

TEST REPORT

Reference No. : WTD21D01004876W
FCC ID : 2AADC-RCM
Applicant..... : Inspectron Inc.
Address..... : 29108 Lorie Lane, Wixom, MI 48393 USA
Manufacturer : Inspectron Inc.
Address..... : 29108 Lorie Lane, Wixom, MI 48393 USA
Product..... : ROCAM mini HD
Model(s) : ROCAM mini HD-Basis
Brand Name..... : 
Standards..... : FCC CFR47 Part 15.247
Date of Receipt sample : 2021-01-19
Date of Test : 2021-01-19 to 2021-05-13
Date of Issue..... : 2021-05-13
Test Result..... : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

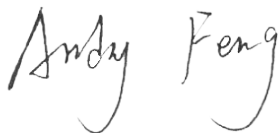
Waltek Testing Group Co., Ltd.

Address: No. 77, Houjie Section, Guantai Road, Houjie Town, Dongguan City, Guangdong, China

Tel: +86-769-2267 6998

Fax: +86-769-2267 6828

Compiled by:



Andy Feng / Project Engineer

Approved by:



Daniel Liu / Designated Reviewer

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD21D01004876 W	2021-01-19	2021-01-19 to 2021-05-13	2021-05-13	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	ROCAM mini HD
Model(s):	ROCAM mini HD-Basis
Model Description:	N/A
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40 5G-802.11a/ n(HT20/40)/ac(HT20/40/80)
Bluetooth Version:	Bluetooth v4.1 with BLE
Hardware Version:	WG225
Software Version:	14.10.2020

4.2 Details of E.U.T.

Operation Frequency:	WiFi: 802.11b/g/n HT20: 2412~2462MHz 802.11n HT40: 2422~2452MHz BLE:2402-2480MHz
Max. RF output power:	WiFi(2.4G): 11.97dBm BLE: 11.50dBm
Type of Modulation:	WiFi: CCK, OFDM BLE:GFSK
Antenna installation:	WiFi: internal permanent antenna BLE: internal permanent antenna
Antenna Gain:	WiFi(2.4G): 2dBi BLE: 2dBi
Ratings:	DC 18V

4.3 Channel List

WIFI

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	-

BT BLE

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Power Spectral Density	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
6dB Bandwidth	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Band Edge	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Transmitter Spurious Emissions	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX

Table 2 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BT BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BT BLE	1 Mbps	0/19/39	TX
6dB Bandwidth	BT BLE	1 Mbps	0/19/39	TX
Band Edge	BT BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BT BLE	1 Mbps	0/19/39	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .

4.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

5 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	PASS
Conducted Emissions	15.207(a)	N/A
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

6 Equipment Used during Test

6.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	2020-07-30	2021-07-29
2.	LISN	R&S	ENV216	101215	2020-07-30	2021-07-29
3.	Cable	Top	TYPE16(3.5M)	-	2020-07-30	2021-07-29
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2020-07-30	2021-07-29
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2020-07-30	2021-07-29
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2020-07-30	2021-07-29
4.	Cable	LARGE	RF300	-	2020-07-30	2021-07-29
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2020-04-20 2021-04-19	2021-04-19 2022-04-18
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2020-04-20 2021-04-19	2021-04-19 2022-04-18
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2020-08-22	2021-08-21
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2020-04-20 2021-04-19	2021-04-19 2022-04-18
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2020-04-25 2021-04-24	2021-04-24 2022-04-23
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2020-04-20 2021-04-19	2021-04-19 2022-04-18
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2020-04-20 2021-04-19	2021-04-19 2022-04-18
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2020-04-20 2021-04-19	2021-04-19 2022-04-18
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2020-04-20 2021-04-19	2021-04-19 2022-04-18
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2020-04-25 2021-04-24	2021-04-24 2022-04-23
3	Amplifier	Compliance pirection	PAP-0203	22024	2020-04-20 2021-04-19	2021-04-19 2022-04-18

		systems inc				
4	Cable	HUBER+SUHNER	CBL2	525178	2020-04-20 2021-04-19	2021-04-19 2022-04-18
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2020-04-20 2021-04-19	2021-04-19 2022-04-18
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2020-04-20 2021-04-19	2021-04-19 2022-04-18
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2020-04-20 2021-04-19	2021-04-19 2022-04-18

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10 ⁻⁷ Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval: 95%. Confidence factor:k=2	

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

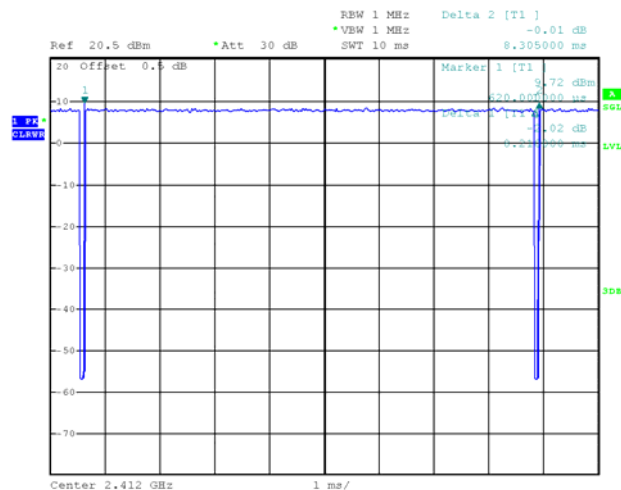
7 Duty Cycle

Modulation	On time(ms)	Period(ms)	Duty Cycle(%)	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	8.21	8.30	98.92	0.05	-0.094
802.11g	1.330	1.385	96.03	0.18	-0.352
802.11n20	1.260	1.300	96.92	0.14	-0.272
802.11n40	0.600	0.675	88.89	0.51	-1.023
GFSK	2.136	2.508	85.17	0.70	-1.394

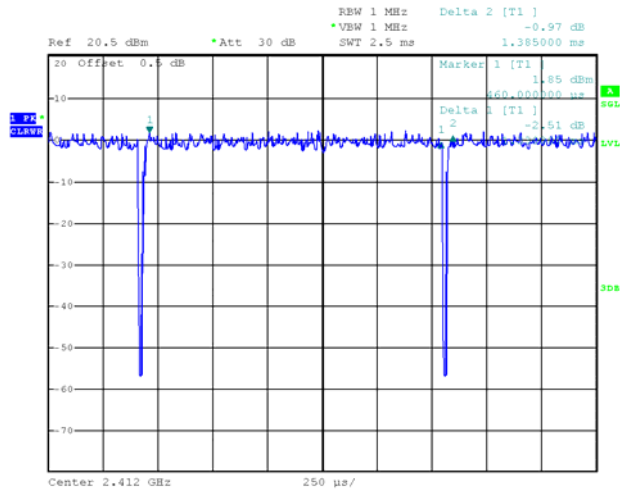
Remark:

- 1) Duty Cycle=On Time/Period
- 2) Duty Cycle Factor= $10 \cdot \log(1/\text{Duty cycle})$
- 3) Average Factor= $20 \log_{10} \text{Duty Cycle}$

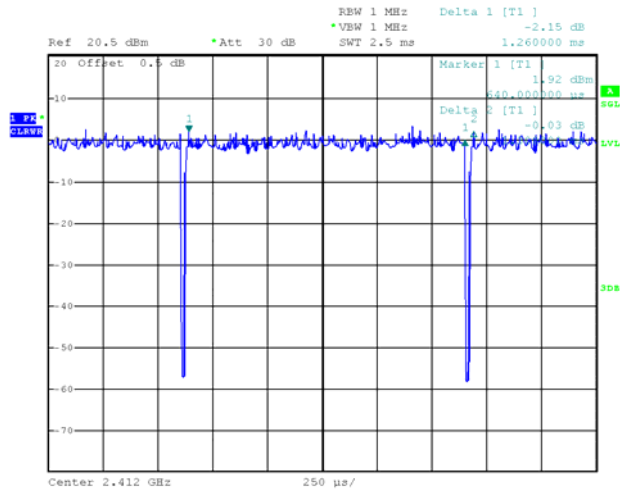
802.11b

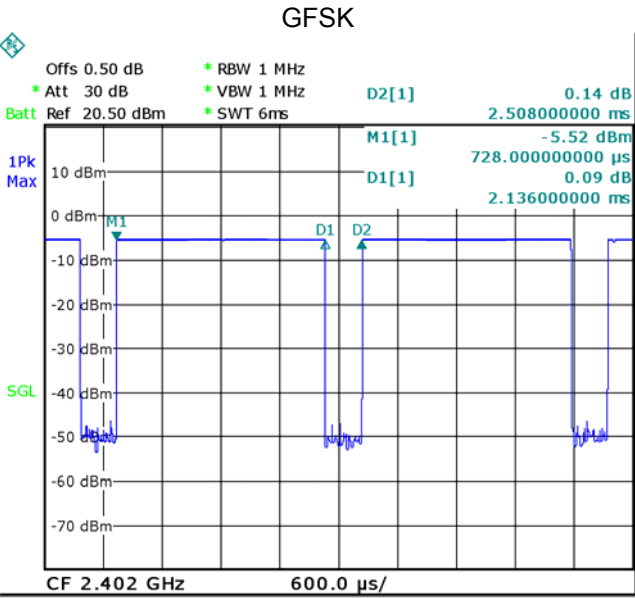
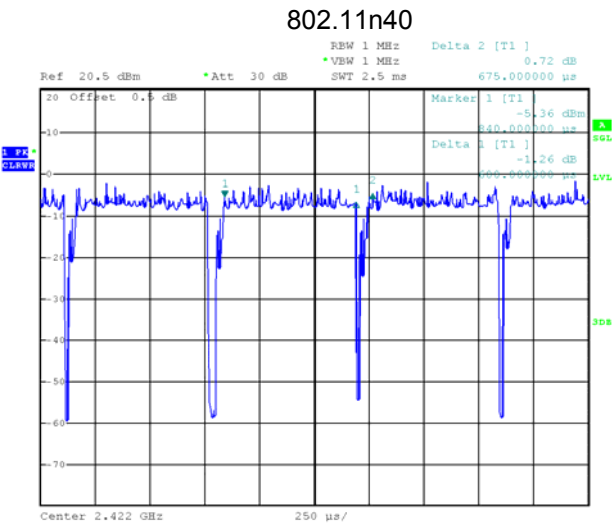


802.11g



802.11n20





8 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Limit:

Frequency (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

8.1 E.U.T. Operation

Operating Environment:

Temperature: 22.4 °C

Humidity: 53.7 % RH

Atmospheric Pressure: 101.8kPa

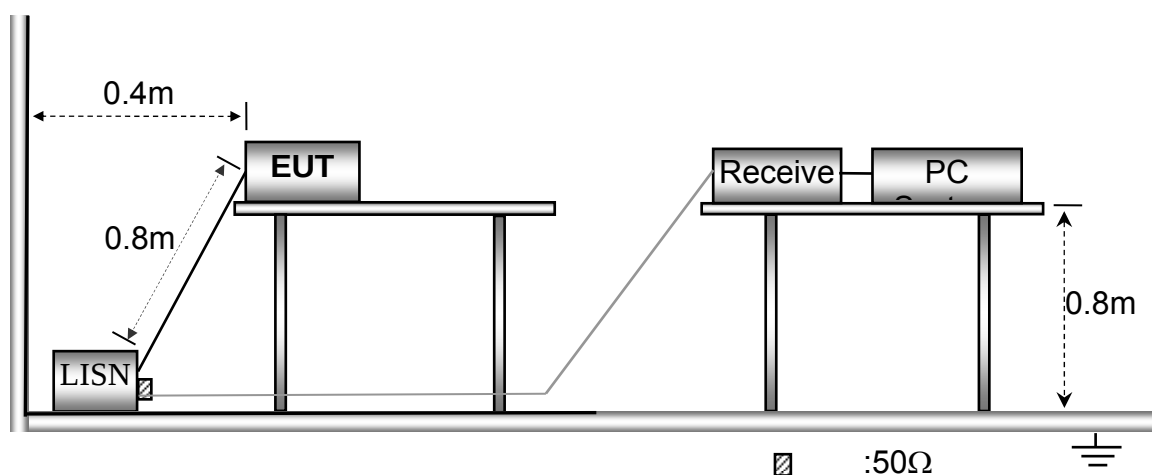
Test Voltage: AC 120V, 60Hz

EUT Operation:

The test was performed in Transmitting mode, the worst test data (GFSK modulation Low channel) were shown in the report.

8.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



8.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

8.4 Conducted Emission Test Result

Note: This product only powered by battery and not connect to the utility grid, so the Conducted Emission is not required.

9 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

9.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

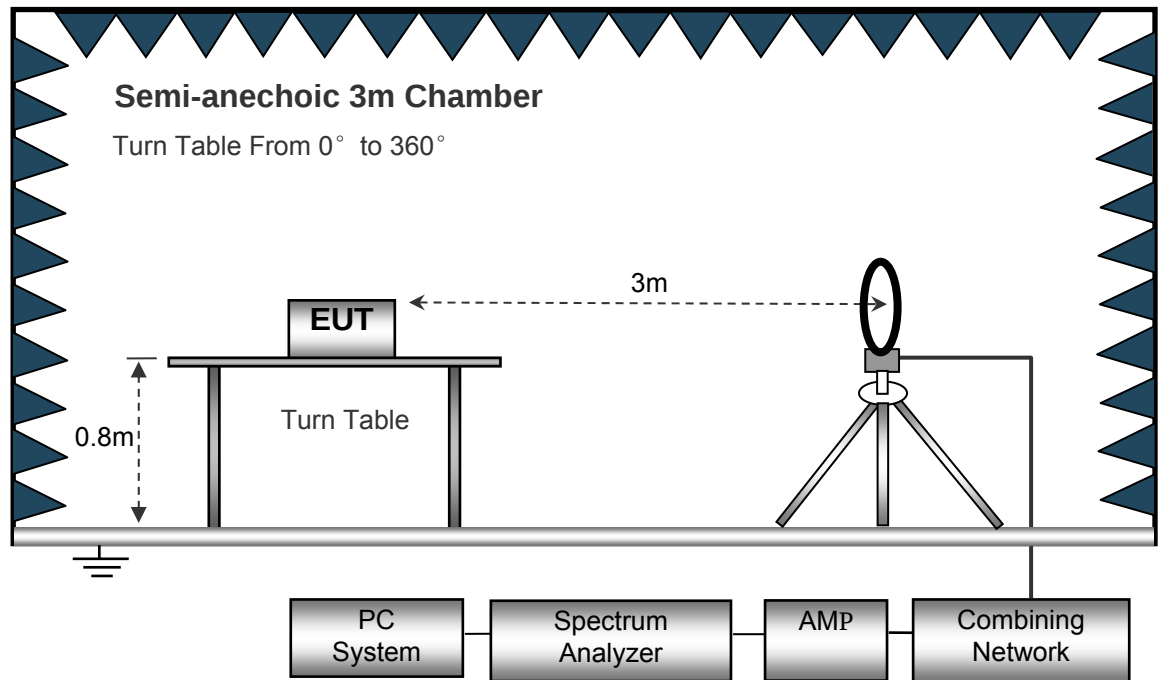
EUT Operation :

The test was performed in TX transmitting mode, the test data were shown in the report.

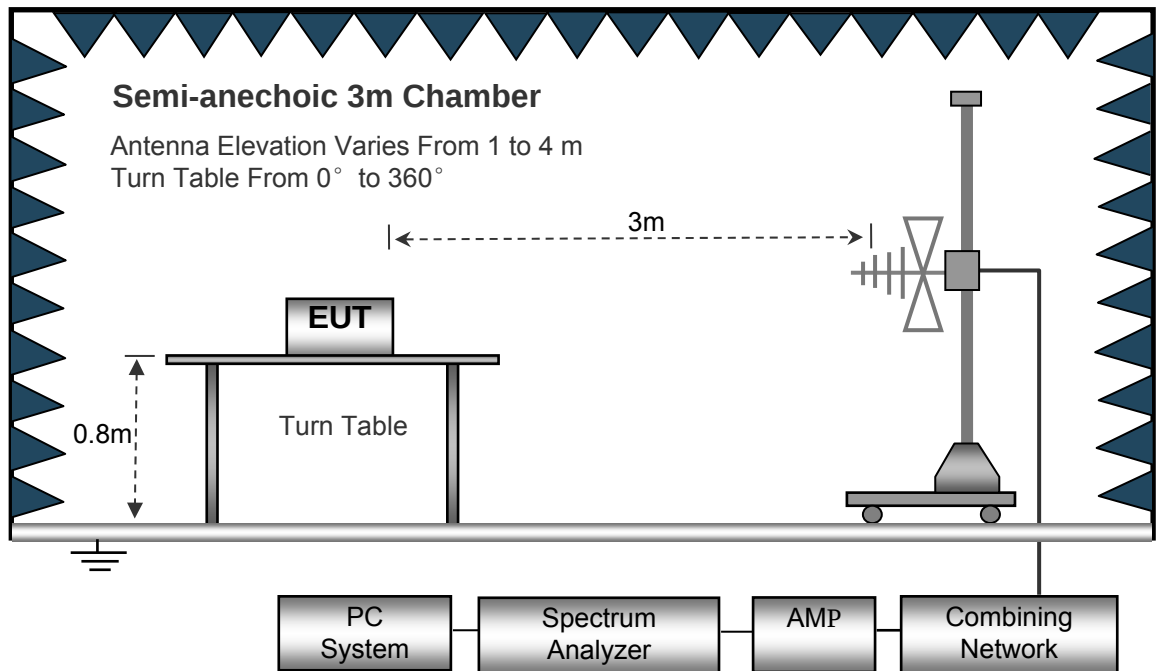
9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

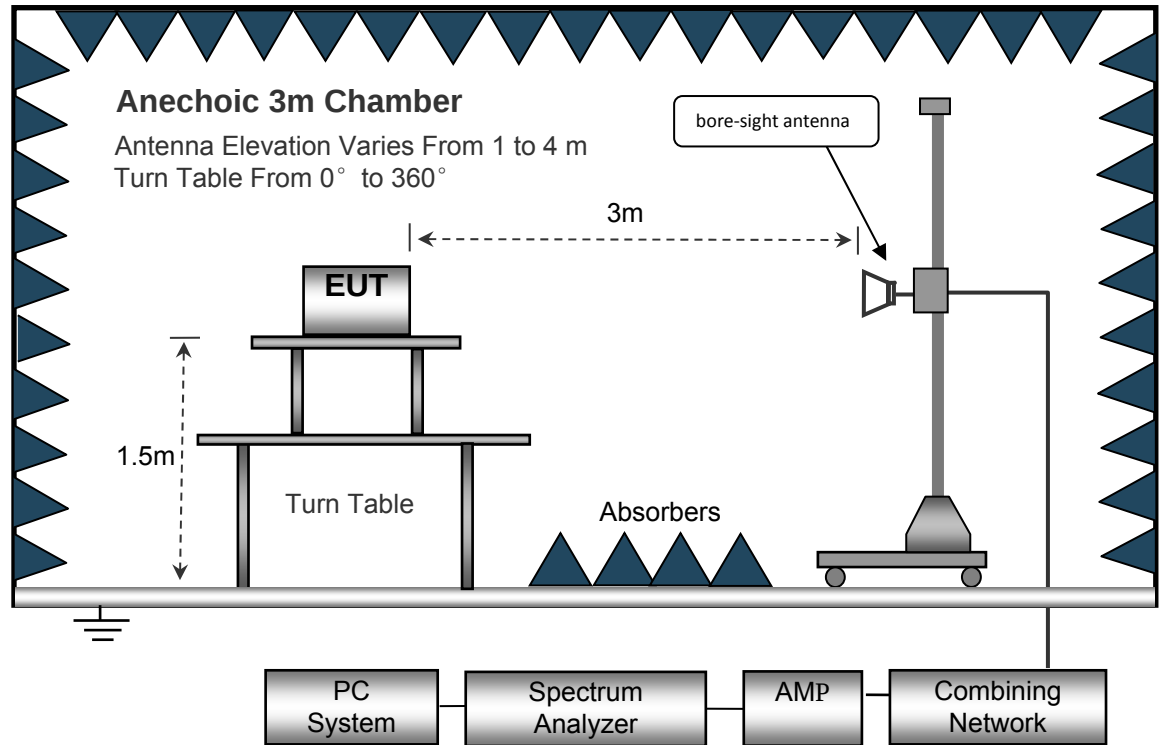
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
IF Bandwidth.....10kHz
Video Bandwidth.....10kHz
Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....100kHz
Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....1MHz
Video Bandwidth.....3MHz
DetectorAve.
Resolution Bandwidth.....1MHz
Video Bandwidth.....10Hz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

9.5 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

9.6 Summary of Test Results

Wifi:

Test Frequency: 9KHz~30MHz

Remark: only the worst data (802.11b/g/n Low channel mode) were recorded.

Frequency	Measurement results dBμV @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dBμV/m @30m	Limits dBμV/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
802.11b							
6.022	25.36	QP	21.84	40.00	7.20	29.54	-22.34
15.731	25.65	QP	21.35	40.00	7.00	29.54	-22.54
25.683	25.38	QP	20.67	40.00	6.05	29.54	-23.49
802.11g							
6.022	25.35	QP	21.84	40.00	7.19	29.54	-22.35
15.731	25.39	QP	21.35	40.00	6.74	29.54	-22.80
25.683	25.33	QP	20.67	40.00	6.00	29.54	-23.54
802.11n(HT20)							
6.022	25.25	QP	21.84	40.00	7.09	29.54	-22.45
15.731	25.49	QP	21.35	40.00	6.84	29.54	-22.70
25.683	25.31	QP	20.67	40.00	5.98	29.54	-23.56
802.11n(HT40)							
6.022	25.28	QP	21.84	40.00	7.12	29.54	-22.42
15.731	25.47	QP	21.35	40.00	6.82	29.54	-22.72
25.683	25.34	QP	20.67	40.00	6.01	29.54	-23.53

Test Frequency : 30MHz ~ 8GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
223.45	42.65	QP	328	1.1	H	-11.62	31.03	46.00	-14.97
223.45	38.79	QP	306	1.2	V	-11.62	27.17	46.00	-18.83
4824.00	50.63	PK	224	1.3	V	-1.06	49.57	74.00	-24.43
4824.00	41.00	Ave	224	1.3	V	-1.06	39.94	54.00	-14.06
7236.00	44.02	PK	34	1.7	H	1.33	45.35	74.00	-28.65
7236.00	40.45	Ave	34	1.7	H	1.33	41.78	54.00	-12.22
2332.25	46.81	PK	336	1.8	V	-13.19	33.62	74.00	-40.38
2332.25	39.08	Ave	336	1.8	V	-13.19	25.89	54.00	-28.11
2358.79	44.29	PK	188	1.9	H	-13.14	31.15	74.00	-42.85
2358.79	37.95	Ave	188	1.9	H	-13.14	24.81	54.00	-29.19
2497.54	42.59	PK	48	1.8	V	-13.08	29.51	74.00	-44.49
2497.54	36.30	Ave	48	1.8	V	-13.08	23.22	54.00	-30.78

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
223.45	41.38	QP	292	1.9	H	-11.62	29.76	46.00	-16.24
223.45	40.18	QP	179	1.5	V	-11.62	28.56	46.00	-17.44
4874.00	51.75	PK	302	1.2	V	-0.62	51.13	74.00	-22.87
4874.00	40.26	Ave	302	1.2	V	-0.62	39.64	54.00	-14.36
7311.00	43.34	PK	311	1.7	H	2.21	45.55	74.00	-28.45
7311.00	40.87	Ave	311	1.7	H	2.21	43.08	54.00	-10.92
2312.55	46.92	PK	229	1.7	V	-13.19	33.73	74.00	-40.27
2312.55	38.25	Ave	229	1.7	V	-13.19	25.06	54.00	-28.94
2379.19	42.01	PK	188	1.9	H	-13.14	28.87	74.00	-45.13
2379.19	38.62	Ave	188	1.9	H	-13.14	25.48	54.00	-28.52
2496.40	43.67	PK	320	1.6	V	-13.08	30.59	74.00	-43.41
2496.40	38.51	Ave	320	1.6	V	-13.08	25.43	54.00	-28.57

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
223.45	41.21	QP	137	1.7	H	-11.62	29.59	46.00	-16.41
223.45	40.63	QP	239	1.5	V	-11.62	29.01	46.00	-16.99
4924.00	51.98	PK	77	1.9	V	-0.24	51.74	74.00	-22.26
4924.00	38.99	Ave	77	1.9	V	-0.24	38.75	54.00	-15.25
7386.00	41.97	PK	256	1.9	H	2.84	44.81	74.00	-29.19
7386.00	39.96	Ave	256	1.9	H	2.84	42.80	54.00	-11.20
2318.57	45.60	PK	330	1.8	V	-13.19	32.41	74.00	-41.59
2318.57	39.41	Ave	330	1.8	V	-13.19	26.22	54.00	-27.78
2357.42	42.07	PK	170	1.3	H	-13.14	28.93	74.00	-45.07
2357.42	38.24	Ave	170	1.3	H	-13.14	25.10	54.00	-28.90
2491.54	43.29	PK	98	1.5	V	-13.08	30.21	74.00	-43.79
2491.54	36.76	Ave	98	1.5	V	-13.08	23.68	54.00	-30.32

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Low Channel 2412MHz									
223.45	40.02	QP	320	1.3	H	-11.62	28.40	46.00	-17.60
223.45	39.30	QP	97	1.0	V	-11.62	27.68	46.00	-18.32
4824.00	50.97	PK	143	1.4	V	-1.06	49.91	74.00	-24.09
4824.00	39.00	Ave	143	1.4	V	-1.06	37.94	54.00	-16.06
7236.00	40.98	PK	146	1.9	H	1.33	42.31	74.00	-31.69
7236.00	38.61	Ave	146	1.9	H	1.33	39.94	54.00	-14.06
2311.26	45.17	PK	53	1.6	V	-13.19	31.98	74.00	-42.02
2311.26	37.75	Ave	53	1.6	V	-13.19	24.56	54.00	-29.44
2380.43	44.05	PK	75	1.2	H	-13.14	30.91	74.00	-43.09
2380.43	38.08	Ave	75	1.2	H	-13.14	24.94	54.00	-29.06
2486.35	44.40	PK	233	1.8	V	-13.08	31.32	74.00	-42.68
2486.35	36.22	Ave	233	1.8	V	-13.08	23.14	54.00	-30.86

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
223.45	39.93	QP	206	1.1	H	-11.62	28.31	46.00	-17.69
223.45	38.79	QP	188	1.9	V	-11.62	27.17	46.00	-18.83
4874.00	52.45	PK	57	1.3	V	-0.62	51.83	74.00	-22.17
4874.00	37.95	Ave	57	1.3	V	-0.62	37.33	54.00	-16.67
7311.00	42.42	PK	255	1.8	H	2.21	44.63	74.00	-29.37
7311.00	37.50	Ave	255	1.8	H	2.21	39.71	54.00	-14.29
2344.52	45.30	PK	318	1.5	V	-13.19	32.11	74.00	-41.89
2344.52	39.76	Ave	318	1.5	V	-13.19	26.57	54.00	-27.43
2382.91	42.50	PK	339	1.0	H	-13.14	29.36	74.00	-44.64
2382.91	37.62	Ave	339	1.0	H	-13.14	24.48	54.00	-29.52
2485.85	42.47	PK	99	1.9	V	-13.08	29.39	74.00	-44.61
2485.85	38.26	Ave	99	1.9	V	-13.08	25.18	54.00	-28.82

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: High Channel 2462MHz									
223.45	38.71	QP	317	1.5	H	-11.62	27.09	46.00	-18.91
223.45	39.07	QP	89	1.2	V	-11.62	27.45	46.00	-18.55
4924.00	51.12	PK	58	1.7	V	-0.24	50.88	74.00	-23.12
4924.00	38.73	Ave	58	1.7	V	-0.24	38.49	54.00	-15.51
7386.00	43.68	PK	247	1.7	H	2.84	46.52	74.00	-27.48
7386.00	36.35	Ave	247	1.7	H	2.84	39.19	54.00	-14.81
2342.30	46.68	PK	325	1.0	V	-13.19	33.49	74.00	-40.51
2342.30	39.19	Ave	325	1.0	V	-13.19	26.00	54.00	-28.00
2363.81	43.26	PK	345	1.9	H	-13.14	30.12	74.00	-43.88
2363.81	37.38	Ave	345	1.9	H	-13.14	24.24	54.00	-29.76
2498.11	42.22	PK	247	1.9	V	-13.08	29.14	74.00	-44.86
2498.11	36.19	Ave	247	1.9	V	-13.08	23.11	54.00	-30.89

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: Low Channel 2412MHz									
223.45	39.46	QP	318	1.2	H	-11.62	27.84	46.00	-18.16
223.45	40.55	QP	311	1.0	V	-11.62	28.93	46.00	-17.07
4824.00	50.72	PK	286	1.2	V	-1.06	49.66	74.00	-24.34
4824.00	40.02	Ave	286	1.2	V	-1.06	38.96	54.00	-15.04
7236.00	42.86	PK	257	2.0	H	1.33	44.19	74.00	-29.81
7236.00	35.51	Ave	257	2.0	H	1.33	36.84	54.00	-17.16
2317.22	45.98	PK	321	1.8	V	-13.19	32.79	74.00	-41.21
2317.22	38.58	Ave	321	1.8	V	-13.19	25.39	54.00	-28.61
2372.36	42.80	PK	172	1.1	H	-13.14	29.66	74.00	-44.34
2372.36	38.06	Ave	172	1.1	H	-13.14	24.92	54.00	-29.08
2493.63	44.37	PK	60	1.7	V	-13.08	31.29	74.00	-42.71
2493.63	36.62	Ave	60	1.7	V	-13.08	23.54	54.00	-30.46

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: Middle Channel 2437MHz									
223.45	39.91	QP	212	1.5	H	-11.62	28.29	46.00	-17.71
223.45	41.45	QP	77	1.5	V	-11.62	29.83	46.00	-16.17
4874.00	49.48	PK	181	1.4	V	-0.62	48.86	74.00	-25.14
4874.00	40.11	Ave	181	1.4	V	-0.62	39.49	54.00	-14.51
7311.00	41.55	PK	232	1.1	H	2.21	43.76	74.00	-30.24
7311.00	36.93	Ave	232	1.1	H	2.21	39.14	54.00	-14.86
2334.16	45.26	PK	21	1.9	V	-13.19	32.07	74.00	-41.93
2334.16	38.18	Ave	21	1.9	V	-13.19	24.99	54.00	-29.01
2385.04	42.32	PK	251	1.7	H	-13.14	29.18	74.00	-44.82
2385.04	37.07	Ave	251	1.7	H	-13.14	23.93	54.00	-30.07
2491.94	42.87	PK	127	1.1	V	-13.08	29.79	74.00	-44.21
2491.94	36.37	Ave	127	1.1	V	-13.08	23.29	54.00	-30.71

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: High Channel 2462MHz									
223.45	40.12	QP	199	1.2	H	-11.62	28.50	46.00	-17.50
223.45	42.00	QP	176	1.9	V	-11.62	30.38	46.00	-15.62
4924.00	49.27	PK	95	1.9	V	-0.24	49.03	74.00	-24.97
4924.00	38.89	Ave	95	1.9	V	-0.24	38.65	54.00	-15.35
7386.00	42.94	PK	142	1.9	H	2.84	45.78	74.00	-28.22
7386.00	36.91	Ave	142	1.9	H	2.84	39.75	54.00	-14.25
2328.42	46.64	PK	220	2.0	V	-13.19	33.45	74.00	-40.55
2328.42	37.05	Ave	220	2.0	V	-13.19	23.86	54.00	-30.14
2389.14	43.20	PK	58	1.9	H	-13.14	30.06	74.00	-43.94
2389.14	37.61	Ave	58	1.9	H	-13.14	24.47	54.00	-29.53
2486.85	44.50	PK	265	1.9	V	-13.08	31.42	74.00	-42.58
2486.85	37.74	Ave	265	1.9	V	-13.08	24.66	54.00	-29.34

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n40: Low Channel 2422MHz									
223.45	39.96	QP	222	1.3	H	-11.62	28.34	46.00	-17.66
223.45	41.07	QP	51	1.7	V	-11.62	29.45	46.00	-16.55
4844.00	47.85	PK	323	1.1	V	-1.06	46.79	74.00	-27.21
4844.00	37.78	Ave	323	1.1	V	-1.06	36.72	54.00	-17.28
7266.00	40.92	PK	143	1.7	H	1.33	42.25	74.00	-31.75
7266.00	34.73	Ave	143	1.7	H	1.33	36.06	54.00	-17.94
2336.38	46.15	PK	47	1.5	V	-13.19	32.96	74.00	-41.04
2336.38	39.62	Ave	47	1.5	V	-13.19	26.43	54.00	-27.57
2356.75	43.39	PK	246	1.8	H	-13.14	30.25	74.00	-43.75
2356.75	38.08	Ave	246	1.8	H	-13.14	24.94	54.00	-29.06
2490.38	44.89	PK	52	1.4	V	-13.08	31.81	74.00	-42.19
2490.38	38.60	Ave	52	1.4	V	-13.08	25.52	54.00	-28.48

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n40: Middle Channel 2437MHz									
223.45	40.38	QP	103	1.2	H	-11.62	28.76	46.00	-17.24
223.45	40.52	QP	292	1.1	V	-11.62	28.90	46.00	-17.10
4874.00	47.43	PK	154	1.5	V	-0.62	46.81	74.00	-27.19
4874.00	37.24	Ave	154	1.5	V	-0.62	36.62	54.00	-17.38
7311.00	40.35	PK	275	1.2	H	2.21	42.56	74.00	-31.44
7311.00	35.16	Ave	275	1.2	H	2.21	37.37	54.00	-16.63
2345.54	45.02	PK	190	1.1	V	-13.19	31.83	74.00	-42.17
2345.54	39.94	Ave	190	1.1	V	-13.19	26.75	54.00	-27.25
2384.85	44.46	PK	118	2.0	H	-13.14	31.32	74.00	-42.68
2384.85	37.16	Ave	118	2.0	H	-13.14	24.02	54.00	-29.98
2484.47	43.27	PK	158	1.5	V	-13.08	30.19	74.00	-43.81
2484.47	38.17	Ave	158	1.5	V	-13.08	25.09	54.00	-28.91

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n40: High Channel 2452MHz									
223.45	40.79	QP	181	1.6	H	-11.62	29.17	46.00	-16.83
223.45	41.05	QP	120	1.7	V	-11.62	29.43	46.00	-16.57
4904.00	46.94	PK	168	1.2	V	-0.24	46.70	74.00	-27.30
4904.00	36.89	Ave	168	1.2	V	-0.24	36.65	54.00	-17.35
7356.00	40.44	PK	201	1.5	H	2.84	43.28	74.00	-30.72
7356.00	35.15	Ave	201	1.5	H	2.84	37.99	54.00	-16.01
2340.71	46.33	PK	195	1.9	V	-13.19	33.14	74.00	-40.86
2340.71	39.30	Ave	195	1.9	V	-13.19	26.11	54.00	-27.89
2363.62	44.94	PK	211	1.8	H	-13.14	31.80	74.00	-42.20
2363.62	37.26	Ave	211	1.8	H	-13.14	24.12	54.00	-29.88
2498.61	43.08	PK	344	1.9	V	-13.08	30.00	74.00	-44.00
2498.61	38.63	Ave	344	1.9	V	-13.08	25.55	54.00	-28.45

Test Frequency: 8GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

BT BLE:**Test Frequency: 9KHz~30MHz**

Remark: only the worst data (GFSK modulation Low channel mode) were recorded.

Frequency	Measurement results dBμV @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dBμV/m @30m	Limits dBμV/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
6.021	24.28	QP	21.84	40.00	6.12	29.54	-23.42
15.732	25.45	QP	21.35	40.00	6.80	29.54	-22.74
25.681	25.64	QP	20.67	40.00	6.31	29.54	-23.23

Test Frequency : 30MHz ~ 8GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2402MHz									
269.33	35.13	QP	227	1.7	H	-13.35	21.78	46.00	-24.22
269.33	38.46	QP	254	1.6	V	-13.35	25.11	46.00	-20.89
4804.00	44.22	PK	90	1.4	V	-1.06	43.16	74.00	-30.84
4804.00	43.62	Ave	90	1.4	V	-1.06	42.56	54.00	-11.44
7206.00	44.86	PK	164	1.3	H	1.33	46.19	74.00	-27.81
7206.00	36.29	Ave	164	1.3	H	1.33	37.62	54.00	-16.38
2335.30	46.10	PK	8	1.3	V	-13.19	32.91	74.00	-41.09
2335.30	38.25	Ave	8	1.3	V	-13.19	25.06	54.00	-28.94
2358.97	42.06	PK	165	1.5	H	-13.14	28.92	74.00	-45.08
2358.97	36.38	Ave	165	1.5	H	-13.14	23.24	54.00	-30.76
2492.58	42.79	PK	296	1.0	V	-13.08	29.71	74.00	-44.29
2492.58	36.04	Ave	296	1.0	V	-13.08	22.96	54.00	-31.04

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel 2440MHz									
269.33	36.28	QP	284	1.4	H	-13.35	22.93	46.00	-23.07
269.33	38.61	QP	93	2.0	V	-13.35	25.26	46.00	-20.74
4880.00	43.46	PK	114	2.0	V	-0.62	42.84	74.00	-31.16
4880.00	43.66	Ave	114	2.0	V	-0.62	43.04	54.00	-10.96
7320.00	45.09	PK	151	1.1	H	2.21	47.30	74.00	-26.70
7320.00	35.52	Ave	151	1.1	H	2.21	37.73	54.00	-16.27
2327.49	45.67	PK	224	1.5	V	-13.19	32.48	74.00	-41.52
2327.49	39.43	Ave	224	1.5	V	-13.19	26.24	54.00	-27.76
2387.68	42.83	PK	289	1.9	H	-13.14	29.69	74.00	-44.31
2387.68	38.45	Ave	289	1.9	H	-13.14	25.31	54.00	-28.69
2484.97	43.63	PK	211	1.3	V	-13.08	30.55	74.00	-43.45
2484.97	36.79	Ave	211	1.3	V	-13.08	23.71	54.00	-30.29

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK High Channel 2480MHz									
269.33	36.98	QP	307	1.3	H	-13.35	23.63	46.00	-22.37
269.33	38.46	QP	155	1.3	V	-13.35	25.11	46.00	-20.89
4960.00	42.58	PK	336	1.2	V	-0.24	42.34	74.00	-31.66
4960.00	43.19	Ave	336	1.2	V	-0.24	42.95	54.00	-11.05
7440.00	44.51	PK	292	1.3	H	2.84	47.35	74.00	-26.65
7440.00	36.29	Ave	292	1.3	H	2.84	39.13	54.00	-14.87
2327.32	45.97	PK	33	1.8	V	-13.19	32.78	74.00	-41.22
2327.32	37.04	Ave	33	1.8	V	-13.19	23.85	54.00	-30.15
2360.68	44.67	PK	21	1.8	H	-13.14	31.53	74.00	-42.47
2360.68	36.05	Ave	21	1.8	H	-13.14	22.91	54.00	-31.09
2491.03	44.48	PK	220	1.9	V	-13.08	31.40	74.00	-42.60
2491.03	38.87	Ave	220	1.9	V	-13.08	25.79	54.00	-28.21

Test Frequency: 8GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

10 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

Test Result: PASS

Limit:

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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
 - a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to _ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW _ $[3 \times \text{RBW}]$.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.

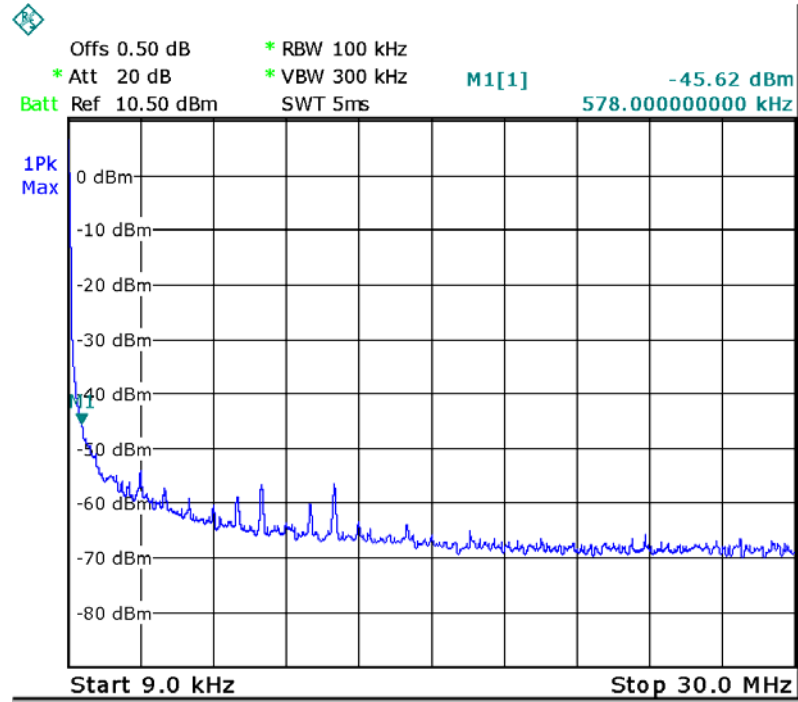
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

10.2 Test Result

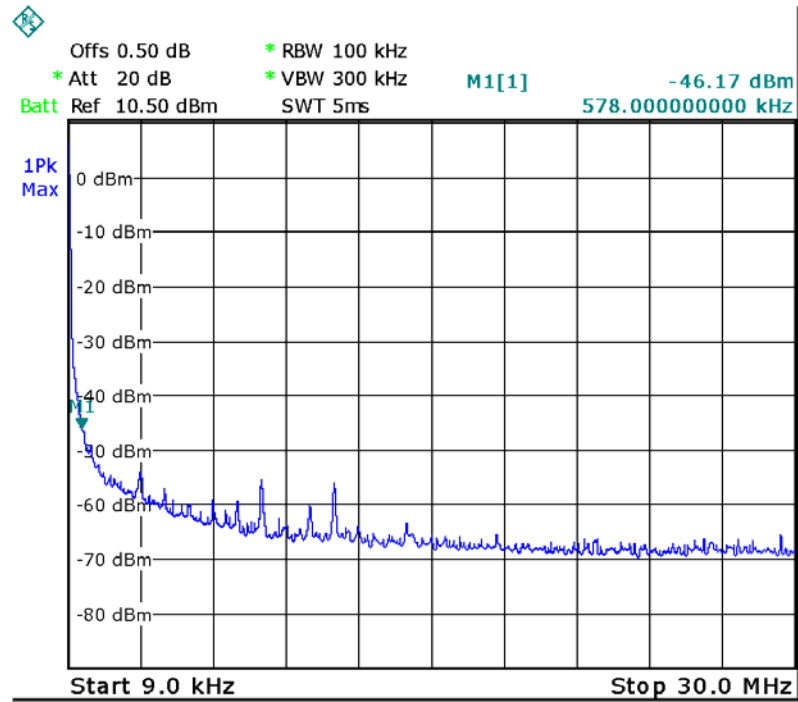
9KHz – 30MHz

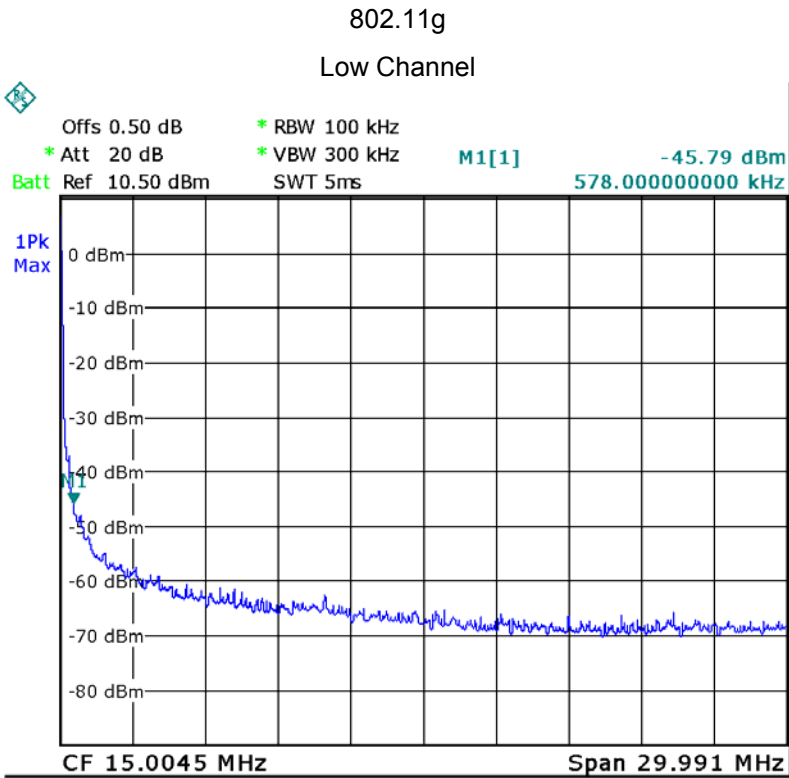
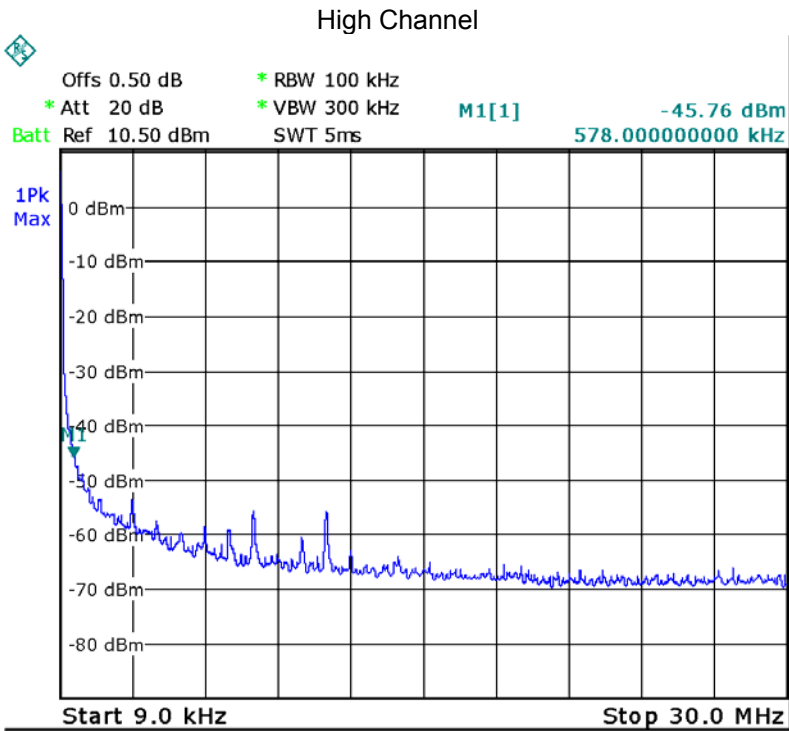
802.11b

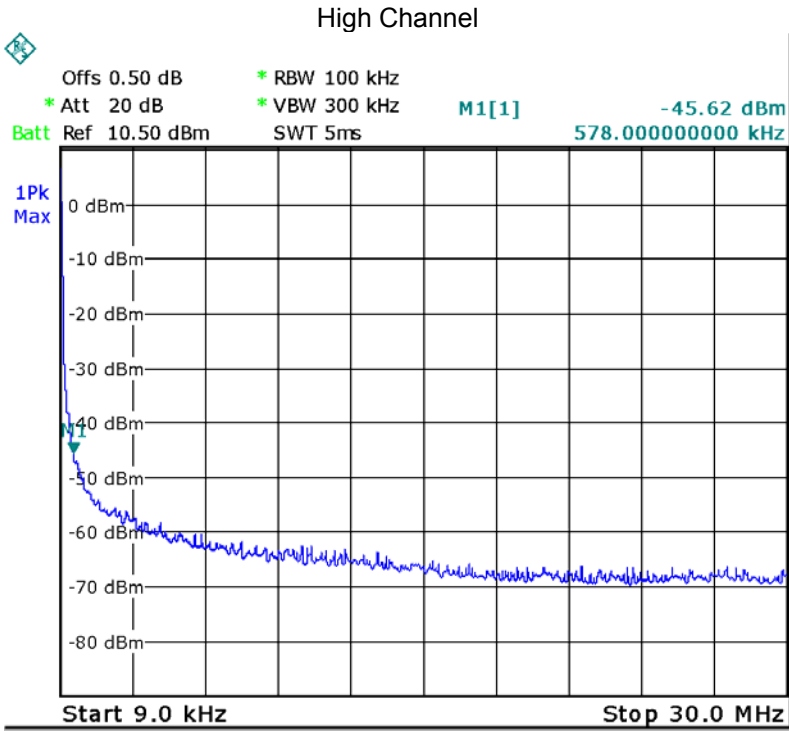
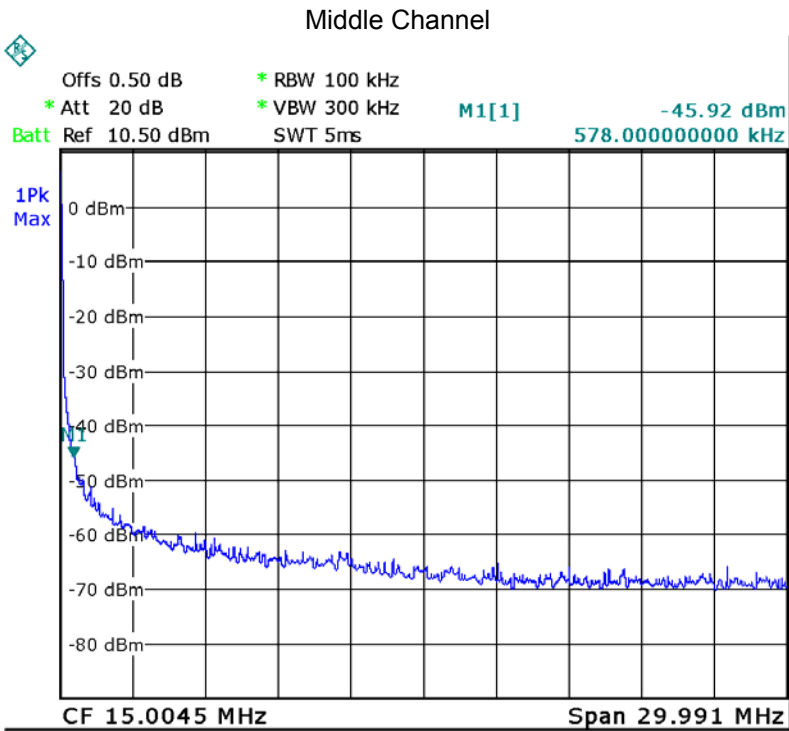
Low Channel



Middle Channel

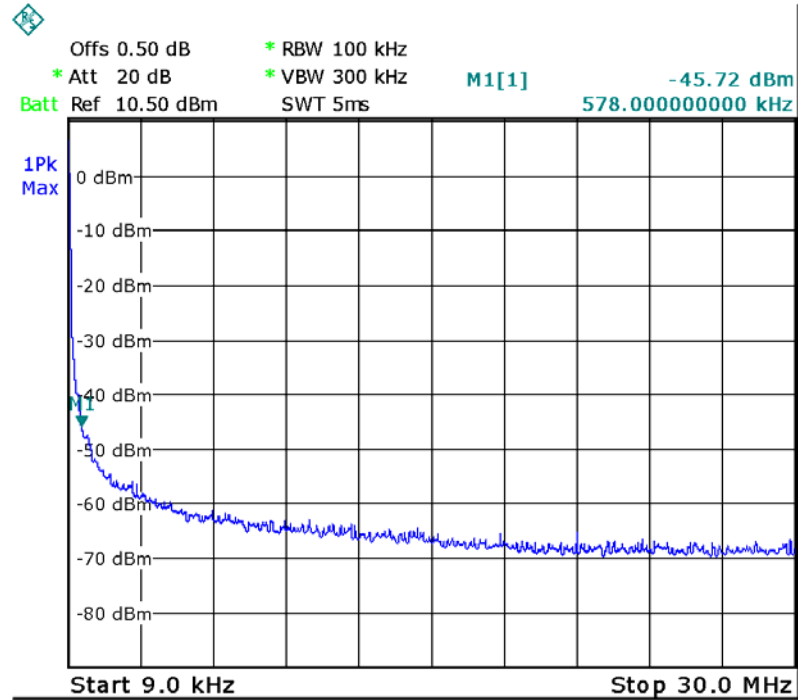




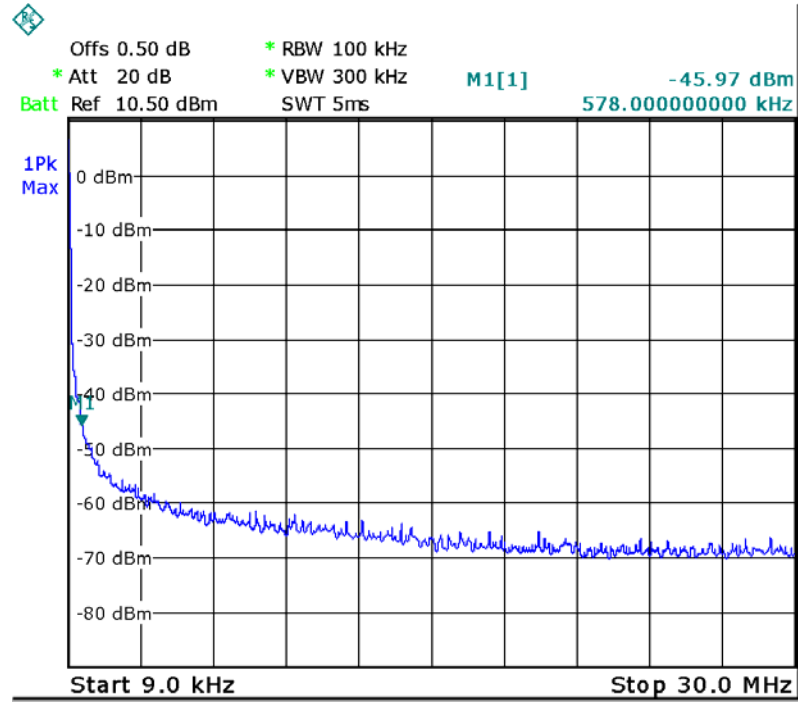


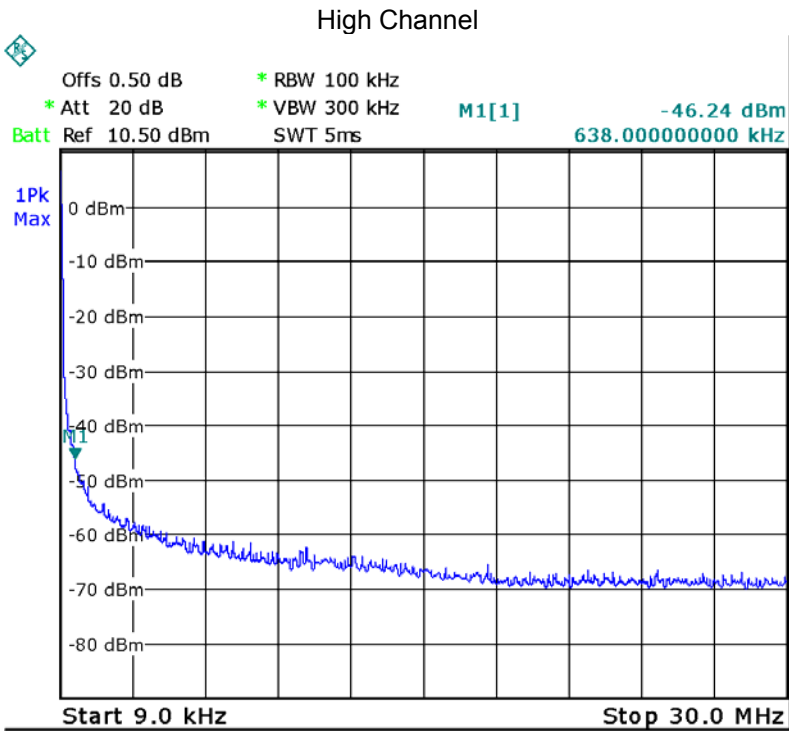
802.11n HT20

Low Channel

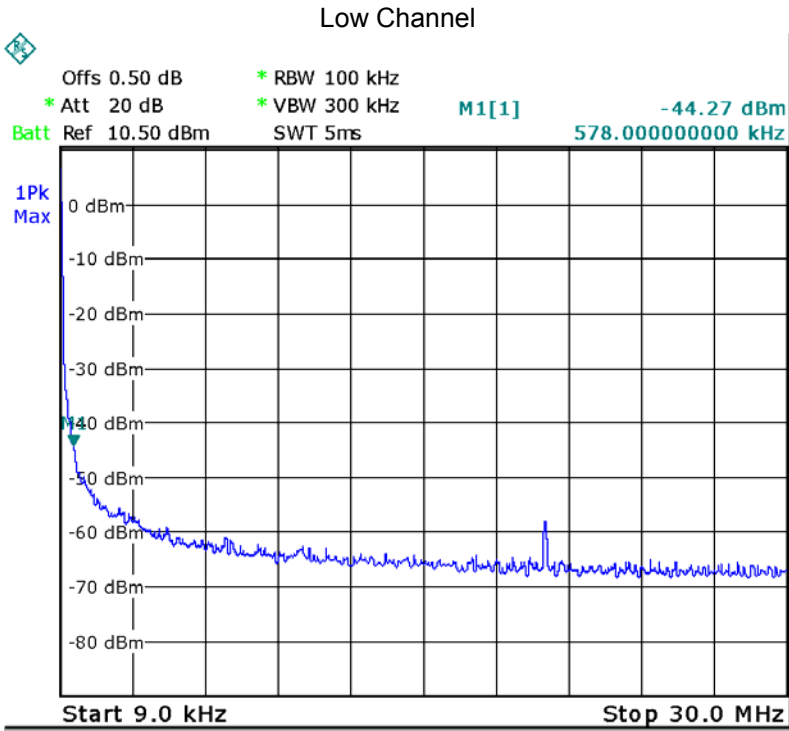


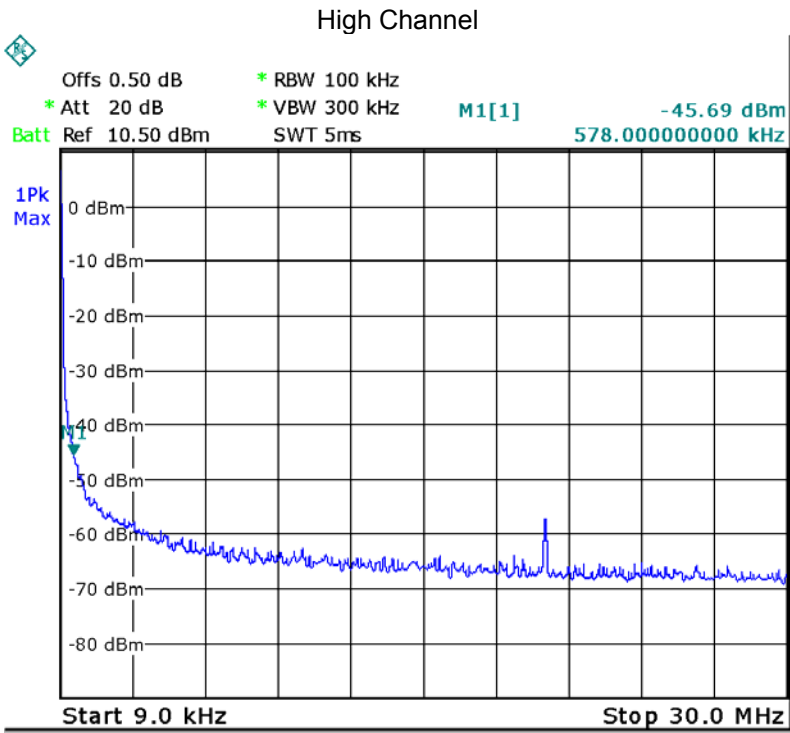
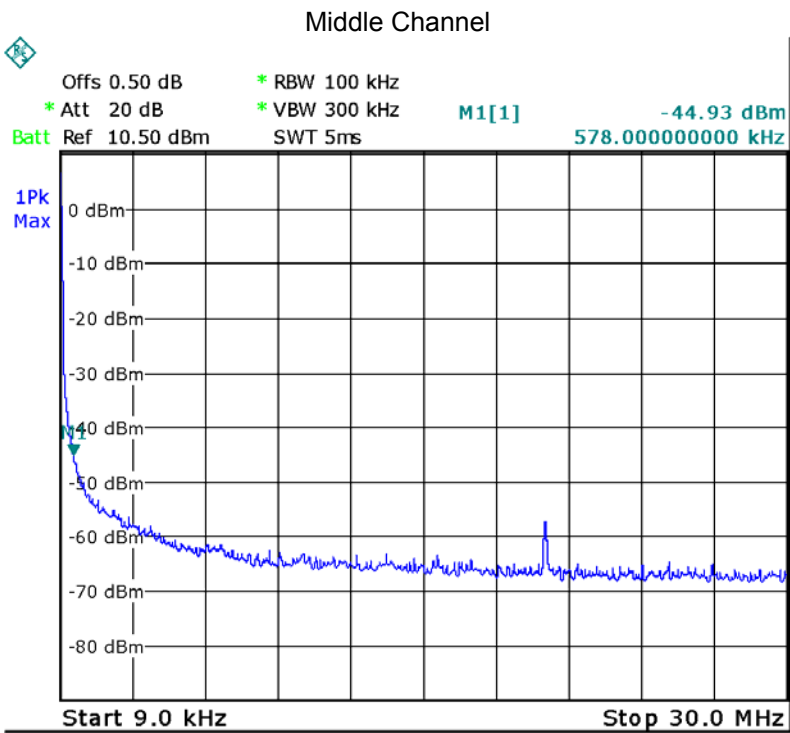
Middle Channel





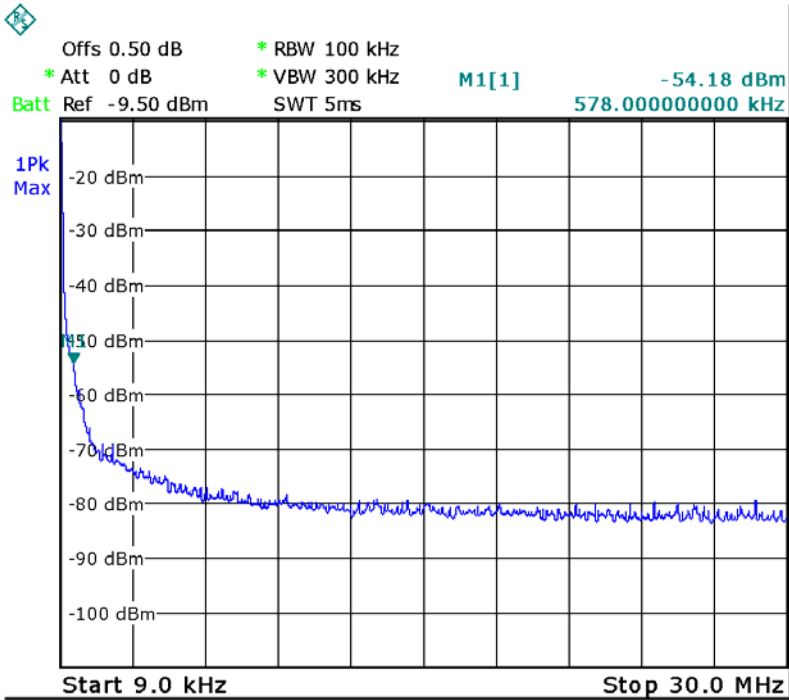
802.11n HT40



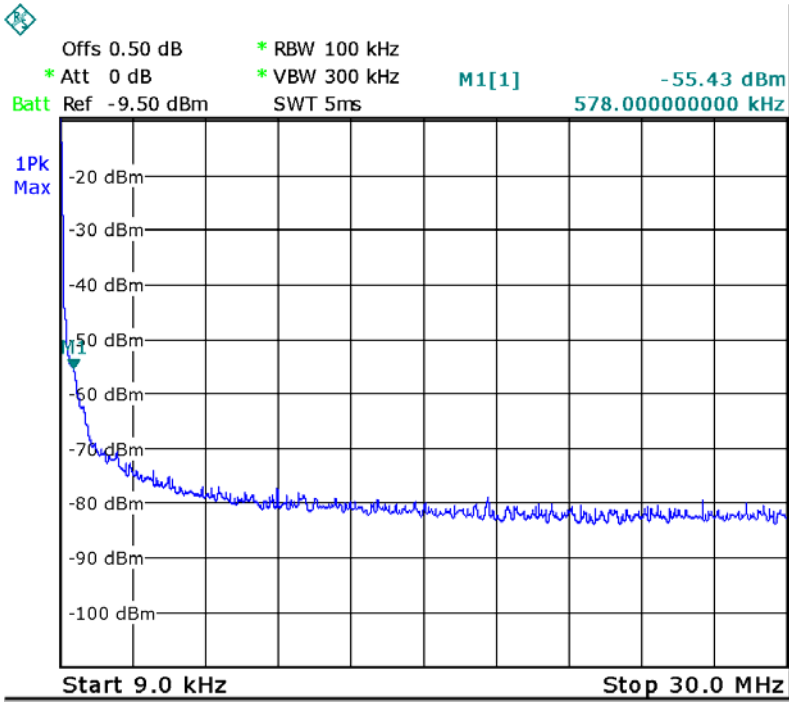


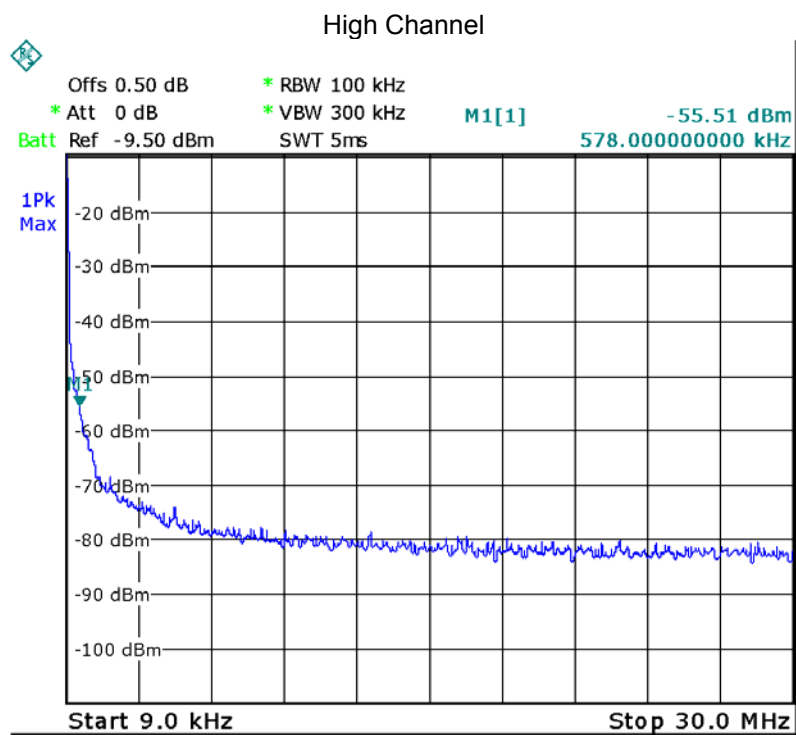
BLE

Low Channel



Middle Channel



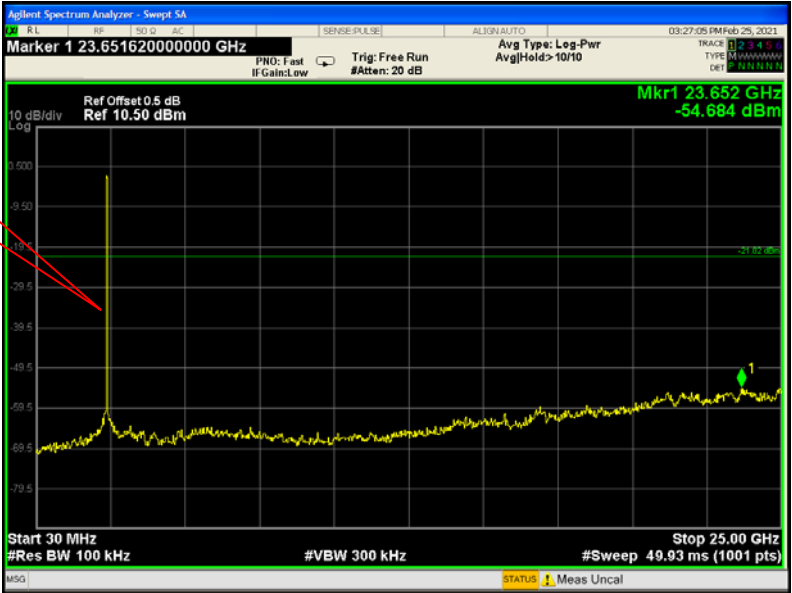


Above 30MHz

802.11b

Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



802.11g

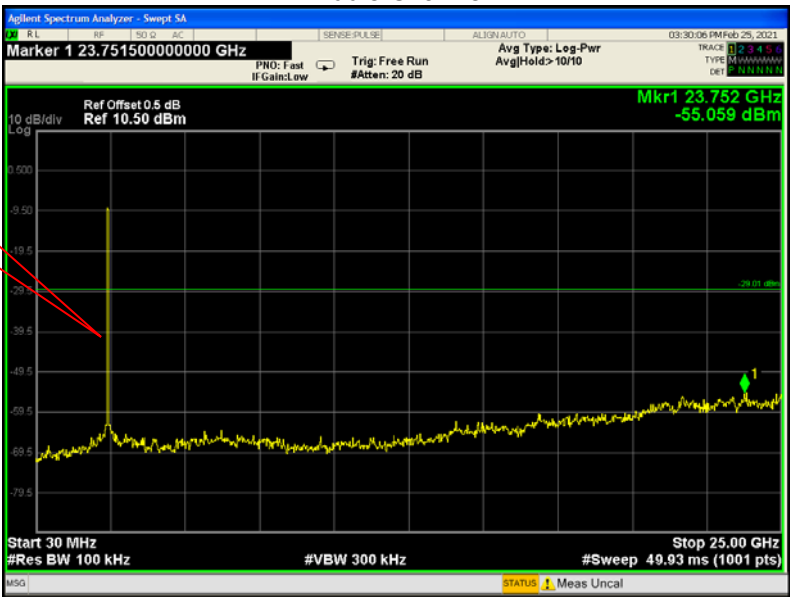
Low Channel

Fundamental



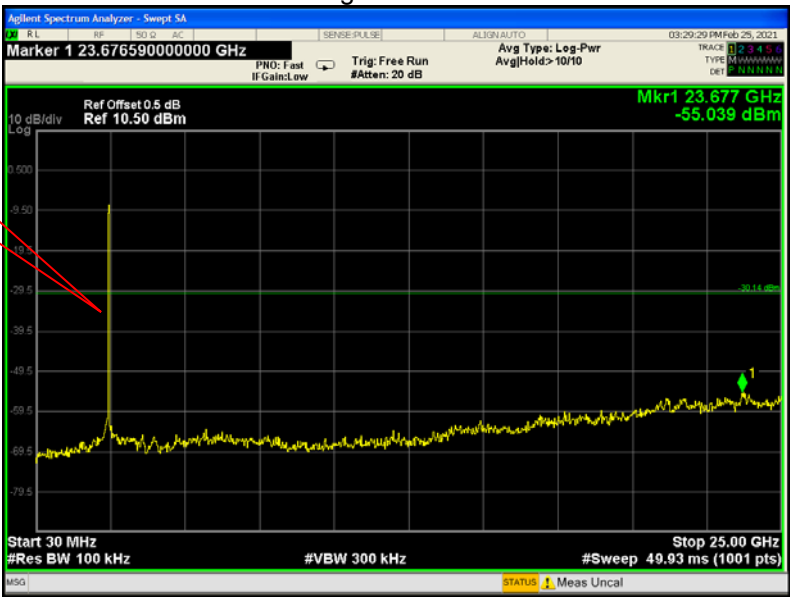
Middle Channel

Fundamental



High Channel

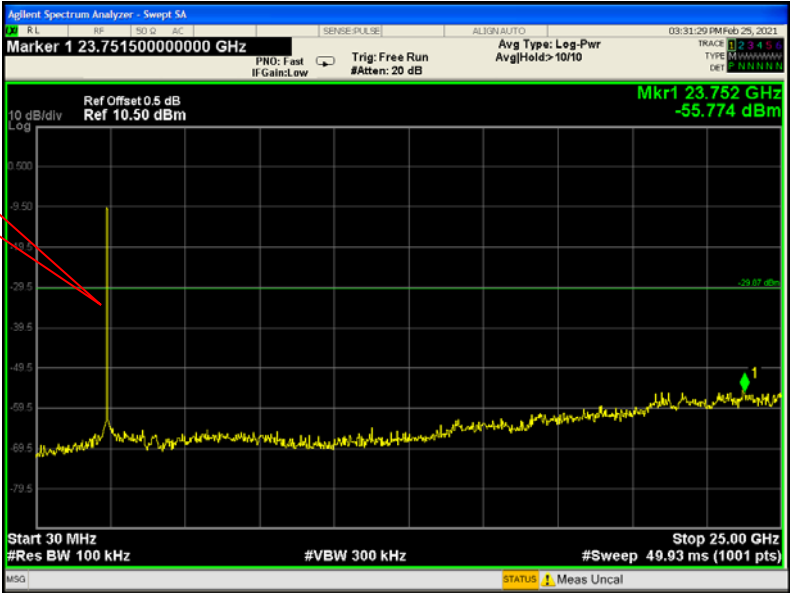
Fundamental



802.11n HT20

Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



802.11n HT40

Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



BLE

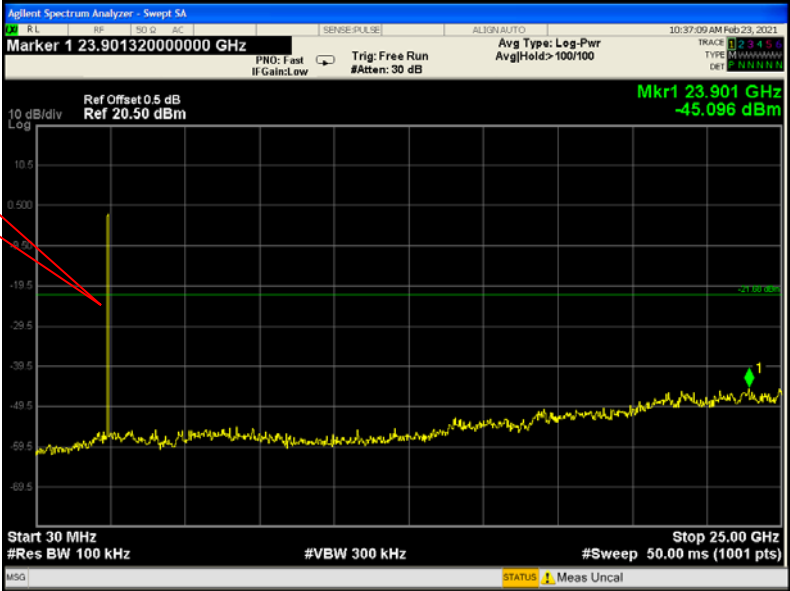
Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



11 Band Edge Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

Test Limit: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band 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 Mode: Transmitting

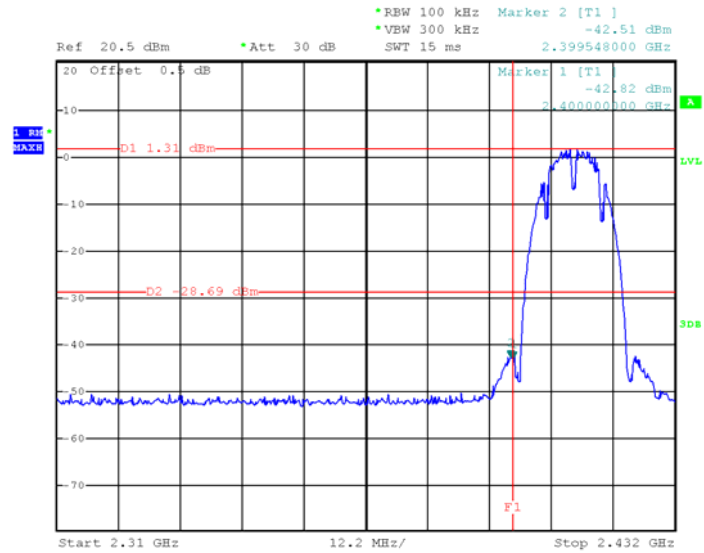
11.1 Test Produce

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.

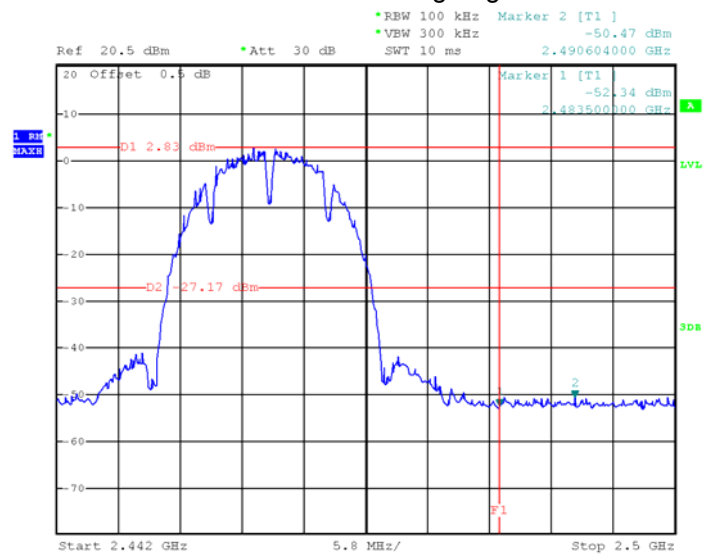
11.2 Test Result

Test result plots shown as follows:

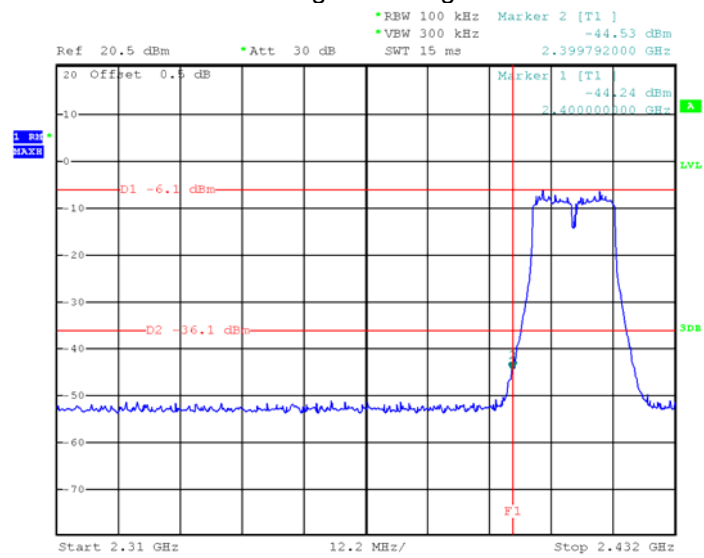
TX 11b: Band edge-left side



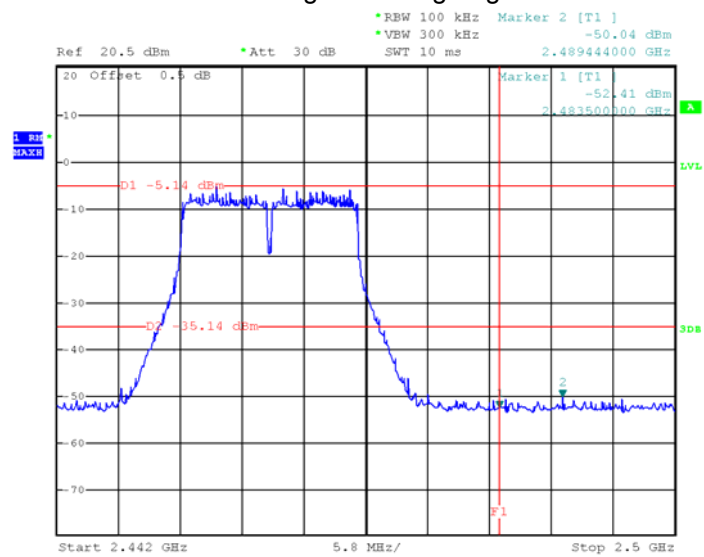
TX 11b: Band edge-right side



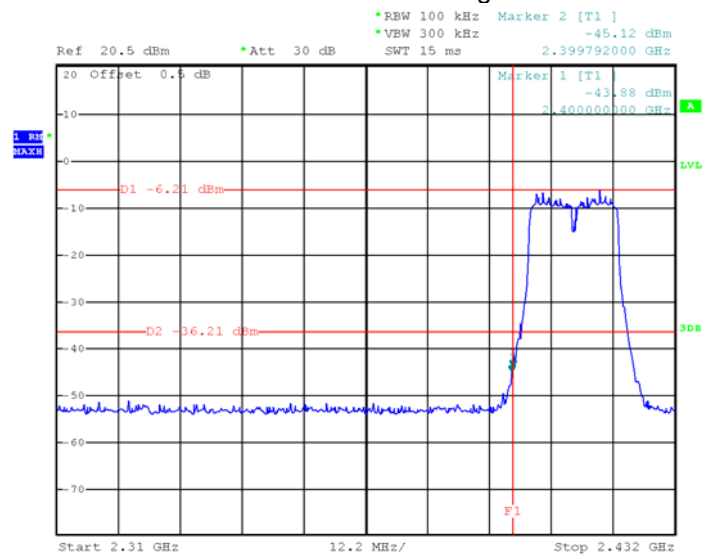
TX 11g: Band edge-left side



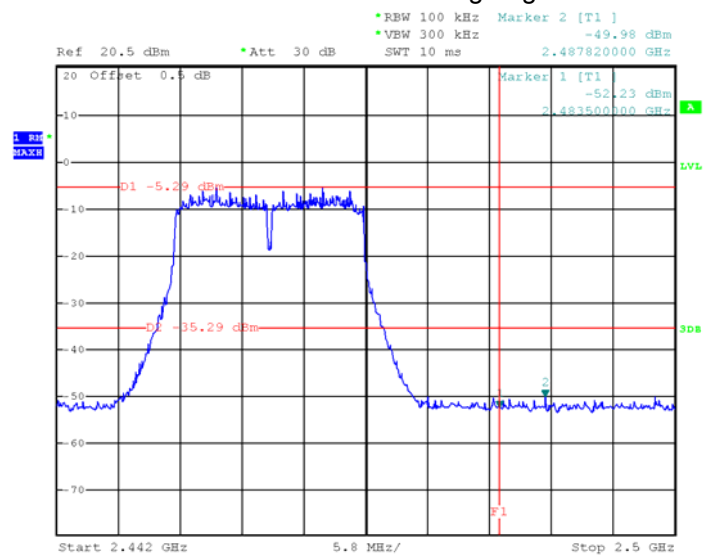
TX 11g: Band edge-right side



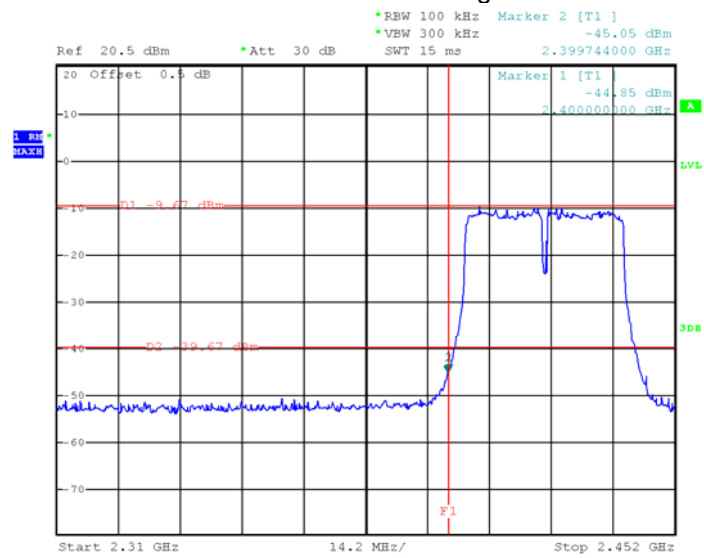
TX 11n HT20: Band edge-left side



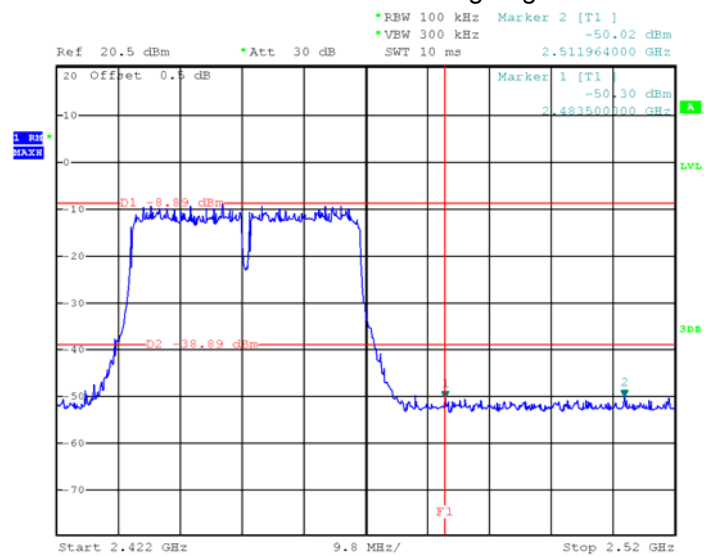
TX 11n HT20: Band edge-right side

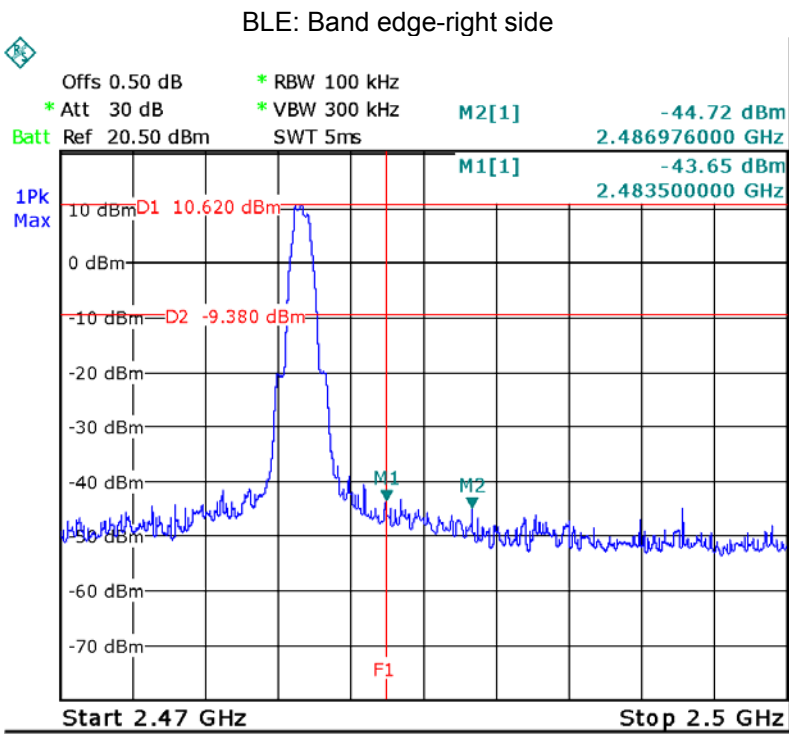
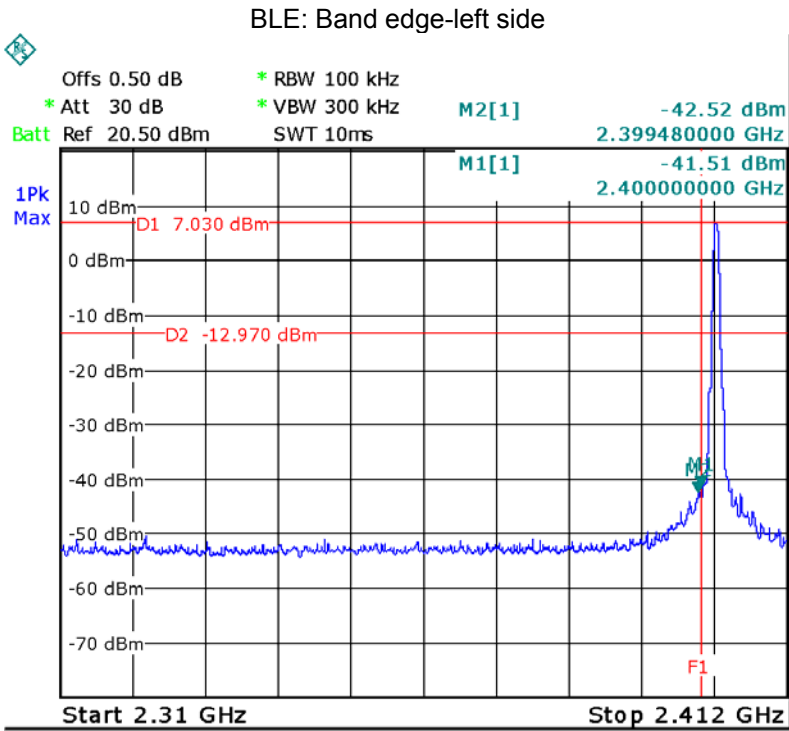


TX 11n HT40: Band edge-left side



TX 11n HT40: Band edge-right side





12 6 dB Bandwidth and 99% Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

12.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz
99% Bandwidth Set the spectrum analyzer: RBW = 1%-5% DTS OBW, VBW = 3*RBW

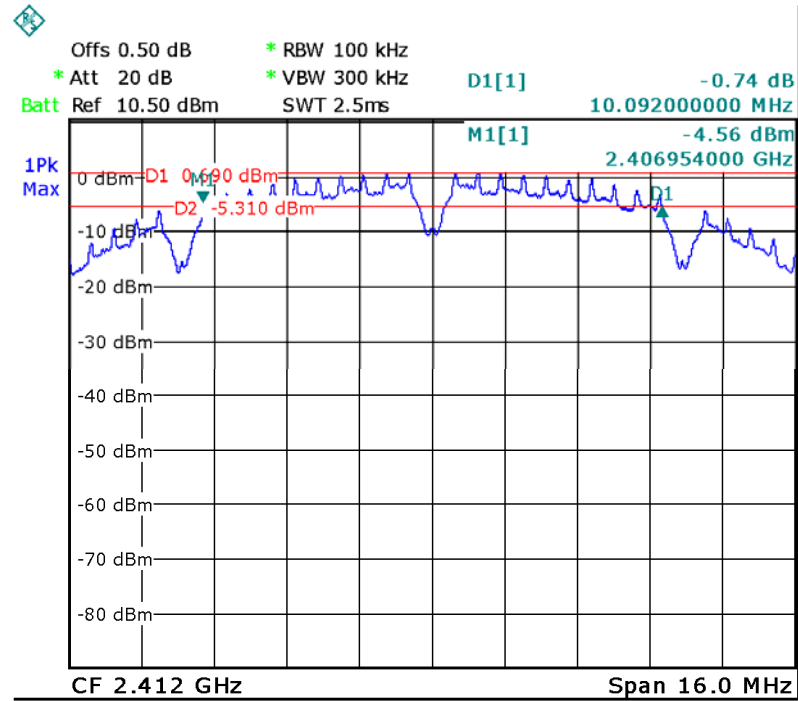
12.2 Test Result:

Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b	Channel 1	10.092	14.339
	Channel 6	10.092	14.371
	Channel 11	10.124	14.339
TX 11g	Channel 1	16.417	16.816
	Channel 6	16.517	16.866
	Channel 11	16.467	16.866
TX 11n HT20	Channel 1	17.138	17.731
	Channel 6	17.407	17.838
	Channel 11	17.299	17.784
TX 11n HT40	Channel 3	36.010	36.996
	Channel 6	35.790	36.886
	Channel 9	35.790	36.886
BLE	Channel 0	0.731	1.036
	Channel 19	0.731	1.042
	Channel 39	0.725	1.042

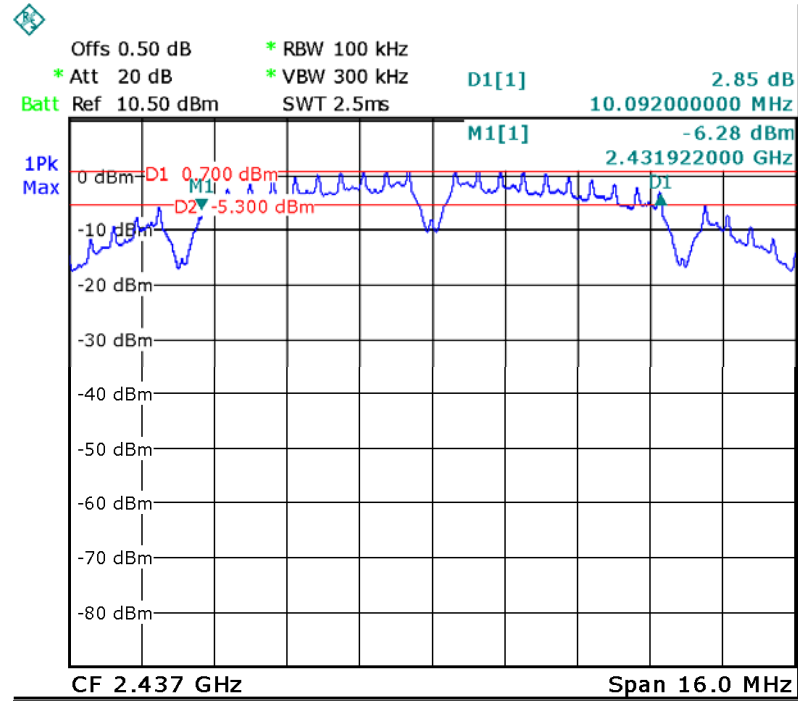
Test result plot:

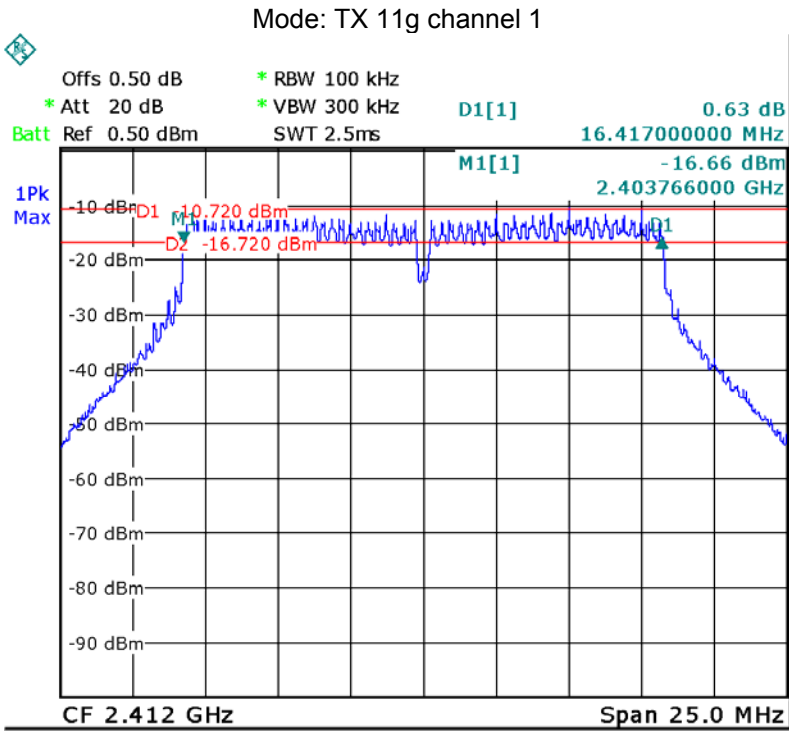
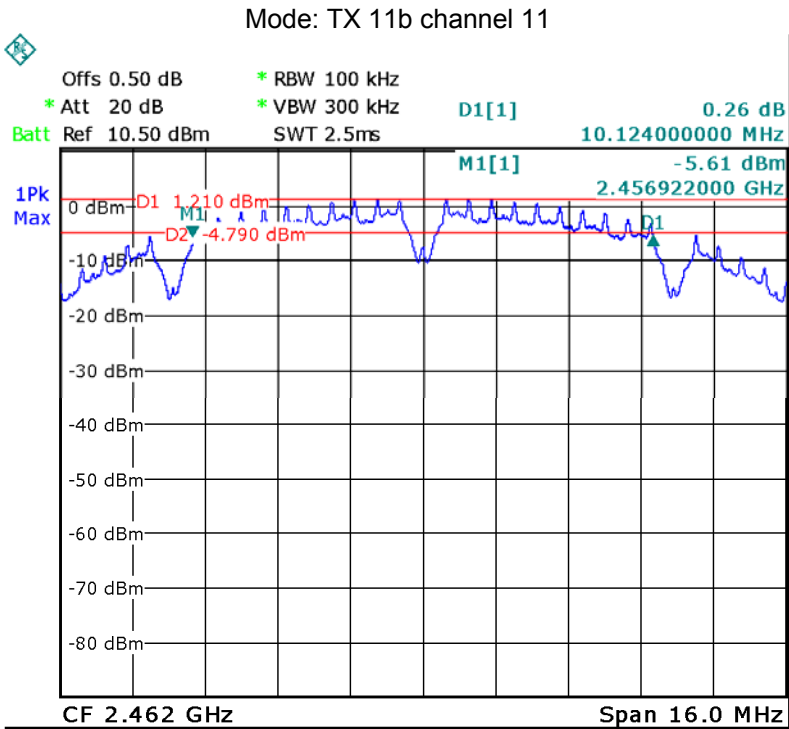
6 dB Bandwidth

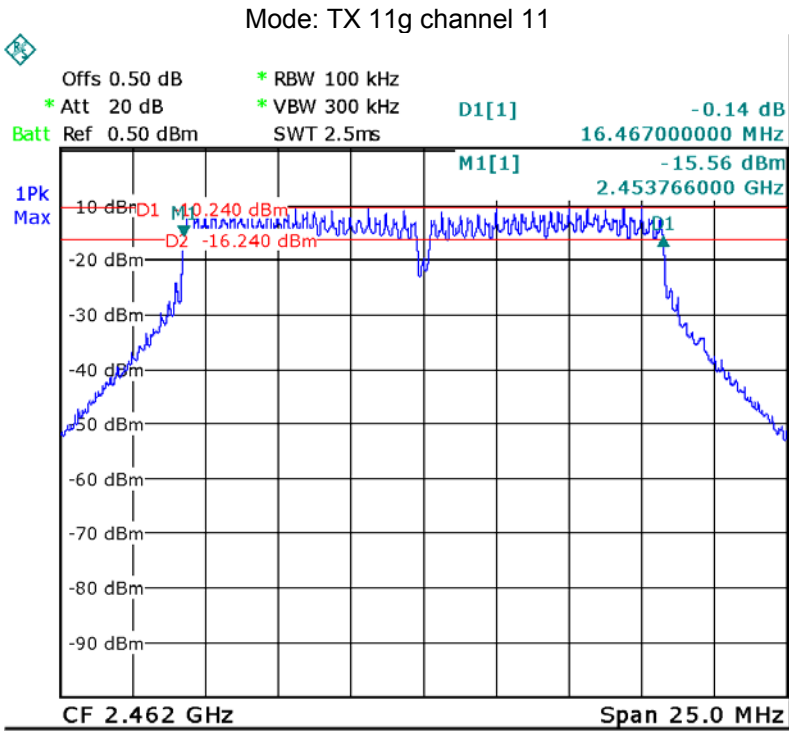
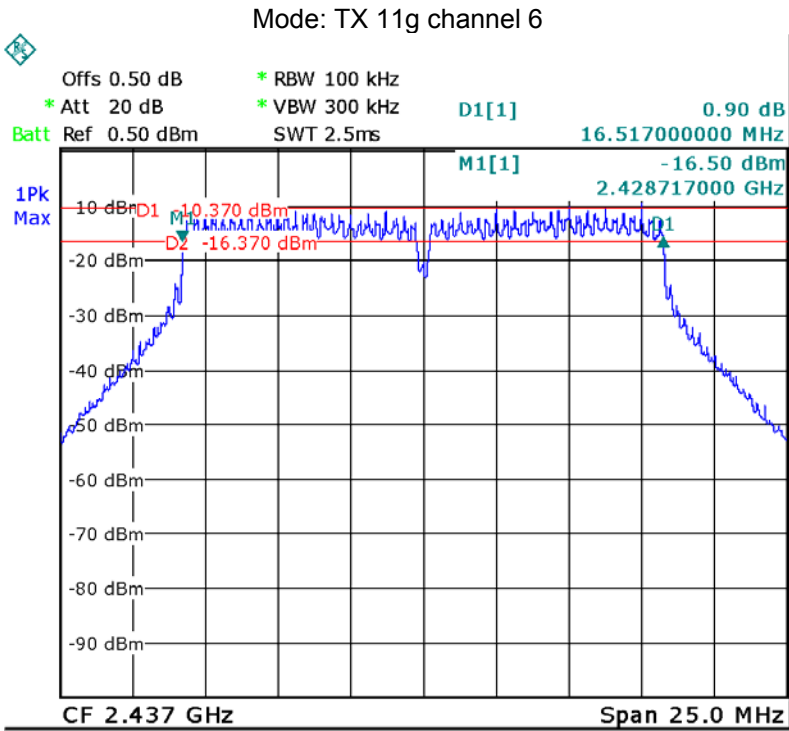
Mode: TX 11b channel 1

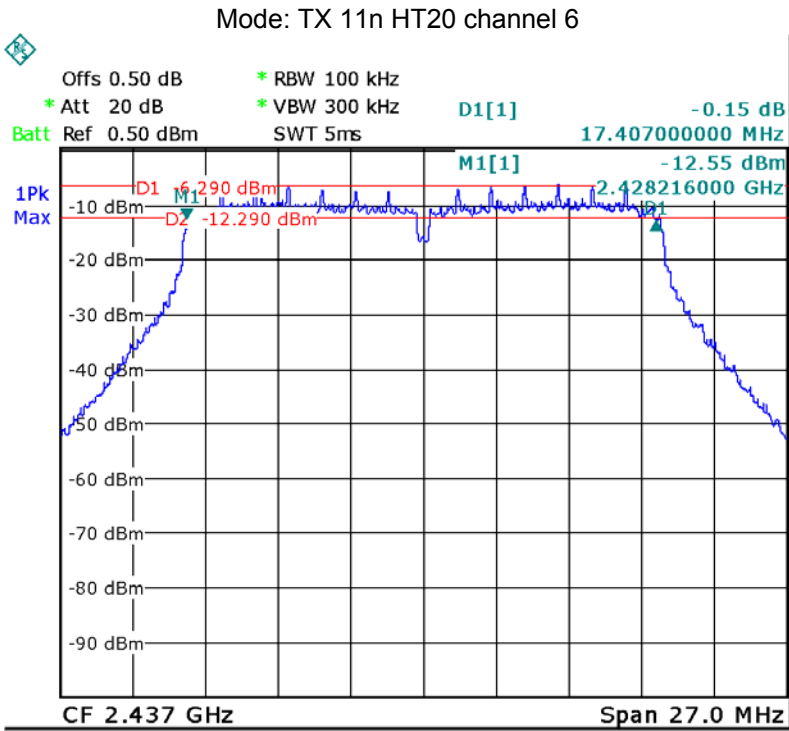
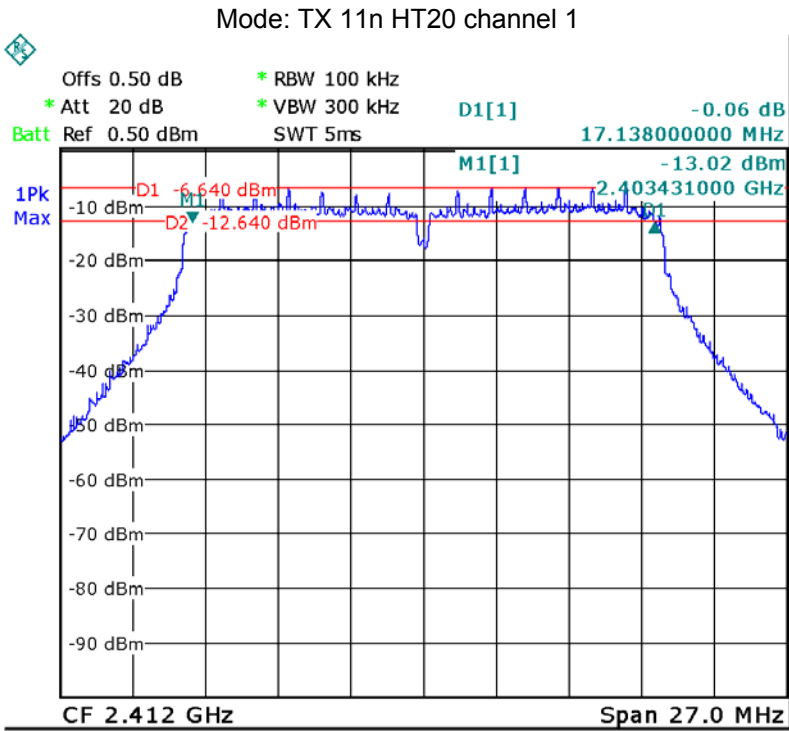


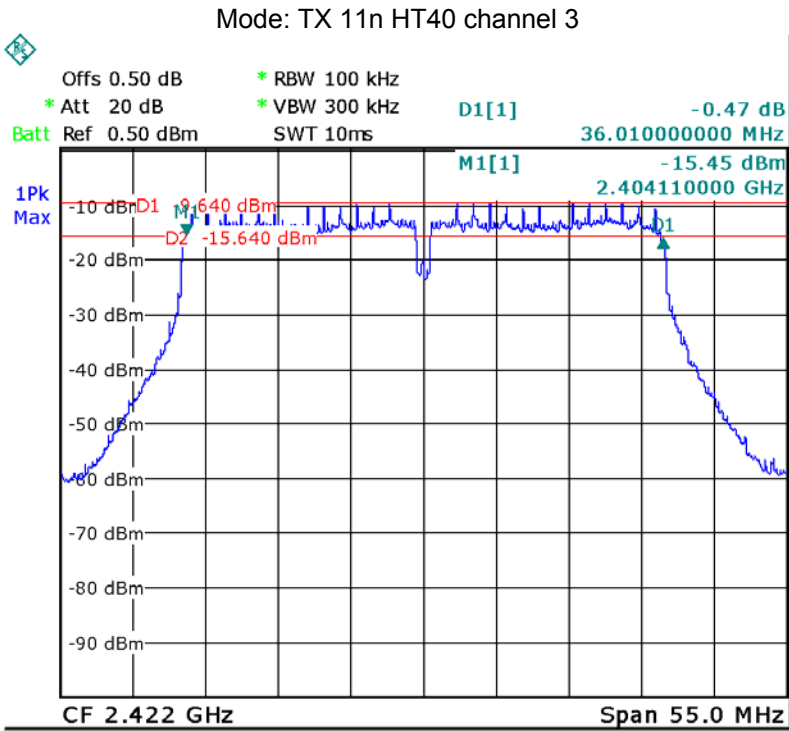
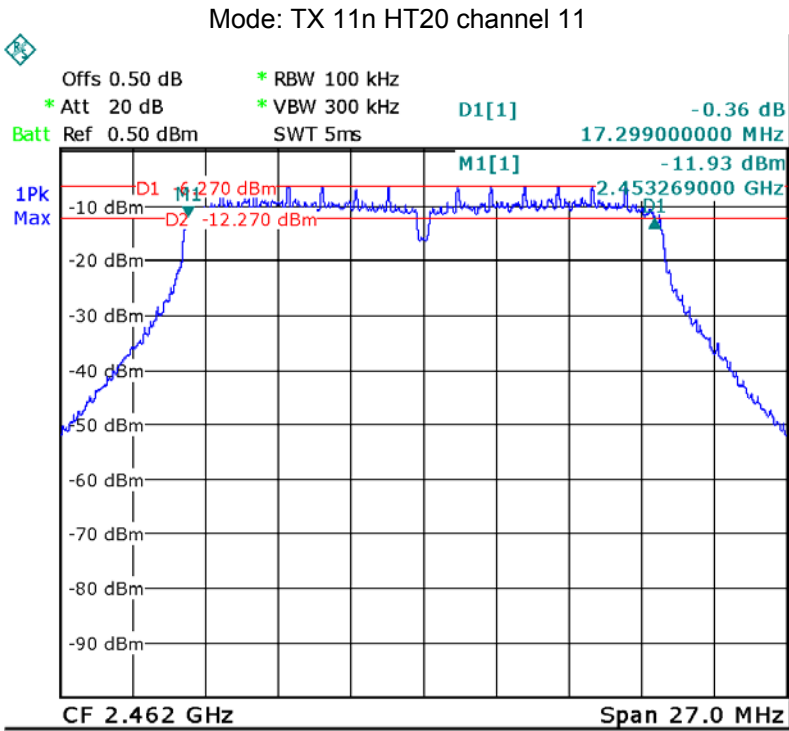
Mode: TX 11b channel 6

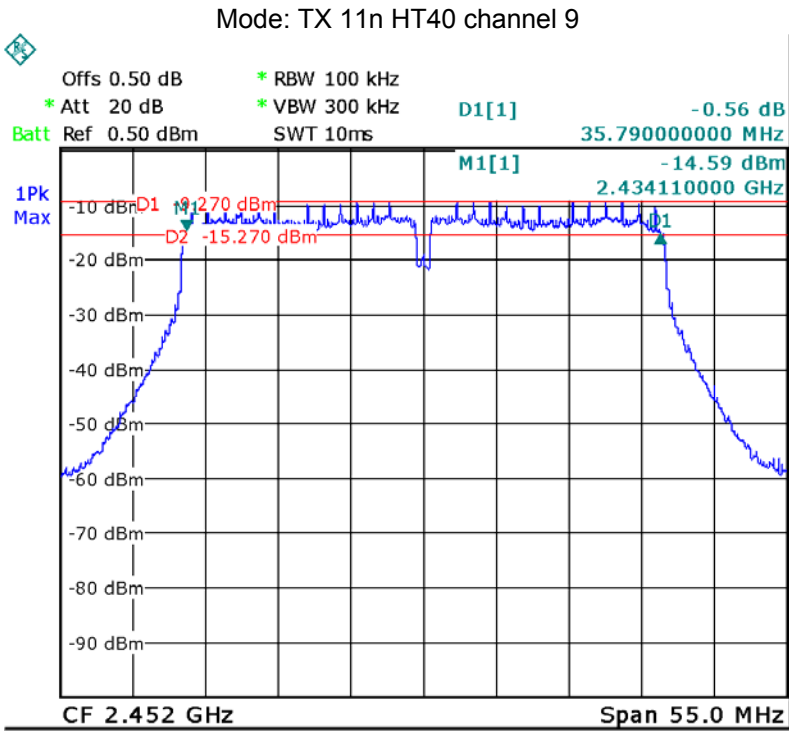
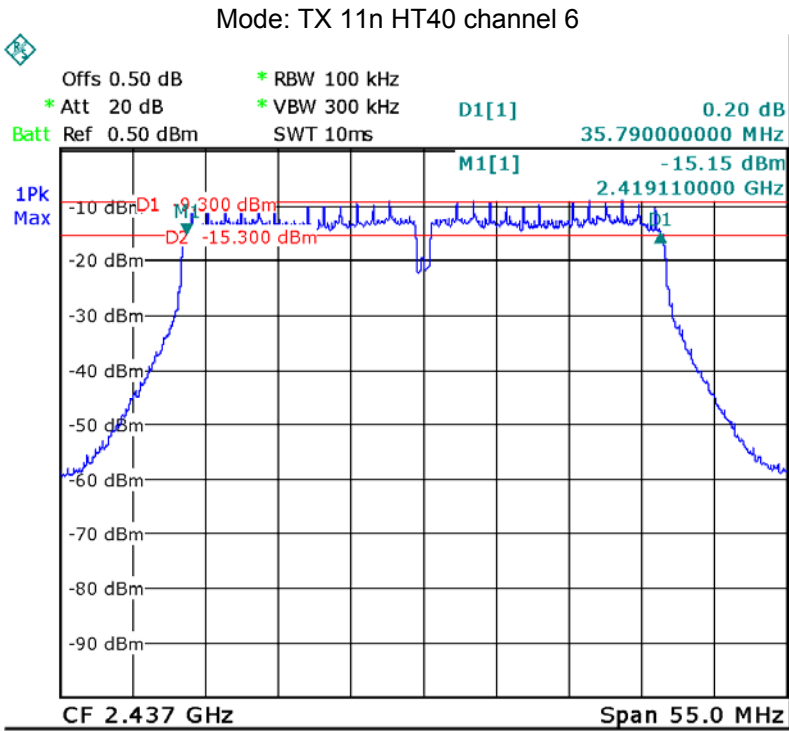


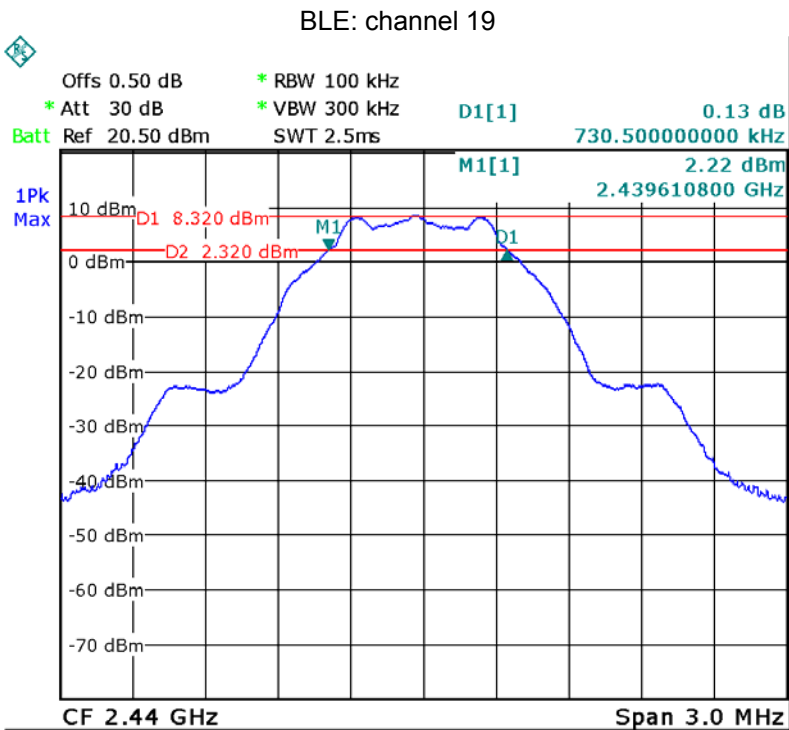
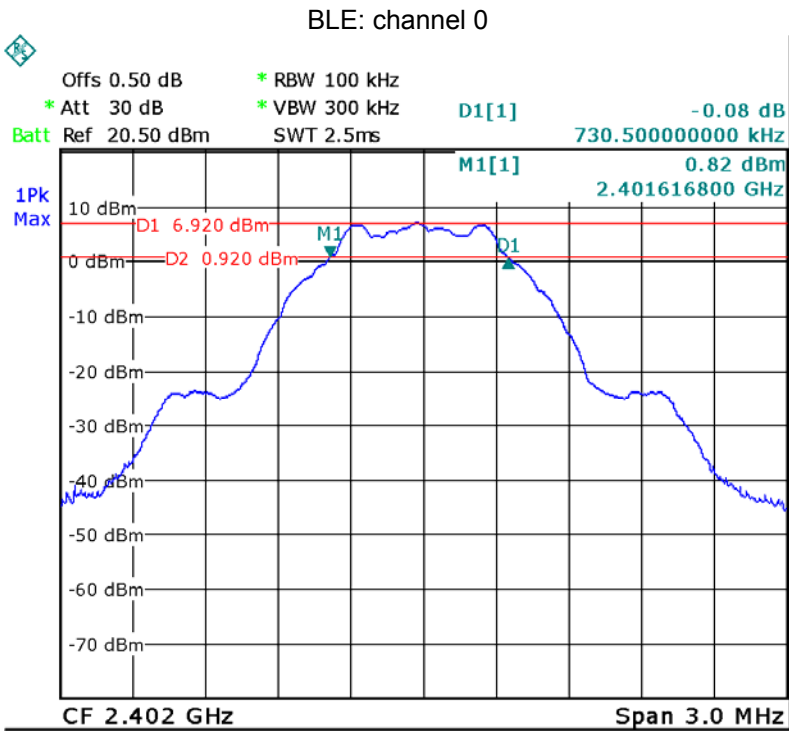


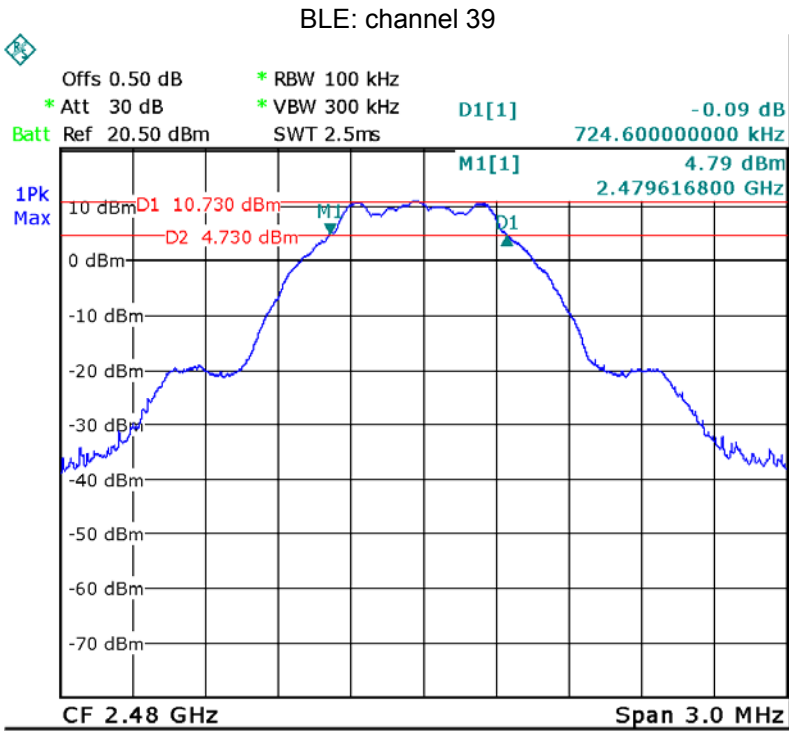






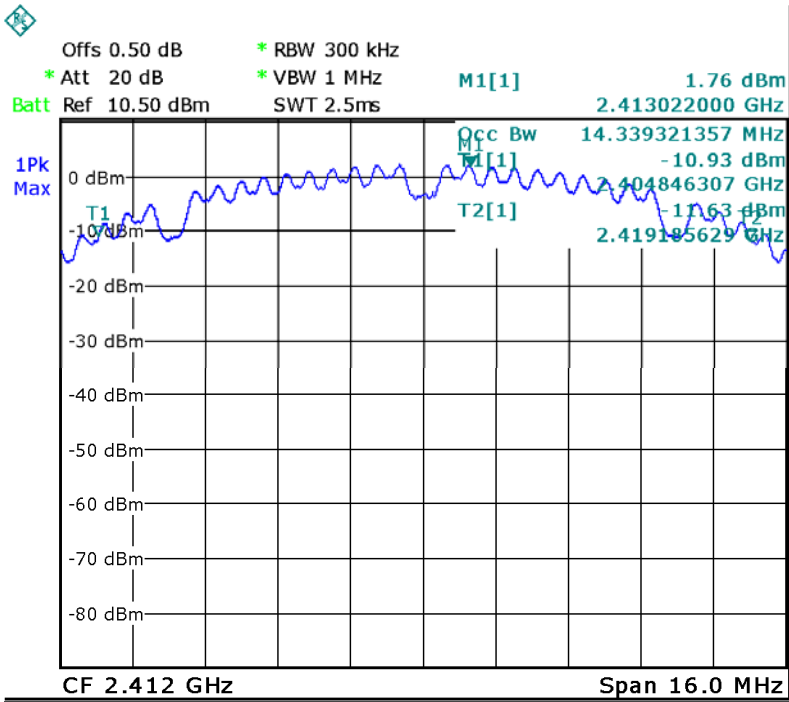


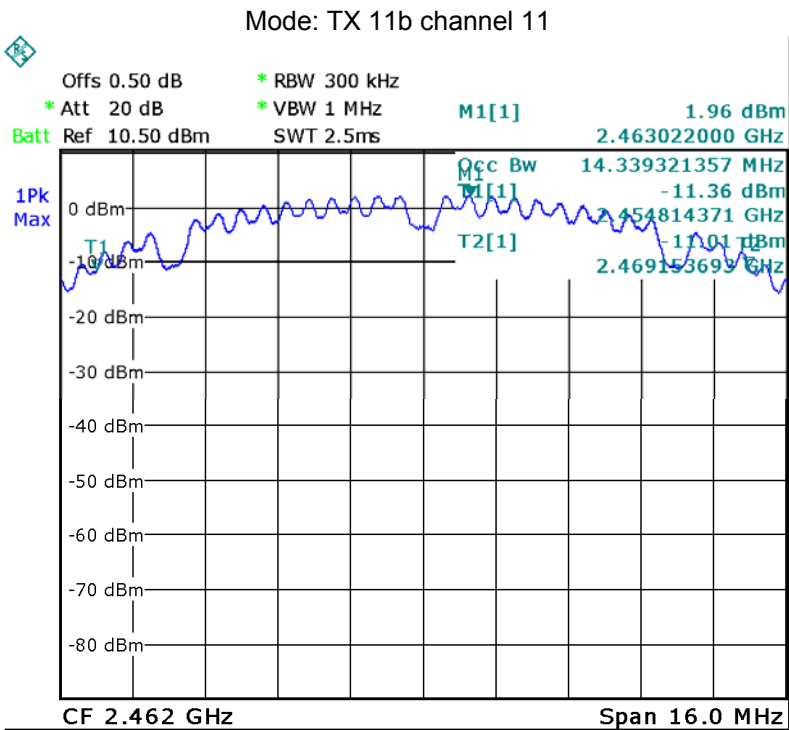
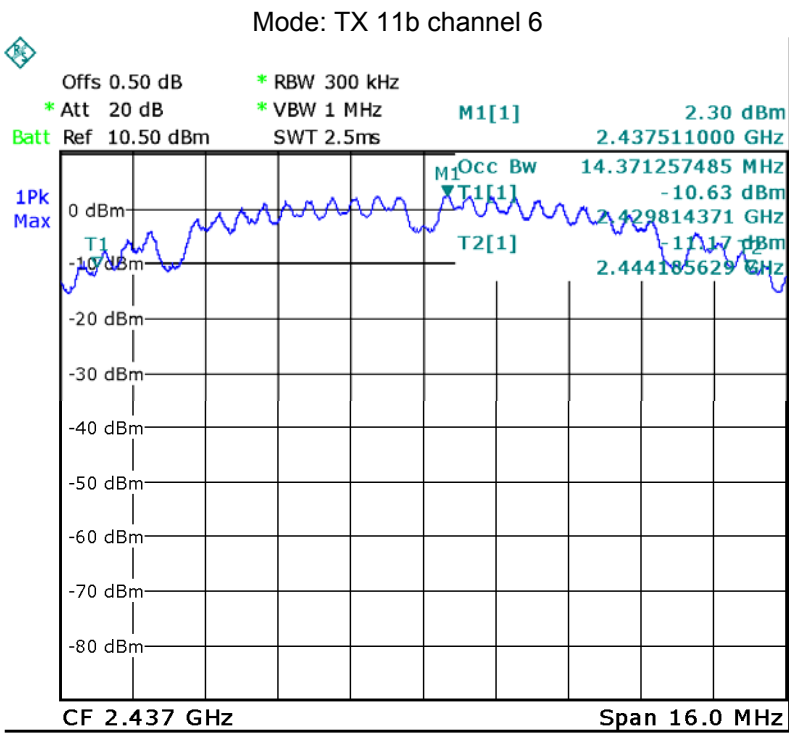


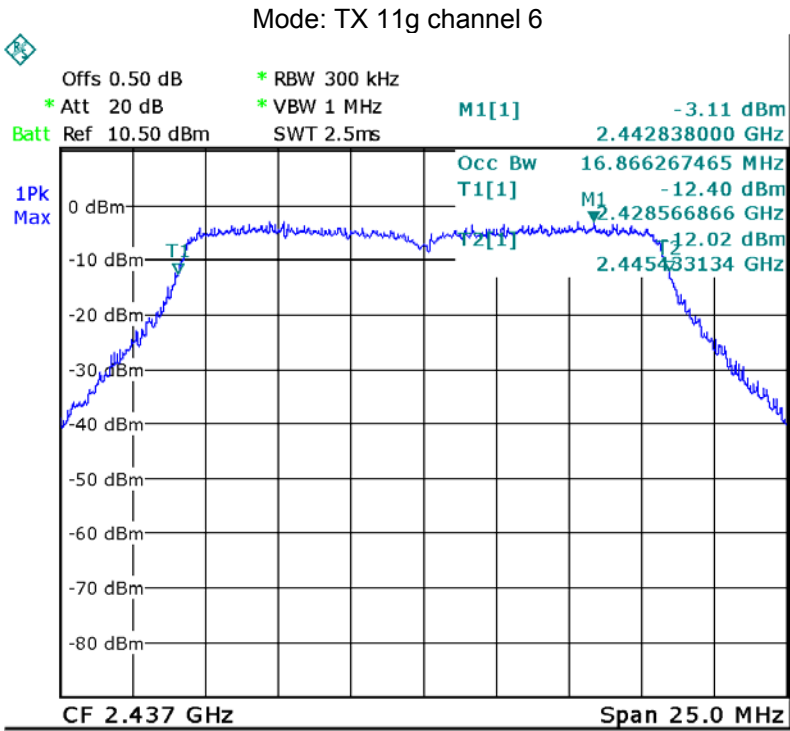
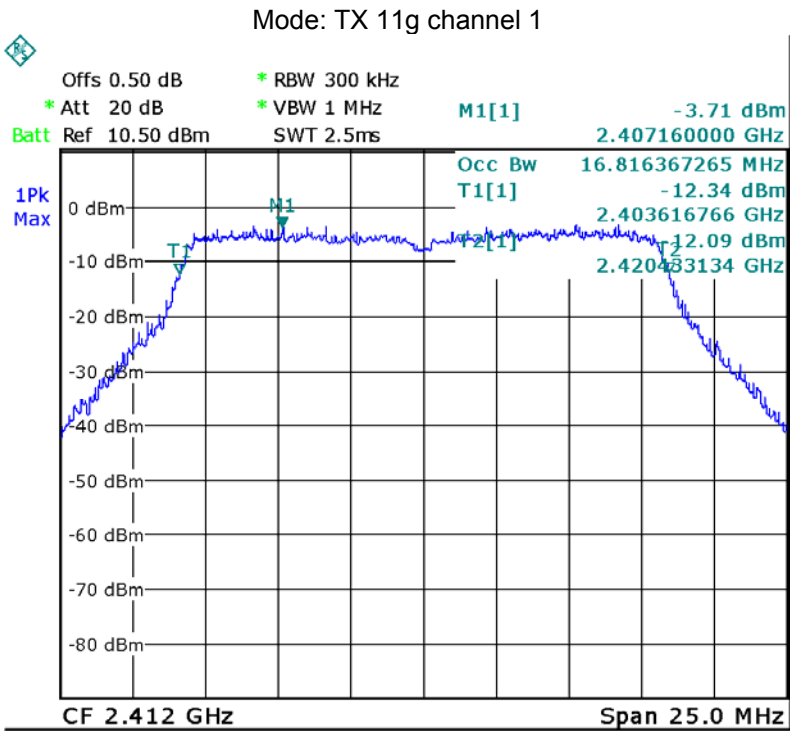


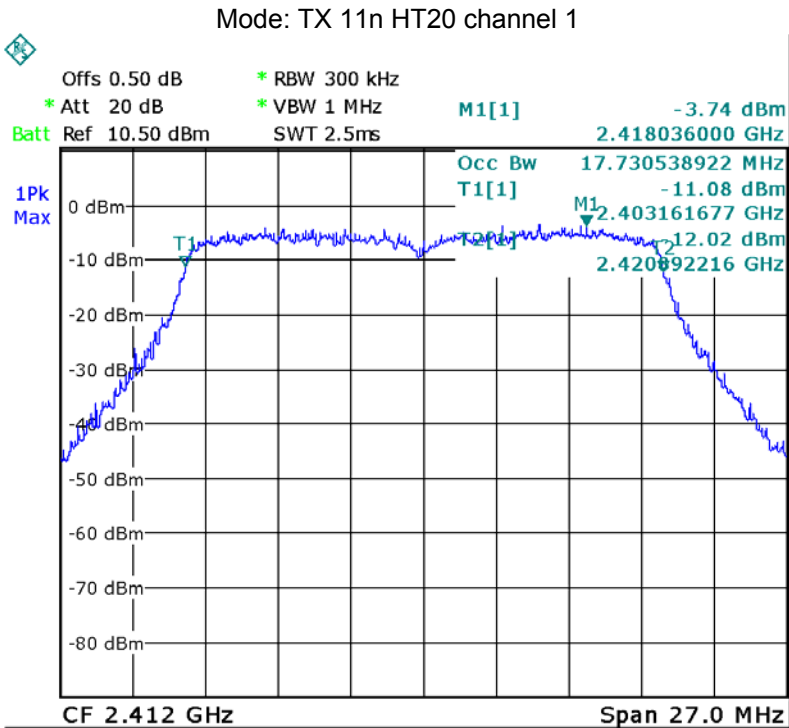
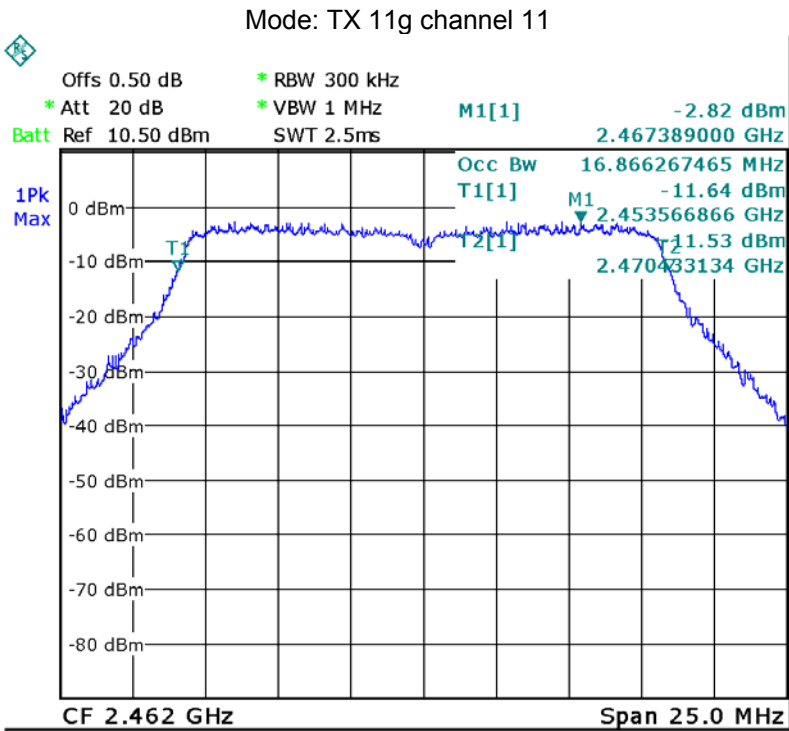
99% Bandwidth

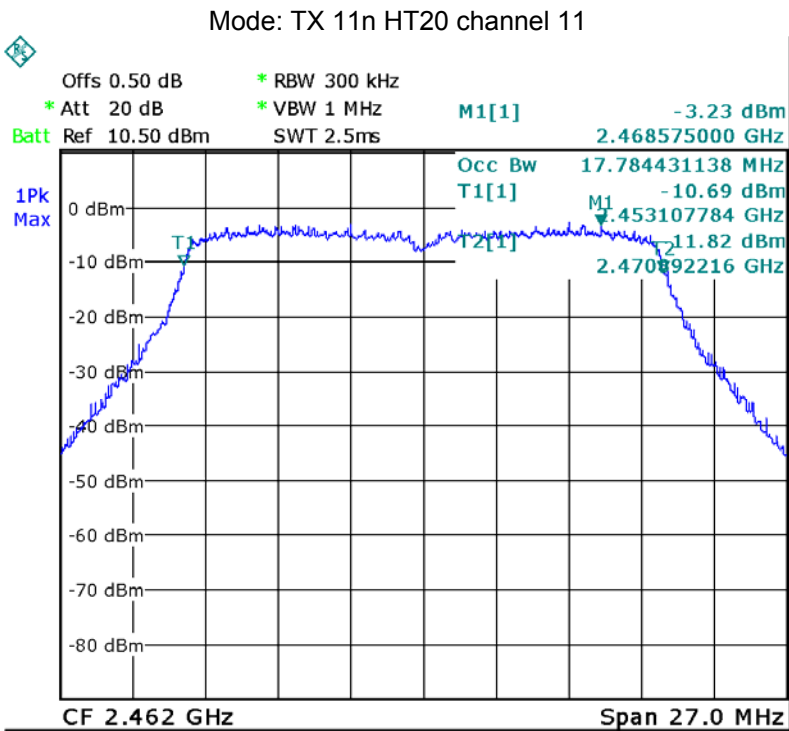
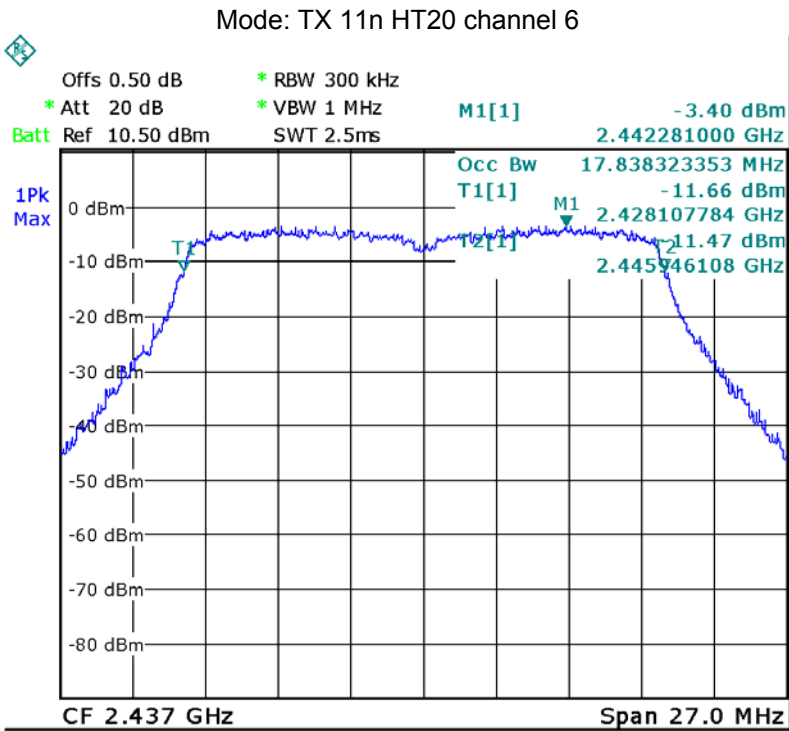
Mode: TX 11b channel 1

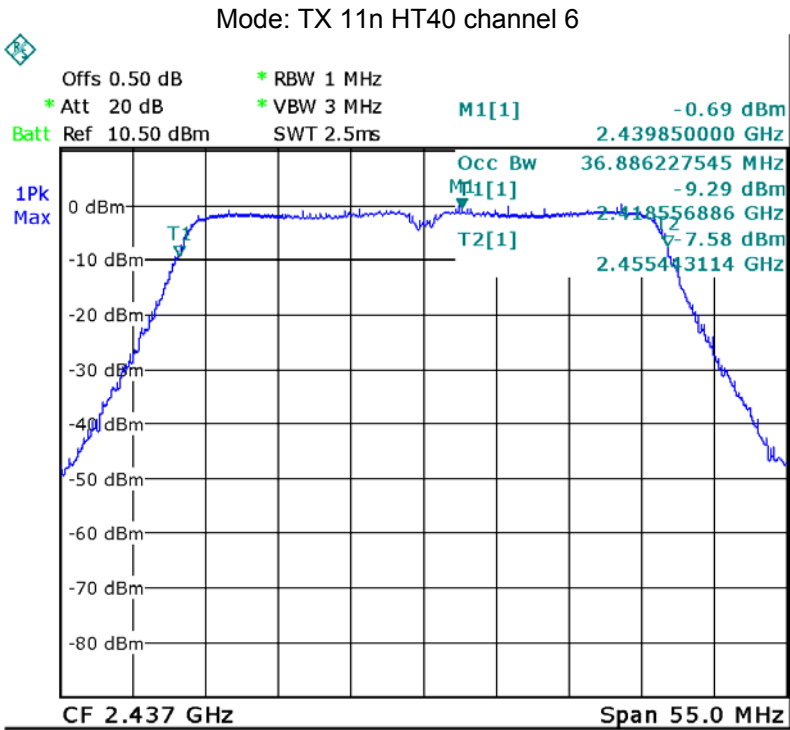
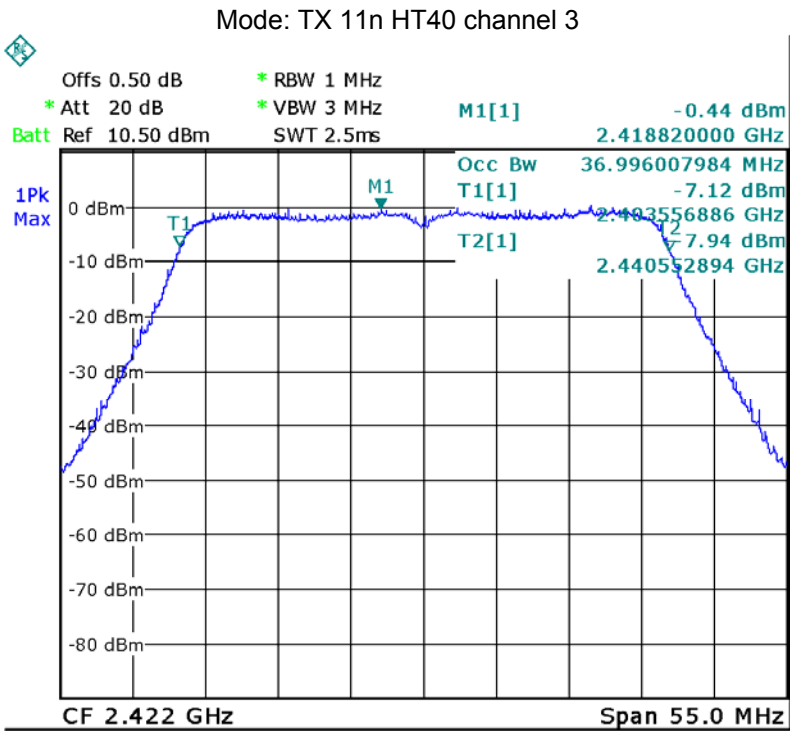


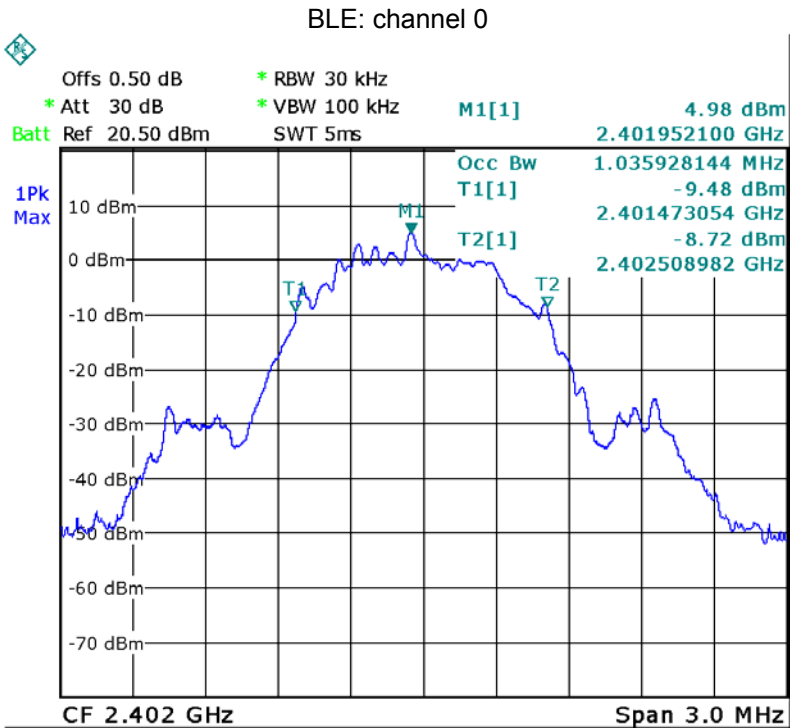
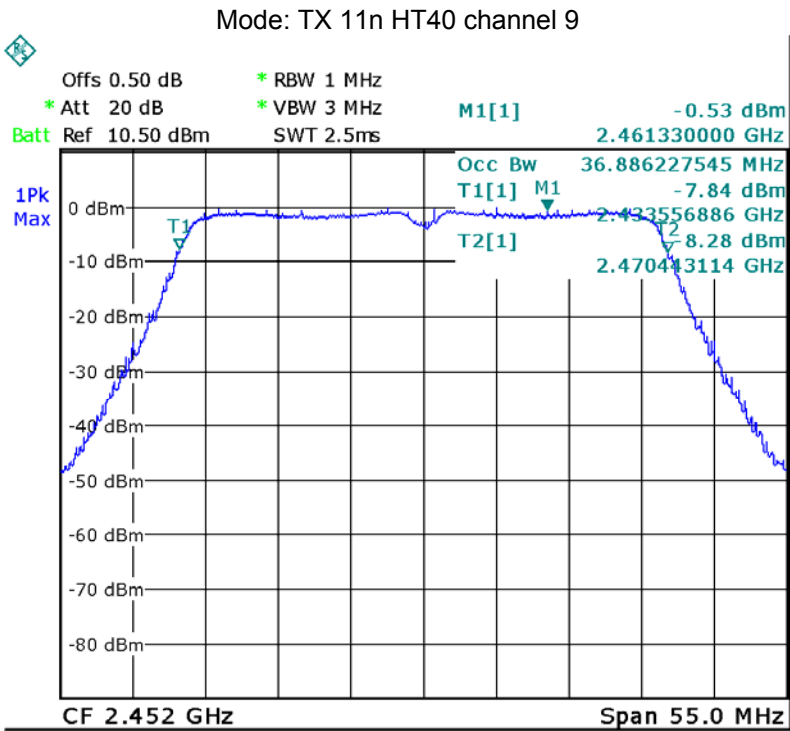


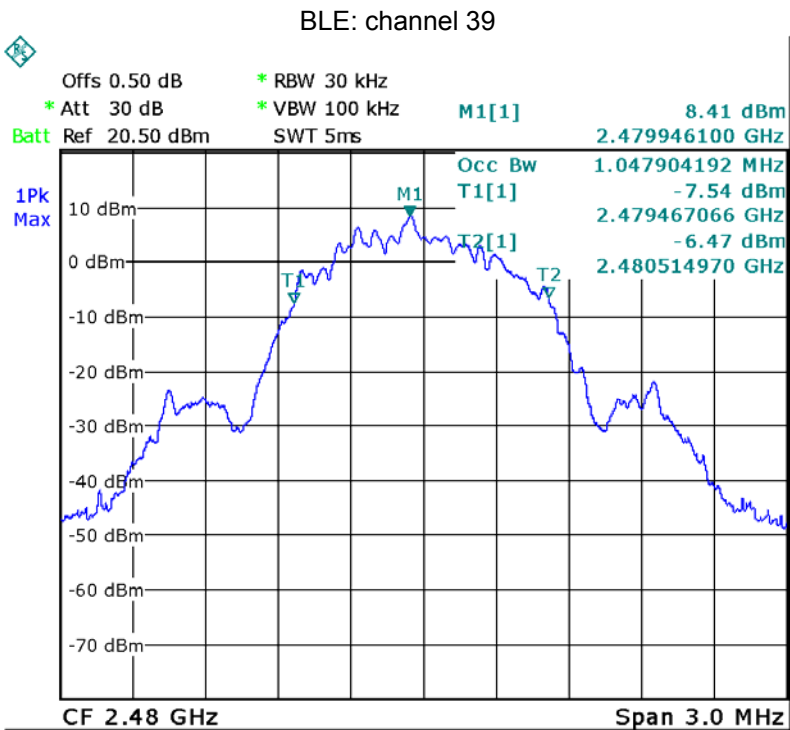
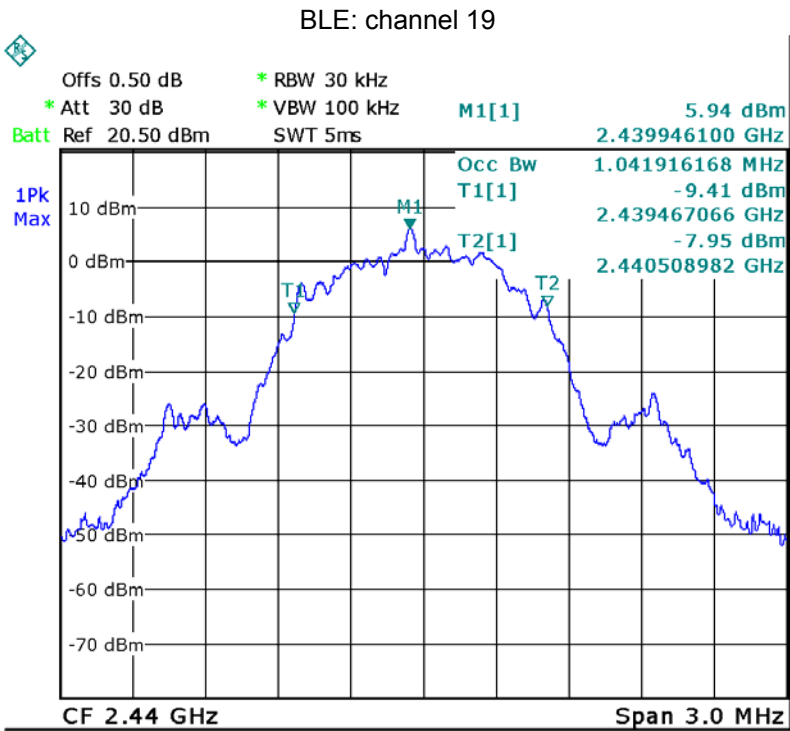












13 Maximum Peak conducted Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

13.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019

section 8.3.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the $RBW \geq DTS$ bandwidth.
- b) Set $VBW \geq 3 \times RBW$.
- c) Set $span \geq 3 \times RBW$
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

section 8.3.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- a) Set the $RBW = 1\%$ to 5% of the OBW, not to exceed 1 MHz..
- b) Set the $VBW \geq 3 \times RBW$
- c) Set the $span \geq 1.5 \times OBW$.
- d) Detector = RMS.
- e) Sweep time = auto couple.
- f) trigger = free run..
- g) Number of points in sweep $\geq [2 \times span / RBW]$. (This gives bin-to-bin spacing $\geq RBW / 2$, so that narrowband signals are not lost between frequency bins.)
- h) Trace average at least 100 traces in power averaging (rms) mode.
- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum..
- j) Add $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average

over both the ON and OFF times of the transmission), duty cycle test results please refer to the section 7.

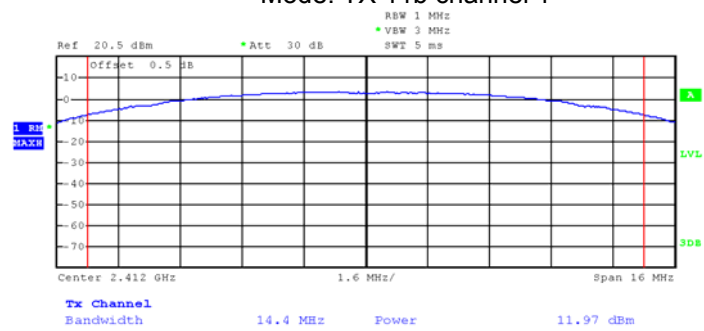
13.2 Test Result:

Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
TX 11b	Low-2412	11.97	1W/30dBm
	Middle-2437	11.48	1W/30dBm
	High-2462	11.64	1W/30dBm
TX 11g	Low-2412	11.29	1W/30dBm
	Middle-2437	11.04	1W/30dBm
	High-2462	11.09	1W/30dBm
TX 11n HT20	Low-2412	11.15	1W/30dBm
	Middle-2437	10.96	1W/30dBm
	High-2462	10.98	1W/30dBm
TX 11n HT40	Low-2422	11.61	1W/30dBm
	Middle-2437	11.50	1W/30dBm
	High-2452	10.70	1W/30dBm
BLE	Low-2402	7.69	1W/30dBm
	Middle-2440	9.11	1W/30dBm
	High-2480	11.50	1W/30dBm

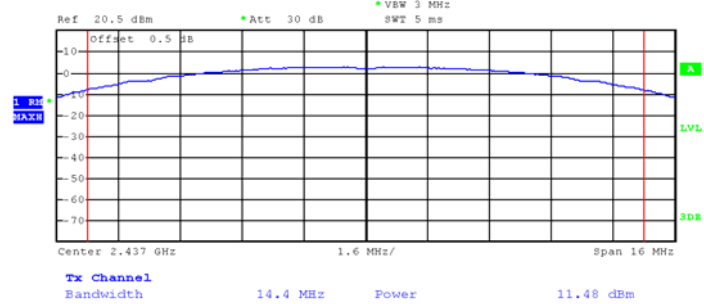
Note: duty cycle test results please refer to the section 7.

Test Plot

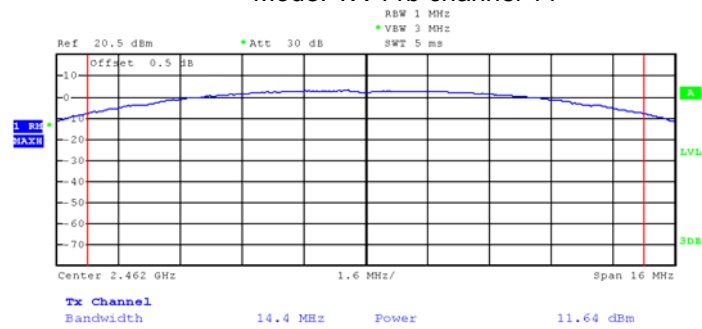
Mode: TX 11b channel 1



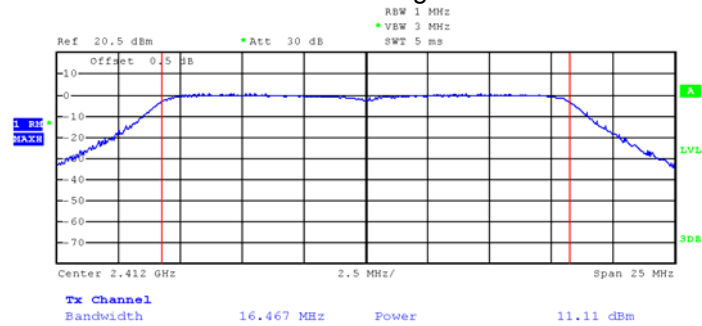
Mode: TX 11b channel 6



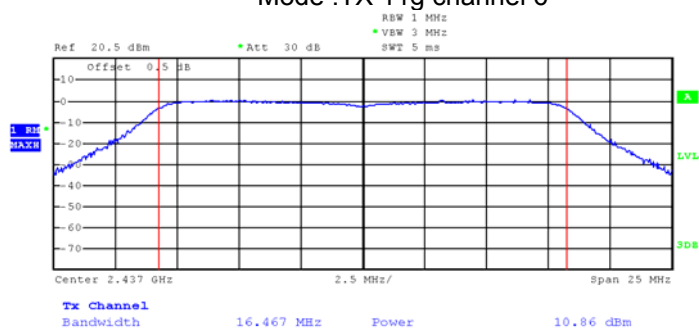
Mode: TX 11b channel 11



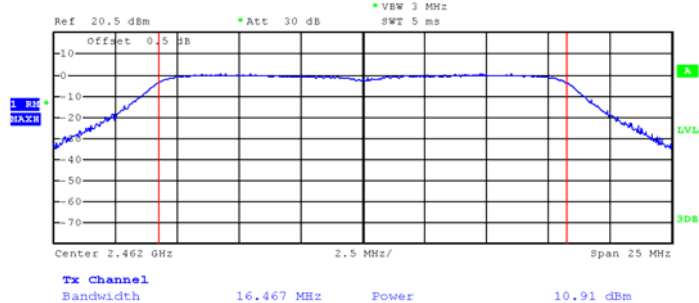
Mode :TX 11g channel 1



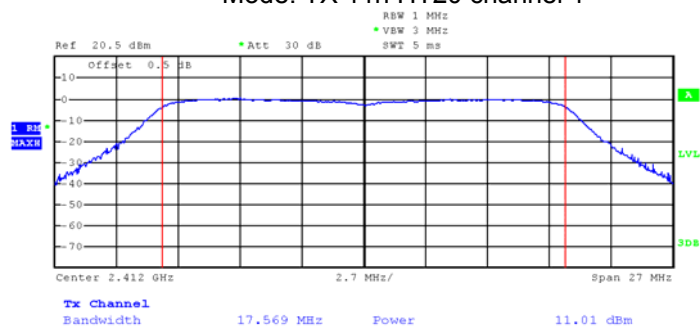
Mode :TX 11g channel 6



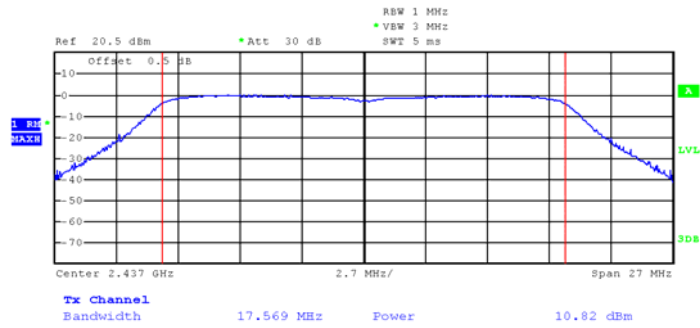
Mode :TX 11g channel 11



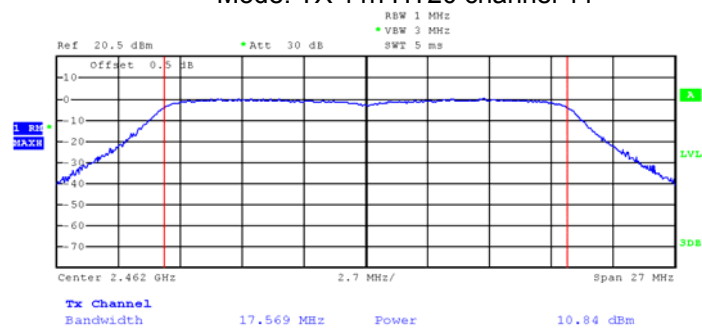
Mode: TX 11n HT20 channel 1



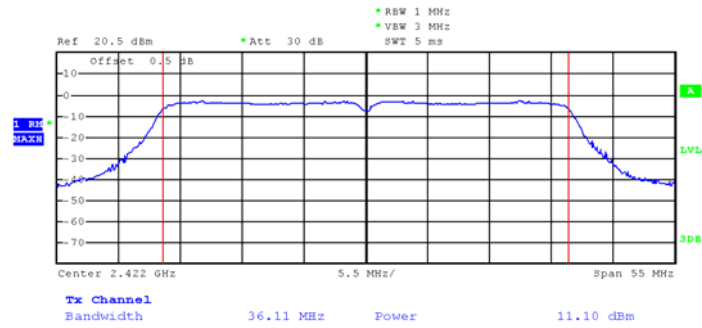
Mode: TX 11n HT20 channel 6



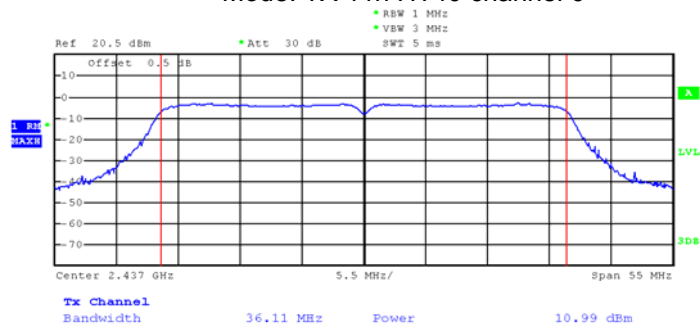
Mode: TX 11n HT20 channel 11



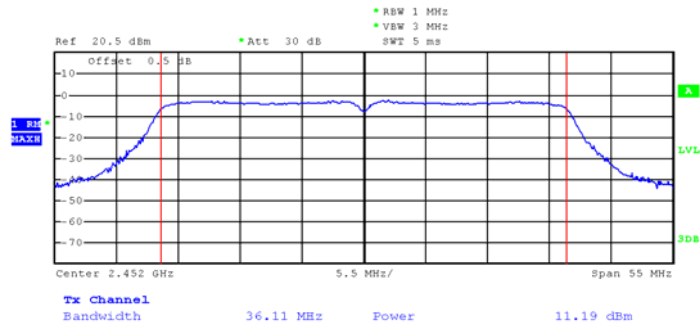
Mode: TX 11n HT40 channel 3

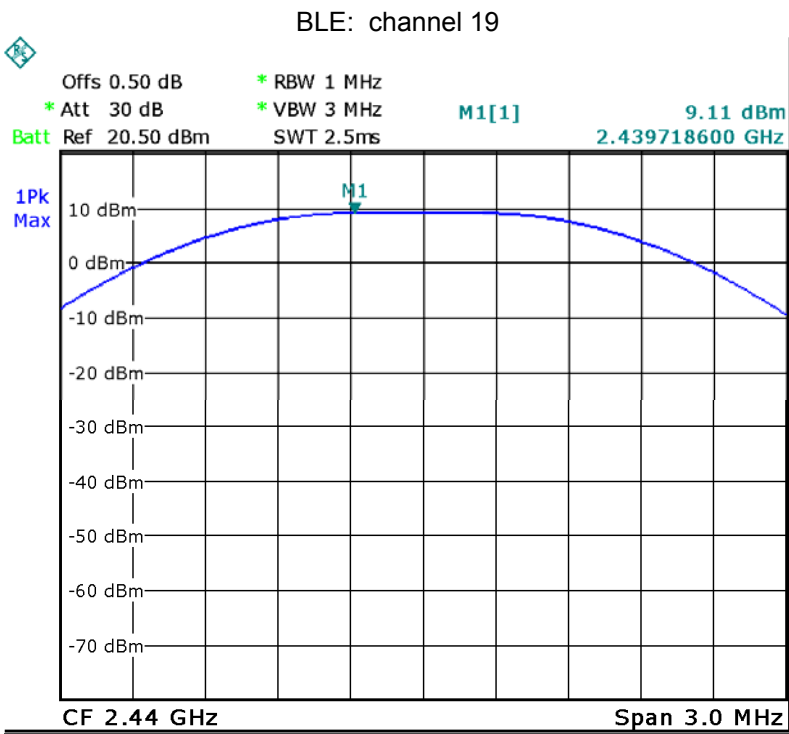
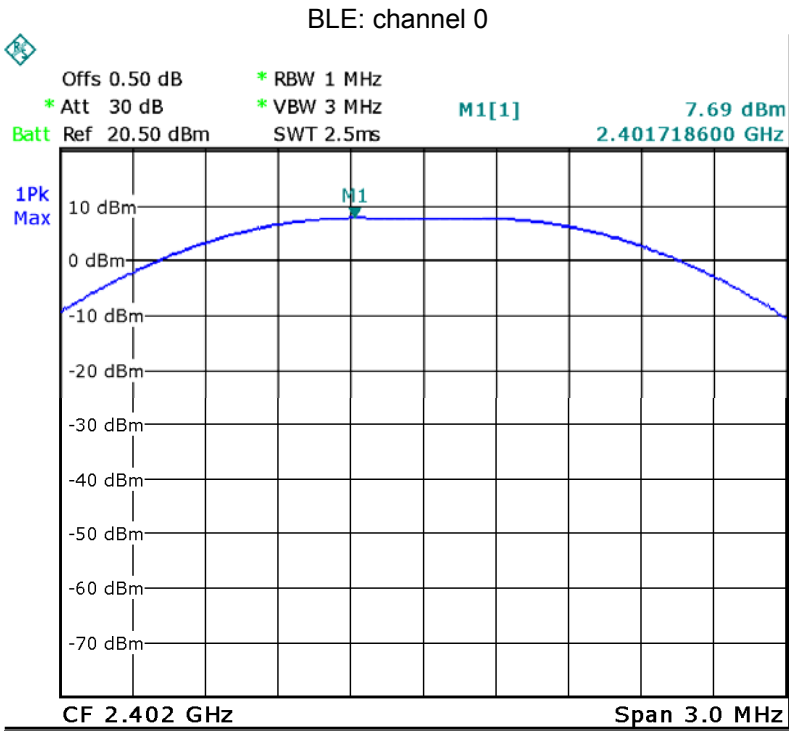


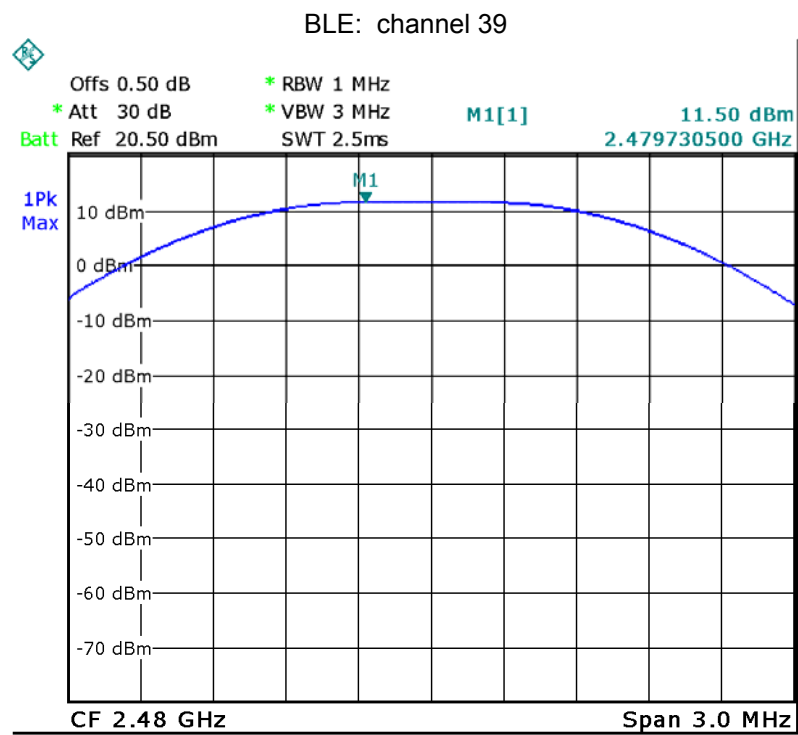
Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9







14 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

14.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 10.2

For 2.4G WiFi:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = RMS. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.
4. Add $[10 \log (1 / D)]$, where D is the duty cycle, to the measured PSD to compute the average PSD during the actual transmission time when the EUT cannot be configured to transmit continuously (i.e., $D < 98\%$), duty cycle test results please refer to the section 7.

For BLE:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

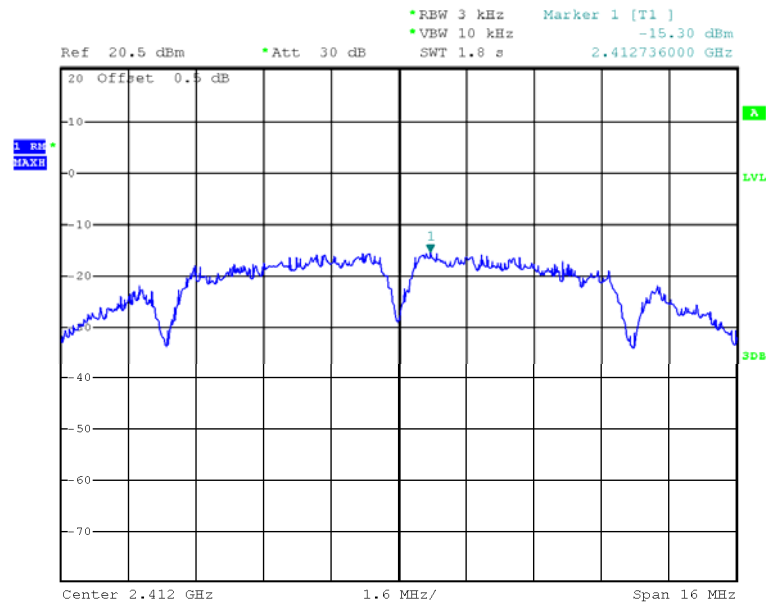
14.2 Test Result:

Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
TX 11b	Low-2412	-15.30	8dBm per 3kHz
	Middle-2437	-14.70	8dBm per 3kHz
	High-2462	-15.24	8dBm per 3kHz
TX 11g	Low-2412	-22.47	8dBm per 3kHz
	Middle-2437	-22.46	8dBm per 3kHz
	High-2462	-22.56	8dBm per 3kHz
TX 11n HT20	Low-2412	-22.70	8dBm per 3kHz

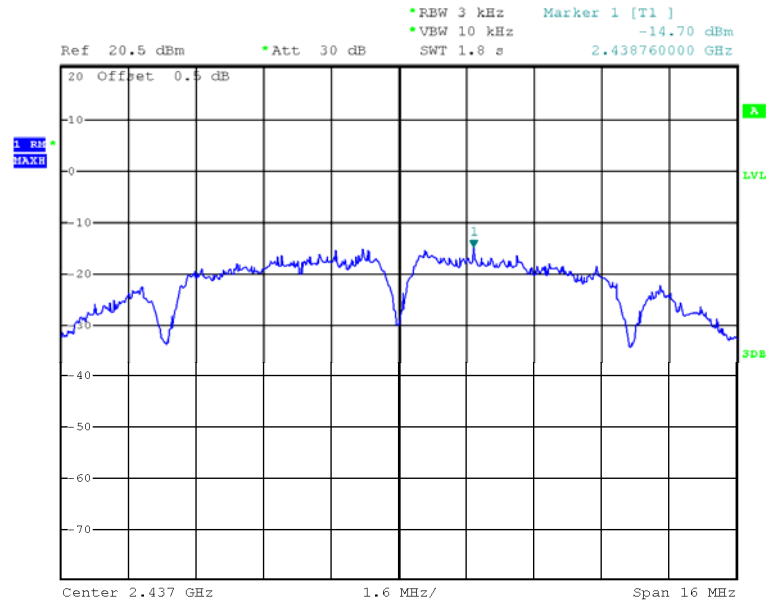
	Middle-2437	-22.74	8dBm per 3kHz
	High-2462	-22.81	8dBm per 3kHz
TX 11n HT40	Low-2422	-26.65	8dBm per 3kHz
	Middle-2437	-26.41	8dBm per 3kHz
	High-2452	-26.64	8dBm per 3kHz
BLE	Low-2402	-7.22	8dBm per 3kHz
	Middle-2440	-4.99	8dBm per 3kHz
	High-2480	-4.60	8dBm per 3kHz

Note: duty cycle test results please refer to the section 7.

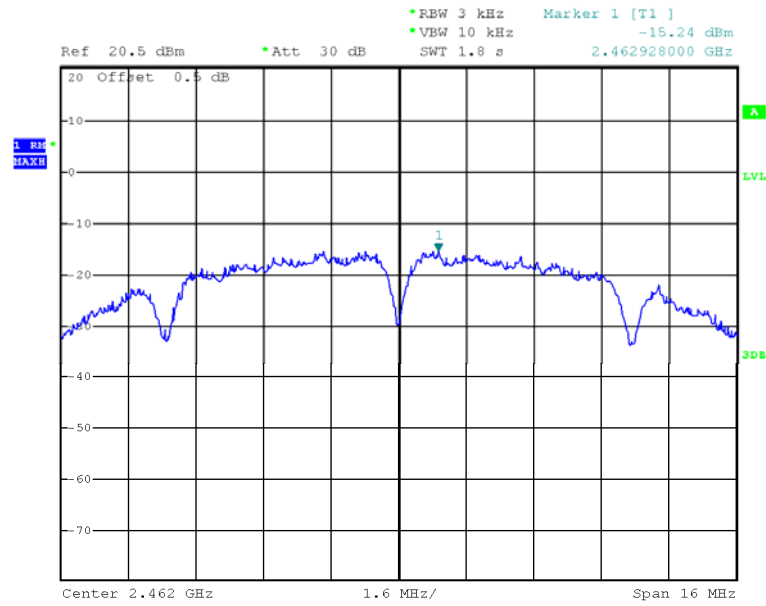
Test Plot
Mode: TX 11b channel 1



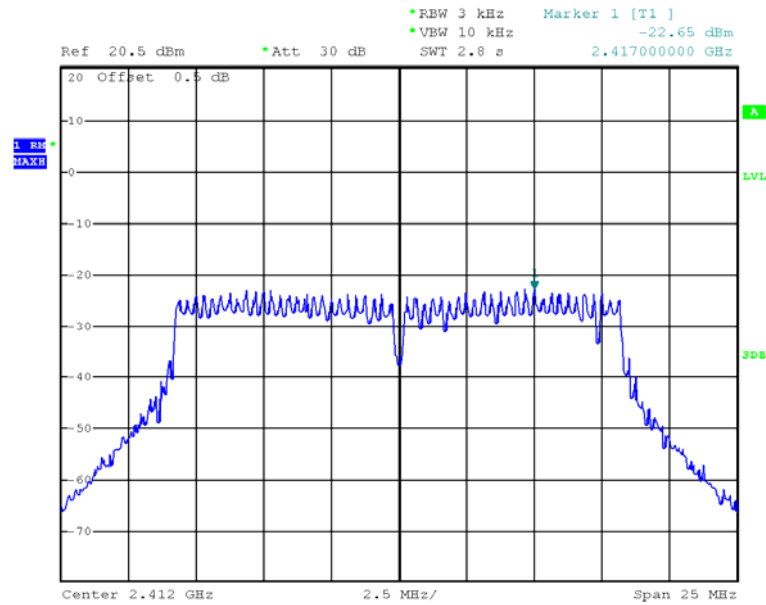
Mode: TX 11b channel 6



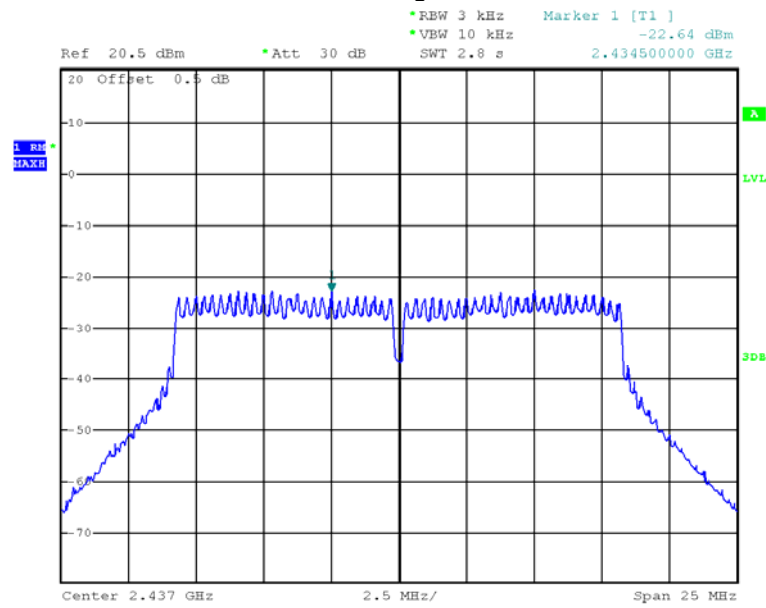
Mode: TX 11b channel 11



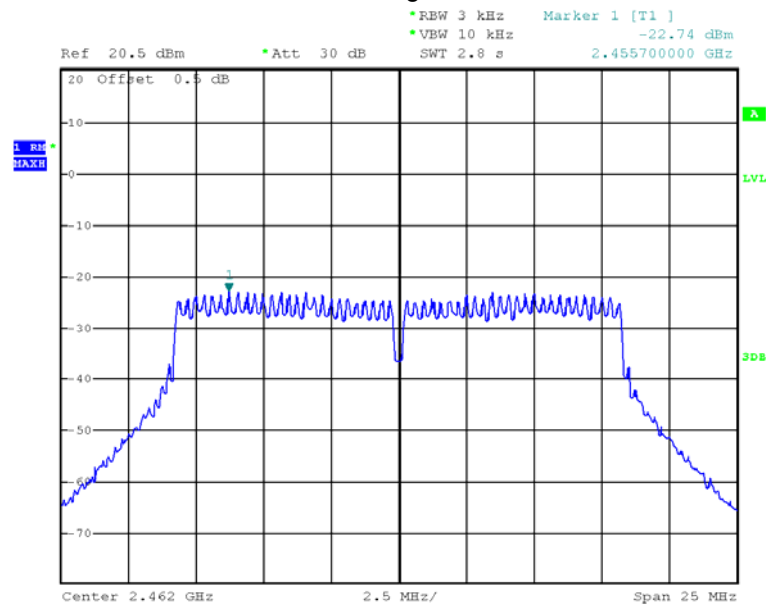
Mode :TX 11g channel 1



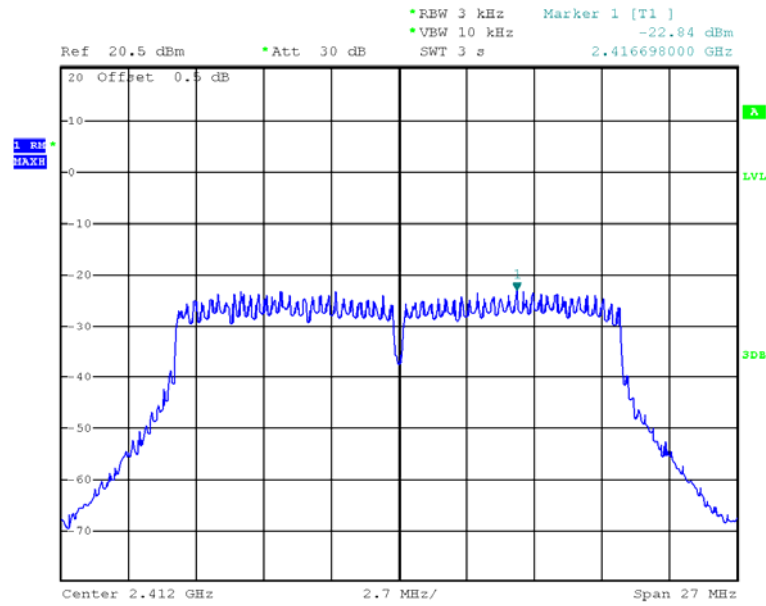
Mode :TX 11g channel 6



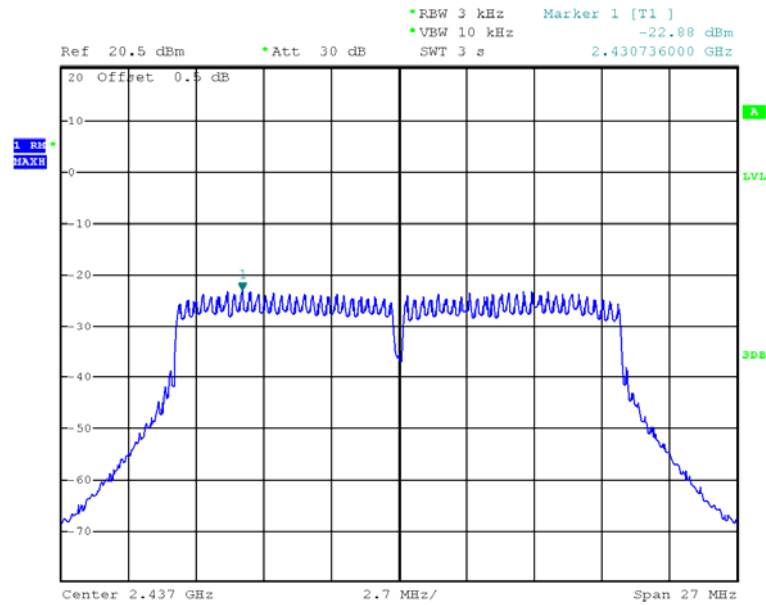
Mode :TX 11g channel 11



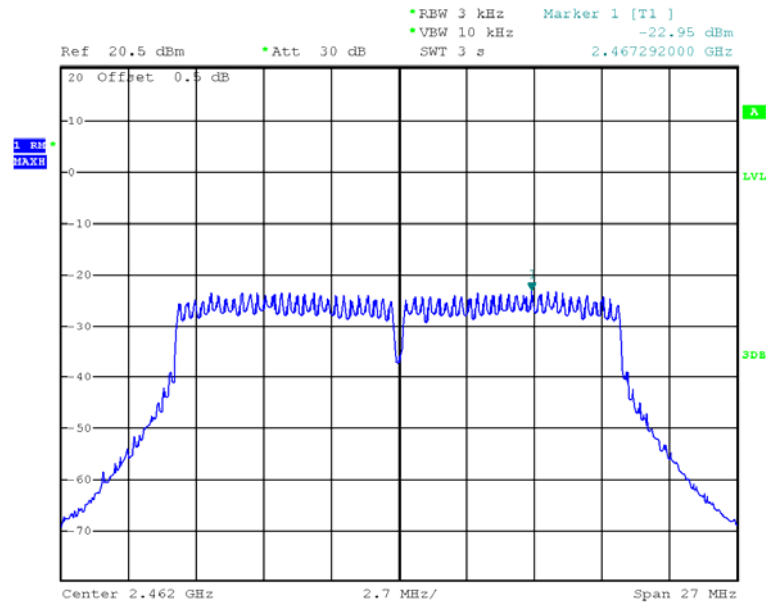
Mode: TX 11n HT20 channel 1



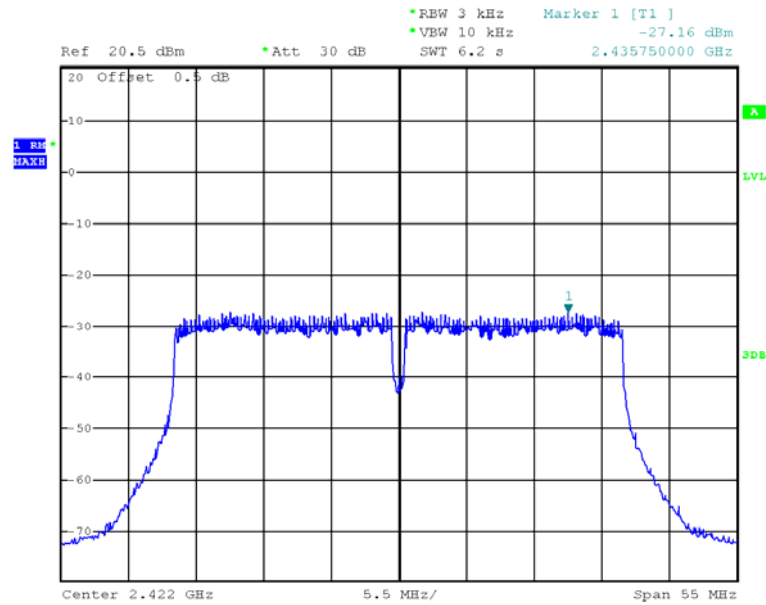
Mode: TX 11n HT20 channel 6



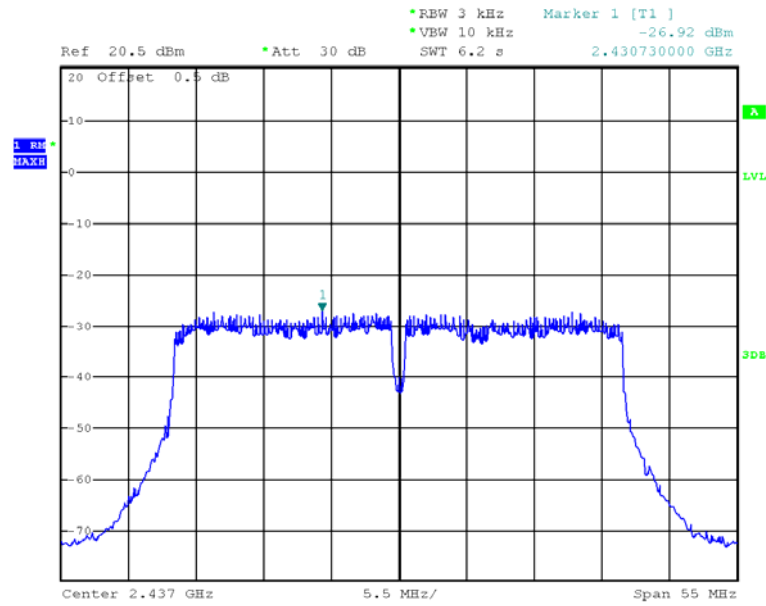
Mode: TX 11n HT20 channel 11



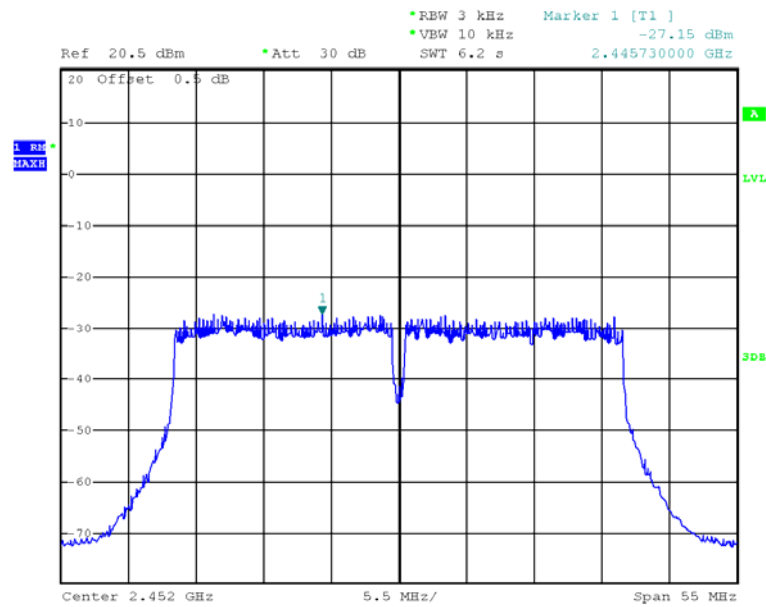
Mode: TX 11n HT40 channel 3

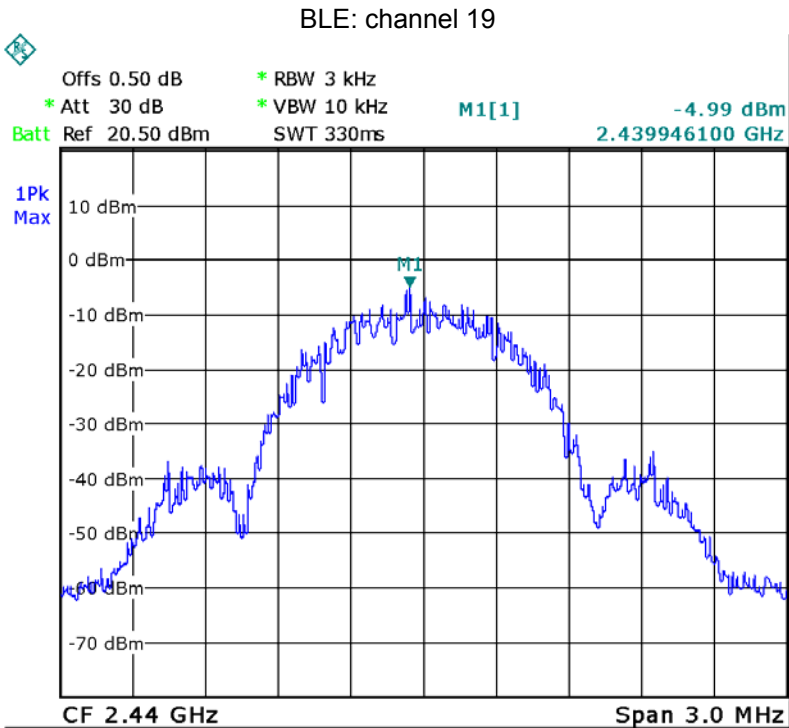
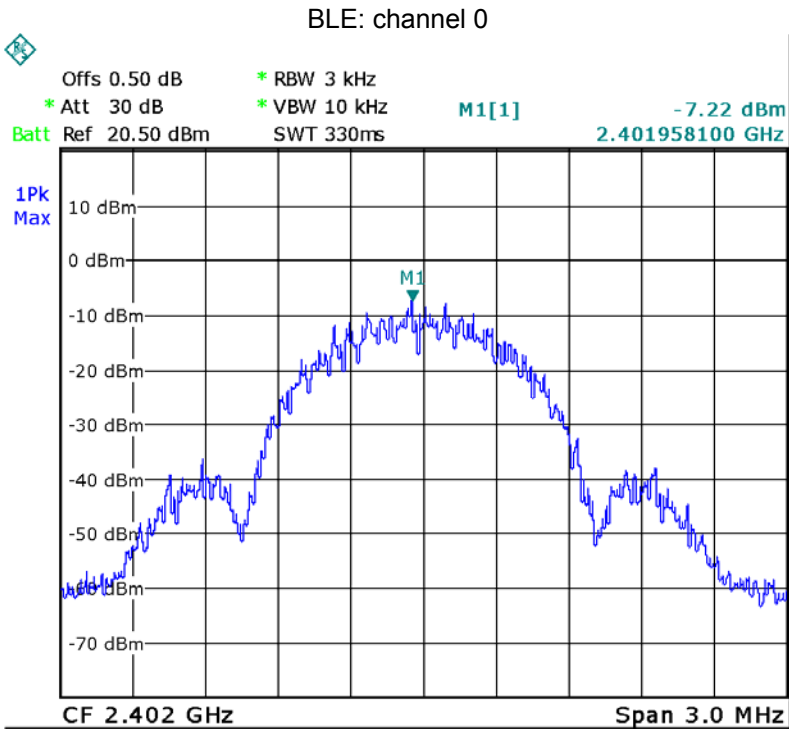


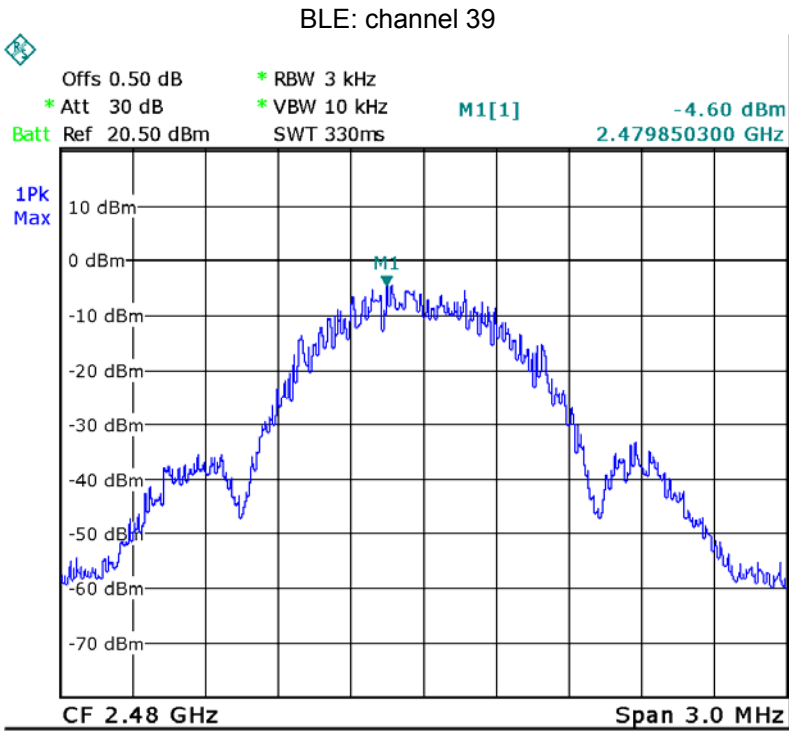
Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9

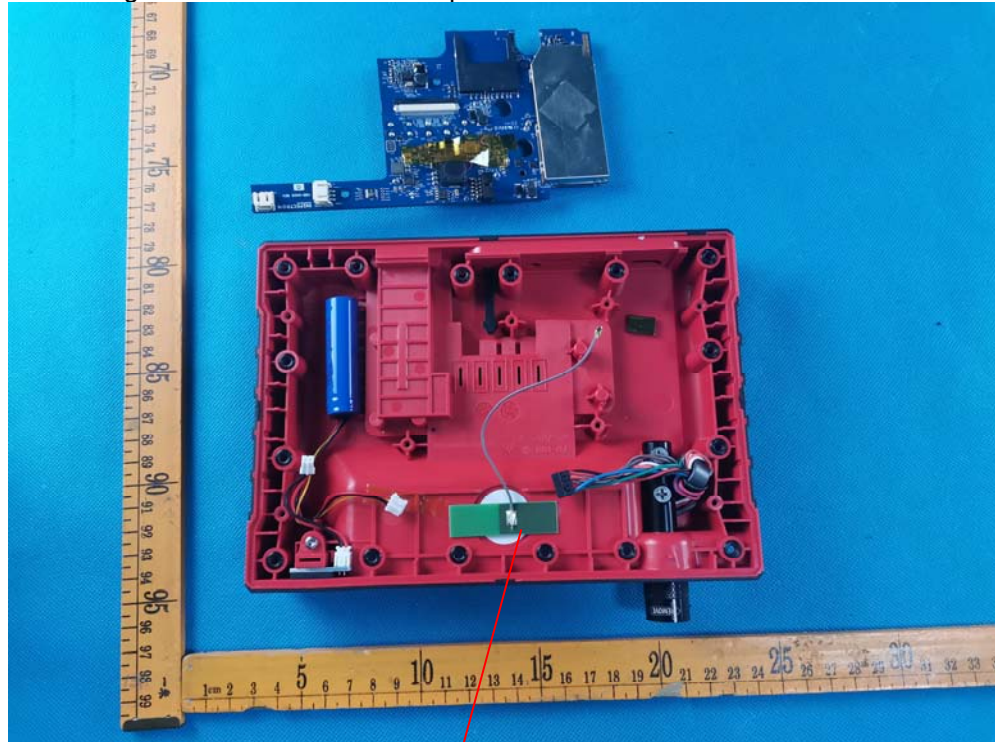






15 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfill the requirement of this section.



WIFI ANT.

16 Photographs of test setup and EUT.

Note: Please refer to appendix: ROCAM mini HD-Basis -Photo.

=====End of Report=====