

# **FCC Test Report**

FCC ID : UIDSBR-AC1900P

Equipment : AC1900 Wi-Fi Router with RipCurrent<sup>™</sup>

Technology

Model No. : SBR-AC1900P

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 : Jul. 29, 2015

Tested Date : Aug. 21 ~ Sep. 30, 2015

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

Approved & Reviewed by:

Gary Chang / Manager

lac-MRA



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# **Release Record**

Report No.	Version	Description	Issued Date
FR572901AN	Rev. 01	Initial issue	Oct. 13, 2015

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# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.454MHz 38.92 (Margin -7.88dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5705.00MHz 67.19 (Margin -1.01dB) - PK [dBuV/m at 3m]: 5000.00MHz 52.99 (Margin -1.01dB) - AV [dBuV/m at 3m]: 5460.00MHz 52.99 (Margin -1.01dB) - AV	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(e)	6dB bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]:  Non-beamforming mode 5150-5250MHz: 25.73 5725-5850MHz: 21.47  Beamforming mode 5150-5250MHz: 24.77 5725-5850MHz: 20.78	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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#### **General Description** 1

#### Information 1.1

#### 1.1.1 **Specification of the Equipment under Test (EUT)**

	RF General Information					
Frequency IEEE Std. Range (MHz) 802.11		Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	Data Rate / MCS	
5150-5250	а	5180-5240	36-48 [4]	3	6-54 Mbps	
5150-5250	n (HT20)	5180-5240	36-48 [4]	3	MCS 0-23	
5150-5250	n (HT40)	5190-5230	38-46 [2]	3	MCS 0-23	
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	3	MCS 0-9	
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	3	MCS 0-9	
5150-5250	ac (VHT80)	5210	42 [1]	3	MCS 0-9	
5725-5850	а	5745-5825	149-165 [5]	3	6-54 Mbps	
5725-5850	n (HT20)	5745-5825	149-165 [5]	3	MCS 0-23	
5725-5850	n (HT40)	5755-5795	151-159 [2]	3	MCS 0-23	
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	3	MCS 0-9	
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	3	MCS 0-9	
5725-5850	ac (VHT80)	5775	155 [1]	3	MCS 0-9	

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

Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation. Note 3: 802.11n/ac supports beamforming function.

### 1.1.2 Antenna Details

Ant. No.	Typo	Connector	Operating F	equency (MHz) / Gain (dBi)	
AIII. NO.	Туре	Connector	2400~2483.5	5150~5250	5725~5850
1	Dipole	I-pex	3.29	-	-
2	Dipole	I-pex	3.86	-	-
3	Dipole	I-pex	3.66	-	-
4	Dipole	I-pex	-	4.3	4
5	Dipole	I-pex	-	3.2	2.8
6	Dipole	I-pex	-	3.5	4.3

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

I POWAR SIINNIV I VAA	100-240Vac, 50-60Hz, 1.0A Power line: 1.5m non-shielded without core
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## 1.1.4 Accessories

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

## 1.1.5 Channel List

For Frequency band 5150-5250 MHz					
802.11 a /	HT20 / VHT20	HT40 / VHT40			
Channel	Frequency(MHz)	Channel	Frequency(MHz)		
36	5180	38	5190		
40	5200	46	5230		
44	5220	VH	T80		
48	5240	42	5210		

For Frequency band 5725~5850 MHz					
802.11 a / H	T20 / VHT20	HT40 / VHT40			
Channel	Frequency(MHz)	Channel	Frequency(MHz)		
149	5745	151	5755		
153	5765	159	5795		
157	5785	VHT80			
161	5805	155	5775		
165	5825				

# 1.1.6 Test Tool and Duty Cycle

Test Tool	MTool, version 2.0.2.1				
	Mada	Non-beamforming		Beamforming	
	Mode	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	99.63%	0.02	95.95%	0.18
	VHT40	98.38%	0.07	92.47%	0.34
	VHT80	99.30%	0.03	93.11%	0.31

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# 1.1.7 Power Setting

For Frequency band 5150-5250 MHz						
Modulation Mode	Test Frequency (MHz)	Powe	r Set			
Wodulation Wode	Nest Frequency (MH2)	Non-Beamforming	Beamforming			
11a	5180	66				
11a	5200	64				
11a	5240	86				
HT20	5180	66	56			
HT20	5200	64	56			
HT20	5240	86	82			
HT40	5190	68	52			
HT40	5230	78	74			
VHT20	5180	66	56			
VHT20	5200	64	56			
VHT20	5240	86	82			
VHT40	5190	68	52			
VHT40	5230	78	74			
VHT80	5210	60	58			

For Frequency band 5725~5850 MHz					
Modulation Mode	Test Frequency (MHz)	Powe	Power Set		
Wodulation Wode	N	Non-Beamforming	Beamforming		
11a	5745	66			
11a	5785	66			
11a	5825	66			
HT20	5745	66	60		
HT20	5785	66	60		
HT20	5825	66	60		
HT40	5755	56	52		
HT40	5795	72	68		
VHT20	5745	66	60		
VHT20	5785	66	60		
VHT20	5825	66	60		
VHT40	5755	56	52		
VHT40	5795	72	68		
VHT80	5775	50	46		

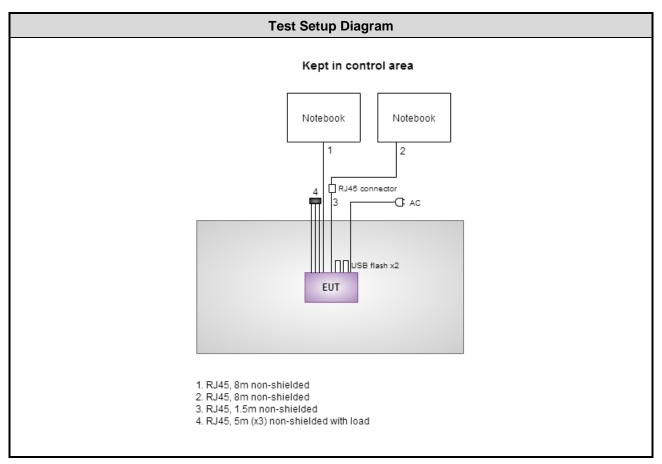
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# 1.2 Local Support Equipment List

	Support Equipment List								
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)				
1	Notebook	DELL	Latitude E6440	DoC	RJ45, 8m non-shielded.				
2	Notebook	DELL	Latitude E6440	DoC	RJ45, 8m non-shielded.				
3	USB 2.0 flash	Kingston	DTSE9						
4	USB 2.0 flash	Kingston	DTSE9						
5	Load	ICC			RJ45, 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)							
Tested Date	Sep. 21, 2015	Sep. 21, 2015							
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until				
EMC Receiver	R&S	ESCS 30	100169	Oct. 17, 2014	Oct. 16, 2015				
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 17, 2014	Nov. 16, 2015				
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015				
Measurement Software	AUDIX	e3	6.120210k	NA	NA				
Note: Calibration Interval of instruments listed above is one year.									

Test Item	Radiated Emission								
Test Site	966 chamber 2 / (03C	H02-WS)							
Tested Date	Aug. 21 ~ Sep. 18, 2015								
Instrument	Manufacturer	Model No.	Serial No.	<b>Calibration Date</b>	Calibration Until				
Spectrum Analyzer	R&S	FSV40	101499	Dec. 31, 2014	Dec. 30, 2015				
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016				
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Oct. 16, 2014	Oct. 15, 2015				
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 14, 2014	Oct. 13, 2015				
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015				
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 10, 2014	Nov. 09, 2015				
Preamplifier	Burgeon	BPA-530	100218	Nov. 10, 2014	Nov. 09, 2015				
Preamplifier	Agilent	83017A	MY39501309	Sep. 29, 2014	Sep. 28, 2015				
Pre-Amplifier	WM	TF-130N-R1	923365	Feb. 10, 2015	Feb. 09, 2016				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 16, 2014	Dec. 15, 2015				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 16, 2014	Dec. 15, 2015				
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 16, 2014	Dec. 15, 2015				
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 16, 2014	Dec. 15, 2015				
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 16, 2014	Dec. 15, 2015				
Measurement Software	AUDIX	e3	6.120210g	NA	NA				
Note: Calibration Inter	val of instruments listed	d above is one year.	·						

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Test Item	RF Conducted	RF Conducted								
Test Site	(TH01-WS)	TH01-WS)								
Tested Date	Sep. 24 ~ Sep. 30, 20	Sep. 24 ~ Sep. 30, 2015								
Instrument	Manufacturer	Manufacturer Model No. Serial No. Calibration Date Calibration Until								
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016					
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 03, 2014	Dec. 02, 2015					
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016					
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016					
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA					
Note: Calibration Inter	rval of instruments liste	d above is one year.								

## 1.5 Testing Applied Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.407

ANSI C63.10-2013

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01

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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

## 1.6 Measurement Uncertainty

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

Measurement Uncertainty					
Parameters	Uncertainty				
Bandwidth	±34.134 Hz				
Conducted power	±0.808 dB				
Frequency error	±34.134 Hz				
Power density	±0.463 dB				
Conducted emission	±2.670 dB				
AC conducted emission	±2.92 dB				
Radiated emission ≤ 1GHz	±3.62 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	22°C / 56%	Kevin Ma
Radiated Emissions	03CH02-WS	21-25°C / 62-68%	Anderson Hung
RF Conducted	TH01-WS	21°C / 64%	Felix Sung

FCC site registration No.: 657002IC site registration No.: 10807A-2

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# 2.2 The Worst Test Modes and Channel Details

## Non-beamforming mode

For Frequency band 5150-5250 MHz							
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration			
Conducted Emissions	11a	5240	6 Mbps				
Radiated Emissions ≤1GHz	11a	5240	6 Mbps				
RF Output Power	11a HT20 HT40 VHT20 VHT40 VHT80	5180 / 5200 / 5240 5180 / 5200 / 5240 5190 / 5230 5180 / 5200 / 5240 5190 / 5230 5210	6 Mbps MCS 0 MCS 0 MCS 0 MCS 0 MCS 0				
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	11a VHT20 VHT40 VHT80	5180 / 5200 / 5240 5180 / 5200 / 5240 5190 / 5230 5210	6 Mbps MCS 0 MCS 0 MCS 0				
Frequency Stability	Un-modulation	5200					

For Frequency band 5725-5850 MHz							
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration			
Conducted Emissions	VHT40	5795	MCS 0				
Radiated Emissions ≤1GHz	VHT40	5795	MCS 0				
RF Output Power	11a HT20 HT40 VHT20 VHT40 VHT80	5745 / 5785 / 5825 5745 / 5785 / 5825 5755 / 5795 5745 / 5785 / 5825 5755 / 5795 5775	6 Mbps MCS 0 MCS 0 MCS 0 MCS 0 MCS 0				
Radiated Emissions >1GHz Emission Bandwidth 6dB bandwidth Peak Power Spectral Density	11a VHT20 VHT40 VHT80	5745 / 5785 / 5825 5745 / 5785 / 5825 5755 / 5795 5775	6 Mbps MCS 0 MCS 0 MCS 0				
Frequency Stability	Un-modulation	5785					

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## Beamforming mode

For Frequency band 5150-5250 MHz								
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration				
Conducted Emissions	VHT20	5240	MCS 0					
Radiated Emissions ≤1GHz	VHT20	5240	MCS 0					
RF Output Power	HT20 HT40 VHT20 VHT40 VHT80	5180 / 5200 / 5240 5190 / 5230 5180 / 5200 / 5240 5190 / 5230 5210	MCS 0 MCS 0 MCS 0 MCS 0 MCS 0					
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	VHT20 VHT40 VHT80	5180 / 5200 / 5240 5190 / 5230 5210	MCS 0 MCS 0 MCS 0					

For Frequency band 5725-5850 MHz							
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration			
Conducted Emissions	VHT40	5795	MCS 0				
Radiated Emissions ≤1GHz	VHT40	5795	MCS 0				
RF Output Power	HT20 HT40 VHT20 VHT40 VHT80	5745 / 5785 / 5825 5755 / 5795 5745 / 5785 / 5825 5755 / 5795 5775	MCS 0 MCS 0 MCS 0 MCS 0 MCS 0				
Radiated Emissions >1GHz Emission Bandwidth 6dB bandwidth Peak Power Spectral Density	VHT20 VHT40 VHT80	5745 / 5785 / 5825 5755 / 5795 5775	MCS 0 MCS 0 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.

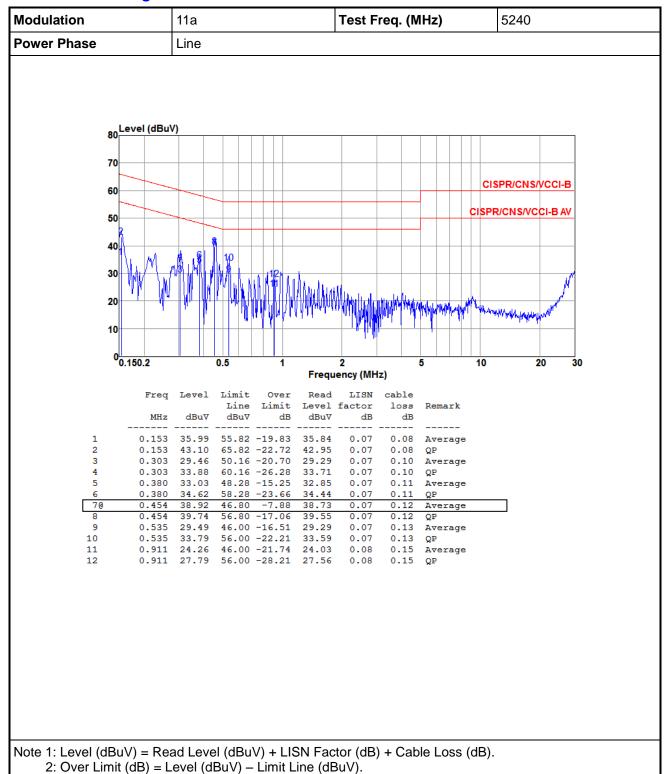
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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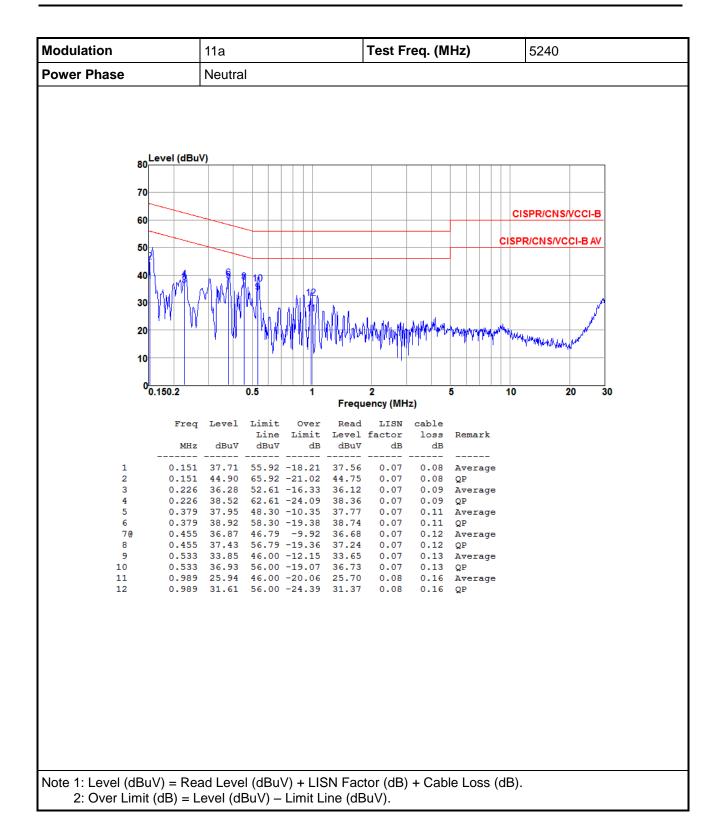
#### 3.1.4 Test Result of Conducted Emissions

## Non-beamforming mode



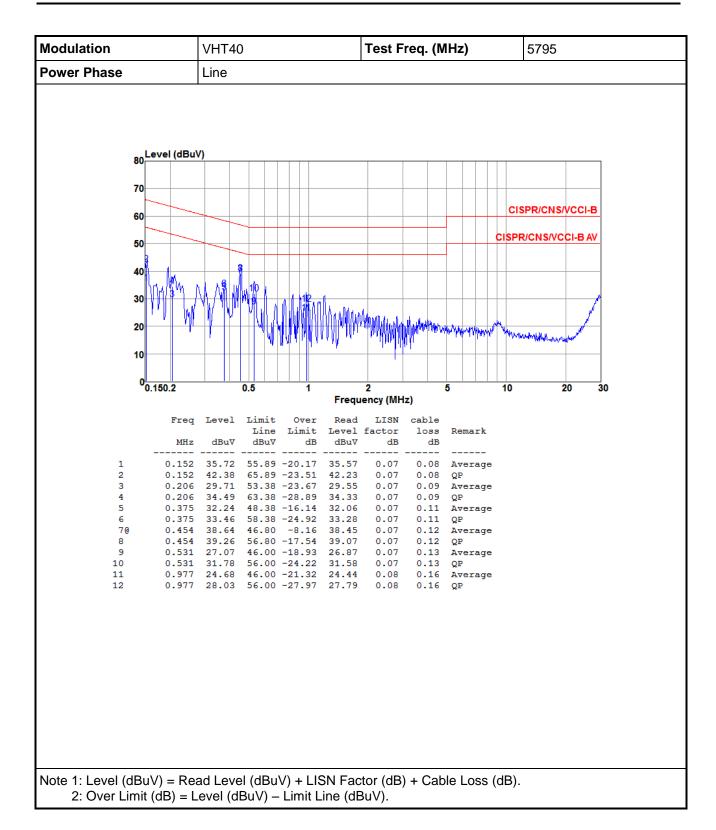
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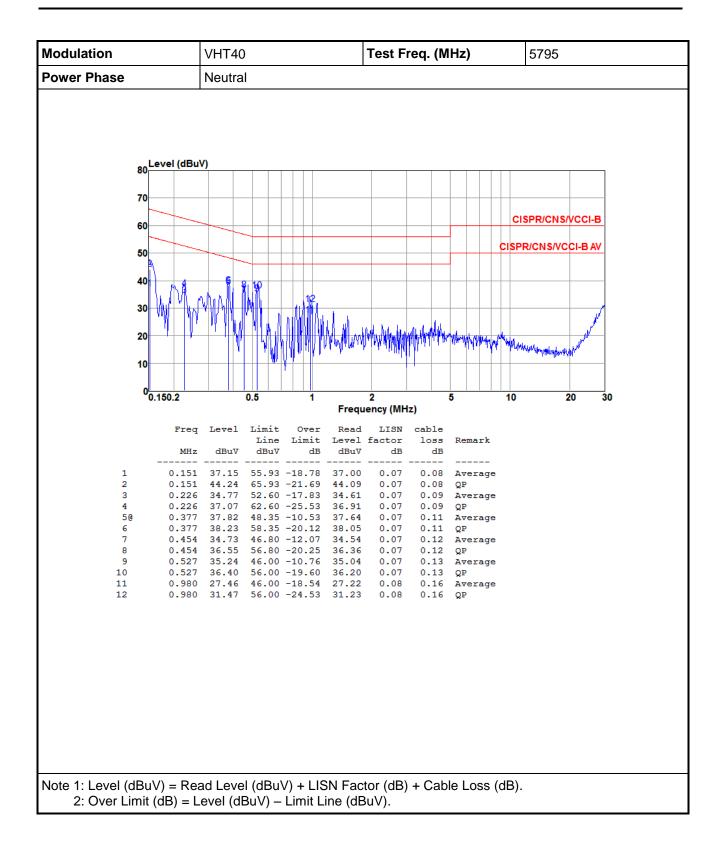
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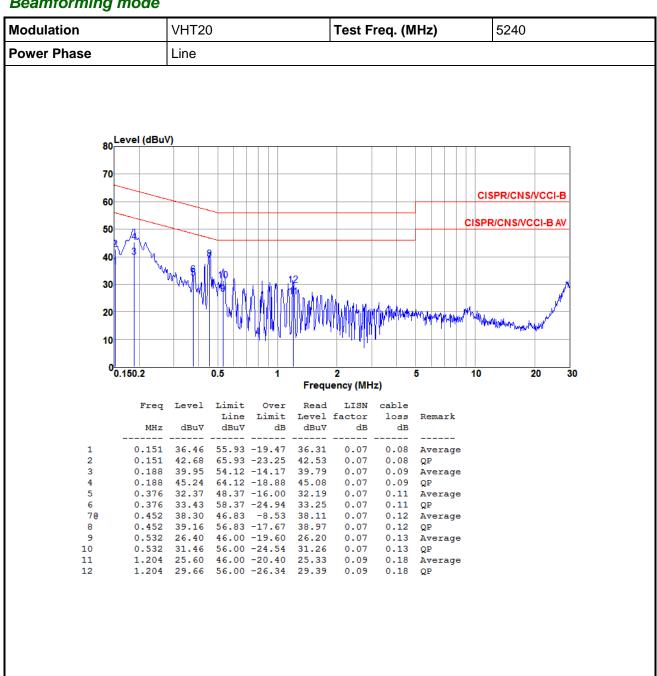




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### Beamforming mode

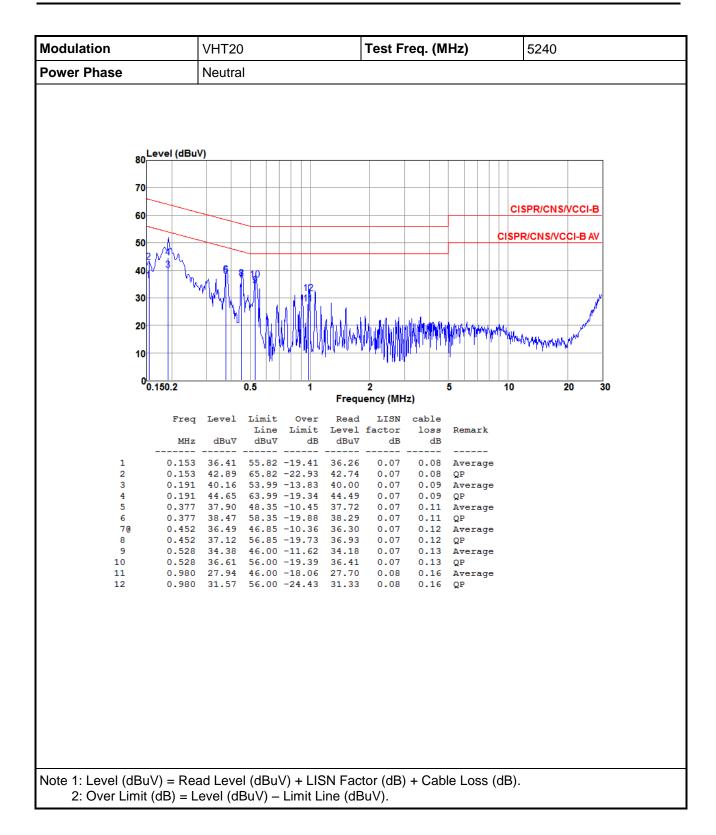


Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

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

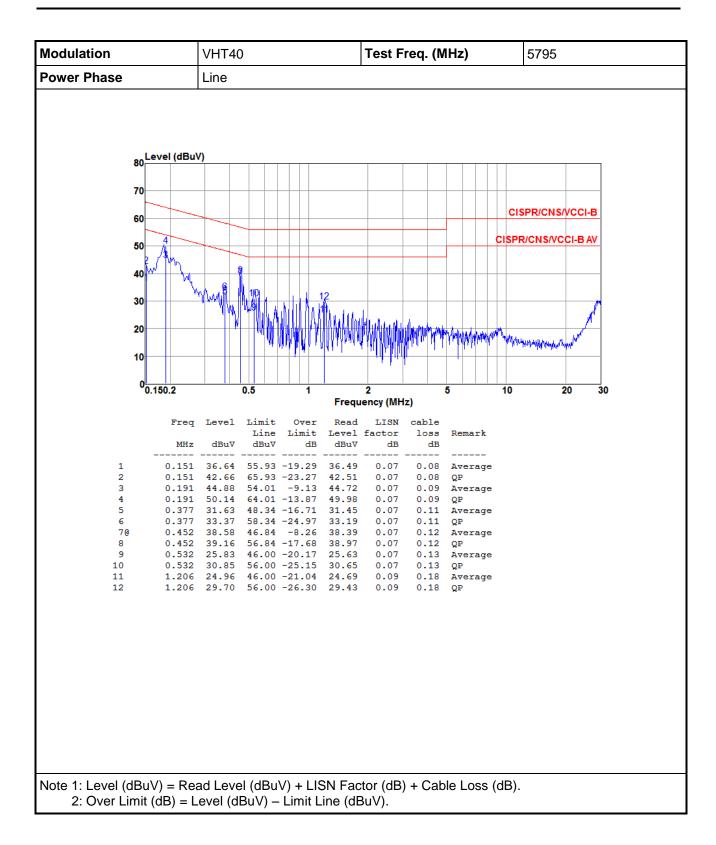
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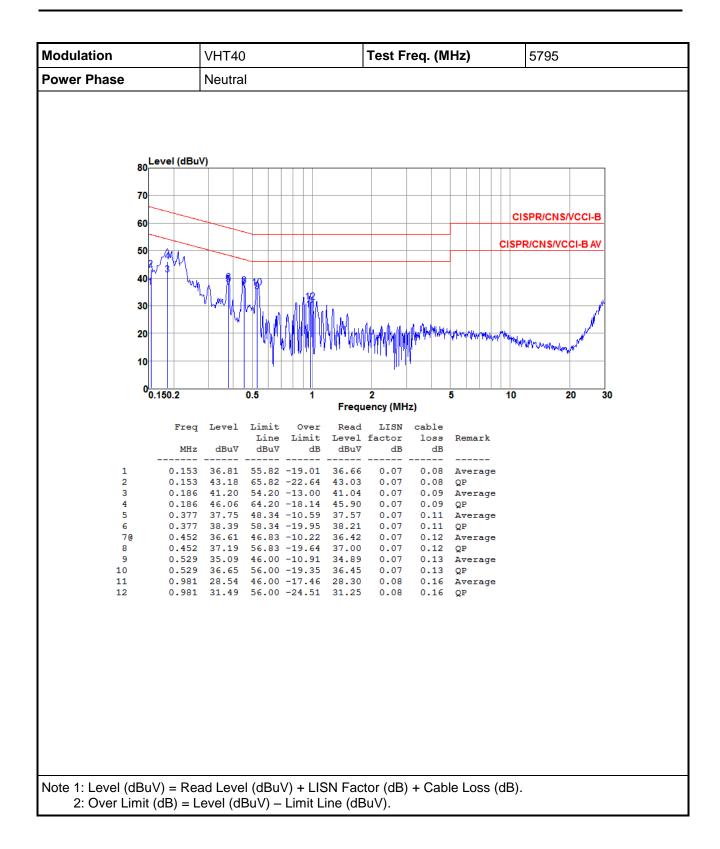
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### 3.2 Emission Bandwidth

#### 3.2.1 Limit of Emission bandwidth

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

#### 3.2.2 Test Procedures

#### 26dB Bandwidth

- 1. Set RBW = approximately 1% of the emission bandwidth.
- 2. Set the VBW > RBW, Detector = Peak.
- 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

#### 6dB Bandwidth

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

### 3.2.3 Test Setup



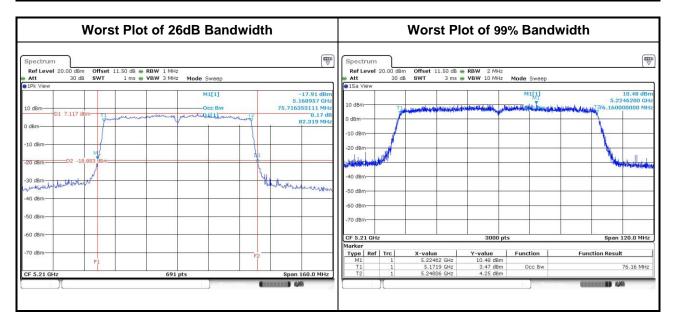
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### 3.2.4 Test Result of Emission Bandwidth

## Non-beamforming mode

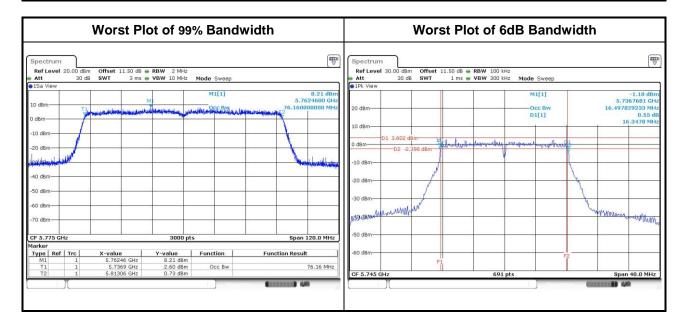
	For Frequency band 5150-5250 MHz									
	Emission Bandwidth									
Mode	NI	Freq.	2	26dB Band	width (MHz	)	l	99% Bandv	vidth (MHz)	
wode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
11a	3	5180	20.29	20.46	20.35		16.84	16.76	16.72	
11a	3	5200	20.17	20.41	20.23		16.85	16.78	16.75	
11a	3	5240	20.46	20.52	20.46		16.84	16.78	16.75	
VHT20	3	5180	20.46	20.52	20.58		17.86	17.74	17.78	
VHT20	3	5200	20.75	20.46	20.52		17.86	17.73	17.77	
VHT20	3	5240	20.81	20.87	20.81		17.87	17.77	17.81	
VHT40	3	5190	40.93	40.46	40.12		36.52	36.56	36.52	
VHT40	3	5230	40.81	40.35	40.23		36.52	36.54	36.56	
VHT80	3	5210	81.86	82.32	81.62		76.04	76.16	76.00	



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	For Frequency band 5725-5850 MHz													
	Emission Bandwidth													
			О	BW Band	width (MH	z)		6dB B	andwidth	(MHz)				
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	6dB BW Limit (MHz)			
11a	3	5745	16.93	16.77	16.74		16.35	16.35	16.35		0.5			
11a	3	5785	16.85	16.78	16.74		16.35	16.35	16.35		0.5			
11a	3	5825	16.84	16.77	16.75		16.35	16.35	16.41		0.5			
VHT20	3	5745	17.92	17.77	17.80		17.62	17.62	17.62		0.5			
VHT20	3	5785	17.86	17.77	17.79		17.57	17.62	17.57		0.5			
VHT20	3	5825	17.90	17.77	17.80		17.57	17.62	17.57		0.5			
VHT40	3	5755	36.56	36.48	36.54		36.29	36.41	36.41		0.5			
VHT40	3	5795	36.50	36.46	36.58		36.41	36.41	36.41		0.5			
VHT80	3	5775	76.12	76.08	76.16		75.59	75.59	76.06		0.5			

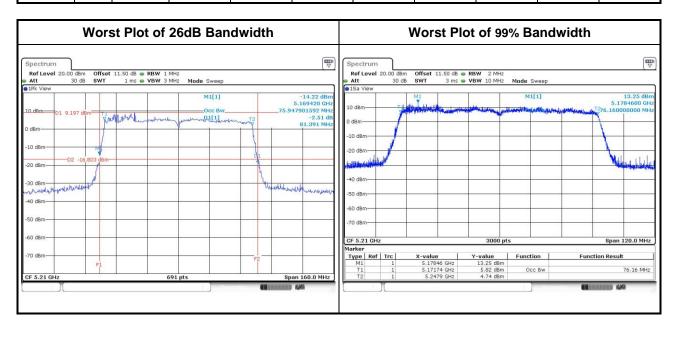


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## Beamforming mode

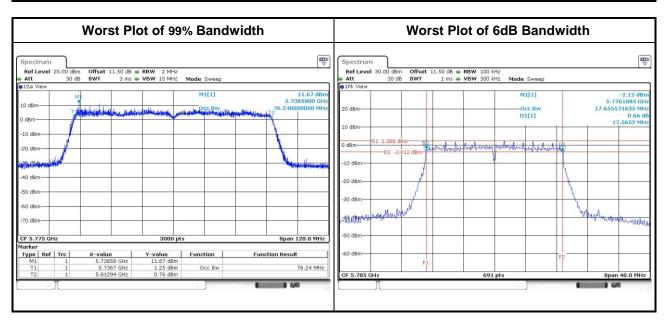
	For Frequency band 5150-5250 MHz													
	Emission Bandwidth													
Mada		Freq.	2	26dB Band	width (MHz	)		99% Bandv	vidth (MHz)	1				
Mode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3				
VHT20	3	5180	20.64	20.23	20.58		17.81	17.71	17.75					
VHT20	3	5200	20.58	20.52	20.58		17.81	17.73	17.76					
VHT20	3	5240	20.58	20.35	20.58		17.83	17.74	17.77					
VHT40	3	5190	40.46	40.70	40.23		36.46	36.46	36.50					
VHT40	3	5230	40.93	40.81	40.93		36.48	36.48	36.50					
VHT80	3	5210	81.39	80.93	80.23		76.04	76.08	76.16					



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	For Frequency band 5725-5850 MHz											
	Emission Bandwidth											
			o	BW Band	width (MH	z)		6dB B	andwidth	(MHz)		
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	6dB BW Limit (MHz)	
VHT20	3	5745	17.84	17.72	17.77		17.62	17.62	17.62		0.5	
VHT20	3	5785	17.84	17.75	17.76		17.57	17.62	17.57		0.5	
VHT20	3	5825	17.84	17.72	17.77		17.57	17.57	17.57		0.5	
VHT40	3	5755	36.60	36.46	36.52		35.94	35.71	35.48		0.5	
VHT40	3	5795	36.54	36.48	36.58		35.83	36.06	36.29		0.5	
VHT80	3	5775	76.20	76.16	76.24		75.59	74.90	75.83		0.5	



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## 3.3 RF Output Power

## 3.3.1 Limit of RF Output Power

	Frequency band 5150-5250 MHz									
Ope	erating Mode	Limit								
	Outdoor access point	Conducted Power: 1 W The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)								
$\boxtimes$	Indoor access point	Conducted Power: 1 W								
	Fixed point-to-point access points	Conducted Power: 1 W								
	Mobile and portable client devices	Conducted Power: 250 mW								

Free	quency Band (MHz)	Limit				
	5250 ~ 5350	250mW or 11dBm+10 log B				
	5470 ~ 5725	250mW or 11dBm+10 log B				
$\boxtimes$	5725 ~ 5850	1 W				
Note	e: "B" is the 26dB emission bandwidth i	n MHz.				

#### 3.3.2 Test Procedures

#### Method PM-G (Measurement using a gated RF average power meter)

Measurements is performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

## 3.3.3 Test Setup



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# 3.3.4 Test Result of Maximum Conducted Output Power

# Non-beamforming mode

			For Frequ	uency band	5150-5250	MHz			
			С	onducted I	Power (dBn	Total	Total	Limit	
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11a	3	5180	16.13	16.14	16.37		125.486	20.99	30.00
11a	3	5200	15.84	15.71	15.87		114.247	20.58	30.00
11a	3	5240	20.73	21.07	21.08		374.475	25.73	30.00
HT20	3	5180	15.98	16.06	16.11		120.824	20.82	30.00
HT20	3	5200	15.83	15.55	15.68		111.157	20.46	30.00
HT20	3	5240	20.71	20.76	20.86		358.784	25.55	30.00
HT40	3	5190	16.39	16.33	16.48		130.968	21.17	30.00
HT40	3	5230	18.32	18.42	18.29		204.876	23.11	30.00
VHT20	3	5180	16.03	16.12	16.23		122.989	20.90	30.00
VHT20	3	5200	15.89	15.63	15.76		113.045	20.53	30.00
VHT20	3	5240	20.79	20.81	20.92		364.048	25.61	30.00
VHT40	3	5190	16.47	16.36	16.54		132.694	21.23	30.00
VHT40	3	5230	18.39	18.49	18.34		207.890	23.18	30.00
VHT80	3	5210	14.49	14.73	14.76		87.758	19.43	30.00

			For Freq	uency band	5725-5850	MHz			
		- ()	С	onducted I	Power (dBn	Total	Total	Limit	
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11a	3	5745	15.75	15.79	15.42		110.349	20.43	30.00
11a	3	5785	15.72	15.81	15.63		111.991	20.49	30.00
11a	3	5825	15.74	15.92	15.61		112.973	20.53	30.00
HT20	3	5745	15.55	15.76	15.55		109.455	20.39	30.00
HT20	3	5785	15.66	15.72	15.61		110.529	20.43	30.00
HT20	3	5825	15.71	15.82	15.62		111.909	20.49	30.00
HT40	3	5755	13.71	13.69	13.06		67.115	18.27	30.00
HT40	3	5795	16.69	16.73	16.51		138.535	21.42	30.00
VHT20	3	5745	15.62	15.81	15.61		110.973	20.45	30.00
VHT20	3	5785	15.69	15.76	15.65		111.467	20.47	30.00
VHT20	3	5825	15.74	15.86	15.67		112.943	20.53	30.00
VHT40	3	5755	13.74	13.72	13.15		67.863	18.32	30.00
VHT40	3	5795	16.74	16.78	16.56		140.139	21.47	30.00
VHT80	3	5775	12.14	12.56	12.37		51.657	17.13	30.00

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## Beamforming mode

			For Freq	uency band	d 5150-5250	MHz				
			C	onducted l	Power (dBn	Total	Total	Limit		
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)	
HT20	3	5180	14.52	14.66	14.46		85.481	19.32	27.55	
HT20	3	5200	14.43	14.22	14.41		81.763	19.13	27.55	
HT20	3	5240	19.98	19.83	19.96		294.785	24.70	27.55	
HT40	3	5190	13.61	13.69	13.78		70.228	18.47	27.55	
HT40	3	5230	17.95	17.76	17.88		183.453	22.64	27.55	
VHT20	3	5180	14.58	14.69	14.51		86.401	19.37	27.55	
VHT20	3	5200	14.49	14.39	14.45		83.459	19.21	27.55	
VHT20	3	5240	20.01	20.02	19.98		300.233	24.77	27.55	
VHT40	3	5190	13.69	13.73	13.81		71.037	18.51	27.55	
VHT40	3	5230	18.05	17.83	17.92		186.444	22.71	27.55	
VHT80	3	5210	14.71	14.63	14.47		86.610	19.38	27.55	

#### Note:

1. Directional gain =  $10 * \log((10^{4.3/20} + 10^{3.2/20} + 10^{3.5/20})^2/3) = 8.45 \text{ dBi} > 6 \text{ dBi}$ Limit shall be reduced to 30 dBm - (8.45 dBi - 6 dBi) = 27.55 dBm.

			For Freq	uency band	d 5725-5850	) MHz			
			C	onducted l	Power (dBn	Total	Total	Limit	
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
HT20	3	5745	14.66	14.92	14.76		90.210	19.55	27.50
HT20	3	5785	14.62	14.81	14.82		89.581	19.52	27.50
HT20	3	5825	14.58	14.82	14.66		88.288	19.46	27.50
HT40	3	5755	13.32	13.31	13.21		63.848	18.05	27.50
HT40	3	5795	15.86	15.96	15.91		116.988	20.68	27.50
VHT20	3	5745	14.71	14.98	14.82		91.397	19.61	27.50
VHT20	3	5785	14.68	14.91	14.88		91.112	19.60	27.50
VHT20	3	5825	14.62	14.89	14.71		89.385	19.51	27.50
VHT40	3	5755	13.41	13.38	13.29		65.036	18.13	27.50
VHT40	3	5795	16.01	16.03	15.99		119.708	20.78	27.50
VHT80	3	5775	11.91	12.12	12.08		47.960	16.81	27.50

### Note:

1. Directional gain =  $10 * \log((10^{4/20} + 10^{2.8/20} + 10^{4.3/20})^2/3) = 8.50 \text{ dBi} > 6 \text{ dBi}$ Limit shall be reduced to 30 dBm - (8.50 dBi - 6 dBi) = 27.50 dBm.

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# 3.4 Peak Power Spectral Density

## 3.4.1 Limit of Peak Power Spectral Density

	Frequency band 5150-5250 MHz								
Оре	Operating Mode Limit								
	Outdoor access point	17 dBm / MHz							
$\boxtimes$	Indoor access point	17 dBm / MHz							
	Fixed point-to-point access points	17 dBm / MHz							
	Mobile and portable client devices	11 dBm / MHz							

Free	quency Band (MHz)	Limit
	5250 ~ 5350	11 dBm / MHz
	5470 ~ 5725	11 dBm / MHz
	5725 ~ 5850	30 dBm /500 kHz

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#### 3.4.2 Test Procedures

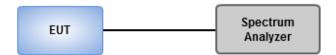
#### For 5150 ~ 5250 MHz

- Method SA-1 (Non Beamforming)
  - 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.

#### For 5725 ~ 5850 MHz

- Method SA-1 (Non Beamforming)
  - 1. Set RBW = 500 kHz, VBW = 2 MHz, Sweep time = auto, Detector = RMS.
  - 2. Trace average 100 traces.
  - 3. Use the peak marker function to determine the maximum amplitude level.
- - 1. Set RBW = 500 kHz, VBW = 2 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.

#### 3.4.3 Test Setup



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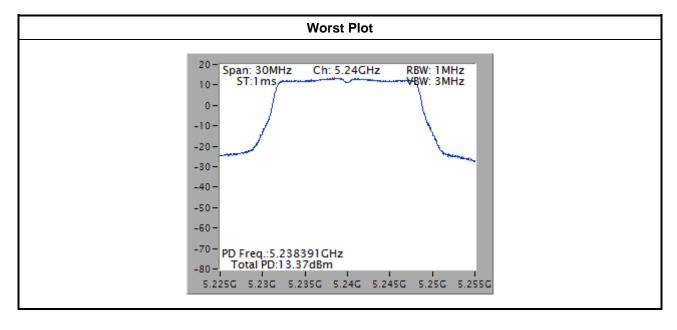
## 3.4.4 Test Result of Peak Power Spectral Density

## Non-beamforming mode

			For Frequency	band 5150-5250 MF	lz						
Co	ndition			Peak Power Spectral Density (dBm/MHz)							
Modulation 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	3	5180	8.43	0.00	8.43	14.55					
11a	3	5200	8.13	0.00	8.13	14.55					
11a	3	5240	13.37	0.00	13.37	14.55					
VHT20	3	5180	7.88	0.00	7.88	14.55					
VHT20	3	5200	7.72	0.00	7.72	14.55					
VHT20	3	5240	12.92	0.00	12.92	14.55					
VHT40	3	5190	5.71	0.00	5.71	14.55					
VHT40	3	5230	7.72	0.00	7.72	14.55					
VHT80	3	5210	0.24	0.00	0.24	14.55					

#### Note:

- 1. D.F is duty factor.
- 2. Test result is bin-by-bin summing measured value of each TX port. 3. Directional gain =  $10 * log((10^{4.3/20} + 10^{3.2/20} + 10^{3.5/20})^2/3) = 8.45 dBi > 6 dBi$ Limit shall be reduced to 17 dBm - (8.45 dBi - 6 dBi) = 14.55 dBm.



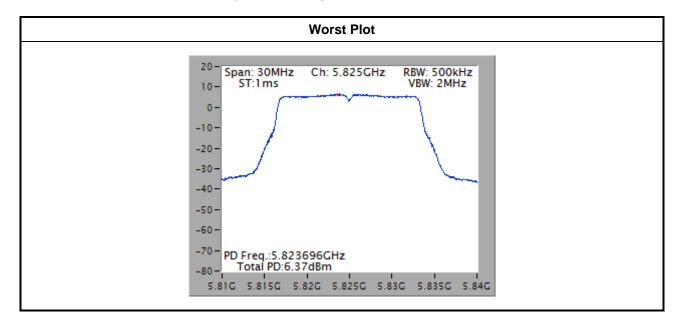
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For Frequency band 5725-5850 MHz							
Condition			Peak Power Spectral Density (dBm/500kHz)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)	
11a	3	5745	6.25	0.00	6.25	27.50	
11a	3	5785	6.27	0.00	6.27	27.50	
11a	3	5825	6.37	0.00	6.37	27.50	
VHT20	3	5745	5.99	0.00	5.99	27.50	
VHT20	3	5785	6.01	0.00	6.01	27.50	
VHT20	3	5825	6.11	0.00	6.11	27.50	
VHT40	3	5755	1.22	0.00	1.22	27.50	
VHT40	3	5795	4.23	0.00	4.23	27.50	
VHT80	3	5775	-3.52	0.00	-3.52	27.50	

#### Note:

- 1. D.F is duty factor.
- Test result is bin-by-bin summing measured value of each TX port. Directional gain =  $10 * log((10^{4/20}+10^{2.8/20}+10^{4.3/20})^2/3) = 8.50 dBi > 6 dBi$  Limit shall be reduced to 30 dBm (8.50 dBi 6 dBi) = 27.50 dBm.



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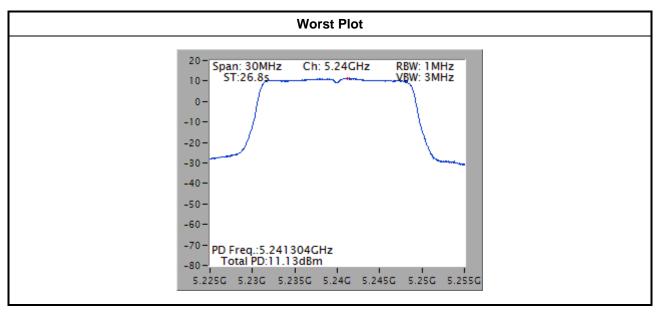


## Beamforming mode

For Frequency band 5150-5250 MHz							
Condition			Peak Power Spectral Density (dBm/MHz)				
Modulation 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	3	5180	5.53	0.18	5.71	14.55	
VHT20	3	5200	5.59	0.18	5.77	14.55	
VHT20	3	5240	11.13	0.18	11.31	14.55	
VHT40	3	5190	2.03	0.34	2.37	14.55	
VHT40	3	5230	6.17	0.34	6.51	14.55	
VHT80	3	5210	0.05	0.31	0.36	14.55	

#### Note:

- 1. D.F is duty factor.
- 2.
- Test result is bin-by-bin summing measured value of each TX port. Directional gain =  $10 * log((10^{4.3/20} + 10^{3.2/20} + 10^{3.5/20})^2/3) = 8.45 dBi > 6 dBi$  Limit shall be reduced to 17 dBm (8.45 dBi 6 dBi) = 14.55 dBm.



Note: The plot is without duty factor.

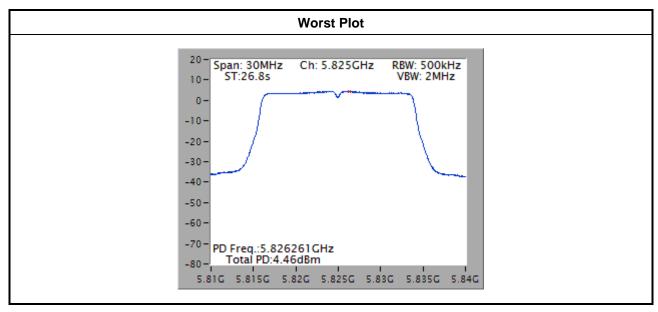
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For Frequency band 5725-5850 MHz							
Condition			Peak Power Spectral Density (dBm/500kHz)				
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)	
VHT20	3	5745	4.28	0.18	4.46	27.50	
VHT20	3	5785	4.23	0.18	4.41	27.50	
VHT20	3	5825	4.46	0.18	4.64	27.50	
VHT40	3	5755	-0.15	0.34	0.19	27.50	
VHT40	3	5795	2.77	0.34	3.11	27.50	
VHT80	3	5775	-2.95	0.31	-2.64	27.50	

#### Note:

- 1. D.F is duty factor.
- 2.
- Test result is bin-by-bin summing measured value of each TX port. Directional gain =  $10 * log((10^{4/20}+10^{2.8/20}+10^{4.3/20})^2/3) = 8.50 dBi > 6 dBi$  Limit shall be reduced to 30 dBm (8.50 dBi 6 dBi) = 27.50 dBm.



Note: The plot is without duty factor.

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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					
5.15 - 5.25 GHz	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
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]					
5.725 - 5.850 GHz	5.715 5.725 GHz: e.i.r.p17 dBm [78.2 dBuV/m@3m] 5.85 5.86 GHz: e.i.r.p17 dBm [78.2 dBuV/m@3m] Other un-restricted band: 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

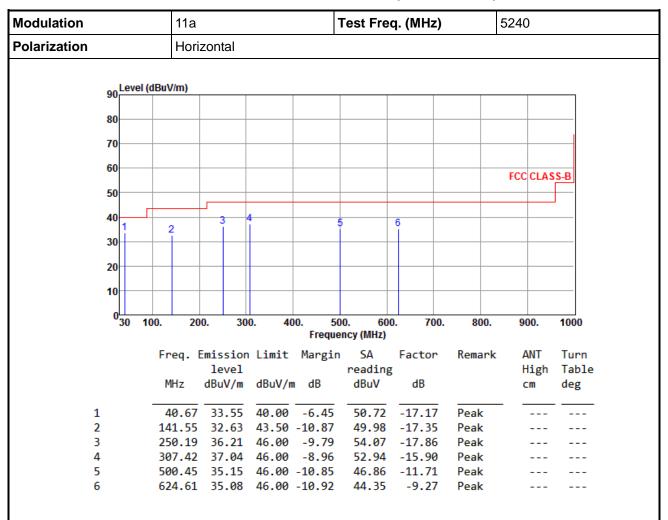


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### Non- beamforming mode

# 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	Modulation				11a			Test Freq. (MHz)				5240		
Polarization			Vertical											
9	o <mark>Le</mark>	vel (dB	uV/m)											
8	0													
7	0													
6	0									ECC	CLAS	e D		
5	0									100	CLAS	3-0		
				4										
4	0 1	1 3									6	5		
3	0													
2	0													
1	0													
	0 30							. 700				4000		
	30	100.	. 20	0. 30	0. 40		00. 60 ency (MHz)	0. 700	. 800.	90	00.	1000		
		F	Frea. F	mission	Limit	Margin		Factor	Remark	. Δ	NT	Turn		
				level			reading				ligh	Table		
			MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		C	m	deg		
1		_	38.73	35.45	40.00	-4.55	52.79	-17.34	QP QP		100	- 0		
2			54.25	36.75	40.00	-3.25	53.41	-16.66	Peak					
3			86.26	32.27	40.00		55.06		Peak					
4			283.17		46.00			-16.63	Peak					
5			500.45	36.19		-9.81	47.90		Peak					
6		9	960.23	35.58	54.00	-18.42	40.29	-4.71	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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Modulation		VHT40				Test Fre	q. (MHz)	5795				
Polarization			Horizontal									
	90 Lev	el (dBu\	//m)									
	80											
	70											
	60									F00 01 /		
	50									FCC CLA	122-B	
	30			_							_	
	40		1			4	5				6	
	30		-	2	3 <del> </del>		Ĭ					
	20											
	20											
	10										_	
	030	100.	20	0. 30	0 40	00. 50	00. 600	D. 700.	800.	900.	1000	
	30	100.	20	0. 50	0. 40		ncy (MHz)	. 700.	000.	300.	1000	
		Fr	eq. E	mission	Limit	Margin		Factor	Remark	ANT	Turn	
				level			reading			High		
		M	1Hz	dBuV/m	dBuV/n	n dB	dBuV	dB		cm	deg	
1		14	18.34	32.11	43.50	-11.39	49.08	-16.97	Peak			
2		25	0.19	31.49	46.00	-14.51	49.35	-17.86	Peak			
3			5.48	31.53		-14.47	47.48	-15.95	Peak			
4 5			9.45	34.93 32.81		-11.07 -13.19	46.64 43.91	-11.71 -11.10	Peak Peak			
6			0.23				40.63	-4.71	Peak 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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Modulation	VHT40	Test Fre	Test Freq. (MHz)				
Polarization	Vertical	<u>.</u>					
90 Level (dBu	V/m)						
80							
70							
60							
					FCC CLAS	S-B	
50							
40 1		5	6				
30	3 4		l i				
20							
10							
0 <mark></mark> 30 100.	200. 300. 40	00. 500. 60	00. 700.	800.	900.	1000	
		Frequency (MHz)					
F	req. Emission Limit		Factor	Remark	ANT	Turn	
	level	readin	_		High	Table	
<b>'</b>	MHz dBuV/m dBuV/m	n dB dBuV	dB		cm	deg	
1	40.37 35.15 40.00	-4.85 52.34	-17.19	QP	100	300	
		-7.45 54.08		Peak			
	48.34 30.46 43.50			Peak			
_	00.72 31.24 43.50 00.45 36.28 46.00		-19.72 -11.71	Peak Peak			
	24.61 33.21 46.00			Peak			

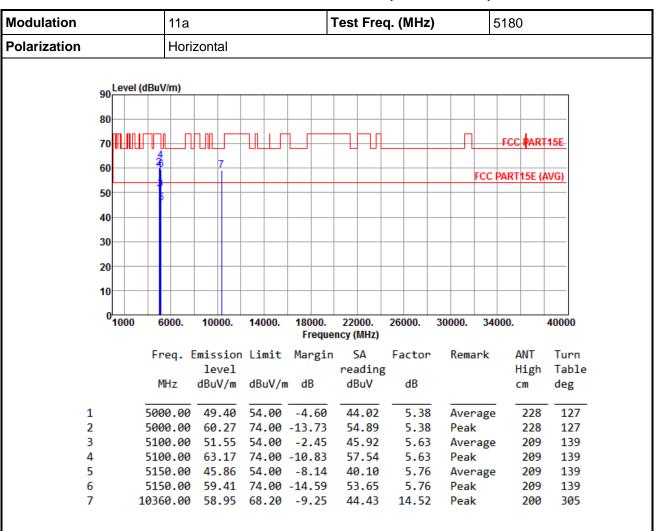
\*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



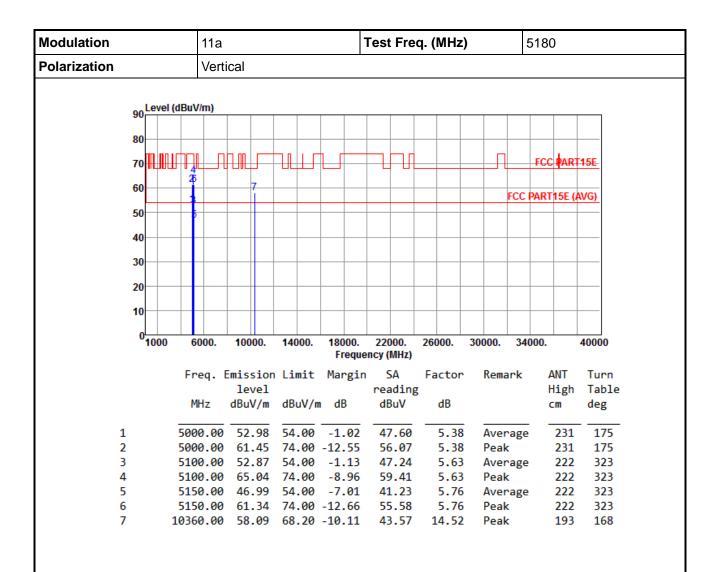
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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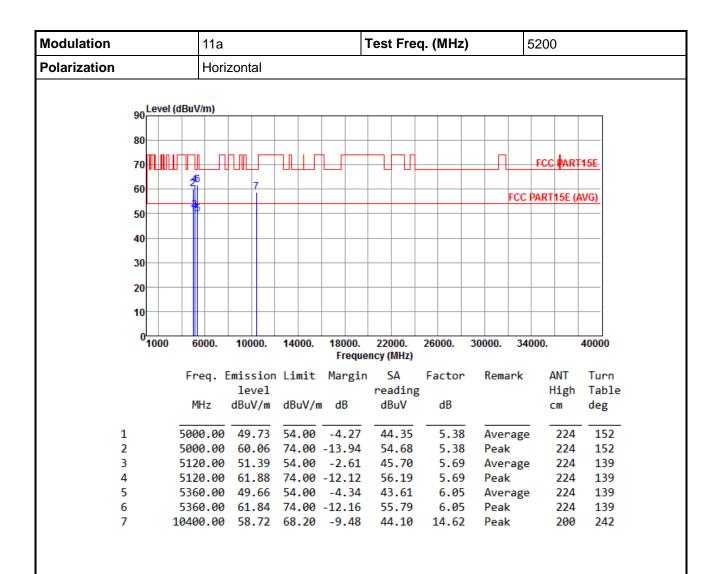


\*Factor includes antenna factor, cable loss and amplifier gain

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

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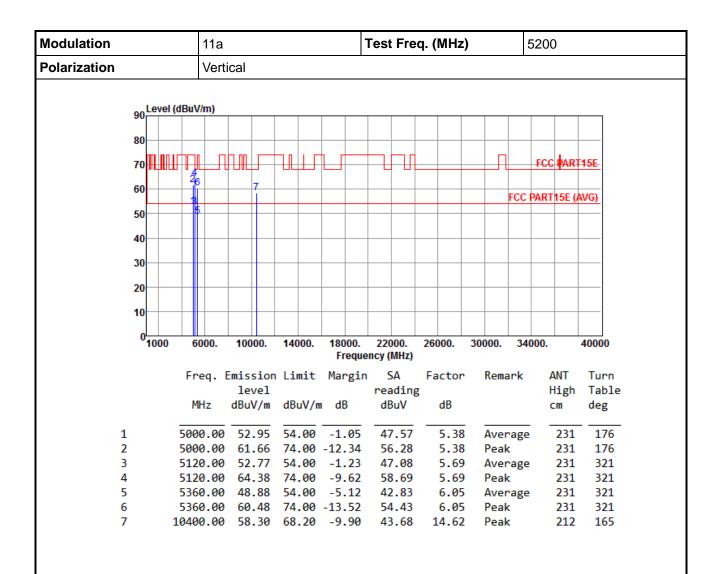


\*Factor includes antenna factor, cable loss and amplifier gain

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

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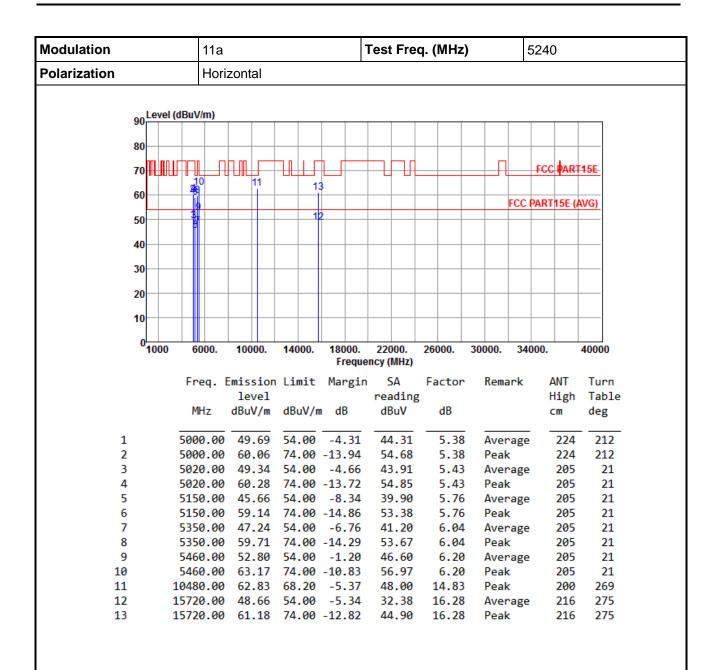


\*Factor includes antenna factor, cable loss and amplifier gain

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

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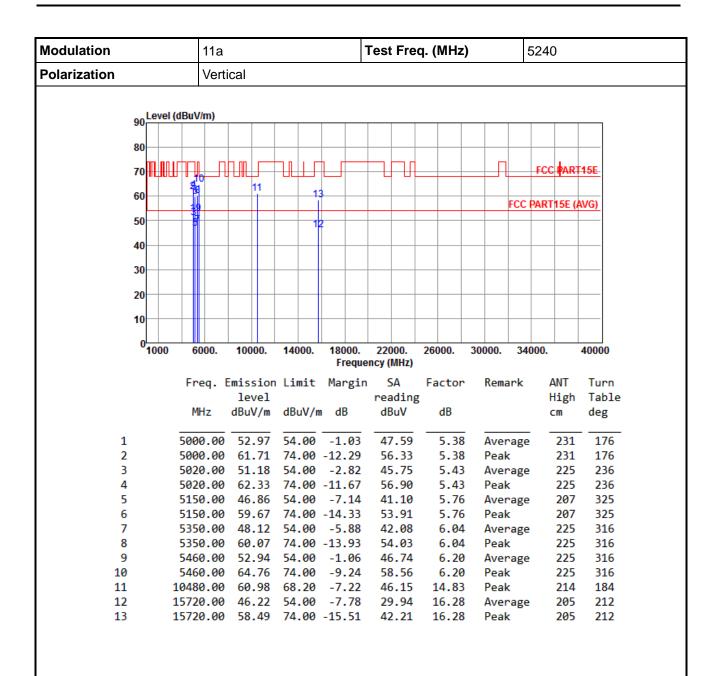


\*Factor includes antenna factor, cable loss and amplifier gain

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

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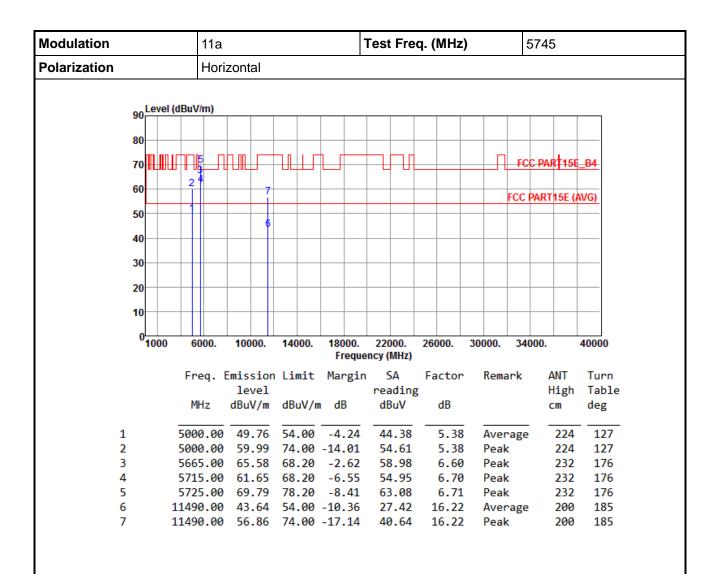


\*Factor includes antenna factor, cable loss and amplifier gain

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

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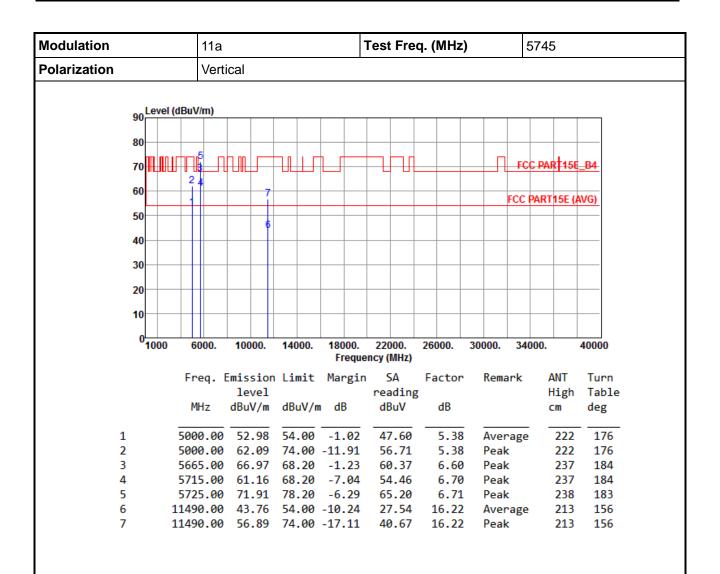


\*Factor includes antenna factor, cable loss and amplifier gain

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

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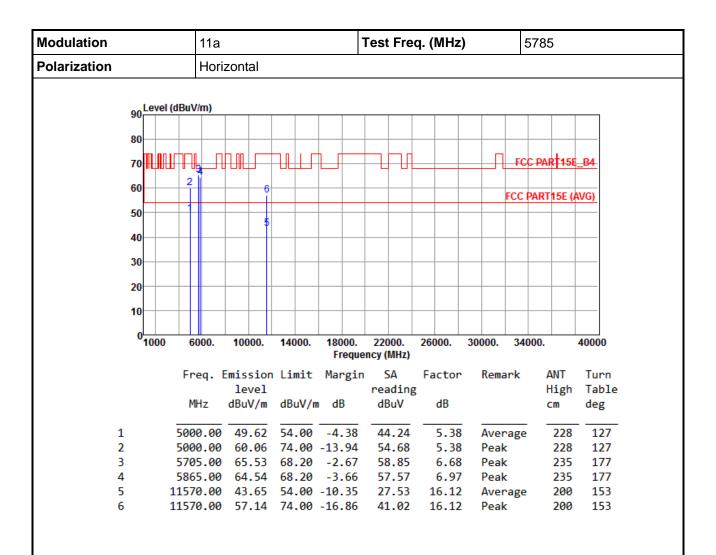


\*Factor includes antenna factor, cable loss and amplifier gain

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

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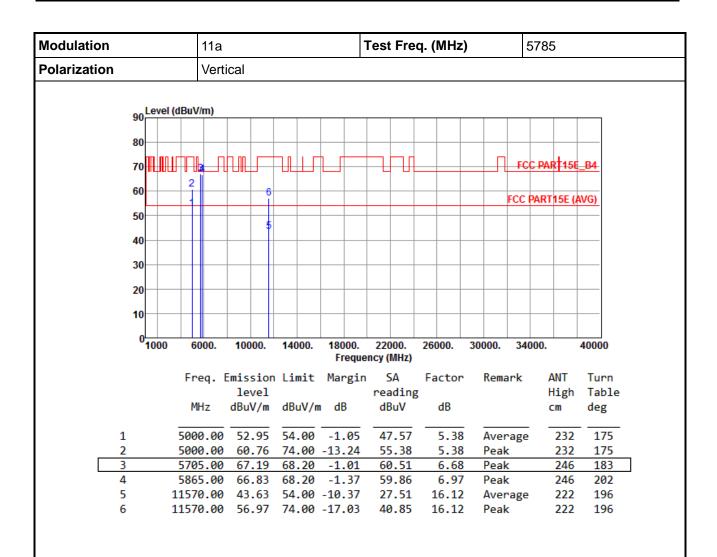


\*Factor includes antenna factor, cable loss and amplifier gain

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

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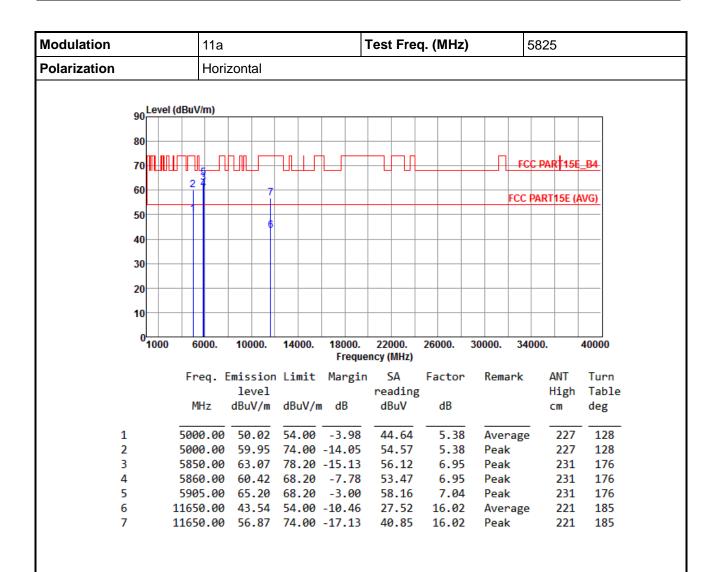


\*Factor includes antenna factor, cable loss and amplifier gain

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

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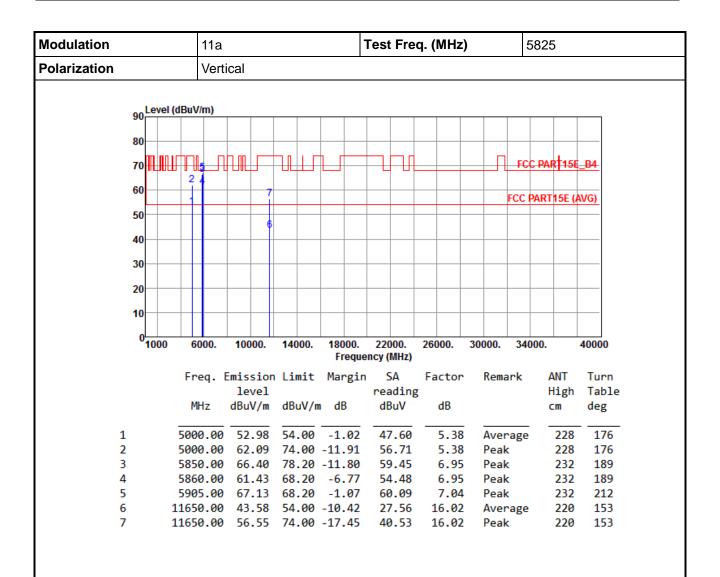


\*Factor includes antenna factor, cable loss and amplifier gain

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

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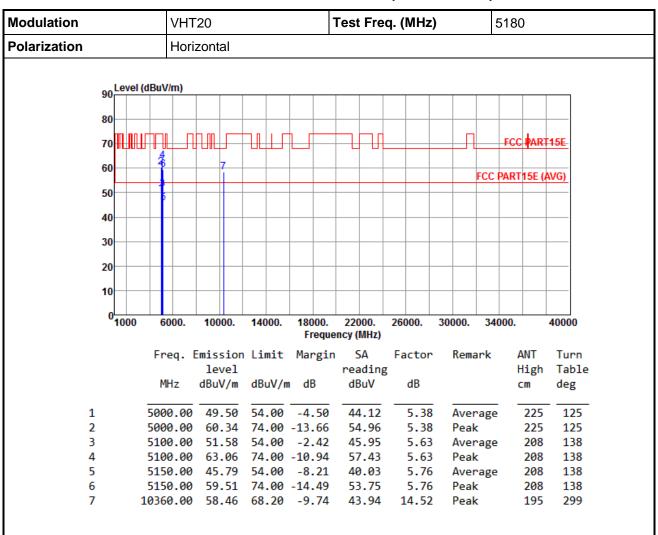
\*Factor includes antenna factor, cable loss and amplifier gain

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



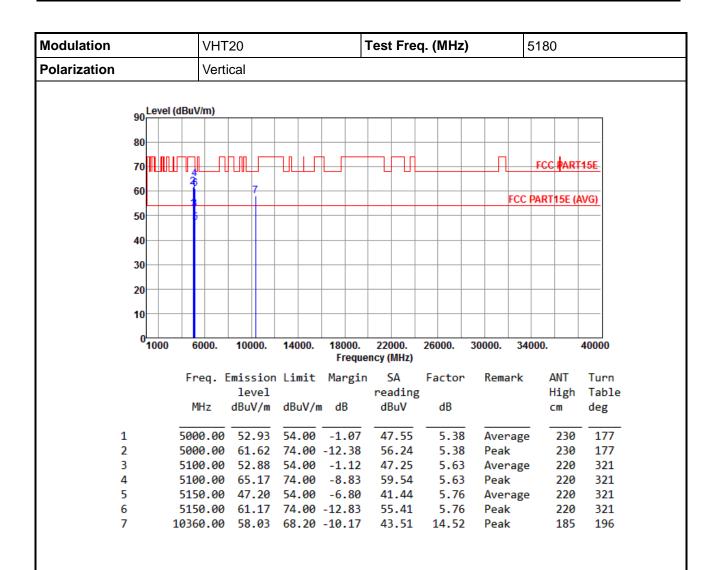
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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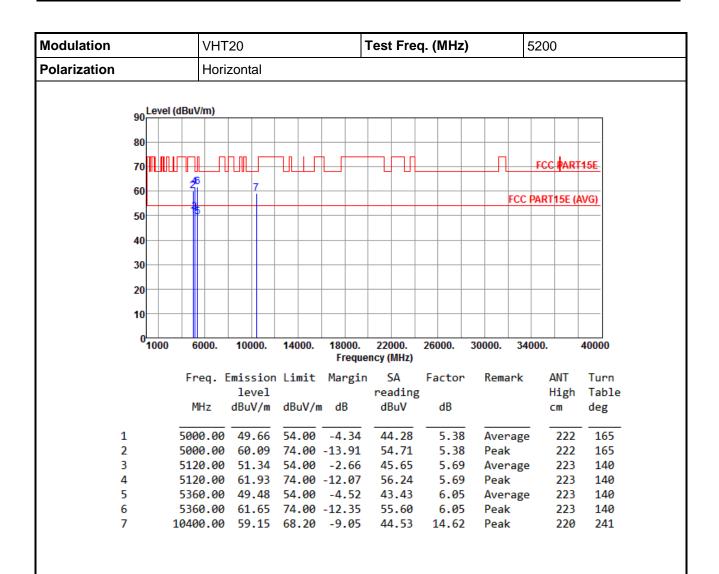


\*Factor includes antenna factor, cable loss and amplifier gain

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

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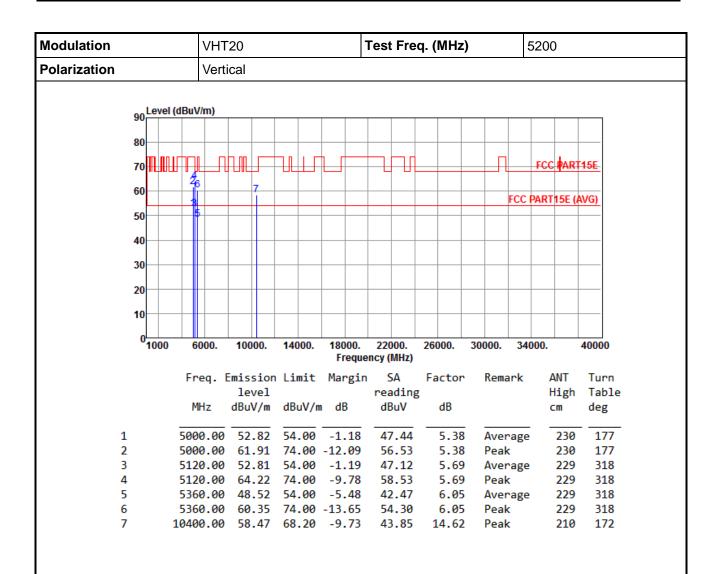


\*Factor includes antenna factor, cable loss and amplifier gain

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

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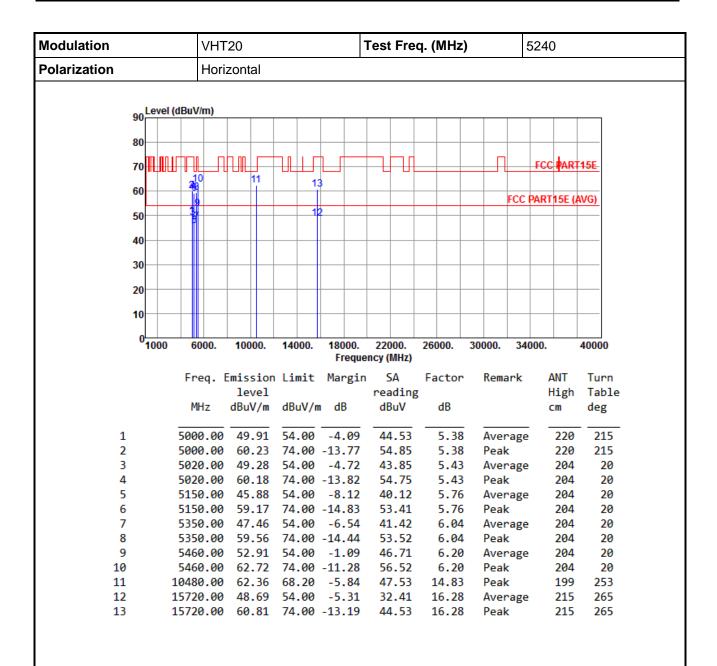


\*Factor includes antenna factor, cable loss and amplifier gain

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

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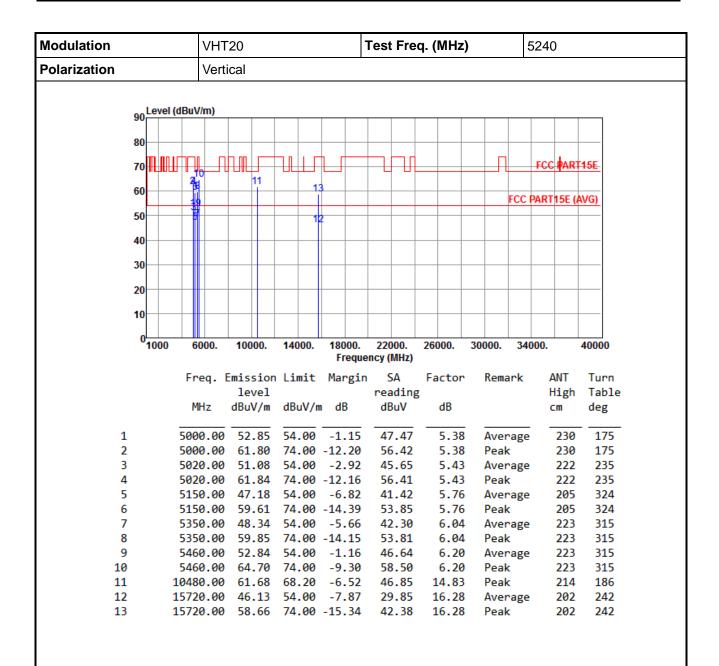


\*Factor includes antenna factor, cable loss and amplifier gain

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

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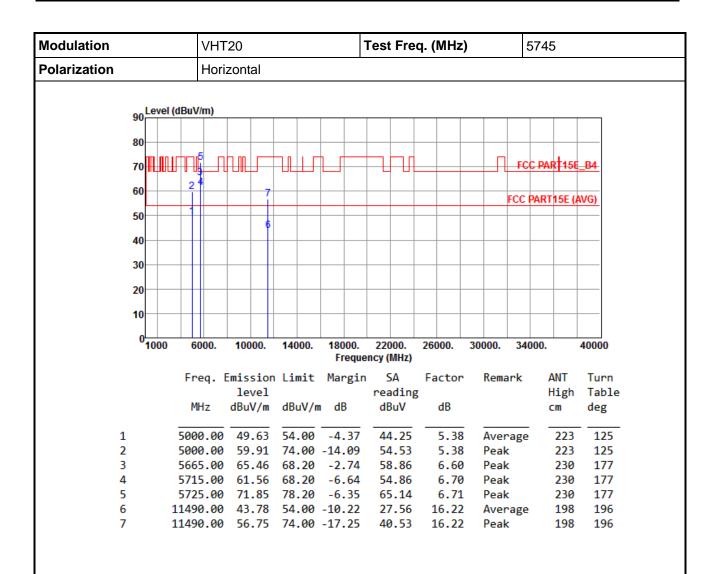


\*Factor includes antenna factor, cable loss and amplifier gain

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

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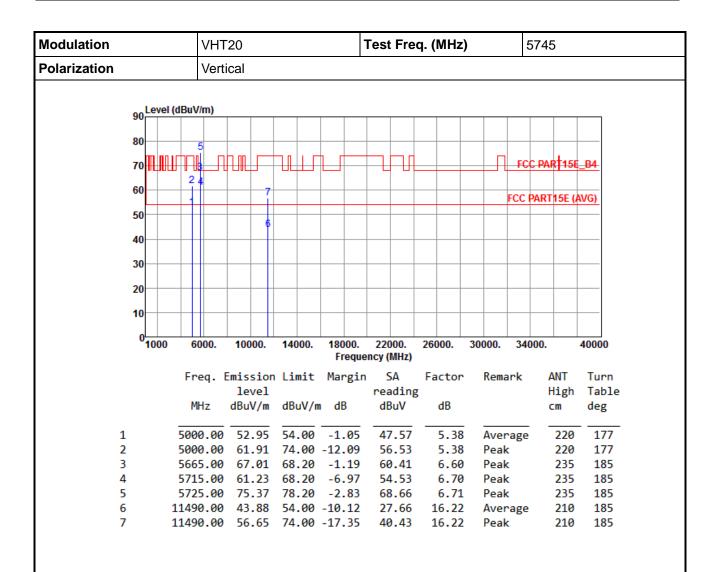


\*Factor includes antenna factor, cable loss and amplifier gain

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

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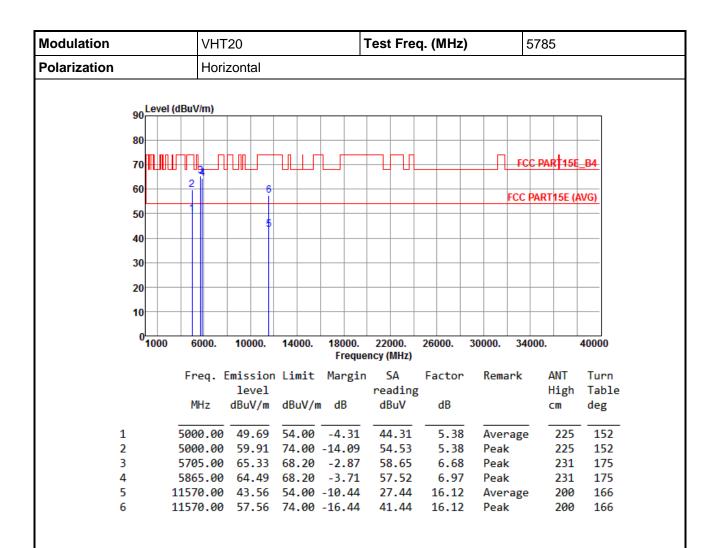


\*Factor includes antenna factor, cable loss and amplifier gain

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

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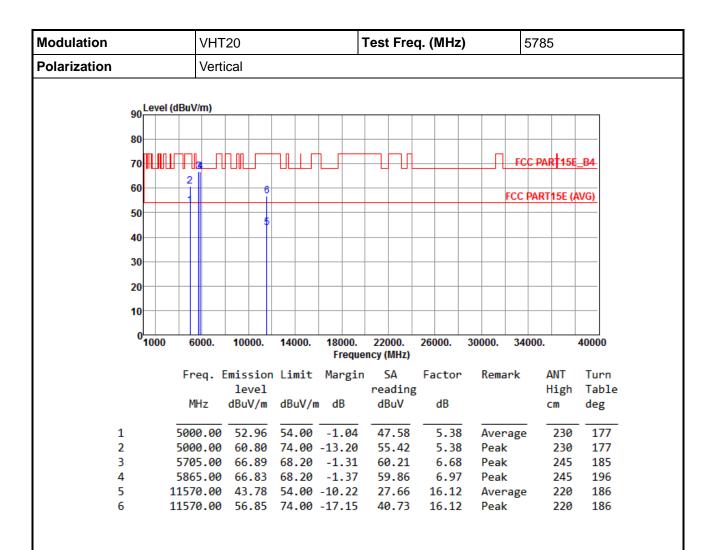


\*Factor includes antenna factor, cable loss and amplifier gain

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

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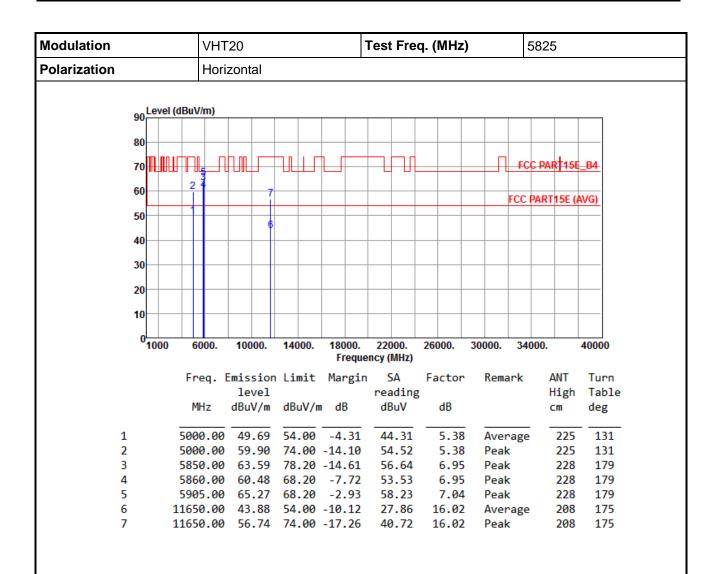


\*Factor includes antenna factor, cable loss and amplifier gain

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

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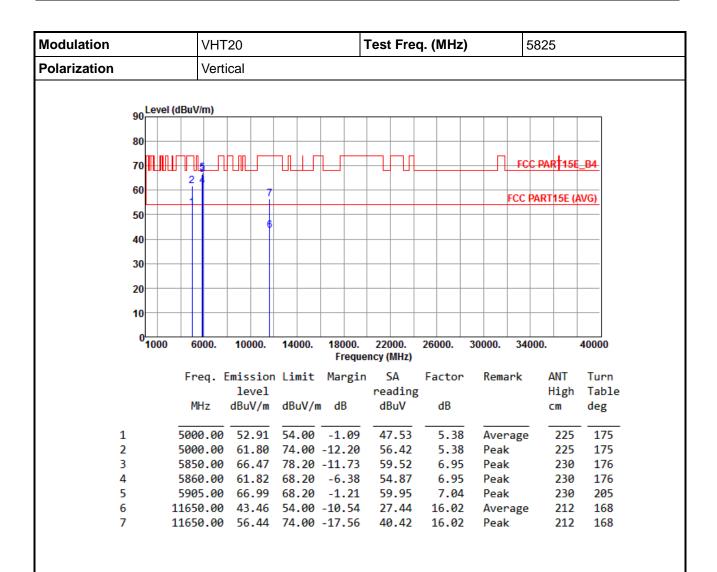


\*Factor includes antenna factor, cable loss and amplifier gain

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

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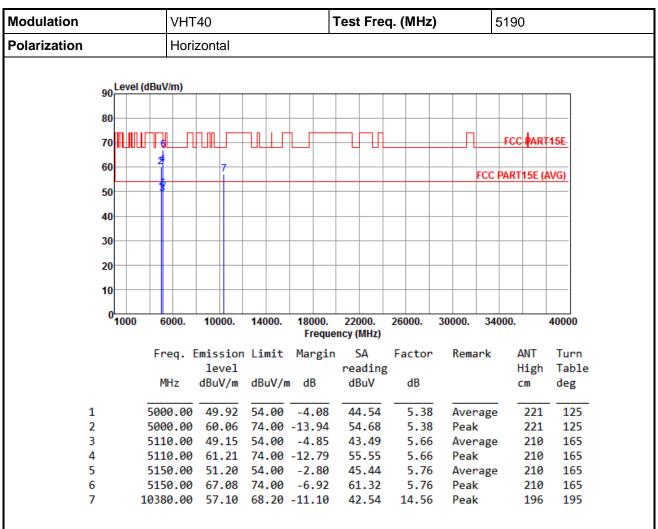
\*Factor includes antenna factor, cable loss and amplifier gain

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



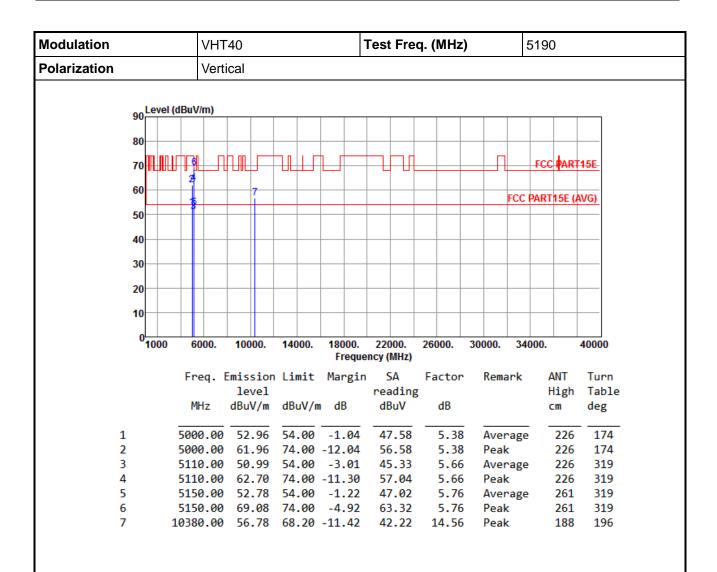
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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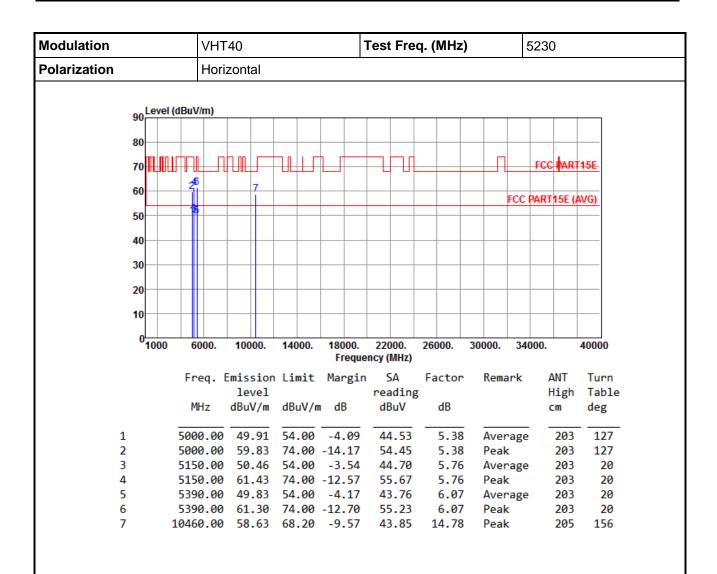


\*Factor includes antenna factor, cable loss and amplifier gain

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

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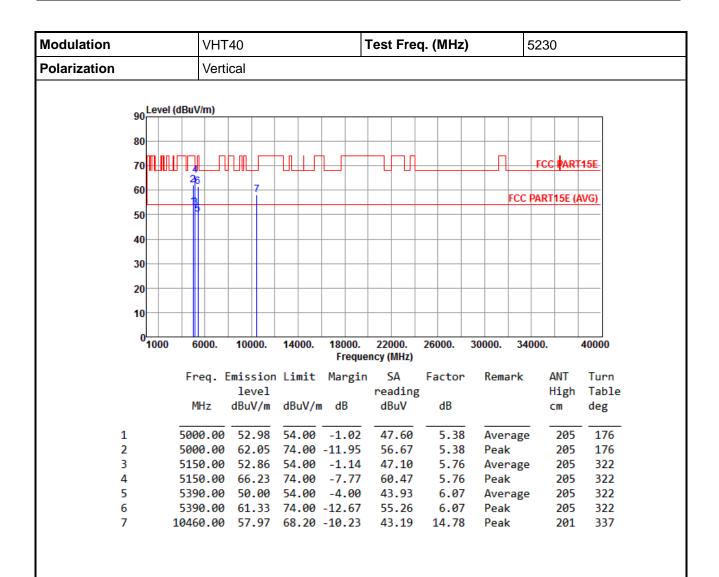


\*Factor includes antenna factor, cable loss and amplifier gain

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

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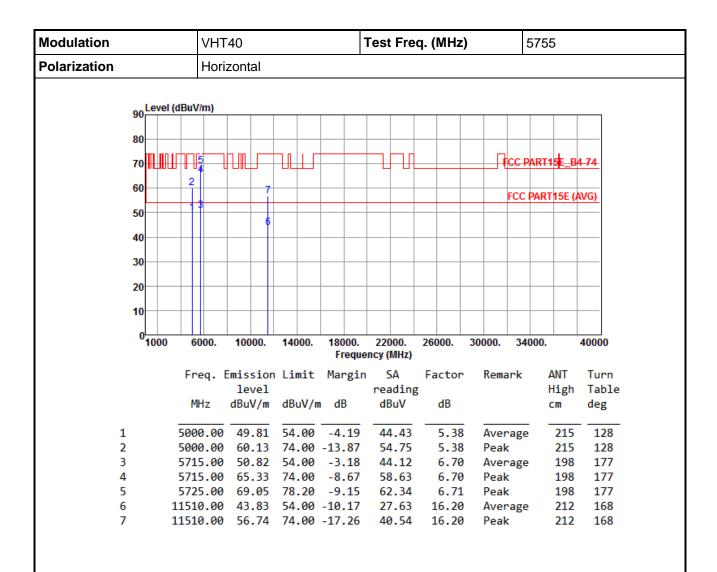


\*Factor includes antenna factor, cable loss and amplifier gain

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

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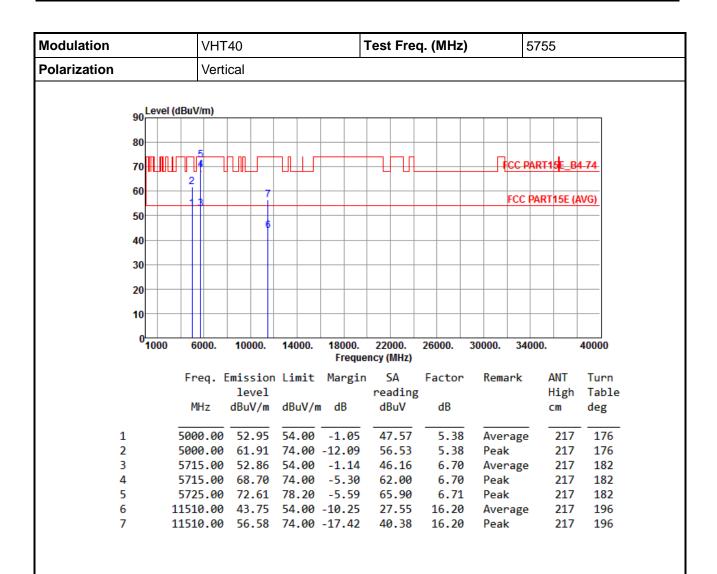


\*Factor includes antenna factor, cable loss and amplifier gain

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

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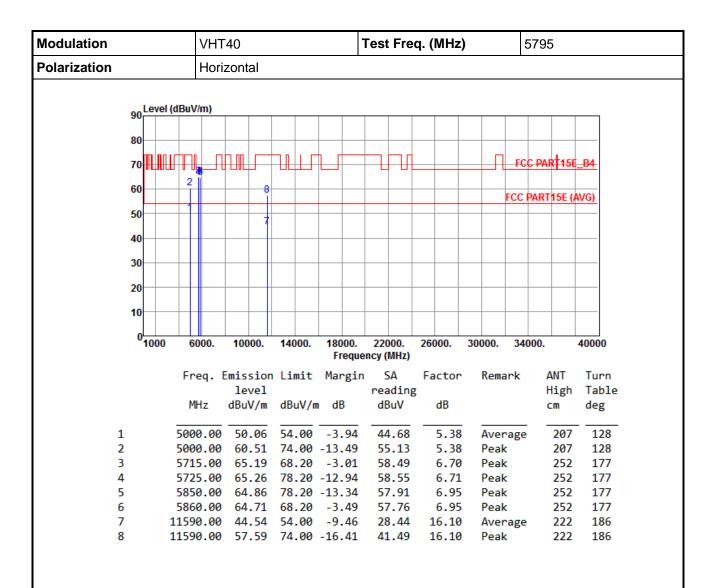


\*Factor includes antenna factor, cable loss and amplifier gain

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

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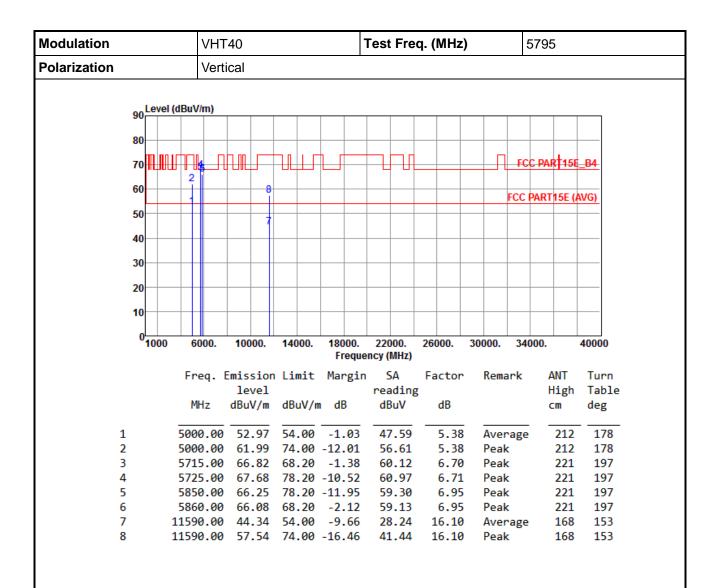


\*Factor includes antenna factor, cable loss and amplifier gain

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

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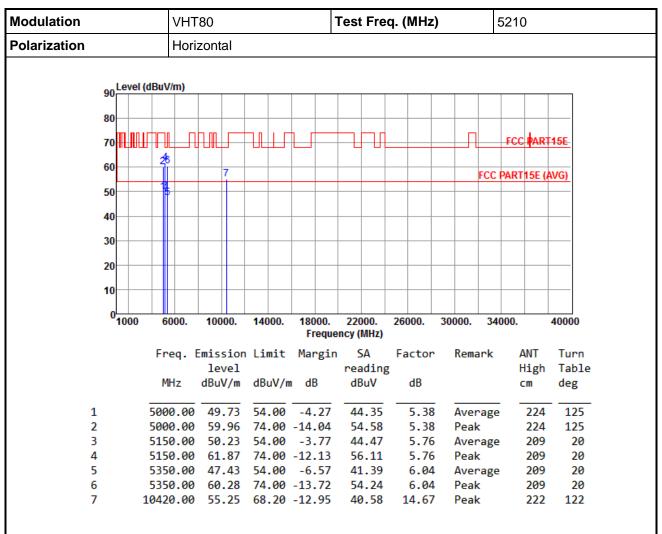
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



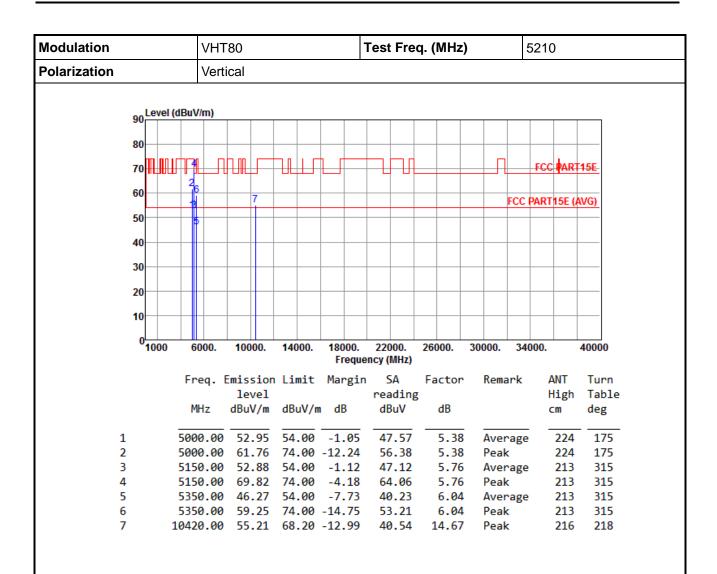
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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<sup>\*</sup>Factor includes antenna factor, cable loss and amplifier gain



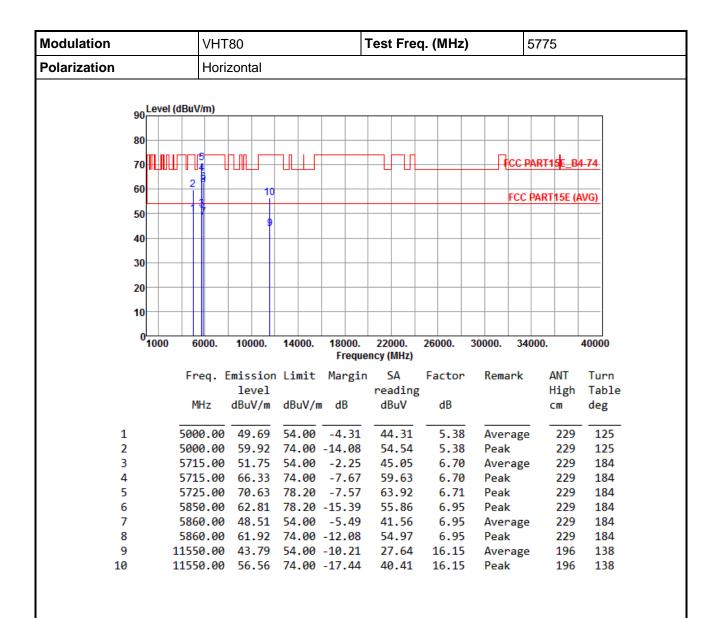


\*Factor includes antenna factor, cable loss and amplifier gain

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

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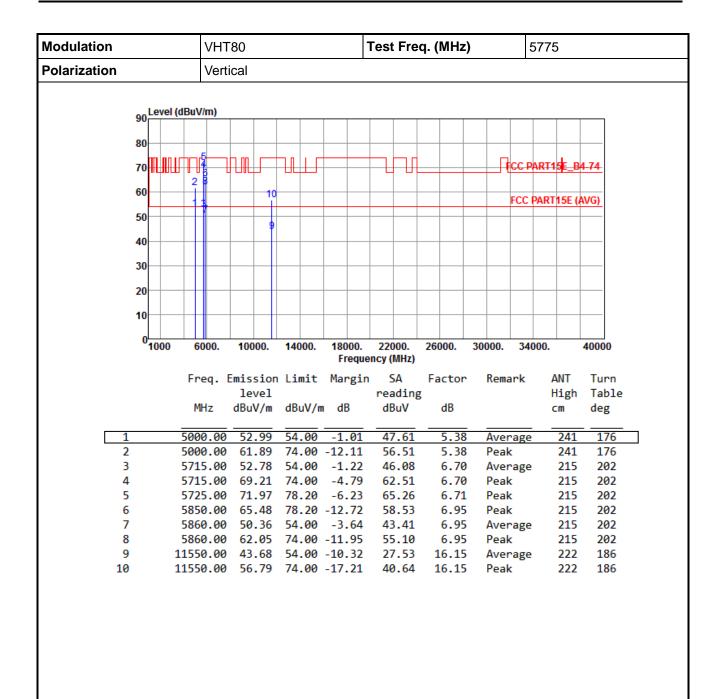


\*Factor includes antenna factor, cable loss and amplifier gain

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

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

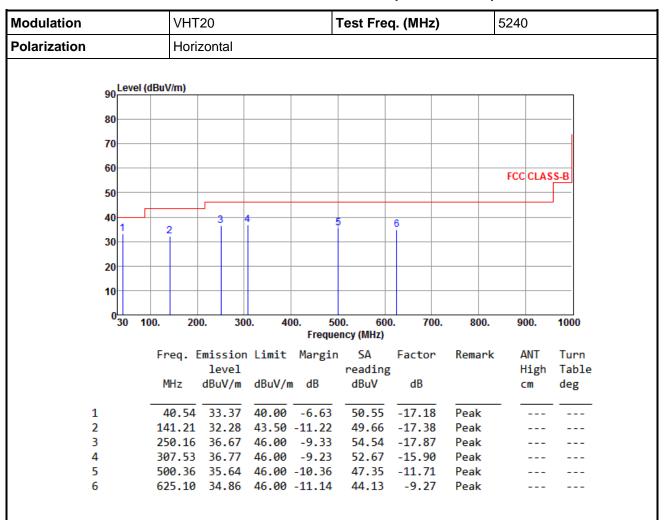
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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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	VHT20				Test Freq. (MHz) 5					
			Vert	Vertical									
		I ev	el (d	IBuV/m)									
	90		C1 (C	Daviiii									
l	80												
	70												
	60										FCC	CLAS	e n
	50										FCC	CLAS	3-Б
	90												
	40	12	_		4			5				(	6
	30	Ш	3										
	20	Н											
	10	Ш	_										
	U	30	10	0. 20	00. 30	0. 40		0. 60 ncy (MHz)	0. 700.	. 800.	9(	00.	1000
				Frea.	Emission	Limit	Margin	SA	Factor	Remark	. A	MT	Turn
					level			reading				ligh	Table
				MHz	dBuV/m	dBuV/m	dB	dBuV	dB		C	m	deg
:	1			38.96	35.34	40.00	-4.66	52.65	-17.31	QP		100	0
	2			54.41					-16.66	Peak			
	3				32.46				-22.80	Peak			
4	4			283.16	39.90	46.00	-6.10	56.54	-16.64	Peak			

500.36 35.94 46.00 -10.06 47.65 -11.71

960.16 35.94 54.00 -18.06 40.65

Peak

Peak

-4.71

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			VH	VHT40						Test Freq. (MHz)					5795		
Polarization			Hor	izont	al												
	90L	evel (di	BuV/m)														
	80																
	70																
	60																
													FCC	CLAS	S-B		
	50																
	40						4	٠,							5		
	30-			2	2 3				·								
	20																
	10																
	03	0 100	). 2	00.	300	). 40		00.	60 (MHz)	0. 70	00.	800.	90	00.	1000		
			Град	Emi c	.ion	limi+	_		SA	Factor		Remark	^	ANT	Turn		
			rreq.		vel	LIMIT	Margin		SA eading			Kemark		wi ligh	Table		
			MHz			dBuV/r	n dB		dBuV	dB				m	deg		
	1	-	148.35	32	.27	43.50	-11.23	-	49.24	-16.97	7	Peak	-				
	2		250.31		.79		-14.21		49.65			Peak					
	3		305.42		.90		-14.10		47.85			Peak					
	4		500.26				-11.17			-11.71		Peak					
	5 6		529.65 960.31				-13.44 -18.24		43.66 40.47			Peak 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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Modulation	VHT40	Test Freq	լ. (MHz)	5795
Polarization	Vertical	•		
90 Level (dBu	iv/m)			
80				
70				
60				FCC CLASS-B
50				TCC CLASS-B
40 1 2		5	6	
30	3 4			
20				
10				
0 30 100.	200. 300. 40	0. 500. 600. Frequency (MHz)	. 700. 800	900. 1000
г	noa Emission limit		Factor Remar	rk ANT Turn
FI	req. Emission Limit level	reading	ractor Remar	K ANI Turn High Tabl
1	MHz dBuV/m dBuV/m	_	dB	cm deg
1 -	40.45 35.47 40.00	-4.53 52.65	-17.18 QP	100 300
_	78.40 32.85 40.00		-21.51 Peak	100 300
	48.52 30.68 43.50			
	00.52 30.82 43.50			
5 50	00.31 35.85 46.00	10 15 17 56	-11.71 Peak	

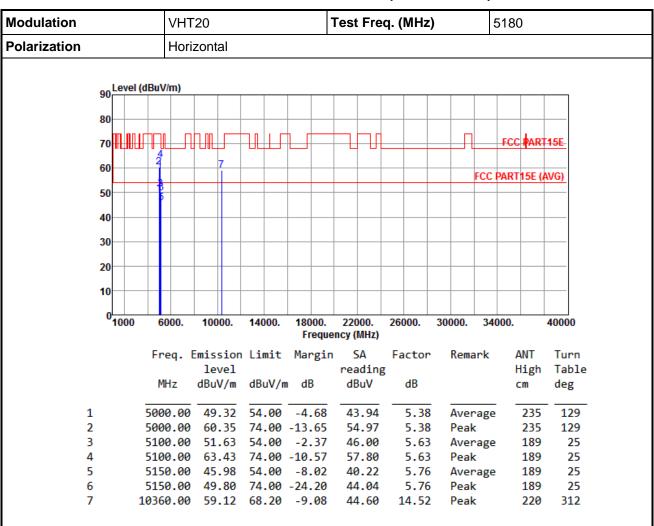
\*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



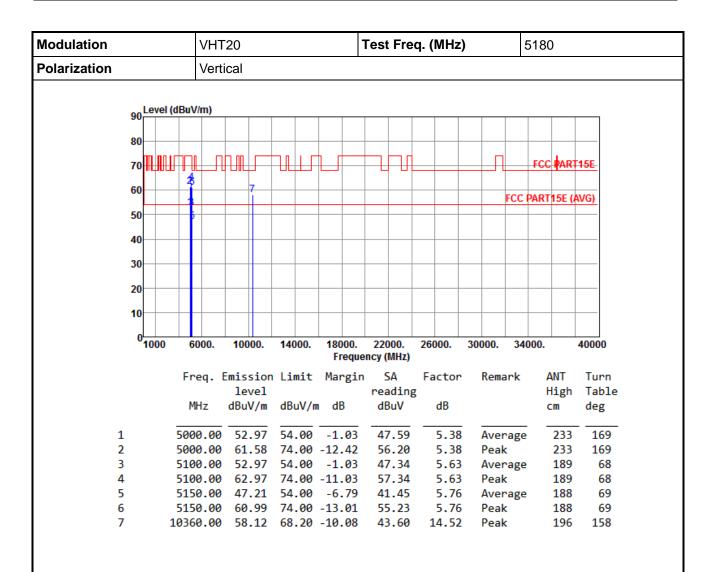
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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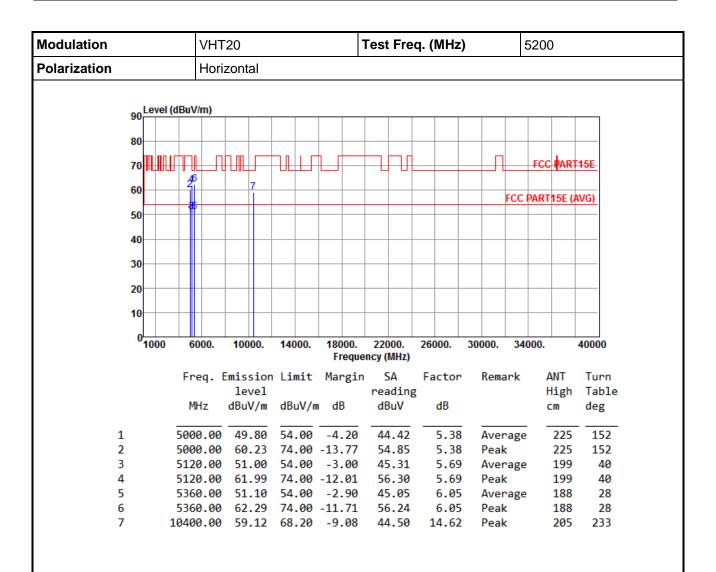


\*Factor includes antenna factor, cable loss and amplifier gain

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

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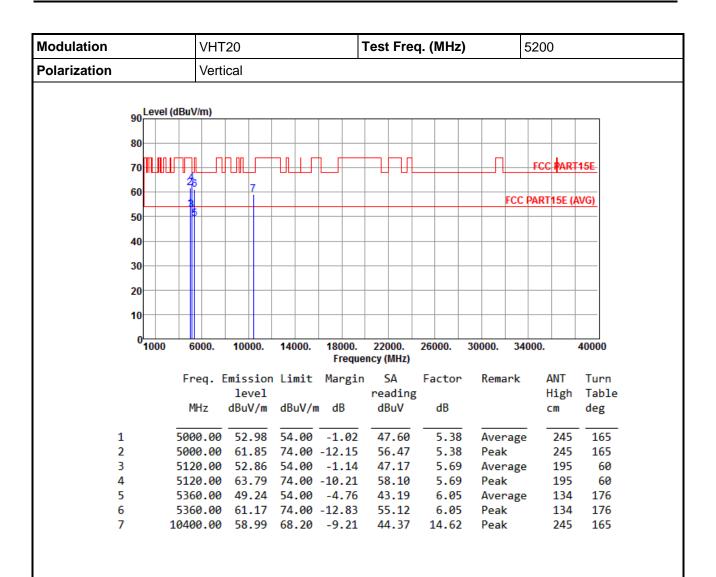


\*Factor includes antenna factor, cable loss and amplifier gain

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

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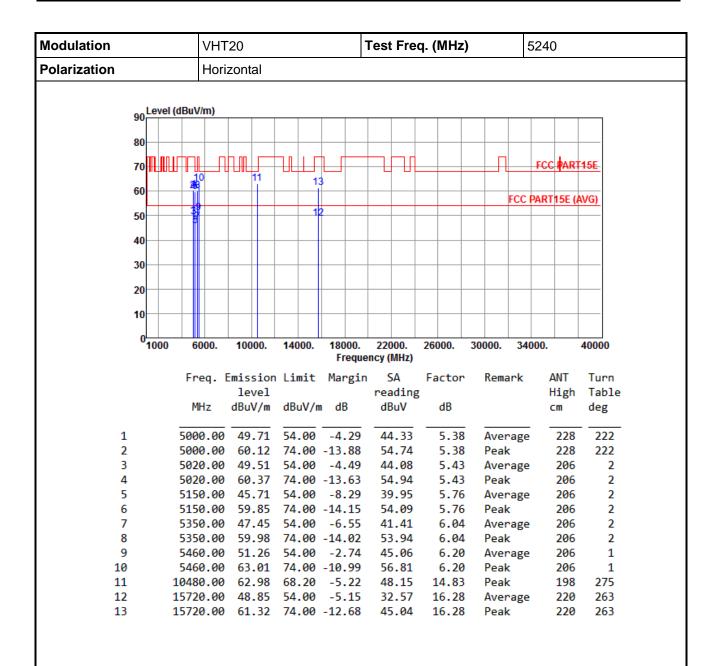


\*Factor includes antenna factor, cable loss and amplifier gain

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

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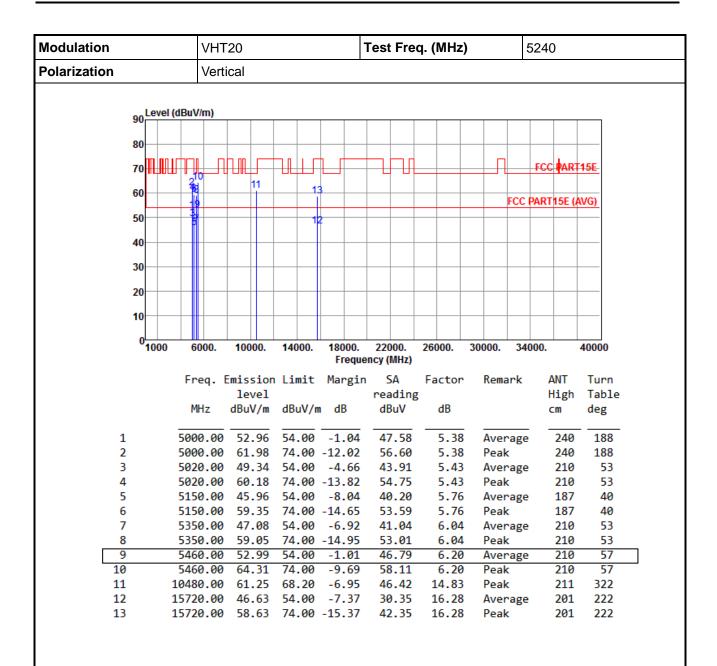


\*Factor includes antenna factor, cable loss and amplifier gain

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

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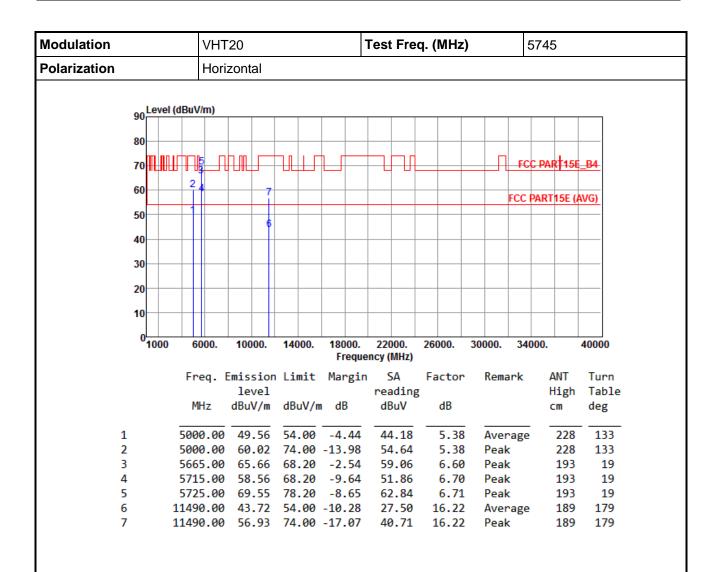


\*Factor includes antenna factor, cable loss and amplifier gain

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

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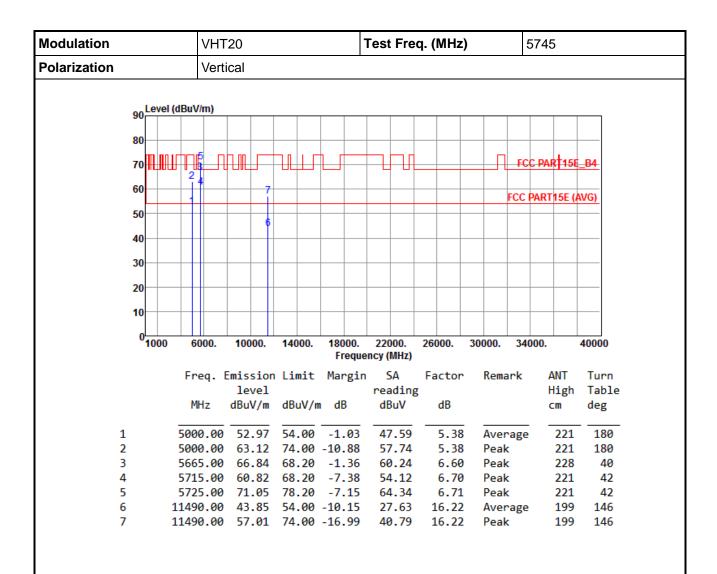


\*Factor includes antenna factor, cable loss and amplifier gain

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

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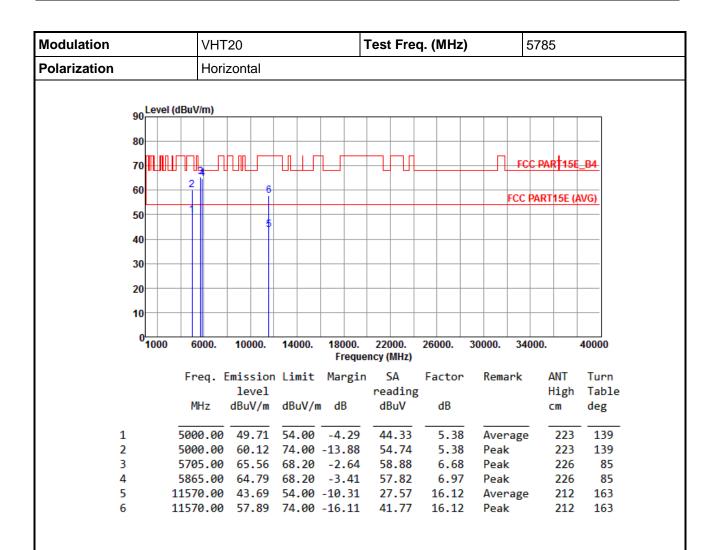


\*Factor includes antenna factor, cable loss and amplifier gain

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

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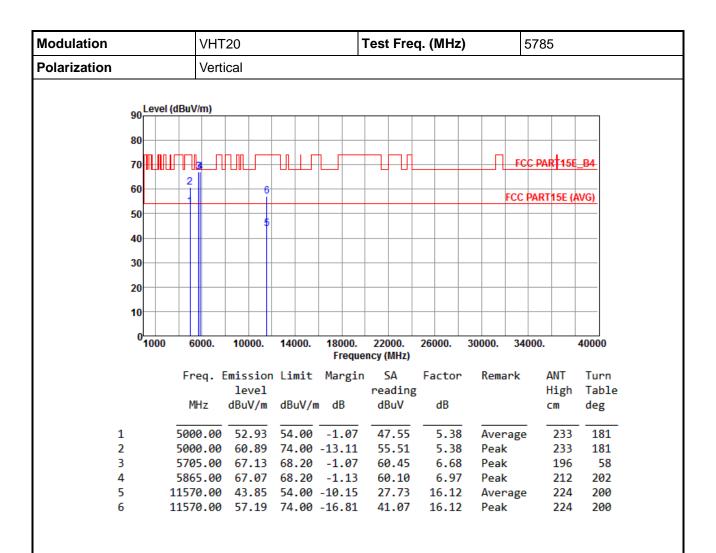


\*Factor includes antenna factor, cable loss and amplifier gain

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

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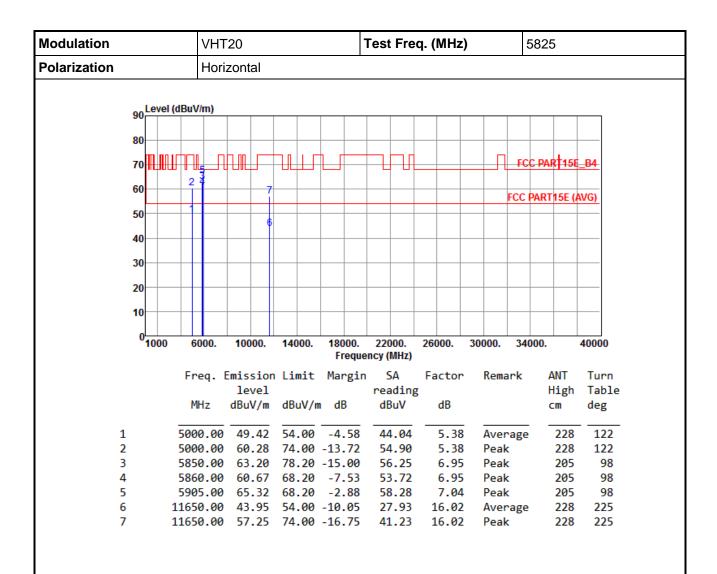


\*Factor includes antenna factor, cable loss and amplifier gain

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

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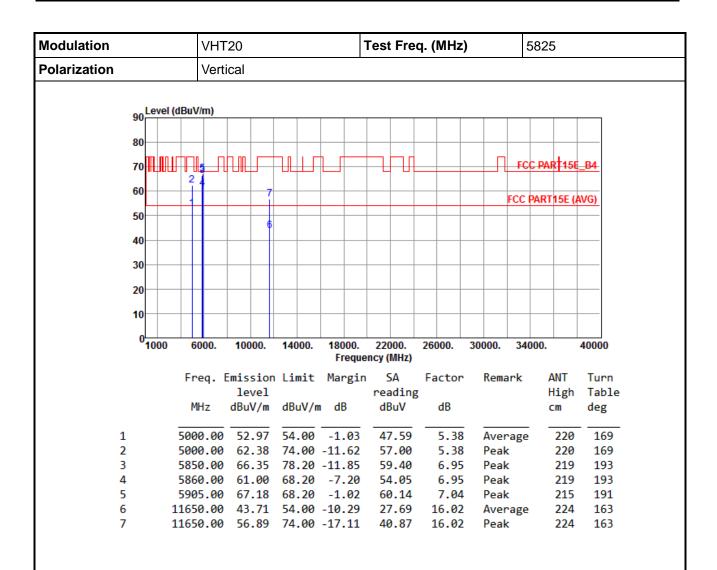


\*Factor includes antenna factor, cable loss and amplifier gain

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

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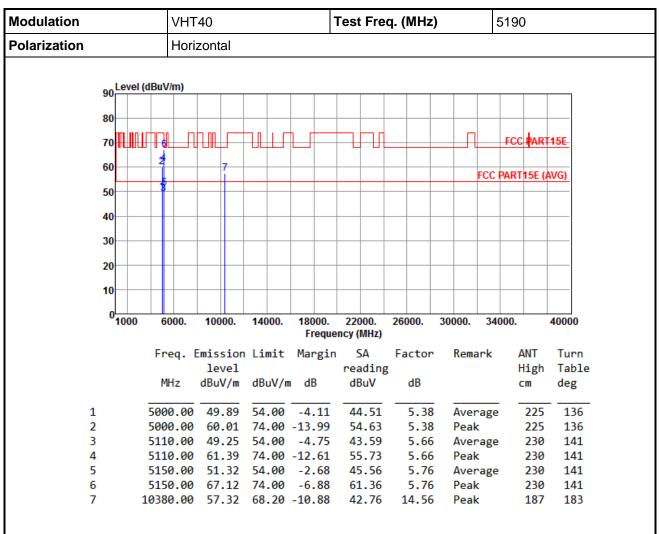
\*Factor includes antenna factor, cable loss and amplifier gain

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



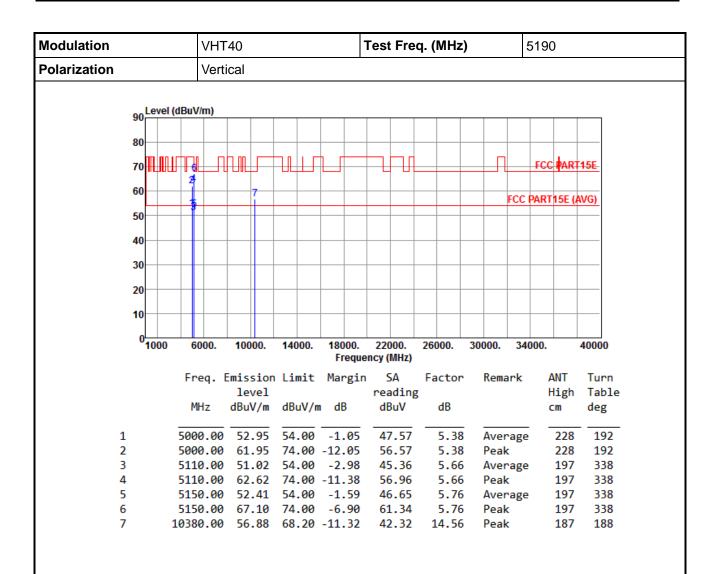
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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

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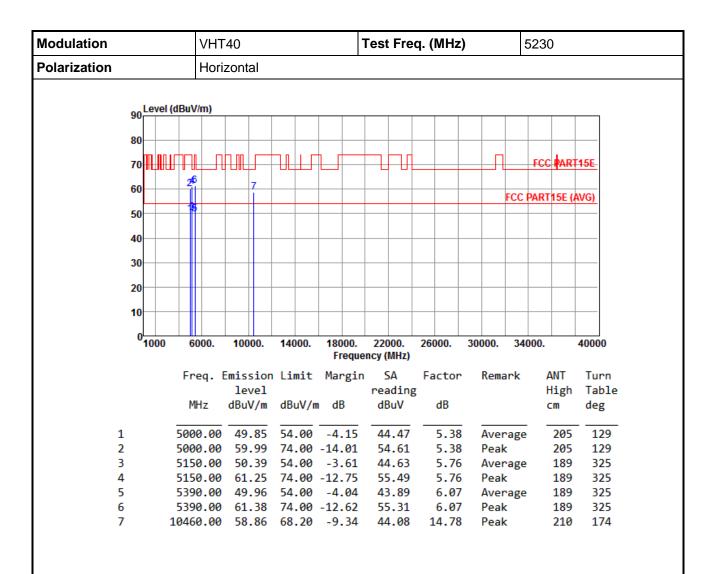


\*Factor includes antenna factor, cable loss and amplifier gain

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

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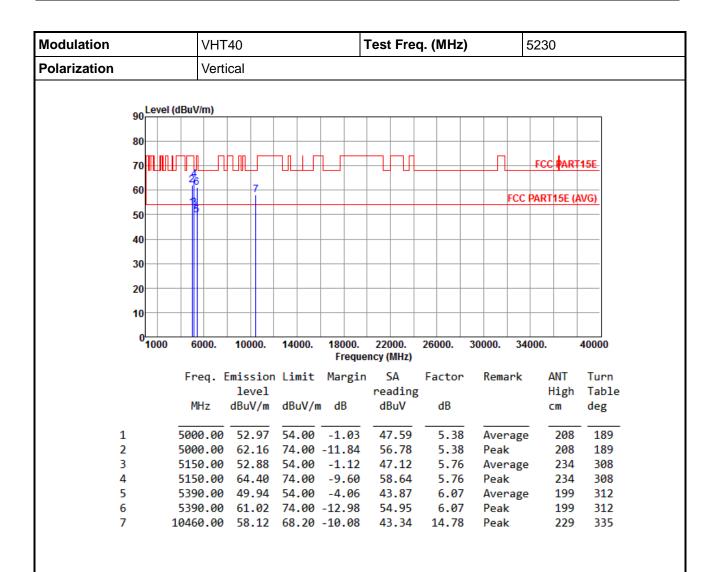


\*Factor includes antenna factor, cable loss and amplifier gain

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

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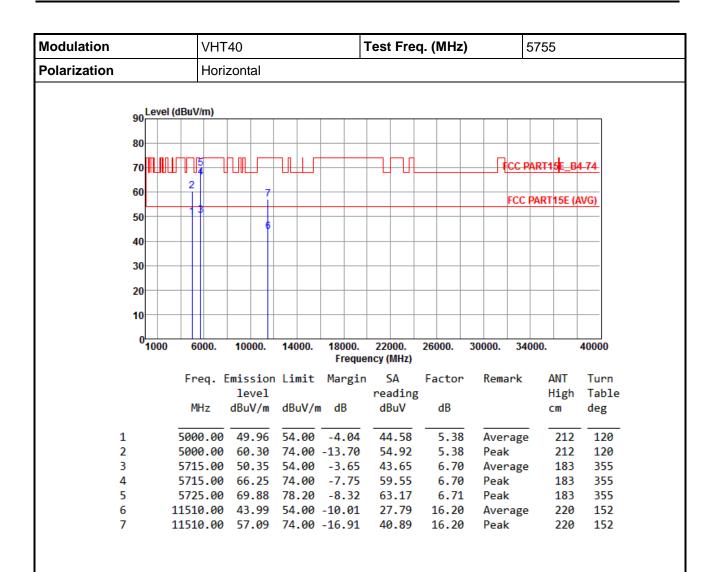


\*Factor includes antenna factor, cable loss and amplifier gain

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

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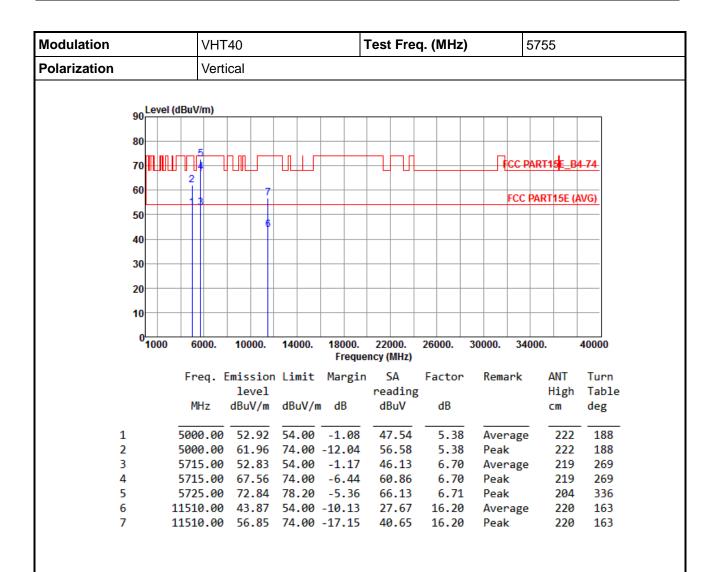


\*Factor includes antenna factor, cable loss and amplifier gain

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

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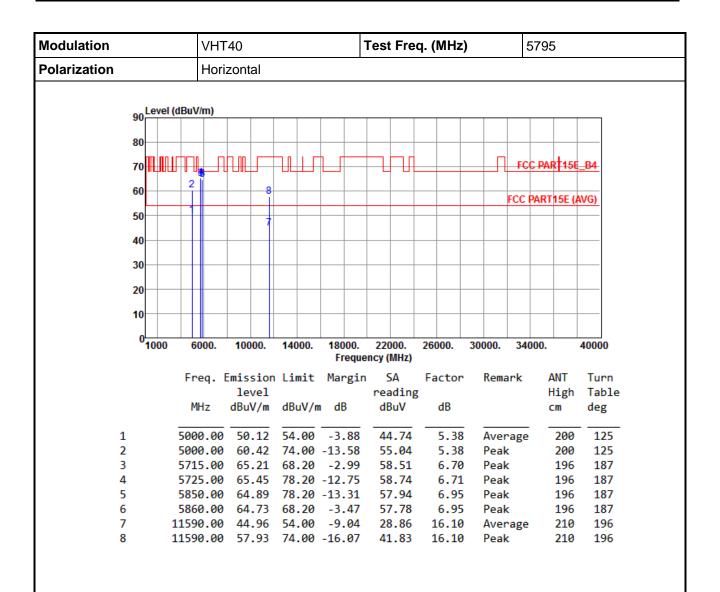


\*Factor includes antenna factor, cable loss and amplifier gain

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

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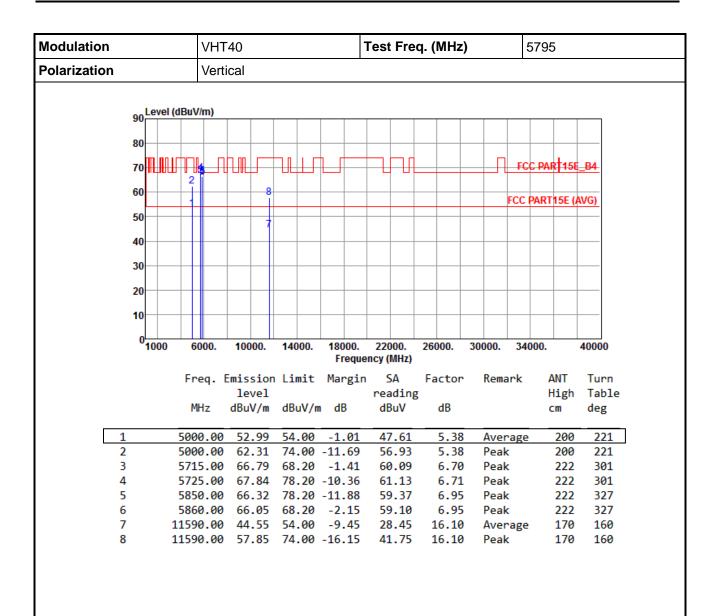


\*Factor includes antenna factor, cable loss and amplifier gain

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

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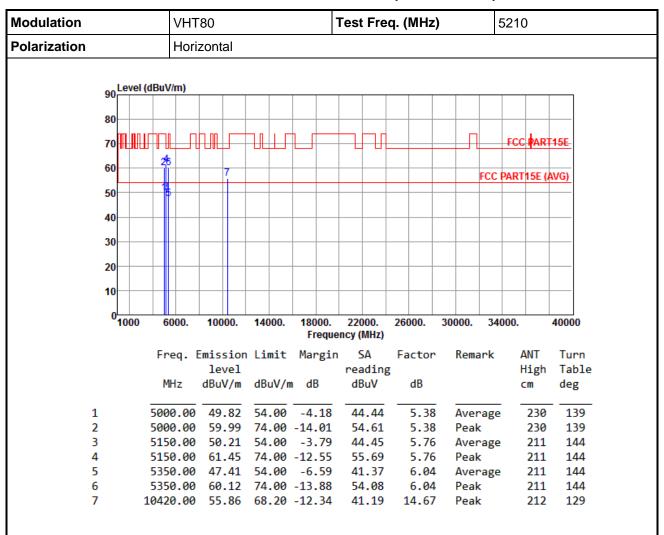
\*Factor includes antenna factor, cable loss and amplifier gain

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

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



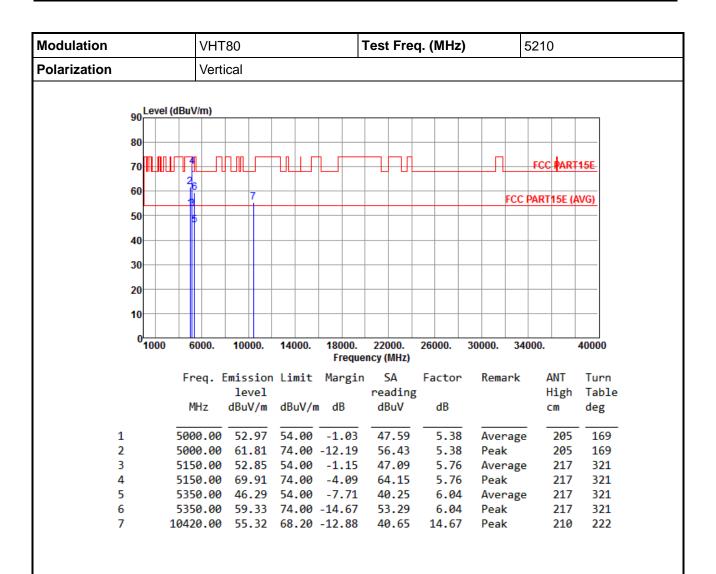
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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<sup>\*</sup>Factor includes antenna factor, cable loss and amplifier gain



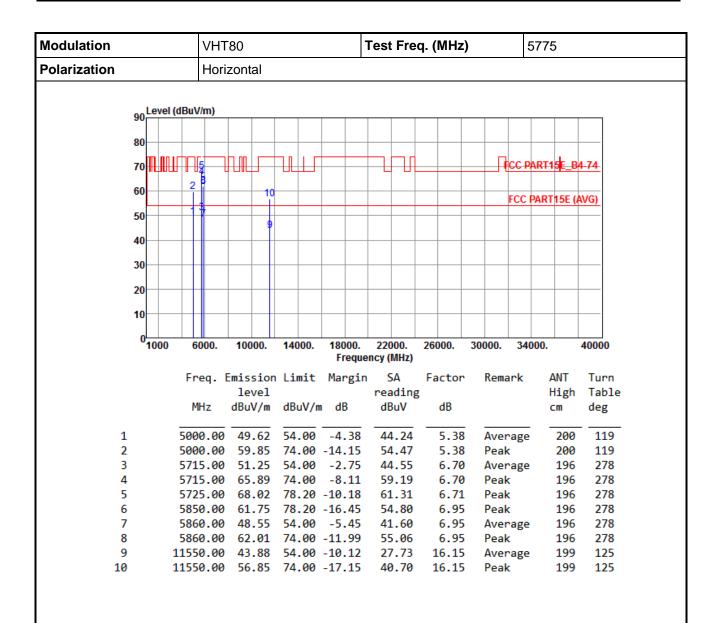


\*Factor includes antenna factor, cable loss and amplifier gain

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

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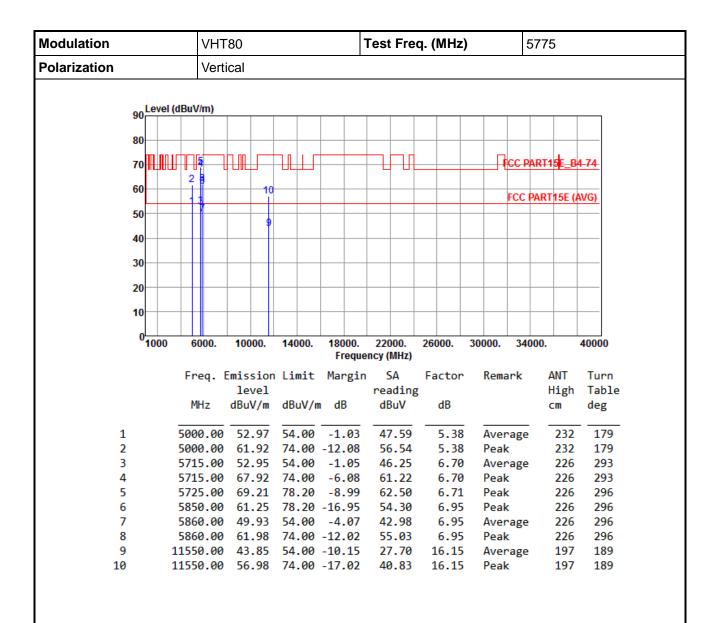


\*Factor includes antenna factor, cable loss and amplifier gain

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

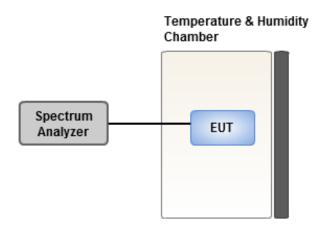
#### 3.6.1 Limit of Frequency Stability

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: 5200 MHz	Frequency Drift (ppm)								
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes					
T20°CVmax	0.57	1.12	0.75	0.50					
T20°CVmin	0.40	0.73	-0.02	0.37					
T50°CVnom	0.98	0.78	1.42	1.19					
T40°CVnom	0.31	0.67	0.54	1.18					
T30°CVnom	0.61	1.14	0.71	1.08					
T20°CVnom	0.49	1.19	1.11	0.26					
T10°CVnom	0.52	0.64	0.84	0.65					
T0°CVnom	0.06	0.79	-0.46	-0.03					
T-10°CVnom	0.18	0.38	0.53	0.44					
T-20°CVnom	-0.03	-0.23	0.80	0.75					
T-30°CVnom	-0.31	-0.45	0.08	-0.56					
Vnom [Vac]: 120		Vmax [Vac]: 138	Vmin [Vac]: 102						
Tnom [°C]: 20		Tmax [°C]: 50	Tmin [°C]: -30						

Frequency: 5785 MHz	Frequency Drift (ppm)							
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes				
T20°CVmax	5.34	5.20	5.69	5.46				
T20°CVmin	4.06	3.79	4.12	4.18				
T50°CVnom	3.63	3.49	3.75	3.92				
T40°CVnom	3.39	3.27	3.91	3.34				
T30°CVnom	2.39	2.28	2.84	2.81				
T20°CVnom	2.62	2.64	3.40	3.10				
T10°CVnom	2.40	2.80	2.49	2.31				
T0°CVnom	2.07	2.00	2.36	2.77				
T-10°CVnom	1.46	1.27	1.89	1.13				
T-20°CVnom	0.73	0.72	0.49	1.16				
T-30°CVnom	0.89	1.06	1.15	0.70				
Vnom [Vac]: 120	V	max [Vac]: 138	Vmin [Vac]:	Vmin [Vac]: 102				
Tnom [°C]: 20	Т	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, 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 Hsiang, Tao Yuan

Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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

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

Tel: 886-3-271-8666 Fax: 886-3-318-0155

Email: ICC\_Service@icertifi.com.tw

==END==

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