

TEST REPORT

Reference No. : WTU19S07049275W001
FCC ID : 2AT85-RNSMU7036-B
Applicant : Guangdong KGH CO.,LTD
Address : Butterfly Industrial Park, Xiantang Town, Dongyuan County, Heyuan City, Guangdong, China
Manufacturer 1 : JIANGSU ECHOM SCIENCE & TECHNOLOGY CO.,LTD
Address : No.168 Qianjin East Road, Economic Development Zone, Kunshan, Jiangsu, China
Manufacturer 2 : DONGGUAN KONKA ELECTRONIC CO., Ltd
Address : NO.5 KONKA ROAD, FENGANG TOWN, DONGGUAN, GUANGDONG, CHINA
Product : 70" ULTRA HD SMART TV
Model(s) : RNSMU7036-B, RNSMU7039
Standards : FCC CFR47 Part 15 C Section 15.247: 2019
Date of Receipt sample : 2019-07-29
Date of Test : 2019-07-29 to 2019-08-08
Date of Issue : 2019-08-09
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.

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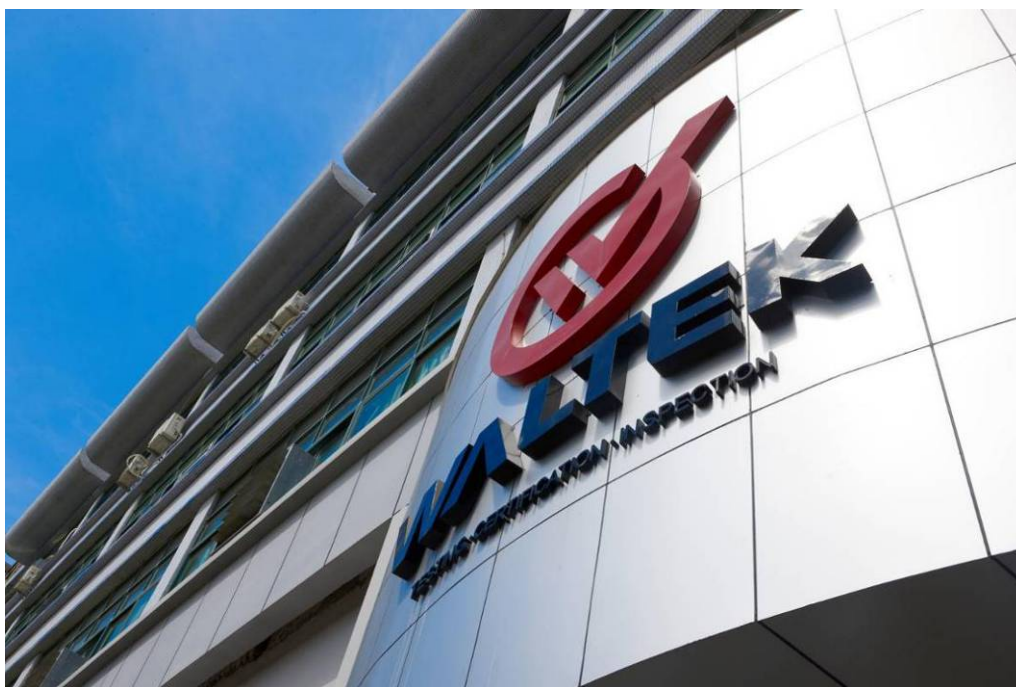


Philo Zhong

Philo Zhong / Manager

1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), ISED (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.



Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Scope Covered By	Scope	Note
USA	ISO/IEC 17025	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A			

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd.	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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2. Revision History

Test report #	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTU19S07049275W001	2019-07-29	2019-07-29 to 2019-08-08	2019-08-09	Original	-	Valid

3 General Information

3.1 General Description of E.U.T

Product:	70" ULTRA HD SMART TV
Model(s):	RNSMU7036-B, RNSMU7039
Model difference:	Only the model name are different. The model: RNSMU7036-B is test sample.
Operation Frequency:	802.11b/g/n HT20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz~2452MHz
Antenna installation:	Integrated Antenna
Antenna Gain:	Ant.1: 2dBi; Ant.2: 2dBi;
Type of modulation:	IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.) IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.) IEEE 802.11n (BPSK/QPSK/16QAM/64QAM,HT20:72Mbps max., HT40:150Mbps max.)

3.2 Details of E.U.T

Ratings	Input: 120V~, 50/60Hz, 230W
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3.3 Channel List

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	-

3.4 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	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Frequency Range	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Transmitter Spurious Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX

Note :The test 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 Equipment Used during Test

4.1 Equipments List

Conducted Emissions Test Site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2018-09-15	2019-09-14
2.	LISN	SCHWARZBECK	NSLK 8128	8128-259	2018-09-15	2019-09-14
3.	Limiter	CYBERTEK	EM5010	261115-001-0024	2018-09-15	2019-09-14
4	Cable	Laplace	RF300	-	2019-07-18	2020-07-17
3m Semi-anechoic Chamber for Radiation Emissions Test site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2019-04-19	2020-04-19
2	Amplifier	Agilent	8447D	2944A10178	2019-04-19	2020-04-19
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2019-04-28	2020-04-28
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2018-10-15	2019-10-15
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2019-04-19	2020-04-19
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2018-10-25	2019-10-25
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2019-04-19	2020-04-19
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	-	2019-04-19	2020-04-19
9	Broad-band Horn Antenna	SCHWARZBECK	BBV 9721	100472	2018-10-25	2019-10-25
10	Spectrum Analyzer	R&S	FSP40	100501	2018-11-13	2019-11-13
11	Coaxial Cable	ZT40-2.92J-2.92J-2.0M	10MHz-40GHz	17100919	2018-10-15	2019-10-15
3m Semi-anechoic Chamber for Radiation(TDK)						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2019-04-20	2020-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2019-05-24	2020-05-23
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2019-04-28	2020-04-27
4	Amplifier	ANRITSU	MH648A	M43381	2019-04-19	2020-04-18
5	Cable	HUBER+SUHNER	CBL2	525178	2019-04-20	2020-04-19

RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	Agilent	N9020A	MY49100060	2018-09-15	2019-09-14
2.	Spectrum Analyzer	R&S	FSP40	100501	2018-11-13	2019-11-12
3.	Coaxial Cable	Top	10Hz-30GHz	-	2019-04-20	2020-04-19
4	DC Block	Gwave	GDCB-3G-N-SMA	140307001	2019-04-20	2019-04-19
5.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	2019-04-20	2020-04-19

4.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

4.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

5 Test Summary

Test Items	Test Requirement	Result
Spurious Radiated Emissions	15.247 15.205(a) 15.209(a)	C
Conducted Emissions	15.207(a)	C
Conducted Spurious Emissions	15.247	C
Bandwidth	15.247(a)(2)	C
Maximum Peak Output Power	15.247(b)(3),(4)	C
Power Spectral Density	15.247(e)	C
Band Edge	15.247(d)	C
Antenna Requirement	15.203	C
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	C
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

6 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:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment :

Temperature: 21.5 °C
Humidity: 51.9 % RH

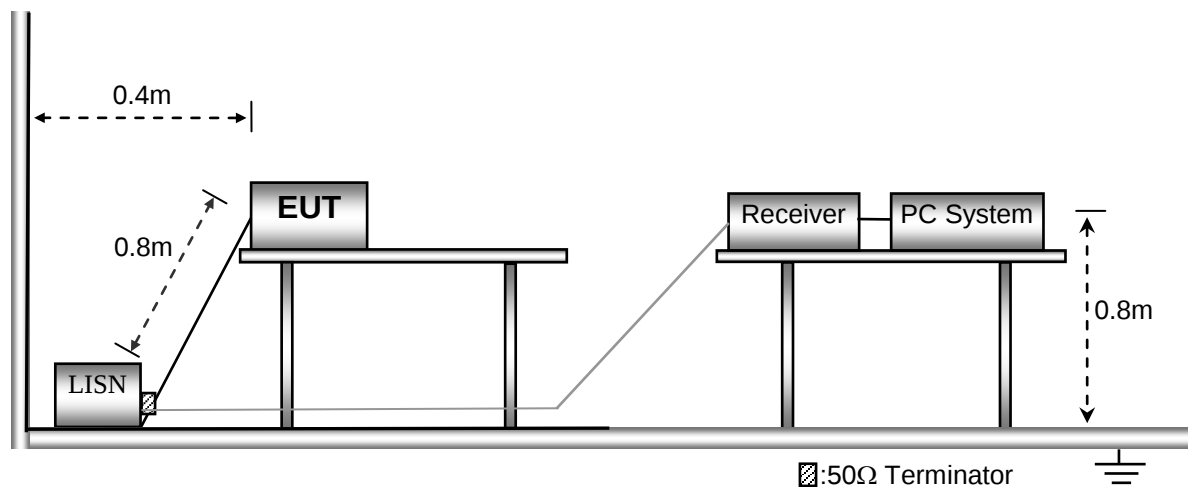
Atmospheric Pressure: 101.2kPa

EUT Operation : Refer to section 4.4.

The test was performed in Transmitting mode(For WIFI), Only the worst case 802.11b mode were record in the report.

6.2 EUT Setup

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



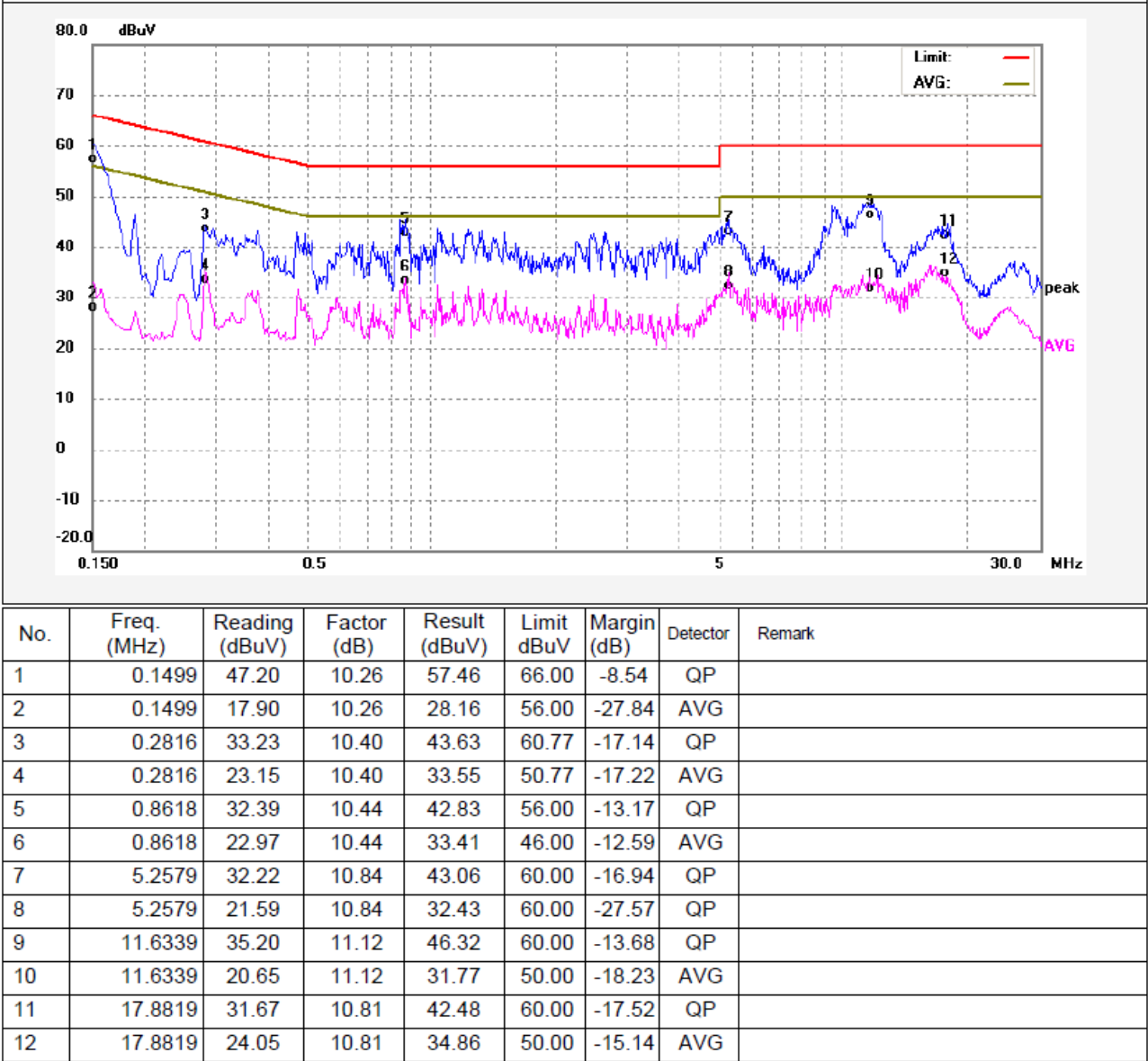
6.3 Measurement Description

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.

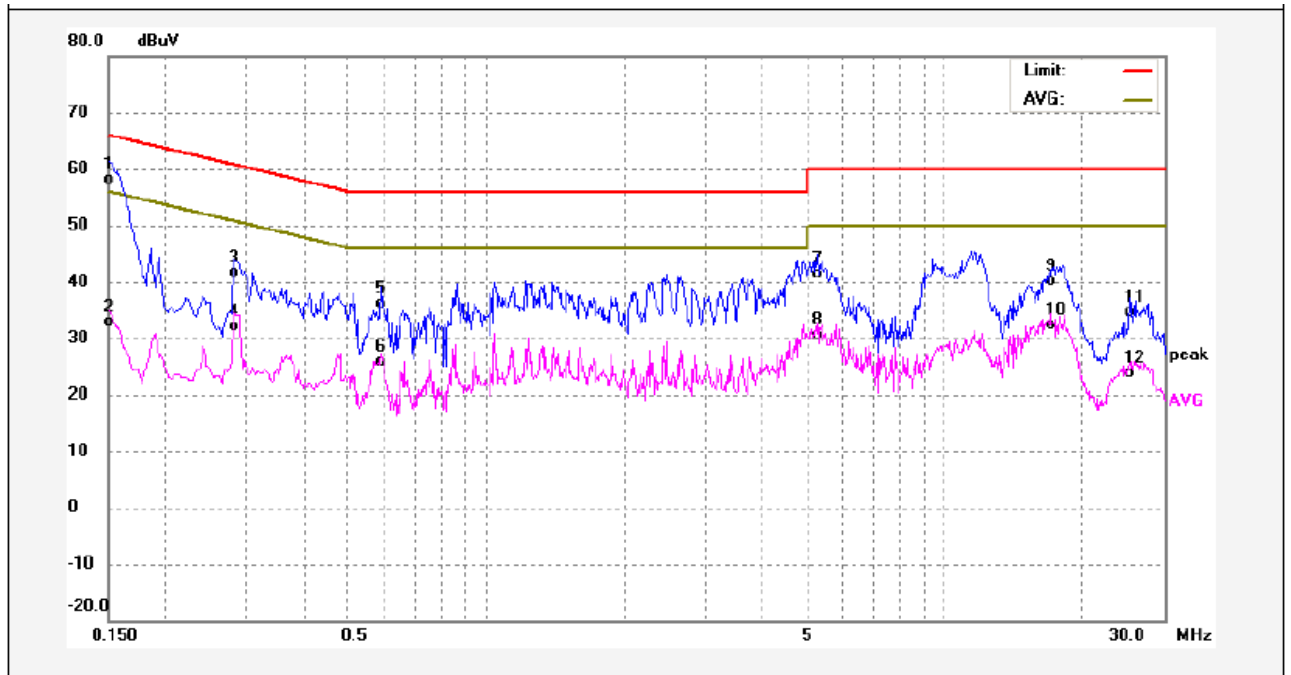
6.4 Conducted Emission Test Result

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

Live line:



Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1499	47.87	10.26	58.13	66.00	-7.87	QP	
2	0.1499	22.60	10.26	32.86	56.00	-23.14	AVG	
3	0.2816	31.14	10.40	41.54	60.77	-19.23	QP	
4	0.2816	21.67	10.40	32.07	50.77	-18.70	AVG	
5	0.5897	25.57	10.48	36.05	56.00	-19.95	QP	
6	0.5897	15.28	10.48	25.76	46.00	-20.24	AVG	
7	5.2579	30.48	10.84	41.32	60.00	-18.68	QP	
8	5.2579	19.70	10.84	30.54	50.00	-19.46	AVG	
9	16.9338	29.26	10.83	40.09	60.00	-19.91	QP	
10	16.9338	21.45	10.83	32.28	50.00	-17.72	AVG	
11	25.4100	24.18	10.49	34.67	60.00	-25.33	QP	
12	25.4100	13.39	10.49	23.88	50.00	-26.12	AVG	

7 Radiated Emissions

Test date: 2018-09-07 to 2018-09-11
 Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method: 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	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C
 Humidity: 52.1 % RH
 Atmospheric Pressure: 101.2kPa

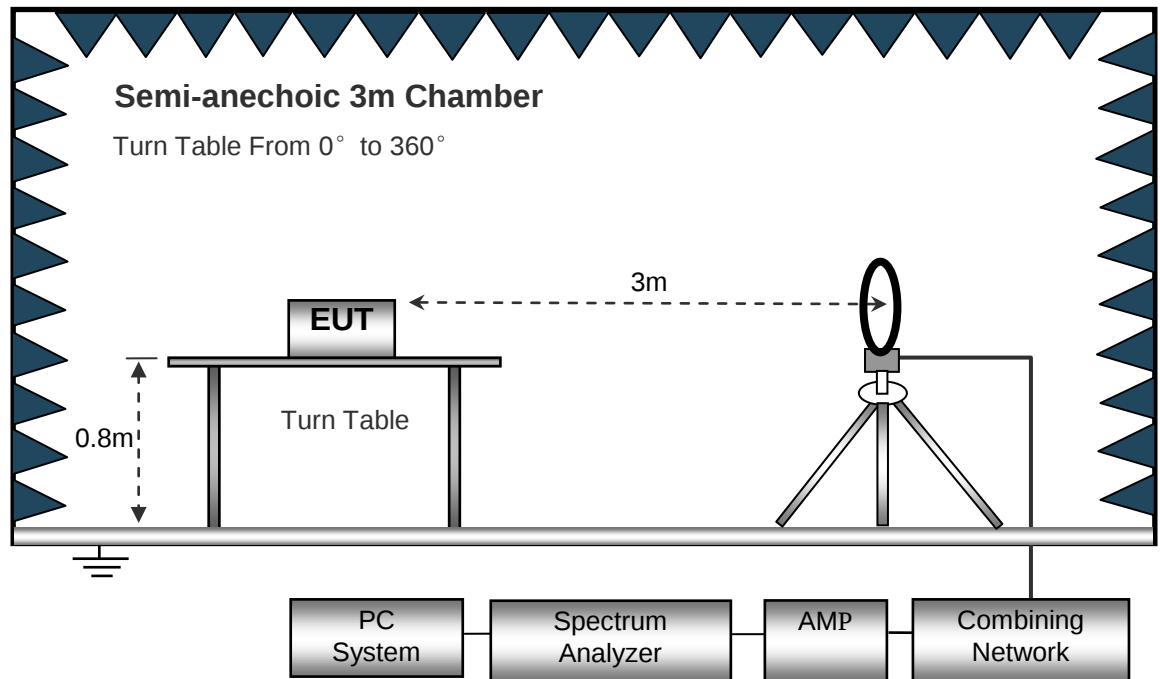
EUT Operation : Refer to section 4.4.

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

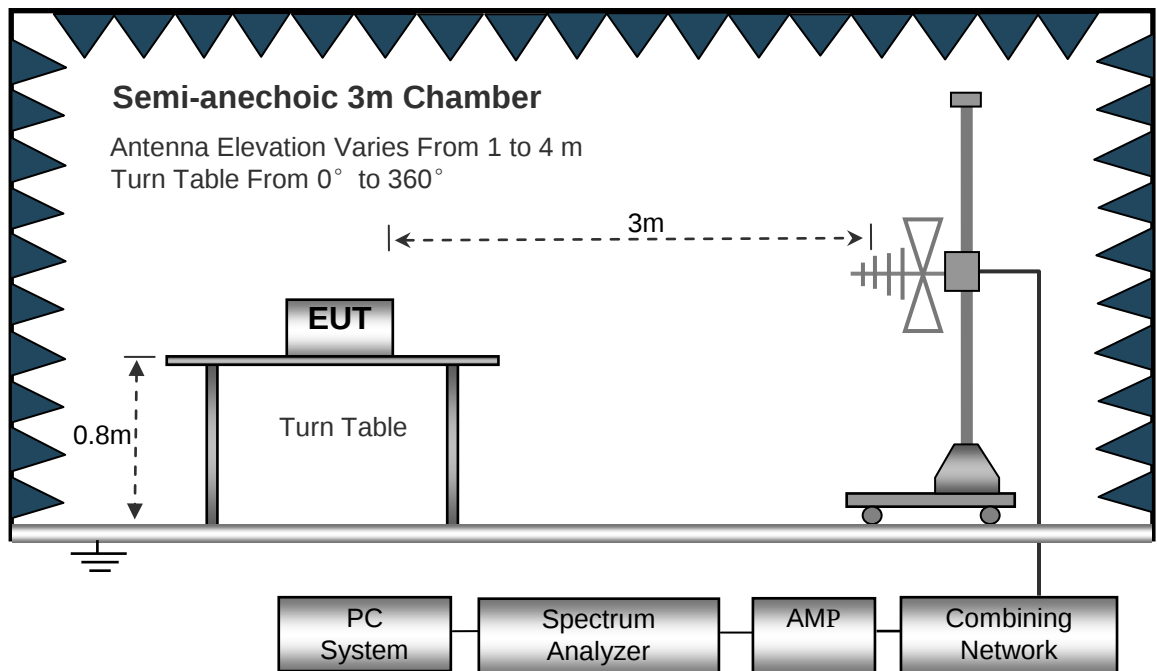
7.2 Test Setup

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

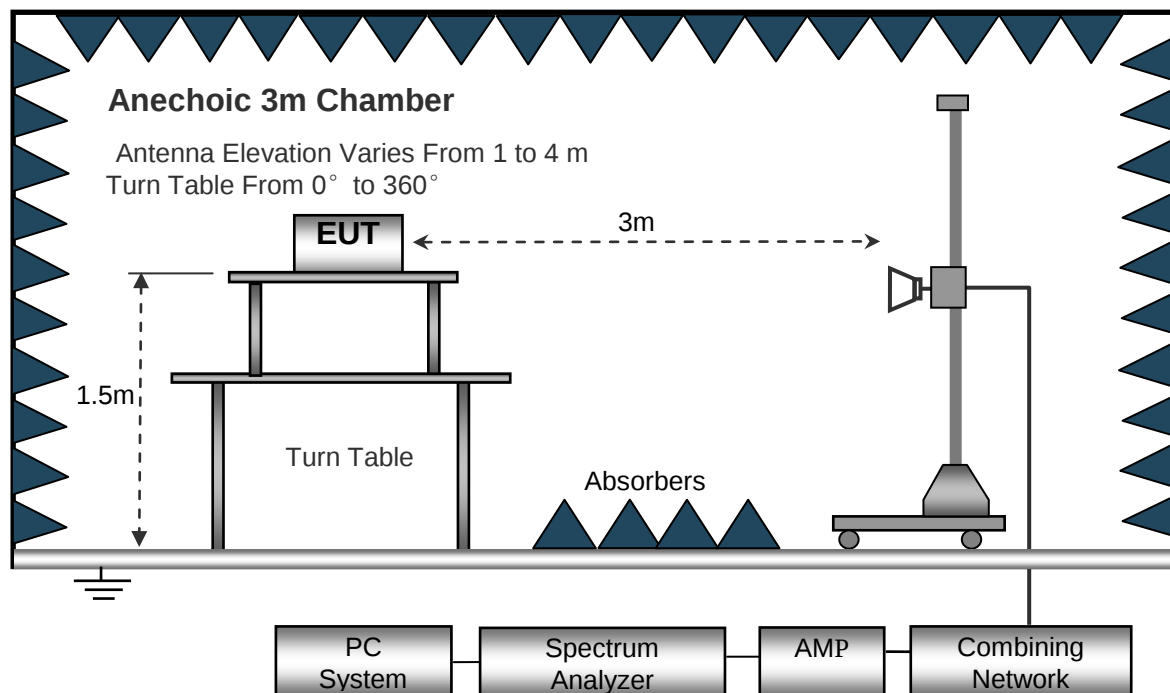
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

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

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth.....100kHz
 Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth.....1MHz
 Video Bandwidth.....3MHz
 Detector Ave.
 Resolution Bandwidth.....1MHz
 Video Bandwidth.....10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
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 X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

7.5 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:

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

7.6 Summary of Test Results

Test Frequency: 9kHz ~ 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	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									
33.56	39.15	QP	228	1.0	H	-17.80	21.35	40.00	-18.65
33.56	53.43	QP	81	1.3	V	-17.80	35.63	40.00	-4.37
4824.00	53.92	PK	257	1.5	V	-1.05	52.87	74.00	-21.13
4824.00	41.26	Ave	257	1.5	V	-1.05	40.21	54.00	-13.79
7236.00	48.97	PK	198	1.8	H	1.34	50.31	74.00	-23.69
7236.00	38.30	Ave	198	1.8	H	1.34	39.64	54.00	-14.36
2316.93	46.84	PK	169	1.8	V	-13.19	33.65	74.00	-40.35
2316.93	39.91	Ave	169	1.8	V	-13.19	26.72	54.00	-27.28
2384.96	43.10	PK	291	1.9	H	-13.14	29.96	74.00	-44.04
2384.96	37.36	Ave	291	1.9	H	-13.14	24.22	54.00	-29.78
2494.79	44.50	PK	34	1.7	V	-13.08	31.42	74.00	-42.58
2494.79	37.19	Ave	34	1.7	V	-13.08	24.11	54.00	-29.89

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)
11b: Middle Channel 2437MHz									
33.56	39.73	QP	212	1.2	H	-17.80	21.93	40.00	-18.07
33.56	52.99	QP	265	1.0	V	-17.80	35.19	40.00	-4.81
4874.00	54.48	PK	119	1.1	V	-0.62	53.86	74.00	-20.14
4874.00	40.93	Ave	119	1.1	V	-0.62	40.31	54.00	-13.69
7311.00	49.54	PK	11	1.3	H	2.21	51.75	74.00	-22.25
7311.00	37.92	Ave	11	1.3	H	2.21	40.13	54.00	-13.87
2344.10	45.88	PK	155	1.0	V	-13.19	32.69	74.00	-41.31
2344.10	38.18	Ave	155	1.0	V	-13.19	24.99	54.00	-29.01
2351.66	43.88	PK	255	1.7	H	-13.14	30.74	74.00	-43.26
2351.66	36.58	Ave	255	1.7	H	-13.14	23.44	54.00	-30.56
2486.29	44.14	PK	117	1.8	V	-13.08	31.06	74.00	-42.94
2486.29	36.90	Ave	117	1.8	V	-13.08	23.82	54.00	-30.18

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									
33.56	39.40	QP	275	1.8	H	-17.80	21.60	40.00	-18.40
33.56	54.26	QP	106	1.7	V	-17.80	36.46	40.00	-3.54
4924.00	54.28	PK	275	1.7	V	-0.24	54.04	74.00	-19.96
4924.00	42.27	Ave	275	1.7	V	-0.24	42.03	54.00	-11.97
7386.00	48.19	PK	343	1.0	H	2.84	51.03	74.00	-22.97
7386.00	37.44	Ave	343	1.0	H	2.84	40.28	54.00	-13.72
2316.89	45.22	PK	35	1.6	V	-13.19	32.03	74.00	-41.97
2316.89	38.97	Ave	35	1.6	V	-13.19	25.78	54.00	-28.22
2369.03	42.32	PK	268	1.3	H	-13.14	29.18	74.00	-44.82
2369.03	36.84	Ave	268	1.3	H	-13.14	23.70	54.00	-30.30
2483.63	43.65	PK	82	1.1	V	-13.08	30.57	74.00	-43.43
2483.63	36.38	Ave	82	1.1	V	-13.08	23.30	54.00	-30.70

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									
33.56	40.47	QP	104	1.2	H	-17.80	22.67	40.00	-17.33
33.56	54.13	QP	12	1.9	V	-17.80	36.33	40.00	-3.67
4824.00	54.64	PK	109	1.2	V	-1.06	53.58	74.00	-20.42
4824.00	42.95	Ave	109	1.2	V	-1.06	41.89	54.00	-12.11
7236.00	47.71	PK	196	1.7	H	1.33	49.04	74.00	-24.96
7236.00	36.87	Ave	196	1.7	H	1.33	38.20	54.00	-15.80
2311.21	45.37	PK	117	1.2	V	-13.19	32.18	74.00	-41.82
2311.21	38.36	Ave	117	1.2	V	-13.19	25.17	54.00	-28.83
2360.16	43.49	PK	173	1.6	H	-13.14	30.35	74.00	-43.65
2360.16	36.77	Ave	173	1.6	H	-13.14	23.63	54.00	-30.37
2491.10	42.64	PK	133	1.6	V	-13.08	29.56	74.00	-44.44
2491.10	36.08	Ave	133	1.6	V	-13.08	23.00	54.00	-31.00

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									
33.56	40.52	QP	350	1.2	H	-17.80	22.72	40.00	-17.28
33.56	51.68	QP	145	1.8	V	-17.80	33.88	40.00	-6.12
4874.00	55.30	PK	75	1.5	V	-0.62	54.68	74.00	-19.32
4874.00	41.19	Ave	75	1.5	V	-0.62	40.57	54.00	-13.43
7311.00	49.62	PK	75	1.8	H	2.21	51.83	74.00	-22.17
7311.00	39.08	Ave	75	1.8	H	2.21	41.29	54.00	-12.71
2326.67	46.84	PK	273	1.5	V	-13.19	33.65	74.00	-40.35
2326.67	39.71	Ave	273	1.5	V	-13.19	26.52	54.00	-27.48
2378.70	42.18	PK	50	1.8	H	-13.14	29.04	74.00	-44.96
2378.70	37.40	Ave	50	1.8	H	-13.14	24.26	54.00	-29.74
2486.71	44.80	PK	293	2.0	V	-13.08	31.72	74.00	-42.28
2486.71	38.54	Ave	293	2.0	V	-13.08	25.46	54.00	-28.54

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									
33.56	40.01	QP	251	2.0	H	-17.80	22.21	40.00	-17.79
33.56	52.27	QP	186	1.3	V	-17.80	34.47	40.00	-5.53
4924.00	49.17	PK	50	1.2	V	-0.24	48.93	74.00	-25.07
4924.00	42.36	Ave	50	1.2	V	-0.24	42.12	54.00	-11.88
7386.00	48.32	PK	345	1.5	H	2.84	51.16	74.00	-22.84
7386.00	40.48	Ave	345	1.5	H	2.84	43.32	54.00	-10.68
2319.80	46.96	PK	5	2.0	V	-13.19	33.77	74.00	-40.23
2319.80	37.58	Ave	5	2.0	V	-13.19	24.39	54.00	-29.61
2373.71	44.50	PK	207	1.9	H	-13.14	31.36	74.00	-42.64
2373.71	38.15	Ave	207	1.9	H	-13.14	25.01	54.00	-28.99
2494.94	44.03	PK	307	1.7	V	-13.08	30.95	74.00	-43.05
2494.94	36.31	Ave	307	1.7	V	-13.08	23.23	54.00	-30.77

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)
n20: Low Channel 2412MHz									
33.56	40.38	QP	246	1.0	H	-17.80	22.58	40.00	-17.42
33.56	51.19	QP	289	1.7	V	-17.80	33.39	40.00	-6.61
4824.00	51.00	PK	345	1.1	V	-1.06	49.94	74.00	-24.06
4824.00	37.86	Ave	345	1.1	V	-1.06	36.80	54.00	-17.20
7236.00	51.18	PK	99	1.3	H	1.33	52.51	74.00	-21.49
7236.00	37.46	Ave	99	1.3	H	1.33	38.79	54.00	-15.21
2342.63	46.13	PK	311	1.7	V	-13.19	32.94	74.00	-41.06
2342.63	39.11	Ave	311	1.7	V	-13.19	25.92	54.00	-28.08
2363.25	44.63	PK	9	1.4	H	-13.14	31.49	74.00	-42.51
2363.25	37.71	Ave	9	1.4	H	-13.14	24.57	54.00	-29.43
2487.11	42.20	PK	257	1.4	V	-13.08	29.12	74.00	-44.88
2487.11	38.10	Ave	257	1.4	V	-13.08	25.02	54.00	-28.98

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)
n20: Middle Channel 2437MHz									
33.56	41.11	QP	266	1.9	H	-17.80	23.31	40.00	-16.69
33.56	54.24	QP	206	1.7	V	-17.80	36.44	40.00	-3.56
4874.00	49.11	PK	49	1.8	V	-0.62	48.49	74.00	-25.51
4874.00	39.50	Ave	49	1.8	V	-0.62	38.88	54.00	-15.12
7311.00	52.98	PK	344	1.6	H	2.21	55.19	74.00	-18.81
7311.00	32.38	Ave	344	1.6	H	2.21	34.59	54.00	-19.41
2332.34	46.28	PK	91	1.6	V	-13.19	33.09	74.00	-40.91
2332.34	38.55	Ave	91	1.6	V	-13.19	25.36	54.00	-28.64
2363.89	43.99	PK	293	1.1	H	-13.14	30.85	74.00	-43.15
2363.89	37.41	Ave	293	1.1	H	-13.14	24.27	54.00	-29.73
2498.41	44.60	PK	286	1.2	V	-13.08	31.52	74.00	-42.48
2498.41	37.01	Ave	286	1.2	V	-13.08	23.93	54.00	-30.07

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)
n20: High Channel 2462MHz									
33.56	38.01	QP	346	1.1	H	-17.80	20.21	40.00	-19.79
33.56	52.98	QP	230	1.8	V	-17.80	35.18	40.00	-4.82
4924.00	53.24	PK	148	2.0	V	-0.24	53.00	74.00	-21.00
4924.00	40.51	Ave	148	2.0	V	-0.24	40.27	54.00	-13.73
7386.00	51.60	PK	62	1.6	H	2.84	54.44	74.00	-19.56
7386.00	35.85	Ave	62	1.6	H	2.84	38.69	54.00	-15.31
2315.95	45.72	PK	56	2.0	V	-13.19	32.53	74.00	-41.47
2315.95	37.42	Ave	56	2.0	V	-13.19	24.23	54.00	-29.77
2351.04	44.02	PK	149	1.8	H	-13.14	30.88	74.00	-43.12
2351.04	37.63	Ave	149	1.8	H	-13.14	24.49	54.00	-29.51
2492.04	44.54	PK	229	1.5	V	-13.08	31.46	74.00	-42.54
2492.04	37.48	Ave	229	1.5	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)
n40: Low Channel 2422MHz									
33.56	35.26	QP	209	1.6	H	-17.80	17.46	40.00	-22.54
33.56	53.23	QP	173	1.4	V	-17.80	35.43	40.00	-4.57
4844.00	51.14	PK	29	1.5	V	-1.06	50.08	74.00	-23.92
4844.00	41.71	Ave	29	1.5	V	-1.06	40.65	54.00	-13.35
7266.00	44.36	PK	343	1.0	H	1.33	45.69	74.00	-28.31
7266.00	35.74	Ave	343	1.0	H	1.33	37.07	54.00	-16.93
2343.18	45.17	PK	299	1.2	V	-13.19	31.98	74.00	-42.02
2343.18	38.57	Ave	299	1.2	V	-13.19	25.38	54.00	-28.62
2360.58	42.43	PK	306	1.3	H	-13.14	29.29	74.00	-44.71
2360.58	37.83	Ave	306	1.3	H	-13.14	24.69	54.00	-29.31
2486.52	43.69	PK	282	1.9	V	-13.08	30.61	74.00	-43.39
2486.52	38.12	Ave	282	1.9	V	-13.08	25.04	54.00	-28.96

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)
n40: Middle Channel 2437MHz									
33.56	38.59	QP	213	1.8	H	-17.80	20.79	40.00	-19.21
33.56	54.33	QP	62	1.1	V	-17.80	36.53	40.00	-3.47
4874.00	53.01	PK	229	1.5	V	-0.62	52.39	74.00	-21.61
4874.00	42.97	Ave	229	1.5	V	-0.62	42.35	54.00	-11.65
7311.00	49.59	PK	95	1.8	H	2.21	51.80	74.00	-22.20
7311.00	34.71	Ave	95	1.8	H	2.21	36.92	54.00	-17.08
2342.10	46.15	PK	102	1.0	V	-13.19	32.96	74.00	-41.04
2342.10	39.40	Ave	102	1.0	V	-13.19	26.21	54.00	-27.79
2380.65	42.42	PK	200	1.7	H	-13.14	29.28	74.00	-44.72
2380.65	37.90	Ave	200	1.7	H	-13.14	24.76	54.00	-29.24
2499.39	44.45	PK	79	1.2	V	-13.08	31.37	74.00	-42.63
2499.39	36.05	Ave	79	1.2	V	-13.08	22.97	54.00	-31.03

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)
n40: High Channel 2452MHz									
33.56	37.59	QP	6	1.5	H	-17.80	19.79	40.00	-20.21
33.56	52.84	QP	8	1.5	V	-17.80	35.04	40.00	-4.96
4904.00	53.35	PK	108	1.1	V	-0.24	53.11	74.00	-20.89
4904.00	39.27	Ave	108	1.1	V	-0.24	39.03	54.00	-14.97
7356.00	46.10	PK	47	1.3	H	2.84	48.94	74.00	-25.06
7356.00	35.31	Ave	47	1.3	H	2.84	38.15	54.00	-15.85
2324.45	45.58	PK	324	1.5	V	-13.19	32.39	74.00	-41.61
2324.45	37.12	Ave	324	1.5	V	-13.19	23.93	54.00	-30.07
2386.86	44.33	PK	52	1.2	H	-13.14	31.19	74.00	-42.81
2386.86	38.12	Ave	52	1.2	H	-13.14	24.98	54.00	-29.02
2497.96	42.44	PK	262	1.2	V	-13.08	29.36	74.00	-44.64
2497.96	38.91	Ave	262	1.2	V	-13.08	25.83	54.00	-28.17

Test Frequency: 18GHz~25GHz

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

8 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

8.1 Test Produce

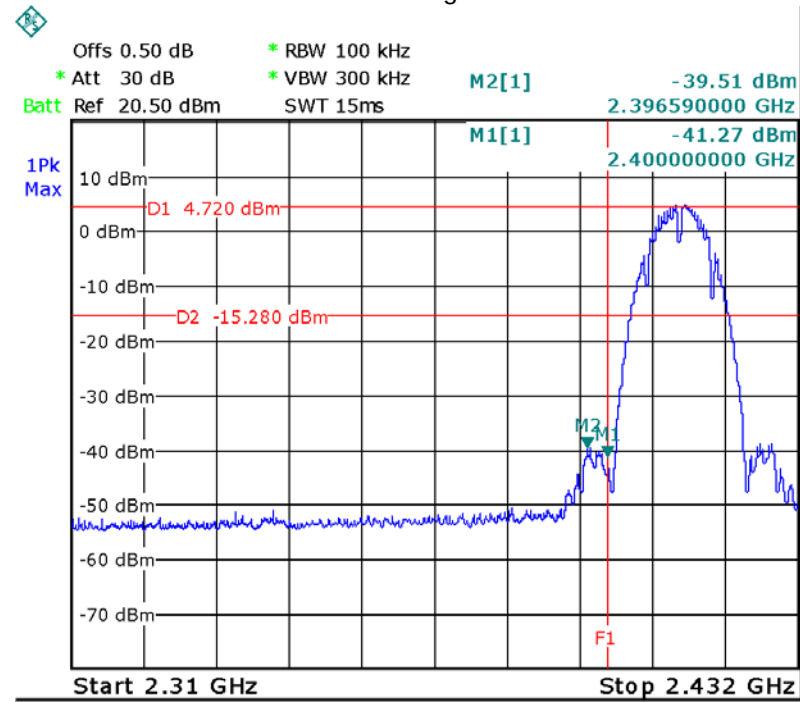
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

8.2 Test Result

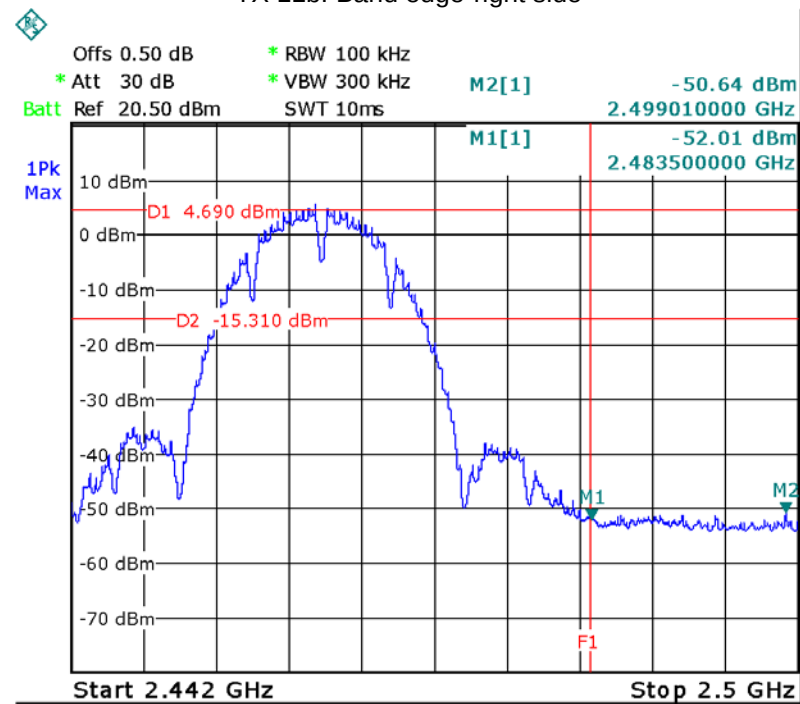
Test result plots shown as follows:

ANT1:

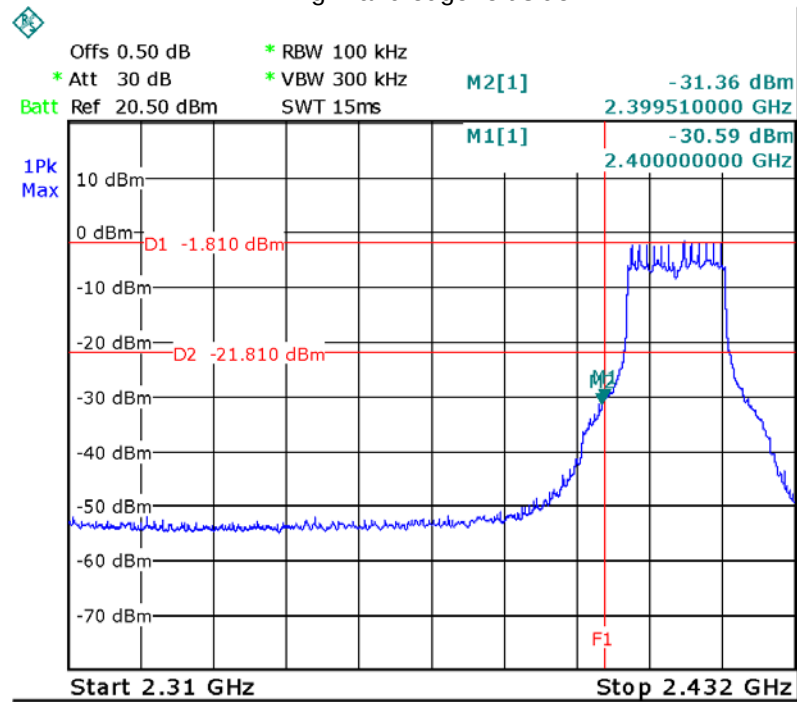
TX 11b: Band edge-left side



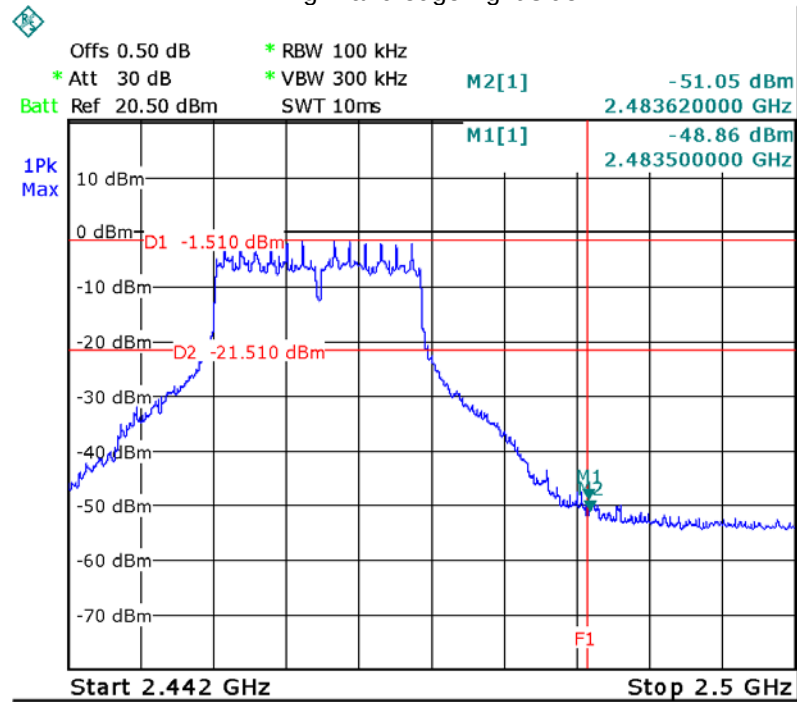
TX 11b: Band edge-right side



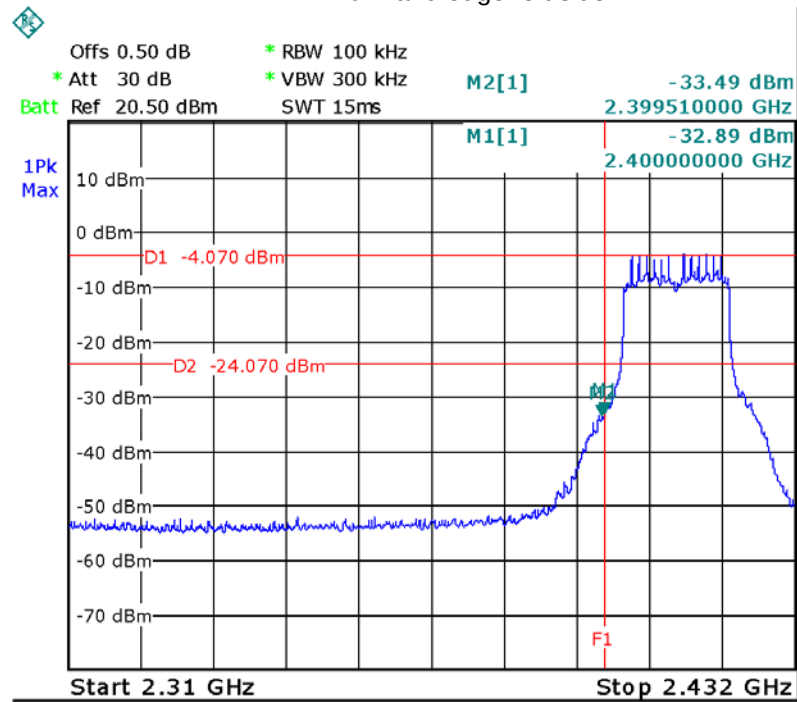
TX 11g: Band edge-left side



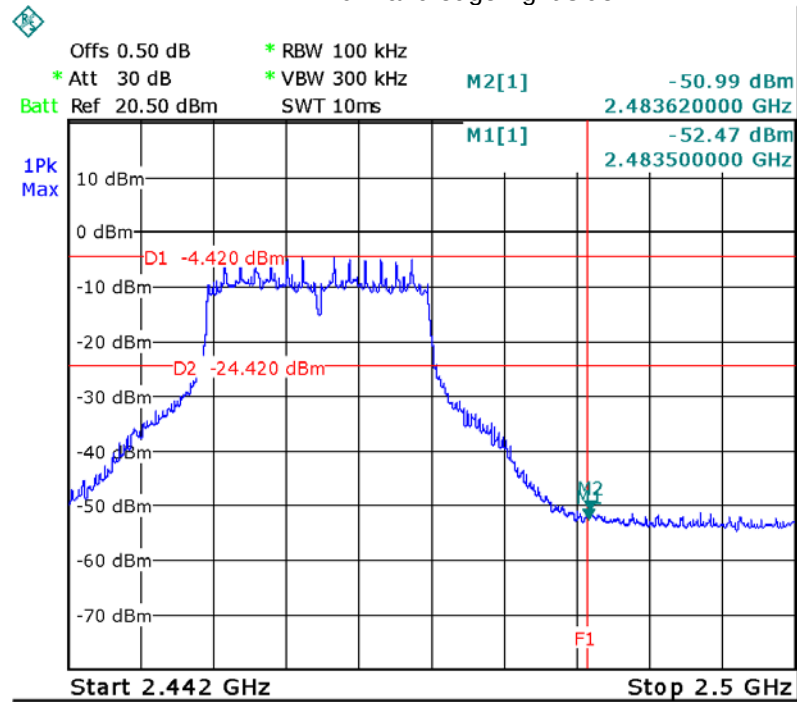
TX 11g: Band edge-right side



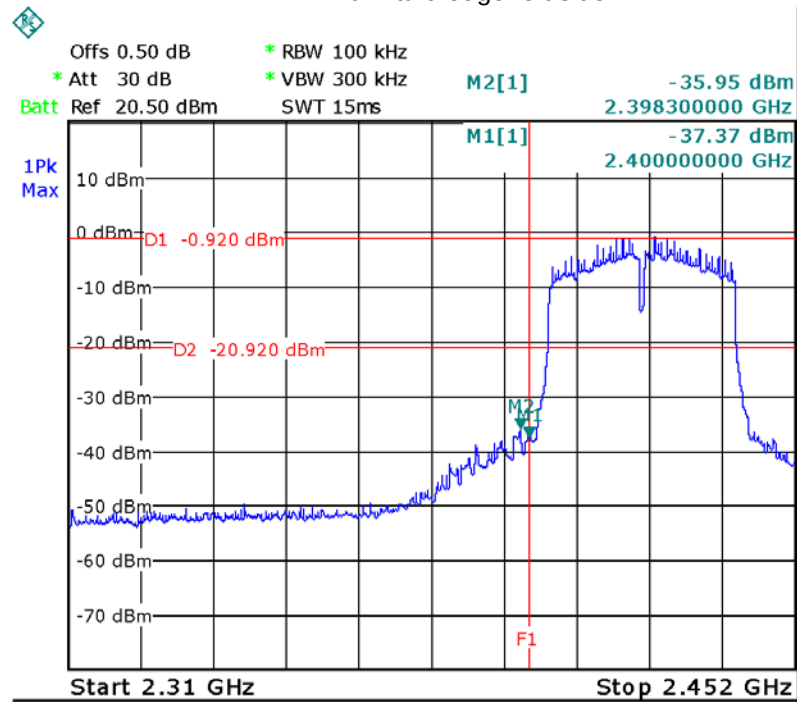
TX 11n HT20: Band edge-left side



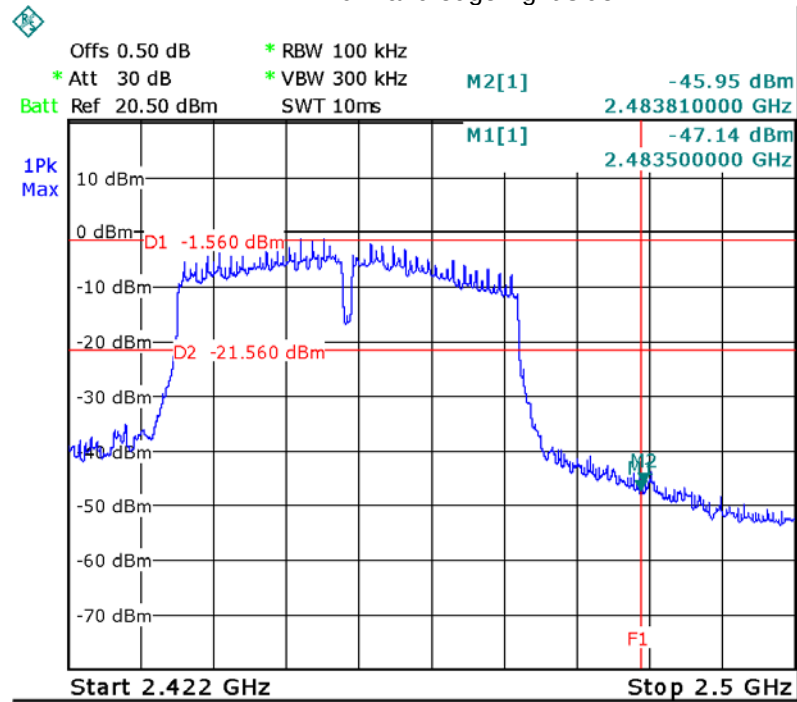
TX 11n HT20: Band edge-right side



TX 11n HT40: Band edge-left side

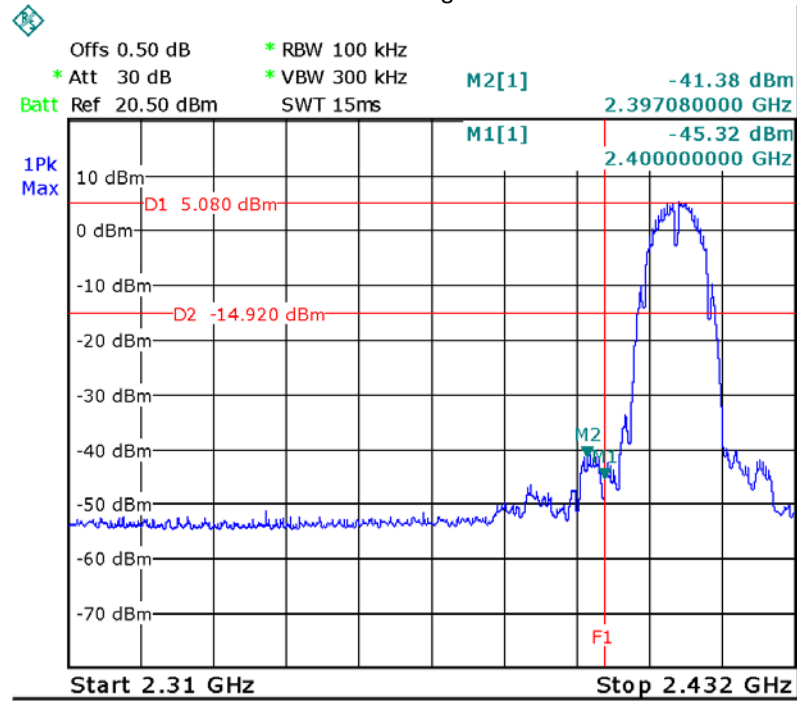


TX 11n HT40: Band edge-right side

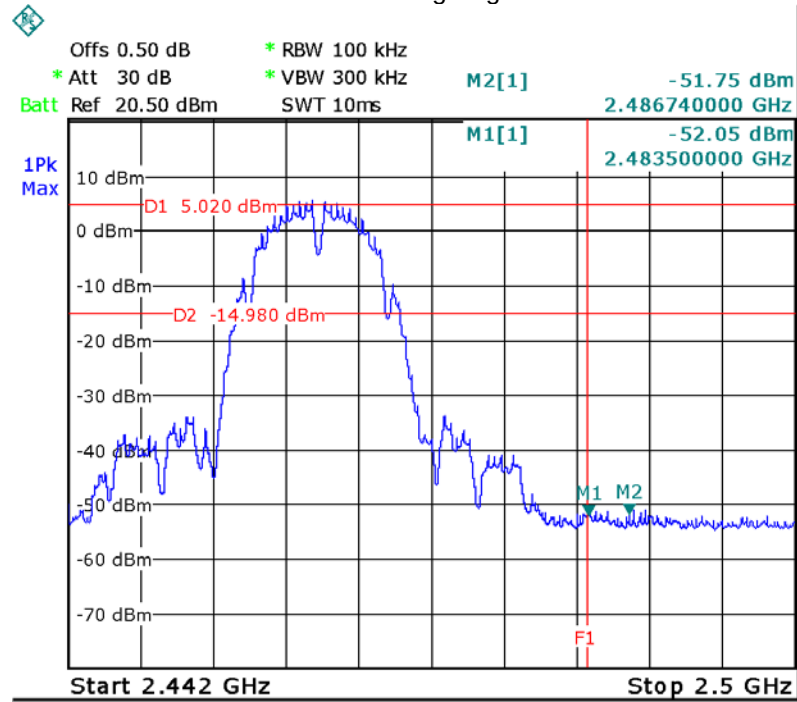


ANT2:

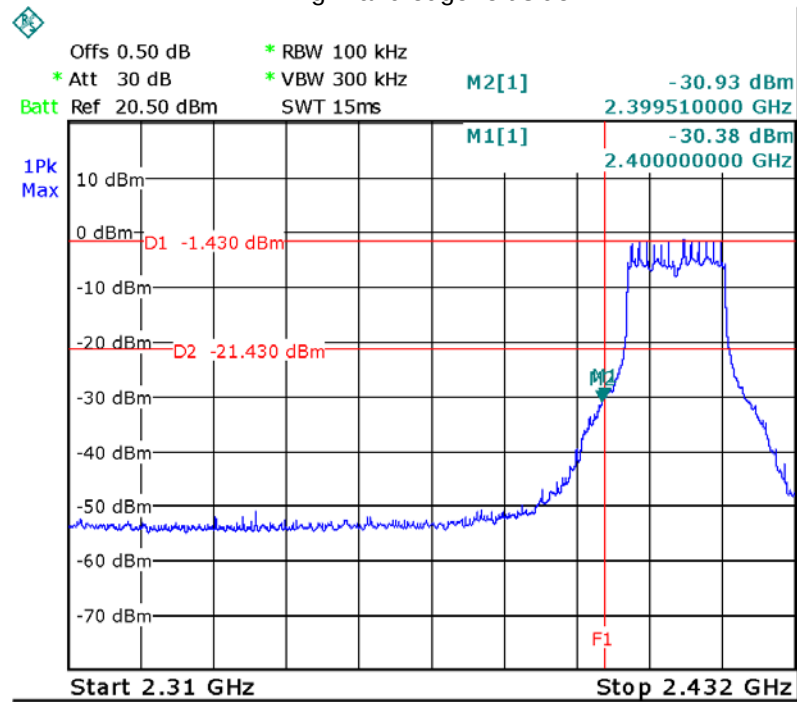
TX 11b: Band edge-left side



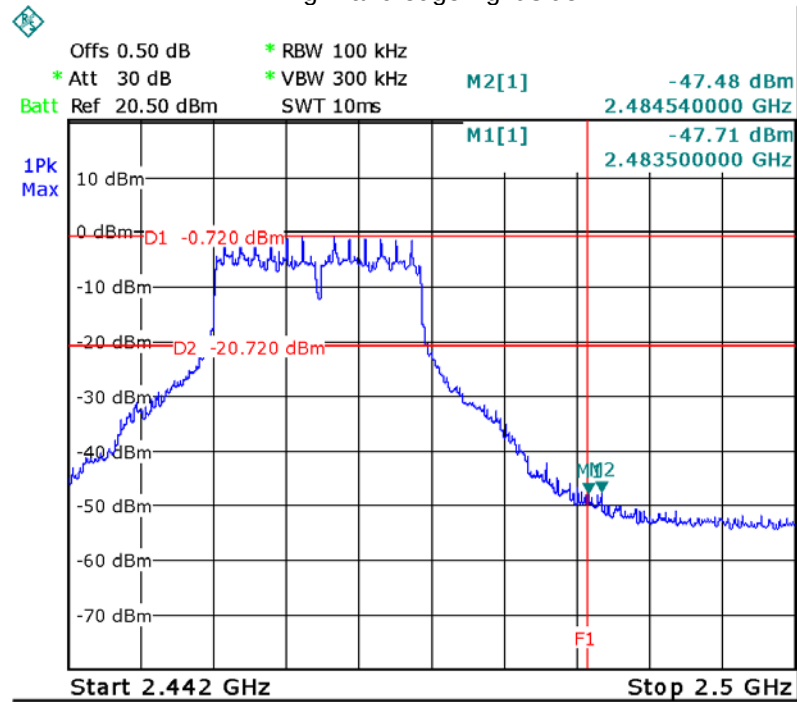
TX 11b: Band edge-right side

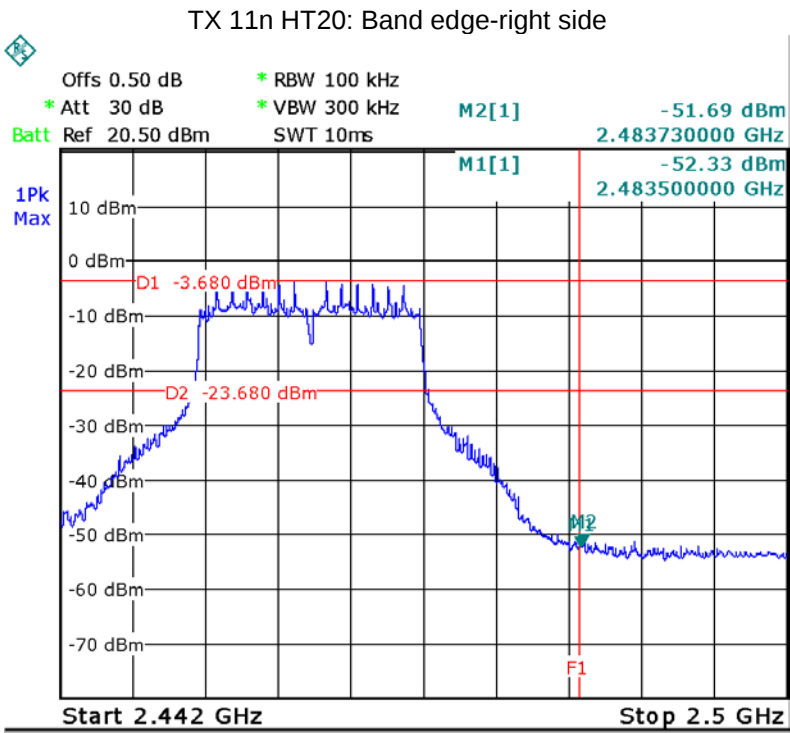
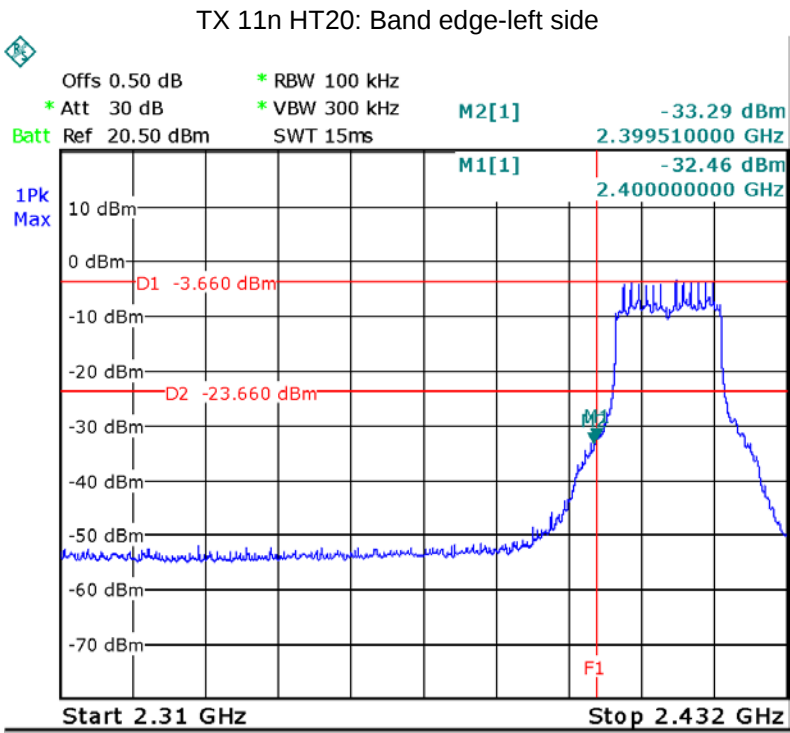


TX 11g: Band edge-left side

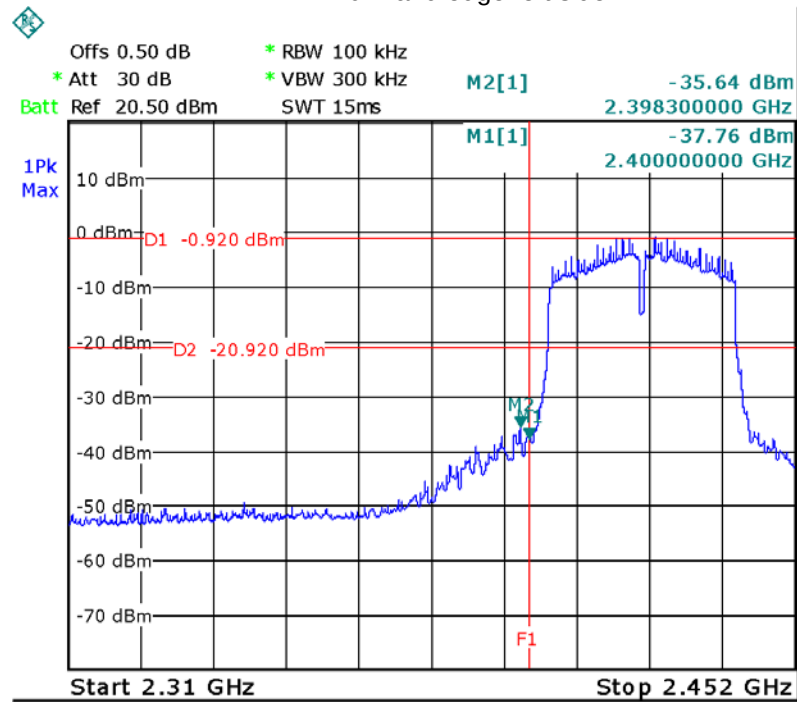


TX 11g: Band edge-right side

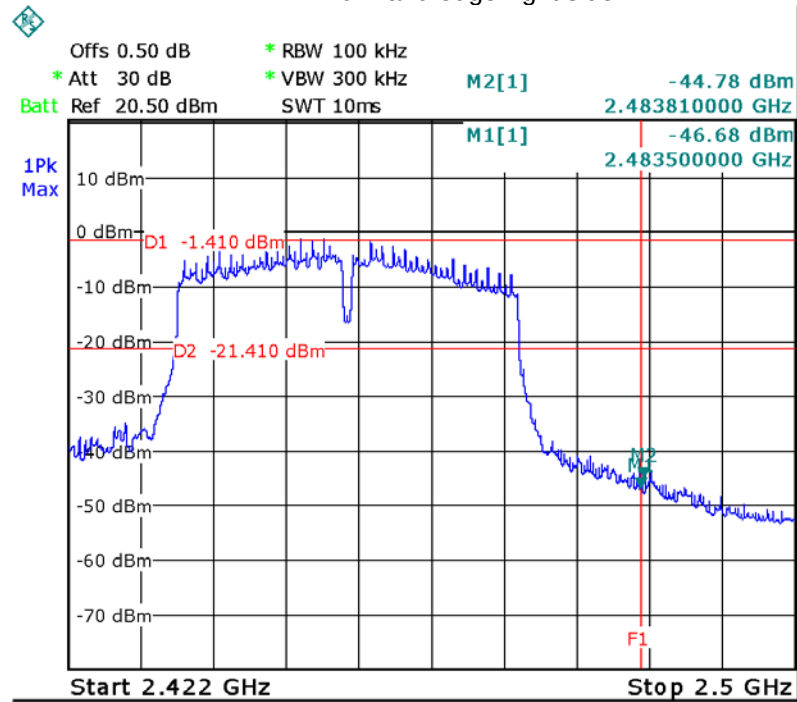




TX 11n HT40: Band edge-left side



TX 11n HT40: Band edge-right side



9 Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

9.1 Test Procedure:

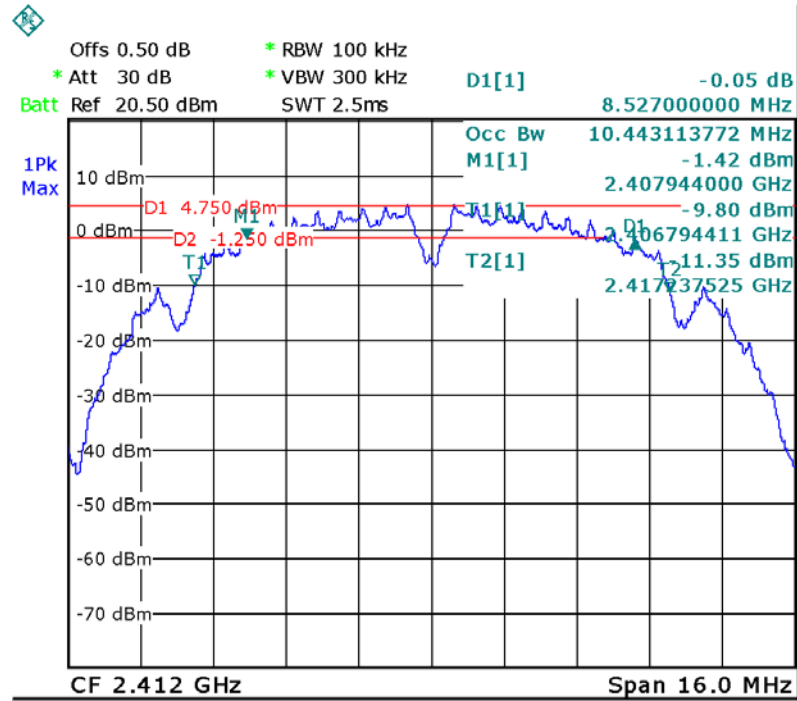
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

9.2 Test Result:

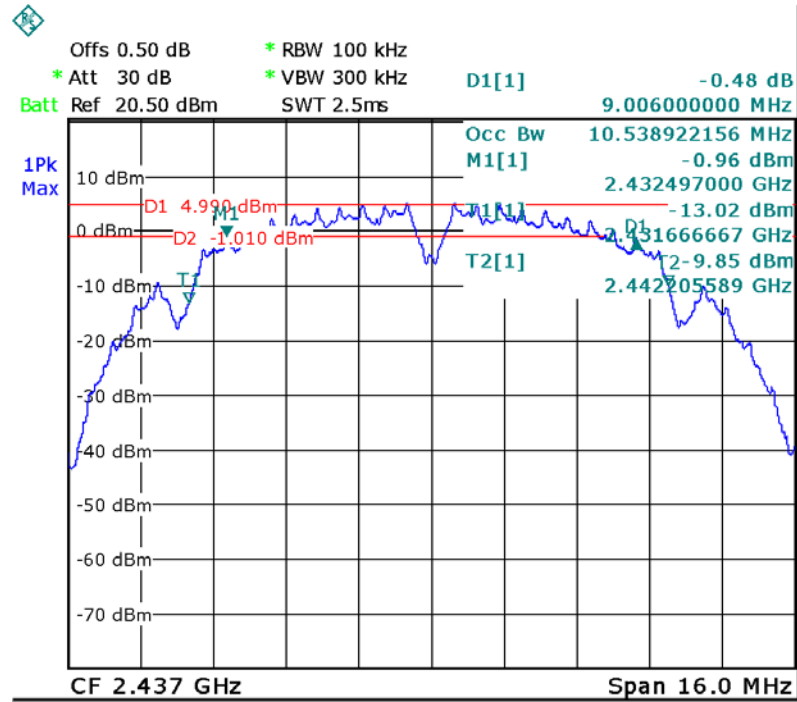
ANT1						
Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	8.527	9.006	8.591	10.443	10.539	10.954
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.218	15.719	16.417	16.467	16.467	16.467
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.407	17.569	17.515	17.677	17.677	17.677
TX 11n HT40	Channel 3	Channel 6	Channel 9	Channel 3	Channel 6	Channel 9
	34.470	34.470	34.910	35.679	35.569	35.569
ANT2						
Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	8.591	8.367	8.399	10.475	10.475	10.954
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.118	16.467	16.417	16.417	16.467	16.467
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.218	17.569	17.461	17.677	17.677	17.677
TX 11n HT40	Channel 3	Channel 6	Channel 9	Channel 3	Channel 6	Channel 9
	33.920	35.020	35.020	35.679	35.569	35.569

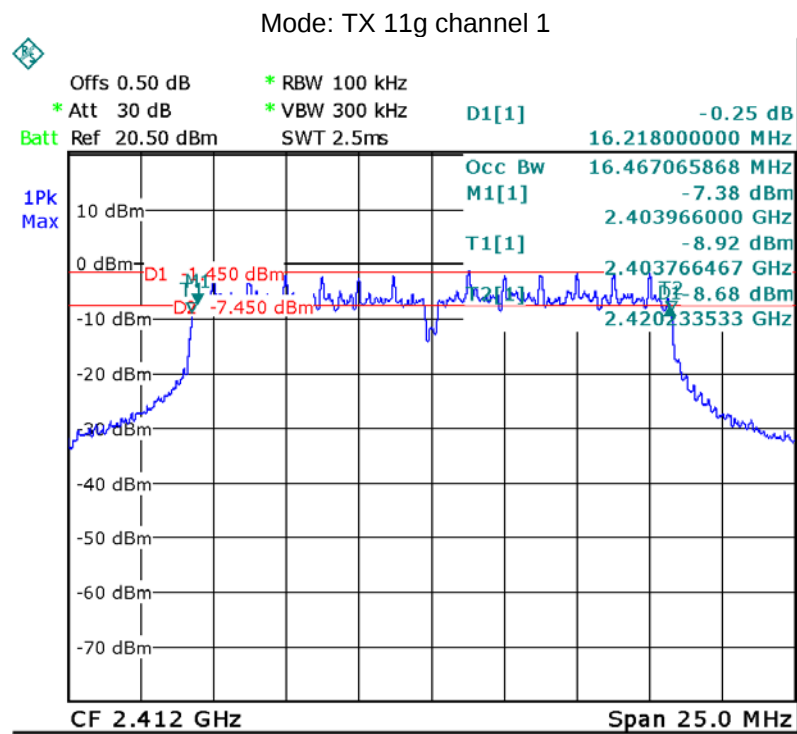
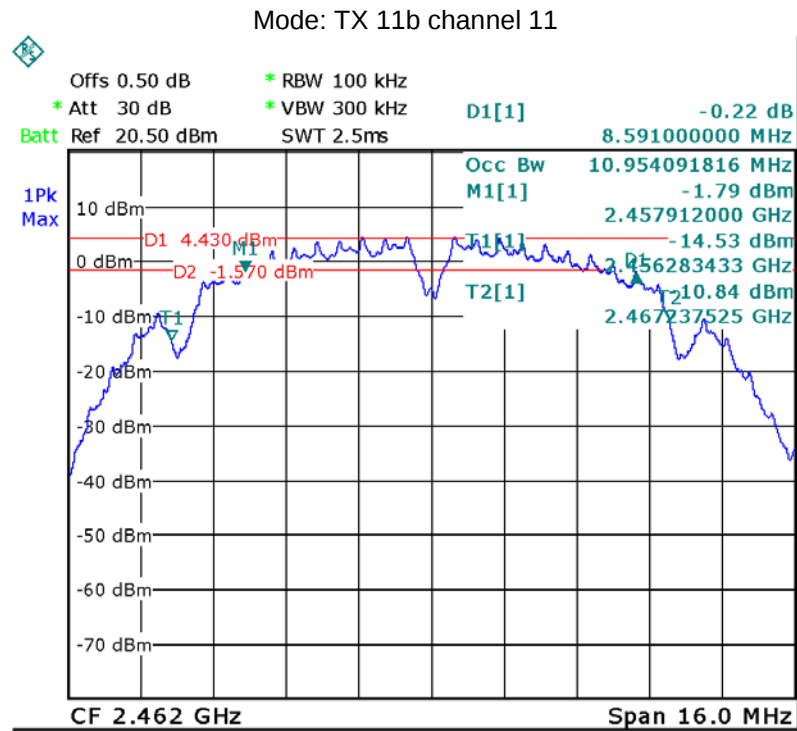
ANT1

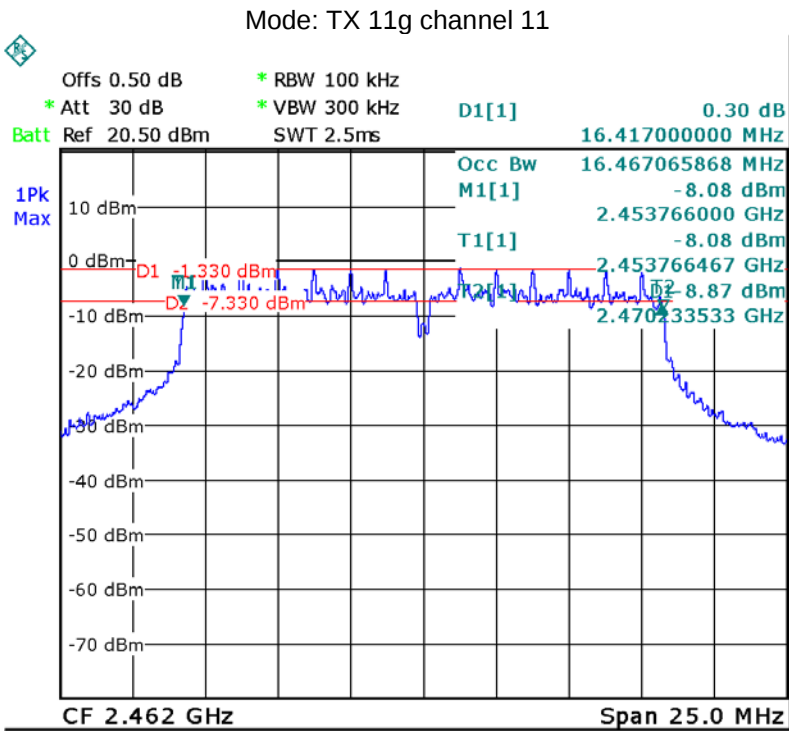
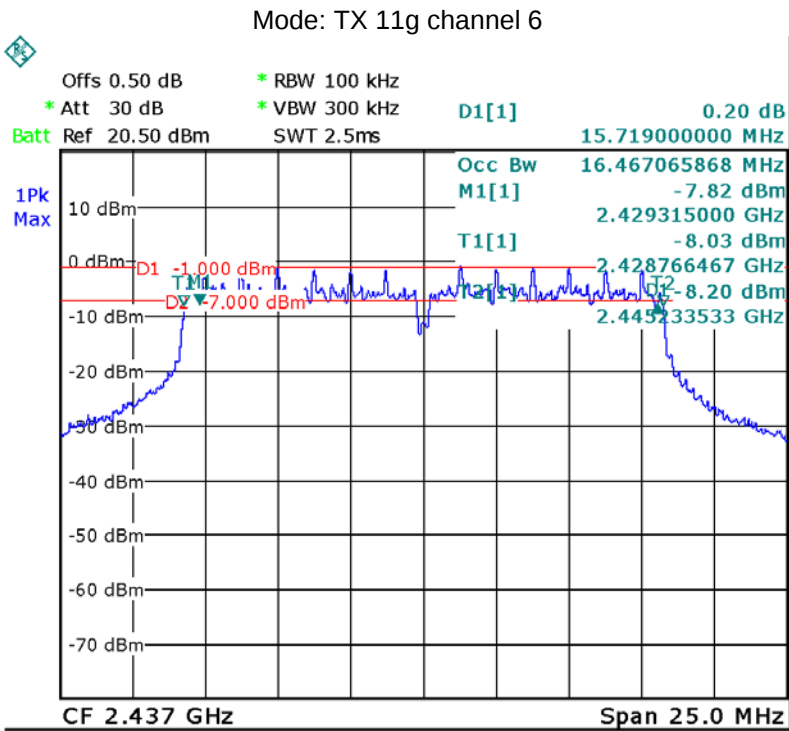
Mode: TX 11b channel 1

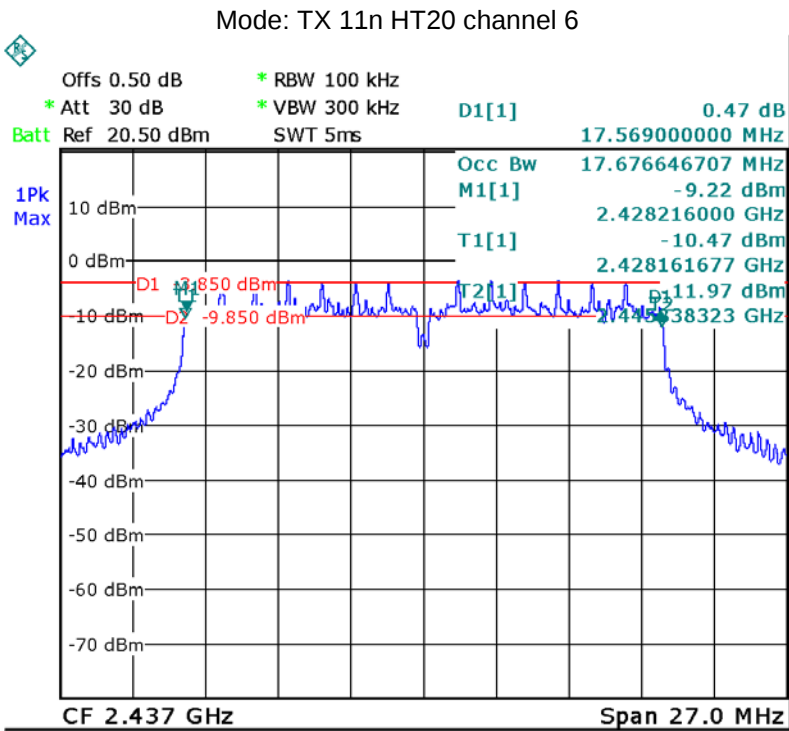
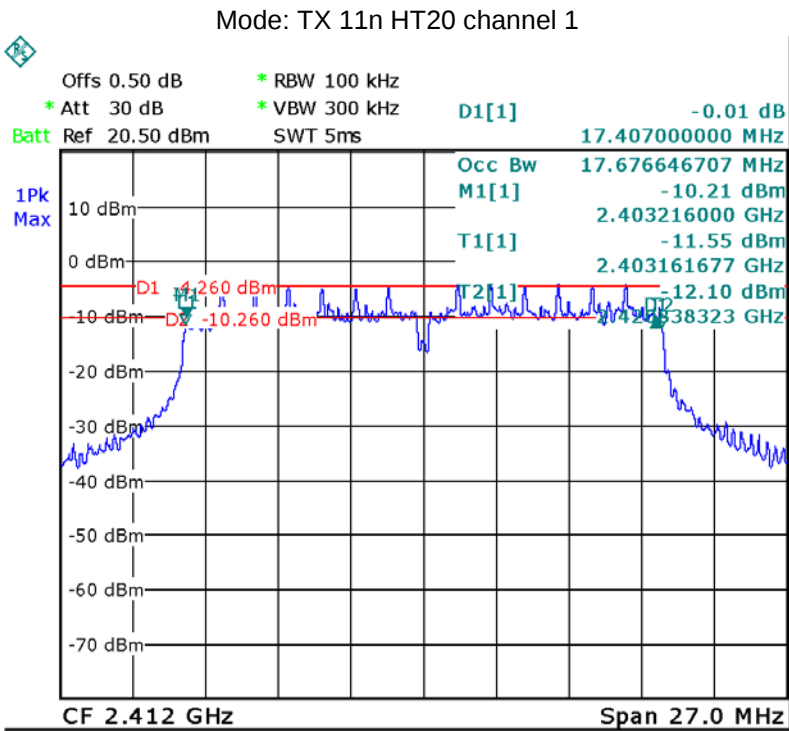


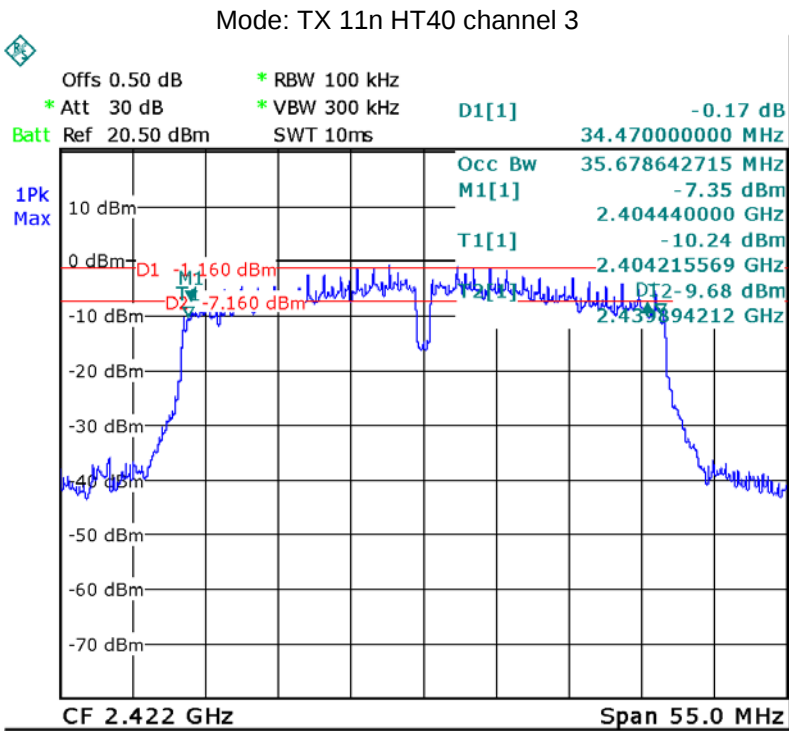
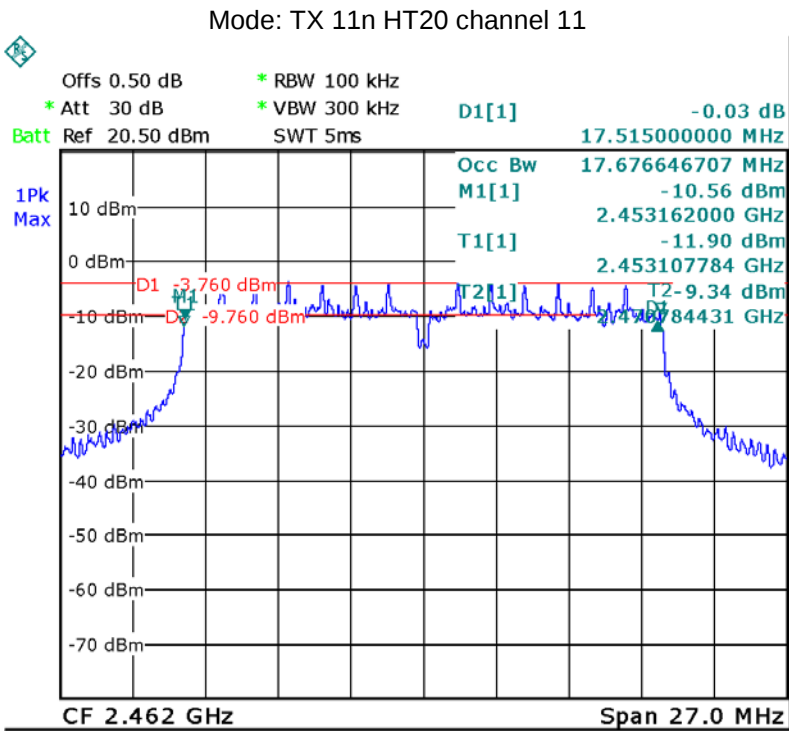
Mode: TX 11b channel 6

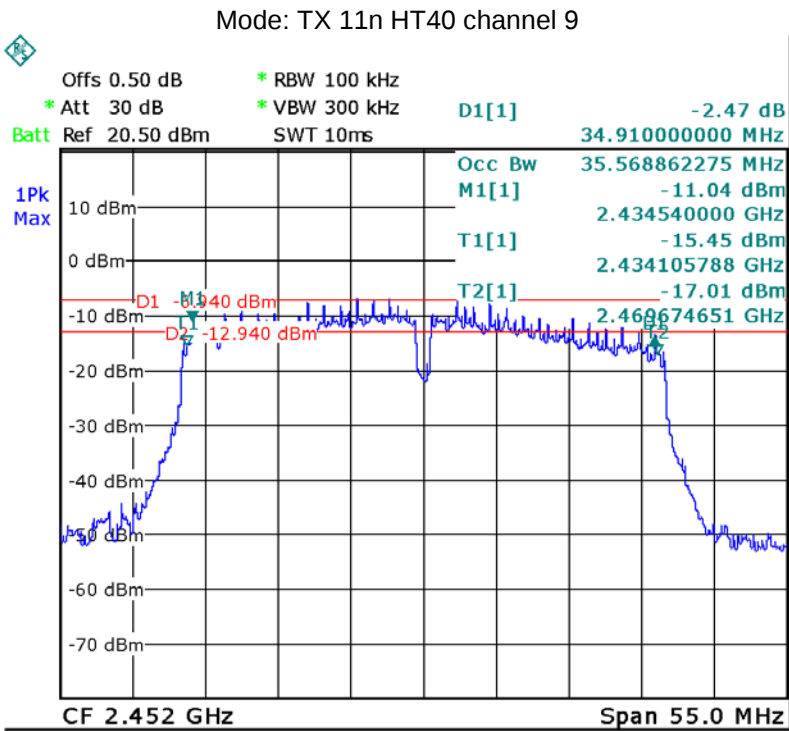
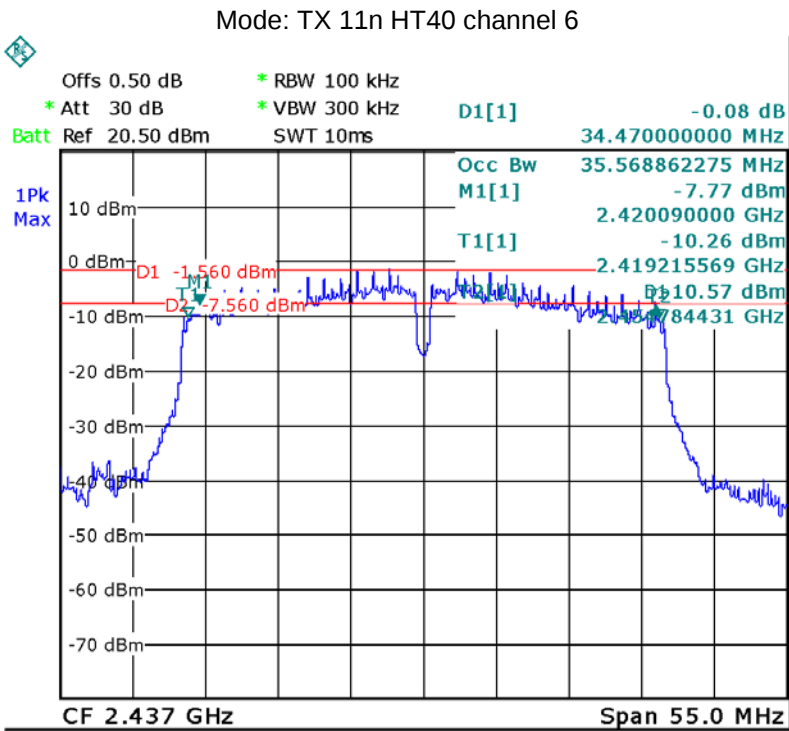






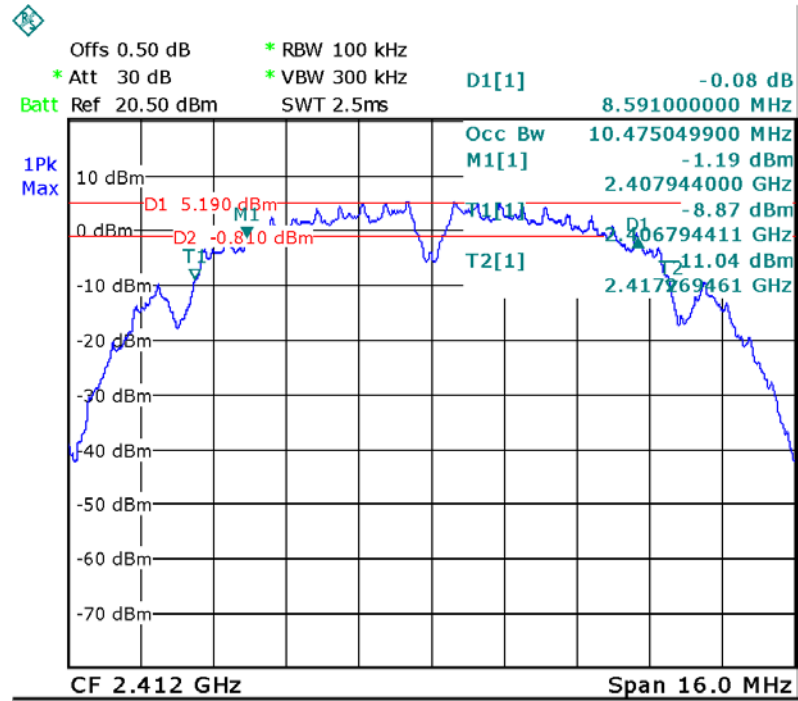




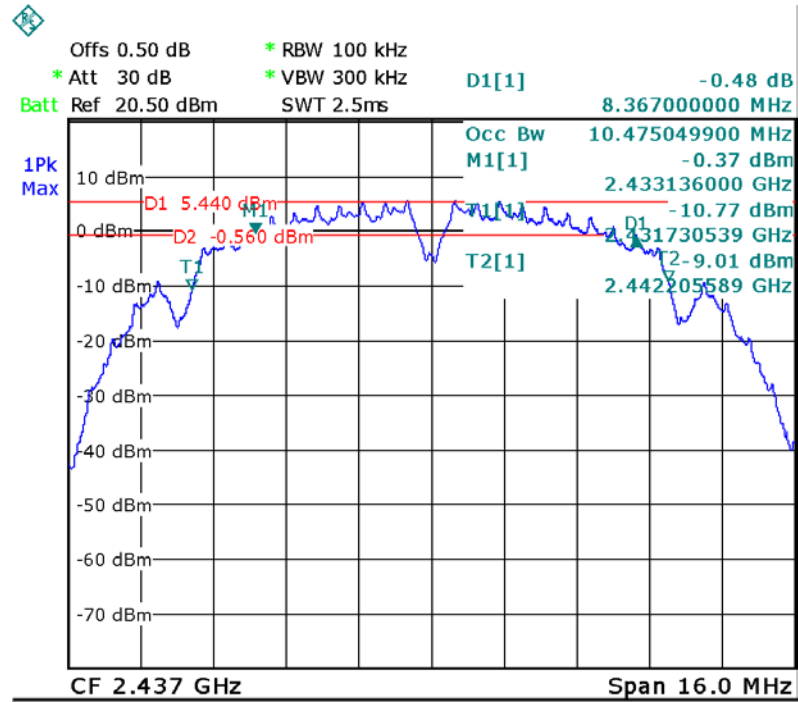


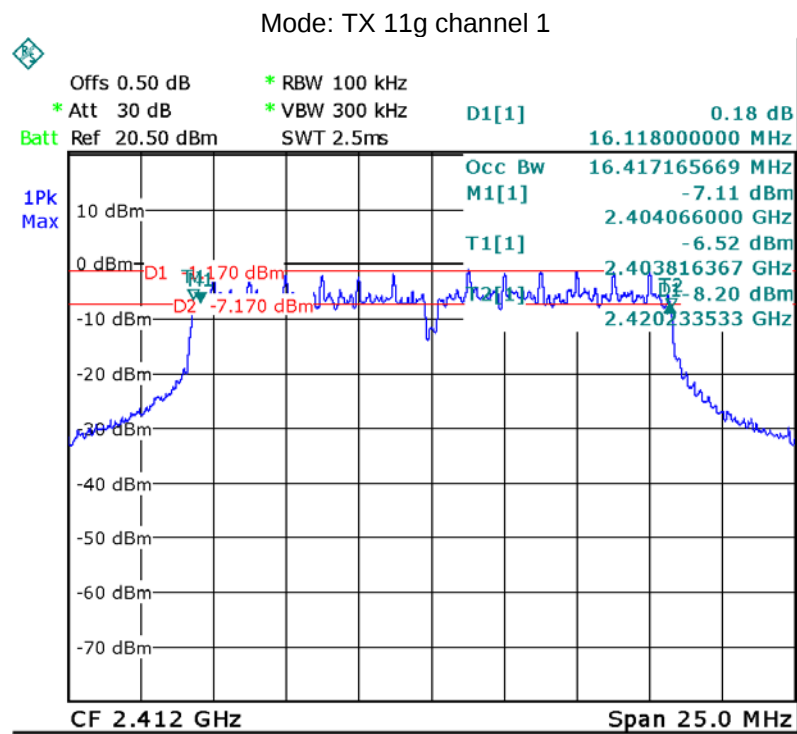
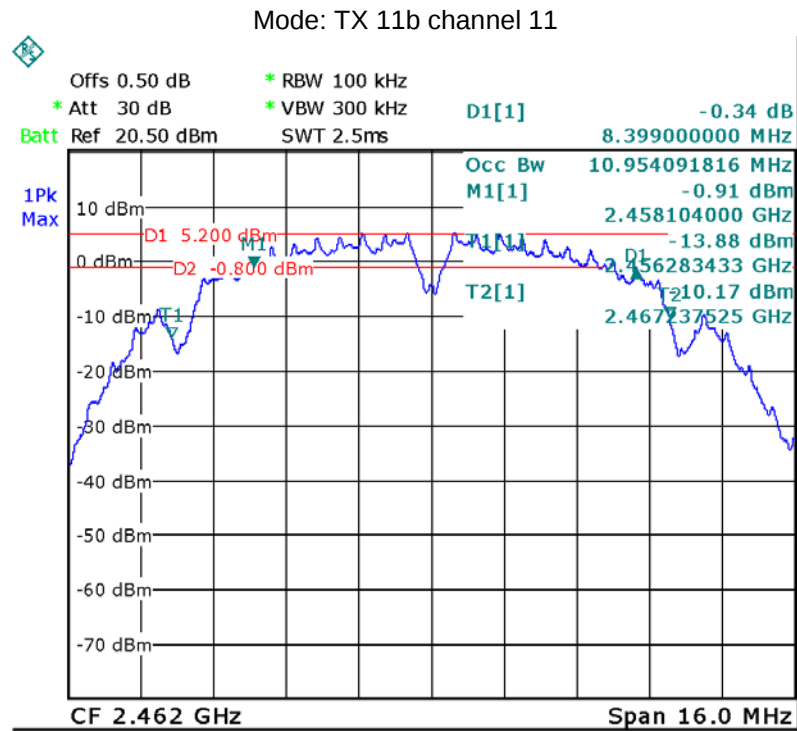
ANT2

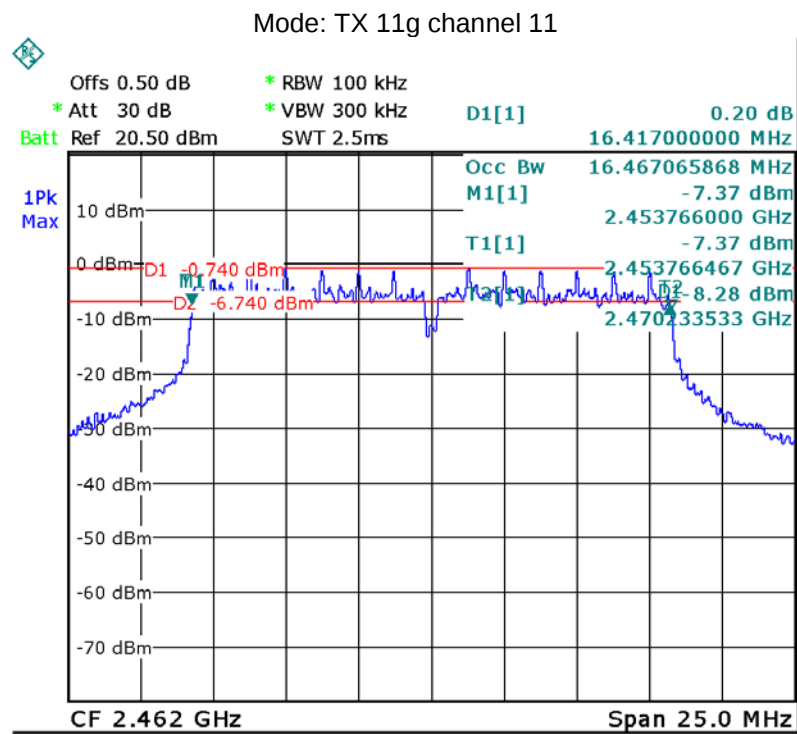
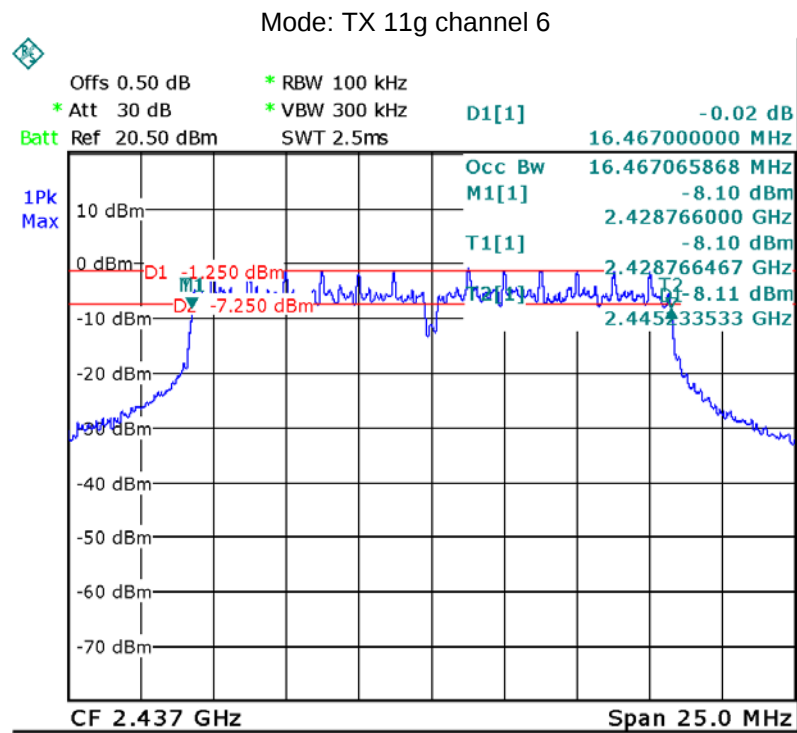
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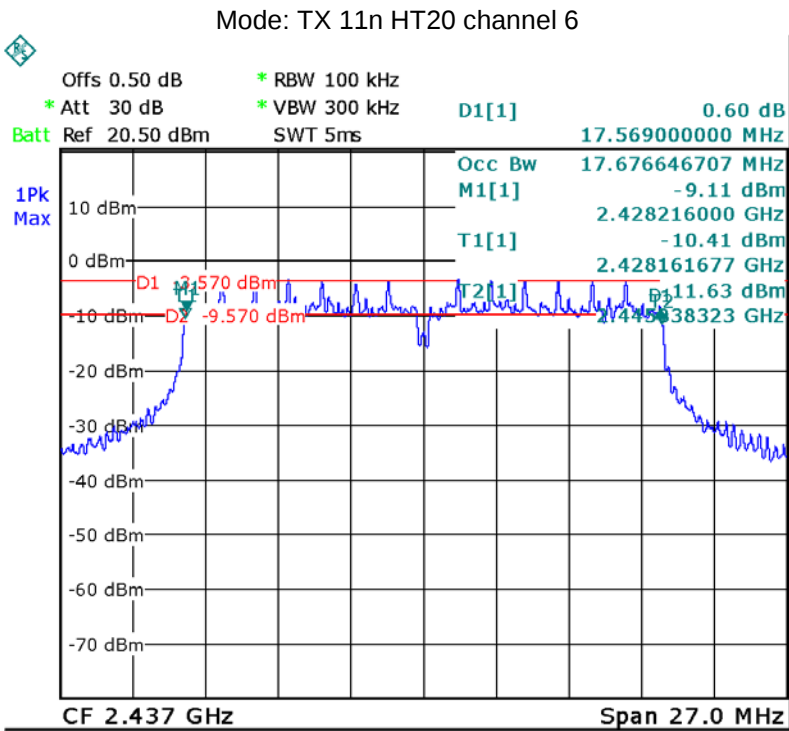
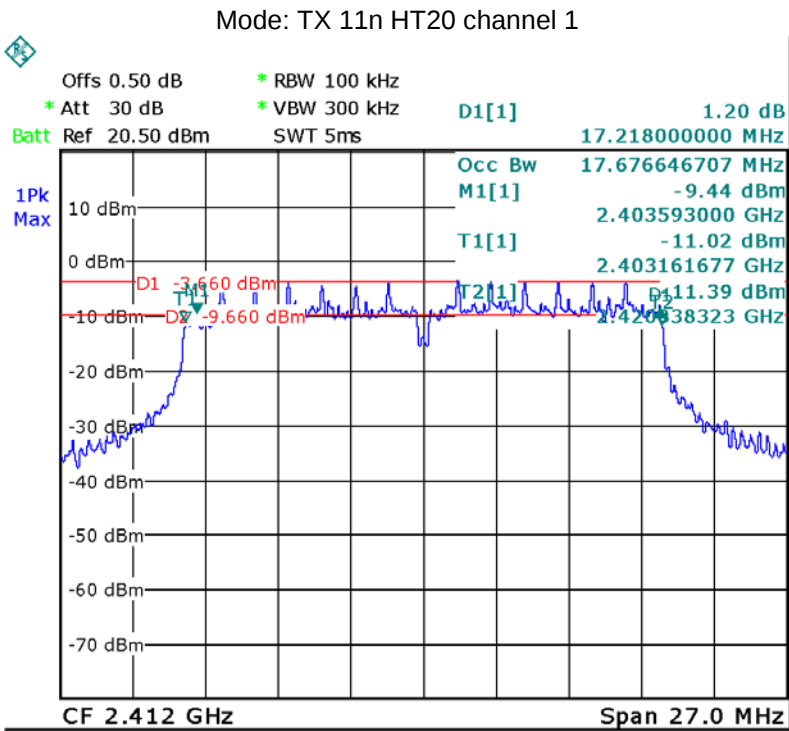


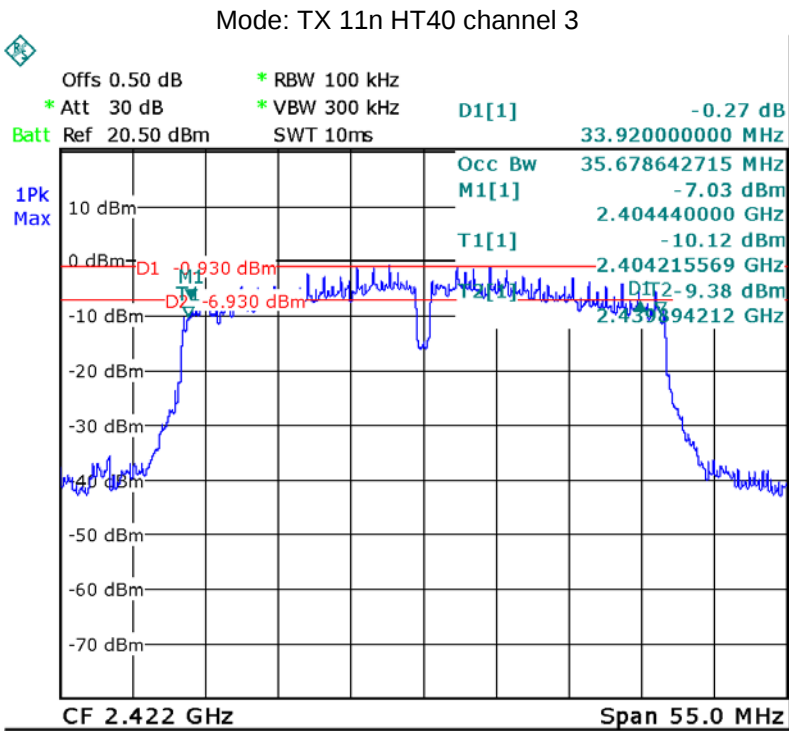
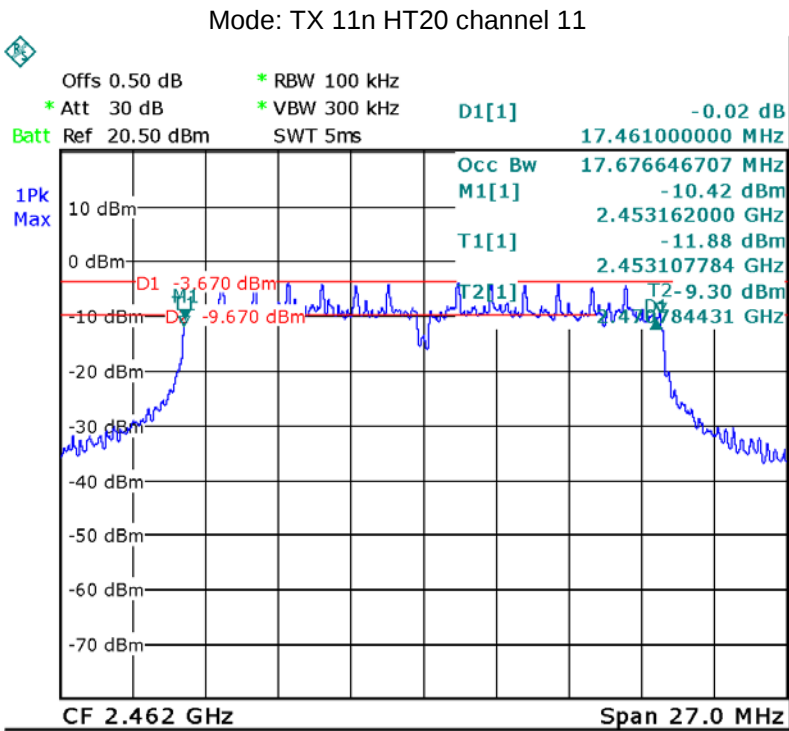
Mode: TX 11b channel 6

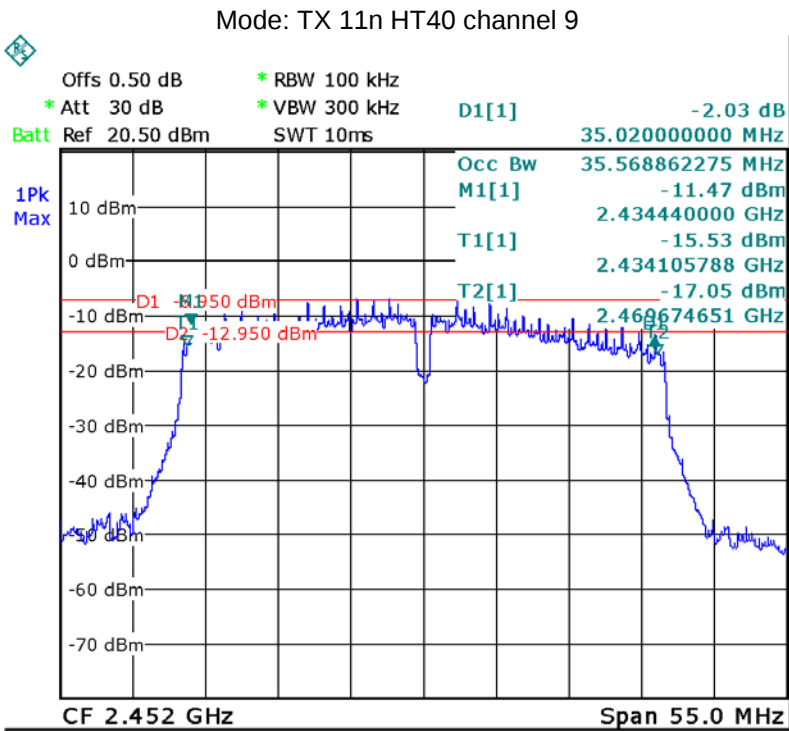
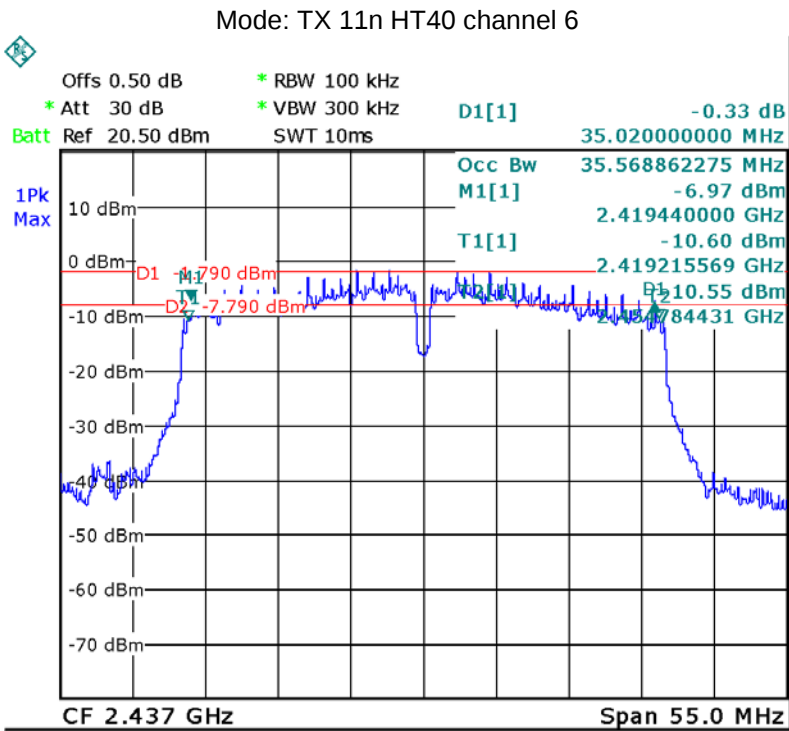












10 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 15.247 Meas Guidance v05r02

10.1 Test Procedure:

558074 D01 15.247 Meas Guidance v05r02

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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

10.2 Test Result:

ANT1		
Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.15	17.27	17.14
Limit: 1W/30dBm		
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.00	17.12	17.22
Limit: 1W/30dBm		
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
14.37	14.34	14.02
Limit: 1W/30dBm		
Test mode :TX 11n HT40		
Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
14.63	14.28	14.17
Limit: 1W/30dBm		

ANT2		
Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.08	17.16	17.03
Limit: 1W/30dBm		
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.22	17.17	17.15
Limit: 1W/30dBm		
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
14.30	14.08	14.09
Limit: 1W/30dBm		
Test mode :TX 11n HT40		
Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
14.31	14.17	14.06
Limit: 1W/30dBm		

ANT1+ANT2		
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
17.35	17.22	17.07
Limit: 1W/30dBm		
Test mode :TX 11n HT40		
Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
17.48	17.24	17.13
Limit: 1W/30dBm		

11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05r02

11.1 Test Procedure:

558074 D01 15.247 Meas Guidance v05r02

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.

11.2 Test Result:

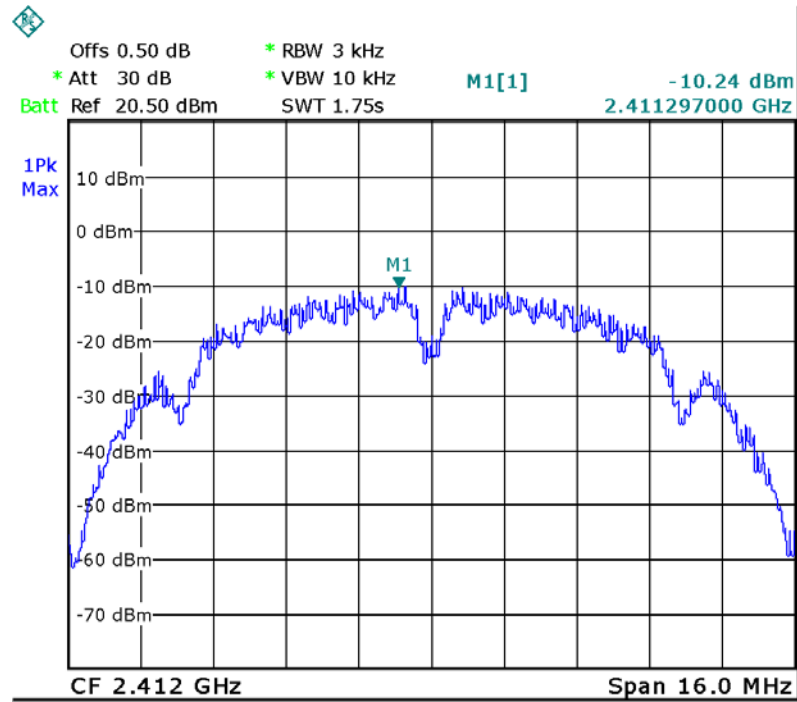
ANT1		
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-10.24	-10.56	-9.81
Limit: 8dBm per 3kHz		
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-17.67	-16.79	-17.36
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-21.32	-21.08	-21.78
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-17.34	-17.57	-18.43
Limit: 8dBm per 3kHz		

ANT2		
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-10.33	-9.57	-9.17
Limit: 8dBm per 3kHz		
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-17.45	-15.99	-16.57
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-20.82	-20.58	-20.44
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-18.07	-17.80	-18.48
Limit: 8dBm per 3kHz		

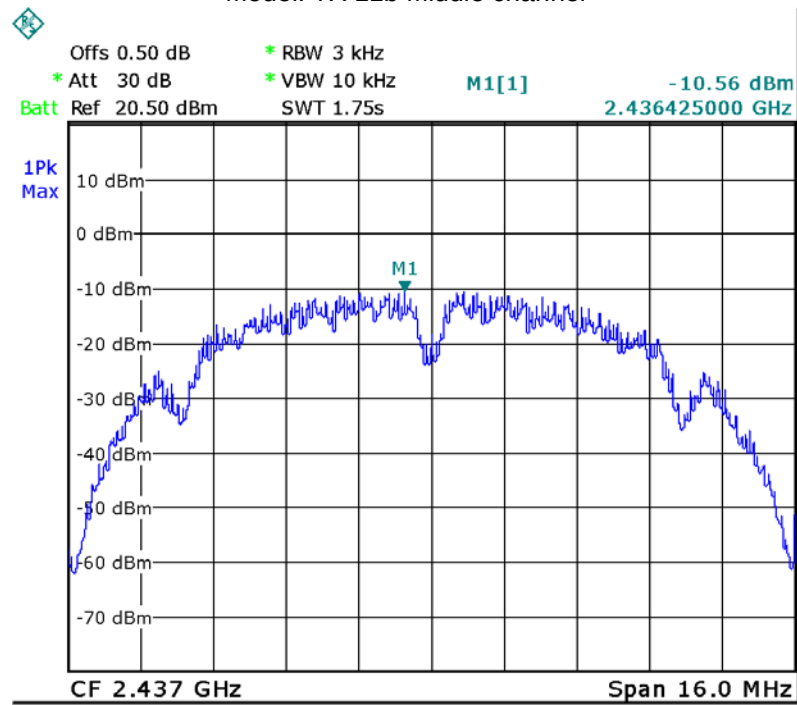
ANT1+ANT2		
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.05	-17.81	-18.05
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-14.68	-14.67	-15.44
Limit: 8dBm per 3kHz		

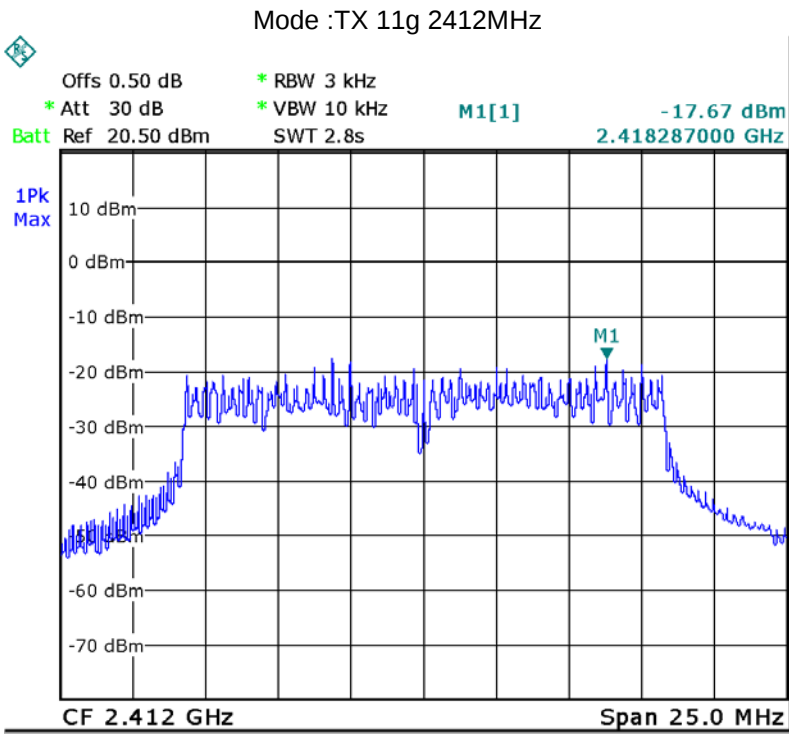
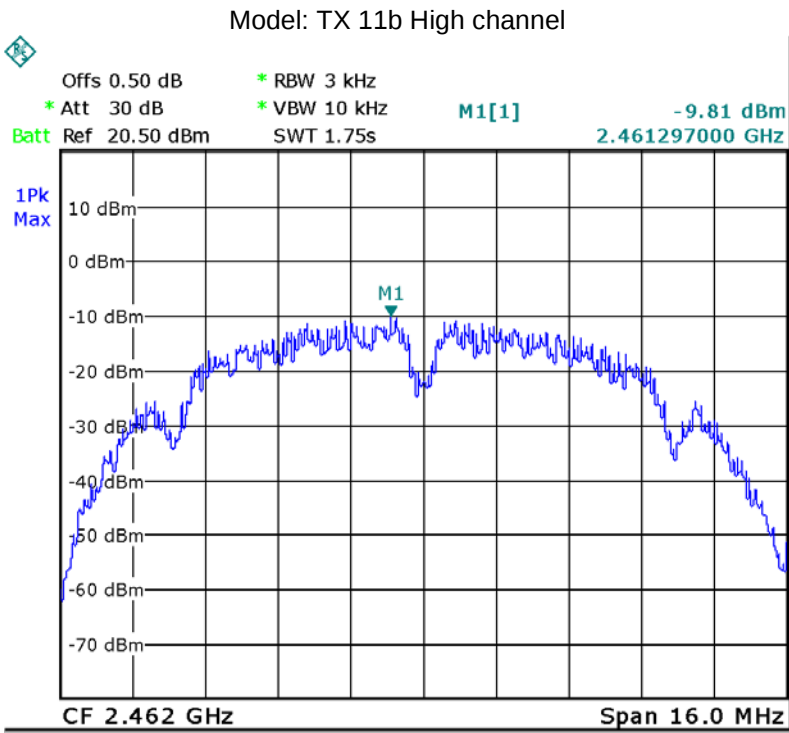
ANT1:

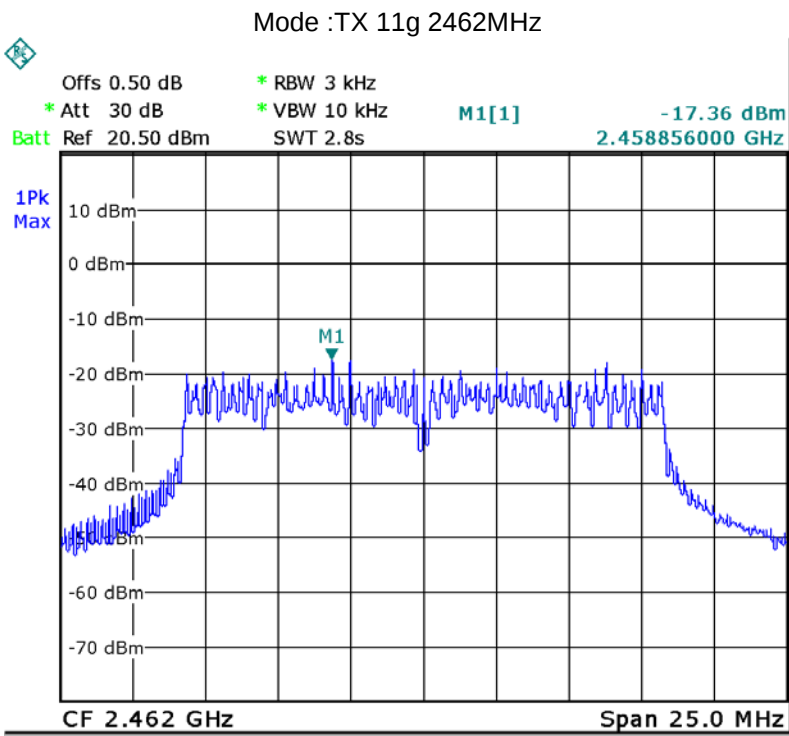
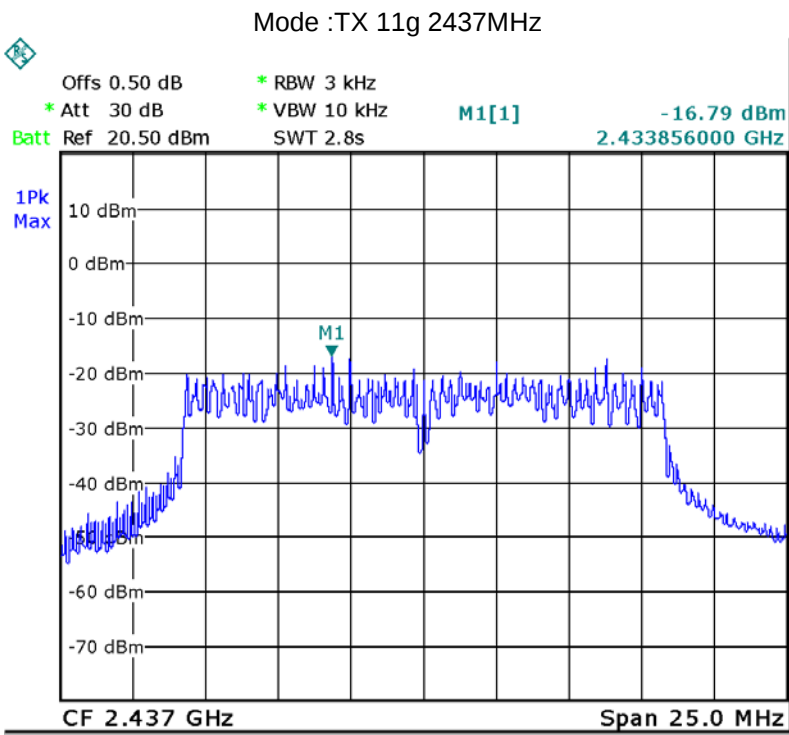
Model: TX 11b Low Channel

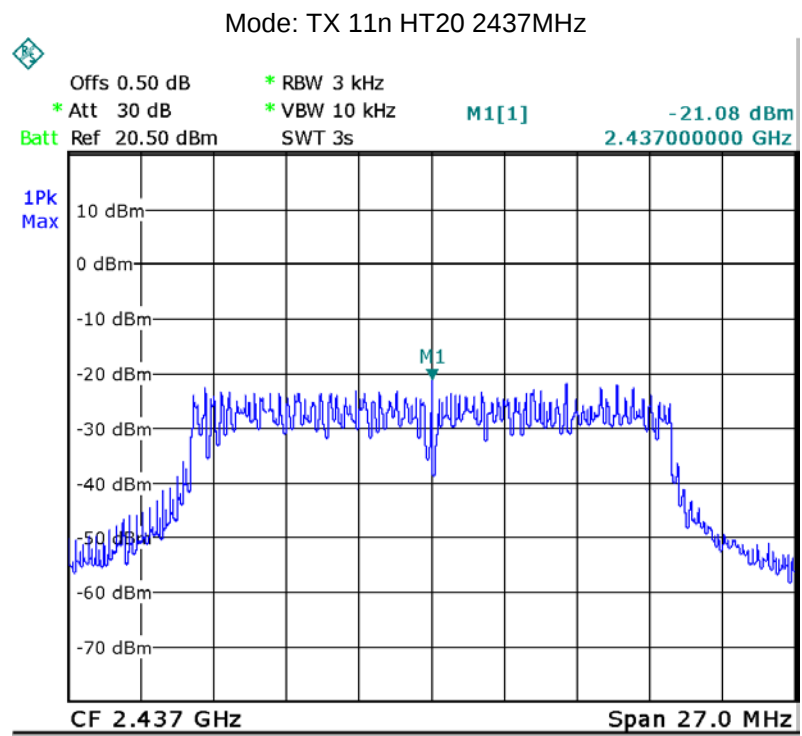
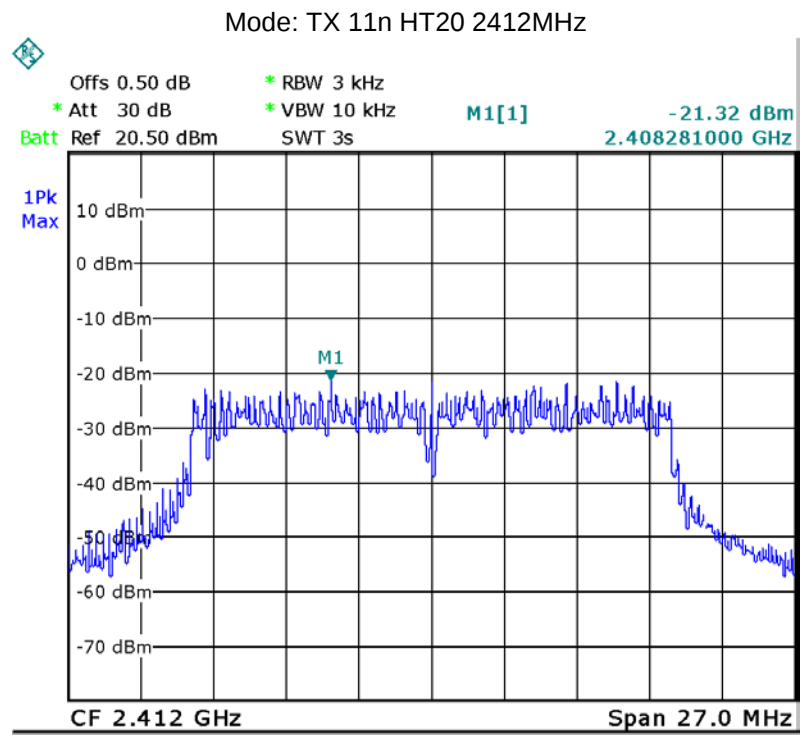


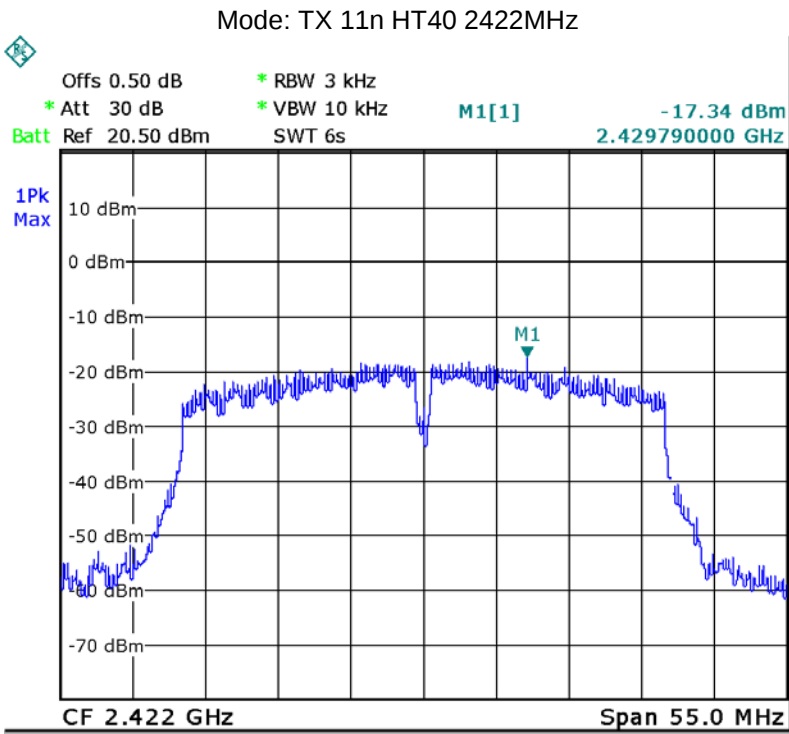
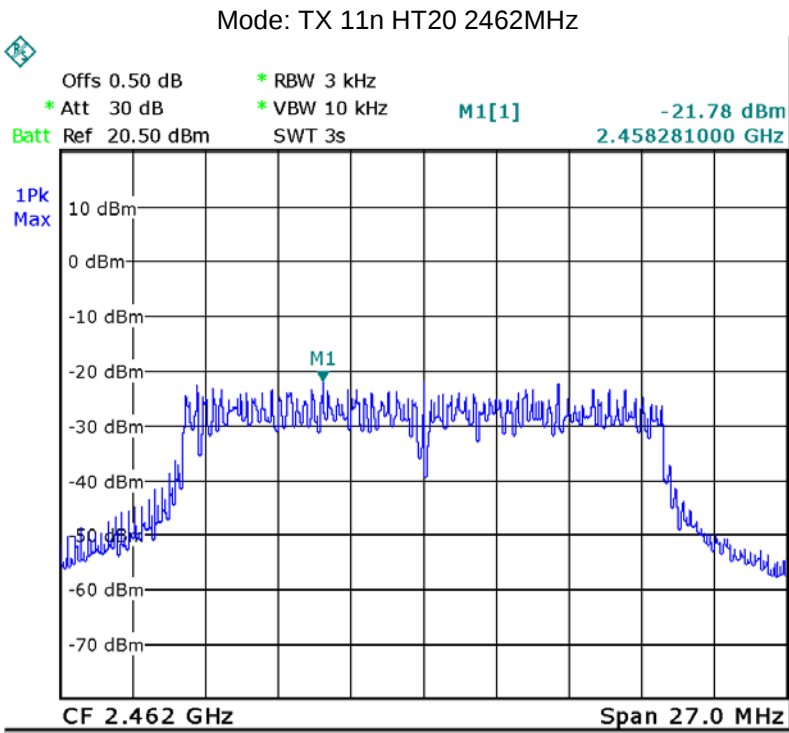
Model: TX 11b Middle channel

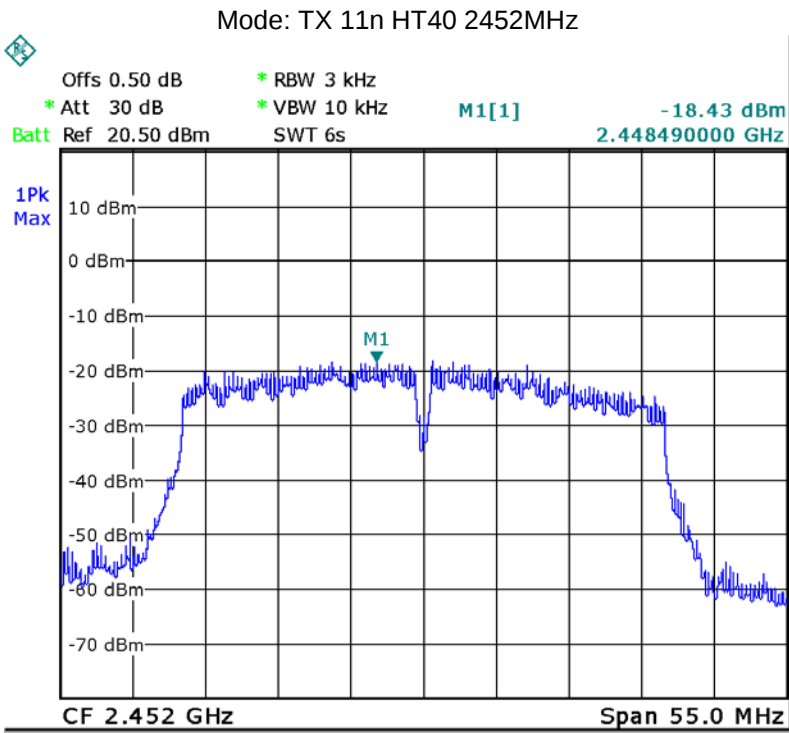
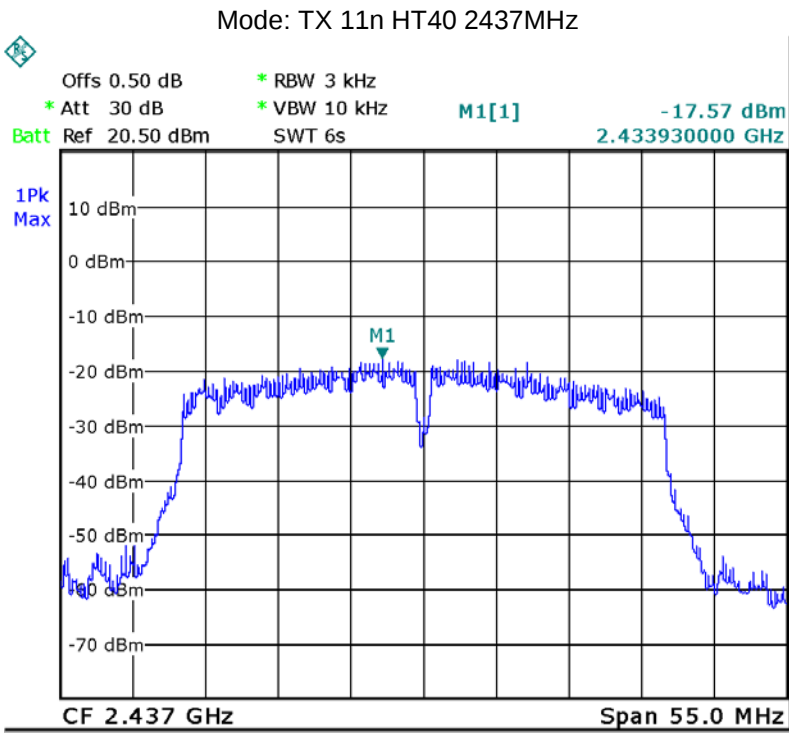






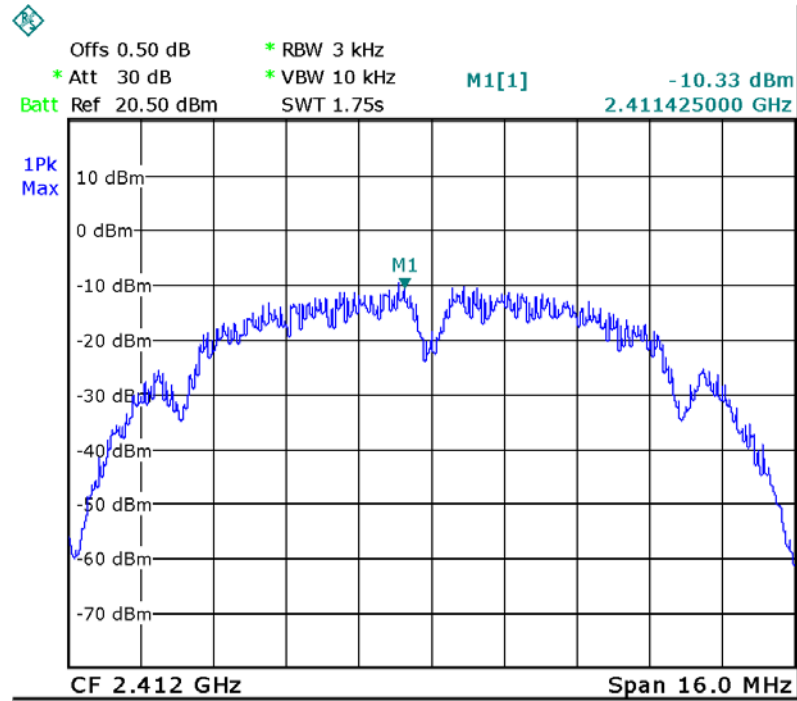




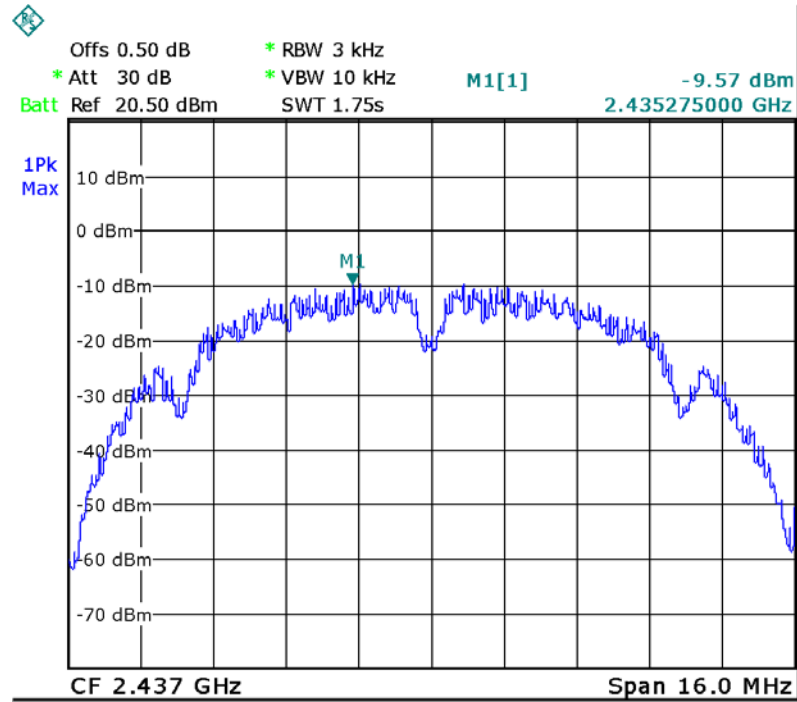


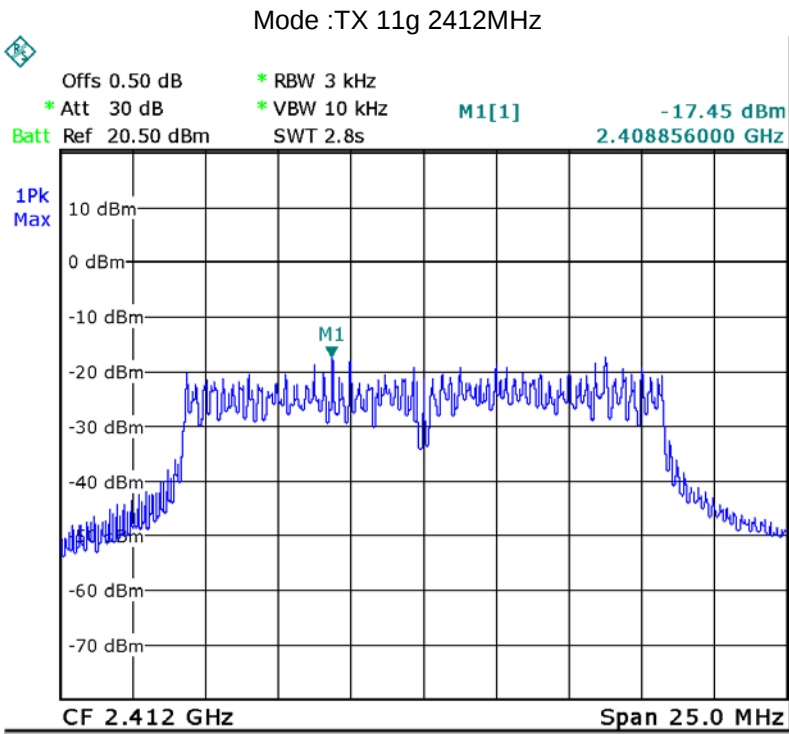
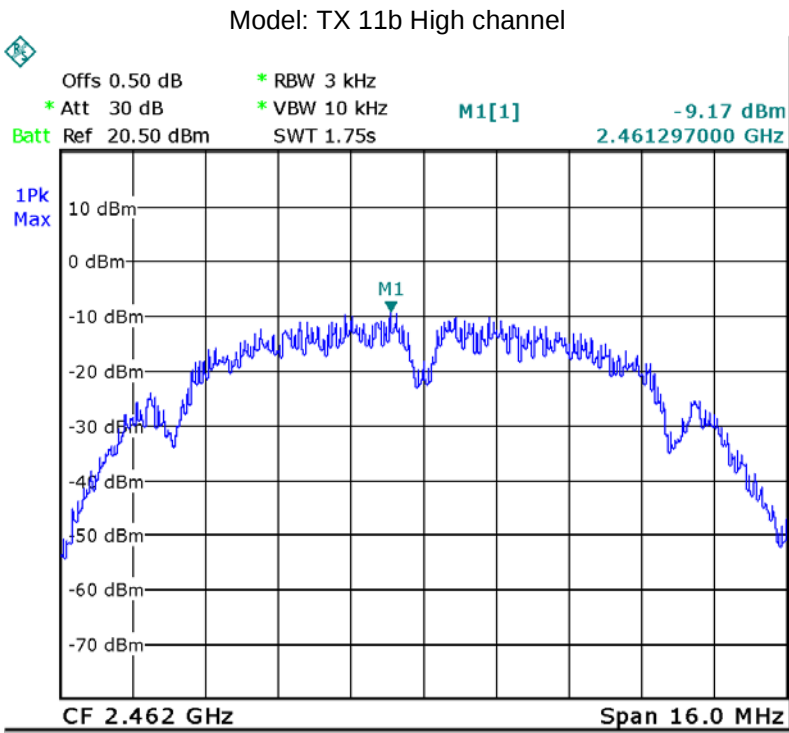
ANT2:

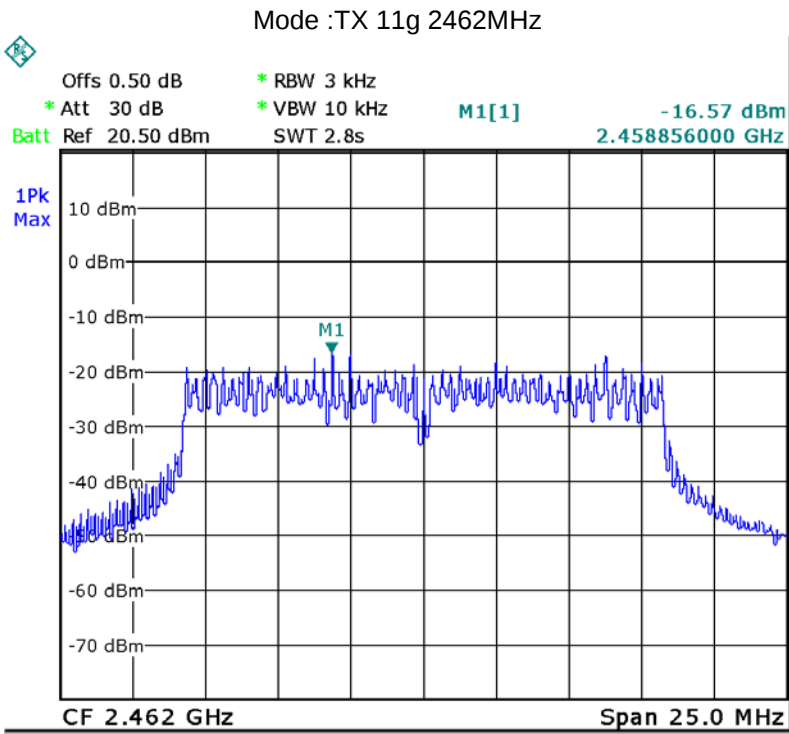
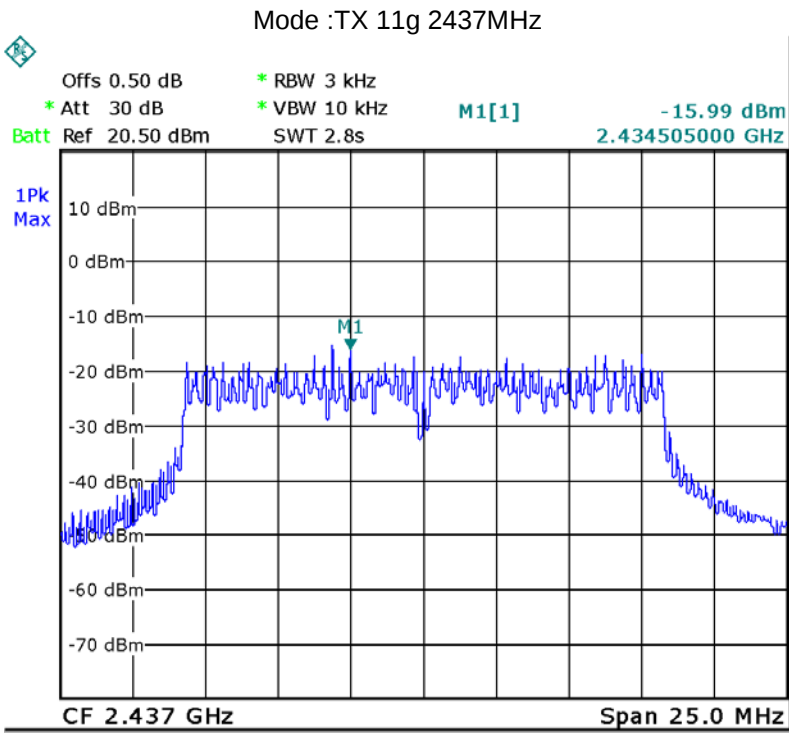
Model: TX 11b Low Channel

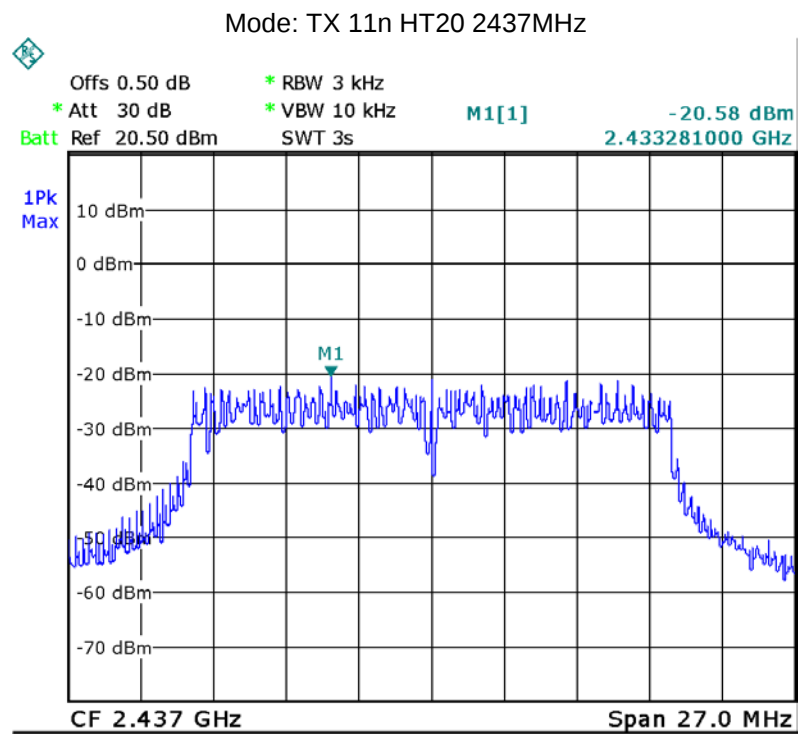
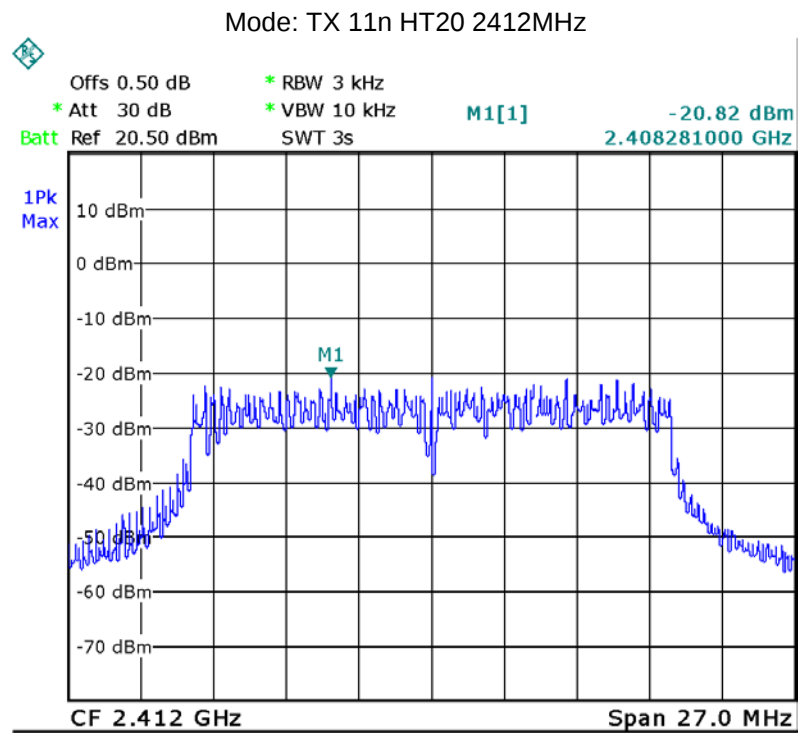


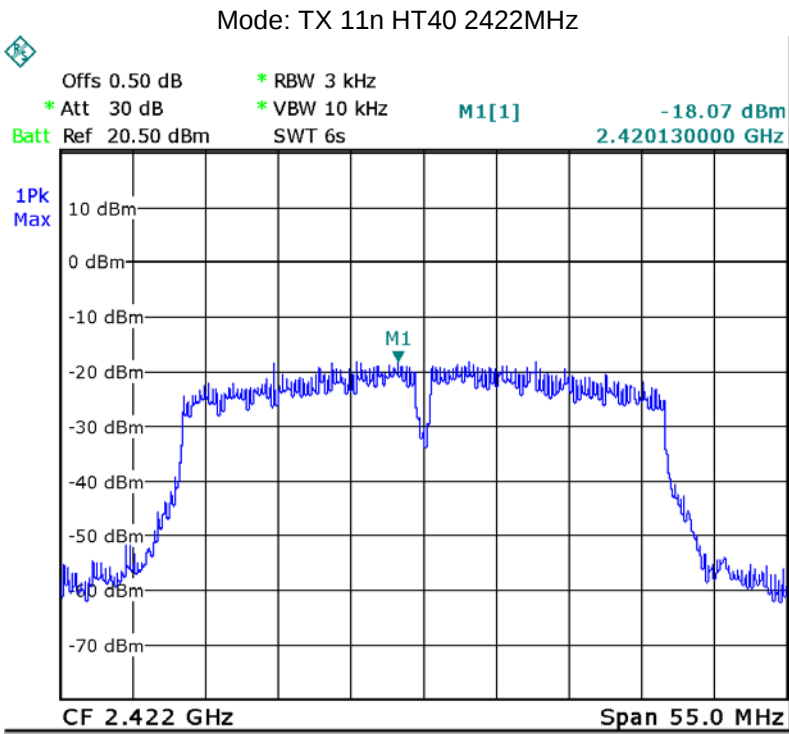
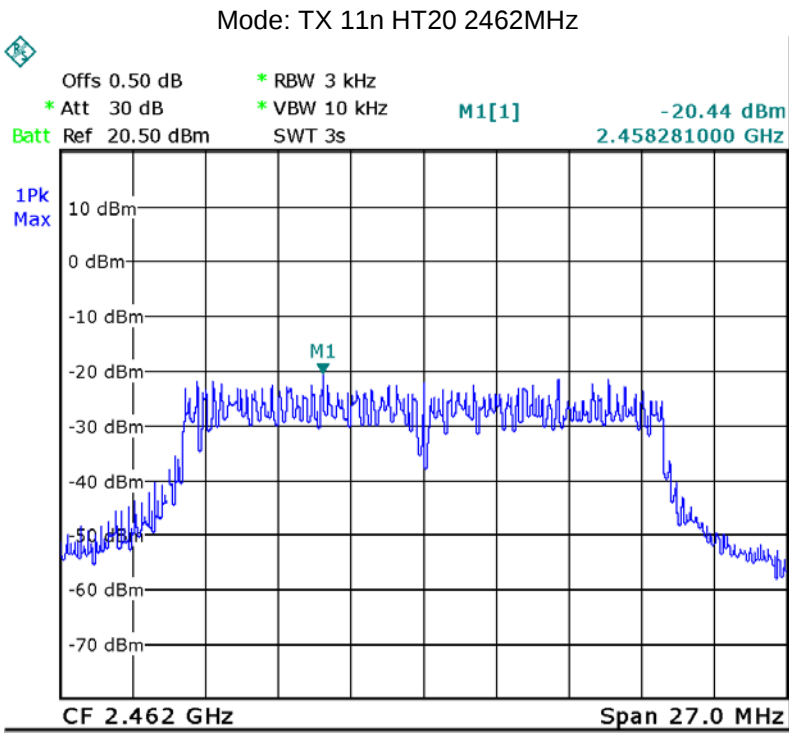
Model: TX 11b Middle channel

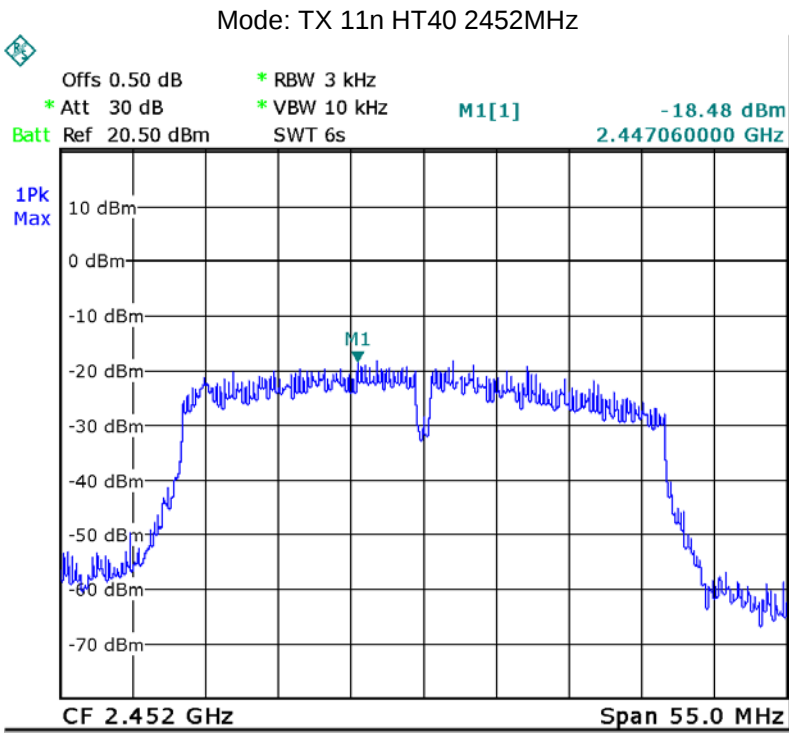
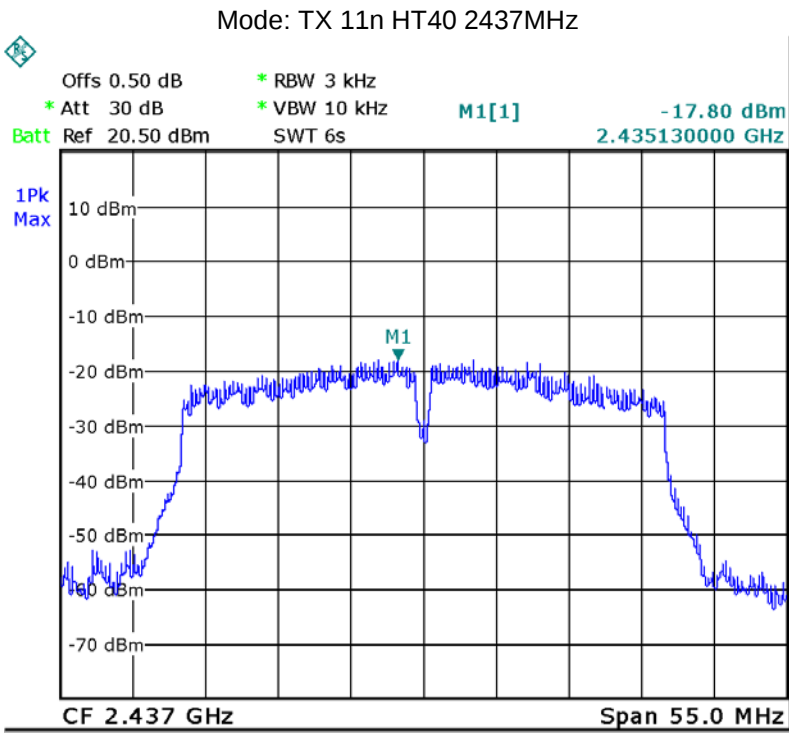












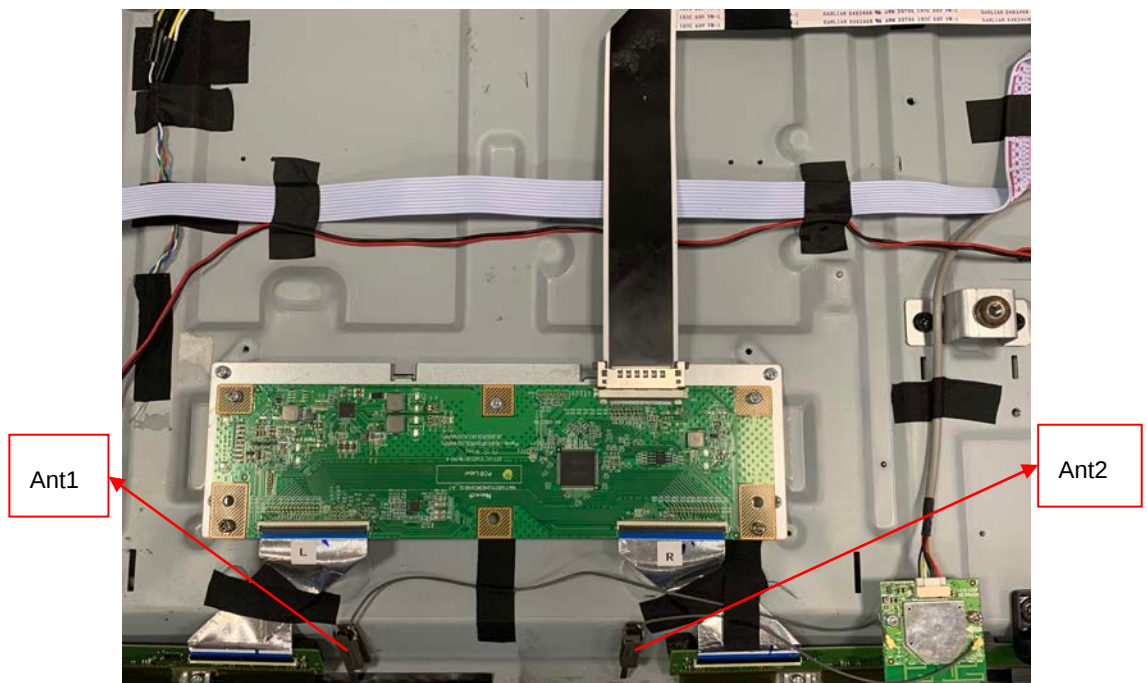
12 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 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.

Result:

The EUT have two Integrated Antenna for 2.4G WiFi, meets the requirements of FCC 15.203.



13 FCC ID: 2AT85-RNSMU7036-B RF Exposure Report

Note: Please refer to RF Exposure Report: WTU19S07049275W002.

14 Photographs - Test Setup Photos

Note: Please refer to Photos: RNSMU7036-B_Test Setup Photos.

15 Photographs - Constructional Details

15.1 External Photos

Note: Please refer to Photos: RNSMU7036-B_ External Photos.

15.2 Internal Photos

Note: Please refer to Photos: RNSMU7036-B_ Internal Photos.

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