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: 2AAGEVTTABLET-5081

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

Report Number:	RSC181119002-0C
Report Date:	2018-12-06
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

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Chengdu). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*".

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***Chengdu Vantron Technology, Ltd.***'s product, model number: **VT-TABLET-5081 (FCC ID: 2AAGEVTTABLET-5081)** or the "EUT" as referred to in this report was the **Tablet Computer.**

Mechanical Description of EUT

The EUT was measured approximately: 235 mm (L) x 153 mm (W) x 21 mm (H).
Rated input voltage: DC 3.7V rechargeable Li-ion battery or DC 5V from adapter

Adapter Information
Manufacturer: Anthin
Model: APS318-0530
Input: AC 100-220V; 50/60Hz
Output: DC 5V, 3A

Note: The products, test model: VT-TABLET-5081, multiple model: ETAB-8-VAN-01-FNQ. Their differences were presented in Product Difference Statement provided by the applicant. So we selected model VT-TABLET-5081 to fully test.

**All measurement and test data in this report was gathered from final production sample, serial number: 181119002/01 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2018-11-19, and EUT conformed to 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: 2AAGEVTTABLET-5081
FCC Part 15C DSS submissions with FCC ID: 2AAGEVTTABLET-5081
FCC Part 15E NII submissions with FCC ID: 2AAGEVTTABLET-5081
FCC Part 15C DXX submissions with FCC ID: 2AAGEVTTABLET-5081

Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.93 dB
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.63 dB
		V	4.88 dB
	200MHz-1GHz	H	5.02 dB
		V	6.06 dB
	1GHz-6GHz		4.51 dB
	6GHz-18GHz		4.49 dB
	18GHz-40GHz		5.48 dB
Conducted RF Power			±0.61dB
Power Spectrum Density			±0.61dB
Occupied Bandwidth			±5%
Conducted Emission			±1.5dB
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 v05.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured in testing mode, which was provided by manufacturer.

For Wi-Fi mode, 802.11b, 802.11g, and 802.11n-HT20 mode, 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	-	-

EUT were tested with Channel 1, 6 and 11.

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

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

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

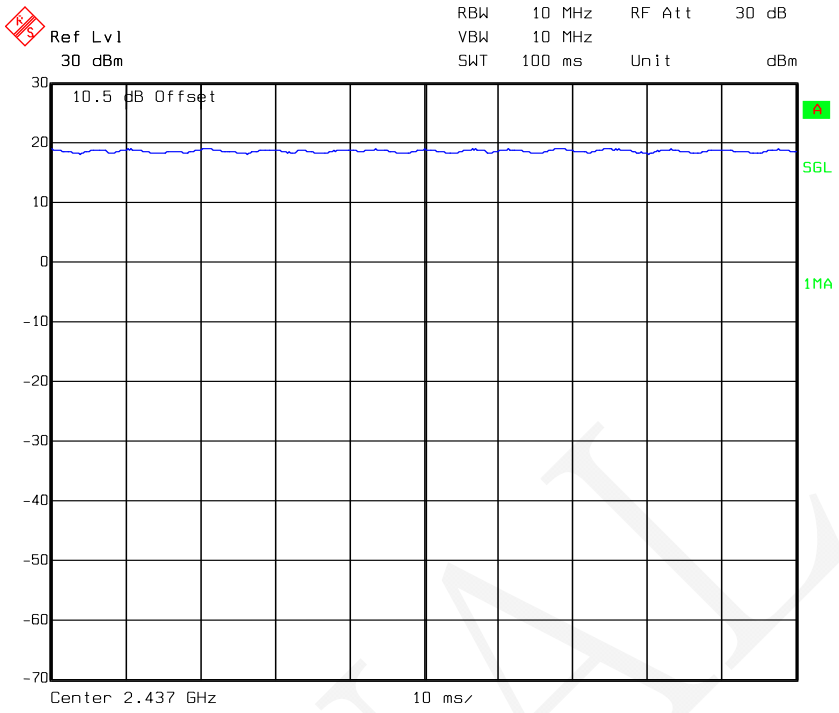
The worst condition (maximum power with maximum duty cycle) was setting by the software as following table:

Test Mode	Test Software Version	RF test tool		
802.11b	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	CCK 1M	CCK 1M	CCK 1M
	Power Level Setting Antenna	Default	Default	Default
802.11g	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	OFDM 6M	OFDM 6M	OFDM 6M
	Power Level Setting Antenna	Default	Default	Default
802.11n-HT20	Test Frequency	2412MHz	2437MHz	2462MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting Antenna	Default	Default	Default
BLE	Test Frequency	2402MHz	2440MHz	2480MHz
	Data Rate	Default	Default	Default
	Power Level Setting	Default	Default	Default

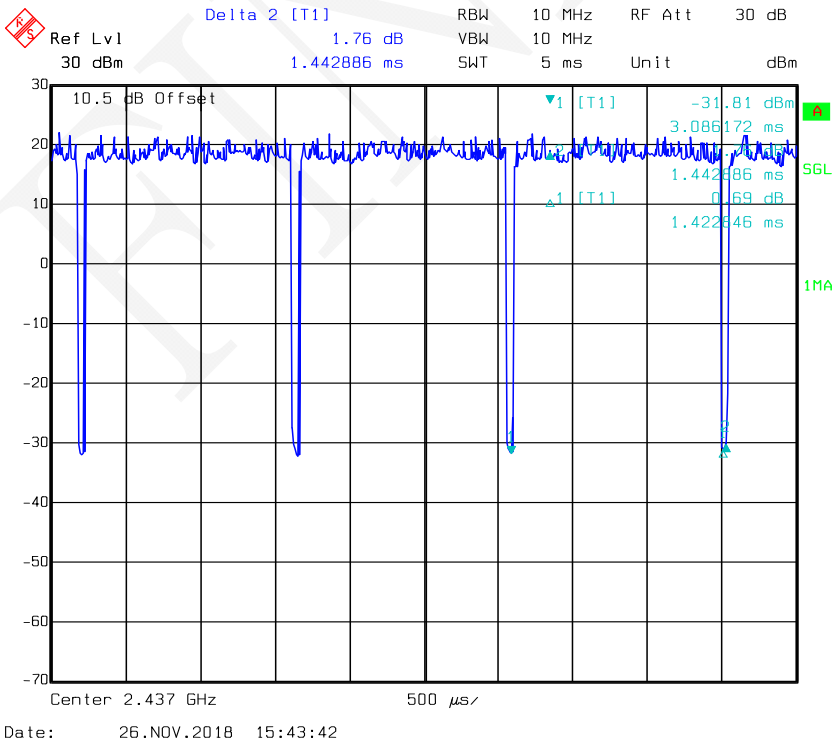
Duty Cycle information is below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	100	100	100
802.11g	1.42	1.44	98.61
802.11n-HT20	1.33	1.35	98.52
BLE	100	100	100

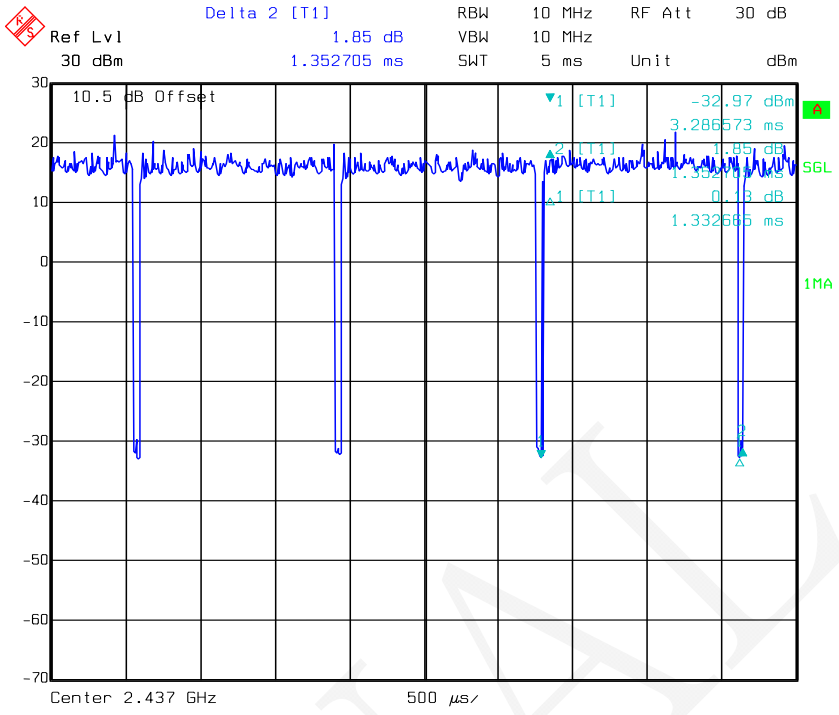
802.11b



802.11g



802.11n-HT20



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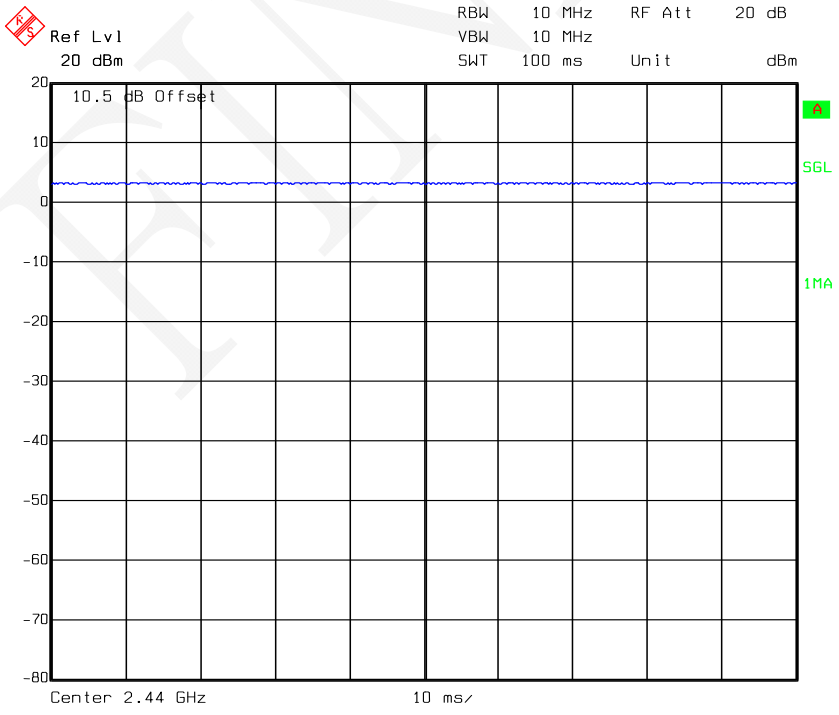
Bluetooth LE mode



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Support Equipment List and Details

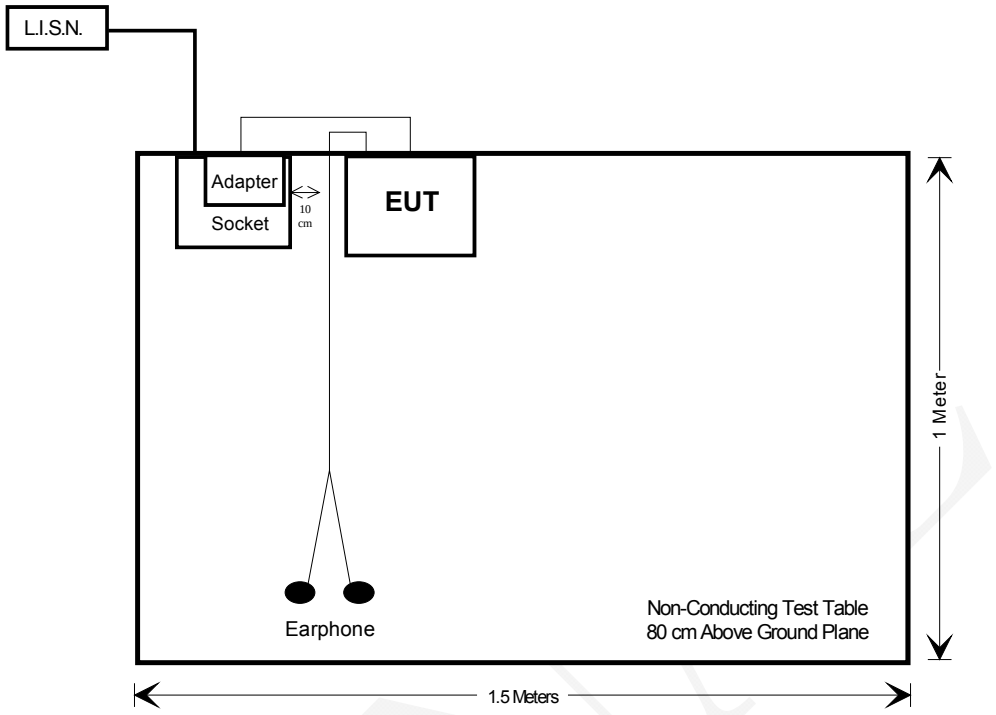
Manufacturer	Description	Model	Serial Number
CHOETECH	Wireless Charger	T517	None
HUAWEI	Adapter	HW-05200C01	None
HUAWEI	Earphone	P9	None

External I/O Cable

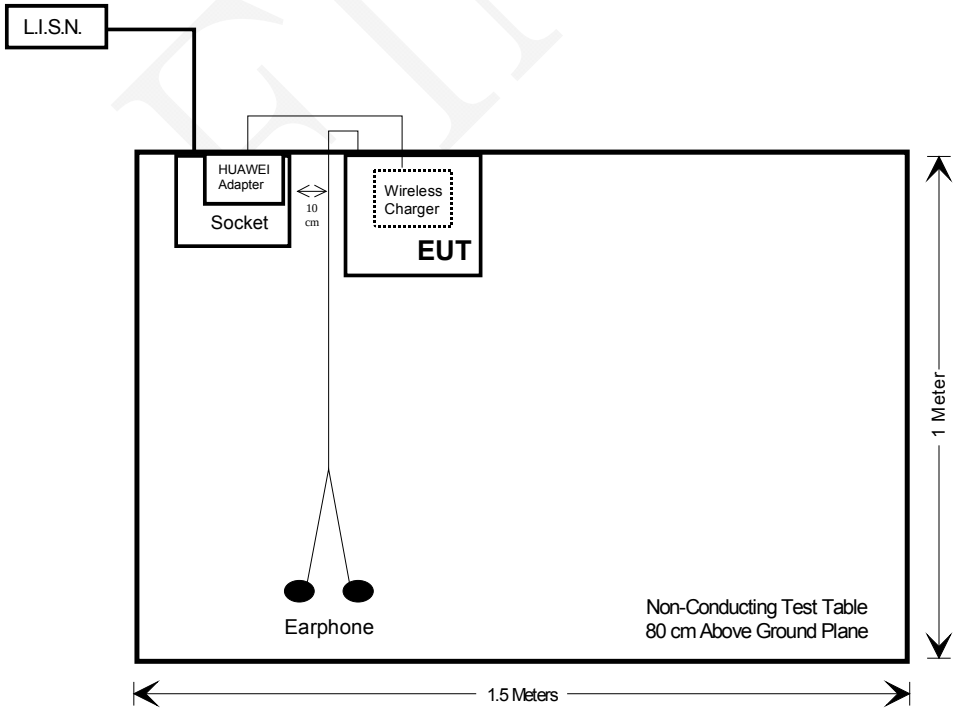
Cable Description	Length (m)	From	To
Adapter Mode			
Unshielded Power Cable	1.2	Adapter	EUT
Unshielded Earphone Cable	1.0	EUT	Earphone
Wireless Charging Mode			
Unshielded Power Cable	1.2	HUA WEI Adapter	Wireless Charger
Unshielded Earphone Cable	1.0	EUT	Earphone

Block Diagram of Test Setup

Conducted Emissions
Adapter Mode



Wireless Charging Mode



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	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

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2018-04-18	2019-04-19
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2018-04-18	2019-04-19
HP	RF Limiter	11947A	3107A01270	2018-08-13	2019-08-12
Unknown	Conducted Cable	L-E003	000003	2018-11-02	2019-11-01
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	N/A	N/A
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2020-05-17
Sonoma	Pre-Amplifier	310N	186684	2018-08-24	2019-08-23
Rohde & Schwarz	Spectrum Analyzer	FSU26	20083	2018-05-09	2019-05-08
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2018-04-18	2019-04-17
A.H. Systems, Inc	Amplifier	PAM-0118P	467	2018-10-19	2019-10-18
EM Electronics	RF Pre-Amplifier	EM18G40	060725	2018-03-28	2019-03-27
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2017-05-19	2020-05-18
ETS	Horn Antenna	3115	003-6076	2017-05-19	2020-05-18
A.H. Systems, Inc	Horn Antenna	SAS-574	510	2017-05-19	2020-05-18
INMET	Attenuator	18N-6dB	64671	2018-10-27	2019-10-26
Sinoscite.,Co Ltd	Reject Band Filter	BSF 2402-2480MN	0898-005	2018-11-10	2019-11-09
Unknown	RF Cable (below 1GHz)	L-E005	000005	2018-10-27	2019-10-26
Unknown	RF Cable (below 1GHz)	T-E128	000128	2018-11-10	2019-11-09
Unknown	RF Cable (below 1GHz)	T-E129	000129	2018-11-10	2019-11-09
Unknown	RF Cable (above 1GHz)	T-E069	000069	2018-11-10	2019-11-09
Micro-coax	RF Cable (above 1GHz)	T-E209	MFR 64639 2310	2018-03-14	2019-03-13
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	N/A	N/A

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2018-05-09	2019-05-08
WEINSCHEL ENGINEERING	Attenuator	1A10dB	AA4135	2018-11-10	2019-11-09
Agilent	USB Wideband Power Sensor	U2021XA	MY53320008	2018-01-18	2019-01-17
E-Microwave	DC Block	EMDCB-00036	OE01304225	2018-10-27	2019-10-26
Unknown	RF Cable	No	000007	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).

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 2.4 G Wi-Fi mode

Please refer to the SAR Report RSC181123050-20

For BLE mode

The max conducted power including tune-up tolerance is 4.5 dBm (3.16mW).
[(max. power of channel, mW)/(min. test separation distance, mm)][√f(GHz)]
= 2.82/5*(√2.48) = 0.9 < 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 WIFI/BT antenna and one NFC antenna, which are permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

RF Module	Manufacturer	Antenna Model	Antenna Gain	Antenna Type
2.4G WLAN	shenzhen bogesi communication technology co.,ltd	WCC-005A	3dBi	FPC Antenna
5G WLAN				
Bluetooth				
NFC	SHENZHEN SUNSHINE GOOD ELECTRONICS CO.,LTD	P134FQ1990A0	0dBi	FPC Antenna

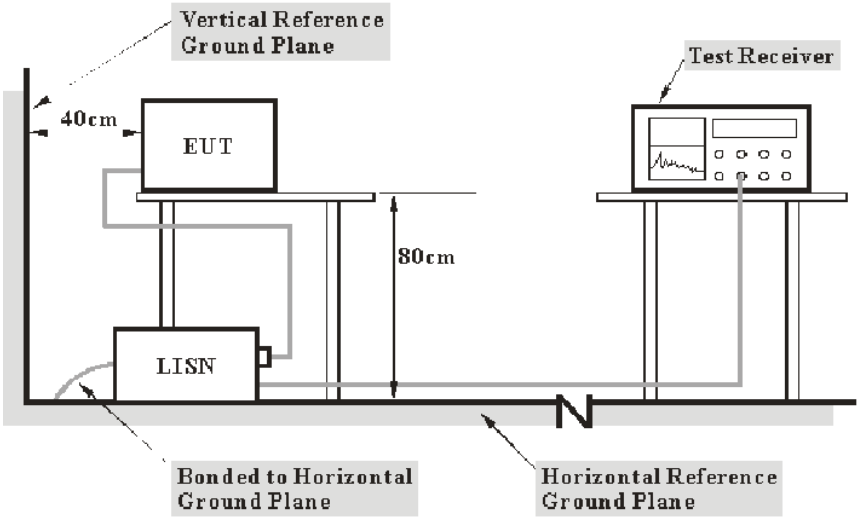
Result: Compliance.

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 AC 120V/60Hz.

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 L.I.S.N.

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:	24 °C
Relative Humidity:	56 %
ATM Pressure:	94.2 kPa

The testing was performed by Tom Tang on 2018-11-20.

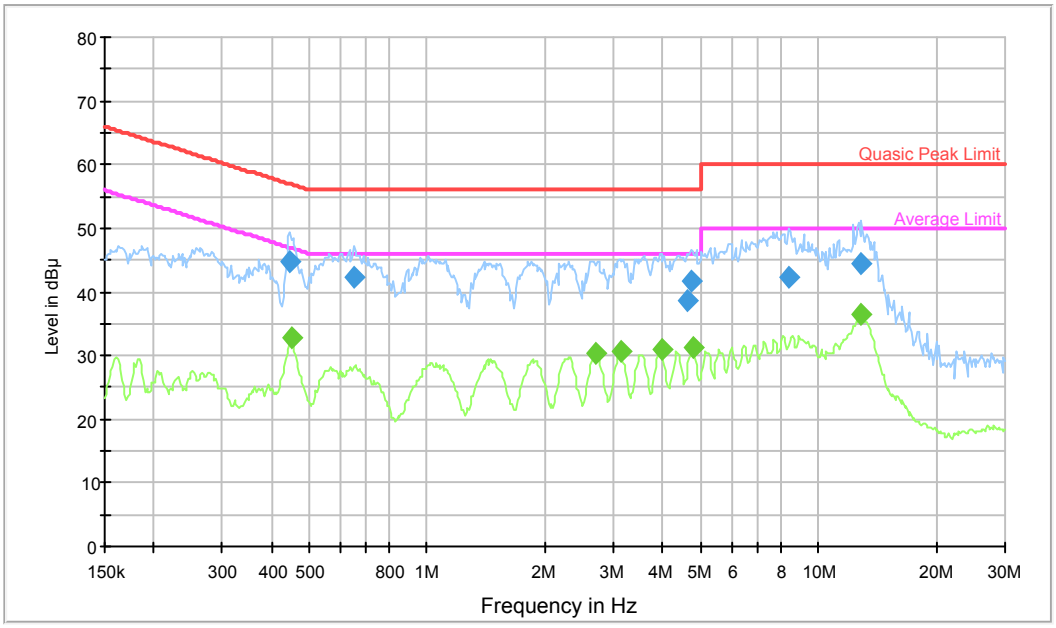
Test Mode: Transmitting

Wi-Fi Mode

802.11n20-Low channel - Worst Case

Adapter Mode

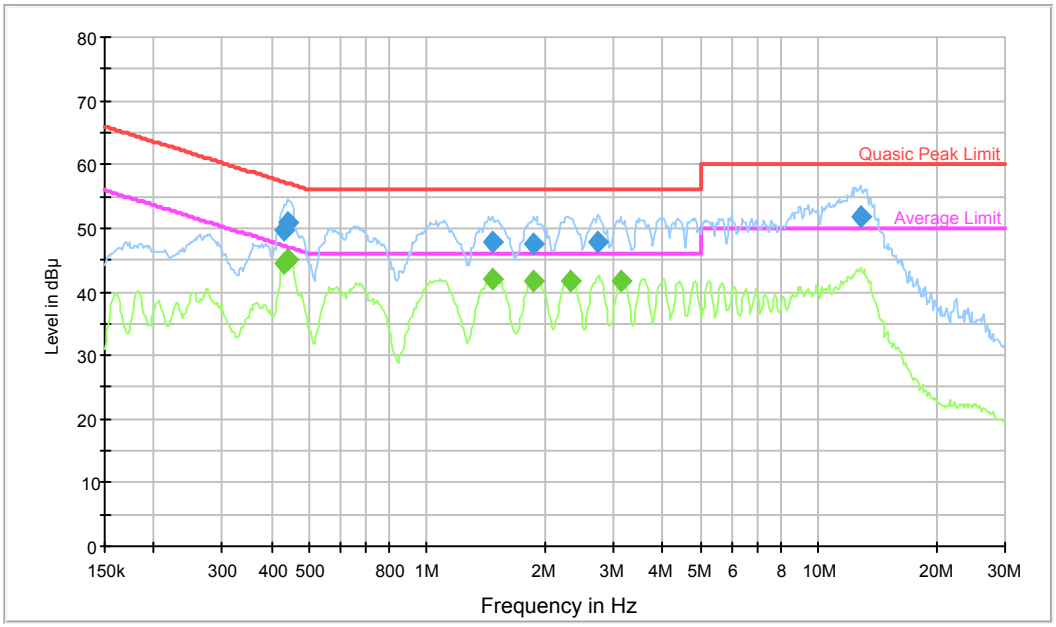
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.446873	44.7	9.000	L1	19.6	12.2	56.9
0.649874	42.3	9.000	L1	19.6	13.7	56.0
4.614454	38.8	9.000	L1	19.8	17.2	56.0
4.726090	41.5	9.000	L1	19.8	14.5	56.0
8.388036	42.3	9.000	L1	19.9	17.7	60.0
12.898197	44.4	9.000	L1	20.1	15.6	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.450448	32.7	9.000	L1	19.6	14.2	46.9
2.684134	30.4	9.000	L1	19.8	15.6	46.0
3.122873	30.8	9.000	L1	19.8	15.2	46.0
3.966160	31.0	9.000	L1	19.8	15.0	46.0
4.763898	31.2	9.000	L1	19.8	14.8	46.0
12.898197	36.6	9.000	L1	20.1	13.4	50.0

AC120 V, 60 Hz, Neutral:

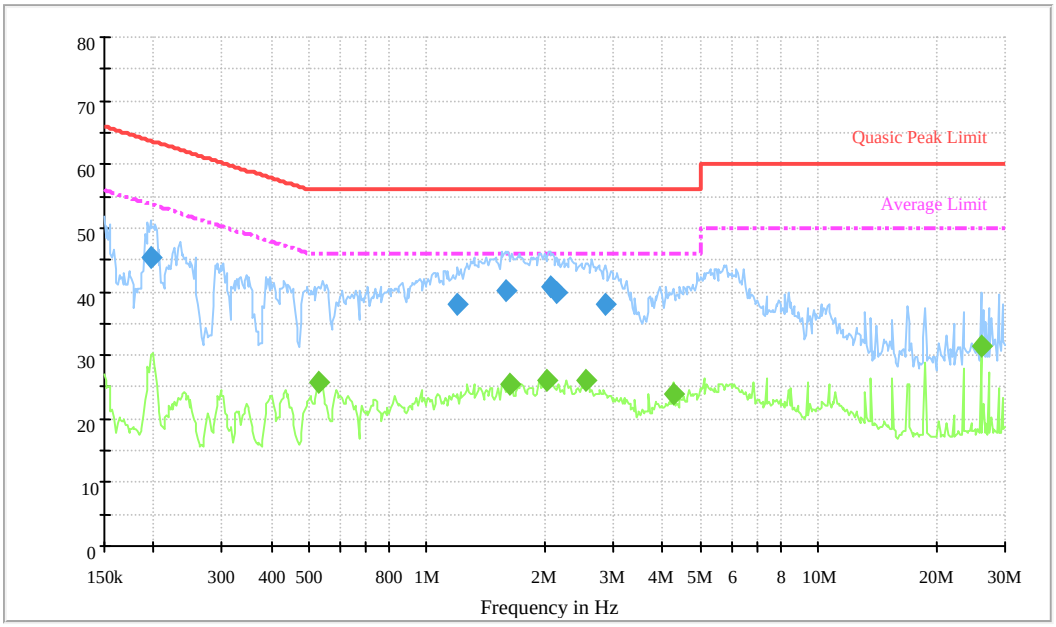


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.429420	49.6	9.000	N	19.6	7.7	57.3
0.443327	50.9	9.000	N	19.6	6.1	57.0
1.464886	47.9	9.000	N	19.8	8.1	56.0
1.875341	47.5	9.000	N	19.8	8.5	56.0
2.727252	47.7	9.000	N	19.9	8.3	56.0
12.795830	51.7	9.000	N	20.2	8.3	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.429420	44.4	9.000	N	19.6	2.9	47.3
0.443327	45.0	9.000	N	19.6	2.0	47.0
1.476605	41.9	9.000	N	19.8	4.1	46.0
1.875341	41.7	9.000	N	19.8	4.3	46.0
2.325491	41.8	9.000	N	19.9	4.2	46.0
3.122873	41.7	9.000	N	19.9	4.3	46.0

Wireless Charging Mode

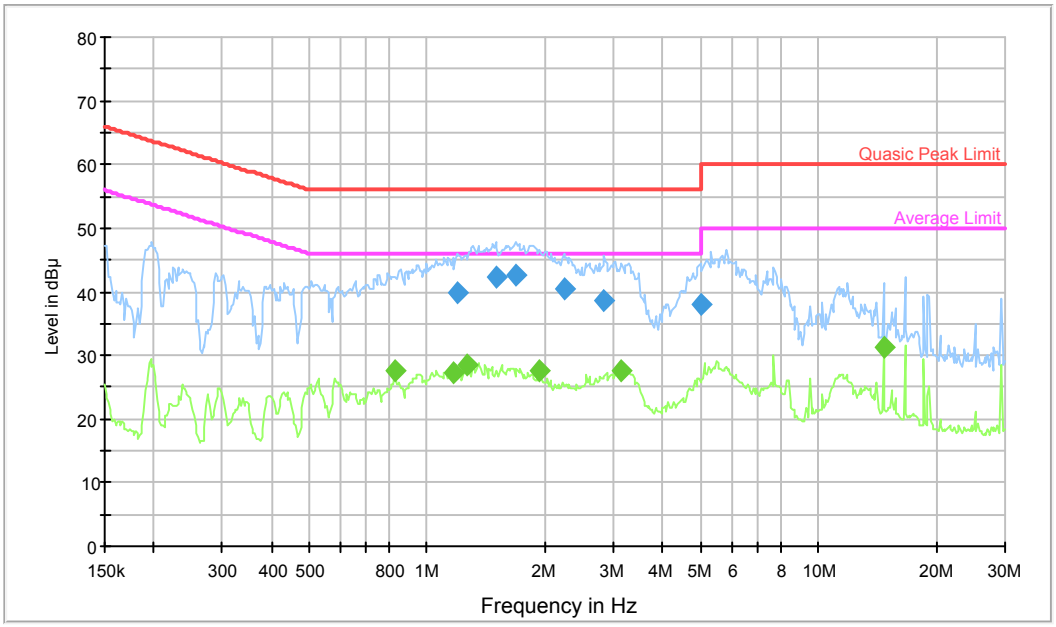
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.196675	45.4	9.000	L1	19.4	18.3	63.7
1.200302	37.9	9.000	L1	19.7	18.1	56.0
1.586387	40.2	9.000	L1	19.7	15.8	56.0
2.063510	40.9	9.000	L1	19.7	15.1	56.0
2.147382	39.7	9.000	L1	19.7	16.3	56.0
2.860806	38.1	9.000	L1	19.8	17.9	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.532496	25.7	9.000	L1	19.5	20.3	46.0
1.624765	25.5	9.000	L1	19.7	20.5	46.0
2.030886	26.2	9.000	L1	19.7	19.8	46.0
2.558827	26.2	9.000	L1	19.8	19.8	46.0
4.261034	23.9	9.000	L1	19.8	22.1	46.0
26.004938	29.8	9.000	L1	20.3	20.2	50.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
1.190776	39.9	9.000	N	19.8	16.1	56.0
1.500325	42.4	9.000	N	19.8	13.6	56.0
1.690804	42.7	9.000	N	19.8	13.3	56.0
2.234662	40.5	9.000	N	19.9	15.5	56.0
2.838101	38.5	9.000	N	19.9	17.5	56.0
4.997188	38.2	9.000	N	20.0	17.8	56.0

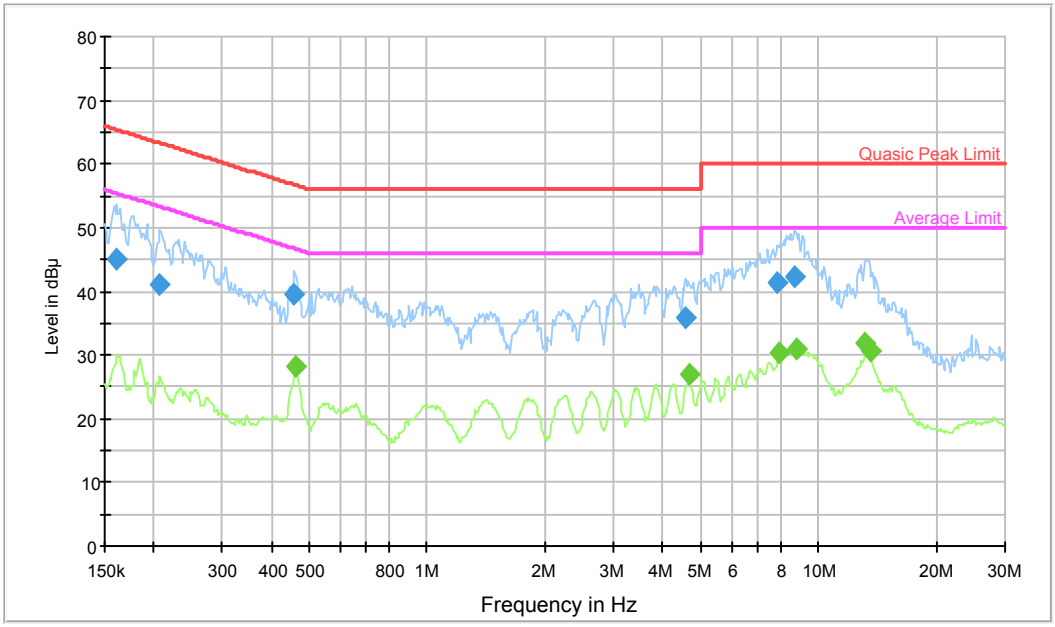
Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.825364	27.7	9.000	N	19.7	18.3	46.0
1.162648	27.3	9.000	N	19.8	18.7	46.0
1.259081	28.5	9.000	N	19.8	17.5	46.0
1.936076	27.4	9.000	N	19.9	18.6	46.0
3.147856	27.6	9.000	N	19.9	18.4	46.0
14.652020	31.1	9.000	N	20.3	18.9	50.0

BLE Mode

Low channel-worst case

Adapter Mode

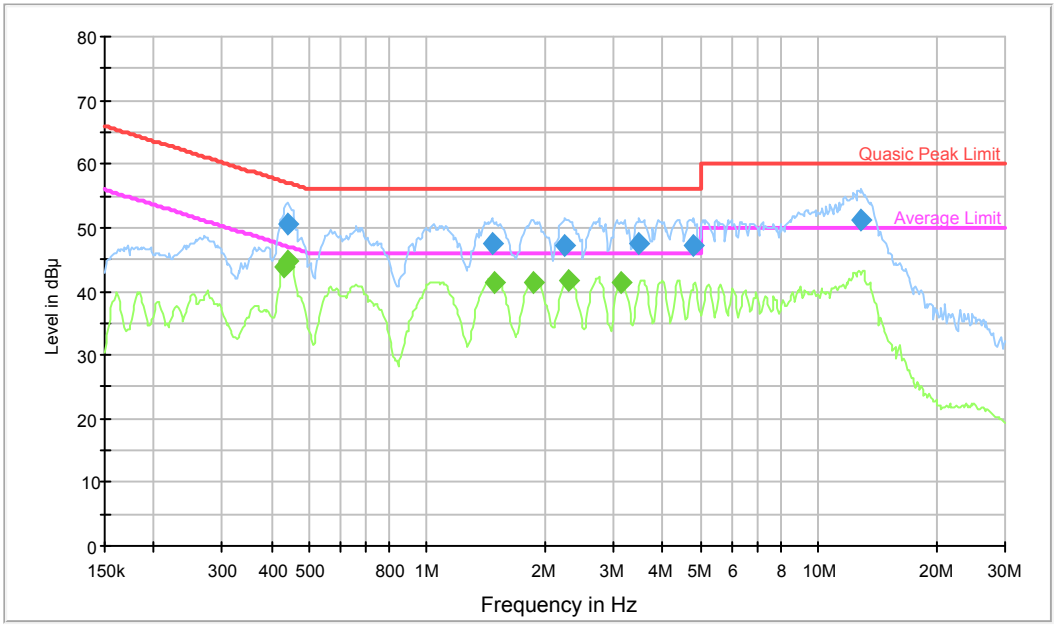
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.161152	45.0	9.000	L1	19.5	20.4	65.4
0.207957	41.1	9.000	L1	19.4	22.2	63.3
0.457684	39.6	9.000	L1	19.6	17.1	56.7
4.577832	35.9	9.000	L1	19.8	20.1	56.0
7.870023	41.4	9.000	L1	19.9	18.6	60.0
8.659691	42.2	9.000	L1	19.9	17.8	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.461346	28.2	9.000	L1	19.5	18.5	46.7
4.688581	27.0	9.000	L1	19.8	19.0	46.0
7.932983	30.3	9.000	L1	19.9	19.7	50.0
8.798800	31.0	9.000	L1	20.0	19.0	50.0
13.210237	31.9	9.000	L1	20.1	18.1	50.0
13.638064	30.5	9.000	L1	20.1	19.5	50.0

AC120 V, 60 Hz, Neutral:

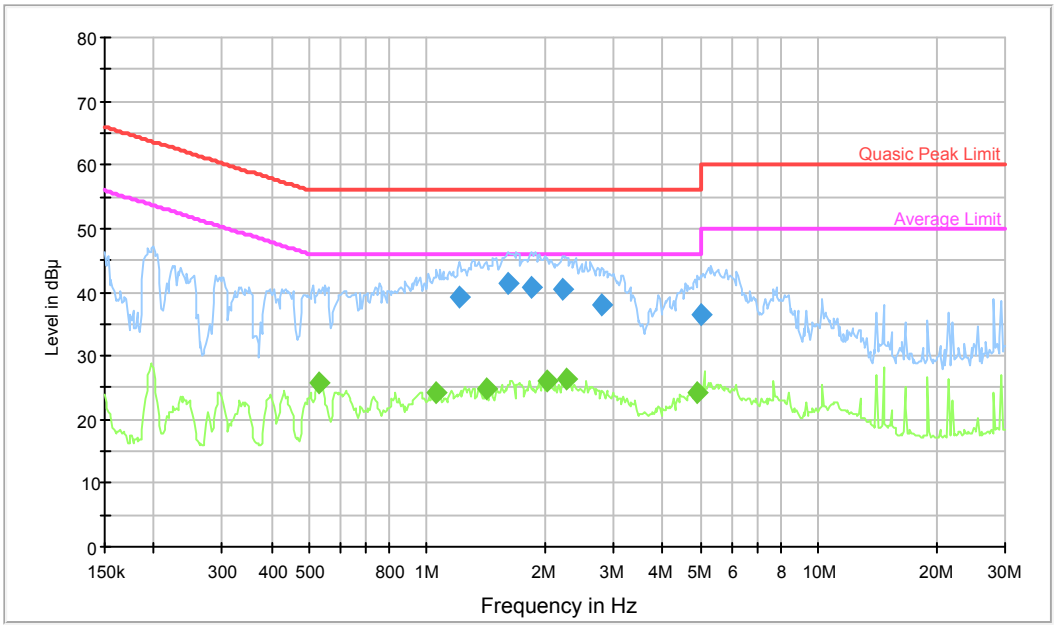


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.443327	50.5	9.000	N	19.6	6.5	57.0
1.464886	47.6	9.000	N	19.8	8.4	56.0
2.252540	47.3	9.000	N	19.9	8.7	56.0
3.491417	47.5	9.000	N	19.9	8.5	56.0
4.802010	47.3	9.000	N	20.0	8.7	56.0
12.898197	51.1	9.000	N	20.2	8.9	60.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.429420	43.9	9.000	N	19.6	3.4	47.3
0.443327	44.8	9.000	N	19.6	2.2	47.0
1.488418	41.3	9.000	N	19.8	4.7	46.0
1.875341	41.4	9.000	N	19.8	4.6	46.0
2.307034	41.7	9.000	N	19.9	4.3	46.0
3.147856	41.4	9.000	N	19.9	4.6	46.0

Wireless Charging Mode

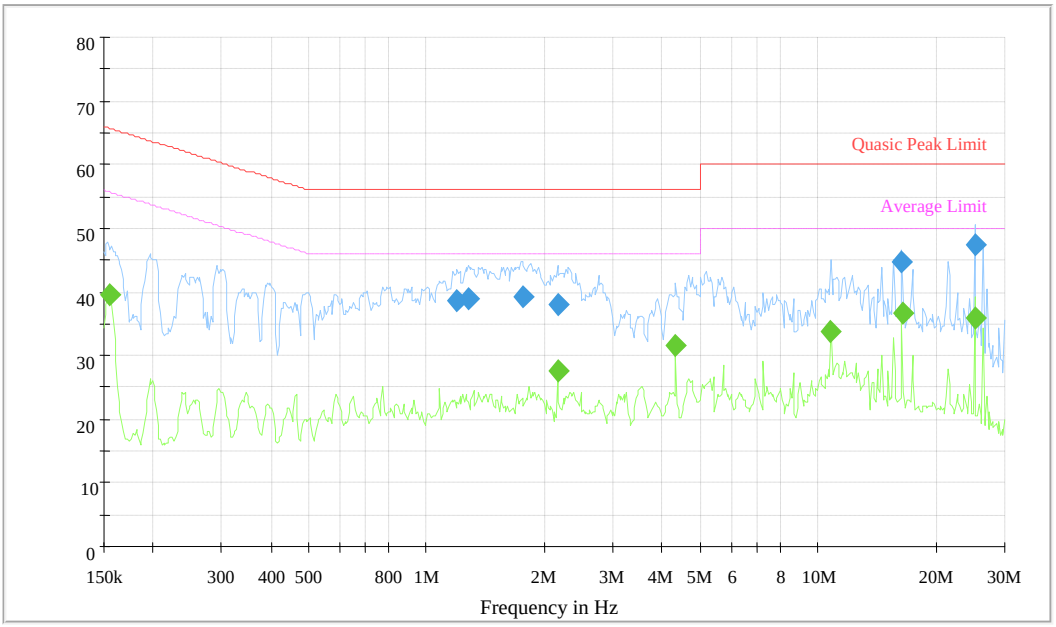
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
1.209904	39.4	9.000	L1	19.7	16.6	56.0
1.611870	41.3	9.000	L1	19.7	14.7	56.0
1.845692	40.7	9.000	L1	19.7	15.3	56.0
2.216927	40.5	9.000	L1	19.7	15.5	56.0
2.793231	38.1	9.000	L1	19.8	17.9	56.0
4.997188	36.6	9.000	L1	19.8	19.4	56.0

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dBµV)
0.532496	25.7	9.000	L1	19.5	20.3	46.0
1.056628	24.1	9.000	L1	19.6	21.9	46.0
1.418932	24.9	9.000	L1	19.7	21.1	46.0
2.030886	26.1	9.000	L1	19.7	19.9	46.0
2.270560	26.3	9.000	L1	19.7	19.7	46.0
4.918182	24.3	9.000	L1	19.8	21.7	46.0

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
1.200302	38.5	9.000	N	19.8	17.5	56.0
1.279307	39.0	9.000	N	19.8	17.0	56.0
1.759527	39.2	9.000	N	19.8	16.8	56.0
2.164561	38.1	9.000	N	19.9	17.9	56.0
16.381172	44.3	9.000	N	20.3	15.7	60.0
25.189161	45.8	9.000	N	20.4	14.2	60.0

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corrected Factor (dB)	Margin (dB)	Limit (dB µ V)
0.154858	39.5	9.000	N	19.5	16.2	55.7
2.164561	27.7	9.000	N	19.9	18.3	46.0
4.329484	31.5	9.000	N	20.0	14.5	46.0
10.824237	32.5	9.000	N	20.2	17.5	50.0
16.381172	35.1	9.000	N	20.3	14.9	50.0
25.189161	34.9	9.000	N	20.4	15.1	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

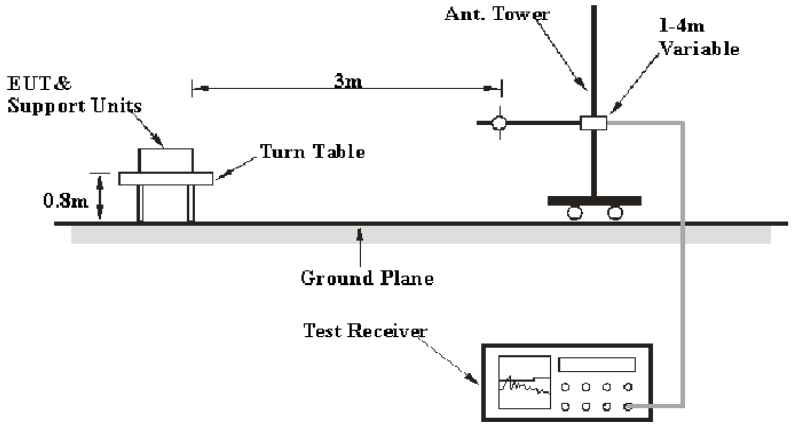
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

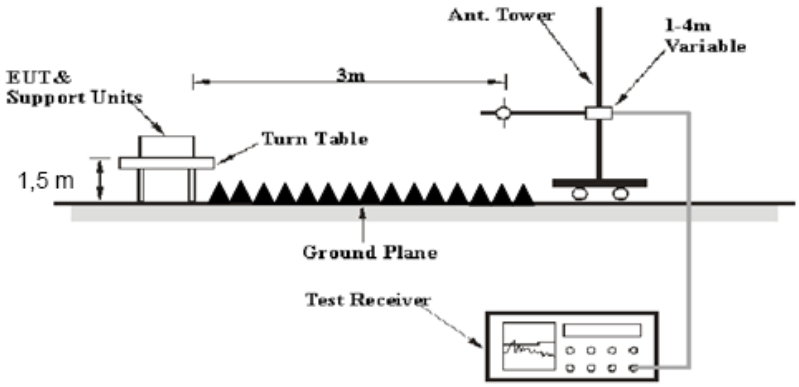
FCC §15.247 (d); §15.209; §15.205;

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.

The adapter was connected to AC 120V/60Hz.

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 Setup was set with the following configurations:

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

Frequency Range	RBW	Video B/W	Duty Cycle	Measurement
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:	23 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-22.*

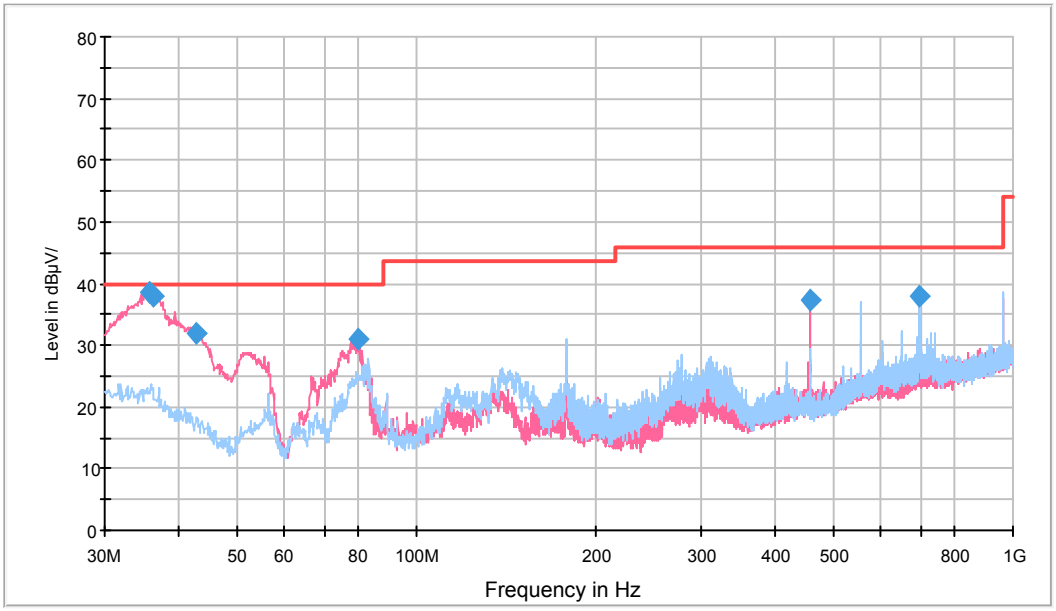
Test Mode: Transmitting

Wi-Fi Mode

1) 30 MHz to 1 GHz

802.11n20-Low channel - Worst Case

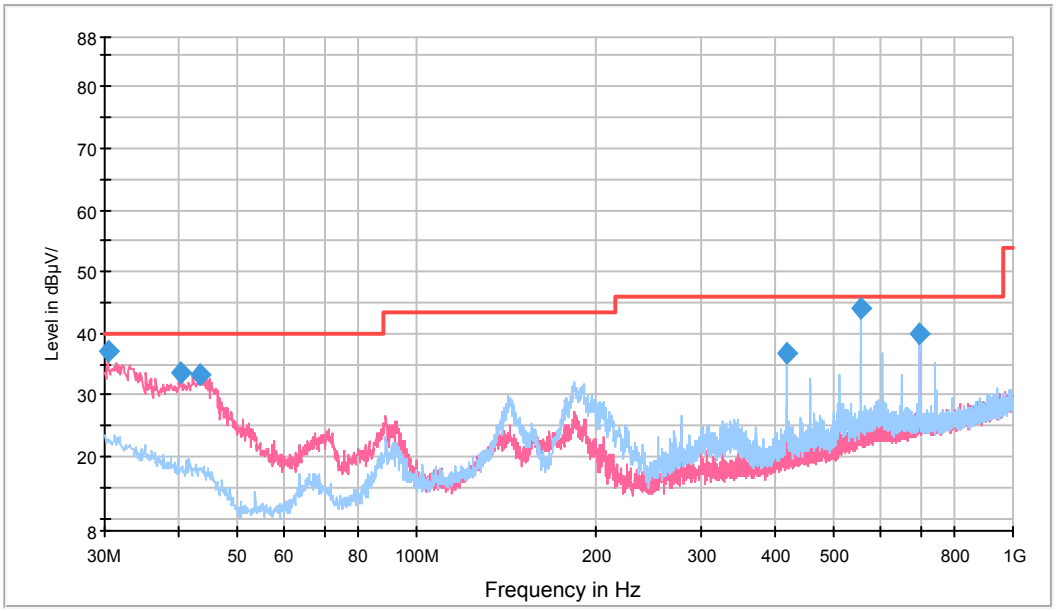
Adapter Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
35.698750	38.6	100.0	V	227.0	-8.6	*1.4	40.0
36.305000	37.8	100.0	V	219.0	-9.0	*2.2	40.0
42.731250	31.9	100.0	V	256.0	-13.0	8.1	40.0
79.955000	30.9	120.0	V	90.0	-16.8	9.1	40.0
456.072500	37.4	135.0	V	302.0	-7.9	8.6	46.0
696.268750	38.1	150.0	H	45.0	-3.0	7.9	46.0

**Within measurement uncertainty!*

Wireless Charging Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
30.363750	37.0	100.0	V	61.0	-5.0	*3.0	40.0
40.306250	33.6	100.0	V	125.0	-11.4	6.4	40.0
43.216250	33.2	100.0	V	297.0	-13.2	6.8	40.0
417.757500	36.8	100.0	H	321.0	-8.3	9.2	46.0
556.952500	44.1	150.0	H	324.0	-5.1	*1.9	46.0
696.390000	39.8	150.0	H	134.0	-3.0	6.2	46.0

**Within measurement uncertainty!*

2) 1 GHz-25 GHz:

802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBµV	PK/AV	H/V	(dB/m)	dB	dB	dBµV/m	dBµV/m	dB
Frequency: 2412MHz									
2412	67.65	PK	H	28.74	3.07	0.00	99.46	N/A	N/A
2412	62.61	AV	H	28.74	3.07	0.00	94.42	N/A	N/A
2412	71.87	PK	V	28.74	3.07	0.00	103.68	N/A	N/A
2412	67.21	AV	V	28.74	3.07	0.00	99.02	N/A	N/A
2390	29.28	PK	V	28.67	3.06	0.00	61.01	74.00	12.99
2390	16.51	AV	V	28.67	3.06	0.00	48.24	54.00	5.76
4824	55.47	PK	V	33.91	4.36	44.72	49.02	74.00	24.98
4824	50.27	AV	V	33.91	4.36	44.72	43.82	54.00	10.18
7236	54.87	PK	V	36.43	5.42	44.00	52.72	74.00	21.28
7236	48.43	AV	V	36.43	5.42	44.00	46.28	54.00	7.72
Frequency: 2437MHz									
2437	68.15	PK	H	28.81	3.09	0.00	100.05	N/A	N/A
2437	63.25	AV	H	28.81	3.09	0.00	95.15	N/A	N/A
2437	71.64	PK	V	28.81	3.09	0.00	103.54	N/A	N/A
2437	66.95	AV	V	28.81	3.09	0.00	98.85	N/A	N/A
4874	56.10	PK	V	34.05	4.39	44.72	49.82	74.00	24.18
4874	51.63	AV	V	34.05	4.39	44.72	45.35	54.00	8.65
7311	54.70	PK	V	36.54	5.44	44.20	52.48	74.00	21.52
7311	48.13	AV	V	36.54	5.44	44.20	45.91	54.00	8.09
Frequency: 2462MHz									
2462	69.17	PK	H	28.89	3.10	0.00	101.16	N/A	N/A
2462	64.36	AV	H	28.89	3.10	0.00	96.35	N/A	N/A
2462	71.51	PK	V	28.89	3.10	0.00	103.50	N/A	N/A
2462	66.81	AV	V	28.89	3.10	0.00	98.80	N/A	N/A
2483.5	29.02	PK	V	28.95	3.12	0.00	61.09	74.00	12.91
2483.5	17.08	AV	V	28.95	3.12	0.00	49.15	54.00	4.85
4924	57.24	PK	V	34.19	4.42	44.71	51.14	74.00	22.86
4924	53.04	AV	V	34.19	4.42	44.71	46.94	54.00	7.06
7386	54.99	PK	V	36.64	5.46	44.40	52.69	74.00	21.31
7386	48.02	AV	V	36.64	5.46	44.40	45.72	54.00	8.28

802.11g Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2412MHz									
2412	67.81	PK	H	28.74	3.07	0.00	99.62	N/A	N/A
2412	57.77	AV	H	28.74	3.07	0.00	89.58	N/A	N/A
2412	71.48	PK	V	28.74	3.07	0.00	103.29	N/A	N/A
2412	61.42	AV	V	28.74	3.07	0.00	93.23	N/A	N/A
2390	36.17	PK	V	28.67	3.06	0.00	67.90	74.00	6.10
2390	19.62	AV	V	28.67	3.06	0.00	51.35	54.00	2.65
4824	52.11	PK	V	33.91	4.36	44.72	45.66	74.00	28.34
4824	39.25	AV	V	33.91	4.36	44.72	32.80	54.00	21.20
7236	57.92	PK	V	36.43	5.42	44.00	55.77	74.00	18.23
7236	43.82	AV	V	36.43	5.42	44.00	41.67	54.00	12.33
Frequency: 2437MHz									
2437	69.44	PK	H	28.81	3.09	0.00	101.34	N/A	N/A
2437	59.42	AV	H	28.81	3.09	0.00	91.32	N/A	N/A
2437	71.93	PK	V	28.81	3.09	0.00	103.83	N/A	N/A
2437	61.78	AV	V	28.81	3.09	0.00	93.68	N/A	N/A
4874	53.61	PK	V	34.05	4.39	44.72	47.33	74.00	26.67
4874	40.37	AV	V	34.05	4.39	44.72	34.09	54.00	19.91
7311	57.96	PK	V	36.54	5.44	44.20	55.74	74.00	18.26
7311	42.78	AV	V	36.54	5.44	44.20	40.56	54.00	13.44
Frequency: 2462MHz									
2462	70.74	PK	H	28.89	3.10	0.00	102.73	N/A	N/A
2462	60.79	AV	H	28.89	3.10	0.00	92.78	N/A	N/A
2462	72.13	PK	V	28.89	3.10	0.00	104.12	N/A	N/A
2462	62.06	AV	V	28.89	3.10	0.00	94.05	N/A	N/A
2483.5	37.75	PK	V	28.95	3.12	0.00	69.82	74.00	*4.18
2483.5	18.88	AV	V	28.95	3.12	0.00	50.95	54.00	*3.05
4924	54.89	PK	V	34.19	4.42	44.71	48.79	74.00	25.21
4924	41.33	AV	V	34.19	4.42	44.71	35.23	54.00	18.77
7386	57.73	PK	V	36.64	5.46	44.40	55.43	74.00	18.57
7386	41.53	AV	V	36.64	5.46	44.40	39.23	54.00	14.77

**Within measurement uncertainty!*

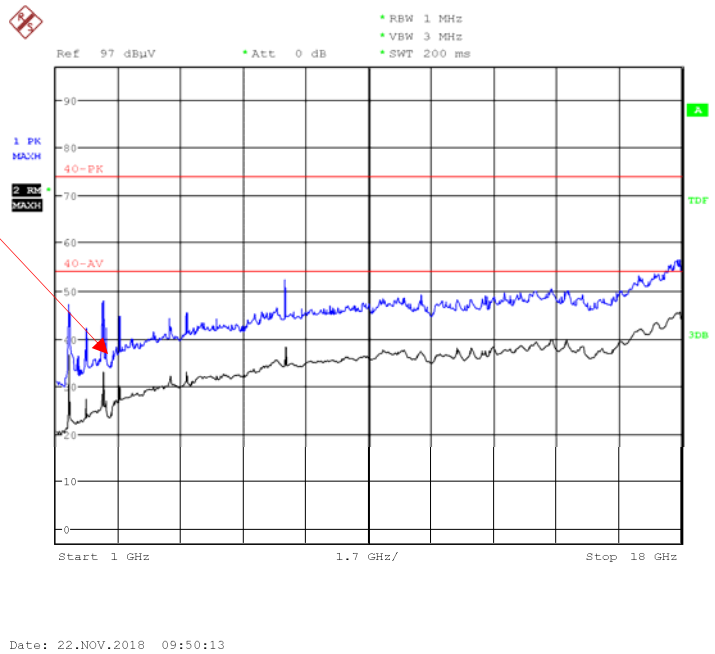
802.11n-HT20 Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2412MHz									
2412	67.07	PK	H	28.74	3.07	0.00	98.88	N/A	N/A
2412	55.53	AV	H	28.74	3.07	0.00	87.34	N/A	N/A
2412	70.32	PK	V	28.74	3.07	0.00	102.13	N/A	N/A
2412	59.09	AV	V	28.74	3.07	0.00	90.90	N/A	N/A
2390	35.93	PK	V	28.67	3.06	0.00	67.66	74.00	6.34
2390	18.21	AV	V	28.67	3.06	0.00	49.94	54.00	*4.06
4824	50.61	PK	V	33.91	4.36	44.72	44.16	74.00	29.84
4824	38.34	AV	V	33.91	4.36	44.72	31.89	54.00	22.11
7236	54.98	PK	V	36.43	5.42	44.00	52.83	74.00	21.17
7236	38.39	AV	V	36.43	5.42	44.00	36.24	54.00	17.76
Frequency: 2437MHz									
2437	67.51	PK	H	28.81	3.09	0.00	99.41	N/A	N/A
2437	56.67	AV	H	28.81	3.09	0.00	88.57	N/A	N/A
2437	70.14	PK	V	28.81	3.09	0.00	102.04	N/A	N/A
2437	59.15	AV	V	28.81	3.09	0.00	91.05	N/A	N/A
4874	51.11	PK	V	34.05	4.39	44.72	44.83	74.00	29.17
4874	38.87	AV	V	34.05	4.39	44.72	32.59	54.00	21.41
7311	54.08	PK	V	36.54	5.44	44.20	51.86	74.00	22.14
7311	37.98	AV	V	36.54	5.44	44.20	35.76	54.00	18.24
Frequency: 2462MHz									
2462	68.43	PK	H	28.89	3.10	0.00	100.42	N/A	N/A
2462	58.24	AV	H	28.89	3.10	0.00	90.23	N/A	N/A
2462	70.02	PK	V	28.89	3.10	0.00	102.01	N/A	N/A
2462	59.65	AV	V	28.89	3.10	0.00	91.64	N/A	N/A
2483.5	31.55	PK	V	28.95	3.12	0.00	63.62	74.00	10.38
2483.5	17.65	AV	V	28.95	3.12	0.00	49.72	54.00	*4.28
4924	51.79	PK	V	34.19	4.42	44.71	45.69	74.00	28.31
4924	39.84	AV	V	34.19	4.42	44.71	33.74	54.00	20.26
7386	53.46	PK	V	36.64	5.46	44.40	51.16	74.00	22.84
7386	38.02	AV	V	36.64	5.46	44.40	35.72	54.00	18.28

Please refer to the below pre-scan plot of worst case:

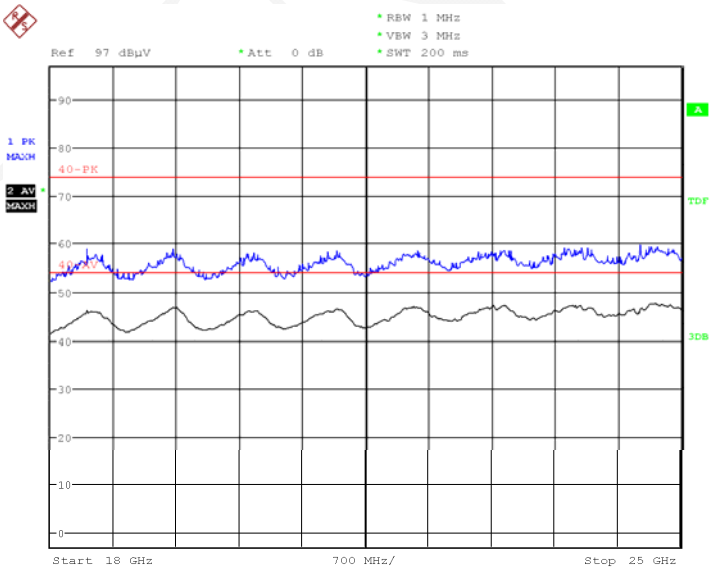
802.11g Mode: High Channel_Horizontal_1GHz-18GHz

Fundamental with Reject Band Filter



Date: 22.NOV.2018 09:50:13

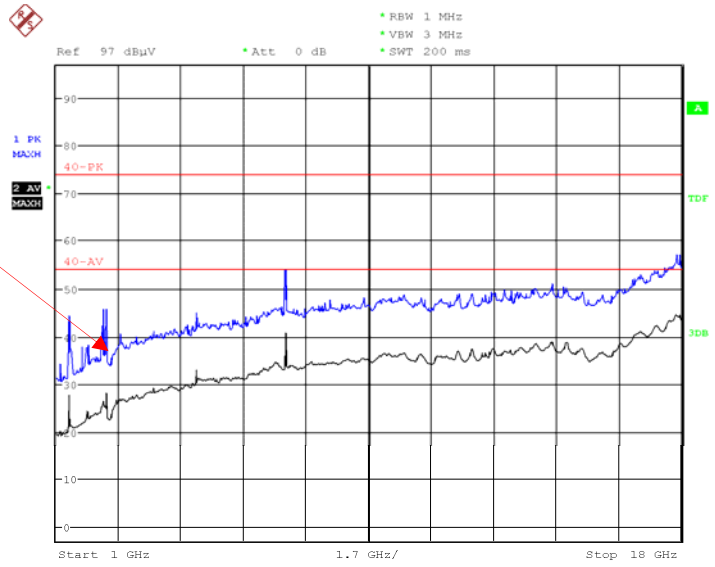
802.11g Mode: High Channel_Horizontal_18GHz-25GHz



Date: 22.NOV.2018 10:24:54

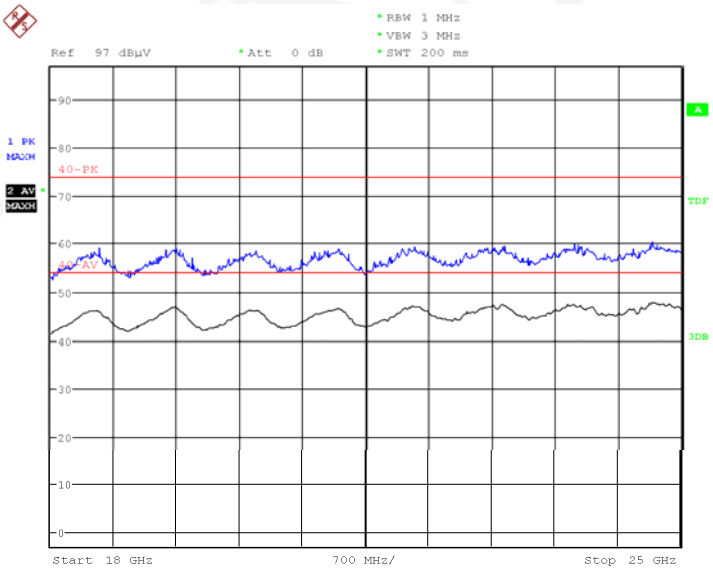
802.11g Mode: High Channel_Vertical_1GHz-18GHz

Fundamental with Reject Band Filter



Date: 22.NOV.2018 09:47:01

802.11g Mode: High Channel_Vertical_18GHz-25GHz



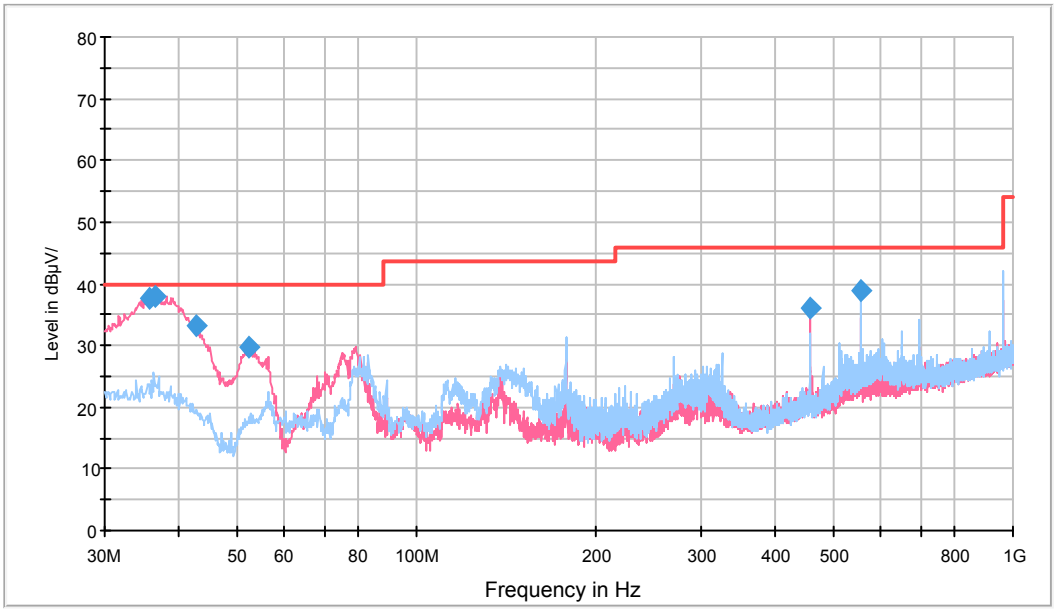
Date: 22.NOV.2018 10:28:40

BLE Mode

1)30 MHz to 1 GHz

Low channel-worst case

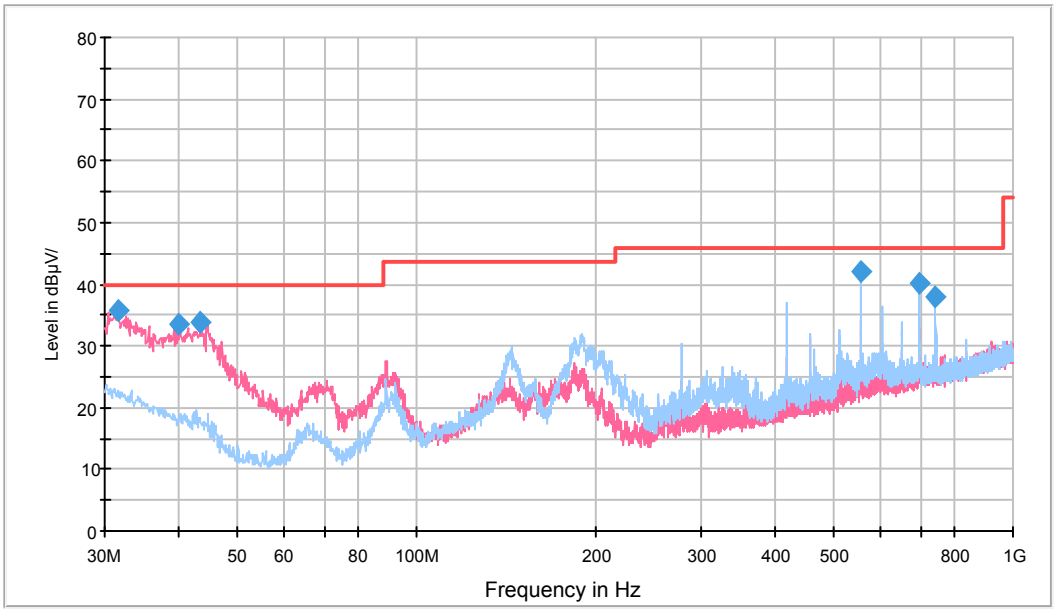
Adapter Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
35.698750	37.5	100.0	V	225.0	-8.6	*2.5	40.0
36.547500	37.9	100.0	V	247.0	-9.1	*2.1	40.0
42.852500	33.2	100.0	V	217.0	-13.0	6.8	40.0
52.310000	29.9	100.0	V	188.0	-17.2	10.1	40.0
456.193750	36.1	125.0	V	46.0	-7.9	9.9	46.0
556.952500	38.8	150.0	H	104.0	-5.1	7.2	46.0

**Within measurement uncertainty!*

Wireless Charging Mode



Frequency (MHz)	QuasicPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corrected Factor (dB/m)	Margin (dB)	Limit (dBµV/m)
31.576250	35.8	100.0	V	62.0	-5.9	*4.2	40.0
39.821250	33.5	100.0	V	187.0	-11.1	6.5	40.0
43.458750	33.8	105.0	V	47.0	-13.4	6.2	40.0
556.952500	42.0	150.0	H	295.0	-5.1	*4.0	46.0
696.268750	40.2	100.0	H	321.0	-3.0	5.8	46.0
742.707500	38.0	120.0	H	0.0	-2.9	8.0	46.0

**Within measurement uncertainty!*

2) 1 GHz-25 GHz

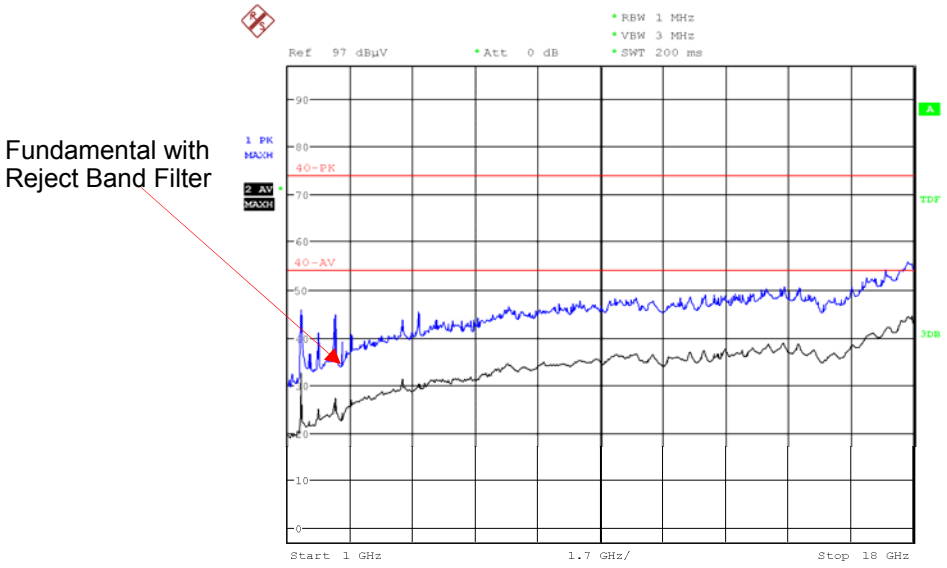
Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	(dB/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2402MHz									
2402	59.18	PK	H	28.71	3.06	0.00	90.95	N/A	N/A
2402	54.41	AV	H	28.71	3.06	0.00	86.18	N/A	N/A
2402	64.61	PK	V	28.71	3.06	0.00	96.38	N/A	N/A
2402	59.77	AV	V	28.71	3.06	0.00	91.54	N/A	N/A
2390	28.81	PK	V	28.67	3.06	0.00	60.54	74.00	13.46
2390	15.87	AV	V	28.67	3.06	0.00	47.60	54.00	6.40
4804	52.64	PK	V	33.85	4.35	44.73	46.11	74.00	27.89
4804	41.32	AV	V	33.85	4.35	44.73	34.79	54.00	19.21
7206	48.13	PK	V	36.39	5.41	43.92	46.01	74.00	27.99
7206	35.65	AV	V	36.39	5.41	43.92	33.53	54.00	20.47
Frequency: 2440MHz									
2440	61.17	PK	H	28.82	3.09	0.00	93.08	N/A	N/A
2440	56.22	AV	H	28.82	3.09	0.00	88.13	N/A	N/A
2440	67.57	PK	V	28.82	3.09	0.00	99.48	N/A	N/A
2440	62.79	AV	V	28.82	3.09	0.00	94.70	N/A	N/A
4880	53.30	PK	V	34.06	4.40	44.72	47.04	74.00	26.96
4880	42.94	AV	V	34.06	4.40	44.72	36.68	54.00	17.32
7320	48.41	PK	V	36.55	5.44	44.22	46.18	74.00	27.82
7320	36.12	AV	V	36.55	5.44	44.22	33.89	54.00	20.11
Frequency: 2480MHz									
2480	62.51	PK	H	28.94	3.12	0.00	94.57	N/A	N/A
2480	57.67	AV	H	28.94	3.12	0.00	89.73	N/A	N/A
2480	69.89	PK	V	28.94	3.12	0.00	101.95	N/A	N/A
2480	65.21	AV	V	28.94	3.12	0.00	97.27	N/A	N/A
2483.5	31.87	PK	V	28.95	3.12	0.00	63.94	74.00	10.06
2483.5	19.46	AV	V	28.95	3.12	0.00	51.53	54.00	*2.47
4960	53.88	PK	V	34.29	4.44	44.71	47.90	74.00	26.10
4960	44.02	AV	V	34.29	4.44	44.71	38.04	54.00	15.96
7440	48.43	PK	V	36.72	5.48	44.54	46.09	74.00	27.91
7440	36.14	AV	V	36.72	5.48	44.54	33.80	54.00	20.20

**Within measurement uncertainty!*

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.

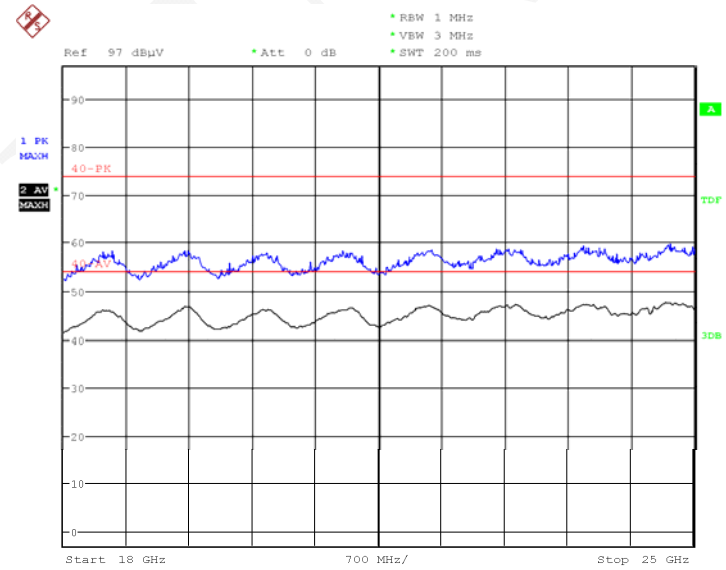
Please refer to the below pre-scan plot of worst case:

High Channel_Horizontal_1GHz-18GHz



Date: 22.NOV.2018 09:36:12

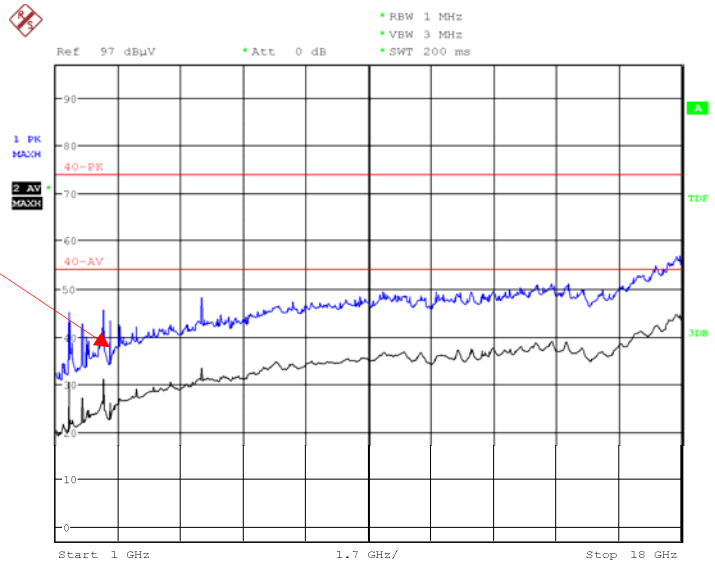
High Channel_Horizontal_18GHz-25GHz



Date: 22.NOV.2018 10:25:56

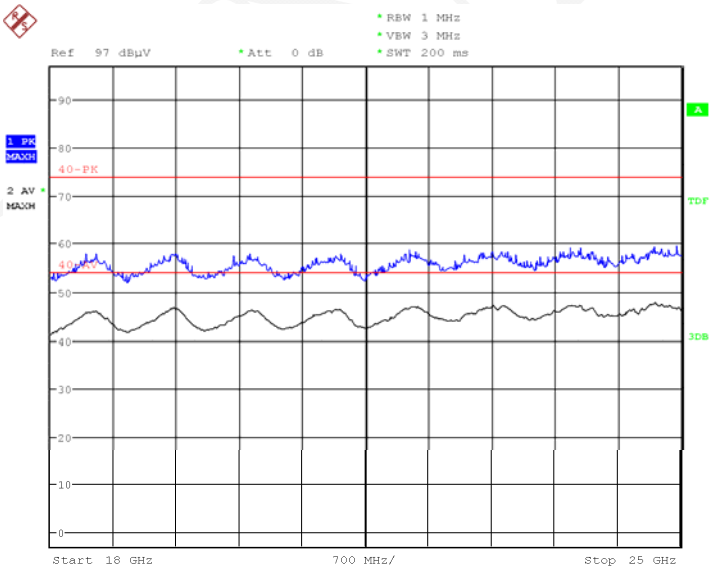
High Channel_Vertical_1GHz-18GHz

Fundamental with Reject Band Filter



Date: 22.NOV.2018 09:35:12

High Channel_Vertical_18GHz-25GHz



Date: 22.NOV.2018 10:24:21

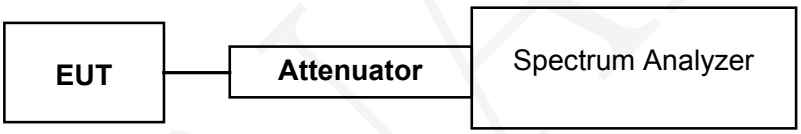
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Mode: Transmitting

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

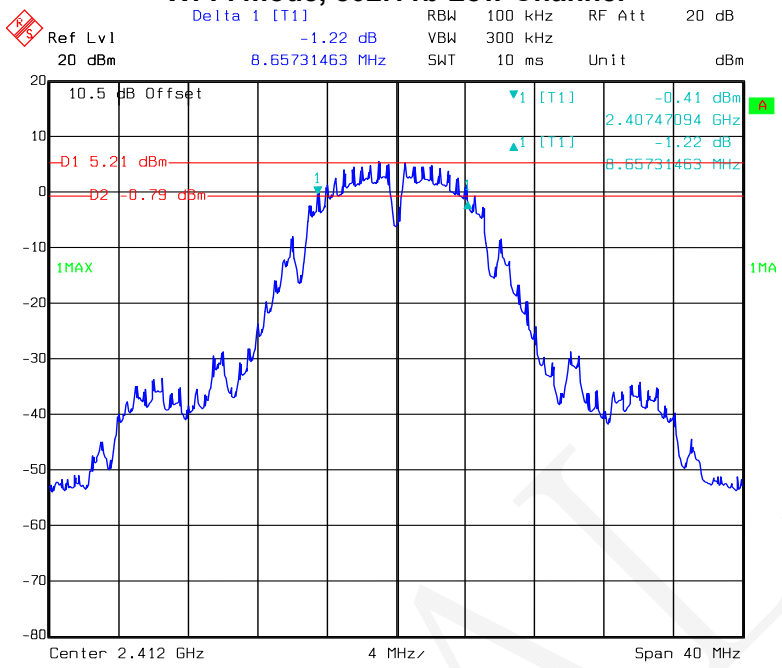
Wi-Fi mode

Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b	Low	2412	8.66	≥0.50
	Middle	2437	8.66	≥0.50
	High	2462	8.58	≥0.50
802.11g	Low	2412	16.43	≥0.50
	Middle	2437	16.51	≥0.50
	High	2462	16.43	≥0.50
802.11n-HT20	Low	2412	17.72	≥0.50
	Middle	2437	17.72	≥0.50
	High	2462	17.72	≥0.50

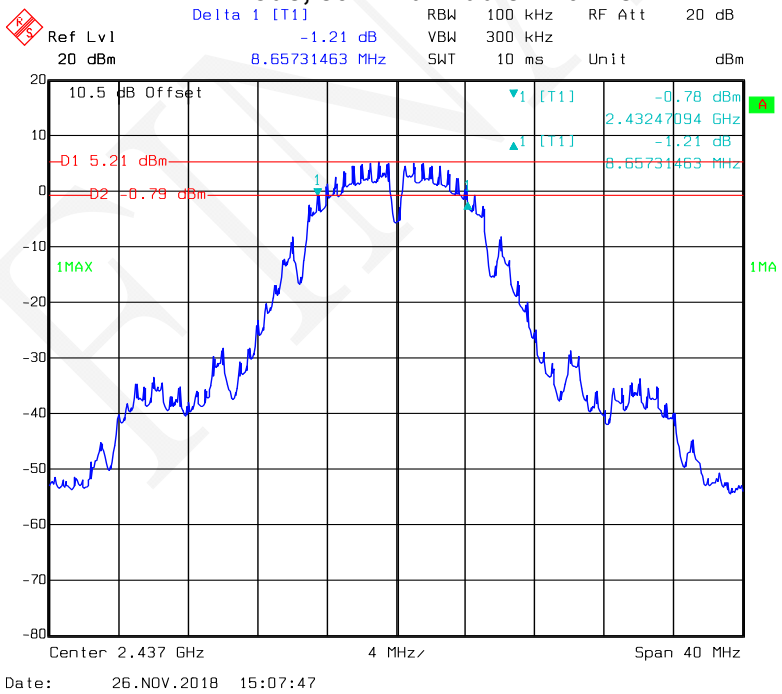
BLE mode

Mode	Channel	Frequency (MHz)	6dB Emission Bandwidth (MHz)	Limit (MHz)
BLE	Low	2402	0.74	≥0.50
	Middle	2440	0.75	≥0.50
	High	2480	0.74	≥0.50

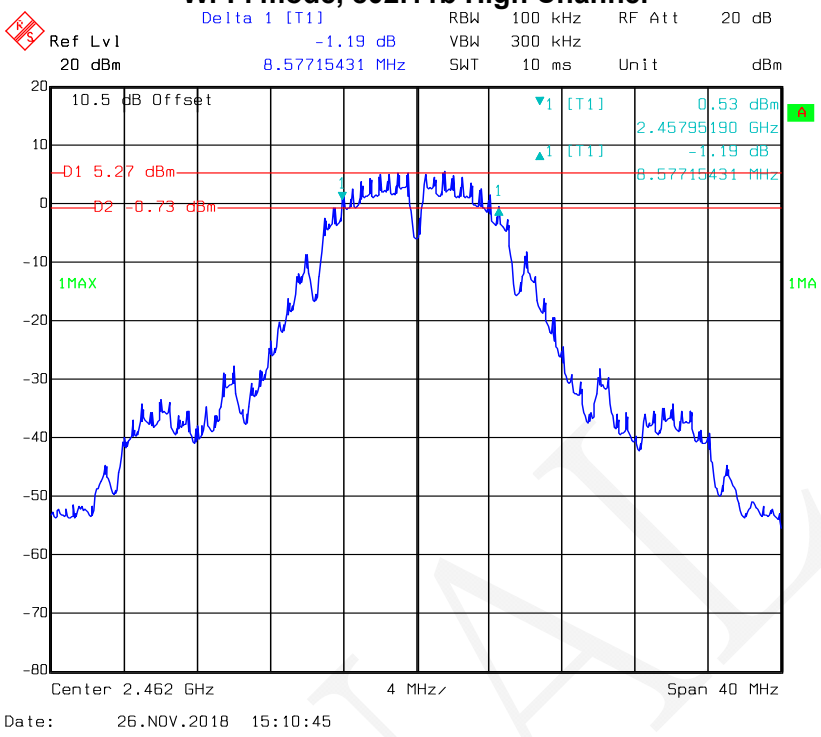
Wi-Fi mode, 802.11b Low Channel



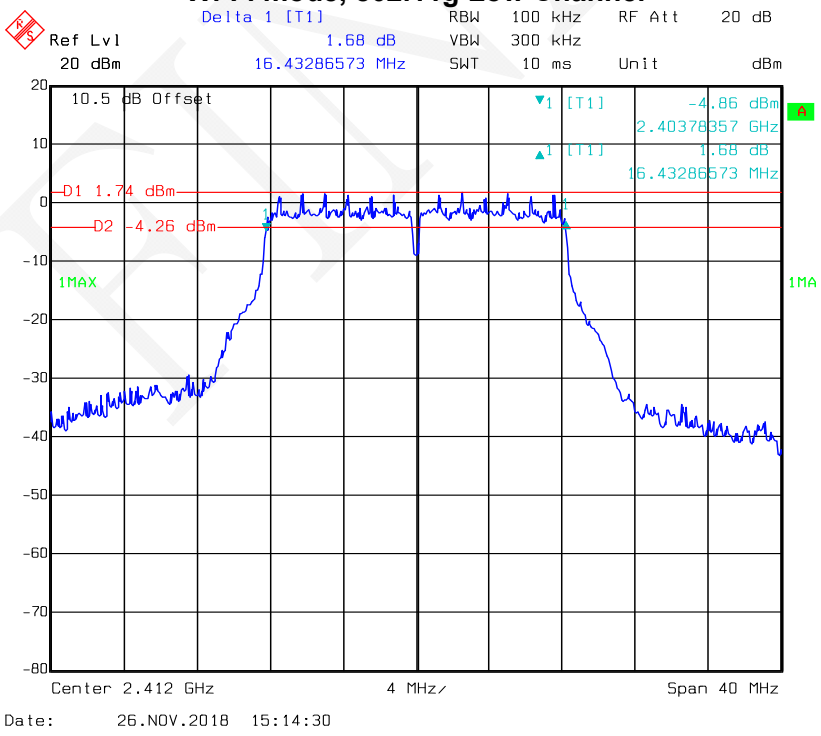
Wi-Fi mode, 802.11b Middle Channel



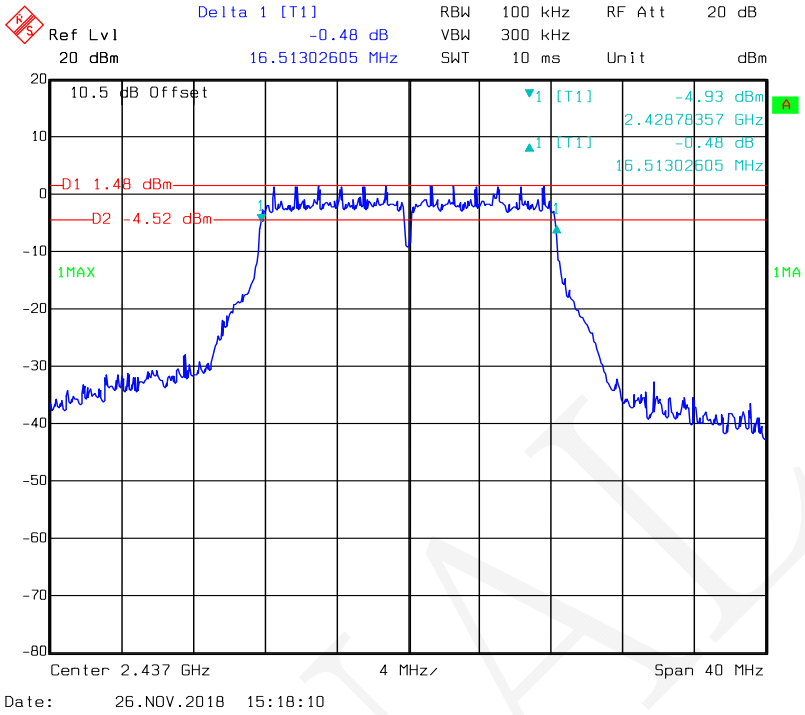
Wi-Fi mode, 802.11b High Channel



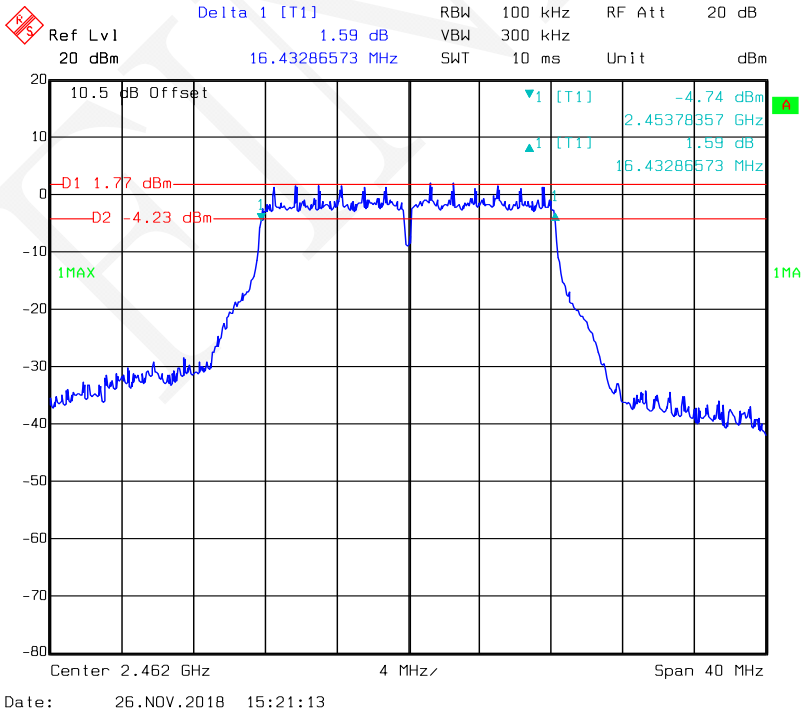
Wi-Fi mode, 802.11g Low Channel



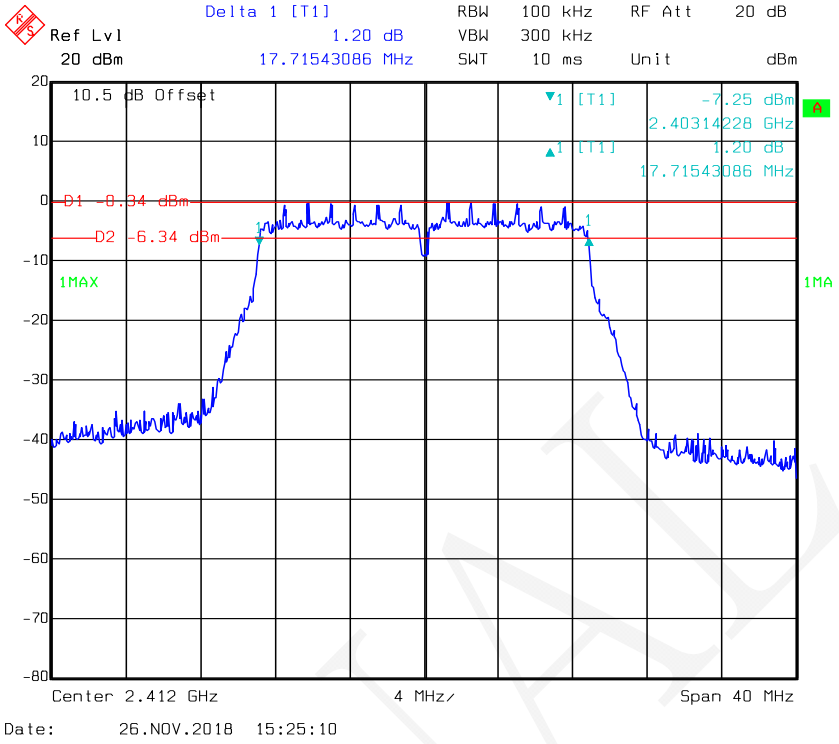
Wi-Fi mode, 802.11g Middle Channel



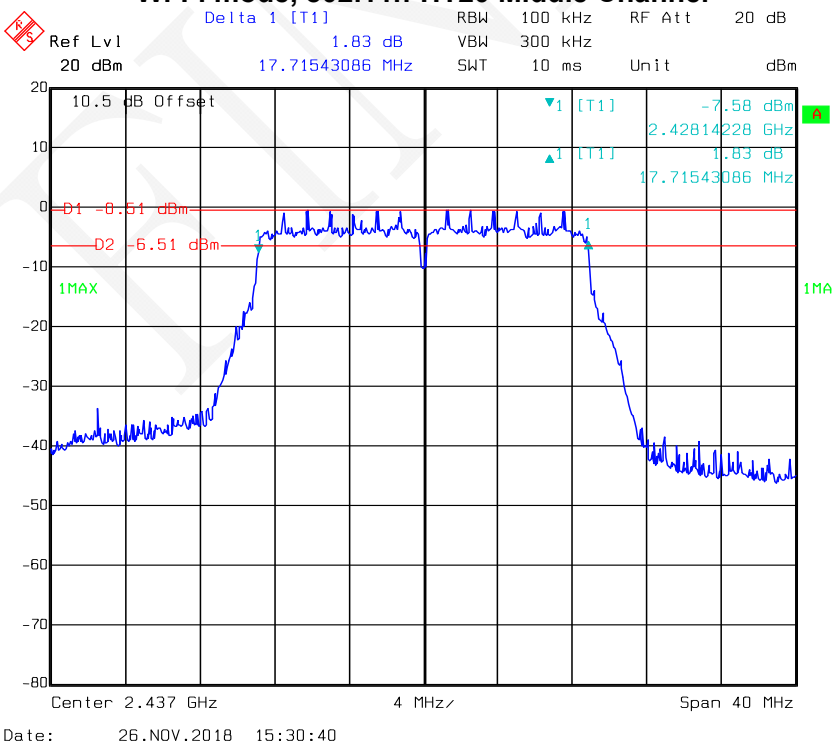
Wi-Fi mode, 802.11g High Channel



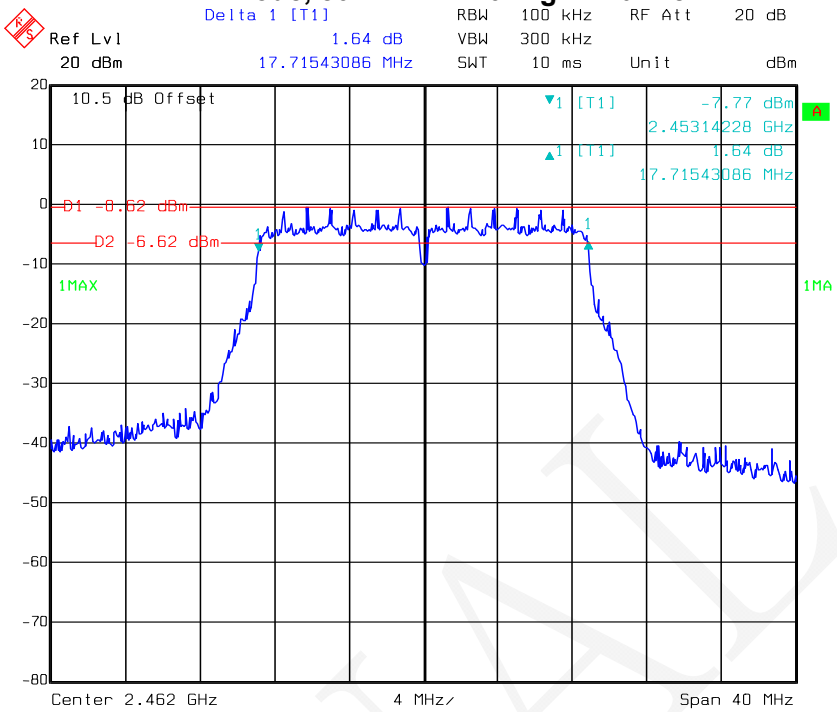
Wi-Fi mode, 802.11n-HT20 Low Channel



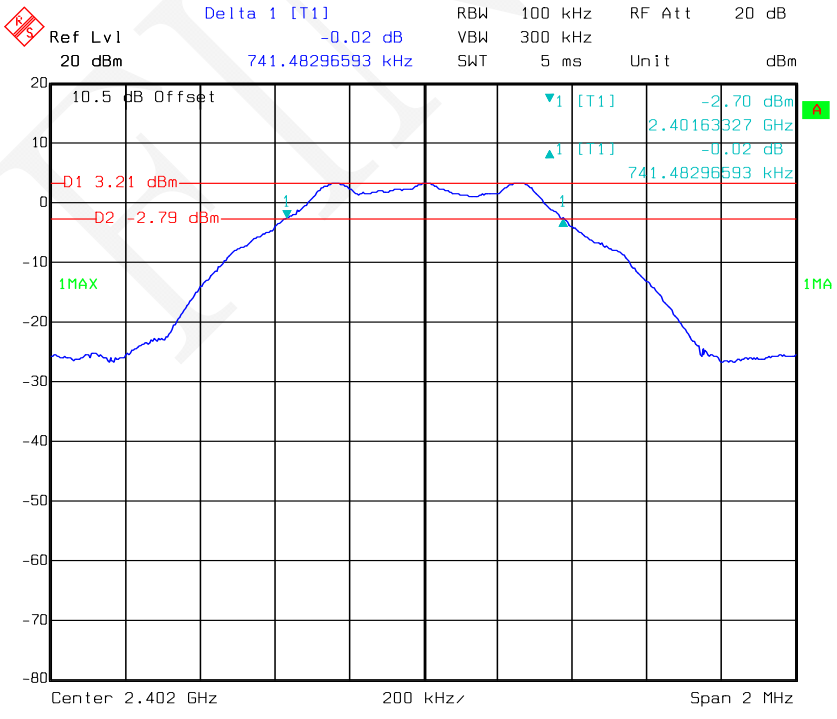
Wi-Fi mode, 802.11n-HT20 Middle Channel



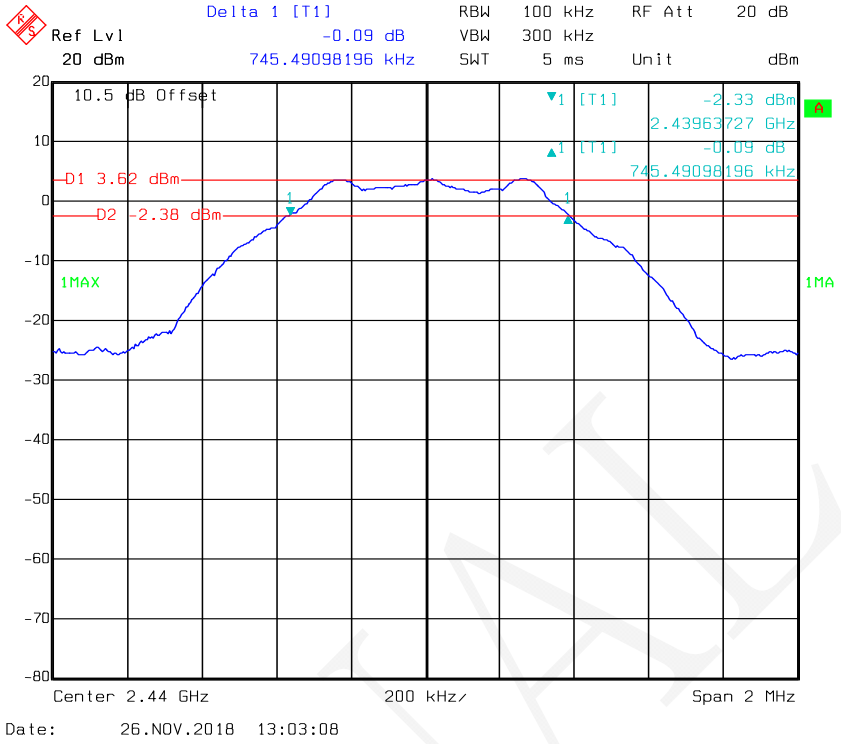
Wi-Fi mode, 802.11n-HT20 High Channel



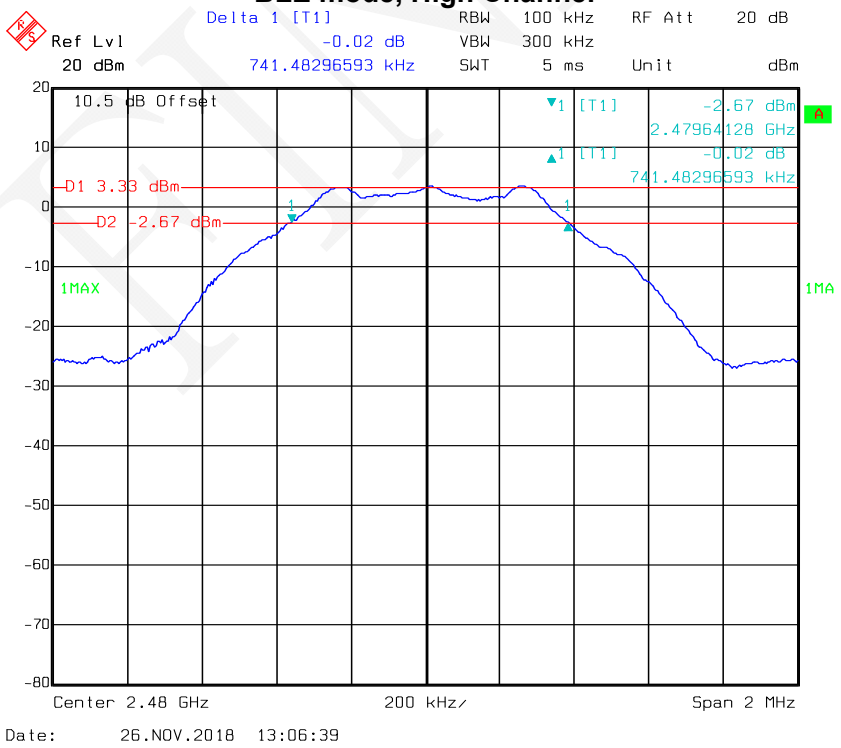
BLE mode, Low Channel



BLE mode, Middle Channel



BLE mode, High Channel



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

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to test equipment.
3. Add a correction factor to the display.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Mode: Transmitting

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

Wi-Fi mode

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	16.76	30
	Middle	2437	16.70	30
	High	2462	16.71	30
802.11g	Low	2412	21.17	30
	Middle	2437	21.20	30
	High	2462	21.29	30
802.11n-HT20	Low	2412	19.07	30
	Middle	2437	19.08	30
	High	2462	18.97	30

Mode	Channel	Frequency (MHz)	Max Conducted Average Output Power (dBm)	Limit (dBm)
802.11b	Low	2412	14.09	30
	Middle	2437	13.83	30
	High	2462	13.86	30
802.11g	Low	2412	12.98	30
	Middle	2437	13.01	30
	High	2462	13.08	30
802.11n-HT20	Low	2412	10.81	30
	Middle	2437	10.69	30
	High	2462	10.58	30

BLE mode

Mode	Channel	Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Limit (dBm)
BLE	Low	2402	3.89	30
	Middle	2440	4.15	30
	High	2480	3.89	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:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

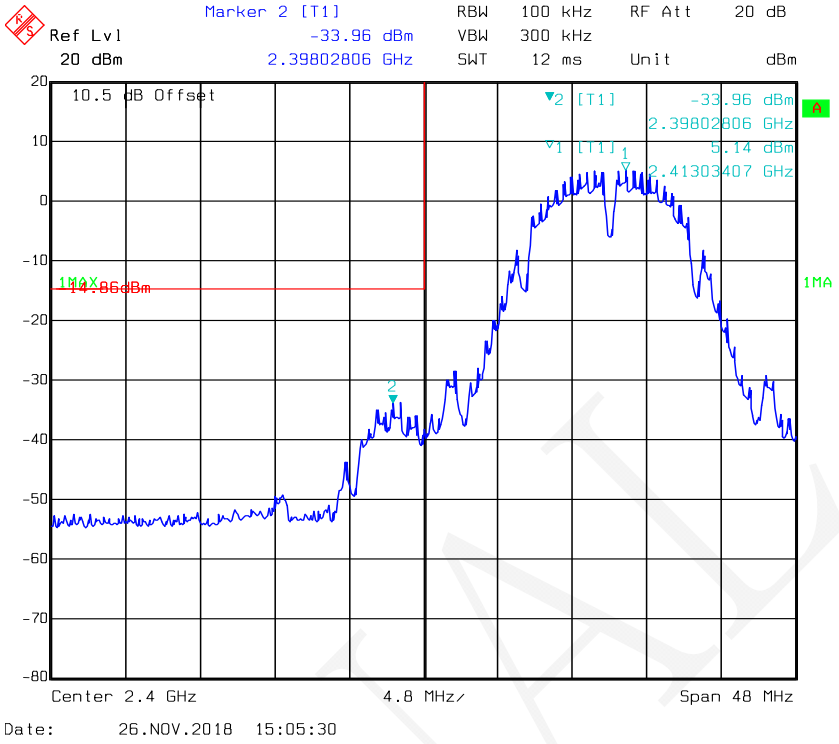
** The testing was performed by Tom Tang on 2018-11-26.*

Test mode: Transmitting

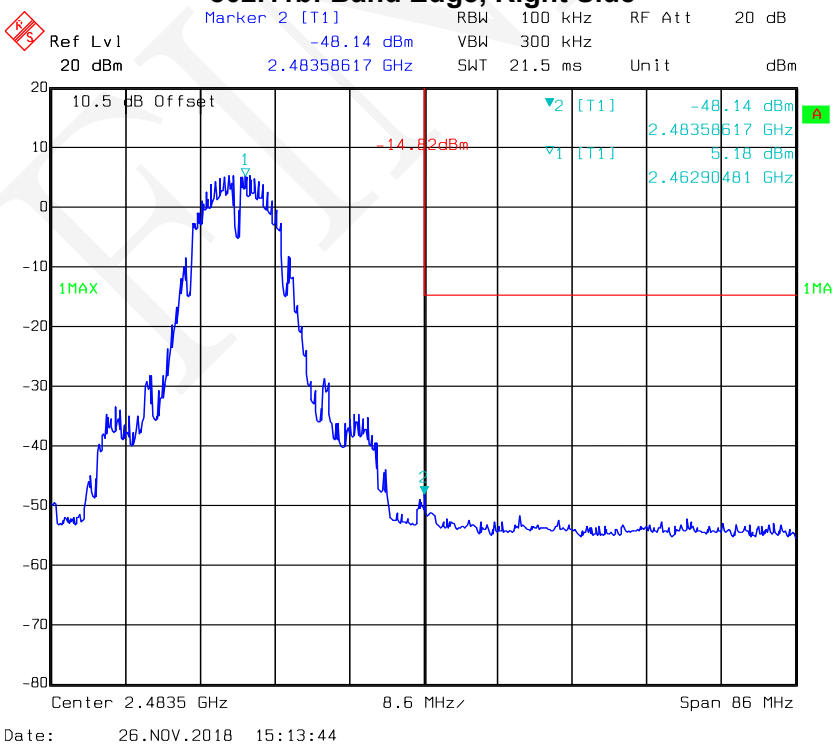
Test Result: Compliance. Please refer to following plots.

Wi-Fi mode

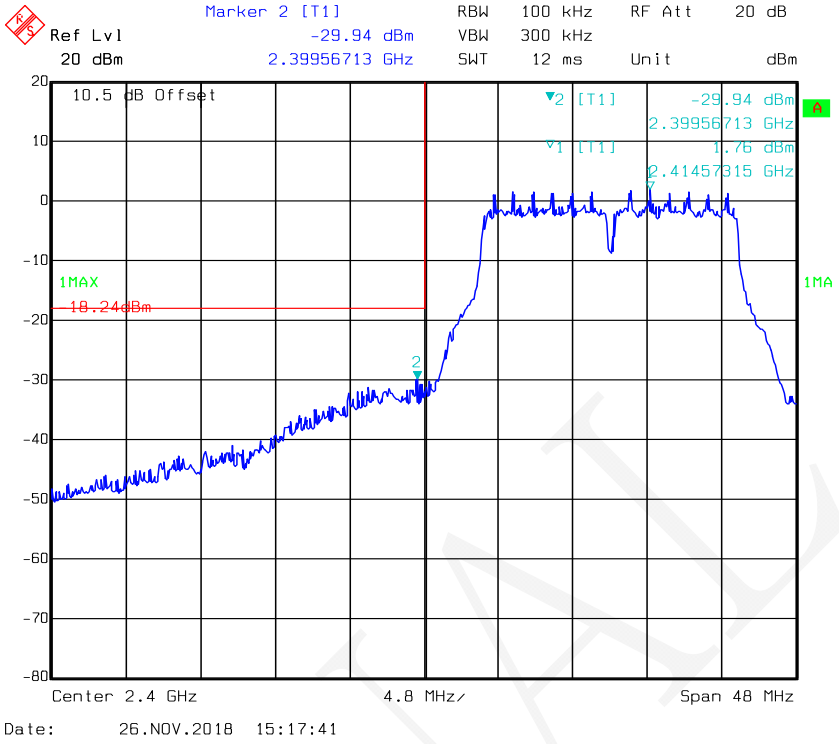
802.11b: Band Edge, Left Side



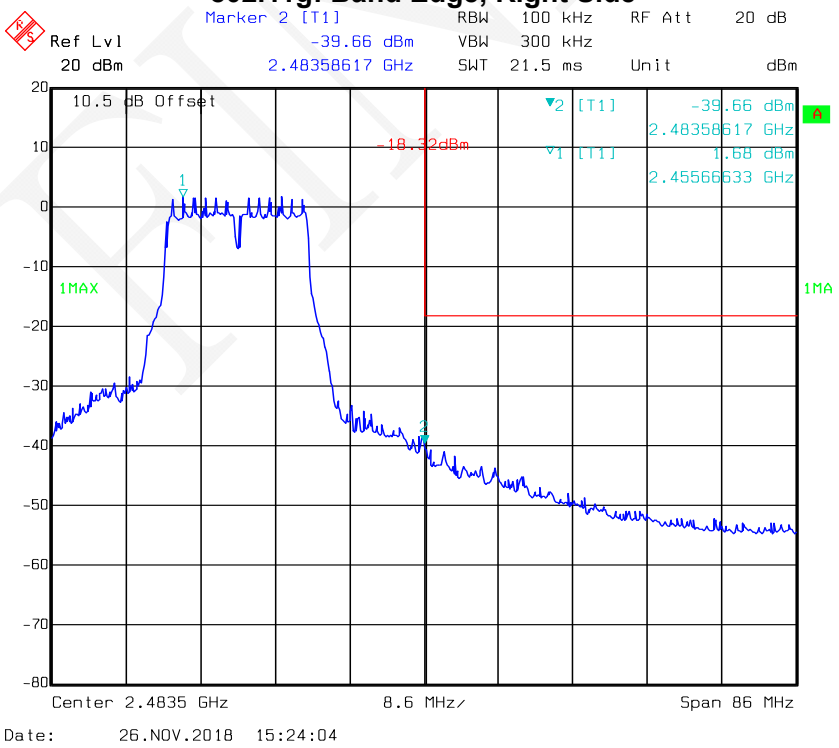
802.11b: Band Edge, Right Side



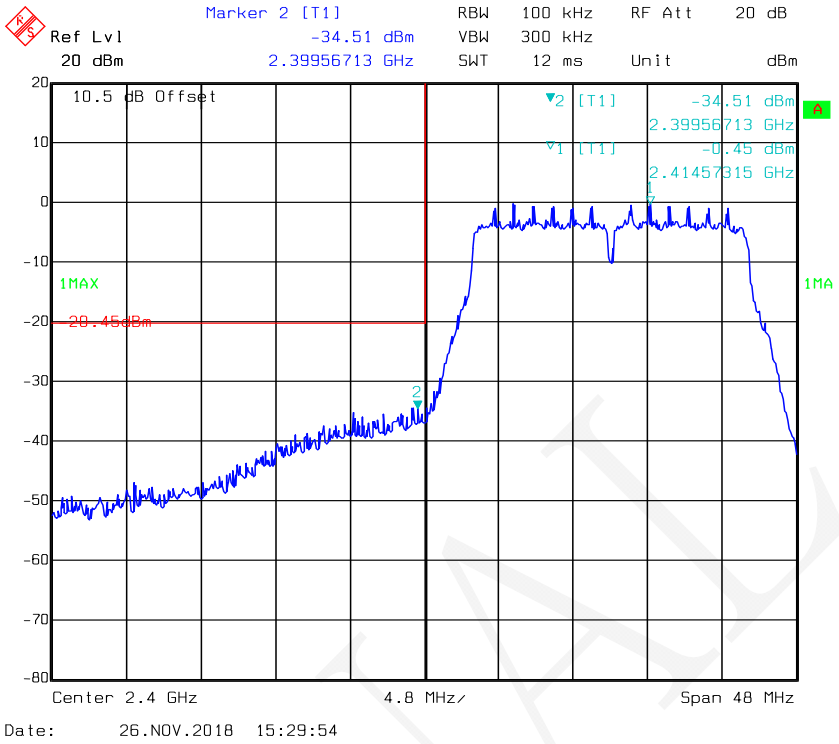
802.11g: Band Edge, Left Side



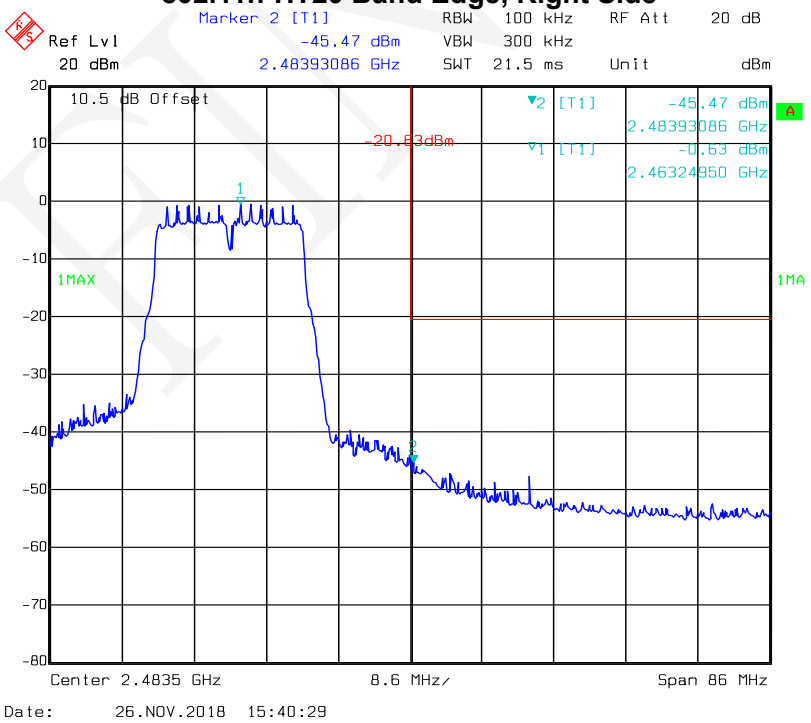
802.11g: Band Edge, Right Side



802.11n-HT20 Band Edge, Left Side

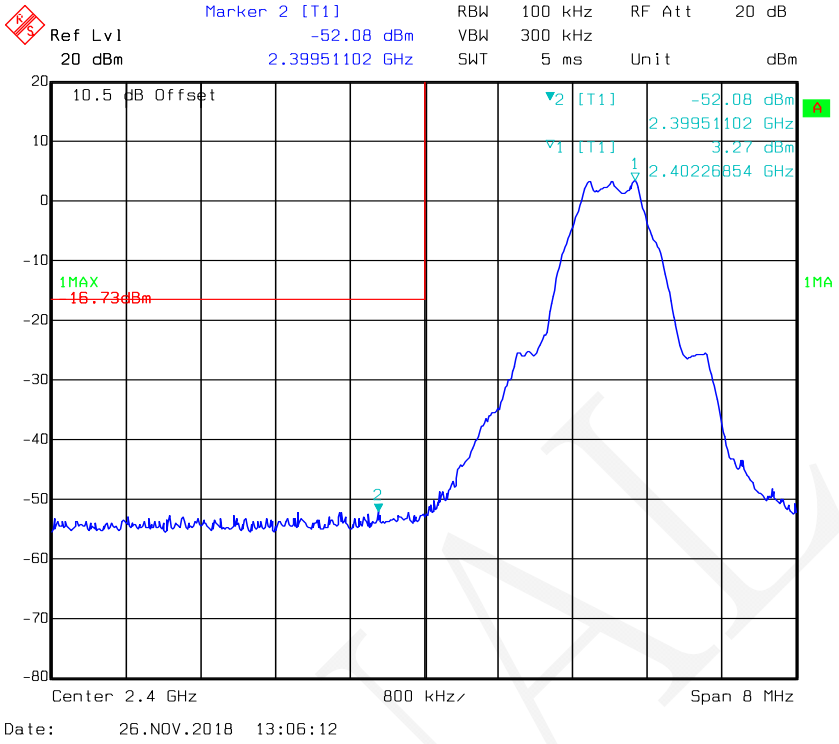


802.11n-HT20 Band Edge, Right Side

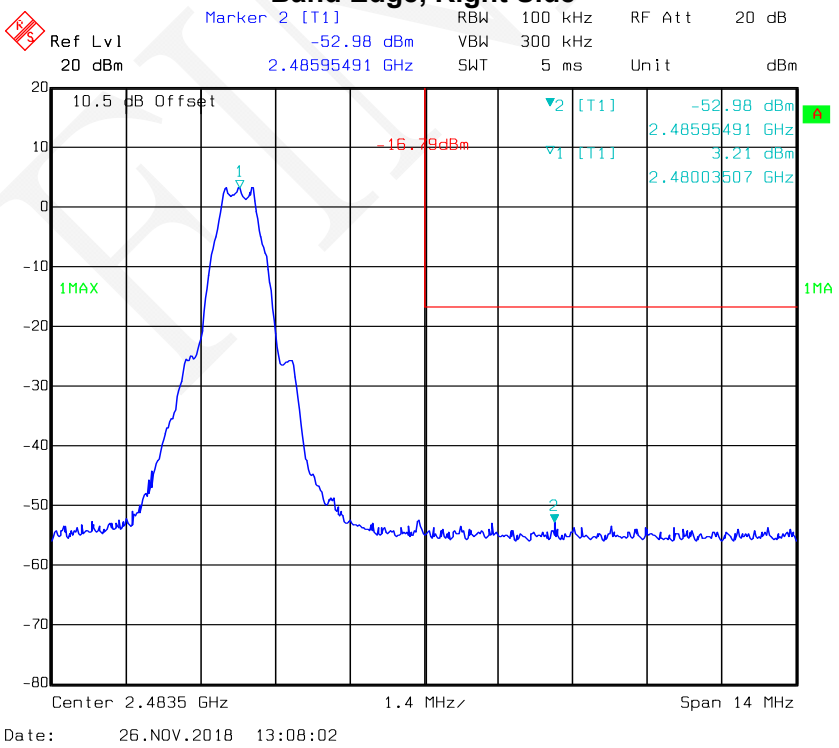


BLE mode

Band Edge, Left Side



Band Edge, Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3×RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	96.1 kPa

** The testing was performed by Tom Tang on 2018-11-26.*

Test Mode: Transmitting

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

Wi-Fi mode

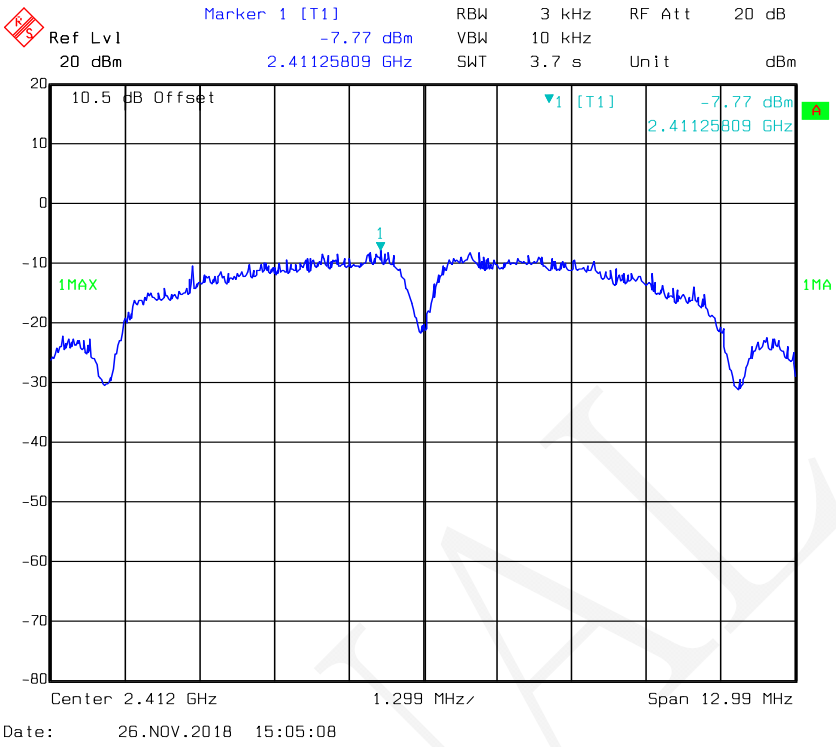
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	Low	2412	-7.77	8
	Middle	2437	-6.91	8
	High	2462	-7.86	8
802.11g	Low	2412	-11.15	8
	Middle	2437	-11.65	8
	High	2462	-11.52	8
802.11n-HT20	Low	2412	-12.95	8
	Middle	2437	-12.45	8
	High	2462	-13.24	8

BLE mode

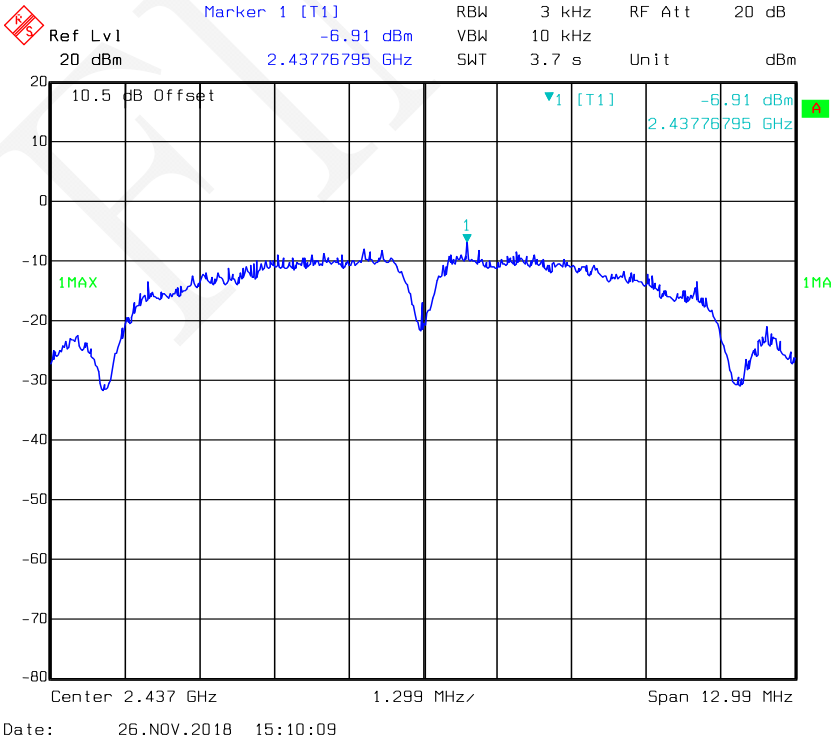
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
BLE	Low	2402	-10.28	8
	Middle	2440	-10.05	8
	High	2480	-10.32	8

Wi-Fi mode

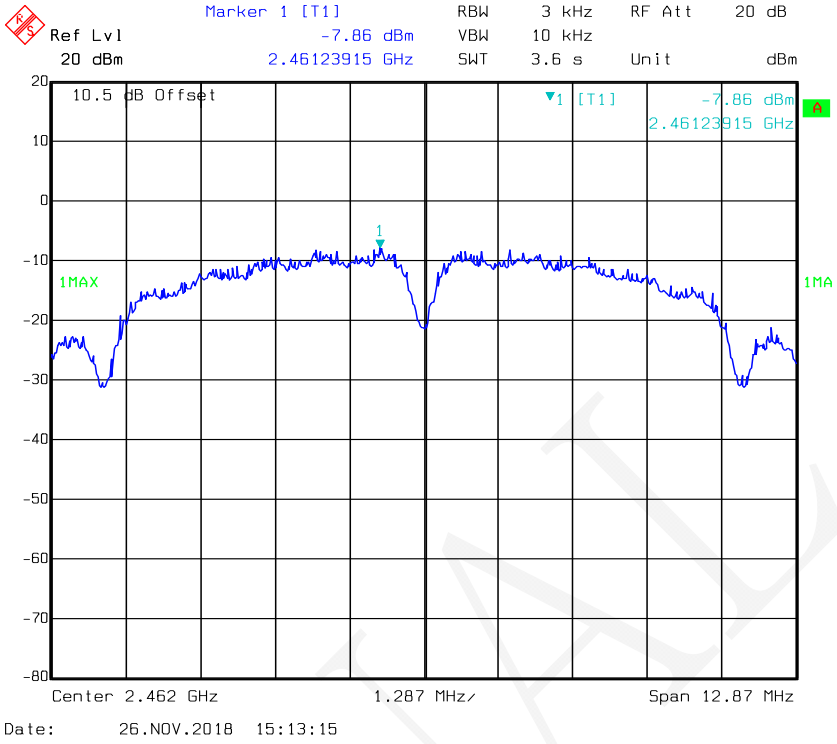
Power Spectral Density, 802.11b Low Channel



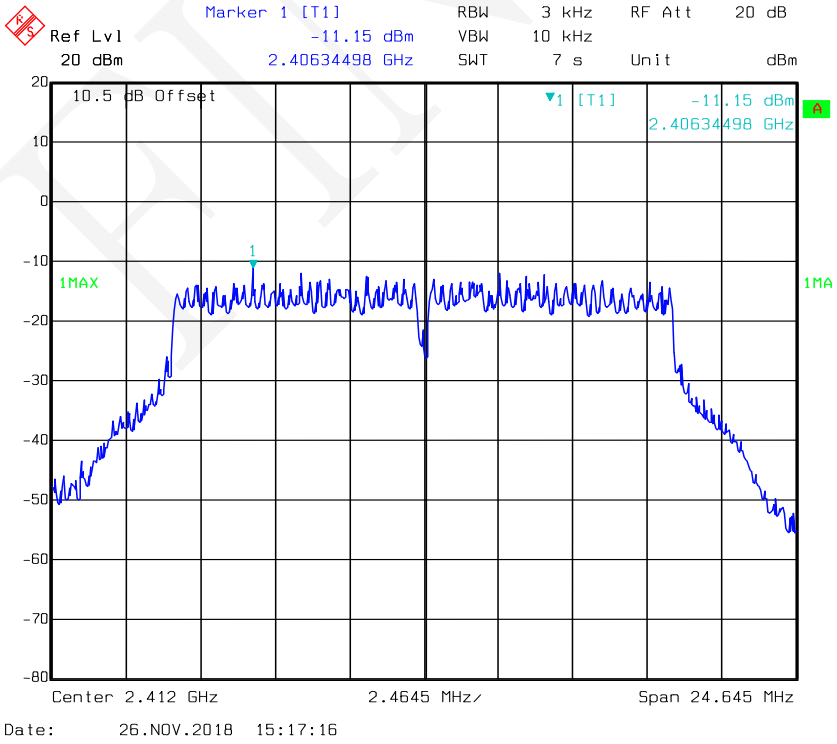
Power Spectral Density, 802.11b Middle Channel



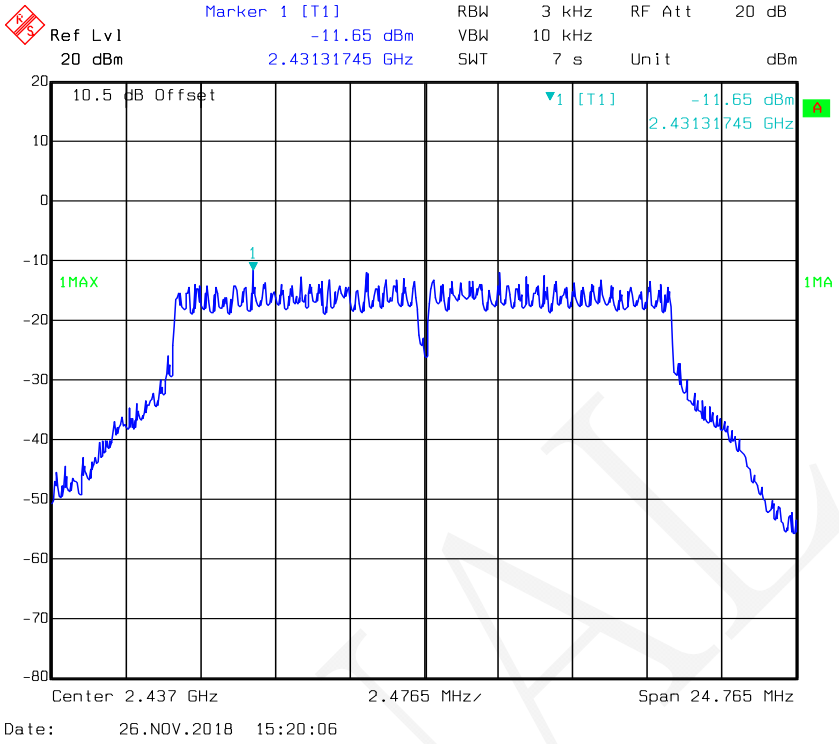
Power Spectral Density, 802.11b High Channel



Power Spectral Density, 802.11g Low Channel



Power Spectral Density, 802.11g Middle Channel



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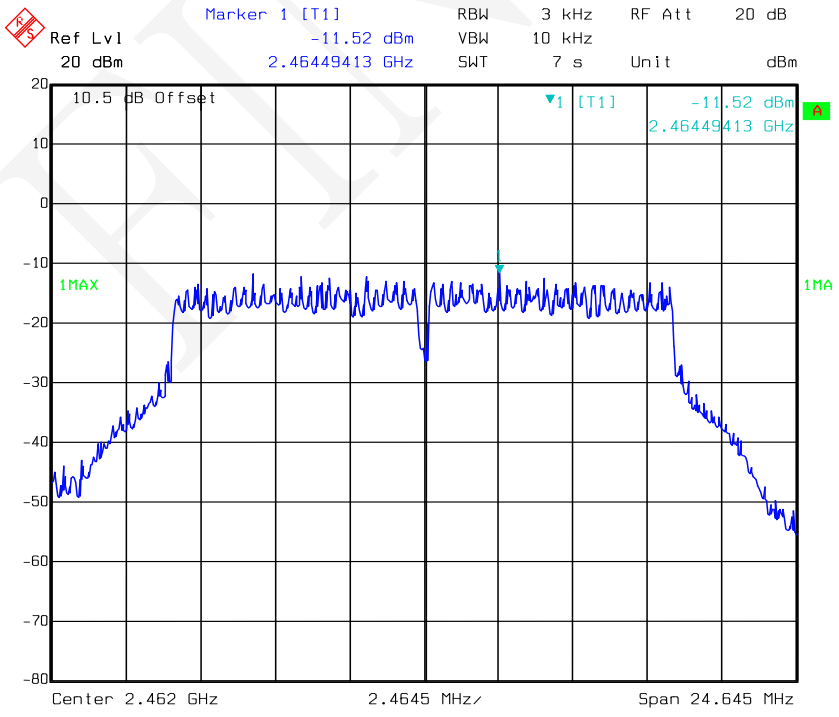
Power Spectral Density, 802.11g High Channel



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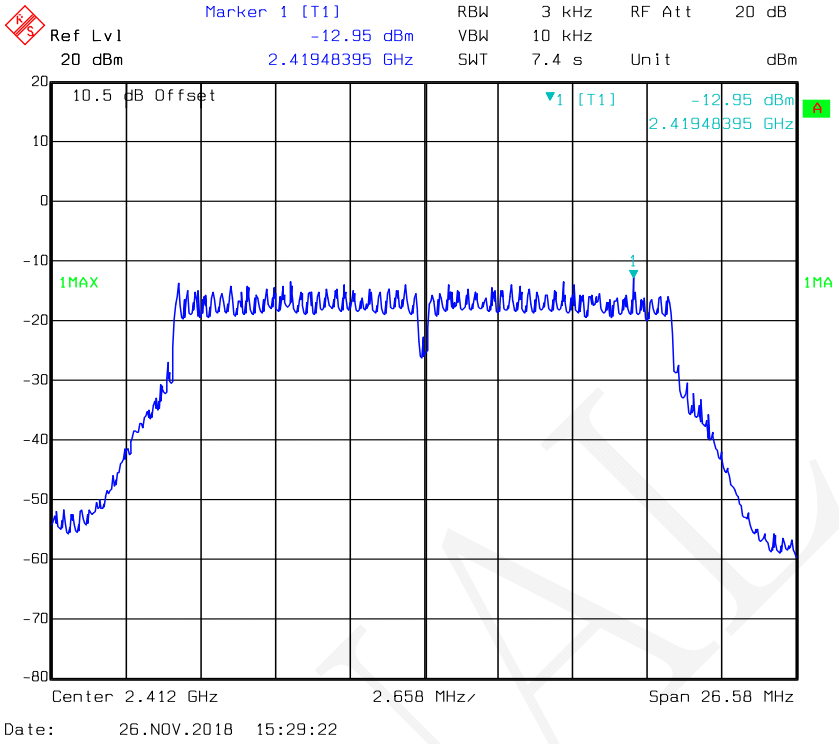
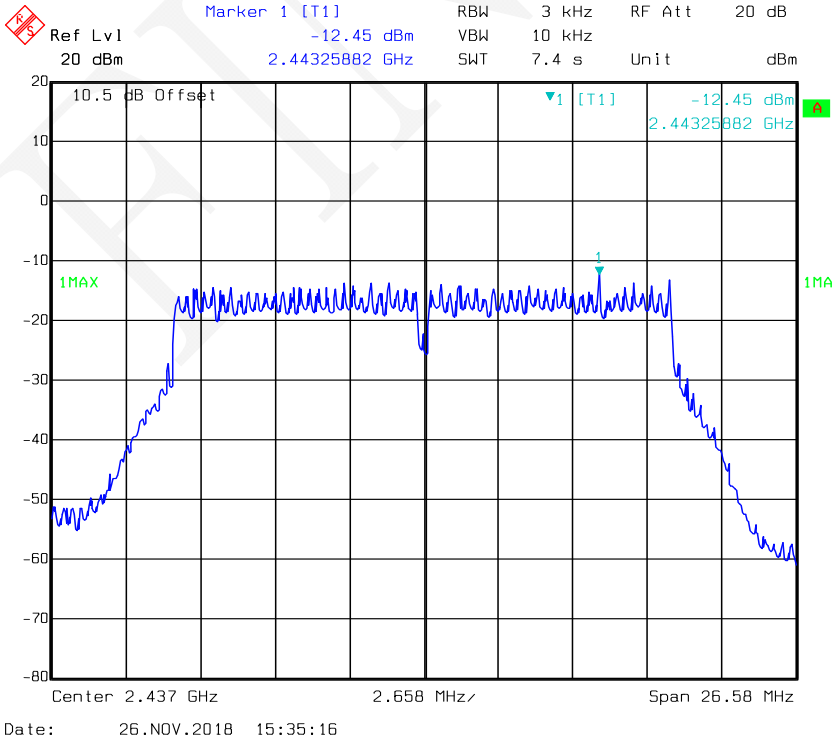
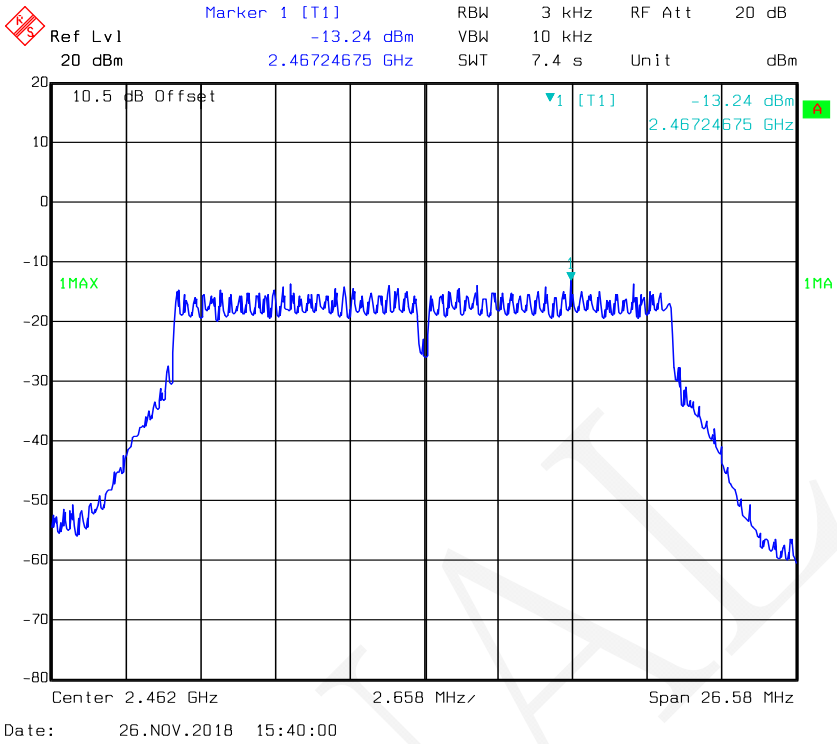
Power Spectral Density, 802.11n-HT20 Low Channel



Power Spectral Density, 802.11n-HT20 Middle Channel

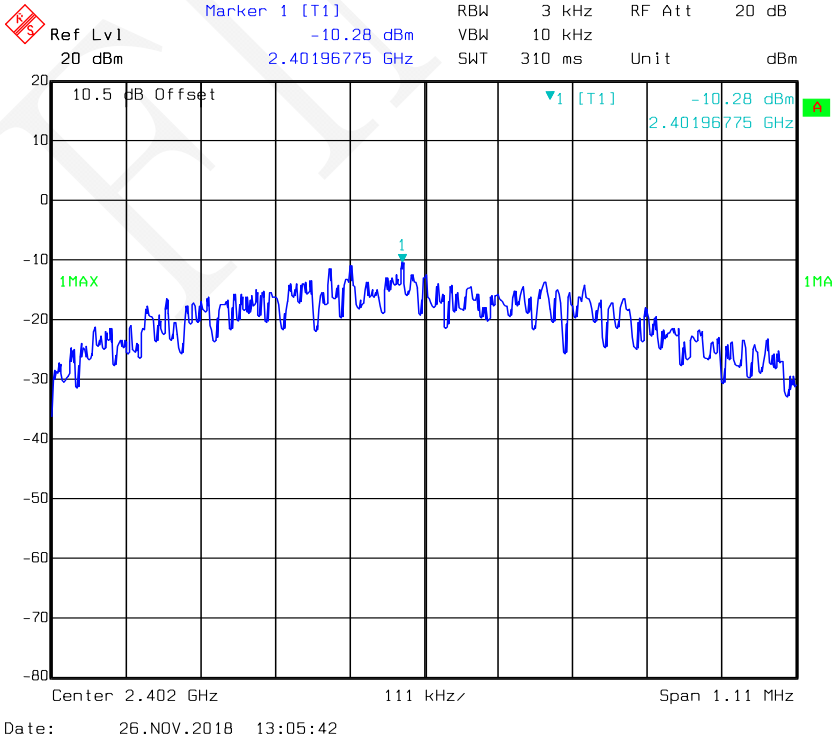


Power Spectral Density, 802.11n-HT20 High Channel

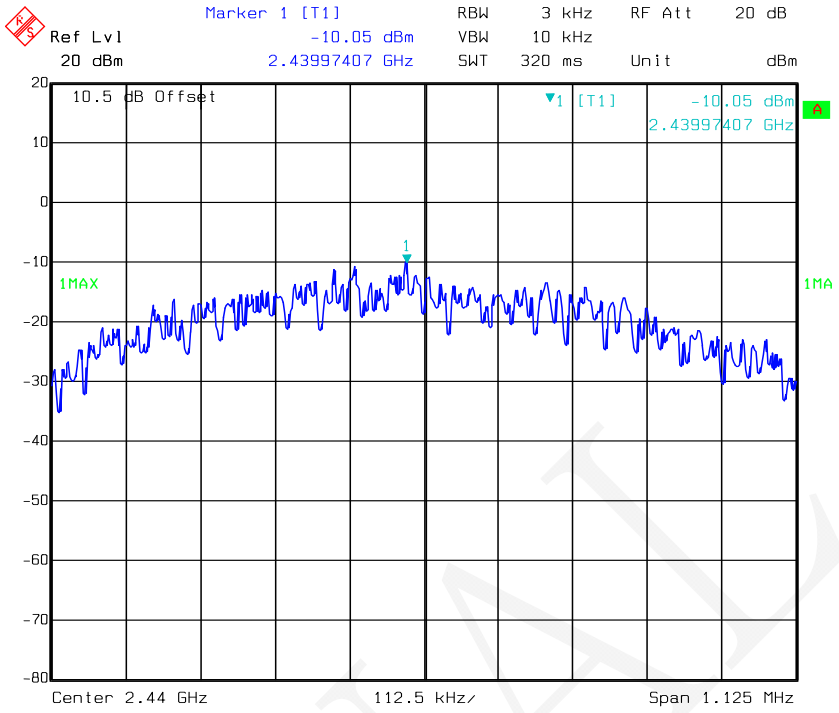


BLE mode

Power Spectral Density, Low Channel



Power Spectral Density, Middle Channel



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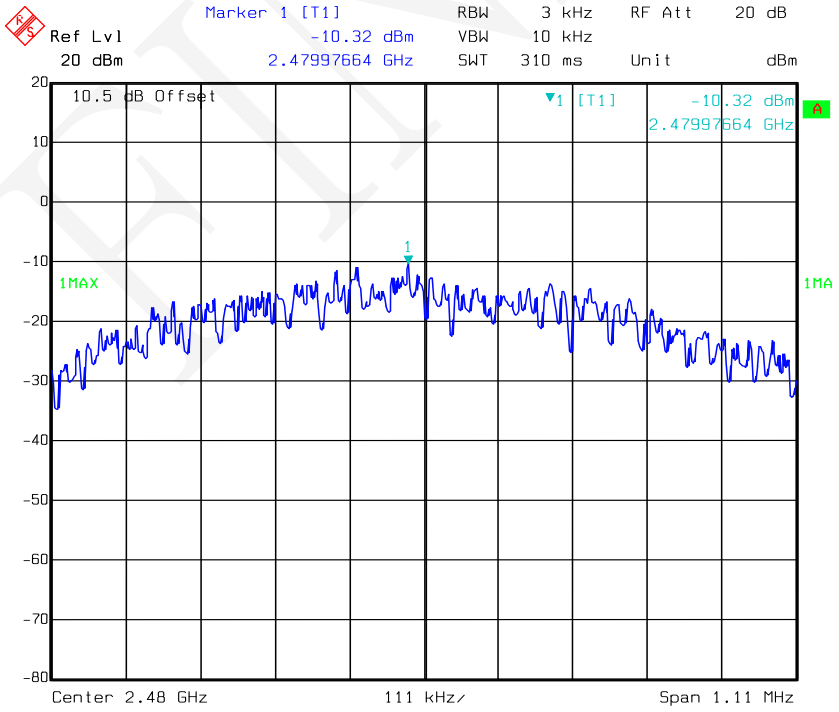
Power Spectral Density, High Channel



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