

TEST REPORT

of

FCC Part 15 Subpart C

New Application; Class I PC; Class II PC

Product : Aristotle Hub
Brand: MATTEL
Model: FMT67
Model Difference: N/A
FCC ID: PU5FMT67
FCC Rule Part: §15.247, Cat: DTS
Applicant: Wistron Corporation
Address: 21F., No. 88, Sec. 1, HsinTai 5th Rd., Hsichih
Dist, New Taipei City 221

Test Performed by:
International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-4;

*Address:

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.

Lung-Tan Hsiang, Tao Yuan County 325, Taiwan

*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-16LR332FC DTS**

Issue Date : **2017/01/05**

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.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory.


VERIFICATION OF COMPLIANCE

Applicant: Wistron Corporation
Product Description: Aristotle Hub
Brand Name: MATTEL
Model No.: FMT67
Model Difference: N/A
FCC ID: PU5FMT67
Date of test: 2016/12/08 ~ 2017/01/04
Date of EUT Received: 2016/12/08

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.

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:	 _____	Date:	2017/01/05 _____
	<i>Dino Chen / Engineer</i>		
Prepared By:	 _____	Date:	2017/01/05 _____
	<i>Gigi Yeh / Specialist</i>		
Approved By:	 _____	Date:	2017/01/05 _____
	<i>Vincent Su / Technical Manager</i>		

Version

Version No.	Date	Description
00	2017/01/05	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%

Table of Contents

1	GENERAL INFORMATION	6
1.1	Related Submittal(s) / Grant (s)	8
1.2	Test Methodology	8
1.3	Test Facility	8
1.4	Special Accessories	8
1.5	Equipment Modifications.....	8
2	SYSTEM TEST CONFIGURATION	9
2.1	EUT Configuration	9
2.2	EUT Exercise	9
2.3	Test Procedure.....	9
2.4	Configuration of Tested System.....	10
3	SUMMARY OF TEST RESULTS	11
4	DESCRIPTION OF TEST MODES	11
5	CONDUCTED EMISSION TEST.....	12
5.1	Standard Applicable:	12
5.2	Measurement Equipment Used:	12
5.3	EUT Setup:.....	12
5.4	Measurement Procedure:	13
5.5	Measurement Result:	13
6	PEAK OUTPUT POWER MEASUREMENT	16
6.1	Standard Applicable:	16
6.2	Measurement Equipment Used:	17
6.3	Test Set-up:	17
6.4	Measurement Procedure:	17
6.5	Measurement Result:	18
7	6dB Bandwidth & 99% Bandwidth	20
7.1	Standard Applicable:	20
7.2	Measurement Equipment Used:	20
7.3	Test Set-up:	20
7.4	Measurement Procedure:	20
7.5	Measurement Result:	21
8	100KHz BANDWIDTH OF BAND EDGES MEASUREMENT.....	33
8.1	Standard Applicable:	33
8.2	Measurement Equipment Used:	33
8.3	Test SET-UP:.....	35
8.4	Measurement Procedure:	36
8.5	Field Strength Calculation:	36
8.6	Measurement Result:	36
9	SPURIOUS RADIATED EMISSION TEST.....	53
9.1	Standard Applicable	53
9.2	Measurement Equipment Used:	53
9.3	Test SET-UP:.....	53
9.4	Measurement Procedure:	54
9.5	Field Strength Calculation	54
9.6	Measurement Result:	54

10	Peak Power Spectral Density	61
10.1	Standard Applicable:	61
10.2	Measurement Equipment Used:	61
10.3	Test Set-up:	61
10.4	Measurement Procedure:	61
10.5	Measurement Result:	62
11	ANTENNA REQUIREMENT	69
11.1	Standard Applicable:	69
11.2	Antenna Connected Construction:	69

1 GENERAL INFORMATION

General:

Product Name	Aristotle Hub	
Brand Name	MATTEL	
Model Name	FMT67	
Model Difference	N/A	
HDMI Port:	One	
Micro sd card	One	
Power Supply	12Vdc from AC adapter	
	Adapter:	Model No.: WA-30J12FU

WLAN: 1TX/1RX

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Power	Modulation Technology
802.11b	2412 – 2462	11	18.00dBm (PK)	DSSS
802.11g	2412 – 2462	11	21.00dBm (PK)	OFDM
802.11n	HT20 2412 – 2462	11	20.00dBm (PK)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Chip Antenna 4.9 dBi		
Tune up power		+/- 1 dB		

Bluetooth: 1TX/1RX

Frequency Range:	2402– 2480MHz	
Bluetooth Version:	BT2.1+BT3.0	BT BLE 4.0+ 4.1
Channel number:	79 channels	40 channels
Modulation type	GFSK +	

1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: PU5FMT67** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

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 DTS Meas Guidance v03r05

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** <Lung-Tan 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 C63.4: 2014. FCC Registration Number is: 872200; Designation Number is: TW1036, 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. Con-ducted 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 m/1.5m(Frequency above 1GHz) above ground plane. The turn table shall rotate 360 degrees to determine the position of maxi-mum 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 according to the requirements in Section 6 and 11 of ANSI C63.10: 2013.

2.4 Configuration of Tested System

Fig. 2-1 AC Power line and Radiated Emission Configuration

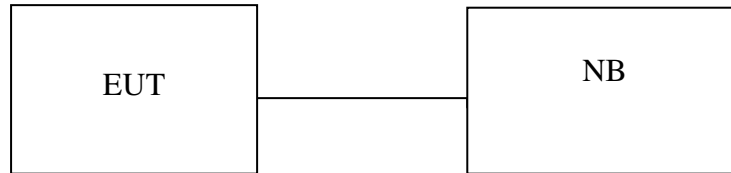


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	NB	HP	440i	N/A	N/A	No- Shielding

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
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5 CONDUCTED EMISSION TEST

5.1 Standard Applicable:

According to §15.207, 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:

AC Power Line Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Conduction 04-3 Cable	WOKEN	CFD 300-NL	Conduction 04-3	07/27/2016	07/26/2017
EMI Receiver 17	Rohde & Schwarz	ESCI 7	100887	09/08/2016	09/07/2017
LISN 18	ROHDE & SCHWARZ	ENV216	101424	02/11/2016	02/10/2017
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/12/2016	03/11/2017
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 C63.4: 2014..
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.

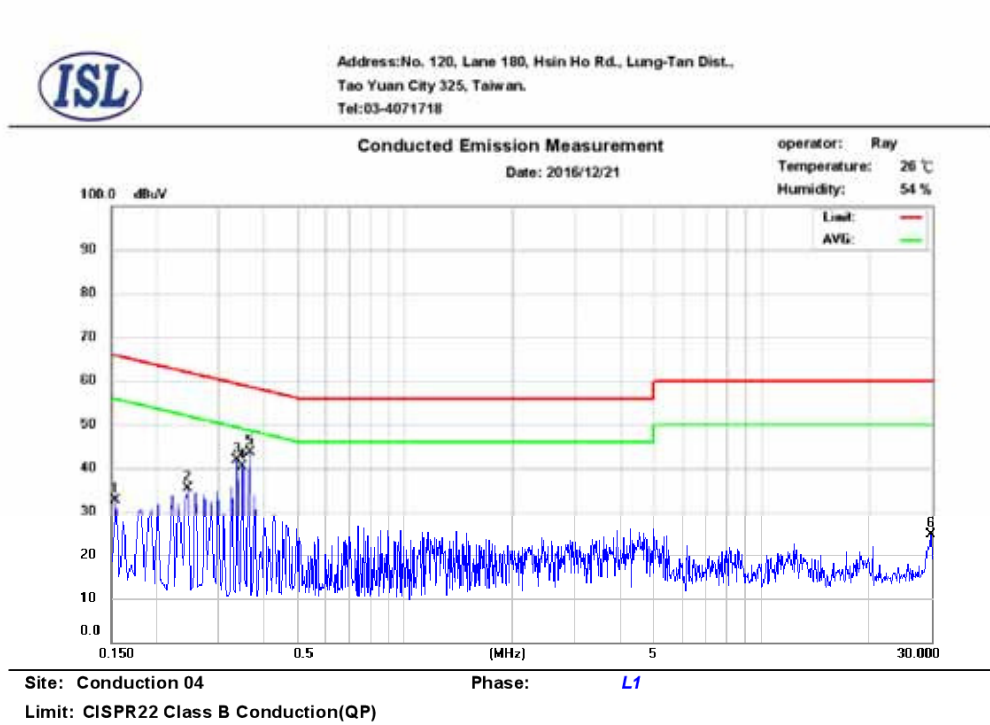
5.5 Measurement Result:

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:	Operation Mode	Test Date:	2016/12/21
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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	0.154	24.23	2.03	9.69	33.92	65.78	-31.86	11.72	55.78	-44.06
2	0.246	21.51	0.87	9.69	31.20	61.89	-30.69	10.56	51.89	-41.33
3	0.338	26.91	3.86	9.69	36.60	59.25	-22.65	13.55	49.25	-35.70
4	0.350	29.28	5.06	9.69	38.97	58.96	-19.99	14.75	48.96	-34.21
5	0.366	28.07	4.53	9.69	37.76	58.59	-20.83	14.22	48.59	-34.37
6	29.878	7.63	0.12	10.14	17.77	60.00	-42.23	10.26	50.00	-39.74

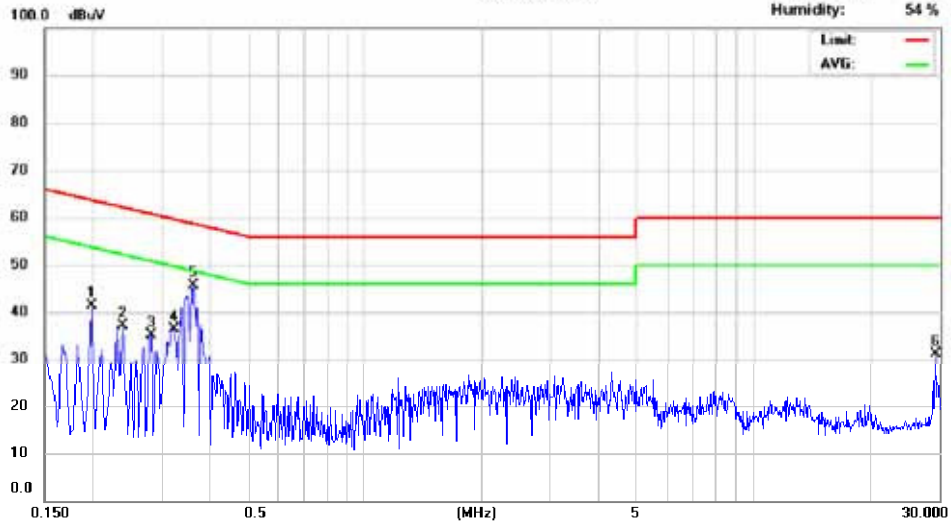


Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-4071718

Conducted Emission Measurement

operator: Ray
Temperature: 26 °C
Humidity: 54 %

Date: 2016/12/21



Site: Conduction 04

Phase: N

Limit: CISPR22 Class B Conduction(QP)

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	0.198	21.58	1.02	9.68	31.26	63.69	-32.43	10.70	53.69	-42.99
2	0.238	22.65	1.38	9.68	32.33	62.17	-29.84	11.06	52.17	-41.11
3	0.282	19.66	0.23	9.69	29.35	60.76	-31.41	9.92	50.76	-40.84
4	0.322	21.93	1.77	9.68	31.61	59.66	-28.05	11.45	49.66	-38.21
5	0.362	31.52	7.12	9.68	41.20	58.68	-17.48	16.80	48.68	-31.88
6	29.294	9.95	-0.51	10.30	20.25	60.00	-39.75	9.79	50.00	-40.21

6 PEAK OUTPUT POWER/ERIP MEASUREMENT

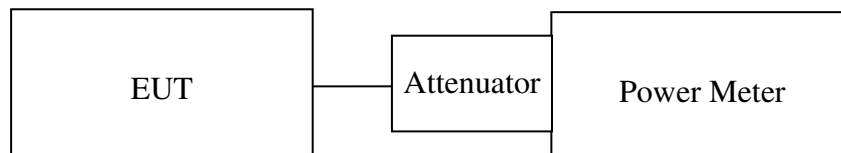
6.1 Standard Applicable:

According to

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 05	Anritsu	ML2495A	1116010	07/28/2016	07/27/2017
Power Sensor 05	Anritsu	MA2411B	34NKF50	07/28/2016	07/27/2017
Power Sensor 06	DARE	RPR3006W	13I00030SNO3 3	11/03/2016	11/02/2017
Power Sensor 07	DARE	RPR3006W	13I00030SNO3 4	11/03/2016	11/02/2017
Temperature Chamber	KSON	THS-B4H100	2287	06/28/2016	06/27/2017
DC Power supply	ABM	8185D	N/A	10/06/2016	10/05/2017
AC Power supply	EXTECH	CFC105W	NA	12/25/2016	12/24/2017
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2015	12/25/2017
Spectrum analyzer	keysight	N9010A	MY56070257	05/31/2016	05/30/2017
Spectrum analyzer	R&S	FSP40	100143	08/07/2016	08/06/2017
Test Software	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:

WIFI 1TX

802.11b

Cable loss = 0	Output Power	Limit (dBm)
CH	Detector	
	PK	AV

BLE Mode

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.95	0.00	0.95	0.00124	1
2442.00	1.23	0.00	1.23	0.00133	1
2480.00	-0.98	0.00	-0.98	0.00080	1

offset: 1

7 6dB Bandwidth & 99% Bandwidth

7.1 Standard Applicable:

According to

7.5 Measurement Result:

802.11b

Frequency (MHz)	6dB Bandwidth (MHz)	99% Band- width (MHz)	Limit (KHz)	Result
Low	7.133	11.928	> 500	PASS
Mid	7.15	11.937	> 500	PASS
High	7.194	12.127	> 500	PASS

802.11g

Frequency (MHz)	6dB Bandwidth (MHz)	99% Band- width (MHz)	Limit (KHz)	Result
Low	16.37	17.011	> 500	PASS
Mid	16.46	17.494	> 500	PASS
High	16.42	17.39	> 500	PASS

802.11n HT20

Frequency (MHz)	6dB Bandwidth (MHz)	99% Band- width (MHz)	Limit (KHz)	Result
Low	17.59	18.028	> 500	PASS
Mid	17.62	18.348	> 500	PASS
High	17.31	18.107	> 500	PASS

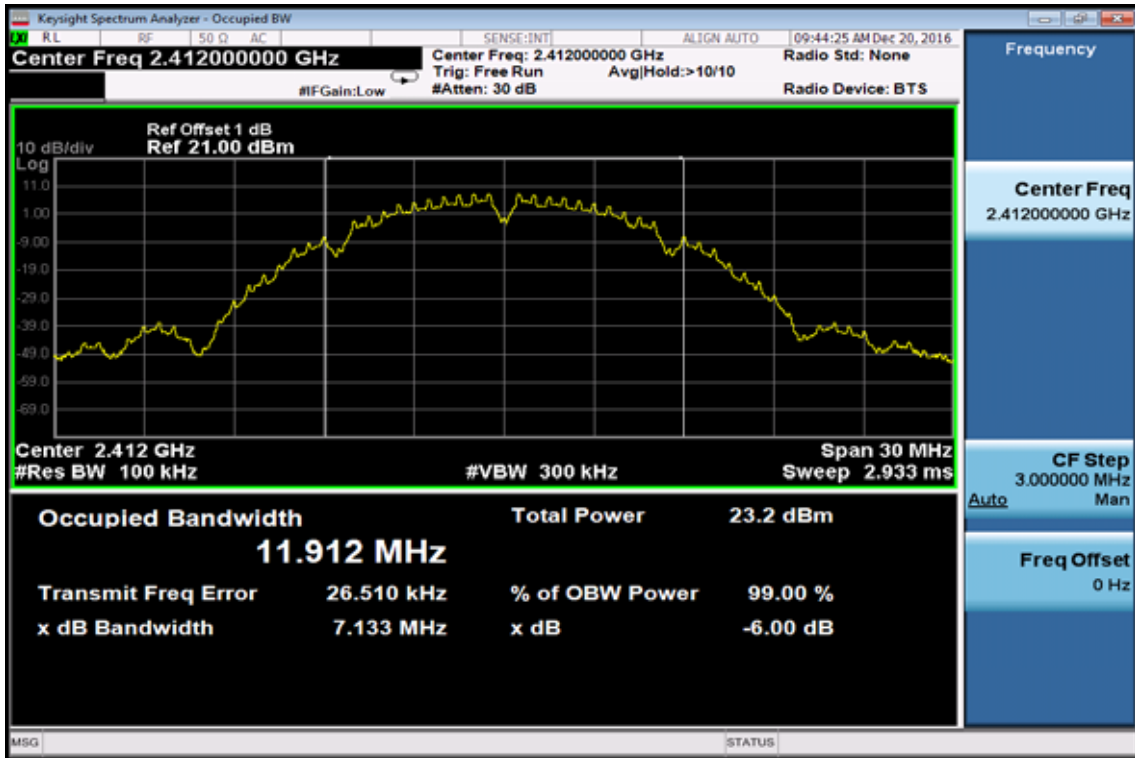
LE Mode

Frequency (MHz)	6dB Bandwidth (MHz)	99% Band- width (MHz)	Limit (KHz)	Result
Low	0.695	1.088	> 500	PASS
Mid	0.683	1.094	> 500	PASS
High	0.699	1.093	> 500	PASS

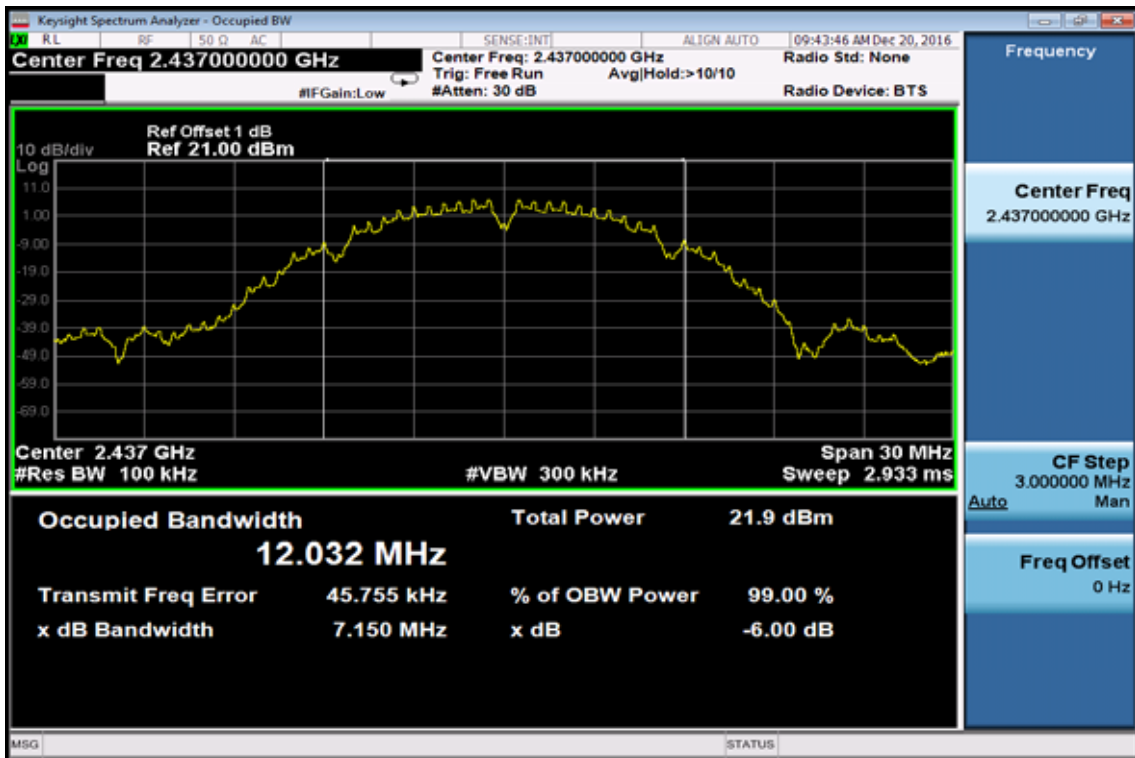
Note: Refer to next page for plots.

802.11b

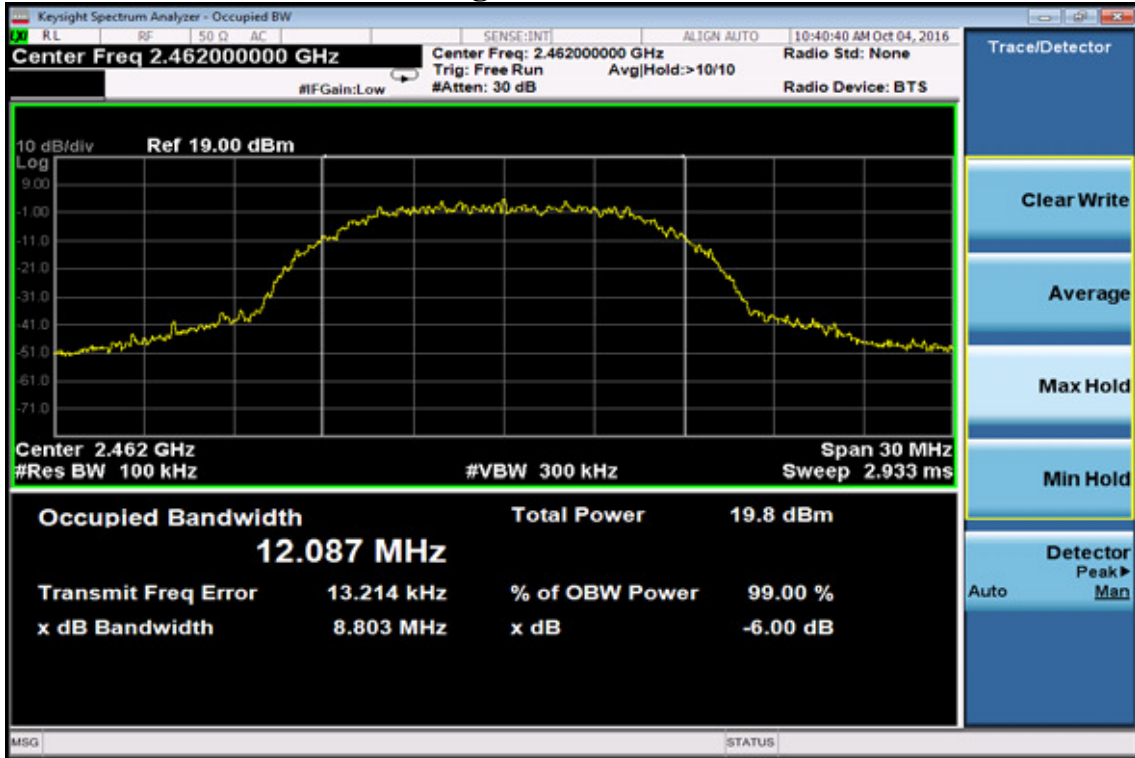
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

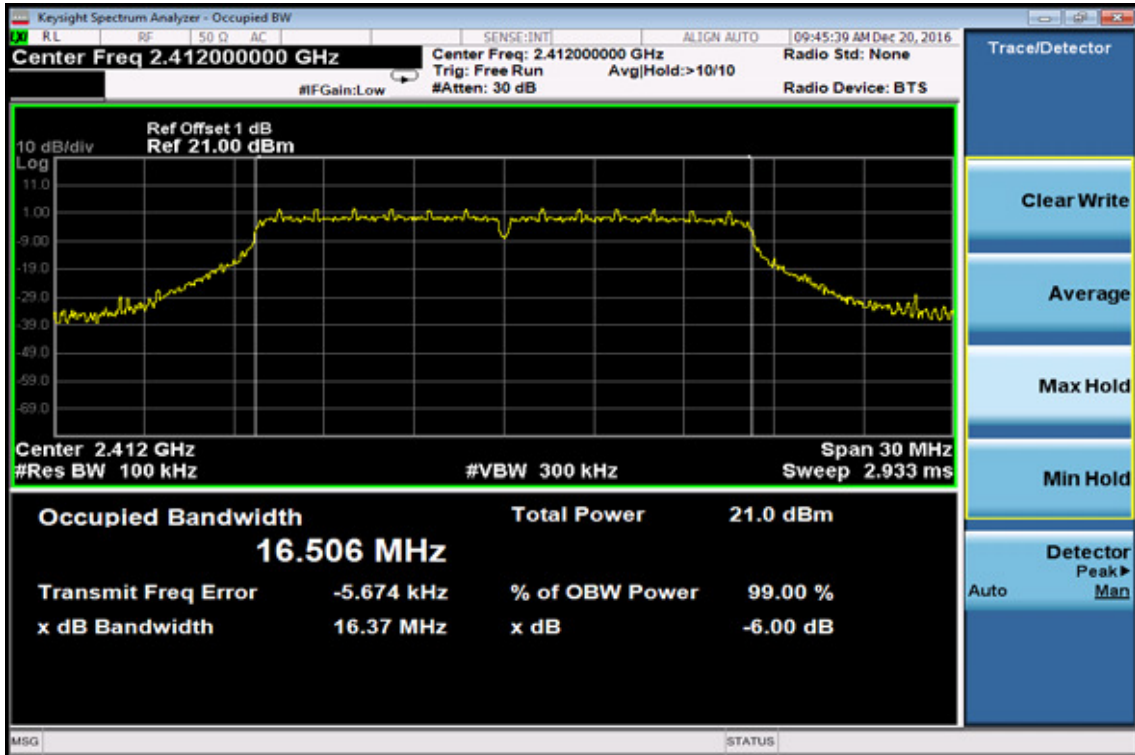


6dB Band Width Test Data CH-High

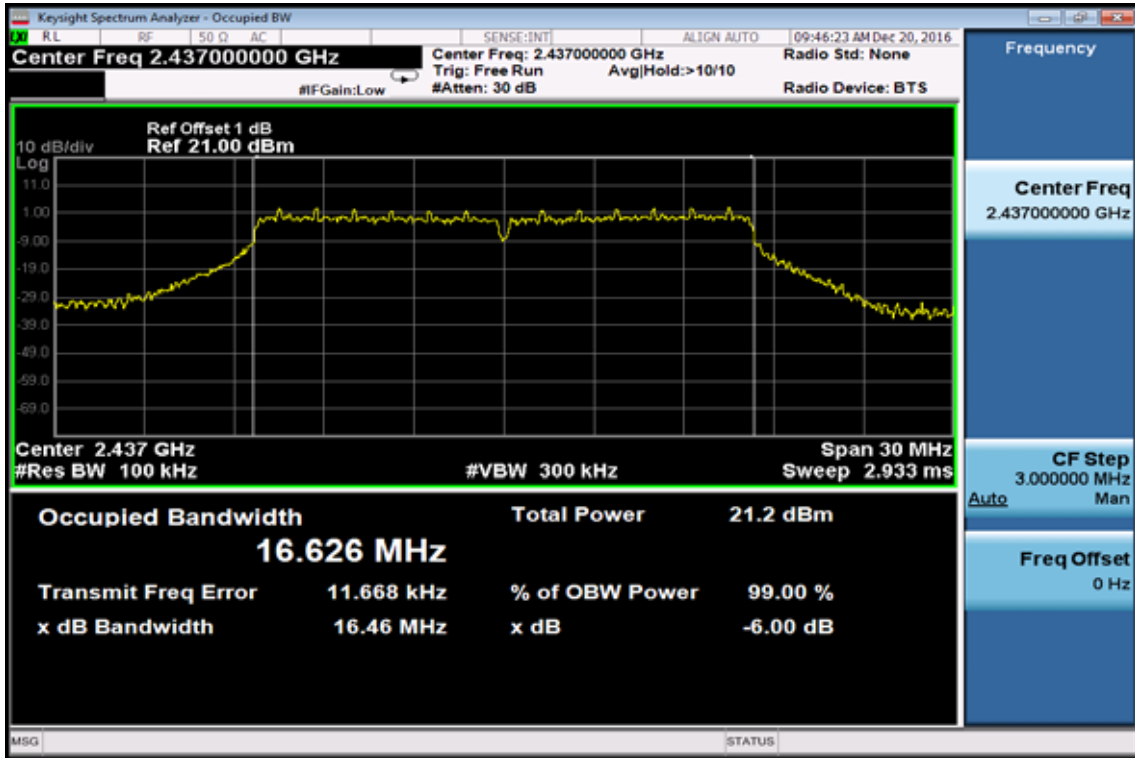


802.11g

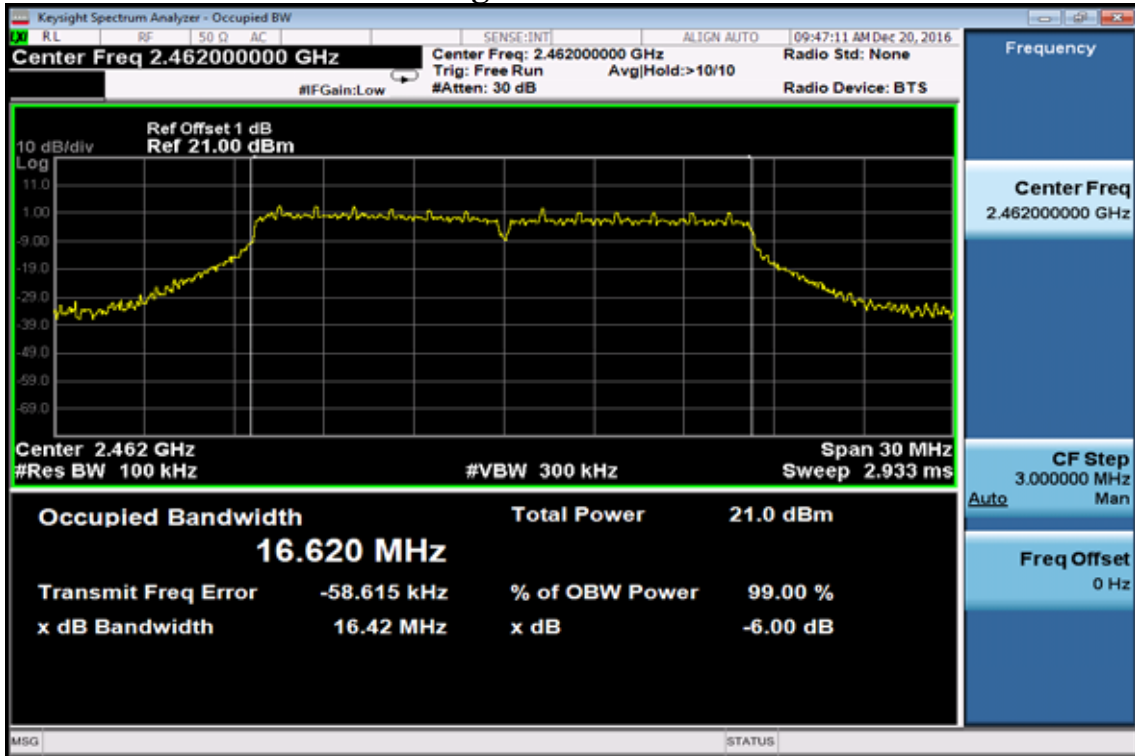
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

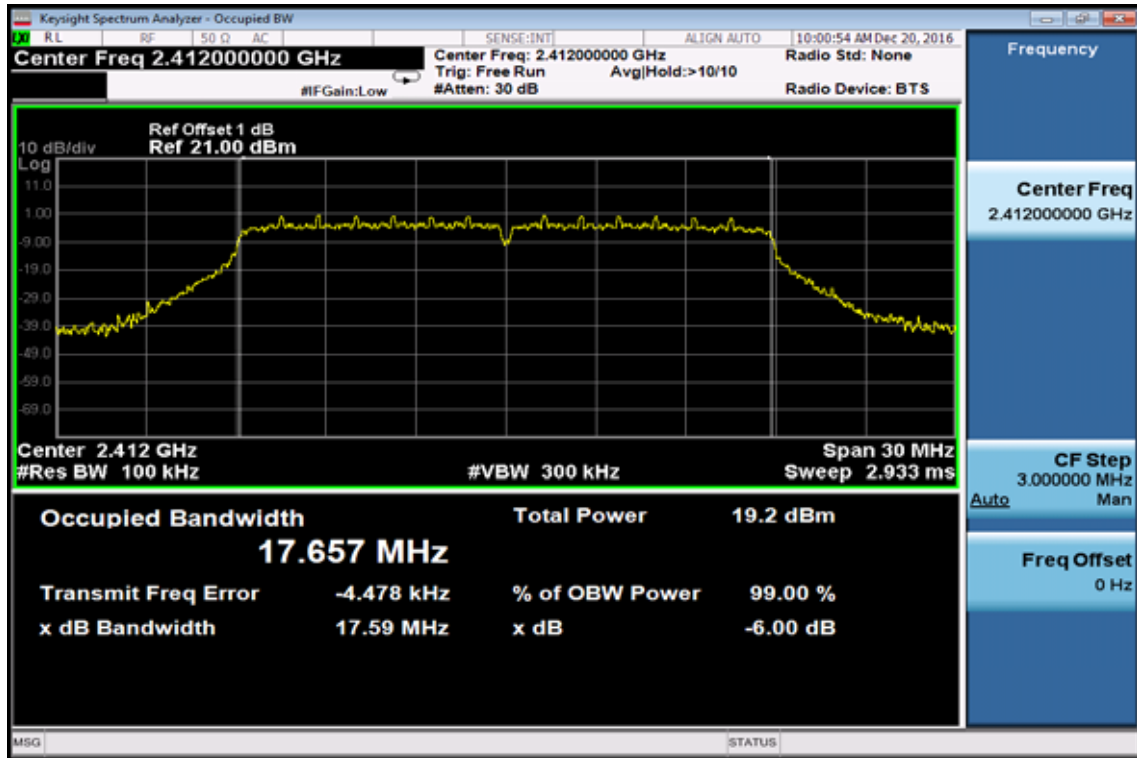


6dB Band Width Test Data CH-High

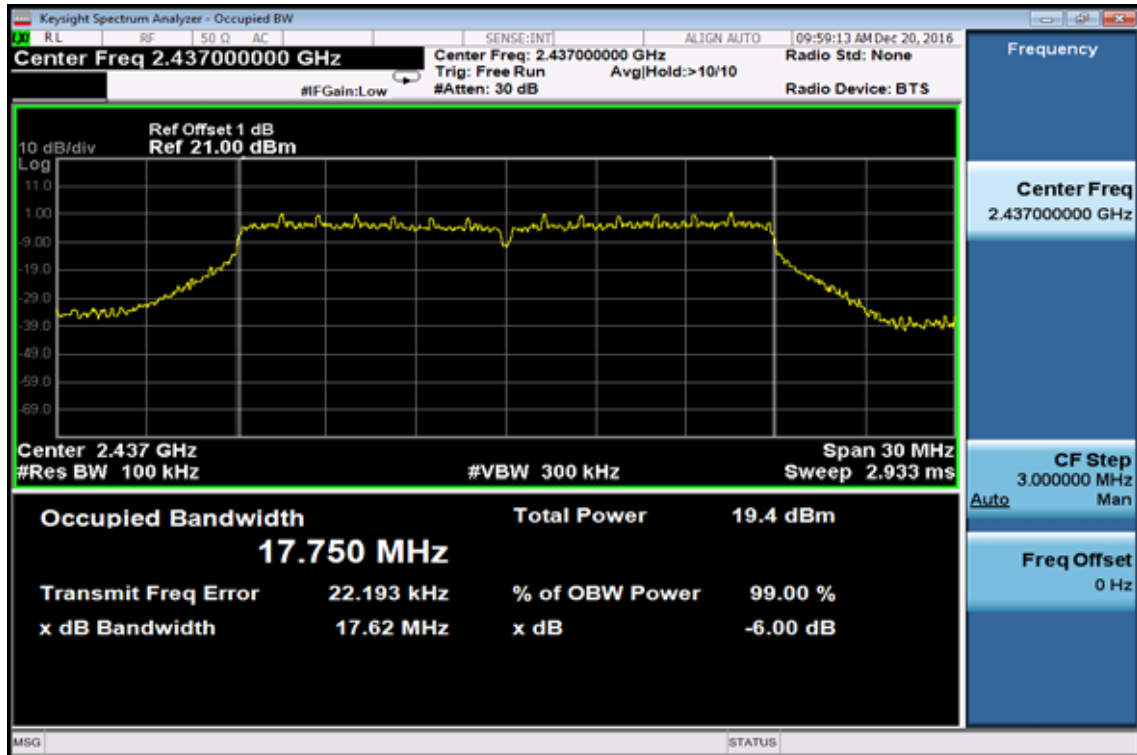


802.11n_20M

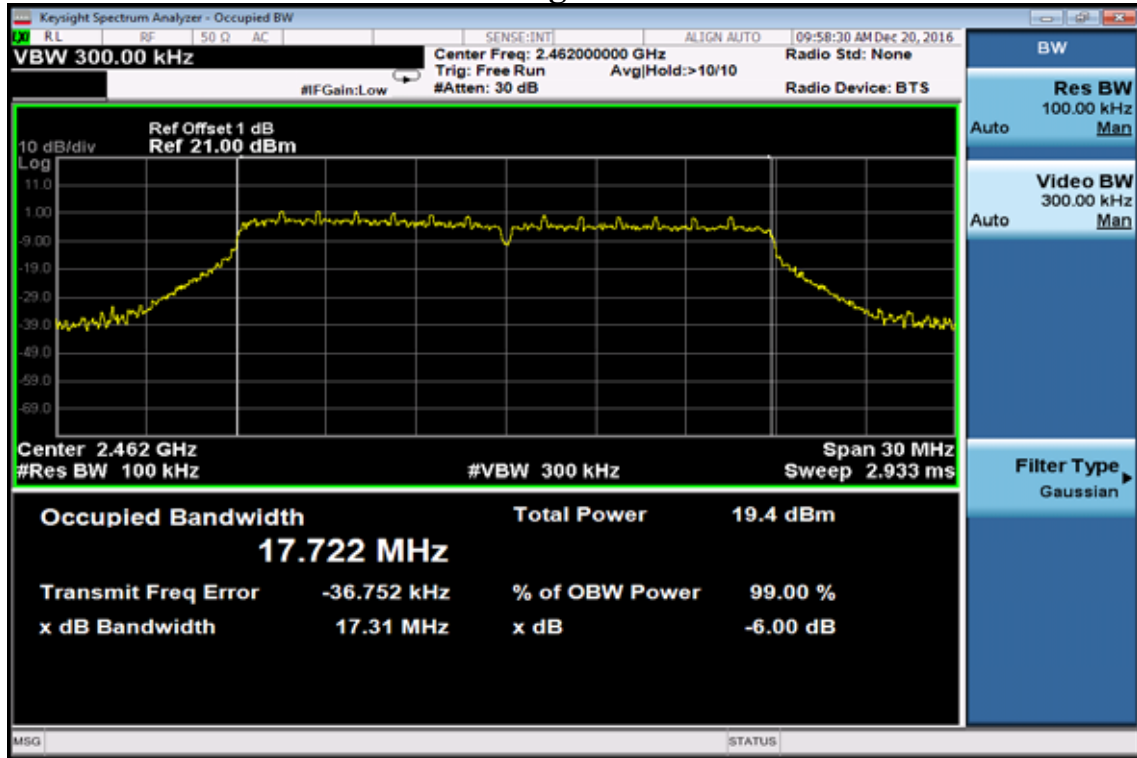
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

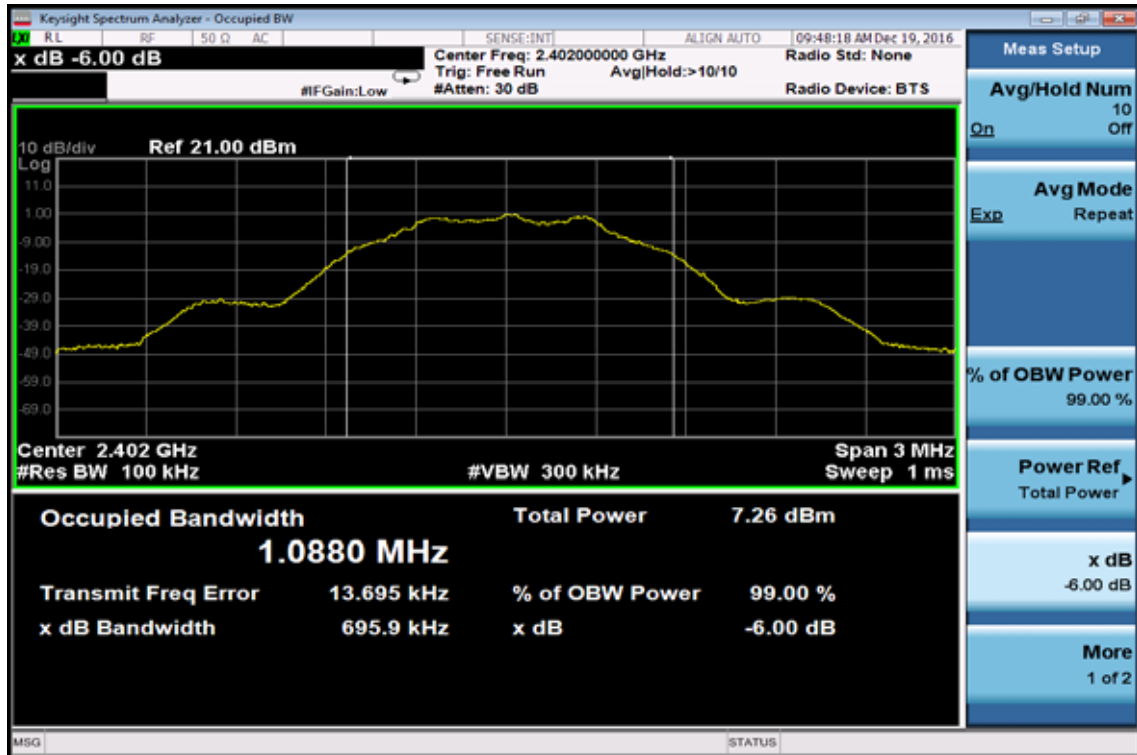


6dB Band Width Test Data CH-High

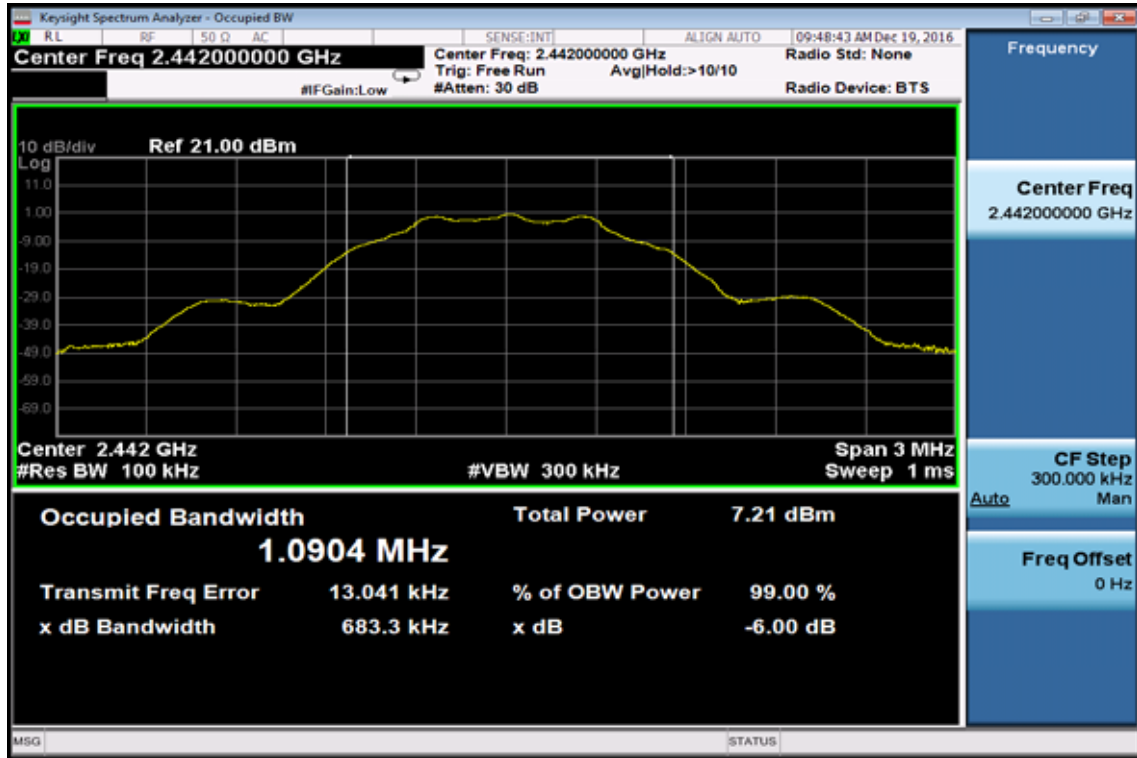


LE Mode

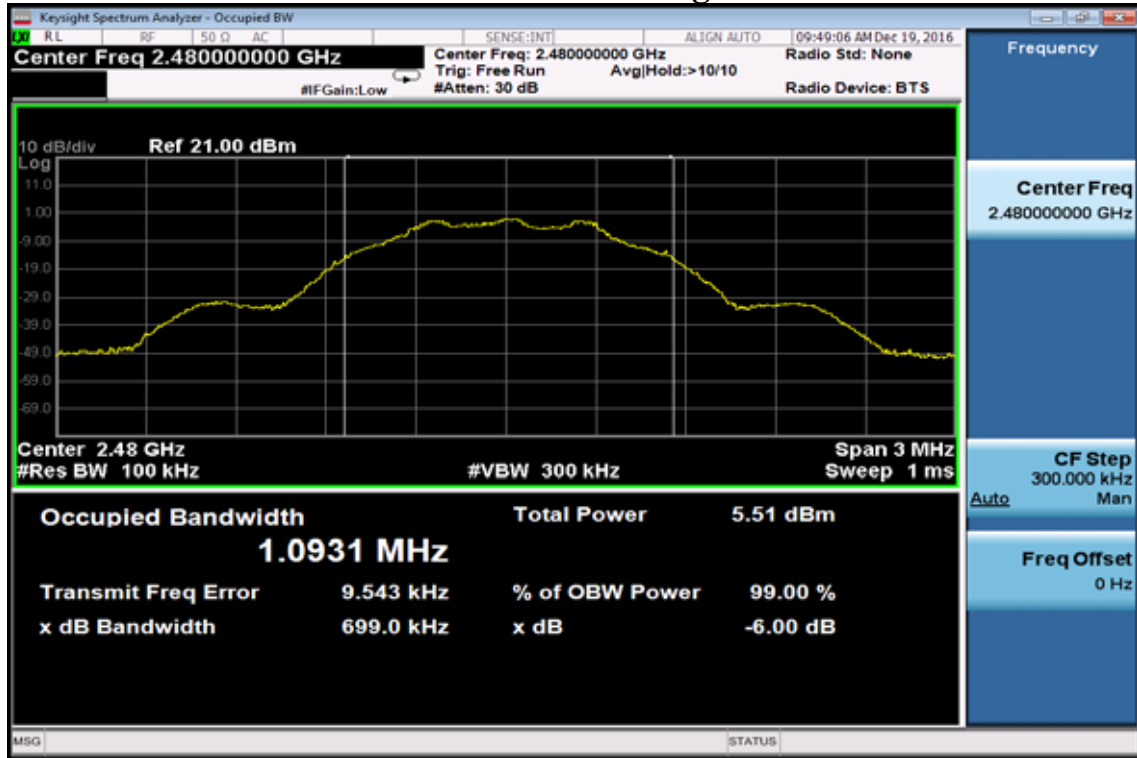
6dB & 99% Band Width Test Data CH-Low



6dB & 99% Band Width Test Data CH-Mid

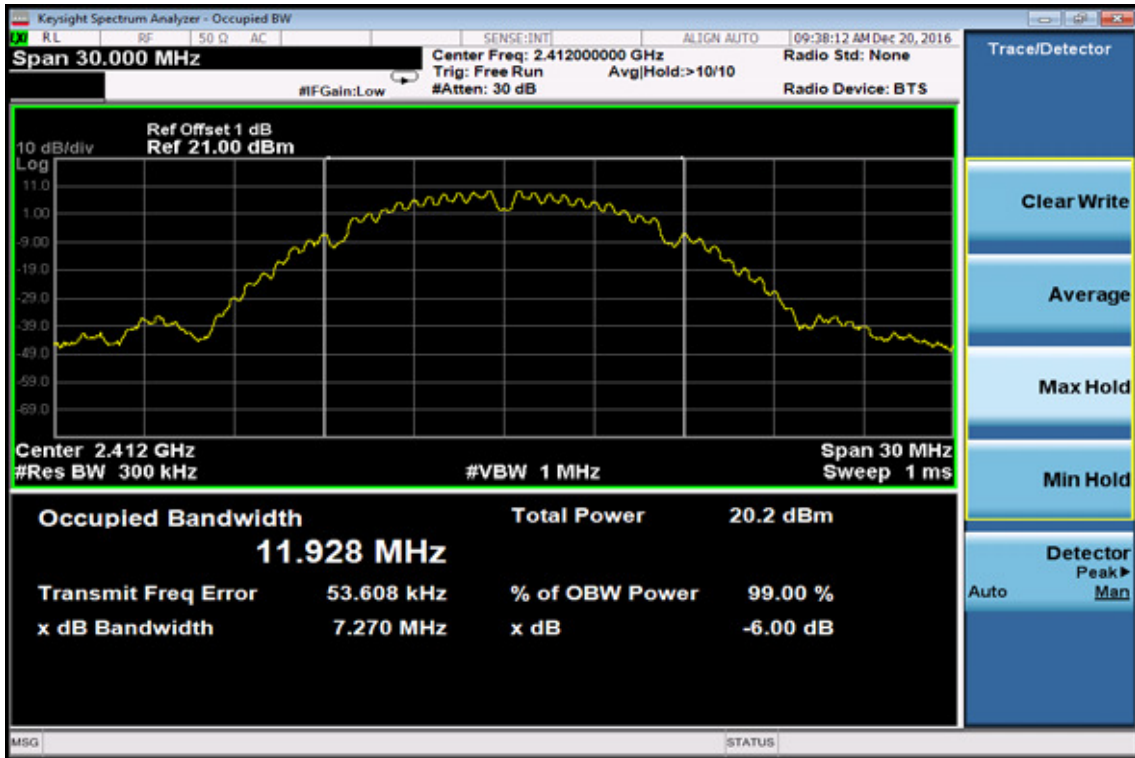


6dB & 99% Band Width Test Data CH-High

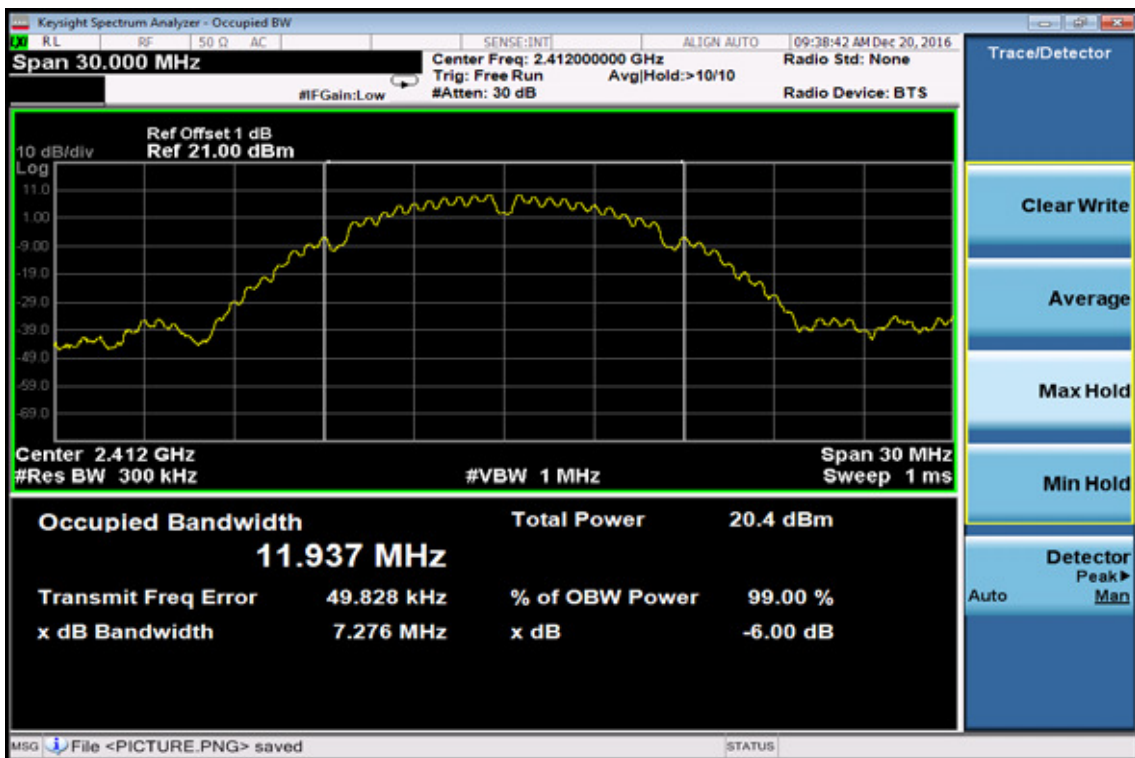


802.11b

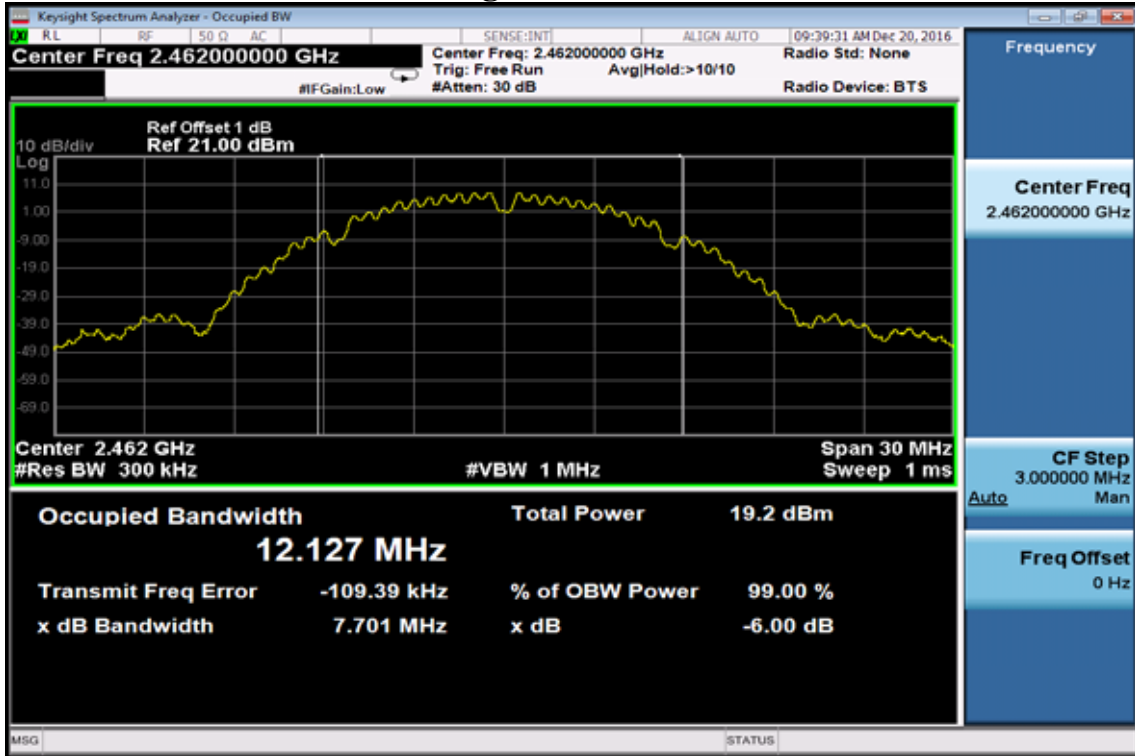
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

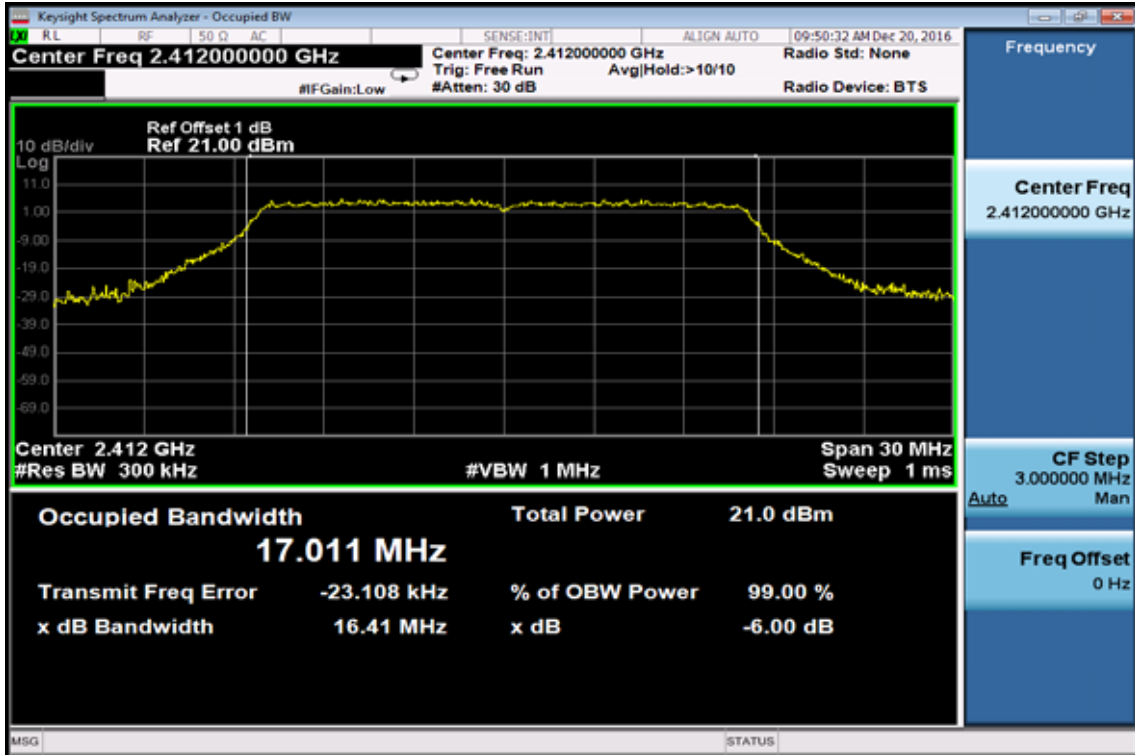


99% Band Width Test Data CH-High

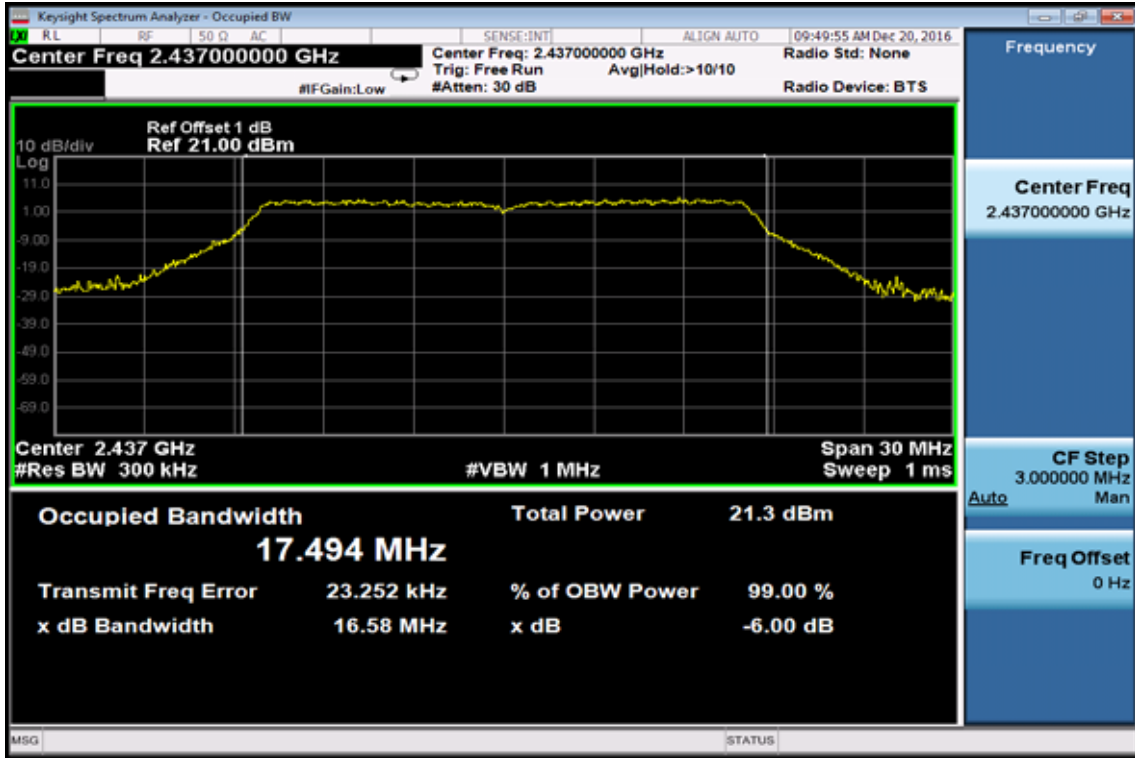


802.11g

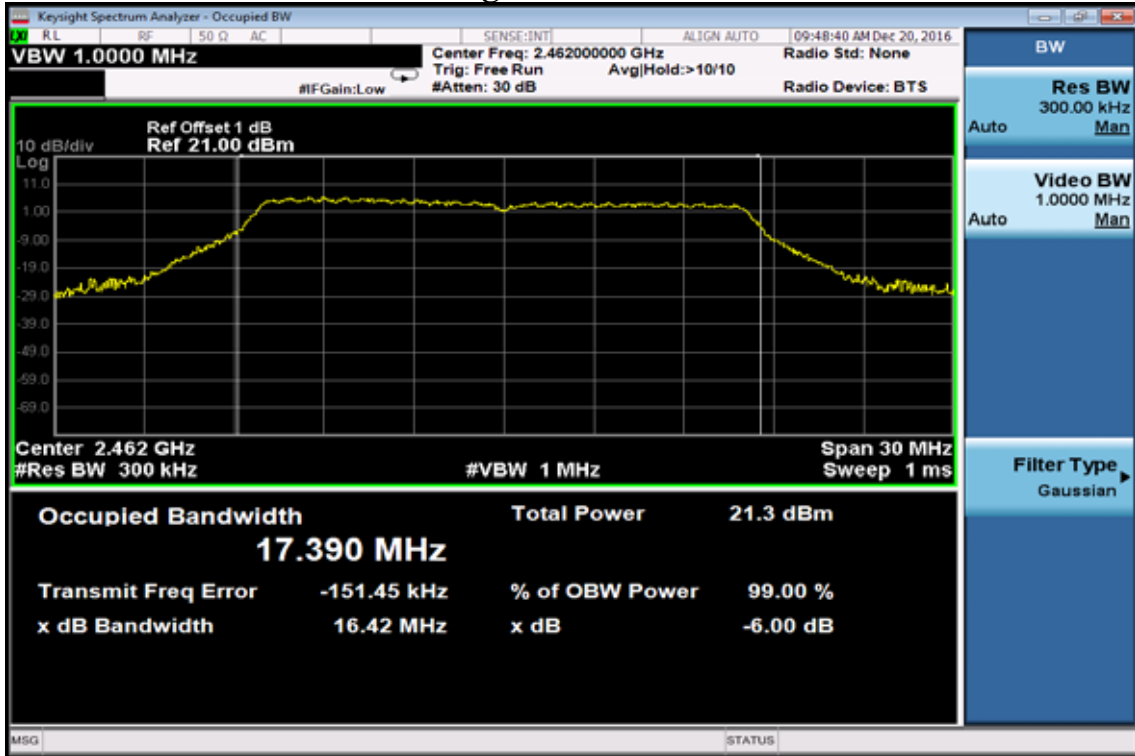
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid

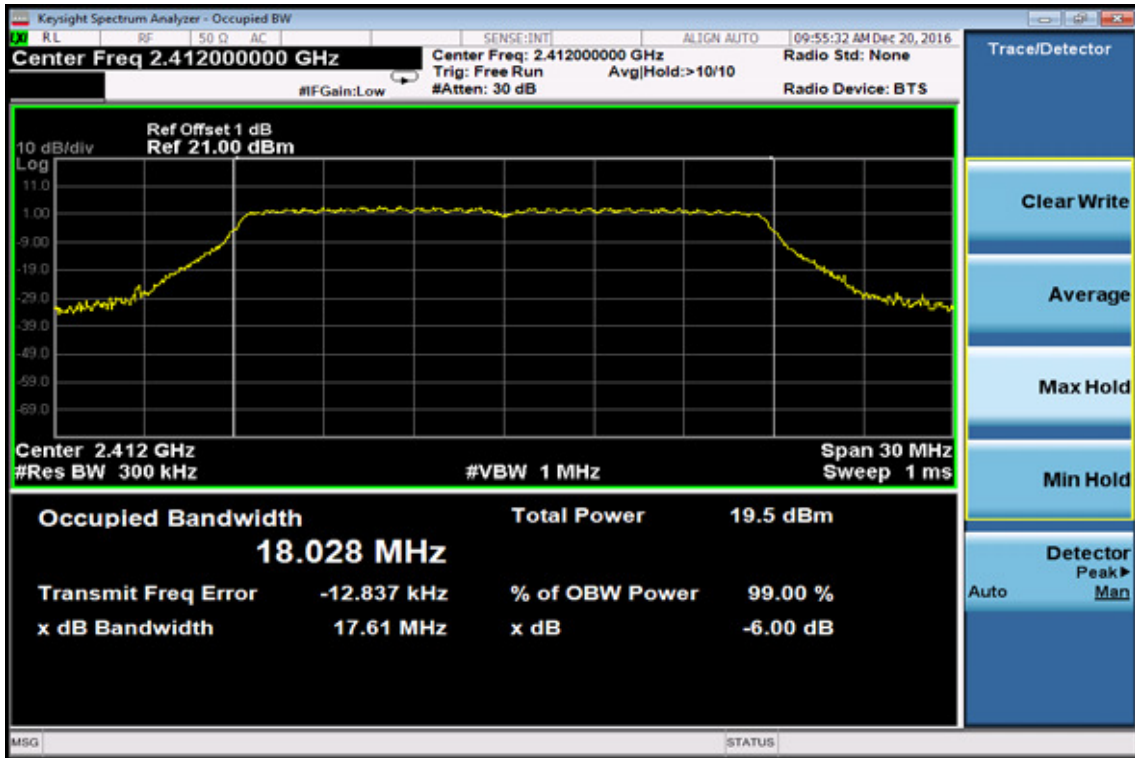


99% Band Width Test Data CH-High

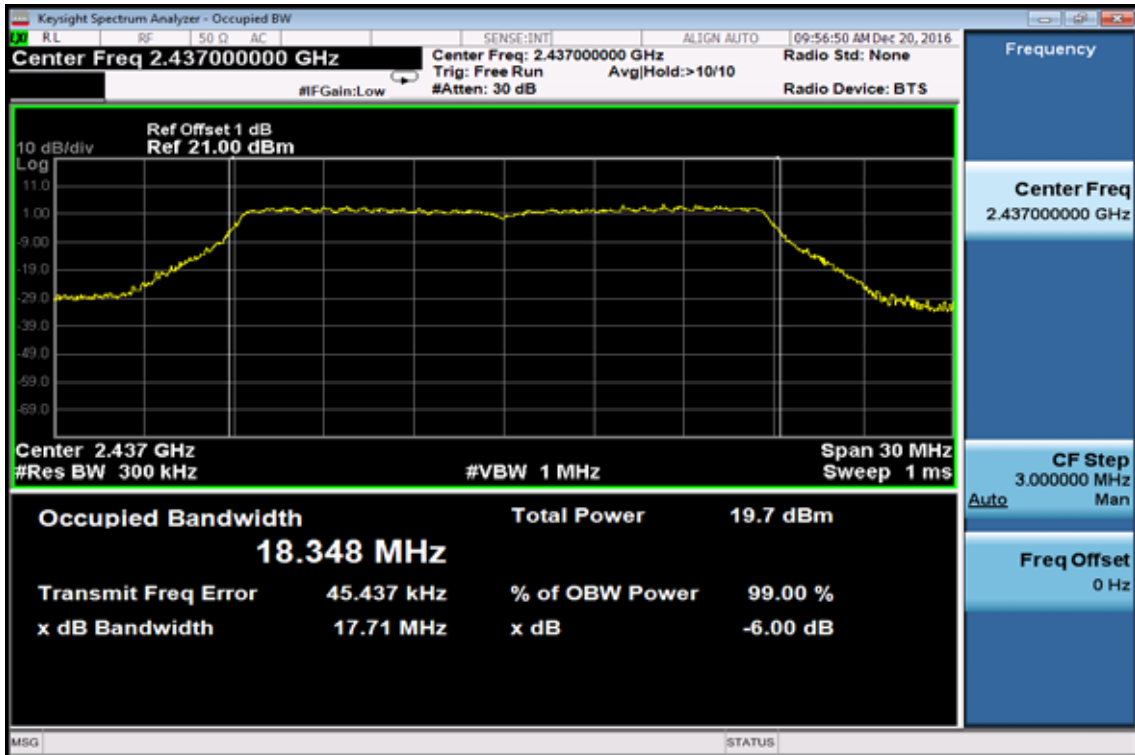


802.11n_20M

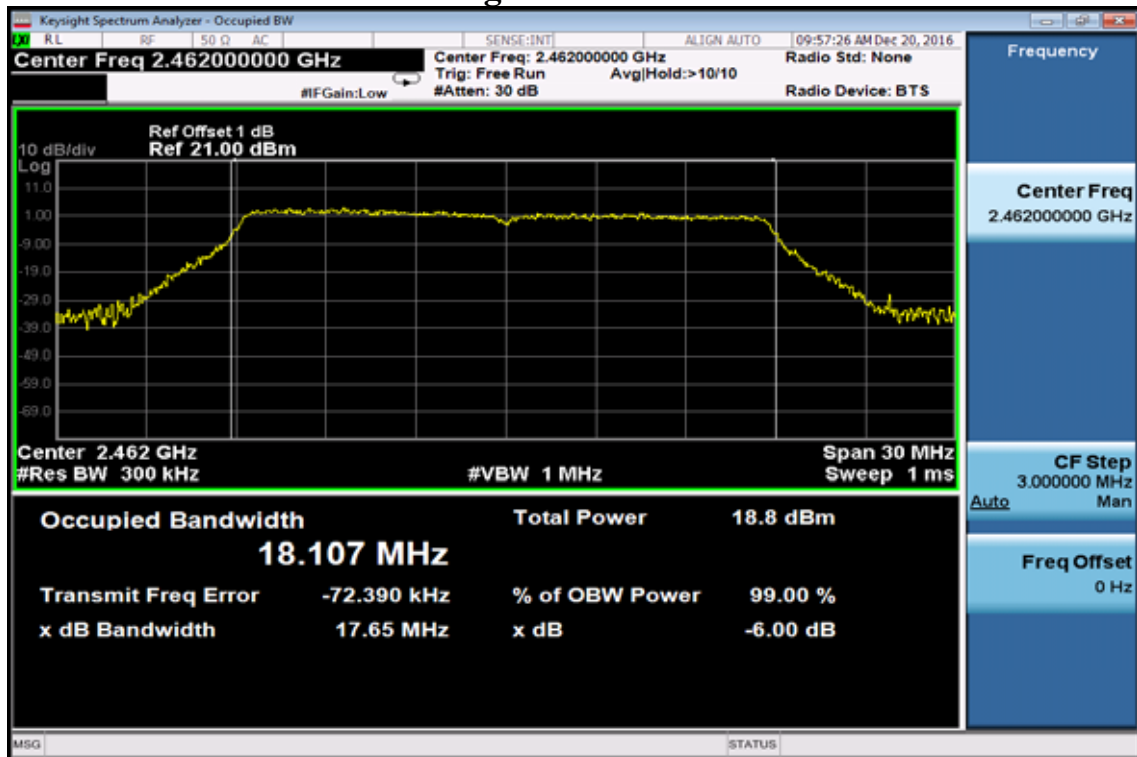
99% Band Width Test Data CH-Low



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

8.2.2 Radiated emission:

Chamber 14(966)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	11/14/2016	11/13/2017
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/20/2016	05/19/2017
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	05/22/2016	05/21/2017
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	06/17/2015	06/16/2017
Bilog Antenna30-1G	Schaffner	CBL 6112D	37873	07/22/2016	07/21/2017
Horn antenna1-18G	ETS	3117	00066665	07/22/2016	07/21/2017
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/21/2015	01/20/2017
Horn antenna18-26G(04)	Com-power	AH-826	081001	07/24/2015	07/23/2017
Preamplifier9-1000M	HP	8447D	NA	03/09/2016	03/08/2017
Preamplifier1-18G	MITEQ	AFS44-001018 00-25-10P-44	1329256	07/27/2016	07/26/2017
Preamplifier1-26G	EM	EM01M26G	NA	03/10/2016	03/09/2017
Preamplifier26-40G	MITEQ	JS-26004000-2 7-5A	818471	07/23/2015	07/22/2017
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	11/25/2016	11/24/2017
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/02/2016	10/01/2017
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&3742 1/2	11/03/2015	11/02/2017
2.4G Filter	Micro-Tronics	Brm50702	76	12/25/2016	12/24/2017
Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

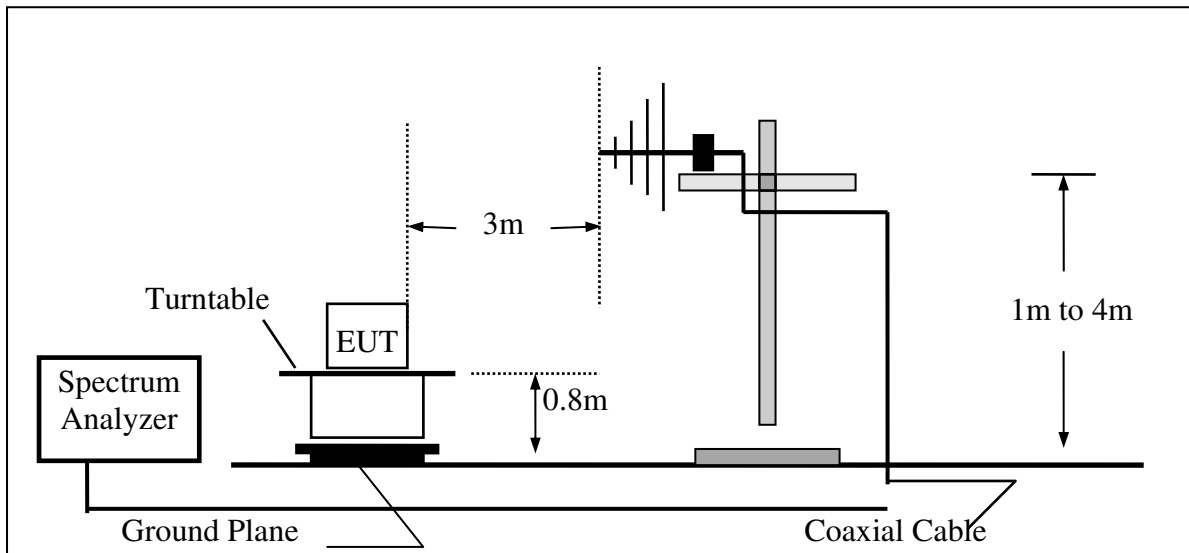
8.3 Test SET-UP:

8.3.1 Conducted Emission at antenna port:

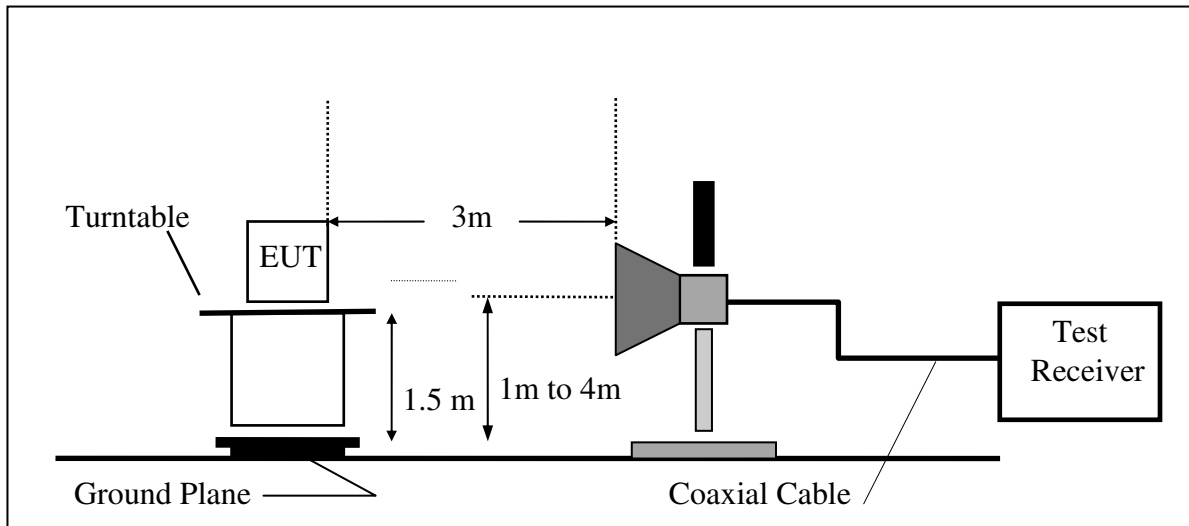
Refer to section 6.3 for details.

8.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 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	

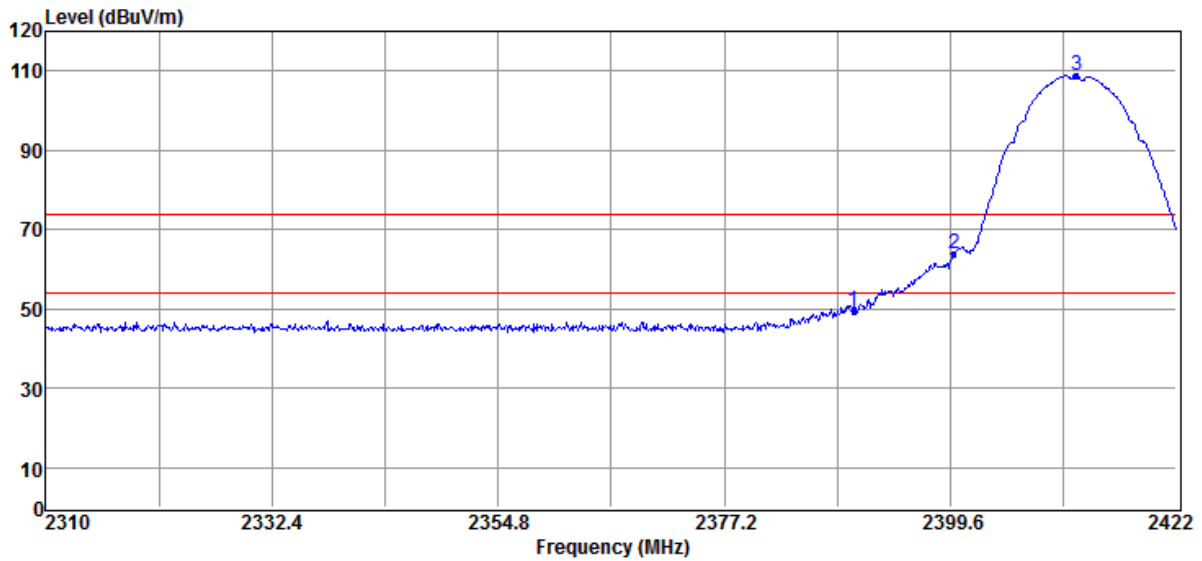
8.6 Measurement Result:

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

Radiated Emission: 802.11 b mode

Operation Mode TX CH Low
Fundamental Frequency 2412 MHz
Temperature 25

Test Date 2016/12/21
Test By Dino



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Li mit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2390.00	52.49	-3.15	49.34	74.00	-24.66	Peak	HORIZONTAL
2	2400.00	67.08	-3.16	63.92	88.84	-24.92	Peak	HORIZONTAL
3	2412.14	111.99	-3.15	108.84	74.00	34.84	Peak	HORIZONTAL

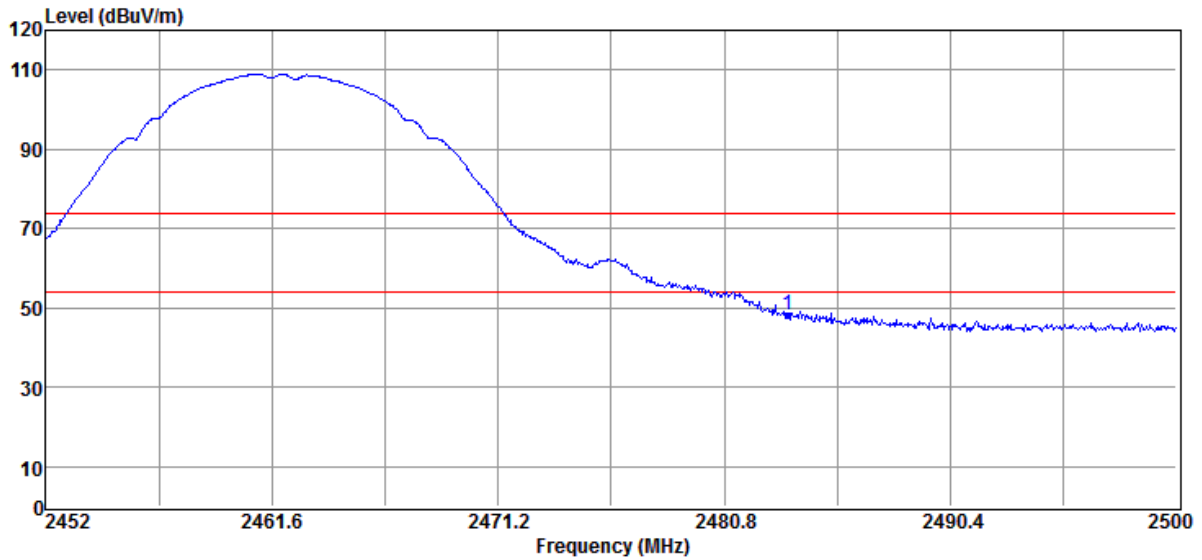
Remark:

- 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.



Operation Mode	TX CH High
Fundamental Frequency	2462 MHz
Temperature	25

Test Date	2016/12/21
Test By	Dino



No	Freq MHz	Reading dBUV	Factor dB/m	Level dBUV/m	Limit dBUV/m	Over Li mit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2483.50	51.37	-3.11	48.26	74.00	-25.74	Peak	HORIZONTAL
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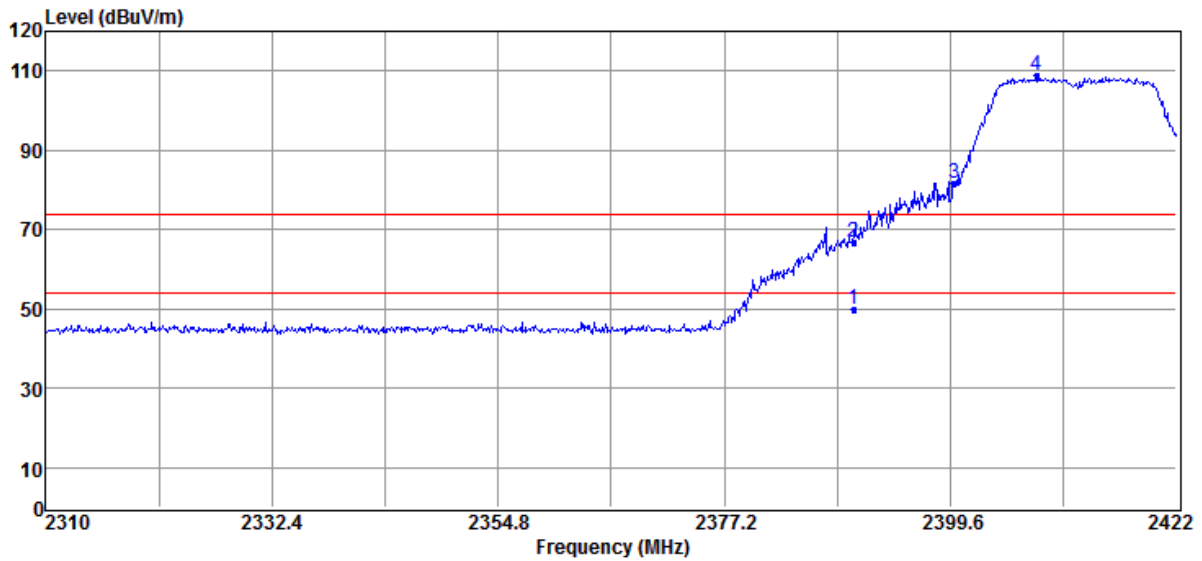
Remark:

- 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 Emission: 802.11 g mode

Operation Mode TX CH Low
Fundamental Frequency 2412 MHz
Temperature 25

Test Date 2016/12/21
Test By Dino



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2390.00	52.99	-3.15	49.84	54.00	-4.16	Average	HORIZONTAL
2	2390.00	69.93	-3.15	66.78	74.00	-7.22	Peak	HORIZONTAL
3	2400.00	84.84	-3.16	81.68	88.96	-7.28	Peak	HORIZONTAL
4	2408.11	112.11	-3.15	108.96	74.00	34.96	Peak	HORIZONTAL

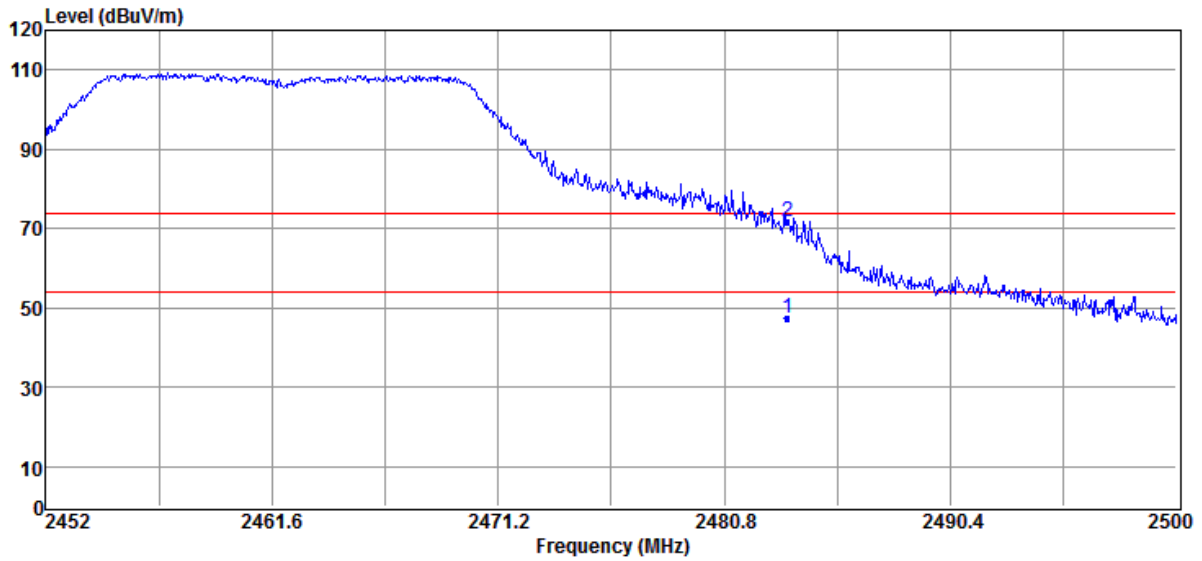
Remark:

- 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.



Operation Mode	TX CH High
Fundamental Frequency	2462 MHz
Temperature	25

Test Date	2016/12/21
Test By	Dino



No	Freq MHz	Reading dBUV	Factor dB/m	Level dBUV/m	Limit dBUV/m	Over L imit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2483.50	50.57	-3.11	47.46	54.00	-6.54	Average	HORIZONTAL
2	2483.50	75.06	-3.11	71.95	74.00	-2.05	Peak	HORIZONTAL

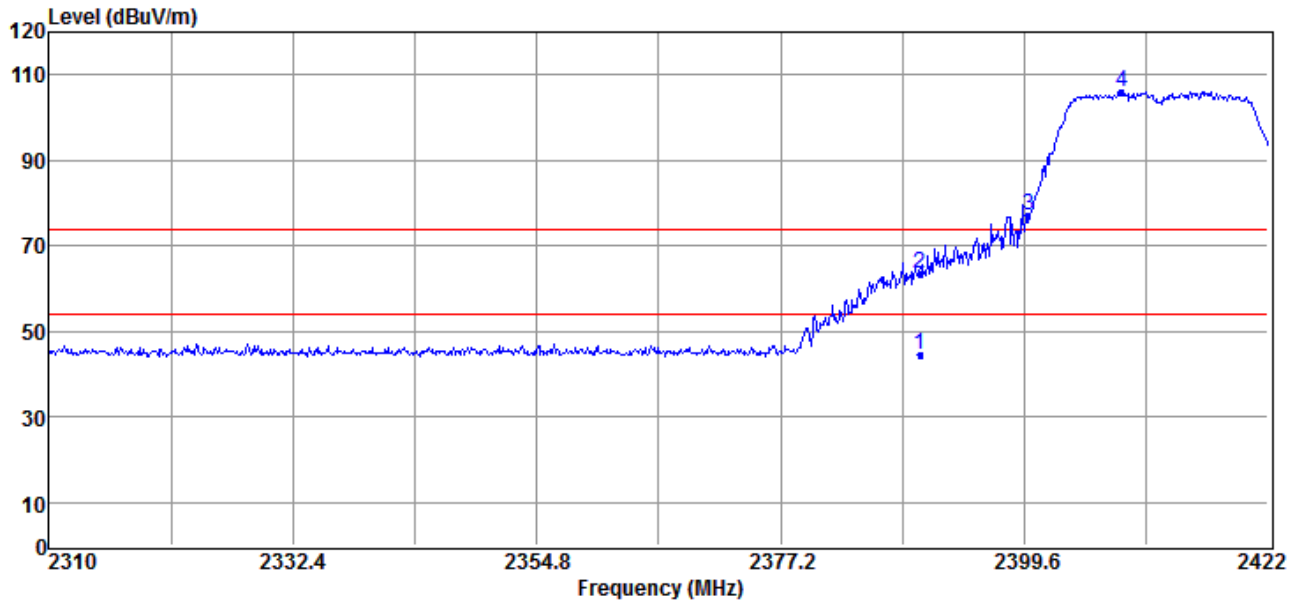
Remark:

- 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 Emission: 802.11 n20 mode

Operation Mode TX CH Low
Fundamental Frequency 2412 MHz
Temperature 25

Test Date 2016/12/21
Test By Dino



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Li mit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2390.00	47.89	-3.15	44.74	54.00	-9.26	Average	HORIZONTAL
2	2390.00	66.49	-3.15	63.34	74.00	-10.66	Peak	HORIZONTAL
3	2400.00	80.27	-3.16	77.11	86.01	-8.90	Peak	HORIZONTAL
4	2408.56	109.16	-3.15	106.01	74.00	32.01	Peak	HORIZONTAL

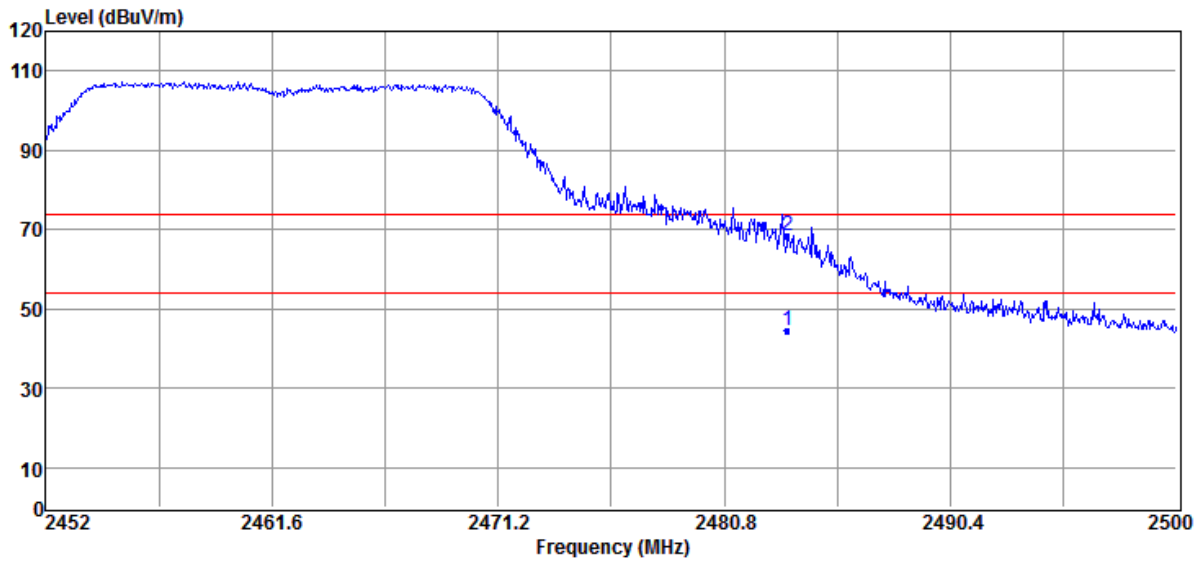
Remark:

- 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.



Operation Mode	TX CH High
Fundamental Frequency	2462 MHz
Temperature	25

Test Date	2016/12/21
Test By	Dino



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2483.50	47.47	-3.11	44.36	54.00	-9.64	Average	HORIZONTAL
2	2483.50	71.73	-3.11	68.62	74.00	-5.38	Peak	HORIZONTAL

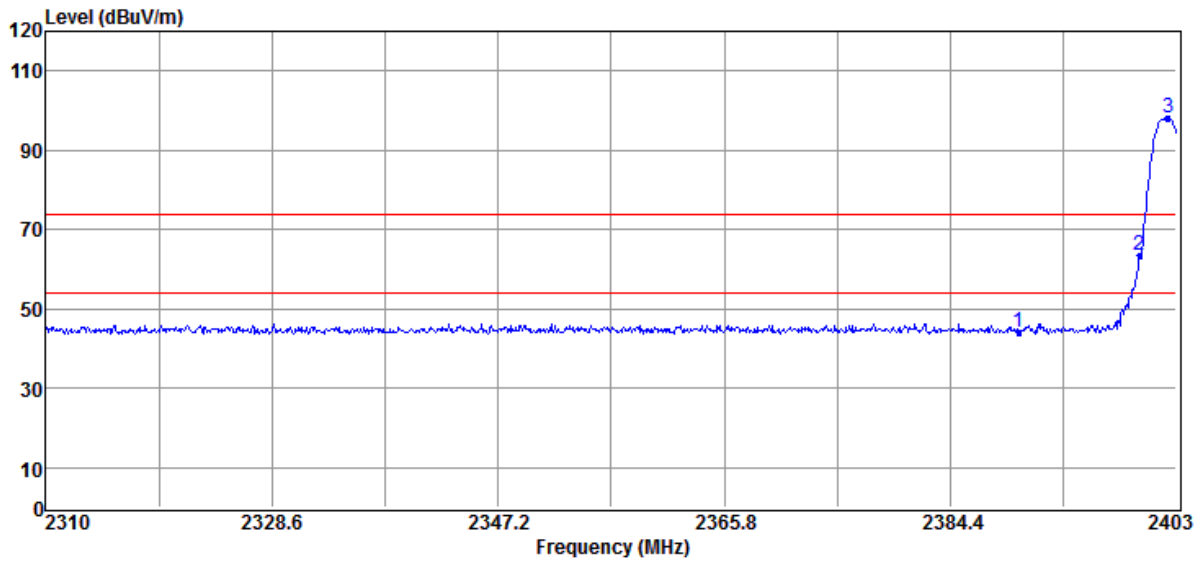
Remark:

- 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 Emission: BLE mode

Operation Mode TX CH Low
Fundamental Frequency 2412 MHz
Temperature 25

Test Date 2016/12/21
Test By Dino



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Li mit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2390.00	47.42	-3.15	44.27	74.00	-29.73	Peak	HORIZONTAL
2	2400.00	66.58	-3.16	63.42	77.99	-14.57	Peak	HORIZONTAL
3	2402.35	101.15	-3.16	97.99	74.00	23.99	Peak	HORIZONTAL

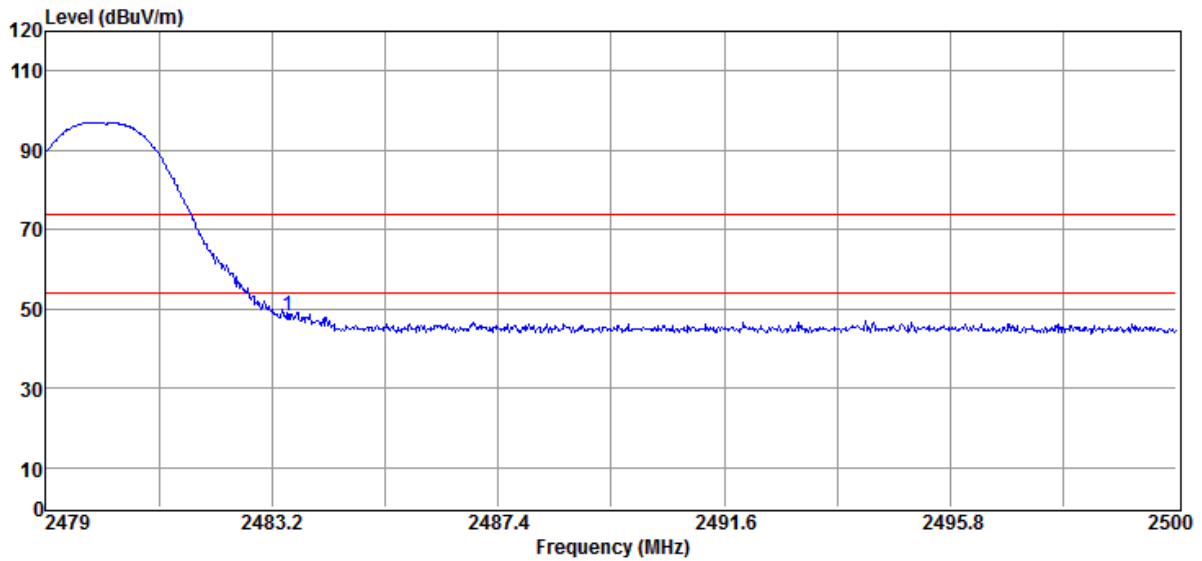
Remark:

- 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.



Operation Mode	TX CH High
Fundamental Frequency	2462 MHz
Temperature	25

Test Date	2016/12/21
Test By	Dino



No	Freq MHz	Reading dBUV	Factor dB/m	Level dBUV/m	Limit dBUV/m	Over Li mit dB	Remark	Pol V/H
----	-------------	-----------------	----------------	-----------------	-----------------	----------------------	--------	------------

1	2483.50	51.20	-3.11	48.09	74.00	-25.91	Peak	HORIZONTAL
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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.

9 SPURIOUS RADIATED EMISSION TEST

9.1 Standard Applicable

According to

9.4 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. 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.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. 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	802.11 g TX CH Low	Test Date	2016/12/21
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25		

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 g TX CH Mid	Test Date	2016/12/21
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25		

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	802.11 g TX CH High	Test Date	2016/12/21
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH Low	Test Date	2016/12/21
Fundamental Frequency	2412MHz	Test By	Dino
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH Mid	Test Date	2016/12/21
Fundamental Frequency	2437MHz	Test By	Dino
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	802.11g TX CH High	Test Date	2016/12/21
Fundamental Frequency	2462MHz	Test By	Dino
Temperature	25		

10 Peak Power Spectral Density

10.1 Standard Applicable:

According to

10.5 Measurement Result:

802.11b Mode

CH	Power Density Level dBm/3KHz	Maximum Limit (dBm)
Low	-5.8	8
Mid	-7.256	8
High	-6.973	8

802.11b
Power Spectral Density Test Plot (CH-Low)



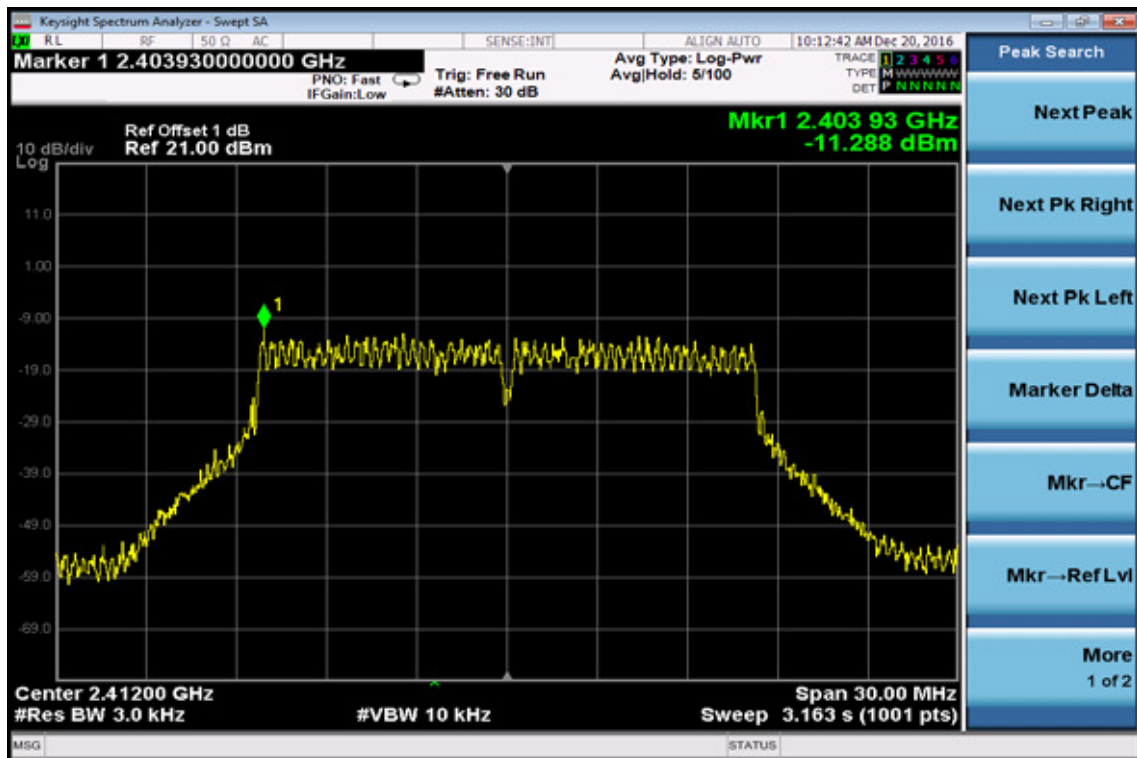
Power Spectral Density Test Plot (CH-Mid)



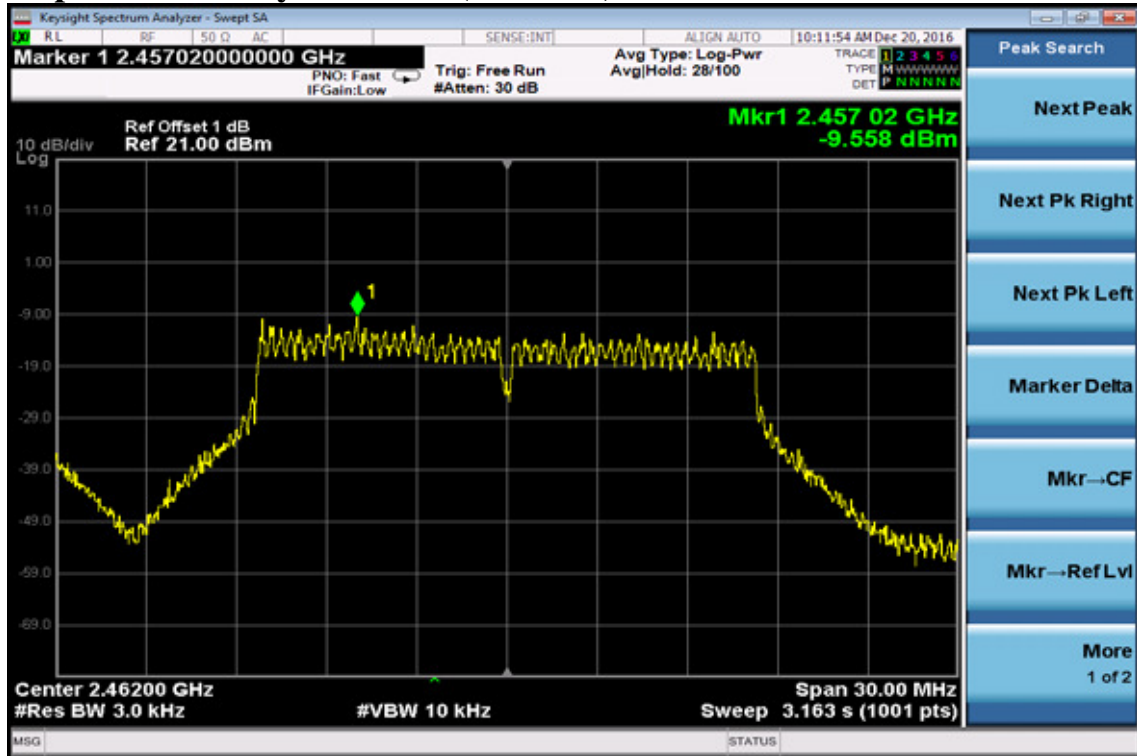
Power Spectral Density Test Plot (CH-High)



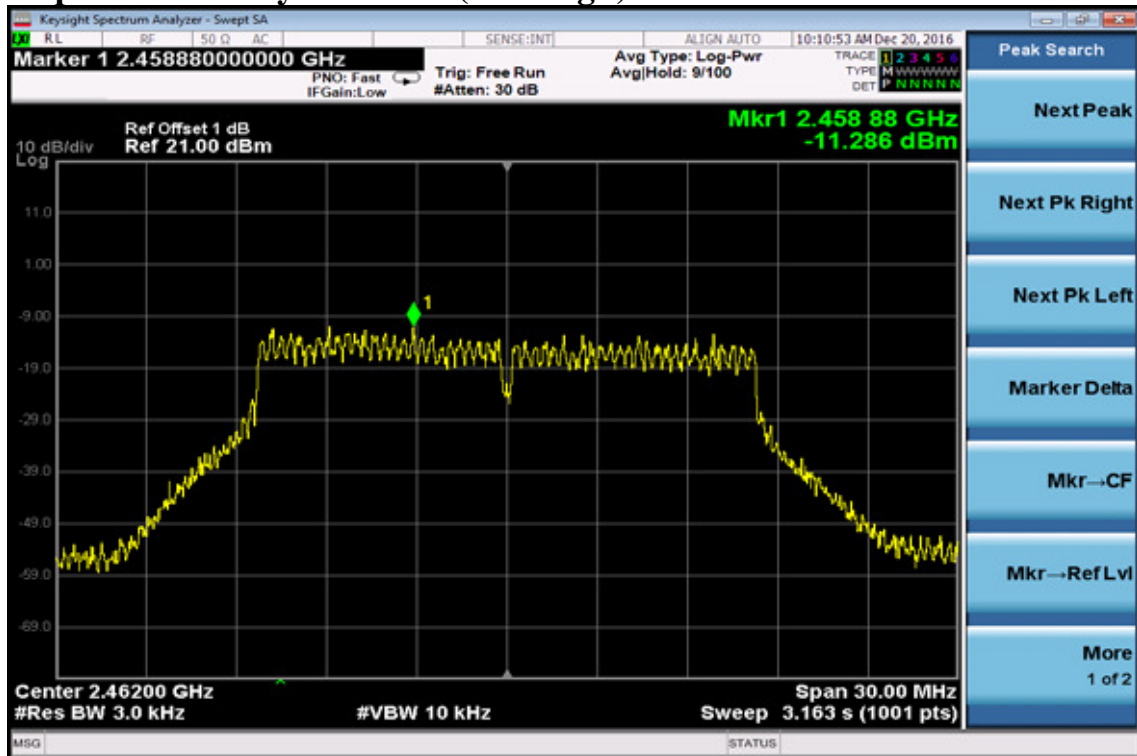
802.11g Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

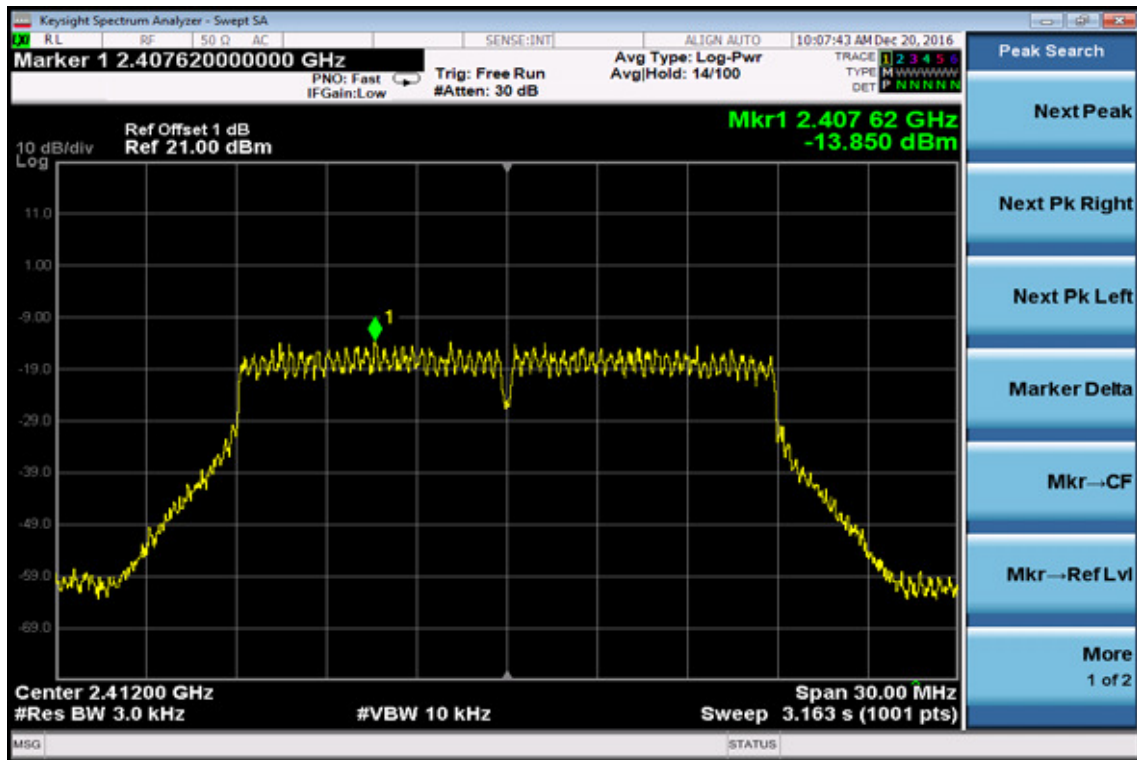


Power Spectral Density Test Plot (CH-High)

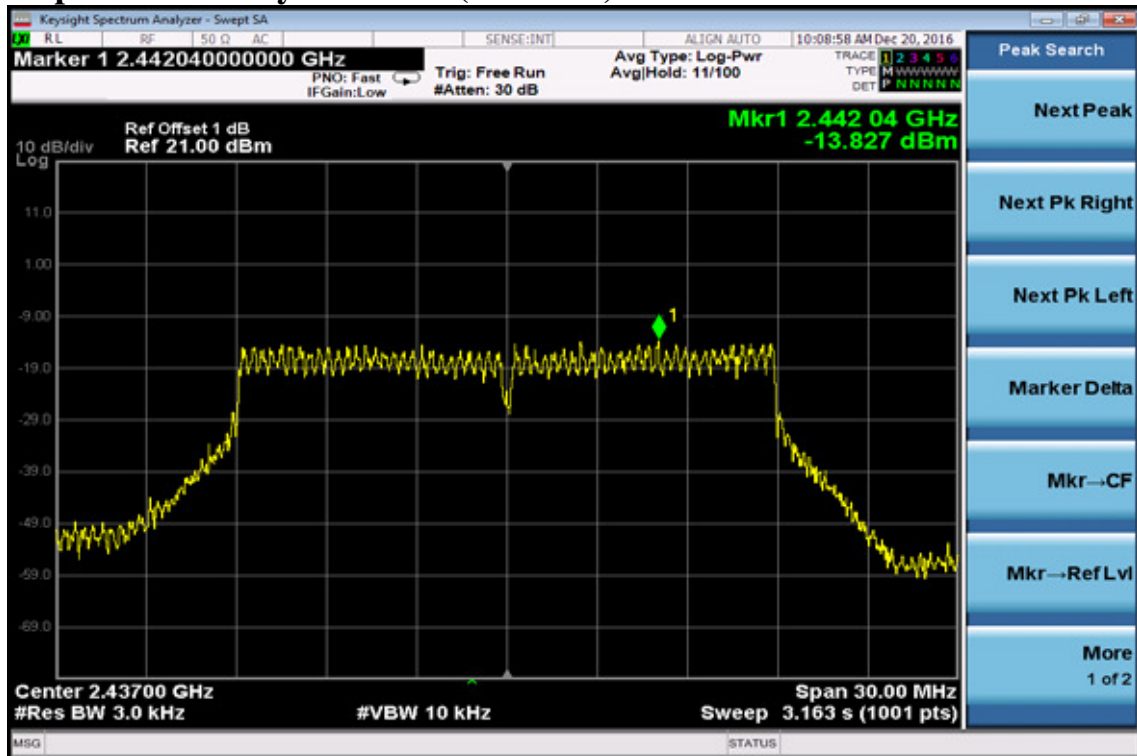


802.11n_20M

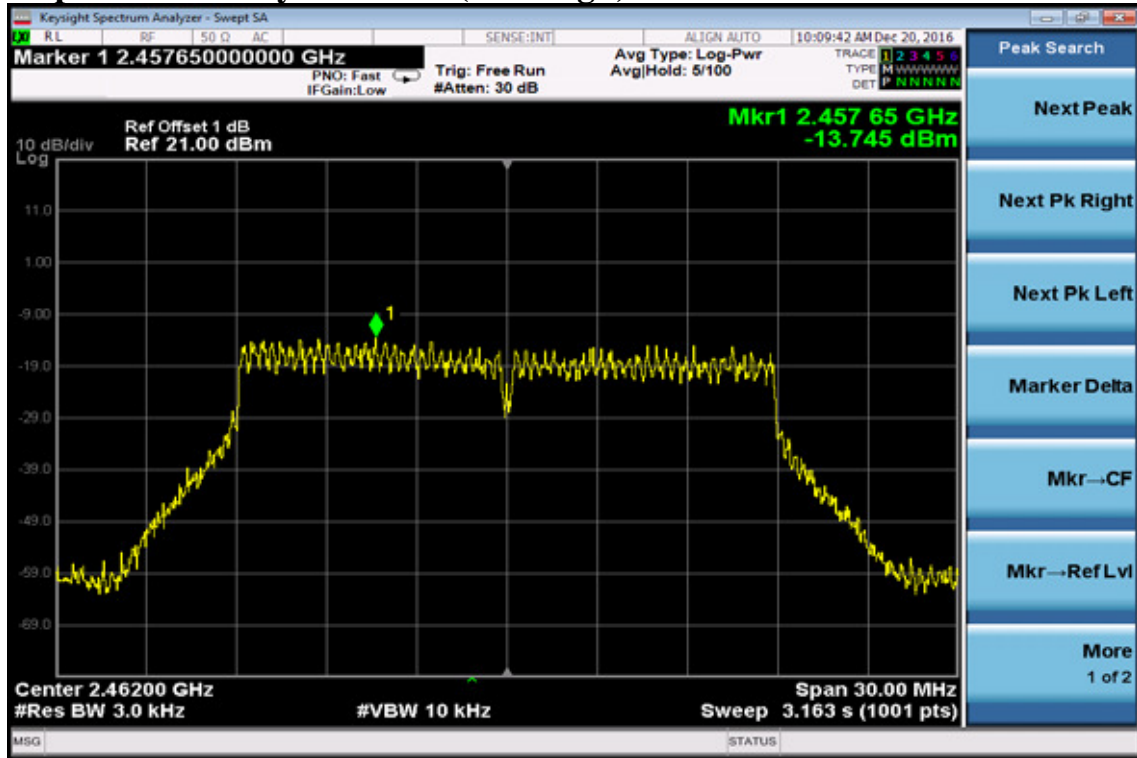
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)

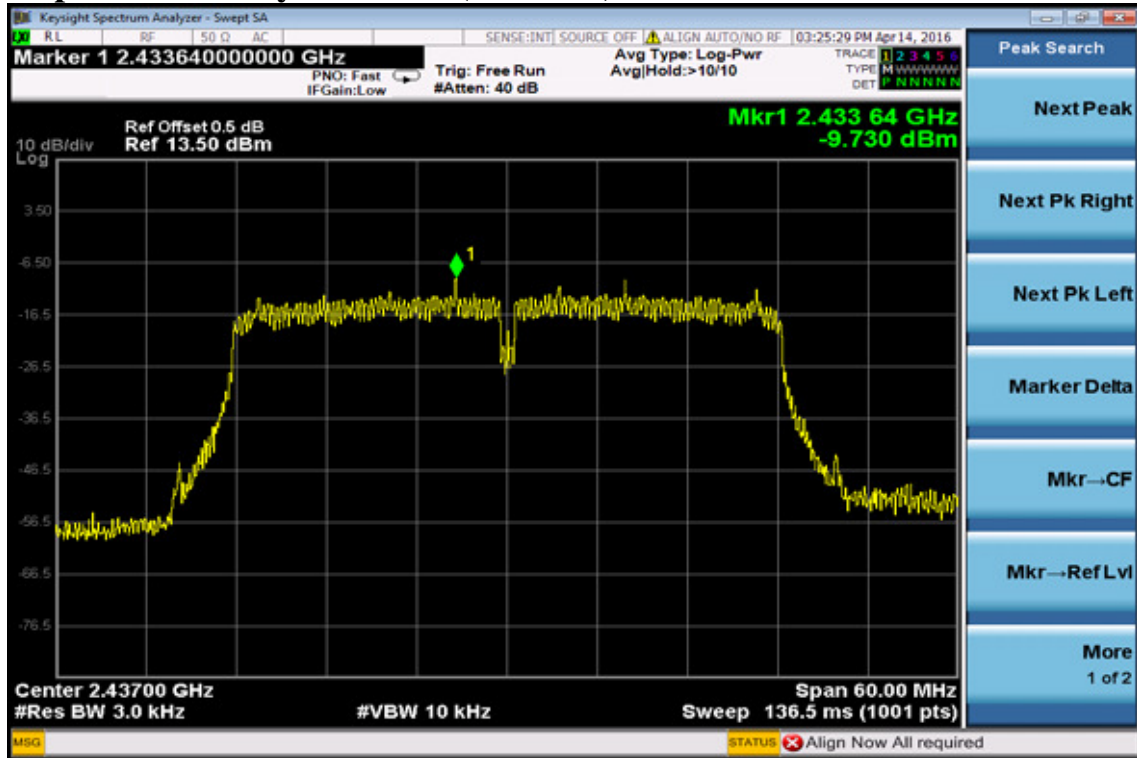


LE Mode

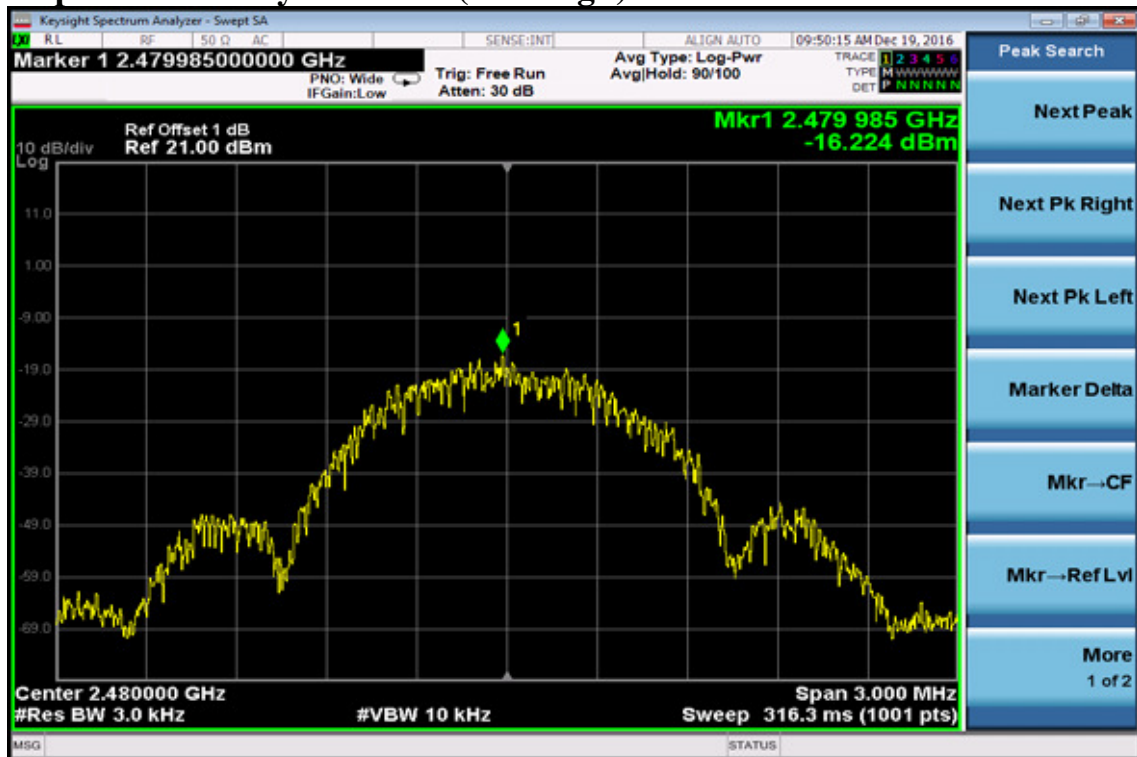
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



11 ANTENNA REQUIREMENT

11.1 Standard Applicable:

According to