TEST REPORT

of

FCC Part 15 Subpart C AND CANADA RSS-247

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product :	**Sensor AID DUO TPMS TOOL**
Brand:	**Cub**
Model:	**FCC: Please see page 7**
	IC:VS-60U029
Model Difference:	**FCC: Please see page 7**
	IC: N/A
FCC ID:	**ZPNVS60U029**
IC:	**9959A-VS60U029**
FCC Rule Part:	**§15.247, Cat: DTS**
IC Rule Part:	**RSS-247 issue 2: 2017**
	RSS-Gen issue 5: 2018
Applicant:	**CUB ELECPARTS INC.**
Address:	**No.6, Lane 546, Sec.6, Changlu Road, Fuhsin Township, Changhua County, Taiwan 506**

Test Performed by:
International Standards Laboratory Corp.
<LT Lab.>
*Site Registration No.
BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-4;

*Address:
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Report No.: **ISL-18LR335FCDTS**
Issue Date : **2018/01/17**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.
This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.
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VERIFICATION OF COMPLIANCE

Applicant:	CUB ELECPARTS INC.
Product Description:	Sensor AID DUO TPMS TOOL
Brand Name:	Cub
Model No.:	FCC: Please see page 7
	IC:VS-60U029
Model Difference:	FCC: Please see page 7
	IC: N/A
FCC ID:	ZPNVS60U029
IC:	9959A-VS60U029
Date of test:	2018/10/25 ~ 2019/01/07
Date of EUT Received:	2018/10/25

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:	Barry Lee	***Date:***	2019/01/17
	Barry Lee / Senior Engineer		
Prepared By:	Gigi yeh	***Date:***	2019/01/17
	Gigi Yeh / Senior Engineer		
Approved By:	Jerry Liu	***Date:***	2019/01/17
	Jerry Liu / Technical Manager		

Version

Version No.	Date	Description
00	2019/01/17	Initial creation of document

Uncertainty of Measurement

Description Of Test	Uncertainty
Conducted Emission (AC power line)	2.586 dB
Field Strength of Spurious Radiation	≤30MHz: 2.96dB 30-1GHz: 4.22 dB 1-40 GHz: 4.08 dB
Conducted Power	2.412 GHz: 1.30 dB 5.805 GHz: 1.55 dB
Power Density	2.412 GHz:1.30 dB 5.805 GHz: 1.67 dB
Frequency	0.0032%
Time	0.01%
DC Voltage	1%

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1 General Information

General:

Product Name	Sensor AID DUO TPMS TOOL	
Brand Name	Cub	
FCC: Model Name	VS-60U029; VS-60U029XX; VS-60U029XX-XX; VS-60U029XX-XX-X; VS-60U024; VS-60U024XX; VS-60U024XX-XX; VS-60U024XX-XX-X; VS-60U029XXXXXXX; VS-60U024XXXXXXX; CT4; Sensor AID TOOL Gen4; Sensor AID DUO TPMS TOOL; SENSOR AID TOOL GEN4; SENSOR AID DUO TPMS TOOL	
IC: Model Name	VS-60U029	
FCC Model Difference	1. For the marketing purpose 2. Where X may be any alpha character “a”-“z”, ”A”-“Z”, or numeric character “0”-“9”,or -, (,) , or blank or combination of alpha and numeric characters	
IC Model Difference	N/A	
Power Supply	5 Vdc from AC/DC adapter or 3.7V from battery	
	Adapter:	Model: SK22G3-0500250U
	Battery:	Model : 625094

IC RSS-Gen:

PMN (Product Marketing Name)	VS-60U029
HVIN (Hardware Version Identification Number)	VS-60U029
Product SW version	1.0
Product HW version	1.0
Radio SW version	RS1.0
Radio HW version	1.0

2.4GHz WLAN: 1TX/1RX

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	18.53 dBm (PK)/ 16.33 dBm (AV)	DSSS
802.11g	2412 – 2462(DTS)	11	23.14 dBm (PK) / 13.06 dBm (AV)	OFDM
802.11n	HT20 2412 – 2462(DTS)	11	22.42 dBm (PK) / 12.21 dBm (AV)	
802.11n	HT40 2422 – 2452(DTS)	7	21.32 dBm (PK) / 10.67 dBm (AV)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Type: PCB, 2.80dBi		
Tune up power (Average)		16 dBm +/- 0.5 dBm		

Bluetooth:

Frequency Range:	2402 – 2480MHz	
Bluetooth Version:	V2.1 + EDR	V4.0
Channel number:	79 channels	40 channels, 2MHz step
Modulation type	GFSK +π / 4DQPSK + 8DPSK	Wide band Modulation (GFSK)
Transmit Power:	9.40 dBm Peak	-0.28 dBm Peak
Dwell Time:	≤ 0.4s	N/A
Antenna Designation:	Type: PCB, 2.80dBi	

This report applies for 2.4GHz Wifi + BT LE.

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: ZPNVS60U029** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and **IC: 9959A-VS60U029** filing to comply with Industry Canada RSS-247 issue 2.

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 558074 D01 15.247 Meas Guidance v0.5

1.3 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory Corp.**<LT Lab.> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.10: 2013. FCC Registration Number is: 487532; Designation Number is: TW0997, Canada Registration Number: 4067B-4.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013 and RSS-Gen issue 5. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8/1.5 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” Is still within the 3dB illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Sub-clause 8.3.1.2 of ANSI C63.10: 2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed channel)

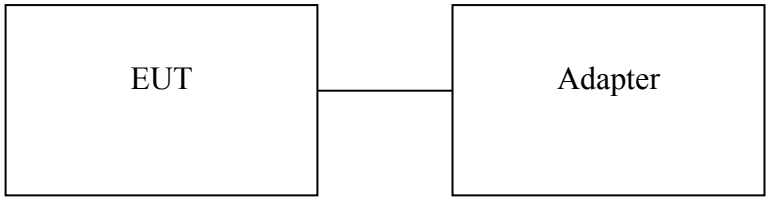


Table 2-1 Equipment Used in Tested System

Item	Equip-ment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Adapter	Apple	A1385	N/A	Non-shield	Non-shield

3 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3),(4) RSS-247 issue 2,§5.4(4)	Peak Output Power/ EIRP	Compliant
§15.247(a)(2) RSS-247 issue 2, §5.2(1) RSS-Gen §6.6	6dB & 99% Power Bandwidth	Compliant
§15.247(d) RSS-247 issue 2, §5.5	100 kHz Bandwidth of Frequency Band Edges	Compliant
§15.247(d) RSS-247 issue 2, §5.5	Spurious Emission	Compliant
§15.247(e) RSS-247 issue 2, §5.2	Peak Power Density	Compliant
§15.203 RSS-GEN 8.3	Antenna Requirement	Compliant

4 Description of Test Modes

The EUT has been tested under engineering operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

802.11 b mode: Channel low (2412MHz)、mid (2437MHz)、high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz)、mid (2437MHz)、high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.

802.11 n _20MHz: Channel low (2412MHz)、mid (2437MHz)、high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.

802.11 n _40MHz: Channel low (2422MHz)、mid (2437MHz)、high (2452MHz) with 13.5Mbps lowest data rate are chosen for full testing.

BT BLE

Channel low (2402MHz)、mid (2442MHz) and high (2480MHz) with each modulation were chosen for full testing.

5 Conduced Emission Test

5.1 Standard Applicable:

According to §15.207 and RSS-Gen §7.2.4, frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note
1.The lower limit shall apply at the transition frequencies
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Conduction 04-3 Cable	WOKEN	CFD 300-NL	Conduction 04 -3	09/11/2018	09/10/2019
EMI Receiver 16	Rohde & Schwarz	ESCI	101221	10/23/2018	10/22/2019
LISN 18	ROHDE & SCHWARZ	ENV216	101424	02/04/2018	02/03/2019
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/06/2018	03/05/2019
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10-2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

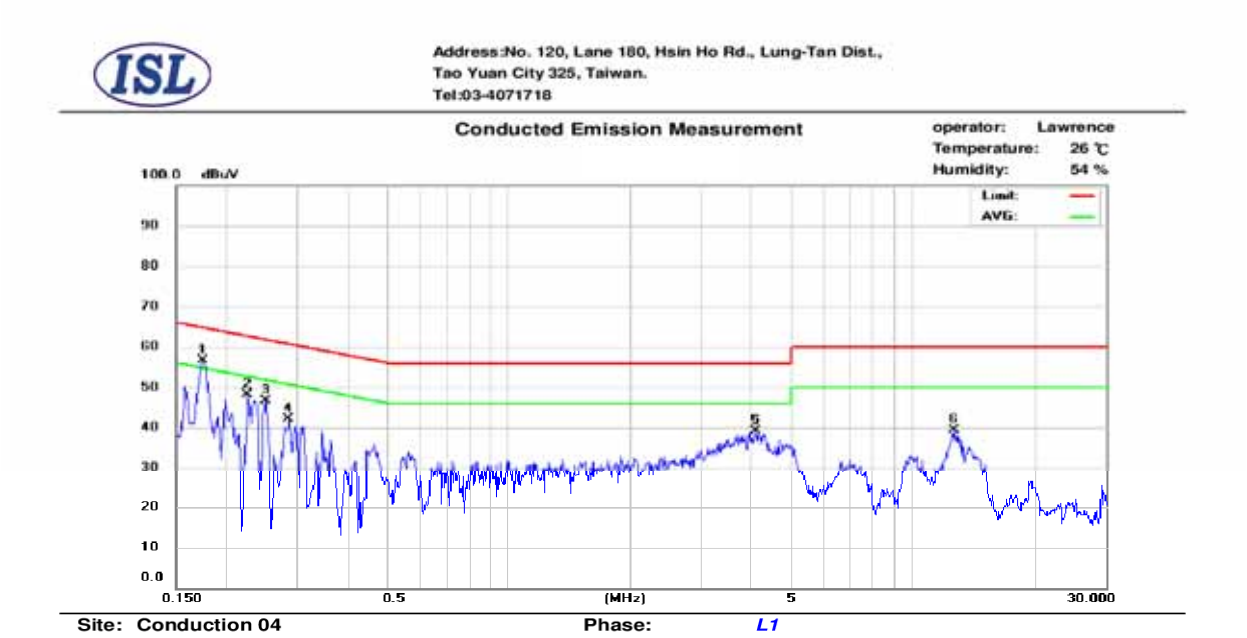
5.5 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Full mode	Test Date:	2018/12/26
Test By:	Barry		



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.174	45.44	32.87	9.69	55.13	64.77	-9.64	42.56	54.77	-12.21
2	0.226	35.37	21.08	9.69	45.06	62.60	-17.54	30.77	52.60	-21.83
3	0.250	29.46	6.66	9.69	39.15	61.76	-22.61	16.35	51.76	-35.41
4	0.286	30.14	13.82	9.70	39.84	60.64	-20.80	23.52	50.64	-27.12
5	4.086	24.06	16.50	9.81	33.87	56.00	-22.13	26.31	46.00	-19.69
6	12.630	23.22	16.96	9.98	33.20	60.00	-26.80	26.94	50.00	-23.06

No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.162	46.03	32.47	9.68	55.71	65.36	-9.65	42.15	55.36	-13.21
2	0.170	44.57	30.64	9.68	54.25	64.96	-10.71	40.32	54.96	-14.64
3	0.226	31.60	14.79	9.68	41.28	62.60	-21.32	24.47	52.60	-28.13
4	0.278	27.07	12.35	9.69	36.76	60.88	-24.12	22.04	50.88	-28.84
5	4.050	23.89	16.88	9.80	33.69	56.00	-22.31	26.68	46.00	-19.32
6	12.602	15.91	8.48	10.01	25.92	60.00	-34.08	18.49	50.00	-31.51

6 Peak Output Power Measurement

6.1 Standard Applicable:

According to §15.247(b)(3),(4)(b)

(3) For 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.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

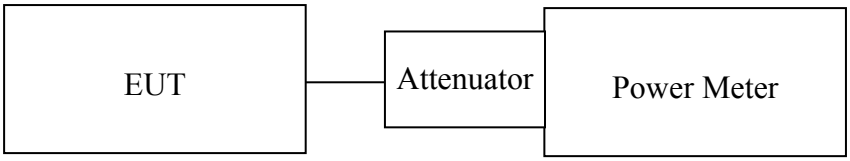
According to RSS-247 issue 2, §5.4
(D)For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e)

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling 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 transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Last Cal.**	**Cal Due.**
Power Meter 05	Anritsu	ML2495A	1116010	10/28/2018	10/27/2019
Power Sensor 05	Anritsu	MA2411B	34NKF50	10/28/2018	10/27/2019
Power Sensor 06	DARE	RPR3006W	13I00030SNO33	12/12/2018	12/11/2019
Power Sensor 07	DARE	RPR3006W	13I00030SNO34	12/12/2018	12/11/2019
Temperature Chamber	KSON	THS-B4H100	2287	12/02/2018	12/01/2019
DC Power supply	ABM	8185D	N/A	11/16/2018	11/15/2019
AC Power supply	EXTECH	CFC105W	NA	12/25/2018	12/24/2019
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2017	12/25/2019
Spectrum analyzer	keysight	N9010A	MY56070257	10/15/2018	10/14/2019
Spectrum analyzer	R&S	FSP40	100116	11/02/2018	11/01/2019
Test Sofware	DARE	Radimation Ver:2013.1.23	NA	NA	NA

6.3 Test Set-up:



6.4 Measurement Procedure:

1. Place the EUT on the table 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 the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.5 Measurement Result:

802.11b

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	17.83	15.61	30.00
Mid	18.53	16.33	
High	17.86	15.60	

802.11g

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	22.73	12.51	30.00
Mid	23.14	13.06	
High	22.48	12.18	

802.11n_HT20

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	22.04	11.75	30.00
Mid	22.42	12.21	
High	21.72	11.36	

802.11n_HT40

Cable loss = 0	Output Power		Limit (dBm)
CH	Detector		
	PK (dBm)	AV (dBm)	
Low	21.08	10.28	30.00
Mid	21.32	10.67	
High	20.59	9.78	

LE Mode 4.0

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
Low	-0.28	0.00	-0.28	0.00094	1
Mid	-0.75	0.00	-0.75	0.00084	1
High	-0.67	0.00	-0.67	0.00086	1

Offset: 1dB

7 6dB Bandwidth & 99% Bandwidth

7.1 Standard Applicable:

According to §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 500kHz.

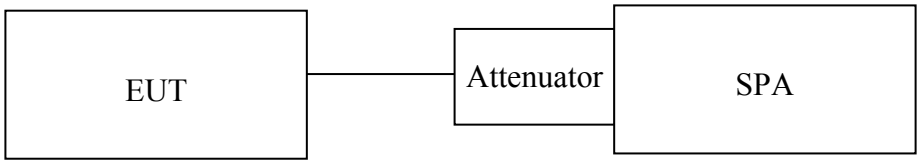
According to RSS-247 issue 2, §5.2

(a)The minimum 6 dB bandwidth shall be 500 kHz.

7.2 Measurement Equipment Used:

Refer to section 6.2 for details.

7.3 Test Set-up:



7.4 Measurement Procedure:

1. Place the EUT on the table 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 the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100kHz, VBW = 3*RBW, Span= cover the complete power envelope of the signal of the UUT Sweep=auto
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

7.5 Measurement Result:

802.11b

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
Low	9.950	15.168	> 500	PASS
Mid	9.823	15.175	> 500	PASS
High	9.795	15.155	> 500	PASS

802.11g

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
Low	16.39	16.812	> 500	PASS
Mid	16.40	16.813	> 500	PASS
High	16.38	16.795	> 500	PASS

802.11n HT20

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
Low	17.60	17.798	> 500	PASS
Mid	17.61	17.799	> 500	PASS
High	17.60	17.796	> 500	PASS

802.11n HT40

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
Low	35.24	36.126	> 500	PASS
Mid	35.24	36.135	> 500	PASS
High	35.24	36.114	> 500	PASS

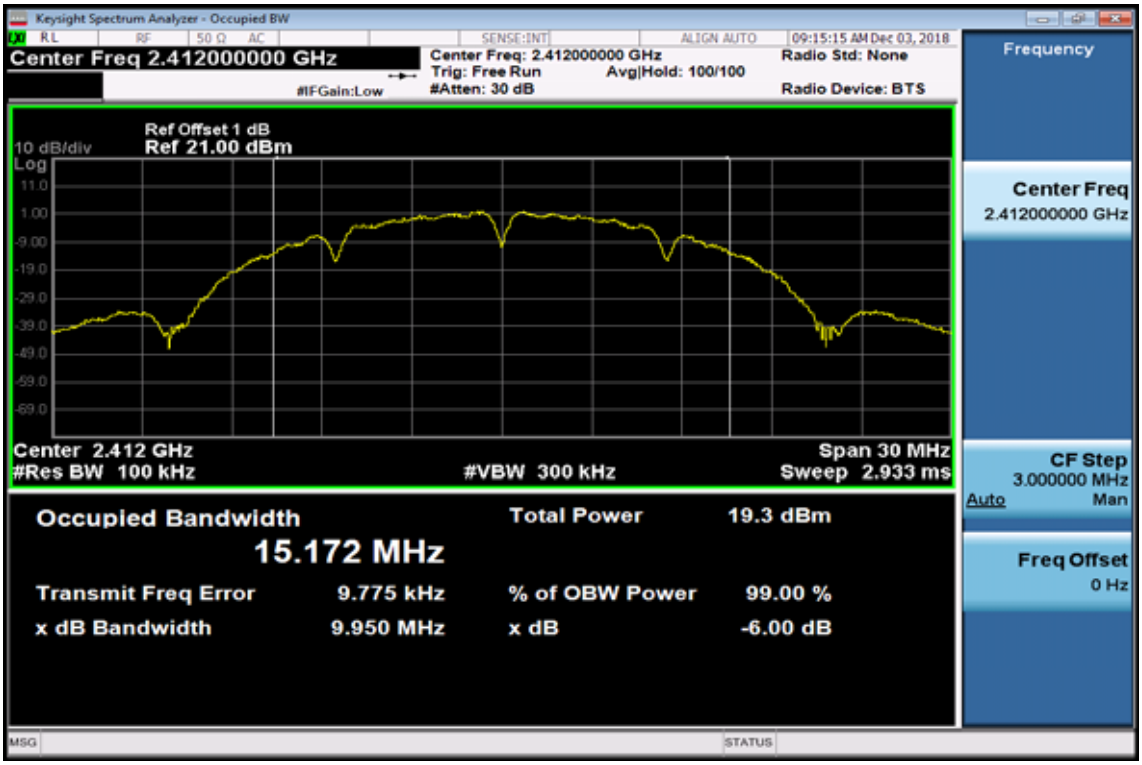
BT LE

Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
Low	0.5723	1.0346	> 500	PASS
Mid	0.5685	1.0338	> 500	PASS
High	0.5672	1.0336	> 500	PASS

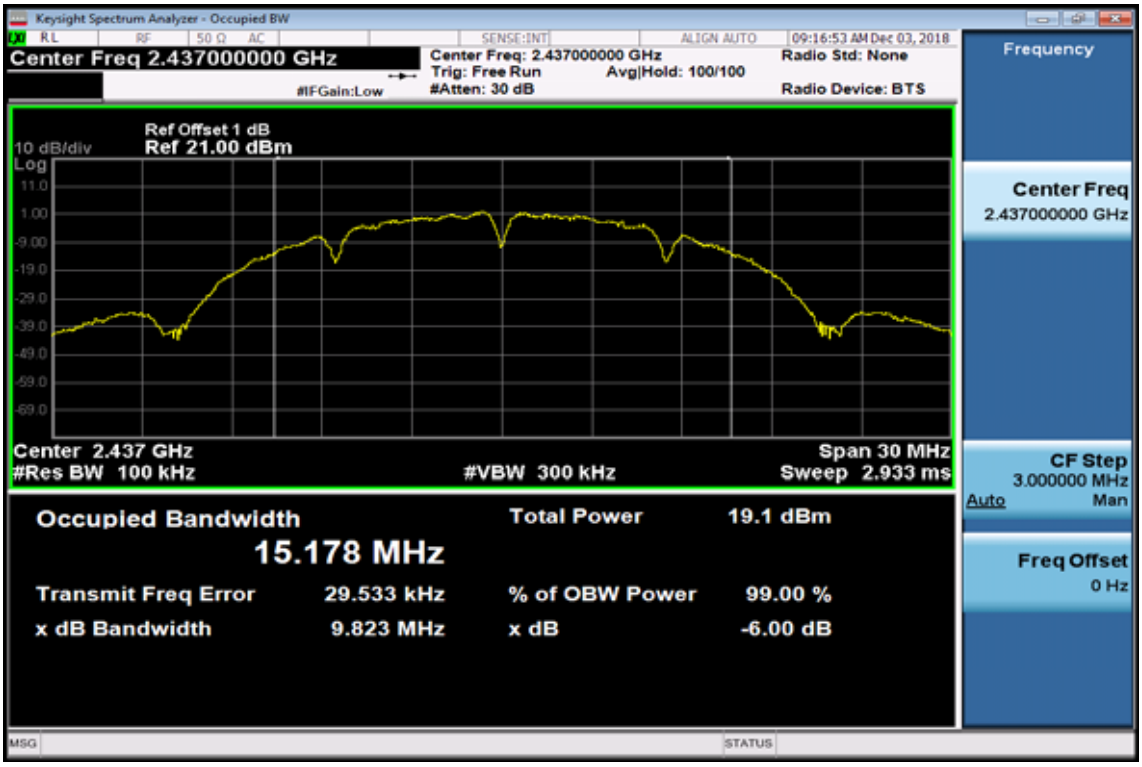
Note: Refer to next page for plots.

802.11b

6dB Band Width Test Data CH-Low



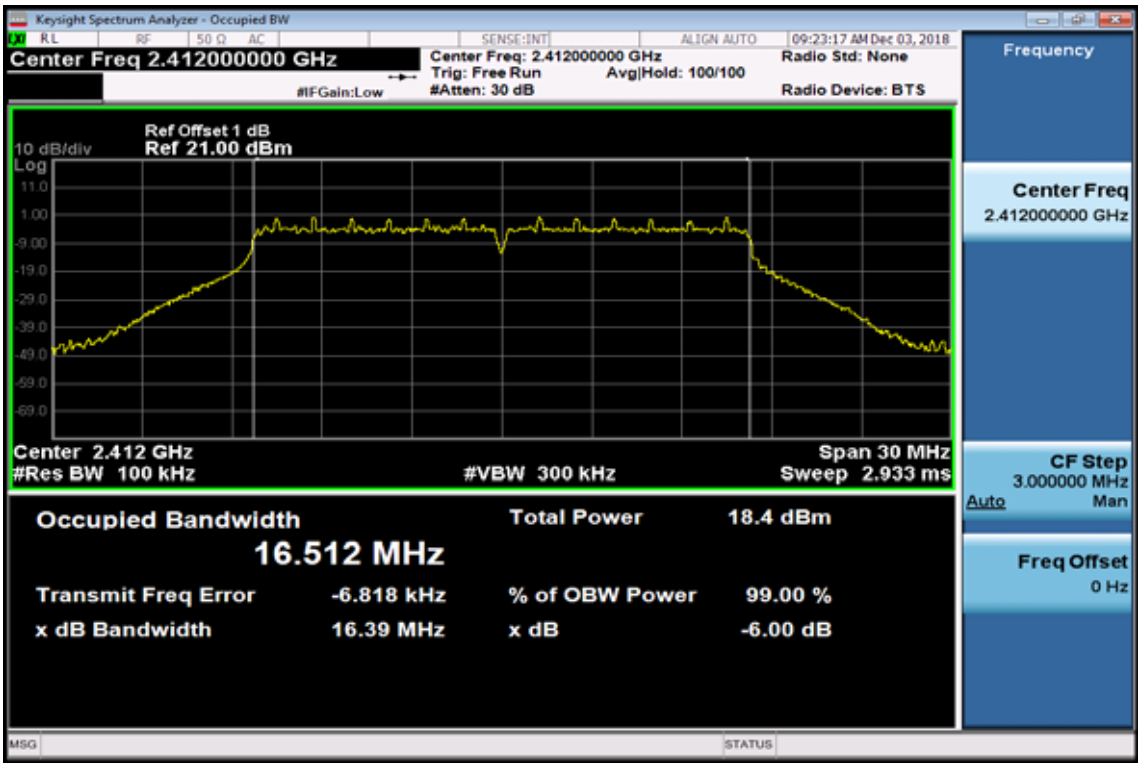
6dB Band Width Test Data CH-Mid



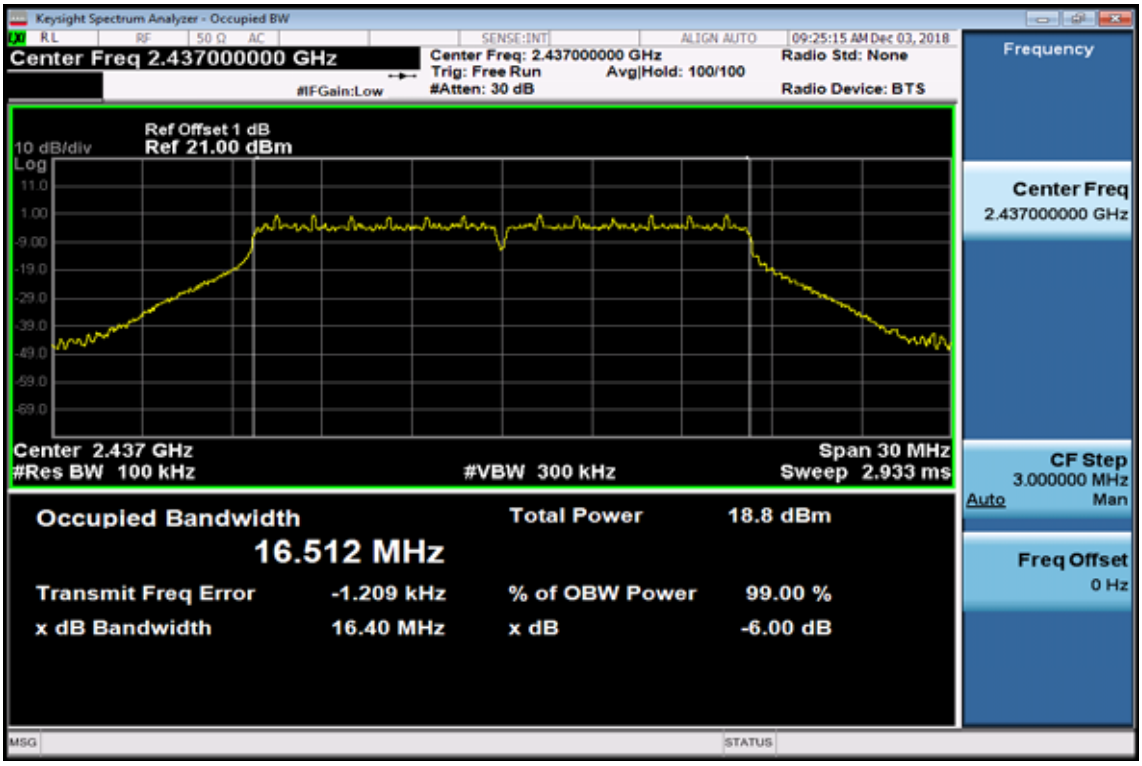
6dB Band Width Test Data CH-High

802.11g

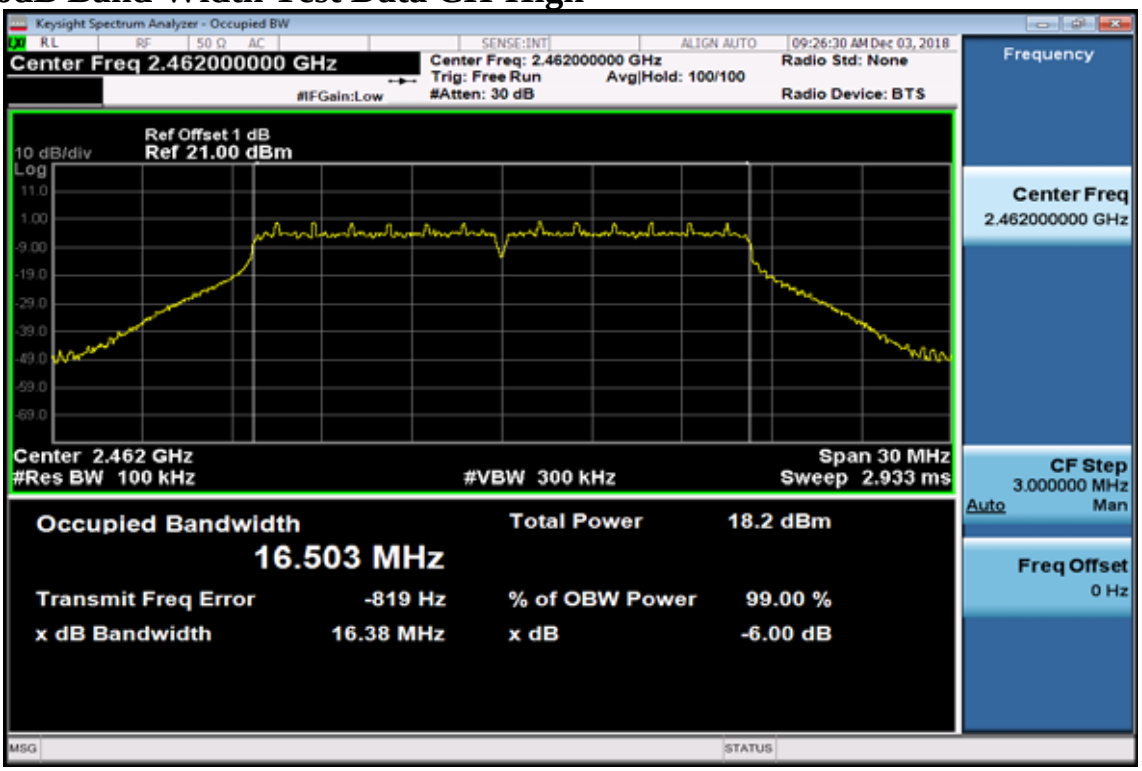
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

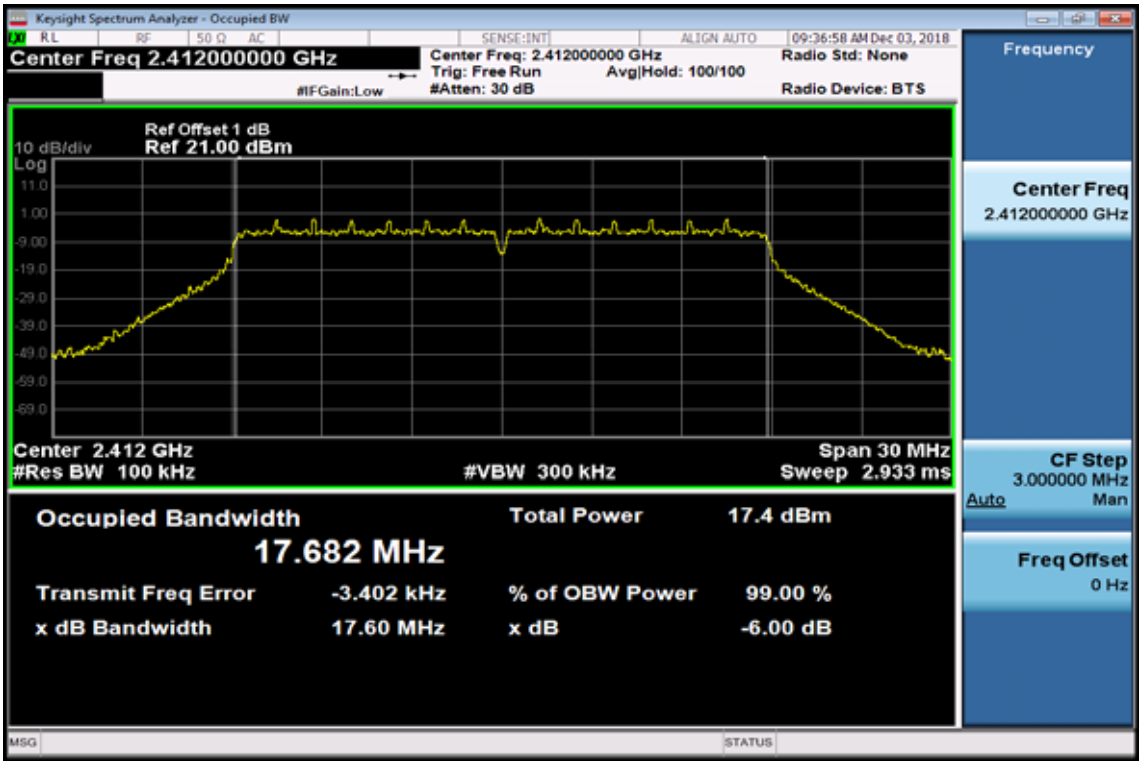


6dB Band Width Test Data CH-High

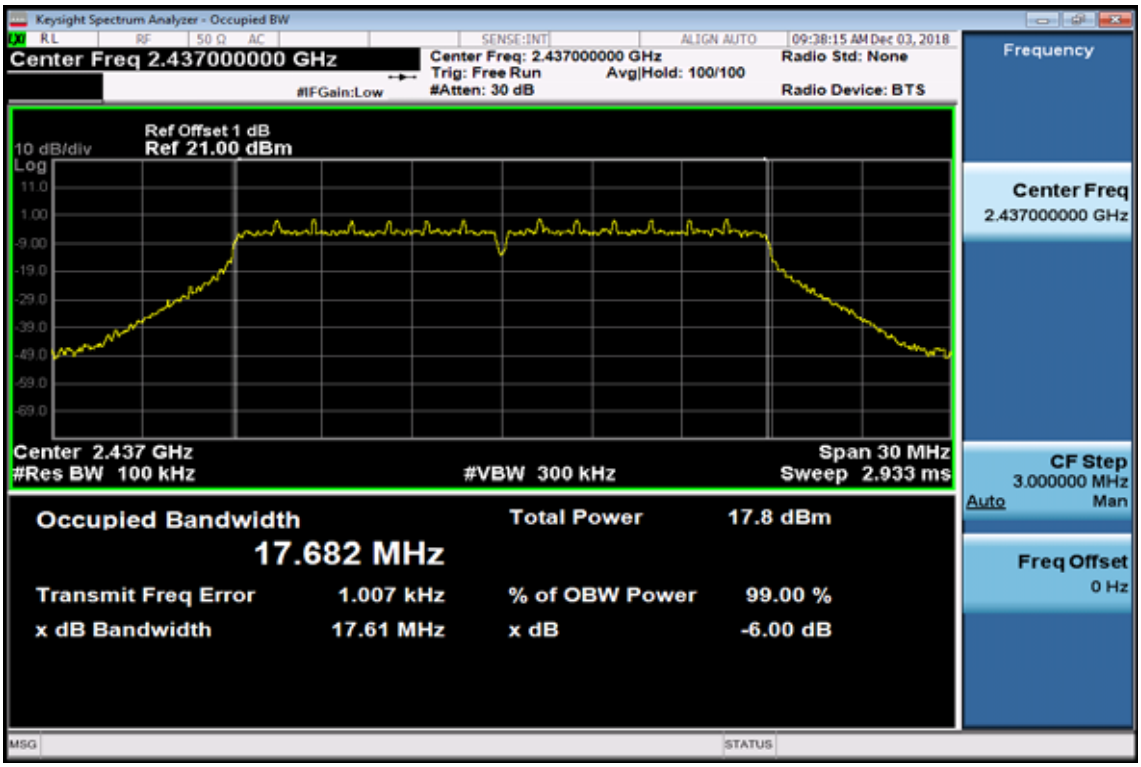


802.11n_20HT

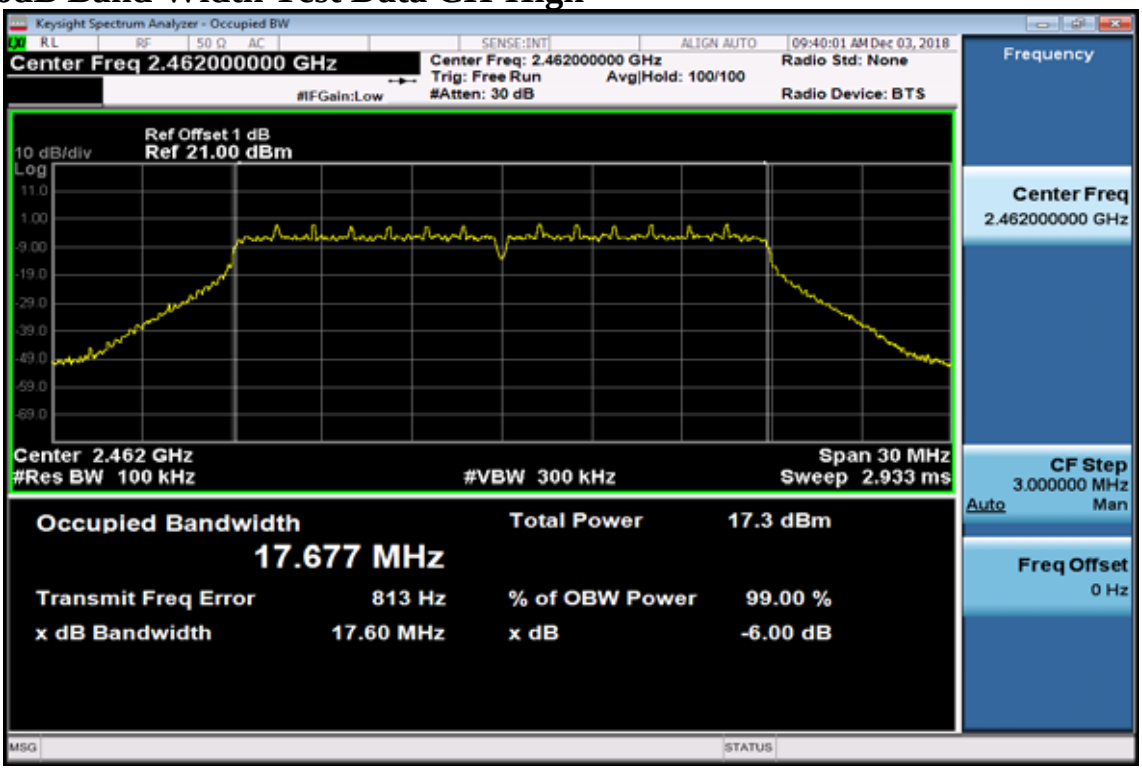
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

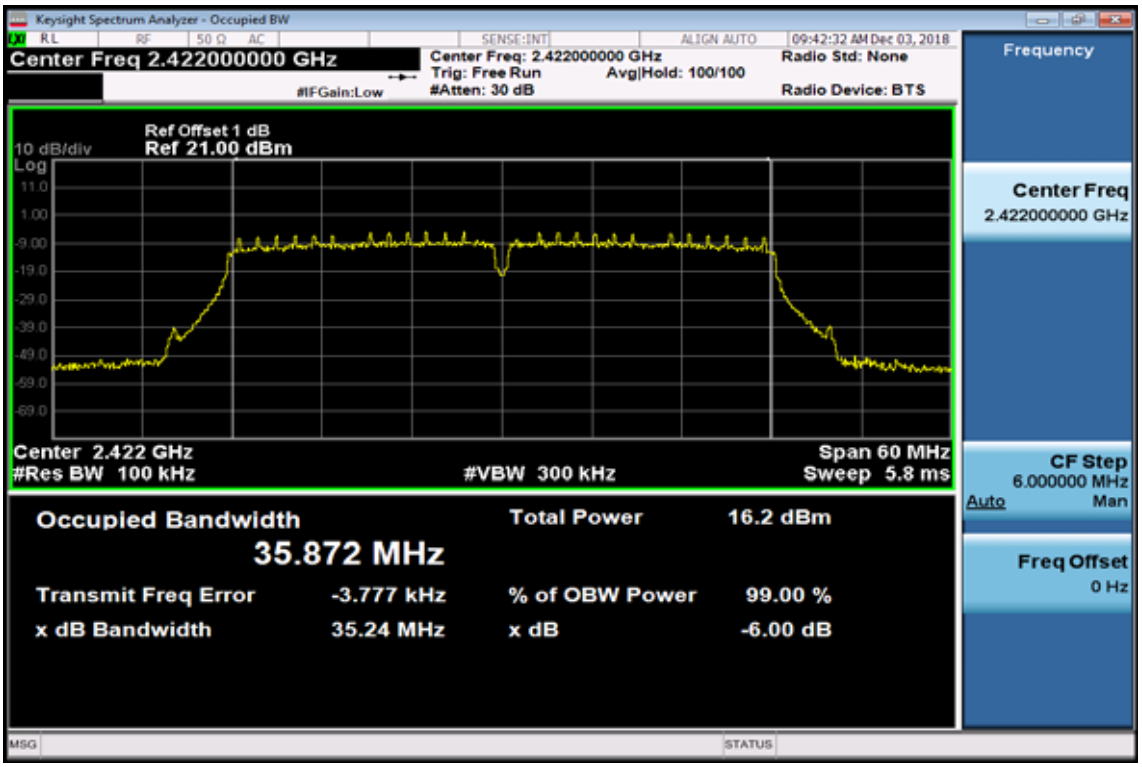


6dB Band Width Test Data CH-High

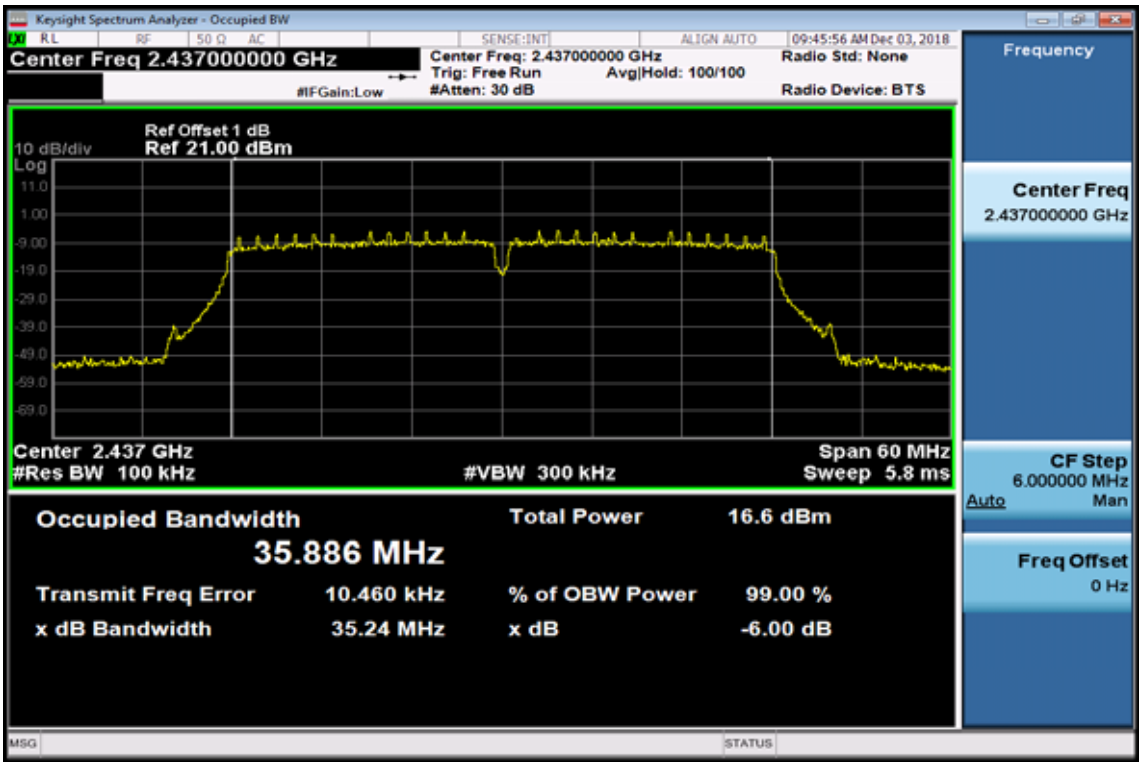


802.11n_40HT

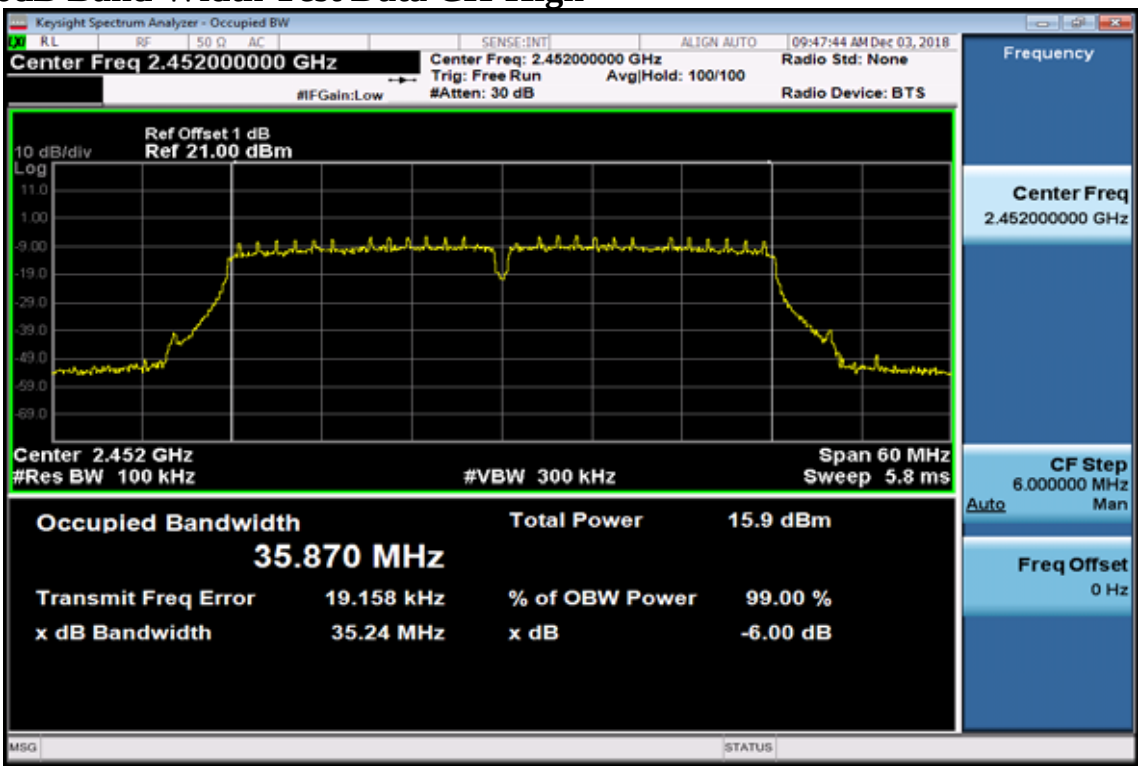
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

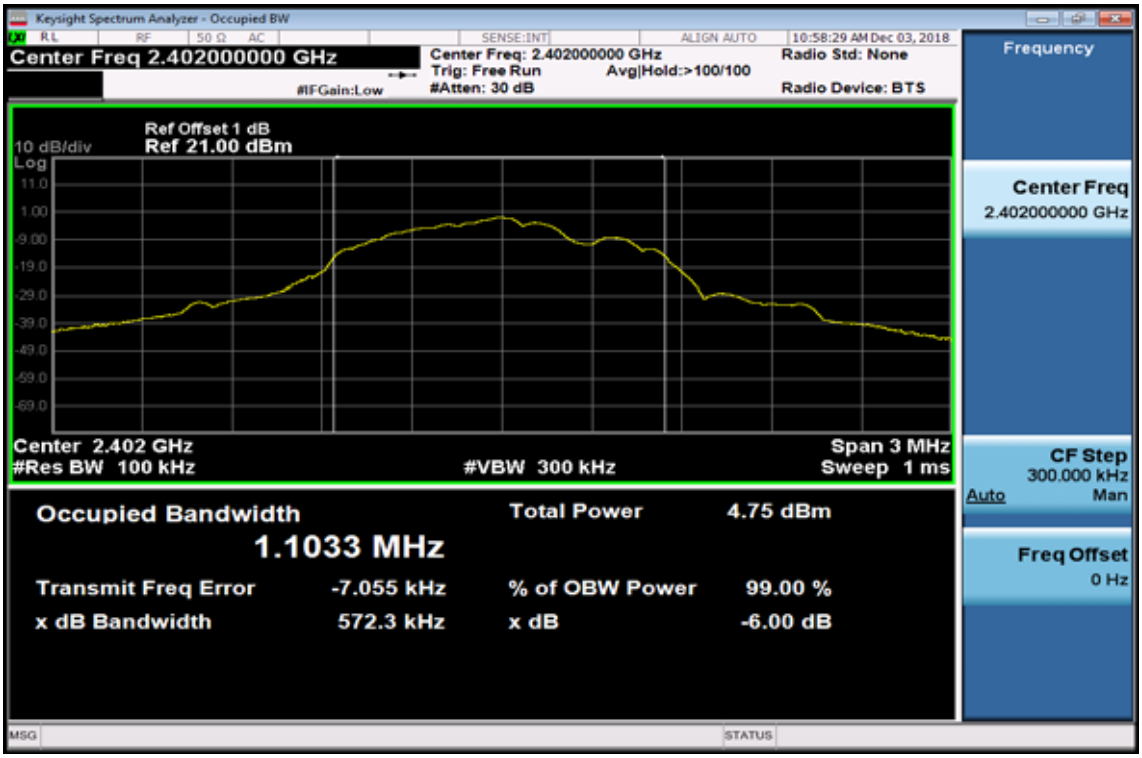


6dB Band Width Test Data CH-High

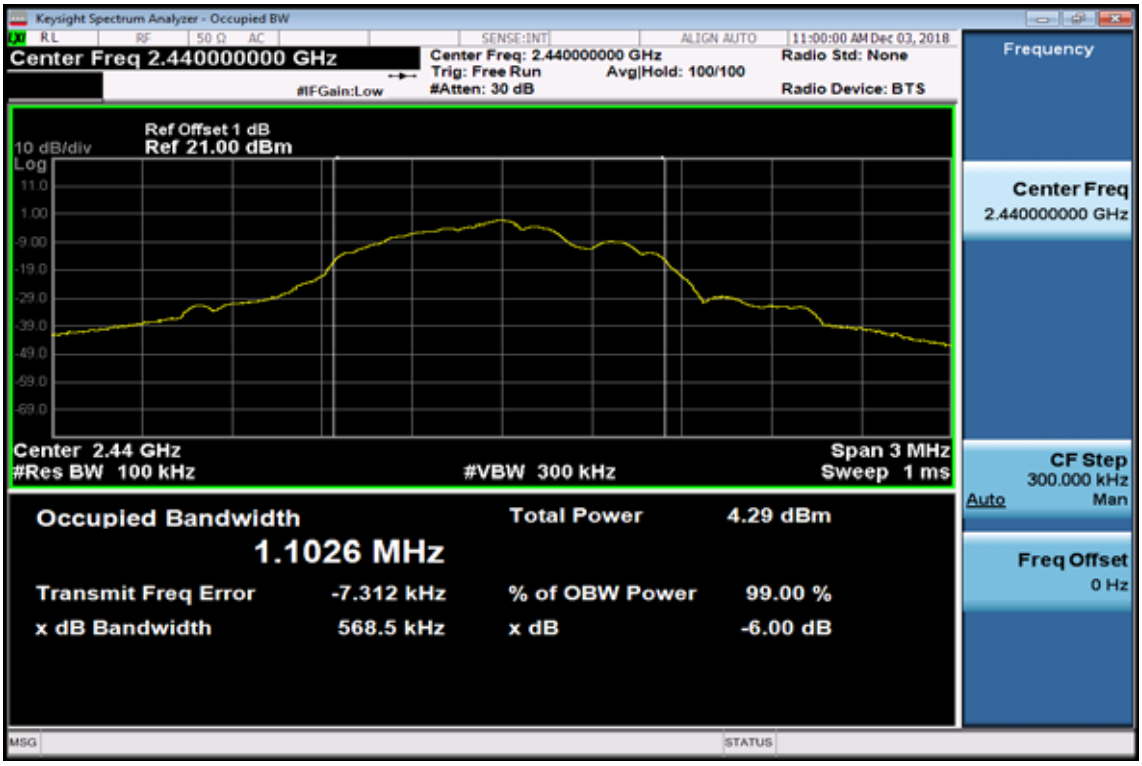


BT LE

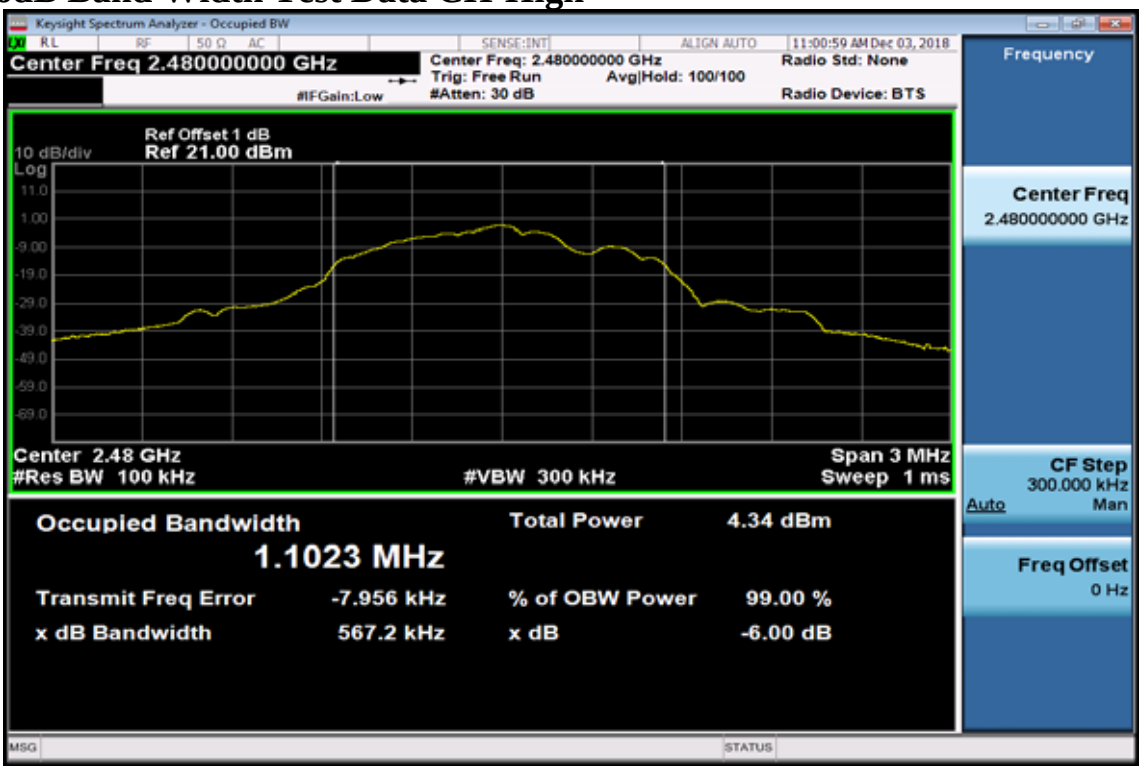
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

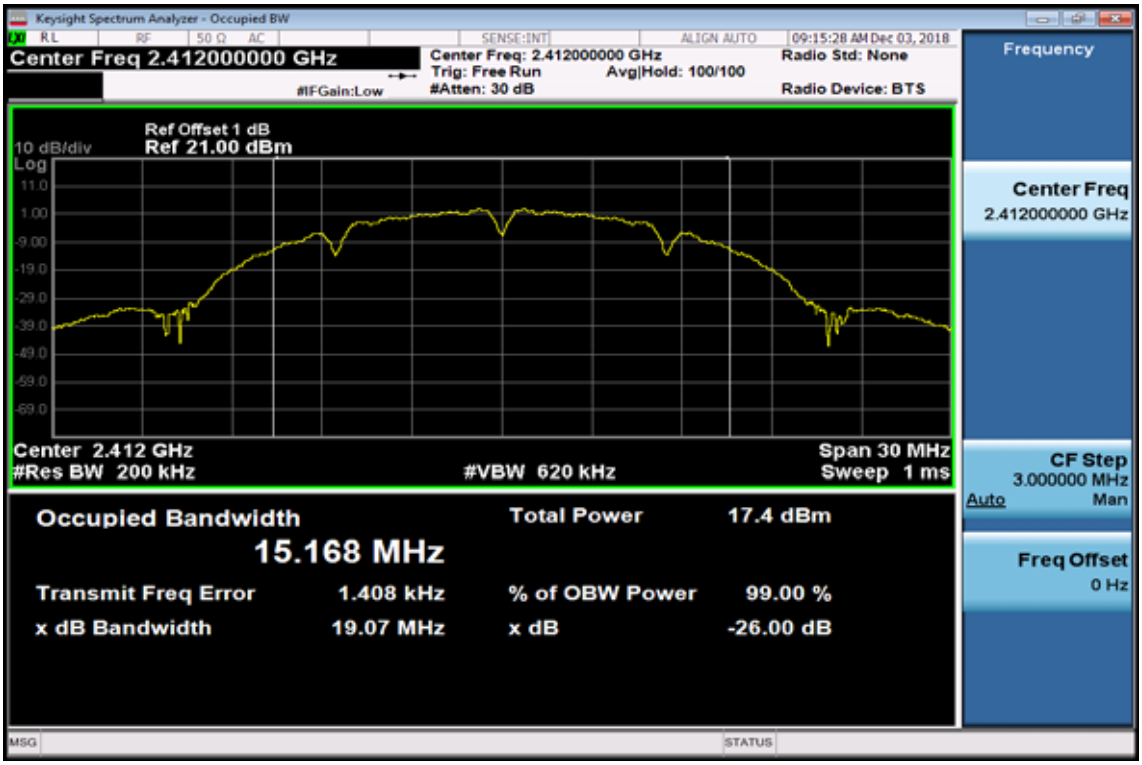


6dB Band Width Test Data CH-High

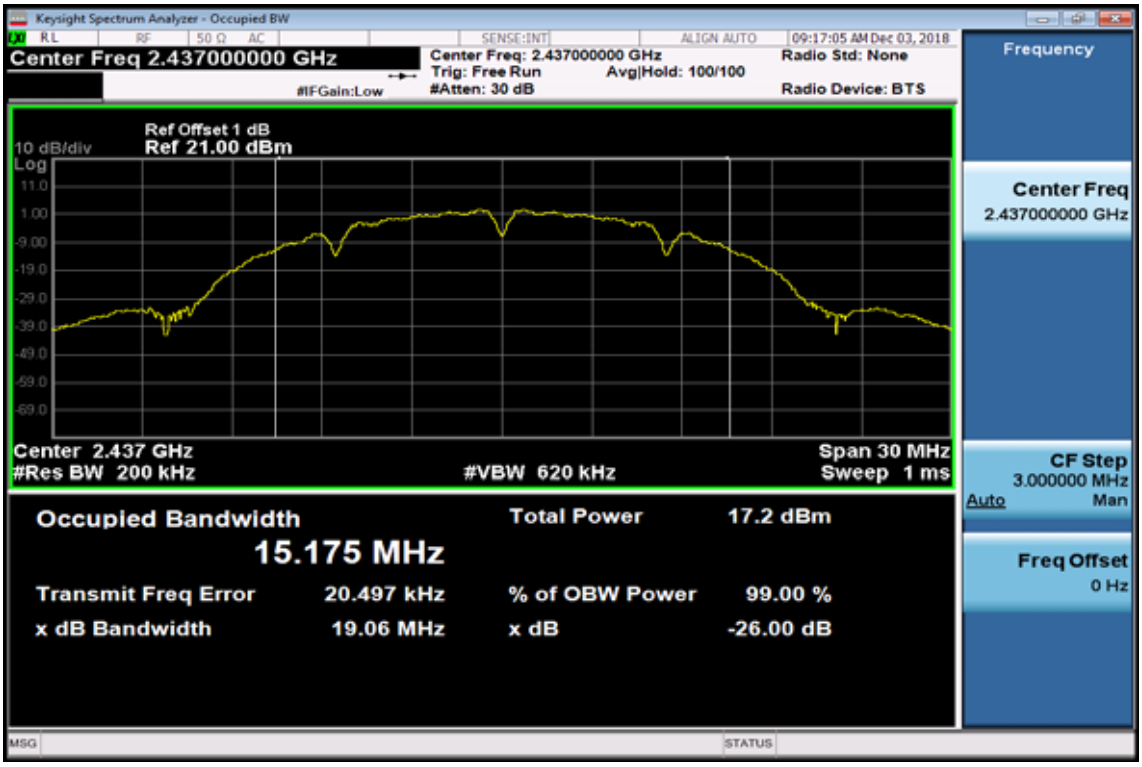


802.11b

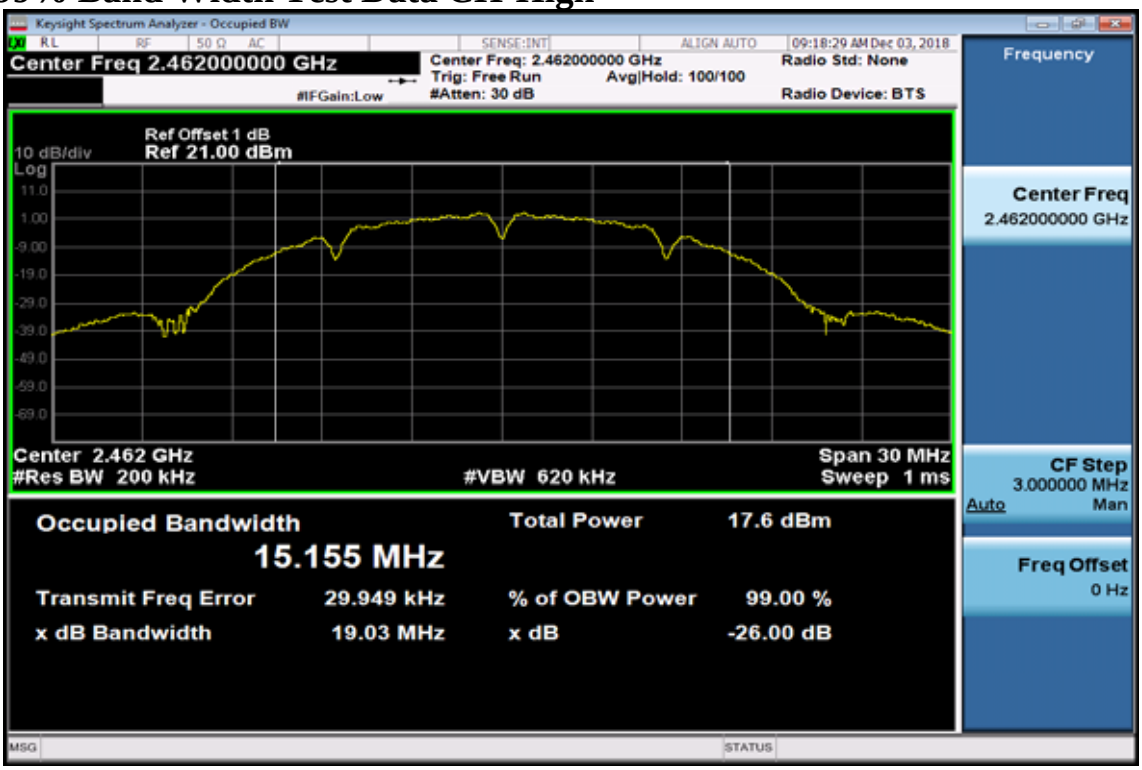
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

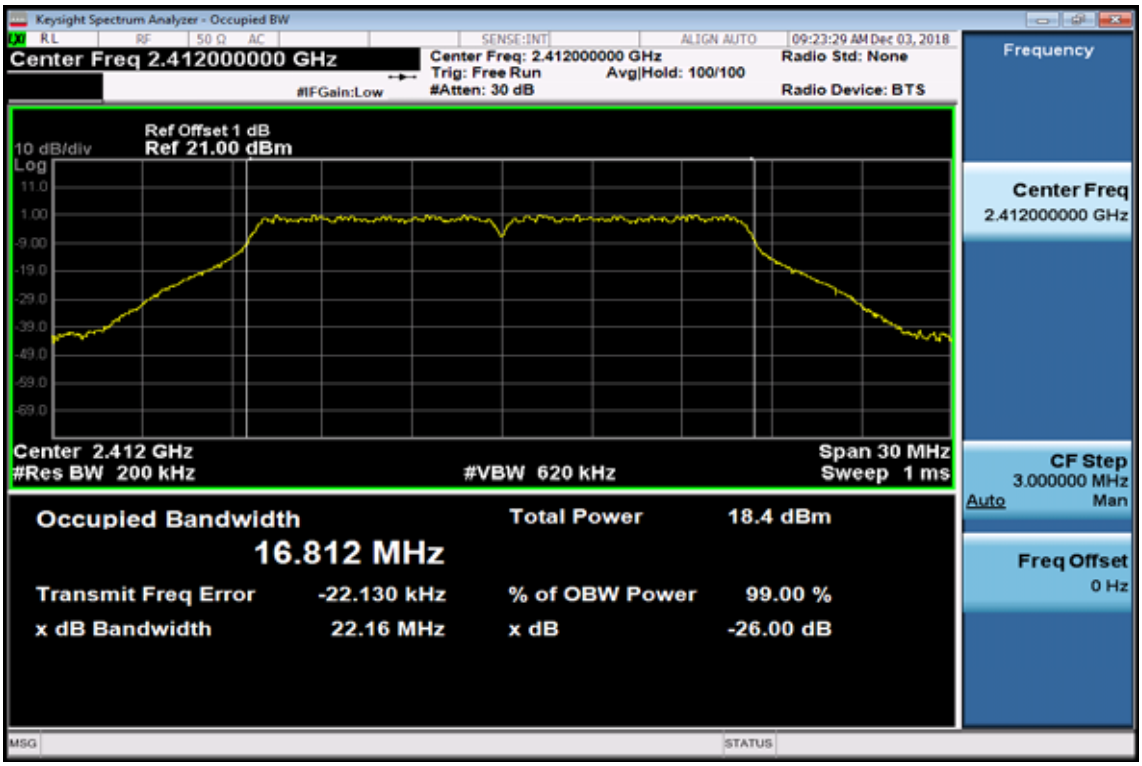


99% Band Width Test Data CH-High

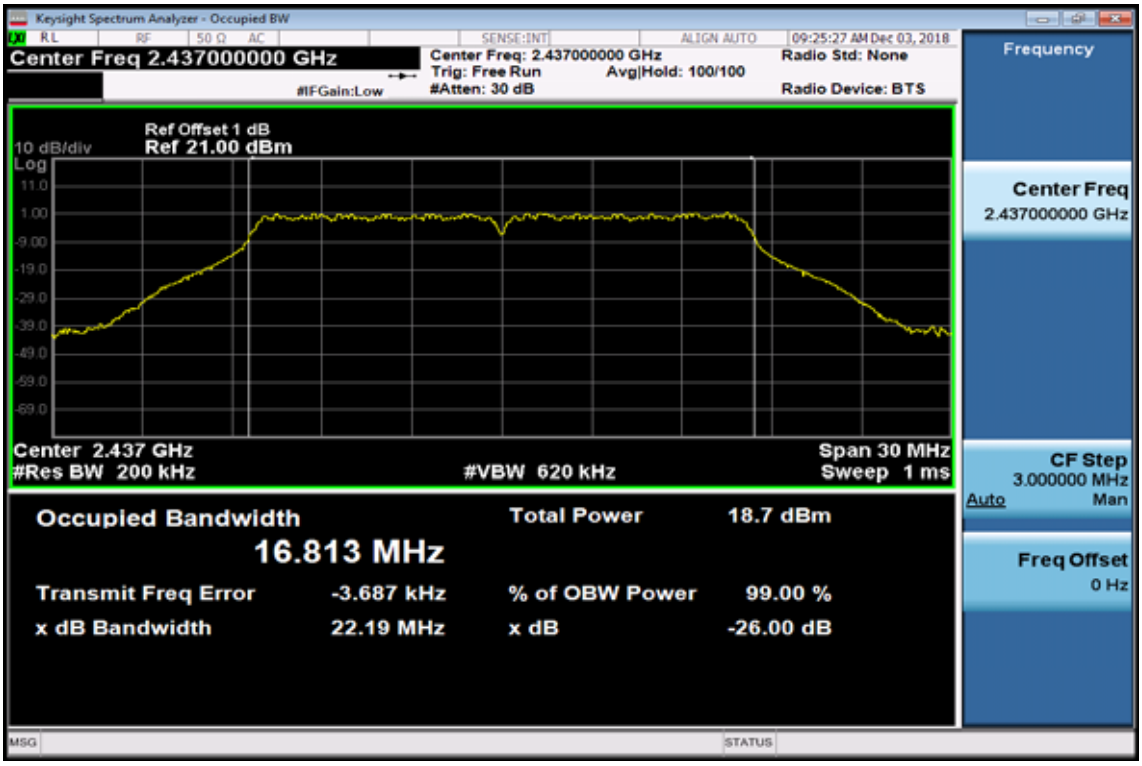


802.11g

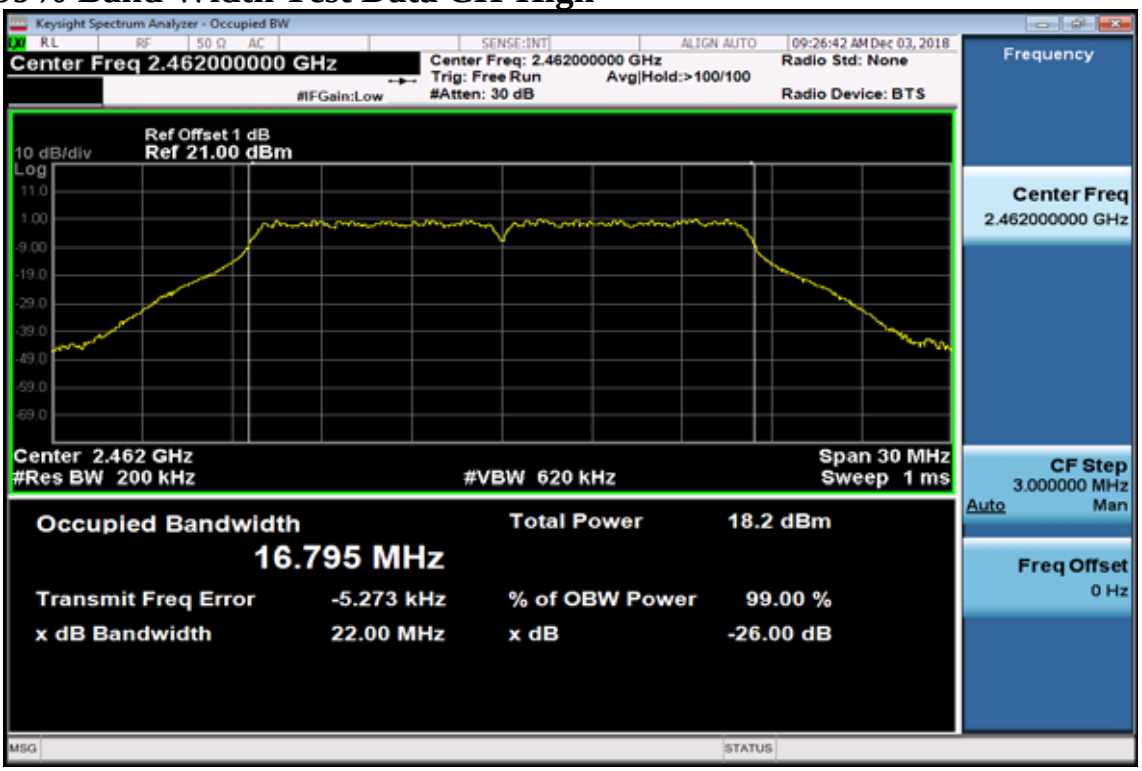
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

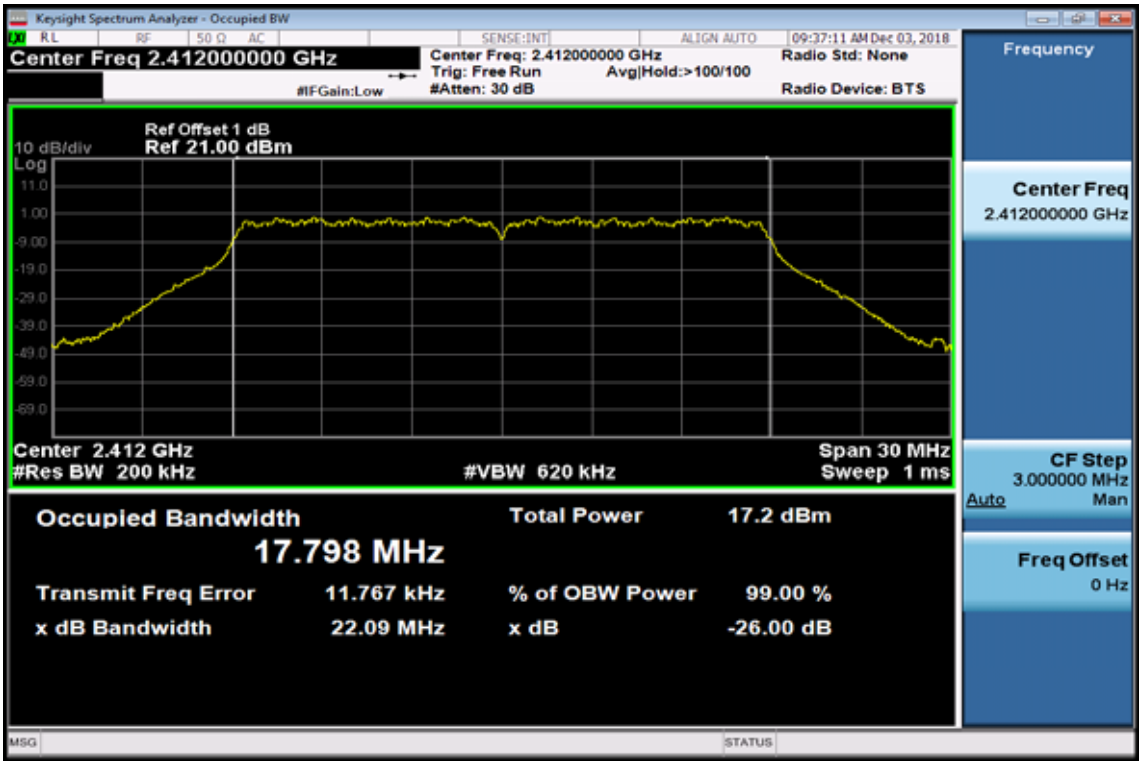


99% Band Width Test Data CH-High

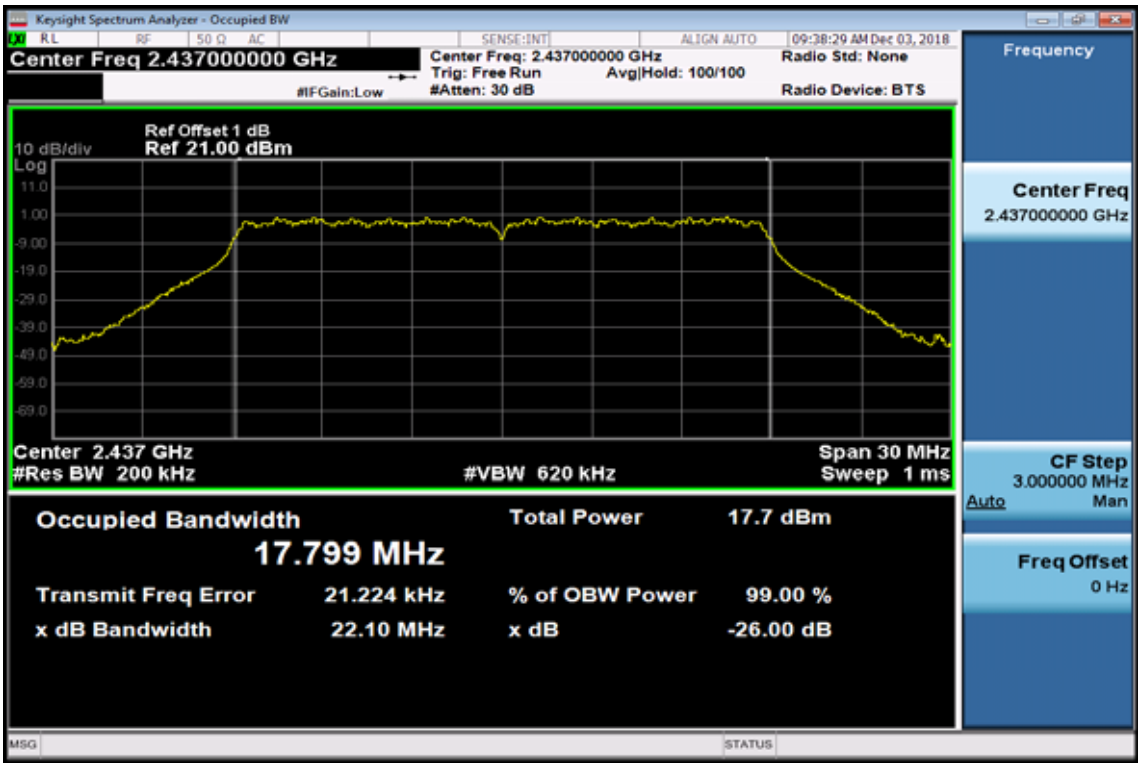


802.11n_20HT

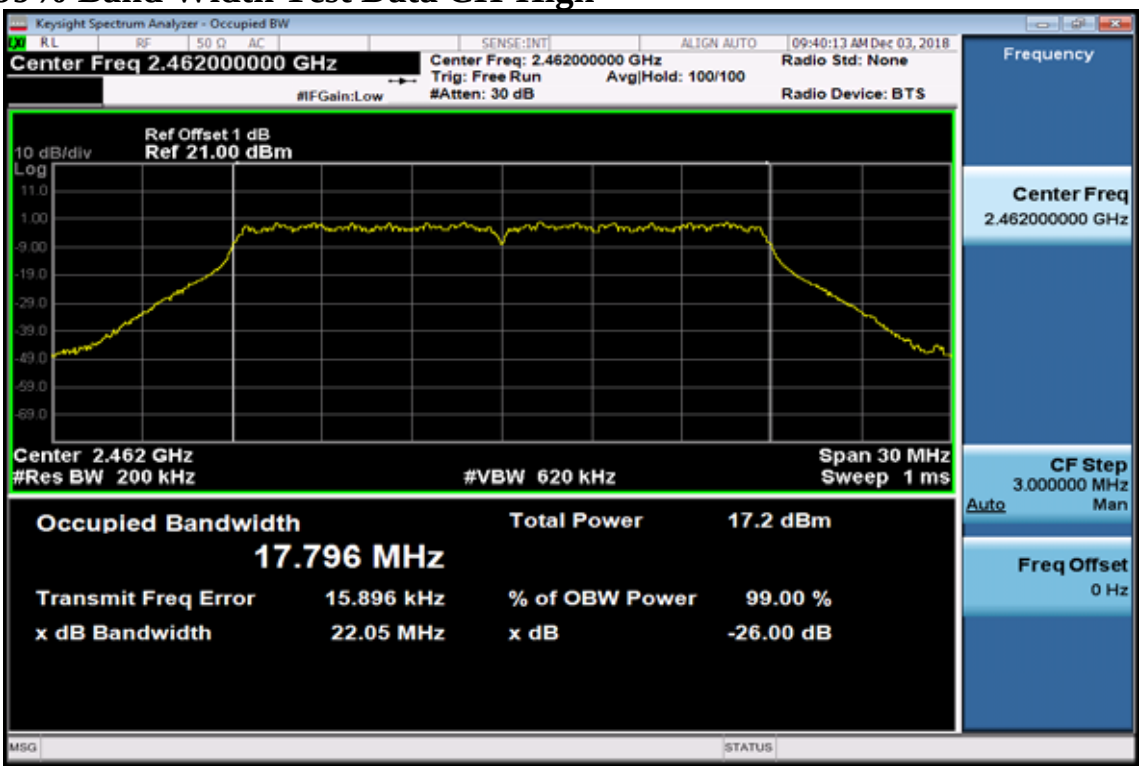
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

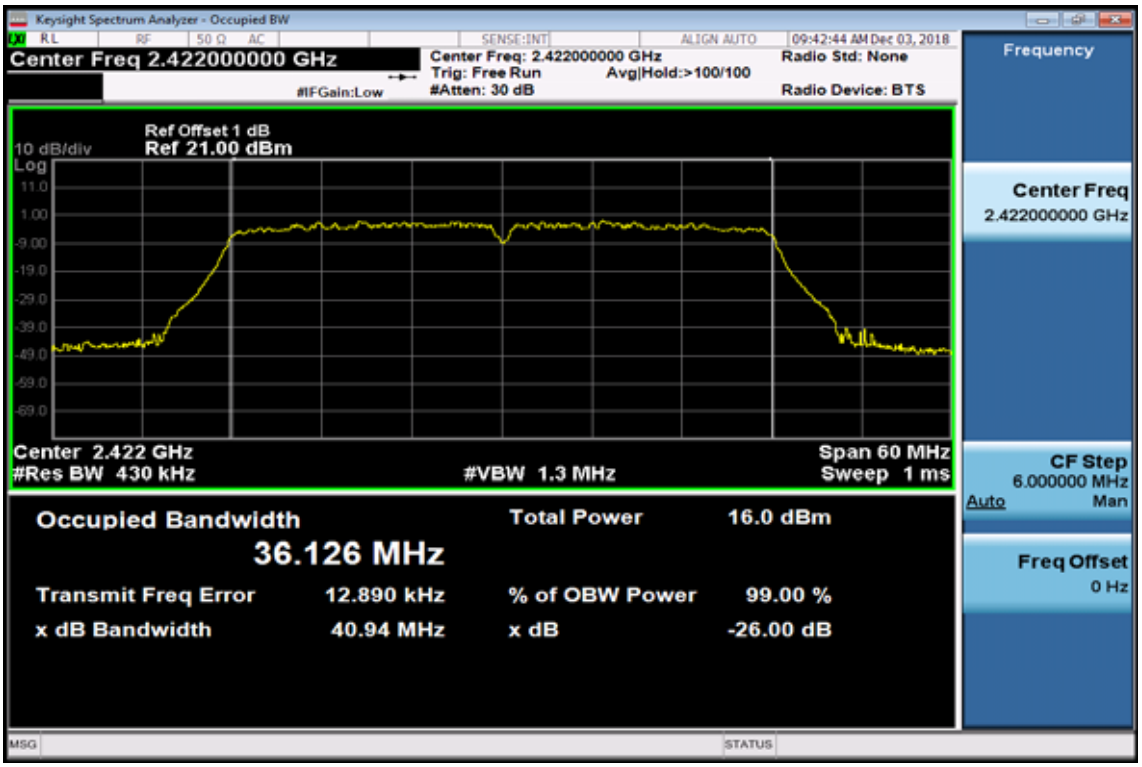


99% Band Width Test Data CH-High

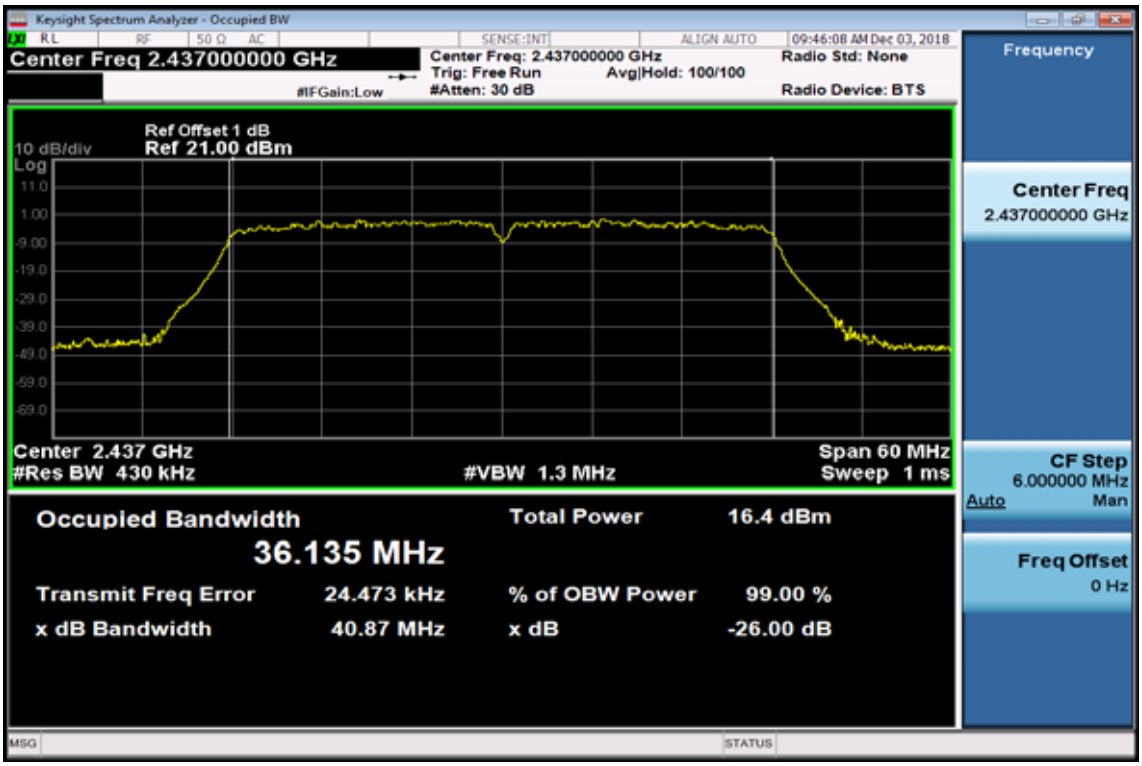


802.11n_40HT

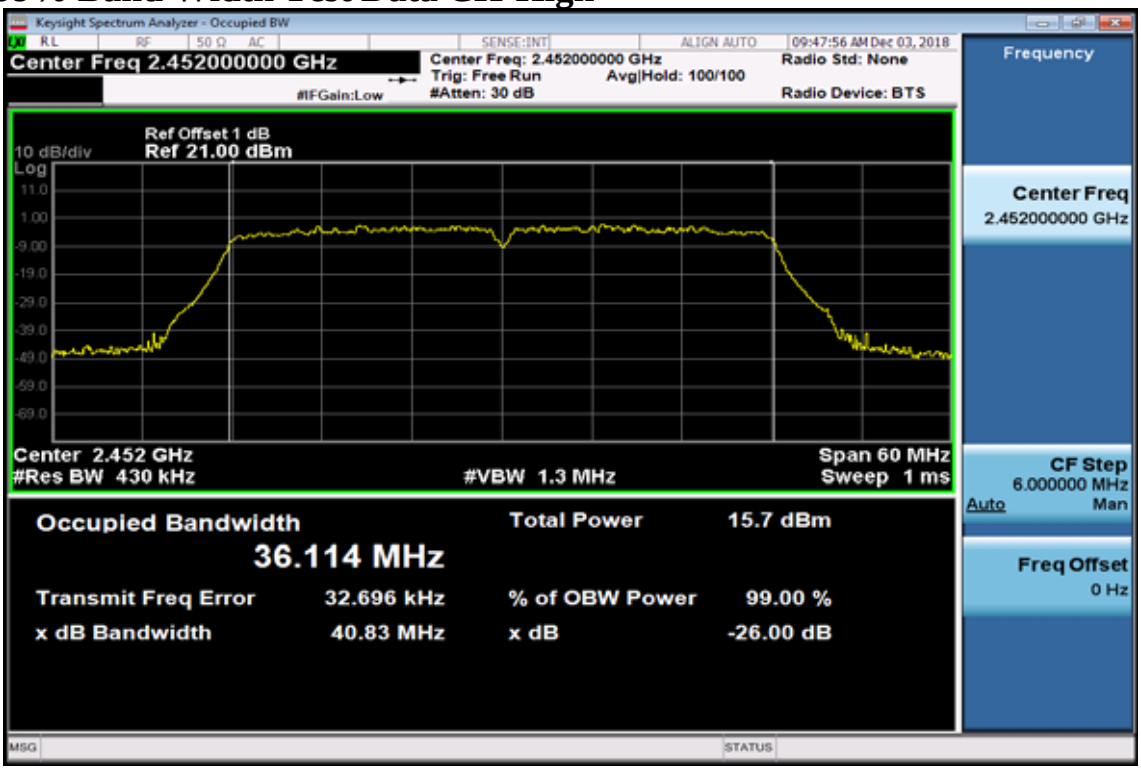
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

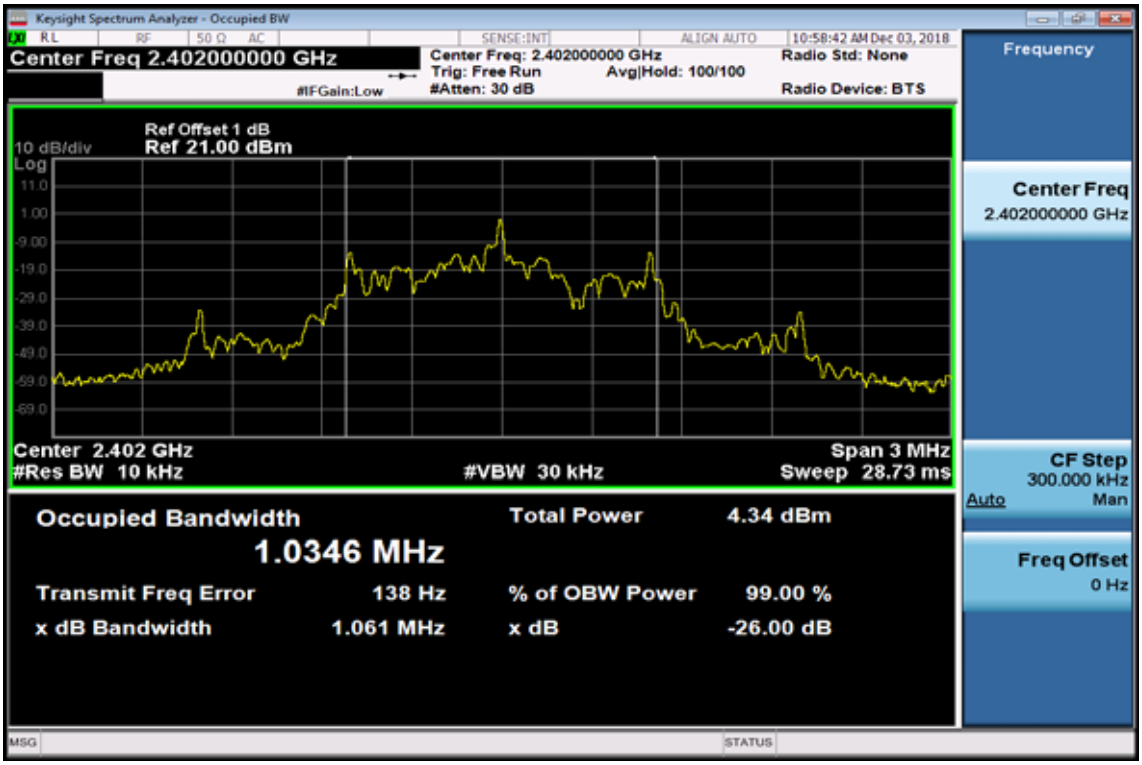


99% Band Width Test Data CH-High



BT LE

99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

99% Band Width Test Data CH-High

8 100kHz Bandwidth of Band Edges Measurement

8.1 Standard Applicable:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

According to RSS-247 issue 2, §5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digi-tally modulated device is operating, the RF power that is produced shall be at least 20 dB be-low that in the 100 kHz bandwidth within the band that contains the highest level of the de-sired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

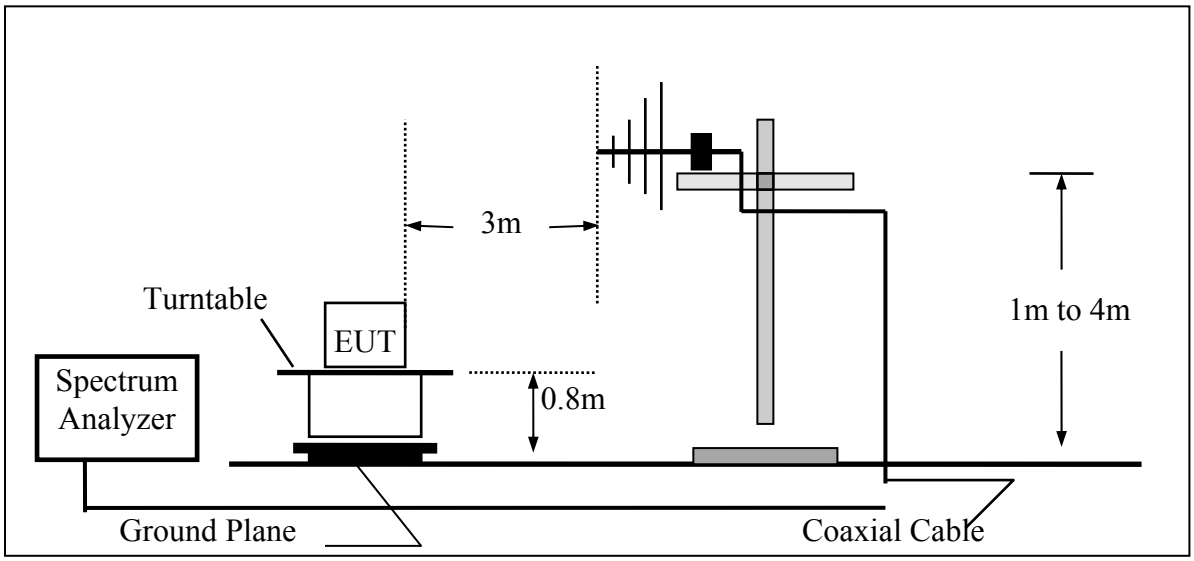
8.2.2. Radiated emission:

Chamber 14(966)					
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Last Cal.**	**Cal Due.**
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY52100117	06/30/2018	06/29/2019
EMI Receiver	SCHWARZBECK	FCVU1534	1534149	12/07/2018	12/06/2019
Dipole antenna	SCHWARZBECK	VHAP,30-300	919	12/28/2017	12/27/2019
Dipole antenna	SCHWARZBECK	UHAP,300-1000	1195	12/28/2017	12/27/2019
Loop Antenna9K-30M	EM	EM 6879	271	06/06/2018	06/05/2020
Bilog Antenna30-1G	SCHWARZBECK	VULB9168	736	07/21/2018	07/20/2019
Horn antenna1-18G	ETS	3117	00066665	11/29/2018	11/28/2019
Horn antenna18-26G(04)	Com-power	AH-826	081001	11/21/2017	11/20/2019
Horn antenna26-40G(05)	Com-power	AH-640	100A	02/22/2017	02/21/2019
Preamplifier9-1000M	HP	8447F	NA	12/08/2018	12/07/2019
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/26/2018	07/25/2019
Preamplifier1-26G	EM	EM01M26G	NA	11/24/2018	11/23/2019
Preamplifier26-40G	MITEQ	JS-26004000-27-5A	818471	11/20/2017	11/19/2019
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	11/12/2018	11/11/2019
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	11/12/2018	11/11/2019
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	11/02/2017	11/01/2019
Signal Generator	R&S	SMU200A	102330	03/14/2018	03/13/2019
Signal Generator	Anritsu	MG3692A	50405	12/07/2018	12/06/2019
2.4G Filter	Micro-Tronics	Brm50702	76	12/25/2018	12/24/2019
Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A

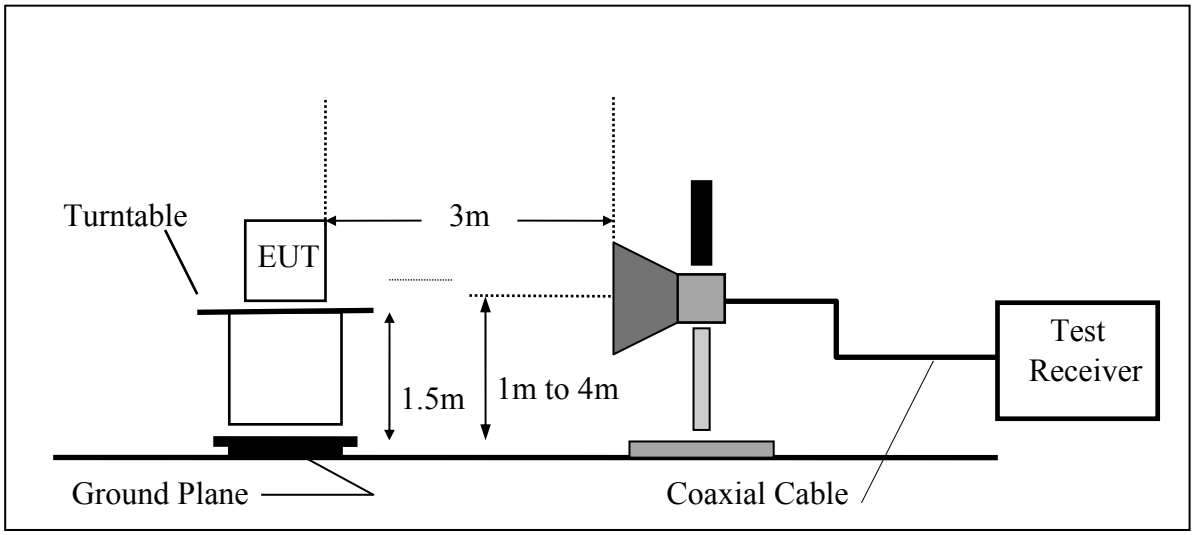
8.3 Test Setup

The test item only performed radiated mode

(A) Radiated Emission Test Setup for frequency below 1000MHz



(B) Radiated Emission Test Setup for frequency above 1 GHz



8.4 Measurement Procedure:

1. Place the EUT on the table 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 the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100kHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

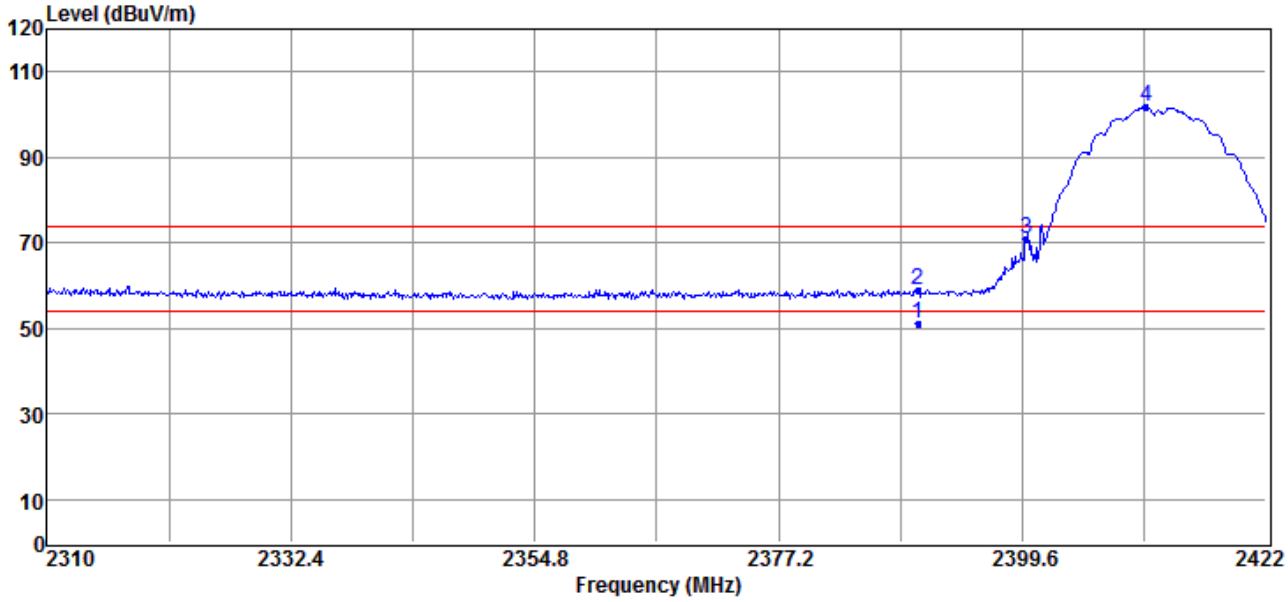
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Radiated Emission: 802.11 b mode

Operation Mode	TX CH Low	Test Date	2019/01/16
Fundamental Frequency	2412 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	18.31	32.72	51.03	54.00	-2.97	Average	VERTICAL
2	2390.00	26.06	32.72	58.78	74.00	-15.22	Peak	VERTICAL
3	2400.00	38.13	32.71	70.84	81.90	-11.06	Peak	VERTICAL
4	2411.02	69.18	32.72	101.90	F	--	Peak	VERTICAL

Remark:

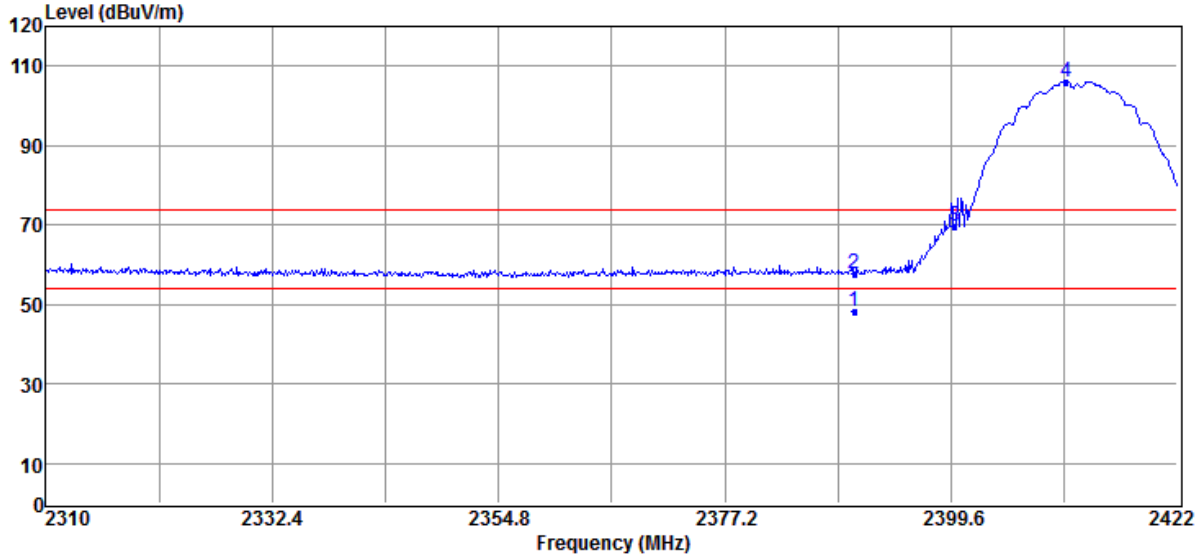
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	15.43	32.72	48.15	54.00	-5.85	Average	HORIZONTAL
2	2390.00	25.19	32.72	57.91	74.00	-16.09	Peak	HORIZONTAL
3	2400.00	36.86	32.71	69.57	76.15	-6.58	Peak	HORIZONTAL
4	2411.02	73.43	32.72	106.15	F	--	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

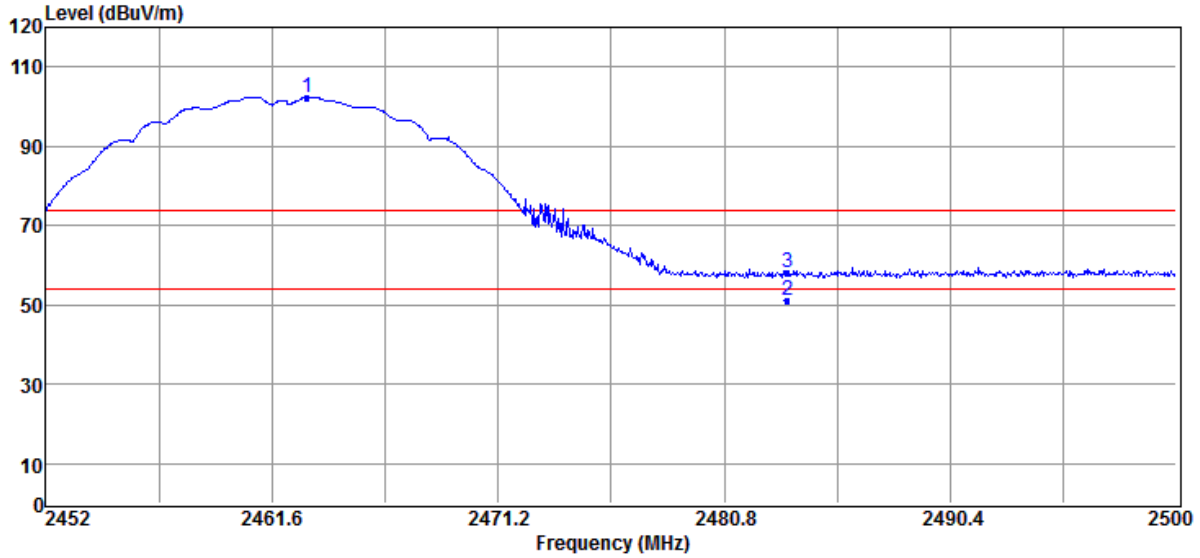
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Operation Mode	TX CH High	Test Date	2019/01/16
Fundamental Frequency	2462 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2463.09	69.64	32.74	102.38	F	---	Peak	VERTICAL
2	2483.50	18.46	32.76	51.22	54.00	-2.78	Average	VERTICAL
3	2483.50	25.22	32.76	57.98	74.00	-16.02	Peak	VERTICAL

Remark:

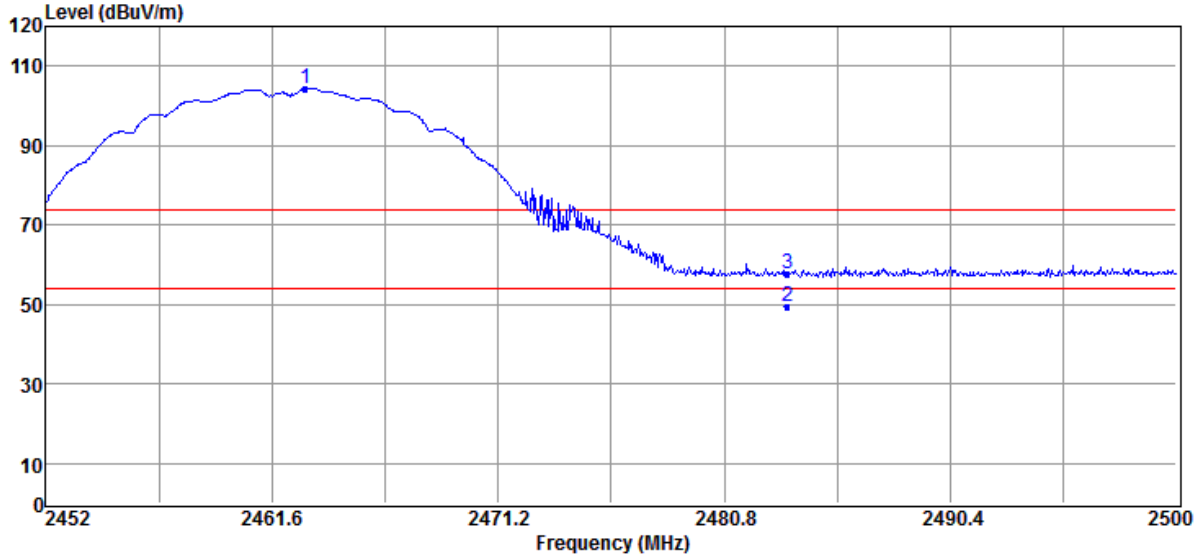
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2462.08	107.19	-3.12	104.30	F	---	Peak	HORIZONTAL
2	2483.50	55.56	-3.11	49.29	54.00	-4.71	Average	HORIZONTAL
3	2485.46	49.13	-3.10	57.65	74.00	-16.35	Peak	HORIZONTAL
4	2485.46	58.48	-3.10	104.30	74.00	30.30	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

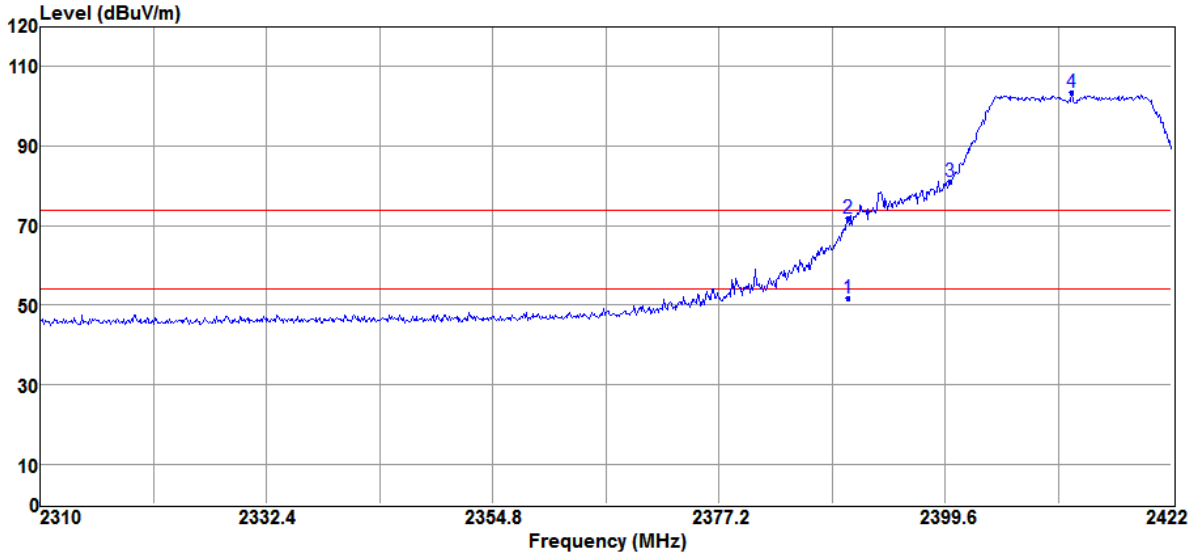
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Radiated Emission: 802.11 g mode

Operation Mode	TX CH Low	Test Date	2019/01/16
Fundamental Frequency	2412 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	54.85	-3.15	49.26	54.00	-4.74	Average	VERTICAL
2	2390.00	75.08	-3.15	58.25	74.00	-15.75	Peak	VERTICAL
3	2400.05	84.19	-3.16	75.96	80.53	-4.57	Peak	VERTICAL
4	2412.14	106.72	-3.15	100.53	F	--	Peak	VERTICAL

Remark:

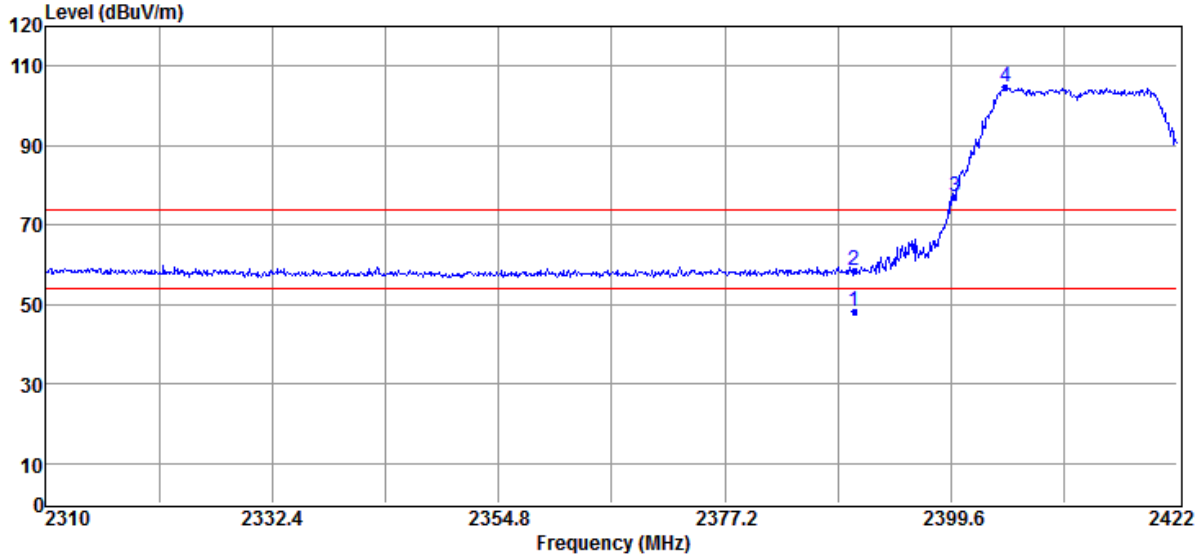
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	15.36	32.72	48.08	54.00	-5.92	Average	HORIZONTAL
2	2390.00	25.74	32.72	58.46	74.00	-15.54	Peak	HORIZONTAL
3	2400.00	44.55	32.71	77.26	84.66	-7.40	Peak	HORIZONTAL
4	2404.98	71.95	32.71	104.66	F	--	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

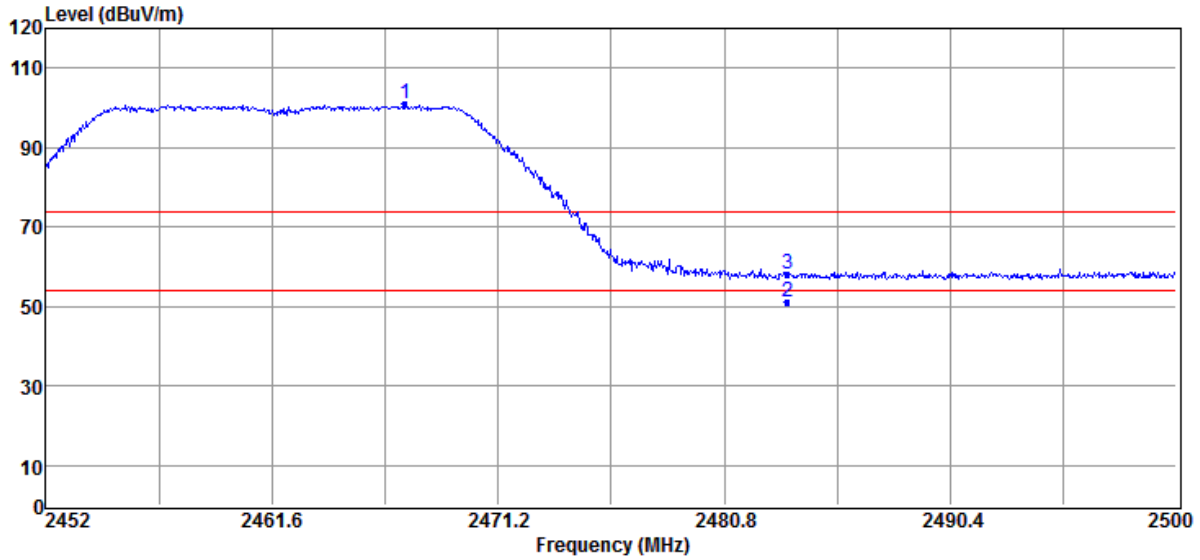
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Operation Mode	TX CH High	Test Date	2019/01/16
Fundamental Frequency	2462 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2467.26	68.09	32.75	100.84	F	---	Peak	VERTICAL
2	2483.50	18.37	32.76	51.13	54.00	-2.87	Average	VERTICAL
3	2483.50	25.34	32.76	58.10	74.00	-15.90	Peak	VERTICAL

Remark:

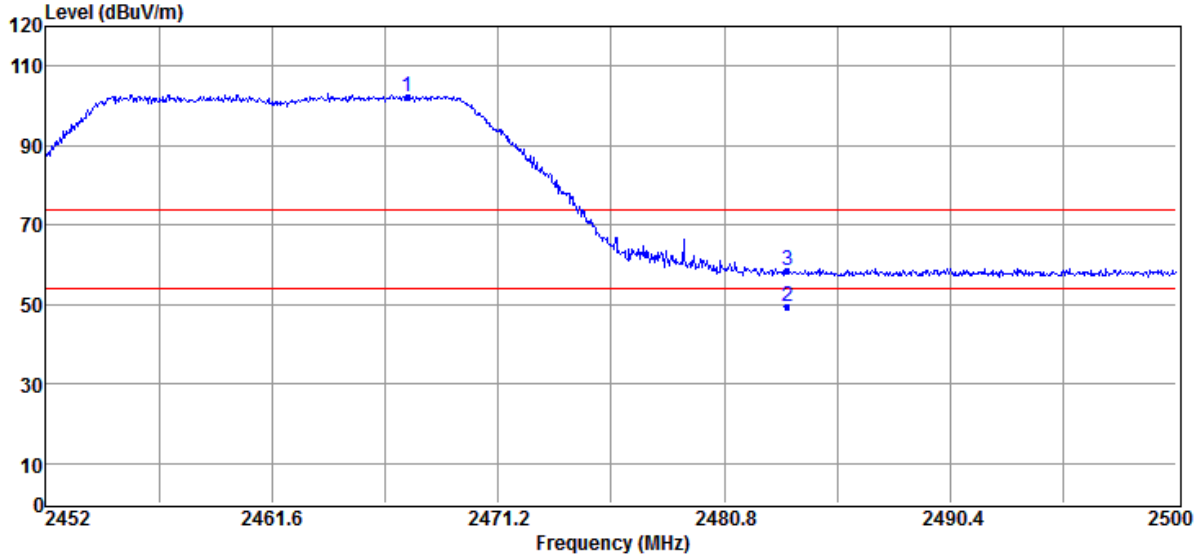
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2467.36	69.71	32.75	102.46	F	---	Peak	HORIZONTAL
2	2483.50	16.58	32.76	49.34	54.00	-4.66	Average	HORIZONTAL
3	2483.50	25.87	32.76	58.63	74.00	-15.37	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

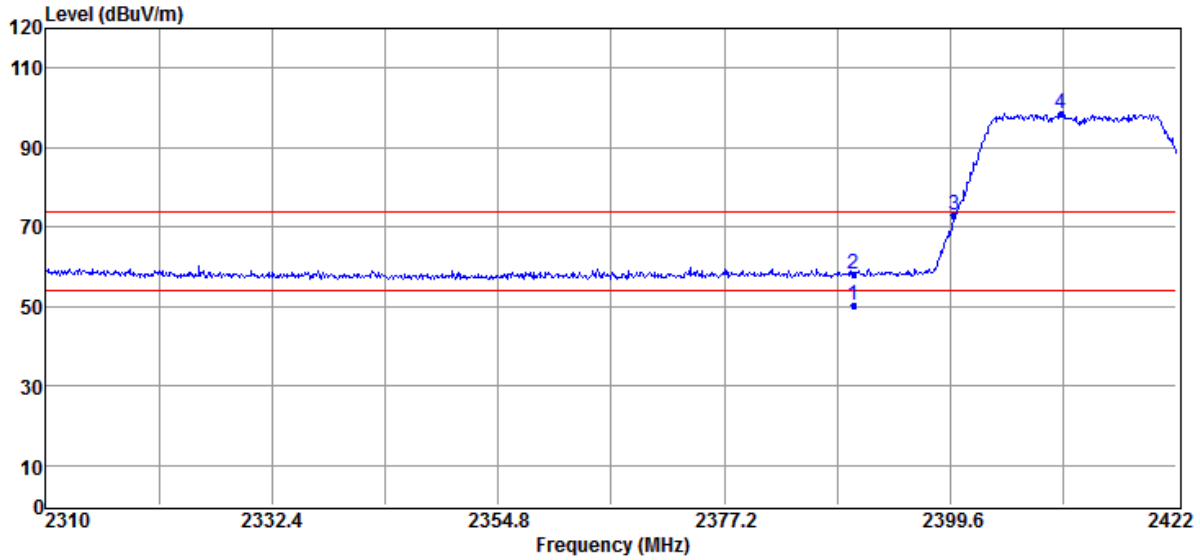
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Radiated Emission: 802.11 n_HT20 mode

Operation Mode	TX CH Low	Test Date	2019/01/16
Fundamental Frequency	2412 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	17.42	32.72	50.14	54.00	-3.86	Average	VERTICAL
2	2390.00	25.37	32.72	58.09	74.00	-15.91	Peak	VERTICAL
3	2400.00	40.13	32.71	72.84	78.59	-5.75	Peak	VERTICAL
4	2410.58	65.87	32.72	98.59	F	--	Peak	VERTICAL

Remark:

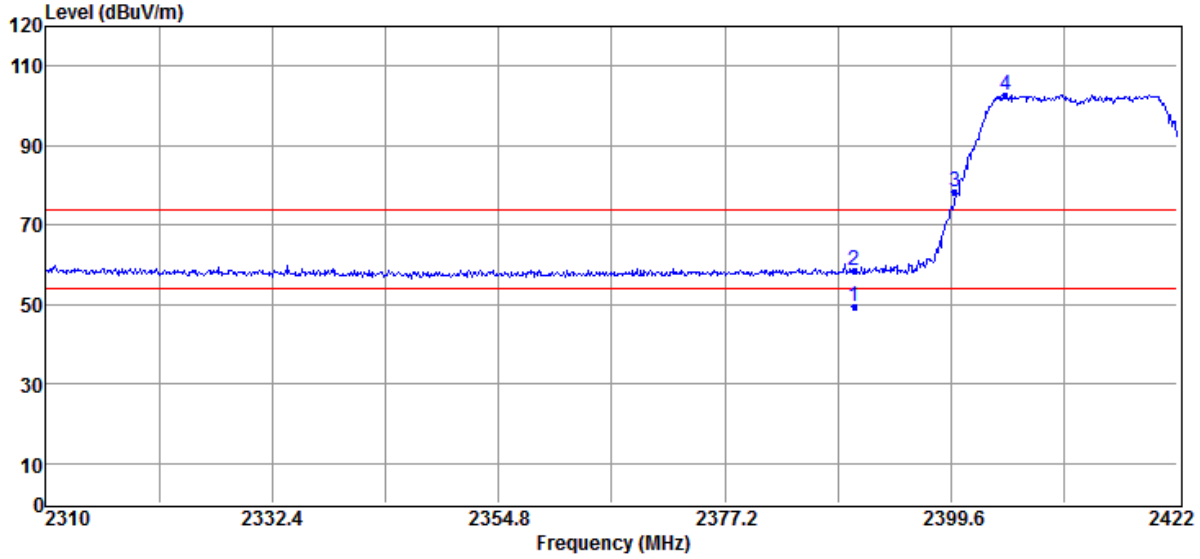
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	16.74	32.72	49.46	54.00	-4.54	Average	HORIZONTAL
2	2390.00	25.88	32.72	58.60	74.00	-15.40	Peak	HORIZONTAL
3	2400.00	45.62	32.71	78.33	82.69	-4.36	Peak	HORIZONTAL
4	2404.98	69.98	32.71	102.69	F	--	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

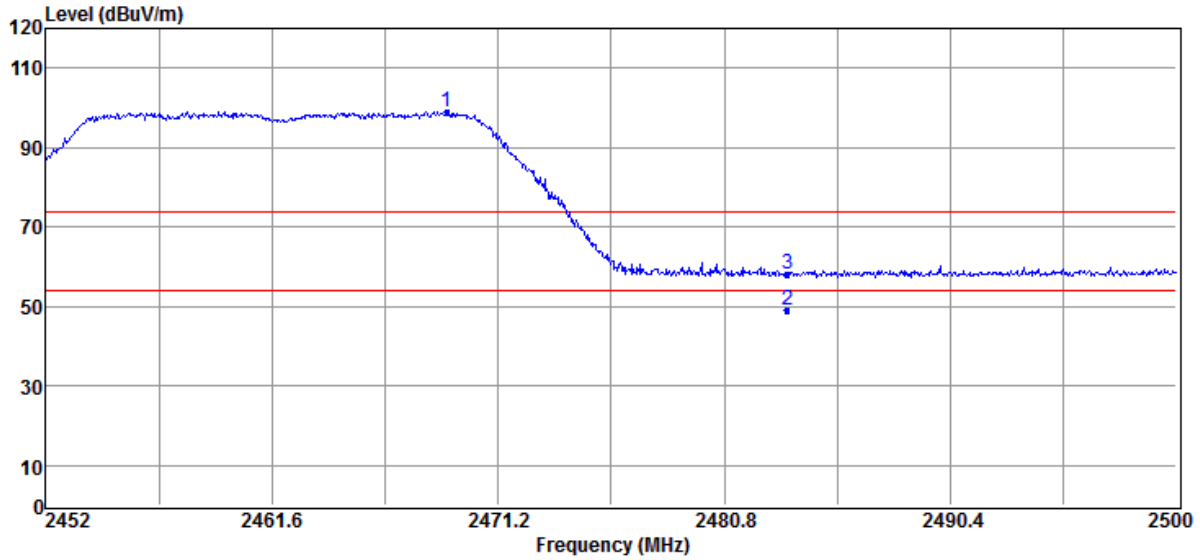
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Operation Mode	TX CH High	Test Date	2019/01/16
Fundamental Frequency	2462 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2469.04	66.41	32.75	99.16	F	---	Peak	VERTICAL
2	2483.50	16.44	32.76	49.20	54.00	-4.80	Average	VERTICAL
3	2483.50	25.50	32.76	58.26	74.00	-15.74	Peak	VERTICAL

Remark:

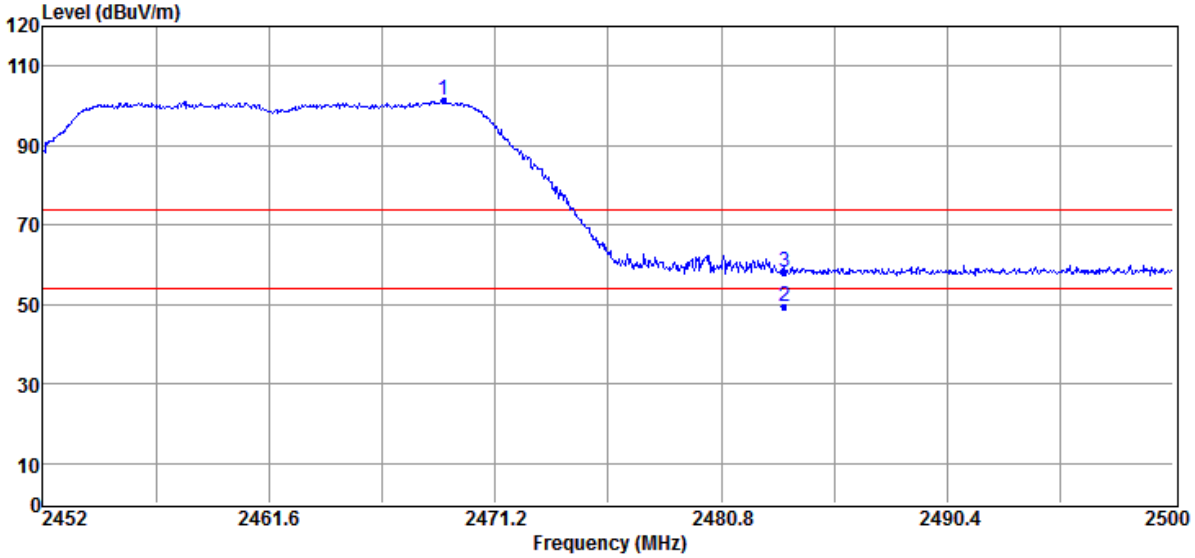
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2469.04	68.58	32.75	101.33	F	---	Peak	HORIZONTAL
2	2483.50	16.72	32.76	49.48	54.00	-4.52	Average	HORIZONTAL
3	2483.50	25.24	32.76	58.00	74.00	-16.00	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

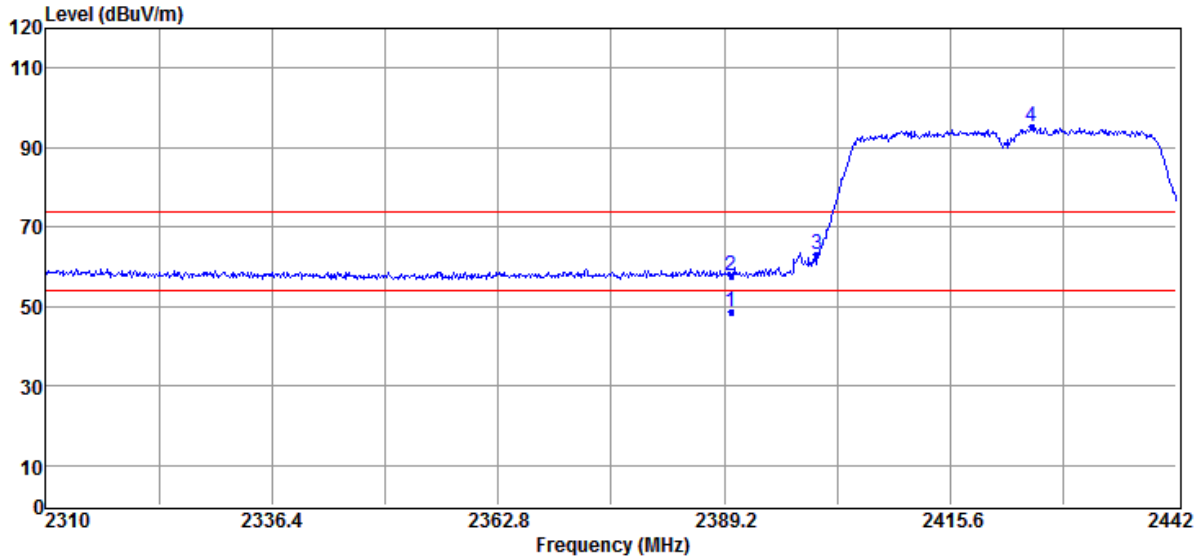
3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Radiated Emission: 802.11 n_HT40 mode

Operation Mode	TX CH Low	Test Date	2019/01/16
Fundamental Frequency	2412 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	16.10	32.72	48.82	54.00	-5.18	Average	VERTICAL
2	2390.00	25.18	32.72	57.90	74.00	-16.10	Peak	VERTICAL
3	2400.00	30.23	32.71	62.94	75.09	-12.15	Peak	VERTICAL
4	2425.10	62.37	32.72	95.09	F	--	Peak	VERTICAL

Remark:

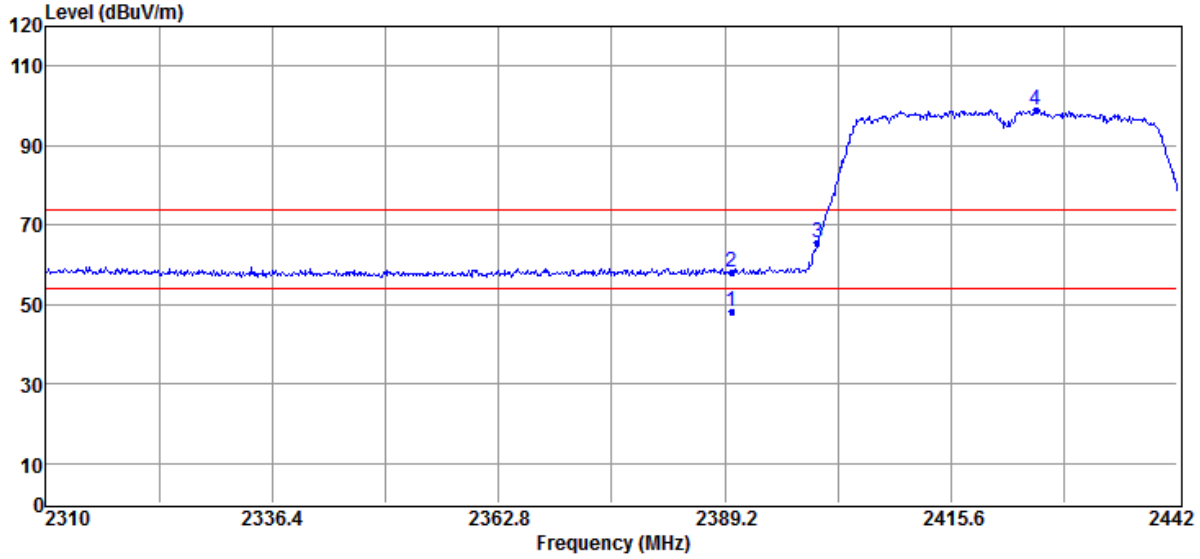
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	15.47	32.72	48.19	54.00	-5.81	Average	HORIZONTAL
2	2390.00	25.60	32.72	58.32	74.00	-15.68	Peak	HORIZONTAL
3	2400.00	32.72	32.71	65.43	79.06	-13.63	Peak	HORIZONTAL
4	2425.50	66.34	32.72	99.06	F	--	Peak	HORIZONTAL

Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

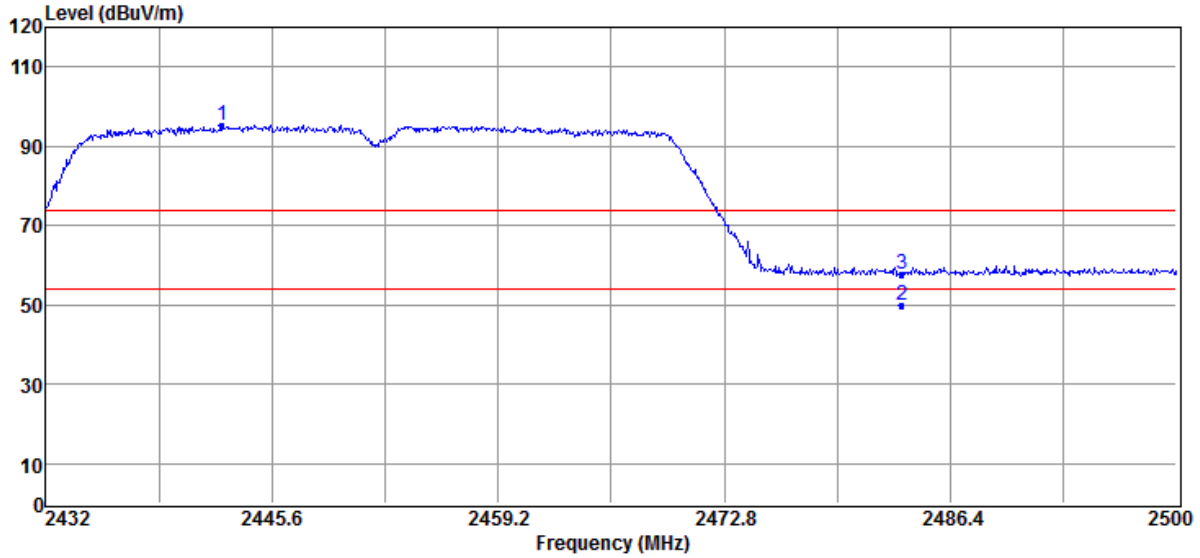
2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

Operation Mode	TX CH High	Test Date	2019/01/16
Fundamental Frequency	2462 MHz	Test By	Barry
Temperature	25 ℃	Humidity	60 %



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2442.61	62.56	32.73	95.29	F	---	Peak	VERTICAL
2	2483.50	17.24	32.76	50.00	54.00	-4.00	Average	VERTICAL
3	2483.50	25.01	32.76	57.77	74.00	-16.23	Peak	VERTICAL

Remark:

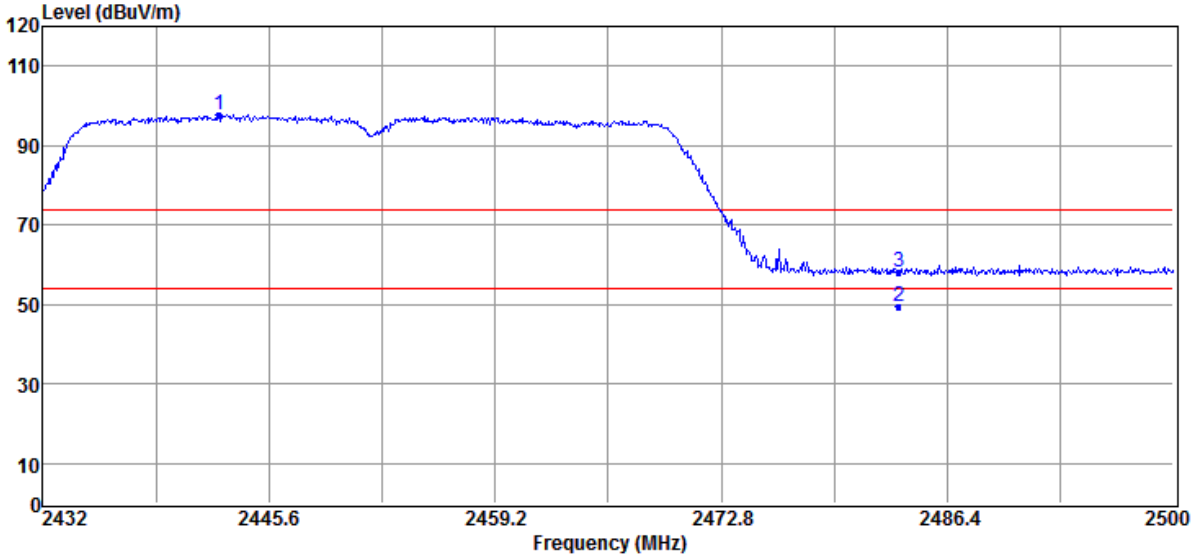
1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2442.61	65.05	32.73	97.78	F	---	Peak	HORIZONTAL
2	2483.50	16.72	32.76	49.48	54.00	-4.52	Peak	HORIZONTAL
3	2483.50	25.26	32.76	58.02	74.00	-15.98	Peak	HORIZONTAL

9 Remark:

1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

2 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: "F" denotes fundamental frequency

9 Spurious Radiated Emission Test

9.1 Standard Applicable

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-247 issue 2, §5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digi-tally modulated device is operating, the RF power that is produced shall be at least 20 dB be-low that in the 100 kHz bandwidth within the band that contains the highest level of the de-sired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

9.2 Measurement Equipment Used:

9.2.1 Conducted Emission at antenna port:

Refer to section 6.2 for details.

9.2.2 Radiated emission:

Refer to section 8.2 for details.

9.3 Test SET-UP:

The test item only performed radiated mode

Refer to section 8.3 for details.

9.4 Measurement Procedure:

1. According 414788 section 2, Either OATS or chamber for radiated emission below 30MHz, the test was done at 966 chamber, the test site was evaluated with OATS and the Chamber has test signals level greater than OATS's .
2. The EUT was placed on a turn table which is 0.8m/1.5m above ground plane in 966 chamber.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. Repeat above procedures until all frequency measured were complete.

9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	46.49	43.27	-6.24	37.03	40.00	-2.97	Peak	VERTICAL
2	69.77	39.70	-8.63	31.07	40.00	-8.93	Peak	VERTICAL
3	314.21	37.20	-4.60	32.60	46.00	-13.40	Peak	VERTICAL
4	443.22	39.03	-2.20	36.83	46.00	-9.17	Peak	VERTICAL
5	562.53	35.00	-0.50	34.50	46.00	-11.50	Peak	VERTICAL
6	777.87	31.06	3.37	34.43	46.00	-11.57	Peak	VERTICAL
1	47.46	37.15	-6.21	30.94	40.00	-9.06	Peak	HORIZONTAL
2	159.98	36.75	-5.89	30.86	43.50	-12.64	Peak	HORIZONTAL
3	313.24	37.01	-4.61	32.40	46.00	-13.60	Peak	HORIZONTAL
4	451.95	38.18	-2.06	36.12	46.00	-9.88	Peak	HORIZONTAL
5	542.16	34.76	-0.95	33.81	46.00	-12.19	Peak	HORIZONTAL
6	770.11	34.27	3.29	37.56	46.00	-8.44	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	48.43	43.76	-6.19	37.57	40.00	-2.43	Peak	VERTICAL
2	70.74	40.85	-8.86	31.99	40.00	-8.01	Peak	VERTICAL
3	316.15	36.77	-4.56	32.21	46.00	-13.79	Peak	VERTICAL
4	448.07	38.20	-2.11	36.09	46.00	-9.91	Peak	VERTICAL
5	497.54	36.56	-1.68	34.88	46.00	-11.12	Peak	VERTICAL
6	546.04	34.02	-0.88	33.14	46.00	-12.86	Peak	VERTICAL
1	51.34	38.42	-6.23	32.19	40.00	-7.81	Peak	HORIZONTAL
2	159.01	37.37	-5.90	31.47	43.50	-12.03	Peak	HORIZONTAL
3	310.33	36.79	-4.66	32.13	46.00	-13.87	Peak	HORIZONTAL
4	441.28	38.54	-2.22	36.32	46.00	-9.68	Peak	HORIZONTAL
5	497.54	37.04	-1.68	35.36	46.00	-10.64	Peak	HORIZONTAL
6	778.84	34.44	3.37	37.81	46.00	-8.19	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11b TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	47.46	44.30	-6.21	38.09	40.00	-1.91	Peak	VERTICAL
2	67.83	38.77	-8.26	30.51	40.00	-9.49	Peak	VERTICAL
3	314.21	36.55	-4.60	31.95	46.00	-14.05	Peak	VERTICAL
4	444.19	38.68	-2.18	36.50	46.00	-9.50	Peak	VERTICAL
5	548.95	34.79	-0.83	33.96	46.00	-12.04	Peak	VERTICAL
6	725.49	31.50	2.50	34.00	46.00	-12.00	Peak	VERTICAL
1	48.43	39.94	-6.19	33.75	40.00	-6.25	Peak	HORIZONTAL
2	157.07	36.41	-5.91	30.50	43.50	-13.00	Peak	HORIZONTAL
3	214.30	40.74	-8.38	32.36	43.50	-11.14	Peak	HORIZONTAL
4	314.21	36.59	-4.60	31.99	46.00	-14.01	Peak	HORIZONTAL
5	449.04	38.89	-2.09	36.80	46.00	-9.20	Peak	HORIZONTAL
6	772.05	34.07	3.31	37.38	46.00	-8.62	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	46.49	43.46	-6.24	37.22	40.00	-2.78	Peak	VERTICAL
2	67.83	39.93	-8.26	31.67	40.00	-8.33	Peak	VERTICAL
3	313.24	38.17	-4.61	33.56	46.00	-12.44	Peak	VERTICAL
4	438.37	41.66	-2.28	39.38	46.00	-6.62	Peak	VERTICAL
5	543.13	35.34	-0.92	34.42	46.00	-11.58	Peak	VERTICAL
6	715.79	31.40	2.27	33.67	46.00	-12.33	Peak	VERTICAL
1	47.46	37.86	-6.21	31.65	40.00	-8.35	Peak	HORIZONTAL
2	159.01	36.77	-5.90	30.87	43.50	-12.63	Peak	HORIZONTAL
3	215.27	40.72	-8.34	32.38	43.50	-11.12	Peak	HORIZONTAL
4	312.27	36.35	-4.62	31.73	46.00	-14.27	Peak	HORIZONTAL
5	449.04	38.12	-2.09	36.03	46.00	-9.97	Peak	HORIZONTAL
6	730.34	39.92	2.62	42.54	46.00	-3.46	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	48.43	44.25	-6.19	38.06	40.00	-1.94	Peak	VERTICAL
2	70.74	40.13	-8.86	31.27	40.00	-8.73	Peak	VERTICAL
3	315.18	35.82	-4.58	31.24	46.00	-14.76	Peak	VERTICAL
4	451.95	38.88	-2.06	36.82	46.00	-9.18	Peak	VERTICAL
5	563.50	34.63	-0.48	34.15	46.00	-11.85	Peak	VERTICAL
6	775.93	30.70	3.36	34.06	46.00	-11.94	Peak	VERTICAL
1	48.43	36.70	-6.19	30.51	40.00	-9.49	Peak	HORIZONTAL
2	160.95	37.32	-5.92	31.40	43.50	-12.10	Peak	HORIZONTAL
3	216.24	40.20	-8.31	31.89	46.00	-14.11	Peak	HORIZONTAL
4	311.30	36.55	-4.65	31.90	46.00	-14.10	Peak	HORIZONTAL
5	446.13	37.73	-2.14	35.59	46.00	-10.41	Peak	HORIZONTAL
6	754.59	35.32	3.14	38.46	46.00	-7.54	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11g TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	46.49	42.25	-6.24	36.01	40.00	-3.99	Peak	VERTICAL
2	68.80	41.36	-8.44	32.92	40.00	-7.08	Peak	VERTICAL
3	316.15	36.31	-4.56	31.75	46.00	-14.25	Peak	VERTICAL
4	445.16	38.75	-2.16	36.59	46.00	-9.41	Peak	VERTICAL
5	544.10	34.31	-0.90	33.41	46.00	-12.59	Peak	VERTICAL
6	718.70	31.67	2.34	34.01	46.00	-11.99	Peak	VERTICAL
1	47.46	38.11	-6.21	31.90	40.00	-8.10	Peak	HORIZONTAL
2	109.54	38.91	-9.55	29.36	43.50	-14.14	Peak	HORIZONTAL
3	159.98	36.15	-5.89	30.26	43.50	-13.24	Peak	HORIZONTAL
4	216.24	41.04	-8.31	32.73	46.00	-13.27	Peak	HORIZONTAL
5	313.24	36.74	-4.61	32.13	46.00	-13.87	Peak	HORIZONTAL
6	448.07	38.28	-2.11	36.17	46.00	-9.83	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	48.43	43.54	-6.19	37.35	40.00	-2.65	Peak	VERTICAL
2	68.80	39.47	-8.44	31.03	40.00	-8.97	Peak	VERTICAL
3	315.18	36.31	-4.58	31.73	46.00	-14.27	Peak	VERTICAL
4	449.04	38.88	-2.09	36.79	46.00	-9.21	Peak	VERTICAL
5	552.83	34.55	-0.74	33.81	46.00	-12.19	Peak	VERTICAL
6	751.68	31.80	3.11	34.91	46.00	-11.09	Peak	VERTICAL
1	52.31	37.06	-6.29	30.77	40.00	-9.23	Peak	HORIZONTAL
2	158.04	36.81	-5.91	30.90	43.50	-12.60	Peak	HORIZONTAL
3	314.21	36.31	-4.60	31.71	46.00	-14.29	Peak	HORIZONTAL
4	450.98	38.41	-2.06	36.35	46.00	-9.65	Peak	HORIZONTAL
5	539.25	35.05	-0.99	34.06	46.00	-11.94	Peak	HORIZONTAL
6	779.81	34.25	3.40	37.65	46.00	-8.35	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	47.46	44.78	-6.21	38.57	40.00	-1.43	Peak	VERTICAL
2	68.80	41.55	-8.44	33.11	40.00	-6.89	Peak	VERTICAL
3	217.21	35.65	-8.27	27.38	46.00	-18.62	Peak	VERTICAL
4	316.15	36.12	-4.56	31.56	46.00	-14.44	Peak	VERTICAL
5	446.13	39.92	-2.14	37.78	46.00	-8.22	Peak	VERTICAL
6	667.29	32.41	1.31	33.72	46.00	-12.28	Peak	VERTICAL
1	48.43	36.88	-6.19	30.69	40.00	-9.31	Peak	HORIZONTAL
2	159.98	36.78	-5.89	30.89	43.50	-12.61	Peak	HORIZONTAL
3	215.27	40.75	-8.34	32.41	43.50	-11.09	Peak	HORIZONTAL
4	311.30	36.02	-4.65	31.37	46.00	-14.63	Peak	HORIZONTAL
5	441.28	37.64	-2.22	35.42	46.00	-10.58	Peak	HORIZONTAL
6	779.81	34.27	3.40	37.67	46.00	-8.33	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	48.43	43.19	-6.19	37.00	40.00	-3.00	Peak	VERTICAL
2	225.94	34.23	-7.83	26.40	46.00	-19.60	Peak	VERTICAL
3	314.21	36.72	-4.60	32.12	46.00	-13.88	Peak	VERTICAL
4	450.98	37.91	-2.06	35.85	46.00	-10.15	Peak	VERTICAL
5	566.41	33.56	-0.42	33.14	46.00	-12.86	Peak	VERTICAL
6	770.11	31.16	3.29	34.45	46.00	-11.55	Peak	VERTICAL
1	46.49	37.43	-6.24	31.19	40.00	-8.81	Peak	HORIZONTAL
2	159.01	37.55	-5.90	31.65	43.50	-11.85	Peak	HORIZONTAL
3	215.27	40.69	-8.34	32.35	43.50	-11.15	Peak	HORIZONTAL
4	311.30	36.68	-4.65	32.03	46.00	-13.97	Peak	HORIZONTAL
5	444.19	38.64	-2.18	36.46	46.00	-9.54	Peak	HORIZONTAL
6	772.05	34.58	3.31	37.89	46.00	-8.11	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	45.52	43.06	-6.27	36.79	40.00	-3.21	Peak	VERTICAL
2	237.58	33.77	-7.11	26.66	46.00	-19.34	Peak	VERTICAL
3	314.21	36.24	-4.60	31.64	46.00	-14.36	Peak	VERTICAL
4	453.89	38.61	-2.03	36.58	46.00	-9.42	Peak	VERTICAL
5	567.38	34.01	-0.38	33.63	46.00	-12.37	Peak	VERTICAL
6	759.44	31.01	3.19	34.20	46.00	-11.80	Peak	VERTICAL
1	51.34	36.67	-6.23	30.44	40.00	-9.56	Peak	HORIZONTAL
2	159.01	38.90	-5.90	33.00	43.50	-10.50	Peak	HORIZONTAL
3	216.24	40.24	-8.31	31.93	46.00	-14.07	Peak	HORIZONTAL
4	314.21	36.81	-4.60	32.21	46.00	-13.79	Peak	HORIZONTAL
5	454.86	38.04	-2.03	36.01	46.00	-9.99	Peak	HORIZONTAL
6	772.05	34.05	3.31	37.36	46.00	-8.64	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	46.49	42.78	-6.24	36.54	40.00	-3.46	Peak	VERTICAL
2	69.77	41.40	-8.63	32.77	40.00	-7.23	Peak	VERTICAL
3	313.24	35.63	-4.61	31.02	46.00	-14.98	Peak	VERTICAL
4	448.07	38.80	-2.11	36.69	46.00	-9.31	Peak	VERTICAL
5	547.98	34.44	-0.84	33.60	46.00	-12.40	Peak	VERTICAL
6	753.62	30.35	3.13	33.48	46.00	-12.52	Peak	VERTICAL
1	109.54	39.00	-9.55	29.45	43.50	-14.05	Peak	HORIZONTAL
2	215.27	40.70	-8.34	32.36	43.50	-11.14	Peak	HORIZONTAL
3	315.18	36.83	-4.58	32.25	46.00	-13.75	Peak	HORIZONTAL
4	443.22	37.85	-2.20	35.65	46.00	-10.35	Peak	HORIZONTAL
5	495.60	36.29	-1.69	34.60	46.00	-11.40	Peak	HORIZONTAL
6	772.05	33.88	3.31	37.19	46.00	-8.81	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	46.49	43.38	-6.24	37.14	40.00	-2.86	Peak	VERTICAL
2	159.01	31.42	-5.90	25.52	43.50	-17.98	Peak	VERTICAL
3	312.27	36.17	-4.62	31.55	46.00	-14.45	Peak	VERTICAL
4	443.22	38.47	-2.20	36.27	46.00	-9.73	Peak	VERTICAL
5	522.76	35.48	-1.27	34.21	46.00	-11.79	Peak	VERTICAL
6	777.87	32.66	3.37	36.03	46.00	-9.97	Peak	VERTICAL
1	50.37	38.36	-6.18	32.18	40.00	-7.82	Peak	HORIZONTAL
2	159.01	37.90	-5.90	32.00	43.50	-11.50	Peak	HORIZONTAL
3	214.30	40.76	-8.38	32.38	43.50	-11.12	Peak	HORIZONTAL
4	312.27	35.42	-4.62	30.80	46.00	-15.20	Peak	HORIZONTAL
5	443.22	37.93	-2.20	35.73	46.00	-10.27	Peak	HORIZONTAL
6	740.04	35.07	2.85	37.92	46.00	-8.08	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	801.11b TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4824.00	48.68	-9.22	39.46	74.00	-34.54	Peak	VERTICAL
2	7762.00	48.09	-1.23	46.86	74.00	-27.14	Peak	VERTICAL
1	4824.00	46.72	-9.22	37.50	74.00	-36.50	Peak	HORIZONTAL
2	7608.00	47.46	-1.62	45.84	74.00	-28.16	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11b TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4874.00	45.76	-9.09	36.67	74.00	-37.33	Peak	VERTICAL
2	7454.00	47.87	-1.63	46.24	74.00	-27.76	Peak	VERTICAL
1	4874.00	46.30	-9.09	37.21	74.00	-36.79	Peak	HORIZONTAL
2	7692.00	48.55	-1.40	47.15	74.00	-26.85	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11b TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4924.00	51.94	-8.96	42.98	74.00	-31.02	Peak	VERTICAL
2	7272.00	48.59	-1.66	46.93	74.00	-27.07	Peak	VERTICAL
1	4924.00	51.56	-8.96	42.60	74.00	-31.40	Peak	HORIZONTAL
2	7342.00	48.01	-1.63	46.38	74.00	-27.62	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	801.11g TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4824.00	47.19	-9.22	37.97	74.00	-36.03	Peak	VERTICAL
2	7566.00	47.83	-1.65	46.18	74.00	-27.82	Peak	VERTICAL
1	4824.00	47.50	-9.22	38.28	74.00	-35.72	Peak	HORIZONTAL
2	7216.00	47.91	-1.69	46.22	74.00	-27.78	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.1g TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4874.00	46.79	-9.09	37.70	74.00	-36.30	Peak	VERTICAL
2	7307.00	47.58	-1.65	45.93	74.00	-28.07	Peak	VERTICAL
1	4874.00	46.52	-9.09	37.43	74.00	-36.57	Peak	HORIZONTAL
2	7363.00	47.82	-1.61	46.21	74.00	-27.79	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4924.00	47.74	-8.96	38.78	74.00	-35.22	Peak	VERTICAL
2	7048.00	47.37	-2.55	44.82	74.00	-29.18	Peak	VERTICAL
1	4924.00	47.03	-8.96	38.07	74.00	-35.93	Peak	HORIZONTAL
2	7139.00	47.24	-2.03	45.21	74.00	-28.79	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4824.00	46.48	-9.22	37.26	74.00	-36.74	Peak	VERTICAL
2	7272.00	47.63	-1.66	45.97	74.00	-28.03	Peak	VERTICAL
1	4824.00	48.57	-9.22	39.35	74.00	-34.65	Peak	HORIZONTAL
2	7328.00	47.41	-1.62	45.79	74.00	-28.21	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4874.00	47.02	-9.09	37.93	74.00	-36.07	Peak	VERTICAL
2	7300.00	47.18	-1.64	45.54	74.00	-28.46	Peak	VERTICAL
1	4874.00	47.11	-9.09	38.02	74.00	-35.98	Peak	HORIZONTAL
2	7328.00	47.48	-1.62	45.86	74.00	-28.14	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT20 TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4924.00	46.77	-8.96	37.81	74.00	-36.19	Peak	VERTICAL
2	7321.00	48.73	-1.63	47.10	74.00	-26.90	Peak	VERTICAL
1	4924.00	47.93	-8.96	38.97	74.00	-35.03	Peak	HORIZONTAL
2	7783.00	47.72	-1.18	46.54	74.00	-27.46	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4844.00	46.26	-9.17	37.09	74.00	-36.91	Peak	VERTICAL
2	7391.00	47.20	-1.60	45.60	74.00	-28.40	Peak	VERTICAL
1	4844.00	47.18	-9.17	38.01	74.00	-35.99	Peak	HORIZONTAL
2	7293.00	47.67	-1.65	46.02	74.00	-27.98	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4874.00	47.42	-9.09	38.33	74.00	-35.67	Peak	VERTICAL
2	7258.00	48.75	-1.67	47.08	74.00	-26.92	Peak	VERTICAL
1	1840.00	60.33	-18.60	41.73	74.00	-32.27	Peak	HORIZONTAL
2	4874.00	47.09	-9.09	38.00	74.00	-36.00	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11n HT40 TX mode	Test Date	2017/05/19
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4904.00	46.63	-9.00	37.63	74.00	-36.37	Peak	VERTICAL
2	7286.00	47.22	-1.65	45.57	74.00	-28.43	Peak	VERTICAL
1	4904.00	47.23	-9.00	38.23	74.00	-35.77	Peak	HORIZONTAL
2	7300.00	47.12	-1.64	45.48	74.00	-28.52	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	173.56	27.81	-6.68	21.13	43.50	-22.37	Peak	VERTICAL
2	375.32	31.39	-3.49	27.90	46.00	-18.10	Peak	VERTICAL
3	515.97	30.97	-1.37	29.60	46.00	-16.40	Peak	VERTICAL
4	554.77	29.20	-0.70	28.50	46.00	-17.50	Peak	VERTICAL
5	776.90	27.83	3.36	31.19	46.00	-14.81	Peak	VERTICAL
6	954.41	27.45	6.36	33.81	46.00	-12.19	Peak	VERTICAL
1	151.25	27.22	-5.97	21.25	43.50	-22.25	Peak	HORIZONTAL
2	343.31	25.83	-4.12	21.71	46.00	-24.29	Peak	HORIZONTAL
3	515.97	39.40	-1.37	38.03	46.00	-7.97	Peak	HORIZONTAL
4	609.09	27.87	0.53	28.40	46.00	-17.60	Peak	HORIZONTAL
5	776.90	29.68	3.36	33.04	46.00	-12.96	Peak	HORIZONTAL
6	857.41	26.55	4.50	31.05	46.00	-14.95	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	169.68	27.89	-6.21	21.68	43.50	-21.82	Peak	VERTICAL
2	369.50	28.42	-3.60	24.82	46.00	-21.18	Peak	VERTICAL
3	467.47	30.04	-1.92	28.12	46.00	-17.88	Peak	VERTICAL
4	518.88	40.66	-1.34	39.32	46.00	-6.68	Peak	VERTICAL
5	633.34	27.15	0.82	27.97	46.00	-18.03	Peak	VERTICAL
6	792.42	29.00	3.51	32.51	46.00	-13.49	Peak	VERTICAL
1	156.10	25.32	-5.92	19.40	43.50	-24.10	Peak	HORIZONTAL
2	364.65	25.94	-3.72	22.22	46.00	-23.78	Peak	HORIZONTAL
3	492.69	28.44	-1.72	26.72	46.00	-19.28	Peak	HORIZONTAL
4	626.55	27.48	0.73	28.21	46.00	-17.79	Peak	HORIZONTAL
5	776.90	27.49	3.36	30.85	46.00	-15.15	Peak	HORIZONTAL
6	925.31	25.24	5.81	31.05	46.00	-14.95	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	169.68	27.68	-6.21	21.47	43.50	-22.03	Peak	VERTICAL
2	288.02	27.28	-5.20	22.08	46.00	-23.92	Peak	VERTICAL
3	387.93	28.01	-3.22	24.79	46.00	-21.21	Peak	VERTICAL
4	498.51	38.63	-1.66	36.97	46.00	-9.03	Peak	VERTICAL
5	619.76	26.81	0.65	27.46	46.00	-18.54	Peak	VERTICAL
6	784.66	27.95	3.44	31.39	46.00	-14.61	Peak	VERTICAL
1	150.28	25.29	-5.97	19.32	43.50	-24.18	Peak	HORIZONTAL
2	316.15	26.85	-4.56	22.29	46.00	-23.71	Peak	HORIZONTAL
3	356.89	28.28	-3.87	24.41	46.00	-21.59	Peak	HORIZONTAL
4	592.60	27.19	0.24	27.43	46.00	-18.57	Peak	HORIZONTAL
5	712.88	26.56	2.19	28.75	46.00	-17.25	Peak	HORIZONTAL
6	792.42	28.64	3.51	32.15	46.00	-13.85	Peak	HORIZONTAL

Remark:

1 No further spurious emissions detected from the lowest internal frequency and 30MHz.

2 Measuring frequencies from the lowest internal frequency to the 1GHz.

3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP

4 Measurement result within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH Low	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4804.00	45.30	-9.27	36.03	74.00	-37.97	Peak	VERTICAL
2	7153.00	46.12	-1.96	44.16	74.00	-29.84	Peak	VERTICAL
1	4804.00	45.10	-9.27	35.83	74.00	-38.17	Peak	HORIZONTAL
2	7321.00	47.36	-1.63	45.73	74.00	-28.27	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH Mid	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4884.00	45.38	-9.06	36.32	74.00	-37.68	Peak	VERTICAL
2	7643.00	46.91	-1.54	45.37	74.00	-28.63	Peak	VERTICAL
1	4884.00	45.88	-9.06	36.82	74.00	-37.18	Peak	HORIZONTAL
2	7202.00	46.08	-1.70	44.38	74.00	-29.62	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz) BLE Mode

Operation Mode	TX mode	Test Date	2019/01/16
Channel number	CH High	Test By	Barry
Temperature	25 ℃	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4960.00	46.35	-8.87	37.48	74.00	-36.52	Peak	VERTICAL
2	7153.00	46.56	-1.96	44.60	74.00	-29.40	Peak	VERTICAL
1	4960.00	46.52	-8.87	37.65	74.00	-36.35	Peak	HORIZONTAL
2	7475.00	47.59	-1.66	45.93	74.00	-28.07	Peak	HORIZONTAL

Remark:

1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency

2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.

3 Measurement of data within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.

5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

10 Peak Power Spectral Density

10.1 Standard Applicable:

According to §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.

According to RSS-247 issue 2, §5.2
(2)The transmitter power spectral density conducted from the transmitter 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 Section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

10.2 Measurement Equipment Used:

Refer to section 6.2 for details.

10.3 Test Set-up:

Refer to section 7.3 for details.

10.4 Measurement Procedure:

1. Place the EUT on the table 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 the spectrum analyzer.
3. Set the spectrum analyzer as RBW =3kHz, VBW = 10kHz, Set the span to 1.5 DTS bandwidth., Sweep=Auto
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

10.5 Measurement Result:

802.11b Mode

CH	Power Density Level dBm/3kHz	Maximum Limit (dBm)
Low	-11.74	8
Mid	-12.74	8
High	-11.76	8

802.11g Mode

CH	Power Density Level dBm/3kHz	Maximum Limit (dBm)
Low	-13.76	8
Mid	-13.36	8
High	-14.50	8

802.11n HT20

CH	Power Density Level dBm/3kHz	Maximum Limit (dBm)
Low	-13.97	8
Mid	-13.81	8
High	-14.93	8

802.11n HT40

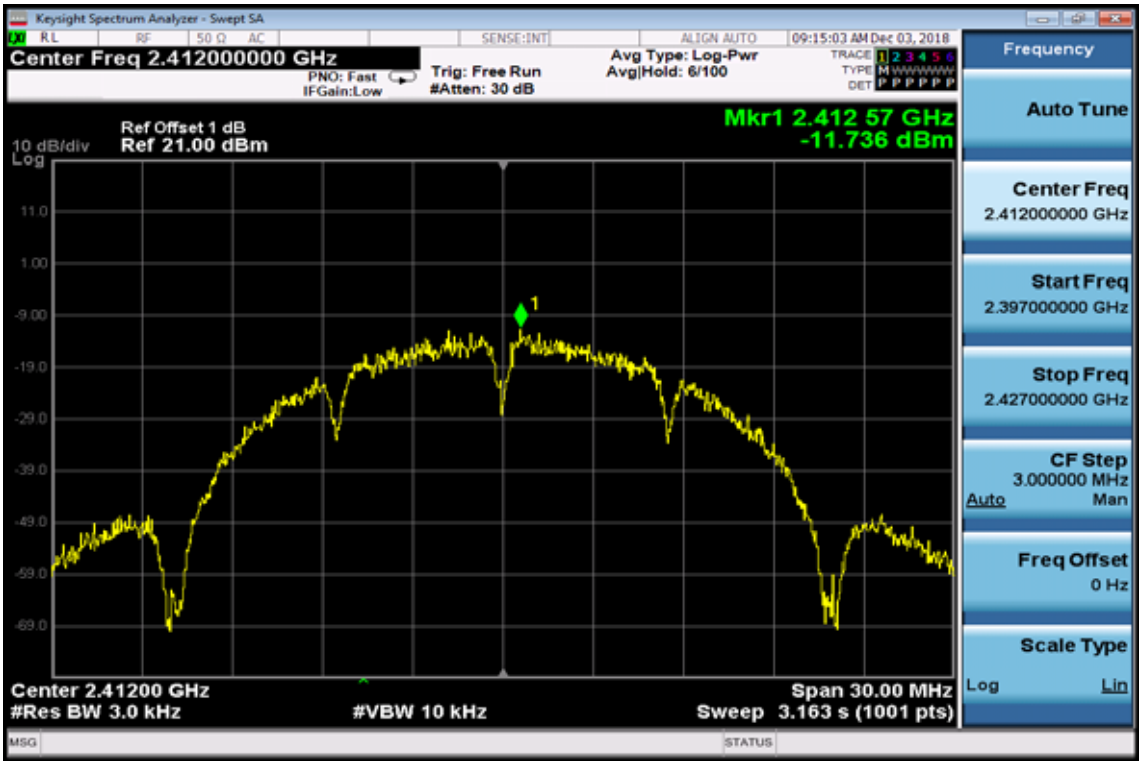
CH	Power Density Level dBm/3kHz	Maximum Limit (dBm)
Low	-19.44	8
Mid	-18.53	8
High	-19.88	8

BT LE mode

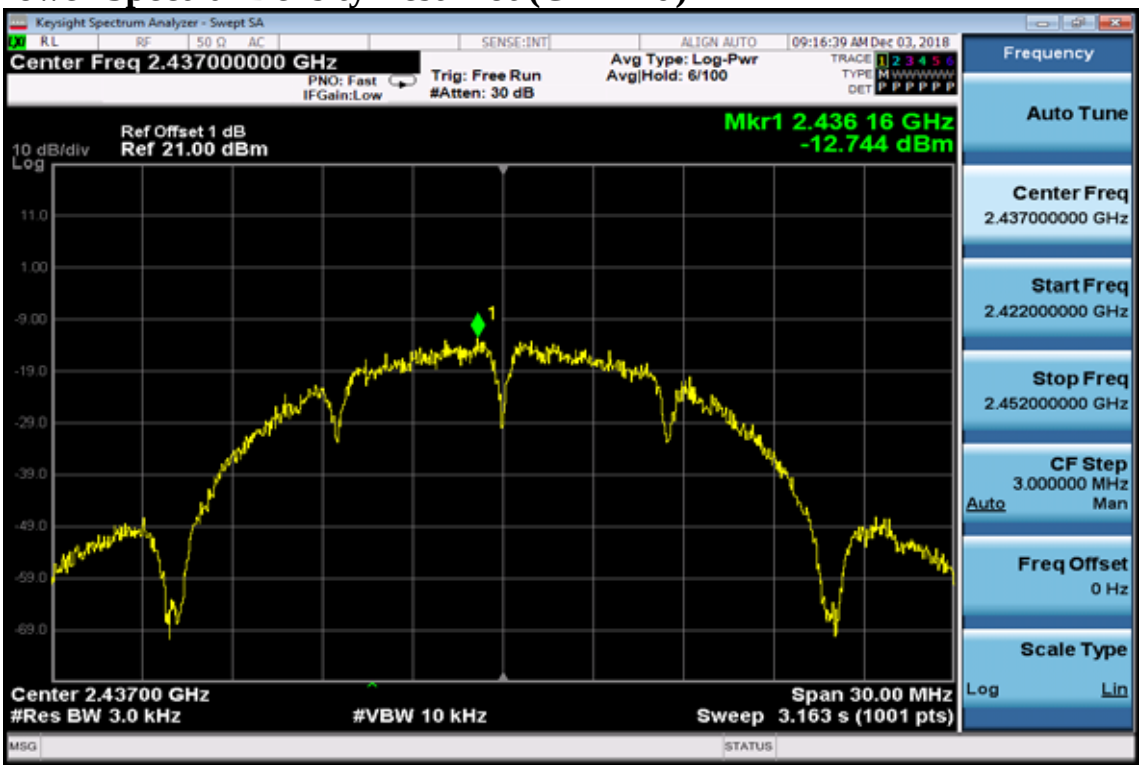
CH	Power Density Level dBm/3kHz	Maximum Limit (dBm)
Low	-1.93	8
Mid	-2.38	8
High	-2.33	8

802.11b

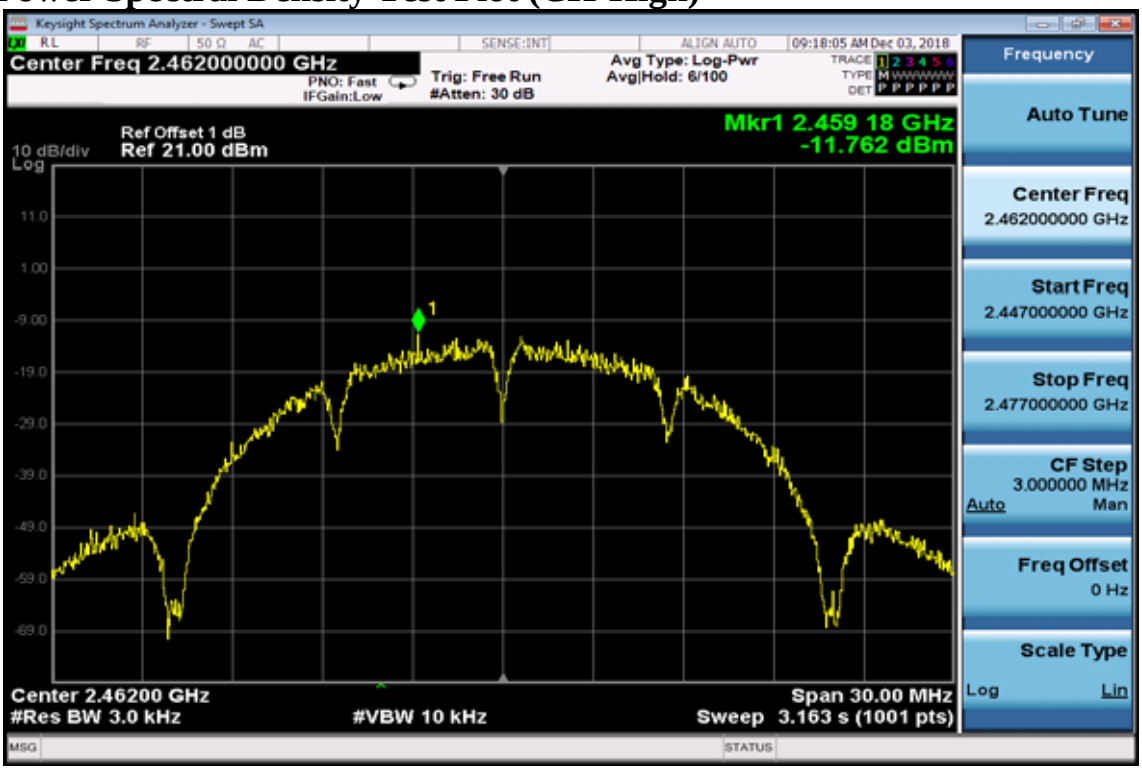
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

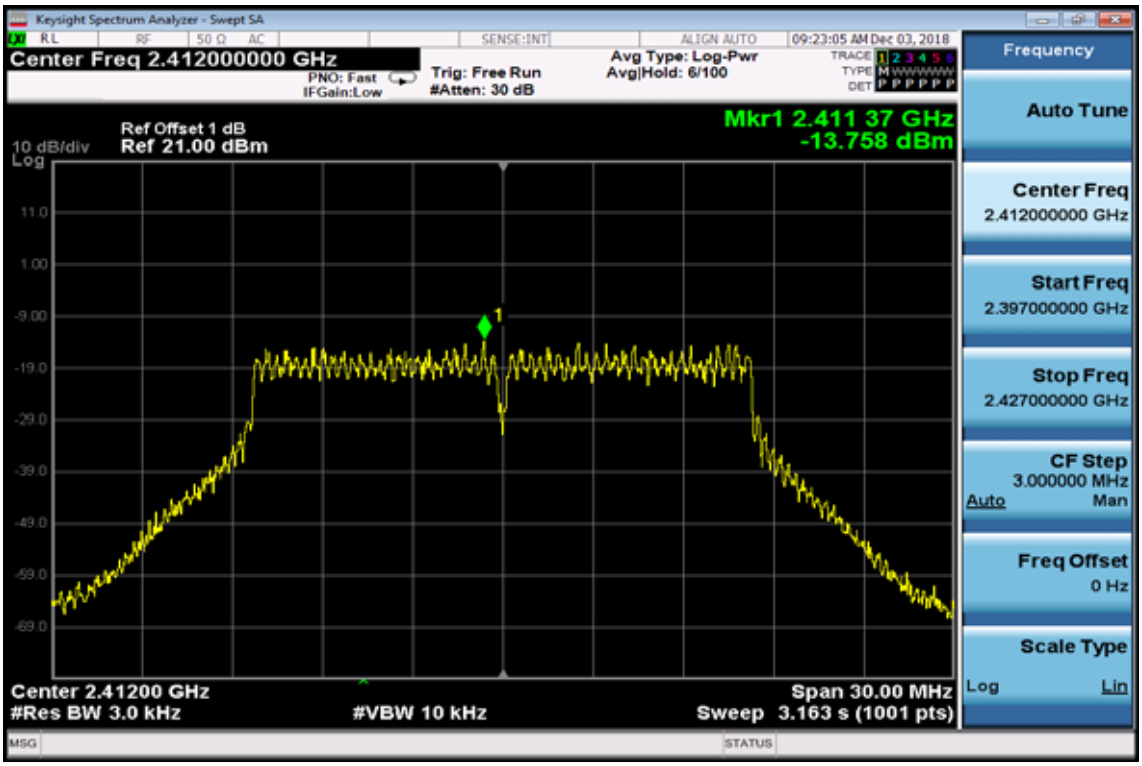


Power Spectral Density Test Plot (CH-High)

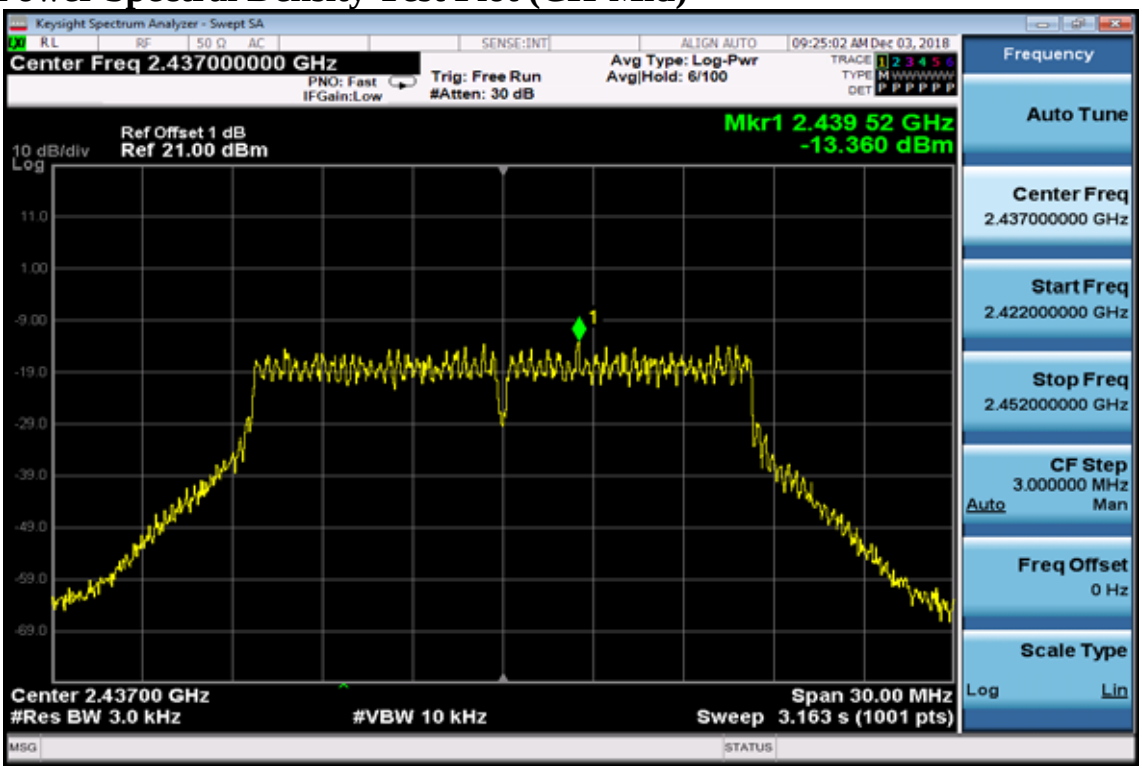


802.11g

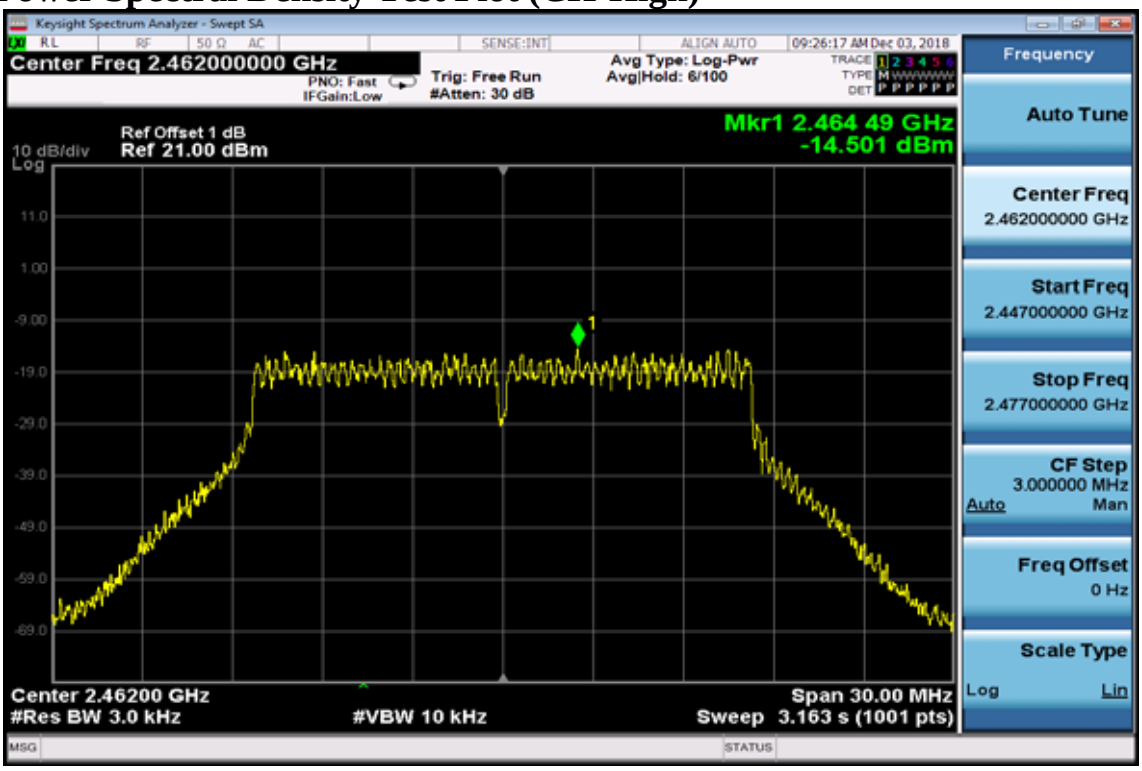
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

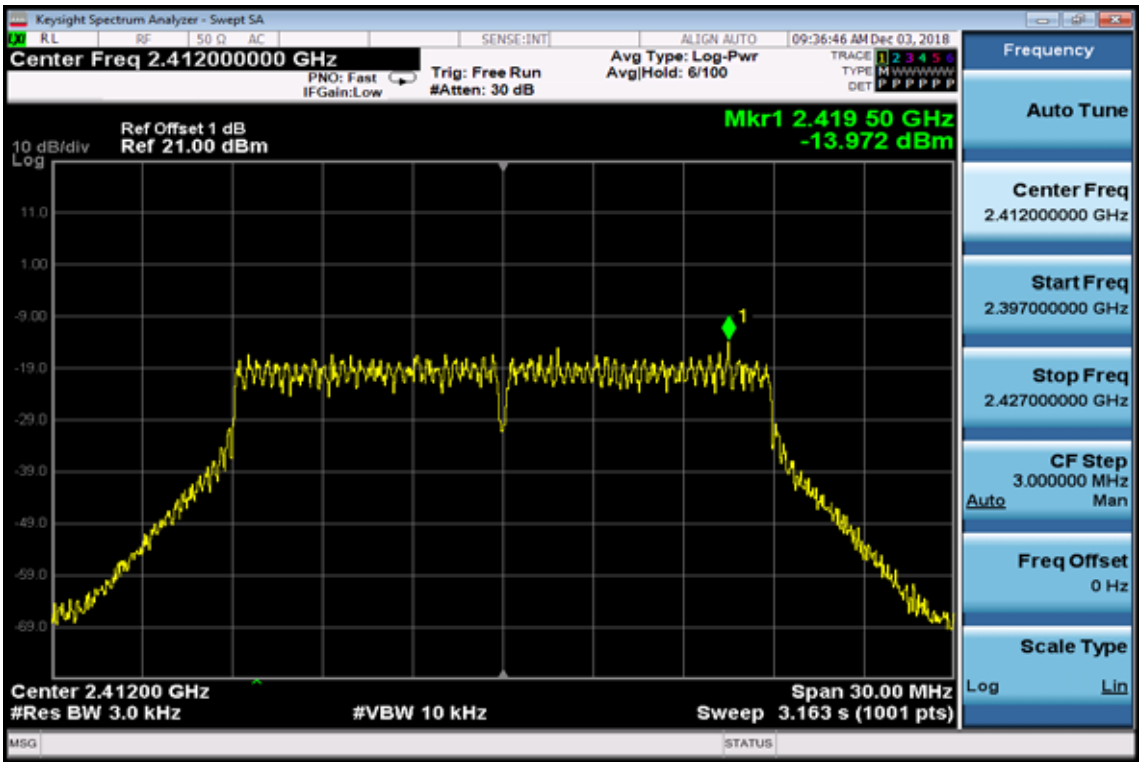


Power Spectral Density Test Plot (CH-High)

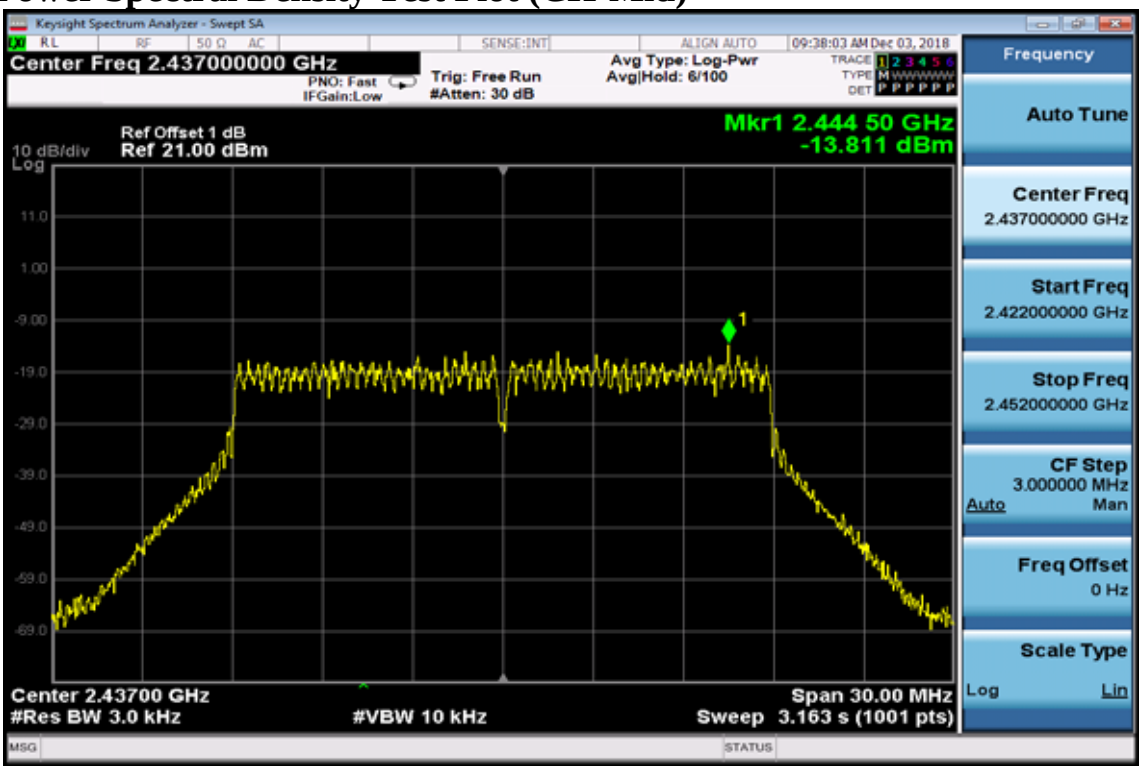


802.11n_20HT

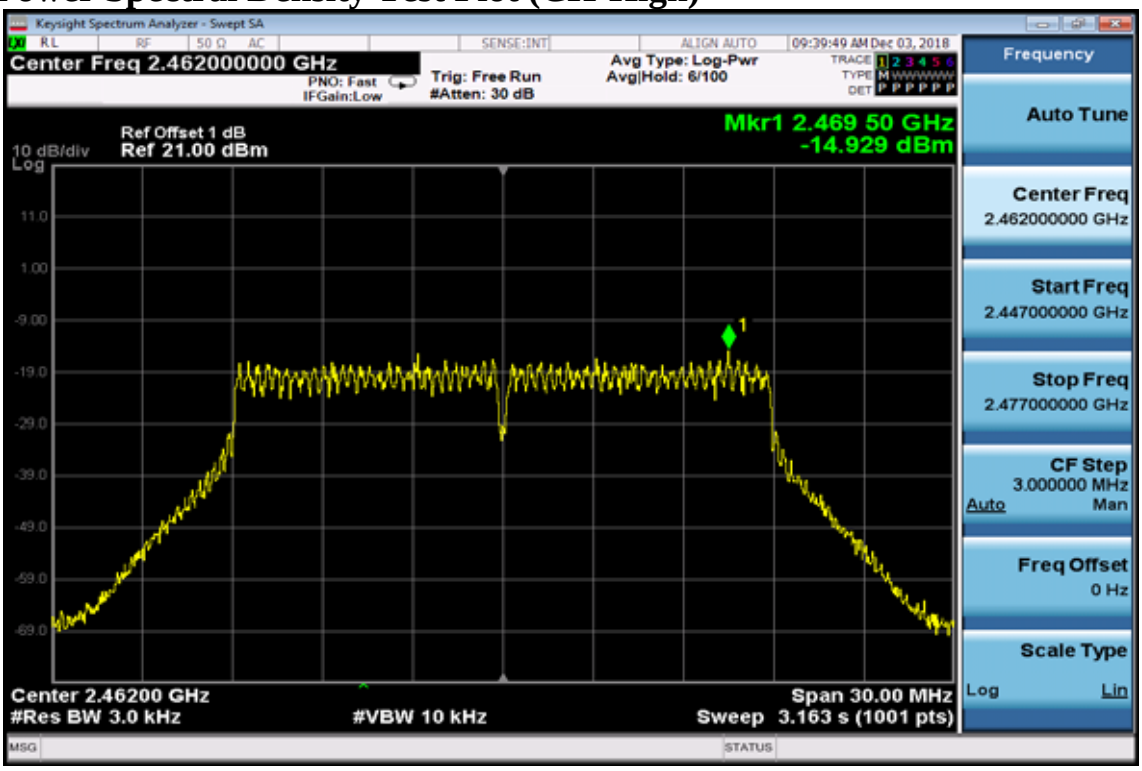
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

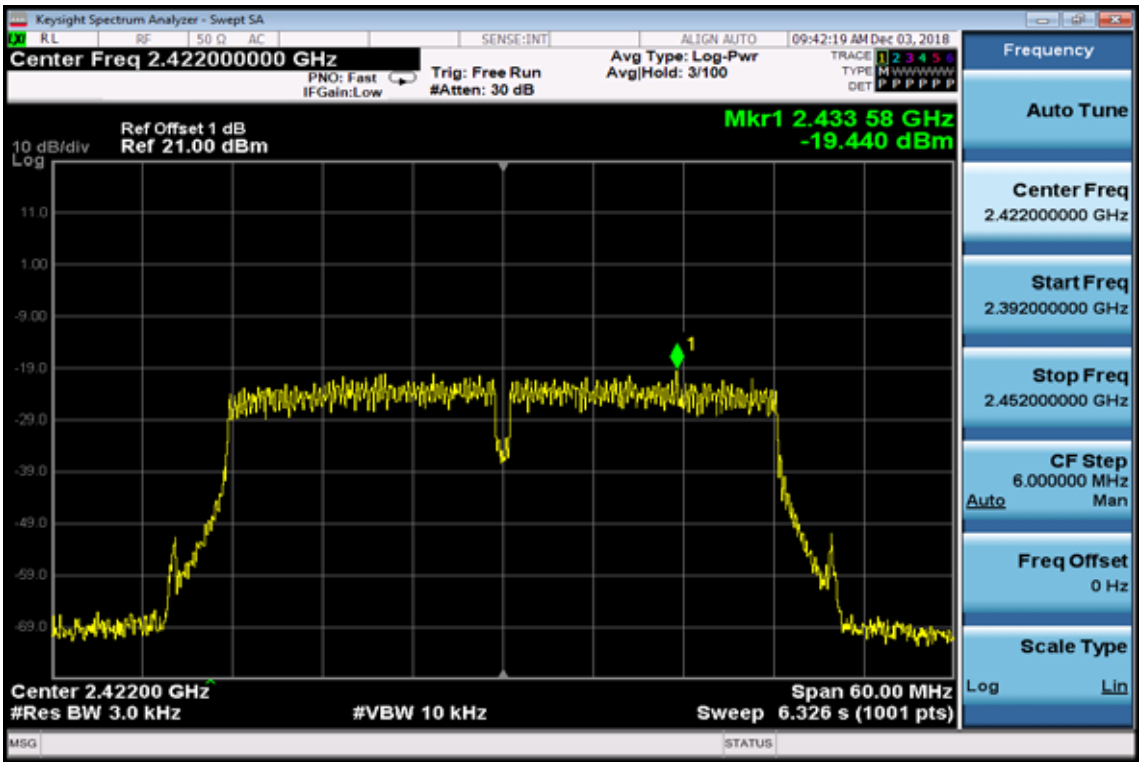


Power Spectral Density Test Plot (CH-High)

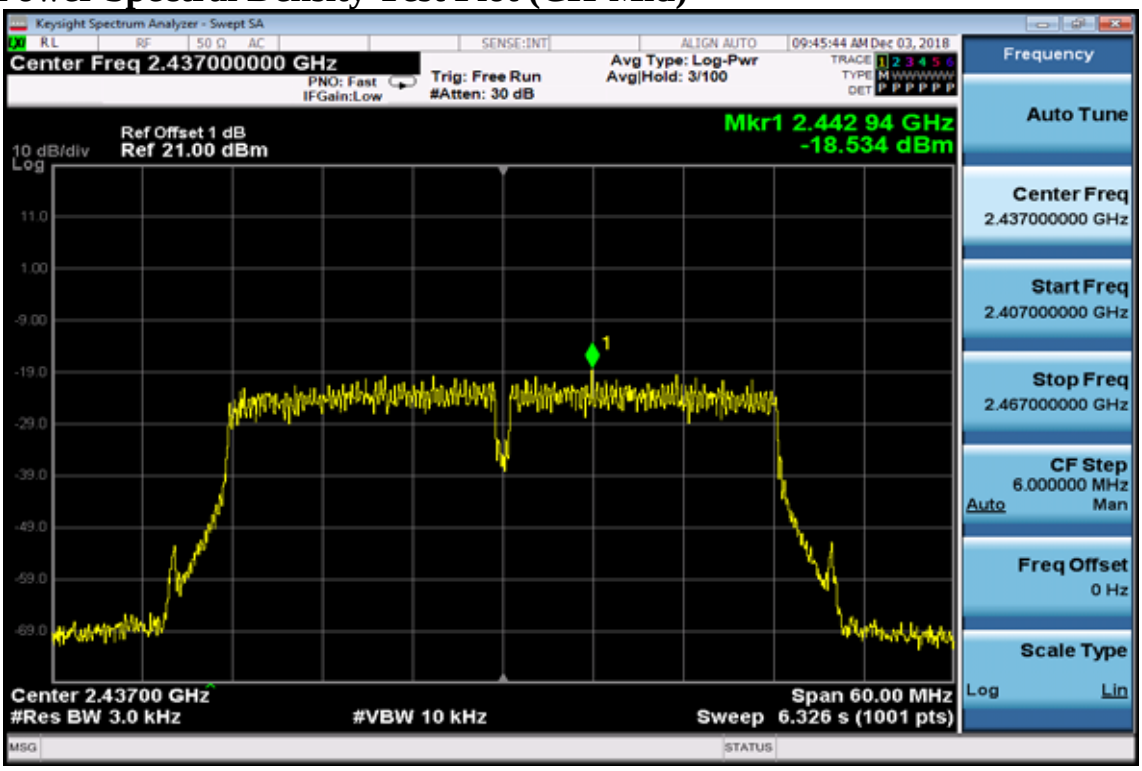


802.11n_40HT

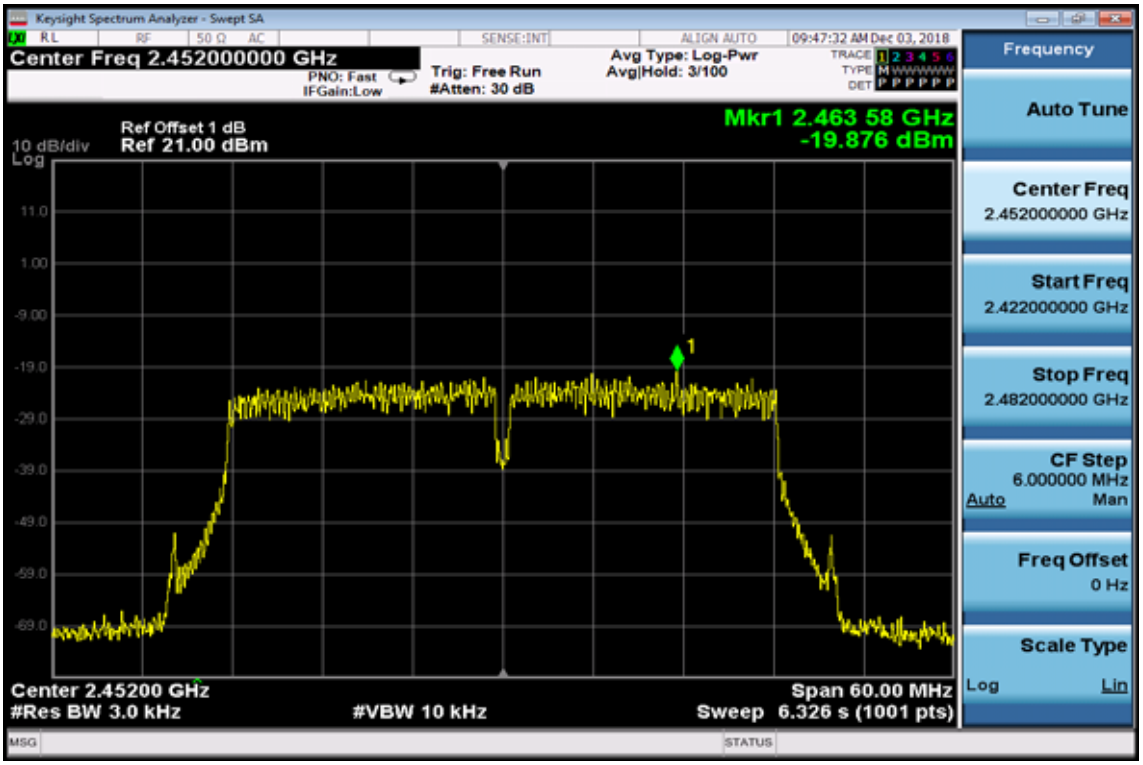
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



BT LE

Power Spectral Density Test Plot (CH-Low)

Power Spectral Density Test Plot (CH-Mid)

Power Spectral Density Test Plot (CH-High)

11 Antenna Requirement

11.1 Standard Applicable:

According to §15.203, 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 Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 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.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be ad

ded to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

11.2 Antenna Connected Construction:

The directional gins of antenna used for transmitting is 2.80dBi PIFA, and the antenna is PCB type and no consideration of replacement. Please see EUT photo and antenna spec. for details.