

TEST REPORT

Reference No. : WTD21D04040642W003
FCC ID : 2AEPISILVERMAXPRO
Applicant..... : COLOMBIANA DE COMERCIO S.A.
Address..... : Car. 43E No 8-71, Medellin, Colombia
Manufacturer : COOSEA GROUP (HK) COMPANY LIMITED LIMITED
Address..... : Ningbo Fenghua No.999, Dacheng East Road, Fenghua, Zhejiang, China
Product..... : Smartphone
Model(s). : Silver Max Pro
Brand Name..... : Kalley
Standards..... : FCC CFR47 Part 15.247
Date of Receipt sample : 2021-04-29
Date of Test : 2021-04-30 to 2021-06-01
Date of Issue..... : 2021-06-02
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:

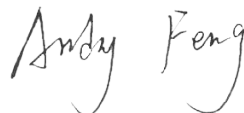
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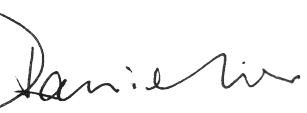
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Compiled by:



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Approved by:



Daniel Liu / Designated Reviewer

2 Contents

	Page
1 COVER PAGE.....	1
2 CONTENTS	2
3 REVISION HISTORY	4
4 GENERAL INFORMATION.....	5
4.1 GENERAL DESCRIPTION OF E.U.T.	5
4.2 DETAILS OF E.U.T.	5
4.3 CHANNEL LIST.....	6
4.4 TEST MODE	7
4.5 TEST FACILITY.....	8
5 TEST SUMMARY	9
6 EQUIPMENT USED DURING TEST	10
6.1 EQUIPMENTS LIST	10
6.2 DESCRIPTION OF SUPPORT UNITS	11
6.3 MEASUREMENT UNCERTAINTY	11
6.4 TEST EQUIPMENT CALIBRATION	11
7 CONDUCTED EMISSION	12
7.1 E.U.T. OPERATION	12
7.2 EUT SETUP.....	12
7.3 MEASUREMENT DESCRIPTION	12
7.4 CONDUCTED EMISSION TEST RESULT	13
8 RADIATED EMISSIONS.....	17
8.1 EUT OPERATION.....	17
8.2 TEST SETUP	18
8.3 SPECTRUM ANALYZER SETUP	19
8.4 TEST PROCEDURE	20
8.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	20
8.6 SUMMARY OF TEST RESULTS	21
9 DUTY CYCLE.....	38
10 CONDUCTED SPURIOUS EMISSIONS.....	39
10.1 TEST PROCEDURE.....	39
10.2 TEST RESULT	40
11 BAND EDGE MEASUREMENT	56
11.1 TEST PRODUCE	56
11.2 TEST RESULT	57
12 6 DB BANDWIDTH AND 99% BANDWIDTH MEASUREMENT	62
12.1 TEST PROCEDURE:.....	62
12.2 TEST RESULT:	62
14 MAXIMUM PEAK CONDUCTED OUTPUT POWER.....	79
14.1 TEST PROCEDURE:.....	79
14.2 TEST RESULT:	80
15 DUTY CYCLE.....	89
16 POWER SPECTRAL DENSITY	90
16.1 TEST PROCEDURE:.....	90
16.2 TEST RESULT:	90
17 ANTENNA REQUIREMENT	99

18 RF EXPOSURE..... 99

19 PHOTOGRAPHS OF TEST SETUP AND EUT..... 99

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD21D04040 642W003	2021-04-29	2021-04-30 to 2021-06-01	2021-06-02	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Smartphone
Model(s):	Silver Max Pro
Model Description:	N/A
GSM Band(s):	GSM 850/900/1800/1900MHz
GPRS/EGPRS Class:	12
WCDMA Band(s):	FDD Band II/V
LTE Band(s):	FDD Band 4/7
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 v5.0 with BLE
GPS:	Support
NFC:	N/A
Hardware Version:	V01A
Software Version:	alps-mp-r0.mp1-V8.46
Highest frequency (Exclude Radio):	1.3GHz
Storage Location:	Internal Storage
Note:	N/A

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): 16.84dBm BLE: -4.65dBm
Type of Modulation:	WiFi: CCK, OFDM BLE:GFSK
Antenna installation:	WiFi: internal permanent antenna BLE: internal permanent antenna
Antenna Gain:	WiFi(2.4G): -3dBi BLE: -2.8dBi
Ratings:	Battery DC 3.87V, 4900mAh DC 5V, 2.0A, charging from adapter (Adapter Input: 100-240V~50/60Hz 0.35A)
Adapter:	Manufacturer: Guangdong Beicom Electronics Co.,Ltd Model No.: U282F0A050200

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)	PASS
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

Note: All test were performed that the device transmit continue of the 100% duty cycle.

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	100115	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	8128-259	2020-07-30	2021-07-29
3.	Limiter	CYBERTEK	EM5010	261115-001-0024	2020-07-30	2021-07-29
4.	Cable	Laplace	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	FSP30	100091	2021-04-20	2022-04-19
2	Amplifier	Agilent	8447D	2944A10178	2021-04-20	2022-04-19
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2020-08-22	2021-08-21
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2021-04-20	2022-04-19
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2021-04-20	2022-04-19
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-04-20	2022-04-19
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-04-20	2022-04-19
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-04-20	2022-04-19
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	2021-04-20	2022-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-04-25	2022-04-24
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2020-05-06 2021-04-29	2021-05-05 2022-04-28
4	Amplifier	ANRITSU	MH648A	M43381	2021-04-20	2022-04-19

5	Cable	HUBER+SUHNER	CBL2	525178	2021-04-20	2022-04-19
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	2021-04-20	2022-04-19
2.	Spectrum Analyzer	R&S	FSP30	100091	2021-04-20	2022-04-19
3.	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2021-04-20	2022-04-19

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 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

Class/Severity: Class B

Limit:

Frequency (MHz)	Limit (dBμV)	
	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

7.1 E.U.T. Operation

Operating Environment :

Temperature: 21.5 °C

Humidity: 51.9 % RH

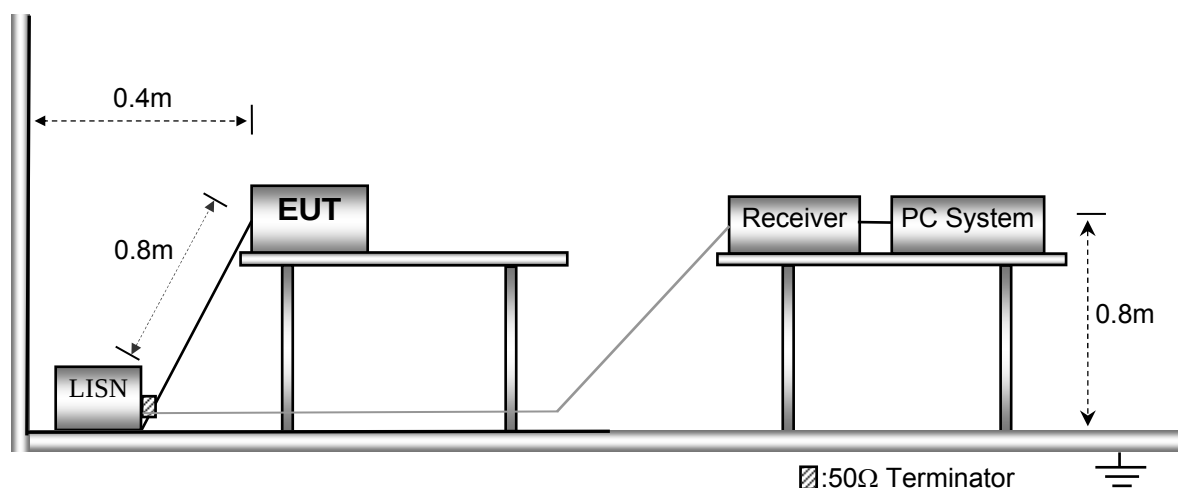
Atmospheric Pressure: 101.2kPa

EUT Operation :

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

7.2 EUT Setup

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



7.3 Measurement Description

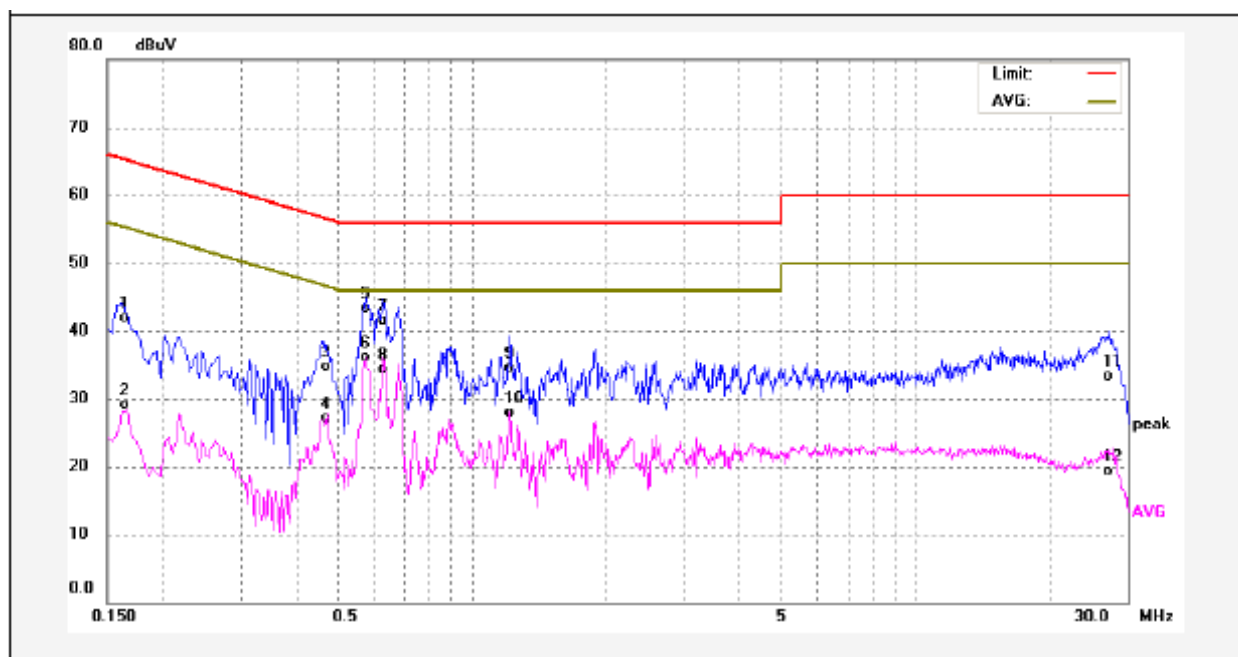
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

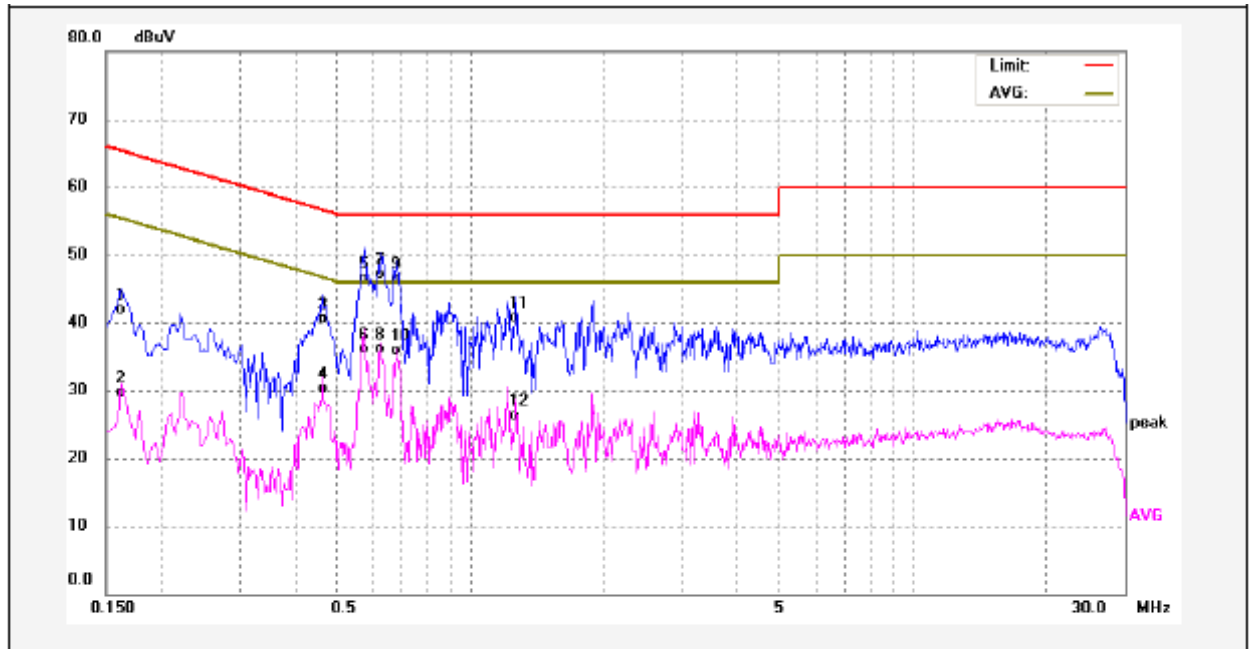
Worst Mode: WIFI mode (802.11b mode low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	31.10	10.78	41.88	65.36	-23.48	QP	
2	0.1620	18.28	10.78	29.06	55.36	-26.30	AVG	
3	0.4660	24.15	10.54	34.69	56.58	-21.89	QP	
4	0.4660	16.54	10.54	27.08	46.58	-19.50	AVG	
5	0.5740	32.73	10.55	43.28	56.00	-12.72	QP	
6	0.5740	25.56	10.55	36.11	46.00	-9.89	AVG	
7	0.6300	31.01	10.57	41.58	56.00	-14.42	QP	
8	0.6300	23.77	10.57	34.34	46.00	-11.66	AVG	
9	1.2100	23.81	10.60	34.41	56.00	-21.59	QP	
10	1.2100	17.35	10.60	27.95	46.00	-18.05	AVG	
11	27.3380	22.47	10.85	33.32	60.00	-26.68	QP	
12	27.3380	8.37	10.85	19.22	50.00	-30.78	AVG	

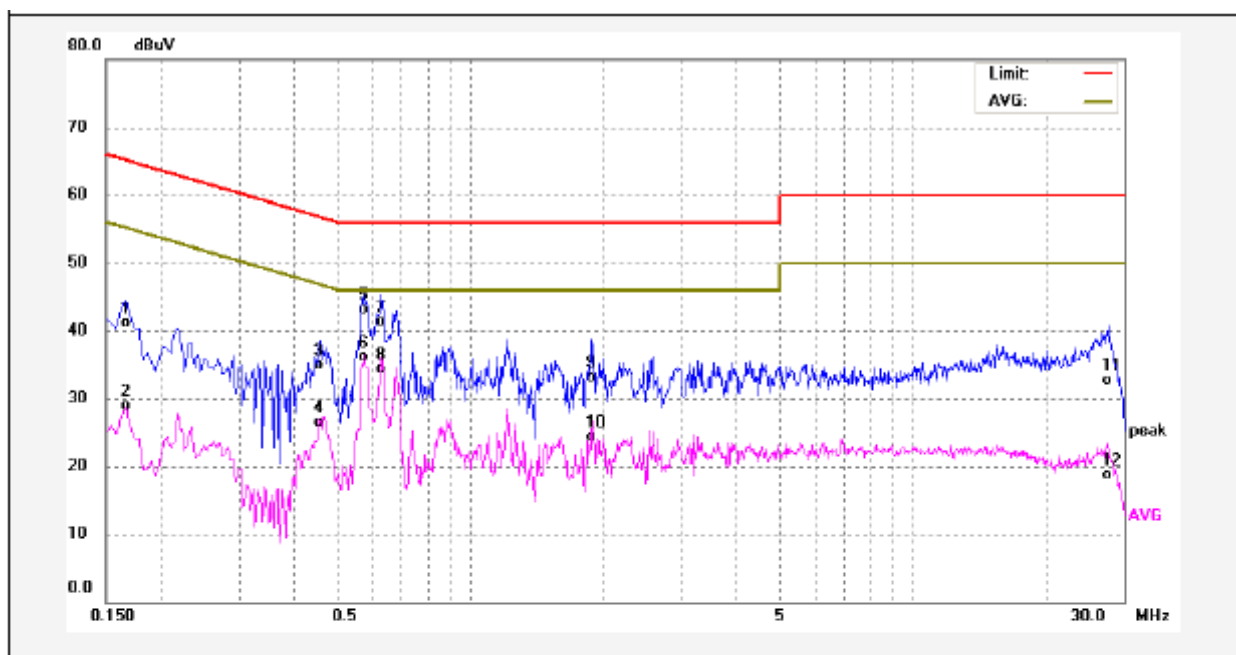
Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	31.08	10.78	41.86	65.36	-23.50	QP	
2	0.1620	18.91	10.78	29.69	55.36	-25.67	AVG	
3	0.4620	30.00	10.54	40.54	56.66	-16.12	QP	
4	0.4620	19.68	10.54	30.22	46.66	-16.44	AVG	
5	0.5780	35.95	10.55	46.50	56.00	-9.50	QP	
6	0.5780	25.61	10.55	36.16	46.00	-9.84	AVG	
7	0.6300	36.57	10.57	47.14	56.00	-8.86	QP	
8	0.6300	25.44	10.57	36.01	46.00	-9.99	AVG	
9	0.6780	35.82	10.59	46.41	56.00	-9.59	QP	
10	0.6780	25.38	10.59	35.97	46.00	-10.03	AVG	
11	1.2579	30.16	10.60	40.76	56.00	-15.24	QP	
12	1.2579	15.78	10.60	26.38	46.00	-19.62	AVG	

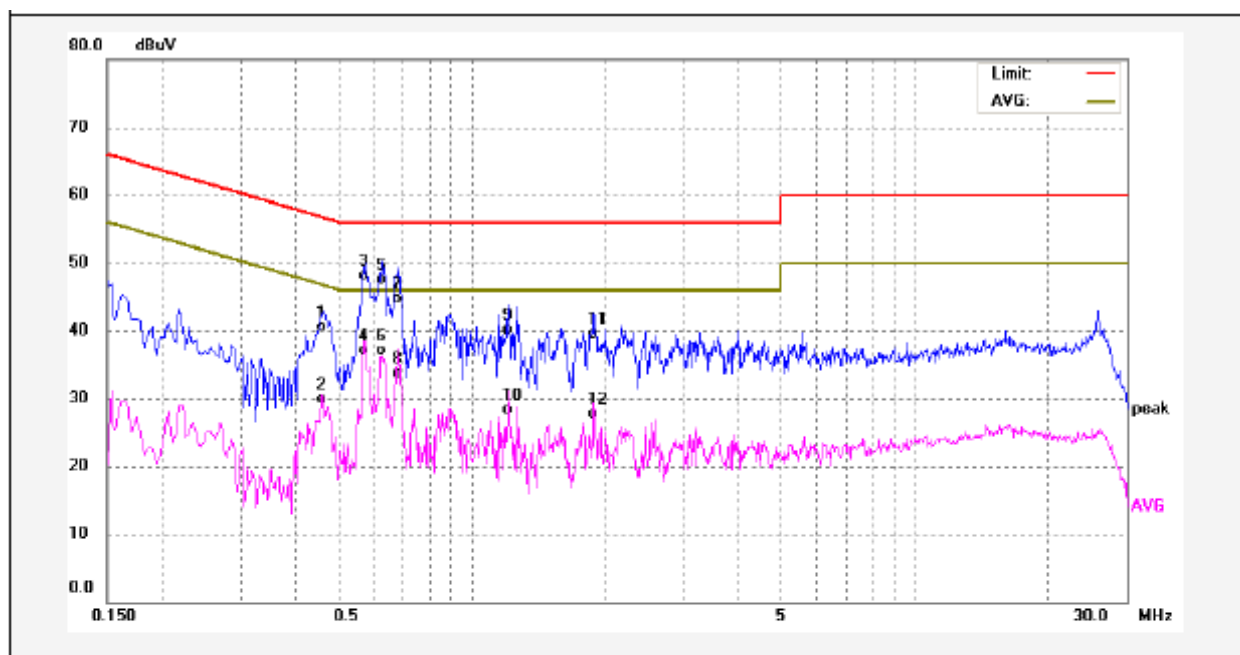
Worst Mode: BLE mode (low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1660	30.41	10.77	41.18	65.15	-23.97	QP	
2	0.1660	18.14	10.77	28.91	55.15	-26.24	AVG	
3	0.4580	24.31	10.54	34.85	56.73	-21.88	QP	
4	0.4580	15.97	10.54	26.51	46.73	-20.22	AVG	
5	0.5740	32.61	10.55	43.16	56.00	-12.84	QP	
6	0.5740	25.53	10.55	36.08	46.00	-9.92	AVG	
7	0.6300	30.82	10.57	41.39	56.00	-14.61	QP	
8	0.6300	23.70	10.57	34.27	46.00	-11.73	AVG	
9	1.8820	22.49	10.60	33.09	56.00	-22.91	QP	
10	1.8820	13.66	10.60	24.26	46.00	-21.74	AVG	
11	27.6940	21.78	10.86	32.64	60.00	-27.36	QP	
12	27.6940	7.81	10.86	18.67	50.00	-31.33	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.4620	29.95	10.54	40.49	56.66	-16.17	QP	
2	0.4620	19.44	10.54	29.98	46.66	-16.68	AVG	
3	0.5740	37.51	10.55	48.06	56.00	-7.94	QP	
4	0.5740	26.64	10.55	37.19	46.00	-8.81	AVG	
5	0.6260	36.99	10.57	47.56	56.00	-8.44	QP	
6	0.6260	26.46	10.57	37.03	46.00	-8.97	AVG	
7	0.6860	34.14	10.59	44.73	56.00	-11.27	QP	
8	0.6860	23.21	10.59	33.80	46.00	-12.20	AVG	
9	1.2020	29.53	10.60	40.13	56.00	-15.87	QP	
10	1.2020	17.79	10.60	28.39	46.00	-17.61	AVG	
11	1.8860	28.89	10.60	39.49	56.00	-16.51	QP	
12	1.8860	17.10	10.60	27.70	46.00	-18.30	AVG	

8 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	$10000 * 2400/F(kHz)$	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	$100 * 24000/F(kHz)$	$20\log^{(24000/F(kHz))} + 40$
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	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

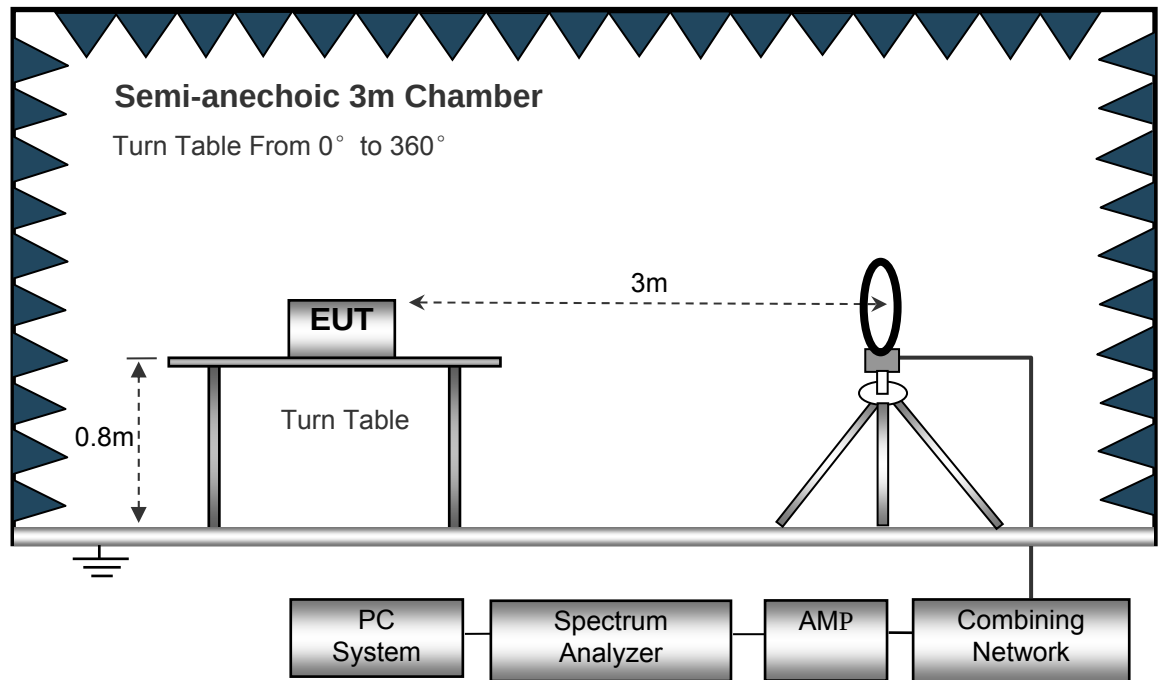
EUT Operation :

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

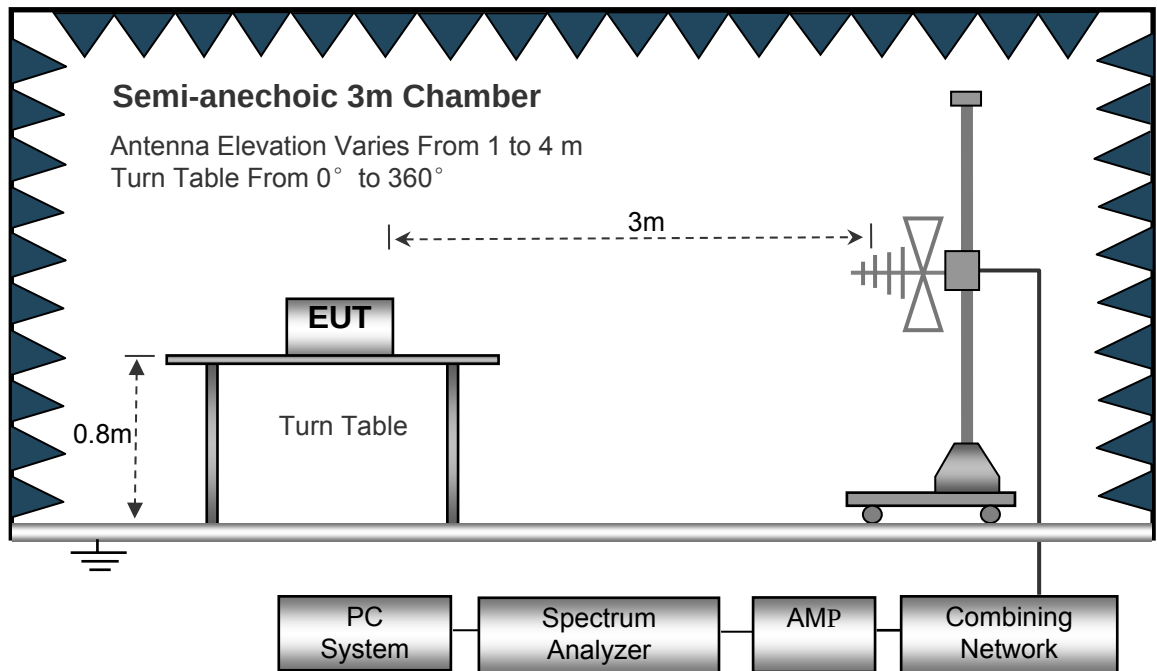
8.2 Test Setup

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

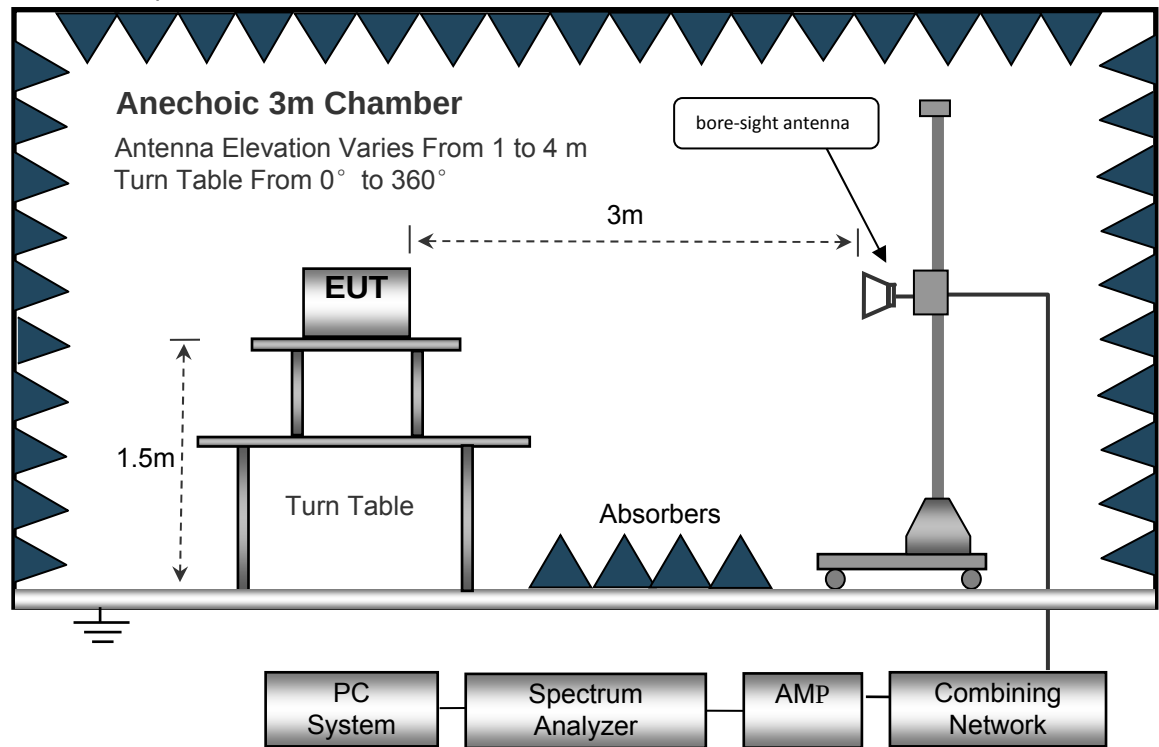
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



8.3 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

8.4 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.

8.5 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:

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

8.6 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	25.28	QP	21.84	40.00	7.12	29.54	-22.42
15.731	25.34	QP	21.35	40.00	6.69	29.54	-22.85
25.680	25.21	QP	20.67	40.00	5.88	29.54	-23.66
802.11g							
6.022	24.26	QP	21.84	40.00	6.10	29.54	-23.44
15.731	25.38	QP	21.35	40.00	6.73	29.54	-22.81
25.680	25.24	QP	20.67	40.00	5.91	29.54	-23.63
802.11n(HT20)							
6.022	24.16	QP	21.84	40.00	6.00	29.54	-23.54
15.731	25.48	QP	21.35	40.00	6.83	29.54	-22.71
25.680	25.32	QP	20.67	40.00	5.99	29.54	-23.55
802.11n(HT40)							
6.022	24.36	QP	21.84	40.00	6.20	29.54	-23.34
15.731	25.41	QP	21.35	40.00	6.76	29.54	-22.78
25.680	25.35	QP	20.67	40.00	6.02	29.54	-23.52

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	35.86	QP	245	1.3	H	-11.62	24.24	46.00	-21.76
223.45	25.98	QP	200	1.4	V	-11.62	14.36	46.00	-31.64
4824.00	53.69	PK	287	1.8	V	-1.06	52.63	74.00	-21.37
4824.00	50.25	Ave	287	1.8	V	-1.06	49.19	54.00	-4.81
7236.00	45.75	PK	181	1.4	H	1.33	47.08	74.00	-26.92
7236.00	40.61	Ave	181	1.4	H	1.33	41.94	54.00	-12.06
2346.19	45.71	PK	48	1.9	V	-13.19	32.52	74.00	-41.48
2346.19	38.82	Ave	48	1.9	V	-13.19	25.63	54.00	-28.37
2389.92	42.15	PK	91	1.0	H	-13.14	29.01	74.00	-44.99
2389.92	37.87	Ave	91	1.0	H	-13.14	24.73	54.00	-29.27
2488.86	42.43	PK	95	1.1	V	-13.08	29.35	74.00	-44.65
2488.86	38.13	Ave	95	1.1	V	-13.08	25.05	54.00	-28.95

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	34.70	QP	152	1.8	H	-11.62	23.08	46.00	-22.92
223.45	27.41	QP	184	1.2	V	-11.62	15.79	46.00	-30.21
4874.00	53.48	PK	228	1.6	V	-0.62	52.86	74.00	-21.14
4874.00	49.22	Ave	228	1.6	V	-0.62	48.60	54.00	-5.40
7311.00	47.03	PK	323	1.3	H	2.21	49.24	74.00	-24.76
7311.00	40.84	Ave	323	1.3	H	2.21	43.05	54.00	-10.95
2313.96	46.74	PK	178	1.0	V	-13.19	33.55	74.00	-40.45
2313.96	39.29	Ave	178	1.0	V	-13.19	26.10	54.00	-27.90
2364.37	44.22	PK	277	1.2	H	-13.14	31.08	74.00	-42.92
2364.37	38.34	Ave	277	1.2	H	-13.14	25.20	54.00	-28.80
2495.55	43.78	PK	217	1.1	V	-13.08	30.70	74.00	-43.30
2495.55	36.75	Ave	217	1.1	V	-13.08	23.67	54.00	-30.33

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	33.83	QP	183	1.7	H	-11.62	22.21	46.00	-23.79
223.45	26.96	QP	218	1.3	V	-11.62	15.34	46.00	-30.66
4924.00	54.36	PK	76	1.8	V	-0.24	54.12	74.00	-19.88
4924.00	50.32	Ave	76	1.8	V	-0.24	50.08	54.00	-3.92
7386.00	48.45	PK	188	1.1	H	2.84	51.29	74.00	-22.71
7386.00	39.69	Ave	188	1.1	H	2.84	42.53	54.00	-11.47
2326.74	45.41	PK	189	1.8	V	-13.19	32.22	74.00	-41.78
2326.74	39.12	Ave	189	1.8	V	-13.19	25.93	54.00	-28.07
2384.30	42.39	PK	233	1.8	H	-13.14	29.25	74.00	-44.75
2384.30	36.31	Ave	233	1.8	H	-13.14	23.17	54.00	-30.83
2498.75	43.22	PK	36	1.7	V	-13.08	30.14	74.00	-43.86
2498.75	37.96	Ave	36	1.7	V	-13.08	24.88	54.00	-29.12

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	34.61	QP	333	1.9	H	-11.62	22.99	46.00	-23.01
223.45	26.86	QP	51	1.3	V	-11.62	15.24	46.00	-30.76
4824.00	54.69	PK	246	1.2	V	-1.06	53.63	74.00	-20.37
4824.00	51.10	Ave	246	1.2	V	-1.06	50.04	54.00	-3.96
7236.00	48.97	PK	350	1.9	H	1.33	50.30	74.00	-23.70
7236.00	39.73	Ave	350	1.9	H	1.33	41.06	54.00	-12.94
2345.75	46.06	PK	204	1.2	V	-13.19	32.87	74.00	-41.13
2345.75	37.34	Ave	204	1.2	V	-13.19	24.15	54.00	-29.85
2354.69	44.49	PK	90	1.6	H	-13.14	31.35	74.00	-42.65
2354.69	37.40	Ave	90	1.6	H	-13.14	24.26	54.00	-29.74
2489.88	44.44	PK	95	1.6	V	-13.08	31.36	74.00	-42.64
2489.88	36.87	Ave	95	1.6	V	-13.08	23.79	54.00	-30.21

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	33.95	QP	23	1.6	H	-11.62	22.33	46.00	-23.67
223.45	25.36	QP	219	1.1	V	-11.62	13.74	46.00	-32.26
4874.00	54.12	PK	356	1.3	V	-0.62	53.50	74.00	-20.50
4874.00	49.94	Ave	356	1.3	V	-0.62	49.32	54.00	-4.68
7311.00	49.28	PK	316	1.7	H	2.21	51.49	74.00	-22.51
7311.00	38.75	Ave	316	1.7	H	2.21	40.96	54.00	-13.04
2341.32	46.46	PK	156	1.7	V	-13.19	33.27	74.00	-40.73
2341.32	39.93	Ave	156	1.7	V	-13.19	26.74	54.00	-27.26
2351.25	44.24	PK	47	1.7	H	-13.14	31.10	74.00	-42.90
2351.25	36.17	Ave	47	1.7	H	-13.14	23.03	54.00	-30.97
2486.52	43.03	PK	61	1.2	V	-13.08	29.95	74.00	-44.05
2486.52	36.67	Ave	61	1.2	V	-13.08	23.59	54.00	-30.41

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	34.74	QP	205	1.9	H	-11.62	23.12	46.00	-22.88
223.45	25.71	QP	35	1.4	V	-11.62	14.09	46.00	-31.91
4924.00	55.20	PK	156	1.3	V	-0.24	54.96	74.00	-19.04
4924.00	50.22	Ave	156	1.3	V	-0.24	49.98	54.00	-4.02
7386.00	49.46	PK	106	2.0	H	2.84	52.30	74.00	-21.70
7386.00	38.17	Ave	106	2.0	H	2.84	41.01	54.00	-12.99
2339.06	46.03	PK	282	1.4	V	-13.19	32.84	74.00	-41.16
2339.06	37.65	Ave	282	1.4	V	-13.19	24.46	54.00	-29.54
2363.42	43.51	PK	39	1.4	H	-13.14	30.37	74.00	-43.63
2363.42	37.87	Ave	39	1.4	H	-13.14	24.73	54.00	-29.27
2498.72	44.02	PK	139	1.2	V	-13.08	30.94	74.00	-43.06
2498.72	37.53	Ave	139	1.2	V	-13.08	24.45	54.00	-29.55

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	35.95	QP	219	1.7	H	-11.62	24.33	46.00	-21.67
223.45	24.49	QP	165	1.2	V	-11.62	12.87	46.00	-33.13
4824.00	56.58	PK	5	1.2	V	-1.06	55.52	74.00	-18.48
4824.00	51.34	Ave	5	1.2	V	-1.06	50.28	54.00	-3.72
7236.00	48.39	PK	311	1.9	H	1.33	49.72	74.00	-24.28
7236.00	37.39	Ave	311	1.9	H	1.33	38.72	54.00	-15.28
2349.18	45.77	PK	178	1.8	V	-13.19	32.58	74.00	-41.42
2349.18	38.32	Ave	178	1.8	V	-13.19	25.13	54.00	-28.87
2367.32	44.96	PK	325	1.7	H	-13.14	31.82	74.00	-42.18
2367.32	37.40	Ave	325	1.7	H	-13.14	24.26	54.00	-29.74
2484.70	43.58	PK	293	1.4	V	-13.08	30.50	74.00	-43.50
2484.70	37.24	Ave	293	1.4	V	-13.08	24.16	54.00	-29.84

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	36.87	QP	266	1.8	H	-11.62	25.25	46.00	-20.75
223.45	25.78	QP	44	1.0	V	-11.62	14.16	46.00	-31.84
4874.00	56.23	PK	337	1.7	V	-0.62	55.61	74.00	-18.39
4874.00	51.01	Ave	337	1.7	V	-0.62	50.39	54.00	-3.61
7311.00	47.91	PK	332	1.9	H	2.21	50.12	74.00	-23.88
7311.00	38.51	Ave	332	1.9	H	2.21	40.72	54.00	-13.28
2348.32	46.52	PK	255	1.3	V	-13.19	33.33	74.00	-40.67
2348.32	37.11	Ave	255	1.3	V	-13.19	23.92	54.00	-30.08
2375.39	44.74	PK	335	2.0	H	-13.14	31.60	74.00	-42.40
2375.39	37.38	Ave	335	2.0	H	-13.14	24.24	54.00	-29.76
2493.99	43.17	PK	1	1.4	V	-13.08	30.09	74.00	-43.91
2493.99	37.48	Ave	1	1.4	V	-13.08	24.40	54.00	-29.60

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	35.39	QP	181	1.1	H	-11.62	23.77	46.00	-22.23
223.45	25.35	QP	284	1.9	V	-11.62	13.73	46.00	-32.27
4924.00	57.25	PK	255	1.2	V	-0.24	57.01	74.00	-16.99
4924.00	50.33	Ave	255	1.2	V	-0.24	50.09	54.00	-3.91
7386.00	46.42	PK	0	1.0	H	2.84	49.26	74.00	-24.74
7386.00	39.42	Ave	0	1.0	H	2.84	42.26	54.00	-11.74
2336.76	45.27	PK	221	1.8	V	-13.19	32.08	74.00	-41.92
2336.76	39.95	Ave	221	1.8	V	-13.19	26.76	54.00	-27.24
2356.65	42.80	PK	242	1.9	H	-13.14	29.66	74.00	-44.34
2356.65	37.54	Ave	242	1.9	H	-13.14	24.40	54.00	-29.60
2490.41	43.64	PK	80	1.2	V	-13.08	30.56	74.00	-43.44
2490.41	38.34	Ave	80	1.2	V	-13.08	25.26	54.00	-28.74

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	34.47	QP	281	1.4	H	-11.62	22.85	46.00	-23.15
223.45	26.47	QP	177	1.6	V	-11.62	14.85	46.00	-31.15
4844.00	54.31	PK	131	2.0	V	-1.06	53.25	74.00	-20.75
4844.00	47.36	Ave	131	2.0	V	-1.06	46.30	54.00	-7.70
7266.00	44.01	PK	81	1.2	H	1.33	45.34	74.00	-28.66
7266.00	38.01	Ave	81	1.2	H	1.33	39.34	54.00	-14.66
2334.31	45.32	PK	132	1.6	V	-13.19	32.13	74.00	-41.87
2334.31	39.36	Ave	132	1.6	V	-13.19	26.17	54.00	-27.83
2385.46	42.73	PK	195	1.3	H	-13.14	29.59	74.00	-44.41
2385.46	37.08	Ave	195	1.3	H	-13.14	23.94	54.00	-30.06
2493.12	44.73	PK	286	1.4	V	-13.08	31.65	74.00	-42.35
2493.12	38.80	Ave	286	1.4	V	-13.08	25.72	54.00	-28.28

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	35.05	QP	163	1.0	H	-11.62	23.43	46.00	-22.57
223.45	25.83	QP	47	1.8	V	-11.62	14.21	46.00	-31.79
4874.00	53.48	PK	289	1.8	V	-0.62	52.86	74.00	-21.14
4874.00	46.39	Ave	289	1.8	V	-0.62	45.77	54.00	-8.23
7311.00	43.53	PK	27	1.4	H	2.21	45.74	74.00	-28.26
7311.00	37.52	Ave	27	1.4	H	2.21	39.73	54.00	-14.27
2313.07	46.78	PK	101	1.9	V	-13.19	33.59	74.00	-40.41
2313.07	38.47	Ave	101	1.9	V	-13.19	25.28	54.00	-28.72
2377.95	44.88	PK	98	1.4	H	-13.14	31.74	74.00	-42.26
2377.95	37.28	Ave	98	1.4	H	-13.14	24.14	54.00	-29.86
2483.56	42.03	PK	137	1.8	V	-13.08	28.95	74.00	-45.05
2483.56	36.56	Ave	137	1.8	V	-13.08	23.48	54.00	-30.52

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	35.00	QP	175	1.8	H	-11.62	23.38	46.00	-22.62
223.45	25.63	QP	225	1.7	V	-11.62	14.01	46.00	-31.99
4904.00	53.30	PK	138	1.2	V	-0.24	53.06	74.00	-20.94
4904.00	45.92	Ave	138	1.2	V	-0.24	45.68	54.00	-8.32
7356.00	42.89	PK	275	1.8	H	2.84	45.73	74.00	-28.27
7356.00	38.43	Ave	275	1.8	H	2.84	41.27	54.00	-12.73
2310.52	46.51	PK	29	1.8	V	-13.19	33.32	74.00	-40.68
2310.52	37.01	Ave	29	1.8	V	-13.19	23.82	54.00	-30.18
2352.74	43.83	PK	96	1.8	H	-13.14	30.69	74.00	-43.31
2352.74	36.29	Ave	96	1.8	H	-13.14	23.15	54.00	-30.85
2491.17	43.18	PK	354	2.0	V	-13.08	30.10	74.00	-43.90
2491.17	38.84	Ave	354	2.0	V	-13.08	25.76	54.00	-28.24

Test Frequency: 8GHz~25GHz

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

BT BLE:**Test Frequency: 9KHz~26MHz**

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
6.023	25.37	QP	21.84	40.00	7.21	29.54	-22.33
15.732	25.40	QP	21.35	40.00	6.75	29.54	-22.79
25.680	24.34	QP	20.67	40.00	5.01	29.54	-24.53

Test Frequency : 26MHz ~ 30MHz

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

Test Frequency : 30MHz ~ 18GHz

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	34.71	QP	60	1.1	H	-13.35	21.36	46.00	-24.64
269.33	38.46	QP	347	1.6	V	-13.35	25.11	46.00	-20.89
4804.00	43.79	PK	44	1.4	V	-1.06	42.73	74.00	-31.27
4804.00	40.32	Ave	44	1.4	V	-1.06	39.26	54.00	-14.74
7206.00	50.28	PK	205	2.0	H	1.33	51.61	74.00	-22.39
7206.00	36.29	Ave	205	2.0	H	1.33	37.62	54.00	-16.38
2321.64	46.74	PK	216	1.6	V	-13.19	33.55	74.00	-40.45
2321.64	37.08	Ave	216	1.6	V	-13.19	23.89	54.00	-30.11
2382.60	43.15	PK	242	1.0	H	-13.14	30.01	74.00	-43.99
2382.60	36.06	Ave	242	1.0	H	-13.14	22.92	54.00	-31.08
2487.50	44.56	PK	202	1.1	V	-13.08	31.48	74.00	-42.52
2487.50	36.50	Ave	202	1.1	V	-13.08	23.42	54.00	-30.58

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	34.50	QP	19	1.0	H	-13.35	21.15	46.00	-24.85
269.33	37.03	QP	312	1.2	V	-13.35	23.68	46.00	-22.32
4880.00	43.46	PK	260	1.3	V	-0.62	42.84	74.00	-31.16
4880.00	39.49	Ave	260	1.3	V	-0.62	38.87	54.00	-15.13
7320.00	50.77	PK	146	1.8	H	2.21	52.98	74.00	-21.02
7320.00	35.66	Ave	146	1.8	H	2.21	37.87	54.00	-16.13
2335.42	45.35	PK	264	1.1	V	-13.19	32.16	74.00	-41.84
2335.42	38.35	Ave	264	1.1	V	-13.19	25.16	54.00	-28.84
2383.75	44.56	PK	277	1.7	H	-13.14	31.42	74.00	-42.58
2383.75	37.21	Ave	277	1.7	H	-13.14	24.07	54.00	-29.93
2490.98	44.25	PK	148	1.8	V	-13.08	31.17	74.00	-42.83
2490.98	36.18	Ave	148	1.8	V	-13.08	23.10	54.00	-30.90

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	35.48	QP	281	1.8	H	-13.35	22.13	46.00	-23.87
269.33	38.46	QP	70	1.0	V	-13.35	25.11	46.00	-20.89
4960.00	44.74	PK	352	1.9	V	-0.24	44.50	74.00	-29.50
4960.00	40.89	Ave	352	1.9	V	-0.24	40.65	54.00	-13.35
7440.00	49.43	PK	42	1.8	H	2.84	52.27	74.00	-21.73
7440.00	36.29	Ave	42	1.8	H	2.84	39.13	54.00	-14.87
2310.50	45.42	PK	98	1.3	V	-13.19	32.23	74.00	-41.77
2310.50	39.07	Ave	98	1.3	V	-13.19	25.88	54.00	-28.12
2387.15	43.33	PK	158	1.6	H	-13.14	30.19	74.00	-43.81
2387.15	37.58	Ave	158	1.6	H	-13.14	24.44	54.00	-29.56
2484.02	44.49	PK	352	1.2	V	-13.08	31.41	74.00	-42.59
2484.02	36.08	Ave	352	1.2	V	-13.08	23.00	54.00	-31.00

Test Frequency: 18GHz~25GHz

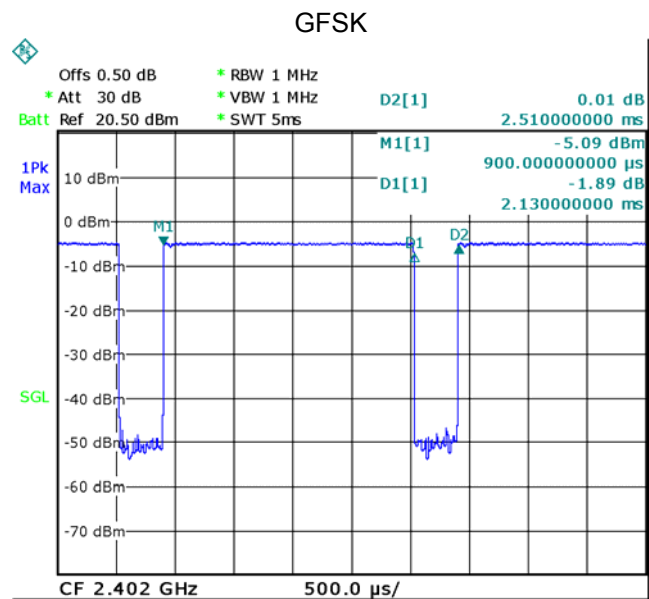
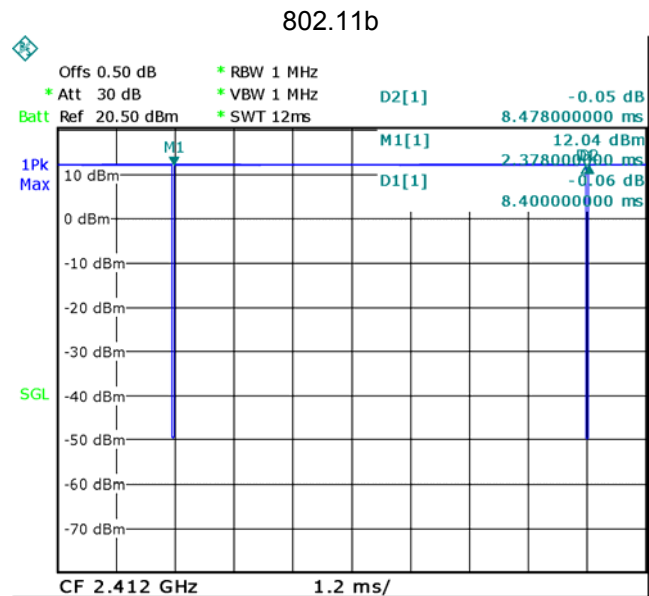
The measurements were more than 20 dB below the limit and not reported.

9 Duty Cycle

Modulation	On time(ms)	Period(ms)	Duty Cycle(%)	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	8.400	8.478	99.08	0.040	-0.080
GFSK	2.13	2.51	84.86	0.840	-1.426

Remark:

- 1) Duty Cycle=On Time/Period
- 2) Duty Cycle Factor=10*log(1/Duty cycle)
- 3) Average Factor=20 log₁₀ Duty Cycle



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.

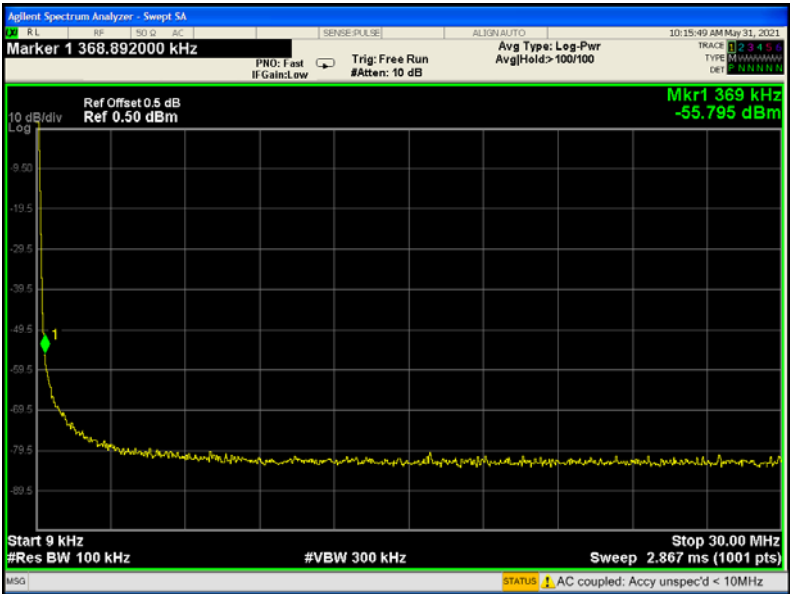
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

10.2 Test Result

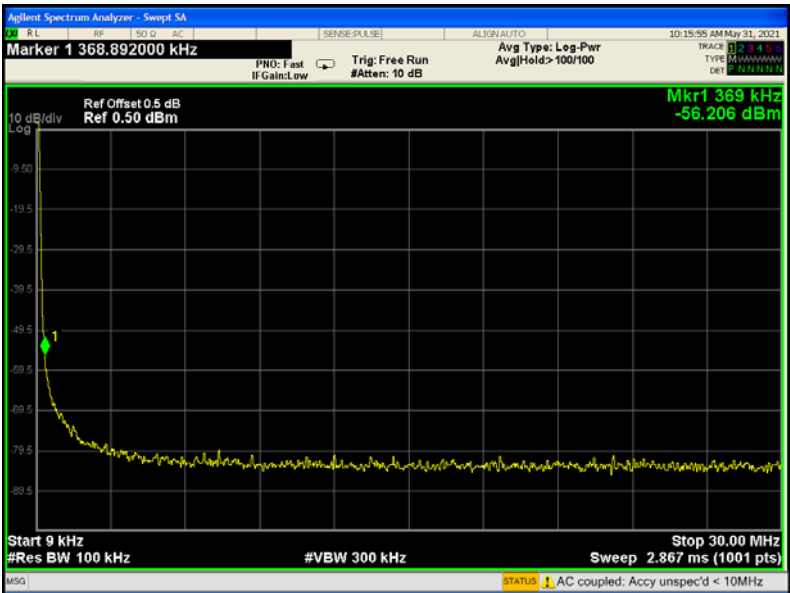
9KHz – 30MHz

802.11b

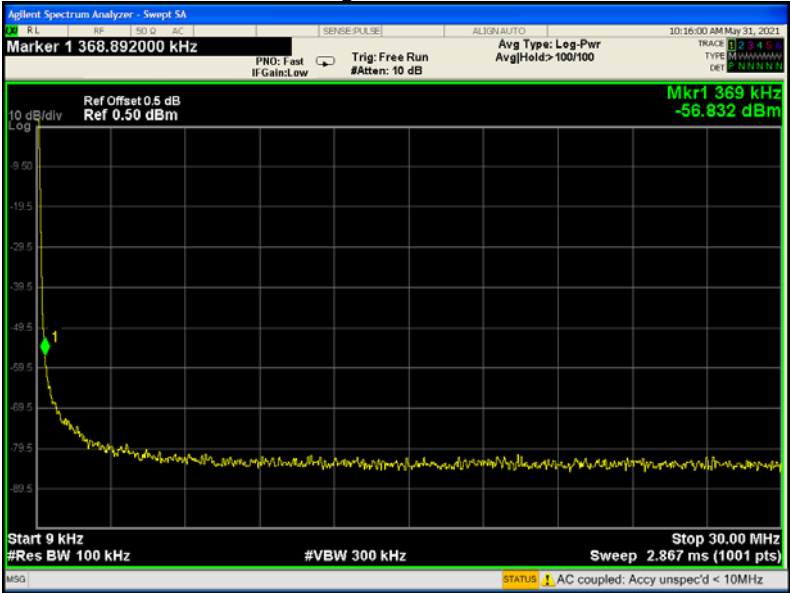
Low Channel



Middle Channel

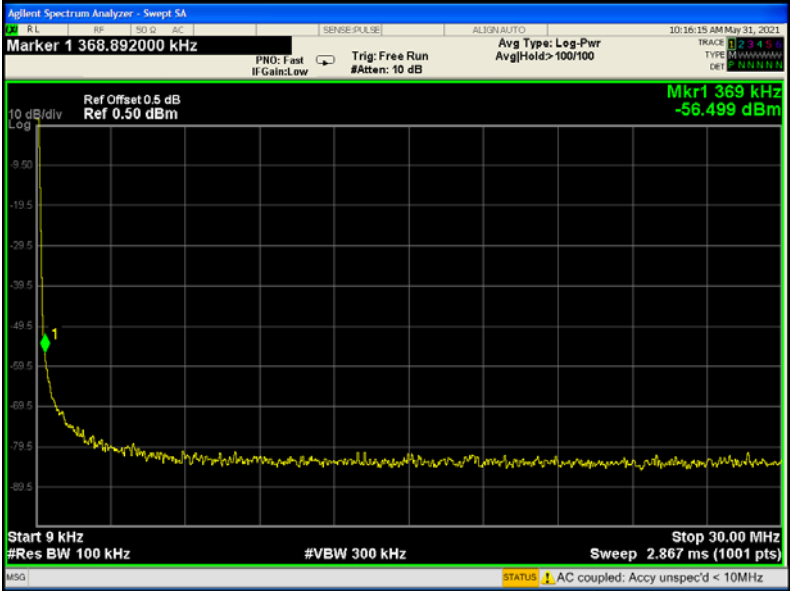


High Channel

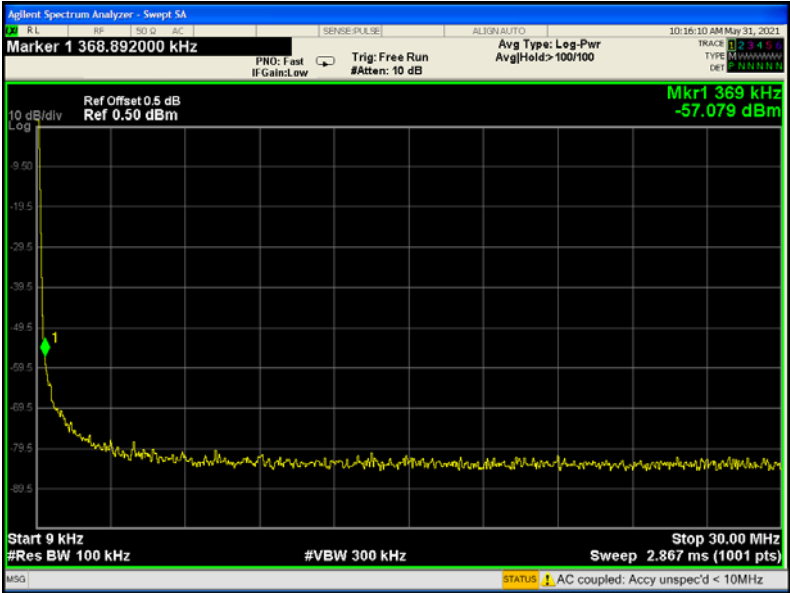


802.11g

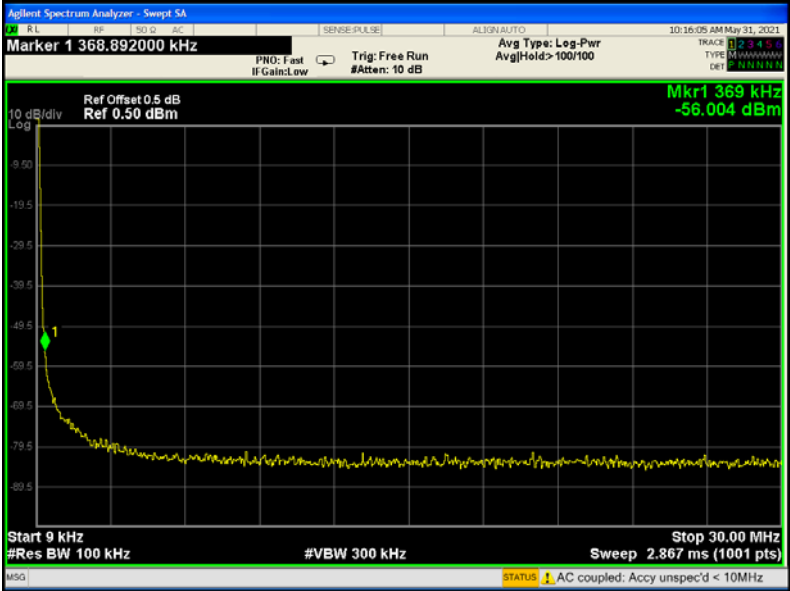
Low Channel



Middle Channel

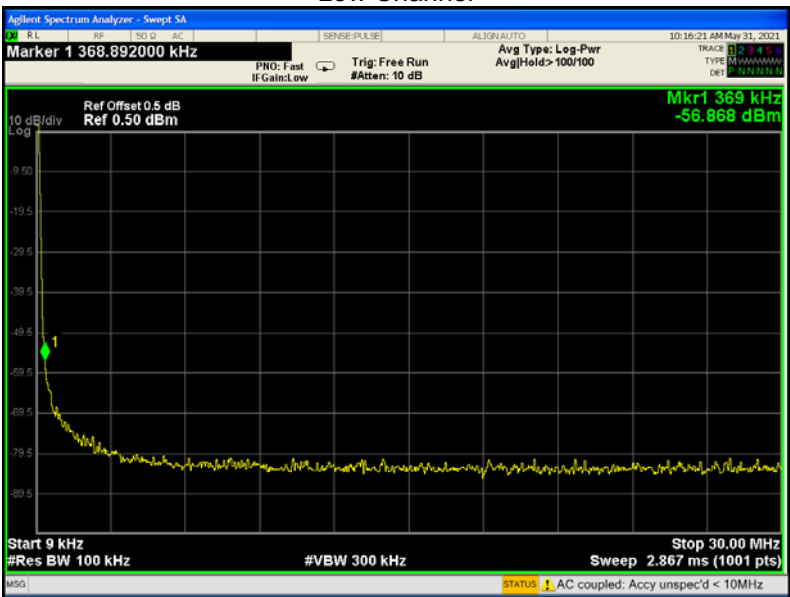


High Channel

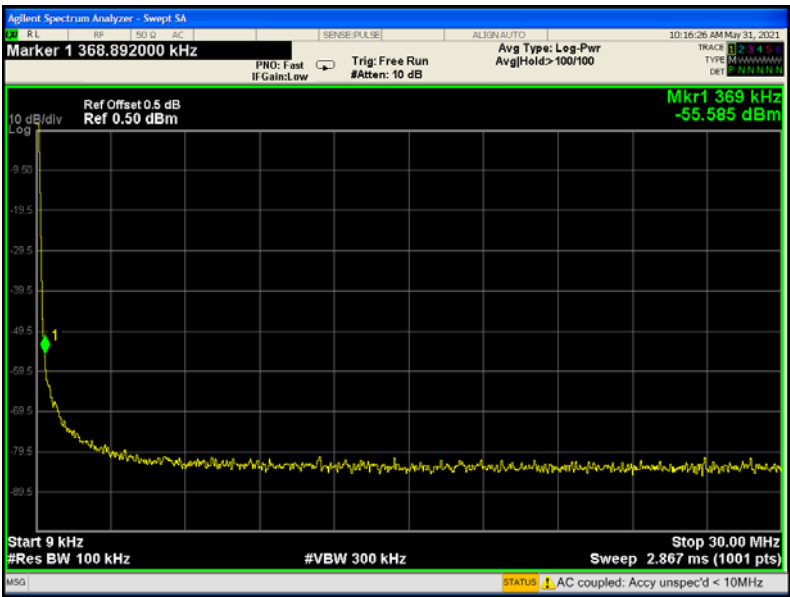


802.11n HT20

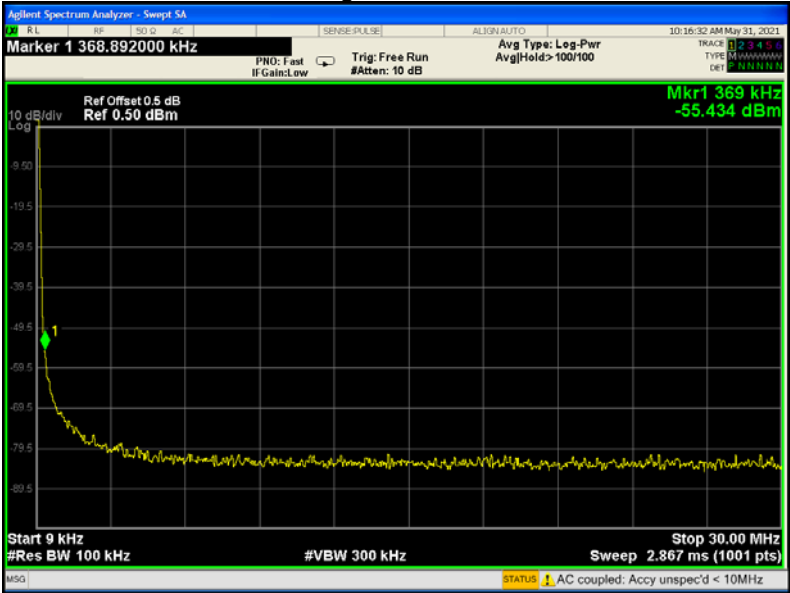
Low Channel



Middle Channel

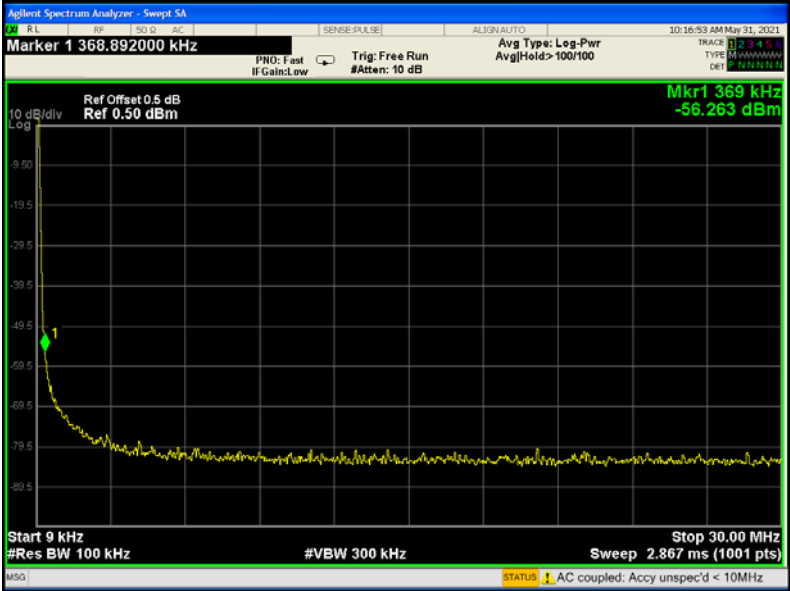


High Channel

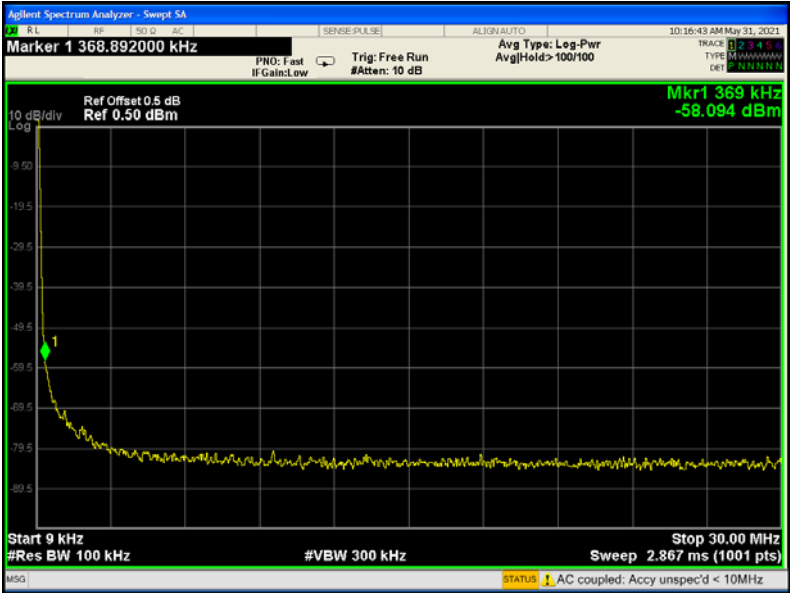


802.11n HT40

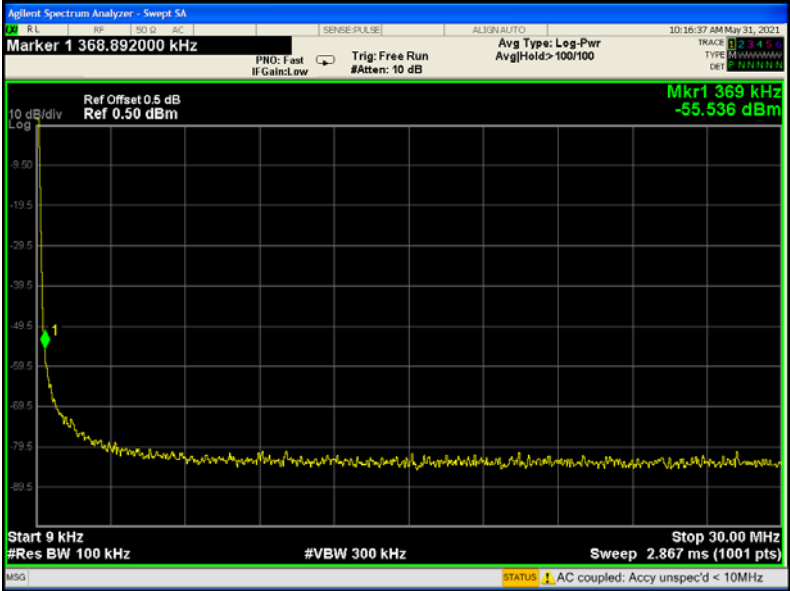
Low Channel



Middle Channel

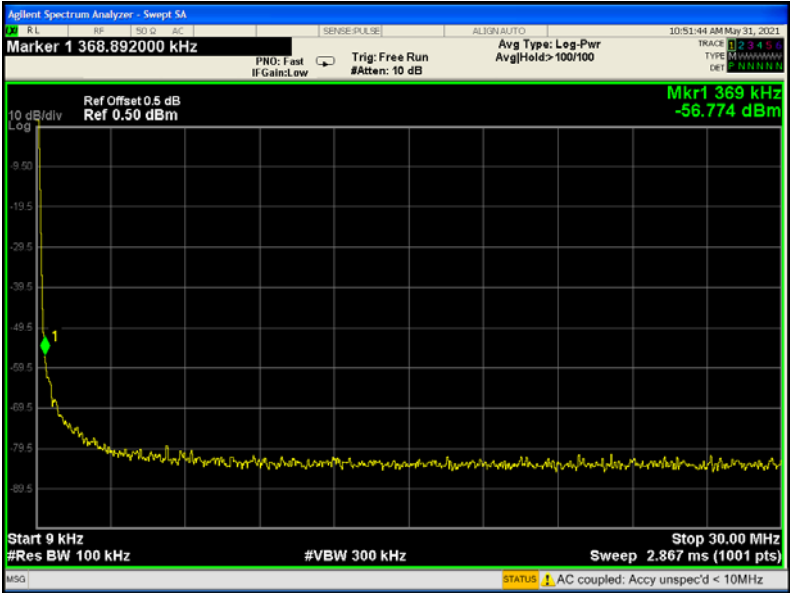


High Channel

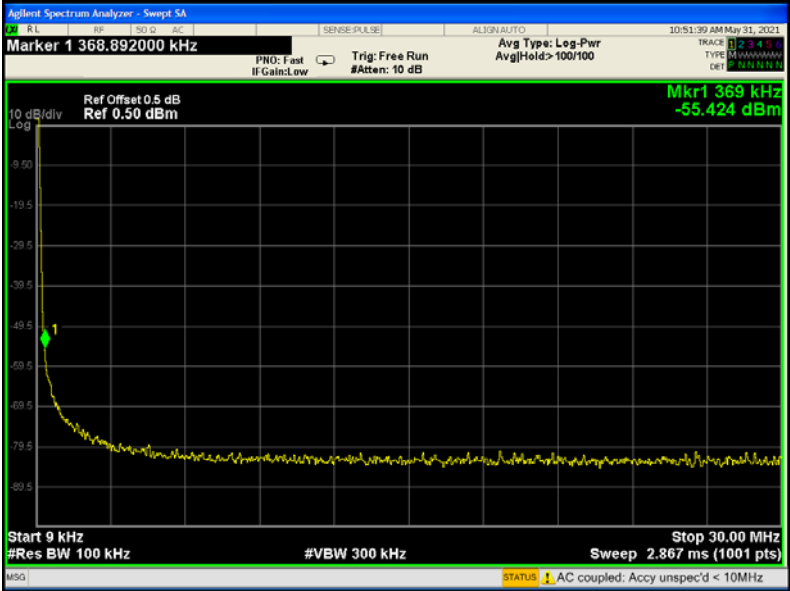


BLE

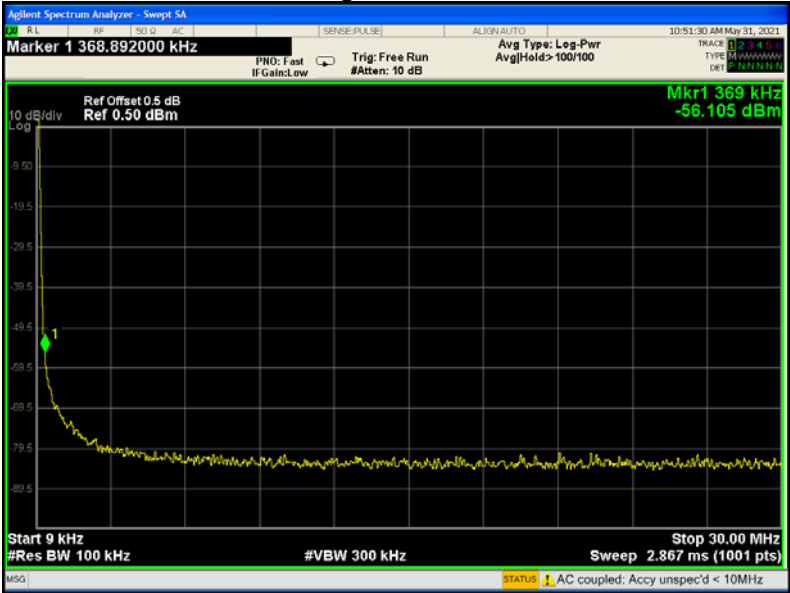
Low Channel



Middle Channel



High Channel

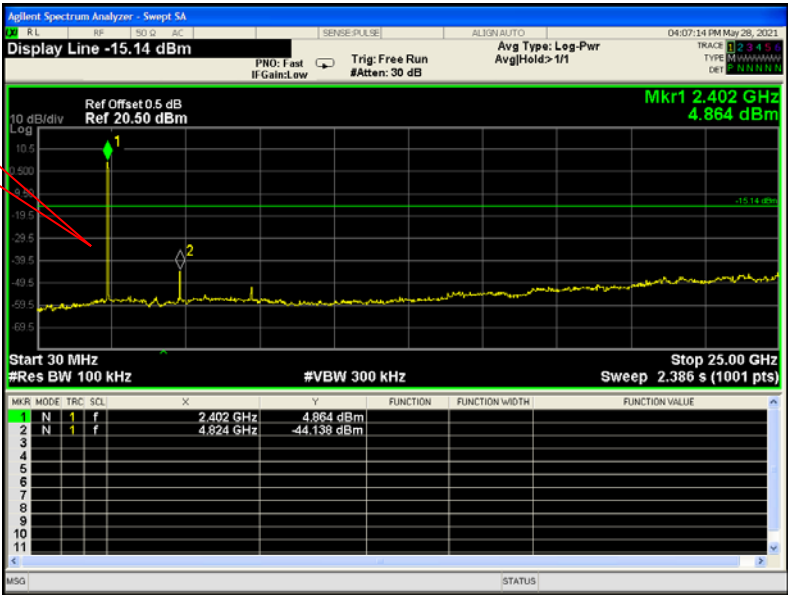


Above 30MHz

802.11b

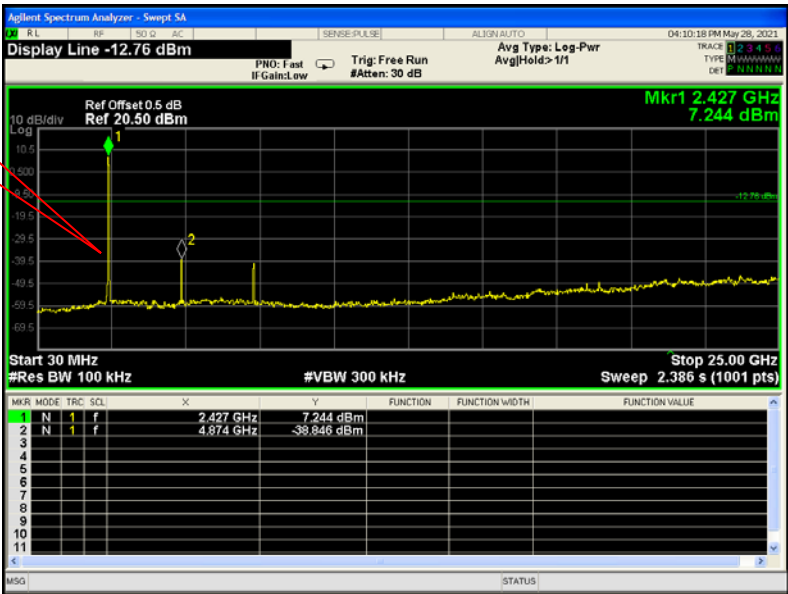
Low Channel

Fundamental



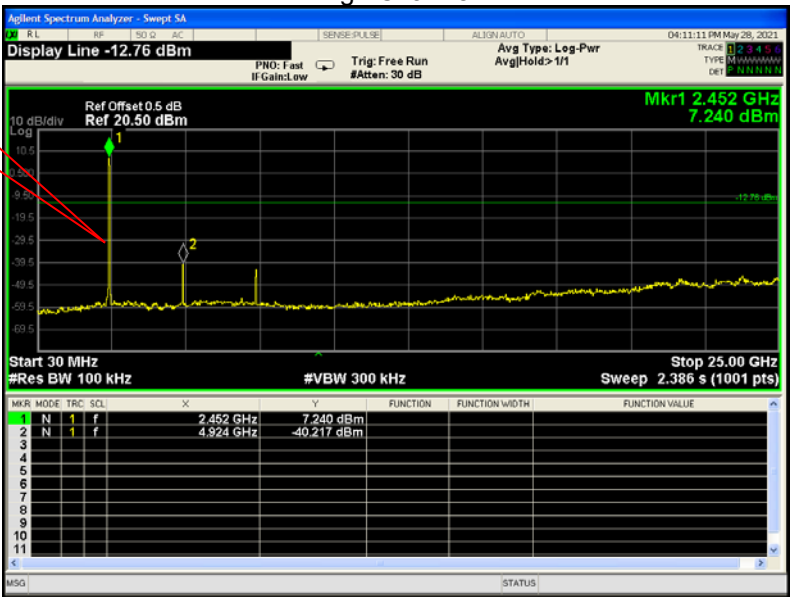
Middle Channel

Fundamental



High Channel

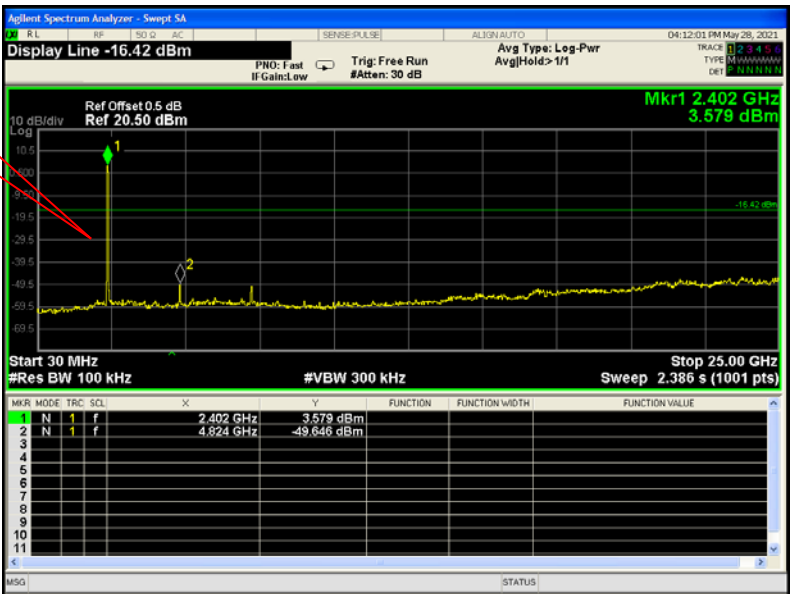
Fundamental



802.11g

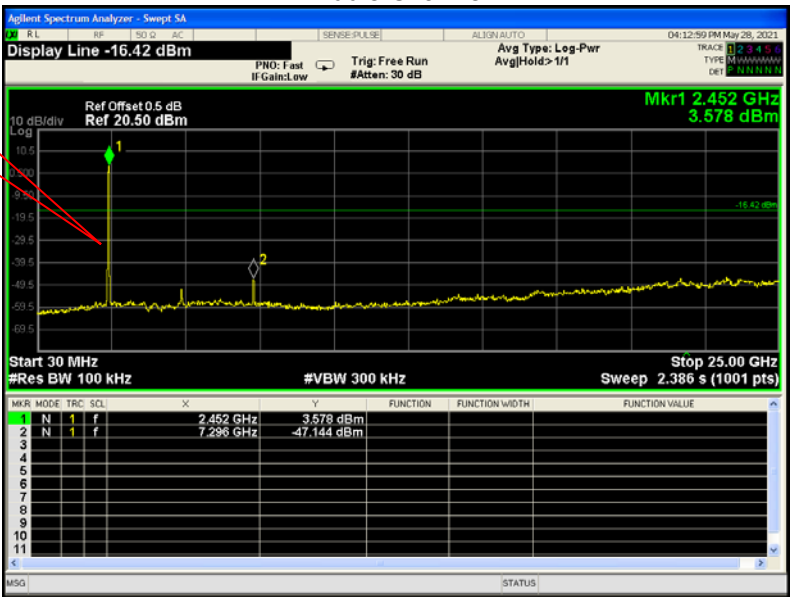
Low Channel

Fundamental



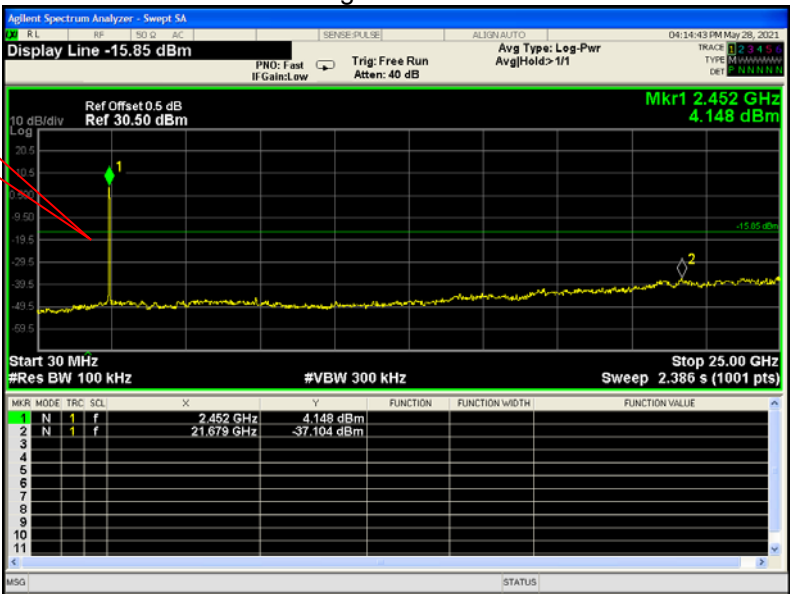
Middle Channel

Fundamental



High Channel

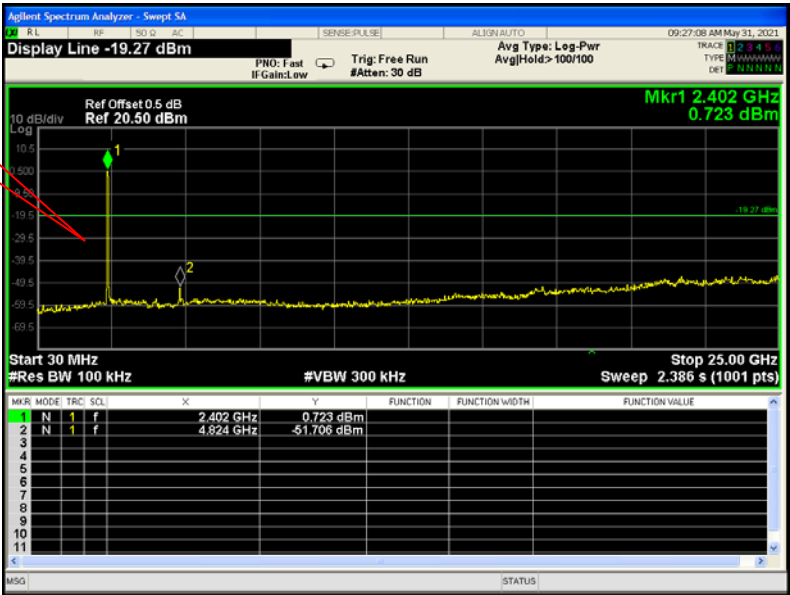
Fundamental



802.11n HT20

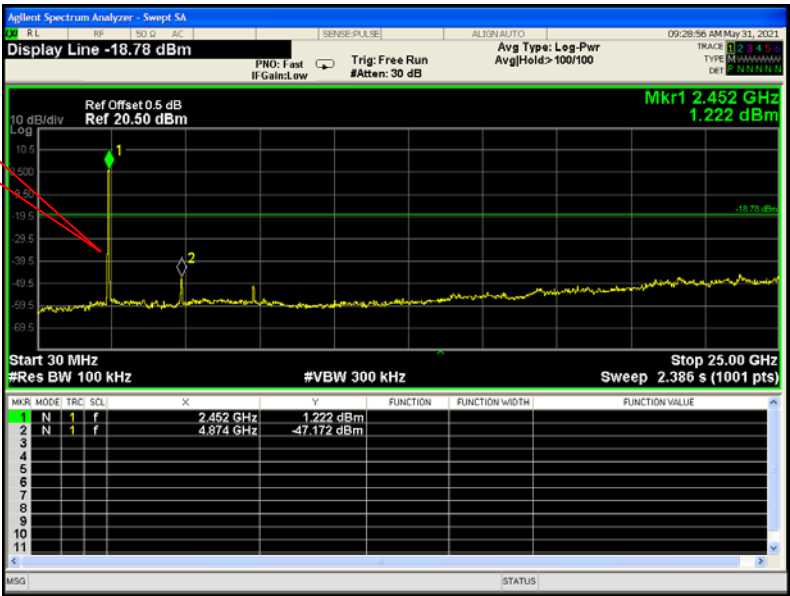
Low Channel

Fundamental



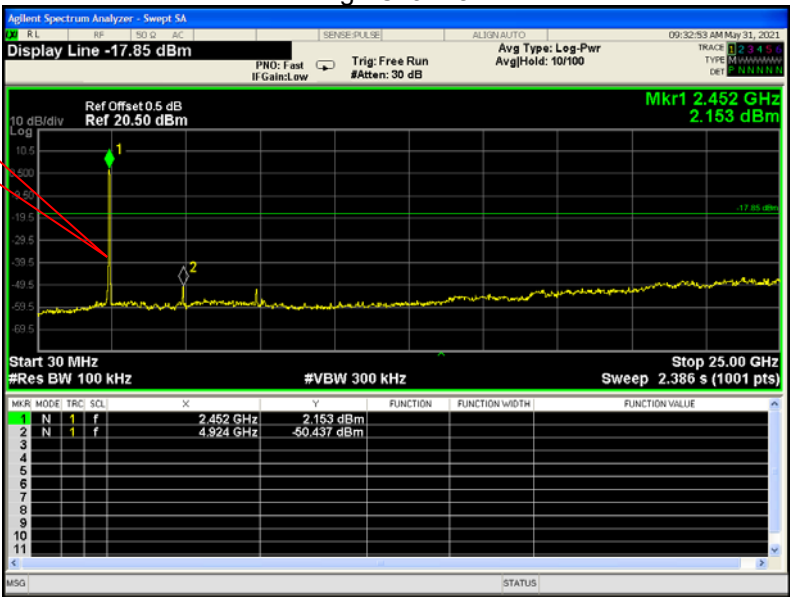
Middle Channel

Fundamental



High Channel

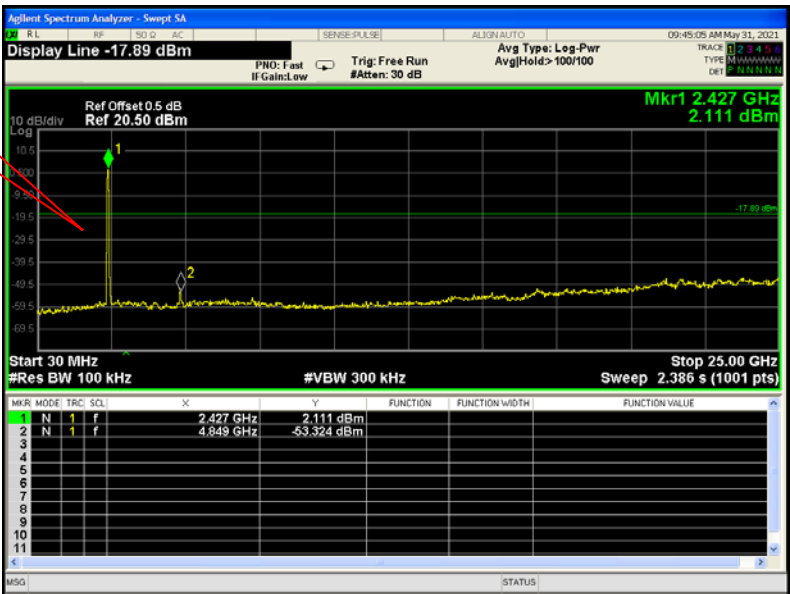
Fundamental



802.11n HT40

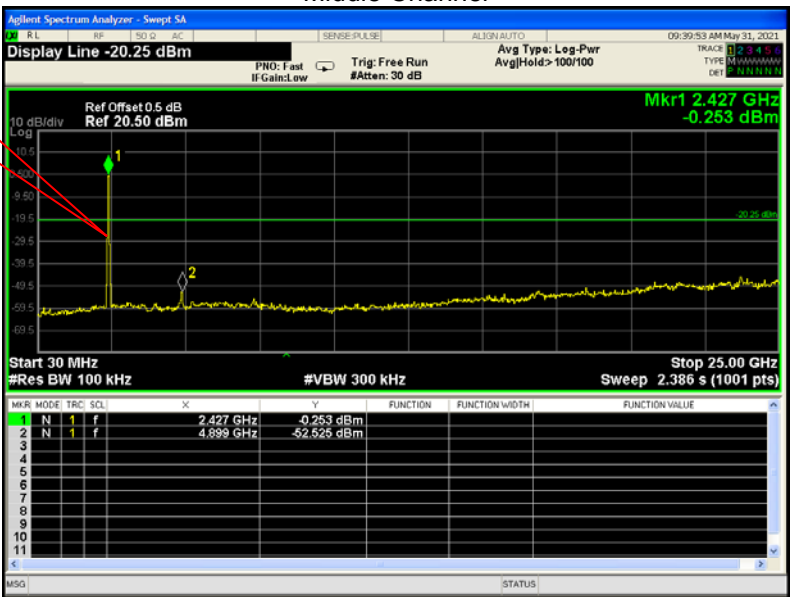
Low Channel

Fundamental



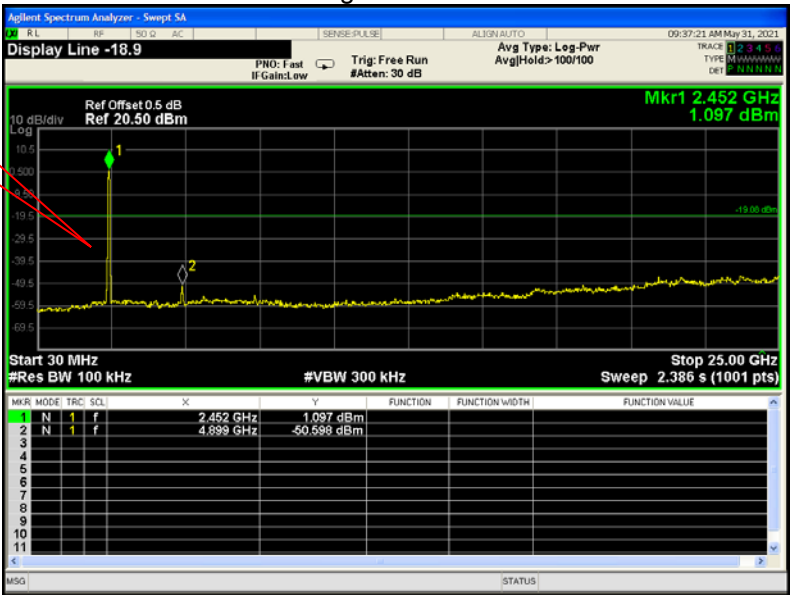
Middle Channel

Fundamental



High Channel

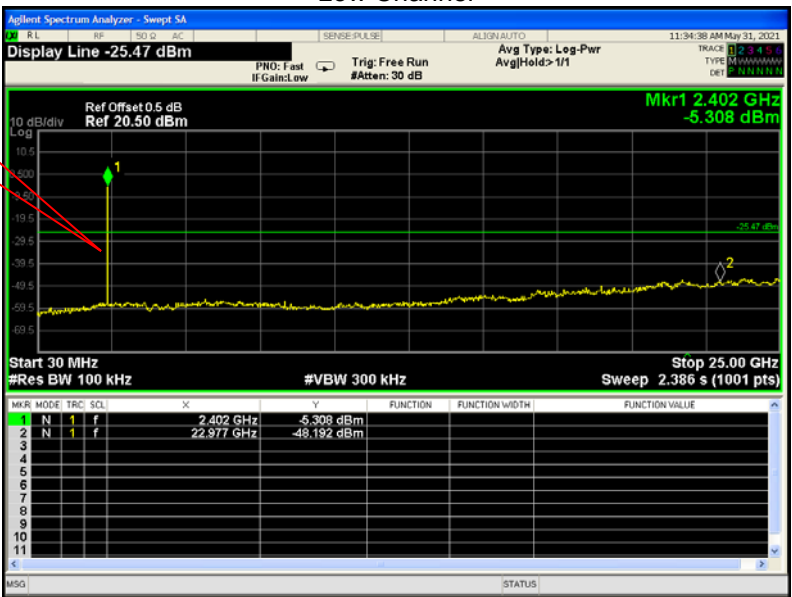
Fundamental



BLE

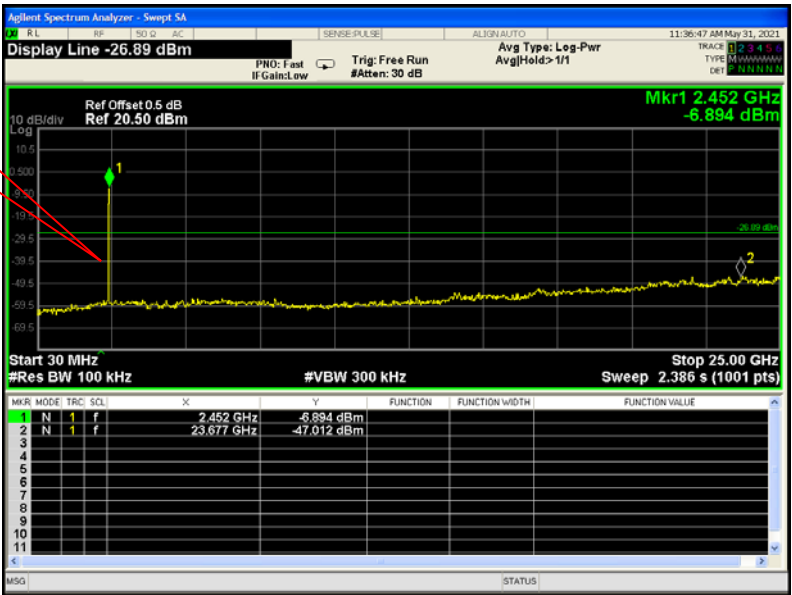
Low Channel

Fundamental



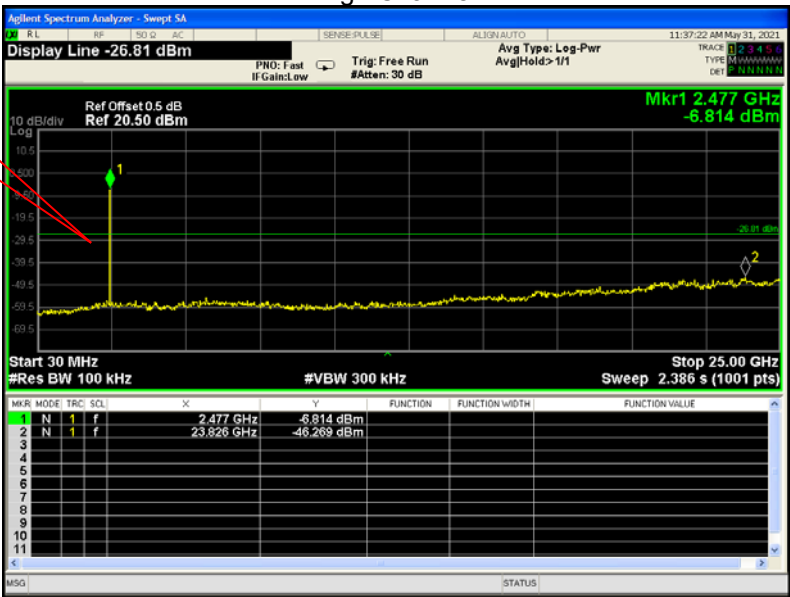
Middle Channel

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)).

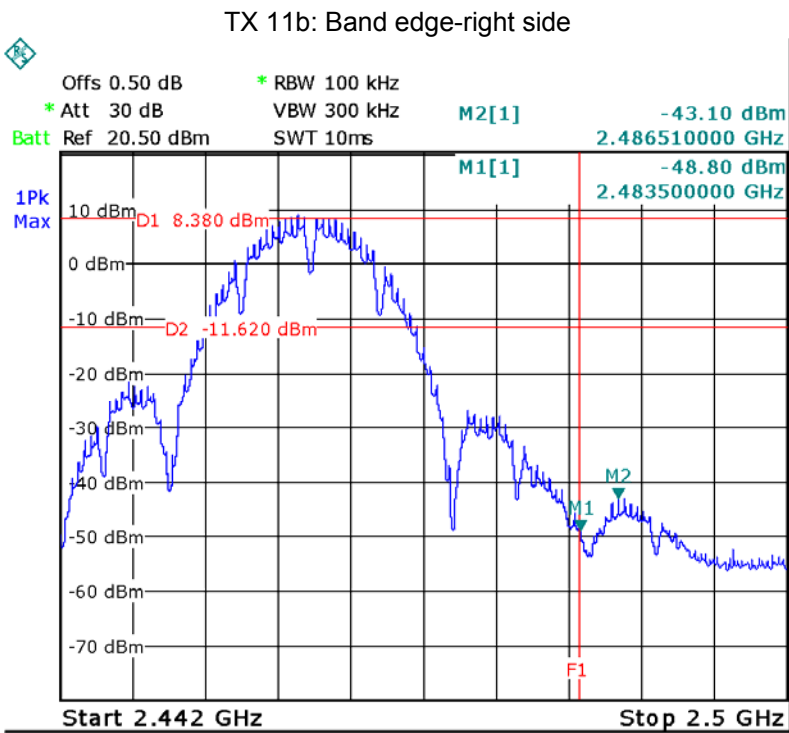
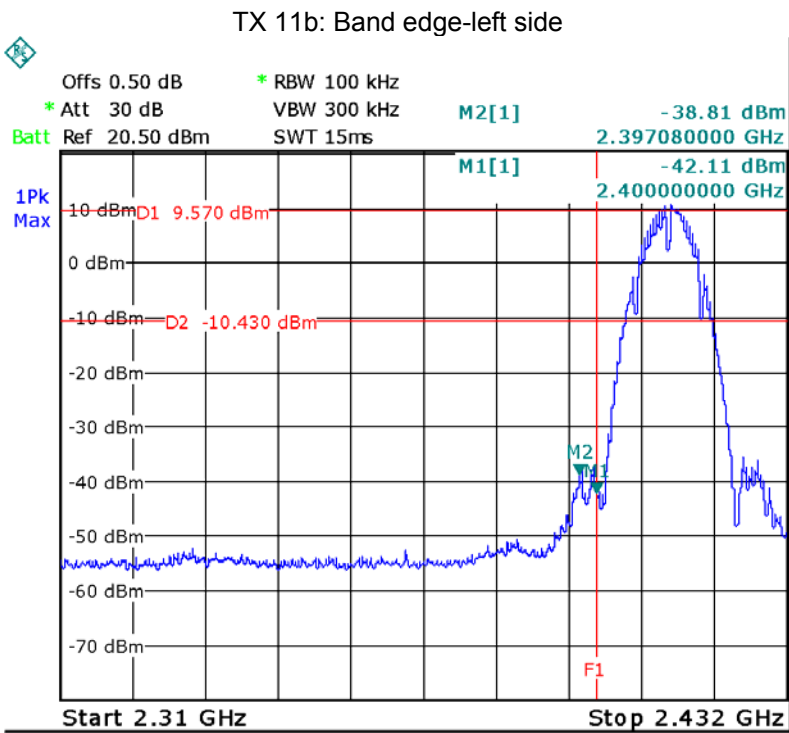
Test Mode: Transmitting

11.1 Test Produce

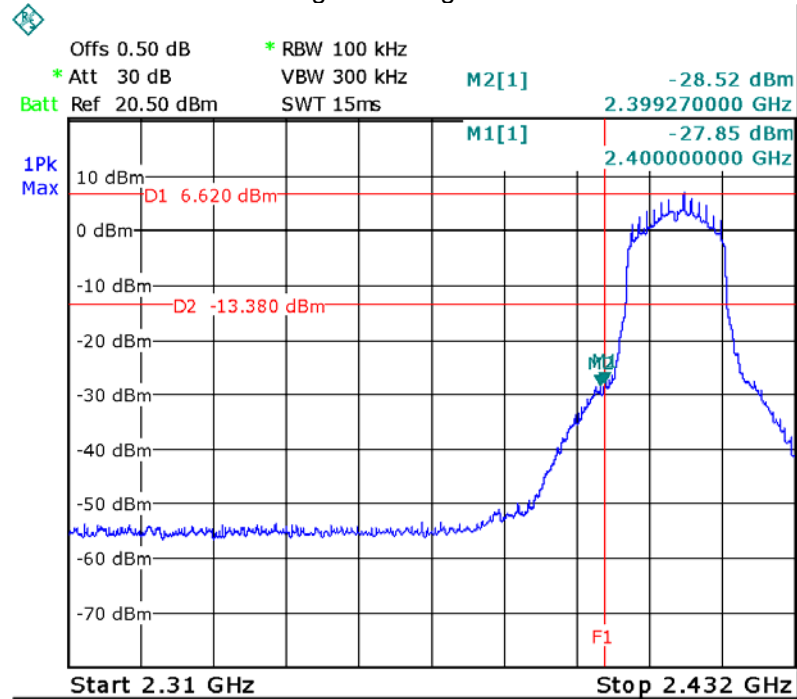
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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

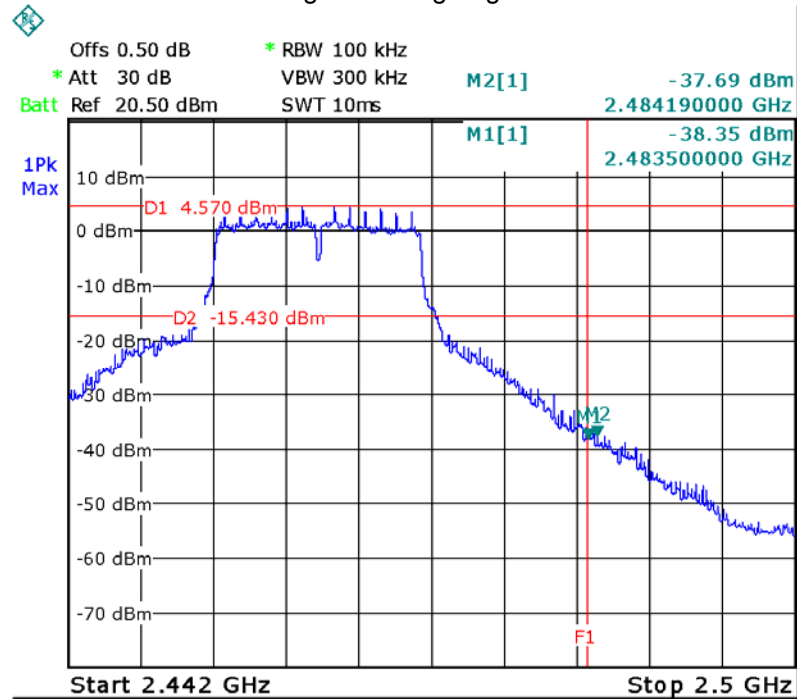
Test result plots shown as follows:

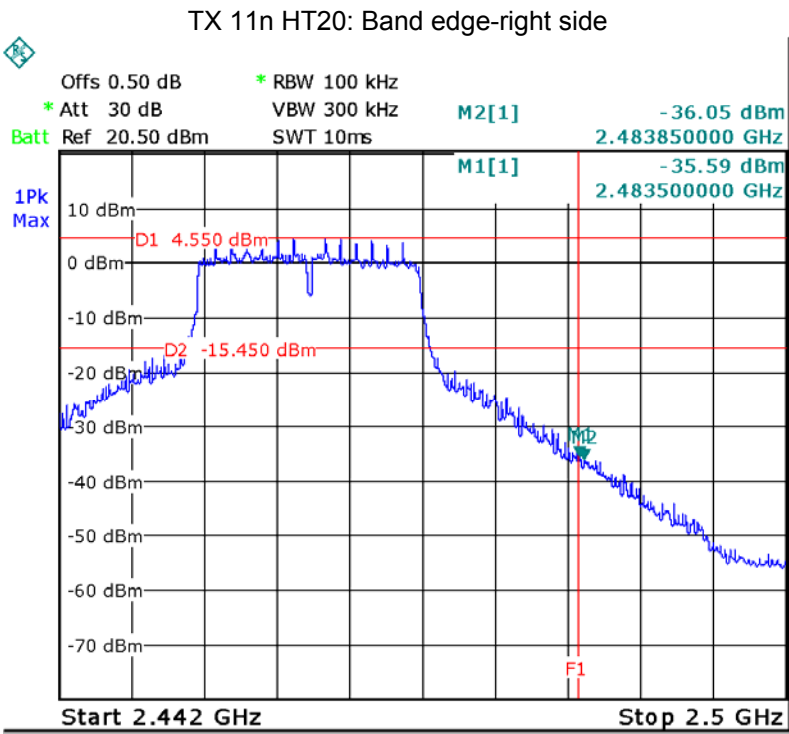
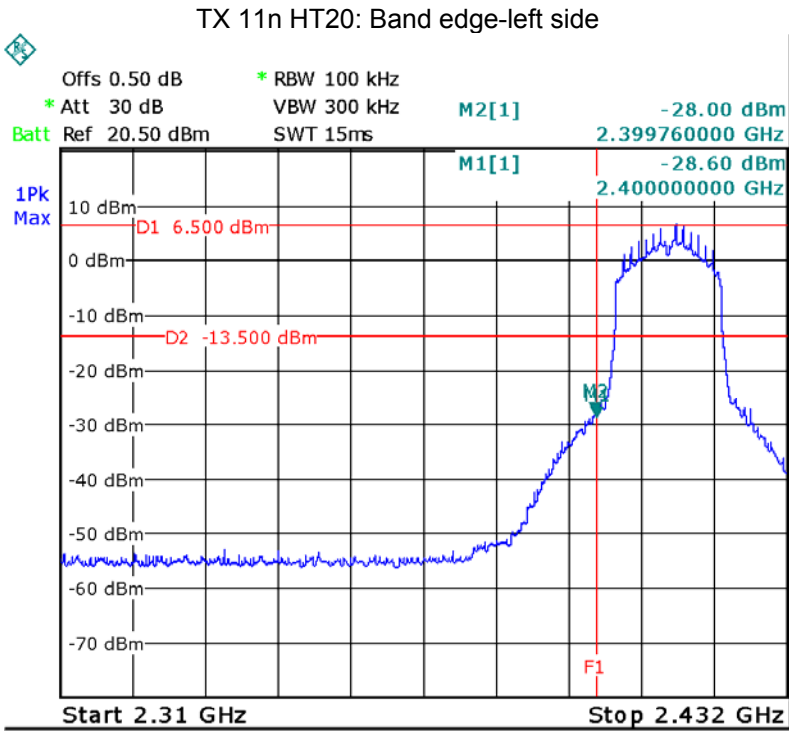


TX 11g: Band edge-left side

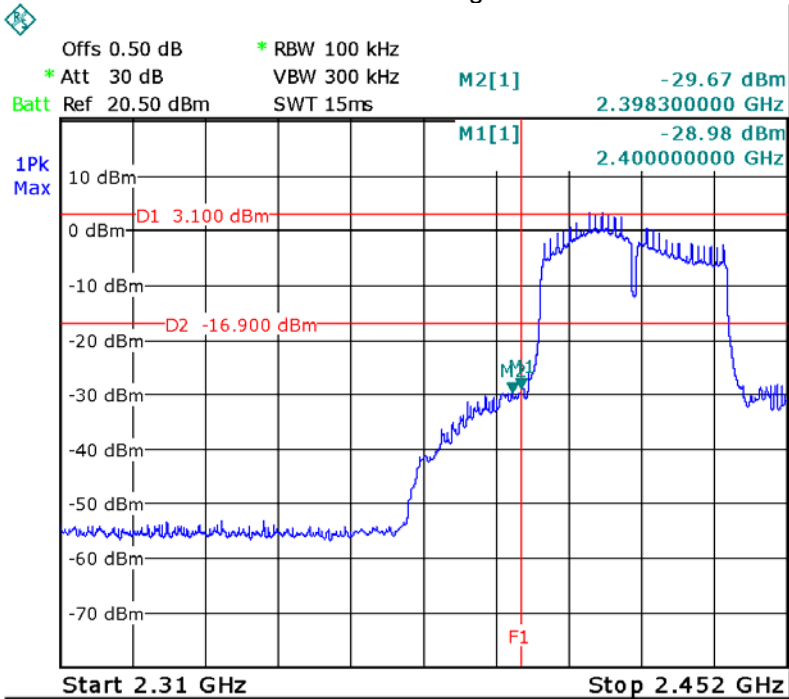


TX 11g: Band edge-right side

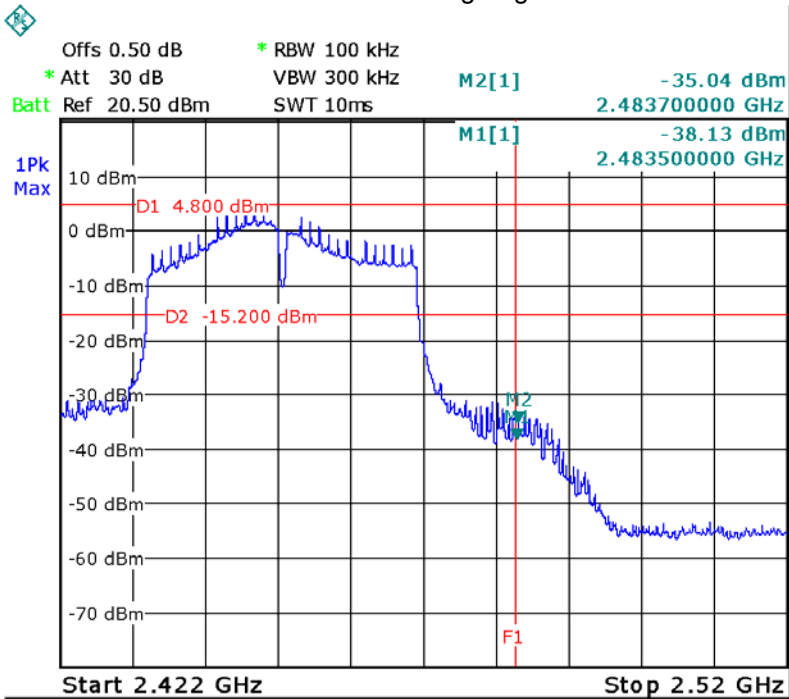




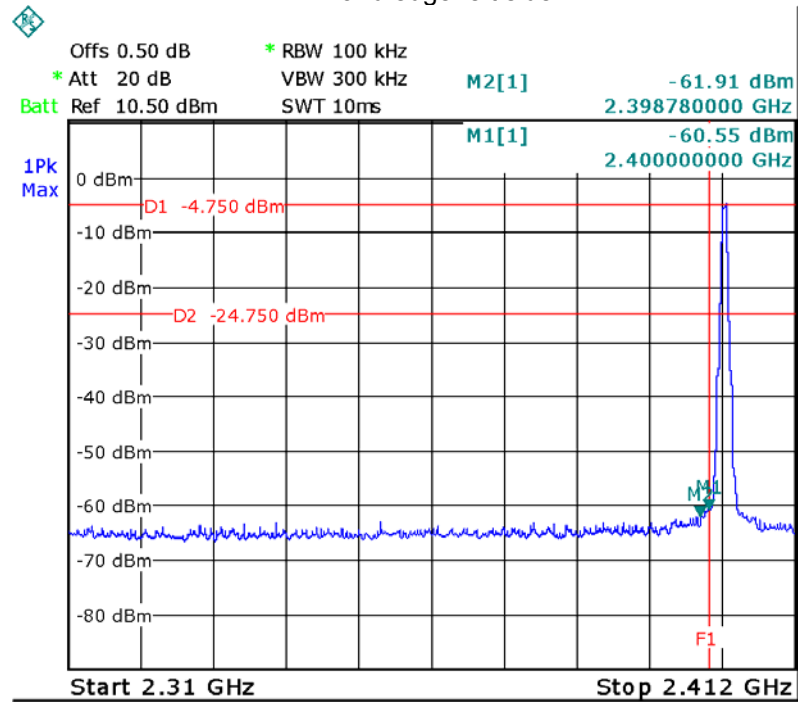
TX 11n HT40: Band edge-left side



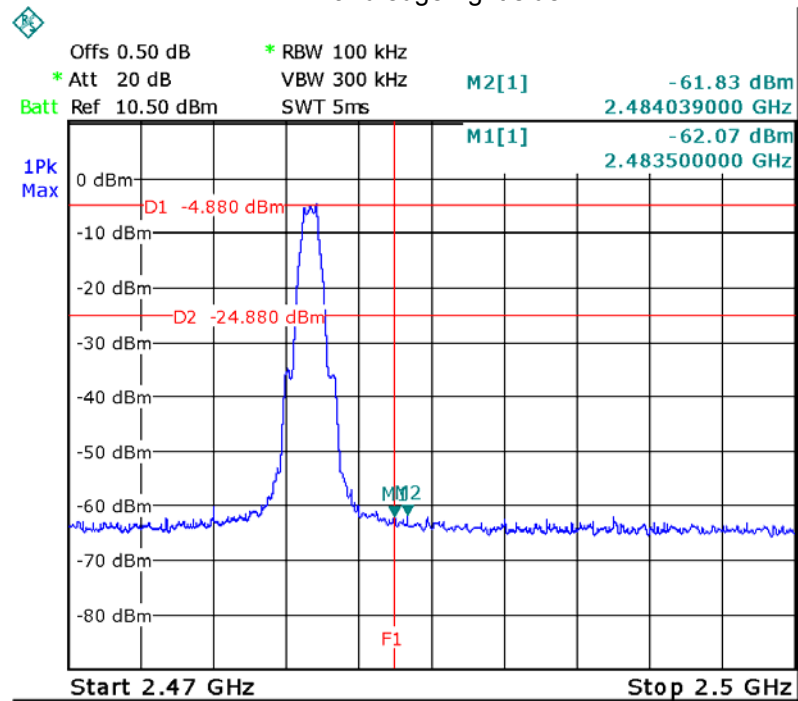
TX 11n HT40: Band edge-right side



BLE: Band edge-left side



BLE: 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

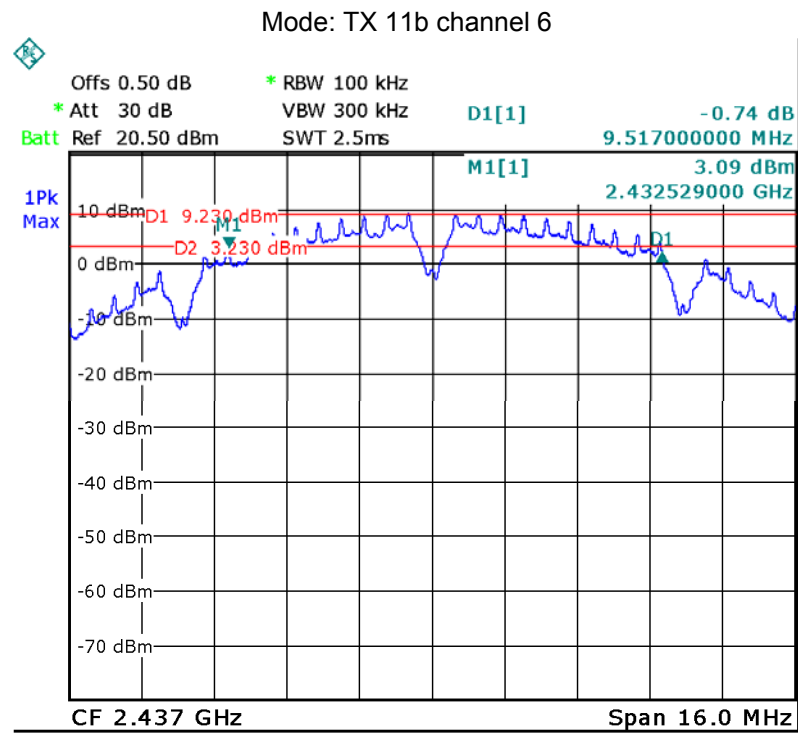
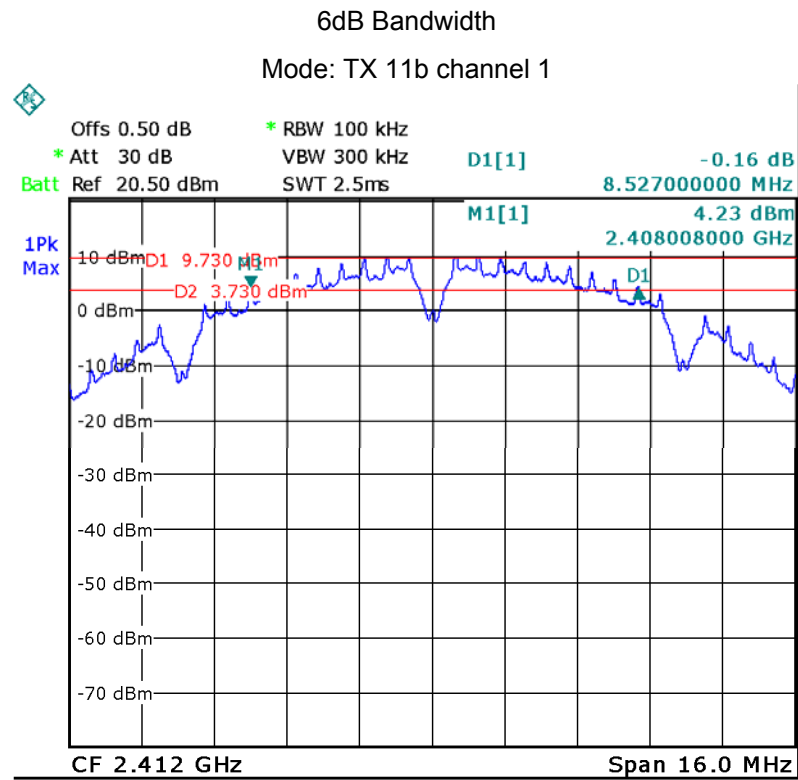
12.1 Test Procedure:

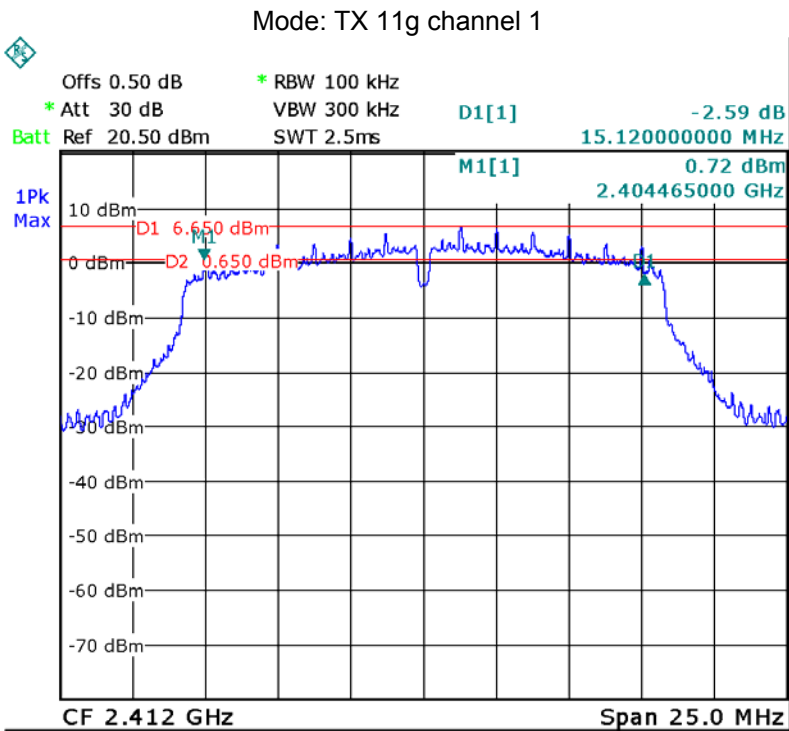
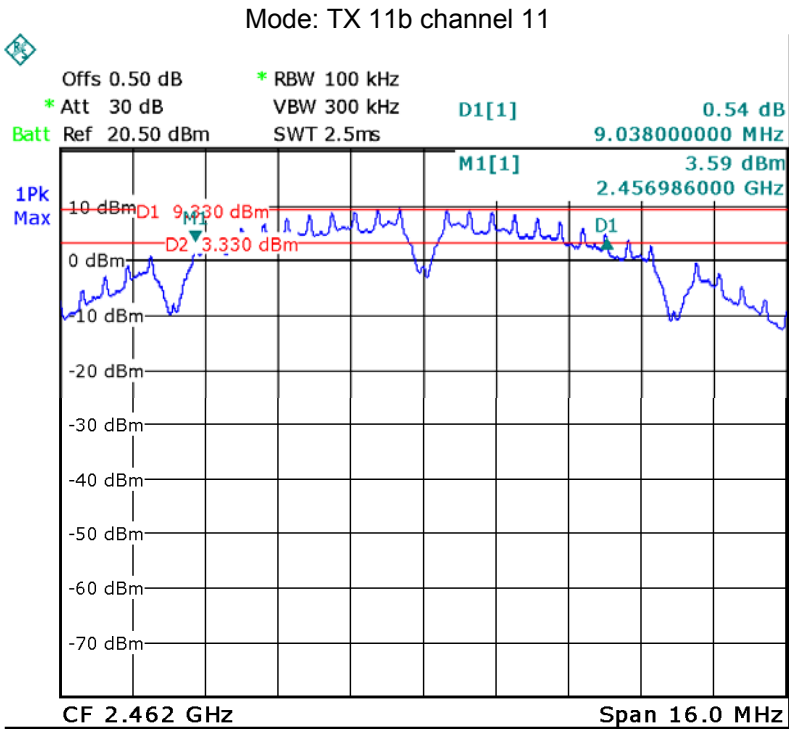
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz
99% Bandwidth Set the spectrum analyzer : RBW = 1~5% DTS OBW, VBW = 3 RBW

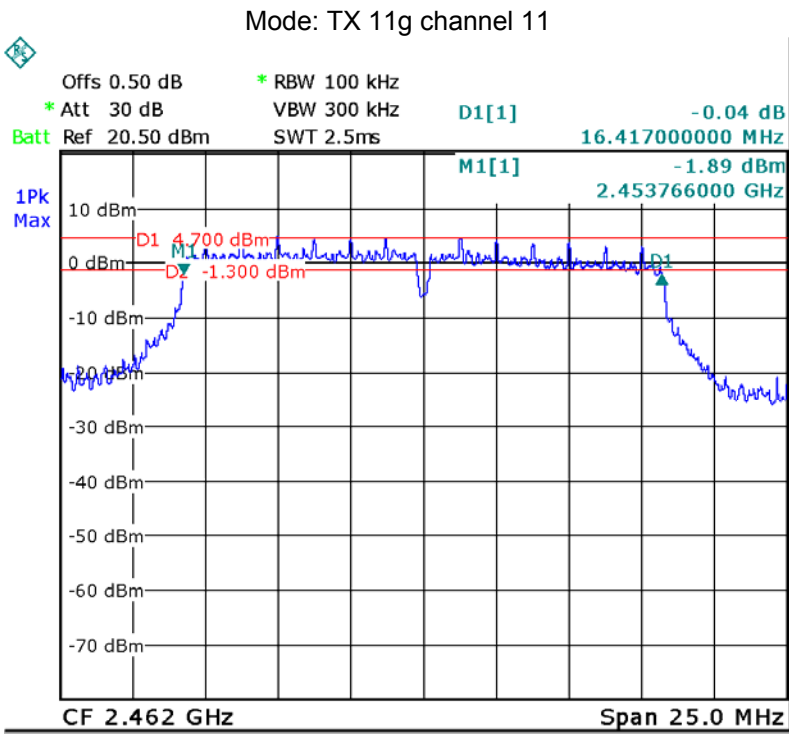
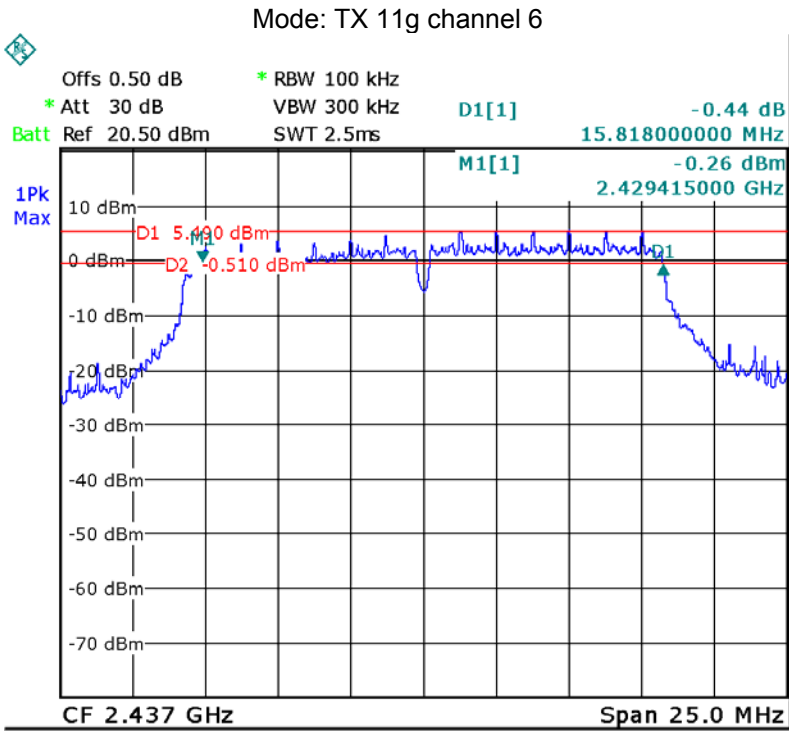
12.2 Test Result:

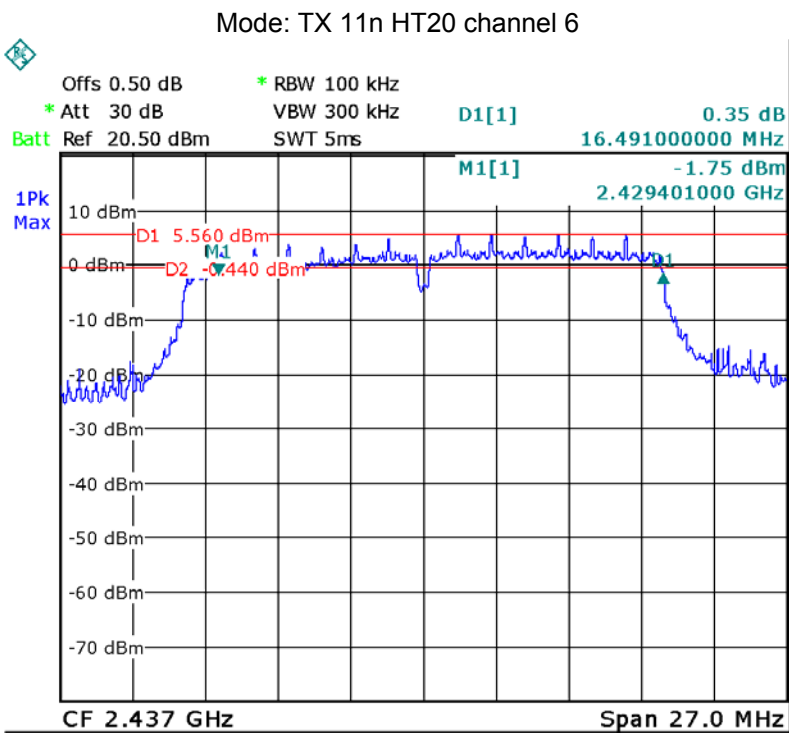
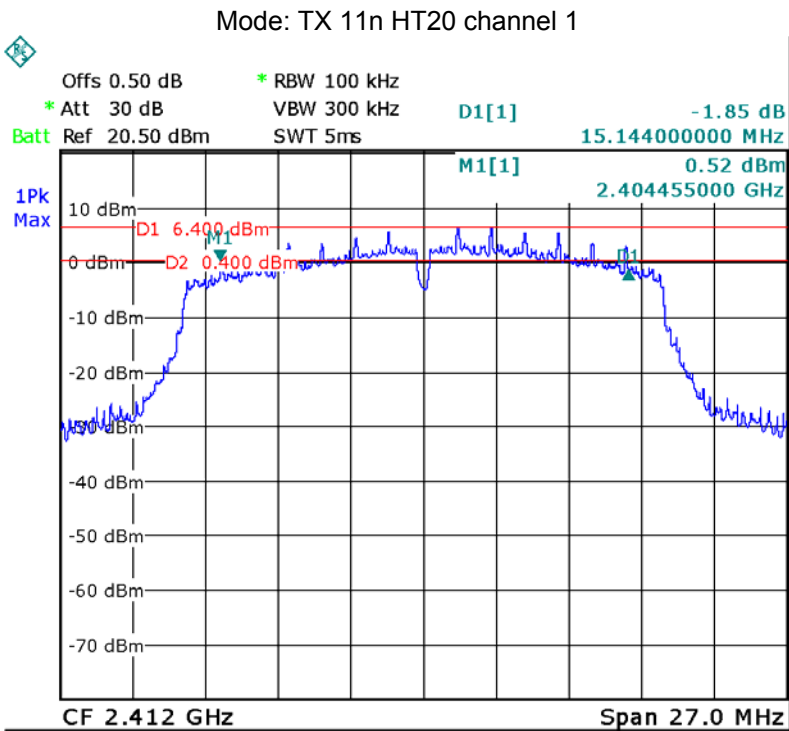
13	Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b		Channel 1	8.53	12.68
		Channel 6	9.52	13.64
		Channel 11	9.04	13.86
TX 11g		Channel 1	15.12	16.52
		Channel 6	15.82	17.17
		Channel 11	16.42	17.37
TX 11n HT20		Channel 1	15.14	17.57
		Channel 6	16.49	18.16
		Channel 11	17.41	18.49
TX 11n HT40		Channel 3	35.02	36.57
		Channel 6	35.13	36.90
		Channel 9	17.46	36.23
BLE		Channel 0	0.671	1.036
		Channel 19	0.671	1.036
		Channel 39	0.659	1.042

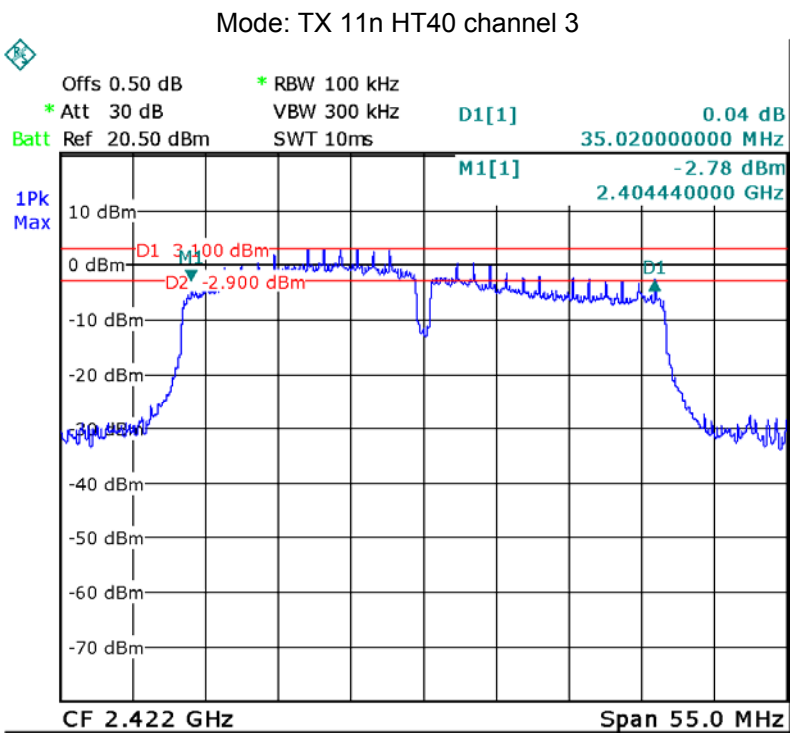
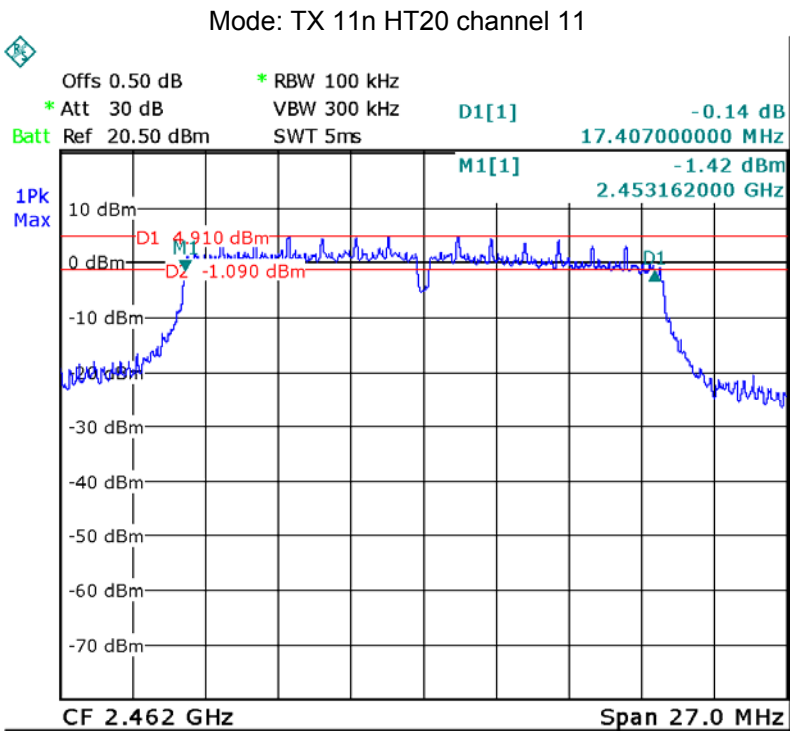
Test result plot:

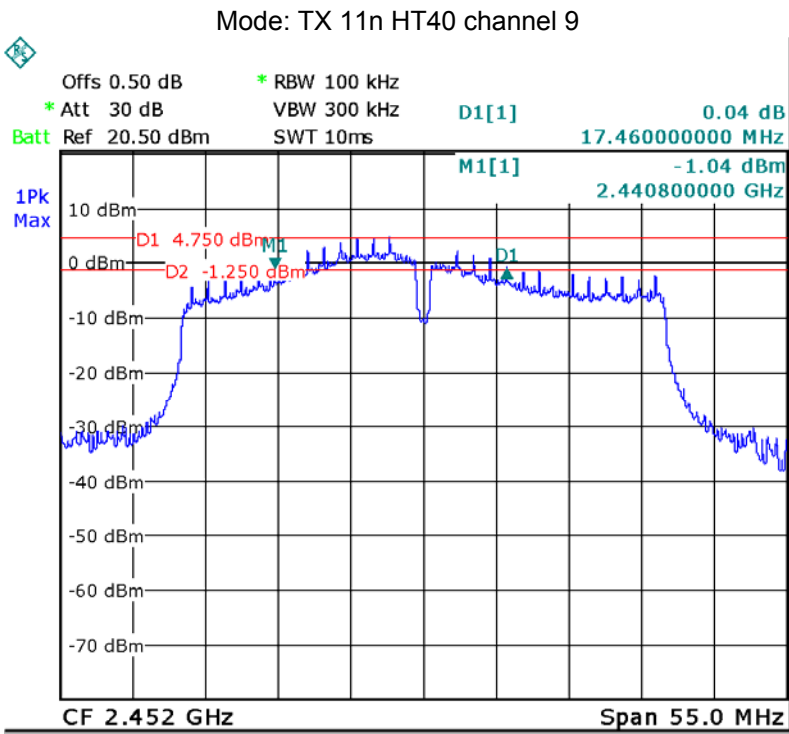
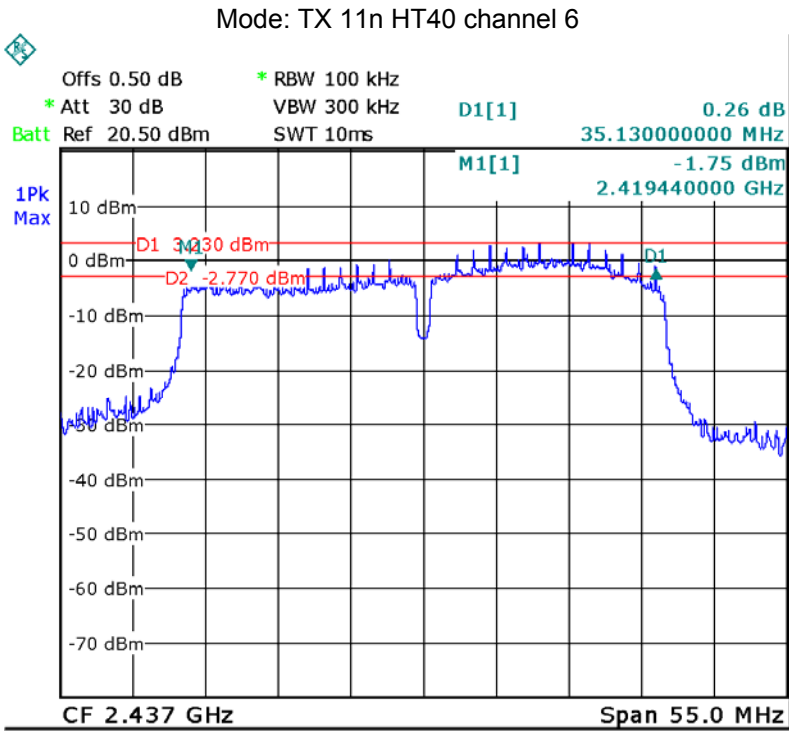


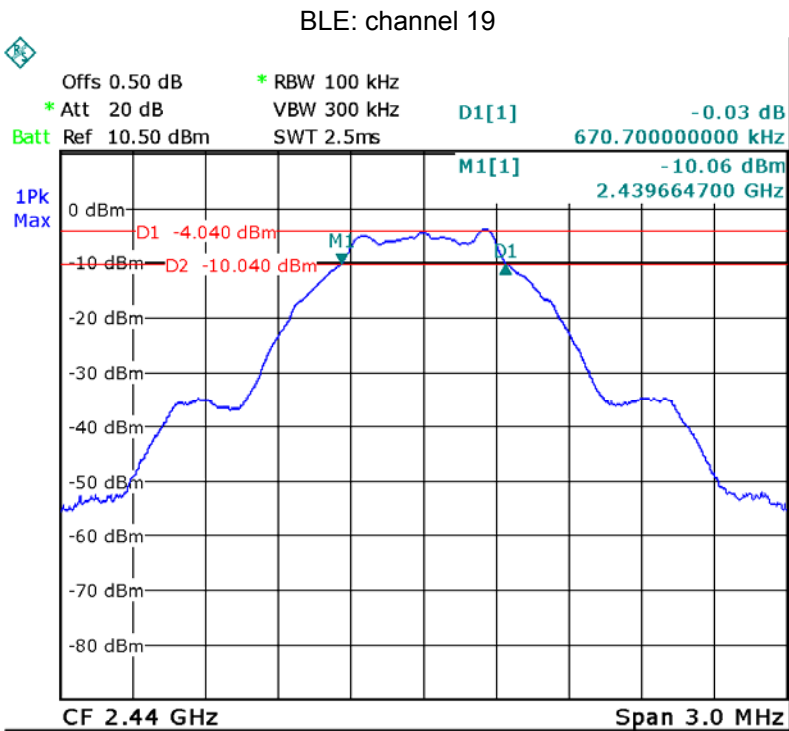
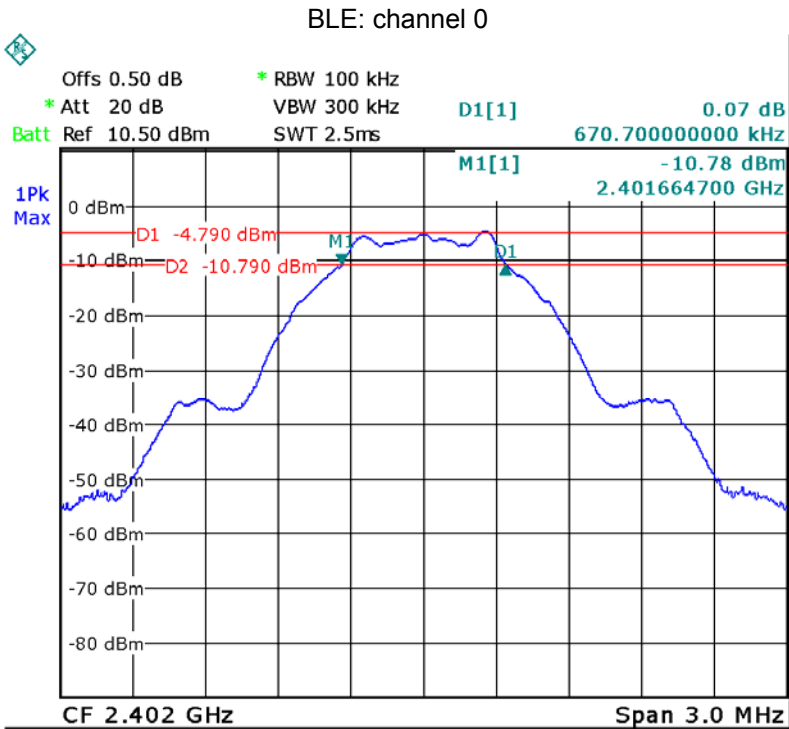


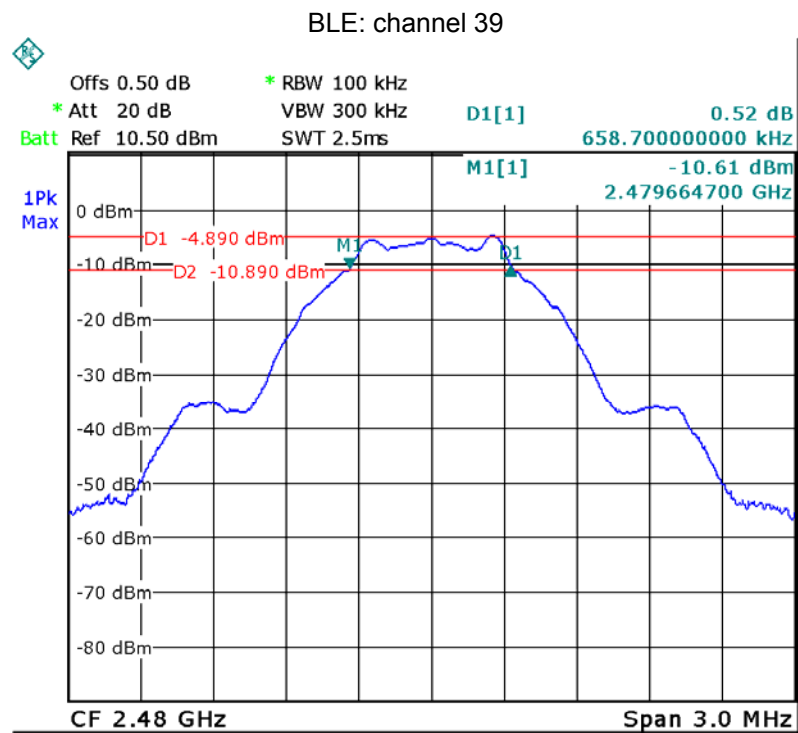


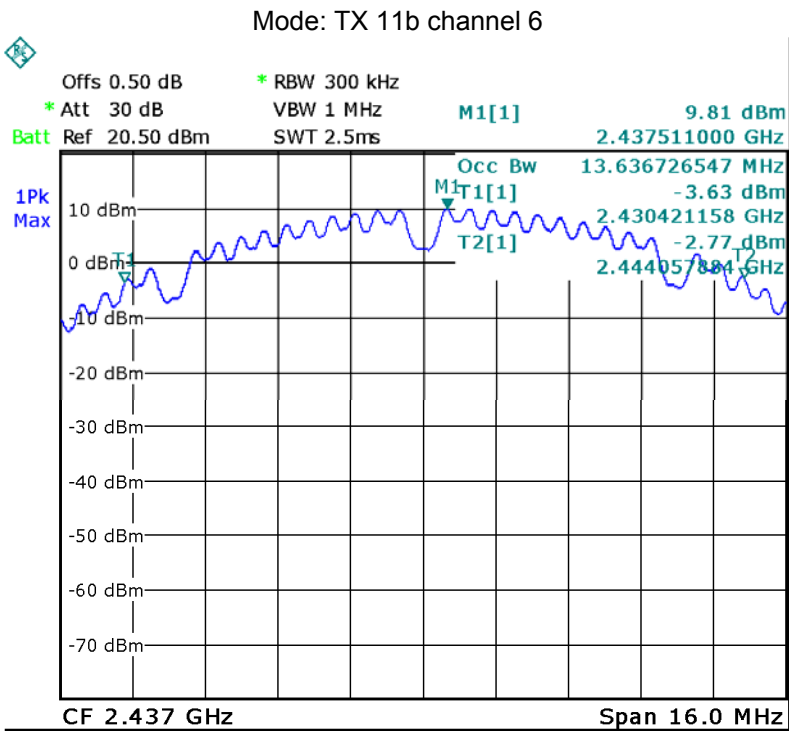
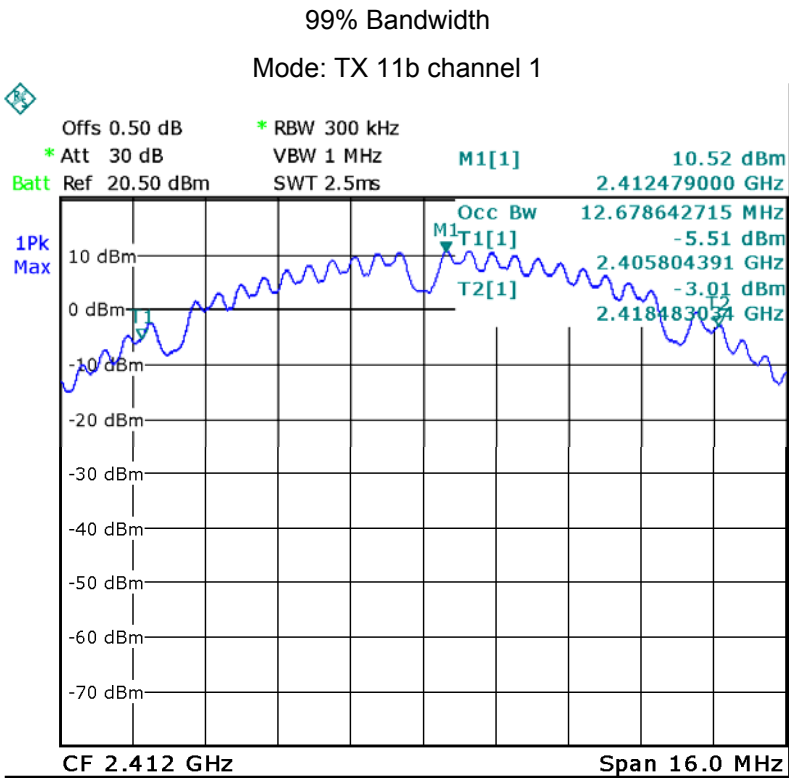


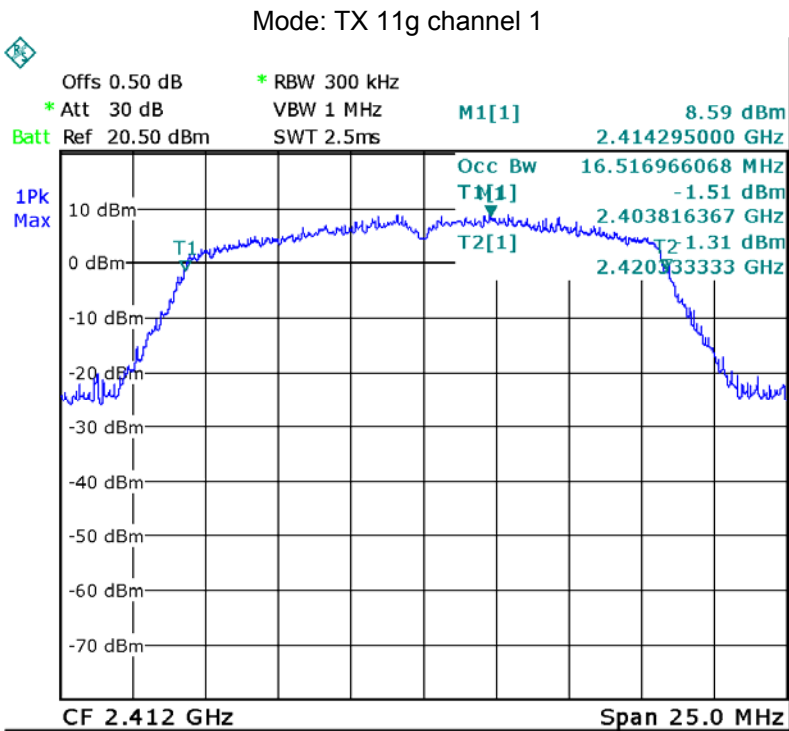
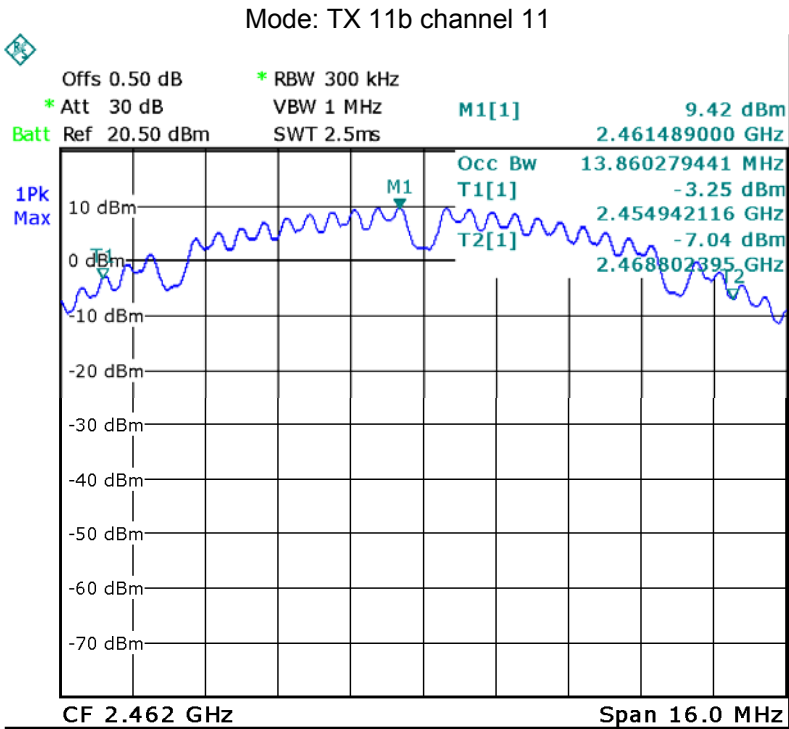


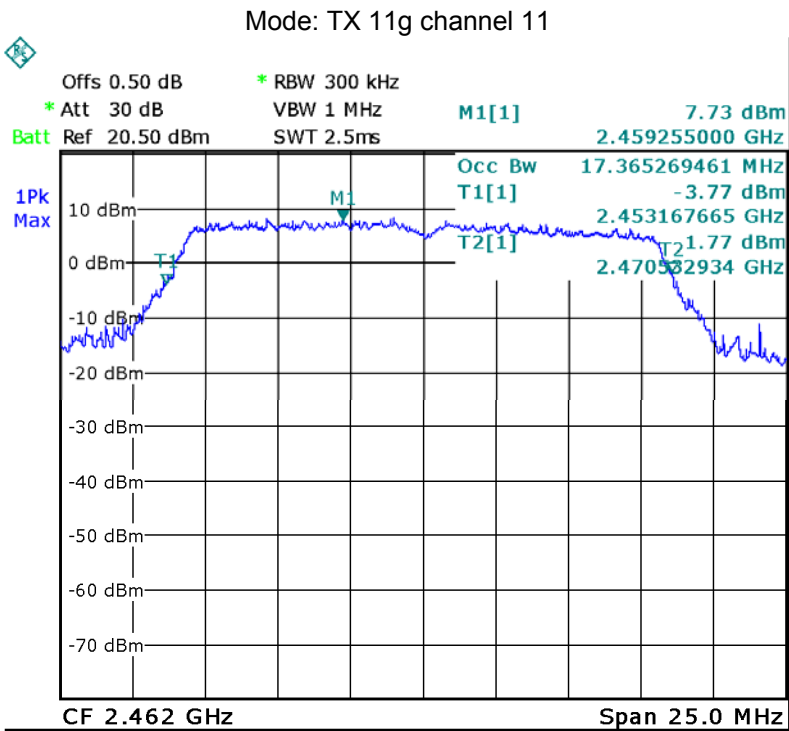
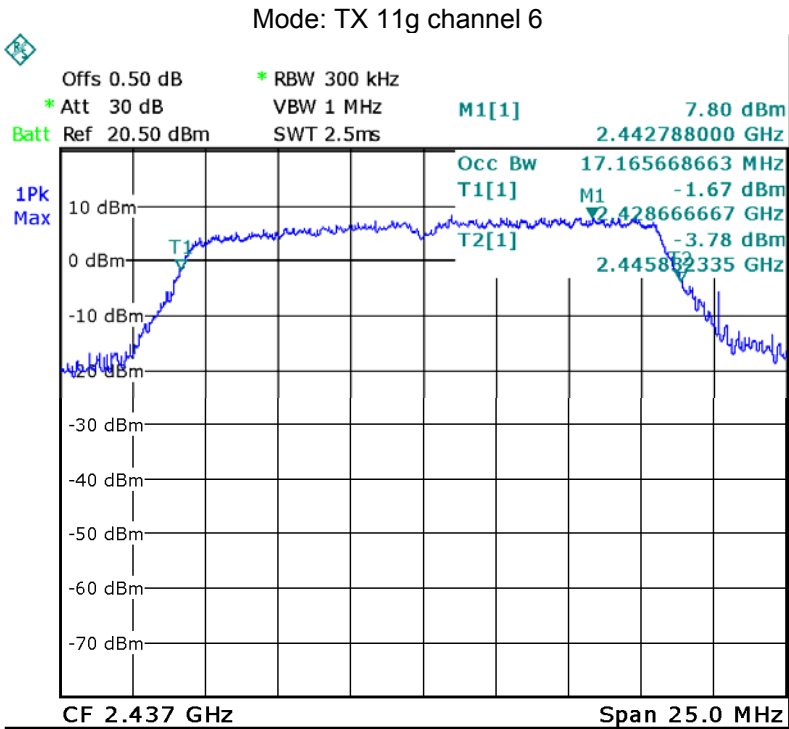


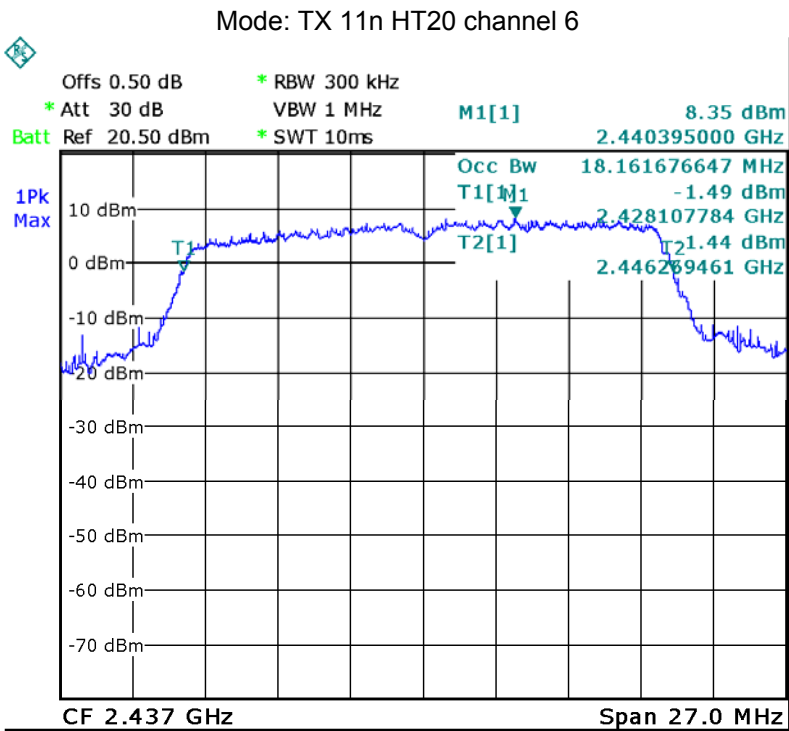
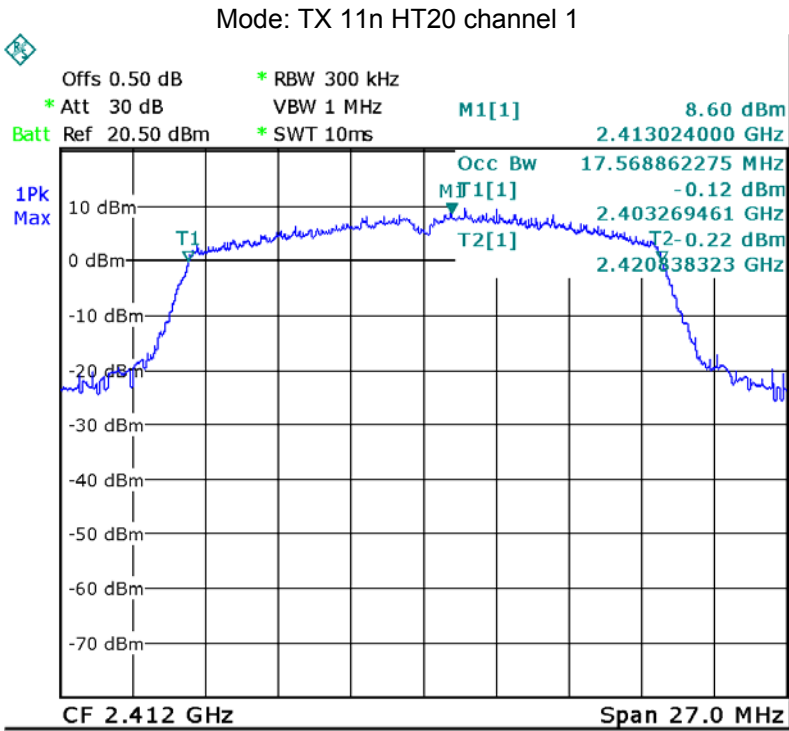


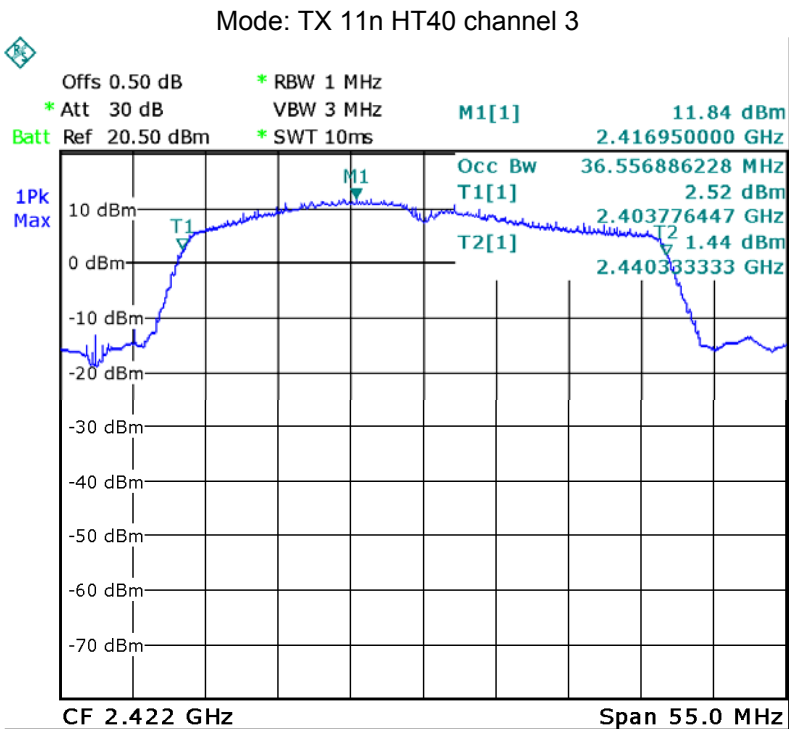
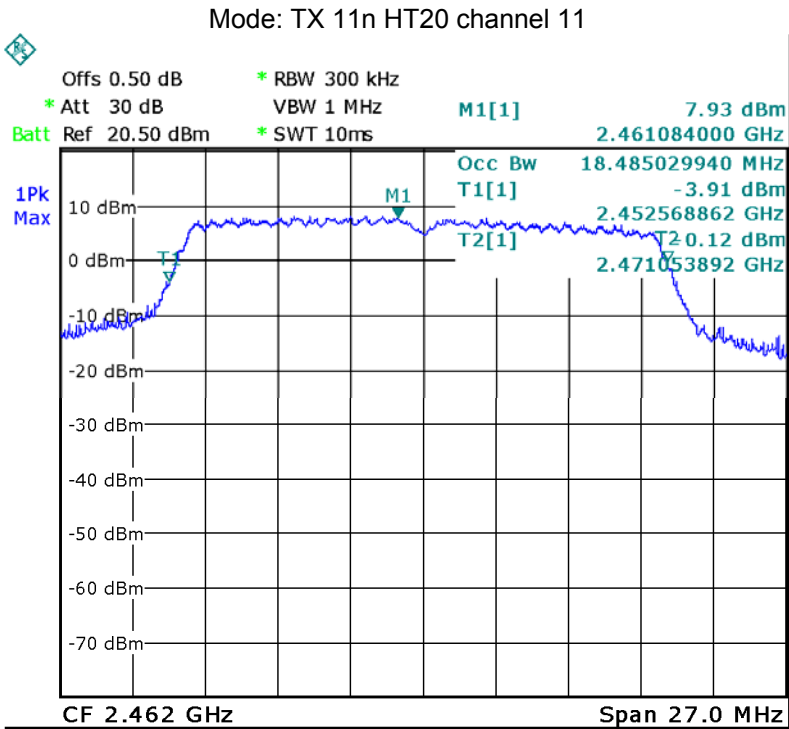


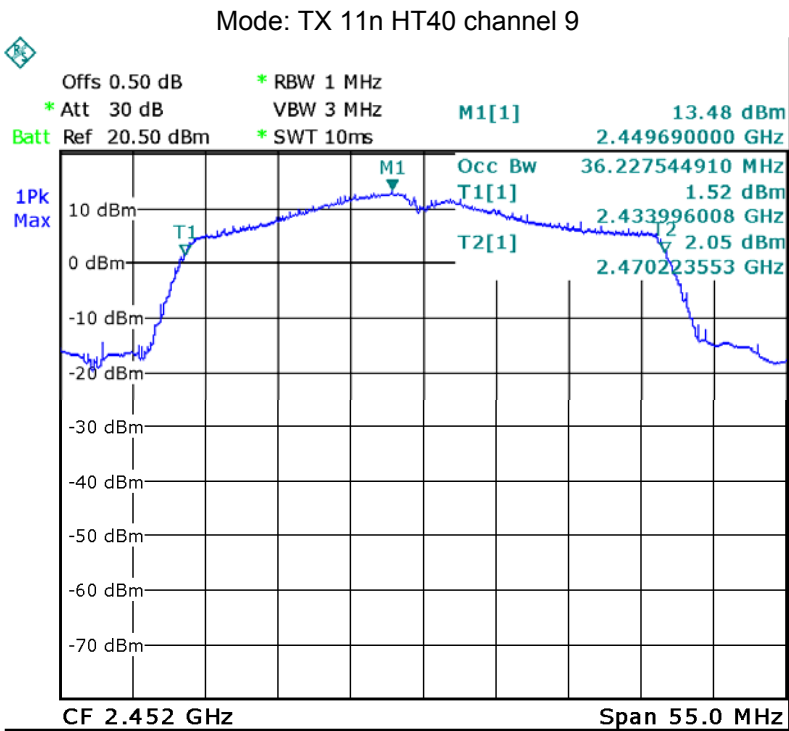
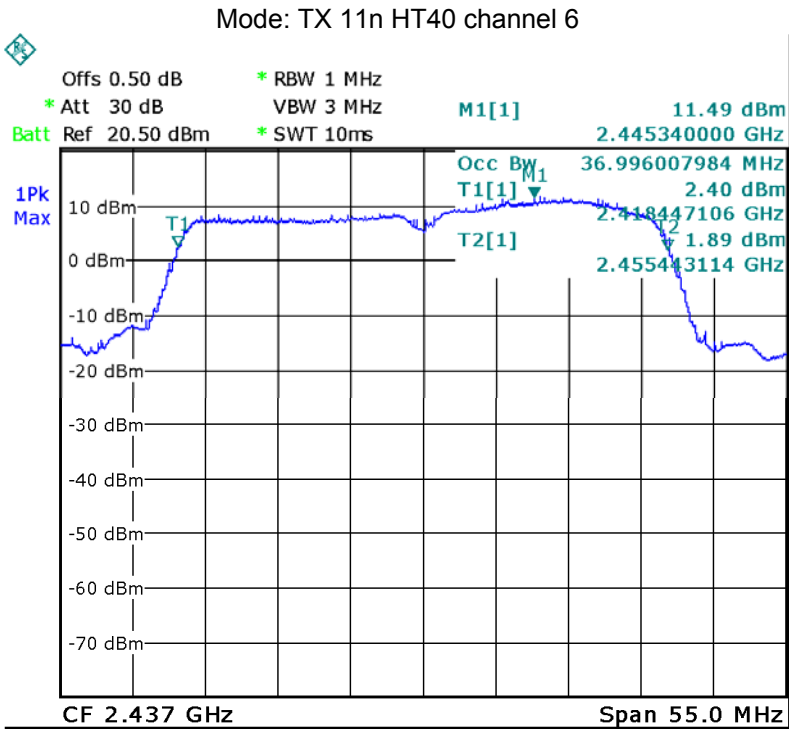


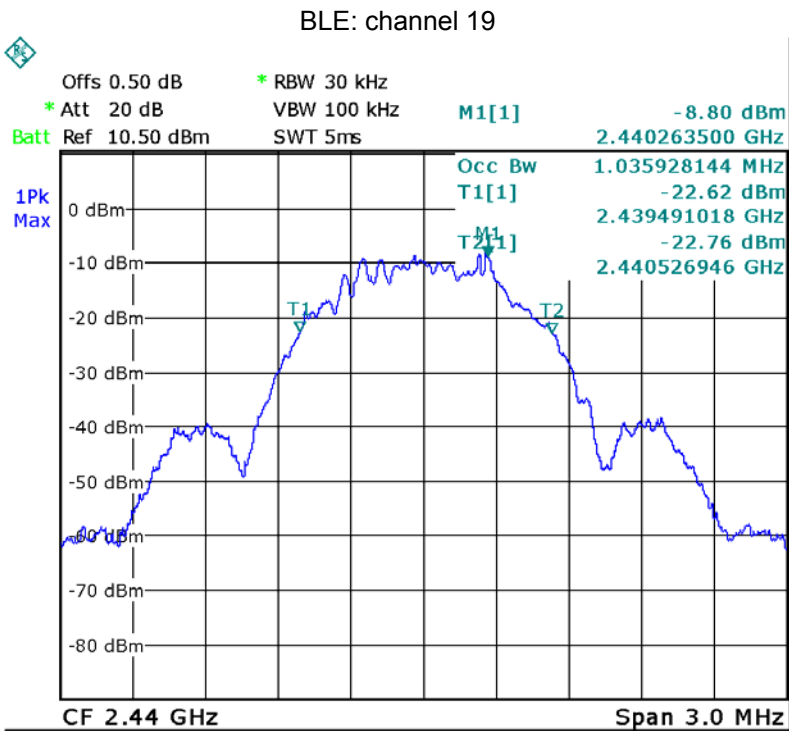
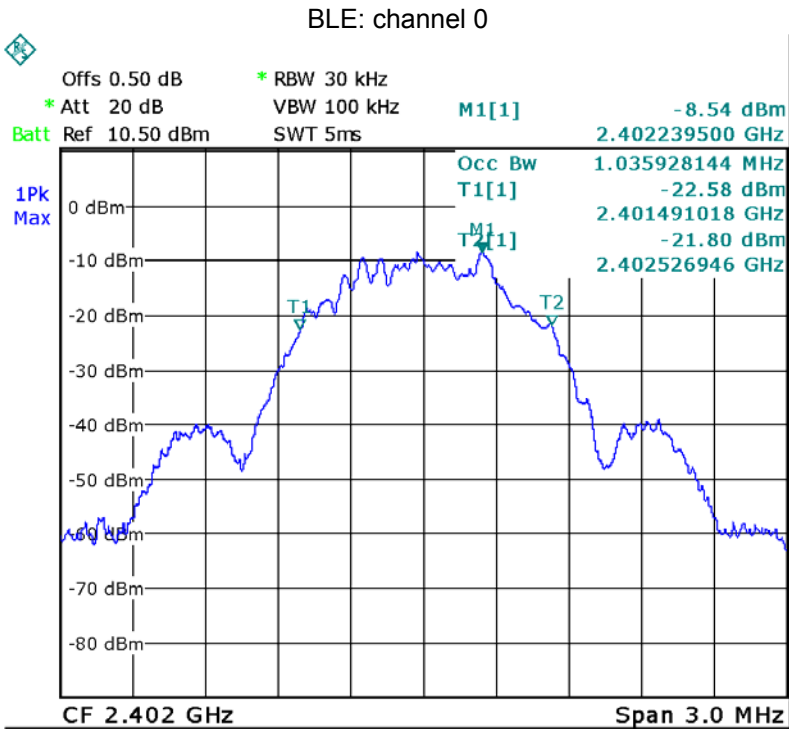


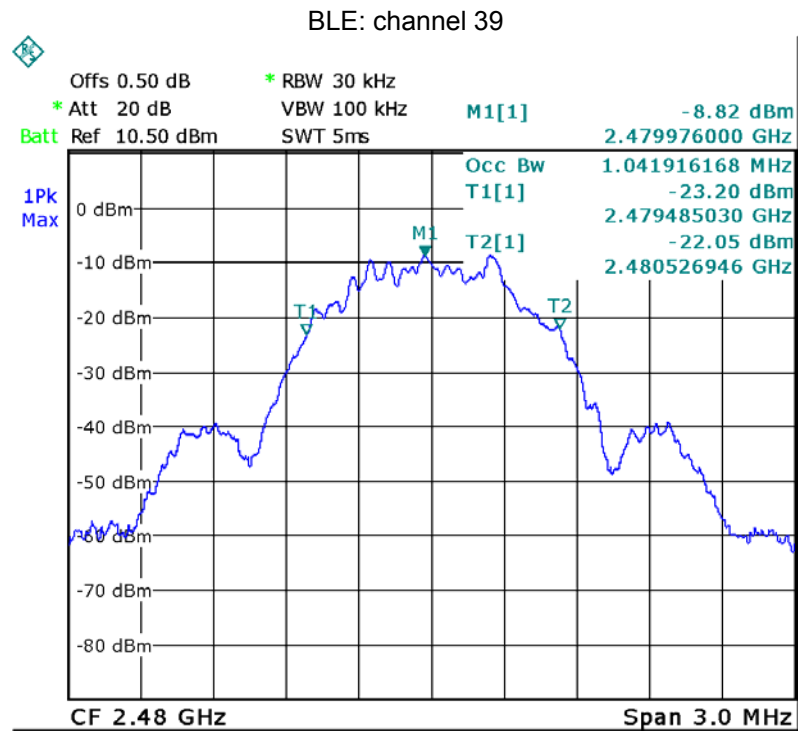












14 Maximum Peak conducted Output Power

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

14.1 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.

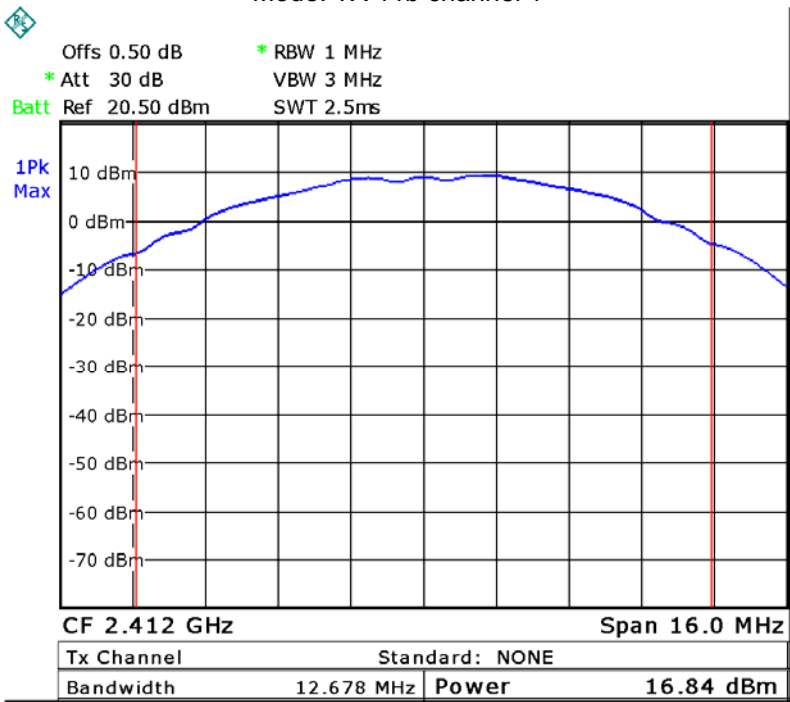
- a) Set the $RBW = 1\%$ to 5% of the OBW, not to exceed 1 MHz..
- b) Set the $VBW \geq 3 \times RBW$
- c) Set the $span \geq 1.5 \times OBW$.
- d) Detector = RMS.
- e) Sweep time = auto couple.
- f) trigger = free run..
- g) Number of points in sweep $\geq [2 \times span / RBW]$. (This gives bin-to-bin 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..

14.2 Test Result:

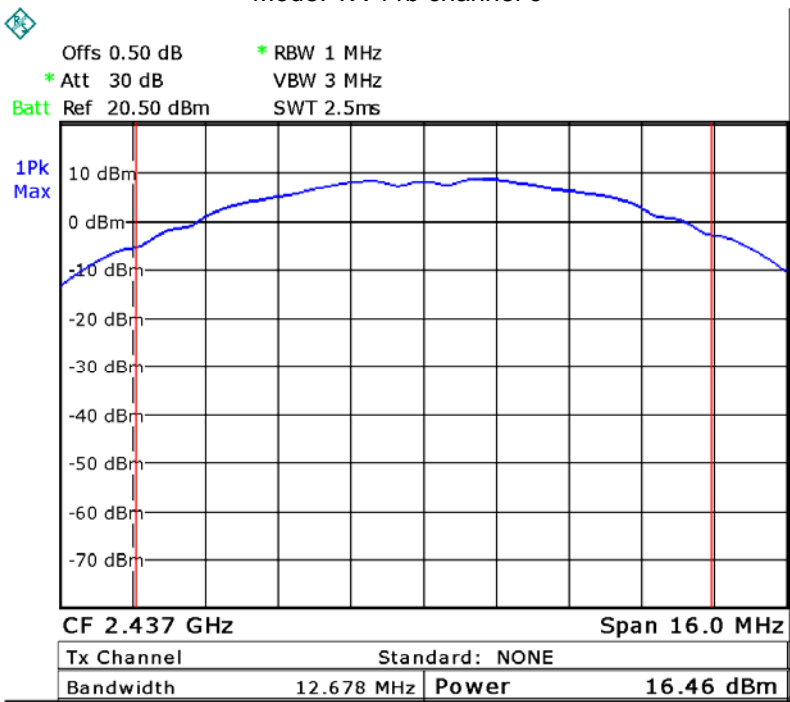
Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
TX 11b	Low-2412	16.84	1W/30dBm
	Middle-2437	15.46	1W/30dBm
	High-2462	16.43	1W/30dBm
TX 11g	Low-2412	16.74	1W/30dBm
	Middle-2437	16.76	1W/30dBm
	High-2462	16.58	1W/30dBm
TX 11n HT20	Low-2412	15.99	1W/30dBm
	Middle-2437	16.15	1W/30dBm
	High-2462	15.92	1W/30dBm
TX 11n HT40	Low-2422	16.34	1W/30dBm
	Middle-2437	16.34	1W/30dBm
	High-2452	16.80	1W/30dBm
BLE	Low-2402	-4.65	1W/30dBm
	Middle-2440	-3.87	1W/30dBm
	High-2480	-4.58	1W/30dBm

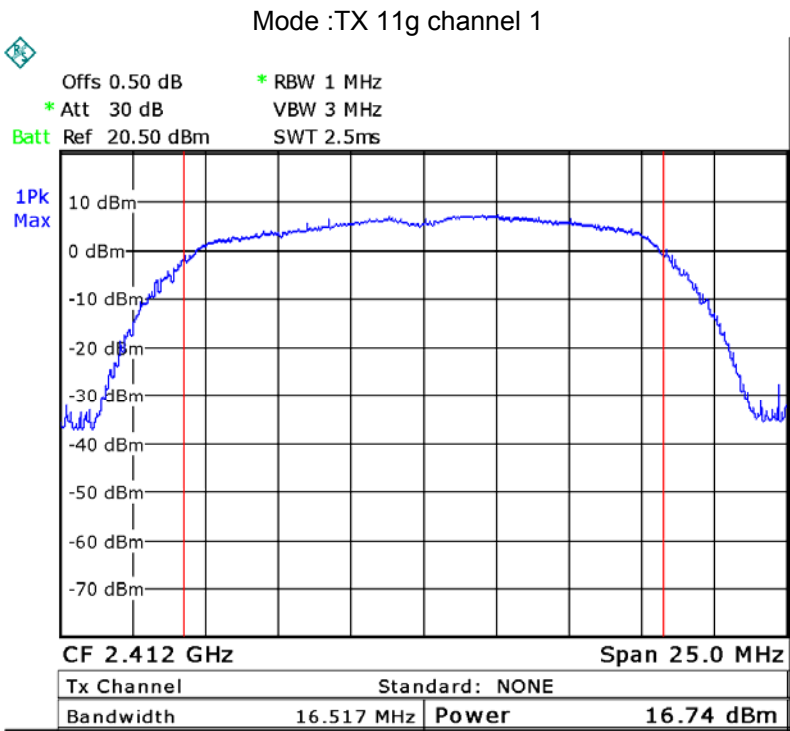
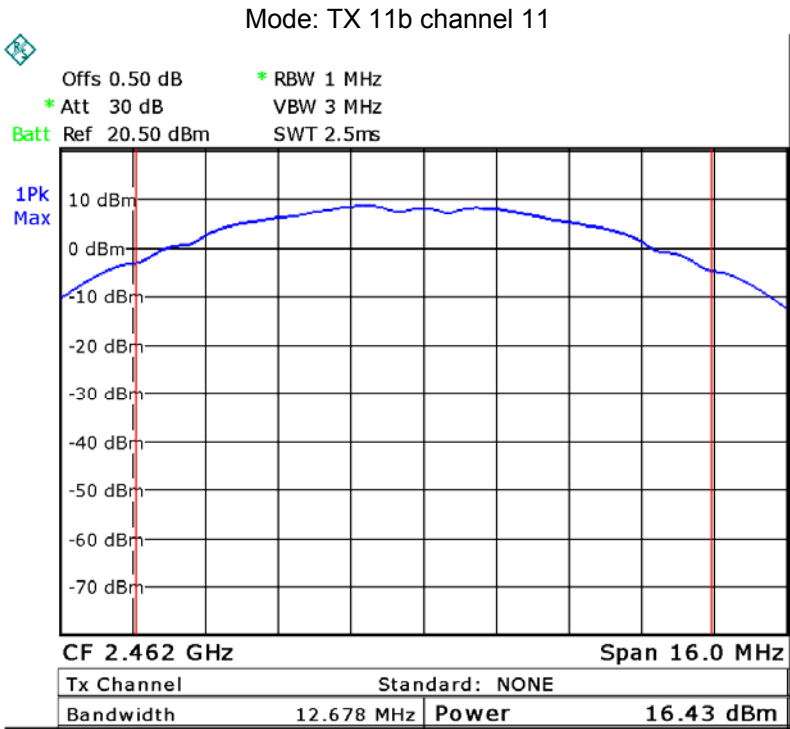
Test Plot

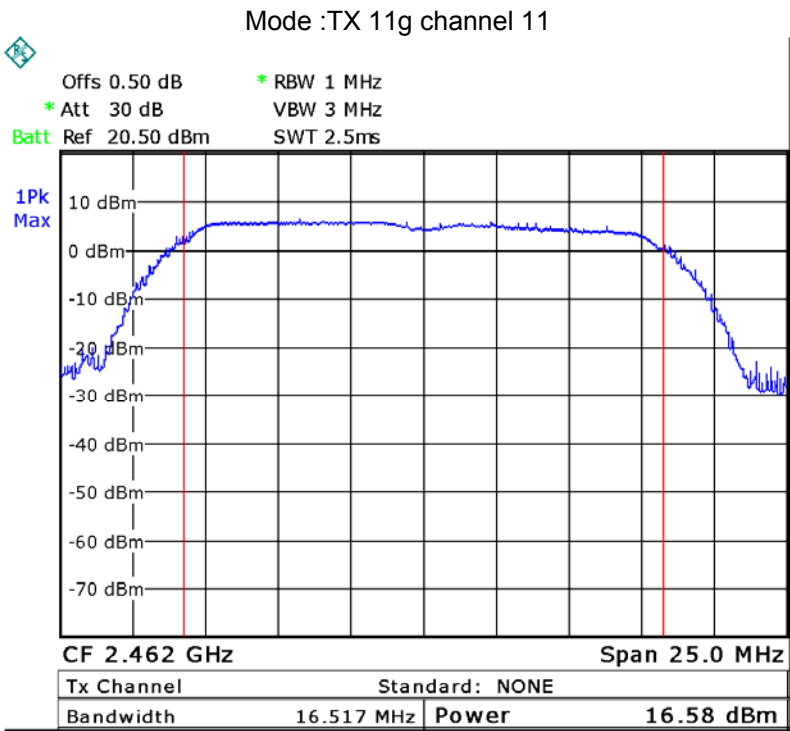
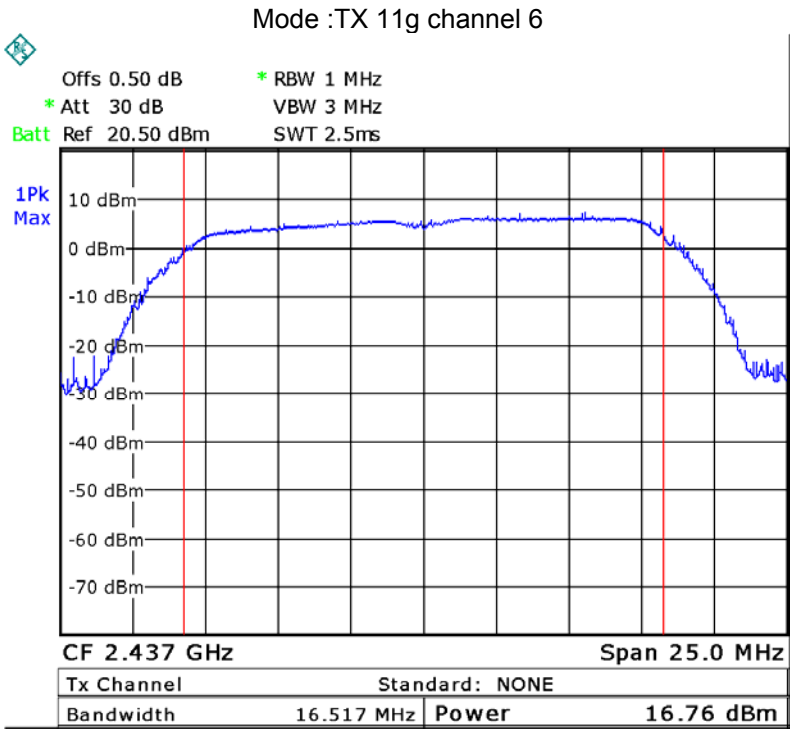
Mode: TX 11b channel 1

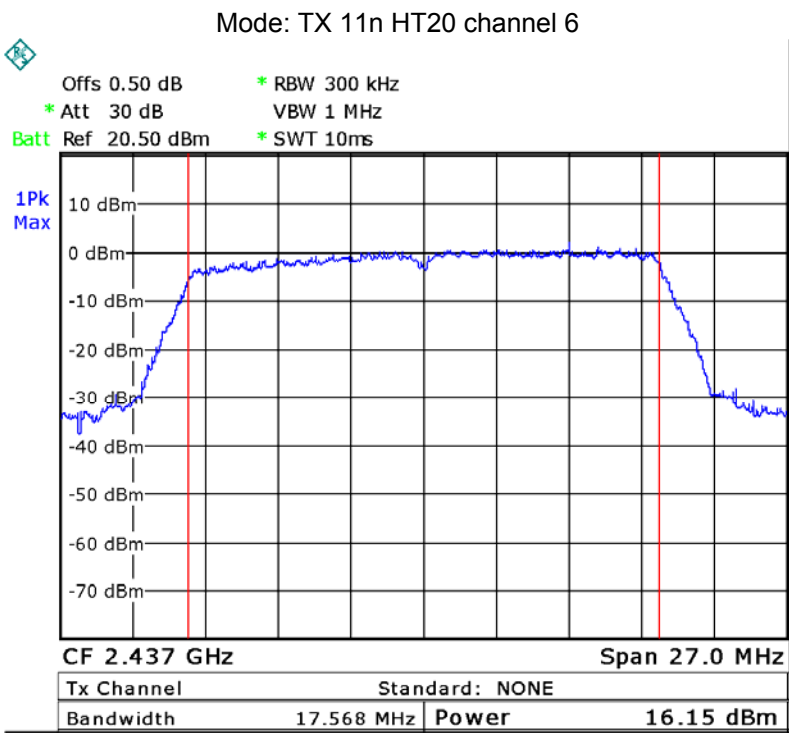
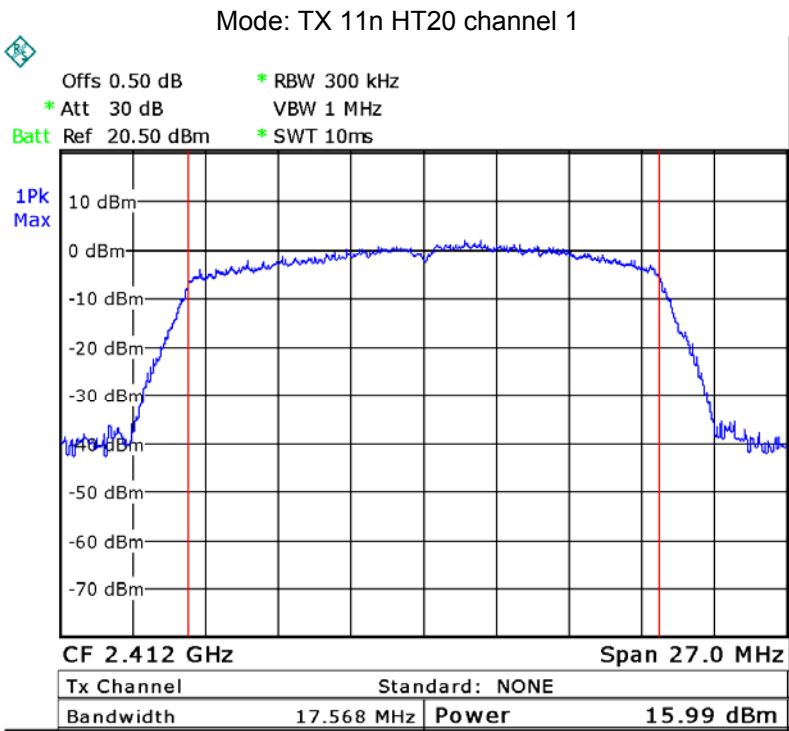


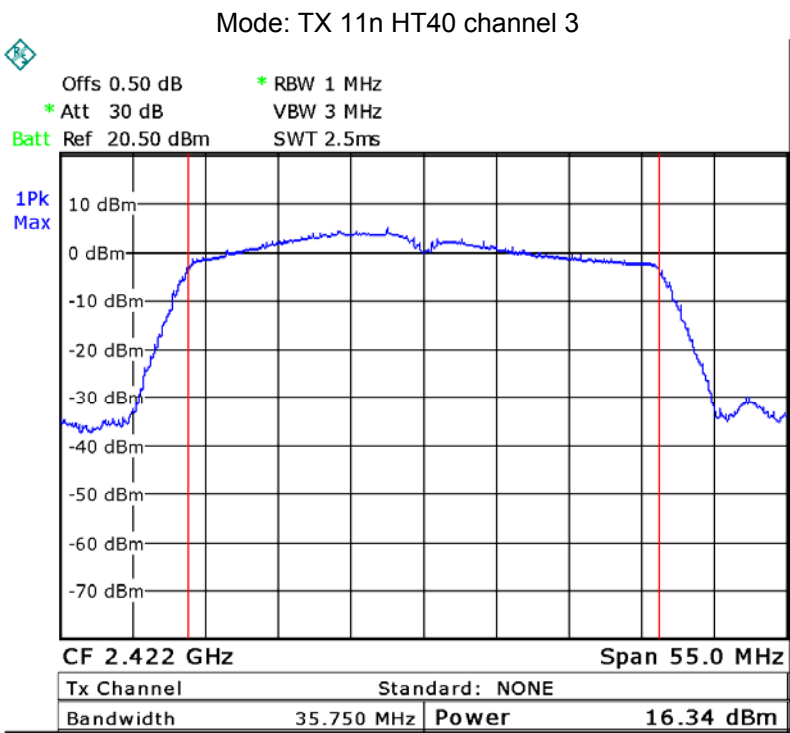
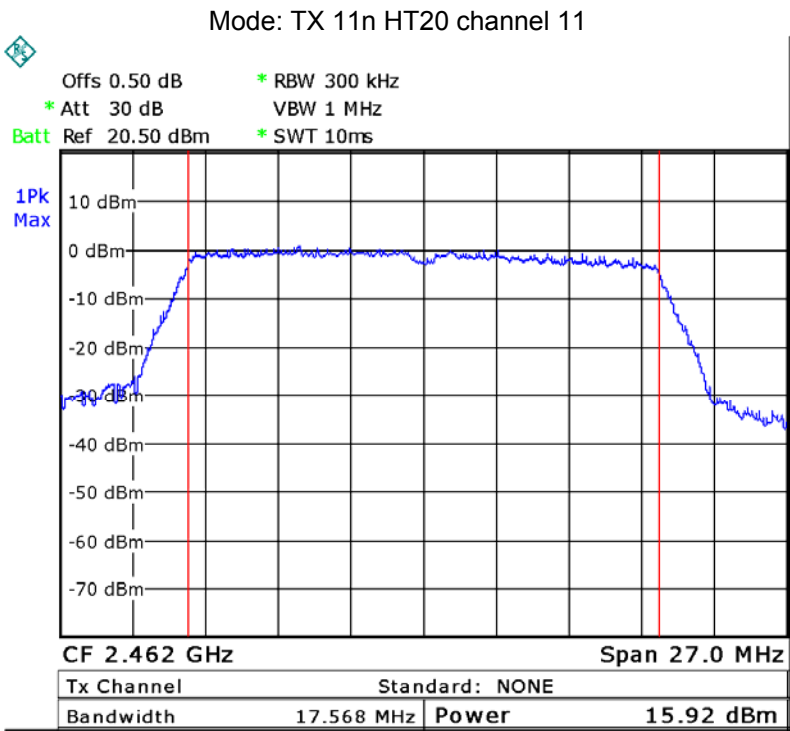
Mode: TX 11b channel 6

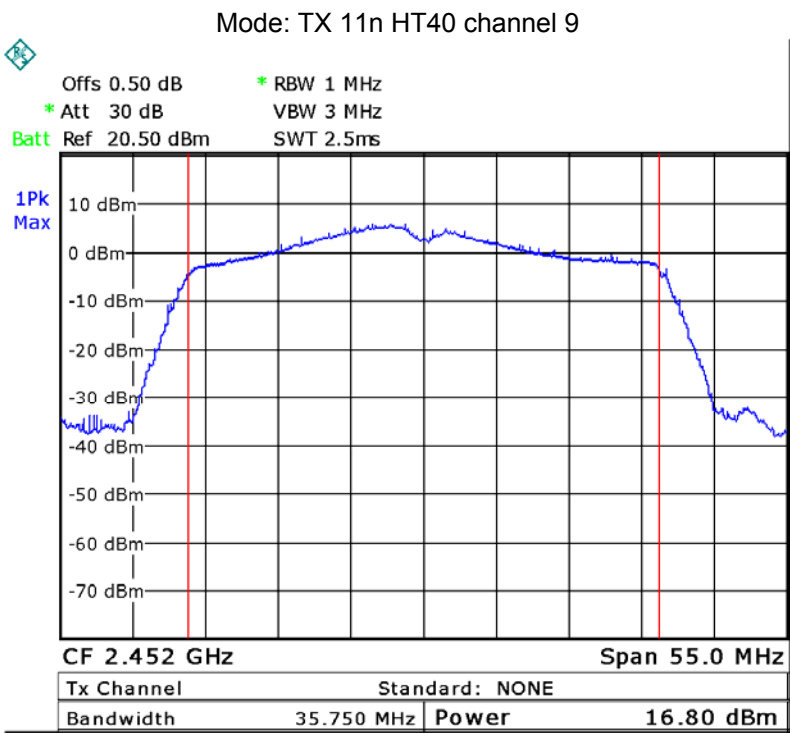
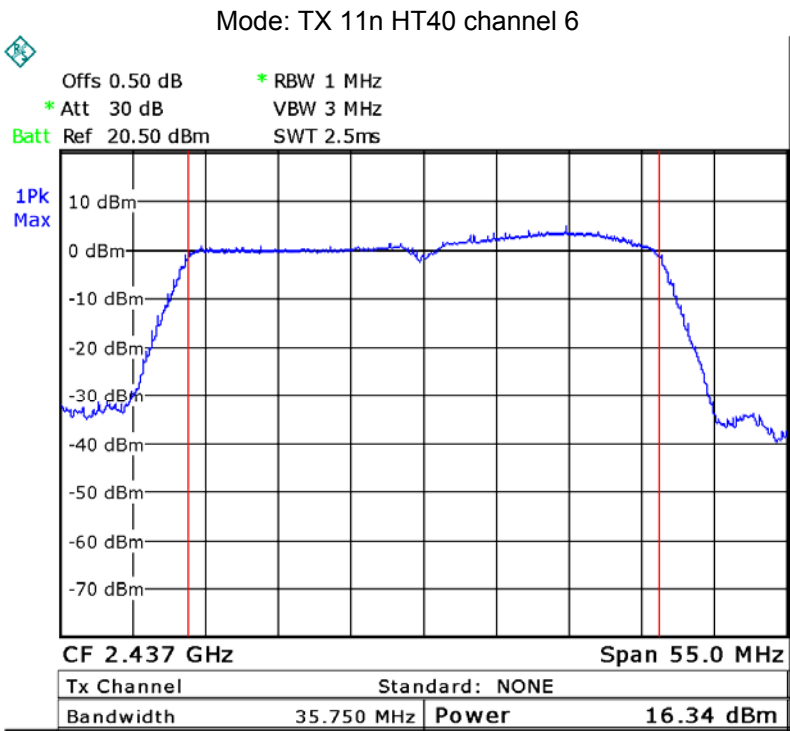


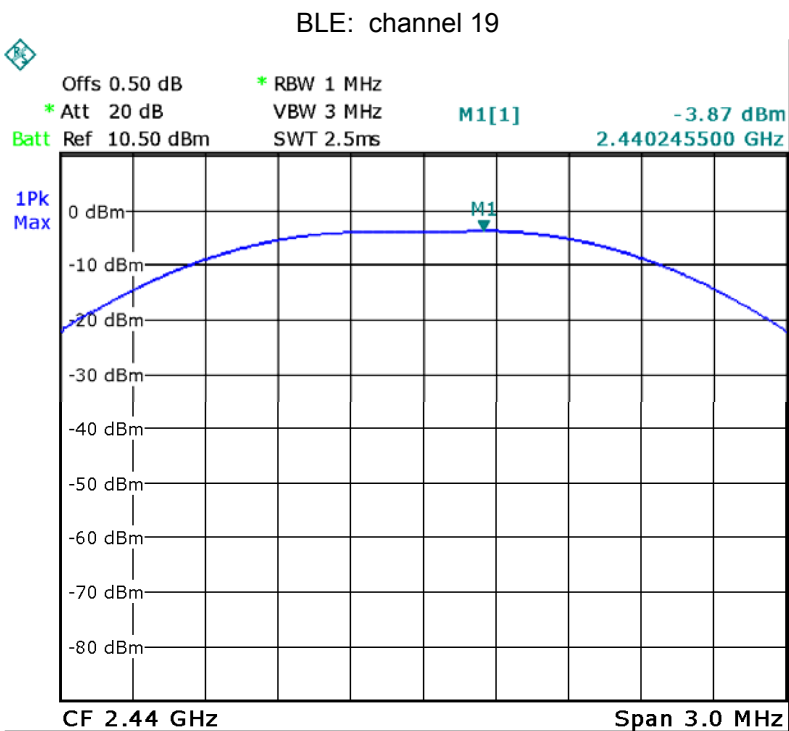
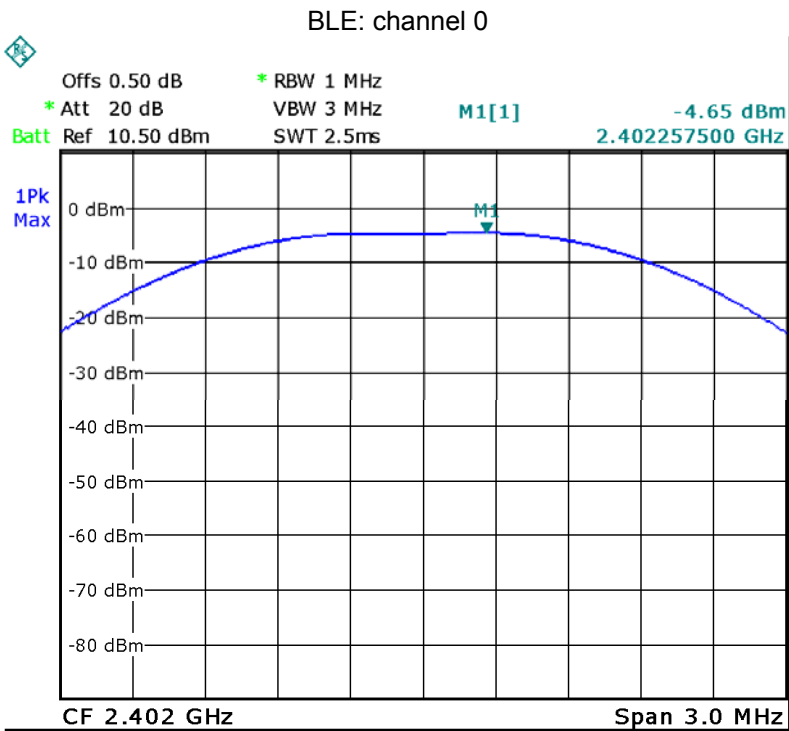


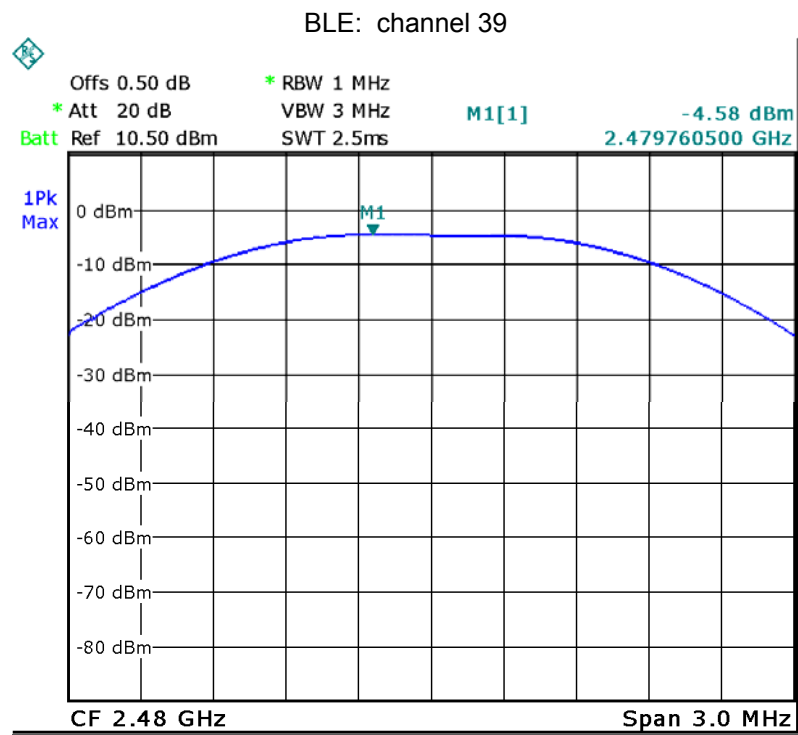












15 Duty cycle

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	EUT transmitting continuously

16 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

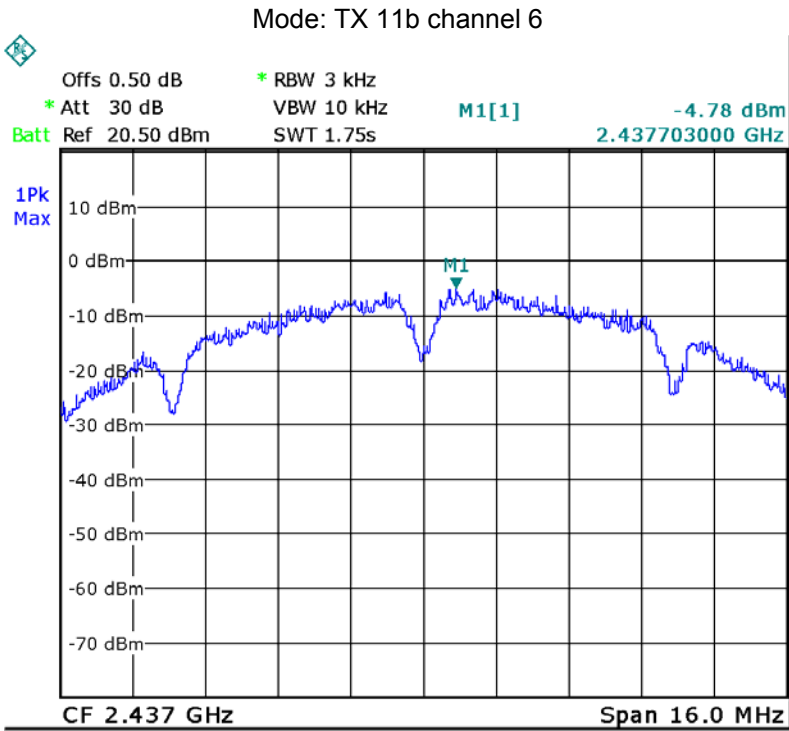
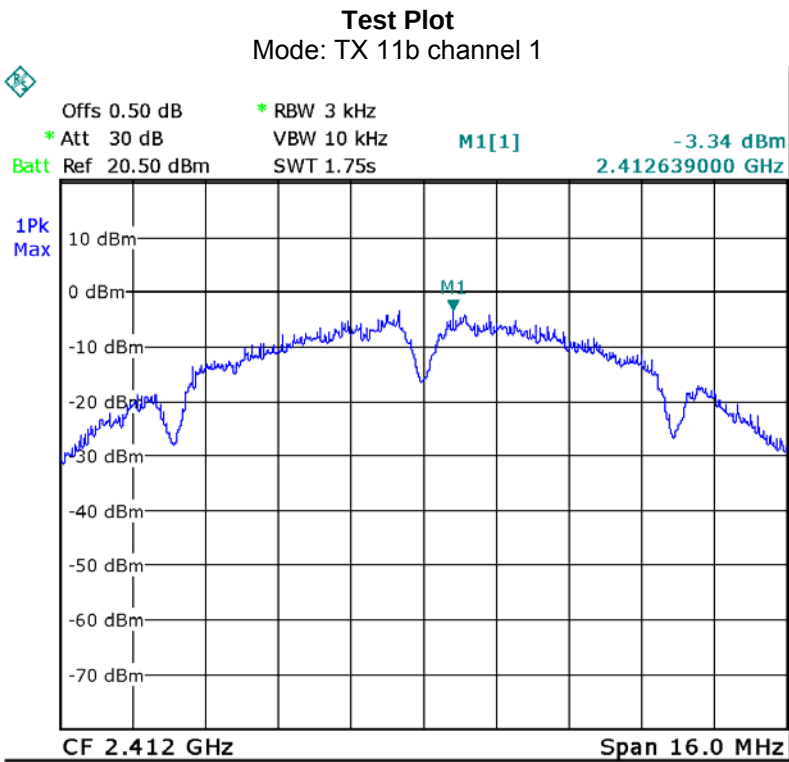
16.1 Test Procedure:

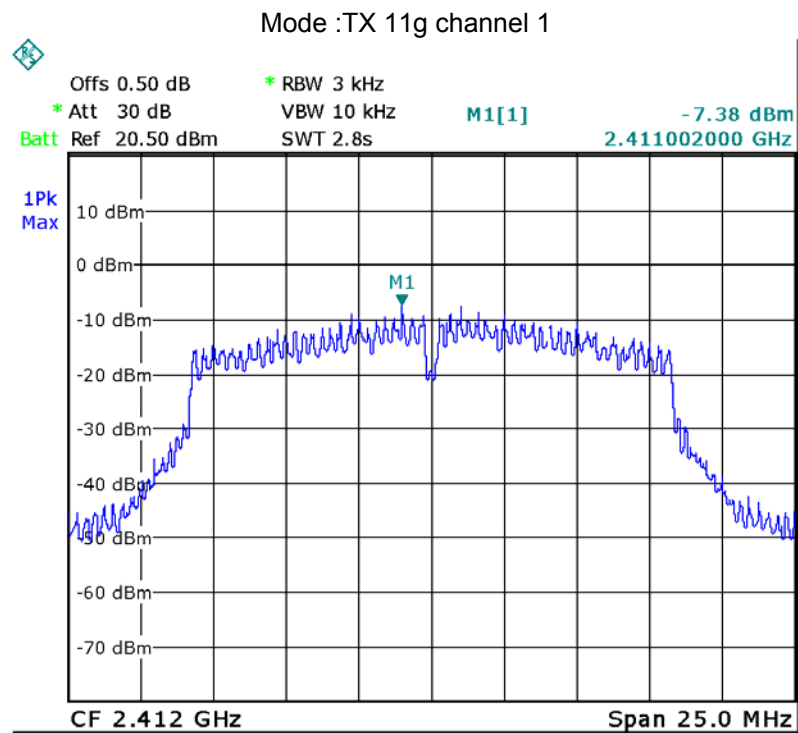
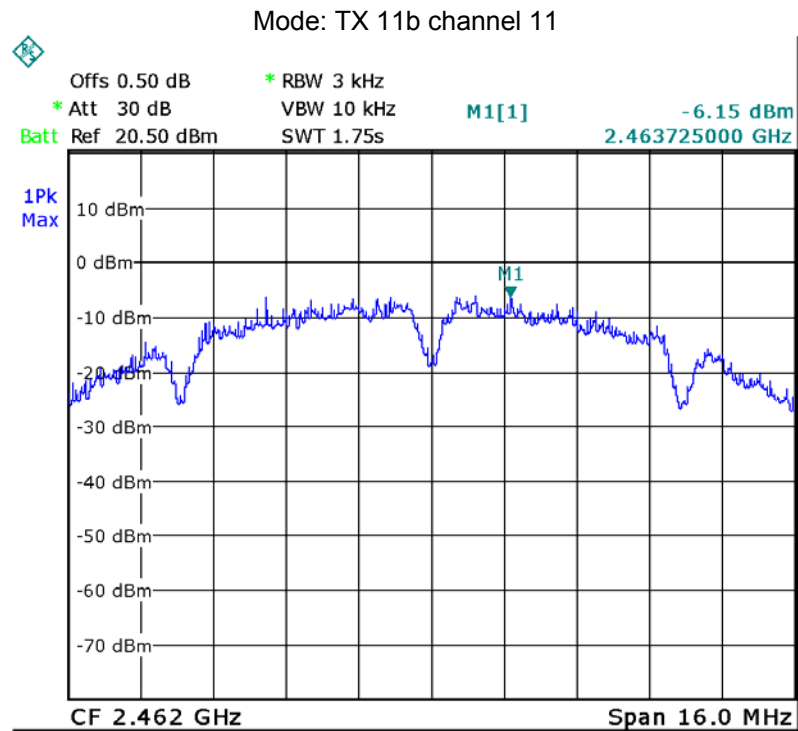
KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 10.2

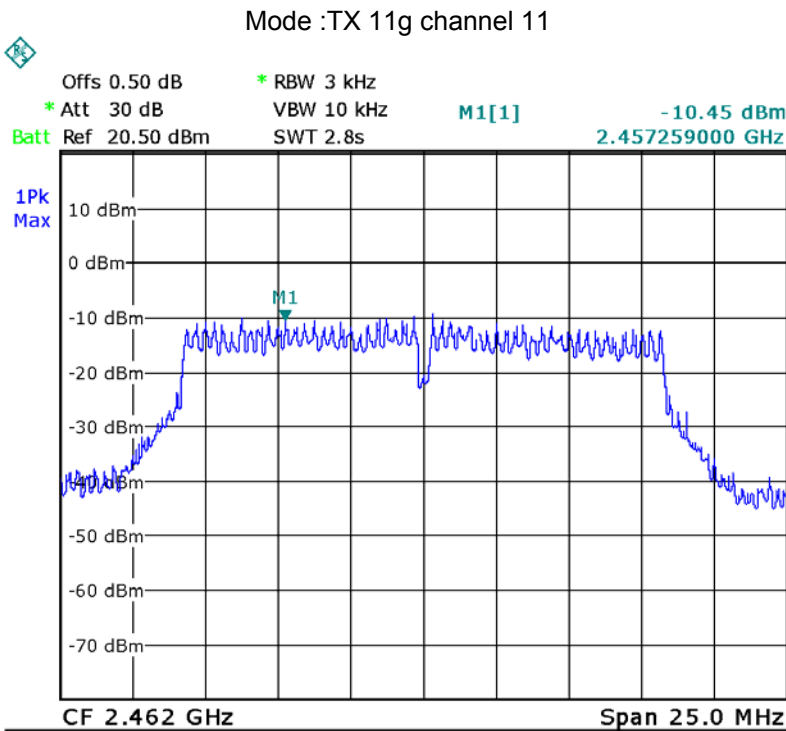
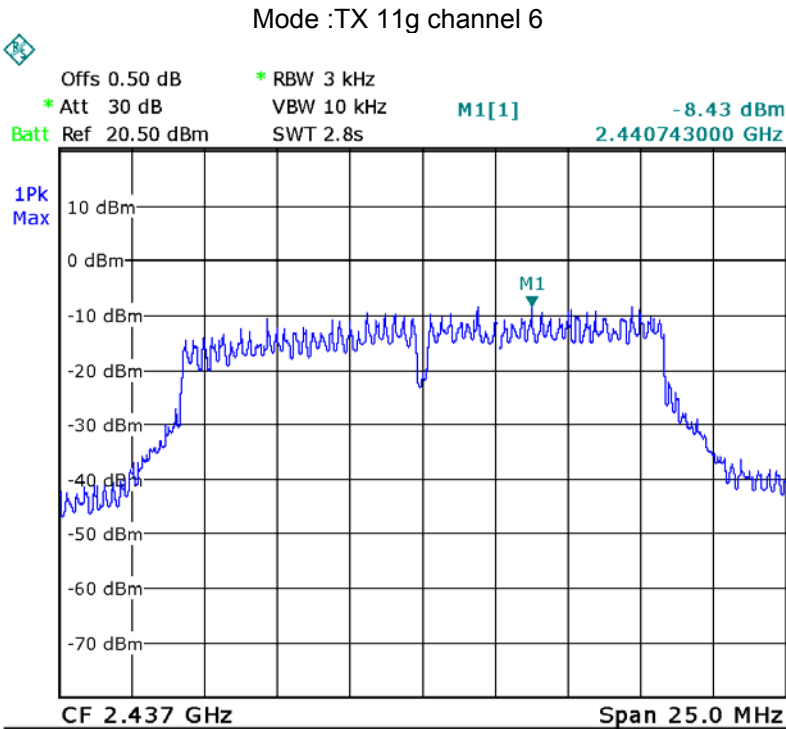
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to 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.

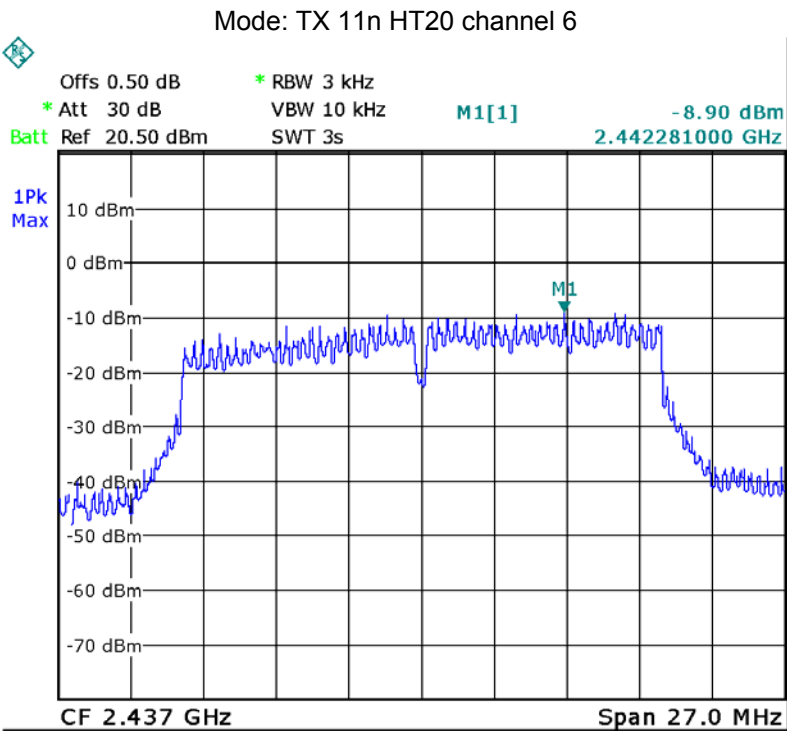
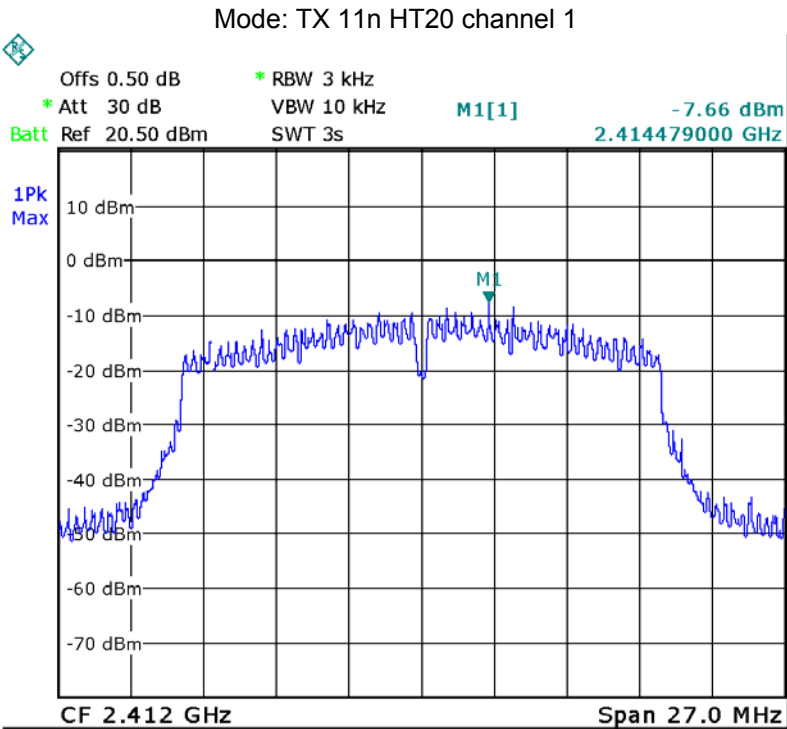
16.2 Test Result:

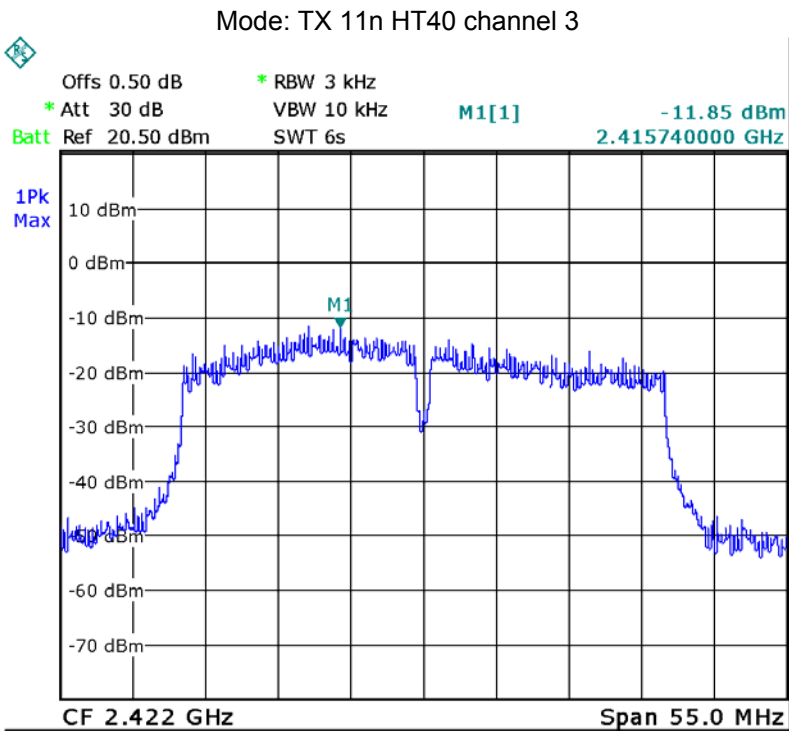
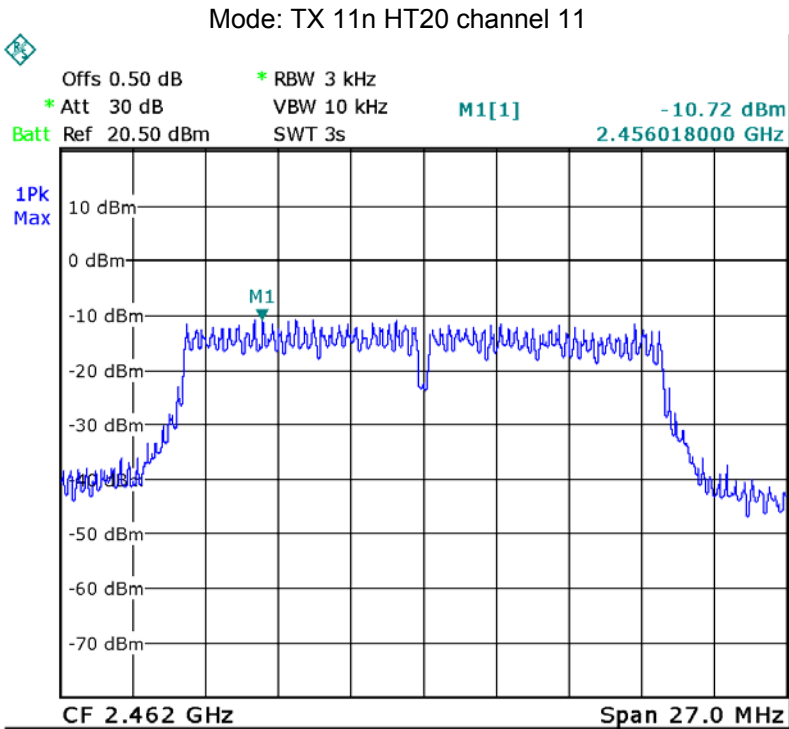
Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
TX 11b	Low-2412	-3.34	8dBm per 3kHz
	Middle-2437	-4.78	8dBm per 3kHz
	High-2462	-6.15	8dBm per 3kHz
TX 11g	Low-2412	-7.38	8dBm per 3kHz
	Middle-2437	-8.43	8dBm per 3kHz
	High-2462	-10.45	8dBm per 3kHz
TX 11n HT20	Low-2412	-7.66	8dBm per 3kHz
	Middle-2437	-8.90	8dBm per 3kHz
	High-2462	-10.72	8dBm per 3kHz
TX 11n HT40	Low-2422	-11.85	8dBm per 3kHz
	Middle-2437	-12.23	8dBm per 3kHz
	High-2452	-9.86	8dBm per 3kHz
BLE	Low-2402	-21.07	8dBm per 3kHz
	Middle-2440	-20.76	8dBm per 3kHz
	High-2480	-21.54	8dBm per 3kHz

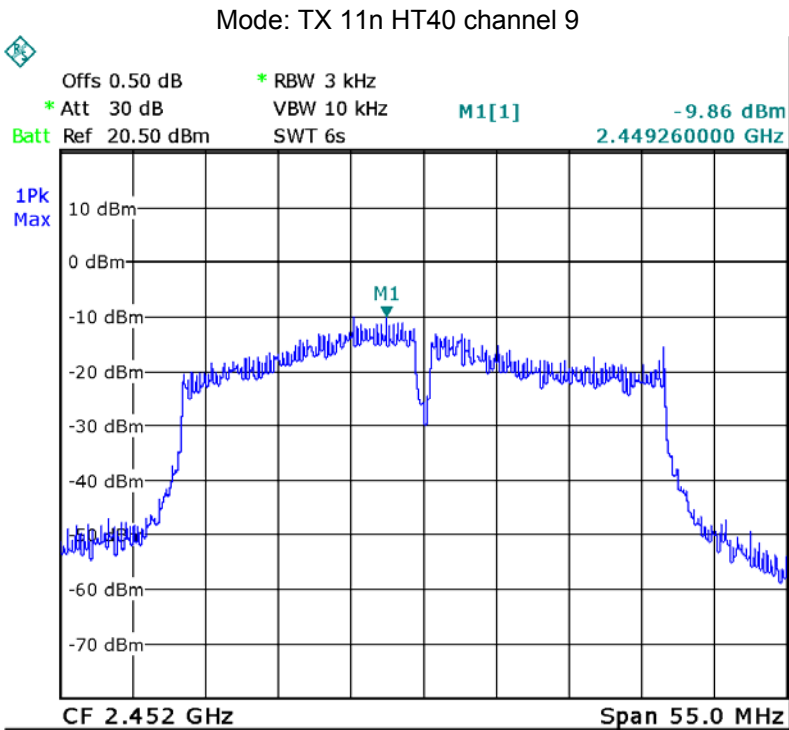
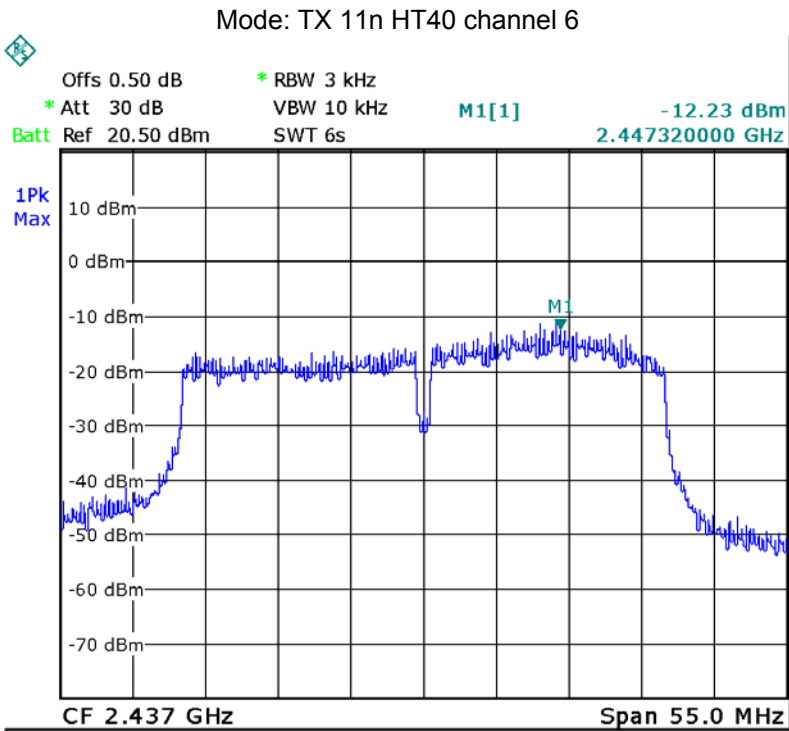


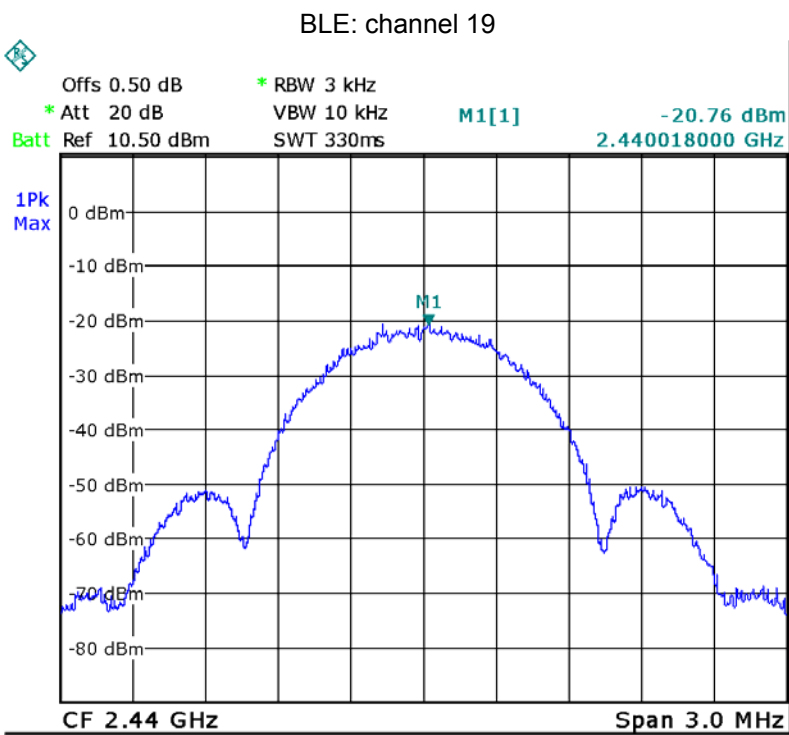
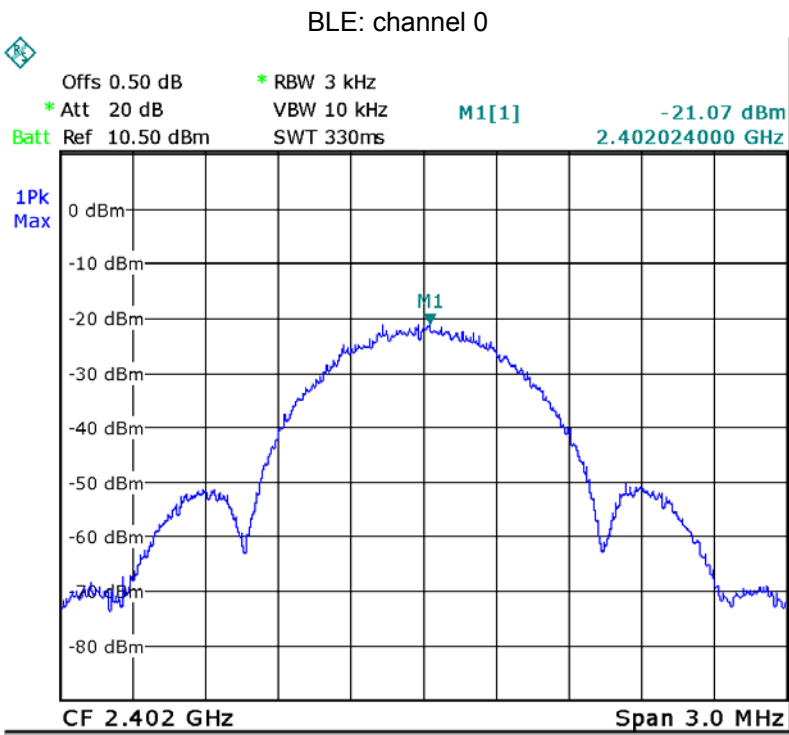


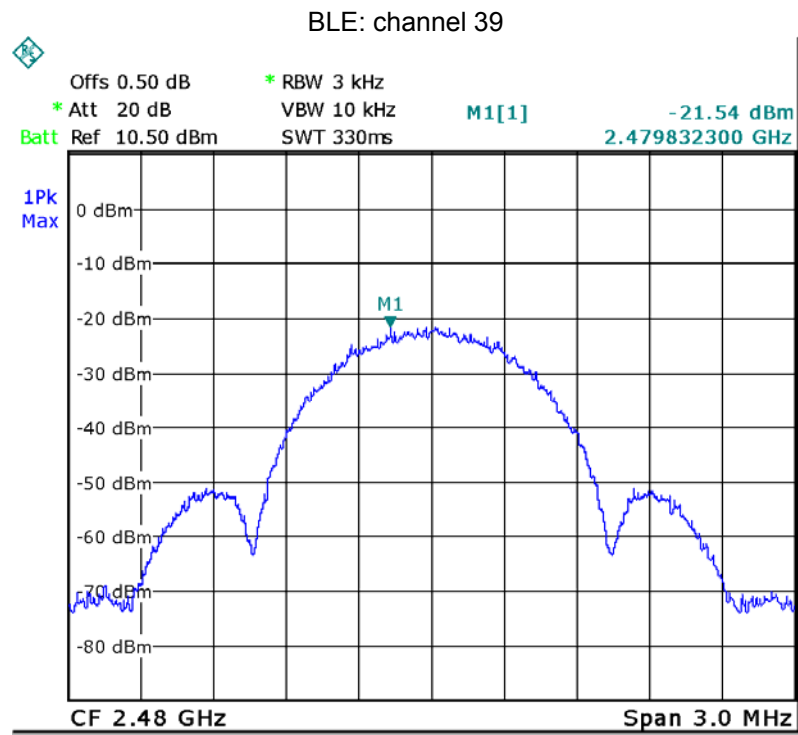












17 Antenna Requirement

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.

18 RF Exposure

Remark: refer to SAR test report: WTD21D04040642W001.

19 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Silver Max Pro-Photos.

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