

FCC Test Report

FCC ID : TVE-120506
Equipment : 2T2R PCIeModule selectable 5GHz+2.4G
Model No. : WMDQ-177ACN
Brand Name : Fortinet, Inc.
Applicant : Fortinet, Inc.
Address : 899 Kifer Road Sunnyvale, CA 94086, USA
Standard : 47 CFR FCC Part 15.407
Received Date : Jul. 16, 2015
Tested Date : Jul. 30 ~ Aug. 13, 2015

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
FR571605AN	Rev. 01	Initial issue	Sep. 07, 2015

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.181MHz 40.39 (Margin -14.07dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5350.00MHz 53.34 (Margin -0.66dB) - AV [dBuV/m at 3m]: 5150.00MHz 53.34 (Margin -0.66dB) - AV	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: 19.70 5725-5850MHz: 18.14	Pass
15.407(a)	Peak Power Spectral Density	Meet the requirement of limit	Pass
15.407(g)	Frequency Stability	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

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

Note 1: RF output power specifies that Maximum Conducted Output Power.
 Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
 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]	2	6-54 Mbps
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	MCS 0-15
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	MCS 0-15
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	MCS 0-9
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	MCS 0-9
5725-5850	ac (VHT80)	5775	155 [1]	2	MCS 0-9

Note 1: RF output power specifies that Maximum Conducted Output Power.
 Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
 Note 3: 802.11a is transmitting signal through chain 0 only.

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)		
				2400~2483.5	5150~5250	5725~5850
1	C210-510579-A	Dipole	R-SMA	2.8	3	2.2

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host
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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: 2.3		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11a	98.06%	0.09
	VHT20	98.21%	0.08
	VHT40	93.56%	0.29
	VHT80	88.64%	0.52

1.1.7 Power Setting

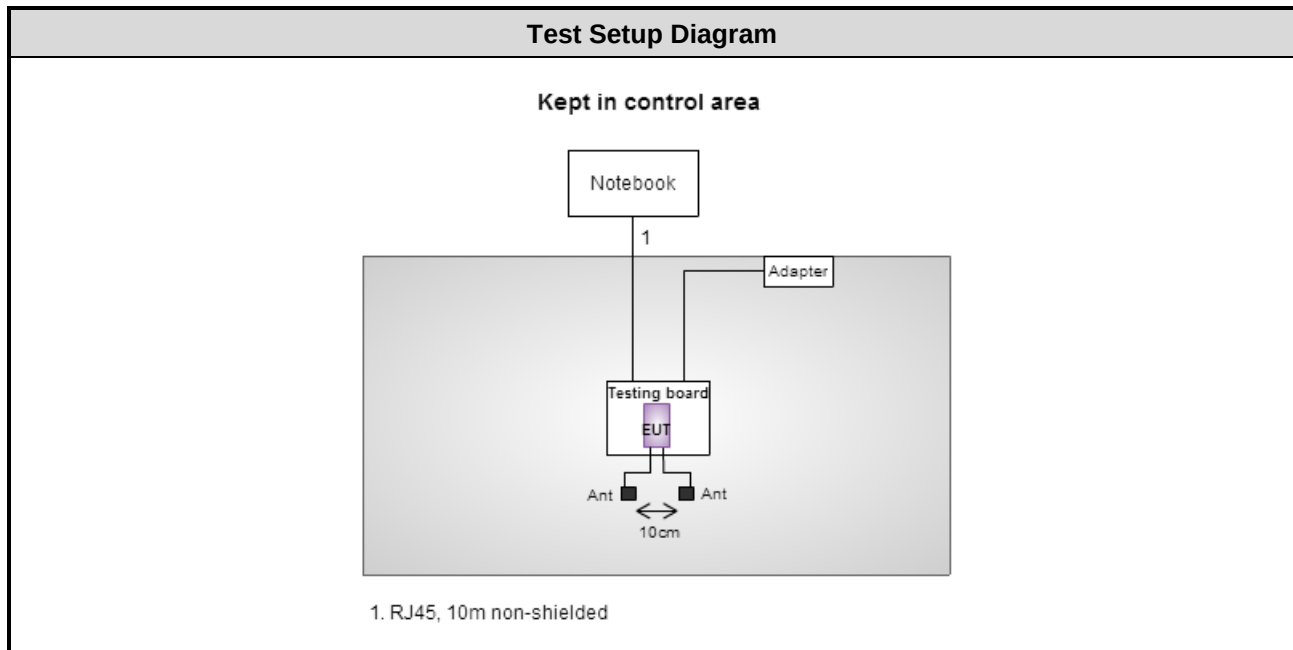
For Frequency band 5150-5250 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5180	9.5
11a	5200	9.5
11a	5240	13
HT20	5180	9.5
HT20	5200	9.5
HT20	5240	13
HT40	5190	13
HT40	5230	16.5
VHT20	5180	9.5
VHT20	5200	9.5
VHT20	5240	13
VHT40	5190	13
VHT40	5230	16.5
VHT80	5210	10.5

For Frequency band 5725~5850 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5745	14
11a	5785	15
11a	5825	15
HT20	5745	14
HT20	5785	15
HT20	5825	15
HT40	5755	13.5
HT40	5795	15.5
VHT20	5745	14
VHT20	5785	15
VHT20	5825	15
VHT40	5755	13.5
VHT40	5795	15.5
VHT80	5775	10.5

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E6440	DoC	RJ45, 10m non-shielded.

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
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. 17, 2014	Nov. 16, 2015
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 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 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 09, 2014	Dec. 08, 2015
Receiver	R&S	ESR3	101658	Nov. 10, 2014	Nov. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Sep. 05, 2014	Sep. 04, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 11, 2014	Dec. 10, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 10, 2014	Nov. 09, 2015
Preamplifier	Burgeon	BPA-530	SN:100219	Sep. 09, 2014	Sep. 08, 2015
Preamplifier	Agilent	83017A	MY39501308	Oct. 09, 2014	Oct. 08, 2015
Preamplifier	EMC	EMC184045B	980192	Aug. 26, 2014	Aug. 25, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 15, 2014	Dec. 14, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 15, 2014	Dec. 14, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 15, 2014	Dec. 14, 2015
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 15, 2014	Dec. 14, 2015
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 15, 2014	Dec. 14, 2015
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 03, 2014	Dec. 02, 2015
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 C63.10-2013

FCC KDB 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

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Measurement Uncertainty

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

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Conducted power	± 0.808 dB
Frequency error	± 34.134 Hz
Power density	± 0.463 dB
Conducted emission	± 2.670 dB
AC conducted emission	± 2.92 dB
Radiated emission ≤ 1 GHz	± 3.72 dB
Radiated emission > 1 GHz	± 5.65 dB
Time	$\pm 0.1\%$
Temperature	± 0.6 °C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 58%	Kevin Ma
Radiated Emissions	03CH01-WS	24-25°C / 63-66%	Aska Huang Morgan Chen
RF Conducted	TH01-WS	22°C / 63%	Felix Sung

➤ 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	---	---
NOTE:				
1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Z-plane results were found as the worst case and were shown in this report.				

For Frequency band 5725-5850 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	11a	5785	6 Mbps	---
Radiated Emissions ≤ 1 GHz	11a	5785	6 Mbps	---
RF Output Power	11a	5745 / 5785 / 5825	6 Mbps	---
	HT20	5745 / 5785 / 5825	MCS 0	
	HT40	5755 / 5795	MCS 0	
	VHT20	5745 / 5785 / 5825	MCS 0	
	VHT40	5755 / 5795	MCS 0	
	VHT80	5775	MCS 0	
Radiated Emissions > 1 GHz 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	
Frequency Stability	Un-modulation	5785	---	---
NOTE:				
2. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Z-plane results were found as the worst case and were shown in this report.				

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

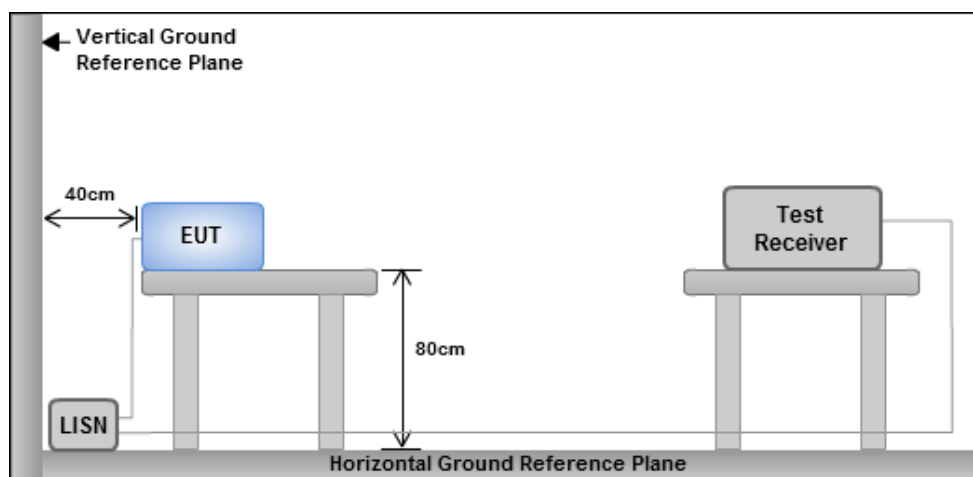
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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.

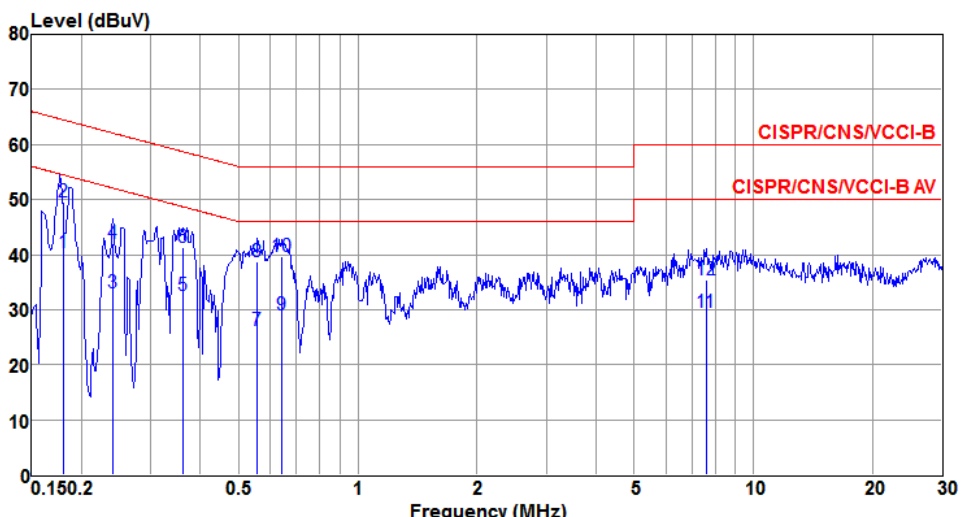
3.1.3 Test Setup



- 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		

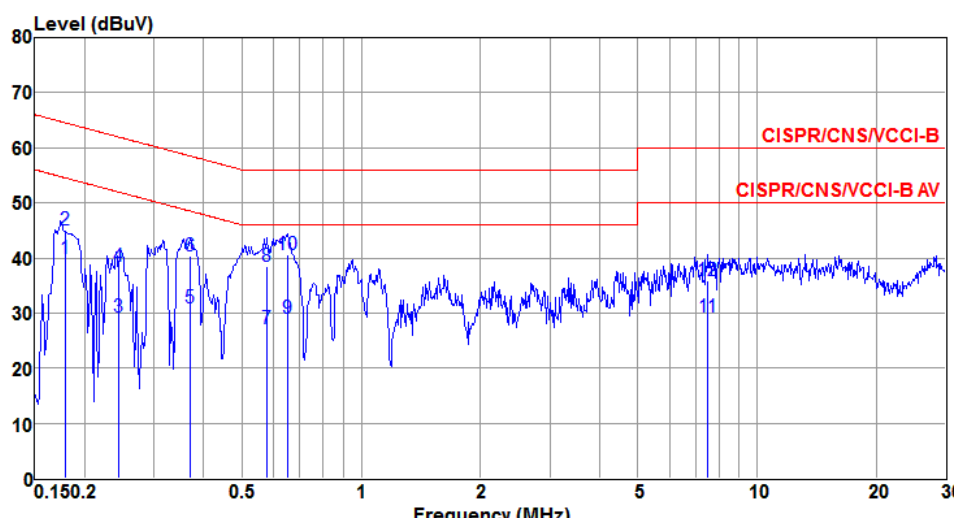


Freq	Level	Limit	Over	Read	LISN	cable		
MHz	dBuV	Line	Limit	Level	factor	loss	Remark	
		dBuV	dB	dBuV	dB	dB		
1*	0.181	40.39	54.46	-14.07	39.82	0.48	0.09	Average
2	0.181	49.61	64.46	-14.85	49.04	0.48	0.09	QP
3	0.240	33.14	52.08	-18.94	32.81	0.23	0.10	Average
4	0.240	42.10	62.08	-19.98	41.77	0.23	0.10	QP
5	0.361	32.50	48.69	-16.19	32.20	0.19	0.11	Average
6	0.361	41.40	58.69	-17.29	41.10	0.19	0.11	QP
7	0.558	26.23	46.00	-19.77	25.95	0.15	0.13	Average
8	0.558	38.82	56.00	-17.18	38.54	0.15	0.13	QP
9	0.641	28.94	46.00	-17.06	28.67	0.13	0.14	Average
10	0.641	39.73	56.00	-16.27	39.46	0.13	0.14	QP
11	7.606	29.51	50.00	-20.49	28.66	0.55	0.30	Average
12	7.606	35.47	60.00	-24.53	34.62	0.55	0.30	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		



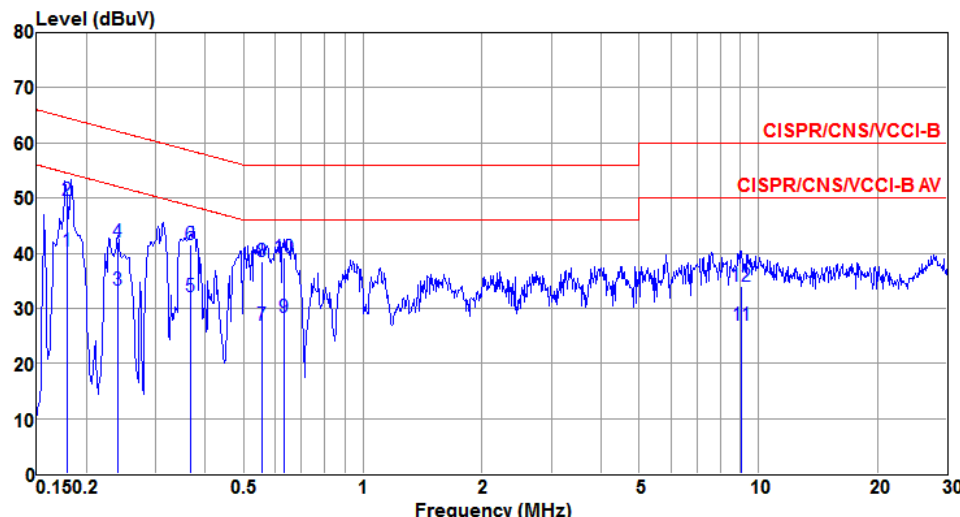
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1*	0.179	39.89	54.53	-14.64	39.33	0.47	0.09	Average
2	0.179	45.14	64.53	-19.39	44.58	0.47	0.09	QP
3	0.244	29.30	51.96	-22.66	28.99	0.21	0.10	Average
4	0.244	38.49	61.96	-23.47	38.18	0.21	0.10	QP
5	0.369	30.98	48.52	-17.54	30.73	0.14	0.11	Average
6	0.369	40.48	58.52	-18.04	40.23	0.14	0.11	QP
7	0.579	27.27	46.00	-18.73	26.95	0.19	0.13	Average
8	0.579	38.48	56.00	-17.52	38.16	0.19	0.13	QP
9	0.651	29.07	46.00	-16.93	28.73	0.20	0.14	Average
10	0.651	40.63	56.00	-15.37	40.29	0.20	0.14	QP
11	7.526	29.16	50.00	-20.84	28.27	0.59	0.30	Average
12	7.526	35.78	60.00	-24.22	34.89	0.59	0.30	QP

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

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

Modulation	11a	Test Freq. (MHz)	5785
Power Phase	Line		

Level (dBuV)



The graph displays the measured level in dBuV against frequency in MHz. The y-axis ranges from 0 to 80 dBuV, and the x-axis ranges from 0.15 to 30 MHz. Two red limit lines are shown: CISPR/CNS/VCCI-B (upper) and CISPR/CNS/VCCI-B AV (lower). A blue line represents the measured signal, which fluctuates between approximately 20 and 50 dBuV. Several peaks are labeled with numbers 1 through 12, corresponding to the data points in the table below.

Frequency (MHz)

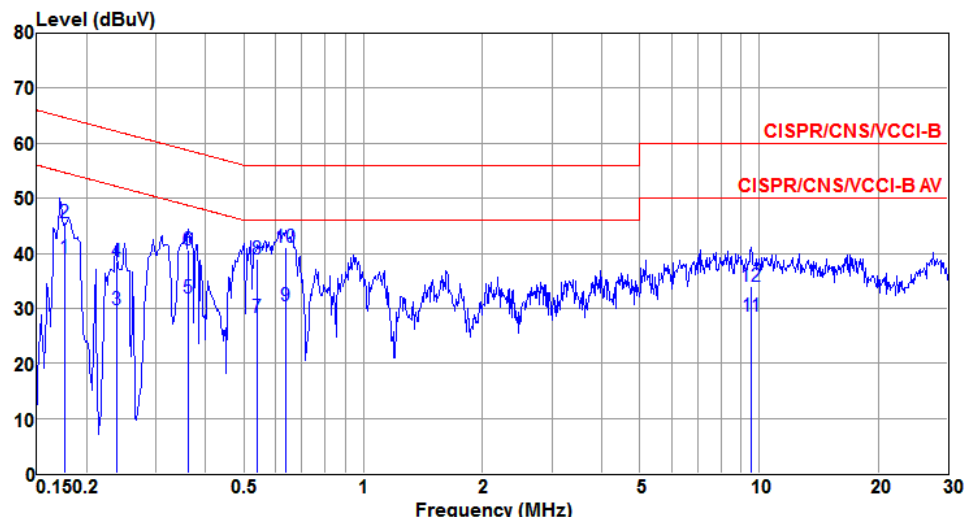
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1*	0.179	40.43	54.55	-14.12	39.82	0.52	0.09	Average
2	0.179	49.65	64.55	-14.90	49.04	0.52	0.09	QP
3	0.240	33.20	52.08	-18.88	32.87	0.23	0.10	Average
4	0.240	42.12	62.08	-19.96	41.79	0.23	0.10	QP
5	0.367	32.14	48.56	-16.42	31.84	0.19	0.11	Average
6	0.367	41.47	58.56	-17.09	41.17	0.19	0.11	QP
7	0.555	26.99	46.00	-19.01	26.71	0.15	0.13	Average
8	0.555	38.54	56.00	-17.46	38.26	0.15	0.13	QP
9	0.630	28.25	46.00	-17.75	27.98	0.14	0.13	Average
10	0.630	39.18	56.00	-16.82	38.91	0.14	0.13	QP
11	9.059	27.00	50.00	-23.00	26.08	0.62	0.30	Average
12	9.059	33.99	60.00	-26.01	33.07	0.62	0.30	QP

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

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

Modulation	11a	Test Freq. (MHz)	5785
Power Phase	Neutral		

Level (dBuV)



The graph displays the measured level in dBuV across a frequency range from 0.150.2 MHz to 30 MHz. Two red limit lines are shown: CISPR/CNS/VCCI-B (upper) and CISPR/CNS/VCCI-B AV (lower). The measured signal is represented by a blue line with peaks labeled 1 through 12. The levels generally decrease as frequency increases, staying below the limits.

	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.176	39.21	54.66	-15.45	38.62	0.50	0.09	Average
2	0.176	45.60	64.66	-19.06	45.01	0.50	0.09	QP
3	0.238	29.78	52.17	-22.39	29.47	0.21	0.10	Average
4	0.238	38.46	62.17	-23.71	38.15	0.21	0.10	QP
5	0.361	31.86	48.69	-16.83	31.60	0.15	0.11	Average
6	0.361	40.66	58.69	-18.03	40.40	0.15	0.11	QP
7	0.541	28.31	46.00	-17.69	28.00	0.18	0.13	Average
8	0.541	38.97	56.00	-17.03	38.66	0.18	0.13	QP
9	0.637	30.49	46.00	-15.51	30.15	0.20	0.14	Average
10*	0.637	40.99	56.00	-15.01	40.65	0.20	0.14	QP
11	9.552	28.59	50.00	-21.41	27.76	0.53	0.30	Average
12	9.552	33.89	60.00	-26.11	33.06	0.53	0.30	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 Limit of Emission bandwidth

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

3.2.2 Test Procedures

26dB Bandwidth

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

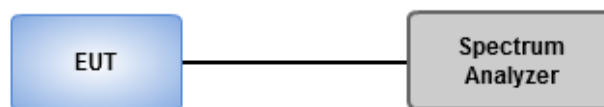
Occupied Bandwidth

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

6dB Bandwidth

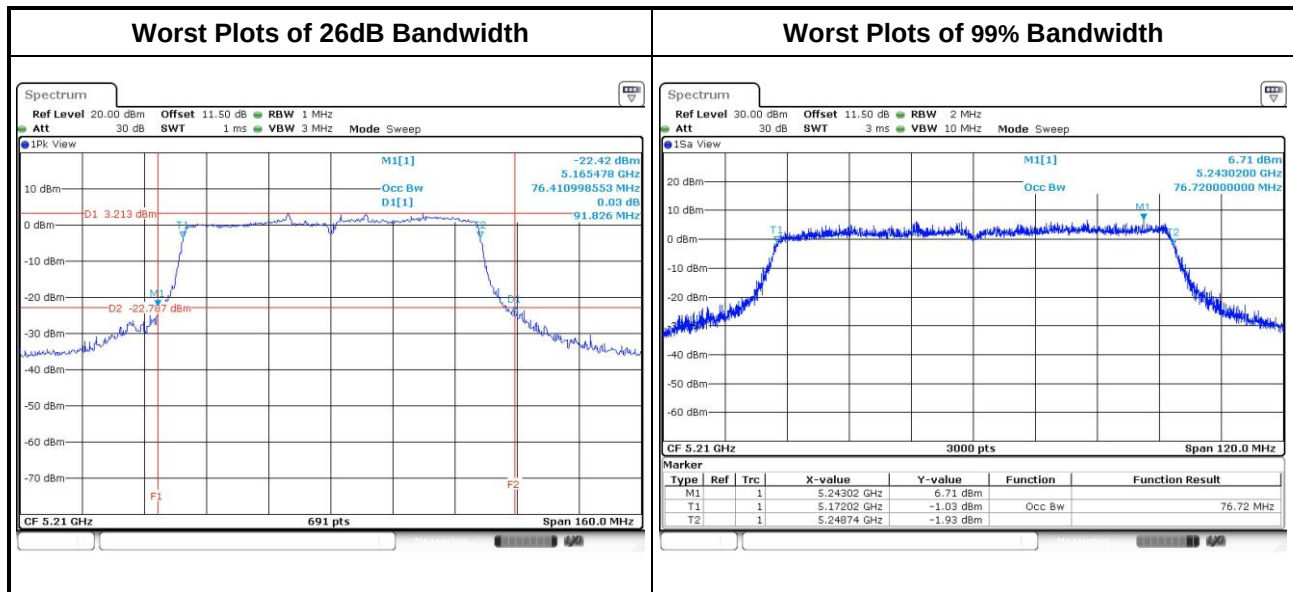
1. Set RBW = 100kHz, VBW = 300kHz
2. Detector = Peak, Trace mode = max hold.
3. Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB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

3.2.3 Test Setup



3.2.4 Test Result of Emission Bandwidth

For Frequency band 5150-5250 MHz										
Emission Bandwidth										
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
11a	2	5180	22.43	23.48	---	---	16.77	16.72	---	---
11a	2	5200	22.67	22.96	---	---	16.74	16.72	---	---
11a	2	5240	23.19	23.01	---	---	16.79	16.72	---	---
VHT20	2	5180	23.48	23.77	---	---	17.94	17.92	---	---
VHT20	2	5200	23.48	24.81	---	---	17.90	17.88	---	---
VHT20	2	5240	23.77	24.64	---	---	17.88	17.90	---	---
VHT40	2	5190	47.65	47.42	---	---	36.82	36.92	---	---
VHT40	2	5230	51.25	47.07	---	---	37.10	37.10	---	---
VHT80	2	5210	91.83	89.04	---	---	76.72	76.64	---	---

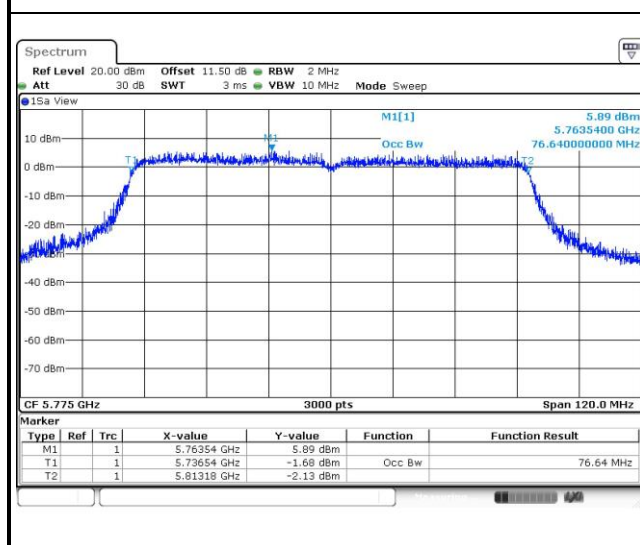


For Frequency band 5725-5850 MHz

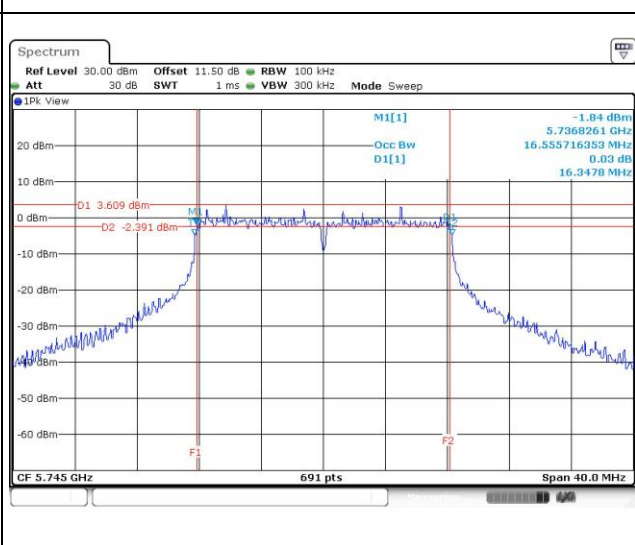
Emission Bandwidth

Mode	N _{TX}	Freq. (MHz)	OBW Bandwidth (MHz)				6dB Bandwidth (MHz)				6dB BW Limit (MHz)
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	
11a	2	5745	16.88	16.84	---	---	16.35	16.35	---	---	0.5
11a	2	5785	16.98	16.95	---	---	16.35	16.35	---	---	0.5
11a	2	5825	16.93	16.87	---	---	16.35	16.35	---	---	0.5
VHT20	2	5745	17.92	17.90	---	---	17.57	17.62	---	---	0.5
VHT20	2	5785	18.05	18.05	---	---	16.35	16.35	---	---	0.5
VHT20	2	5825	18.03	18.01	---	---	16.35	16.35	---	---	0.5
VHT40	2	5755	36.88	36.86	---	---	36.41	36.41	---	---	0.5
VHT40	2	5795	36.98	36.88	---	---	36.29	36.29	---	---	0.5
VHT80	2	5775	76.64	76.60	---	---	76.29	76.06	---	---	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

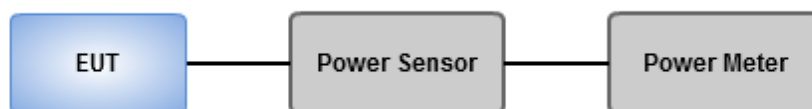
Frequency Band (MHz)	Limit
☐ 5250 ~ 5350	250mW or 11dBm+10 log B
☐ 5470 ~ 5725	250mW or 11dBm+10 log B
☒ 5725 ~ 5850	1 W

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	2	5180	9.49	9.59	---	---	17.991	12.55	30.00
11a	2	5200	10.12	10.16	---	---	20.655	13.15	30.00
11a	2	5240	13.61	13.65	---	---	46.135	16.64	30.00
HT20	2	5180	9.52	9.49	---	---	17.846	12.52	30.00
HT20	2	5200	10.02	10.06	---	---	20.185	13.05	30.00
HT20	2	5240	13.51	13.54	---	---	45.033	16.54	30.00
HT40	2	5190	12.91	12.72	---	---	38.250	15.83	30.00
HT40	2	5230	16.45	16.71	---	---	91.038	19.59	30.00
VHT20	2	5180	9.65	9.62	---	---	18.388	12.65	30.00
VHT20	2	5200	10.13	10.18	---	---	20.727	13.17	30.00
VHT20	2	5240	13.62	13.68	---	---	46.349	16.66	30.00
VHT40	2	5190	13.02	12.82	---	---	39.187	15.93	30.00
VHT40	2	5230	16.55	16.82	---	---	93.270	19.70	30.00
VHT80	2	5210	10.58	10.39	---	---	22.368	13.50	30.00

For Frequency band 5725-5850 MHz									
Mode	N _{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11a	2	5745	13.92	13.85	---	---	48.926	16.90	30.00
11a	2	5785	15.2	15.06	---	---	65.176	18.14	30.00
11a	2	5825	14.76	14.65	---	---	59.097	17.72	30.00
HT20	2	5745	14.13	14.21	---	---	52.245	17.18	30.00
HT20	2	5785	15.11	14.95	---	---	63.695	18.04	30.00
HT20	2	5825	14.69	14.51	---	---	57.693	17.61	30.00
HT40	2	5755	12.82	12.74	---	---	37.936	15.79	30.00
HT40	2	5795	14.35	14.21	---	---	53.590	17.29	30.00
VHT20	2	5745	14.26	14.34	---	---	53.833	17.31	30.00
VHT20	2	5785	15.22	15.03	---	---	65.108	18.14	30.00
VHT20	2	5825	14.81	14.62	---	---	59.243	17.73	30.00
VHT40	2	5755	12.93	12.85	---	---	38.909	15.90	30.00
VHT40	2	5795	14.48	14.32	---	---	55.094	17.41	30.00
VHT80	2	5775	9.76	9.56	---	---	18.499	12.67	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

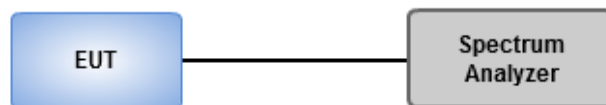
For 5150 ~ 5250 MHz

- ☒ Method SA-1 (for 11a/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 Alternative (for 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.

For 5725 ~ 5850 MHz

- ☒ Method SA-1 (for 11a/VHT20)
 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 (for VHT40/VHT80)
 1. Set RBW = 500 kHz, VBW = 2 MHz, Detector = RMS.
 2. Set sweep time $\geq 10 \times (\text{number of points in sweep}) \times (\text{total on/off period of the transmitted signal})$.
 3. Perform a single sweep.
 4. Use the peak marker function to determine the maximum amplitude level.
 5. Add $10 \log(1/x)$, where x is the duty cycle.

3.4.3 Test Setup

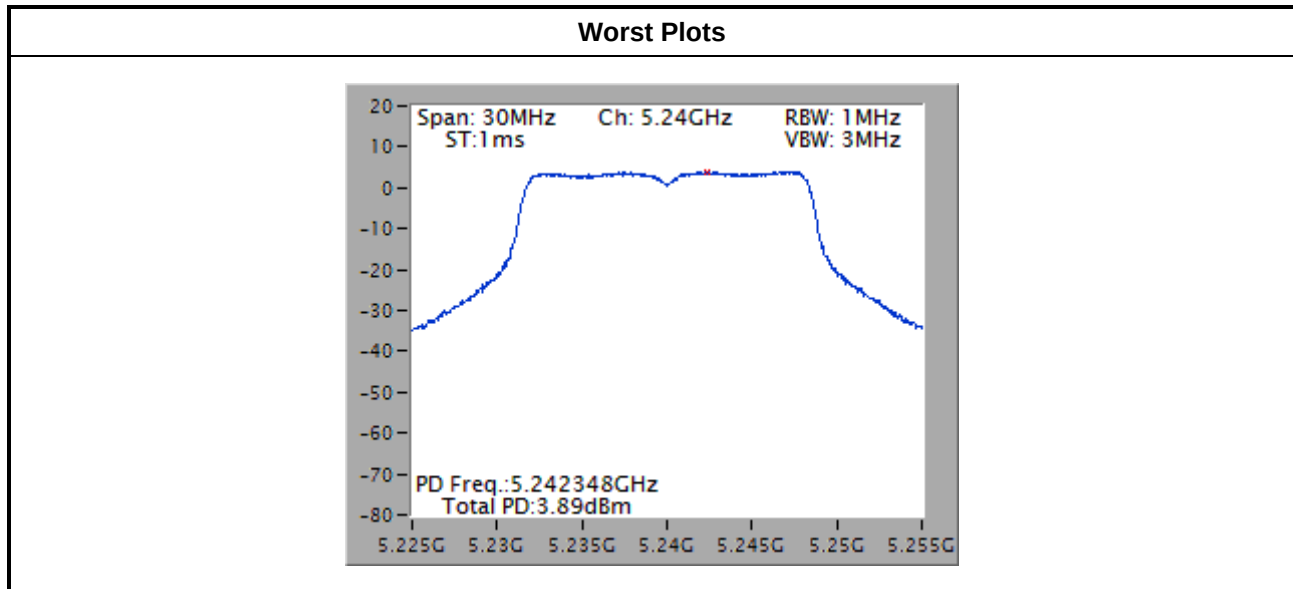


3.4.4 Test Result of Peak Power Spectral Density

For Frequency band 5150-5250 MHz						
Condition			Peak Power Spectral Density (dBm/MHz)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)
11a	2	5180	0.05	0.00	0.05	16.99
11a	2	5200	0.96	0.00	0.96	16.99
11a	2	5240	3.89	0.00	3.89	16.99
VHT20	2	5180	-0.15	0.00	-0.15	16.99
VHT20	2	5200	0.59	0.00	0.59	16.99
VHT20	2	5240	3.40	0.00	3.40	16.99
VHT40	2	5190	-0.25	0.29	0.04	16.99
VHT40	2	5230	3.58	0.29	3.87	16.99
VHT80	2	5210	-5.62	0.52	-5.10	16.99

Note:

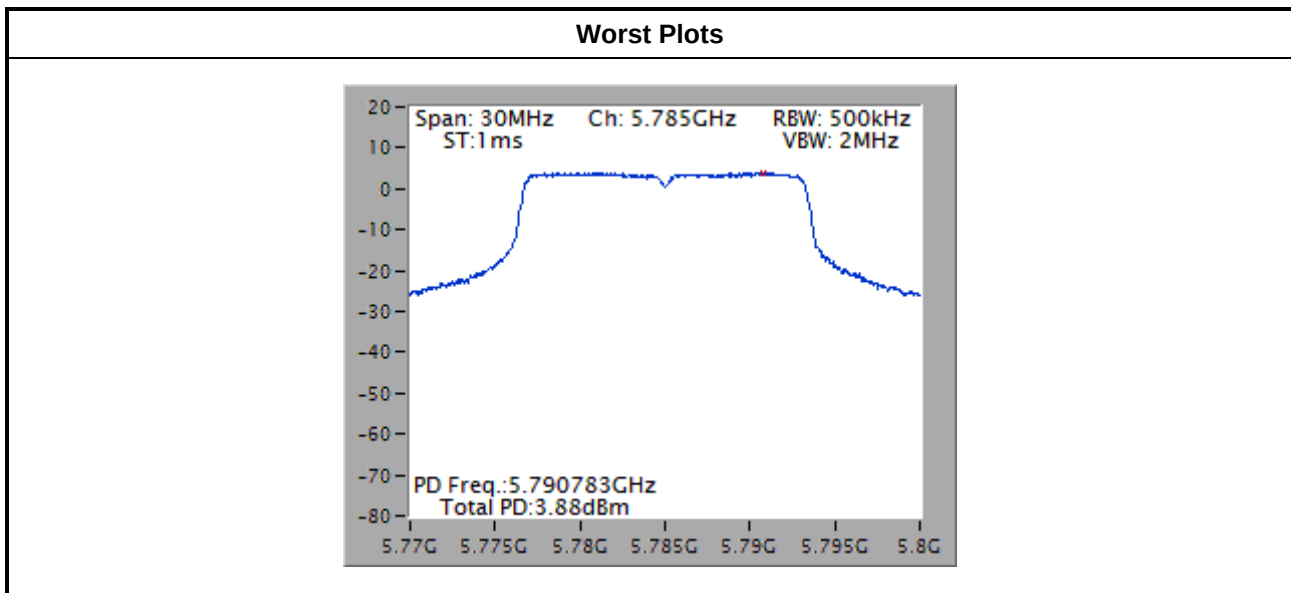
1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. Directional gain = $3+10 \cdot \log(2/1) = 6.01 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $17 \text{ dBm} - (6.01 \text{ dBi} - 6 \text{ dBi}) = 16.99 \text{ dBm}$.



For Frequency band 5725-5850 MHz						
Condition			Peak Power Spectral Density (dBm/500kHz)			
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)
11a	2	5745	3.26	0.00	3.26	30.00
11a	2	5785	3.88	0.00	3.88	30.00
11a	2	5825	3.59	0.00	3.59	30.00
VHT20	2	5745	2.11	0.00	2.11	30.00
VHT20	2	5785	3.62	0.00	3.62	30.00
VHT20	2	5825	2.94	0.00	2.94	30.00
VHT40	2	5755	-1.77	0.29	-1.48	30.00
VHT40	2	5795	-0.46	0.29	-0.17	30.00
VHT80	2	5775	-8.02	0.52	-7.50	30.00

Note:

1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.



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 - 5.850 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

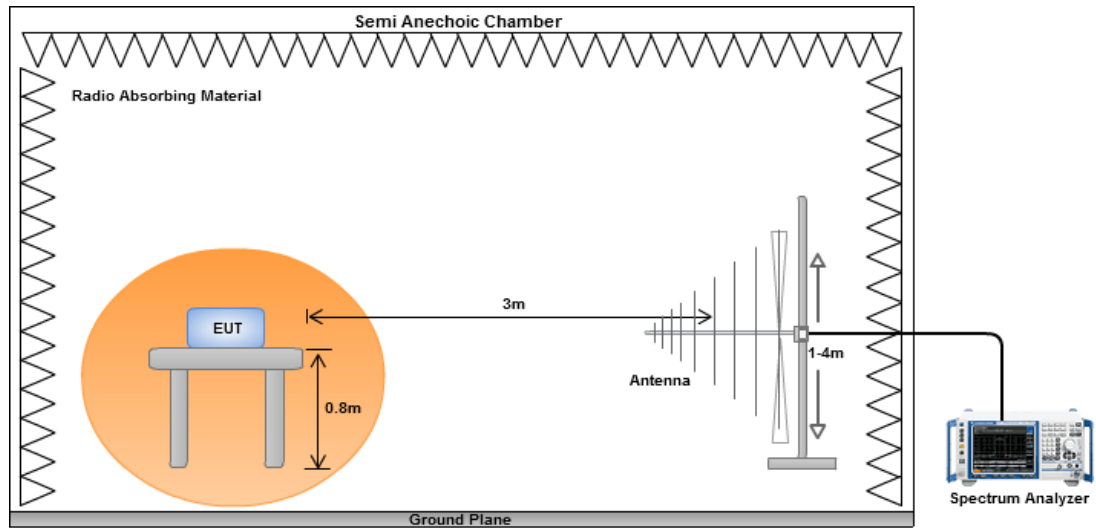
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360° . A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

Note:

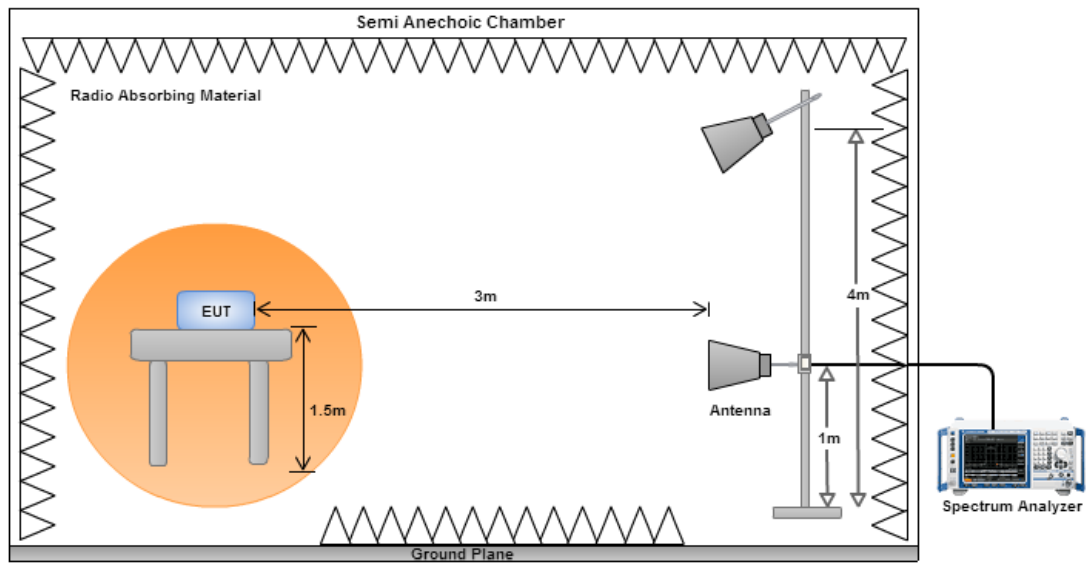
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz

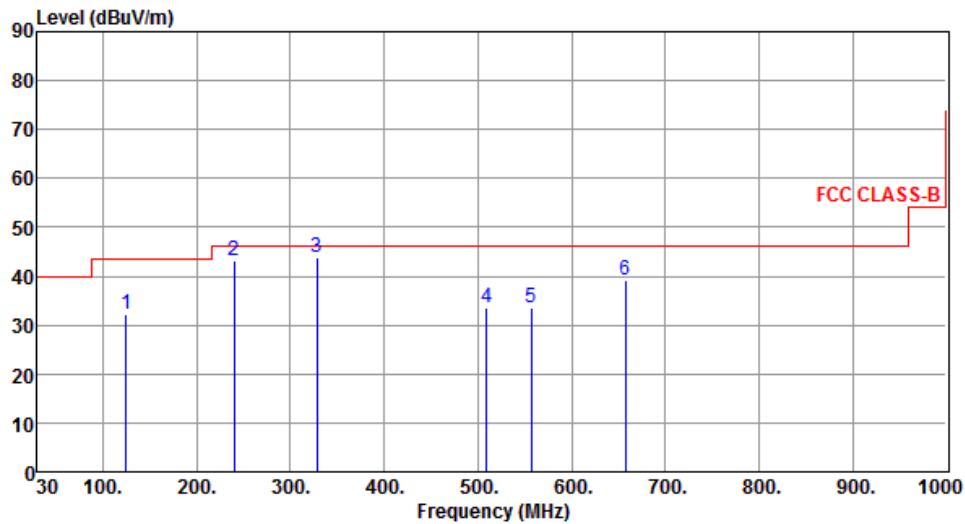


3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

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

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

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



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	125.06	32.22	43.50	-11.28	50.70	-18.48	Peak	---	---
2	240.21	43.07	46.00	-2.93	60.85	-17.78	QP	100	241
3	328.75	43.89	46.00	-2.11	59.23	-15.34	QP	100	252
4	509.18	33.64	46.00	-12.36	44.87	-11.23	Peak	---	---
5	556.71	33.62	46.00	-12.38	43.93	-10.31	Peak	---	---
6	657.59	39.12	46.00	-6.88	47.83	-8.71	Peak	---	---

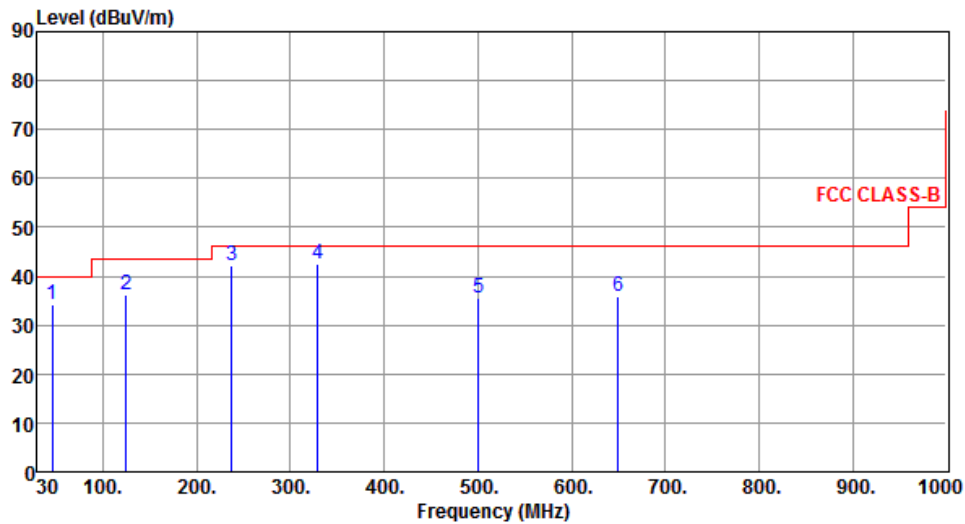
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

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



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.52	34.16	40.00	-5.84	50.47	-16.31	Peak	---	---
2	125.06	36.20	43.50	-7.30	54.68	-18.48	Peak	---	---
3	237.58	42.30	46.00	-3.70	60.13	-17.83	Peak	---	---
4	328.76	42.60	46.00	-3.40	57.94	-15.34	Peak	---	---
5	500.45	35.61	46.00	-10.39	47.01	-11.40	Peak	---	---
6	649.83	35.75	46.00	-10.25	44.59	-8.84	Peak	---	---

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

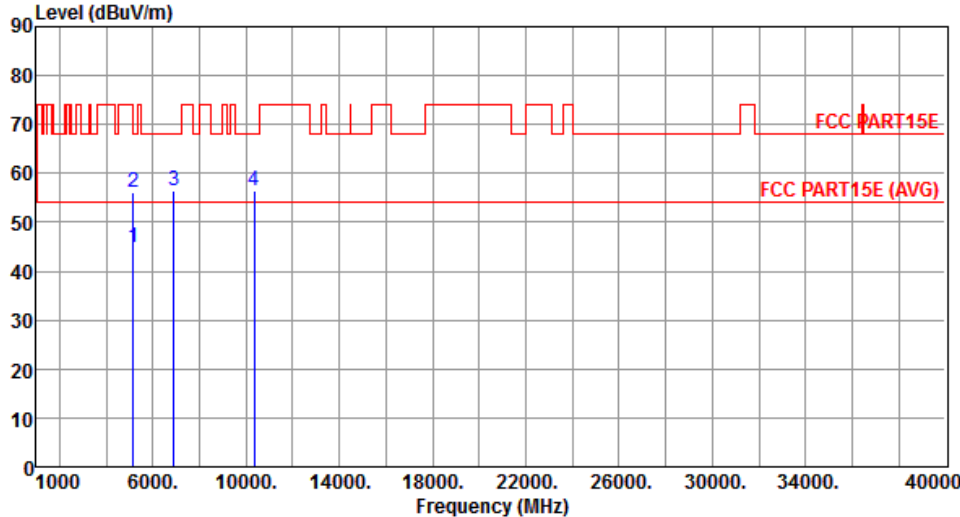
*Factor includes antenna factor , cable loss and amplifier gain

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		

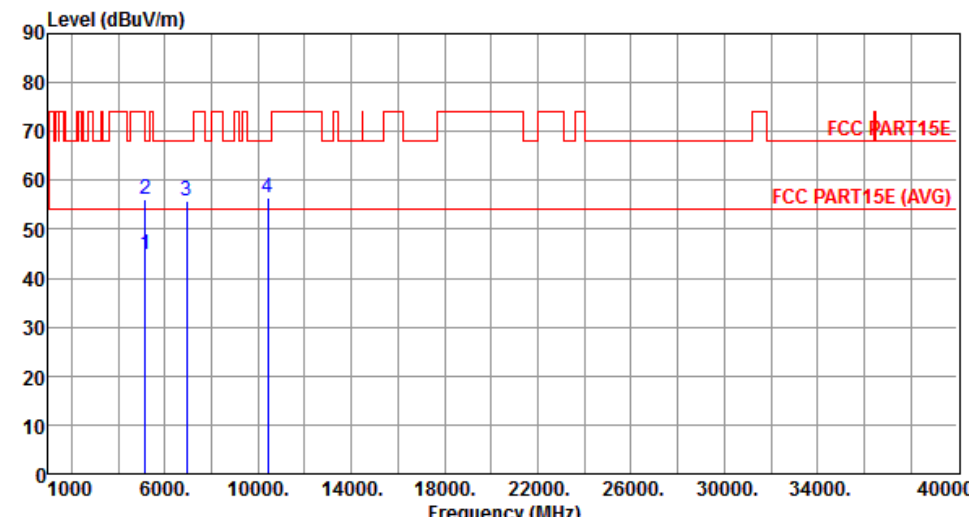


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	44.69	54.00	-9.31	39.23	5.46	Average	185	344
2	5150.00	56.04	74.00	-17.96	50.58	5.46	Peak	185	344
3	6906.66	56.58	68.20	-11.62	48.17	8.41	Peak	206	70
4	10360.00	56.42	68.20	-11.78	41.01	15.41	Peak	175	133

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		
Level (dBuV/m) </			

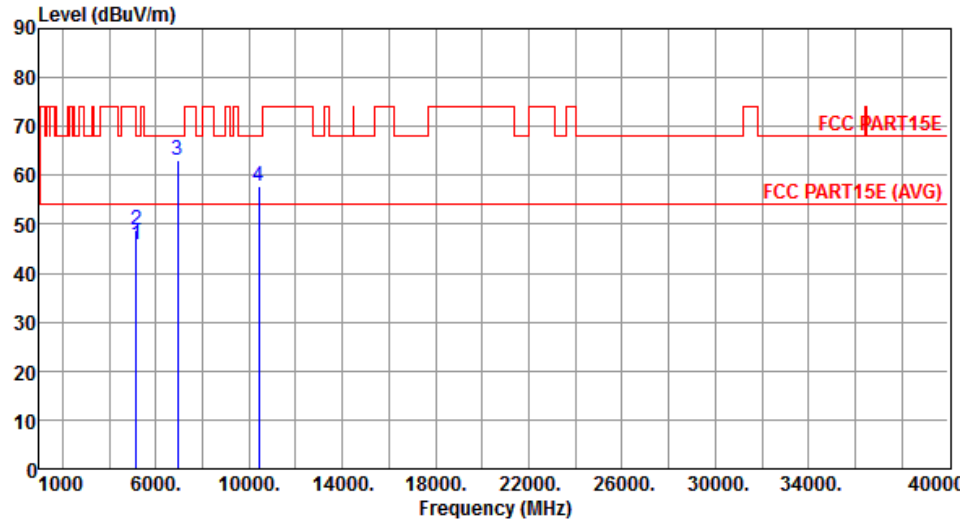
Modulation	11a	Test Freq. (MHz)	5200
Polarization	Horizontal		



	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	44.72	54.00	-9.28	39.26	5.46	Average	190	353
2	5150.00	56.12	74.00	-17.88	50.66	5.46	Peak	190	353
3	6933.33	55.96	68.20	-12.24	47.51	8.45	Peak	203	74
4	10400.00	56.57	68.20	-11.63	41.02	15.55	Peak	177	125

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		

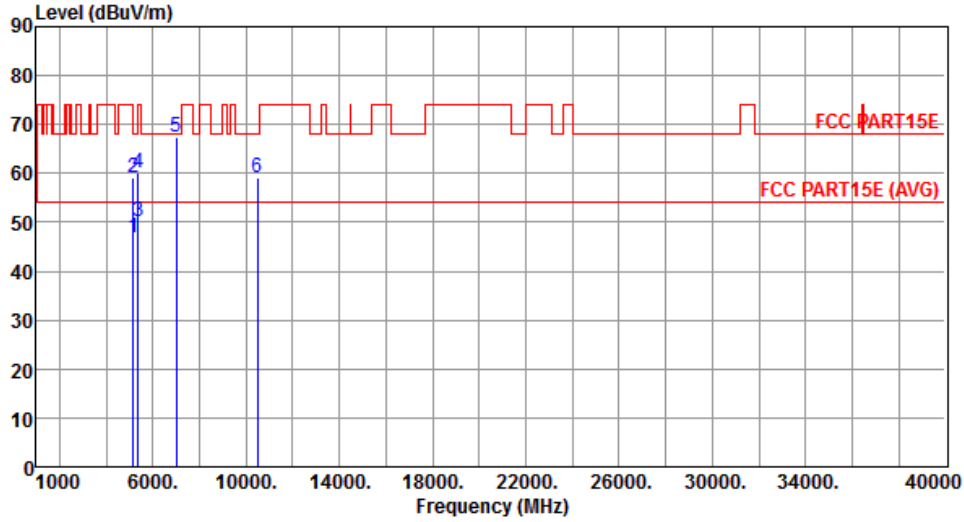


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	45.90	54.00	-8.10	40.44	5.46	Average	272	339
2	5150.00	48.67	74.00	-25.33	43.21	5.46	Peak	272	339
3	6933.33	63.24	68.20	-4.96	54.79	8.45	Peak	190	149
4	10400.00	57.75	68.20	-10.45	42.20	15.55	Peak	170	332

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		
Level (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	5150.00	46.71	54.00	-7.29	41.25	5.46	Average	289	341
2	5150.00	59.04	74.00	-14.96	53.58	5.46	Peak	289	341
3	5350.00	50.16	54.00	-3.84	44.60	5.56	Average	289	341
4	5350.00	60.24	74.00	-13.76	54.68	5.56	Peak	289	341
5	6986.66	67.30	68.20	-0.90	58.79	8.51	Peak	187	146
6	10480.00	59.10	68.20	-9.10	43.24	15.86	Peak	189	199

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) </			

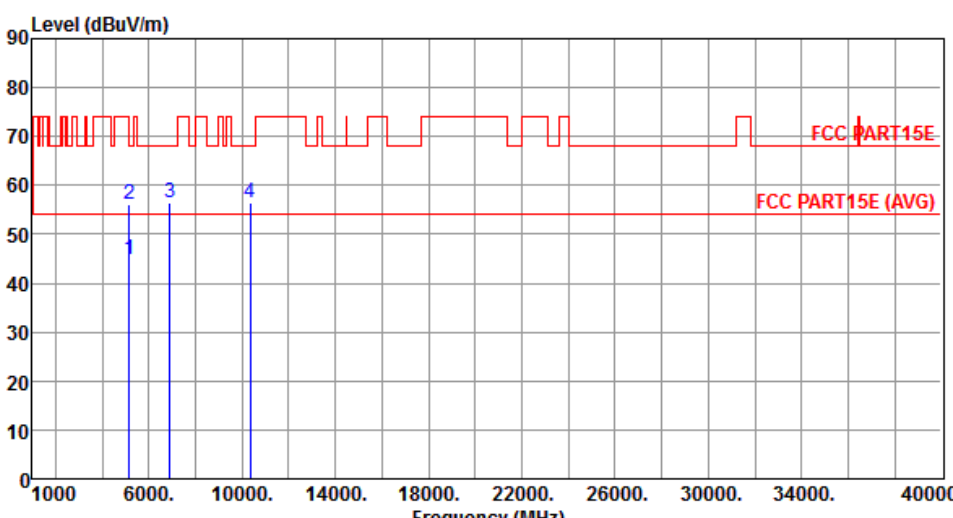
Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		
Level (dBuV/m) <			

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

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

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

Modulation	VHT20	Test Freq. (MHz)	5180
Polarization	Horizontal		

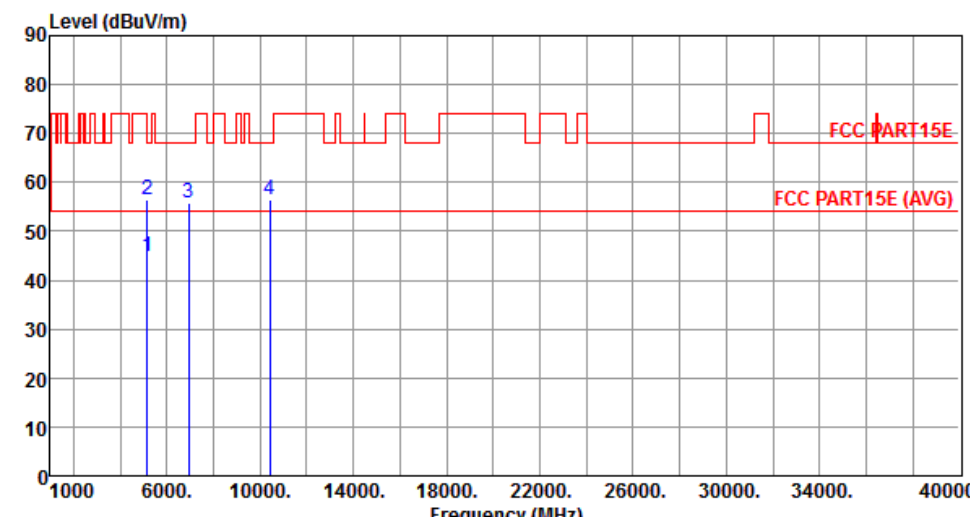


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	44.69	54.00	-9.31	39.23	5.46	Average	185	344
2	5150.00	56.04	74.00	-17.96	50.58	5.46	Peak	185	344
3	6906.66	56.58	68.20	-11.62	48.17	8.41	Peak	206	70
4	10360.00	56.42	68.20	-11.78	41.01	15.41	Peak	175	133

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) <			

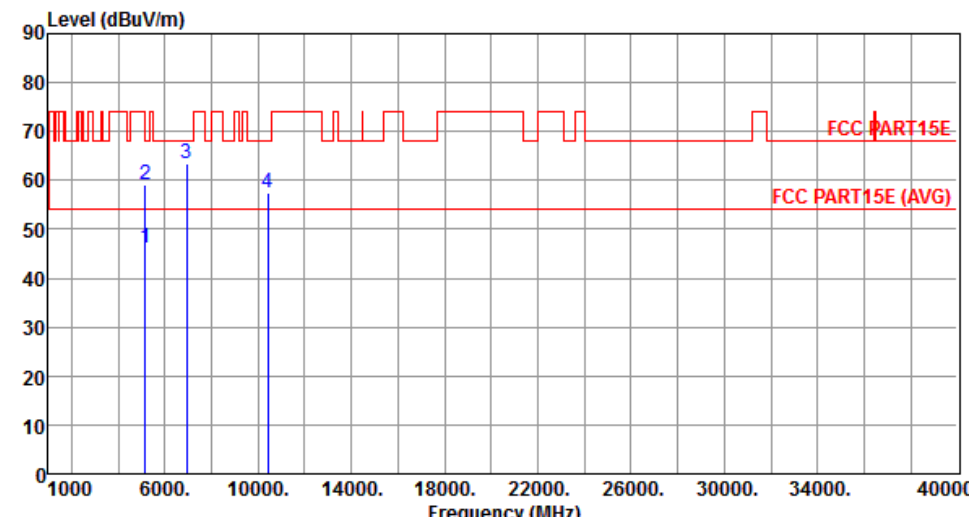
Modulation	VHT20	Test Freq. (MHz)	5200
Polarization	Horizontal		



	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	44.85	54.00	-9.15	39.39	5.46	Average	186	344
2	5150.00	56.39	74.00	-17.61	50.93	5.46	Peak	186	344
3	6933.33	55.79	68.20	-12.41	47.34	8.45	Peak	220	65
4	10400.00	56.45	68.20	-11.75	40.90	15.55	Peak	215	54

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).

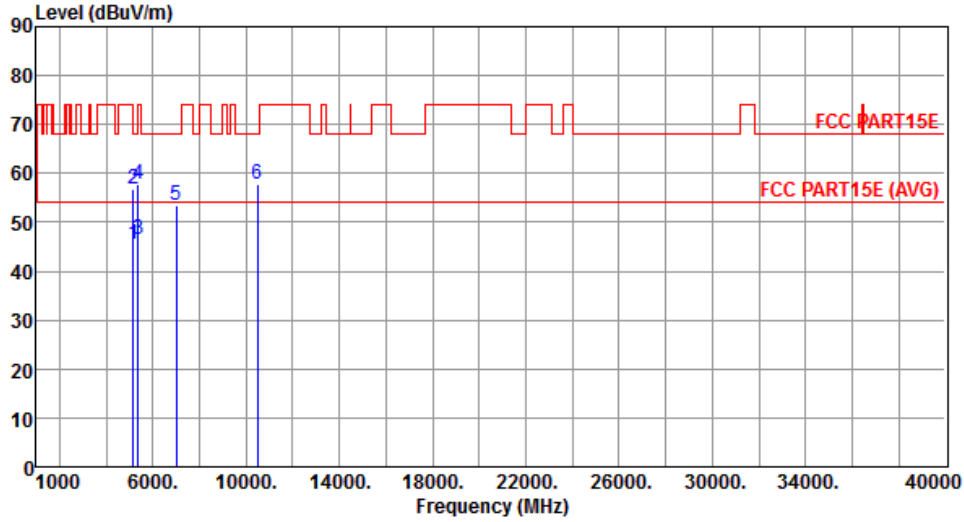
Modulation	VHT20	Test Freq. (MHz)	5200
Polarization	Vertical		



	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	46.00	54.00	-8.00	40.54	5.46	Average	272	339
2	5150.00	59.18	74.00	-14.82	53.72	5.46	Peak	272	339
3	6933.33	63.31	68.20	-4.89	54.86	8.45	Peak	185	155
4	10400.00	57.50	68.20	-10.70	41.95	15.55	Peak	170	332

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).

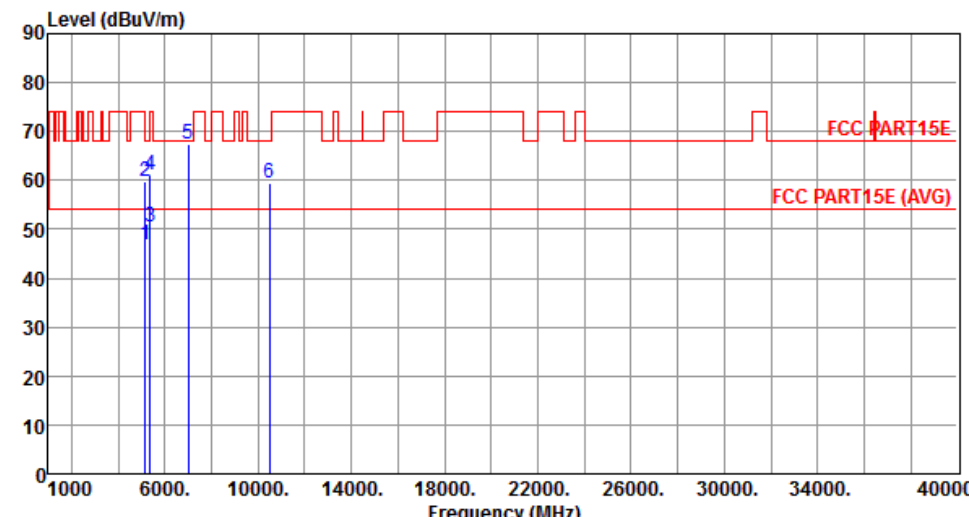
Modulation	VHT20	Test Freq. (MHz)	5240
Polarization	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	45.65	54.00	-8.35	40.19	5.46	Average	195	325
2	5150.00	56.85	74.00	-17.15	51.39	5.46	Peak	195	325
3	5350.00	46.51	54.00	-7.49	40.95	5.56	Average	195	325
4	5350.00	57.89	74.00	-16.11	52.33	5.56	Peak	195	325
5	6986.66	53.32	68.20	-14.88	44.81	8.51	Peak	211	55
6	10480.00	57.68	68.20	-10.52	41.82	15.86	Peak	155	333

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		



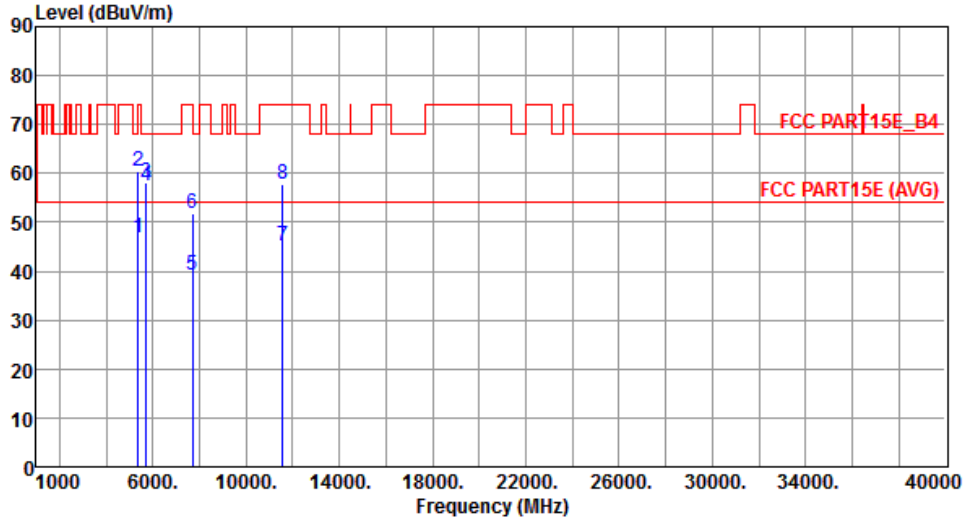
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	46.91	54.00	-7.09	41.45	5.46	Average	275	339
2	5150.00	59.65	74.00	-14.35	54.19	5.46	Peak	289	341
3	5350.00	50.42	54.00	-3.58	44.86	5.56	Average	289	341
4	5350.00	61.22	74.00	-12.78	55.66	5.56	Peak	289	341
5	6986.66	67.45	68.20	-0.75	58.94	8.51	Peak	187	146
6	10480.00	59.35	68.20	-8.85	43.49	15.86	Peak	189	199

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		
Level (dBuV/m) </			

Modulation	VHT20	Test Freq. (MHz)	5785
Polarization	Horizontal		

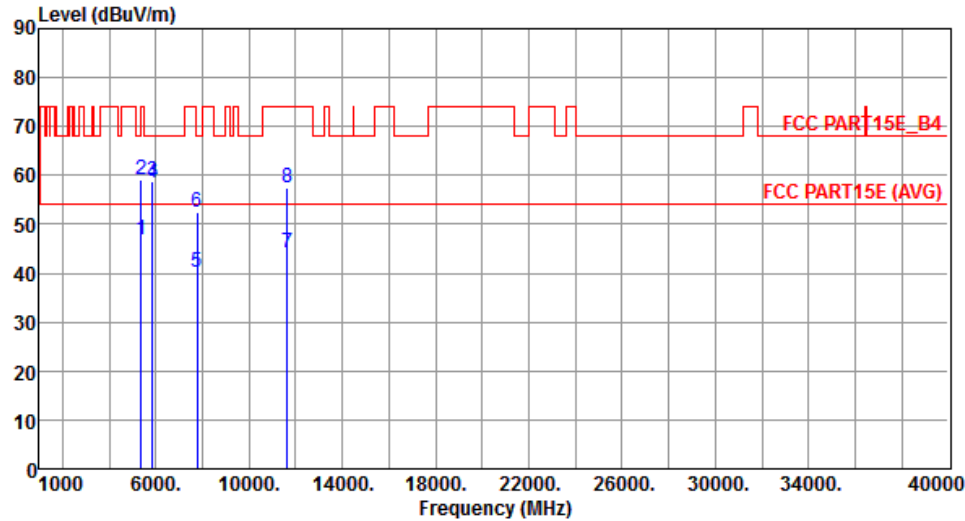


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	46.99	54.00	-7.01	41.43	5.56	Average	201	6
2	5350.00	60.38	74.00	-13.62	54.82	5.56	Peak	201	6
3	5715.00	57.98	68.20	-10.22	52.33	5.65	Peak	201	6
4	5725.00	57.36	78.20	-20.84	51.72	5.64	Peak	201	6
5	7713.00	39.32	54.00	-14.68	29.23	10.09	Average	166	358
6	7713.00	51.92	74.00	-22.08	41.83	10.09	Peak	166	358
7	11570.00	45.19	54.00	-8.81	29.42	15.77	Average	166	358
8	11570.00	57.85	74.00	-16.15	42.08	15.77	Peak	166	358

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	Vertical		
Level (dBuV/m) <			

Modulation	VHT20	Test Freq. (MHz)	5825
Polarization	Horizontal		



The graph displays the emission level in dBuV/m against frequency in MHz. The y-axis ranges from 0 to 90 dBuV/m, and the x-axis ranges from 1000 to 40000 MHz. A red line represents the FCC Part 15E (AVG) limit at approximately 55 dBuV/m. A red line labeled 'FCC PART15E_B4' is at approximately 70 dBuV/m. Blue vertical lines indicate test results at various frequencies: 5350 MHz (24 dB), 5850 MHz (6 dB), 7766 MHz (5 dB), and 11650 MHz (8 dB). The test results are summarized 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	5350.00	46.72	54.00	-7.28	41.16	5.56	Average	189	112
2	5350.00	59.01	74.00	-14.99	53.45	5.56	Peak	189	112
3	5850.00	58.75	78.20	-19.45	53.00	5.75	Peak	189	112
4	5860.00	58.39	68.20	-9.81	52.63	5.76	Peak	189	112
5	7766.00	40.14	54.00	-13.86	30.11	10.03	Average	160	344
6	7766.00	52.46	68.20	-15.74	42.43	10.03	Peak	160	344
7	11650.00	44.10	54.00	-9.90	28.54	15.56	Average	185	109
8	11650.00	57.61	74.00	-16.39	42.05	15.56	Peak	185	109

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)	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		

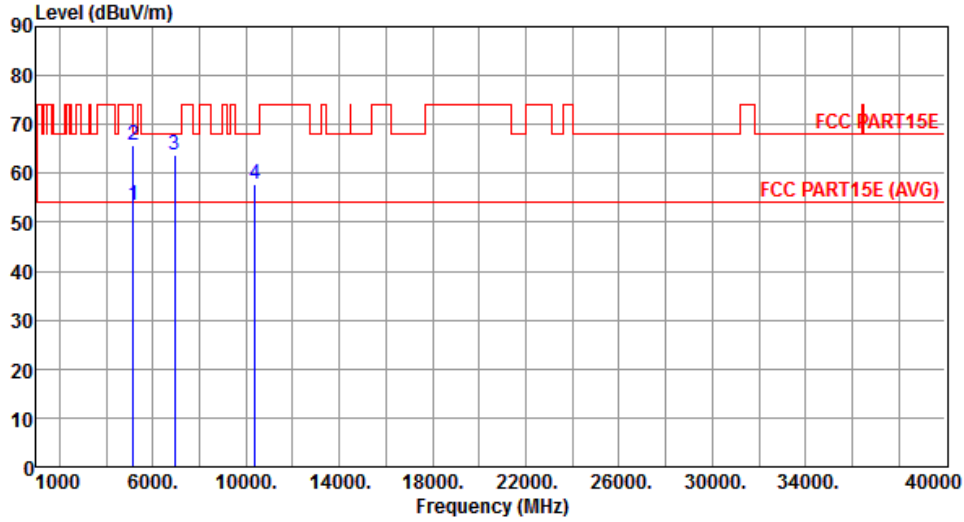
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	45.69	54.00	-8.31	40.23	5.46	Average	106	2
2	5150.00	56.66	74.00	-17.34	51.20	5.46	Peak	106	2
3	6920.00	53.58	68.20	-14.62	45.15	8.43	Peak	200	36
4	10380.00	57.98	68.20	-10.22	42.50	15.48	Peak	169	339

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	53.32	54.00	-0.68	47.86	5.46	Average	192	136
2	5150.00	65.77	74.00	-8.23	60.31	5.46	Peak	192	136
3	6920.00	63.73	68.20	-4.47	55.30	8.43	Peak	192	136
4	10380.00	57.80	68.20	-10.40	42.32	15.48	Peak	164	64

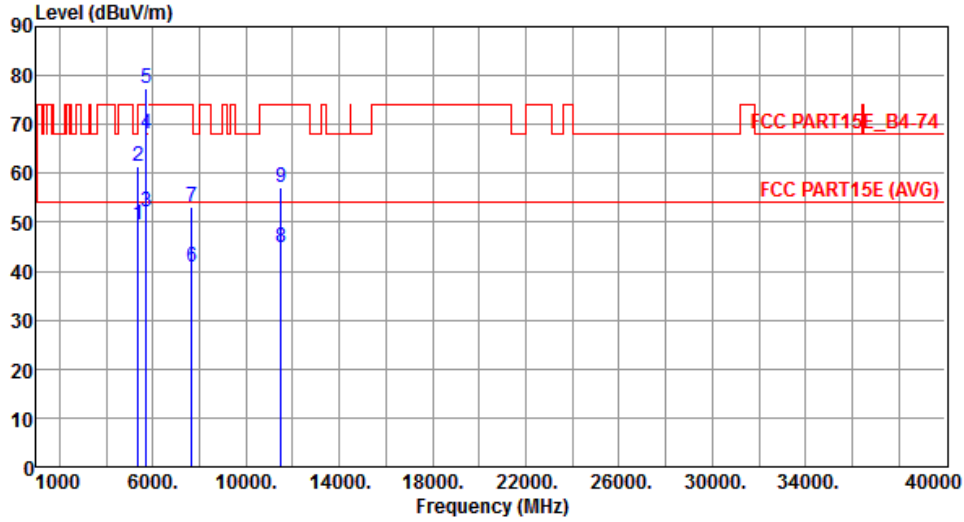
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

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

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

Modulation	VHT40	Test Freq. (MHz)	5755
Polarization	Horizontal		
 			

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	5350.00	49.40	54.00	-4.60	43.84	5.56	Average	249	94
2	5350.00	61.53	74.00	-12.47	55.97	5.56	Peak	249	94
3	5715.00	52.28	54.00	-1.72	46.63	5.65	Average	248	93
4	5715.00	67.93	74.00	-6.07	62.28	5.65	Peak	248	93
5	5725.00	77.26	78.20	-0.94	71.62	5.64	Peak	248	93
6	7673.00	40.98	54.00	-13.02	30.87	10.11	Average	170	346
7	7673.00	53.02	74.00	-20.98	42.91	10.11	Peak	170	346
8	11510.00	44.94	54.00	-9.06	29.02	15.92	Average	185	336
9	11510.00	57.25	74.00	-16.75	41.33	15.92	Peak	185	336

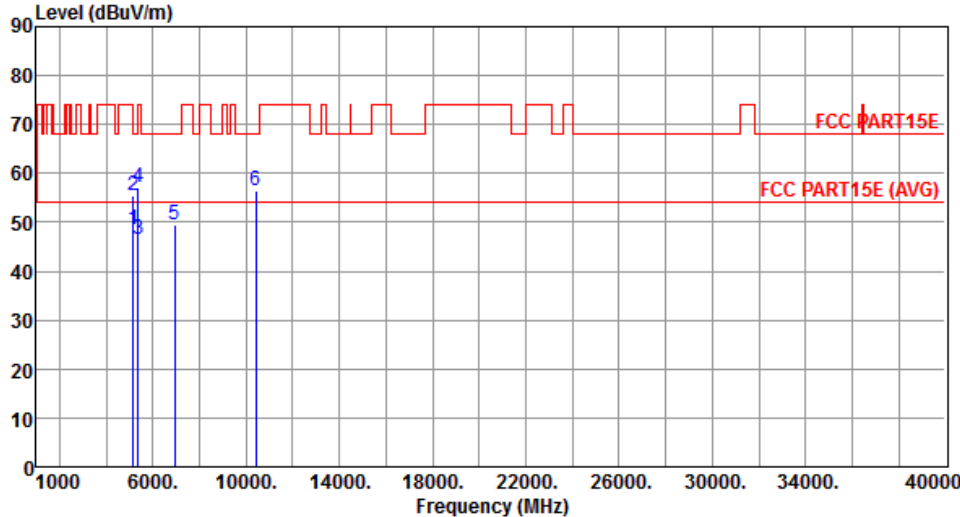
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

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

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

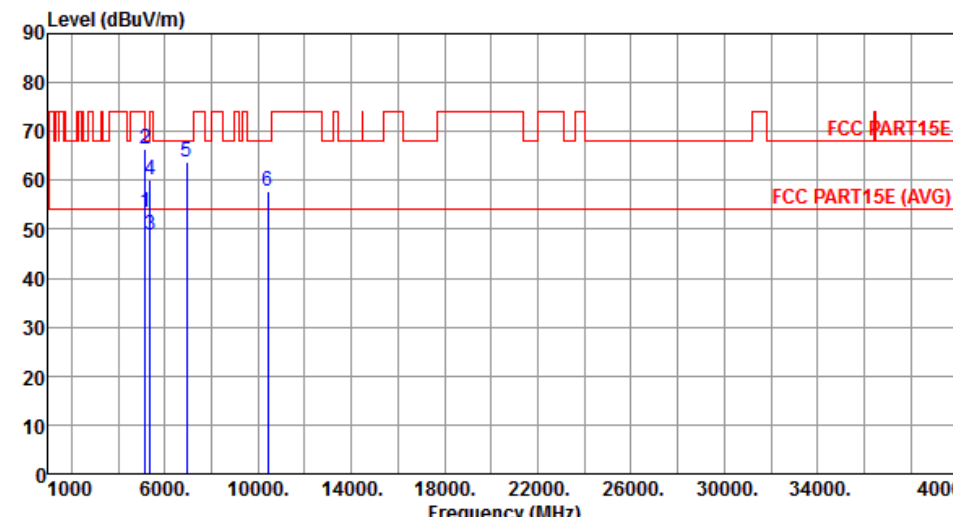
Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Horizontal		



	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	48.36	54.00	-5.64	42.90	5.46	Average	109	1
2	5150.00	55.36	74.00	-18.64	49.90	5.46	Peak	109	1
3	5350.00	46.47	54.00	-7.53	40.91	5.56	Average	109	1
4	5350.00	57.02	74.00	-16.98	51.46	5.56	Peak	110	1
5	6946.66	49.58	68.20	-18.62	41.12	8.46	Peak	172	355
6	10420.00	56.52	68.20	-11.68	40.89	15.63	Peak	175	335

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).

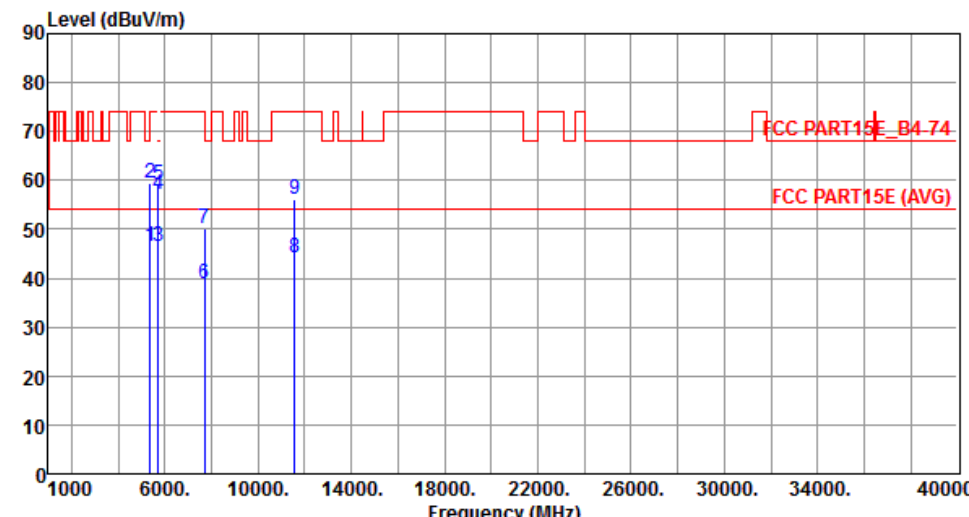
Modulation	VHT80	Test Freq. (MHz)	5210
Polarization	Vertical		



	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	53.34	54.00	-0.66	47.88	5.46	Average	192	136
2	5150.00	66.31	74.00	-7.69	60.85	5.46	Peak	192	136
3	5350.00	48.80	54.00	-5.20	43.24	5.56	Average	192	136
4	5350.00	59.97	74.00	-14.03	54.41	5.56	Peak	192	136
5	6946.66	63.83	68.20	-4.37	55.37	8.46	Peak	192	136
6	10420.00	57.89	68.20	-10.31	42.26	15.63	Peak	202	352

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).

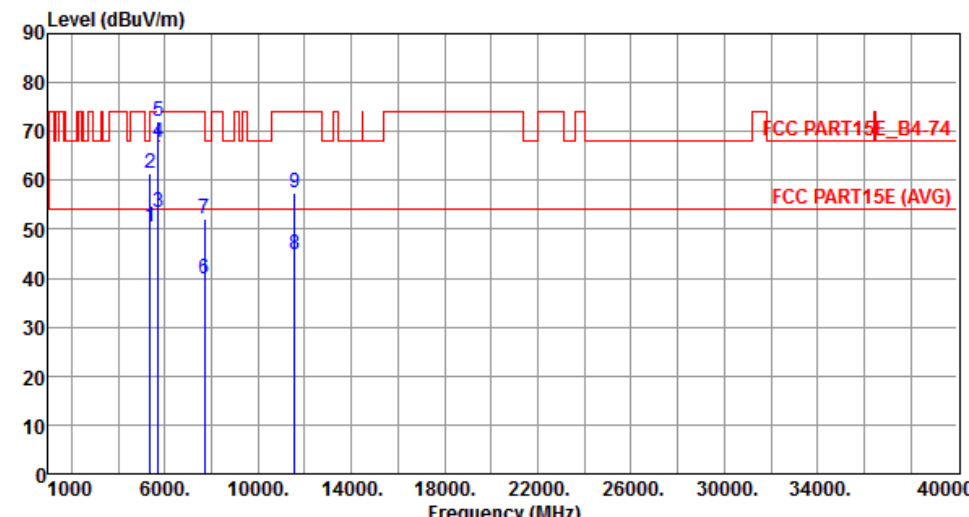
Modulation	VHT80	Test Freq. (MHz)	5775
Polarization	Horizontal		



	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	46.55	54.00	-7.45	40.99	5.56	Average	177	10
2	5350.00	59.30	74.00	-14.70	53.74	5.56	Peak	177	10
3	5715.00	46.42	54.00	-7.58	40.77	5.65	Average	177	10
4	5715.00	57.10	74.00	-16.90	51.45	5.65	Peak	177	10
5	5725.00	58.97	78.20	-19.23	53.33	5.64	Peak	177	10
6	7700.00	38.99	54.00	-15.01	28.90	10.09	Average	195	300
7	7700.00	50.10	74.00	-23.90	40.01	10.09	Peak	195	300
8	11550.00	44.17	54.00	-9.83	28.36	15.81	Average	165	339
9	11550.00	56.21	74.00	-17.79	40.40	15.81	Peak	165	339

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	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	50.44	54.00	-3.56	44.88	5.56	Average	195	20
2	5350.00	61.58	74.00	-12.42	56.02	5.56	Peak	195	20
3	5715.00	53.32	54.00	-0.68	47.67	5.65	Average	191	7
4	5715.00	67.86	74.00	-6.14	62.21	5.65	Peak	191	7
5	5725.00	71.95	78.20	-6.25	66.31	5.64	Peak	191	7
6	7700.00	39.99	54.00	-14.01	29.90	10.09	Average	202	318
7	7700.00	52.08	74.00	-21.92	41.99	10.09	Peak	202	318
8	11550.00	44.71	54.00	-9.29	28.90	15.81	Average	170	352
9	11550.00	57.55	74.00	-16.45	41.74	15.81	Peak	170	352

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

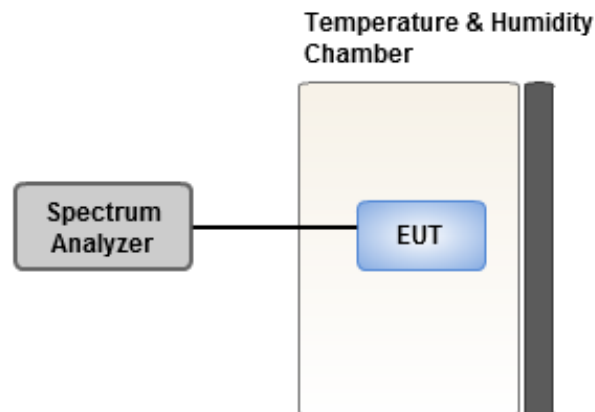
3.6.1 Limit of Frequency Stability

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	5.70	5.29	5.86	5.96
T20°C Vmin	4.49	5.02	4.09	5.16
T55°C Vnom	4.10	3.59	4.30	4.24
T50°C Vnom	3.22	3.21	3.61	3.47
T40°C Vnom	3.07	3.13	3.82	3.48
T30°C Vnom	3.29	3.64	3.08	3.53
T20°C Vnom	2.13	2.69	2.05	2.36
T10°C Vnom	2.17	1.83	2.17	2.58
T0°C Vnom	2.25	1.96	2.45	2.07
T-10°C Vnom	1.11	0.76	1.58	1.97
T-20°C Vnom	0.71	0.74	1.31	1.42
T-30°C Vnom	0.06	0.31	0.10	0.03
Vnom [Vac]: 120		Vmax [Vac]: 138		Vmin [Vac]: 102
Tnom [°C]: 20		Tmax [°C]: 55		Tmin [°C]: -30

Frequency: 5785 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	4.64	4.99	4.35	4.96
T20°C Vmin	3.29	3.54	3.12	3.60
T55°C Vnom	3.28	2.81	3.08	3.45
T50°C Vnom	3.39	3.45	3.21	3.43
T40°C Vnom	2.91	2.92	3.49	3.16
T30°C Vnom	2.76	3.45	3.46	2.73
T20°C Vnom	1.67	2.46	2.17	1.75
T10°C Vnom	2.38	2.42	2.68	2.34
T0°C Vnom	1.95	2.24	2.38	2.46
T-10°C Vnom	1.32	1.32	1.70	1.38
T-20°C Vnom	1.10	0.78	1.50	1.65
T-30°C Vnom	0.12	0.31	0.79	0.02
Vnom [Vac]: 120		Vmax [Vac]: 138		Vmin [Vac]: 102
Tnom [°C]: 20		Tmax [°C]: 55		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

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan,
R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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

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Email: ICC_Service@icertifi.com.tw

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