

# FCC TEST REPORT

for

YICHEN (SHENZHEN) TECHNOLOGY CO., LTD

750M Wi-Fi Range Extender Repeater

Model Number: U28

Serial Number: U26, JWA-AC2500, JWA-AC2600,

JWA-AC2319R, JWA-AC2316R, JWA-AC2326R, JWA-AC2329R

FCC ID: 2AJSTU28

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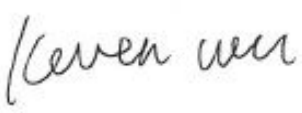
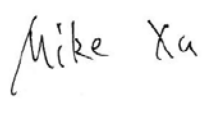


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Report No. : 16KWE094398F  
Date of Test : Aug.18~Oct.17,2016  
Date of Report : Oct.18, 2016

## TABLE OF CONTENTS

Test Report Declaration	Page
<b>1. TEST SUMMARY.....</b>	<b>4</b>
<b>2. GENERAL PRODUCT INFORMATION.....</b>	<b>5</b>
2.1 Product Function .....	5
2.2 Description of Device (EUT).....	5
2.3 Test Supporting System.....	5
2.4 Independent Operation Modes.....	6
2.5 TEST SITES .....	7
2.6 List of Test and Measurement Instruments.....	8
<b>3. TEST SET-UP AND OPERATION MODES .....</b>	<b>9</b>
3.1 Principle of Configuration Selection .....	9
3.2 Block Diagram of Test Set-up .....	9
3.3 Special Accessories and Auxiliary Equipment.....	9
3.4 Countermeasures to Achieve EMC Compliance.....	9
<b>4. EMISSION TEST RESULTS.....</b>	<b>10</b>
4.1 Conducted Emission at the Mains Terminals Test .....	10
4.2 Radiated Emission Test .....	15
<b>5. BAND EDGE COMPLIANCE TEST.....</b>	<b>33</b>
5.1 Limits .....	33
5.2 Test setup.....	33
5.3 Test Data .....	33
<b>6. 26DB AND 6DB BANDWIDTH TEST .....</b>	<b>48</b>
6.1 Applicable Standard.....	48
6.2 Test Procedure .....	48
6.3 Test setup.....	48
<b>7. OUTPUT POWER TEST .....</b>	<b>57</b>
7.1 Limits .....	57
7.2 Test setup.....	57
7.3 Test result.....	58
<b>8. DUTY CYCLE.....</b>	<b>59</b>
8.1 Test Procedure .....	59
8.2 TEST SETUP .....	59
<b>9. PEAK POWER SPECTRAL DENSITY TEST.....</b>	<b>62</b>
9.1 Limits .....	62
9.2 Test setup.....	62
9.3 Test data.....	62
<b>10. FREQUENCY STABILITY TEST .....</b>	<b>70</b>
10.1.limit .....	70
10.2 Test Configuration.....	70
10.3 test procedure.....	70
<b>11. ANTENNA REQUIREMENTS.....</b>	<b>72</b>
10.1 Limits.....	72
10.2 Result.....	72
<b>12. PHOTOGRAPHS OF TEST SET-UP .....</b>	<b>73</b>
<b>13. PHOTOGRAPHS OF THE EUT.....</b>	<b>75</b>

## Keyway Testing Technology Co., Ltd.

<b>Applicant: Address:</b>	YICHEN (SHENZHEN) TECHNOLOGY CO., LTD 23/F, Block C1, Nanshan I Park, No. 1001, Xueyuan Road, Taoyuan Street, Nanshan District, Shenzhen, China	
<b>Manufacturer: Address:</b>	YICHEN (SHENZHEN) TECHNOLOGY CO., LTD 23/F, Block C1, Nanshan I Park, No. 1001, Xueyuan Road, Taoyuan Street, Nanshan District, Shenzhen, China	
<b>E.U.T:</b>	750M Wi-Fi Range Extender Repeater	
<b>Model Number:</b>	U28	
<b>Serial Model:</b>	U26, JWA-AC2500, JWA-AC2600, JWA-AC2319R, JWA-AC2316R, JWA-AC2326R, JWA-AC2329R	
<b>Trade Name:</b>		<b>Serial No.:</b> -----
<b>Date of Receipt:</b>	Aug. 17 , 2016	<b>Date of Test:</b> Aug.18~Oct.17,2016
<b>Test Specification:</b>	FCC Part 15, Subpart 15.407: 2015 ANSI C63.10:2013 KDB789033 D02 v01r03	
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.	
		<b>Issue Date: Oct.18, 2016</b>
Tested by:	Reviewed by:	Approved by:
		
_____ Keven Wu / Engineer	_____ Mike Xu / Supervisor	 _____ Andy Gao / Supervisor
<b>Other Aspects:</b>	None.	
<i>Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested</i>		
<i>This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.</i>		

## 1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emissions	15.407(b)	PASS
26dB bandwidth and 99%dB Bandwidth	15.407 (a)	PASS
6dB bandwidth	15.407(e)	PASS
Power density	15.407 (a)	PASS
Maximum Peak Output Power	15.407 (a)	PASS
Band EDGE	15.407 (b)	PASS
Frequency Stability	15.407 (g)	PASS
Antenna Requirement	15.203/15.407(g)	PASS

## 2. GENERAL PRODUCT INFORMATION

### 2.1 Product Function

Refer to Technical Construction Form and User Manual.

### 2.2 Description of Device (EUT)

Product Name:	750M Wi-Fi Range Extender Repeater
Model No.:	U28
Serial Model:	U26, JWA-AC2500, JWA-AC2600, JWA-AC2319R, JWA-AC2316R, JWA-AC2326R, JWA-AC2329R
Model Difference	All the models are the same circuit and RF module, except the model names and colour.
Operation Frequency:	5.15GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Channel numbers:	9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
Modulation technology:	OFDM
	IEEE 802.11a: (6/9/12/18/24/36/48/54) IEEE 802.11n(HT20)/(VHT20):150/144.44/130/117/115.56 /104/86.67/78/52/6.5Mbps IEEE 802.11n(HT40)/ac(VHT40):300/270/240/180/150/120/108/ 90/54/45/13.5 Mbps IEEE 802.11ac(VHT80):up to 750Mbps
Antenna Type:	PIFA antenna
Antenna gain:	2.73dBi
Power supply:	AC 120V/60Hz

### 2.3 Test Supporting System

None.

## 2.4 Independent Operation Modes

The basic operation modes are:

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5150~5250 MHz band,

802.11a,802.11n(HT20),802.11ac(VHT20) mode Channel 5180MHz, 5200MHz,5240MHz were tested.

802.11n40/ac(VHT40) mode Channel 5190MHz, 5230MHz were tested.

802.11ac80 mode Channel 5210MHz was tested.

For 5725~5850 MHz band,

802.11a,802.11n(HT20),802.11ac(VHT20) mode Channel 5745MHz, 5785MHz, 5825MHz were tested.

802.11n40/ac(VHT40) mode Channel 5755MHz, 5795MHz were tested.

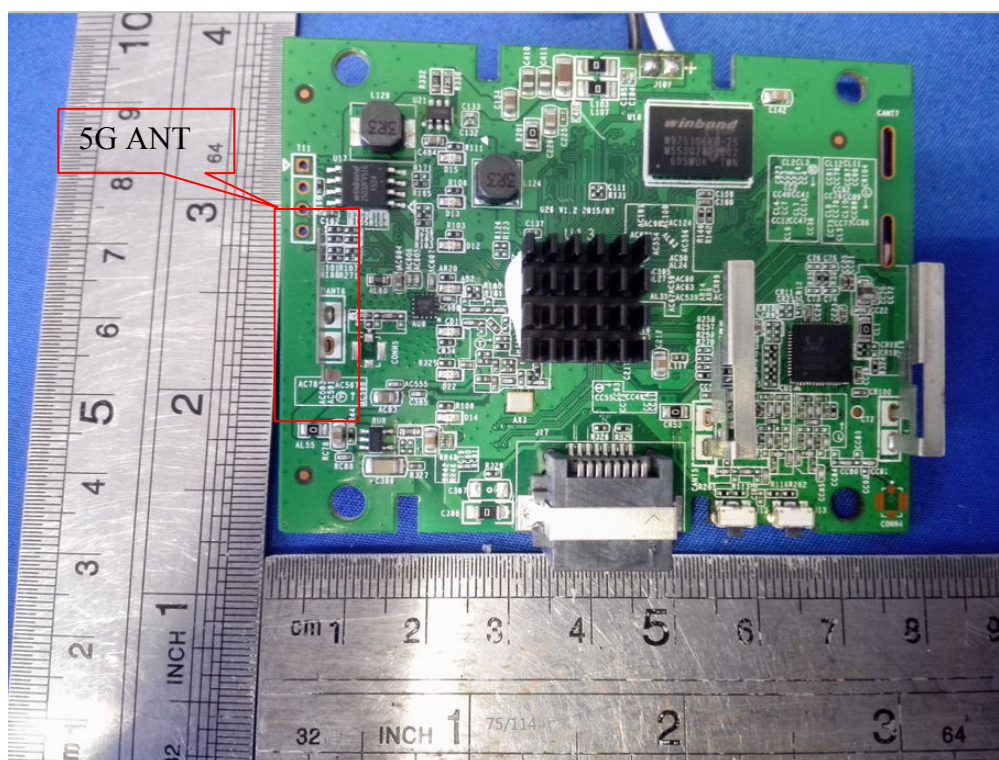
802.11ac80 mode Channel 5775MHz was tested.

### EUT Exercise Software

The software "AP\_QA\_Tool" was used for testing, which was provided by manufacturer.

,802.11a mode:6Mbps , 802.11n(HT20)/ 802.11ac(VHT20) mode: 6.5Mbps,

802.11n(HT40)/ac(VHT40) mode:13.5Mbps, 802.11ac80 mode:MCS0 were test



## 2.5 TEST SITES

### Test Facilities

Lab Qualifications : Certificated by Industry Canada  
Registration No.: 9868A  
Date of registration: December 8, 2011

Certificated by FCC, USA  
Registration No.: 370994  
Date of registration: February 21, 2012

Certificated by CNAS China  
Registration No.: CNAS L5783  
Date of registration: August 8, 2012

## 2.6 List of Test and Measurement Instruments

For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,16	Apr. 27,17
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 27,16	Apr. 27,17
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 27,16	Apr. 27,17
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 27,16	Apr. 27,17

For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 27,16	Apr. 27,17
System Simulator	Agilent	E5515C	GB43130245	Apr. 27,16	Apr. 27,17
Power Splitter	Weinschel	1506A	NW425	Apr. 27,16	Apr. 27,17
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 27,16	Apr. 27,17
Spectrum Analyzer	Agilent	E4407B	MY4511304	Apr. 27,16	Apr. 27,17
Spectrum Analyzer	R&S	FSV40	132.1.3008K39-100967	Apr. 27,16	Apr. 27,17
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 27,16	Apr. 27,17
Signal Amplifier	SONOMA	310	187016	Apr. 27,16	Apr. 27,17
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 27,16	Apr. 27,17
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 27,16	Apr. 27,17
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 27,16	Apr. 27,17
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 27,16	Apr. 27,17
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 27,16	Apr. 27,17
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 27,16	Apr. 27,17
High Pass filter	Micro	HPM50111	324216	Apr. 27,16	Apr. 27,17
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 27,16	Apr. 27,17
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 27,16	Apr. 27,17
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 27,16	Apr. 27,17
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 27,16	Apr. 27,17
Splitter	Agilent	11636B	0025164	Apr. 27,16	Apr. 27,17
Power Meter	Anritsu	ML2495A	1204003	Apr. 24,16	Apr. 24,17
Power Sensor	Anritsu	MA2411B	1126150	Apr. 24,16	Apr. 24,17
Spectrum Analyzer	Agilent	N9020A	MY56070279	Jul.26,16	Jul.25,17



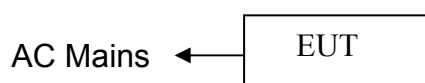
### 3. TEST SET-UP AND OPERATION MODES

#### 3.1 Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

#### 3.2 Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



*(EUT: 750M Wi-Fi Range Extender Repeater )*

#### 3.3 Special Accessories and Auxiliary Equipment

None.

#### 3.4 Countermeasures to Achieve EMC Compliance

None.

## 4. EMISSION TEST RESULTS

### 4.1 Conducted Emission at the Mains Terminals Test

Limit 15.207 limits

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

#### Test Setup

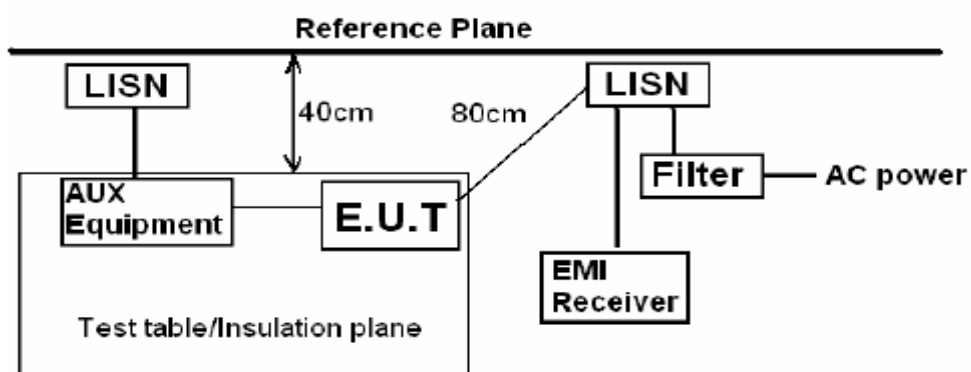
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

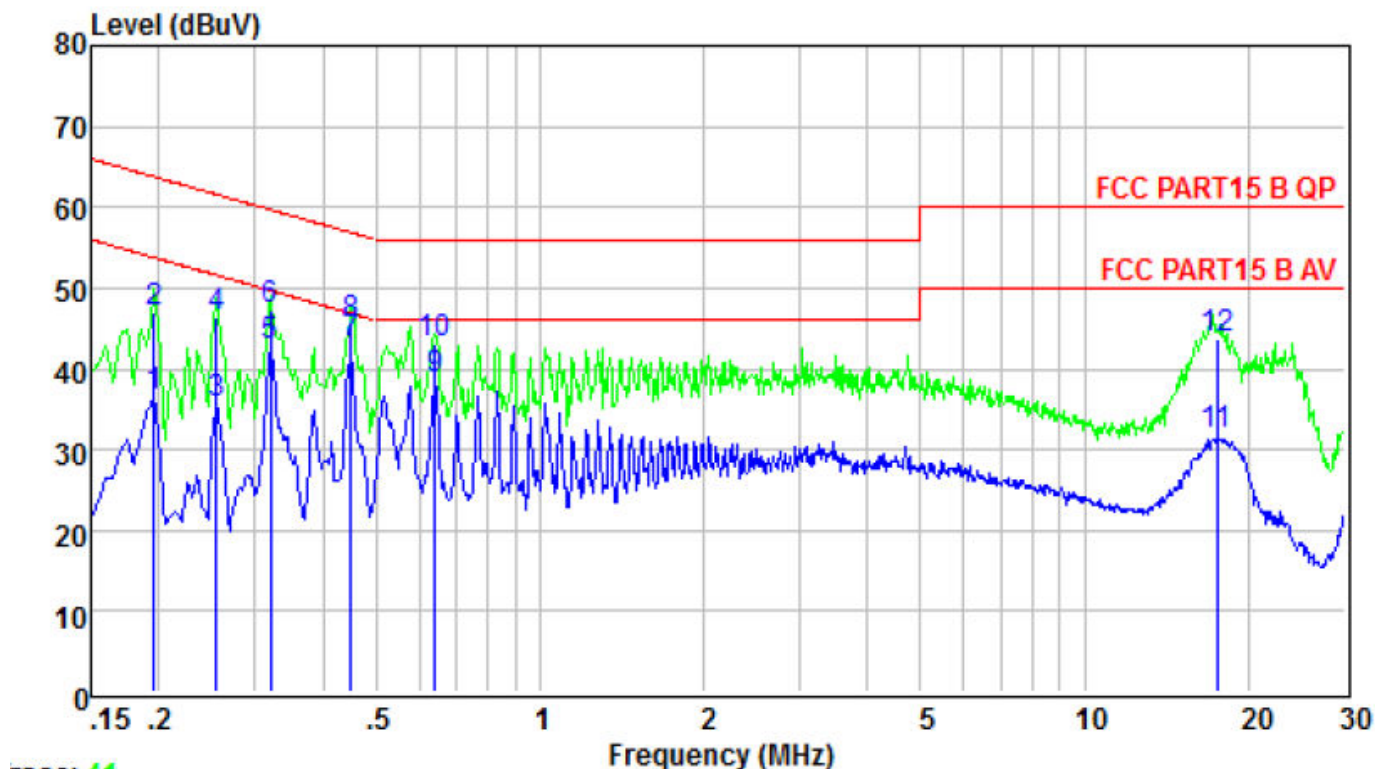
The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



*Remark:*  
 E.U.T: Equipment Under Test  
 LISN: Line Impedance Stabilization Network  
 Test table height=0.8m

EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Link Mode

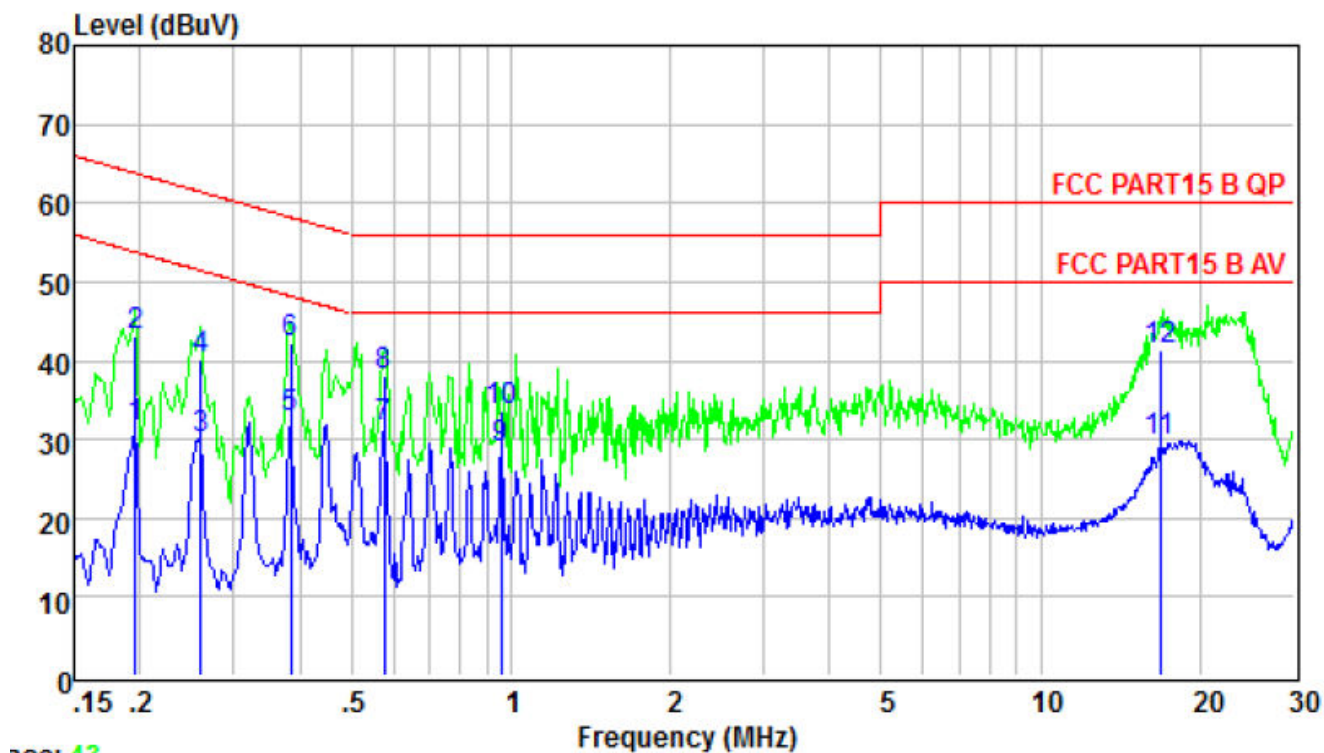


Trace: 41

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.195	36.62	53.80	-17.18	Average
2	0.195	47.10	63.80	-16.70	QP
3	0.255	35.77	51.60	-15.83	Average
4	0.255	46.26	61.60	-15.34	QP
5	0.320	42.68	49.71	-7.03	Average
6	0.320	47.20	59.71	-12.51	QP
7	0.449	43.00	46.89	-3.89	Average
8	0.449	45.50	56.89	-11.39	QP
9	0.641	38.78	46.00	-7.22	Average
10	0.641	43.03	56.00	-12.97	QP
11	17.475	31.82	50.00	-18.18	Average
12	17.475	43.58	60.00	-16.42	QP

EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Link Mode

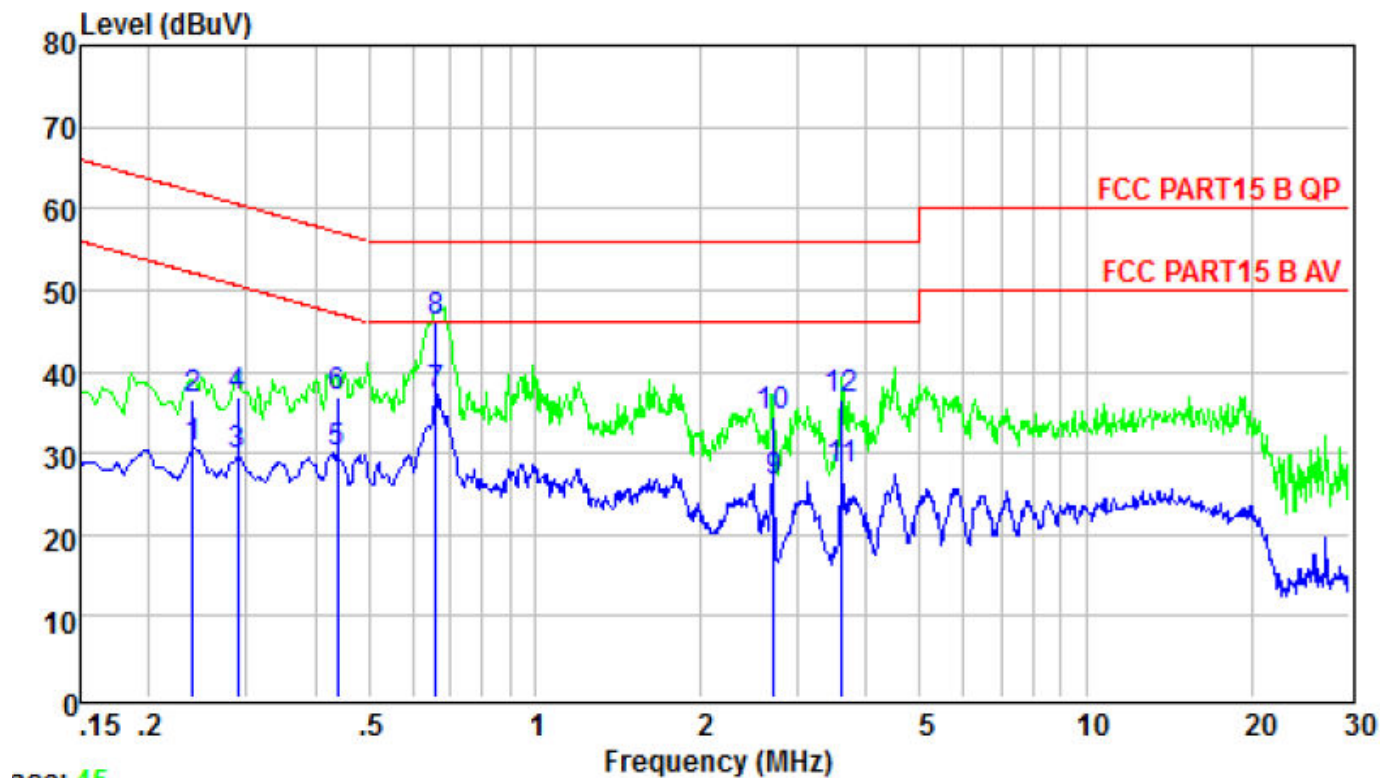
Neutral



acc: 43

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	dBuV	dB	
1	0.195	31.57	53.80	-22.23	Average
2	0.195	43.25	63.80	-20.55	QP
3	0.260	30.06	51.42	-21.36	Average
4	0.260	40.13	61.42	-21.29	QP
5	0.385	32.58	48.17	-15.59	Average
6	0.385	42.26	58.17	-15.91	QP
7	0.576	31.52	46.00	-14.48	Average
8	0.576	38.14	56.00	-17.86	QP
9	0.958	28.96	46.00	-17.04	Average
10	0.958	33.48	56.00	-22.52	QP
11	16.750	29.74	50.00	-20.26	Average
12	16.750	41.26	60.00	-18.74	QP

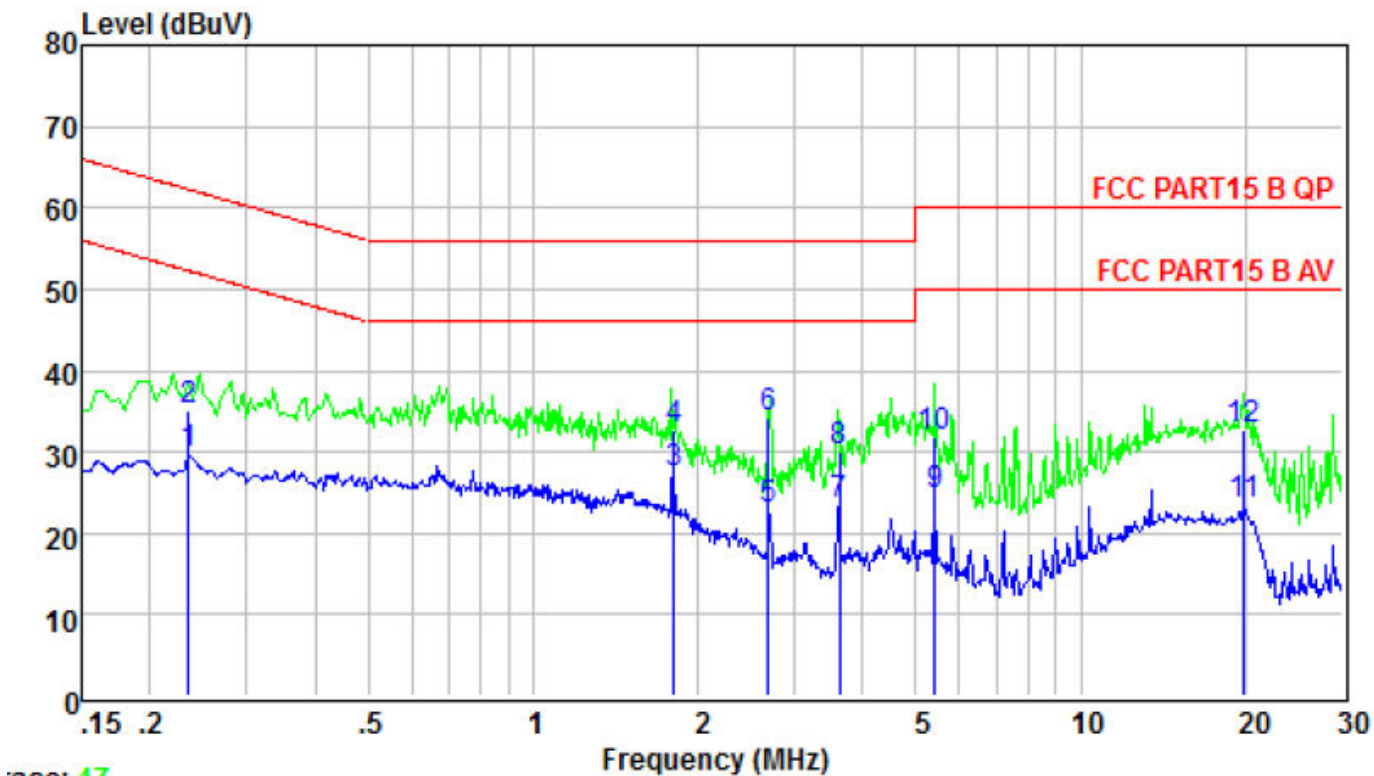
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 240V/60Hz	Test Mode :	Link Mode



ace: 45

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.240	30.69	52.08	-21.39	Average
2	0.240	36.69	62.08	-25.39	QP
3	0.289	29.88	50.54	-20.66	Average
4	0.289	36.89	60.54	-23.65	QP
5	0.440	30.11	47.07	-16.96	Average
6	0.440	36.89	57.07	-20.18	QP
7	0.661	37.13	46.00	-8.87	Average
8	0.661	46.23	56.00	-9.77	QP
9	2.707	26.57	46.00	-19.43	Average
10	2.707	34.59	56.00	-21.41	QP
11	3.603	27.86	46.00	-18.14	Average
12	3.603	36.59	56.00	-19.41	QP

EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Link Mode



Trace: 47

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.235	29.61	52.26	-22.65	Average
2	0.235	35.12	62.26	-27.14	QP
3	1.810	27.40	46.00	-18.60	Average
4	1.810	32.63	56.00	-23.37	QP
5	2.692	22.93	46.00	-23.07	Average
6	2.692	34.12	56.00	-21.88	QP
7	3.623	23.56	46.00	-22.44	Average
8	3.623	30.12	56.00	-25.88	QP
9	5.419	24.72	50.00	-25.28	Average
10	5.419	31.85	60.00	-28.15	QP
11	19.845	23.53	50.00	-26.47	Average
12	19.845	32.63	60.00	-27.37	QP

## 4.2 Radiated Emission Test

### Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

### Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

## Test setup

The EUT was placed on a turn table which was 0.8 m (above 1GHz, the high was 1.5m) above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz, Both PK and AV measure, PK detector is used.

The frequency range from 30MHz to 10<sup>th</sup> harmonic are checked. and no any emissions were found from 18GHz to 40 GHz, So the radiated emissions from 18GHz to 40GHz were not record.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty:  $\pm 3.2$  dB at a level of confidence of 95%.

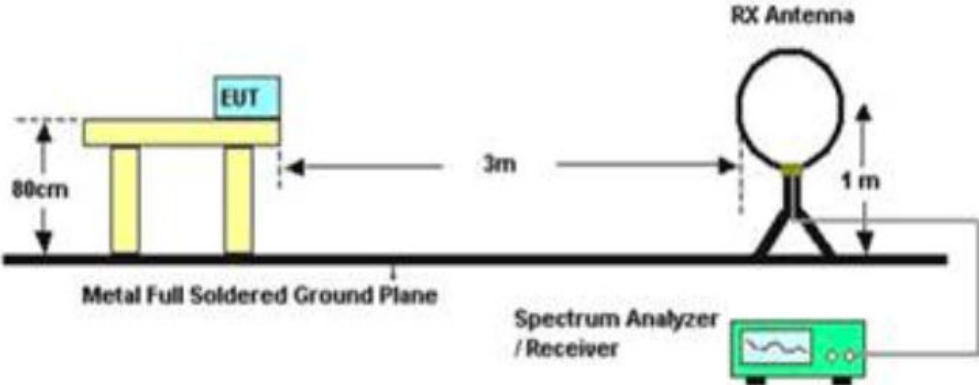
3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

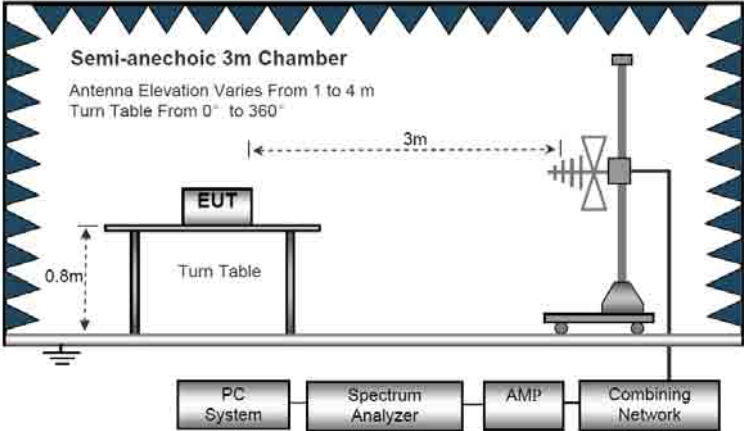
5. For Both PK and AV value above 1GHz, PK detector is used.



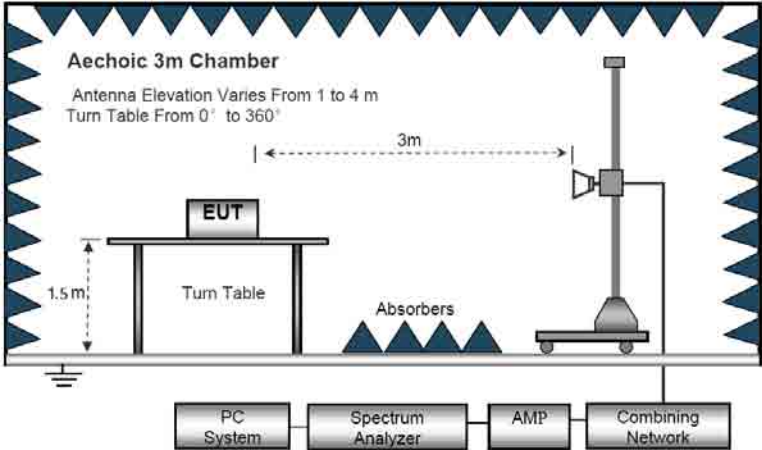
### Radiated Emission Test-Up Frequency Below 30MHz



### Below 1GHz



### Above 1GHz



EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	AC 120V/60Hz		

**Below 30MHz**

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

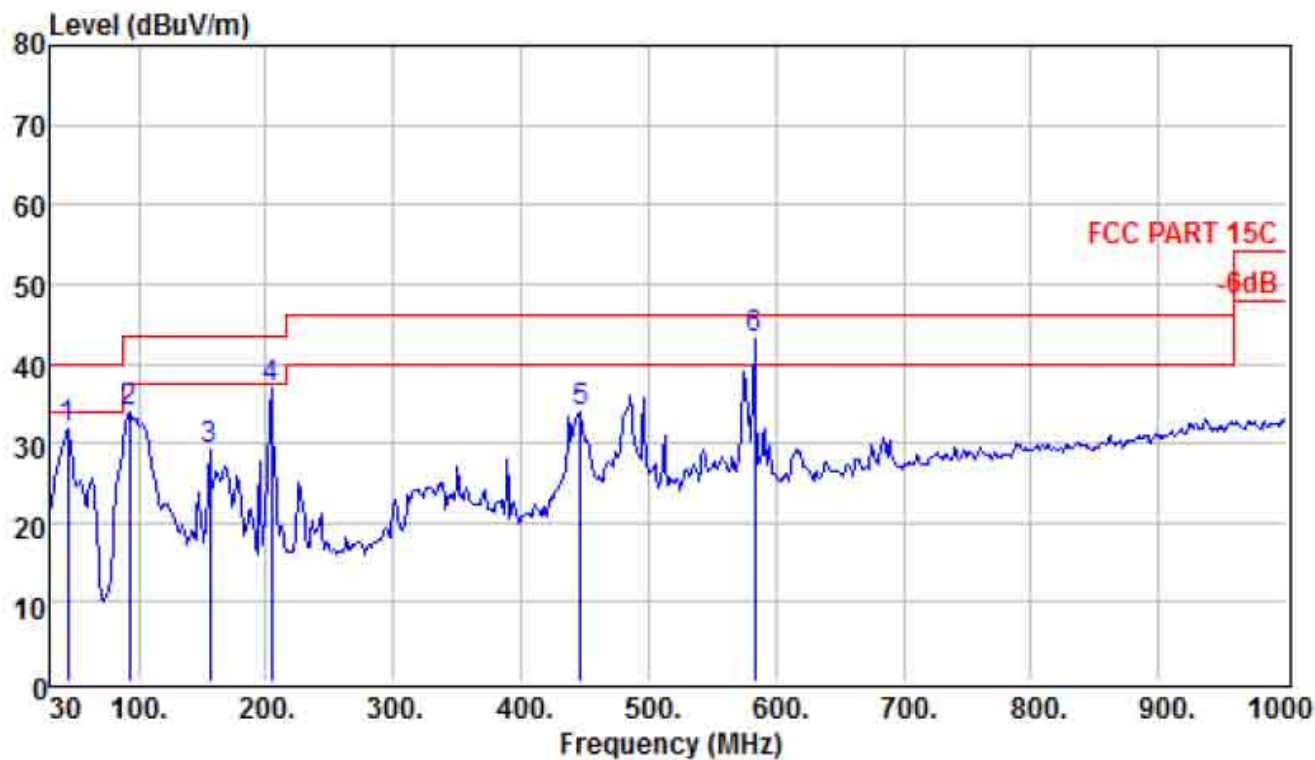
Distance extrapolation factor =  $40 \log(\text{specific distance/test distance})$ (dB);

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

Below 1GHz

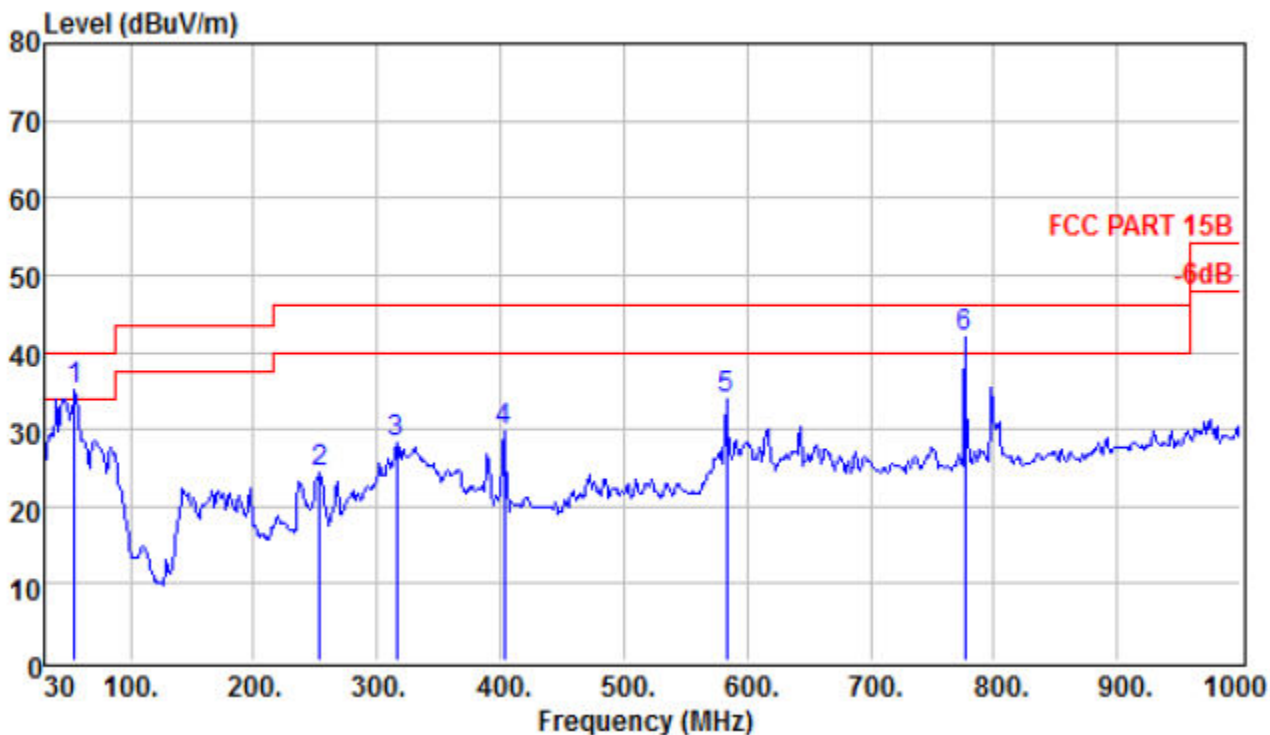
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	AC 120V/60Hz		

Horizontal



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Line	Limit	Remark		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	47.460	52.85	9.84	0.75	31.39	32.05	40.00	-7.95 QP
2	253.100	41.74	12.91	1.70	30.97	25.38	46.00	-20.62 QP
3	328.760	43.29	14.65	2.02	30.79	29.17	46.00	-16.83 QP
4	403.450	40.56	16.41	2.37	30.63	28.71	46.00	-17.29 QP
5	582.900	43.90	20.05	3.20	30.74	36.41	46.00	-9.59 QP
6	801.150	44.34	23.00	4.29	30.56	41.07	46.00	-4.93 QP

Vertical



	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	Remark
	MHz	Level	Factor	Loss	Factor	Line	Limit	
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 !	54.250	57.47	8.16	0.75	31.37	35.01	40.00	-4.99 QP
2	253.100	40.65	12.91	1.70	30.97	24.29	46.00	-21.71 QP
3	316.150	42.95	14.25	1.94	30.87	28.27	46.00	-17.73 QP
4	403.450	41.72	16.41	2.37	30.63	29.87	46.00	-16.13 QP
5	582.900	41.36	20.05	3.20	30.74	33.87	46.00	-12.13 QP
6 !	776.900	45.59	22.72	4.21	30.62	41.90	46.00	-4.10 QP

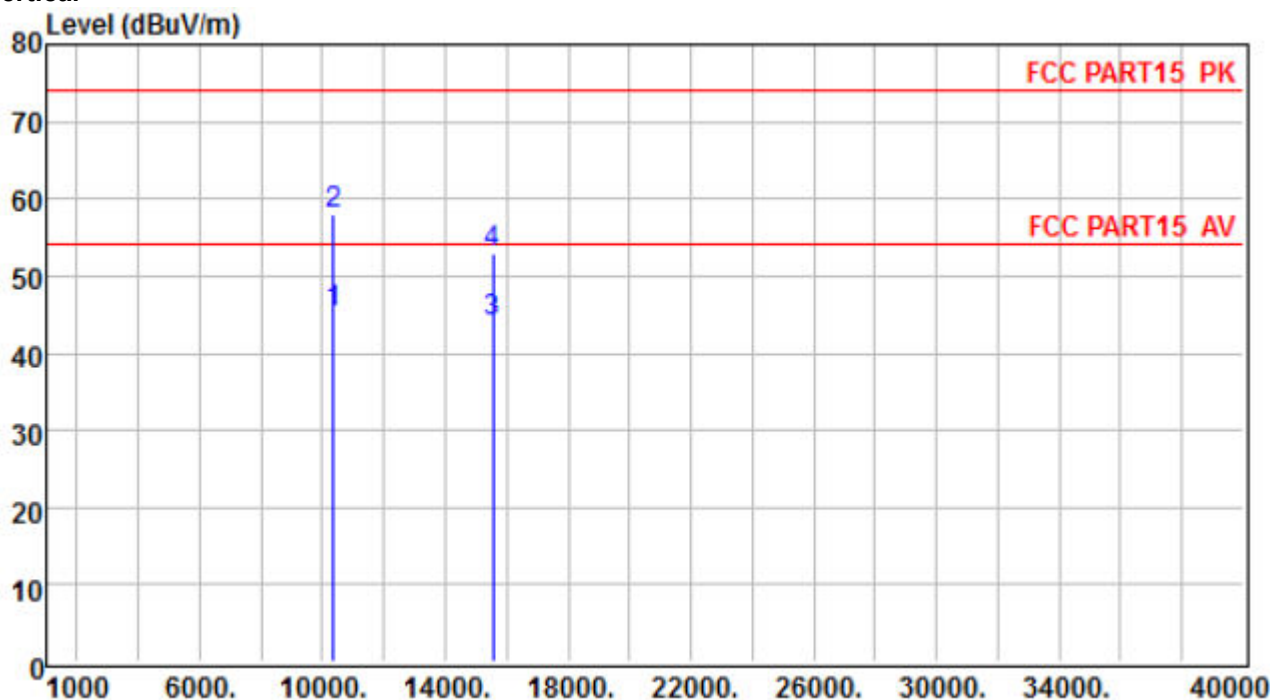
NOTE:

Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor,  
 Over Limit= Absolute Level – Limit

Above 1GHz

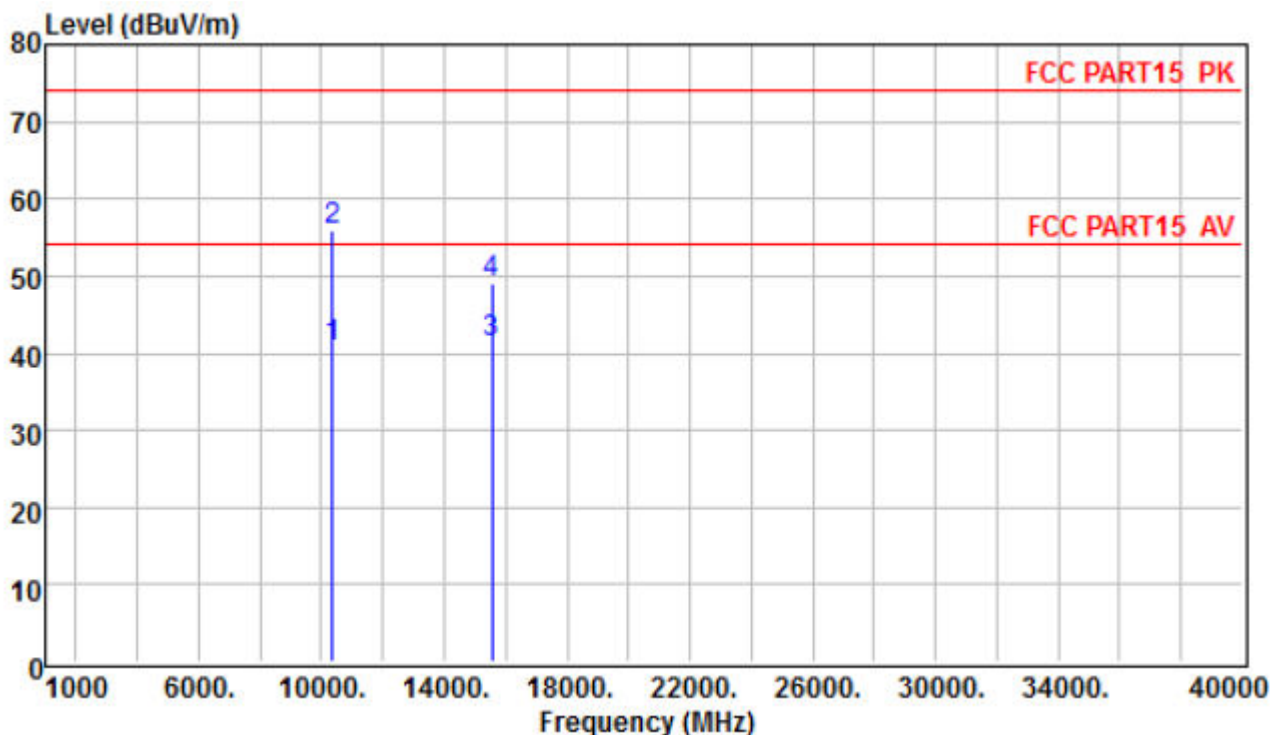
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5180
Test Voltage :	AC 120V/60Hz		

Vertical



Frequency (MHz)								Limit	Over	Remark
Read	Antenna	Cable	Preamp	Limit	Over	Limit	Over	Remark		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	dB		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	10360.000	33.12	23.99	17.04	28.84	45.31	54.00	-8.69	Average	
2	10360.000	45.67	23.99	17.04	28.84	57.86	74.00	-16.14	Peak	
3	15540.000	29.78	23.53	20.34	29.63	44.02	54.00	-9.98	Average	
4	15540.000	38.76	23.53	20.34	29.63	53.00	74.00	-21.00	Peak	

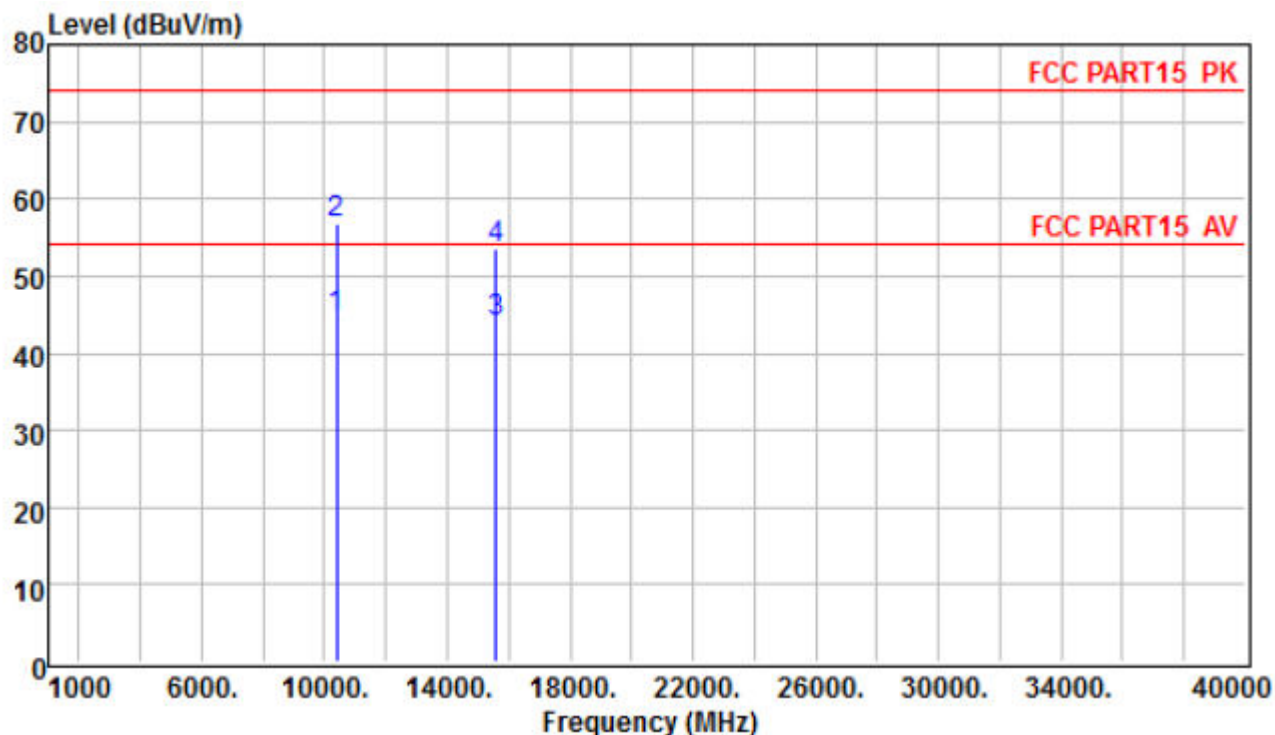
Horizontal



	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	10360.000	28.56	23.99	17.04	28.84	40.75	54.00	-13.25 Average
2	10360.000	43.87	23.99	17.04	28.84	56.06	74.00	-17.94 Peak
3	15540.000	26.98	23.53	20.34	29.63	41.22	54.00	-12.78 Average
4	15540.000	34.76	23.53	20.34	29.63	49.00	74.00	-25.00 Peak

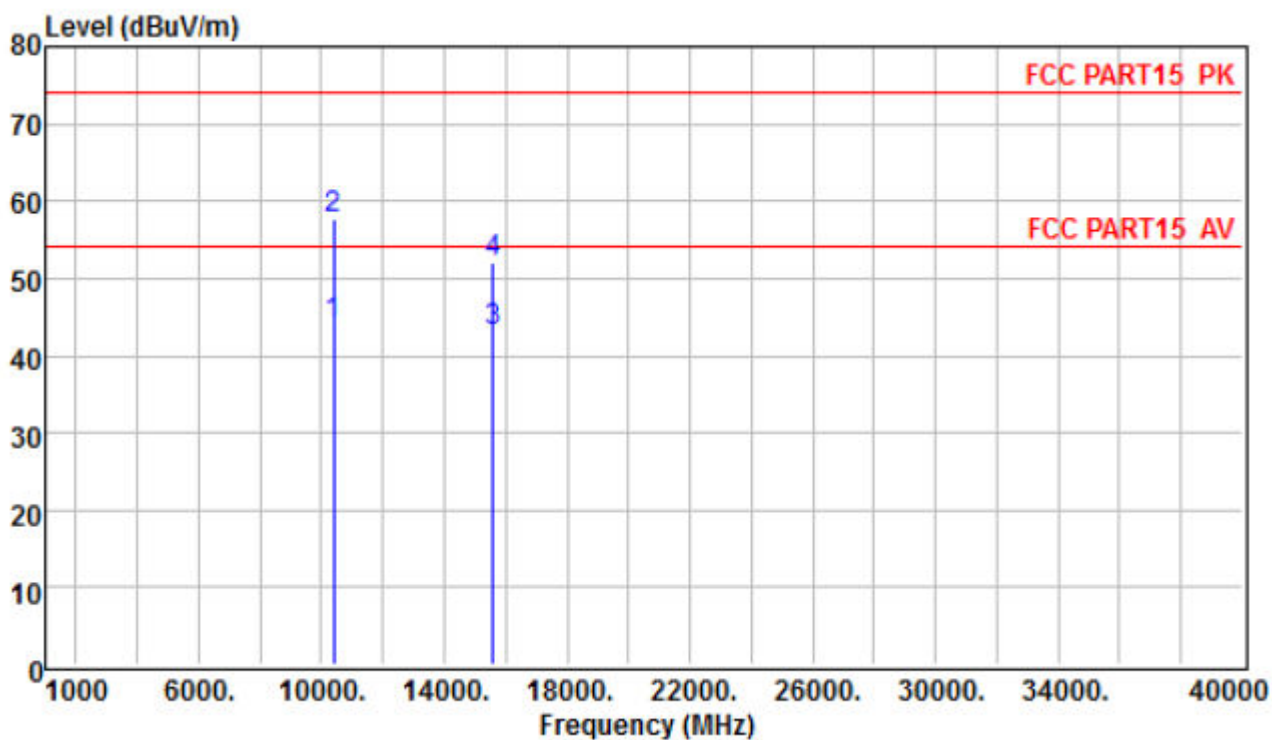
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5200
Test Voltage :	AC 120V/60Hz		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	10400.000	32.36	24.04	17.04	28.84	44.60	54.00	-9.40 Average
2	10400.000	44.50	24.04	17.04	28.84	56.74	74.00	-17.26 Peak
3	15600.000	29.54	23.79	20.39	29.64	44.08	54.00	-9.92 Average
4	15600.000	38.98	23.79	20.39	29.64	53.52	74.00	-20.48 Peak

Horizontal

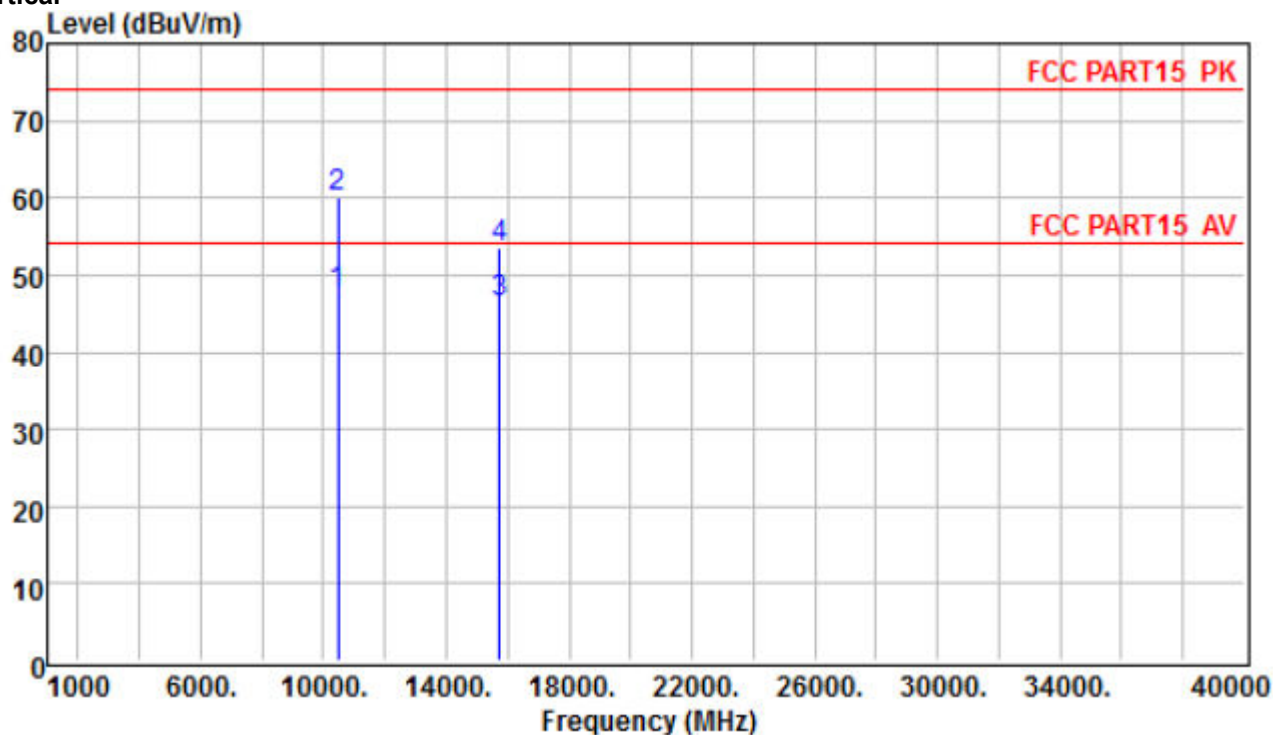


	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	10400.000	31.76	24.04	17.04	28.84	44.00	54.00	-10.00	Average
2	10400.000	45.34	24.04	17.04	28.84	57.58	74.00	-16.42	Peak
3	15600.000	28.65	23.79	20.39	29.64	43.19	54.00	-10.81	Average
4	15600.000	37.43	23.79	20.39	29.64	51.97	74.00	-22.03	Peak



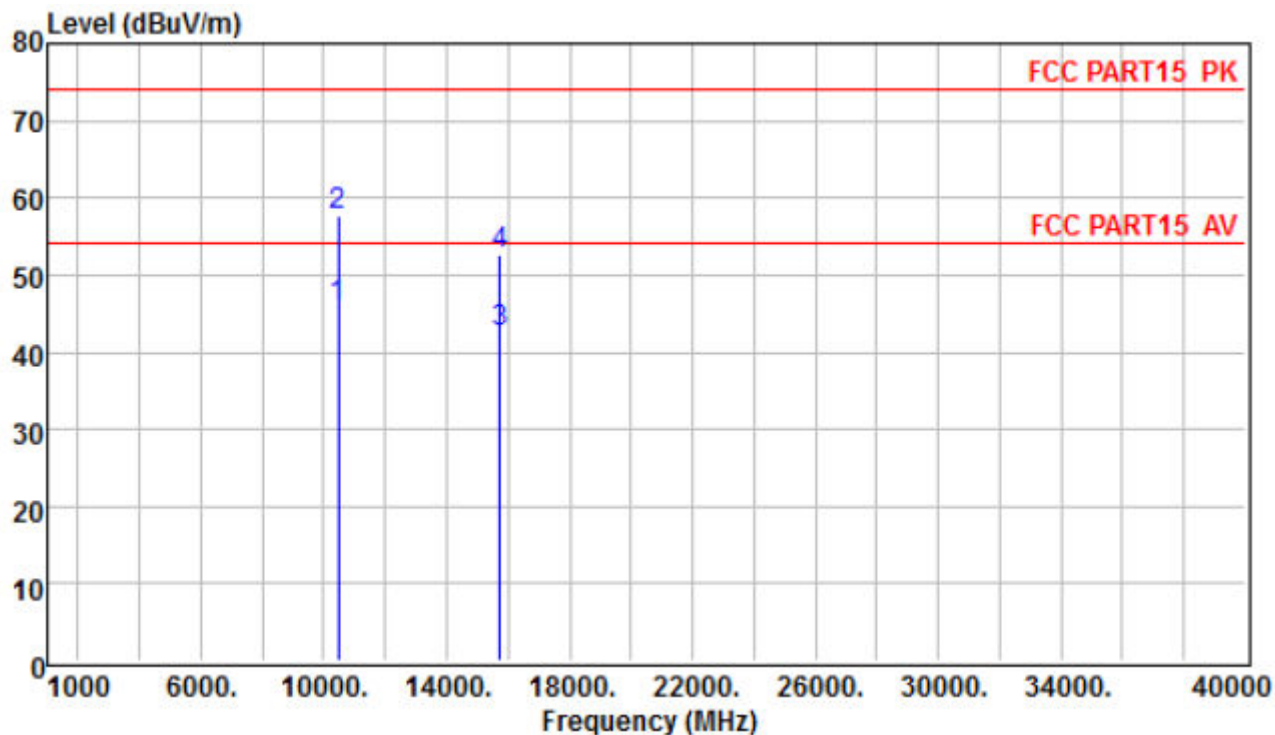
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5240
Test Voltage :	AC 120V/60Hz		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	10480.000	34.35	25.17	17.06	28.85	47.73	54.00	-6.27 Average
2	10480.000	46.77	25.17	17.06	28.85	60.15	74.00	-13.85 Peak
3	15720.000	31.35	24.25	20.45	29.66	46.39	54.00	-7.61 Average
4	15720.000	38.45	24.25	20.45	29.66	53.49	74.00	-20.51 Peak

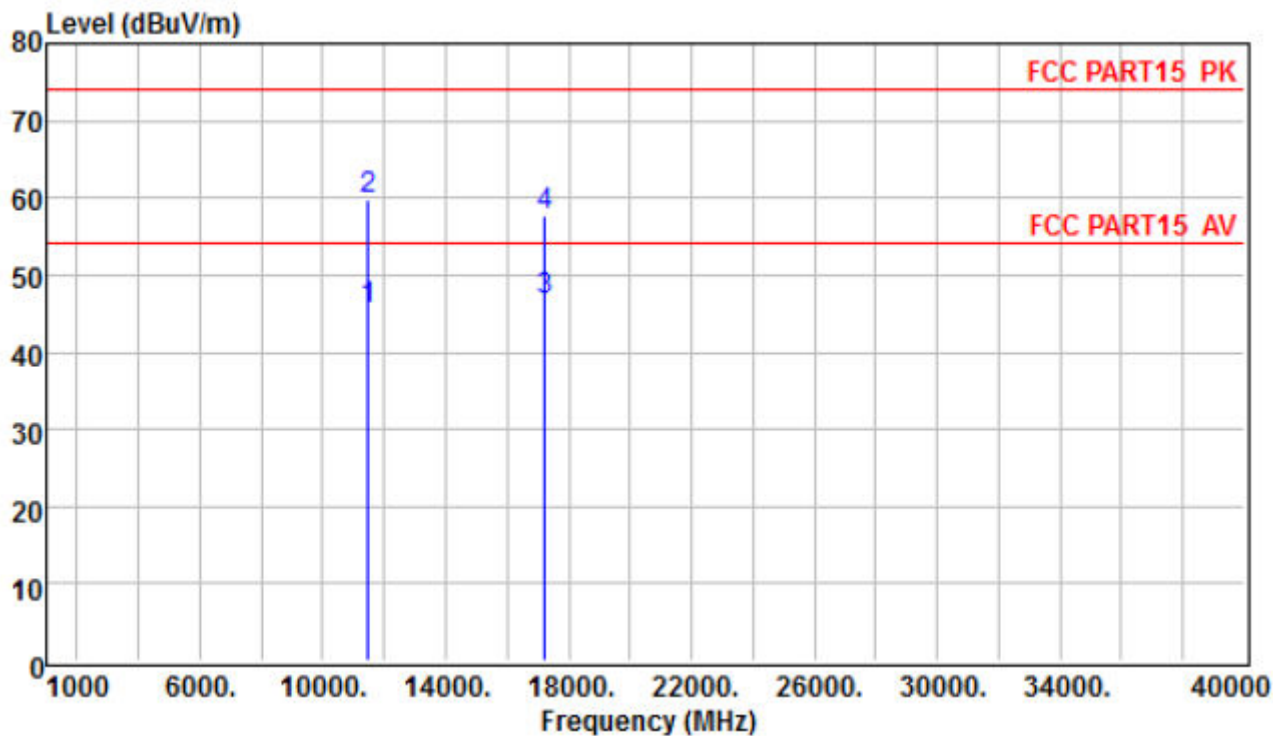
Horizontal



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	10480.000	32.55	25.17	17.06	28.85	45.93	54.00	-8.07 Average
2	10480.000	44.44	25.17	17.06	28.85	57.82	74.00	-16.18 Peak
3	15720.000	27.35	24.25	20.45	29.66	42.39	54.00	-11.61 Average
4	15720.000	37.57	24.25	20.45	29.66	52.61	74.00	-21.39 Peak

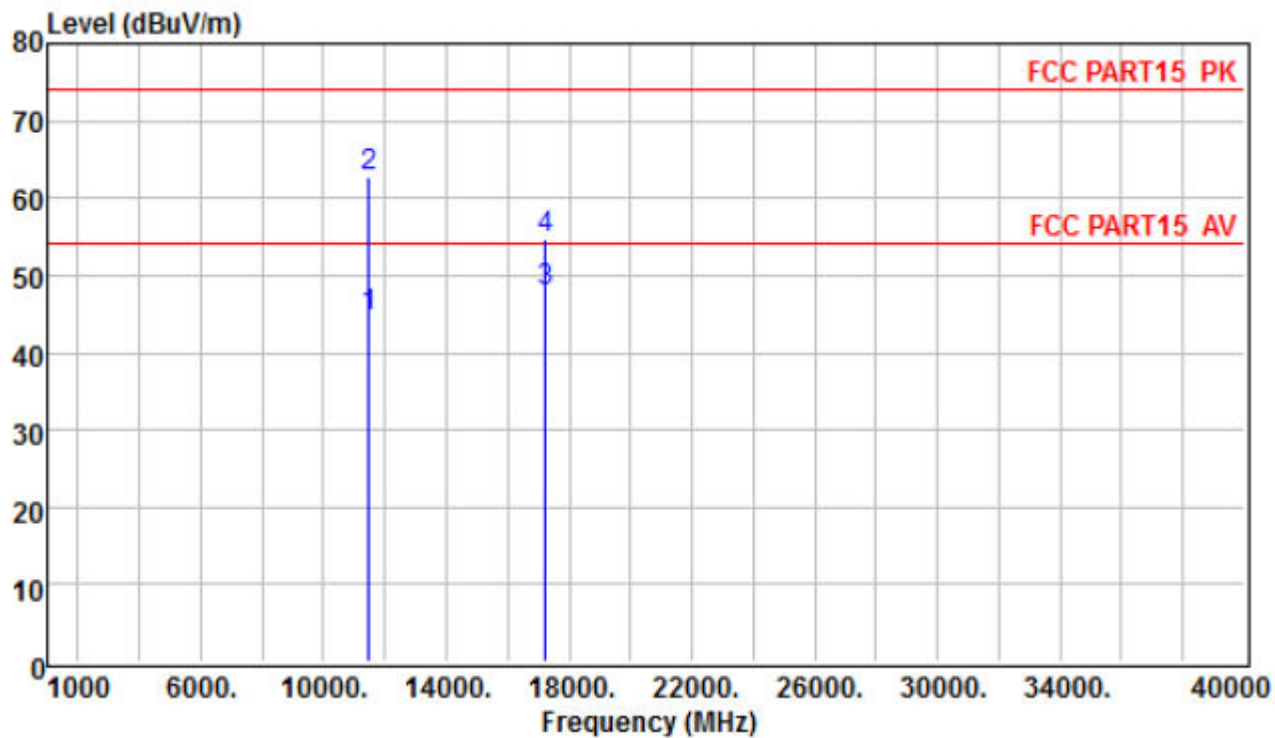
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5745
Test Voltage :	AC 120V/60Hz		

Vertical



	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11490.000	33.43	23.89	17.26	28.95	45.63	54.00	-8.37 Average
2	11490.000	47.45	23.89	17.26	28.95	59.65	74.00	-14.35 Peak
3	17235.000	30.43	24.97	21.54	30.19	46.75	54.00	-7.25 Average
4	17235.000	41.45	24.97	21.54	30.19	57.77	74.00	-16.23 Peak

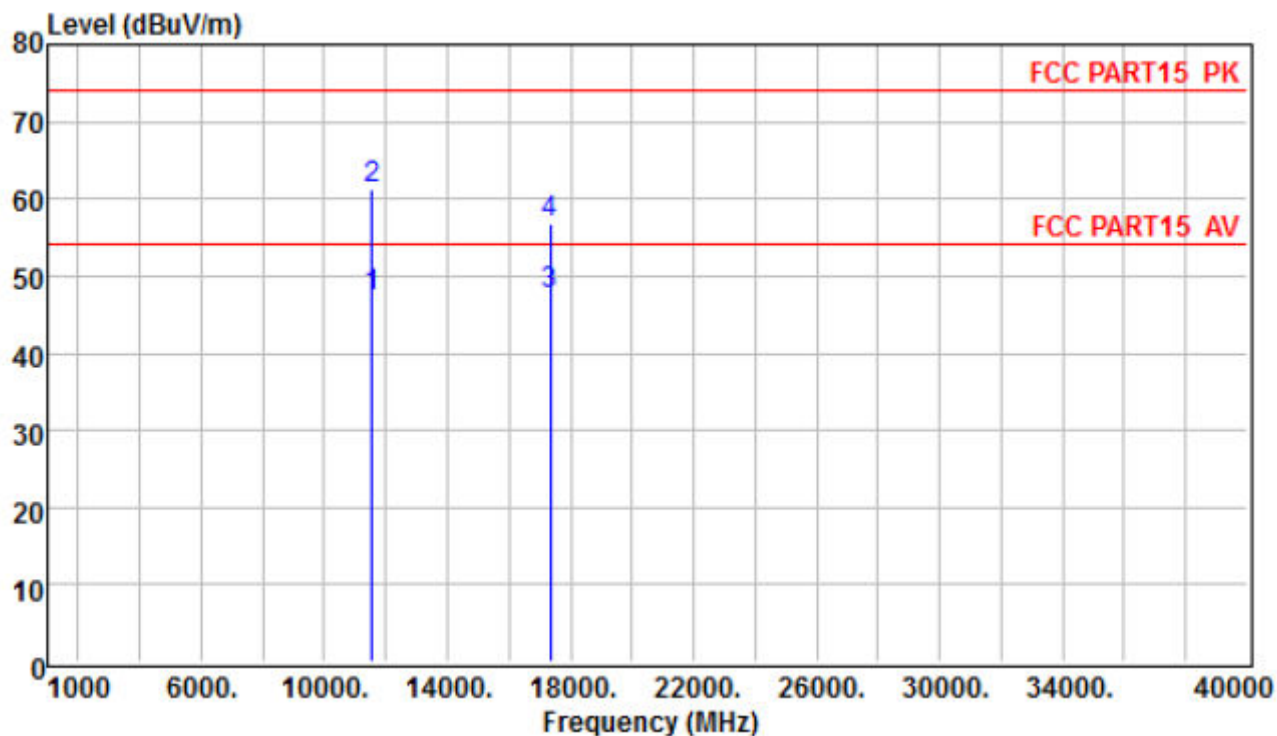
Horizontal



	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11490.000	32.45	23.89	17.26	28.95	44.65	54.00	-9.35 Average
2	11490.000	50.45	23.89	17.26	28.95	62.65	74.00	-11.35 Peak
3	17235.000	31.56	24.97	21.54	30.19	47.88	54.00	-6.12 Average
4	17235.000	38.34	24.97	21.54	30.19	54.66	74.00	-19.34 Peak

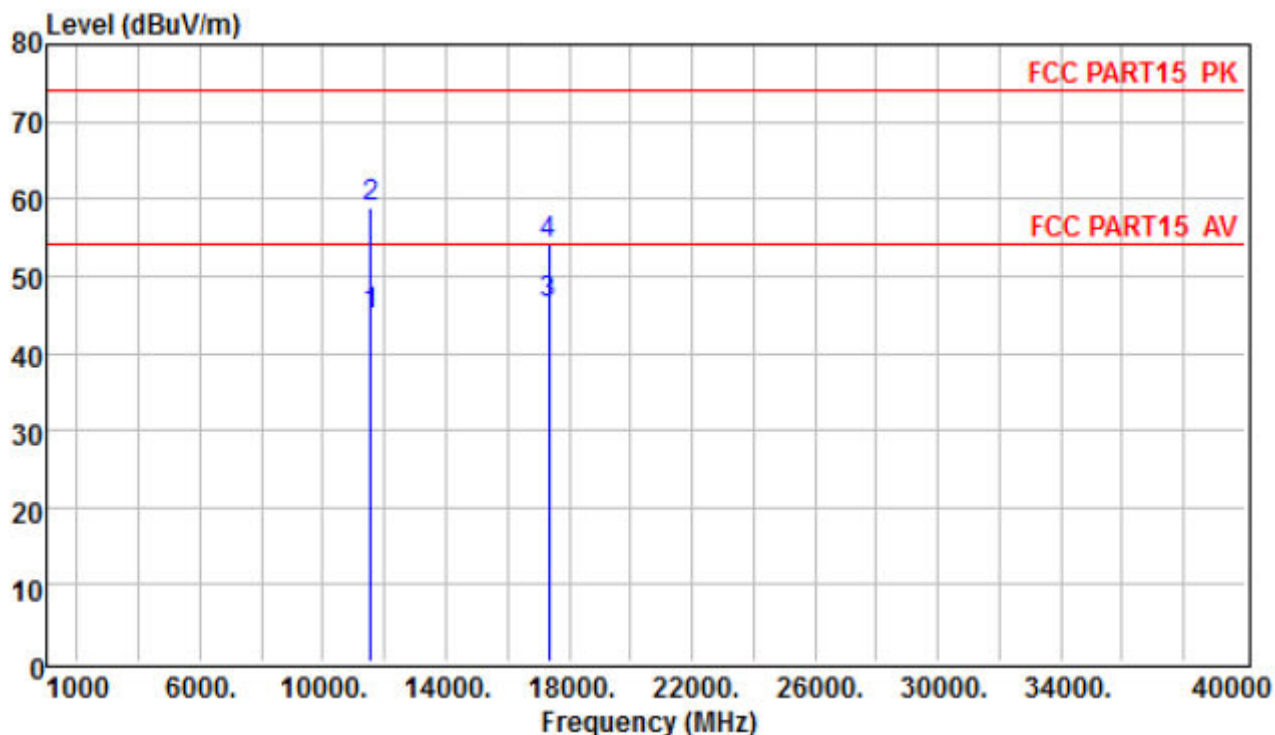
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5785
Test Voltage :	AC 120V/60Hz		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11570.000	33.09	25.83	17.28	28.96	47.24	54.00	-6.76 Average
2	11570.000	46.98	25.83	17.28	28.96	61.13	74.00	-12.87 Peak
3	17355.000	30.86	25.16	21.66	30.24	47.44	54.00	-6.56 Average
4	17355.000	40.08	25.16	21.66	30.24	56.66	74.00	-17.34 Peak

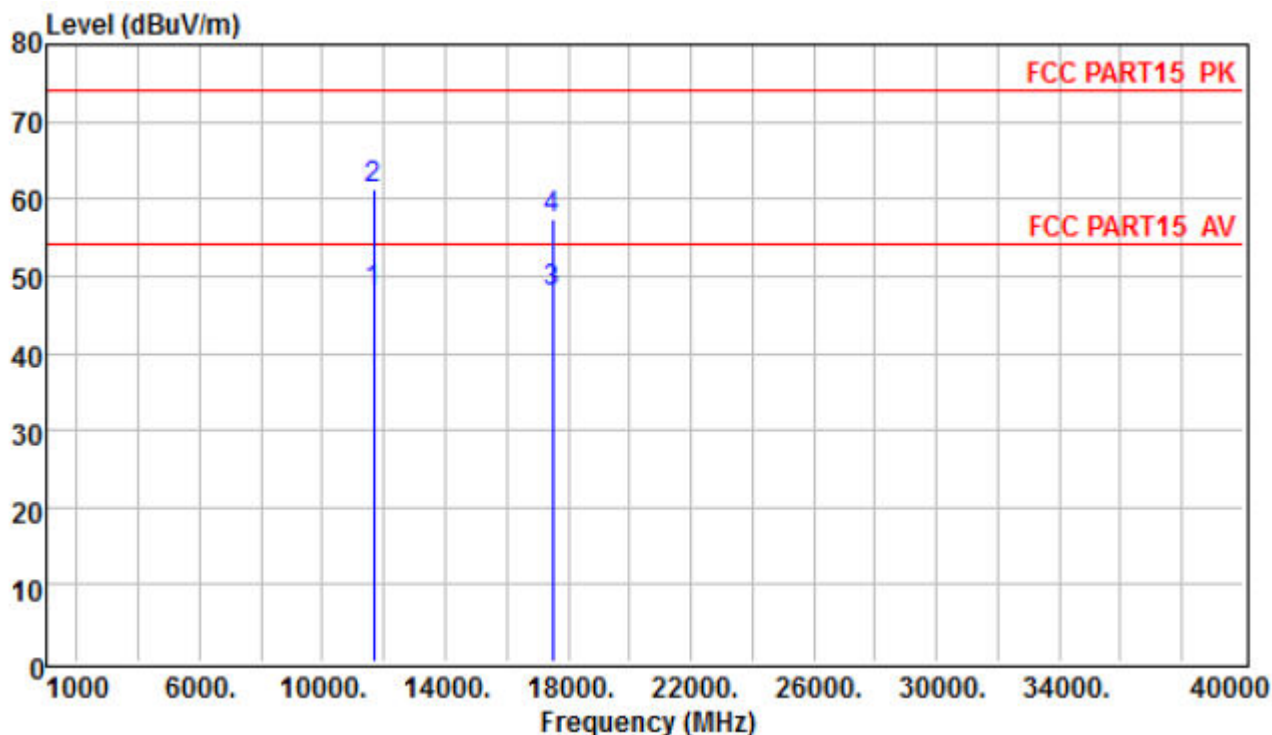
Horizontal



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11570.000	30.76	25.83	17.28	28.96	44.91	54.00	-9.09 Average
2	11570.000	44.87	25.83	17.28	28.96	59.02	74.00	-14.98 Peak
3	17355.000	29.86	25.16	21.66	30.24	46.44	54.00	-7.56 Average
4	17355.000	37.64	25.16	21.66	30.24	54.22	74.00	-19.78 Peak

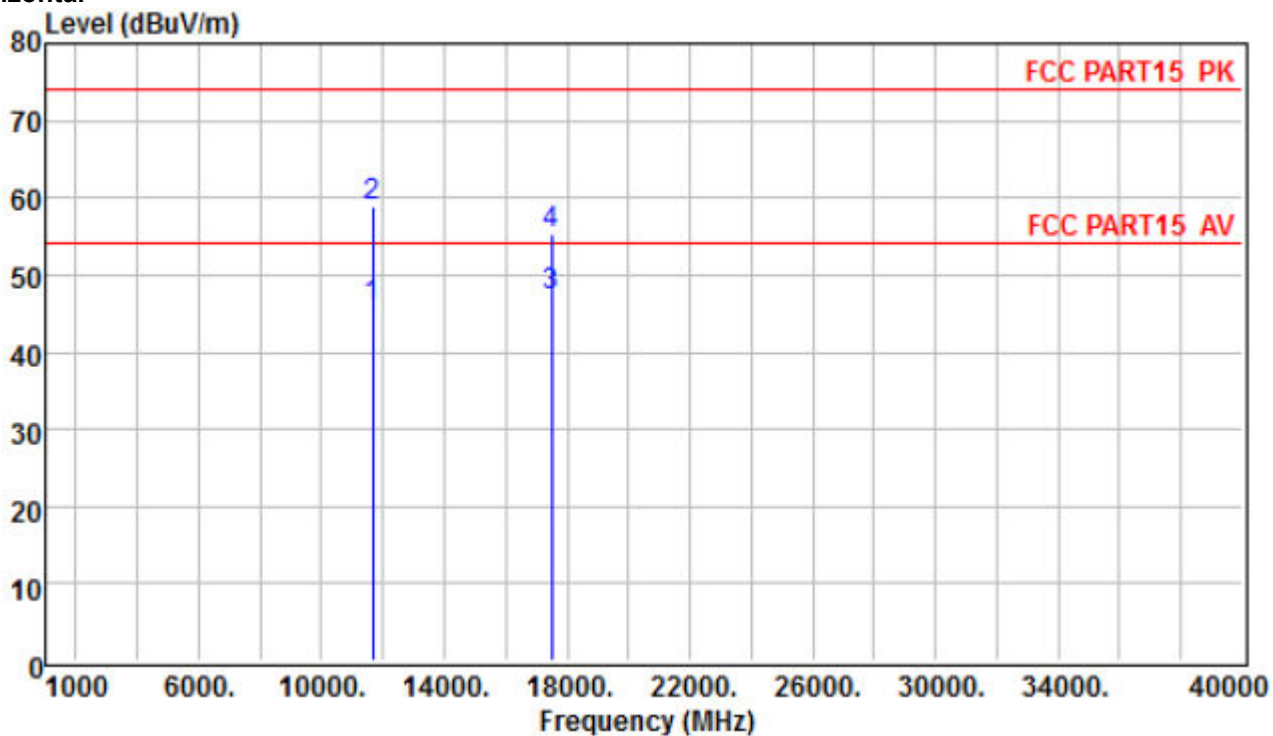
EUT :	750M Wi-Fi Range Extender Repeater	Model Name :	U28
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	802.11a-5825
Test Voltage :	AC 120V/60Hz		

Vertical



	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11650.000	33.75	25.76	17.30	28.96	47.85	54.00	-6.15 Average
2	11650.000	47.08	25.76	17.30	28.96	61.18	74.00	-12.82 Peak
3	17475.000	30.08	26.35	21.77	30.29	47.91	54.00	-6.09 Average
4	17475.000	39.55	26.35	21.77	30.29	57.38	74.00	-16.62 Peak

Horizontal



	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	11650.000	31.66	25.76	17.30	28.96	45.76	54.00	-8.24 Average
2	11650.000	44.77	25.76	17.30	28.96	58.87	74.00	-15.13 Peak
3	17475.000	29.56	26.35	21.77	30.29	47.39	54.00	-6.61 Average
4	17475.000	37.56	26.35	21.77	30.29	55.39	74.00	-18.61 Peak

Note: "802.11a" mode is the worst mode.

Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor,

Over Limit= Absolute Level – Limit

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.



## 5. BAND EDGE COMPLIANCE TEST

### 5.1 Limits

all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. For the band 5725-5825 MHz , All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

### 5.2 Test setup

Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

Same as Clause 4.2.

### 5.3 Test Data

Please see data as below:

Note: we pretest horizontal and vertical, the worst was vertical and show in the report.

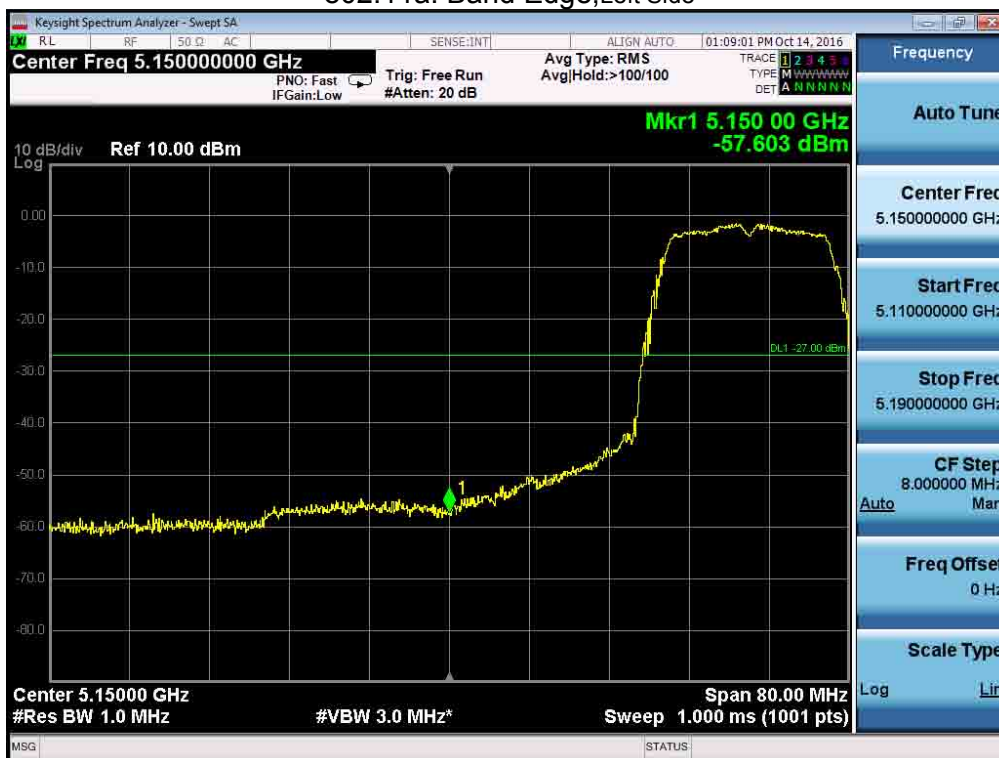
Frequency	Meter Reading	antenna Factor	cable loss	preamp factor	Emission Level	EIRP	Limit	Result
(MHz)	(dB $\mu$ V)	(dB)	(dB)	(dB)	(dB $\mu$ V/m)	[dBm]	[dBm]	
802.11a								
5180	34.65	28.66	12.93	27.62	48.62	-46.58	-27.00	Pass
5240	34.13	28.73	13.09	27.62	48.33	-46.87	-27.00	Pass
5650	32.23	28.44	14.64	27.67	47.64	-47.56	-27.00	Pass
5700	33.12	28.52	14.95	27.67	48.92	-46.28	10.00	Pass
5720	33.43	27.59	15.05	27.67	48.4	-46.8	15.60	Pass
5725	37.24	27.63	15.16	27.67	52.36	-42.84	27.00	Pass
5850	38.24	27.86	15.75	27.68	54.17	-41.03	27.00	Pass
5855	34.53	26.9	15.84	27.69	49.58	-45.62	15.60	Pass
5875	32.23	26.93	15.93	27.69	47.4	-47.80	10.00	Pass
5925	31.22	27.05	16.15	27.69	46.73	-48.47	-27.00	Pass
802.11n(HT20)								
5180	34.43	28.66	12.93	27.62	48.4	-46.8	-27.00	Pass
5240	34.65	28.73	13.09	27.62	48.85	-46.35	-27.00	Pass
5650	32.24	28.44	14.64	27.67	47.65	-47.55	32.24	Pass
5700	33.53	28.52	14.95	27.67	49.33	-45.87	33.53	Pass
5720	33.21	27.59	15.05	27.67	48.18	-47.02	33.21	Pass
5725	38.35	27.63	15.16	27.67	53.47	-41.73	38.35	Pass
5850	39.23	27.86	15.75	27.68	55.16	-40.04	39.23	Pass
5855	34.34	26.9	15.84	27.69	49.39	-45.81	34.34	Pass
5875	32.54	26.93	15.93	27.69	47.71	-47.49	32.54	Pass
5925	31.35	27.05	16.15	27.69	46.86	-48.34	31.35	Pass
802.11n(HT40)								
5180	34.12	28.66	12.93	27.62	48.09	-47.11	-27.00	Pass
5240	34.42	28.73	13.09	27.62	48.62	-46.58	-27.00	Pass
5650	32.27	28.44	14.64	27.67	47.68	-47.52	-27.00	Pass
5700	33.46	28.52	14.95	27.67	49.26	-45.94	10.00	Pass
5720	33.26	27.59	15.05	27.67	48.23	-46.97	15.60	Pass
5725	38.87	27.63	15.16	27.67	53.99	-41.21	27.00	Pass
5850	39.56	27.86	15.75	27.68	55.49	-39.71	27.00	Pass
5855	34.39	26.9	15.84	27.69	49.44	-45.76	15.60	Pass
5875	32.76	26.93	15.93	27.69	47.93	-47.27	10.00	Pass
5925	31.34	27.05	16.15	27.69	46.85	-48.35	-27.00	Pass
802.11ac(VHT20)								
5180	33.34	28.66	12.93	27.62	47.31	-47.89	-27.00	Pass
5240	33.35	28.73	13.09	27.62	47.55	-47.65	-27.00	Pass
5650	32.35	28.44	14.64	27.67	47.76	-47.44	-27.00	Pass
5700	33.53	28.52	14.95	27.67	49.33	-45.87	10.00	Pass
5720	33.26	27.59	15.05	27.67	48.23	-46.97	15.60	Pass
5725	38.57	27.63	15.16	27.67	53.69	-41.51	27.00	Pass
5850	39.56	27.86	15.75	27.68	55.49	-39.71	27.00	Pass
5855	34.44	26.9	15.84	27.69	49.49	-45.71	15.60	Pass
5875	32.35	26.93	15.93	27.69	47.52	-47.68	10.00	Pass
5925	31.76	27.05	16.15	27.69	47.27	-47.93	-27.00	Pass
802.11ac(VHT40)								

5180	33.76	28.66	12.93	27.62	47.73	-47.47	-27.00	Pass
5240	33.45	28.73	13.09	27.62	47.65	-47.55	-27.00	Pass
5650	32.38	28.44	14.64	27.67	47.79	-47.41	-27.00	Pass
5700	33.56	28.52	14.95	27.67	49.36	-45.84	10.00	Pass
5720	33.53	27.59	15.05	27.67	48.5	-46.7	15.60	Pass
5725	38.54	27.63	15.16	27.67	53.66	-41.54	27.00	Pass
5850	39.58	27.86	15.75	27.68	55.51	-39.69	27.00	Pass
5855	34.49	26.9	15.84	27.69	49.54	-45.66	15.60	Pass
5875	32.34	26.93	15.93	27.69	47.51	-47.69	10.00	Pass
5925	31.63	27.05	16.15	27.69	47.14	-48.06	-27.00	Pass
802.11ac(VHT80)								
5180	33.54	28.66	12.93	27.62	47.51	-47.69	-27.00	Pass
5240	33.11	28.73	13.09	27.62	47.31	-47.89	-27.00	Pass
5650	32.75	28.44	14.64	27.67	48.16	-47.04	-27.00	Pass
5700	33.43	28.52	14.95	27.67	49.23	-45.97	10.00	Pass
5720	33.56	27.59	15.05	27.67	48.53	-46.67	15.60	Pass
5725	38.36	27.63	15.16	27.67	53.48	-41.72	27.00	Pass
5850	39.43	27.86	15.75	27.68	55.36	-39.84	27.00	Pass
5855	34.46	26.9	15.84	27.69	49.51	-45.69	15.60	Pass
5875	32.46	26.93	15.93	27.69	47.63	-47.57	10.00	Pass
5925	31.54	27.05	16.15	27.69	47.05	-48.15	-27.00	Pass

Remark: 1. According to KDB 789033 D02 section H) d) (iii), for measurement above 1000MHz@3m distance, the limit of EIRP is calculated as follows:  $EIRP[dBm] = E[dB\mu V/m] - 95.2$

For conducted test:  
5.2G

802.11a: Band Edge, Left Side

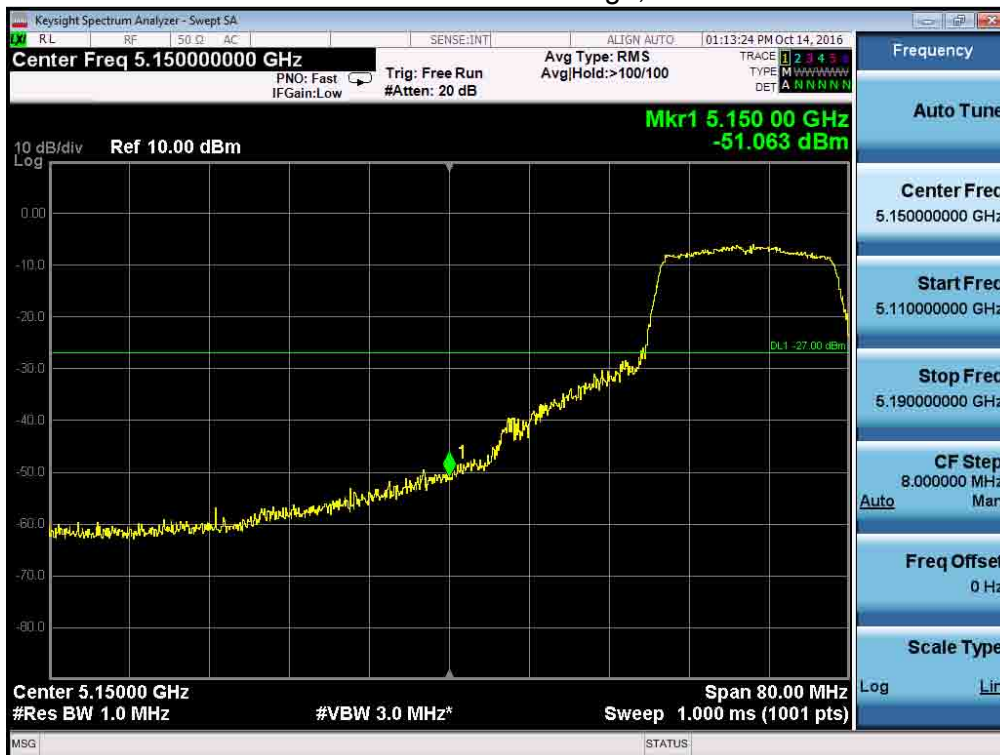


802.11a: Band Edge, Right Side

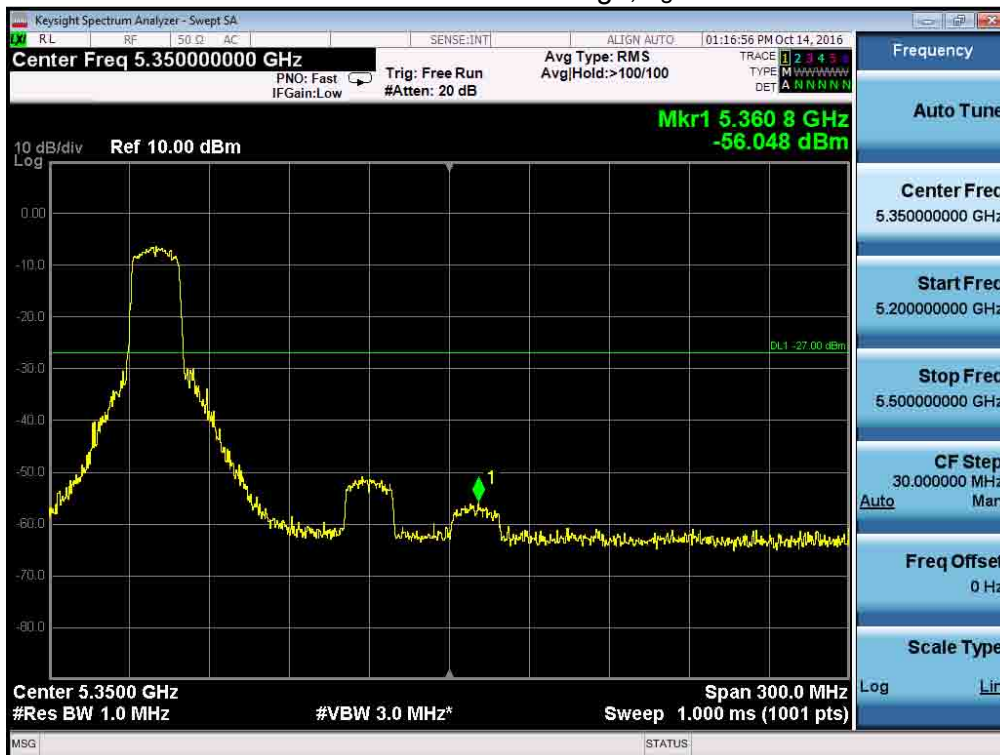


Note: EIRP BAND EDGE=Reading Level+antenna gain

802.11n (20) : Band Edge, Left Side

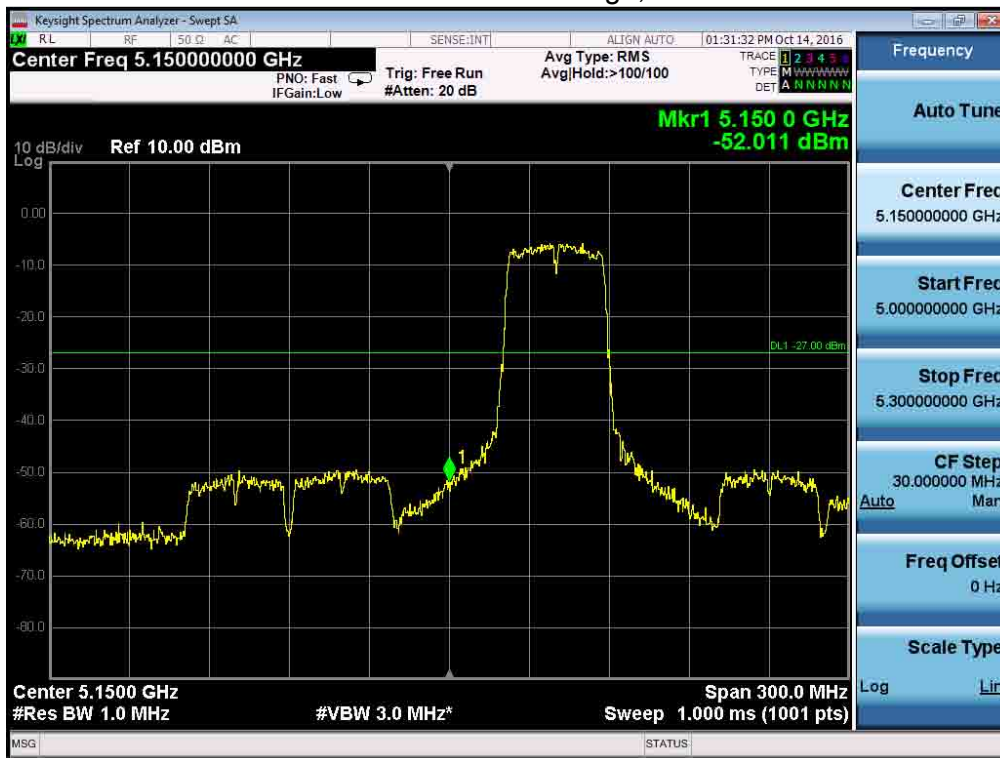


802.11n (20) : Band Edge, Right Side

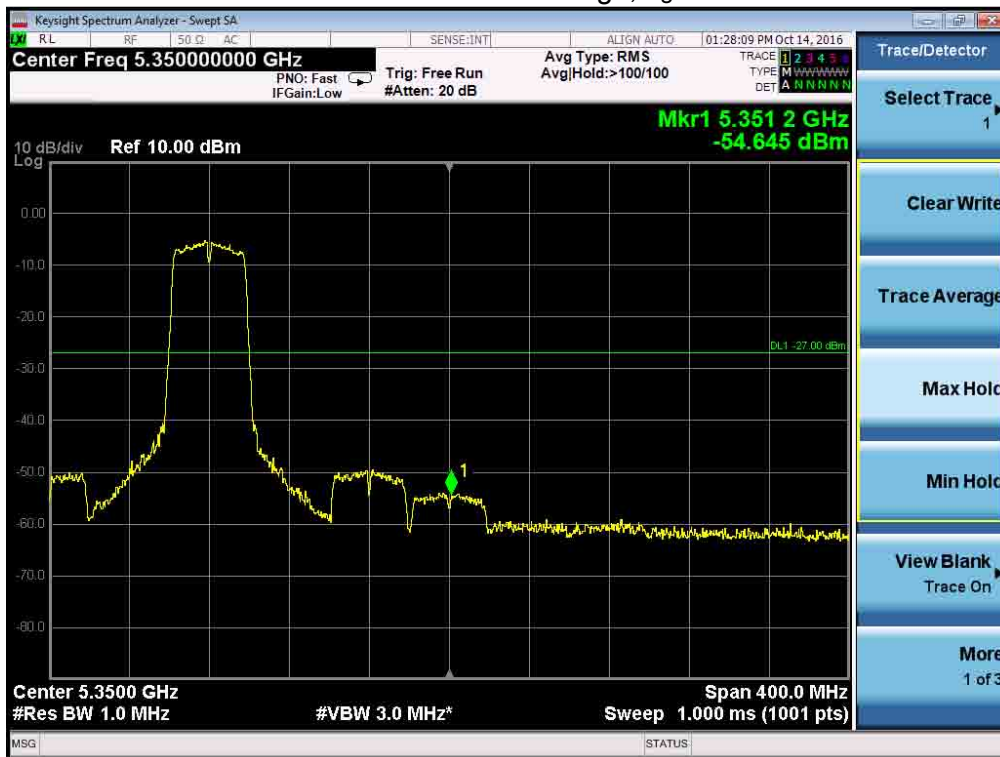


Note: EIRP BAND EDGE=Reading Level+antenna gain

802.11n (40) : Band Edge, Left Side

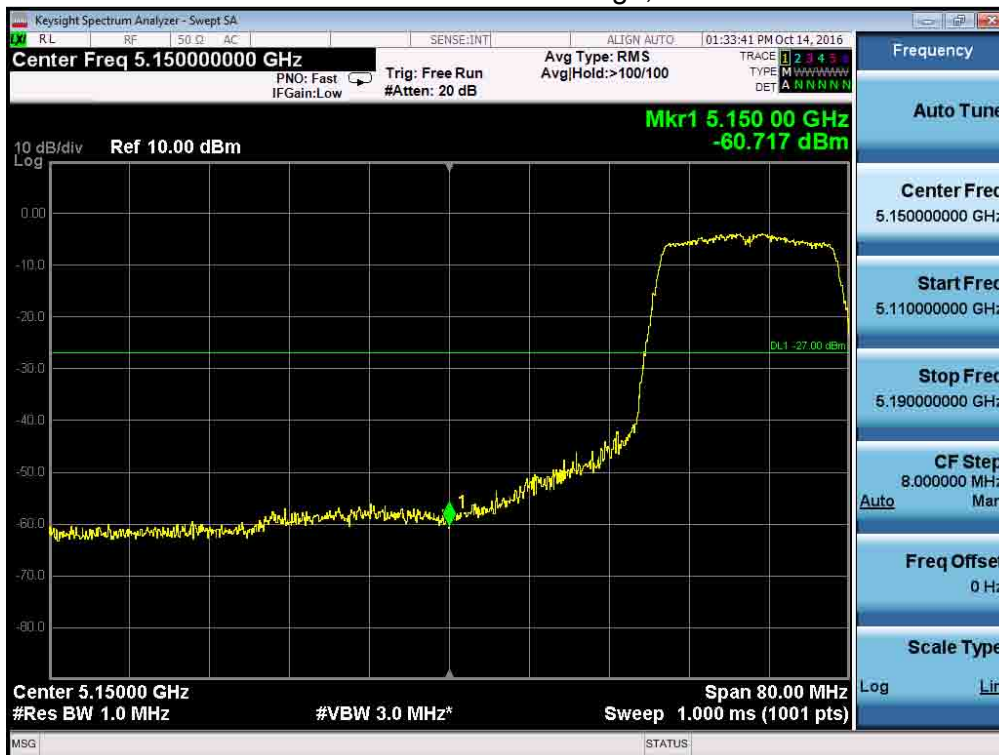


802.11n (40) : Band Edge, Right Side

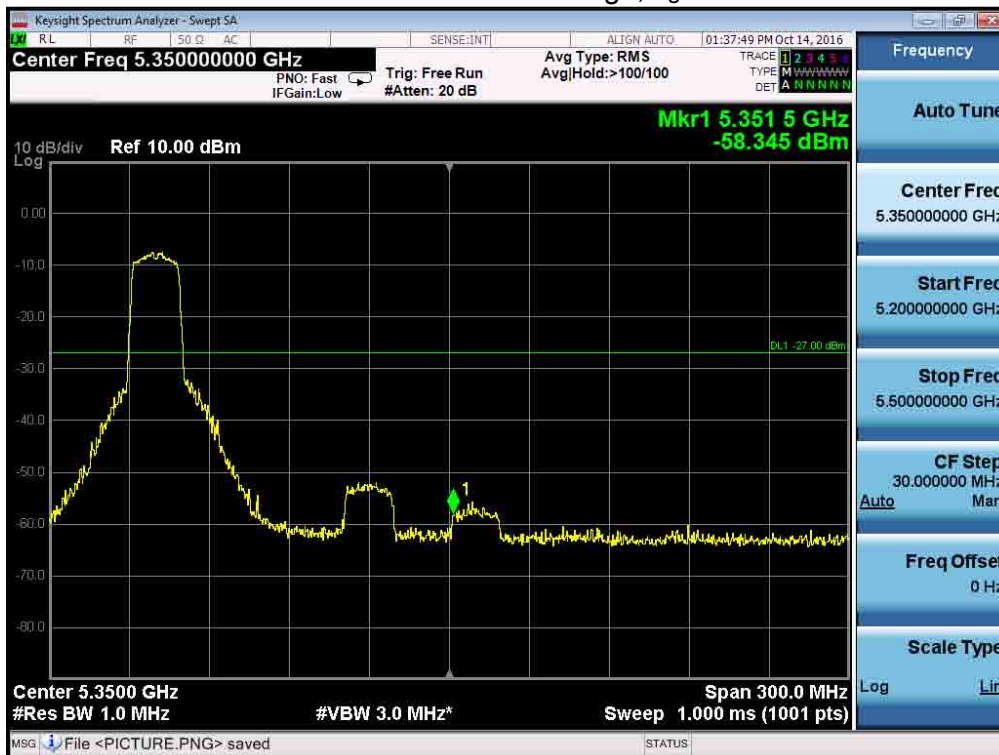


Note: EIRP BAND EDGE=Reading Level+antenna gain

802.11ac (20) : Band Edge,Left Side

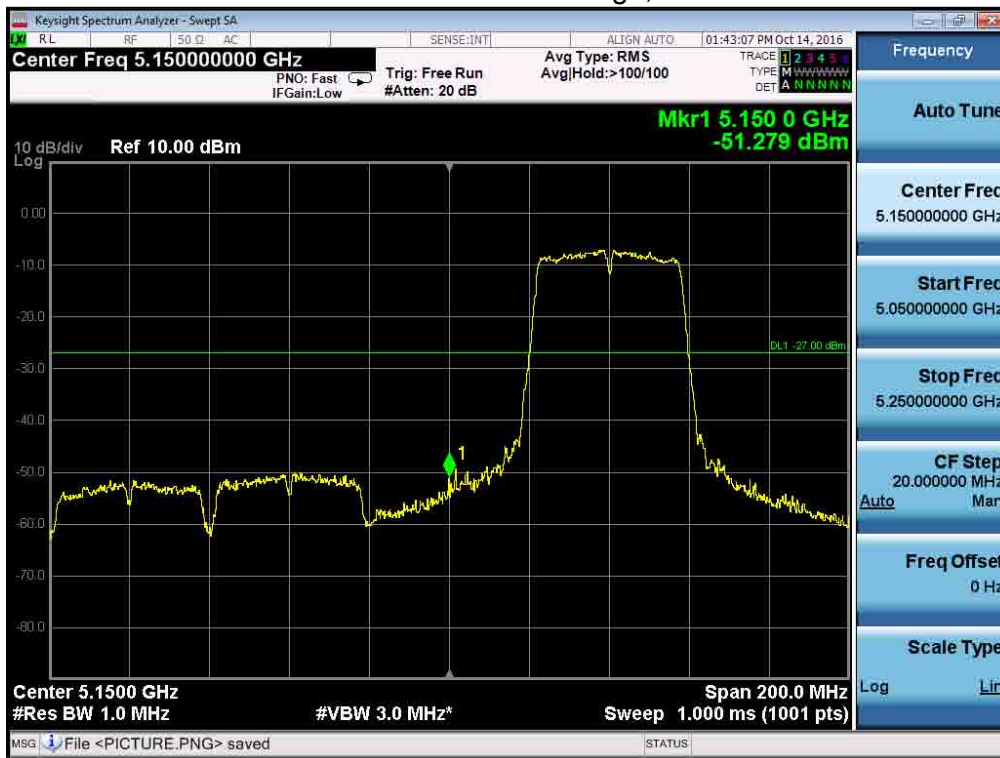


802.11ac (20) : Band Edge,Right Side

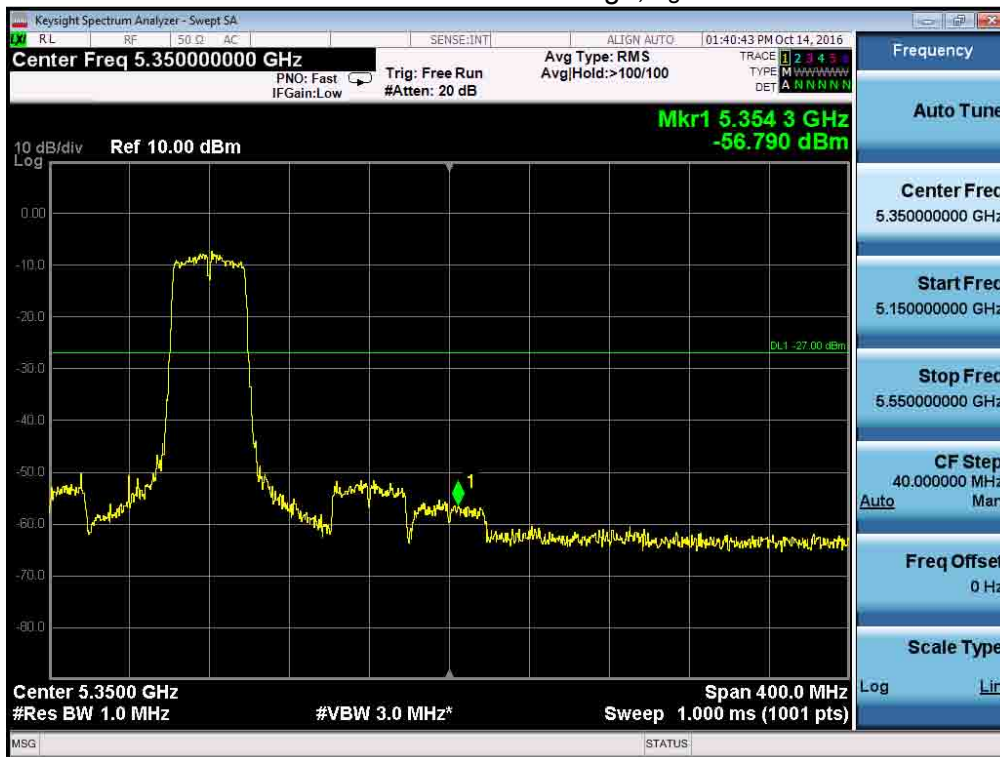


Note: EIRP BAND EDGE=Reading Level+antenna gain

802.11ac (40) : Band Edge,Left Side



802.11ac (40) : Band Edge,Right Side



Note: EIRP BAND EDGE=Reading Level+antenna gain



802.11ac (80) : Band Edge,Left Side



802.11ac (80) : Band Edge,Right Side



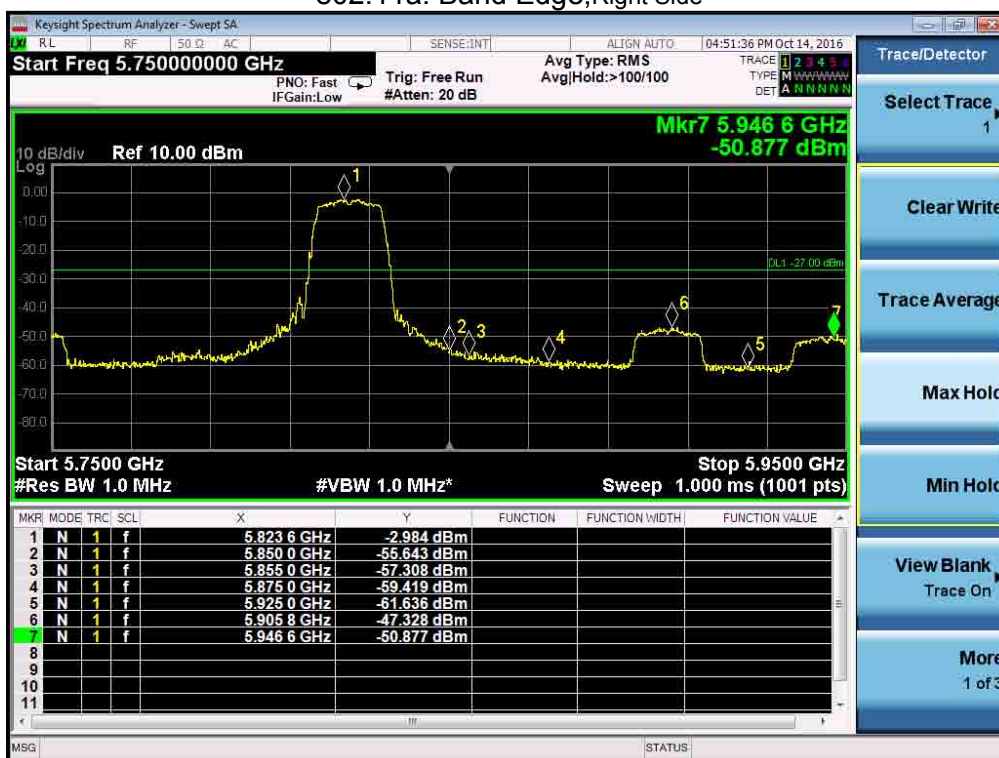
Note: EIRP BAND EDGE=Reading Level+antenna gain

5.8G

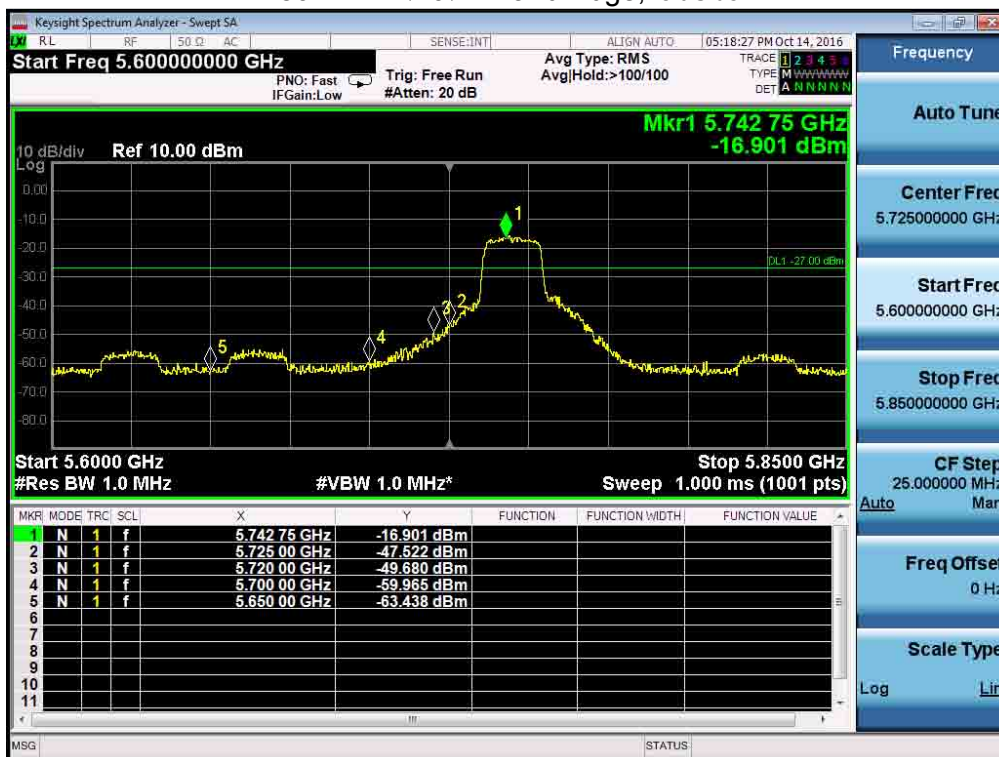
802.11a: Band Edge, Left Side



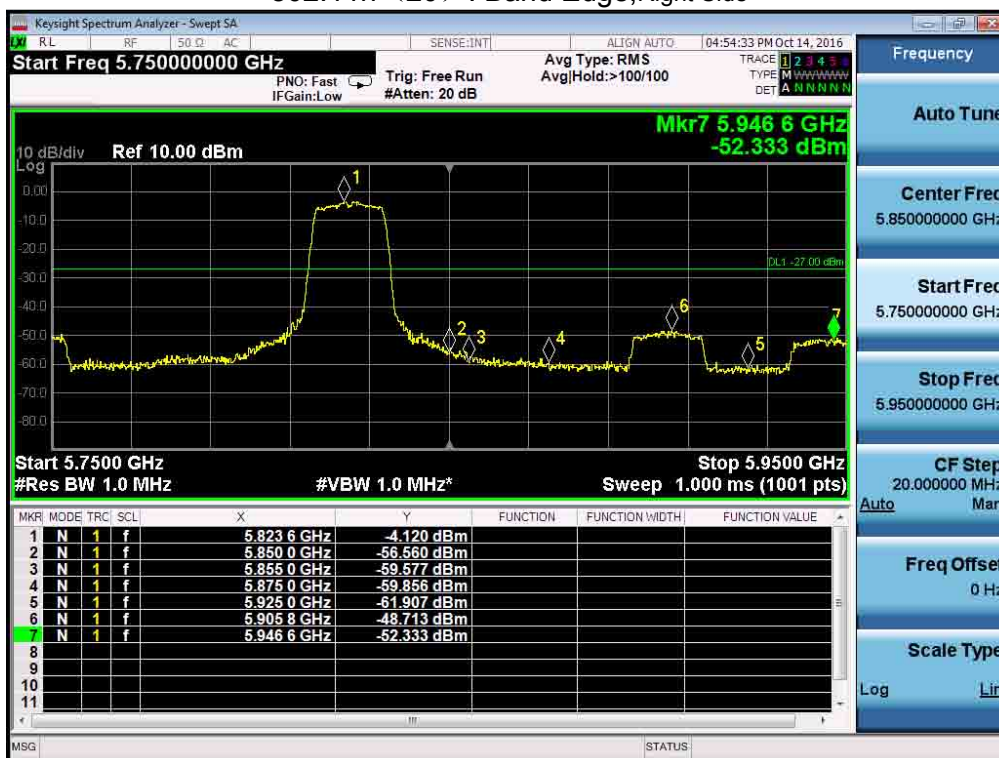
802.11a: Band Edge, Right Side



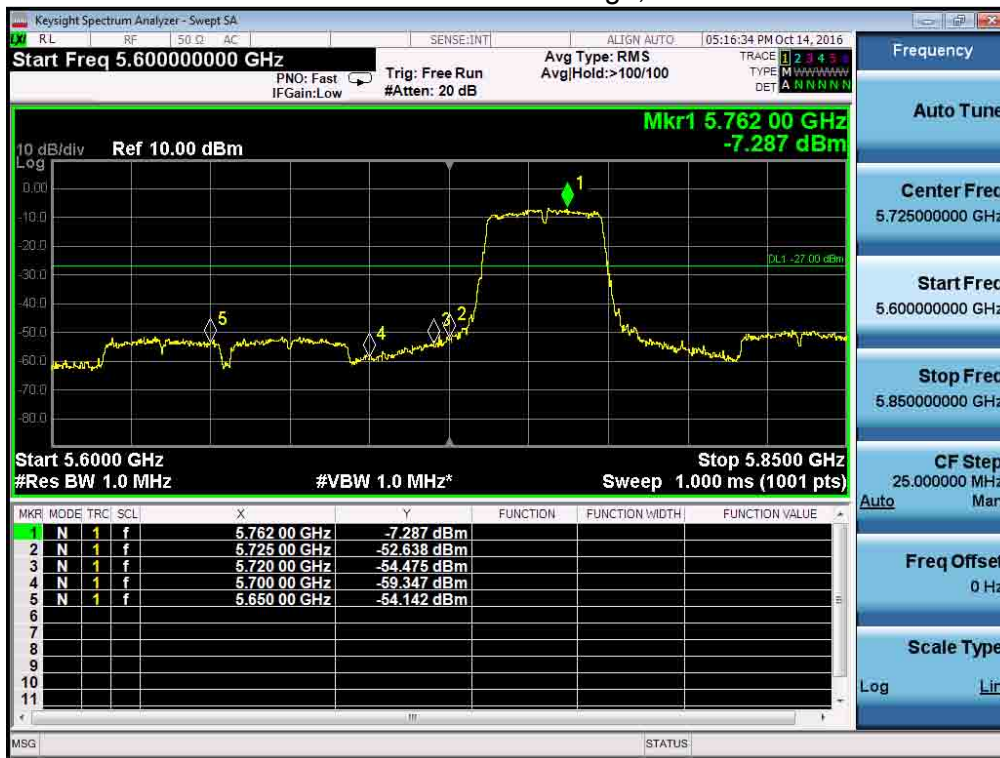
802.11n (20) : Band Edge, Left Side



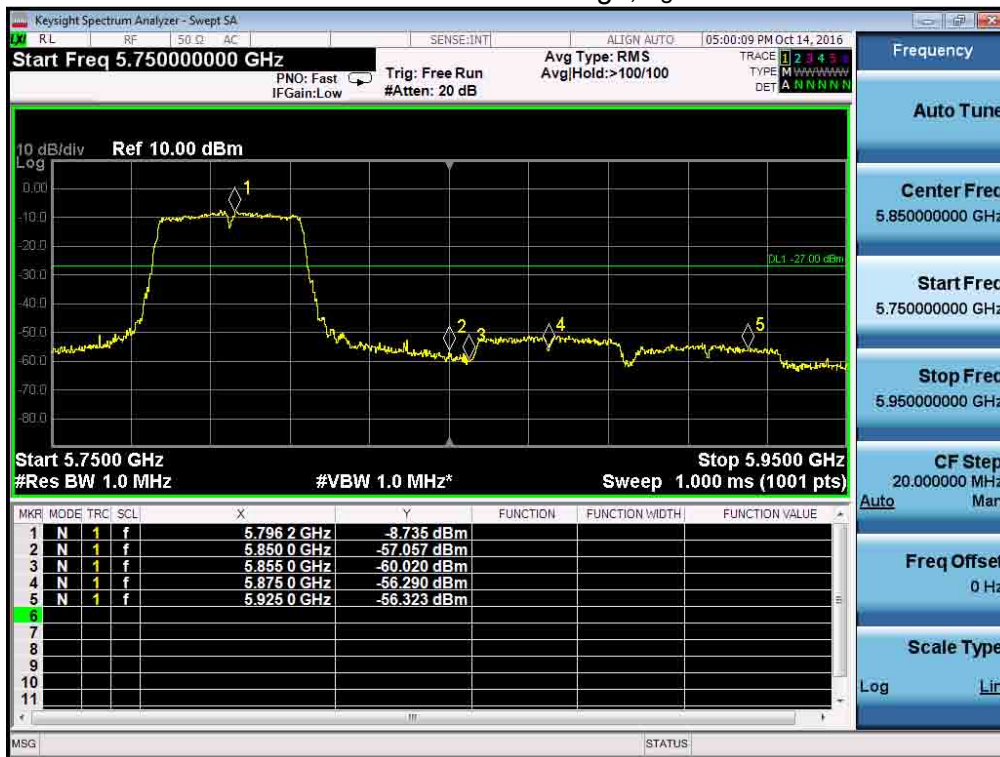
802.11n (20) : Band Edge, Right Side



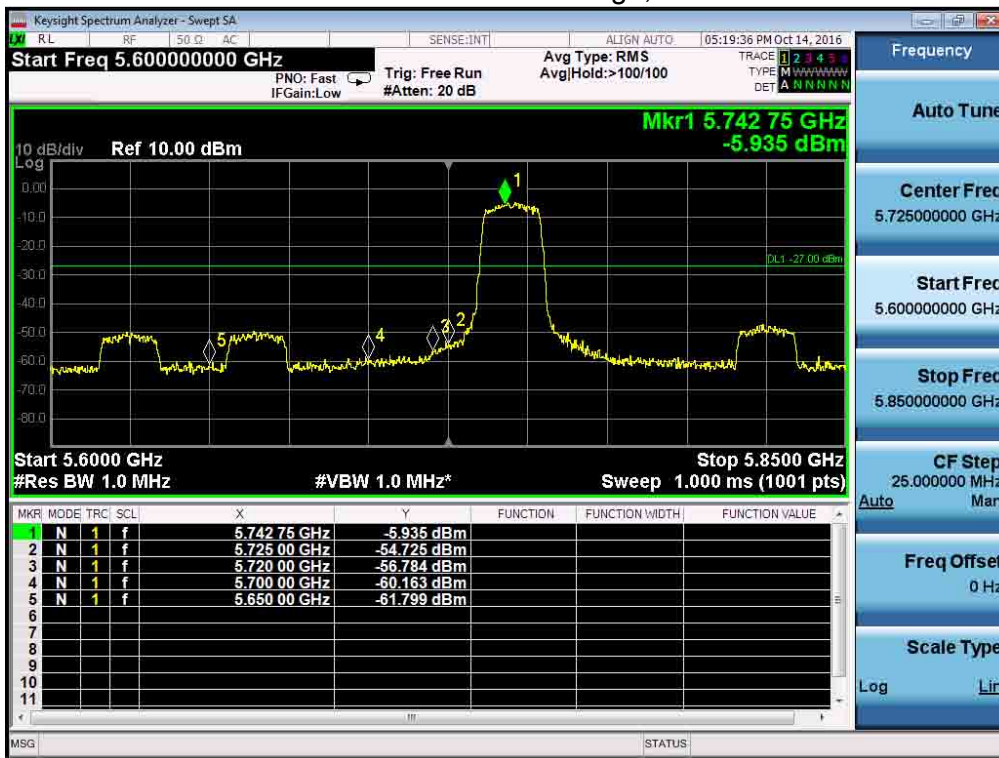
802.11n (40) : Band Edge, Left Side



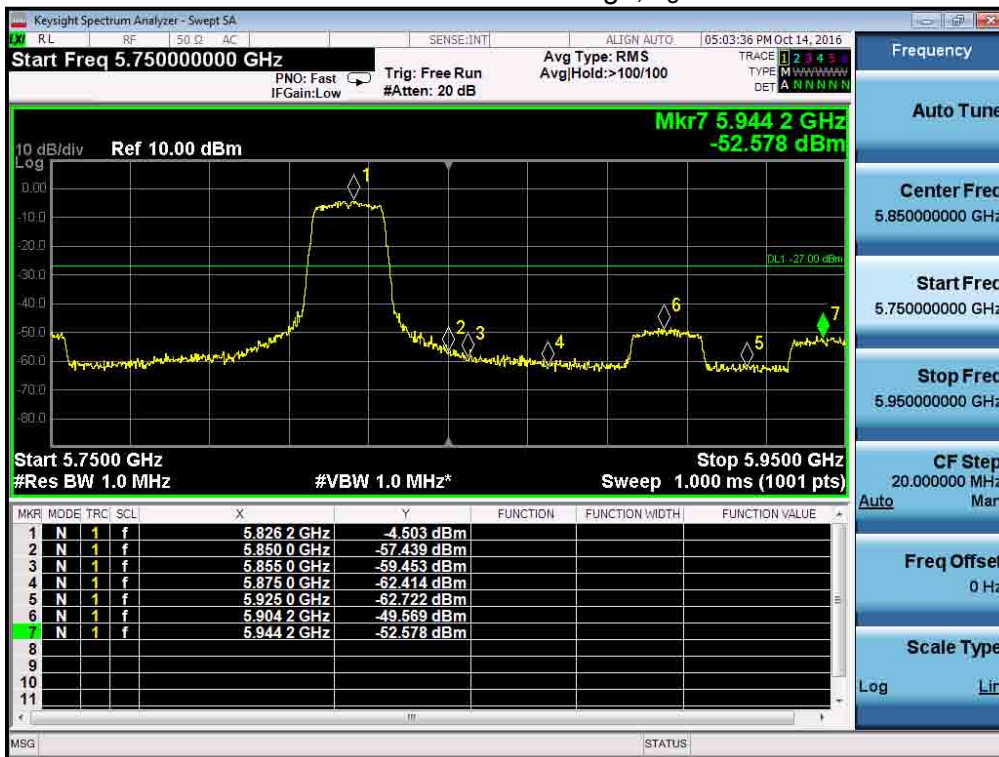
802.11n (40) : Band Edge, Right Side



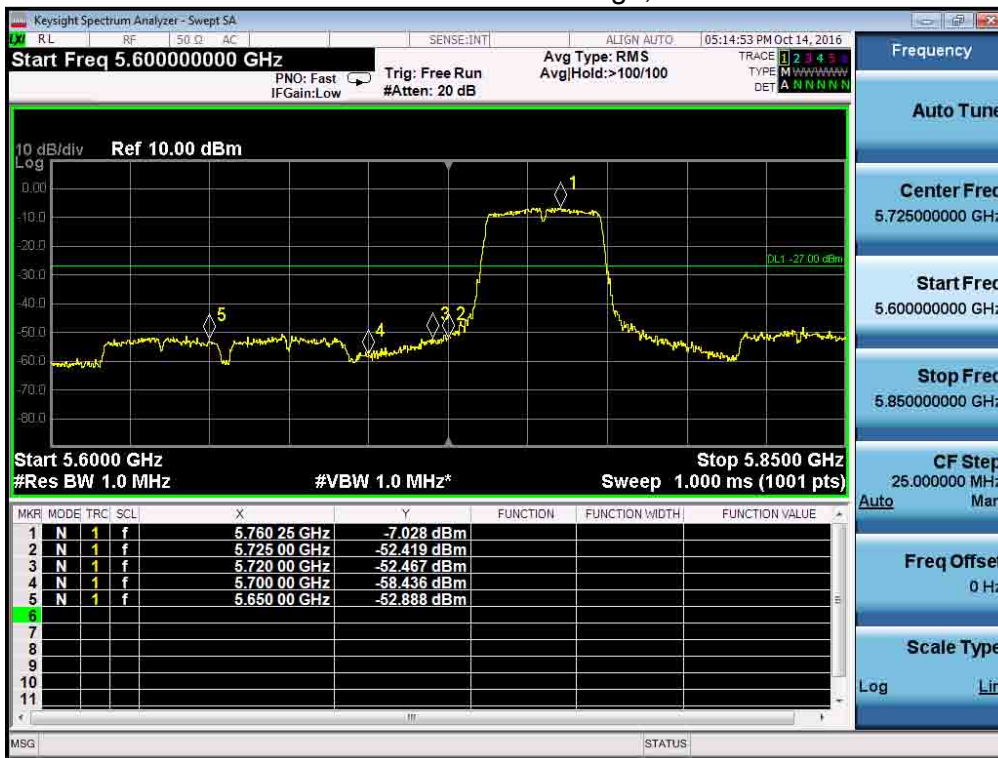
802.11ac (20) : Band Edge,Left Side



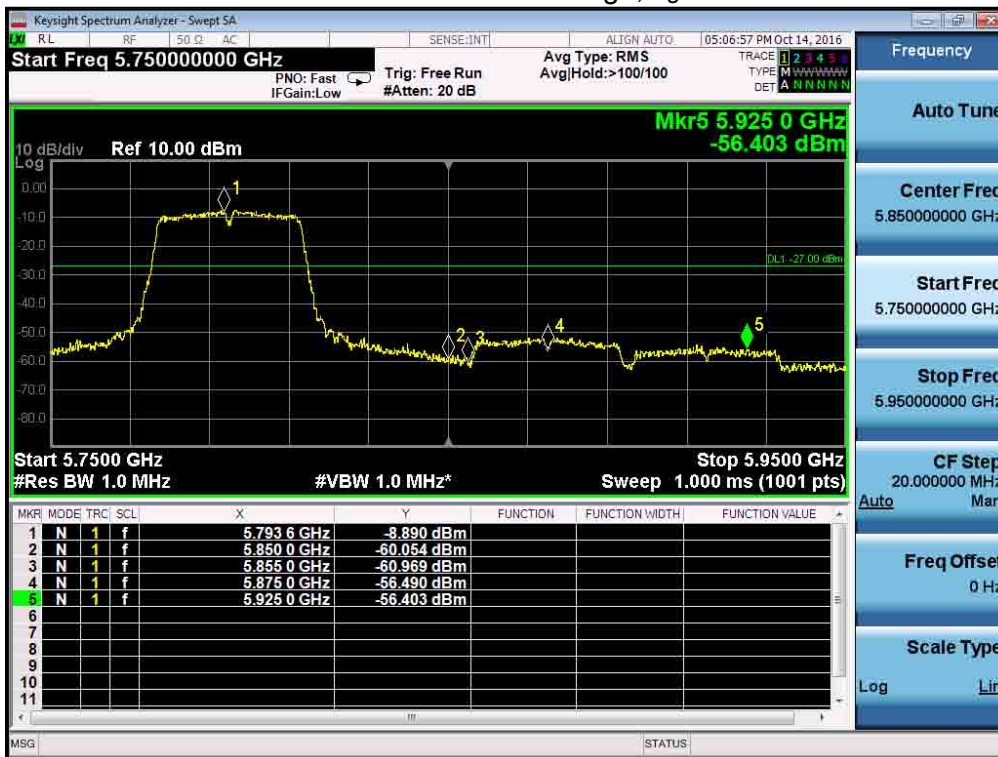
802.11ac (20) : Band Edge,Right Side



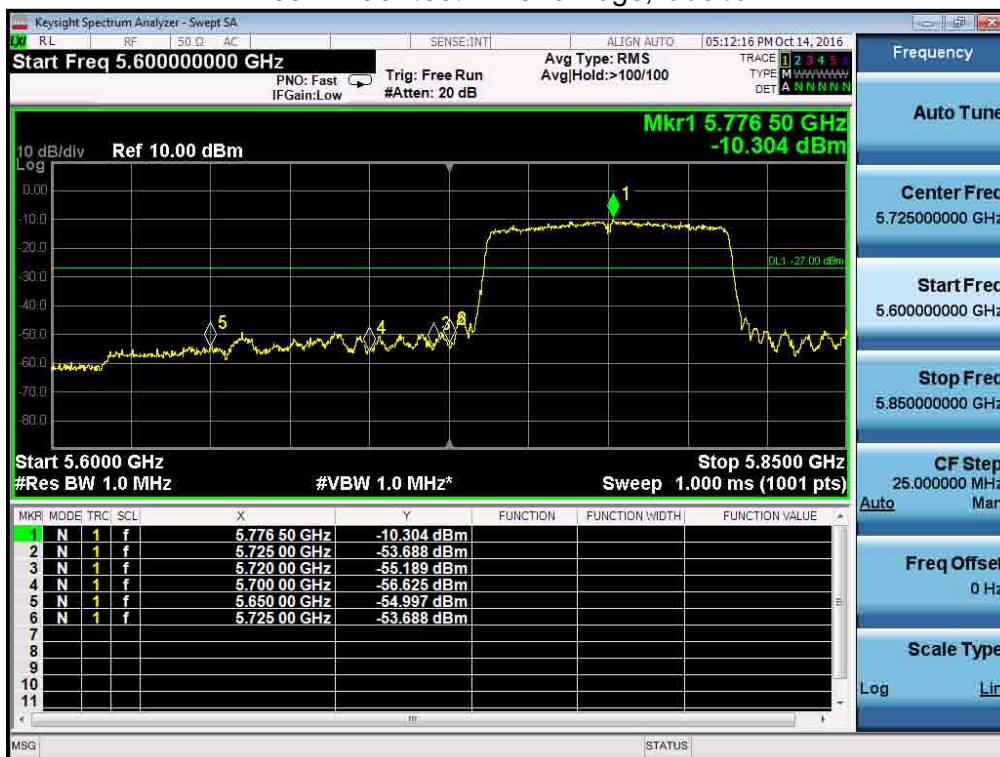
802.11ac (40) : Band Edge,Left Side



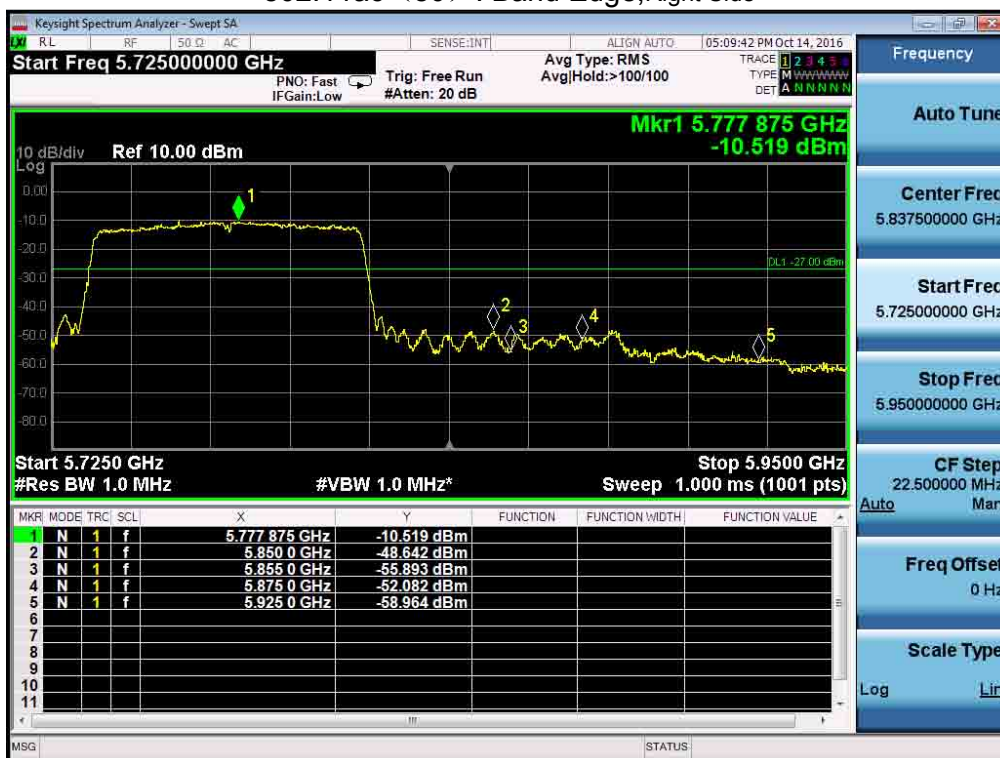
802.11ac (40) : Band Edge,Right Side



802.11ac (80) : Band Edge,Left Side



802.11ac (80) : Band Edge,Right Side



Note: EIRP BAND EDGE=Reading Level+antenna gain  
 For 5.8G bandedge,The frequency below 5725MHz and above 5850MHz, the level all below -27dbm/MHz, in 5725MHz- 5850MHz the level below 27dbm/MHz, so it comply 15.407b(4)i.

## 6. 26DB AND 6DB BANDWIDTH TEST

### 6.1 Applicable Standard

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

### 6.2 Test Procedure

#### 1. Emission Bandwidth (EBW)

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

#### 2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

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

### 6.3 Test setup



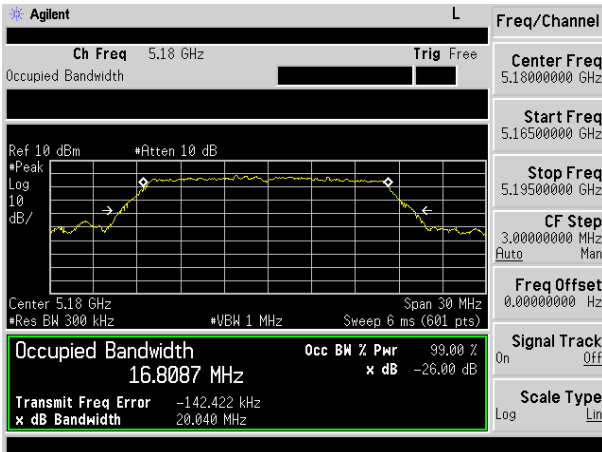


<b>Mode</b>	<b>Channel number</b>	<b>Frequency (MHz)</b>	<b>26dB Bandwidth (MHz)</b>
802.11a	36	5180	20.040
	40	5200	20.075
	48	5240	20.117
802.11n (HT20)	36	5180	20.285
	40	5200	20.286
	48	5240	20.326
802.11n (HT40)	38	5190	42.190
	46	5230	42.154
802.11ac (VHT20)	36	5180	20.161
	40	5200	20.156
	48	5240	20.190
802.11ac (VHT40)	38	5190	42.076
	46	5230	41.754
802.11ac (VHT80)	42	5210	82.523

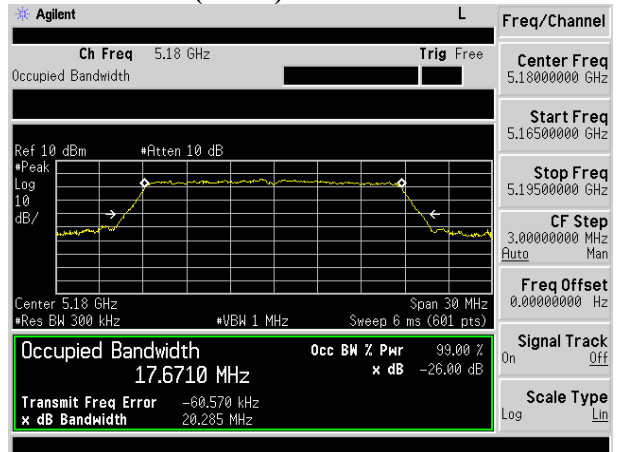
<b>Mode</b>	<b>Channel number</b>	<b>Frequency (MHz)</b>	<b>6dB Bandwidth (MHz)</b>	<b>Limit (MHz)</b>
802.11a	149	5745	16.419	0.5
	157	5785	16.482	0.5
	165	5825	16.445	0.5
802.11n (HT20)	149	5745	17.673	0.5
	157	5785	17.631	0.5
	165	5825	17.654	0.5
802.11n (HT40)	151	5755	36.346	0.5
	159	5795	36.116	0.5
802.11ac (VHT20)	149	5745	17.650	0.5
	157	5785	17.638	0.5
	165	5825	17.634	0.5
802.11ac (VHT40)	151	5755	36.357	0.5
	159	5795	36.061	0.5
802.11ac (VHT80)	155	5775	75.087	0.5

5150-5250 MHz:

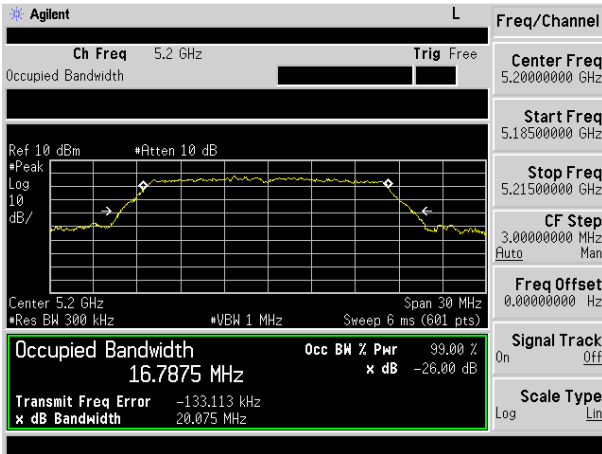
802.11a mode-ch36



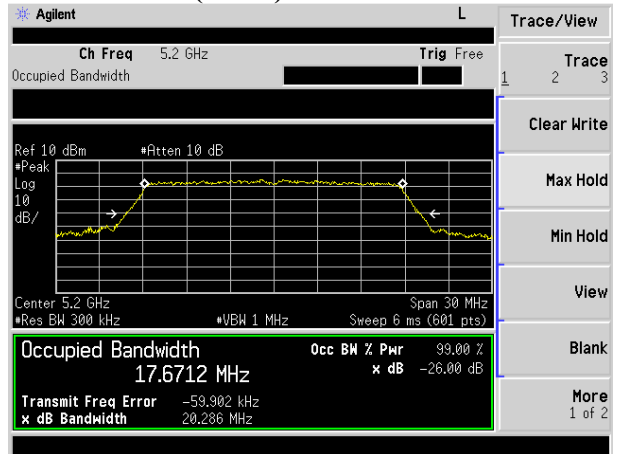
802.11n(HT20) mode-ch36



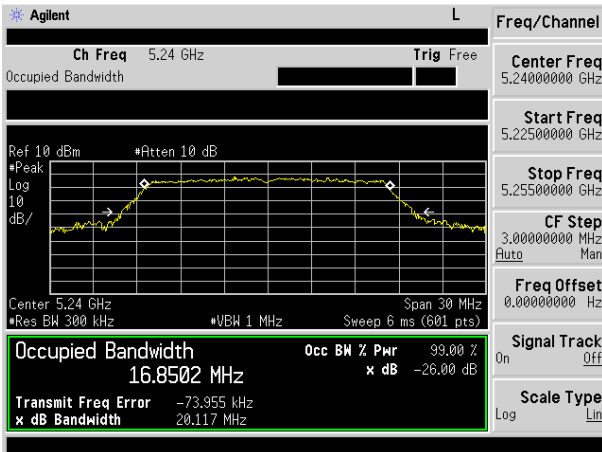
802.11a mode-ch40



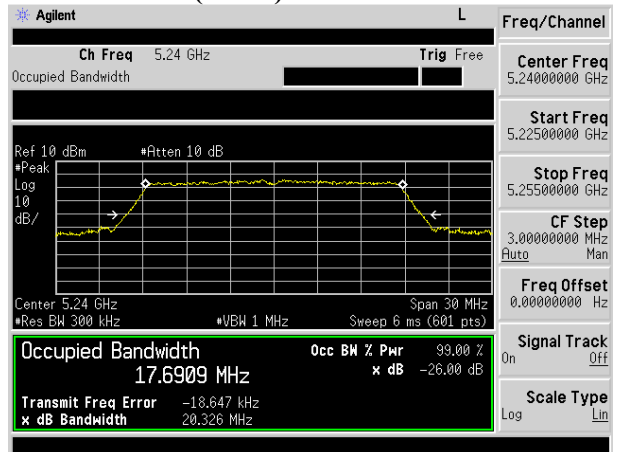
802.11n(HT20) mode-ch40



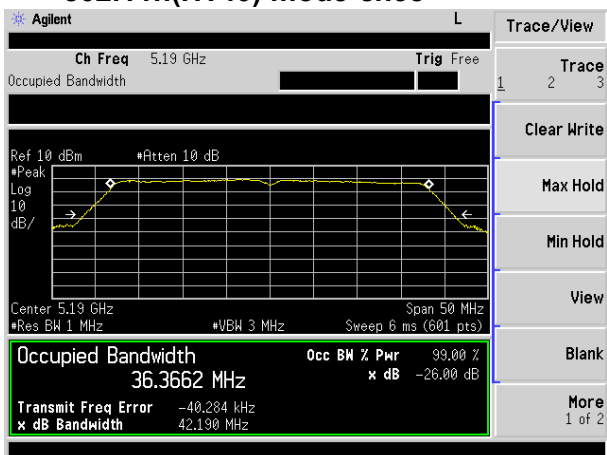
802.11a mode-ch48



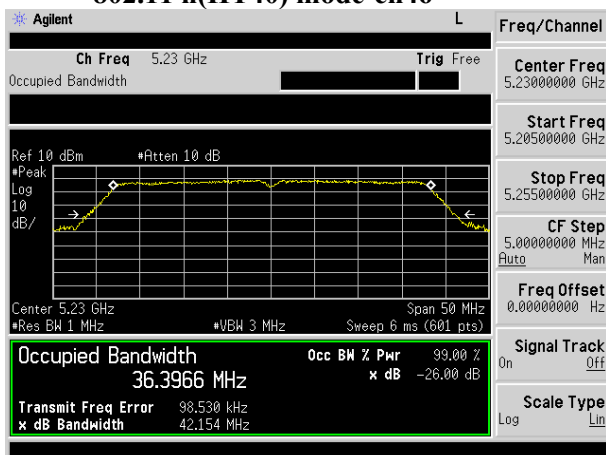
802.11n(HT20) mode-ch48



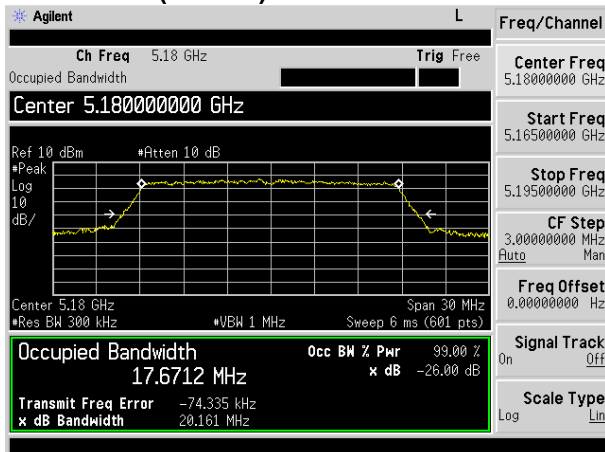
### 802.11n(HT40) mode-ch38



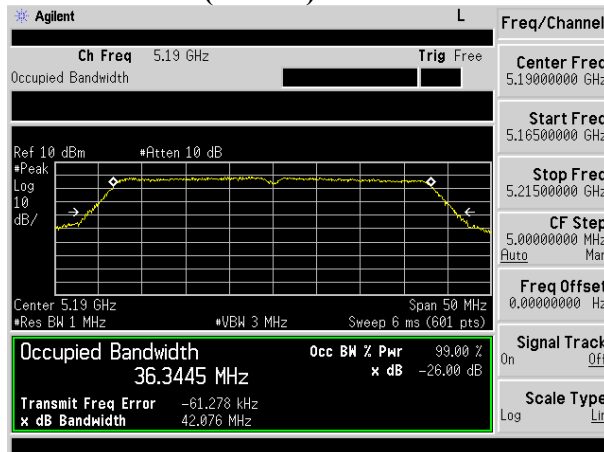
### 802.11 n(HT40) mode-ch46



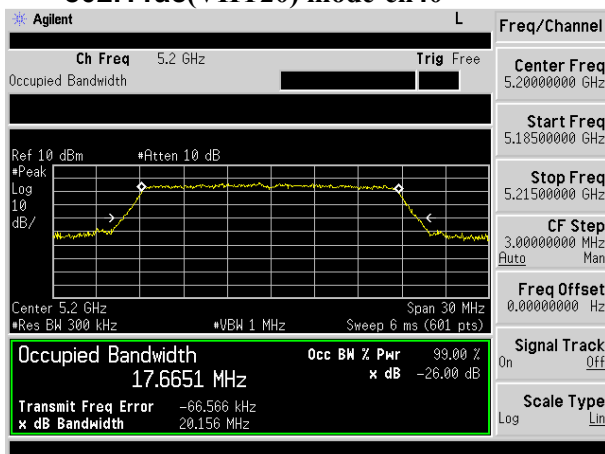
### 802.11ac(VHT20) mode-ch36



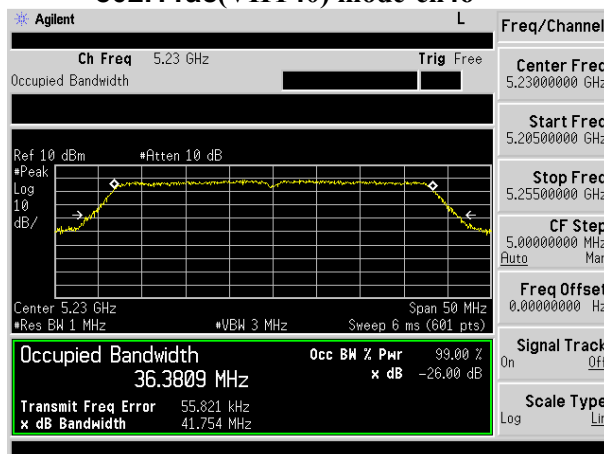
### 802.11ac(VHT40) mode-ch38



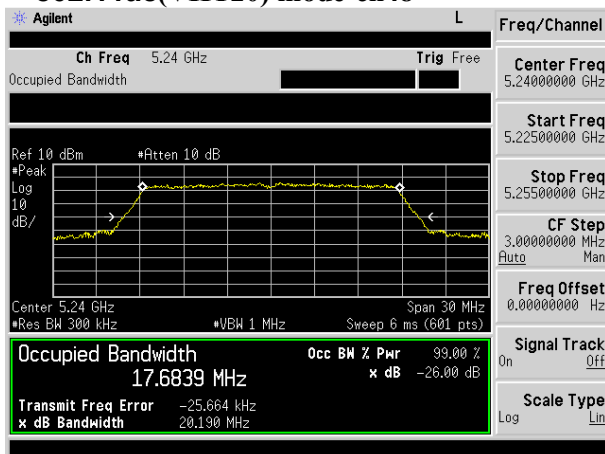
### 802.11ac(VHT20) mode-ch40



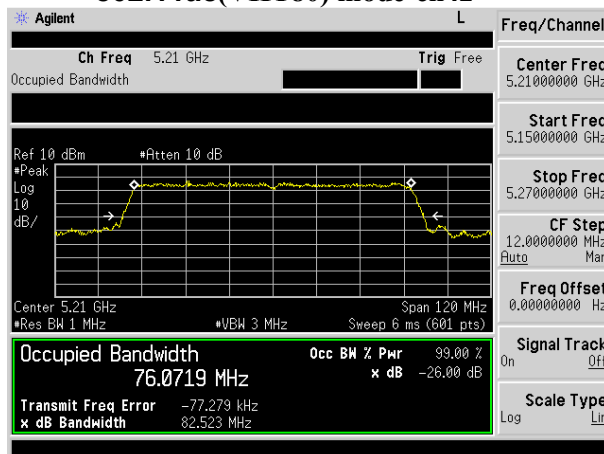
### 802.11ac(VHT40) mode-ch46



### 802.11ac(VHT20) mode-ch48

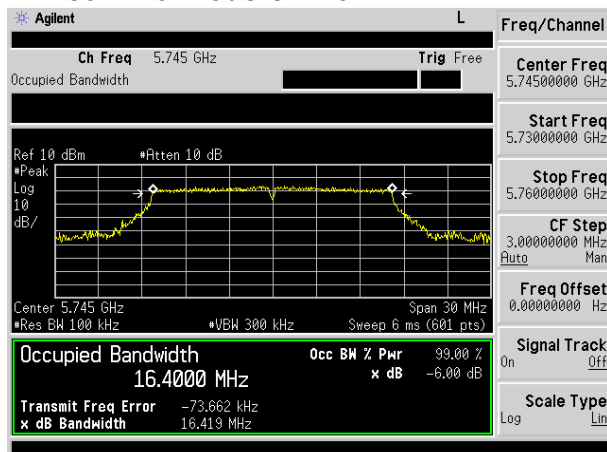


### 802.11ac(VHT80) mode-ch42

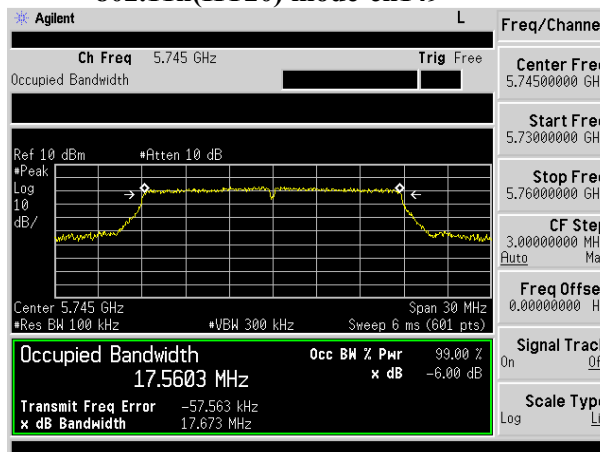


5725-5850MHz:

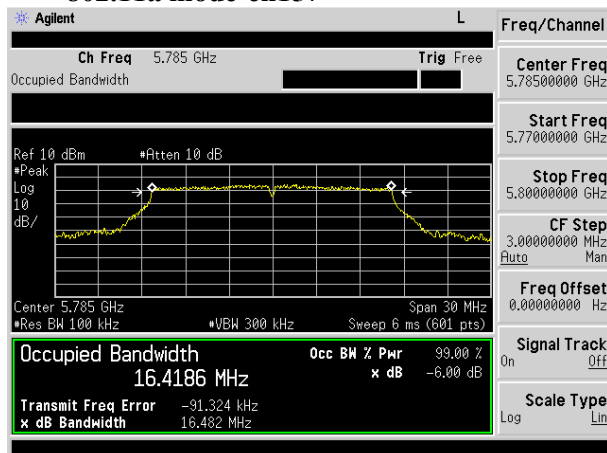
### 802.11a mode-ch149



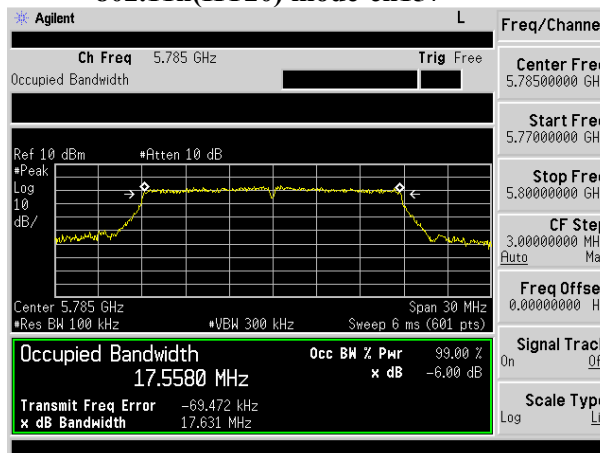
### 802.11n(HT20) mode-ch149



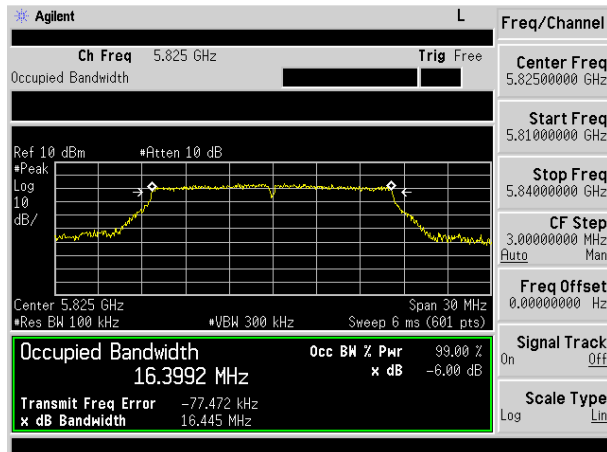
### 802.11a mode-ch157



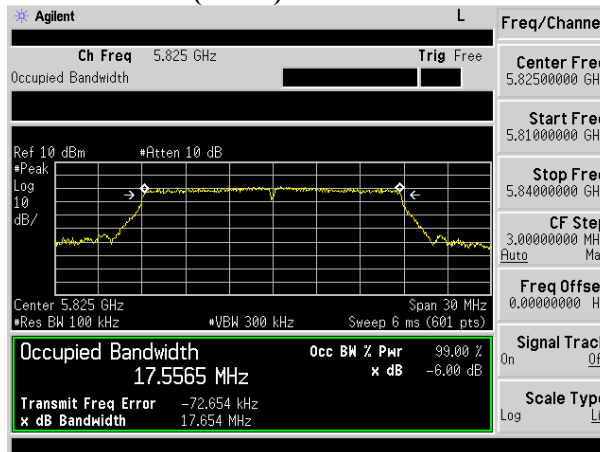
### 802.11n(HT20) mode-ch157



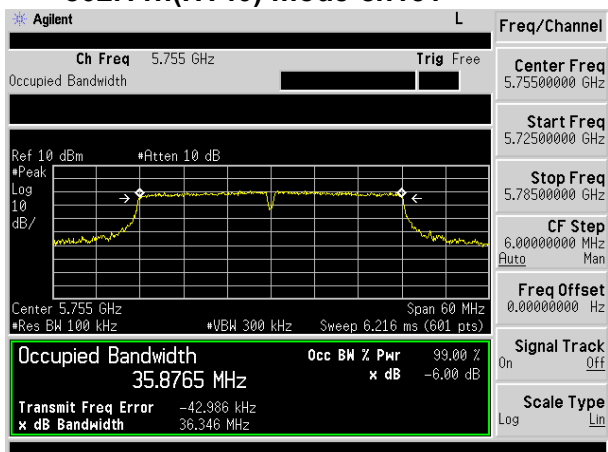
### 802.11a mode-ch165



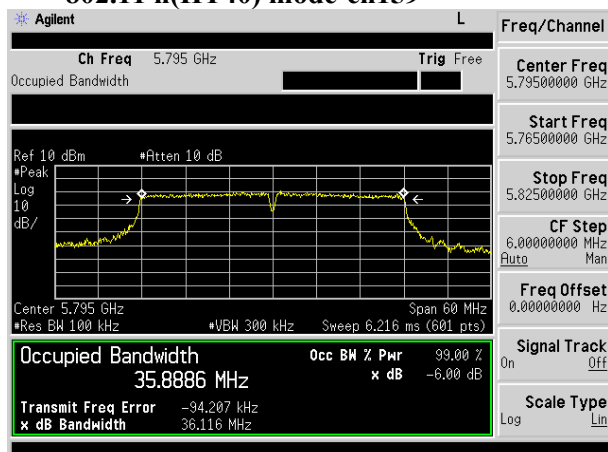
### 802.11n(HT20) mode-ch165



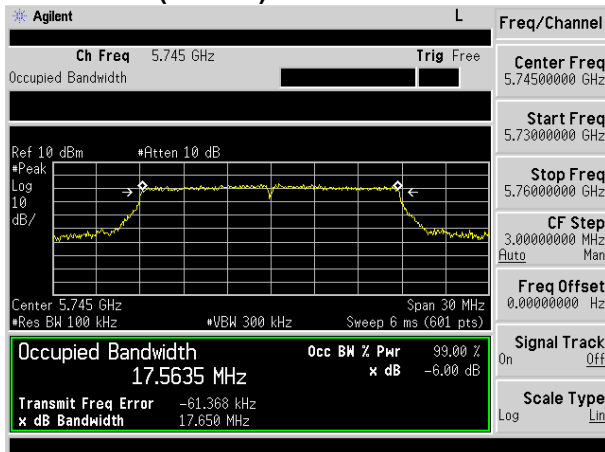
### 802.11n(HT40) mode-ch151



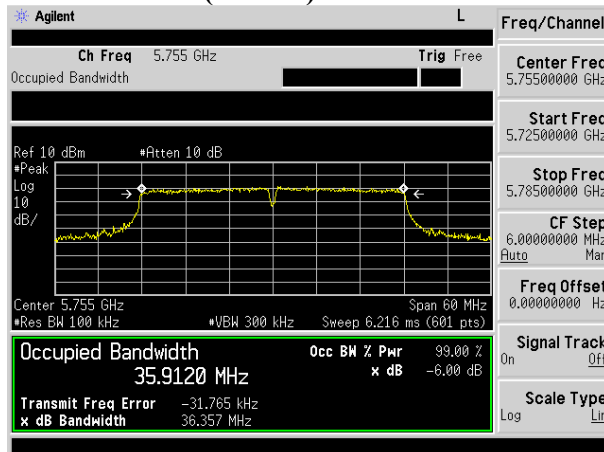
### 802.11 n(HT40) mode-ch159



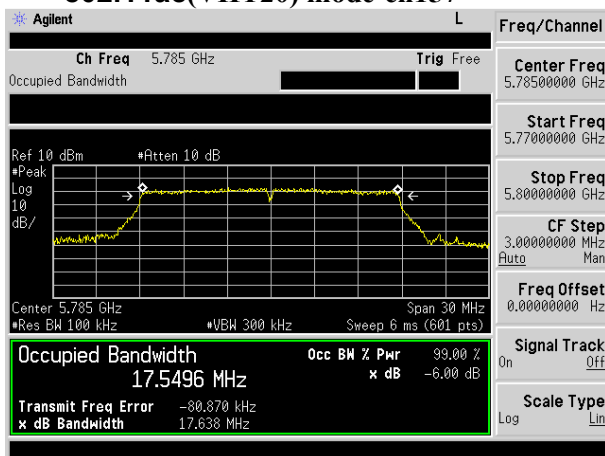
### 802.11ac(VHT20) mode-ch149



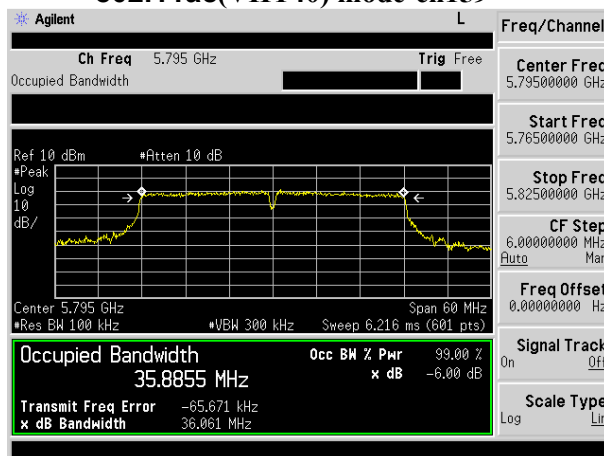
### 802.11ac(VHT40) mode-ch151



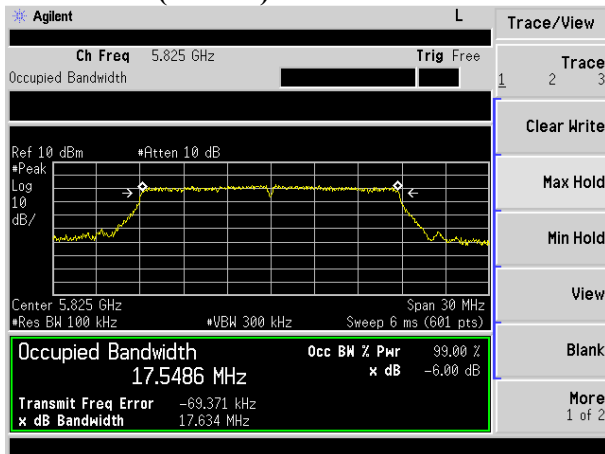
### 802.11ac(VHT20) mode-ch157



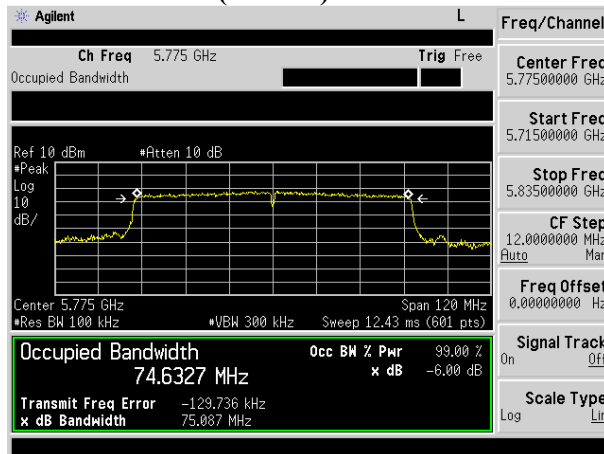
### 802.11ac(VHT40) mode-ch159



### 802.11ac(VHT20) mode-ch165



### 802.11ac(VHT80) mode-ch155





## 7. OUTPUT POWER TEST

### 7.1 Limits

Band 5.15-5.25GHz:

FCC: For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

Band 5.725-5.825GHz:

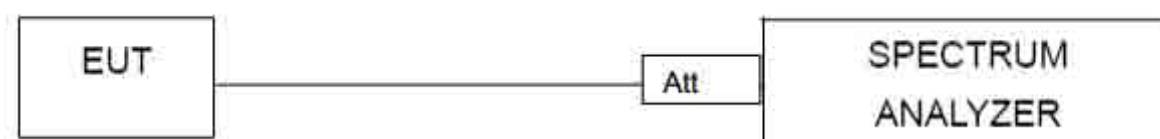
FCC: For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

### 7.2 Test setup

1. The maximum average conducted output power can be measured using Method PM-G (Measurement using a gated RF average power meter):
2. Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.
  - a. The Transmitter output (antenna port) was connected to the power meter.
  - b. Turn on the EUT and power meter and then record the power value.
  - c. Repeat above procedures on all channels needed to be tested.



Duty cycle



## 7.3 Test result

	Frequency (MHz)	Average Output Power (dBm)	FCC Limit (dBm)	Result
802.11a	5180	15.09	24	Pass
	5200	15.43	24	Pass
	5240	15.34	24	Pass
	5745	14.54	30	Pass
	5785	13.35	30	Pass
	5825	14.12	30	Pass
802.11n (HT20)	5180	12.62	24	Pass
	5200	12.11	24	Pass
	5240	12.13	24	Pass
	5745	11.87	30	Pass
	5785	11.56	30	Pass
	5825	11.45	30	Pass
802.11n (HT40)	5190	10.41	24	Pass
	5230	10.32	24	Pass
	5755	10.53	30	Pass
	5795	10.56	30	Pass
802.11ac (VHT20)	5180	11.06	24	Pass
	5200	11.35	24	Pass
	5240	11.26	24	Pass
	5745	11.65	30	Pass
	5785	11.34	30	Pass
	5825	11.23	30	Pass
802.11ac (VHT40)	5190	10.24	24	Pass
	5230	10.47	24	Pass
	5755	10.56	30	Pass
	5795	10.26	30	Pass
802.11ac (VHT80)	5210	9.87	24	Pass
	5775	9.94	30	Pass

NOTE: During the test the EUT is in 100% duty cycle transmitting.

## 8. DUTY CYCLE

### 8.1 Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set  $RBW \geq OBW$  if possible; otherwise, set RBW to the largest available value. Set  $VBW \geq RBW$ . Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are  $> 50/T$  and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Zero Span

RBW = 3MHz

VBW = 3MHz

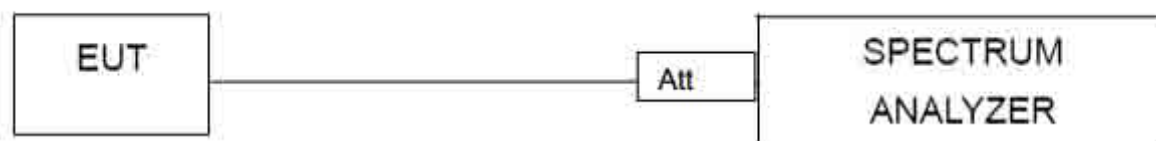
Number of points in Sweep  $> 100$

Detector function = peak

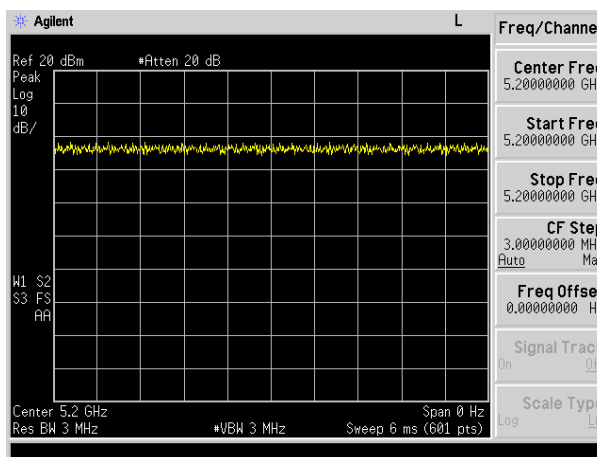
Trace = Clear write Measure  $T_{total}$  and  $T_{on}$

Calculate Duty Cycle =  $T_{on} / T_{total}$  and Duty Cycle Factor =  $10 \cdot \log(1/\text{Duty Cycle})$

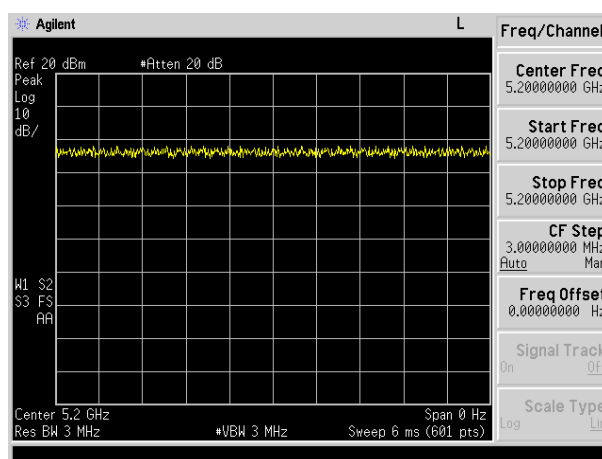
### 8.2 TEST SETUP



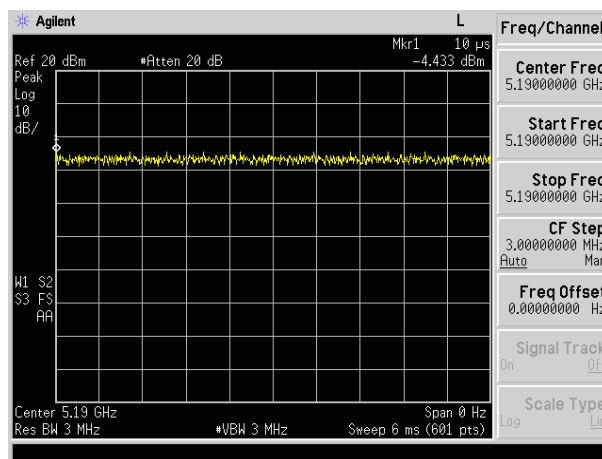
### Test plot of Duty Cycle for 802.11a



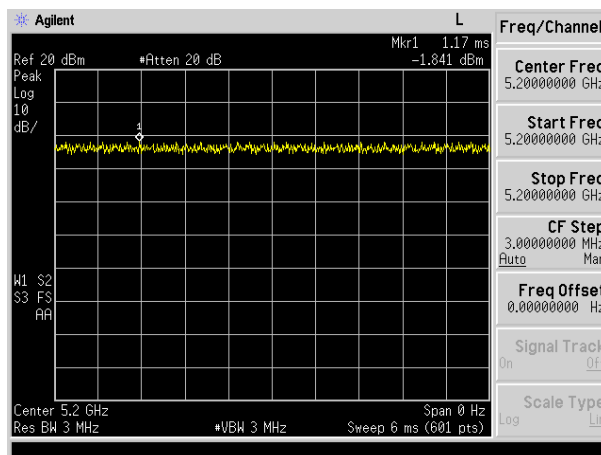
### Test plot of Duty Cycle for 802.11n(HT20)



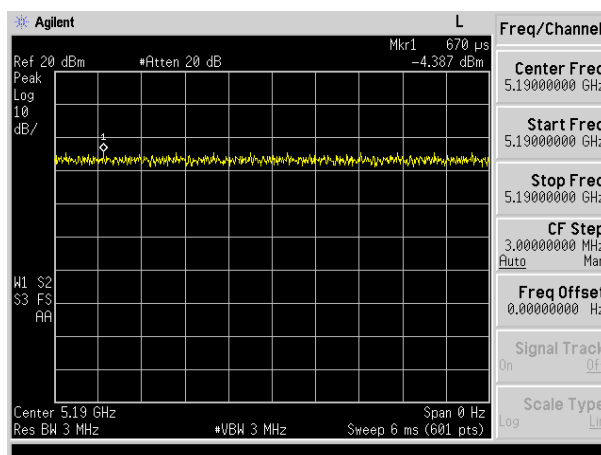
### Test plot of Duty Cycle for 802.11n(HT40)



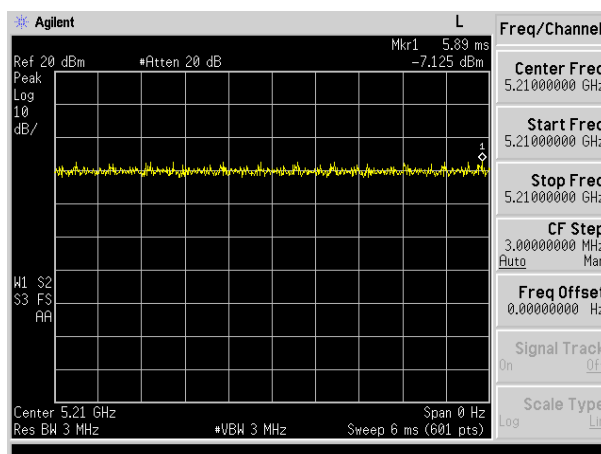
### Test plot of Duty Cycle for 802.11ac(VHT20)



### Test plot of Duty Cycle for 802.11ac(VHT40)



### Test plot of Duty Cycle for 802.11ac(VHT80)



## 9. PEAK POWER SPECTRAL DENSITY TEST

### 9.1 Limits

Band 5.15-5.25GHz:

FCC: In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Band 5.725-5.825GHz:

FCC: In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

### 9.2 Test setup

Methods refer to FCC KDB 789033

- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...".
- 2) Use the peak search function on the instrument to find the peak of the spectrum.
- 3) The result is the PPSD.
- 4) The above procedures make use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified in the 15.407(a)(5). That rule section also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth



### 9.3 Test data

Test data as below

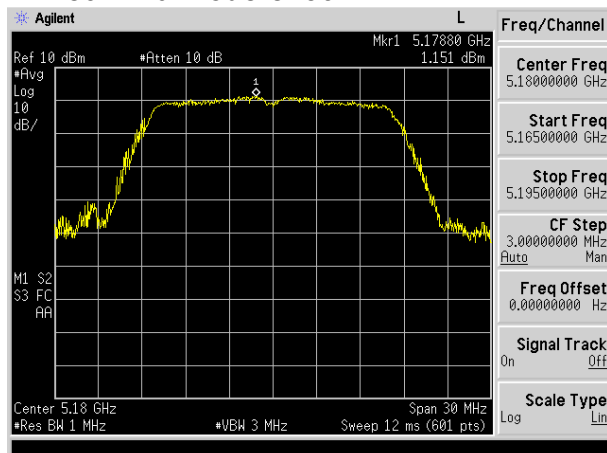
## 5150MHz-5250MHz:

Mode	Frequency (MHz)	Power Density. Antenna	FCC Limit (dBm)
		(dBm/MHz)	
802.11a	5180	1.151	11
	5200	1.353	11
	5240	2.06	11
802.11n (HT20)	5180	1.568	11
	5200	0.839	11
	5240	-0.6	11
802.11n (HT40)	5190	-1.129	11
	5230	0.66	11
802.11ac (VHT20)	5180	1.884	11
	5200	1.36	11
	5240	0.083	11
802.11ac (VHT40)	5190	-1.597	11
	5230	-3.453	11
802.11ac (VHT80)	5210	-4.989	11

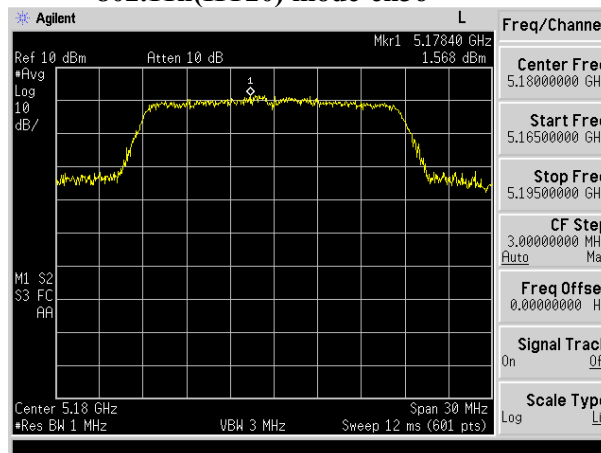
## 5725MHz-5850MHz:

Mode	Frequency (MHz)	Power Density.	Power Density.	FCC Limit (dBm /500KHz)
		(dBm /300KHz)	(dBm /500KHz)	
802.11a	5745	-0.513	1.71	30
	5785	1.643	3.86	30
	5825	0.819	3.04	30
802.11n (HT20)	5745	-1.719	0.50	30
	5785	-0.529	1.69	30
	5825	-1.187	1.03	30
802.11n (HT40)	5755	-5.624	-3.40	30
	5795	-3.913	-1.69	30
802.11ac (VHT20)	5745	-1.564	0.66	30
	5785	-0.691	1.53	30
	5825	-1.06	1.16	30
802.11ac (VHT40)	5755	-4.57	-2.35	30
	5795	-4.458	-2.24	30
802.11ac (VHT80)	5775	-6.636	-4.42	30

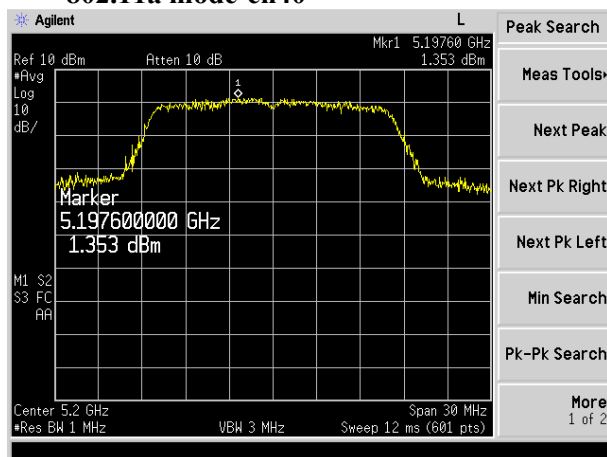
5150-5250 MHz:  
802.11a mode-ch36



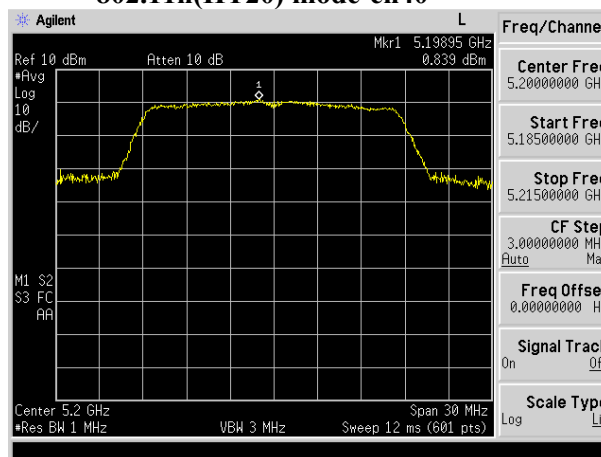
802.11n(HT20) mode-ch36



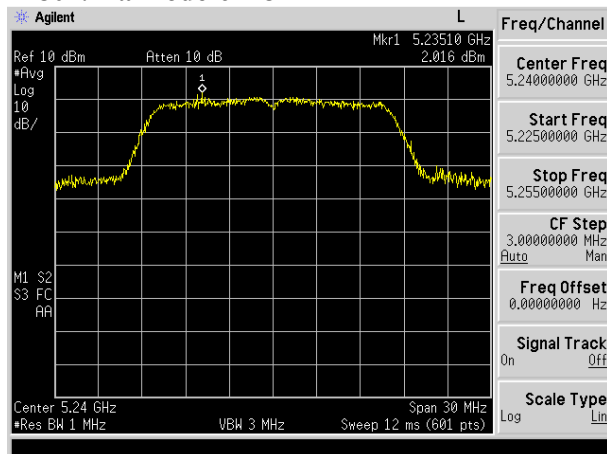
802.11a mode-ch40



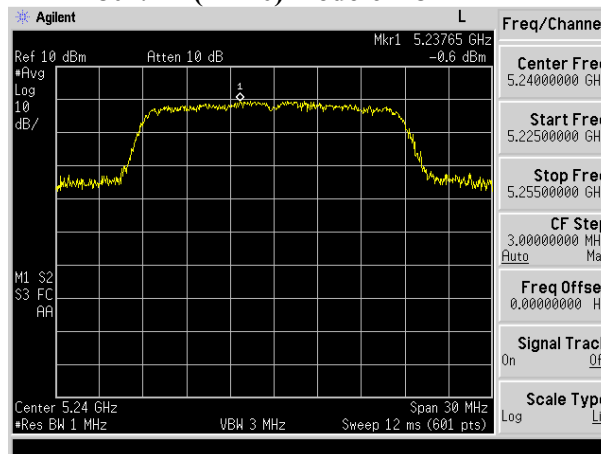
802.11n(HT20) mode-ch40



802.11a mode-ch48

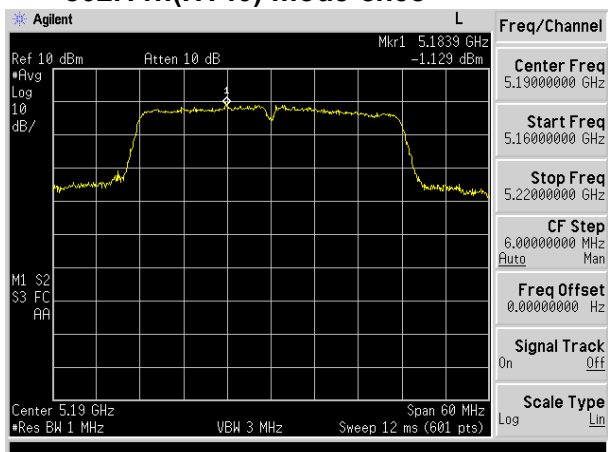


802.11n(HT20) mode-ch48

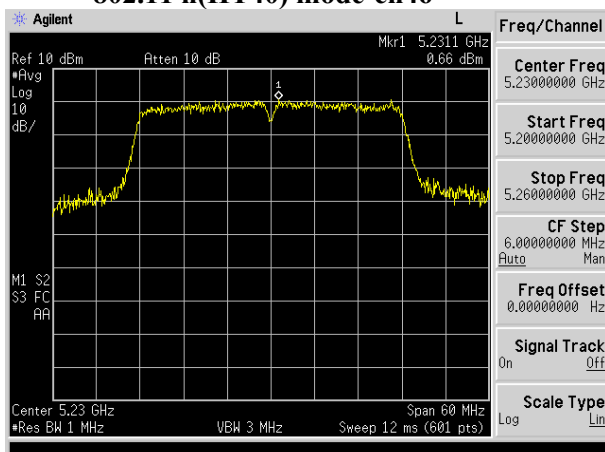




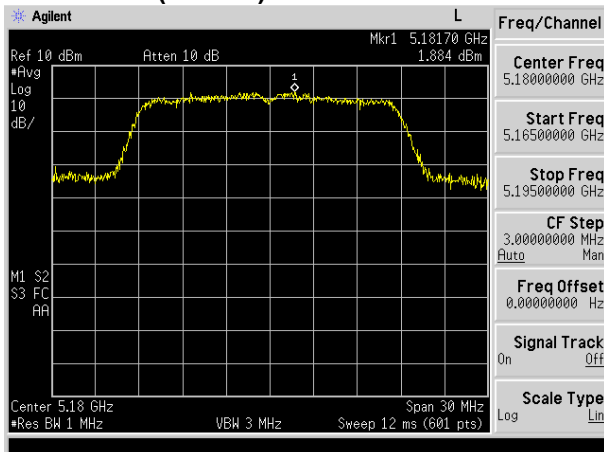
### 802.11n(HT40) mode-ch38



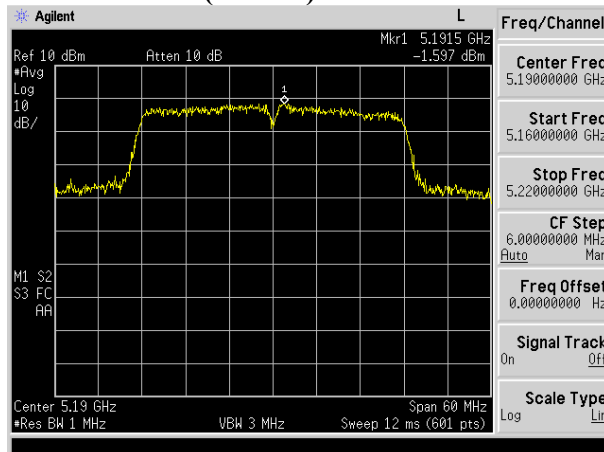
### 802.11 n(HT40) mode-ch46



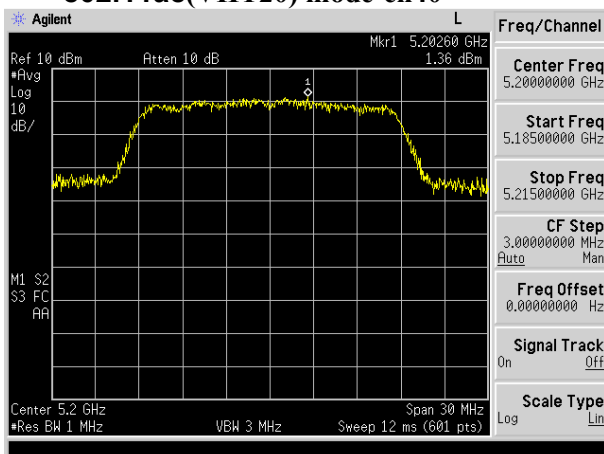
802.11ac(VHT20) mode-ch36



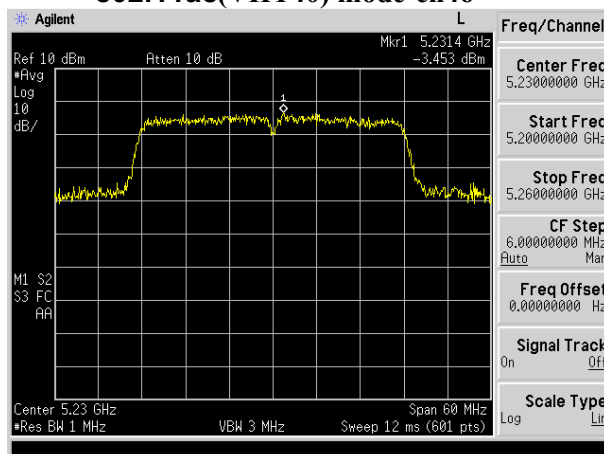
802.11ac(VHT40) mode-ch38



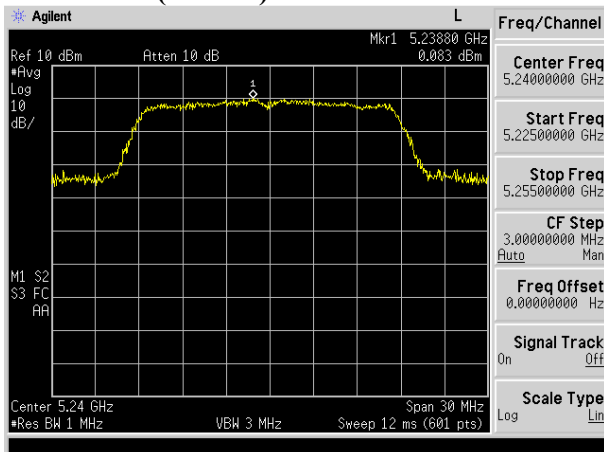
802.11ac(VHT20) mode-ch40



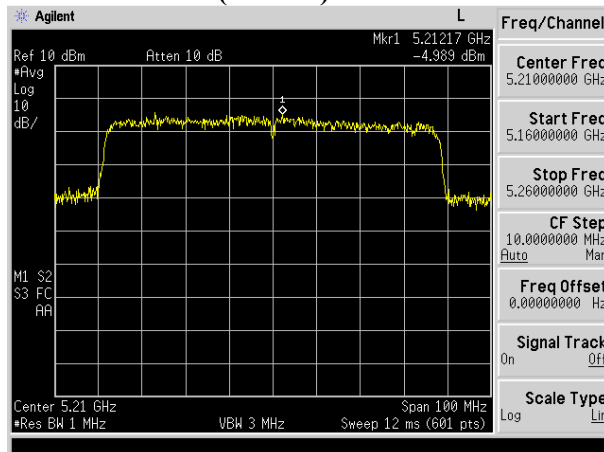
802.11ac(VHT40) mode-ch46



802.11ac(VHT20) mode-ch48

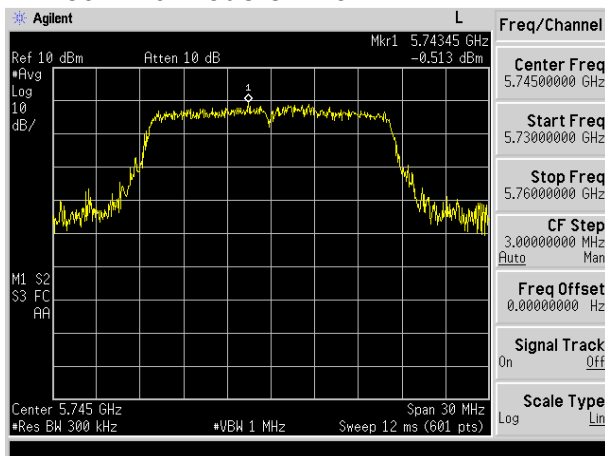


802.11ac(VHT80) mode-ch42

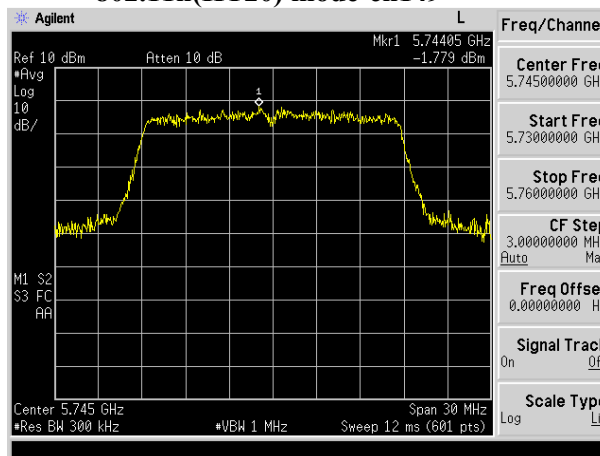


5725-5850MHz:

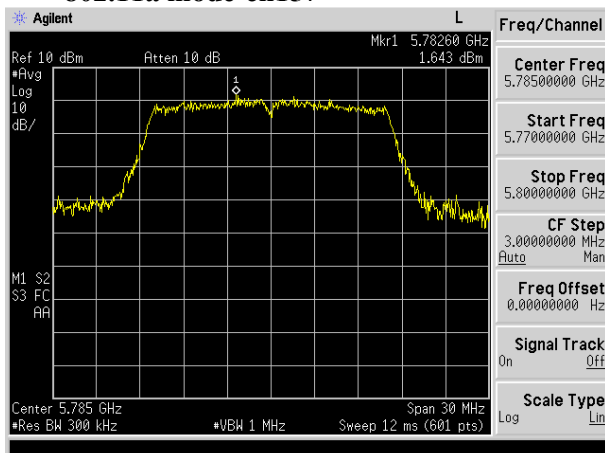
802.11a mode-ch149



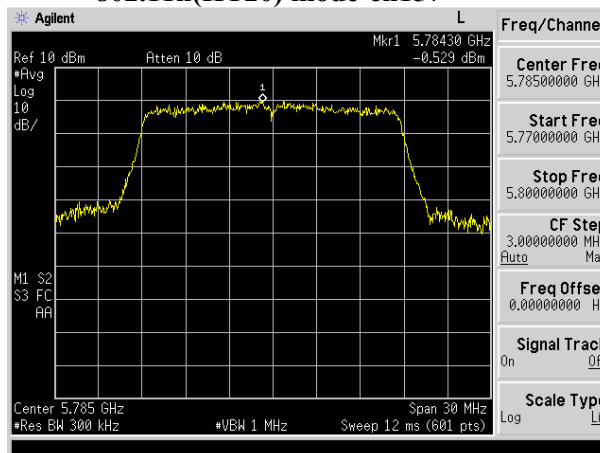
802.11n(HT20) mode-ch149



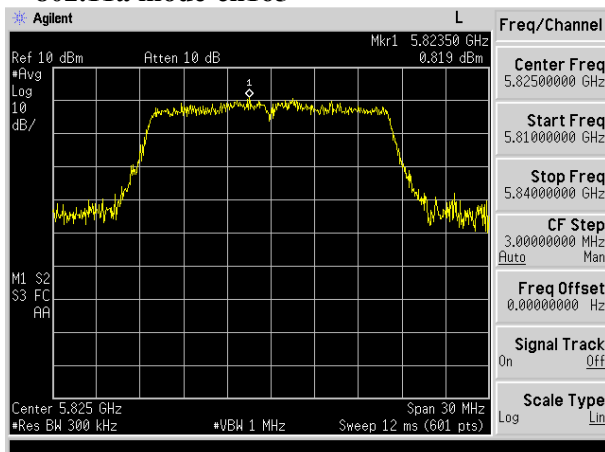
802.11a mode-ch157



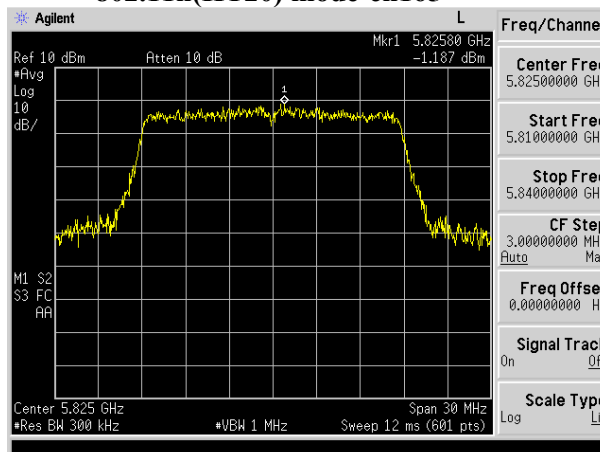
802.11n(HT20) mode-ch157



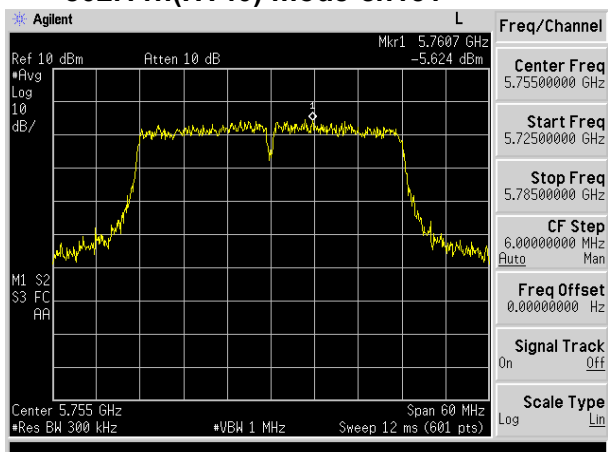
802.11a mode-ch165



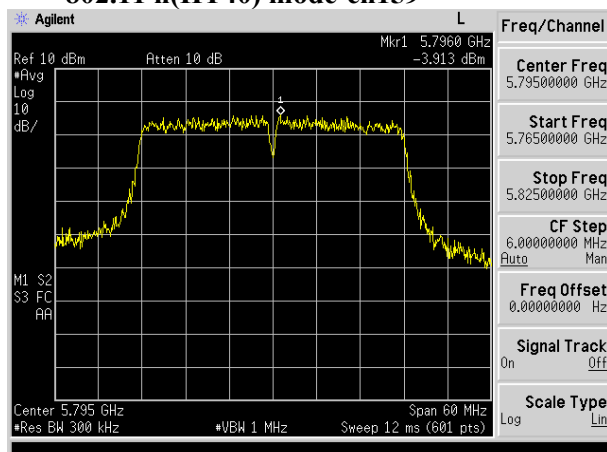
802.11n(HT20) mode-ch165



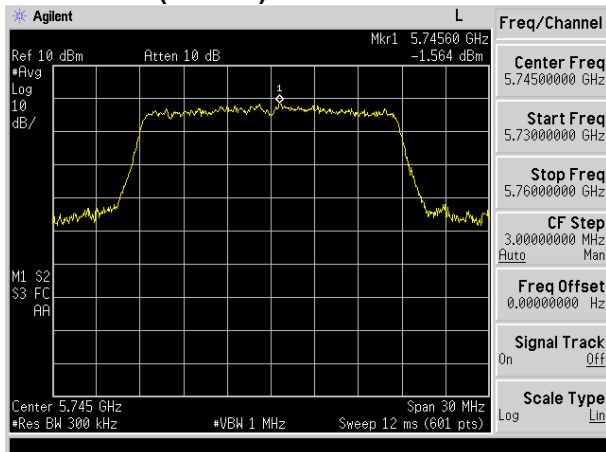
### 802.11n(HT40) mode-ch151



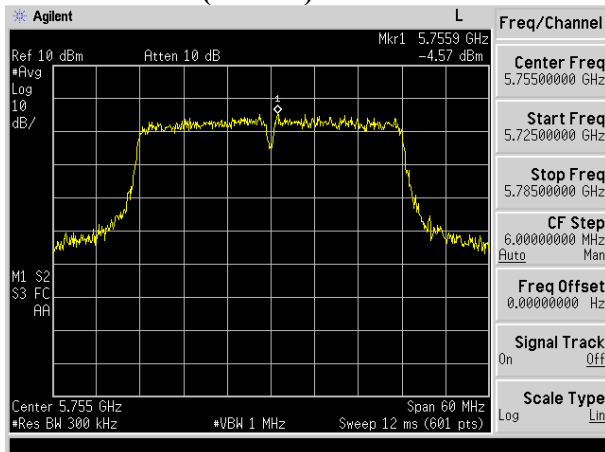
### 802.11 n(HT40) mode-ch159



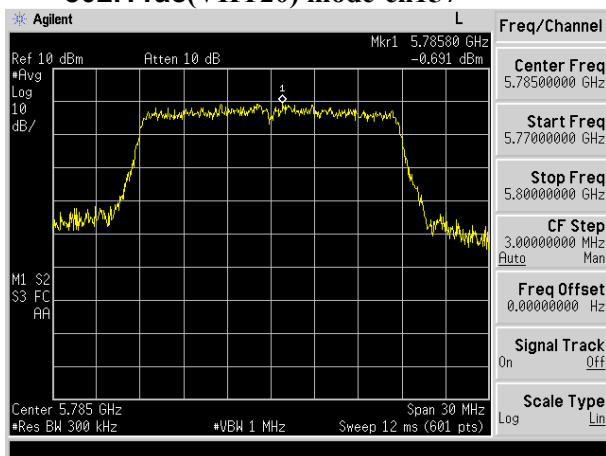
802.11ac(VHT20) mode-ch149



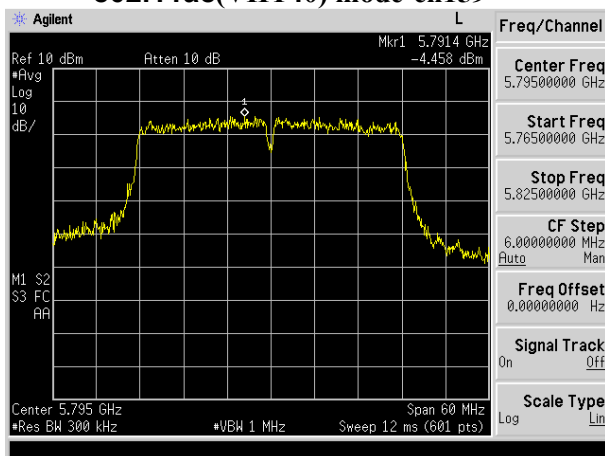
802.11ac(VHT40) mode-ch151



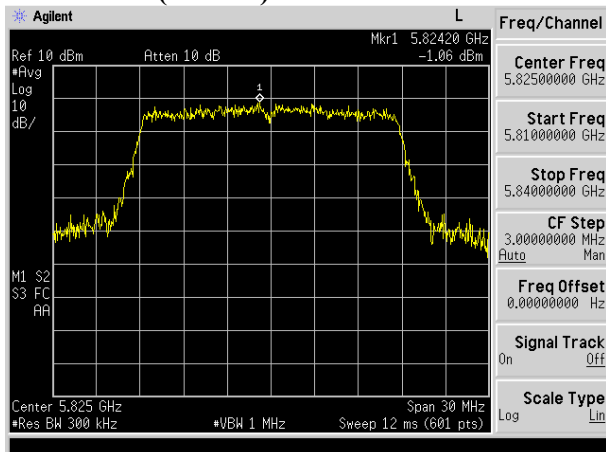
802.11ac(VHT20) mode-ch157



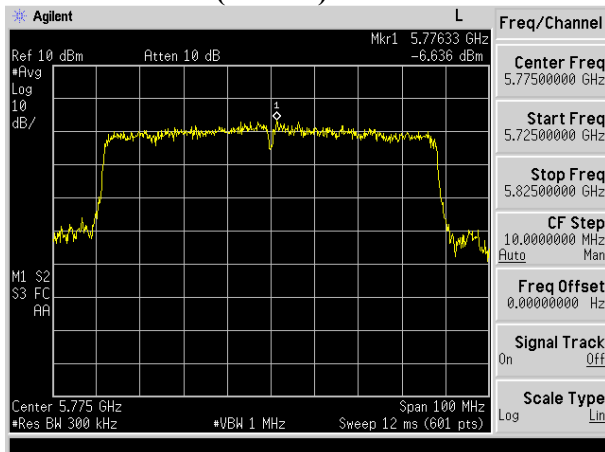
802.11ac(VHT40) mode-ch159



802.11ac(VHT20) mode-ch165



802.11ac(VHT80) mode-ch155

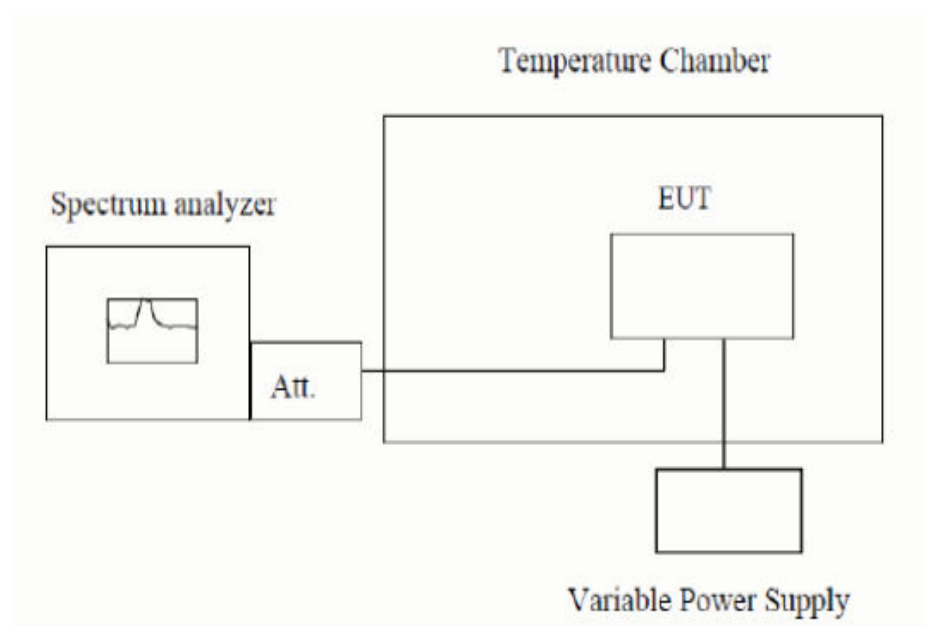


## 10. FREQUENCY STABILITY TEST

### 10.1.limit

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 10.2 Test Configuration



### 10.3 test procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and the limit is less than  $\pm 20$  ppm (IEEE 802.11 specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is  $-30^\circ\text{C} \sim 50^\circ\text{C}$ .

## Test result

Measurement Data (the worst channel):

## Frequency Stability under Temperature

Operating Frequency: 5180 MHz				
Environment Temperature (°C)	Voltage (V)	Measured Frequency (MHz)	Test Result (MHz)	Max. Deviation (ppm)
50	120	5180	5180.0135	2.606
40	120	5180	5180.0103	1.988
30	120	5180	5180.0112	2.162
20	120	5180	5180.0117	2.258
10	120	5180	5180.0105	2.027
0	120	5180	5180.0143	2.761
-10	120	5180	5180.0112	2.162
-20	120	5180	5180.0133	2.568
-30	120	5180	5180.0124	2.394

## Frequency Stability under Voltage

Operating Frequency: 5180 MHz			
AC Voltage (V)	Measured Frequency (MHz)	Test Result (MHz)	Max. Deviation (ppm)
108	5180	5180.0132	2.548
120	5180	5180.0238	4.595
132	5180	5180.0134	2.587

## 11.ANTENNA REQUIREMENTS

### 10.1 Limits

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

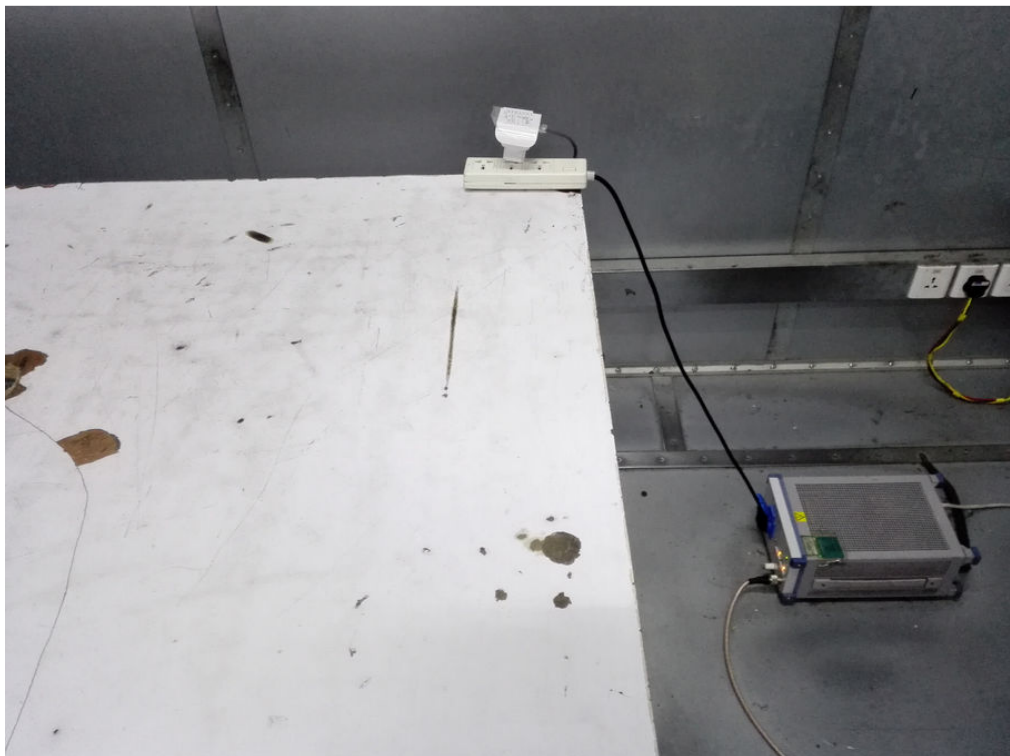
### 10.2 Result

The antennas used for this product is PIFA antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2.73dBi.

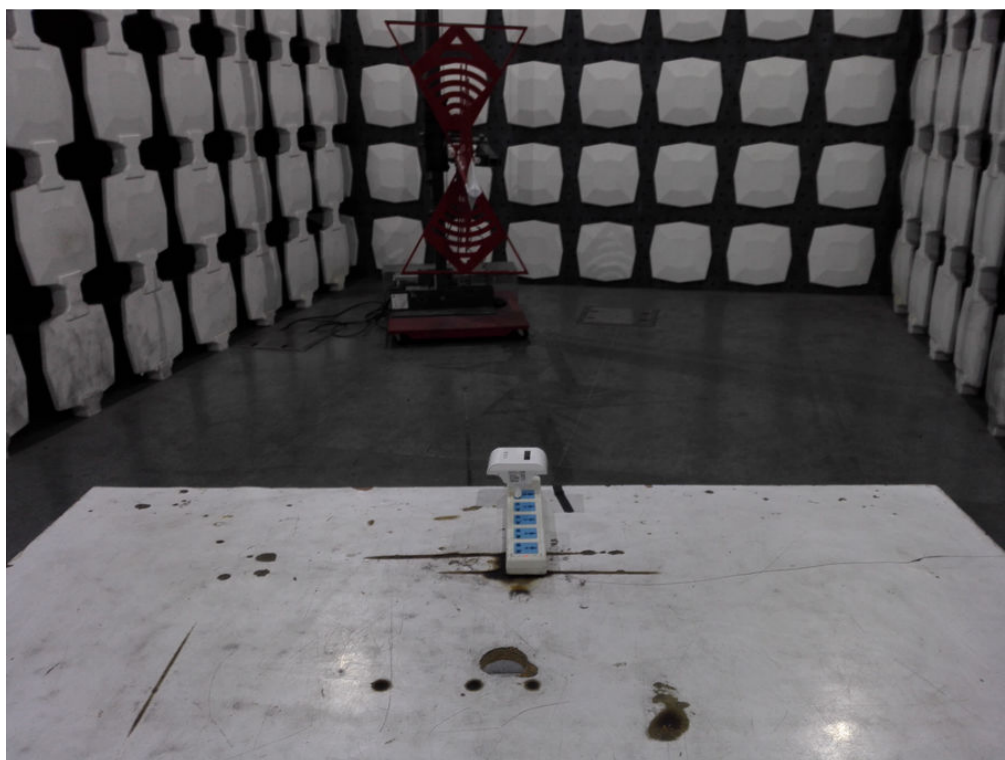


## 12.PHOTOGRAPHS OF TEST SET-UP

Conducted Emission



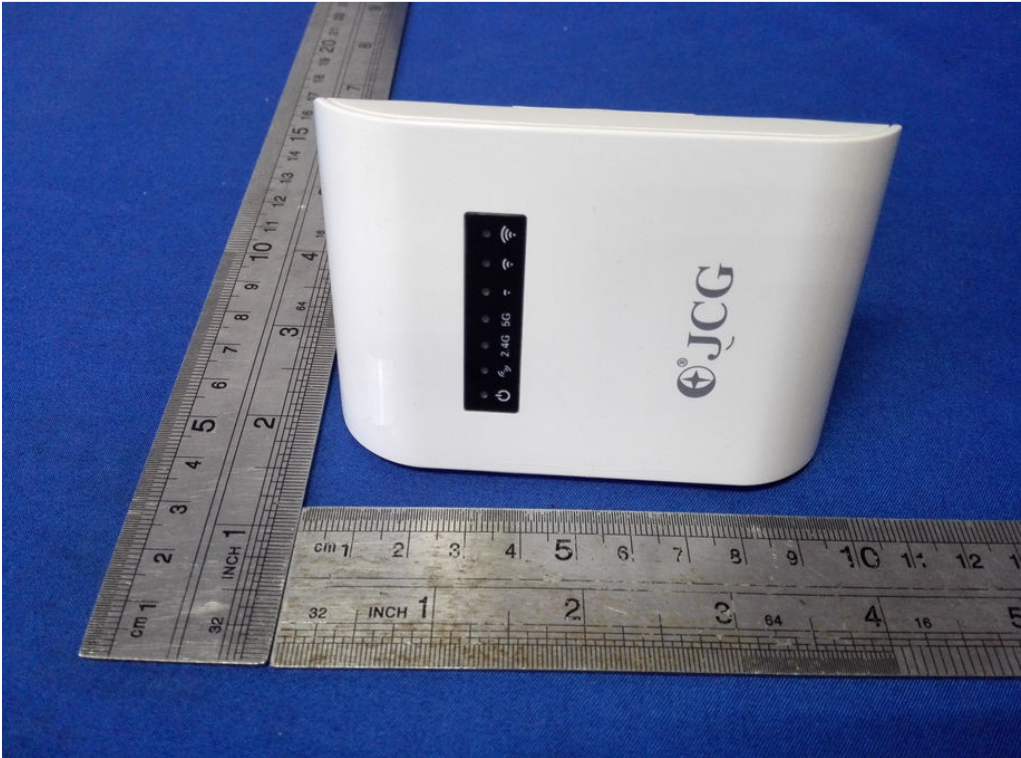
### Radiated Emission Test

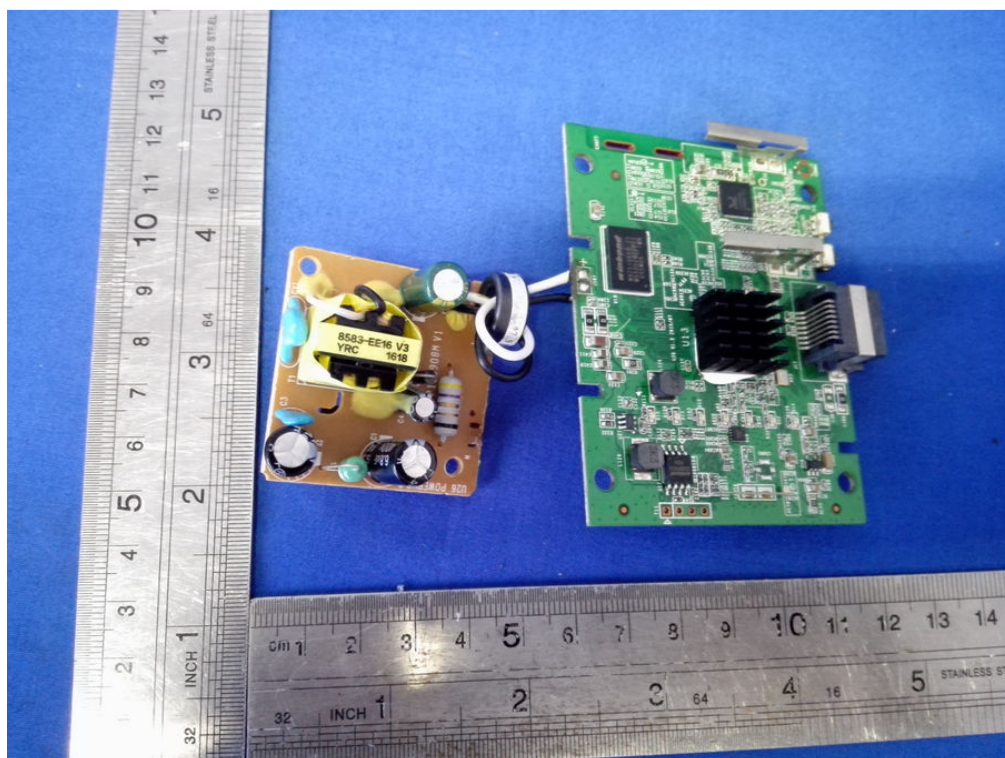
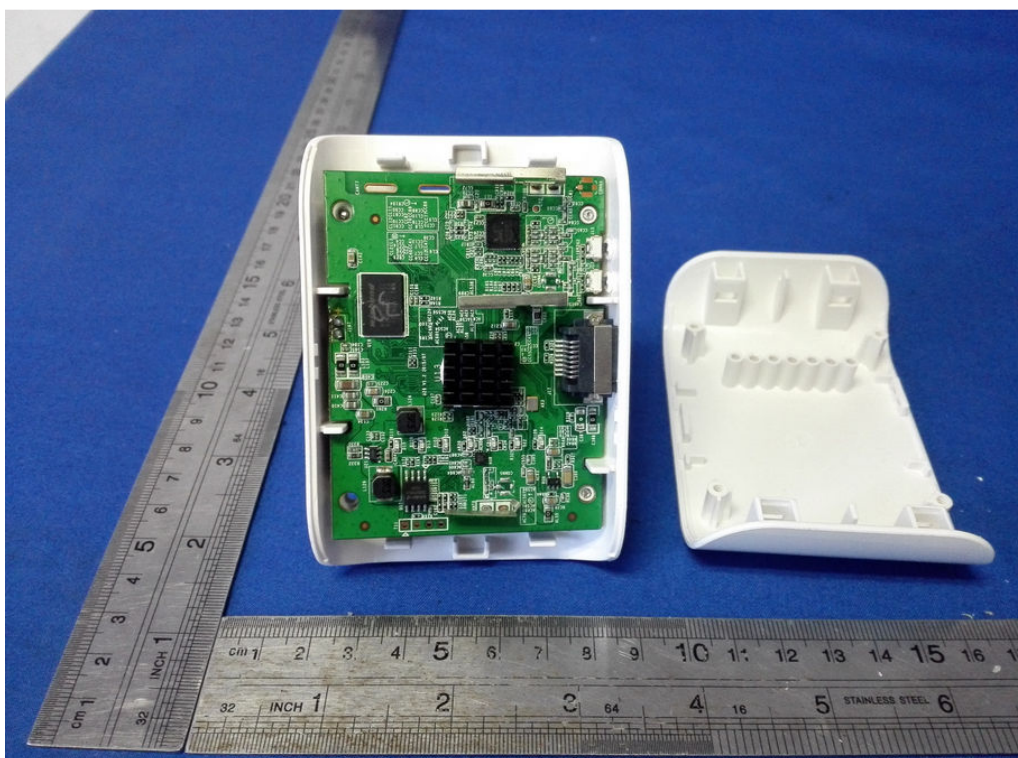


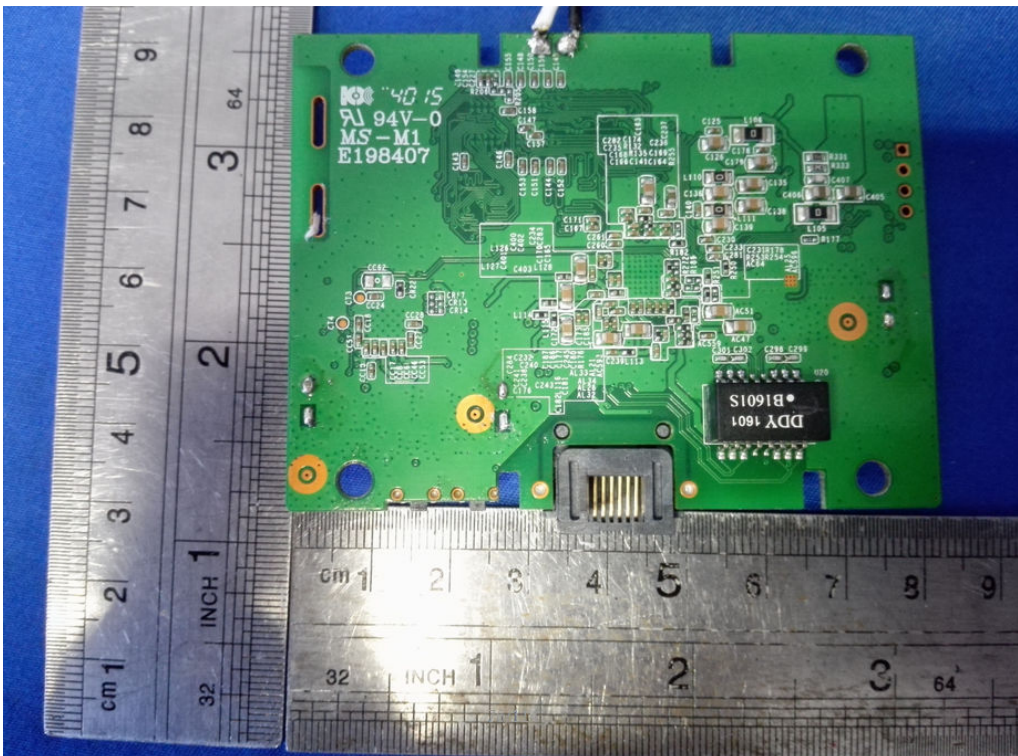
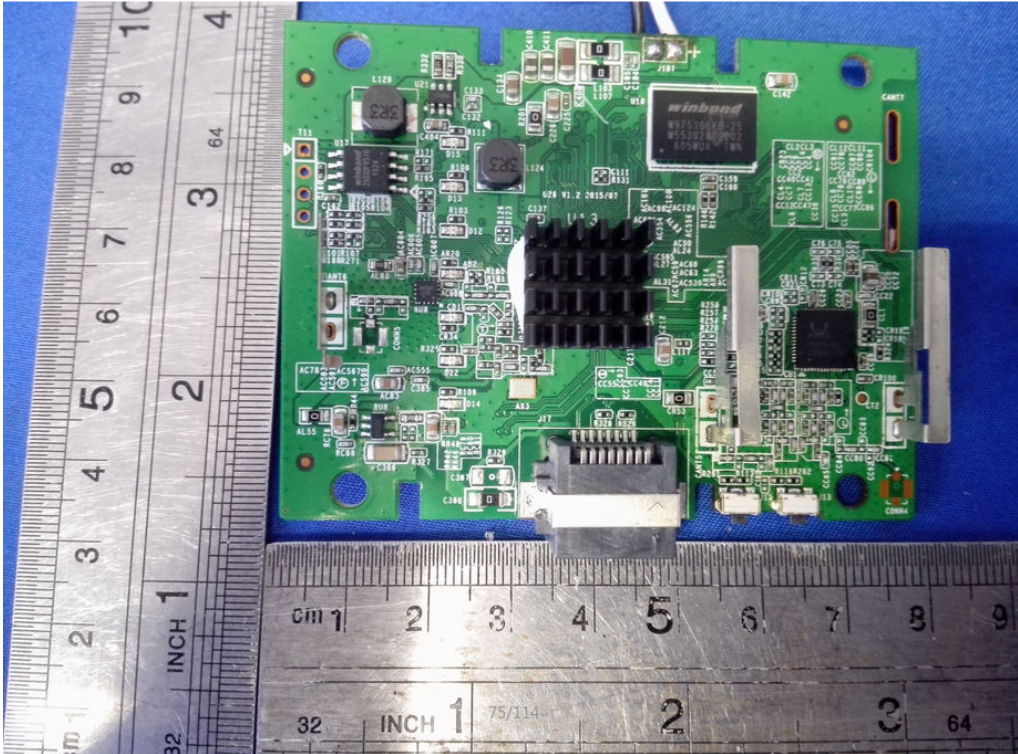
### 13. PHOTOGRAPHS OF THE EUT

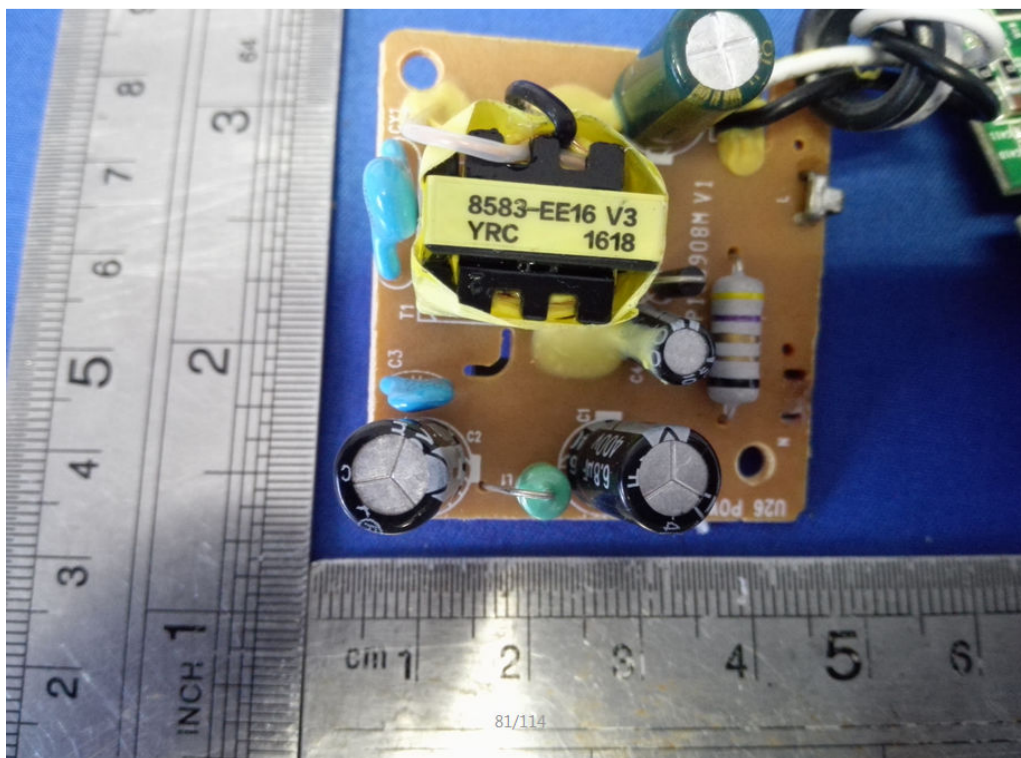
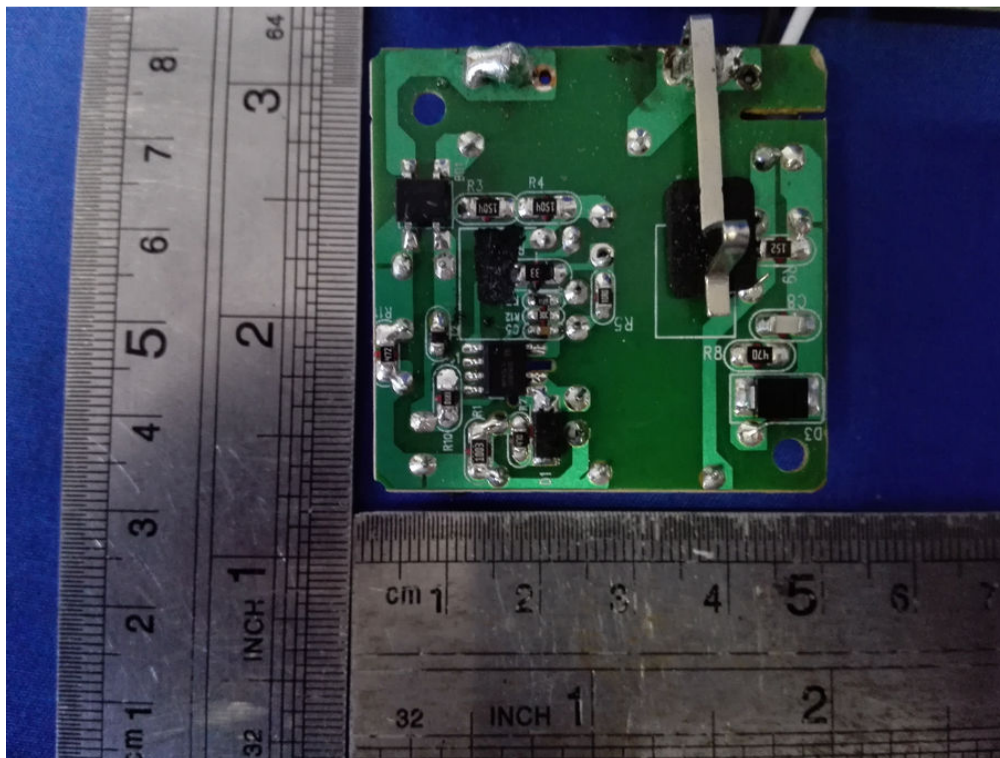












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