



FCC RADIO TEST REPORT

FCC ID: 2AET3-AR-2819

Product : WiFi AP Router with USB Charger
Trade Name : POWER ADD
Model No : AR-2819
Serial Model : N/A

Applicant's name : Long-Hua International Corp.
Address : 2F-11, No.604, Sec. 4, Bade Rd., Songshan Dist., Taipei City 10566,
Taiwan (R.O.C.)

Prepared By : Nowd Testing Services Co.,Ltd.
No. 606, FuerYuanjian Business Centre, 25 Zone, Bao'an District,
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Report No. : NTS150518007R

Date of Test : May.18, 2015

Date of Rep. : May.27, 2015

TEST RESULT CERTIFICATION

Applicant's name Long-Hua International Corp.

Address 2F-11, No.604, Sec. 4, Bade Rd., Songshan Dist., Taipei City 10566,
Taiwan (R.O.C.)

Manufacture's Name... Dong Guan Well Shin Electronic Products Co., Ltd.

Address Changlong Village Huangjiang Town Dongguan Guangdong 532766
China

Product description

Product name..... WiFi AP Router with USB Charger

Model and/or type AR-2819
reference

Serial Model N/A

Standards FCC Part15.247

Test procedure..... ANSI C63.4-2003 and KDB 558074 D01 DTS Meas Guidance v03r03

This device described above has been tested by Nowd Testing Services Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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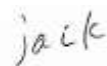
Date of Test.....

Date (s) of performance of tests..... 18 May. 2015 ~27 May. 2015

Date of Issue..... 28 May. 2015

Test Result..... **Pass**

Prepared by:



Jack Wu
Testing Engineer

Reviewed by:



Andy Xie
Technical Manager

Approved by:



somnia
Authorized Signatory

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205&15.209	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Nowd Testing Services Co.,Ltd.

Add. : No. 606, FuerYuanjian Business Centre, 25 Zone, Bao'an District,
Shenzhen, Guandong

FCC Registration No.:230614;

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	WiFi AP Router with USB Charger	
Trade Name	POWER ADD	
Model Name	AR-2819	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a WiFi AP Router with USB Charger	
	Operation Frequency:	802.11b/g/n(20MHz): 2412~2462MHz 802.11n(40MHz):2422~2452MHz
	Modulation Type:	802.11b: DSSS (BPSK/QPSK/CCK) 802.11g/n: OFDM (BPSK/QPSK/16QAM/64QAM)
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz/40MHz): up to 150 Mbps
	Number Of Channel	802.11b/g/n20MHz:11CH 802.11n40MHz:7CH
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	1.0 dBi
Channel List	Please refer to the Note 2.	
Battery	N/A	
Adapter	N/A	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List for 802.11b/g/n(20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	06	2437	09	2452		
04	2427	07	2442				
05	2432	08	2447				

3.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Ceramic chip antenna	N/A	1.0	Wifi Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9
Mode 5	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	Link Mode

For RF conducted measurement	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n/20MHz CH1/ CH6/ CH11
Mode 4	802.11n/40MHz CH3/ CH6/ CH9

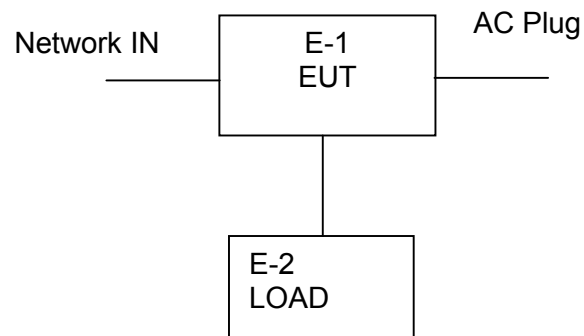
Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported
- (3) EUT configured to transmit continuously:

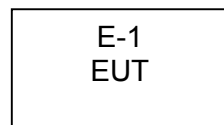
Operated Mode for Worst Duty Cycle	
Test Signal Duty Cycle (x)	Average correction factor (dB)
100% - IEEE 802.11b	0
100% - IEEE 802.11g	0
100% - IEEE 802.11n (HT20)	0
100% - IEEE 802.11n (HT40)	0

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test



RF conducted measurement



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	WiFi AP Router with USB Charger	POWER ADD	AR-2819	N/A	EUT
E-2	LOAD	N/A	2.5R		

Item	Shielded Type	Ferrite Core	Length	Note
C1	Yes	No	20cm	temporary antenna connector (cable loss:0.5dBm) (antenna impedance: 50R)

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Equipment list Radiation test & other conducted test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	160400005	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI7	101318	2014.06.07	2015.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.07	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3182	150900201	2014.06.07	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensors	R&S	NRV-Z31	100698	2014.07.06	2015.07.05	1 year
12	Test Cable 10MHz-1GHz	ElectricFever	R-01	1259400	2014.07.06	2015.07.05	1 year
13	Test Cable 1-25GHz	ElectricFever	R-02	1258670	2014.07.06	2015.07.05	1 year
14	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

Note:

We will use the temporary antenna connector (By ipex connector) When conducted test
And this temporary antenna connector is listed within the instrument list

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2014.06.06	2015.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	Kyoritsu	KNW-407	8-1789-3	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.07	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.07	2015.06.06	1 year
6	Absorbing clamp	R&S	MDS-21	100423	2014.06.08	2015.06.07	1 year
7	Test Cable 150KHz-30MHz	NTS	C01	01	2015.05.14	2016.05.13	1 year

1	Attenuation	MCE	24-10-34	BN9258	2014.07.06	2015.07.05	1 year
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3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

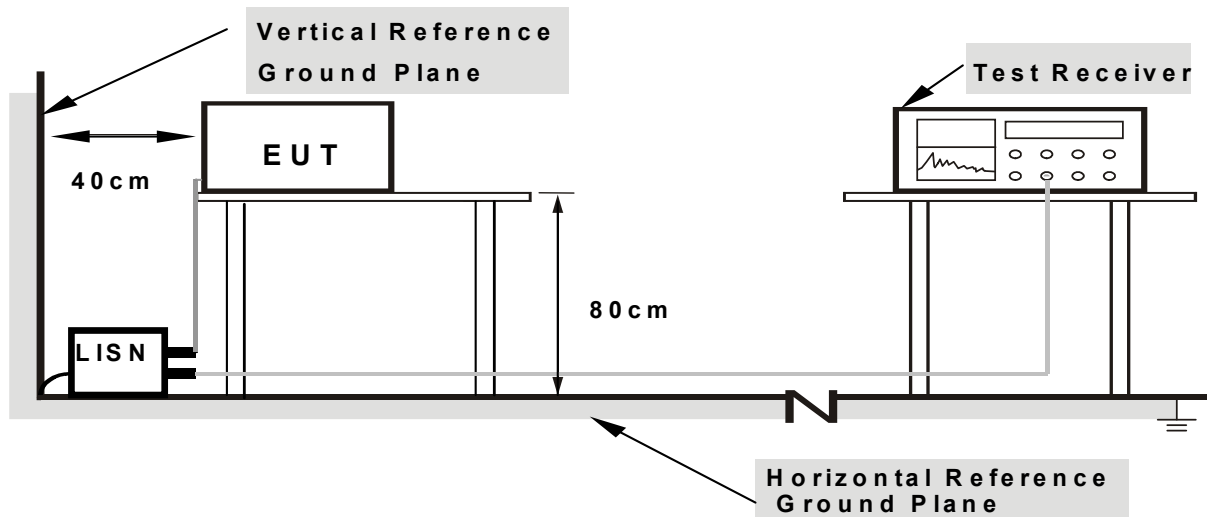
3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



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

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

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

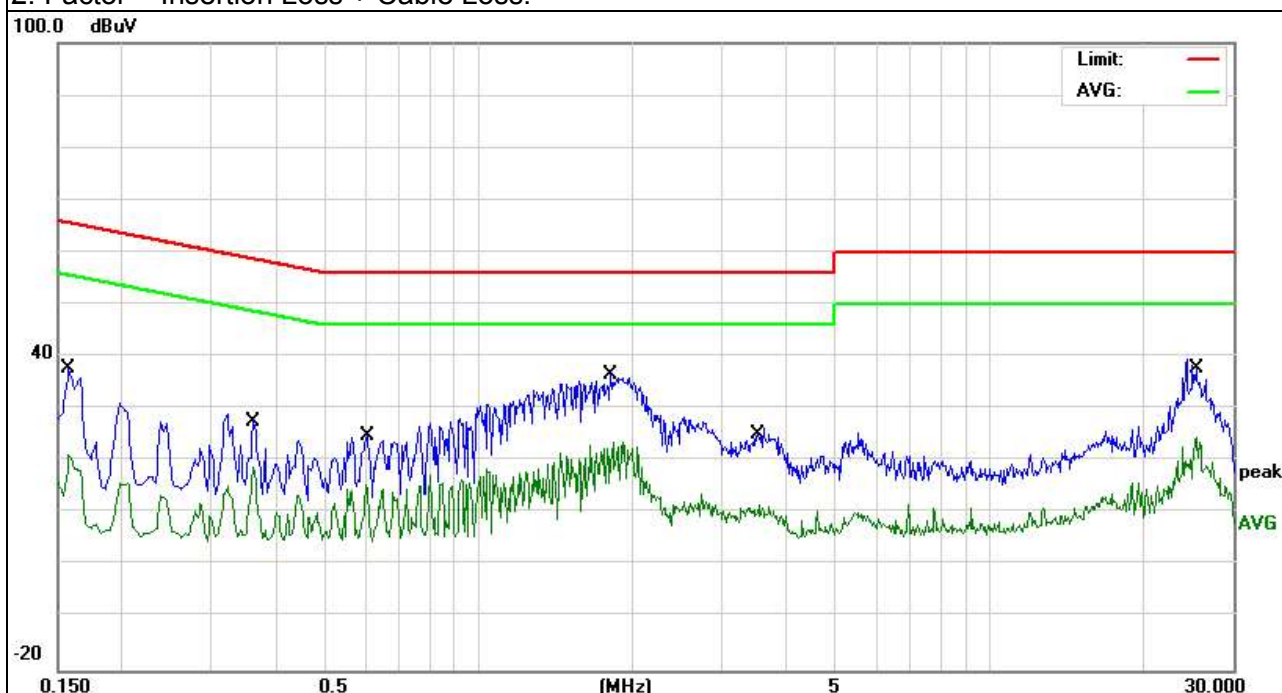
3.1.6 TEST RESULTS

EUT :	WiFi AP Router with USB Charger	Model Name. :	AR-2819
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1580	28.10	9.62	37.72	65.56	-27.84	peak
0.1580	11.51	9.62	21.13	55.56	-34.43	AVG
0.3620	18.10	9.51	27.61	58.68	-31.07	peak
0.3620	9.36	9.51	18.87	48.68	-29.81	AVG
0.6020	14.89	9.77	24.66	56.00	-31.34	peak
0.6020	5.83	9.77	15.60	46.00	-30.40	AVG
1.8300	25.22	9.66	34.88	56.00	-21.12	peak
1.8300	14.11	9.66	23.77	46.00	-22.23	AVG
3.5340	14.70	9.69	24.39	56.00	-31.61	peak
3.5340	1.85	9.69	11.54	46.00	-34.46	AVG
25.5580	26.15	9.93	36.08	60.00	-23.92	peak
25.5580	14.67	9.93	24.60	50.00	-25.40	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

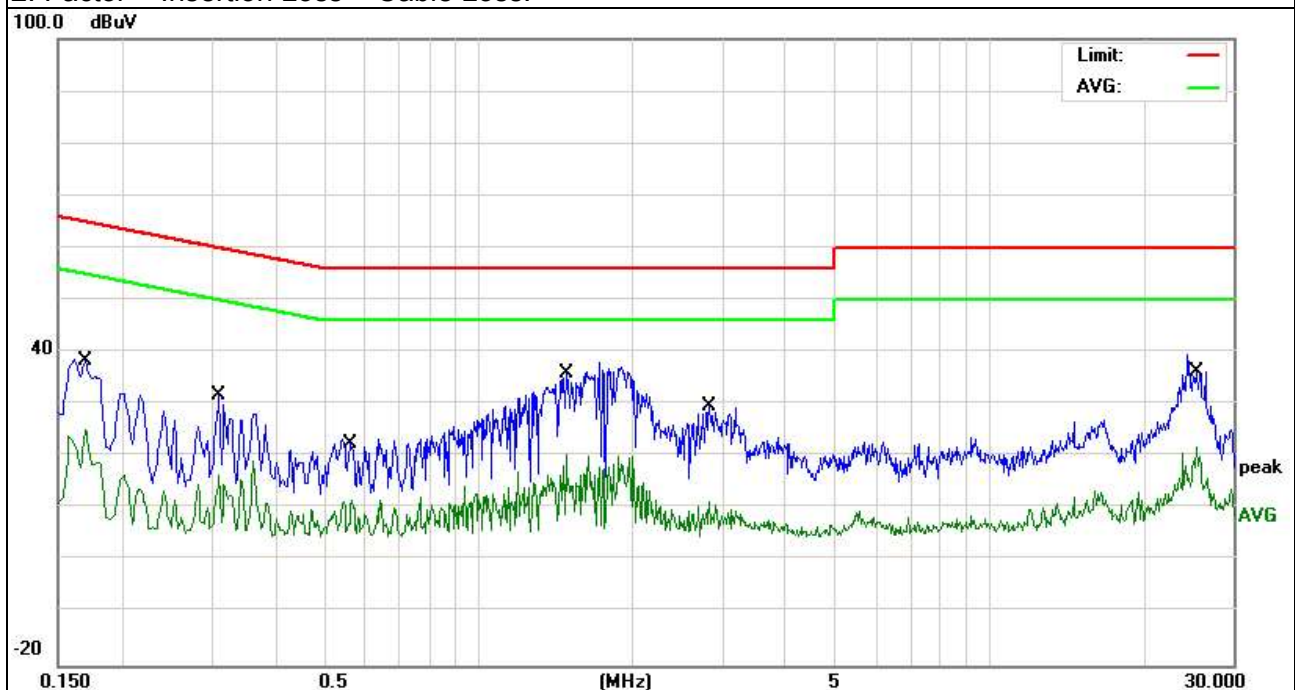


EUT :	WiFi AP Router with USB Charger	Model Name. :	AR-2819
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1700	28.62	9.62	38.24	64.96	-26.72	peak
0.1700	15.68	9.62	25.30	54.96	-29.66	AVG
0.3100	21.95	9.71	31.66	59.97	-28.31	peak
0.3100	6.75	9.71	16.46	49.97	-33.51	AVG
0.5660	12.10	9.78	21.88	56.00	-34.12	peak
0.5660	1.93	9.78	11.71	46.00	-34.29	AVG
1.4819	26.10	9.70	35.80	56.00	-20.20	peak
1.4819	10.64	9.70	20.34	46.00	-25.66	AVG
2.8260	20.01	9.67	29.68	56.00	-26.32	peak
2.8260	1.65	9.67	11.32	46.00	-34.68	AVG
25.4460	26.23	9.93	36.16	60.00	-23.84	peak
25.4460	11.98	9.93	21.91	50.00	-28.09	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- e. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- f. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- g. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

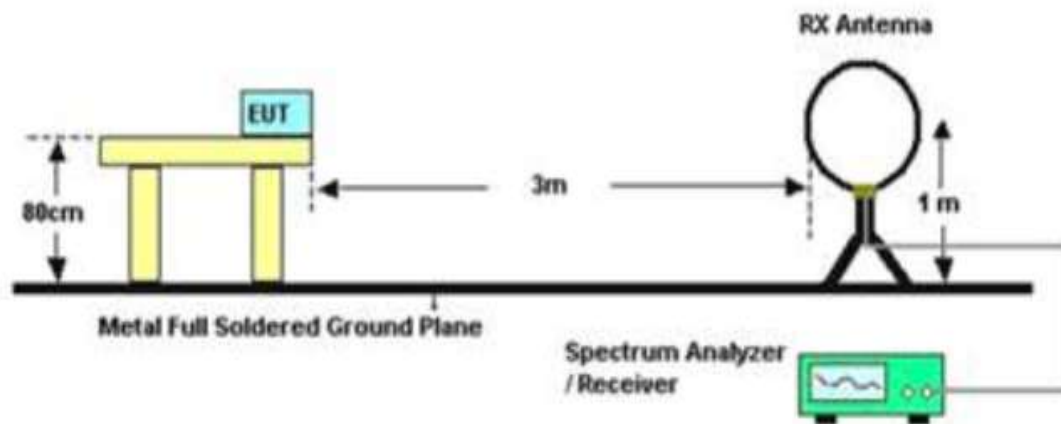
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

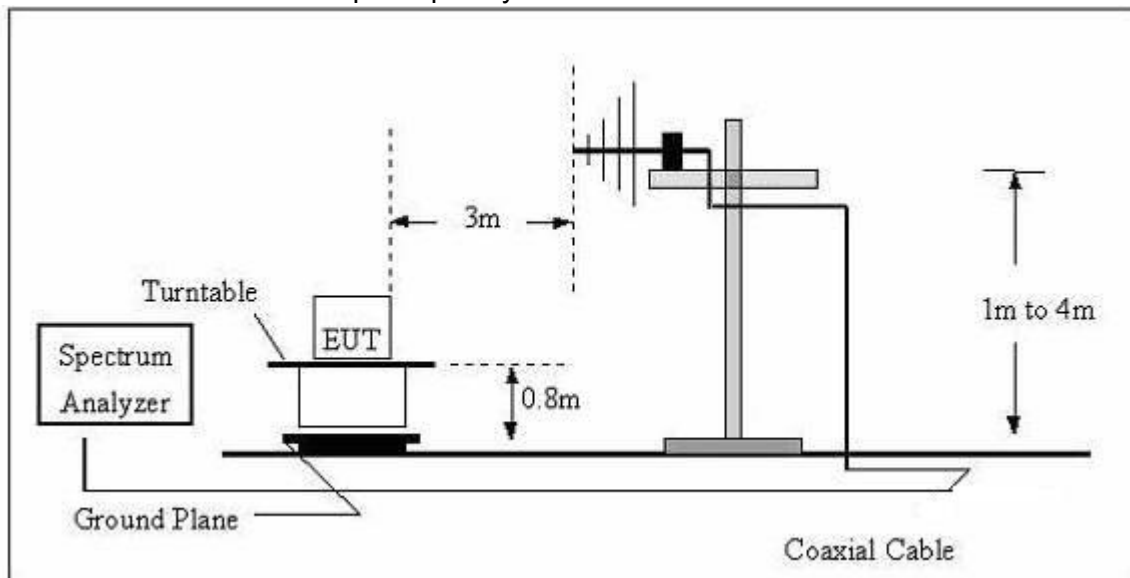
No deviation

3.2.4 TEST SETUP

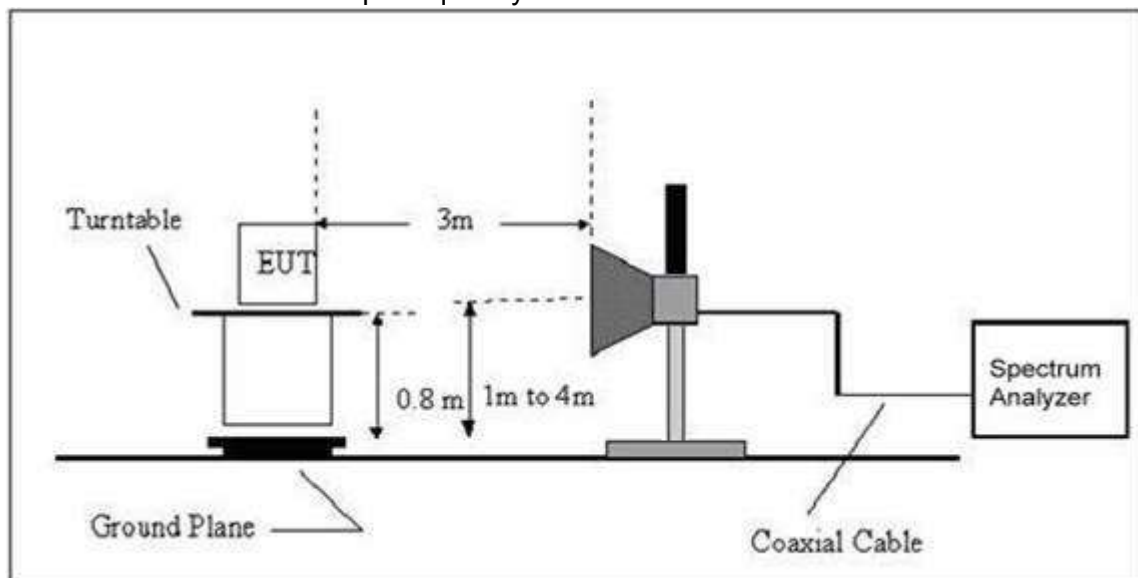
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	WiFi AP Router with USB Charger	Model Name. :	AR-2819
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	N/A
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

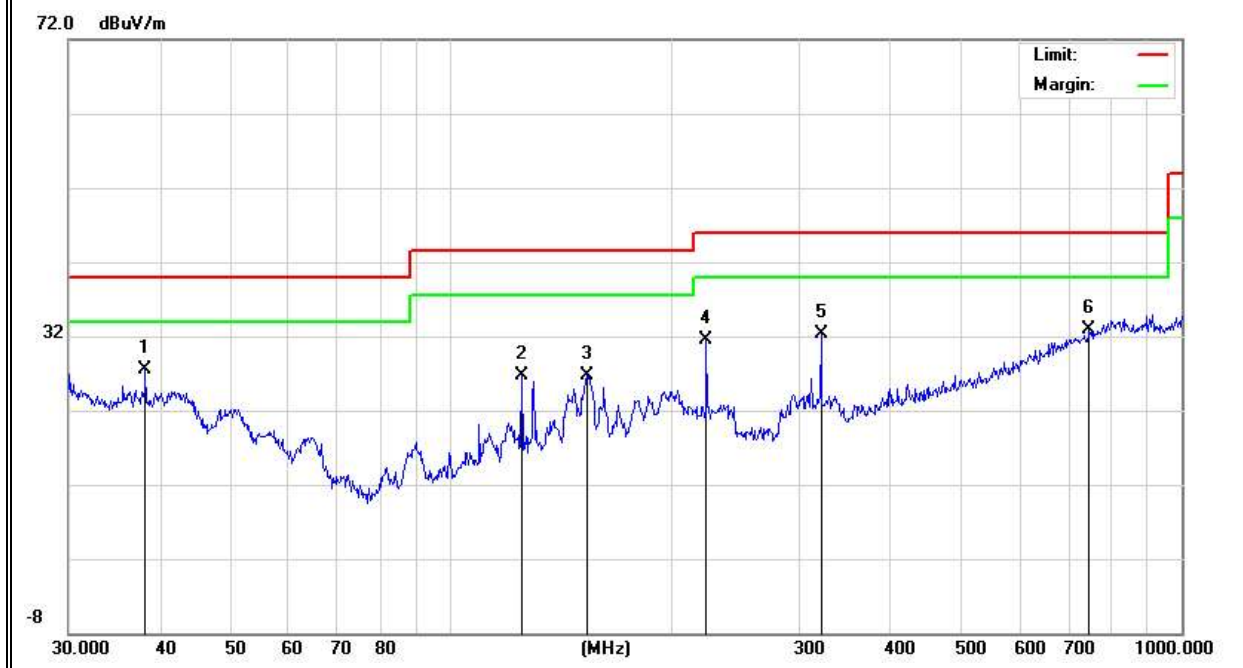
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	20 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V
Test Mode :	Mode 1		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	38.212	12.82	14.66	27.48	40.00	-12.52	QP
V	125.0066	14.64	11.99	26.63	43.50	-16.87	QP
V	153.7384	16.22	10.44	26.66	43.50	-16.84	QP
V	223.7333	19.21	12.38	31.59	46.00	-14.41	QP
V	321.0607	17.23	15.03	32.26	46.00	-13.74	QP
V	747.4825	6.78	26.04	32.82	46.00	-13.18	QP

Remark:

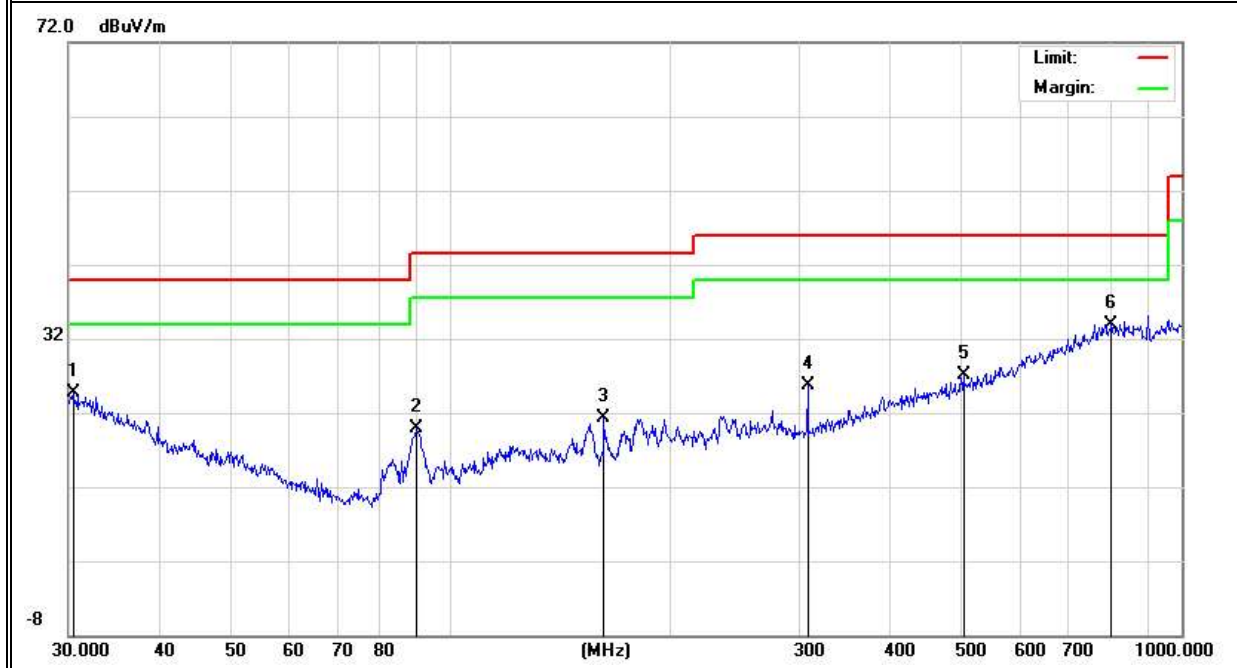
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	30.4237	5.52	19.19	24.71	40.00	-15.29	QP
H	89.5899	12.04	7.84	19.88	43.50	-23.62	QP
H	162.0414	10.75	10.50	21.25	43.50	-22.25	QP
H	307.8312	11.27	14.48	25.75	46.00	-20.25	QP
H	502.9395	6.72	20.35	27.07	46.00	-18.93	QP
H	801.7862	6.60	27.40	34.00	46.00	-12.00	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	20 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V
Test Mode :	TX 11B/G/N(20/40MHz)		

11 b Mode

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark	Comment
Low Channel (2412 MHz)-Above 1G							
4824.000	47.87	10.44	58.31	74	-15.69	Pk	Vertical
4824.000	32.34	10.44	42.78	54	-11.22	AV	Vertical
7236.000	37.49	12.39	49.88	74	-24.12	pk	Vertical
4824.000	42.66	10.44	53.1	74	-20.9	pk	Horizontal
4824.000	21.54	10.44	31.98	54	-22.02	AV	Horizontal
7236.000	33.13	12.39	45.52	74	-28.48	pk	Horizontal
Mid Channel (2437 MHz)-Above 1G							
4874.000	45.14	10.4	55.54	74	-18.46	pk	Vertical
4874.000	33.27	10.4	43.67	54	-10.33	AV	Vertical
7311.000	36.53	12.75	49.28	74	-24.72	Pk	Vertical
4874.000	47.35	10.4	57.75	74	-16.25	Pk	Horizontal
4874.000	31.16	10.4	41.56	54	-12.44	AV	Horizontal
7311.000	34.63	12.75	47.38	74	-26.62	Pk	Horizontal
High Channel (2462 MHz)- Above 1G							
4924.000	44.54	10.39	54.93	74	-19.07	pk	Vertical
4924.000	35.43	10.39	45.82	54	-8.18	AV	Vertical
7386.000	33.22	12.68	45.9	74	-28.1	pk	Vertical
4924.000	45.27	10.39	55.66	74	-18.34	pk	Horizontal
4924.000	27.94	10.39	38.33	54	-15.67	AV	Horizontal
7386.000	35.23	12.68	47.91	74	-26.09	pk	Horizontal

11 g Mode

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2412 MHz)-Above 1G							
4824.000	47.02	10.44	57.46	74.00	-16.54	Pk	Vertical
4824.000	31.48	10.44	44.92	54.00	-12.08	AV	Vertical
7236.000	40.76	12.39	53.15	74.00	-20.85	pk	Vertical
4824.000	48.23	10.44	58.67	74.00	-15.33	pk	Horizontal
4824.000	30.32	10.44	46.76	54.00	-13.24	AV	Horizontal
7236.000	41.29	12.39	53.68	74.00	-20.32	pk	Horizontal
Mid Channel (2437 MHz)-Above 1G							
4874.000	48.63	10.40	59.03	74.00	-14.97	pk	Vertical
4874.000	32.62	10.40	46.02	54.00	-10.98	AV	Vertical
7311.000	41.21	12.75	53.96	74.00	-20.04	Pk	Vertical
4874.000	48.13	10.40	58.53	74.00	-15.47	Pk	Horizontal
4874.000	32.18	10.40	46.58	54.00	-11.42	AV	Horizontal
7311.000	42.16	12.75	54.91	74.00	-19.09	Pk	Horizontal
High Channel (2462 MHz)- Above 1G							
4924.000	48.39	10.39	58.78	74.00	-15.22	pk	Vertical
4924.000	34.12	10.39	48.51	54.00	-9.49	AV	Vertical
7386.000	42.57	12.68	55.25	74.00	-18.75	pk	Vertical
4924.000	48.16	10.39	58.55	74.00	-15.45	pk	Horizontal
4924.000	30.29	10.39	46.68	54.00	-13.32	AV	Horizontal
7386.000	43.18	12.68	55.86	74.00	-18.14	pk	Horizontal

11 n(20MHz) Mode

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2412 MHz)-Above 1G							
4824.375	50.14	10.44	60.58	74.00	-13.42	Pk	Vertical
4824.375	31.46	10.44	41.90	54.00	-12.10	Av	Vertical
7236.025	43.43	12.39	55.82	74.00	-18.18	Pk	Vertical
7236.025	27.70	12.39	40.09	54.00	-13.91	Av	Vertical
4824.375	51.56	10.44	62.00	74.00	-12.00	Pk	Horizontal
4824.375	32.64	10.44	43.08	54.00	-10.92	Av	Horizontal
7236.279	44.10	12.39	56.49	74.00	-17.51	Pk	Horizontal
7236.279	29.27	12.39	41.66	54.00	-12.34	Av	Horizontal
Mid Channel (2437 MHz)-Above 1G							
4874.025	47.72	10.40	58.12	74.00	-15.88	Pk	Vertical
4874.025	28.63	10.40	39.03	54.00	-14.97	Av	Vertical
7311.264	41.35	12.75	54.10	74.00	-19.90	Pk	Vertical
7311.264	24.31	12.75	37.06	54.00	-16.94	Av	Vertical
4874.311	48.49	10.40	58.89	74.00	-15.11	Pk	Horizontal
4874.311	29.71	10.40	40.11	54.00	-13.89	Av	Horizontal
7311.025	40.60	12.75	53.35	74.00	-20.65	Pk	Horizontal
7311.025	25.29	12.75	38.04	54.00	-15.96	Av	Horizontal
High Channel (2462 MHz)- Above 1G							
4924.288	50.32	10.39	60.71	74.00	-13.29	Pk	Vertical
4924.288	31.95	10.39	42.34	54.00	-11.66	Av	Vertical
7386.284	43.72	12.68	56.40	74.00	-17.60	Pk	Vertical
7386.284	27.36	12.68	40.04	54.00	-13.96	Av	Vertical
4924.315	50.33	10.39	60.72	74.00	-13.28	Pk	Horizontal
4924.315	32.45	10.39	42.84	54.00	-11.16	Av	Horizontal
7386.245	42.73	12.68	55.41	74.00	-18.59	Pk	Horizontal
7386.245	27.97	12.68	40.65	54.00	-13.35	Av	Horizontal

11 n(40MHz) Mode

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detect or Type	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2422 MHz)-Above 1G							
4844.298	42.76	10.43	53.19	74.00	-20.81	peak	Vertical
7266.934	37.44	12.37	49.81	74.00	-24.19	peak	Vertical
4844.156	43.15	10.43	53.58	74.00	-20.42	peak	Horizontal
7266.002	36.96	12.37	49.33	74.00	-24.67	peak	Horizontal
Mid Channel (2437 MHz)-Above 1G							
4874.253	41.78	10.45	52.23	74.00	-21.77	peak	Vertical
7311.049	37.16	12.41	49.57	74.00	-24.43	peak	Vertical
4874.865	43.29	10.45	53.74	74.00	-20.26	peak	Vertical
7311.652	36.46	12.41	48.87	74.00	-25.13	peak	Horizontal
High Channel (2452 MHz)- Above 1G							
4904.386	40.89	10.39	51.28	74.00	-22.72	peak	Vertical
7356.182	34.13	12.68	46.81	74.00	-27.19	peak	Vertical
4904.998	40.53	10.39	50.92	74.00	-23.08	peak	Horizontal
7356.785	35.14	12.68	47.82	74.00	-26.18	peak	Horizontal

This value is much less than the limits AVG; the report does not show.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. 3 kHz ≤ Set the RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



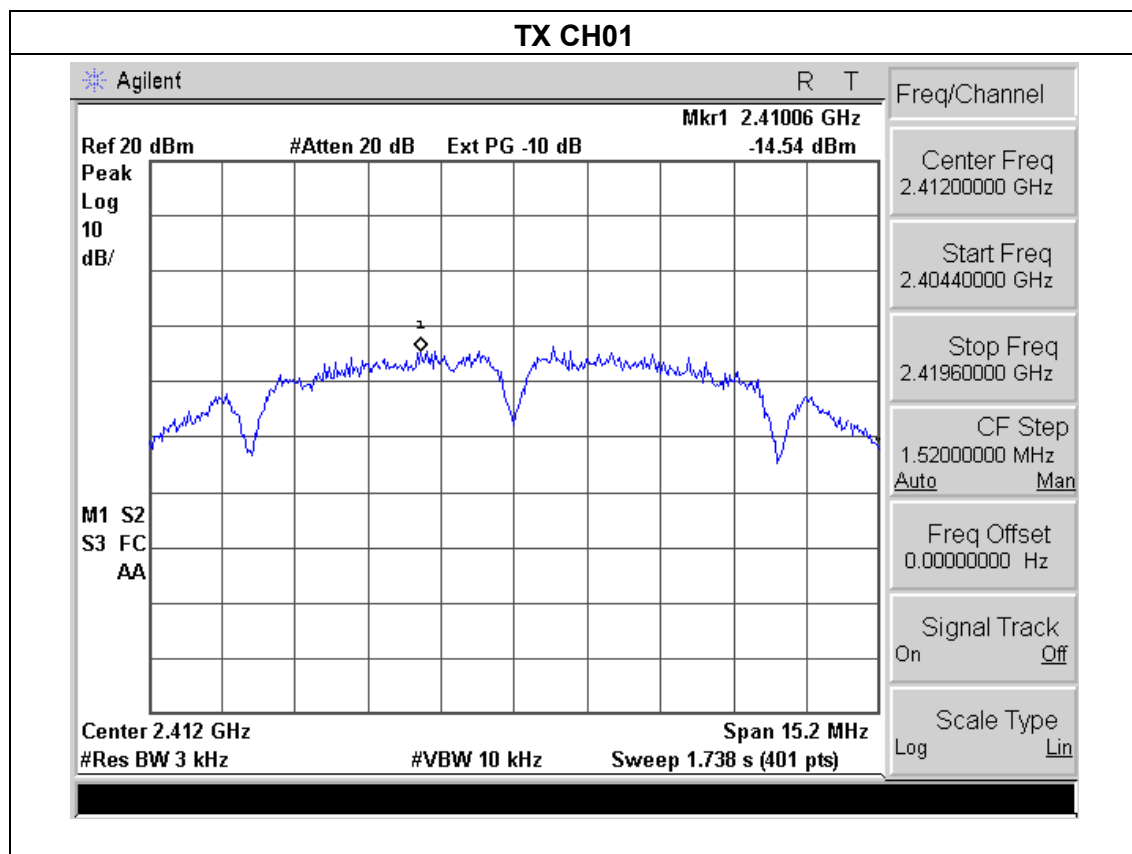
4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

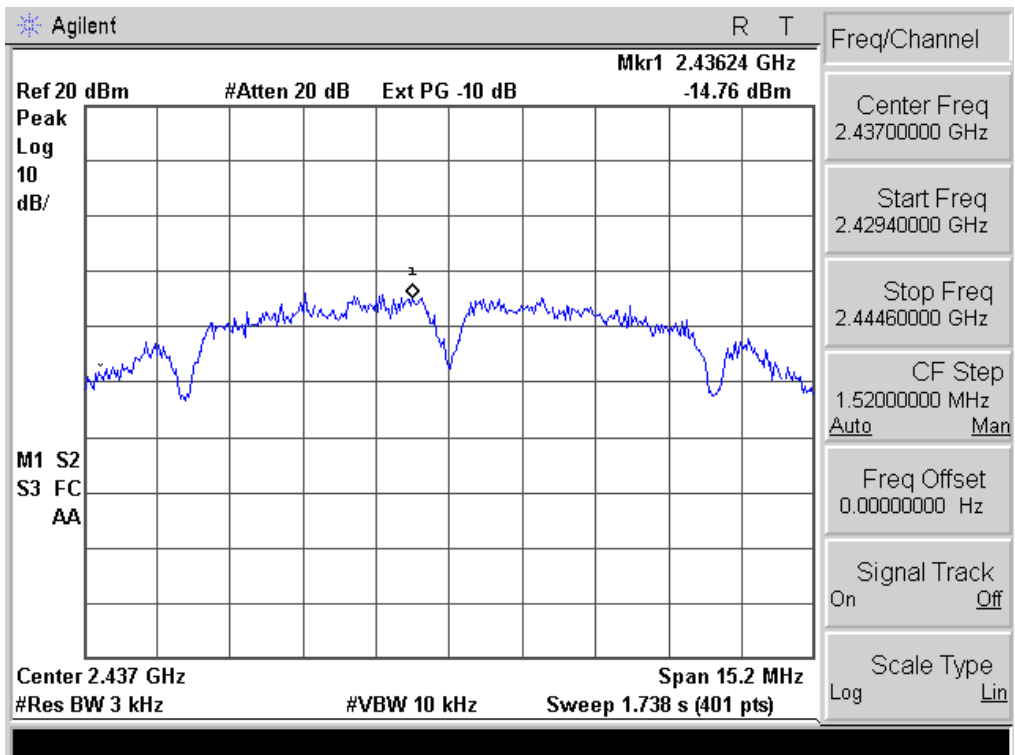
4.1.5 TEST RESULTS

EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

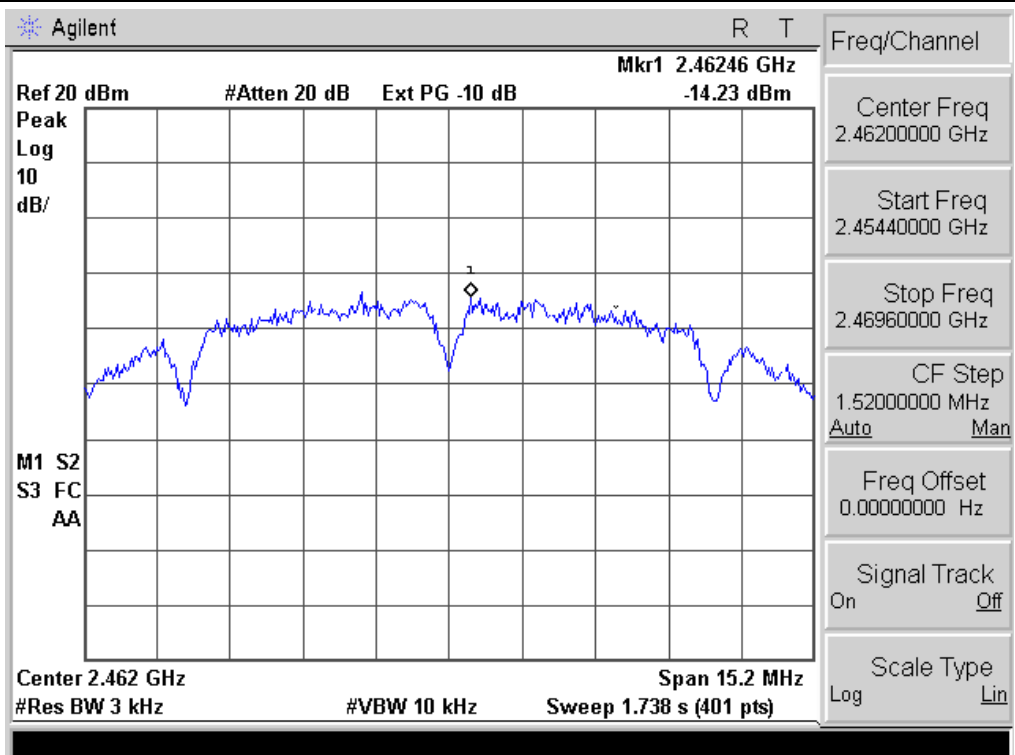
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-14.54	8	PASS
2437 MHz	-14.76	8	PASS
2462 MHz	-14.23	8	PASS



TX CH06

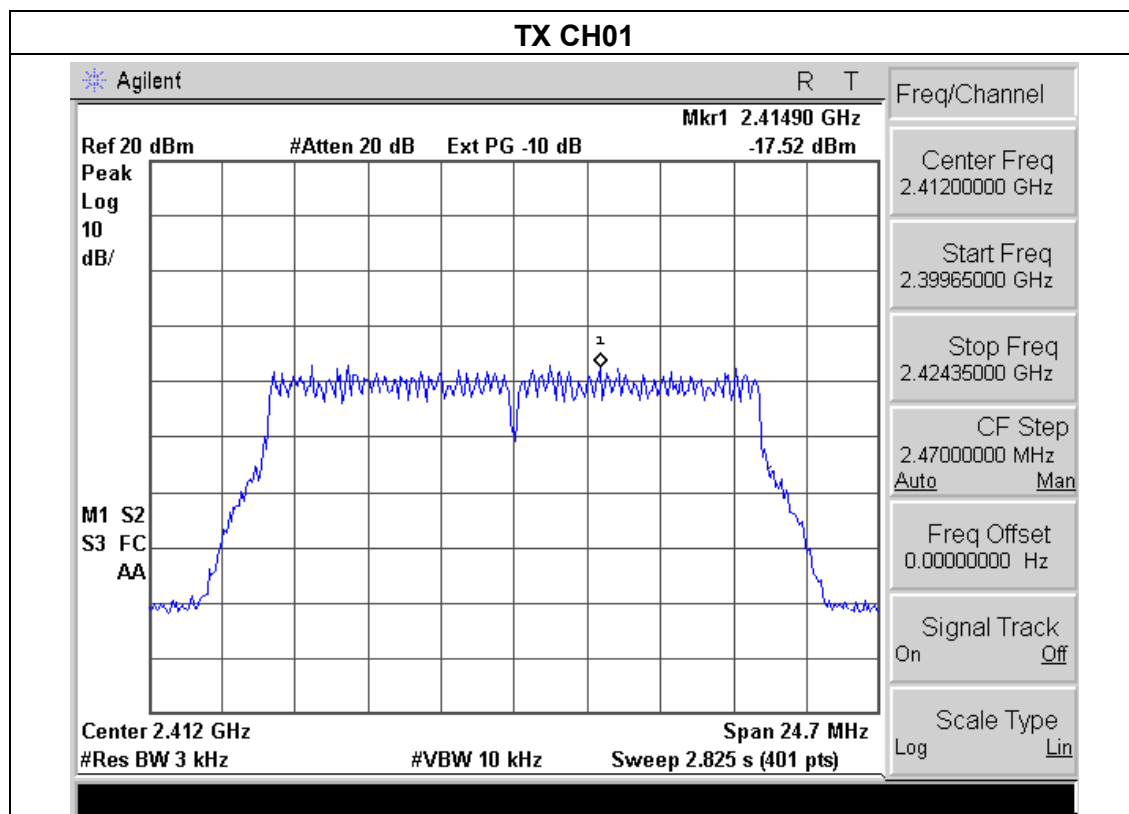


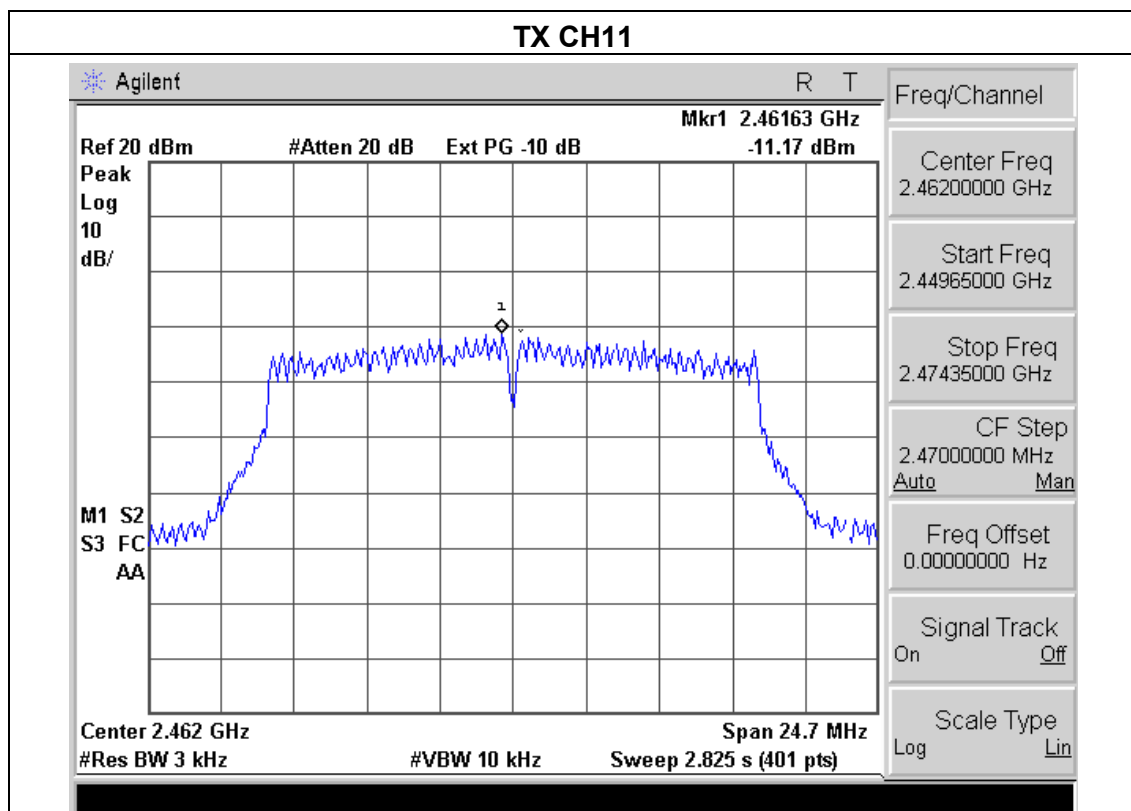
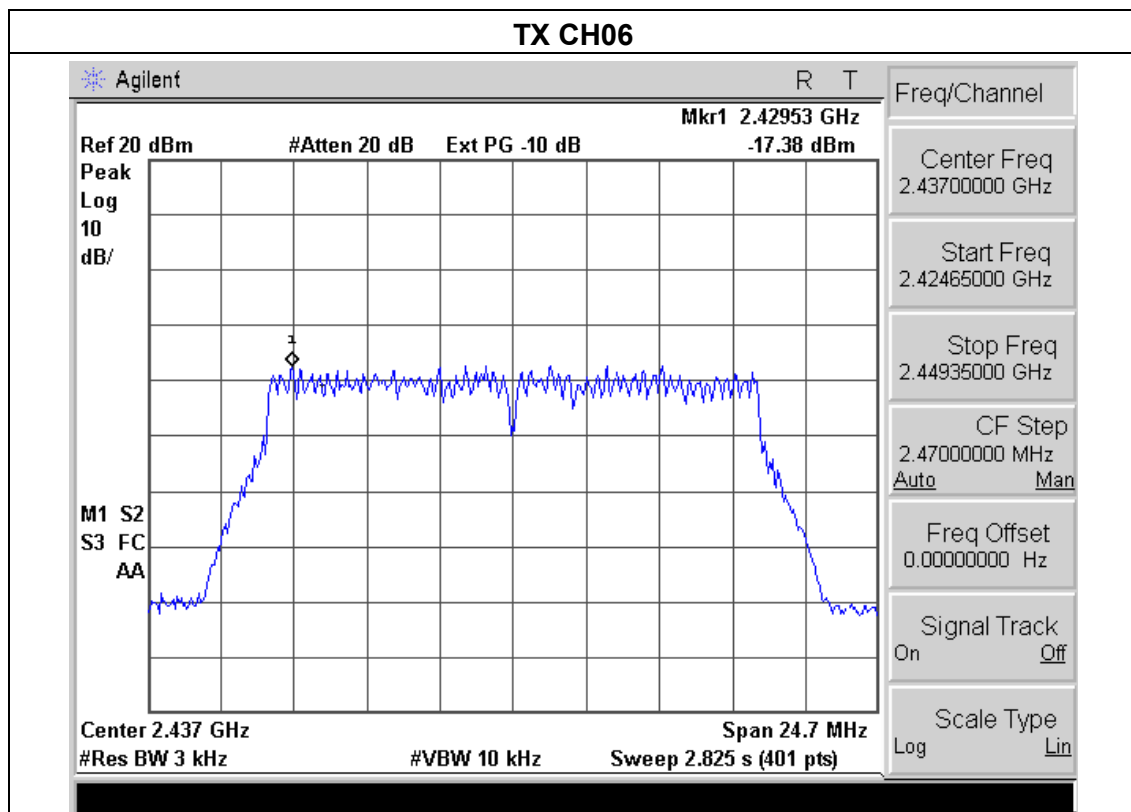
TX CH11



EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

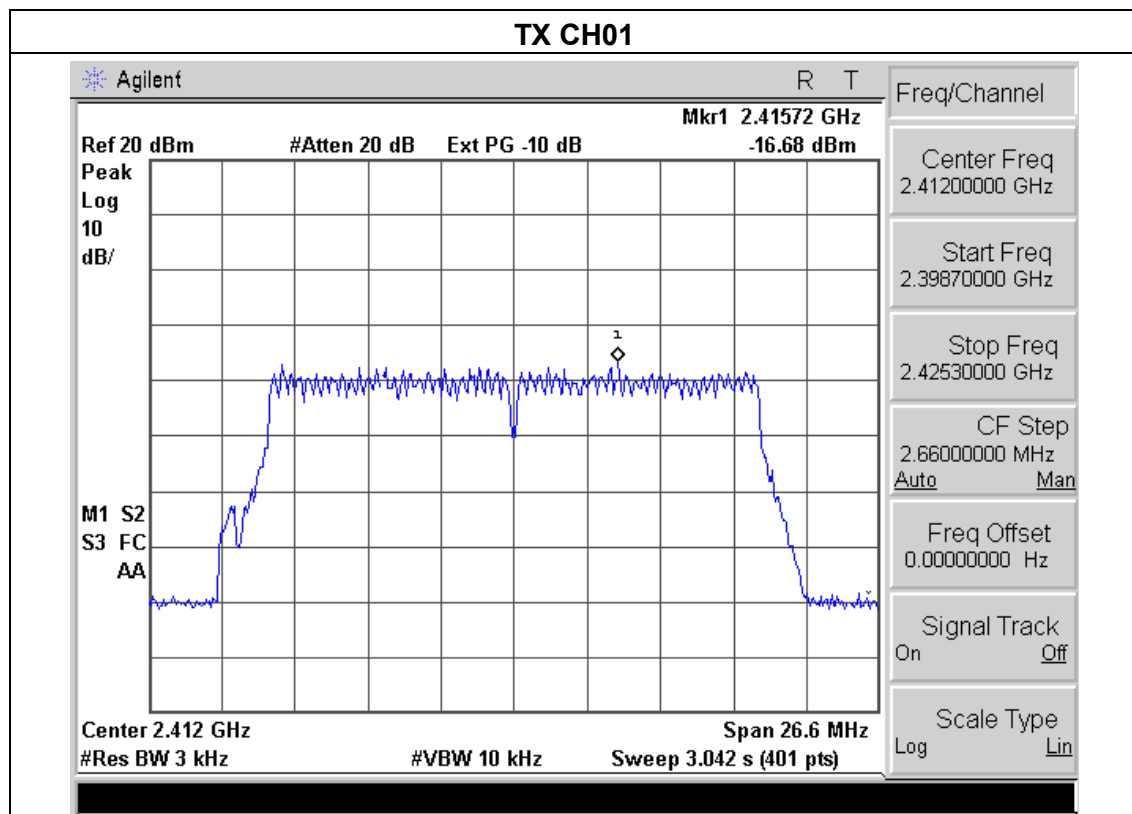
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-17.52	8	PASS
2437 MHz	-17.38	8	PASS
2462 MHz	-11.17	8	PASS

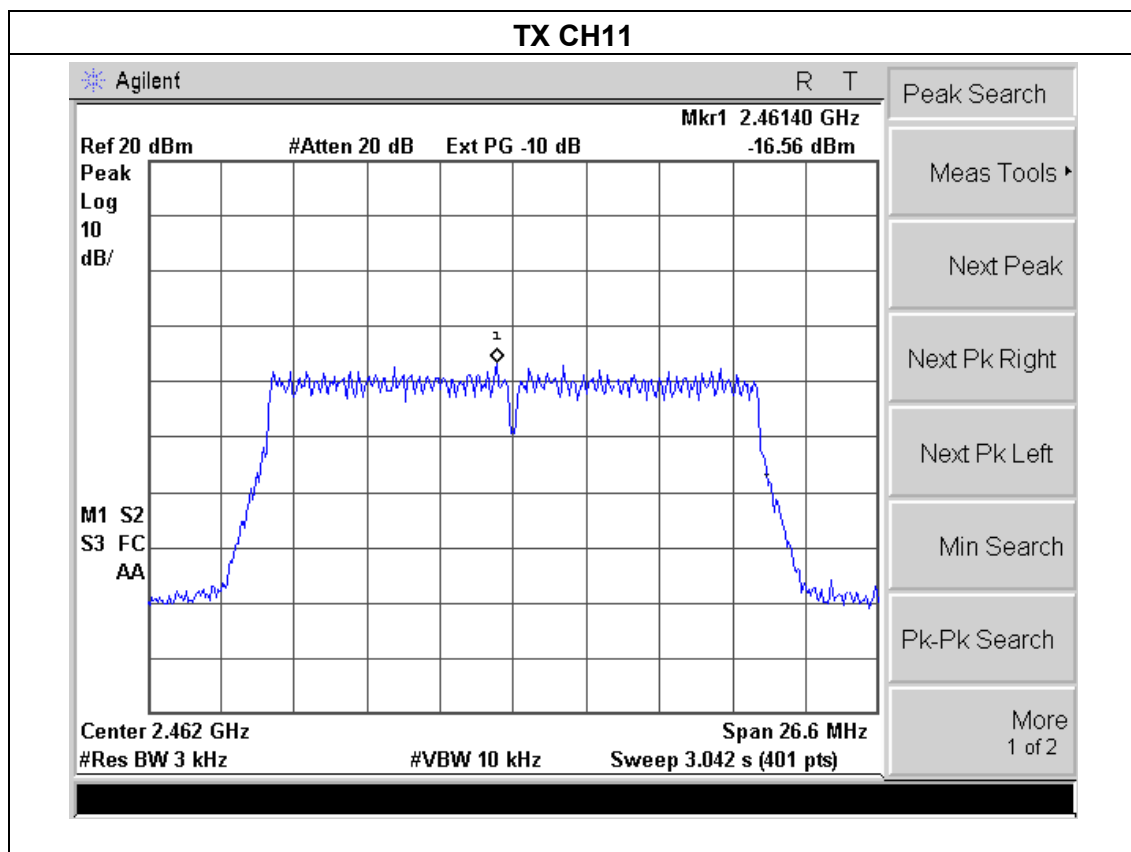
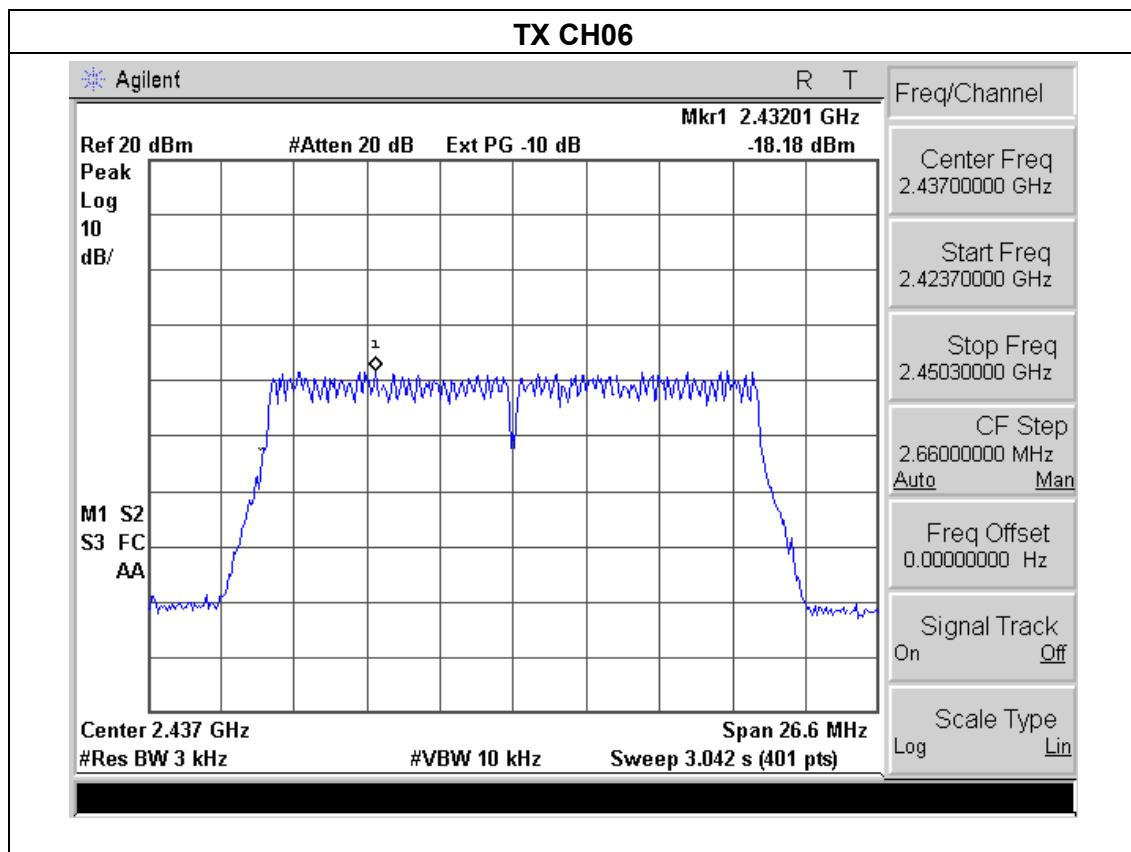




EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

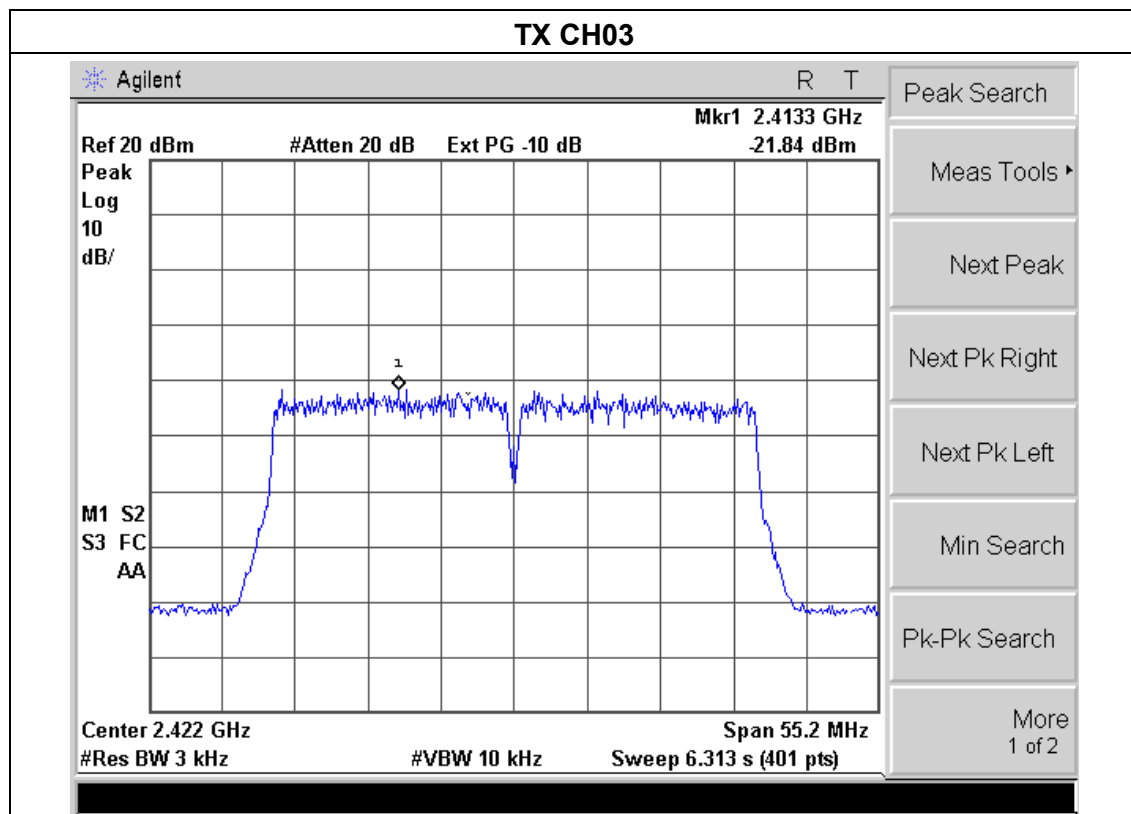
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-16.68	8	PASS
2437 MHz	-18.18	8	PASS
2462 MHz	-16.56	8	PASS

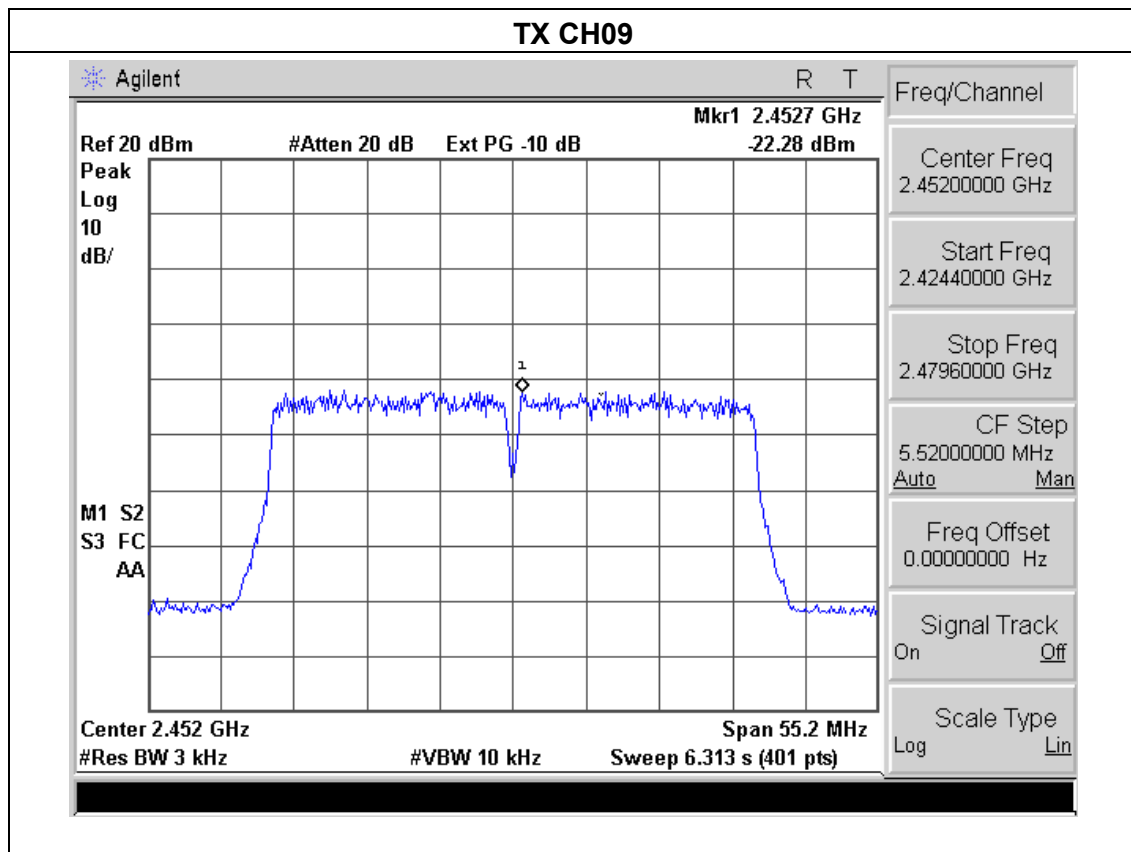
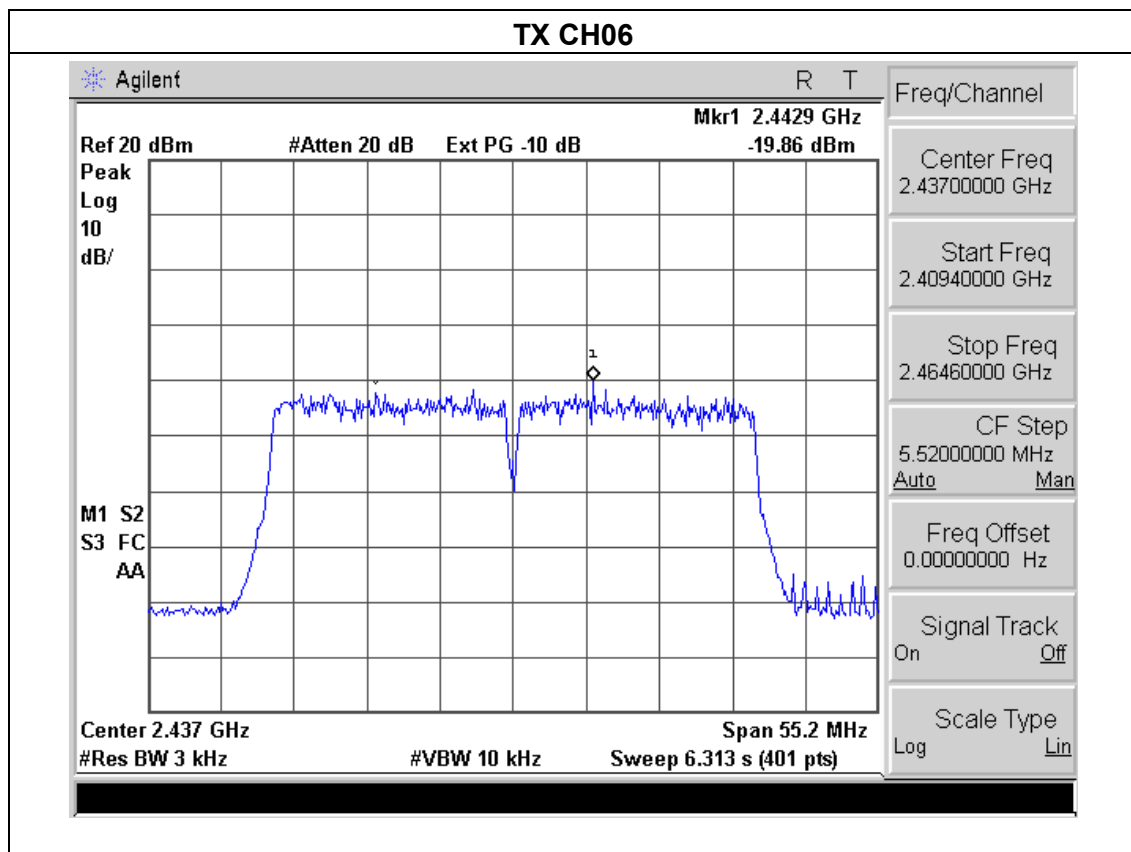




EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2422 MHz	-21.84	8	PASS
2437 MHz	-19.86	8	PASS
2452 MHz	-22.28	8	PASS





5. BANDWIDTH TEST

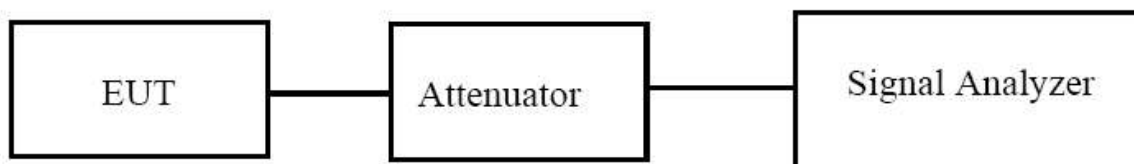
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



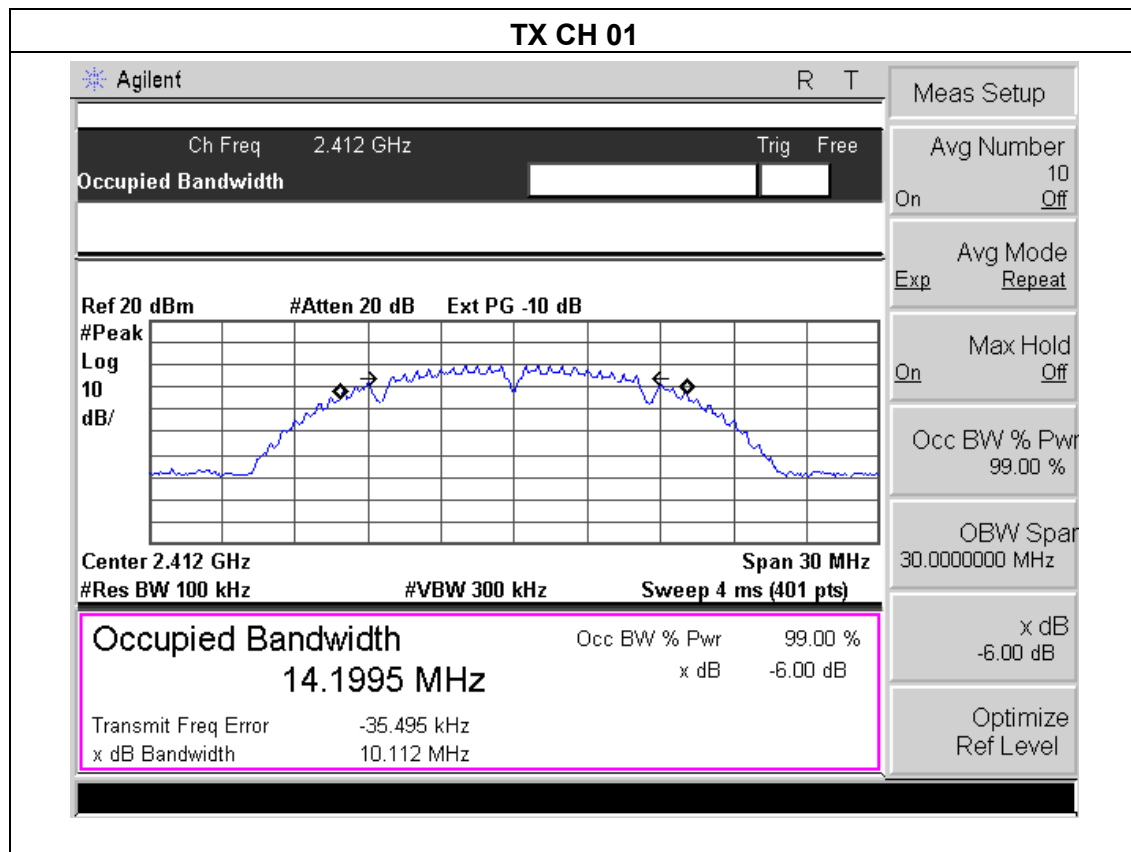
5.1.2 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

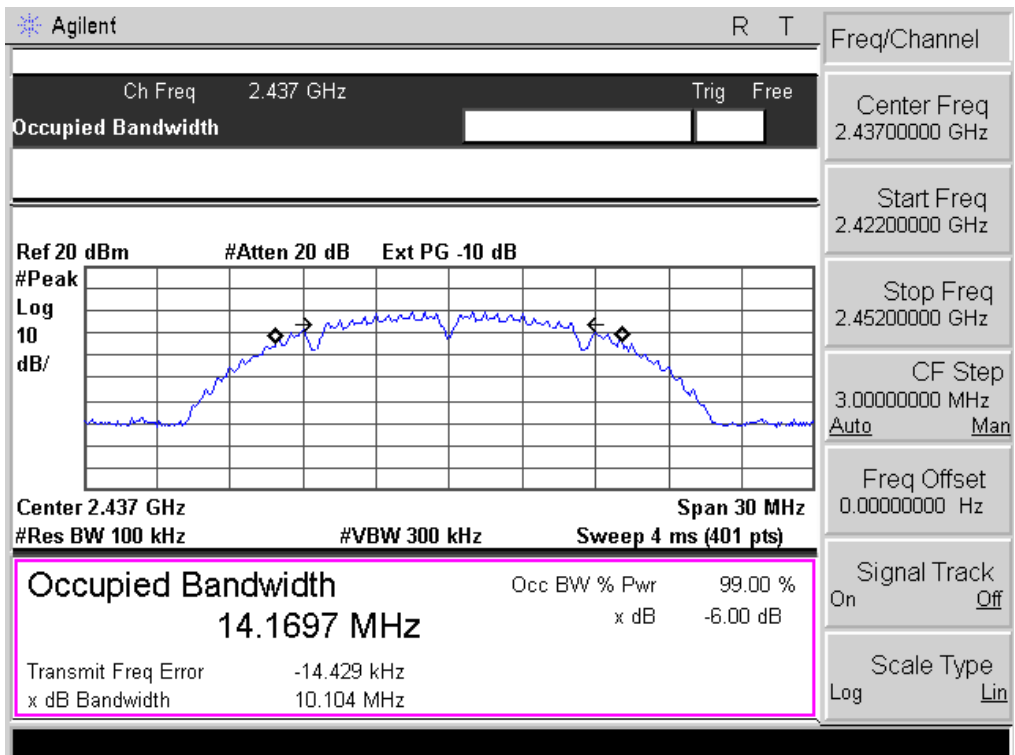
5.1.3 TEST RESULTS

EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

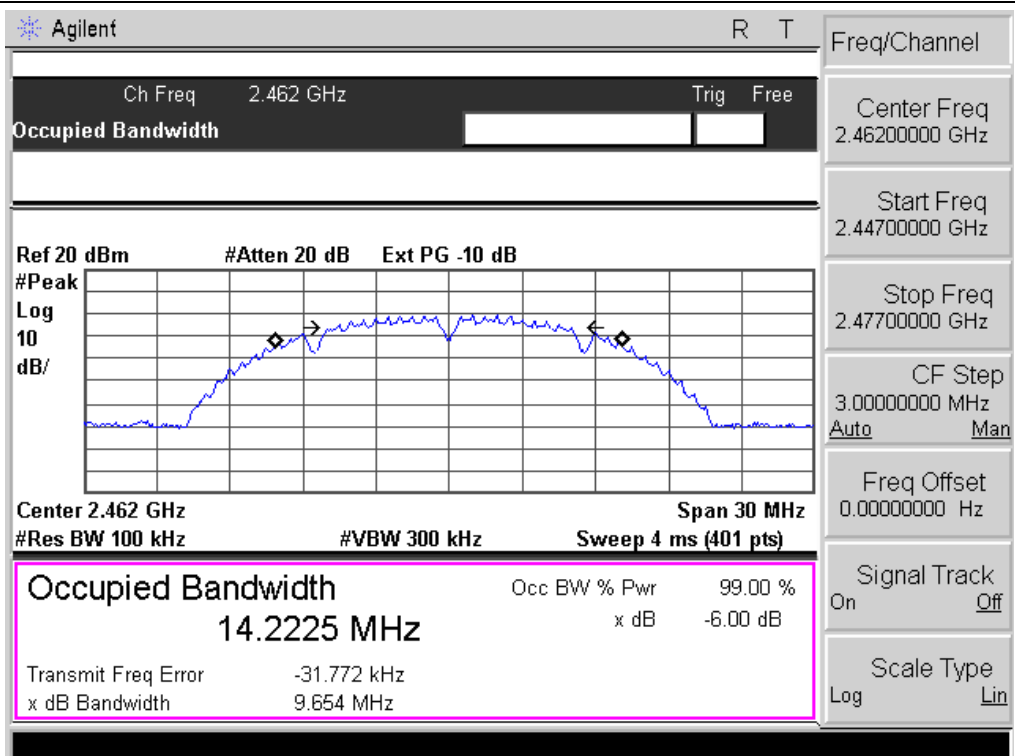
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.112	500	Pass
Middle	2437	10.104	500	Pass
High	2462	9.654	500	Pass



TX CH 06

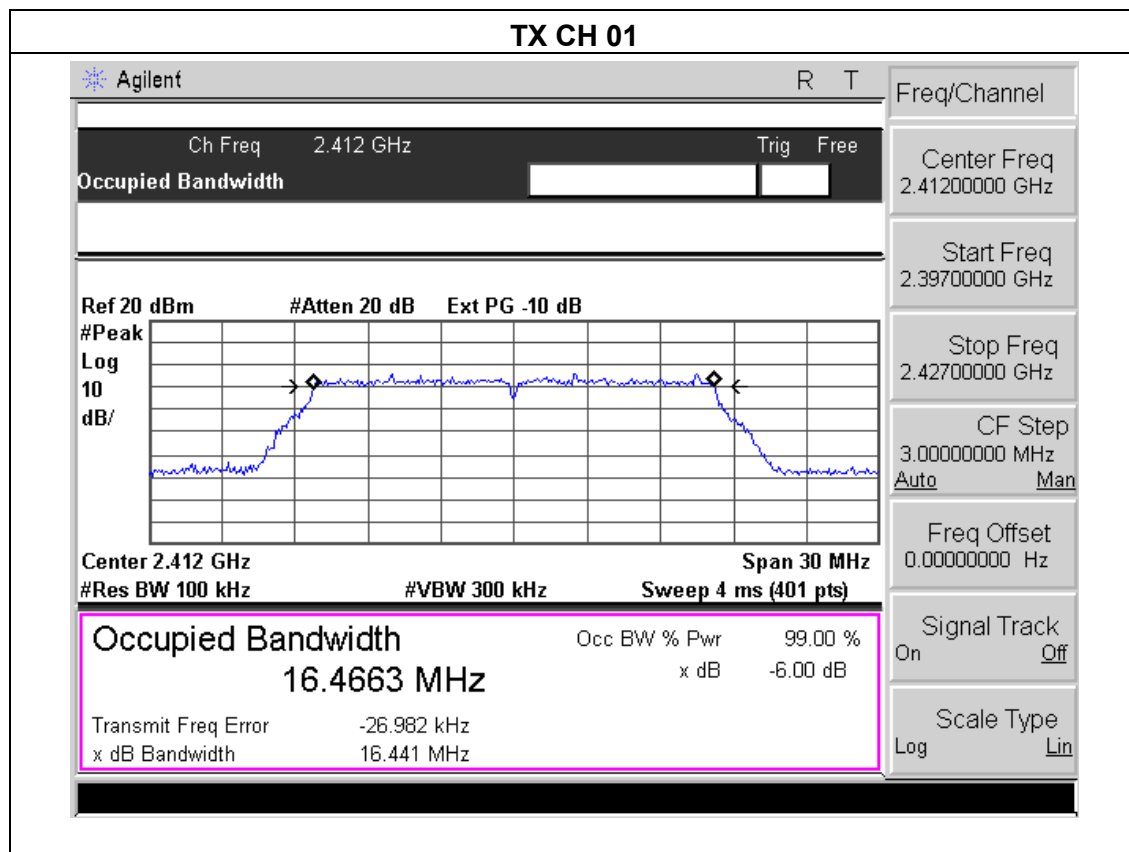


TX CH 11

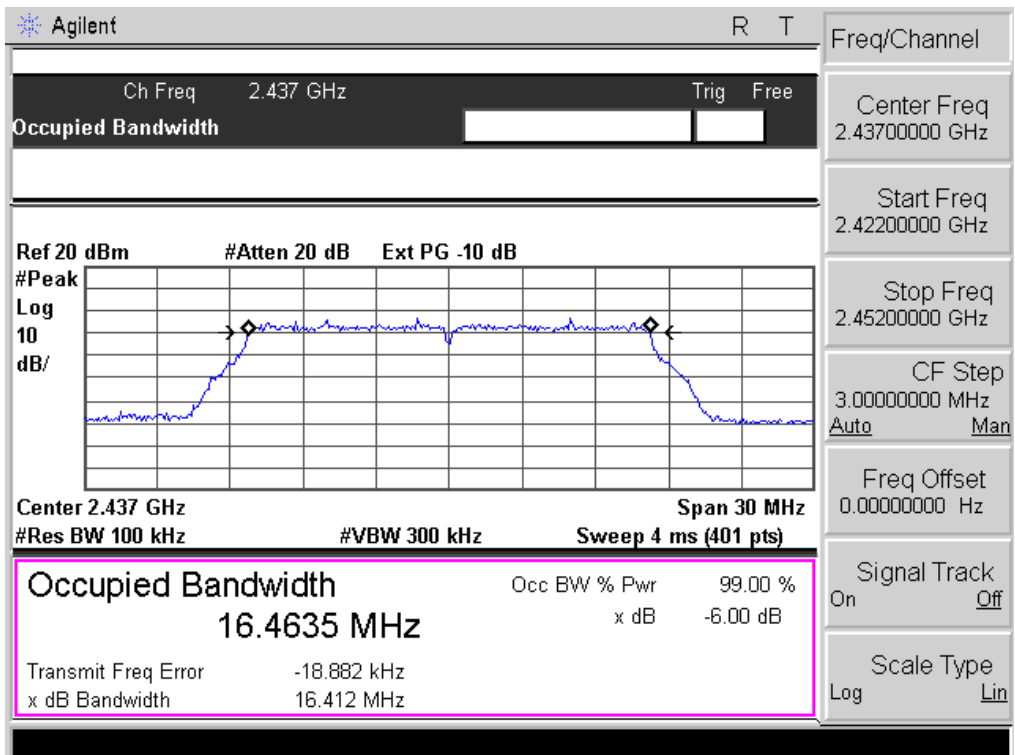


EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

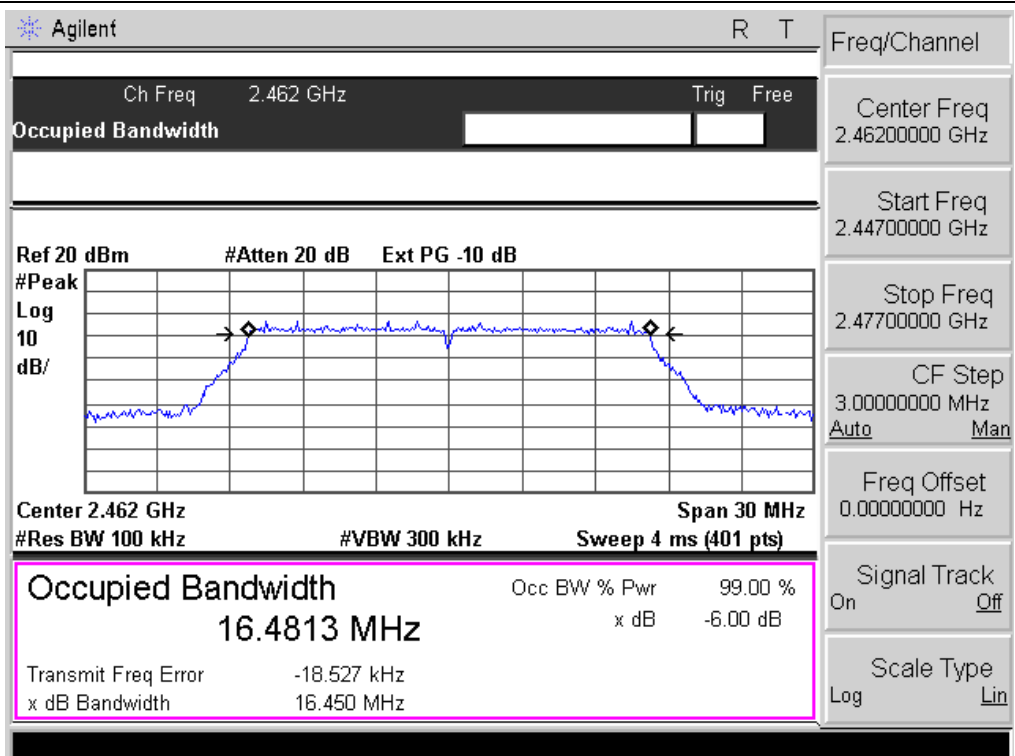
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.441	500	Pass
Middle	2437	16.412	500	Pass
High	2462	16.450	500	Pass



TX CH 06

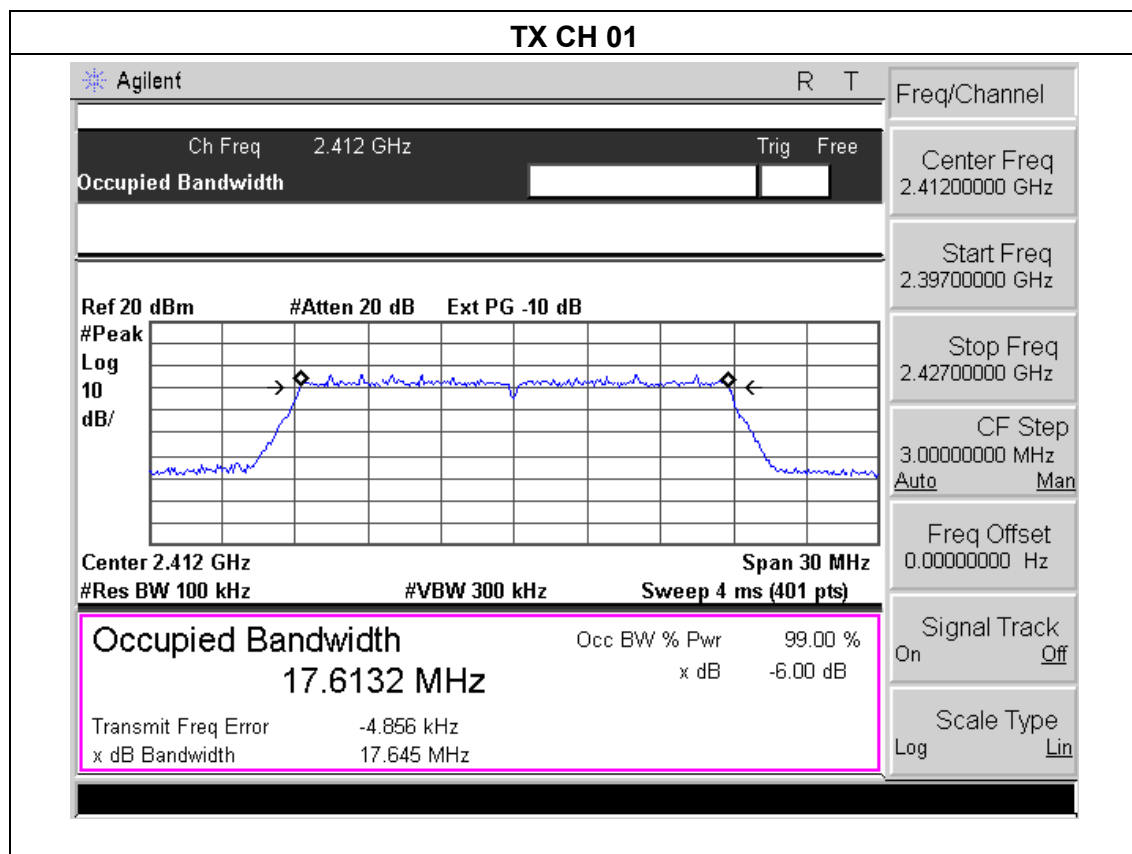


TX CH 11

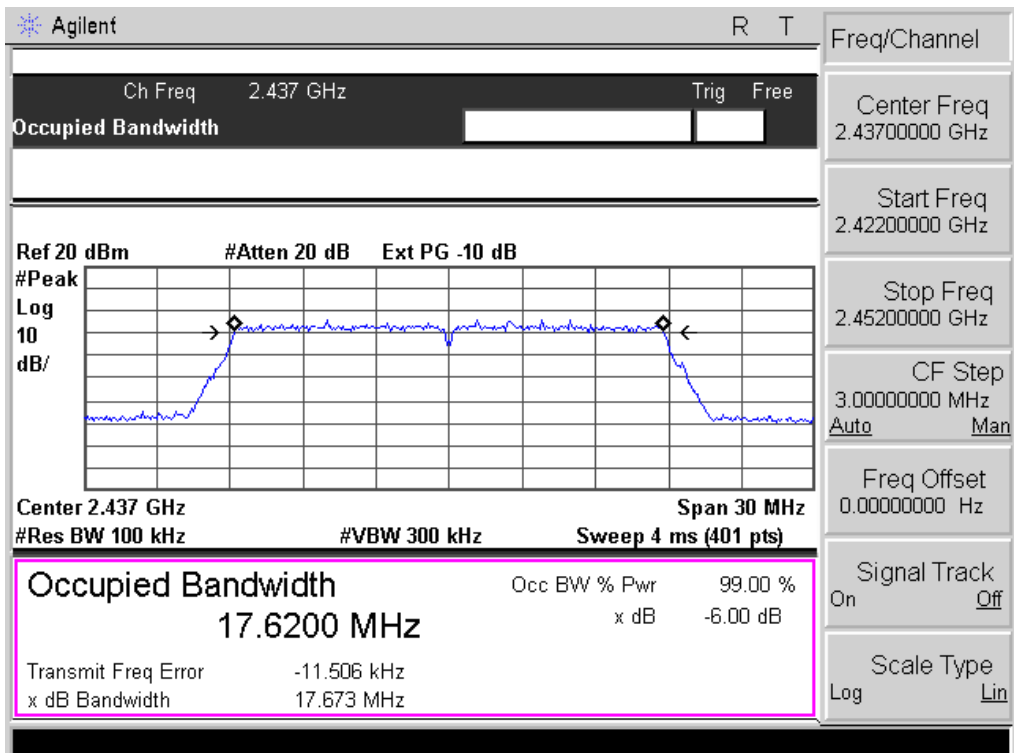


EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

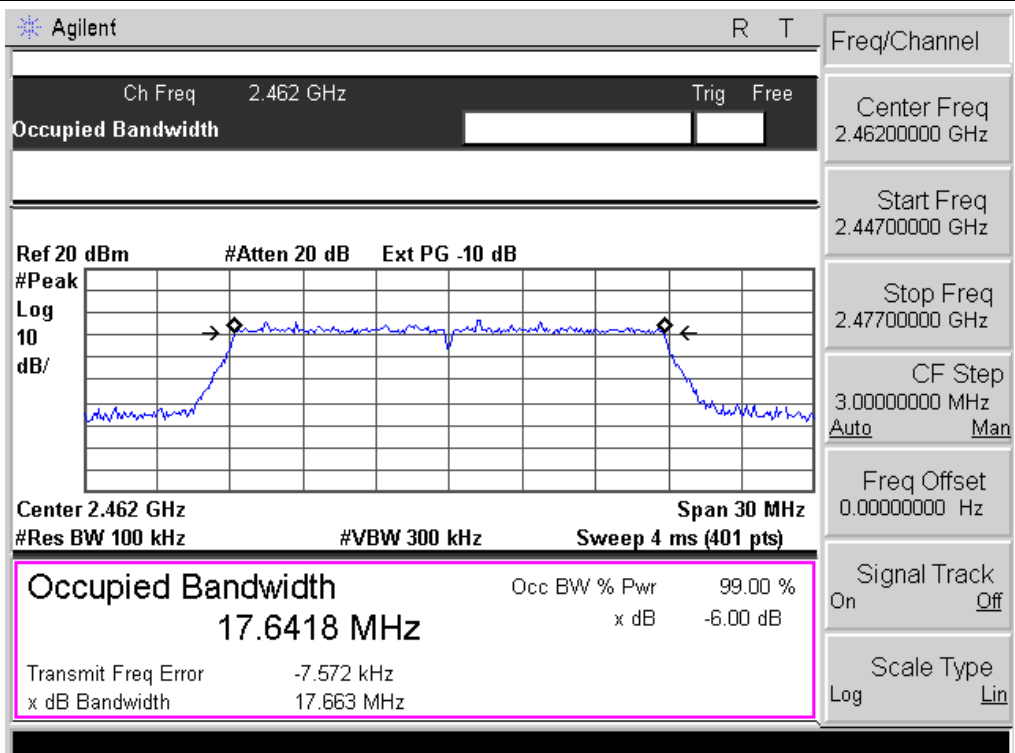
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.645	500	Pass
Middle	2437	17.673	500	Pass
High	2462	17.663	500	Pass



TX CH 06

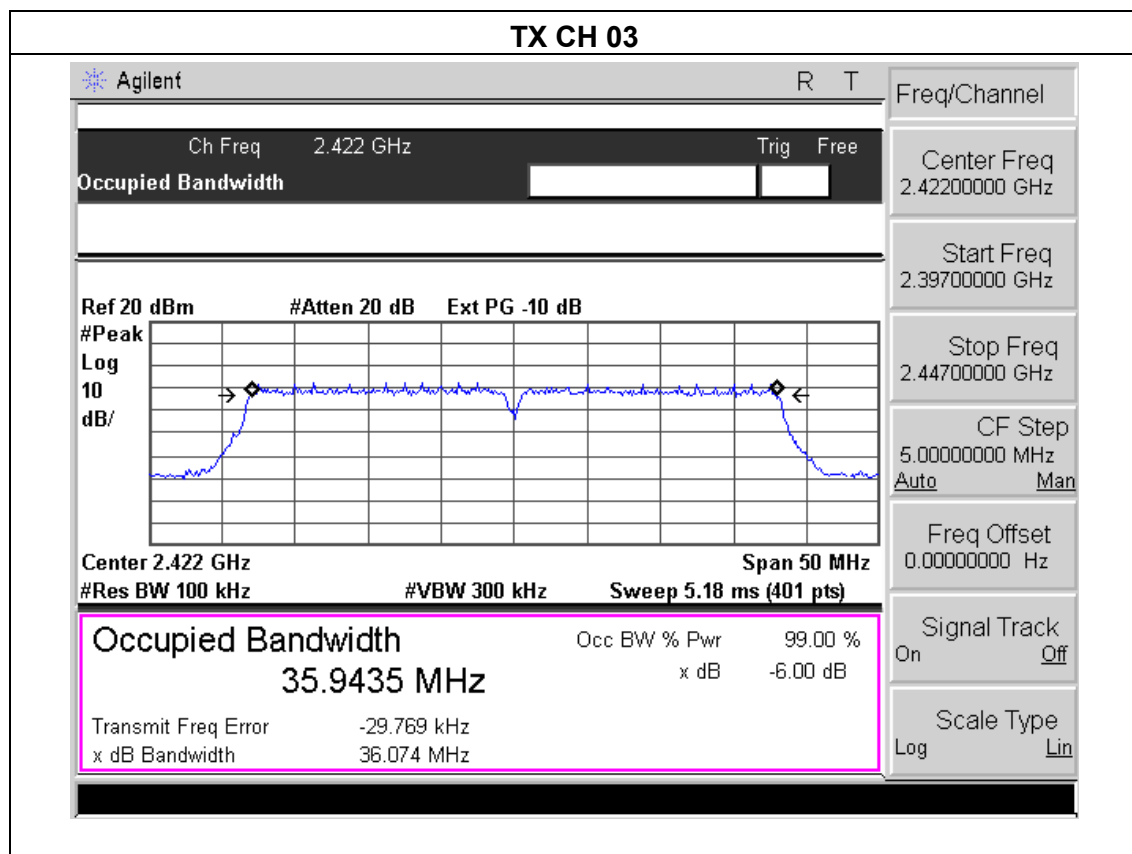


TX CH 11

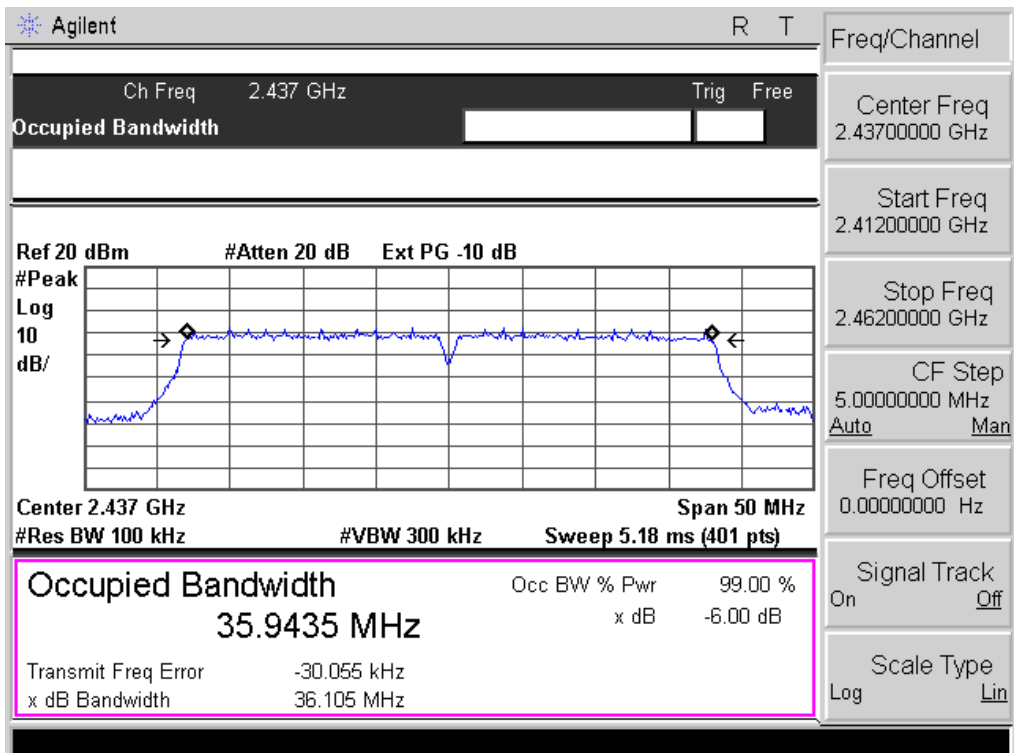


EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

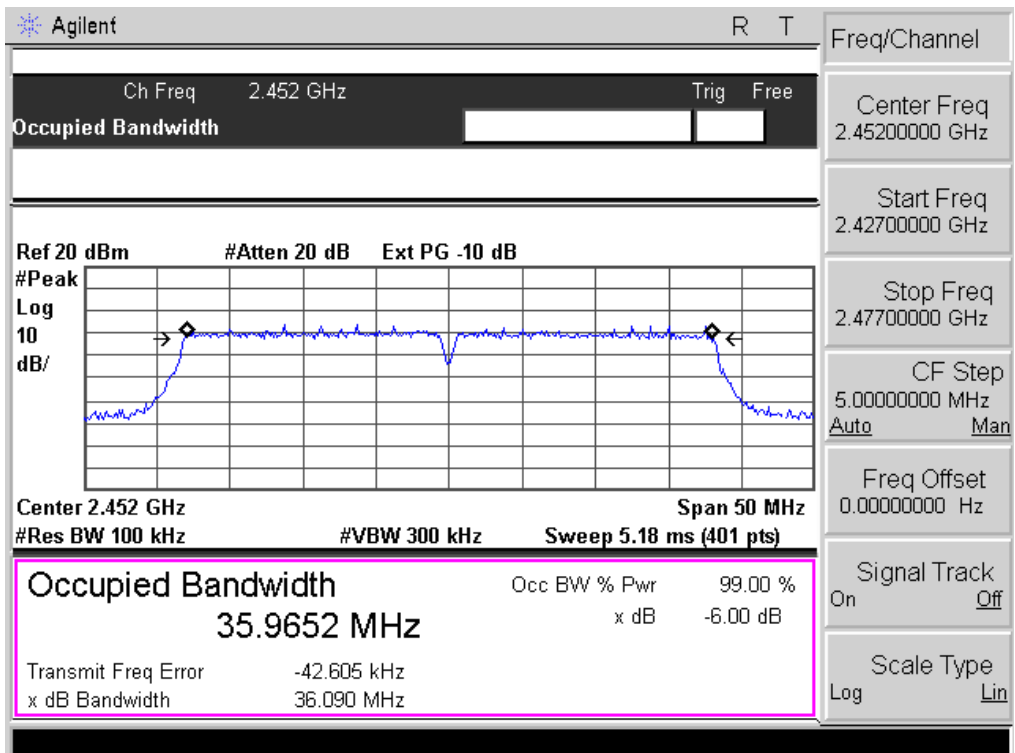
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.074	500	Pass
Middle	2437	36.105	500	Pass
High	2452	36.090	500	Pass



TX CH 06



TX CH 09



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b/g/n20/n40 Mode		

TX 802.11b Mode				
Test Channel	Frequency	Maximum Conducted Output Power(PK)	Average Power(dBm)	LIMIT
	(MHz)	(dBm)	(dBm)	(dBm)
CH01	2412	13.54	9.51	30
CH06	2437	13.22	9.45	30
CH11	2462	13.46	9.53	30
TX 802.11g Mode				
CH01	2412	12.57	8.29	30
CH06	2437	12.36	8.14	30
CH11	2462	12.44	8.27	30
TX 802.11n-HT20 Mode				
CH01	2412	11.42	7.55	30
CH06	2437	11.31	7.33	30
CH11	2462	11.41	7.41	30
TX 802.11n-HT40 Mode				
CH03	2422	10.82	7.24	30
CH06	2437	10.64	7.31	30
CH09	2452	10.95	7.40	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

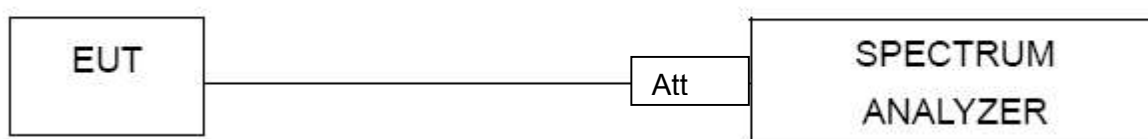
TEST PROCEDURE

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

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

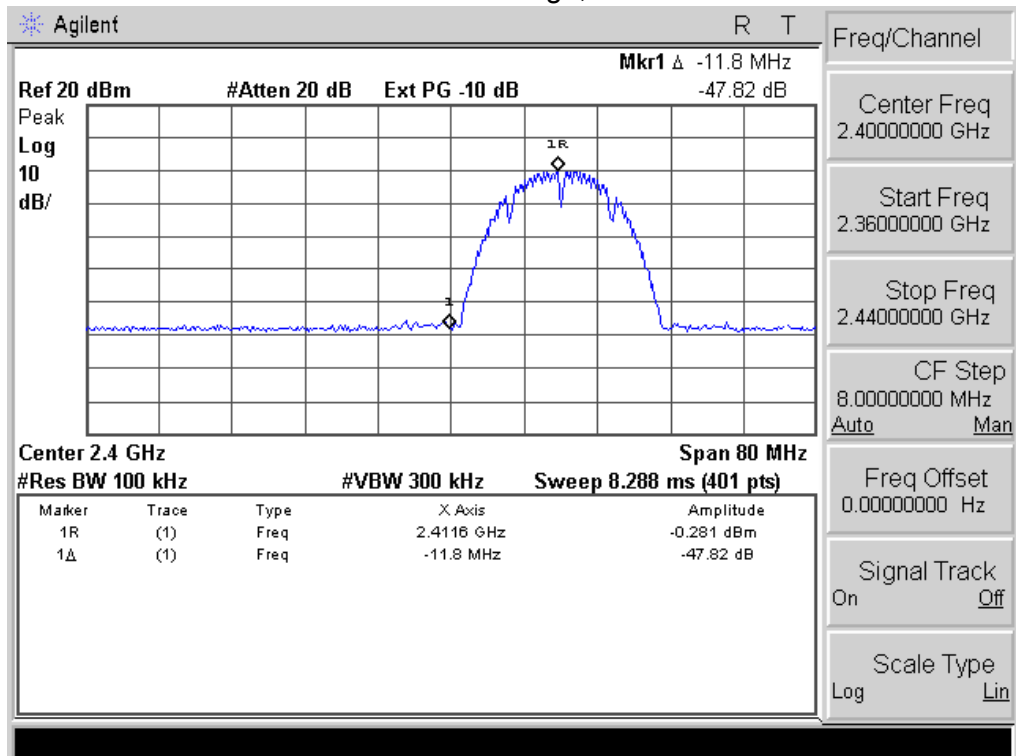
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.4 TEST RESULTS

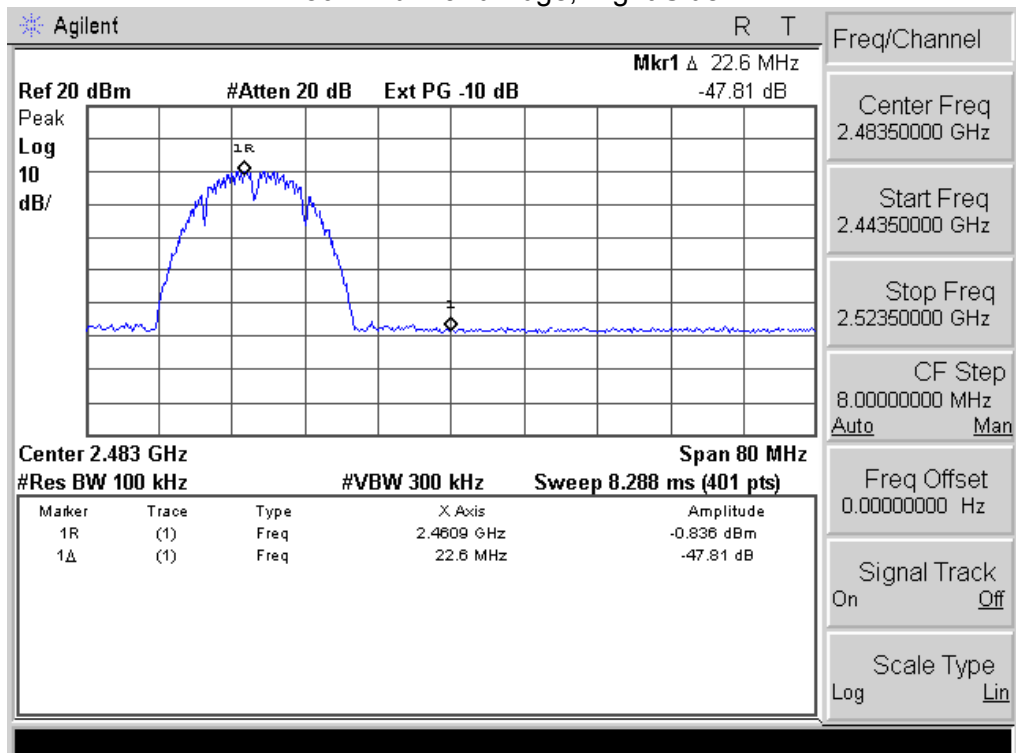
EUT :	WiFi AP Router with USB Charger	Model Name :	AR-2819
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	AC 120V

Frequency Band	Delta Peak to band emission (dBc)	> Limit (dBc)	Result
802.11b			
2400	47.82	20	Pass
2483.5	47.81	20	Pass
802.11g			
2400	40.66	20	Pass
2483.5	43.93	20	Pass
802.11n20			
2400	37.64	20	Pass
2483.5	41.54	20	Pass
802.11n40			
2400	38.67	20	Pass
2483.5	39.48	20	Pass

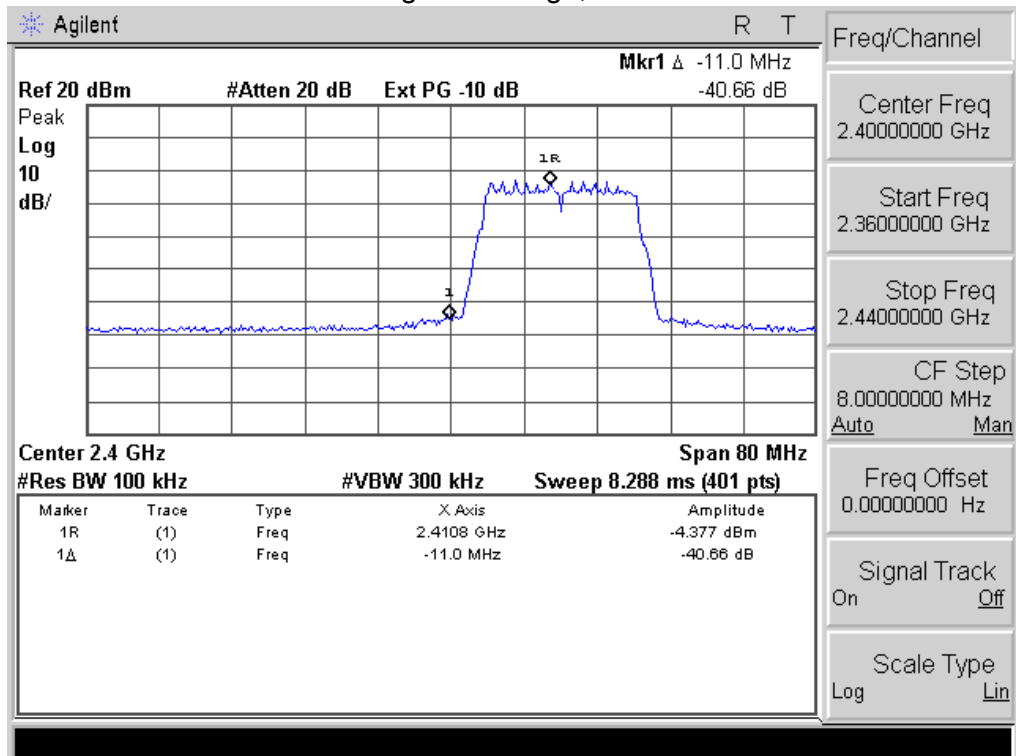
802.11b: Band Edge, Left Side



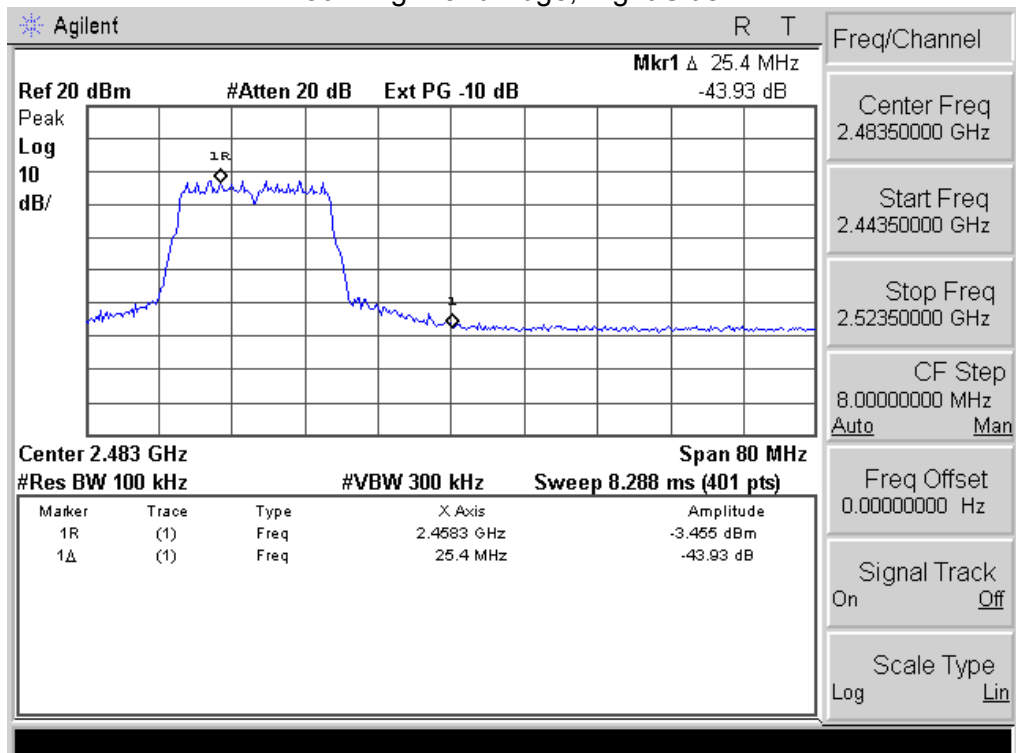
802.11b: Band Edge, Right Side



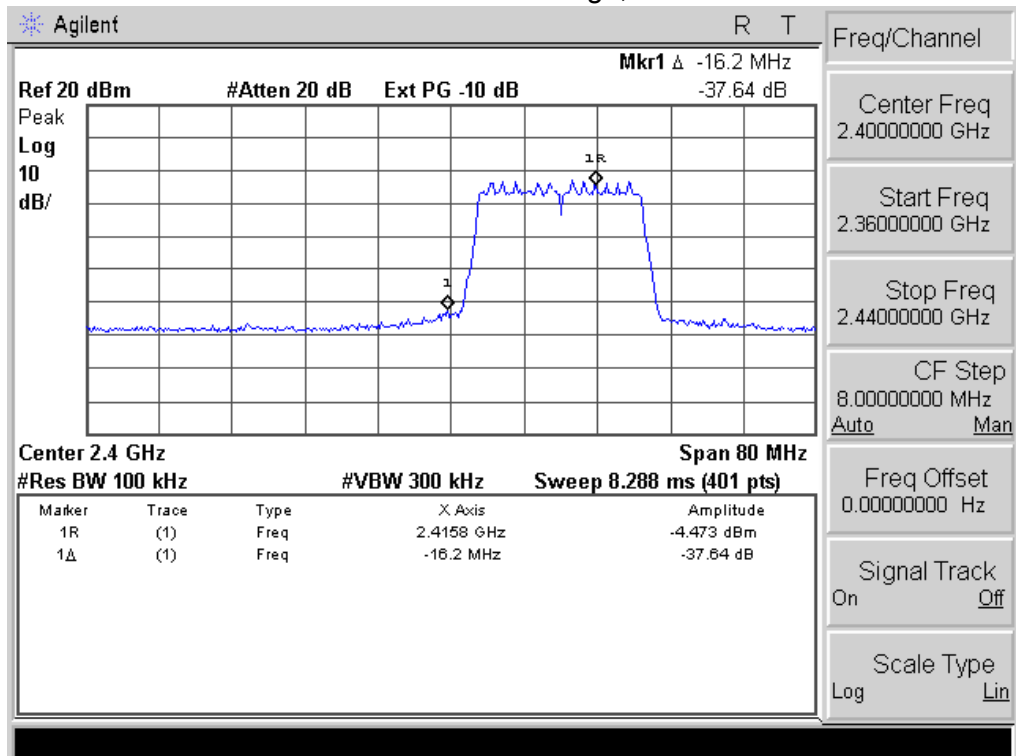
802.11g: Band Edge, Left Side



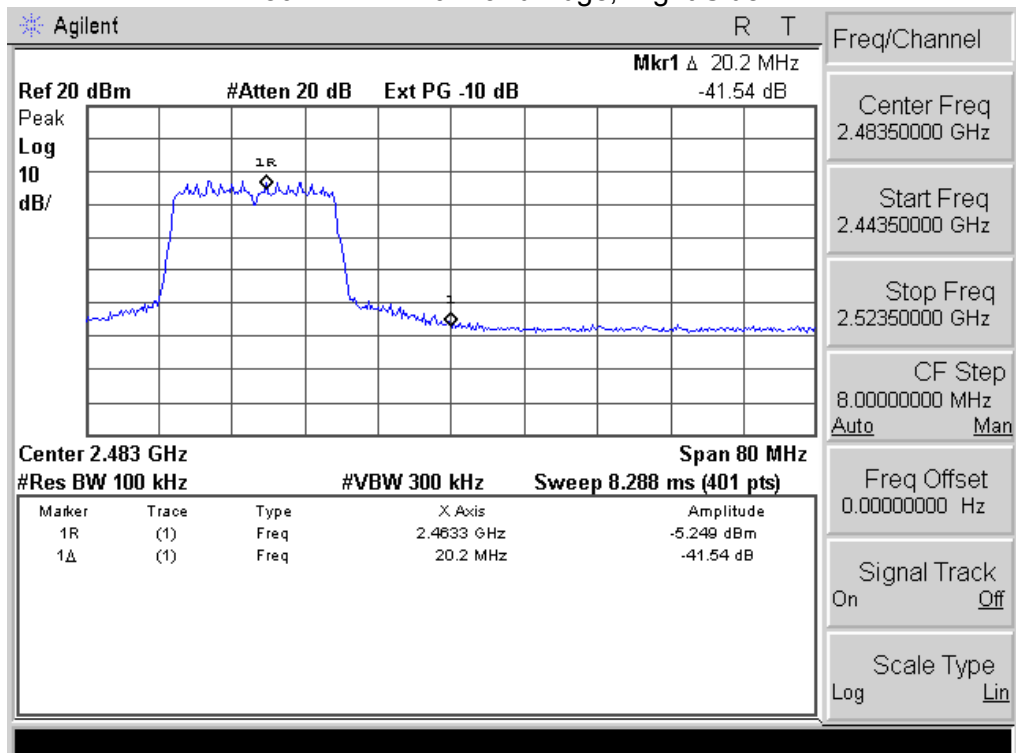
802.11g: Band Edge, Right Side



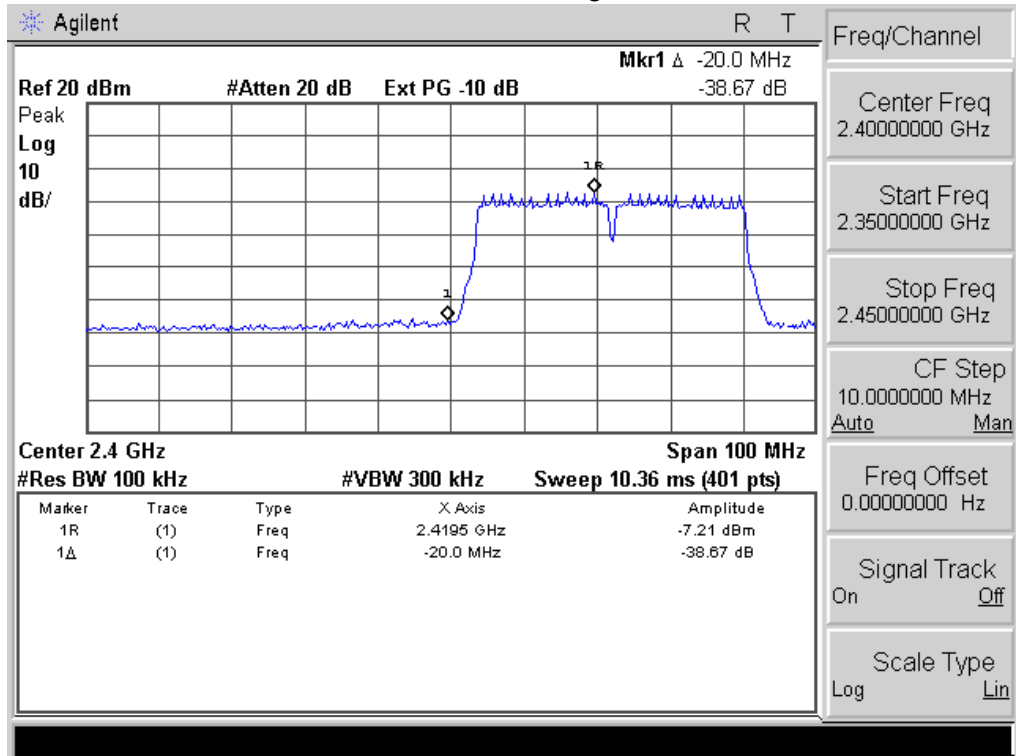
802.11n-HT20: Band Edge, Left Side



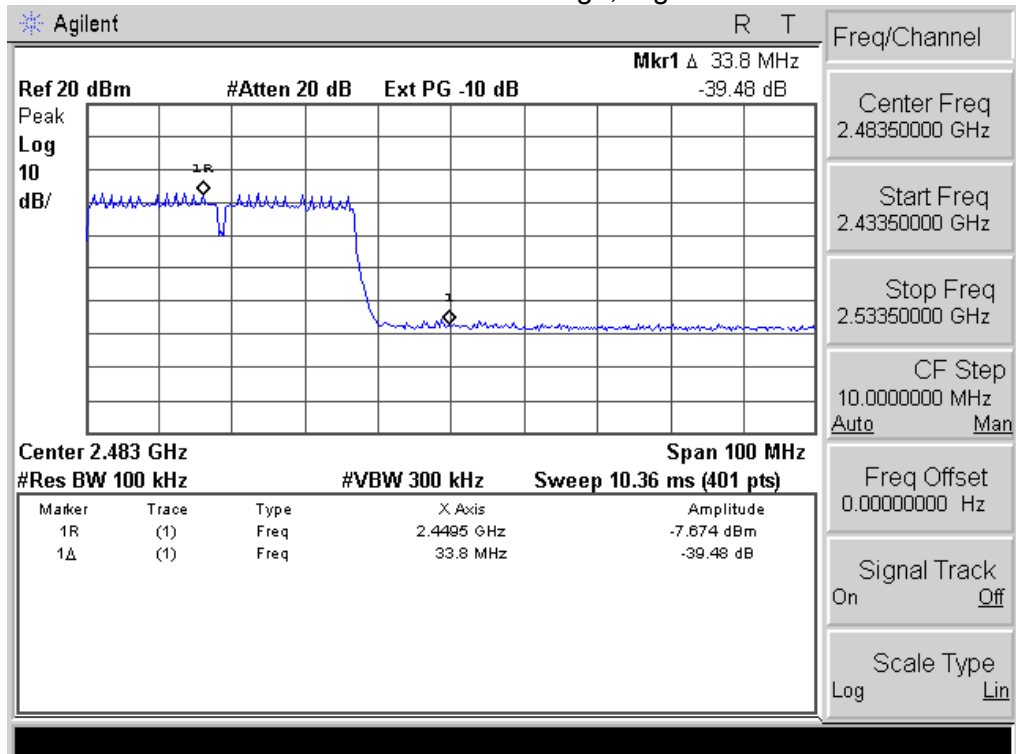
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

The EUT antenna is permanent attached antenna. It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos



CONDUCTED EMISSION Photos