

# **FCC C2PC Test Report**

FCC ID : UIDSBR-AC1200P

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

Technology

: SBR-AC1200P Model No.

**Brand Name** : ARRIS

**Applicant** : ARRIS Group, Inc.

: 3871 Lakefield Drive, Suite 300, Suwanee, **Address** 

Georgia 30024, United States

**Standard** : 47 CFR FCC Part 15.407

**Received Date** : May 25, 2016

: May 30 ~ Jun. 20, 2016 **Tested Date** 

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 Cherl Assistant Manager Gary Chang / Manager Testing Laboratory

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## **Release Record**

Report No.	Version	Description	Issued Date
FR592203-02AN	Rev. 01	Initial issue	Oct. 07, 2016

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## **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.240MHz 42.16 (Margin -9.92dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5350.00MHz 52.97 (Margin -1.03dB) - AV [dBuV/m at 3m]: 5470.00MHz 72.97 (Margin -1.03dB) - PK	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: 23.90 5470~5725MHz: 23.93  Beamforming mode 5250~5350MHz: 23.55 5470~5725MHz: 23.52	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>TX</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.

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.

#### 1.1.2 Antenna Details

Ant. No.	Model	Tyro	Connector	Antenna (	a Gain (dBi)	
Ant. No.	Wiodei	Туре	Connector	5250~5350 MHz 5470~5725	5470~5725 MHz	
1	617210JP	PIFA	I-pex	2.87	3.2	
2	617210K2	PIFA	I-pex	3.23	3.54	

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

I POWAR SIINNIV I VNA	100-240Vac, 50-60Hz, 1.0A Power line: 1.5m non-shielded without core
	1 ower line. 1.5m flori siliciaca without core

#### 1.1.4 Accessories

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

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### 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					
		Non-beamforming		Beamforming		
	Mode	Duty cycle (%)	Duty factor (dB)	98.68% 0.06	Duty factor (dB)	
	11a	99.31%	0.03			
Duty Cycle and Duty Footor	HT20	99.26%	0.03	98.68%	0.06	
Duty Cycle and Duty Factor	HT40	98.23%	0.08	98.47%	0.07	
	VHT20	99.26%	0.03	98.68%	0.06	
	VHT40	98.23%	0.08	98.47%	0.07	
	VHT80	99.36%	0.03	98.62%	0.06	

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## 1.1.7 Power Setting

For Frequency band 5250~5350 MHz					
Modulation Mode	Test Frequency (MHz)	Powe	r Set		
Wiodulation Wiode	rest Frequency (winz)	Non-Beamforming	Beamforming		
11a	5260	82			
11a	5300	82			
11a	5320	82			
HT20	5260	82	82		
HT20	5300	82	82		
HT20	5320	78	78		
HT40	5270	85	84		
HT40	5310	73	70		
VHT20	5260	82	82		
VHT20	5300	82	82		
VHT20	5320	78	78		
VHT40	5270	85	84		
VHT40	5310	73	70		
VHT80	5290	67	68		

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For Frequency band 5470~5725 MHz					
Modulation Mode	Test Frequency (MHz)	Powe	r Set		
Woddiation Wode	rest Frequency (Minz)	Non-Beamforming	Beamforming		
11a	5500	80			
11a	5580	82			
11a	5700	72			
HT20	5500	78	78		
HT20	5580	82	78		
HT20	5700	70	70		
HT40	5510	70	70		
HT40	5550	85	84		
HT40	5670	79	74		
VHT20	5500	78	78		
VHT20	5580	82	78		
VHT20	5700	70	70		
VHT40	5510	70	70		
VHT40	5550	85	84		
VHT40	5670	79	74		
VHT80	5530	66	66		

### Channel that extends across the 5.725 GHz boundary

For Frequency band 5470~5725 MHz						
Modulation Mode	Test Frequency (MHz)	Tost Fraguency (MHz)	r Set			
Woddiation Wode		Non-Beamforming	Beamforming			
11a	5720	82				
HT20	5720	83	78			
HT40	5710	85	84			
VHT20	5720	83	78			
VHT40	5710	85	84			
VHT80	5690	83	81			

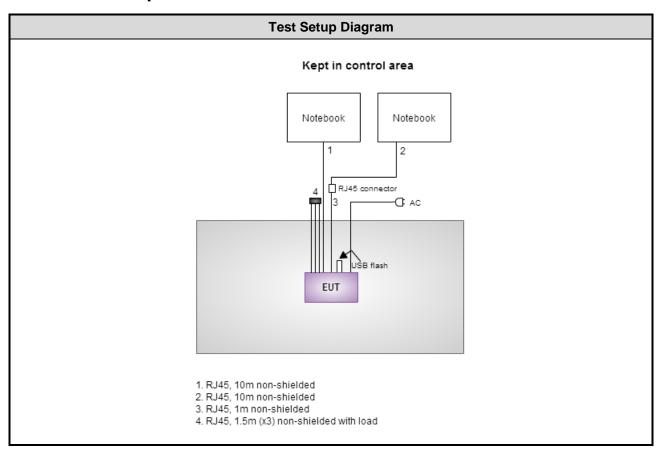
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## 1.2 Local Support Equipment List

	Support Equipment List											
No.	lo. Equipment Brand Model FCC ID Signal cable / Lengtl											
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.							
2	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.							
3	USB 2.0 flash	Kingston	DTSE9									
4	Load	ICC			RJ45, 1.5m non-shielded x3.							

## 1.3 Test Setup Chart



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## 1.4 The Equipment List

Test Item	Conducted Emission	Conducted Emission									
Test Site	Conduction room 1 /	Conduction room 1 / (CO01-WS)									
Instrument	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	Radiated Emission								
Test Site	966 chamber 2 / (03C	966 chamber 2 / (03CH02-WS)								
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibrat									
Spectrum Analyzer	R&S	FSV40	101499	Dec. 17, 2015	Dec. 16, 2016					
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017					
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Nov. 09, 2015	Nov. 08, 2016					
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 07, 2015	Oct. 06, 2016					
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016					
Preamplifier	Burgeon	BPA-530	100218	Nov. 03, 2015	Nov. 02, 2016					
Preamplifier	Agilent	83017A	MY39501309	Sep. 22, 2015	Sep. 21, 2016					
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 10, 2015	Dec. 09, 2016					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 10, 2015	Dec. 09, 2016					
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 10, 2015	Dec. 09, 2016					
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 10, 2015	Dec. 09, 2016					
LF cable 10M	EMCC	CFD400-E	CFD400-001	Dec. 10, 2015	Dec. 09, 2016					
Measurement Software	AUDIX	e3	6.120210g	NA	NA					
Note: Calibration Inter	rval of instruments liste	d above is one year.								

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RF Conducted				
(TH01-WS)				
Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 2017
GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
APC	AFC-500W	F312060012	Oct. 26, 2015	Oct. 25, 2016
Sporton	Sporton_1	1.3.30	NA	NA
	(TH01-WS)  Manufacturer  R&S  GIANT FORCE  Anritsu  Anritsu  APC	(TH01-WS)  Manufacturer Model No.  R&S FSV40  GIANT FORCE GCT-225-40-SP-SD  Anritsu ML2495A  Anritsu MA2411B  APC AFC-500W	Manufacturer         Model No.         Serial No.           R&S         FSV40         101063           GIANT FORCE         GCT-225-40-SP-SD         MAF1212-002           Anritsu         ML2495A         1241002           Anritsu         MA2411B         1207366           APC         AFC-500W         F312060012	(TH01-WS)         Manufacturer         Model No.         Serial No.         Calibration Date           R&S         FSV40         101063         Feb. 17, 2016           GIANT FORCE         GCT-225-40-SP-SD         MAF1212-002         Nov. 27, 2015           Anritsu         ML2495A         1241002         Sep. 21, 2015           Anritsu         MA2411B         1207366         Sep. 21, 2015           APC         AFC-500W         F312060012         Oct. 26, 2015

## 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	±3.87 dB					
Radiated emission > 1GHz	±5.60 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	03CH02-WS	21-23°C / 64-68%	Felix Sung Anderson Hung
RF Conducted	TH01-WS	22°C / 64%	Alex Huang

FCC site registration No.: 181692IC site registration No.: 10807A-2

### 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 Configuration						
Conducted Emissions	VHT40	5550	MCS 0							
Radiated Emissions ≤1GHz	VHT40	5550	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							
Frequency Stability	Un-modulation	5320								

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### Beamforming mode

For F	For Frequency band 5250-5350 MHz, 5470-5725 MHz										
Test item	Modulation Mode			Test Configuration							
Conducted Emissions	VHT40	5550	MCS 0								
Radiated Emissions ≤1GHz	VHT40	5550	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		MCS 0								
Emission Bandwidth Peak Power Spectral Density	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0								
	VHT80	5290 / 5530 / 5690	MCS 0								

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### 3 Transmitter Test Results

#### 3.1 Conducted Emissions

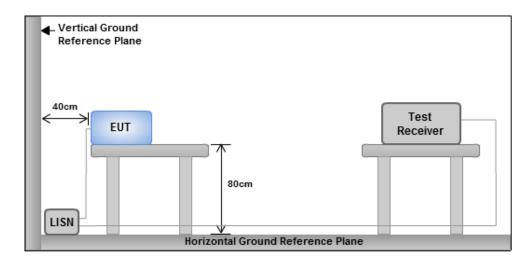
#### 3.1.1 Limit of Conducted Emissions

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.

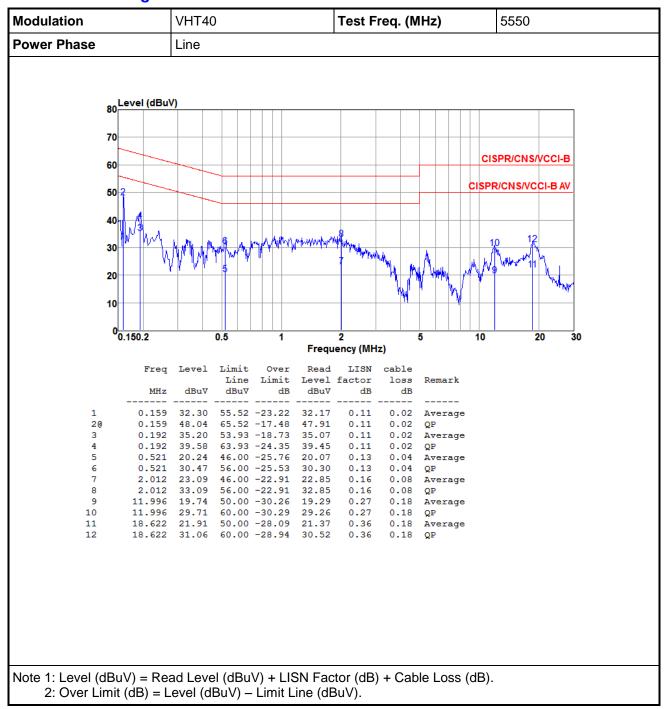
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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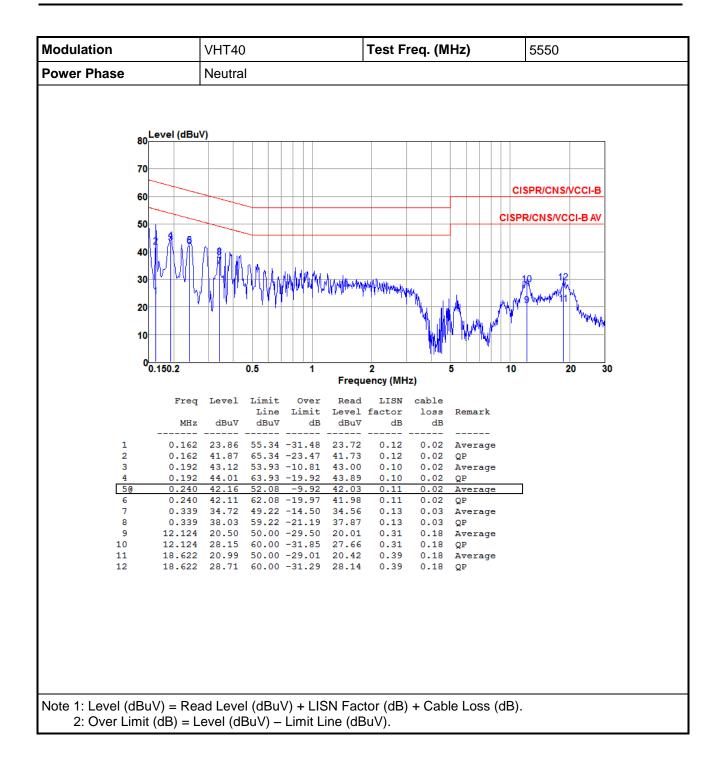
#### 3.1.4 Test Result of Conducted Emissions

#### Non-beamforming mode



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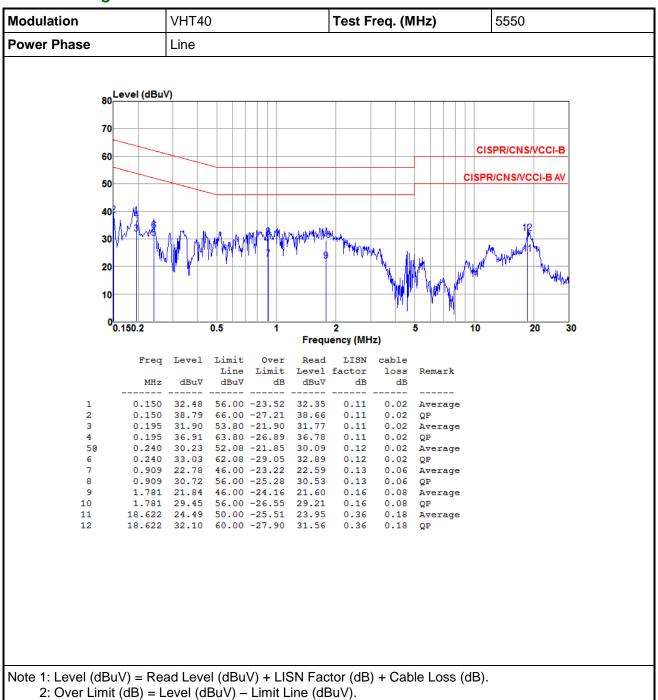




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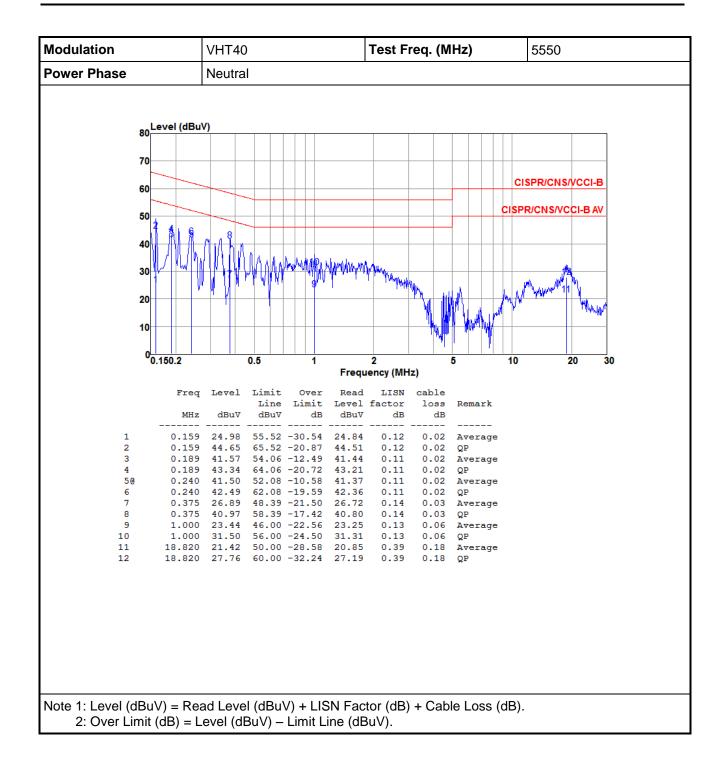


#### Beamforming mode



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#### 3.2 Emission Bandwidth

#### 3.2.1 Test Procedures

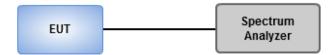
#### 26dB Bandwidth

- 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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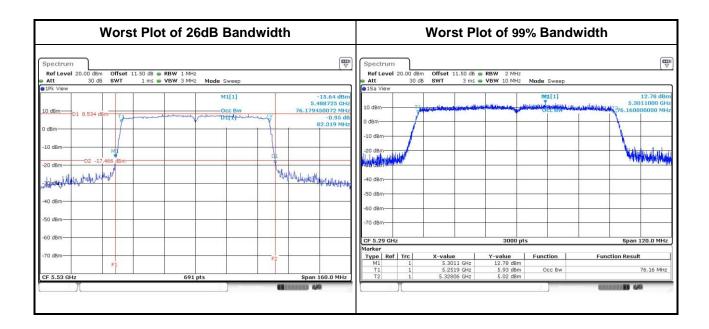
## 3.2.3 Test Result of Emission Bandwidth

## Non-beamforming mode

	Emission Bandwidth										
Mode	N	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	23.07	29.68		16.99	17.21		24.00		
11a	2	5300	23.25	29.89		17.05	17.25		24.00		
11a	2	5320	23.13	29.22		17.03	17.26		24.00		
VHT20	2	5260	23.94	28.06		18.07	18.25		24.00		
VHT20	2	5300	25.68	29.16		18.06	18.29		24.00		
VHT20	2	5320	24.17	26.84		18.00	18.20		24.00		
VHT40	2	5270	41.30	42.00		36.88	37.10		24.00		
VHT40	2	5310	41.51	43.48		36.62	36.66		24.00		
VHT80	2	5290	82.09	82.09		76.04	76.16		24.00		
11a	2	5500	23.07	22.03		17.00	17.05		24.00		
11a	2	5580	27.19	27.54		17.11	17.32		24.00		
11a	2	5700	21.51	21.68		16.94	17.05		24.00		
VHT20	2	5500	24.58	24.99		18.01	18.16		24.00		
VHT20	2	5580	25.68	29.28		18.08	18.26		24.00		
VHT20	2	5700	21.68	22.03		17.96	18.23		24.00		
VHT40	2	5510	40.93	41.16		36.60	36.76		24.00		
VHT40	2	5550	41.29	44.78		36.88	37.16		24.00		
VHT40	2	5670	43.15	47.86		36.66	36.78		24.00		
VHT80	2	5530	81.86	82.32		76.04	76.12		24.00		

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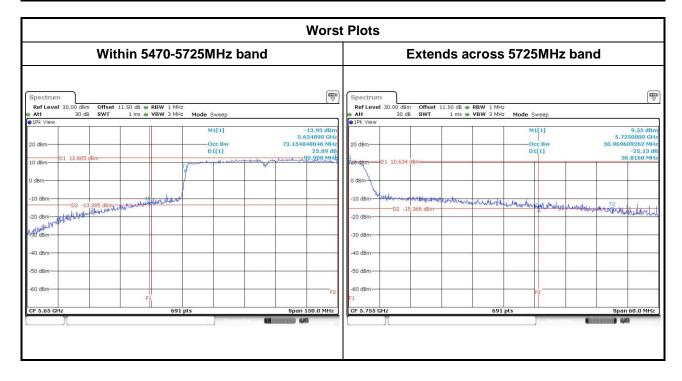
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#### Channel that extends across the 5.725 GHz boundary

	UNII Emission Bandwidth Result ( Within 5470-5725MHz band )											
Mode N <sub>TX</sub>	N	Freq.	26dB Bandwidth (MHz)			99%	Power Limit					
	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)				
11a	2	5720	16.26	16.20		13.57	13.73		23.10			
VHT20	2	5720	16.94	16.76		14.14	14.28		23.24			
VHT40	2	5710	35.92	43.53		33.53	33.77		24.00			
VHT80	2	5690	76.76	90.91		73.22	73.50		24.00			

	UNII Emission Bandwidth Result ( Extends across 5725MHz band )										
	Mode N <sub>TX</sub>	Freq.	26dB Bandwidth (MHz)			99% Bandwidth (MHz)					
Wiode		(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2			
11a	2	5720	6.37	7.65		3.59	3.63				
VHT20	2	5720	6.99	8.22		4.02	4.19				
VHT40	2	5710	13.64	19.96		3.45	3.75				
VHT80	2	5690	20.28	36.82		3.30	3.66				

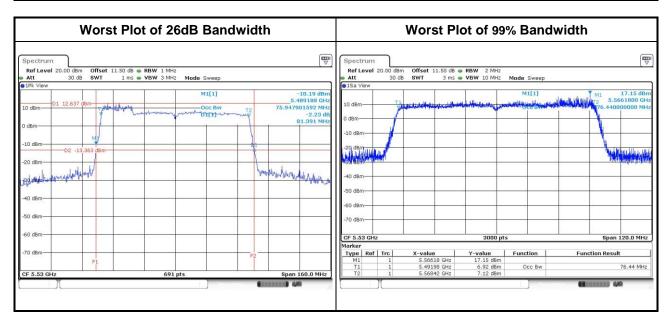


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### Beamforming mode

				Emissio	on Bandwid	th			
BA - d -		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	24.81	27.48		17.97	18.26		24.00
VHT20	2	5300	26.03	29.97		17.99	18.22		24.00
VHT20	2	5320	23.42	27.25		18.00	18.32		24.00
VHT40	2	5270	45.33	48.46		36.78	37.00		24.00
VHT40	2	5310	40.81	40.93		36.54	36.62		24.00
VHT80	2	5290	80.00	80.23		75.88	75.84		24.00
VHT20	2	5500	23.07	26.14		17.94	18.17		24.00
VHT20	2	5580	23.25	24.58		17.94	18.11		24.00
VHT20	2	5700	21.68	21.91		17.90	18.10		24.00
VHT40	2	5510	40.58	41.04		36.58	36.56		24.00
VHT40	2	5550	40.93	43.15		36.72	37.04		24.00
VHT40	2	5670	41.04	45.33		36.58	36.64		24.00
VHT80	2	5530	80.93	81.39		75.96	76.44		24.00



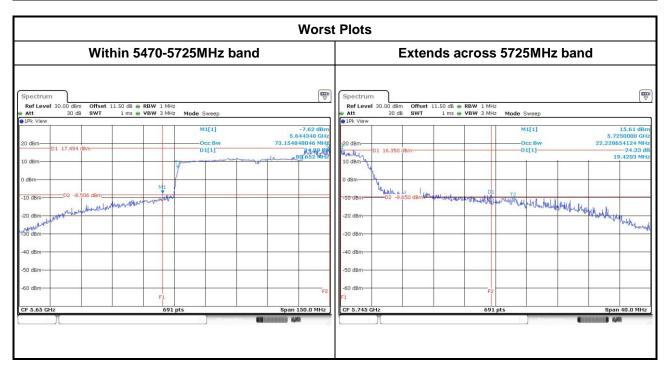
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#### Channel that extends across the 5.725 GHz boundary

	UNII Emission Bandwidth Result ( Within 5470-5725MHz band )										
Mode	N	Freq.	26dB	Bandwidth	(MHz)	99%	Power Limit				
Mode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2	(dBm)		
VHT20	2	5720	16.45	19.03		14.06	14.15		23.16		
VHT40	2	5710	43.62	43.83		33.45	33.55		24.00		
VHT80	2	5690	75.44	80.65		73.10	73.22		24.00		

	UNII Emission Bandwidth Result ( Extends across 5725MHz band )										
Mode	N	Freq.	26dE	Bandwidth (	MHz)	99% Bandwidth (MHz)					
Wode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 0	Chain 1	Chain 2			
VHT20	2	5720	8.72	9.78		3.90	4.02				
VHT40	2	5710	19.25	19.42		3.57	3.57				
VHT80	2	5690	10.70	16.00		3.46	3.62				



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### 3.3 RF Output Power

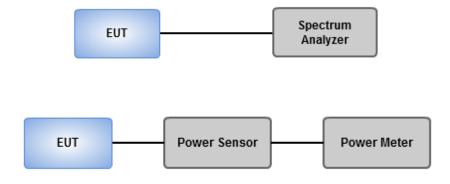
### 3.3.1 Limit of RF Output Power

Fred	quency Band (MHz)	Limit						
	5250 ~ 5350	250mW or 11dBm+10 log B						
	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	20.02	20.29			207.367	23.17	24.00
11a	2	5300	20.07	20.39			211.021	23.24	24.00
11a	2	5320	20.09	20.34			210.237	23.23	24.00
HT20	2	5260	20.02	20.18			204.693	23.11	24.00
HT20	2	5300	19.98	20.31			206.939	23.16	24.00
HT20	2	5320	18.98	19.41			166.365	22.21	24.00
HT40	2	5270	20.41	21.25			243.253	23.86	24.00
HT40	2	5310	17.58	17.77			117.121	20.69	24.00
VHT20	2	5260	20.04	20.21			205.880	23.14	24.00
VHT20	2	5300	20.02	20.36			209.104	23.20	24.00
VHT20	2	5320	19	19.46			167.741	22.25	24.00
VHT40	2	5270	20.46	21.28			245.450	23.90	24.00
VHT40	2	5310	17.62	17.82			118.344	20.73	24.00
VHT80	2	5290	16.58	17.08			96.549	19.85	24.00
11a	2	5500	19.61	19.59			182.403	22.61	24.00
11a	2	5580	19.98	20.16			203.293	23.08	24.00
11a	2	5700	17.80	17.70			119.140	20.76	24.00
HT20	2	5500	18.91	19.25			161.943	22.09	24.00
HT20	2	5580	20.01	20.01			200.461	23.02	24.00
HT20	2	5700	16.97	17.15			101.654	20.07	24.00
HT40	2	5510	16.31	17.39			97.584	19.89	24.00
HT40	2	5550	20.55	21.20			245.327	23.90	24.00
HT40	2	5670	18.63	19.58			163.728	22.14	24.00
VHT20	2	5500	18.95	19.30			163.637	22.14	24.00
VHT20	2	5580	20.06	20.07			203.016	23.08	24.00
VHT20	2	5700	17.01	17.20			102.715	20.12	24.00
VHT40	2	5510	16.36	17.42			98.459	19.93	24.00
VHT40	2	5550	20.58	21.24			247.333	23.93	24.00
VHT40	2	5670	18.68	19.62			165.412	22.19	24.00
VHT80	2	5530	16.01	16.51			84.674	19.28	24.00

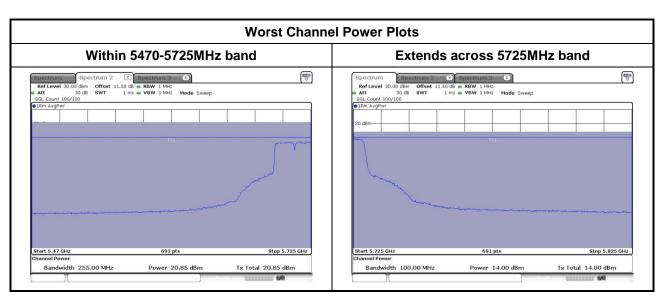
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#### Channel that extends across the 5.725 GHz boundary

	Maximum Conducted Output Power (Within 5470-5725MHz band)											
	N <sub>TX</sub>	Freq. (MHz)	Conducted Power without duty factor					Duty	Total	Total		
Mode			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)	factor (dB)	Power (mW)	Power (dBm)	Limit (dBm)	
11a	2	5720	19.33	19.22			22.29	0.00	169.264	22.29	23.10	
HT20	2	5720	19.42	19.46			22.45	0.00	175.806	22.45	23.24	
HT40	2	5710	20.85	20.03			23.47	0.00	222.312	23.47	24.00	
VHT20	2	5720	19.49	19.37			22.44	0.00	175.417	22.44	23.24	
VHT40	2	5710	20.81	20.20			23.53	0.00	225.216	23.53	24.00	
VHT80	2	5690	20.45	19.85			23.17	0.00	207.523	23.17	24.00	

	Maximum Conducted Output Power (Extends across 5725MHz band)											
	lode N <sub>TX</sub>	Freq. (MHz)	Cond	ducted Po	wer with	out duty fa	actor	Duty factor (dB)	Total	Total	Limit (dBm)	
Mode			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)		Power (mW)	Power (dBm)		
11a	2	5720	13.19	13.24			16.23	0.00	41.931	16.23	30.00	
HT20	2	5720	13.97	13.82			16.91	0.00	49.045	16.91	30.00	
HT40	2	5710	10.69	9.96			13.35	0.00	21.630	13.35	30.00	
VHT20	2	5720	13.94	14.00			16.98	0.00	49.893	16.98	30.00	
VHT40	2	5710	10.90	9.95			13.46	0.00	22.188	13.46	30.00	
VHT80	2	5690	6.61	6.18			9.41	0.00	8.731	9.41	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	19.94	20.34			206.771	23.15	23.94
HT20	2	5300	20.01	20.41			210.131	23.22	23.94
HT20	2	5320	18.87	19.43			164.790	22.17	23.94
HT40	2	5270	20.22	20.79			225.146	23.52	23.94
HT40	2	5310	17.16	17.08			103.050	20.13	23.94
VHT20	2	5260	19.98	20.39			208.936	23.20	23.94
VHT20	2	5300	20.03	20.45			211.611	23.26	23.94
VHT20	2	5320	18.91	19.46			166.112	22.20	23.94
VHT40	2	5270	20.25	20.82			226.707	23.55	23.94
VHT40	2	5310	17.22	17.15			104.603	20.20	23.94
VHT80	2	5290	17.07	17.04			101.516	20.07	23.94
HT20	2	5500	19.11	19.08			162.380	22.11	23.62
HT20	2	5580	19.16	19.19			165.399	22.19	23.62
HT20	2	5700	17.05	16.85			99.116	19.96	23.62
HT40	2	5510	16.50	17.40			99.622	19.98	23.62
HT40	2	5550	20.15	20.74			222.091	23.47	23.62
HT40	2	5670	17.61	18.15			122.990	20.90	23.62
VHT20	2	5500	19.17	19.13			164.450	22.16	23.62
VHT20	2	5580	19.21	19.24			167.314	22.24	23.62
VHT20	2	5700	17.12	16.90			100.501	20.02	23.62
HT40	2	5510	16.54	17.45			100.672	20.03	23.62
VHT40	2	5550	20.2	20.8			224.939	23.52	23.62
VHT40	2	5670	17.68	18.22			124.988	20.97	23.62
VHT80	2	5530	16.12	16.56			86.216	19.36	23.62

#### Note:

1. For 5250 ~ 5350 MHz band

Directional gain = 10 \*  $\log((10^{2.87/20} + 10^{3.23/20})^2/2) = 6.06$  dBi > 6 dBi Limit shall be reduced to 24 dBm – (6.06 dBi – 6 dBi) = 23.94 dBm For 5470 ~ 5725MHz band

Directional gain = 10 \* log( $(10^{3.2/20}+10^{3.54/20})^2/2$ ) = 6.38 dBi > 6 dBi Limit shall be reduced to 24 dBm - (6.38 dBi - 6 dBi) = 23.62 dBm

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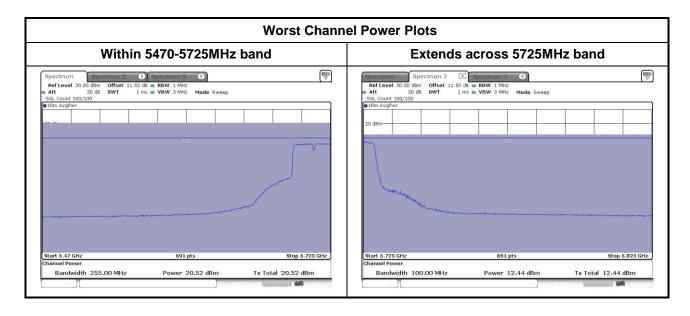
#### Channel that extends across the 5.725 GHz boundary

	Maximum Conducted Output Power (Within 5470-5725MHz band)											
			Conducted Power without duty factor				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	17.93	17.85			20.90	0.00	123.041	20.90	22.78	
HT40	2	5710	20.36	19.78			23.09	0.00	203.703	23.09	23.62	
VHT20	2	5720	18.08	17.86			20.98	0.00	125.363	20.98	22.78	
VHT40	2	5710	20.52	19.59			23.09	0.00	203.711	23.09	23.62	
VHT80	2	5690	20.29	19.43			22.89	0.00	194.606	22.89	23.62	

Note: Directional gain =  $10 * \log((10^{3.2720} + 10^{3.54/20})^2/2) = 6.38 \text{ dBi} > 6 \text{ dBi}$ , limit shall be reduced 0.38 dB (6.38dBi – 6dBi)

	Maximum Conducted Output Power (Extends across 5725MHz band)											
			Conducted Power without duty factor					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	12.28	11.5			14.92	0.00	31.030	14.92	29.28	
HT40	2	5710	10.41	9.46			12.97	0.00	19.821	12.97	29.28	
VHT20	2	5720	12.44	12.42			15.44	0.00	34.997	15.44	29.28	
VHT40	2	5710	10.47	9.64			13.09	0.00	20.347	13.09	29.28	
VHT80	2	5690	6.11	5.95			9.04	0.00	8.019	9.04	29.28	

Note: Directional gain =  $10 * \log((10^{3.6/20} + 10^{3.82/20})^2/2) = 6.72 \text{ dBi} > 6 \text{ dBi}$ , Limit shall be reduced to 30 dBm - (6.72 dBi - 6 dBi) = 29.28 dBm



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## 3.4 Peak Power Spectral Density

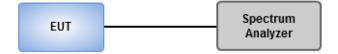
#### 3.4.1 Limit of Peak Power Spectral Density

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
  - 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.
- - 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

C	onditio	on	F	Peak Power Spectra	l Density (dBm/MH	z)
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	10.44	0.00	10.44	10.94
11a	2	5300	10.63	0.00	10.63	10.94
11a	2	5320	10.50	0.00	10.50	10.94
VHT20	2	5260	10.14	0.00	10.14	10.94
VHT20	2	5300	10.09	0.00	10.09	10.94
VHT20	2	5320	9.40	0.00	9.40	10.94
VHT40	2	5270	7.90	0.00	7.90	10.94
VHT40	2	5310	4.82	0.00	4.82	10.94
VHT80	2	5290	0.84	0.00	0.84	10.94
11a	2	5500	10.19	0.00	10.19	10.62
11a	2	5580	10.35	0.00	10.35	10.62
11a	2	5700	8.09	0.00	8.09	10.62
11a	2	5720	10.37	0.00	10.37	10.62
VHT20	2	5500	9.35	0.00	9.35	10.62
VHT20	2	5580	10.32	0.00	10.32	10.62
VHT20	2	5700	6.92	0.00	6.92	10.62
VHT20	2	5720	10.32	0.00	10.32	10.62
VHT40	2	5510	4.03	0.00	4.03	10.62
VHT40	2	5550	7.93	0.00	7.93	10.62
VHT40	2	5670	6.22	0.00	6.22	10.62
VHT40	2	5710	7.74	0.00	7.74	10.62
VHT80	2	5530	0.46	0.00	0.46	10.62
VHT80	2	5690	4.97	0.00	4.97	10.62

#### Note:

- 1. D.F is duty factor.
- 2. Test result is bin-by-bin summing measured value of each TX port.
- 3. For 5250 ~ 5350 MHz band Directional gain =  $10 * log((10^{2.87/20} + 10^{3.23/20})^2/2) = 6.06 dBi > 6 dBi$

Limit shall be reduced to 11 dBm - (6.06 dBi - 6 dBi) = 10.94 dBm.

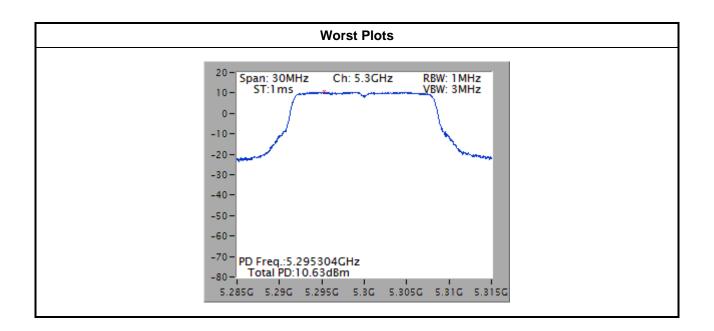
For 5470 ~ 5725MHz band

Directional gain =  $10 * log((10^{3.2/20} + 10^{3.54/20})^2/2) = 6.38 dBi > 6 dBi$ 

Limit shall be reduced to 11 dBm - (6.38 dBi - 6 dBi) = 10.62 dBm.

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### Beamforming mode

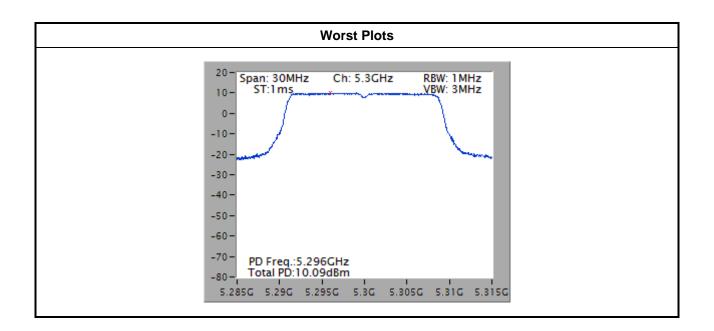
Condition			Peak Power Spectral Density (dBm/MHz)			
Mode	N <sub>TX</sub>	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)
VHT20	2	5260	10.08	0.00	10.08	10.94
VHT20	2	5300	10.09	0.00	10.09	10.94
VHT20	2	5320	9.05	0.00	9.05	10.94
VHT40	2	5270	7.37	0.00	7.37	10.94
VHT40	2	5310	3.70	0.00	3.70	10.94
VHT80	2	5290	0.94	0.00	0.94	10.94
VHT20	2	5500	8.99	0.00	8.99	10.62
VHT20	2	5580	9.08	0.00	9.08	10.62
VHT20	2	5700	7.02	0.00	7.02	10.62
VHT20	2	5720	9.15	0.00	9.15	10.62
VHT40	2	5510	3.74	0.00	3.74	10.62
VHT40	2	5550	7.44	0.00	7.44	10.62
VHT40	2	5670	4.64	0.00	4.64	10.62
VHT40	2	5710	7.64	0.00	7.64	10.62
VHT80	2	5530	0.34	0.00	0.34	10.62
VHT80	2	5690	4.33	0.00	4.33	10.62

#### Note:

- 1. D.F is duty factor.
- 2. Test result is bin-by-bin summing measured value of each TX port.
- 3. For  $5250 \sim 5350$  MHz band Directional gain =  $10 * \log((10^{2.87/20} + 10^{3.23/20})^2/2) = 6.06$  dBi > 6 dBi Limit shall be reduced to 11 dBm (6.06 dBi 6 dBi) = 10.94 dBm. For  $5470 \sim 5725$ MHz band Directional gain =  $10 * \log((10^{3.2/20} + 10^{3.54/20})^2/2) = 6.38$  dBi > 6 dBi Limit shall be reduced to 11 dBm (6.38 dBi 6 dBi) = 10.62 dBm.

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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.

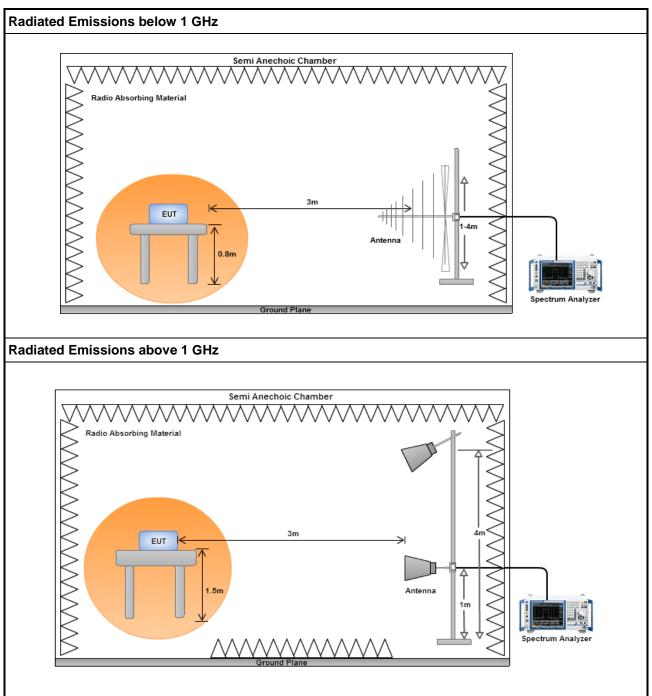
#### Note:

- 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.
- 3. 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

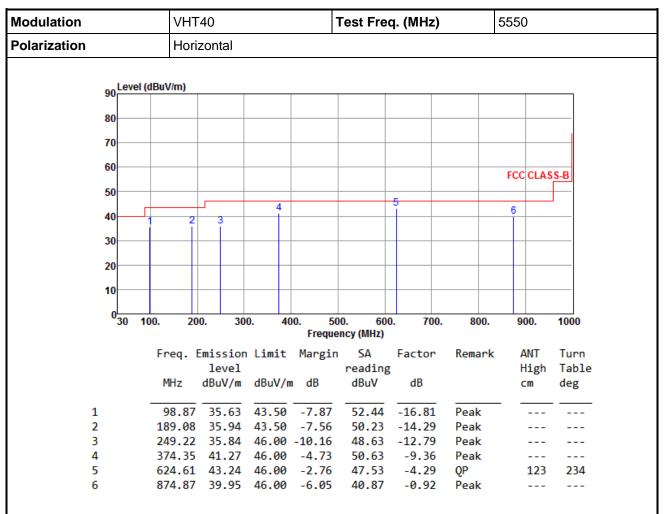


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#### Non- beamforming mode

# 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			VHT	40			Test Fre	q. (MHz	<b>:</b> )	5550	
Polarization			Verti	ical							
	90L	evel (d	lBuV/m)								
	80										
	70										
	60										
										FCC CLA	ASS-B
	50							6			
	40	1 7		3	4		5	Ť			
	30-										
	30										
	20										
	10										
	03	0 10	0. 20	0. 30	0.		600. 60		0. 800.	900.	1000
							ency (MHz)				
			Freq. I	mission level	n Limi	t Margi		Factor	Remark		Turn n Table
			MHz	dBuV/m	dBuV	/m dB	readin@ dBuV	g dB		High cm	deg
				abav,	abar	, u.b	ubu.	45		C.III	ucg
:	1		38.73	38.90	40.0	0 -1.10	50.88	-11.98	QP QP	100	152
	2		89.17								
	3		249.22	36.80							
	4 5		374.35 499.48	38.39 36.94							
	6			42.59							

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

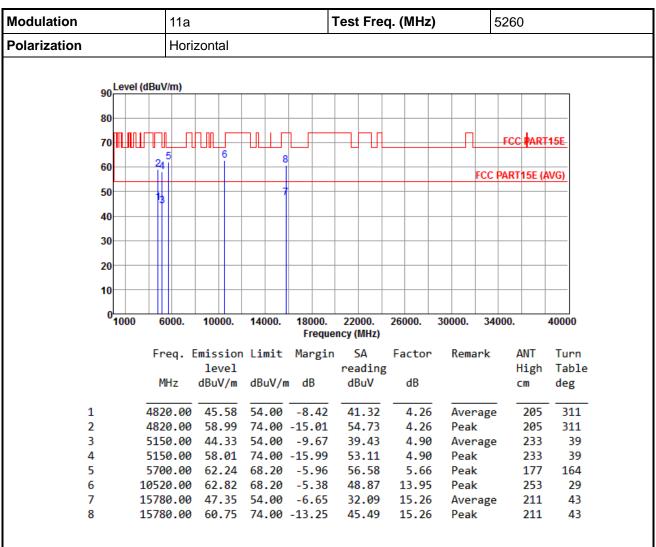
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



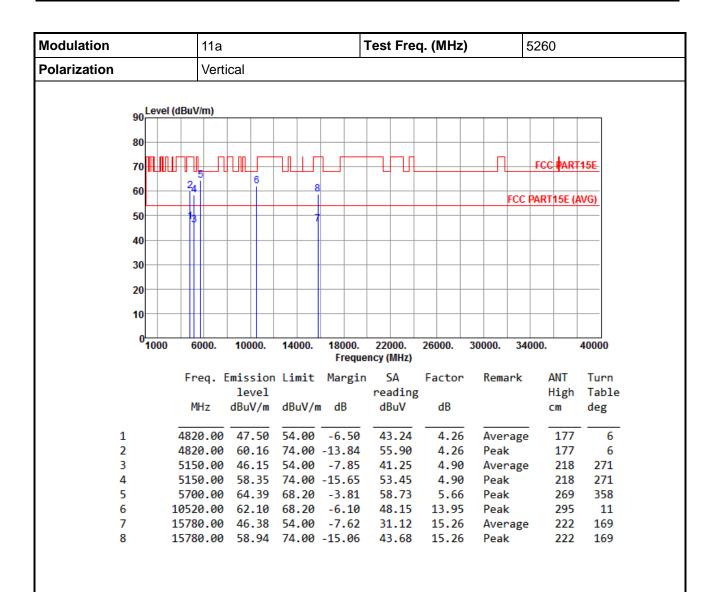
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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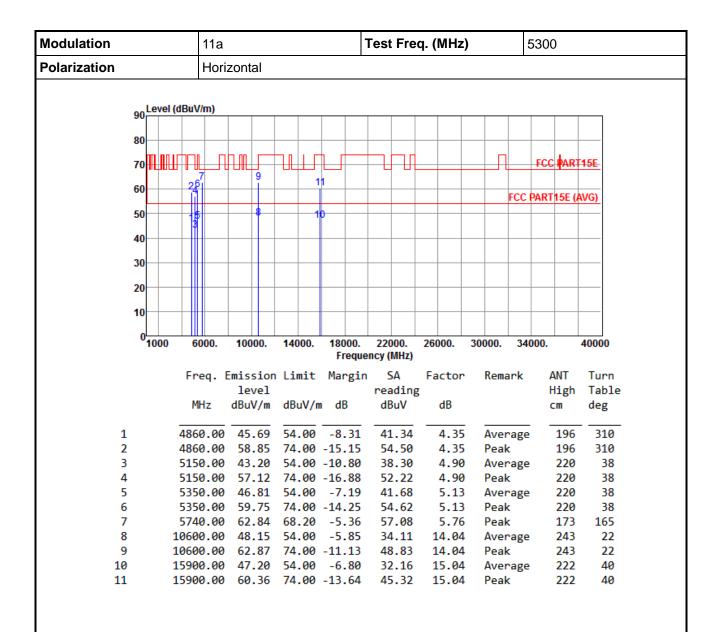


\*Factor includes antenna factor, cable loss and amplifier gain

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

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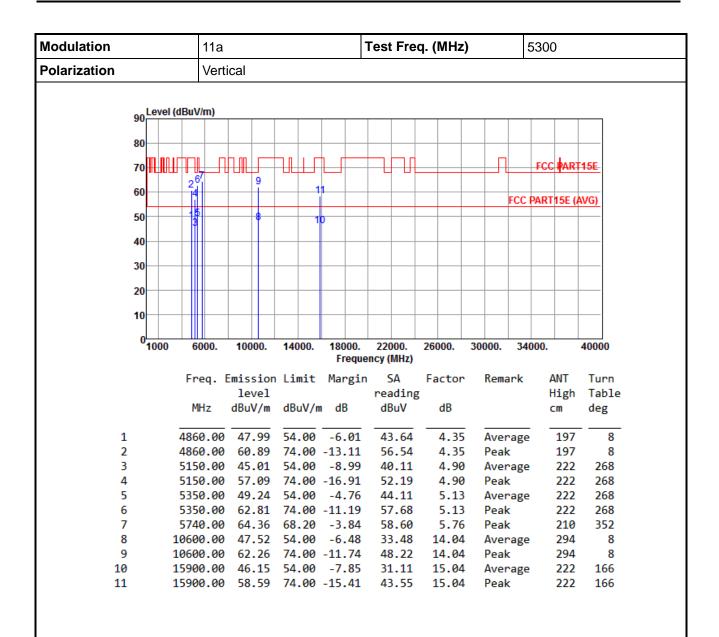


\*Factor includes antenna factor, cable loss and amplifier gain

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

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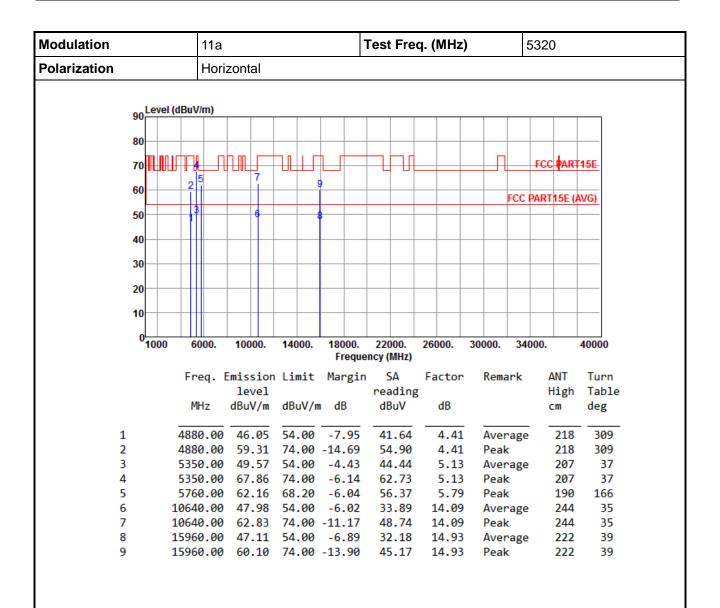


\*Factor includes antenna factor, cable loss and amplifier gain

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

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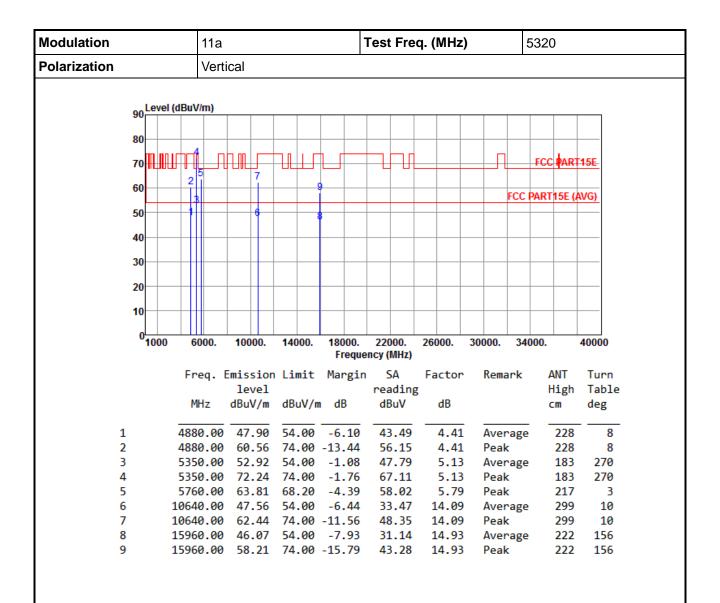


\*Factor includes antenna factor, cable loss and amplifier gain

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				11a							Γest	Fre	q. (	MHz)	)		5500	)	
Polarization				Horizontal															
	90 Level (dBuV/m)						m)												
	80																		
		rm nr						. –								_			
	70			ЩН		6	┸					Ш				FC	C PAF	1115E	(74)
	60			<b>!</b>		$\perp$			8								<u> </u>		
	50					5										FCC	PART	15E (/	AVG)
	50								1										
	40																		
	30																		
	20																		
	10																		
	0	1000	6	000.	100	00.	140	00.		000.	220		260	000.	30000.	34	1000.		40000
										eque		MHz)							
			Fr	eq.			Lim	it	Mai	rgin		Α		actor	Ren	ıark	_	ANT.	Turn
			м	Hz		vel V/m	dBu	V/m	di	2		ding uV	3	dB				digh m	Tabl deg
				1112	ubu	v / III	ubu	· / II	ı uı	_	ub	uv		ub				-111	ueg
1				0.00			54.					.66		5.26		rage	2	279	
2				0.00		.63	74.					.37		5.26				279	189
3				0.00 0.00		.72	54. 74.			. 28 . 02		.46 .72		5.26 5.26		erage	2	279 279	189 189
4 5				0.00 0.00			74. 54.			. 62 . 40		.11	1	5.26 14.49		ık erage		188	189
6				0.00			74.			.34		.17		14.49		_	-	188	66
7				0.00			54.			.71		.28		7.01		rage	2	223	211
					59		74.					.04		7.01	Pea	_		223	211

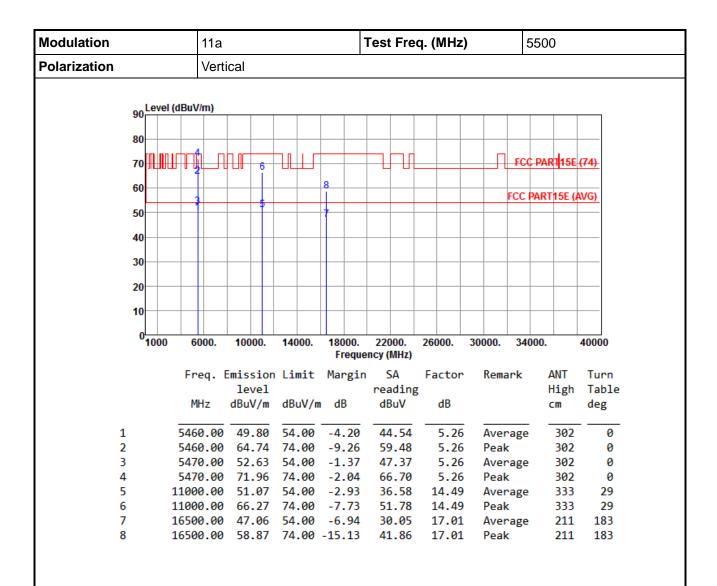
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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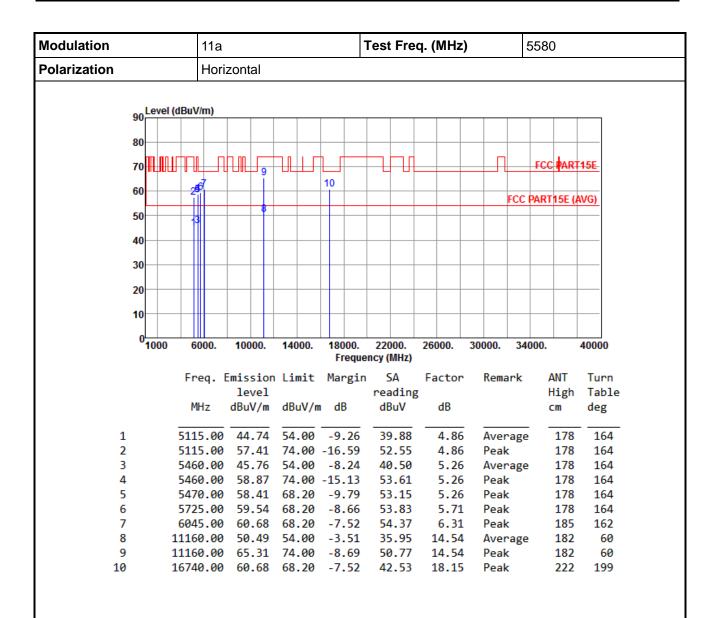


\*Factor includes antenna factor, cable loss and amplifier gain

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

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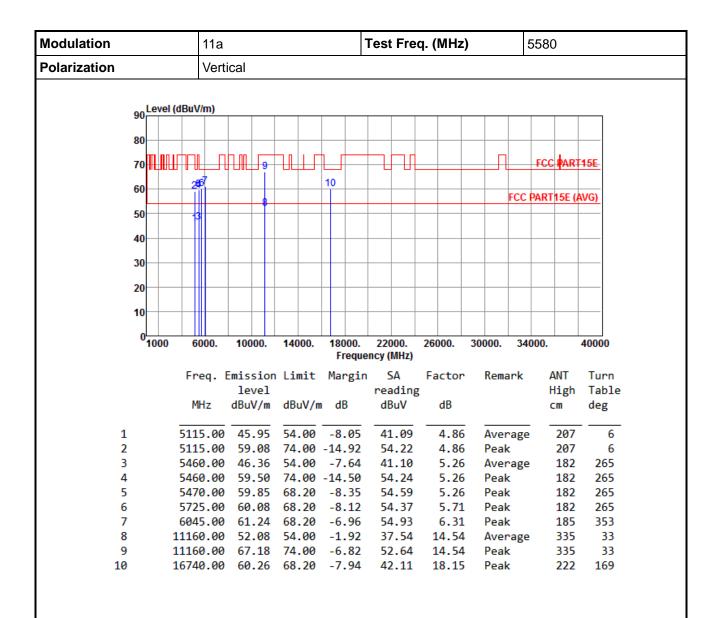


\*Factor includes antenna factor, cable loss and amplifier gain

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

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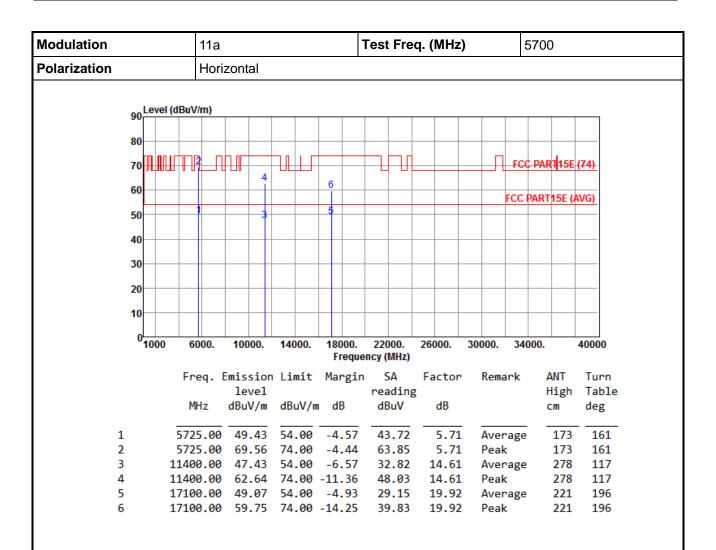


\*Factor includes antenna factor, cable loss and amplifier gain

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

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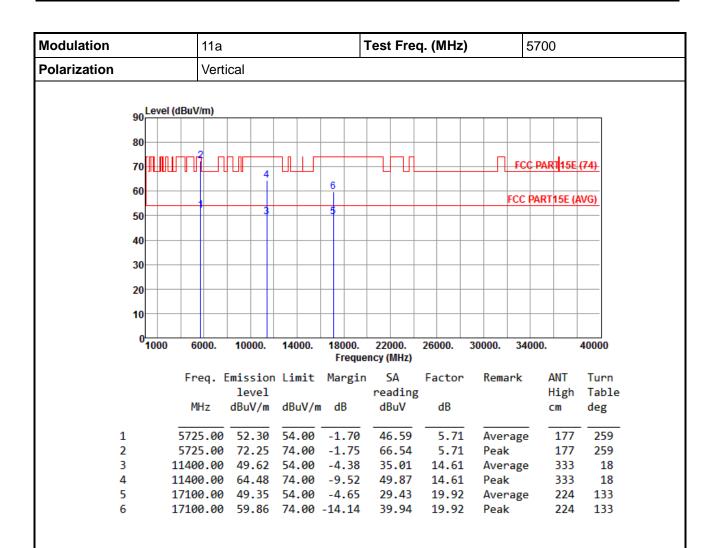


\*Factor includes antenna factor, cable loss and amplifier gain

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

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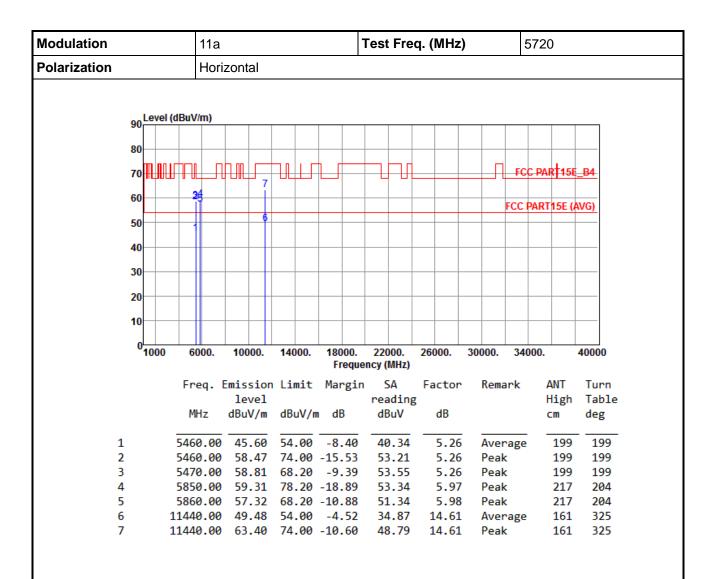


\*Factor includes antenna factor, cable loss and amplifier gain

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

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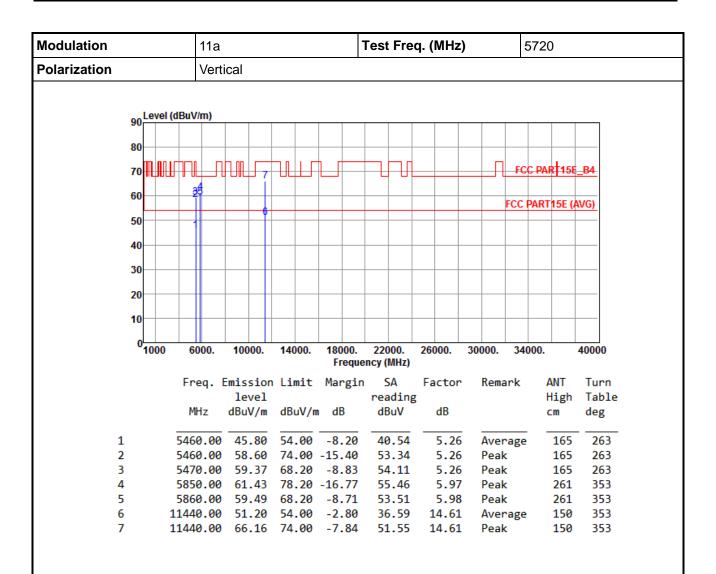


\*Factor includes antenna factor, cable loss and amplifier gain

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

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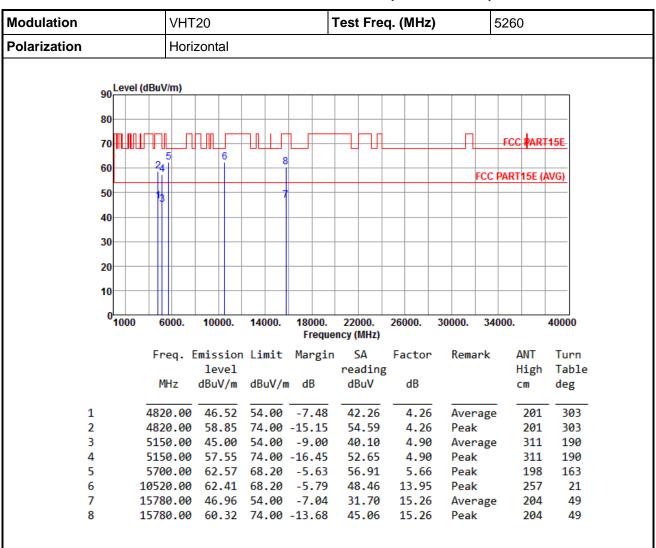
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



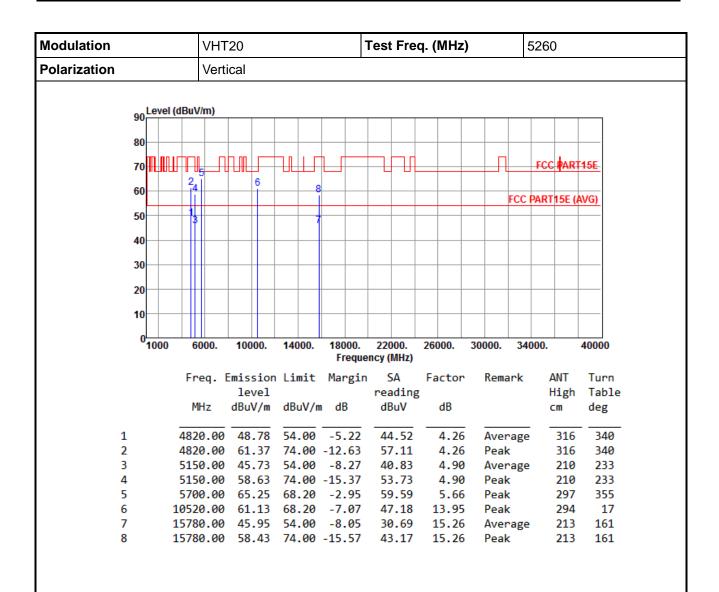
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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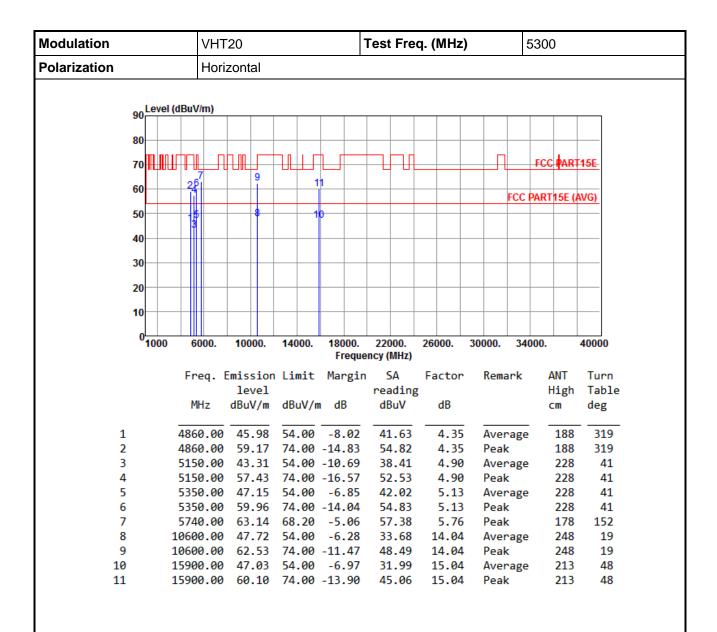


\*Factor includes antenna factor, cable loss and amplifier gain

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

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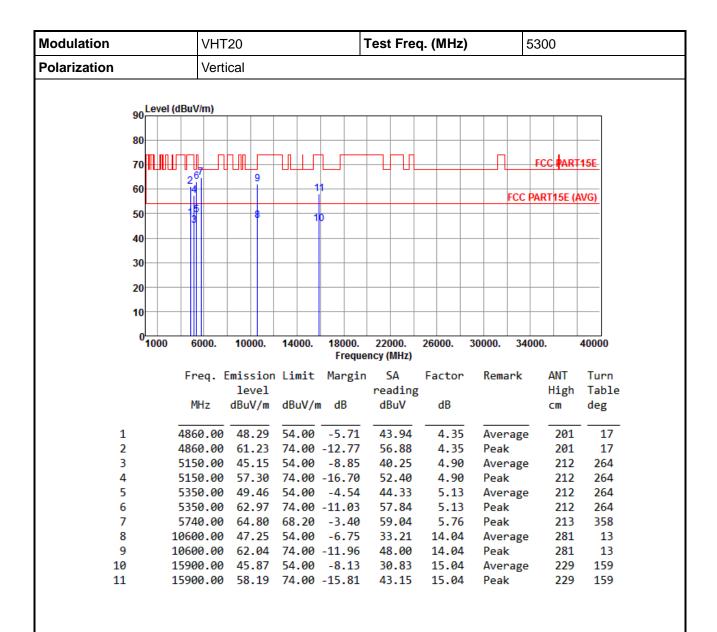


\*Factor includes antenna factor, cable loss and amplifier gain

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

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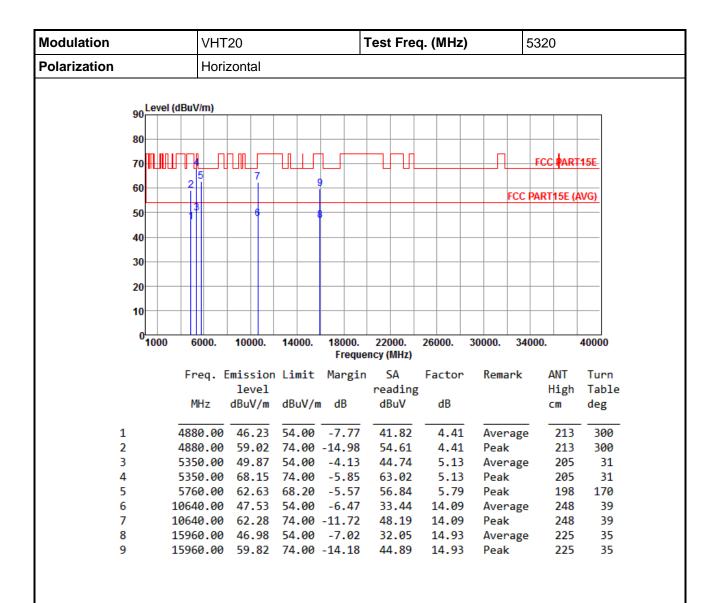


\*Factor includes antenna factor, cable loss and amplifier gain

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

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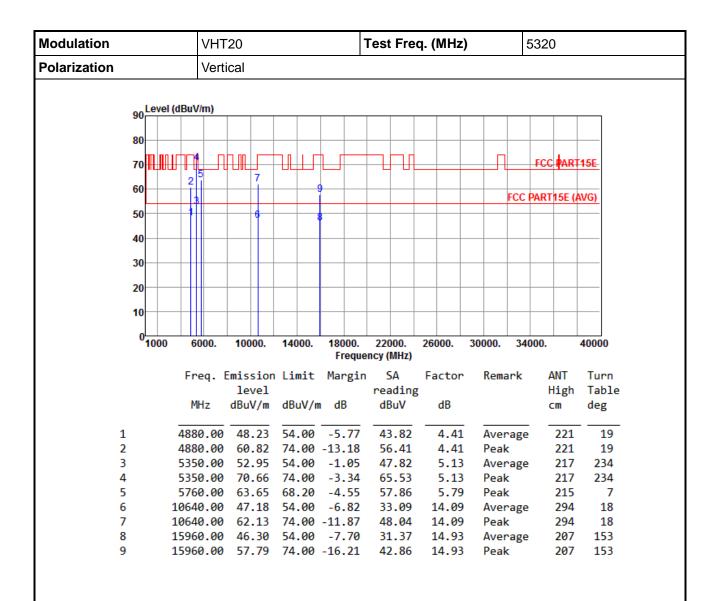


\*Factor includes antenna factor, cable loss and amplifier gain

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

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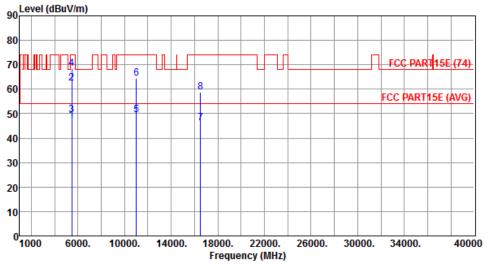
\*Factor includes antenna factor, cable loss and amplifier gain

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

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Modulation	VHT20	Test Freq. (MHz)	5500
Polarization	Horizontal		
Lovel (dDu)	(Im)		
90 Level (dBu)	//m)		



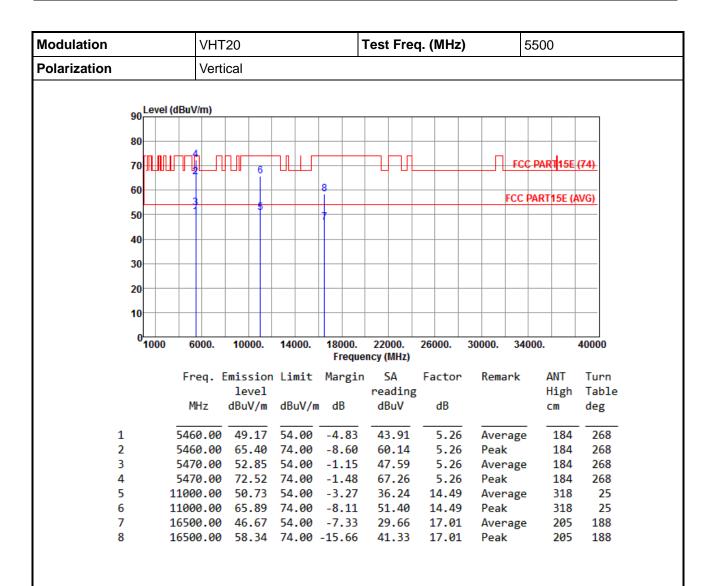
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	5460.00	47.15	54.00	-6.85	41.89	5.26	Average	275	183
2	5460.00	62.52	74.00	-11.48	57.26	5.26	Peak	275	183
3	5470.00	49.61	54.00	-4.39	44.35	5.26	Average	275	183
4	5470.00	68.28	74.00	-5.72	63.02	5.26	Peak	275	183
5	11000.00	49.33	54.00	-4.67	34.84	14.49	Average	182	70
6	11000.00	64.35	74.00	-9.65	49.86	14.49	Peak	182	70
7	16500.00	46.05	54.00	-7.95	29.04	17.01	Average	228	219
8	16500.00	58.78	74.00	-15.22	41.77	17.01	Peak	228	219

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

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

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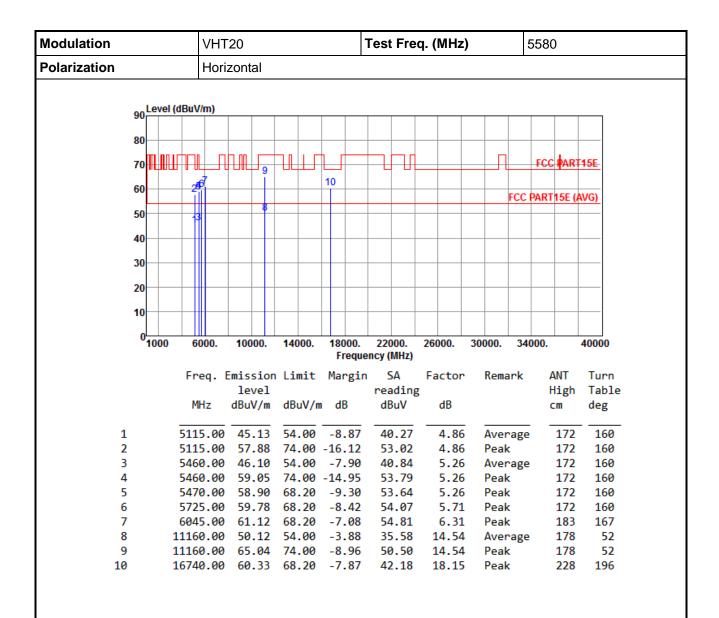


\*Factor includes antenna factor, cable loss and amplifier gain

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

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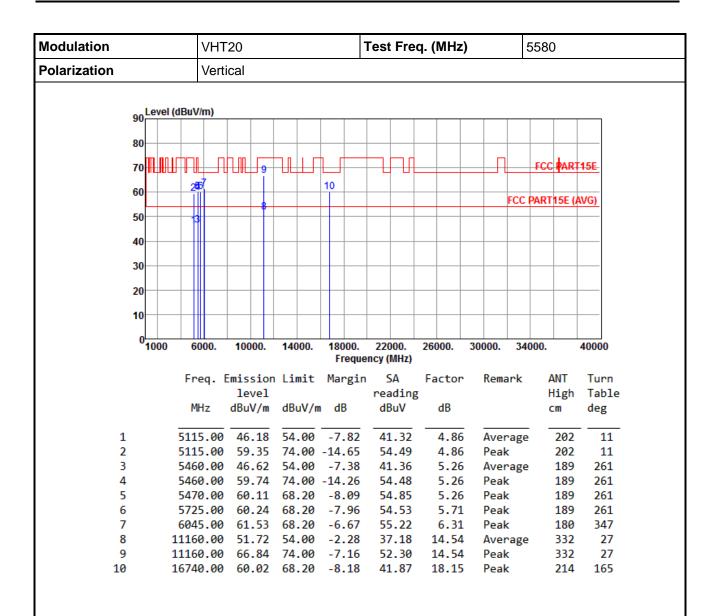


\*Factor includes antenna factor, cable loss and amplifier gain

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

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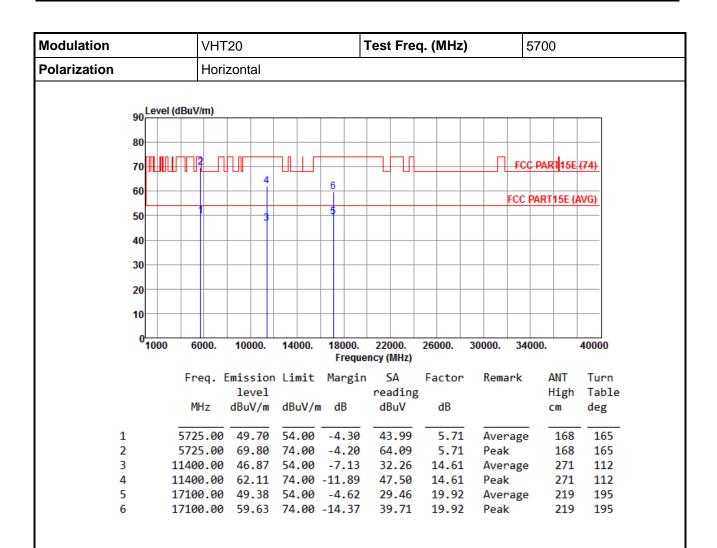


\*Factor includes antenna factor, cable loss and amplifier gain

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

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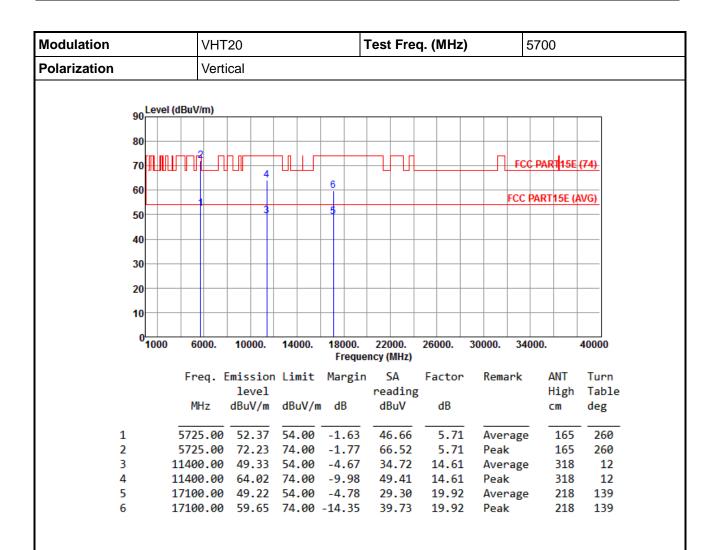


\*Factor includes antenna factor, cable loss and amplifier gain

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

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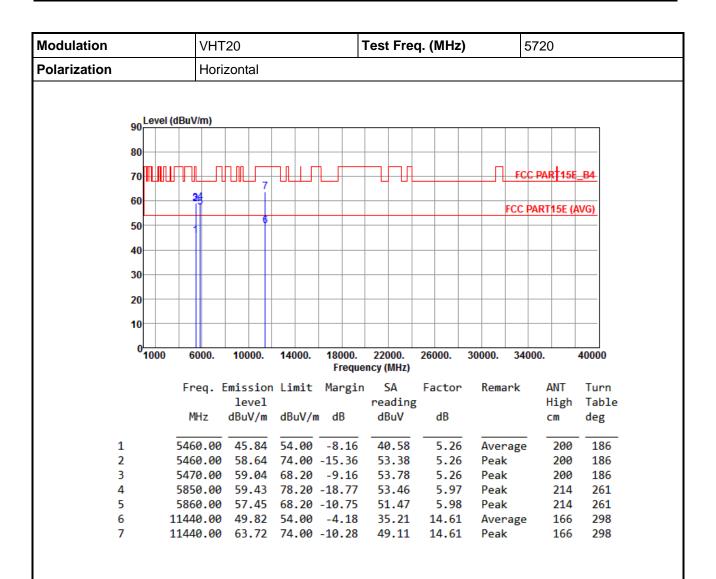


\*Factor includes antenna factor, cable loss and amplifier gain

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

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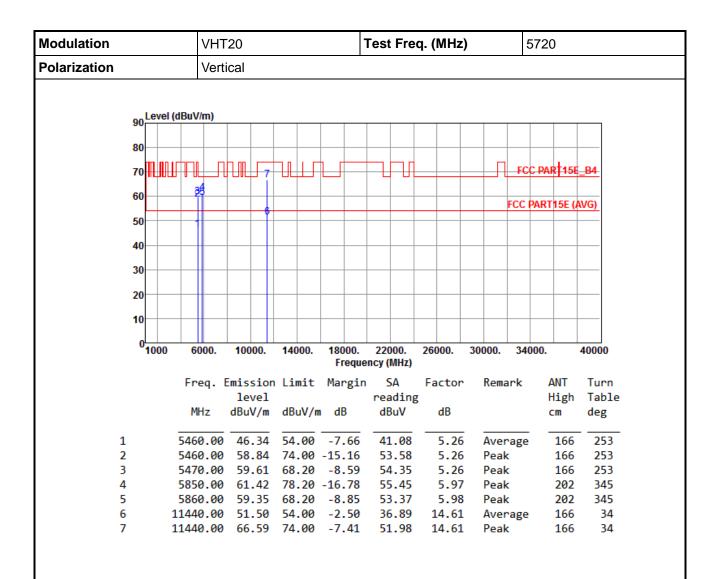


\*Factor includes antenna factor, cable loss and amplifier gain

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

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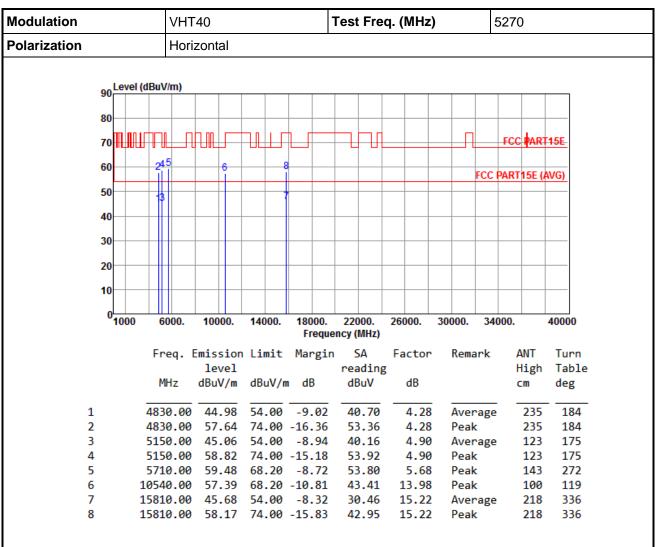
\*Factor includes antenna factor, cable loss and amplifier gain

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



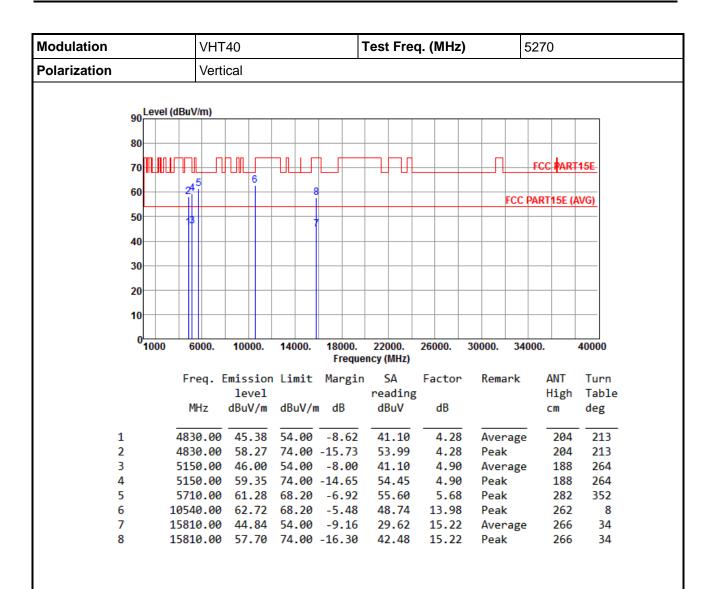
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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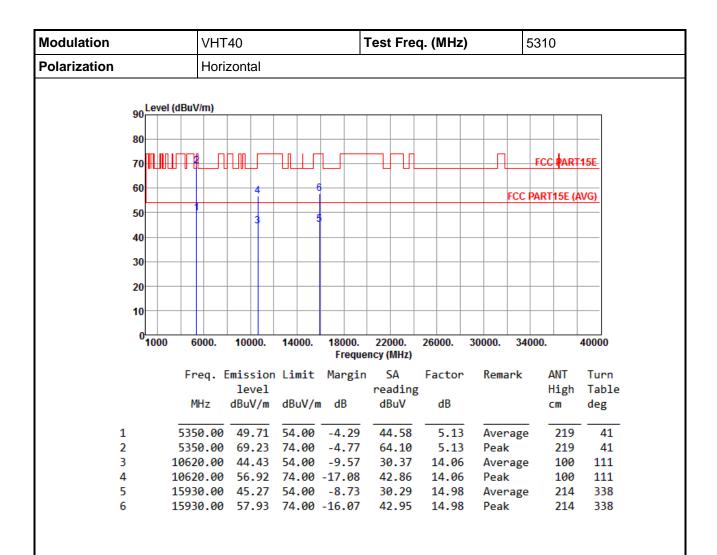


\*Factor includes antenna factor, cable loss and amplifier gain

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

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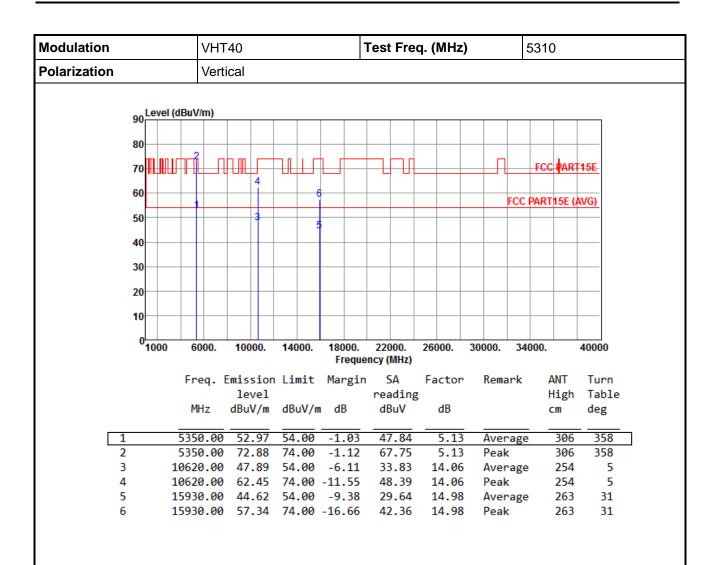


\*Factor includes antenna factor, cable loss and amplifier gain

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

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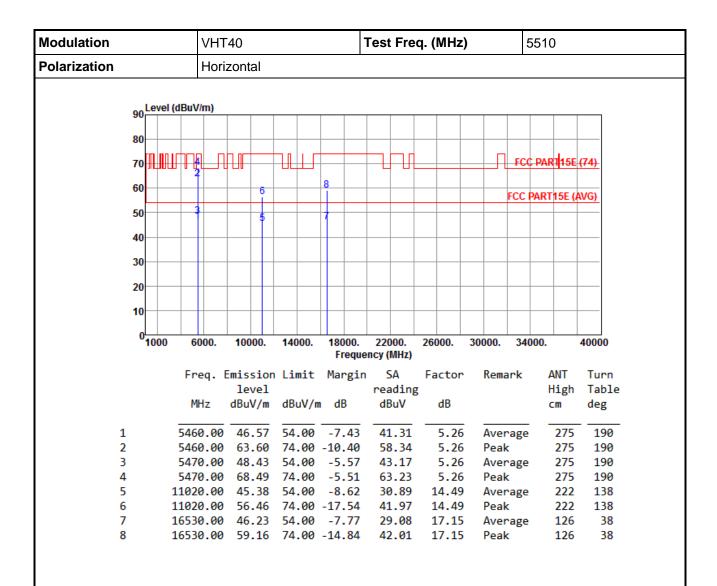


\*Factor includes antenna factor, cable loss and amplifier gain

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

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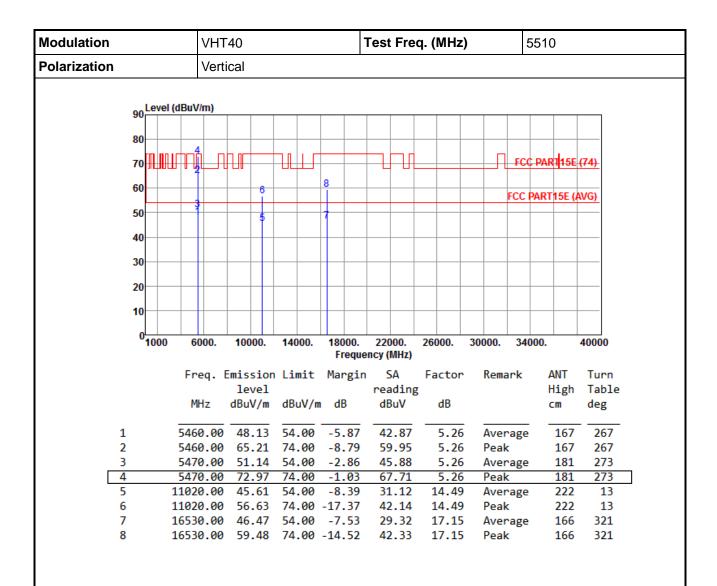


\*Factor includes antenna factor, cable loss and amplifier gain

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

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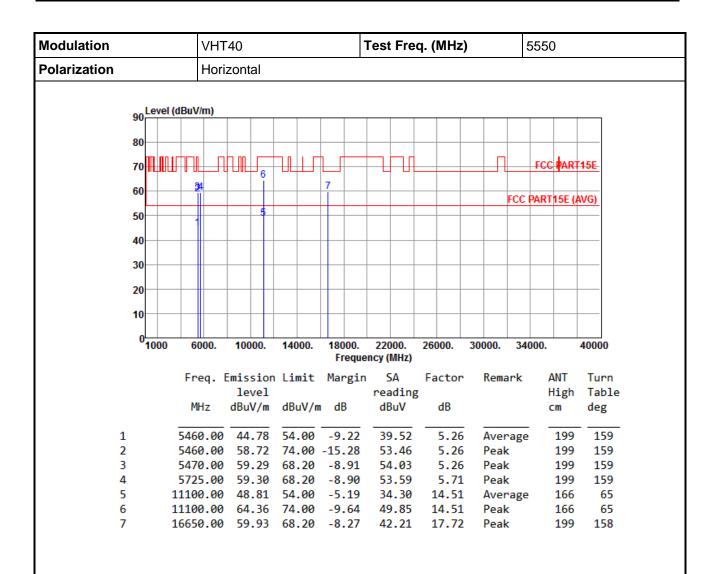


\*Factor includes antenna factor, cable loss and amplifier gain

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

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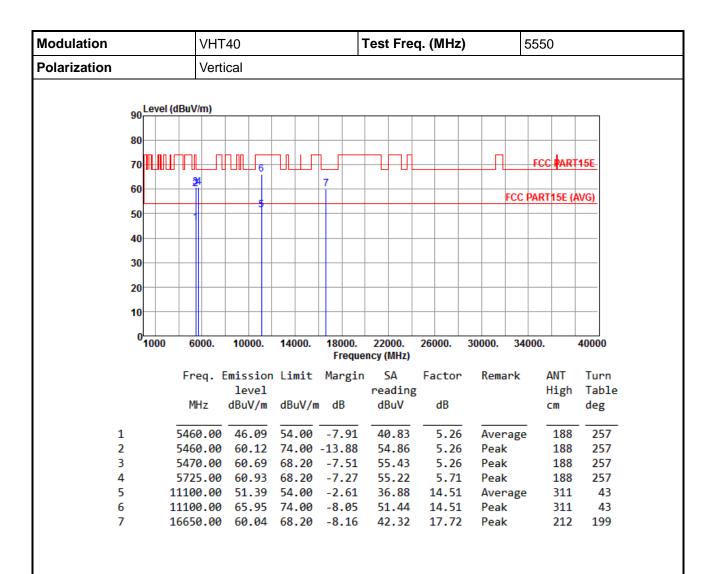


\*Factor includes antenna factor, cable loss and amplifier gain

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

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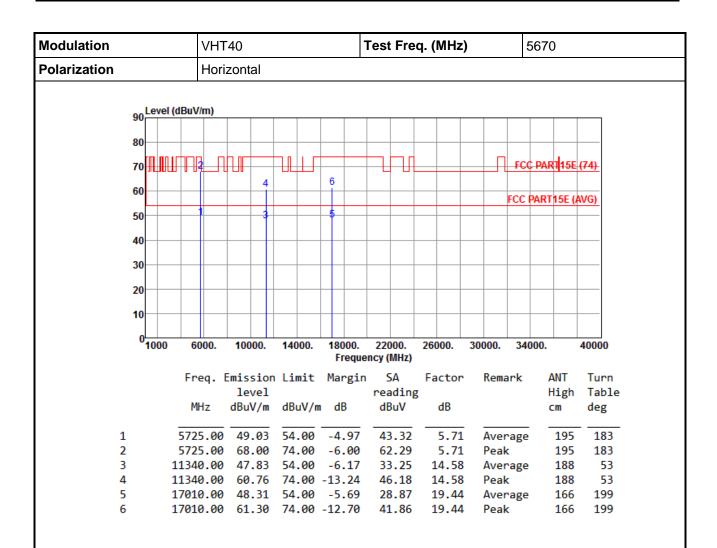


\*Factor includes antenna factor, cable loss and amplifier gain

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

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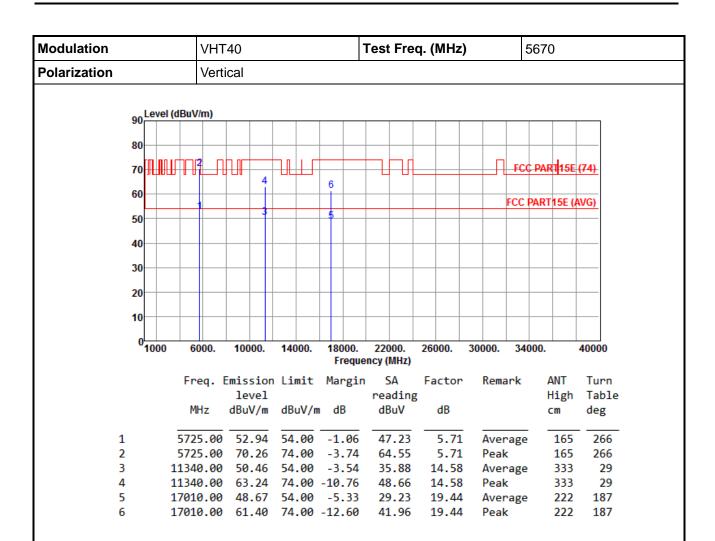


\*Factor includes antenna factor, cable loss and amplifier gain

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

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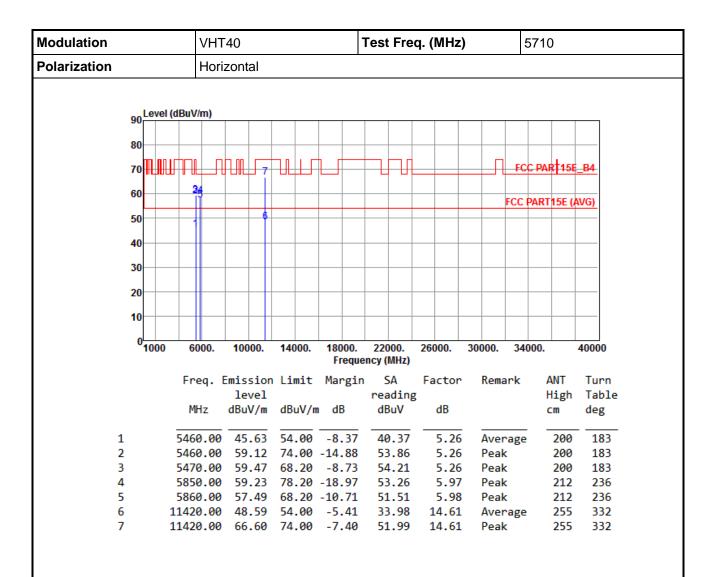


\*Factor includes antenna factor, cable loss and amplifier gain

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

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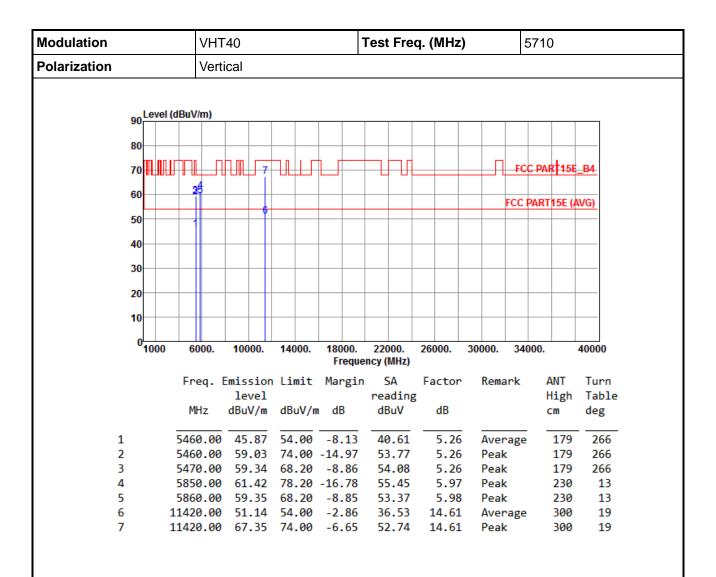


\*Factor includes antenna factor, cable loss and amplifier gain

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

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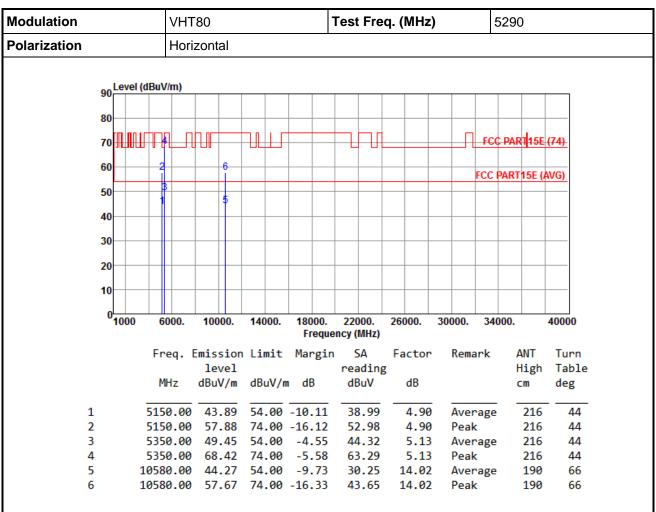
\*Factor includes antenna factor, cable loss and amplifier gain

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



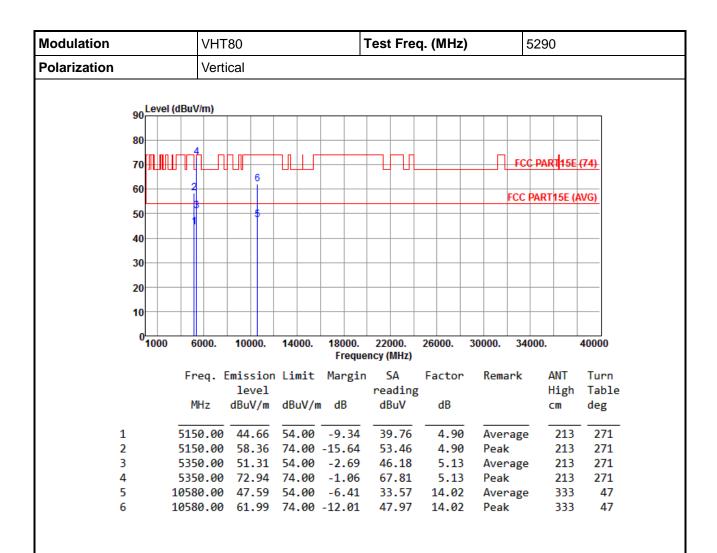
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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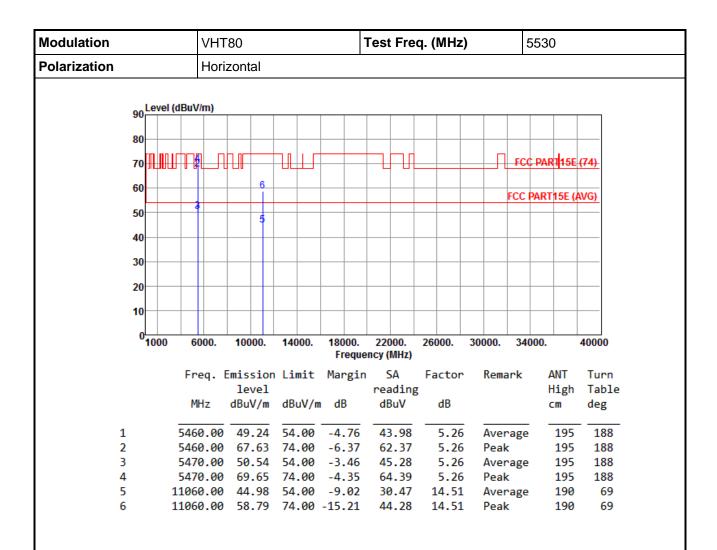


\*Factor includes antenna factor, cable loss and amplifier gain

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

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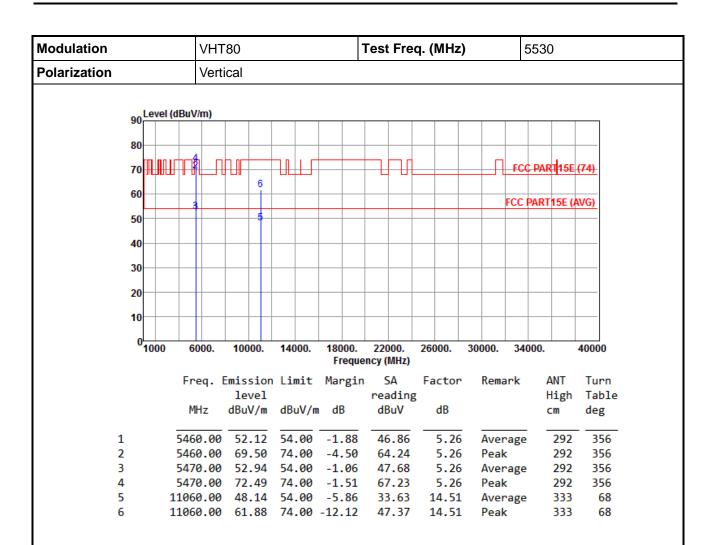


\*Factor includes antenna factor, cable loss and amplifier gain

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

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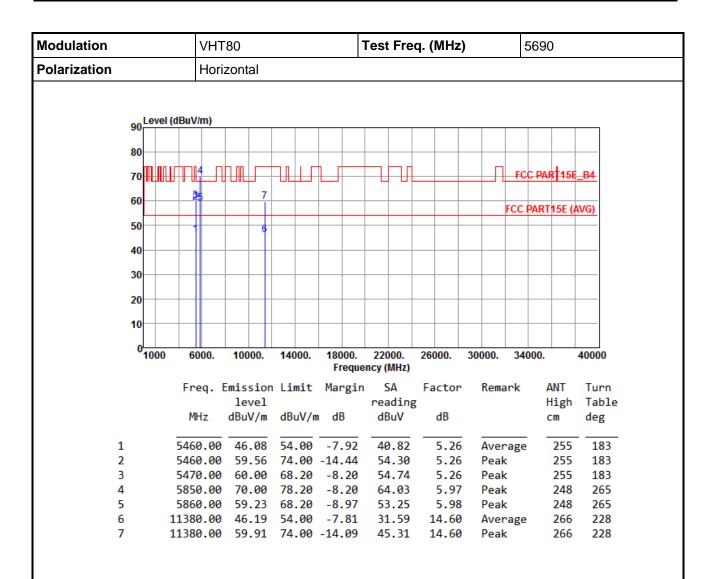


\*Factor includes antenna factor, cable loss and amplifier gain

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

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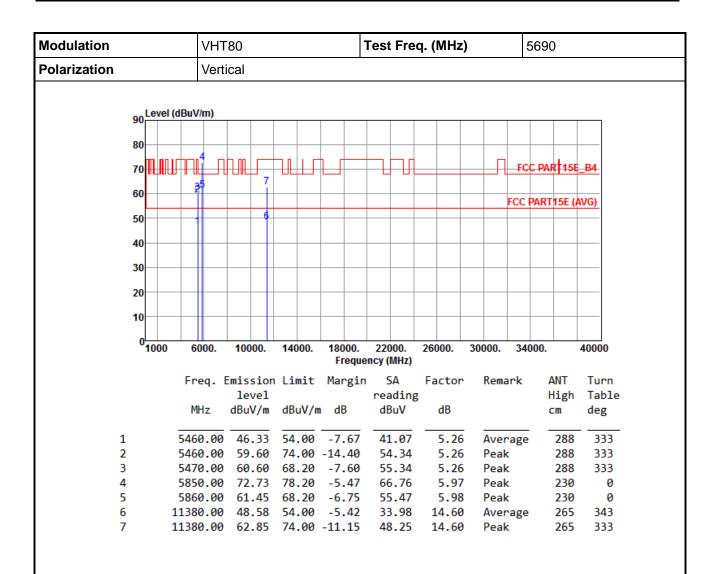


\*Factor includes antenna factor, cable loss and amplifier gain

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

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

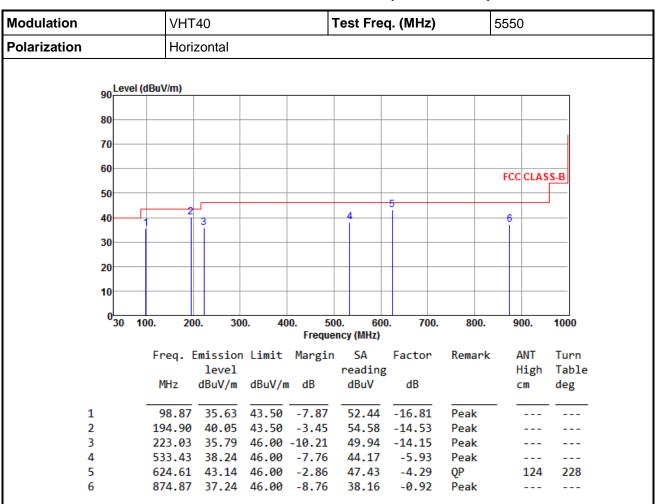
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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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			VHT40				Test Fre	q. (MHz)	5550			
Polarization				Verti	cal						•	
	90	Leve	el (dBu\	//m)								
	80											
	70											
	60										FCC CL	ASS-B
	50											
	40	1	2 3				5		6			_
	40		ĪĬ	4								
	30											
	20											
	20											
	10											
	0	30	100.	20	0 20	00.	400.	500. 60	00. 700	D. 800.	900.	1000
		30	100.	20	0. 30	ю.		iency (MHz)	. 70C	J. 800.	900.	1000
			Fr	ea. E	missio	n Limi	t Margi	n SA	Factor	Remark	c ANT	Turn
					level			reading	g		Hig	h Table
			M	1Hz	dBuV/m	dBuV	/m dB	dBuV	dB		cm	deg
	1			88.73	38.77	40.0	0 -1.23	50.75	-11.98	QP .		0 165
	2			39.17	38.58	43.5				•		
:	3		11	5.36	37.76					Peak		
	4			4.83	34.73							
	5			4.35	38.75	46.0						
•	6		62	4.61	43.14	46.0	0 -2.86	47.43	-4.29	Peak		

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

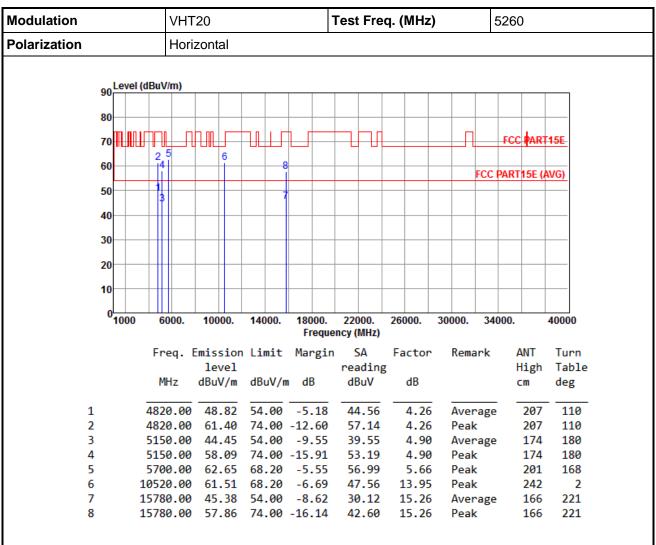
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



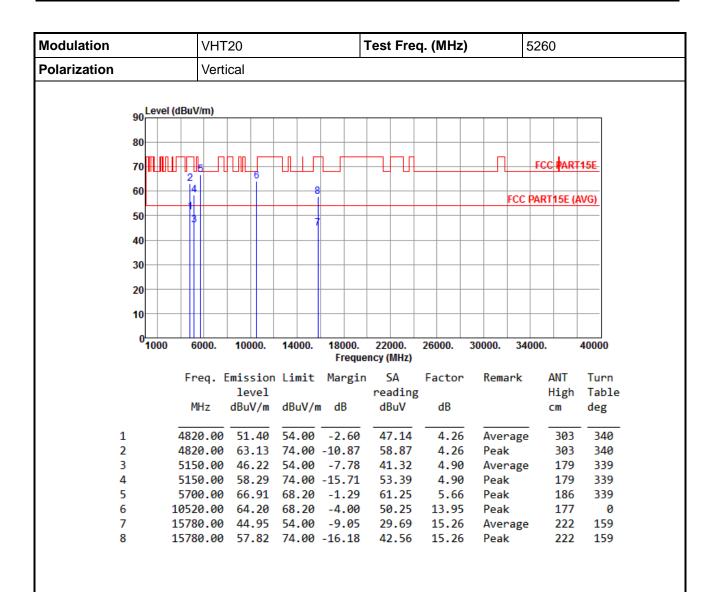
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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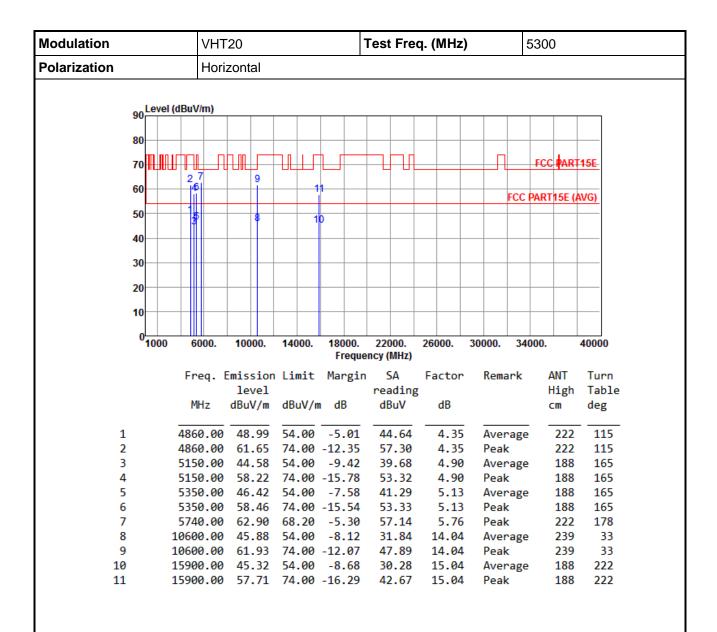


\*Factor includes antenna factor, cable loss and amplifier gain

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

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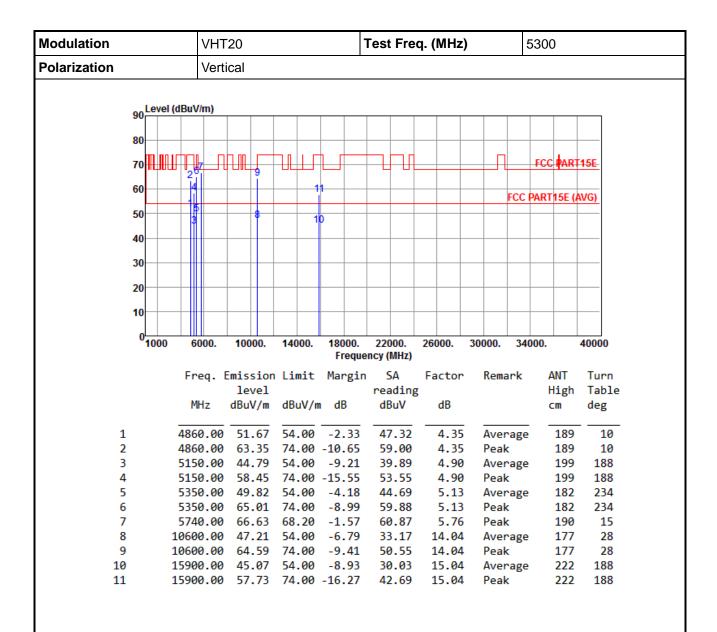


\*Factor includes antenna factor, cable loss and amplifier gain

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

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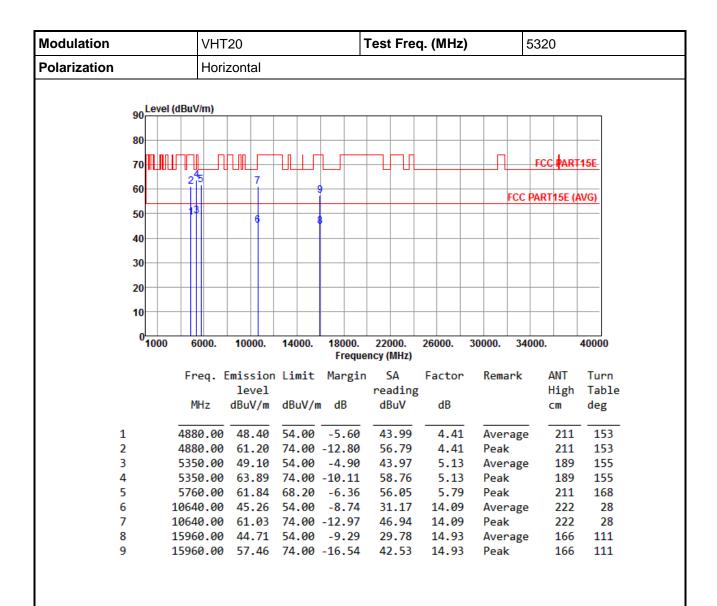


\*Factor includes antenna factor, cable loss and amplifier gain

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

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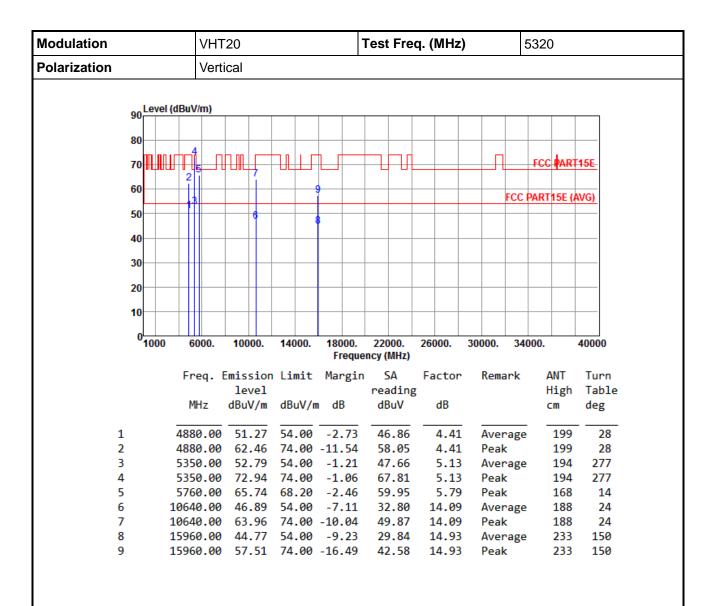


\*Factor includes antenna factor, cable loss and amplifier gain

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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2

3

4

5

6

7

8

Modulation		VH	T20			Test Fre	q. (MHz)		5500	
Polarization		Но	rizontal							
	90 Level	(dBuV/m)								
	80									
	70		6					F	CC PART 15E	(74)
	60				8			FC	C PART15E (	AVG)
	50	3	5		7				O I AIRT I DE (I	<del>(( ) )</del>
	40									
	30									
	20									
	10									
	0 1000	6000.	10000.	14000.	18000. Freque	22000. ency (MHz)	26000.	30000. 3	4000.	40000
		Freq.	Emission level	Limit	Margin	n SA reading	Factor	Remark	ANT High	Turn Table
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
	1	5460.0	47.51	54.00	-6.49	42.25	5.26	Averag	e 322	284

58.97

45.23

64.39

35.55

52.26

29.78

41.78

5.26

5.26

5.26

14.49

14.49

17.01

17.01

Peak

Peak

Peak

Peak

Average

Average

Average

322

322

322

182

182

223

223

284

284

284

33

33

176

176

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB) \*Factor includes antenna factor , cable loss and amplifier gain

5460.00 64.23 74.00 -9.77

5470.00 50.49 54.00 -3.51

5470.00 69.65 74.00 -4.35

11000.00 50.04 54.00 -3.96

11000.00 66.75 74.00 -7.25

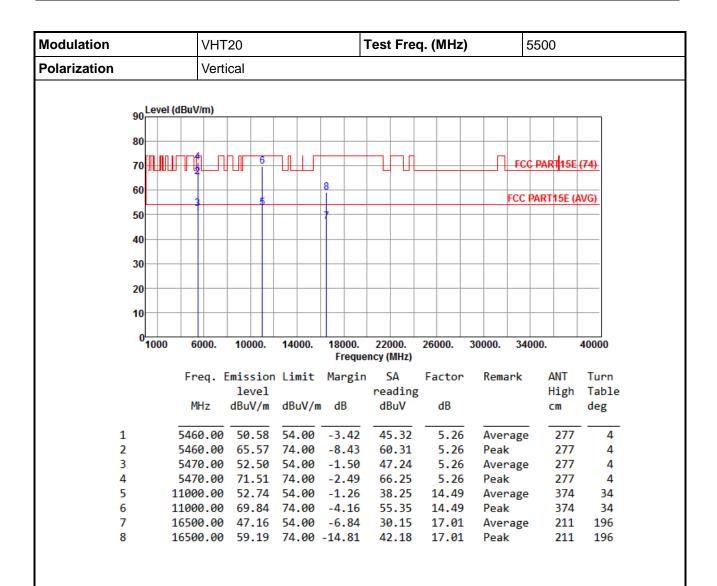
16500.00 46.79 54.00 -7.21

16500.00 58.79 74.00 -15.21

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

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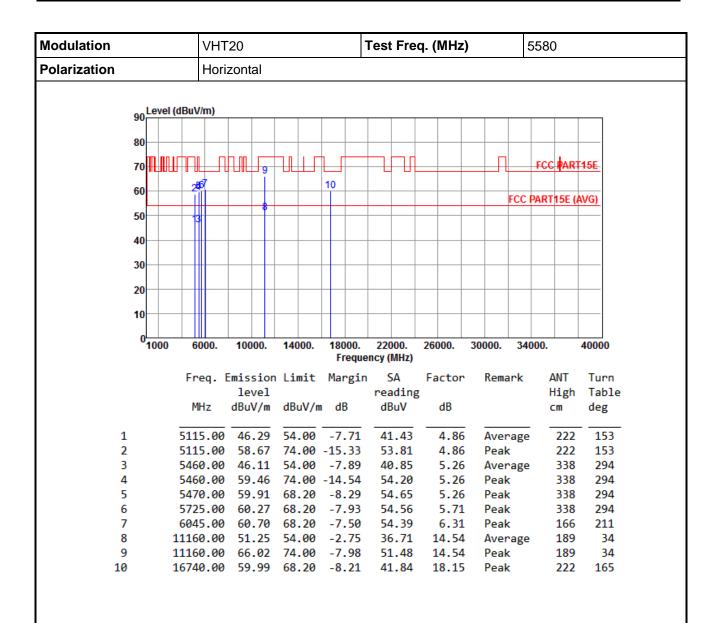


\*Factor includes antenna factor, cable loss and amplifier gain

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

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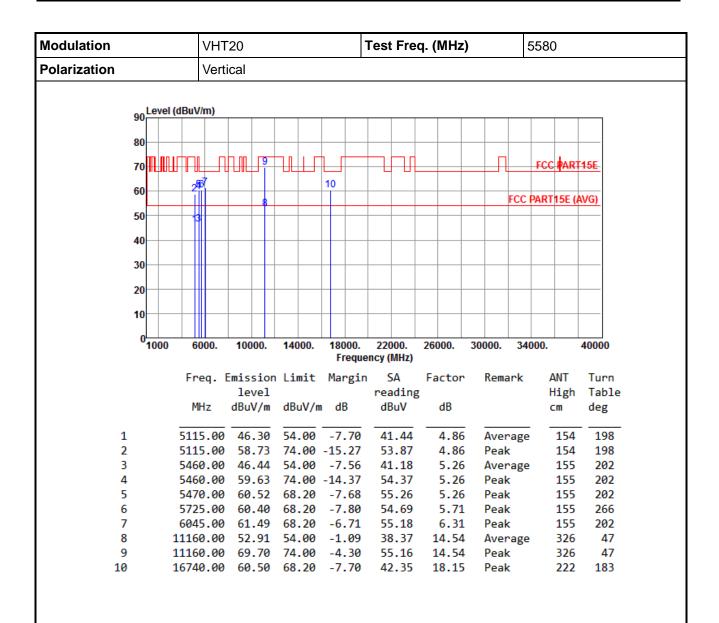


\*Factor includes antenna factor, cable loss and amplifier gain

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

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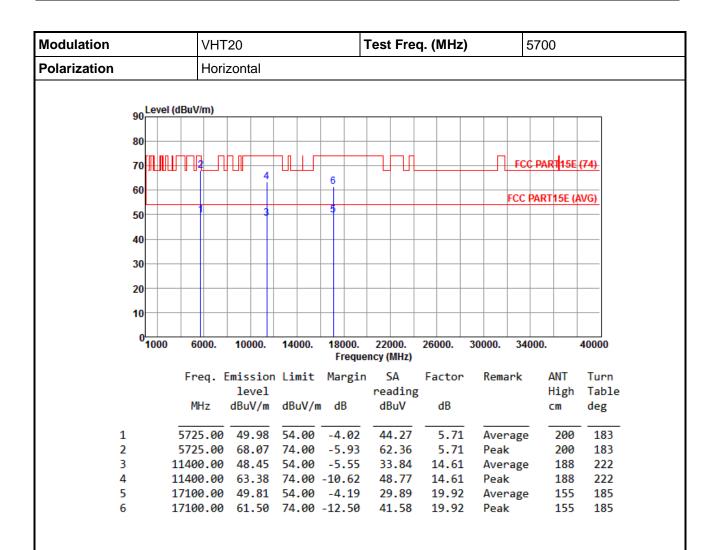


\*Factor includes antenna factor, cable loss and amplifier gain

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

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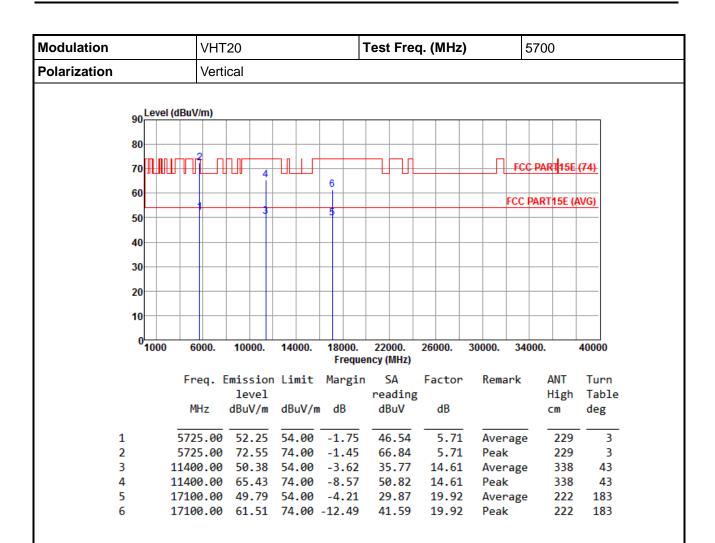


\*Factor includes antenna factor, cable loss and amplifier gain

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

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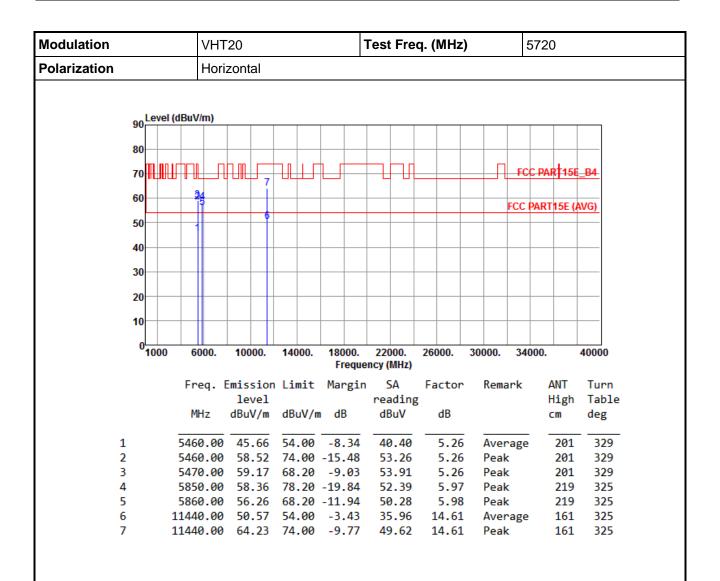


\*Factor includes antenna factor, cable loss and amplifier gain

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

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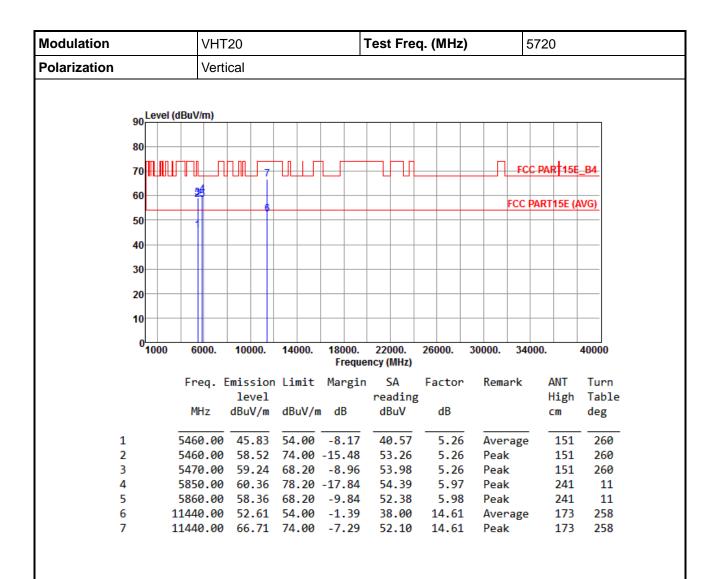


\*Factor includes antenna factor, cable loss and amplifier gain

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

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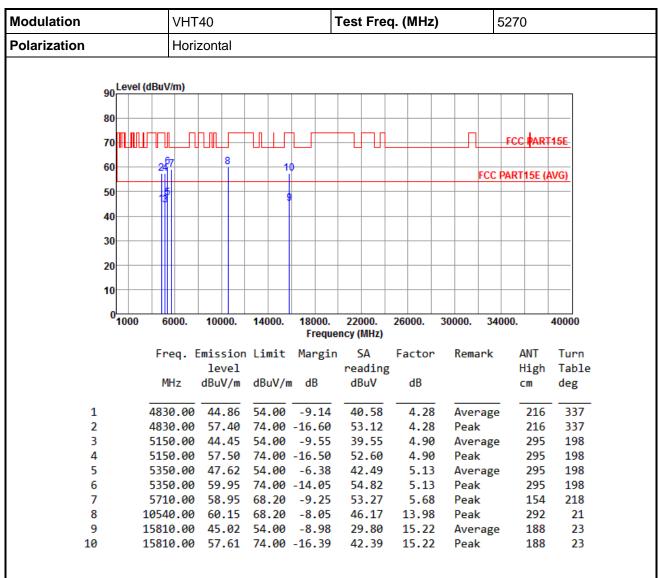
\*Factor includes antenna factor, cable loss and amplifier gain

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



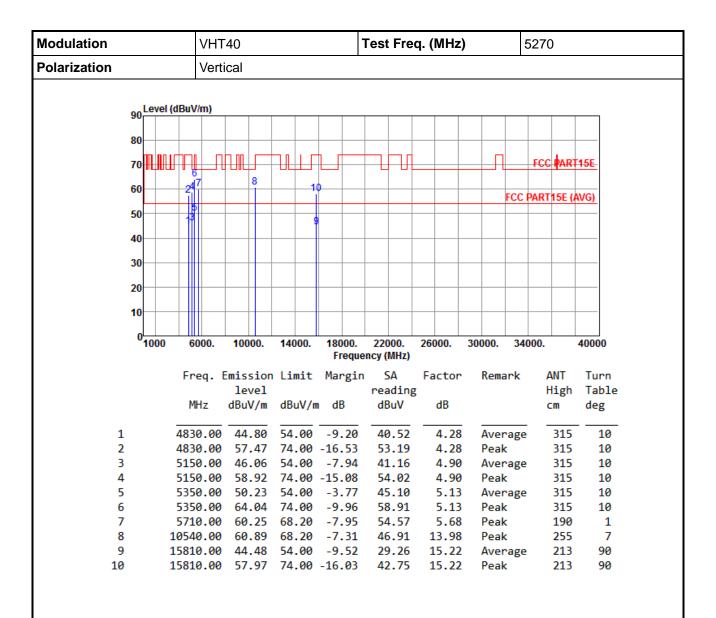
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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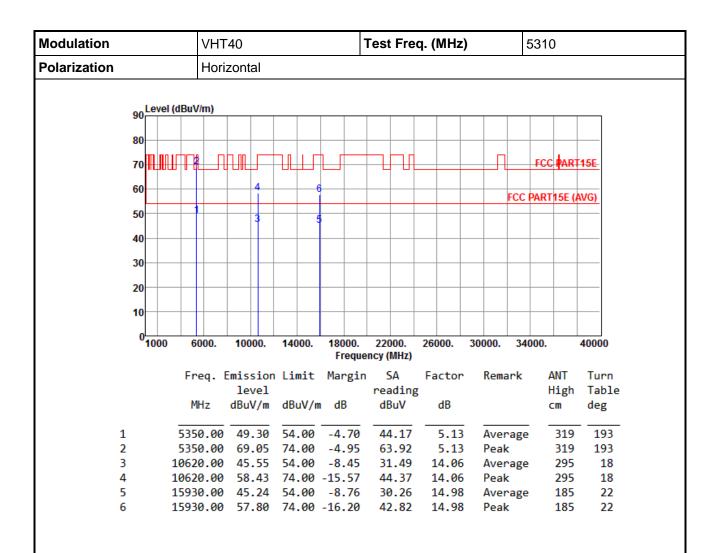


\*Factor includes antenna factor, cable loss and amplifier gain

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

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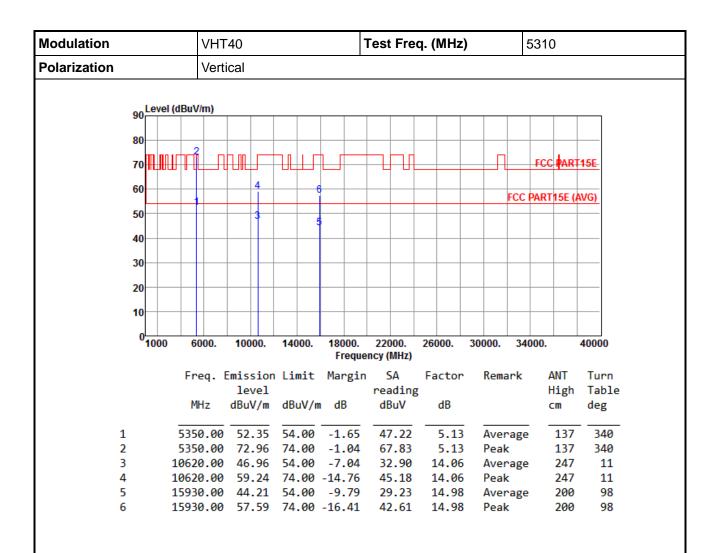


\*Factor includes antenna factor, cable loss and amplifier gain

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

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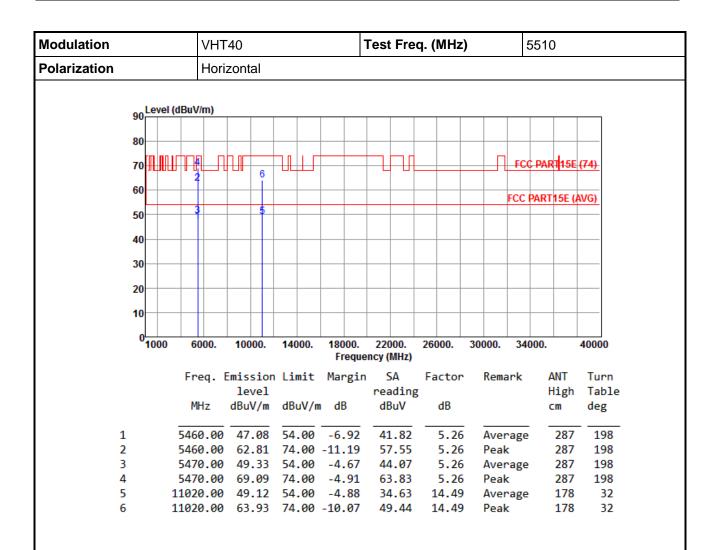


\*Factor includes antenna factor, cable loss and amplifier gain

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

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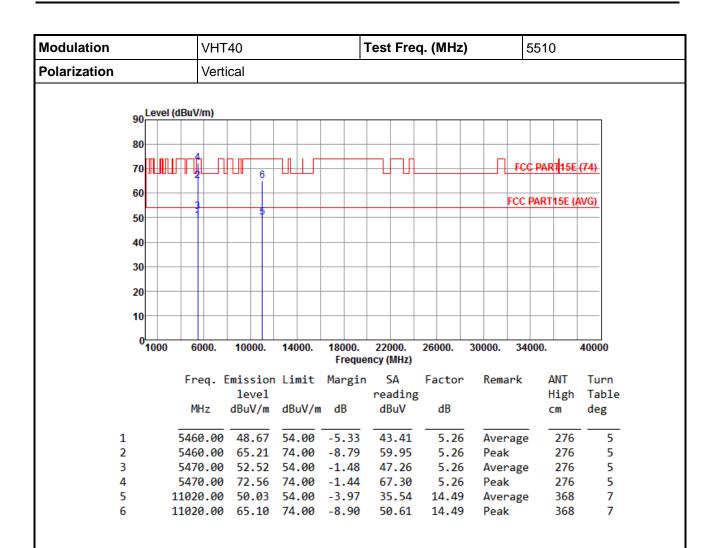


\*Factor includes antenna factor, cable loss and amplifier gain

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

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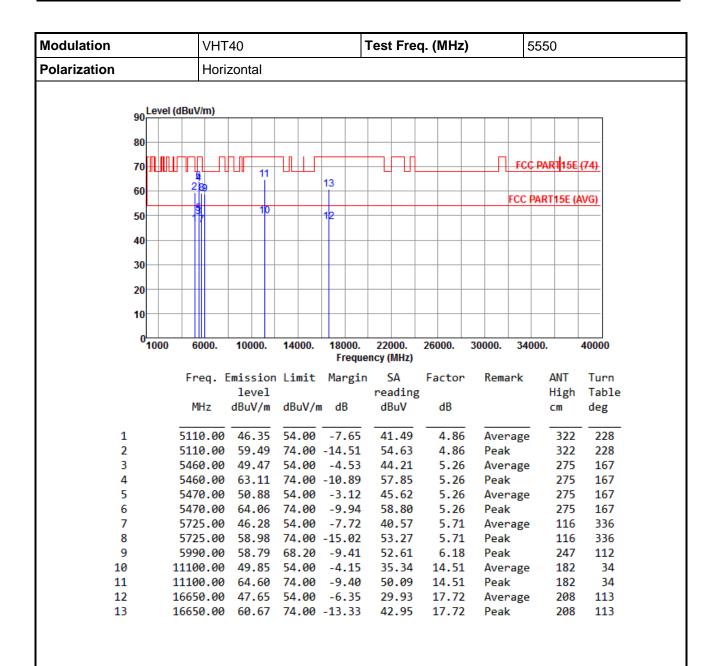


\*Factor includes antenna factor, cable loss and amplifier gain

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

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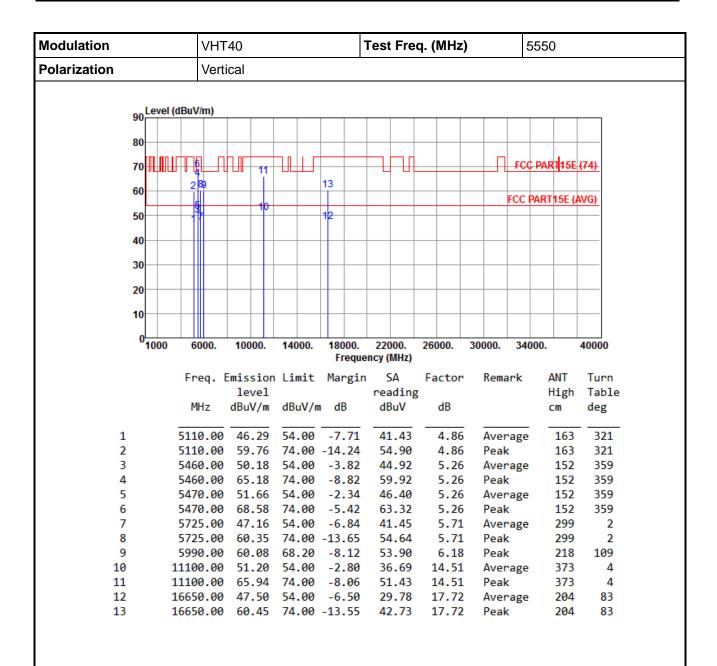


\*Factor includes antenna factor, cable loss and amplifier gain

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

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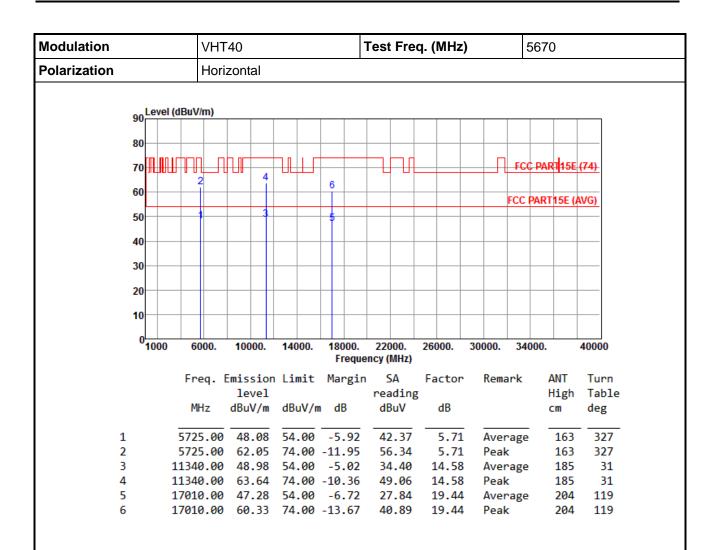


\*Factor includes antenna factor, cable loss and amplifier gain

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

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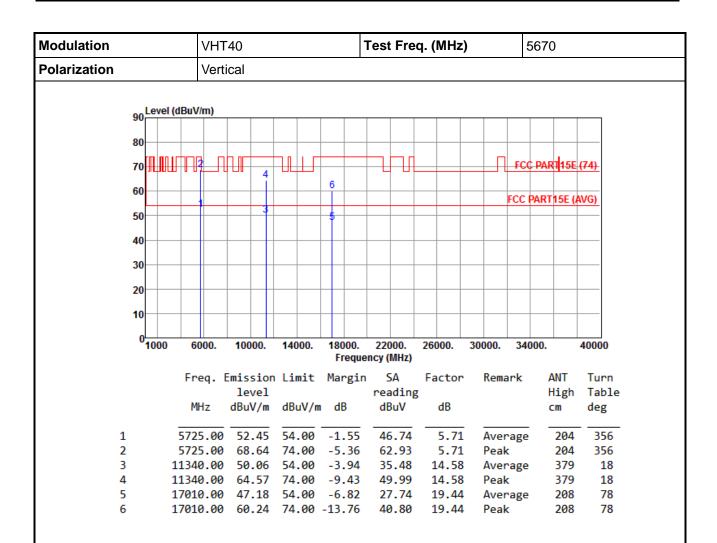


\*Factor includes antenna factor, cable loss and amplifier gain

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

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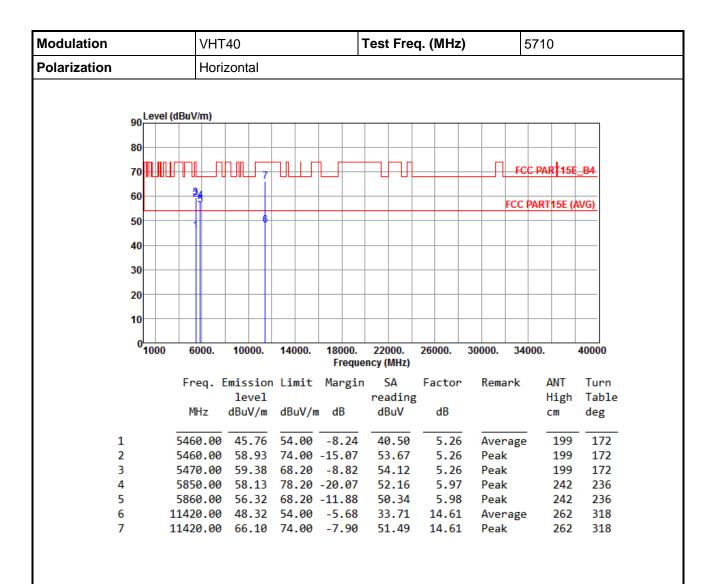


\*Factor includes antenna factor, cable loss and amplifier gain

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

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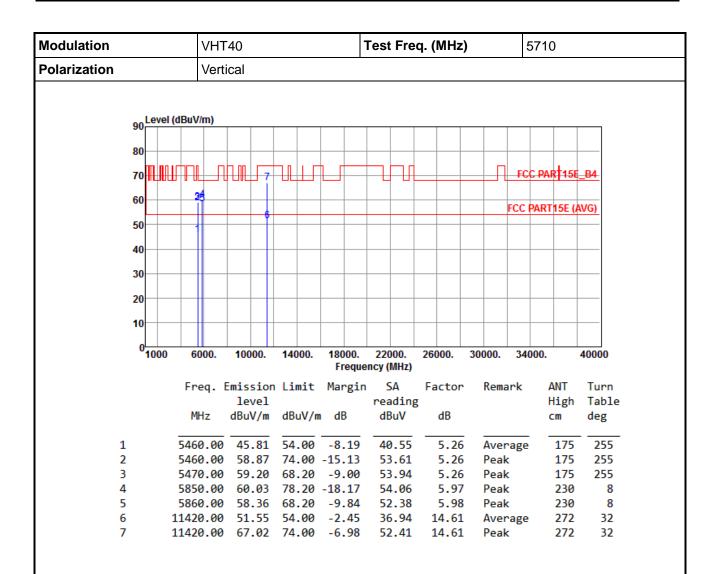


\*Factor includes antenna factor, cable loss and amplifier gain

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

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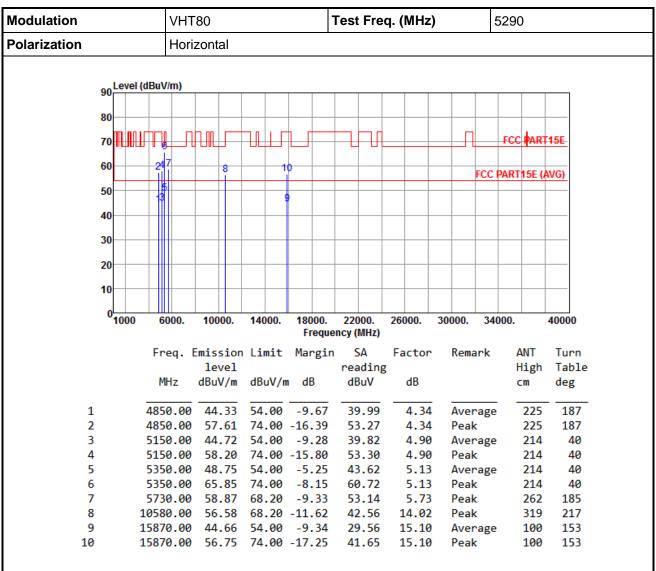
\*Factor includes antenna factor, cable loss and amplifier gain

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



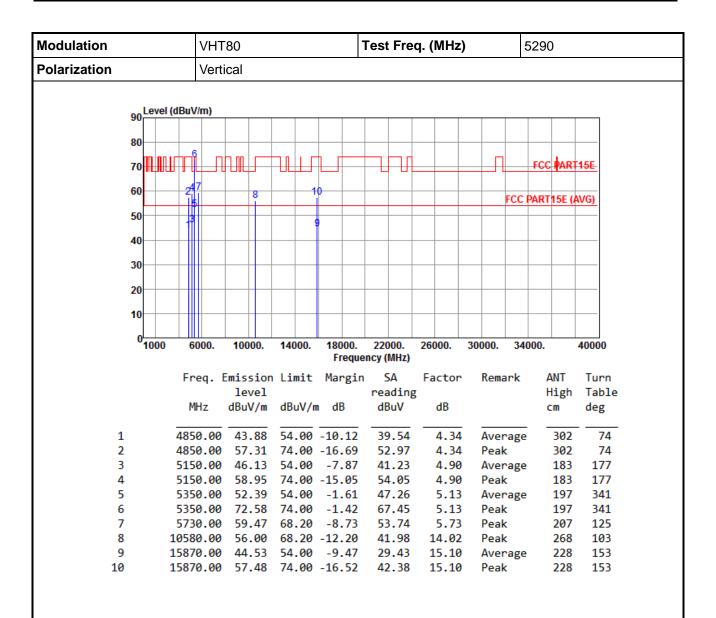
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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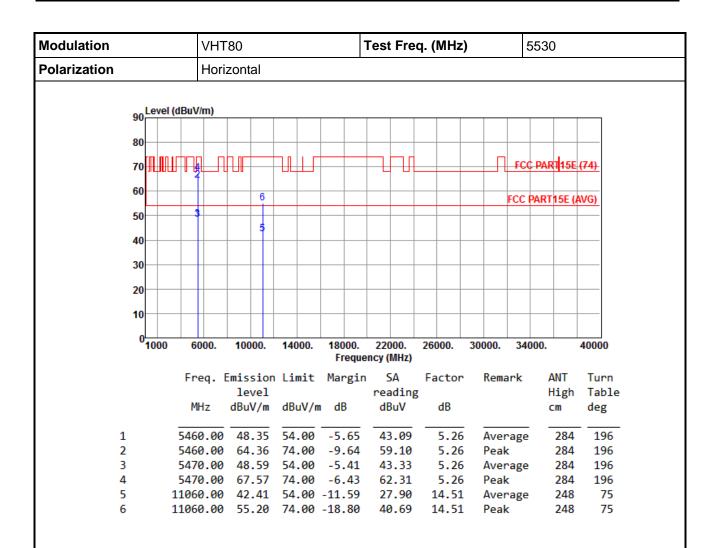


\*Factor includes antenna factor, cable loss and amplifier gain

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

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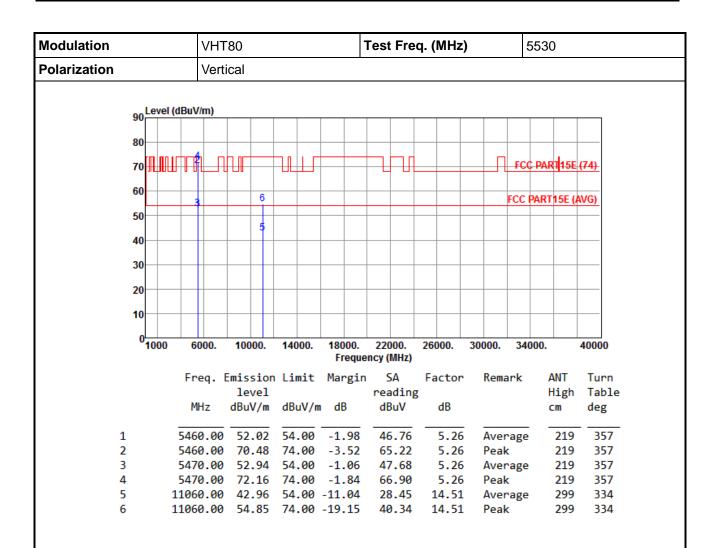


\*Factor includes antenna factor, cable loss and amplifier gain

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

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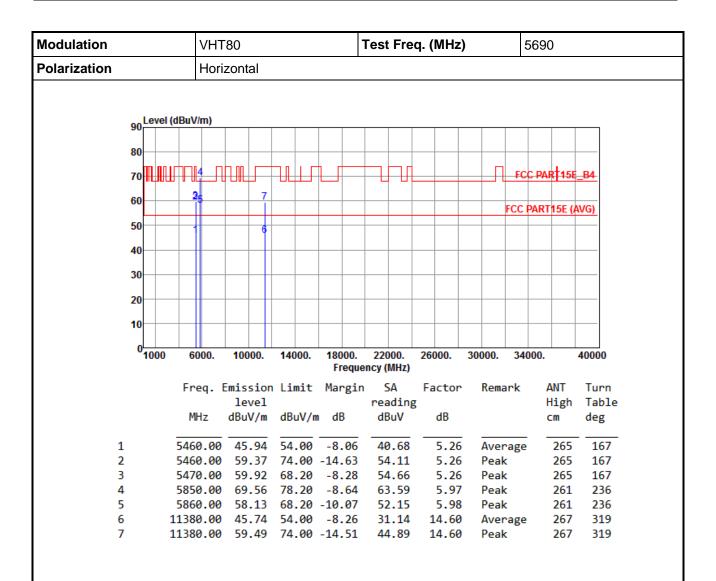


\*Factor includes antenna factor, cable loss and amplifier gain

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

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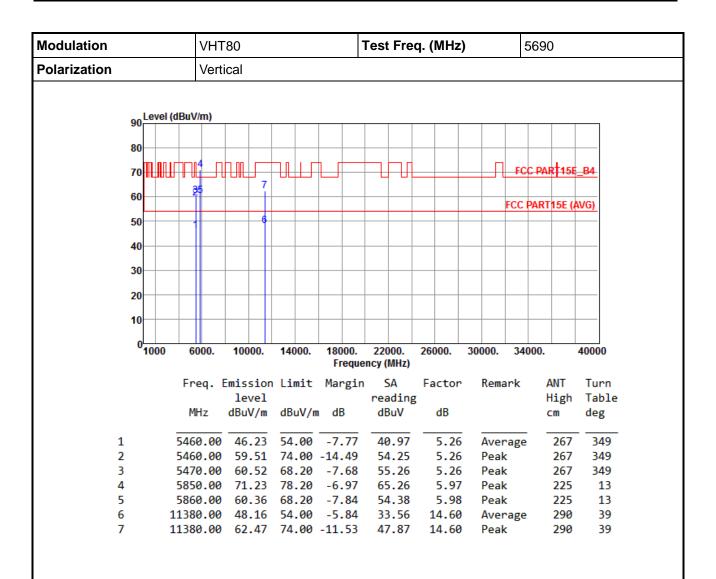


\*Factor includes antenna factor, cable loss and amplifier gain

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

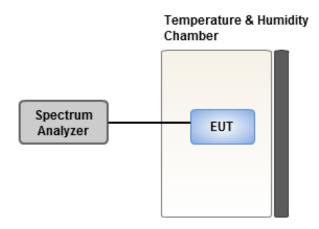
## 3.6.1 Limit of Frequency Stability

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.
- 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



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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	2.17	2.47	2.26	2.82	
T20°CVmin	1.81	2.14	2.50	1.72	
T50°CVnom	4.50	4.66	4.82	4.62	
T40°CVnom	1.77	2.24	1.39	2.25	
T30°CVnom	2.33	2.59	2.76	2.94	
T20°CVnom	2.84	2.96	2.71	2.97	
T10°CVnom	3.26	3.13	3.35	3.39	
T0°CVnom	3.53	4.09	3.74	4.16	
T-10°CVnom	1.84	2.07	2.38	2.21	
T-20°CVnom	1.53	1.57	2.23	1.60	
T-30°CVnom	1.36	1.51	1.38	1.67	
Vnom [Vac]: 120		/max [Vac]: 138	Vmin [Vac]: 1	Vmin [Vac]: 102	
Tnom [°C]: 20 Tm		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 District. 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

==END==

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