

FCC Test Report

FCC ID : I88WAC6503D-S
Equipment : 802.11 ac Unified Pro Access Point
Model No. : WAC6503D-S
Brand Name : ZyXEL
Applicant : ZyXEL Communications Corporation
Address : No. 2, Gongye E. 9th Road, Hsinchu Science
Park, Hsinchu, Taiwan.
Standard : 47 CFR FCC Part 15.407
Received Date : Oct. 07, 2014
Tested Date : Oct. 14 ~ Nov. 5, 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
FR4O0702AN	Rev. 01	Initial issue	Dec. 11, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 3.695MHz 31.80 (Margin -14.20dB) - AV	Pass
15.407(b)(1)(2)(3) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5150.00MHz 53.00 (Margin -1.00dB) - AV	Pass
15.407(a)(1)(2)(3)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(a)(1)(2)(3)	RF Output Power	Max Power [dBm]: 15.83	Pass
15.407(a)(1)(2)(3)	Peak Power Spectral Density	Meet the requirement of limit	Pass
15.407(a)(6)	Peak Excursion	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]	3	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 0-9
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.

1.1.2 Antenna Details

Ant. No.	Model	Type	Antenna Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
1	WAC6503D-S	Dipole	IPEX	4	6	6	6	6

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	1. AC Adapter (support unit only.) Brand: DVE Model: DSA-24CA-12 120120 Rating: I/P: 100-240Vac, 50/60Hz, 0.8A O/P: 12Vdc, 2A
	2. POE Injector (support unit for radiated emission test only.) Brand: ZyXEL Model: PoE12-HP Rating: I/P: 100-240Vac, 50/60Hz, 1.5A max. O/P: 48Vdc, 42.1W
	3. POE Injector (support unit for conducted emission only.) Brand: PowerDsine 3001GC Model: E018205D G Rating: I/P: 100-250Vac, 50/60Hz, 0.5A O/P: 48Vdc, 0.35A

1.1.4 Accessories

NA

1.1.5 Channel List

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

1.1.6 Test Tool and Duty Cycle

Test Tool	CART, Version: 4.9		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11a	98.32%	0.07
	VHT20	98.72%	0.06
	VHT40	95.20%	0.21
	VHT80	89.93%	0.46

1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11a	5180	6.5
11a	5200	6.5
11a	5240	6.5
HT20	5180	6.5
HT20	5200	6.5
HT20	5240	6.5
HT40	5190	11
HT40	5230	11
VHT20	5180	6.5
VHT20	5200	6.5
VHT20	5240	6.5
VHT40	5190	11
VHT40	5230	11
VHT80	5210	10.5

1.2 Local Support Equipment List

Support Equipment List (Adapter Mode)					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	Notebook01	DELL	Latitude E5430	C0GB4X1	RJ45, 10m non-shielded w/o core.
2	Notebook02	DELL	Latitude E6440	JMXMD12	RJ45, 10m non-shielded w/o core.
3	AC Adapter	DVE	DSA-24CA-12 120120	---	---

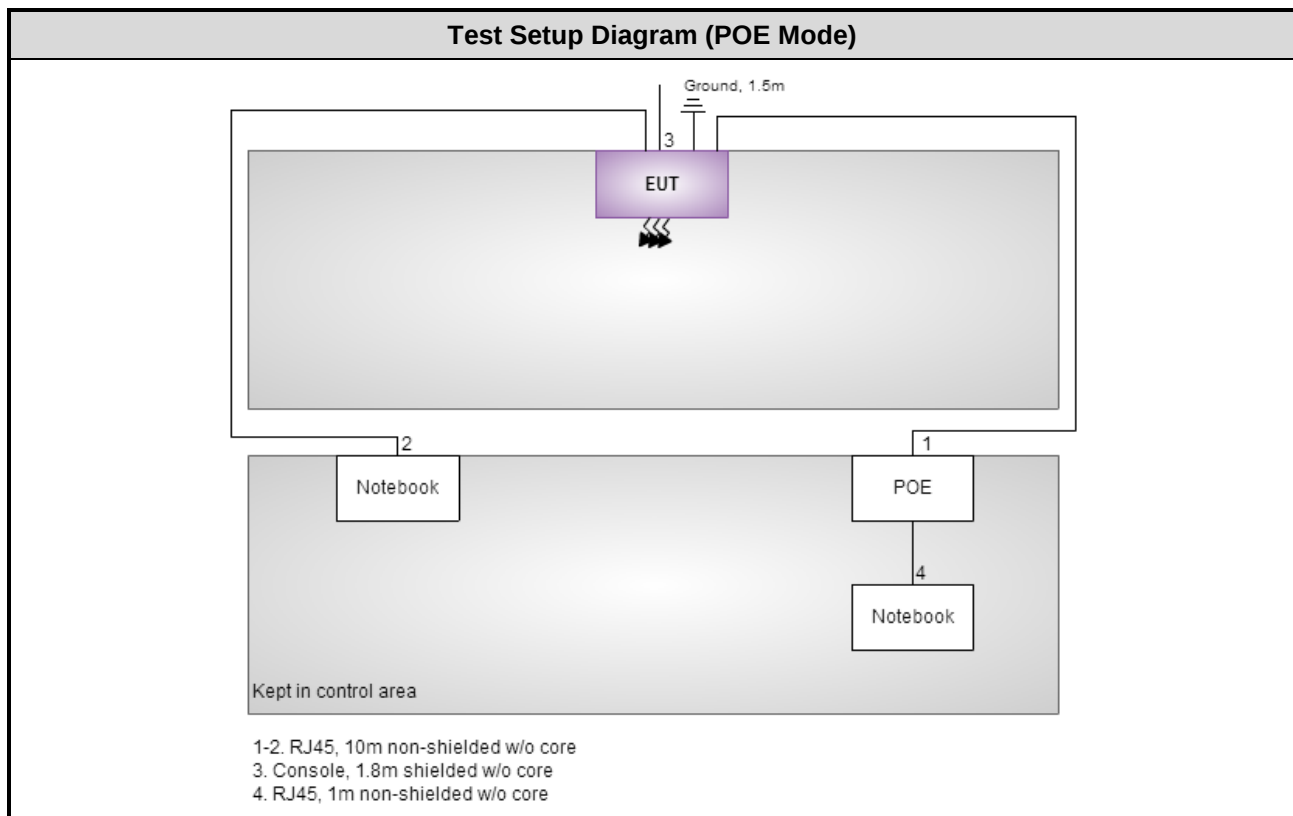
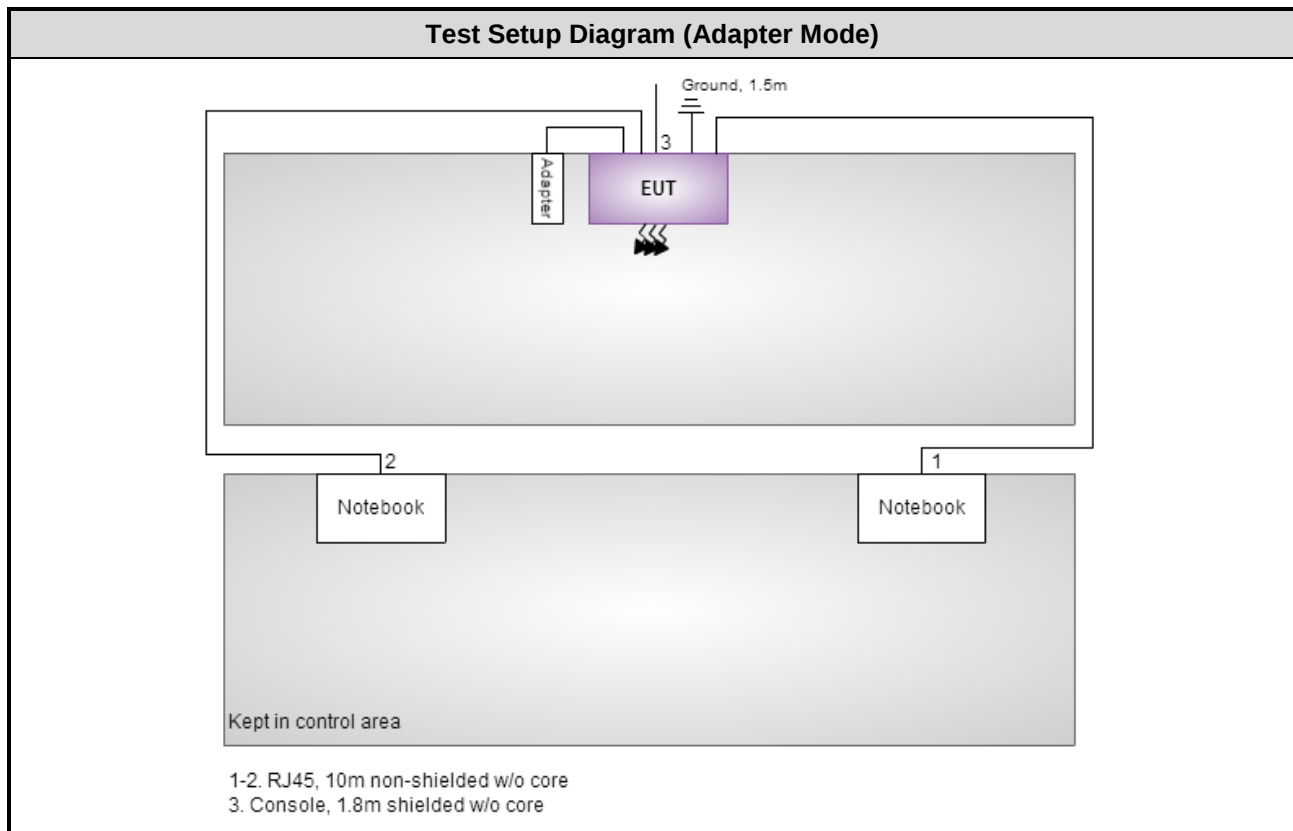
Note: No. 3 was provided by applicant.

Support Equipment List (POE Mode)					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E5430	C0GB4X1	RJ45, 10m non-shielded w/o core.
2	Notebook	DELL	Latitude E5430	9ZFB4X1	RJ45, 1m non-shielded w/o core.
3	POE Injector	ZyXEL	PoE12-HP	---	RJ45, 10m non-shielded w/o core.
4	POE Injector	PowerDsine 3001GC	E018205D G	---	RJ45, 10m non-shielded w/o core.

Note:

- 1) No. 3 & 4 were provided by applicant.
- 2) No. 3 was for radiated emission test used.
- 3) No. 4 was for conducted emission test used.

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Test Date	Nov. 4 ~ Nov. 5, 2014				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
EMC Receiver	R&S	ESCS 30	100169	Oct. 17, 2014	Oct. 16, 2015
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
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 chamber 3 / (03CH03-WS)				
Test Date	Oct. 14 ~ Oct. 23, 2014				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 16, 2014	Sep. 15, 2015
Receiver	R&S	ESR3	101657	Jan. 18, 2014	Jan. 17, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-562	Feb. 07, 2014	Feb. 06, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 20, 2014	Feb. 19, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA9170154	Jan. 10, 2014	Jan. 09, 2015
Preamplifier	EMC	EMC02325	980187	Sep. 26, 2014	Sep. 25, 2015
Preamplifier	Agilent	83017A	MY53270014	Sep. 17, 2014	Sep. 16, 2015
Preamplifier	EMC	EMC184045B	980192	Aug. 26, 2014	Aug. 25, 2015
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 19, 2014	Feb. 18, 2015
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22601/4	Feb. 19, 2014	Feb. 18, 2015
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 19, 2014	Feb. 18, 2015
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 17, 2014	Feb. 16, 2015
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 17, 2014	Feb. 16, 2015
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 17, 2014	Feb. 16, 2015
Measurement Software	AUDIX	e3	6.120210g	NA	NA
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)				
Test Date	Nov. 05, 2014				
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	Sep. 29, 2014	Sep. 28, 2015
Power Sensor	Anritsu	MA2411B	1207366	Sep. 29, 2014	Sep. 28, 2015
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 C63.10-2009

FCC KDB 412172 D01 Determining ERP and EIRP v01

FCC KDB 7789033 D01 General UNII Test Procedures Old Rules v01r04

FCC KDB 644545 D01 Guidance for IEEE 802.11ac v01r02 Old Rules

FCC KDB 644545 D02 Alternative Guidance for 802.11ac Old 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 ≤ 1GHz	±3.26 dB
Radiated emission > 1GHz	±4.94 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 58-62%	Peter Lin
Radiated Emissions	03CH03-WS	21-26°C / 62-67%	Anderson Hung Aska Huang
RF Conducted	TH01-WS	22°C / 65%	Felix Sung

➤ FCC site registration No.: 390588

➤ IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	VHT40	5190	MCS 0	1.2
Radiated Emissions ≤1GHz	VHT40	5190	MCS 0	1.2
RF Output Power	11a	5180 / 5200 / 5240	6 Mbps	1
	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	1
	VHT20	5180 / 5200 / 5240	MCS 0	
	VHT40	5190 / 5230	MCS 0	
	VHT80	5210	MCS 0	
Peak Excursion	11a	5240	6 Mbps	1
	HT20	5240	MCS 0	
	HT40	5230	MCS 0	
	VHT20	5240	MCS 0	
	VHT40	5230	MCS 0	
	VHT80	5210	MCS 0	
Frequency Stability	Un-modulation	5240	---	1
NOTE: 1. This device can be powered by AC adapter or POE. Each power supply was selected for final testing as below configuration. 2. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Y-plane results were found as the worst case and were shown in this report. 3. Test configurations are listed as below: (1) Configuration 1: AC Adapter mode (2) Configuration 2: POE mode				

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

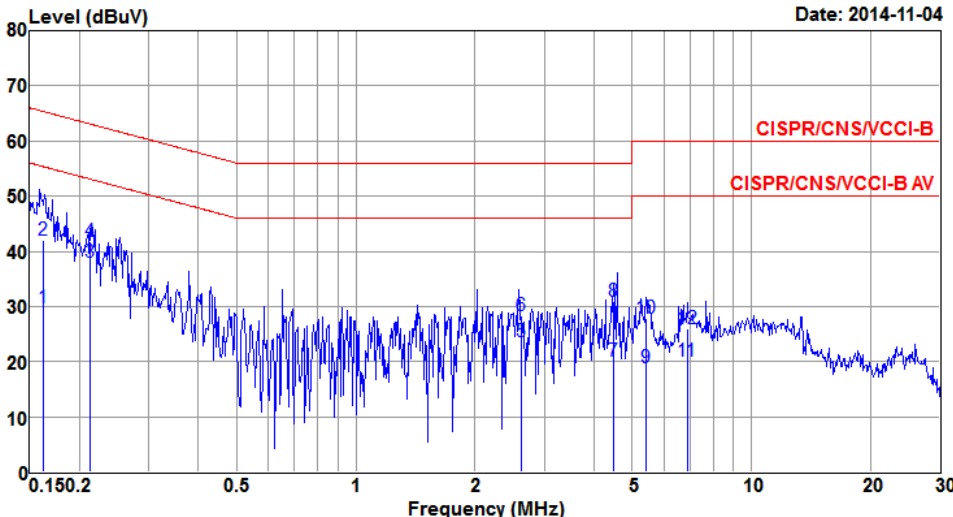
3.1.3 Test Setup



- 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	Test Configuration	1

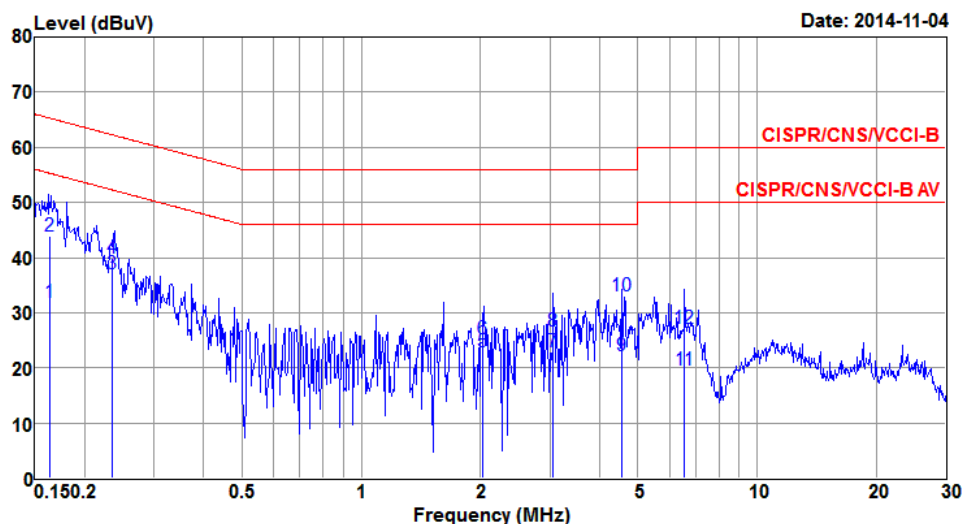


Date: 2014-11-04

	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.162	29.79	55.38	-25.59	29.36	0.41	0.02	Average
2	0.162	42.06	65.38	-23.32	41.63	0.41	0.02	QP
3*	0.213	38.12	53.09	-14.97	37.68	0.43	0.01	Average
4	0.213	41.78	63.09	-21.31	41.34	0.43	0.01	QP
5	2.623	23.53	46.00	-22.47	22.43	1.03	0.07	Average
6	2.623	28.33	56.00	-27.67	27.23	1.03	0.07	QP
7	4.475	19.96	46.00	-26.04	18.66	1.14	0.16	Average
8	4.475	30.95	56.00	-25.05	29.65	1.14	0.16	QP
9	5.421	18.98	50.00	-31.02	17.52	1.28	0.18	Average
10	5.421	27.84	60.00	-32.16	26.38	1.28	0.18	QP
11	6.889	20.11	50.00	-29.89	18.46	1.44	0.21	Average
12	6.889	26.04	60.00	-33.96	24.39	1.44	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).

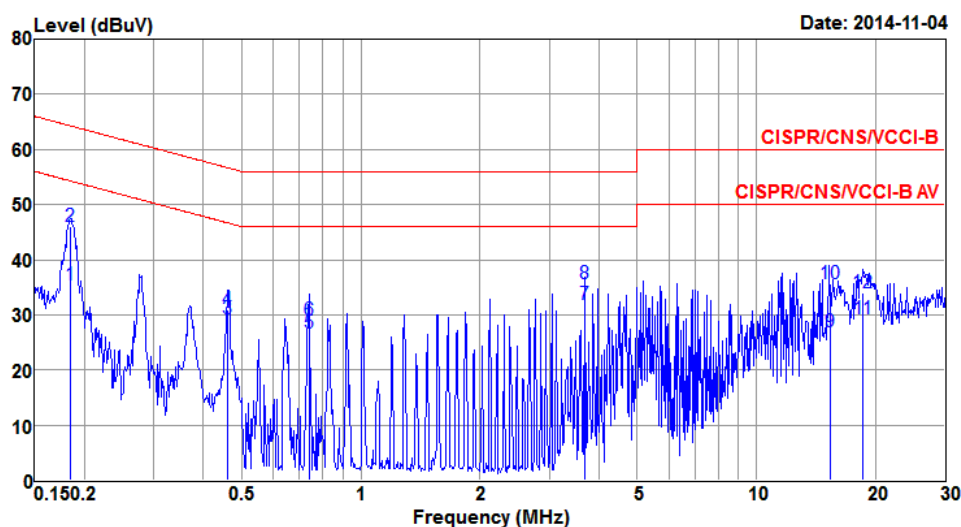
Modulation	VHT40	Test Freq. (MHz)	5190
Power Phase	Neutral	Test Configuration	1



	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.164	31.95	55.27	-23.32	31.43	0.50	0.02	Average
2	0.164	43.82	65.27	-21.45	43.30	0.50	0.02	QP
3*	0.235	37.04	52.28	-15.24	36.50	0.53	0.01	Average
4	0.235	39.85	62.28	-22.43	39.31	0.53	0.01	QP
5	2.034	22.98	46.00	-23.02	21.87	1.09	0.02	Average
6	2.034	25.33	56.00	-30.67	24.22	1.09	0.02	QP
7	3.049	22.83	46.00	-23.17	21.62	1.11	0.10	Average
8	3.049	26.68	56.00	-29.32	25.47	1.11	0.10	QP
9	4.553	22.24	46.00	-23.76	20.87	1.21	0.16	Average
10	4.553	32.94	56.00	-23.06	31.57	1.21	0.16	QP
11	6.561	19.51	50.00	-30.49	17.86	1.45	0.20	Average
12	6.561	27.03	60.00	-32.97	25.38	1.45	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).

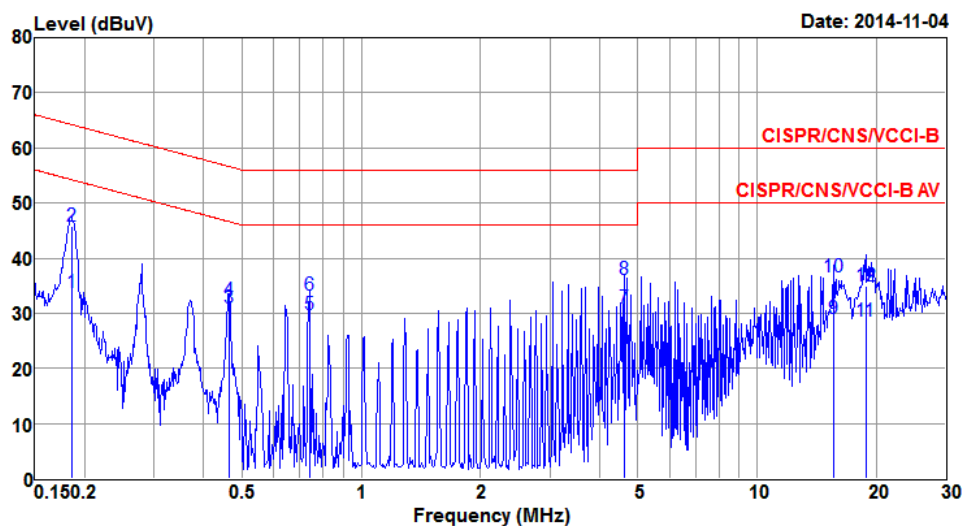
Modulation	VHT40	Test Freq. (MHz)	5190
Power Phase	Line	Test Configuration	2



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.184	35.30	54.28	-18.98	34.90	0.39	0.01	Average
2	0.184	46.13	64.28	-18.15	45.73	0.39	0.01	QP
3	0.461	29.20	46.67	-17.47	28.79	0.39	0.02	Average
4	0.461	30.86	56.67	-25.81	30.45	0.39	0.02	QP
5	0.739	26.77	46.00	-19.23	26.35	0.40	0.02	Average
6	0.739	29.02	56.00	-26.98	28.60	0.40	0.02	QP
7*	3.695	31.80	46.00	-14.20	31.21	0.46	0.13	Average
8	3.695	35.72	56.00	-20.28	35.13	0.46	0.13	QP
9	15.340	26.97	50.00	-23.03	26.10	0.55	0.32	Average
10	15.340	35.54	60.00	-24.46	34.67	0.55	0.32	QP
11	18.628	29.20	50.00	-20.80	28.27	0.55	0.38	Average
12	18.628	34.10	60.00	-25.90	33.17	0.55	0.38	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)	5190
Power Phase	Neutral	Test Configuration	2



	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.186	33.79	54.22	-20.43	33.30	0.48	0.01	Average
2	0.186	45.78	64.22	-18.44	45.29	0.48	0.01	QP
3	0.462	30.85	46.65	-15.80	30.36	0.47	0.02	Average
4	0.462	32.45	56.65	-24.20	31.96	0.47	0.02	QP
5	0.739	29.74	46.00	-16.26	29.24	0.48	0.02	Average
6	0.739	33.32	56.00	-22.68	32.82	0.48	0.02	QP
7*	4.624	31.00	46.00	-15.00	30.30	0.53	0.17	Average
8	4.624	36.15	56.00	-19.85	35.45	0.53	0.17	QP
9	15.632	29.09	50.00	-20.91	28.21	0.56	0.32	Average
10	15.632	36.57	60.00	-23.43	35.69	0.56	0.32	QP
11	18.830	28.56	50.00	-21.44	27.62	0.56	0.38	Average
12	18.830	35.04	60.00	-24.96	34.10	0.56	0.38	QP

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

3.2 Emission Bandwidth

3.2.1 Test Procedures

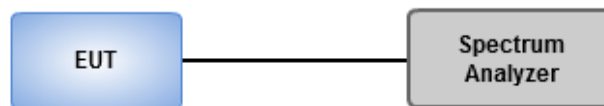
26dB Bandwidth

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

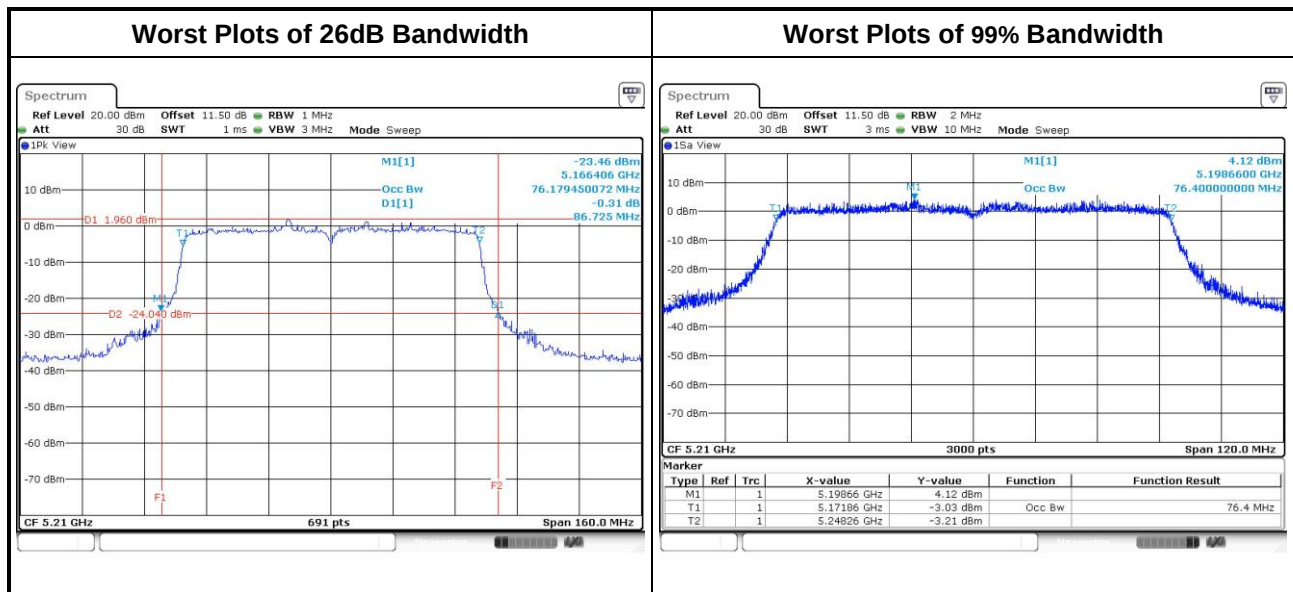
1. Set RBW = 1 % to 5 % of the OBW
2. Set VBW $\geq$ 3 RBW
3. Sample detection and single sweep mode shall be used
4. Use the 99 % power bandwidth function of the instrument

3.2.2 Test Setup



3.2.3 Test Result of Emission Bandwidth

Emission Bandwidth												
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)				Power Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	26dB BW	99%OBW
11a	3	5180	22.26	22.32	22.61	--	16.80	16.72	16.65	--	17.00	16.21
11a	3	5200	23.01	22.55	22.43	--	16.80	16.71	16.67	--	17.00	16.22
11a	3	5240	23.54	22.26	22.32	--	16.80	16.70	16.68	--	17.00	16.22
VHT20	3	5180	24.29	24.99	22.96	--	17.97	17.87	17.81	--	17.00	16.51
VHT20	3	5200	23.76	23.94	23.07	--	17.95	17.87	17.82	--	17.00	16.51
VHT20	3	5240	23.83	23.36	24.12	--	17.93	17.86	17.84	--	17.00	16.51
VHT40	3	5190	46.38	45.10	45.91	--	36.72	36.70	36.74	--	17.00	17.00
VHT40	3	5230	46.38	44.75	46.26	--	36.84	36.66	36.88	--	17.00	17.00
VHT80	3	5210	85.80	86.03	86.73	--	76.40	76.24	76.36	--	17.00	17.00



3.3 RF Output Power

3.3.1 Limit of RF Output Power

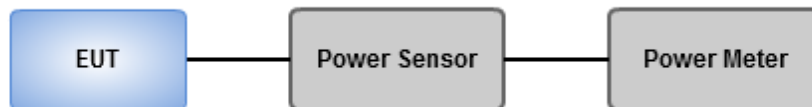
Frequency Band (GHz)		Limit for FCC 15.407
☒	5.15~5.25	50mW or 4dBm+10 log B
☐	5.25~5.35	250mW or 11dBm+10 log B
☐	5.47~5.725	250mW or 11dBm+10 log B

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

3.3.2 Test Procedures

- ☒ **Power meter**
 - ☒ Measurements 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

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	3	5180	6.66	7.53	6.8	--	15.083	11.78	17.00
11a	3	5200	6.85	7.61	6.93	--	15.541	11.91	17.00
11a	3	5240	6.69	7.74	7.21	--	15.870	12.01	17.00
HT20	3	5180	6.58	7.54	6.77	--	14.979	11.75	17.00
HT20	3	5200	6.59	7.55	6.94	--	15.192	11.82	17.00
HT20	3	5240	6.62	7.52	6.97	--	15.219	11.82	17.00
HT40	3	5190	10.68	11.61	10.62	--	37.717	15.77	17.00
HT40	3	5230	10.65	11.71	10.54	--	37.764	15.77	17.00
VHT20	3	5180	6.63	7.59	6.81	--	15.141	11.80	17.00
VHT20	3	5200	6.64	7.59	6.99	--	15.355	11.86	17.00
VHT20	3	5240	6.71	7.62	7.02	--	15.504	11.90	17.00
VHT40	3	5190	10.73	11.69	10.68	--	38.282	15.83	17.00
VHT40	3	5230	10.69	11.75	10.60	--	38.166	15.82	17.00
VHT80	3	5210	9.78	10.09	9.71	--	29.069	14.63	17.00

3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

Frequency Band (GHz)		Limit (dBm) for FCC 15.407
☒	5.15~5.25	4
☐	5.25~5.35	11
☐	5.47~5.725	11

3.4.2 Test Procedures

☒ Method SA-1 (For 11a / 11ac VHT20)

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.

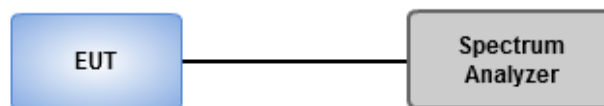
☐ Method SA-2

1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
2. Set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{symbol period of the transmitted signal})$.
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.

☒ Method SA-2 Alternative (For 11ac VHT40 / VHT80)

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.

3.4.3 Test Setup

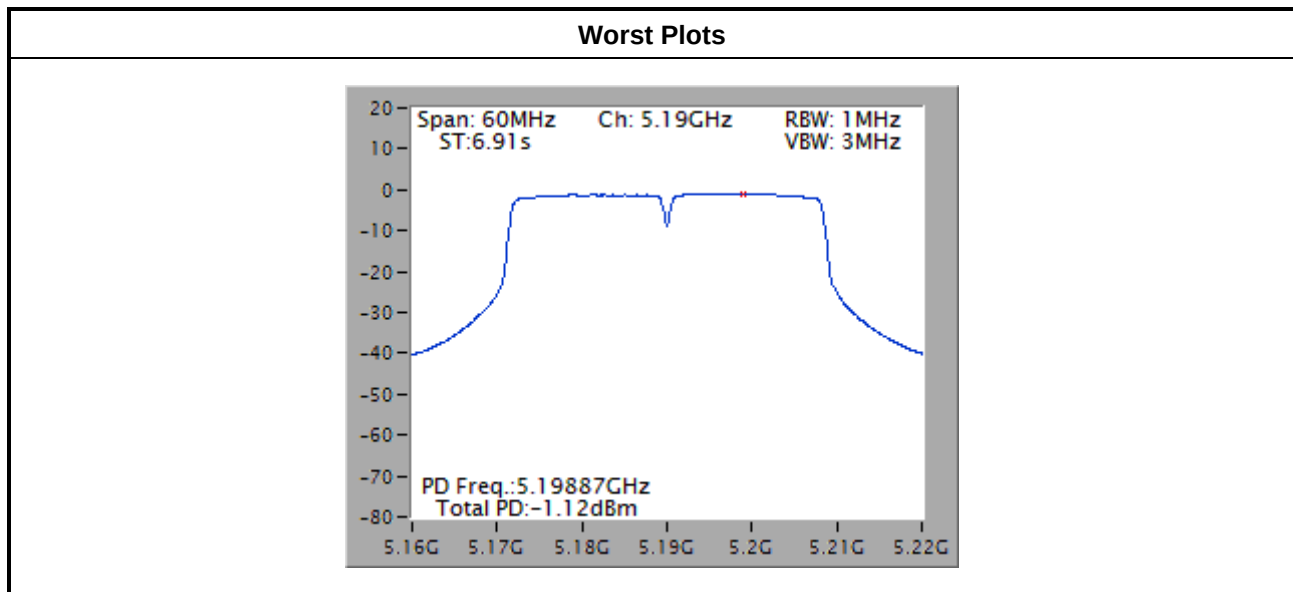


3.4.4 Test Result of Peak Power Spectral Density

Condition			Peak Power Spectral Density (dBm)			
Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
11a	3	5180	-1.14	0.00	-1.14	-0.77
11a	3	5200	-1.18	0.00	-1.18	-0.77
11a	3	5240	-1.08	0.00	-1.08	-0.77
VHT20	3	5180	-1.58	0.00	-1.58	-0.77
VHT20	3	5200	-1.59	0.00	-1.59	-0.77
VHT20	3	5240	-1.45	0.00	-1.45	-0.77
VHT40	3	5190	-1.12	0.21	-0.91	-0.77
VHT40	3	5230	-1.15	0.21	-0.94	-0.77
VHT80	3	5210	-5.39	0.46	-4.93	-0.77

Note:

1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. Directional gain = $6 + 10 \cdot \log(3/1) = 10.77 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $4 \text{ dBm} - (10.77 \text{ dBi} - 6 \text{ dBi}) = -0.77 \text{ dBm}$.



Note: Power density plot without duty factor

3.5 Peak Excursion

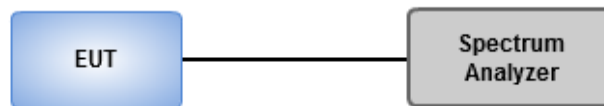
3.5.1 Peak Excursion Limit

Peak excursion of the modulation envelope shall not exceed 13 dB across any 1 MHz bandwidth.

3.5.2 Test Procedures

1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = peak.
2. Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
3. Use the peak search function to find the peak of the spectrum.
4. Use the procedure of section 3.4.2 to measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD

3.5.3 Test Setup

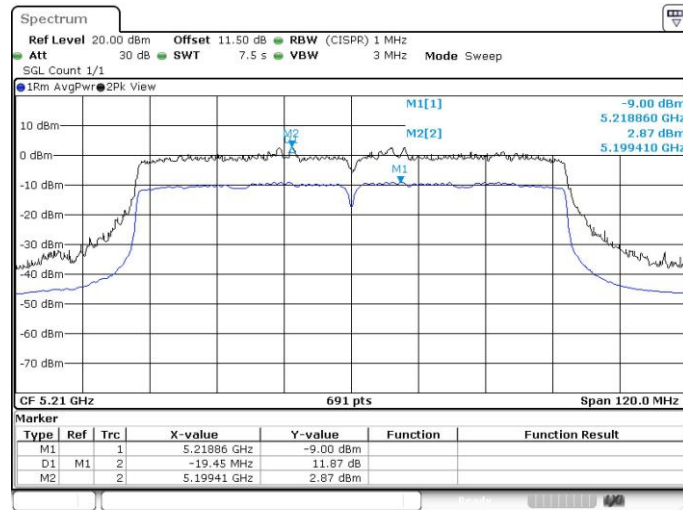


3.5.4 Test Result of Peak Excursion

Mode	Modulation Mode	N _{TX}	Freq. (MHz)	Measured Value(dB)	Duty Factor (dB)	Peak Excursion (dB)	Limit
11a	BPSK	3	5200	8.35	0.00	8.35	13
11a	QPSK	3	5200	9.66	0.22	9.44	13
11a	16QAM	3	5200	10.17	0.42	9.75	13
11a	64QAM	3	5200	10.85	0.81	10.04	13
VHT20	BPSK	3	5200	8.87	0.00	8.87	13
VHT20	QPSK	3	5200	9.53	0.22	9.31	13
VHT20	16QAM	3	5200	9.55	0.44	9.11	13
VHT20	64QAM	3	5200	10.72	0.91	9.81	13
VHT20	256QAM	3	5200	10.05	1.11	8.94	13
VHT40	BPSK	3	5190	8.82	0.21	8.61	13
VHT40	QPSK	3	5190	9.71	0.47	9.24	13
VHT40	16QAM	3	5190	10.25	0.87	9.38	13
VHT40	64QAM	3	5190	10.44	1.46	8.98	13
VHT40	256QAM	3	5190	10.7	1.75	8.95	13
VHT80	BPSK	3	5210	10.77	0.46	10.31	13
VHT80	QPSK	3	5210	11.3	0.94	10.36	13
VHT80	16QAM	3	5210	11.87	1.42	10.45	13
VHT80	64QAM	3	5210	11.64	2.10	9.54	13
VHT80	256QAM	3	5210	10.86	2.43	8.43	13

Note: Measured value = Peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission. Since the duty cycle is < 98 %, duty factor is required to average spectrum
Peak exclusion = Measured value – duty factor

Worst Plots



3.6 Transmitter Radiated and Band Edge Emissions

3.6.1 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] 5.825 5.835 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).

3.6.2 Test Procedures

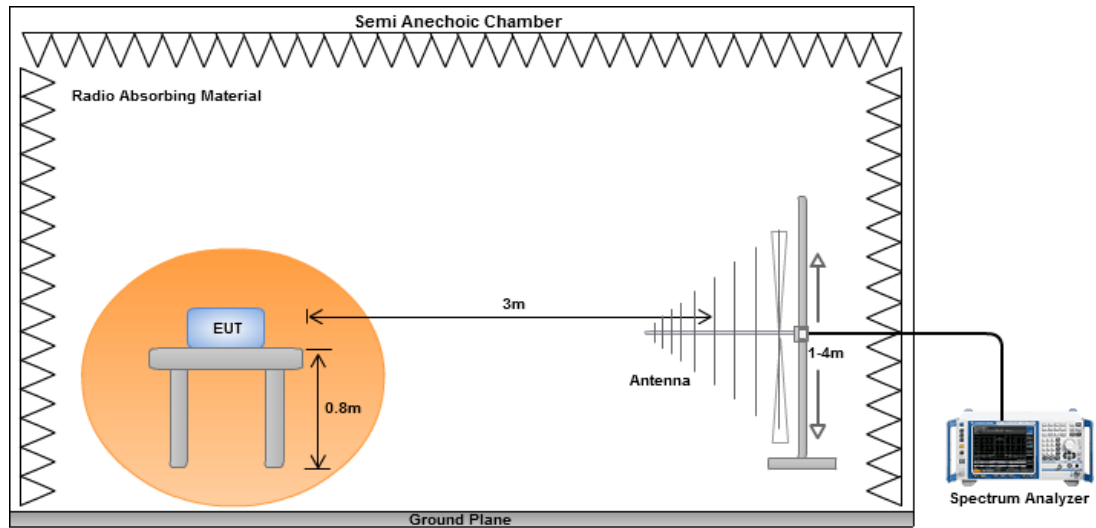
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

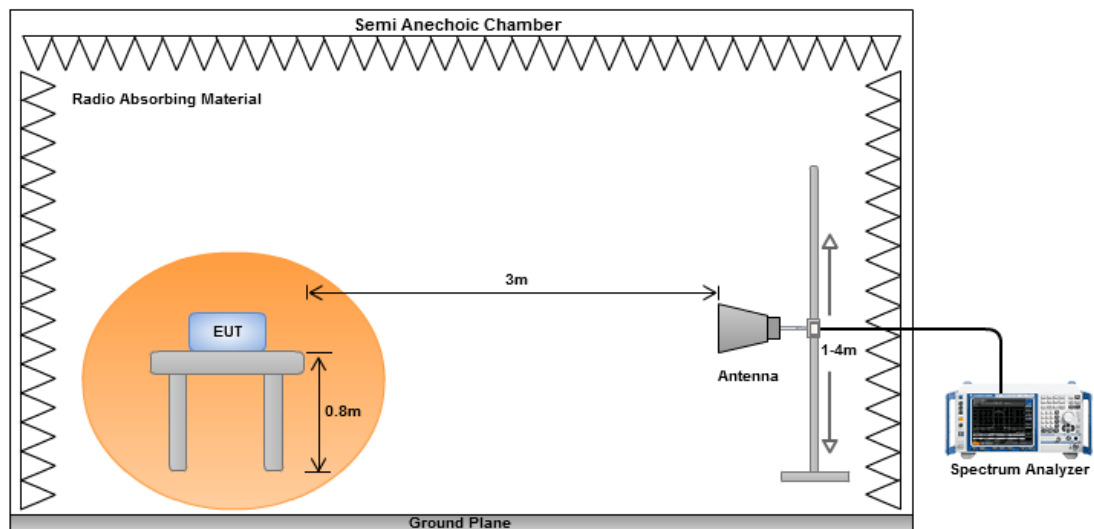
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.6.3 Test Setup

Radiated Emissions below 1 GHz

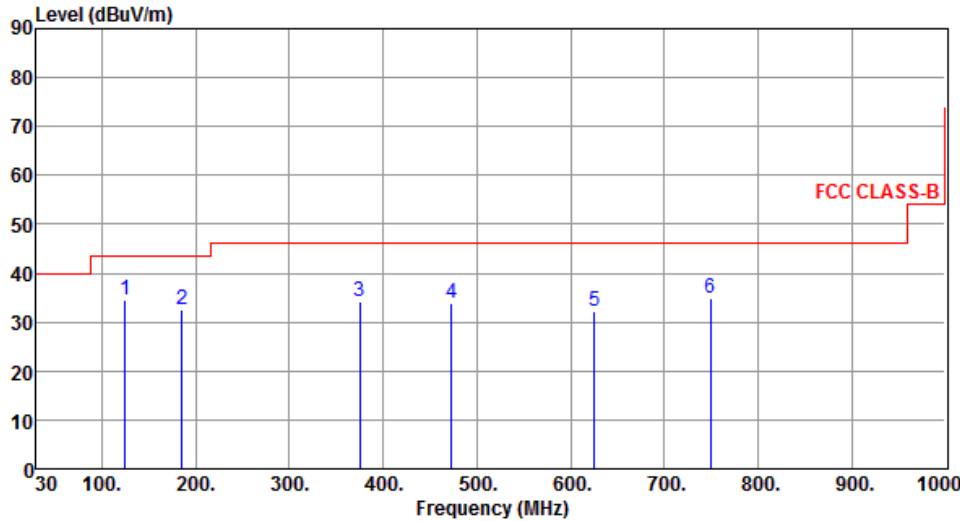


Radiated Emissions above 1 GHz



3.6.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal	Test Configuration	1

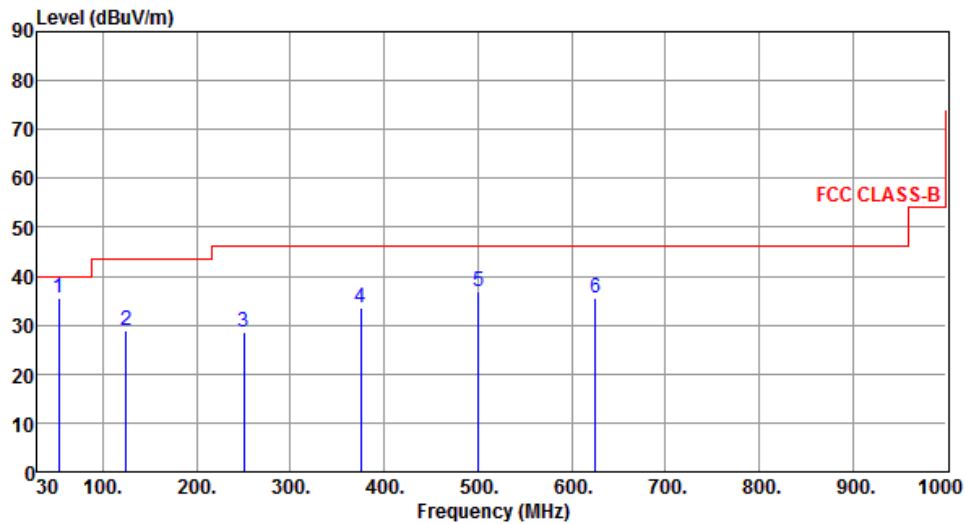


The graph displays the radiated unwanted emissions for a transmitter. The y-axis represents the Level in dBUV/m, ranging from 0 to 90. The x-axis represents the Frequency in MHz, ranging from 30 to 1000. A red line indicates the FCC CLASS-B limit, which is 40 dBUV/m from 30 MHz to 100 MHz, 45 dBUV/m from 100 MHz to 1000 MHz, and 55 dBUV/m from 1000 MHz to 1100 MHz. Six emission peaks are identified and labeled 1 through 6, with their corresponding data provided in the table below.

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	125.06	34.56	43.50	-8.94	49.71	-15.15	Peak	---	---
2	185.20	32.40	43.50	-11.10	48.04	-15.64	Peak	---	---
3	375.32	34.20	46.00	-11.80	44.95	-10.75	Peak	---	---
4	473.29	33.91	46.00	-12.09	42.24	-8.33	Peak	---	---
5	625.58	32.18	46.00	-13.82	37.44	-5.26	Peak	---	---
6	749.74	35.00	46.00	-11.00	38.16	-3.16	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)	5190
Polarization	Vertical	Test Configuration	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	53.28	35.47	40.00	-4.53	48.63	-13.16	Peak	---	---
2	125.06	28.88	43.50	-14.62	44.03	-15.15	Peak	---	---
3	250.19	28.46	46.00	-17.54	42.93	-14.47	Peak	---	---
4	375.32	33.39	46.00	-12.61	44.14	-10.75	Peak	---	---
5	500.45	36.86	46.00	-9.14	44.86	-8.00	Peak	---	---
6	625.58	35.63	46.00	-10.37	40.89	-5.26	Peak	---	---

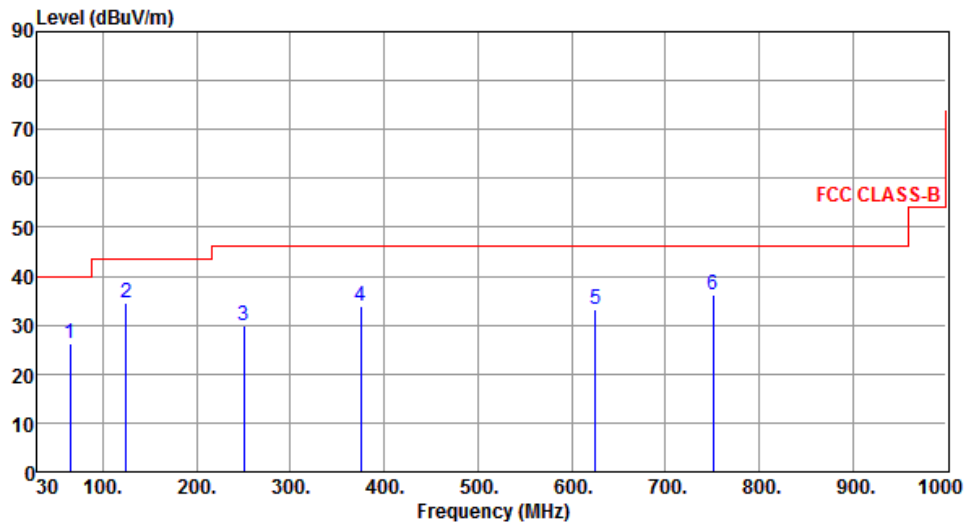
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*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.

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal	Test Configuration	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	64.92	26.25	40.00	-13.75	40.69	-14.44	Peak	---	---
2	125.06	34.46	43.50	-9.04	49.61	-15.15	Peak	---	---
3	250.19	29.97	46.00	-16.03	44.44	-14.47	Peak	---	---
4	375.32	33.94	46.00	-12.06	44.69	-10.75	Peak	---	---
5	625.58	33.33	46.00	-12.67	38.59	-5.26	Peak	---	---
6	750.71	36.05	46.00	-9.95	39.20	-3.15	Peak	---	---

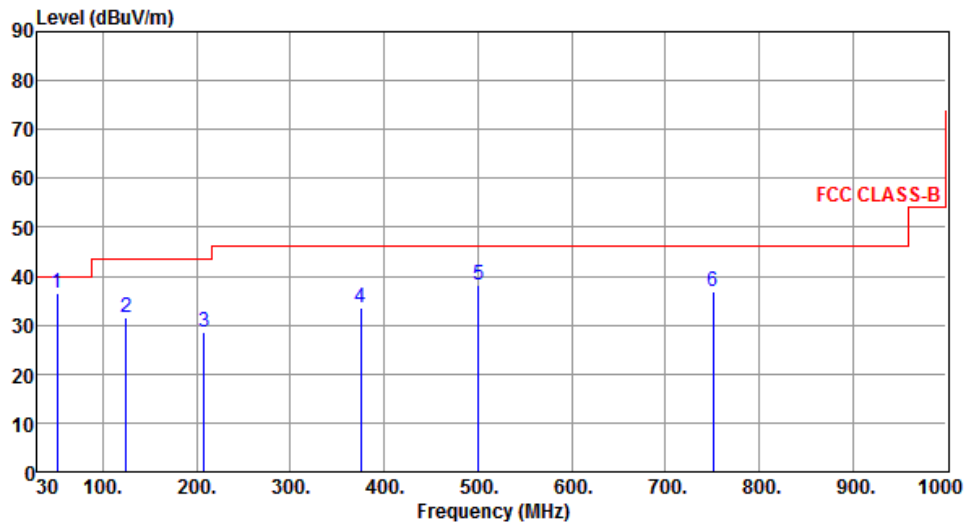
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Vertical	Test Configuration	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	51.34	36.47	40.00	-3.53	49.51	-13.04	Peak	---	---
2	125.06	31.60	43.50	-11.90	46.75	-15.15	Peak	---	---
3	207.51	28.59	43.50	-14.91	44.83	-16.24	Peak	---	---
4	375.32	33.63	46.00	-12.37	44.38	-10.75	Peak	---	---
5	500.45	38.05	46.00	-7.95	46.05	-8.00	Peak	---	---
6	750.71	36.97	46.00	-9.03	40.12	-3.15	Peak	---	---

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

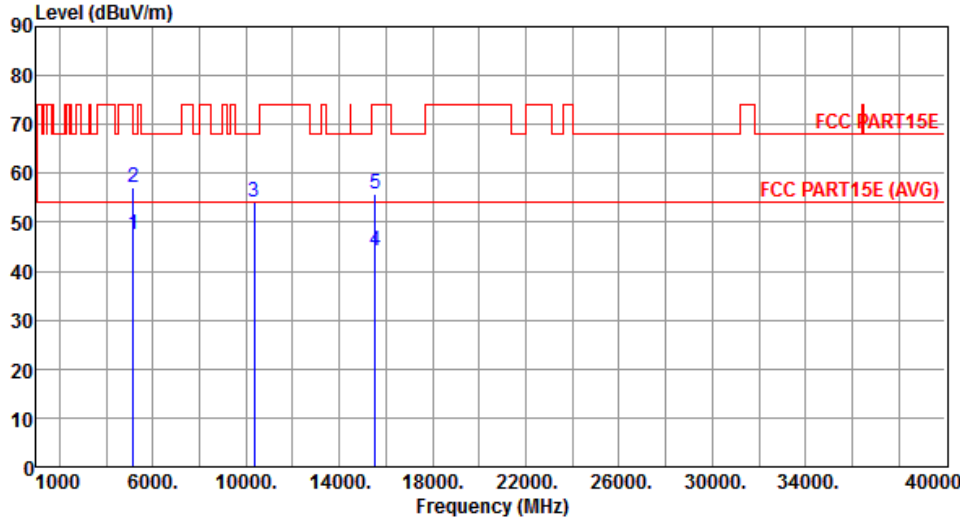
*Factor includes antenna factor , cable loss and amplifier gain

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

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

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

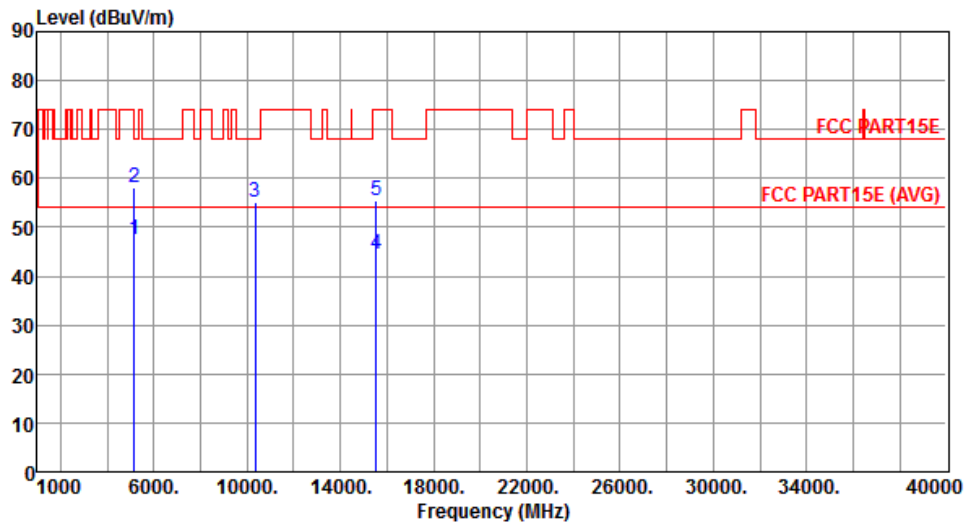
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Horizontal	Test Configuration	1



	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	47.46	54.00	-6.54	41.28	6.18	Average	---	---
2	5150.00	57.21	74.00	-16.79	51.03	6.18	Peak	---	---
3	10360.00	54.08	68.20	-14.12	37.12	16.96	Peak	---	---
4	15540.00	44.06	54.00	-9.94	26.18	17.88	Average	---	---
5	15540.00	55.64	74.00	-18.36	37.76	17.88	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	Test Configuration	1



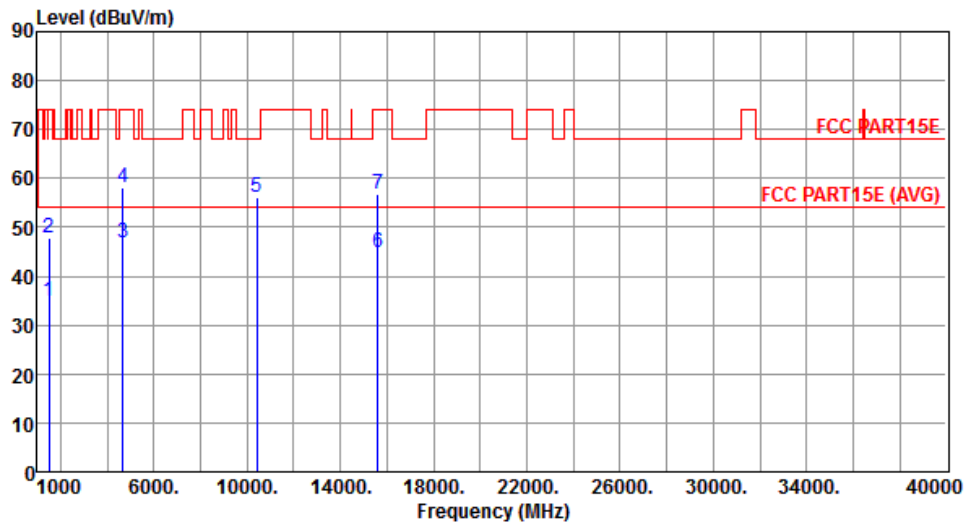
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.43	54.00	-6.57	41.25	6.18	Average	---	---
2	5150.00	58.09	74.00	-15.91	51.91	6.18	Peak	---	---
3	10360.00	55.22	68.20	-12.98	38.26	16.96	Peak	---	---
4	15540.00	44.39	54.00	-9.61	26.51	17.88	Average	---	---
5	15540.00	55.41	74.00	-18.59	37.53	17.88	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	Test Configuration	1



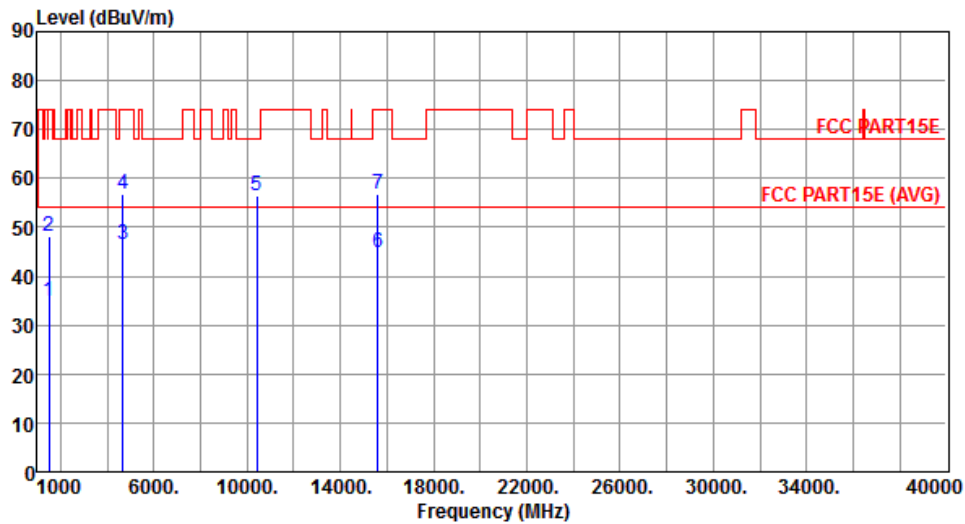
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	34.82	54.00	-19.18	39.81	-4.99	Average	---	---
2	1500.00	47.82	74.00	-26.18	52.81	-4.99	Peak	---	---
3	4656.00	46.69	54.00	-7.31	41.66	5.03	Average	---	---
4	4656.00	58.04	74.00	-15.96	53.01	5.03	Peak	---	---
5	10400.00	56.11	68.20	-12.09	39.03	17.08	Peak	---	---
6	15600.00	44.90	54.00	-9.10	27.17	17.73	Average	---	---
7	15600.00	56.79	74.00	-17.21	39.06	17.73	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	Vertical	Test Configuration	1



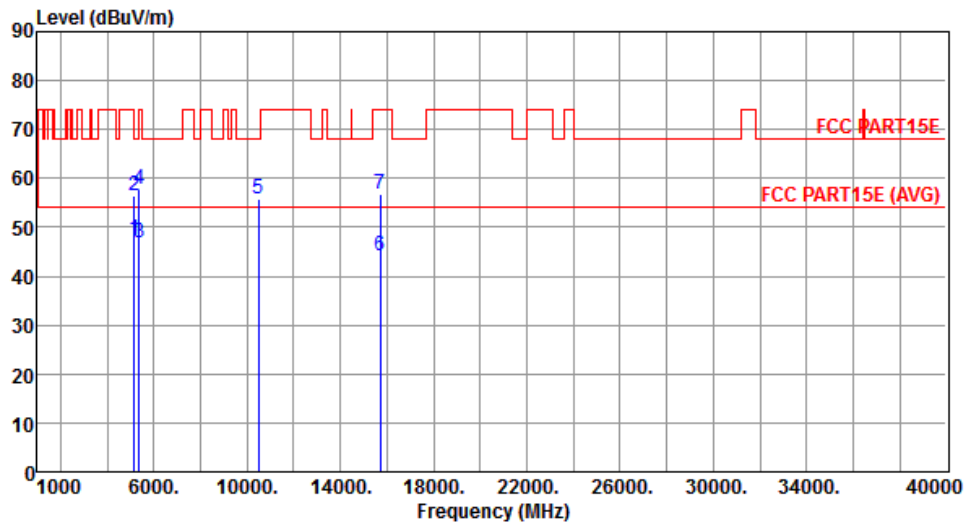
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1500.00	34.82	54.00	-19.18	39.81	-4.99	Average	---	---
2	1500.00	48.10	74.00	-25.90	53.09	-4.99	Peak	---	---
3	4656.00	46.51	54.00	-7.49	41.48	5.03	Average	---	---
4	4656.00	56.88	74.00	-17.12	51.85	5.03	Peak	---	---
5	10400.00	56.40	68.20	-11.80	39.32	17.08	Peak	---	---
6	15600.00	44.80	54.00	-9.20	27.07	17.73	Average	---	---
7	15600.00	56.83	74.00	-17.17	39.10	17.73	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	Test Configuration	1



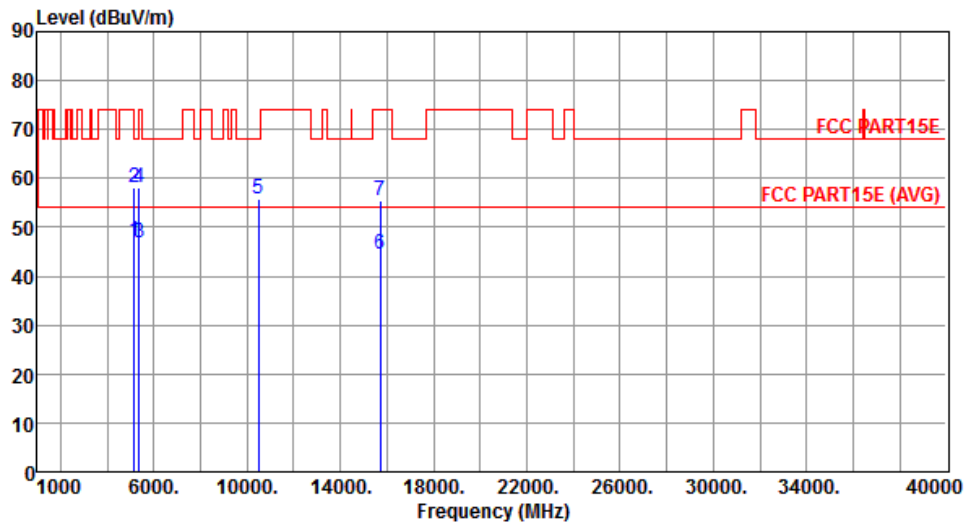
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.32	54.00	-6.68	41.14	6.18	Average	---	---
2	5150.00	56.49	74.00	-17.51	50.31	6.18	Peak	---	---
3	5350.00	46.84	54.00	-7.16	40.33	6.51	Average	---	---
4	5350.00	57.77	74.00	-16.23	51.26	6.51	Peak	---	---
5	10480.00	55.94	68.20	-12.26	38.62	17.32	Peak	---	---
6	15720.00	44.26	54.00	-9.74	26.83	17.43	Average	---	---
7	15720.00	56.64	74.00	-17.36	39.21	17.43	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	Test Configuration	1



	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	47.14	54.00	-6.86	40.96	6.18	Average	---	---
2	5150.00	58.18	74.00	-15.82	52.00	6.18	Peak	---	---
3	5350.00	46.93	54.00	-7.07	40.42	6.51	Average	---	---
4	5350.00	57.99	74.00	-16.01	51.48	6.51	Peak	---	---
5	10480.00	55.85	68.20	-12.35	38.53	17.32	Peak	---	---
6	15720.00	44.37	54.00	-9.63	26.94	17.43	Average	---	---
7	15720.00	55.55	74.00	-18.45	38.12	17.43	Peak	---	---

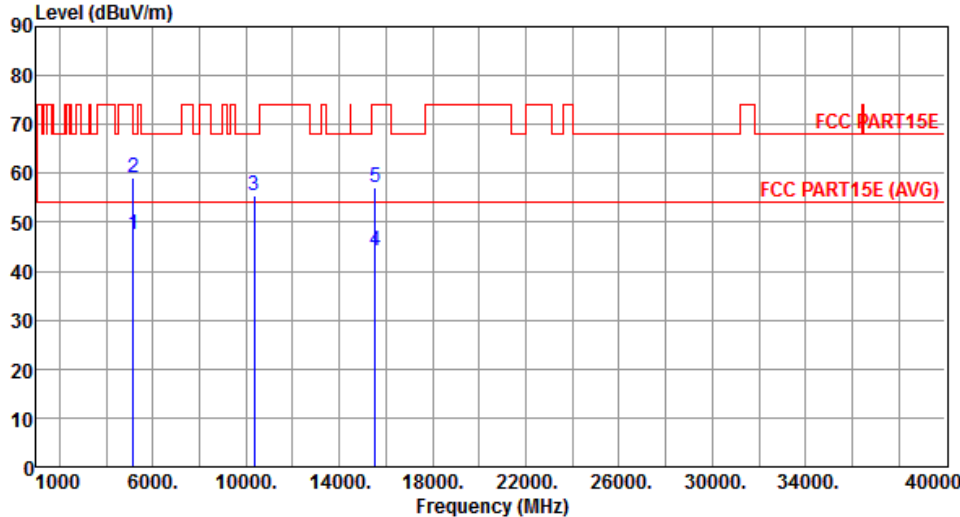
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

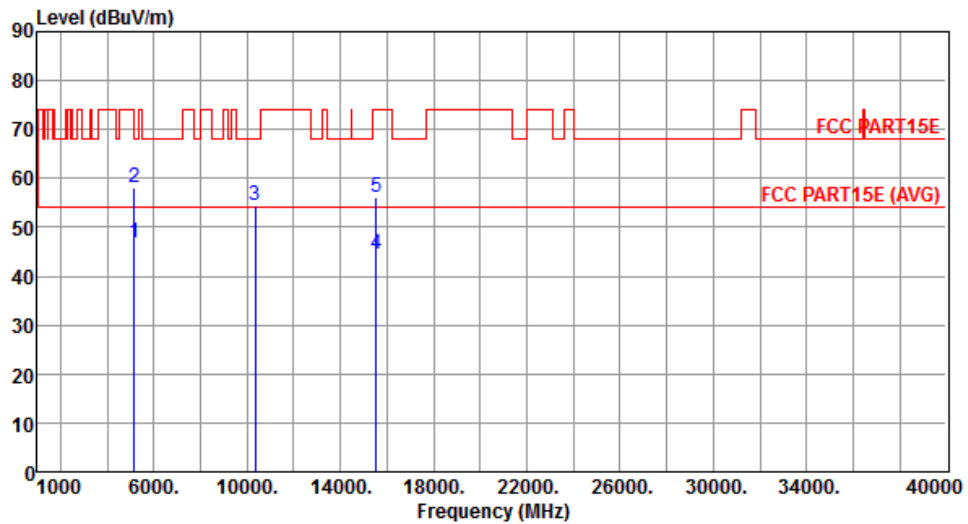
Modulation	VHT20	Test Freq. (MHz)	5180
Polarization	Horizontal	Test Configuration	1



	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	47.52	54.00	-6.48	41.34	6.18	Average	---	---
2	5150.00	59.06	74.00	-14.94	52.88	6.18	Peak	---	---
3	10360.00	55.41	68.20	-12.79	38.45	16.96	Peak	---	---
4	15540.00	44.30	54.00	-9.70	26.42	17.88	Average	---	---
5	15540.00	57.02	74.00	-16.98	39.14	17.88	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	Test Configuration	1



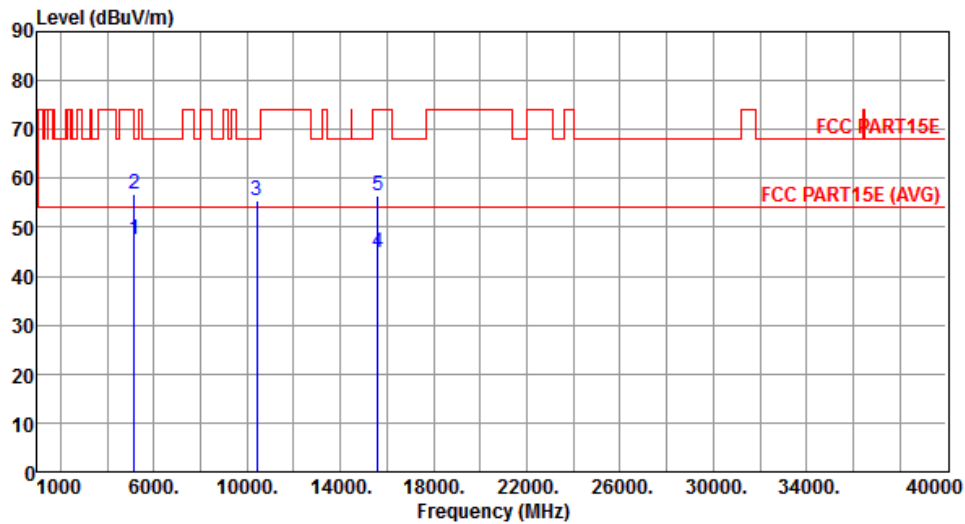
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	46.73	54.00	-7.27	40.55	6.18	Average	---	---
2	5150.00	58.23	74.00	-15.77	52.05	6.18	Peak	---	---
3	10360.00	54.34	68.20	-13.86	37.38	16.96	Peak	---	---
4	15540.00	44.41	54.00	-9.59	26.53	17.88	Average	---	---
5	15540.00	56.06	74.00	-17.94	38.18	17.88	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	Horizontal	Test Configuration	1



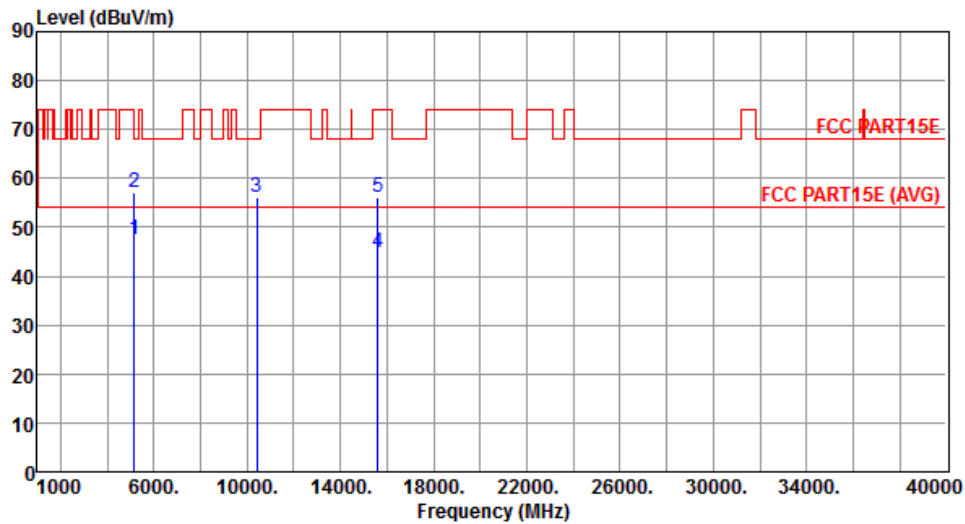
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.40	54.00	-6.60	41.22	6.18	Average	---	---
2	5150.00	56.85	74.00	-17.15	50.67	6.18	Peak	---	---
3	10400.00	55.55	68.20	-12.65	38.47	17.08	Peak	---	---
4	15600.00	44.68	54.00	-9.32	26.95	17.73	Average	---	---
5	15600.00	56.33	74.00	-17.67	38.60	17.73	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	Test Configuration	1



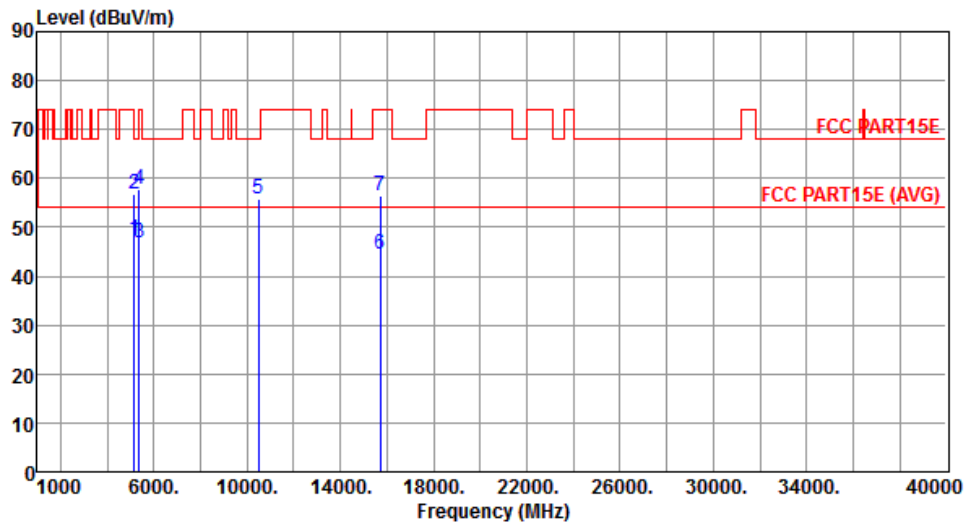
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.47	54.00	-6.53	41.29	6.18	Average	---	---
2	5150.00	57.11	74.00	-16.89	50.93	6.18	Peak	---	---
3	10400.00	56.25	68.20	-11.95	39.17	17.08	Peak	---	---
4	15600.00	44.76	54.00	-9.24	27.03	17.73	Average	---	---
5	15600.00	56.29	74.00	-17.71	38.56	17.73	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	Test Configuration	1



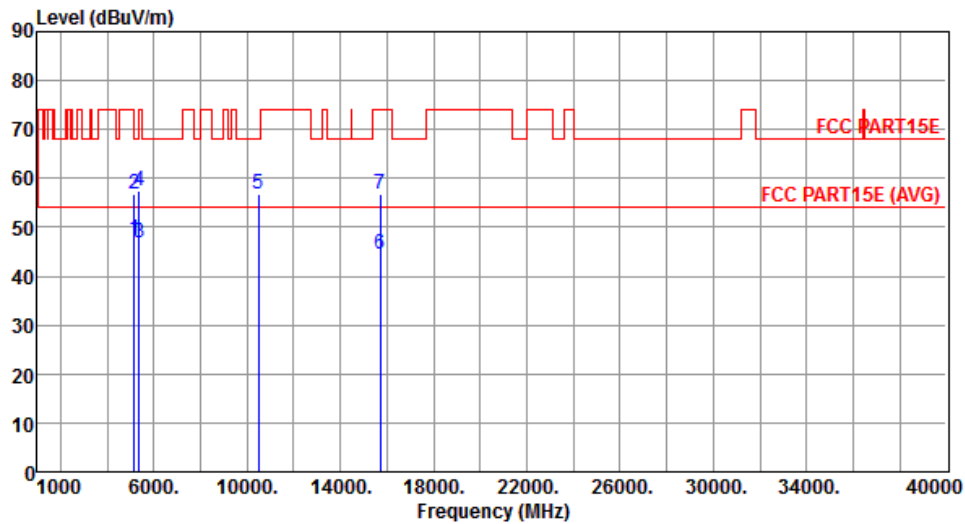
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.34	54.00	-6.66	41.16	6.18	Average	---	---
2	5150.00	56.86	74.00	-17.14	50.68	6.18	Peak	---	---
3	5350.00	46.75	54.00	-7.25	40.24	6.51	Average	---	---
4	5350.00	57.84	74.00	-16.16	51.33	6.51	Peak	---	---
5	10480.00	55.65	68.20	-12.55	38.33	17.32	Peak	---	---
6	15720.00	44.55	54.00	-9.45	27.12	17.43	Average	---	---
7	15720.00	56.50	74.00	-17.50	39.07	17.43	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	Test Configuration	1



	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	47.41	54.00	-6.59	41.23	6.18	Average	---	---
2	5150.00	56.76	74.00	-17.24	50.58	6.18	Peak	---	---
3	5350.00	46.92	54.00	-7.08	40.41	6.51	Average	---	---
4	5350.00	57.57	74.00	-16.43	51.06	6.51	Peak	---	---
5	10480.00	56.86	68.20	-11.34	39.54	17.32	Peak	---	---
6	15720.00	44.38	54.00	-9.62	26.95	17.43	Average	---	---
7	15720.00	56.90	74.00	-17.10	39.47	17.43	Peak	---	---

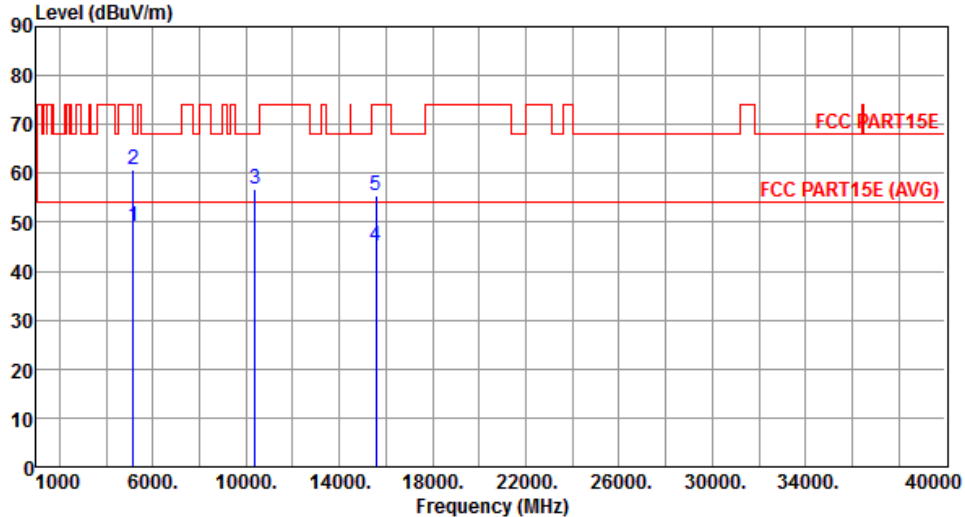
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

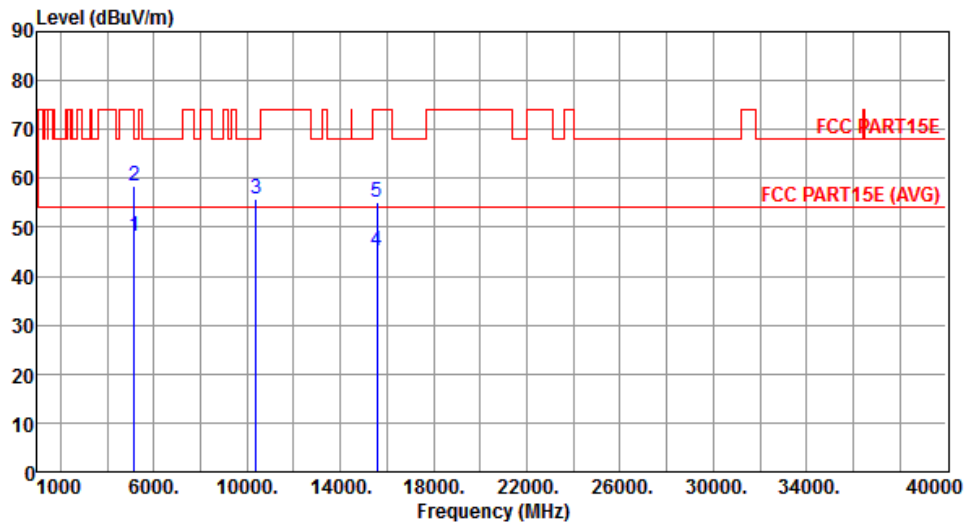
Modulation	VHT40	Test Freq. (MHz)	5190
Polarization	Horizontal	Test Configuration	1



	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	49.11	54.00	-4.89	42.93	6.18	Average	---	---
2	5150.00	60.91	74.00	-13.09	54.73	6.18	Peak	---	---
3	10380.00	56.83	68.20	-11.37	39.81	17.02	Peak	---	---
4	15570.00	45.07	54.00	-8.93	27.27	17.80	Average	---	---
5	15570.00	55.41	74.00	-18.59	37.61	17.80	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	Test Configuration	1



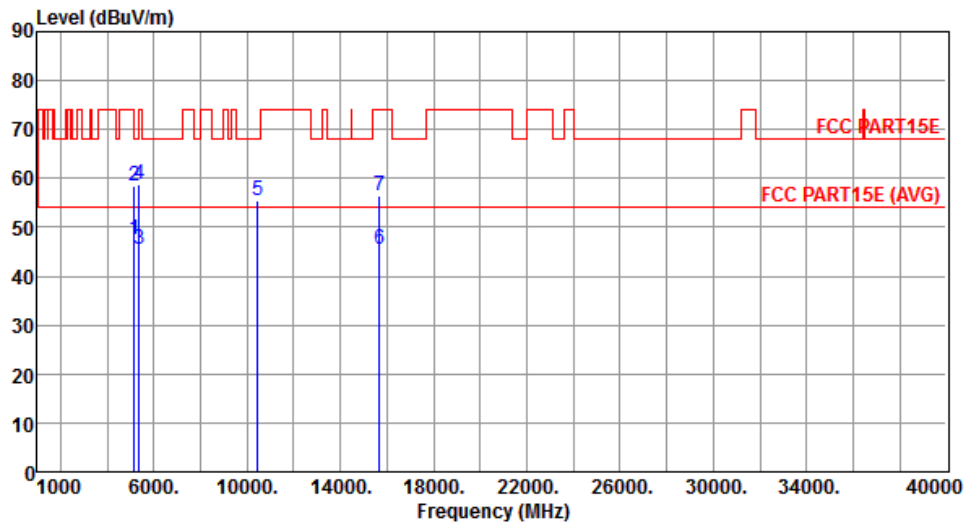
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	48.27	54.00	-5.73	42.09	6.18	Average	---	---
2	5150.00	58.52	74.00	-15.48	52.34	6.18	Peak	---	---
3	10380.00	55.67	68.20	-12.53	38.65	17.02	Peak	---	---
4	15570.00	45.18	54.00	-8.82	27.38	17.80	Average	---	---
5	15570.00	55.23	74.00	-18.77	37.43	17.80	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	Test Configuration	1



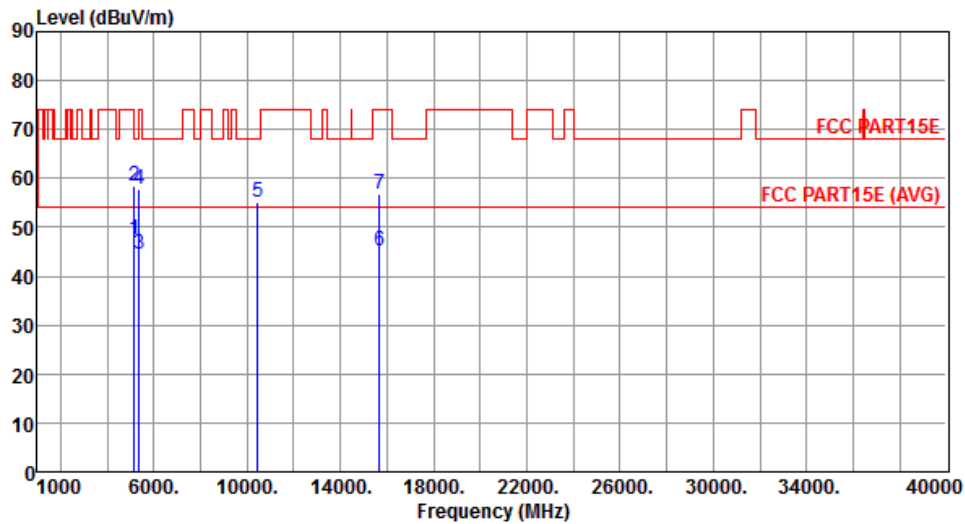
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	47.40	54.00	-6.60	41.22	6.18	Average	---	---
2	5150.00	58.56	74.00	-15.44	52.38	6.18	Peak	---	---
3	5350.00	45.58	54.00	-8.42	39.07	6.51	Average	---	---
4	5350.00	58.72	74.00	-15.28	52.21	6.51	Peak	---	---
5	10460.00	55.38	68.20	-12.82	38.12	17.26	Peak	---	---
6	15690.00	45.35	54.00	-8.65	27.84	17.51	Average	---	---
7	15690.00	56.36	74.00	-17.64	38.85	17.51	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	Test Configuration	1



	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	47.41	54.00	-6.59	41.23	6.18	Average	---	---
2	5150.00	58.41	74.00	-15.59	52.23	6.18	Peak	---	---
3	5350.00	44.47	54.00	-9.53	37.96	6.51	Average	---	---
4	5350.00	57.91	74.00	-16.09	51.40	6.51	Peak	---	---
5	10460.00	55.27	68.20	-12.93	38.01	17.26	Peak	---	---
6	15690.00	45.18	54.00	-8.82	27.67	17.51	Average	---	---
7	15690.00	56.66	74.00	-17.34	39.15	17.51	Peak	---	---

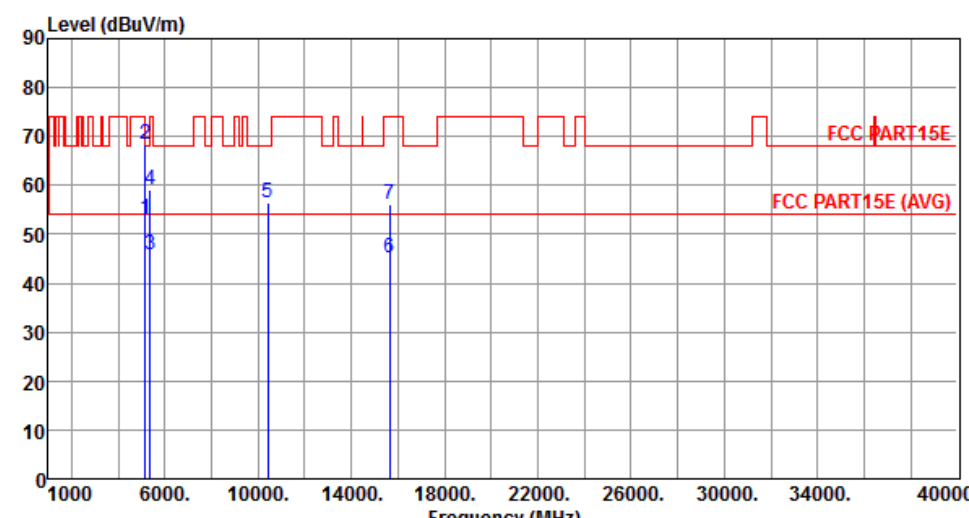
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

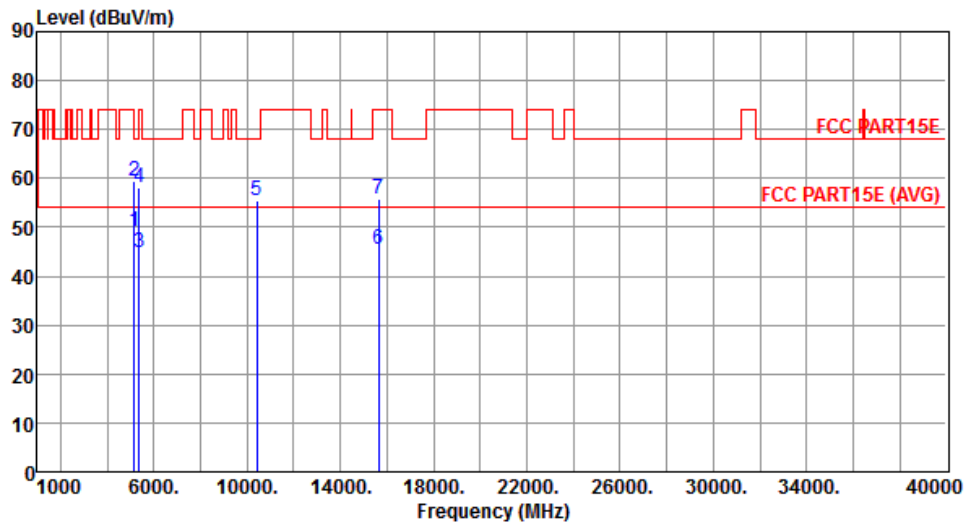
Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Horizontal	Test Configuration	1



	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	53.00	54.00	-1.00	46.82	6.18	Average	---	---
2	5150.00	68.29	74.00	-5.71	62.11	6.18	Peak	---	---
3	5350.00	45.96	54.00	-8.04	39.45	6.51	Average	---	---
4	5350.00	59.17	74.00	-14.83	52.66	6.51	Peak	---	---
5	10420.00	56.37	68.20	-11.83	39.24	17.13	Peak	---	---
6	15630.00	45.33	54.00	-8.67	27.68	17.65	Average	---	---
7	15630.00	55.97	74.00	-18.03	38.32	17.65	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	Test Configuration	1



	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	49.27	54.00	-4.73	43.09	6.18	Average	---	---
2	5150.00	59.45	74.00	-14.55	53.27	6.18	Peak	---	---
3	5350.00	44.88	54.00	-9.12	38.37	6.51	Average	---	---
4	5350.00	58.09	74.00	-15.91	51.58	6.51	Peak	---	---
5	10420.00	55.46	68.20	-12.74	38.33	17.13	Peak	---	---
6	15630.00	45.39	54.00	-8.61	27.74	17.65	Average	---	---
7	15630.00	55.65	74.00	-18.35	38.00	17.65	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).

3.7 Frequency Stability

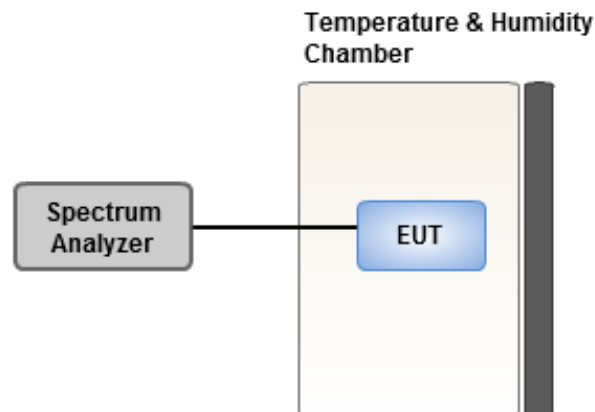
3.7.1 Limit of Frequency Stability

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.

3.7.2 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.

3.7.3 Test Setup



3.7.4 Test Result of Frequency Stability

Frequency: 5200 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	2.17	2.85	2.62	2.15
T20°C Vmin	3.12	3.81	2.75	3.95
T50°C Vnom	4.78	4.72	5.07	4.78
T40°C Vnom	4.09	4.95	3.93	4.54
T30°C Vnom	3.52	3.96	4.07	3.06
T20°C Vnom	2.62	2.80	2.35	3.02
T10°C Vnom	2.34	2.42	2.76	2.68
T0°C Vnom	1.85	2.44	2.35	2.21
T-10°C Vnom	2.21	2.09	2.17	2.81
T-20°C Vnom	1.09	1.53	1.40	1.02
T-30°C Vnom	0.41	0.70	1.02	0.10
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>.

Linkou

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Kwei Shan Site II

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No. 14-1, Lane 19, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

==END==