TEST REPORT

Reference No.	:	WTS18S08120316-2W V1
FCC ID	:	2AOAB-PM01
Applicant	:	Beijing Babel Technology CO.,Ltd
Address	:	Room 409, Block C, Zhongguancun Zhizao Park 45 Chengfu Rd., Haidian District, Beijing, China
Manufacturer	:	SHENZHEN GOMTEL SCIENCE & TECHNOLOGY CO., LIMITED
Address	:	5th Floor, Sector B, Fuhua Technology Building, No. 9116 Beihuan Road, Shenzhen, China
Product	:	Translator
Model(s)	:	PM01
Brand Name	:	JoneR
Standards	:	FCC CFR47 Part 15.247:2017
Date of Receipt sample	:	2018-08-07
Date of Test	:	2018-08-08 to 2018-08-21
Date of Issue	:	2018-09-01
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.

Prepared By:
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Approved by:

Philo Zhong

Philo Zhong / Manager

2 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) of USA, 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), IC(Industry 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. Electro Magnetic 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.

Test Facility:

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	**A2LA (Certificate No.: 4243.01)**	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	**International Services**	WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note: 1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476. 2. IC Canada 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

3 Contents

REVISION HISTORY

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S08120316-2W	2018-08-07	2018-08-08 to 2018-08-21	2018-08-22	original	-	Valid

4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S08120316-2W	2018-08-07	2018-08-08 to 2018-08-21	2018-08-22	original	-	Replaced
WTS18S08120316-2W V1	2018-08-07	2018-08-08 to 2018-08-21	2018-09-01	Version 1	Updated	Valid

5 General Information

5.1 General Description of E.U.T.

Product:	Translator
Model(s):	PM01
Model Description:	N/A
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40
Bluetooth Version:	Bluetooth v4.1 with BLE
Hardware Version:	P663-V00-V2
Software Version:	C500-P663TG-V01

5.2 Details of E.U.T.

Operation Frequency:	WiFi: 802.11b/g/n HT20: 2412~2462MHz 802.11n HT40: 2422~2452MHz Bluetooth: 2402~2480MHz
Max. RF output power:	WiFi(2.4G): 9.47dBm Bluetooth: 6.05dBm
Type of Modulation:	WiFi: CCK, OFDM Bluetooth: GFSK, Pi/4 DQPSK, 8DPSK
Antenna installation:	internal permanent antenna
Antenna Gain:	WiFi(2.4G): 0.1dBi Bluetooth: 0.1dBi
Ratings:	DC 3.8V, 1500mAh from battery DC 5V, 2.0A, charging from adapter (Adapter Input: 100-240V~50/60Hz 0.35A)
Adapter:	Manufacturer: DONGGUAN AOHAI POWER TECHNOLOGY CO.,LTD. Model No.: A8A-050200U-US1 Sale Without adapter

5.3 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

5.4 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 .

6 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

7 Equipment Used during Test

7.1 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	2017-09-12	2018-09-11
2.	LISN	R&S	ENV216	101215	2017-09-12	2018-09-11
3.	Cable	Top	TYPE16(3.5M)	-	2017-09-12	2018-09-11
Conducted Emissions Test Site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
4.	Cable	LARGE	RF300	-	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP	100091	2018-04-29	2019-04-28
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2018-04-09	2019-04-08
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2018-04-09	2019-04-08
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2018-04-09	2019-04-08
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2018-04-09	2019-04-08
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2018-04-13	2019-04-12
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2018-04-13	2019-04-12
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	2018-04-13	2019-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-09	2019-04-08
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2018-04-13	2019-04-12
4	Cable	HUBER+SUHNER	CBL2	525178	2018-04-13	2019-04-12

RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2017-09-12	2018-09-11
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2017-09-12	2018-09-11
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2017-09-12	2018-09-11

7.2 Description of Support Units

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

7.3 Measurement Uncertainty

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

7.4 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.

8 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit:

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 o 30	60	50

8.1 E.U.T. Operation

Operating Environment **:**

Temperature: 21.5 °C

Humidity: 51.9 % RH

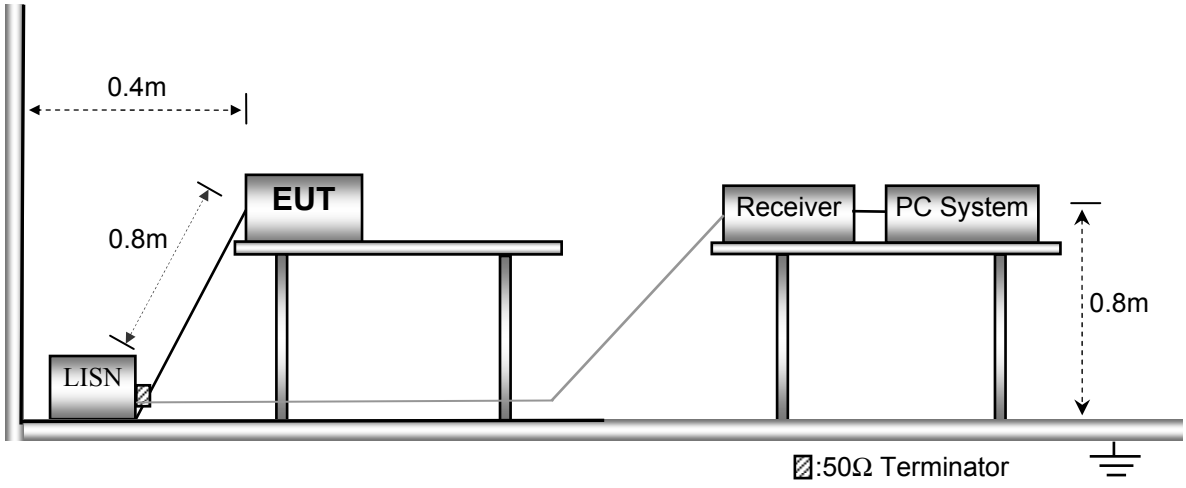
Atmospheric Pressure: 101.2kPa

EUT Operation **:**

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

8.2 EUT Setup

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



8.3 Measurement Description

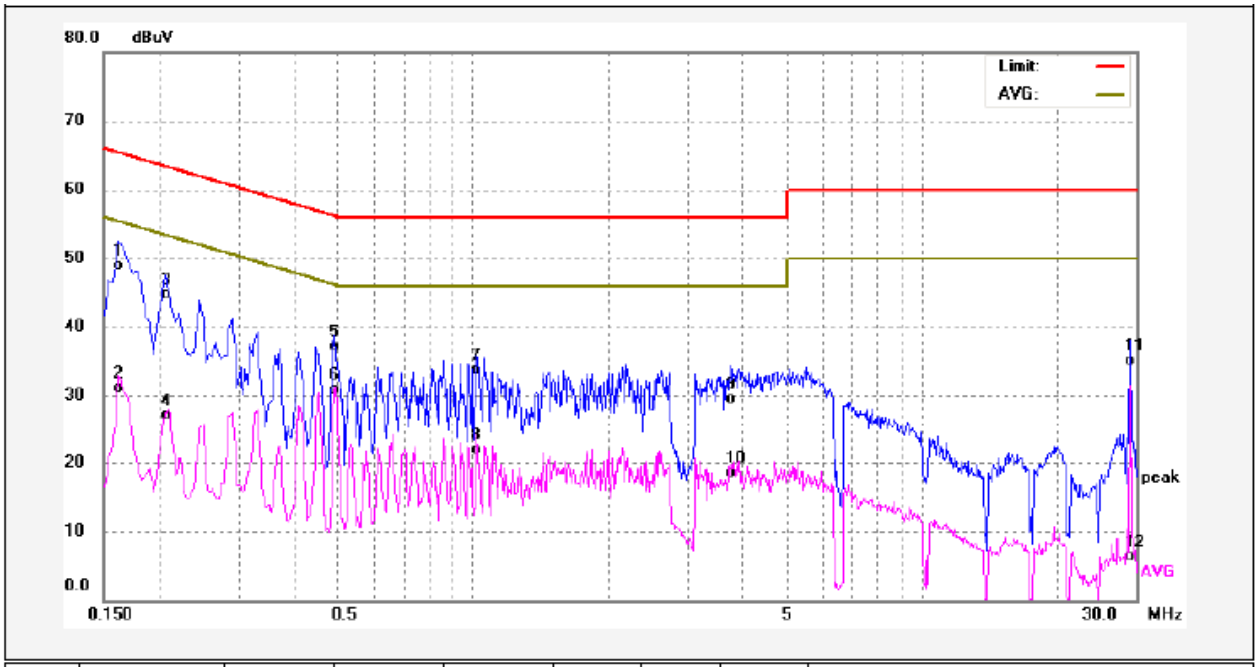
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

8.4 Conducted Emission Test Result

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

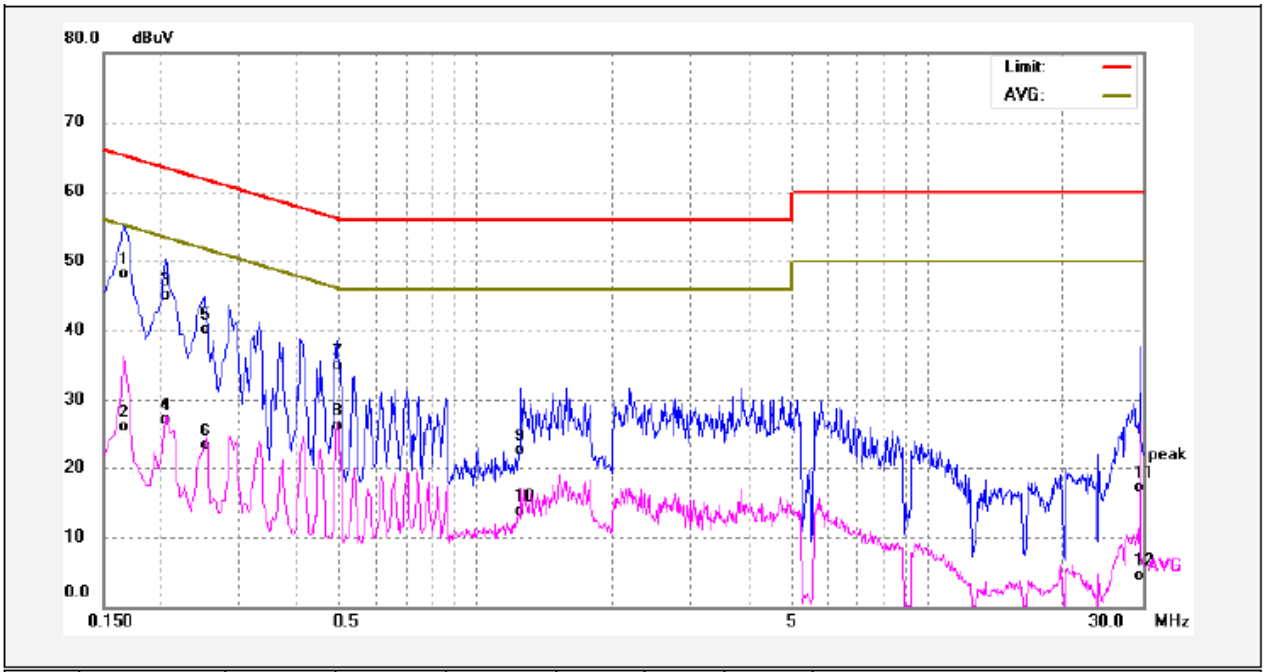
Worst Mode: WIFI mode (802.11b mode low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	38.53	10.28	48.81	65.36	-16.55	QP	
2	0.1620	20.75	10.28	31.03	55.36	-24.33	AVG	
3	0.2060	34.30	10.33	44.63	63.36	-18.73	QP	
4	0.2060	16.77	10.33	27.10	53.36	-26.26	AVG	
5	0.4900	26.74	10.42	37.16	56.17	-19.01	QP	
6	0.4900	20.57	10.42	30.99	46.17	-15.18	AVG	
7	1.0180	23.22	10.44	33.66	56.00	-22.34	QP	
8	1.0180	11.38	10.44	21.82	46.00	-24.18	AVG	
9	3.7500	18.83	10.76	29.59	56.00	-26.41	QP	
10	3.7500	7.65	10.76	18.41	46.00	-27.59	AVG	
11	29.1420	24.78	10.31	35.09	60.00	-24.91	QP	
12	29.1420	-4.09	10.31	6.22	50.00	-43.78	AVG	

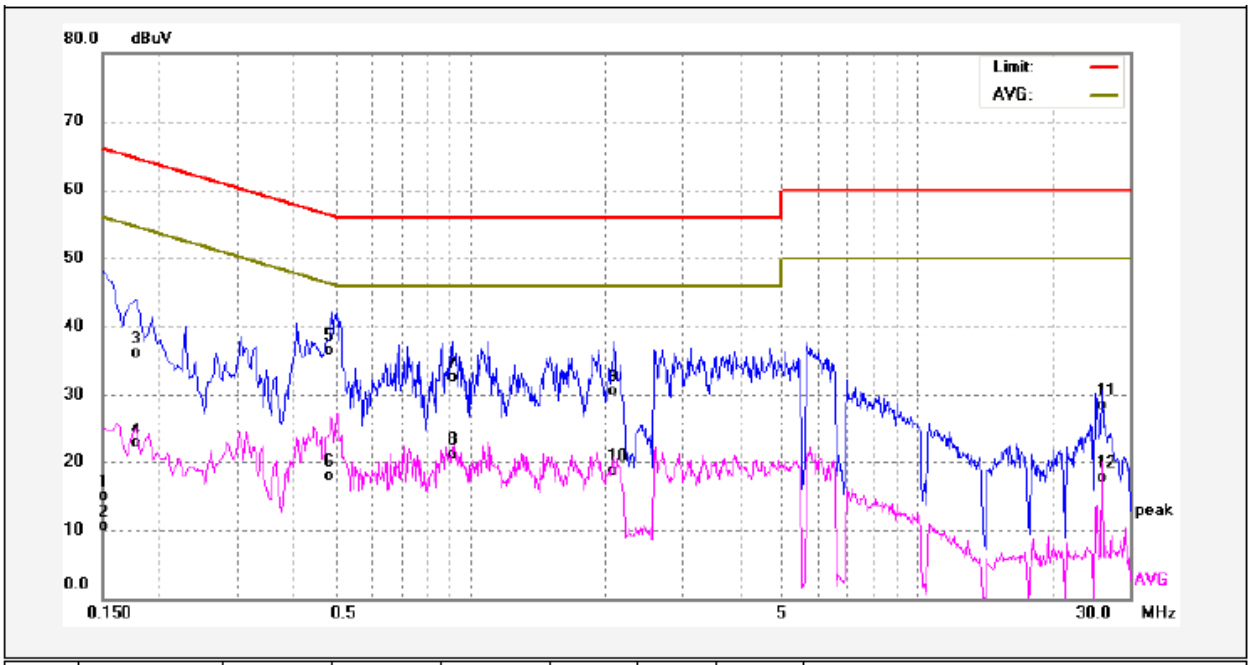
Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1660	37.82	10.28	48.10	65.15	-17.05	QP	
2	0.1660	15.91	10.28	26.19	55.15	-28.96	AVG	
3	0.2060	34.71	10.33	45.04	63.36	-18.32	QP	
4	0.2060	16.77	10.33	27.10	53.36	-26.26	AVG	
5	0.2500	29.62	10.39	40.01	61.75	-21.74	QP	
6	0.2500	12.93	10.39	23.32	51.75	-28.43	AVG	
7	0.4940	24.54	10.42	34.96	56.10	-21.14	QP	
8	0.4940	15.90	10.42	26.32	46.10	-19.78	AVG	
9	1.2579	12.00	10.45	22.45	56.00	-33.55	QP	
10	1.2579	3.17	10.45	13.62	46.00	-32.38	AVG	
11	29.6100	6.88	10.29	17.17	60.00	-42.83	QP	
12	29.6100	-5.75	10.29	4.54	50.00	-45.46	AVG	

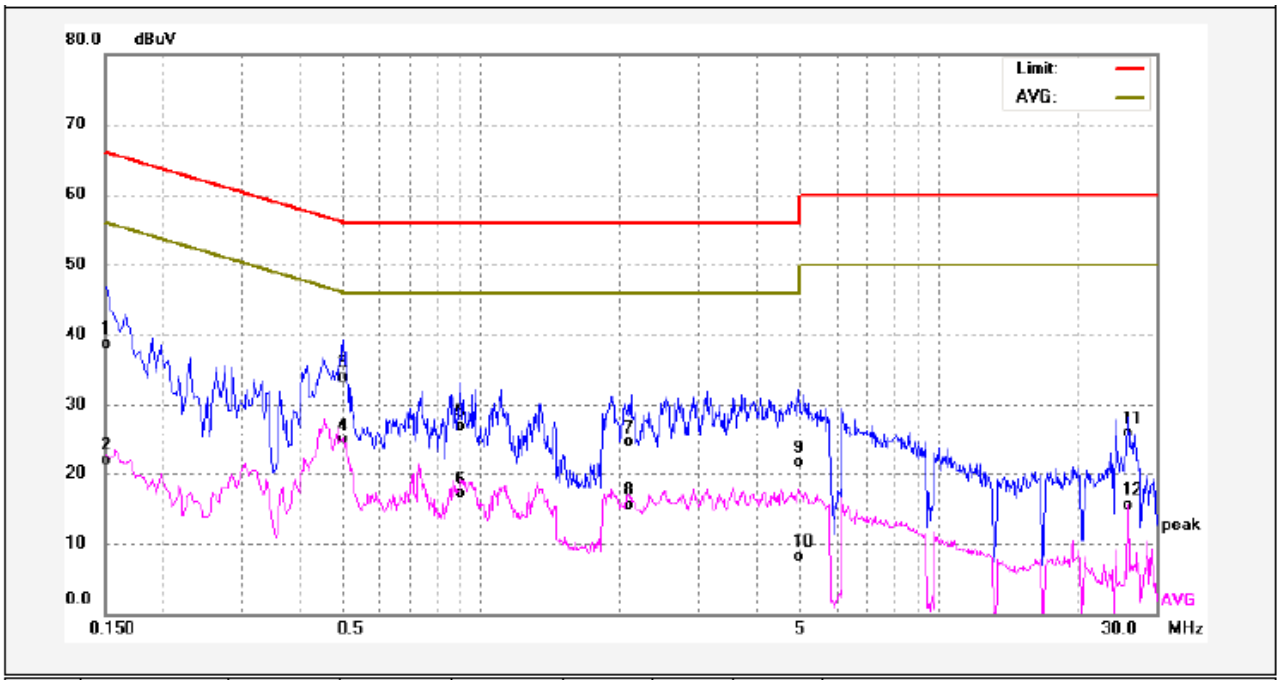
Worst Mode: BLE mode (low channel)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1499	4.55	10.26	14.81	66.00	-51.19	QP	
2	0.1499	0.23	10.26	10.49	56.00	-45.51	AVG	
3	0.1780	25.76	10.30	36.06	64.57	-28.51	QP	
4	0.1780	12.32	10.30	22.62	54.57	-31.95	AVG	
5	0.4900	26.10	10.42	36.52	56.17	-19.65	QP	
6	0.4900	7.49	10.42	17.91	46.17	-28.26	AVG	
7	0.9100	21.97	10.44	32.41	56.00	-23.59	QP	
8	0.9100	10.63	10.44	21.07	46.00	-24.93	AVG	
9	2.1099	19.93	10.58	30.51	56.00	-25.49	QP	
10	2.1099	8.10	10.58	18.68	46.00	-27.32	AVG	
11	26.0020	18.04	10.46	28.50	60.00	-31.50	QP	
12	26.0020	7.19	10.46	17.65	50.00	-32.35	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	28.37	10.26	38.63	65.99	-27.36	QP	
2	0.1500	11.69	10.26	21.95	55.99	-34.04	AVG	
3	0.4980	23.50	10.42	33.92	56.03	-22.11	QP	
4	0.4980	14.58	10.42	25.00	46.03	-21.03	AVG	
5	0.9020	16.53	10.44	26.97	56.00	-29.03	QP	
6	0.9020	6.66	10.44	17.10	46.00	-28.90	AVG	
7	2.1300	13.99	10.59	24.58	56.00	-31.42	QP	
8	2.1300	4.92	10.59	15.51	46.00	-30.49	AVG	
9	4.9460	10.63	10.81	21.44	56.00	-34.56	QP	
10	4.9460	-2.74	10.81	8.07	46.00	-37.93	AVG	
11	26.0020	15.53	10.46	25.99	60.00	-34.01	QP	
12	26.0020	5.04	10.46	15.50	50.00	-34.50	AVG	

9 Radiated Emissions

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(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

9.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

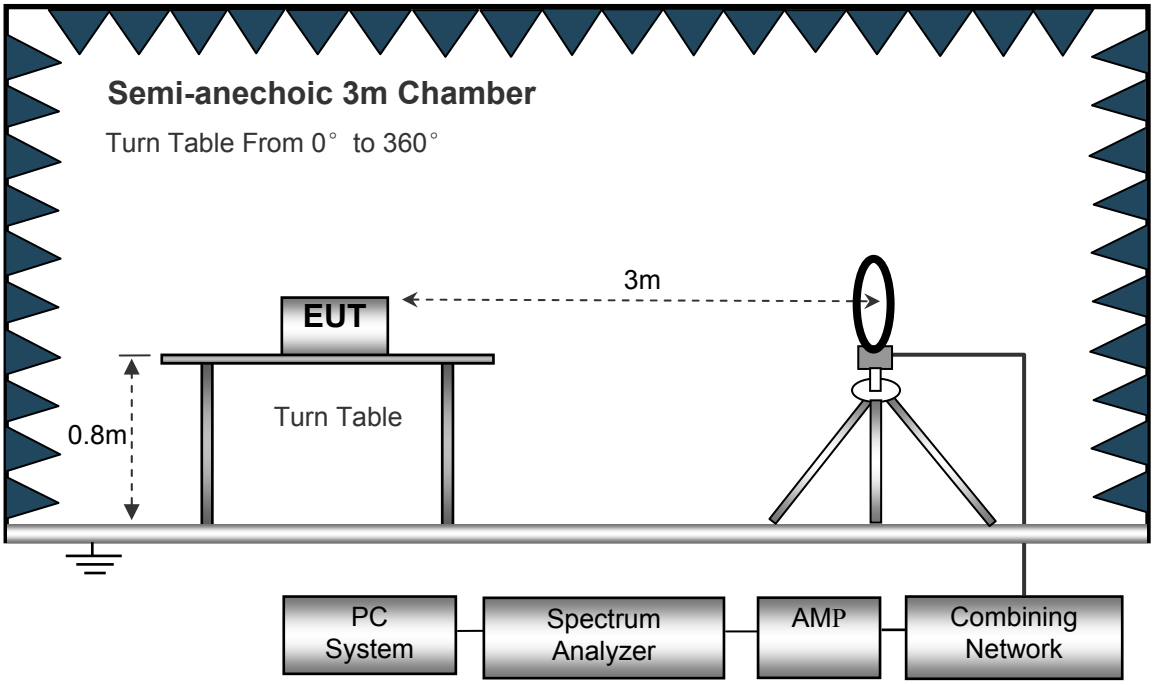
EUT Operation **:**

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

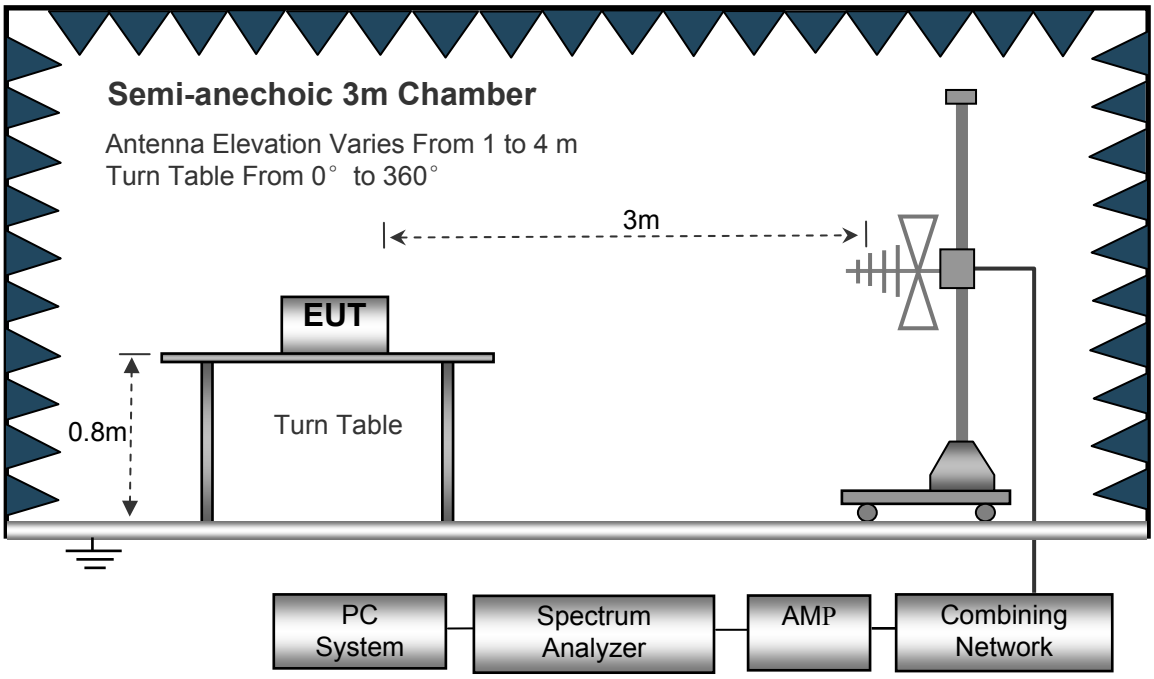
9.2 Test Setup

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

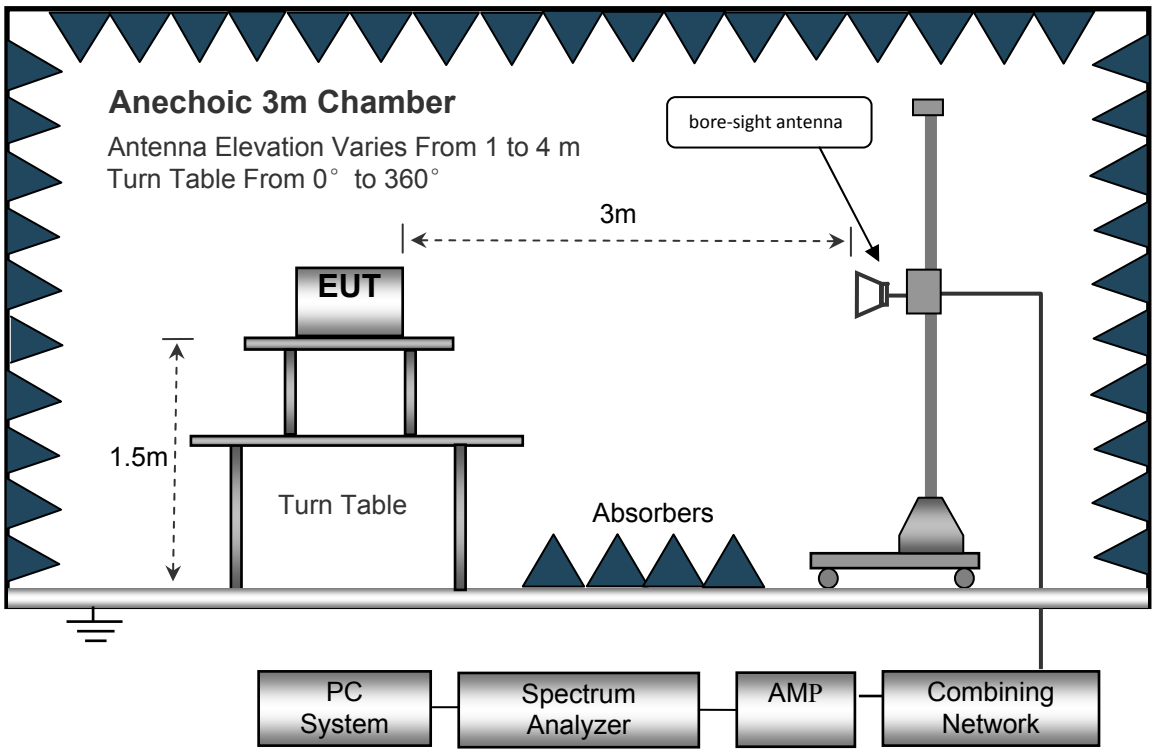
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

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

30MHz ~ 1GHz

Sweep Speed ..... Auto
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

9.4 Test Procedure

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

9.5 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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:

Margin = Corr. Ampl. – Limit

9.6 Summary of Test Results

Wifi:
Test Frequency: 9KHz~30MHz

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

Frequency	Measurement results dBμV @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dBμV/m @30m	Limits dBμV/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
802.11b							
6.021	25.30	QP	21.84	40.00	7.14	29.54	-22.40
15.730	25.18	QP	21.35	40.00	6.53	29.54	-23.01
25.680	25.40	QP	20.67	40.00	6.07	29.54	-23.47
802.11g							
6.021	25.53	QP	21.84	40.00	7.37	29.54	-22.17
15.730	24.75	QP	21.35	40.00	6.10	29.54	-23.44
25.680	25.09	QP	20.67	40.00	5.76	29.54	-23.78
802.11n(HT20)							
6.021	25.03	QP	21.84	40.00	6.87	29.54	-22.67
15.730	24.45	QP	21.35	40.00	5.80	29.54	-23.74
25.680	25.23	QP	20.67	40.00	5.90	29.54	-23.64
802.11n(HT40)							
6.021	25.12	QP	21.84	40.00	6.96	29.54	-22.58
15.730	25.33	QP	21.35	40.00	6.68	29.54	-22.86
25.680	24.58	QP	20.67	40.00	5.25	29.54	-24.29

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									
223.45	40.92	QP	82	1.1	H	-11.62	29.30	46.00	-16.70
223.45	34.34	QP	352	1.3	V	-11.62	22.72	46.00	-23.28
4824.00	50.44	PK	163	2.0	V	-1.06	49.38	74.00	-24.62
4824.00	47.49	Ave	163	2.0	V	-1.06	46.43	54.00	-7.57
7236.00	41.07	PK	237	1.7	H	1.33	42.40	74.00	-31.60
7236.00	40.02	Ave	237	1.7	H	1.33	41.35	54.00	-12.65
2326.49	45.76	PK	110	1.2	V	-13.19	32.57	74.00	-41.43
2326.49	38.62	Ave	110	1.2	V	-13.19	25.43	54.00	-28.57
2356.77	44.00	PK	320	1.7	H	-13.14	30.86	74.00	-43.14
2356.77	37.35	Ave	320	1.7	H	-13.14	24.21	54.00	-29.79
2492.18	43.42	PK	293	1.0	V	-13.08	30.34	74.00	-43.66
2492.18	38.09	Ave	293	1.0	V	-13.08	25.01	54.00	-28.99

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	40.84	QP	335	1.2	H	-11.62	29.22	46.00	-16.78
223.45	35.25	QP	239	1.7	V	-11.62	23.63	46.00	-22.37
4874.00	51.32	PK	48	1.5	V	-0.62	50.70	74.00	-23.30
4874.00	47.58	Ave	48	1.5	V	-0.62	46.96	54.00	-7.04
7311.00	42.53	PK	308	1.8	H	2.21	44.74	74.00	-29.26
7311.00	40.61	Ave	308	1.8	H	2.21	42.82	54.00	-11.18
2329.23	46.57	PK	198	1.4	V	-13.19	33.38	74.00	-40.62
2329.23	38.48	Ave	198	1.4	V	-13.19	25.29	54.00	-28.71
2360.52	42.46	PK	32	1.7	H	-13.14	29.32	74.00	-44.68
2360.52	36.85	Ave	32	1.7	H	-13.14	23.71	54.00	-30.29
2497.93	44.61	PK	77	1.8	V	-13.08	31.53	74.00	-42.47
2497.93	37.74	Ave	77	1.8	V	-13.08	24.66	54.00	-29.34

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
223.45	41.89	QP	345	1.6	H	-11.62	30.27	46.00	-15.73
223.45	35.26	QP	239	1.1	V	-11.62	23.64	46.00	-22.36
4924.00	52.26	PK	308	1.7	V	-0.24	52.02	74.00	-21.98
4924.00	47.85	Ave	308	1.7	V	-0.24	47.61	54.00	-6.39
7386.00	41.76	PK	42	1.8	H	2.84	44.60	74.00	-29.40
7386.00	39.37	Ave	42	1.8	H	2.84	42.21	54.00	-11.79
2334.94	46.98	PK	87	1.6	V	-13.19	33.79	74.00	-40.21
2334.94	39.85	Ave	87	1.6	V	-13.19	26.66	54.00	-27.34
2359.29	42.79	PK	79	1.5	H	-13.14	29.65	74.00	-44.35
2359.29	37.08	Ave	79	1.5	H	-13.14	23.94	54.00	-30.06
2489.53	42.70	PK	149	1.9	V	-13.08	29.62	74.00	-44.38
2489.53	37.58	Ave	149	1.9	V	-13.08	24.50	54.00	-29.50

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	42.48	QP	183	1.3	H	-11.62	30.86	46.00	-15.14
223.45	36.33	QP	83	1.4	V	-11.62	24.71	46.00	-21.29
4824.00	53.46	PK	114	1.2	V	-1.06	52.40	74.00	-21.60
4824.00	46.55	Ave	114	1.2	V	-1.06	45.49	54.00	-8.51
7236.00	40.40	PK	79	1.2	H	1.33	41.73	74.00	-32.27
7236.00	40.18	Ave	79	1.2	H	1.33	41.51	54.00	-12.49
2321.98	45.33	PK	57	1.7	V	-13.19	32.14	74.00	-41.86
2321.98	37.27	Ave	57	1.7	V	-13.19	24.08	54.00	-29.92
2370.13	43.85	PK	160	1.3	H	-13.14	30.71	74.00	-43.29
2370.13	38.10	Ave	160	1.3	H	-13.14	24.96	54.00	-29.04
2495.87	44.53	PK	153	1.7	V	-13.08	31.45	74.00	-42.55
2495.87	36.26	Ave	153	1.7	V	-13.08	23.18	54.00	-30.82

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
223.45	43.30	QP	307	1.7	H	-11.62	31.68	46.00	-14.32
223.45	37.00	QP	3	1.7	V	-11.62	25.38	46.00	-20.62
4874.00	52.43	PK	357	1.9	V	-0.62	51.81	74.00	-22.19
4874.00	47.43	Ave	357	1.9	V	-0.62	46.81	54.00	-7.19
7311.00	40.69	PK	127	1.7	H	2.21	42.90	74.00	-31.10
7311.00	41.44	Ave	127	1.7	H	2.21	43.65	54.00	-10.35
2339.29	45.02	PK	123	1.2	V	-13.19	31.83	74.00	-42.17
2339.29	38.10	Ave	123	1.2	V	-13.19	24.91	54.00	-29.09
2365.43	43.49	PK	37	1.2	H	-13.14	30.35	74.00	-43.65
2365.43	38.68	Ave	37	1.2	H	-13.14	25.54	54.00	-28.46
2495.63	44.88	PK	340	1.1	V	-13.08	31.80	74.00	-42.20
2495.63	38.08	Ave	340	1.1	V	-13.08	25.00	54.00	-29.00

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: High Channel 2462MHz									
223.45	44.49	QP	46	1.8	H	-11.62	32.87	46.00	-13.13
223.45	36.80	QP	78	1.5	V	-11.62	25.18	46.00	-20.82
4924.00	51.43	PK	100	1.9	V	-0.24	51.19	74.00	-22.81
4924.00	46.71	Ave	100	1.9	V	-0.24	46.47	54.00	-7.53
7386.00	40.58	PK	86	1.7	H	2.84	43.42	74.00	-30.58
7386.00	42.26	Ave	86	1.7	H	2.84	45.10	54.00	-8.90
2335.09	45.73	PK	6	1.9	V	-13.19	32.54	74.00	-41.46
2335.09	38.17	Ave	6	1.9	V	-13.19	24.98	54.00	-29.02
2360.07	42.27	PK	293	1.2	H	-13.14	29.13	74.00	-44.87
2360.07	36.32	Ave	293	1.2	H	-13.14	23.18	54.00	-30.82
2490.37	43.04	PK	3	1.9	V	-13.08	29.96	74.00	-44.04
2490.37	36.47	Ave	3	1.9	V	-13.08	23.39	54.00	-30.61

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	44.35	QP	296	1.9	H	-11.62	32.73	46.00	-13.27
223.45	36.85	QP	193	1.6	V	-11.62	25.23	46.00	-20.77
4824.00	51.15	PK	305	2.0	V	-1.06	50.09	74.00	-23.91
4824.00	45.33	Ave	305	2.0	V	-1.06	44.27	54.00	-9.73
7236.00	40.15	PK	311	1.8	H	1.33	41.48	74.00	-32.52
7236.00	43.03	Ave	311	1.8	H	1.33	44.36	54.00	-9.64
2343.05	45.93	PK	178	1.7	V	-13.19	32.74	74.00	-41.26
2343.05	38.17	Ave	178	1.7	V	-13.19	24.98	54.00	-29.02
2371.19	44.83	PK	46	1.3	H	-13.14	31.69	74.00	-42.31
2371.19	37.10	Ave	46	1.3	H	-13.14	23.96	54.00	-30.04
2496.90	42.23	PK	233	1.8	V	-13.08	29.15	74.00	-44.85
2496.90	37.85	Ave	233	1.8	V	-13.08	24.77	54.00	-29.23

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	45.61	QP	270	1.6	H	-11.62	33.99	46.00	-12.01
223.45	37.81	QP	276	1.1	V	-11.62	26.19	46.00	-19.81
4874.00	49.78	PK	187	1.4	V	-0.62	49.16	74.00	-24.84
4874.00	43.84	Ave	187	1.4	V	-0.62	43.22	54.00	-10.78
7311.00	40.51	PK	20	1.5	H	2.21	42.72	74.00	-31.28
7311.00	41.54	Ave	20	1.5	H	2.21	43.75	54.00	-10.25
2326.88	45.02	PK	149	1.5	V	-13.19	31.83	74.00	-42.17
2326.88	37.45	Ave	149	1.5	V	-13.19	24.26	54.00	-29.74
2367.39	43.39	PK	74	1.1	H	-13.14	30.25	74.00	-43.75
2367.39	37.41	Ave	74	1.1	H	-13.14	24.27	54.00	-29.73
2489.34	44.12	PK	61	1.2	V	-13.08	31.04	74.00	-42.96
2489.34	36.50	Ave	61	1.2	V	-13.08	23.42	54.00	-30.58

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	46.63	QP	87	1.6	H	-11.62	35.01	46.00	-10.99
223.45	39.20	QP	263	1.5	V	-11.62	27.58	46.00	-18.42
4924.00	48.40	PK	211	1.9	V	-0.24	48.16	74.00	-25.84
4924.00	42.58	Ave	211	1.9	V	-0.24	42.34	54.00	-11.66
7386.00	41.13	PK	196	1.9	H	2.84	43.97	74.00	-30.03
7386.00	40.60	Ave	196	1.9	H	2.84	43.44	54.00	-10.56
2336.36	45.26	PK	172	1.5	V	-13.19	32.07	74.00	-41.93
2336.36	38.00	Ave	172	1.5	V	-13.19	24.81	54.00	-29.19
2363.87	43.47	PK	60	1.5	H	-13.14	30.33	74.00	-43.67
2363.87	38.39	Ave	60	1.5	H	-13.14	25.25	54.00	-28.75
2483.63	42.83	PK	86	1.8	V	-13.08	29.75	74.00	-44.25
2483.63	37.57	Ave	86	1.8	V	-13.08	24.49	54.00	-29.51

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	46.85	QP	53	1.7	H	-11.62	35.23	46.00	-10.77
223.45	40.07	QP	239	1.1	V	-11.62	28.45	46.00	-17.55
4844.00	46.07	PK	290	1.0	V	-1.06	45.01	74.00	-28.99
4844.00	40.24	Ave	290	1.0	V	-1.06	39.18	54.00	-14.82
7266.00	39.23	PK	133	1.4	H	1.33	40.56	74.00	-33.44
7266.00	37.73	Ave	133	1.4	H	1.33	39.06	54.00	-14.94
2313.97	45.87	PK	74	1.9	V	-13.19	32.68	74.00	-41.32
2313.97	38.62	Ave	74	1.9	V	-13.19	25.43	54.00	-28.57
2366.31	44.93	PK	291	1.0	H	-13.14	31.79	74.00	-42.21
2366.31	36.20	Ave	291	1.0	H	-13.14	23.06	54.00	-30.94
2489.22	44.30	PK	269	1.1	V	-13.08	31.22	74.00	-42.78
2489.22	38.62	Ave	269	1.1	V	-13.08	25.54	54.00	-28.46

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n40: Middle Channel 2437MHz									
223.45	46.13	QP	198	1.2	H	-11.62	34.51	46.00	-11.49
223.45	39.98	QP	83	2.0	V	-11.62	28.36	46.00	-17.64
4874.00	45.51	PK	145	1.5	V	-0.62	44.89	74.00	-29.11
4874.00	39.24	Ave	145	1.5	V	-0.62	38.62	54.00	-15.38
7311.00	39.17	PK	239	1.2	H	2.21	41.38	74.00	-32.62
7311.00	37.88	Ave	239	1.2	H	2.21	40.09	54.00	-13.91
2325.54	46.83	PK	280	1.3	V	-13.19	33.64	74.00	-40.36
2325.54	38.53	Ave	280	1.3	V	-13.19	25.34	54.00	-28.66
2370.23	42.51	PK	155	1.1	H	-13.14	29.37	74.00	-44.63
2370.23	36.81	Ave	155	1.1	H	-13.14	23.67	54.00	-30.33
2486.76	42.99	PK	114	1.2	V	-13.08	29.91	74.00	-44.09
2486.76	37.91	Ave	114	1.2	V	-13.08	24.83	54.00	-29.17

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	46.22	QP	296	1.1	H	-11.62	34.60	46.00	-11.40
223.45	40.49	QP	329	1.6	V	-11.62	28.87	46.00	-17.13
4904.00	45.18	PK	15	1.4	V	-0.24	44.94	74.00	-29.06
4904.00	40.12	Ave	15	1.4	V	-0.24	39.88	54.00	-14.12
7356.00	38.28	PK	306	1.4	H	2.84	41.12	74.00	-32.88
7356.00	38.62	Ave	306	1.4	H	2.84	41.46	54.00	-12.54
2348.91	45.73	PK	270	2.0	V	-13.19	32.54	74.00	-41.46
2348.91	37.88	Ave	270	2.0	V	-13.19	24.69	54.00	-29.31
2385.59	44.86	PK	176	1.4	H	-13.14	31.72	74.00	-42.28
2385.59	36.34	Ave	176	1.4	H	-13.14	23.20	54.00	-30.80
2495.31	44.83	PK	47	1.1	V	-13.08	31.75	74.00	-42.25
2495.31	38.30	Ave	47	1.1	V	-13.08	25.22	54.00	-28.78

Test Frequency: 18GHz~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	24.05	QP	21.84	40.00	5.89	29.54	-23.65
15.730	25.67	QP	21.35	40.00	7.02	29.54	-22.52
25.680	24.26	QP	20.67	40.00	4.93	29.54	-24.61

Test Frequency : 26MHz ~ 30MHz

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

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
GFSK Low Channel 2402MHz									
269.33	34.59	QP	146	1.8	H	-13.35	21.24	46.00	-24.76
269.33	40.89	QP	303	1.9	V	-13.35	27.54	46.00	-18.46
4804.00	45.56	PK	25	1.5	V	-1.06	44.50	74.00	-29.50
4804.00	41.23	Ave	25	1.5	V	-1.06	40.17	54.00	-13.83
7206.00	44.63	PK	80	1.4	H	1.33	45.96	74.00	-28.04
7206.00	36.39	Ave	80	1.4	H	1.33	37.72	54.00	-16.28
2344.73	45.80	PK	43	1.5	V	-13.19	32.61	74.00	-41.39
2344.73	39.18	Ave	43	1.5	V	-13.19	25.99	54.00	-28.01
2350.63	44.72	PK	359	1.5	H	-13.14	31.58	74.00	-42.42
2350.63	36.64	Ave	359	1.5	H	-13.14	23.50	54.00	-30.50
2487.79	42.76	PK	237	2.0	V	-13.08	29.68	74.00	-44.32
2487.79	36.41	Ave	237	2.0	V	-13.08	23.33	54.00	-30.67

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	33.19	QP	233	1.9	H	-13.35	19.84	46.00	-26.16
269.33	40.03	QP	53	1.3	V	-13.35	26.68	46.00	-19.32
4880.00	43.46	PK	278	1.2	V	-0.62	42.84	74.00	-31.16
4880.00	41.21	Ave	278	1.2	V	-0.62	40.59	54.00	-13.41
7320.00	44.47	PK	26	1.9	H	2.21	46.68	74.00	-27.32
7320.00	37.14	Ave	26	1.9	H	2.21	39.35	54.00	-14.65
2319.41	46.35	PK	94	1.6	V	-13.19	33.16	74.00	-40.84
2319.41	39.71	Ave	94	1.6	V	-13.19	26.52	54.00	-27.48
2356.31	43.18	PK	278	1.5	H	-13.14	30.04	74.00	-43.96
2356.31	37.02	Ave	278	1.5	H	-13.14	23.88	54.00	-30.12
2494.40	43.97	PK	261	1.1	V	-13.08	30.89	74.00	-43.11
2494.40	38.05	Ave	261	1.1	V	-13.08	24.97	54.00	-29.03

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	33.96	QP	317	1.7	H	-13.35	20.61	46.00	-25.39
269.33	38.46	QP	284	1.7	V	-13.35	25.11	46.00	-20.89
4960.00	43.86	PK	6	1.4	V	-0.24	43.62	74.00	-30.38
4960.00	42.11	Ave	6	1.4	V	-0.24	41.87	54.00	-12.13
7440.00	45.76	PK	228	1.2	H	2.84	48.60	74.00	-25.40
7440.00	36.29	Ave	228	1.2	H	2.84	39.13	54.00	-14.87
2336.39	45.92	PK	265	1.8	V	-13.19	32.73	74.00	-41.27
2336.39	39.92	Ave	265	1.8	V	-13.19	26.73	54.00	-27.27
2377.23	42.08	PK	102	1.9	H	-13.14	28.94	74.00	-45.06
2377.23	36.51	Ave	102	1.9	H	-13.14	23.37	54.00	-30.63
2498.44	42.68	PK	234	1.8	V	-13.08	29.60	74.00	-44.40
2498.44	37.65	Ave	234	1.8	V	-13.08	24.57	54.00	-29.43

Test Frequency: 18GHz~25GHz

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

10 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017

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:

Blow 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 1GHz:

For WIFI mode

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

For BLE mode

RBW = 100kHz, VBW = 300kHz, Sweep = auto

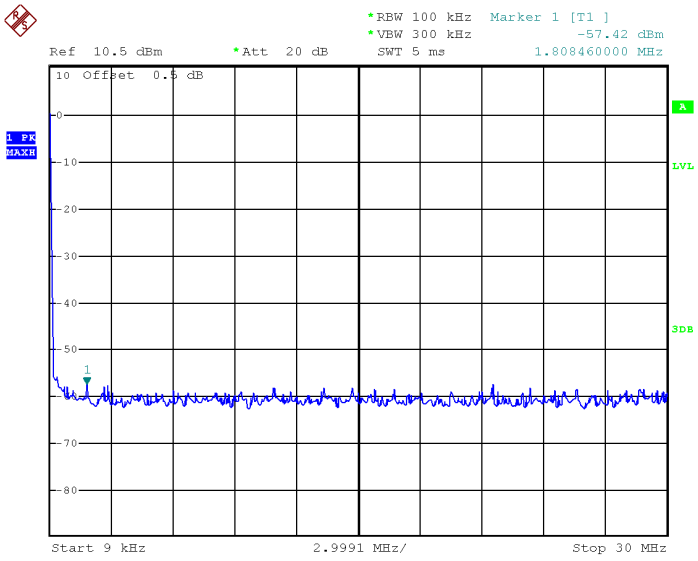
Detector function = peak, Trace = max hold

10.2 Test Result

9KHz – 30MHz

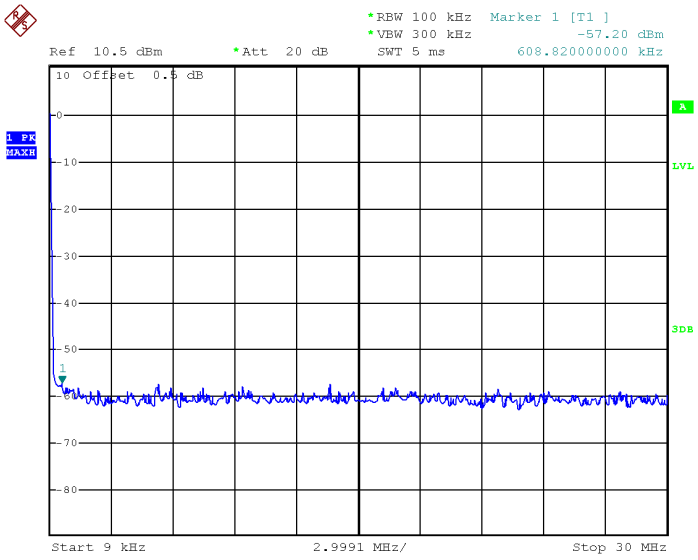
802.11b

Low Channel



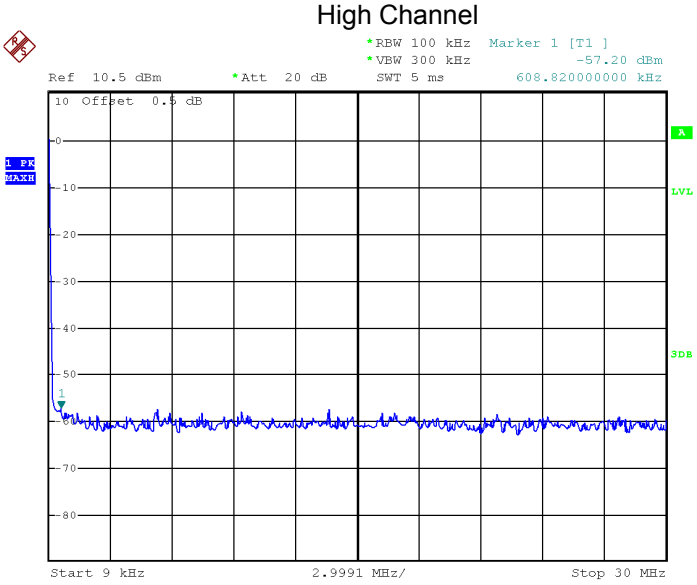
Date: 17.AUG.2018 02:04:52

Middle Channel



Date: 17.AUG.2018 02:04:44

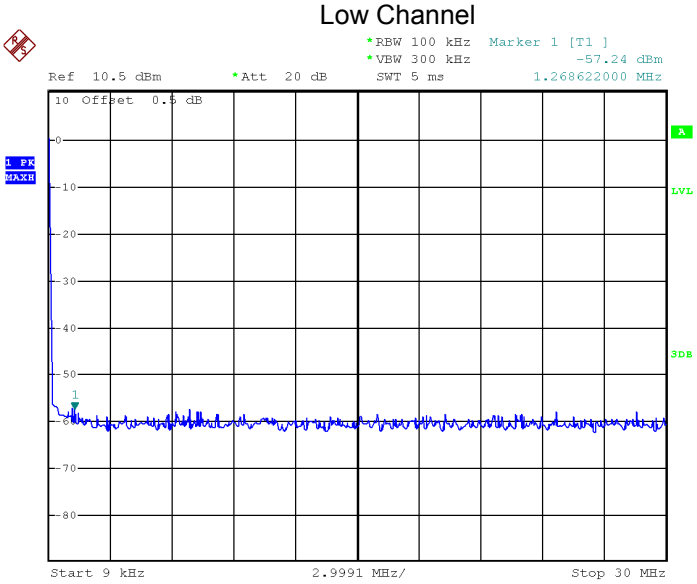
High Channel



Date: 17.AUG.2018 02:04:44

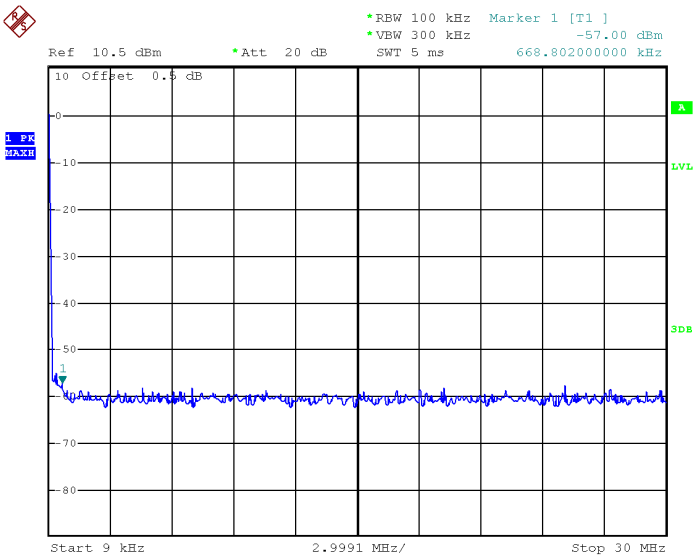
802.11g

Low Channel



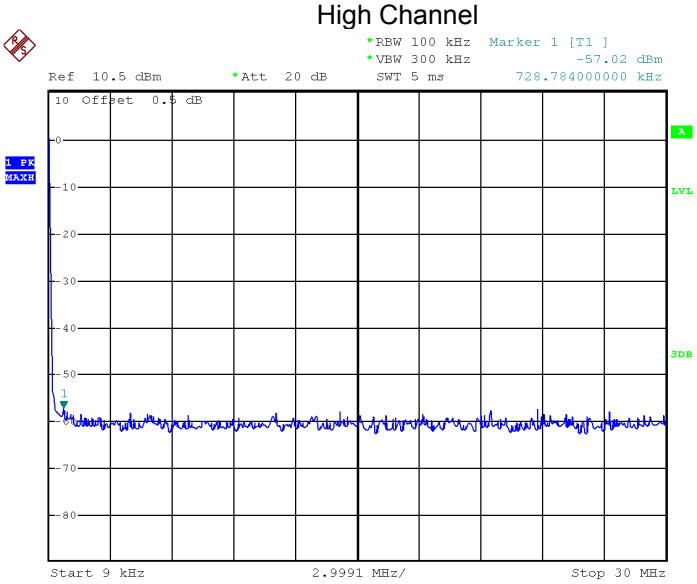
Date: 17.AUG.2018 02:05:16

Middle Channel



Date: 17.AUG.2018 02:05:26

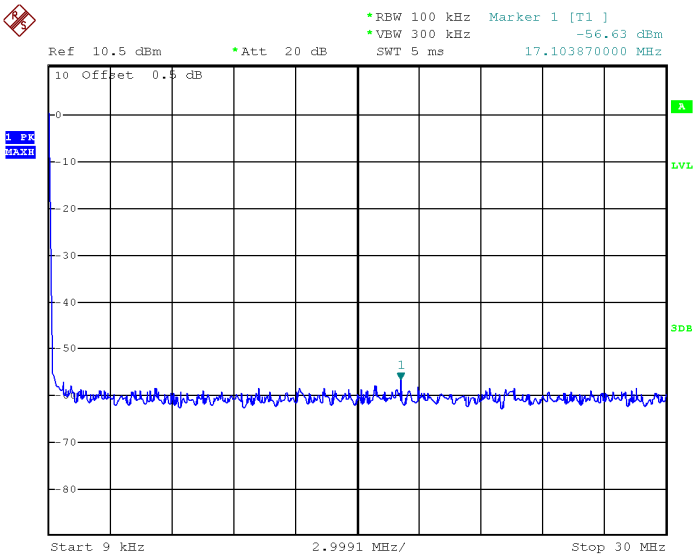
High Channel



Date: 17.AUG.2018 02:05:08

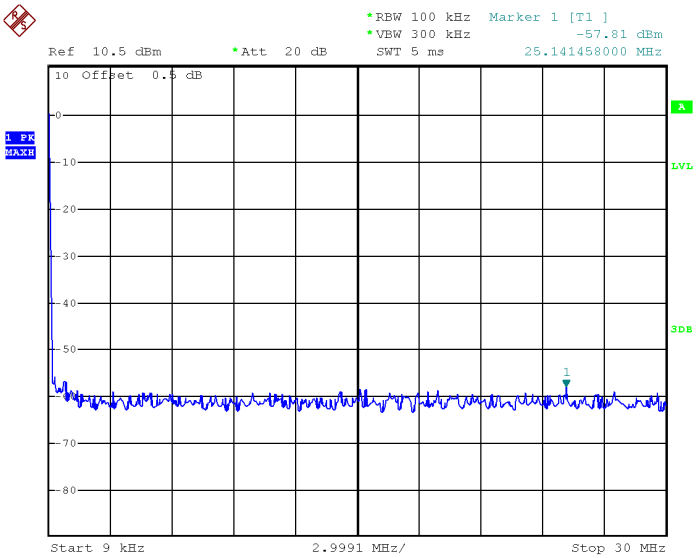
802.11n HT20

Low Channel



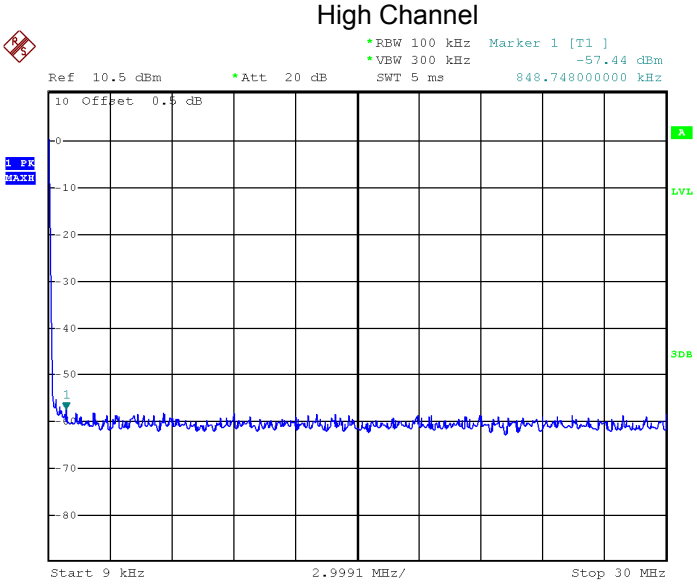
Date: 17.AUG.2018 02:05:41

Middle Channel



Date: 17.AUG.2018 02:05:46

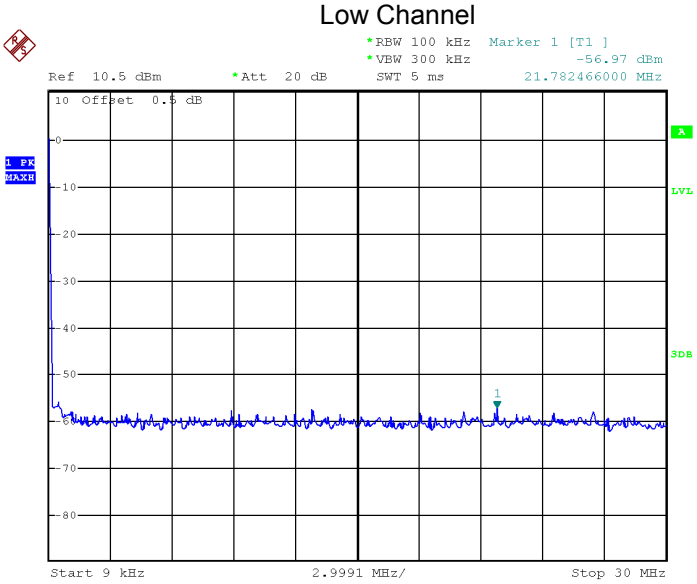
High Channel



Date: 17.AUG.2018 02:05:33

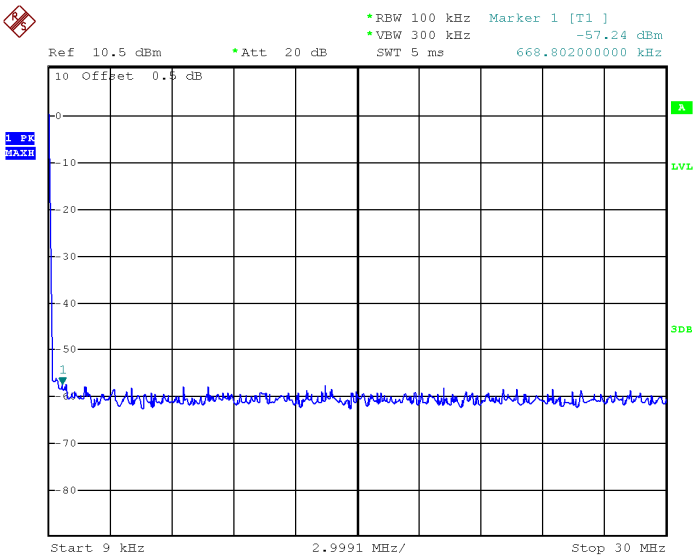
802.11n HT40

Low Channel



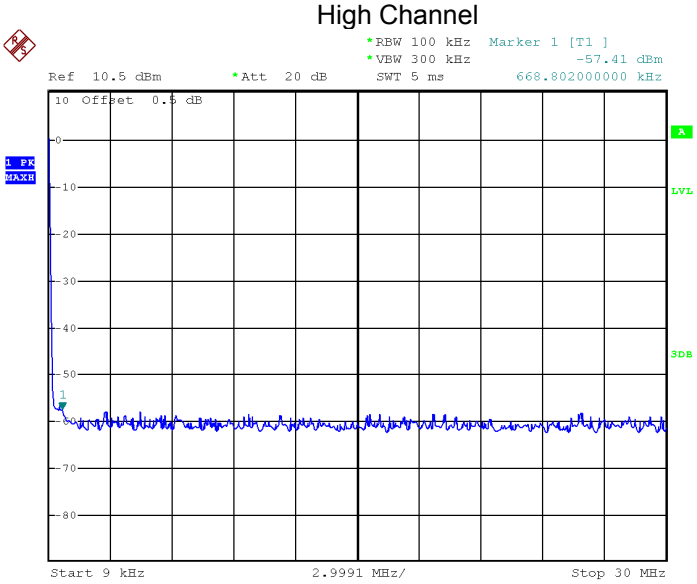
Date: 17.AUG.2018 02:06:04

Middle Channel



Date: 17.AUG.2018 02:06:16

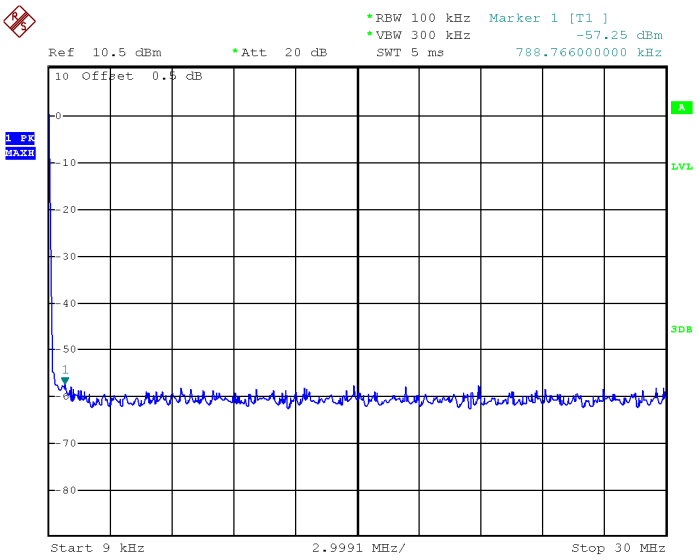
High Channel



Date: 17.AUG.2018 02:05:54

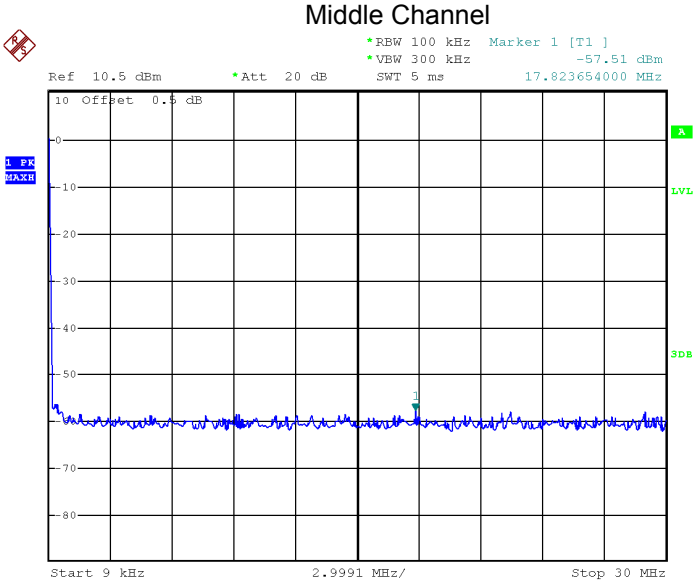
BLE

Low Channel



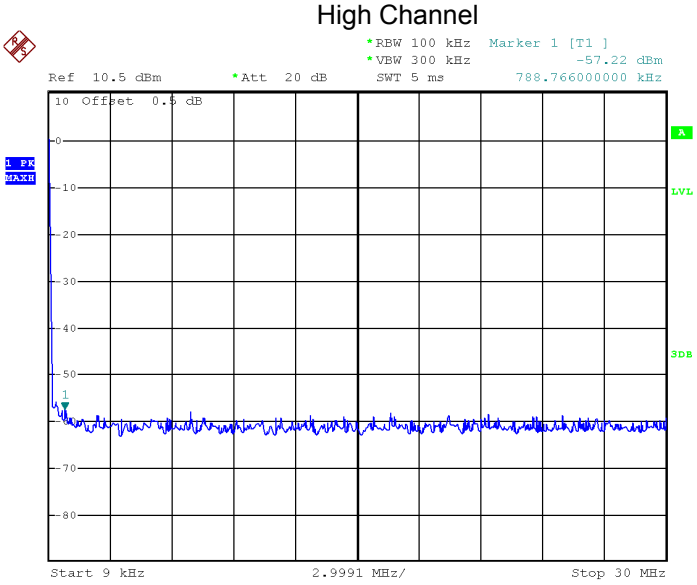
Date: 17.AUG.2018 02:06:30

Middle Channel



Date: 17.AUG.2018 02:06:39

High Channel

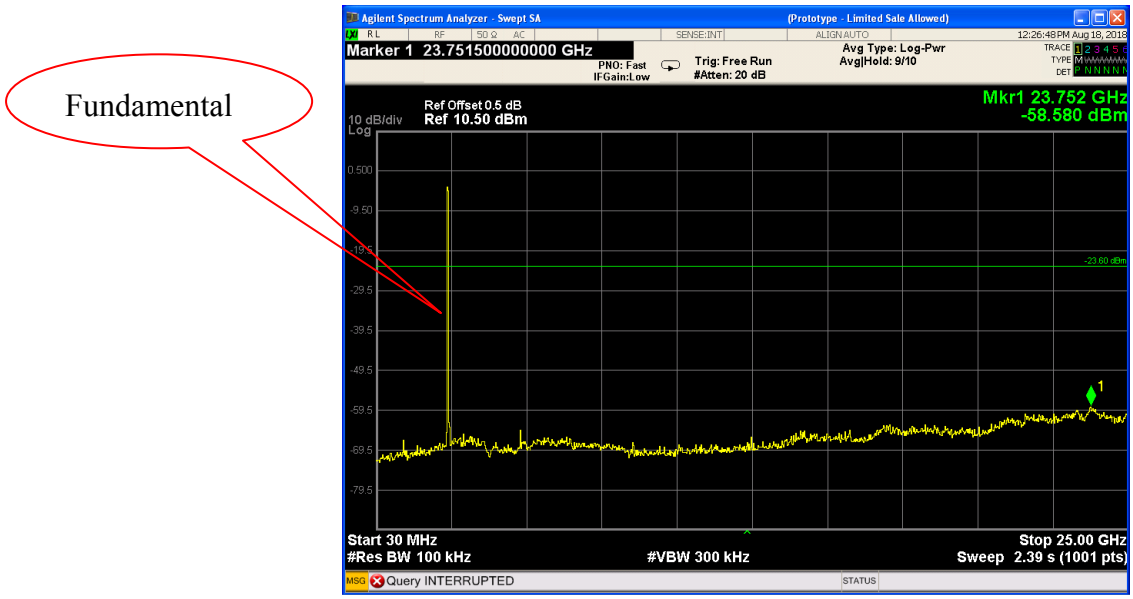


Date: 17.AUG.2018 02:06:45

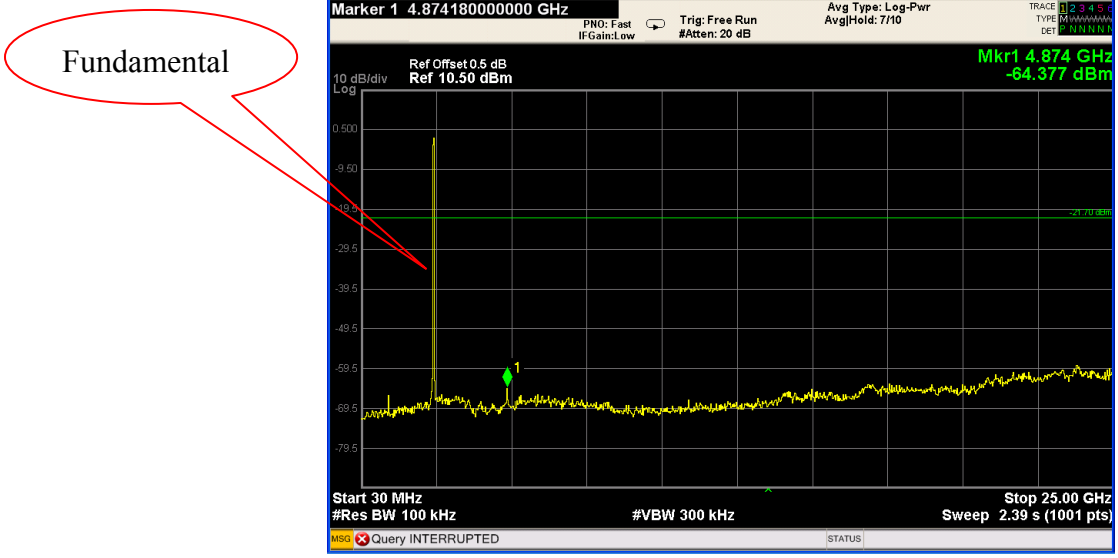
Above 30MHz

802.11b

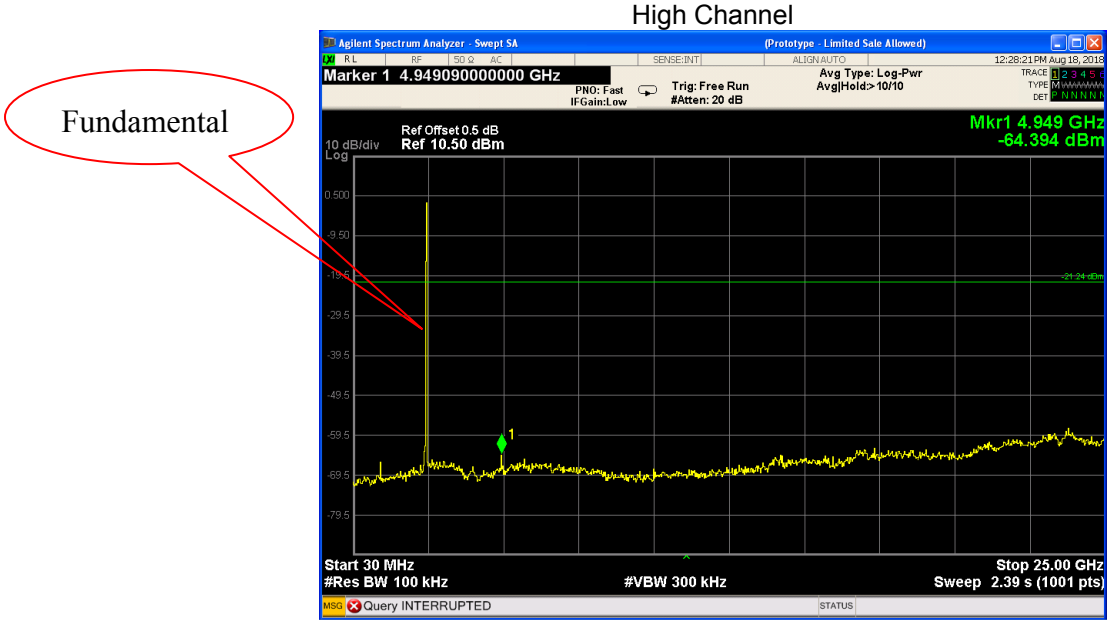
Low Channel



Middle Channel

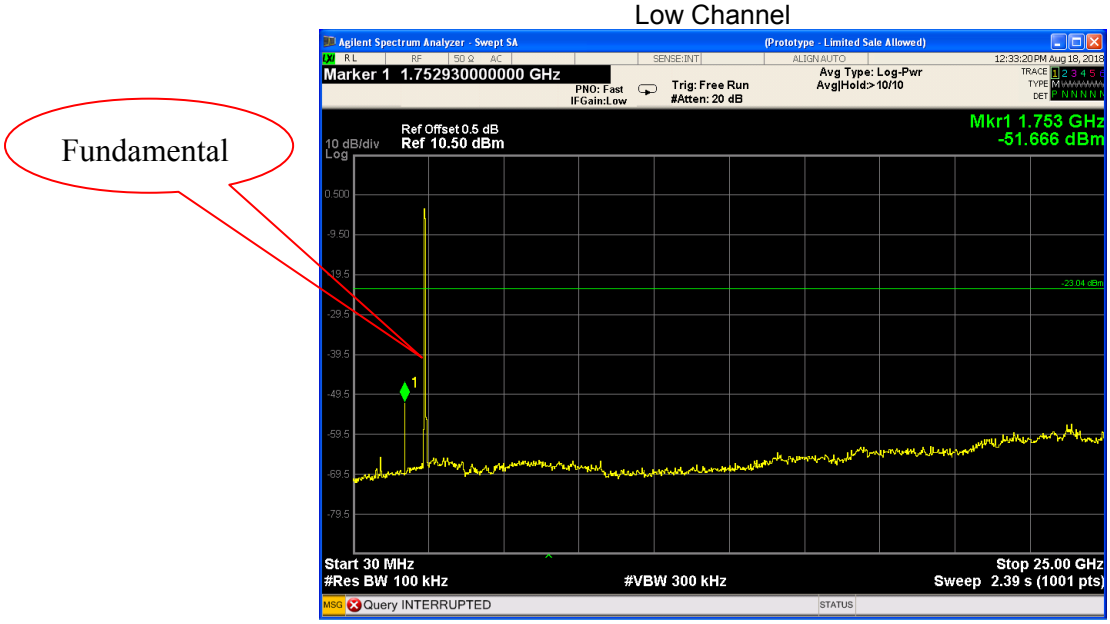


High Channel

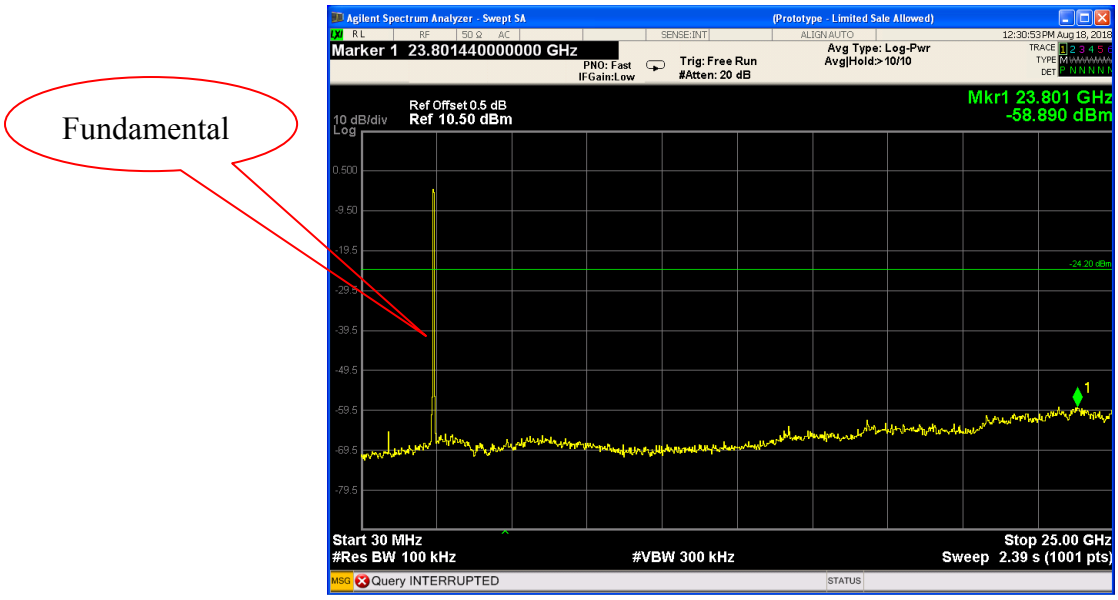


802.11g

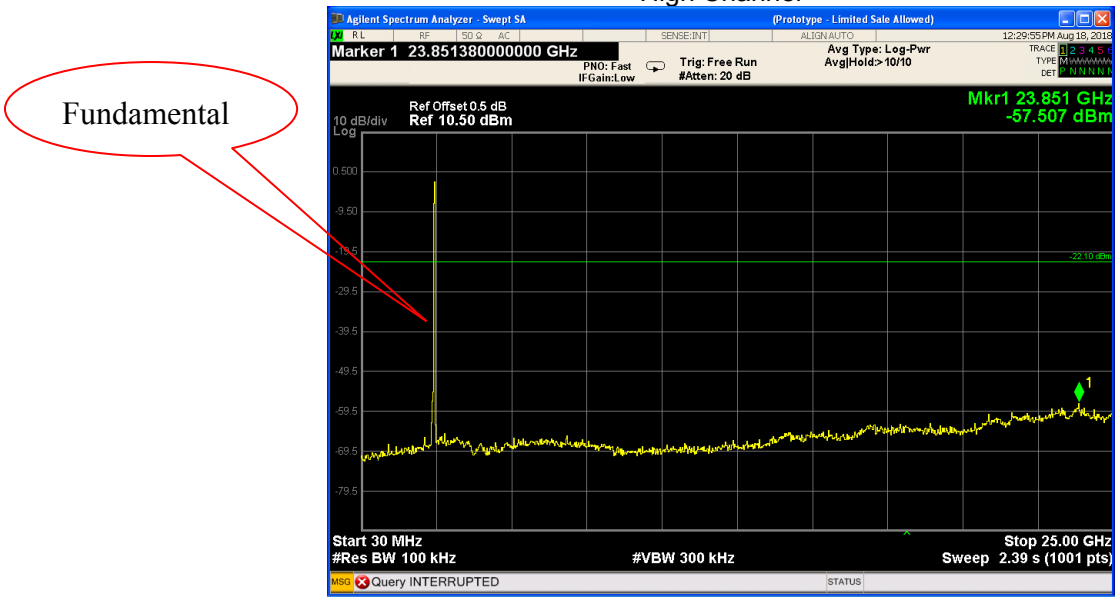
Low Channel



Middle Channel

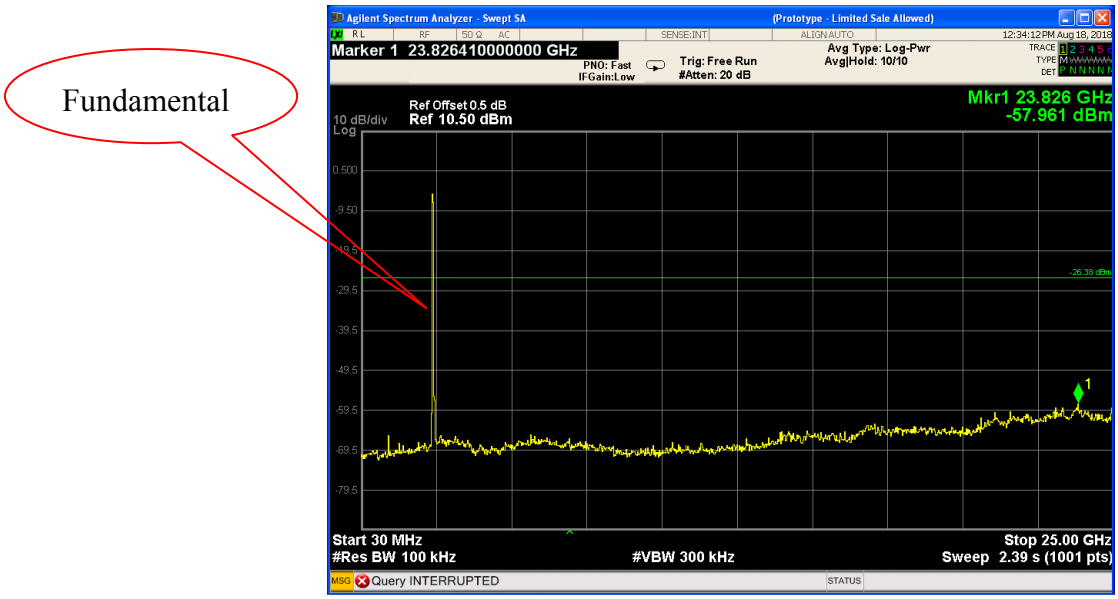


High Channel

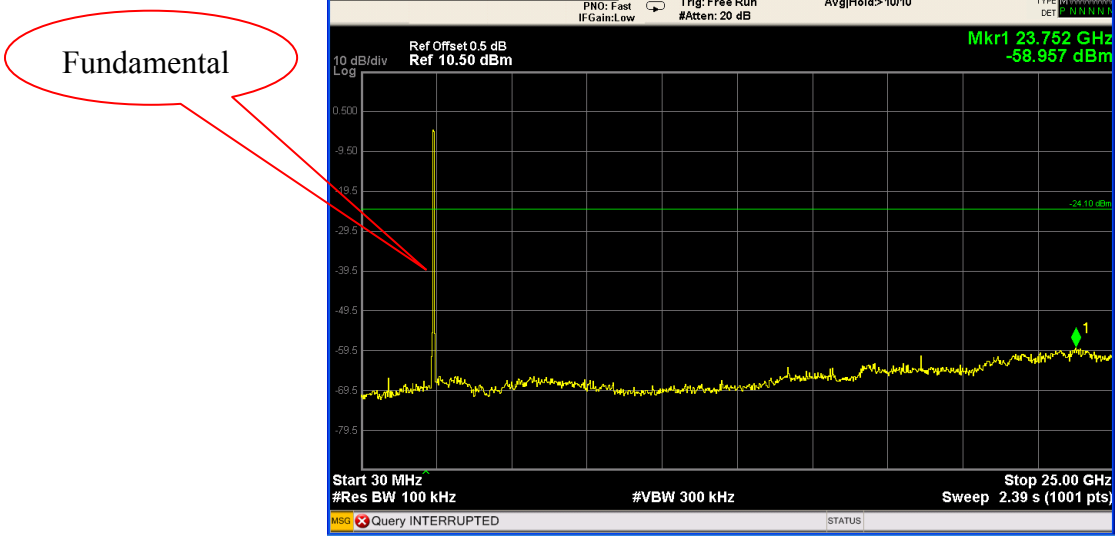


802.11n HT20

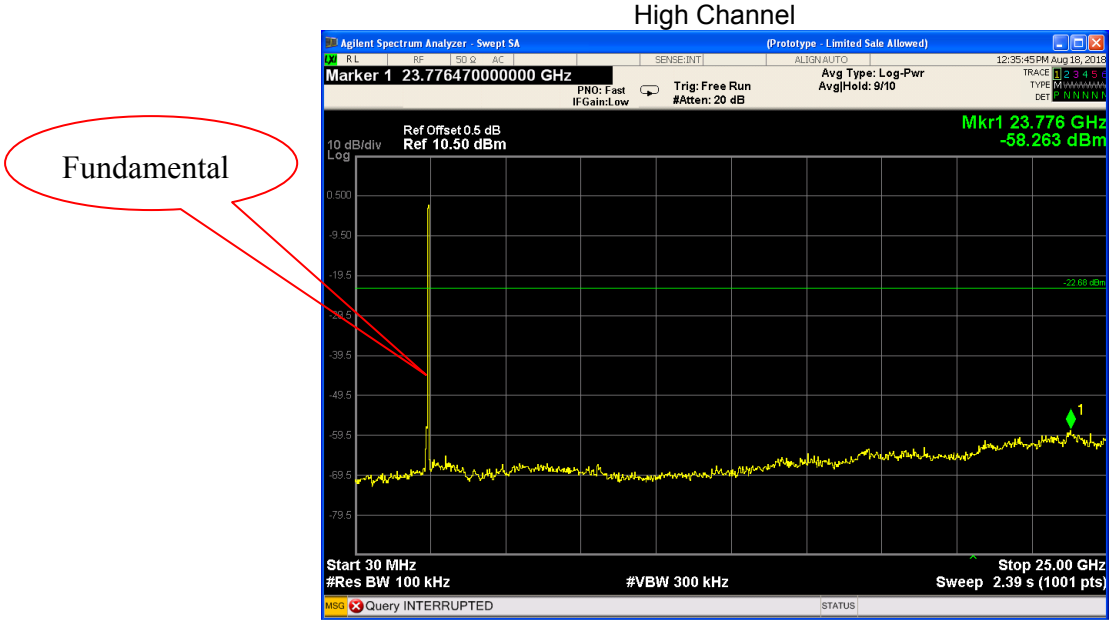
Low Channel



Middle Channel

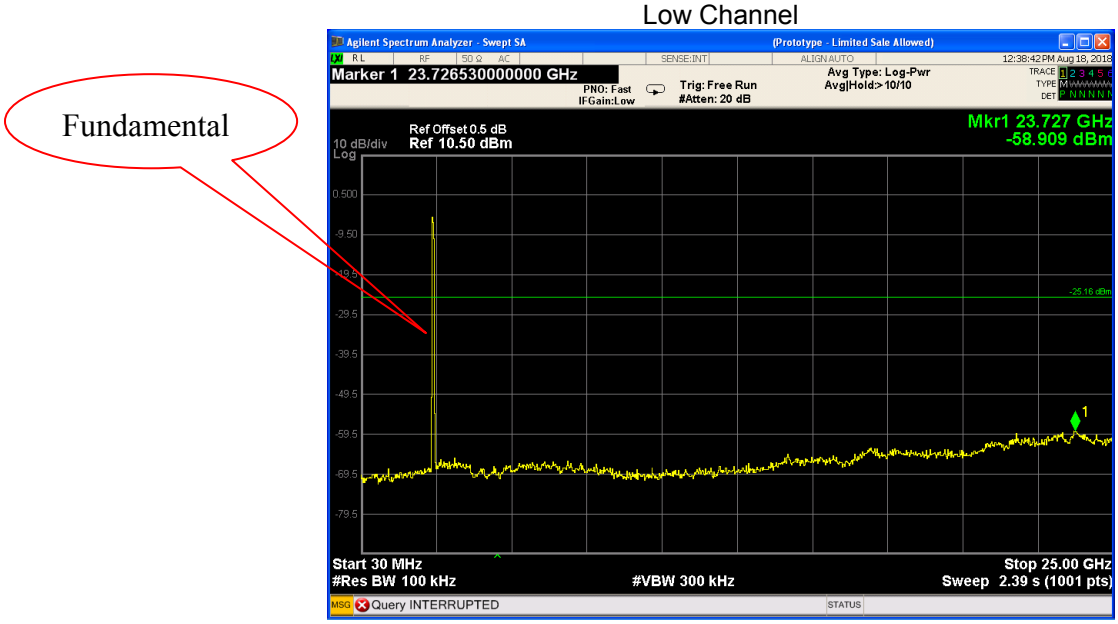


High Channel

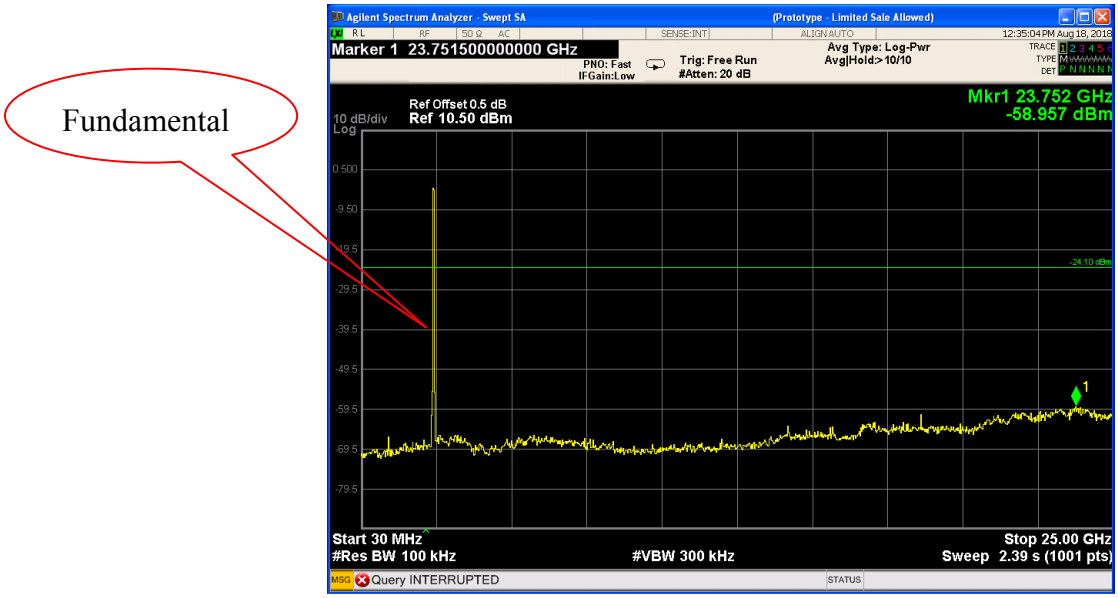


802.11n HT40

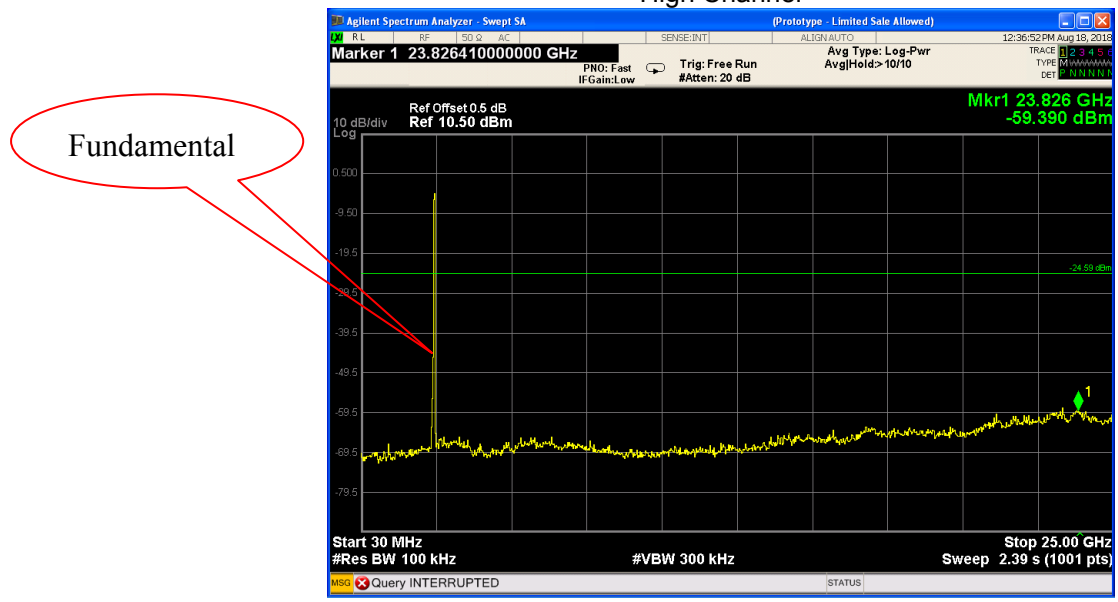
Low Channel



Middle Channel

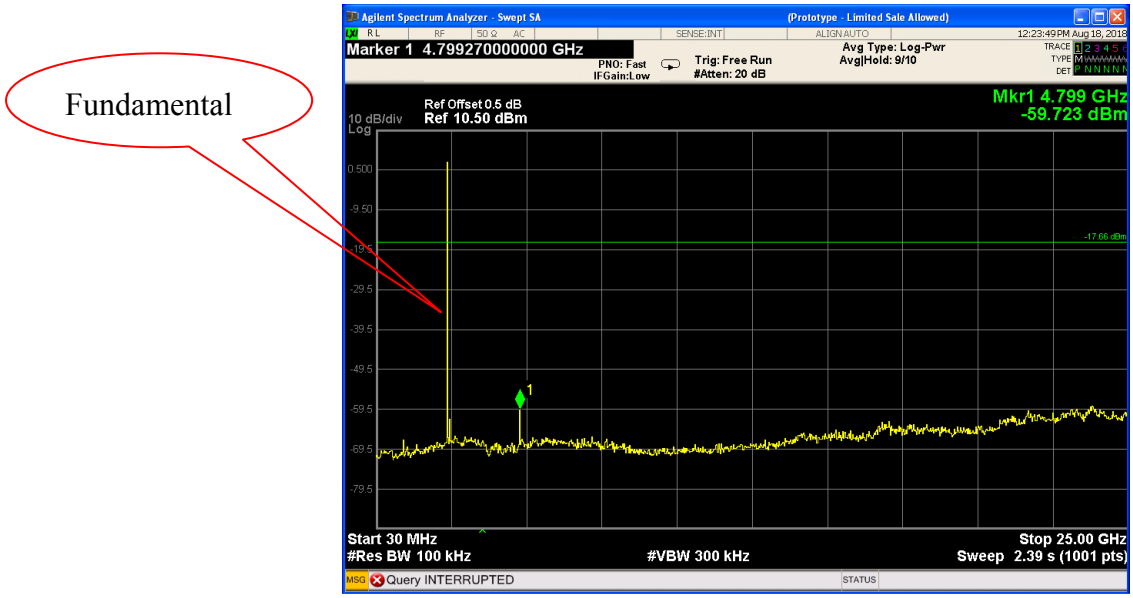


High Channel

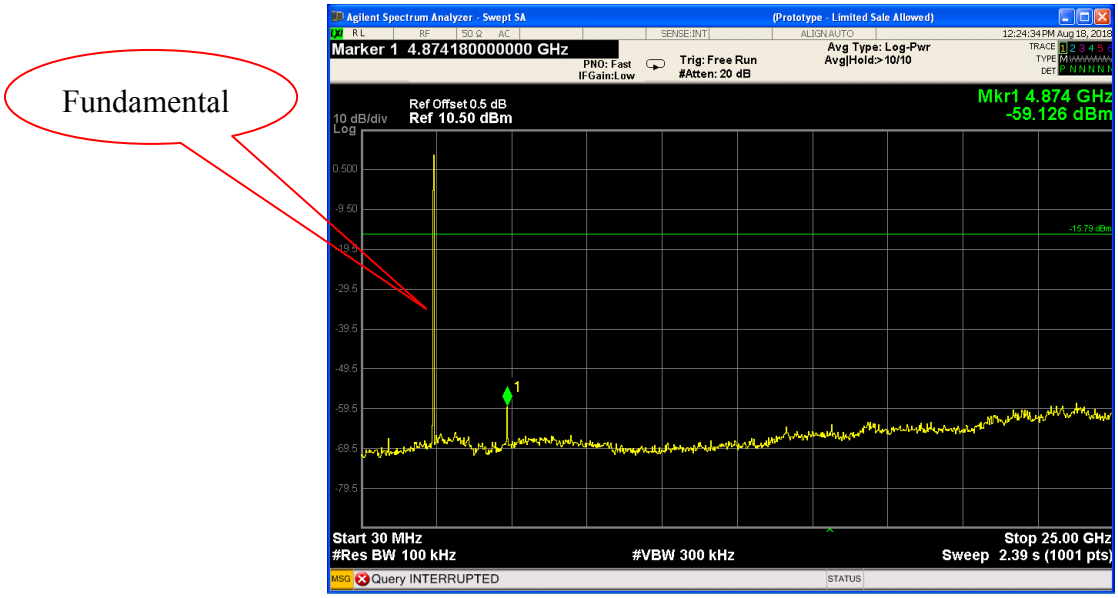


BLE

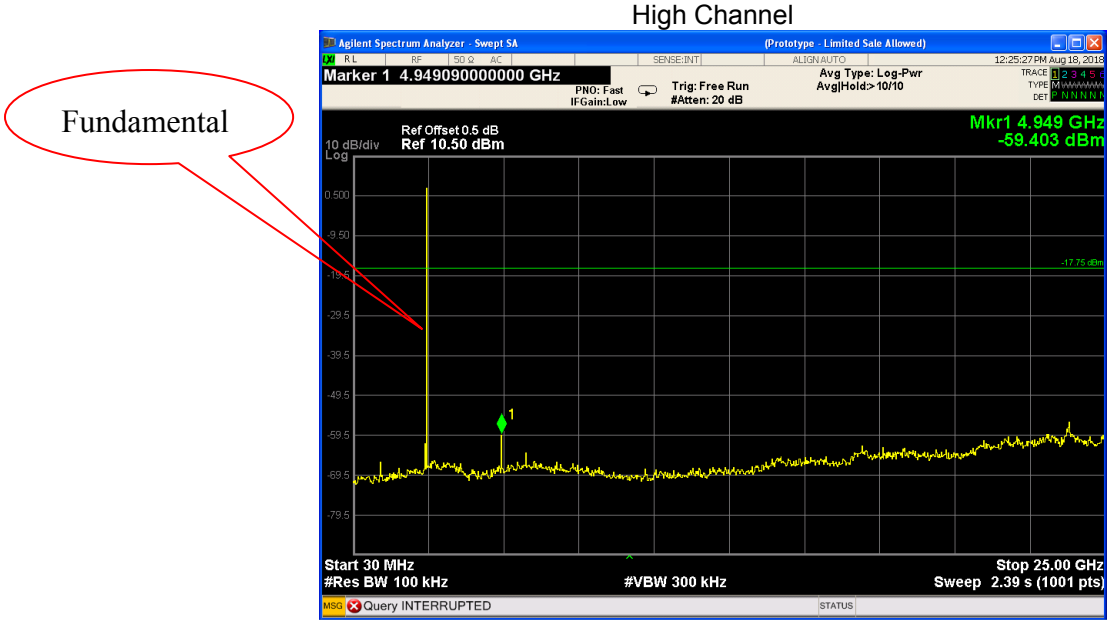
Low Channel



Middle Channel



High Channel



11 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017
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

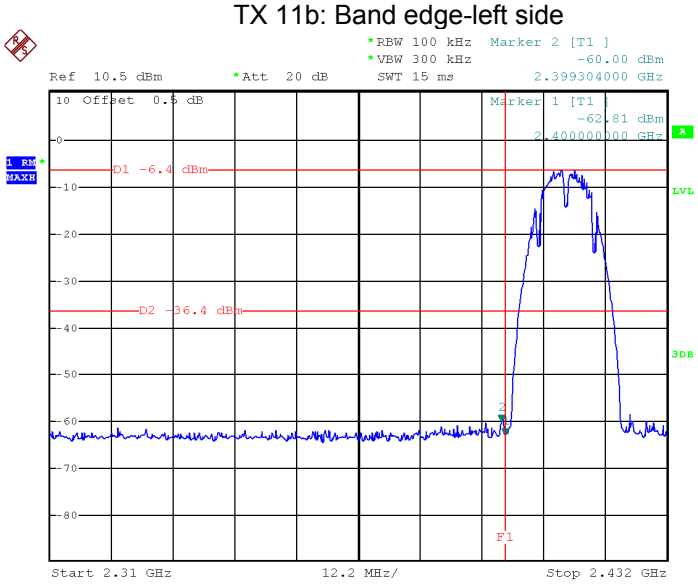
11.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.2 Test Result

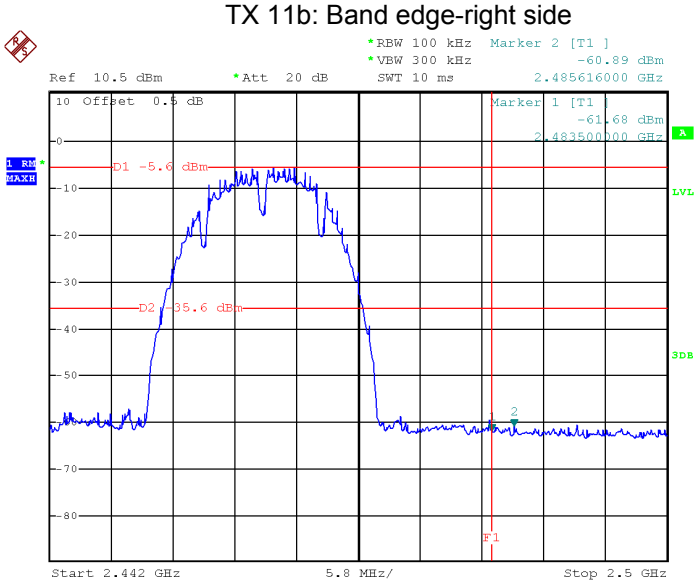
Test result plots shown as follows:

TX 11b: Band edge-left side



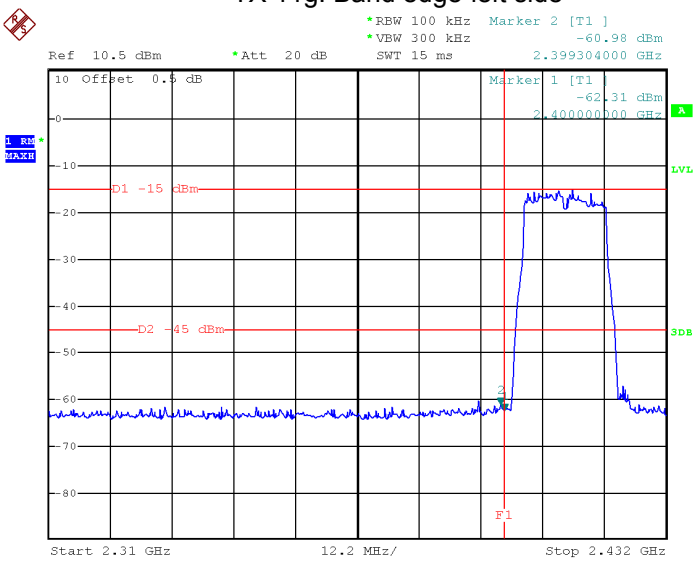
Date: 15.AUG.2018 21:33:18

TX 11b: Band edge-right side



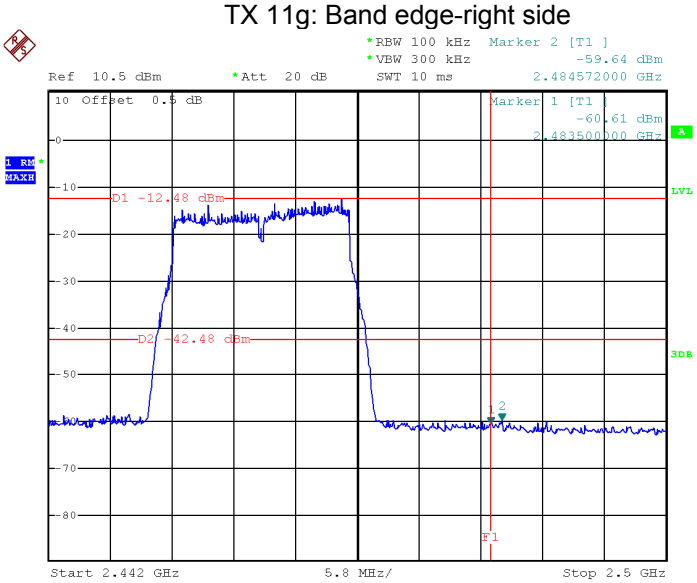
Date: 15.AUG.2018 21:32:00

TX 11g: Band edge-left side



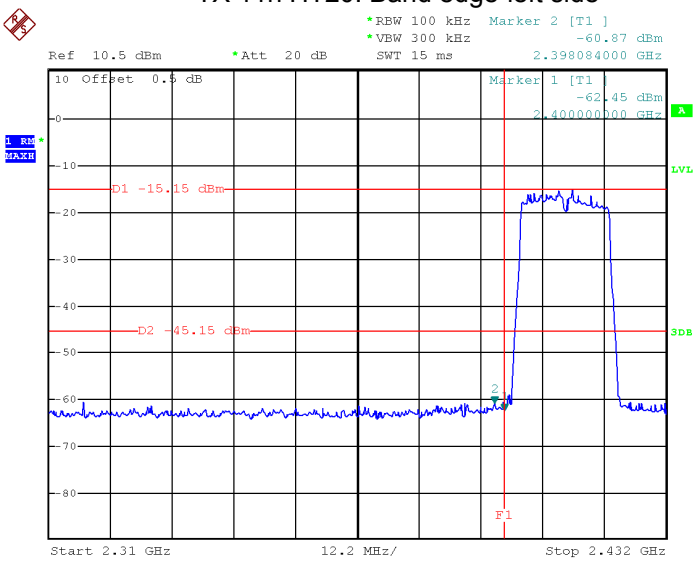
Date: 15.AUG.2018 21:56:55

TX 11g: Band edge-right side



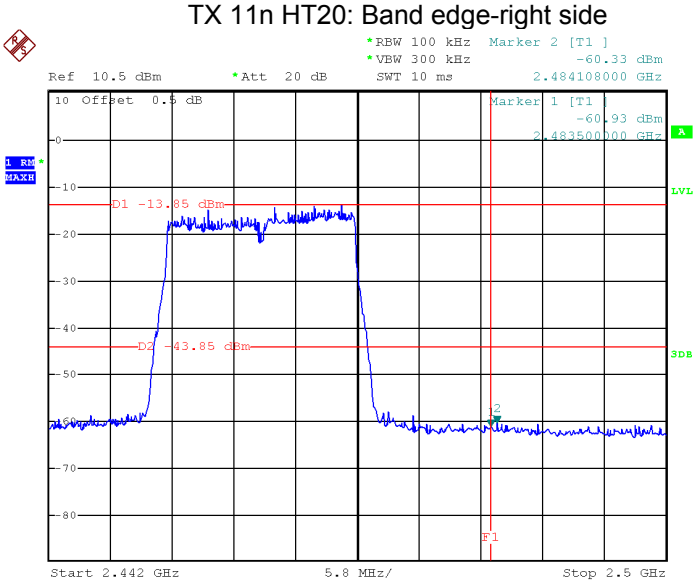
Date: 15.AUG.2018 21:55:45

TX 11n HT20: Band edge-left side



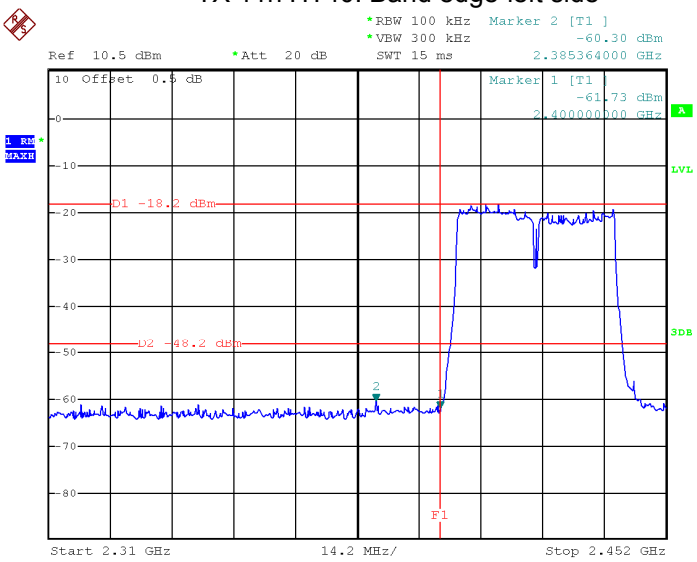
Date: 15.AUG.2018 22:17:19

TX 11n HT20: Band edge-right side



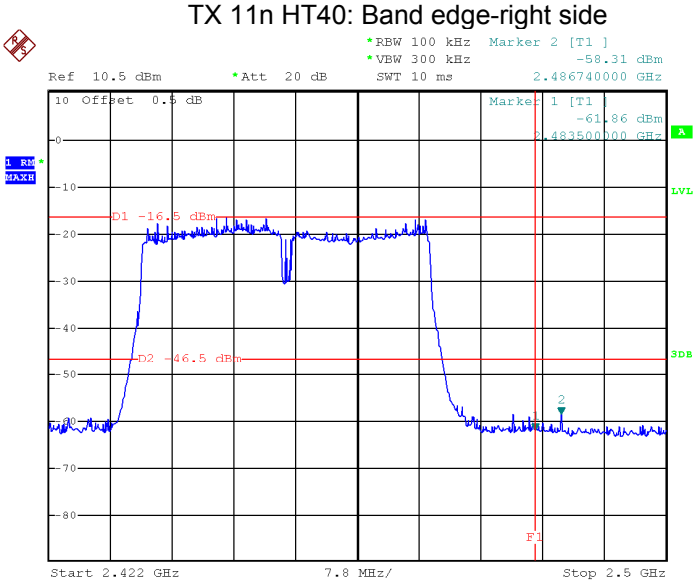
Date: 15.AUG.2018 22:15:48

TX 11n HT40: Band edge-left side



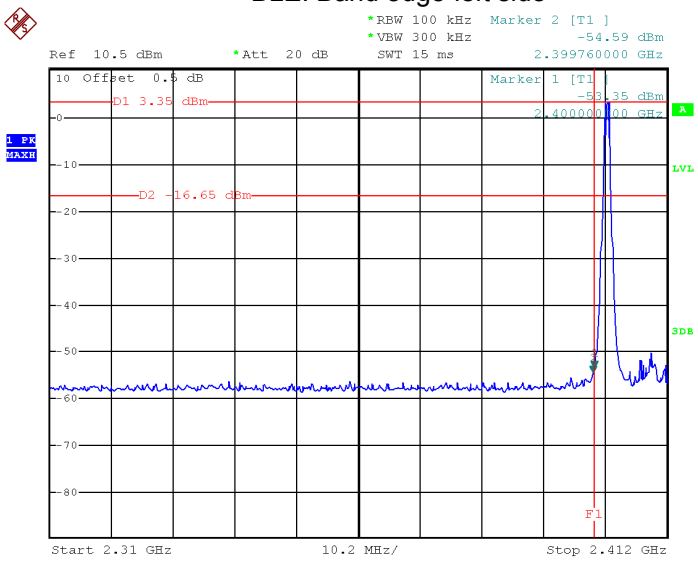
Date: 15.AUG.2018 22:34:26

TX 11n HT40: Band edge-right side



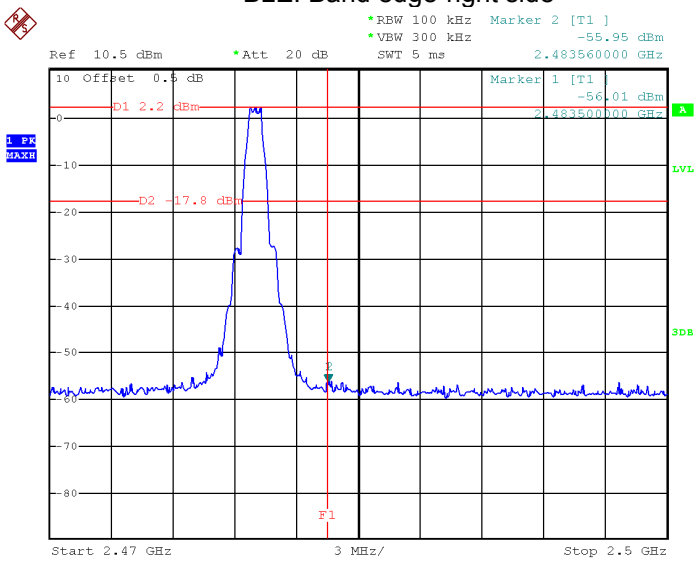
Date: 15.AUG.2018 22:33:04

BLE: Band edge-left side



Date: 16.AUG.2018 02:33:28

BLE: Band edge-right side



Date: 16.AUG.2018 02:29:03

12 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017

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;

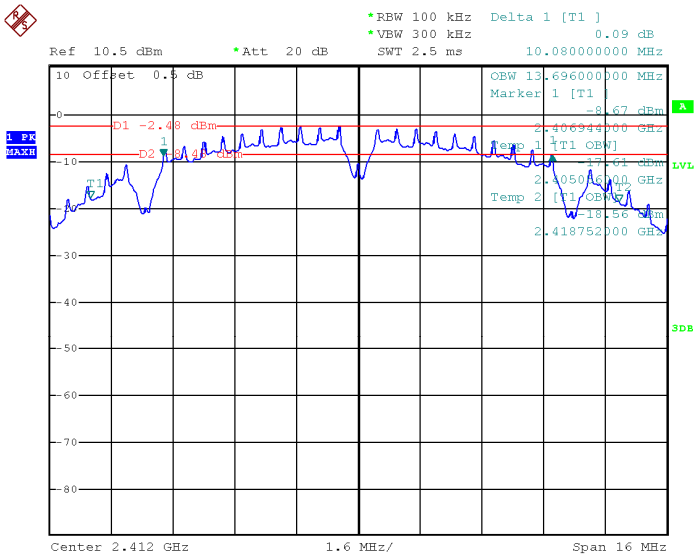
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

12.2 Test Result:

Operation mode	Test Channel	Bandwidth (MHz)
TX 11b	Channel 1	10.080
	Channel 6	10.080
	Channel 11	10.080
TX 11g	Channel 1	16.400
	Channel 6	16.400
	Channel 11	16.400
TX 11n HT20	Channel 1	17.550
	Channel 6	17.550
	Channel 11	17.550
TX 11n HT40	Channel 3	36.300
	Channel 6	35.970
	Channel 9	36.080
BLE	Channel 0	0.738
	Channel 19	0.702
	Channel 39	0.714

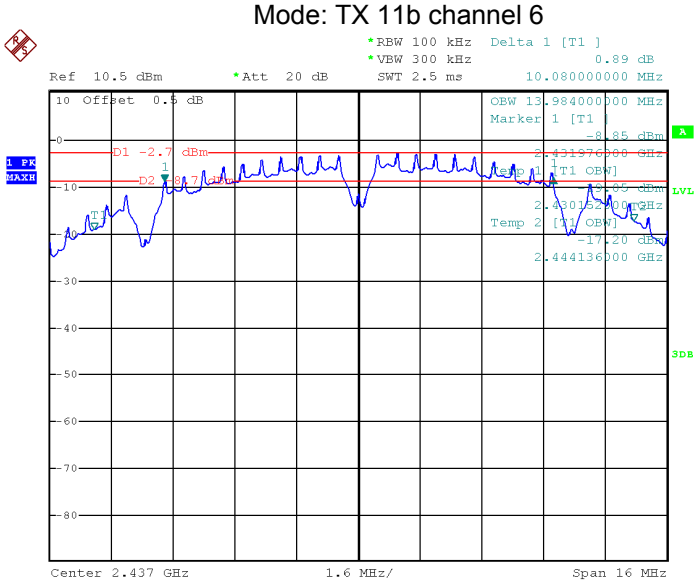
Test result plot:

Mode: TX 11b channel 1



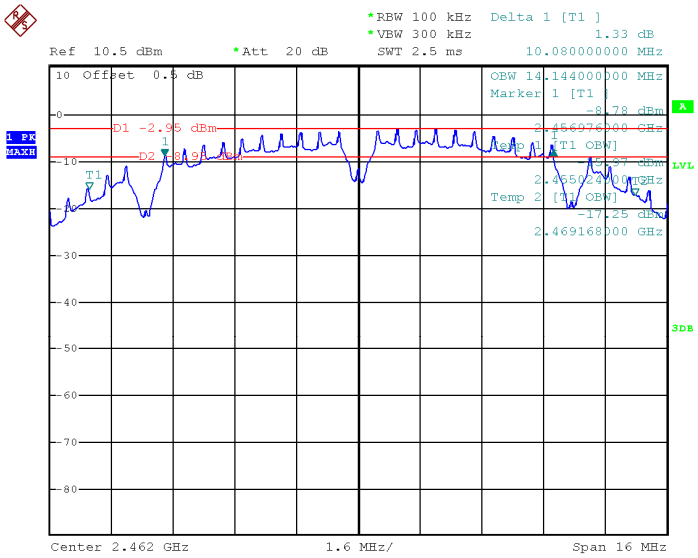
Date: 15.AUG.2018 21:23:22

Mode: TX 11b channel 6



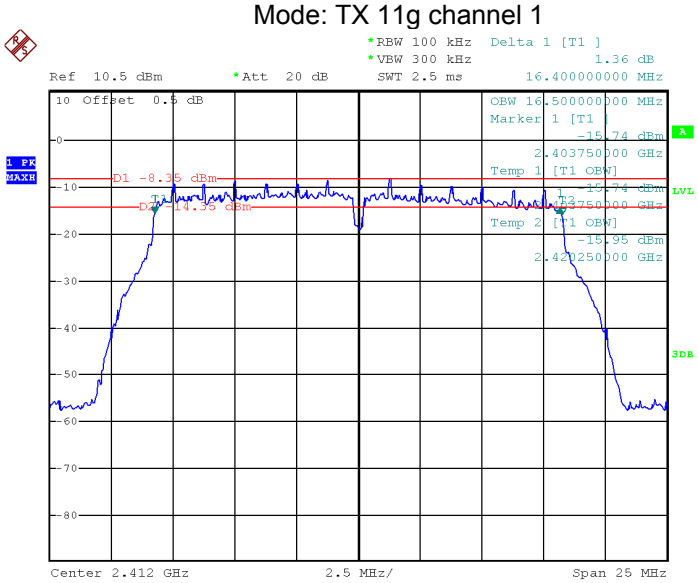
Date: 15.AUG.2018 21:26:38

Mode: TX 11b channel 11



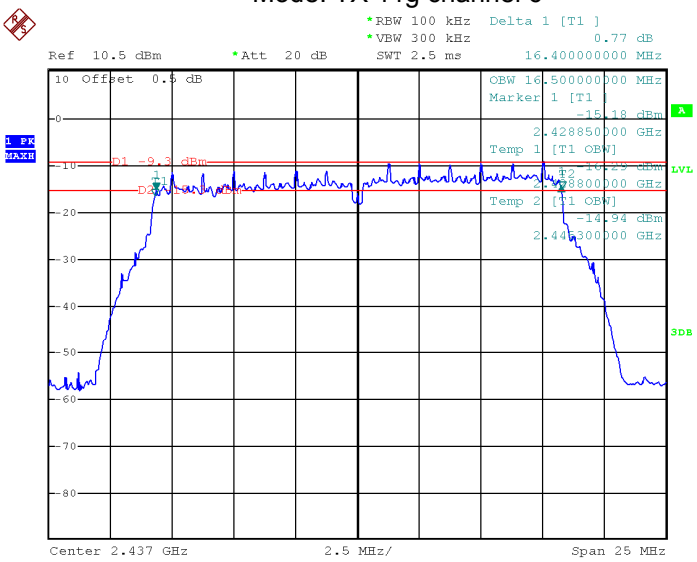
Date: 15.AUG.2018 21:29:17

Mode: TX 11g channel 1



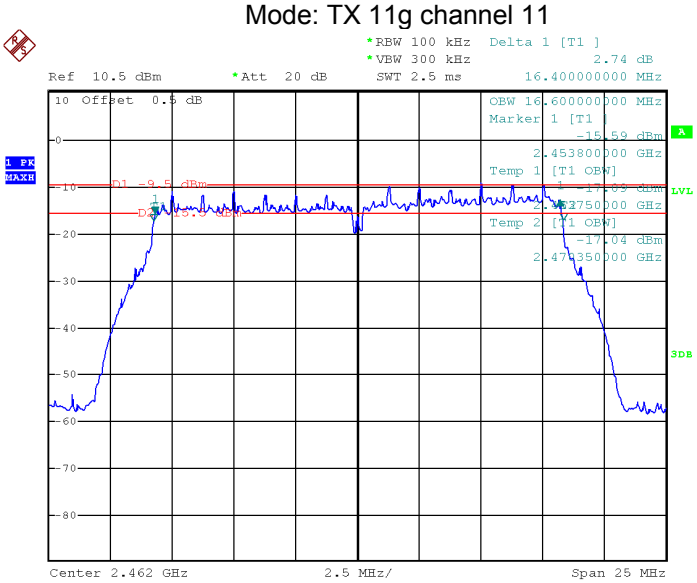
Date: 15.AUG.2018 21:36:10

Mode: TX 11g channel 6



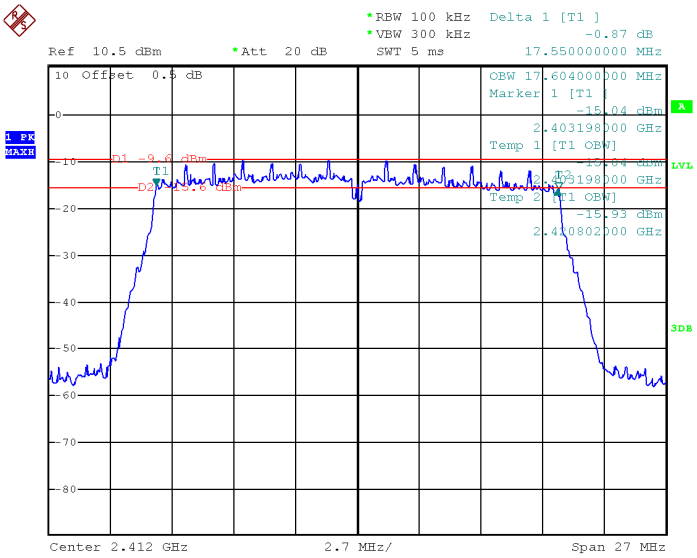
Date: 15.AUG.2018 21:43:26

Mode: TX 11g channel 11



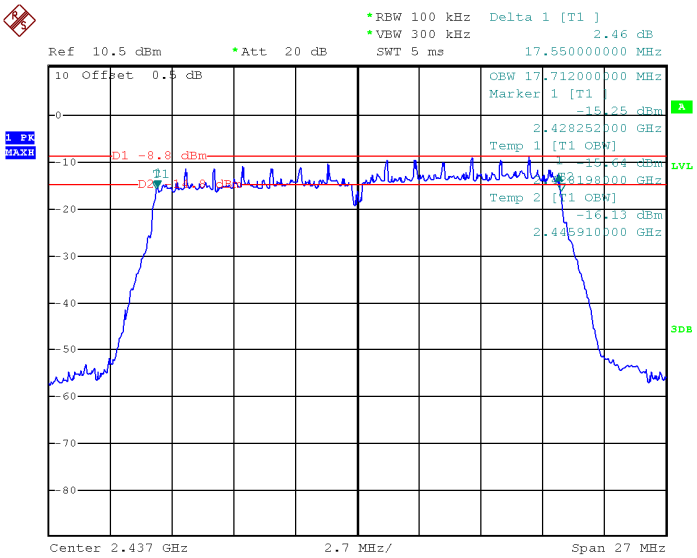
Date: 15.AUG.2018 21:46:15

Mode: TX 11n HT20 channel 1



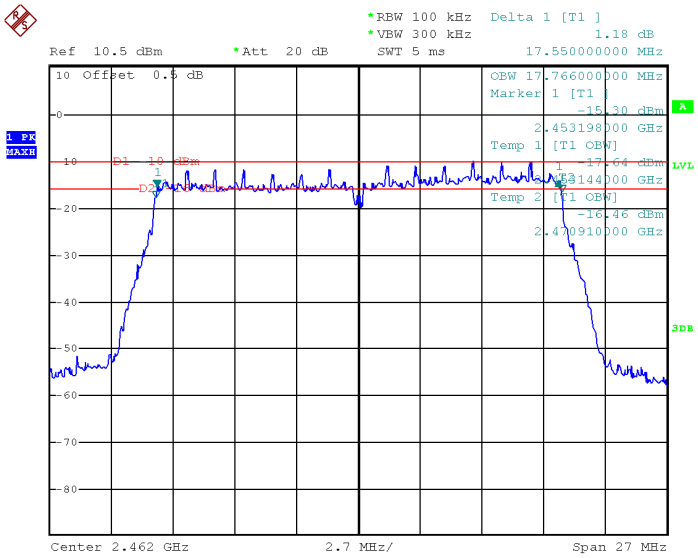
Date: 15.AUG.2018 22:00:41

Mode: TX 11n HT20 channel 6



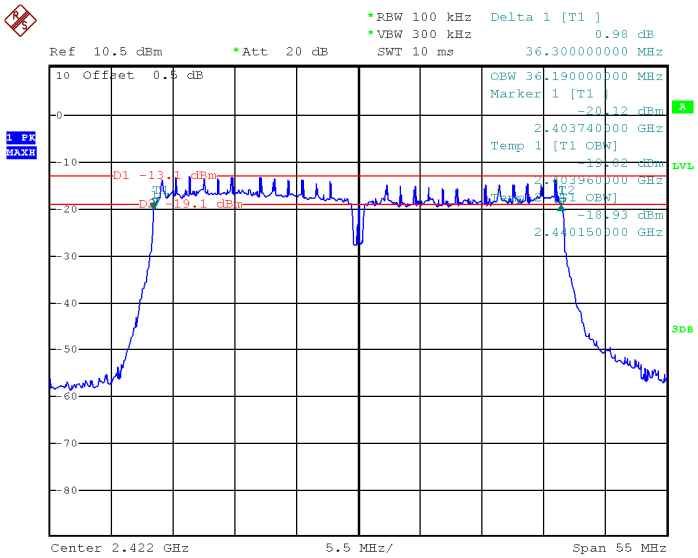
Date: 15.AUG.2018 22:10:41

Mode: TX 11n HT20 channel 11



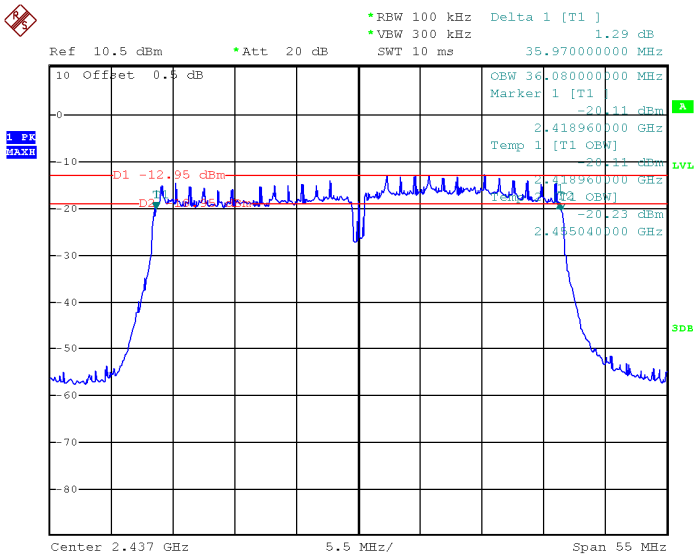
Date: 15.AUG.2018 22:13:59

Mode: TX 11n HT40 channel 3



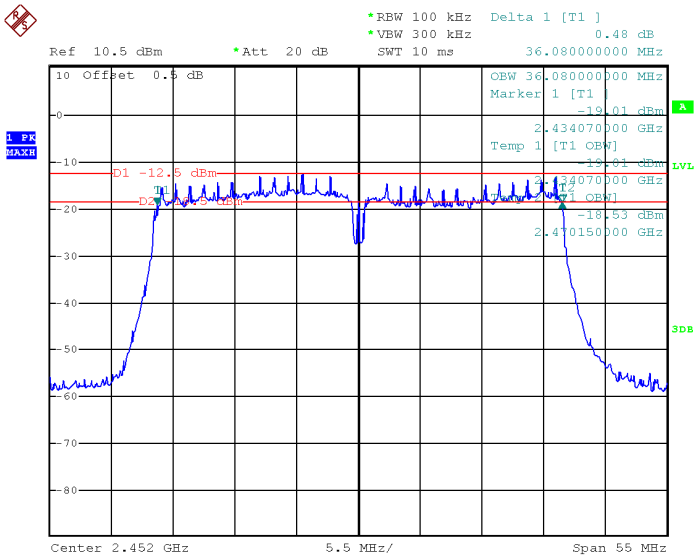
Date: 15.AUG.2018 22:20:16

Mode: TX 11n HT40 channel 6



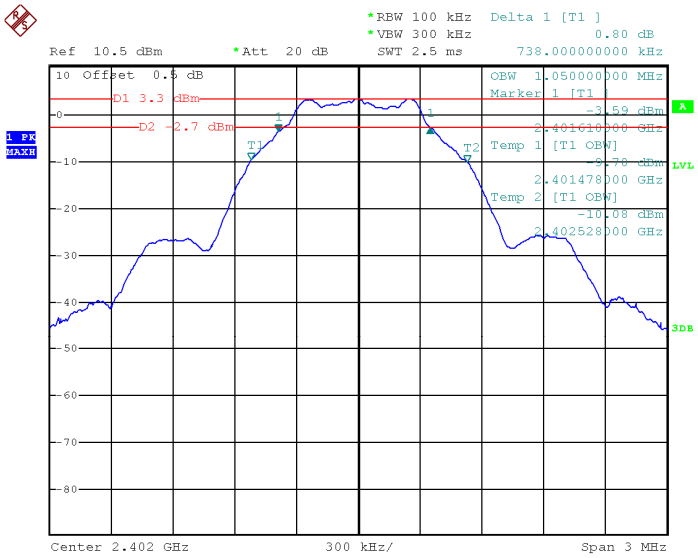
Date: 15.AUG.2018 22:28:38

Mode: TX 11n HT40 channel 9



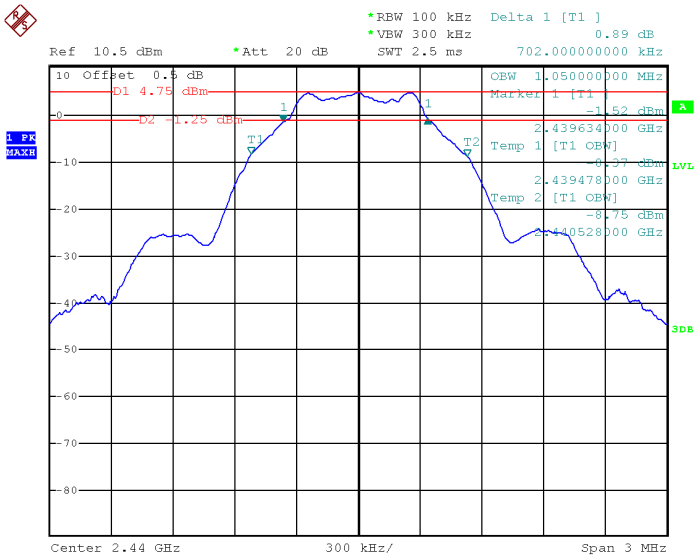
Date: 15.AUG.2018 22:31:07

BLE: channel 0



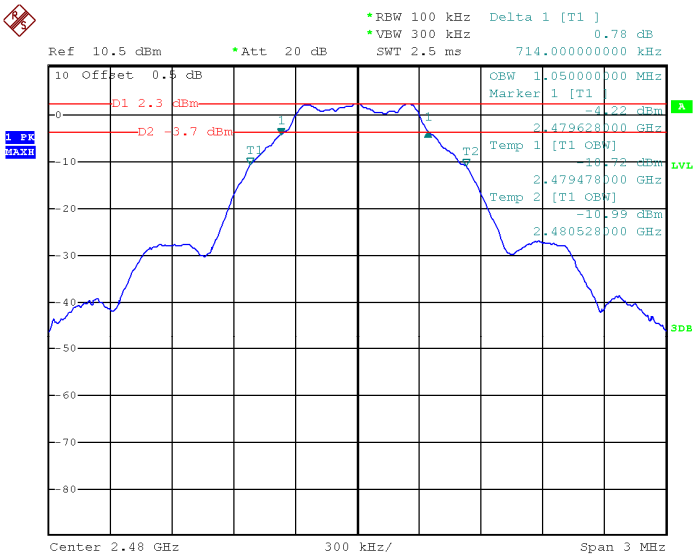
Date: 16.AUG.2018 02:25:09

BLE: channel 19



Date: 16.AUG.2018 02:26:30

BLE: channel 39



Date: 16.AUG.2018 02:27:34

13 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017

13.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017

section 9.1.1 (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 ≥ DTS bandwidth.

b)Set VBW ≥ 3 RBW.

c)Set span ≥ 3 x 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 9.1.2 (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 MHz.

b)Set the VBW ≥ 3 RBW

c)Set the span ≥ 1.5 x DTS bandwidth.

d)Detector = peak.

e)Sweep time = auto couple.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

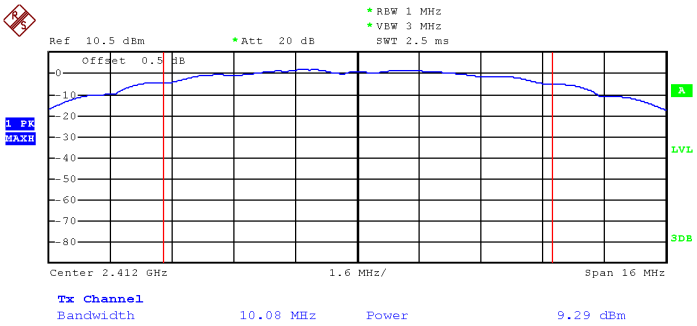
h)Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

13.2 Test Result:

Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
TX 11b	Low-2412	9.29	1W/30dBm
	Middle-2437	9.14	1W/30dBm
	High-2462	9.03	1W/30dBm
TX 11g	Low-2412	9.42	1W/30dBm
	Middle-2437	9.47	1W/30dBm
	High-2462	9.22	1W/30dBm
TX 11n HT20	Low-2412	9.20	1W/30dBm
	Middle-2437	9.37	1W/30dBm
	High-2462	9.09	1W/30dBm
TX 11n HT40	Low-2422	9.13	1W/30dBm
	Middle-2437	9.28	1W/30dBm
	High-2452	9.23	1W/30dBm
BLE	Low-2402	4..38	1W/30dBm
	Middle-2440	5.80	1W/30dBm
	High-2480	3.31	1W/30dBm

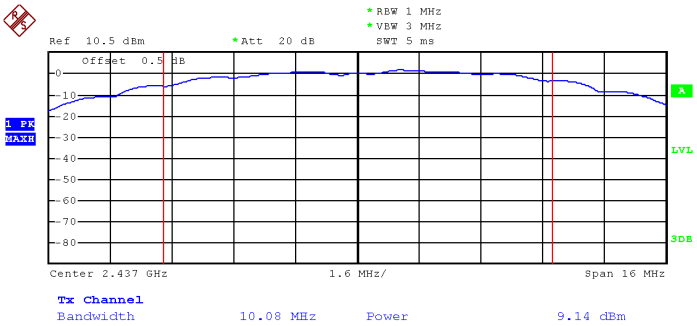
Test Plot

Mode: TX 11b channel 1



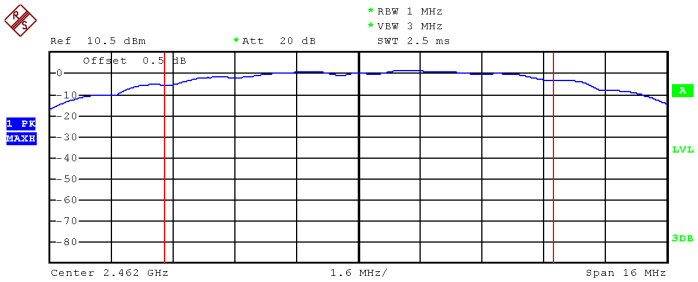
Date: 15.AUG.2018 21:23:55

Mode: TX 11b channel 6



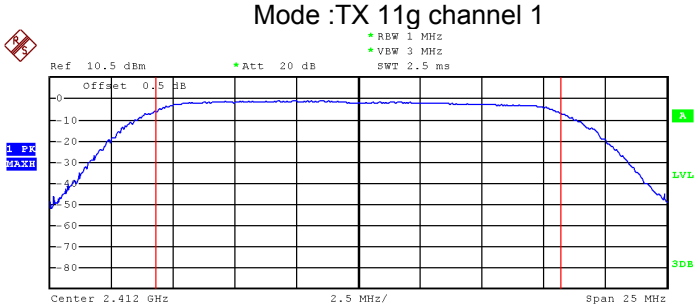
Date: 15.AUG.2018 21:25:28

Mode: TX 11b channel 11



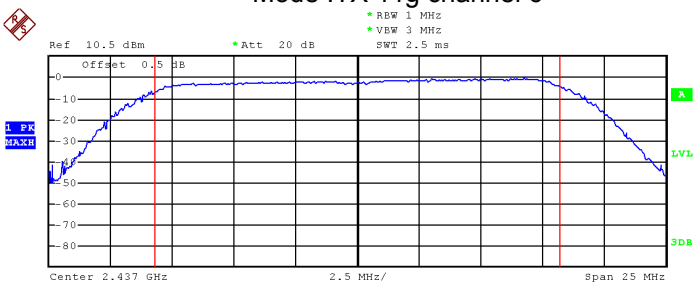
Date: 15.AUG.2018 21:29:39

Mode :TX 11g channel 1



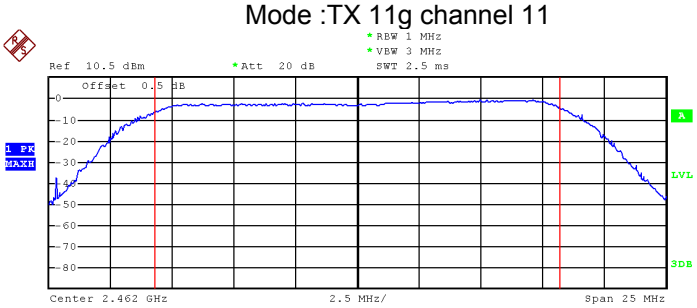
Date: 15.AUG.2018 21:39:24

Mode :TX 11g channel 6



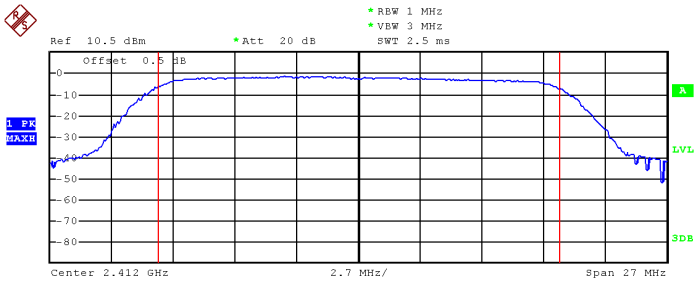
Date: 15.AUG.2018 21:41:46

Mode :TX 11g channel 11



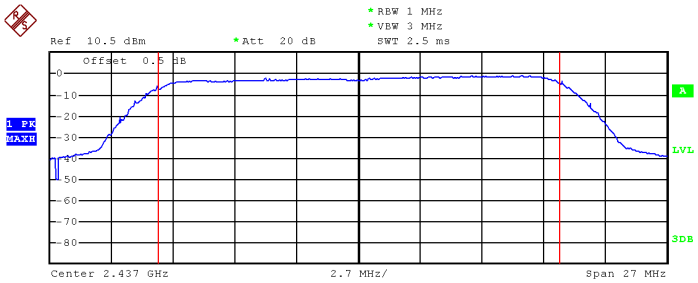
Date: 15.AUG.2018 21:45:03

Mode: TX 11n HT20 channel 1



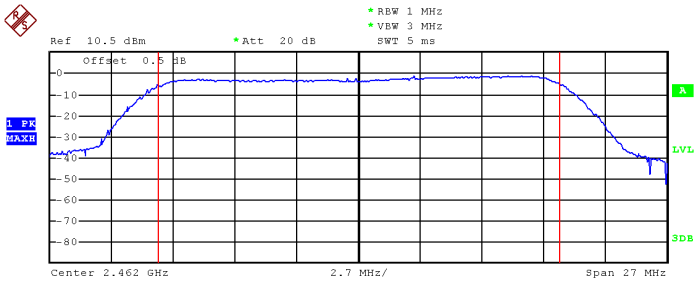
Date: 15.AUG.2018 22:03:23

Mode: TX 11n HT20 channel 6



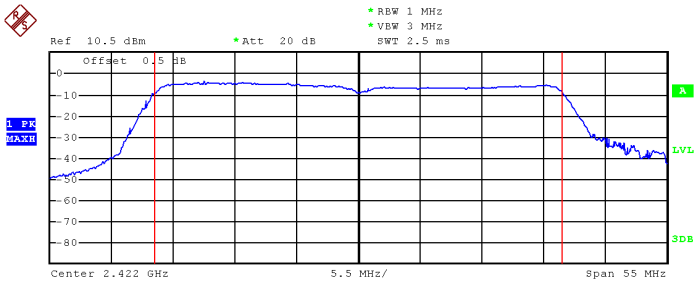
Date: 15.AUG.2018 22:02:46

Mode: TX 11n HT20 channel 11



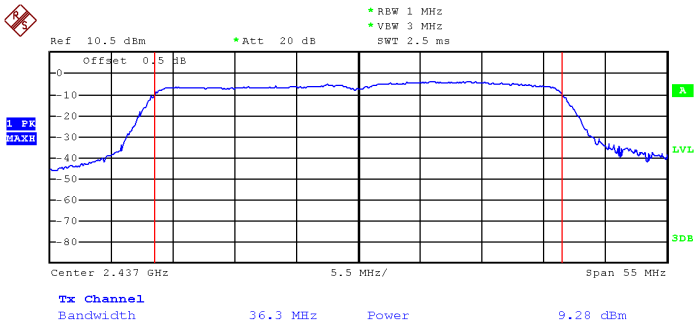
Date: 15.AUG.2018 22:12:25

Mode: TX 11n HT40 channel 3



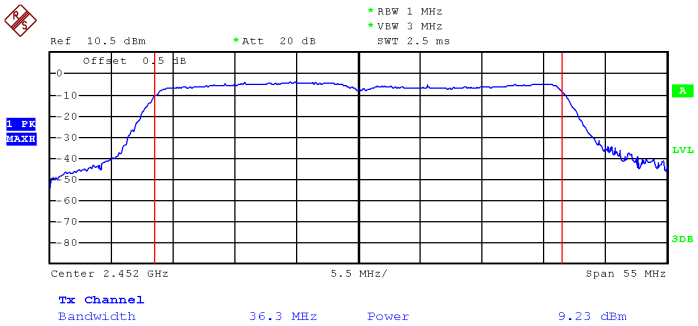
Date: 15.AUG.2018 22:20:52

Mode: TX 11n HT40 channel 6



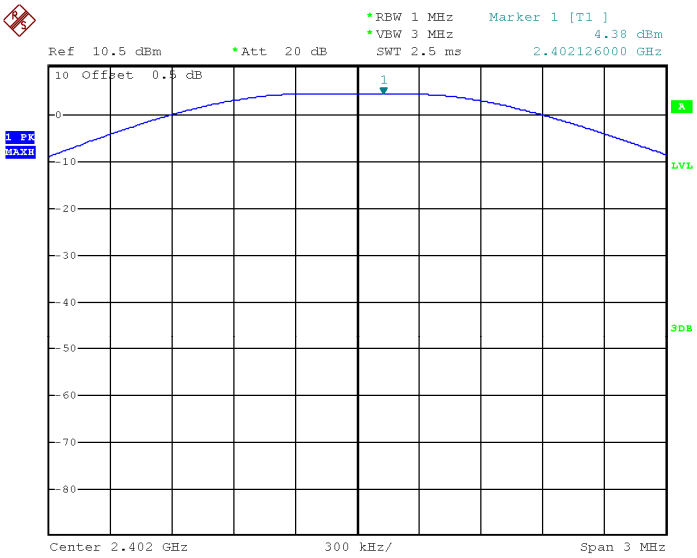
Date: 15.AUG.2018 22:22:36

Mode: TX 11n HT40 channel 9



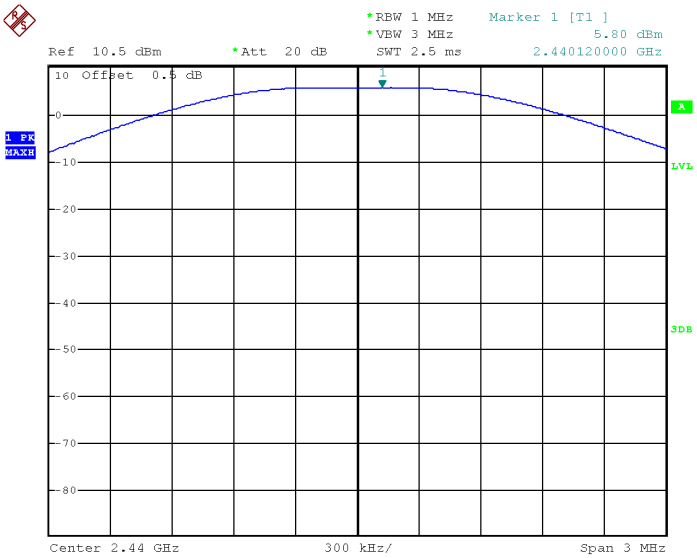
Date: 15.AUG.2018 22:30:08

BLE: channel 0



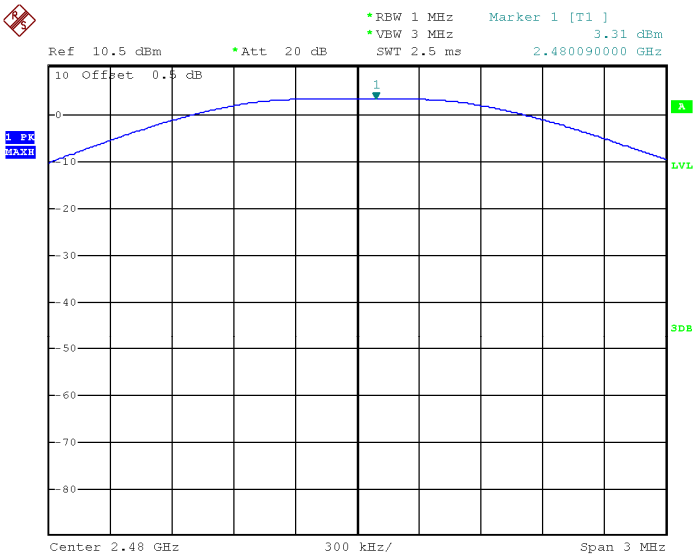
Date: 16.AUG.2018 02:21:04

BLE: channel 19



Date: 16.AUG.2018 02:21:37

BLE: channel 39



Date: 16.AUG.2018 02:21:59

14 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017

14.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017 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.

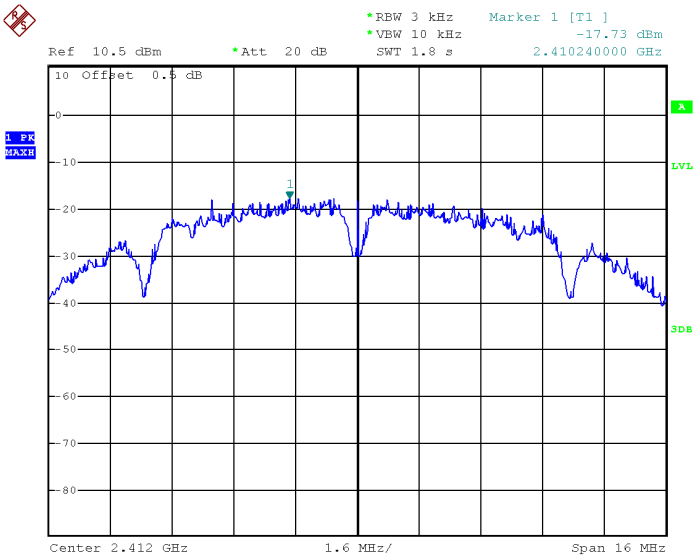
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

14.2 Test Result:

Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
TX 11b	Low-2412	-17.73	8dBm per 3kHz
	Middle-2437	-16.20	8dBm per 3kHz
	High-2462	-16.61	8dBm per 3kHz
TX 11g	Low-2412	-19.42	8dBm per 3kHz
	Middle-2437	-20.78	8dBm per 3kHz
	High-2462	-20.84	8dBm per 3kHz
TX 11n HT20	Low-2412	-19.53	8dBm per 3kHz
	Middle-2437	-20.76	8dBm per 3kHz
	High-2462	-20.99	8dBm per 3kHz
TX 11n HT40	Low-2422	-21.78	8dBm per 3kHz
	Middle-2437	-21.61	8dBm per 3kHz
	High-2452	-20.45	8dBm per 3kHz
BLE	Low-2402	-11.30	8dBm per 3kHz
	Middle-2440	-9.88	8dBm per 3kHz
	High-2480	-12.22	8dBm per 3kHz

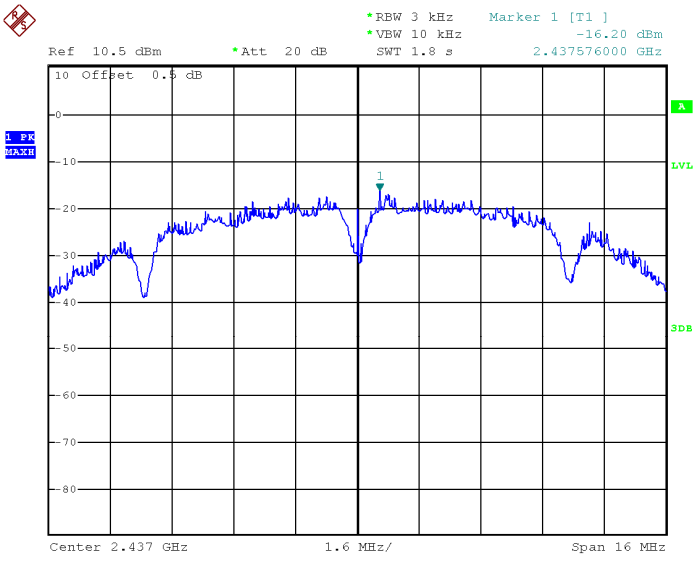
Test Plot

Mode: TX 11b channel 1



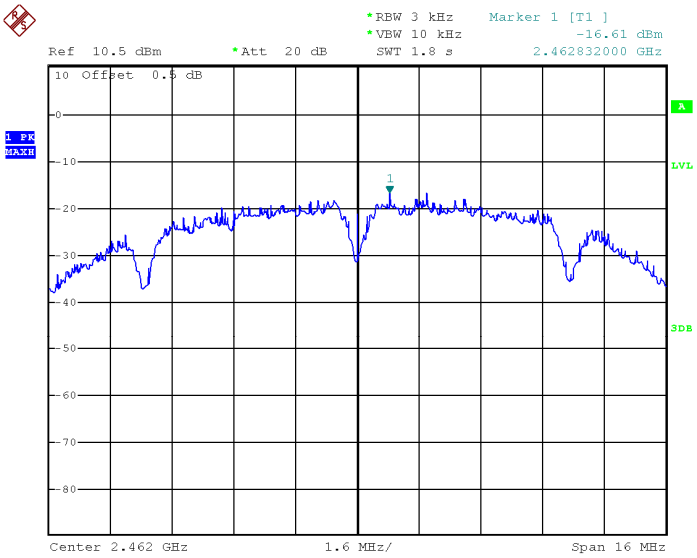
Date: 15.AUG.2018 21:24:20

Mode: TX 11b channel 6



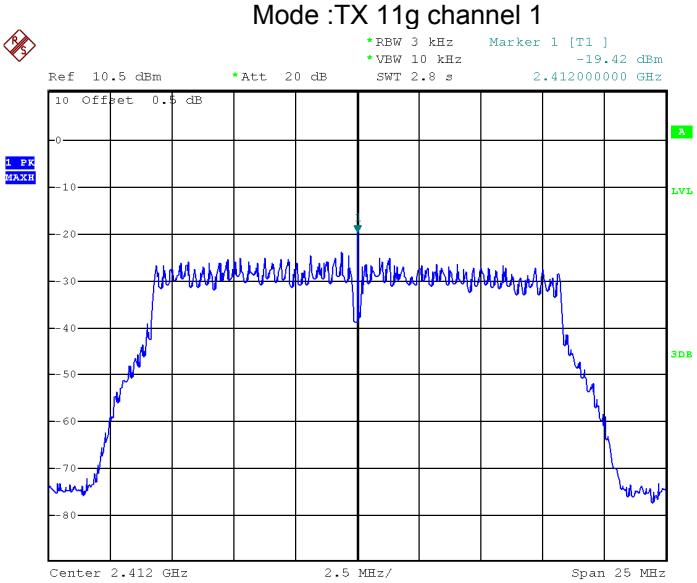
Date: 15.AUG.2018 21:27:08

Mode: TX 11b channel 11



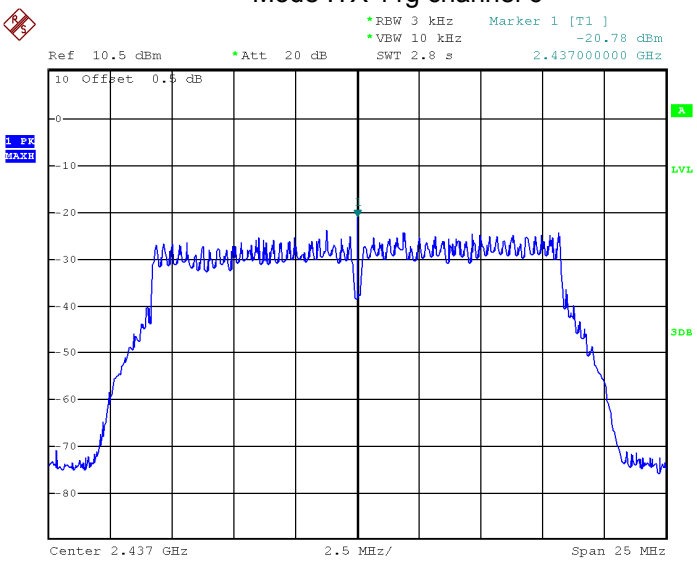
Date: 15.AUG.2018 21:30:20

Mode :TX 11g channel 1



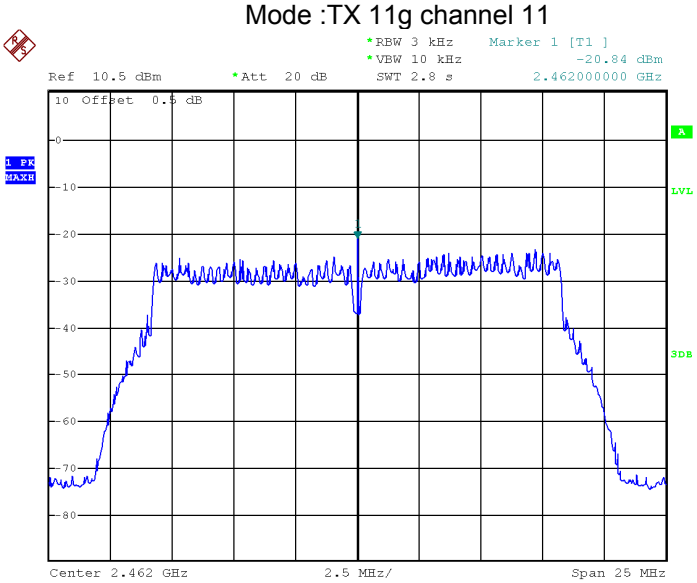
Date: 15.AUG.2018 21:39:54

Mode :TX 11g channel 6



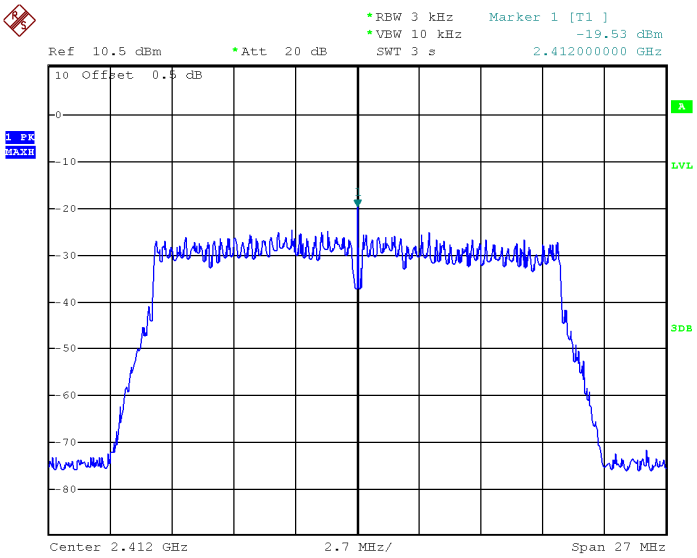
Date: 15.AUG.2018 21:43:54

Mode :TX 11g channel 11



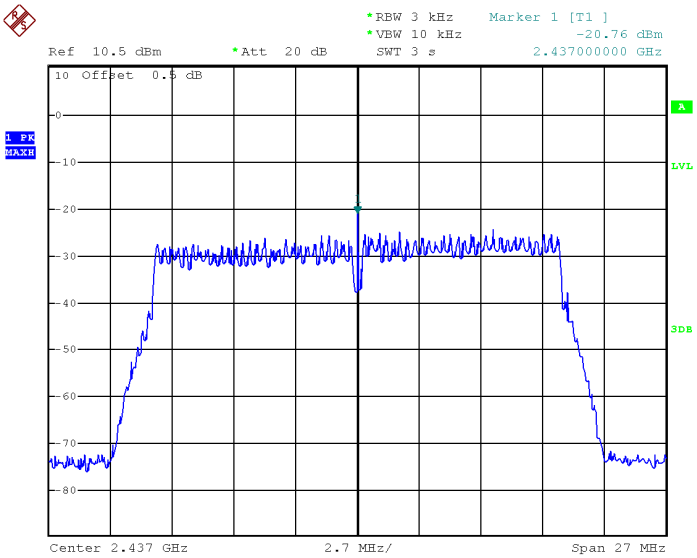
Date: 15.AUG.2018 21:47:36

Mode: TX 11n HT20 channel 1



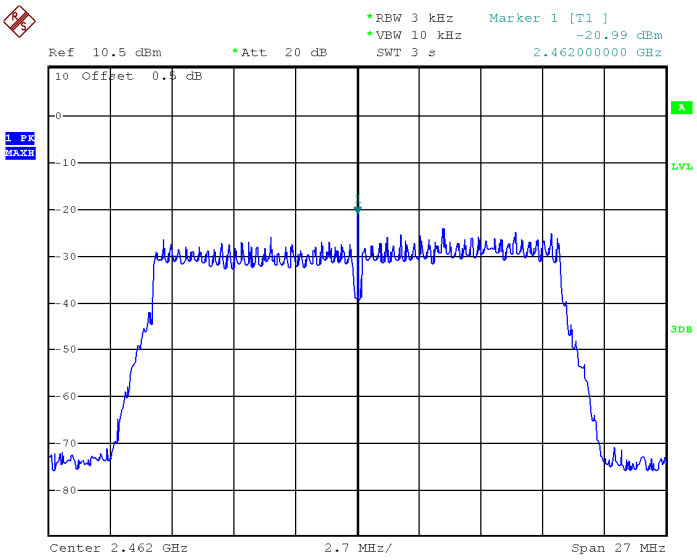
Date: 15.AUG.2018 22:01:36

Mode: TX 11n HT20 channel 6



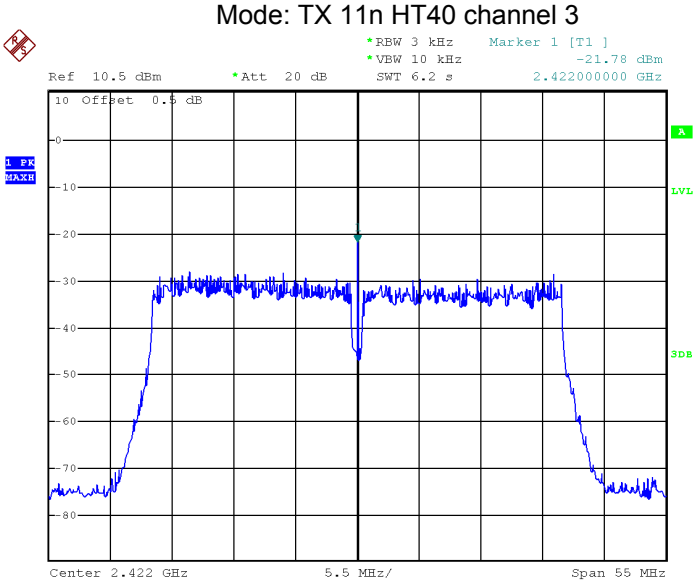
Date: 15.AUG.2018 22:11:10

Mode: TX 11n HT20 channel 11



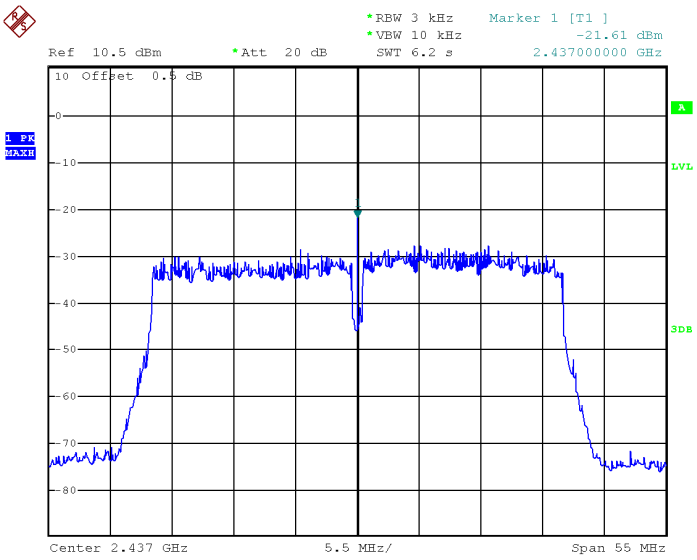
Date: 15.AUG.2018 22:14:30

Mode: TX 11n HT40 channel 3



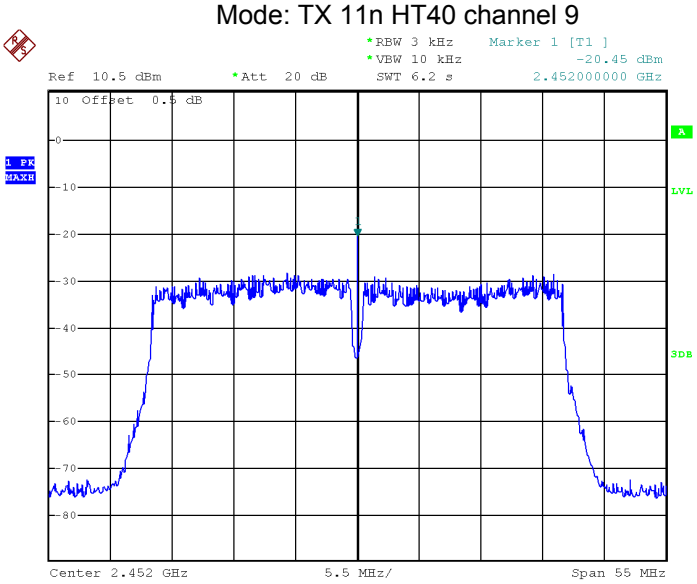
Date: 15.AUG.2018 22:21:21

Mode: TX 11n HT40 channel 6



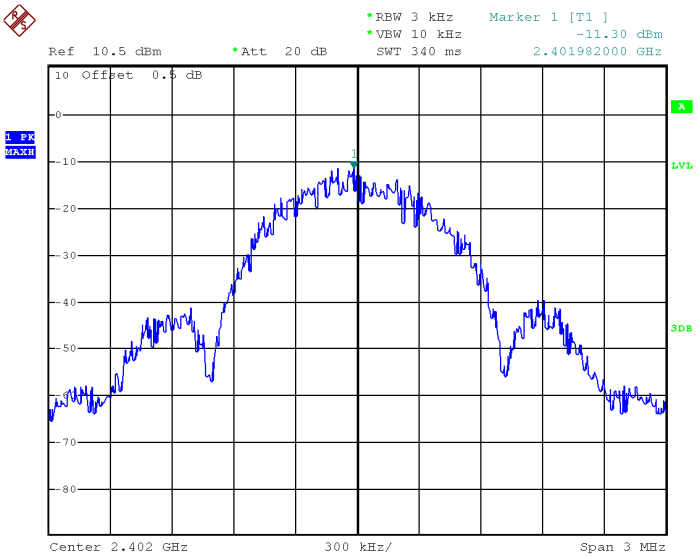
Date: 15.AUG.2018 22:29:06

Mode: TX 11n HT40 channel 9



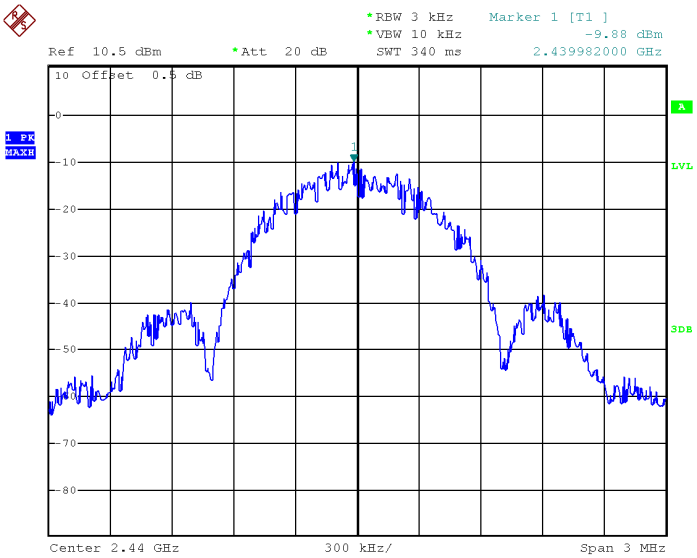
Date: 15.AUG.2018 22:31:34

BLE: channel 0



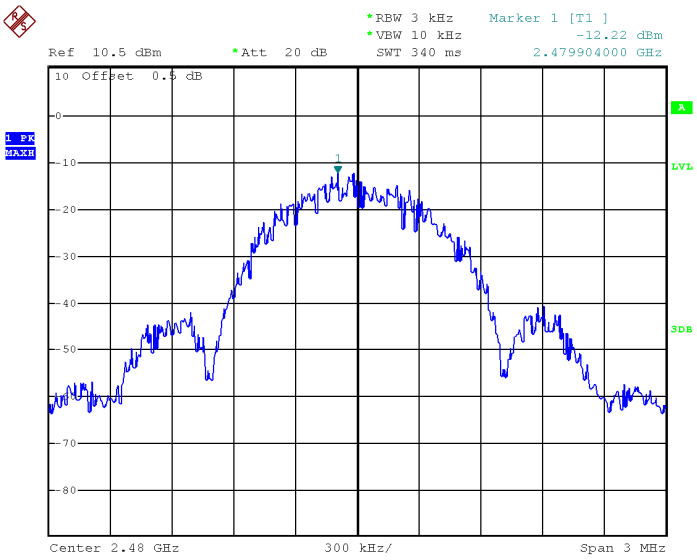
Date: 16.AUG.2018 02:23:29

BLE: channel 19



Date: 16.AUG.2018 02:23:07

BLE: channel 39



Date: 16.AUG.2018 02:22:42

15 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, 15.221, or §15.236. 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 antenna other than that furnished by the responsible party shall be used with the device.

Result:

This product has an integrated antenna for WIFI antenna, meets the requirement for FCC 15.203.

16 RF Exposure

Remark: refer to MPE test report: WTS18S08120316-3W.

17 Photographs of test setup and EUT.

Note: Please refer to appendix: WTS18S08120316W_Photo.

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