FCC PART 15.247

TEST REPORT

For

Chengdu Vantron Technology, Ltd.

No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

FCC ID: 2AAGETAB5071-TM

Report Type:	**Product Name:**
Original Report	Tablet Computer

Report Number:	RSC170626001B
Report Date:	2017-07-10
Reviewed By:	Sula Huang EMC Director
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Chengdu Vantron Technology, Ltd.***'s product, model number: **VT-TABLET-5071-TM-FP (FCC ID: 2AAGETAB5071-TM)** or the "EUT" as referred to in this report was the **Tablet Computer**.

Mechanical Description of EUT

The EUT was measured approximately: 226mm (L) x 127 mm (W) x 18 mm (H).

Rated input voltage: DC 3.7V rechargeable Li-ion battery or DC 5V charging from USB port.

**All measurement and test data in this report were gathered from final production sample, serial number: 170626001/01 (assigned by BACL). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-06-23, and EUT complied with test requirement.*

Objective

This report is prepared on behalf of ***Chengdu Vantron Technology, Ltd.*** in accordance with Part 2, Subpart J, Part 15, Subparts A 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: 2AAGETAB5071-TM.
FCC Part 15.407 NII submissions with FCC ID: 2AAGETAB5071-TM.
FCC Part 15.247 DSS submissions with FCC ID: 2AAGETAB5071-TM.
FCC Part 15.225 DXX submissions with FCC ID: 2AAGETAB5071-TM.

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.71 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.57 dB
		V	4.81 dB
	200MHz-1GHz	H	5.69 dB
		V	6.07 dB
	1GHz-6GHz		5.49 dB
	6GHz-18GHz		5.57 dB
Conducted RF Power			±0.61dB
Power Spectrum Density			±0.61dB
Occupied Bandwidth			±5%
Humidity			±5%
Temperature			±1℃

Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v04.

Test Facility

The test site used by BACL to collect test data is located No. 5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, 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.

BACL's test facility has been fully described in reports on file and registered with the Innovation, Science and Economic Development Canada under Registration Numbers: 3062C-1.

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

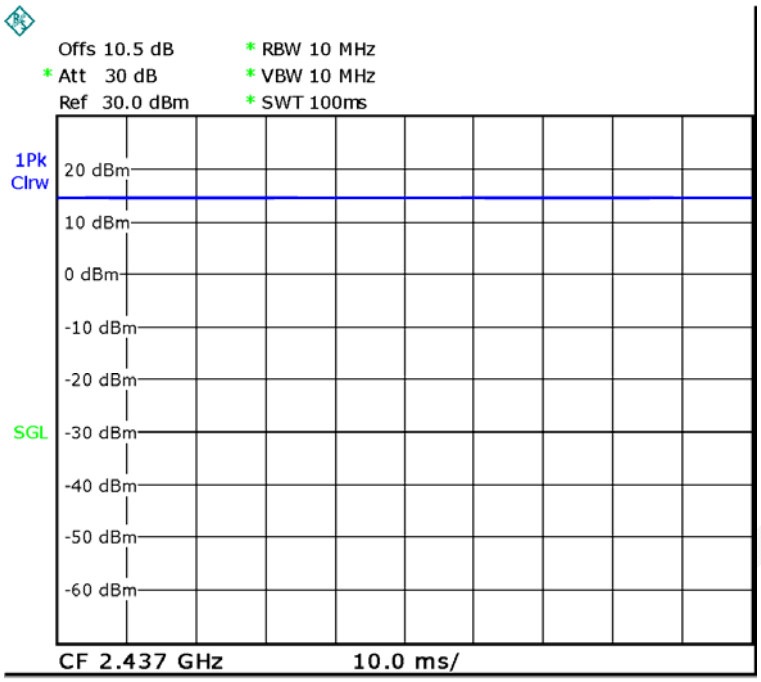
The worst condition (maximum power with maximum duty cycle) was setting by the software as following table:

Test Mode	Test Software Version	RF Tool		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level Setting	Default	Default	Default
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	Default	Default	Default
802.11n-HT20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	Default	Default	Default
BLE	Test Frequency	2402MHz	2440MHz	2480MHz
	Data Rate	Default	Default	Default
	Power Level Setting	Default	Default	Default

Duty Cycle information is below:

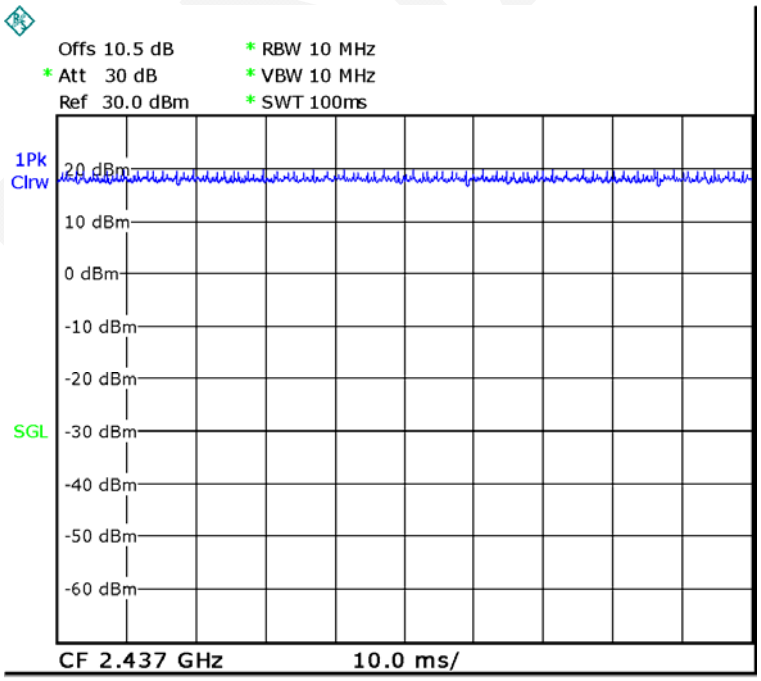
Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	100	100	100
802.11g	100	100	100
802.11n-HT20	100	100	100
BLE	0.41	0.62	66.13

802.11b



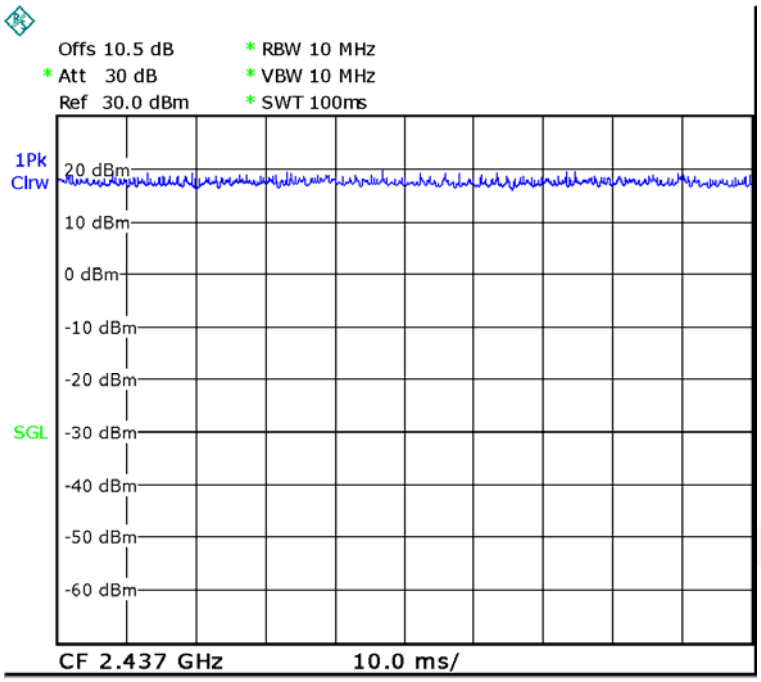
Date: 28.JUN.2017 14:47:59

802.11g



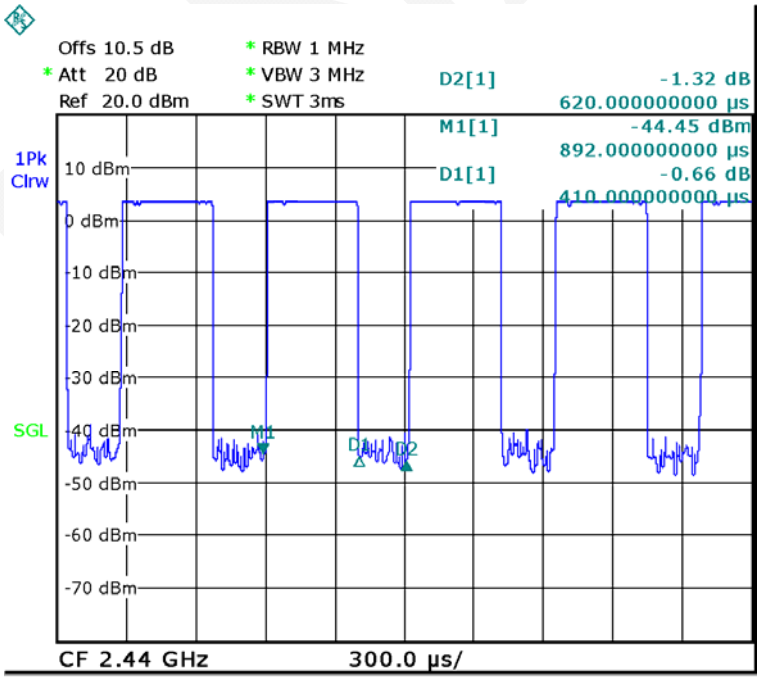
Date: 28.JUN.2017 14:48:22

802.11n-HT20



Date: 28.JUN.2017 14:48:54

Duty Cycle (worst case) of Bluetooth LE mode as follows:



Date: 28.JUN.2017 14:29:28

Support Equipment List and Details

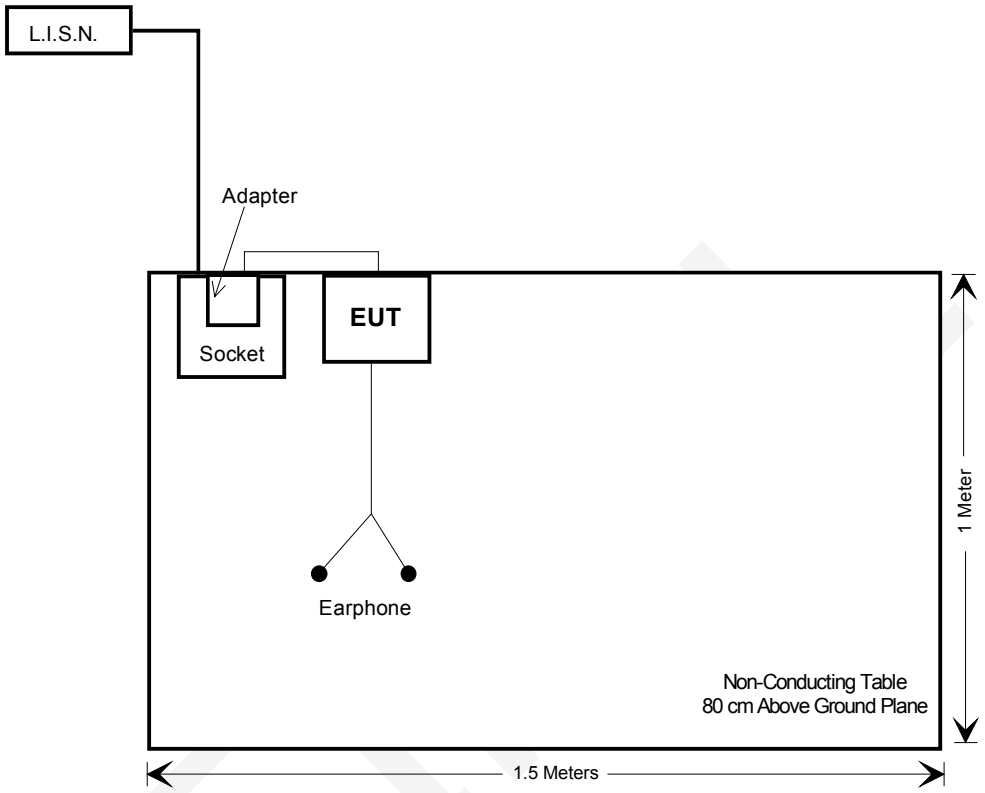
Manufacturer	Description	Model	Serial Number
N/A	Earphone	N/A	N/A
Xinheyuan	Adapter	XHY0501WLC	N/A

External I/O Cable

Cable Description	Length (m)	From	To
Unshielded USB Cable	1.0	Adapter	EUT
Unshielded Earphone Cable	1.2	EUT	Earphone

Block Diagram of Test Setup

AC Power Lines Conducted Emissions Test



Test Equipments List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2017-05-20	2018-05-19
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-11-10	2017-11-09
N/A	Conducted Cable	NO.5	N/A	N/A	N/A
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A
Radiated Emissions Test					
Agilent	Pre-Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2017-05-20	2018-05-19
Sunol Sciences	Broadband Antenna	JB3	A121808	2017-05-18	2020-05-17
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2017-05-18	2018-05-17
ETS	Horn Antenna	3115	003-6076	2017-05-19	2020-05-18
A.H.Systems,inc	Horn Antenna	SAS-574	505	2016-12-02	2017-12-01
Mini-circuits	Pre-Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
Quinstar	Pre-Amplifier	QLW-18405536-JO	15964004001	2017-05-20	2018-05-19
HP	Pre-Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
INMET	Attenuator	N-6dB	/	2016-11-10	2017-11-09
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
Rohde & Schwarz	EMC32	N/A	V 8.52.0	N/A	N/A
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSL18	100180	2016-12-02	2017-12-01
WEINSCHEL ENGINEERING	Attenuator	1A10dB	AA4135	2016-11-10	2017-11-09
Agilent	USB Wideband Power Sensor	U2021XA	MY53320008	2016-12-02	2017-12-01
N/A	RF Cable	NO.3	N/A	2016-11-10	2017-11-09
E-Microwave	DC Block	EMDCB-00036	OE01304225	Each Time	/
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).

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:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(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 Wi-Fi mode:

Compliance, please refer to the SAR report: RSC170630050-20A.

For Bluetooth LE mode:

The max peak conducted output power including tune-up tolerance is 4.5 dBm (2.82 mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 2.82/5*(√2.480) = 0.9< 3.0

So the stand-alone SAR evaluation for Bluetooth LE 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

This device used one internal PCB antenna which connected to the main board with I-PEX socket, the maximum gain is 1.5 dBi for 2.4G band and 3.0dBi for 5G band, which fulfill the requirement of this section, and please refer to the EUT photos.

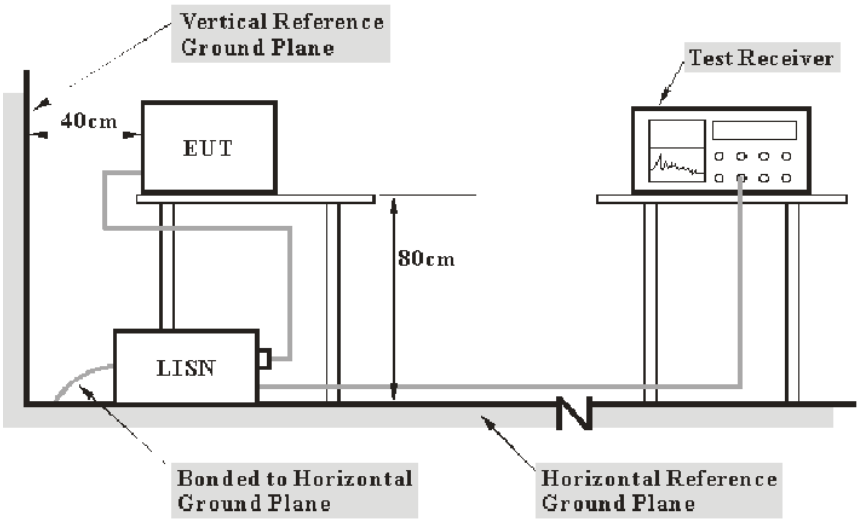
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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 limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

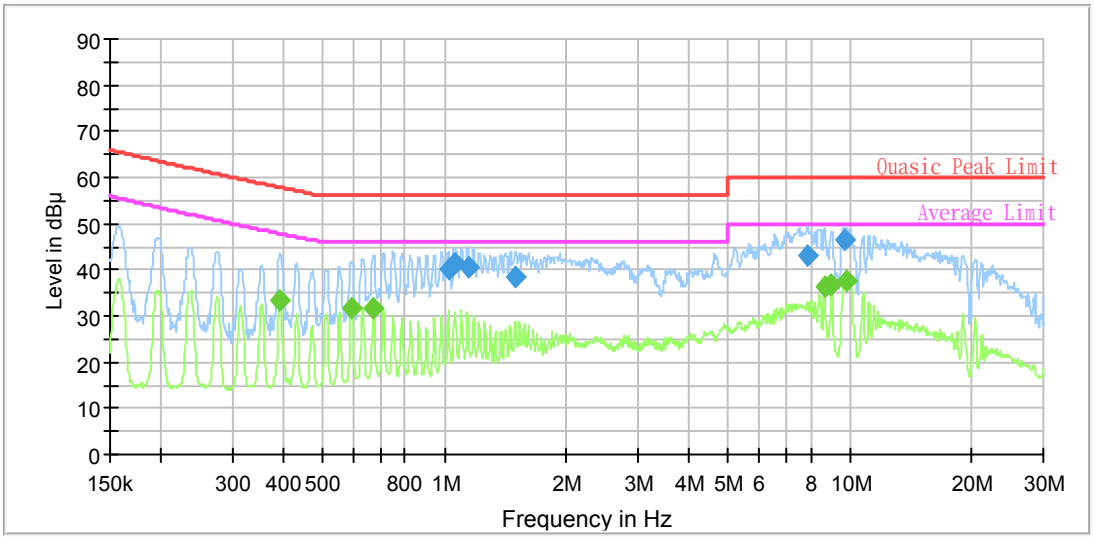
Temperature:	29 °C
Relative Humidity:	54 %
ATM Pressure:	95.1 kPa

The testing was performed by Tom Tang on 2017-07-04.

Test Mode: Transmitting

For Wi-Fi Mode

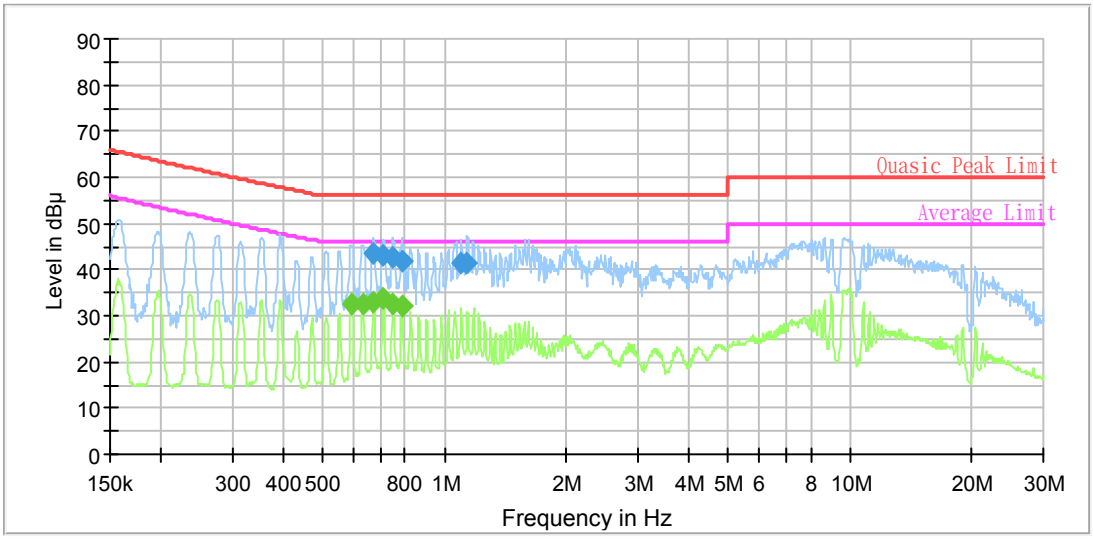
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dB µV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
1.027404	40.1	200.0	9.000	L1	19.8	15.9	56.0
1.060745	41.3	200.0	9.000	L1	19.8	14.7	56.0
1.144330	40.8	200.0	9.000	L1	19.8	15.2	56.0
1.489280	38.3	200.0	9.000	L1	19.8	17.7	56.0
7.869274	43.2	200.0	9.000	L1	20.0	16.8	60.0
9.723473	46.6	200.0	9.000	L1	20.0	13.4	60.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.394140	33.3	200.0	9.000	L1	19.8	14.5	47.8
0.589868	31.8	200.0	9.000	L1	19.8	14.2	46.0
0.670245	31.6	200.0	9.000	L1	19.8	14.4	46.0
8.660516	36.2	200.0	9.000	L1	20.0	13.8	50.0
9.013239	36.9	200.0	9.000	L1	20.0	13.1	50.0
9.840623	37.7	200.0	9.000	L1	20.0	12.3	50.0

AC120 V, 60 Hz, Neutral:



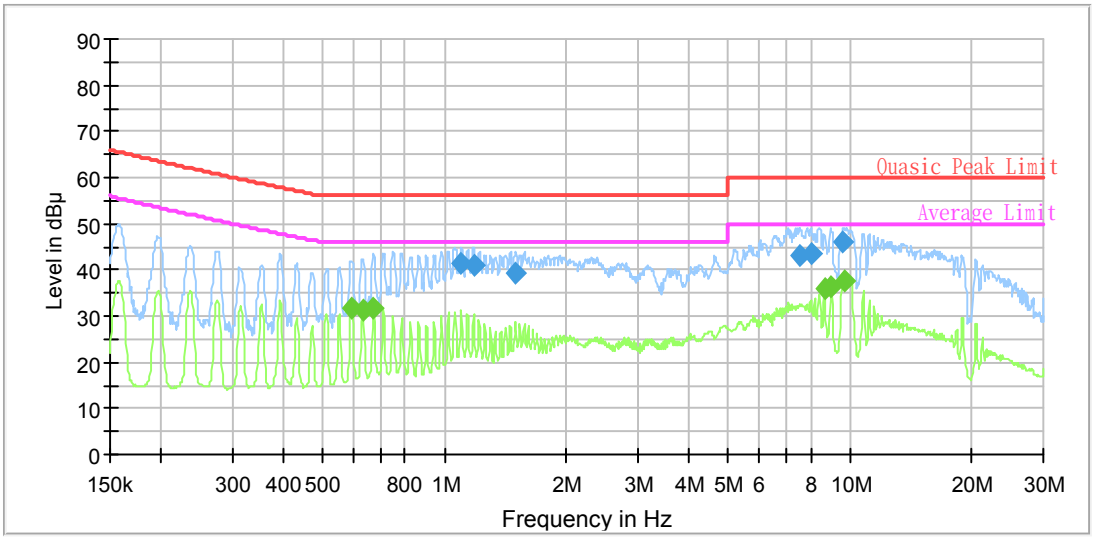
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.670245	43.6	200.0	9.000	N	19.5	12.4	56.0
0.708771	43.2	200.0	9.000	N	19.5	12.8	56.0
0.746525	42.6	200.0	9.000	N	19.5	13.4	56.0
0.786289	41.9	200.0	9.000	N	19.5	14.1	56.0
1.099548	41.4	200.0	9.000	N	19.6	14.6	56.0
1.139771	41.3	200.0	9.000	N	19.6	14.7	56.0

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.589868	32.5	200.0	9.000	N	19.5	13.5	46.0
0.631289	32.5	200.0	9.000	N	19.5	13.5	46.0
0.667575	33.1	200.0	9.000	N	19.5	12.9	46.0
0.708771	33.6	200.0	9.000	N	19.5	12.4	46.0
0.746525	32.7	200.0	9.000	N	19.5	13.3	46.0
0.786289	32.2	200.0	9.000	N	19.5	13.8	46.0

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

For BLE Mode

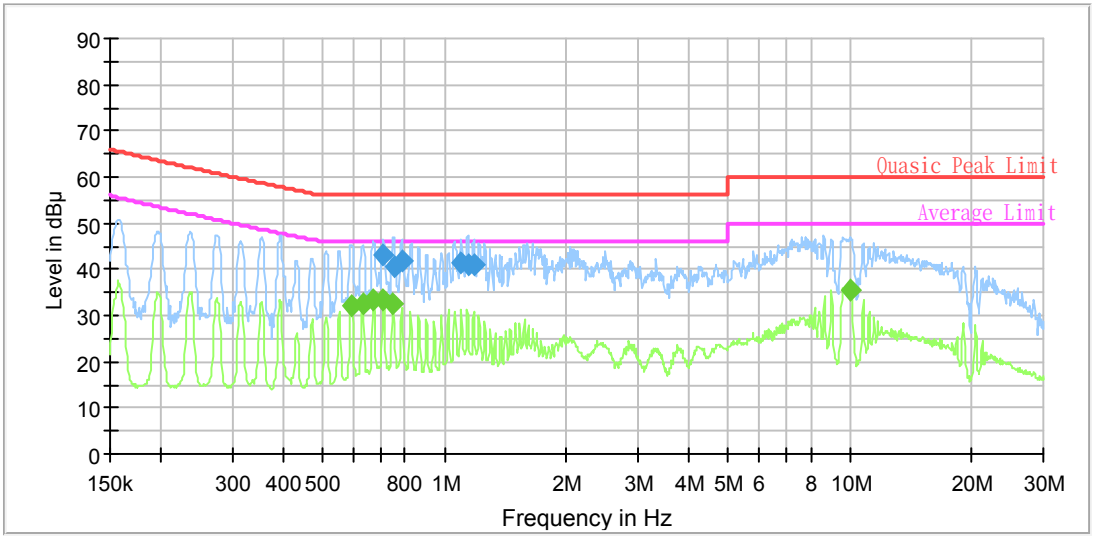
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.103946	41.4	200.0	9.000	L1	19.8	14.6	56.0
1.181466	41.0	200.0	9.000	L1	19.8	15.0	56.0
1.495237	39.2	200.0	9.000	L1	19.8	16.8	56.0
7.531194	42.9	200.0	9.000	L1	20.0	17.1	60.0
8.027923	43.6	200.0	9.000	L1	20.0	16.4	60.0
9.646150	46.1	200.0	9.000	L1	20.0	13.9	60.0

Frequency (MHz)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.589868	31.7	200.0	9.000	L1	19.8	14.3	46.0
0.631289	31.3	200.0	9.000	L1	19.8	14.7	46.0
0.670245	31.5	200.0	9.000	L1	19.8	14.5	46.0
8.660516	35.9	200.0	9.000	L1	20.0	14.1	50.0
8.977330	36.4	200.0	9.000	L1	20.0	13.6	50.0
9.723473	37.4	200.0	9.000	L1	20.0	12.6	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dB µV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.708771	43.2	200.0	9.000	N	19.5	12.8	56.0
0.752509	40.5	200.0	9.000	N	19.5	15.5	56.0
0.786289	41.9	200.0	9.000	N	19.5	14.1	56.0
1.099548	41.4	200.0	9.000	N	19.6	14.6	56.0
1.144330	40.8	200.0	9.000	N	19.6	15.2	56.0
1.181466	41.0	200.0	9.000	N	19.6	15.0	56.0

Frequency (MHz)	Average (dB µV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.589868	32.2	200.0	9.000	N	19.5	13.8	46.0
0.631289	32.4	200.0	9.000	N	19.5	13.6	46.0
0.670245	33.4	200.0	9.000	N	19.5	12.6	46.0
0.708771	33.5	200.0	9.000	N	19.5	12.5	46.0
0.746525	32.5	200.0	9.000	N	19.5	13.5	46.0
9.999020	35.4	200.0	9.000	N	19.8	14.6	50.0

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

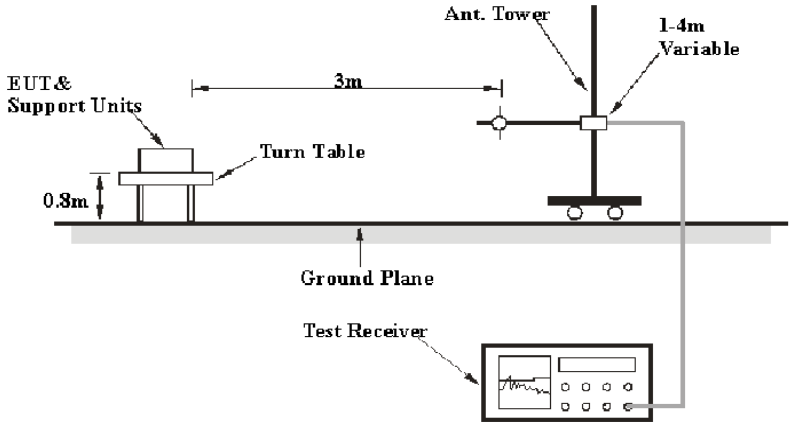
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

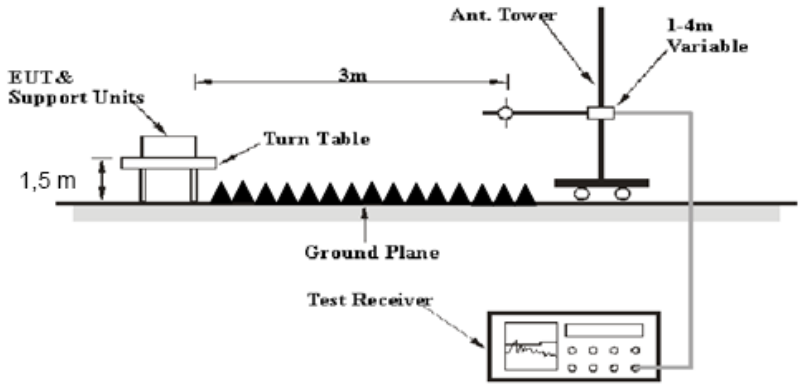
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



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

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

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

Frequency Range	RBW	Video B/W	Duty Cycle	Detector
Above 1 GHz	1MHz	3 MHz	Any	PK
	1MHz	10Hz	>98%	AV
	1MHz	1/T	<98%	AV

Note: T is 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:

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 Data

Environmental Conditions

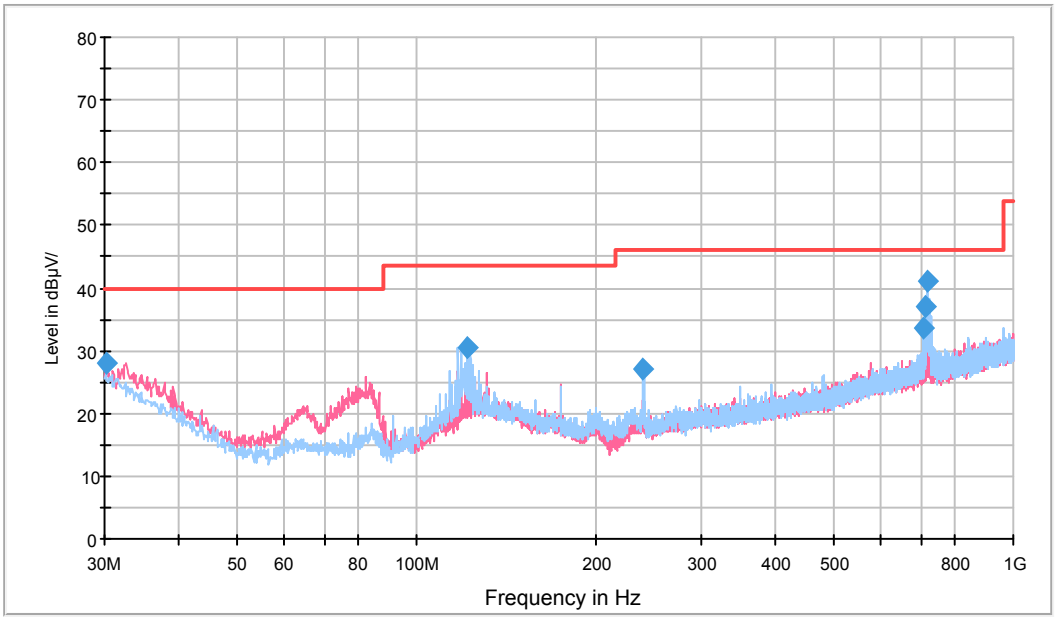
Temperature:	29 °C
Relative Humidity:	42 %
ATM Pressure:	94.5 kPa

** The testing was performed by Tom Tang on 2017-07-07.*

Test Mode: Transmitting

For Wi-Fi mode

1) 30 MHz to 1 GHz:



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.121250	28.2	100.0	V	10.0	-1.0	11.8	40.0
121.540000	30.5	115.0	H	89.0	-7.7	13.0	43.5
240.130000	27.1	165.0	H	334.0	-8.2	18.9	46.0
709.363750	33.7	100.0	H	234.0	0.8	12.3	46.0
714.820000	37.0	100.0	H	234.0	0.9	9.0	46.0
720.276250	41.0	150.0	H	224.0	0.9	5.0	46.0

2) 1GHz-25GHz:

802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
2412 MHz									
2412	74.48	PK	H	28.74	3.00	0.00	106.22	N/A	N/A
2412	70.21	AV	H	28.74	3.00	0.00	101.95	N/A	N/A
2412	71.61	PK	V	28.74	3.00	0.00	103.35	N/A	N/A
2412	66.81	AV	V	28.74	3.00	0.00	98.55	N/A	N/A
2390	29.97	PK	H	28.67	3.00	0.00	61.64	74.00	12.36
2390	15.41	AV	H	28.67	3.00	0.00	47.08	54.00	6.92
4824	35.19	PK	H	33.91	5.11	26.87	47.34	74.00	26.66
4824	19.52	AV	H	33.91	5.11	26.87	31.67	54.00	22.33
7236	42.77	PK	H	36.43	6.18	26.36	59.02	74.00	14.98
7236	35.75	AV	H	36.43	6.18	26.36	52.00	54.00	2.00
2437 MHz									
2437	74.10	PK	H	28.81	3.00	0.00	105.91	N/A	N/A
2437	69.81	AV	H	28.81	3.00	0.00	101.62	N/A	N/A
2437	71.41	PK	V	28.81	3.00	0.00	103.22	N/A	N/A
2437	66.68	AV	V	28.81	3.00	0.00	98.49	N/A	N/A
4874	34.98	PK	H	34.05	5.09	26.87	47.25	74.00	26.75
4874	19.30	AV	H	34.05	5.09	26.87	31.57	54.00	22.43
7311	41.17	PK	H	36.54	6.21	26.40	57.52	74.00	16.48
7311	34.67	AV	H	36.54	6.21	26.40	51.02	54.00	2.98
2462 MHz									
2462	74.05	PK	H	28.89	2.99	0.00	105.93	N/A	N/A
2462	69.72	AV	H	28.89	2.99	0.00	101.60	N/A	N/A
2462	71.83	PK	V	28.89	2.99	0.00	103.71	N/A	N/A
2462	66.76	AV	V	28.89	2.99	0.00	98.64	N/A	N/A
2483.5	29.76	PK	H	28.95	2.99	0.00	61.70	74.00	12.30
2483.5	15.67	AV	H	28.95	2.99	0.00	47.61	54.00	6.39
4924	34.89	PK	H	34.19	5.07	26.88	47.27	74.00	26.73
4924	19.24	AV	H	34.19	5.07	26.88	31.62	54.00	22.38
7386	40.33	PK	H	36.64	6.25	26.43	56.79	74.00	17.21
7386	33.59	AV	H	36.64	6.25	26.43	50.05	54.00	3.95

802.11g Mode

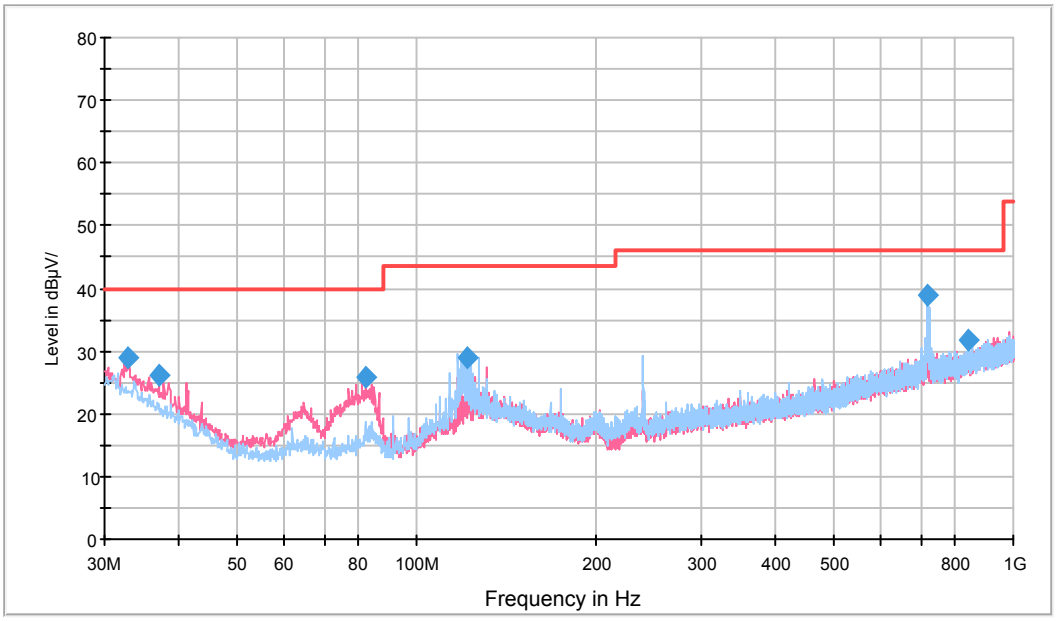
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
2412 MHz									
2412	76.86	PK	H	28.74	3.00	0.00	108.60	N/A	N/A
2412	67.24	AV	H	28.74	3.00	0.00	98.98	N/A	N/A
2412	73.77	PK	V	28.74	3.00	0.00	105.51	N/A	N/A
2412	64.17	AV	V	28.74	3.00	0.00	95.91	N/A	N/A
2390	38.81	PK	H	28.67	3.00	0.00	70.48	74.00	3.52
2390	19.49	AV	H	28.67	3.00	0.00	51.16	54.00	2.84
4824	35.64	PK	H	33.91	5.11	26.87	47.79	74.00	26.21
4824	20.16	AV	H	33.91	5.11	26.87	32.31	54.00	21.69
7236	46.01	PK	H	36.43	6.18	26.36	62.26	74.00	11.74
7236	30.06	AV	H	36.43	6.18	26.36	46.31	54.00	7.69
2437 MHz									
2437	76.49	PK	H	28.81	3.00	0.00	108.30	N/A	N/A
2437	66.90	AV	H	28.81	3.00	0.00	98.71	N/A	N/A
2437	72.91	PK	V	28.81	3.00	0.00	104.72	N/A	N/A
2437	63.27	AV	V	28.81	3.00	0.00	95.08	N/A	N/A
4874	35.31	PK	H	34.05	5.09	26.87	47.58	74.00	26.42
4874	19.49	AV	H	34.05	5.09	26.87	31.76	54.00	22.24
7311	45.75	PK	H	36.54	6.21	26.40	62.10	74.00	11.90
7311	29.78	AV	H	36.54	6.21	26.40	46.13	54.00	7.87
2462 MHz									
2462	76.36	PK	H	28.89	2.99	0.00	108.24	N/A	N/A
2462	66.85	AV	H	28.89	2.99	0.00	98.73	N/A	N/A
2462	72.75	PK	V	28.89	2.99	0.00	104.63	N/A	N/A
2462	63.17	AV	V	28.89	2.99	0.00	95.05	N/A	N/A
2483.5	38.86	PK	H	28.95	2.99	0.00	70.80	74.00	3.20
2483.5	18.34	AV	H	28.95	2.99	0.00	50.28	54.00	3.72
4924	35.12	PK	H	34.19	5.07	26.88	47.50	74.00	26.50
4924	19.65	AV	H	34.19	5.07	26.88	32.03	54.00	21.97
7386	45.67	PK	H	36.64	6.25	26.43	62.13	74.00	11.87
7386	29.86	AV	H	36.64	6.25	26.43	46.32	54.00	7.68

802.11n-HT20 Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBµV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBµV/m	dBµV/m	dB
2412 MHz									
2412	76.71	PK	H	28.74	3.00	0.00	108.45	N/A	N/A
2412	66.42	AV	H	28.74	3.00	0.00	98.16	N/A	N/A
2412	73.33	PK	V	28.74	3.00	0.00	105.07	N/A	N/A
2412	63.52	AV	V	28.74	3.00	0.00	95.26	N/A	N/A
2390	40.59	PK	H	28.67	3.00	0.00	72.26	74.00	1.74
2390	20.52	AV	H	28.67	3.00	0.00	52.19	54.00	1.81
4824	35.21	PK	H	33.91	5.11	26.87	47.36	74.00	26.64
4824	19.94	AV	H	33.91	5.11	26.87	32.09	54.00	21.91
7236	46.43	PK	H	36.43	6.18	26.36	62.68	74.00	11.32
7236	29.39	AV	H	36.43	6.18	26.36	45.64	54.00	8.36
2437 MHz									
2437	76.01	PK	H	28.81	3.00	0.00	107.82	N/A	N/A
2437	66.09	AV	H	28.81	3.00	0.00	97.90	N/A	N/A
2437	73.23	PK	V	28.81	3.00	0.00	105.04	N/A	N/A
2437	62.85	AV	V	28.81	3.00	0.00	94.66	N/A	N/A
4874	34.68	PK	H	34.05	5.09	26.87	46.95	74.00	27.05
4874	19.13	AV	H	34.05	5.09	26.87	31.40	54.00	22.60
7311	45.92	PK	H	36.54	6.21	26.40	62.27	74.00	11.73
7311	29.17	AV	H	36.54	6.21	26.40	45.52	54.00	8.48
2462 MHz									
2462	76.06	PK	H	28.89	2.99	0.00	107.94	N/A	N/A
2462	66.11	AV	H	28.89	2.99	0.00	97.99	N/A	N/A
2462	73.23	PK	V	28.89	2.99	0.00	105.11	N/A	N/A
2462	63.01	AV	V	28.89	2.99	0.00	94.89	N/A	N/A
2483.5	40.14	PK	H	28.95	2.99	0.00	72.08	74.00	1.92
2483.5	18.61	AV	H	28.95	2.99	0.00	50.55	54.00	3.45
4924	34.97	PK	H	34.19	5.07	26.88	47.35	74.00	26.65
4924	18.86	AV	H	34.19	5.07	26.88	31.24	54.00	22.76
7386	45.47	PK	H	36.64	6.25	26.43	61.93	74.00	12.07
7386	29.05	AV	H	36.64	6.25	26.43	45.51	54.00	8.49

For BLE mode

1) 30 MHz to 1 GHz:



Frequency (MHz)	QuasicPeak (dB µ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
32.910000	28.8	100.0	V	348.0	-3.0	11.2	40.0
37.032500	26.0	100.0	V	199.0	-5.6	14.0	40.0
82.380000	25.7	100.0	V	217.0	-12.8	14.3	40.0
121.543750	29.1	100.0	H	259.0	-7.7	14.4	43.5
720.276250	38.9	100.0	H	214.0	0.9	7.1	46.0
840.556250	31.8	100.0	H	160.0	2.5	14.2	46.0

2) 1GHz-25GHz:

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Detector	Polar	Factor					
MHz	dBμV	PK/QP/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
2402 MHz									
2402	71.19	PK	H	28.71	3.00	0.00	102.90	N/A	N/A
2402	66.33	AV	H	28.71	3.00	0.00	98.04	N/A	N/A
2402	69.34	PK	V	28.71	3.00	0.00	101.05	N/A	N/A
2402	64.61	AV	V	28.71	3.00	0.00	96.32	N/A	N/A
2390	29.37	PK	H	28.67	3.00	0.00	61.04	74.00	12.96
2390	15.52	AV	H	28.67	3.00	0.00	47.19	54.00	6.81
4804	34.71	PK	H	33.85	5.12	26.87	46.81	74.00	27.19
4804	19.96	AV	H	33.85	5.12	26.87	32.06	54.00	21.94
7206	32.02	PK	H	36.39	6.16	26.35	48.22	74.00	25.78
7206	18.02	AV	H	36.39	6.16	26.35	34.22	54.00	19.78
2440 MHz									
2440	71.24	PK	H	28.82	3.00	0.00	103.06	N/A	N/A
2440	66.16	AV	H	28.82	3.00	0.00	97.98	N/A	N/A
2440	69.81	PK	V	28.82	3.00	0.00	101.63	N/A	N/A
2440	65.08	AV	V	28.82	3.00	0.00	96.90	N/A	N/A
4880	34.46	PK	H	34.06	5.09	26.87	46.74	74.00	27.26
4880	19.67	AV	H	34.06	5.09	26.87	31.95	54.00	22.05
7320	31.98	PK	H	36.55	6.22	26.40	48.35	74.00	25.65
7320	18.21	AV	H	36.55	6.22	26.40	34.58	54.00	19.42
2480 MHz									
2480	71.57	PK	H	28.94	2.99	0.00	103.50	N/A	N/A
2480	66.47	AV	H	28.94	2.99	0.00	98.40	N/A	N/A
2480	70.51	PK	V	28.94	2.99	0.00	102.44	N/A	N/A
2480	65.76	AV	V	28.94	2.99	0.00	97.69	N/A	N/A
2483.5	31.22	PK	H	28.95	2.99	0.00	63.16	74.00	10.84
2483.5	19.36	AV	H	28.95	2.99	0.00	51.30	54.00	2.70
4960	34.94	PK	H	34.29	5.05	26.88	47.40	74.00	26.60
4960	20.06	AV	H	34.29	5.05	26.88	32.52	54.00	21.48
7440	32.46	PK	H	36.72	6.27	26.45	49.00	74.00	25.00
7440	18.47	AV	H	36.72	6.27	26.45	35.01	54.00	18.99

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude
Spurious emissions more than 20 dB below the limit were not reported.

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 Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	47 %
ATM Pressure:	95.5 kPa

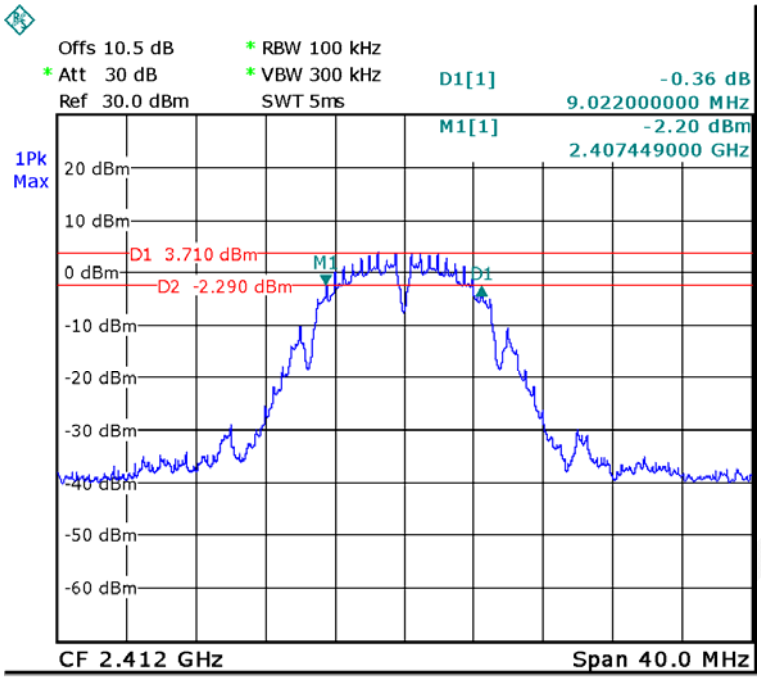
** The testing was performed by Tom Tang on 2017-06-28.*

Test Mode: Transmitting

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

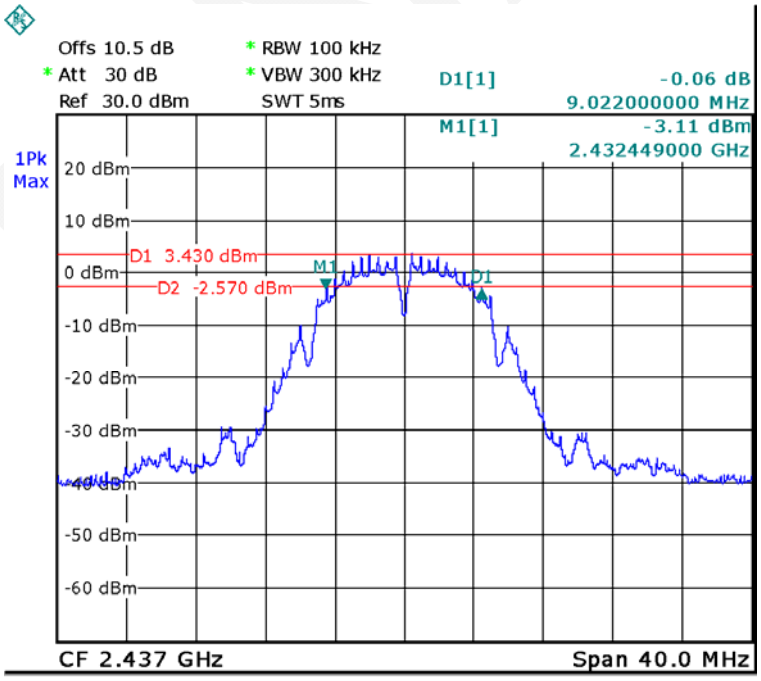
Test mode	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	9.022	≥0.50
	Middle	2437	9.022	≥0.50
	High	2462	9.022	≥0.50
802.11g	Low	2412	16.367	≥0.50
	Middle	2437	16.367	≥0.50
	High	2462	16.367	≥0.50
802.11n ht20	Low	2412	17.645	≥0.50
	Middle	2437	17.645	≥0.50
	High	2462	17.645	≥0.50
BLE	Low	2402	0.727	≥0.50
	Middle	2440	0.727	≥0.50
	High	2480	0.727	≥0.50

802.11b Low Channel



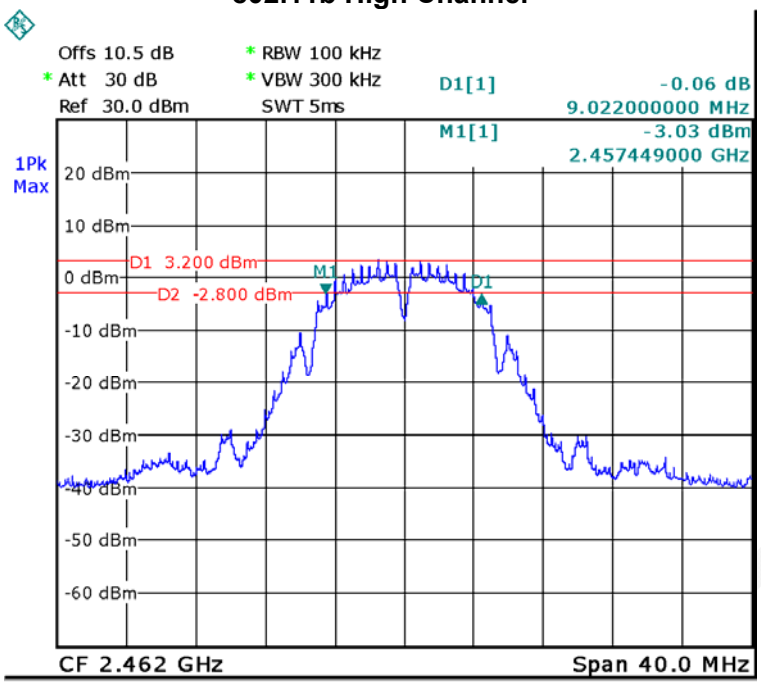
Date: 28.JUN.2017 15:10:26

802.11b Middle Channel



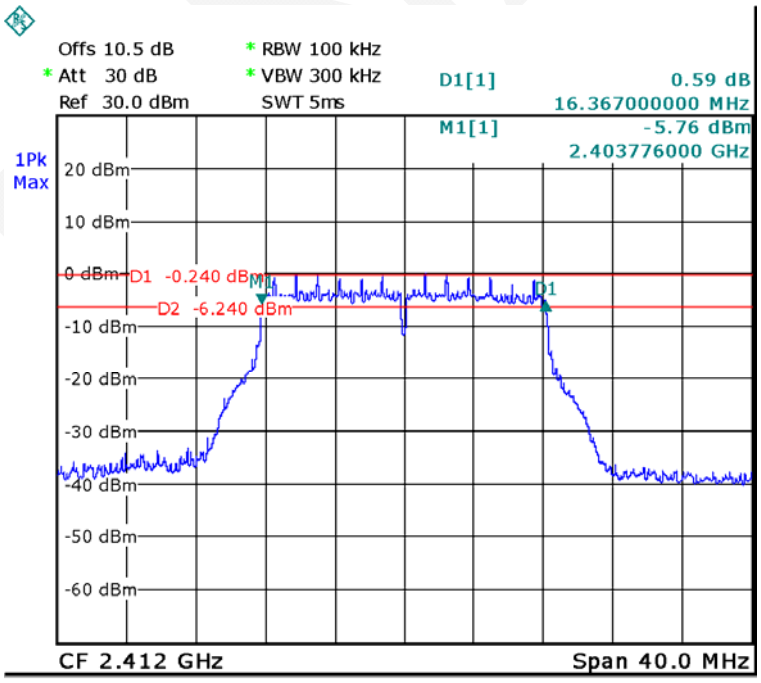
Date: 28.JUN.2017 15:12:20

802.11b High Channel



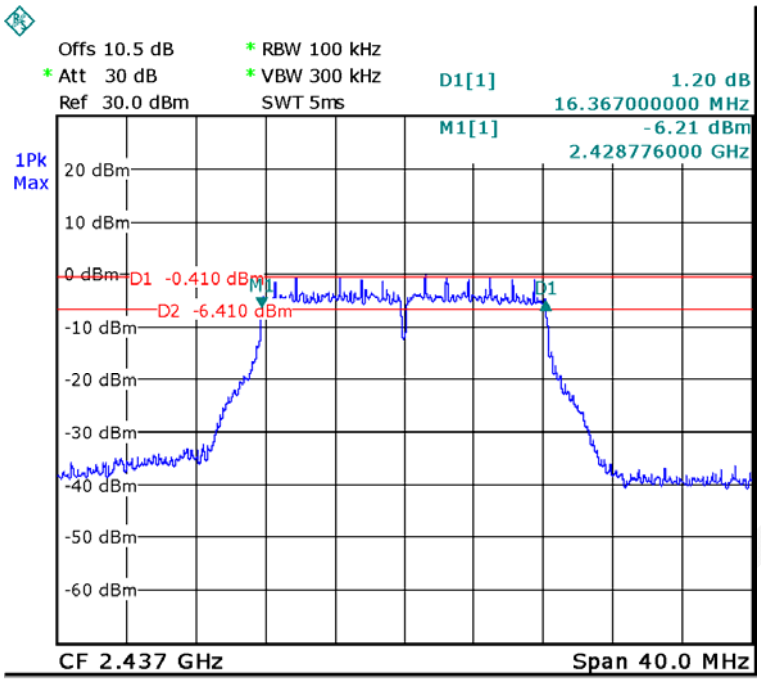
Date: 28.JUN.2017 15:15:08

802.11g Low Channel



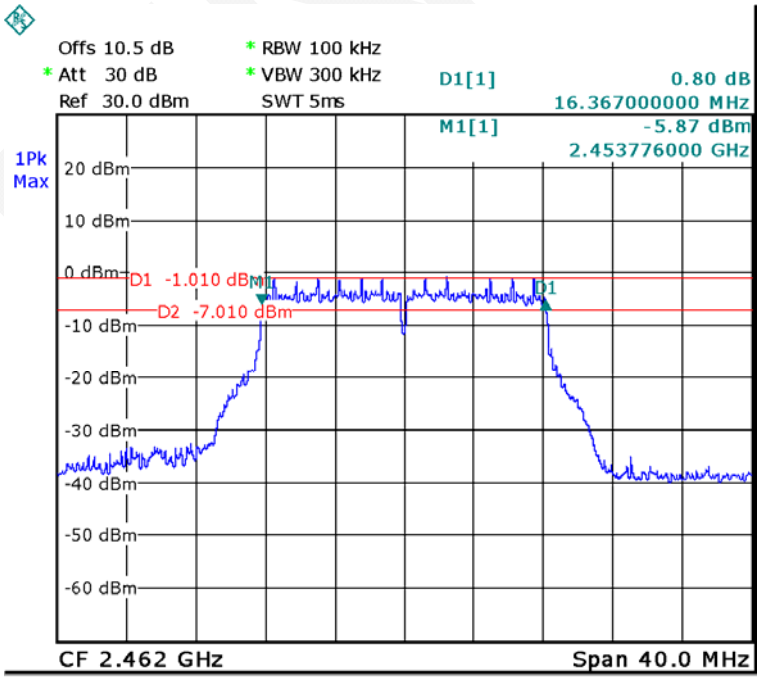
Date: 28.JUN.2017 15:16:54

802.11g Middle Channel



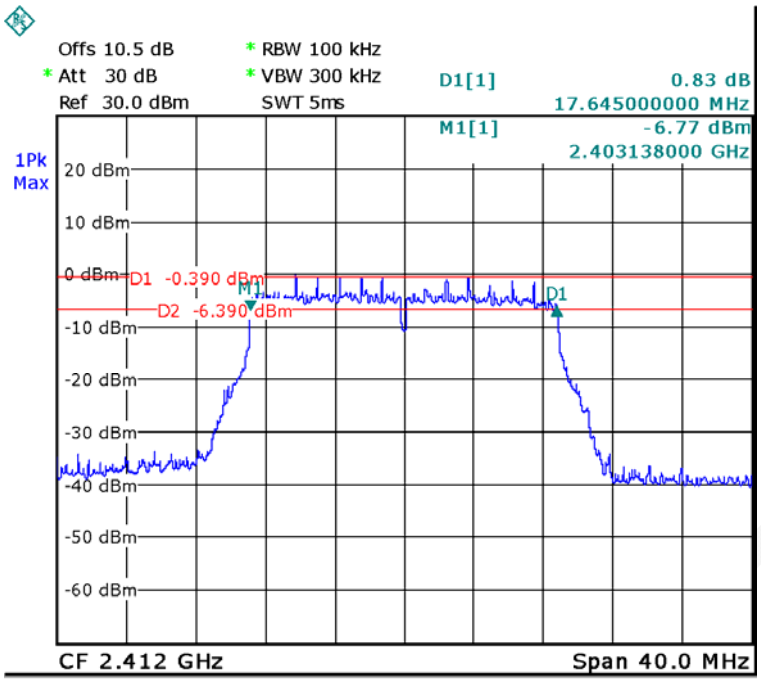
Date: 28.JUN.2017 15:18:03

802.11g High Channel



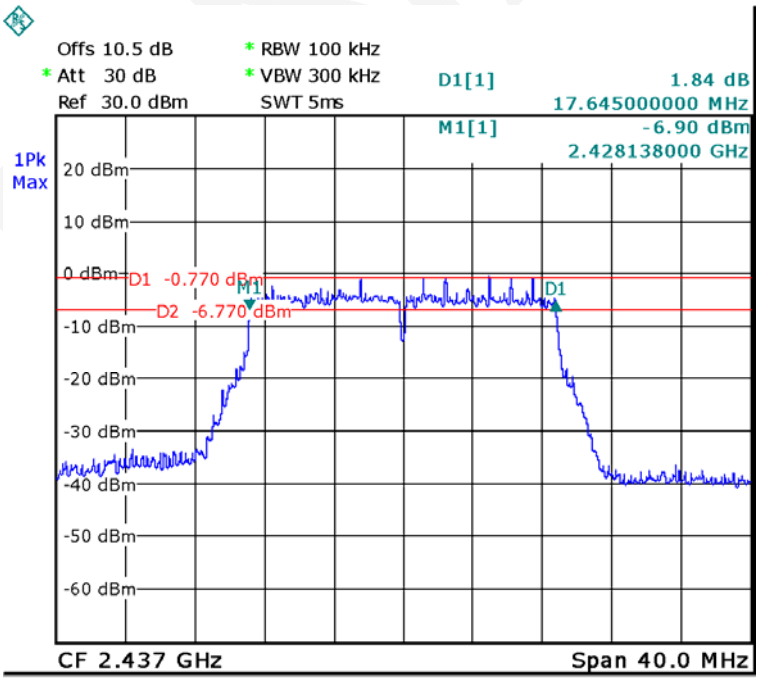
Date: 28.JUN.2017 15:19:20

802.11n-HT20 Low Channel



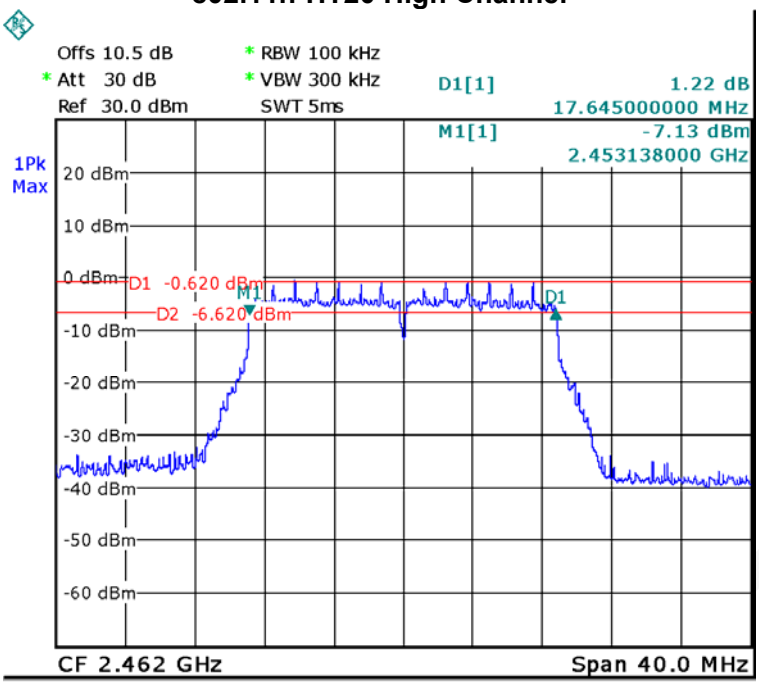
Date: 28.JUN.2017 15:20:45

802.11n-HT20 Middle Channel



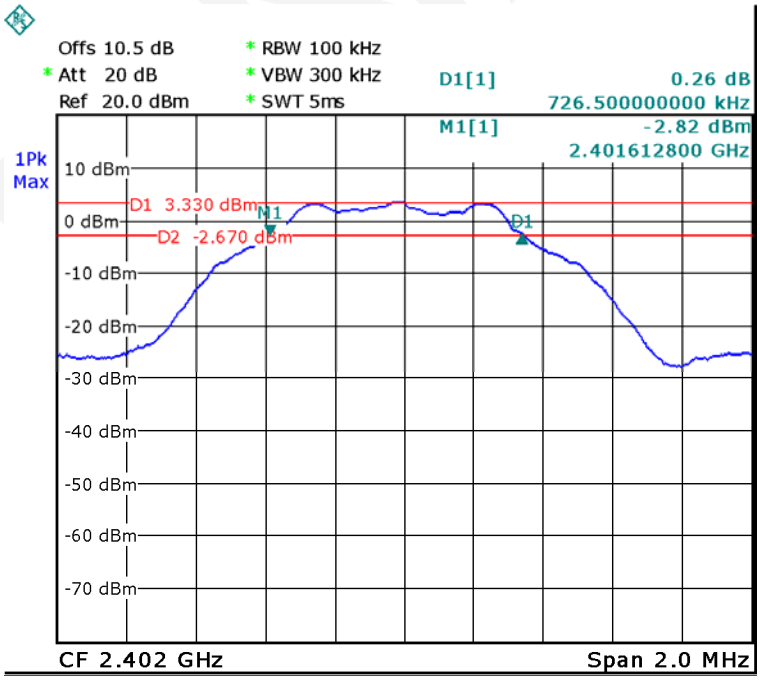
Date: 28.JUN.2017 15:22:37

802.11n-HT20 High Channel



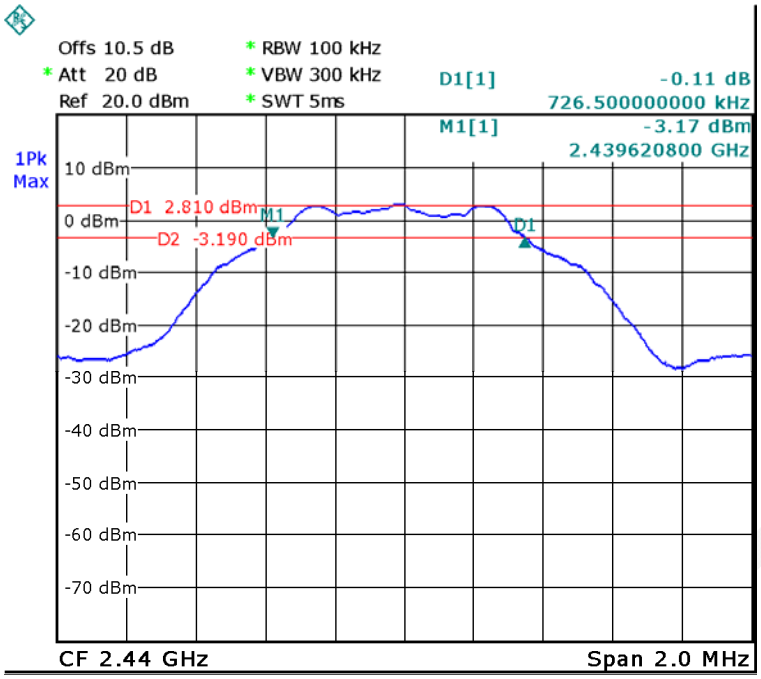
Date: 28.JUN.2017 15:23:54

BLE: Low Channel



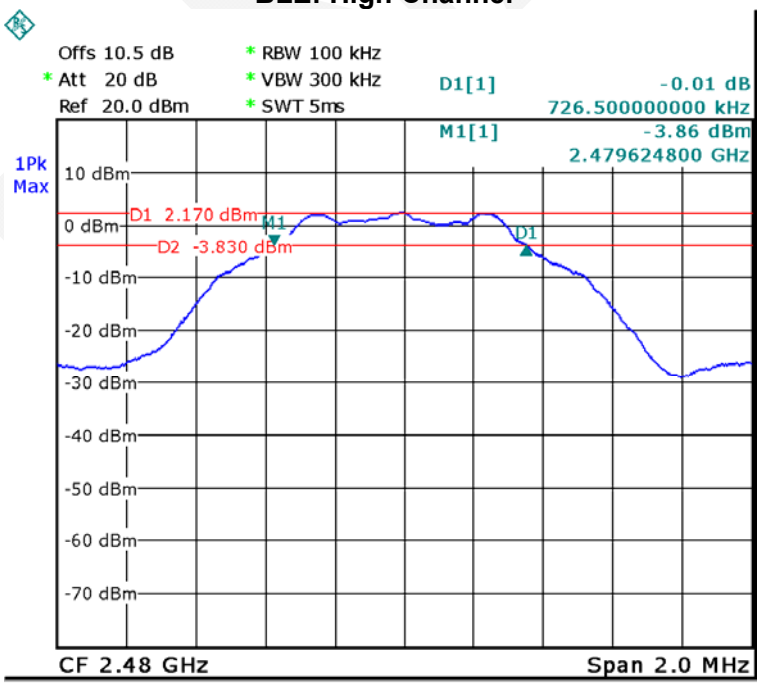
Date: 28.JUN.2017 14:31:16

BLE: Middle Channel



Date: 28.JUN.2017 14:32:43

BLE: High Channel



Date: 28.JUN.2017 14:33:58

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 Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	47 %
ATM Pressure:	95.5 kPa

** The testing was performed by Tom Tang on 2017-06-28.*

Test Mode: Transmitting

Test Result: Compliance. 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	15.15	13.62	30
	Middle	2437	15.00	13.07	30
	High	2462	14.75	12.88	30
802.11g	Low	2412	19.35	12.19	30
	Middle	2437	19.33	12.12	30
	High	2462	19.27	11.89	30
802.11n20	Low	2412	19.25	12.16	30
	Middle	2437	19.40	12.07	30
	High	2462	19.19	11.87	30
BLE	Low	2402	4.36	-	30
	Middle	2440	3.61	-	30
	High	2480	3.01	-	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 Data

Environmental Conditions

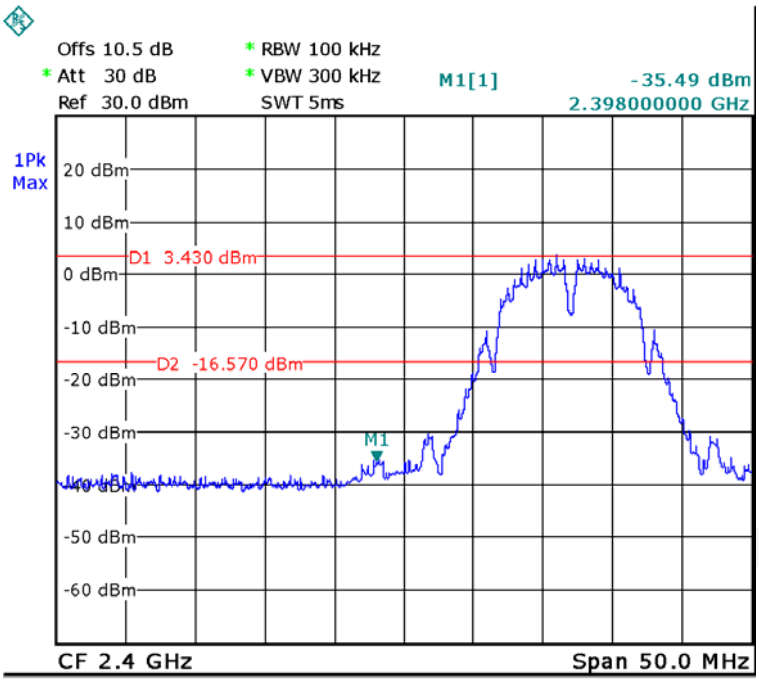
Temperature:	28 °C
Relative Humidity:	47 %
ATM Pressure:	95.5 kPa

** The testing was performed by Tom Tang on 2017-06-28.*

Test mode: Transmitting

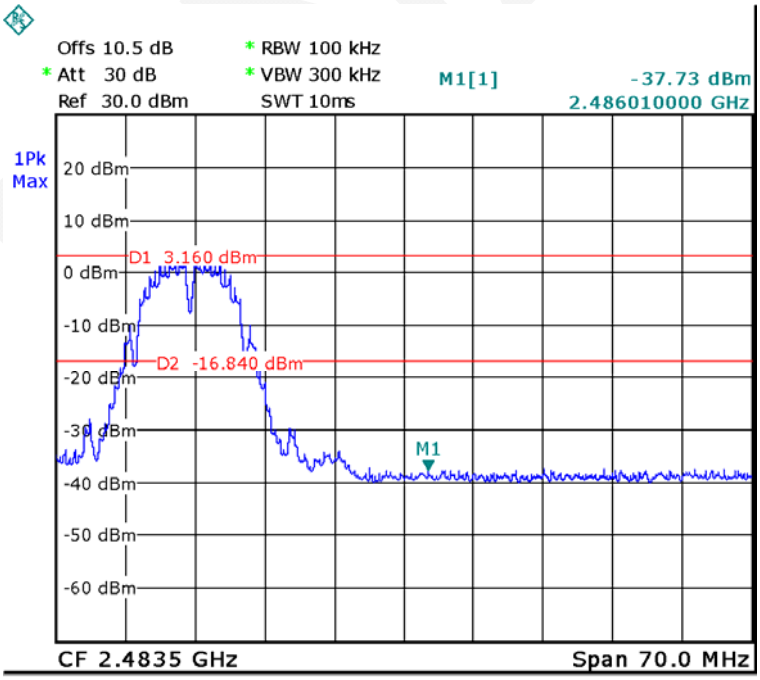
Test Result: Compliance. Please refer to following plots.

802.11b: Band Edge, Left Side



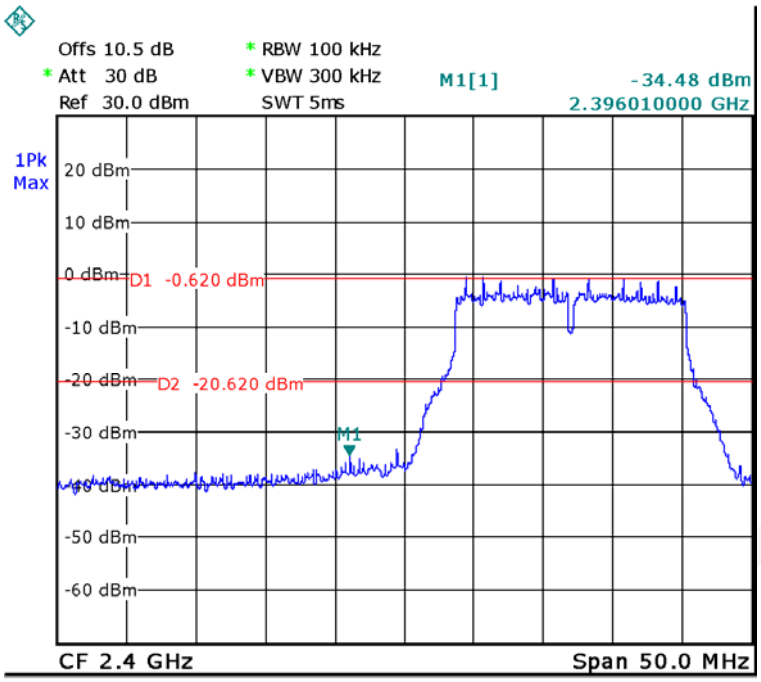
Date: 28.JUN.2017 15:26:46

802.11b: Band Edge, Right Side



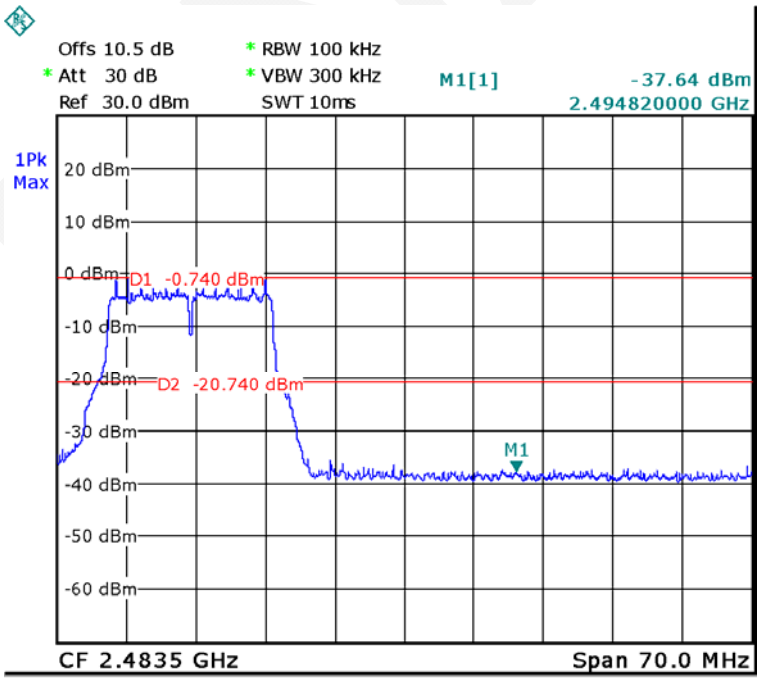
Date: 28.JUN.2017 15:37:04

802.11g: Band Edge, Left Side



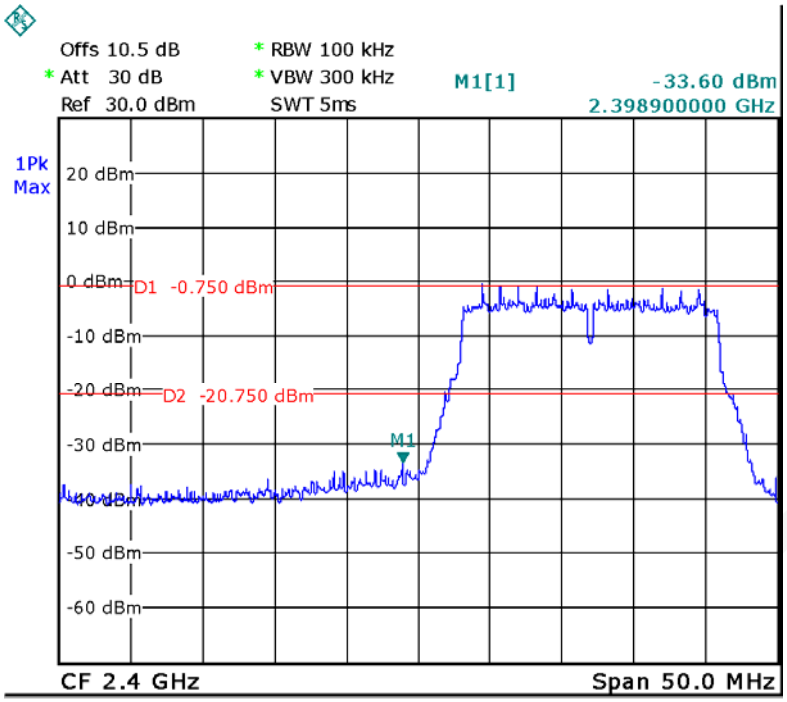
Date: 28.JUN.2017 15:28:02

802.11g: Band Edge, Right Side



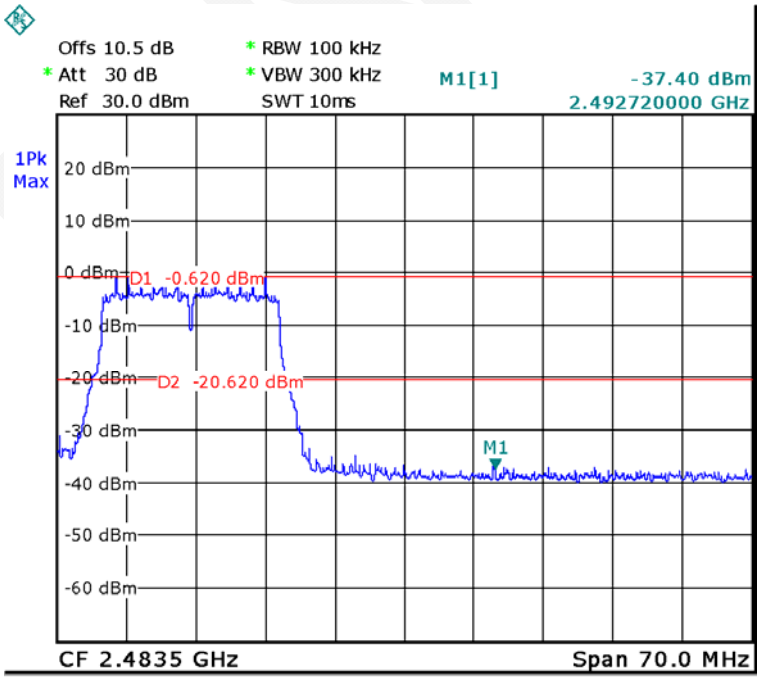
Date: 28.JUN.2017 15:35:13

802.11n-HT20 Band Edge, Left Side



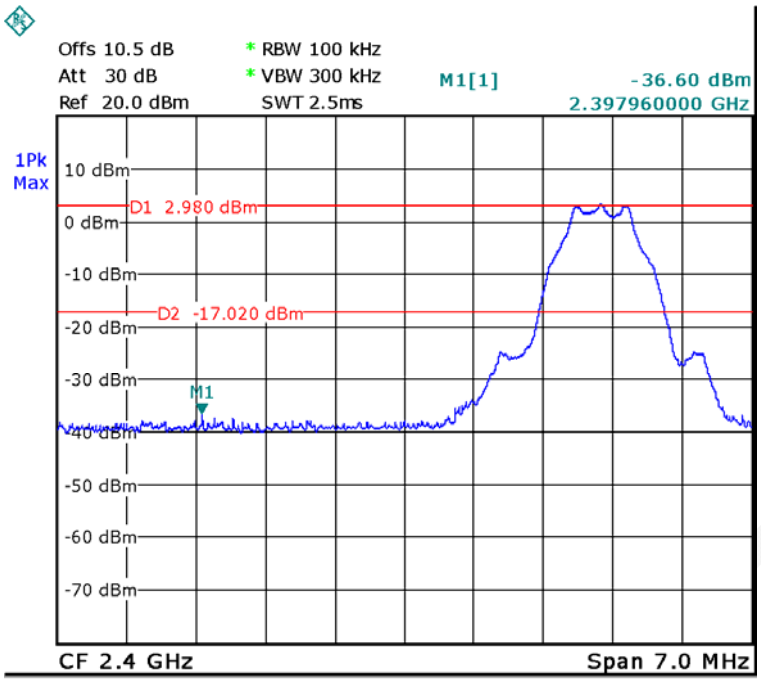
Date: 28.JUN.2017 15:29:02

802.11n-HT20 Band Edge, Right Side



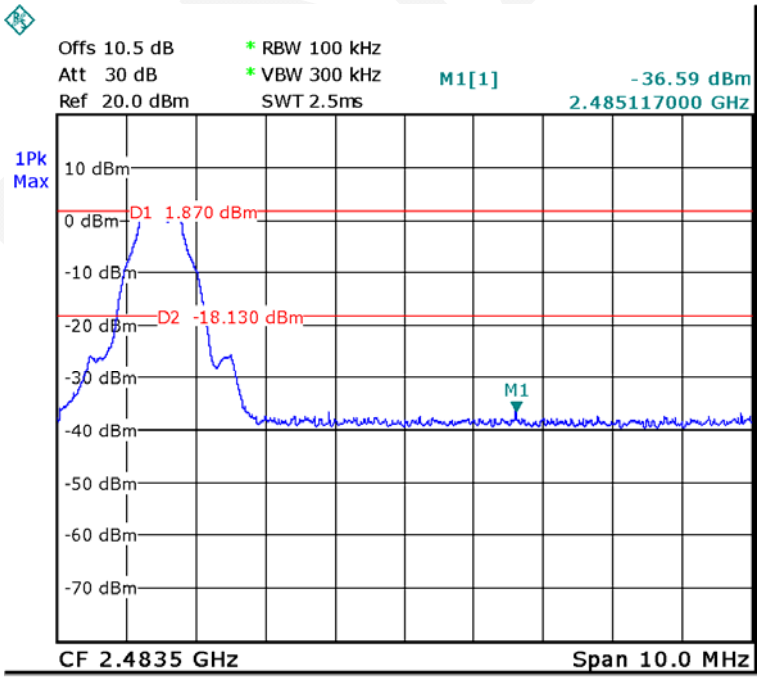
Date: 28.JUN.2017 15:31:35

BLE: Band Edge, Left Side



Date: 28.JUN.2017 14:38:32

BLE: Band Edge, Right Side



Date: 28.JUN.2017 14:40:26

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 Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	47 %
ATM Pressure:	95.5 kPa

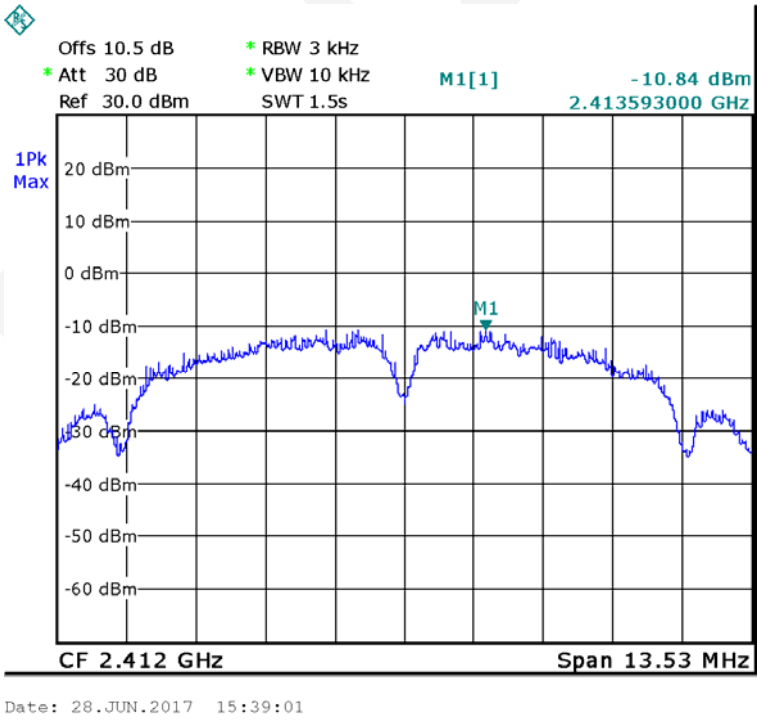
** The testing was performed by Tom Tang on 2017-06-28.*

Test Mode: Transmitting

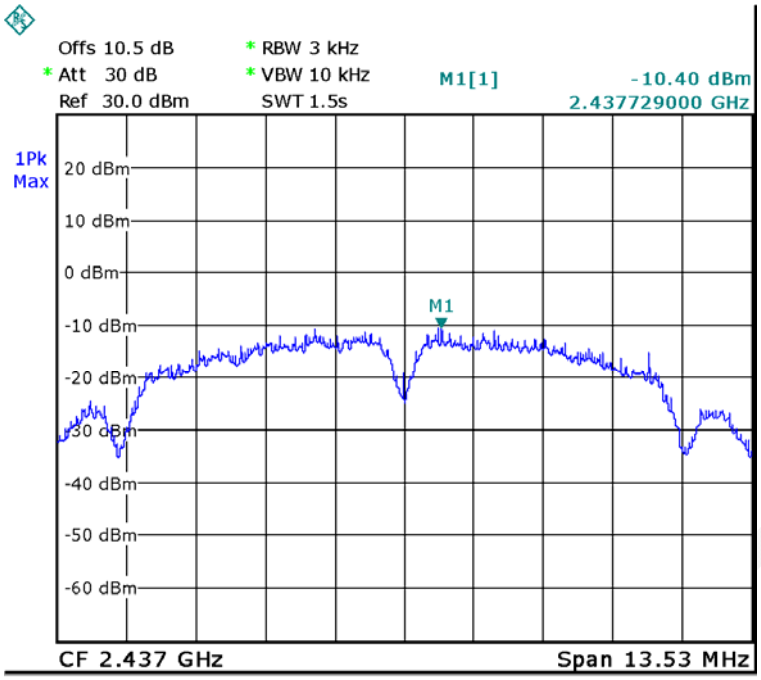
Test Result: Compliance. Please refer to the following table and plots

Test mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-10.84	≤8
	Middle	2437	-10.40	≤8
	High	2462	-10.45	≤8
802.11g	Low	2412	-13.39	≤8
	Middle	2437	-13.56	≤8
	High	2462	-13.63	≤8
802.11n20	Low	2412	-14.43	≤8
	Middle	2437	-14.35	≤8
	High	2462	-14.55	≤8
BLE	Low	2402	-10.90	≤8
	Middle	2440	-11.47	≤8
	High	2480	-12.11	≤8

Power Spectral Density, 802.11b Low Channel

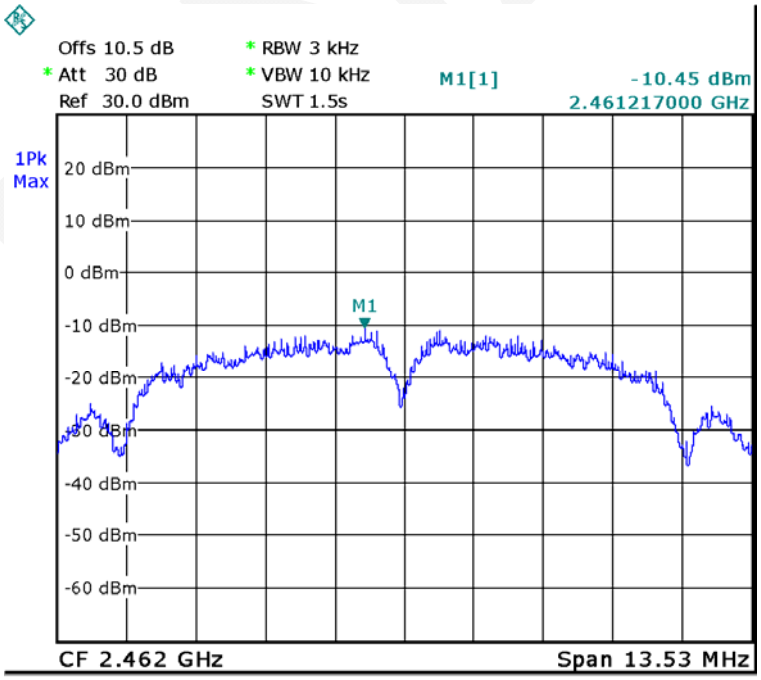


Power Spectral Density, 802.11b Middle Channel



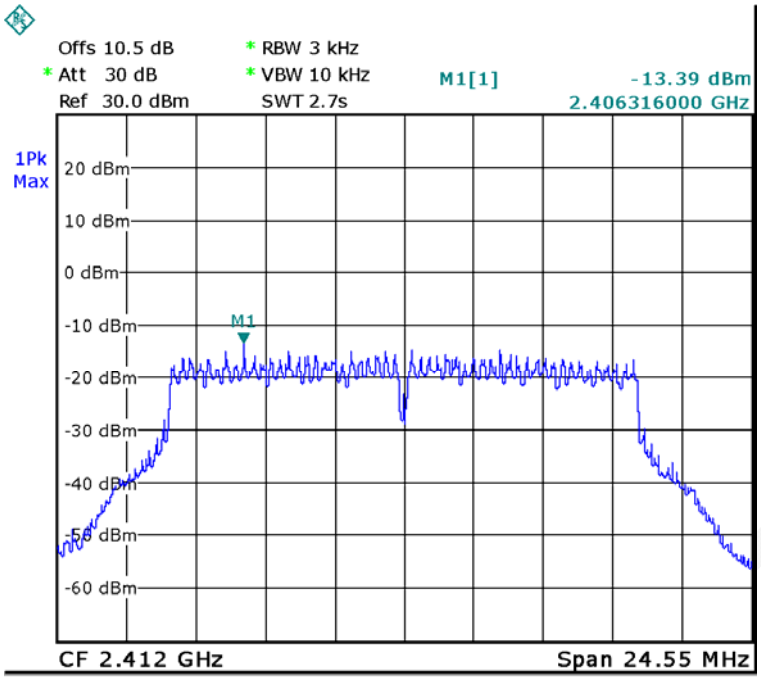
Date: 28.JUN.2017 15:41:07

Power Spectral Density, 802.11b High Channel



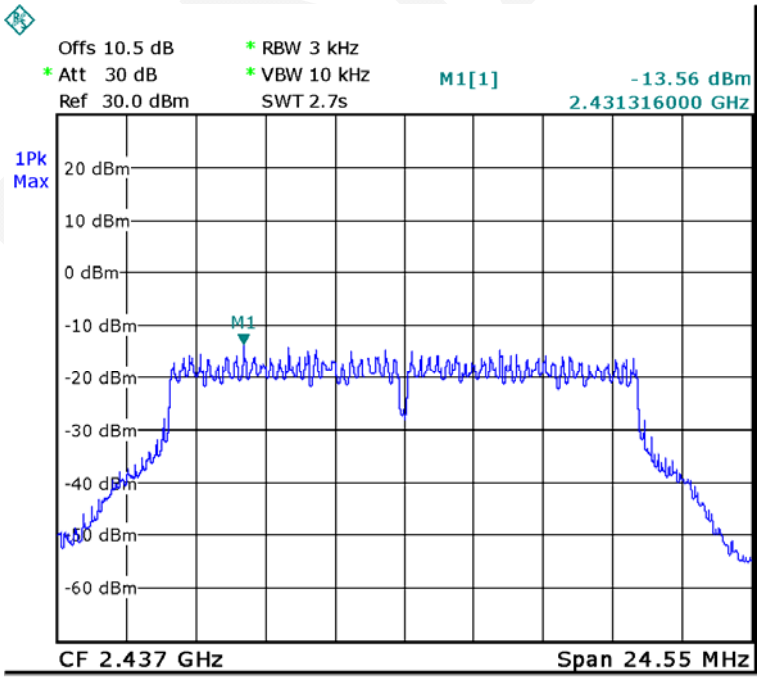
Date: 28.JUN.2017 15:42:02

Power Spectral Density, 802.11g Low Channel



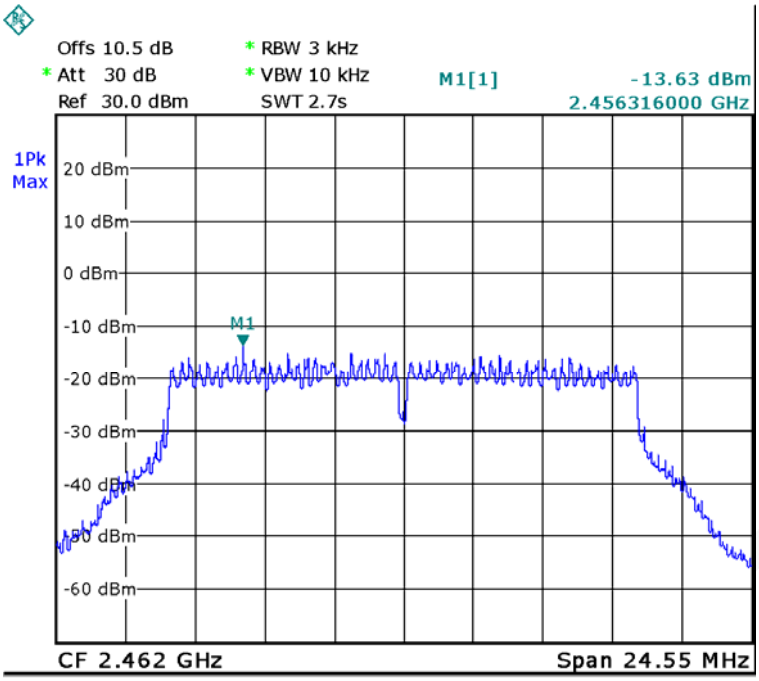
Date: 28.JUN.2017 15:43:46

Power Spectral Density, 802.11g Middle Channel



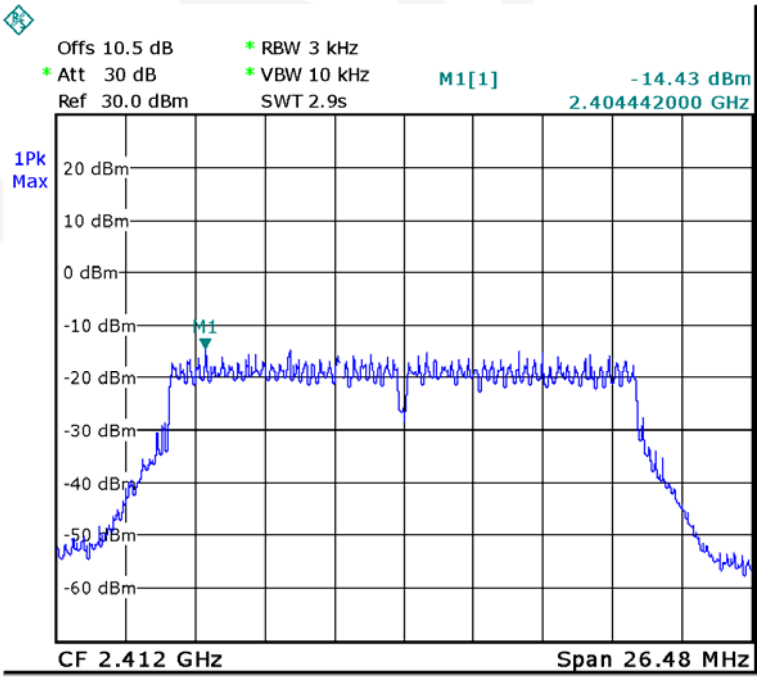
Date: 28.JUN.2017 15:44:48

Power Spectral Density, 802.11g High Channel



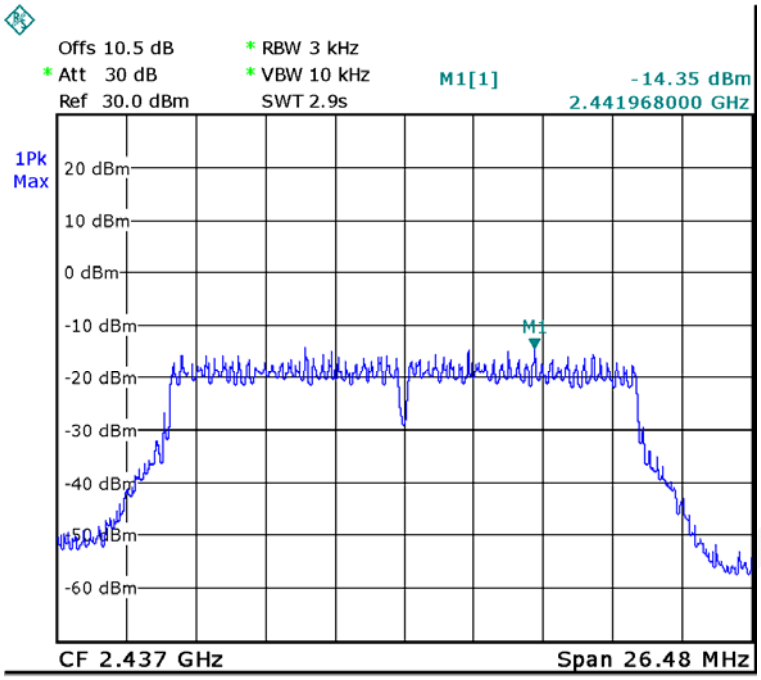
Date: 28.JUN.2017 15:45:20

Power Spectral Density, 802.11n-HT20 Low Channel



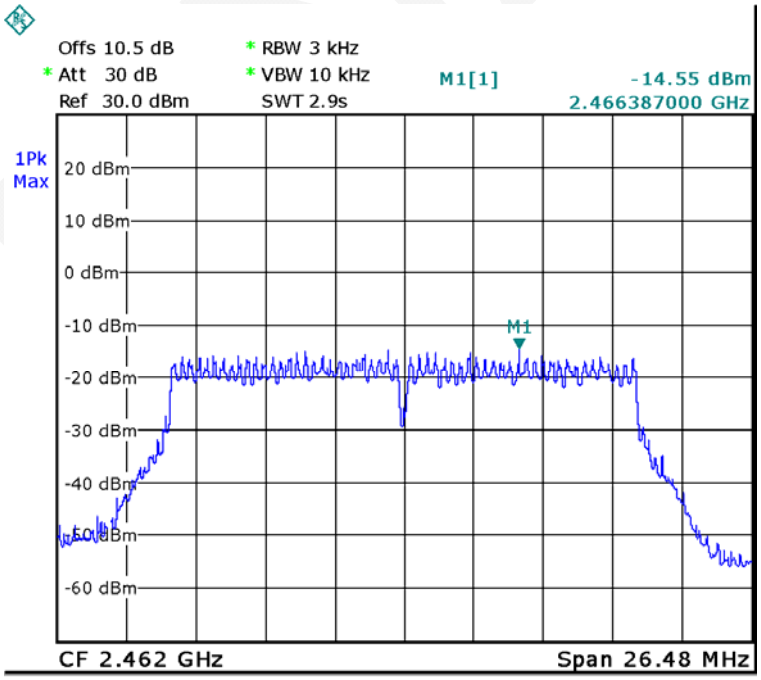
Date: 28.JUN.2017 15:46:39

Power Spectral Density, 802.11n-HT20 Middle Channel



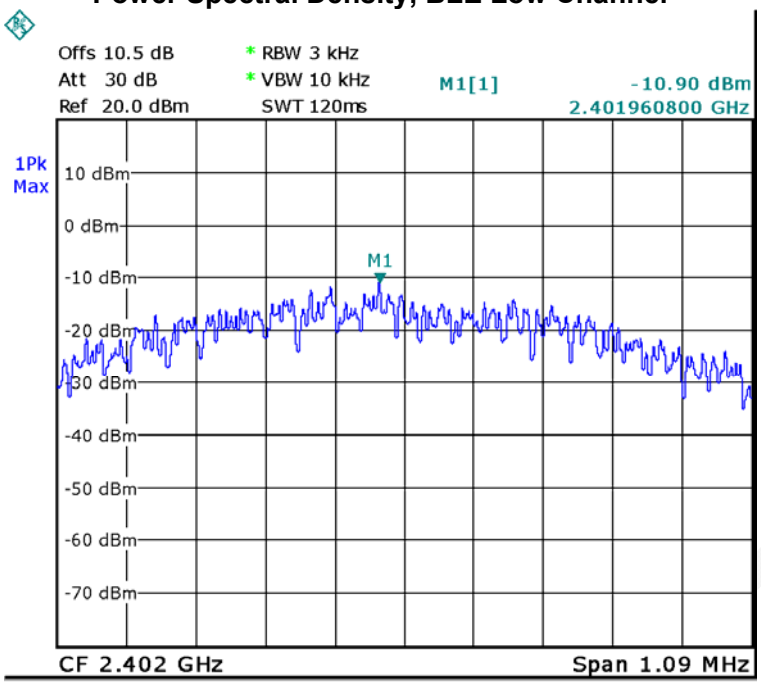
Date: 28.JUN.2017 15:47:14

Power Spectral Density, 802.11n-HT20 High Channel



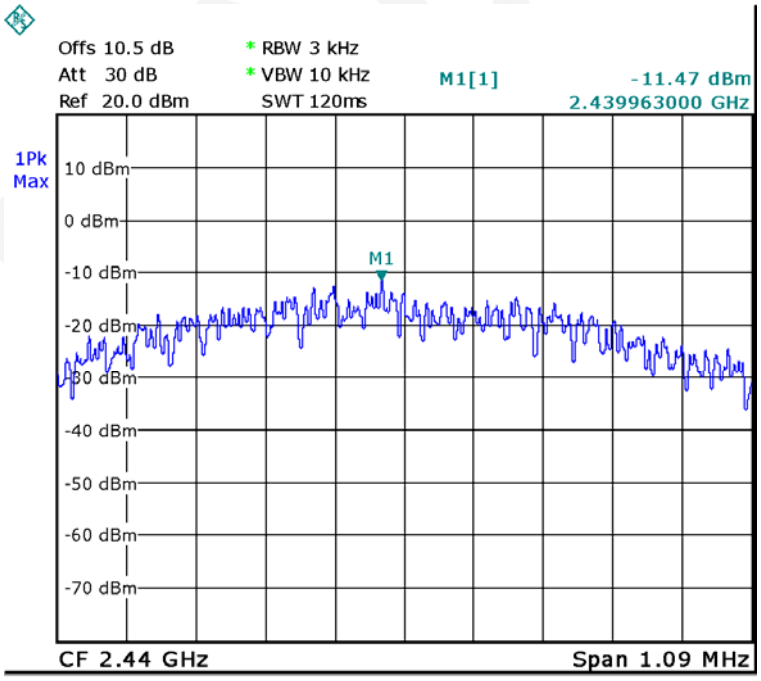
Date: 28.JUN.2017 15:47:58

Power Spectral Density, BLE Low Channel



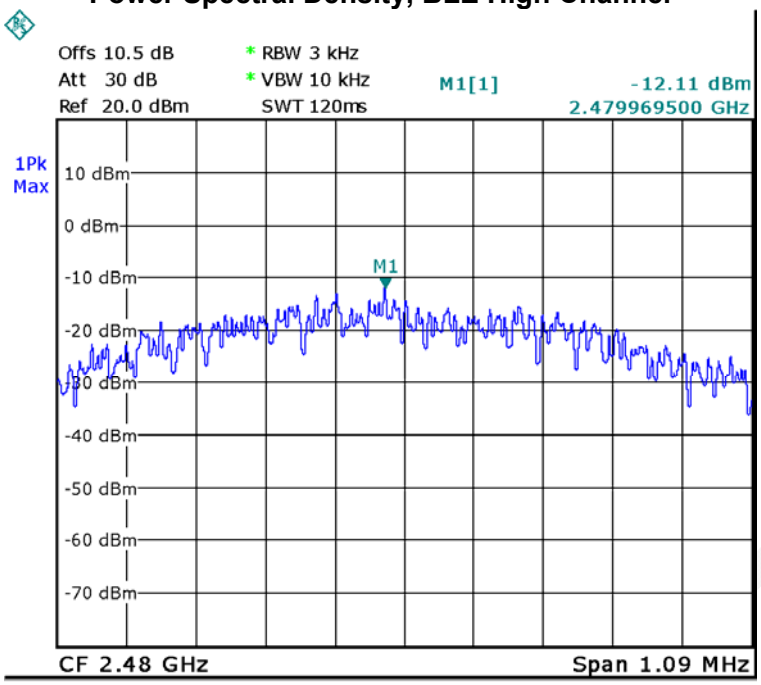
Date: 28.JUN.2017 14:42:56

Power Spectral Density, BLE Middle Channel



Date: 28.JUN.2017 14:42:24

Power Spectral Density, BLE High Channel



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