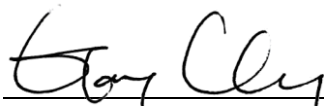


FCC Test Report

FCC ID : RYK-WPEA352ACN
Equipment : 802.11ac/b/g/n Mini PCIe Module
Model No. : WPEA-352ACN
Brand Name : SparkLAN
Applicant : SparkLAN Communications, Inc.
Address : 8F., No.257, Sec. 2, Tiding Blvd., Neihu
District, Taipei City 11493, Taiwan.
Standard : 47 CFR FCC Part 15.407
Received Date : Jul. 28, 2014
Tested Date : Aug. 04 ~ Aug. 23, 2014

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.

Approved & Reviewed by:



Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR472801AN	Rev. 01	Initial issue	Sep. 05, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.163MHz 44.34 (Margin -10.96dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5725.00MHz 77.20 (Margin -1.00dB) - PK	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: 22.63 5725-5850MHz: 20.60	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]	1	6-54 Mbps
5150-5250	n (HT20)	5180-5240	36-48 [4]	3	MCS 0-23
5150-5250	n (HT40)	5190-5230	38-46 [2]	3	MCS 0-23
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	3	MCS 0-8
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	3	MCS 0-9
5150-5250	ac (VHT80)	5210	42 [1]	3	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.
 Note 3: 802.11a is transmitting signal through chain 0 only.

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]	1	6-54 Mbps
5725-5850	n (HT20)	5745-5825	149-165 [5]	3	MCS 0-23
5725-5850	n (HT40)	5755-5795	151-159 [2]	3	MCS 0-23
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	3	MCS 0-8
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	3	MCS 0-9
5725-5850	ac (VHT80)	5775	155 [1]	3	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.
 Note 3: 802.11a is transmitting signal through chain 0 only.

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Gain (dBi)	Remarks
1	GEC6200	Dipole	RP-SMA Plug	5	-

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host
-------------------	------------------

1.1.4 Accessories

N/A

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	VHT 80	
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	ART2-GUI, version 4_9_536_CS_U2		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11a	100.00%	0.00
	VHT20	100.00%	0.00
	VHT40	100.00%	0.00
	VHT80	100.00%	0.00

1.1.7 Power Setting

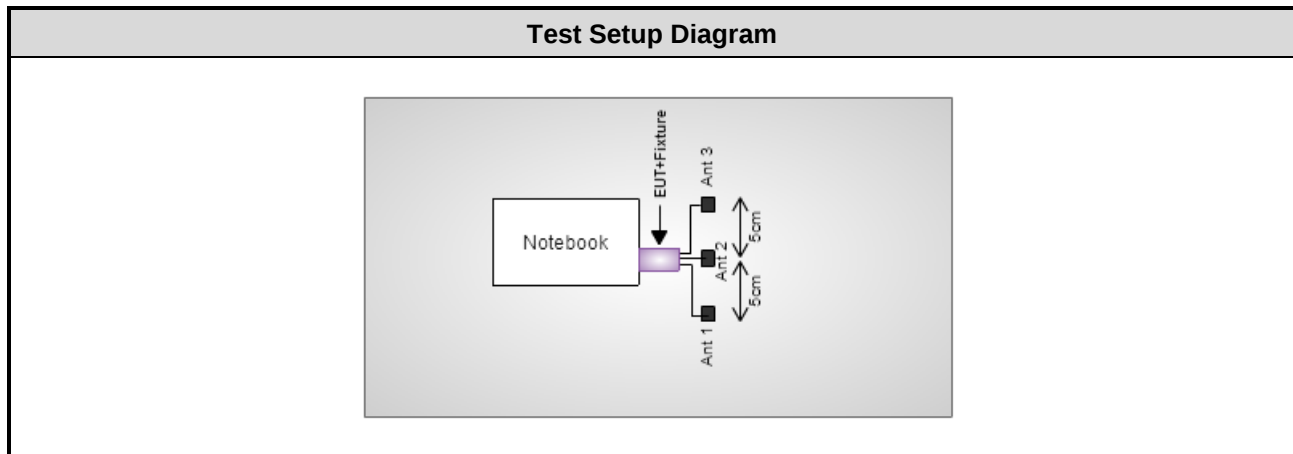
For Frequency band 5150-5250 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5180	19.5
11a	5200	22.5
11a	5240	20.5
HT20	5180	18
HT20	5200	18
HT20	5240	18
HT40	5190	12.5
HT40	5230	21
VHT20	5180	18
VHT20	5200	18
VHT20	5240	18
VHT40	5190	12.5
VHT40	5230	21
VHT80	5210	10

For Frequency band 5725~5850 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5745	19
11a	5785	20
11a	5825	20
HT20	5745	16
HT20	5785	16
HT20	5825	16
HT40	5755	14
HT40	5795	19
VHT20	5745	16
VHT20	5785	16
VHT20	5825	16
VHT40	5755	14
VHT40	5795	19
VHT80	5775	10.5

1.2 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	E6430	---	DoC	---

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
EMC Receiver	R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Apr. 23, 2014	Apr. 22, 2015
50 ohm terminal (Support Unit)	NA	50	04	Apr. 18, 2014	Apr. 17, 2015
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Jan. 25, 2014	Jan. 24, 2015
Receiver	R&S	ESR3	101658	Jan. 10, 2014	Jan. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 02, 2014	Jan. 01, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 13, 2014	Feb. 12, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	SN:100219	Nov. 28, 2013	Nov. 27, 2014
Preamplifier	Agilent	83017A	MY39501308	Dec. 16, 2013	Dec. 15, 2014
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 16, 2013	Dec. 15, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 16, 2013	Dec. 15, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 16, 2013	Dec. 15, 2014
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 11, 2013	Dec. 10, 2014
Power Meter	Anritsu	ML2495A	1241002	Oct. 24, 2013	Oct. 23, 2014
Power Sensor	Anritsu	MA2411B	1207366	Oct. 24, 2013	Oct. 23, 2014
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 C63.10-2009

FCC KDB 412172

FCC 789033 D02 General UNII Test Procedures New Rules v01

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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

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
Temperature	± 0.6 °C
Conducted emission	± 2.670 dB
AC conducted emission	± 2.92 dB
Radiated emission ≤ 1 GHz	± 3.26 dB
Radiated emission > 1 GHz	± 4.94 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	20°C / 62%	Skys Huang
Radiated Emissions	03CH01-WS	20-25°C / 60-65%	Haru Yang Aska Huang
RF Conducted	TH01-WS	23°C / 65%	Brad Wu

➤ FCC site registration No.: 657002

➤ 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	5230	MCS 0	---
Radiated Emissions ≤ 1 GHz	VHT40	5230	MCS 0	---
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 > 1 GHz 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	---	---

For Frequency band 5725-5850 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	VHT40	5795	MCS 0	---
Radiated Emissions ≤ 1 GHz	VHT40	5795	MCS 0	---
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 Emission Bandwidth 6dB bandwidth Peak Power Spectral Density	11a	5745 / 5785 / 5825	6 Mbps	---
	VHT20	5745 / 5785 / 5825	MCS 0	
	VHT40	5755 / 5795	MCS 0	
	VHT80	5775	MCS 0	

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.

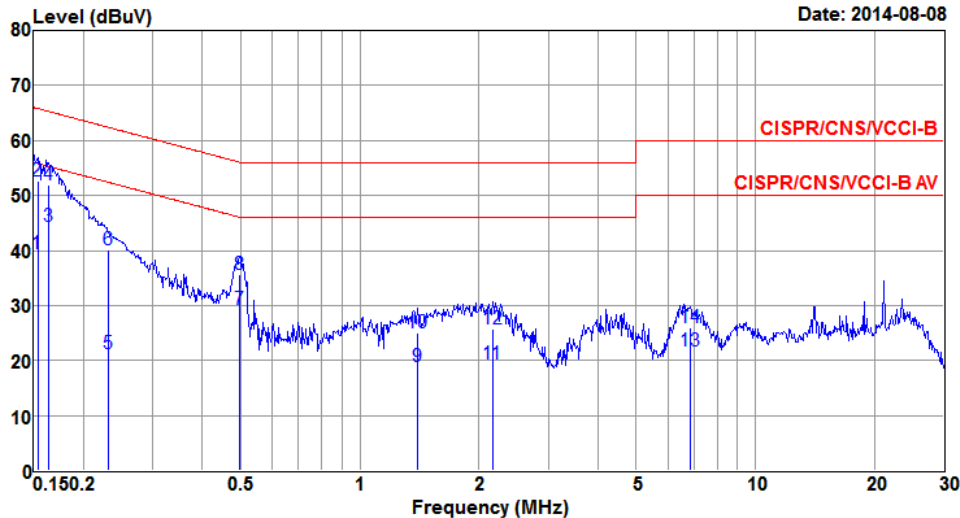
3.1.3 Test Setup



- 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)	5230
Power Phase	Line		



Date: 2014-08-08

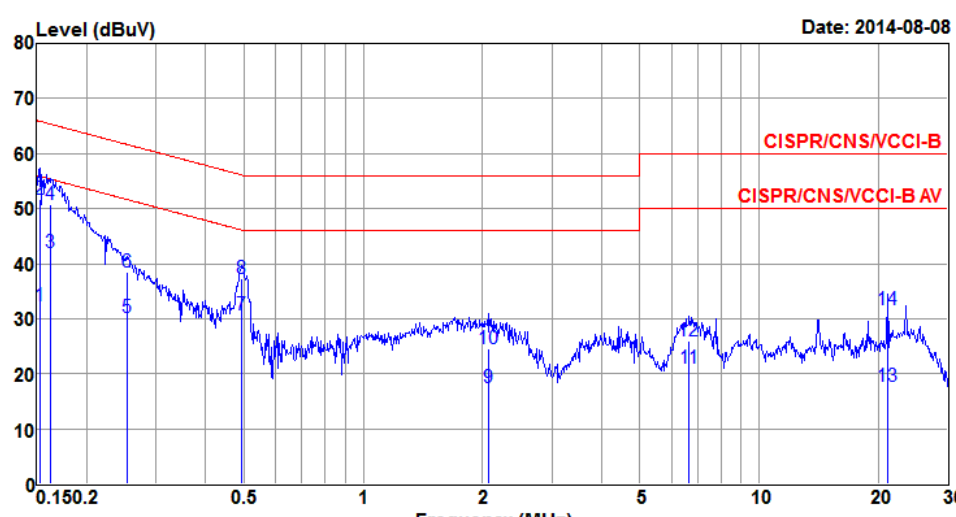
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.153	39.45	55.82	-16.37	39.03	0.40	0.02	Average
2	0.153	52.65	65.82	-13.17	52.23	0.40	0.02	QP
3*	0.163	44.34	55.30	-10.96	43.92	0.40	0.02	Average
4	0.163	51.86	65.30	-13.44	51.44	0.40	0.02	QP
5	0.232	21.20	52.39	-31.19	20.80	0.39	0.01	Average
6	0.232	40.10	62.39	-22.29	39.70	0.39	0.01	QP
7	0.497	29.22	46.05	-16.83	28.77	0.39	0.06	Average
8	0.497	35.75	56.05	-20.30	35.30	0.39	0.06	QP
9	1.396	18.81	46.00	-27.19	18.28	0.42	0.11	Average
10	1.396	25.10	56.00	-30.90	24.57	0.42	0.11	QP
11	2.167	19.35	46.00	-26.65	18.88	0.43	0.04	Average
12	2.167	25.77	56.00	-30.23	25.30	0.43	0.04	QP
13	6.841	21.66	50.00	-28.34	20.94	0.51	0.21	Average
14	6.841	26.04	60.00	-33.96	25.32	0.51	0.21	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	VHT40	Test Freq. (MHz)	5230
Power Phase	Neutral		

Level (dBuV)

Date: 2014-08-08

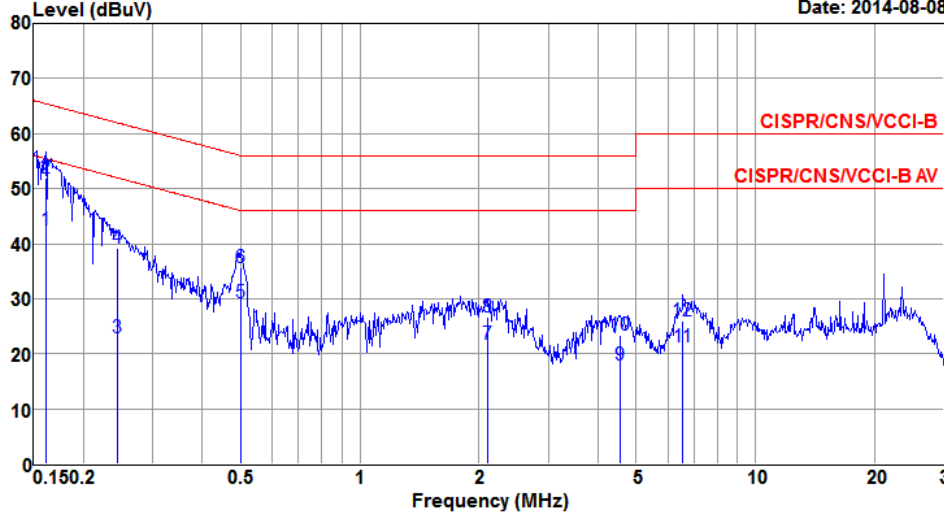


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.152	32.38	55.87	-23.49	31.88	0.48	0.02	Average
2	0.152	51.62	65.87	-14.25	51.12	0.48	0.02	QP
3*	0.162	42.08	55.34	-13.26	41.58	0.48	0.02	Average
4	0.162	50.66	65.34	-14.68	50.16	0.48	0.02	QP
5	0.253	30.15	51.64	-21.49	29.66	0.48	0.01	Average
6	0.253	38.38	61.64	-23.26	37.89	0.48	0.01	QP
7	0.494	30.75	46.10	-15.35	30.22	0.47	0.06	Average
8	0.494	37.32	56.10	-18.78	36.79	0.47	0.06	QP
9	2.066	17.48	46.00	-28.52	16.95	0.50	0.03	Average
10	2.066	24.67	56.00	-31.33	24.14	0.50	0.03	QP
11	6.662	21.08	50.00	-28.92	20.33	0.54	0.21	Average
12	6.662	26.04	60.00	-33.96	25.29	0.54	0.21	QP
13	21.147	17.69	50.00	-32.31	16.73	0.55	0.41	Average
14	21.147	31.69	60.00	-28.31	30.73	0.55	0.41	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	VHT40	Test Freq. (MHz)	5795
Power Phase	Line		



Date: 2014-08-08

	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1*	0.161	42.41	55.43	-13.02	41.99	0.40	0.02	Average
2	0.161	51.98	65.43	-13.45	51.56	0.40	0.02	QP
3	0.244	22.94	51.95	-29.01	22.54	0.39	0.01	Average
4	0.244	39.28	61.95	-22.67	38.88	0.39	0.01	QP
5	0.499	29.24	46.01	-16.77	28.79	0.39	0.06	Average
6	0.499	35.75	56.01	-20.26	35.30	0.39	0.06	QP
7	2.110	21.77	46.00	-24.23	21.31	0.43	0.03	Average
8	2.110	26.62	56.00	-29.38	26.16	0.43	0.03	QP
9	4.549	18.04	46.00	-27.96	17.41	0.47	0.16	Average
10	4.549	23.46	56.00	-32.54	22.83	0.47	0.16	QP
11	6.557	21.24	50.00	-28.76	20.54	0.50	0.20	Average
12	6.557	25.99	60.00	-34.01	25.29	0.50	0.20	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	VHT40	Test Freq. (MHz)	5795
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.

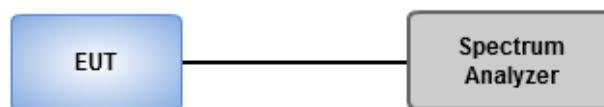
Occupied Bandwidth

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

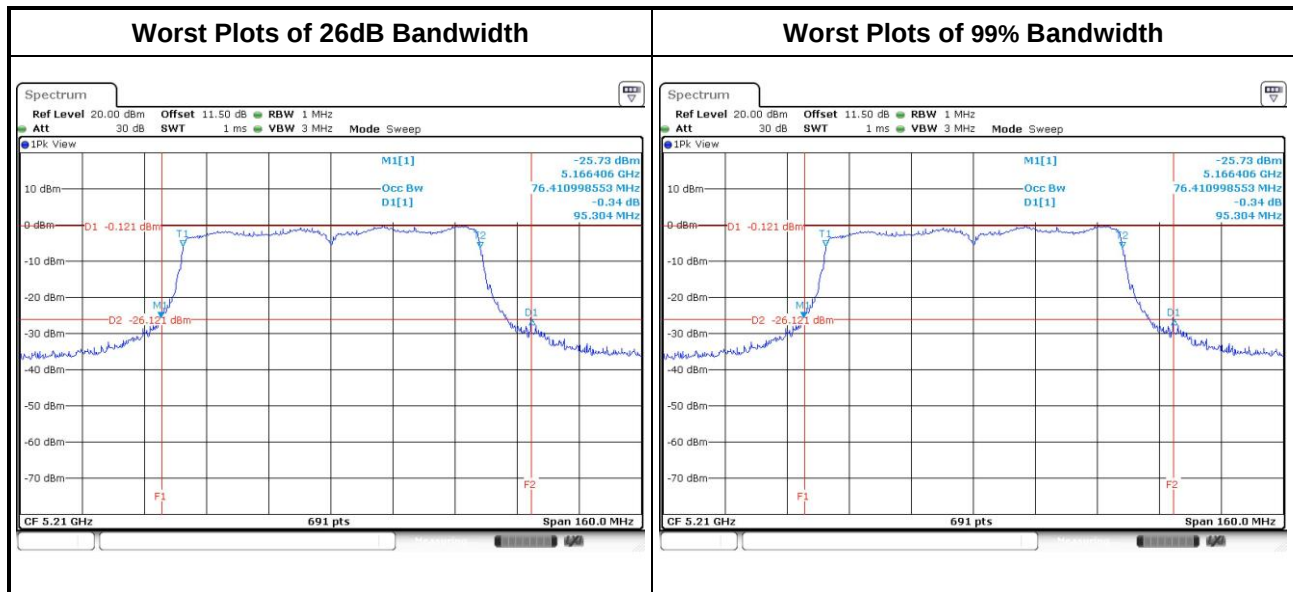
1. Set RBW = 100kHz, VBW = 300kHz
2. Detector = Peak, Trace mode = max hold.
3. Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB 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	1	5180	36.09	---	---	---	18.31	---	---	---
11a	1	5200	47.61	---	---	---	31.77	---	---	---
11a	1	5240	38.77	---	---	---	19.68	---	---	---
VHT20	3	5180	26.03	24.23	24.87	---	18.12	18.06	18.00	---
VHT20	3	5200	28.35	24.87	25.57	---	18.23	18.06	18.00	---
VHT20	3	5240	26.38	26.26	26.20	---	18.12	18.00	18.06	---
VHT40	3	5190	46.73	46.03	46.73	---	37.28	37.16	37.16	---
VHT40	3	5230	84.64	77.83	74.20	---	39.22	38.93	38.06	---
VHT80	3	5210	95.30	92.99	90.90	---	76.41	76.18	76.41	---

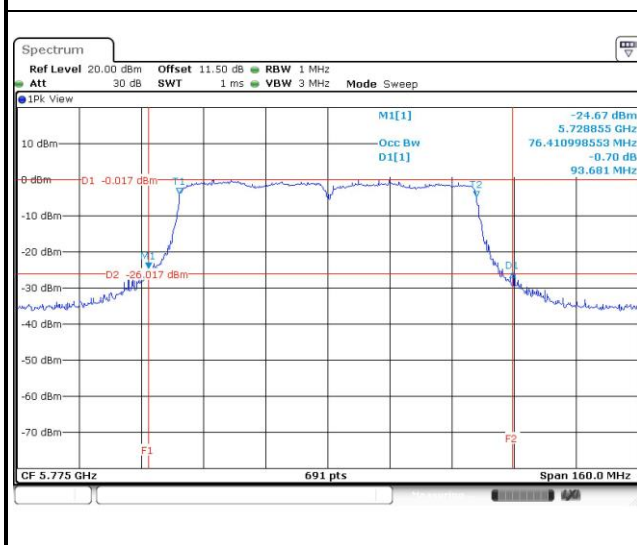


For Frequency band 5725-5850 MHz

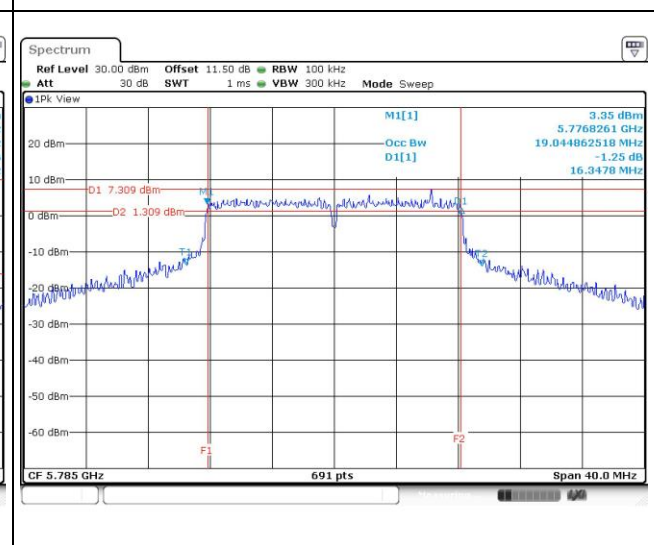
Emission Bandwidth

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	1	5745	18.89	---	---	---	16.41	---	---	---	0.5
11a	1	5785	21.64	---	---	---	16.35	---	---	---	0.5
11a	1	5825	23.08	---	---	---	16.35	---	---	---	0.5
VHT20	3	5745	17.89	17.95	17.89	---	17.28	17.57	17.57	---	0.5
VHT20	3	5785	18.00	18.06	18.00	---	17.57	16.93	17.57	---	0.5
VHT20	3	5825	18.00	18.06	17.95	---	17.57	17.57	17.57	---	0.5
VHT40	3	5755	37.28	37.28	37.05	---	36.17	36.41	36.41	---	0.5
VHT40	3	5795	37.63	37.51	37.40	---	36.06	36.41	36.41	---	0.5
VHT80	3	5775	76.41	76.64	76.41	---	76.29	75.83	75.83	---	0.5

Worst Plots of 99% Bandwidth



Worst Plots 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
☒	Mobile and portable client devices	Conducted Power: 250 mW

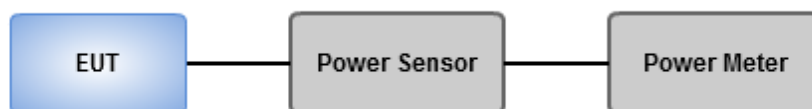
Frequency Band (MHz)		Limit
☐	5250 ~ 5350	250mW or 11dBm+10 log B
☐	5470 ~ 5725	250mW or 11dBm+10 log B
☒	5725 ~ 5850	1 W

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	1	5180	17.89	---	---	---	61.518	17.89	24.00
11a	1	5200	20.92	---	---	---	123.595	20.92	24.00
11a	1	5240	18.51	---	---	---	70.958	18.51	24.00
HT20	3	5180	15.38	14.72	14.65	---	93.337	19.70	24.00
HT20	3	5200	15.41	15.32	15.18	---	101.755	20.08	24.00
HT20	3	5240	15.65	15.08	15.76	---	106.609	20.28	24.00
HT40	3	5190	9.81	9.16	9.92	---	27.631	14.41	24.00
HT40	3	5230	17.92	17.51	17.84	---	179.121	22.53	24.00
VHT20	3	5180	15.49	14.85	14.74	---	95.734	19.81	24.00
VHT20	3	5200	15.51	15.42	15.3	---	104.281	20.18	24.00
VHT20	3	5240	15.74	15.15	15.82	---	108.426	20.35	24.00
VHT40	3	5190	9.93	9.23	10.05	---	28.331	14.52	24.00
VHT40	3	5230	18.01	17.62	17.95	---	183.424	22.63	24.00
VHT80	3	5210	7.30	6.58	7.68	---	15.782	11.98	24.00

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	1	5745	17.13	---	---	---	51.642	17.13	30.00
11a	1	5785	18.5	---	---	---	70.795	18.50	30.00
11a	1	5825	18.84	---	---	---	76.560	18.84	30.00
HT20	3	5745	13.62	13.31	14.72	---	74.092	18.70	30.00
HT20	3	5785	13.41	13.06	14.42	---	69.828	18.44	30.00
HT20	3	5825	13.65	13.28	14.29	---	71.309	18.53	30.00
HT40	3	5755	11.65	11.62	11.84	---	44.419	16.48	30.00
HT40	3	5795	15.64	15.82	15.61	---	111.230	20.46	30.00
VHT20	3	5745	13.73	13.45	14.84	---	76.215	18.82	30.00
VHT20	3	5785	13.52	13.21	14.55	---	71.942	18.57	30.00
VHT20	3	5825	13.76	13.34	14.43	---	73.079	18.64	30.00
VHT40	3	5755	11.72	11.74	11.98	---	45.563	16.59	30.00
VHT40	3	5795	15.78	15.98	15.72	---	114.797	20.60	30.00
VHT80	3	5775	8.13	7.80	7.92	---	18.721	12.72	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
☒	Mobile and portable 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 $\geq 10 * (\text{number of points in sweep}) * (\text{total on/off period of the transmitted signal})$.
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

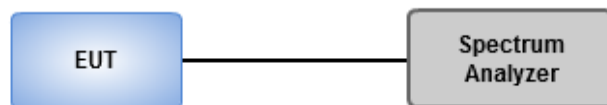
☒ Method SA-1

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 $\geq 10 * (\text{number of points in sweep}) * (\text{total on/off period of the transmitted signal})$.
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

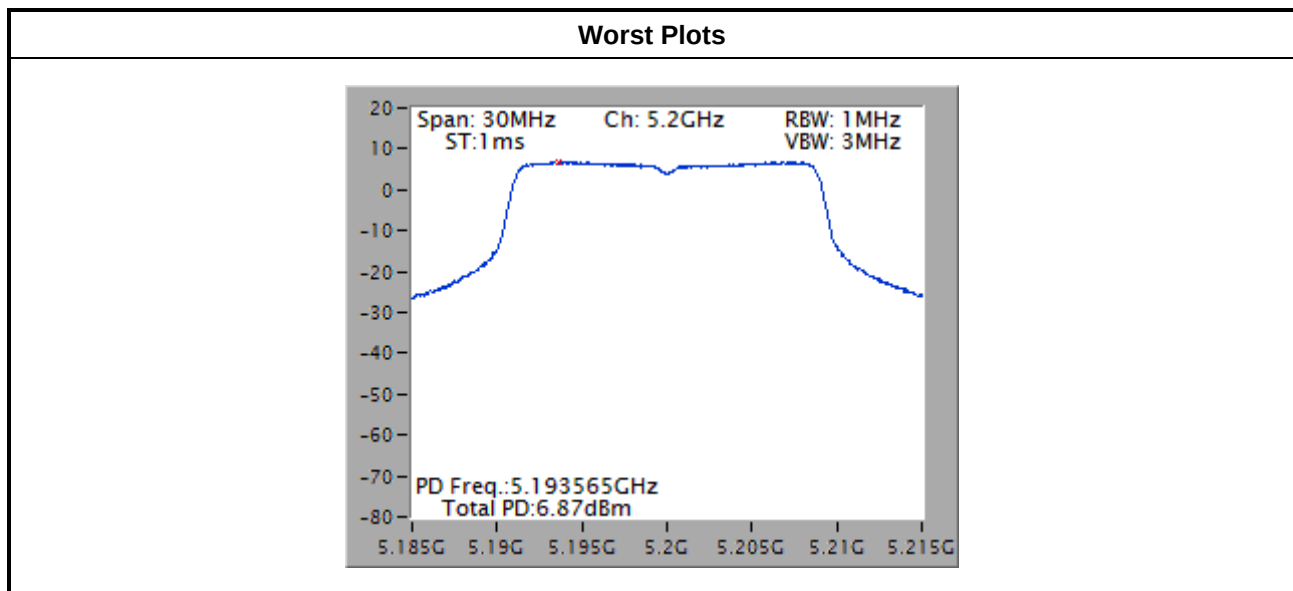


3.4.4 Test Result of Peak Power Spectral Density

For Frequency band 5150-5250 MHz						
Condition			Peak Power Spectral Density (dBm)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
11a	1	5180	5.61	0.00	5.61	11
11a	1	5200	8.01	0.00	8.01	11
11a	1	5240	6.27	0.00	6.27	11
VHT20	3	5180	6.83	0.00	6.83	7.23
VHT20	3	5200	6.87	0.00	6.87	7.23
VHT20	3	5240	6.75	0.00	6.75	7.23
VHT40	3	5190	-0.90	0.00	-0.90	7.23
VHT40	3	5230	6.77	0.00	6.77	7.23
VHT80	3	5210	-5.85	0.00	-5.85	7.23

Note:

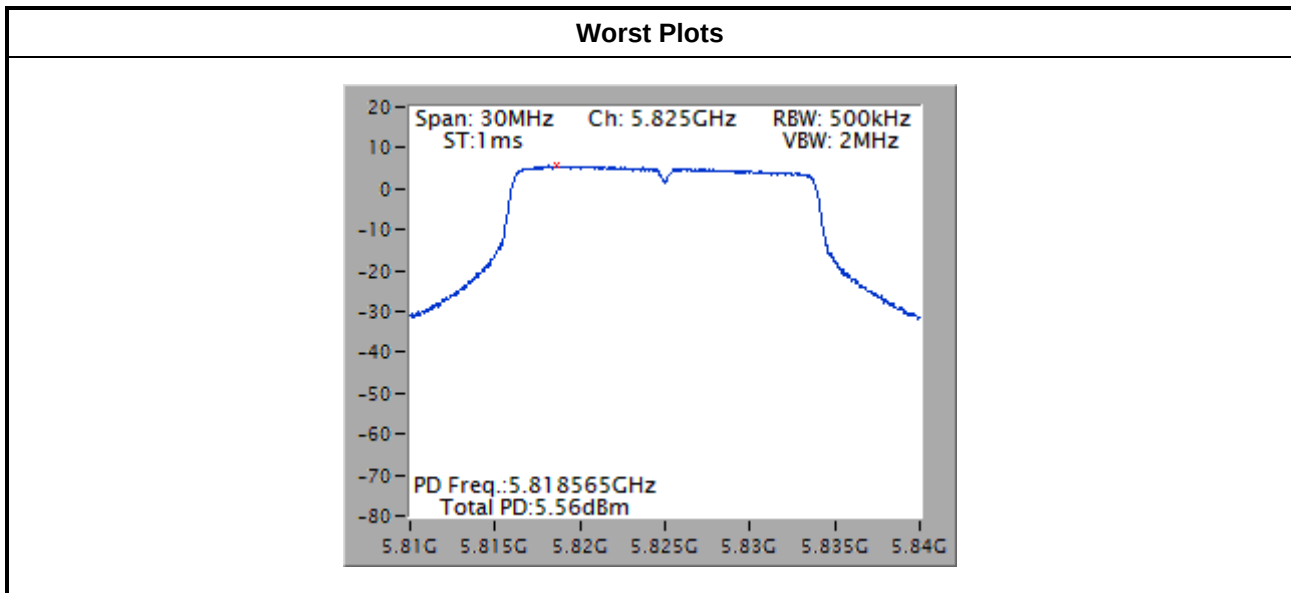
1. D.F is duty factor.
2. Test results for VHT20 / VHT40 / VHT80 are bin-by-bin summing measured value of each TX port.
3. Directional gain = $5 + 10 \cdot \log(3/1) = 9.77 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $11 \text{ dBm} - (9.77 \text{ dBi} - 6 \text{ dBi}) = 7.23 \text{ dBm}$.



For Frequency band 5725-5850 MHz						
Condition			Peak Power Spectral Density (dBm)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
11a	1	5745	4.58	0.00	4.58	30.00
11a	1	5785	5.08	0.00	5.08	30.00
11a	1	5825	5.20	0.00	5.20	30.00
VHT20	3	5745	5.28	0.00	5.28	26.23
VHT20	3	5785	5.14	0.00	5.14	26.23
VHT20	3	5825	5.56	0.00	5.56	26.23
VHT40	3	5755	-0.12	0.00	-0.12	26.23
VHT40	3	5795	4.39	0.00	4.39	26.23
VHT80	3	5775	-6.81	0.00	-6.81	26.23

Note:

1. D.F is duty factor.
2. Test results for VHT20 / VHT40 / VHT80 are bin-by-bin summing measured value of each TX port.
3. Directional gain = $5 + 10 \cdot \log(3/1) = 9.77 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $30 \text{ dBm} - (9.77 \text{ dBi} - 6 \text{ dBi}) = 26.23 \text{ dBm}$.



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]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.825 GHz	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.85 5.86 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

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

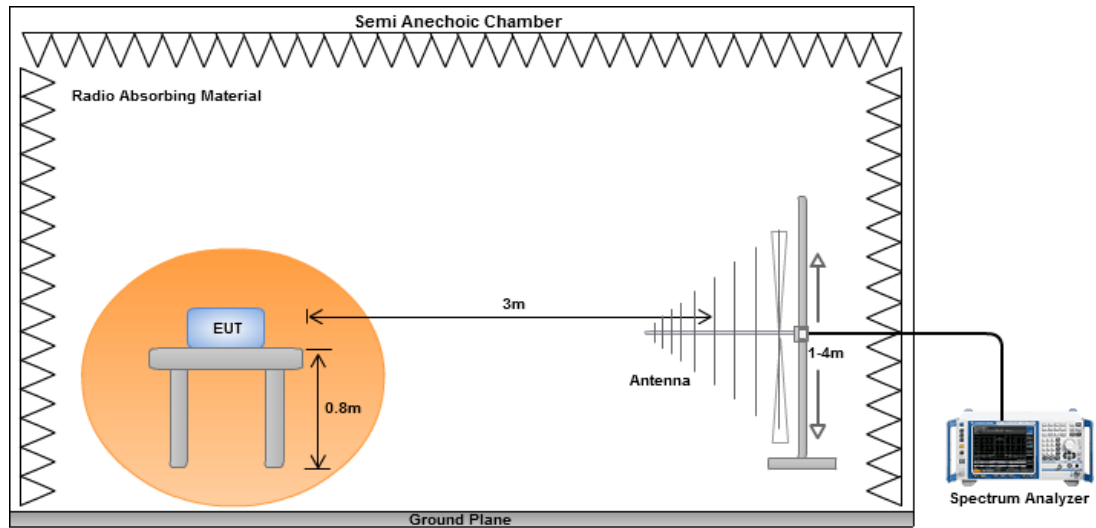
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360° . A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
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:

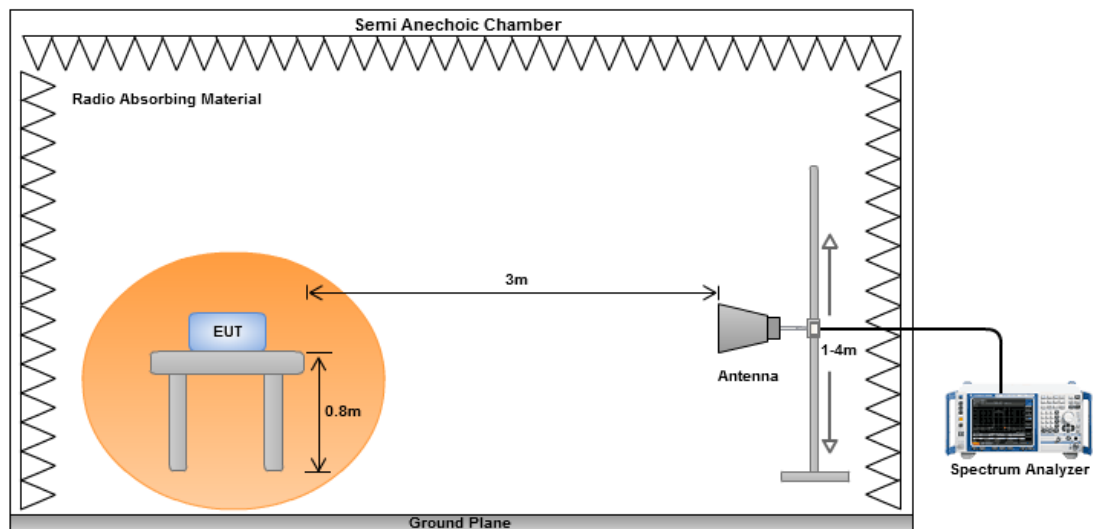
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



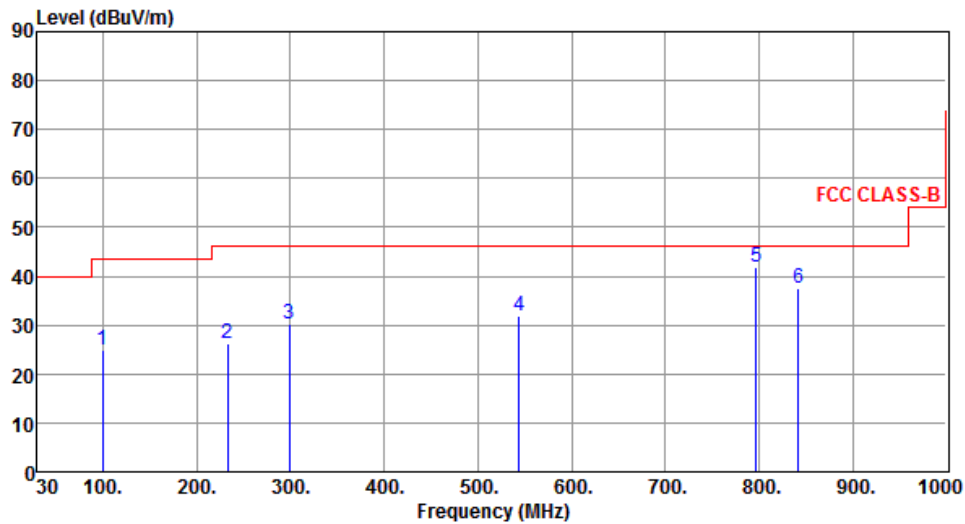
Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	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	99.84	24.79	43.50	-18.71	46.64	-21.85	Peak	---	---
2	232.73	26.26	46.00	-19.74	44.72	-18.46	Peak	---	---
3	298.69	30.28	46.00	-15.72	46.47	-16.19	Peak	---	---
4	544.10	31.79	46.00	-14.21	42.58	-10.79	Peak	---	---
5	797.27	41.99	46.00	-4.01	48.79	-6.80	Peak	---	---
6	841.89	37.40	46.00	-8.60	43.65	-6.25	Peak	---	---

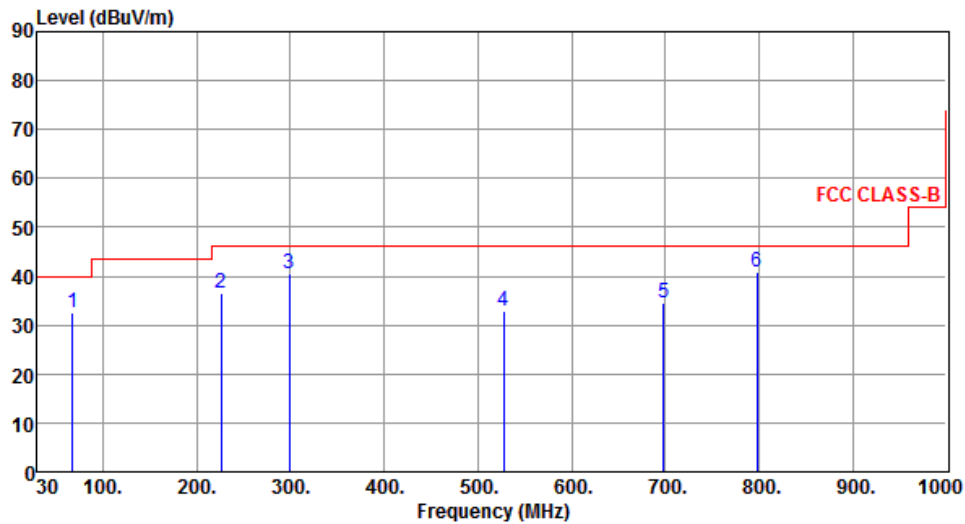
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	VHT40	Test Freq. (MHz)	5795
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	67.83	32.51	40.00	-7.49	51.42	-18.91	Peak	---	---
2	225.94	36.50	46.00	-9.50	55.29	-18.79	Peak	---	---
3	298.69	40.51	46.00	-5.49	56.70	-16.19	Peak	---	---
4	527.61	32.85	46.00	-13.15	43.93	-11.08	Peak	---	---
5	698.33	34.62	46.00	-11.38	42.88	-8.26	Peak	---	---
6	798.24	40.72	46.00	-5.28	47.51	-6.79	Peak	---	---

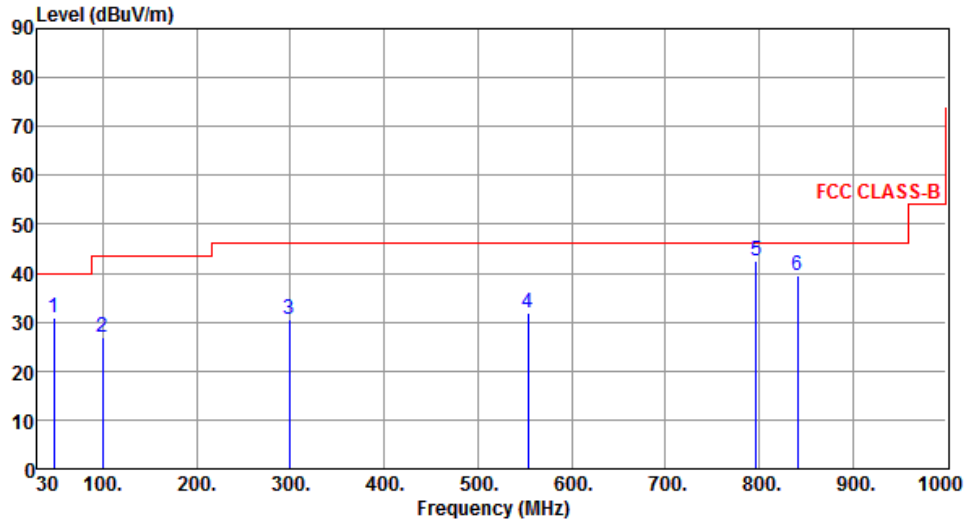
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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	47.46	31.05	40.00	-8.95	47.70	-16.65	Peak	---	---
2	99.84	26.77	43.50	-16.73	48.62	-21.85	Peak	---	---
3	298.69	30.72	46.00	-15.28	46.91	-16.19	Peak	---	---
4	553.80	32.03	46.00	-13.97	42.64	-10.61	Peak	---	---
5	797.27	42.67	46.00	-3.33	49.47	-6.80	Peak	---	---
6	840.92	39.36	46.00	-6.64	45.62	-6.26	Peak	---	---

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

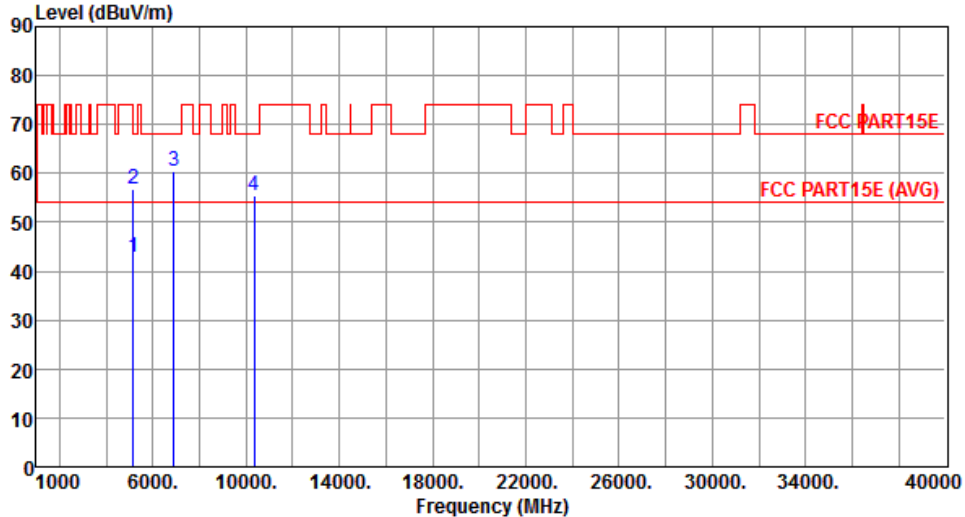
*Factor includes antenna factor , cable loss and amplifier gain

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

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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

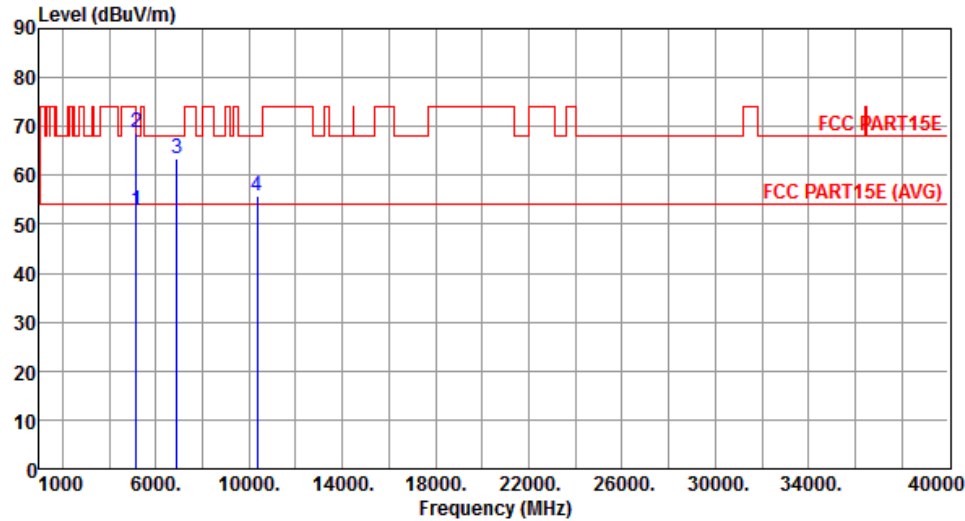
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Horizontal		



	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	42.98	54.00	-11.02	37.42	5.56	Average	---	---
2	5150.00	56.89	74.00	-17.11	51.33	5.56	Peak	---	---
3	6906.66	60.38	68.20	-7.82	52.27	8.11	Peak	---	---
4	10360.00	55.45	68.20	-12.75	40.38	15.07	Peak	---	---

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)	5180
Polarization	Vertical		

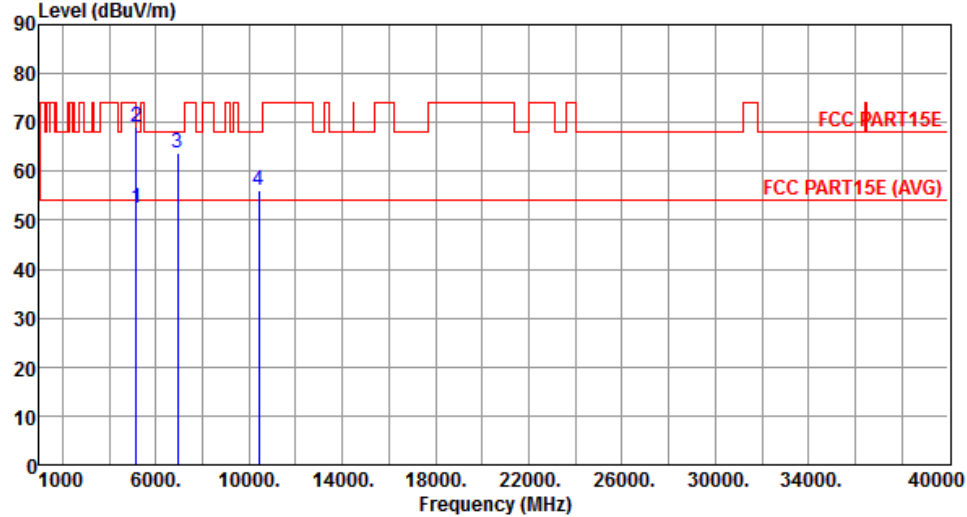


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	52.79	54.00	-1.21	47.23	5.56	Average	---	---
2	5150.00	68.69	74.00	-5.31	63.13	5.56	Peak	---	---
3	6906.66	63.44	68.20	-4.76	55.33	8.11	Peak	---	---
4	10360.00	55.94	68.20	-12.26	40.87	15.07	Peak	---	---

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) </			

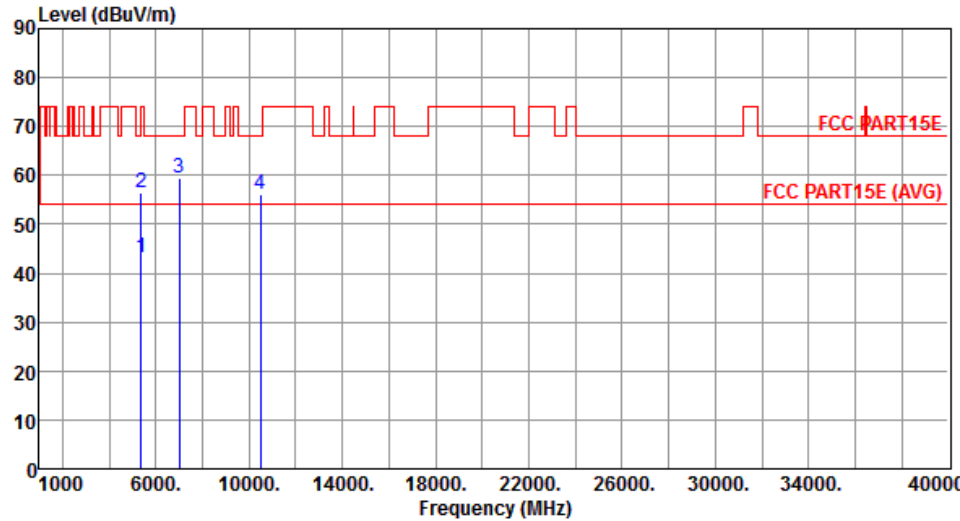
Modulation	11a	Test Freq. (MHz)	5200
Polarization	Vertical		



	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	52.62	54.00	-1.38	47.06	5.56	Average	---	---
2	5150.00	69.24	74.00	-4.76	63.68	5.56	Peak	---	---
3	6933.33	63.79	68.20	-4.41	55.67	8.12	Peak	---	---
4	10400.00	56.08	68.20	-12.12	40.95	15.13	Peak	---	---

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).

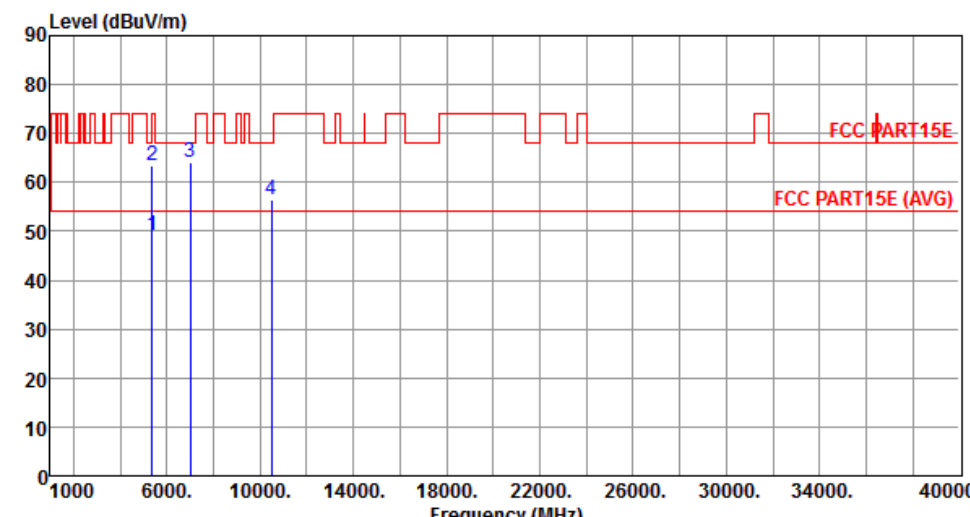
Modulation	11a	Test Freq. (MHz)	5240
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	43.20	54.00	-10.80	37.49	5.71	Average	---	---
2	5350.00	56.44	74.00	-17.56	50.73	5.71	Peak	---	---
3	6986.66	59.60	68.20	-8.60	51.46	8.14	Peak	---	---
4	10480.00	56.07	68.20	-12.13	40.83	15.24	Peak	---	---

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)	5240
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	5350.00	49.08	54.00	-4.92	43.37	5.71	Average	---	---
2	5350.00	63.27	74.00	-10.73	57.56	5.71	Peak	---	---
3	6986.66	64.05	68.20	-4.15	55.91	8.14	Peak	---	---
4	10480.00	56.50	68.20	-11.70	41.26	15.24	Peak	---	---

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	Horizontal		
Level (dBuV/m)			

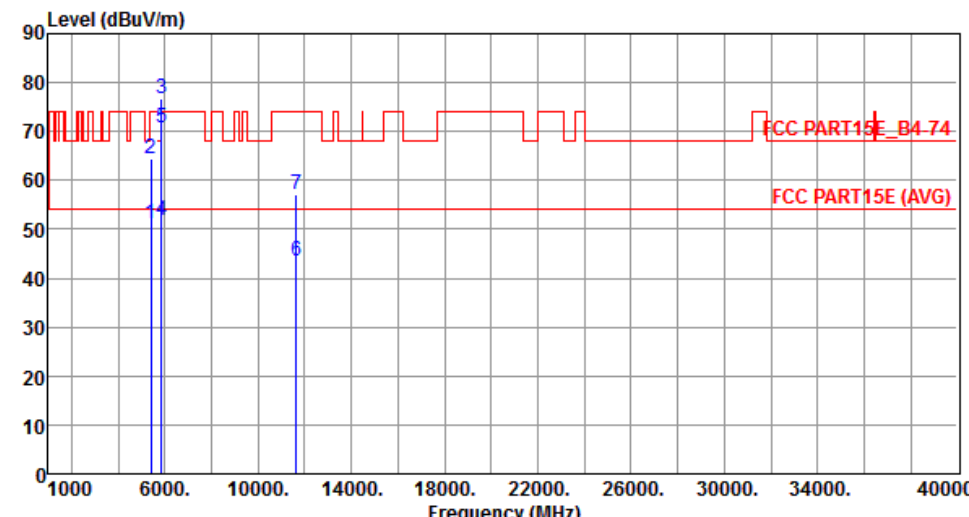
Modulation	11a	Test Freq. (MHz)	5745
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		
Level (dBuV/m) <			

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

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

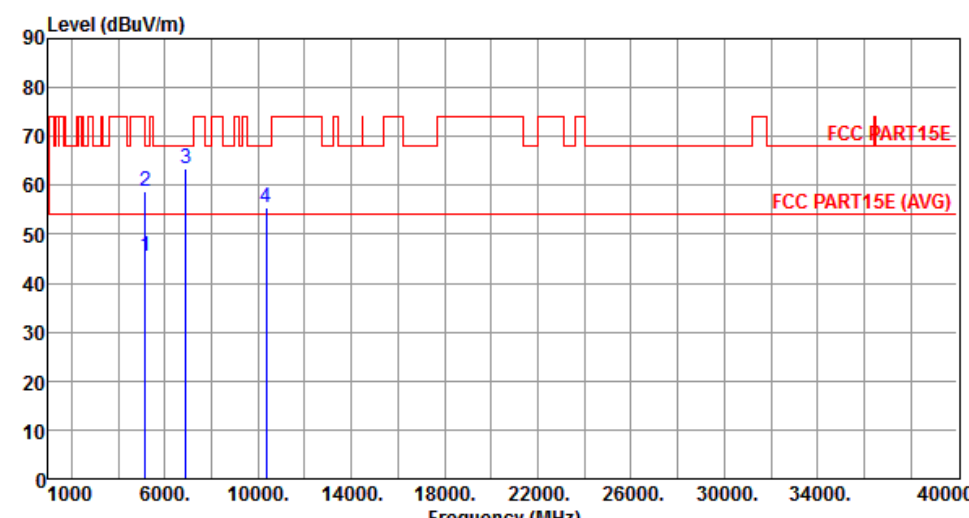


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5405.00	51.06	54.00	-2.94	45.33	5.73	Average	---	---
2	5405.00	64.54	74.00	-9.46	58.81	5.73	Peak	---	---
3	5850.00	76.75	78.20	-1.45	71.13	5.62	Peak	---	---
4	5860.00	51.83	54.00	-2.17	46.21	5.62	Average	---	---
5	5860.00	70.84	74.00	-3.16	65.22	5.62	Peak	---	---
6	11650.00	43.36	54.00	-10.64	28.97	14.39	Average	---	---
7	11650.00	57.06	74.00	-16.94	42.67	14.39	Peak	---	---

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).

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

Modulation	VHT20	Test Freq. (MHz)	5180
Polarization	Horizontal		

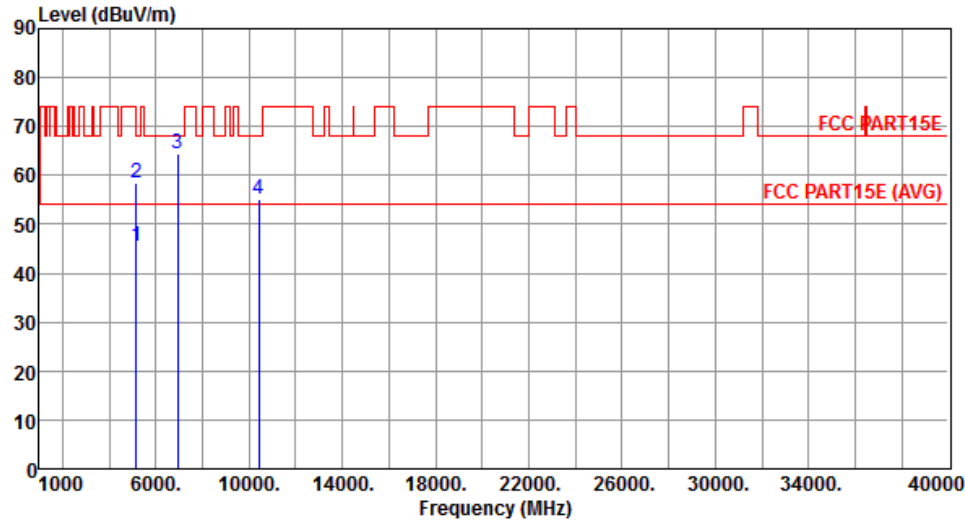


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	45.51	54.00	-8.49	39.95	5.56	Average	---	---
2	5150.00	58.74	74.00	-15.26	53.18	5.56	Peak	---	---
3	6906.70	63.58	68.30	-4.72	55.47	8.11	Peak	---	---
4	10360.00	55.50	68.20	-12.70	40.43	15.07	Peak	---	---

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) <			

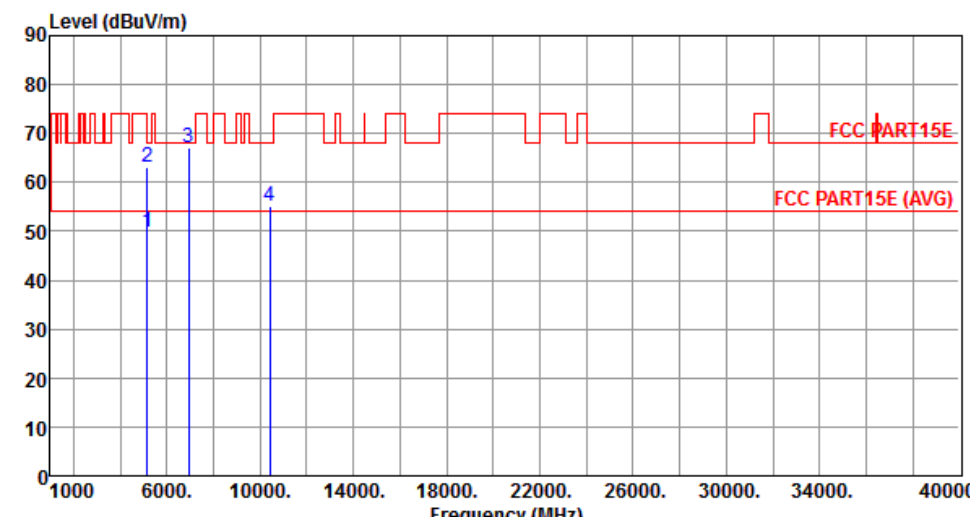
Modulation	VHT20	Test Freq. (MHz)	5200
Polarization	Horizontal		



	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	45.57	54.00	-8.43	40.01	5.56	Average	---	---
2	5150.00	58.49	74.00	-15.51	52.93	5.56	Peak	---	---
3	6933.30	64.54	68.20	-3.66	56.42	8.12	Peak	---	---
4	10400.00	55.23	68.20	-12.97	40.10	15.13	Peak	---	---

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)	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	49.87	54.00	-4.13	44.31	5.56	Average	---	---
2	5150.00	63.00	74.00	-11.00	57.44	5.56	Peak	---	---
3	6933.30	67.09	68.20	-1.11	58.97	8.12	Peak	---	---
4	10400.00	55.15	68.20	-13.05	40.02	15.13	Peak	---	---

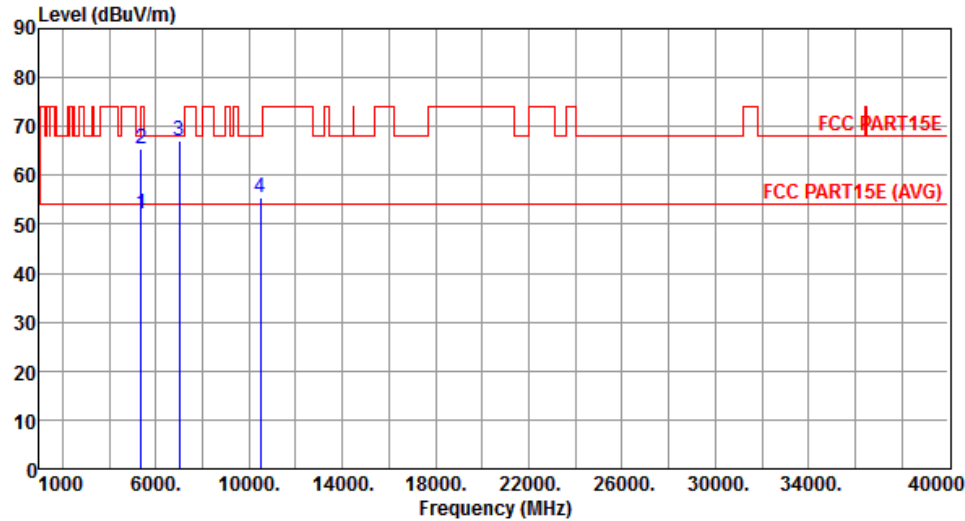
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT20	Test Freq. (MHz)	5240
Polarization	Horizontal		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	45.79	54.00	-8.21	40.08	5.71	Average	---	---
2	5350.00	58.06	74.00	-15.94	52.35	5.71	Peak	---	---
3	6986.70	64.21	68.20	-3.99	56.07	8.14	Peak	---	---
4	10480.00	55.06	68.20	-13.14	39.82	15.24	Peak	---	---

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	Vertical		

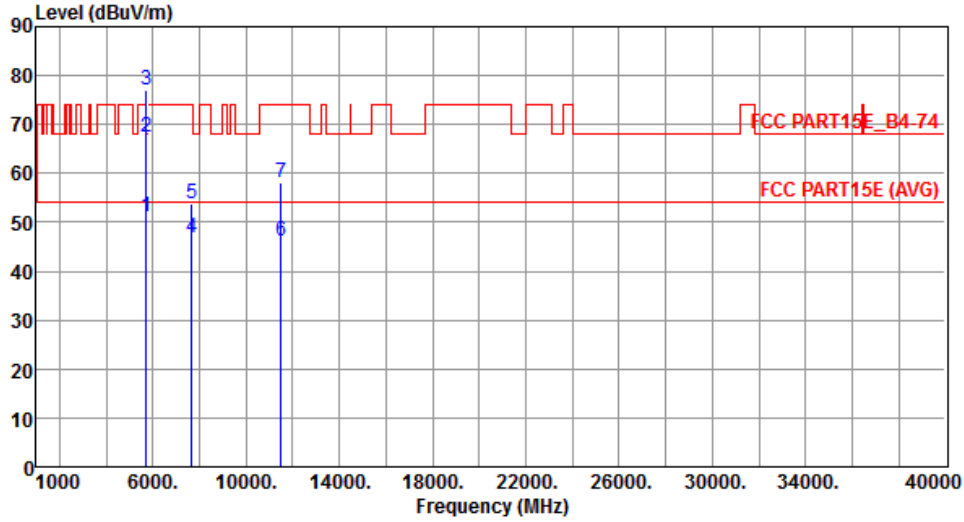


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	52.19	54.00	-1.81	46.48	5.71	Average	---	---
2	5350.00	65.35	74.00	-8.65	59.64	5.71	Peak	---	---
3	6986.70	67.12	68.20	-1.08	58.98	8.14	Peak	---	---
4	10480.00	55.56	68.20	-12.64	40.32	15.24	Peak	---	---

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)	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	5715.00	51.06	54.00	-2.94	45.48	5.58	Average	---	---
2	5715.00	67.51	74.00	-6.49	61.93	5.58	Peak	---	---
3	5725.00	77.20	78.20	-1.00	71.62	5.58	Peak	---	---
4	7660.00	46.75	54.00	-7.25	36.50	10.25	Average	---	---
5	7660.00	53.88	74.00	-20.12	43.63	10.25	Peak	---	---
6	11490.00	46.11	54.00	-7.89	31.54	14.57	Average	---	---
7	11490.00	58.21	74.00	-15.79	43.64	14.57	Peak	---	---

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		
Level (dBuV/m)			

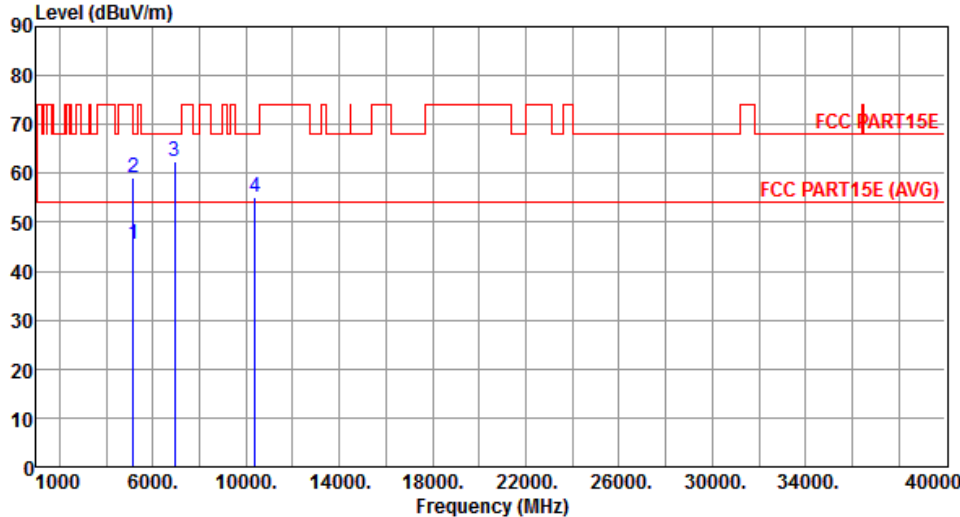
Modulation	VHT20	Test Freq. (MHz)	5785
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5825
Polarization	Horizontal		
 <			

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

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

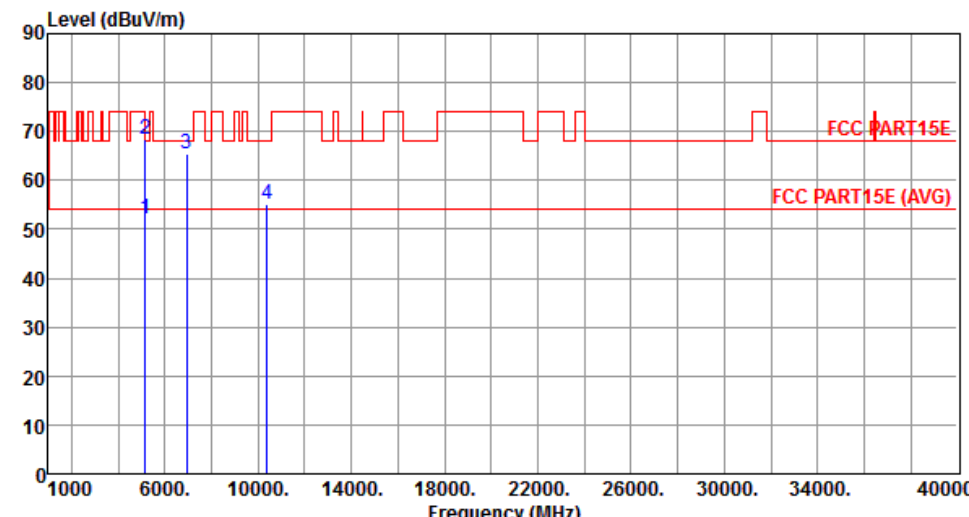
Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal		



	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	45.46	54.00	-8.54	39.90	5.56	Average	---	---
2	5150.00	59.25	74.00	-14.75	53.69	5.56	Peak	---	---
3	6920.00	62.41	68.20	-5.79	54.30	8.11	Peak	---	---
4	10380.00	55.26	68.20	-12.94	40.15	15.11	Peak	---	---

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).

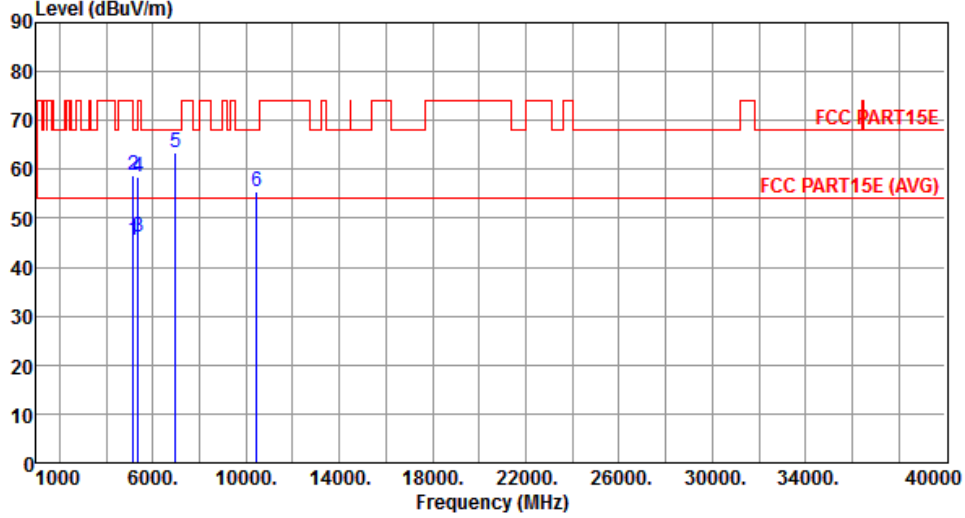
Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Vertical		



	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	52.16	54.00	-1.84	46.60	5.56	Average	---	---
2	5150.00	68.31	74.00	-5.69	62.75	5.56	Peak	---	---
3	6920.00	65.33	68.20	-2.87	57.22	8.11	Peak	---	---
4	10380.00	55.11	68.20	-13.09	40.00	15.11	Peak	---	---

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).

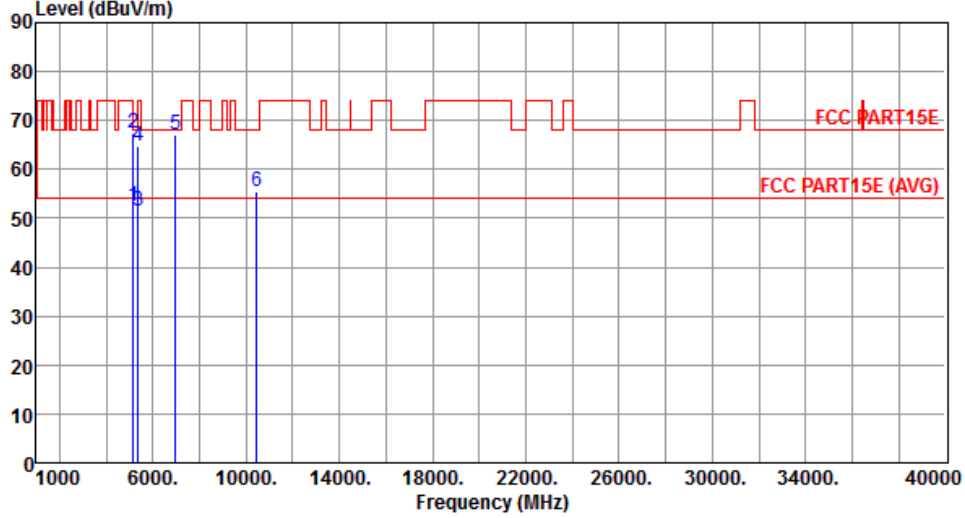
Modulation	VHT40	Test Freq. (MHz)	5230
Polarization	Horizontal		



	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	45.53	54.00	-8.47	39.97	5.56	Average	---	---
2	5150.00	58.82	74.00	-15.18	53.26	5.56	Peak	---	---
3	5350.00	46.02	54.00	-7.98	40.31	5.71	Average	---	---
4	5350.00	58.60	74.00	-15.40	52.89	5.71	Peak	---	---
5	6973.30	63.57	68.20	-4.63	55.44	8.13	Peak	---	---
6	10460.00	55.53	68.20	-12.67	40.32	15.21	Peak	---	---

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).

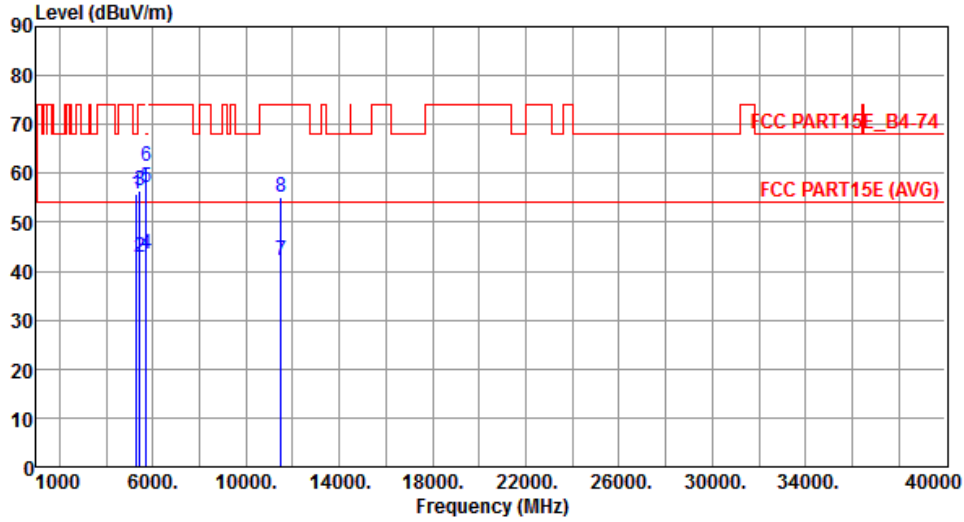
Modulation	VHT40	Test Freq. (MHz)	5230
Polarization	Vertical		



	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	52.50	54.00	-1.50	46.94	5.56	Average	---	---
2	5150.00	67.40	74.00	-6.60	61.84	5.56	Peak	---	---
3	5350.00	51.56	54.00	-2.44	45.85	5.71	Average	---	---
4	5350.00	64.88	74.00	-9.12	59.17	5.71	Peak	---	---
5	6973.30	66.96	68.20	-1.24	58.83	8.13	Peak	---	---
6	10460.00	55.48	68.20	-12.72	40.27	15.21	Peak	---	---

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).

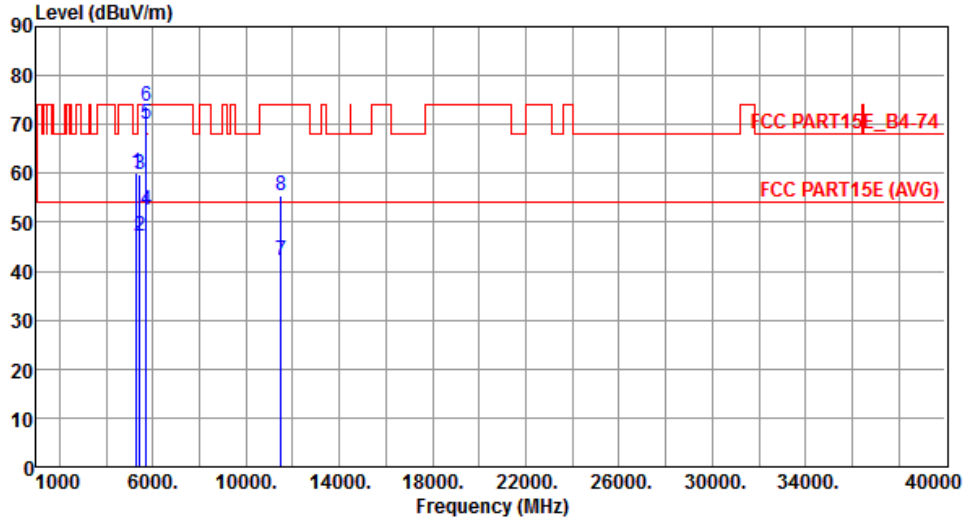
Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5280.00	55.72	68.20	-12.48	50.05	5.67	Peak	---	---
2	5426.00	42.68	54.00	-11.32	36.96	5.72	Average	---	---
3	5426.00	56.45	74.00	-17.55	50.73	5.72	Peak	---	---
4	5715.00	43.36	54.00	-10.64	37.78	5.58	Average	---	---
5	5715.00	57.24	74.00	-16.76	51.66	5.58	Peak	---	---
6	5725.00	61.36	78.20	-16.84	55.78	5.58	Peak	---	---
7	11510.00	42.06	54.00	-11.94	27.51	14.55	Average	---	---
8	11510.00	54.99	74.00	-19.01	40.44	14.55	Peak	---	---

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		

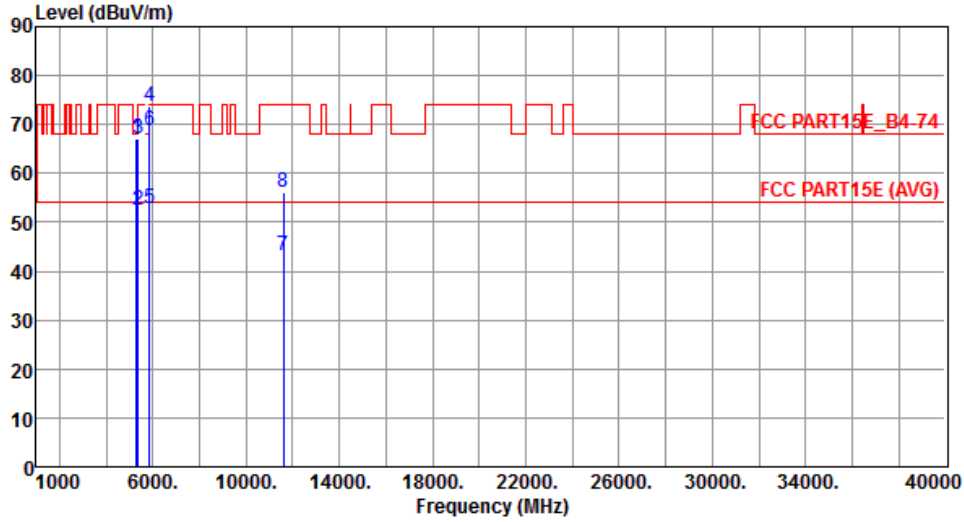


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5280.00	60.12	68.20	-8.08	54.45	5.67	Peak	---	---
2	5426.00	47.22	54.00	-6.78	41.50	5.72	Average	---	---
3	5426.00	59.79	74.00	-14.21	54.07	5.72	Peak	---	---
4	5715.00	52.59	54.00	-1.41	47.01	5.58	Average	---	---
5	5715.00	69.99	74.00	-4.01	64.41	5.58	Peak	---	---
6	5725.00	73.87	78.20	-4.33	68.29	5.58	Peak	---	---
7	11510.00	42.19	54.00	-11.81	27.64	14.55	Average	---	---
8	11510.00	55.48	74.00	-18.52	40.93	14.55	Peak	---	---

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)	5795
Polarization	Horizontal		
Level (dBuV/m) <			

Modulation	VHT40	Test Freq. (MHz)	5795
Polarization	Vertical		

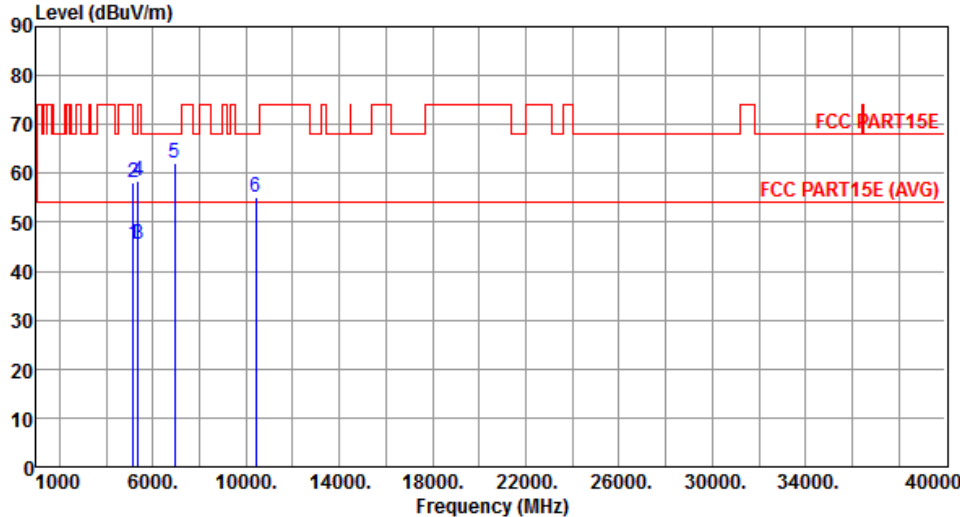


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5280.00	67.10	68.20	-1.10	61.43	5.67	Peak	---	---
2	5360.00	52.58	54.00	-1.42	46.86	5.72	Average	---	---
3	5360.00	67.23	74.00	-6.77	61.51	5.72	Peak	---	---
4	5850.00	73.68	78.20	-4.52	68.06	5.62	Peak	---	---
5	5860.00	52.83	54.00	-1.17	47.21	5.62	Average	---	---
6	5860.00	68.78	74.00	-5.22	63.16	5.62	Peak	---	---
7	11590.00	43.06	54.00	-10.94	28.61	14.45	Average	---	---
8	11590.00	56.04	74.00	-17.96	41.59	14.45	Peak	---	---

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

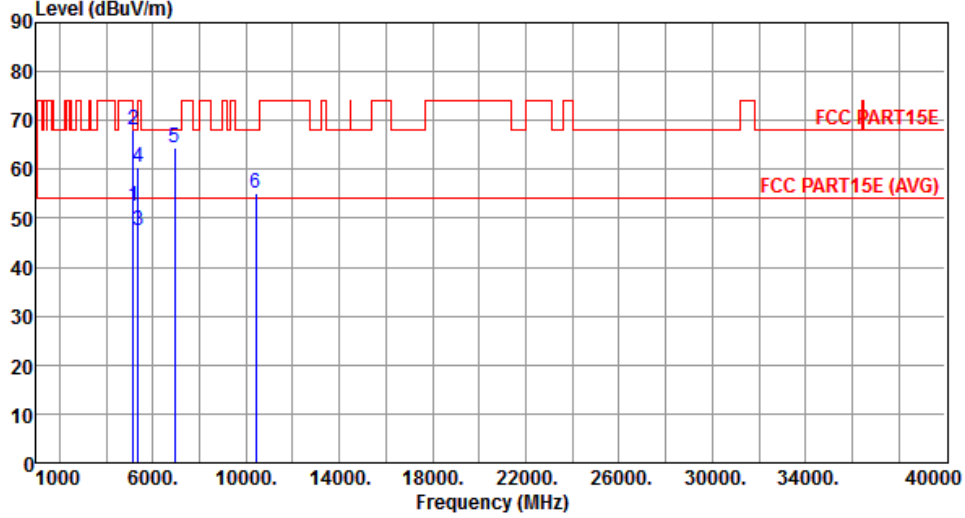
Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Horizontal		



	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	45.61	54.00	-8.39	40.05	5.56	Average	---	---
2	5150.00	58.21	74.00	-15.79	52.65	5.56	Peak	---	---
3	5350.00	45.62	54.00	-8.38	39.91	5.71	Average	---	---
4	5350.00	58.45	74.00	-15.55	52.74	5.71	Peak	---	---
5	6946.70	62.08	68.20	-6.12	53.96	8.12	Peak	---	---
6	10420.00	55.12	68.20	-13.08	39.97	15.15	Peak	---	---

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		

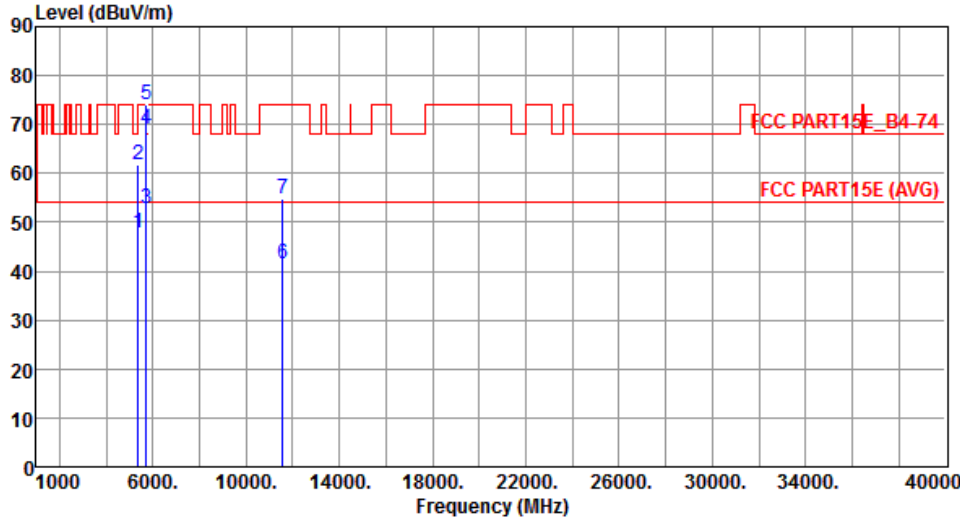


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	52.38	54.00	-1.62	46.82	5.56	Average	---	---
2	5150.00	68.00	74.00	-6.00	62.44	5.56	Peak	---	---
3	5350.00	47.48	54.00	-6.52	41.77	5.71	Average	---	---
4	5350.00	60.34	74.00	-13.66	54.63	5.71	Peak	---	---
5	6946.70	64.59	68.20	-3.61	56.47	8.12	Peak	---	---
6	10420.00	55.02	68.20	-13.18	39.87	15.15	Peak	---	---

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		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5384.00	47.82	54.00	-6.18	42.09	5.73	Average	---	---
2	5384.00	61.76	74.00	-12.24	56.03	5.73	Peak	---	---
3	5715.00	52.68	54.00	-1.32	47.10	5.58	Average	---	---
4	5715.00	69.08	74.00	-4.92	63.50	5.58	Peak	---	---
5	5725.00	74.12	78.20	-4.08	68.54	5.58	Peak	---	---
6	11550.00	41.52	54.00	-12.48	27.02	14.50	Average	---	---
7	11550.00	54.85	74.00	-19.15	40.35	14.50	Peak	---	---

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).

3.6 Frequency Stability

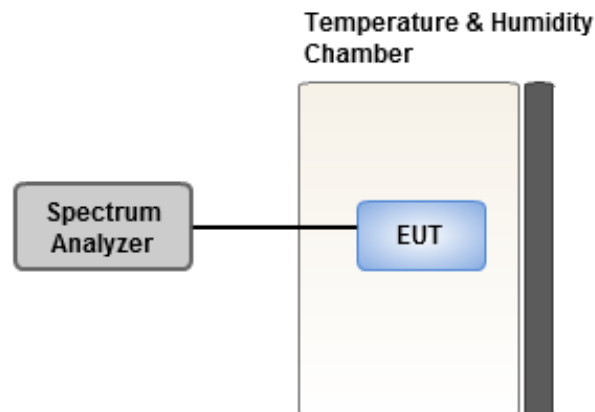
3.6.1 Limit of Frequency Stability

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	0.06	0.09	-0.47	0.41
T20°C Vmin	4.31	4.35	4.46	4.22
T50°C Vnom	5.83	6.07	5.90	5.89
T40°C Vnom	-1.20	-0.91	-0.62	-0.83
T30°C Vnom	0.90	1.48	1.06	0.82
T20°C Vnom	2.67	3.46	2.79	2.96
T10°C Vnom	0.33	0.66	0.98	-0.01
T0°C Vnom	0.75	1.10	0.31	0.60
T-10°C Vnom	-0.04	0.80	0.44	0.08
T-20°C Vnom	-0.43	-0.04	-0.76	-0.44
T-30°C Vnom	0.85	1.31	1.00	1.14
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, 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 Hsiang. Location map can be found on our website <http://www.icertifi.com.tw>.

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