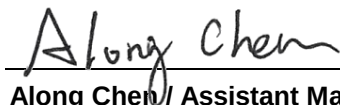


FCC Test Report

FCC ID : 2AMUGTBG100
Equipment : LoRaWAN Gateway
Model No. : TBGW100
Brand Name : Tabs
Applicant : TrackNet, Inc
Address : 900 LAFAYETTE ST #329, SANTA CLARA,
California, United States, 95050
Standard : 47 CFR FCC Part 15.407
Received Date : Oct. 05, 2017
Tested Date : Oct. 12 ~ Nov. 06, 2017

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FR7O0501AN	Rev. 01	Initial issue	Nov. 22, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.318MHz 36.52 (Margin -13.23dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 59.10MHz 38.96 (Margin -1.04dB) – QP	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(e)	6dB bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]: 5150-5250MHz: 17.20 5725-5850MHz: 25.68	Pass
15.407(a)	Peak Power Spectral Density	Meet the requirement of limit	Pass
15.407(g)	Frequency Stability	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS
5150-5250	a	5180-5240	36-48 [4]	2	6-54 Mbps
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	MCS 0-15
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	MCS 0-15
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	2	MCS 0-9
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	2	MCS 0-9
5150-5250	ac (VHT80)	5210	42 [1]	2	MCS 0-9

Note 1: RF output power specifies that Maximum Conducted Output Power.
Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS
5725-5850	a	5745-5825	149-165 [5]	2	6-54 Mbps
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	MCS 0-15
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	MCS 0-15
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	MCS 0-9
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	MCS 0-9
5725-5850	ac (VHT80)	5775	155 [1]	2	MCS 0-9

Note 1: RF output power specifies that Maximum Conducted Output Power.
Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Frequency band (MHz) / Antenna Gain (dBi)		
				2400~2483.5	5150~5250	5725~5850
1	N2410DTR-PK1-G55UR2	Embedded Antenna	I-PEX	2.7	5.7	5.7
2	N2410DBK-T-PK1-G45UR3	Embedded Antenna	I-PEX	2.16	3.78	3.78

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from AC adapter
-------------------	-----------------------

1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	AC adapter 1	Brand: APD Model: WA-24Q12FU Power Rating: I/P: 100-240Vac, 50-60Hz, 0.7A Max. O/P: 12Vdc, 2A Power Line: AC 1.2m non-shielded without core
2	AC adapter 2	Brand: PHIHONG Model: PSAC24A-120L6 Power Rating: I/P: 100-240Vac, 50-60Hz, 0.6A O/P: 12Vdc, 2A Power Line: AC 1.2m non-shielded without core
3	USB cable	1m shielded without core
4	RJ45 (Flat)	1m non-shielded without core

1.1.5 Channel List

For Frequency band 5150-5250 MHz			
802.11 a / HT20 / VHT20		HT40 / VHT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
36	5180	38	5190
40	5200	46	5230
44	5220	VHT80	
48	5240	42	5210

For Frequency band 5725~5850 MHz			
802.11 a / HT20 / VHT20		HT40 / VHT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
149	5745	151	5755
153	5765	159	5795
157	5785	VHT80	
161	5805	155	5775
165	5825	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	Putty, version: 0.6		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11a	88.29%	0.54
	VHT20	87.62%	0.57
	VHT40	77.14%	1.13
	VHT80	63.46%	1.97

1.1.7 Power Setting

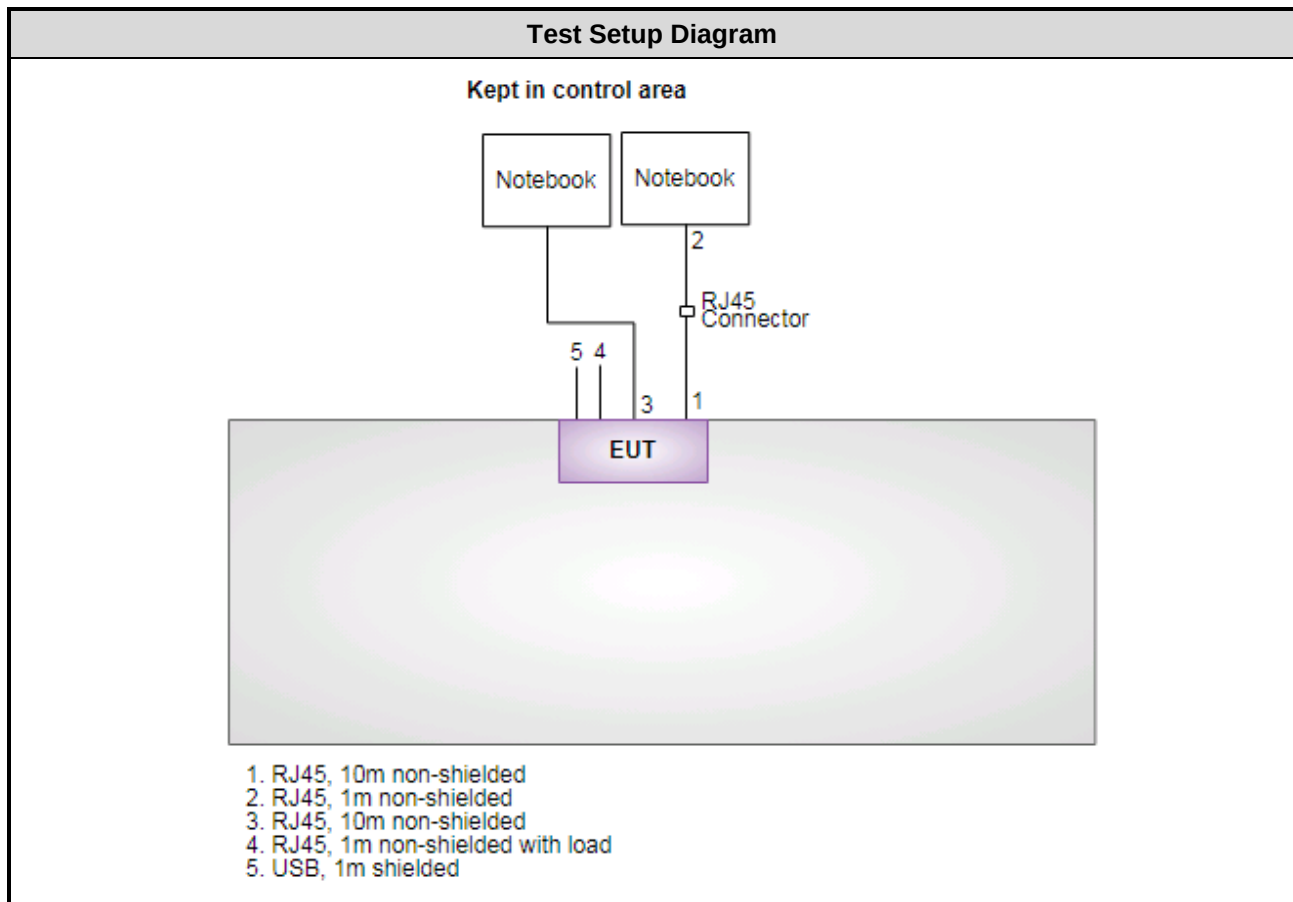
For Frequency band 5150-5250 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5180	7/11
11a	5200	7/11
11a	5240	8/12
HT20	5180	7/11
HT20	5200	7/11
HT20	5240	8/12
HT40	5190	12/16
HT40	5230	13/17
VHT20	5180	7/11
VHT20	5200	7/11
VHT20	5240	8/12
VHT40	5190	12/16
VHT40	5230	13/17
VHT80	5210	11/15

For Frequency band 5725~5850 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5745	32/35
11a	5785	33/35
11a	5825	34/35
HT20	5745	32/35
HT20	5785	33/35
HT20	5825	34/35
HT40	5755	32/35
HT40	5795	33/35
VHT20	5745	32/35
VHT20	5785	33/35
VHT20	5825	34/35
VHT40	5755	32/35
VHT40	5795	33/35
VHT80	5775	24/27

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.
2	Notebook	DELL	Latitude E5420	DoC	RJ45, 10m non-shielded.

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Nov. 06, 2017				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Dec. 21, 2016	Dec. 20, 2017
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 08, 2016	Nov. 07, 2017
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 20, 2016	Dec. 19, 2017
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Oct. 12 ~ Oct. 16, 2017				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 25, 2017	Jul. 24, 2018
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 21, 2016	Dec. 20, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 09, 2016	Dec. 08, 2017
Preamplifier	EMC	EMC02325	980225	Jul. 28, 2017	Jul. 27, 2018
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2017	Oct. 05, 2018
Preamplifier	EMC	EMC184045B	980192	Aug. 22, 2017	Aug. 21, 2018
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 09, 2016	Dec. 08, 2017
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 09, 2016	Dec. 08, 2017
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 09, 2016	Dec. 08, 2017
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 09, 2016	Dec. 08, 2017
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Oct. 30 ~ Nov. 01, 2017				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
Power Meter	Anritsu	ML2495A	1241002	Oct. 16, 2017	Oct. 15, 2018
Power Sensor	Anritsu	MA2411B	1207366	Oct. 16, 2017	Oct. 15, 2018
Signal Generator	R&S	SMB100A	175727	Oct. 26, 2017	Oct. 25, 2018
AC POWER SOURCE	G.W .	APS-9102	EL920581	Jun. 03, 2017	Jun. 02, 2018
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.407

ANSI C63.10-2013

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04

FCC KDB 644545 D03 Guidance for IEEE 802.11ac New Rules v01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Conducted power	± 0.808 dB
Frequency error	± 34.134 Hz
Power density	± 0.463 dB
Conducted emission	± 2.670 dB
AC conducted emission	± 2.90 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.63 dB
Time	$\pm 0.1\%$
Temperature	± 0.6 °C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 59%	Alex Tsai
Radiated Emissions	03CH01-WS	25°C / 64-66%	Aska Huang Vincent Yeh
RF Conducted	TH01-WS	22°C / 64%	Brad Wu

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

For Frequency band 5150-5250 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	VHT40	5190	6 Mbps	---
Radiated Emissions ≤1GHz	VHT40	5190	6 Mbps	---
RF Output Power	11a	5180 / 5200 / 5240	6 Mbps	---
	HT20	5180 / 5200 / 5240	MCS 0	
	HT40	5190 / 5230	MCS 0	
	VHT20	5180 / 5200 / 5240	MCS 0	
	VHT40	5190 / 5230	MCS 0	
	VHT80	5210	MCS 0	
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	11a	5180 / 5200 / 5240	6 Mbps	---
	VHT20	5180 / 5200 / 5240	MCS 0	
	VHT40	5190 / 5230	MCS 0	
	VHT80	5210	MCS 0	
Frequency Stability	Un-modulation	5200	---	---
NOTE:				
1. Two adapters (APD & PHIHONG) had been covered during the pretest and found that PHIHONG adapter was the worst case and was selected for final testing.				

For Frequency band 5725-5850 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	11a	5745	6 Mbps	---
Radiated Emissions ≤ 1 GHz	11a	5745	6 Mbps	---
RF Output Power	11a	5745 / 5785 / 5825	6 Mbps	---
	HT20	5745 / 5785 / 5825	MCS 0	
	HT40	5755 / 5795	MCS 0	
	VHT20	5745 / 5785 / 5825	MCS 0	
	VHT40	5755 / 5795	MCS 0	
	VHT80	5775	MCS 0	
Radiated Emissions > 1 GHz	11a	5745 / 5785 / 5825	6 Mbps	---
Emission Bandwidth	VHT20	5745 / 5785 / 5825	MCS 0	
6dB bandwidth	VHT40	5755 / 5795	MCS 0	
Peak Power Spectral Density	VHT80	5775	MCS 0	
Frequency Stability	Un-modulation	5785	---	---
NOTE: 1. Two adapters (APD & PHIHONG) had been covered during the pretest and found that PHIHONG adapter was the worst case and was selected for final testing.				

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

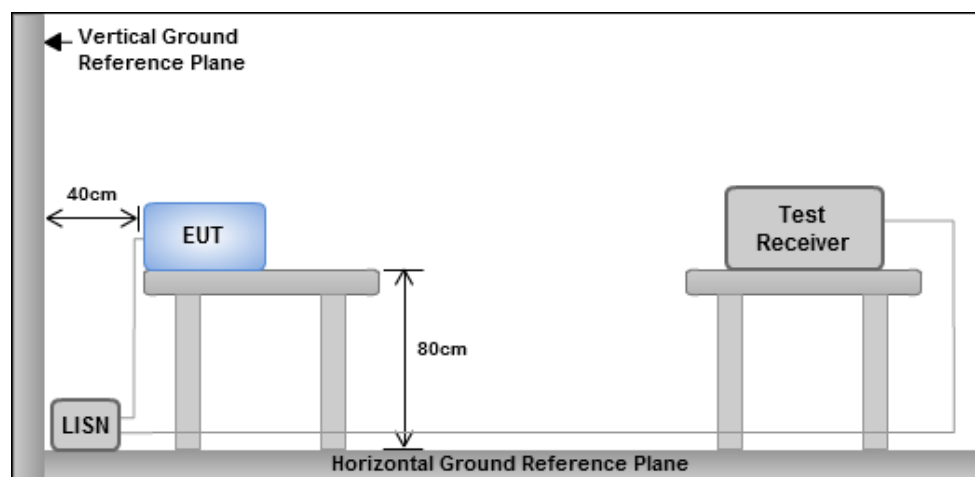
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.1.2 Test Procedures

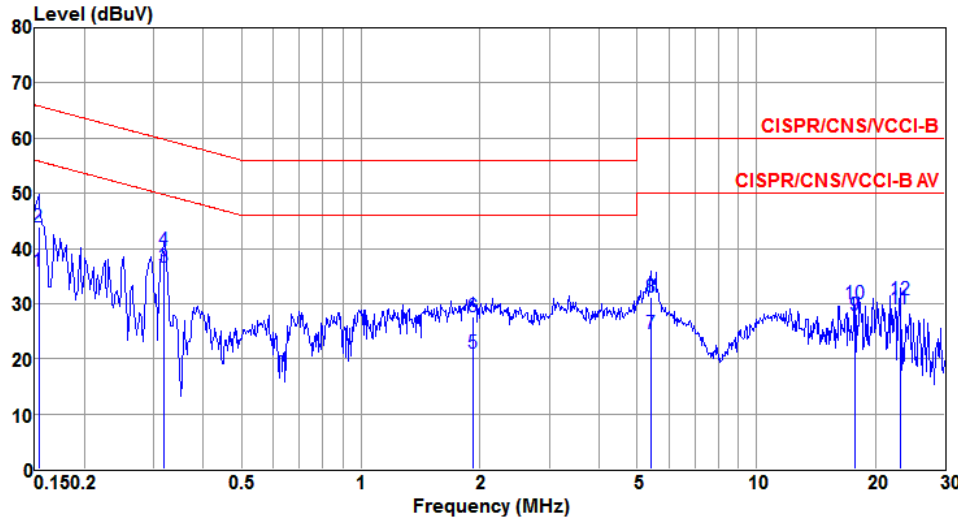
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

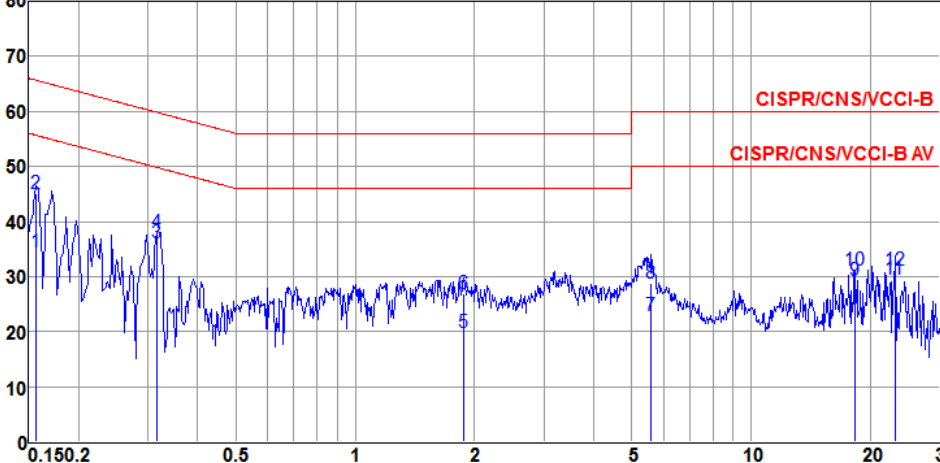
3.1.3 Test Setup



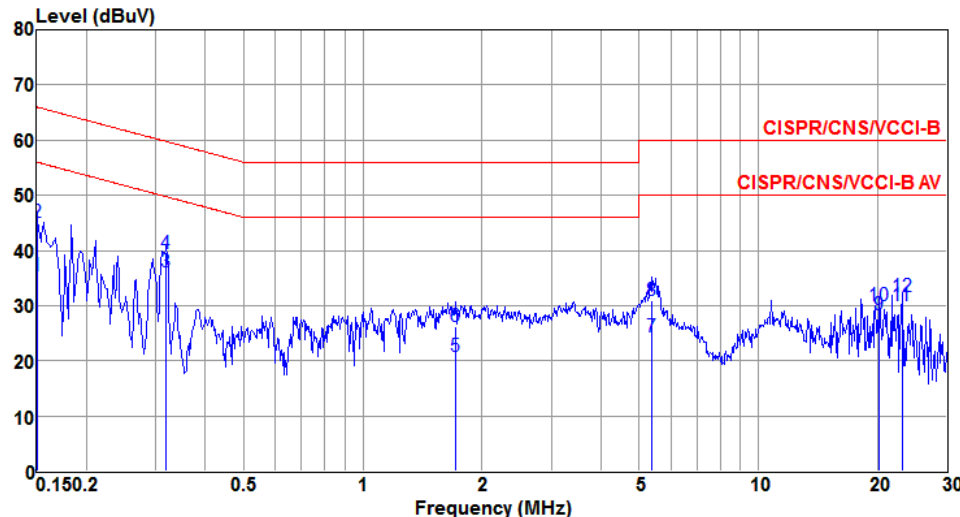
- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

Modulation	VHT40	Test Freq. (MHz)	5190																																																																																																																																							
Power Phase	Line																																																																																																																																									
Level (dBUV)  <table><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>LISN</th><th>cable</th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Line</th><th>Limit</th><th>Level</th><th>factor</th><th>loss</th><th>Remark</th></tr><tr><th></th><th></th><th></th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr><tr><td>1</td><td>0.153</td><td>35.77</td><td>55.82</td><td>-20.05</td><td>35.66</td><td>0.07</td><td>0.04</td><td>Average</td></tr><tr><td>2</td><td>0.153</td><td>43.91</td><td>65.82</td><td>-21.91</td><td>43.80</td><td>0.07</td><td>0.04</td><td>QP</td></tr><tr><td>3</td><td>0.318</td><td>36.52</td><td>49.75</td><td>-13.23</td><td>36.35</td><td>0.13</td><td>0.04</td><td>Average</td></tr><tr><td>4</td><td>0.318</td><td>39.64</td><td>59.75</td><td>-20.11</td><td>39.47</td><td>0.13</td><td>0.04</td><td>QP</td></tr><tr><td>5</td><td>1.918</td><td>21.09</td><td>46.00</td><td>-24.91</td><td>20.94</td><td>0.11</td><td>0.04</td><td>Average</td></tr><tr><td>6</td><td>1.918</td><td>27.71</td><td>56.00</td><td>-28.29</td><td>27.56</td><td>0.11</td><td>0.04</td><td>QP</td></tr><tr><td>7</td><td>5.419</td><td>24.59</td><td>50.00</td><td>-25.41</td><td>24.20</td><td>0.21</td><td>0.18</td><td>Average</td></tr><tr><td>8</td><td>5.419</td><td>31.24</td><td>60.00</td><td>-28.76</td><td>30.85</td><td>0.21</td><td>0.18</td><td>QP</td></tr><tr><td>9</td><td>17.694</td><td>27.87</td><td>50.00</td><td>-22.13</td><td>27.32</td><td>0.30</td><td>0.25</td><td>Average</td></tr><tr><td>10</td><td>17.694</td><td>29.90</td><td>60.00</td><td>-30.10</td><td>29.35</td><td>0.30</td><td>0.25</td><td>QP</td></tr><tr><td>11</td><td>23.128</td><td>28.98</td><td>50.00</td><td>-21.02</td><td>28.35</td><td>0.35</td><td>0.28</td><td>Average</td></tr><tr><td>12</td><td>23.128</td><td>30.59</td><td>60.00</td><td>-29.41</td><td>29.96</td><td>0.35</td><td>0.28</td><td>QP</td></tr></table> Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB). Note 2: Over Limit (dB) = Level (dBUV) – Limit Line (dBUV).					Freq	Level	Limit	Over	Read	LISN	cable			MHz	dBuV	Line	Limit	Level	factor	loss	Remark				dBuV	dB	dBuV	dB	dB		1	0.153	35.77	55.82	-20.05	35.66	0.07	0.04	Average	2	0.153	43.91	65.82	-21.91	43.80	0.07	0.04	QP	3	0.318	36.52	49.75	-13.23	36.35	0.13	0.04	Average	4	0.318	39.64	59.75	-20.11	39.47	0.13	0.04	QP	5	1.918	21.09	46.00	-24.91	20.94	0.11	0.04	Average	6	1.918	27.71	56.00	-28.29	27.56	0.11	0.04	QP	7	5.419	24.59	50.00	-25.41	24.20	0.21	0.18	Average	8	5.419	31.24	60.00	-28.76	30.85	0.21	0.18	QP	9	17.694	27.87	50.00	-22.13	27.32	0.30	0.25	Average	10	17.694	29.90	60.00	-30.10	29.35	0.30	0.25	QP	11	23.128	28.98	50.00	-21.02	28.35	0.35	0.28	Average	12	23.128	30.59	60.00	-29.41	29.96	0.35	0.28	QP
	Freq	Level	Limit	Over	Read	LISN	cable																																																																																																																																			
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Modulation	VHT40	Test Freq. (MHz)	5190																																																																																																																																							
Power Phase	Neutral																																																																																																																																									
Level (dBuV)  Frequency (MHz) <table><thead><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>LISN</th><th>cable</th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>dBuV</th><th>dB</th><th>dBuV</th><th>factor</th><th>loss</th><th>Remark</th></tr><tr><th></th><th></th><th></th><th></th><th></th><th></th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>0.156</td><td>34.42</td><td>55.69</td><td>-21.27</td><td>34.33</td><td>0.05</td><td>0.04</td><td>Average</td></tr><tr><td>2</td><td>0.156</td><td>45.10</td><td>65.69</td><td>-20.59</td><td>45.01</td><td>0.05</td><td>0.04</td><td>QP</td></tr><tr><td>3@</td><td>0.315</td><td>36.14</td><td>49.84</td><td>-13.70</td><td>35.99</td><td>0.11</td><td>0.04</td><td>Average</td></tr><tr><td>4</td><td>0.315</td><td>37.90</td><td>59.84</td><td>-21.94</td><td>37.75</td><td>0.11</td><td>0.04</td><td>QP</td></tr><tr><td>5</td><td>1.878</td><td>19.95</td><td>46.00</td><td>-26.05</td><td>19.80</td><td>0.11</td><td>0.04</td><td>Average</td></tr><tr><td>6</td><td>1.878</td><td>27.00</td><td>56.00</td><td>-29.00</td><td>26.85</td><td>0.11</td><td>0.04</td><td>QP</td></tr><tr><td>7</td><td>5.594</td><td>22.83</td><td>50.00</td><td>-27.17</td><td>22.45</td><td>0.20</td><td>0.18</td><td>Average</td></tr><tr><td>8</td><td>5.594</td><td>28.68</td><td>60.00</td><td>-31.32</td><td>28.30</td><td>0.20</td><td>0.18</td><td>QP</td></tr><tr><td>9</td><td>18.243</td><td>29.33</td><td>50.00</td><td>-20.67</td><td>28.74</td><td>0.34</td><td>0.25</td><td>Average</td></tr><tr><td>10</td><td>18.243</td><td>31.19</td><td>60.00</td><td>-28.81</td><td>30.60</td><td>0.34</td><td>0.25</td><td>QP</td></tr><tr><td>11</td><td>23.128</td><td>29.57</td><td>50.00</td><td>-20.43</td><td>28.89</td><td>0.40</td><td>0.28</td><td>Average</td></tr><tr><td>12</td><td>23.128</td><td>31.20</td><td>60.00</td><td>-28.80</td><td>30.52</td><td>0.40</td><td>0.28</td><td>QP</td></tr></tbody></table>					Freq	Level	Limit	Over	Read	LISN	cable			MHz	dBuV	dBuV	dB	dBuV	factor	loss	Remark							dB	dB		1	0.156	34.42	55.69	-21.27	34.33	0.05	0.04	Average	2	0.156	45.10	65.69	-20.59	45.01	0.05	0.04	QP	3@	0.315	36.14	49.84	-13.70	35.99	0.11	0.04	Average	4	0.315	37.90	59.84	-21.94	37.75	0.11	0.04	QP	5	1.878	19.95	46.00	-26.05	19.80	0.11	0.04	Average	6	1.878	27.00	56.00	-29.00	26.85	0.11	0.04	QP	7	5.594	22.83	50.00	-27.17	22.45	0.20	0.18	Average	8	5.594	28.68	60.00	-31.32	28.30	0.20	0.18	QP	9	18.243	29.33	50.00	-20.67	28.74	0.34	0.25	Average	10	18.243	31.19	60.00	-28.81	30.60	0.34	0.25	QP	11	23.128	29.57	50.00	-20.43	28.89	0.40	0.28	Average	12	23.128	31.20	60.00	-28.80	30.52	0.40	0.28	QP
	Freq	Level	Limit	Over	Read	LISN	cable																																																																																																																																			
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						dB	dB																																																																																																																																			
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Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB). Note 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).																																																																																																																																										

Modulation	11a	Test Freq. (MHz)	5745
Power Phase	Line		



	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.150	35.39	56.00	-20.61	35.28	0.07	0.04	Average
2	0.150	45.11	66.00	-20.89	45.00	0.07	0.04	QP
3@	0.318	36.11	49.75	-13.64	35.94	0.13	0.04	Average
4	0.318	39.38	59.75	-20.37	39.21	0.13	0.04	QP
5	1.716	20.67	46.00	-25.33	20.51	0.12	0.04	Average
6	1.716	26.30	56.00	-29.70	26.14	0.12	0.04	QP
7	5.362	24.31	50.00	-25.69	23.92	0.21	0.18	Average
8	5.362	31.03	60.00	-28.97	30.64	0.21	0.18	QP
9	20.258	28.22	50.00	-21.78	27.65	0.31	0.26	Average
10	20.258	30.07	60.00	-29.93	29.50	0.31	0.26	QP
11	23.128	30.01	50.00	-19.99	29.38	0.35	0.28	Average
12	23.128	31.62	60.00	-28.38	30.99	0.35	0.28	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

Note 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	11a	Test Freq. (MHz)	5745
Power Phase	Neutral		
Level (dBuV)			

3.2 Emission Bandwidth

3.2.1 Limit of Emission bandwidth

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.2.2 Test Procedures

26dB Bandwidth

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW, Detector = Peak.
3. Trace mode = max hold.
4. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

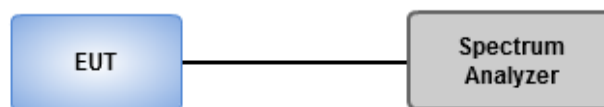
Occupied Bandwidth

1. Set RBW = 1 % to 5 % of the OBW
2. Set VBW $\geq$ 3 RBW
3. Sample detection and single sweep mode shall be used
4. Use the 99 % power bandwidth function of the instrument

6dB Bandwidth

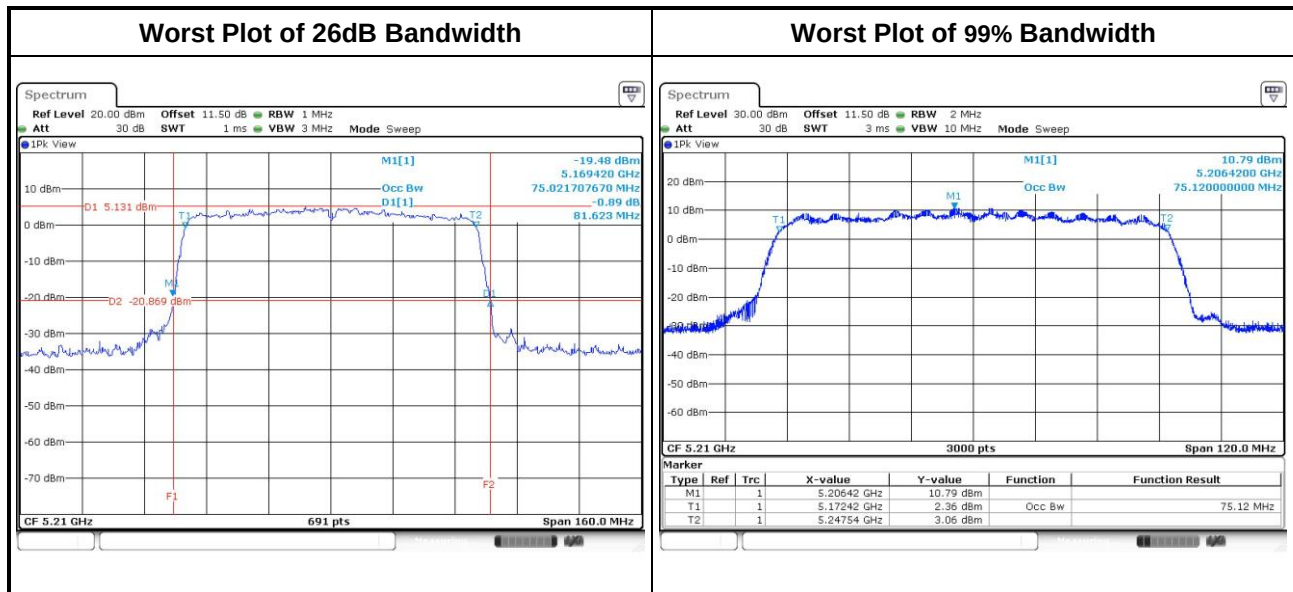
1. Set RBW = 100kHz, VBW = 300kHz
2. Detector = Peak, Trace mode = max hold.
3. Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.2.3 Test Setup



3.2.4 Test Result of Emission Bandwidth

For Frequency band 5150-5250 MHz										
Emission Bandwidth										
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
11a	2	5180	19.94	20.17	---	---	16.81	16.82	---	---
11a	2	5200	20.12	20.12	---	---	16.82	16.84	---	---
11a	2	5240	20.00	20.06	---	---	16.83	16.84	---	---
VHT20	2	5180	20.35	20.35	---	---	17.68	17.70	---	---
VHT20	2	5200	20.41	20.46	---	---	17.68	17.69	---	---
VHT20	2	5240	20.35	20.41	---	---	17.69	17.69	---	---
VHT40	2	5190	41.74	41.86	---	---	36.14	36.14	---	---
VHT40	2	5230	41.74	41.62	---	---	36.16	36.16	---	---
VHT80	2	5210	81.62	81.39	---	---	75.12	75.12	---	---

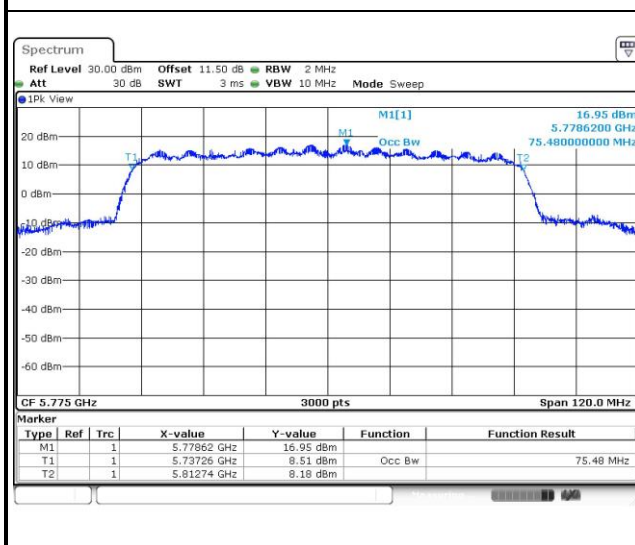


For Frequency band 5725-5850 MHz

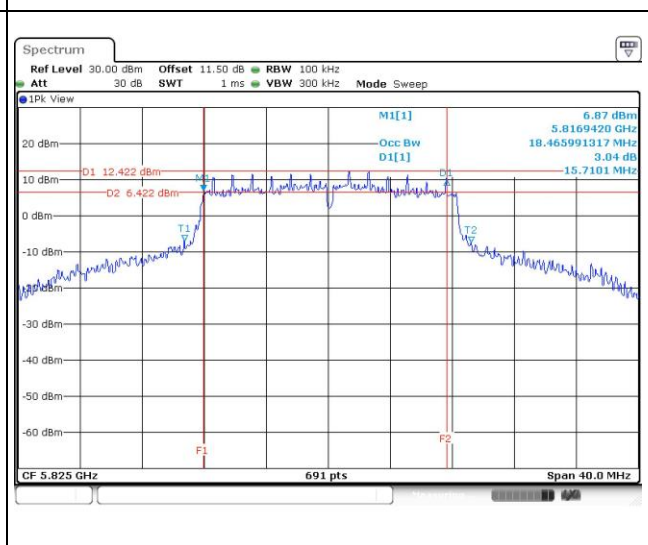
Emission Bandwidth

Mode	N _{TX}	Freq. (MHz)	OBW Bandwidth (MHz)				6dB Bandwidth (MHz)				6dB BW Limit (MHz)
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	
11a	2	5745	17.69	17.48	---	---	16.29	16.06	---	---	0.5
11a	2	5785	18.07	17.55	---	---	15.88	16.06	---	---	0.5
11a	2	5825	17.87	17.87	---	---	15.71	16.06	---	---	0.5
VHT20	2	5745	18.41	18.33	---	---	17.33	16.93	---	---	0.5
VHT20	2	5785	18.86	18.35	---	---	16.81	16.52	---	---	0.5
VHT20	2	5825	19.01	18.42	---	---	15.94	16.52	---	---	0.5
VHT40	2	5755	37.56	37.22	---	---	35.24	35.25	---	---	0.5
VHT40	2	5795	37.56	37.26	---	---	35.25	35.25	---	---	0.5
VHT80	2	5775	75.48	75.48	---	---	75.13	75.36	---	---	0.5

Worst Plot of 99% Bandwidth



Worst Plot of 6dB Bandwidth



3.3 RF Output Power

3.3.1 Limit of RF Output Power

Frequency band 5150-5250 MHz		
Operating Mode		Limit
☐	Outdoor access point	Conducted Power: 1 W The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)
☒	Indoor access point	Conducted Power: 1 W
☐	Fixed point-to-point access points	Conducted Power: 1 W
☐	Client devices	Conducted Power: 250 mW

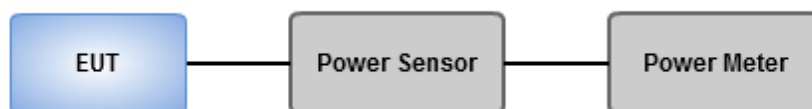
Frequency Band (MHz)	Limit
☐ 5250 ~ 5350	250mW or 11dBm+10 log B
☐ 5470 ~ 5725	250mW or 11dBm+10 log B
☒ 5725 ~ 5850	1 W

Note: "B" is the 26dB emission bandwidth in MHz.

3.3.2 Test Procedures

- ☒ **Method PM-G (Measurement using a gated RF average power meter)**
 - ☒ Measurements may is 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.

3.3.3 Test Setup



3.3.4 Test Result of Maximum Conducted Output Power

For Frequency band 5150-5250 MHz									
Mode	N _{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11a	2	5180	11.43	11.59	---	---	28.321	14.52	30.00
11a	2	5200	11.46	11.48	---	---	28.056	14.48	30.00
11a	2	5240	11.42	11.51	---	---	28.025	14.48	30.00
HT20	2	5180	11.31	11.47	---	---	27.549	14.40	30.00
HT20	2	5200	11.40	11.48	---	---	27.864	14.45	30.00
HT20	2	5240	11.35	11.52	---	---	27.836	14.45	30.00
HT40	2	5190	14.05	14.17	---	---	51.531	17.12	30.00
HT40	2	5230	14.01	14.15	---	---	51.178	17.09	30.00
VHT20	2	5180	11.34	11.53	---	---	27.838	14.45	30.00
VHT20	2	5200	11.43	11.5	---	---	28.025	14.48	30.00
VHT20	2	5240	11.4	11.57	---	---	28.159	14.50	30.00
VHT40	2	5190	14.14	14.23	---	---	52.427	17.20	30.00
VHT40	2	5230	14.02	14.19	---	---	51.477	17.12	30.00
VHT80	2	5210	13.92	14.10	---	---	50.364	17.02	30.00

For Frequency band 5725-5850 MHz									
Mode	N _{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11a	2	5745	22.76	22.58	---	---	369.933	25.68	30.00
11a	2	5785	22.58	22.53	---	---	360.195	25.57	30.00
11a	2	5825	22.51	22.48	---	---	355.249	25.51	30.00
HT20	2	5745	22.65	22.45	---	---	359.870	25.56	30.00
HT20	2	5785	22.69	22.47	---	---	362.384	25.59	30.00
HT20	2	5825	22.51	22.49	---	---	355.657	25.51	30.00
HT40	2	5755	22.56	22.42	---	---	354.884	25.50	30.00
HT40	2	5795	22.61	22.48	---	---	359.400	25.56	30.00
VHT20	2	5745	22.68	22.47	---	---	361.957	25.59	30.00
VHT20	2	5785	22.73	22.49	---	---	364.918	25.62	30.00
VHT20	2	5825	22.54	22.55	---	---	359.360	25.56	30.00
VHT40	2	5755	22.58	22.41	---	---	355.315	25.51	30.00
VHT40	2	5795	22.64	22.51	---	---	361.892	25.59	30.00
VHT80	2	5775	19.92	20.16	---	---	201.928	23.05	30.00

3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

Frequency band 5150-5250 MHz		
Operating Mode		Limit
☐	Outdoor access point	17 dBm / MHz
☒	Indoor access point	17 dBm / MHz
☐	Fixed point-to-point access points	17 dBm / MHz
☐	Client devices	11 dBm / MHz

Frequency Band (MHz)		Limit
☐	5250 ~ 5350	11 dBm / MHz
☐	5470 ~ 5725	11 dBm / MHz
☒	5725 ~ 5850	30 dBm / 500 kHz

3.4.2 Test Procedures

For 5150 ~ 5250 MHz

☐ Method SA-1

1. Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
2. Trace average 100 traces.
3. Use the peak marker function to determine the maximum amplitude level.

☒ Method SA-2 Alternative

1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
2. Set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add $10 \log(1/x)$, where x is the duty cycle.

For 5725 ~ 5850 MHz

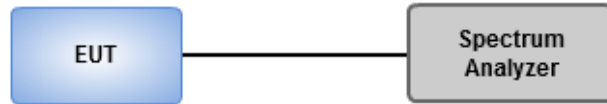
☐ Method SA-1

1. Set RBW = 500 kHz, VBW = 2 MHz, Sweep time = auto, Detector = RMS.
2. Trace average 100 traces.
3. Use the peak marker function to determine the maximum amplitude level.

☒ Method SA-2 Alternative

1. Set RBW = 500 kHz, VBW = 2 MHz, Detector = RMS.
2. Set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add $10 \log(1/x)$, where x is the duty cycle.

3.4.3 Test Setup

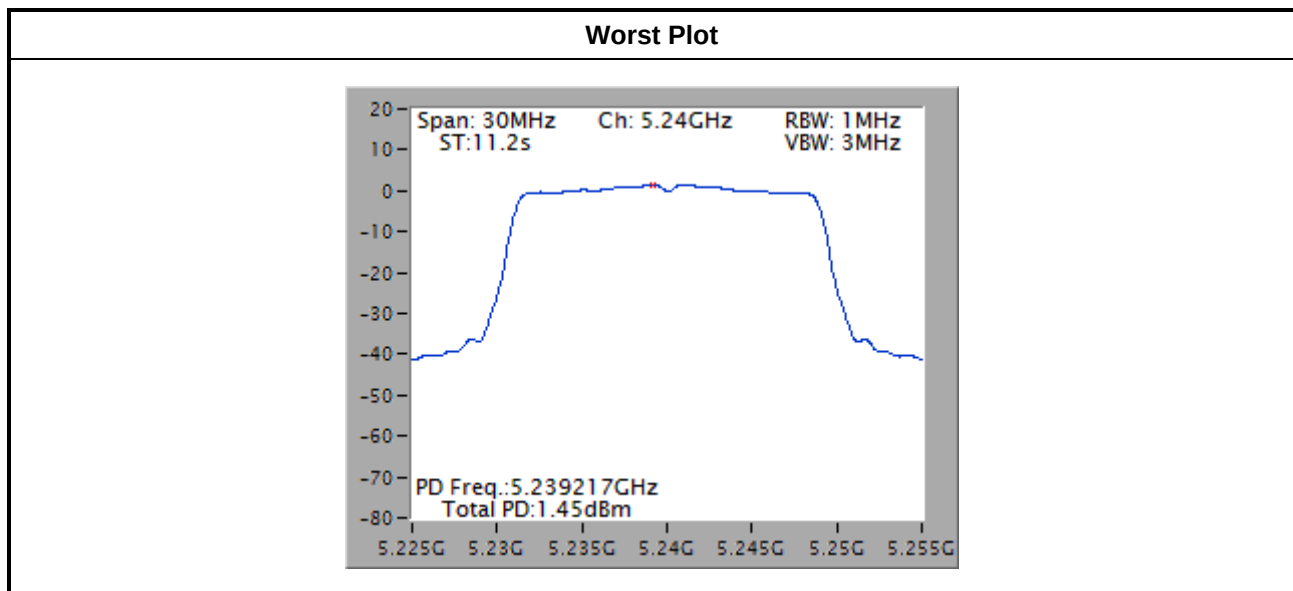


3.4.4 Test Result of Peak Power Spectral Density

For Frequency band 5150-5250 MHz						
Condition			Peak Power Spectral Density (dBm/MHz)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)
11a	2	5180	1.38	0.54	1.92	15.2
11a	2	5200	1.42	0.54	1.96	15.2
11a	2	5240	1.46	0.54	2.00	15.2
VHT20	2	5180	1.04	0.57	1.61	15.2
VHT20	2	5200	1.14	0.57	1.71	15.2
VHT20	2	5240	1.45	0.57	2.02	15.2
VHT40	2	5190	0.20	1.13	1.33	15.2
VHT40	2	5230	0.17	1.13	1.30	15.2
VHT80	2	5210	-4.03	1.97	-2.06	15.2

Note:

1. D.F is duty factor.
2. Test results are bin-by-bin summing measured value of each TX port.
3. Directional gain = $10 * \log((10^{5.7/20} + 10^{3.78/20})^2 / 2) = 7.8 \text{ dBi} > 6 \text{ dBi}$
Limit shall be reduced to $17 \text{ dBm} - (7.8 \text{ dBi} - 6 \text{ dBi}) = 15.2 \text{ dBm}$

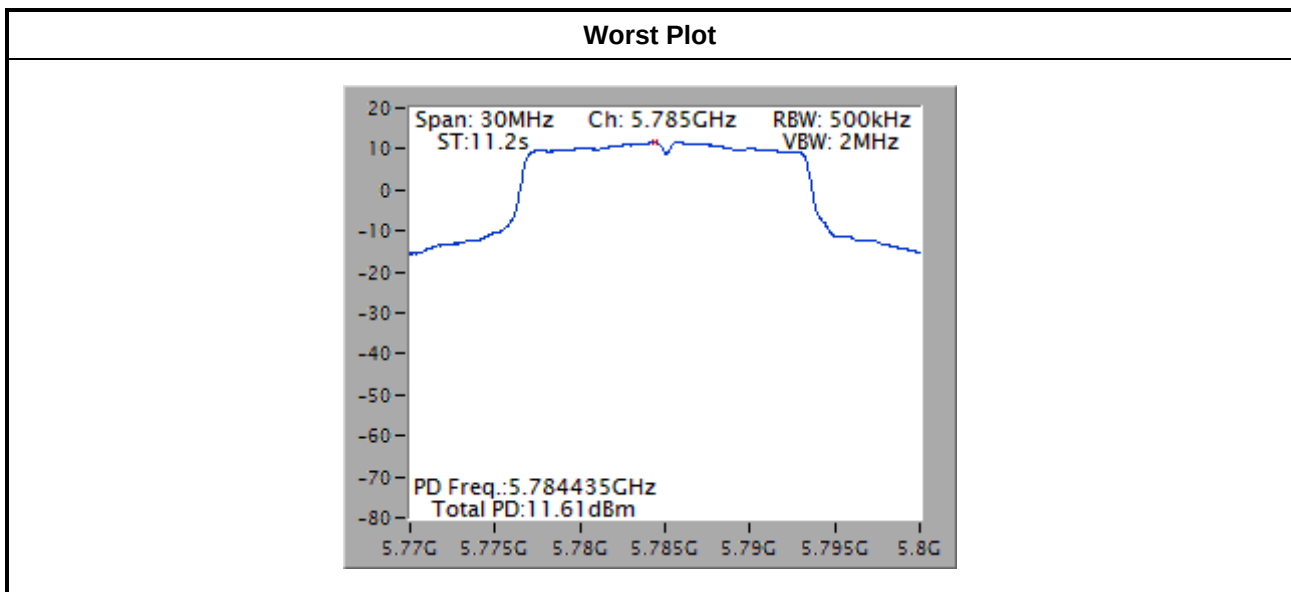


Note: Worst plot is w/o duty factor.

For Frequency band 5725-5850 MHz						
Condition			Peak Power Spectral Density (dBm/500kHz)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)
11a	2	5745	11.53	0.54	12.07	28.20
11a	2	5785	11.61	0.54	12.15	28.20
11a	2	5825	11.48	0.54	12.02	28.20
VHT20	2	5745	11.36	0.57	11.93	28.20
VHT20	2	5785	11.07	0.57	11.64	28.20
VHT20	2	5825	11.12	0.57	11.69	28.20
VHT40	2	5755	7.60	1.13	8.73	28.20
VHT40	2	5795	7.66	1.13	8.79	28.20
VHT80	2	5775	1.03	1.97	3.00	28.20

Note:

1. D.F is duty factor.
2. Test results are bin-by-bin summing measured value of each TX port.
4. Directional gain = $10 * \log((10^{5.7/20} + 10^{3.78/20})^2 / 2) = 7.8 \text{ dBi} > 6 \text{ dBi}$
3. Limit shall be reduced to $30 \text{ dBm} - (7.8 \text{ dBi} - 6 \text{ dBi}) = 28.20 \text{ dBm}$



Note: Worst plot is w/o duty factor.

3.5 Transmitter Radiated and Band Edge Emissions

3.5.1 Limit of Transmitter Radiated and Band Edge Emissions

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Un-restricted band emissions above 1GHz Limit		
Operating Band	Limit	
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]	
5.725 - 5.850 GHz	☒	15.407(b)(4)(i) 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.
	☐	15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see § 15.205(c))

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

3.5.2 Test Procedures

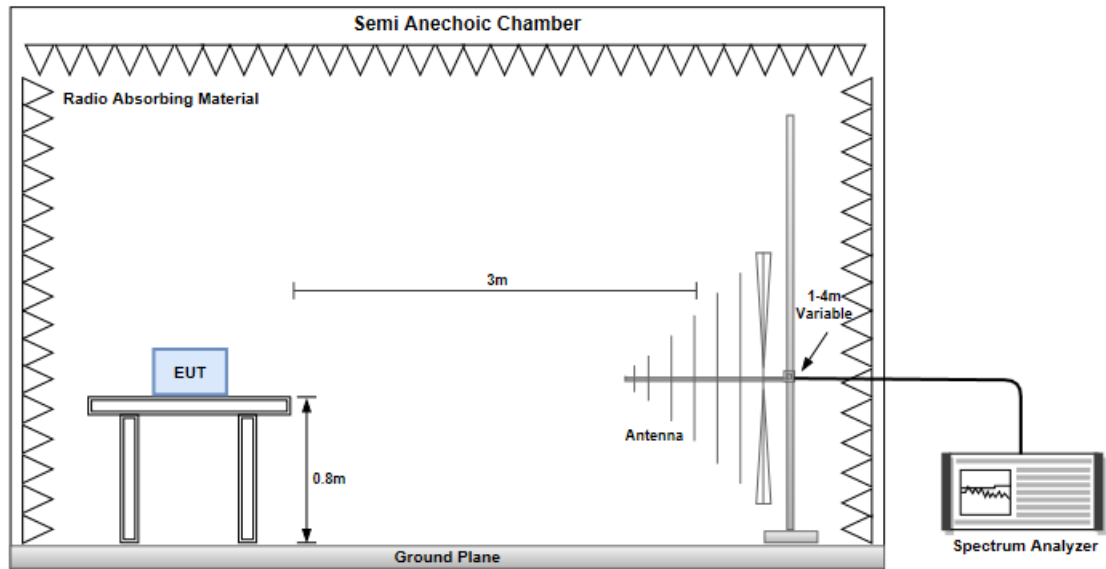
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360° . A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360° , the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

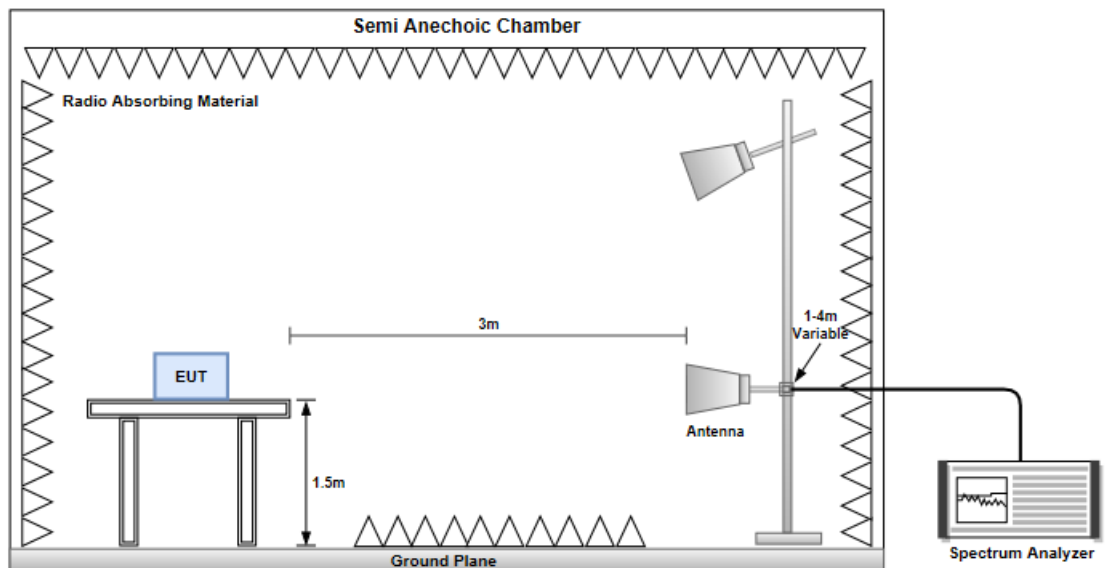
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.5.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Vertical		
Level (dBuV/m)			

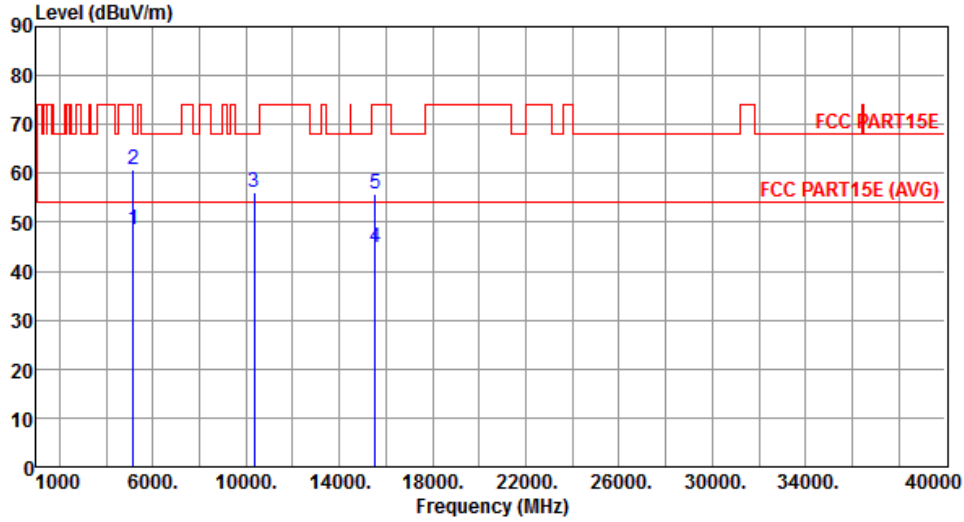
Modulation	11a	Test Freq. (MHz)	5745
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11a	Test Freq. (MHz)	5745
Polarization	Vertical		
Level (dBuV/m) </			

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a

Modulation	11a	Test Freq. (MHz)	5180
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	48.32	54.00	-5.68	43.91	4.41	Average	177	96
2	5150.00	60.92	74.00	-13.08	56.51	4.41	Peak	177	96
3	10360.00	55.97	68.20	-12.23	42.30	13.67	Peak	100	134
4	15540.00	44.90	54.00	-9.10	30.62	14.28	Average	100	278
5	15540.00	55.75	74.00	-18.25	41.47	14.28	Peak	100	278

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

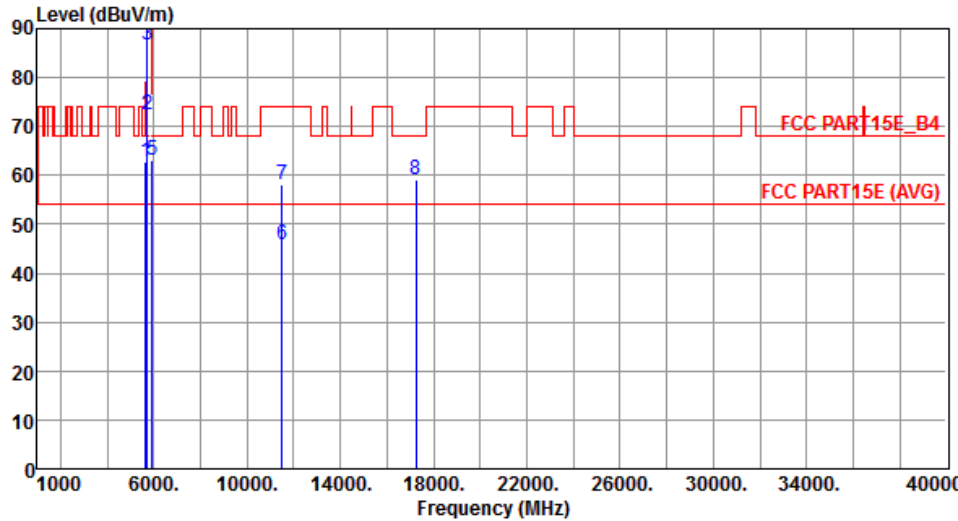
Modulation	11a	Test Freq. (MHz)	5200
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	11a	Test Freq. (MHz)	5200
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	11a	Test Freq. (MHz)	5240
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11a	Test Freq. (MHz)	5240
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	11a	Test Freq. (MHz)	5745
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	62.61	68.20	-5.59	57.52	5.09	Peak	375	262
2	5700.00	72.26	105.20	-32.94	67.10	5.16	Peak	375	262
3	5720.00	86.70	110.80	-24.10	81.52	5.18	Peak	375	262
4	5725.00	92.45	122.20	-29.75	87.26	5.19	Peak	375	262
5	5925.00	63.11	68.20	-5.09	57.68	5.43	Peak	375	262
6	11490.00	45.93	54.00	-8.07	31.41	14.52	Average	152	131
7	11490.00	58.18	74.00	-15.82	43.66	14.52	Peak	152	131
8	17235.00	59.24	68.20	-8.96	41.77	17.47	Peak	100	331

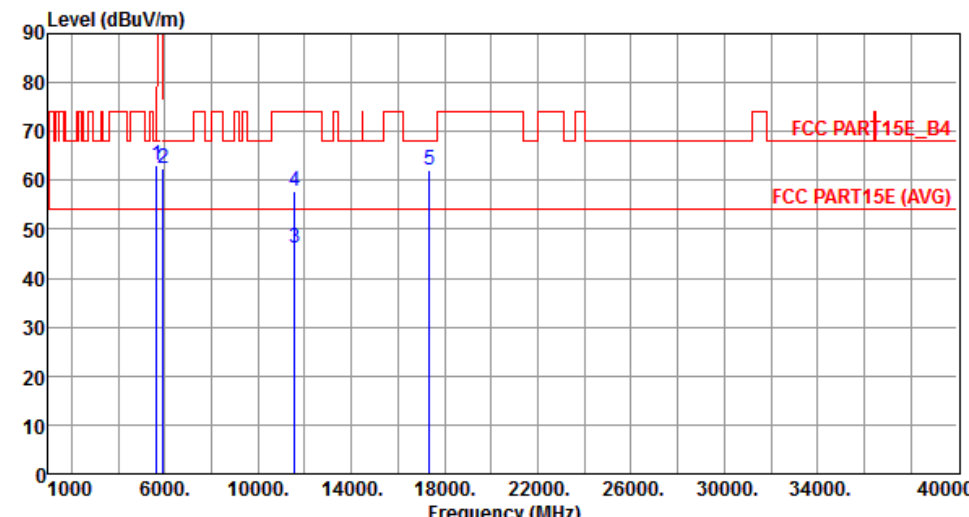
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	11a	Test Freq. (MHz)	5745
Polarization	Vertical		
Level (dBuV/m)			

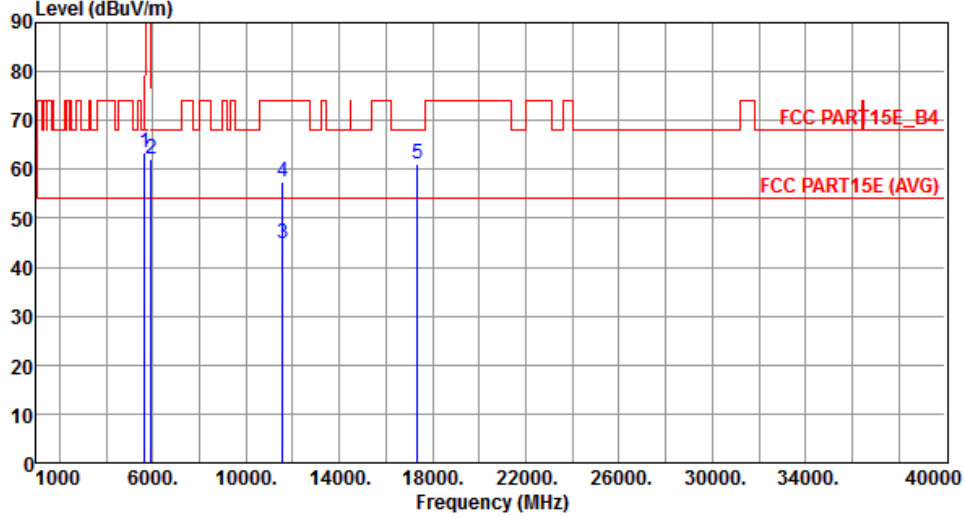
Modulation	11a	Test Freq. (MHz)	5785
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	63.14	68.20	-5.06	58.05	5.09	Peak	380	260
2	5925.00	62.51	68.20	-5.69	57.08	5.43	Peak	380	260
3	11570.00	46.19	54.00	-7.81	31.85	14.34	Average	155	137
4	11570.00	57.93	74.00	-16.07	43.59	14.34	Peak	155	137
5	17355.00	62.27	68.20	-5.93	44.48	17.79	Peak	100	314

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	63.34	68.20	-4.86	58.25	5.09	Peak	164	104
2	5925.00	62.08	68.20	-6.12	56.65	5.43	Peak	164	104
3	11570.00	44.92	54.00	-9.08	30.58	14.34	Average	246	270
4	11570.00	57.34	74.00	-16.66	43.00	14.34	Peak	246	270
5	17355.00	61.10	68.20	-7.10	43.31	17.79	Peak	100	152

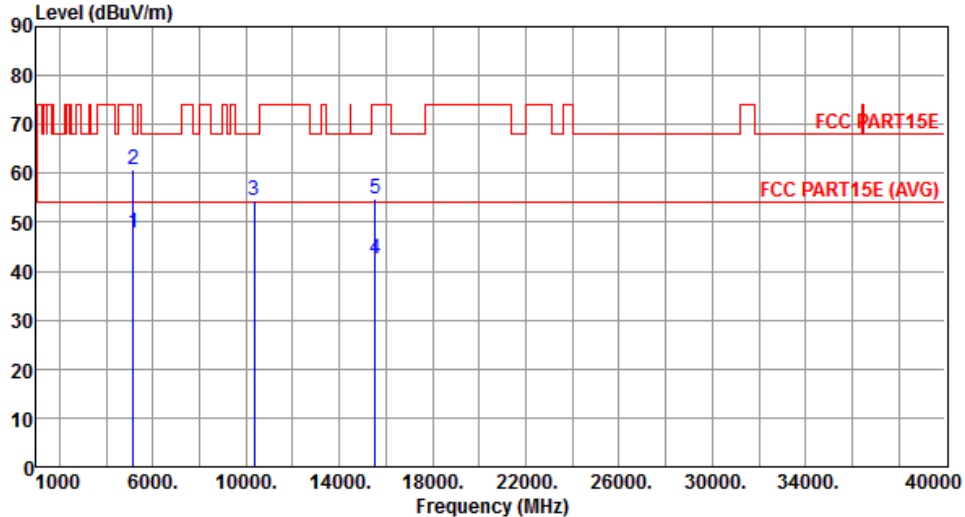
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	11a	Test Freq. (MHz)	5825
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11a	Test Freq. (MHz)	5825
Polarization	Vertical		
 </			

3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT20

Modulation	VHT20	Test Freq. (MHz)	5180
Polarization	Horizontal		



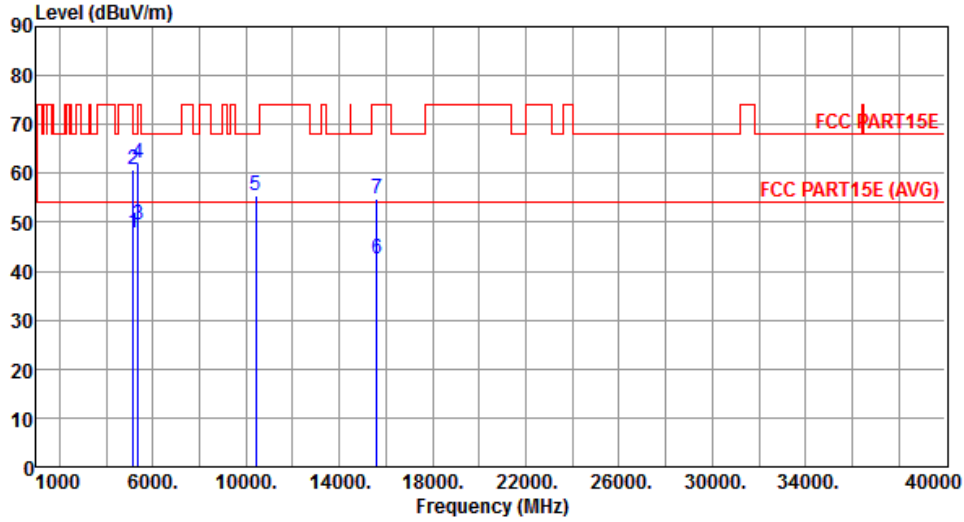
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.80	54.00	-6.20	43.39	4.41	Average	100	92
2	5150.00	60.78	74.00	-13.22	56.37	4.41	Peak	100	92
3	10360.00	54.60	68.20	-13.60	40.93	13.67	Peak	100	311
4	15540.00	42.39	54.00	-11.61	28.11	14.28	Average	100	252
5	15540.00	54.67	74.00	-19.33	40.39	14.28	Peak	100	252

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT20	Test Freq. (MHz)	5180
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5200
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5200
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.88	54.00	-6.12	43.47	4.41	Average	214	90
2	5150.00	60.82	74.00	-13.18	56.41	4.41	Peak	214	90
3	5350.00	49.58	54.00	-4.42	44.89	4.69	Average	214	90
4	5350.00	62.07	74.00	-11.93	57.38	4.69	Peak	214	90
5	10400.00	55.39	68.20	-12.81	41.67	13.72	Peak	100	141
6	15600.00	42.37	54.00	-11.63	28.19	14.18	Average	100	278
7	15600.00	54.84	74.00	-19.16	40.66	14.18	Peak	100	278

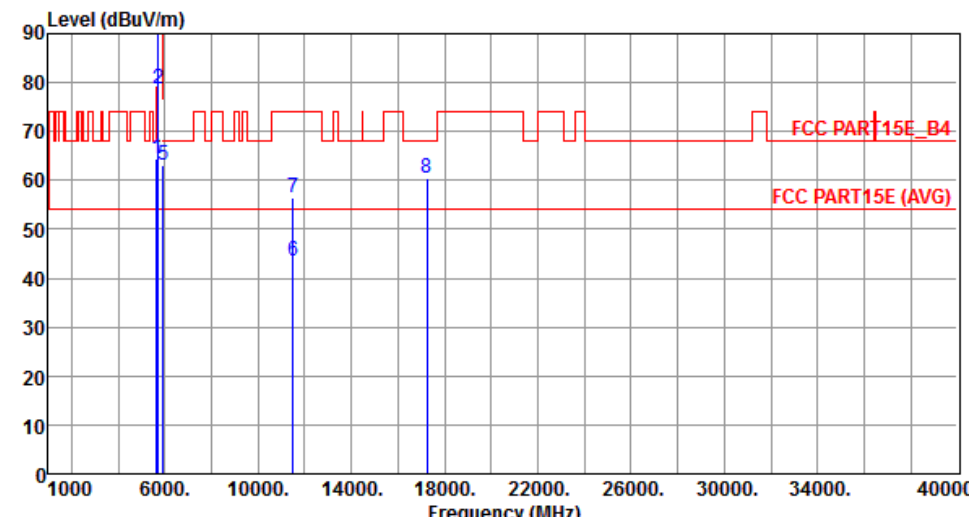
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	VHT20	Test Freq. (MHz)	5240
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5240
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT20	Test Freq. (MHz)	5745
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5745
Polarization	Vertical		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	64.51	68.20	-3.69	59.42	5.09	Peak	161	98
2	5700.00	78.79	105.20	-26.41	73.63	5.16	Peak	161	98
3	5720.00	93.86	110.80	-16.94	88.68	5.18	Peak	161	98
4	5725.00	100.24	122.20	-21.96	95.05	5.19	Peak	161	98
5	5925.00	63.21	68.20	-4.99	57.78	5.43	Peak	161	98
6	11490.00	43.47	54.00	-10.53	28.95	14.52	Average	238	270
7	11490.00	56.42	74.00	-17.58	41.90	14.52	Peak	238	270
8	17235.00	60.30	68.20	-7.90	42.83	17.47	Peak	100	153

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT20	Test Freq. (MHz)	5785
Polarization	Horizontal		
 </			

Modulation	VHT20	Test Freq. (MHz)	5785
Polarization	Vertical		
Level (dBuV/m)			

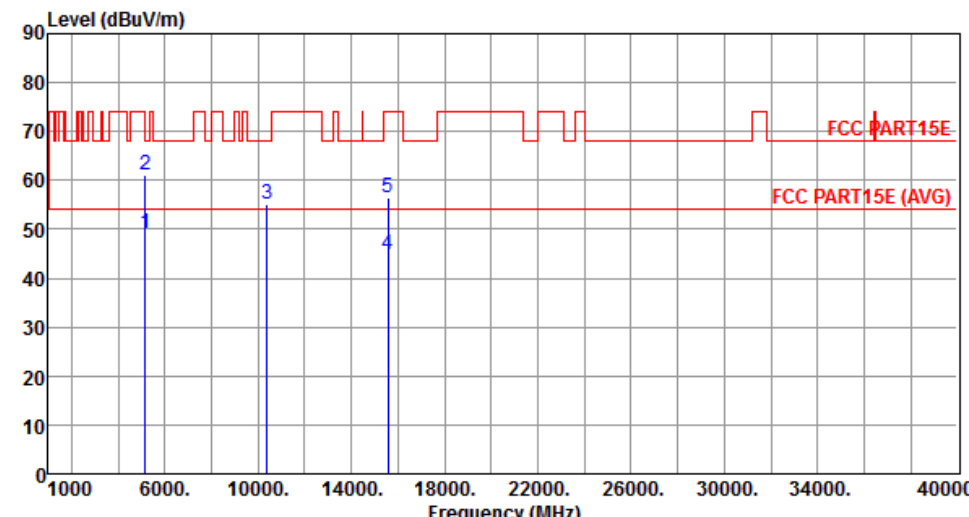
Modulation	VHT20	Test Freq. (MHz)	5825
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT20	Test Freq. (MHz)	5825
Polarization	Vertical		
Level (dBuV/m) </			

3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT40

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Vertical		

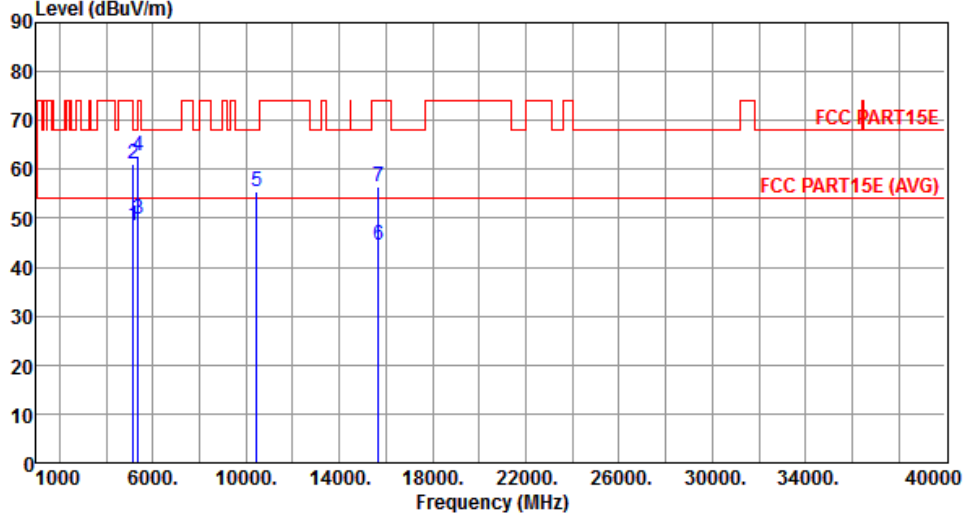


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	49.18	54.00	-4.82	44.77	4.41	Average	217	86
2	5150.00	61.08	74.00	-12.92	56.67	4.41	Peak	217	86
3	10380.00	55.25	68.20	-12.95	41.55	13.70	Peak	100	145
4	15570.00	44.71	54.00	-9.29	30.49	14.22	Average	100	284
5	15570.00	56.35	74.00	-17.65	42.13	14.22	Peak	100	284

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT40	Test Freq. (MHz)	5230
Polarization	Horizontal		
Level (dBuV/m) </			

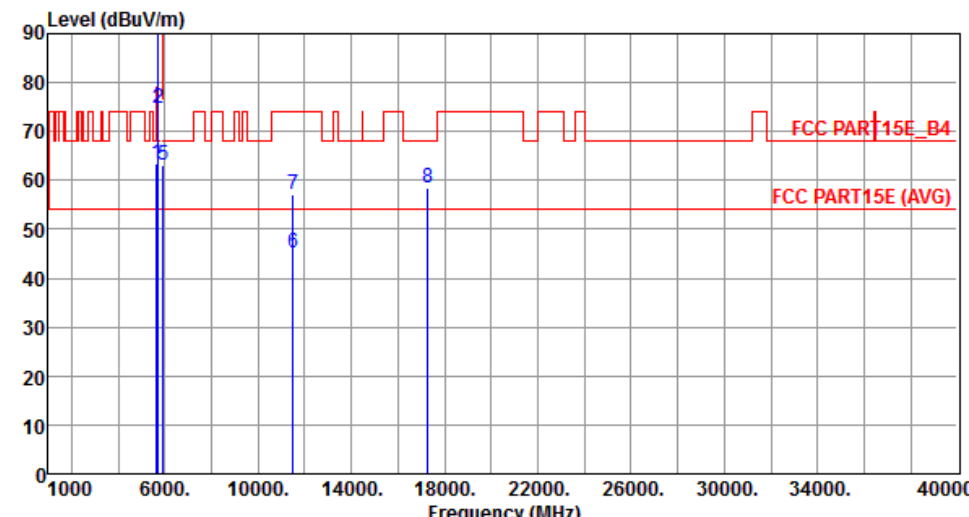
Modulation	VHT40	Test Freq. (MHz)	5230
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	48.46	54.00	-5.54	44.05	4.41	Average	192	86
2	5150.00	61.06	74.00	-12.94	56.65	4.41	Peak	192	86
3	5350.00	49.94	54.00	-4.06	45.25	4.69	Average	192	86
4	5350.00	62.66	74.00	-11.34	57.97	4.69	Peak	192	86
5	10460.00	55.45	68.20	-12.75	41.68	13.77	Peak	100	151
6	15690.00	44.61	54.00	-9.39	30.58	14.03	Average	100	277
7	15690.00	56.38	74.00	-17.62	42.35	14.03	Peak	100	277

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Horizontal		



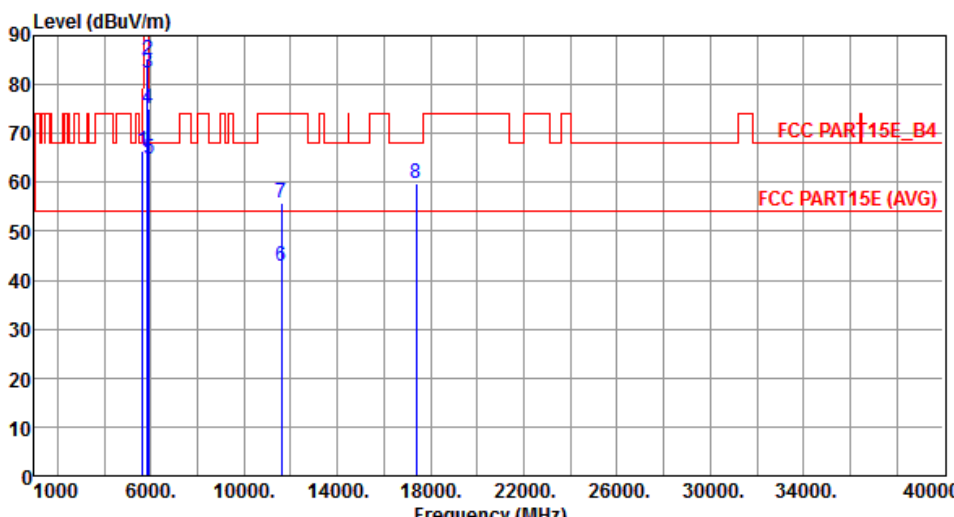
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	63.29	68.20	-4.91	58.20	5.09	Peak	371	276
2	5700.00	74.88	105.20	-30.32	69.72	5.16	Peak	371	276
3	5720.00	89.30	110.80	-21.50	84.12	5.18	Peak	371	276
4	5725.00	90.74	122.20	-31.46	85.55	5.19	Peak	371	276
5	5925.00	63.19	68.20	-5.01	57.76	5.43	Peak	371	276
6	11510.00	45.17	54.00	-8.83	30.67	14.50	Average	149	146
7	11510.00	57.10	74.00	-16.90	42.60	14.50	Peak	149	146
8	17265.00	58.40	68.20	-9.80	40.84	17.56	Peak	100	311

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5795
Polarization	Horizontal		
Level (dBuV/m) <			

Modulation	VHT40	Test Freq. (MHz)	5795
Polarization	Vertical		

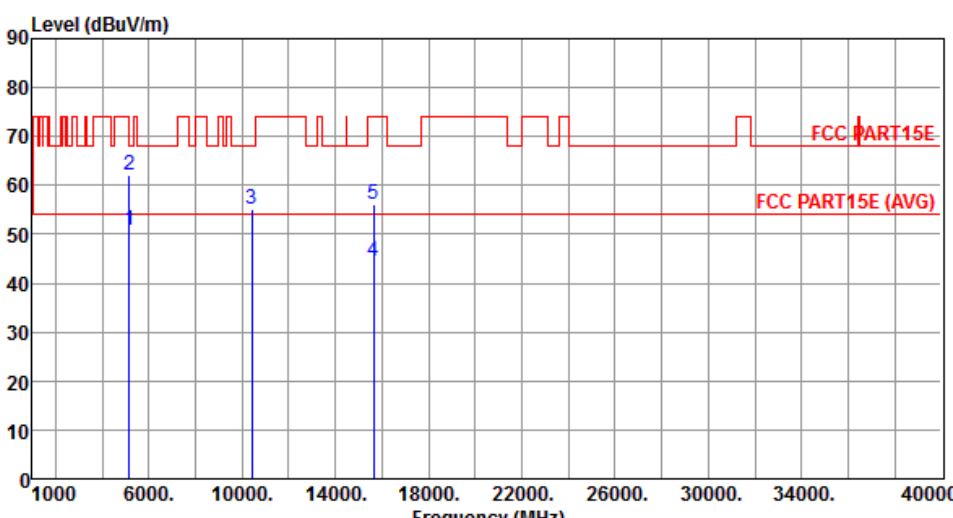


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5650.00	66.54	68.20	-1.66	61.45	5.09	Peak	168	102
2	5850.00	85.15	122.20	-37.05	79.80	5.35	Peak	168	102
3	5855.00	82.20	110.80	-28.60	76.85	5.35	Peak	168	102
4	5875.00	75.08	105.20	-30.12	69.70	5.38	Peak	168	102
5	5925.00	64.83	68.20	-3.37	59.40	5.43	Peak	168	102
6	11590.00	42.91	54.00	-11.09	28.62	14.29	Average	220	255
7	11590.00	55.65	74.00	-18.35	41.36	14.29	Peak	220	255
8	17385.00	59.68	68.20	-8.52	41.82	17.86	Peak	100	163

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80

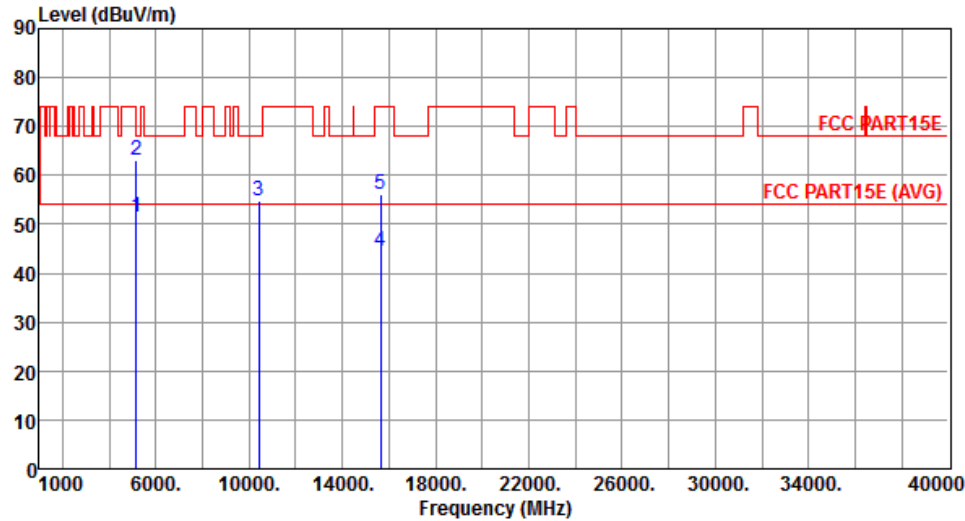
Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	50.95	54.00	-3.05	46.54	4.41	Average	108	114
2	5150.00	61.96	74.00	-12.04	57.55	4.41	Peak	108	114
3	10420.00	55.16	68.20	-13.04	41.42	13.74	Peak	100	301
4	15630.00	44.66	54.00	-9.34	30.53	14.13	Average	100	246
5	15630.00	56.01	74.00	-17.99	41.88	14.13	Peak	100	246

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	51.52	54.00	-2.48	47.11	4.41	Average	221	121
2	5150.00	62.96	74.00	-11.04	58.55	4.41	Peak	221	121
3	10420.00	54.92	68.20	-13.28	41.18	13.74	Peak	100	154
4	15630.00	44.40	54.00	-9.60	30.27	14.13	Average	100	277
5	15630.00	56.06	74.00	-17.94	41.93	14.13	Peak	100	277

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT80	Test Freq. (MHz)	5775
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT80	Test Freq. (MHz)	5775
Polarization	Vertical		
Level (dBuV/m) </			

3.6 Frequency Stability

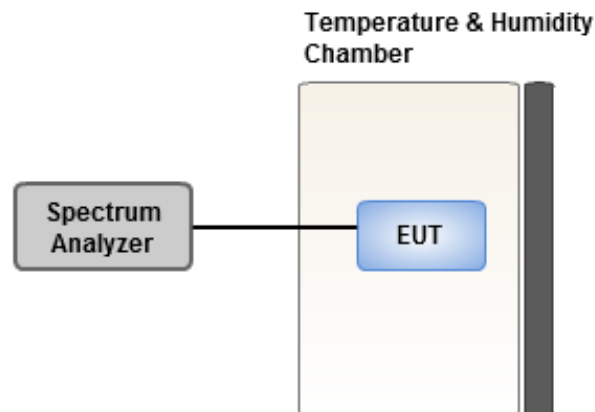
3.6.1 Limit of Frequency Stability

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.

3.6.2 Test Procedures

1. The EUT is installed in an environment test chamber with external power source.
2. Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT.
3. A sufficient stabilization period at each temperature is used prior to each frequency measurement.
4. When temperature is stabled, measure the frequency stability.
5. The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage. Change setting of chamber and external power source to complete all conditions.

3.6.3 Test Setup



3.6.4 Test Result of Frequency Stability

Frequency: 5200 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	5.85	5.43	5.40	5.52
T20°C Vmin	4.37	4.65	4.10	4.11
T50°C Vnom	3.51	3.81	4.19	3.94
T40°C Vnom	3.07	3.26	3.32	3.63
T30°C Vnom	2.69	2.80	2.89	2.59
T20°C Vnom	3.21	2.88	2.74	3.01
T10°C Vnom	3.03	3.32	2.34	2.01
T0°C Vnom	3.08	3.23	3.52	2.68
T-10°C Vnom	2.05	1.93	1.92	2.04
T-20°C Vnom	1.37	0.92	1.02	0.95
T-30°C Vnom	1.61	1.47	1.05	1.00
Vnom [Vac]: 120		Vmax [Vac]: 138		Vmin [Vac]: 102
Tnom [°C]: 20		Tmax [°C]: 50		Tmin [°C]: -30

Frequency: 5785 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	4.77	4.85	5.45	5.14
T20°C Vmin	4.42	4.34	4.38	3.66
T50°C Vnom	4.27	3.89	4.20	4.36
T40°C Vnom	2.65	2.52	2.34	3.02
T30°C Vnom	3.69	3.66	3.27	3.62
T20°C Vnom	3.08	2.97	2.48	2.88
T10°C Vnom	2.36	2.05	2.02	1.66
T0°C Vnom	3.05	2.34	2.90	3.03
T-10°C Vnom	1.51	1.47	2.16	1.87
T-20°C Vnom	1.10	1.18	1.49	1.42
T-30°C Vnom	1.07	1.12	0.87	0.39
Vnom [Vac]: 120		Vmax [Vac]: 138		Vmin [Vac]: 102
Tnom [°C]: 20		Tmax [°C]: 50		Tmin [°C]: -30

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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