



FCC PART 15.247

TEST REPORT

For

Beijing Noitom Technology Limited

Room 432 ,Main Tower 28 Xijiekouwai Blvd, Beijing, China

FCC ID: 2ABTRN10030020

Report Type: Original Report	Product Name: Noitom Tablet
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TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S)	4
TEST METHODOLOGY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	7
EXTERNAL CABLE	10
BLOCK DIAGRAM OF TEST SETUP	10
SUMMARY OF TEST RESULTS	11
FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE.....	12
APPLICABLE STANDARD	12
FCC §15.203 - ANTENNA REQUIREMENT	13
APPLICABLE STANDARD	13
ANTENNA CONNECTOR CONSTRUCTION	13
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS.....	14
APPLICABLE STANDARD	14
MEASUREMENT UNCERTAINTY	14
EUT SETUP	14
EMI TEST RECEIVER SETUP	15
TEST PROCEDURE	15
CORRECTED AMPLITUDE & MARGIN CALCULATION	15
TEST EQUIPMENT LIST AND DETAILS	16
TEST DATA	16
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS.....	19
APPLICABLE STANDARD	19
MEASUREMENT UNCERTAINTY	19
EUT SETUP	20
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	21
TEST PROCEDURE	21
CORRECTED AMPLITUDE & MARGIN CALCULATION	21
TEST EQUIPMENT LIST AND DETAILS	22
TEST DATA	22
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH	27
APPLICABLE STANDARD	27
TEST PROCEDURE	27
TEST EQUIPMENT LIST AND DETAILS	27
TEST DATA	27
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER	35
APPLICABLE STANDARD	35
TEST PROCEDURE	35
TEST EQUIPMENT LIST AND DETAILS	35

TEST DATA	35
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	37
APPLICABLE STANDARD	37
TEST PROCEDURE	37
TEST EQUIPMENT LIST AND DETAILS	37
TEST DATA	37
FCC §15.247(e) - POWER SPECTRAL DENSITY	42
APPLICABLE STANDARD	42
TEST PROCEDURE	42
TEST EQUIPMENT LIST AND DETAILS	42
TEST DATA	42

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Beijing Noitom Technology Limited's** product, model number: **n10030020** (**FCC ID: 2ABTRN10030020**) (the "EUT") in this report was a **Noitom Tablet**, which was measured approximately: 25.7 cm (L) × 17.2 cm (W) × 0.93 cm (H), rated input voltage: DC3.7V rechargeable Li-ion battery or DC5V from adapter.

Adapter information:

MODEL: MX12X8-0502000UX

INPUT: 100-240V~ 50-60Hz 0.35A

OUTPUT: DC5.0V 2A

**All measurement and test data in this report was gathered from final production sample, serial number: 161012051 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-10-12, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of **Beijing Noitom Technology Limited** 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 15B JBP submissions with FCC ID: 2ABTRN10030020.
FCC Part 15C DSS submissions with FCC ID: 2ABTRN10030020.
FCC Part 15E NII submissions with FCC ID: 2ABTRN10030020.

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.

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: ± 5.13 dB;

6G~25GHz: ± 5.47 dB;

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. For 2.4GHz band, 11 channels are provided to testing:

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

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

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.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The worst condition (maximum power) was setting by the Engineer Mode as following table:

Test Mode	Test Software Version	Ampak RFTTestTool&CMD		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	11Mbps	11Mbps	11Mbps
	Power Level Setting	9	9	9
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	54Mbps	54Mbps	54Mbps
	Power Level Setting	9	9	9
802.11n ht20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS7	MCS7	MCS7
	Power Level Setting	9	9	9

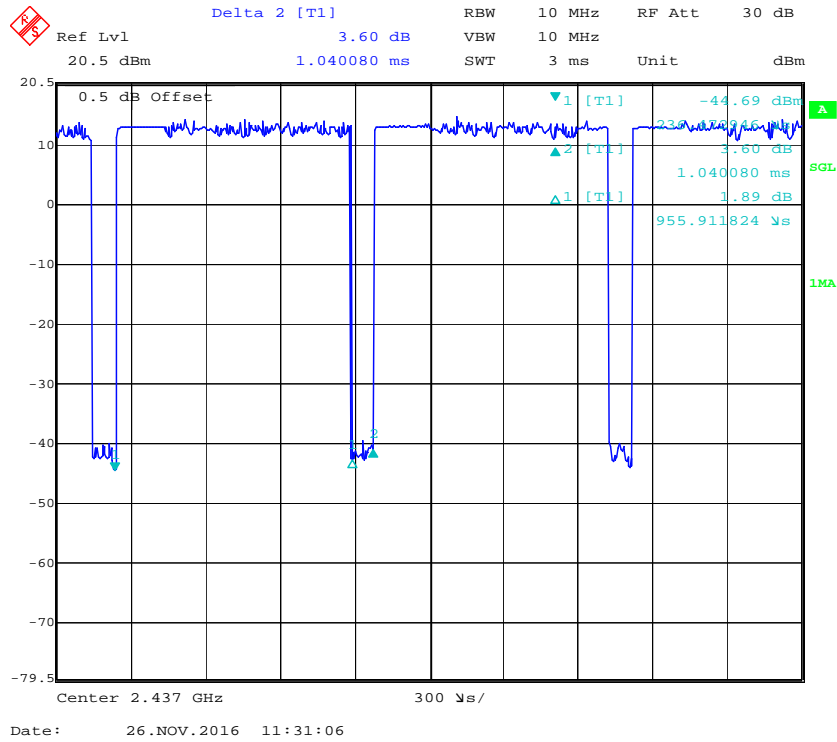
Note: BLE mode configured as maximum power by the system default setting.

The maximum duty cycle as following table:

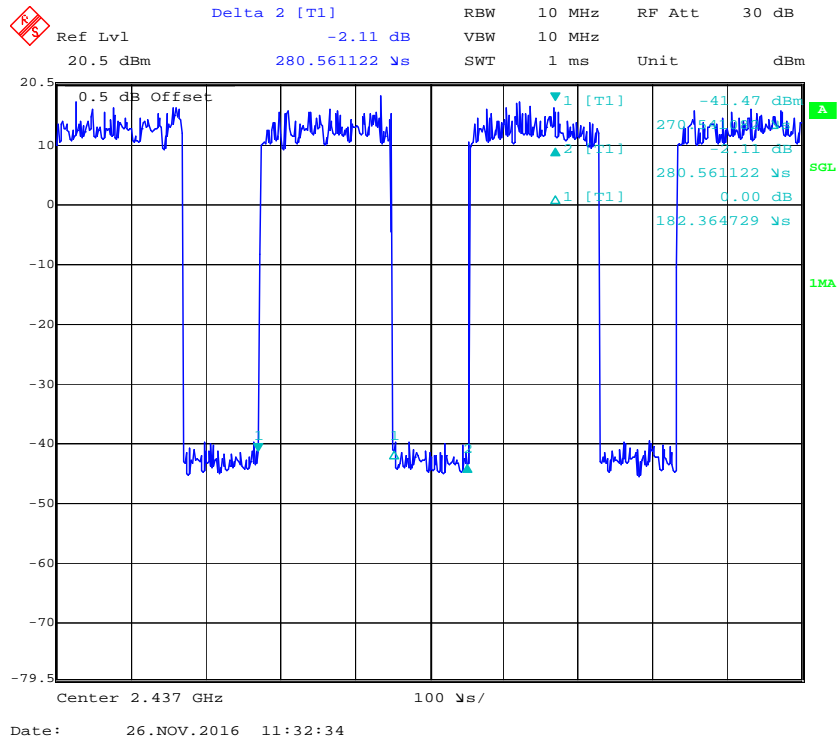
Test mode	T _{on} (ms)	T _{on+off} (ms)	Duty Cycle (%)
802.11b	0.956	1.040	92%
802.11g	0.182	0.281	65%
802.11n ht20	0.170	0.267	64%
BLE	0.403	0.627	64%

The minimum transmission duration (T) is 0.956ms for 802.11b, 0.182ms for 802.11g, 0.17ms for 802.11n ht20, and 0.403ms for BLE mode.

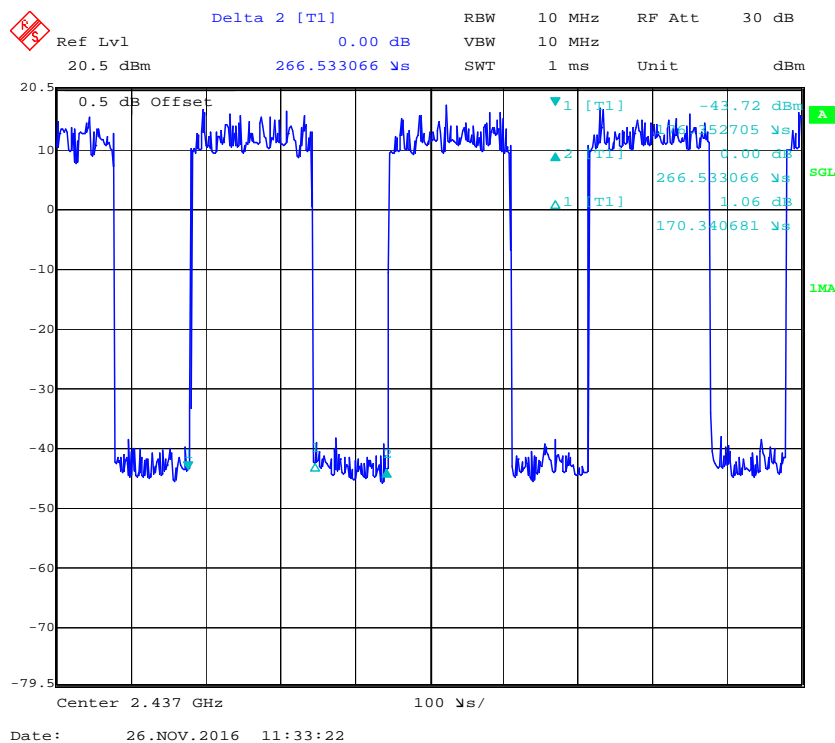
802.11b



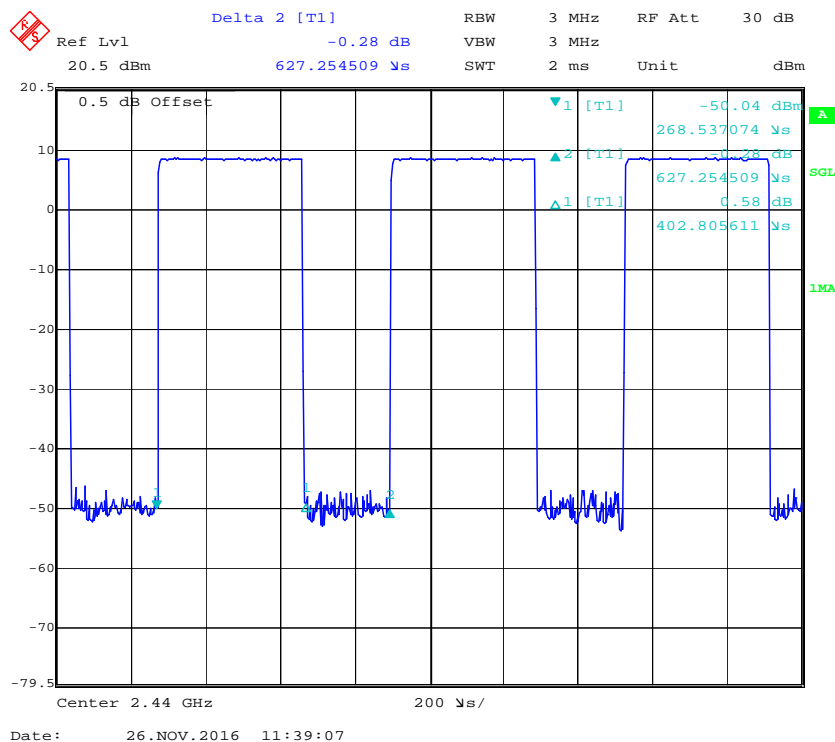
802.11g



802.11n ht20



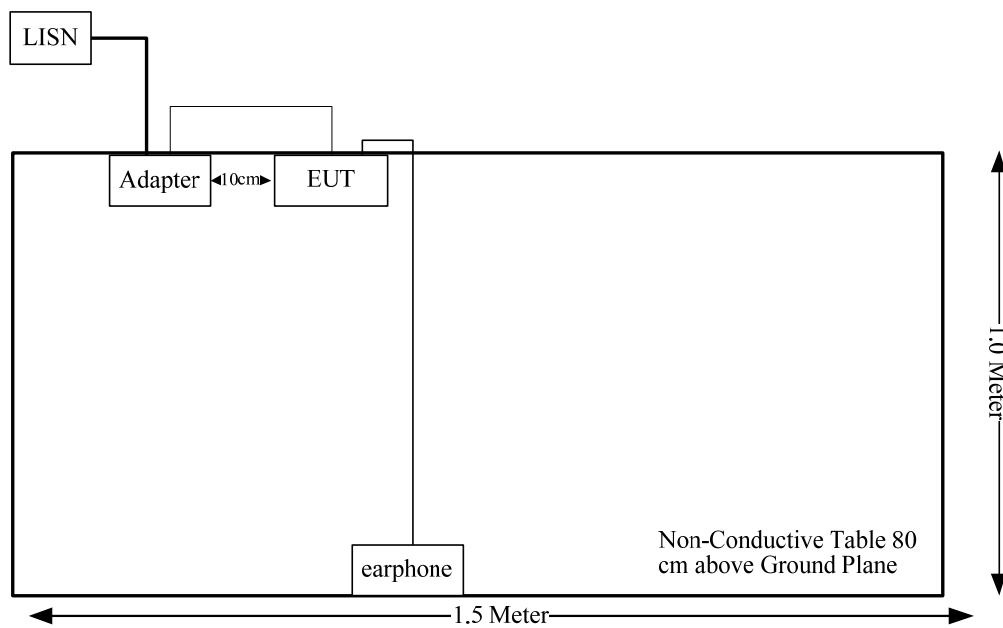
BLE



External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter Cable	Yes	Yes	1.04	Adapter	EUT
Earphone Cable	No	No	1.02	EUT	Earphone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	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 & §2.1093- RF EXPOSURE

Applicable Standard

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

Measurement Result

For WiFi mode

The max tune-up conducted power is 9.6 dBm (9.12 mW).

$[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})][\sqrt{f(\text{GHz})}]$
 $= 9.12/5 \cdot (\sqrt{2.462}) = 2.9 \leq 3.0$

For bluetooth LE mode

The max tune-up conducted power is 8.3 dBm (6.76 mW).

$[(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})][\sqrt{f(\text{GHz})}]$
 $= 6.76/5 \cdot (\sqrt{2.48}) = 2.1 < 3.0$

So the stand-alone SAR evaluation is not necessary.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has one internal antenna arrangement for Wifi/BT, and the antenna gain is 2.0 dBi@2.4GHz, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

Measurement Uncertainty

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

If U_{lab} is less than or equal to U_{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:

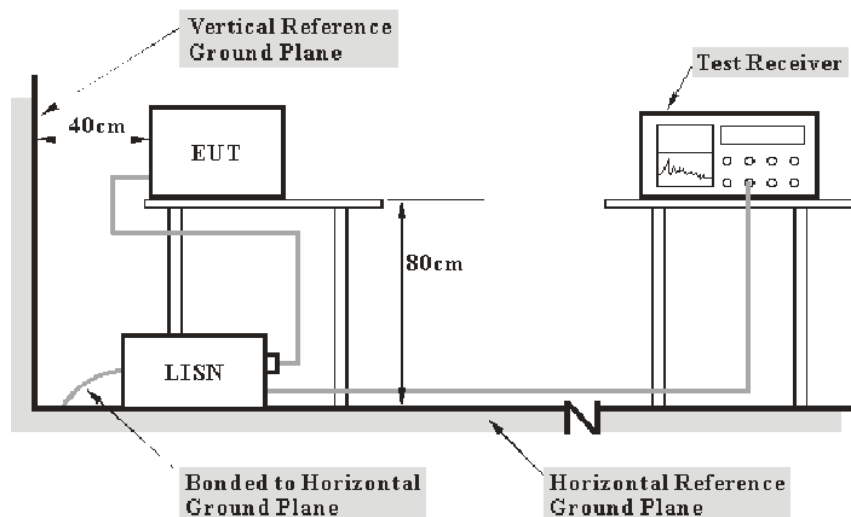
–compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
 –non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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:

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	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
N/A	Conducted Cable	NO.5	N/A	2016-11-10	2017-11-09
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
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 Data

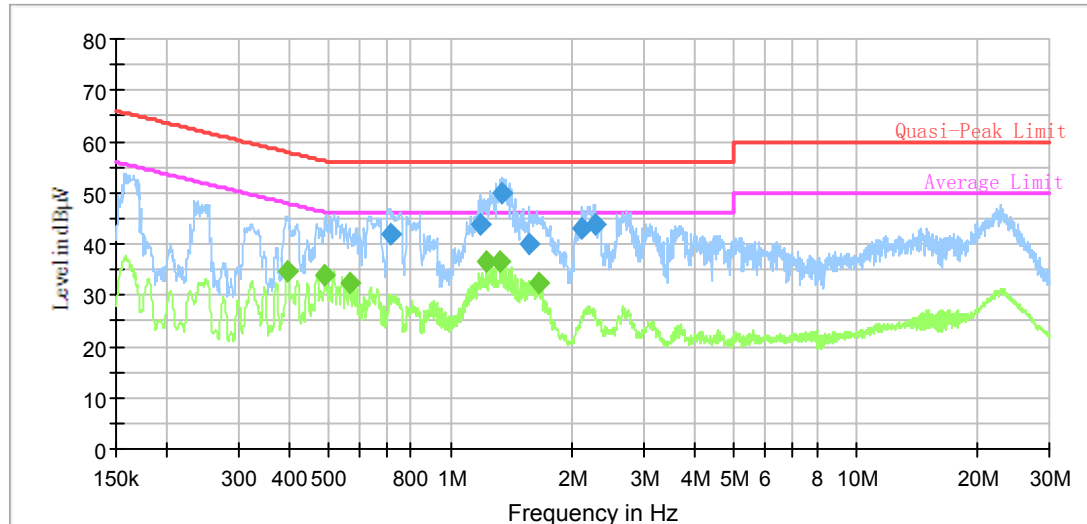
Environmental Conditions

Temperature:	29.3 °C
Relative Humidity:	53 %
ATM Pressure:	100.8 kPa

The testing was performed by Tom Tang on 2016-12-05.

Test Mode: Transmitting (802.11b mode was the worst)

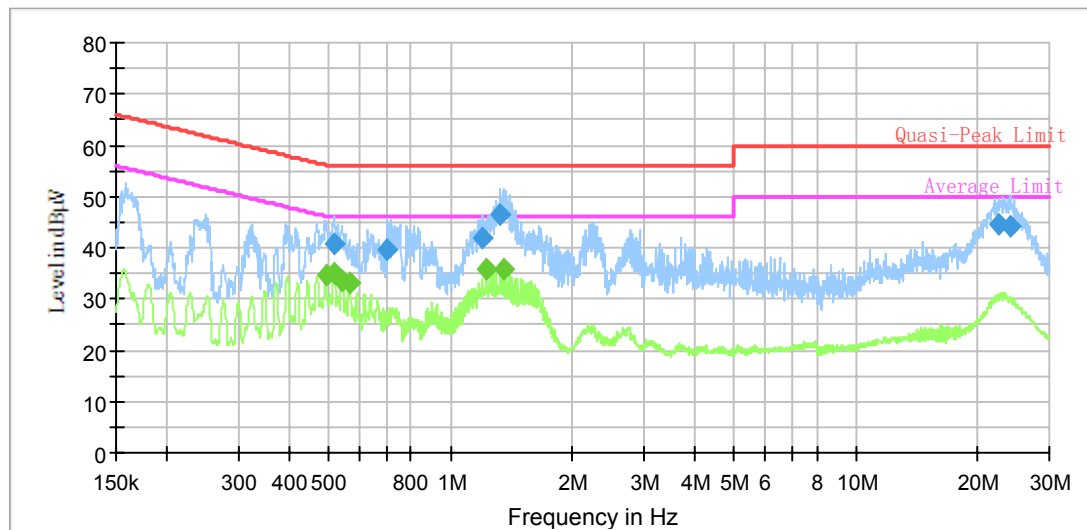
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.709870	42.1	9.000	L1	19.6	13.9	56.0	Compliance
1.191019	43.7	9.000	L1	19.6	12.3	56.0	Compliance
1.345395	49.7	9.000	L1	19.6	6.3	56.0	Compliance
1.566018	39.9	9.000	L1	19.7	16.1	56.0	Compliance
2.109051	43.0	9.000	L1	19.7	13.0	56.0	Compliance
2.270873	43.7	9.000	L1	19.7	12.3	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.396099	34.8	9.000	L1	19.6	13.1	47.9	Compliance
0.491494	33.9	9.000	L1	19.6	12.2	46.1	Compliance
0.565274	32.2	9.000	L1	19.6	13.8	46.0	Compliance
1.227254	36.7	9.000	L1	19.6	9.3	46.0	Compliance
1.324061	36.7	9.000	L1	19.6	9.3	46.0	Compliance
1.659436	32.4	9.000	L1	19.7	13.6	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.518736	40.8	9.000	N	19.7	15.2	56.0	Compliance
0.701411	39.6	9.000	N	19.7	16.4	56.0	Compliance
1.205383	42.0	9.000	N	19.7	14.0	56.0	Compliance
1.324061	46.4	9.000	N	19.7	9.6	56.0	Compliance
22.553029	44.7	9.000	N	20.1	15.3	60.0	Compliance
24.042076	44.1	9.000	N	20.2	15.9	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.493462	34.6	9.000	N	19.7	11.5	46.1	Compliance
0.516668	35.1	9.000	N	19.7	10.9	46.0	Compliance
0.542046	33.4	9.000	N	19.7	12.6	46.0	Compliance
0.565274	33.3	9.000	N	19.7	12.7	46.0	Compliance
1.227254	35.7	9.000	N	19.7	10.3	46.0	Compliance
1.348086	36.0	9.000	N	19.7	10.0	46.0	Compliance

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

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

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

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

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

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

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

Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:

30M~200MHz: ± 4.7 dB;

200M~1GHz: ± 6.0 dB;

1G~6GHz: ± 5.13 dB;

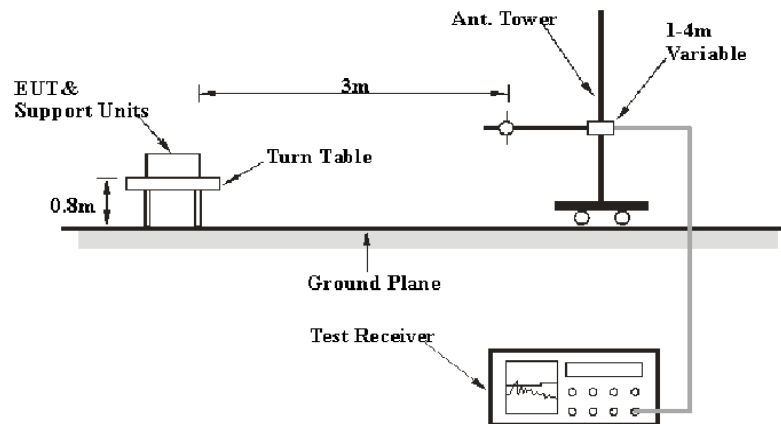
6G~25GHz: ± 5.47 dB;

Table 2 – Values of U_{cisp}

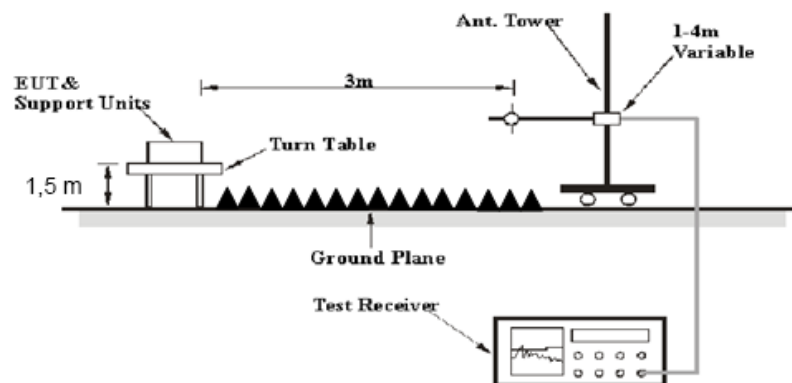
Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

30MHz-1000MHz:

Detector	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

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

Note: T is minimum transmission duration

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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 Data

Environmental Conditions

Temperature:	24.2 °C
Relative Humidity:	60 %
ATM Pressure:	101.1 kPa

* The testing was performed by Tom Tang on 2016-11-14.

Test Mode: Transmitting

30MHz-25GHz:

802.11b Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	62.14	PK	H	23.50	3.00	0.00	88.64	N/A	N/A
2412	53.62	AV	H	23.50	3.00	0.00	80.12	N/A	N/A
2412	70.92	PK	V	23.50	3.00	0.00	97.42	N/A	N/A
2412	62.23	AV	V	23.50	3.00	0.00	88.73	N/A	N/A
2390	26.65	PK	V	23.57	3.00	0.00	53.22	74.00	20.78
2390	15.68	AV	V	23.57	3.00	0.00	42.25	54.00	11.75
4824	32.72	PK	V	30.84	5.11	26.87	41.80	74.00	32.20
4824	23.14	AV	V	30.84	5.11	26.87	32.22	54.00	21.78
7236	31.45	PK	V	34.77	6.18	26.36	46.04	74.00	27.96
7236	22.07	AV	V	34.77	6.18	26.36	36.66	54.00	17.34
1335	31.47	PK	V	23.67	2.44	26.49	31.09	74.00	42.91
1335	22.74	AV	V	23.67	2.44	26.49	22.36	54.00	31.64
307.42	43.28	QP	V	14.29	1.10	27.57	31.10	46.00	14.90
364.65	42.96	QP	V	15.70	1.47	27.95	32.18	46.00	13.82
Middle Channel: 2437 MHz									
2437	61.95	PK	H	23.41	3.00	0.00	88.36	N/A	N/A
2437	53.41	AV	H	23.41	3.00	0.00	79.82	N/A	N/A
2437	71.1	PK	V	23.41	3.00	0.00	97.51	N/A	N/A
2437	62.19	AV	V	23.41	3.00	0.00	88.60	N/A	N/A
4874	32.61	PK	V	31.00	5.09	26.87	41.83	74.00	32.17
4874	22.71	AV	V	31.00	5.09	26.87	31.93	54.00	22.07
7311	31.56	PK	V	34.92	6.21	26.40	46.29	74.00	27.71
7311	22.03	AV	V	34.92	6.21	26.40	36.76	54.00	17.24
1422	31.44	PK	V	23.90	2.56	26.40	31.50	74.00	42.50
1422	22.79	AV	V	23.90	2.56	26.40	22.85	54.00	31.15
3005	31.25	PK	V	24.23	3.44	26.41	32.51	74.00	41.49
3005	22.46	AV	V	24.23	3.44	26.41	23.72	54.00	30.28
307.42	43.48	QP	V	14.29	1.10	27.57	31.30	46.00	14.70
364.65	43.07	QP	V	15.70	1.47	27.95	32.29	46.00	13.71
High Channel: 2462 MHz									
2462	62.11	PK	H	23.33	2.99	0.00	88.43	N/A	N/A
2462	53.14	AV	H	23.33	2.99	0.00	79.46	N/A	N/A
2462	71.14	PK	V	23.33	2.99	0.00	97.46	N/A	N/A
2462	62.37	AV	V	23.33	2.99	0.00	88.69	N/A	N/A
2483.5	26.81	PK	V	23.26	2.99	0.00	53.06	74.00	20.94
2483.5	15.78	AV	V	23.26	2.99	0.00	42.03	54.00	11.97
4924	33.13	PK	V	31.16	5.07	26.88	42.48	74.00	31.52
4924	23.24	AV	V	31.16	5.07	26.88	32.59	54.00	21.41
7386	31.7	PK	V	35.07	6.25	26.43	46.59	74.00	27.41
7386	22.17	AV	V	35.07	6.25	26.43	37.06	54.00	16.94
3131	31.04	PK	V	24.93	3.63	26.46	33.14	74.00	40.86
3131	22.63	AV	V	24.93	3.63	26.46	24.73	54.00	29.27
307.42	43.65	QP	V	14.29	1.10	27.57	31.47	46.00	14.53
364.65	43.35	QP	V	15.70	1.47	27.95	32.57	46.00	13.43

802.11g Mode

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	61.71	PK	H	23.50	3.00	0.00	88.21	N/A	N/A
2412	53.17	AV	H	23.50	3.00	0.00	79.67	N/A	N/A
2412	71.1	PK	V	23.50	3.00	0.00	97.60	N/A	N/A
2412	61.73	AV	V	23.50	3.00	0.00	88.23	N/A	N/A
2390	26.84	PK	V	23.57	3.00	0.00	53.41	74.00	20.59
2390	15.76	AV	V	23.57	3.00	0.00	42.33	54.00	11.67
4824	33.59	PK	V	30.84	5.11	26.87	42.67	74.00	31.33
4824	20.06	AV	V	30.84	5.11	26.87	29.14	54.00	24.86
7236	32.05	PK	V	34.77	6.18	26.36	46.64	74.00	27.36
7236	19.36	AV	V	34.77	6.18	26.36	33.95	54.00	20.05
1365	33.84	PK	V	23.75	2.48	26.46	33.61	74.00	40.39
1365	22.57	AV	V	23.75	2.48	26.46	22.34	54.00	31.66
307.42	43.37	QP	V	14.29	1.10	27.57	31.19	46.00	14.81
364.65	43.18	QP	V	15.70	1.47	27.95	32.40	46.00	13.60
Middle Channel: 2437 MHz									
2437	62.15	PK	H	23.41	3.00	0.00	88.56	N/A	N/A
2437	53.59	AV	H	23.41	3.00	0.00	80.00	N/A	N/A
2437	71.24	PK	V	23.41	3.00	0.00	97.65	N/A	N/A
2437	61.81	AV	V	23.41	3.00	0.00	88.22	N/A	N/A
4874	33.73	PK	V	31.00	5.09	26.87	42.95	74.00	31.05
4874	19.84	AV	V	31.00	5.09	26.87	29.06	54.00	24.94
7311	31.71	PK	V	34.92	6.21	26.40	46.44	74.00	27.56
7311	19.83	AV	V	34.92	6.21	26.40	34.56	54.00	19.44
1255	34.19	PK	V	23.46	2.33	26.57	33.41	74.00	40.59
1255	22.82	AV	V	23.46	2.33	26.57	22.04	54.00	31.96
2284	32.07	PK	V	23.93	3.02	26.86	32.16	74.00	41.84
2284	20.64	AV	V	23.93	3.02	26.86	20.73	54.00	33.27
307.42	43.2	QP	V	14.29	1.10	27.57	31.02	46.00	14.98
364.65	42.9	QP	V	15.70	1.47	27.95	32.12	46.00	13.88
High Channel: 2462 MHz									
2462	62.18	PK	H	23.33	2.99	0.00	88.50	N/A	N/A
2462	53.59	AV	H	23.33	2.99	0.00	79.91	N/A	N/A
2462	70.93	PK	V	23.33	2.99	0.00	97.25	N/A	N/A
2462	61.92	AV	V	23.33	2.99	0.00	88.24	N/A	N/A
2483.5	26.61	PK	V	23.26	2.99	0.00	52.86	74.00	21.14
2483.5	15.59	AV	V	23.26	2.99	0.00	41.84	54.00	12.16
4924	33.24	PK	V	31.16	5.07	26.88	42.59	74.00	31.41
4924	19.77	AV	V	31.16	5.07	26.88	29.12	54.00	24.88
7386	32.01	PK	V	35.07	6.25	26.43	46.90	74.00	27.10
7386	19.32	AV	V	35.07	6.25	26.43	34.21	54.00	19.79
2201	33.55	PK	V	24.22	3.03	26.85	33.95	74.00	40.05
2201	20.38	AV	V	24.22	3.03	26.85	20.78	54.00	33.22
307.42	44.74	QP	V	14.29	1.10	27.57	32.56	46.00	13.44
364.65	43.86	QP	V	15.70	1.47	27.95	33.08	46.00	12.92

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	Polar (H/V)	Factor (dB)					
Low Channel: 2412 MHz									
2412	62.45	PK	H	23.50	3.00	0.00	88.95	N/A	N/A
2412	47.36	AV	H	23.50	3.00	0.00	73.86	N/A	N/A
2412	71.05	PK	V	23.50	3.00	0.00	97.55	N/A	N/A
2412	57.58	AV	V	23.50	3.00	0.00	84.08	N/A	N/A
2390	27.41	PK	V	23.57	3.00	0.00	53.98	74.00	20.02
2390	16.24	AV	V	23.57	3.00	0.00	42.81	54.00	11.19
4824	33.25	PK	V	30.84	5.11	26.87	42.33	74.00	31.67
4824	20.21	AV	V	30.84	5.11	26.87	29.29	54.00	24.71
7236	31.64	PK	V	34.77	6.18	26.36	46.23	74.00	27.77
7236	19.37	AV	V	34.77	6.18	26.36	33.96	54.00	20.04
1358	33.69	PK	V	23.73	2.47	26.47	33.42	74.00	40.58
1358	22.83	AV	V	23.73	2.47	26.47	22.56	54.00	31.44
307.42	45.21	QP	V	14.29	1.10	27.57	33.03	46.00	12.97
364.65	44.08	QP	V	15.70	1.47	27.95	33.30	46.00	12.70
Middle Channel: 2437 MHz									
2437	61.76	PK	H	23.41	3.00	0.00	88.17	N/A	N/A
2437	53.6	AV	H	23.41	3.00	0.00	80.01	N/A	N/A
2437	70.88	PK	V	23.41	3.00	0.00	97.29	N/A	N/A
2437	61.93	AV	V	23.41	3.00	0.00	88.34	N/A	N/A
4874	33.48	PK	V	31.00	5.09	26.87	42.70	74.00	31.30
4874	20.34	AV	V	31.00	5.09	26.87	29.56	54.00	24.44
7311	31.64	PK	V	34.92	6.21	26.40	46.37	74.00	27.63
7311	19.08	AV	V	34.92	6.21	26.40	33.81	54.00	20.19
1626	33.69	PK	V	24.30	2.77	26.45	34.31	74.00	39.69
1626	22.58	AV	V	24.30	2.77	26.45	23.20	54.00	30.80
2331	33.16	PK	V	23.77	3.01	26.87	33.07	74.00	40.93
2331	23.05	AV	V	23.77	3.01	26.87	22.96	54.00	31.04
307.42	45.68	QP	V	14.29	1.10	27.57	33.50	46.00	12.50
364.65	44.3	QP	V	15.70	1.47	27.95	33.52	46.00	12.48
High Channel: 2462 MHz									
2462	62.38	PK	H	23.33	2.99	0.00	88.70	N/A	N/A
2462	48.67	AV	H	23.33	2.99	0.00	74.99	N/A	N/A
2462	70.86	PK	V	23.33	2.99	0.00	97.18	N/A	N/A
2462	56.72	AV	V	23.33	2.99	0.00	83.04	N/A	N/A
2483.5	27.78	PK	V	23.26	2.99	0.00	54.03	74.00	19.97
2483.5	17.22	AV	V	23.26	2.99	0.00	43.47	54.00	10.53
4924	33.24	PK	V	31.16	5.07	26.88	42.59	74.00	31.41
4924	20.16	AV	V	31.16	5.07	26.88	29.51	54.00	24.49
7386	31.32	PK	V	35.07	6.25	26.43	46.21	74.00	27.79
7386	19.25	AV	V	35.07	6.25	26.43	34.14	54.00	19.86
2254	34.06	PK	V	24.04	3.02	26.86	34.26	74.00	39.74
2254	23.58	AV	V	24.04	3.02	26.86	23.78	54.00	30.22
307.42	43.88	QP	V	14.29	1.10	27.57	31.70	46.00	14.30
364.65	42.67	QP	V	15.70	1.47	27.95	31.89	46.00	14.11

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	63.2	PK	H	23.53	3.00	0.00	89.73	N/A	N/A
2402	57.96	AV	H	23.53	3.00	0.00	84.49	N/A	N/A
2402	76.58	PK	V	23.53	3.00	0.00	103.11	N/A	N/A
2402	71.82	AV	V	23.53	3.00	0.00	98.35	N/A	N/A
2390	25.17	PK	V	23.57	3.00	0.00	51.74	74.00	22.26
2390	13.39	AV	V	23.57	3.00	0.00	39.96	54.00	14.04
4804	34.41	PK	V	30.77	5.12	26.87	43.43	74.00	30.57
4804	29.51	AV	V	30.77	5.12	26.87	38.53	54.00	15.47
7206	33.31	PK	V	34.71	6.16	26.35	47.83	74.00	26.17
7206	27.84	AV	V	34.71	6.16	26.35	42.36	54.00	11.64
3205	37.09	PK	V	25.35	3.74	26.48	39.70	74.00	34.30
3205	24.95	AV	V	25.35	3.74	26.48	27.56	54.00	26.44
307.42	44.08	QP	V	14.29	1.10	27.57	31.90	46.00	14.10
364.65	42.78	QP	V	15.70	1.47	27.95	32.00	46.00	14.00
Middle Channel: 2440 MHz									
2440	62.98	PK	H	23.40	3.00	0.00	89.38	N/A	N/A
2440	57.94	AV	H	23.40	3.00	0.00	84.34	N/A	N/A
2440	76.19	PK	V	23.40	3.00	0.00	102.59	N/A	N/A
2440	71.35	AV	V	23.40	3.00	0.00	97.75	N/A	N/A
4880	33.87	PK	V	31.02	5.09	26.87	43.11	74.00	30.89
4880	26.41	AV	V	31.02	5.09	26.87	35.65	54.00	18.35
7320	33.34	PK	V	34.94	6.22	26.40	48.10	74.00	25.90
7320	27.32	AV	V	34.94	6.22	26.40	42.08	54.00	11.92
3250	37.03	PK	V	25.60	3.81	26.50	39.94	74.00	34.06
3250	24.68	AV	V	25.60	3.81	26.50	27.59	54.00	26.41
4000	35.92	PK	V	29.00	4.92	26.55	43.29	74.00	30.71
4000	23.41	AV	V	29.00	4.92	26.55	30.78	54.00	23.22
307.42	44.25	QP	V	14.29	1.10	27.57	32.07	46.00	13.93
364.65	43.06	QP	V	15.70	1.47	27.95	32.28	46.00	13.72
High Channel: 2480 MHz									
2480	61.34	PK	H	23.27	2.99	0.00	87.60	N/A	N/A
2480	56.29	AV	H	23.27	2.99	0.00	82.55	N/A	N/A
2480	76.46	PK	V	23.27	2.99	0.00	102.72	N/A	N/A
2480	71.48	AV	V	23.27	2.99	0.00	97.74	N/A	N/A
2483.5	25.61	PK	V	23.26	2.99	0.00	51.86	74.00	22.14
2483.5	14.04	AV	V	23.26	2.99	0.00	40.29	54.00	13.71
4960	33.22	PK	V	31.27	5.05	26.88	42.66	74.00	31.34
4960	28.51	AV	V	31.27	5.05	26.88	37.95	54.00	16.05
7440	33.35	PK	V	35.18	6.27	26.45	48.35	74.00	25.65
7440	28.63	AV	V	35.18	6.27	26.45	43.63	54.00	10.37
3310	35.54	PK	V	25.94	3.90	26.52	38.86	74.00	35.14
3310	23.17	AV	V	25.94	3.90	26.52	26.49	54.00	27.51
307.42	43.97	QP	V	14.29	1.10	27.57	31.79	46.00	14.21
364.65	42.89	QP	V	15.70	1.47	27.95	32.11	46.00	13.89

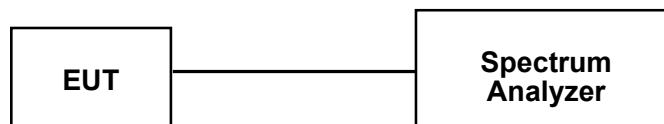
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

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

Test Procedure

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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:	25.6~25.8 °C
Relative Humidity:	31~31.5 %
ATM Pressure:	101~101.5 kPa

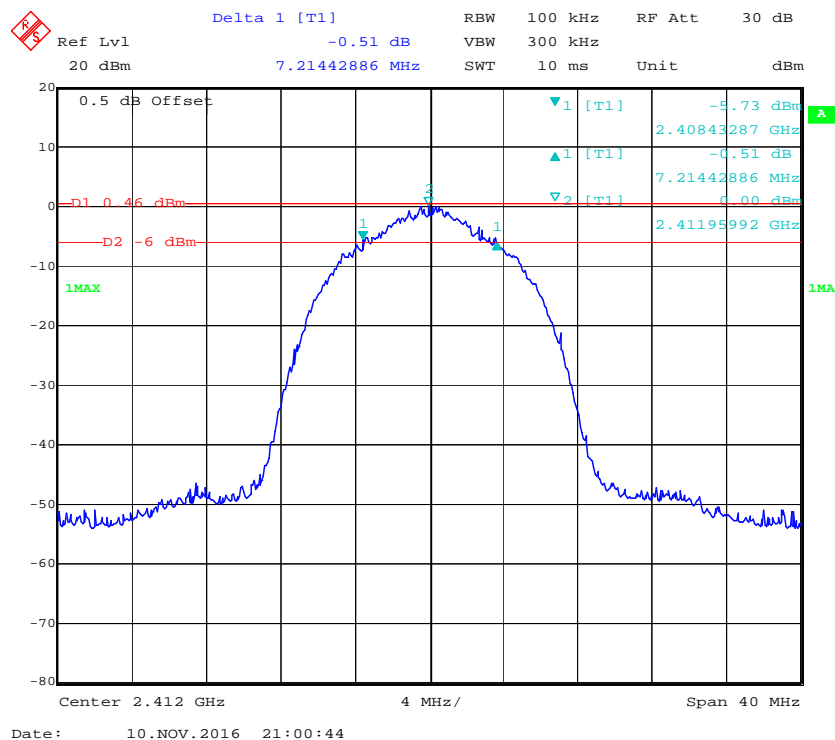
* The testing was performed by Tom Tang from 2016-11-10 to 2016-11-11.

Test Mode: Transmitting

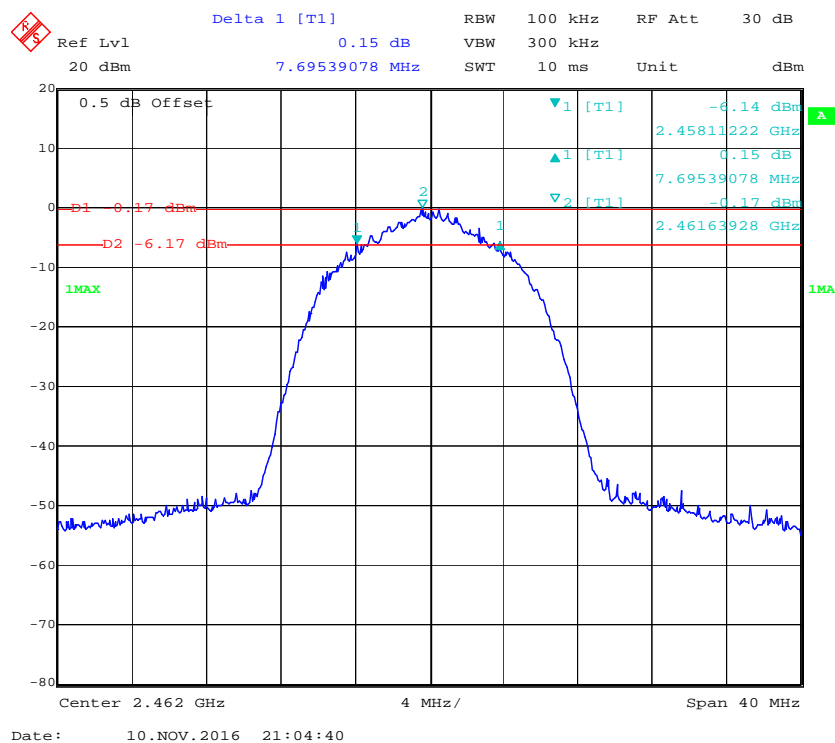
Test Result: Compliant. Please refer to the following table and plots.

Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	7.21	≥0.5
	Middle	2437	7.29	≥0.5
	High	2462	7.70	≥0.5
802.11g	Low	2412	16.03	≥0.5
	Middle	2437	16.27	≥0.5
	High	2462	15.39	≥0.5
802.11n20	Low	2412	17.31	≥0.5
	Middle	2437	17.64	≥0.5
	High	2462	17.31	≥0.5
BLE	Low	2402	0.74	≥0.5
	Middle	2440	0.75	≥0.5
	High	2480	0.75	≥0.5

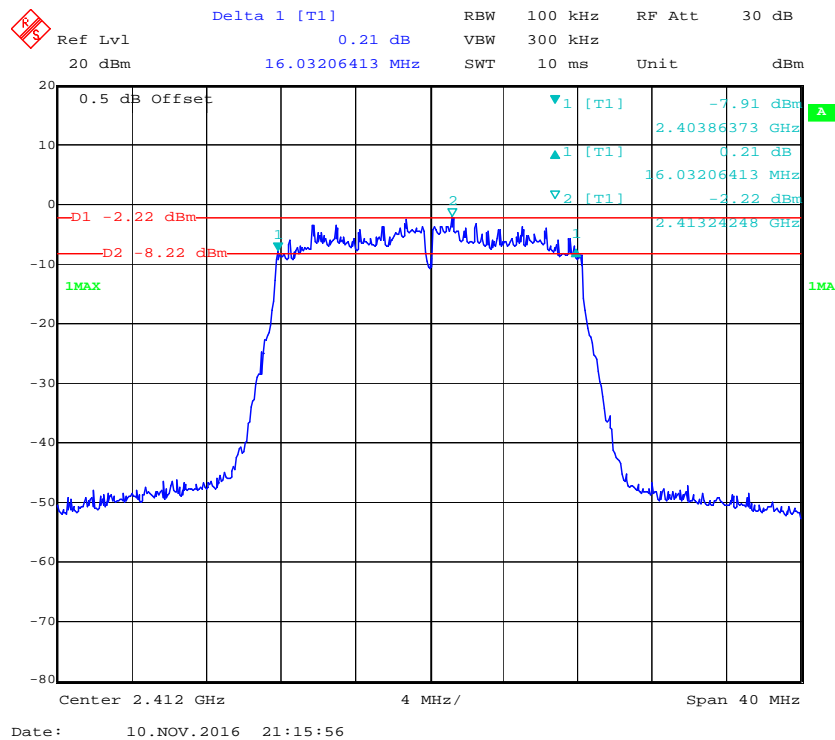
802.11b Low Channel



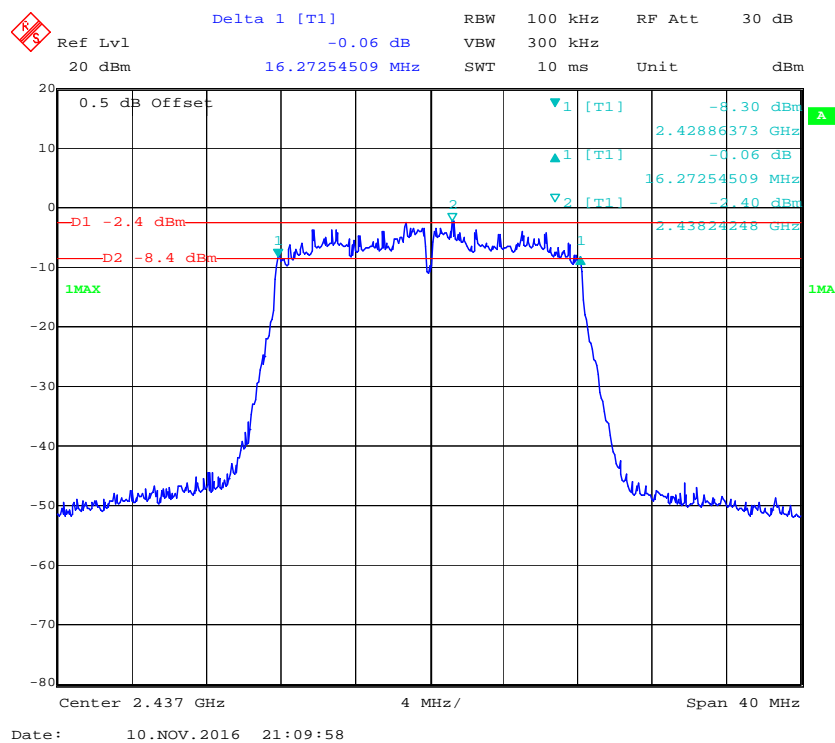
Page 29 of 49



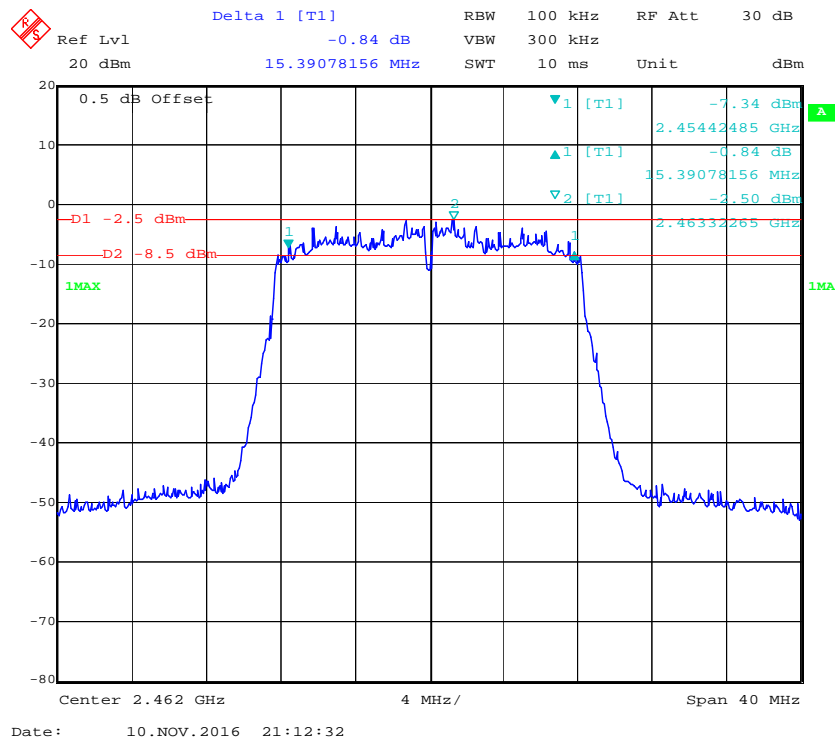
802.11g Low Channel



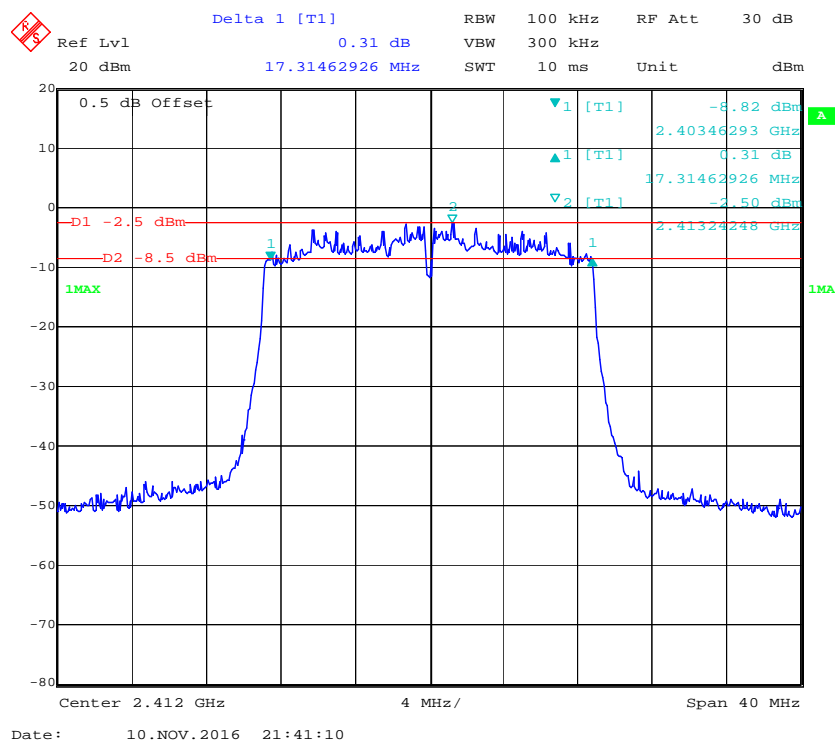
802.11g Middle Channel



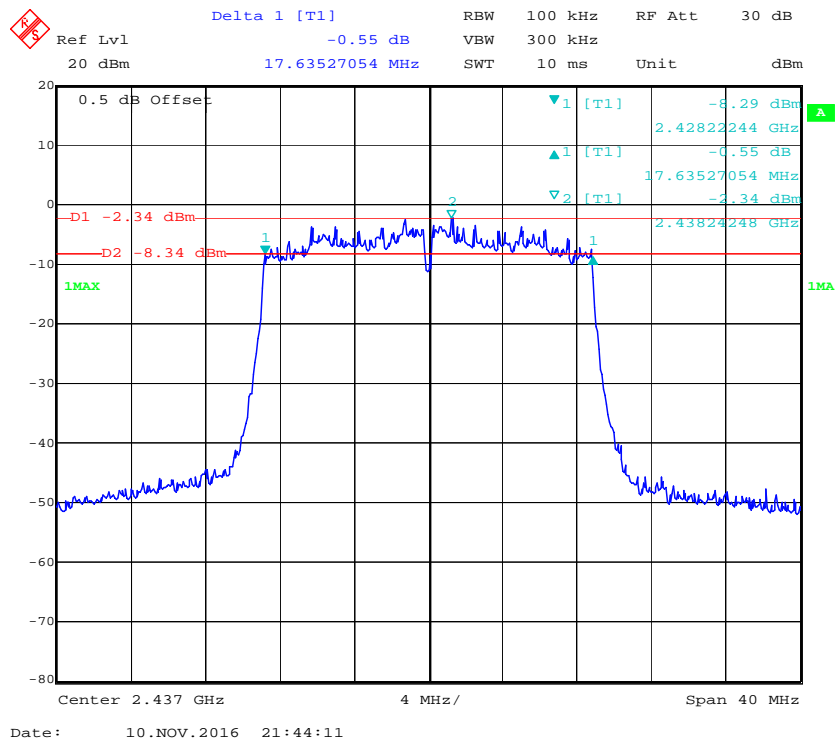
802.11g High Channel



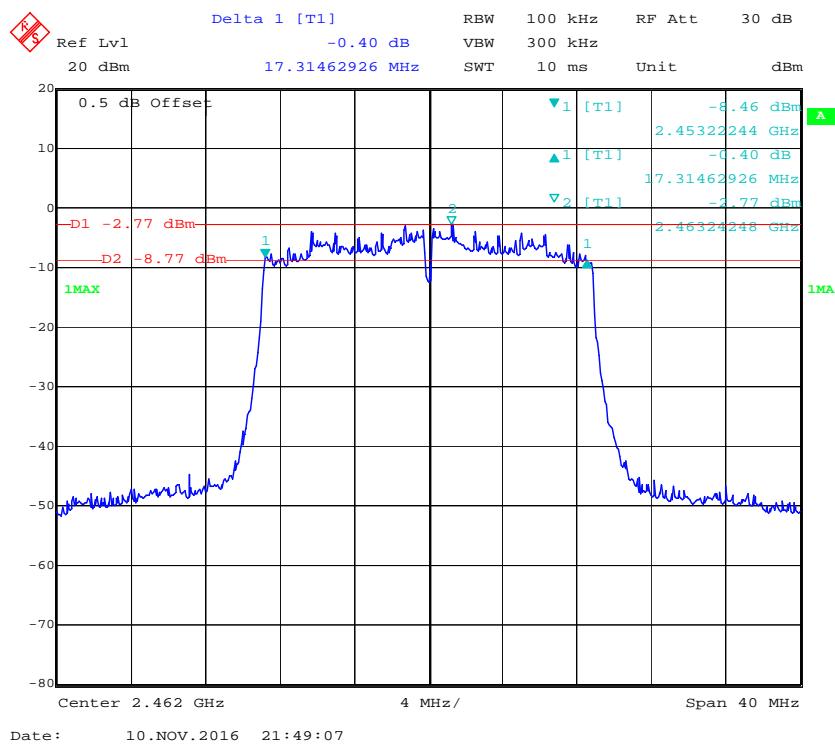
802.11n ht20 Low Channel



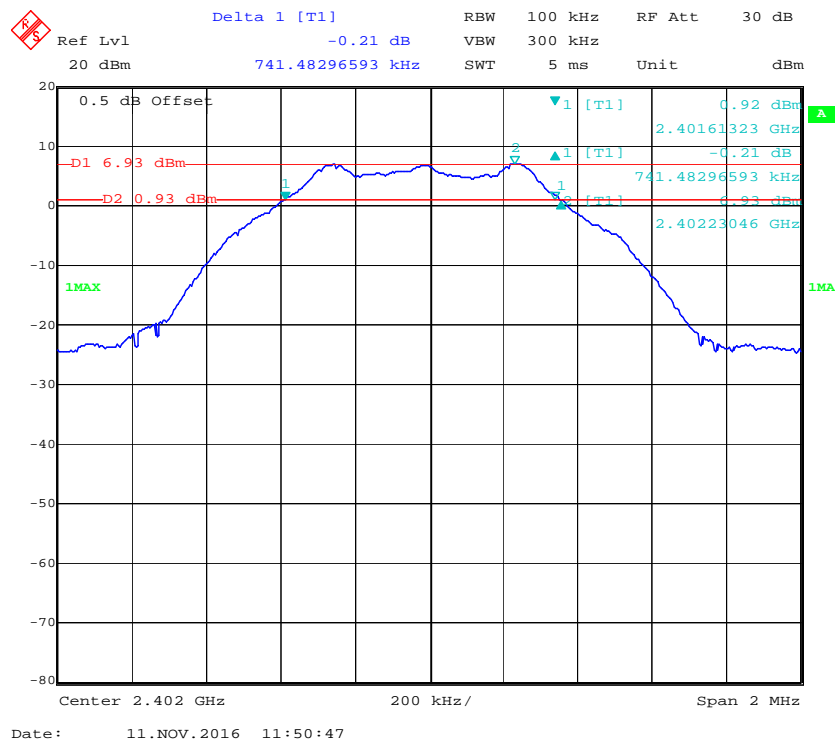
802.11n ht20 Middle Channel



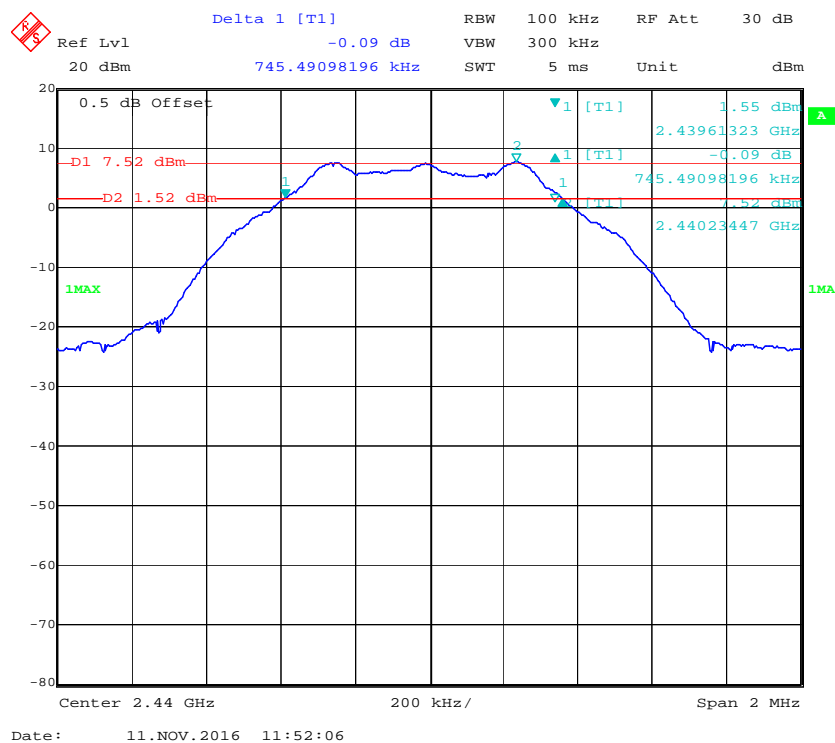
802.11n ht20 High Channel



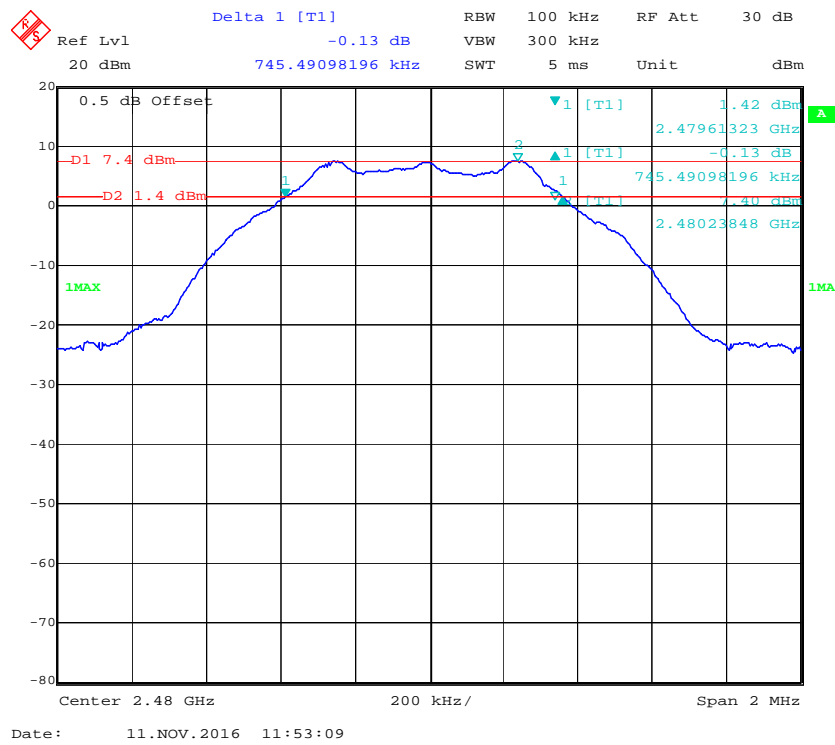
BLE Low Channel



BLE Middle Channel



Page 34 of 49



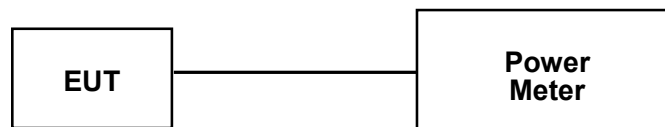
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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	2017-01-02
Agilent	P-Series Power Meter	N1912A	MY5000798	2016-01-03	2017-01-02
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:	25.8 °C
Relative Humidity:	31 %
ATM Pressure:	101.5 kPa

* The testing was performed by Tom Tang on 2016-11-10.

Test Mode: Transmitting

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

Test mode	Channel	Frequency	Max Peak Conducted Output Power	Max Conducted Average Output Power	Limit
		(MHz)	(dBm)	(dBm)	(dBm)
802.11b	Low	2412	15.49	8.83	30
	Middle	2437	15.02	8.5	30
	High	2462	15.02	8.36	30
802.11g	Low	2412	16.22	9.5	30
	Middle	2437	16.57	9.48	30
	High	2462	16.24	9.28	30
802.11n20	Low	2412	16.19	9.44	30
	Middle	2437	16.16	9.36	30
	High	2462	16.01	9.21	30
BLE	Low	2402	7.61	/	30
	Middle	2440	8.23	/	30
	High	2480	8.11	/	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

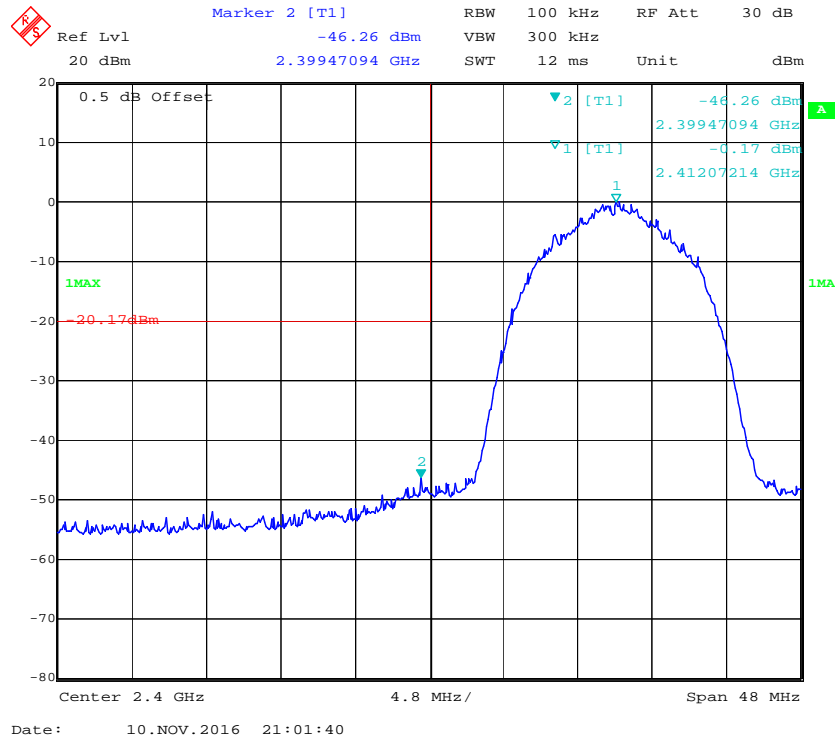
Temperature:	25.6~25.8 °C
Relative Humidity:	31~31.5 %
ATM Pressure:	101~101.5 kPa

* The testing was performed by Tom Tang from 2016-11-10 to 2016-11-11.

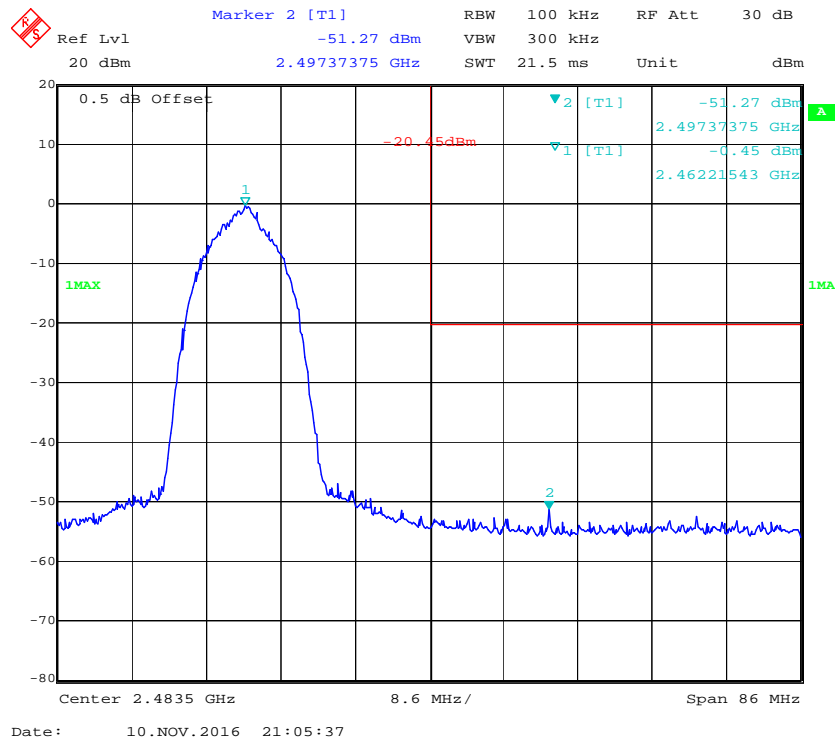
Test mode: Transmitting

Test Result: Compliant. Please refer to following plots.

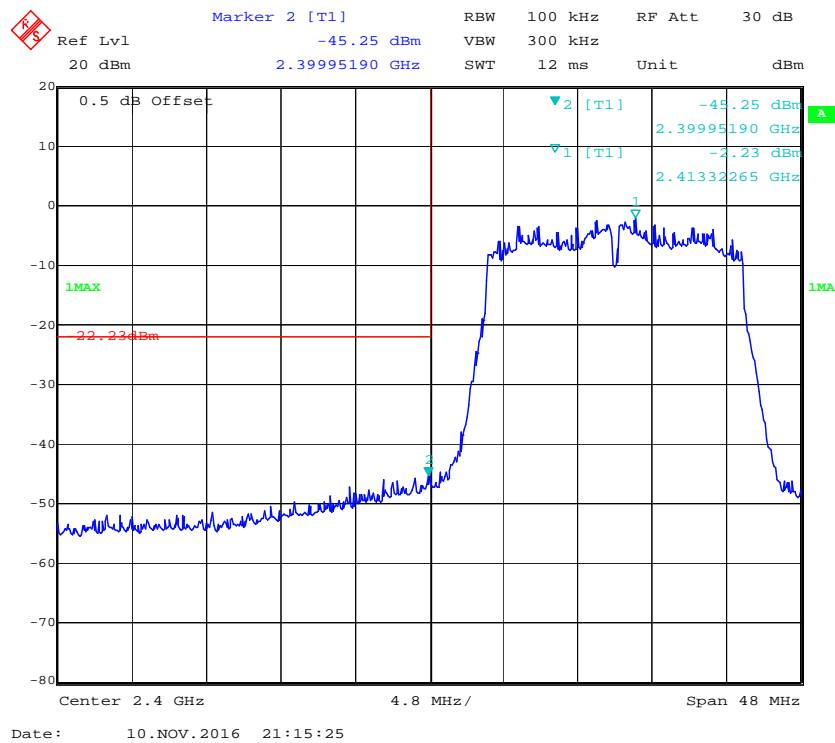
802.11b: Band Edge, Left Side



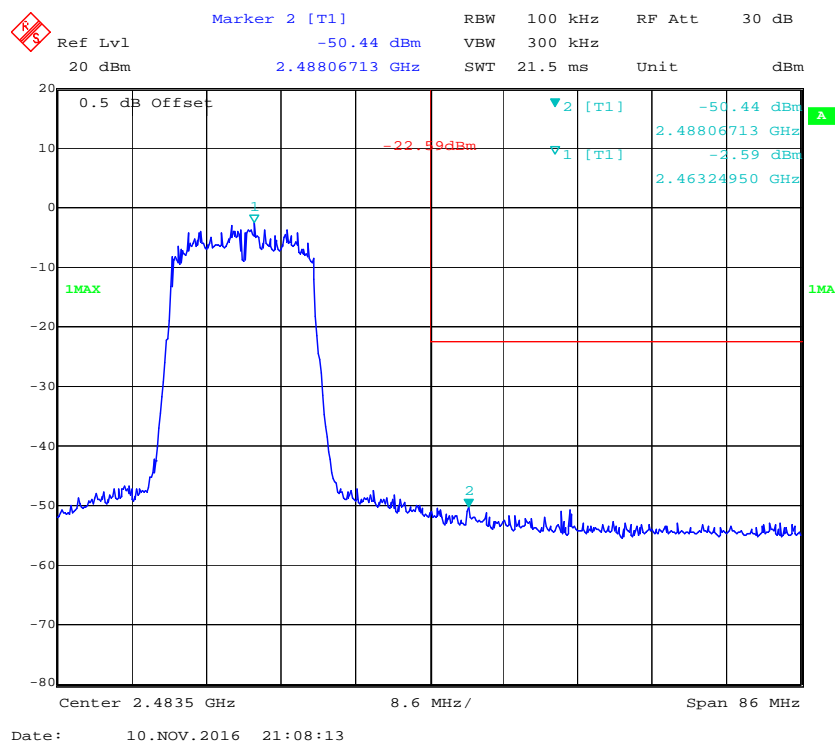
802.11b: Band Edge, Right Side



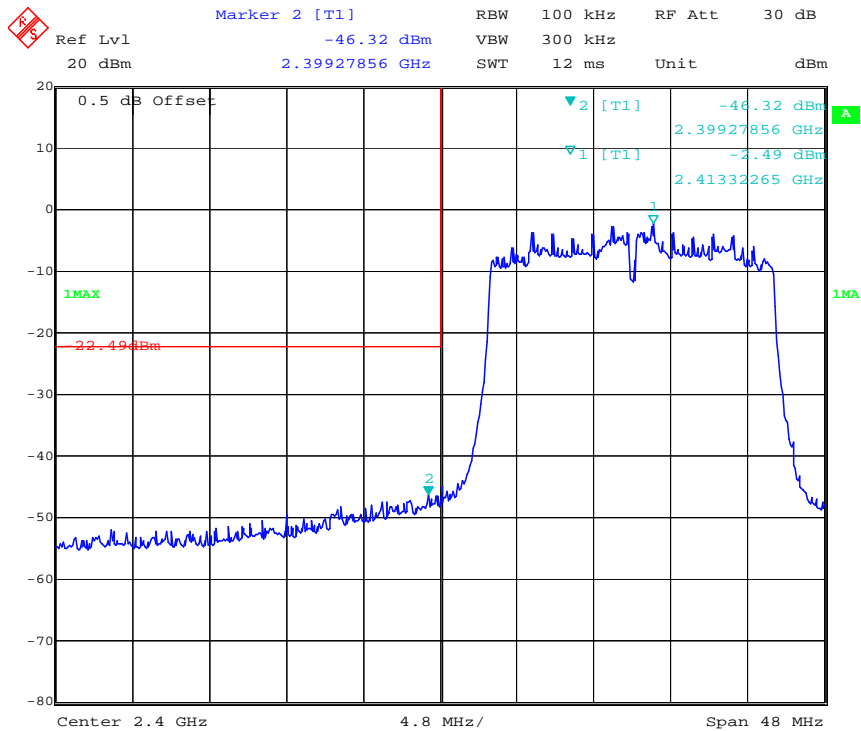
802.11g: Band Edge, Left Side



802.11g: Band Edge, Right Side

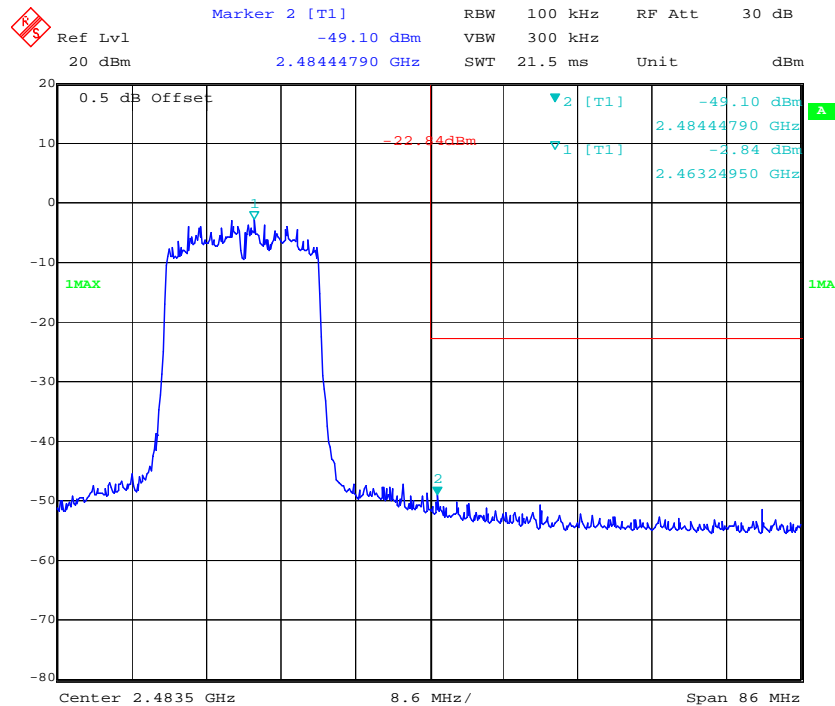


802.11n ht20 Band Edge, Left Side



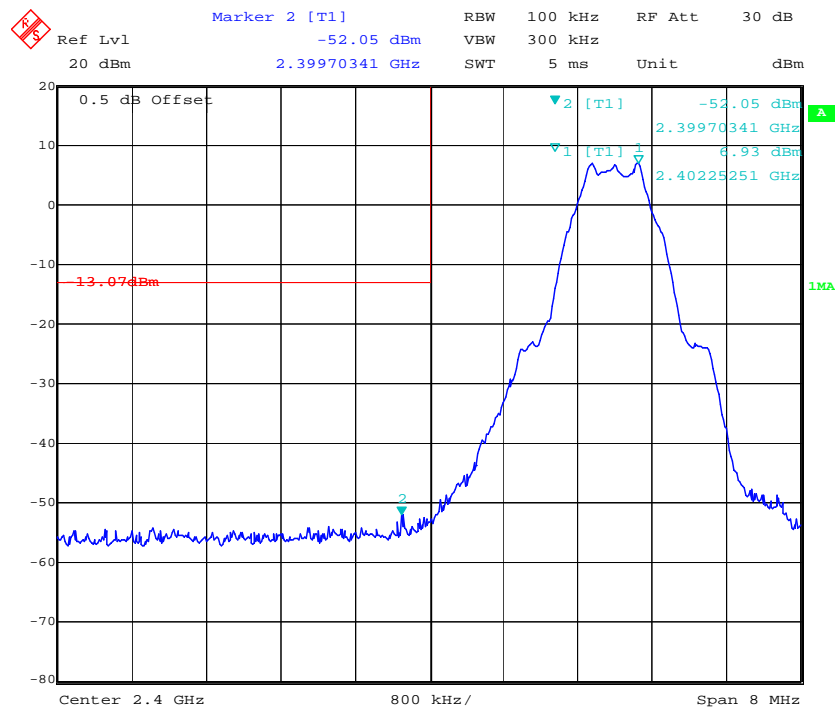
Date: 10.NOV.2016 21:40:06

802.11n ht20 Band Edge, Right Side

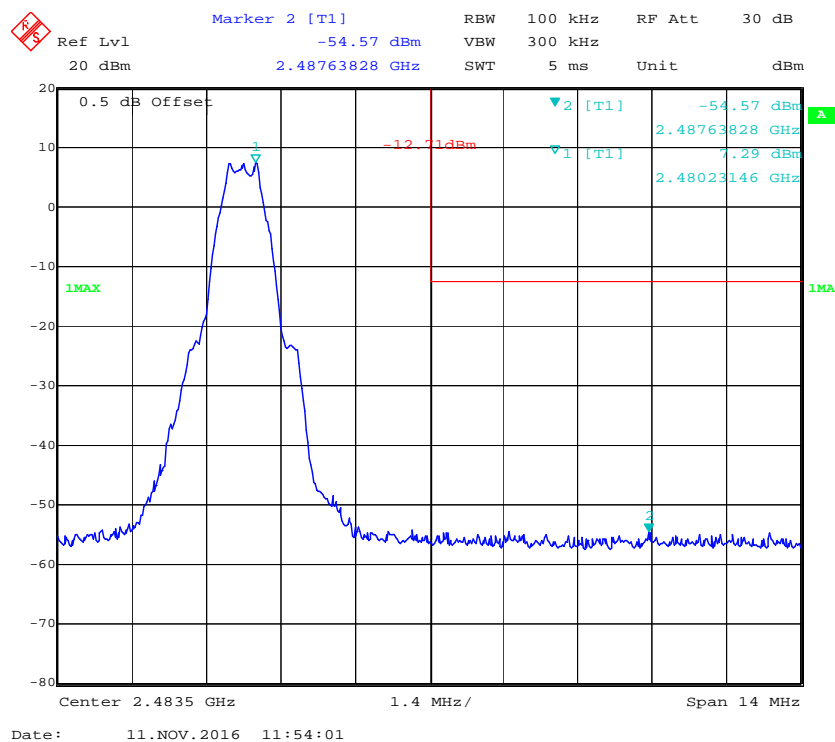


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BLE Band Edge , Left Side



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: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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:	25.6~25.8 °C
Relative Humidity:	31~31.5 %
ATM Pressure:	101~101.5 kPa

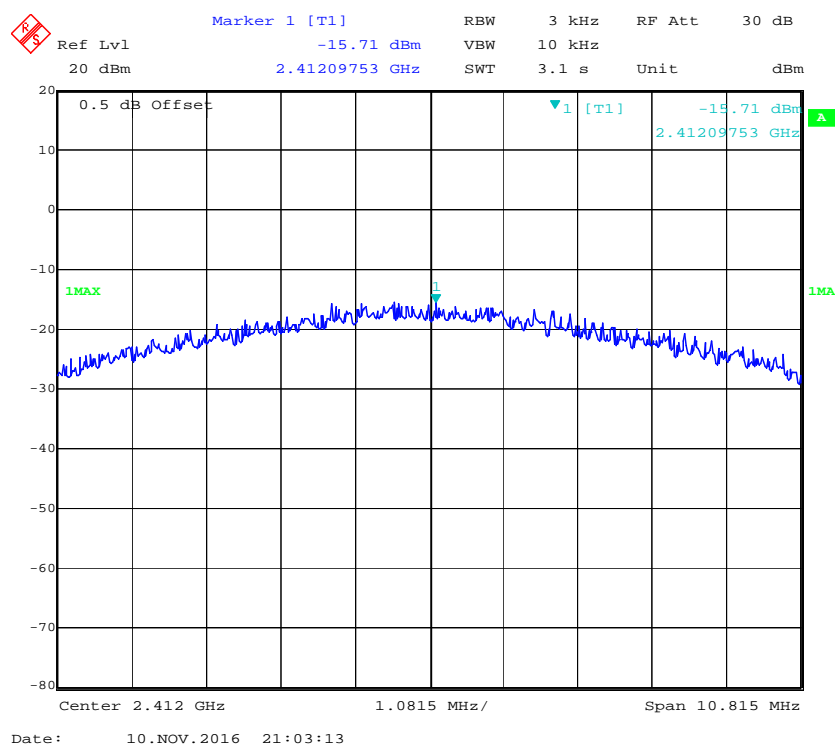
* The testing was performed by Tom Tang from 2016-11-10 to 2016-11-11.

Test Mode: Transmitting

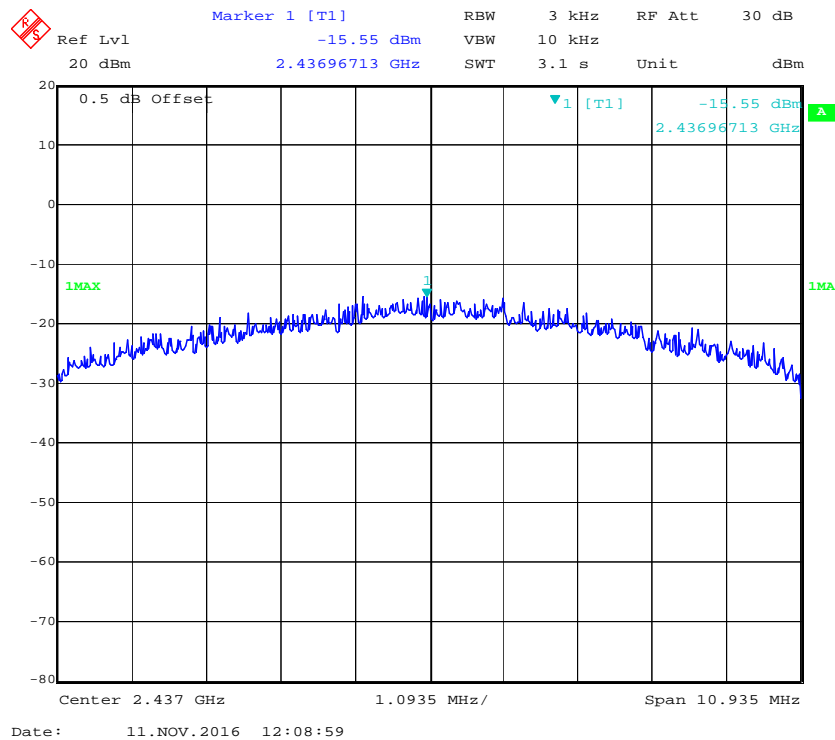
Test Result: Compliant. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-15.71	≤8
	Middle	2437	-15.55	≤8
	High	2462	-15.81	≤8
802.11g	Low	2412	-17.6	≤8
	Middle	2437	-18.28	≤8
	High	2462	-18.72	≤8
802.11n20	Low	2412	-18.02	≤8
	Middle	2437	-18.32	≤8
	High	2462	-18.35	≤8
BLE	Low	2402	-7.39	≤8
	Middle	2440	-6.87	≤8
	High	2480	-6.98	≤8

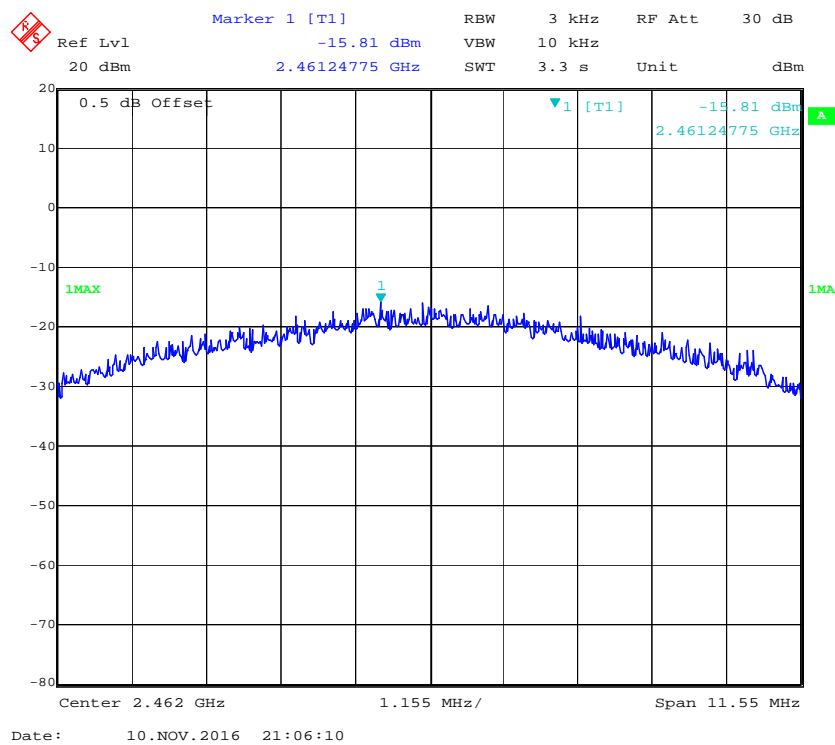
Power Spectral Density, 802.11b Low Channel



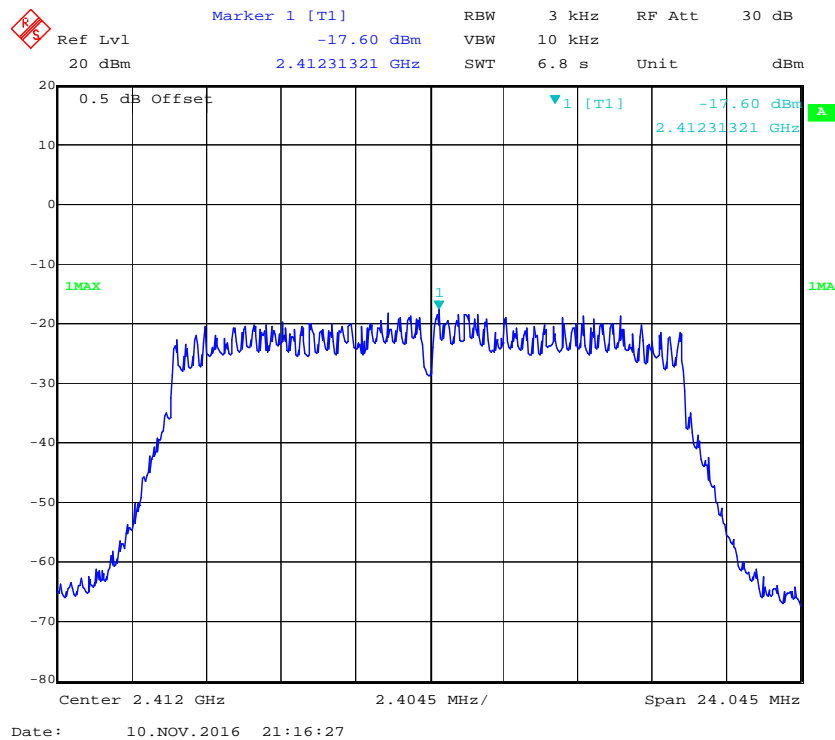
Power Spectral Density, 802.11b Middle Channel



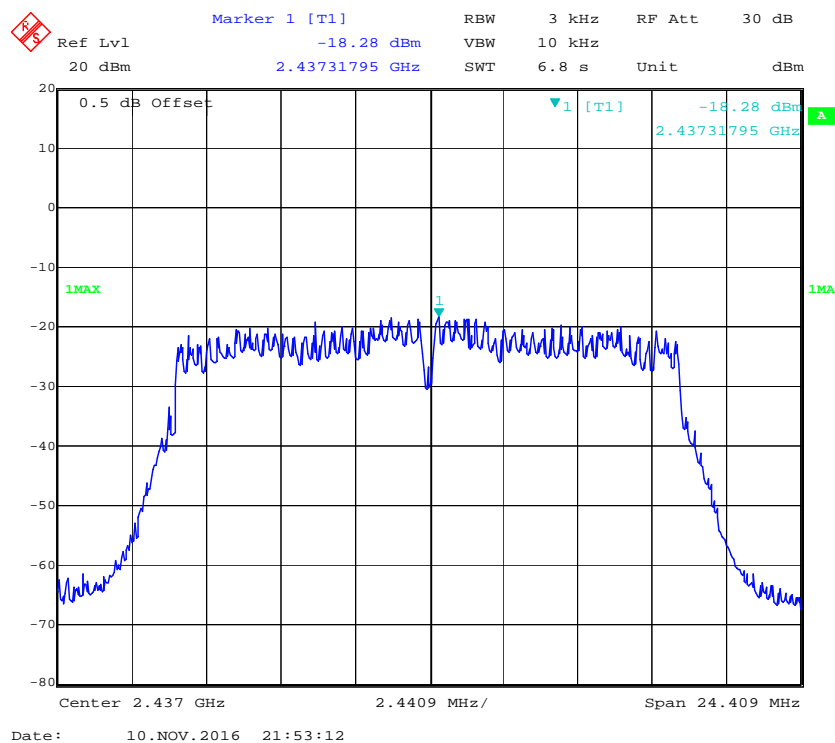
Power Spectral Density, 802.11b High Channel



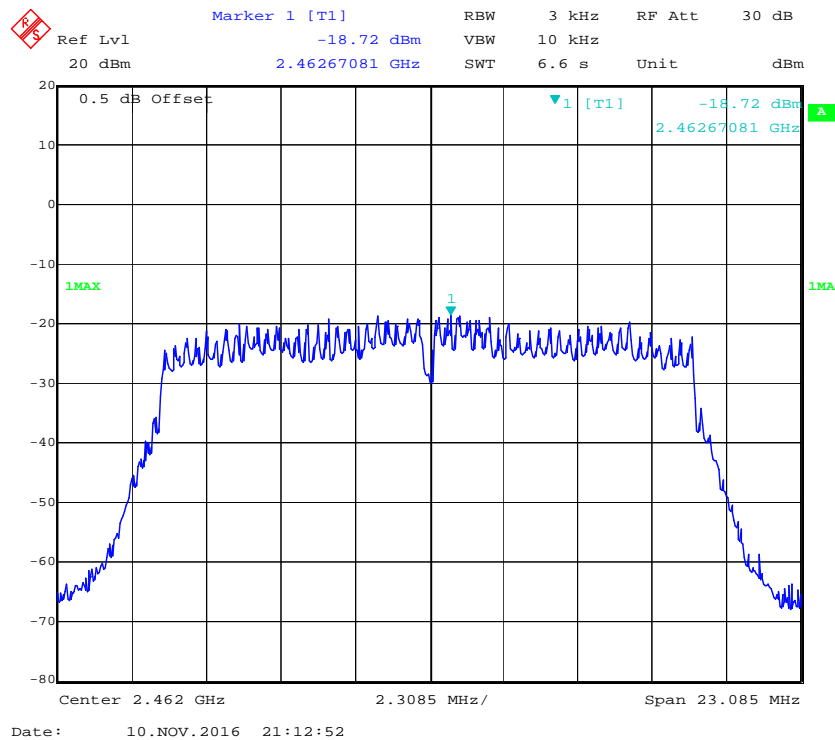
Power Spectral Density, 802.11g Low Channel



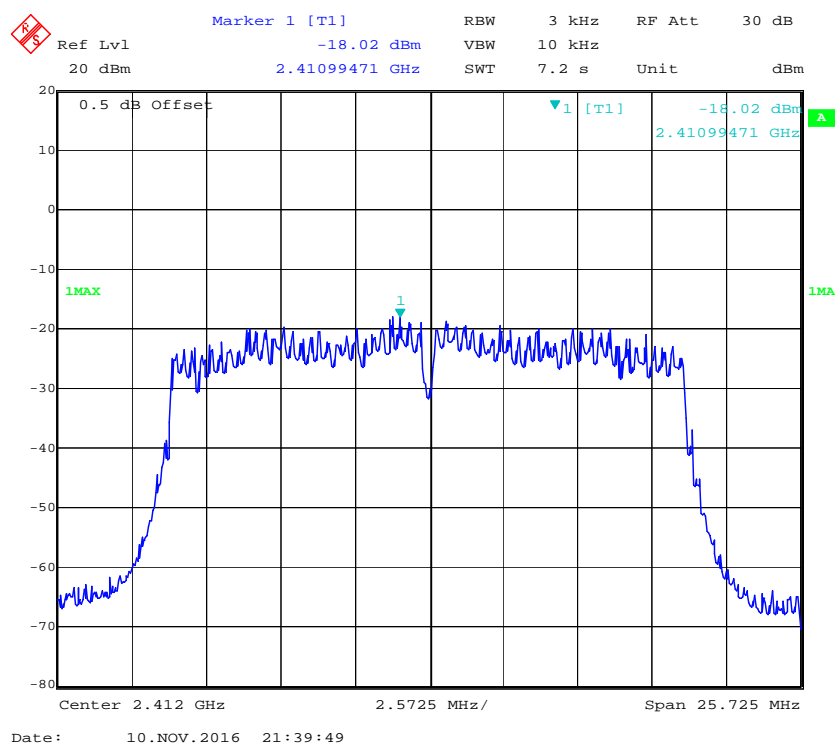
Power Spectral Density, 802.11g Middle Channel



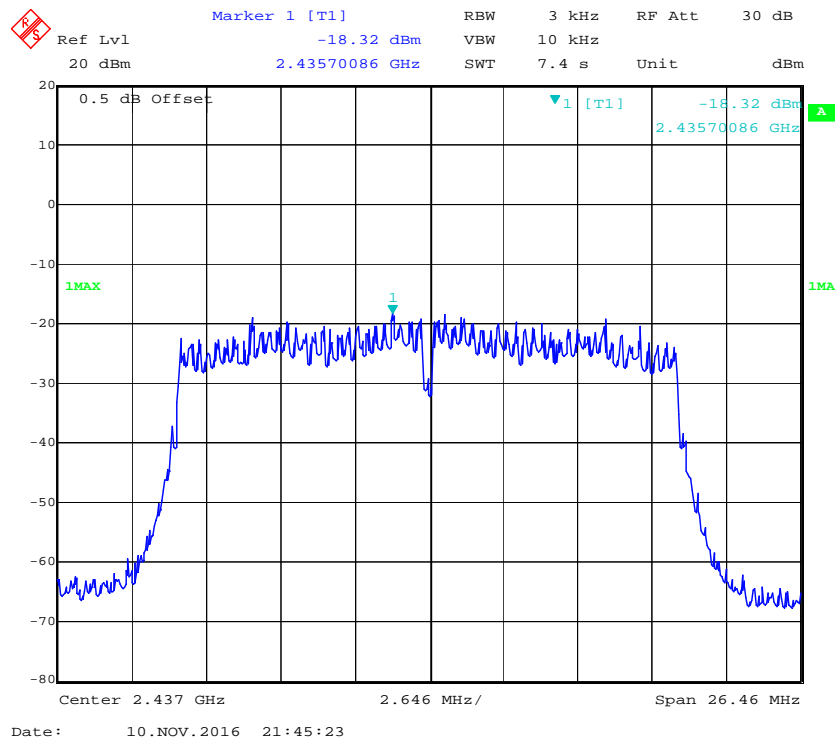
Power Spectral Density, 802.11g High Channel



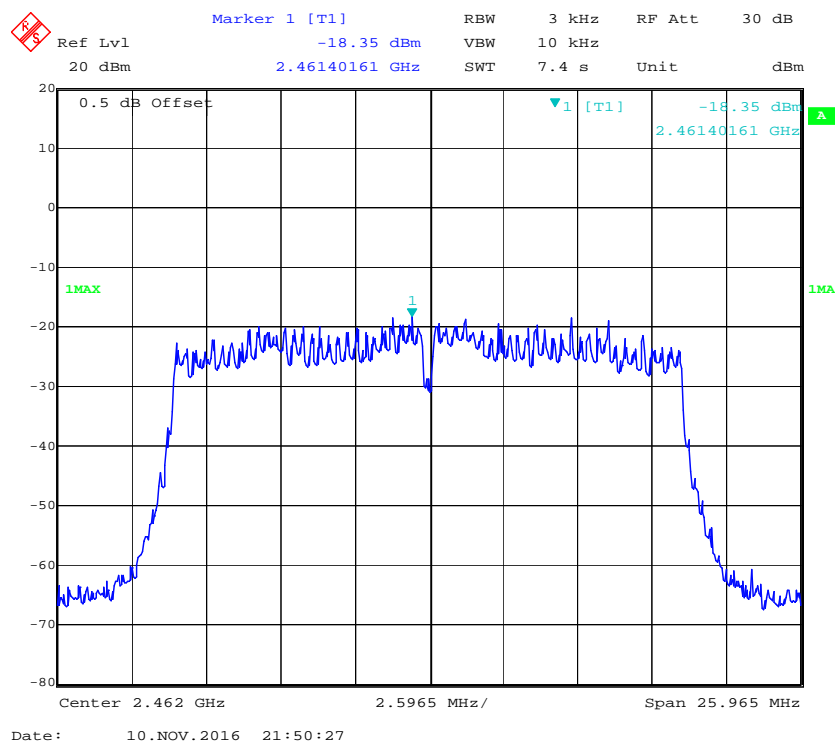
Power Spectral Density, 802.11n ht20 Low Channel



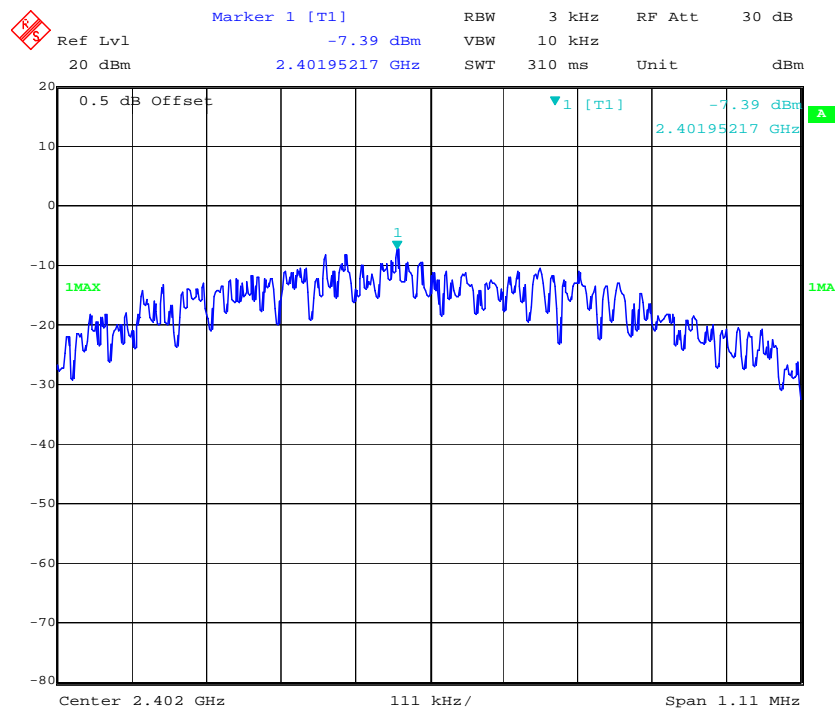
Power Spectral Density, 802.11n ht20 Middle Channel



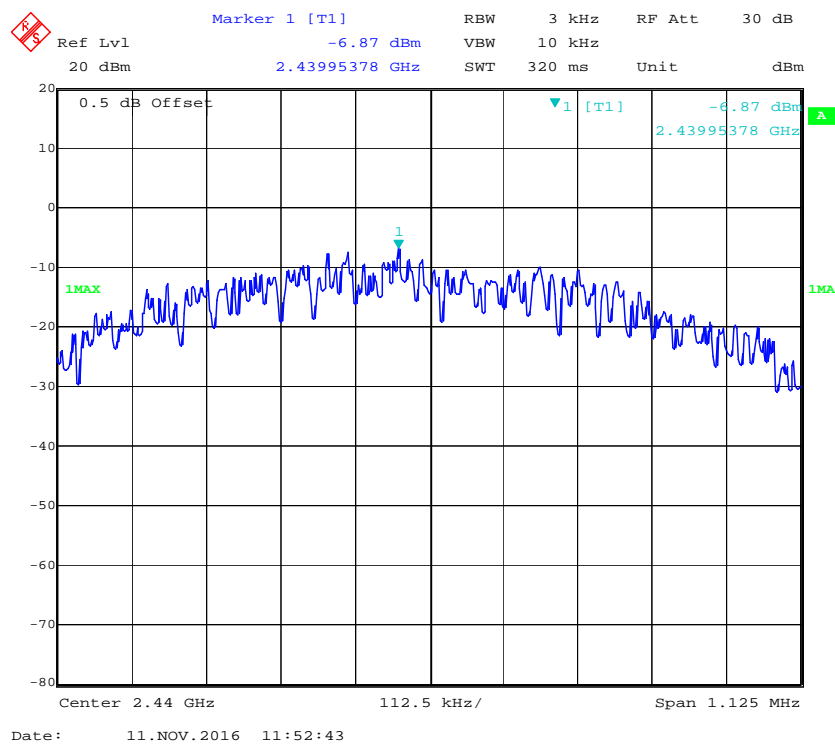
Power Spectral Density, 802.11n ht20 High Channel



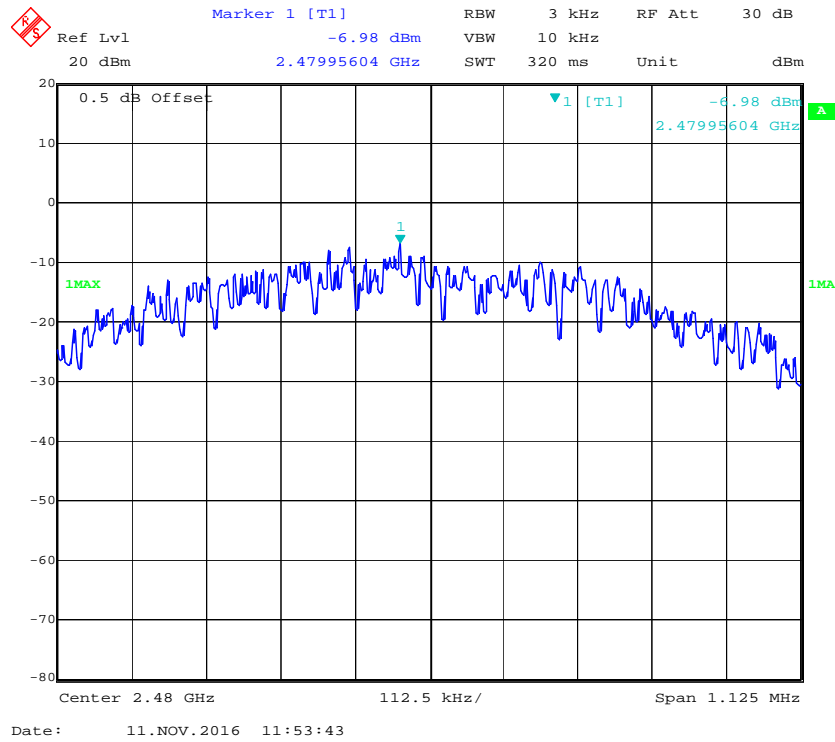
Power Spectral Density, BLE Low Channel



Power Spectral Density, BLE Middle Channel



Power Spectral Density, BLE High Channel



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