FCC PART 15.247

TEST REPORT

For

Huawei Technologies Co.,Ltd

Administration Building,Headquarters of Huawei Technologies Co.,Ltd., Bantian,Longgang District, Shenzhen, 518129, P.R.C

Test Model: R250D-E
FCC ID: QISR250D-E

Report Type:	**Product Name:**
Original Report	Remote Unit

Test Engineer:	*Lorin Bian*
Report Number:	RDG161107002B
Report Date:	2016-12-23
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Huawei Technologies Co.,Ltd***'s product, model number: ***R250D-E (FCC ID: QISR250D-E)*** (the "EUT") in this report was a ***Remote Unit***, which was measured approximately:8.6cm (L) x 14cm (W) x 3.6cm (H), rated input voltage: DC 48V from adapter or DC -48V from POE port.

Adapter Information:
Model No: HW-100-48AC14D
AC Input: 100-240Vac, 50-60Hz, 2A
DC Output: 48V 2.08A

**All measurement and test data in this report was gathered from final production sample, serial number: 161107002 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-11-18, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of ***Huawei Technologies 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)

FCC Part 15E NII submissions with FCC ID: QISR250D-E.
FCC Part 15B JBP submissions with FCC ID: QISR250D-E.

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. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The uncertainty of any RF tests which use conducted method measurement is ±3.17 dB, the uncertainty of any radiation on emissions measurement is:

30M~200MHz: ±4.7 dB;
200M~1GHz: ±6.0 dB;
1G~6GHz: ±5.13dB;
6G~25GHz: ±5.47dB;

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China.

Test site at BACL 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 April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. 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.

The device support 2.4GHz, 5GHz double band WLAN, and Bluetooth BLE.

For 2.4G band WLAN, the device support SISO, 2 x 2 MIMO, at 802.11 n system, and 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 802.11n20 modes were tested with Channel 1, 6 and 11.
For 802.11n40 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.

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.

EUT Exercise Software

The IPOR&QSPR was used for testing, and the commands were provided by manufacturer. The maximum power and duty cycle was set by commands as following table:

1TX:

Software and version			IPOR&QRCT		
Mode	Channel	Frequency (MHz)	Data Rate	Power Level	
			(Mbps)	Chain 0	Chain 1
802.11 b	Low	2412	1	18	18
	Middle	2437	1	18	18
	High	2462	1	18	18
802.11 g	Low	2412	6	17	17
	Middle	2437	6	17	17
	High	2462	6	17	17
802.11 n20	Low	2412	MCS0	17	17
	Middle	2437	MCS0	17	17
	High	2462	MCS0	17	17
802.11 n40	Low	2422	MCS0	16	16
	Middle	2437	MCS0	16	16
	High	2452	MCS0	16	16

2TX, Non-beamforming:

Software and version			IPOR&QRCT		
Mode	Channel	Frequency (MHz)	Data Rate	Power Level	
			(Mbps)	Chain 0	Chain 1
802.11 b	Low	2412	1	18	18
	Middle	2437	1	18	18
	High	2462	1	18	18
802.11 g	Low	2412	6	17	17
	Middle	2437	6	17	17
	High	2462	6	16	16
802.11 n20	Low	2412	MCS0	17	17
	Middle	2437	MCS0	17	17
	High	2462	MCS0	16	16
802.11 n40	Low	2422	MCS0	15	15
	Middle	2437	MCS0	16	16
	High	2452	MCS0	15	15

2TX, with beamforming:

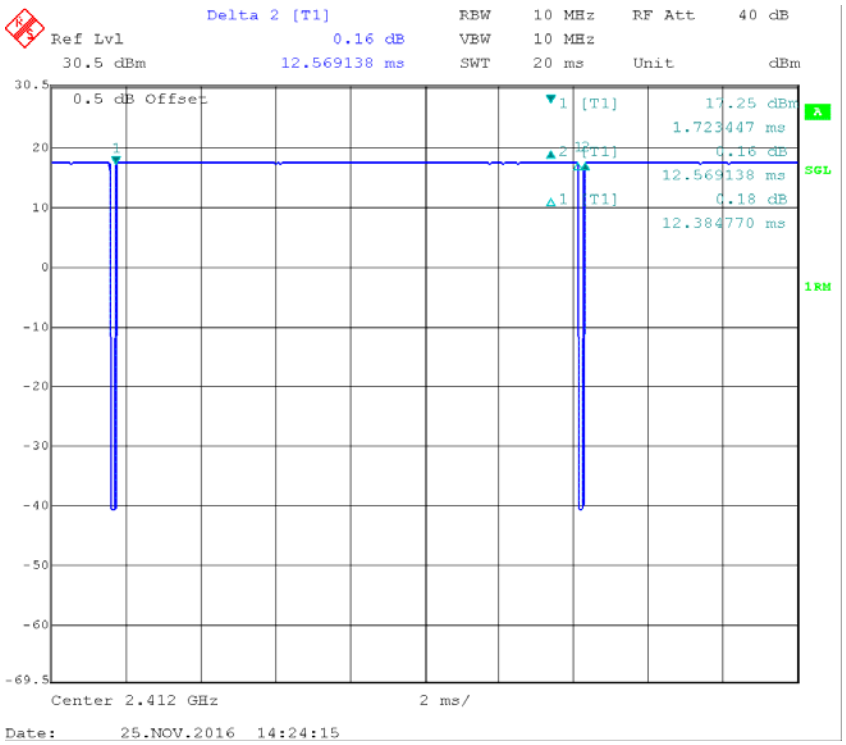
Software and version			IPOR&QRCT		
Mode	Channel	Frequency (MHz)	Data Rate	Power Level	
			(Mbps)	Chain 0	Chain 1
802.11 n20	Low	2412	MCS0	17	17
	Middle	2437	MCS0	17	17
	High	2462	MCS0	16	16
802.11 n40	Low	2422	MCS0	15	15
	Middle	2437	MCS0	16	16
	High	2452	MCS0	15	15

Note: BLE mode configured as maximum power by the system default setting.

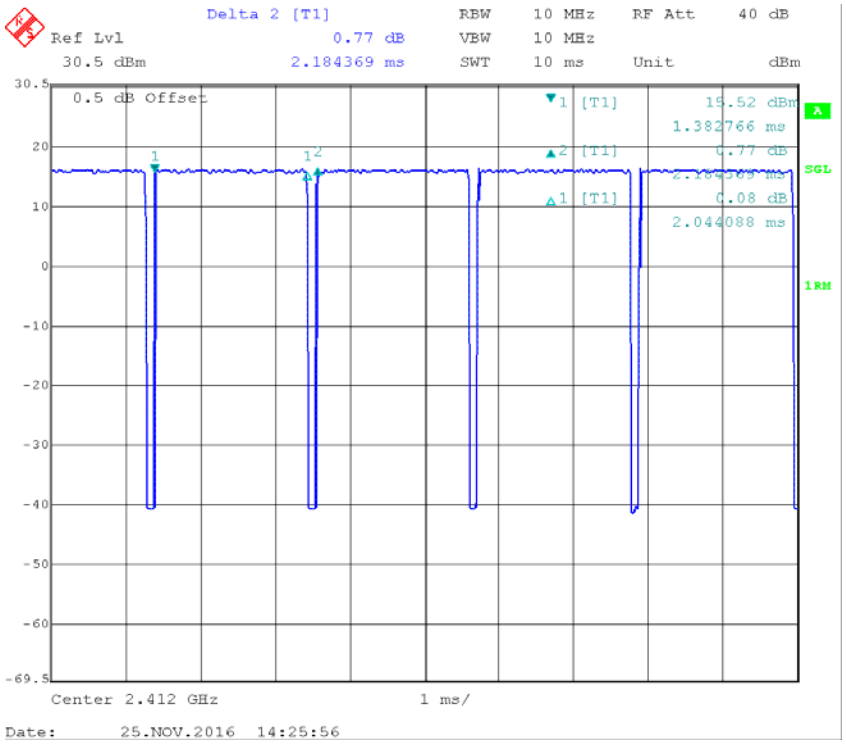
The duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)	Minimum Transmission Duration (T) (ms)
802.11b	12.38	12.57	98	12.38
802.11g	2.18	2.04	94	2.18
802.11n ht20	1.90	2.04	93	1.90
802.11n ht40	0.93	1.05	89	0.93
BLE	0.357	0.625	57	0.357

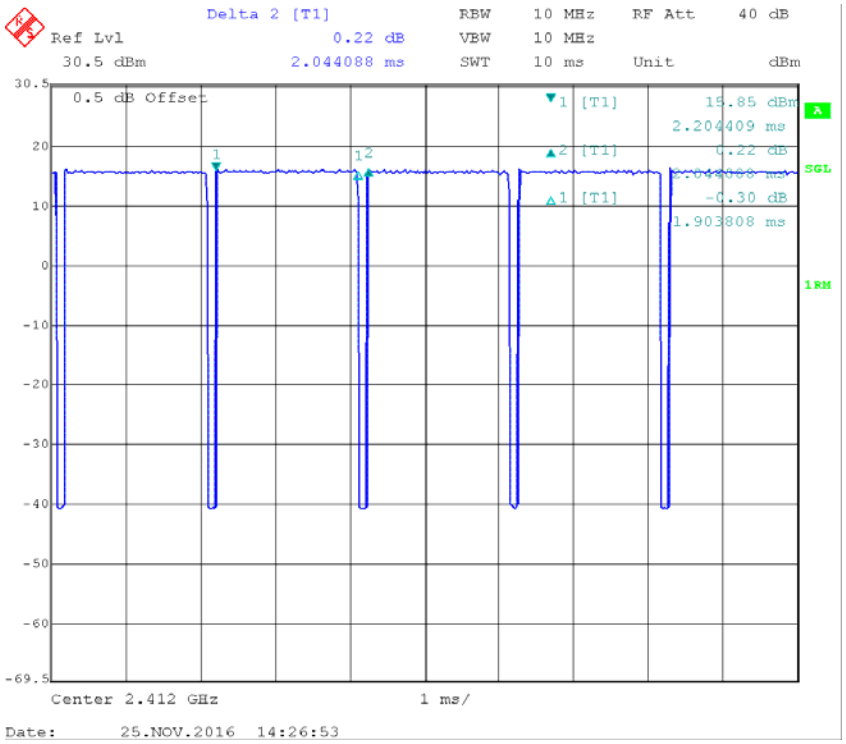
802.11b



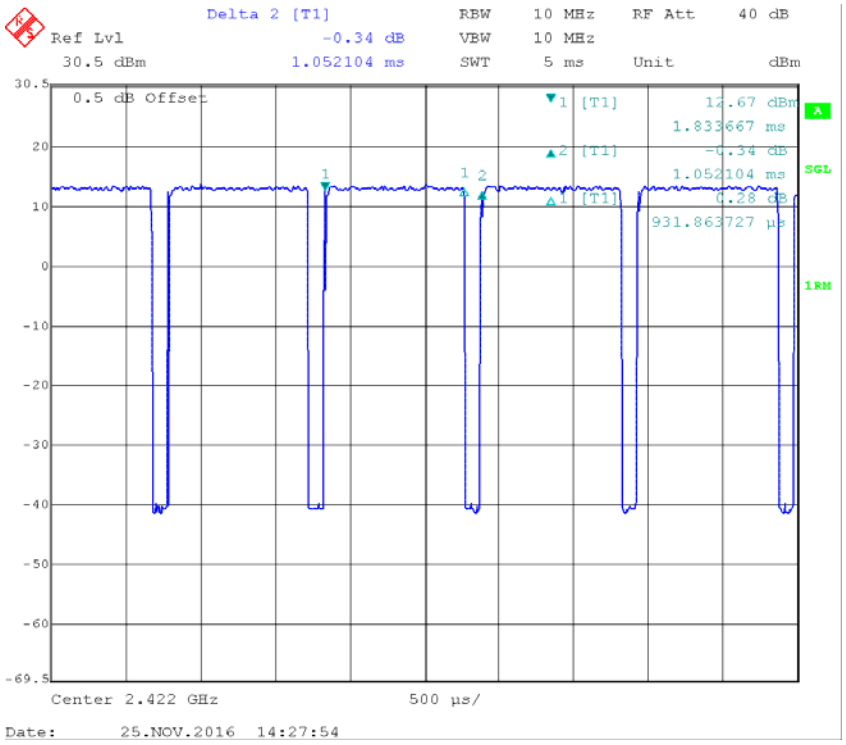
802.11g



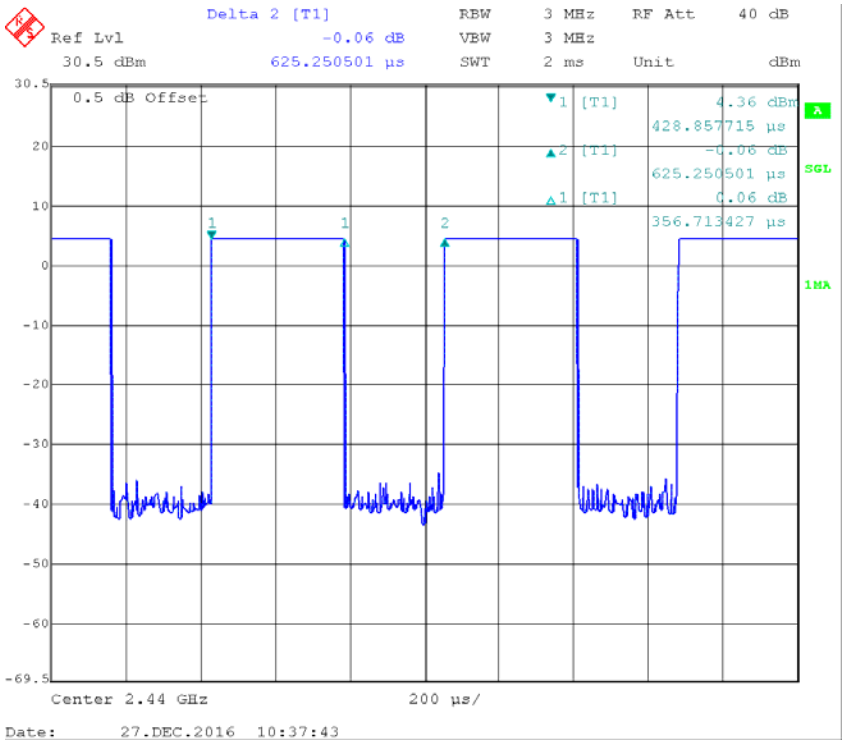
802.11n ht20



802.11n ht40



BLE



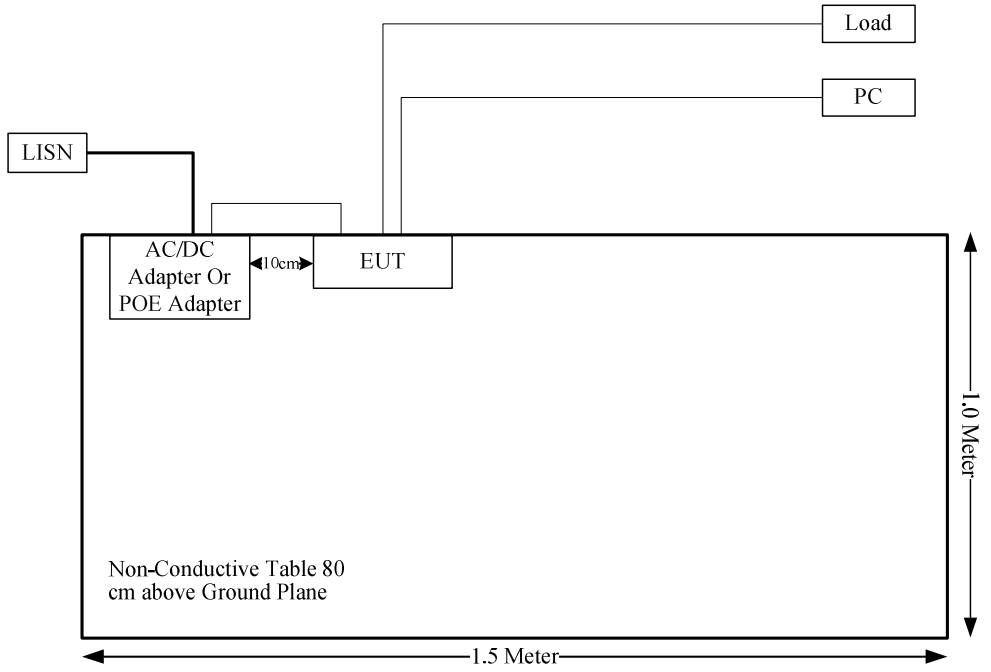
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	PC	8176	99Y7315
N/A	Load	N/A	/
Huawei	POE adapter	PoE35-54A	/

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	No	Yes	10	RJ45 Port of Laptop	EUT
RJ45 Cable*4	No	Yes	10	EUT	Load

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1091	Maximum Permissable 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/f²)	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/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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN 2.4GHz	2412-2462	5.5	3.55	28	630.96	20.00	0.4456	1.0
WLAN 5GHz	5150-5850	5.4	3.47	20	100.00	20.00	0.0690	1.0
BLE	2402-2480	2.2	1.66	4	2.51	20.00	0.0008	1.0

The 2.4GHz and 5GHz band can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$=S_{2.4}/S_{limit\text{-}2.4} + S_5/S_{limit\text{-}5} + S_{BLE}/S_{BLE}$

=0.45/1+0.07/1+0.0008/1

=0.5

< 1.0

Result: Compliance, The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥20 cm.

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 Information And Connector Construction

Ant.	Manufacturer	Model	Antenna Type	Connector	Frequency Range/Antenna Gain
ANT 1	Hong lin Kunshan	N/A	Internal	U.FL	5.5dBi/2.4GHz Band 5.4dBi/5GHz Band
ANT 2	HUAWEI	N/A	Internal	Printed	5.5dBi/2.4GHz Band 5.4dBi/5GHz Band
BLE	Hong Lin Kunshan	N/A	Internal	U.FL	2.2dBi/2.4GHz Band

Result: Compliance. Please refer to the EUT photos

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：

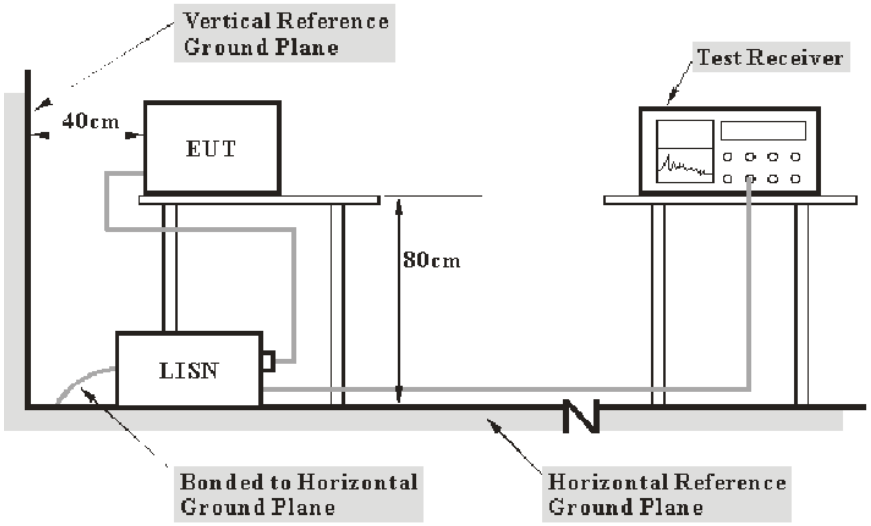
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level, increased by (U_{lab} − U_{cispr}), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} − U_{cispr}), 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. (Chengdu) is ±3.17 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
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 V/60 Hz AC 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:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
N/A	Conducted Cable	NO.5	N/A	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

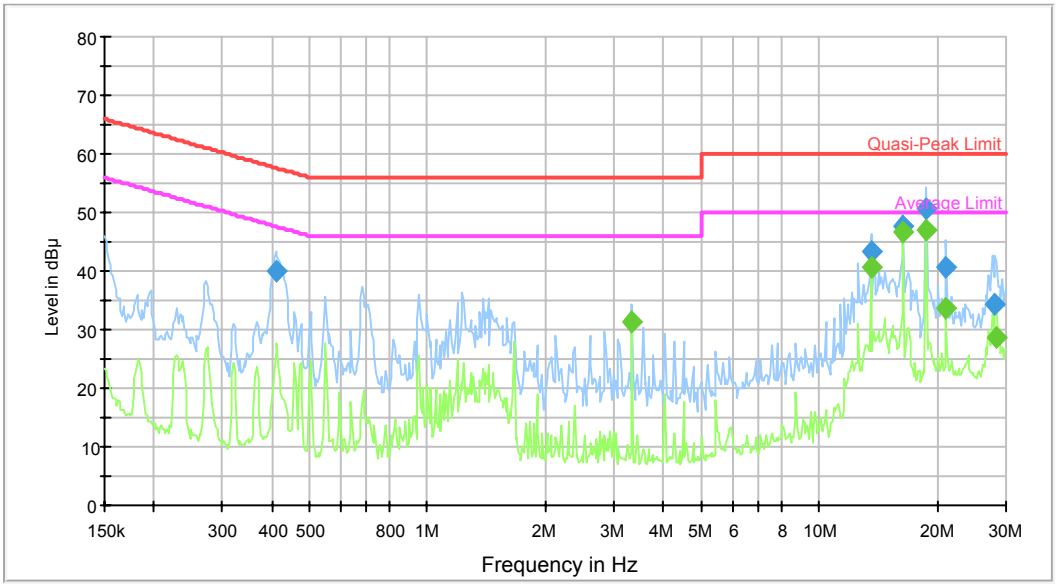
Environmental Conditions

Temperature:	26.7 °C
Relative Humidity:	48 %
ATM Pressure:	101kPa

The testing was performed by Lorin Bian on 2016-12-13.

Test Mode: Transmitting (WiFi+BLE, AC/DC adapter is the worst)

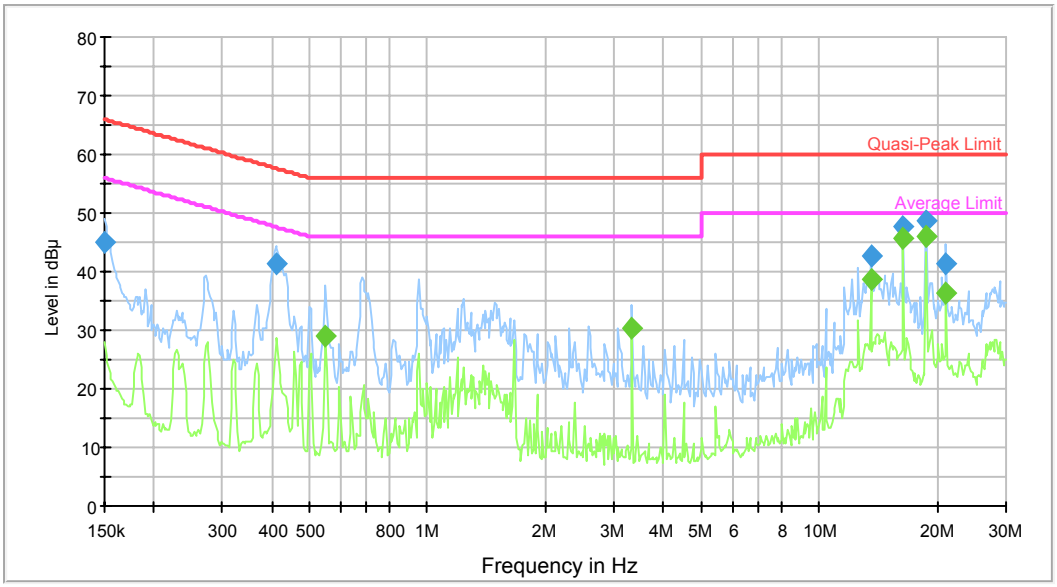
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.409372	40.1	9.000	L1	19.8	17.6	57.7	Compliance
13.529825	43.3	9.000	L1	20.0	16.7	60.0	Compliance
16.381172	47.8	9.000	L1	20.1	12.2	60.0	Compliance
18.757459	50.8	9.000	L1	20.0	9.2	60.0	Compliance
21.138881	40.7	9.000	L1	20.1	19.3	60.0	Compliance
28.161848	34.2	9.000	L1	20.3	25.8	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
3.328423	31.2	9.000	L1	19.7	14.8	46.0	Compliance
13.529825	40.8	9.000	L1	20.0	9.2	50.0	Compliance
16.381172	46.8	9.000	L1	20.1	3.2	50.0	Compliance
18.757459	47.0	9.000	L1	20.0	3.0	50.0	Compliance
21.138881	33.5	9.000	L1	20.1	16.5	50.0	Compliance
28.387142	28.8	9.000	L1	20.3	21.2	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	45.1	9.000	N	19.7	20.9	66.0	Compliance
0.409372	41.5	9.000	N	19.6	16.2	57.7	Compliance
13.529825	42.6	9.000	N	19.9	17.4	60.0	Compliance
16.381172	47.5	9.000	N	19.9	12.5	60.0	Compliance
18.757459	48.8	9.000	N	19.9	11.2	60.0	Compliance
21.138881	41.5	9.000	N	20.0	18.5	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.549741	29.1	9.000	N	19.6	16.9	46.0	Compliance
3.328423	30.5	9.000	N	19.7	15.5	46.0	Compliance
13.529825	38.7	9.000	N	19.9	11.3	50.0	Compliance
16.381172	45.7	9.000	N	19.9	4.3	50.0	Compliance
18.757459	46.1	9.000	N	19.9	3.9	50.0	Compliance
21.138881	36.2	9.000	N	20.0	13.8	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_{cispr} 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_{cispr} of Table 2, then:
–compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

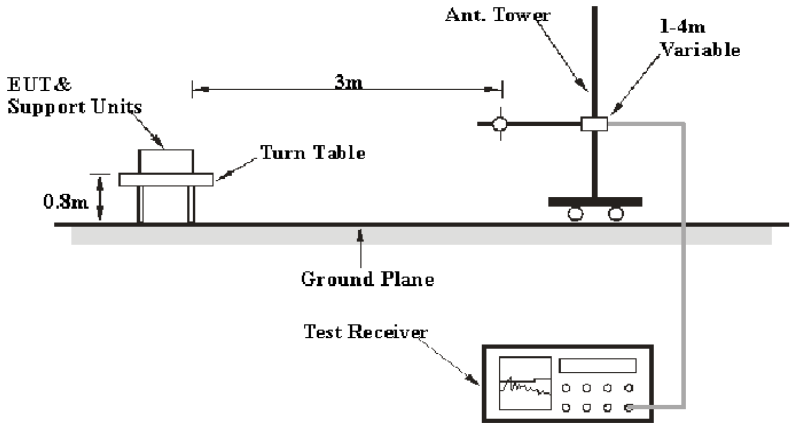
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:
30M~200MHz: ±4.7 dB;
200M~1GHz: ±6.0 dB;
1G-6GHz: ±5.13dB;
6G~25GHz: ±5.47 dB;

Table 2 – Values of U_{cispr}

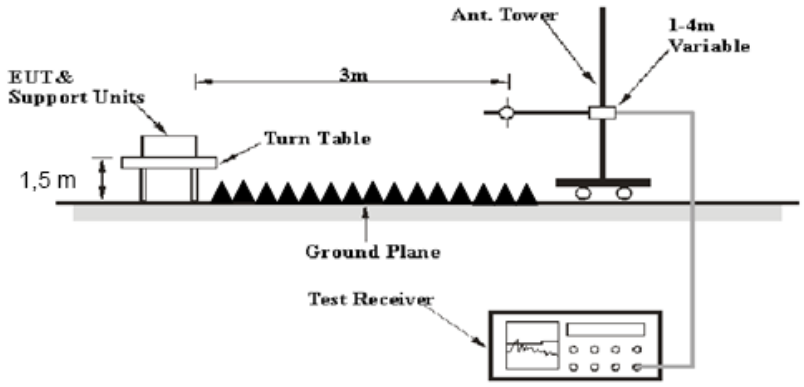
Measurement		U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC)	(30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters 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:

30-1000MHz:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

1GHz- 25GHz:

Detector	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

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:

Corrected Amplitude = Meter Reading + Antenna Loss + 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2015-12-02	2016-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2015-12-02	2016-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2015-12-02	2016-12-01
ETS	Horn Antenna	3115	003-6076	2015-12-02	2016-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2015-12-02	2016-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Section 15.205, 15.209 and 15.247.

Test Data

Environmental Conditions

Temperature:	22.1 °C
Relative Humidity:	49%
ATM Pressure:	101.3kPa

** The testing was performed by Lorin Bian on 2016-11-30.*

Test Mode: Transmitting (AC/DC adapter is the worst)

1TX:

802.11b Mode (Chain 0 was the worst)

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	76.12	PK	H	23.50	3.00	0.00	102.62	N/A	N/A
2412	73.15	AV	H	23.50	3.00	0.00	99.65	N/A	N/A
2412	70.05	PK	V	23.50	3.00	0.00	96.55	N/A	N/A
2412	67.05	AV	V	23.50	3.00	0.00	93.55	N/A	N/A
2390	25.27	PK	H	23.57	3.00	0.00	51.84	74.00	22.16
2390	13.75	AV	H	23.57	3.00	0.00	40.32	54.00	13.68
4824	34.17	PK	H	30.84	5.11	26.87	43.25	74.00	30.75
4824	27.52	AV	H	30.84	5.11	26.87	36.60	54.00	17.40
7236	31.49	PK	H	34.77	6.18	26.36	46.08	74.00	27.92
7236	24.84	AV	H	34.77	6.18	26.36	39.43	54.00	14.57
2545	37.21	PK	H	23.29	3.03	26.85	36.68	74.00	37.32
2545	30.05	AV	H	23.29	3.03	26.85	29.52	54.00	24.48
241.46	52.37	QP	H	12.30	1.09	27.55	38.21	46.00	7.79
324.88	54.72	QP	H	14.65	1.21	27.64	42.94	46.00	3.06
Middle Channel: 2437 MHz									
2437	76.99	PK	H	23.41	3.00	0.00	103.40	N/A	N/A
2437	73.54	AV	H	23.41	3.00	0.00	99.95	N/A	N/A
2437	70.27	PK	V	23.41	3.00	0.00	96.68	N/A	N/A
2437	67.05	AV	V	23.41	3.00	0.00	93.46	N/A	N/A
4874	34.53	PK	H	31.00	5.09	26.87	43.75	74.00	30.25
4874	27.72	AV	H	31.00	5.09	26.87	36.94	54.00	17.06
7311	31.81	PK	H	34.92	6.21	26.40	46.54	74.00	27.46
7311	25.38	AV	H	34.92	6.21	26.40	40.11	54.00	13.89
1552	37.87	PK	H	24.18	2.71	26.38	38.38	74.00	35.62
1552	30.45	AV	H	24.18	2.71	26.38	30.96	54.00	23.04
3235	33.37	PK	H	25.52	3.78	26.49	36.18	74.00	37.82
3235	26.72	AV	H	25.52	3.78	26.49	29.53	54.00	24.47
241.46	52.51	QP	H	12.30	1.09	27.55	38.35	46.00	7.65
324.88	54.89	QP	H	14.65	1.21	27.64	43.11	46.00	2.89
High Channel: 2462 MHz									
2462	76.3	PK	H	23.33	2.99	0.00	102.62	N/A	N/A
2462	73.02	AV	H	23.33	2.99	0.00	99.34	N/A	N/A
2462	69.84	PK	V	23.33	2.99	0.00	96.16	N/A	N/A
2462	66.27	AV	V	23.33	2.99	0.00	92.59	N/A	N/A
2483.5	25.77	PK	H	23.26	2.99	0.00	52.02	74.00	21.98
2483.5	14.09	AV	H	23.26	2.99	0.00	40.34	54.00	13.66
4924	34.68	PK	H	31.16	5.07	26.88	44.03	74.00	29.97
4924	27.84	AV	H	31.16	5.07	26.88	37.19	54.00	16.81
7386	31.55	PK	H	35.07	6.25	26.43	46.44	74.00	27.56
7386	25.02	AV	H	35.07	6.25	26.43	39.91	54.00	14.09
3202	37.62	PK	H	25.33	3.73	26.48	40.20	74.00	33.80
3202	30.65	AV	H	25.33	3.73	26.48	33.23	54.00	20.77
241.46	52.47	QP	H	12.30	1.09	27.55	38.31	46.00	7.69
324.88	54.81	QP	H	14.65	1.21	27.64	43.03	46.00	2.97

802.11g Mode (Chain 0 was the worst)

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	78.46	PK	H	23.50	3.00	0.00	104.96	N/A	N/A
2412	68.21	AV	H	23.50	3.00	0.00	94.71	N/A	N/A
2412	74.17	PK	V	23.50	3.00	0.00	100.67	N/A	N/A
2412	63.82	AV	V	23.50	3.00	0.00	90.32	N/A	N/A
2389	36.33	PK	H	23.58	3.00	0.00	62.91	74.00	11.09
2389	20.67	AV	H	23.58	3.00	0.00	47.25	54.00	6.75
4824	33.81	PK	H	30.84	5.11	26.87	42.89	74.00	31.11
4824	23.54	AV	H	30.84	5.11	26.87	32.62	54.00	21.38
7236	31.24	PK	H	34.77	6.18	26.36	45.83	74.00	28.17
7236	20.83	AV	H	34.77	6.18	26.36	35.42	54.00	18.58
2545	39.1	PK	H	23.29	3.03	26.85	38.57	74.00	35.43
2545	29.72	AV	H	23.29	3.03	26.85	29.19	54.00	24.81
241.46	52.65	QP	H	12.30	1.09	27.55	38.49	46.00	7.51
324.88	55.1	QP	H	14.65	1.21	27.64	43.32	46.00	2.68
Middle Channel: 2437 MHz									
2437	76.4	PK	H	23.41	3.00	0.00	102.81	N/A	N/A
2437	66.82	AV	H	23.41	3.00	0.00	93.23	N/A	N/A
2437	73.75	PK	V	23.41	3.00	0.00	100.16	N/A	N/A
2437	64.18	AV	V	23.41	3.00	0.00	90.59	N/A	N/A
4874	34.35	PK	H	31.00	5.09	26.87	43.57	74.00	30.43
4874	27.51	AV	H	31.00	5.09	26.87	36.73	54.00	17.27
7311	30.89	PK	H	34.92	6.21	26.40	45.62	74.00	28.38
7311	26.75	AV	H	34.92	6.21	26.40	41.48	54.00	12.52
1463	39.65	PK	H	24.00	2.62	26.37	39.90	74.00	34.10
1463	34.07	AV	H	24.00	2.62	26.37	34.32	54.00	19.68
2697	31.69	PK	H	23.59	3.16	26.70	31.74	74.00	42.26
2697	21.2	AV	H	23.59	3.16	26.70	21.25	54.00	32.75
241.46	55.17	QP	H	12.30	1.09	27.55	41.01	46.00	4.99
324.88	55.39	QP	H	14.65	1.21	27.64	43.61	46.00	2.39
High Channel: 2462 MHz									
2462	74.94	PK	H	23.33	2.99	0.00	101.26	N/A	N/A
2462	64.42	AV	H	23.33	2.99	0.00	90.74	N/A	N/A
2462	73.57	PK	V	23.33	2.99	0.00	99.89	N/A	N/A
2462	63.24	AV	V	23.33	2.99	0.00	89.56	N/A	N/A
2483.5	36.72	PK	H	23.26	2.99	0.00	62.97	74.00	11.03
2483.5	21.24	AV	H	23.26	2.99	0.00	47.49	54.00	6.51
4924	33.55	PK	H	31.16	5.07	26.88	42.90	74.00	31.10
4924	23.38	AV	H	31.16	5.07	26.88	32.73	54.00	21.27
7386	30.81	PK	H	35.07	6.25	26.43	45.70	74.00	28.30
7386	20.47	AV	H	35.07	6.25	26.43	35.36	54.00	18.64
2074	39.62	PK	H	24.65	3.04	26.83	40.48	74.00	33.52
2074	29.6	AV	H	24.65	3.04	26.83	30.46	54.00	23.54
241.46	55.29	QP	H	12.30	1.09	27.55	41.13	46.00	4.87
324.88	55.48	QP	H	14.65	1.21	27.64	43.70	46.00	2.30

802.11 n ht20 Mode (Chain 0 was the worst)

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	77.09	PK	H	23.50	3.00	0.00	103.59	N/A	N/A
2412	65.74	AV	H	23.50	3.00	0.00	92.24	N/A	N/A
2412	73.66	PK	V	23.50	3.00	0.00	100.16	N/A	N/A
2412	61.49	AV	V	23.50	3.00	0.00	87.99	N/A	N/A
2390	37.46	PK	H	23.57	3.00	0.00	64.03	74.00	9.97
2390	20.72	AV	H	23.57	3.00	0.00	47.29	54.00	6.71
4824	33.24	PK	H	30.84	5.11	26.87	42.32	74.00	31.68
4824	21.38	AV	H	30.84	5.11	26.87	30.46	54.00	23.54
7236	31.8	PK	H	34.77	6.18	26.36	46.39	74.00	27.61
7236	19.58	AV	H	34.77	6.18	26.36	34.17	54.00	19.83
2545	39.68	PK	H	23.29	3.03	26.85	39.15	74.00	34.85
2545	28.51	AV	H	23.29	3.03	26.85	27.98	54.00	26.02
241.46	55.02	QP	H	12.30	1.09	27.55	40.86	46.00	5.14
324.88	55.31	QP	H	14.65	1.21	27.64	43.53	46.00	2.47
Middle Channel: 2437 MHz									
2437	80.41	PK	H	23.41	3.00	26.88	79.94	N/A	N/A
2437	70.05	AV	H	23.41	3.00	26.88	69.58	N/A	N/A
2437	74.65	PK	V	23.41	3.00	26.88	74.18	N/A	N/A
2437	63.51	AV	V	23.41	3.00	26.88	63.04	N/A	N/A
4874	32.85	PK	H	31.00	5.09	26.87	42.07	74.00	31.93
4874	20.97	AV	H	31.00	5.09	26.87	30.19	54.00	23.81
7311	31.53	PK	H	34.92	6.21	26.40	46.26	74.00	27.74
7311	20.22	AV	H	34.92	6.21	26.40	34.95	54.00	19.05
1558	39.35	PK	H	24.19	2.71	26.39	39.86	74.00	34.14
1558	28.02	AV	H	24.19	2.71	26.39	28.53	54.00	25.47
3064	31.44	PK	H	24.56	3.53	26.43	33.10	74.00	40.90
3064	20.23	AV	H	24.56	3.53	26.43	21.89	54.00	32.11
241.46	52.99	QP	H	12.30	1.09	27.55	38.83	46.00	7.17
324.88	53.67	QP	H	14.65	1.21	27.64	41.89	46.00	4.11
High Channel: 2462 MHz									
2462	75.64	PK	H	23.33	2.99	0.00	101.96	N/A	N/A
2462	62.58	AV	H	23.33	2.99	0.00	88.90	N/A	N/A
2462	73.49	PK	V	23.33	2.99	0.00	99.81	N/A	N/A
2462	61.58	AV	V	23.33	2.99	0.00	87.90	N/A	N/A
2483.5	37.02	PK	H	23.26	2.99	0.00	63.27	74.00	10.73
2483.5	21.23	AV	H	23.26	2.99	0.00	47.48	54.00	6.52
4924	32.99	PK	H	31.16	5.07	26.88	42.34	74.00	31.66
4924	21.31	AV	H	31.16	5.07	26.88	30.66	54.00	23.34
7386	31.81	PK	H	35.07	6.25	26.43	46.70	74.00	27.30
7386	19.15	AV	H	35.07	6.25	26.43	34.04	54.00	19.96
1723	39.45	PK	H	24.46	2.84	26.55	40.20	74.00	33.80
1723	28.34	AV	H	24.46	2.84	26.55	29.09	54.00	24.91
241.46	53.13	QP	H	12.30	1.09	27.55	38.97	46.00	7.03
324.88	53.84	QP	H	14.65	1.21	27.64	42.06	46.00	3.94

802.11 n ht40 Mode (Chain 0 was the worst)

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	70.51	PK	H	23.47	3.00	0.00	96.98	N/A	N/A
2422	60.54	AV	H	23.47	3.00	0.00	87.01	N/A	N/A
2422	67.59	PK	V	23.47	3.00	0.00	94.06	N/A	N/A
2422	58.27	AV	V	23.47	3.00	0.00	84.74	N/A	N/A
2390	35.76	PK	H	23.57	3.00	0.00	62.33	74.00	11.67
2390	21.87	AV	H	23.57	3.00	0.00	48.44	54.00	5.56
4844	32.82	PK	H	30.90	5.10	26.87	41.95	74.00	32.05
4844	22.57	AV	H	30.90	5.10	26.87	31.70	54.00	22.30
7266	31.92	PK	H	34.83	6.19	26.38	46.56	74.00	27.44
7266	21.85	AV	H	34.83	6.19	26.38	36.49	54.00	17.51
1405	41.75	PK	H	23.85	2.54	26.42	41.72	74.00	32.28
1405	31.54	AV	H	23.85	2.54	26.42	31.51	54.00	22.49
241.46	53.09	QP	H	12.30	1.09	27.55	38.93	46.00	7.07
324.88	53.76	QP	H	14.65	1.21	27.64	41.98	46.00	4.02
Middle Channel: 2437 MHz									
2437	77.27	PK	H	23.41	3.00	0.00	103.68	N/A	N/A
2437	67.2	AV	H	23.41	3.00	0.00	93.61	N/A	N/A
2437	70.35	PK	V	23.41	3.00	0.00	96.76	N/A	N/A
2437	60.12	AV	V	23.41	3.00	0.00	86.53	N/A	N/A
4874	29.75	PK	H	31.00	5.09	26.87	38.97	74.00	35.03
4874	20.88	AV	H	31.00	5.09	26.87	30.10	54.00	23.90
7311	31.48	PK	H	34.92	6.21	26.40	46.21	74.00	27.79
7311	21.32	AV	H	34.92	6.21	26.40	36.05	54.00	17.95
1526	41.5	PK	H	24.14	2.69	26.36	41.97	74.00	32.03
1526	30.37	AV	H	24.14	2.69	26.36	30.84	54.00	23.16
3610	31.19	PK	H	27.44	4.34	26.58	36.39	74.00	37.61
3610	21.47	AV	H	27.44	4.34	26.58	26.67	54.00	27.33
241.46	53.27	QP	H	12.30	1.09	27.55	39.11	46.00	6.89
324.88	54.05	QP	H	14.65	1.21	27.64	42.27	46.00	3.73
High Channel: 2452 MHz									
2452	70.59	PK	H	23.36	3.00	0.00	96.95	N/A	N/A
2452	60.68	AV	H	23.36	3.00	0.00	87.04	N/A	N/A
2452	68.02	PK	V	23.36	3.00	0.00	94.38	N/A	N/A
2452	57.86	AV	V	23.36	3.00	0.00	84.22	N/A	N/A
2483.5	36.42	PK	H	23.26	2.99	0.00	62.67	74.00	11.33
2483.5	21.52	AV	H	23.26	2.99	0.00	47.77	54.00	6.23
4904	30.15	PK	H	31.09	5.08	26.87	39.45	74.00	34.55
4904	20.28	AV	H	31.09	5.08	26.87	29.58	54.00	24.42
7356	31.66	PK	H	35.01	6.23	26.42	46.48	74.00	27.52
7356	21.34	AV	H	35.01	6.23	26.42	36.16	54.00	17.84
1285	41.82	PK	H	23.54	2.37	26.54	41.19	74.00	32.81
1285	30.27	AV	H	23.54	2.37	26.54	29.64	54.00	24.36
241.46	54.12	QP	H	12.30	1.09	27.55	39.96	46.00	6.04
324.88	54.34	QP	H	14.65	1.21	27.64	42.56	46.00	3.44

2TX, Nonbeamforming:

802.11 b 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	79.28	PK	H	23.50	3.00	0.00	105.78	N/A	N/A
2412	74.34	AV	H	23.50	3.00	0.00	100.84	N/A	N/A
2412	75.39	PK	V	23.50	3.00	0.00	101.89	N/A	N/A
2412	65.12	AV	V	23.50	3.00	0.00	91.62	N/A	N/A
2390	30.62	PK	H	23.57	3.00	0.00	57.19	74.00	16.81
2390	22.19	AV	H	23.57	3.00	0.00	48.76	54.00	5.24
4824	36.16	PK	H	30.84	5.11	26.87	45.24	74.00	28.76
4824	26.54	AV	H	30.84	5.11	26.87	35.62	54.00	18.38
7236	33.96	PK	H	34.77	6.18	26.36	48.55	74.00	25.45
7236	23.52	AV	H	34.77	6.18	26.36	38.11	54.00	15.89
1405	35.52	PK	H	23.85	2.54	26.42	35.49	74.00	38.51
1405	25.84	AV	H	23.85	2.54	26.42	25.81	54.00	28.19
241.46	54.24	QP	H	12.30	1.09	27.55	40.08	46.00	5.92
324.88	54.43	QP	H	14.65	1.21	27.64	42.65	46.00	3.35
Middle Channel: 2437 MHz									
2437	80.86	PK	H	23.41	3.00	0.00	107.27	N/A	N/A
2437	76.58	AV	H	23.41	3.00	0.00	102.99	N/A	N/A
2437	74.57	PK	V	23.41	3.00	0.00	100.98	N/A	N/A
2437	69.87	AV	V	23.41	3.00	0.00	96.28	N/A	N/A
4874	36.46	PK	H	31.00	5.09	26.87	45.68	74.00	28.32
4874	26.64	AV	H	31.00	5.09	26.87	35.86	54.00	18.14
7311	33.41	PK	H	34.92	6.21	26.40	48.14	74.00	25.86
7311	23.48	AV	H	34.92	6.21	26.40	38.21	54.00	15.79
1442	43.65	PK	H	23.95	2.59	26.39	43.80	74.00	30.20
1442	33.29	AV	H	23.95	2.59	26.39	33.44	54.00	20.56
2005	34.34	PK	H	24.88	3.05	26.82	35.45	74.00	38.55
2005	23.99	AV	H	24.88	3.05	26.82	25.10	54.00	28.90
241.46	53.97	QP	H	12.30	1.09	27.55	39.81	46.00	6.19
324.88	54.26	QP	H	14.65	1.21	27.64	42.48	46.00	3.52
High Channel: 2462 MHz									
2462	80.21	PK	H	23.33	2.99	0.00	106.53	N/A	N/A
2462	75.9	AV	H	23.33	2.99	0.00	102.22	N/A	N/A
2462	75.34	PK	V	23.33	2.99	0.00	101.66	N/A	N/A
2462	71.18	AV	V	23.33	2.99	0.00	97.50	N/A	N/A
2483.5	28.76	PK	H	23.26	2.99	0.00	55.01	74.00	18.99
2483.5	16.92	AV	H	23.26	2.99	0.00	43.17	54.00	10.83
4924	36.28	PK	H	31.16	5.07	26.88	45.63	74.00	28.37
4924	26.42	AV	H	31.16	5.07	26.88	35.77	54.00	18.23
7386	33.09	PK	H	35.07	6.25	26.43	47.98	74.00	26.02
7386	23.58	AV	H	35.07	6.25	26.43	38.47	54.00	15.53
1432	35.69	PK	H	23.92	2.58	26.40	35.79	74.00	38.21
1432	25.33	AV	H	23.92	2.58	26.40	25.43	54.00	28.57
241.46	53.21	QP	H	12.30	1.09	27.55	39.05	46.00	6.95
324.88	53.29	QP	H	14.65	1.21	27.64	41.51	46.00	4.49

802.11 g 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	80.08	PK	H	23.50	3.00	0.00	106.58	N/A	N/A
2412	70.21	AV	H	23.50	3.00	0.00	96.71	N/A	N/A
2412	75.15	PK	V	23.50	3.00	0.00	101.65	N/A	N/A
2412	65.54	AV	V	23.50	3.00	0.00	92.04	N/A	N/A
2389	40.52	PK	H	23.58	3.00	0.00	67.10	74.00	6.90
2389	22.69	AV	H	23.58	3.00	0.00	49.27	54.00	4.73
4824	36.56	PK	H	30.84	5.11	26.87	45.64	74.00	28.36
4824	24.23	AV	H	30.84	5.11	26.87	33.31	54.00	20.69
7236	32.27	PK	H	34.77	6.18	26.36	46.86	74.00	27.14
7236	21.69	AV	H	34.77	6.18	26.36	36.28	54.00	17.72
2241	37.1	PK	H	24.08	3.02	26.85	37.35	74.00	36.65
2241	26.34	AV	H	24.08	3.02	26.85	26.59	54.00	27.41
241.46	53.35	QP	H	12.30	1.09	27.55	39.19	46.00	6.81
324.88	53.46	QP	H	14.65	1.21	27.64	41.68	46.00	4.32
Middle Channel: 2437 MHz									
2437	80.92	PK	H	23.41	3.00	0.00	107.33	N/A	N/A
2437	70.63	AV	H	23.41	3.00	0.00	97.04	N/A	N/A
2437	74.63	PK	V	23.41	3.00	0.00	101.04	N/A	N/A
2437	64.59	AV	V	23.41	3.00	0.00	91.00	N/A	N/A
4874	35.99	PK	H	31.00	5.09	26.87	45.21	74.00	28.79
4874	24.96	AV	H	31.00	5.09	26.87	34.18	54.00	19.82
7311	31.87	PK	H	34.92	6.21	26.40	46.60	74.00	27.40
7311	21.19	AV	H	34.92	6.21	26.40	35.92	54.00	18.08
1655	36.79	PK	H	24.35	2.79	26.48	37.45	74.00	36.55
1655	26.42	AV	H	24.35	2.79	26.48	27.08	54.00	26.92
3024	32.06	PK	H	24.33	3.47	26.42	33.44	74.00	40.56
3024	21.18	AV	H	24.33	3.47	26.42	22.56	54.00	31.44
241.46	53.31	QP	H	12.30	1.09	27.55	39.15	46.00	6.85
324.88	53.38	QP	H	14.65	1.21	27.64	41.60	46.00	4.40
High Channel: 2462 MHz									
2462	80.69	PK	H	23.33	2.99	0.00	107.01	N/A	N/A
2462	69.99	AV	H	23.33	2.99	0.00	96.31	N/A	N/A
2462	75.17	PK	V	23.33	2.99	0.00	101.49	N/A	N/A
2462	64.94	AV	V	23.33	2.99	0.00	91.26	N/A	N/A
2483.5	40.53	PK	H	23.26	2.99	0.00	66.78	74.00	7.22
2483.5	24.17	AV	H	23.26	2.99	0.00	50.42	54.00	3.58
4924	35.88	PK	H	31.16	5.07	26.88	45.23	74.00	28.77
4924	24.34	AV	H	31.16	5.07	26.88	33.69	54.00	20.31
7386	32.18	PK	H	35.07	6.25	26.43	47.07	74.00	26.93
7386	21.54	AV	H	35.07	6.25	26.43	36.43	54.00	17.57
2950	36.69	PK	H	24.10	3.39	26.46	37.72	74.00	36.28
2950	25.73	AV	H	24.10	3.39	26.46	26.76	54.00	27.24
241.46	53.49	QP	H	12.30	1.09	27.55	39.33	46.00	6.67
324.88	53.67	QP	H	14.65	1.21	27.64	41.89	46.00	4.11

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	81.23	PK	H	23.50	3.00	0.00	107.73	N/A	N/A
2412	70.42	AV	H	23.50	3.00	0.00	96.92	N/A	N/A
2412	75.65	PK	V	23.50	3.00	0.00	102.15	N/A	N/A
2412	64.86	AV	V	23.50	3.00	0.00	91.36	N/A	N/A
2390	39.69	PK	H	23.57	3.00	0.00	66.26	74.00	7.74
2390	19.27	AV	H	23.57	3.00	0.00	45.84	54.00	8.16
4824	36.1	PK	H	30.84	5.11	26.87	45.18	74.00	28.82
4824	22.65	AV	H	30.84	5.11	26.87	31.73	54.00	22.27
7236	32.33	PK	H	34.77	6.18	26.36	46.92	74.00	27.08
7236	20.39	AV	H	34.77	6.18	26.36	34.98	54.00	19.02
1424	36.41	PK	H	23.90	2.57	26.40	36.48	74.00	37.52
1424	24.22	AV	H	23.90	2.57	26.40	24.29	54.00	29.71
241.46	53.74	QP	H	12.30	1.09	27.55	39.58	46.00	6.42
324.88	53.96	QP	H	14.65	1.21	27.64	42.18	46.00	3.82
Middle Channel: 2437 MHz									
2437	80.41	PK	H	23.41	3.00	0.00	106.82	N/A	N/A
2437	70.05	AV	H	23.41	3.00	0.00	96.46	N/A	N/A
2437	74.65	PK	V	23.41	3.00	0.00	101.06	N/A	N/A
2437	63.51	AV	V	23.41	3.00	0.00	89.92	N/A	N/A
4874	35.57	PK	H	31.00	5.09	26.87	44.79	74.00	29.21
4874	22.14	AV	H	31.00	5.09	26.87	31.36	54.00	22.64
7311	32.84	PK	H	34.92	6.21	26.40	47.57	74.00	26.43
7311	20.69	AV	H	34.92	6.21	26.40	35.42	54.00	18.58
1654	32.25	PK	H	24.35	2.79	26.48	32.91	74.00	41.09
1654	19.84	AV	H	24.35	2.79	26.48	20.50	54.00	33.50
2142	37.29	PK	H	24.42	3.03	26.84	37.90	74.00	36.10
2142	24.17	AV	H	24.42	3.03	26.84	24.78	54.00	29.22
241.46	53.86	QP	H	12.30	1.09	27.55	39.70	46.00	6.30
324.88	54.05	QP	H	14.65	1.21	27.64	42.27	46.00	3.73
High Channel: 2462 MHz									
2462	79.69	PK	H	23.33	2.99	0.00	106.01	N/A	N/A
2462	66.05	AV	H	23.33	2.99	0.00	92.37	N/A	N/A
2462	73.58	PK	V	23.33	2.99	0.00	99.90	N/A	N/A
2462	60.54	AV	V	23.33	2.99	0.00	86.86	N/A	N/A
2483.5	39.53	PK	H	23.26	2.99	0.00	65.78	74.00	8.22
2483.5	21.73	AV	H	23.26	2.99	0.00	47.98	54.00	6.02
4924	35.69	PK	H	31.16	5.07	26.88	45.04	74.00	28.96
4924	22.47	AV	H	31.16	5.07	26.88	31.82	54.00	22.18
7386	32.16	PK	H	35.07	6.25	26.43	47.05	74.00	26.95
7386	20.24	AV	H	35.07	6.25	26.43	35.13	54.00	18.87
1553	36.85	PK	H	24.18	2.71	26.38	37.36	74.00	36.64
1553	24.63	AV	H	24.18	2.71	26.38	25.14	54.00	28.86
241.46	53.59	QP	H	12.30	1.09	27.55	39.43	46.00	6.57
324.88	53.88	QP	H	14.65	1.21	27.64	42.10	46.00	3.90

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	76.09	PK	H	23.47	3.00	0.00	102.56	N/A	N/A
2422	64.94	AV	H	23.47	3.00	0.00	91.41	N/A	N/A
2422	69.58	PK	V	23.47	3.00	0.00	96.05	N/A	N/A
2422	59.37	AV	V	23.47	3.00	0.00	85.84	N/A	N/A
2390	35.76	PK	H	23.57	3.00	0.00	62.33	74.00	11.67
2390	21.87	AV	H	23.57	3.00	0.00	48.44	54.00	5.56
4844	36.18	PK	H	30.90	5.10	26.87	45.31	74.00	28.69
4844	24.73	AV	H	30.90	5.10	26.87	33.86	54.00	20.14
7266	31.76	PK	H	34.83	6.19	26.38	46.40	74.00	27.60
7266	20.04	AV	H	34.83	6.19	26.38	34.68	54.00	19.32
2233	32.76	PK	H	24.11	3.02	26.85	33.04	74.00	40.96
2233	20.01	AV	H	24.11	3.02	26.85	20.29	54.00	33.71
241.46	53.27	QP	H	12.30	1.09	27.55	39.11	46.00	6.89
324.88	53.98	QP	H	14.65	1.21	27.64	42.20	46.00	3.80
Middle Channel: 2437 MHz									
2437	77.27	PK	H	23.41	3.00	0.00	103.68	N/A	N/A
2437	67.2	AV	H	23.41	3.00	0.00	93.61	N/A	N/A
2437	70.35	PK	V	23.41	3.00	0.00	96.76	N/A	N/A
2437	60.12	AV	V	23.41	3.00	0.00	86.53	N/A	N/A
4874	36.14	PK	H	31.00	5.09	26.87	45.36	74.00	28.64
4874	24.07	AV	H	31.00	5.09	26.87	33.29	54.00	20.71
7311	31.85	PK	H	34.92	6.21	26.40	46.58	74.00	27.42
7311	20.1	AV	H	34.92	6.21	26.40	34.83	54.00	19.17
1694	36.41	PK	H	24.41	2.82	26.52	37.12	74.00	36.88
1694	25.28	AV	H	24.41	2.82	26.52	25.99	54.00	28.01
2187	32.03	PK	H	24.26	3.03	26.85	32.47	74.00	41.53
2187	19.96	AV	H	24.26	3.03	26.85	20.40	54.00	33.60
241.46	53.41	QP	H	12.30	1.09	27.55	39.25	46.00	6.75
324.88	54.15	QP	H	14.65	1.21	27.64	42.37	46.00	3.63
High Channel: 2452 MHz									
2452	75.91	PK	H	23.36	3.00	0.00	102.27	N/A	N/A
2452	64.98	AV	H	23.36	3.00	0.00	91.34	N/A	N/A
2452	69.47	PK	V	23.36	3.00	0.00	95.83	N/A	N/A
2452	58.25	AV	V	23.36	3.00	0.00	84.61	N/A	N/A
2483.5	36.49	PK	H	23.26	2.99	0.00	62.74	74.00	11.26
2483.5	24.05	AV	H	23.26	2.99	0.00	50.30	54.00	3.70
4904	35.67	PK	H	31.09	5.08	26.87	44.97	74.00	29.03
4904	22.33	AV	H	31.09	5.08	26.87	31.63	54.00	22.37
7356	32.68	PK	H	35.01	6.23	26.42	47.50	74.00	26.50
7356	20.14	AV	H	35.01	6.23	26.42	34.96	54.00	19.04
2742	36.94	PK	H	23.68	3.20	26.66	37.16	74.00	36.84
2742	25.22	AV	H	23.68	3.20	26.66	25.44	54.00	28.56
241.46	53.37	QP	H	12.30	1.09	27.55	39.21	46.00	6.79
324.88	54.07	QP	H	14.65	1.21	27.64	42.29	46.00	3.71

2TX, With beamforming:

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	80.08	PK	H	23.50	3.00	0.00	106.58	N/A	N/A
2412	70.11	AV	H	23.50	3.00	0.00	96.61	N/A	N/A
2412	68.25	PK	V	23.50	3.00	0.00	94.75	N/A	N/A
2412	58.96	AV	V	23.50	3.00	0.00	85.46	N/A	N/A
2390	36.54	PK	H	23.57	3.00	0.00	63.11	74.00	10.89
2390	19.02	AV	H	23.57	3.00	0.00	45.59	54.00	8.41
4824	45.08	PK	H	30.84	5.11	26.87	54.16	74.00	19.84
4824	35.94	AV	H	30.84	5.11	26.87	45.02	54.00	8.98
7236	43.59	PK	H	34.77	6.18	26.36	58.18	74.00	15.82
7236	33.18	AV	H	34.77	6.18	26.36	47.77	54.00	6.23
9648	34.71	PK	H	37.09	7.79	26.20	53.39	74.00	20.61
9648	18.56	AV	H	37.09	7.79	26.20	37.24	54.00	16.76
280.26	52.18	QP	H	13.90	1.22	27.50	39.80	46.00	6.20
316.15	51.09	QP	H	14.50	1.19	27.60	39.18	46.00	6.82
Middle Channel: 2437 MHz									
2437.0	79.51	PK	H	23.41	3.00	0.00	105.92	N/A	N/A
2437.0	69.23	AV	H	23.41	3.00	0.00	95.64	N/A	N/A
2437.0	75.33	PK	V	23.41	3.00	0.00	101.74	N/A	N/A
2437.0	65.54	AV	V	23.41	3.00	0.00	91.95	N/A	N/A
4874.0	42.03	PK	H	31.00	5.09	26.87	51.25	74.00	22.75
4874.0	31.69	AV	H	31.00	5.09	26.87	40.91	54.00	13.09
7311.0	37.79	PK	H	34.92	6.21	26.40	52.52	74.00	21.48
7311.0	28.41	AV	H	34.92	6.21	26.40	43.14	54.00	10.86
9748.0	26.50	PK	H	37.15	7.72	26.26	45.11	74.00	28.89
9748.0	20.21	AV	H	37.15	7.72	26.26	38.82	54.00	15.18
280.26	52.42	QP	H	13.90	1.22	27.50	40.04	46.00	5.96
316.15	51.27	QP	H	14.50	1.19	27.60	39.36	46.00	6.64
High Channel: 2462 MHz									
2462	80.62	PK	H	23.33	2.99	0.00	106.94	N/A	N/A
2462	70.55	AV	H	23.33	2.99	0.00	96.87	N/A	N/A
2462	73.48	PK	V	23.33	2.99	0.00	99.8	N/A	N/A
2462	64.21	AV	V	23.33	2.99	0.00	90.53	N/A	N/A
2483.5	43.52	PK	H	23.26	2.99	0.00	69.77	74.00	4.23
2483.5	25.72	AV	H	23.26	2.99	0.00	51.97	54.00	2.03
4924	42.37	PK	H	31.16	5.07	26.88	51.72	74.00	22.28
4924	32.11	AV	H	31.16	5.07	26.88	41.46	54.00	12.54
7386	36.60	PK	H	35.07	6.25	26.43	51.49	74.00	22.51
7386	27.66	AV	H	35.07	6.25	26.43	42.55	54.00	11.45
9848	23.26	PK	H	37.21	7.65	26.33	41.79	74.00	32.21
9848	20.57	AV	H	37.21	7.65	26.33	39.1	54.00	14.9
280.26	52.61	QP	H	13.90	1.22	27.50	40.23	46.00	5.77
316.15	51.44	QP	H	14.50	1.19	27.60	39.53	46.00	6.47

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	78.96	PK	H	23.47	3.00	0.00	105.43	N/A	N/A
2422	67.70	AV	H	23.47	3.00	0.00	94.17	N/A	N/A
2422	72.25	PK	V	23.47	3.00	0.00	98.72	N/A	N/A
2422	62.29	AV	V	23.47	3.00	0.00	88.76	N/A	N/A
2390	42.06	PK	H	23.57	3.00	0.00	68.63	74.00	5.37
2390	24.85	AV	H	23.57	3.00	0.00	51.42	54.00	2.58
4844	31.41	PK	H	30.90	5.10	26.87	40.54	74.00	33.46
4844	12.67	AV	H	30.90	5.10	26.87	21.8	54.00	32.2
7266	25.65	PK	H	34.83	6.19	26.38	40.29	74.00	33.71
7266	9.73	AV	H	34.83	6.19	26.38	24.37	54.00	29.63
9688	23.13	PK	H	37.11	7.76	26.23	41.77	74.00	32.23
9688	17.62	AV	H	37.11	7.76	26.23	36.26	54.00	17.74
280.26	51.95	QP	H	13.90	1.22	27.50	39.57	46.00	6.43
316.15	50.95	QP	H	14.50	1.19	27.60	39.04	46.00	6.96
Middle Channel: 2437 MHz									
2437	78.56	PK	H	23.41	3.00	0.00	104.97	N/A	N/A
2437	68.39	AV	H	23.41	3.00	0.00	94.8	N/A	N/A
2437	73.04	PK	V	23.41	3.00	0.00	99.45	N/A	N/A
2437	62.06	AV	V	23.41	3.00	0.00	88.47	N/A	N/A
4874	32.97	PK	H	31.00	5.09	26.87	42.19	74.00	31.81
4874	13.44	AV	H	31.00	5.09	26.87	22.66	54.00	31.34
7311	26.40	PK	H	34.92	6.21	26.40	41.13	74.00	32.87
7311	9.26	AV	H	34.92	6.21	26.40	23.99	54.00	30.01
9748	21.87	PK	H	37.15	7.72	26.26	40.48	74.00	33.52
9748	18.64	AV	H	37.15	7.72	26.26	37.25	54.00	16.75
280.26	52.18	QP	H	13.90	1.22	27.50	39.80	46.00	6.20
316.15	50.99	QP	H	14.50	1.19	27.60	39.08	46.00	6.92
High Channel: 2452 MHz									
2452	79.86	PK	H	23.36	3.00	0.00	106.22	N/A	N/A
2452	69.48	AV	H	23.36	3.00	0.00	95.84	N/A	N/A
2452	73.48	PK	V	23.36	3.00	0.00	99.84	N/A	N/A
2452	63.74	AV	V	23.36	3.00	0.00	90.1	N/A	N/A
2483.5	44.33	PK	H	23.26	2.99	0.00	70.58	74.00	3.42
2483.5	25.04	AV	H	23.26	2.99	0.00	51.29	54.00	2.71
4904	31.56	PK	H	31.09	5.08	26.87	40.86	74.00	33.14
4904	12.91	AV	H	31.09	5.08	26.87	22.21	54.00	31.79
7356	26.73	PK	H	35.01	6.23	26.42	41.55	74.00	32.45
7356	9.60	AV	H	35.01	6.23	26.42	24.42	54.00	29.58
9808	22.11	PK	H	37.18	7.68	26.30	40.67	74.00	33.33
9808	18.50	AV	H	37.18	7.68	26.30	37.06	54.00	16.94
280.26	51.9	QP	H	13.90	1.22	27.50	39.52	46.00	6.48
316.15	50.9	QP	H	14.50	1.19	27.60	38.99	46.00	7.01

BLE Mode:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2402 MHz									
2402	62.26	PK	H	23.53	3.00	0.00	88.79	N/A	N/A
2402	56.9	AV	H	23.53	3.00	0.00	83.43	N/A	N/A
2402	61.19	PK	V	23.53	3.00	0.00	87.72	N/A	N/A
2402	55.37	AV	V	23.53	3.00	0.00	81.90	N/A	N/A
2390	30.42	PK	H	23.57	3.00	0.00	56.99	74.00	17.01
2390	12.93	AV	H	23.57	3.00	0.00	39.50	54.00	14.50
4804	33.09	PK	H	30.77	5.12	26.87	42.11	74.00	31.89
4804	22.04	AV	H	30.77	5.12	26.87	31.06	54.00	22.94
7206	32.33	PK	H	34.71	6.16	26.35	46.85	74.00	27.15
7206	20.91	AV	H	34.71	6.16	26.35	35.43	54.00	18.57
2950	34.08	PK	H	24.10	3.39	26.46	35.11	74.00	38.89
2950	21.85	AV	H	24.10	3.39	26.46	22.88	54.00	31.12
241.46	53.55	QP	H	12.30	1.09	27.55	39.39	46.00	6.61
324.88	54.36	QP	H	14.65	1.21	27.64	42.58	46.00	3.42
Middle Channel: 2440 MHz									
2440	63.27	PK	H	23.40	3.00	0.00	89.67	N/A	N/A
2440	57.35	AV	H	23.40	3.00	0.00	83.75	N/A	N/A
2440	62.58	PK	V	23.40	3.00	0.00	88.98	N/A	N/A
2440	56.73	AV	V	23.40	3.00	0.00	83.13	N/A	N/A
4880	33.66	PK	H	31.02	5.09	26.87	42.90	74.00	31.10
4880	22.1	AV	H	31.02	5.09	26.87	31.34	54.00	22.66
7320	31.29	PK	H	34.94	6.22	26.40	46.05	74.00	27.95
7320	20.85	AV	H	34.94	6.22	26.40	35.61	54.00	18.39
1684	33.47	PK	H	24.39	2.81	26.51	34.16	74.00	39.84
1684	21.54	AV	H	24.39	2.81	26.51	22.23	54.00	31.77
3305	34.16	PK	H	25.91	3.89	26.52	37.44	74.00	36.56
3305	22.41	AV	H	25.91	3.89	26.52	25.69	54.00	28.31
241.46	54.43	QP	H	12.30	1.09	27.55	40.27	46.00	5.73
324.88	54.65	QP	H	14.65	1.21	27.64	42.87	46.00	3.13
High Channel: 2480 MHz									
2480	62.05	PK	H	23.27	2.99	0.00	88.31	N/A	N/A
2480	56.48	AV	H	23.27	2.99	0.00	82.74	N/A	N/A
2480	61.24	PK	V	23.27	2.99	0.00	87.50	N/A	N/A
2480	55.76	AV	V	23.27	2.99	0.00	82.02	N/A	N/A
2483.5	33.59	PK	H	23.26	2.99	0.00	59.84	74.00	14.16
2483.5	14.05	AV	H	23.26	2.99	0.00	40.30	54.00	13.70
4960	33.44	PK	H	31.27	5.05	26.88	42.88	74.00	31.12
4960	21.58	AV	H	31.27	5.05	26.88	31.02	54.00	22.98
7440	31.69	PK	H	35.18	6.27	26.45	46.69	74.00	27.31
7440	20.74	AV	H	35.18	6.27	26.45	35.74	54.00	18.26
1538	33.59	PK	H	24.16	2.70	26.37	34.08	74.00	39.92
1538	21.64	AV	H	24.16	2.70	26.37	22.13	54.00	31.87
241.46	54.55	QP	H	12.30	1.09	27.55	40.39	46.00	5.61
324.88	54.74	QP	H	14.65	1.21	27.64	42.96	46.00	3.04

2.4GHz band and 5.8GHz band transmit simultaneously

(2.4GHz 802.11b 2TX Channel 2412MHz+ 5.8GHz 2TX 802.11a 5745MHz with beamforming was the worst+BLE):

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
4824	36.16	PK	H	30.84	5.11	26.87	45.24	74.00	28.76
4824	26.54	AV	H	30.84	5.11	26.87	35.62	54.00	18.38
7236	33.96	PK	H	34.77	6.18	26.36	48.55	74.00	25.45
7236	23.52	AV	H	34.77	6.18	26.36	38.11	54.00	15.89
1405	35.52	PK	H	23.85	2.54	26.42	35.49	74.00	38.51
1405	25.84	AV	H	23.85	2.54	26.42	25.81	54.00	28.19
11490	34.45	PK	H	37.99	8.22	26.02	54.64	74.00	19.36
11490	22.68	AV	H	37.99	8.22	26.02	42.87	54.00	11.13
17235	31.90	PK	H	42.98	10.82	25.99	59.71	74.00	14.29
17235	19.98	AV	H	42.98	10.82	25.99	47.79	54.00	6.21
4880	33.66	PK	H	31.02	5.09	26.87	42.90	74.00	31.10
4880	22.1	AV	H	31.02	5.09	26.87	31.34	54.00	22.66
7320	31.29	PK	H	34.94	6.22	26.40	46.05	74.00	27.95
7320	20.85	AV	H	34.94	6.22	26.40	35.61	54.00	18.39
241.46	54.24	QP	H	12.30	1.09	27.55	40.08	46.00	5.92
324.88	54.43	QP	H	14.65	1.21	27.64	42.65	46.00	3.35

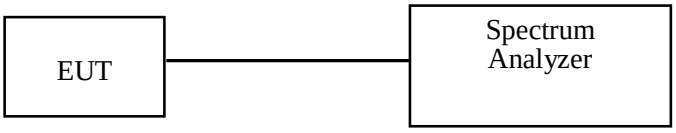
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26.1~27.6 °C
Relative Humidity:	32~34%
ATM Pressure:	101.3~101.5 kPa

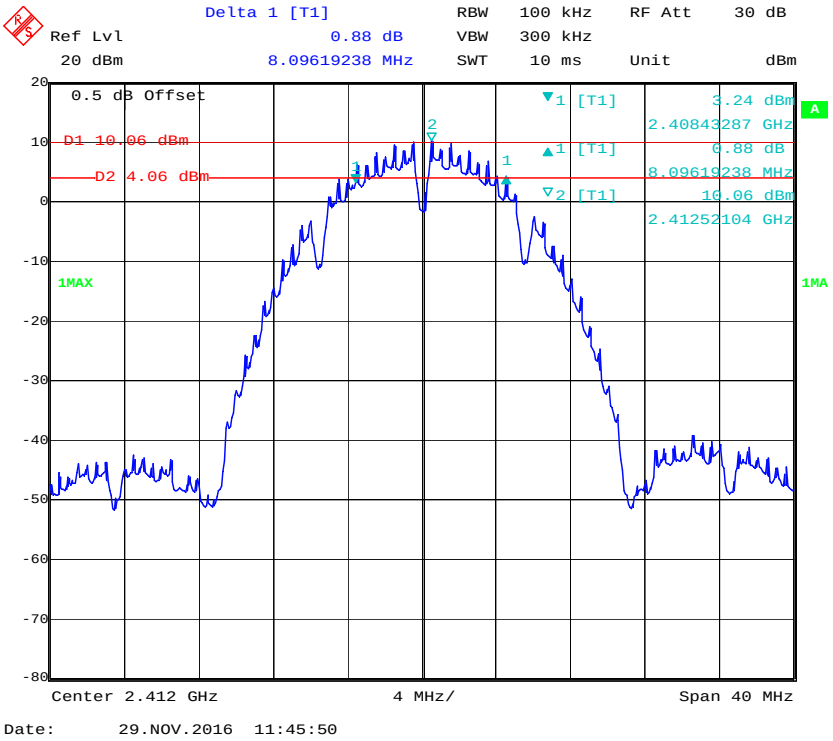
** The testing was performed by Lorin Bian from 2016-11-25 to 2016-11-29.*

Test Mode: Transmitting (For WIfi, Test performed at Chain 0)

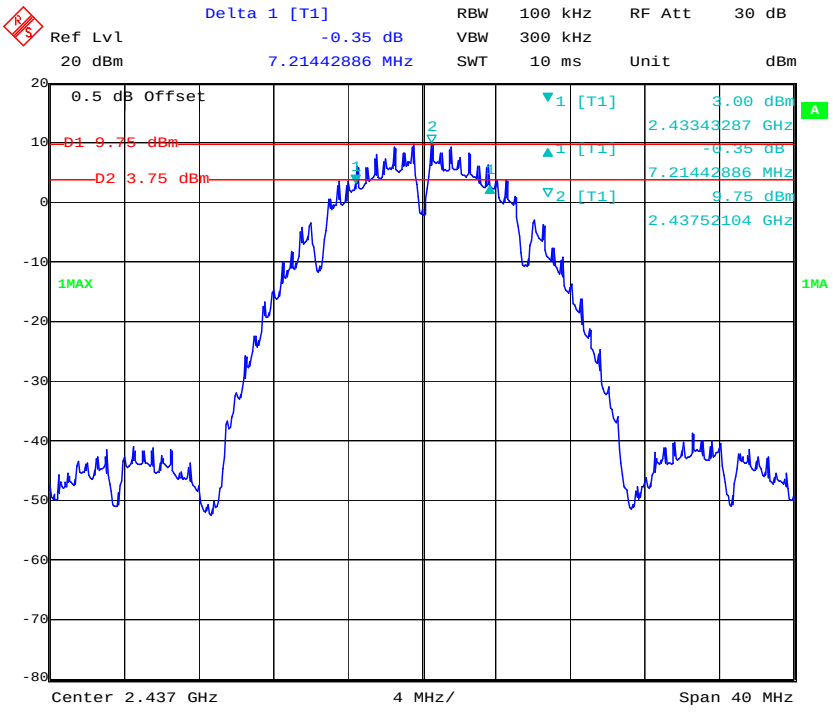
Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	8.10	≥0.5
	Middle	2437	7.21	≥0.5
	High	2462	8.66	≥0.5
802.11g	Low	2412	16.35	≥0.5
	Middle	2437	16.35	≥0.5
	High	2462	16.35	≥0.5
802.11n20	Low	2412	17.64	≥0.5
	Middle	2437	17.56	≥0.5
	High	2462	17.64	≥0.5
802.11 n40	Low	2422	35.43	≥0.5
	Middle	2437	35.43	≥0.5
	High	2452	35.75	≥0.5
BLE	Low	2402	0.759	≥0.5
	Middle	2440	0.752	≥0.5
	High	2480	0.757	≥0.5

802.11b Low Channel



802.11b Middle Channel



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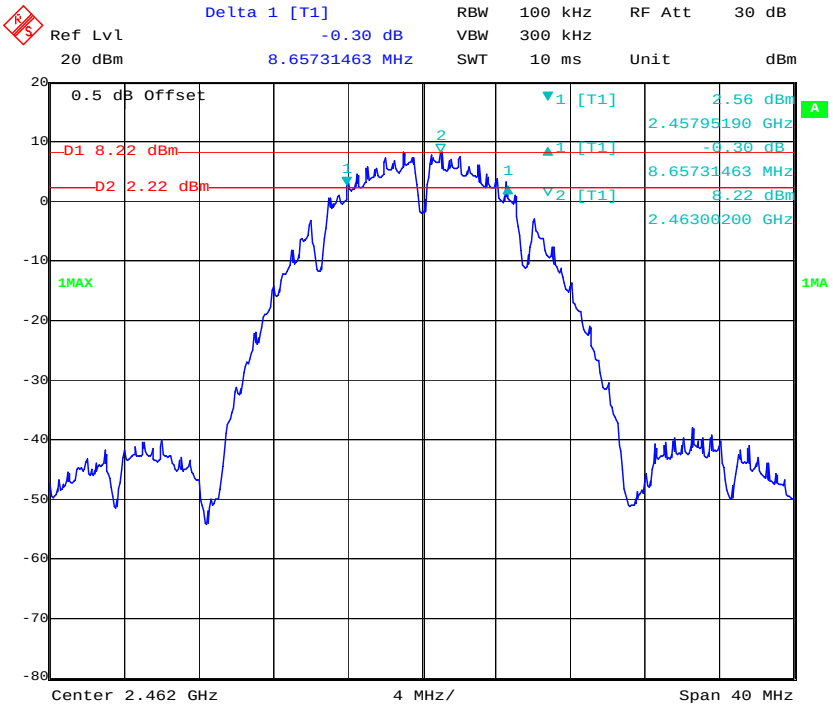
802.11b High Channel



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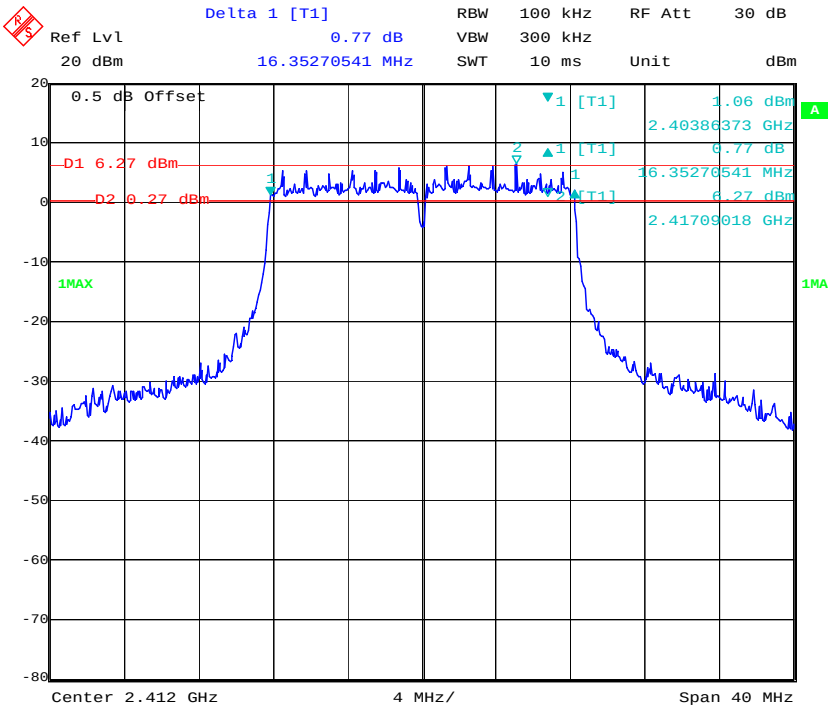
802.11g Low Channel



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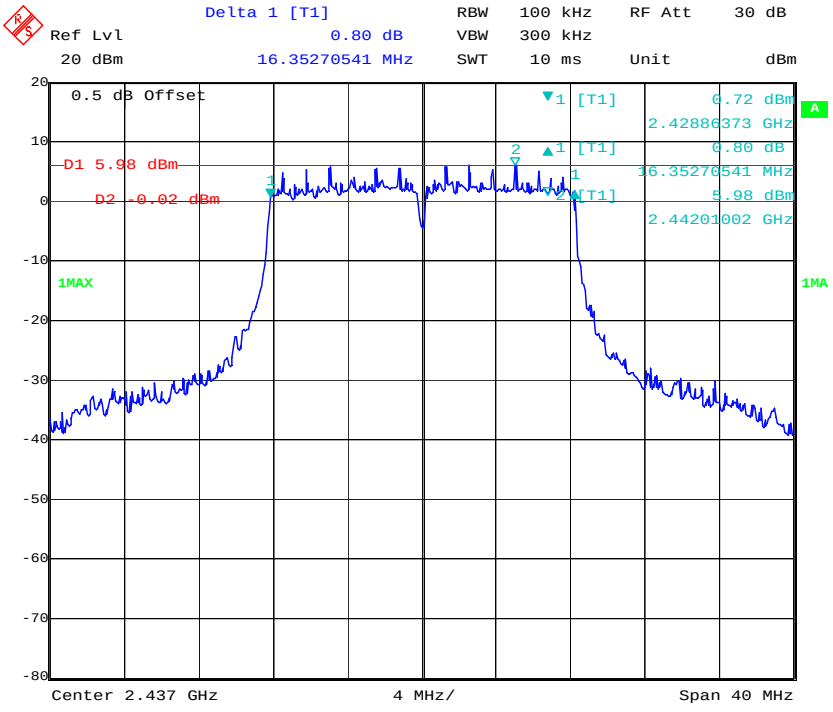
802.11g Middle Channel



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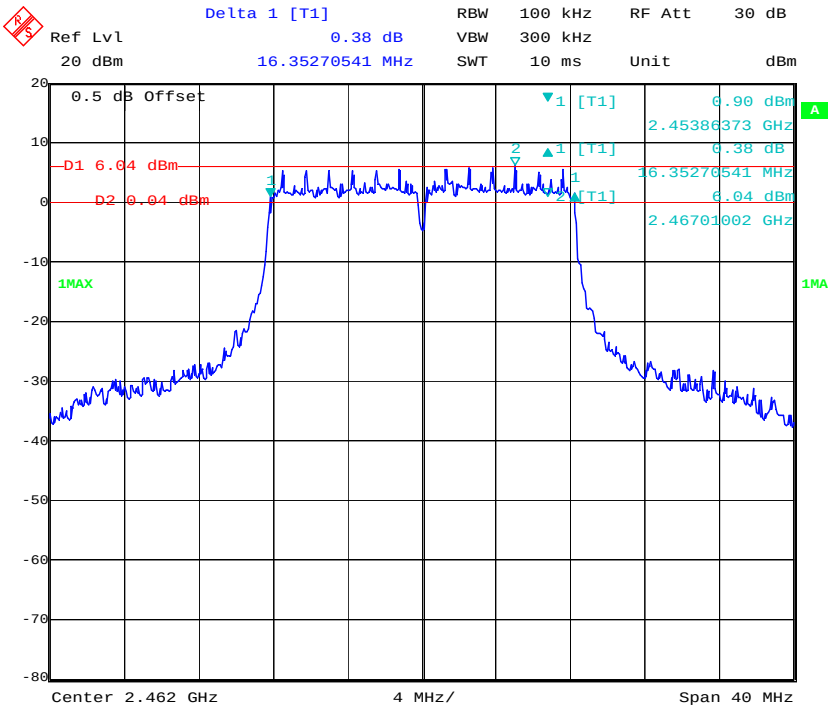
802.11g High Channel



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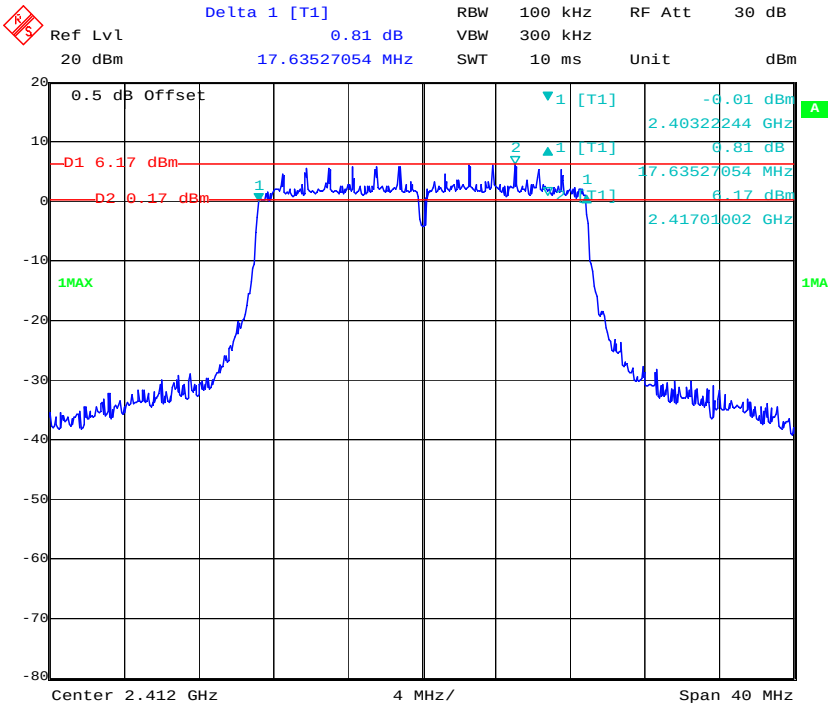
802.11n ht20 Low Channel



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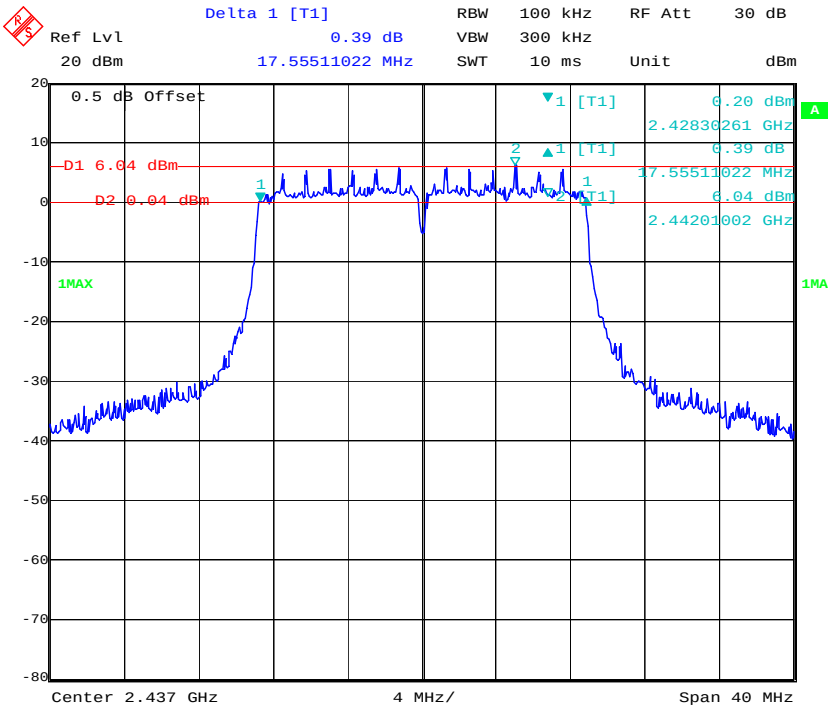
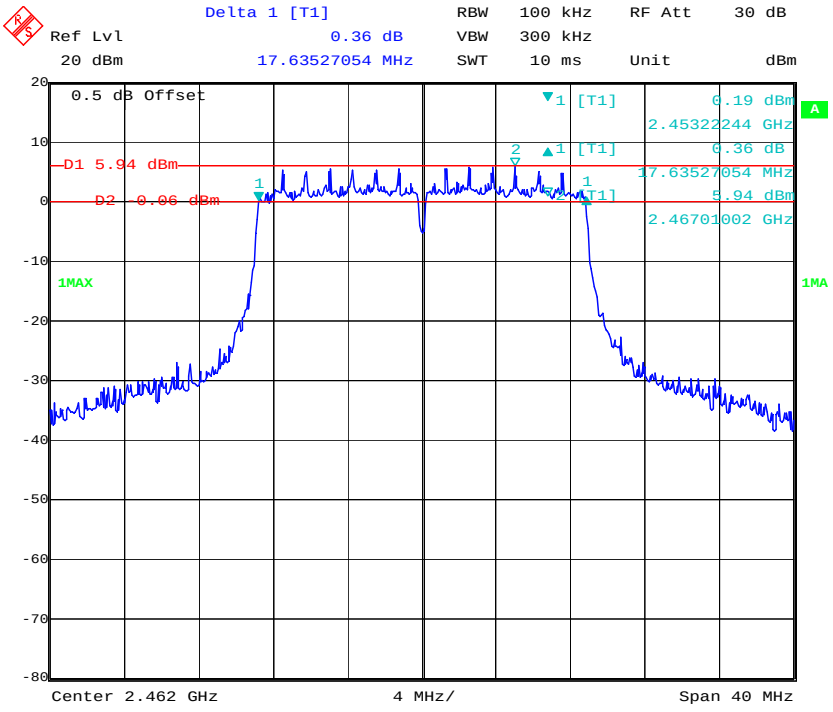
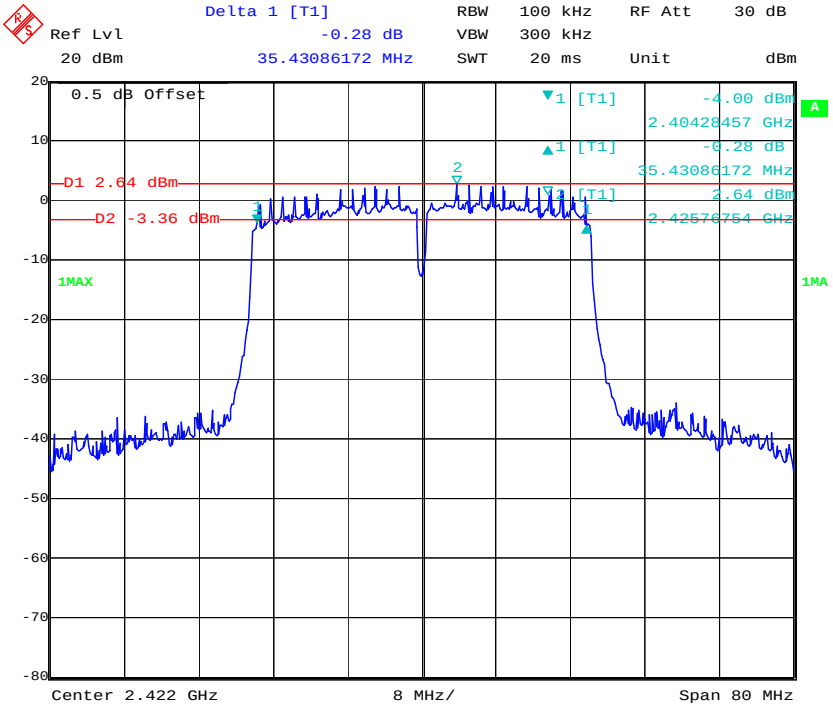
802.11n ht20 Middle Channel



802.11n ht20 High Channel

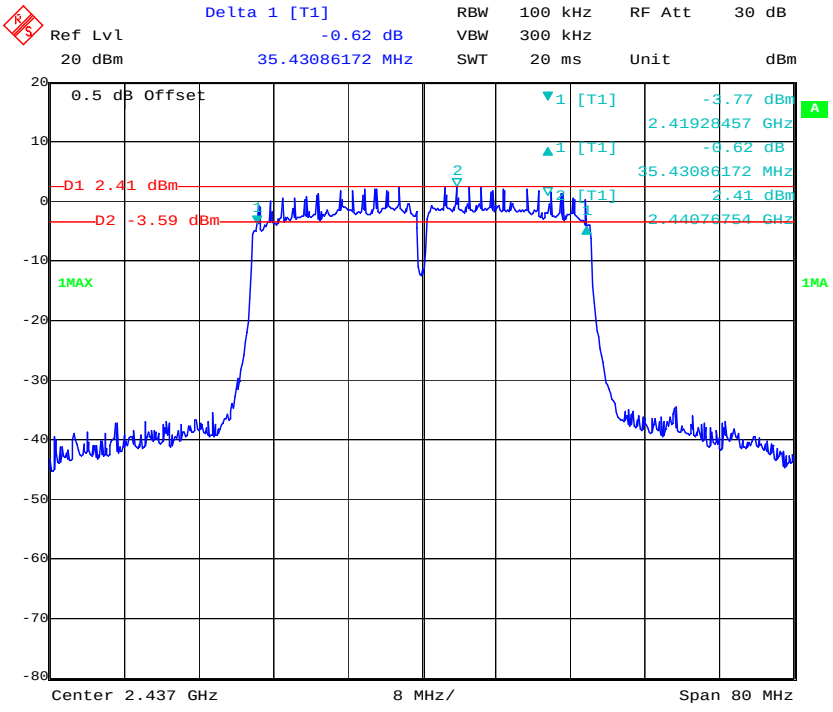


802.11n ht40 Low Channel



Date: 29.NOV.2016 11:13:33

802.11n ht40 Middle Channel



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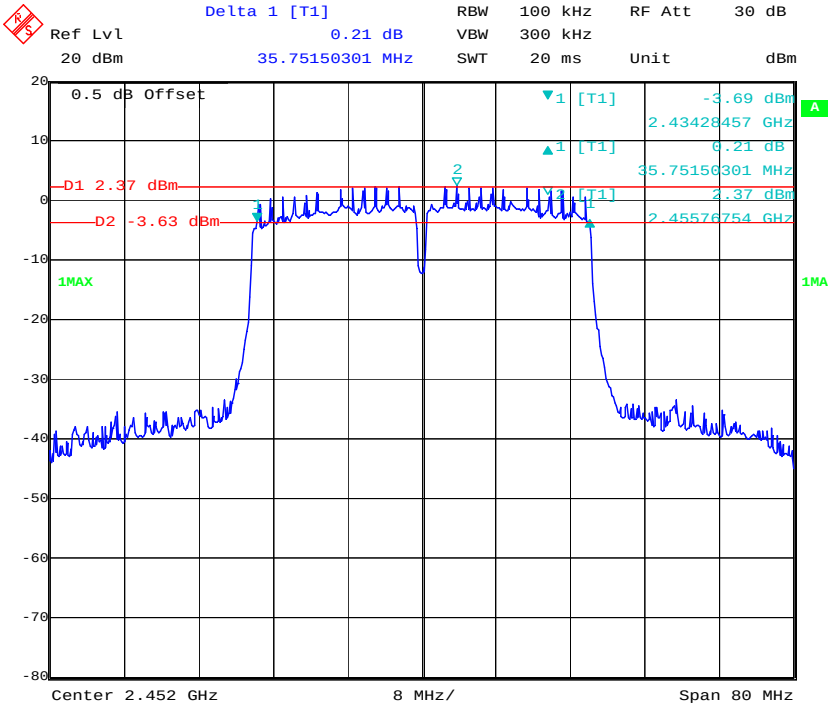
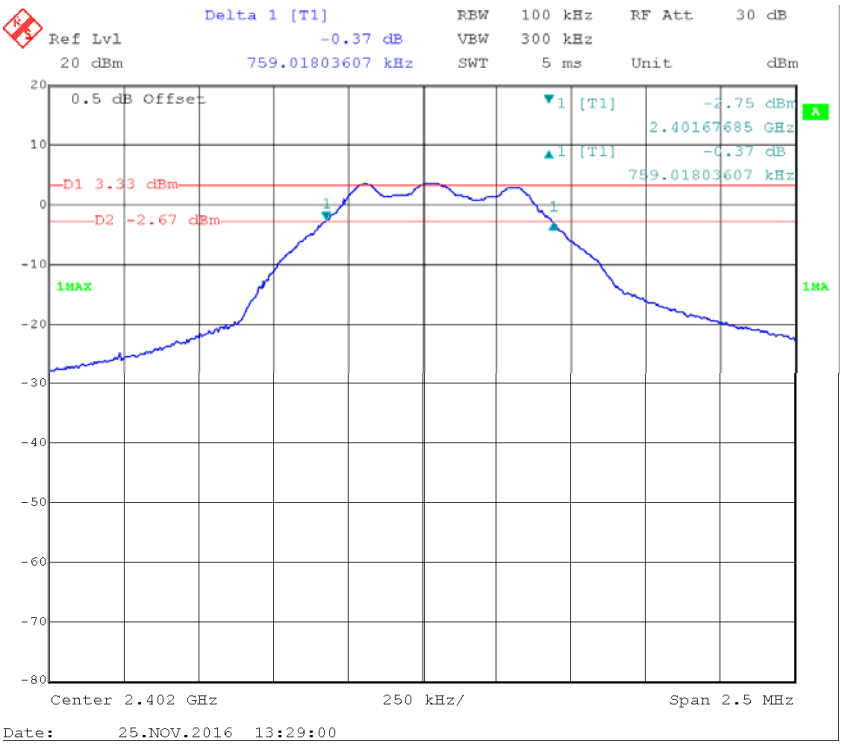
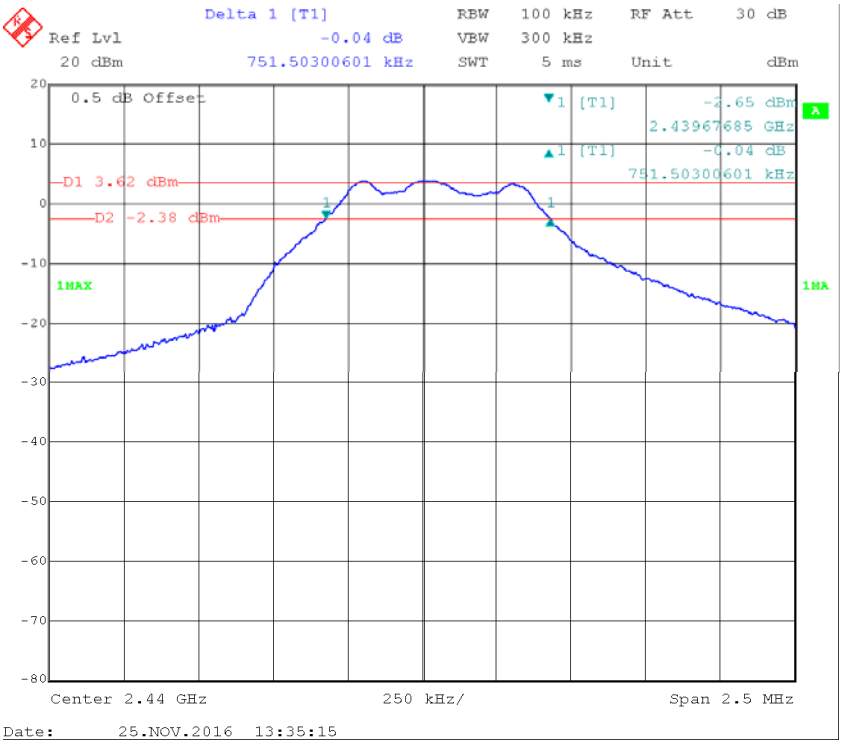
802.11n ht40 High Channel



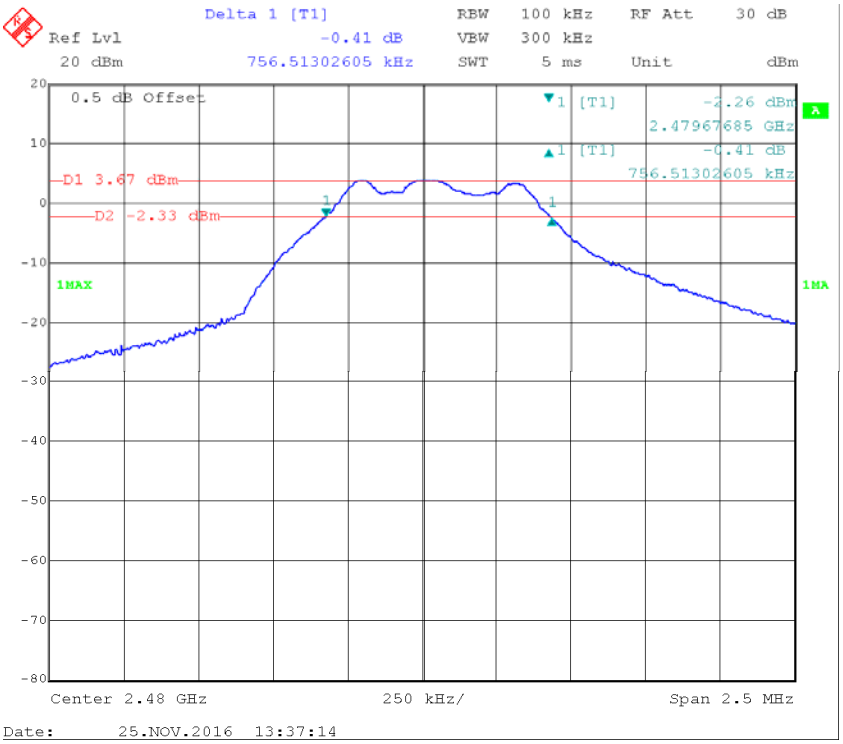
BLE Low Channel



BLE Middle Channel



BLE High Channel



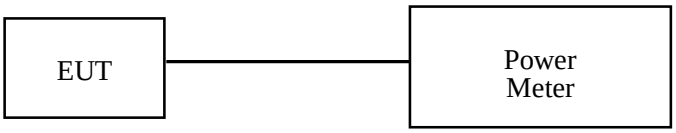
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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
   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	MY54170074	2016-01-03	2017-01-03
Agilent	P-Series Power Meter	N1912A	MY5000798	2016-01-03	2017-01-03
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26.9 °C
Relative Humidity:	44 %
ATM Pressure:	101 kPa

** The testing was performed by Lorin Bian on 2016-12-13.*

Test Mode: Transmitting

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

WLAN:

1TX:

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)		Limit (dBm)
			Chain 0	Chain 1	
802.11b	Low	2412	24.92	24.19	30
	Middle	2437	24.81	24.13	30
	High	2462	24.47	23.99	30
802.11g	Low	2412	24.98	23.98	30
	Middle	2437	24.83	23.9	30
	High	2462	24.34	23.7	30
802.11n20	Low	2412	24.87	23.91	30
	Middle	2437	24.86	24.23	30
	High	2462	24.38	23.7	30
802.11n40	Low	2422	24.12	23.33	30
	Middle	2437	24.06	23.84	30
	High	2452	23.97	23.27	30

2TX, Non-beamforming:

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11b	Low	2412	24.83	24.03	27.46	30
	Middle	2437	24.69	24.13	27.43	30
	High	2462	24.31	23.98	27.16	30
802.11g	Low	2412	24.8	23.82	27.35	30
	Middle	2437	24.47	23.69	27.11	30
	High	2462	23.48	22.6	26.07	30
802.11n20	Low	2412	24.76	23.9	27.36	30
	Middle	2437	24.43	23.88	27.17	30
	High	2462	23.44	22.68	26.09	30
802.11n40	Low	2422	23.12	22.28	25.73	30
	Middle	2437	23.98	23.35	26.69	30
	High	2452	23.09	22.13	25.65	30

Note: the antenna gains are 5.5 dBi in 2.4GHz band, the device employed Cyclic Delay Diversity (CDD) for 2TX 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 NANT ≤ 4;

So:

Directional gain = GANT + Array Gain = 5.5dBi < 6dBi

2TX, With-beamforming:

Test mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)		Total (dBm)	Limit (dBm)
			Chain 0	Chain 1		
802.11n20	Low	2412	24.44	23.47	26.99	27.5
	Middle	2437	24.42	23.21	26.87	27.5
	High	2462	23.21	22.34	25.81	27.5
802.11n40	Low	2422	23.01	22.19	25.63	27.5
	Middle	2437	22.68	23.15	25.93	27.5
	High	2452	22.79	22.08	25.46	27.5

Note: the 2 antenna maximum antenna gains are 5.5dBi, and employed beamforming for 802.11n transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 10 log(NANT/NSS) dB;

So:

Directional gain = GANT + Array Gain = 5.5dBi + 10 log(2) = 8.5dBi >6dBi

BLE：

Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Limit (dBm)
Low	2402	3.35	30
Middle	2440	3.71	30
High	2480	3.79	30

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	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

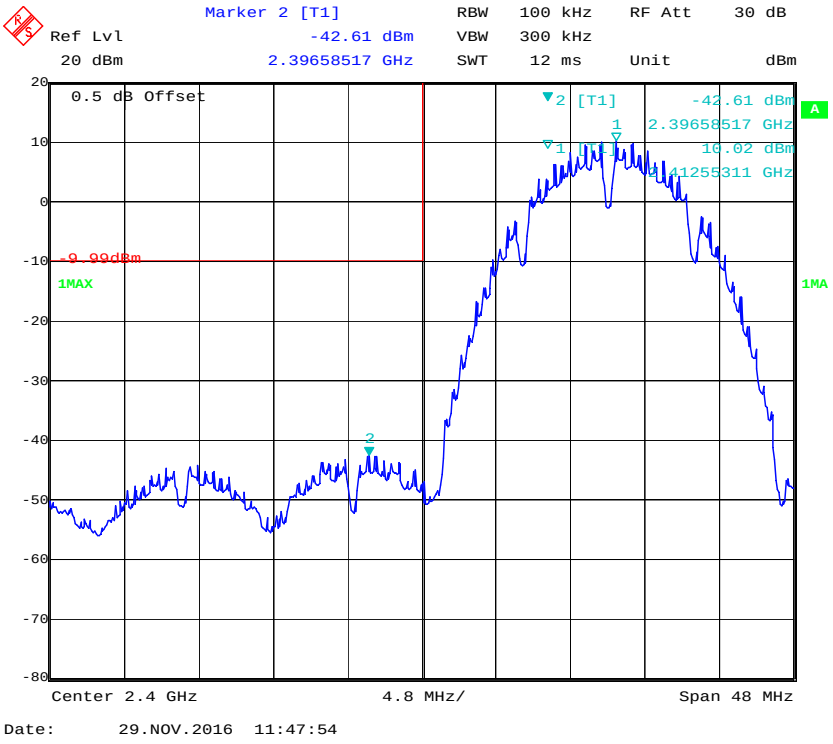
Temperature:	26.1~27.6 °C
Relative Humidity:	32~34%
ATM Pressure:	101.3~101.5 kPa

** The testing was performed by Lorin Bian from 2016-11-25 to 2016-11-29.*

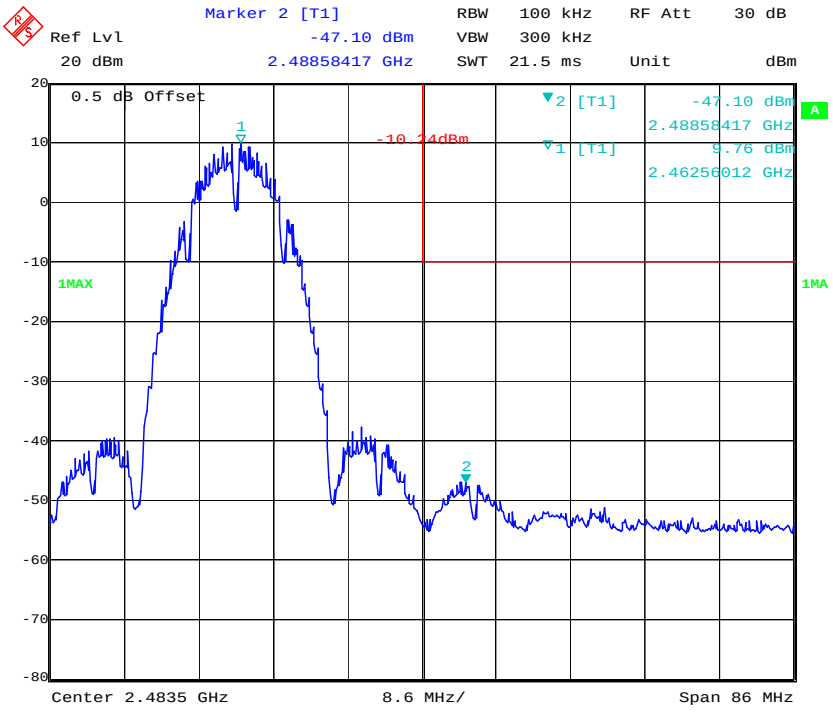
Test mode: Transmitting (1TX mode was tested since the maximum power per chain)

Test Result: Compliant. Please refer to following plots.

Chain 0, 802.11b: Band Edge, Left Side

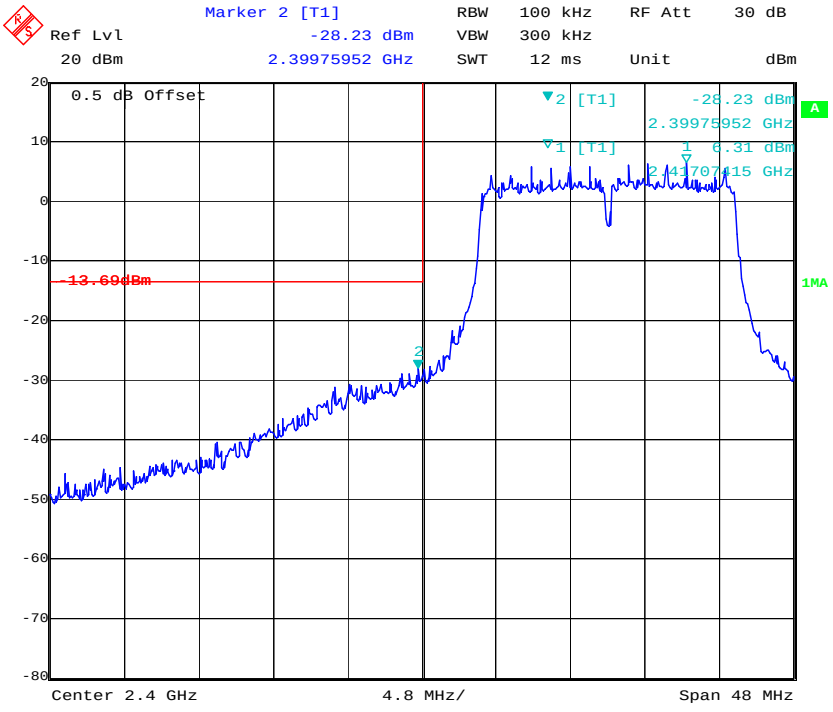


Chain 0, 802.11b: Band Edge, Right Side



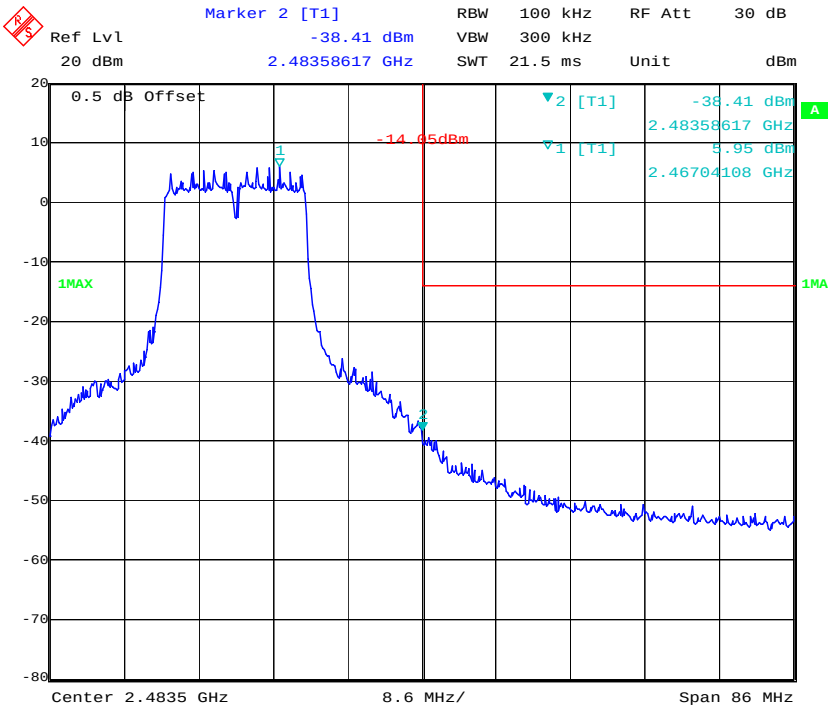
Date: 29.NOV.2016 11:56:26

Chain 0, 802.11g: Band Edge, Left Side

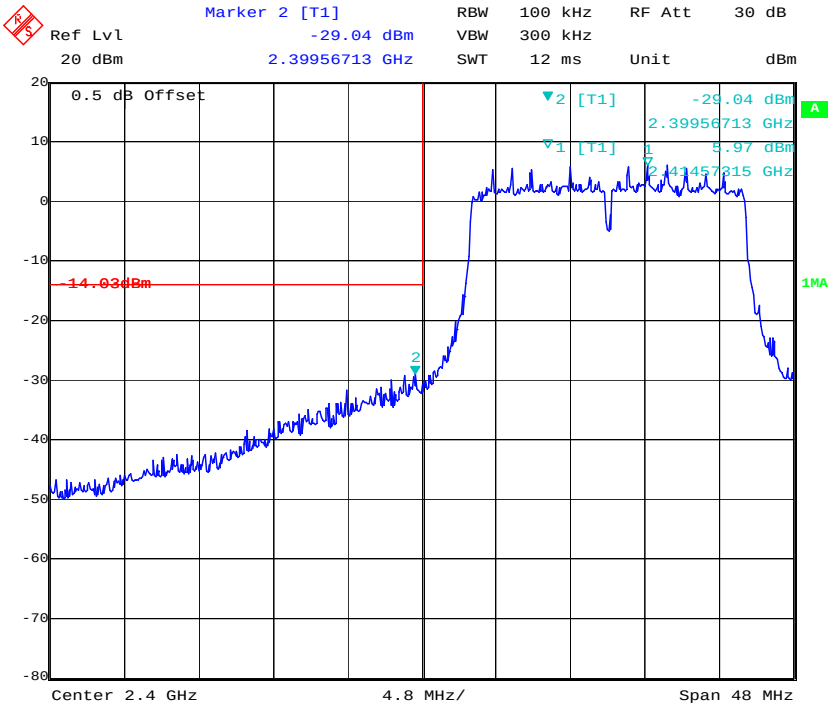


Date: 29.NOV.2016 11:44:00

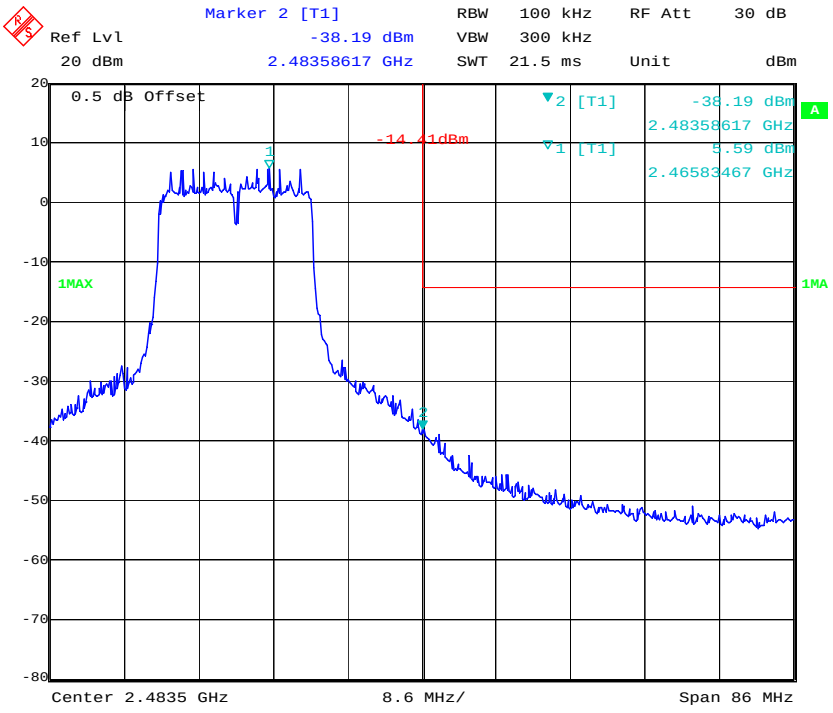
Chain 0, 802.11g: Band Edge, Right Side



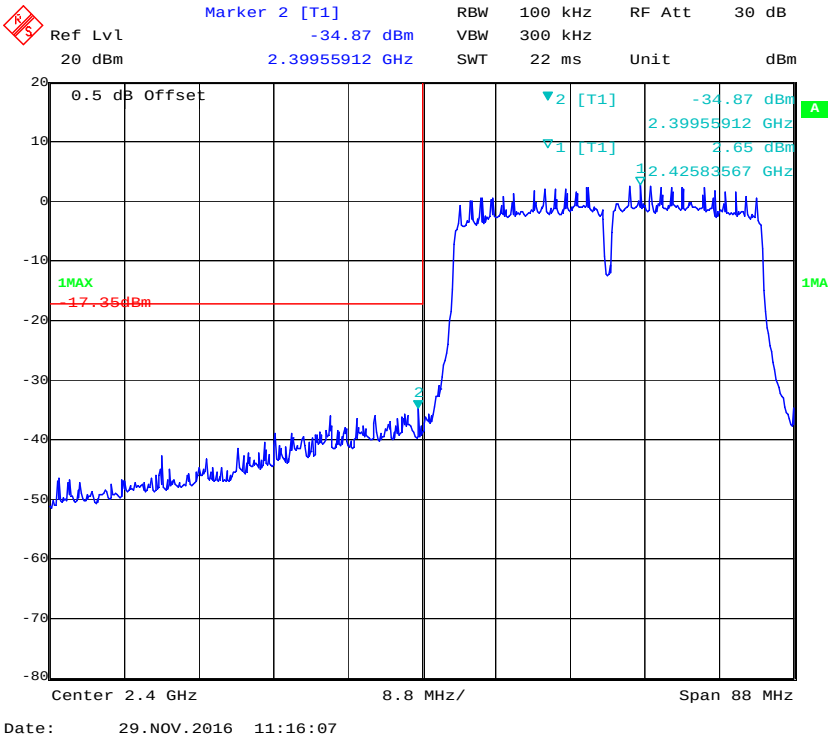
Chain 0, 802.11n ht20 Band Edge, Left Side



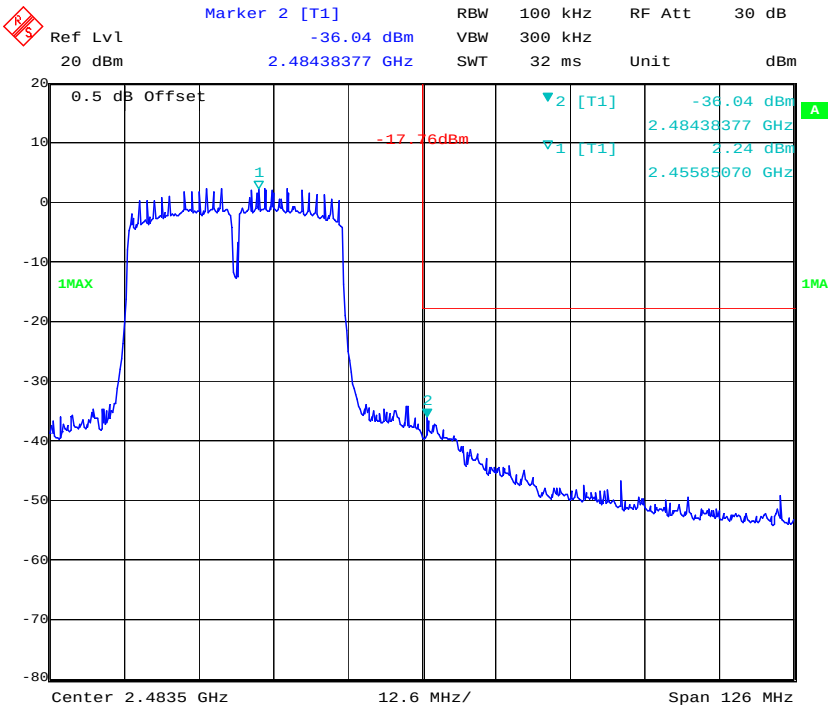
Chain 0, 802.11n ht20 Band Edge, Right Side



Chain 0, 802.11n ht40 Band Edge, Left Side

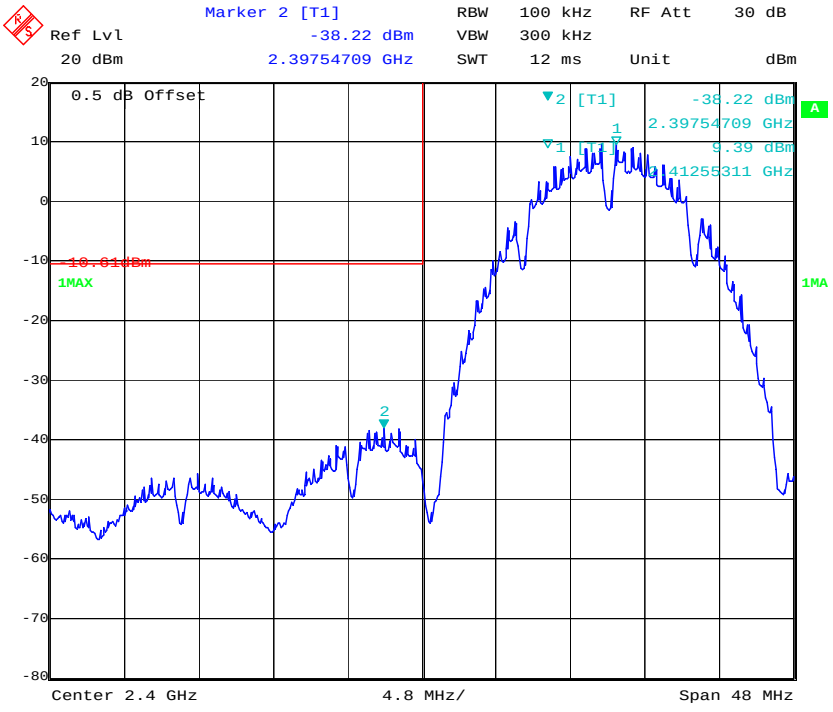


Chain 0, 802.11n ht40 Band Edge, Right Side



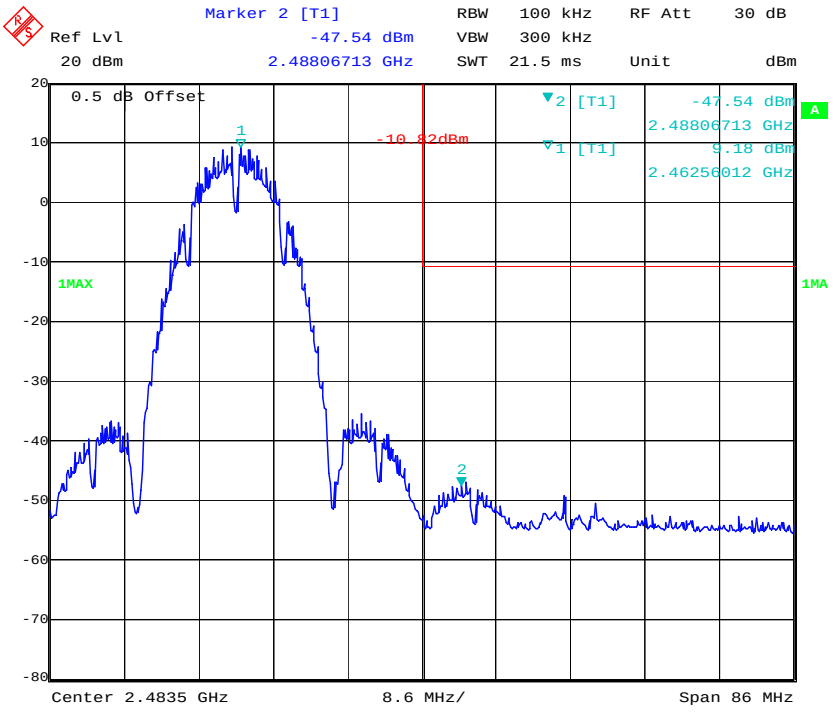
Date: 29.NOV.2016 11:04:56

Chain 1, 802.11b: Band Edge, Left Side

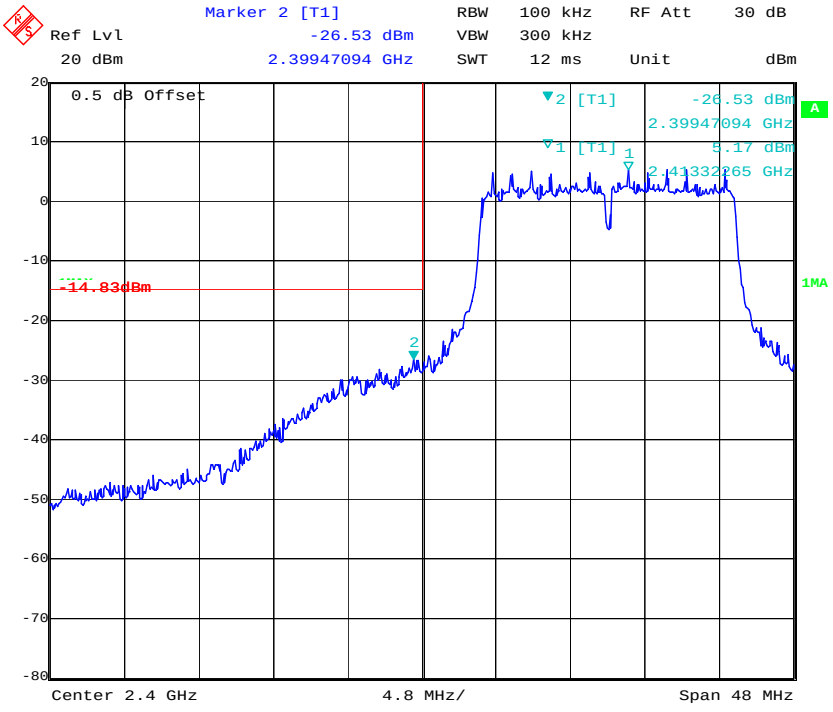


Date: 29.NOV.2016 10:24:28

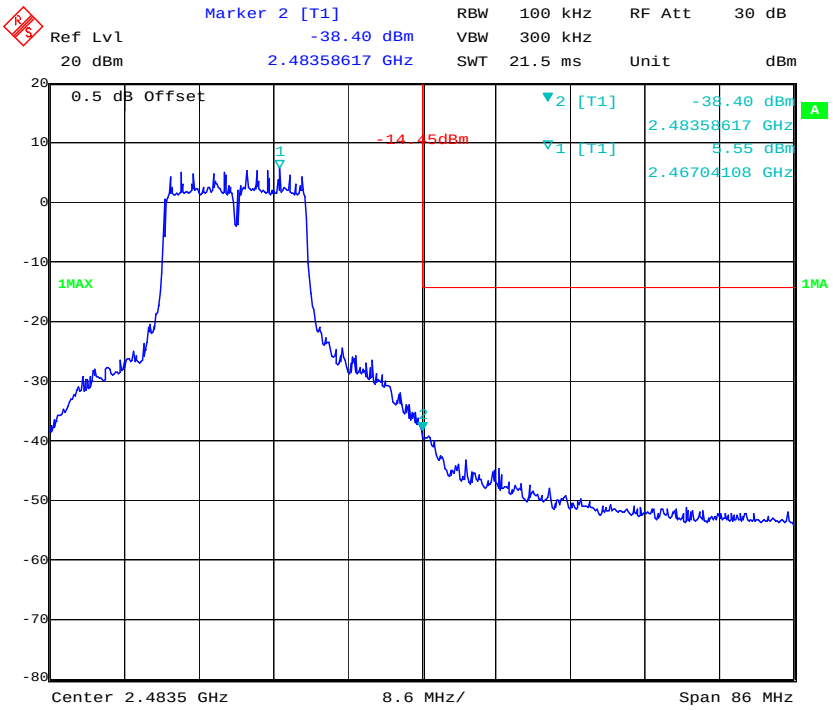
Chain 1, 802.11b: Band Edge, Right Side



Chain 1, 802.11g: Band Edge, Left Side

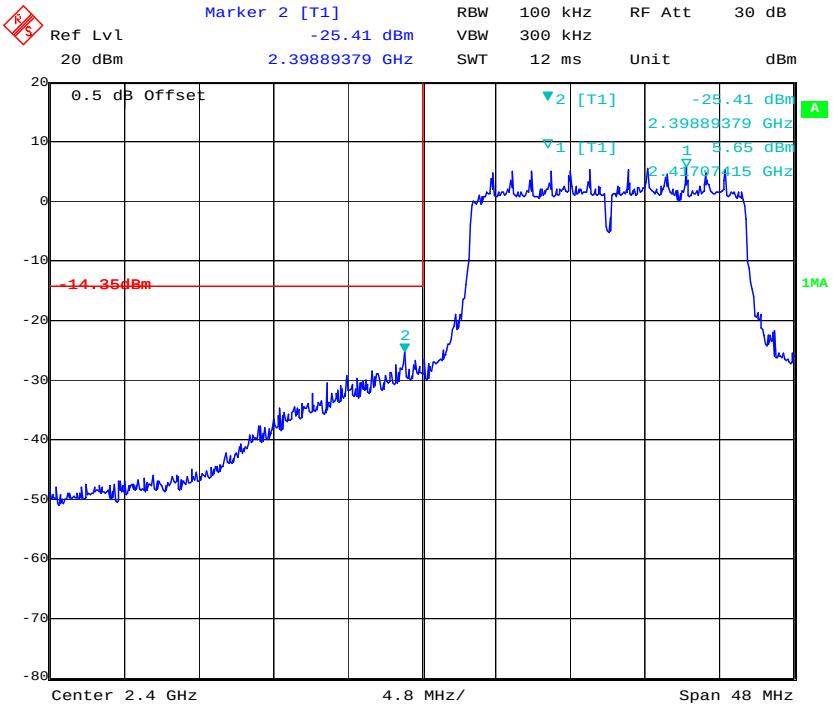


Chain 1, 802.11g: Band Edge, Right Side



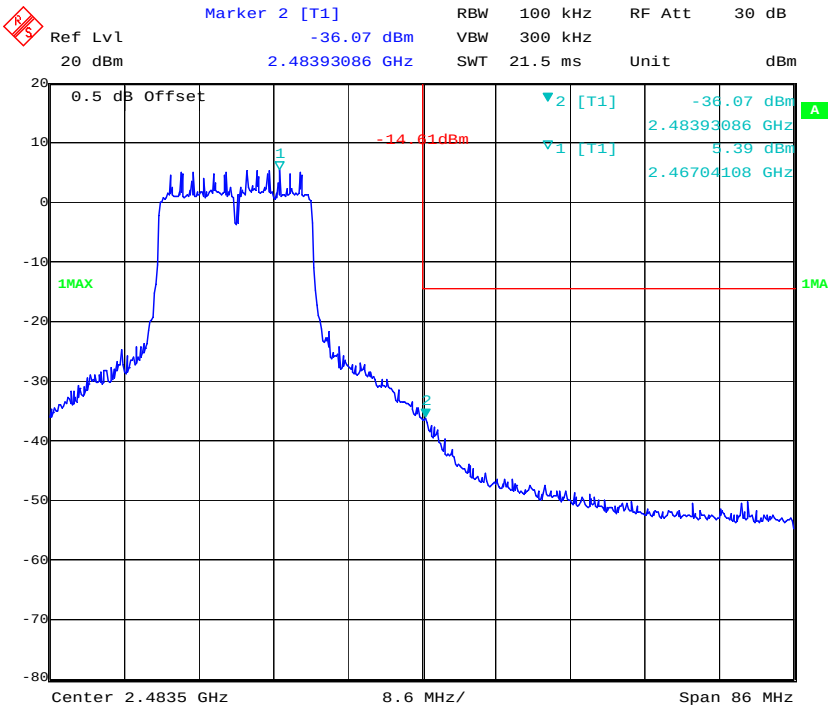
Date: 29.NOV.2016 10:35:01

Chain 1, 802.11n ht20 Band Edge, Left Side

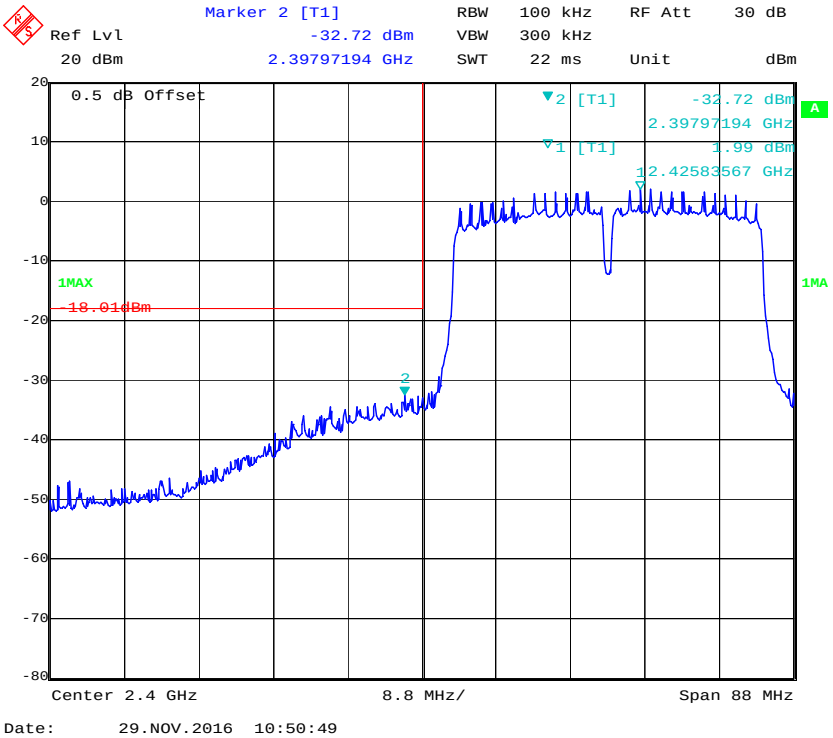


Date: 29.NOV.2016 10:47:22

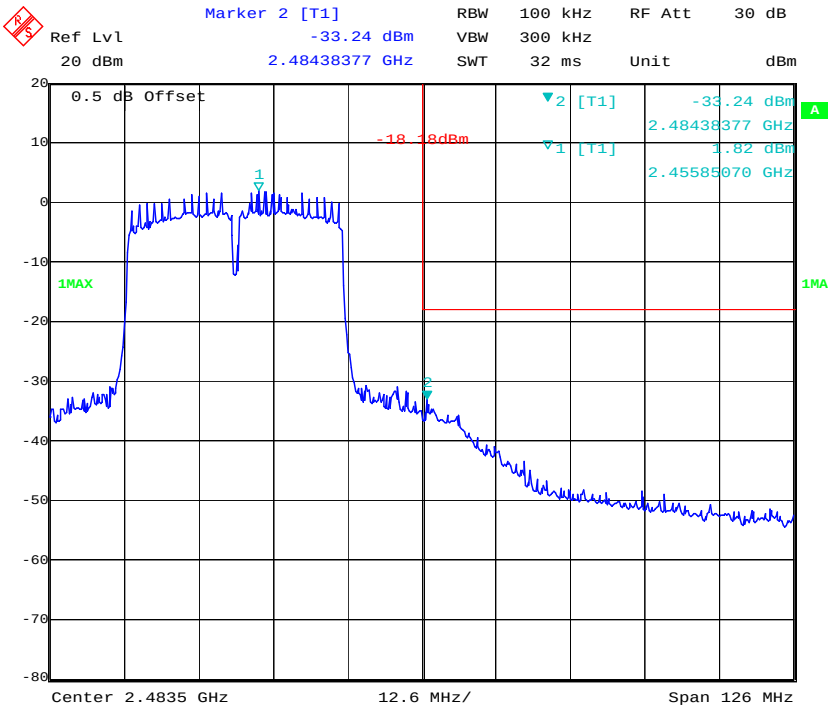
Chain 1, 802.11n ht20 Band Edge, Right Side



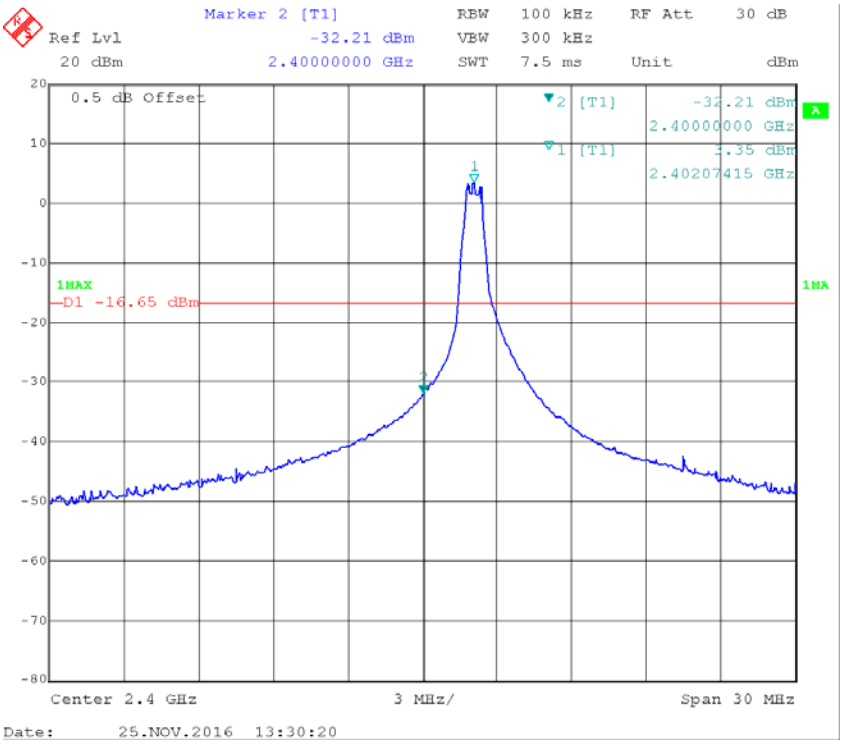
Chain 1, 802.11n ht40 Band Edge, Left Side



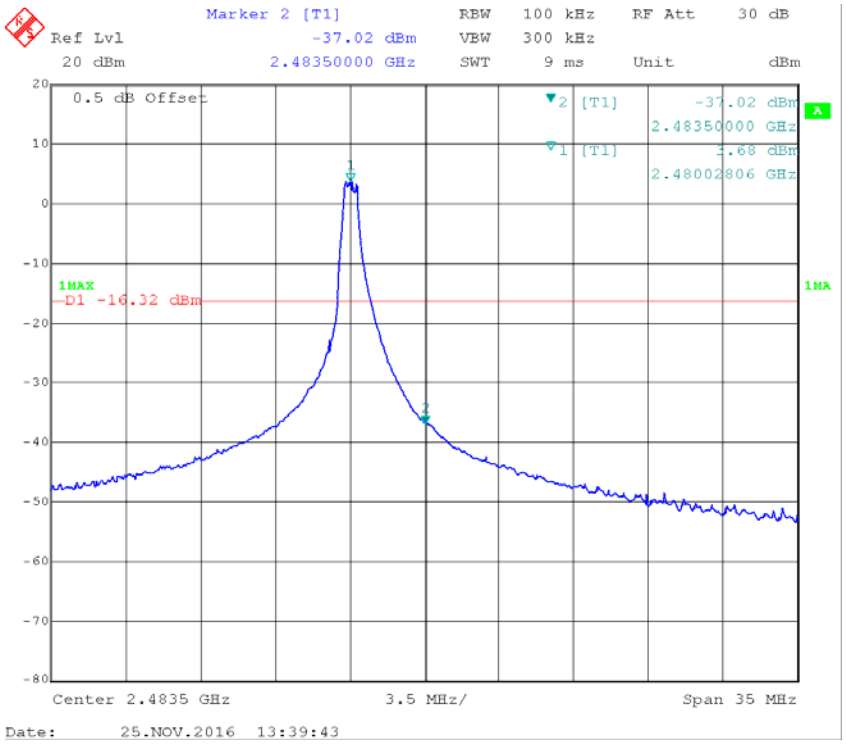
Chain 1, 802.11n ht40 Band Edge, Right Side



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

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 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26.3~27.6 °C
Relative Humidity:	32~41 %
ATM Pressure:	100.8~101.3 kPa

** The testing was performed by Lorin Bian from 2016-11-25 to 2016-12-11.*

Test Mode: Transmitting (1TX mode was the maximum power mode per chain, so the 2TX modes PSD is less than 1TX mode per chain)

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	-7.37	-7.74	-4.54	≤5.7
	Middle	2437	-7.04	-8.33	-4.63	≤5.7
	High	2462	-7.01	-8.2	-4.55	≤5.7
802.11g	Low	2412	-10.36	-10.82	-7.57	≤5.7
	Middle	2437	-10	-11.03	-7.47	≤5.7
	High	2462	-10.41	-11.74	-8.01	≤5.7
802.11n20	Low	2412	-9.7	-10.31	-6.98	≤5.7
	Middle	2437	-10.58	-11.14	-7.84	≤5.7
	High	2462	-10.68	-11.04	-7.85	≤5.7
802.11n40	Low	2422	-12.6	-13.44	-9.99	≤5.7
	Middle	2437	-13.54	-13.31	-10.41	≤5.7
	High	2452	-12.37	-13.08	-9.70	≤5.7

Note: the antenna maximum gain are 5.3dBi in 2.4GHz band, and 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:

Array Gain = 10 log(NANT/NSS) dB.

So:

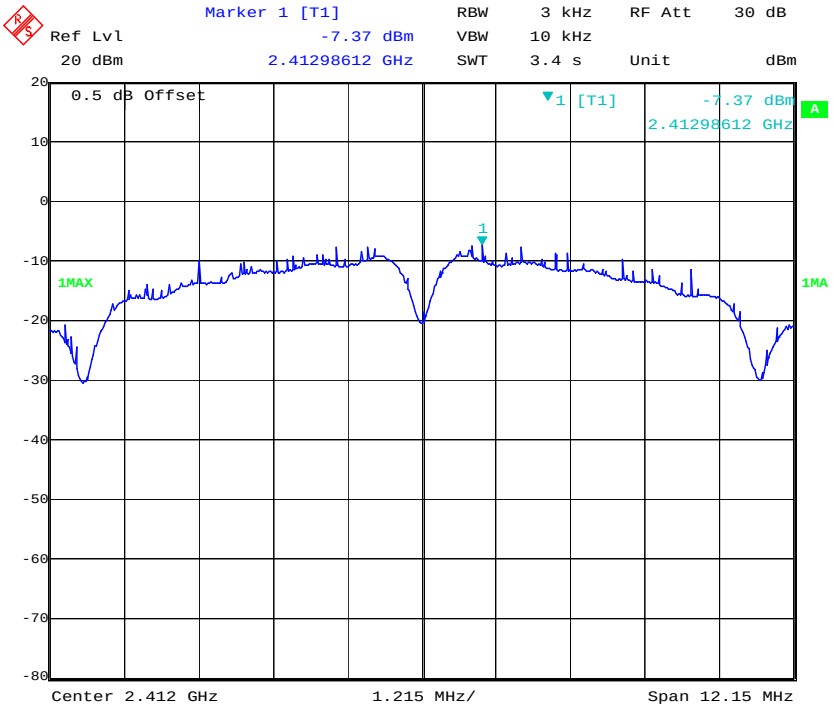
Directional gain = GANT + Array Gain = 5.3+10*log(2) =8.3 dBi

The Power density Limits was reduce 2.3dB

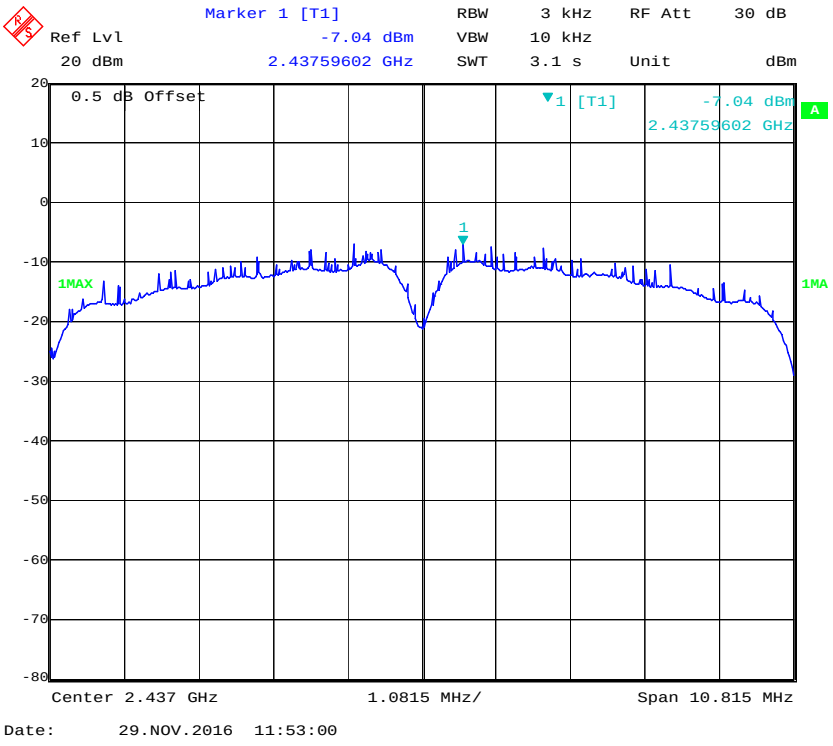
Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
BLE	Low	2402	-11.35	≤8
	Middle	2440	-11.87	≤8
	High	2480	-11.82	≤8

Chain 0:

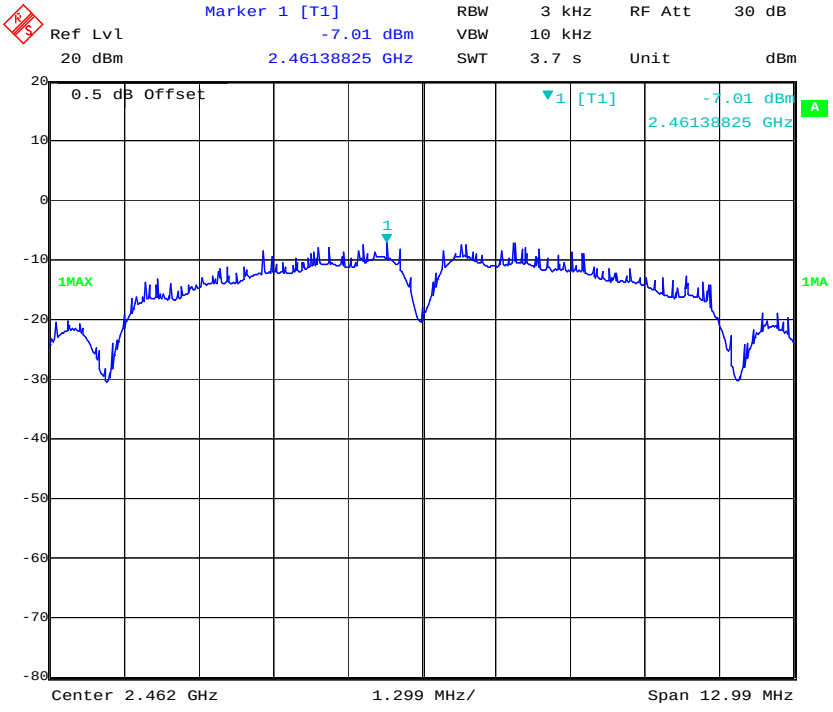
Power Spectral Density, 802.11b Low Channel



Power Spectral Density, 802.11b Middle Channel

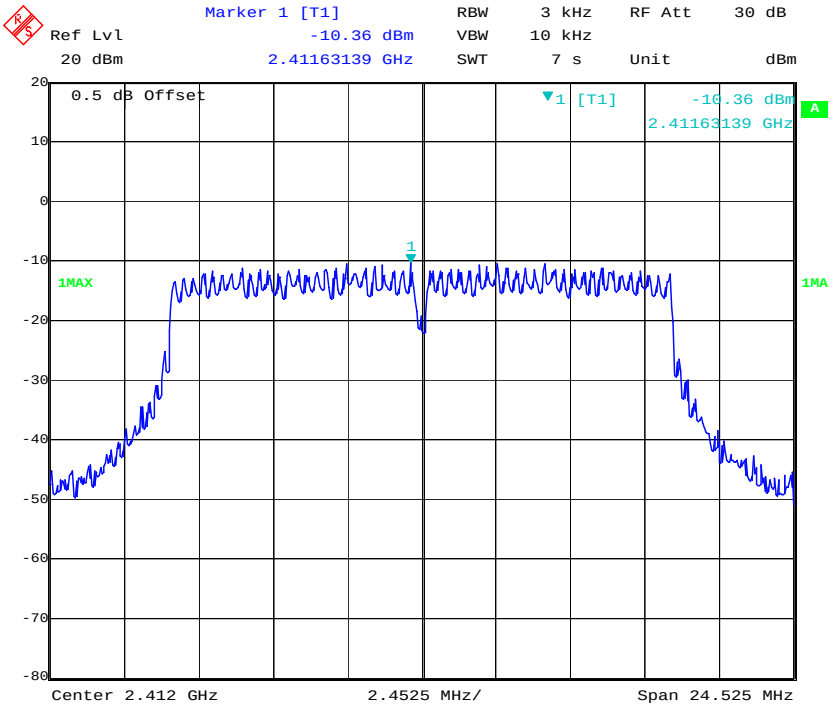


Power Spectral Density, 802.11b High Channel



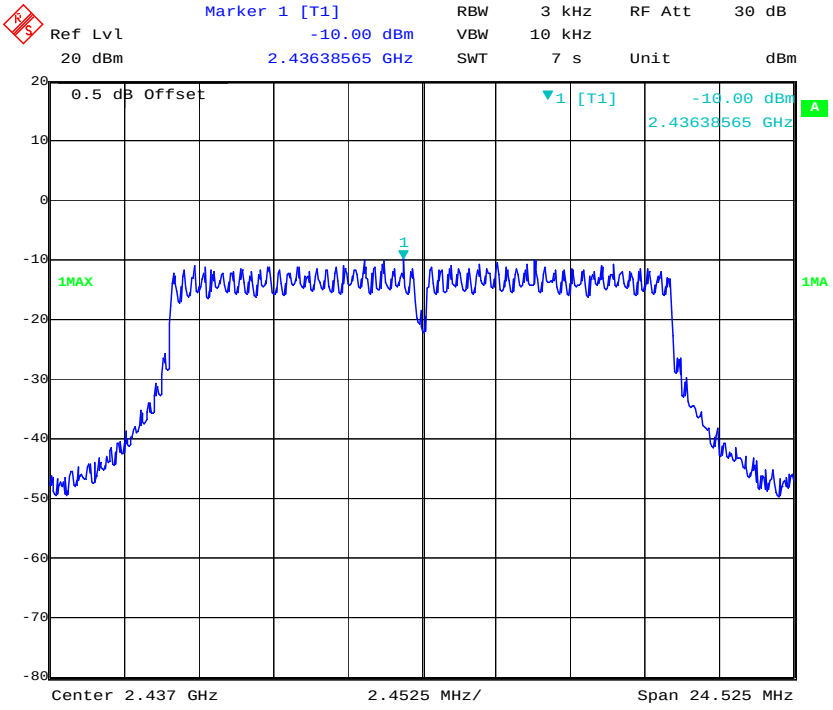
Date: 11.DEC.2016 14:00:04

Power Spectral Density, 802.11g Low Channel



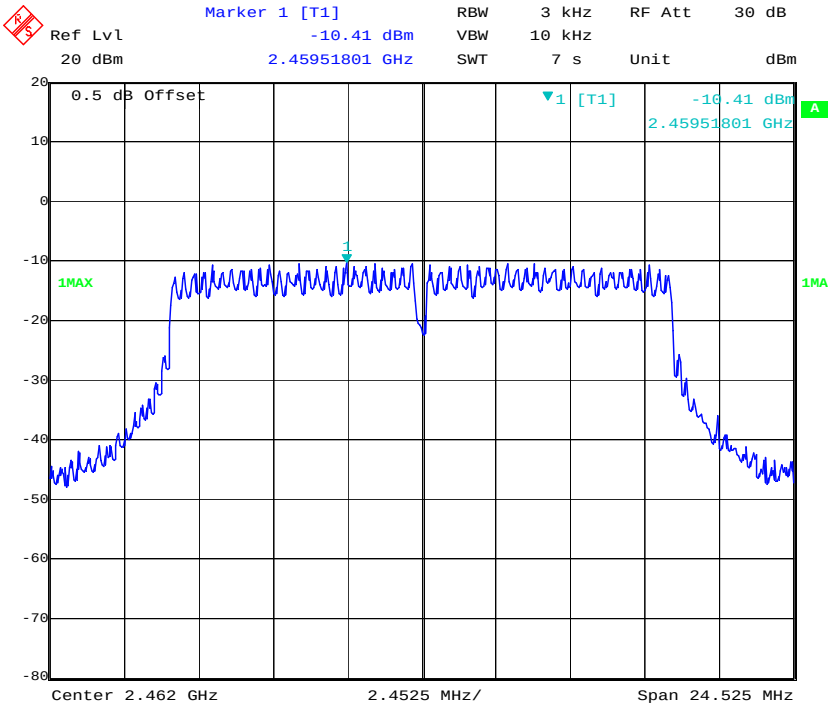
Date: 29.NOV.2016 11:43:36

Power Spectral Density, 802.11g Middle Channel



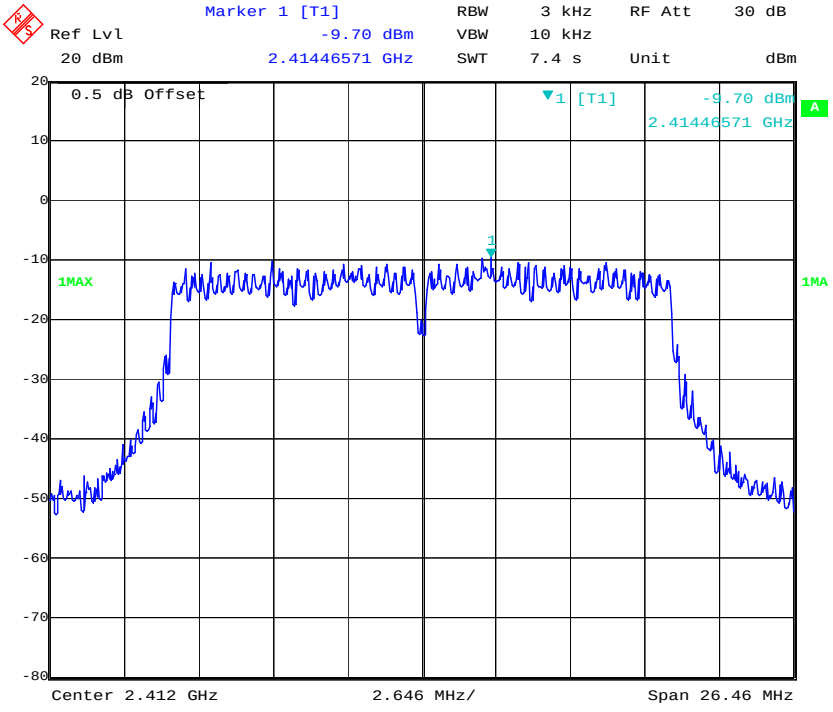
Date: 29.NOV.2016 11:40:53

Power Spectral Density, 802.11g High Channel



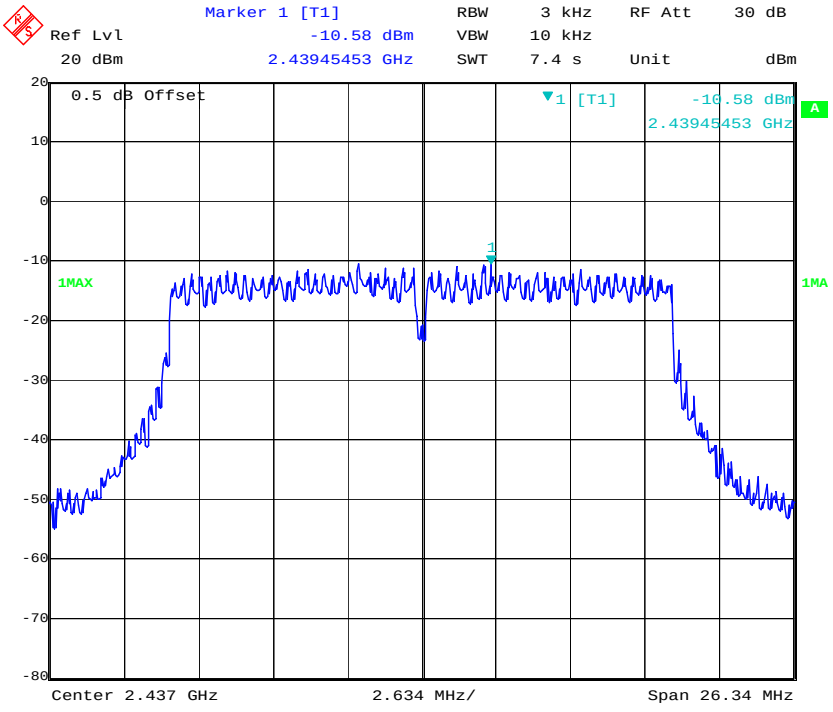
Date: 29.NOV.2016 11:35:39

Power Spectral Density, 802.11n ht20 Low Channel



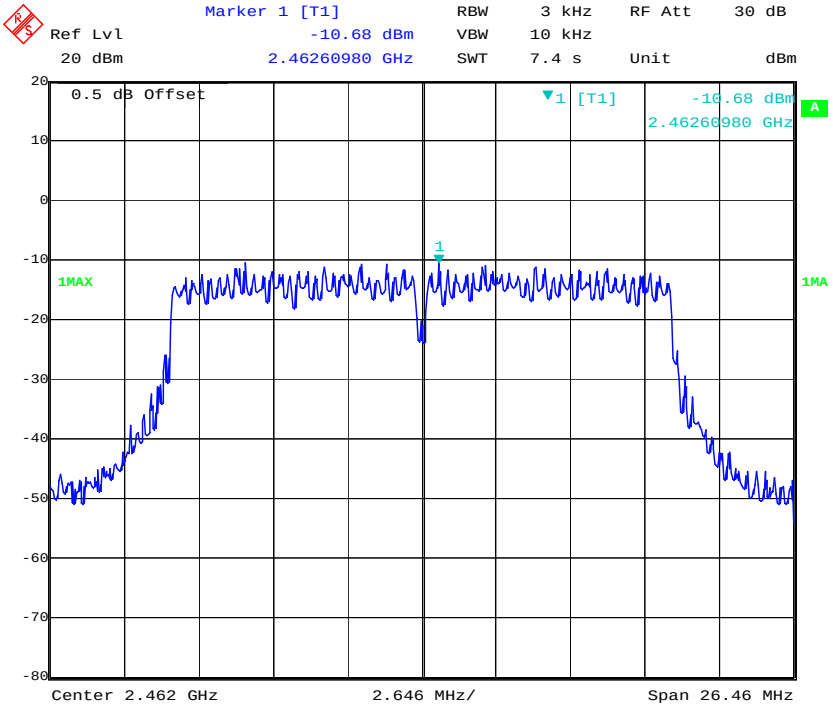
Date: 29.NOV.2016 11:23:40

Power Spectral Density, 802.11n ht20 Middle Channel



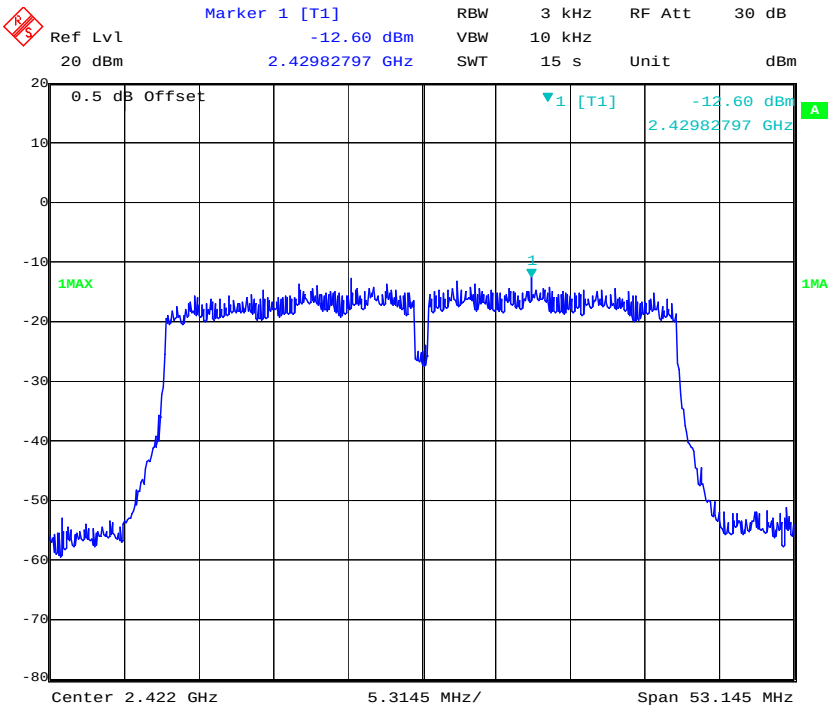
Date: 29.NOV.2016 11:26:09

Power Spectral Density, 802.11n ht20 High Channel



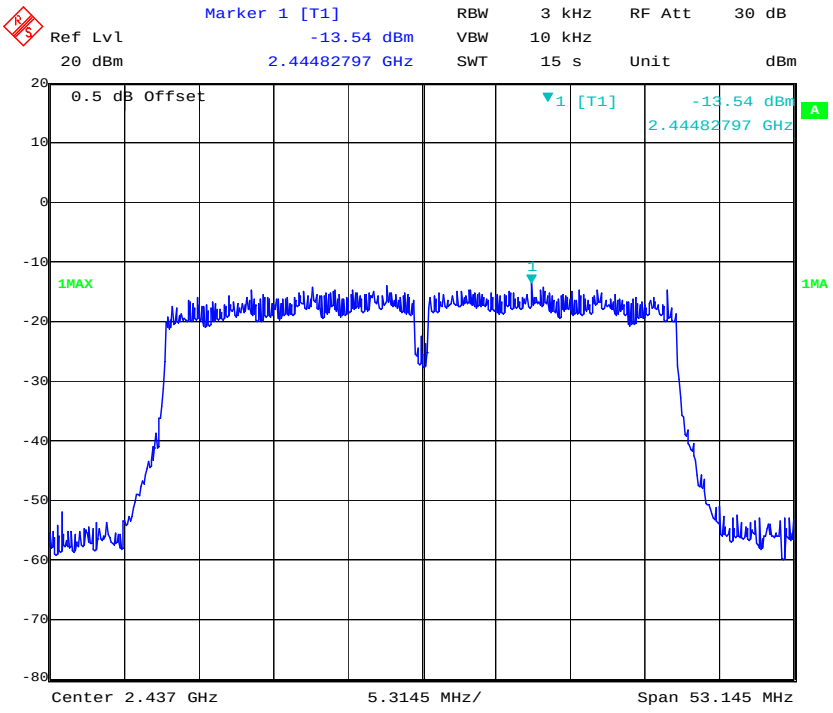
Date: 29.NOV.2016 11:30:23

Power Spectral Density, 802.11n ht40 Low Channel



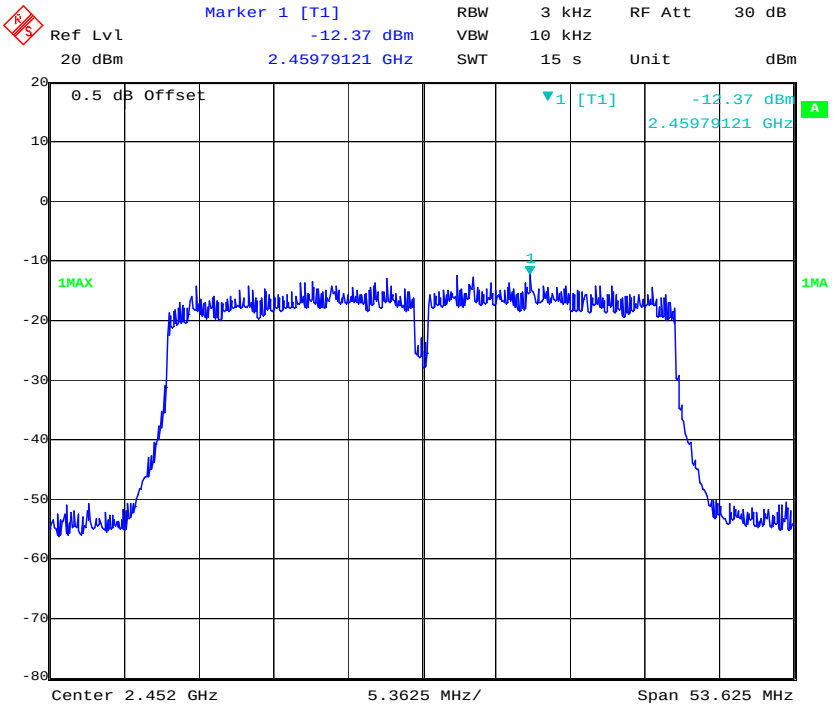
Date: 29.NOV.2016 11:18:57

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 29.NOV.2016 11:12:35

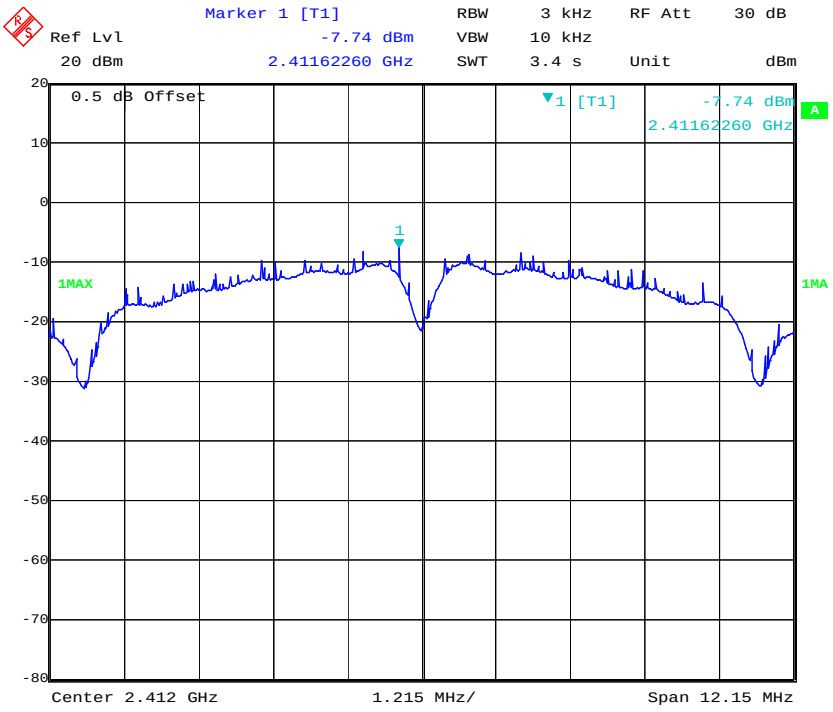
Power Spectral Density, 802.11n ht40 High Channel



Date: 29.NOV.2016 11:04:33

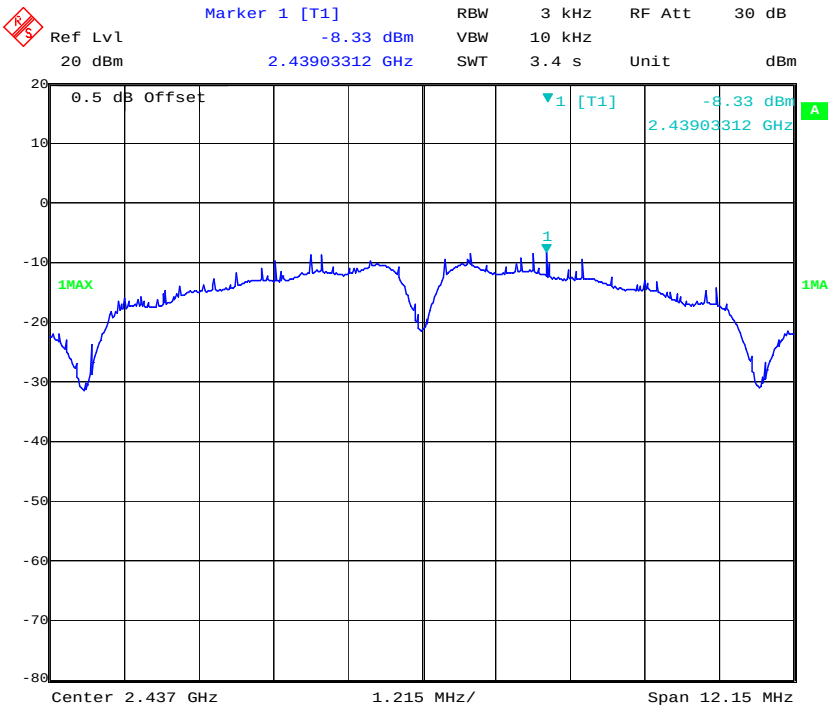
Chain 1

Power Spectral Density, 802.11b Low Channel



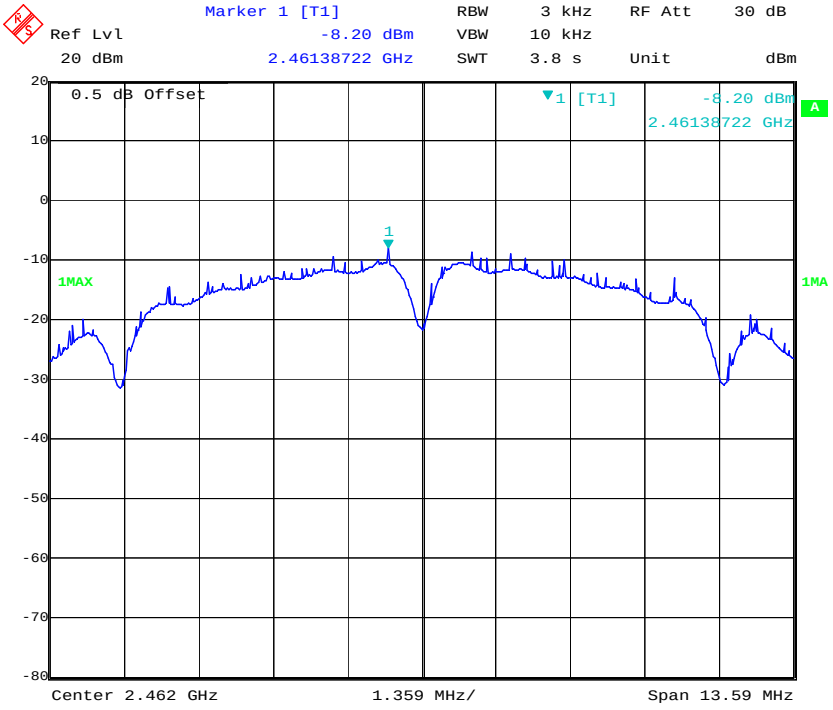
Date: 29.NOV.2016 10:24:07

Power Spectral Density, 802.11b Middle Channel



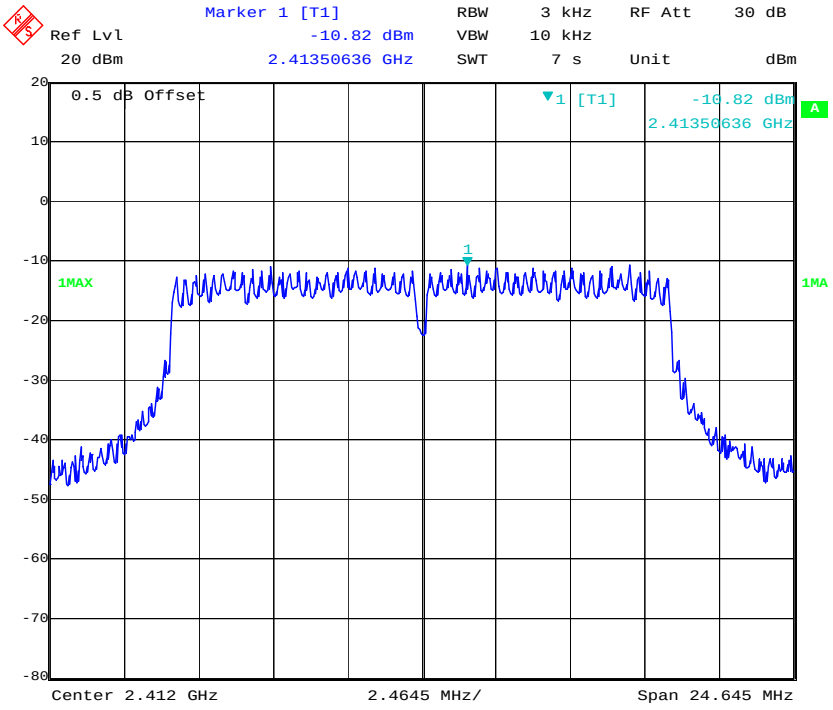
Date: 29.NOV.2016 10:19:29

Power Spectral Density, 802.11b High Channel



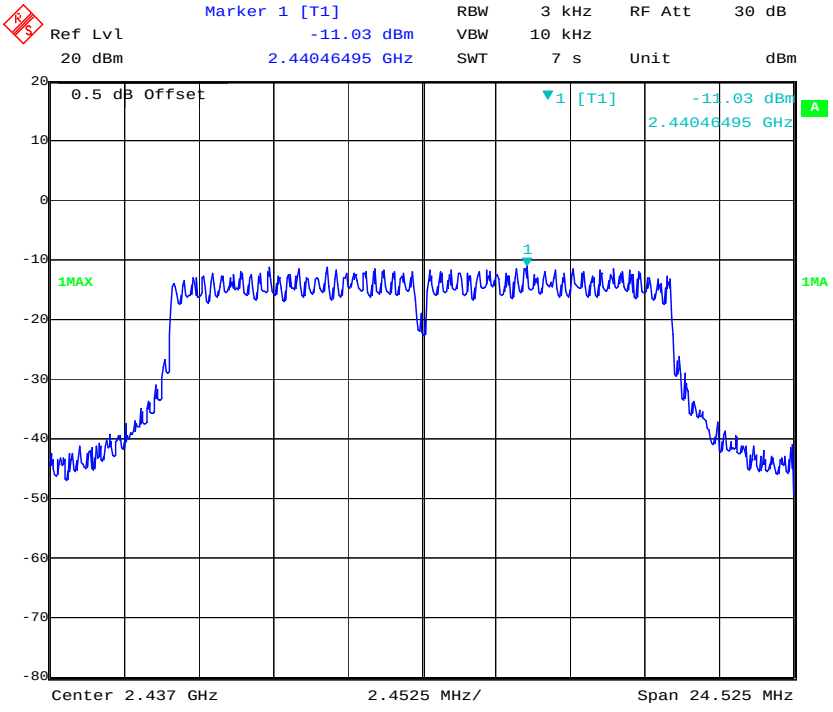
Date: 29.NOV.2016 10:16:13

Power Spectral Density, 802.11g Low Channel



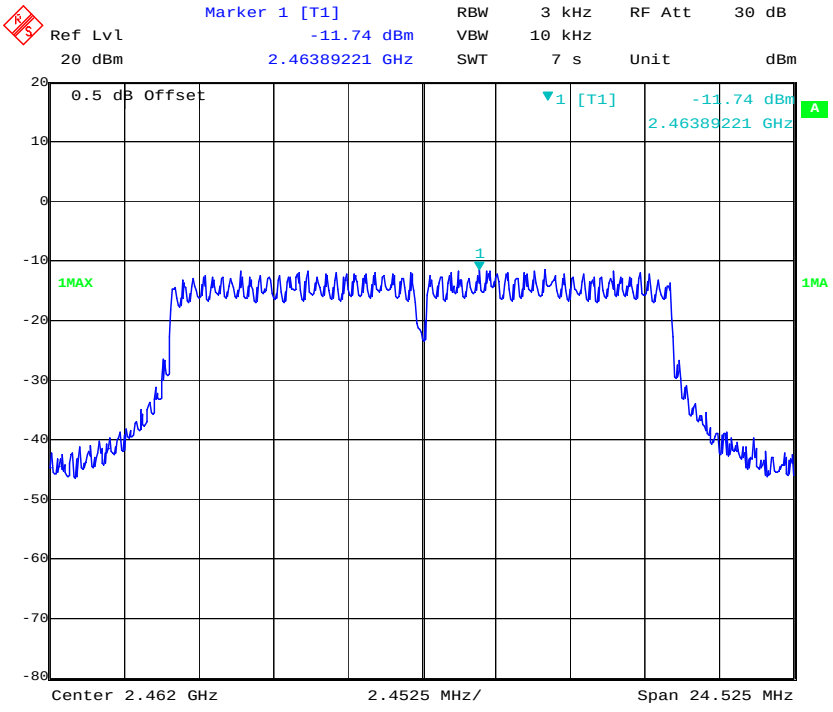
Date: 29.NOV.2016 10:27:52

Power Spectral Density, 802.11g Middle Channel



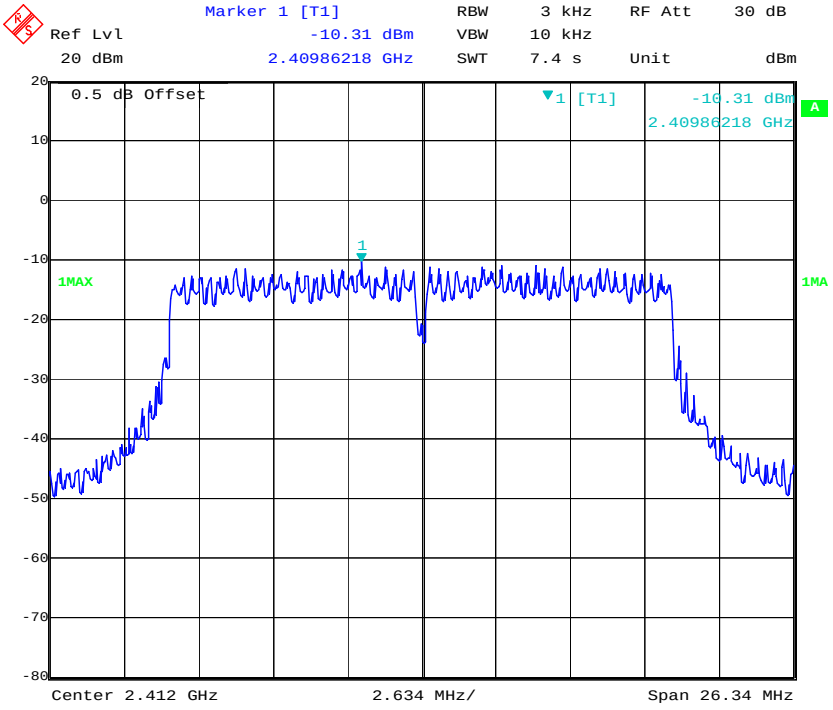
Date: 29.NOV.2016 10:31:41

Power Spectral Density, 802.11g High Channel



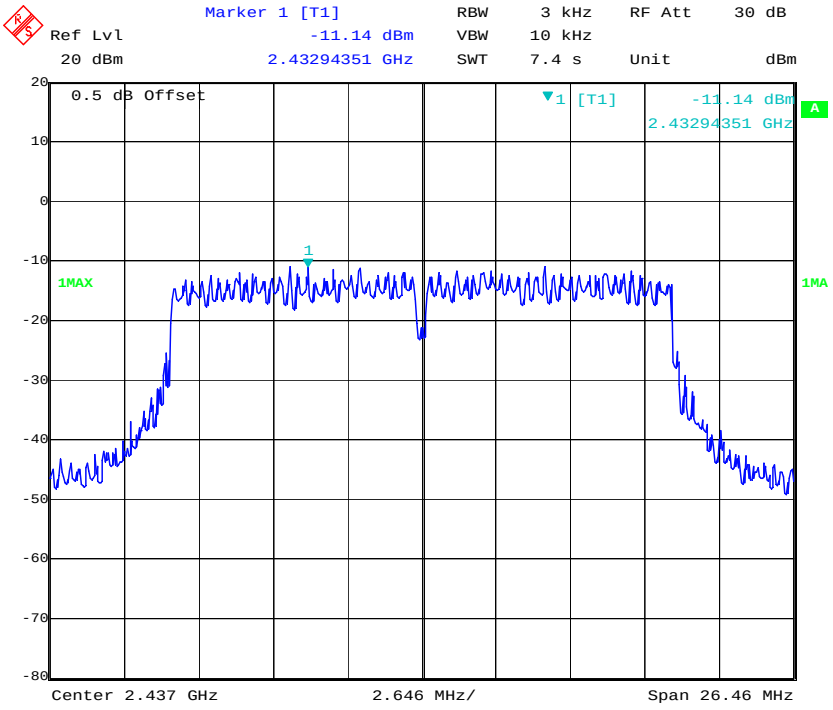
Date: 29.NOV.2016 10:34:33

Power Spectral Density, 802.11n ht20 Low Channel



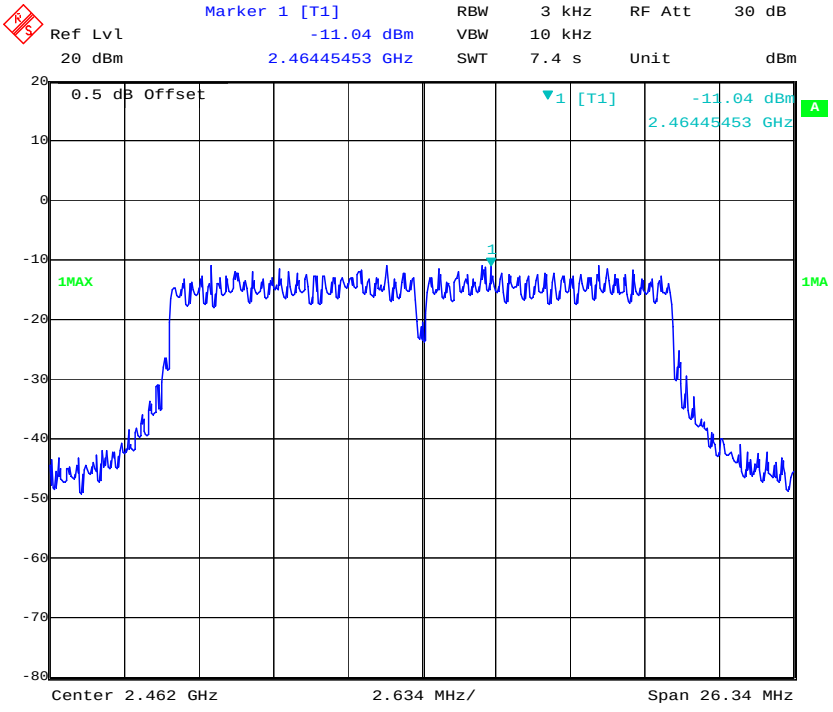
Date: 29.NOV.2016 10:46:53

Power Spectral Density, 802.11n ht20 Middle Channel



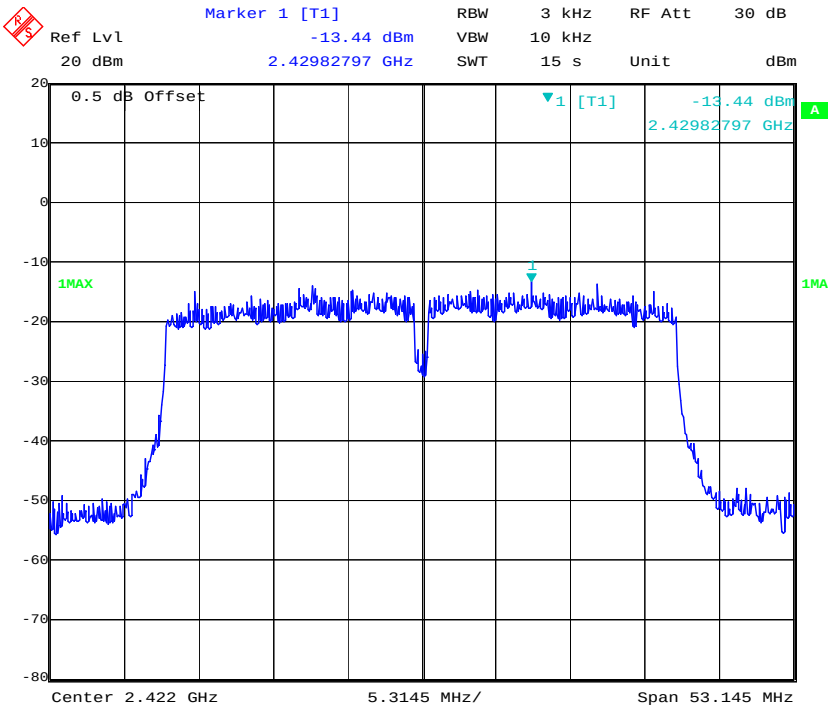
Date: 29.NOV.2016 10:43:48

Power Spectral Density, 802.11n ht20 High Channel



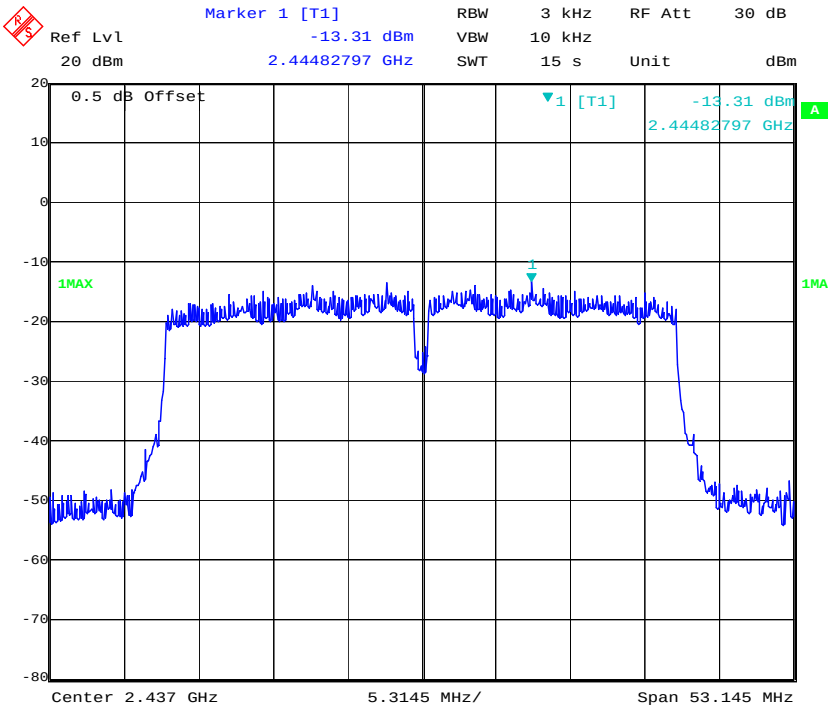
Date: 29.NOV.2016 10:37:49

Power Spectral Density, 802.11n ht40 Low Channel



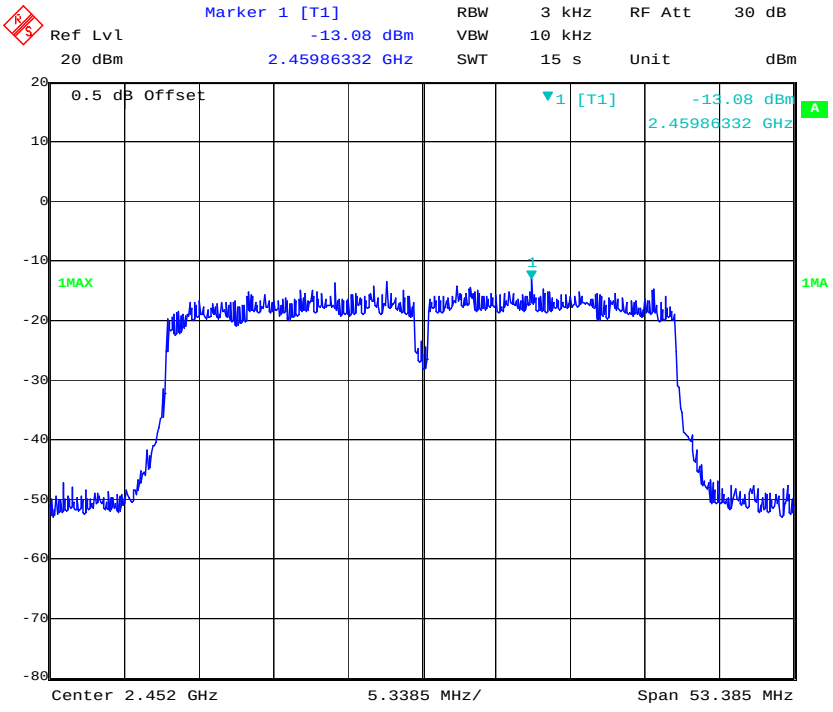
Date: 29.NOV.2016 10:50:14

Power Spectral Density, 802.11n ht40 Middle Channel



Date: 29.NOV.2016 10:54:01

Power Spectral Density, 802.11n ht40 High Channel



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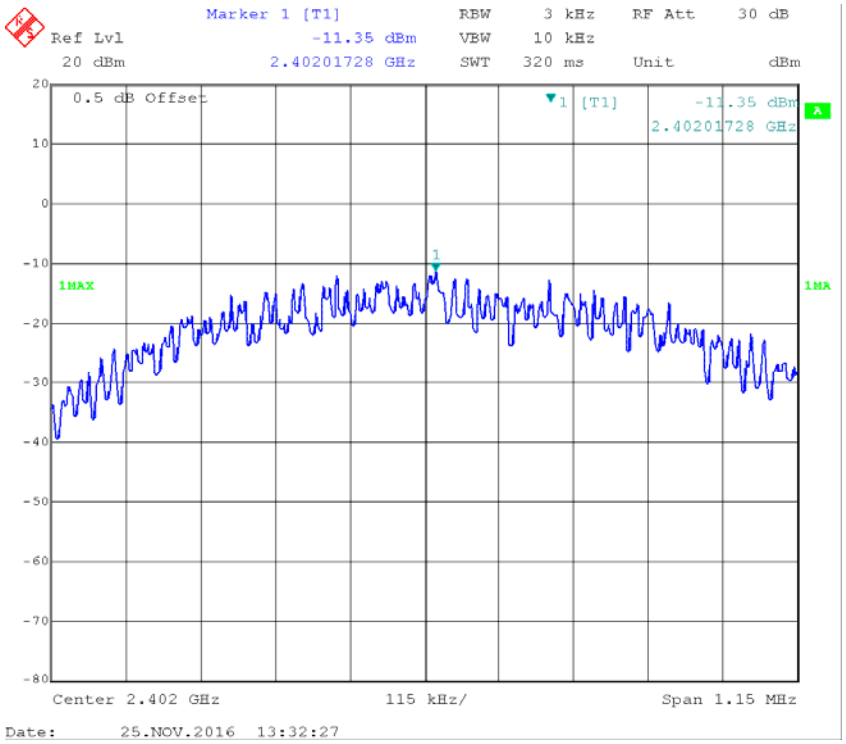
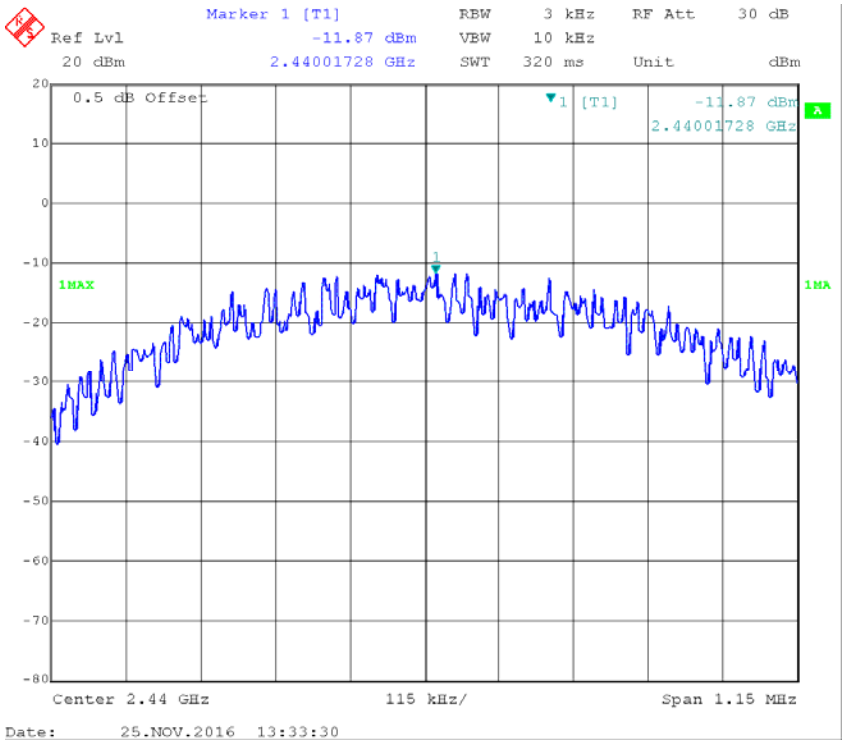
BLE:

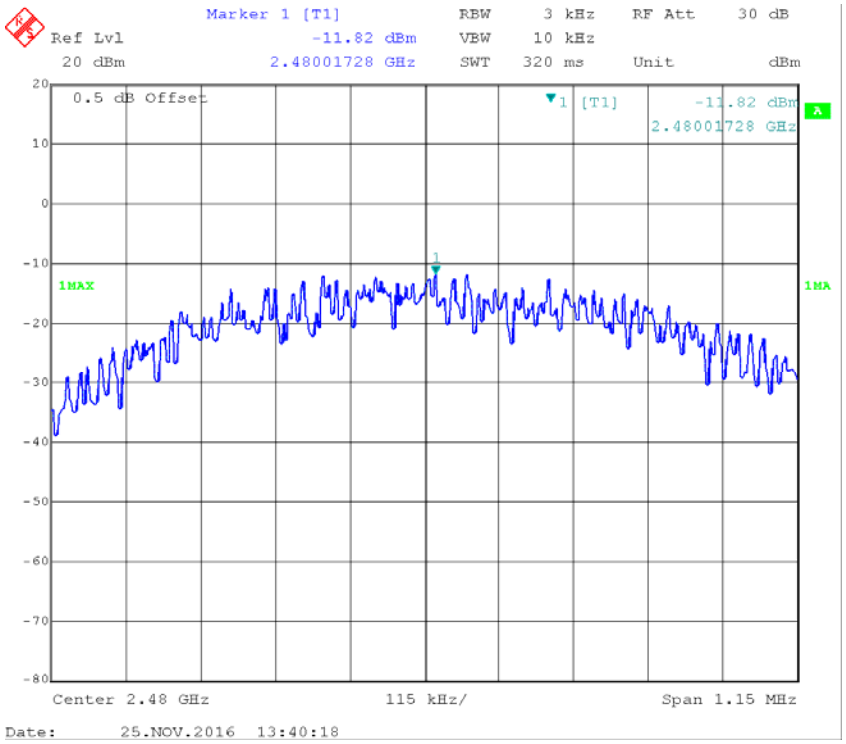
Power Spectral Density, Low Channel



Power Spectral Density, Middle Channel



Power Spectral Density, High Channel



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