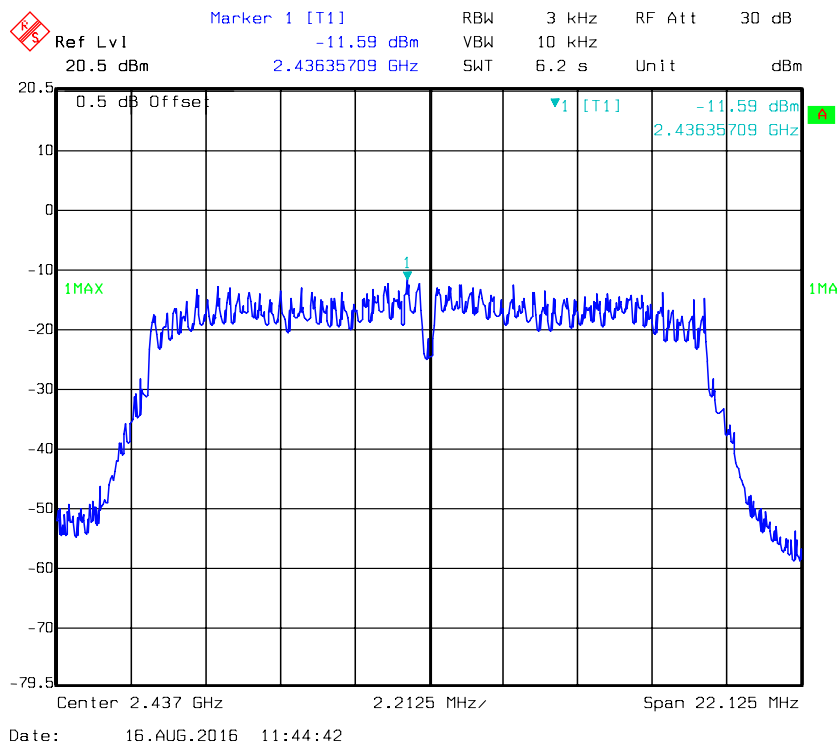
Power Spectral Density, 802.11b High Channel



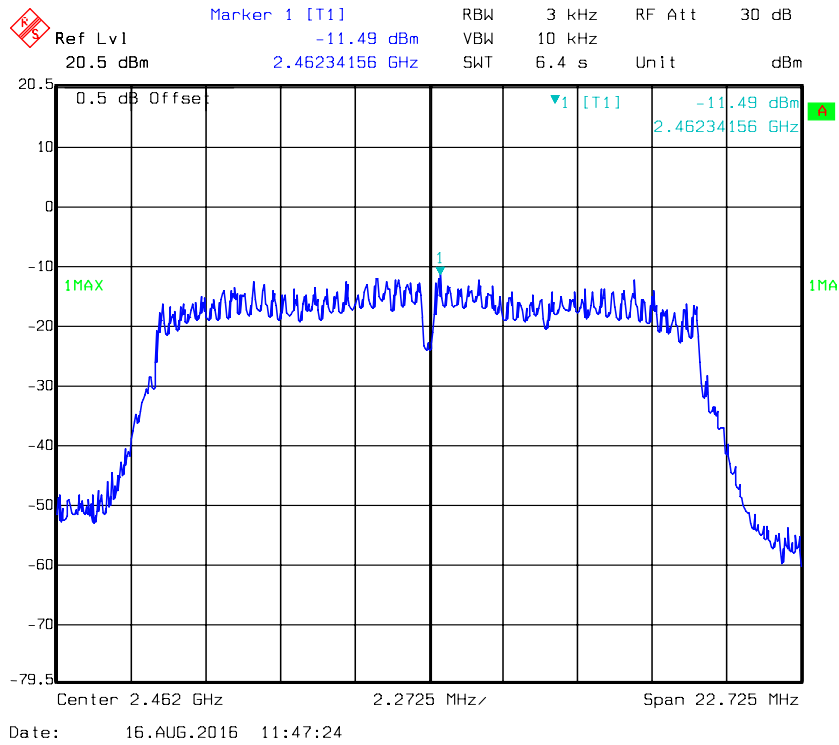
Power Spectral Density, 802.11g Low Channel



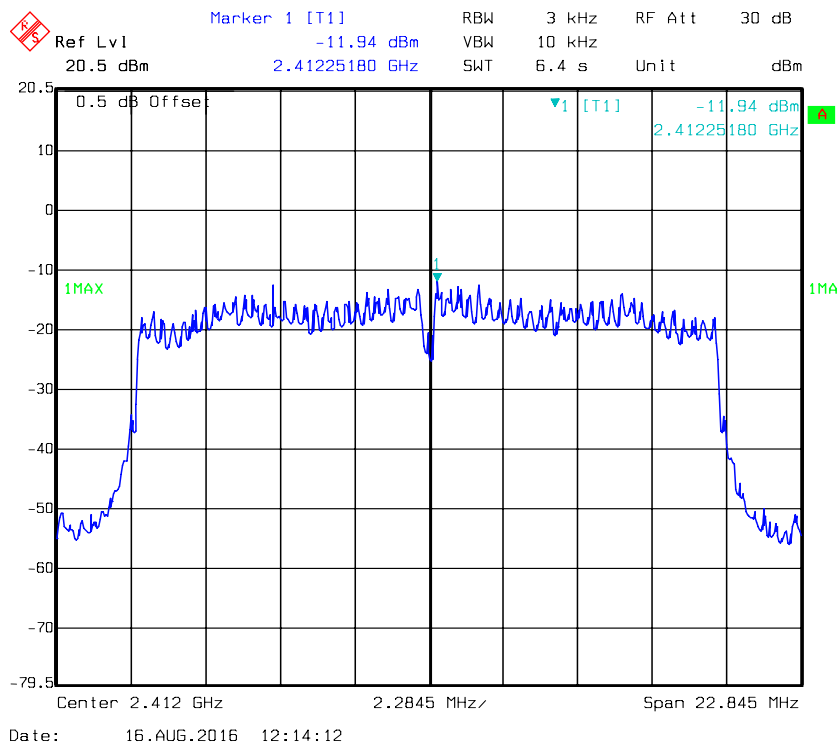
Power Spectral Density, 802.11g Middle Channel



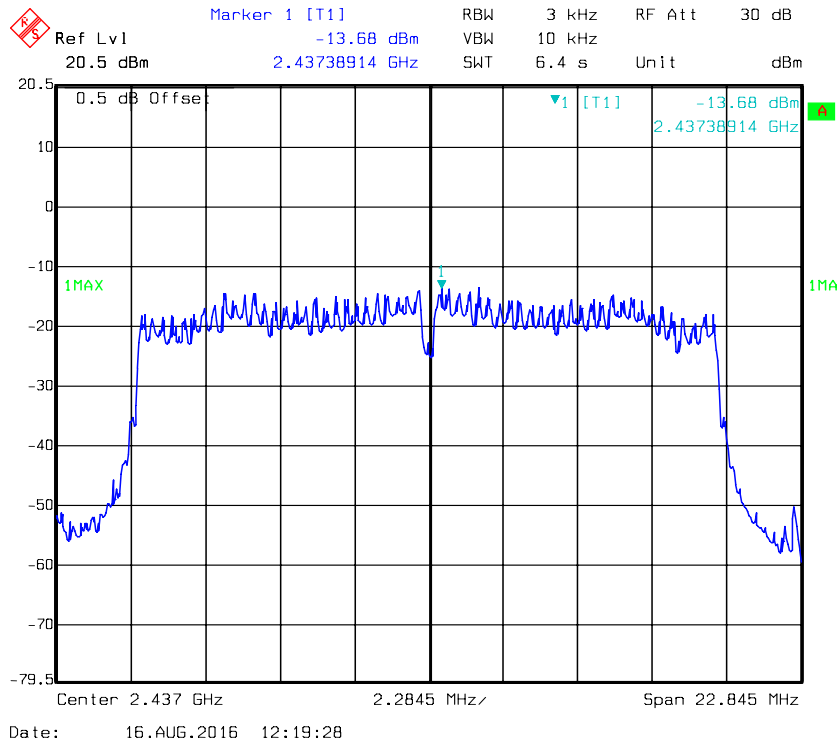
Power Spectral Density, 802.11g High Channel



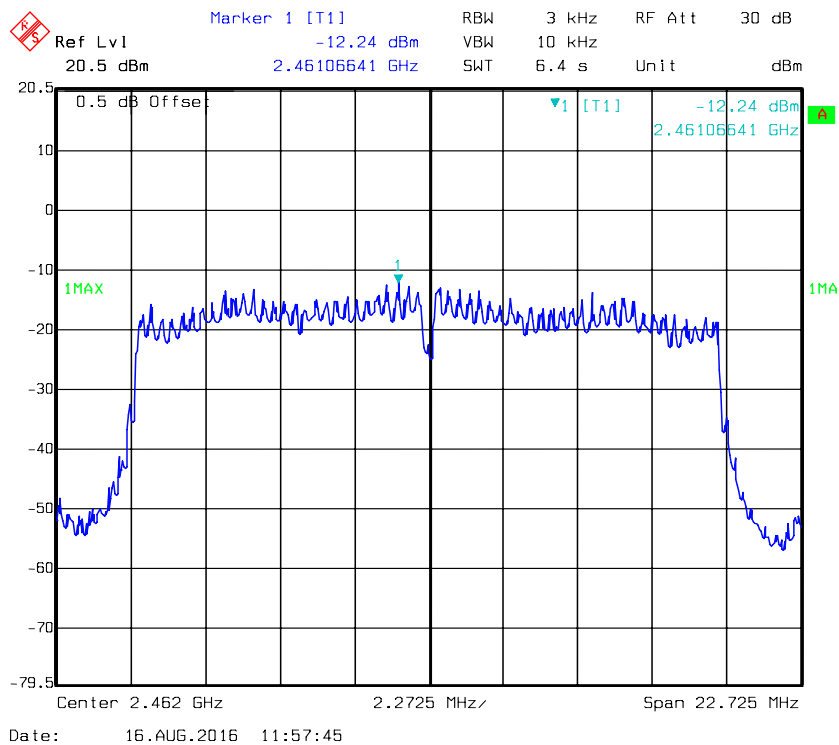
Power Spectral Density, 802.11n ht20 Low Channel



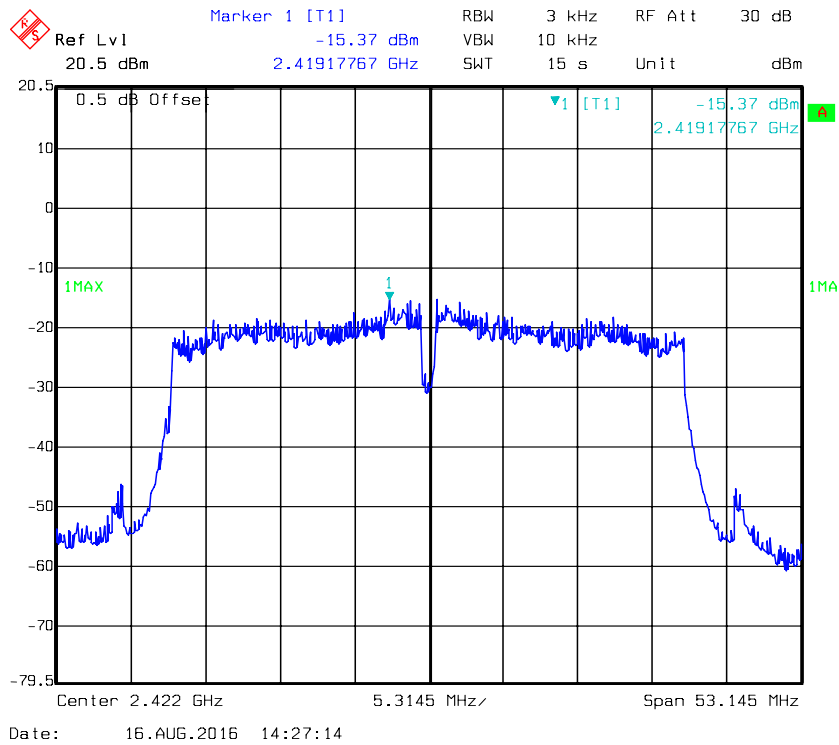
Power Spectral Density, 802.11n ht20 Middle Channel



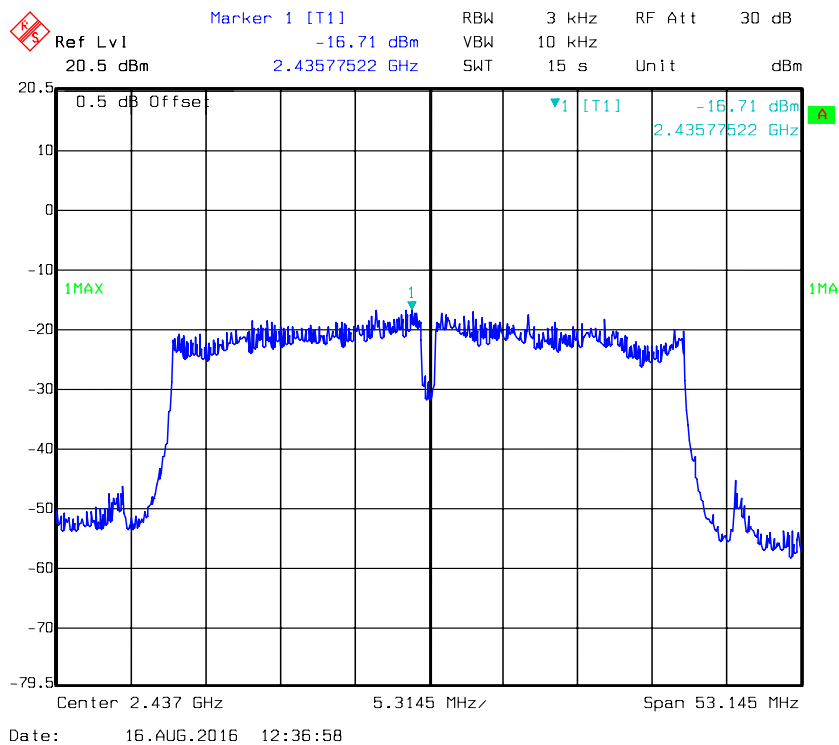
Power Spectral Density, 802.11n ht20 High Channel



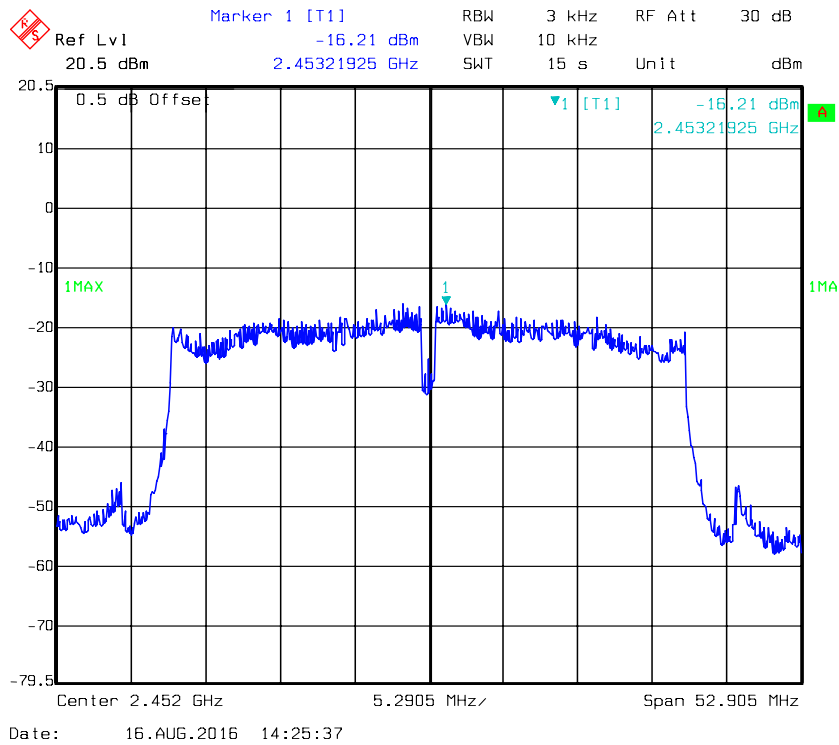
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel

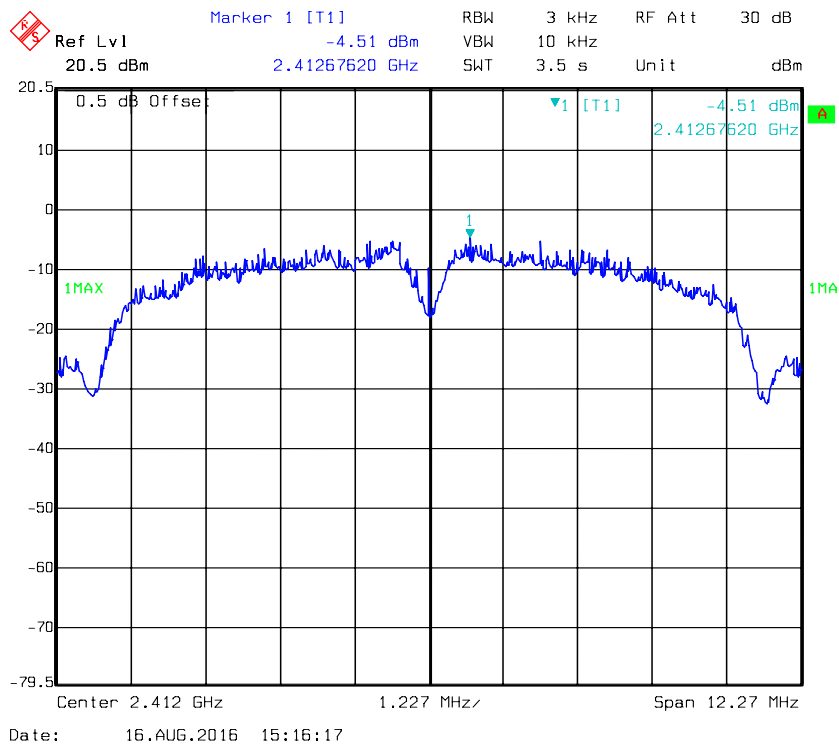


Power Spectral Density, 802.11n ht40 High Channel

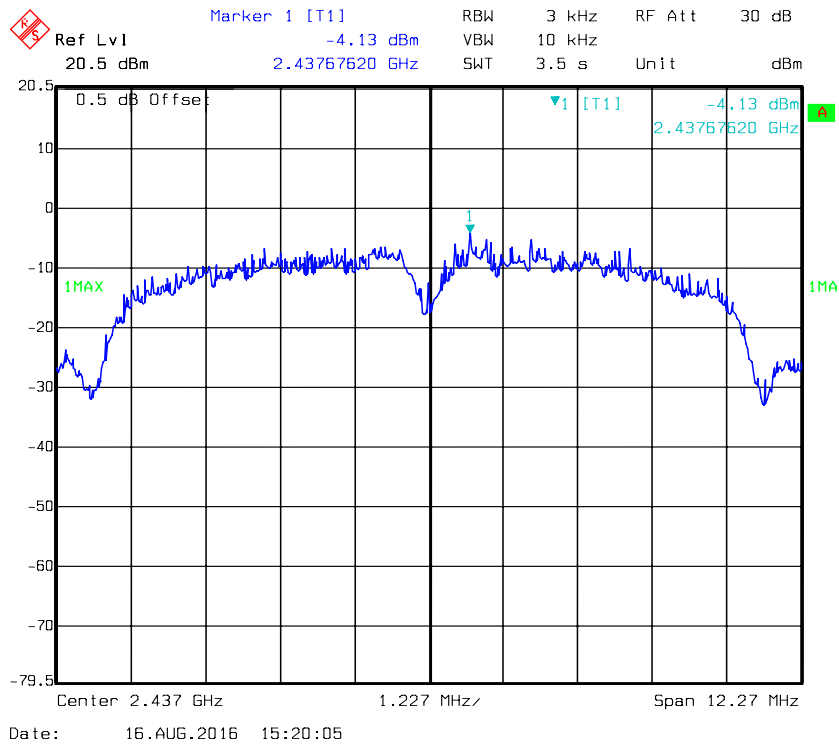


Chain 1

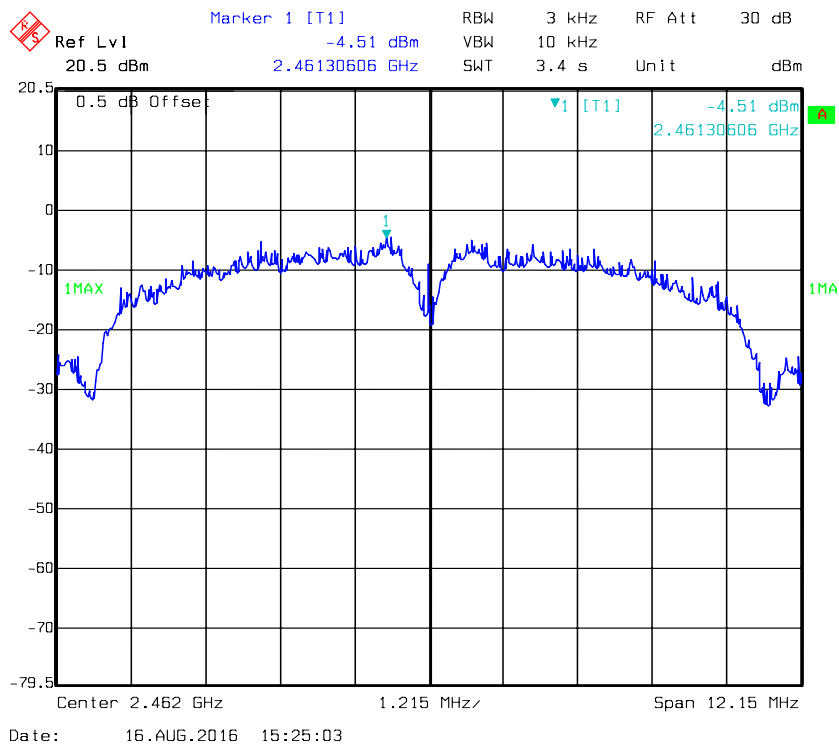
Power Spectral Density, 802.11b Low Channel



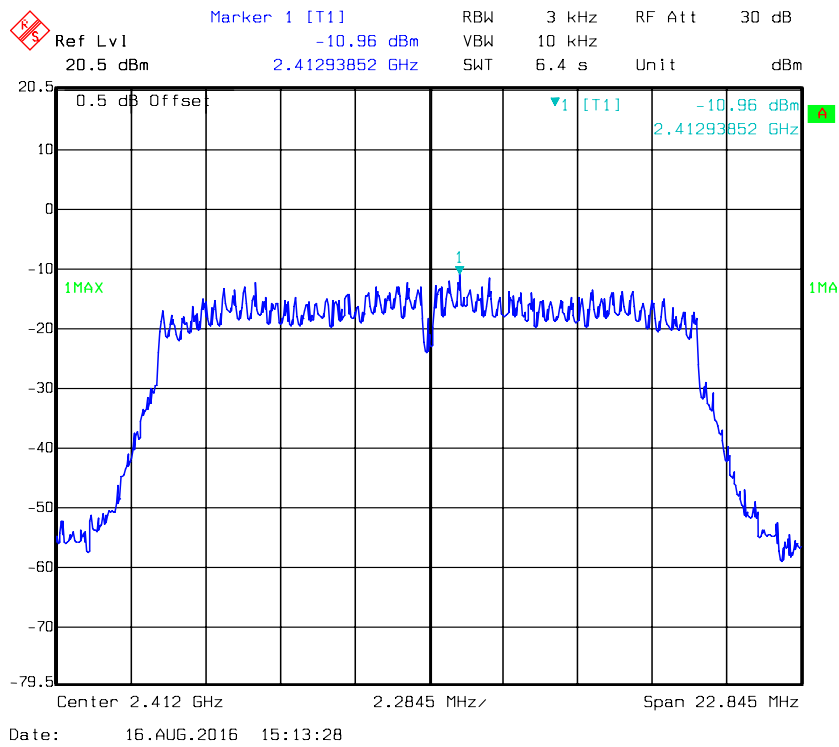
Power Spectral Density, 802.11b Middle Channel



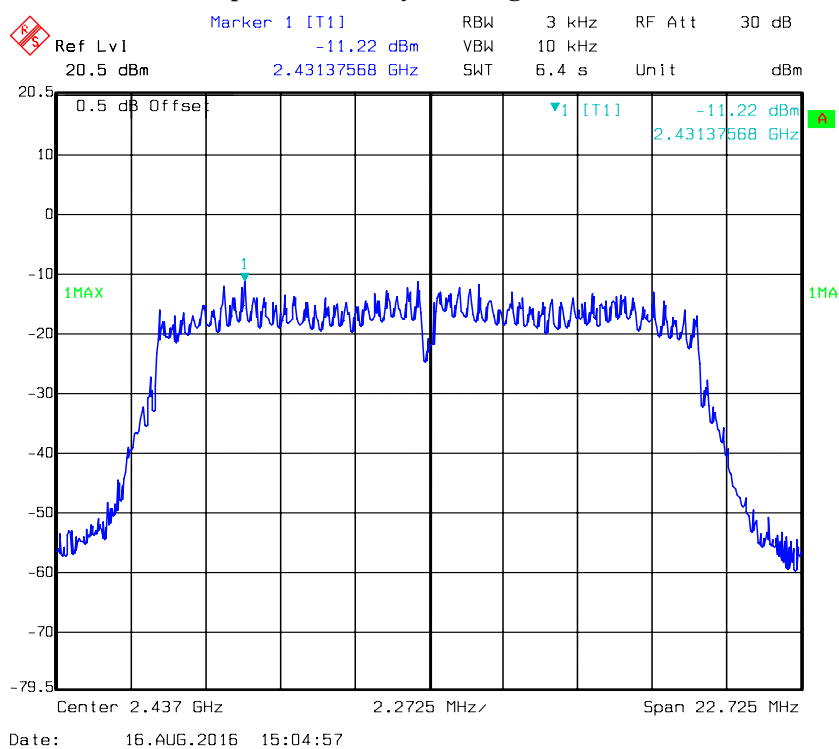
Power Spectral Density, 802.11b High Channel



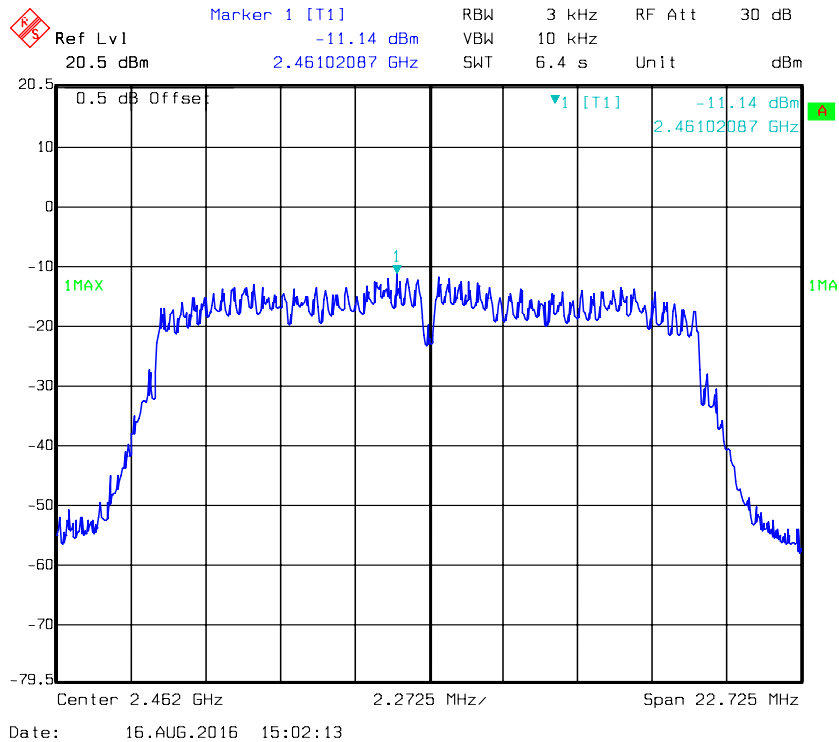
Power Spectral Density, 802.11g Low Channel



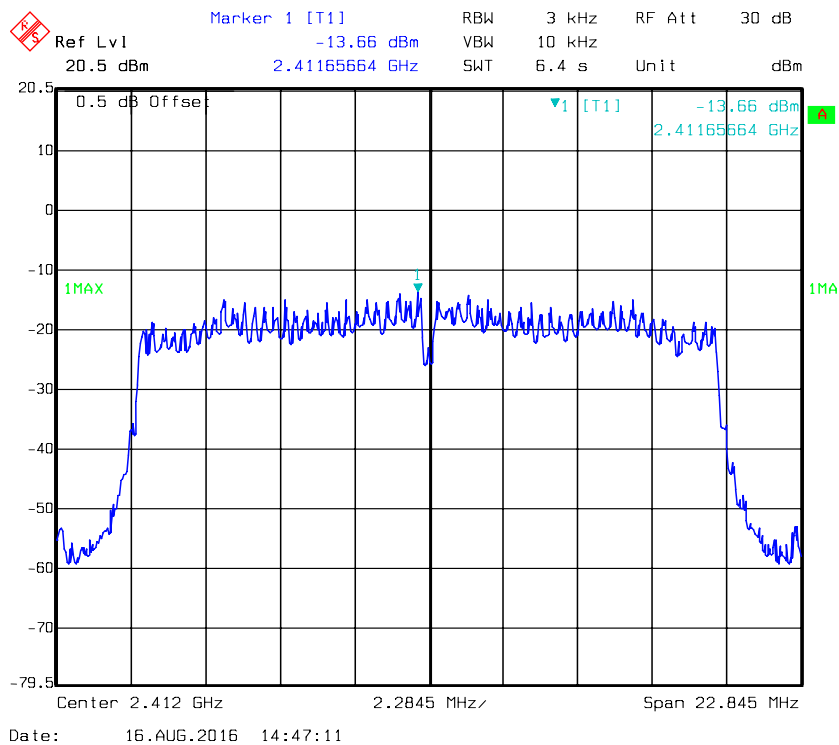
Power Spectral Density, 802.11g Middle Channel



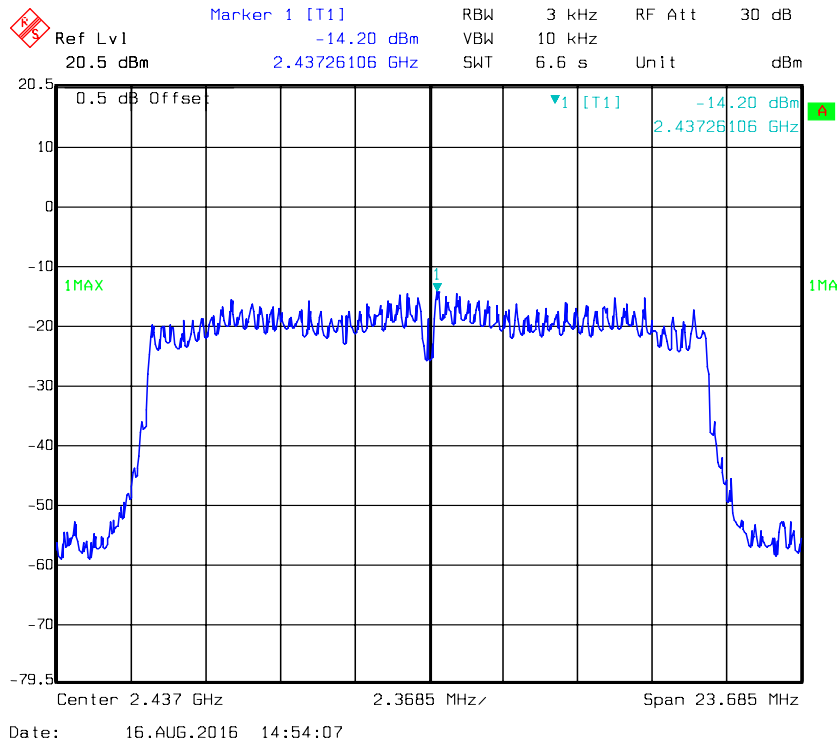
Power Spectral Density, 802.11g High Channel



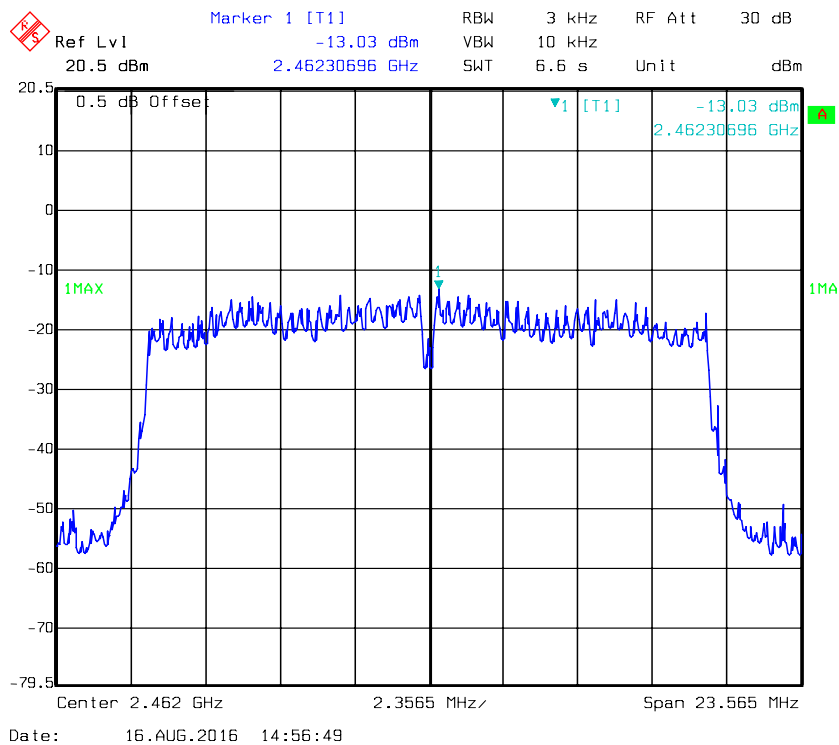
Power Spectral Density, 802.11n ht20 Low Channel



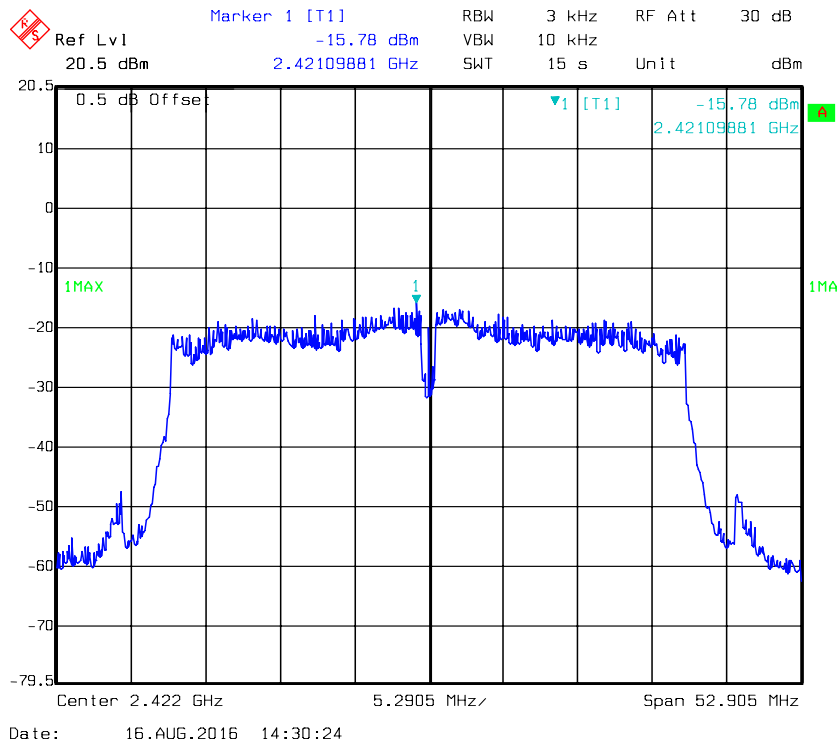
Power Spectral Density, 802.11n ht20 Middle Channel



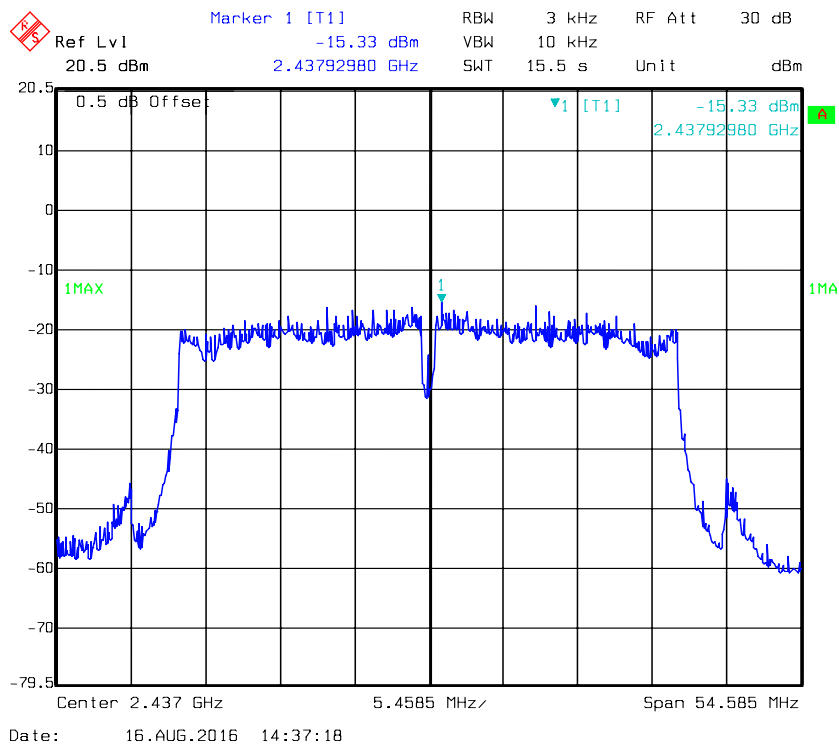
Power Spectral Density, 802.11n ht20 High Channel



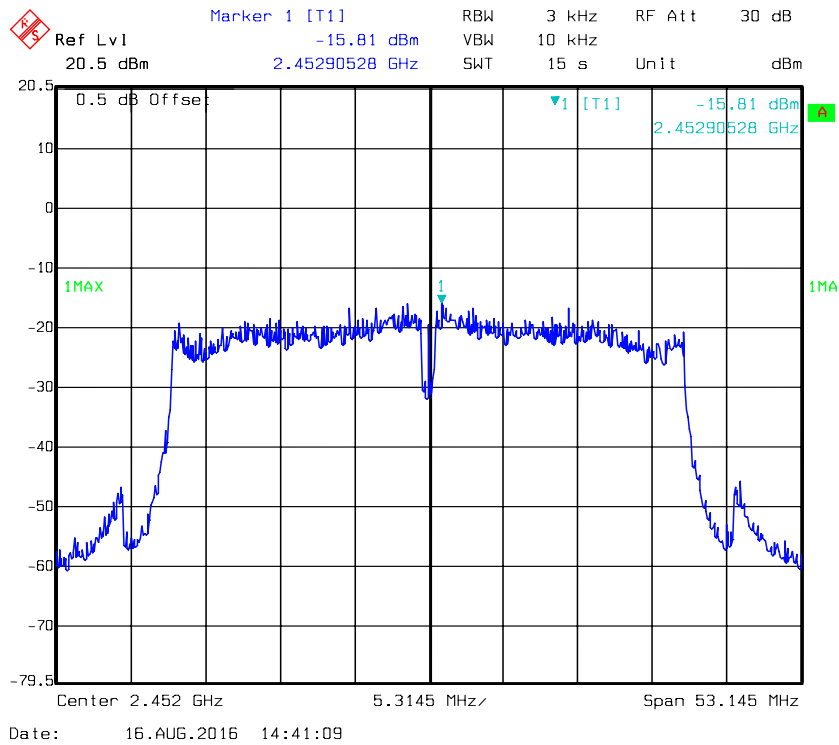
Power Spectral Density, 802.11n ht40 Low Channel



Power Spectral Density, 802.11n ht40 Middle Channel



Power Spectral Density, 802.11n ht40 High Channel



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