

# **FCC C2PC Test Report**

FCC ID : UIDSBX-AC1200P

Equipment : AC1200 Wi-Fi Extender with RipCurrent<sup>™</sup>

**Technology** 

Model No. : SBX-AC1200P

Brand Name : ARRIS

Applicant : ARRIS Group, Inc.

Address : 3871 Lakefield Drive, Suite 300, Suwanee,

Georgia 30024, United States

Standard : 47 CFR FCC Part 15.407

Received Date : May 31, 2016

Tested Date : Jun. 01 ~ Jul. 07, 2016

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

Reviewed by: Approved by:

Along Chen / Assistant Manager Gary Chang / Manager

Testing Laborate

2732

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# **Release Record**

Report No.	Version	Description	Issued Date
FR593001-01AN	Rev. 01	Initial issue	Sep. 14, 2016

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# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.159MHz 52.49 (Margin -3.03dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5470.00MHz 72.99 (Margin -1.01dB) - PK [dBuV/m at 3m]: 5725.00MHz 52.99 (Margin -1.01dB) - AV	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]:  Non-beamforming mode  5250~5350MHz: 23.50  5470~5725MHz: 23.58  Beamforming mode  5250~5350MHz: 23.83  5470~5725MHz: 23.53	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

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# 1 General Description

### 1.1 Information

This report is issued as a FCC Class II Permissive Change. The modification is only concerned with adding 5250~5350MHz and 5470~5725 MHz band by software setting.

### 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 <sub>⊤x</sub> )	Data Rate / MCS		
5250-5350 5470-5725	а	5260-5320 5500-5720	52-64 [4] 100-144 [9]	2	6-54 Mbps		
5250-5350 5470-5725	n (HT20)	5260-5320 5500-5720	52-64 [4] 100-144 [9]	2	MCS 0-15		
5250-5350 5470-5725	n (HT40)	5270-5310 5510-5710	54-62 [2] 102-142 [4]	2	MCS 0-15		
5250-5350 5470-5725	ac (VHT20)	5260-5320 5500-5720	52-64 [4] 100-144 [9]	2	MCS 0-9		
5250-5350 5470-5725	ac (VHT40)	5270-5310 5510-5710	54-62 [2] 102-142 [4]	2	MCS 0-9		
5250-5350 5470-5725	ac (VHT80)	5290 5530~5690	58 [1] 106-138 [2]	2	MCS 0-9		

Note 1: RF output power specifies that Maximum Conducted Output Power.

#### 1.1.2 Antenna Details

Ant. No.	Model Tv	Tymo	Type Connector	Antenna Gain (dBi)		
Ant. No.	Wodei	туре		5250~5350 MHz	5470~5725 MHz	
1	617210L2	Dipole	I-pex	2.5	2.69	
2	617210L3	Dipole	I-pex	2.54	3.16	

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	100-240Vac, 50/60Hz, 0.6A Power line: 1m non-shielded without core
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Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

Note 3: 802.11n/ac supports beamforming mode.

Note 4: The device has disabled the 5600-5650MHz band by S/W setting.



## 1.1.4 Accessories

	Accessories				
No.	Equipment	Description			
1	RJ45 cable	1m non-shielded without core			

## 1.1.5 Channel List

802.11 a / H	T20 / VHT20	HT40 /	VHT40
Channel	Frequency(MHz)	Channel	Frequency(MHz)
52	5260	54	5270
56	5280	62	5310
60	5300	102	5510
64	5320	110	5550
100	5500	134	5670
104	5520	142	5710
108	5540	VH	T80
112	5560	58	5290
116	5580	106	5530
132	5660	138	5690
136	5680		
140	5700		
144	5720		

# 1.1.6 Test Tool and Duty Cycle

Test Tool	MTool, version: 2.0.2.7				
	Mode	Non-beamforming		Beamforming	
		Duty cycle (%)	Duty factor (dB)	Duty cycle (%)	Duty factor (dB)
Duty Cycle and Duty Footor	11a	99.31%	0.03		
Duty Cycle and Duty Factor	VHT20	99.26%	0.03	98.23%	0.08
	VHT40	98.08%	0.08	98.52%	0.06
	VHT80	99.62%	0.02	98.54%	0.06

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# 1.1.7 Power Setting

For Frequency band 5250~5350 MHz					
Modulation Mode	Tost Fraguency (MUz)	Powe	r Set		
Wodulation Wode	Test Frequency (MHz)	Non-Beamforming	Beamforming		
11a	5260	76			
11a	5300	76			
11a	5320	68			
HT20	5260	78	76		
HT20	5300	77	74		
HT20	5320	67	70		
HT40	5270	76	78		
HT40	5310	59	61		
VHT20	5260	78	76		
VHT20	5300	77	74		
VHT20	5320	67	70		
VHT40	5270	76	78		
VHT40	5310	59	61		
VHT80	5290	56	57		

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For Frequency band 5470~5725 MHz					
Modulation Mode	Test Frequency (MHz)	Powe	Power Set		
Woddiation Wode	rest Frequency (Minz)	Non-Beamforming	Beamforming		
11a	5500	70			
11a	5580	80			
11a	5700	66			
HT20	5500	66	72		
HT20	5580	80	80		
HT20	5700	66	70		
HT40	5510	54	56		
HT40	5550	70	71		
HT40	5670	64	64		
VHT20	5500	66	72		
VHT20	5580	80	80		
VHT20	5700	66	70		
VHT40	5510	54	56		
VHT40	5550	70	71		
VHT40	5670	64	64		
VHT80	5530	54	56		

## Channel that extends across the 5.725 GHz boundary

For Frequency band 5470~5725 MHz					
Modulation Mode	Ilation Mode Test Frequency (MHz)				
Woddiation Wode		Non-Beamforming	Beamforming		
11a	5720	80			
HT20	5720	80	80		
HT40	5710	78	76		
VHT20	5720	80	80		
VHT40	5710	78	76		
VHT80	5690	80	80		

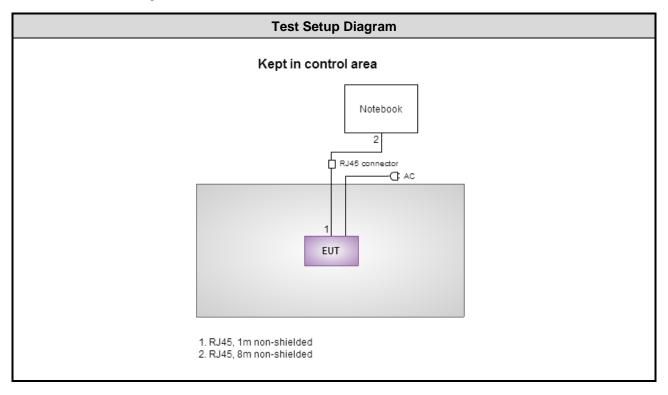
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# 1.2 Local Support Equipment List

	Support Equipment List									
No. Equipment Brand Model FCC ID Signal cable / Length (										
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 8m non-shielded.					

# 1.3 Test Setup Chart



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# 1.4 The Equipment List

Test Item	Conducted Emission										
Test Site	Conduction room 1 /	Conduction room 1 / (CO01-WS)									
Instrument	Manufacturer	Manufacturer Model No. Serial No. Calibration Date Calibration Until									
EMC Receiver	R&S	ESCS 30	100169	Oct. 21, 2015	Oct. 20, 2016						
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2015	Nov. 12, 2016						
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016						
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 / (030	966 chamber 3 / (03CH03-WS)										
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until							
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016							
Receiver	Agilent	N9038A	MY53290044	Oct. 14, 2015	Oct. 13, 2016							
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 26, 2016	Apr. 25, 2017							
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 24, 2016	Feb. 23, 2017							
Horn Antenna 18G-40G			BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016							
Preamplifier	EMC	EMC02325	980187	Sep. 21, 2015	Sep. 20, 2016							
Preamplifier	Agilent	83017A	MY53270014	Sep. 07, 2015	Sep. 06, 2016							
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016							
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 05, 2016	Feb. 04, 2017							
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22600/4	Feb. 05, 2016	Feb. 04, 2017							
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 05, 2016	Feb. 04, 2017							
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 05, 2016	Feb. 04, 2017							
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 05, 2016	Feb. 04, 2017							
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 05, 2016	Feb. 04, 2017							
Measurement Software	AUDIX	e3	6.120210g	NA	NA							
Note: Calibration Int	erval of instruments lis	sted above is one year.										

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Test Item	RF Conducted										
Test Site	(TH01-WS)	ГН01-WS)									
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until						
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017						
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016						
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016						
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016						
AC POWER SOURCE	APC	AFC-500W	F312060012	Oct. 26, 2015	Oct. 25, 2016						
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 v01r02

FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

# 1.6 Measurement Uncertainty

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

Measurement Uncertainty							
Parameters	Uncertainty						
Bandwidth	±34.134 Hz						
Conducted power	±0.808 dB						
Frequency error	±34.134 Hz						
Power density	±0.463 dB						
Conducted emission	±2.670 dB						
AC conducted emission	±2.90 dB						
Radiated emission ≤ 1GHz	±3.66 dB						
Radiated emission > 1GHz	±5.37 dB						
Time	±0.1%						
Temperature	±0.6 °C						

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# 2 Test Configuration

# 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 63%	Howard Huang
Radiated Emissions	03CH03-WS	22°C / 61-64%	Felix Sung Allen Yu
RF Conducted	TH01-WS	22°C / 64%	Alex Huang

FCC site registration No.: 207696IC site registration No.: 10807C-1

## 2.2 The Worst Test Modes and Channel Details

#### Non-beamforming mode

For Frequency band 5250-5350 MHz, 5470-5725 MHz										
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration						
Conducted Emissions	VHT20	5260	MCS 0							
Radiated Emissions ≤1GHz	VHT20	5260	MCS 0							
	11a	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	6 Mbps							
	HT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0							
RF Output Power	HT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0							
	VHT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0							
	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0							
	VHT80	5290 / 5530 / 5690	MCS 0							
	11a	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	6 Mbps							
Radiated Emissions >1GHz Emission Bandwidth	VHT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0							
Peak Power Spectral Density	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0							
	VHT80	5290 / 5530 / 5690	MCS 0	1						
Frequency Stability	Un-modulation	5320								

#### NOTE:

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<sup>.</sup> 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.



#### Beamforming mode

For I	requency band	d 5250-5350 MHz, 5470-572	25 MHz	
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	VHT40	5270	MCS 0	
Radiated Emissions ≤1GHz	VHT40	5270	MCS 0	
	HT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0	
	HT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	
RF Output Power	VHT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0	
	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	
	VHT80	5290 / 5530 / 5690	MCS 0	
Radiated Emissions >1GHz	VHT20	5260 / 5300 / 5320 5500 / 5580 / 5700 / 5720	MCS 0	
Emission Bandwidth Peak Power Spectral Density	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	
· ,	VHT80	5290 / 5530 / 5690	MCS 0	

#### NOTE:

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<sup>1.</sup> 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 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  $\Omega$  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.

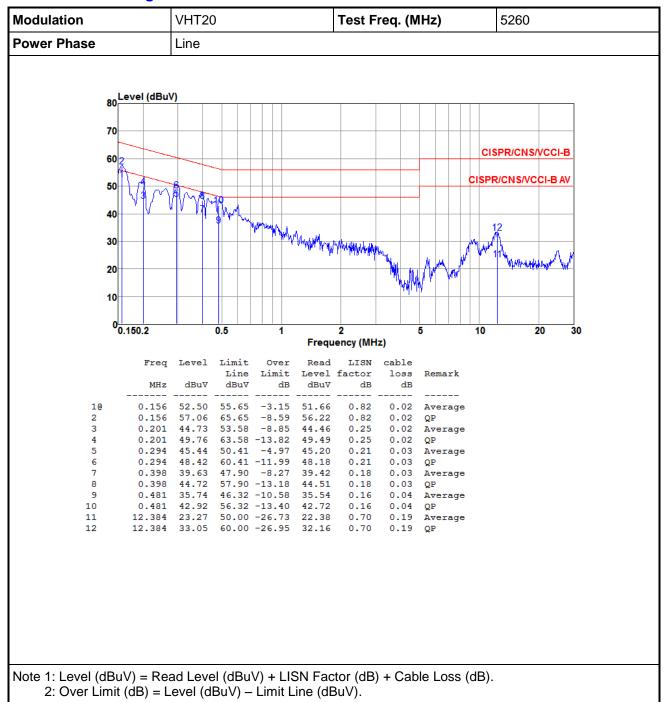
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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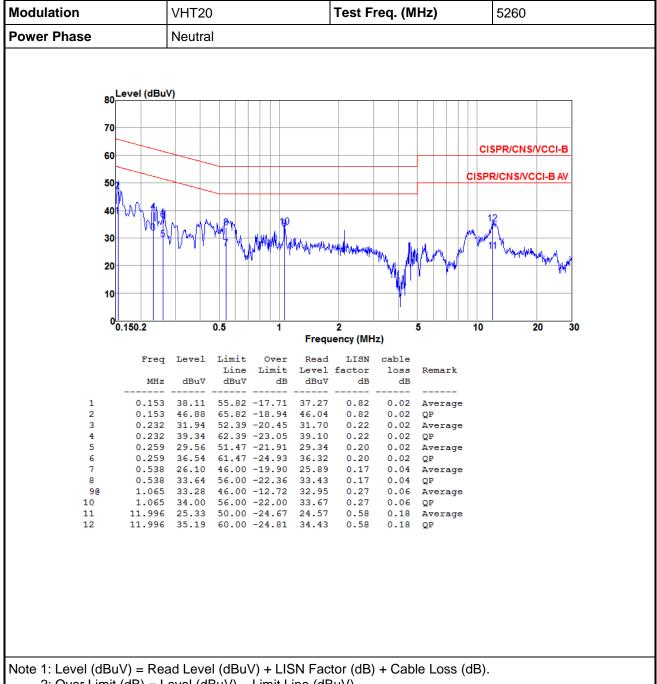
#### 3.1.4 Test Result of Conducted Emissions

#### Non- beamforming mode



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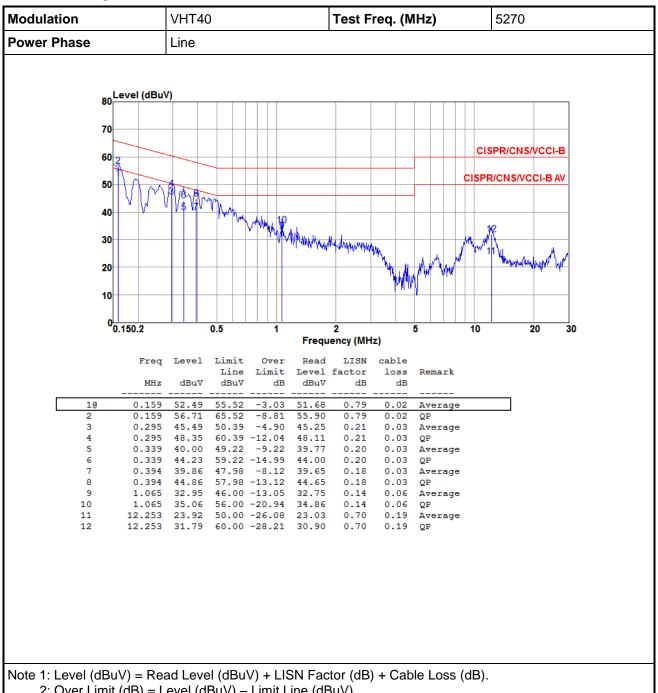


2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

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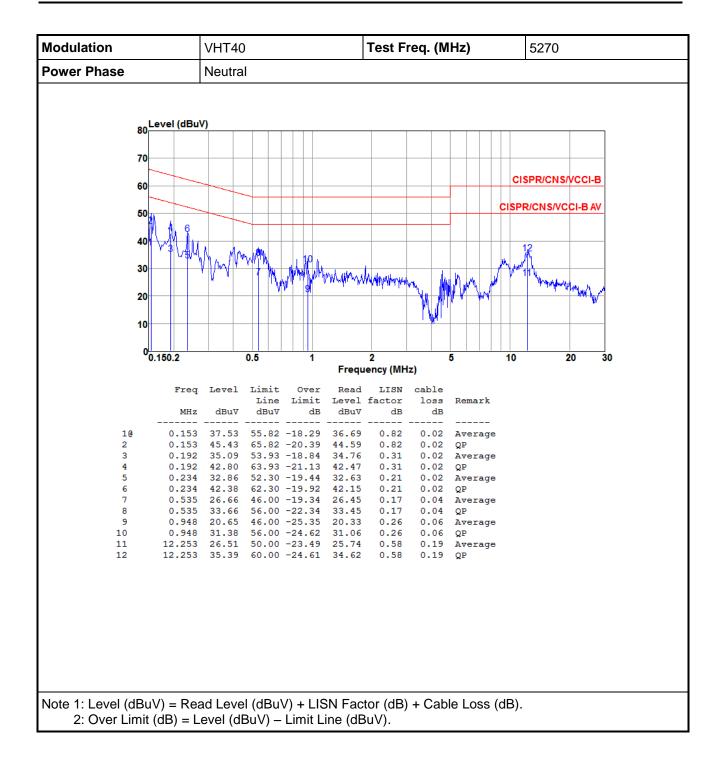
### Beamforming mode



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

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### 3.2 Emission Bandwidth

#### 3.2.1 Test Procedures

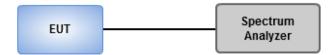
#### 26dB Bandwidth

- 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 ≥ 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



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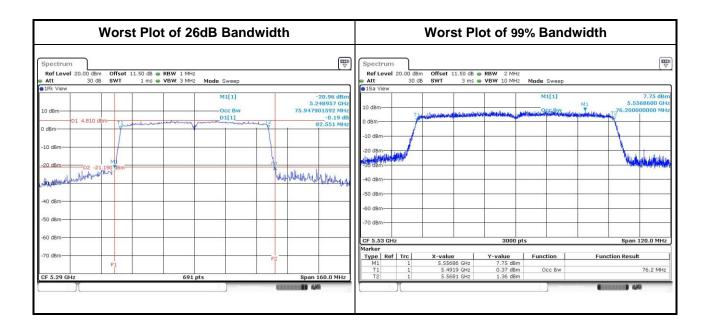
# 3.2.3 Test Result of Emission Bandwidth

# Non-beamforming mode

				Emissio	on Bandwid	th			
		Freq.	26dB	Bandwidth	(MHz)	99%	Bandwidth	(MHz)	Power Limit
Mode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)
11a	2	5260	38.67	37.10		18.16	17.63		24.00
11a	2	5300	37.91	35.25		18.20	17.69		24.00
11a	2	5320	25.10	22.55		17.02	17.11		24.00
VHT20	2	5260	37.57	39.25		19.93	19.04		24.00
VHT20	2	5300	39.30	38.43		19.30	18.74		24.00
VHT20	2	5320	25.57	28.75		18.01	18.17		24.00
VHT40	2	5270	67.01	76.06		37.30	37.90		24.00
VHT40	2	5310	43.13	57.28		36.66	36.74		24.00
VHT80	2	5290	81.86	82.55		76.04	76.08		24.00
11a	2	5500	22.38	26.20		17.00	17.21		24.00
11a	2	5580	35.13	37.91		18.82	19.61		24.00
11a	2	5700	21.80	24.17		16.97	17.14		24.00
VHT20	2	5500	23.13	30.32		18.00	18.23		24.00
VHT20	2	5580	35.59	39.48		18.85	19.82		24.00
VHT20	2	5700	22.14	30.38		18.02	18.23		24.00
VHT40	2	5510	46.61	48.35		36.66	36.74		24.00
VHT40	2	5550	78.96	77.68		36.98	37.16		24.00
VHT40	2	5670	74.67	75.83		36.80	36.92		24.00
VHT80	2	5530	81.62	82.55		76.04	76.20		24.00

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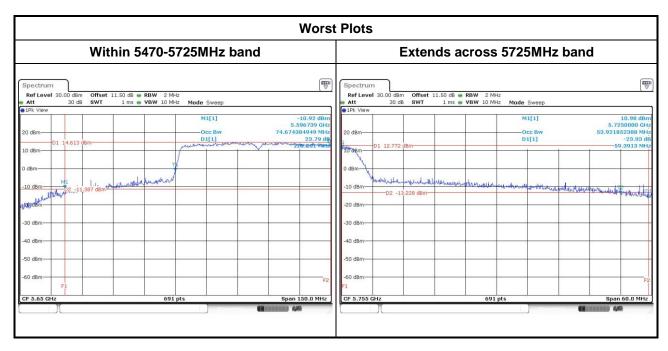
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#### Channel that extends across the 5.725 GHz boundary

	UNII Emission Bandwidth Result ( Within 5470-5725MHz band )												
Mode	N	. Freg.	26dB Bandwidth (MHz)			99% Bandwidth (MHz)			Power Limit				
	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)				
11a	2	5720	18.97	23.28		13.595	13.835		23.78				
VHT20	2	5720	21.19	20.82		14.135	14.255		24.00				
VHT40	2	5710	64.83	63.51		33.65	33.91		24.00				
VHT80	2	5690	128.26	114.57		73.50	73.38		24.00				

	UNII Emission Bandwidth Result ( Extends across 5725MHz band )											
Mode N	N	Freq.	26dE	26dB Bandwidth (MHz)			% Bandwidth (MHz)					
	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2				
11a	2	5720	11.11	12.70		3.575	3.675					
VHT20	2	5720	13.11	14.52		3.975	4.105					
VHT40	2	5710	34.14	34.84		3.73	3.89					
VHT80	2	5690	58.61	59.39		3.38	3.34					

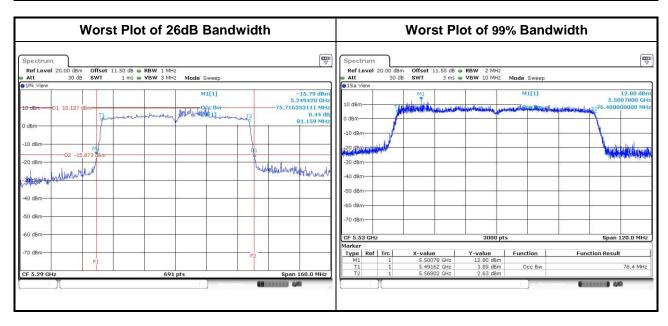


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### Beamforming mode

				Emissio	on Bandwid	th			
NA o al o		Freq.	26dB	Bandwidth	(MHz)	99%	Bandwidth (	(MHz)	Power Limit
Mode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)
VHT20	2	5260	31.01	35.94		18.77	18.56		24.00
VHT20	2	5300	25.57	31.65		18.30	18.31		24.00
VHT20	2	5320	30.38	29.45		17.99	18.12		24.00
VHT40	2	5270	61.80	67.71		38.14	39.66		24.00
VHT40	2	5310	40.70	43.59		36.60	36.72		24.00
VHT80	2	5290	81.16	80.23		75.88	75.92		24.00
VHT20	2	5500	27.59	30.55		17.99	18.24		24.00
VHT20	2	5580	27.83	34.03		18.88	19.88		24.00
VHT20	2	5700	27.36	31.30		17.95	18.25		24.00
VHT40	2	5510	40.70	41.28		36.60	36.64		24.00
VHT40	2	5550	73.51	68.06		37.14	37.18		24.00
VHT40	2	5670	66.32	51.59		36.74	36.80		24.00
VHT80	2	5530	80.93	80.70		76.24	76.40		24.00



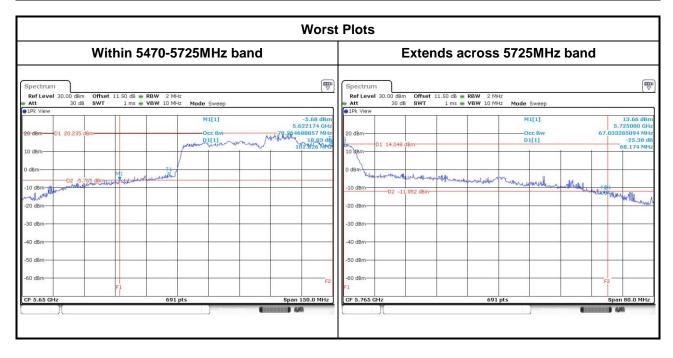
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### Channel that extends across the 5.725 GHz boundary

	UNII Emission Bandwidth Result ( Within 5470-5725MHz band )											
Mode		Freq.	26dB Bandwidth (MHz)			99%	Power Limit					
Wode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)			
VHT20	2	5720	18.85	19.59		14.485	14.645		23.75			
VHT40	2	5710	63.81	60.16		33.81	33.93		24.00			
VHT80	2	5690	102.83	100.22		73.66	73.46		24.00			

	UNII Emission Bandwidth Result ( Extends across 5725MHz band )											
Mode	N	Freq.	26dE	Bandwidth (	MHz)	99% Bandwidth (MHz)						
Wiode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2				
VHT20	2	5720	11.76	14.87		4.325	4.505					
VHT40	2	5710	35.13	36.58		3.81	4.17					
VHT80	2	5690	68.17	67.13		3.54	3.66					



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### 3.3 RF Output Power

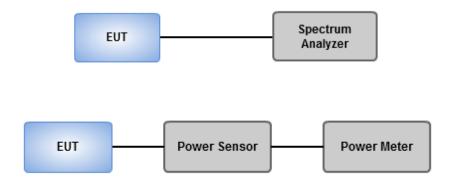
### 3.3.1 Limit of RF Output Power

Fred	quency Band (MHz)	Limit					
$\boxtimes$	5250 ~ 5350	250mW or 11dBm+10 log B					
$\boxtimes$	5470 ~ 5725	250mW or 11dBm+10 log B					
Note	Note: "B" is the 26dB emission bandwidth in MHz.						

#### 3.3.2 Test Procedures

- Power meter (For channel that does not extends across the 5.725 GHz boundary)
  - 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
- Spectrum analyzer (For channel that extends across the 5.725 GHz boundary)
- 1. Set RBW=1MHz, VBW=3MHz, Sweep time= Auto, Detector = RMS
- 2. Trace average at least 100 traces in power averaging mode
- 3. Compute power by integrating the spectrum across the 26 dB EBW
- 4. Add 10 log(1/X, X:duty cycle) if duty cycle is <98%)

#### 3.3.3 Test Setup



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# 3.3.4 Test Result of Maximum Conducted Output Power

# Non-beamforming mode

			С	onducted I	Power (dBn	n)	Total	Total	Limit
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11a	2	5260	20.29	19.16			189.319	22.77	24.00
11a	2	5300	20.31	19.11			188.869	22.76	24.00
11a	2	5320	17.21	16.22			94.481	19.75	24.00
HT20	2	5260	19.68	21.11			222.019	23.46	24.00
HT20	2	5300	19.42	20.75			206.349	23.15	24.00
HT20	2	5320	17.16	16.36			95.251	19.79	24.00
HT40	2	5270	19.84	20.64			212.261	23.27	24.00
HT40	2	5310	15.19	14.72			62.685	17.97	24.00
VHT20	2	5260	19.72	21.15			224.073	23.50	24.00
VHT20	2	5300	19.48	20.79			208.666	23.19	24.00
VHT20	2	5320	17.19	16.39			95.911	19.82	24.00
VHT40	2	5270	19.88	20.69			214.494	23.31	24.00
VHT40	2	5310	15.23	14.78			63.403	18.02	24.00
VHT80	2	5290	13.85	13.35			45.893	16.62	24.00
11a	2	5500	17.11	17.45			106.995	20.29	24.00
11a	2	5580	20.10	20.01			202.560	23.07	24.00
11a	2	5700	15.83	16.11			79.114	18.98	24.00
HT20	2	5500	16.08	15.84			78.922	18.97	24.00
HT20	2	5580	20.21	19.75			199.360	23.00	24.00
HT20	2	5700	15.98	16.29			82.188	19.15	24.00
HT40	2	5510	13.93	12.94			44.396	16.47	24.00
HT40	2	5550	18.61	17.87			133.846	21.27	24.00
HT40	2	5670	16.62	16.33			88.873	19.49	24.00
VHT20	2	5500	16.11	15.89			79.647	19.01	24.00
VHT20	2	5580	20.26	19.8			201.669	23.05	24.00
VHT20	2	5700	16.02	16.33			82.948	19.19	24.00
VHT40	2	5510	13.95	12.99			44.738	16.51	24.00
VHT40	2	5550	18.65	17.89			134.800	21.30	24.00
VHT40	2	5670	16.66	16.35			89.497	19.52	24.00
VHT80	2	5530	13.77	12.66			42.273	16.26	24.00

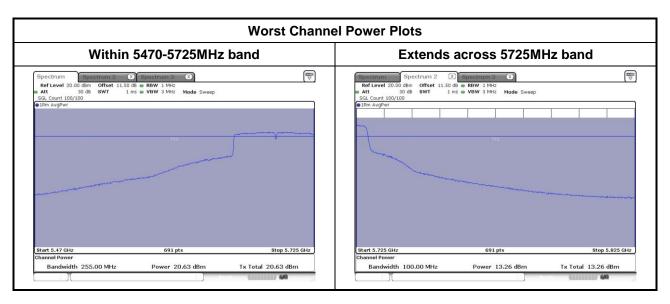
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#### Channel that extends across the 5.725 GHz boundary

	Maximum Conducted Output Power (Within 5470-5725MHz band)											
		Freq. (MHz)	Conducted Power without duty factor					Duty	Total	Total		
Mode	N <sub>TX</sub>		Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)	factor (dB)	Power (mW)	Power (dBm)	Limit (dBm)	
11a	2	5720	19.09	19.25			22.18	0.00	165.236	22.18	23.78	
HT20	2	5720	18.85	18.92			21.90	0.00	154.719	21.90	24.00	
HT40	2	5710	20.48	20.25			23.38	0.00	217.612	23.38	24.00	
VHT20	2	5720	18.83	18.92			21.89	0.00	154.367	21.89	24.00	
VHT40	2	5710	20.53	20.32			23.44	0.00	220.626	23.44	24.00	
VHT80	2	5690	20.63	20.50			23.58	0.00	227.813	23.58	24.00	

	Maximum Conducted Output Power (Extends across 5725MHz band)										
		Freq. (MHz)	Cond	Conducted Power without duty factor					Total	Total	
Mode	N <sub>TX</sub>		Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)	Duty factor (dB)	Power (mW)	Power (dBm)	Limit (dBm)
11a	2	5720	12.95	12.92			15.95	0.00	39.313	15.95	30.00
HT20	2	5720	13.16	13.00			16.09	0.00	40.654	16.09	30.00
HT40	2	5710	10.38	10.13			13.27	0.00	21.218	13.27	30.00
VHT20	2	5720	13.14	13.26			16.21	0.00	41.790	16.21	30.00
VHT40	2	5710	10.55	10.13			13.36	0.00	21.654	13.36	30.00
VHT80	2	5690	7.34	6.92			10.15	0.00	10.340	10.15	30.00



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# Beamforming mode

			С	onducted I	Power (dBn	n)	Total	Total	Limit
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
HT20	2	5260	19.08	20.44			191.572	22.82	24.00
HT20	2	5300	18.50	19.88			168.069	22.25	24.00
HT20	2	5320	17.43	17.85			116.289	20.66	24.00
HT40	2	5270	20.61	20.94			239.245	23.79	24.00
HT40	2	5310	15.51	15.82			73.758	18.68	24.00
VHT20	2	5260	19.11	20.49			193.414	22.86	24.00
VHT20	2	5300	18.54	19.92			169.624	22.29	24.00
VHT20	2	5320	17.45	17.88			116.967	20.68	24.00
VHT40	2	5270	20.65	20.98			241.459	23.83	24.00
VHT40	2	5310	15.55	15.88			74.618	18.73	24.00
VHT80	2	5290	14.32	14.48			55.094	17.41	24.00
HT20	2	5500	17.71	17.68			117.634	20.71	24.00
HT20	2	5580	20.14	19.98			202.817	23.07	24.00
HT20	2	5700	16.84	17.64			106.382	20.27	24.00
HT40	2	5510	13.81	14.55			52.554	17.21	24.00
HT40	2	5550	16.98	17.11			101.293	20.06	24.00
HT40	2	5670	16.63	17.26			99.236	19.97	24.00
VHT20	2	5500	17.77	17.73			119.134	20.76	24.00
VHT20	2	5580	20.17	20.01			204.223	23.10	24.00
VHT20	2	5700	16.88	17.69			107.502	20.31	24.00
VHT40	2	5510	13.85	14.59			53.040	17.25	24.00
VHT40	2	5550	17.03	17.15			102.346	20.10	24.00
VHT40	2	5670	16.68	17.32			100.510	20.02	24.00
VHT80	2	5530	13.86	14.31			51.299	17.10	24.00

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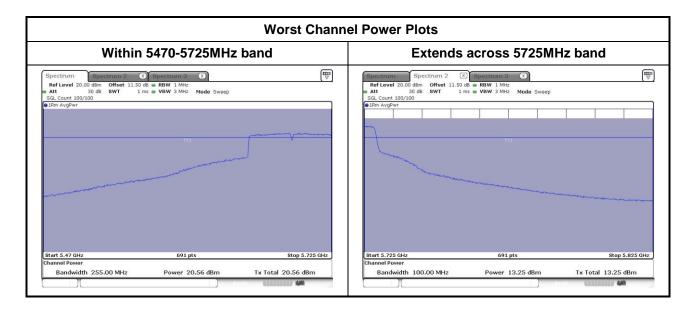


#### Channel that extends across the 5.725 GHz boundary

	Maximum Conducted Output Power (Within 5470-5725MHz band)											
		Freq. (MHz)	Conducted Power without duty factor					Duty	Total	Total		
Mode	N <sub>TX</sub>		Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)	factor (dB)	Power (mW)	Power (dBm)	Limit (dBm)	
HT20	2	5720	18.93	18.82			21.89	0.00	154.371	21.89	23.75	
HT40	2	5710	20.18	19.49			22.86	0.00	193.152	22.86	24.00	
VHT20	2	5720	18.95	19.11			22.04	0.00	159.994	22.04	23.75	
VHT40	2	5710	20.21	19.62			22.94	0.00	196.576	22.94	24.00	
VHT80	2	5690	20.56	20.47			23.53	0.00	225.192	23.53	24.00	

	Maximum Conducted Output Power (Extends across 5725MHz band)										
			Conducted Power without duty factor				actor	Duty	Total	Total	
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)	factor (dB)	Power (mW)	Power (dBm)	Limit (dBm)
HT20	2	5720	12.88	13.14			16.02	0.00	40.015	16.02	29.91
HT40	2	5710	10.10	9.76			12.94	0.00	19.695	12.94	29.91
VHT20	2	5720	13.22	13.25			16.25	0.00	42.124	16.25	29.91
VHT40	2	5710	10.18	9.85			13.03	0.00	20.084	13.03	29.91
VHT80	2	5690	7.49	7.35			10.43	0.00	11.043	10.43	29.91

Note: Directional gain =  $10 * \log((10^{2.7/20} + 10^{3.44/20})^2/2) = 6.09 \text{ dBi}$ , limit shall be reduced to 30 dBm - (6.09 dBi - 6 dBi) = 29.91 dBm



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# 3.4 Peak Power Spectral Density

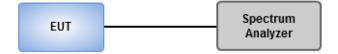
### 3.4.1 Limit of Peak Power Spectral Density

Free	quency Band (MHz)	Limit
$\boxtimes$	5250 ~ 5350	11 dBm / MHz
$\boxtimes$	5470 ~ 5725	11 dBm / MHz

#### 3.4.2 Test Procedures

- Method SA-1
  - 1. Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
  - 2. Trace average 100 traces.
  - 3. Use the peak marker function to determine the maximum amplitude level.
- - 1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
  - 2. Set sweep time ≥ 10 \* (number of points in sweep) \* (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 if duty cycle < 98%

#### 3.4.3 Test Setup



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# 3.4.4 Test Result of Peak Power Spectral Density

# Non-beamforming mode

	Conditio	on	F	Peak Power Spectra	l Density (dBm/MH	<u>z)</u>
Mode	N <sub>TX</sub>	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)
11a	2	5260	10.23	0.00	10.23	11
11a	2	5300	10.13	0.00	10.13	11
11a	2	5320	7.05	0.00	7.05	11
VHT20	2	5260	10.25	0.00	10.25	11
VHT20	2	5300	10.23	0.00	10.23	11
VHT20	2	5320	6.35	0.00	6.35	11
VHT40	2	5270	7.14	0.00	7.14	11
VHT40	2	5310	1.58	0.00	1.58	11
VHT80	2	5290	-2.33	0.00	-2.33	11
11a	2	5500	7.57	0.00	7.57	11
11a	2	5580	10.31	0.00	10.31	11
11a	2	5700	6.25	0.00	6.25	11
11a	2	5720	10.28	0.00	10.28	11
VHT20	2	5500	6.08	0.00	6.08	11
VHT20	2	5580	10.21	0.00	10.21	11
VHT20	2	5700	5.82	0.00	5.82	11
VHT20	2	5720	10.05	0.00	10.05	11
VHT40	2	5510	0.38	0.00	0.38	11
VHT40	2	5550	5.18	0.00	5.18	11
VHT40	2	5670	3.25	0.00	3.25	11
VHT40	2	5710	8.02	0.00	8.02	11
VHT80	2	5530	-2.90	0.00	-2.90	11
VHT80	2	5690	4.74	0.00	4.74	11

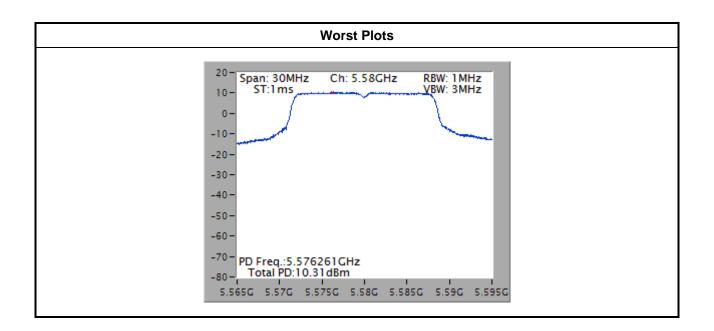
#### Note:

1. D.F is duty factor.

2. Test results are bin-by-bin summing measured value of each TX port.

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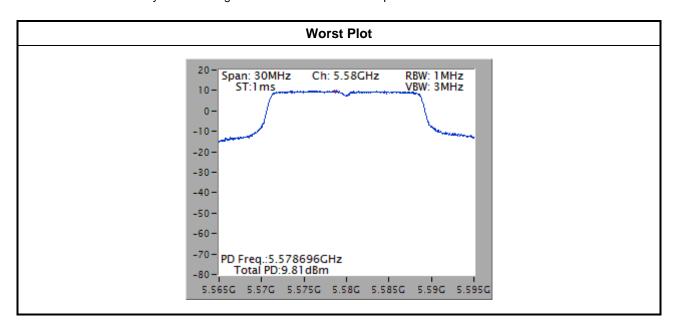


### Beamforming mode

Condition			Peak Power Spectral Density (dBm/MHz)			
Mode	N <sub>TX</sub>	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)
VHT20	2	5260	9.67	0.00	9.67	11
VHT20	2	5300	8.89	0.00	8.89	11
VHT20	2	5320	7.41	0.00	7.41	11
VHT40	2	5270	7.82	0.00	7.82	11
VHT40	2	5310	2.28	0.00	2.28	11
VHT80	2	5290	-1.74	0.00	-1.74	11
VHT20	2	5500	7.54	0.00	7.54	11
VHT20	2	5580	9.81	0.00	9.81	11
VHT20	2	5700	6.93	0.00	6.93	11
VHT20	2	5720	9.74	0.00	9.74	11
VHT40	2	5510	1.12	0.00	1.12	11
VHT40	2	5550	5.61	0.00	5.61	11
VHT40	2	5670	3.45	0.00	3.45	11
VHT40	2	5710	7.31	0.00	7.31	11
VHT80	2	5530	-1.88	0.00	-1.88	11
VHT80	2	5690	4.90	0.00	4.90	11

#### Note:

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



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### 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				
5.25 - 5.35 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]				
5.47 - 5.725 GHz	e.i.r.p27 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).

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#### 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.

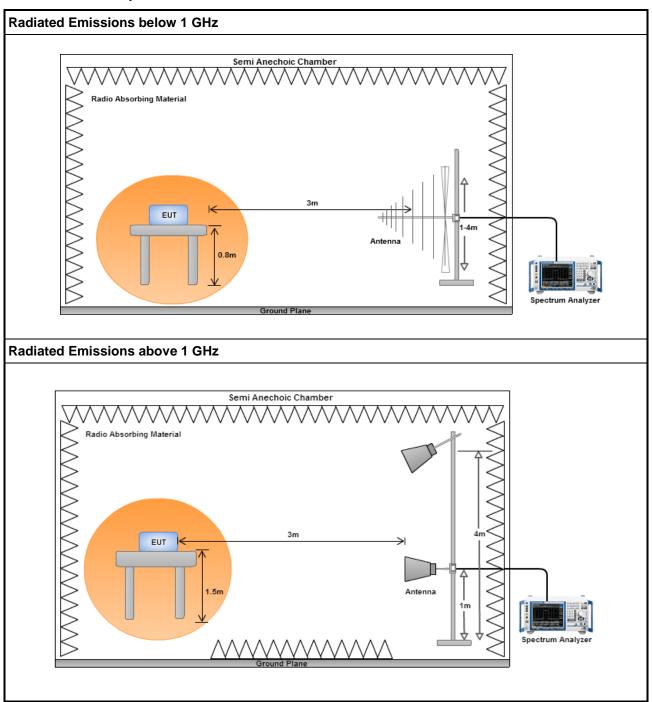
#### Note:

- 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.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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## 3.5.3 Test Setup

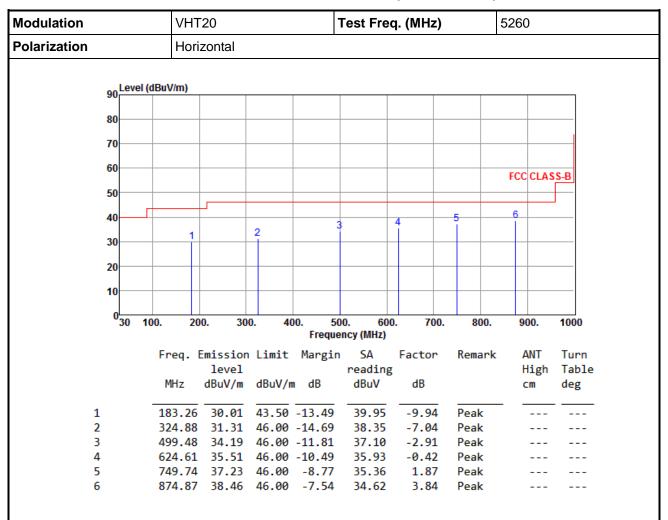


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## Non- beamforming mode

## 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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.

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Modulation Polarization			VHT	20			Test Fre	5260				
			Verti	Vertical								
	90 <sup>L</sup>	evel (di	BuV/m)									
	80											
	70											
	60											
	00									FCC CLA	SS-B	
	50	-										
	40									6		
	40	1			_		4		5	i		
	30		2		3							
	20											
	20											
	10											
	03											
	-3	30 100	0. 20	0. 30	0.		00. 60 ency (MHz)	0. 700.	800.	900.	1000	
			Freq. E	mission	limit	t Margir		Factor	Remark	ANT	Turn	
				level		3	reading			High	Table	
			MHz	dBuV/m	dBuV,	/m dB	dBuV	dB		cm	deg	
:	1	-	51.34	36.03	40.00	-3.97	43.90	-7.87	QP .	100	274	
	2		159.01	26.11		-17.39	34.11	-8.00	Peak			
	3		374.35	29.62	46.00	-16.38	35.31	-5.69	Peak			
	4					-10.25		-2.91	Peak			
	5					-11.85		1.87	Peak			
•	6		874.87	37.25	46.00	8.75	33.41	3.84	Peak			

\*Factor includes antenna factor, cable loss and amplifier gain

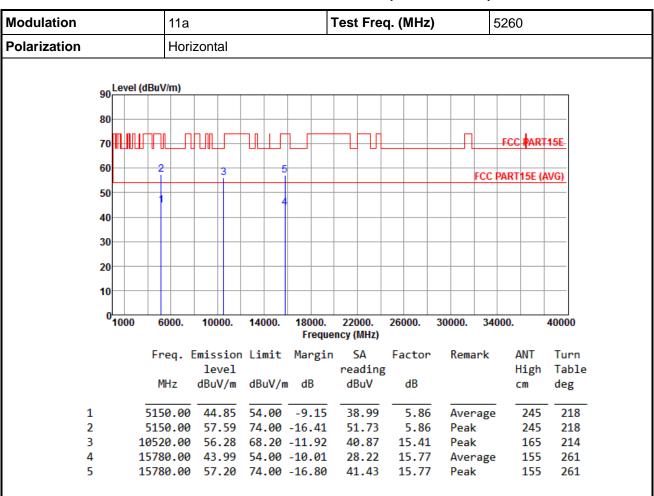
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

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



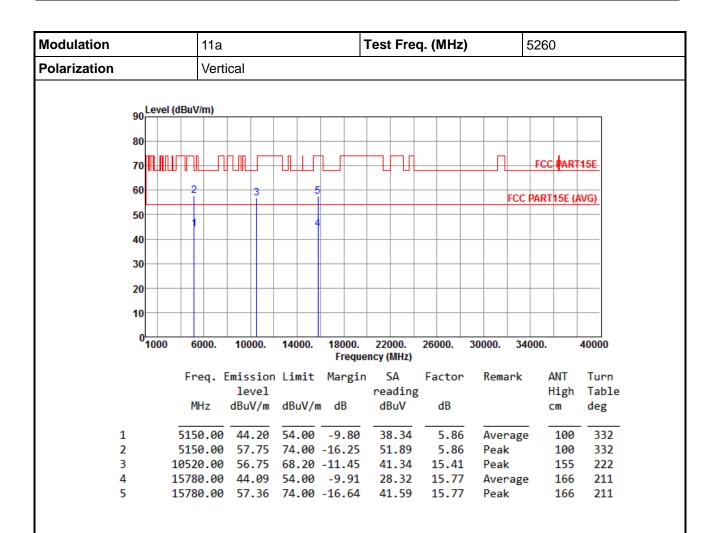
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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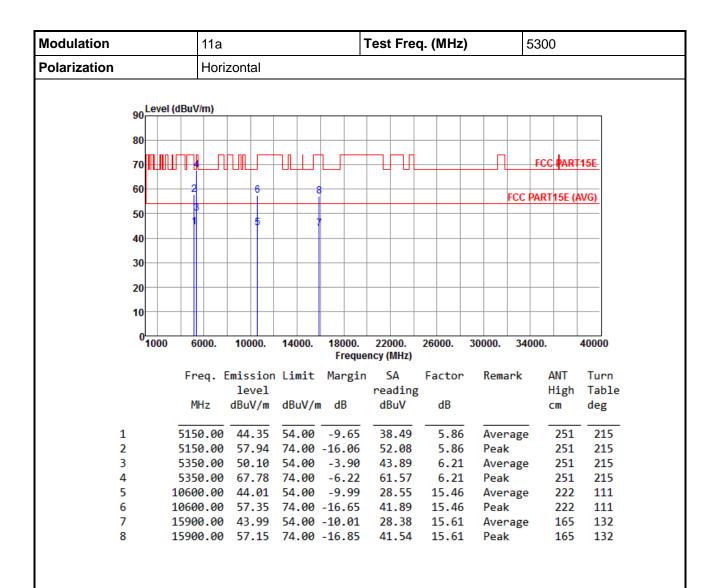


\*Factor includes antenna factor, cable loss and amplifier gain

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

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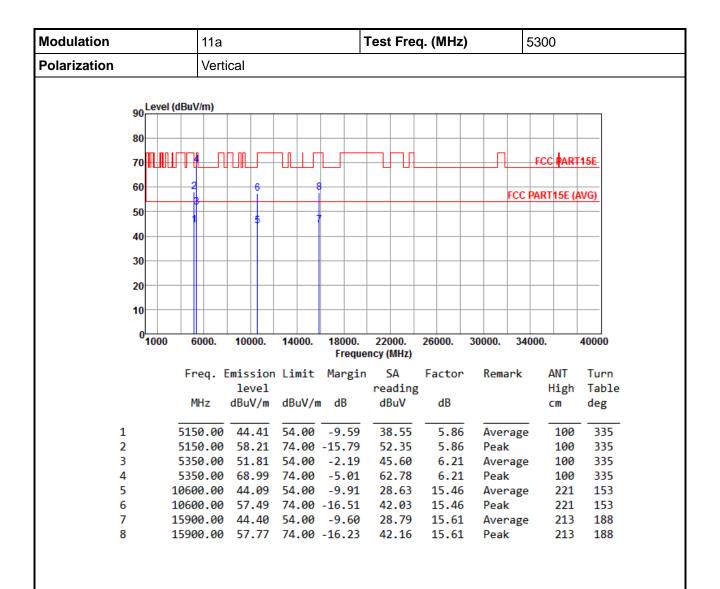


\*Factor includes antenna factor, cable loss and amplifier gain

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

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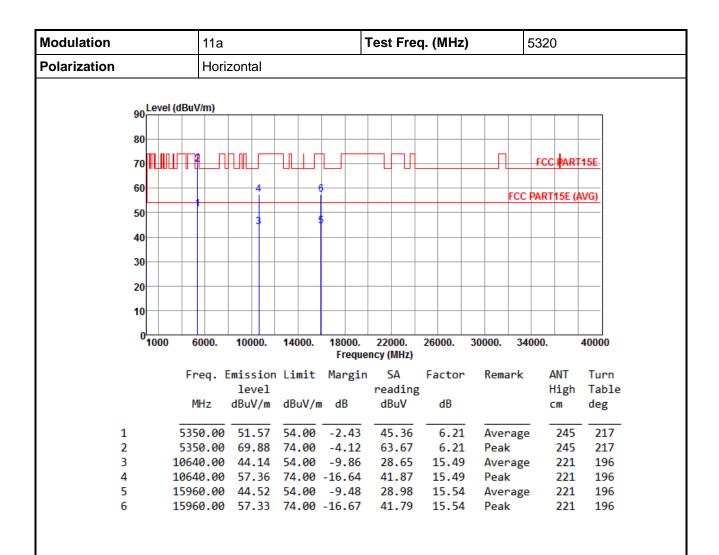


\*Factor includes antenna factor, cable loss and amplifier gain

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

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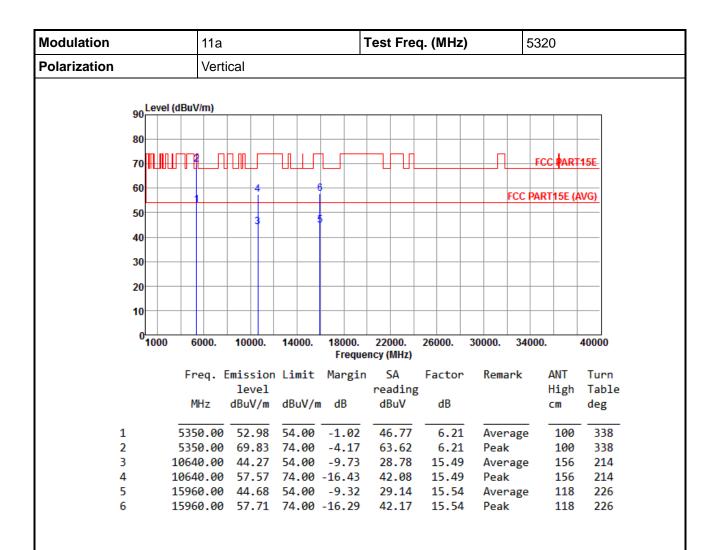


\*Factor includes antenna factor, cable loss and amplifier gain

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

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\*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation				1	l1a						-	Γest	Fre	q. (	MHz	:)		;	5500	)	
Polarization					Horizontal																
	90	Leve	(dB	uV/r	//m)																
	50																				
	80		+																		
	70		Ш	Ħ					$\coprod$									FC	C PAR	115E	(74)
	60			1			-6-			8											
	00						Ĭ			Ĭ								FCC	PART	15E (	AVG)
	50		+	1			+			7											
	40						1			1											
	30																				
	20																				
	10																				
	0	1000		600	00.	100	00.	140	00.		000.	220		26	000.	300	000.	34	000.		4000
												ncy (l									
			F	re	q. I			ı Li	nit	Mai	rgin		Α		actor	•	Rema	ark		ANT.	Tu
				MH	level Mz dBuV/m		JD.	JD. 377				reading dBuV		g dB					ligh		
				חוייו	2	ubu	v/m	ubi	JV/II	ı u	0	ub	uv		uБ					-m	de
:	1		54	160	.00	48	.56	54	.00	-5	.44	42	.19		6.37	,	Aver	rage	-	209	2
:	2		54	160	.00 64.31		74.00		-9	.69	57	.94	6.37					209	2		
	3	5470.				54.00			.51	1 44	4.11		6.38					209			
	4					69					.48		.14		6.38		Peak			209	
	5					44			.00		.39		.86		15.75			rage	!	222	
	5 7				.00		.62 .99		.00	-16	.38		.87 .94		15.75 16.05		Peak	c rage		222 211	1
	_		103	000	.00	44	. 55	54	.00	-9	.01	20	. 54	-	10.03		-ver	age		211	1

211

199

Peak

16.05

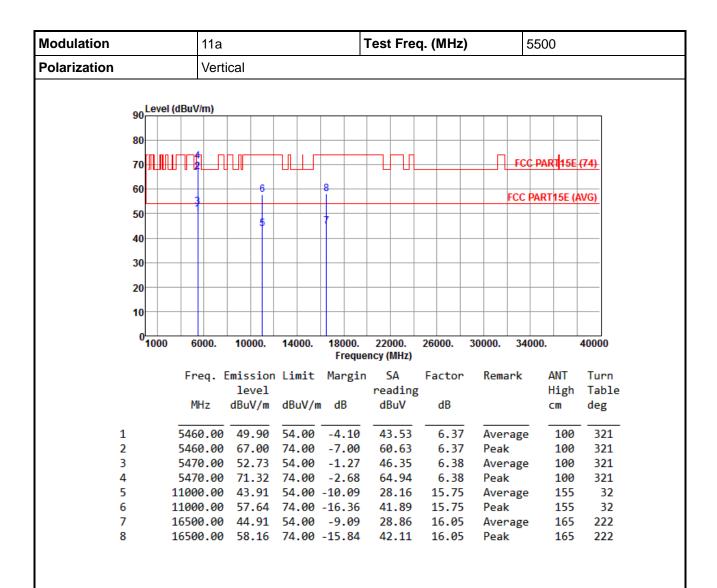
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

16500.00 57.99 74.00 -16.01 41.94

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

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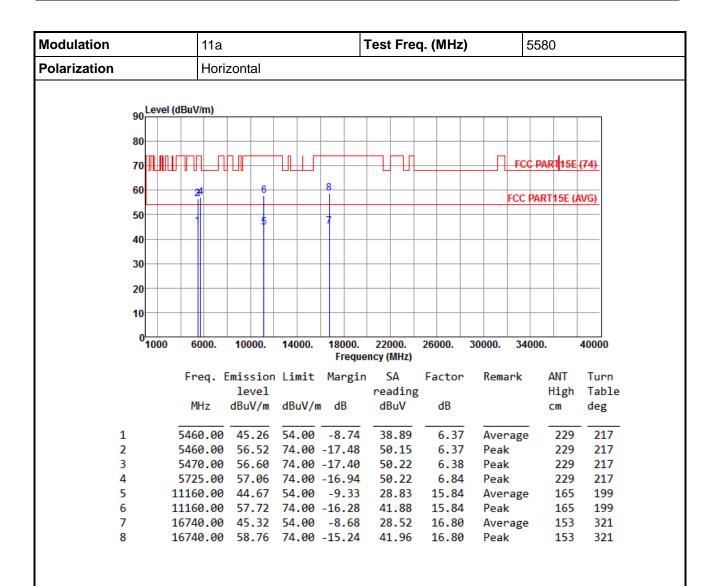


\*Factor includes antenna factor, cable loss and amplifier gain

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

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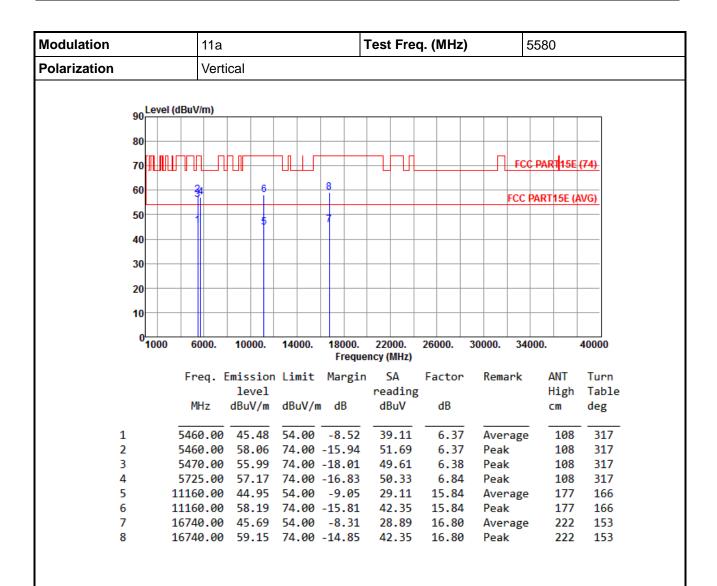


\*Factor includes antenna factor, cable loss and amplifier gain

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

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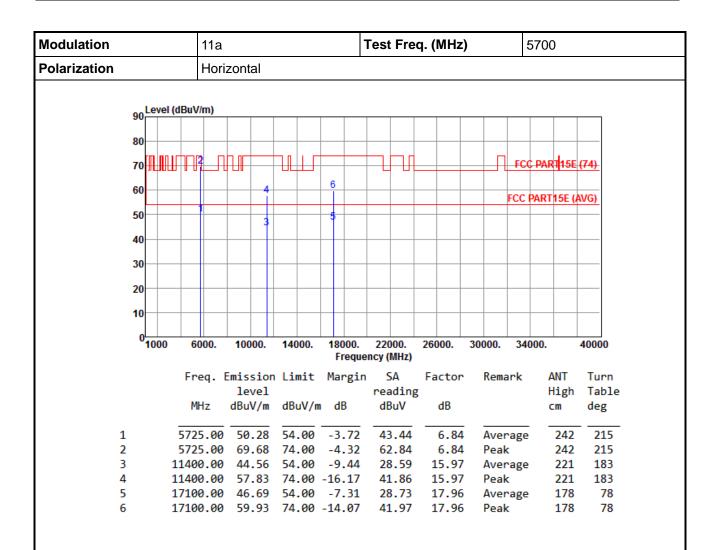


\*Factor includes antenna factor, cable loss and amplifier gain

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

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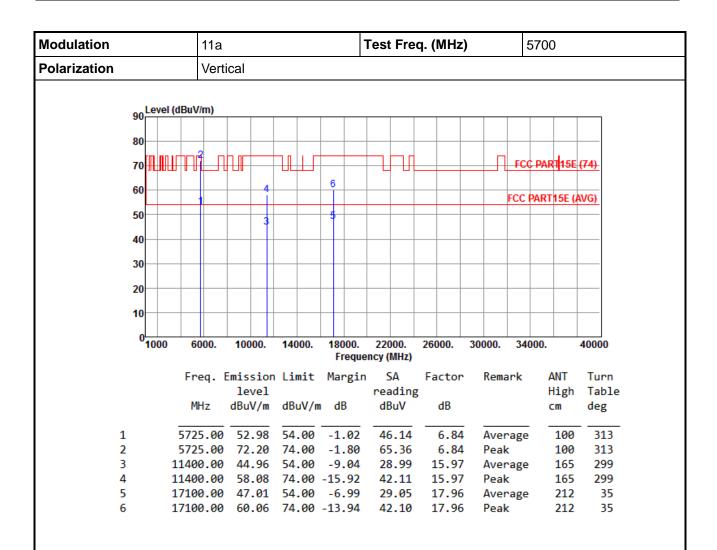


\*Factor includes antenna factor, cable loss and amplifier gain

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

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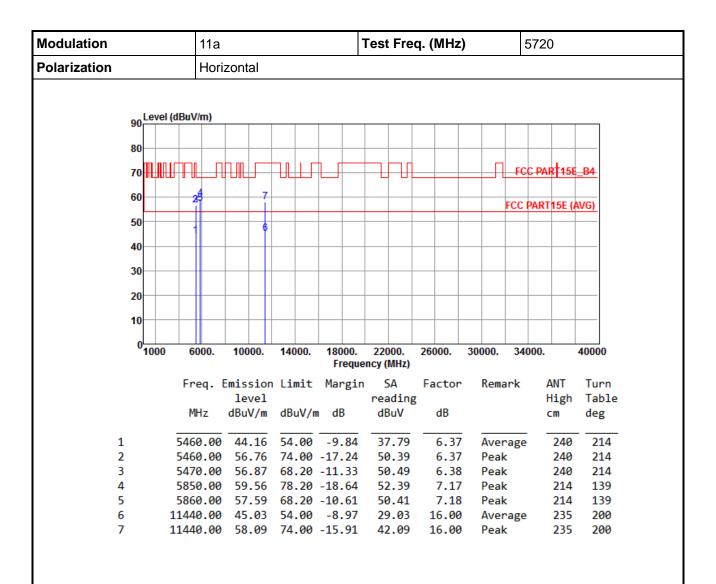


\*Factor includes antenna factor, cable loss and amplifier gain

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

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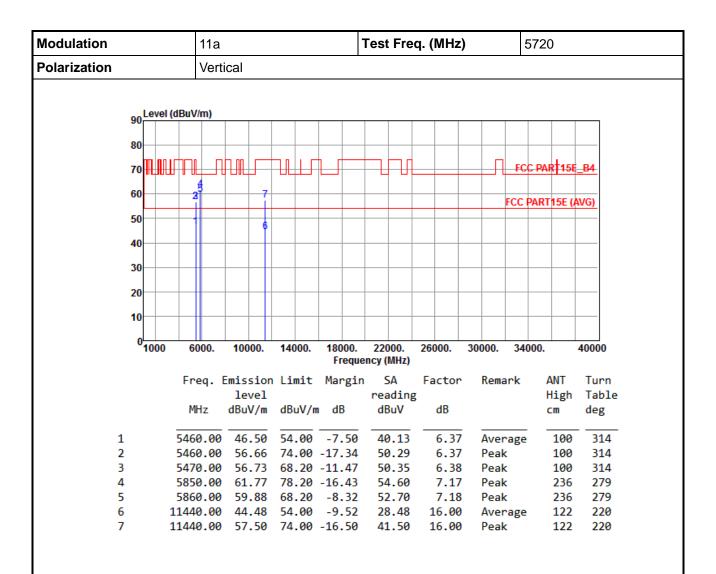


\*Factor includes antenna factor, cable loss and amplifier gain

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

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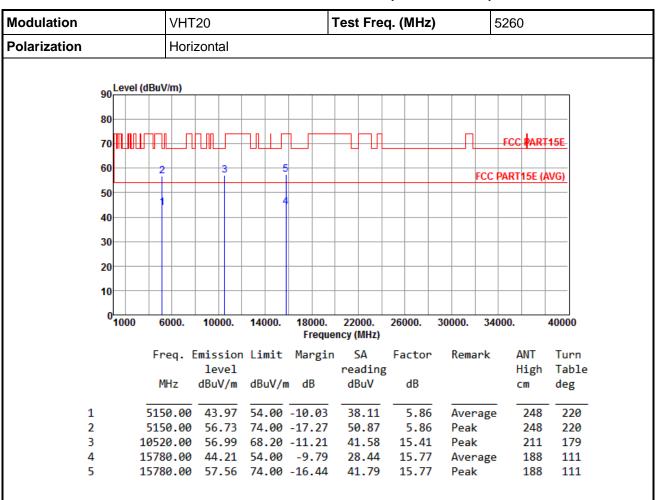
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



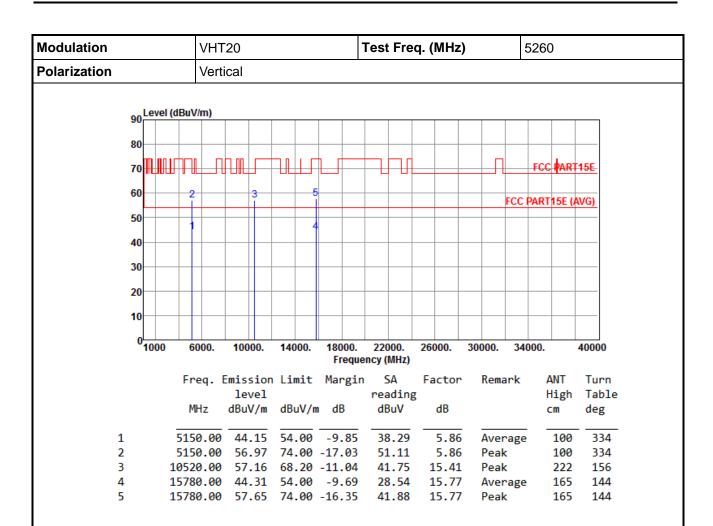
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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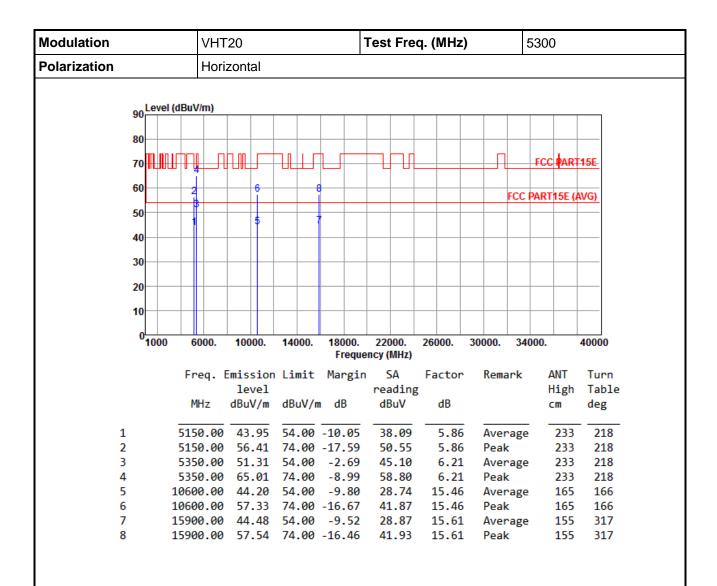


\*Factor includes antenna factor, cable loss and amplifier gain

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

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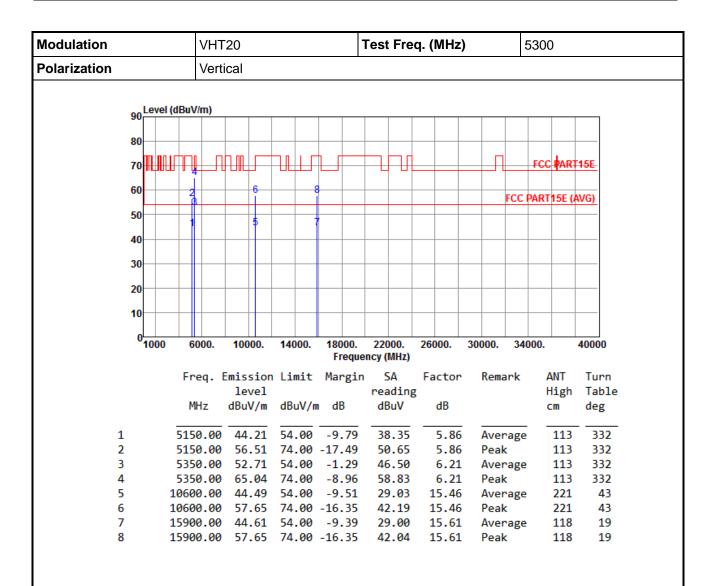


\*Factor includes antenna factor, cable loss and amplifier gain

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

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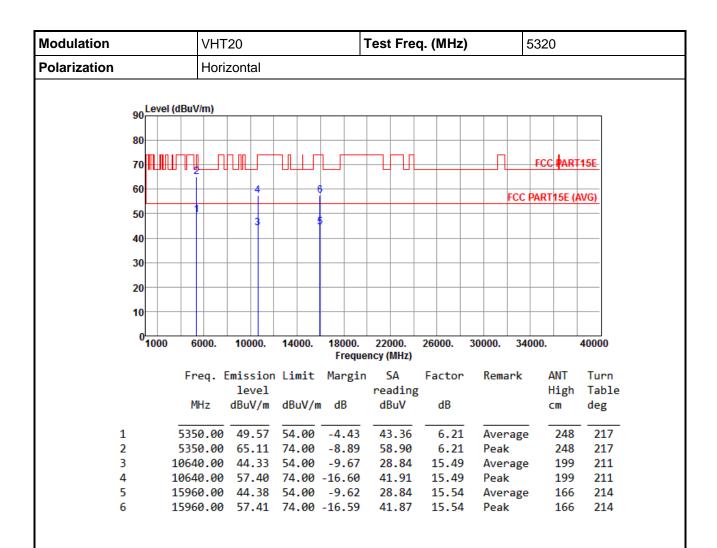


\*Factor includes antenna factor, cable loss and amplifier gain

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

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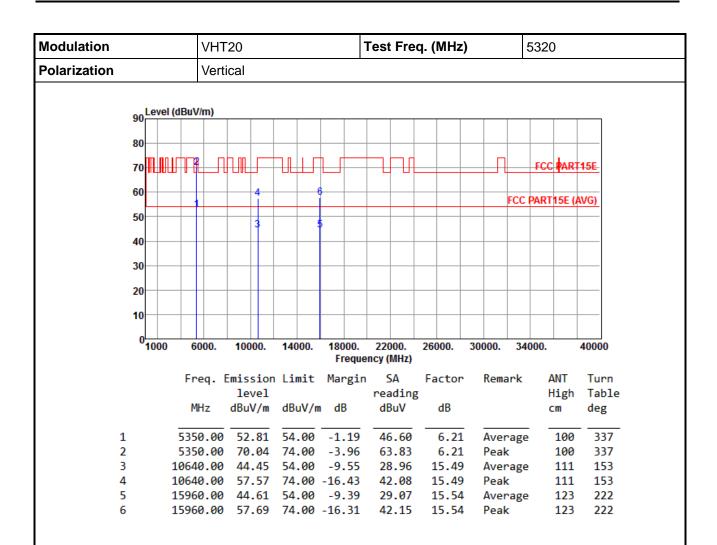


\*Factor includes antenna factor, cable loss and amplifier gain

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

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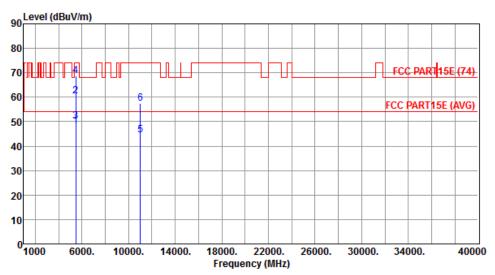
\*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation	VHT20	Test Freq. (MHz)	5500
Polarization	Horizontal		



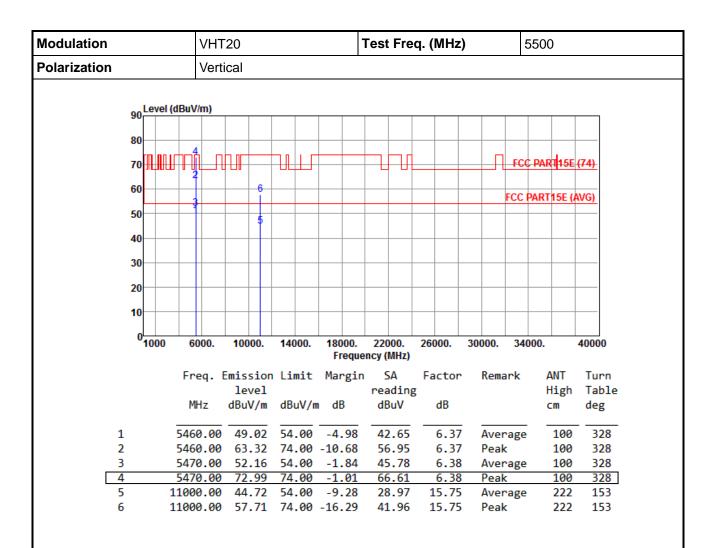
	Freq. MHz	Emission level dBuV/m			SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5460.00	48.02	54.00	-5.98	41.65	6.37	Average	220	216
2	5460.00	60.36	74.00	-13.64	53.99	6.37	Peak	220	216
3	5470.00	50.22	54.00	-3.78	43.84	6.38	Average	220	216
4	5470.00	68.67	74.00	-5.33	62.29	6.38	Peak	220	216
5	11000.00	44.42	54.00	-9.58	28.67	15.75	Average	194	183
6	11000.00	57.53	74.00	-16.47	41.78	15.75	Peak	194	183

\*Factor includes antenna factor, cable loss and amplifier gain

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

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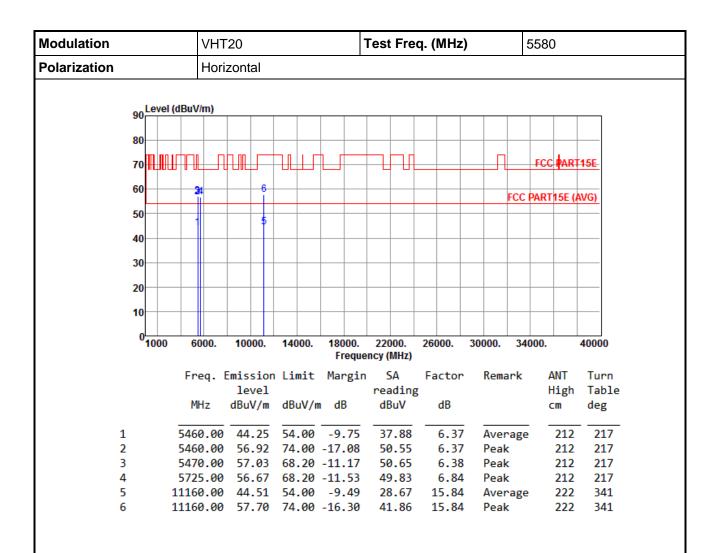


\*Factor includes antenna factor, cable loss and amplifier gain

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

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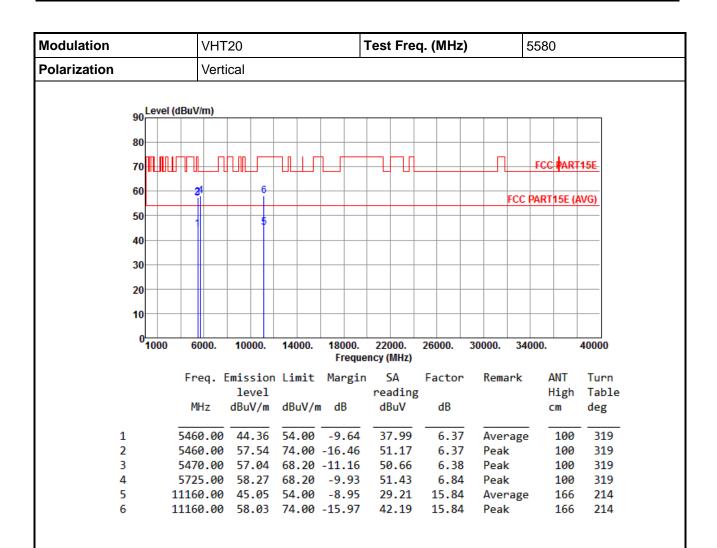


\*Factor includes antenna factor, cable loss and amplifier gain

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

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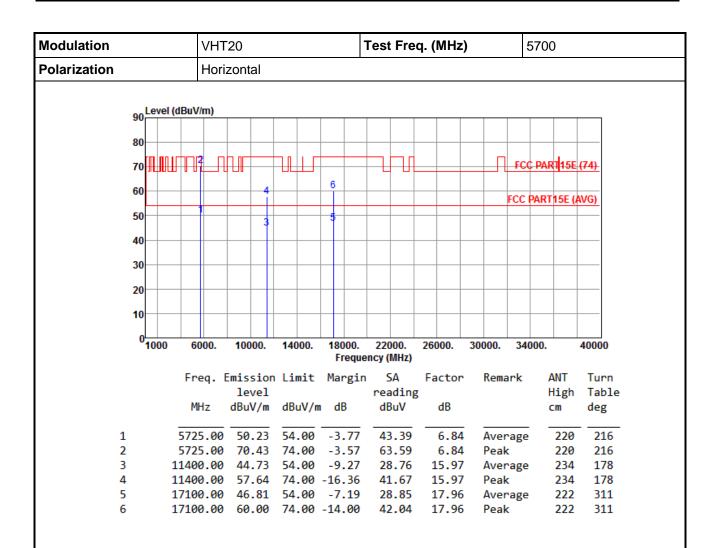


\*Factor includes antenna factor, cable loss and amplifier gain

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

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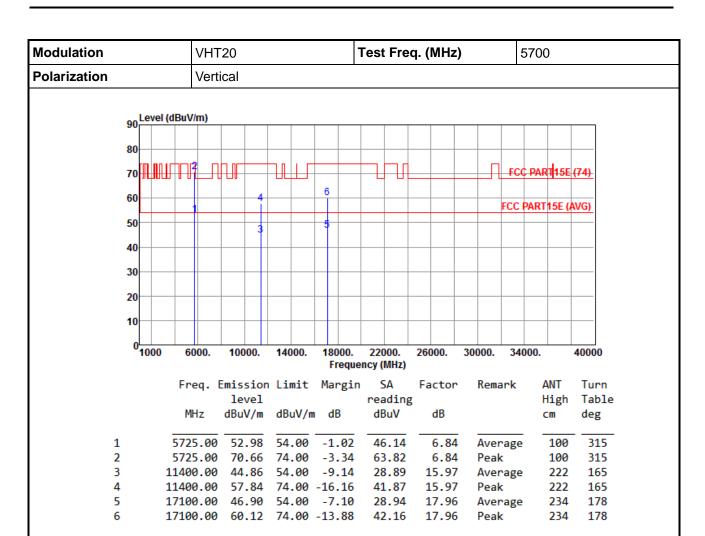


\*Factor includes antenna factor, cable loss and amplifier gain

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

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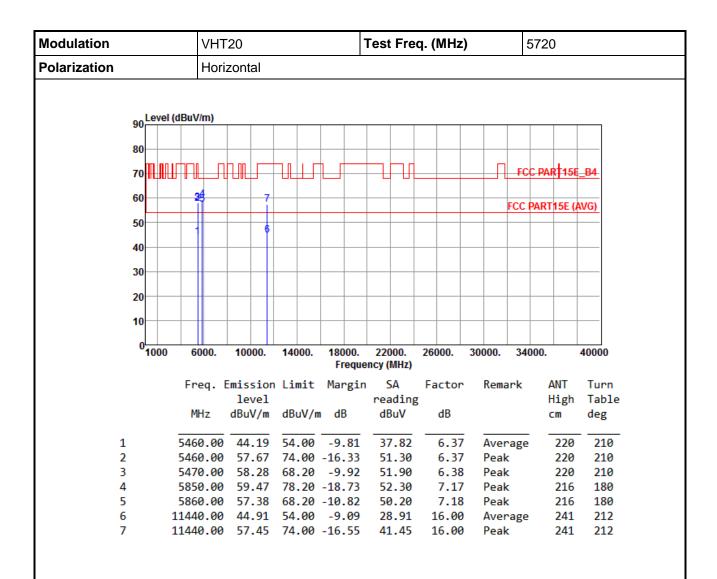


\*Factor includes antenna factor, cable loss and amplifier gain

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

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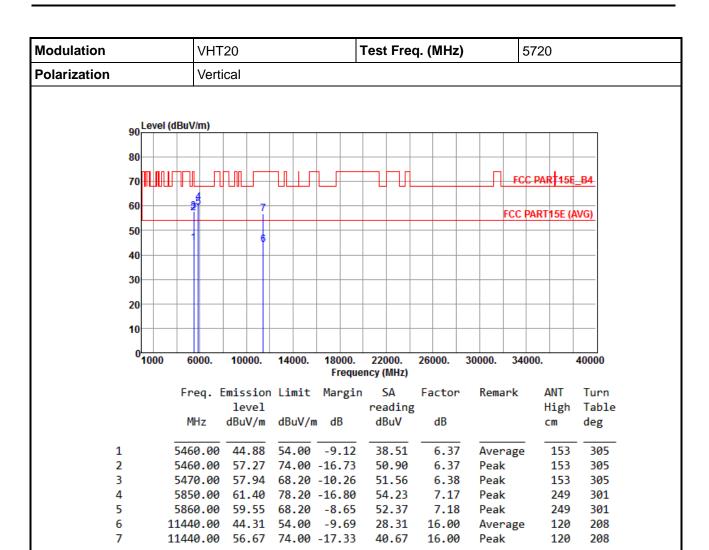


\*Factor includes antenna factor, cable loss and amplifier gain

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

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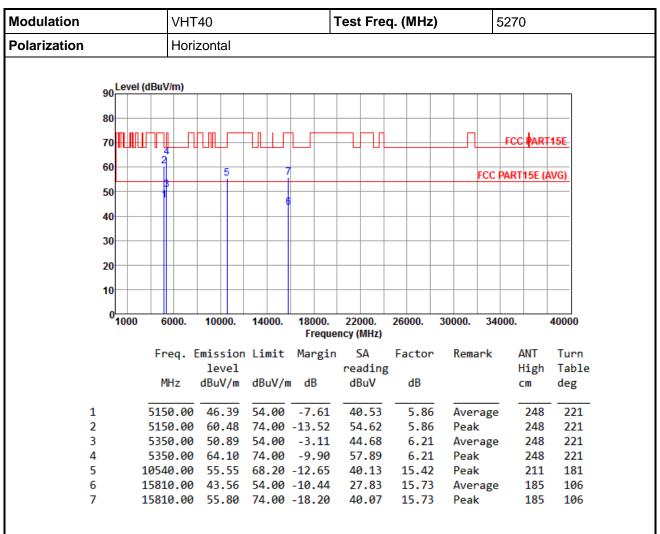
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



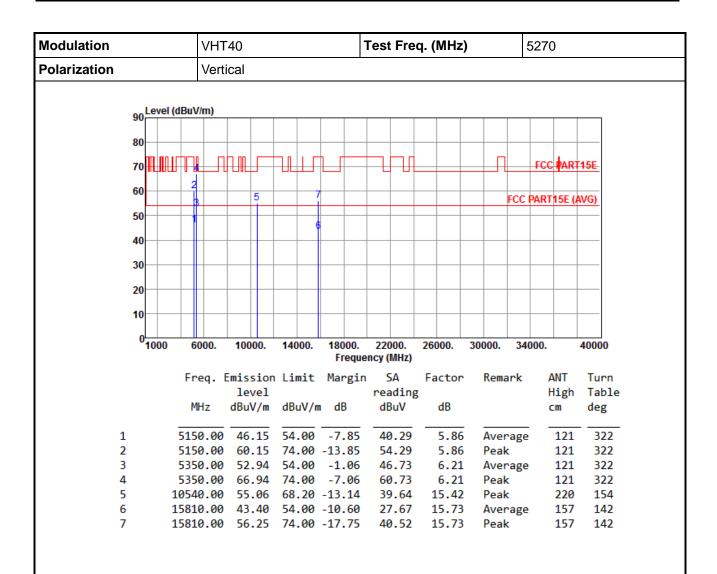
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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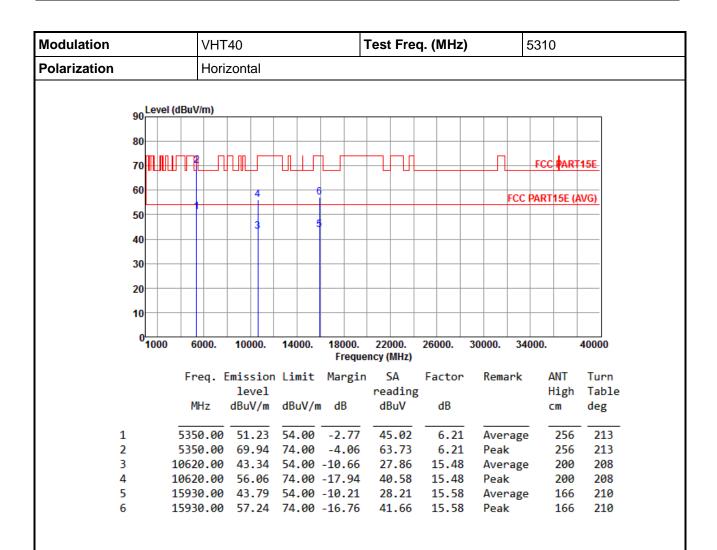


\*Factor includes antenna factor, cable loss and amplifier gain

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

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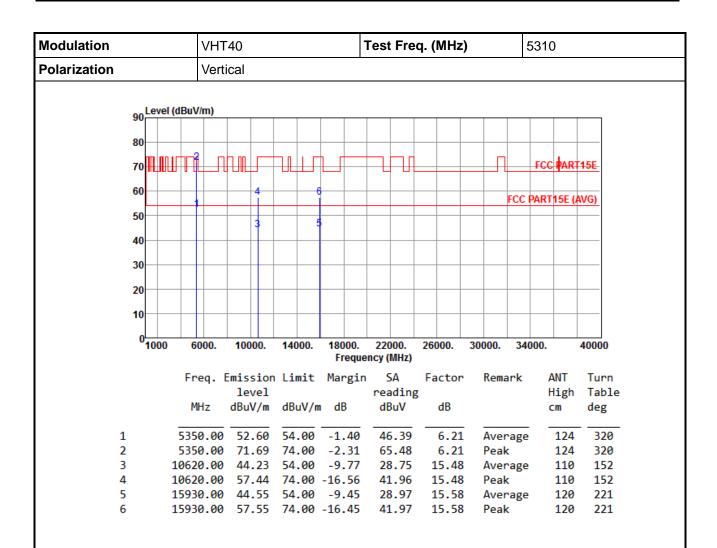


\*Factor includes antenna factor, cable loss and amplifier gain

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

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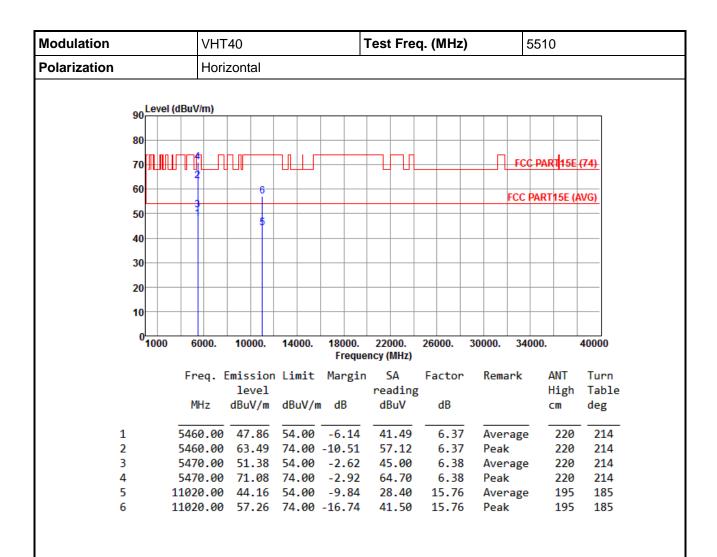


\*Factor includes antenna factor, cable loss and amplifier gain

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

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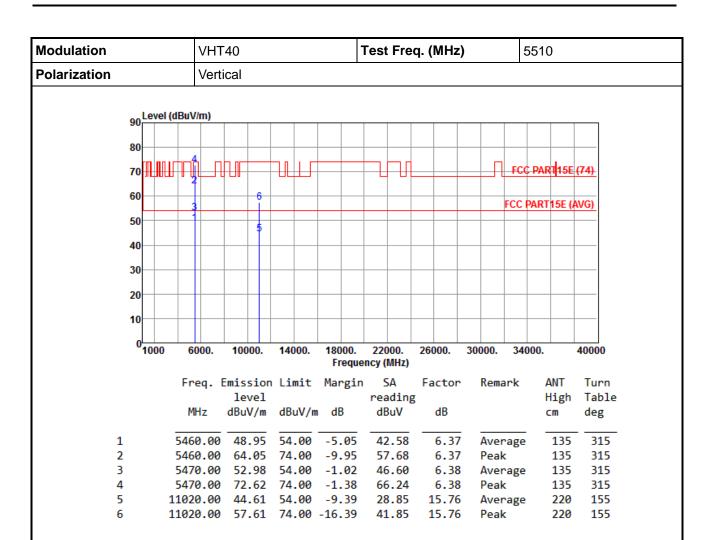


\*Factor includes antenna factor, cable loss and amplifier gain

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

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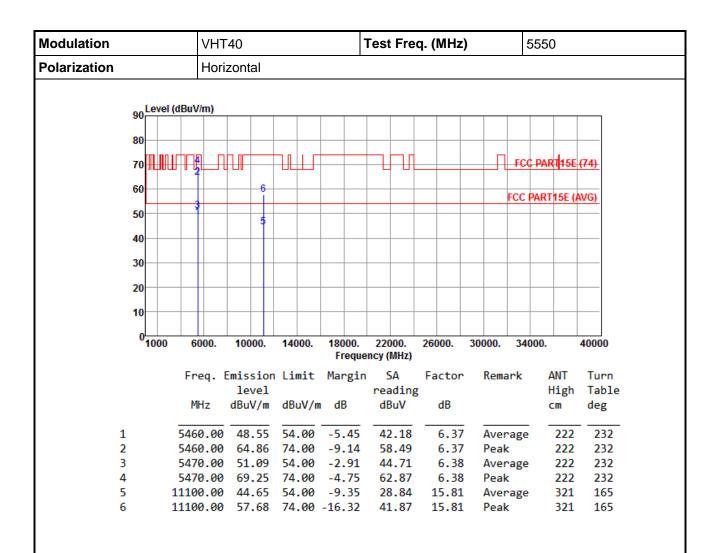


\*Factor includes antenna factor, cable loss and amplifier gain

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

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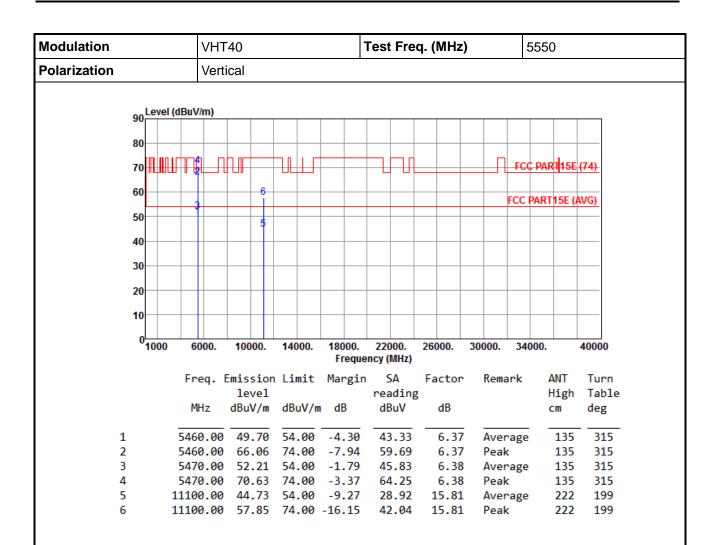


\*Factor includes antenna factor, cable loss and amplifier gain

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

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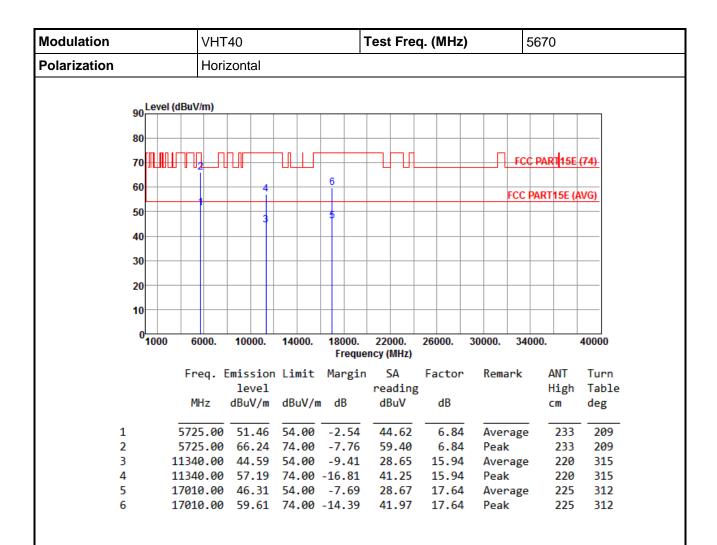


\*Factor includes antenna factor, cable loss and amplifier gain

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

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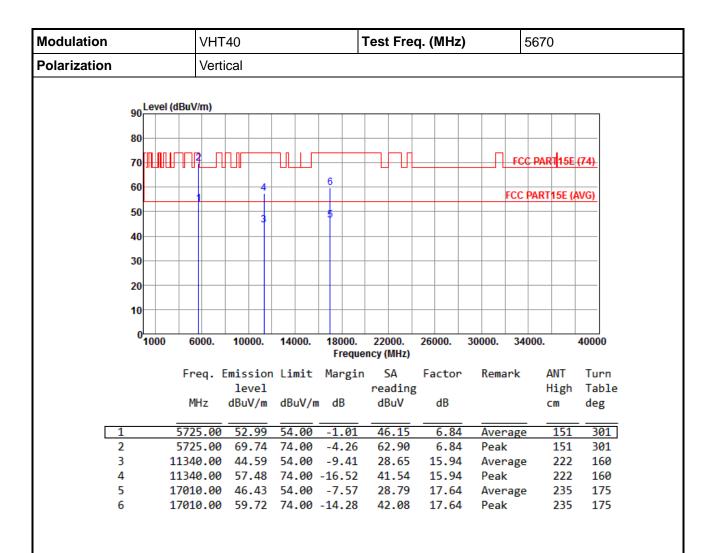


\*Factor includes antenna factor, cable loss and amplifier gain

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

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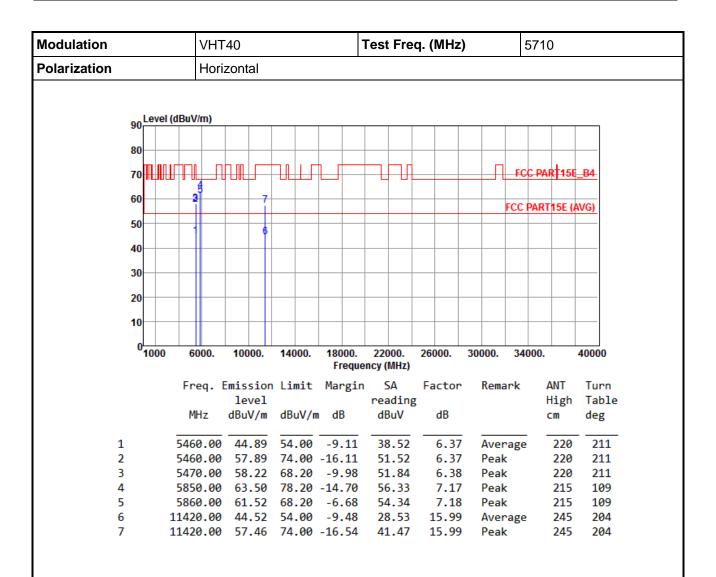


\*Factor includes antenna factor, cable loss and amplifier gain

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

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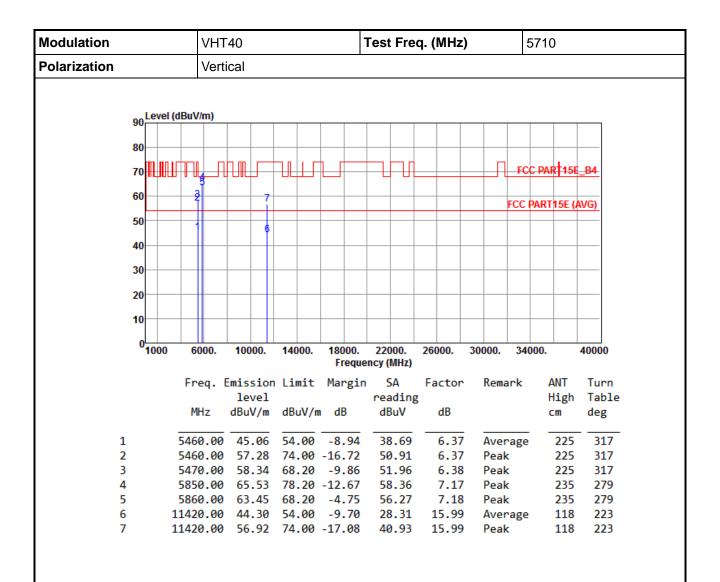


\*Factor includes antenna factor, cable loss and amplifier gain

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

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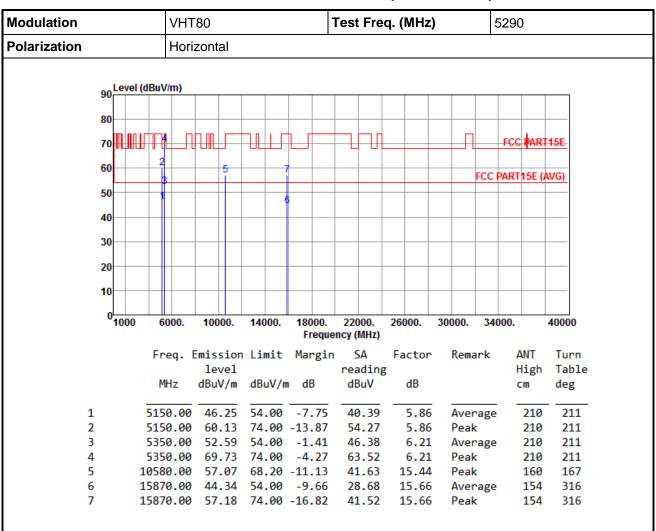
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



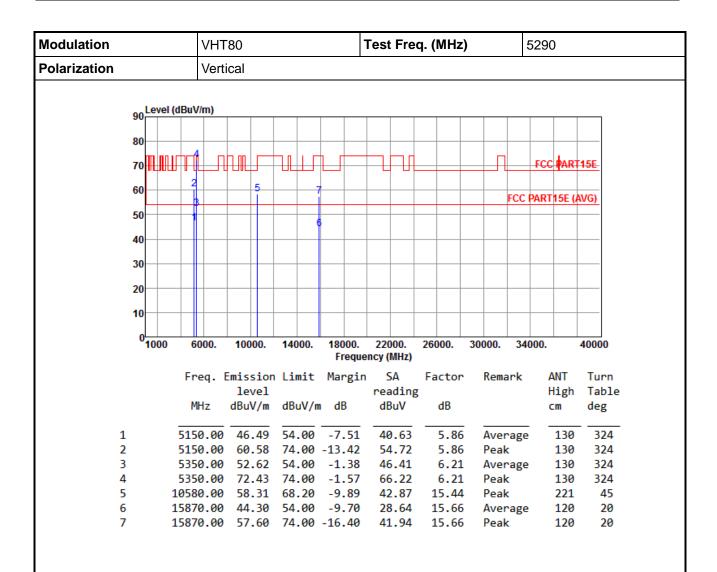
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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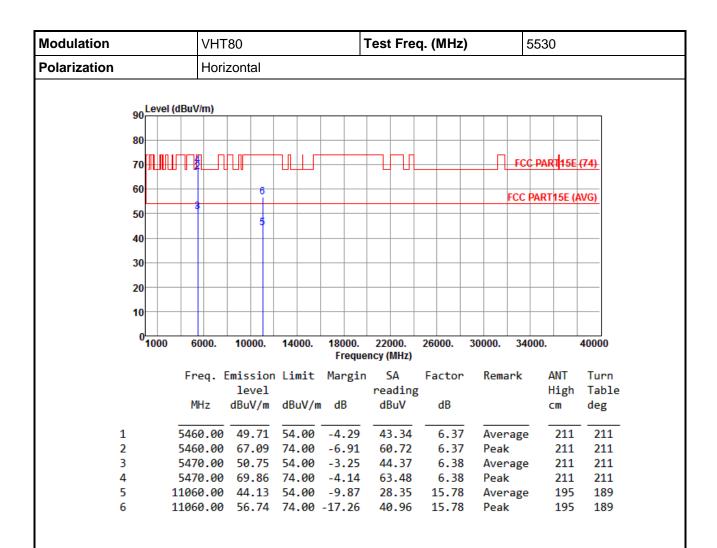


\*Factor includes antenna factor, cable loss and amplifier gain

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

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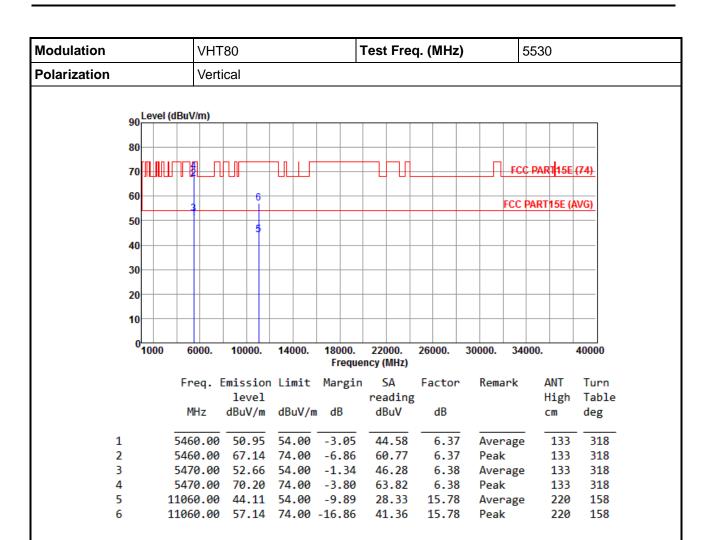


\*Factor includes antenna factor, cable loss and amplifier gain

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

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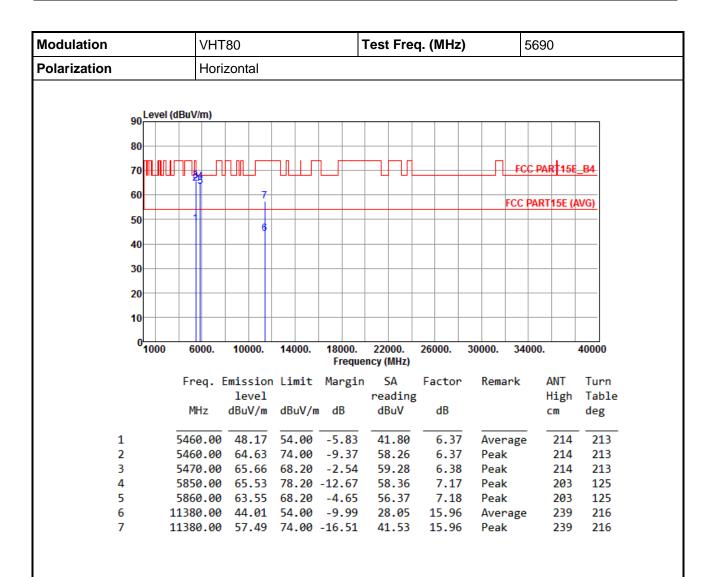


\*Factor includes antenna factor, cable loss and amplifier gain

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

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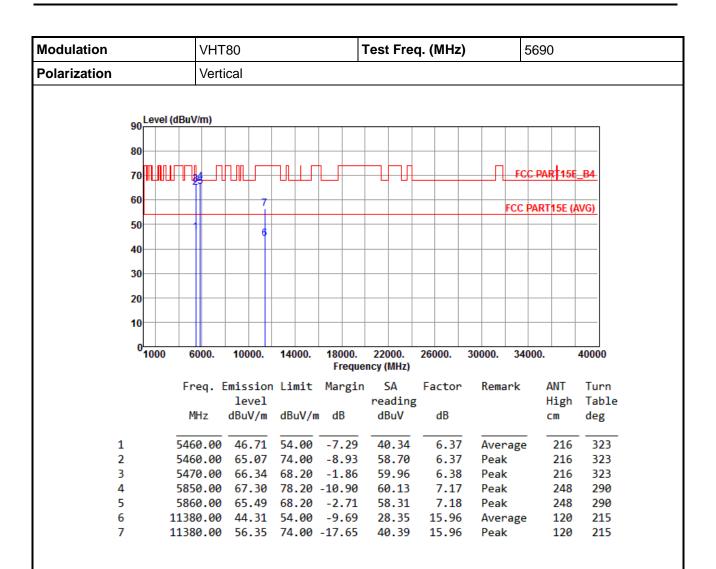


\*Factor includes antenna factor, cable loss and amplifier gain

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

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\*Factor includes antenna factor, cable loss and amplifier gain

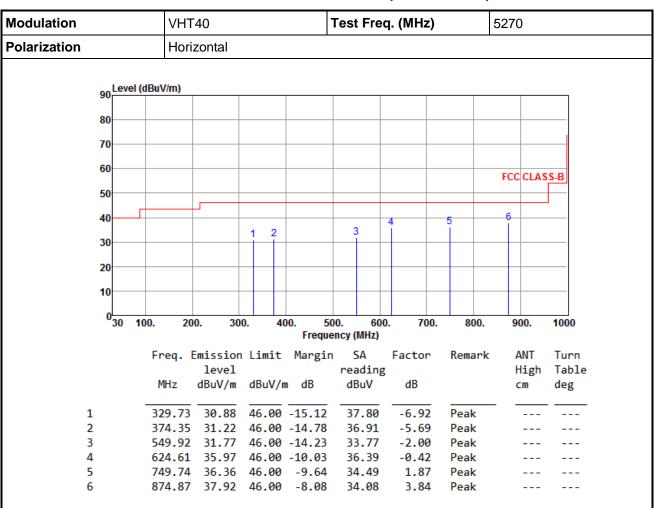
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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# Beamforming mode

#### 3.5.9 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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.

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Modulation Polarization			VHT	40		7	Test Fre	q. (MHz)	5270	5270		
			Vertical									
	90 Lev	vel (dBu	V/m)									
	80											
	70											
	60											
	00									FCC CLAS	SS-B	
	50										+	
	40									6		
	10								5	ì		
	30			2 3								
	20											
				1 1								
	10											
	030	100.	20	0. 30	0 4/	00. 50	0. 600	0. 700.	800.	900.	1000	
	30	100.	20	0. 30	U. 40		o. ood ncy (MHz)	u. 700.	800.	900.	1000	
		F	req. E	mission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
				level			reading			High	Table	
		ı	MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		cm	deg	
1		_	45.52	36.07	40.00	-3.93	43.98	-7.91	QP	100	289	
2			18.18			-19.46	37.33	-10.79	Peak			
3		30	01.60	27.86	46.00	-18.14	35.55	-7.69	Peak			
4			99.48			-8.40	40.51	-2.91	Peak			
5			49.74	33.76		-12.24	31.89	1.87	Peak			
6		8	/4.87	36.60	46.00	-9.40	32.76	3.84	Peak			

\*Factor includes antenna factor, cable loss and amplifier gain

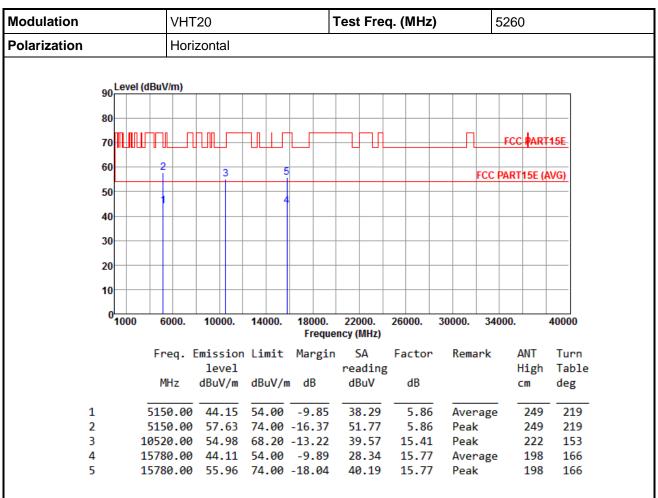
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

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## 3.5.10 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT20



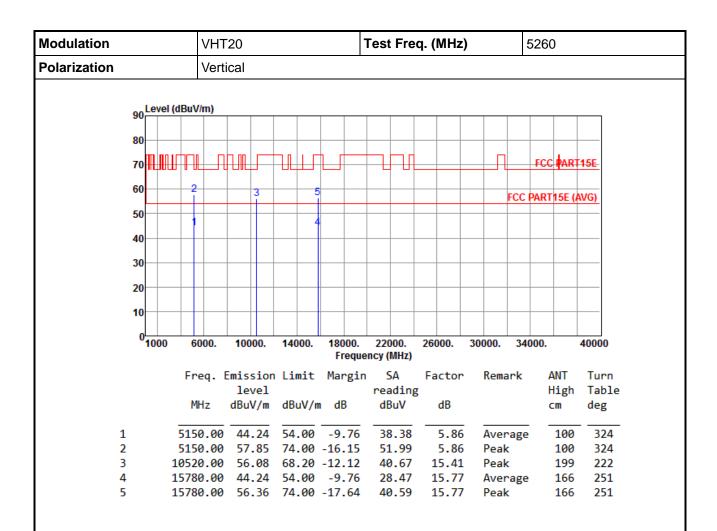
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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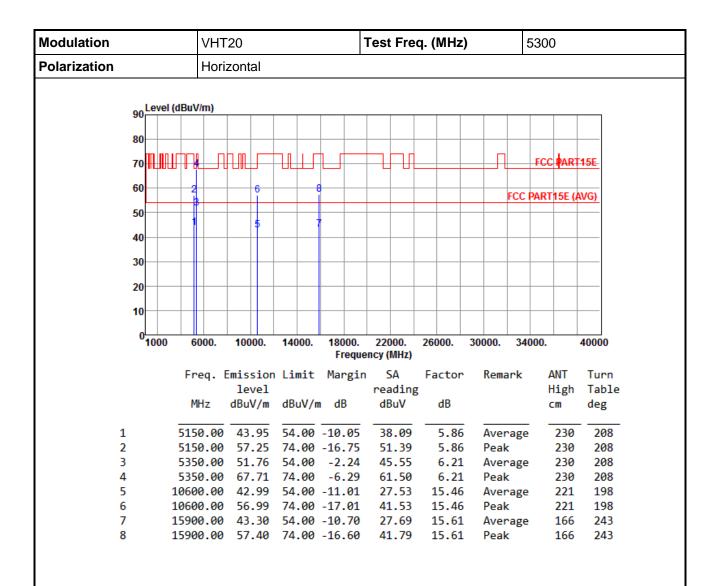


\*Factor includes antenna factor, cable loss and amplifier gain

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

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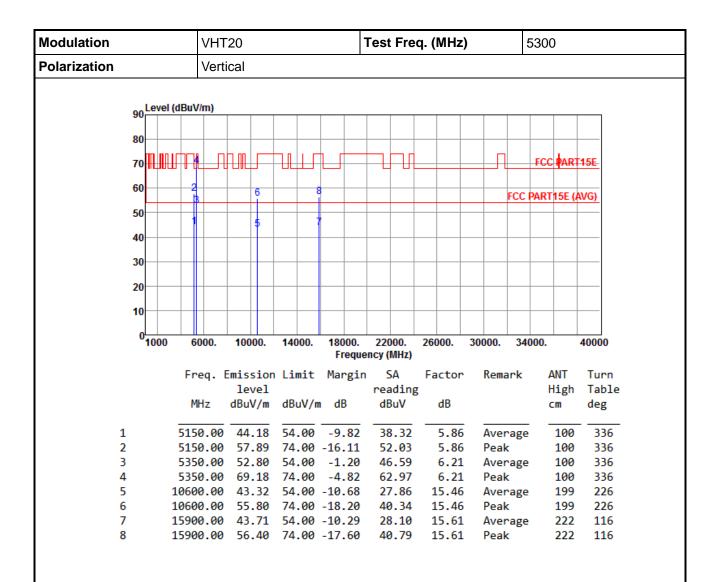


\*Factor includes antenna factor, cable loss and amplifier gain

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

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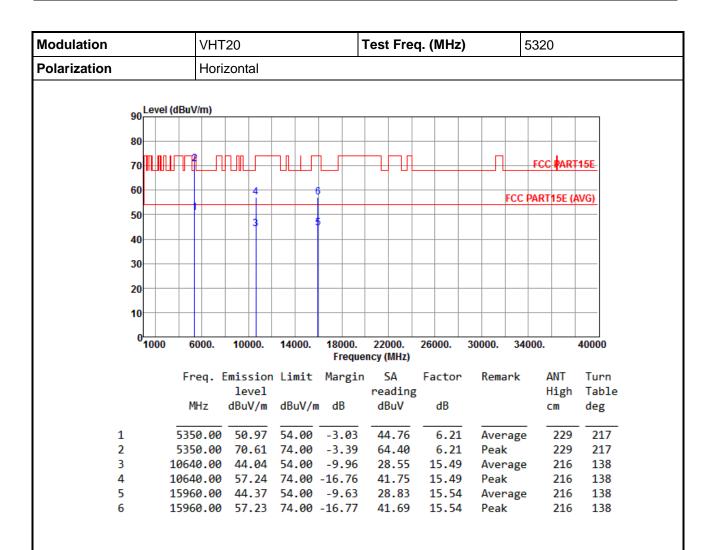


\*Factor includes antenna factor, cable loss and amplifier gain

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

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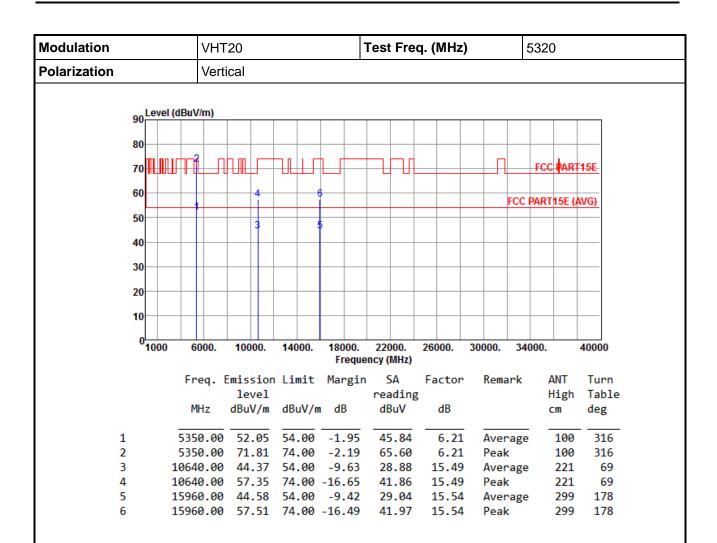


\*Factor includes antenna factor, cable loss and amplifier gain

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

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\*Factor includes antenna factor, cable loss and amplifier gain

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

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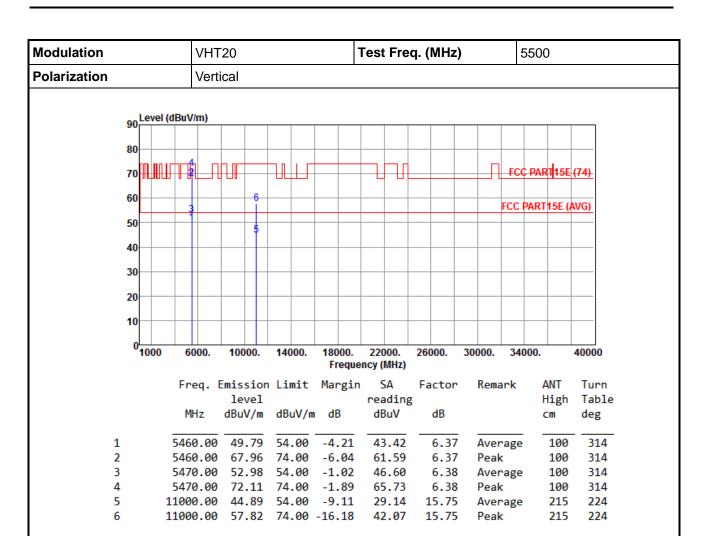
Modulation			VHT20					Test Fre	eq. (MH	5500	5500		
Polarization				Horizontal									
	90 Lev	el (dBu\	//m)	Τ									
	80												
	70										FCC PART	5E (74)	
	60				6						FCC PART15	E (AVG)	
	50				5							- (11 - 7	
	40												
	30												
	20												
	10												
	0 100	00 6	000.	100	00.	14000.	18000. Frequ	22000. ency (MHz)	26000.	30000.	34000.	40000	
		Fr	eq.		sior vel	Limit	Margi	n SA readin		r Rema		Turn gh Table	
		M	1⊔-	dBu	1/m	dRuV/m	AB.					doa	

		level			reading			High	Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	5460.00	50.66	54.00	-3.34	44.29	6.37	Average	212	208
2	5460.00				59.68	6.37	Peak	212	208
3	5470.00	51.67	54.00	-2.33	45.29	6.38	Average	212	208
4	5470.00	70.32	74.00	-3.68	63.94	6.38	Peak	212	208
5	11000.00	44.39	54.00	-9.61	28.64	15.75	Average	216	143
6	11000.00	57.46	74.00	-16.54	41.71	15.75	Peak	216	143

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

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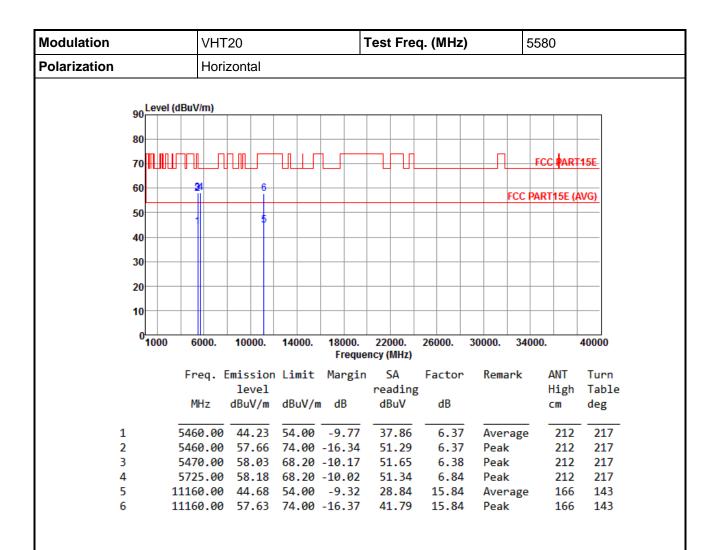


\*Factor includes antenna factor, cable loss and amplifier gain

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

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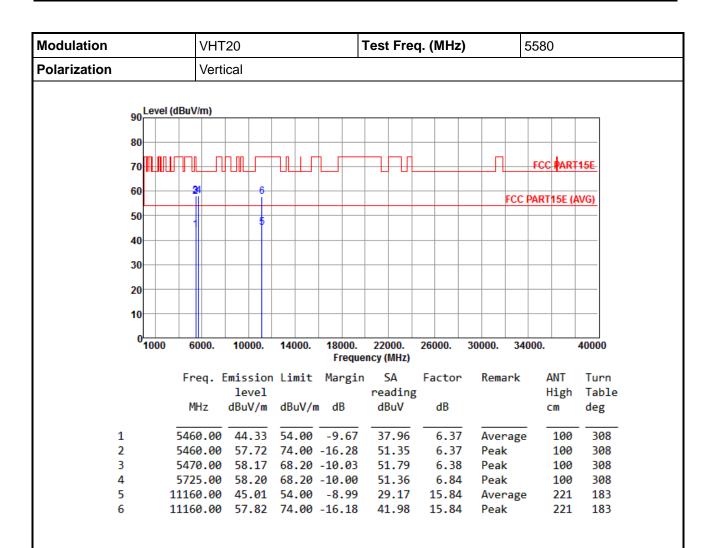


\*Factor includes antenna factor, cable loss and amplifier gain

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

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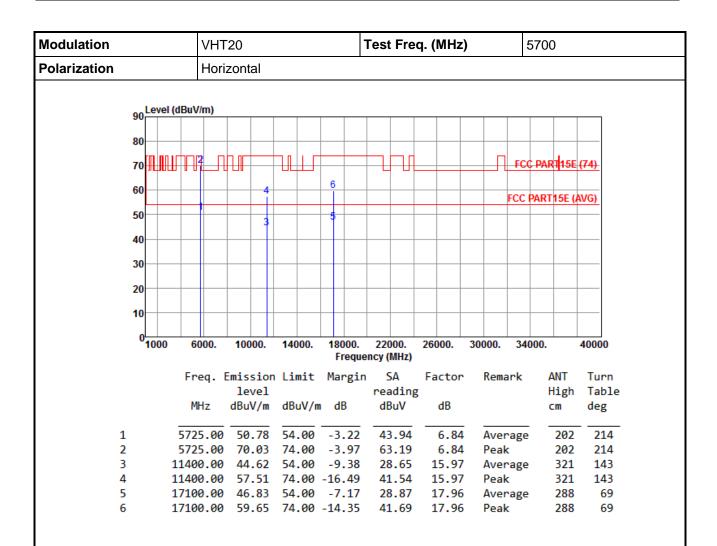


\*Factor includes antenna factor, cable loss and amplifier gain

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

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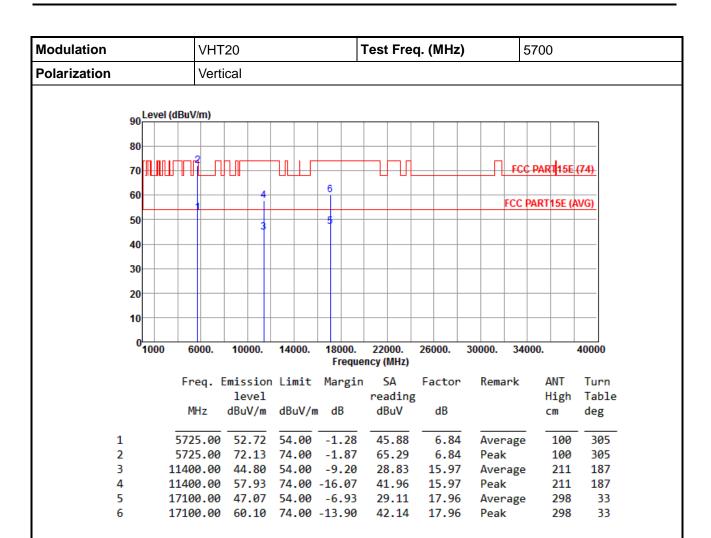


\*Factor includes antenna factor, cable loss and amplifier gain

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

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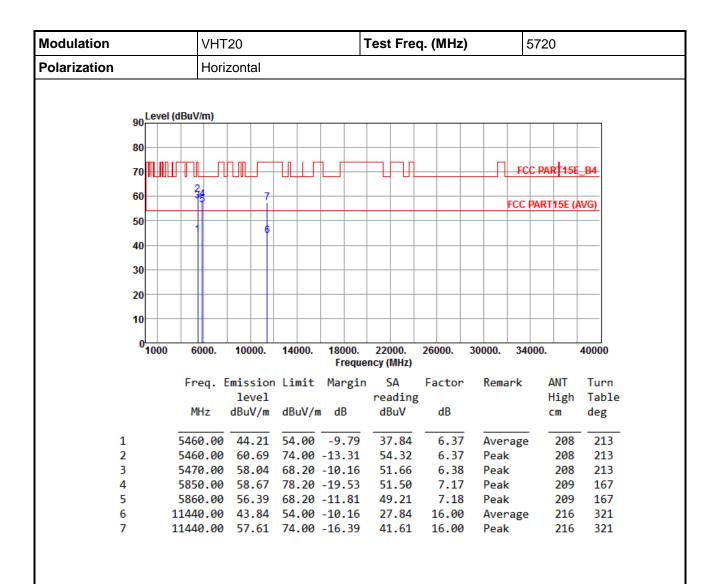


\*Factor includes antenna factor, cable loss and amplifier gain

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

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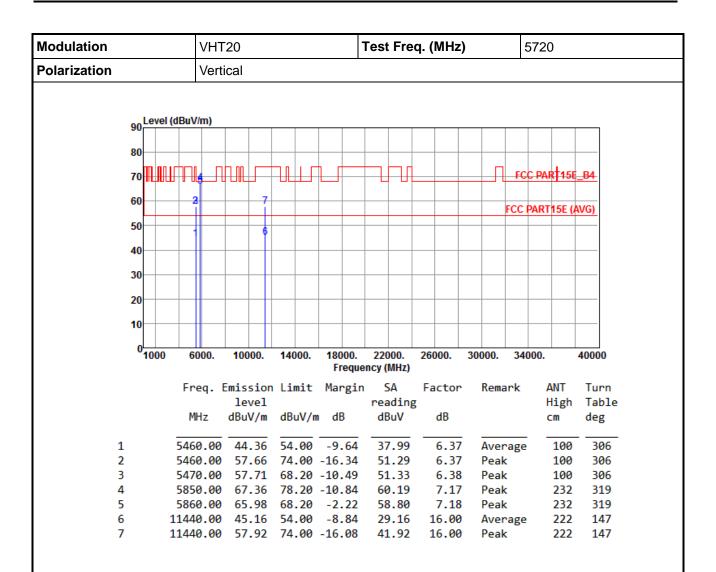


\*Factor includes antenna factor, cable loss and amplifier gain

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

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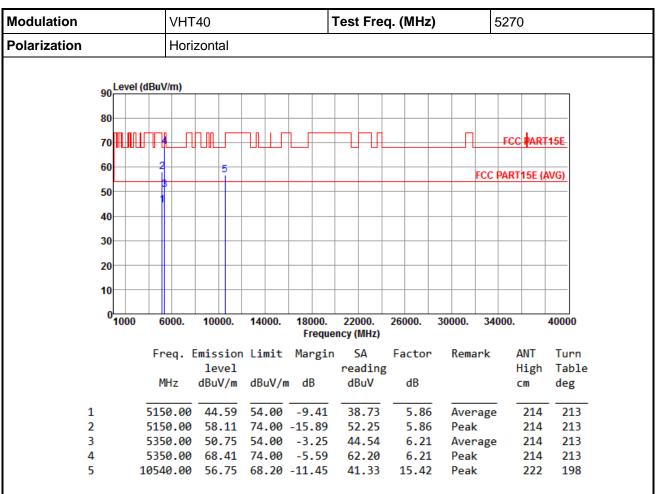
\*Factor includes antenna factor, cable loss and amplifier gain

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

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### 3.5.11 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT40



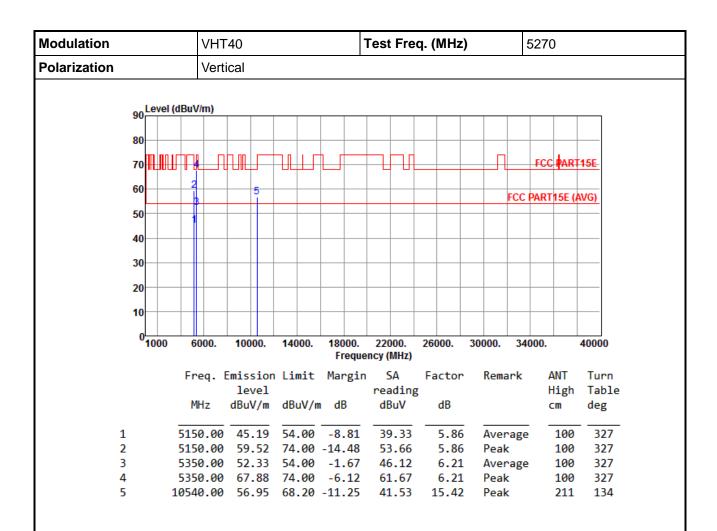
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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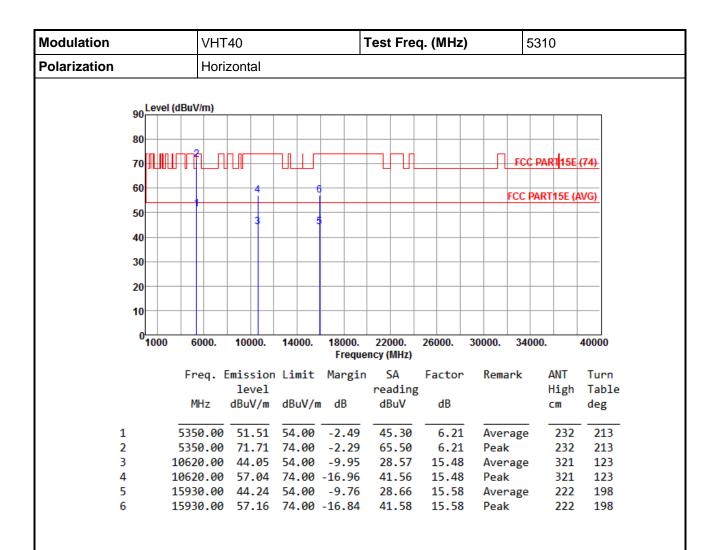


\*Factor includes antenna factor, cable loss and amplifier gain

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

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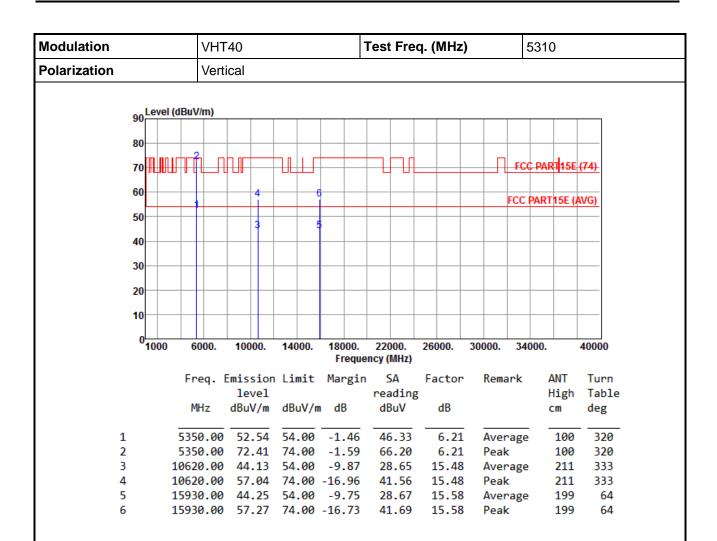


\*Factor includes antenna factor, cable loss and amplifier gain

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

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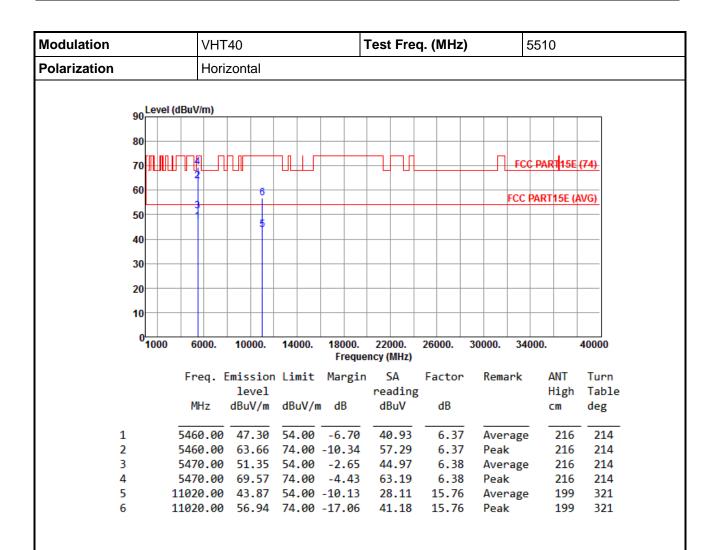


\*Factor includes antenna factor, cable loss and amplifier gain

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

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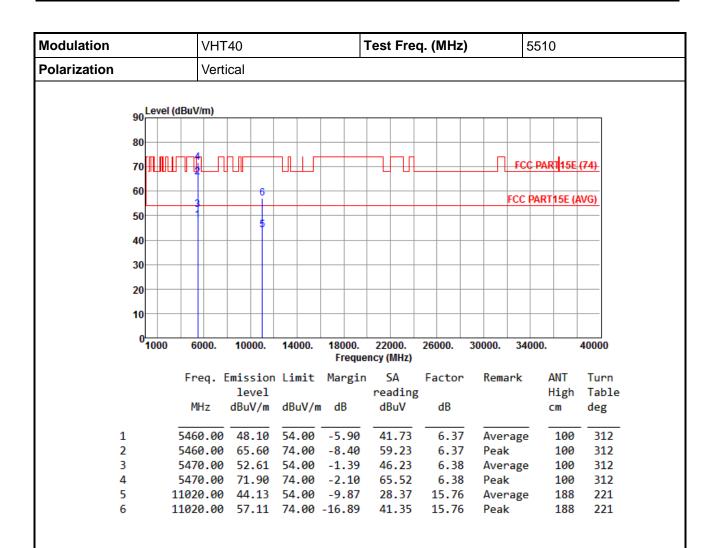


\*Factor includes antenna factor, cable loss and amplifier gain

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

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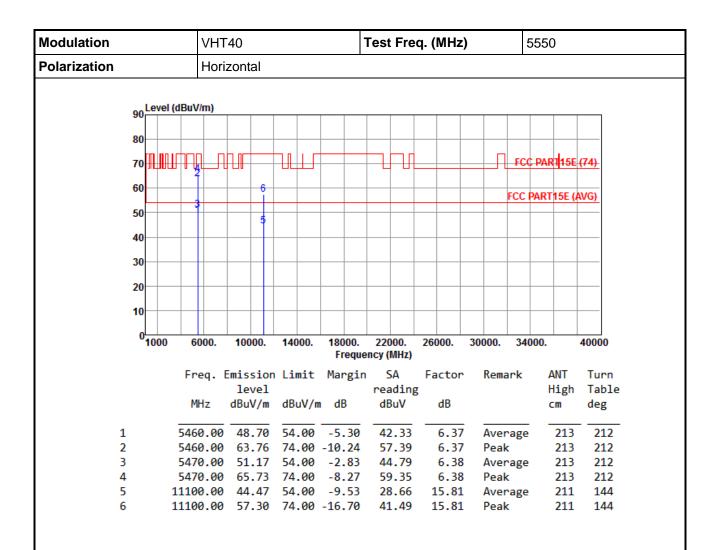


\*Factor includes antenna factor, cable loss and amplifier gain

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

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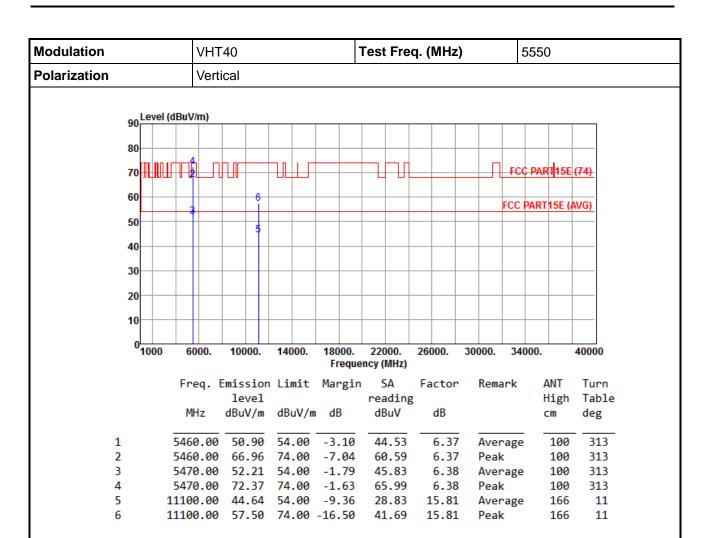


\*Factor includes antenna factor, cable loss and amplifier gain

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

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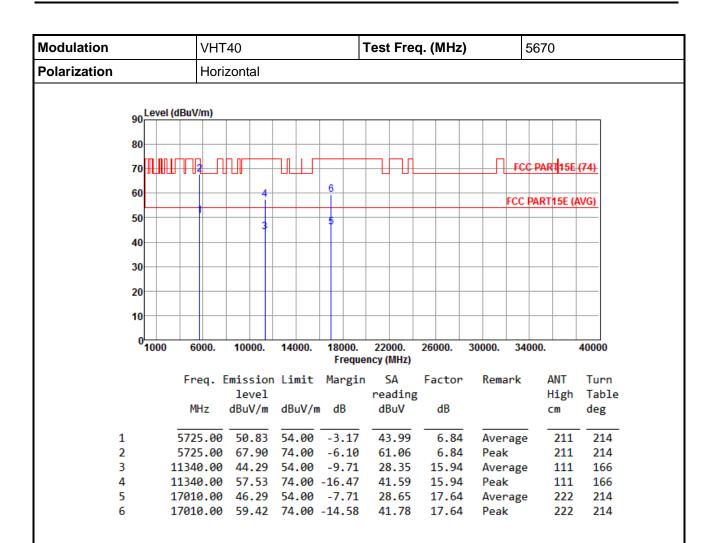


\*Factor includes antenna factor, cable loss and amplifier gain

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

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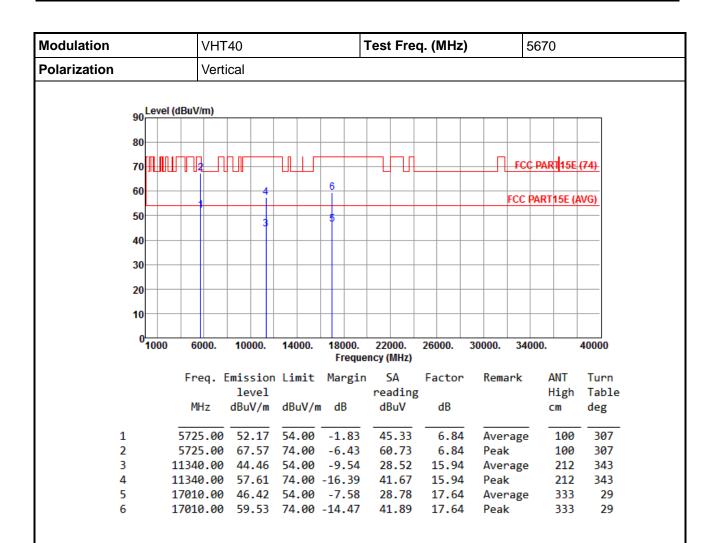


\*Factor includes antenna factor, cable loss and amplifier gain

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

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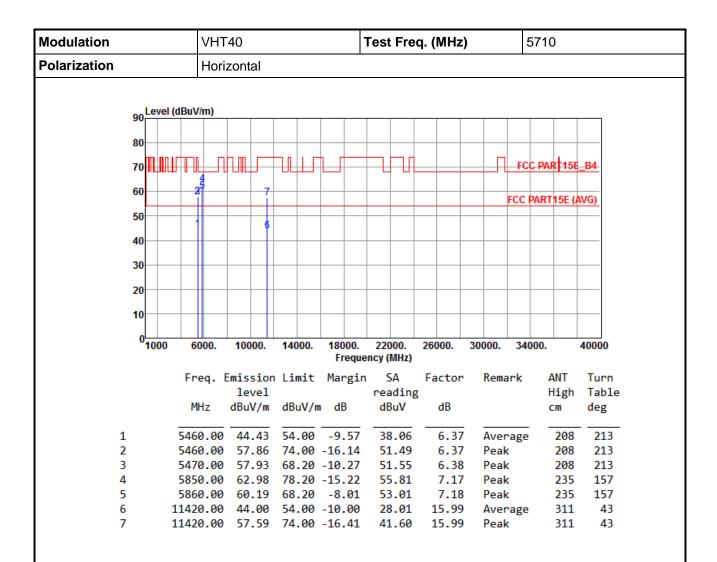


\*Factor includes antenna factor, cable loss and amplifier gain

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

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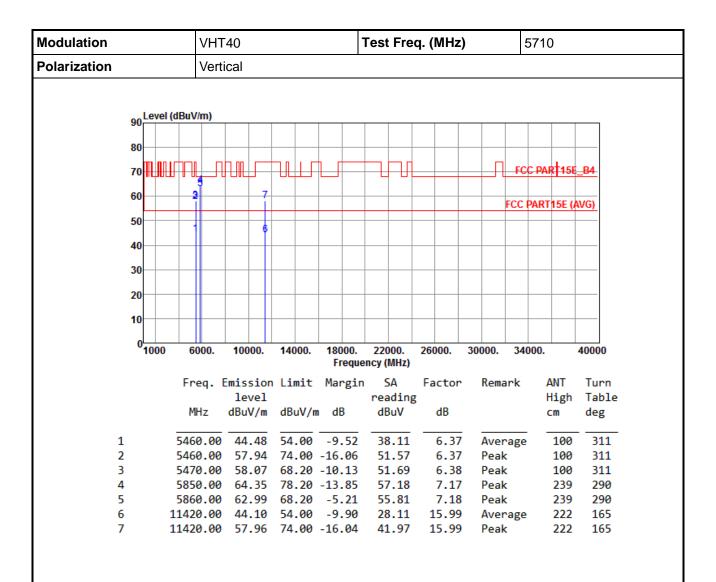


\*Factor includes antenna factor, cable loss and amplifier gain

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

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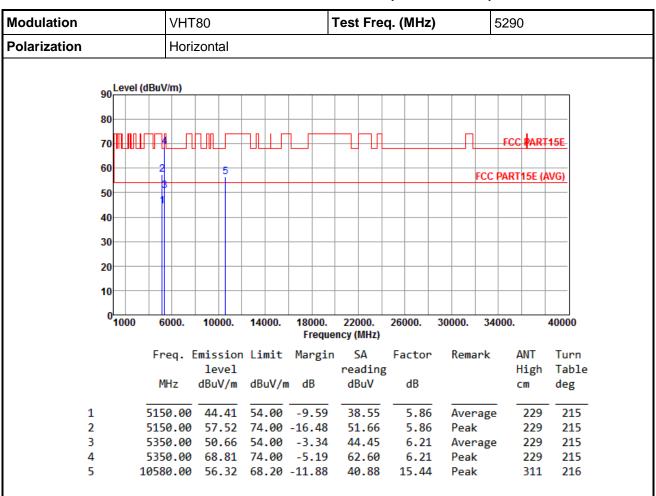
\*Factor includes antenna factor, cable loss and amplifier gain

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

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## 3.5.12 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80



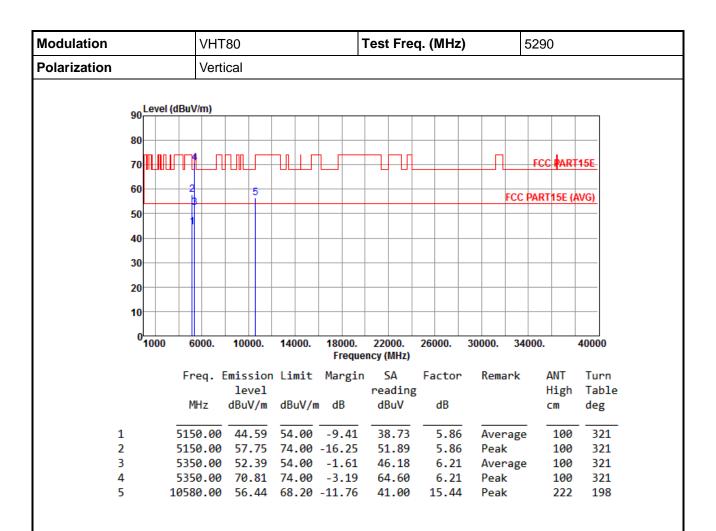
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

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

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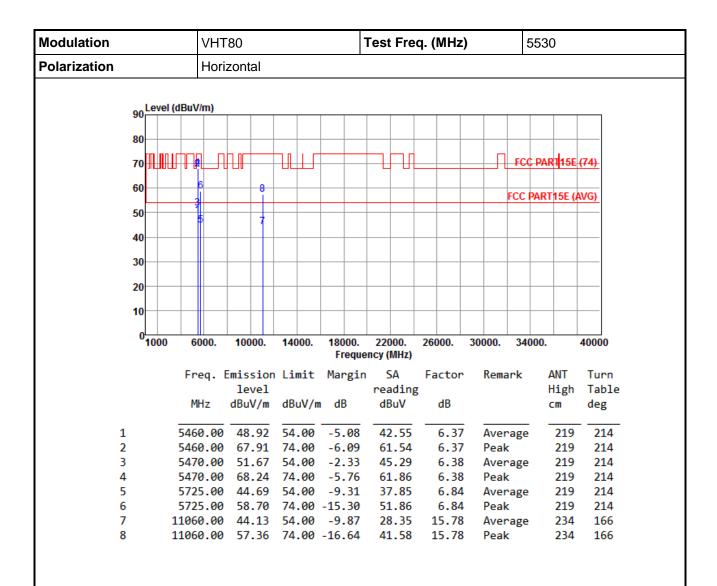


\*Factor includes antenna factor, cable loss and amplifier gain

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

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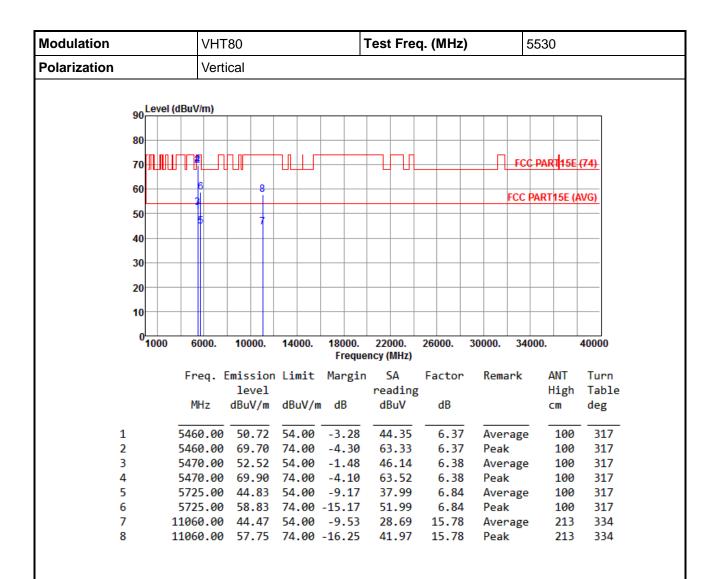


\*Factor includes antenna factor, cable loss and amplifier gain

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

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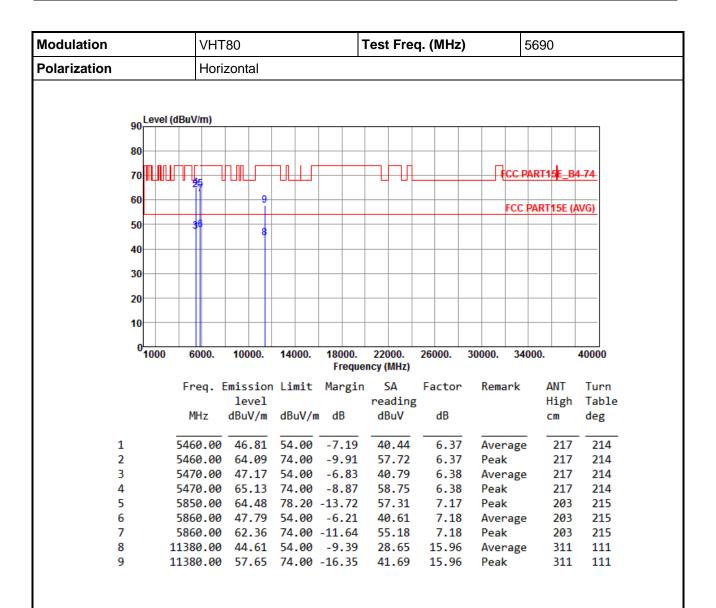


\*Factor includes antenna factor, cable loss and amplifier gain

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

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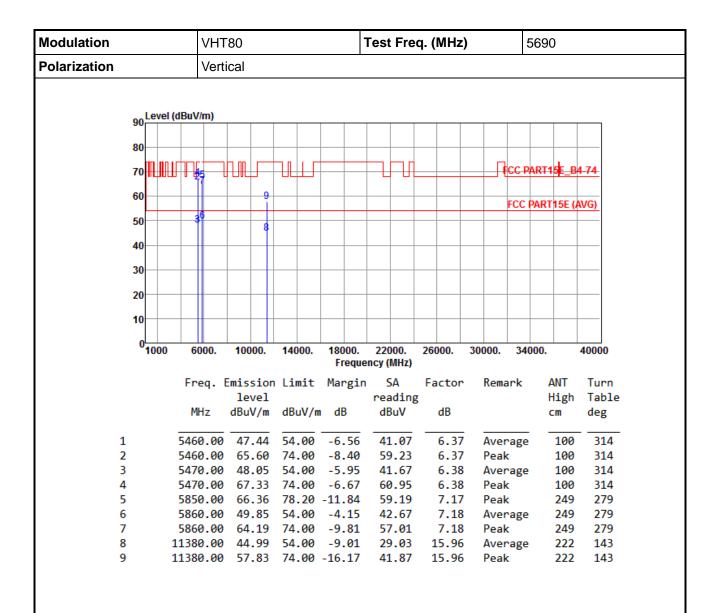


\*Factor includes antenna factor, cable loss and amplifier gain

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

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\*Factor includes antenna factor, cable loss and amplifier gain

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

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# 3.6 Frequency Stability

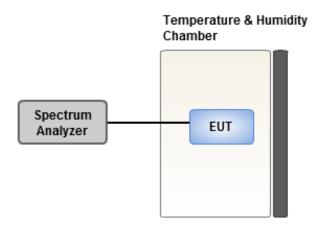
### 3.6.1 Limit of Frequency Stability

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.
- 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



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# 3.6.4 Test Result of Frequency Stability

Frequency: 5320 MHz	Frequency Drift (ppm)				
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes	
T20°CVmax	0.85	0.75	0.87	1.23	
T20°CVmin	-0.25	0.07	0.34	-0.21	
T50°CVnom	2.92	3.18	2.85	3.01	
T40°CVnom	1.29	1.25	1.49	1.74	
T30°CVnom	2.40	3.14	2.20	2.34	
T20°CVnom	3.93	4.03	3.90	4.19	
T10°CVnom	3.45	3.36	3.80	3.68	
T0°CVnom	4.27	4.84	4.66	3.95	
T-10°CVnom	1.98	2.03	2.34	2.09	
T-20°CVnom	1.83	1.99	2.43	1.68	
T-30°CVnom	1.62	1.92	1.74	1.90	
Vnom [Vac]: 120		max [Vac]: 138	Vmin [Vac]:	Vmin [Vac]: 102	
Tnom [°C]: 20 Tn		max [°C]: 50	Tmin [°C]: -3	Tmin [°C]: -30	

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# 4 Test laboratory information

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

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

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

#### 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 District, Tao Yuan City 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 District, Tao Yuan City 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

<u>==END</u>==

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