



FCC Part 15.247

TEST REPORT

For

AAEON Technology Inc.

5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C

FCC ID: OHBRTC700RKWBG

Report Type Original Report	Product Type: Rugged Tablet Computer
Report Producer :	Himiko Chen <i>Himiko Chen</i>
Report Number :	RLK1803004-00B
Report Date :	2018-05-21
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Taiwan)

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Revision History

Revision	Report Number	Issue Date	Description	Author/Revised by
1.0	RLK1803004-00B	2018.05.21	Original Report	Himiko Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	AAEON Technology Inc. 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C
Manufacturer	AAEON Technology Inc. 5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien Dist., New Taipei City 23145, Taiwan, R.O.C
Brand(Trade) Name	 an ASUS assoc. co.
Product (Equipment)	Rugged Tablet Computer
Model Name	RTC-700RK-TAD-WBGR-6102
Series Model	xRTC-700RKx (x - Where x may be any combination of alphanumeric characters or "-" or blank.)
Model Discrepancy	For marketing purpose
EUT Function	IEEE 802.11 bgn + BT4.1
Frequency Range	IEEE 802.11 b/g/n HT20 mode: 2412 ~ 2462 MHz BLE mode : 2402 ~ 2480 MHz
Number of Channels	IEEE 802.11 b/g/n HT20 mode: 11 Channels BLE mode : 40 Channels
Output Power	IEEE 802.11b mode: 15.19 dBm (0.033 W) IEEE 802.11g mode: 20.73 dBm (0.118 W) IEEE 802.11n HT20 mode: 20.59 dBm (0.115 W) BLE mode: 5.48 dBm (0.0035W)
Received Date	Mar 01, 2018.
Date of Test	Mar 02, 2018 ~ May 21, 2018
Related Submittal(s)/Grant(s)	FCC Part 15.225 DXX with FCC ID : OHBRTC700RKWBG FCC Part 15.247 DSS with FCC ID : OHBRTC700RKWBG
Modulation Type	IEEE 802.11b mode: CCK IEEE 802.11g/n HT 20 mode: OFDM BLE mode : GFSK 1Mbps

**All measurement and test data in this report was gathered from production sample serial number: 1803004
(Assigned by BACL, Taiwan).*

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter <i>Brand Name: FSP</i> <i>Model: FSP036-RBBN2</i> <i>I/P: 100-240Vac, 1.2A</i> <i>O/P: 12Vdc, 3A</i> ☐ By Power Core
	☐ DC Type ☐ DC Power Supply ☒ Battery : (1) <i>Rechargeable Li-polymer Battery</i> <i>Brand Name: AAEON</i> <i>Model: RTC600S</i> <i>7.4V = 1530mAh, 11.322Wh</i> (2) <i>Rechargeable Li-polymer Battery</i> <i>Brand Name: AAEON</i> <i>Model: RTC600H</i> <i>7.4V = 1530mAh, 11.322Wh</i> ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System

**The worst was Adapter mode*

1.3 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the AAEON Technology Inc. Displays (Model: RTC-700RK-TAD-WBGR-6102, xRTC-700RKx (x - Where x may be any combination of alphanumeric characters or "-" or blank.)) to the requirements of the following Standards:

Part 2, Subpart J, Part 15 Subparts A and Part 15 Subparts C of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC Part 15.247 rules and all measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Measurement Uncertainty

Parameter	Expanded Measurement uncertainty
RF output power with Power Meter	± 0.55 dB
Occupied Channel Bandwidth	± 4.45 %
RF Conducted test with Spectrum	± 1.45 dB
AC Power Line Conducted Emission	± 4.64 dB
Radiated Below 1G	± 5.83 dB
Radiated Above 1G-18G	± 5.35 dB
Radiated Above 18G-40G	± 4.49 dB

1.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

☒ 68-3, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

2 System Test Configuration

2.1 Description of Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer.

No special accessory, No modification was made to the EUT and No special equipment used during test.

For Wi-Fi 2.4G mode, there are totally 11 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	-	-
6	2437	-	-
7	2442	-	-

For 802.11b/g/n HT20 modes: Channel 1, 6 and 11 were tested.

For BLE mode, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	2440	39	2480

For BLE mode: Channel 0, 19 and 39 were tested.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power and PSD across all data rates bandwidths, and modulations.

Radiated below 1G were tested worst output power mode.

2.2 Description of Worst Test Configuration

Modulation Used for Conformance Test			
Configuration	NTX	Data Rate	Worst Data Rate
802.11b mode	1	1-11 Mbps	1 Mbps
802.11g mode	1	6-54 Mbps	6 Mbps
802.11n HT 20 mode	1	MCS 0-7	MCS 0
BLE mode	1	125 kbps-1 Mbps	1 Mbps

Worst Case of Power Setting				
EUT Exercise Software		RFTestTool		
Configuration	NTX	Low CH	Mid CH	High CH
802.11b mode	1	0	0	0
802.11g mode	1	0	0	0
802.11n HT 20 mode	1	0	0	0
BLE mode	1	Default	Default	Default

2.3 Support Equipment List and Details

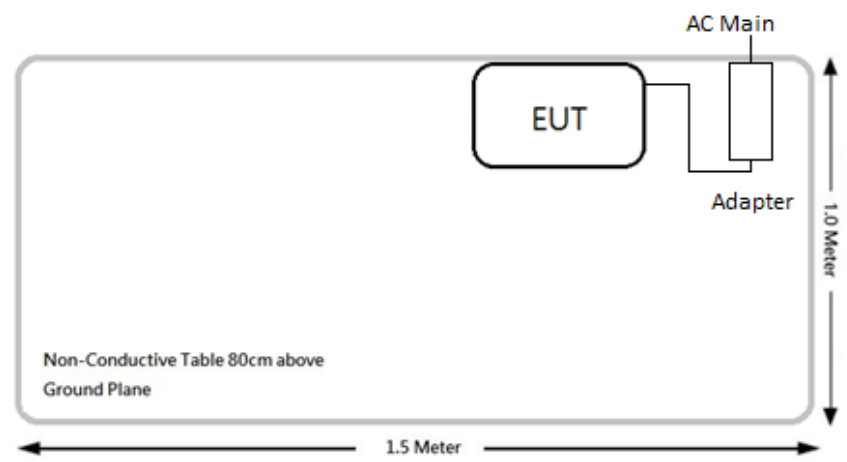
No.	Description	Manufacturer	Model Number	BSMI	FCC ID/DoC
A	N/A	N/A	N/A	N/A	N/A

2.4 External Cable List and Details

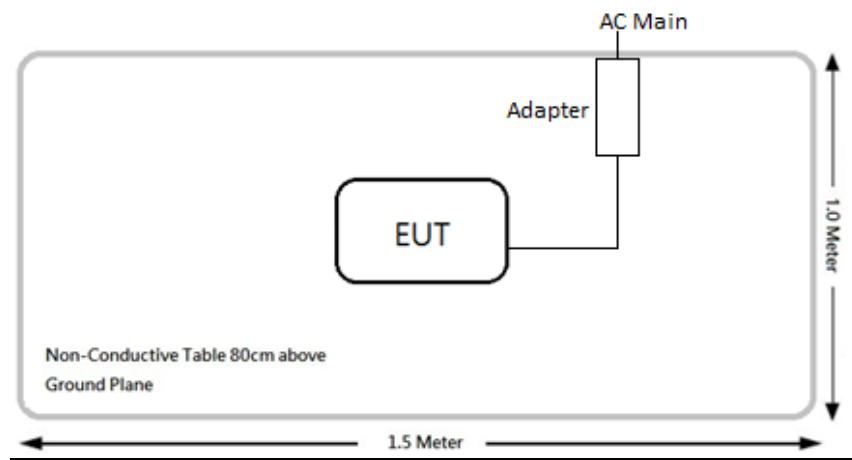
No.	Cable Description	Length (m)	From	To
1	N/A	N/A	N/A	N/A

2.5 Block Diagram of Test Setup

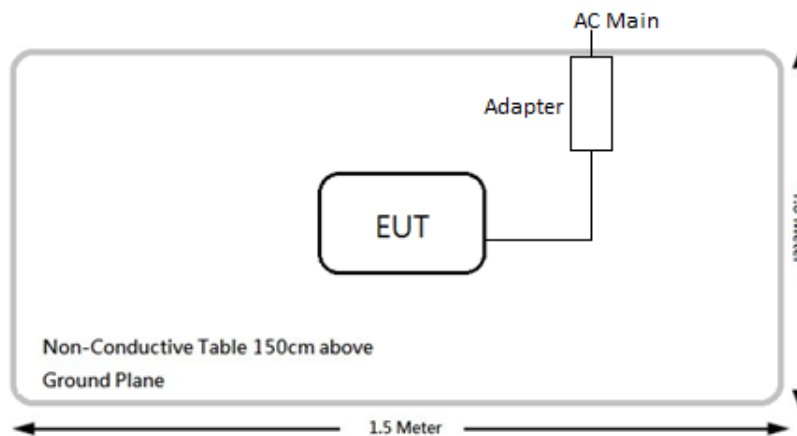
Conduction



Radiation below 1G



Radiation Above 1G



2.6 Duty Cycle

According to KDB 558074 D01 DTS Meas Guidance v04 section 6.0:

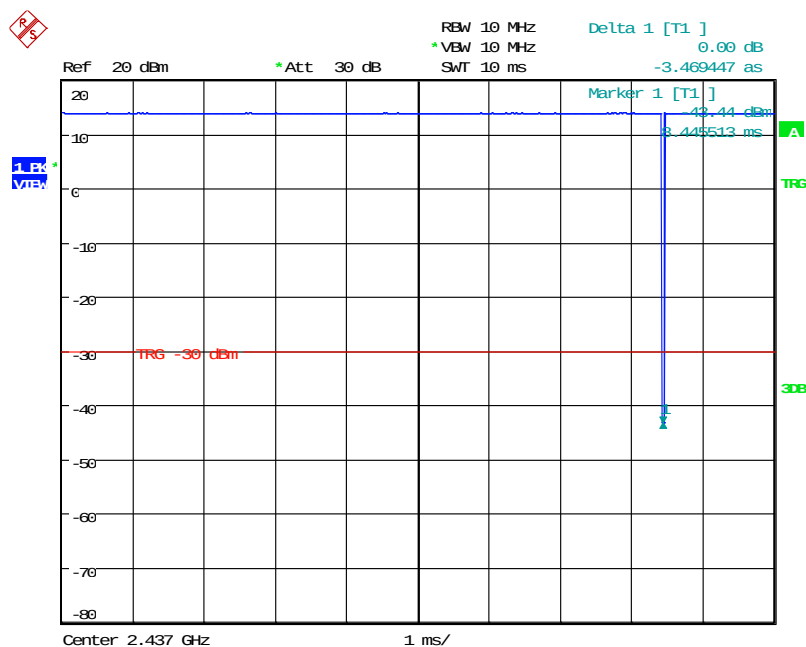
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b mode	16.91	16.91	100.00	0.00
802.11g mode	1.44	1.44	100.00	0.00
802.11n HT 20 mode	1.34	1.34	100.00	0.00
BLE mode	0.43	0.62	69.35	1.59

Note: Duty Factor = $10 \cdot \log(1/\text{Duty cycle})$

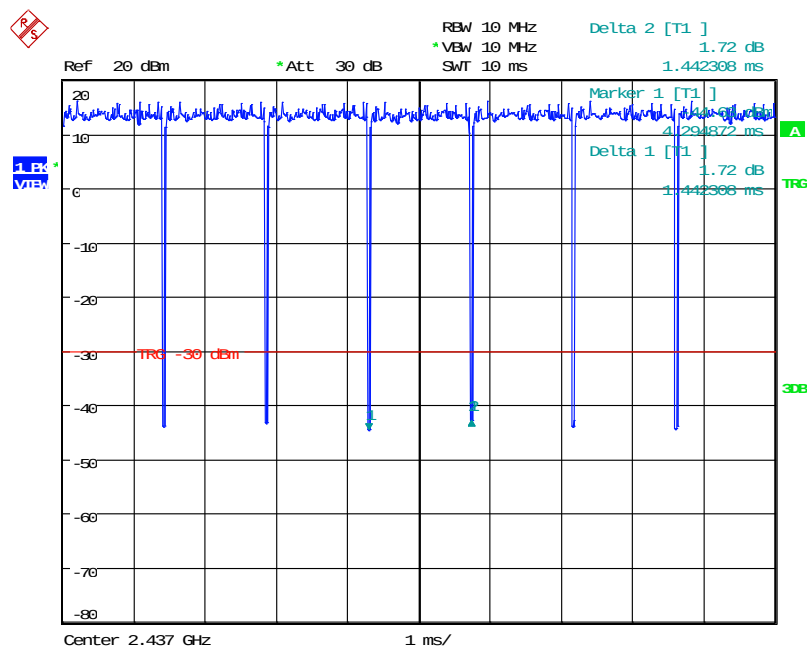
Please refer to the following plots.

B mode



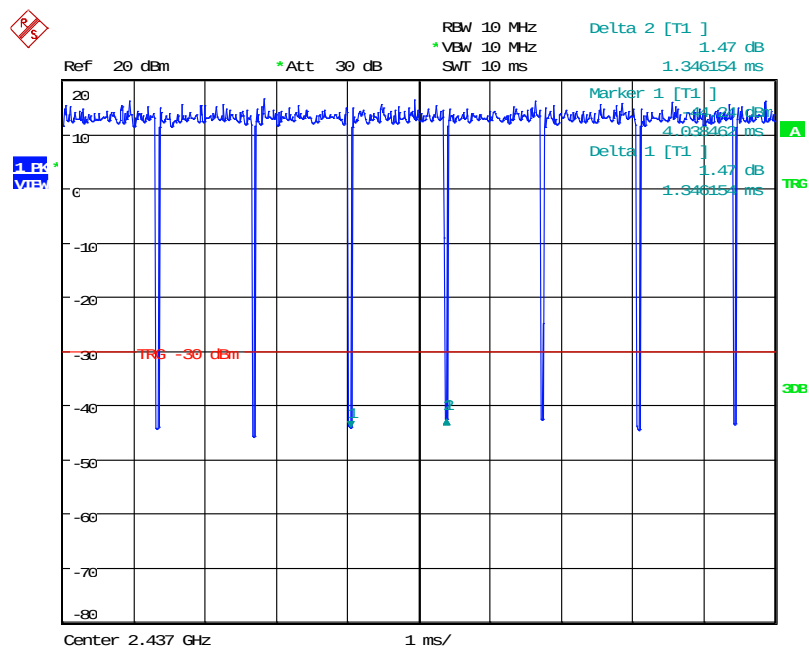
Date: 21.MAY.2018 13:12:29

G mode



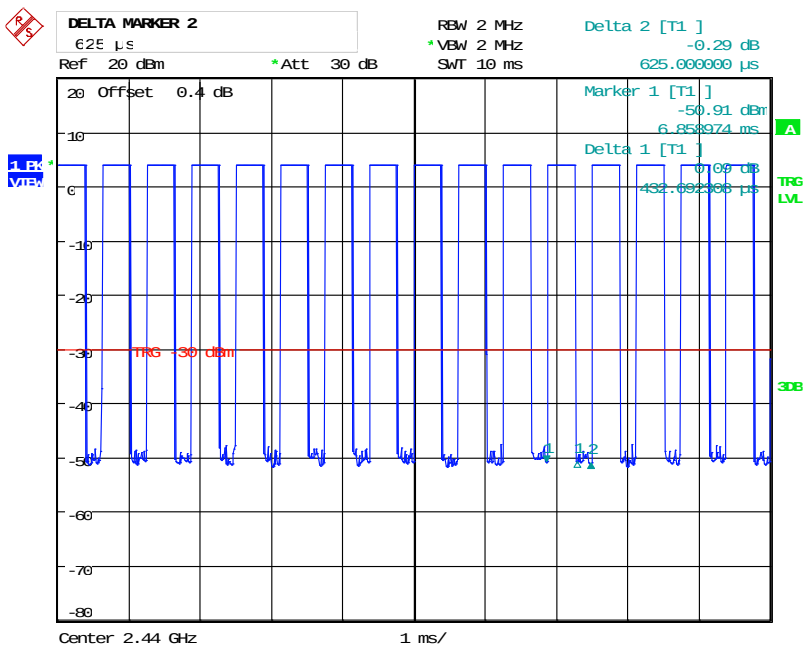
Date: 21.MAY.2018 13:11:09

N 20 mod



Date: 21.MAY.2018 13:11:42

BLE mode



Date: 21.MAR.2018 00:50:37

3 Summary of Test Results

FCC Rules	Description of Test	Result
FCC §15.247(i), § 2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 FCC §15.247(i), § 2.1093 - RF Exposure

4.1 Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot$

$[\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz.

2. Power and distance are rounded to the nearest mW and mm before calculation.

3. The result is rounded to one decimal place for comparison.

4. 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

4.2 RF Exposure Evaluation Result

For Wi-Fi and BLE Mode:

Please refer to the SAR report, report No.: RLK1803004-20A

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

According to § 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.

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 user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6 dBi

5.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Antenna Gain	Result
Aristotle	RFA-25-JP19-70B-50	PIFA Antenna	3.89 dBi	Compliance

The EUT has an internal detachable antenna arrangement, fulfill the requirement of this section.

6 FCC §15.207 - AC Line Conducted Emissions

6.1 Applicable Standard

According to FCC §15.207

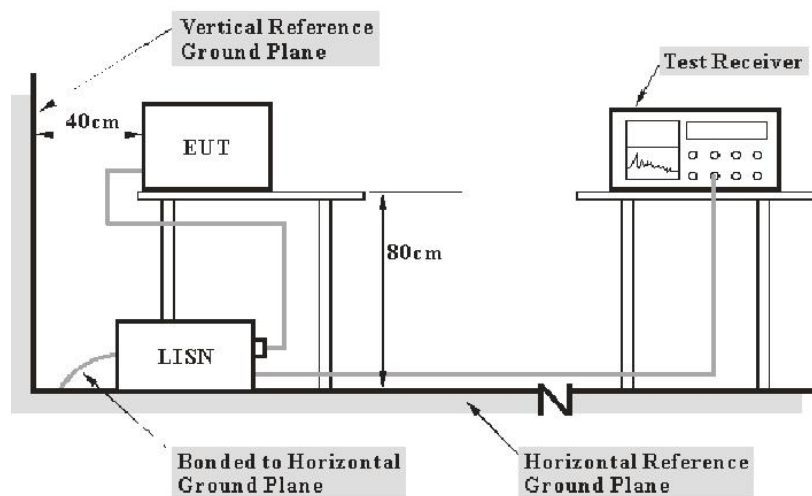
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 2}
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

Note 2: A linear average detector is required

6.2 EUT Setup



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

6.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz. During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	Receiver RBW
150 kHz - 30 MHz	9 kHz

6.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

6.5 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Date	Calibration Due Date
LISN	EMCO	3816/2	00075848	2017/08/02	2018/08/01
LISN	Rohde & Schwarz	ENV216	101248	2017/07/20	2018/07/19
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2017/11/06	2018/11/05
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2017/08/10	2018/08/09
RF Cable	EMEC	EM-CB5D	001	2017/07/10	2018/07/09
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

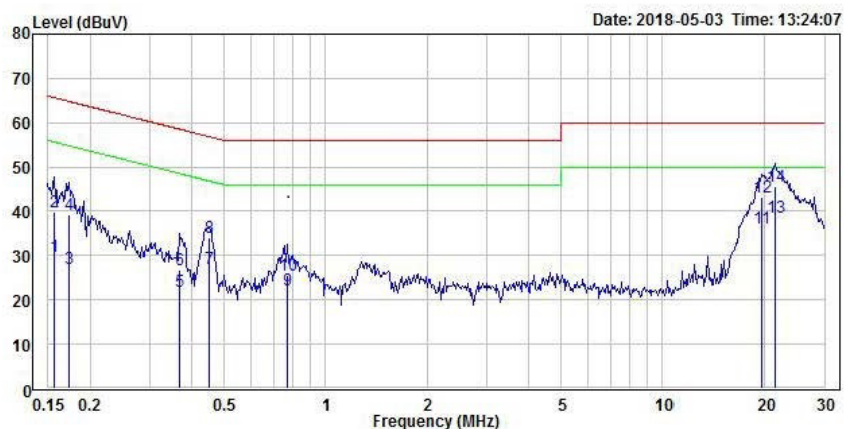
6.6 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	58 %
ATM Pressure:	1010 hPa

The testing was performed by Ian on 2018-05-03

6.7 AC Line Conducted Emission Test Plot and Data

Mode: AC 120V/60 Hz, Wi-Fi mode, Line



Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Line

EUT : Rugged Tablet Computer

Model : RTC-700RK-TAD-WBGR-6102

Note : WiFi MODE

Power : 120V/60Hz

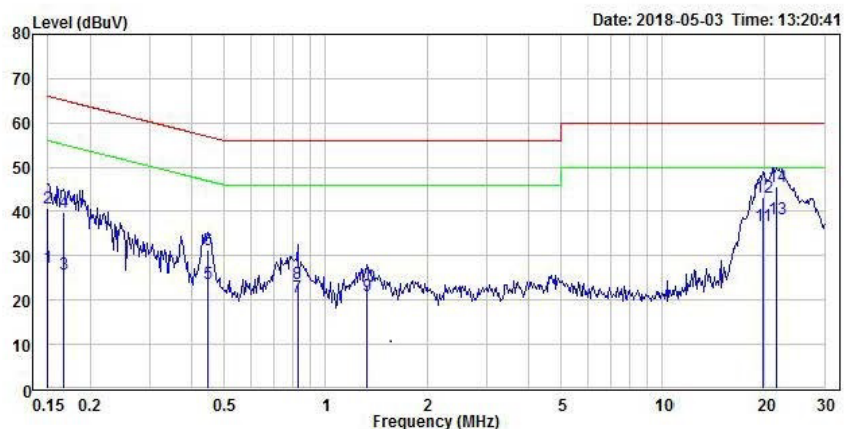
	Freq	Level	Limit	Over		Read		
	MHz	dBuV	Line	Limit	Factor	Level	Remark	Pol/Phase
	MHz	dBuV	dBuV	dB	dB	dBuV		
1	0.156	29.68	55.67	-25.99	19.50	10.18	Average	Line
2	0.156	39.97	65.67	-25.70	19.50	20.47	QP	Line
3	0.173	27.02	54.81	-27.79	19.50	7.52	Average	Line
4	0.173	39.39	64.81	-25.42	19.50	19.89	QP	Line
5	0.369	21.99	48.52	-26.53	19.51	2.48	Average	Line
6	0.369	26.90	58.52	-31.62	19.51	7.39	QP	Line
7	0.450	27.17	46.87	-19.70	19.51	7.66	Average	Line
8	0.450	34.20	56.87	-22.67	19.51	14.69	QP	Line
9	0.768	22.19	46.00	-23.81	19.52	2.67	Average	Line
10	0.768	25.63	56.00	-30.37	19.52	6.11	QP	Line
11	19.511	36.22	50.00	-13.78	19.84	16.38	Average	Line
12	19.511	43.08	60.00	-16.92	19.84	23.24	QP	Line
13	21.468	38.60	50.00	-11.40	19.85	18.75	Average	Line
14	21.468	45.48	60.00	-14.52	19.85	25.63	QP	Line

Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Mode: AC 120V/60 Hz, Wi-Fi mode, Neutral

Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Neutral
 EUT : Rugged Tablet Computer
 Model : RTC-700RK-TAD-WBGR-6102
 Note : WiFi MODE
 Power : 120V/60Hz

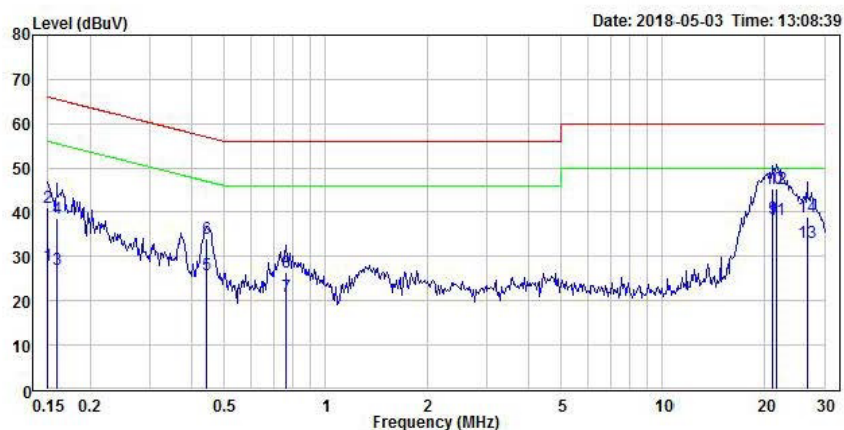
	Freq	Level	Limit	Over		Read		
	MHz	dBuV	Line	Limit	Factor	Level	Remark	Pol/Phase
			dBuV	dB	dB	dBuV		
1	0.150	27.50	56.00	-28.50	19.63	7.87	Average	Neutral
2	0.150	40.80	66.00	-25.20	19.63	21.17	QP	Neutral
3	0.166	25.83	55.14	-29.31	19.63	6.20	Average	Neutral
4	0.166	39.96	65.14	-25.18	19.63	20.33	QP	Neutral
5	0.447	23.67	46.93	-23.26	19.64	4.03	Average	Neutral
6	0.447	31.32	56.93	-25.61	19.64	11.68	QP	Neutral
7	0.825	20.77	46.00	-25.23	19.66	1.11	Average	Neutral
8	0.825	23.72	56.00	-32.28	19.66	4.06	QP	Neutral
9	1.320	20.95	46.00	-25.05	19.68	1.27	Average	Neutral
10	1.320	23.12	56.00	-32.88	19.68	3.44	QP	Neutral
11	19.667	36.81	50.00	-13.19	20.04	16.77	Average	Neutral
12	19.667	43.07	60.00	-16.93	20.04	23.03	QP	Neutral
13	21.640	38.37	50.00	-11.63	20.06	18.31	Average	Neutral
14	21.640	45.75	60.00	-14.25	20.06	25.69	QP	Neutral

Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Mode: AC 120V/60 Hz, BLE mode, Line

Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Line

EUT : Rugged Tablet Computer

Model : RTC-700RK-TAD-WBGR-6102

Note : BLE MODE

Power : 120V/60Hz

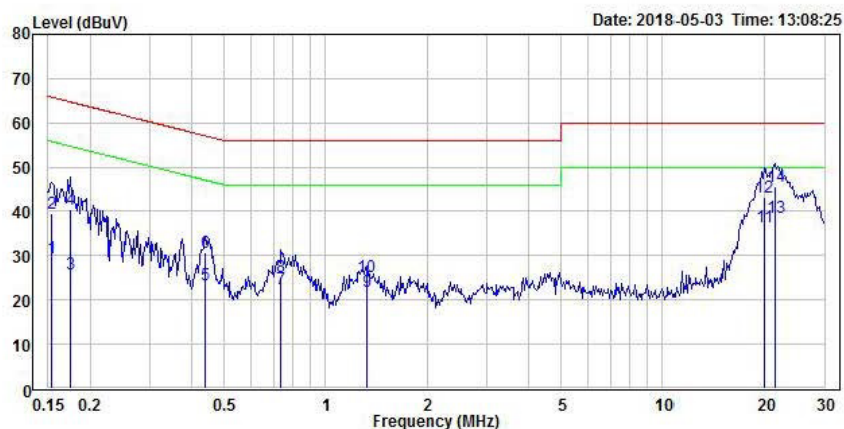
	Freq	Level	Limit	Over	Read		
	MHz	dBuV	dBuV	Limit	Factor	Level	Remark
				dB	dB	dBuV	Pol/Phase
1	0.150	27.96	56.00	-28.04	19.50	8.46	Average Line
2	0.150	40.98	66.00	-25.02	19.50	21.48	QP Line
3	0.159	27.18	55.54	-28.36	19.50	7.68	Average Line
4	0.159	38.77	65.54	-26.77	19.50	19.27	QP Line
5	0.443	25.98	47.00	-21.02	19.51	6.47	Average Line
6	0.443	34.19	57.00	-22.81	19.51	14.68	QP Line
7	0.762	20.97	46.00	-25.03	19.52	1.45	Average Line
8	0.762	26.52	56.00	-29.48	19.52	7.00	QP Line
9	21.129	38.72	50.00	-11.28	19.84	18.88	Average Line
10	21.129	45.20	60.00	-14.80	19.84	25.36	QP Line
11	21.640	38.35	50.00	-11.65	19.85	18.50	Average Line
12	21.640	45.22	60.00	-14.78	19.85	25.37	QP Line
13	26.621	33.29	50.00	-16.71	19.87	13.42	Average Line
14	26.621	38.85	60.00	-21.15	19.87	18.98	QP Line

Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Mode: AC 120V/60 Hz, BLE mode, Neutral

Condition: limit\FCC\FCC Conduction Clsaa-B QP.csv Neutral

EUT : Rugged Tablet Computer

Model : RTC-700RK-TAD-WBGR-6102

Note : BLE MODE

Power : 120V/60Hz

	Freq	Level	Limit	Over	Read		
	MHz	dBuV	Line	Limit	Factor	Level	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	Pol/Phase
1	0.154	29.58	55.80	-26.22	19.63	9.95	Average Neutral
2	0.154	39.53	65.80	-26.27	19.63	19.90	QP Neutral
3	0.175	25.82	54.74	-28.92	19.63	6.19	Average Neutral
4	0.175	40.41	64.74	-24.33	19.63	20.78	QP Neutral
5	0.440	23.30	47.07	-23.77	19.64	3.66	Average Neutral
6	0.440	30.81	57.07	-26.26	19.64	11.17	QP Neutral
7	0.738	22.45	46.00	-23.55	19.66	2.79	Average Neutral
8	0.738	25.28	56.00	-30.72	19.66	5.62	QP Neutral
9	1.320	21.88	46.00	-24.12	19.68	2.20	Average Neutral
10	1.320	25.29	56.00	-30.71	19.68	5.61	QP Neutral
11	19.824	36.38	50.00	-13.62	20.04	16.34	Average Neutral
12	19.824	43.19	60.00	-16.81	20.04	23.15	QP Neutral
13	21.468	38.70	50.00	-11.30	20.06	18.64	Average Neutral
14	21.468	45.61	60.00	-14.39	20.06	25.55	QP Neutral

Note:

Level = Read Level + Factor

Over Limit (Margin) = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

7 FCC §15.209, §15.205, §15.247(d) – Spurious Emissions

7.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As Per FCC §15.205(a) and RSS-Gen except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5.46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 – 167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3.3458 – 3.358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

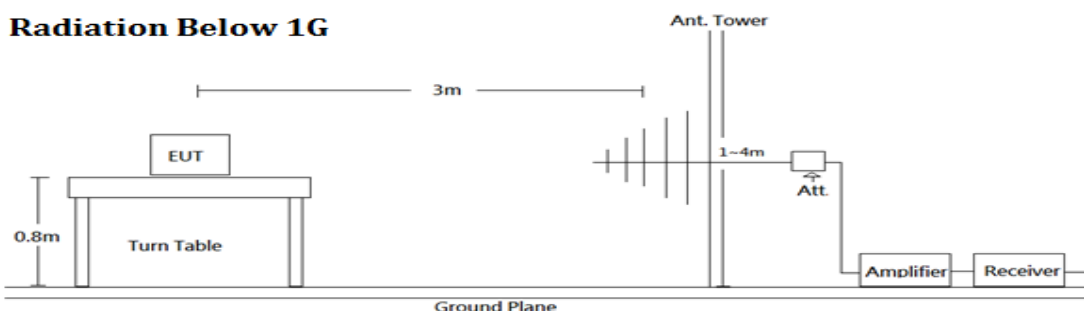
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

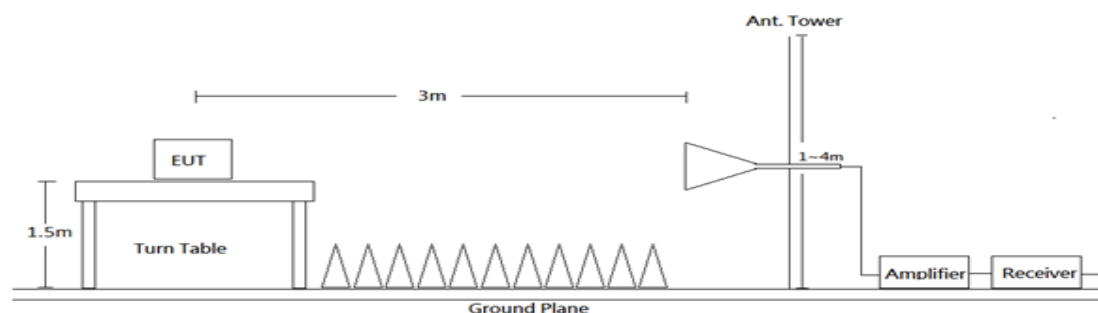
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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)).

7.2 EUT Setup

Radiation Below 1G



Radiation Above 1G



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

7.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Detector	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	QP		QP
Above 1 GHz	1 MHz	3 MHz	PK		PK
	1 MHz	3 MHz	RMS	>98%	Ave
	1 MHz	1/T	PK	<98%	Ave

7.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

7.5 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
966A Room					
Bilog Antenna	Sunol & Mini-Circuits	JB6/UNAT-6+	A050115 / 15542_01	2017/12/20	2018/12/19
Horn Antenna	EMCO	3115	9311-4158	2017/05/31	2018/05/30
Horn Antenna	ETS-Lindgren	3116	00062638	2017/09/02	2018/09/01
Preamplifier	Sonoma	310N	130602	2017/07/03	2018/07/02
Preamplifier	EMEC	EM01G18G	060697	2017/04/14	2018/04/13
Preamplifier	EMEC	EM18G40G	060656	2018/01/15	2019/01/14
EMI Test Receiver	R & S	ESR7	101419	2017/11/06	2018/11/05
Spectrum Analyzer	Rohde & Schwarz	FSV40	101203	2017/07/13	2018/07/12
Microflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2017/10/31	2018/10/30
Microflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2017/11/10	2018/11/09
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2018/03/05	2019/03/04
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-80CM	160309-2	2018/01/29	2019/01/28
20 dB Attenuator	NCL	BW-S20W5+	NA	Each Use	/
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	060772	N.C.R	N.C.R
Software	Farad	EZ EMC	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2017/05/08	2018/05/07
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

7.6 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian from 2018-03-20 to 2018-04-10

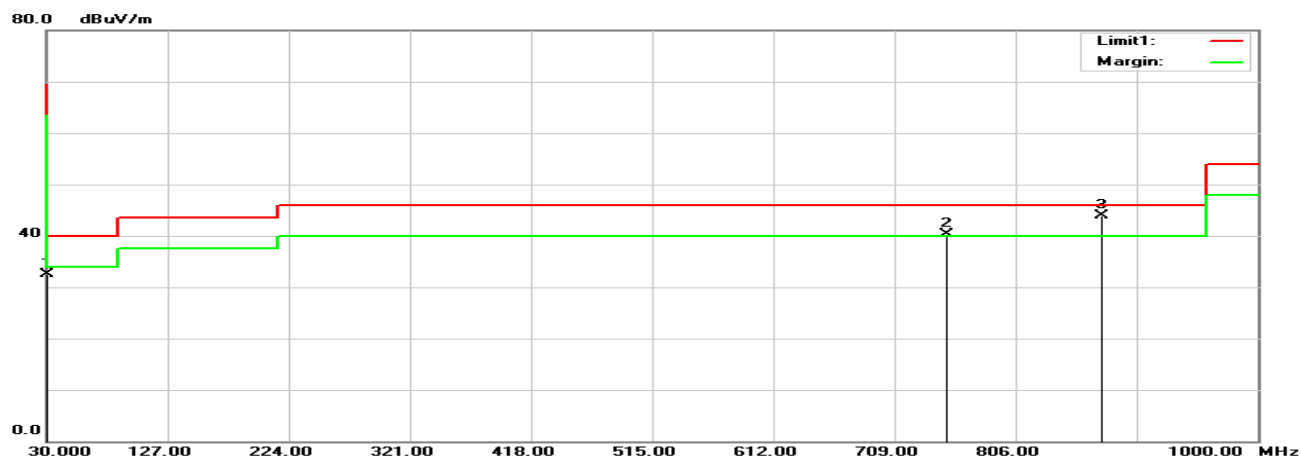
7.7 Radiated Emission Test Plot and Data

Wi-Fi Mode: Transmitting Mode (Pre-scan with three orthogonal axis, and worse case as X axis)

Below 1G (30 MHz-1 GHz) test the output power worst mode:

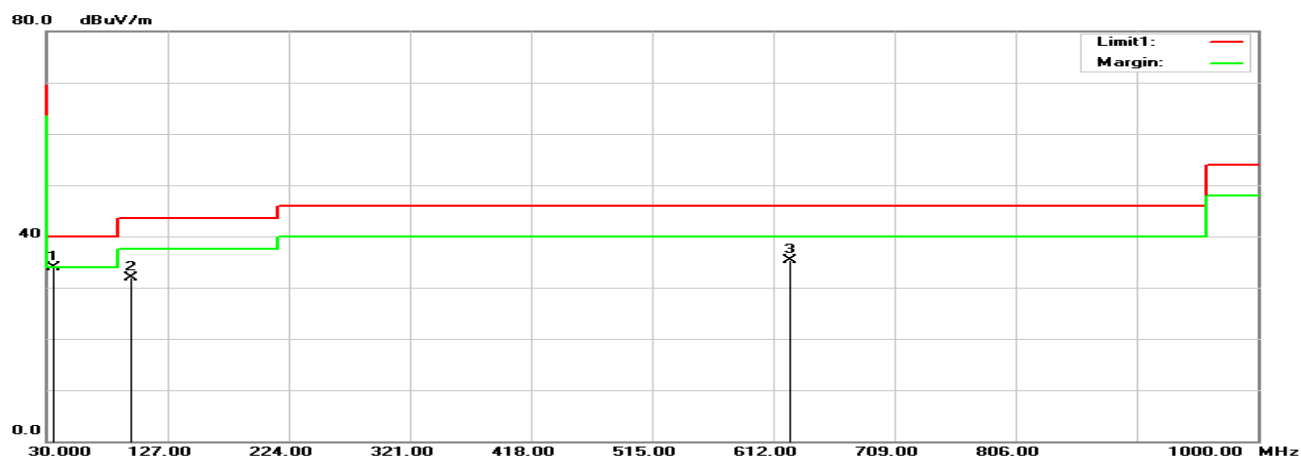
Wi-Fi mode: Worst case is 802.11g mode Middle Channel

Horizontal



Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
30.9700	36.47	-3.93	32.54	40.00	-7.46	100	288	peak
750.7100	42.48	-2.09	40.39	46.00	-5.61	100	208	peak
874.8700	43.32	0.60	43.92	46.00	-2.08	100	111	QP

Vertical

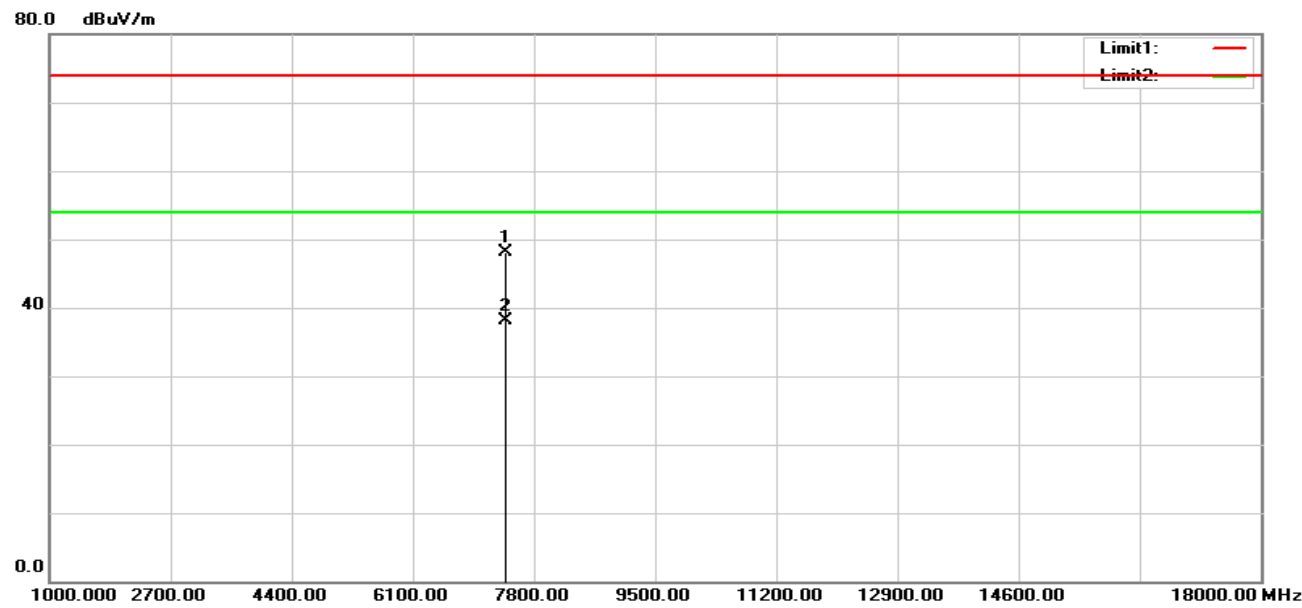


Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	41.33	-7.35	33.98	40.00	-6.02	100	119	peak
97.9000	46.86	-15.01	31.85	43.50	-11.65	100	1	peak
625.5800	39.16	-3.81	35.35	46.00	-10.65	100	328	peak

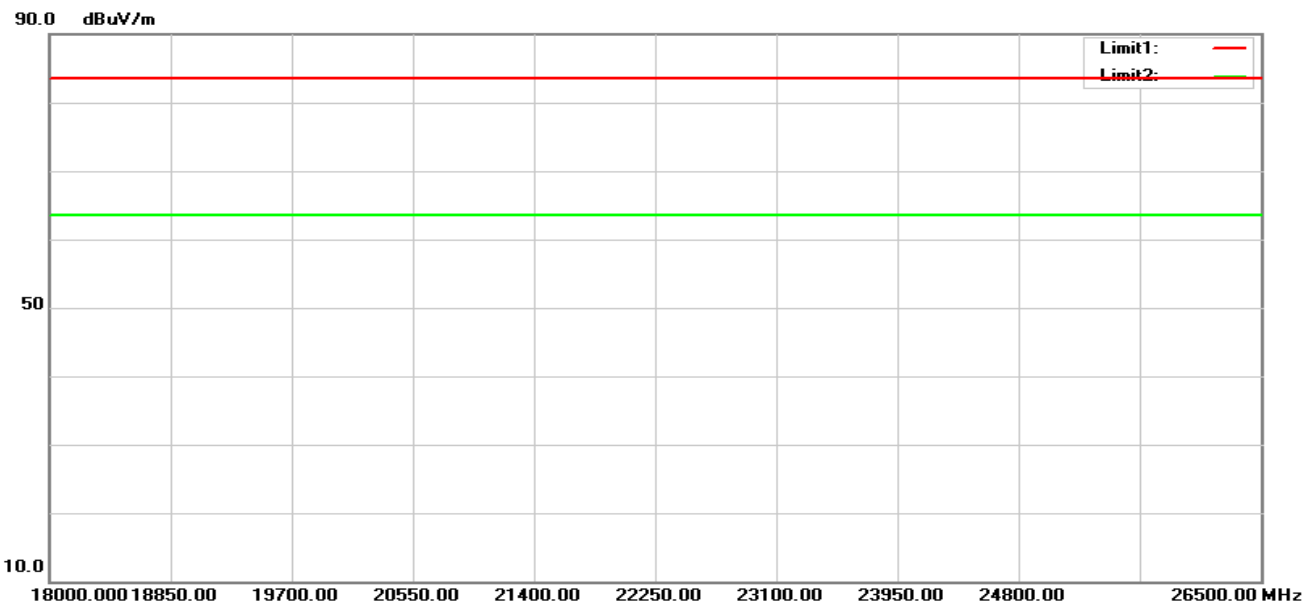
Above 1G (1 GHz-26.5 GHz): the output power Worst case is 802.11g mode High channel

Horizontal

1GHz-18GHz:

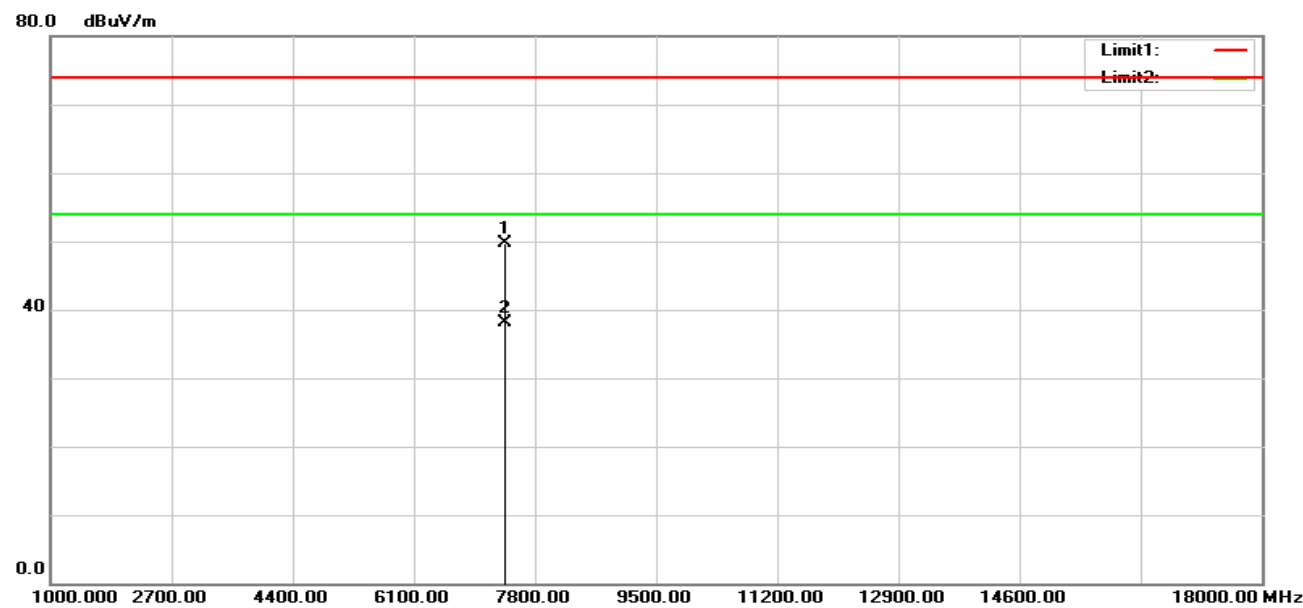


18GHz-26.5GHz:

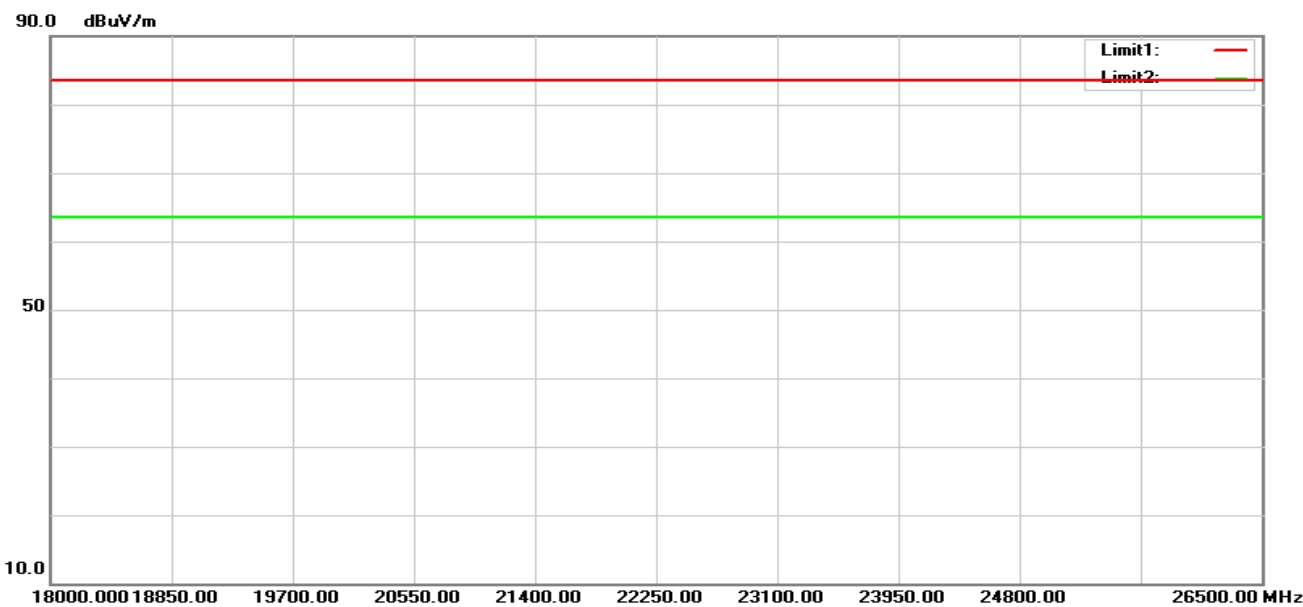


Vertical

1GHz-18GHz:



18GHz-26.5GHz:



Wi-Fi B mode**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2373.480	62.28	-4.92	57.36	74.00	-16.64	150	304	peak
2373.480	48.43	-4.92	43.51	54.00	-10.49	150	304	AVG
2410.855	105.61	-4.84	100.77	N/A	N/A	150	197	peak
2410.855	102.82	-4.84	97.98	N/A	N/A	150	197	AVG
7239.000	40.65	6.69	47.34	74.00	-26.66	150	141	peak
7239.000	35.14	6.69	41.83	54.00	-12.17	150	141	AVG
Mid Channel								
2360.730	62.22	-4.95	57.27	74.00	-16.73	150	190	peak
2360.730	48.15	-4.95	43.20	54.00	-10.80	150	190	AVG
2438.060	104.76	-4.78	99.98	N/A	N/A	150	187	peak
2438.060	102.41	-4.78	97.63	N/A	N/A	150	187	AVG
2489.740	62.14	-4.67	57.47	74.00	-16.53	150	106	peak
2489.740	48.27	-4.67	43.60	54.00	-10.40	150	106	AVG
7307.000	41.90	6.97	48.87	74.00	-25.13	150	137	peak
7307.000	36.38	6.97	43.35	54.00	-10.65	150	137	AVG
High Channel								
2463.050	104.53	-4.72	99.81	N/A	N/A	150	187	peak
2463.050	101.93	-4.72	97.21	N/A	N/A	150	187	AVG
2495.800	62.43	-4.65	57.78	74.00	-16.22	150	35	peak
2495.800	48.41	-4.65	43.76	54.00	-10.24	150	35	AVG
7375.000	43.18	7.23	50.41	74.00	-23.59	150	133	peak
7375.000	38.34	7.23	45.57	54.00	-8.43	150	133	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2310.000	62.47	-5.06	57.41	74.00	-16.59	150	206	peak
2310.000	48.38	-5.06	43.32	54.00	-10.68	150	206	AVG
2413.155	85.31	-4.84	80.47	N/A	N/A	150	319	peak
2413.155	83.57	-4.84	78.73	N/A	N/A	150	319	AVG
7239.000	40.23	6.69	46.92	74.00	-27.08	150	289	peak
7239.000	33.23	6.69	39.92	54.00	-14.08	150	289	AVG
Mid Channel								
2379.350	62.03	-4.91	57.12	74.00	-16.88	150	98	peak
2379.350	48.13	-4.91	43.22	54.00	-10.78	150	98	AVG
2438.250	87.87	-4.78	83.09	N/A	N/A	150	55	peak
2438.250	85.41	-4.78	80.63	N/A	N/A	150	55	AVG
2488.030	61.73	-4.67	57.06	74.00	-16.94	150	250	peak
2488.030	48.22	-4.67	43.55	54.00	-10.45	150	250	AVG
7307.000	41.14	6.97	48.11	74.00	-25.89	150	294	peak
7307.000	36.98	6.97	43.95	54.00	-10.05	150	294	AVG
High Channel								
2463.100	86.63	-4.72	81.91	N/A	N/A	150	293	peak
2463.100	84.92	-4.72	80.20	N/A	N/A	150	293	AVG
2496.150	62.34	-4.65	57.69	74.00	-16.31	150	164	peak
2496.150	48.51	-4.65	43.86	54.00	-10.14	150	164	AVG
7375.000	41.51	7.23	48.74	74.00	-25.26	150	264	peak
7375.000	37.58	7.23	44.81	54.00	-9.19	150	264	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Wi-Fi G mode**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2389.925	73.61	-4.89	68.72	74.00	-5.28	150	199	peak
2389.925	56.28	-4.89	51.39	54.00	-2.61	150	199	AVG
2407.980	106.86	-4.84	102.02	N/A	N/A	150	196	peak
2407.980	97.53	-4.84	92.69	N/A	N/A	150	196	AVG
7239.000	39.73	6.69	46.42	74.00	-27.58	150	140	peak
7239.000	30.49	6.69	37.18	54.00	-16.82	150	140	AVG
Mid Channel								
2362.630	62.01	-4.95	57.06	74.00	-16.94	150	182	peak
2362.630	48.67	-4.95	43.72	54.00	-10.28	150	182	AVG
2439.770	106.15	-4.78	101.37	N/A	N/A	150	189	peak
2439.770	96.31	-4.78	91.53	N/A	N/A	150	189	AVG
2498.670	62.37	-4.64	57.73	74.00	-16.27	150	297	peak
2498.670	48.32	-4.64	43.68	54.00	-10.32	150	297	AVG
7307.000	40.36	6.97	47.33	74.00	-26.67	150	129	peak
7307.000	29.52	6.97	36.49	54.00	-17.51	150	129	AVG
High Channel								
2457.750	105.99	-4.74	101.25	N/A	N/A	150	189	peak
2457.750	96.21	-4.74	91.47	N/A	N/A	150	189	AVG
2483.550	72.04	-4.69	67.35	74.00	-6.65	150	188	peak
2483.550	53.57	-4.69	48.88	54.00	-5.12	150	188	AVG
7392.000	40.80	7.29	48.09	74.00	-25.91	150	129	peak
7392.000	30.81	7.29	38.10	54.00	-15.90	150	129	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2348.410	61.96	-4.98	56.98	74.00	-17.02	150	123	peak
2348.410	48.53	-4.98	43.55	54.00	-10.45	150	123	AVG
2419.250	86.54	-4.82	81.72	N/A	N/A	150	145	peak
2419.250	78.97	-4.82	74.15	N/A	N/A	150	145	AVG
7239.000	40.07	6.69	46.76	74.00	-27.24	150	262	peak
7239.000	30.11	6.69	36.80	54.00	-17.20	150	262	AVG
Mid Channel								
2344.010	61.90	-4.99	56.91	74.00	-17.09	150	129	peak
2344.010	48.73	-4.99	43.74	54.00	-10.26	150	129	AVG
2441.100	88.80	-4.76	84.04	N/A	N/A	150	56	peak
2441.100	80.92	-4.76	76.16	N/A	N/A	150	56	AVG
2492.780	61.44	-4.66	56.78	74.00	-17.22	150	81	peak
2492.780	48.46	-4.66	43.80	54.00	-10.20	150	81	AVG
7307.000	40.29	6.97	47.26	74.00	-26.74	150	295	peak
7307.000	30.68	6.97	37.65	74.00	-36.35	150	295	peak
High Channel								
2464.650	87.83	-4.72	83.11	N/A	N/A	150	292	peak
2464.650	83.43	-4.72	78.71	N/A	N/A	150	292	AVG
2490.750	62.35	-4.66	57.69	74.00	-16.31	150	189	peak
2490.750	48.20	-4.66	43.54	54.00	-10.46	150	189	AVG
7375.000	42.56	7.23	49.79	74.00	-24.21	150	288	peak
7375.000	30.93	7.23	38.16	54.00	-15.84	150	288	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Wi-Fi N20 mode**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2388.775	77.31	-4.89	72.42	74.00	-1.58	150	184	peak
2388.775	57.88	-4.89	52.99	54.00	-1.01	150	184	AVG
2405.565	107.79	-4.85	102.94	N/A	N/A	150	189	peak
2405.565	97.04	-4.85	92.19	N/A	N/A	150	189	AVG
7239.000	43.09	6.69	49.78	74.00	-24.22	150	134	peak
7239.000	30.48	6.69	37.17	54.00	-16.83	150	134	AVG
Mid Channel								
2386.190	62.03	-4.89	57.14	74.00	-16.86	150	79	peak
2386.190	48.25	-4.89	43.36	54.00	-10.64	150	79	AVG
2431.790	107.20	-4.79	102.41	N/A	N/A	150	207	peak
2431.790	95.64	-4.79	90.85	N/A	N/A	150	207	AVG
2484.800	62.95	-4.67	58.28	74.00	-15.72	150	206	peak
2484.800	48.49	-4.67	43.82	54.00	-10.18	150	206	AVG
7307.000	42.61	6.97	49.58	74.00	-24.42	150	144	peak
7307.000	29.82	6.97	36.79	54.00	-17.21	150	144	AVG
High Channel								
2464.300	106.57	-4.72	101.85	N/A	N/A	150	190	peak
2464.300	95.78	-4.72	91.06	N/A	N/A	150	190	AVG
2483.650	77.69	-4.69	73.00	74.00	-1.00	150	179	peak
2483.650	53.46	-4.69	48.77	54.00	-5.23	150	179	AVG
7375.000	42.34	7.23	49.57	74.00	-24.43	150	135	peak
7375.000	31.97	7.23	39.20	54.00	-14.80	150	135	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2325.295	62.29	-5.03	57.26	74.00	-16.74	150	299	peak
2325.295	48.33	-5.03	43.30	54.00	-10.70	150	299	AVG
2419.020	86.79	-4.82	81.97	N/A	N/A	150	145	peak
2419.020	78.75	-4.82	73.93	N/A	N/A	150	145	AVG
7222.000	40.11	6.63	46.74	74.00	-27.26	150	287	peak
7222.000	28.50	6.63	35.13	54.00	-18.87	150	287	AVG
Mid Channel								
2338.500	62.26	-5.00	57.26	74.00	-16.74	150	236	peak
2338.500	48.36	-5.00	43.36	54.00	-10.64	150	236	AVG
2440.720	89.12	-4.76	84.36	N/A	N/A	150	53	peak
2440.720	80.85	-4.76	76.09	N/A	N/A	150	53	AVG
2484.800	61.87	-4.67	57.20	74.00	-16.80	150	0	peak
2484.800	48.51	-4.67	43.84	54.00	-10.16	150	0	AVG
7307.000	40.79	6.97	47.76	74.00	-26.24	150	290	peak
7307.000	30.41	6.97	37.38	54.00	-16.62	150	290	AVG
High Channel								
2460.000	87.83	-4.73	83.10	N/A	N/A	150	307	peak
2460.000	80.92	-4.73	76.19	N/A	N/A	150	307	AVG
2498.500	63.43	-4.64	58.79	74.00	-15.21	150	152	peak
2498.500	48.57	-4.64	43.93	54.00	-10.07	150	152	AVG
7392.000	40.64	7.29	47.93	74.00	-26.07	150	306	peak
7392.000	31.16	7.29	38.45	54.00	-15.55	150	306	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

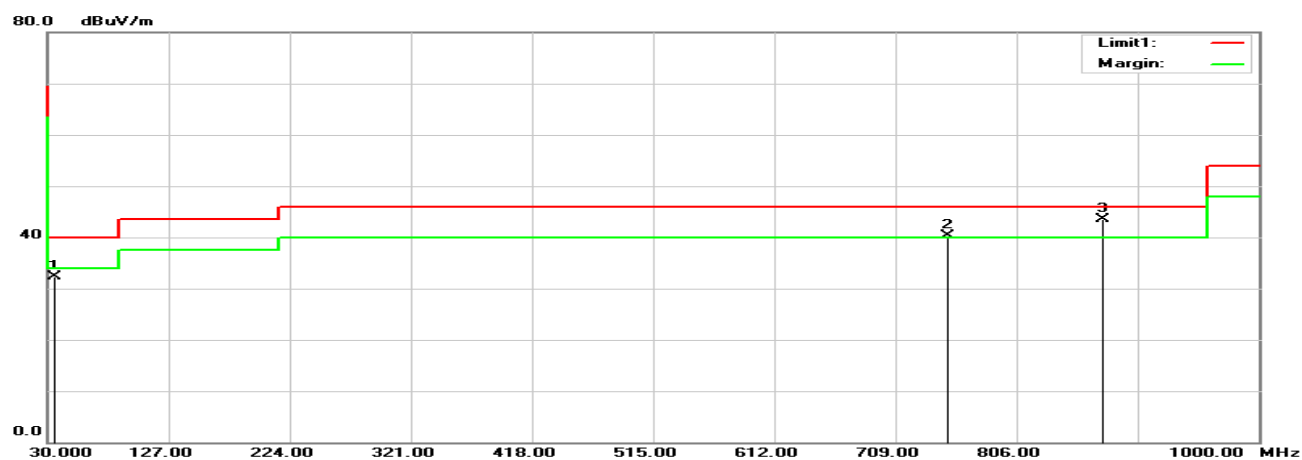
Spurious emissions more than 20 dB below the limit were not reported

BLE Mode (C1 HomeSystem): Transmitting Mode (Pre-scan with three orthogonal axis, and worse case as X axis)

Below 1G (30 MHz-1 GHz) test the output power worst mode:

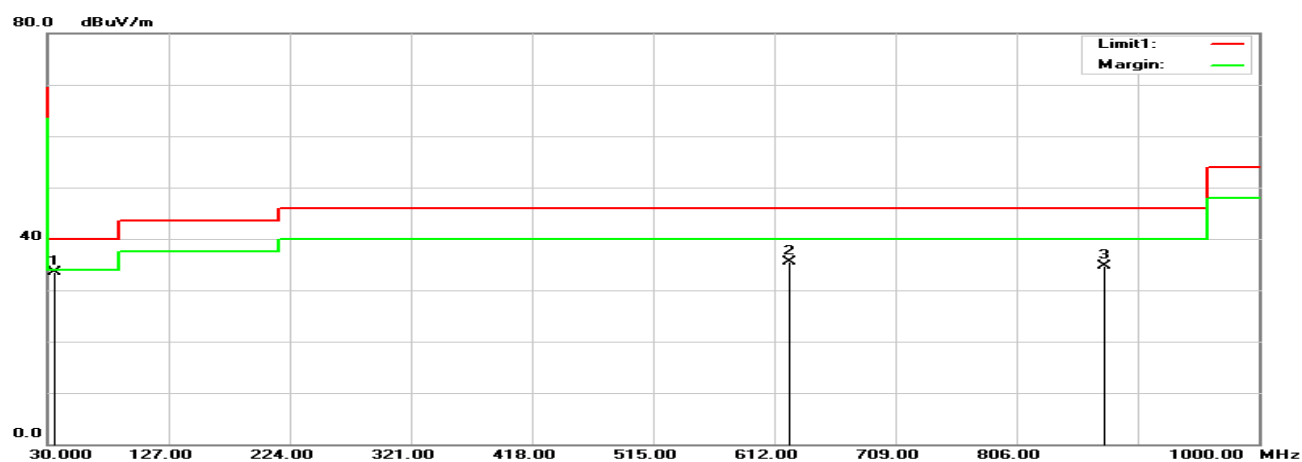
BLE mode: Worst case is BLE High Channel

Horizontal



Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	39.62	-7.35	32.27	40.00	-7.73	100	211	peak
750.7100	42.35	-2.09	40.26	46.00	-5.74	100	204	peak
874.8700	42.85	0.60	43.45	46.00	-2.55	100	102	QP

Vertical

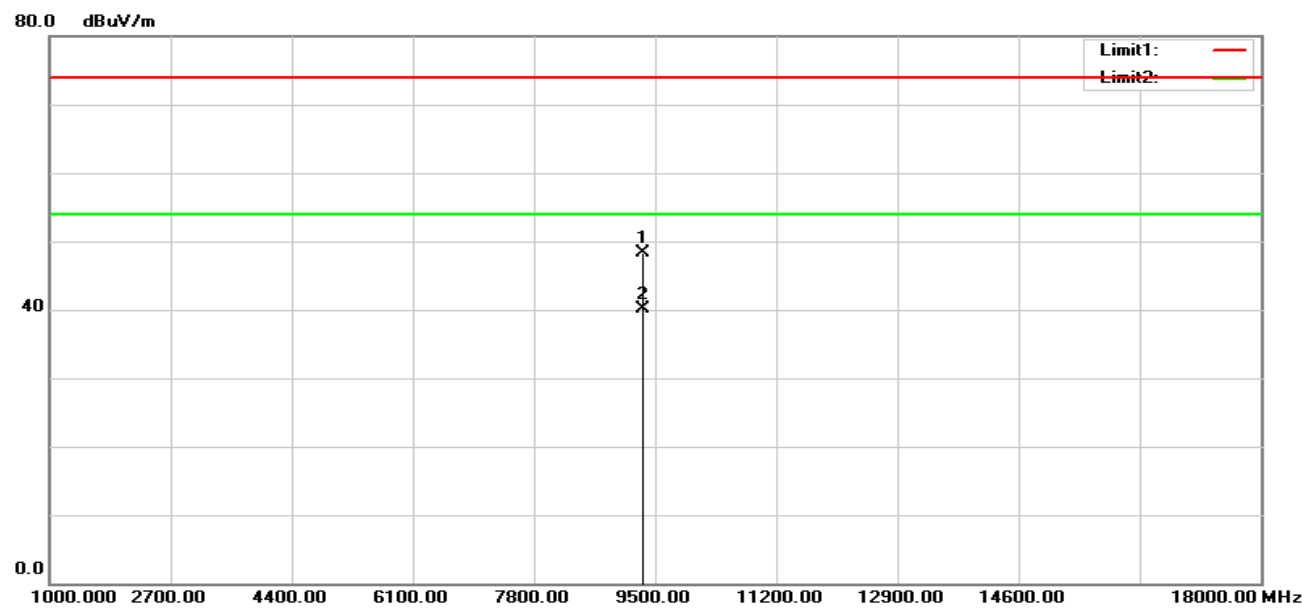


Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	40.92	-7.35	33.57	40.00	-6.43	100	13	peak
624.6100	39.40	-3.82	35.58	46.00	-10.42	100	328	peak
875.8400	34.09	0.62	34.71	46.00	-11.29	100	38	peak

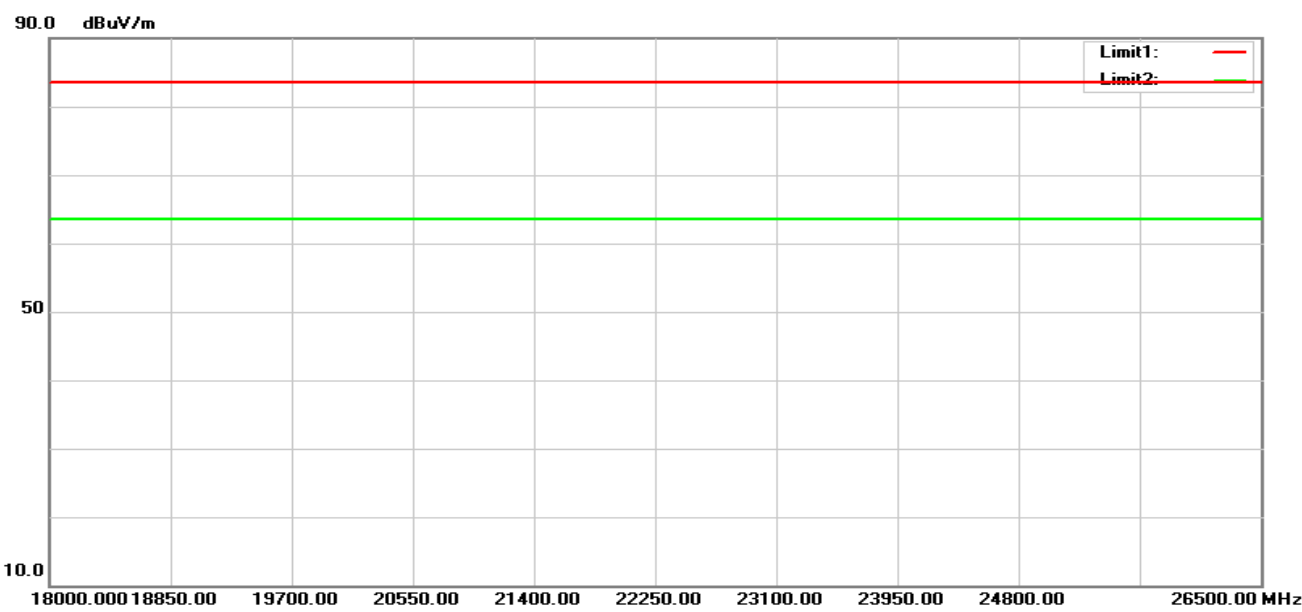
Above 1G (1 GHz-26.5 GHz) the output power Worst case is BLE mode High channel

Horizontal

1GHz-18GHz:

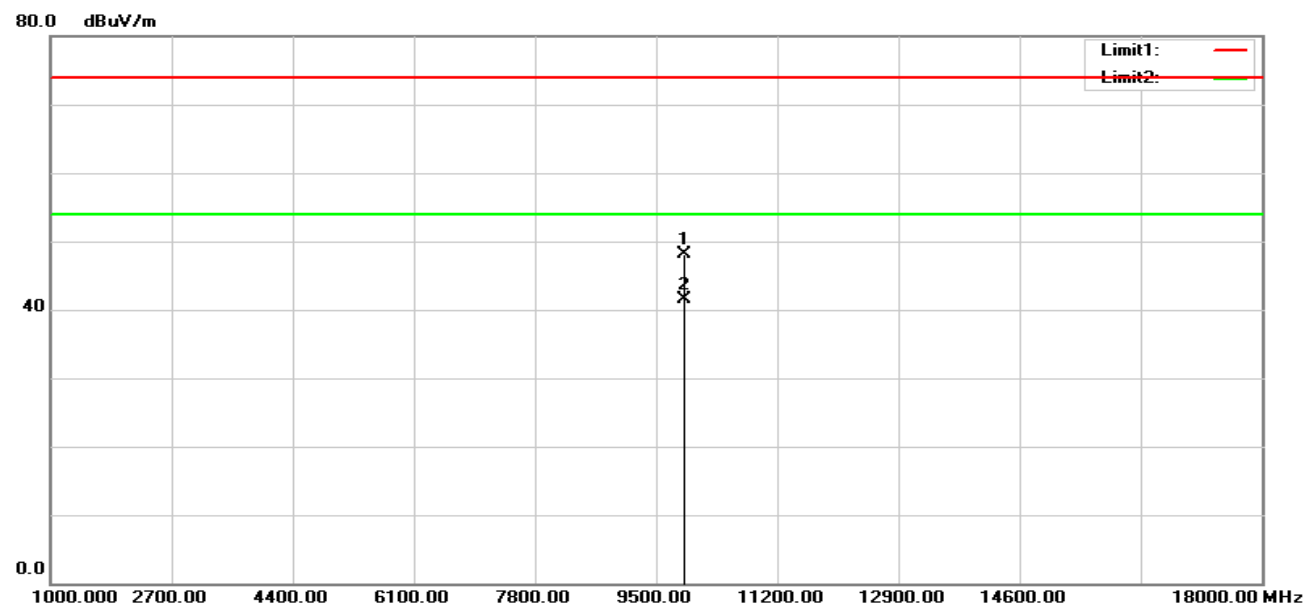


18GHz-26.5GHz:

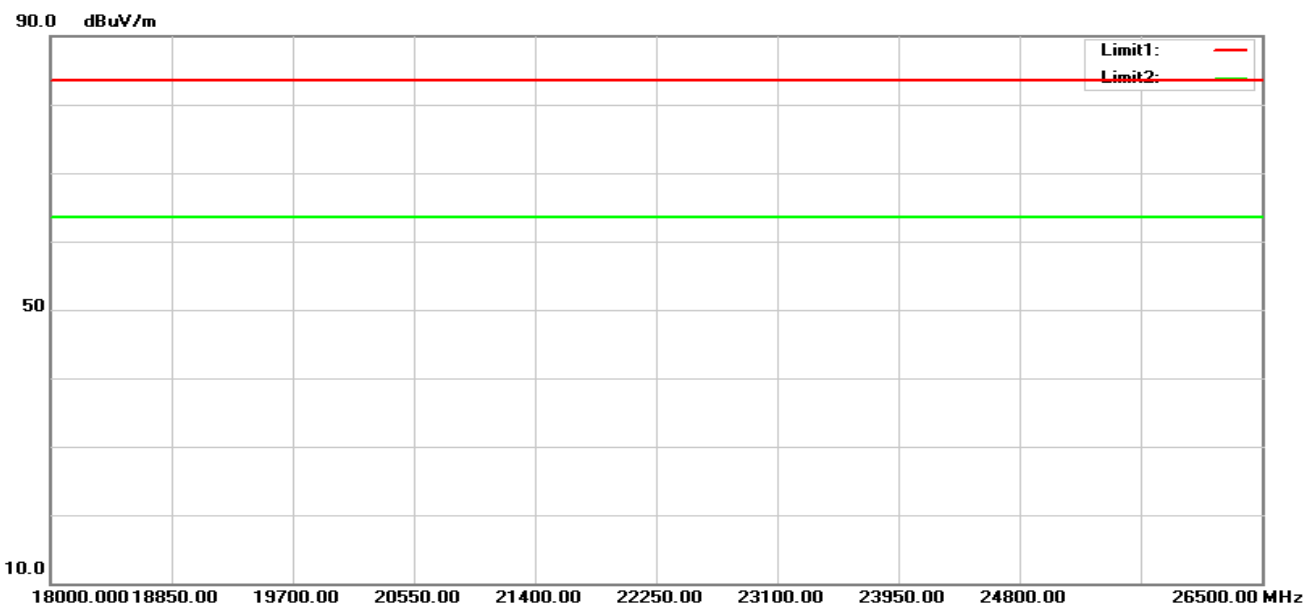


Vertical

1GHz-18GHz:



18GHz-26.5GHz:



BLE mode**Horizontal**

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2319.595	59.93	-5.05	54.88	74.00	-19.12	150	209	peak
2319.595	46.75	-5.05	41.70	54.00	-12.30	150	209	AVG
2402.340	102.37	-4.86	97.51	N/A	N/A	150	194	peak
2402.340	101.55	-4.86	96.69	N/A	N/A	150	194	AVG
7290.000	37.84	6.90	44.74	74.00	-29.26	150	62	peak
7290.000	30.13	6.90	37.03	54.00	-16.97	150	62	AVG
Mid Channel								
2326.720	59.81	-5.03	54.78	74.00	-19.22	150	65	peak
2326.720	46.97	-5.03	41.94	54.00	-12.06	150	65	AVG
2440.340	102.29	-4.77	97.52	N/A	N/A	150	192	peak
2440.340	101.52	-4.77	96.75	N/A	N/A	150	192	AVG
2497.720	59.64	-4.64	55.00	74.00	-19.00	150	168	peak
2497.720	46.52	-4.64	41.88	54.00	-12.12	150	168	AVG
6814.000	38.91	5.23	44.14	74.00	-29.86	150	1	peak
6814.000	29.36	5.23	34.59	54.00	-19.41	150	1	AVG
High Channel								
2479.780	102.10	-4.68	97.42	N/A	N/A	150	185	peak
2479.780	101.38	-4.68	96.70	N/A	N/A	150	185	AVG
2488.030	59.99	-4.67	55.32	74.00	-18.68	150	101	peak
2488.030	47.06	-4.67	42.39	54.00	-11.61	150	101	AVG
9330.000	37.58	10.76	48.34	74.00	-25.66	150	89	peak
9330.000	29.26	10.76	40.02	54.00	-13.98	150	89	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Vertical

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
Low Channel								
2345.720	59.68	-4.99	54.69	74.00	-19.31	150	344	peak
2345.720	46.76	-4.99	41.77	54.00	-12.23	150	344	AVG
2401.865	83.68	-4.86	78.82	N/A	N/A	150	77	peak
2401.865	83.17	-4.86	78.31	N/A	N/A	150	77	AVG
7562.000	37.48	7.79	45.27	74.00	-28.73	150	211	peak
7562.000	29.52	7.79	37.31	54.00	-16.69	150	211	AVG
Mid Channel								
2348.950	59.72	-4.98	54.74	74.00	-19.26	150	139	peak
2348.950	46.74	-4.98	41.76	54.00	-12.24	150	139	AVG
2440.340	84.07	-4.77	79.30	N/A	N/A	150	59	peak
2440.340	83.36	-4.77	78.59	N/A	N/A	150	59	AVG
2488.790	59.54	-4.67	54.87	74.00	-19.13	150	229	peak
2488.790	46.38	-4.67	41.71	54.00	-12.29	150	229	AVG
7239.000	38.75	6.69	45.44	74.00	-28.56	150	19	peak
7239.000	29.91	6.69	36.60	54.00	-17.40	150	19	AVG
High Channel								
2479.780	84.63	-4.68	79.95	N/A	N/A	150	72	peak
2479.780	83.90	-4.68	79.22	N/A	N/A	150	72	AVG
2488.450	53.93	-4.67	49.26	74.00	-24.74	150	249	peak
2488.450	40.76	-4.67	36.09	54.00	-17.91	150	249	AVG
9891.000	36.16	11.86	48.02	74.00	-25.98	150	209	peak
9891.000	29.58	11.86	41.44	54.00	-12.56	150	209	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

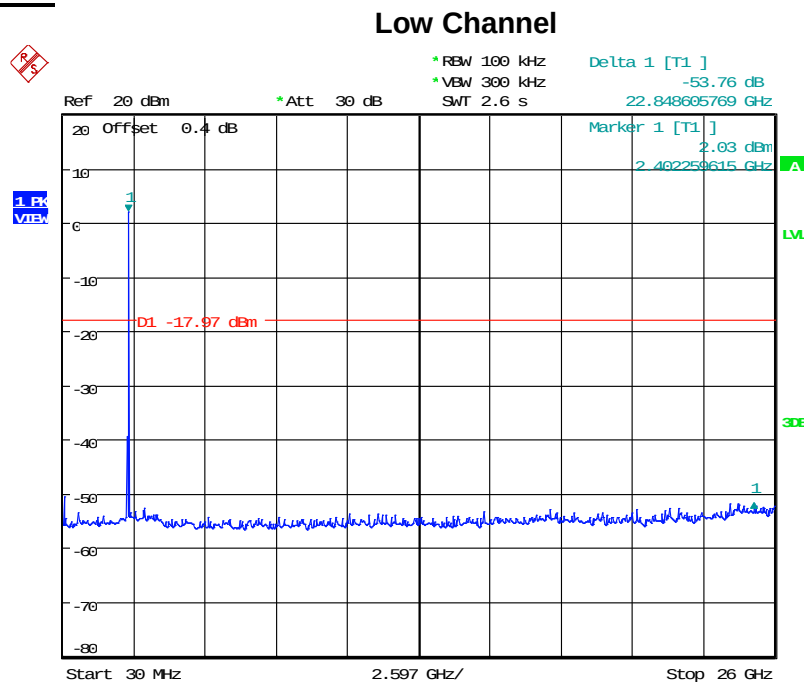
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Conducted Spurious Emissions:

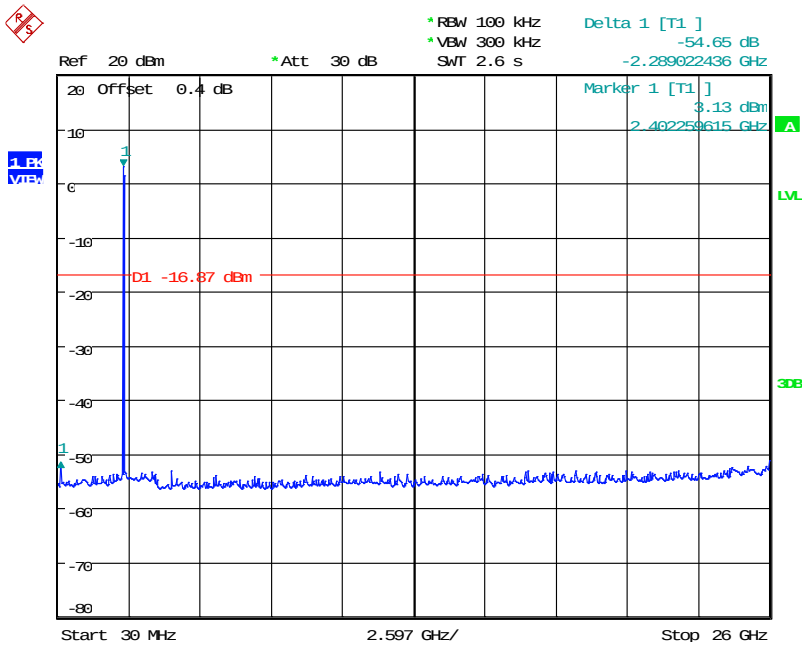
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B mode				
Low	2412	53.76	≥ 20	Compliance
Mid	2437	54.65	≥ 20	Compliance
High	2462	53.85	≥ 20	Compliance
G mode				
Low	2412	50.80	≥ 20	Compliance
Mid	2437	50.53	≥ 20	Compliance
High	2462	49.83	≥ 20	Compliance
N20 mode				
Low	2412	50.47	≥ 20	Compliance
Mid	2437	51.18	≥ 20	Compliance
High	2462	47.53	≥ 20	Compliance
BLE mode				
Low	2402	52.92	≥ 20	Compliance
Mid	2440	54.39	≥ 20	Compliance
High	2480	54.48	≥ 20	Compliance

Please refer to the following plots

Wi-Fi B mode:

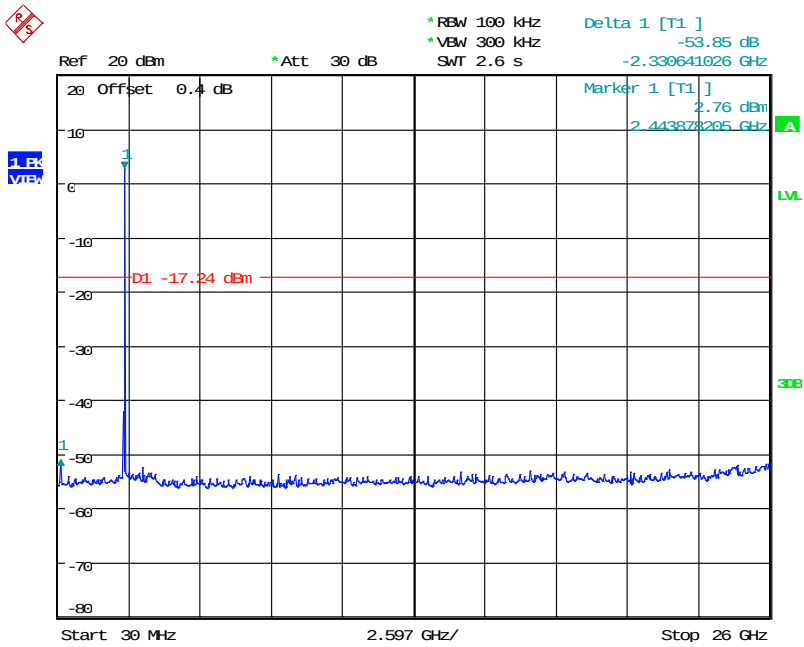
Date: 20.MAR.2018 00:14:41

Middle Channel



Date: 20.MAR.2018 00:59:11

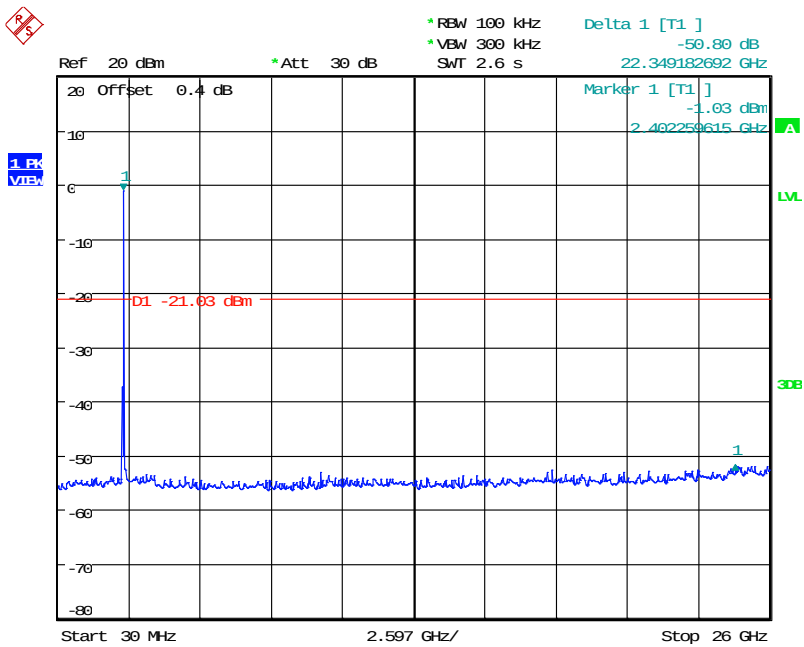
High Channel



Date: 20.MAR.2018 00:53:00

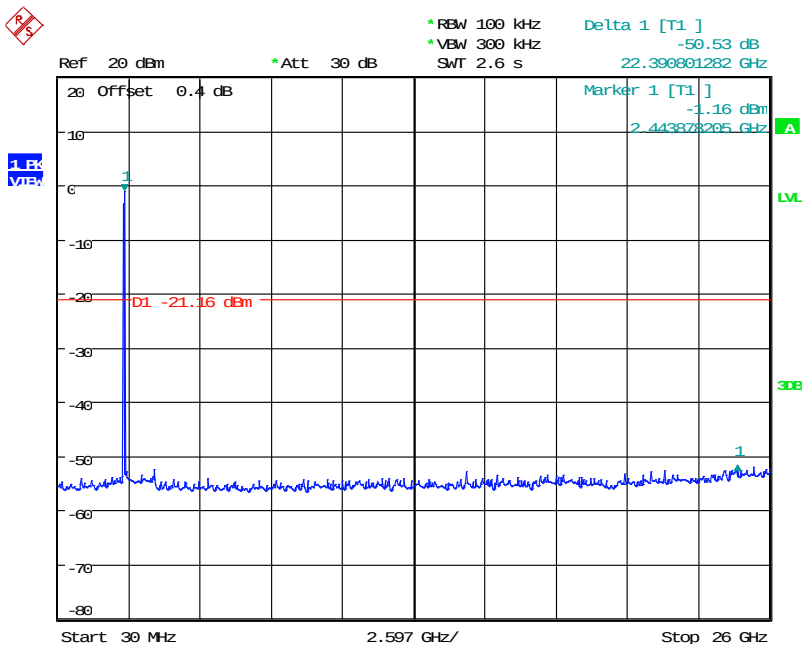
Wi-Fi G mode:

Low Channel



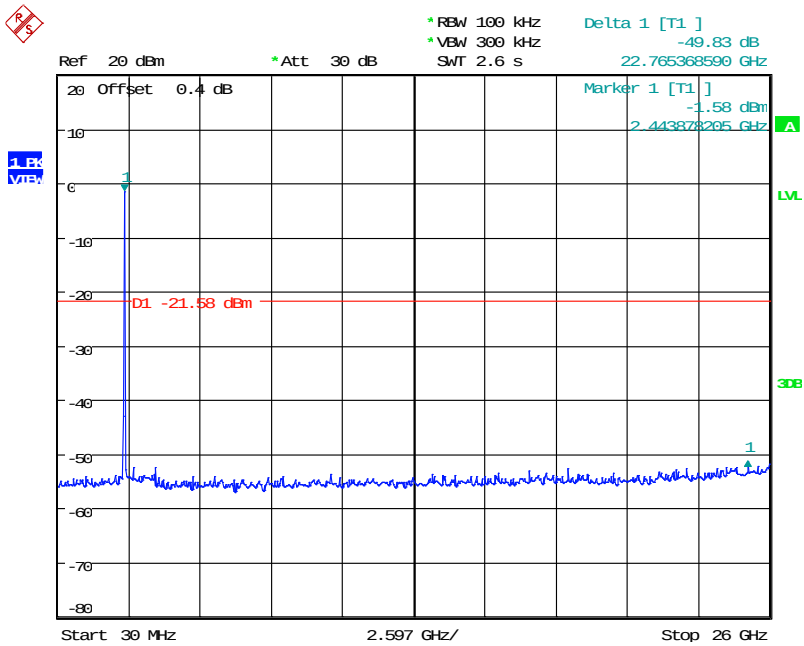
Date: 20.MAR.2018 01:08:54

Middle Channel



Date: 20.MAR.2018 01:15:26

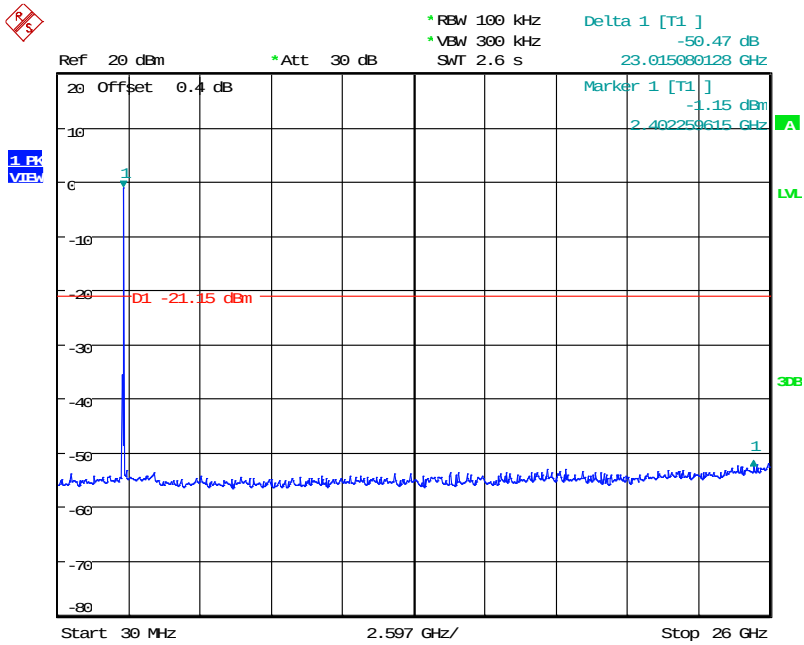
High Channel



Date: 20.MAR.2018 01:24:01

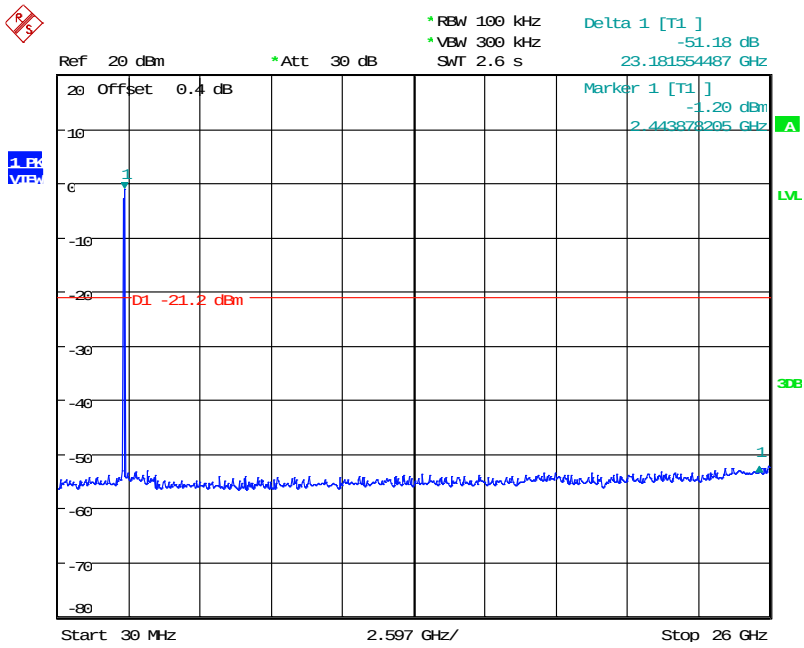
Wi-Fi N20 mode:

Low Channel



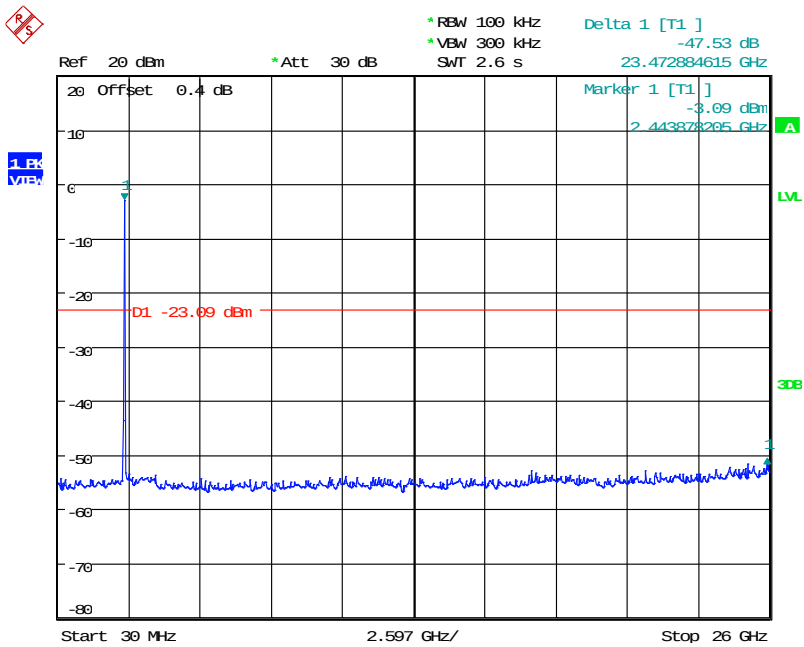
Date: 20.MAR.2018 01:33:19

Middle Channel



Date: 20.MAR.2018 01:41:52

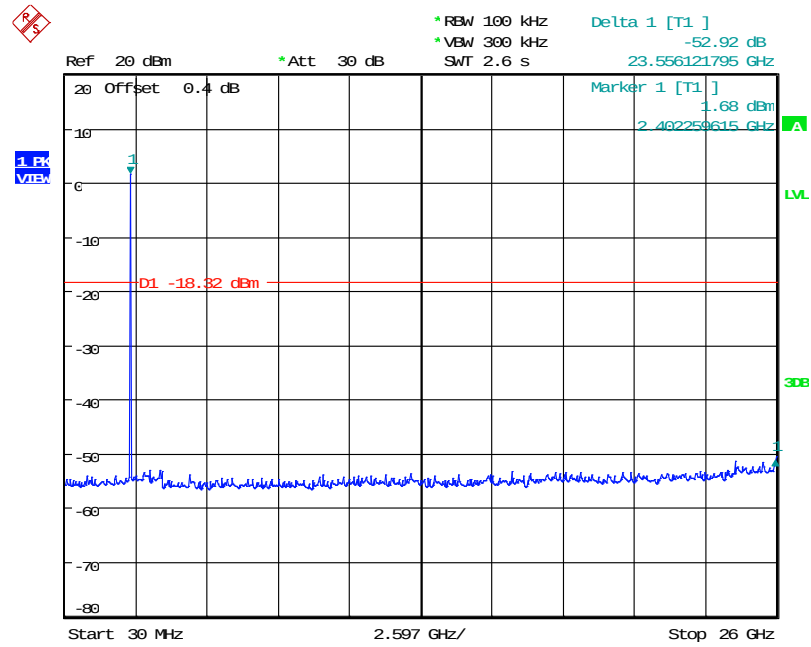
High Channel



Date: 20.MAR.2018 01:53:44

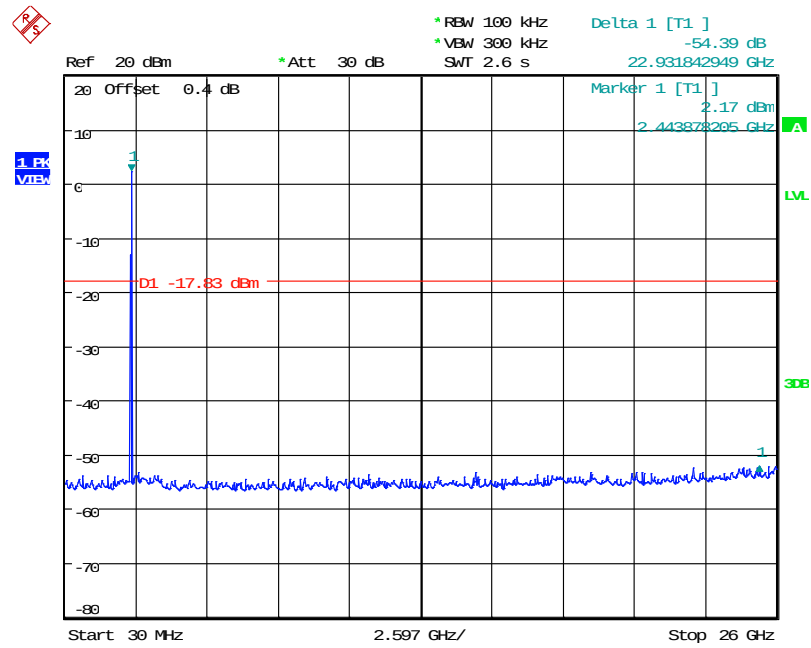
BLE mode:

Low Channel



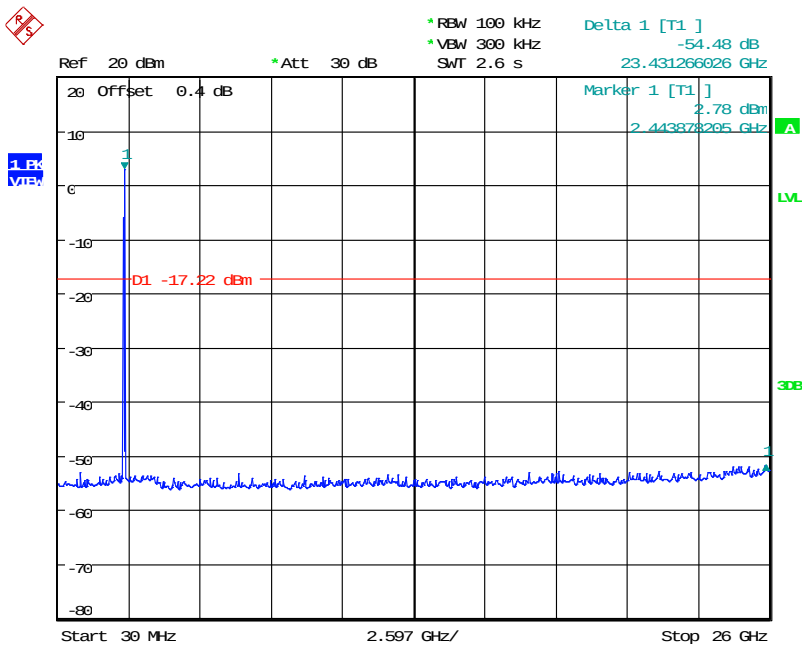
Date: 21.MAR.2018 00:34:31

Middle Channel



Date: 21.MAR.2018 00:29:19

High Channel



Date: 21.MAR.2018 00:45:46

8 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

8.1 Applicable Standard

According to FCC §15.247(a) (2).

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.2 Test Procedure

According to ANSI C63.10-2013

6 dB Emission Bandwidth

The steps for the first option are as follows:

- Set RBW = 100 kHz.
- Set the VBW $\geq [3 \times \text{RBW}]$.
- Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

8.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian from 2018-03-20 to 2018-03-21

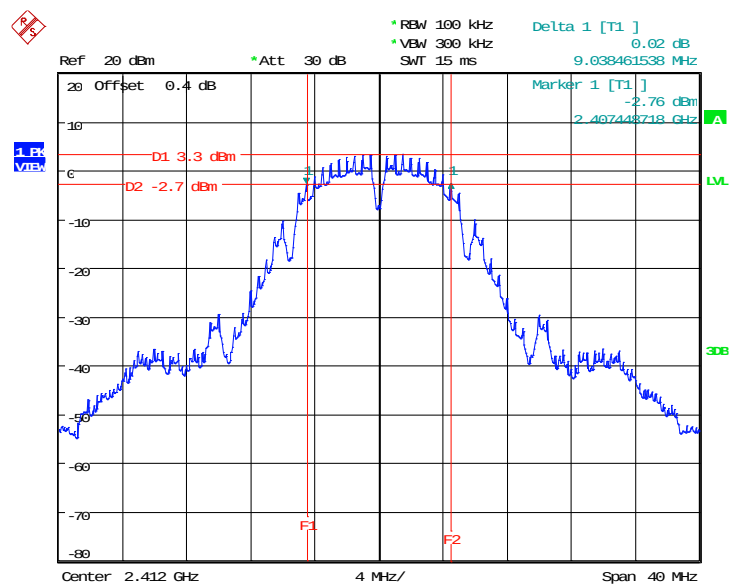
8.5 Test Results

Channel	Frequency (MHz)	99% Bandwidth (MHz)	6 dB OBW (MHz)	6dB Limit (MHz)	Result
B mode					
Low	2412	11.86	9.04	> 0.5	Compliance
Middle	2437	11.86	8.59	> 0.5	Compliance
High	2462	11.69	8.53	> 0.5	Compliance
G mode					
Low	2412	18.03	16.35	> 0.5	Compliance
Middle	2437	18.03	16.35	> 0.5	Compliance
High	2462	18.03	16.35	> 0.5	Compliance
N20 mode					
Low	2412	18.99	17.63	> 0.5	Compliance
Middle	2437	19.07	17.63	> 0.5	Compliance
High	2462	19.15	17.63	> 0.5	Compliance
BLE mode					
Low	2402	1.0577	0.716	> 0.5	Compliance
Middle	2440	1.0577	0.721	> 0.5	Compliance
High	2480	1.0577	0.726	> 0.5	Compliance

Please refer to the following plots

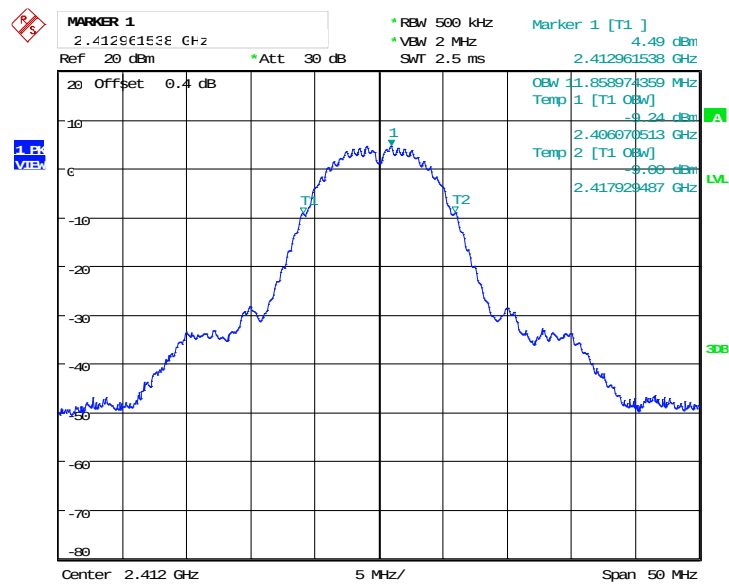
Wi-Fi B mode Low CH:

6 dB Emission Bandwidth



Date: 19.MAR.2018 23:58:22

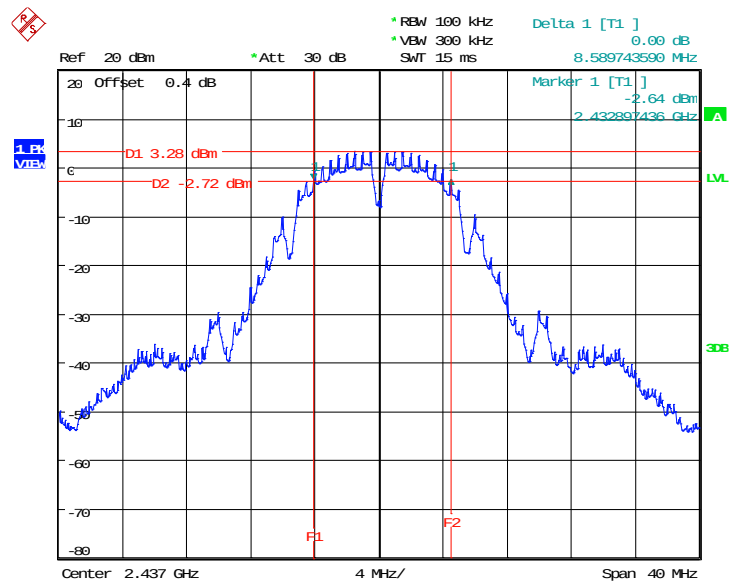
Occupied Bandwidth (99%)



Date: 20.MAR.2018 00:05:52

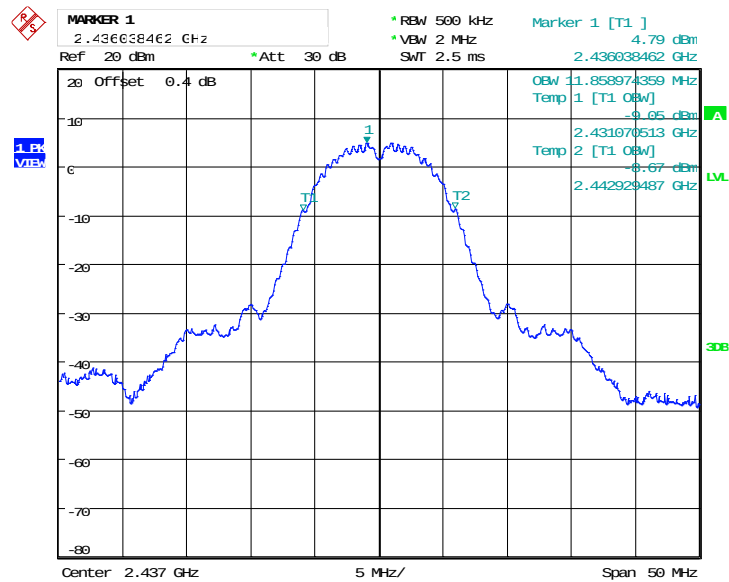
Wi-Fi B mode Middle CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 00:36:16

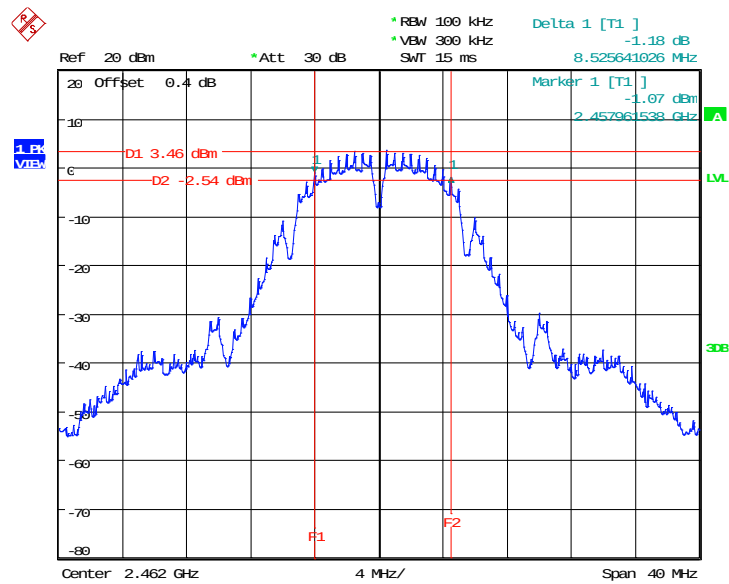
Occupied Bandwidth (99%)



Date: 20.MAR.2018 00:37:29

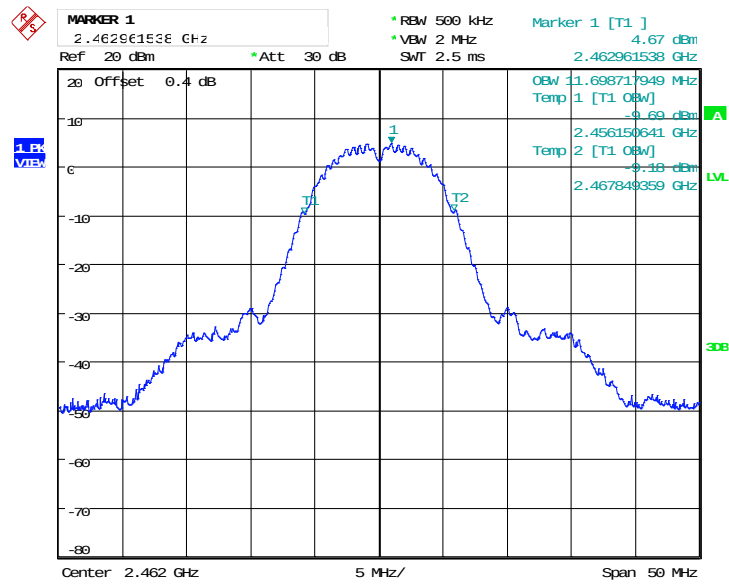
Wi-Fi B mode High CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 00:43:54

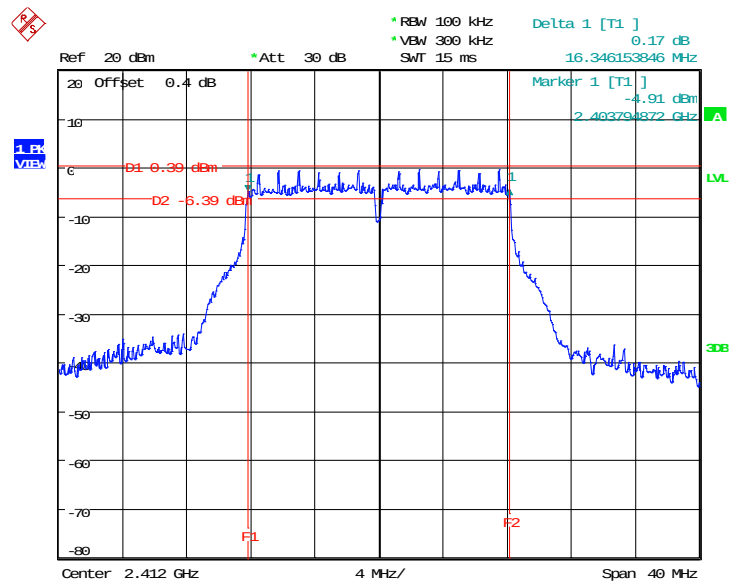
Occupied Bandwidth (99%)



Date: 20.MAR.2018 00:47:01

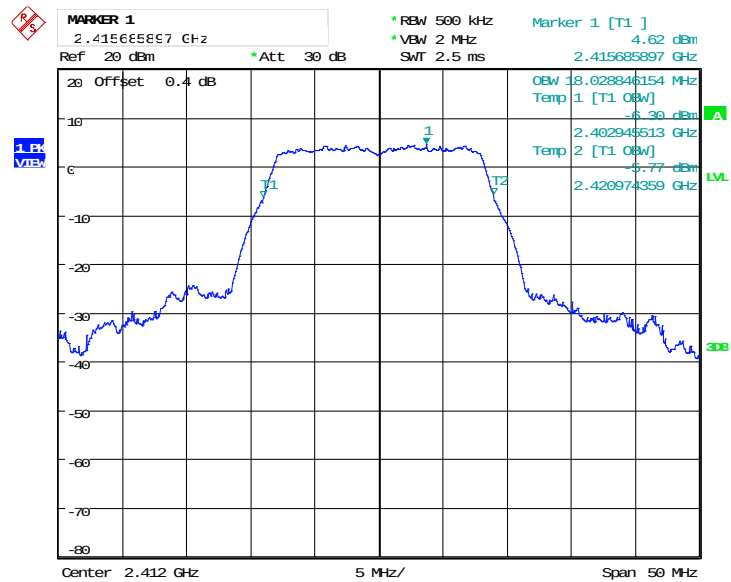
Wi-Fi G mode Low CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:03:10

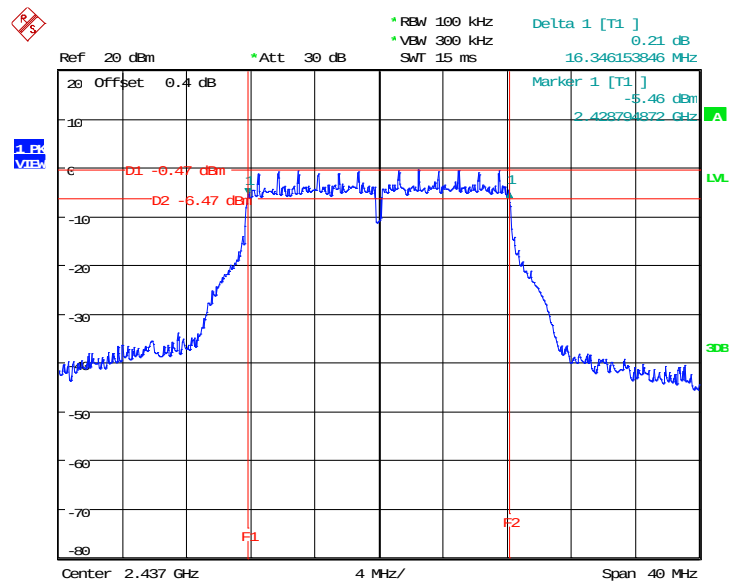
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:05:28

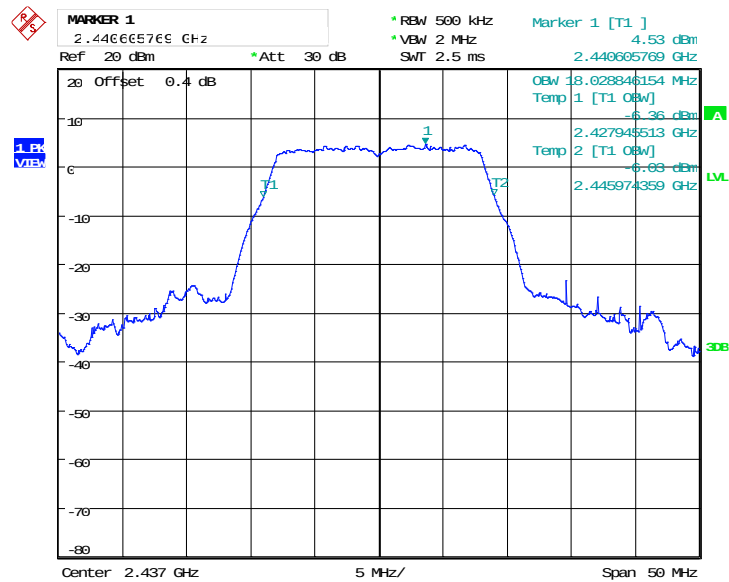
Wi-Fi G mode Middle CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:12:41

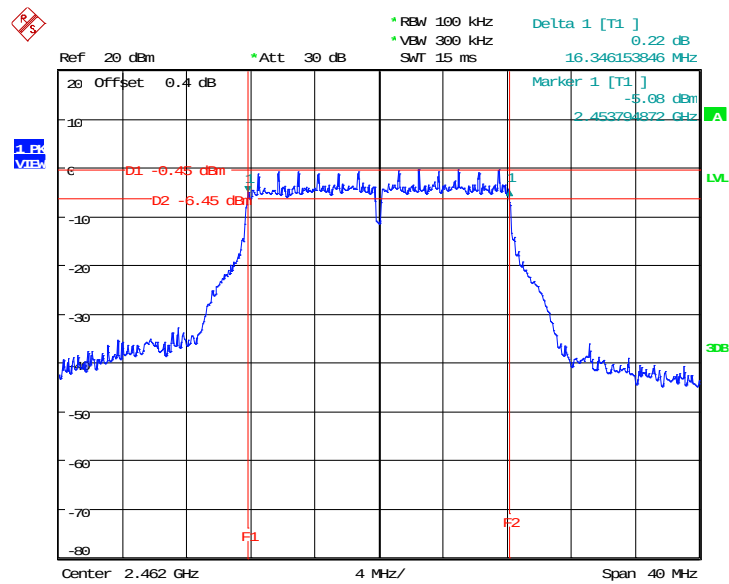
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:13:52

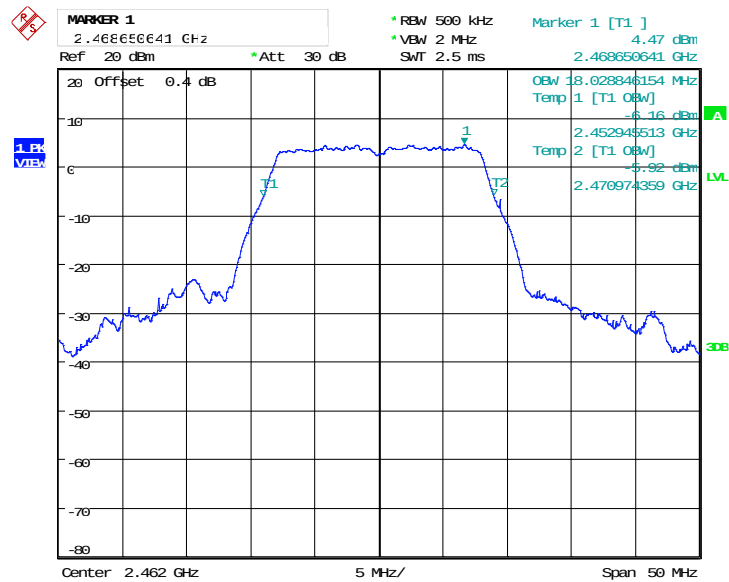
Wi-Fi G mode High CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:19:38

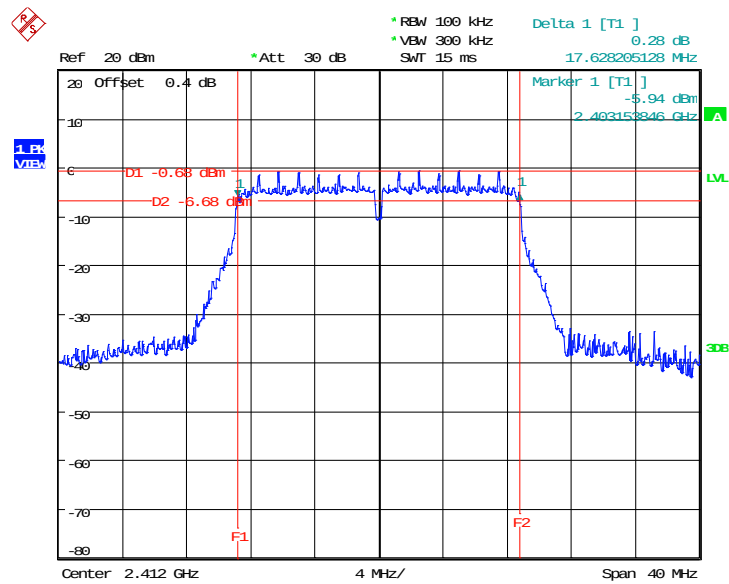
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:20:44

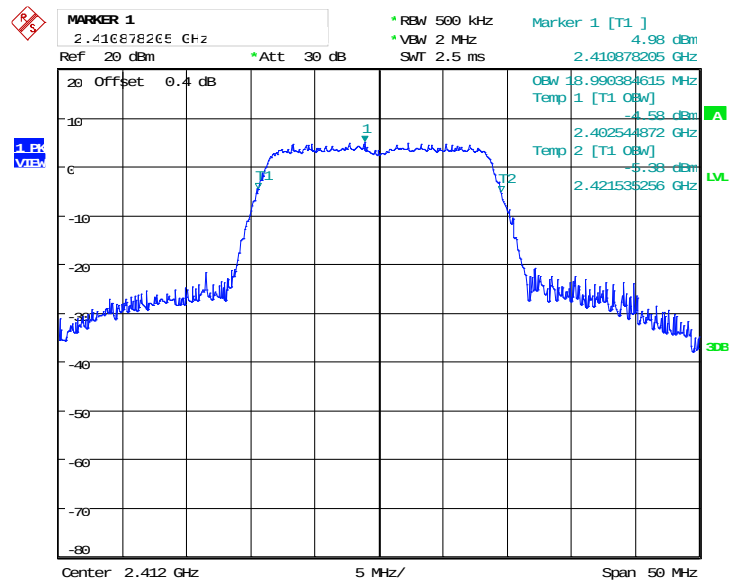
Wi-Fi HT N20 mode Low CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:29:28

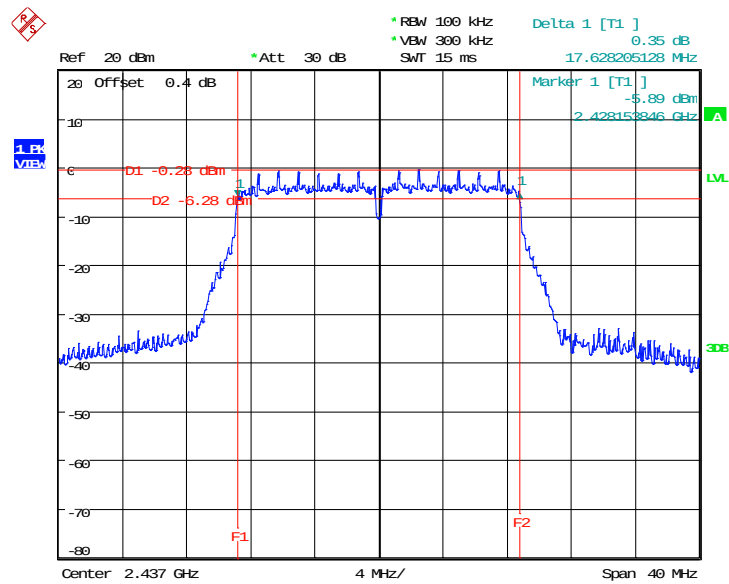
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:30:28

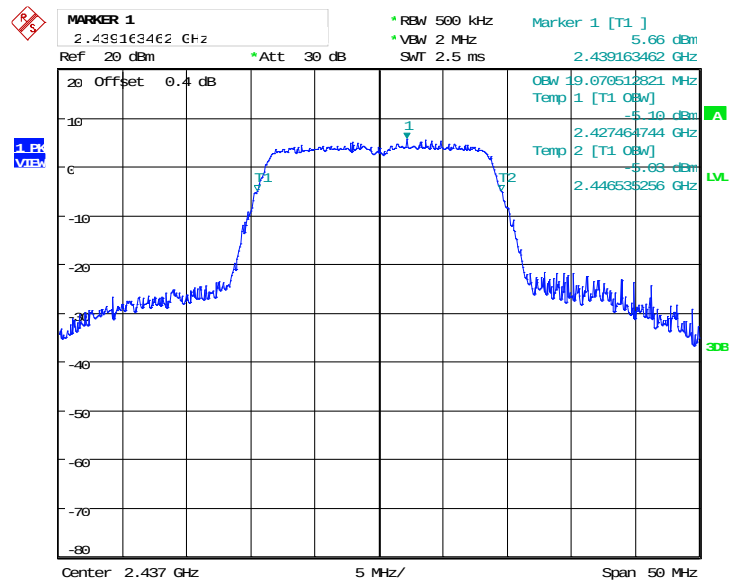
Wi-Fi HT N20 mode Middle CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:38:53

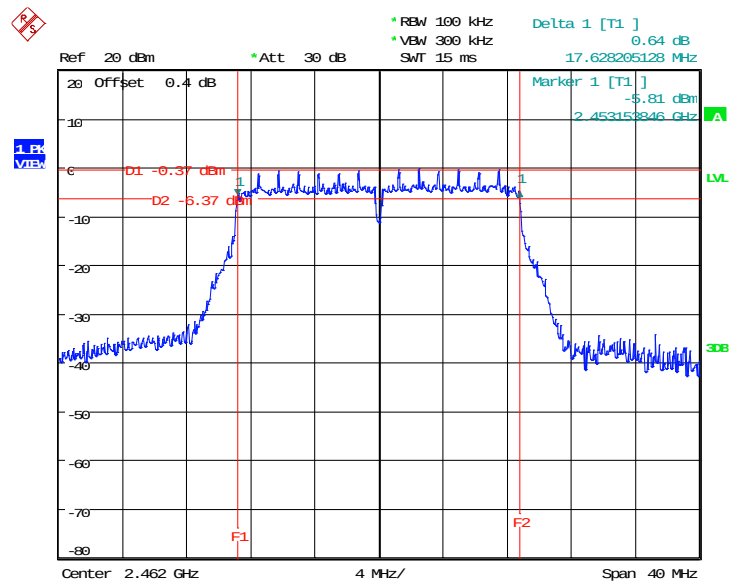
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:40:30

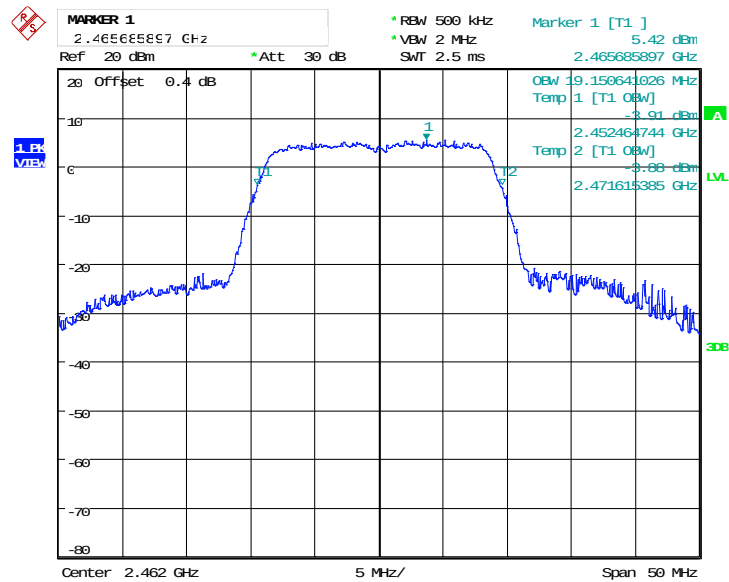
Wi-Fi HT 20 mode High CH:

6 dB Emission Bandwidth



Date: 20.MAR.2018 01:46:13

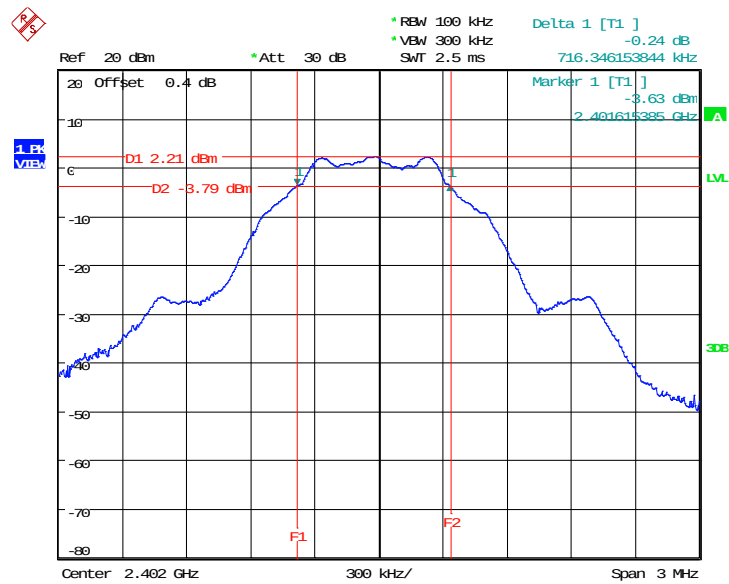
Occupied Bandwidth (99%)



Date: 20.MAR.2018 01:49:39

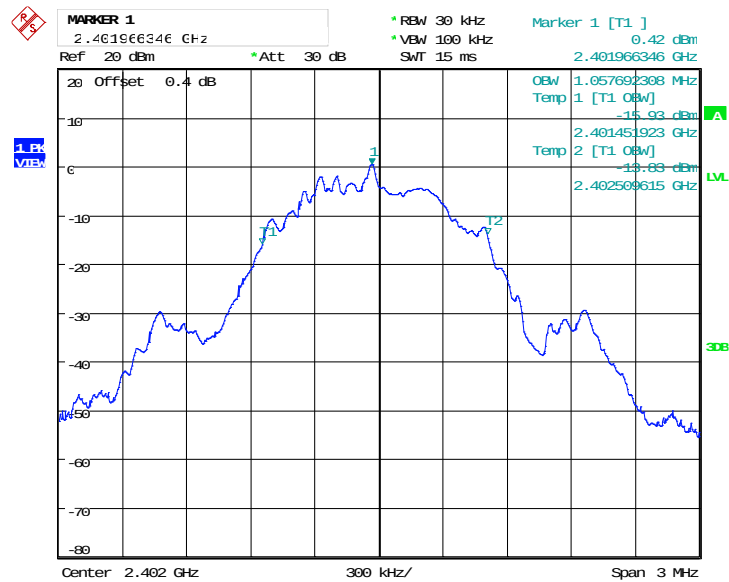
BLE mode Low CH:

6 dB Emission Bandwidth



Date: 21.MAR.2018 00:19:01

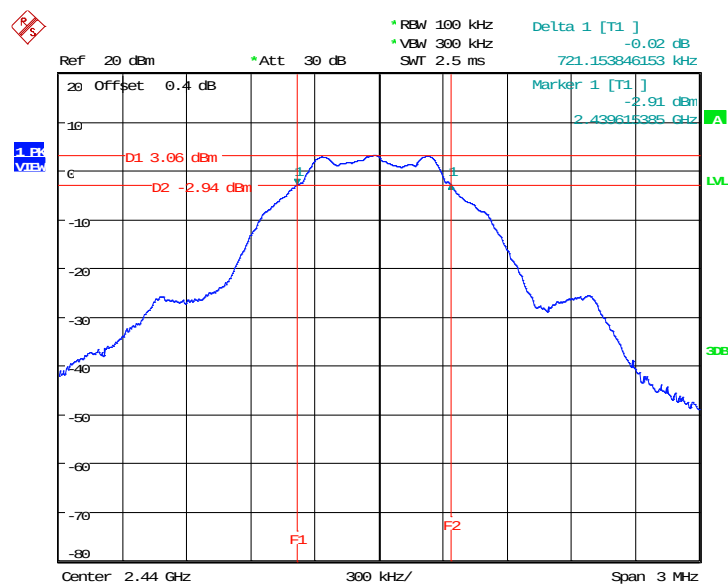
Occupied Bandwidth (99%)



Date: 21.MAR.2018 00:20:20

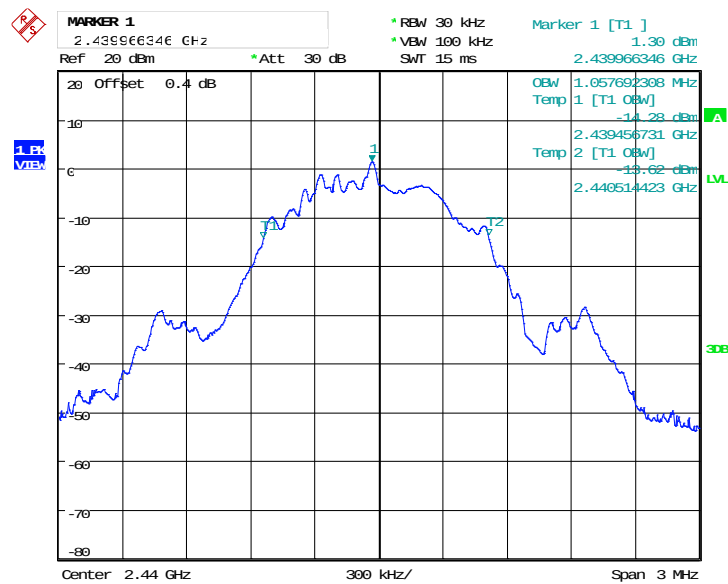
BLE mode Middle CH:

6 dB Emission Bandwidth



Date: 21.MAR.2018 00:27:14

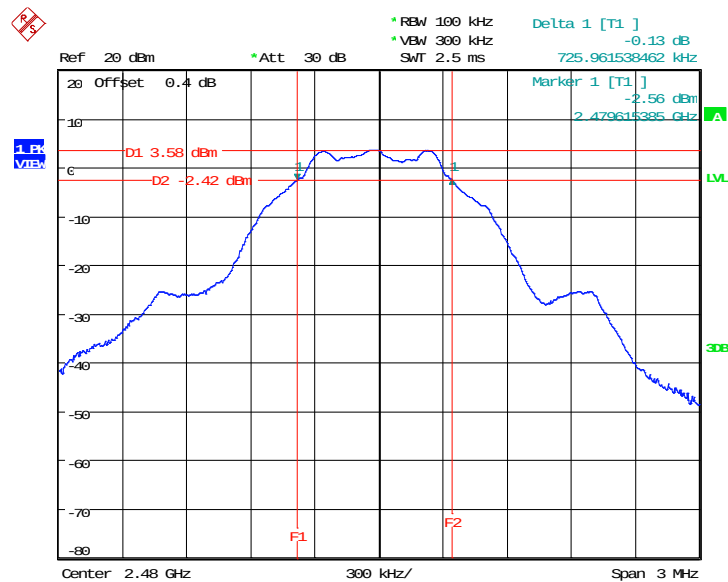
Occupied Bandwidth (99%)



Date: 21.MAR.2018 00:28:03

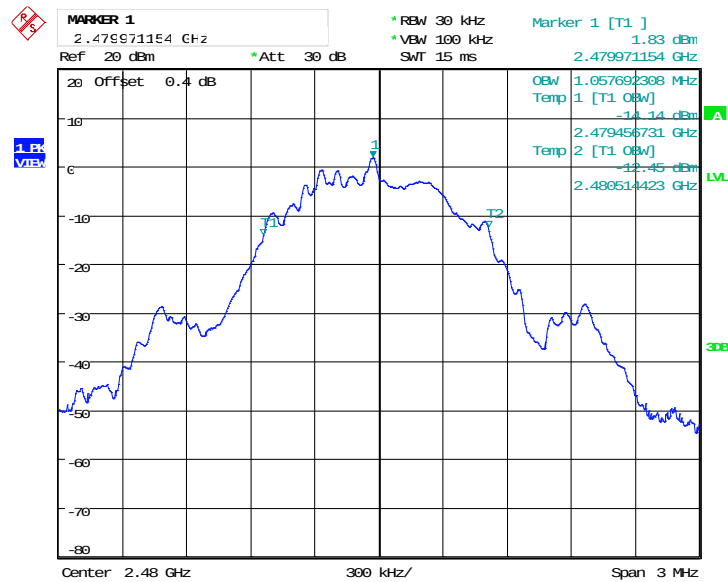
BLE mode High CH:

6 dB Emission Bandwidth



Date: 21.MAR.2018 00:37:51

Occupied Bandwidth (99%)



Date: 21.MAR.2018 00:39:35

9 FCC §15.247(b)(3) – Maximum Output Power

9.1 Applicable Standard

According to FCC §15.247(b) (3).

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

9.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.
3. Add a correction factor to the display.

9.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2018/03/07	2019/03/06
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

9.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian on 2018-03-20

9.5 Test Results

Channel	Frequency (MHz)	Maximum peak Conducted Output Power (dBm)	Limit (dBm)	Result
B mode				
Low	2412	15.05	30	Compliance
Middle	2437	15.09	30	Compliance
High	2462	15.19	30	Compliance
G mode				
Low	2412	20.14	30	Compliance
Middle	2437	20.51	30	Compliance
High	2462	20.73	30	Compliance
N20 mode				
Low	2412	20.04	30	Compliance
Middle	2437	20.35	30	Compliance
High	2462	20.59	30	Compliance
BLE mode				
Low	2402	3.46	30	Compliance
Middle	2440	4.38	30	Compliance
High	2480	5.48	30	Compliance

Channel	Frequency (MHz)	Average Output Power (dBm)	Duty Factor	Total Average Output Power (dBm)	Limit (dBm)	Result
B mode						
Low	2412	12.18	0.00	12.18	30	Compliance
Middle	2437	12.15	0.00	12.15	30	Compliance
High	2462	12.30	0.00	12.30	30	Compliance
G mode						
Low	2412	10.91	0.00	10.91	30	Compliance
Middle	2437	11.13	0.00	11.13	30	Compliance
High	2462	11.28	0.00	11.28	30	Compliance
N20 mode						
Low	2412	10.89	0.00	10.89	30	Compliance
Middle	2437	11.05	0.00	11.05	30	Compliance
High	2462	11.21	0.00	11.21	30	Compliance
BLE mode						
Low	2402	1.75	1.59	3.34	30	Compliance
Middle	2440	2.61	1.59	4.20	30	Compliance
High	2480	3.76	1.59	5.35	30	Compliance

10 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

10.1 Applicable Standard

According to FCC §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)).

10.2 Test Procedure

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.

10.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

10.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian from 2018-03-20 to 2018-03-21

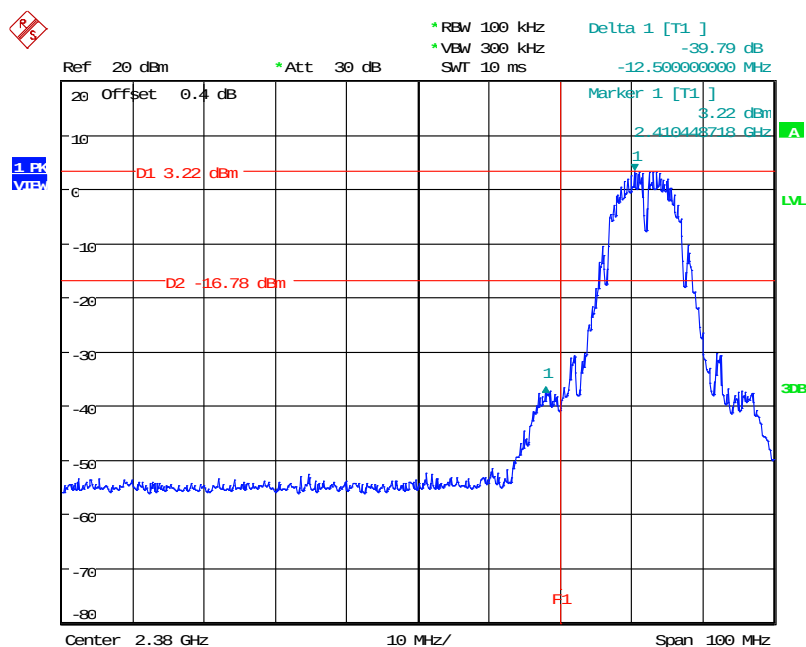
10.5 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	RESULT
B mode				
Low	2412	39.79	≥ 20	PASS
High	2462	54.54	≥ 20	PASS
G mode				
Low	2412	33.42	≥ 20	PASS
High	2462	43.42	≥ 20	PASS
N20 mode				
Low	2412	32.61	≥ 20	PASS
High	2462	40.02	≥ 20	PASS
BLE mode				
Low	2402	54.70	≥ 20	PASS
High	2480	47.16	≥ 20	PASS

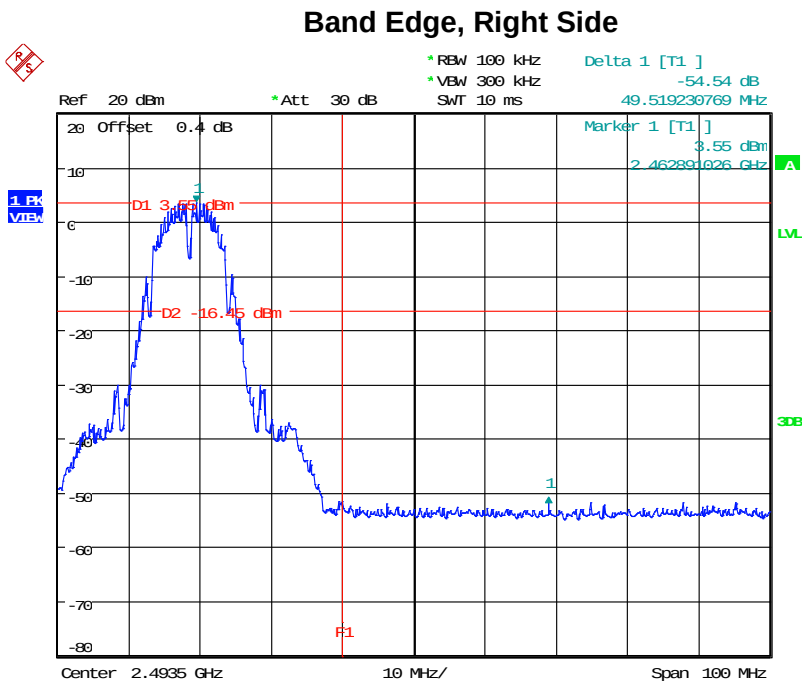
Please refer to the following plots

Wi-Fi B mode:

Band Edge, Left Side

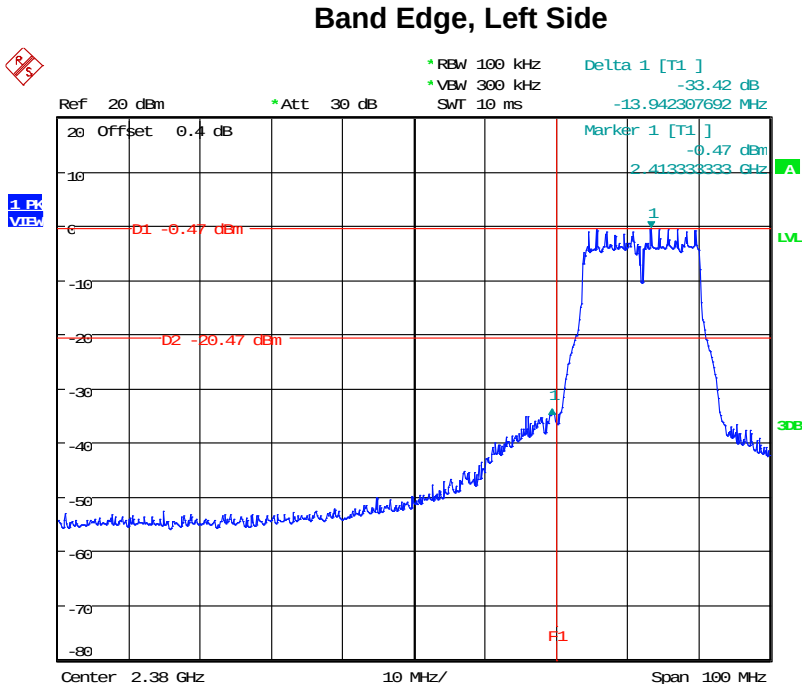


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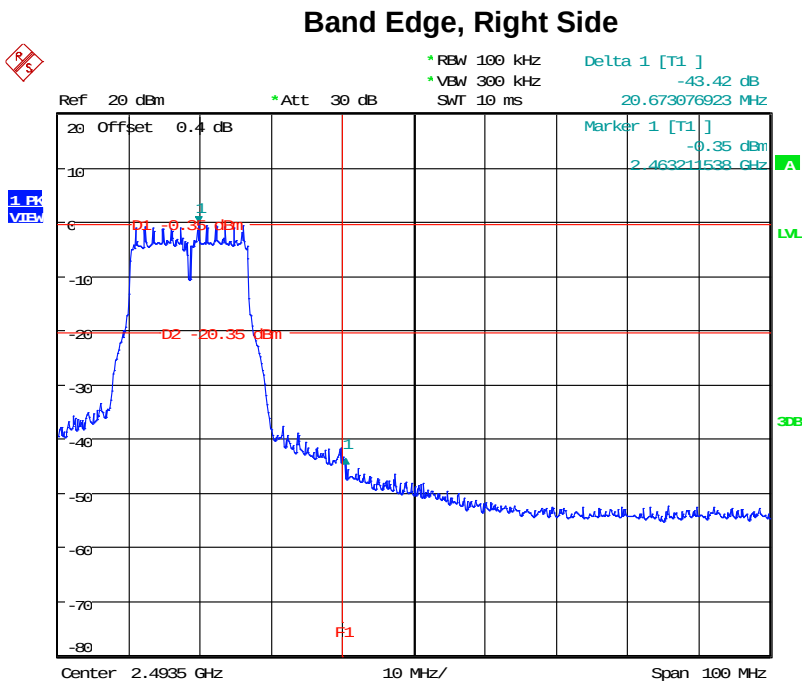


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Wi-Fi G mode:

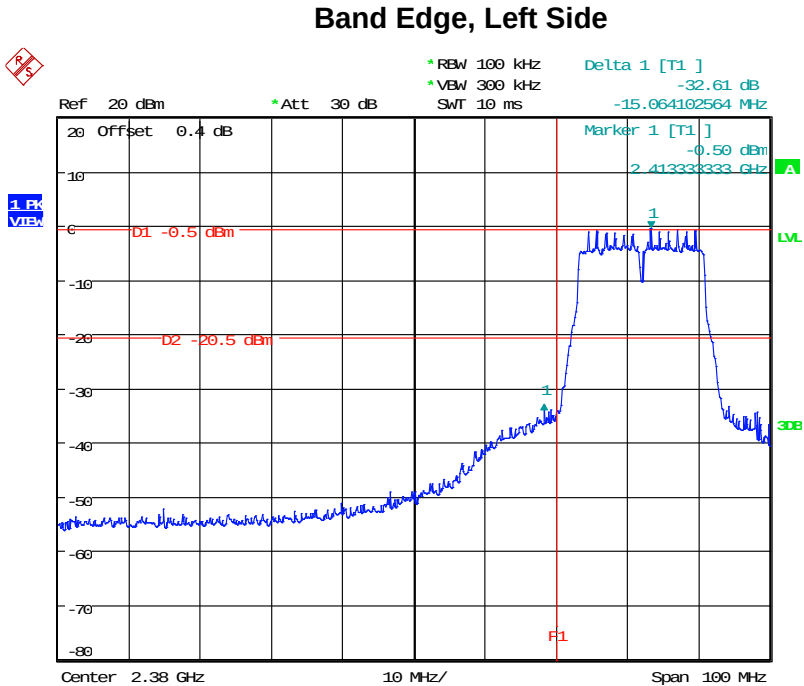


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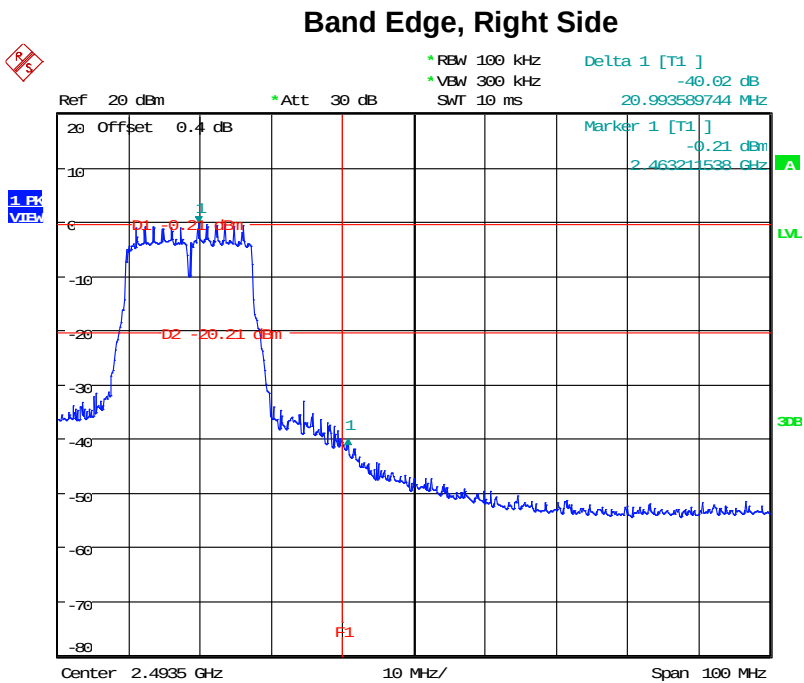


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Wi-Fi N20 mode:

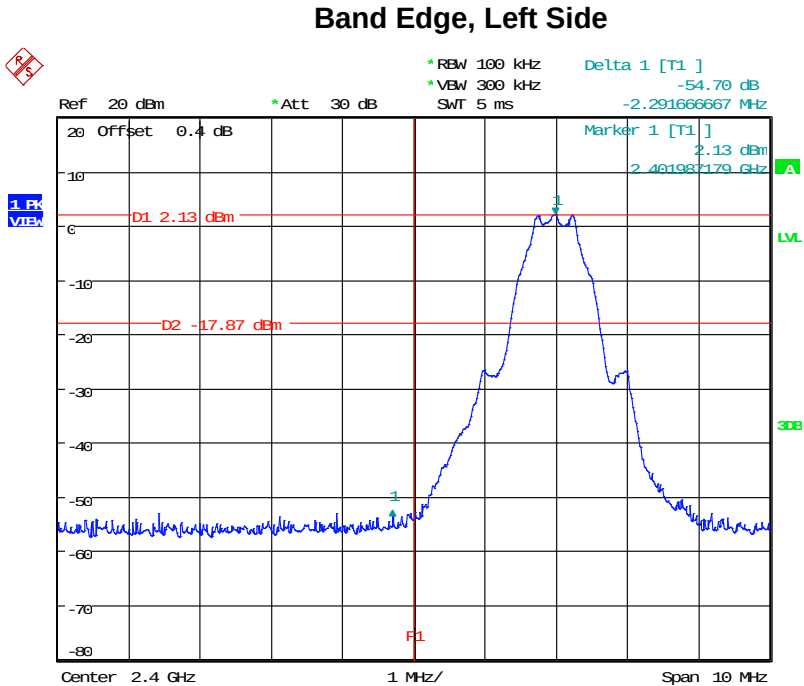


Date: 20.MAR.2018 01:31:58

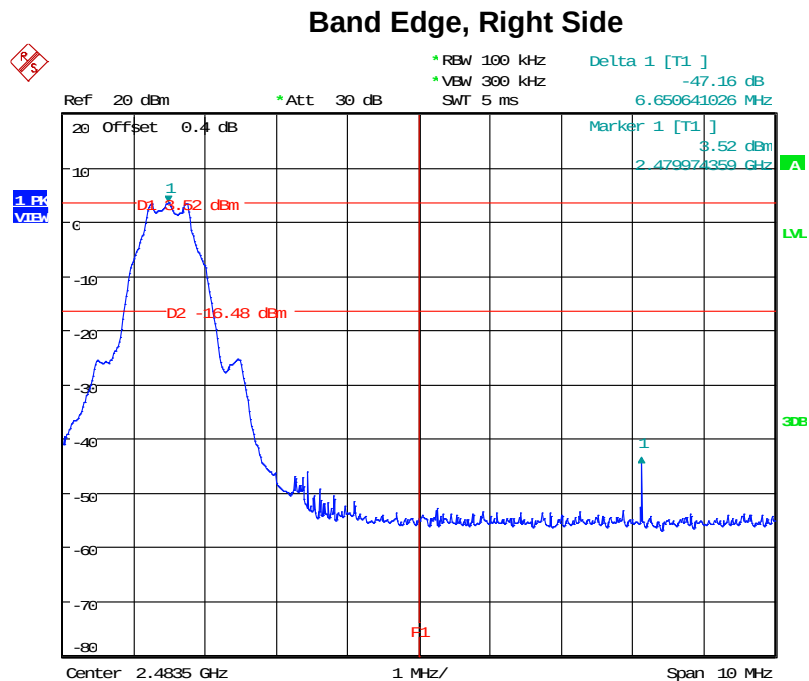


Date: 20.MAR.2018 01:52:38

BLE mode:



Date: 21.MAR.2018 00:21:47



Date: 21.MAR.2018 00:41:24

11 FCC §15.247(e) – Power Spectral Density

11.1 Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

11.2 Test Procedure

According to ANSI C63.10-2013

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq [3 \times \text{RBW}]$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

11.3 Test Equipment List and Details

Descriptions	Manufacturers	Models	Serial Numbers	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/21	2019/02/20

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).

11.4 Test Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	55.4 %
ATM Pressure:	1015 hPa

The testing was performed by Ian from 2018-03-20 to 2018-03-21

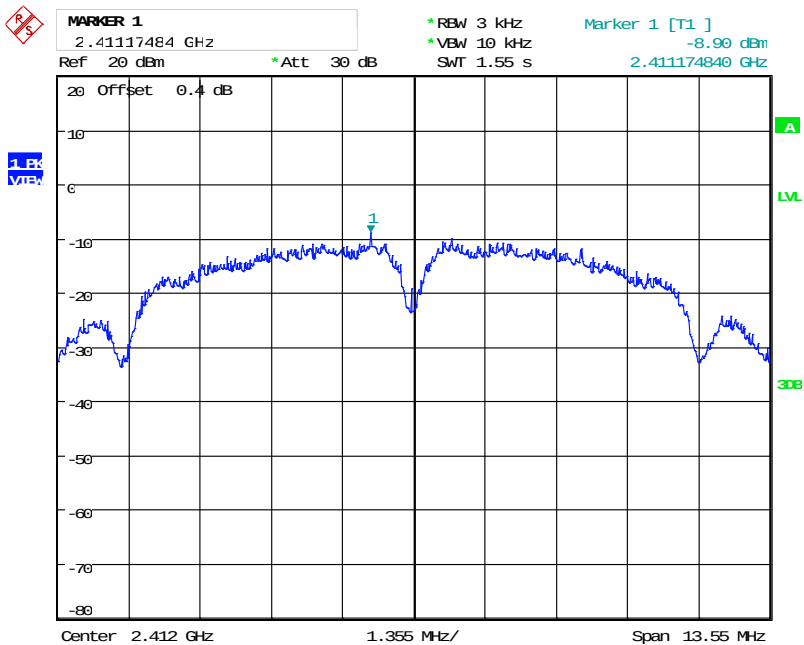
11.5 Test Results

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B mode				
Low	2412	-8.90	8	Compliance
Middle	2437	-9.95	8	Compliance
High	2462	-10.19	8	Compliance
G mode				
Low	2412	-13.71	8	Compliance
Middle	2437	-13.75	8	Compliance
High	2462	-13.50	8	Compliance
N20 mode				
Low	2412	-14.16	8	Compliance
Middle	2437	-14.42	8	Compliance
High	2462	-13.05	8	Compliance
BLE mode				
Low	2402	-11.48	8	Compliance
Middle	2440	-10.50	8	Compliance
High	2480	-9.97	8	Compliance

Please refer to the following plots

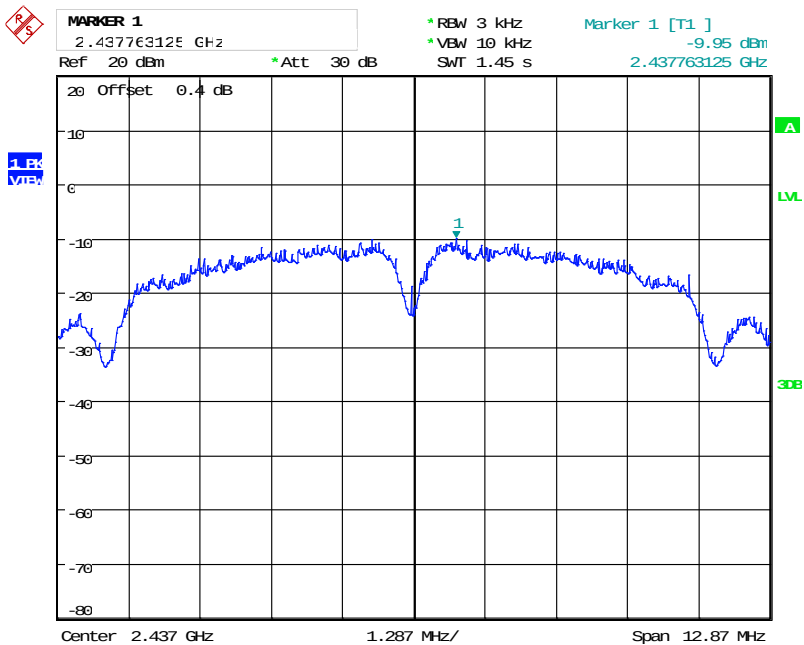
Wi-Fi B mode:

Low Channel



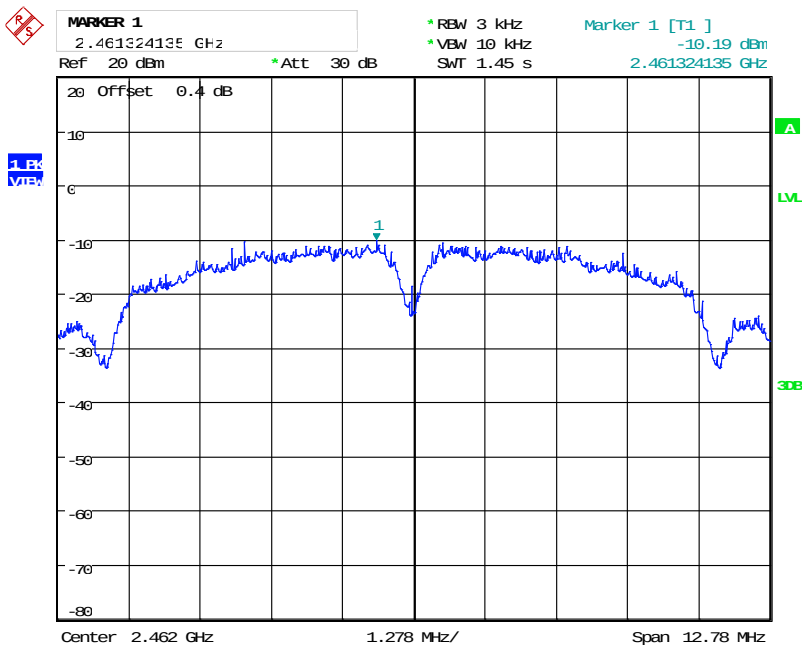
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Middle Channel



Date: 20.MAR.2018 00:41:53

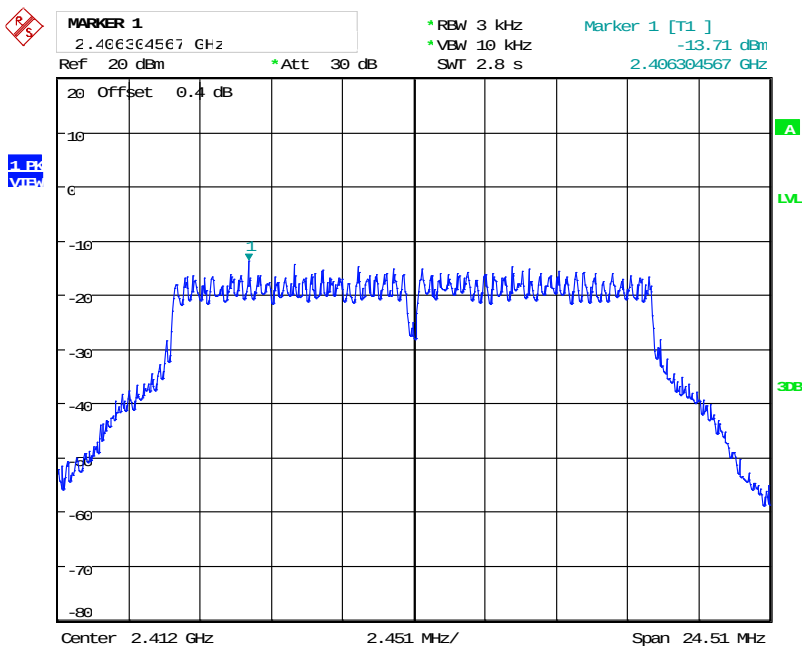
High Channel



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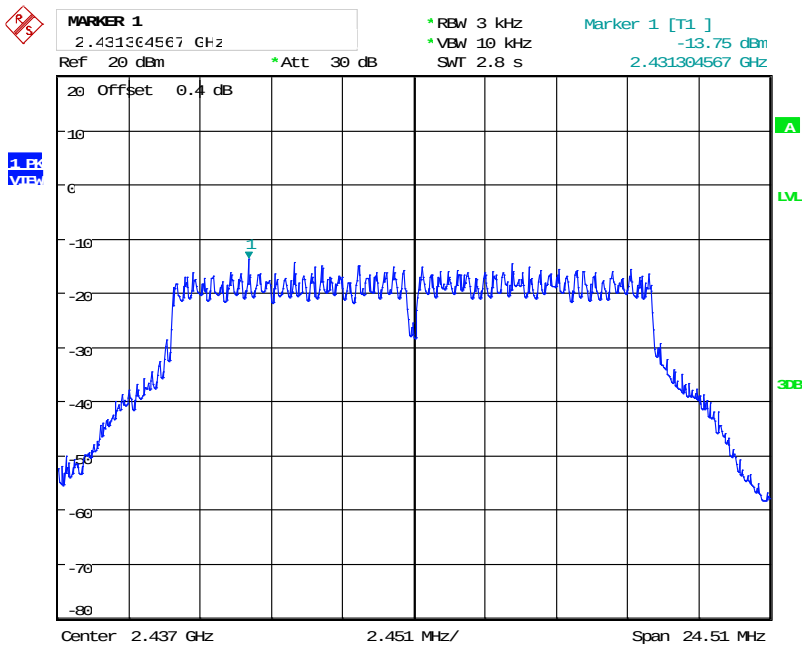
Wi-Fi G mode:

Low Channel



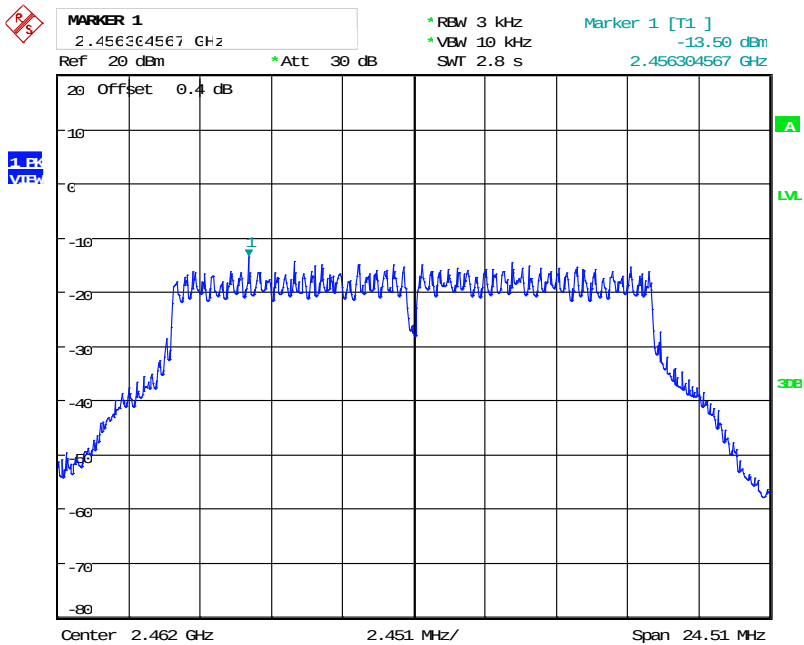
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Middle Channel



Date: 20.MAR.2018 01:17:42

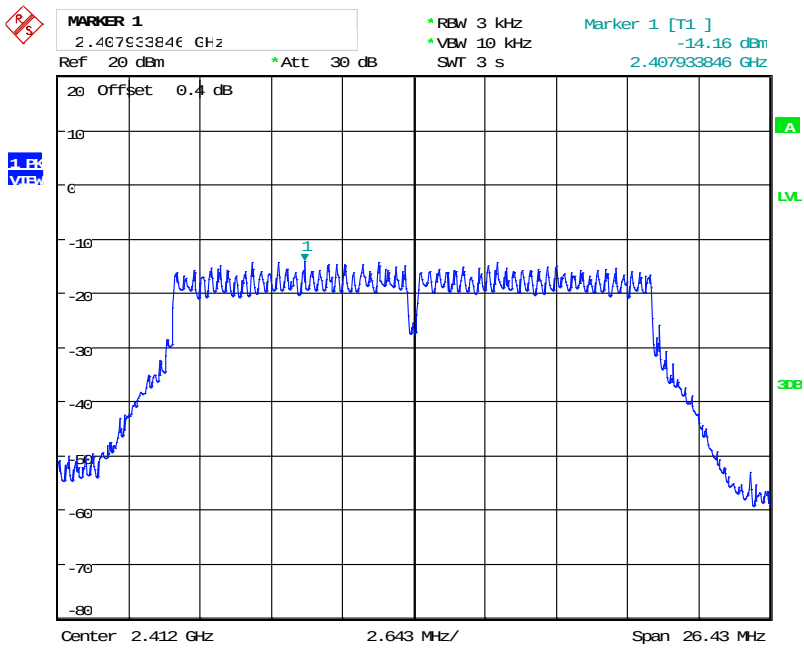
High Channel



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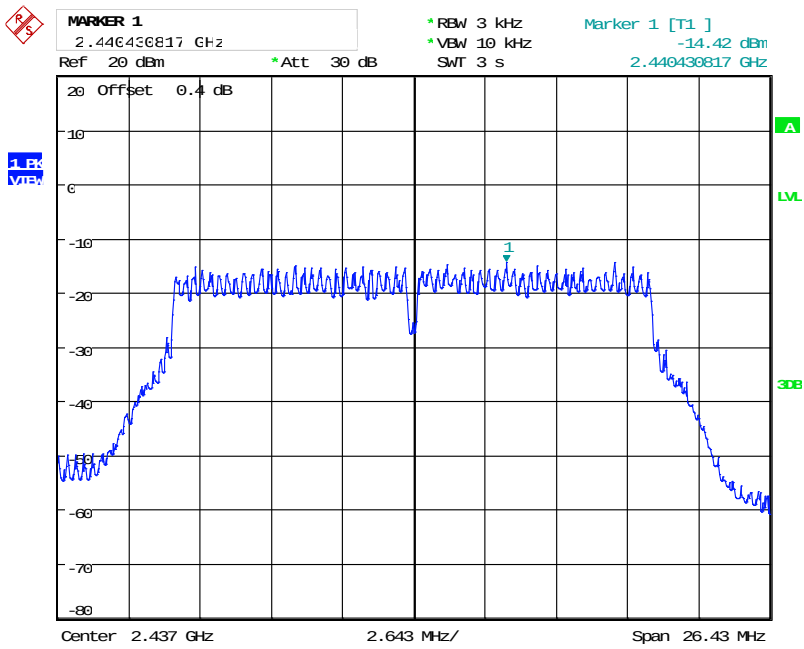
Wi-Fi N20 mode:

Low Channel



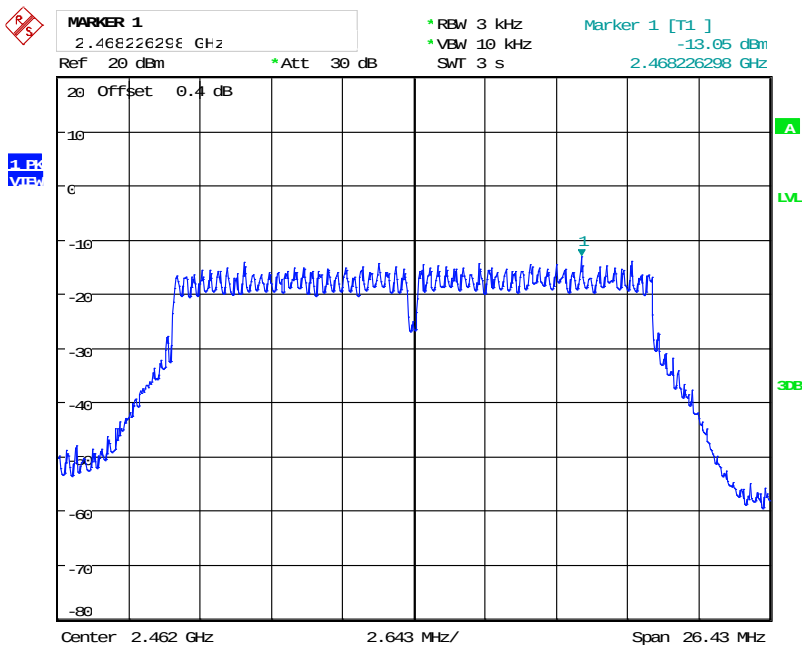
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Middle Channel



Date: 20.MAR.2018 01:44:19

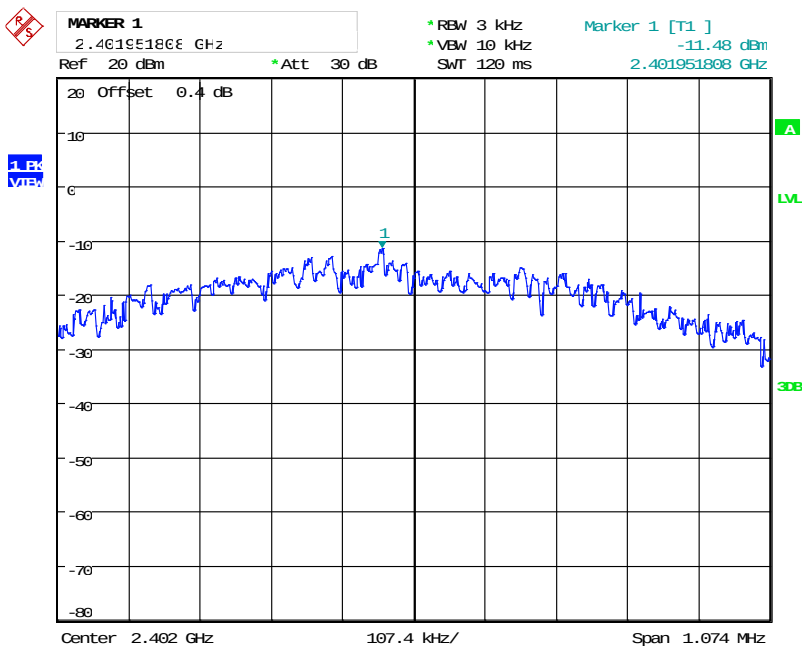
High Channel



Date: 20.MAR.2018 01:57:16

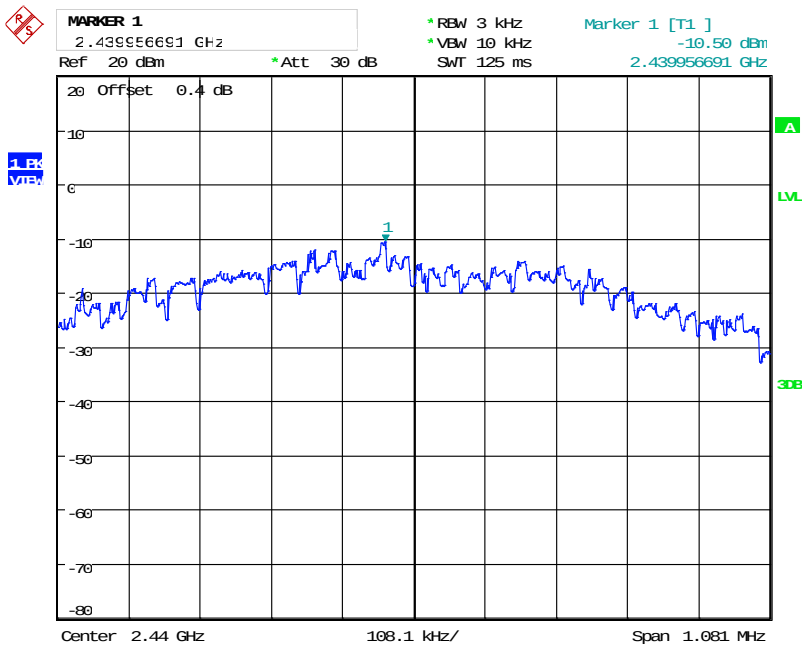
BLE mode:

Low Channel



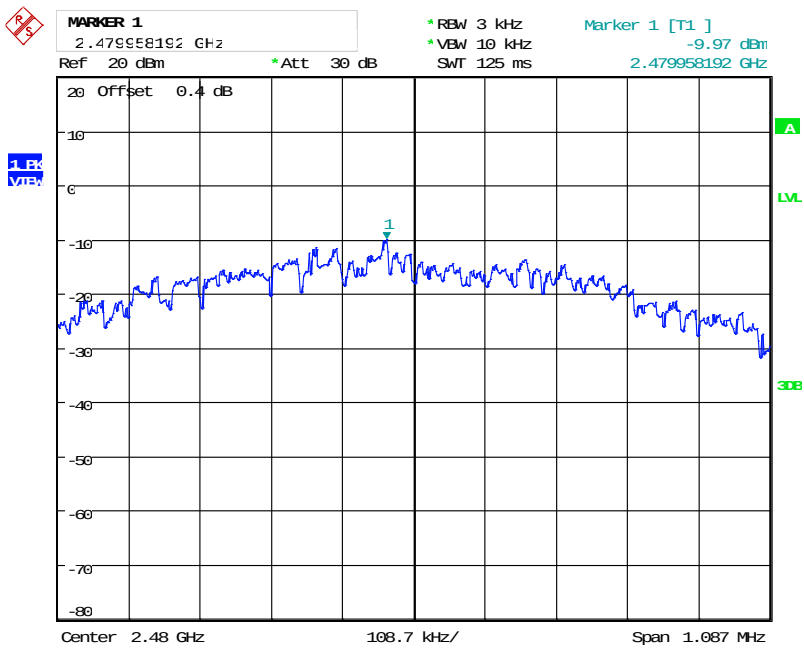
Date: 21.MAR.2018 00:25:18

Middle Channel



Date: 21.MAR.2018 00:31:24

High Channel



Date: 21.MAR.2018 00:43:00

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