FCC PART 15.247

TEST REPORT

For

Shanghai Bwave Technology Co., Ltd.

6F, Building 12, 399 Keyuan Road, Zhangjiang Hi-Tech Park, Shanghai, China

FCC ID: 2AHMN-BW8800

Report Type:	**Product Type:**
Original Report	wireless module

Test Engineer:	Matt Yao
Report Number:	RKS160310001-00A
Report Date:	2016-03-16
Reviewed By:	Jesse Huang EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) Chenghu Road,Kunshan Development Zone No.248,Kunshan, Jiangsu, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Shanghai Bwave Technology Co., Ltd.'s product, model number: BW8800 (FCC ID: 2AHMN-BW8800) or the "EUT" in this report was a wireless module, which was measured approximately: 50mm (L) x23mm (W)) x8mm (H), rated input voltage: DC 5 V.

**All measurement and test data in this report was gathered from production sample serial number: 20160223001 (Assigned by the BACL. The EUT supplied by the applicant was received on 2016-02-23)*

Antenna information

WIFI Mode:

Chain	Manufacturer	Antenna Type	Max. Antenna Gain
0	Signal Plus Technology Co.,Ltd	Passive	2.20dBi
1	Signal Plus Technology Co.,Ltd	Passive	2.11dBi

BLE Mode:

Manufacturer	Antenna Type	Max. Antenna Gain
Signal Plus Technology Co.,Ltd	Passive	2.11dBi

Objective

This report is prepared on behalf of Shanghai Bwave Technology Co., Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS and FCC Part 15.407 NII submission with FCC ID: 2AHMN-BW8800.

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 and FCC KDB558074 D01 DTS Meas Guidance v03r04.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with RF radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Lake Road, Kunshan Development Zone No.248,Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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 and 802.11n-HT20 mode, 11 channels are provided to testing:

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

EUT was tested with Channel 1, 6 and 11.

For Bluetooth LE mode, 40 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	…	…
…	…	…	…
…	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Labtool

We have pretested all of the date rate, The worst condition(maximum power with 100% duty cycle) was performed under:
802.11b: Data rate:1 Mbps, Power level: 18
802.11g: Data rate: 6 Mbps, Power level: 19
802.11n-HT20: Data rate: MCS0, Power level: 18

Support Equipment List and Details

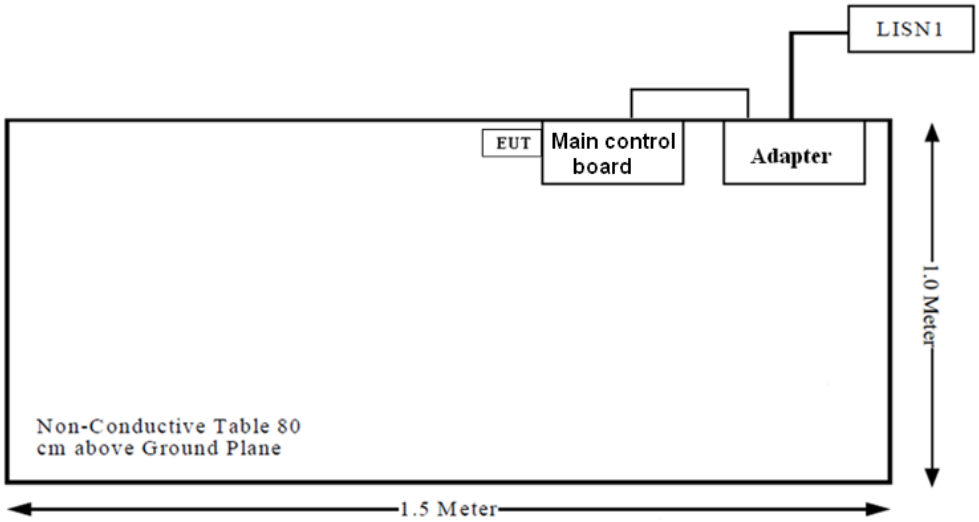
Manufacturer	Description	Model	Serial Number
Bwave	Control board	N/A	N/A

External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.3	EUT	Control board

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §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, §2.1093)

(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 §2.1093 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/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2437	2.20	1.660	18	63.10	20	0.021	1.0
802.11g	2462	2.20	1.660	17	50.12	20	0.017	1.0
802.11n HT20	2462	2.20	1.660	16	39.81	20	0.013	1.0
BLE	2480	2.11	1.626	3	2.00	20	0.0006	1.0

Note: The target power : 802.11b :16dBm±2dB
802.11g :15dBm±2dB
802.11n :14dBm±2dB
BLE:1±2dBm,
which declared by the 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.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has two IPEX connectors to attach the two Passive antennas (chain 0,chain 1)arrangement for wifi, which the antenna gain are 2.2 dBi and 2.11dBi, fulfill the requirement of this section. Please refer to the EUT photos.

The EUT has a IPEX connector to attach a Passive antenna (chain 1) arrangement for Bluetooth, which the antenna gain is 2.11 dBi, 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

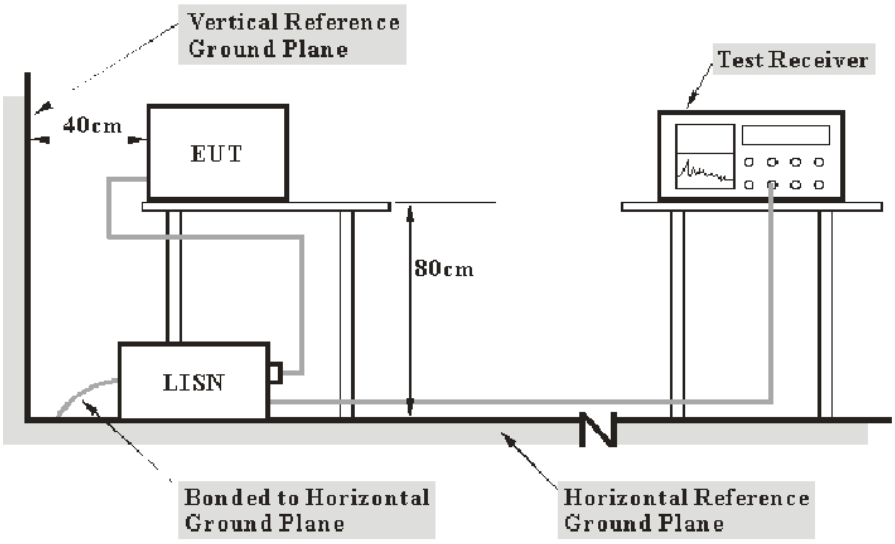
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Kunshan) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

EUT Setup



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

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

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 outlet of the LISN.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	934115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	892239/018	2015-6-23	2016-6-22
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2015-6-19	2016-6-18
HP	Current probe	8710-1744	636	2015-6-19	2016-6-18
FCC	ISN	FCC-TLISN-T8-02	20376	2015-6-23	2016-6-22
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2015-10-01	2016-10-01
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	--	--

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, the worst margin reading as below:

WIFI Mode: **9.35 dB** at 0.425000 **MHz** in the **Neutral** conducted mode

BLE Mode: **8.85 dB** at **0.425000MHz** in the **Neutral** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

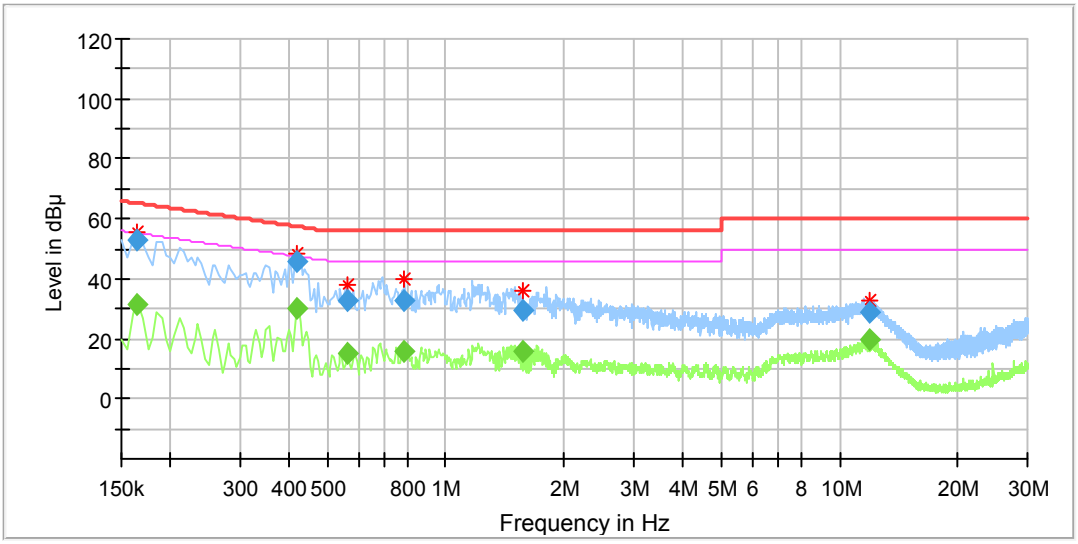
Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-03-16.

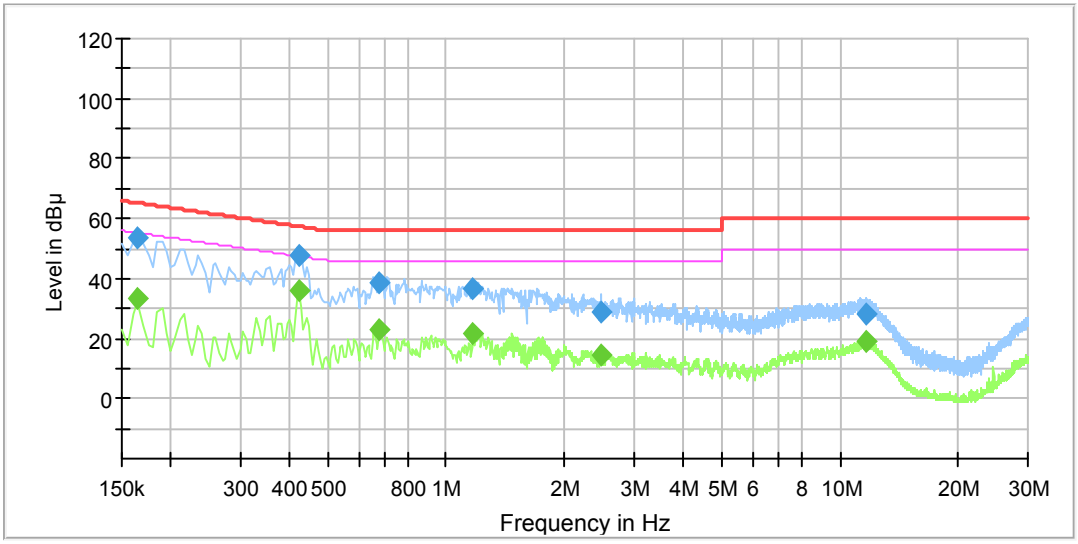
WIFI Mode:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	---	31.47	9.000	L1	11.0	23.74	55.21	Compliance
0.165000	52.97	---	9.000	L1	11.0	12.24	65.21	Compliance
0.420000	---	30.10	9.000	L1	11.0	17.35	47.45	Compliance
0.420000	45.76	---	9.000	L1	11.0	11.69	57.45	Compliance
0.560000	---	15.32	9.000	L1	11.1	30.68	46.00	Compliance
0.560000	32.71	---	9.000	L1	11.1	23.29	56.00	Compliance
0.785000	---	15.55	9.000	L1	11.1	30.45	46.00	Compliance
0.785000	32.43	---	9.000	L1	11.1	23.57	56.00	Compliance
1.565000	---	15.90	9.000	L1	11.1	30.10	46.00	Compliance
1.565000	29.41	---	9.000	L1	11.1	26.59	56.00	Compliance
11.940000	---	19.70	9.000	L1	11.3	30.30	50.00	Compliance
11.940000	28.60	---	9.000	L1	11.3	31.40	60.00	Compliance

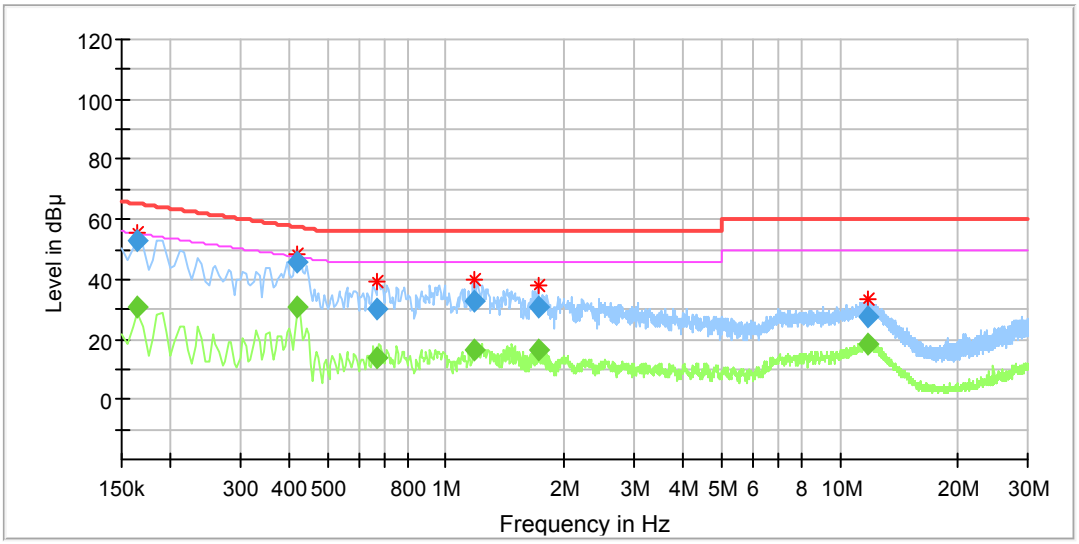
AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	---	33.44	9.000	N	11.0	21.77	55.21	Compliance
0.165000	53.39	---	9.000	N	11.0	11.82	65.21	Compliance
0.425000	---	35.97	9.000	N	11.0	11.38	47.35	Compliance
0.425000	48.00	---	9.000	N	11.0	9.35	57.35	Compliance
0.675000	---	22.86	9.000	N	11.1	23.14	46.00	Compliance
0.675000	38.57	---	9.000	N	11.1	17.43	56.00	Compliance
1.170000	---	21.94	9.000	N	11.1	24.06	46.00	Compliance
1.170000	36.58	---	9.000	N	11.1	19.42	56.00	Compliance
2.480000	---	14.81	9.000	N	11.3	31.19	46.00	Compliance
2.480000	29.15	---	9.000	N	11.3	26.85	56.00	Compliance
11.620000	---	19.06	9.000	N	11.4	30.94	50.00	Compliance
11.620000	28.12	---	9.000	N	11.4	31.88	60.00	Compliance

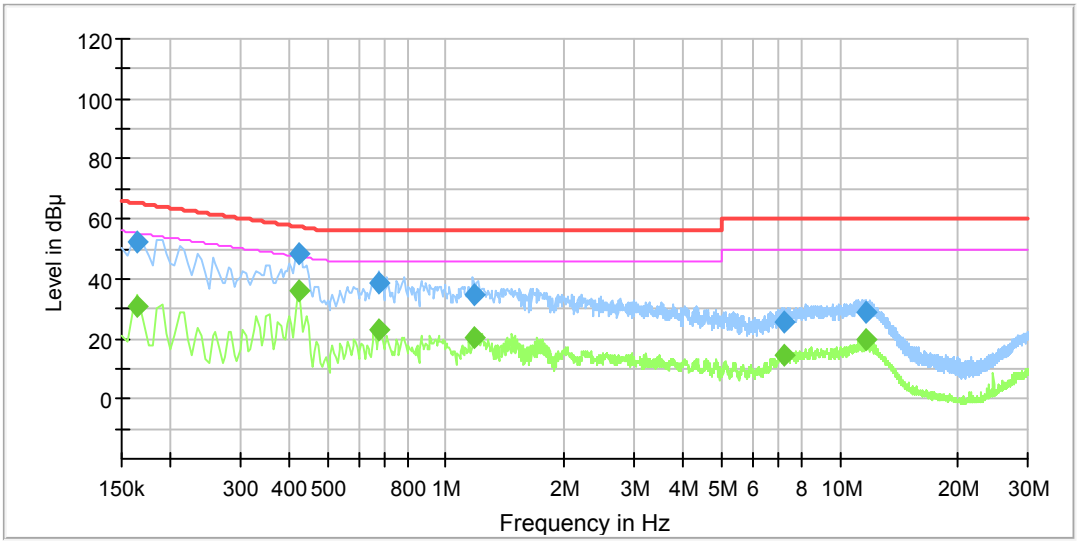
BLE Mode:

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	---	30.61	9.000	L1	11.0	24.60	55.21	Compliance
0.165000	52.72	---	9.000	L1	11.0	12.49	65.21	Compliance
0.420000	---	30.73	9.000	L1	11.0	16.72	47.45	Compliance
0.420000	45.96	---	9.000	L1	11.0	11.49	57.45	Compliance
0.670000	---	13.90	9.000	L1	11.1	32.10	46.00	Compliance
0.670000	30.30	---	9.000	L1	11.1	25.70	56.00	Compliance
1.175000	---	16.45	9.000	L1	11.1	29.55	46.00	Compliance
1.175000	32.48	---	9.000	L1	11.1	23.52	56.00	Compliance
1.710000	---	16.72	9.000	L1	11.2	29.28	46.00	Compliance
1.710000	30.57	---	9.000	L1	11.2	25.43	56.00	Compliance
11.795000	---	18.32	9.000	L1	11.3	31.68	50.00	Compliance
11.795000	27.61	---	9.000	L1	11.3	32.39	60.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	---	30.89	9.000	N	11.0	24.32	55.21	Compliance
0.165000	52.38	---	9.000	N	11.0	12.83	65.21	Compliance
0.425000	---	35.81	9.000	N	11.0	11.54	47.35	Compliance
0.425000	48.50	---	9.000	N	11.0	8.85	57.35	Compliance
0.675000	---	22.90	9.000	N	11.1	23.10	46.00	Compliance
0.675000	38.41	---	9.000	N	11.1	17.59	56.00	Compliance
1.175000	---	20.41	9.000	N	11.1	25.59	46.00	Compliance
1.175000	34.42	---	9.000	N	11.1	21.58	56.00	Compliance
7.225000	---	14.26	9.000	N	11.4	35.74	50.00	Compliance
7.225000	25.72	---	9.000	N	11.4	34.28	60.00	Compliance
11.645000	---	19.52	9.000	N	11.4	30.48	50.00	Compliance
11.645000	28.68	---	9.000	N	11.4	31.32	60.00	Compliance

Note:
1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
2) Corrected Amplitude = Reading + Corr.
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;

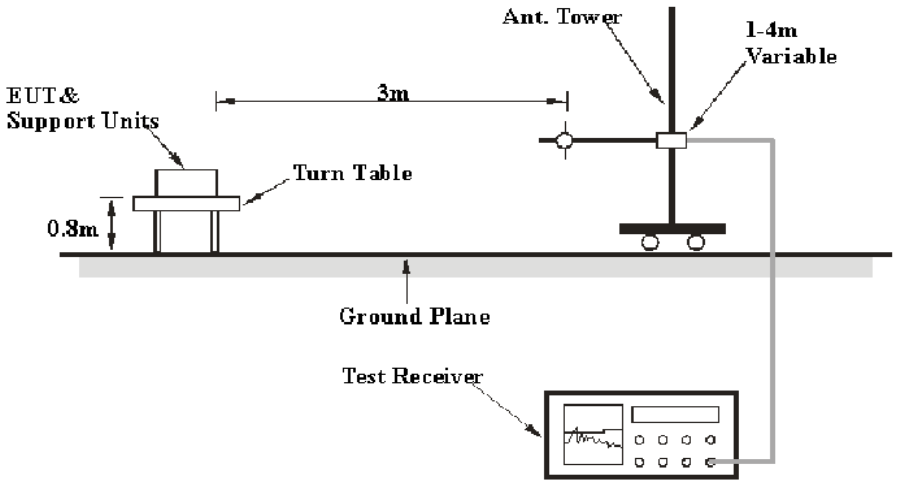
Measurement Uncertainty

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.

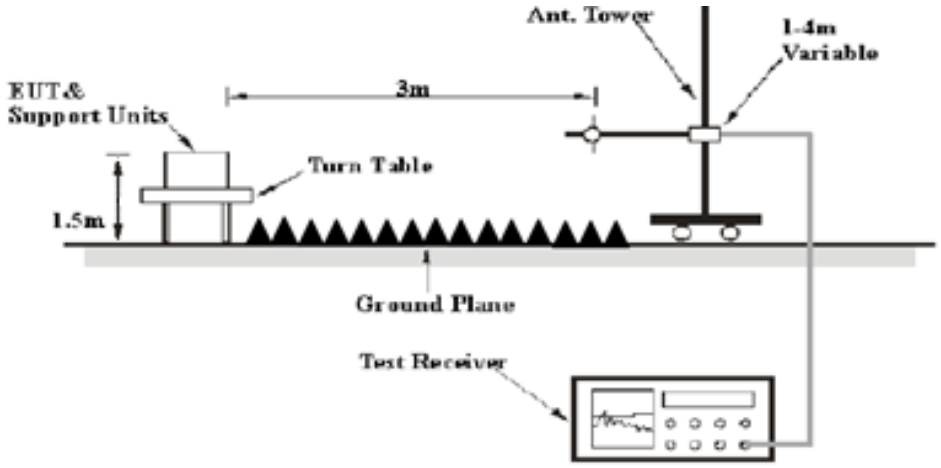
Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters 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 adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

Frequency Range	RBW	Video B/W	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 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrunent	Amplifier	330	171377	2015-09-16	2016-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-09-16	2016-09-16
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2015-09-16	2016-09-16
champrotek	Chamber	Chamber A	1#	2015-09-17	2016-09-17
R&S	Auto test Software	EMC32	V 09.10.0	-	-
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-06-16	2016-12-15

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

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – 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.

WIFI Mode:**5.79 dB** at **4824 MHz** in the **Horizontal** polarization

BLE Mode: **3.47 dB** at 299.974250 **MHz** in the **Horizontal** polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

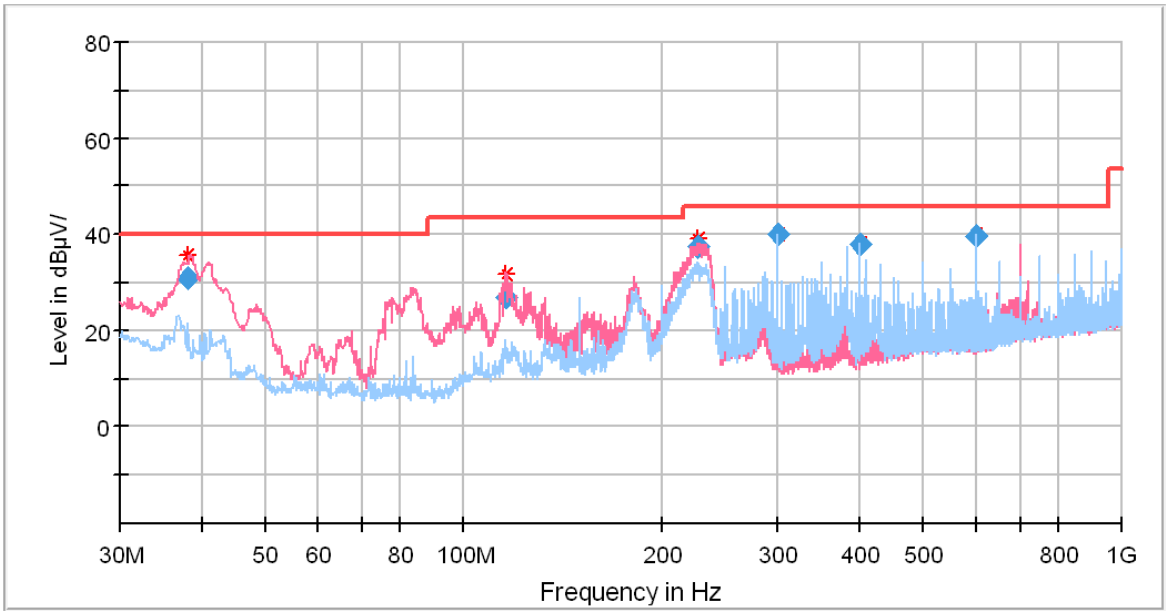
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-03-16

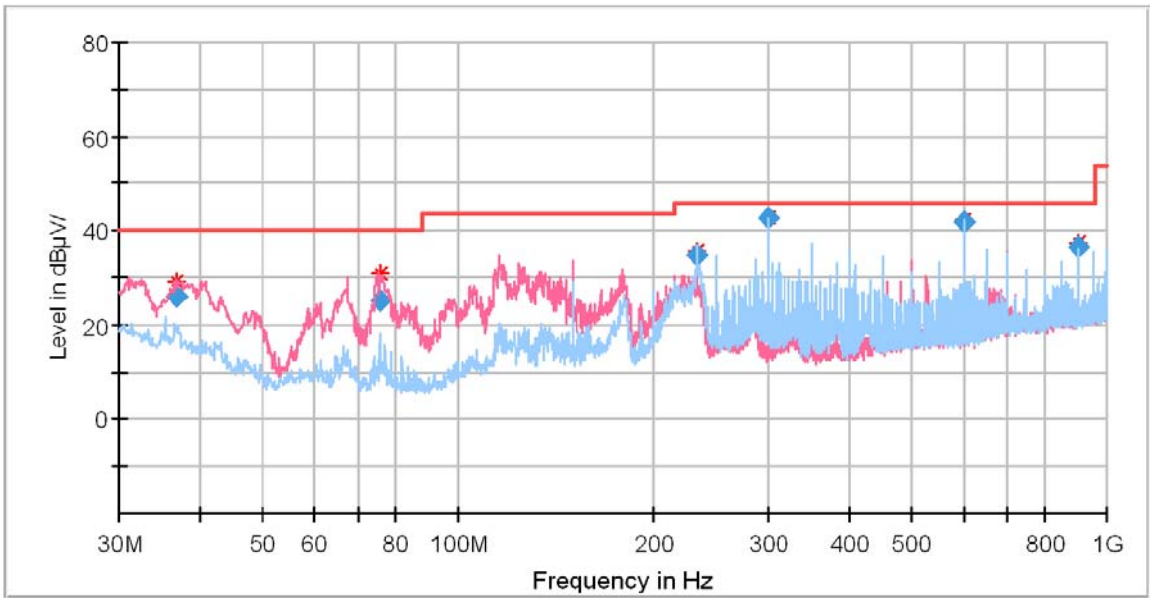
30 MHz-1 GHz:

WIFI Mode, Chain 0+Chain 1:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
37.961700	40.28	QP	128.0	100.0	V	-9.3	30.98	40.00	9.02
115.865850	39.1	QP	203.0	100.0	V	-12.2	26.90	43.50	16.60
227.332850	49.8	QP	300.0	100.0	V	-12.3	37.50	46.00	8.50
299.975400	50.27	QP	171.0	100.0	H	-10.4	39.87	46.00	6.13
399.969750	46.41	QP	176.0	100.0	H	-8.4	38.01	46.00	7.99
599.956350	44.72	QP	318.0	100.0	H	-5.2	39.52	46.00	6.48

BLE Mode:



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
36.869900	32.33	QP	133.0	100.0	V	-8.7	25.99	40.00	14.01
76.101450	43.98	QP	206.0	100.0	V	-17.1	25.13	40.00	14.87
233.460500	46.16	QP	100.0	100.0	H	-12.2	34.91	46.00	11.09
299.974250	43.66	QP	178.0	100.0	H	-10.4	42.53	46.00	3.47
599.955750	36.27	QP	318.0	100.0	H	-5.2	41.80	46.00	4.20
899.931250	31.06	QP	226.0	100.0	H	-0.9	36.37	46.00	9.63

1GHz-25GHz

EUT operation mode: Transmitting

802.11b Mode, Chain 0+ Chain 1:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	95.62	PK	241.00	150.0	V	3.00	98.62	/	/
2412	92.56	Ave	241.00	150.0	V	3.00	95.56	/	/
2412	96.36	PK	162.00	150.0	H	3.00	99.36	/	/
2412	92.24	Ave	162.00	150.0	H	3.00	95.24	/	/
2357	32.76	PK	133.00	150.0	V	2.50	35.26	74.00	38.74
2357	23.05	Ave	133.00	150.0	V	2.50	25.55	54.00	28.45
2390	38.72	PK	219.00	200.0	V	2.90	41.62	74.00	32.38
2390	22.36	Ave	219.00	200.0	V	2.90	25.26	54.00	28.74
4824	39.82	PK	24.00	150.0	H	13.80	53.62	74.00	20.38
4824	34.41	Ave	24.00	150.0	H	13.80	48.21	54.00	5.79
6620	32.46	PK	89.00	200.0	V	18.80	51.26	74.00	22.74
6620	15.45	Ave	89.00	200.0	V	18.80	34.25	54.00	19.75
7236	33.16	PK	110.00	200.0	H	18.80	51.96	74.00	22.04
7236	16.34	Ave	110.00	200.0	H	18.80	35.14	54.00	18.86

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	96.15	PK	231.00	150.0	V	3.00	99.15	/	/
2437	90.24	Ave	231.00	150.0	V	3.00	93.24	/	/
2437	95.12	PK	123.00	200.0	H	3.00	98.12	/	/
2437	89.69	Ave	123.00	200.0	H	3.00	92.69	/	/
1477	36.66	PK	130.00	150.0	V	0.00	36.66	74.00	37.34
1477	23.69	Ave	130.00	150.0	V	0.00	23.69	54.00	30.31
1696	43.86	PK	167.00	200.0	H	0.70	44.56	74.00	29.44
1696	24.91	Ave	167.00	200.0	H	0.70	25.61	54.00	28.39
4874	39.42	PK	10.00	150.0	V	13.90	53.32	74.00	20.68
4874	33.25	Ave	10.00	150.0	V	13.90	47.15	54.00	6.85
6677	30.56	PK	356.00	200.0	H	18.80	49.36	74.00	24.64
6677	16.46	Ave	356.00	200.0	H	18.80	35.26	54.00	18.74
7311	30.74	PK	237.00	150.0	H	18.90	49.64	74.00	24.36
7311	15.93	Ave	237.00	150.0	H	18.90	34.83	54.00	19.17

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	95.23	PK	120.00	200.0	V	3.00	98.23	/	/
2462	93.21	Ave	120.00	200.0	V	3.00	96.21	/	/
2462	94.16	PK	180.00	100.0	H	3.00	97.16	/	/
2462	87.63	Ave	180.00	100.0	H	3.00	90.63	/	/
2483.5	52.44	PK	145.00	200.0	V	3.20	55.64	74.00	18.36
2483.5	38.36	Ave	145.00	200.0	V	3.20	41.56	54.00	12.44
2563	40.16	PK	330.00	200.0	V	4.20	44.36	74.00	29.64
2563	29.49	Ave	330.00	200.0	V	4.20	33.69	54.00	20.31
4924	45.56	PK	67.00	200.0	H	14.00	59.56	74.00	14.44
4924	32.75	Ave	67.00	200.0	H	14.00	46.75	54.00	7.25
6681	36.85	PK	123.00	100.0	H	18.80	55.65	74.00	18.35
6681	17.84	Ave	123.00	100.0	H	18.80	36.64	54.00	17.36
7386	31.46	PK	290.00	200.0	H	19.80	51.26	74.00	22.74
7386	14.85	Ave	290.00	200.0	H	19.80	34.65	54.00	19.35

802.11g Mode, Chain 0+ Chain 1:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	93.23	PK	110.0	200.0	V	3.00	96.23	/	/
2412	89.32	Ave	110.0	200.0	V	3.00	92.32	/	/
2412	92.23	PK	40.0	200.0	H	3.00	95.23	/	/
2412	88.89	Ave	40.0	200.0	H	3.00	91.89	/	/
2357	34.94	PK	177.0	200.0	V	2.50	37.44	74.00	36.56
2357	21.08	Ave	177.0	200.0	V	2.50	23.58	54.00	30.42
2390	38.75	PK	65.0	200.0	H	2.90	41.65	74.00	32.35
2390	19.64	Ave	65.0	200.0	H	2.90	22.54	54.00	31.46
4824	36.20	PK	91.0	200.0	H	13.80	50.00	74.00	24.00
4824	33.63	Ave	91.0	200.0	H	13.80	47.43	54.00	6.57
6665	33.03	PK	230.0	150.0	V	18.80	51.83	74.00	22.17
6665	18.96	Ave	230.0	150.0	V	18.80	37.76	54.00	16.24
7236	29.76	PK	170.0	200.0	H	18.80	48.56	74.00	25.44
7236	17.99	Ave	170.0	200.0	H	18.80	36.79	54.00	17.21

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	93.23	PK	120.0	200.0	V	3.00	96.23	/	/
2437	87.56	Ave	120.0	200.0	V	3.00	90.56	/	/
2437	92.56	PK	60.0	200.0	H	3.00	95.56	/	/
2437	87.59	Ave	60.0	200.0	H	3.00	90.59	/	/
1480	40.87	PK	190.0	200.0	V	0.00	40.87	74.00	33.13
1480	22.33	Ave	190.0	200.0	V	0.00	22.33	54.00	31.67
1590	40.92	PK	80.0	200.0	H	0.70	41.62	74.00	32.38
1590	27.21	Ave	80.0	200.0	H	0.70	27.91	54.00	26.09
4874	41.90	PK	0.0	200.0	V	13.90	55.80	74.00	18.20
4874	33.56	Ave	0.0	200.0	V	13.90	47.46	54.00	6.54
6636	32.75	PK	310.0	150.0	H	18.80	51.55	74.00	22.45
6636	19.54	Ave	310.0	150.0	H	18.80	38.34	54.00	15.66
7311	29.79	PK	194.0	200.0	H	18.90	48.69	74.00	25.31
7311	20.88	Ave	194.0	200.0	H	18.90	39.78	54.00	14.22

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	94.26	PK	96.0	200.0	V	3.00	97.26	/	/
2462	90.26	Ave	96.0	200.0	V	3.00	93.26	/	/
2462	93.56	PK	36.0	150.0	H	3.00	96.56	/	/
2462	89.31	Ave	36.0	150.0	H	3.00	92.31	/	/
2483.5	52.64	PK	166.0	150.0	V	3.20	55.84	74.00	18.16
2483.5	42.06	Ave	166.0	150.0	V	3.20	45.26	54.00	8.74
2526	37.35	PK	60.0	150.0	H	4.20	41.55	74.00	32.45
2556	25.87	Ave	60.0	150.0	H	4.20	30.07	54.00	23.93
4924	42.26	PK	20.0	200.0	V	14.00	56.26	74.00	17.74
4924	33.45	Ave	20.0	200.0	V	14.00	47.45	54.00	6.55
6632	32.95	PK	286.0	200.0	H	18.70	51.65	74.00	22.35
6632	17.79	Ave	286.0	200.0	H	18.70	36.49	54.00	17.51
7386	26.57	PK	170.0	200.0	V	19.80	46.37	74.00	27.63
7386	27.64	Ave	170.0	200.0	V	19.80	47.44	54.00	6.56

802.11n-HT20 Mode, Chain 0 + Chain 1:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	92.69	PK	160.0	200.0	V	3.00	95.69	/	/
2412	88.56	Ave	160.0	200.0	V	3.00	91.56	/	/
2412	92.23	PK	89.0	200.0	H	3.00	95.23	/	/
2412	89.31	Ave	89.0	200.0	H	3.00	92.31	/	/
2366	31.86	PK	290.0	150.0	H	2.90	34.76	74.00	39.24
2366	21.77	Ave	290.0	150.0	H	2.90	24.67	54.00	29.33
2390	41.85	PK	119.0	150.0	V	2.90	44.75	74.00	29.25
2390	21.16	Ave	119.0	150.0	V	2.90	24.06	54.00	29.94
4824	28.64	PK	61.0	200.0	H	13.80	42.44	74.00	31.56
4824	33.95	Ave	61.0	200.0	H	13.80	47.75	54.00	6.25
6655	29.64	PK	322.0	150.0	V	18.80	48.44	74.00	25.56
6655	16.38	Ave	322.0	150.0	V	18.80	35.18	54.00	18.82
7236	33.84	PK	188.0	200.0	H	18.80	52.64	74.00	21.36
7236	15.69	Ave	188.0	200.0	H	18.80	34.49	54.00	19.51

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	93.26	PK	150.0	200.0	V	3.00	96.26	/	/
2437	88.63	Ave	150.0	200.0	V	3.00	91.63	/	/
2437	92.63	PK	90.0	200.0	H	3.00	95.63	/	/
2437	88.55	Ave	90.0	200.0	H	3.00	91.55	/	/
1555	35.53	PK	220.0	200.0	V	0.00	35.53	74.00	38.47
1555	25.89	Ave	220.0	200.0	V	0.00	25.89	54.00	28.11
2290	37.83	PK	110.0	200.0	H	0.70	38.53	74.00	35.47
2290	25.86	Ave	110.0	200.0	H	0.70	26.56	54.00	27.44
4874	38.56	PK	30.0	200.0	V	13.90	52.46	74.00	21.54
4874	31.89	Ave	30.0	200.0	V	13.90	45.79	54.00	8.21
6650	31.98	PK	340.0	150.0	H	18.80	50.78	74.00	23.22
6650	16.94	Ave	340.0	150.0	H	18.80	35.74	54.00	18.26
7311	27.78	PK	224.0	150.0	H	18.90	46.68	74.00	27.32
7311	13.52	Ave	224.0	150.0	H	18.90	32.42	54.00	21.58

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	92.50	PK	126.0	200.0	V	3.00	95.50	/	/
2462	88.26	Ave	126.0	200.0	V	3.00	91.26	/	/
2462	92.23	PK	90.0	150.0	H	3.00	95.23	/	/
2462	88.25	Ave	90.0	150.0	H	3.00	91.25	/	/
2483.5	52.47	PK	180.0	150.0	V	3.20	55.67	74.00	18.33
2483.5	39.78	Ave	180.0	150.0	V	3.20	42.98	54.00	11.02
2496	38.43	PK	90.0	150.0	H	4.20	42.63	74.00	31.37
2496	22.66	Ave	90.0	150.0	H	4.20	26.86	54.00	27.14
4924	41.76	PK	230.0	200.0	V	14.00	55.76	74.00	18.24
4924	31.77	Ave	230.0	200.0	V	14.00	45.77	54.00	8.23
6650	30.74	PK	289.0	150.0	H	18.70	49.44	74.00	24.56
6650	17.61	Ave	289.0	150.0	H	18.70	36.31	54.00	17.69
7386	26.51	PK	188.0	200.0	V	19.80	46.31	74.00	27.69
7386	12.62	Ave	188.0	200.0	V	19.80	32.42	54.00	21.58

BLE Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
2402	91.32	PK	185.0	150.0	V	3.00	94.32	/	/
2402	82.16	Ave	185.0	150.0	V	3.00	85.16	/	/
2402	90.63	PK	150.0	150.0	H	3.00	93.63	/	/
2402	82.01	Ave	150.0	150.0	H	3.00	85.01	/	/
2375	30.65	Ave	66.0	150.0	H	4.10	34.75	54	19.25
2375	38.89	PK	66.0	150.0	H	4.10	42.99	74	31.01
2390	22.25	Ave	38.0	150.0	V	4.10	26.35	54	27.65
2390	33.66	PK	38.0	150.0	V	4.10	37.76	74	36.24
4804	32.05	Ave	124.0	150.0	H	13.70	45.75	54	8.25
4804	40.94	PK	124.0	150.0	H	13.70	54.64	74	19.36
6686	33.19	PK	154.0	250.0	V	18.80	51.99	74	22.01
6686	20.99	Ave	154.0	250.0	V	18.80	39.79	54	14.21
7206	31.11	PK	269.0	150.0	V	20.50	51.61	74	22.39
7206	23.79	Ave.	269.0	150.0	V	20.50	44.29	54	9.71

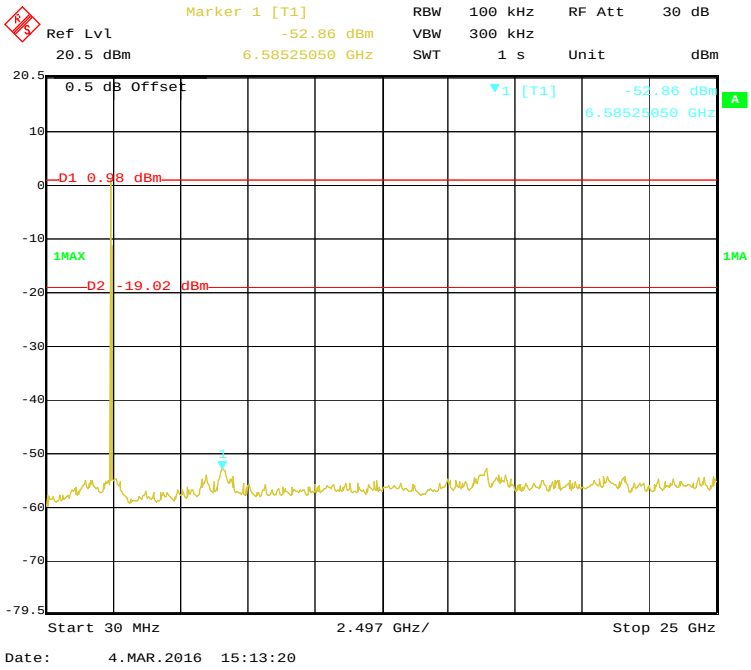
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2440MHz)									
2440	91.58	PK	168.0	150.0	V	2.60	94.18	/	/
2440	82.63	Ave	168.0	150.0	V	2.60	85.23	/	/
2440	91.65	PK	168.0	150.0	H	2.60	94.25	/	/
2440	83	Ave	168.0	150.0	H	2.60	85.6	/	/
1501	31.53	Ave	156.0	250.0	V	0	31.53	54	22.47
1501	46.68	PK	156.0	250.0	V	0	46.68	74	27.32
2262	35.16	Ave	320.0	150.0	V	0.70	35.86	54	18.14
2262	45.09	PK	320.0	150.0	V	0.70	45.79	74	28.21
4880	40.09	PK	21.0	150.0	H	13.90	53.99	74	20.01
4880	34.88	Ave	21.0	150.0	H	13.90	48.78	54	5.22
6656	35.14	PK	83.0	249.0	H	18.80	53.94	74	20.06
6656	20.06	Ave	83.0	249.0	H	18.80	38.86	54	15.14
7320	35.99	PK	266.0	150.0	V	20.80	56.79	74	17.21
7320	24.78	Ave.	266.0	150.0	V	20.80	45.58	54	8.42

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
2480	92.42	PK	154.0	100.0	V	3.20	95.62	/	/
2480	82.43	Ave	154.0	100.0	V	3.20	85.63	/	/
2480	92.39	PK	136.0	100.0	H	3.20	95.59	/	/
2480	82.36	Ave	136.0	100.0	H	3.20	85.56	/	/
2483.5	41.16	PK	50.0	249.0	H	4.20	45.36	74	28.64
2483.5	39.49	Ave	50.0	249.0	H	4.20	43.69	54	10.31
2525	37.49	PK	100.0	249.0	H	4.40	41.89	74	32.11
2525	28.58	Ave	100.0	249.0	H	4.40	32.98	54	21.02
4960	31.16	Ave	321.0	150.0	H	14.10	45.26	54	8.74
4960	37.76	PK	321.0	150.0	H	14.10	51.86	74	22.14
6685	31.84	PK	25.0	250.0	V	18.80	50.64	74	23.36
6685	16.99	Ave	25.0	250.0	V	18.80	35.79	54	18.21
7440	34.79	PK	208.0	150.0	V	21.20	55.99	74	18.01
7440	23.6	Ave	208.0	150.0	V	21.20	44.8	54	9.2

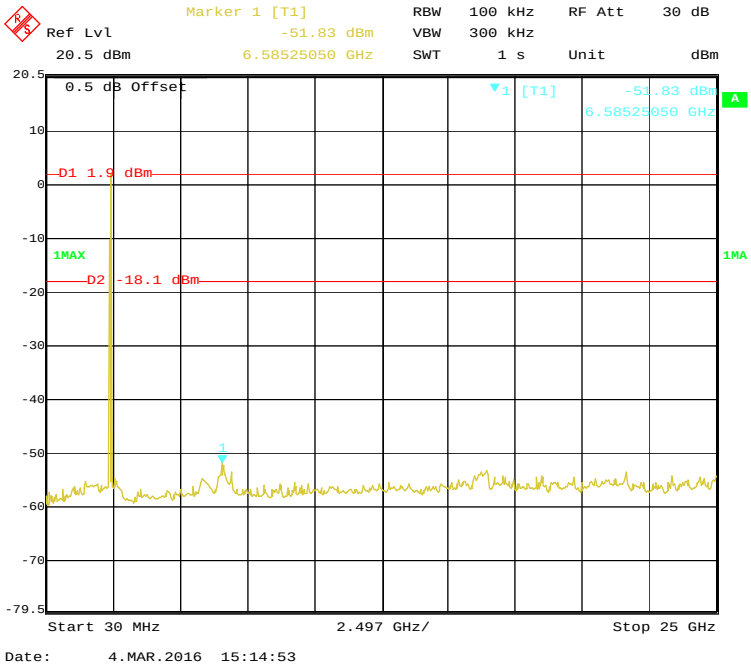
Conducted Spurious Emissions at Antenna Port

WIFI Mode:

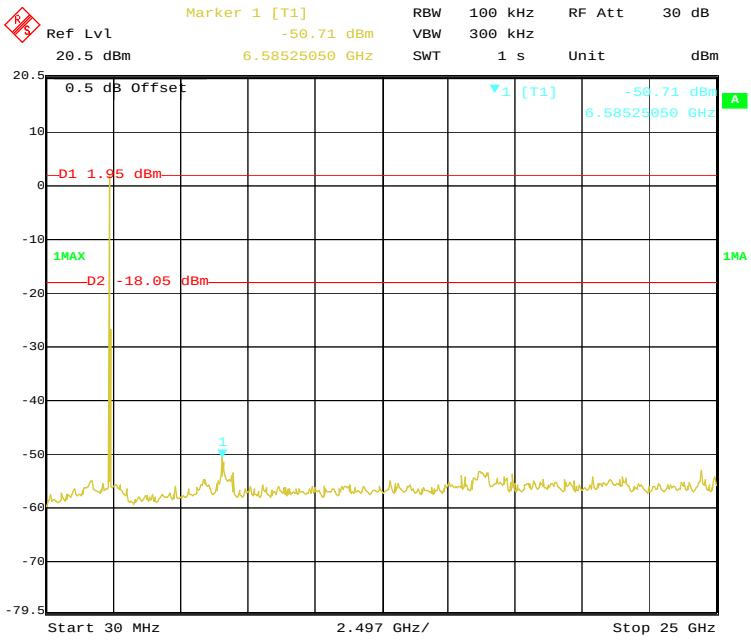
Chain 0 802.11b Low Channel



Chain 0 802.11b Middle Channel

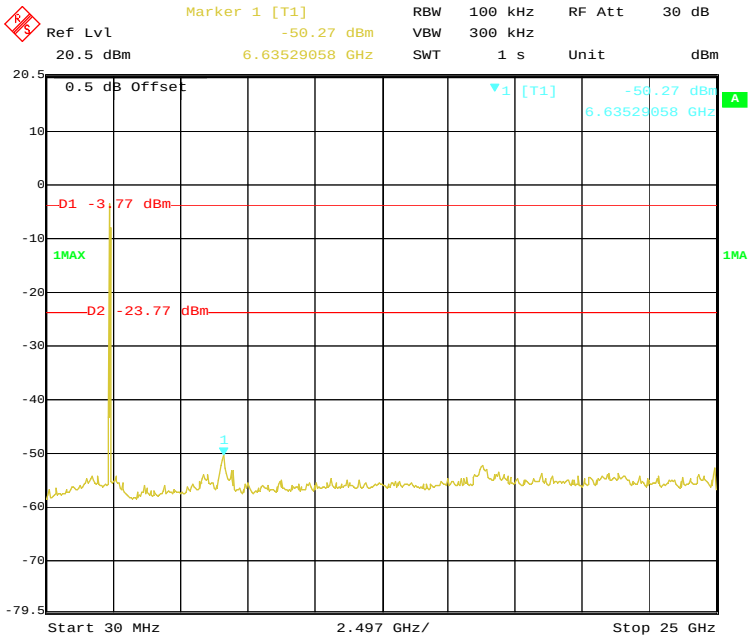


Chain 0 802.11b High Channel



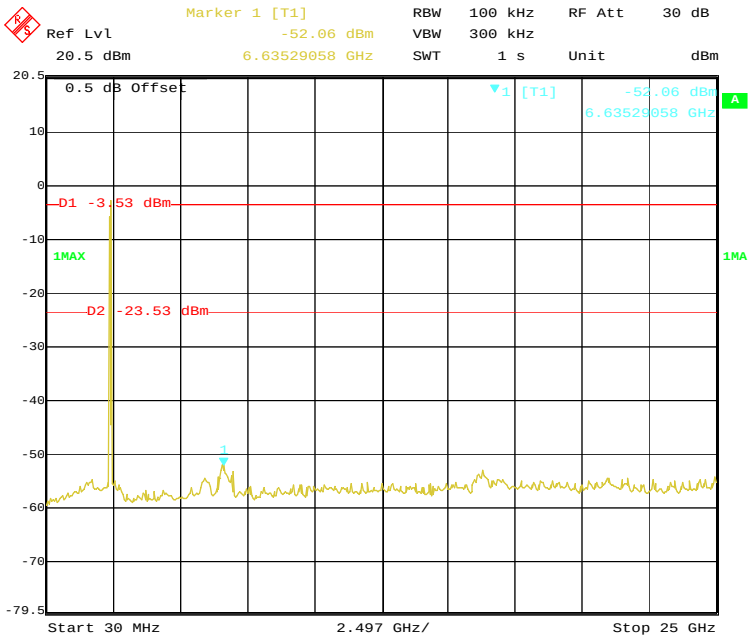
Date: 4.MAR.2016 15:16:20

Chain 0 802.11g Low Channel

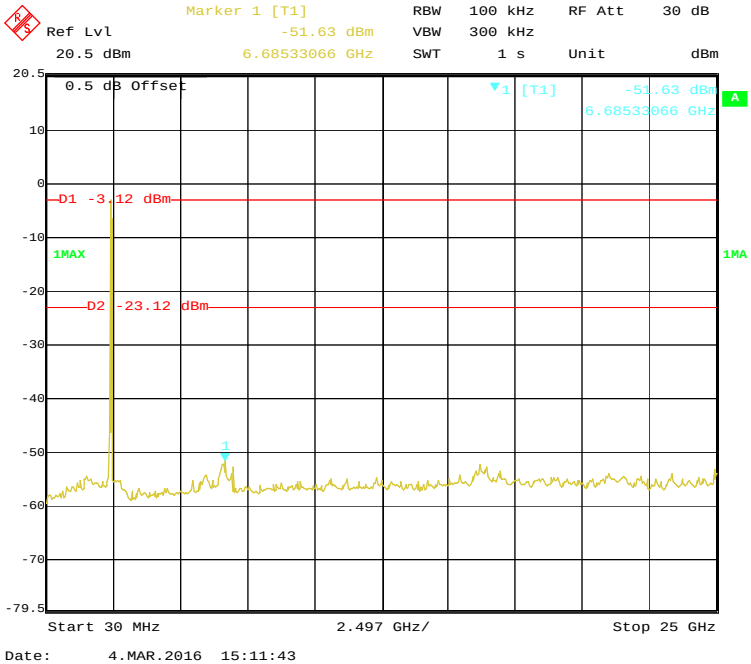


Date: 4.MAR.2016 15:08:51

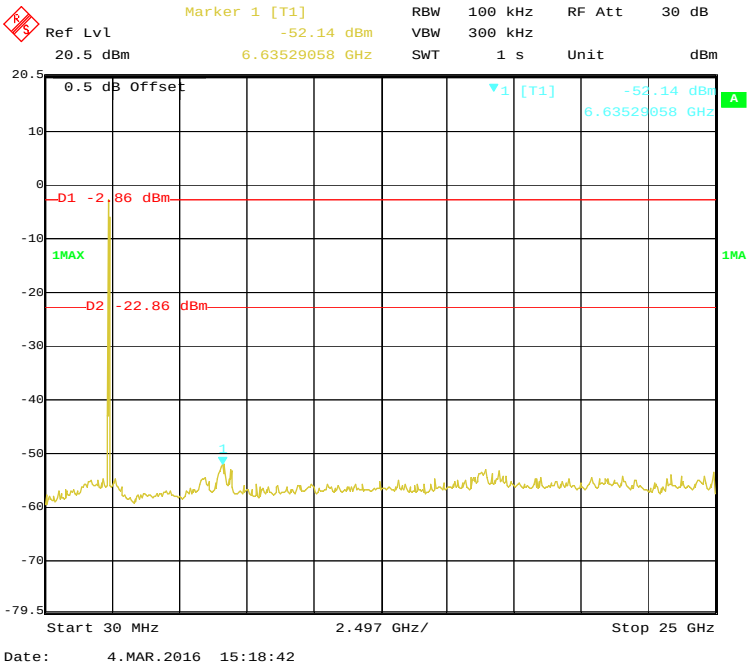
Chain 0 802.11g Middle Channel



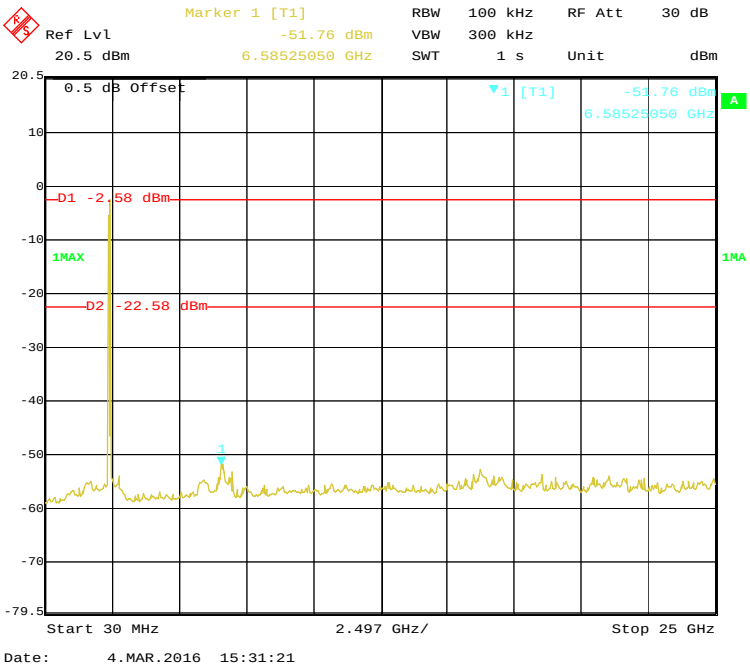
Chain 0 802.11g High Channel



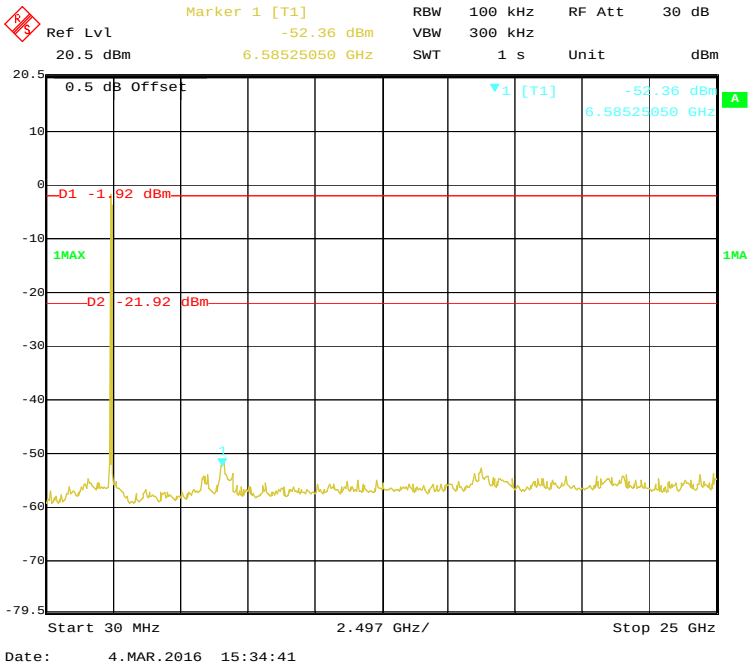
Chain 0 802.11n-HT20 Low Channel



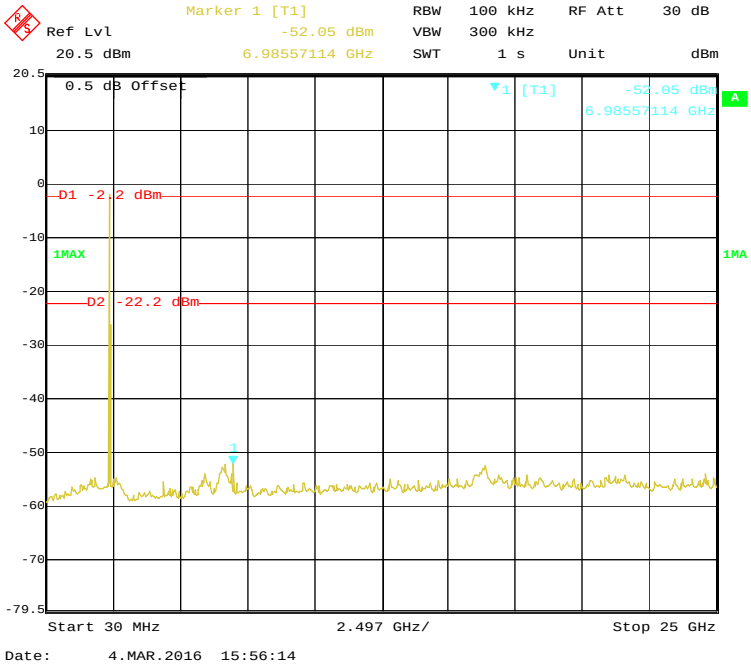
Chain 0 802.11n-HT20 Middle Channel



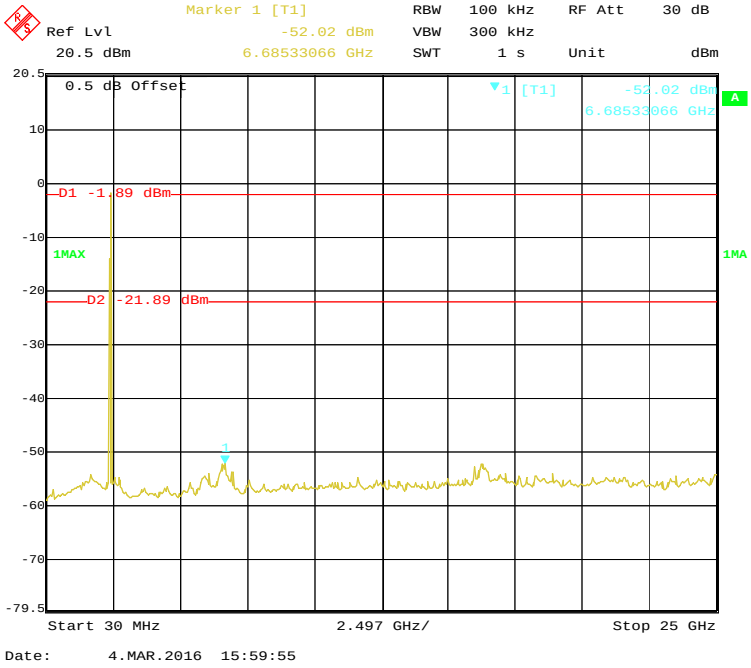
Chain 0 802.11n-HT20 High Channel



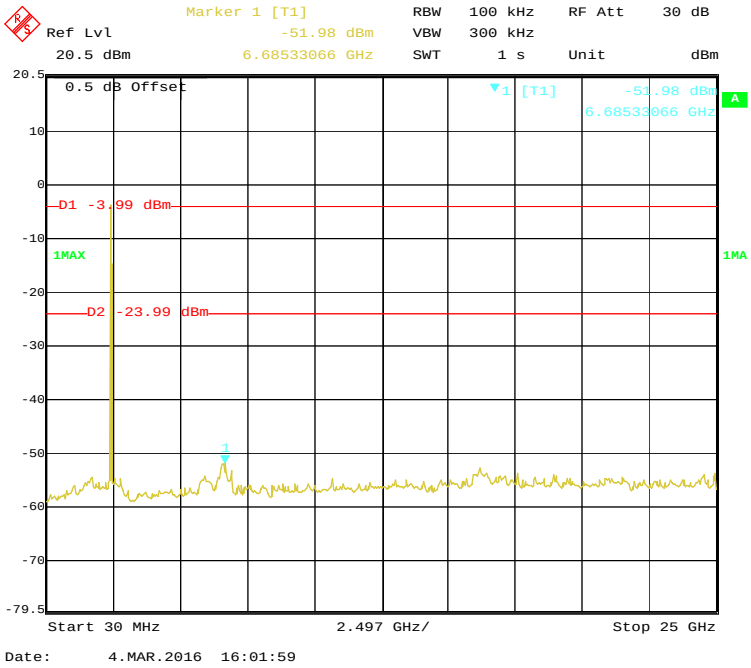
Chain 1 802.11b Low Channel



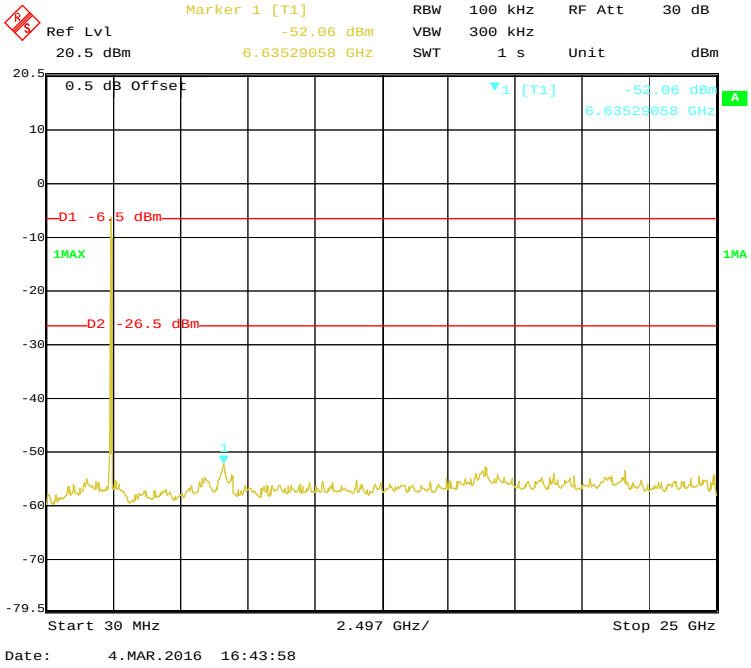
Chain 1 802.11b Middle Channel



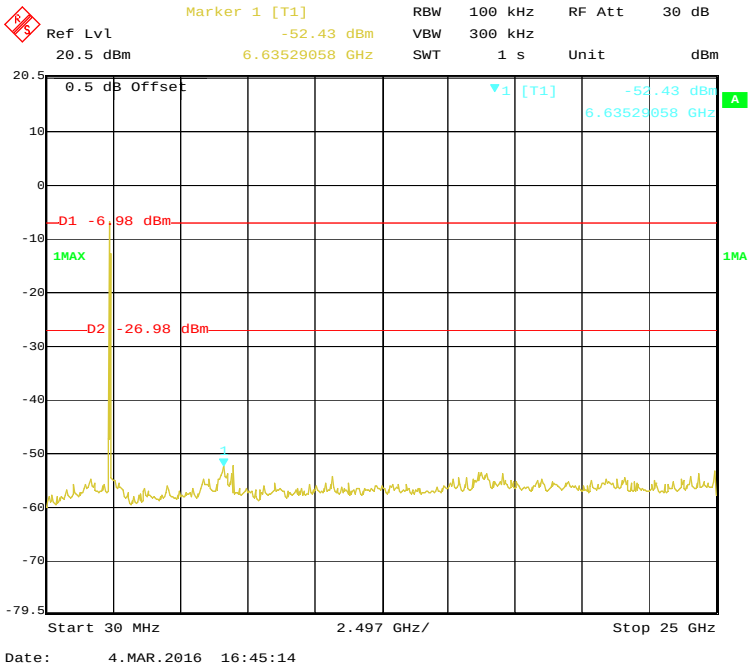
Chain 1 802.11b High Channel



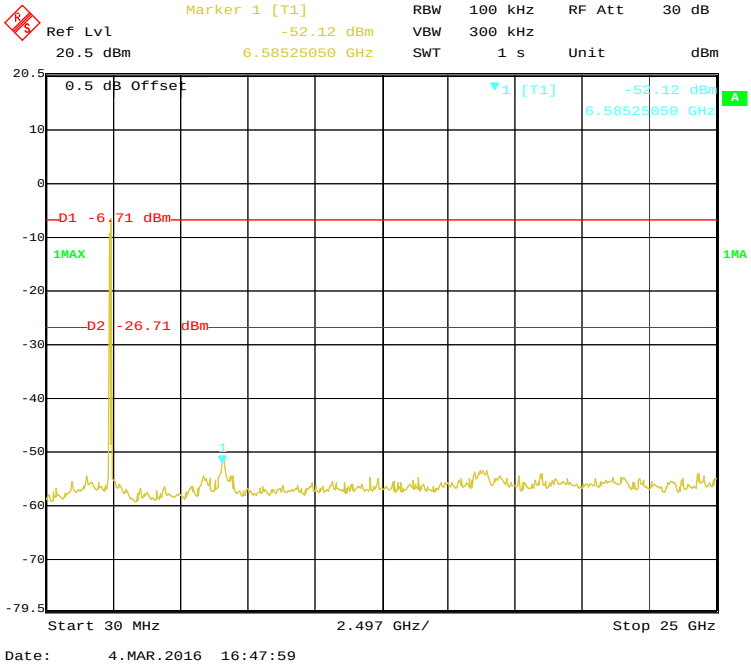
Chain 1 802.11g Low Channel



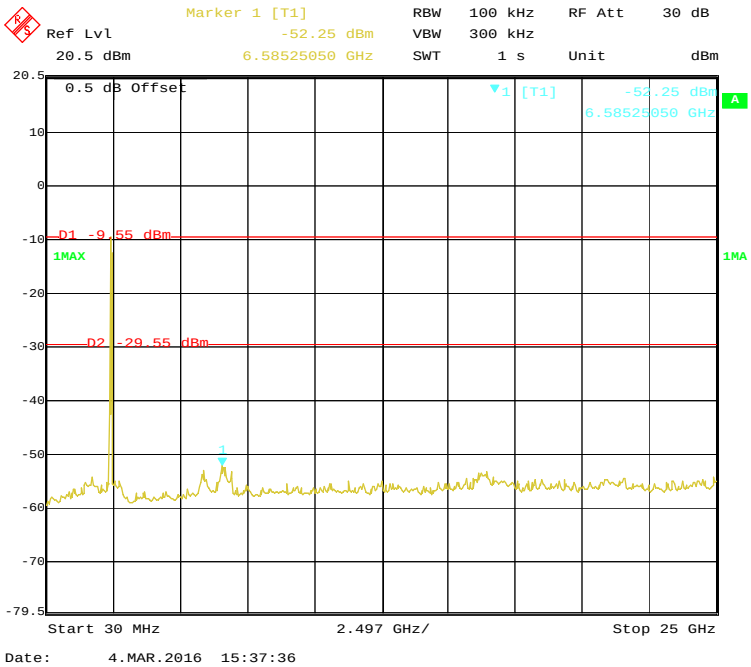
Chain 1 802.11g Middle Channel



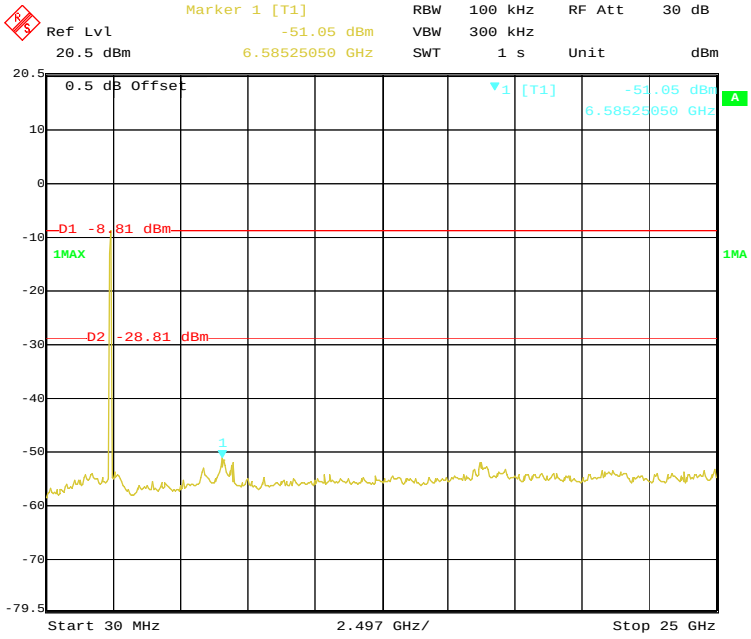
Chain 1 802.11g High Channel



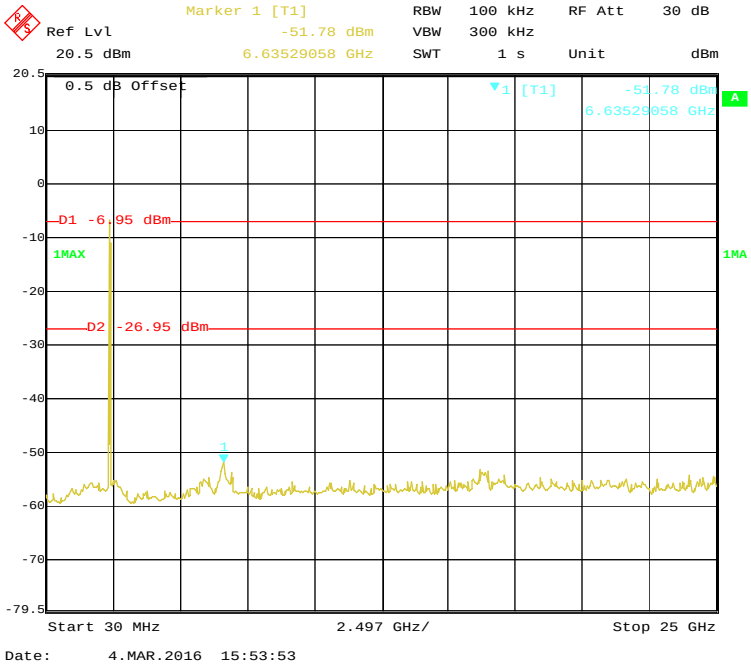
Chain 1 802.11n-HT20 Low Channel



Chain 1 802.11n-HT20 Middle Channel

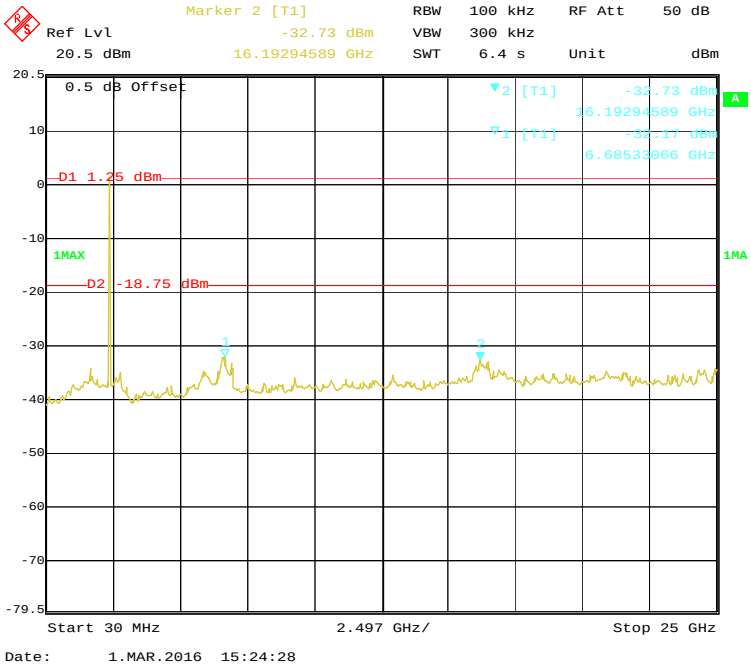


Chain 1 802.11n-HT20 High Channel

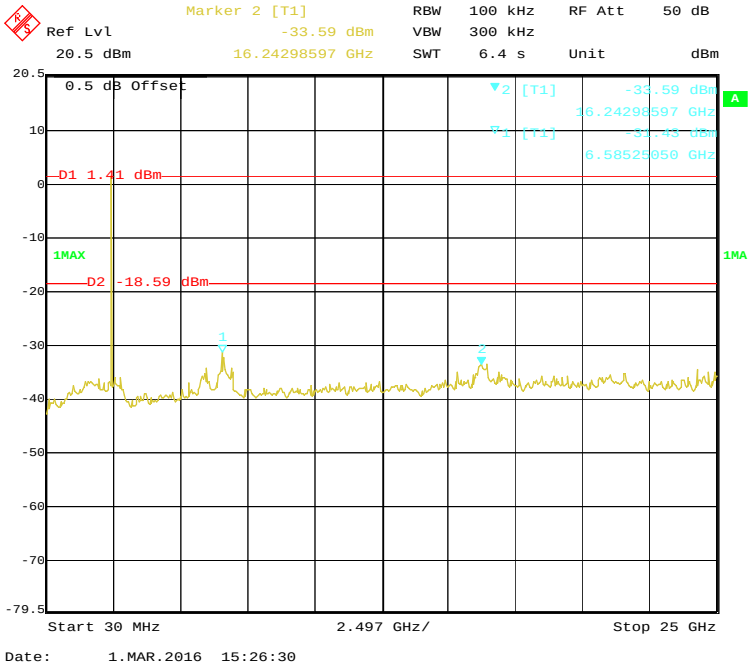


BLE Mode:

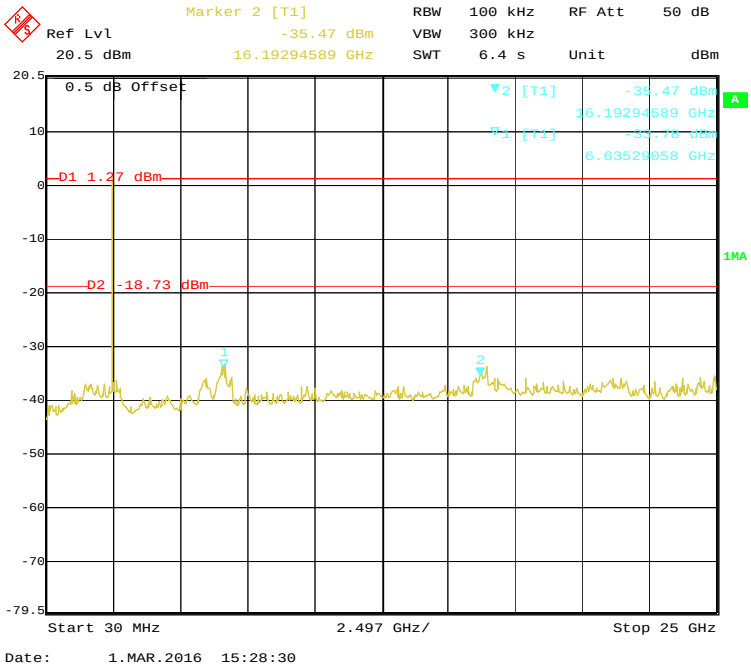
BLE Mode Low Channel



BLE Mode Middle Channel



BLE Mode High Channel



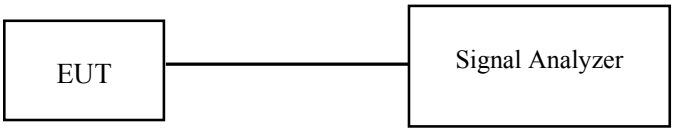
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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:	27 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-03-01& 2016-03-03&2016-03-04.

Test Result: Pass.

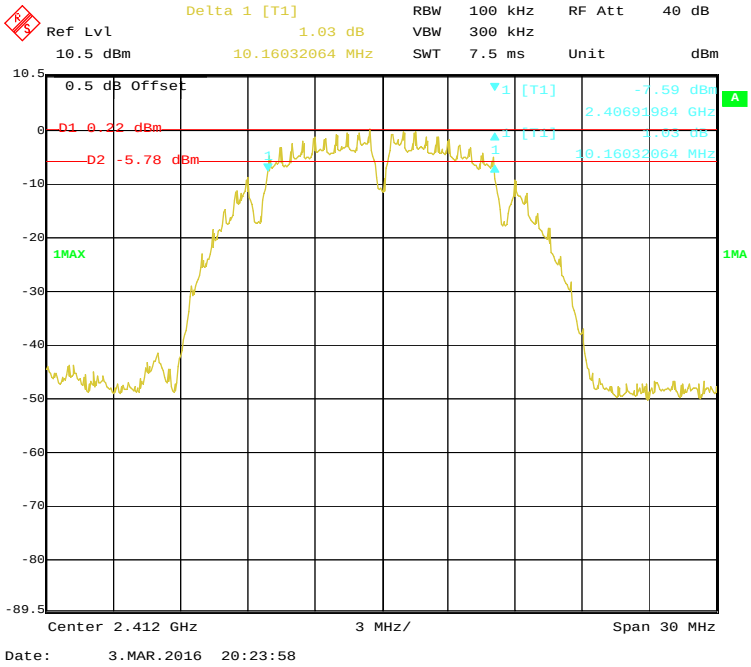
Please refer to the following tables and plots.

EUT operation mode: Transmitting

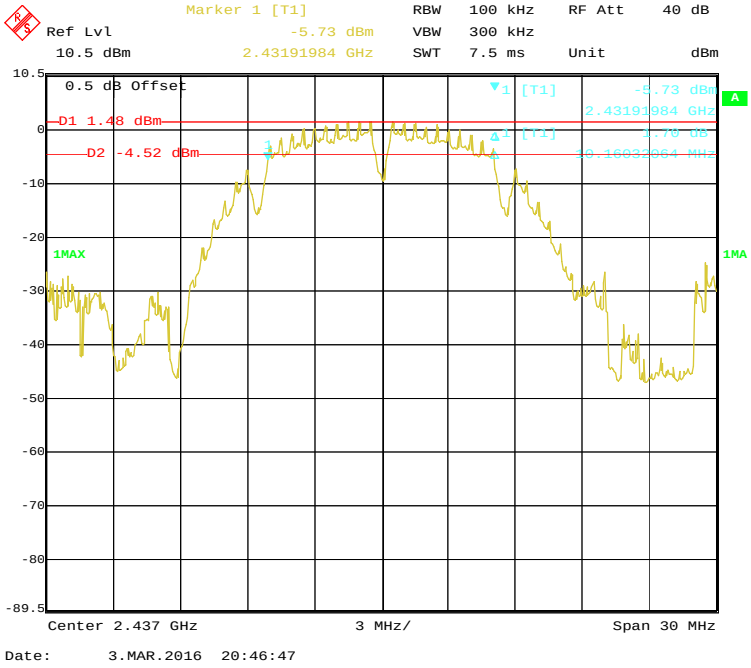
WIFI Mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		Limit (kHz)
		Chain 0	Chain 1	
802.11b mode				
Low	2412	10.16	10.16	≥500
Middle	2437	10.16	10.16	≥500
High	2462	10.16	10.16	≥500
802.11g mode				
Low	2412	16.53	16.59	≥500
Middle	2437	16.59	16.59	≥500
High	2462	16.59	16.59	≥500
802.11n-HT20 mode				
Low	2412	17.74	17.68	≥500
Middle	2437	17.80	17.68	≥500
High	2462	17.74	17.68	≥500

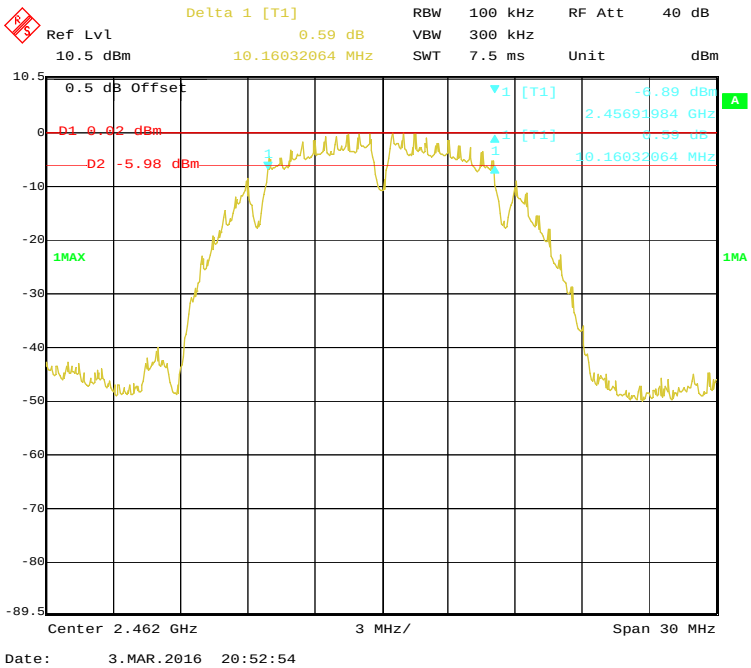
Chain 0 802.11b Low Channel



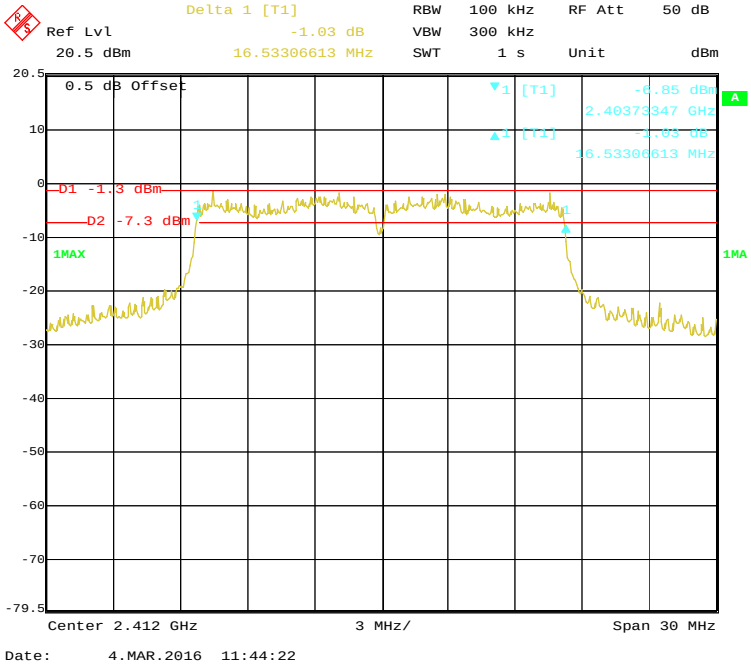
Chain 0 802.11b Middle Channel



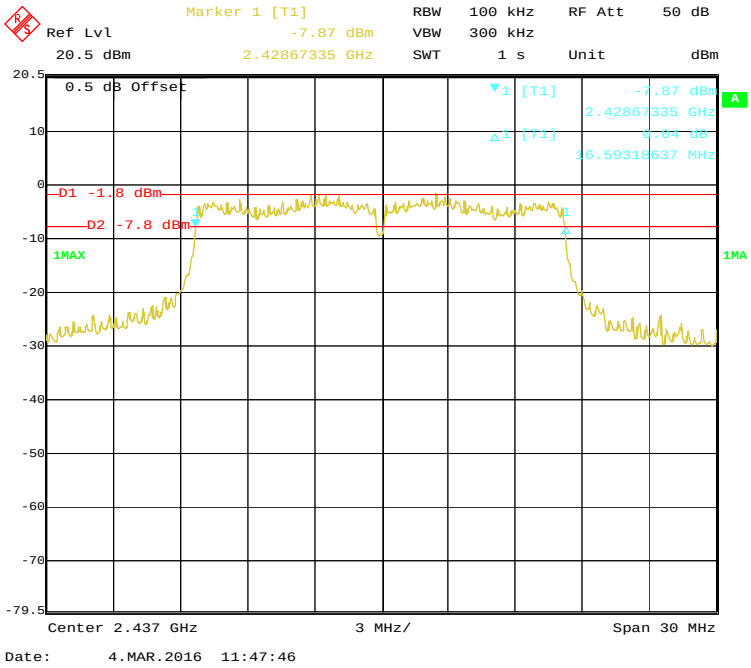
Chain 0 802.11b High Channel



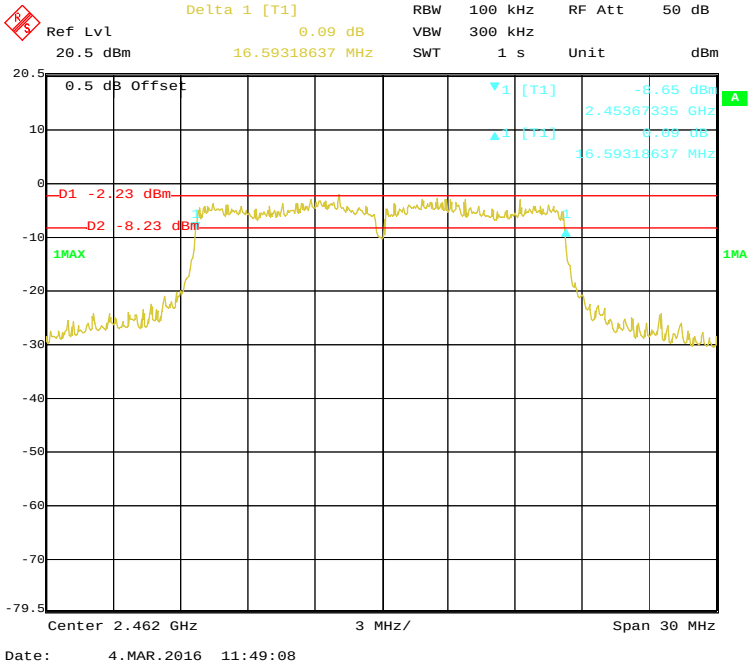
Chain 0 802.11g Low Channel



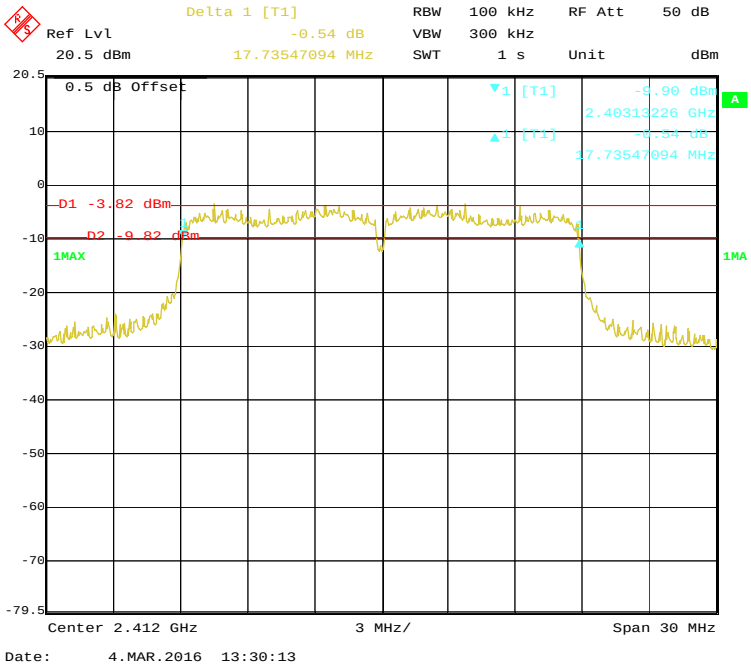
Chain 0 802.11g Middle Channel



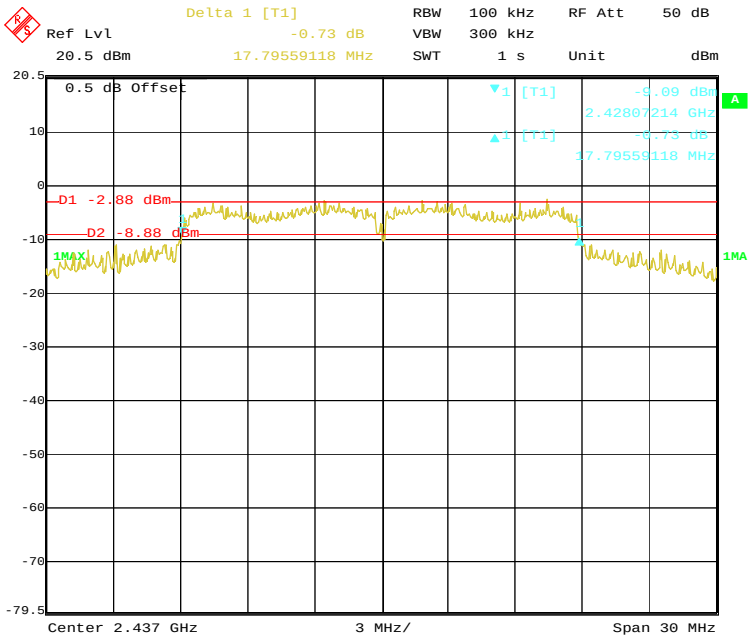
Chain 0 802.11g High Channel



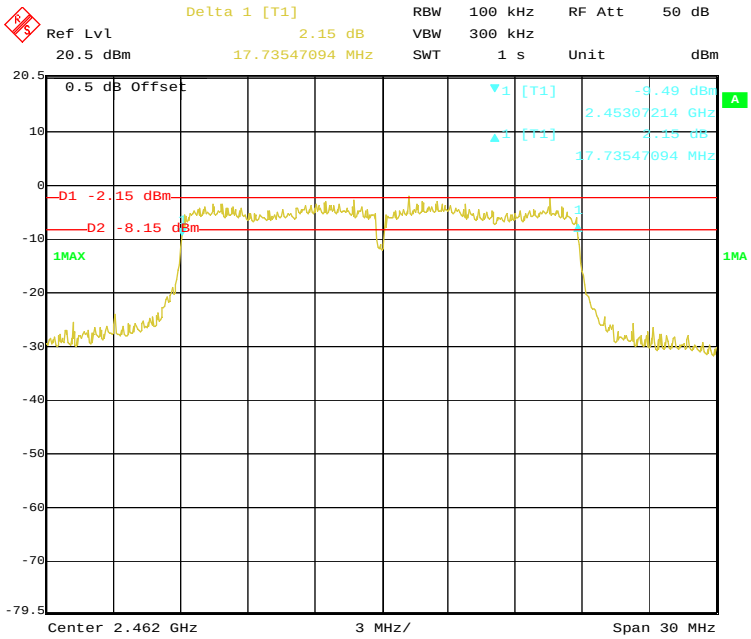
Chain 0 802.11n-HT20 Low Channel



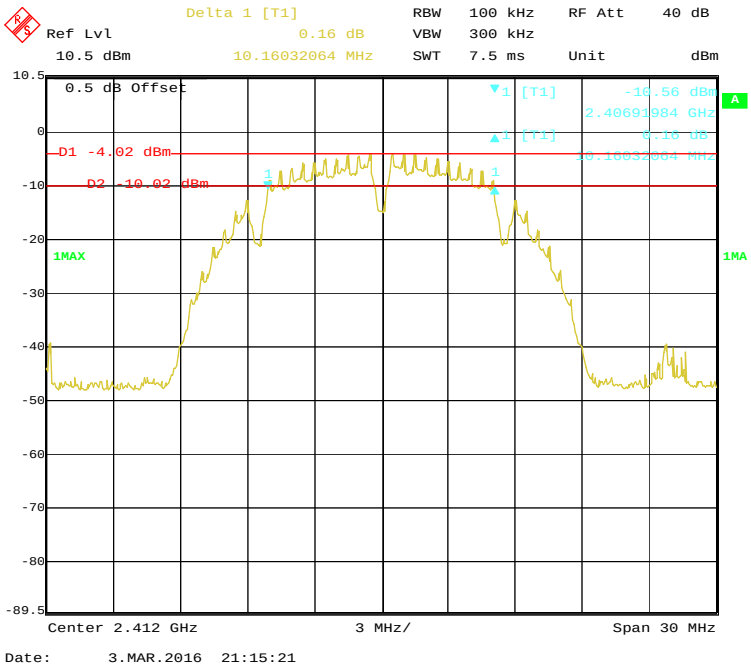
Chain 0 802.11n-HT20 Middle Channel



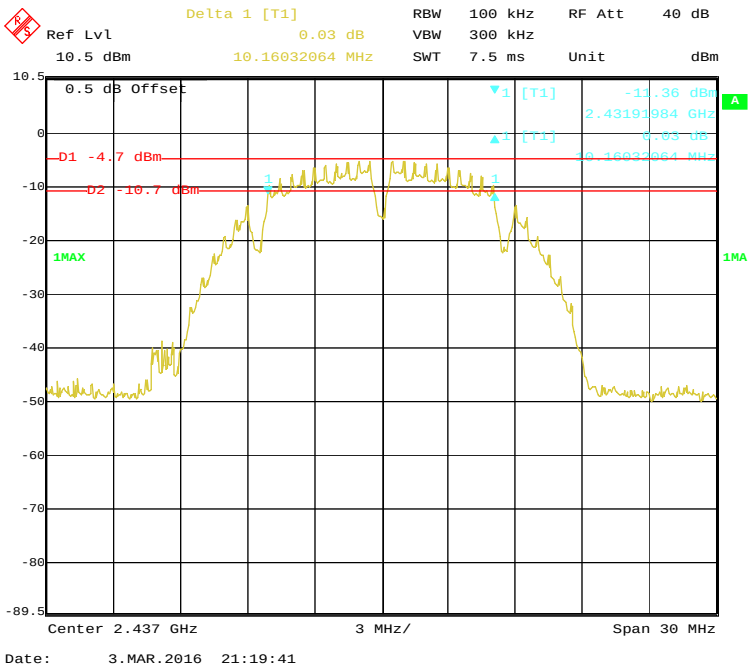
Chain 0 802.11n-HT20 High Channel



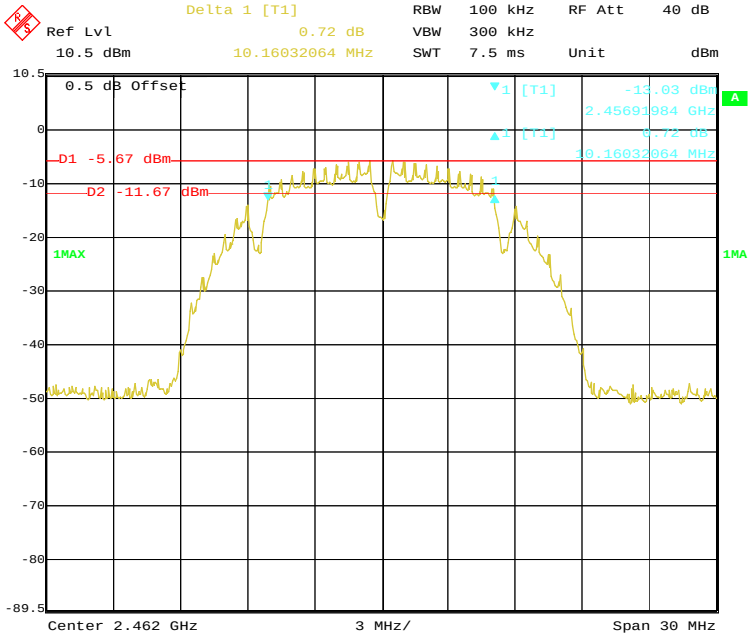
Chain 1 802.11b Low Channel



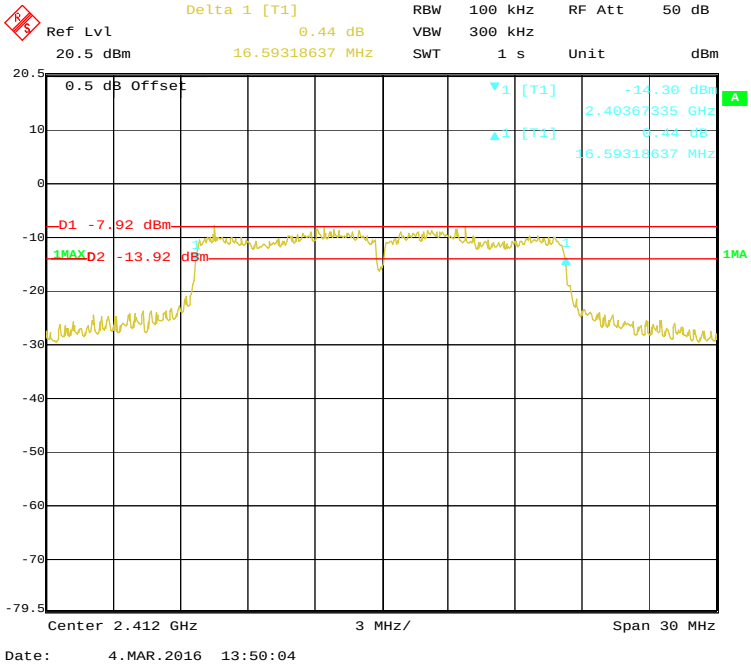
Chain 1 802.11b Middle Channel



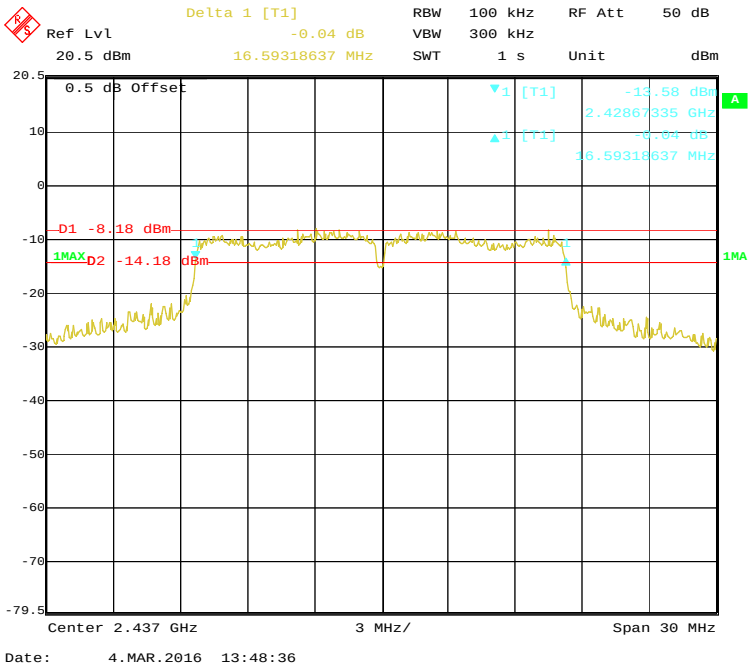
Chain 1 802.11b High Channel



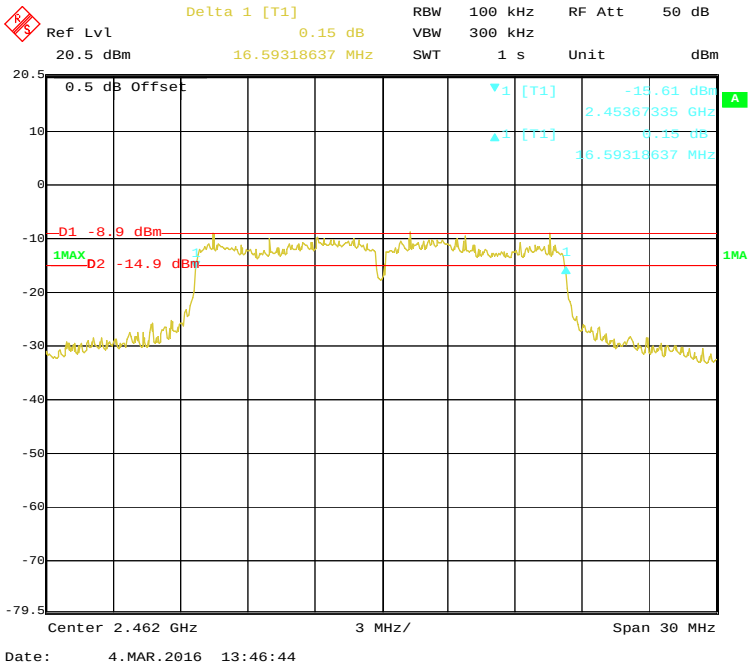
Chain 1 802.11g Low Channel



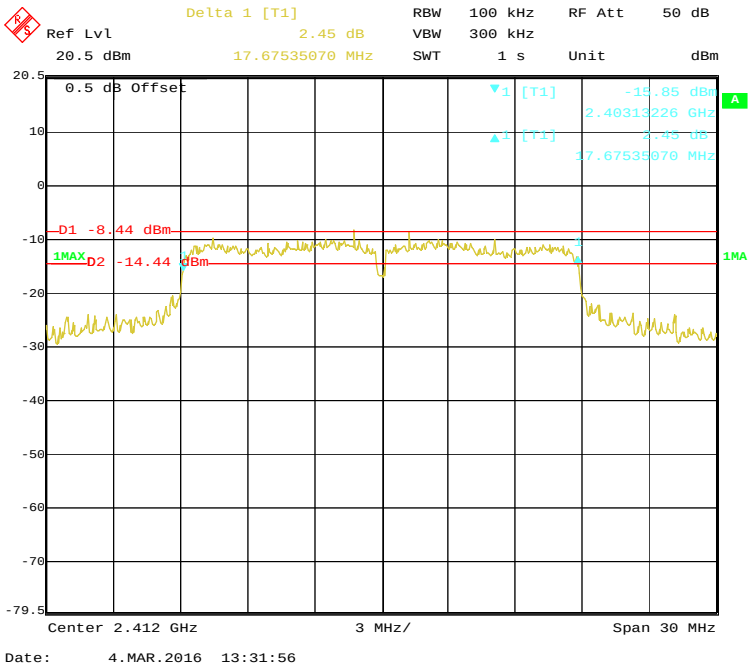
Chain 1 802.11g Middle Channel



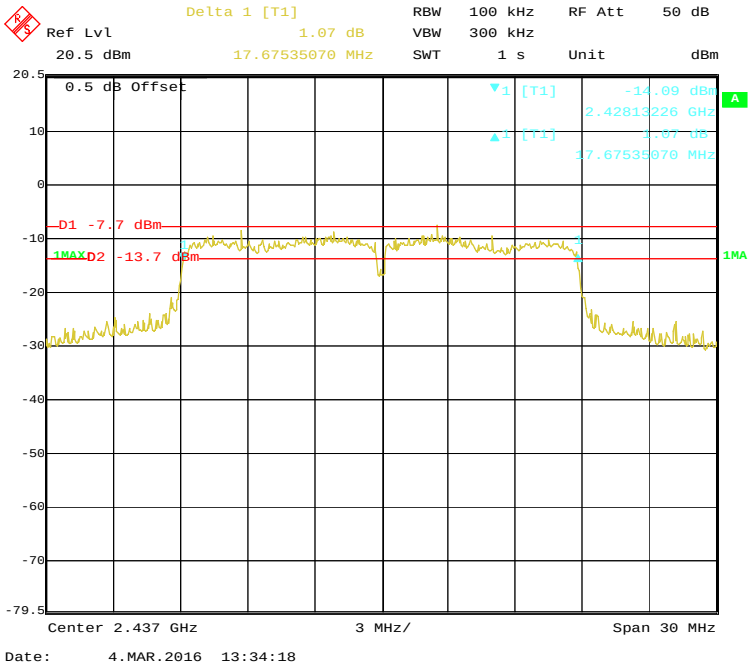
Chain 1 802.11g High Channel



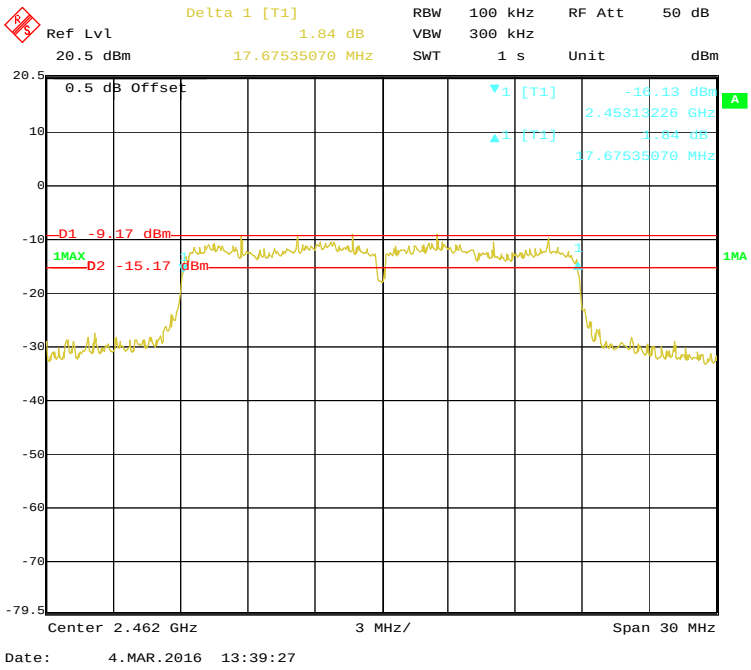
Chain 1 802.11n-HT20 Low Channel



Chain 1 802.11n-HT20 Middle Channel



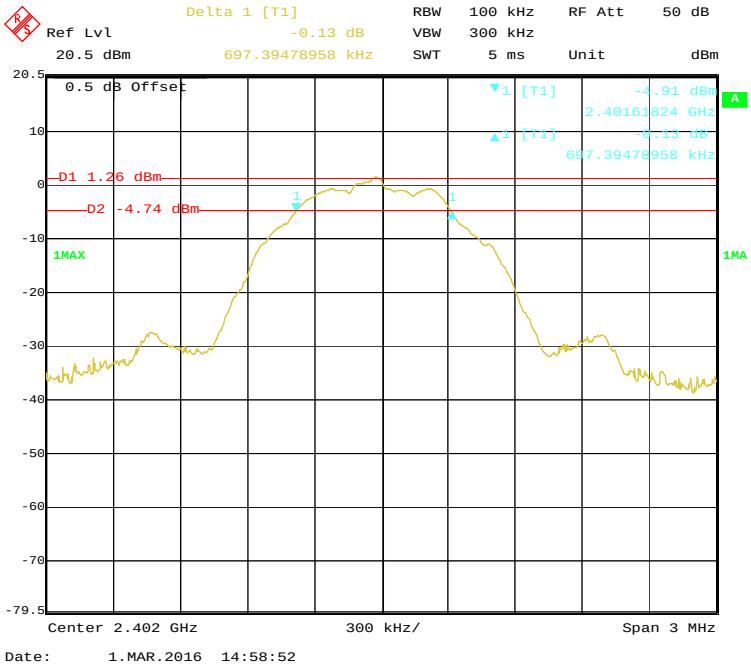
Chain 1 802.11n-HT20 High Channel



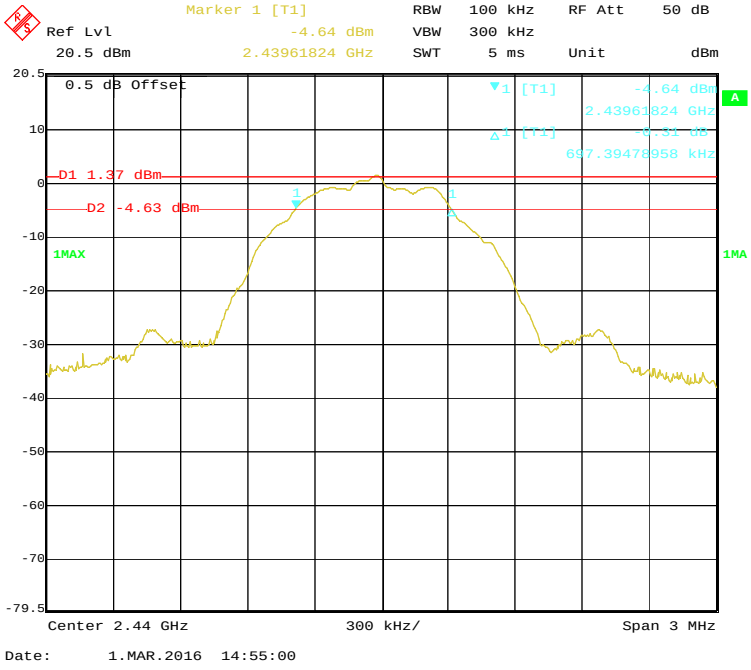
BLE Mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
BLE mode			
Low	2402	0.697	≥500
Middle	2440	0.697	≥500
High	2480	0.697	≥500

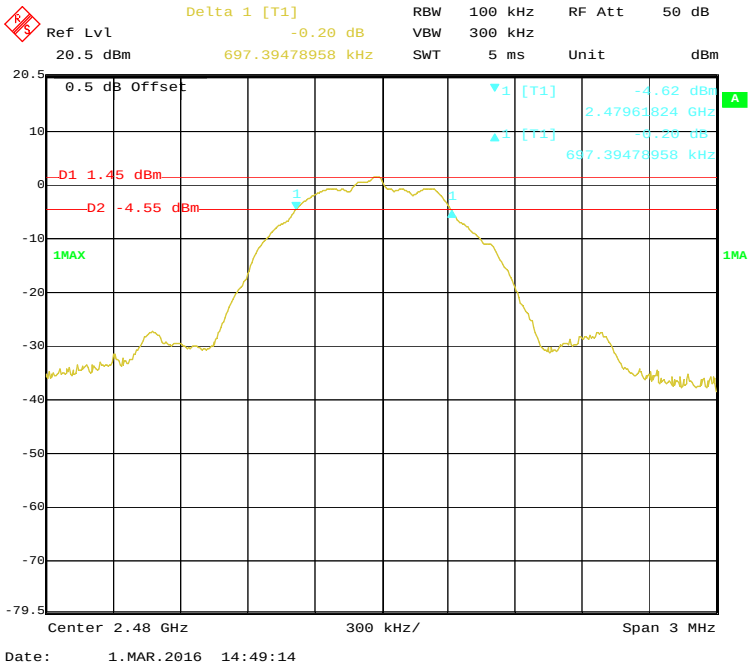
BLE Low Channel



BLE Middle Channel



BLE High Channel



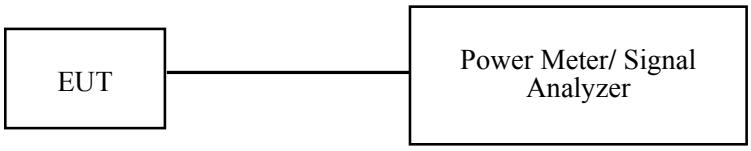
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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 one 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
Rohde & Schwarz	OSP120 BASE UNIT	OSP120	101247	2014-05-27	2016-05-27
Rohde & Schwarz	Power Sensor	NRP-Z91	200014	2015-08-01	2017-07-31
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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:	27 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-03-01& 2016-03-04

EUT operation mode: Transmitting

WIFI Mode:

Channel	Frequency (MHz)	Max Conducted Average Output Power (dBm)			Limit (dBm)	Result
		Chain 0	Chain 1	Total		
802.11b						
Low	2412	14.30	7.91	15.20	30	Pass
Middle	2437	14.60	8.18	15.49	30	Pass
High	2462	13.88	7.80	14.84	30	Pass
802.11g						
Low	2412	13.10	7.50	14.16	30	Pass
Middle	2437	12.90	7.90	14.09	30	Pass
High	2462	12.60	7.10	13.68	30	Pass
802.11n-HT20						
Low	2412	12.50	7.10	13.60	30	Pass
Middle	2437	11.90	7.20	13.17	30	Pass
High	2462	12.22	7.40	13.46	30	Pass

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)			Limit (dBm)	Result
		Chain 0	Chain 1	Total		
802.11b						
Low	2412	15.10	8.11	15.89	30	Pass
Middle	2437	15.05	8.19	15.86	30	Pass
High	2462	14.39	8.44	15.37	30	Pass
802.11g						
Low	2412	14.11	8.14	15.09	30	Pass
Middle	2437	14.09	8.88	15.23	30	Pass
High	2462	13.51	8.23	14.64	30	Pass
802.11n-HT20						
Low	2412	14.00	8.21	15.02	30	Pass
Middle	2437	13.01	8.00	14.20	30	Pass
High	2462	13.32	8.54	14.57	30	Pass

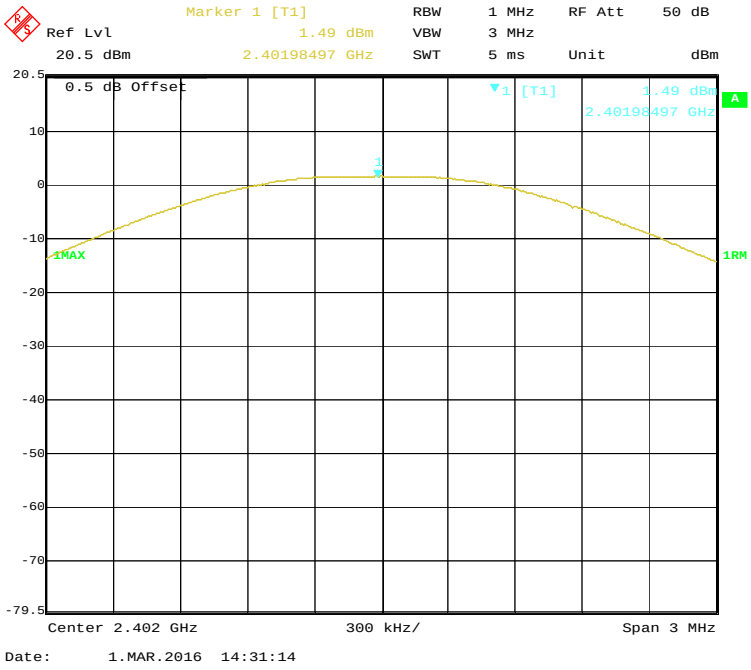
Note：The total gain=10Log10(10^(Chain 0/10)+10^(Chain 1/10))=5.17dBi
Chain 0 gain=2.11dBi, Chain 1 gain =2.20dBi

BLE Mode:

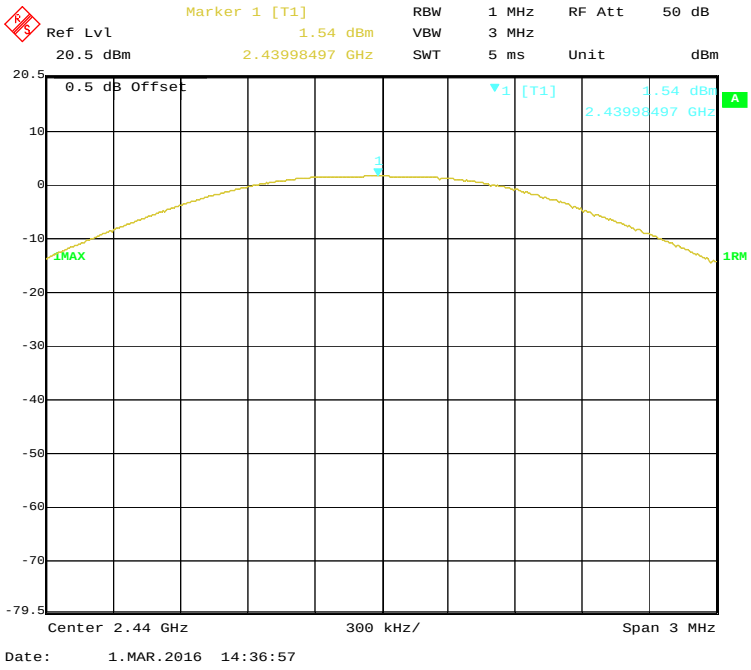
Channel	Frequency (MHz)	Max Conducted Average Output Power (dBm)	Limit (dBm)	Result
BLE				
Low	2402	1.49	30	Pass
Middle	2440	1.54	30	Pass
High	2480	1.62	30	Pass

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
BLE				
Low	2402	2.21	30	Pass
Middle	2440	2.30	30	Pass
High	2480	2.38	30	Pass

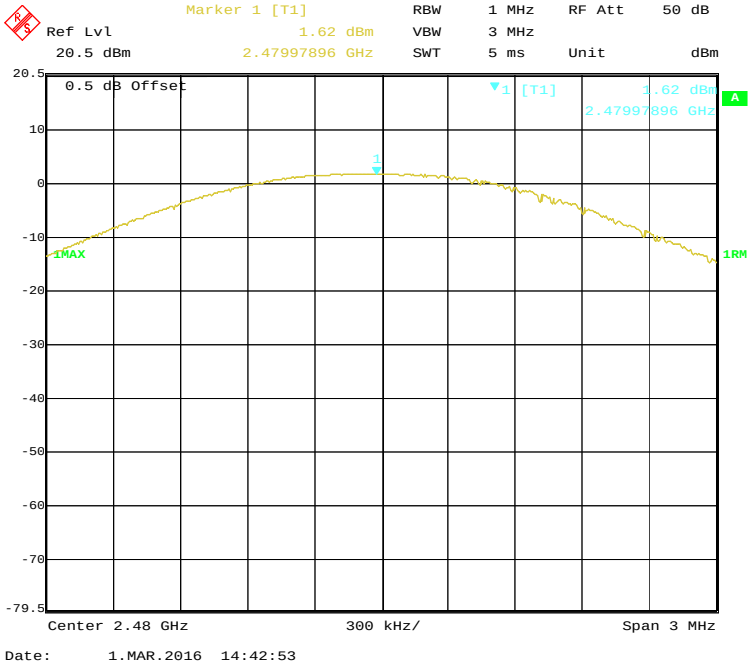
BLE RF Output Power, Low Channel



BLE RF Output Power, Middle Channel



BLE 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

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	100048	2015-11-12	2016-11-11
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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:	27 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

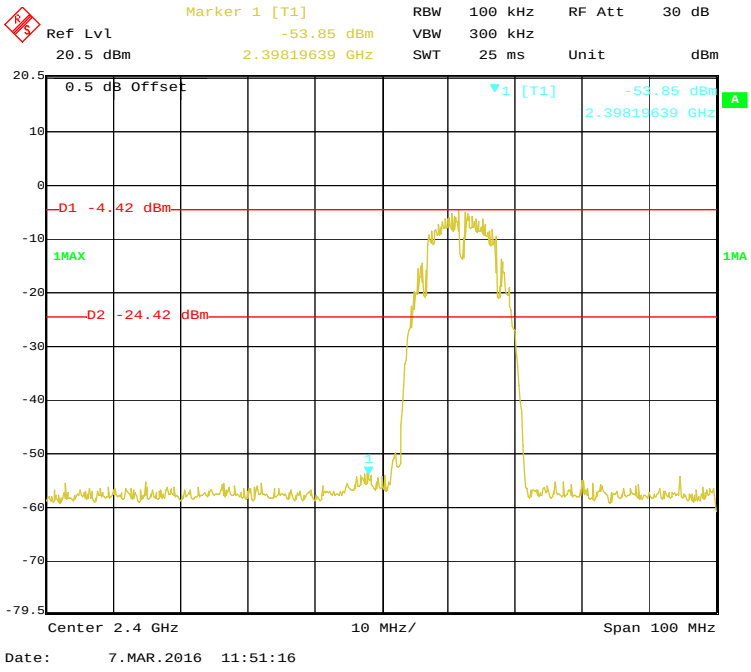
The testing was performed by Matt Yao on 2016-03-01& 2016-03-07

Test Result: *Compliance*

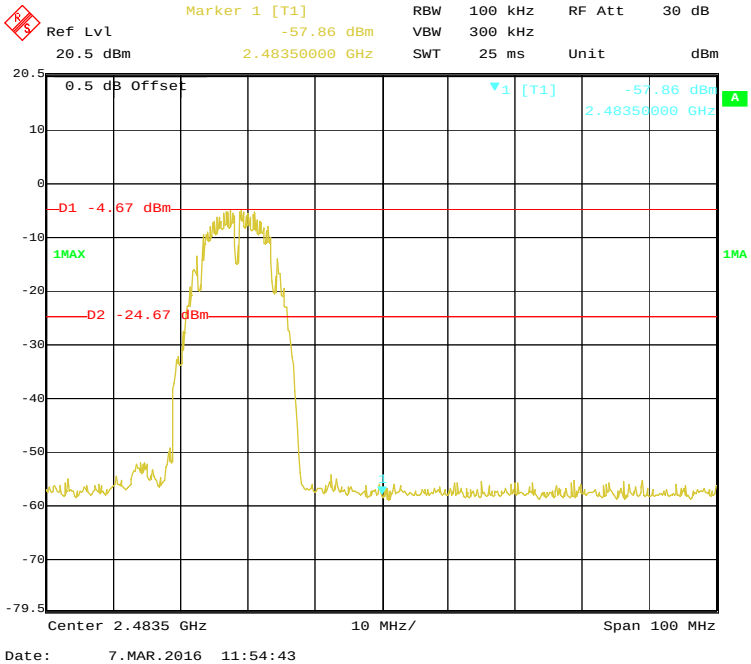
Please refer to the following table and plots.

WIFI Mode:

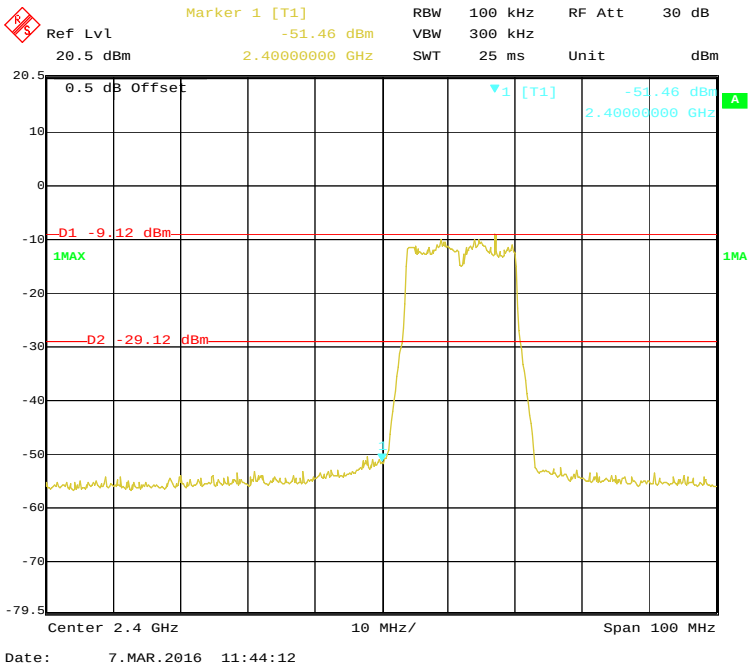
Chain 0 802.11b: Band Edge, Left Side



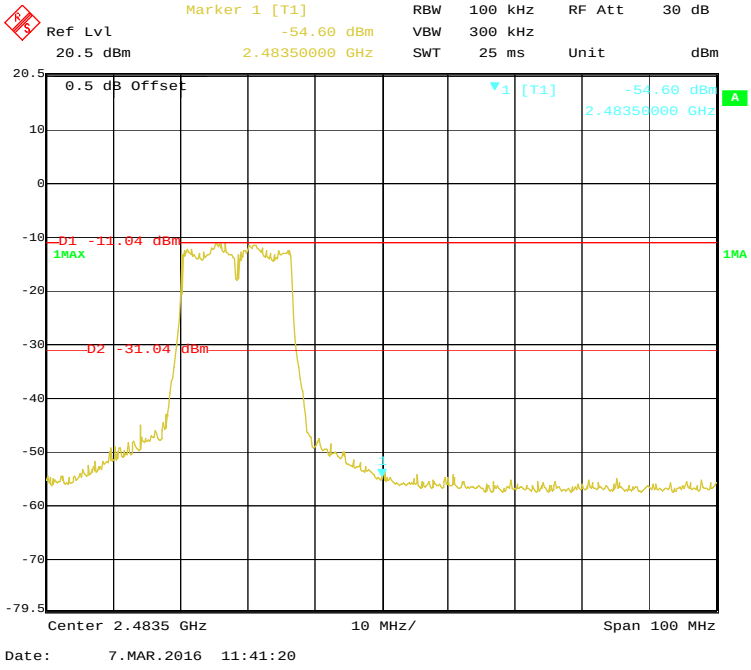
Chain 0 802.11b: Band Edge, Right Side



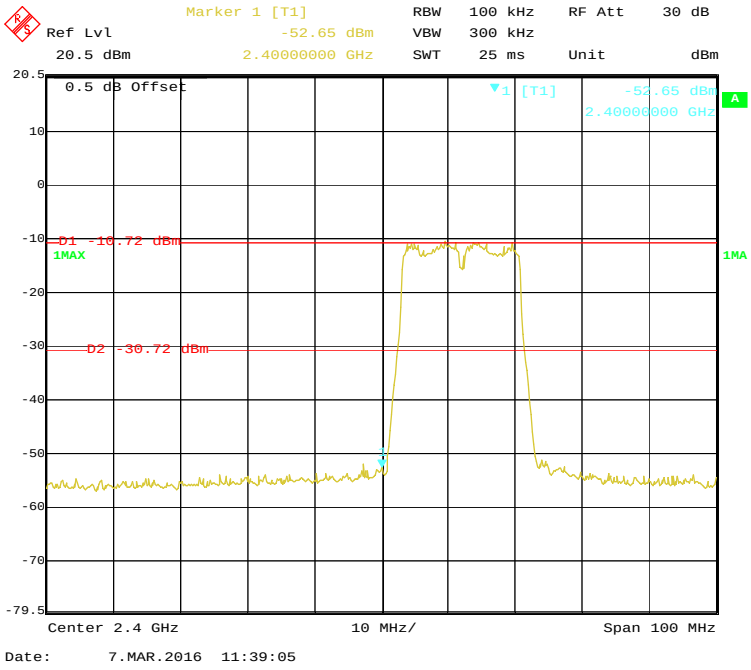
Chain 0 802.11g: Band Edge, Left Side



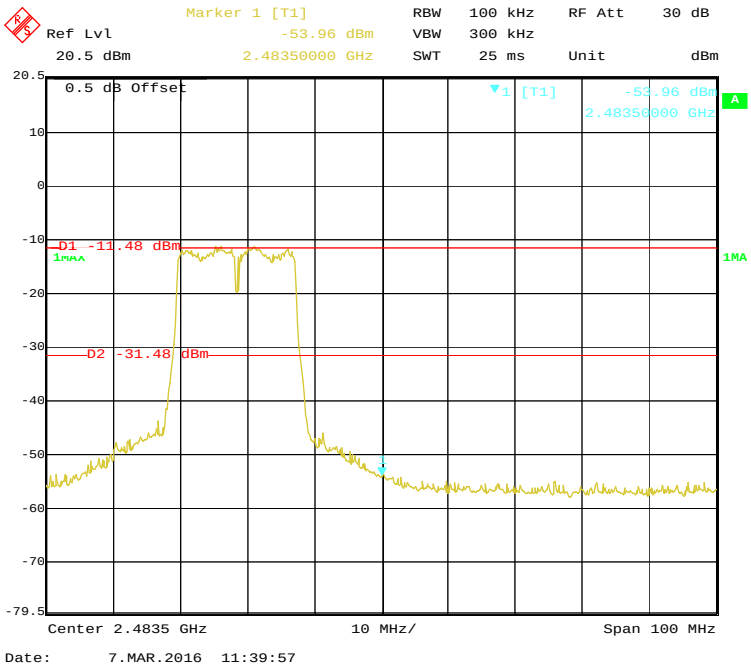
Chain 0 802.11g: Band Edge, Right Side



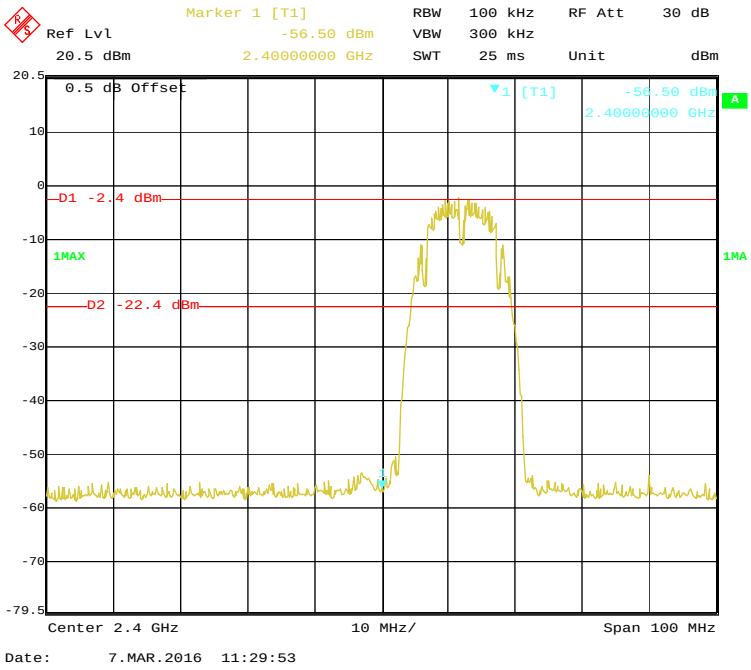
Chain 0 802.11n-HT20: Band Edge, Left Side



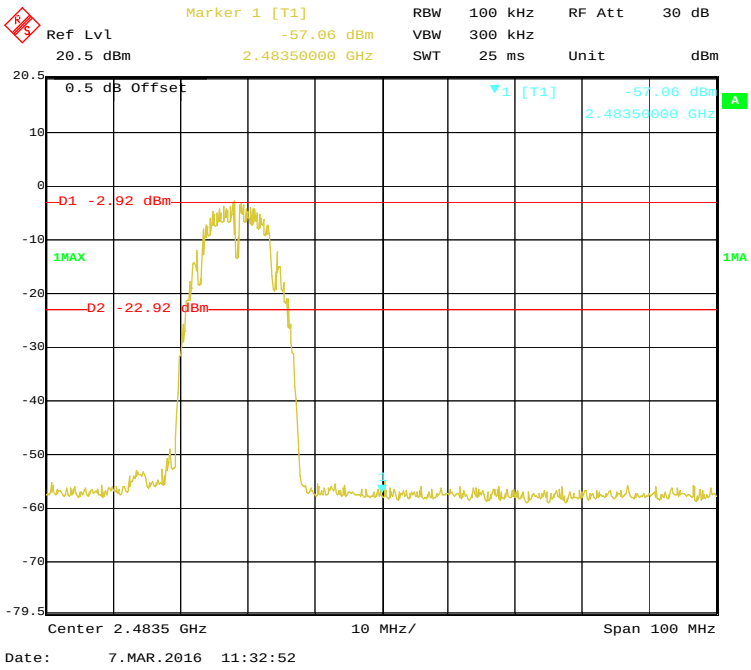
Chain 0 802.11n-HT20: Band Edge, Right Side



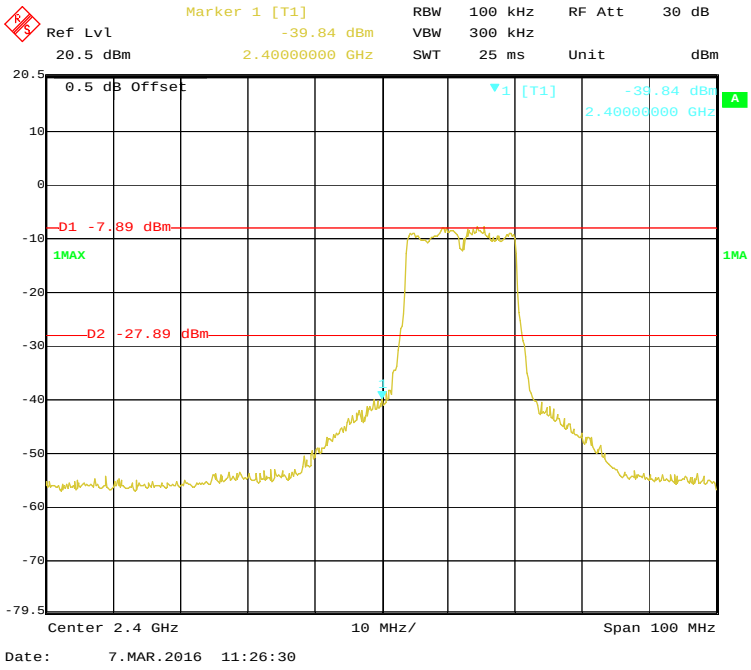
Chain 1 802.11b: Band Edge, Left Side



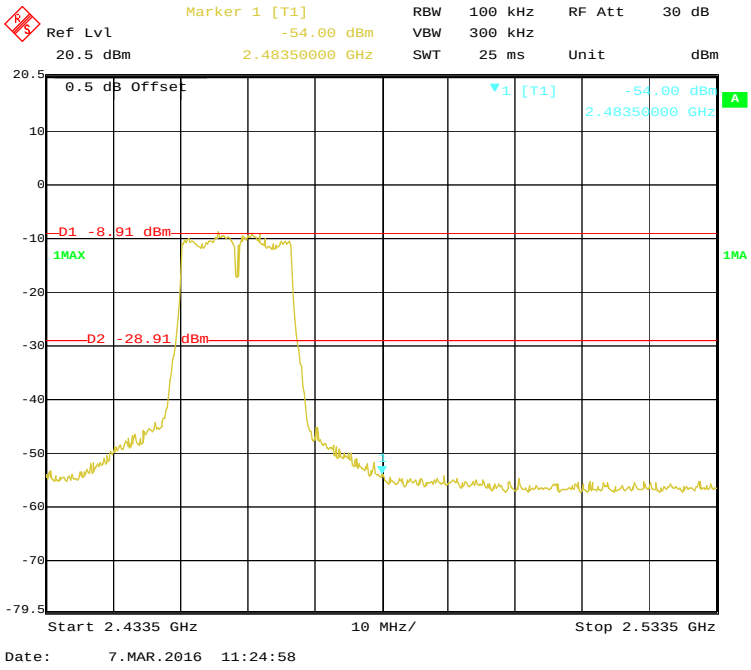
Chain 1 802.11b: Band Edge, Right Side



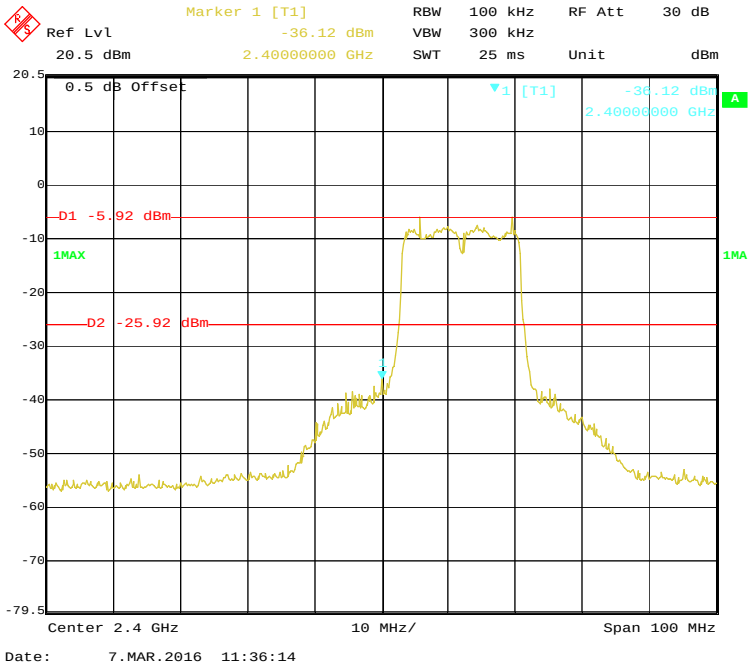
Chain 1 802.11g: Band Edge, Left Side



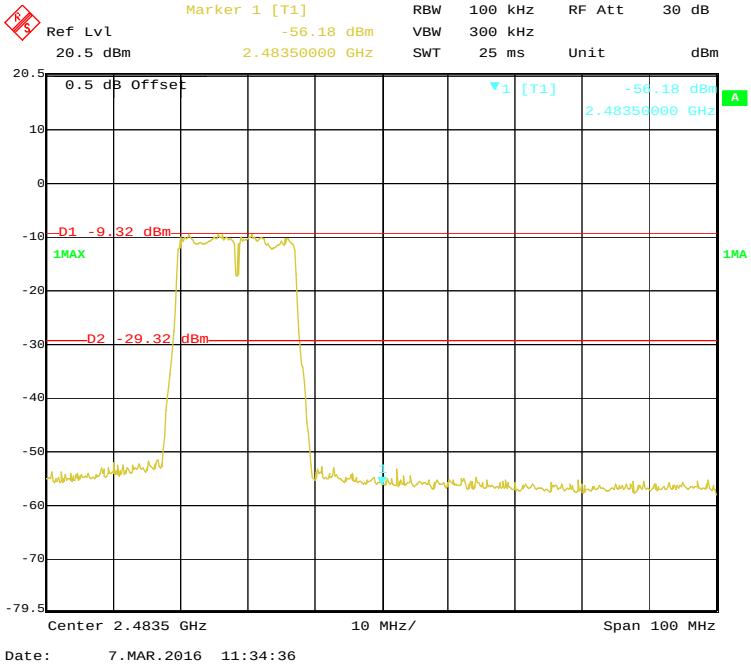
Chain 1 802.11g: Band Edge, Right Side



Chain 1 802.11n-HT20: Band Edge, Left Side

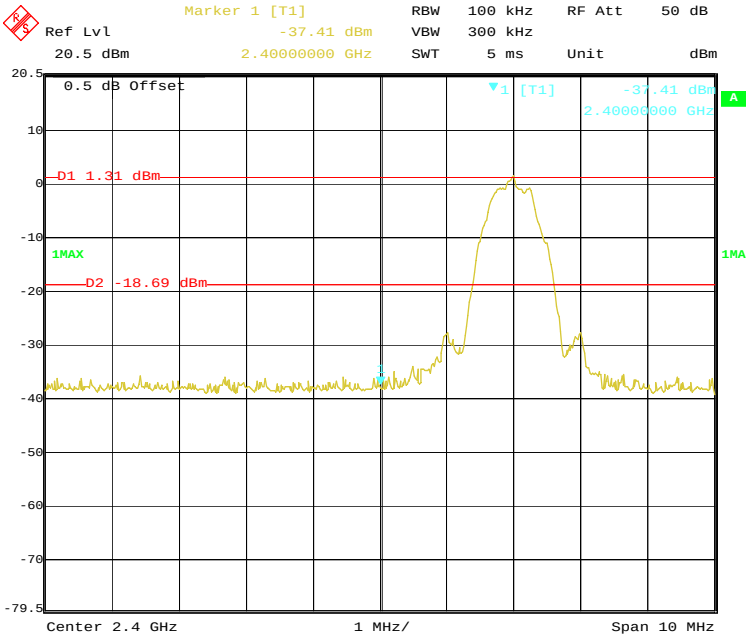


Chain1 802.11n-HT20: Band Edge, Right Side

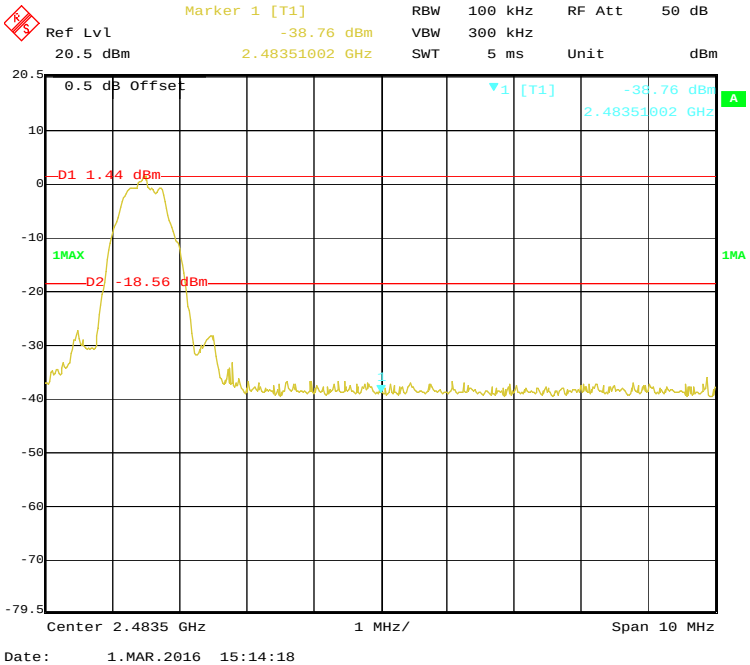


BLE Mode:

BLE Band Edge, Left Side



BLE 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

According to KDB558074 D01 DTS Meas Guidance v03r04 sub-clause 10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
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 amplitude level within the RBW.
10. 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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:	27 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Matt Yao on 2016-03-01&2016-01-04

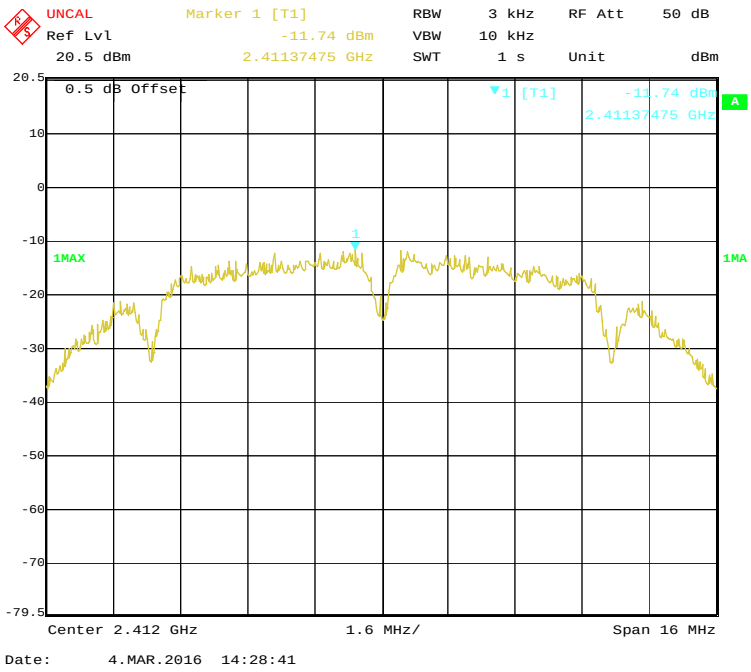
EUT operation mode: Transmitting

Test Result: Pass

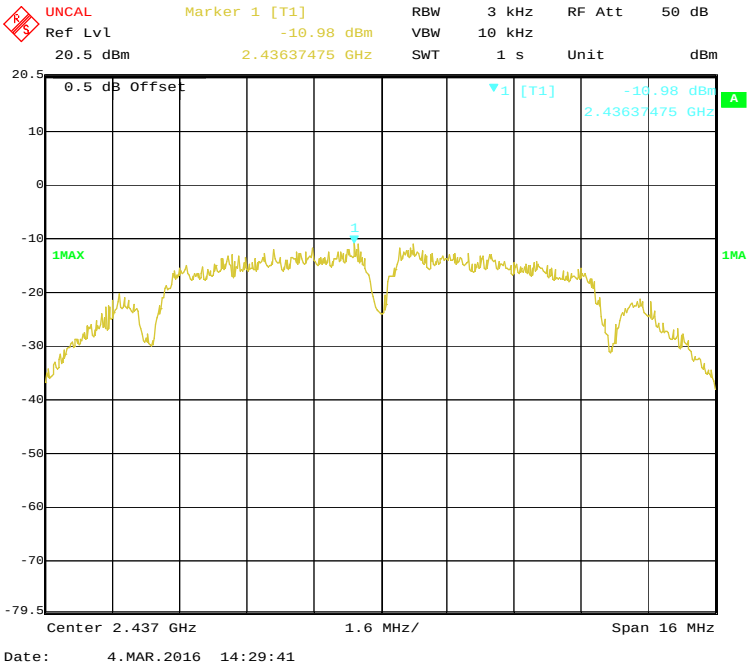
WIFI mode:

Channel	Frequency (MHz)	PSD (dBm/3kHz)			Limit (dBm/3kHz)
		Chain 0	Chain 1	Total	
802.11b mode					
Low	2412	-11.74	-17.48	-10.71	≤8
Middle	2437	-10.98	-16.76	-9.96	≤8
High	2462	-11.42	-18.38	-10.62	≤8
802.11g mode					
Low	2412	-16.10	-22.25	-15.16	≤8
Middle	2437	-16.01	-22.06	-15.05	≤8
High	2462	-16.69	-21.98	-15.56	≤8
802.11n-HT20 mode					
Low	2412	-13.50	-21.25	-12.83	≤8
Middle	2437	-15.60	-24.47	-15.07	≤8
High	2462	-16.13	-21.28	-14.97	≤8

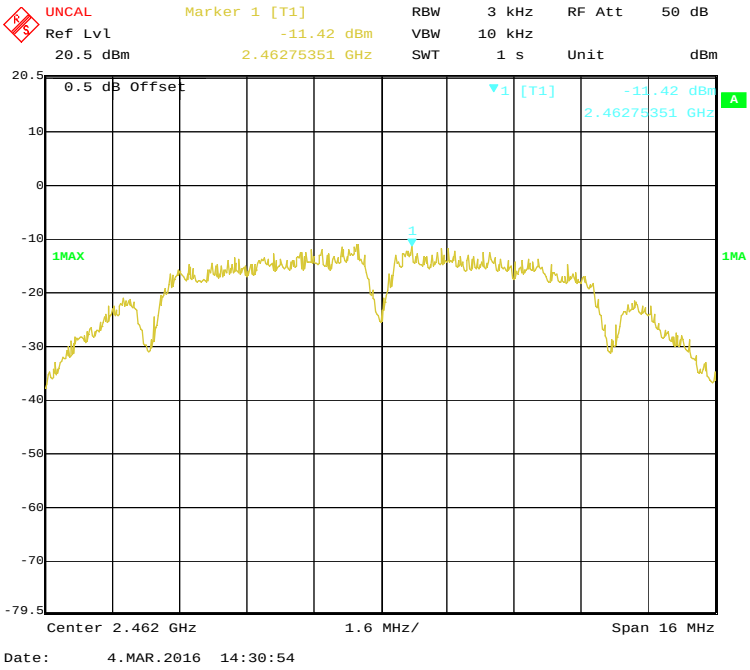
Chain 0 Power Spectral Density, 802.11b Low Channel



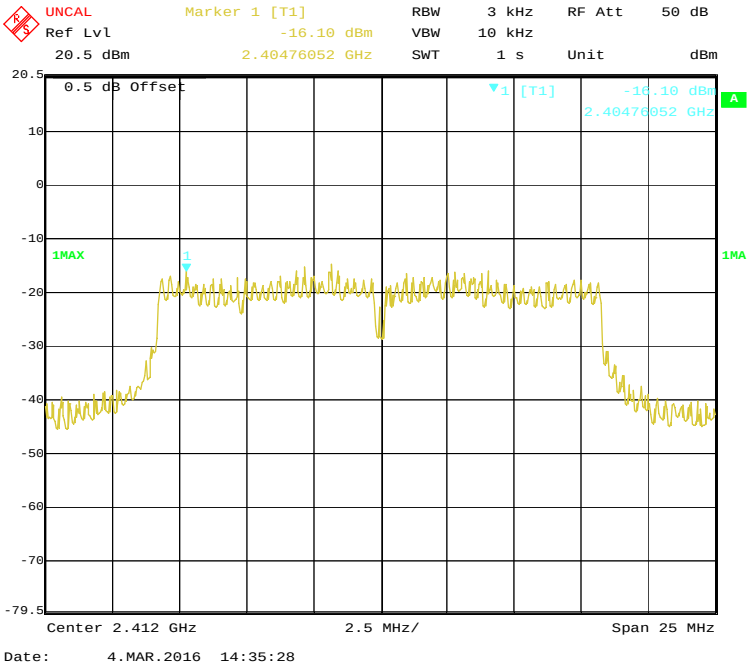
Chain 0 Power Spectral Density, 802.11b Middle Channel



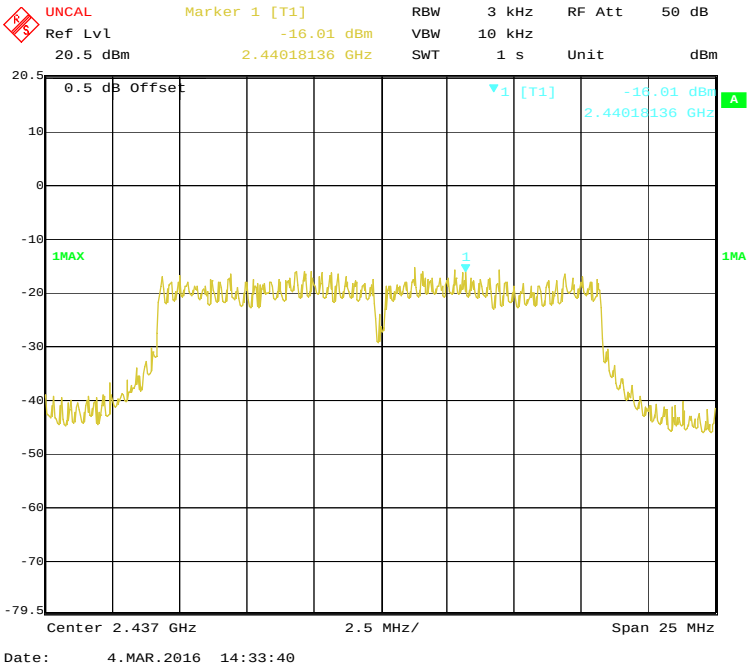
Chain 0 Power Spectral Density, 802.11b High Channel



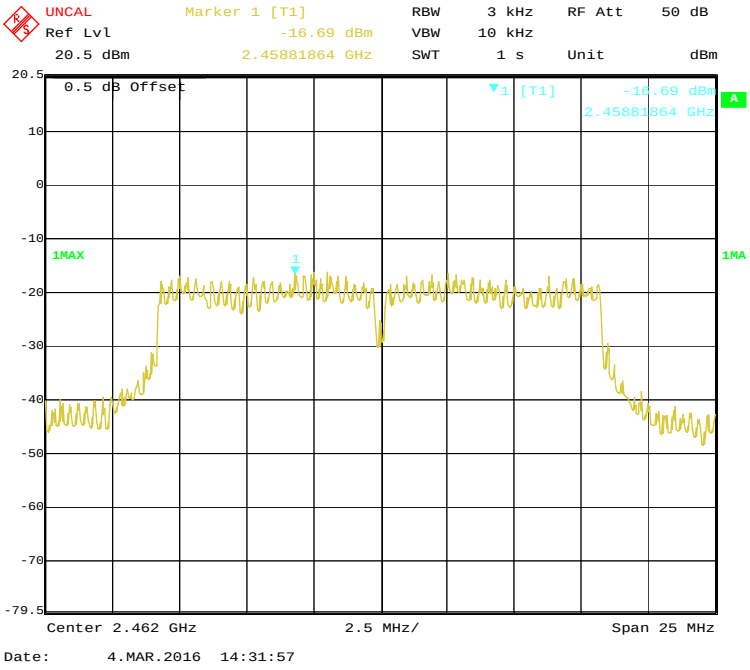
Chain 0 Power Spectral Density, 802.11g Low Channel



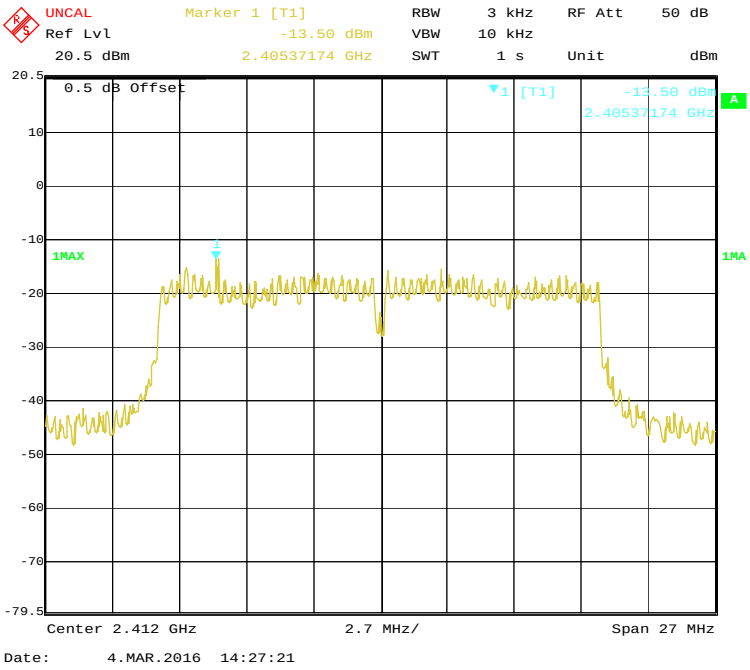
Chain 0 Power Spectral Density, 802.11g Middle Channel



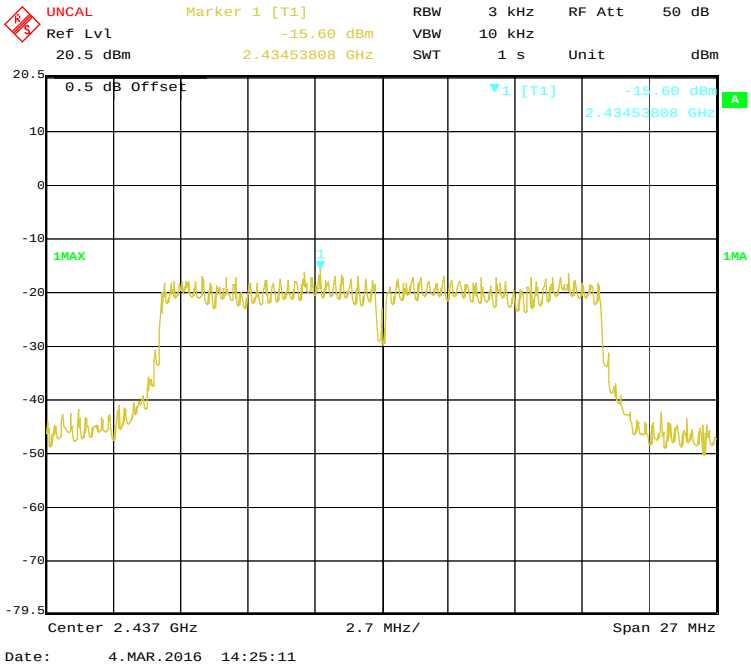
Chain 0 Power Spectral Density, 802.11g High Channel



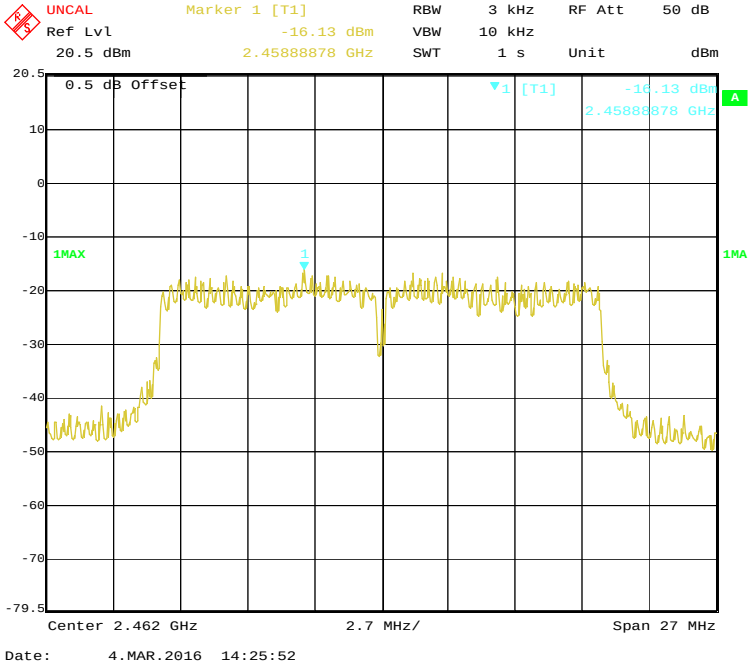
Chain 0 Power Spectral Density, 802.11n-HT20 Low Channel



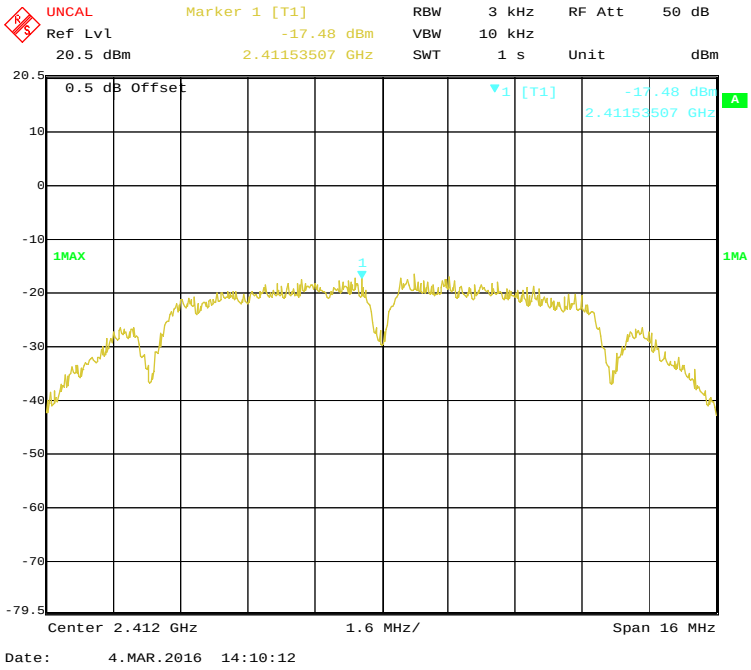
Chain 0 Power Spectral Density, 802.11n-HT20 Middle Channel



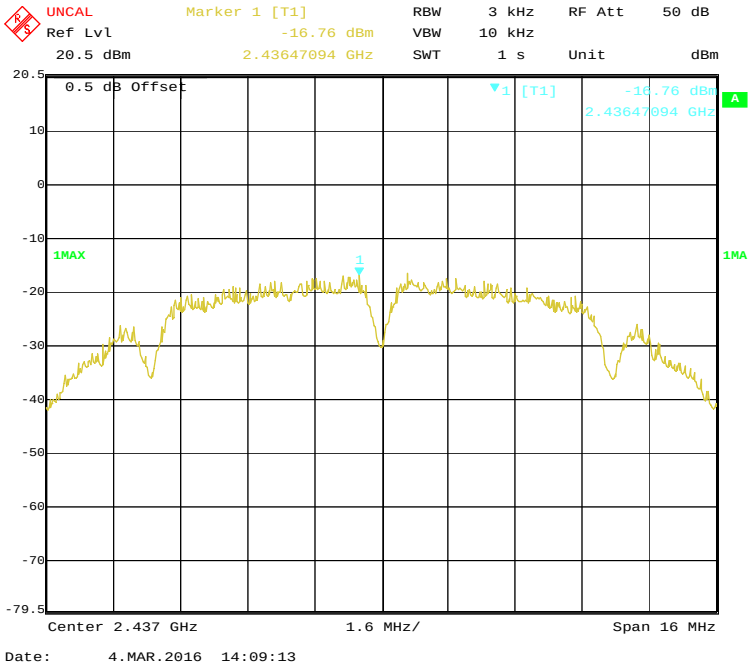
Chain 0 Power Spectral Density, 802.11n-HT20 High Channel



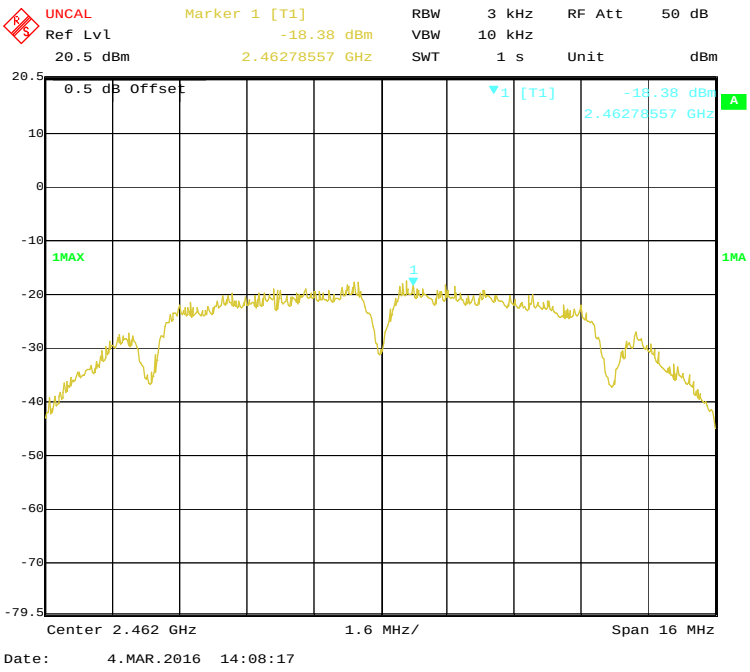
Chain 1 Power Spectral Density, 802.11b Low Channel



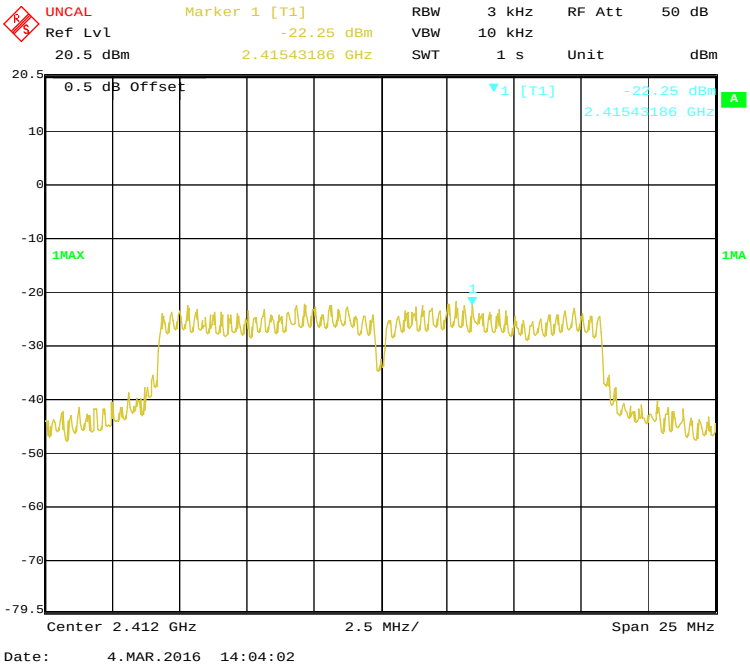
Chain 1 Power Spectral Density, 802.11b Middle Channel



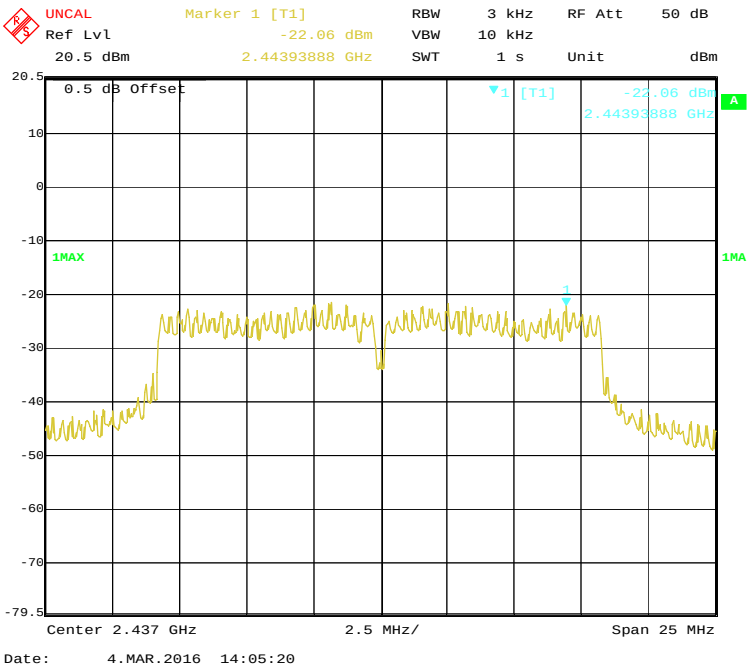
Chain 1 Power Spectral Density, 802.11b High Channel



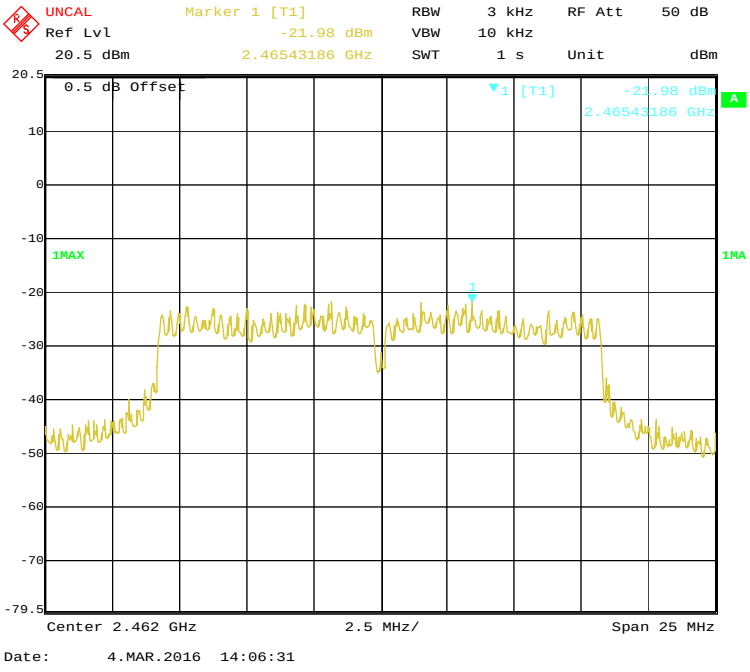
Chain 1 Power Spectral Density, 802.11g Low Channel



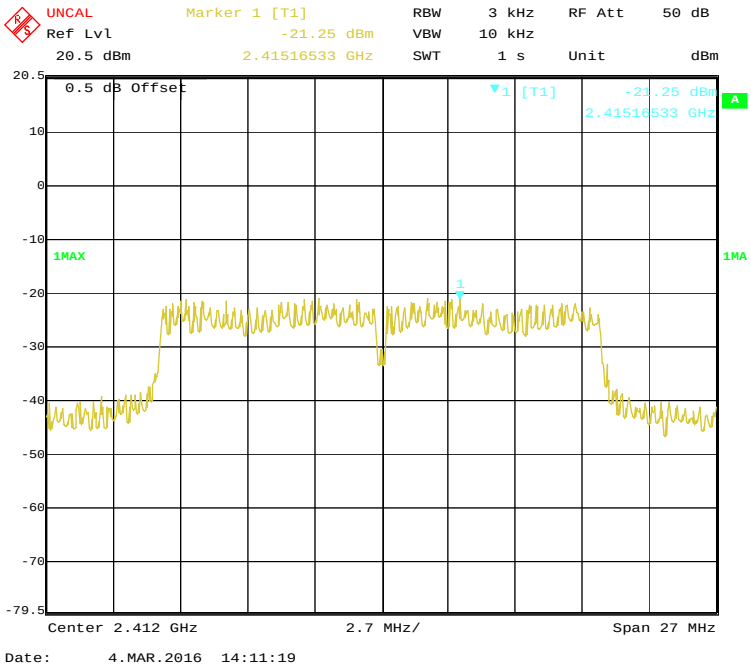
Chain 1 Power Spectral Density, 802.11g Middle Channel



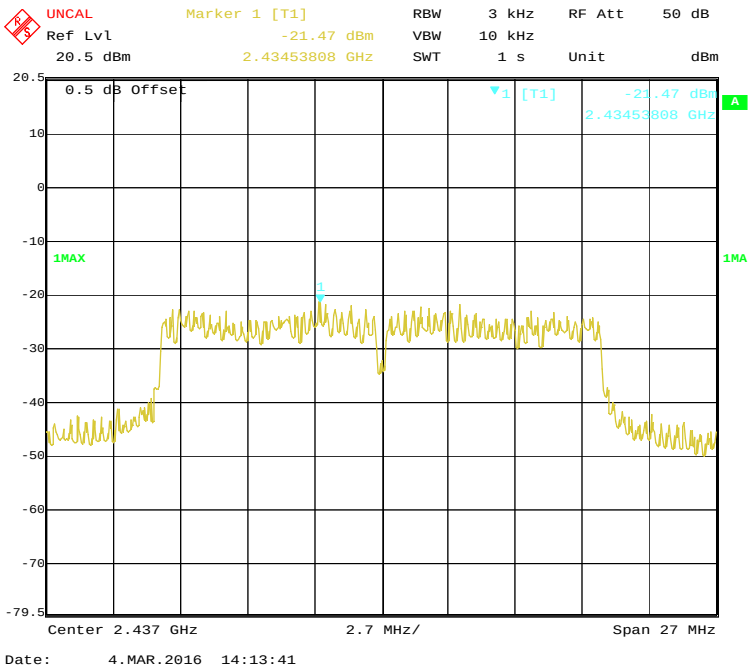
Chain 1 Power Spectral Density, 802.11g High Channel



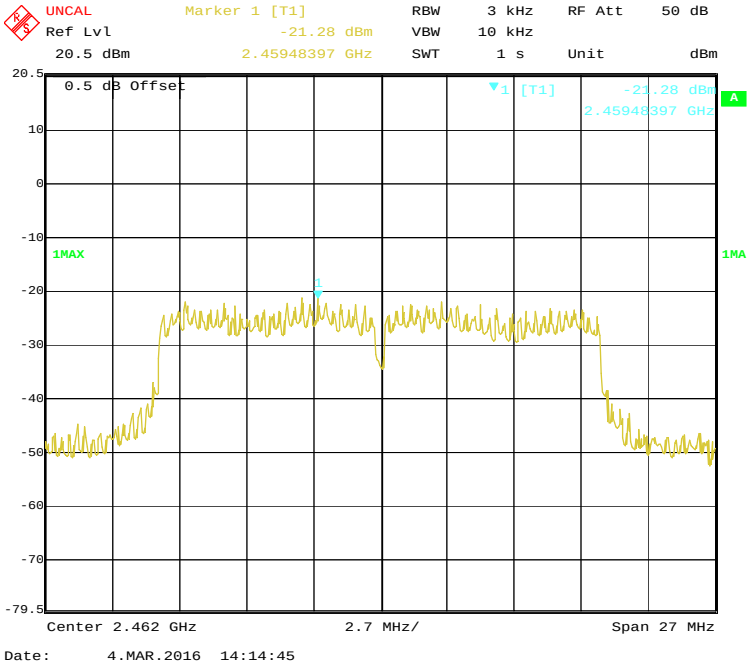
Chain 1 Power Spectral Density, 802.11n-HT20 Low Channel



Chain 1 Power Spectral Density, 802.11n-HT20 Middle Channel



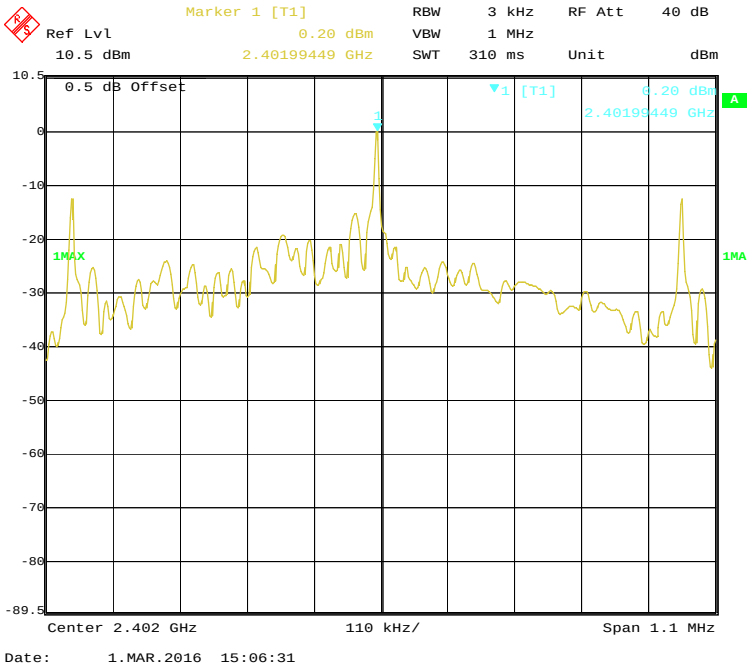
Chain 1 Power Spectral Density, 802.11n-HT20 High Channel



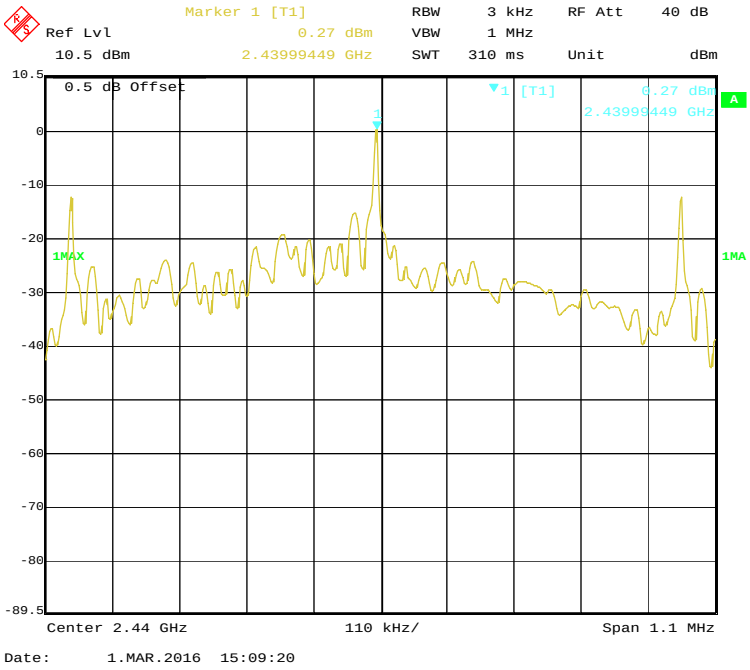
BLE mode:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
BLE mode			
Low	2402	0.20	≤8
Middle	2440	0.27	≤8
High	2480	0.33	≤8

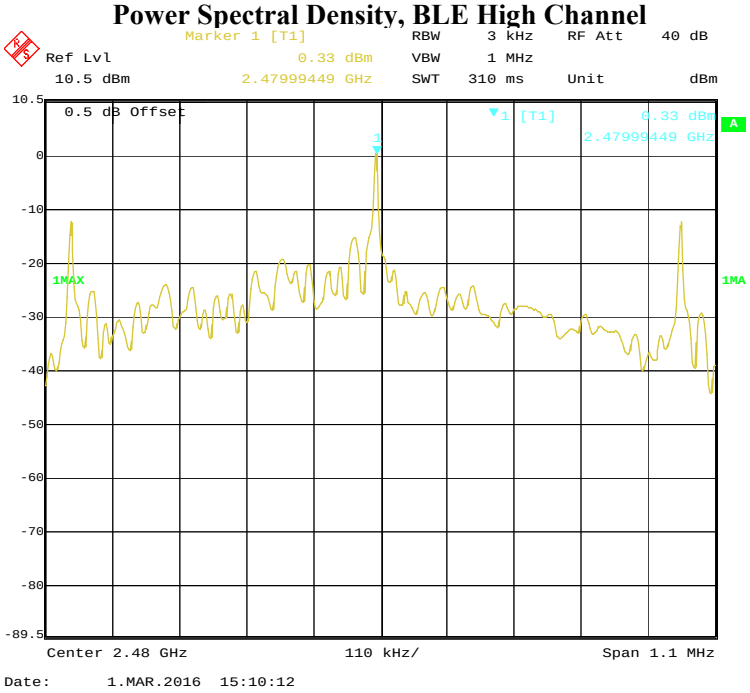
Power Spectral Density, BLE Low Channel



Power Spectral Density, BLE Middle Channel



Power Spectral Density, BLE High Channel



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