

TEST REPORT

Reference No...... : WTD22D07138960W002 V1
FCC ID : 2AEPIBLACKZ
Applicant..... : COLOMBIANA DE COMERCIO S.A.
Address..... : Car. 43E No 8-71, Medellin, Colombia
Manufacturer : Sichuan Koobee Communication Equipment Co., Ltd.
Address..... : 3 Floor, Building 2, 69 Gangyuan Road West Section, Lingang Development Zone, Yibin City, Sichuan Province, China
Product..... : Smartphone
Model(s) : Black Z
Brand Name : Kalley
Standards..... : FCC CFR47 Part 15.247
Date of Receipt sample : 2022-07-12
Date of Test : 2022-07-12 to 2022-07-22
Date of Issue..... : 2022-09-01
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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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD22D07138960W002	2022-07-12	2022-07-12 to 2022-07-22	2022-08-25	Original	-	Replaced
WTD22D07138960W002 V1	2022-07-12	2022-07-12 to 2022-07-22	2022-09-01	Version 1	Updated	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Smartphone
Model(s):	Black Z
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 2/4/5/7
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:	KS7Q_01
Software Version:	Kalley_BALCK_V01_20220620
Highest frequency (Exclude Radio):	2.3GHz
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): 16.51dBm BLE: -3.82dBm
Type of Modulation:	WiFi: CCK, OFDM BLE:GFSK
Antenna installation:	WiFi: internal permanent antenna BLE: internal permanent antenna
Antenna Gain:	WiFi(2.4G): 1.0dBi BLE: 1.0dBi
Ratings:	Battery DC 3.87V, 4900mAh DC 5.0V==2.0A charging from adapter (Adapter Input: 100-240V~50/60Hz 0.35A)
Adapter:	Manufacturer: Guangdong Beicom Electronics Co.,Ltd Model No.: U312E0A050200

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	2021-07-26	2022-07-25
2.	LISN	R&S	ENV216	100115	2021-07-26	2022-07-25
3.	Cable	Top	TYPE16(3.5M)	-	2021-07-26	2022-07-25
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	2022-04-28	2023-04-27
2	Amplifier	Agilent	8447D	2944A10178	2021-07-26	2022-07-25
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2021-08-23	2022-08-22
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2022-04-28	2023-04-27
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2022-04-28	2023-04-27
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-07-30	2022-07-29
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2022-04-28	2023-04-27
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-07-26	2022-07-25
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	2022-04-28	2023-04-27
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-10-31	2022-10-30
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2022-05-02	2023-05-01
4	Amplifier	ANRITSU	MH648A	M43381	2022-04-28	2023-04-27
5	Cable	HUBER+SUHNER	CBL2	525178	2022-04-28	2023-04-27
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP40	100501	2021-07-26	2022-07-25
2	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2022-04-28	2023-04-27

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	$\pm 1 \times 10^{-7}$ Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7 dB
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 (dB μ V)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46
0.5 to 5	56	46
5 to 30	60	50

7.1 E.U.T. Operation

Operating Environment :

Temperature: 21.5 °C

Humidity: 51.9 % RH

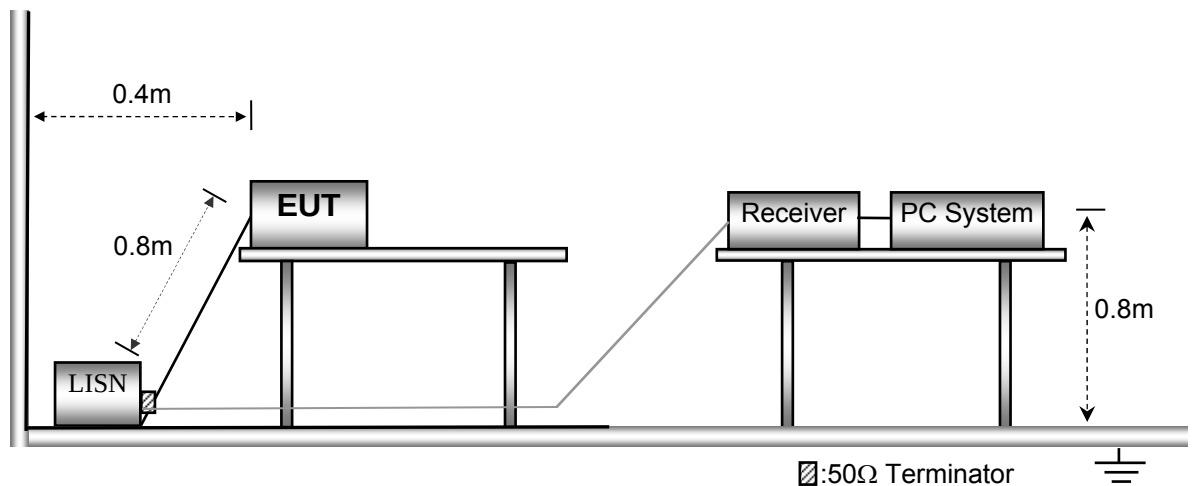
Atmospheric Pressure: 101.2kPa

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

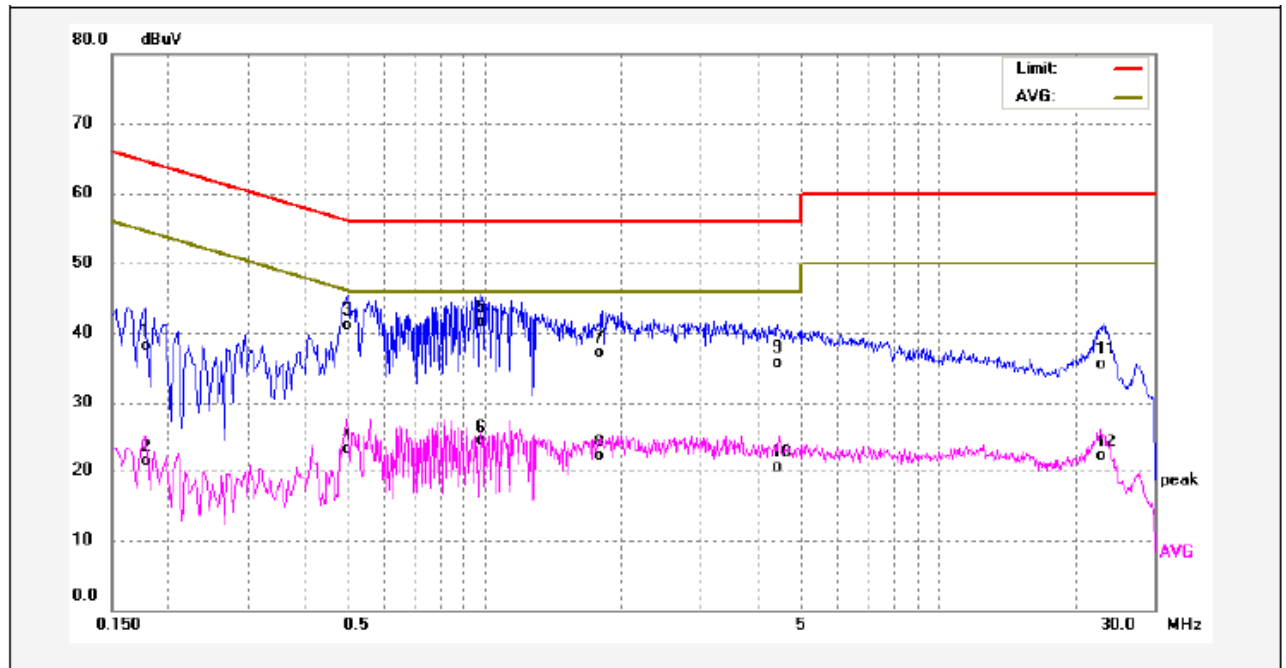
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

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

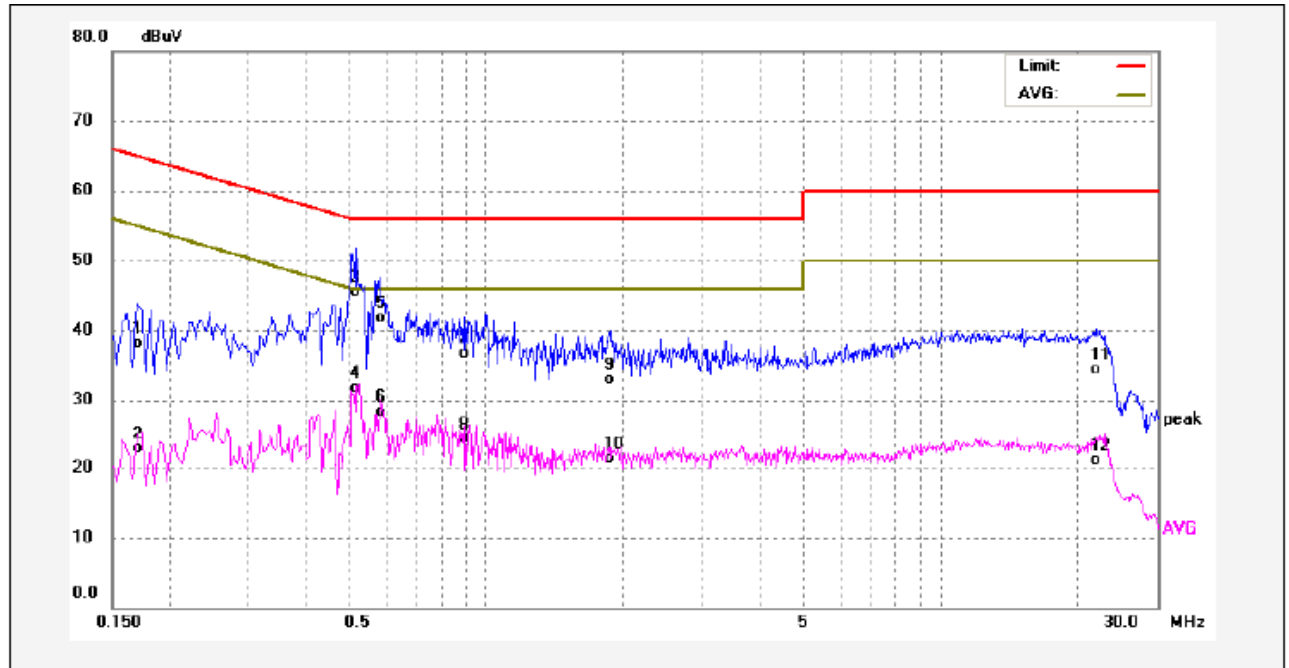
Worst Mode: WIFI mode (802.11b mode low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1780	26.20	11.98	38.18	64.57	-26.39	QP	
2	0.1780	9.26	11.98	21.24	54.57	-33.33	AVG	
3	0.5020	29.32	11.74	41.06	56.00	-14.94	QP	
4	0.5020	11.38	11.74	23.12	46.00	-22.88	AVG	
5	0.9820	29.65	11.90	41.55	56.00	-14.45	QP	
6	0.9820	12.35	11.90	24.25	46.00	-21.75	AVG	
7	1.8100	25.13	11.90	37.03	56.00	-18.97	QP	
8	1.8100	10.15	11.90	22.05	46.00	-23.95	AVG	
9	4.4140	23.57	12.10	35.67	56.00	-20.33	QP	
10	4.4140	8.42	12.10	20.52	46.00	-25.48	AVG	
11	23.1500	24.31	11.23	35.54	60.00	-24.46	QP	
12	23.1500	10.86	11.23	22.09	50.00	-27.91	AVG	

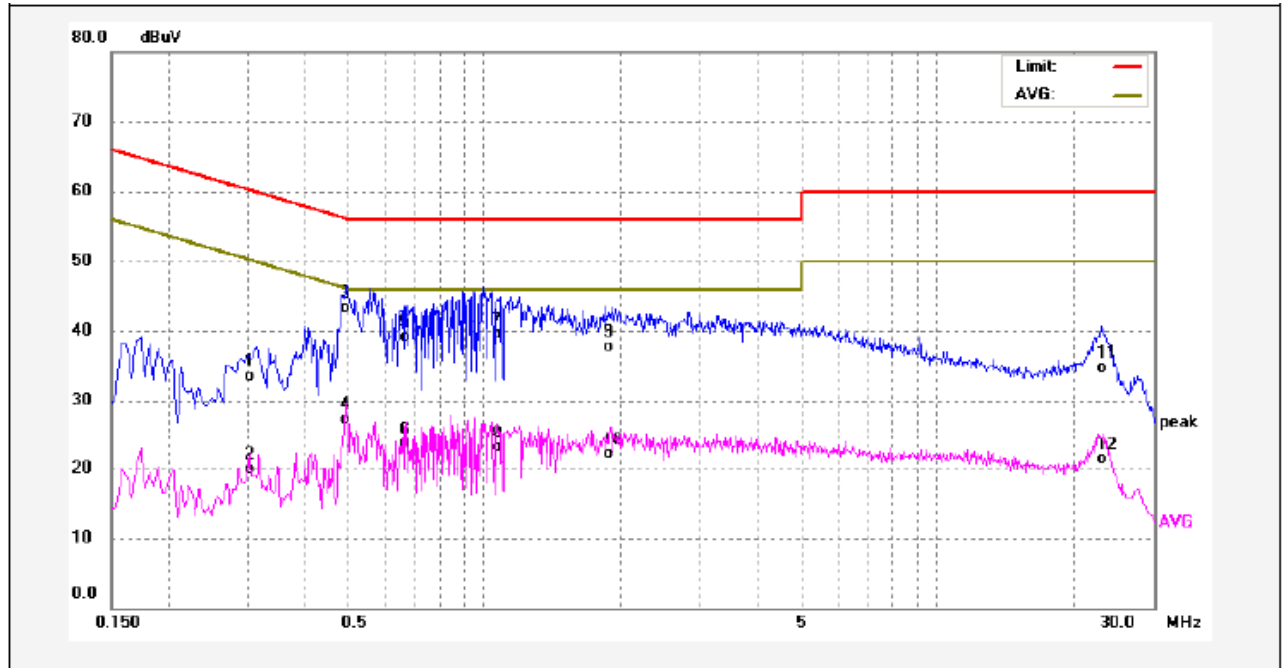
Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1700	26.57	11.46	38.03	64.96	-26.93	QP	
2	0.1700	11.39	11.46	22.85	54.96	-32.11	AVG	
3	0.5180	34.35	11.16	45.51	56.00	-10.49	QP	
4	0.5180	20.50	11.16	31.66	46.00	-14.34	AVG	
5	0.5820	30.56	11.20	41.76	56.00	-14.24	QP	
6	0.5820	17.14	11.20	28.34	46.00	-17.66	AVG	
7	0.8900	25.49	11.30	36.79	56.00	-19.21	QP	
8	0.8900	12.92	11.30	24.22	46.00	-21.78	AVG	
9	1.8700	21.63	11.30	32.93	56.00	-23.07	QP	
10	1.8700	10.06	11.30	21.36	46.00	-24.64	AVG	
11	21.9380	23.03	11.27	34.30	60.00	-25.70	QP	
12	21.9380	9.93	11.27	21.20	50.00	-28.80	AVG	

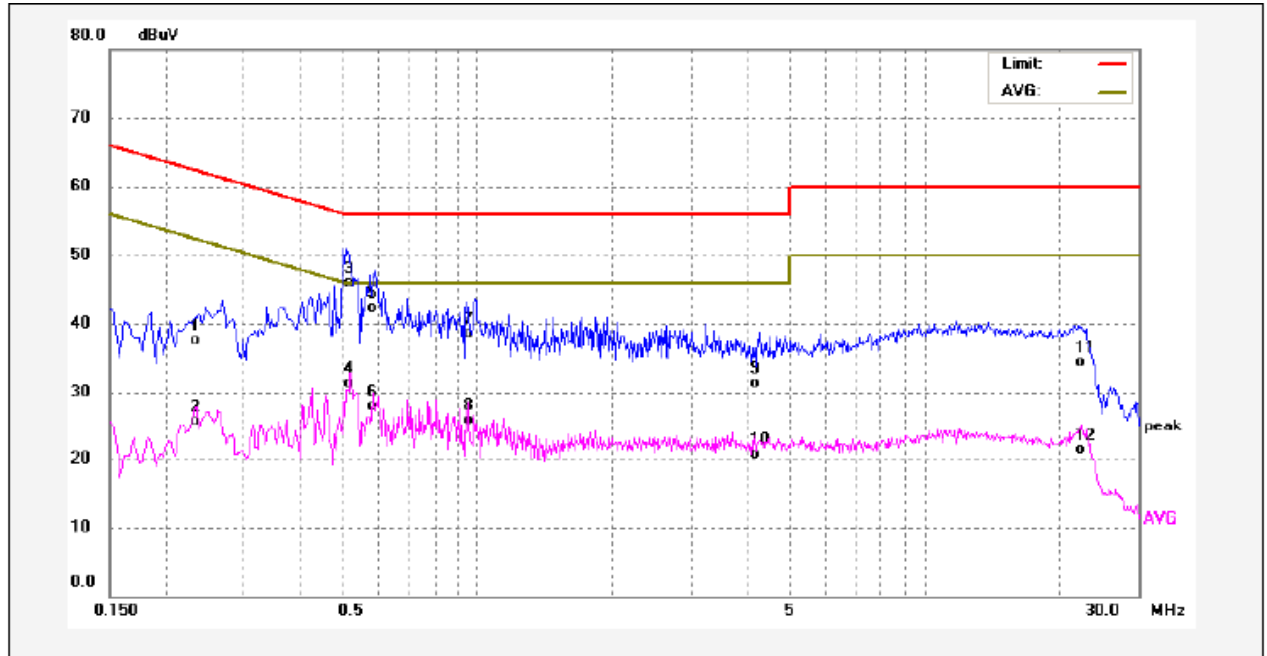
Worst Mode: BLE mode (low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3020	22.31	11.24	33.55	60.19	-26.64	QP	
2	0.3020	8.70	11.24	19.94	50.19	-30.25	AVG	
3	0.4940	32.08	11.14	43.22	56.10	-12.88	QP	
4	0.4940	16.13	11.14	27.27	46.10	-18.83	AVG	
5	0.6700	27.74	11.28	39.02	56.00	-16.98	QP	
6	0.6700	12.41	11.28	23.69	46.00	-22.31	AVG	
7	1.0660	28.22	11.30	39.52	56.00	-16.48	QP	
8	1.0660	11.71	11.30	23.01	46.00	-22.99	AVG	
9	1.8900	26.50	11.30	37.80	56.00	-18.20	QP	
10	1.8900	10.90	11.30	22.20	46.00	-23.80	AVG	
11	23.1780	23.41	11.29	34.70	60.00	-25.30	QP	
12	23.1780	10.01	11.29	21.30	50.00	-28.70	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.2340	26.12	11.30	37.42	62.30	-24.88	QP	
2	0.2340	14.35	11.30	25.65	52.30	-26.65	AVG	
3	0.5180	34.84	11.16	46.00	56.00	-10.00	QP	
4	0.5180	20.20	11.16	31.36	46.00	-14.64	AVG	
5	0.5820	31.04	11.20	42.24	56.00	-13.76	QP	
6	0.5820	16.73	11.20	27.93	46.00	-18.07	AVG	
7	0.9500	27.11	11.30	38.41	56.00	-17.59	QP	
8	0.9500	14.62	11.30	25.92	46.00	-20.08	AVG	
9	4.1660	19.67	11.56	31.23	56.00	-24.77	QP	
10	4.1660	9.19	11.56	20.75	46.00	-25.25	AVG	
11	22.3900	22.96	11.28	34.24	60.00	-25.76	QP	
12	22.3900	9.94	11.28	21.22	50.00	-28.78	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	$2400/F(\text{kHz})$	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	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

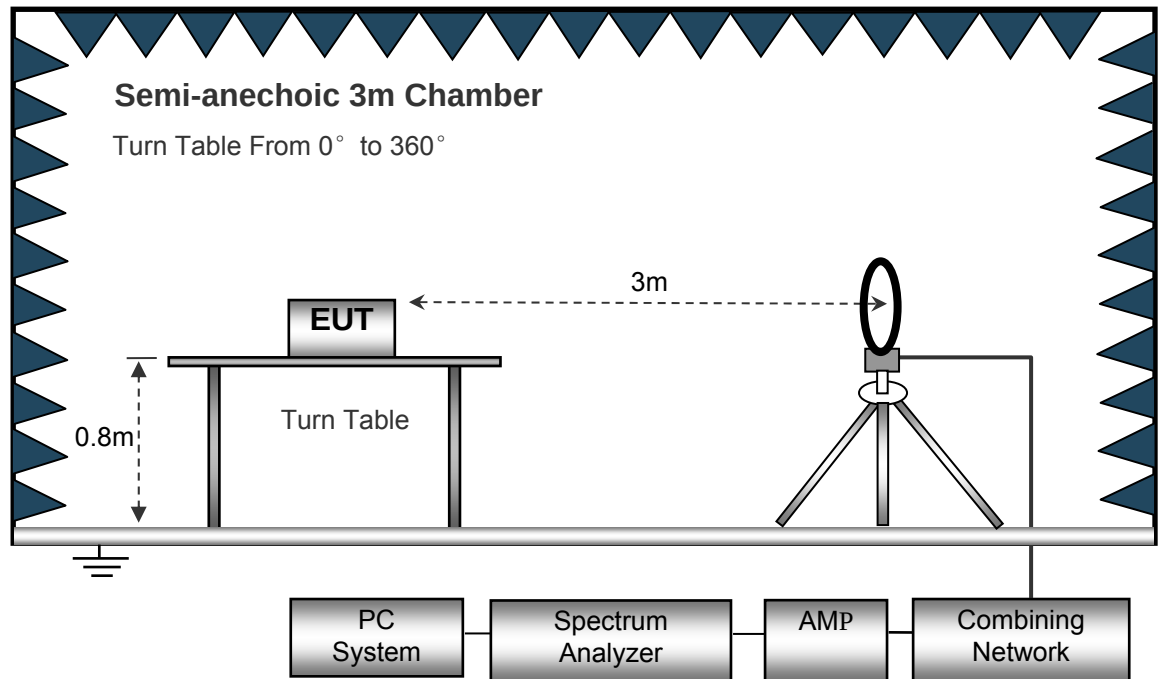
EUT Operation :

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

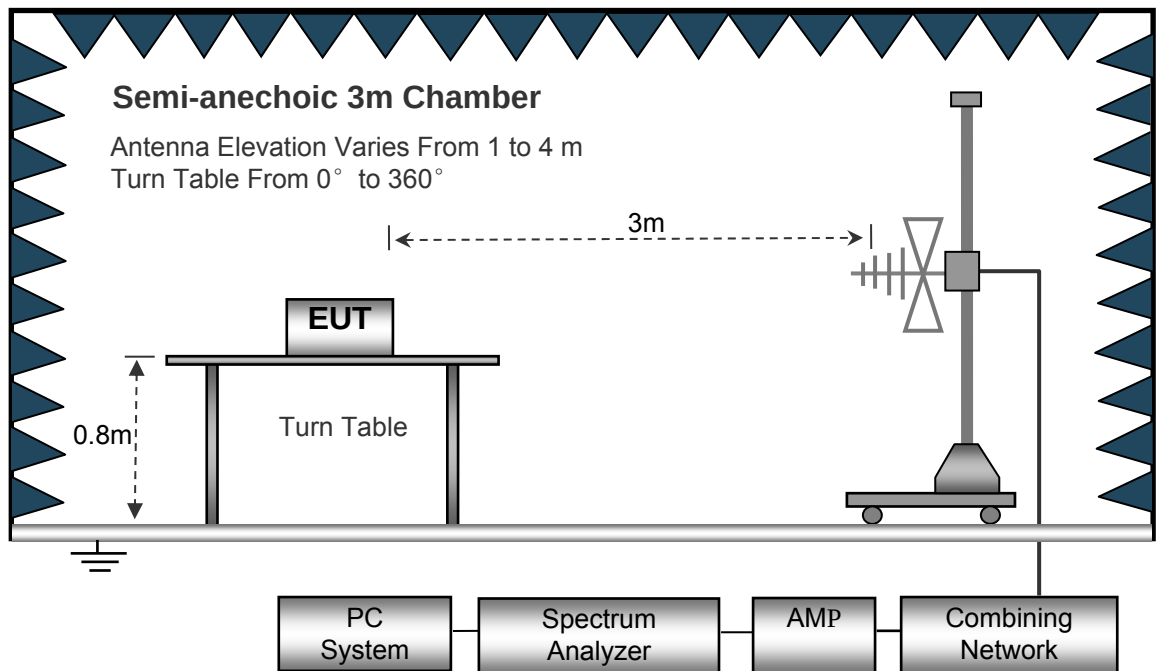
8.2 Test Setup

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

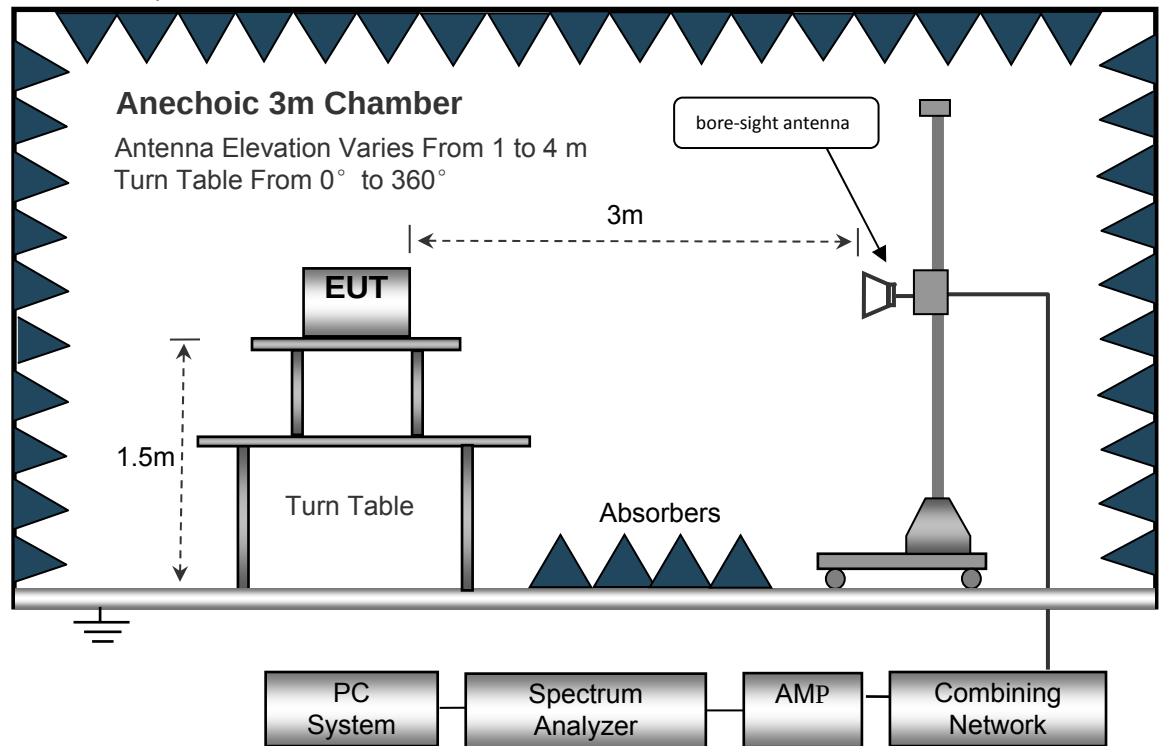
The test setup for emission measurement below 30MHz.



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
 - 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

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							
6.021	25.11	QP	21.84	40.00	6.95	29.54	-22.59
15.730	24.58	QP	21.35	40.00	5.93	29.54	-23.61
25.680	25.36	QP	20.67	40.00	6.03	29.54	-23.51
802.11g							
6.021	23.14	QP	21.84	40.00	4.98	29.54	-24.56
15.730	25.33	QP	21.35	40.00	6.68	29.54	-22.86
25.680	25.36	QP	20.67	40.00	6.03	29.54	-23.51
802.11n(HT20)							
6.021	23.11	QP	21.84	40.00	4.95	29.54	-24.59
15.730	24.76	QP	21.35	40.00	6.11	29.54	-23.43
25.680	24.65	QP	20.67	40.00	5.32	29.54	-24.22
802.11n(HT40)							
6.021	24.03	QP	21.84	40.00	5.87	29.54	-23.67
15.730	25.73	QP	21.35	40.00	7.08	29.54	-22.46
25.680	24.16	QP	20.67	40.00	4.83	29.54	-24.71

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	41.64	QP	25	1.9	H	-11.62	30.02	46.00	-15.98
223.45	32.99	QP	183	1.9	V	-11.62	21.37	46.00	-24.63
4824.00	48.56	PK	252	1.5	V	-1.06	47.50	74.00	-26.50
4824.00	39.45	Ave	252	1.5	V	-1.06	38.39	54.00	-15.61
7236.00	41.20	PK	312	1.0	H	1.33	42.53	74.00	-31.47
7236.00	39.84	Ave	312	1.0	H	1.33	41.17	54.00	-12.83
2333.57	46.08	PK	305	1.2	V	-13.19	32.89	74.00	-41.11
2333.57	37.45	Ave	305	1.2	V	-13.19	24.26	54.00	-29.74
2377.07	43.95	PK	54	1.8	H	-13.14	30.81	74.00	-43.19
2377.07	38.47	Ave	54	1.8	H	-13.14	25.33	54.00	-28.67
2498.46	43.92	PK	308	1.9	V	-13.08	30.84	74.00	-43.16
2498.46	38.12	Ave	308	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)
11b: Middle Channel 2437MHz									
223.45	40.33	QP	78	1.0	H	-11.62	28.71	46.00	-17.29
223.45	31.98	QP	227	1.8	V	-11.62	20.36	46.00	-25.64
4874.00	49.25	PK	157	1.3	V	-0.62	48.63	74.00	-25.37
4874.00	38.34	Ave	157	1.3	V	-0.62	37.72	54.00	-16.28
7311.00	42.52	PK	29	1.9	H	2.21	44.73	74.00	-29.27
7311.00	38.65	Ave	29	1.9	H	2.21	40.86	54.00	-13.14
2347.99	45.31	PK	277	1.3	V	-13.19	32.12	74.00	-41.88
2347.99	37.77	Ave	277	1.3	V	-13.19	24.58	54.00	-29.42
2353.16	42.64	PK	203	1.5	H	-13.14	29.50	74.00	-44.50
2353.16	38.43	Ave	203	1.5	H	-13.14	25.29	54.00	-28.71
2491.24	42.88	PK	135	1.8	V	-13.08	29.80	74.00	-44.20
2491.24	37.96	Ave	135	1.8	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)
11b: High Channel 2462MHz									
223.45	40.32	QP	322	1.6	H	-11.62	28.70	46.00	-17.30
223.45	30.70	QP	255	1.6	V	-11.62	19.08	46.00	-26.92
4924.00	49.10	PK	263	1.4	V	-0.24	48.86	74.00	-25.14
4924.00	37.00	Ave	263	1.4	V	-0.24	36.76	54.00	-17.24
7386.00	43.36	PK	139	1.3	H	2.84	46.20	74.00	-27.80
7386.00	38.47	Ave	139	1.3	H	2.84	41.31	54.00	-12.69
2339.08	45.32	PK	188	1.4	V	-13.19	32.13	74.00	-41.87
2339.08	37.92	Ave	188	1.4	V	-13.19	24.73	54.00	-29.27
2383.64	43.28	PK	227	1.1	H	-13.14	30.14	74.00	-43.86
2383.64	37.40	Ave	227	1.1	H	-13.14	24.26	54.00	-29.74
2494.21	43.91	PK	301	1.5	V	-13.08	30.83	74.00	-43.17
2494.21	38.38	Ave	301	1.5	V	-13.08	25.30	54.00	-28.70

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									
223.45	39.47	QP	332	1.4	H	-11.62	27.85	46.00	-18.15
223.45	29.21	QP	128	1.1	V	-11.62	17.59	46.00	-28.41
4824.00	49.99	PK	29	1.7	V	-1.06	48.93	74.00	-25.07
4824.00	35.57	Ave	29	1.7	V	-1.06	34.51	54.00	-19.49
7236.00	42.54	PK	191	1.0	H	1.33	43.87	74.00	-30.13
7236.00	39.87	Ave	191	1.0	H	1.33	41.20	54.00	-12.80
2318.74	46.07	PK	32	1.8	V	-13.19	32.88	74.00	-41.12
2318.74	39.77	Ave	32	1.8	V	-13.19	26.58	54.00	-27.42
2369.64	43.16	PK	328	1.6	H	-13.14	30.02	74.00	-43.98
2369.64	37.16	Ave	328	1.6	H	-13.14	24.02	54.00	-29.98
2499.15	42.65	PK	349	1.9	V	-13.08	29.57	74.00	-44.43
2499.15	38.63	Ave	349	1.9	V	-13.08	25.55	54.00	-28.45

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	40.11	QP	335	1.4	H	-11.62	28.49	46.00	-17.51
223.45	29.88	QP	353	1.2	V	-11.62	18.26	46.00	-27.74
4874.00	49.57	PK	162	1.8	V	-0.62	48.95	74.00	-25.05
4874.00	36.62	Ave	162	1.8	V	-0.62	36.00	54.00	-18.00
7311.00	41.50	PK	113	1.9	H	2.21	43.71	74.00	-30.29
7311.00	40.68	Ave	113	1.9	H	2.21	42.89	54.00	-11.11
2329.34	45.80	PK	71	1.4	V	-13.19	32.61	74.00	-41.39
2329.34	39.76	Ave	71	1.4	V	-13.19	26.57	54.00	-27.43
2376.05	42.85	PK	308	1.8	H	-13.14	29.71	74.00	-44.29
2376.05	38.74	Ave	308	1.8	H	-13.14	25.60	54.00	-28.40
2487.29	43.61	PK	48	1.8	V	-13.08	30.53	74.00	-43.47
2487.29	37.53	Ave	48	1.8	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)
11g: High Channel 2462MHz									
223.45	38.77	QP	131	1.1	H	-11.62	27.15	46.00	-18.85
223.45	29.12	QP	140	1.3	V	-11.62	17.50	46.00	-28.50
4924.00	50.07	PK	230	1.3	V	-0.24	49.83	74.00	-24.17
4924.00	37.52	Ave	230	1.3	V	-0.24	37.28	54.00	-16.72
7386.00	42.87	PK	305	1.3	H	2.84	45.71	74.00	-28.29
7386.00	40.40	Ave	305	1.3	H	2.84	43.24	54.00	-10.76
2330.23	45.79	PK	304	1.1	V	-13.19	32.60	74.00	-41.40
2330.23	39.45	Ave	304	1.1	V	-13.19	26.26	54.00	-27.74
2355.63	43.24	PK	278	1.7	H	-13.14	30.10	74.00	-43.90
2355.63	37.78	Ave	278	1.7	H	-13.14	24.64	54.00	-29.36
2489.56	43.42	PK	248	1.8	V	-13.08	30.34	74.00	-43.66
2489.56	38.70	Ave	248	1.8	V	-13.08	25.62	54.00	-28.38

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	38.40	QP	1	1.8	H	-11.62	26.78	46.00	-19.22
223.45	28.40	QP	150	1.7	V	-11.62	16.78	46.00	-29.22
4824.00	49.37	PK	93	1.4	V	-1.06	48.31	74.00	-25.69
4824.00	37.37	Ave	93	1.4	V	-1.06	36.31	54.00	-17.69
7236.00	43.47	PK	76	1.2	H	1.33	44.80	74.00	-29.20
7236.00	40.10	Ave	76	1.2	H	1.33	41.43	54.00	-12.57
2324.15	45.19	PK	342	1.6	V	-13.19	32.00	74.00	-42.00
2324.15	39.06	Ave	342	1.6	V	-13.19	25.87	54.00	-28.13
2382.04	43.03	PK	352	1.5	H	-13.14	29.89	74.00	-44.11
2382.04	36.10	Ave	352	1.5	H	-13.14	22.96	54.00	-31.04
2483.61	43.27	PK	194	1.6	V	-13.08	30.19	74.00	-43.81
2483.61	38.72	Ave	194	1.6	V	-13.08	25.64	54.00	-28.36

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	37.18	QP	70	1.7	H	-11.62	25.56	46.00	-20.44
223.45	28.87	QP	169	1.1	V	-11.62	17.25	46.00	-28.75
4874.00	49.18	PK	338	1.2	V	-0.62	48.56	74.00	-25.44
4874.00	37.69	Ave	338	1.2	V	-0.62	37.07	54.00	-16.93
7311.00	42.49	PK	148	1.4	H	2.21	44.70	74.00	-29.30
7311.00	41.49	Ave	148	1.4	H	2.21	43.70	54.00	-10.30
2330.84	45.08	PK	275	1.6	V	-13.19	31.89	74.00	-42.11
2330.84	37.48	Ave	275	1.6	V	-13.19	24.29	54.00	-29.71
2380.84	43.63	PK	266	1.2	H	-13.14	30.49	74.00	-43.51
2380.84	38.66	Ave	266	1.2	H	-13.14	25.52	54.00	-28.48
2492.19	44.23	PK	301	1.0	V	-13.08	31.15	74.00	-42.85
2492.19	37.79	Ave	301	1.0	V	-13.08	24.71	54.00	-29.29

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	37.34	QP	317	1.6	H	-11.62	25.72	46.00	-20.28
223.45	29.90	QP	269	1.9	V	-11.62	18.28	46.00	-27.72
4924.00	49.47	PK	26	1.7	V	-0.24	49.23	74.00	-24.77
4924.00	36.86	Ave	26	1.7	V	-0.24	36.62	54.00	-17.38
7386.00	42.16	PK	252	1.6	H	2.84	45.00	74.00	-29.00
7386.00	40.17	Ave	252	1.6	H	2.84	43.01	54.00	-10.99
2327.37	46.63	PK	139	1.4	V	-13.19	33.44	74.00	-40.56
2327.37	39.34	Ave	139	1.4	V	-13.19	26.15	54.00	-27.85
2369.02	42.37	PK	11	1.6	H	-13.14	29.23	74.00	-44.77
2369.02	36.40	Ave	11	1.6	H	-13.14	23.26	54.00	-30.74
2484.39	44.21	PK	92	1.9	V	-13.08	31.13	74.00	-42.87
2484.39	36.98	Ave	92	1.9	V	-13.08	23.90	54.00	-30.10

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	35.91	QP	22	1.6	H	-11.62	24.29	46.00	-21.71
223.45	30.90	QP	205	1.3	V	-11.62	19.28	46.00	-26.72
4844.00	47.13	PK	233	1.5	V	-1.06	46.07	74.00	-27.93
4844.00	33.87	Ave	233	1.5	V	-1.06	32.81	54.00	-21.19
7266.00	40.02	PK	170	1.9	H	1.33	41.35	74.00	-32.65
7266.00	38.83	Ave	170	1.9	H	1.33	40.16	54.00	-13.84
2341.27	45.55	PK	246	1.8	V	-13.19	32.36	74.00	-41.64
2341.27	37.14	Ave	246	1.8	V	-13.19	23.95	54.00	-30.05
2361.88	42.17	PK	31	1.1	H	-13.14	29.03	74.00	-44.97
2361.88	37.68	Ave	31	1.1	H	-13.14	24.54	54.00	-29.46
2495.02	45.00	PK	143	1.6	V	-13.08	31.92	74.00	-42.08
2495.02	36.37	Ave	143	1.6	V	-13.08	23.29	54.00	-30.71

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n40: Middle Channel 2437MHz									
223.45	36.49	QP	292	1.8	H	-11.62	24.87	46.00	-21.13
223.45	30.89	QP	322	1.9	V	-11.62	19.27	46.00	-26.73
4874.00	47.97	PK	299	1.3	V	-0.62	47.35	74.00	-26.65
4874.00	33.05	Ave	299	1.3	V	-0.62	32.43	54.00	-21.57
7311.00	40.95	PK	103	2.0	H	2.21	43.16	74.00	-30.84
7311.00	39.61	Ave	103	2.0	H	2.21	41.82	54.00	-12.18
2338.83	46.58	PK	68	1.8	V	-13.19	33.39	74.00	-40.61
2338.83	37.08	Ave	68	1.8	V	-13.19	23.89	54.00	-30.11
2377.69	43.04	PK	223	1.5	H	-13.14	29.90	74.00	-44.10
2377.69	36.88	Ave	223	1.5	H	-13.14	23.74	54.00	-30.26
2485.59	44.63	PK	187	1.3	V	-13.08	31.55	74.00	-42.45
2485.59	38.12	Ave	187	1.3	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)
11n40: High Channel 2452MHz									
223.45	36.49	QP	292	1.8	H	-11.62	24.87	46.00	-21.13
223.45	30.89	QP	322	1.9	V	-11.62	19.27	46.00	-26.73
4874.00	47.97	PK	299	1.3	V	-0.62	47.35	74.00	-26.65
4874.00	33.05	Ave	299	1.3	V	-0.62	32.43	54.00	-21.57
7311.00	40.95	PK	103	2.0	H	2.21	43.16	74.00	-30.84
7311.00	39.61	Ave	103	2.0	H	2.21	41.82	54.00	-12.18
2338.83	46.58	PK	68	1.8	V	-13.19	33.39	74.00	-40.61
2338.83	37.08	Ave	68	1.8	V	-13.19	23.89	54.00	-30.11
2377.69	43.04	PK	223	1.5	H	-13.14	29.90	74.00	-44.10
2377.69	36.88	Ave	223	1.5	H	-13.14	23.74	54.00	-30.26
2485.59	44.63	PK	187	1.3	V	-13.08	31.55	74.00	-42.45
2485.59	38.12	Ave	187	1.3	V	-13.08	25.04	54.00	-28.96

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
6.021	23.51	QP	21.84	40.00	5.35	29.54	-24.19
15.730	24.56	QP	21.35	40.00	5.91	29.54	-23.63
25.680	23.75	QP	20.67	40.00	4.42	29.54	-25.12

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	36.07	QP	225	1.2	H	-13.35	22.72	46.00	-23.28
269.33	38.76	QP	311	1.6	V	-13.35	25.41	46.00	-20.59
4804.00	45.22	PK	156	1.4	V	-1.06	44.16	74.00	-29.84
4804.00	41.25	Ave	156	1.4	V	-1.06	40.19	54.00	-13.81
7206.00	45.84	PK	280	1.2	H	1.33	47.17	74.00	-26.83
7206.00	36.63	Ave	280	1.2	H	1.33	37.96	54.00	-16.04
2318.82	45.69	PK	24	1.5	V	-13.19	32.50	74.00	-41.50
2318.82	37.20	Ave	24	1.5	V	-13.19	24.01	54.00	-29.99
2376.42	44.20	PK	312	1.6	H	-13.14	31.06	74.00	-42.94
2376.42	36.93	Ave	312	1.6	H	-13.14	23.79	54.00	-30.21
2488.94	43.03	PK	247	1.9	V	-13.08	29.95	74.00	-44.05
2488.94	37.23	Ave	247	1.9	V	-13.08	24.15	54.00	-29.85

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Middle Channel 2440MHz									
269.33	36.28	QP	263	1.5	H	-13.35	22.93	46.00	-23.07
269.33	39.35	QP	319	1.0	V	-13.35	26.00	46.00	-20.00
4880.00	43.46	PK	136	1.5	V	-0.62	42.84	74.00	-31.16
4880.00	40.80	Ave	136	1.5	V	-0.62	40.18	54.00	-13.82
7320.00	45.39	PK	180	1.2	H	2.21	47.60	74.00	-26.40
7320.00	35.40	Ave	180	1.2	H	2.21	37.61	54.00	-16.39
2310.49	46.93	PK	78	1.4	V	-13.19	33.74	74.00	-40.26
2310.49	37.24	Ave	78	1.4	V	-13.19	24.05	54.00	-29.95
2369.38	42.98	PK	43	1.6	H	-13.14	29.84	74.00	-44.16
2369.38	36.87	Ave	43	1.6	H	-13.14	23.73	54.00	-30.27
2490.59	42.74	PK	228	1.6	V	-13.08	29.66	74.00	-44.34
2490.59	38.59	Ave	228	1.6	V	-13.08	25.51	54.00	-28.49

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 High Channel 2480MHz									
269.33	34.97	QP	183	1.2	H	-13.35	21.62	46.00	-24.38
269.33	38.46	QP	329	1.6	V	-13.35	25.11	46.00	-20.89
4960.00	44.24	PK	165	1.0	V	-0.24	44.00	74.00	-30.00
4960.00	40.10	Ave	165	1.0	V	-0.24	39.86	54.00	-14.14
7440.00	46.08	PK	160	2.0	H	2.84	48.92	74.00	-25.08
7440.00	36.29	Ave	160	2.0	H	2.84	39.13	54.00	-14.87
2338.70	46.42	PK	44	1.1	V	-13.19	33.23	74.00	-40.77
2338.70	39.96	Ave	44	1.1	V	-13.19	26.77	54.00	-27.23
2354.15	43.88	PK	209	1.2	H	-13.14	30.74	74.00	-43.26
2354.15	37.82	Ave	209	1.2	H	-13.14	24.68	54.00	-29.32
2498.84	44.97	PK	37	1.9	V	-13.08	31.89	74.00	-42.11
2498.84	38.27	Ave	37	1.9	V	-13.08	25.19	54.00	-28.81

Test Frequency: 18GHz~25GHz

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

9 Duty Cycle

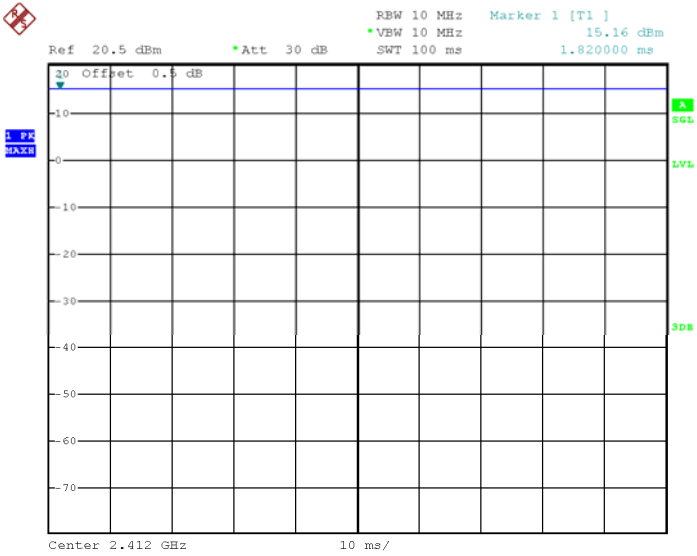
Modulation	On time(ms)	Period(ms)	Duty Cycle(%)	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	100	100	100	0	0
802.11g	100	100	100	0	0
802.11n20	100	100	100	0	0
802.11n40	100	100	100	0	0

Remark:

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

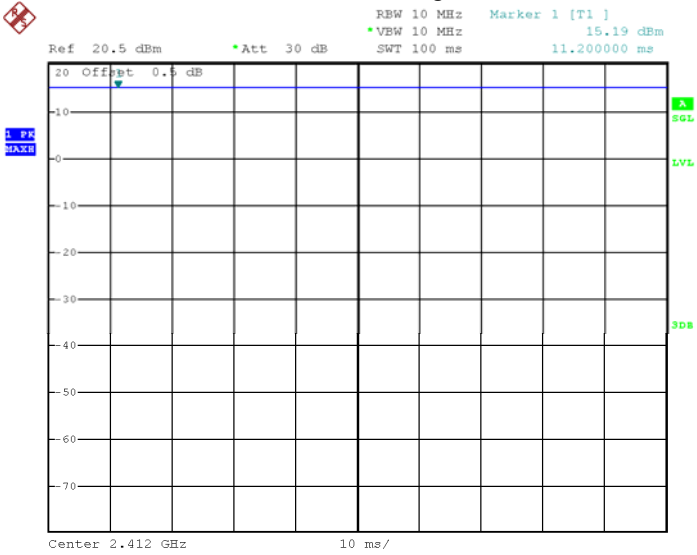
Test Plot

802.11b

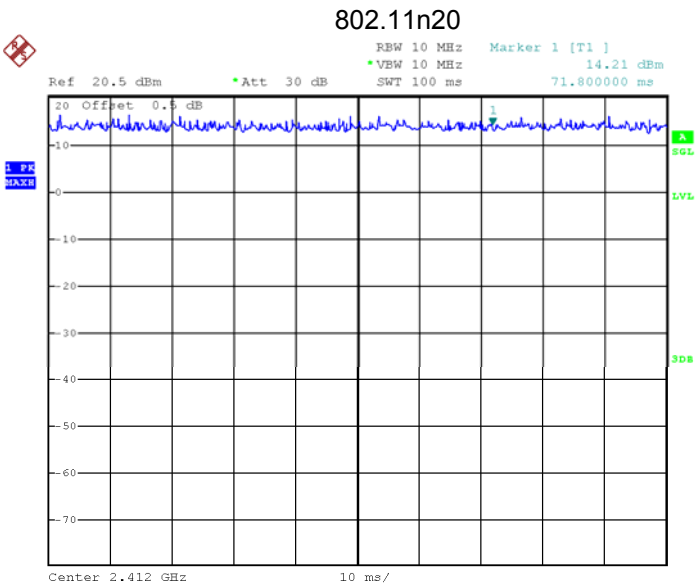


Date: 19.JUL.2022 15:41:22

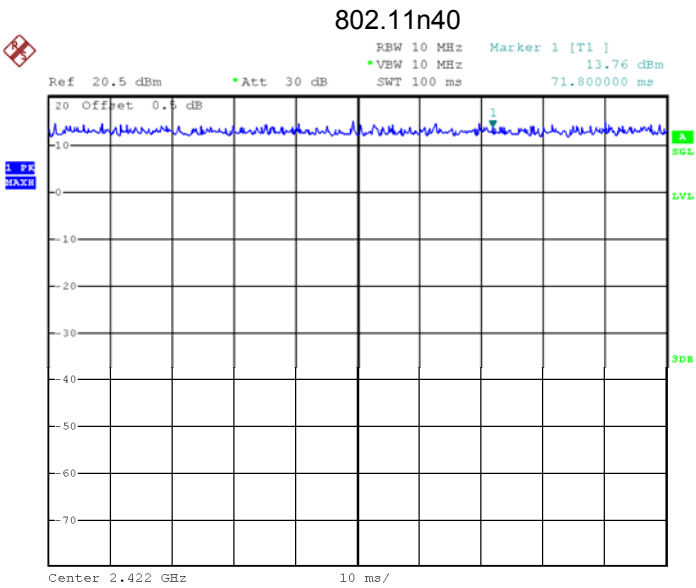
802.11g



Date: 19.JUL.2022 15:42:06



Date: 19.JUL.2022 15:46:29



Date: 19.JUL.2022 15:47:31

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 × 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.

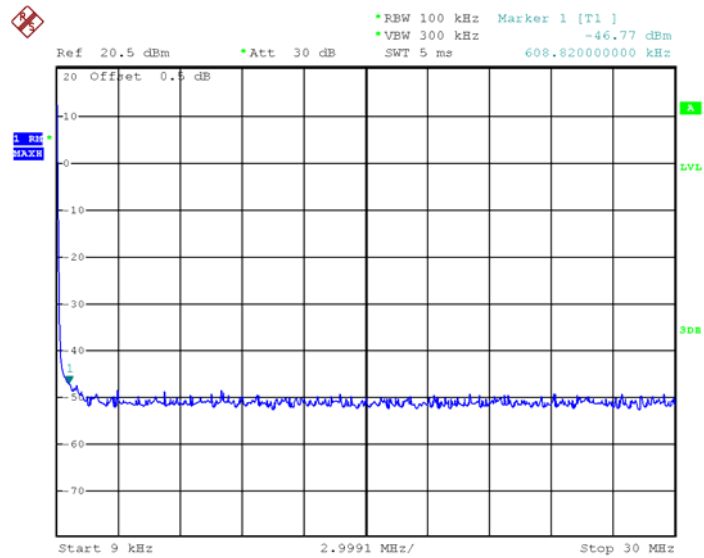
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

10.2 Test Result

9KHz – 30MHz

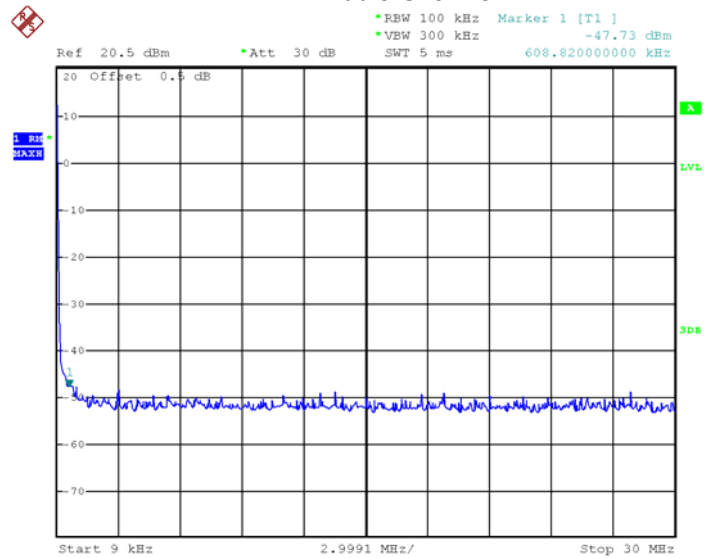
802.11b

Low Channel

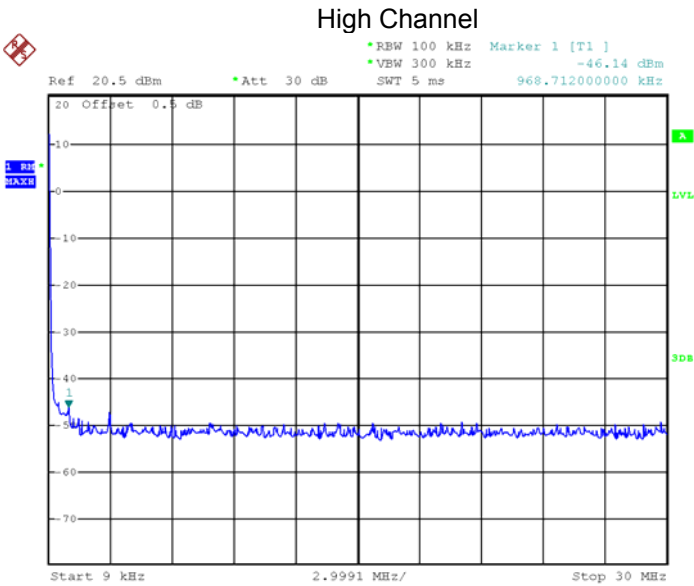


Date: 18.JUL.2022 15:07:39

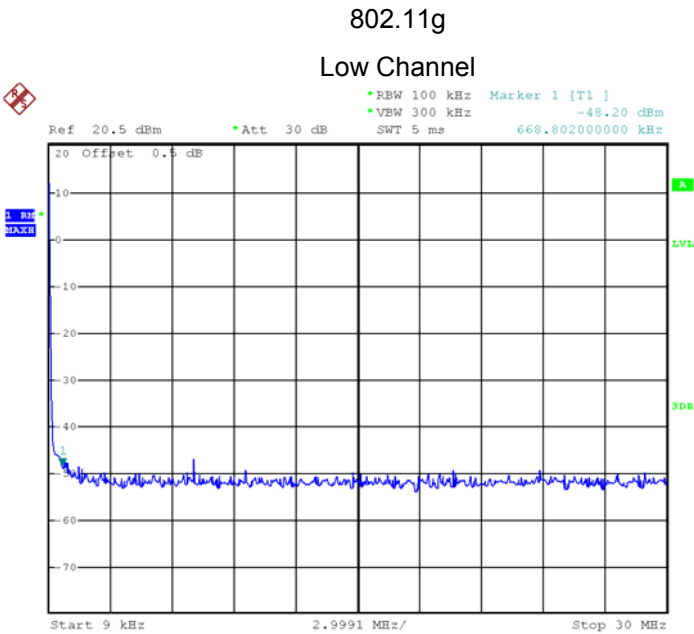
Middle Channel



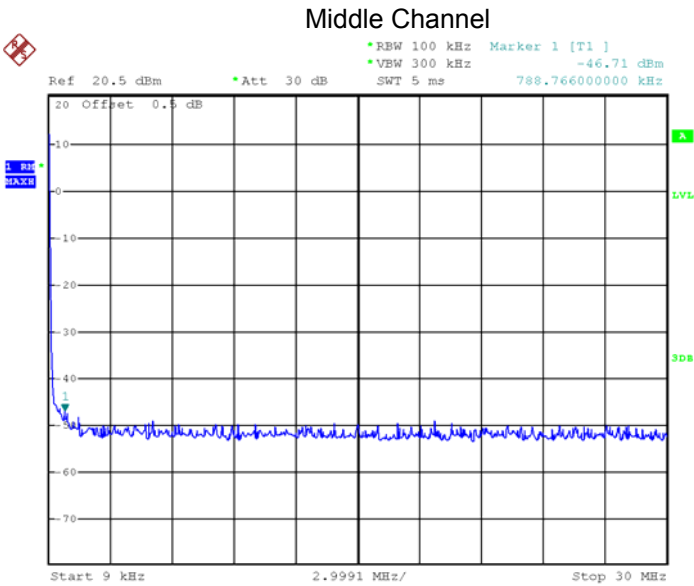
Date: 18.JUL.2022 15:10:45



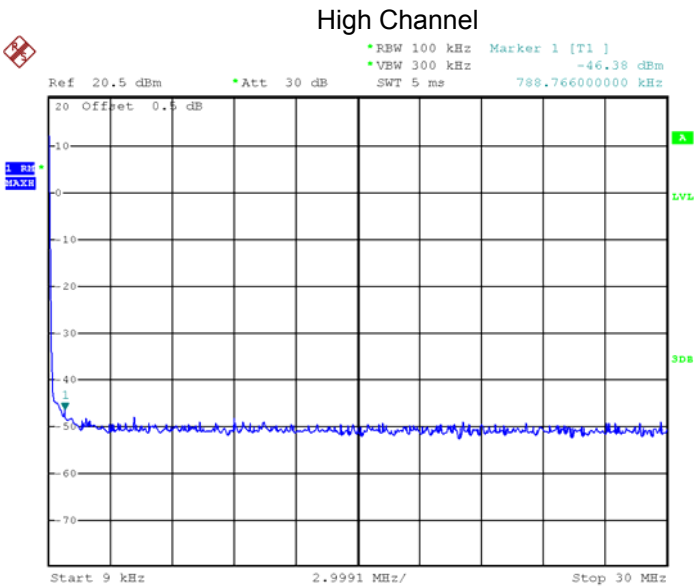
Date: 18.JUL.2022 15:12:47



Date: 18.JUL.2022 15:15:58



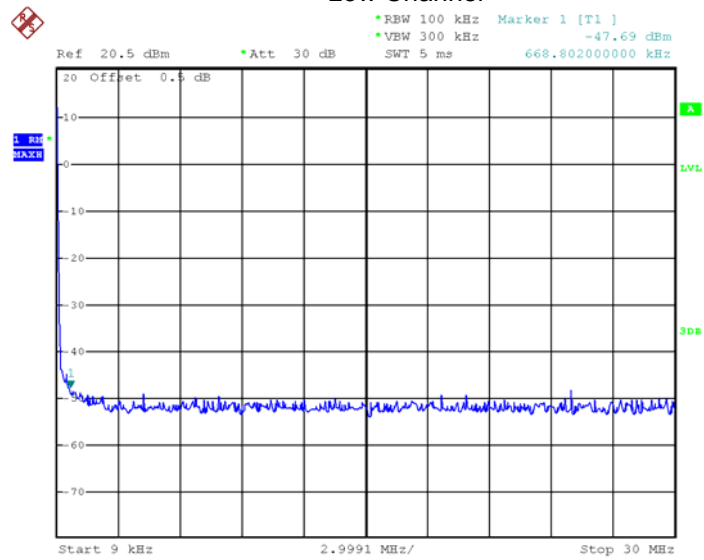
Date: 18.JUL.2022 15:17:38



Date: 18.JUL.2022 15:20:31

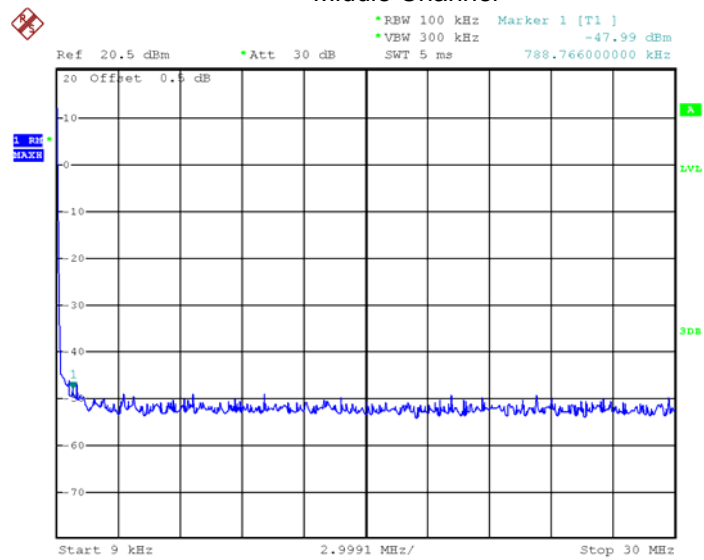
802.11n HT20

Low Channel

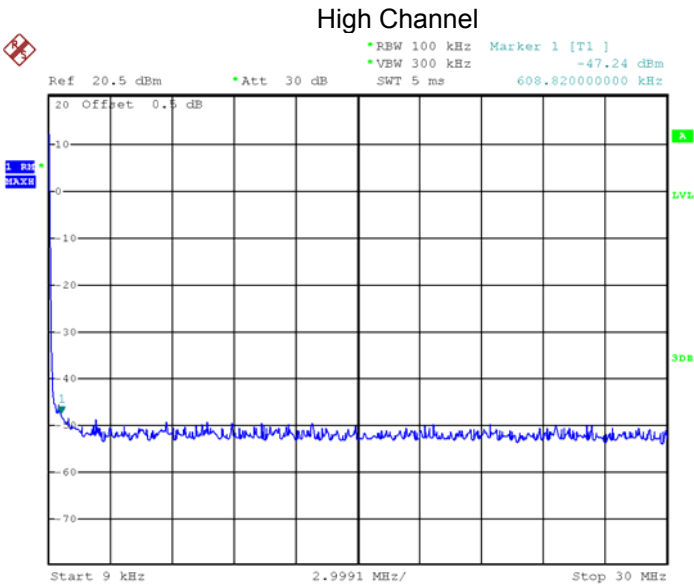


Date: 18.JUL.2022 15:23:38

Middle Channel

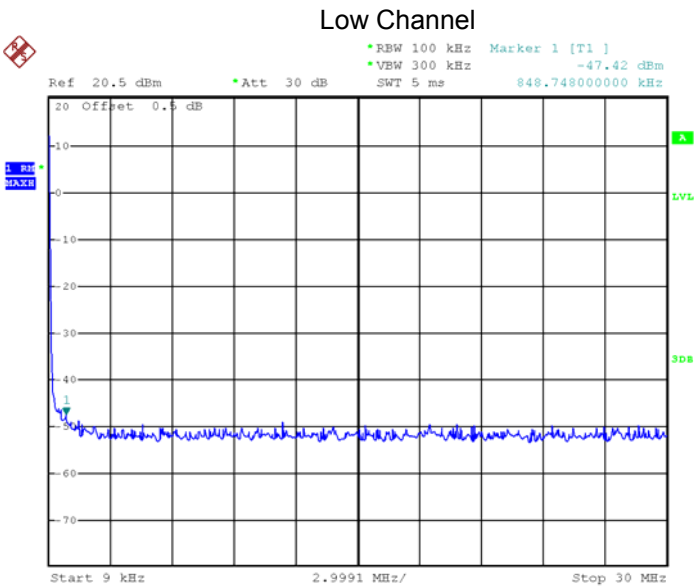


Date: 18.JUL.2022 15:25:04

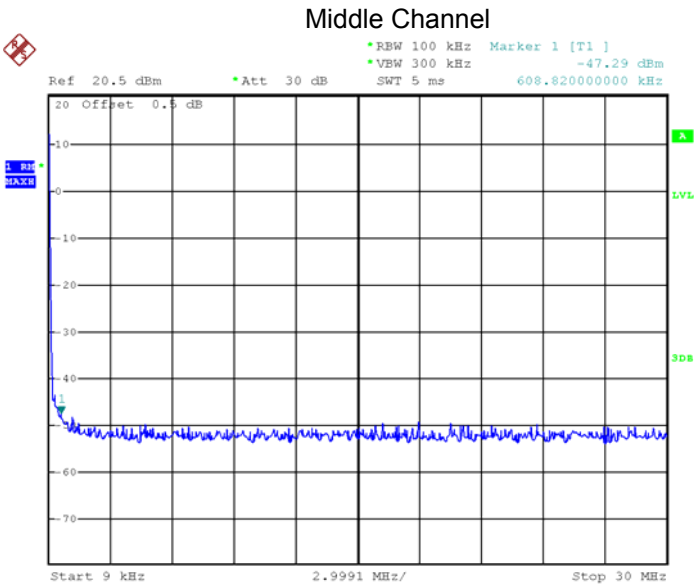


Date: 18.JUL.2022 15:26:31

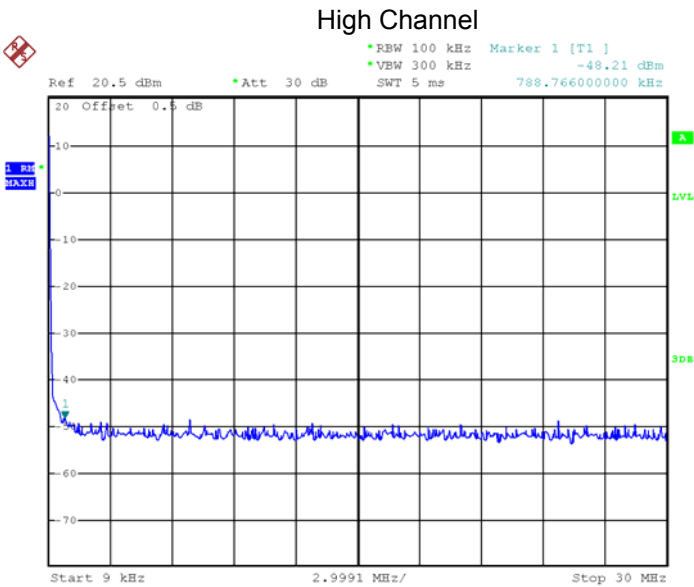
802.11n HT40



Date: 18.JUL.2022 15:28:49



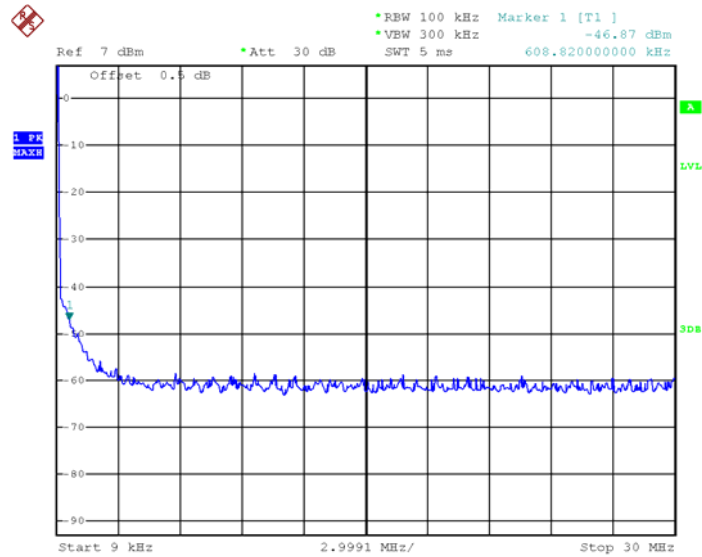
Date: 18.JUL.2022 15:30:32



Date: 18.JUL.2022 15:32:08

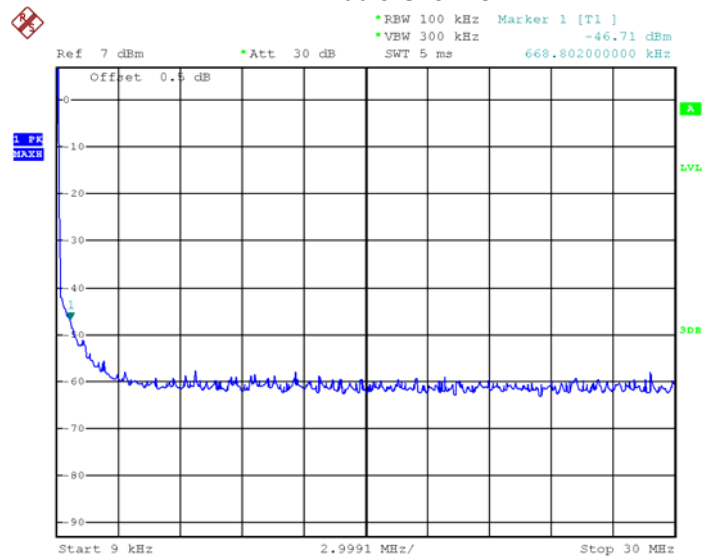
BLE

Low Channel

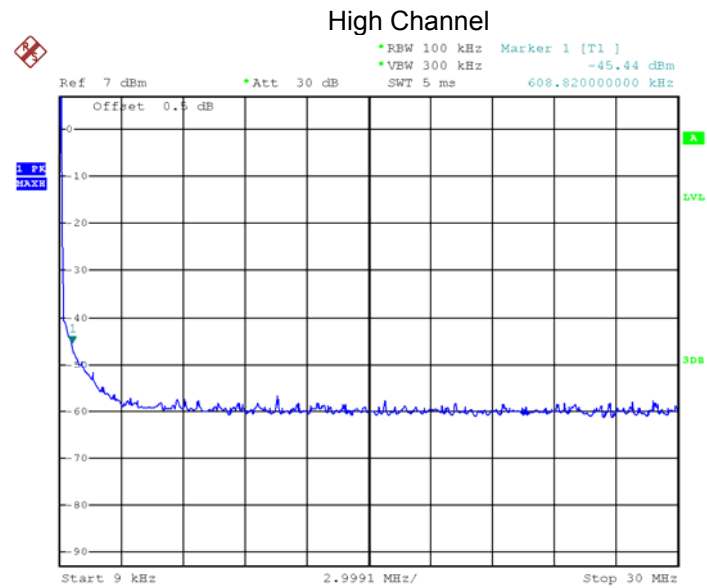


Date: 19.JUL.2022 10:24:27

Middle Channel



Date: 19.JUL.2022 10:23:16



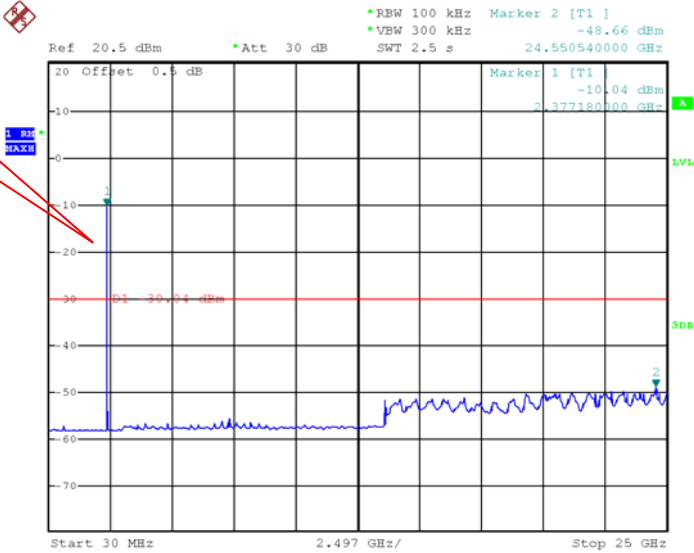
Date: 19.JUL.2022 10:21:57

Above 30MHz

802.11b

Low Channel

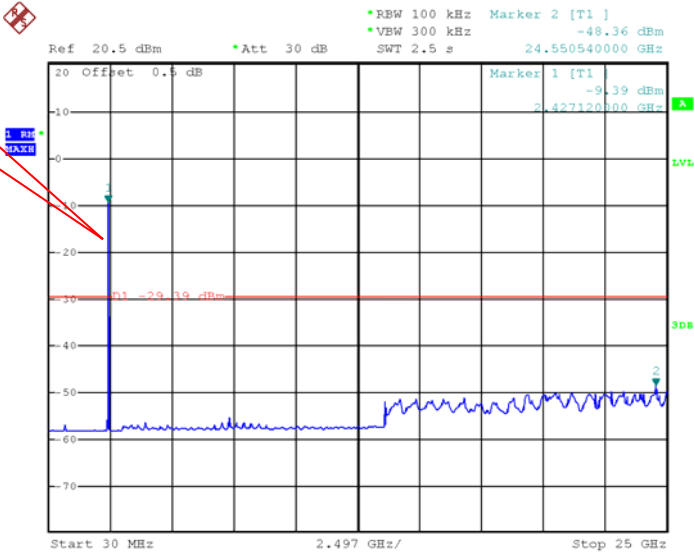
Fundamental



Date: 19.JUL.2022 15:57:26

Middle Channel

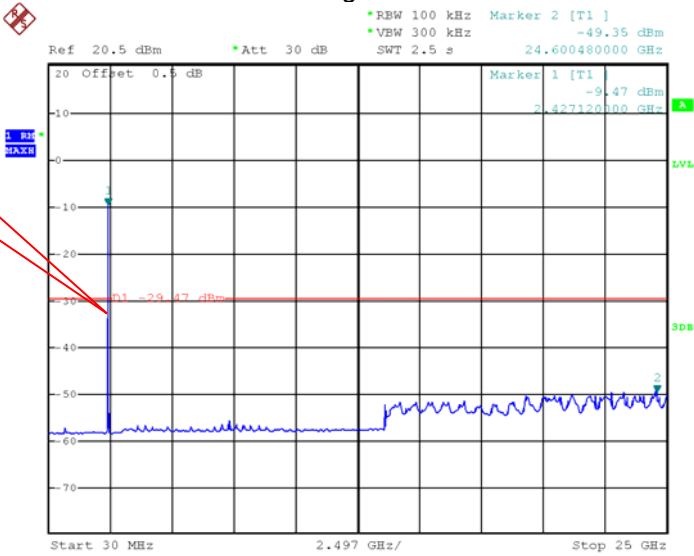
Fundamental



Date: 19.JUL.2022 15:59:08

High Channel

Fundamental

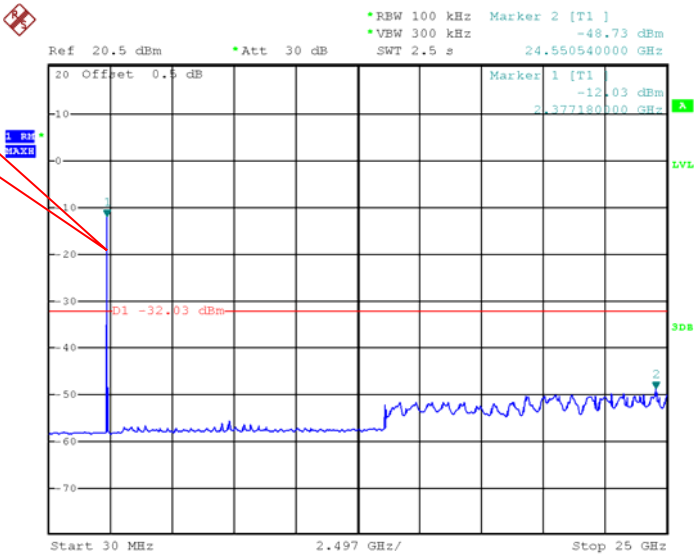


Date: 18.JUL.2022 15:13:32

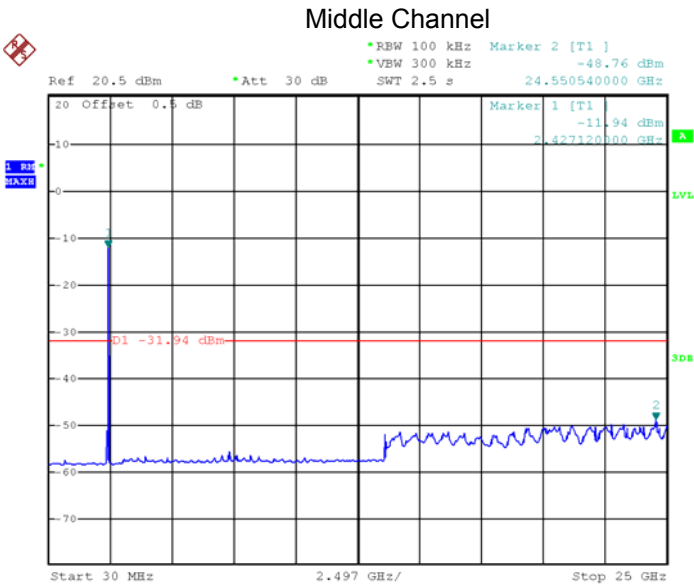
802.11g

Low Channel

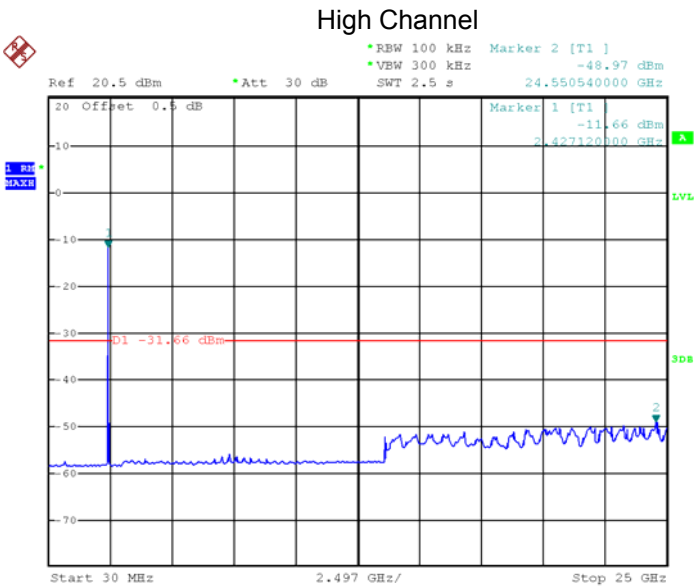
Fundamental



Date: 18.JUL.2022 15:16:55



Date: 18.JUL.2022 15:18:35

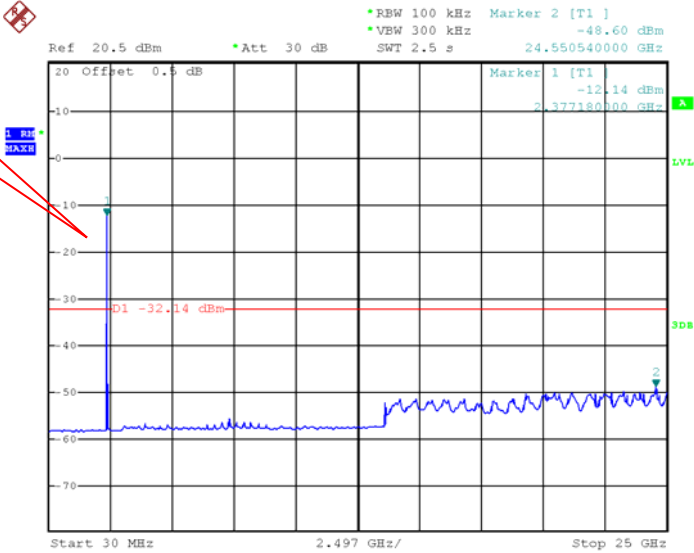


Date: 18.JUL.2022 15:21:07

802.11n HT20

Low Channel

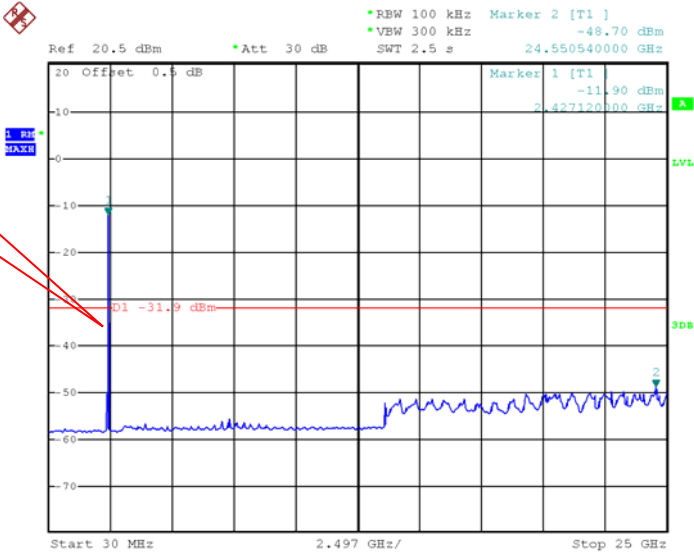
Fundamental



Date: 19.JUL.2022 16:01:04

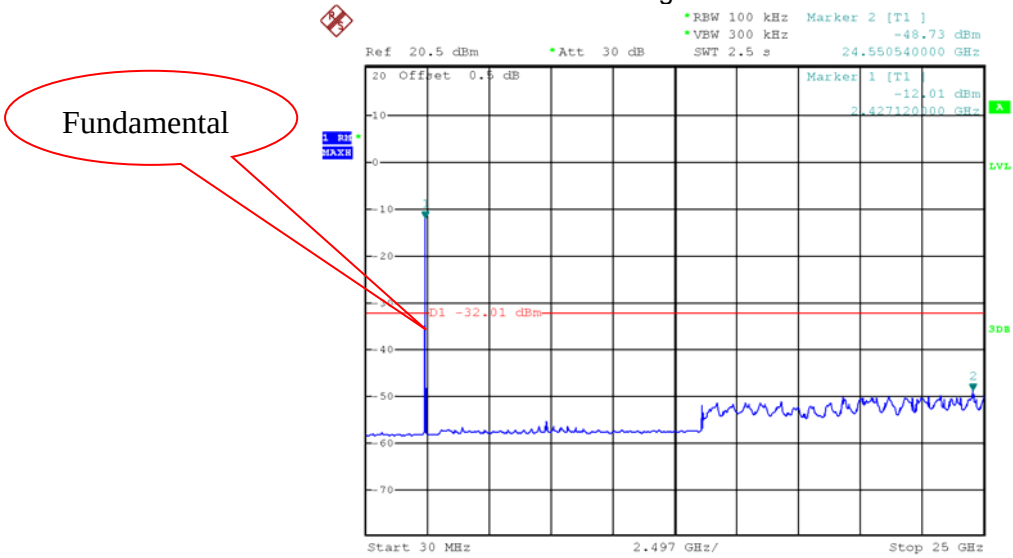
Middle Channel

Fundamental



Date: 18.JUL.2022 15:25:57

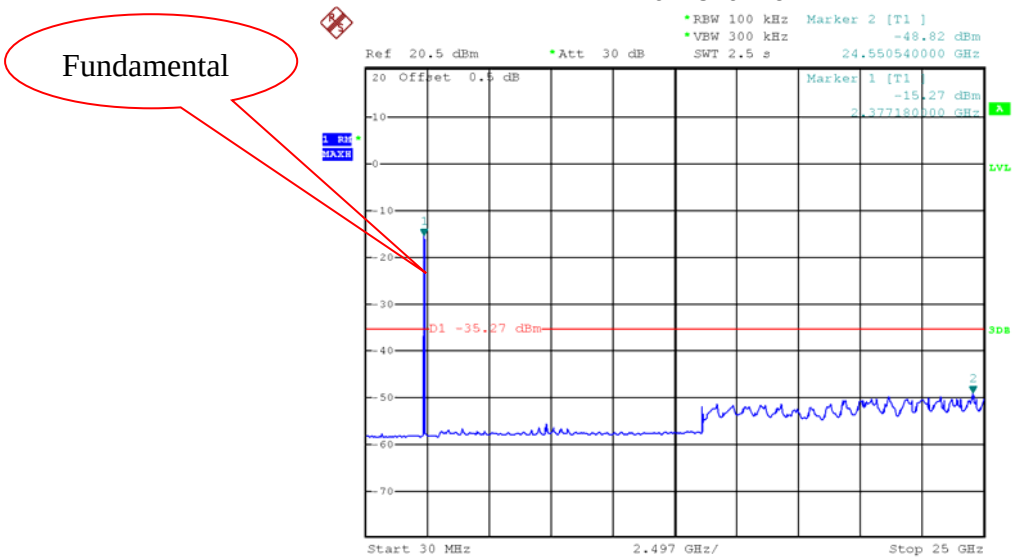
High Channel



Date: 18.JUL.2022 15:27:55

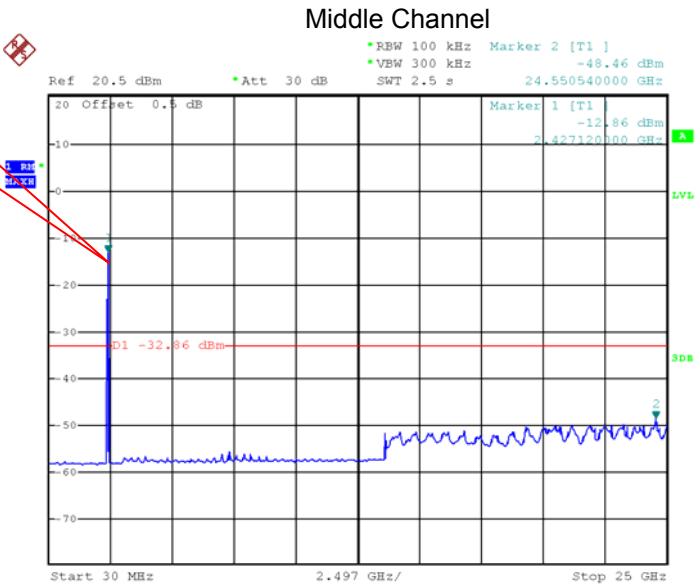
802.11n HT40

Low Channel



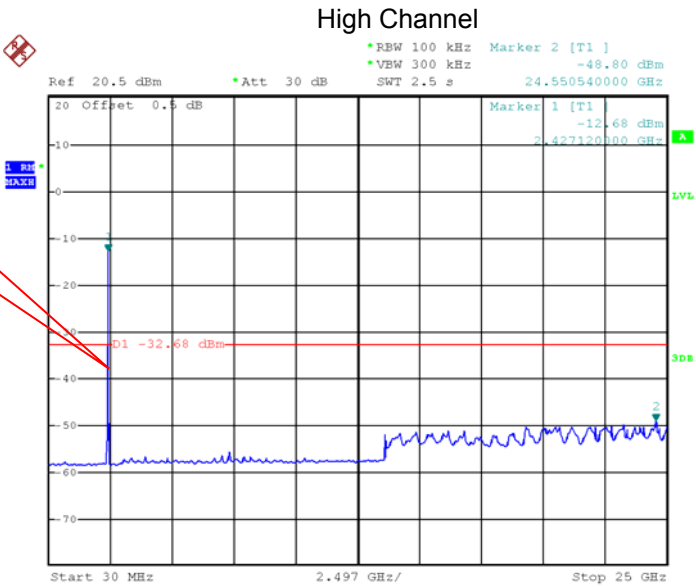
Date: 18.JUL.2022 15:29:56

Fundamental



Date: 19.JUL.2022 16:04:25

Fundamental

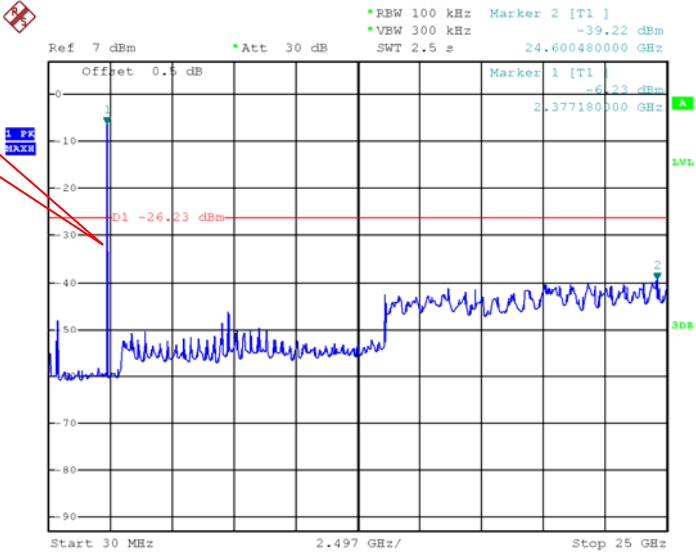


Date: 18.JUL.2022 15:33:11

BLE

Fundamental

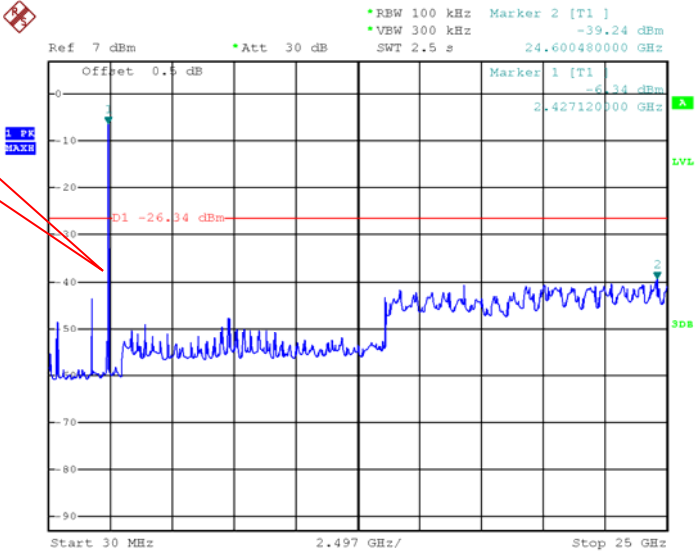
Low Channel



Date: 19.JUL.2022 10:25:10

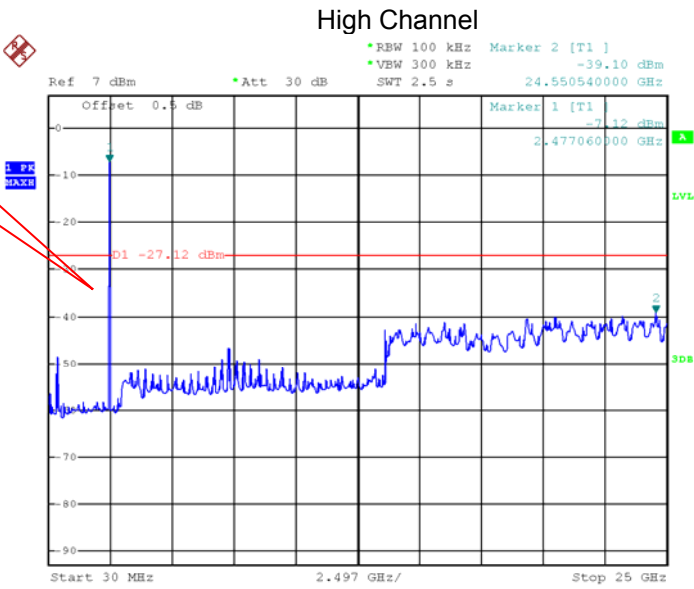
Middle Channel

Fundamental



Date: 19.JUL.2022 10:23:53

Fundamental



Date: 19.JUL.2022 10:22:35

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)).

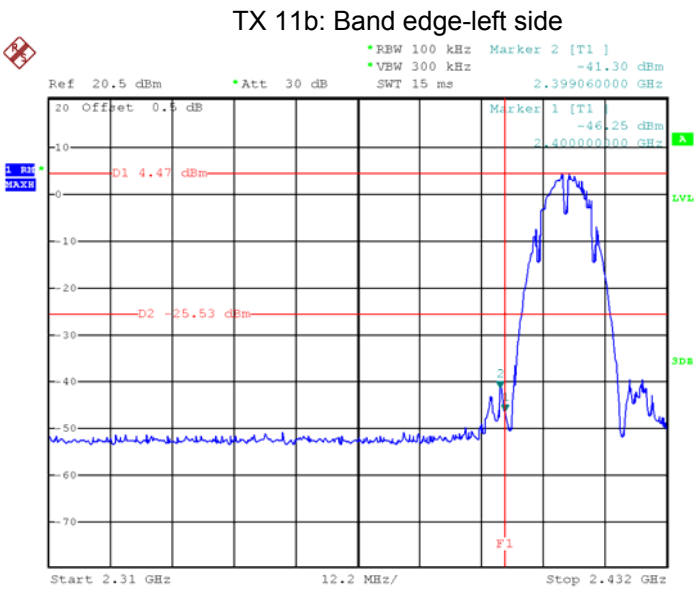
Test Mode: Transmitting

11.1 Test Produce

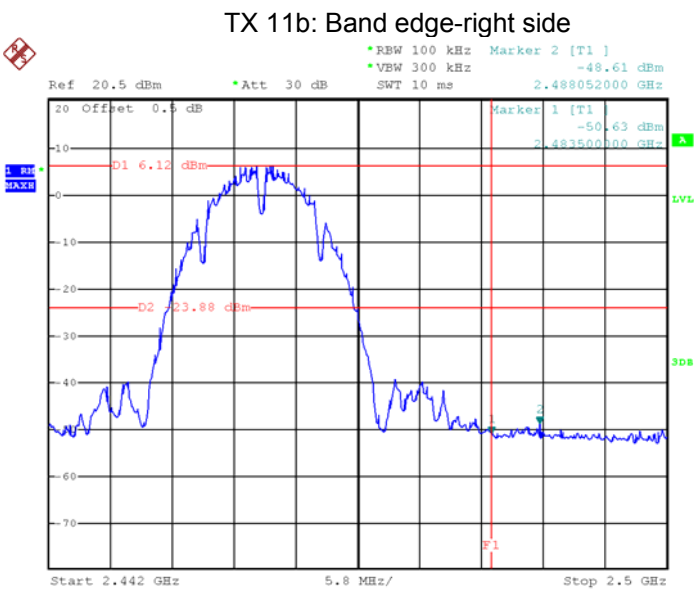
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

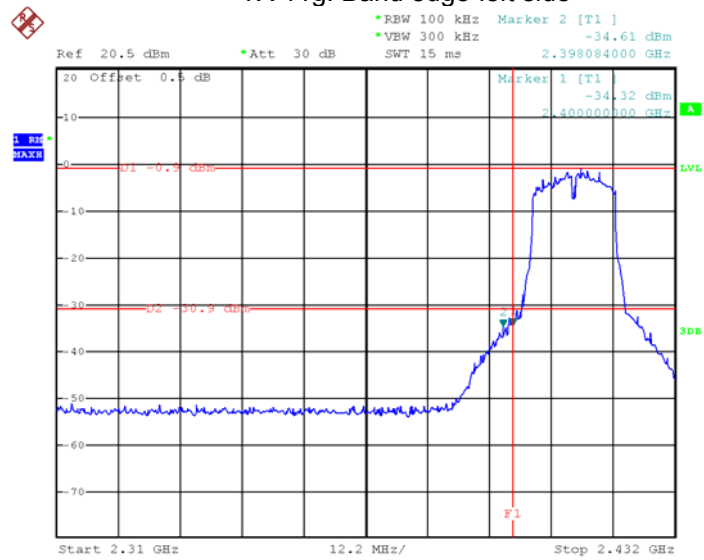


Date: 26.JUL.2022 10:18:11



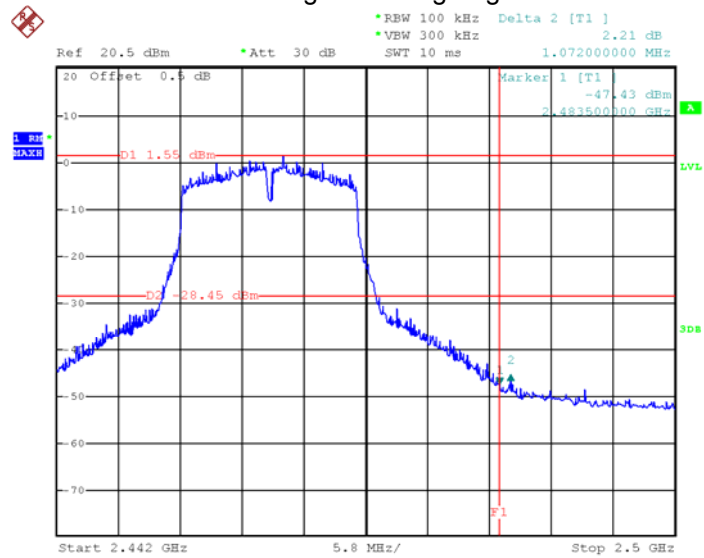
Date: 18.JUL.2022 14:53:07

TX 11g: Band edge-left side

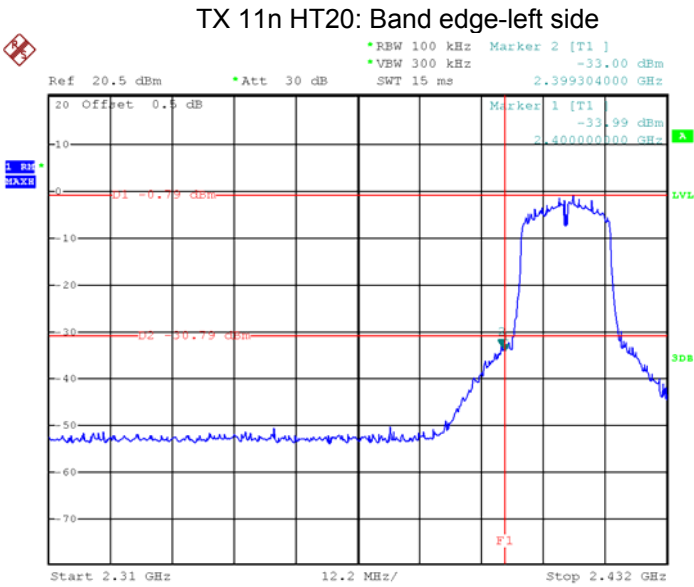


Date: 26.JUL.2022 10:21:42

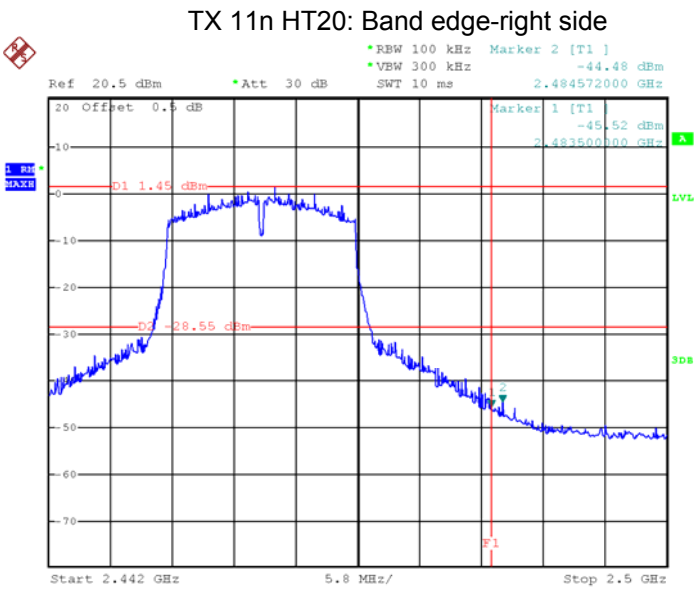
TX 11g: Band edge-right side



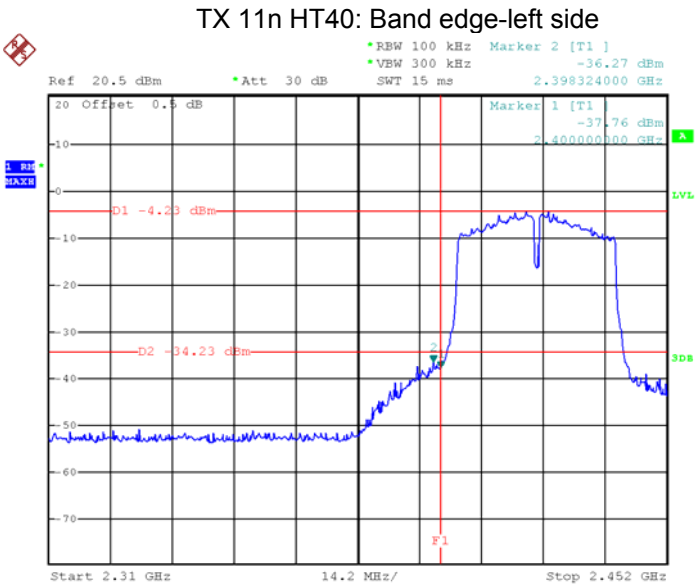
Date: 18.JUL.2022 14:56:41



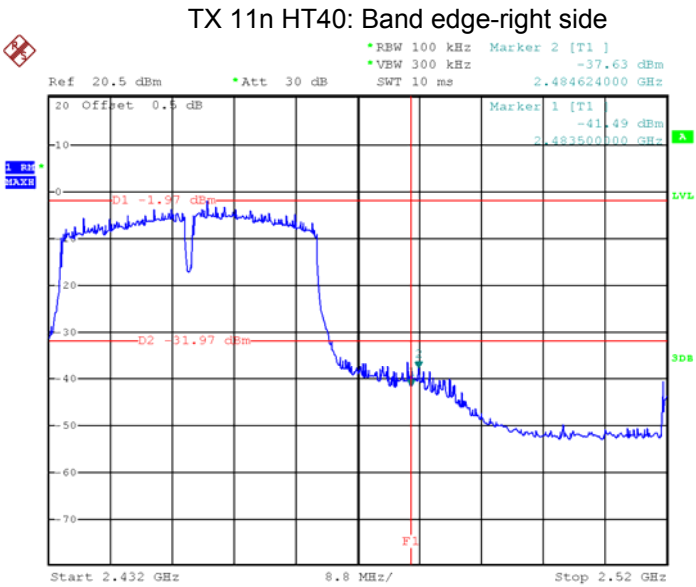
Date: 26.JUL.2022 10:25:31



Date: 18.JUL.2022 15:00:59

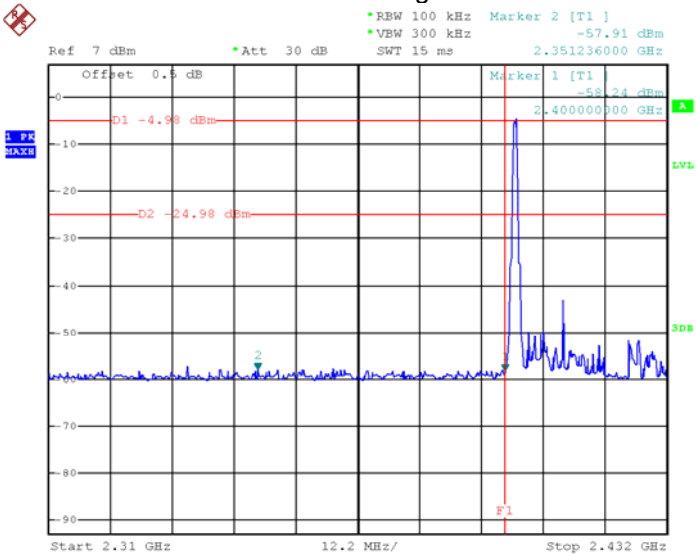


Date: 26.JUL.2022 10:30:29



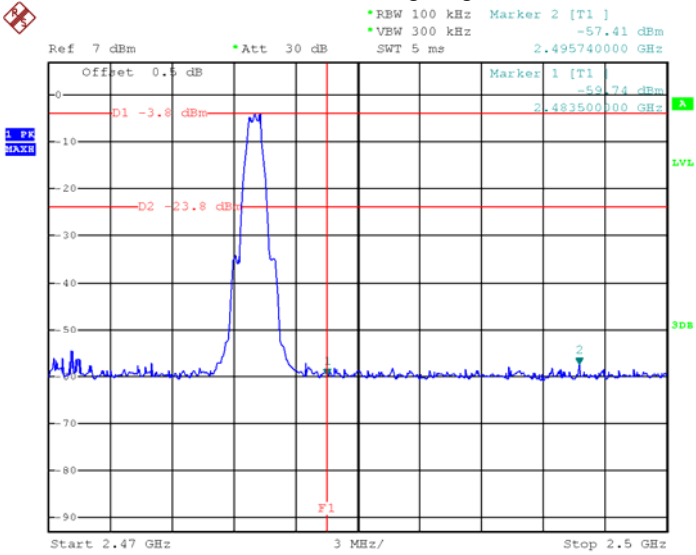
Date: 26.JUL.2022 10:32:36

BLE: Band edge-left side



Date: 19.JUL.2022 10:27:26

BLE: Band edge-right side



Date: 19.JUL.2022 10:29:08

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

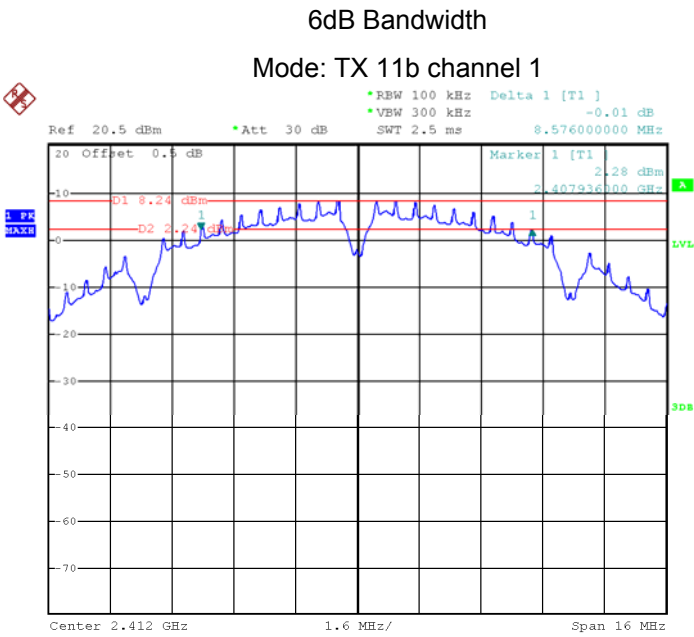
12.1 Test Procedure:

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

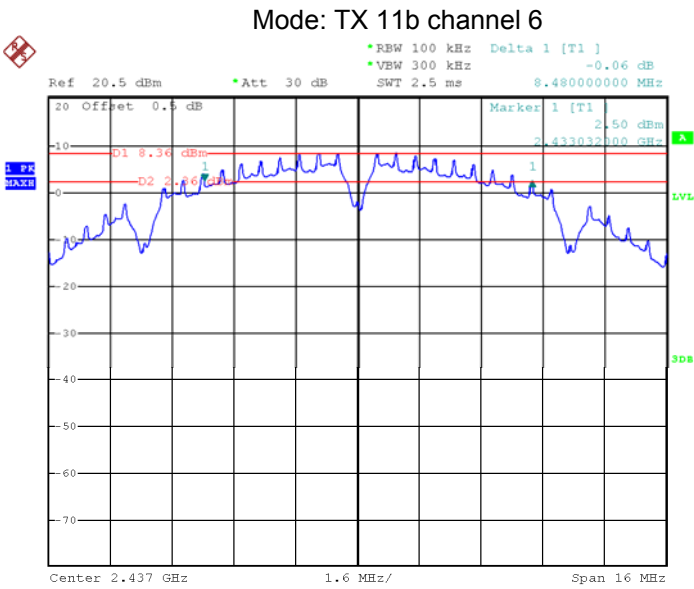
12.2 Test Result:

13	Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b		Channel 1	8.576	12.928
		Channel 6	8.480	13.056
		Channel 11	8.576	12.896
TX 11g		Channel 1	15.200	16.800
		Channel 6	15.350	17.000
		Channel 11	15.150	16.700
TX 11n HT20		Channel 1	16.336	17.820
		Channel 6	15.984	17.928
		Channel 11	16.038	17.766
TX 11n HT40		Channel 3	35.200	36.520
		Channel 6	35.640	37.070
		Channel 9	35.420	36.520
BLE		Channel 0	0.666	1.038
		Channel 19	0.672	1.038
		Channel 39	0.672	1.038

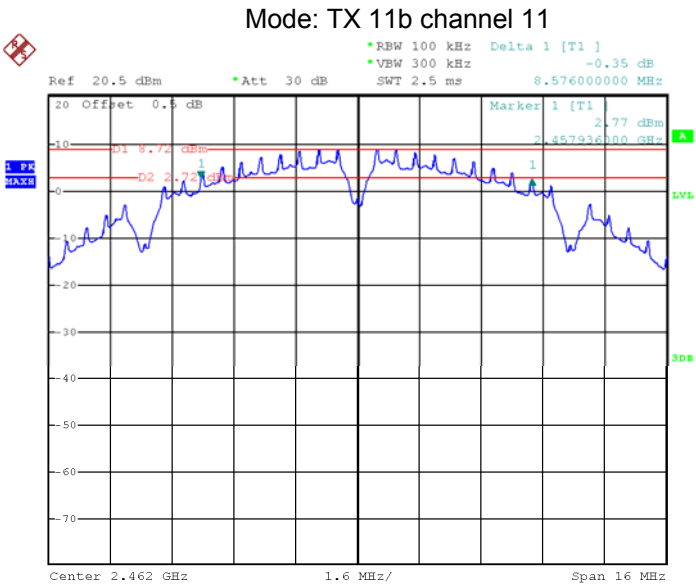
Test result plot:



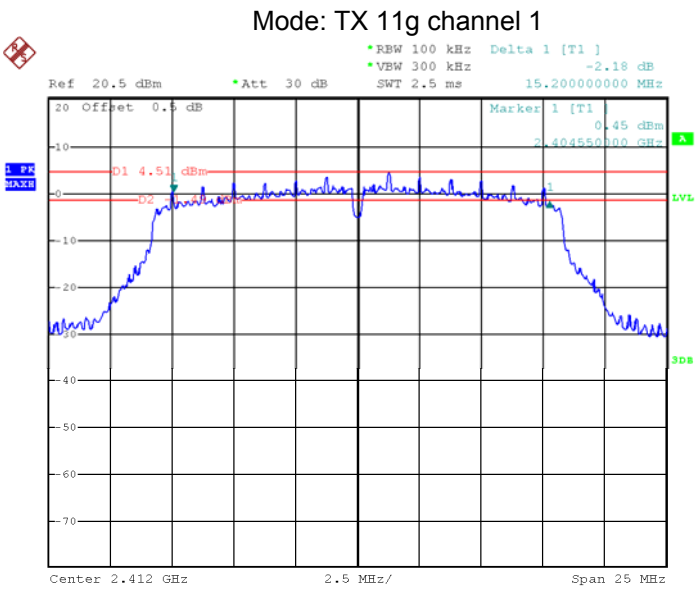
Date: 18.JUL.2022 12:47:30



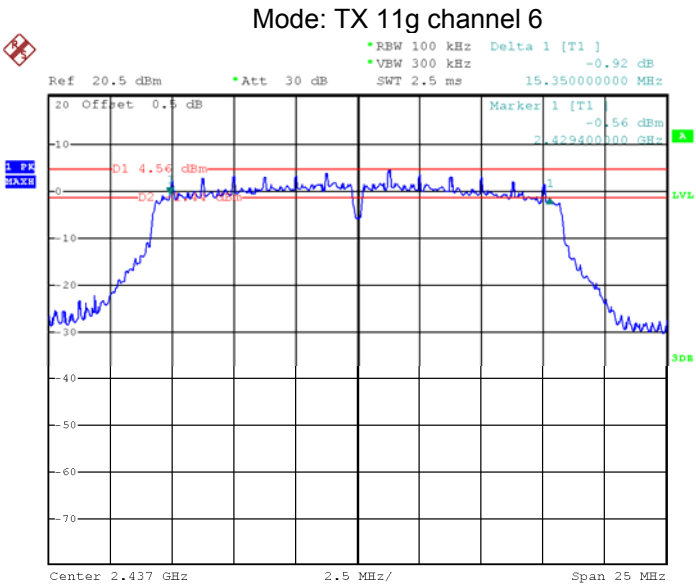
Date: 18.JUL.2022 14:22:51



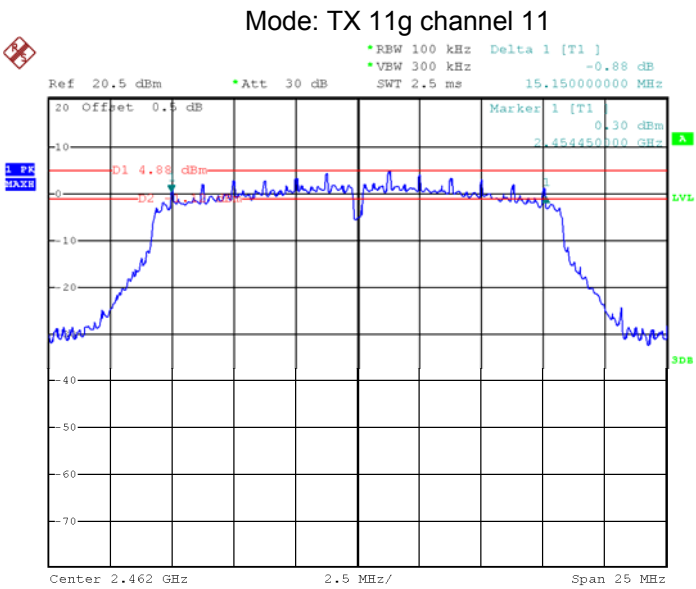
Date: 18.JUL.2022 14:24:22



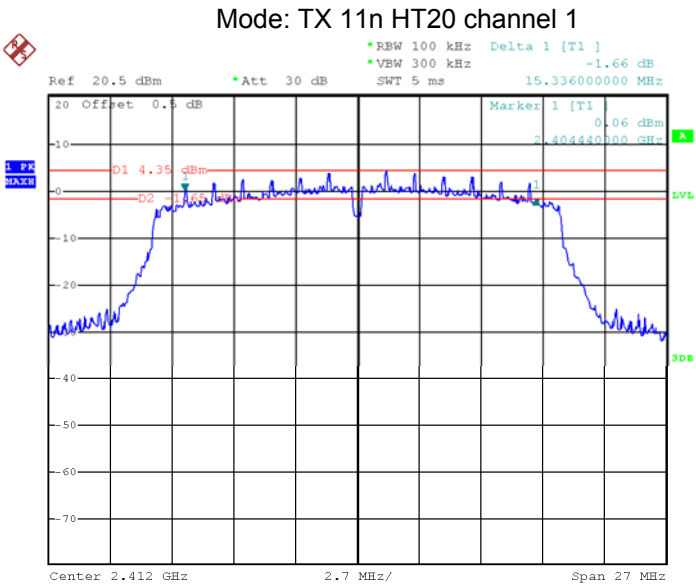
Date: 18.JUL.2022 14:29:07



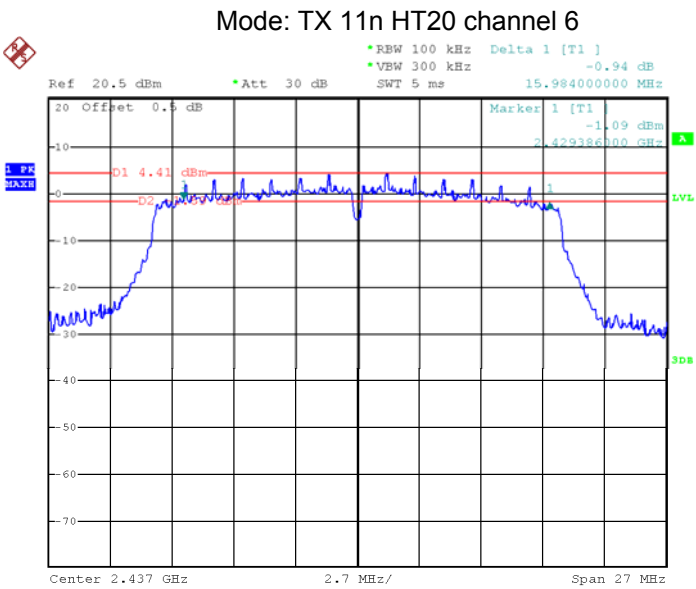
Date: 18.JUL.2022 14:31:41



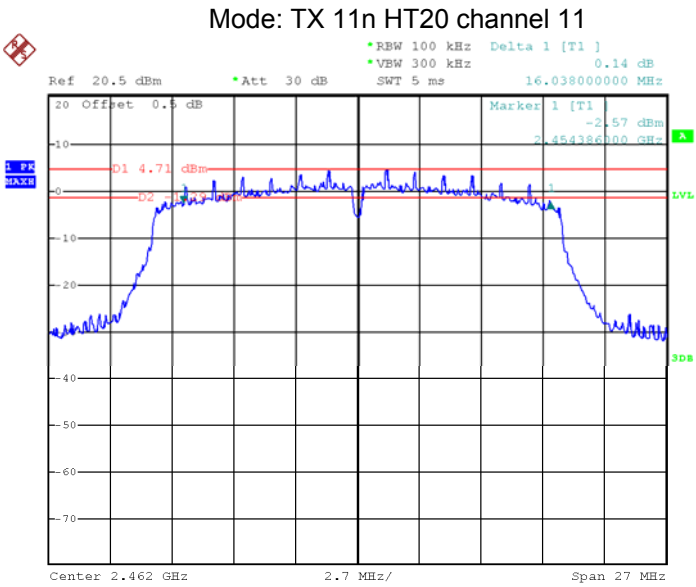
Date: 18.JUL.2022 14:33:18



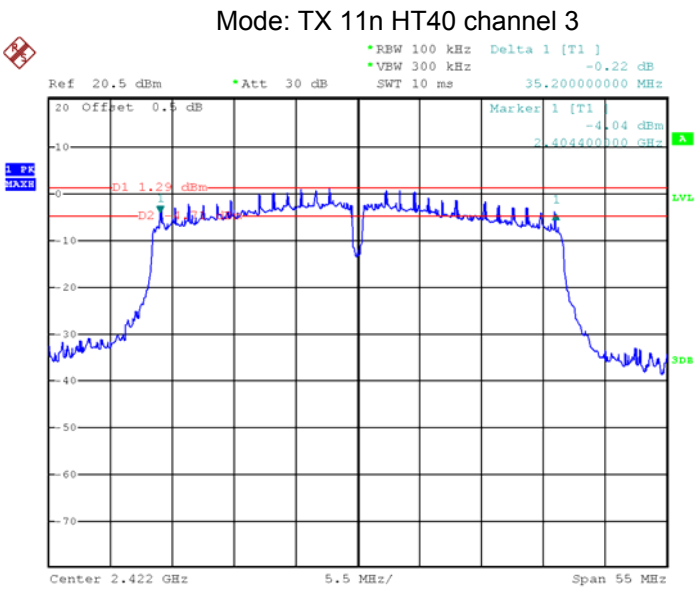
Date: 18.JUL.2022 14:35:26



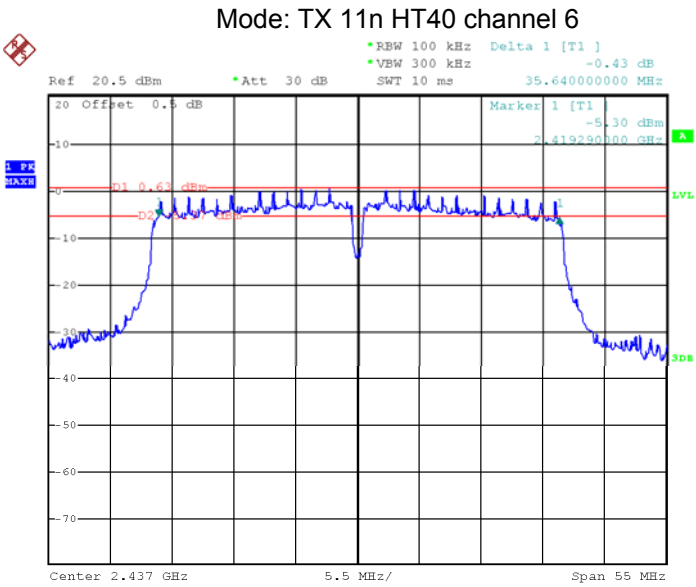
Date: 18.JUL.2022 14:37:40



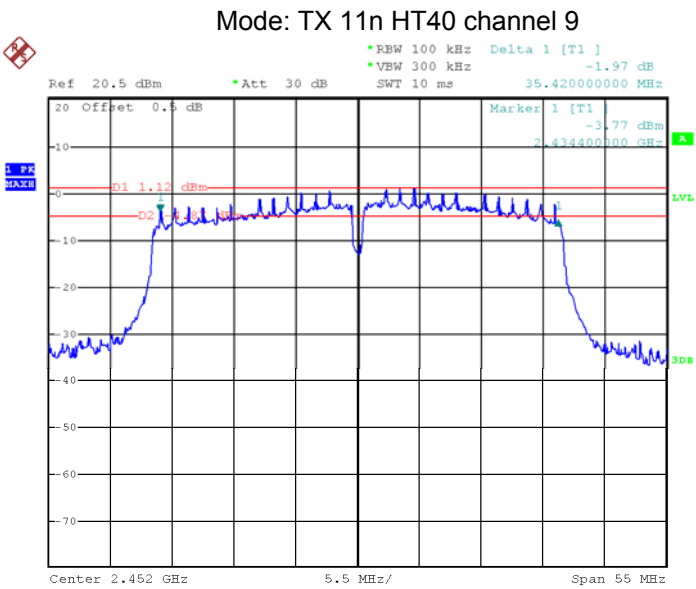
Date: 18.JUL.2022 14:39:59



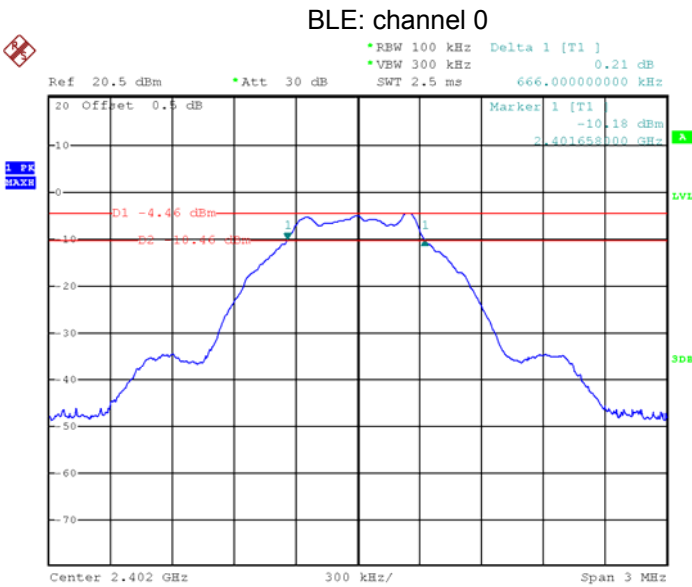
Date: 18.JUL.2022 14:41:39



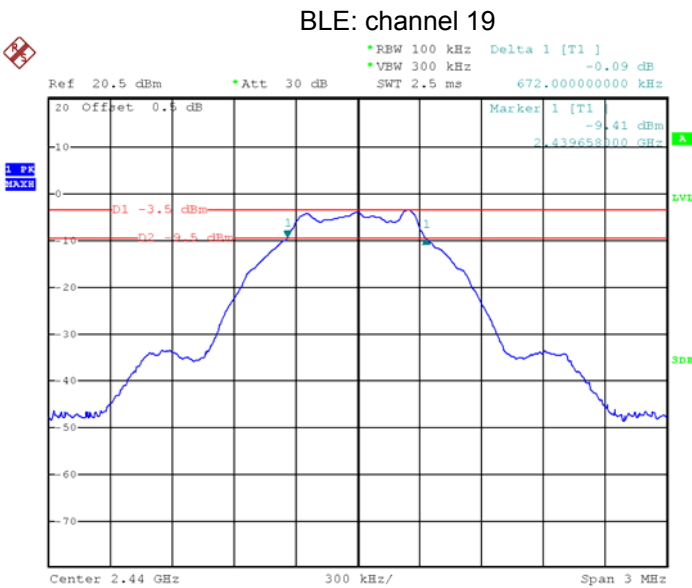
Date: 18.JUL.2022 14:43:02



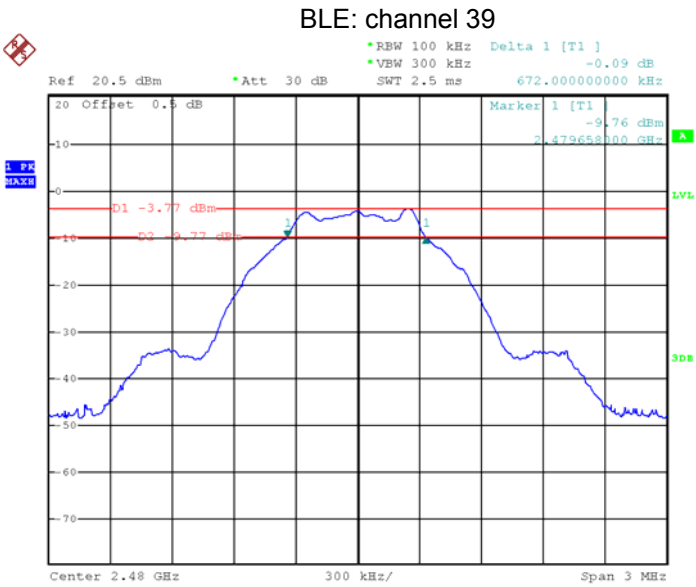
Date: 18.JUL.2022 14:45:07



Date: 19.JUL.2022 09:56:12



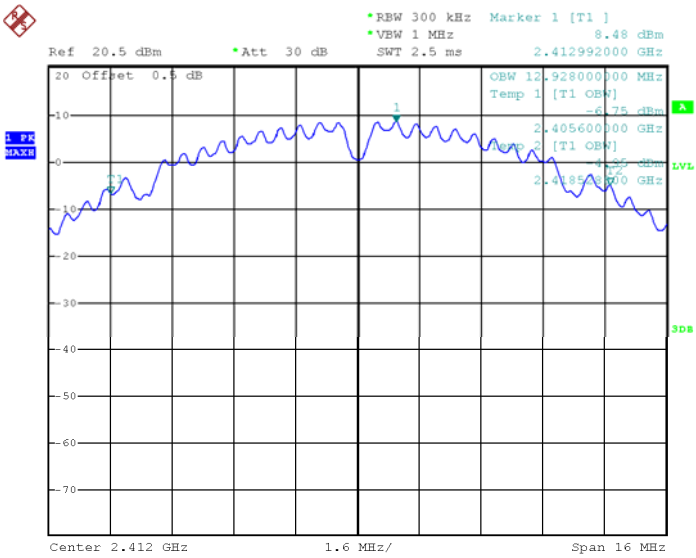
Date: 19.JUL.2022 09:52:52



Date: 19.JUL.2022 09:54:08

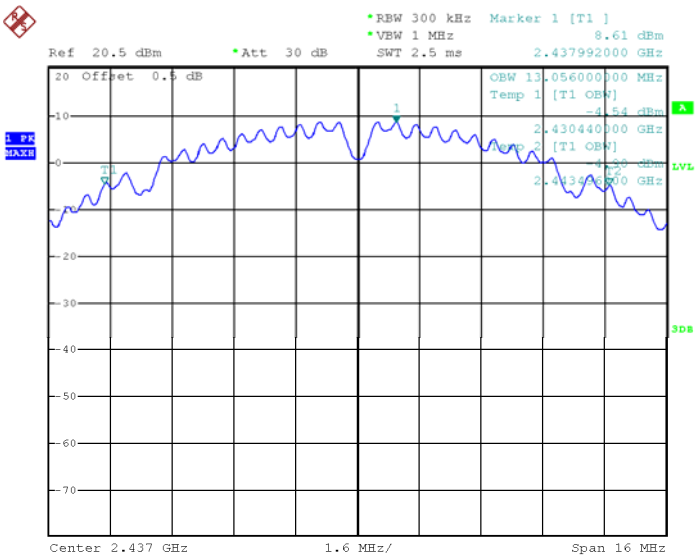
99% Bandwidth

Mode: TX 11b channel 1

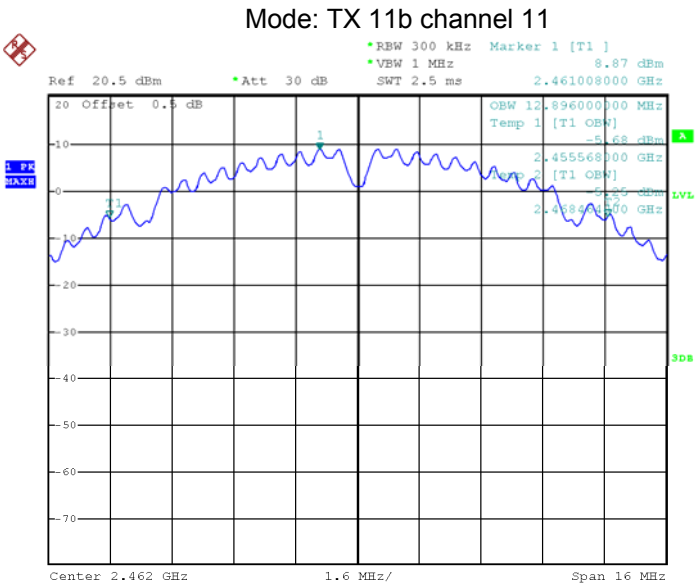


Date: 18.JUL.2022 11:33:42

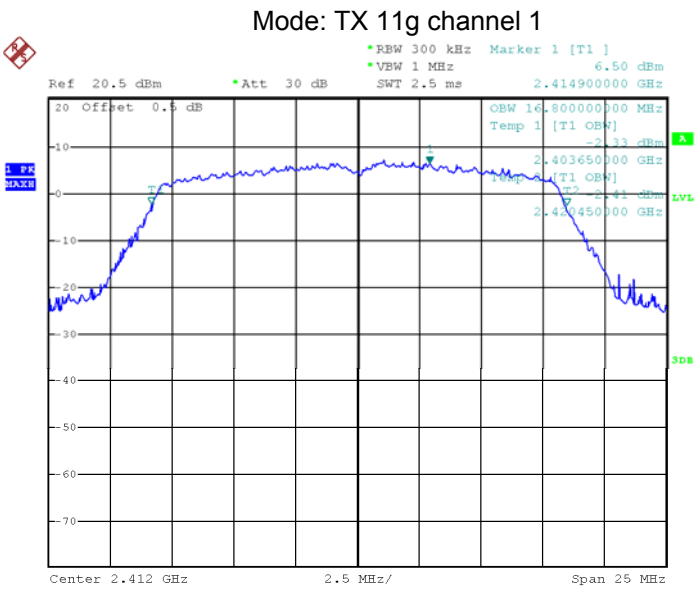
Mode: TX 11b channel 6



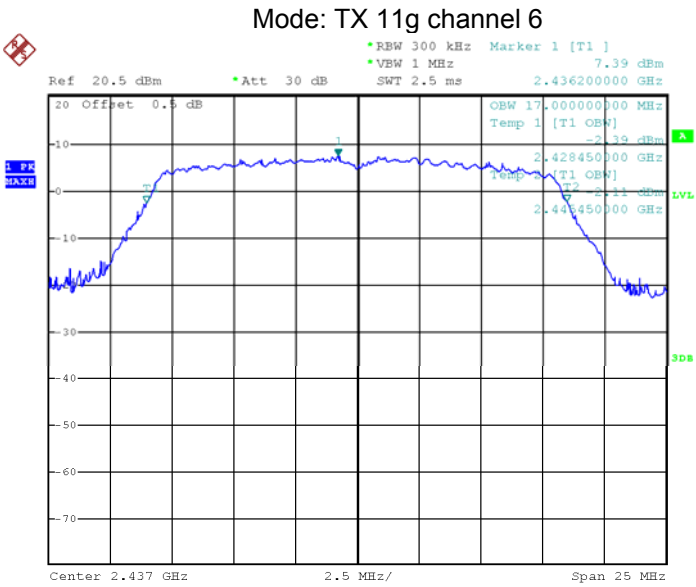
Date: 18.JUL.2022 11:35:04



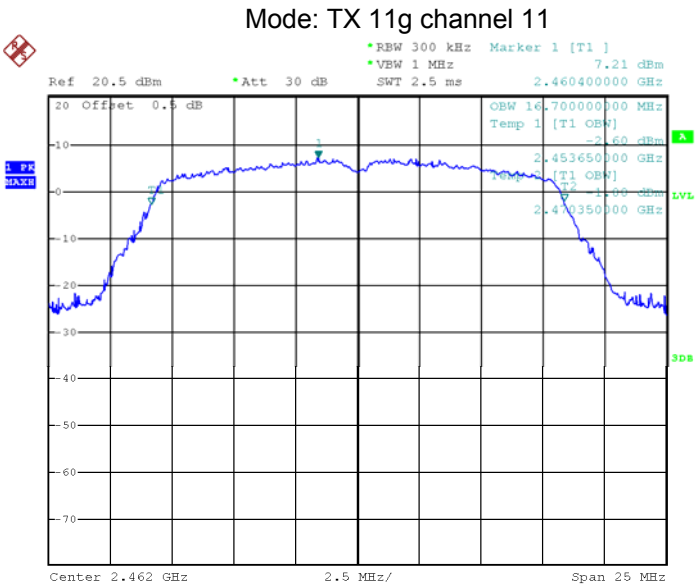
Date: 18.JUL.2022 11:36:19



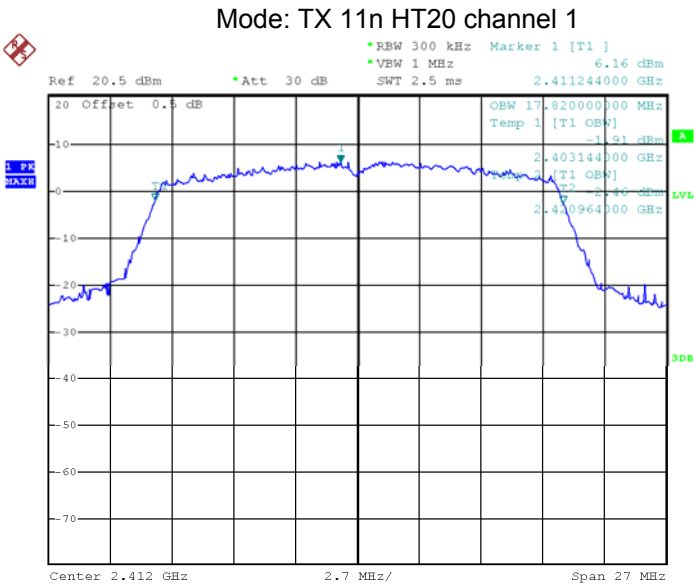
Date: 18.JUL.2022 11:45:15



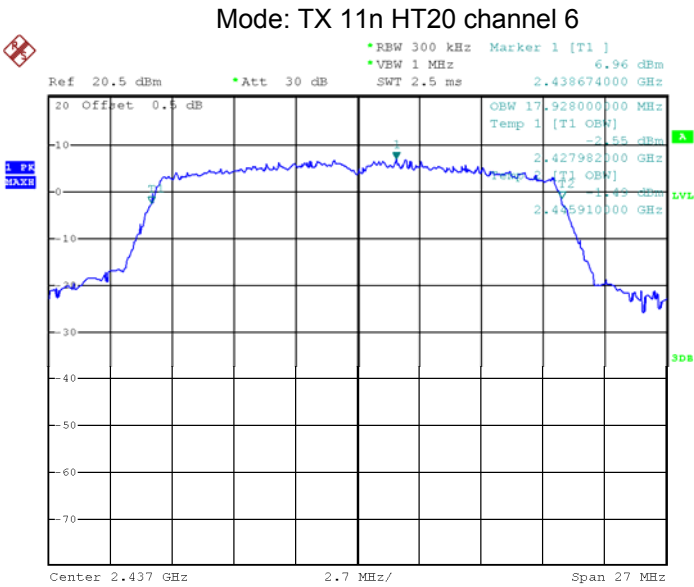
Date: 18.JUL.2022 11:52:37



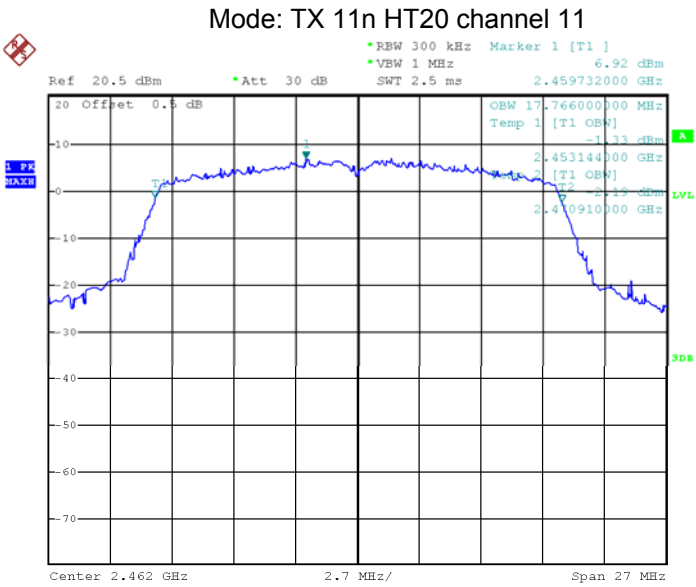
Date: 18.JUL.2022 11:53:23



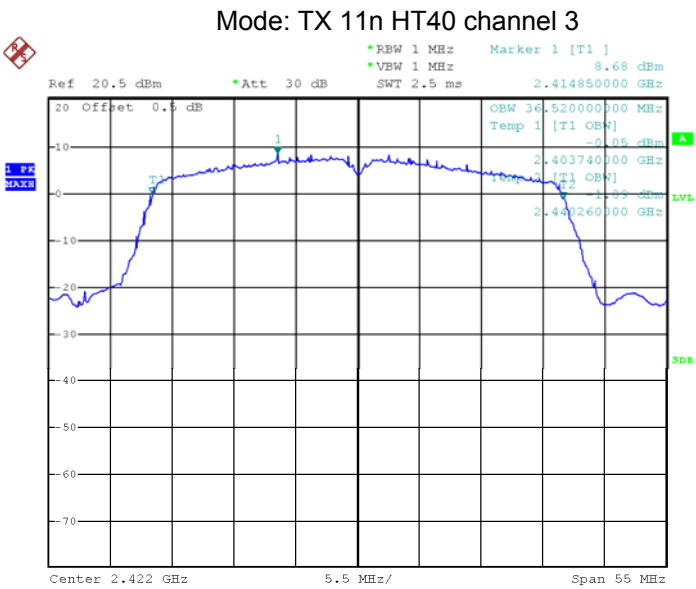
Date: 18.JUL.2022 11:55:25



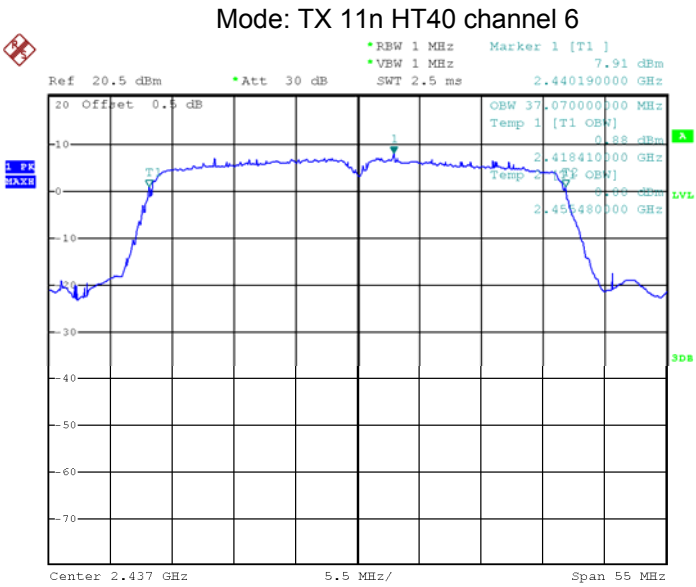
Date: 18.JUL.2022 11:56:05



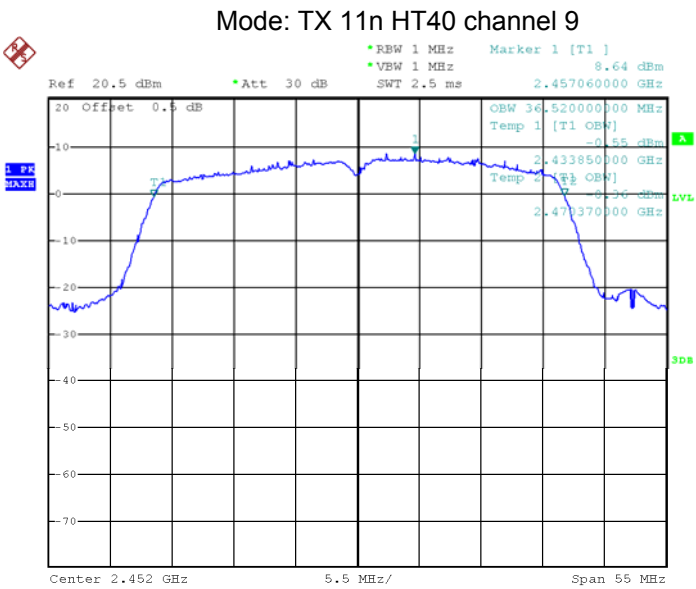
Date: 18.JUL.2022 11:56:42



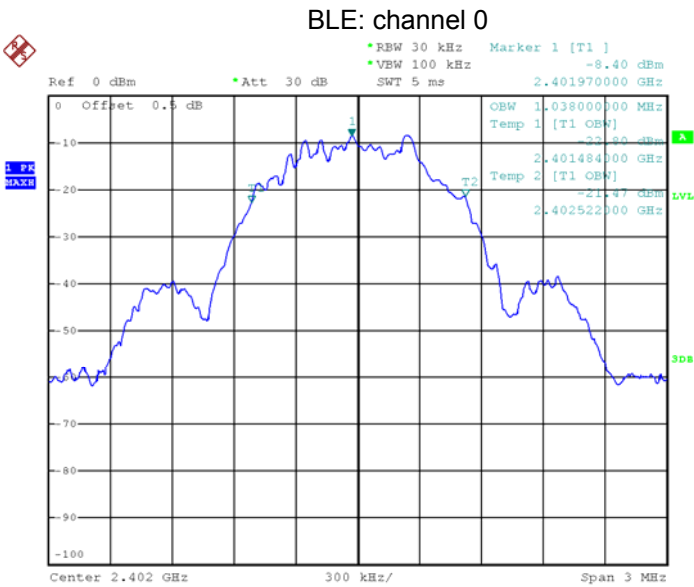
Date: 18.JUL.2022 12:08:05



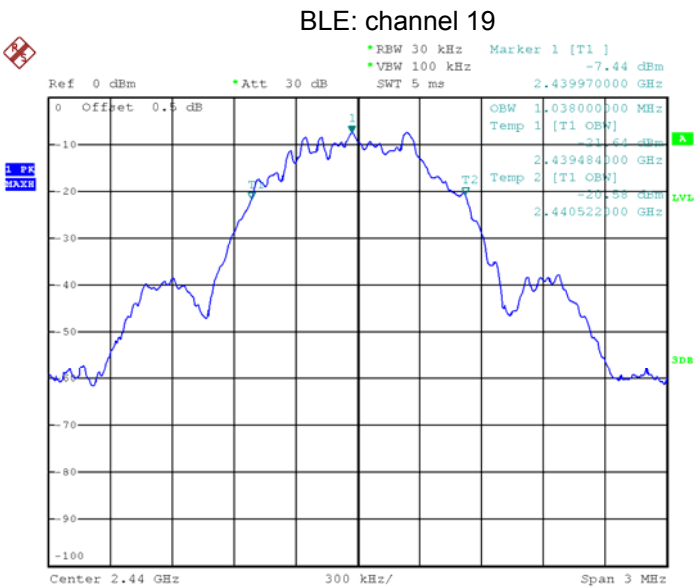
Date: 18.JUL.2022 12:07:36



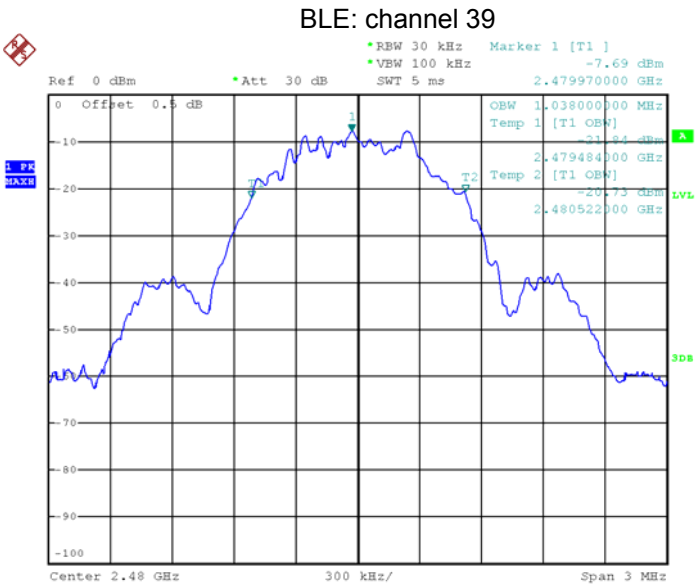
Date: 18.JUL.2022 12:06:59



Date: 19.JUL.2022 09:58:10



Date: 19.JUL.2022 09:58:51



Date: 19.JUL.2022 09:59:30

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 ≥ 3 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.

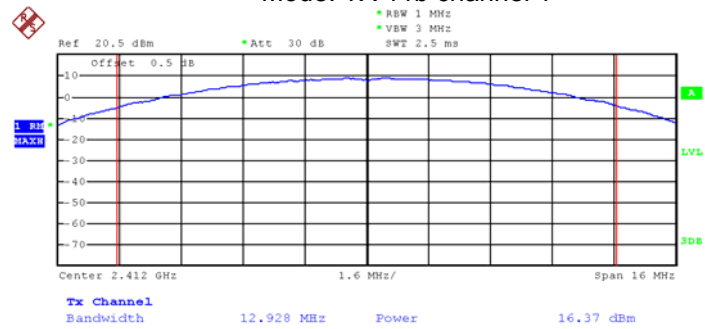
- a) Set the RBW = 1% to 5% of the OBW, not to exceed 1 MHz..
- b) Set the VBW $\geq 3 \times$ RBW
- c) Set the span $\geq 1.5 \times$ OBW.
- d) Detector = RMS.
- e) Sweep time = auto couple.
- f) trigger = free run..
- g) Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\geq \text{RBW} / 2$, 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	16.37	1W/30dBm
	Middle-2437	16.44	1W/30dBm
	High-2462	16.51	1W/30dBm
TX 11g	Low-2412	15.84	1W/30dBm
	Middle-2437	15.84	1W/30dBm
	High-2462	15.84	1W/30dBm
TX 11n HT20	Low-2412	15.44	1W/30dBm
	Middle-2437	16.07	1W/30dBm
	High-2462	15.85	1W/30dBm
TX 11n HT40	Low-2422	15.33	1W/30dBm
	Middle-2437	15.29	1W/30dBm
	High-2452	15.49	1W/30dBm
BLE	Low-2402	-4.75	1W/30dBm
	Middle-2440	-3.82	1W/30dBm
	High-2480	-4.07	1W/30dBm

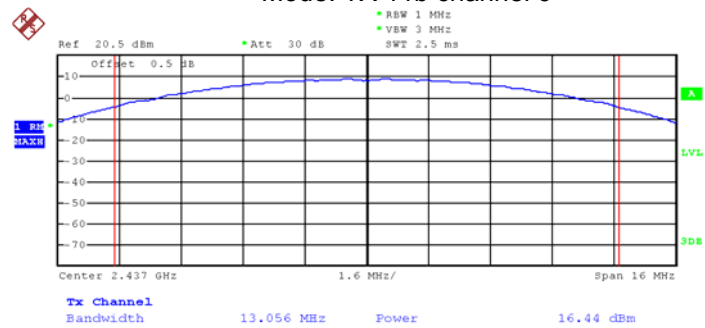
Test Plot

Mode: TX 11b channel 1

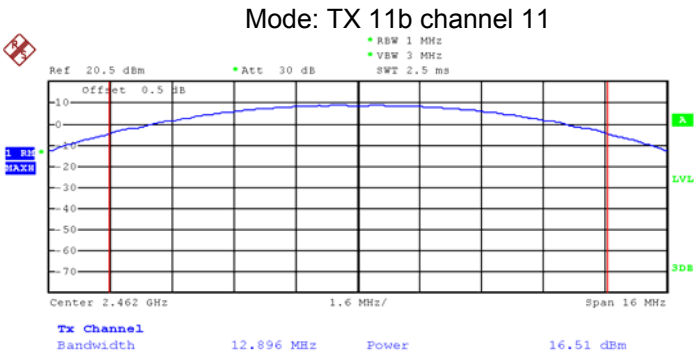


Date: 18.JUL.2022 12:23:21

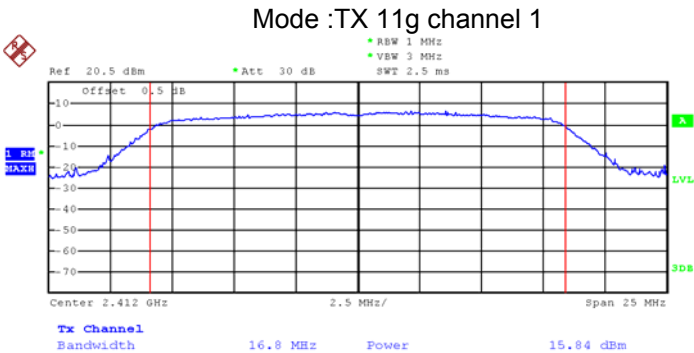
Mode: TX 11b channel 6



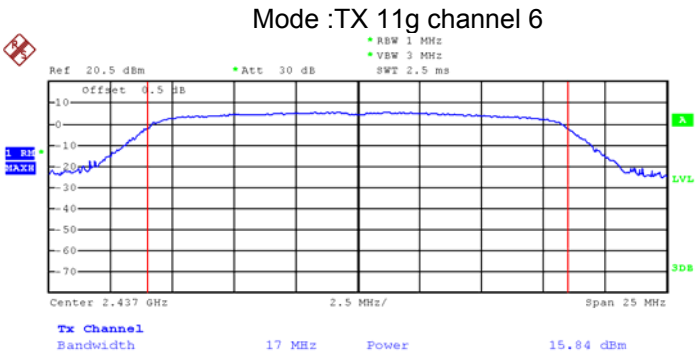
Date: 18.JUL.2022 12:21:11



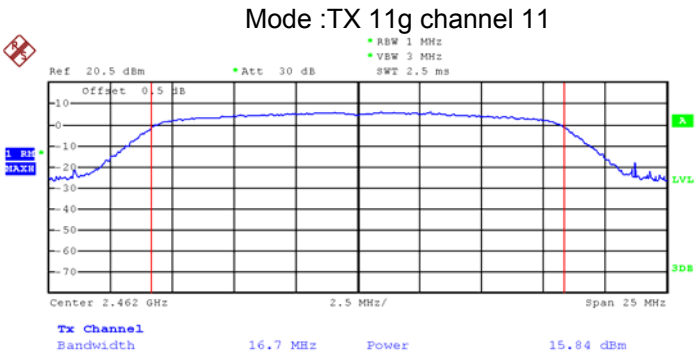
Date: 18.JUL.2022 12:22:07



Date: 18.JUL.2022 12:32:00

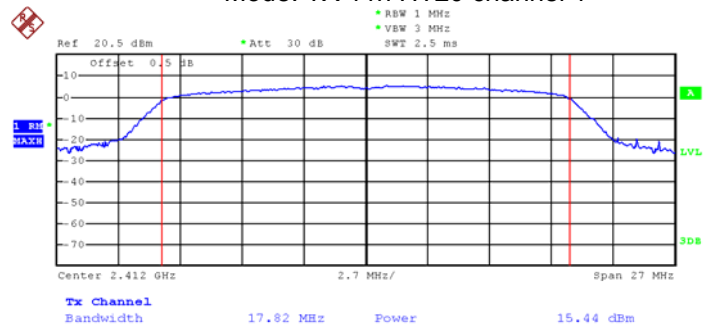


Date: 18.JUL.2022 12:33:23



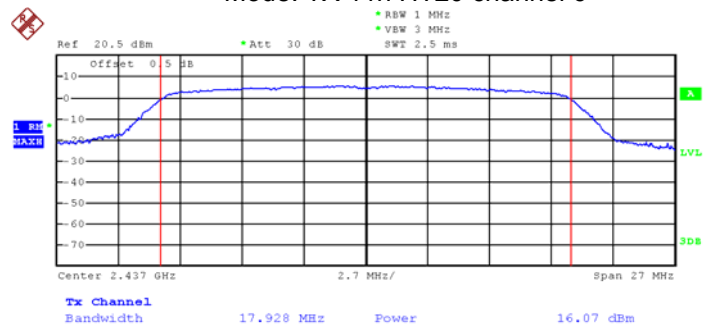
Date: 18.JUL.2022 12:32:44

Mode: TX 11n HT20 channel 1



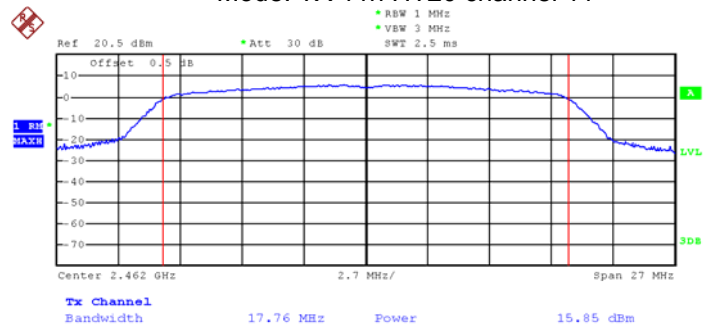
Date: 18.JUL.2022 12:39:15

Mode: TX 11n HT20 channel 6



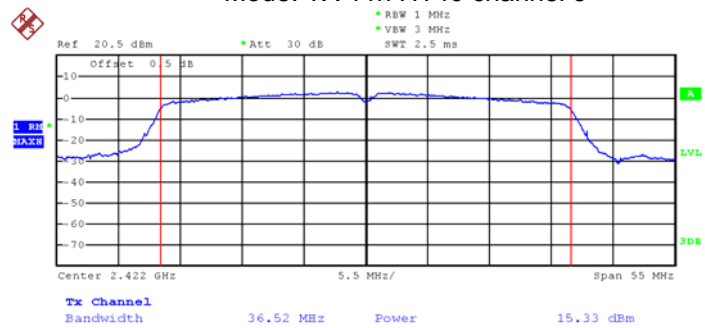
Date: 18.JUL.2022 12:37:39

Mode: TX 11n HT20 channel 11

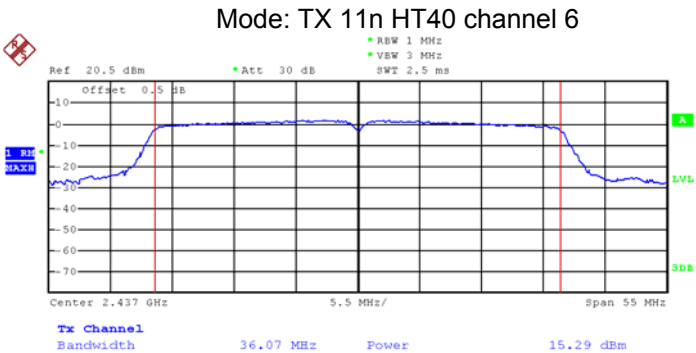


Date: 18.JUL.2022 12:40:02

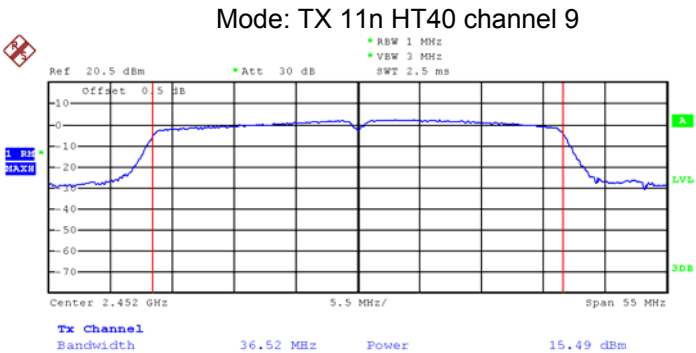
Mode: TX 11n HT40 channel 3



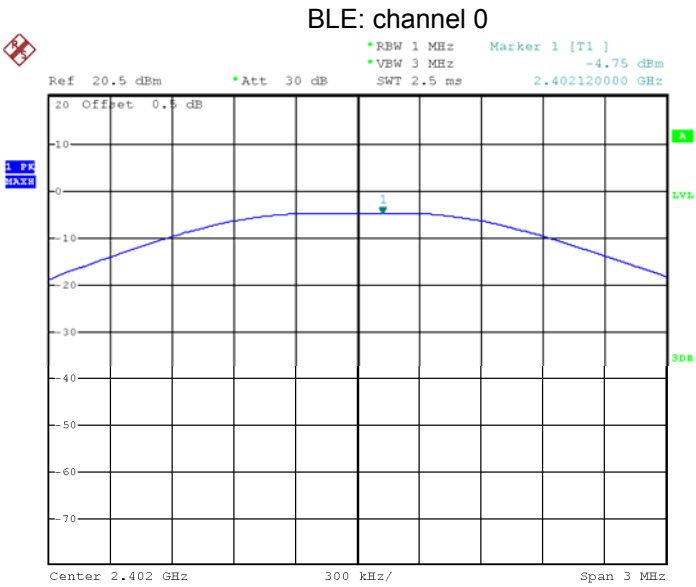
Date: 18.JUL.2022 12:41:06



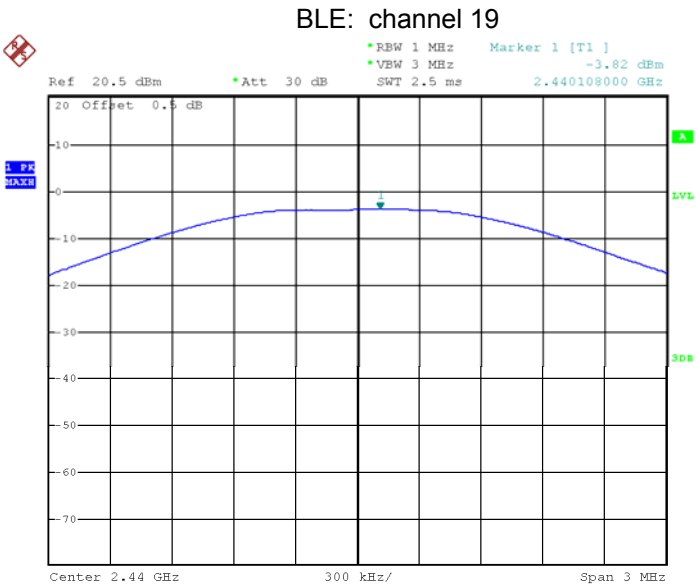
Date: 18.JUL.2022 12:43:27



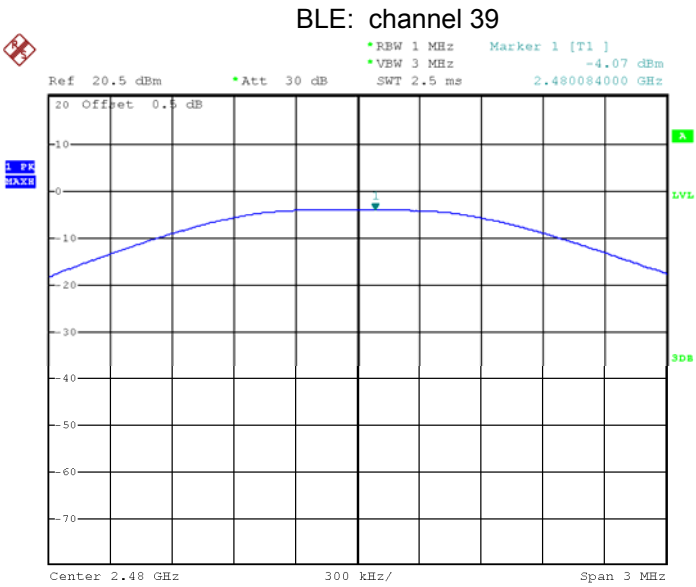
Date: 18.JUL.2022 12:42:41



Date: 18.JUL.2022 18:26:19



Date: 18.JUL.2022 18:27:23



Date: 18.JUL.2022 18:27:55

15 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

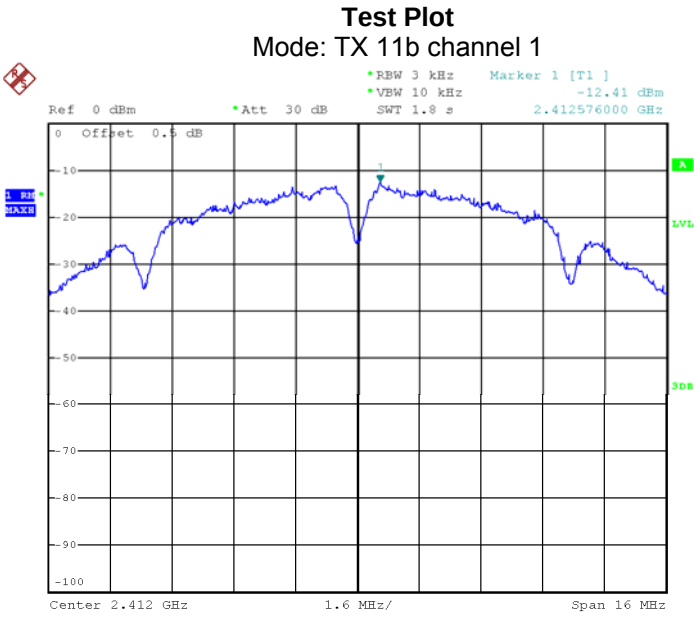
15.1 Test Procedure:

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

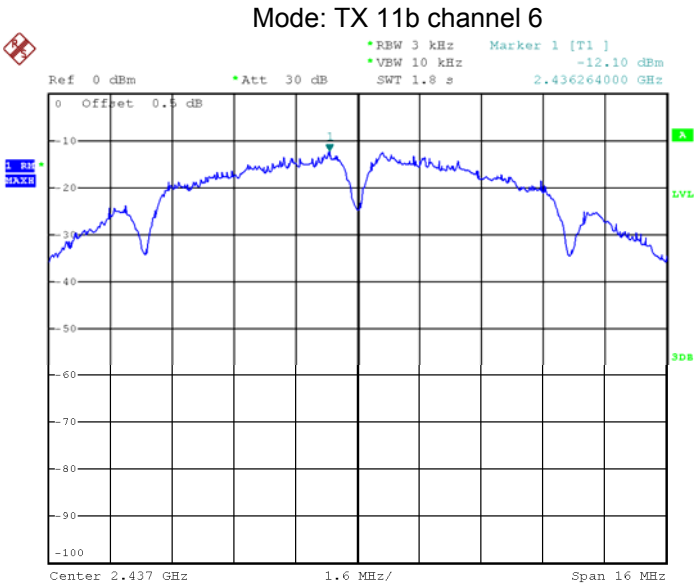
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to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

15.2 Test Result:

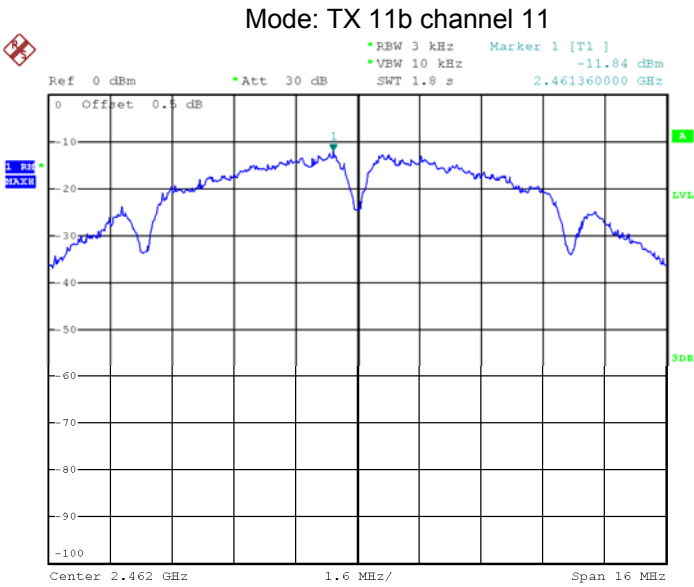
Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
TX 11b	Low-2412	-12.41	8dBm per 3kHz
	Middle-2437	-12.10	8dBm per 3kHz
	High-2462	-11.84	8dBm per 3kHz
TX 11g	Low-2412	-17.43	8dBm per 3kHz
	Middle-2437	-17.40	8dBm per 3kHz
	High-2462	-16.81	8dBm per 3kHz
TX 11n HT20	Low-2412	-18.13	8dBm per 3kHz
	Middle-2437	-18.55	8dBm per 3kHz
	High-2462	-18.18	8dBm per 3kHz
TX 11n HT40	Low-2422	-21.94	8dBm per 3kHz
	Middle-2437	-22.61	8dBm per 3kHz
	High-2452	-21.97	8dBm per 3kHz
BLE	Low-2402	-20.85	8dBm per 3kHz
	Middle-2440	-19.97	8dBm per 3kHz
	High-2480	-20.48	8dBm per 3kHz



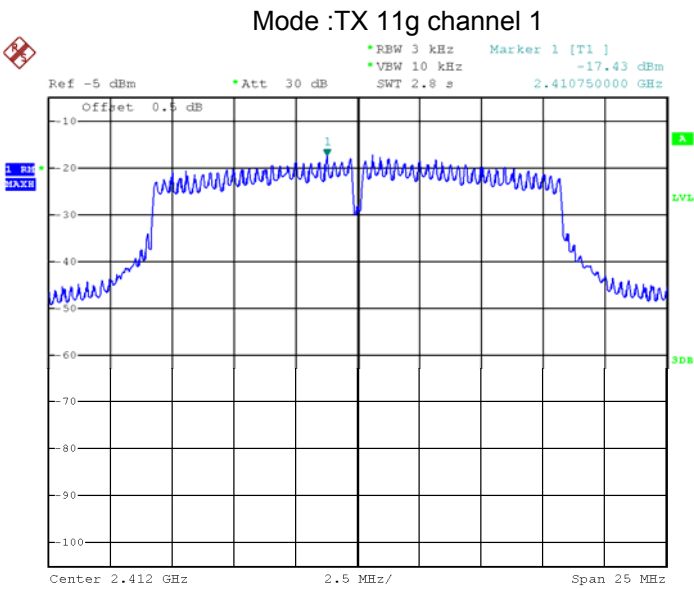
Date: 18.JUL.2022 18:17:07



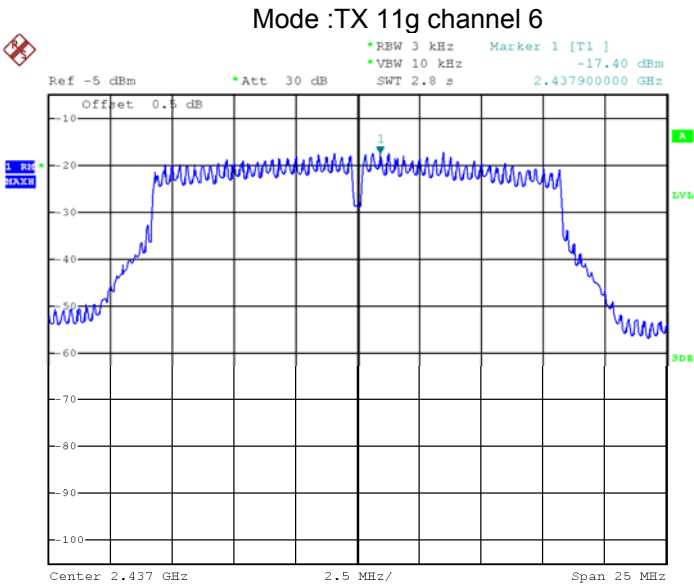
Date: 18.JUL.2022 18:18:01



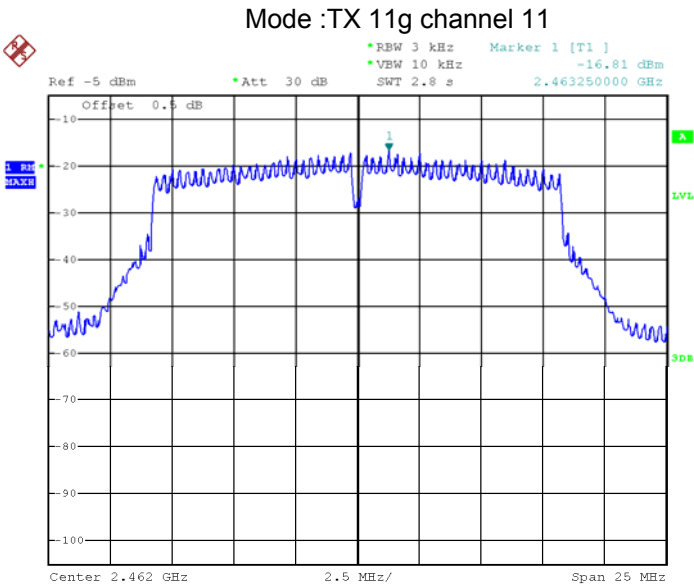
Date: 18.JUL.2022 18:19:15



Date: 18.JUL.2022 18:13:27

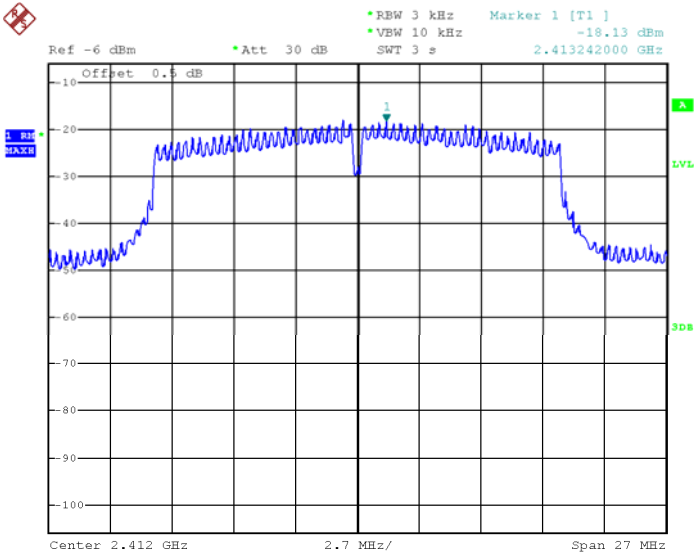


Date: 18.JUL.2022 18:14:34



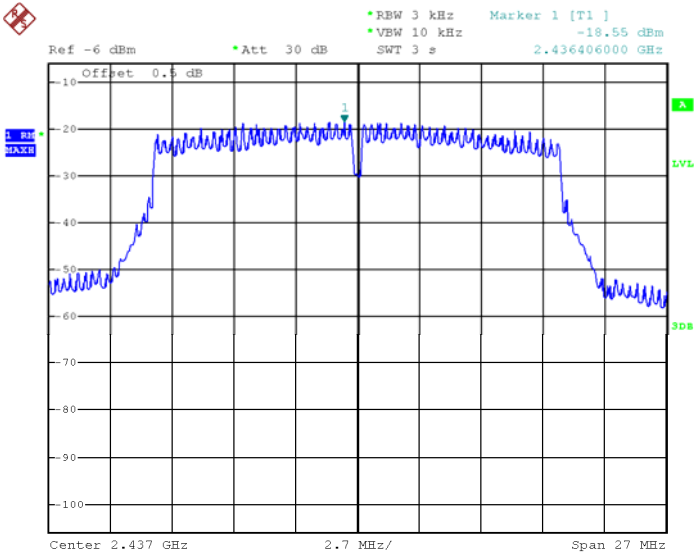
Date: 18.JUL.2022 18:15:25

Mode: TX 11n HT20 channel 1

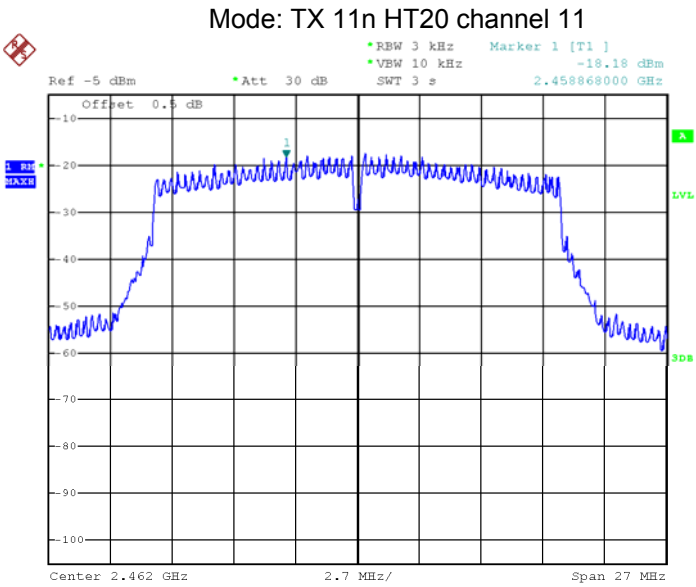


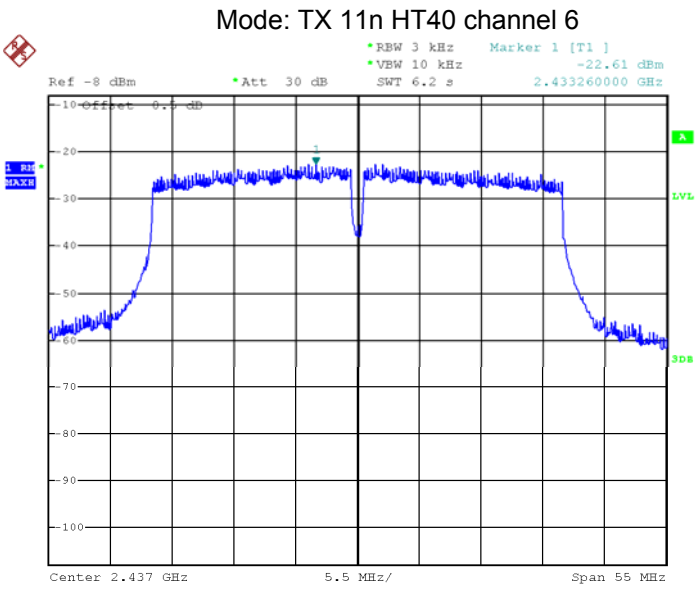
Date: 18.JUL.2022 18:09:04

Mode: TX 11n HT20 channel 6

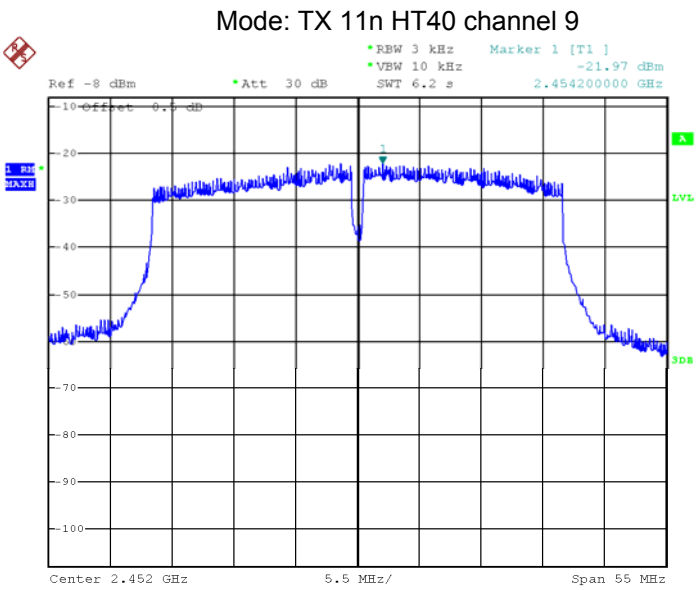


Date: 18.JUL.2022 18:10:28

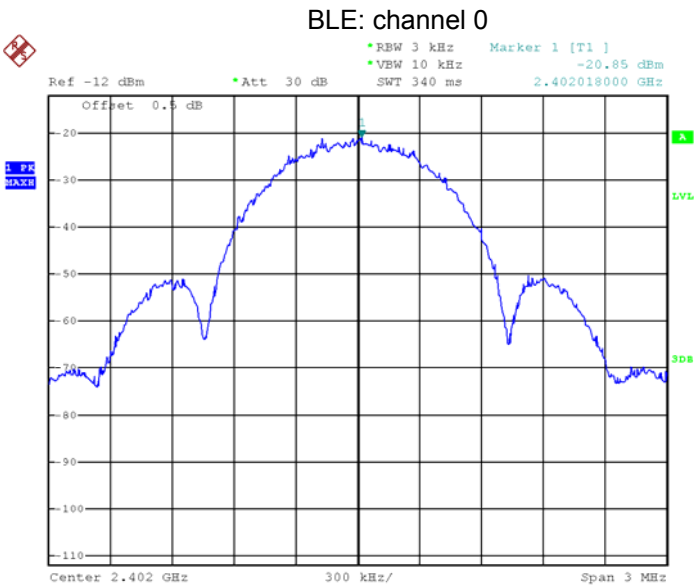




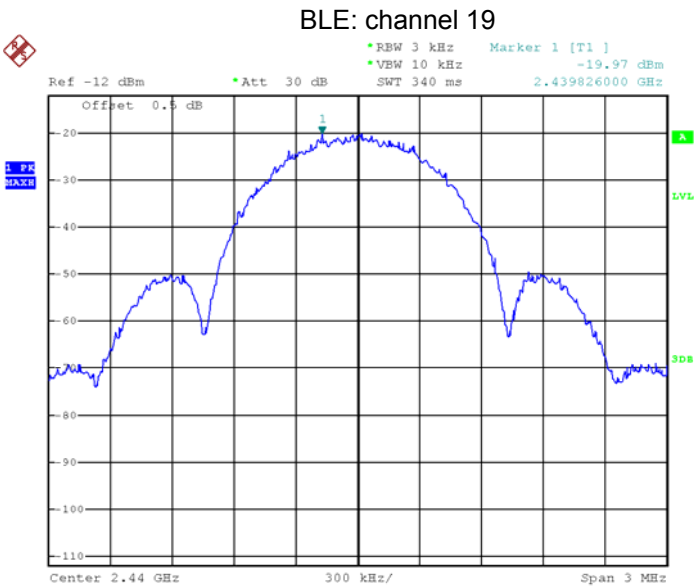
Date: 18.JUL.2022 18:02:31



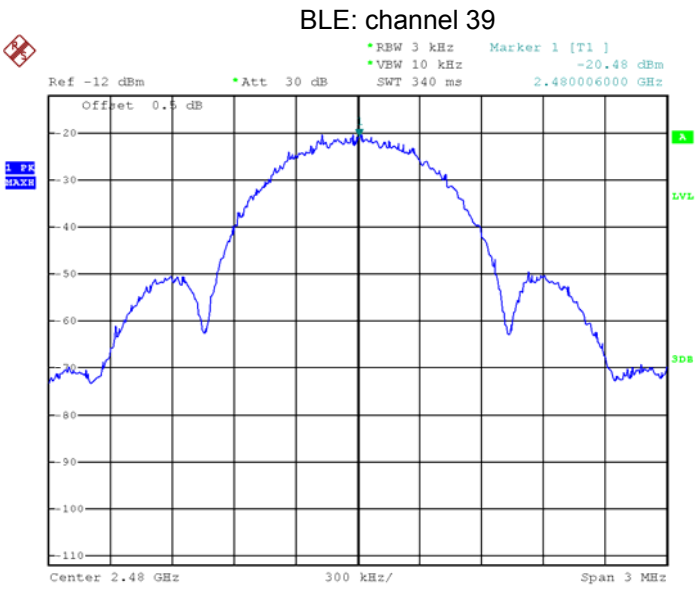
Date: 18.JUL.2022 18:04:25



Date: 19.JUL.2022 10:33:08



Date: 19.JUL.2022 10:32:26



Date: 19.JUL.2022 10:31:48

16 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.

17 RF Exposure

Remark: refer to SAR test report: WTD22X07139033W.

18 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Black Z-Photos.

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