TEST REPORT

Applicant:	DTEN Inc
Address of Applicant:	97 E. Brokaw Road, Suite 180, San Jose, CA 95112, United States
Manufacturer/Factory:	DTEN Inc
Address of Manufacturer/Factory:	97 E. Brokaw Road, Suite 180, San Jose, CA 95112, United States

Equipment Under Test (EUT)

Product Name:	DTEN Mate
Model No.:	DBA13310
Trade Mark:	DTEN
FCC ID:	2AQ7Q-DBA13310
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	Dec. 04, 2020
Date of Test:	Dec. 04, 2020~Mar. 11, 2021
Date of report issued:	Mar. 12, 2021
Test Result :	PASS *

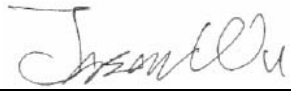
* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*Mar. 12, 2021*	*Original*

Prepared By:  ***Date:*** *Mar. 12, 2021*

Tested/Project Engineer

Check By:  ***Date:*** *Mar. 12, 2021*

Reviewer

3 Contents

Page

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass
Frequency Stability	15.407(g)	Pass

Remarks：

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013.*

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	0.009MHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	DTEN Mate
Model No.:	DBA13310
Serial No.:	N/A
Hardware Version:	K-MATE-V1.0
Software Version:	20200930
Test sample(s) ID:	GTSL202103000144-01
Sample(s) Status:	Engineer sample
Operation Frequency:	802.11a/802.11n(HT20)/802.11ac(HT20): 5745MHz ~ 5825MHz 802.11n(HT40)/ 802.11ac(HT40): 5755MHz ~ 5795MHz 802.11ac(HT80): 5775MHz
Channel numbers:	802.11a/802.11n(HT20)/802.11ac(HT20): 5 802.11n(HT40)/ 802.11ac(HT40): 2 802.11ac(HT80): 1
Channel bandwidth:	802.11a/802.11n(HT20)/802.11ac(HT20) : 20MHz 802.11n(HT40)/802.11ac(HT40) : 40MHz 802.11ac(HT80): 80MHz
Modulation technology:	802.11a/802.11n(H20)/802.11n(H40)/802.11ac(HT20)/802.11ac(HT40) /802.11ac(HT80): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	FPCB antenna
Antenna gain:	1.71dBi
Power supply:	FJ-SW2120502400U INPUT: 100-240V~ 50/60Hz 0.4A OUTPUT: DC 5V 2.4A

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	151	5755MHz	153	5765MHz	155	5775MHz
157	5785MHz	159	5795MHz	161	5805MHz	163	5815MHz
165	5825MHz						

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)		
	802.11 a/n/ac(HT20)	802.11 n/ac(HT40)	802.11ac(HT80)
Lowest channel	5745	5755	
Middle channel	5785		5775
Highest channel	5825	5795	

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13Mbps
802.11ac(HT20)	6.5Mbps
802.11ac(HT40)	13.5Mbps
802.11ac(HT80)	29.3Mbps

5.3 Description of Support Units

None.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383. Designation Number: CN5029

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,

Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2020	Oct. 18 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2020	Oct. 18 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2020	Oct. 18 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

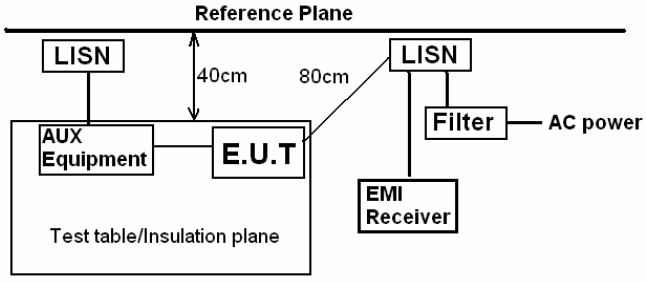
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: *An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.*	
E.U.T Antenna:	
The antennas are integral antenna, the best case gain of the antennas are 1.71 dBi, reference to the appendix II for details	

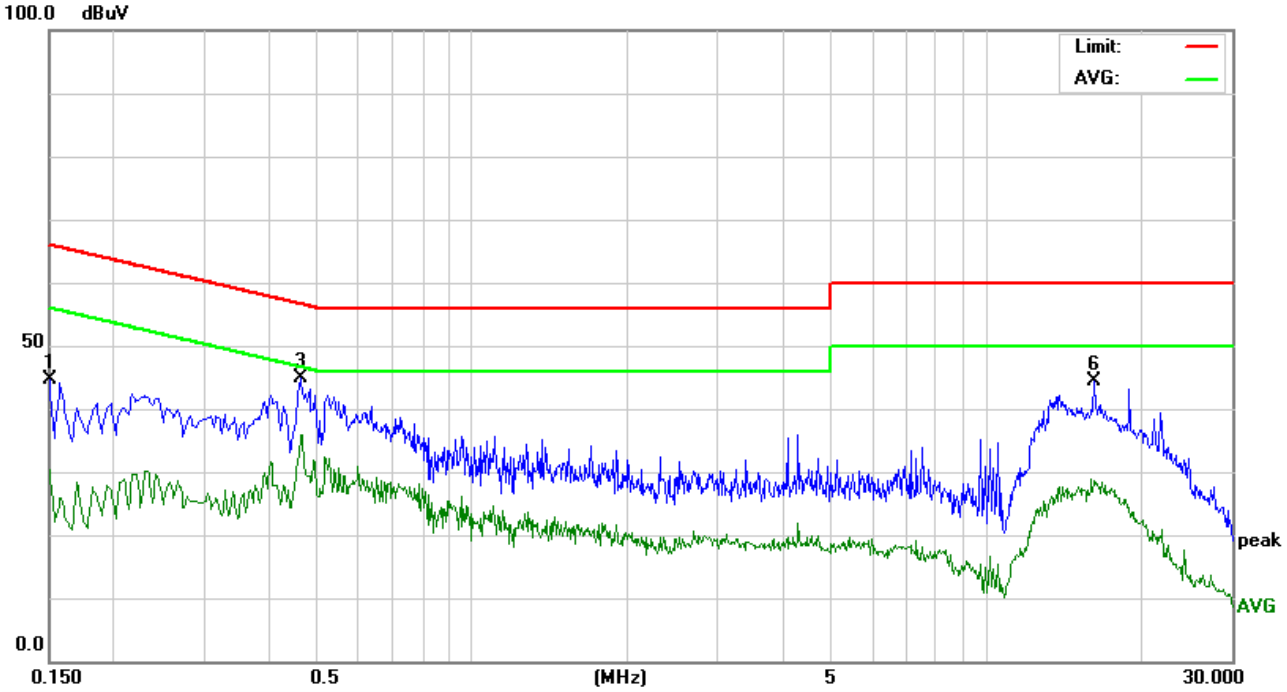
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C / Humid.: 52% / Press.: 1012mbar
Test voltage:	AC 120V, 60Hz
Test results:	Pass

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

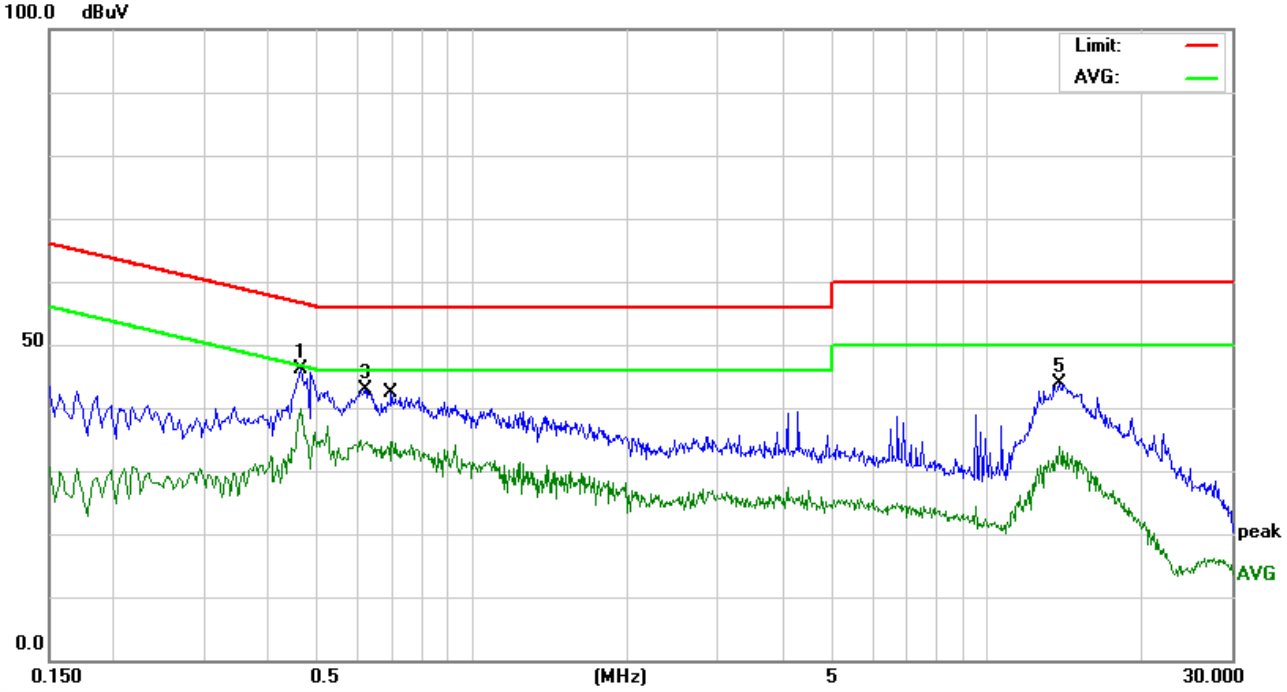
Measurement data

Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	32.76	11.94	44.70	65.99	-21.29	peak
2		0.1500	18.52	11.94	30.46	55.99	-25.53	AVG
3		0.4620	34.87	10.05	44.92	56.66	-11.74	peak
4	*	0.4660	25.92	10.05	35.97	46.58	-10.61	AVG
5		16.0419	18.28	10.56	28.84	50.00	-21.16	AVG
6		16.1420	33.73	10.58	44.31	60.00	-15.69	peak

Neutral:



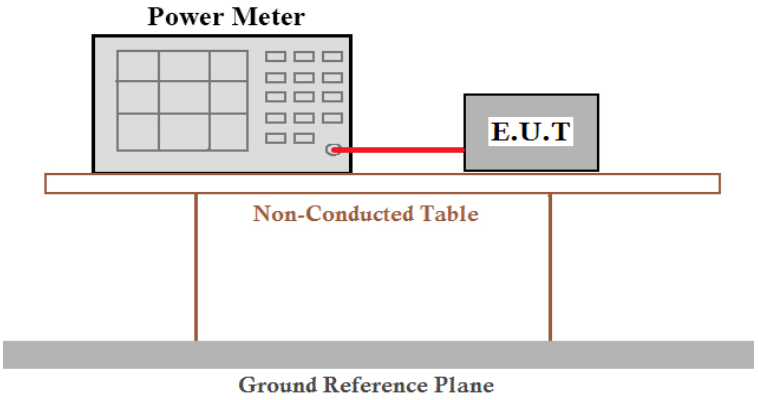
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.4620	36.02	10.05	46.07	56.66	-10.59	peak
2	*	0.4620	29.90	10.05	39.95	46.66	-6.71	AVG
3		0.6180	32.92	9.99	42.91	56.00	-13.09	peak
4		0.6940	24.73	9.98	34.71	46.00	-11.29	AVG
5		13.8540	33.43	10.38	43.81	60.00	-16.19	peak
6		13.8540	23.40	10.38	33.78	50.00	-16.22	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both *limits and measurement with the average detector receiver is unnecessary.*

7.3 Conducted Peak Output Power

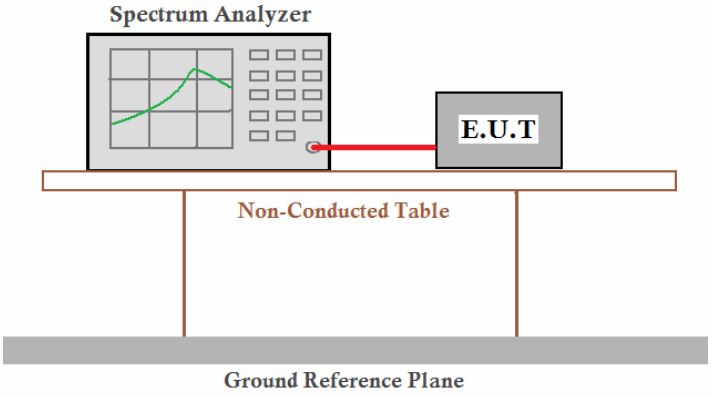
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test CH	Output Power (dBm)						Limit(dBm)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	6.51	6.45	6.58	6.75	6.53	6.66	30.00	Pass
Middle	6.78	6.91	6.98	--	--	--		
Highest	6.85	6.77	6.83	6.77	6.44	--		

Remark: “---“is not applicable

7.4 Channel Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

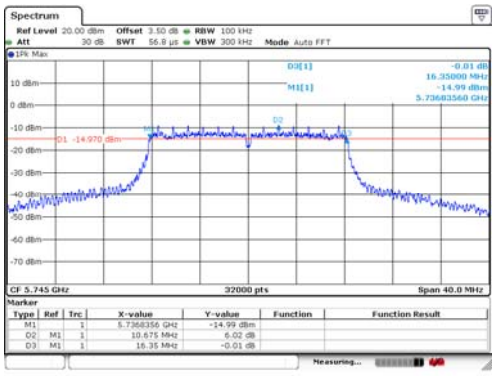
Measurement Data

Test CH	Channel Bandwidth (MHz)						Limit (KHz)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	16.3500	17.5350	17.5425	35.6800	35.5125	75.7850	>500	Pass
Middle	16.3450	17.4938	17.5450	--	--	--		
Highest	16.3450	17.5425	17.5375	35.6600	35.5725	--		

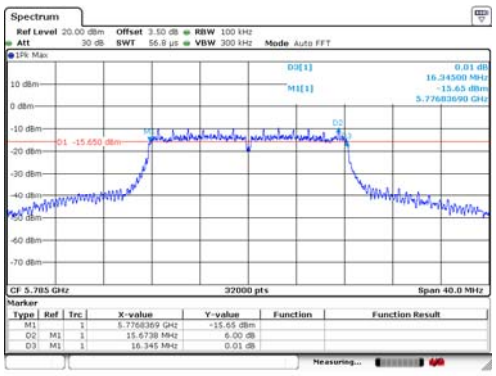
Test CH	99%Channel Bandwidth (MHz)						Limit (KHz)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	16.8438	17.8288	17.8463	36.1125	36.2475	75.5325	>500	Pass
Middle	16.8700	17.8463	17.8588	--	--	--		
Highest	16.8713	17.7563	17.8125	36.1325	36.1325	--		

Remark: "---"is not applicable

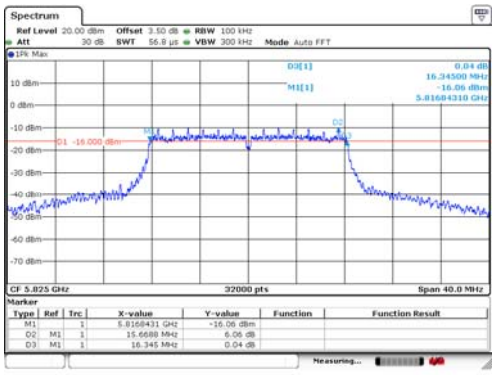
Test plot as follows:
6dB Occupied Bandwidth
Test mode: 802.11a



Lowest channel

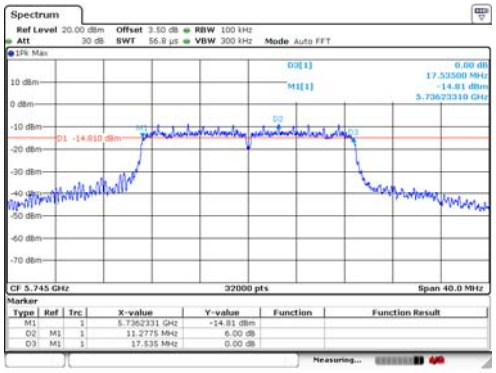


Middle channel

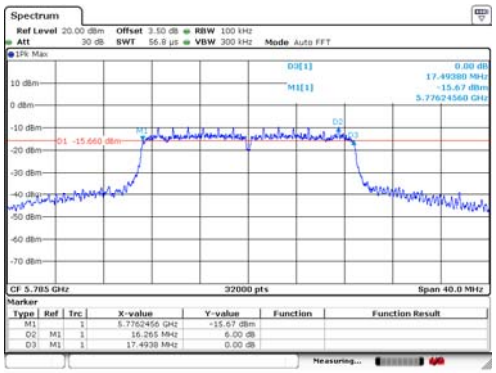


Highest channel

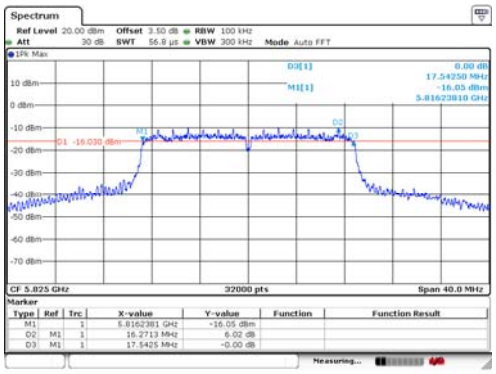
Test mode: 802.11n(HT20)



Lowest channel

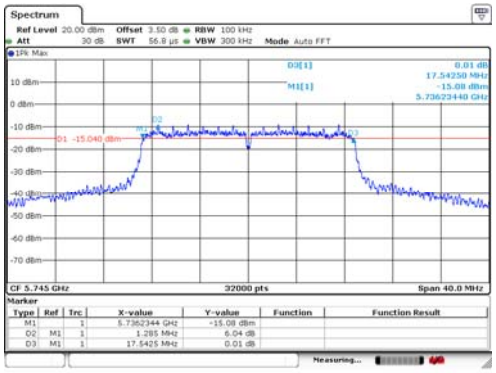


Middle channel

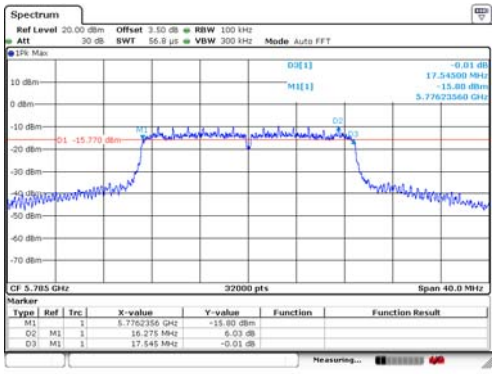


Highest channel

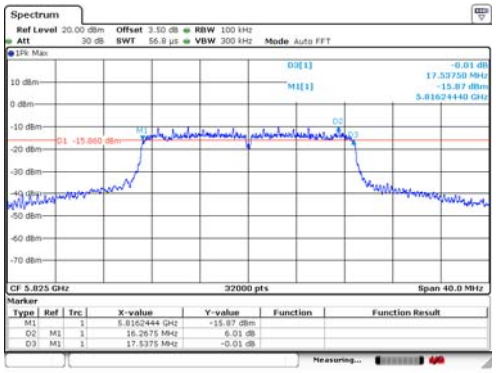
Test mode: 802.11ac(HT20)



Lowest channel

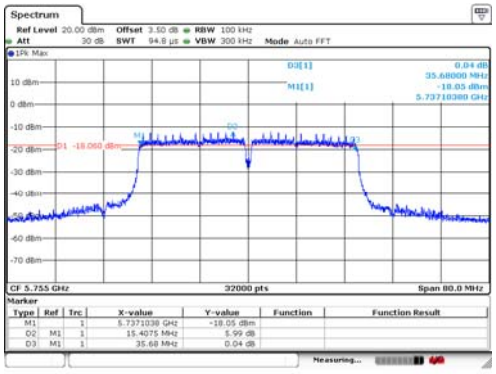


Middle channel

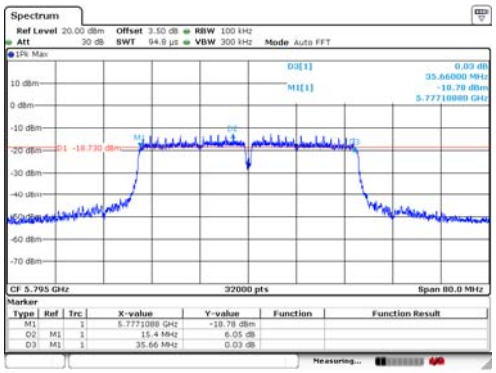


Highest channel

Test mode: 802.11n(HT40)

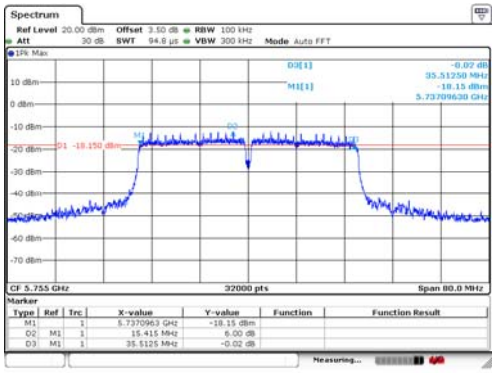


Lowest channel

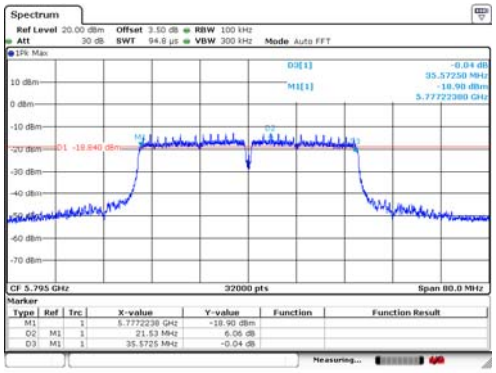


Highest channel

Test mode: 802.11ac(HT40)

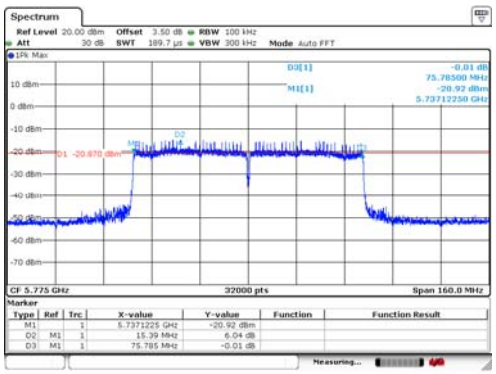


Lowest channel

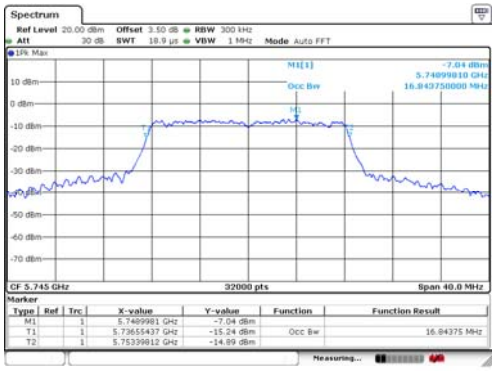


Highest channel

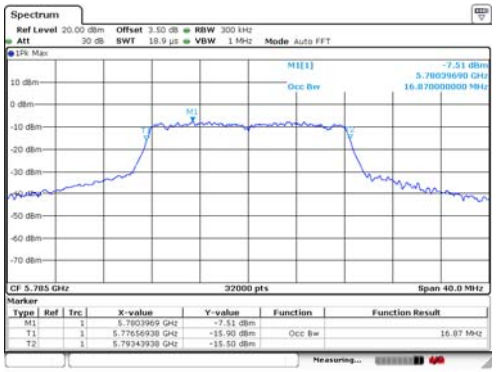
Test mode: 802.11ac(HT80)



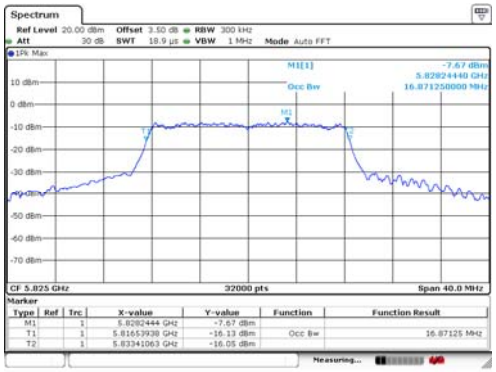
99% Occupied Bandwid
Test mode: 802.11a



Lowest channel

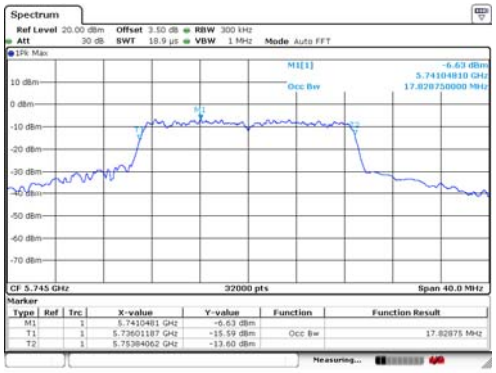


Middle channel

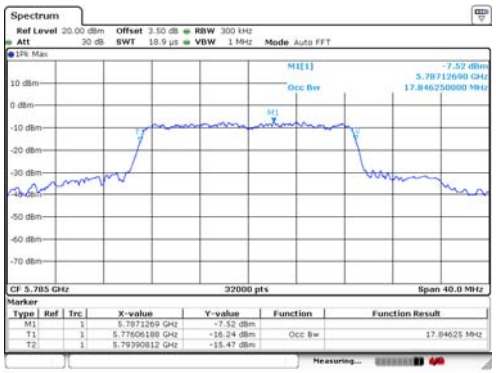


Highest channel

Test mode: 802.11n(HT20)



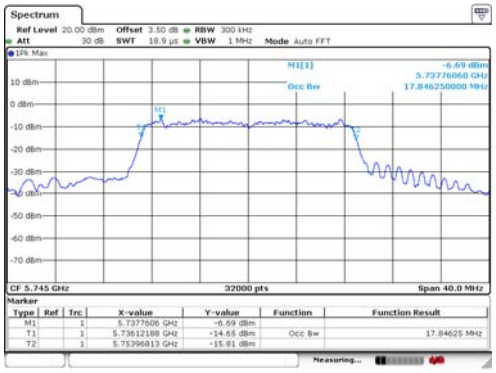
Lowest channel



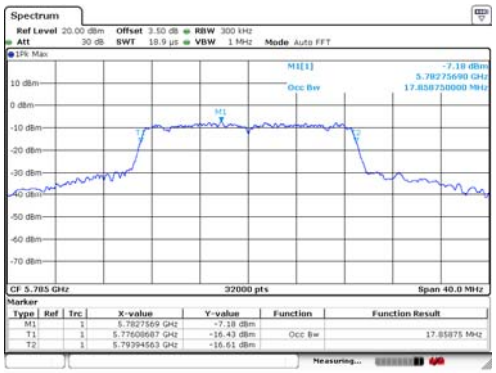
Middle channel

Highest channel

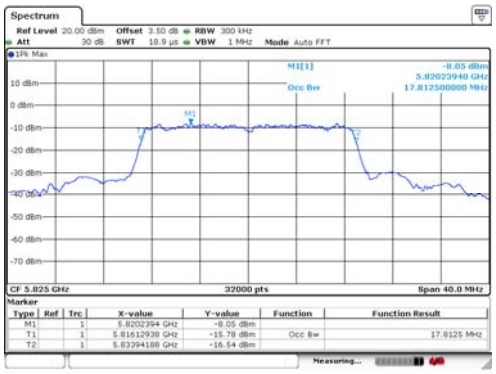
Test mode: 802.11ac(HT20)



Lowest channel

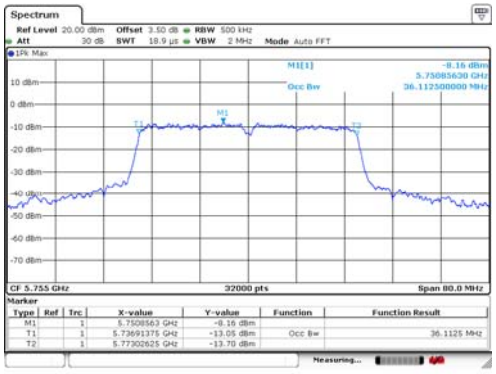


Middle channel

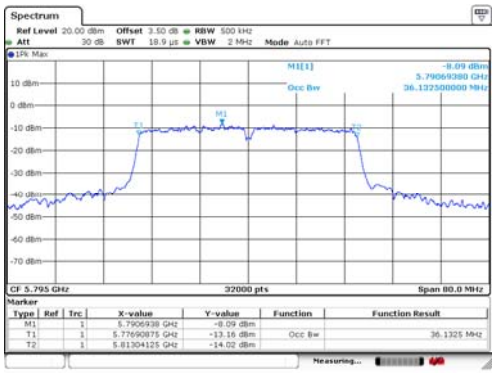


Highest channel

Test mode: 802.11n(HT40)

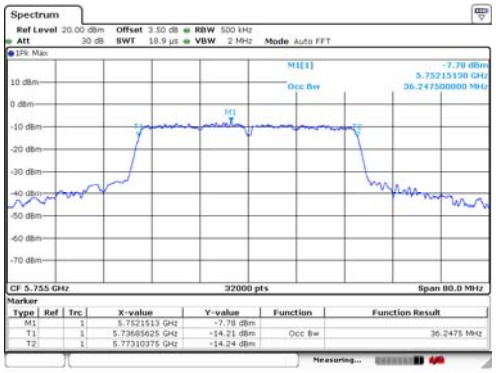


Lowest channel

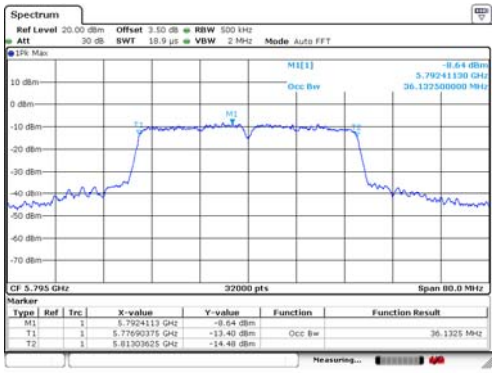


Highest channel

Test mode: 802.11ac(HT40)

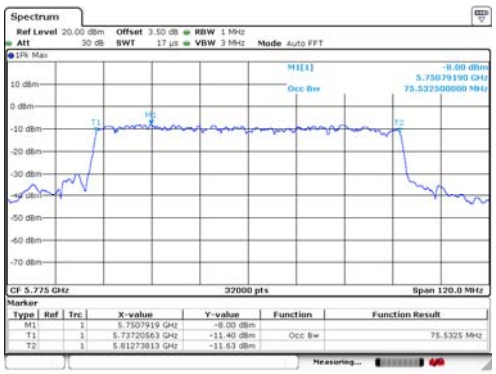


Lowest channel

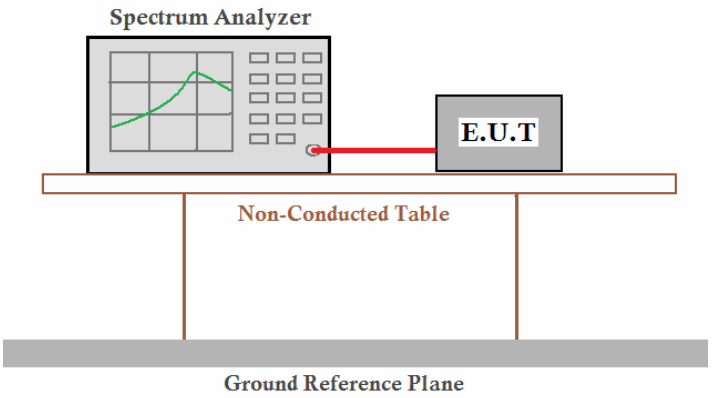


Highest channel

Test mode: 802.11ac(HT80)



7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm/500kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

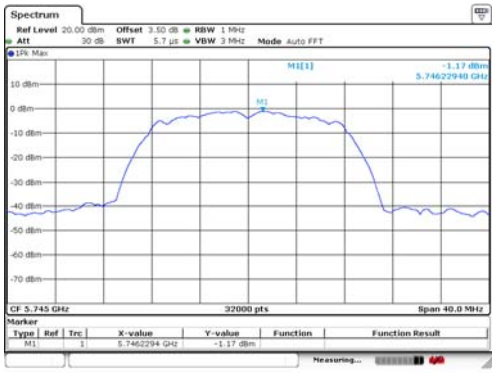
Measurement Data

Test CH	Power Spectral Density (dBm)						Limit (dBm/500kHz)	Result
	802.11a	802.11n (HT20)	802.11ac (HT20)	802.11n (HT40)	802.11ac (HT40)	802.11ac (HT80)		
Lowest	-1.17	-1.50	-1.60	-5.17	-5.34	-13.77	30.00	Pass
Middle	-1.17	-1.15	-1.23	--	--	--		
Highest	-0.43	-0.73	-0.52	-4.69	-4.58	--		

Remark: “---“is not applicable

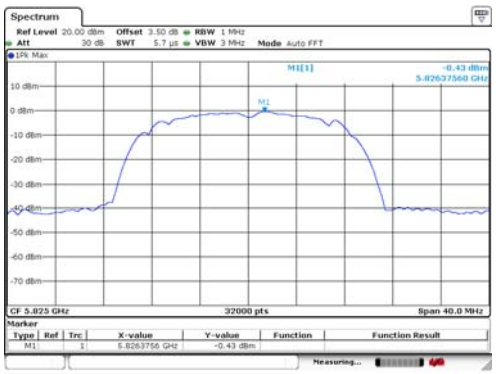
Test plot as follows:

Test mode: 802.11a



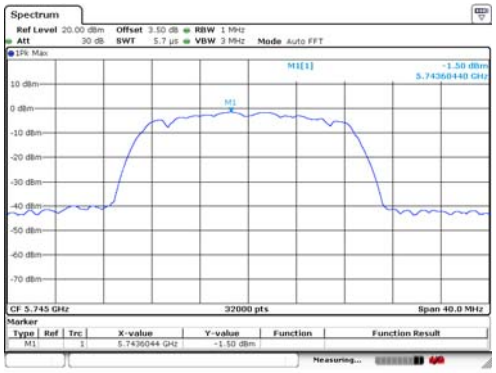
Lowest channel

Middle channel

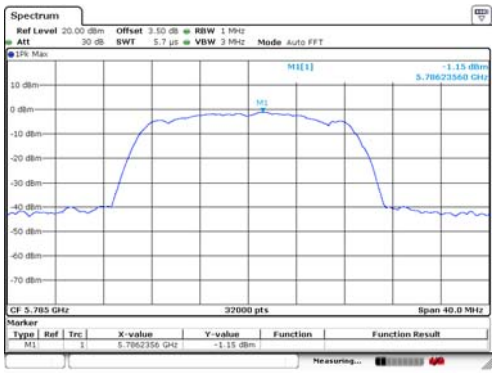


Highest channel

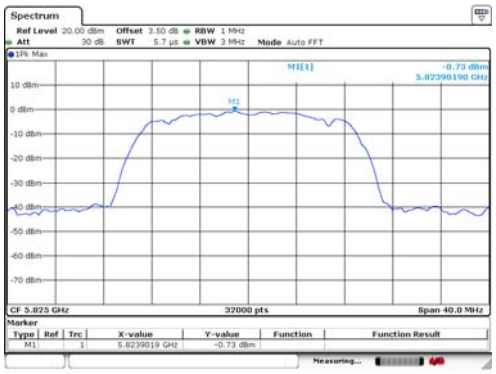
Test mode: 802.11n(HT20)



Lowest channel

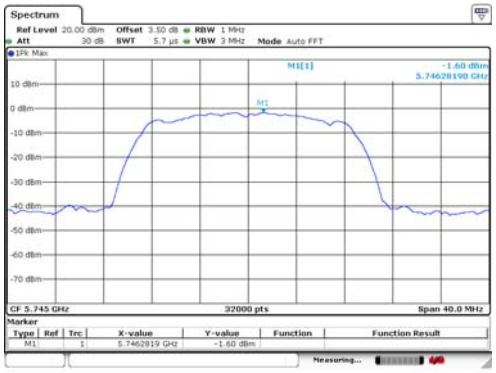


Middle channel

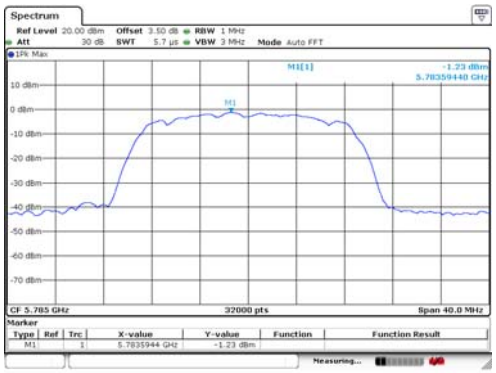


Highest channel

Test mode: 802.11ac(HT20)



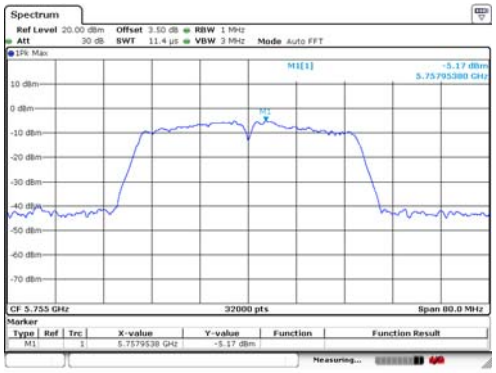
Lowest channel



Middle channel

Highest channel

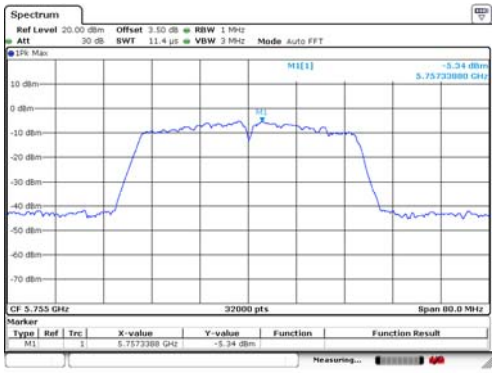
Test mode: 802.11n(HT40)



Lowest channel

Highest channel

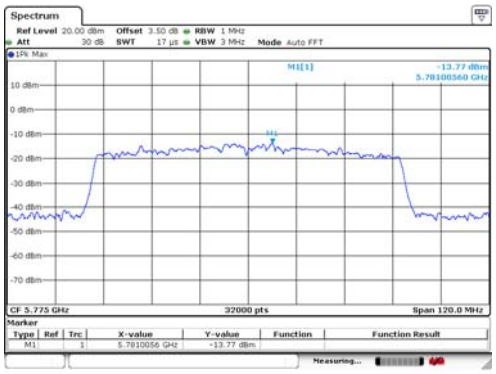
Test mode: 802.11ac(HT40)



Lowest channel

Highest channel

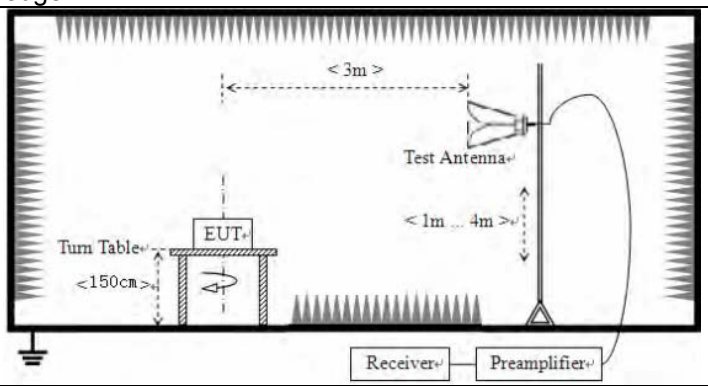
Test mode: 802.11ac(HT80)



Middle channel

7.6 Band edge

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	9kHz to 40GHz, only worse case is reported
Test site:	Measurement Distance: 3m
Receiver setup:	<table><tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr><tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr><tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>RMS</td></tr></table>
Limit:	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.
Test setup:	
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning.

	And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remarks:

1. *Only the worst case Main Antenna test data..*
2. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
5. *According to KDB 789033 D02v02r01 section G) 1) d),for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:*
   E[dBuV/m] = EIRP[dBm] + 95.2;
   E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.
   E[dBuV/m] = 10 + 95.2 = 105.2dBuV/m.
   E[dBuV/m] = 15.6 + 95.2 = 110.8dBuV/m.
   E[dBuV/m] = 27 + 95.2 = 122.2dBuV/m

Measurement data:

IEEE 802.11a

Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	66.74	3.95	70.69	122.2	CH 149
5725.000	H	66.36	3.95	70.31	122.2	CH 149
5850.000	V	50.28	3.96	54.24	122.2	CH 165
5850.000	H	50.16	3.96	54.12	122.2	CH 165

IEEE 802.11n HT20

Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	63.49	3.95	67.44	122.2	CH 149
5725.000	H	64.74	3.95	68.69	122.2	CH 149
5850.000	V	53.68	3.96	57.64	122.2	CH 165
5850.000	H	53.49	3.96	57.45	122.2	CH 165

IEEE 802.11ac HT20

Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	65.46	3.95	69.41	122.2	CH 149
5725.000	H	67.13	3.95	71.08	122.2	CH 149
5850.000	V	52.21	3.96	56.17	122.2	CH 165
5850.000	H	51.49	3.96	55.45	122.2	CH 165

IEEE 802.11n HT40

Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	65.17	3.95	69.12	122.2	CH 151
5725.000	H	68.05	3.95	72.00	122.2	CH 151
5850.000	V	48.66	3.96	52.62	122.2	CH 159
5850.000	H	47.59	3.96	51.55	122.2	CH 159

IEEE 802.11ac HT40

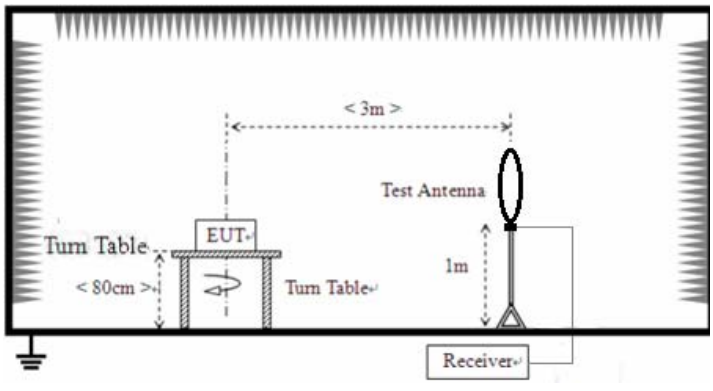
Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	66.39	3.95	70.34	122.2	CH 151
5725.000	H	66.87	3.95	70.82	122.2	CH 151
5850.000	V	45.36	3.96	49.32	122.2	CH 159
5850.000	H	48.42	3.96	52.38	122.2	CH 159

IEEE 802.11ac HT80

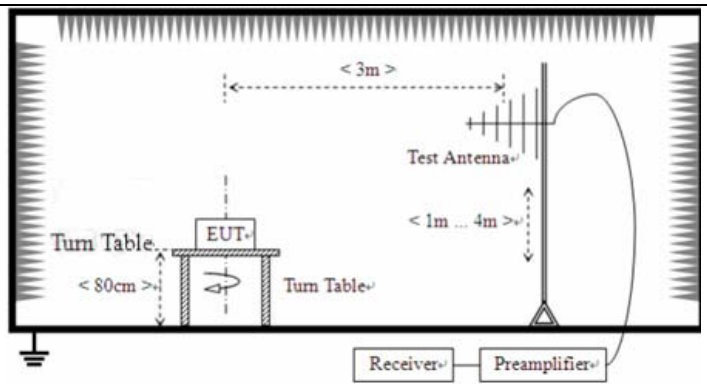
Freq. (MHz)	Ant.Pol. H/V	Reading (dBuv)	Ant/CF (dB)	Act (dBuv/m)	Limit (dBuv/m)	Note
5725.000	V	62.69	3.95	66.64	122.2	CH 155
5850.000	V	55.28	3.96	59.24	122.2	CH 155
5725.000	H	63.46	3.95	67.41	122.2	CH 155
5850.000	H	53.49	3.96	57.45	122.2	CH 155

7.7 Spurious Emission

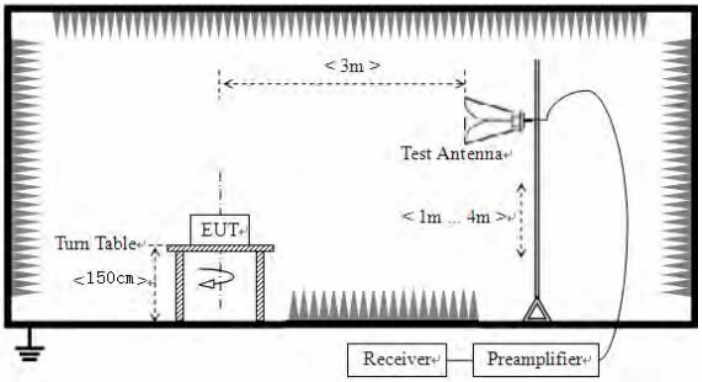
7.7.1 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>9kHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (uV/m)</th><th>Value</th><th>Measurement Distance</th></tr>
<tr><td>0.009MHz-0.490MHz</td><td>2400/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>0.490MHz-1.705MHz</td><td>24000/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>1.705MHz-30MHz</td><td>30</td><td>QP</td><td>30m</td></tr>
<tr><td>30MHz-88MHz</td><td>100</td><td>QP</td><td rowspan="4">3m</td></tr>
<tr><td>88MHz-216MHz</td><td>150</td><td>QP</td></tr>
<tr><td>216MHz-960MHz</td><td>200</td><td>QP</td></tr>
<tr><td>960MHz-1GHz</td><td>500</td><td>QP</td></tr>
</table>
<table>
<tr><th>Frequency</th><th>Limit (dBm/MHz)</th><th>Remark</th></tr>
<tr><td>Above 1GHz</td><td>-27.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>For radiated emissions from 9kHz to 30MHz
 

For radiated emissions from 30MHz to1GHz</td></tr>
</table>



For radiated emissions above 1GHz



Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning.

	And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remarks:

1. *Only the worst case Main Antenna test data.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

Measurement Data:

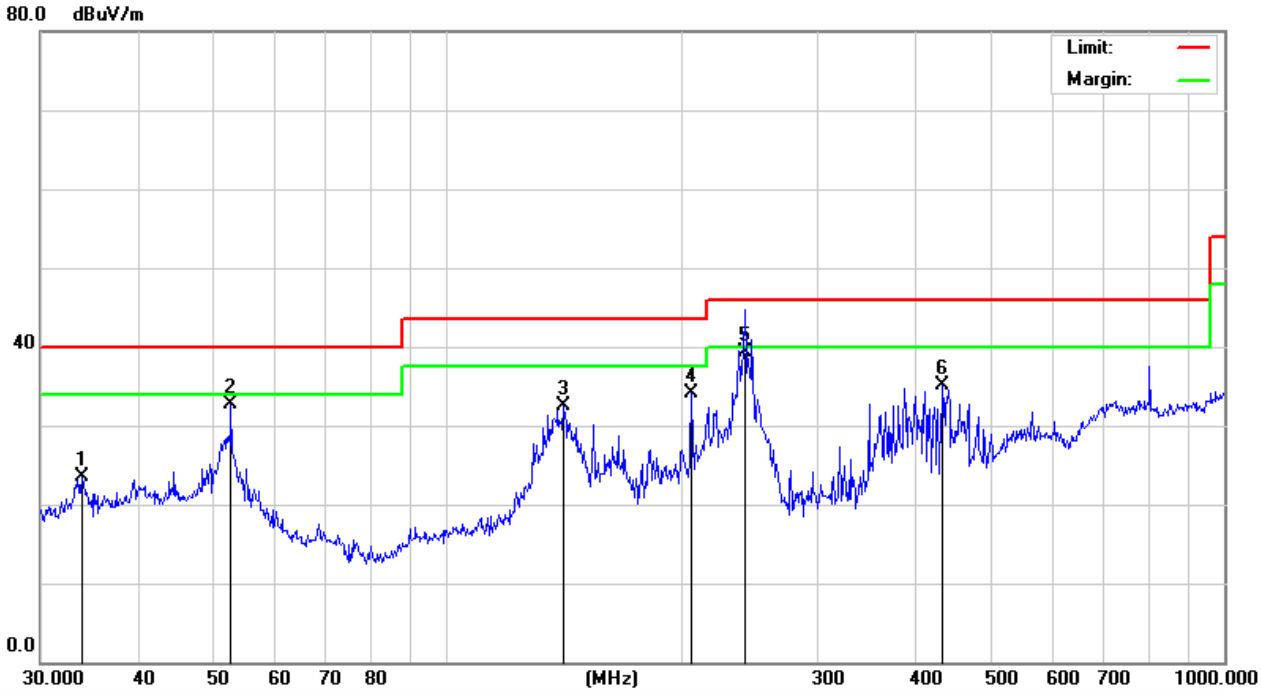
9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Below 1GHz

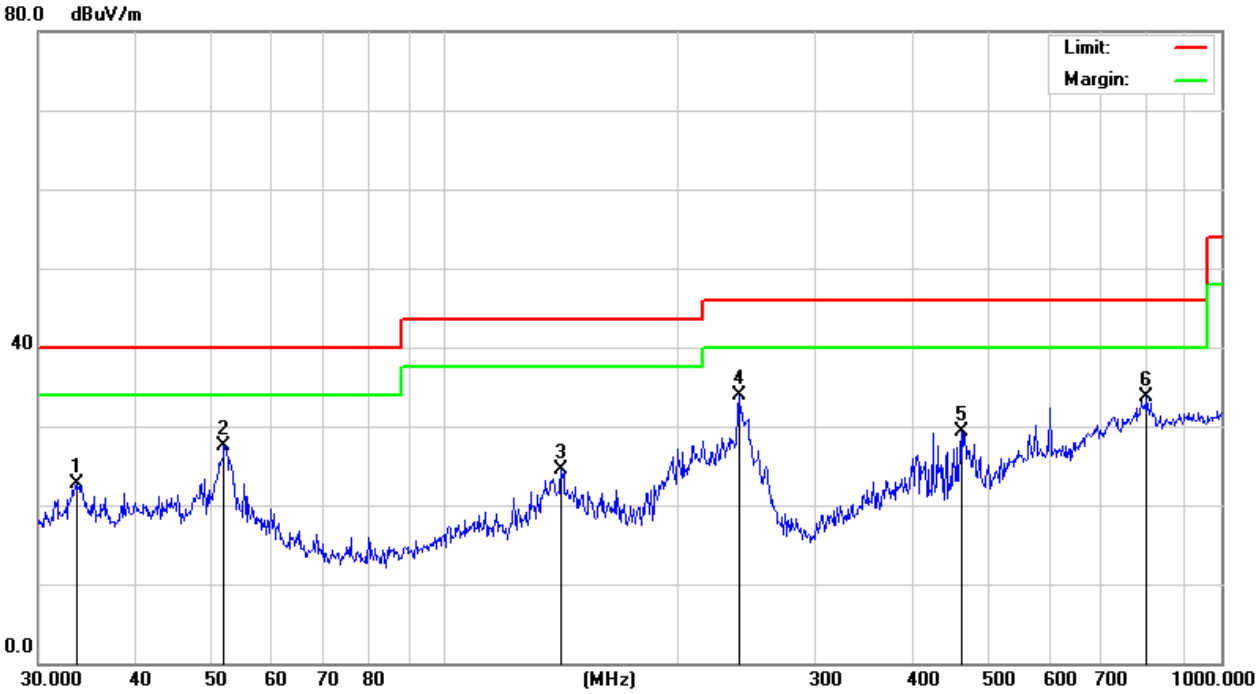
Pre-scan all test modes, found worst case at 802.11ac(HT80), and so only show the test result of 802.11ac(HT80)

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		33.9174	27.18	-3.75	23.43	40.00	-16.57	peak
2		52.7600	36.49	-3.86	32.63	40.00	-7.37	peak
3		141.3298	39.50	-6.94	32.56	43.50	-10.94	peak
4		206.3976	41.30	-7.18	34.12	43.50	-9.38	peak
5	*	241.6763	45.76	-6.51	39.25	46.00	-6.75	QP
6		434.0651	36.04	-0.95	35.09	46.00	-10.91	peak

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		33.5624	27.64	-4.99	22.65	40.00	-17.35	peak
2		52.0251	33.73	-6.26	27.47	40.00	-12.53	peak
3		141.3298	32.07	-7.48	24.59	43.50	-18.91	peak
4	*	239.1473	40.42	-6.60	33.82	46.00	-12.18	peak
5		462.3455	32.65	-3.26	29.39	46.00	-16.61	peak
6		801.7863	26.06	7.67	33.73	46.00	-12.27	peak

Above 1GHz:

802.11a,11n(HT20),11ac(HT20),11n(HT40),11ac(HT40),11ac(HT80) all have been tested,
Only the data of worst case at each channel plan (nominal bandwidth =20MHz, 40MHz, 80MHz) is reported.

Test mode:		802.11a		Test channel:		lowest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11490	32.29	16.82	49.11	74.00	-24.89	PK
V	17235	29.98	22.93	52.91	74.00	-21.09	PK
H	11490	31.09	16.82	47.91	74.00	-26.09	PK
H	17235	29.93	22.93	52.86	74.00	-21.14	PK

Test mode:		802.11a		Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11570	32.49	16.71	49.20	74.00	-24.80	PK
V	17355	28.18	24.37	52.55	74.00	-21.45	PK
H	11570	30.23	16.71	46.94	74.00	-27.06	PK
H	17355	28.48	24.37	52.85	74.00	-21.15	PK

Test mode:		802.11a		Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11650	34.28	16.61	50.89	74.00	-23.11	PK
V	17475	27.05	25.01	52.06	74.00	-21.94	PK
H	11650	32.84	16.61	49.45	74.00	-24.55	PK
H	17475	28.17	25.01	53.18	74.00	-20.82	PK

Test mode:		802.11ac(HT40)		Test channel:		Lowest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11510	32.37	16.78	49.15	74.00	-24.85	PK
V	17265	27.46	23.29	50.75	74.00	-23.25	PK
H	11510	33.65	16.78	50.43	74.00	-23.57	PK
H	17265	28.98	23.29	52.27	74.00	-21.73	PK

Test mode:		802.11ac(HT40)		Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11590	30.78	16.69	47.47	74.00	-26.53	PK
V	17385	26.72	24.73	51.45	74.00	-22.55	PK
H	11590	32.69	16.69	49.38	74.00	-24.62	PK
H	17385	27.15	24.73	51.88	74.00	-22.12	PK

Test mode:		802.11ac(HT80)		Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11550	32.28	16.73	49.01	74.00	-24.99	PK
V	17325	26.72	24.01	50.73	74.00	-23.27	PK
H	11550	29.23	16.73	45.96	74.00	-28.04	PK
H	17325	25.74	24.01	49.75	74.00	-24.25	PK

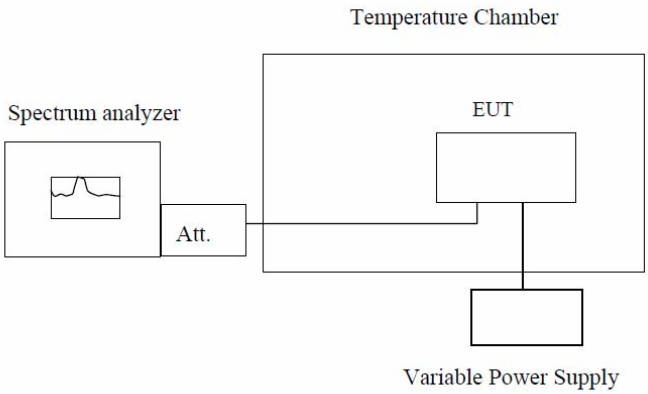
Notes:

1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures 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
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

HT 20MHz					
Frequency stability versus Temp.					
Power Supply: AC 120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.9055	5744.9727	5745.0776	5745.1185
	5785	5785.1369	5784.8660	5785.1099	5785.0922
	5825	5825.1619	5825.0987	5824.9854	5824.9463
-20	5745	5745.0110	5745.1135	5745.0214	5745.0964
	5785	5785.1337	5785.0469	5784.8777	5785.0413
	5825	5825.0684	5824.9309	5825.0781	5824.9953
-10	5745	5745.1078	5745.0858	5745.1418	5745.0162
	5785	5785.1443	5785.0694	5785.0574	5785.1243
	5825	5825.0779	5824.8833	5824.9927	5824.9990
0	5745	5744.9842	5745.0993	5744.9503	5744.9530
	5785	5785.1158	5785.0270	5784.8642	5784.8775
	5825	5825.0622	5825.0644	5824.8513	5825.0589
10	5745	5745.0486	5745.0315	5744.8660	5745.1205
	5785	5784.9064	5785.1680	5784.8641	5785.0557
	5825	5824.9799	5824.8974	5824.8692	5824.9571
20	5745	5744.9309	5745.1265	5744.9795	5745.1486
	5785	5784.8668	5785.0725	5784.9810	5785.1397
	5825	5825.0475	5824.9347	5824.9880	5824.9621
30	5745	5745.0362	5745.0336	5745.0532	5744.9213
	5785	5785.0295	5785.0349	5785.0592	5784.9518
	5825	5824.9634	5824.9642	5825.0640	5825.0428
40	5745	5744.8980	5744.9379	5745.0161	5745.0270
	5785	5785.1513	5785.0227	5785.1509	5785.1092
	5825	5825.0496	5825.1403	5824.9891	5824.9062
50	5745	5745.1163	5744.9877	5744.9932	5745.0214
	5785	5785.1435	5784.9691	5785.1141	5784.8435
	5825	5824.9823	5824.8949	5824.9865	5825.1247

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
108	5745	5745.0698	5745.0112	5745.1695	5745.1158
	5785	5784.9868	5784.8894	5784.9117	5785.0382
	5825	5825.1331	5825.1603	5824.9011	5825.0078
120	5745	5744.9539	5744.9315	5745.0605	5744.9274
	5785	5785.0647	5785.0257	5785.0313	5785.0582
	5825	5824.9941	5824.9947	5825.0288	5824.8652
132	5745	5745.0458	5745.1694	5745.0420	5744.8976
	5785	5785.0740	5784.9871	5785.0559	5785.0749
	5825	5825.0400	5825.0487	5825.0628	5825.0862

HT40 MHz					
Frequency stability versus Temp.					
Power Supply: AC 120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5745.1763	5744.9934	5745.0393	5744.9977
	5785	5784.9678	5785.0433	5785.0935	5784.8431
-20	5825	5824.9614	5825.1995	5825.1433	5824.9910
	5745	5745.0140	5745.0106	5745.0245	5745.0071
-10	5785	5785.0490	5785.0801	5785.1409	5784.9922
	5825	5824.9665	5824.9413	5824.9857	5825.0085
0	5745	5744.9854	5744.9840	5745.1645	5745.0058
	5785	5785.1134	5785.1562	5784.8916	5784.9138
10	5825	5824.8818	5825.0107	5825.0693	5825.1645
	5745	5745.0355	5745.0600	5744.9513	5744.9049
20	5785	5784.9983	5784.8626	5784.8480	5784.8542
	5825	5824.9603	5824.9555	5824.9898	5825.0195
30	5745	5744.8937	5744.9559	5744.9334	5744.8629
	5785	5784.9659	5784.9371	5785.0262	5784.9103
40	5825	5745.0186	5744.9790	5744.8783	5745.1112
	5745	5785.1175	5785.0065	5785.0343	5785.0608
50	5785	5825.1357	5825.0651	5825.0454	5825.0001
	5825	5744.9479	5745.0574	5744.9799	5745.0643

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
108	5745	5745.0999	5745.0672	5745.0858	5744.9545
	5785	5784.9939	5784.9188	5785.0102	5785.0161
120	5825	5825.0237	5825.0116	5825.0095	5824.8605
	5745	5745.0555	5745.0084	5744.8922	5745.0682
132	5785	5785.0865	5785.0499	5785.0963	5785.1827
	5825	5825.1726	5824.8222	5825.0099	5824.9224

HT80 MHz					
Frequency stability versus Temp.					
Power Supply: AC 120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.8731	5745.0311	5744.9208	5745.0676
-20	5785	5785.0209	5784.9756	5785.1207	5784.9817
-10	5825	5825.1222	5824.9462	5825.1052	5824.9156
0	5745	5745.0081	5744.9708	5745.1646	5744.9560
10	5785	5784.8782	5784.9561	5785.0734	5784.9844
20	5825	5825.0681	5824.9075	5824.8928	5825.0424
30	5745	5745.1423	5745.0695	5744.9939	5744.9164
40	5785	5784.9930	5784.9002	5785.0014	5784.9538
50	5825	5825.0103	5825.1105	5825.0195	5825.0215

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
108	5745	5745.1503	5744.9687	5744.9900	5745.0333
120	5785	5785.0764	5785.0106	5785.0339	5784.8790
132	5825	5825.0249	5824.9169	5825.0535	5824.9607

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------END------