

FCC Test Report

FCC ID : UIDSBX-AC1200P

Equipment : AC1200 Wi-Fi Extender with RipCurrent[™]

Technology

Model No. : SBX-AC1200P

Brand Name : ARRIS

Applicant : ARRIS Group, Inc.

Address : 3871 Lakefield Drive, Suite 300, Suwanee,

Georgia 30024, United States

Standard : 47 CFR FCC Part 15.407

Received Date : Sep. 30, 2015

Tested Date : Oct. 15 ~ Dec. 01, 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

Iac-MRA



Report No.: FR593001AN Page: 1 of 110



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information	5
1.2	Local Support Equipment List	
1.3	Test Setup Chart	
1.4	The Equipment List	9
1.5	Testing Applied Standards	10
1.6	Measurement Uncertainty	10
2	TEST CONFIGURATION	11
2.1	Testing Condition	11
2.2	The Worst Test Modes and Channel Details	
3	TRANSMITTER TEST RESULTS	14
3.1	Conducted Emissions	14
3.2	Emission Bandwidth	23
3.3	RF Output Power	28
3.4	Peak Power Spectral Density	31
3.5	Transmitter Radiated and Band Edge Emissions	37
3.6	Frequency Stability	108
4	TEST LABORATORY INFORMATION	110



Release Record

Report No.	Version	Description	Issued Date
FR593001AN	Rev. 01	Initial issue	Dec. 15, 2015

Report No.: FR593001AN Page: 3 of 110



Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.199MHz 46.33 (Margin -7.34dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5850.00MHz 77.19 (Margin -1.01dB) – PK [dBuV/m at 3m]: 5150.00MHz 72.99 (Margin -1.01dB) – PK [dBuV/m at 3m]: 5715.00MHz 72.99 (Margin -1.01dB) - PK	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: 23.29 5725-5850MHz: 23.16 Beamforming mode 5150-5250MHz: 23.34 5725-5850MHz: 22.69	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

Report No.: FR593001AN Page: 4 of 110



1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

	RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS			
5150-5250	а	5180-5240	36-48 [4]	2	6-54 Mbps			
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	MCS 0-15			
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	MCS 0-15			
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	2	MCS 0-9			
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	2	MCS 0-9			
5150-5250	ac (VHT80)	5210	42 [1]	2	MCS 0-9			
5725-5850	а	5745-5825	149-165 [5]	2	6-54 Mbps			
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	MCS 0-15			
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	MCS 0-15			
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	MCS 0-9			
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	MCS 0-9			
5725-5850	ac (VHT80)	5775	155 [1]	2	MCS 0-9			

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

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

1.1.2 Antenna Details

Ant No	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)			
Ant. No.	Wiodei	Туре	Connector	2400~2483.5 5150~5250 5725~585	5725~5850		
1	617210L2	Dipole	I-pex	3.1	3.34	2.7	
2	617210L3	Dipole	I-pex	2.85	2.37	3.44	

1.1.3 Power Supply Type of Equipment under Test (EUT)

I Power Slipply Lyne	100-240Vac, 50-60Hz, 0.6A Power line: 1m non-shielded without core
Power Supply Type	Power line: 1m non-shielded without core

1.1.4 Accessories

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

Report No.: FR593001AN Page : 5 of 110

Note 3: 802.11n/ac supports beamforming function.



1.1.5 Channel List

For Frequency band 5150-5250 MHz					
802.11 a / l	HT20 / VHT20	HT40 / VHT40			
Channel	Frequency(MHz)	Channel	Frequency(MHz)		
36	5180	38	5190		
40	5200	46	5230		
44	5220	VH	Т80		
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	VH	Т80		
161	5805	155	5775		
165	5825				

1.1.6 Test Tool and Duty Cycle

Test Tool	MTool, version: 2.0.2.7					
	Mada	Non-beamforming Be		Beamf	orming	
	Mode	Duty cycle (%)	Duty factor (dB)	Duty cycle (%)	Duty factor (dB)	
	11a	99.31%	0.03			
Duty Cycle and Duty Footor	HT20	99.26%	0.03	98.23%	0.08	
Duty Cycle and Duty Factor	HT40	98.08%	0.08	98.52%	0.06	
	VHT20	99.26%	0.03	98.23%	0.08	
	VHT40	98.08%	0.08	98.52%	0.06	
	VHT80	99.62%	0.02	98.54%	0.06	

Report No.: FR593001AN Page: 6 of 110



1.1.7 Power Setting

For Frequency band 5150-5250 MHz						
Modulation Mode	Tost Fraguency (MUz)	Powe	r Set			
Modulation Mode	Test Frequency (MHz)	Non-Beamforming	Beamforming			
11a	5180	68				
11a	5200	76				
11a	5240	80				
HT20	5180	64	64			
HT20	5200	72	72			
HT20	5240	80	80			
HT40	5190	48	48			
HT40	5230	72	72			
VHT20	5180	64	64			
VHT20	5200	72	72			
VHT20	5240	80	80			
VHT40	5190	48	48			
VHT40	5230	72	72			
VHT80	5210	48	48			

For Frequency band 5725~5850 MHz						
Modulation Mode	Test Frequency (MHz)	Powe	r Set			
Wodulation Wode	rest Frequency (MH2)	Non-Beamforming	Beamforming			
11a	5745	58				
11a	5785	80				
11a	5825	68				
HT20	5745	54	54			
HT20	5785	80	78			
HT20	5825	66	64			
HT40	5755	42	42			
HT40	5795	64	64			
VHT20	5745	54	54			
VHT20	5785	80	78			
VHT20	5825	66	64			
VHT40	5755	42	42			
VHT40	5795	64	64			
VHT80	5775	44	44			

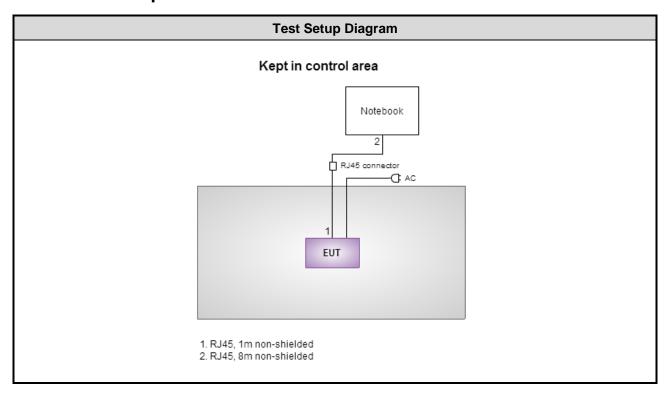
Report No.: FR593001AN Page: 7 of 110



1.2 Local Support Equipment List

Support Equipment List					
No. Equipment Brand Model FCC ID Signal cable / Length				Signal cable / Length (m)	
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.

1.3 Test Setup Chart



Report No.: FR593001AN Page: 8 of 110



1.4 The Equipment List

Test Item	Conducted Emission	Conducted Emission					
Test Site	Conduction room 1 / ((CO01-WS)					
Tested Date	Nov. 26, 2015						
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	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015		
Measurement Software	AUDIX e3 6.120210k NA NA						
Note: Calibration Inte	rval of instruments liste	d above is one year.					

Test Item	Radiated Emission be	Radiated Emission below 1GHz test					
Test Site	966 chamber 2 / (03C	H02-WS)					
Tested Date	Nov. 24, 2015						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until		
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Nov. 09, 2015	Nov. 08, 2016		
Preamplifier	Burgeon	BPA-530	100218	Nov. 03, 2015	Nov. 02, 2016		
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 16, 2014	Dec. 15, 2015		
LF cable 10M	EMCC	CFD400-E	CFD400-001	Jun. 17, 2015	Jun. 16, 2016		
Measurement Software	AUDIX e3 6.120210g NA NA						
Note: Calibration Inte	rval of instruments liste	d above is one year.					

Test Item	Radiated Emission ab	Radiated Emission above 1GHz test						
Test Site	966 chamber 2 / (03C	966 chamber 2 / (03CH02-WS)						
Tested Date	Oct. 15 ~ Oct. 17, 201	5						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101499	Dec. 31, 2014	Dec. 30, 2015			
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. 10, 2014	Nov. 09, 2015			
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. 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			
Measurement Software	AUDIX	e3	6.120210g	NA	NA			
Note: Calibration Inter	rval of instruments listed	d above is one year.						

Report No.: FR593001AN Page: 9 of 110



Test Item	RF Conducted	RF Conducted					
Test Site	(TH01-WS)						
Tested Date	Nov. 27 ~ Dec. 01, 20)15					
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			

Report No.: FR593001AN Page: 10 of 110



2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 43%	Peter Lin
Radiated Emissions	03CH02-WS	21-23°C / 61-62%	Anderson Hung Morgan Chen
RF Conducted	TH01-WS	21°C / 61%	Alex Huang

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

Report No.: FR593001AN Page: 11 of 110



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	HT20	5240	MCS 0	
Radiated Emissions ≤1GHz	HT20	5240	MCS 0	
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		

NOTE:

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

For Frequency band 5725-5850 MHz				
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	VHT20	5785	MCS 0	
Radiated Emissions ≤1GHz	VHT20	5785	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		

NOTE:

Report No.: FR593001AN Page: 12 of 110

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



Beamforming mode

For 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		

NOTE:

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

For Frequency band 5725-5850 MHz					
Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration	
Conducted Emissions	VHT20	5785	MCS 0		
Radiated Emissions ≤1GHz	VHT20	5785	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		

NOTE:

Report No.: FR593001AN Page: 13 of 110

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



3 Transmitter Test Results

3.1 Conducted Emissions

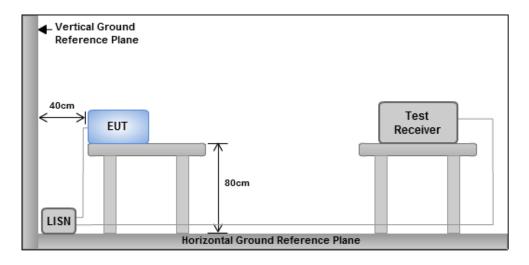
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit					
Frequency Emission (MHz) Quasi-Peak Average					
0.15-0.5	66 - 56 *	56 - 46 *			
0.5-5	56	46			
5-30 60 50					
Note 1: * Decreases with the logarithm of the frequency.					

3.1.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.

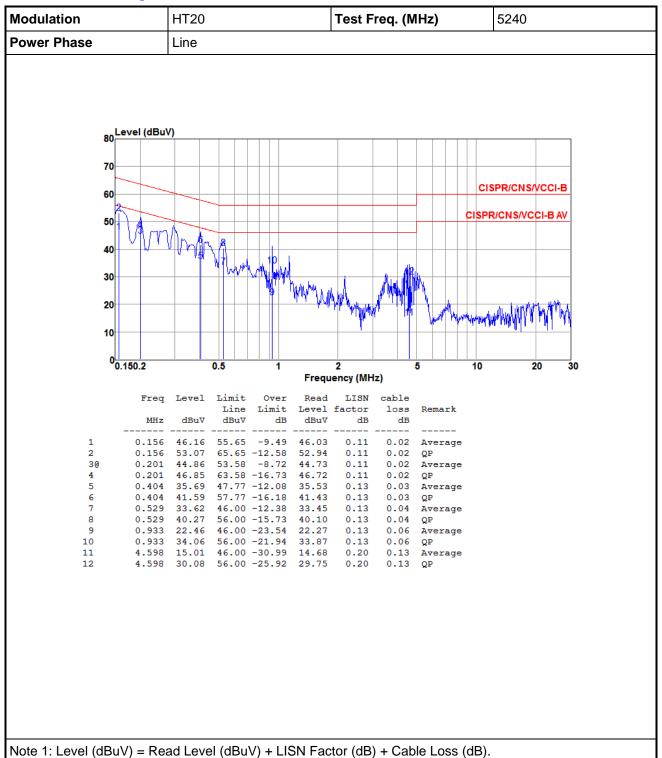
Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

Report No.: FR593001AN Page: 14 of 110



3.1.4 Test Result of Conducted Emissions

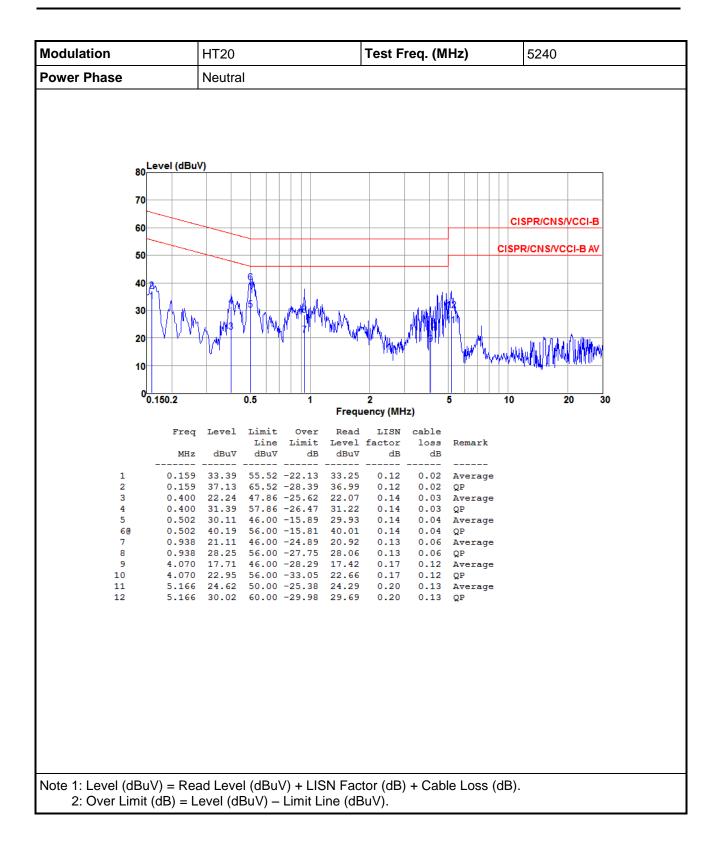
Non-beamforming mode



Report No.: FR593001AN Page: 15 of 110

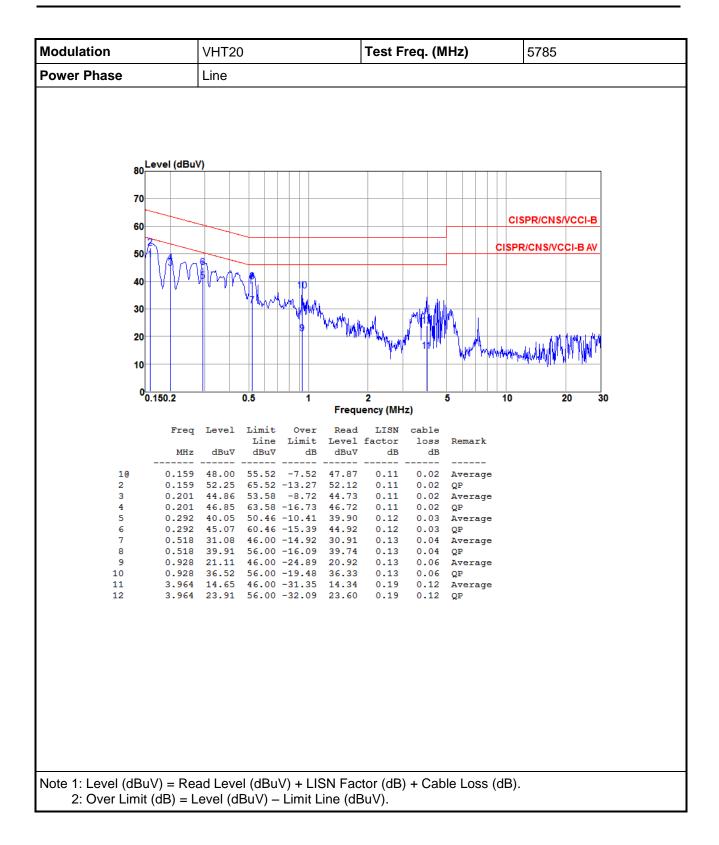
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).





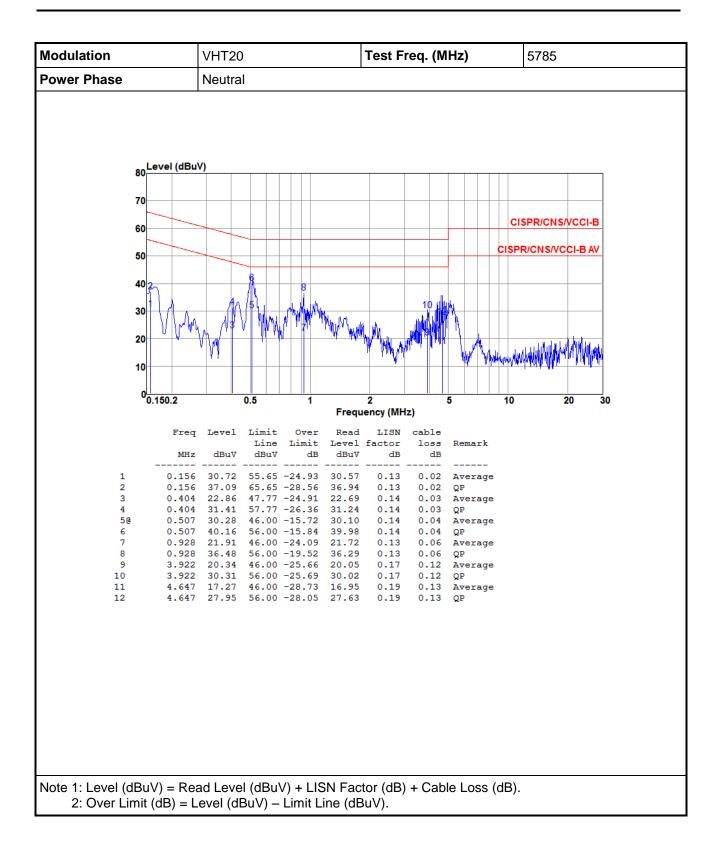
Report No.: FR593001AN Page: 16 of 110





Report No.: FR593001AN Page: 17 of 110

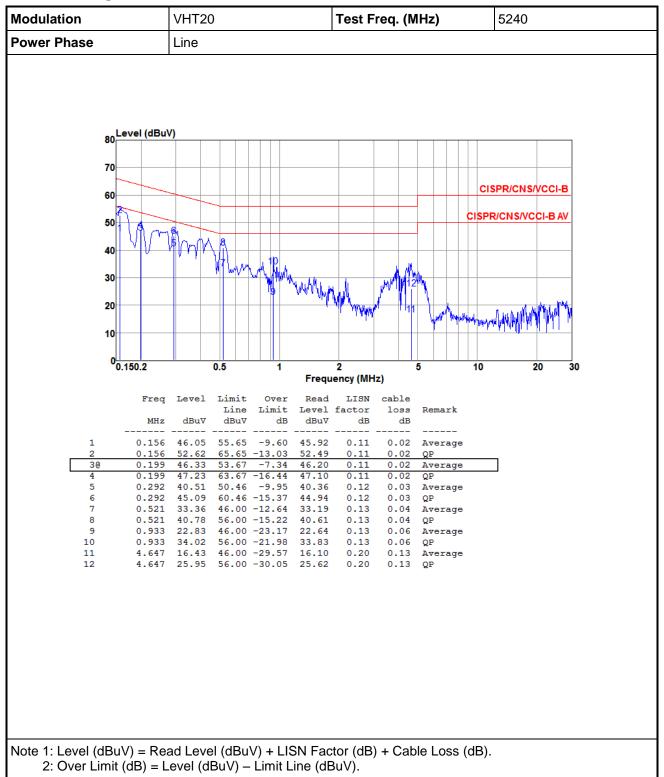




Report No.: FR593001AN Page: 18 of 110



Beamforming mode



Report No.: FR593001AN Page: 19 of 110

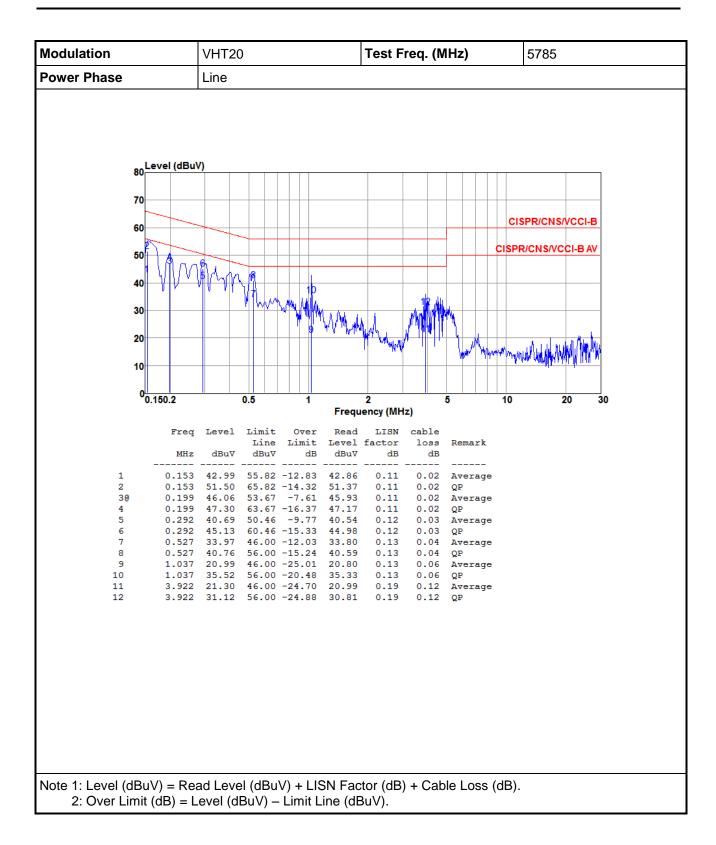


Modulation		VHT2	0			Test F	req.	(MH	lz)			5240	
Power Phase		Neutra	al										
	80 Level (dB 70 60 50 40	uV)										CISPR/CNS/ SPR/CNS/VC	
	20		V MW	יין א ארואייין ע	Ministry								a.ib a mle t
	10	' ' ' '				1 8111111111111111111111111111111111111			W	F TH _{MAN} WY	hull.		AA MILAAM
	0.150.2		0.5	1		2		5				0 2	20 30
	0.150.2		0.5	'	Frequ	ency (MH	łz)	3					20 31
	Free	q Level	Limit Line	Over	Read	LISN factor	cabl		Rema	1.			
	MH:	z dBuV		Limit dB	dBuV	dB		dΒ	CILLO	ııx			
1	0.15			-22.13	33.25	0.12	0.0	02 2		cage			
2	0.15	20.82	65.52 47.73	-26.91	37.10 20.65	0.12 0.14		03 2		cage			
4 5@	0.40		57.73 46.00		30.74	0.14			QP Ave:	cage			
6	0.50	7 40.12	56.00	-15.88	39.94	0.14	0.0	04 (QΡ				
7 8	0.93	3 23.15 3 34.52	46.00 56.00		22.96 34.33	0.13			Ave: QP	cage			
9	4.04	9 16.57	46.00		16.28	0.17	0.1	12 7	Ave	cage			
10 11	4.04		56.00 46.00		28.21 18.11	0.17 0.19			QP Avei	cage			
		7 32.18				0.19			QΡ	5-			

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

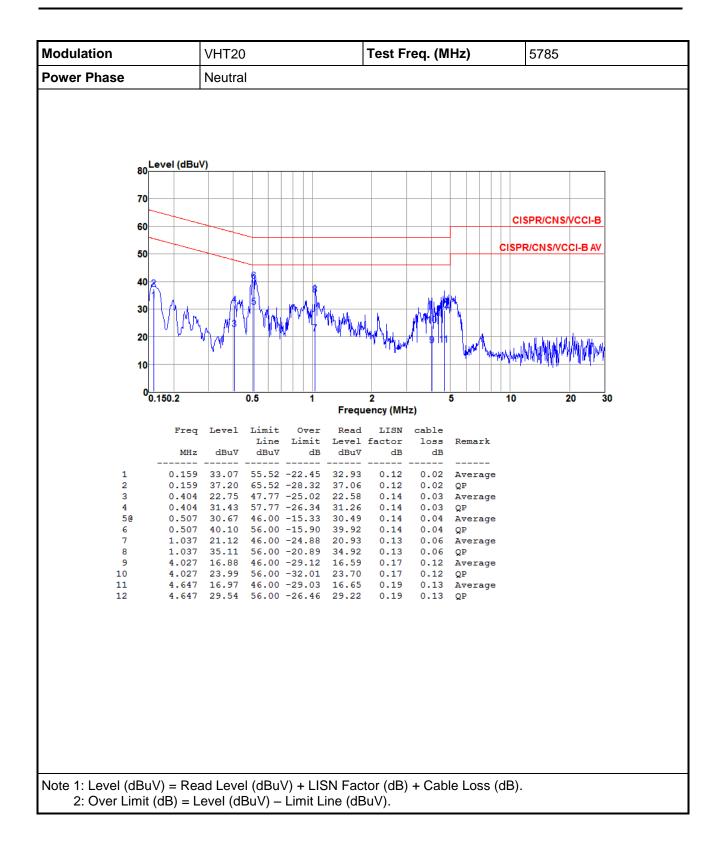
Report No.: FR593001AN Page: 20 of 110





Report No.: FR593001AN Page: 21 of 110





Report No.: FR593001AN Page: 22 of 110



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.

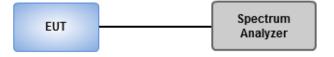
Occupied Bandwidth

- 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



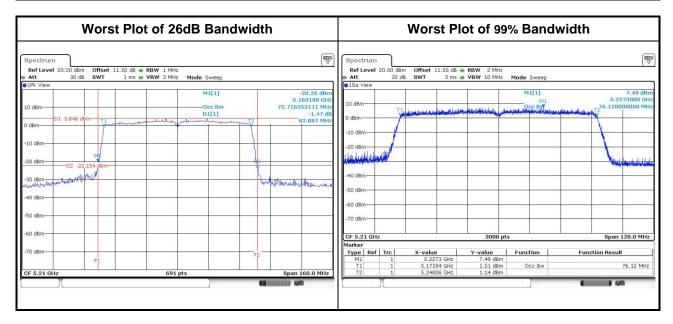
Report No.: FR593001AN Page: 23 of 110



3.2.4 Test Result of Emission Bandwidth

Non-beamforming mode

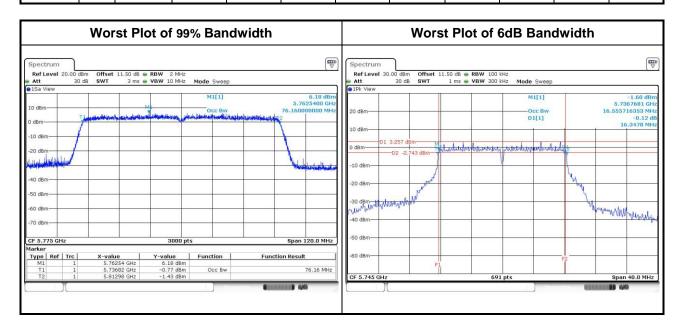
				For Frequ	ency band	5150-5250	MHz			
	Emission Bandwidth									
Mada		Freq.	26dB Bandwidth (MHz)				99% Bandv	vidth (MHz)	1	
Mode	N _{TX}	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
11a	2	5180	25.22	26.20			17.07	17.13		
11a	2	5200	35.43	39.13			17.52	17.47		
11a	2	5240	33.77	39.20			18.73	18.82		
VHT20	2	5180	25.10	27.30			17.98	18.19		
VHT20	2	5200	38.70	38.77			18.14	18.38		
VHT20	2	5240	37.39	38.77			19.20	19.29		
VHT40	2	5190	40.81	41.62			36.58	36.68		
VHT40	2	5230	77.10	77.54			37.10	37.36		
VHT80	2	5210	81.62	82.09			76.04	76.12		



Report No.: FR593001AN Page: 24 of 110



				For Frequency band 5725-5850 MHz									
	Emission Bandwidth												
			0	OBW Bandwidth (MHz)				6dB Bandwidth (MHz)					
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	6dB BW Limit (MHz)		
11a	2	5745	16.95	17.11			16.35	16.41			0.5		
11a	2	5785	18.78	20.41			16.35	16.35			0.5		
11a	2	5825	17.15	17.19			16.35	16.35			0.5		
VHT20	2	5745	17.97	18.15			17.62	17.57			0.5		
VHT20	2	5785	19.26	19.96			17.62	17.62			0.5		
VHT20	2	5825	18.05	18.25			17.62	17.62			0.5		
VHT40	2	5755	36.64	36.72			36.29	36.29			0.5		
VHT40	2	5795	36.76	36.92			36.29	36.29			0.5		
VHT80	2	5775	76.04	76.16			76.29	75.83			0.5		

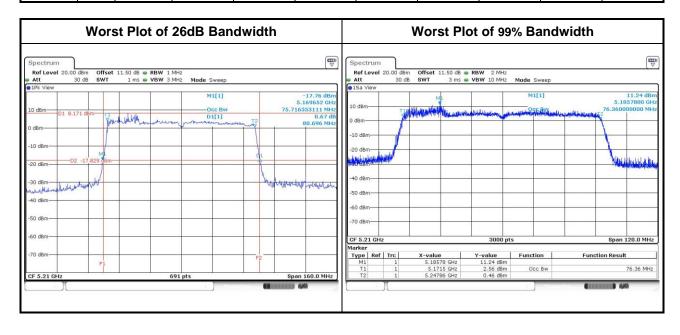


Report No.: FR593001AN Page: 25 of 110



Beamforming mode

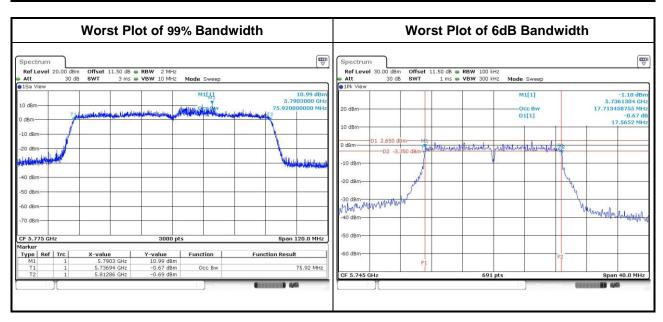
	For Frequency band 5150-5250 MHz									
	Emission Bandwidth									
Mada		Freq.	2	26dB Band	width (MHz)	99% Bandwidth (MHz)			
Mode	N _{TX}	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
VHT20	2	5180	21.57	22.09			17.92	18.13		
VHT20	2	5200	38.04	39.42			18.03	18.24		
VHT20	2	5240	33.04	37.10			19.54	19.37		
VHT40	2	5190	40.70	41.16			36.54	36.64		
VHT40	2	5230	65.51	68.55			37.06	37.36		
VHT80	2	5210	80.70	80.70			76.16	76.36		



Report No.: FR593001AN Page: 26 of 110



	For Frequency band 5725-5850 MHz										
	Emission Bandwidth										
			O	BW Band	width (MH	z)		6dB B	andwidth	(MHz)	
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	6dB BW Limit (MHz)
VHT20	2	5745	17.89	18.12			17.57	17.62			0.5
VHT20	2	5785	18.85	19.40			17.62	17.62			0.5
VHT20	2	5825	17.93	18.17			17.62	17.62			0.5
VHT40	2	5755	36.54	36.68			35.36	36.29			0.5
VHT40	2	5795	36.72	36.90			36.29	35.71			0.5
VHT80	2	5775	75.88	75.92			76.25	75.13			0.5



Report No.: FR593001AN Page: 27 of 110



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						

Fred	quency Band (MHz)	Limit					
	5250 ~ 5350	250mW or 11dBm+10 log B					
	5470 ~ 5725	250mW or 11dBm+10 log B					
	∑ 5725 ~ 5850 1 W						
Note	Note: "B" is the 26dB emission bandwidth in MHz.						

3.3.2 Test Procedures

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

Measurements 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



Report No.: FR593001AN Page: 28 of 110



3.3.4 Test Result of Maximum Conducted Output Power

Non-beamforming mode

	For Frequency band 5150-5250 MHz								
			С	onducted I	Power (dBn	n)	Total	Total	Limit
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11a	2	5180	16.77	16.23			89.509	19.52	30.00
11a	2	5200	19.26	18.43			153.996	21.88	30.00
11a	2	5240	20.46	19.77			206.015	23.14	30.00
HT20	2	5180	15.42	15.27			68.485	18.36	30.00
HT20	2	5200	18.01	17.55			120.126	20.80	30.00
HT20	2	5240	20.57	19.86			210.853	23.24	30.00
HT40	2	5190	12.42	11.71			32.283	15.09	30.00
HT40	2	5230	18.24	18.57			138.626	21.42	30.00
VHT20	2	5180	15.46	15.32			69.197	18.40	30.00
VHT20	2	5200	18.05	17.60			121.370	20.84	30.00
VHT20	2	5240	20.63	19.89			213.110	23.29	30.00
VHT40	2	5190	12.44	11.75			32.501	15.12	30.00
VHT40	2	5230	18.3	18.62			140.386	21.47	30.00
VHT80	2	5210	12.16	11.74			31.372	14.97	30.00

			For Freq	uency band	5725-5850) MHz			
			C	onducted l	Power (dBn	n)	Total	Total	Limit
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11a	2	5745	14.49	14.33			55.221	17.42	30.00
11a	2	5785	19.88	20.09			199.369	23.00	30.00
11a	2	5825	17.35	16.6			100.034	20.00	30.00
HT20	2	5745	14.02	13.61			48.196	16.83	30.00
HT20	2	5785	20.02	20.16			204.214	23.10	30.00
HT20	2	5825	16.72	16.29			89.549	19.52	30.00
HT40	2	5755	10.42	10.33			21.805	13.39	30.00
HT40	2	5795	16.02	15.49			75.394	18.77	30.00
VHT20	2	5745	14.11	13.66			48.991	16.90	30.00
VHT20	2	5785	20.07	20.22			206.821	23.16	30.00
VHT20	2	5825	16.8	16.35			91.015	19.59	30.00
VHT40	2	5755	10.55	10.4			22.315	13.49	30.00
VHT40	2	5795	16.06	15.56			76.339	18.83	30.00
VHT80	2	5775	10.77	10.44			23.006	13.62	30.00

Report No.: FR593001AN Page: 29 of 110



Beamforming mode

			For Freq	uency band	d 5150-5250	MHz			
			С	onducted I	Power (dBn	Total	Total	Limit	
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
HT20	2	5180	15.25	15.51			69.060	18.39	30.00
HT20	2	5200	18.23	17.37			121.103	20.83	30.00
HT20	2	5240	20.77	19.75			213.805	23.30	30.00
HT40	2	5190	12.53	12.18			34.426	15.37	30.00
HT40	2	5230	18.78	18.75			150.499	21.78	30.00
VHT20	2	5180	15.31	15.58			70.104	18.46	30.00
VHT20	2	5200	18.26	17.41			122.069	20.87	30.00
VHT20	2	5240	20.82	19.78			215.842	23.34	30.00
VHT40	2	5190	12.59	12.22			34.828	15.42	30.00
VHT40	2	5230	18.82	18.78			151.717	21.81	30.00
VHT80	2	5210	11.85	11.42			29.178	14.65	30.00

	For Frequency band 5725-5850 MHz								
		F (1411.)	С	onducted I	Power (dBn	n)	Total	Total	Limit
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
HT20	2	5745	13.89	13.86			48.813	16.89	29.91
HT20	2	5785	19.67	19.57			183.256	22.63	29.91
HT20	2	5825	15.97	15.82			77.731	18.91	29.91
HT40	2	5755	10.88	10.58			23.675	13.74	29.91
HT40	2	5795	16.51	16.02			84.766	19.28	29.91
VHT20	2	5745	13.94	13.91			49.378	16.94	29.91
VHT20	2	5785	19.73	19.63			185.806	22.69	29.91
VHT20	2	5825	16.02	15.87			78.631	18.96	29.91
VHT40	2	5755	10.93	10.63			23.949	13.79	29.91
VHT40	2	5795	16.55	16.06			85.550	19.32	29.91
VHT80	2	5775	11.11	10.75			24.797	13.94	29.91

Note:1. Directional gain = $10 * log((10^{2.7/20} + 10^{3.44/20})^2/2) = 6.09 dBi > 6 dBi$ Limit shall be reduced to 30 dBm - (6.09 dBi - 6 dBi) = 29.91 dBm.

Report No.: FR593001AN Page: 30 of 110



3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

	Frequency band 5150-5250 MHz						
Оре	erating 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					

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

Report No.: FR593001AN Page: 31 of 110



3.4.2 Test Procedures

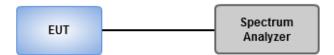
For 5150 ~ 5250 MHz

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



Report No.: FR593001AN Page: 32 of 110



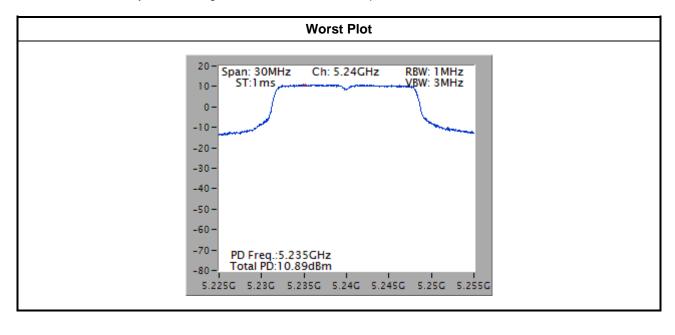
3.4.4 Test Result of Peak Power Spectral Density

Non-beamforming mode

For Frequency band 5150-5250 MHz							
Condition			Peak Power Spectral Density (dBm/MHz)				
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)	
11a	2	5180	7.05	0.00	7.05	17	
11a	2	5200	9.60	0.00	9.60	17	
11a	2	5240	10.89	0.00	10.89	17	
VHT20	2	5180	5.60	0.00	5.60	17	
VHT20	2	5200	7.96	0.00	7.96	17	
VHT20	2	5240	10.41	0.00	10.41	17	
VHT40	2	5190	3.40	0.00	3.40	17	
VHT40	2	5230	5.62	0.00	5.62	17	
VHT80	2	5210	-3.79	0.00	-3.79	17	

Note:

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



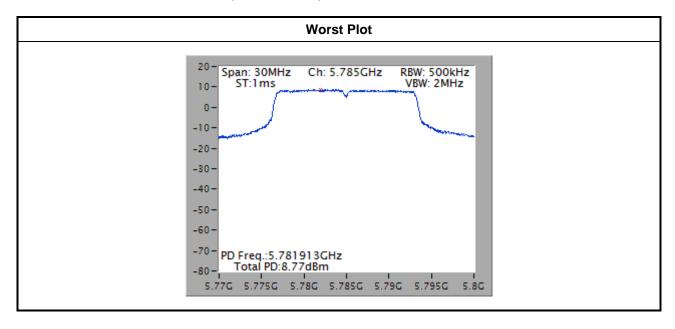
Report No.: FR593001AN Page: 33 of 110



For Frequency band 5725-5850 MHz							
Condition			Peak Power Spectral Density (dBm/500kHz)				
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)	
11a	2	5745	3.10	0.00	3.10	29.91	
11a	2	5785	8.77	0.00	8.77	29.91	
11a	2	5825	5.58	0.00	5.58	29.91	
VHT20	2	5745	1.81	0.00	1.81	29.91	
VHT20	2	5785	8.30	0.00	8.30	29.91	
VHT20	2	5825	4.66	0.00	4.66	29.91	
VHT40	2	5755	-4.42	0.00	-4.42	29.91	
VHT40	2	5795	1.04	0.00	1.04	29.91	
VHT80	2	5775	-6.99	0.00	-6.99	29.91	

Note:

- 1. D.F is duty factor.
- Test result is bin-by-bin summing measured value of each TX port. Directional gain = $10 * log((10^{2.7/20}+10^{3.44/20})^2/2) = 6.09 dBi > 6 dBi$ Limit shall be reduced to 30 dBm (6.09 dBi 6 dBi) = 29.91 dBm.



Report No.: FR593001AN Page: 34 of 110

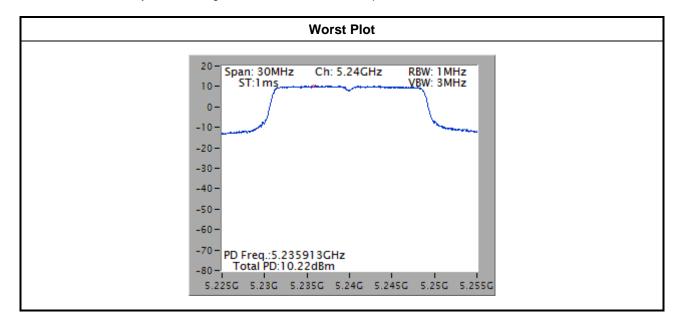


Beamforming mode

For Frequency band 5150-5250 MHz							
Co	ndition	1	Peak Power Spectral Density (dBm/MHz)				
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/MHz)	Duty Factor (dB)	PPSD with D.F (dBm/MHz)	PPSD Limit (dBm/MHz)	
VHT20	2	5180	5.23	0.00	5.23	17	
VHT20	2	5200	7.73	0.00	7.73	17	
VHT20	2	5240	10.22	0.00	10.22	17	
VHT40	2	5190	-1.01	0.00	-1.01	17	
VHT40	2	5230	5.71	0.00	5.71	17	
VHT80	2	5210	-4.08	0.00	-4.08	17	

Note:

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



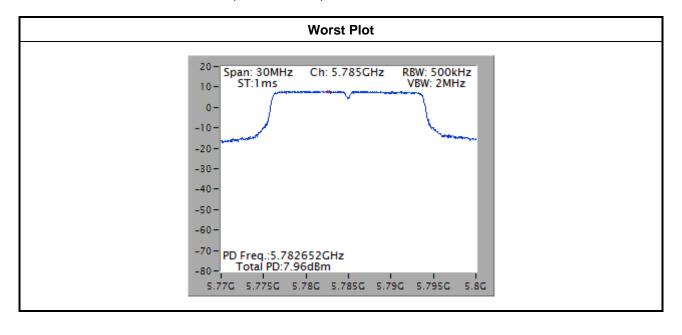
Report No.: FR593001AN Page: 35 of 110



For Frequency band 5725-5850 MHz							
Co	ondition		Peak Power Spectral Density (dBm/500kHz)				
Modulation Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)	
VHT20	2	5745	2.10	0.00	2.10	29.91	
VHT20	2	5785	7.96	0.00	7.96	29.91	
VHT20	2	5825	4.24	0.00	4.24	29.91	
VHT40	2	5755	-3.89	0.00	-3.89	29.91	
VHT40	2	5795	1.55	0.00	1.55	29.91	
VHT80	2	5775	-6.52	0.00	-6.52	29.91	

Note:

- 1. D.F is duty factor.
- 2.
- Test result is bin-by-bin summing measured value of each TX port. Directional gain = $10 * log((10^{2.7720}+10^{3.44/20})^2/2) = 6.09 dBi > 6 dBi$ Limit shall be reduced to 30 dBm (6.09 dBi 6 dBi) = 29.91 dBm.



Report No.: FR593001AN Page: 36 of 110



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

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).

Report No.: FR593001AN Page: 37 of 110



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.

Report No.: FR593001AN Page: 38 of 110



3.5.3 Test Setup

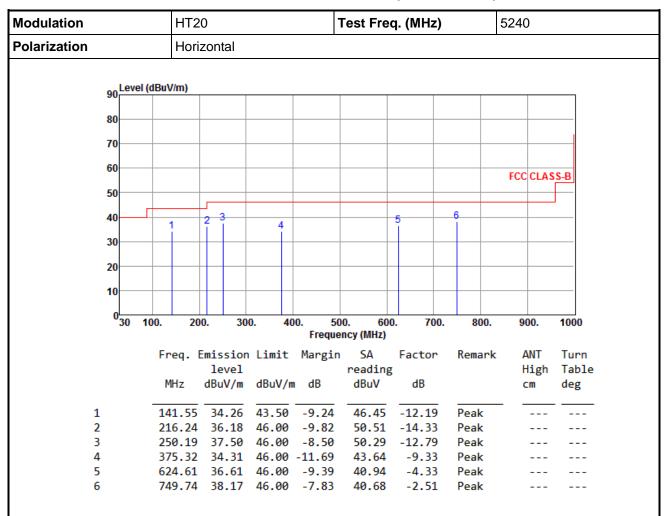


Report No.: FR593001AN Page: 39 of 110



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.

Report No.: FR593001AN Page: 40 of 110



Modulation	dulation			HT20				q. (MHz)	5240		
Polarization			Verti	cal		•					
			•								
	90 ^{Le}	evel (dB	uV/m)								
	80										
	70										
	60									FCC CL	ASS-B
	50										
		. +		_							_
	40			2	3			4	5	6	
	30				<u>_</u>						
	20										
	10										
	030	100.	20	0. 30	0.		00. 60	0. 700	. 800.	900.	1000
							ency (MHz)				
		F	req. E		Limit	: Margir		Factor	Remark		
				level	JD. M	/_ JD	reading			Hig	
			MHz	dBuV/m	aBuv/	m ab	dBuV	dB		cm	deg
	1	_	46.49	38.49	40.00	-1.51	50.09	-11.60	QP		
	2		11.39	34.01	43.50		48.41		Peak		
	3					-12.95					
	4					-12.03		-4.33	Peak		
	5					-11.97					
	6	8	374.87	35.81	46.00	-10.19	36.78	-0.97	Peak		

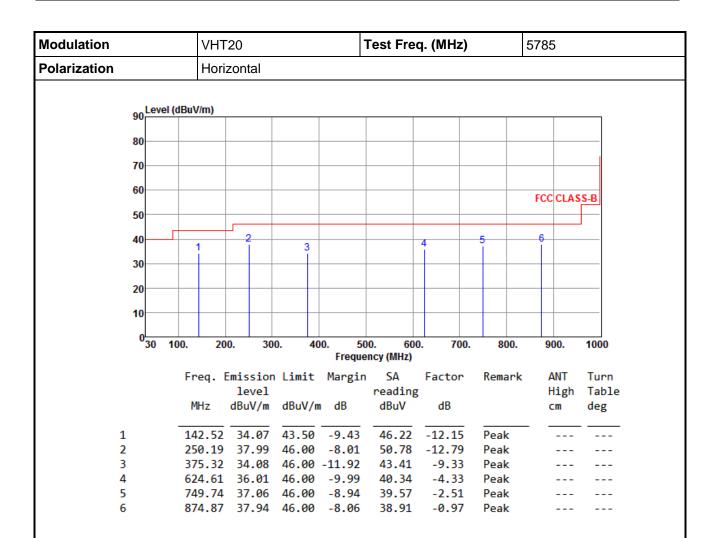
*Factor includes antenna factor, cable loss and amplifier gain

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.

Report No.: FR593001AN Page: 41 of 110





*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.

Report No.: FR593001AN Page: 42 of 110



Modulation	VHT20				Test Fre	q. (MHz)	5785			
Polarization		Verti	cal		•					
90 Le	vel (dBu\	//m)								
80										
70—										
60										
60									FCC CLAS	SS-B
50										
40 1									_	-
40				2			4	5	6	
30						0				
20										
20										
10										
<u></u>										
0 <mark></mark>	100.	20	0. 30	0. 4		00. 600 ency (MHz)	0. 700	. 800.	900.	1000
	-						. .	ъ .	ANT	-
	Fr	eq. t	level	Limit	Margir	reading	Factor	Remark	: ANT High	Turn Table
	м	lHz	dBuV/m	dBuV/	m dB	dBuV	dB		cm	deg
				,	45	4541	-			8
1	4	7.46	38.50	40.00	-1.50	50.11	-11.61	QP		
2	37	5.32	32.60	46.00	-13.40	41.93	-9.33	Peak		
3		0.45			-15.49		-6.53	Peak		
4					-13.41		-4.33	Peak		
5		9.74			-11.71		-2.51	Peak		
6	87	4.87	36.51	46.00	-9.49	37.48	-0.97	Peak		

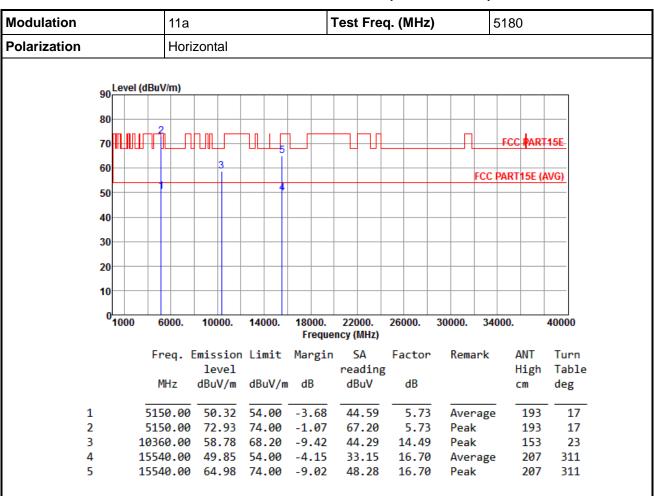
*Factor includes antenna factor, cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

Report No.: FR593001AN Page: 43 of 110



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



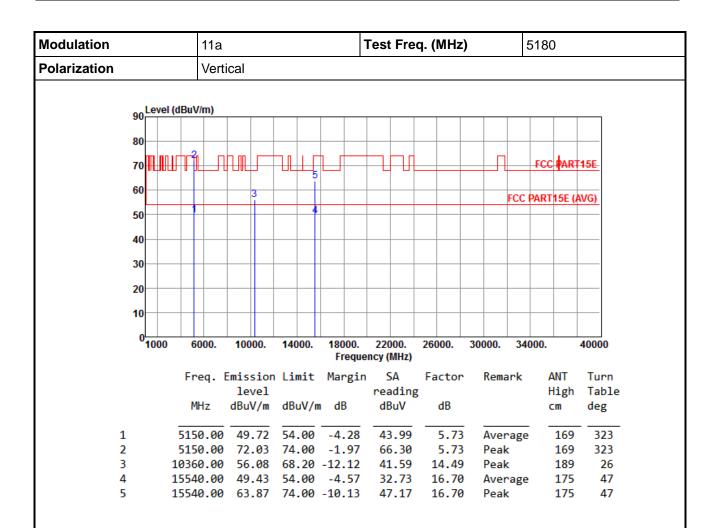
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 44 of 110



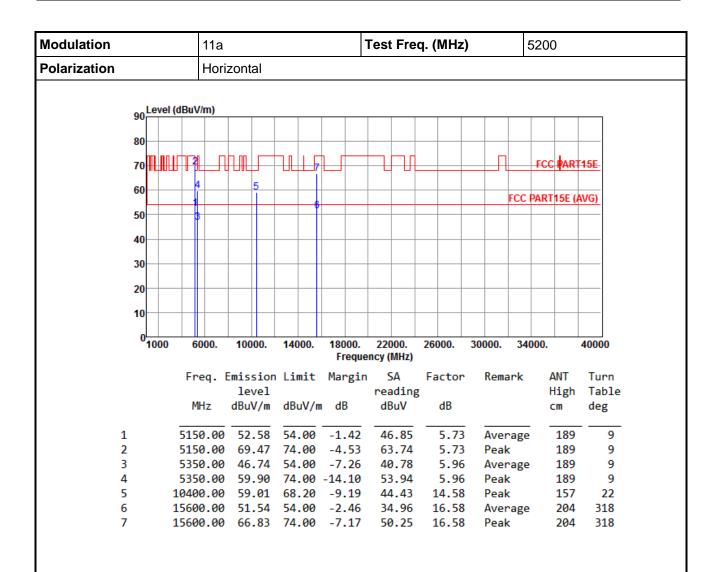


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 45 of 110



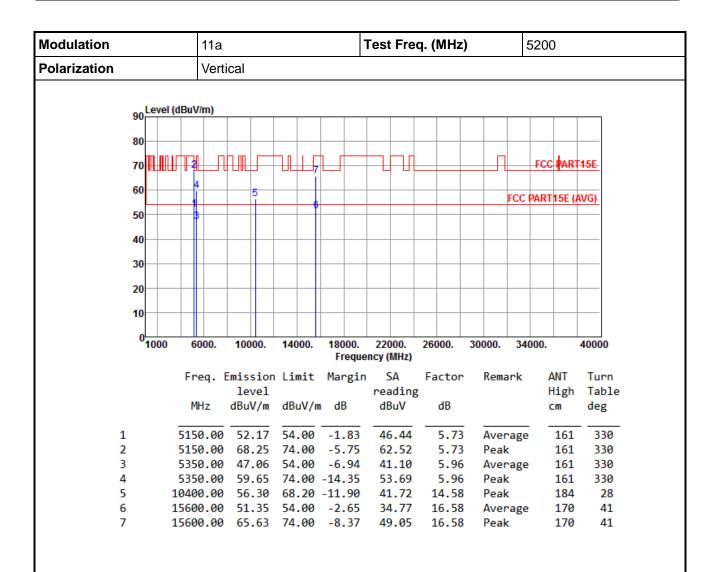


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 46 of 110



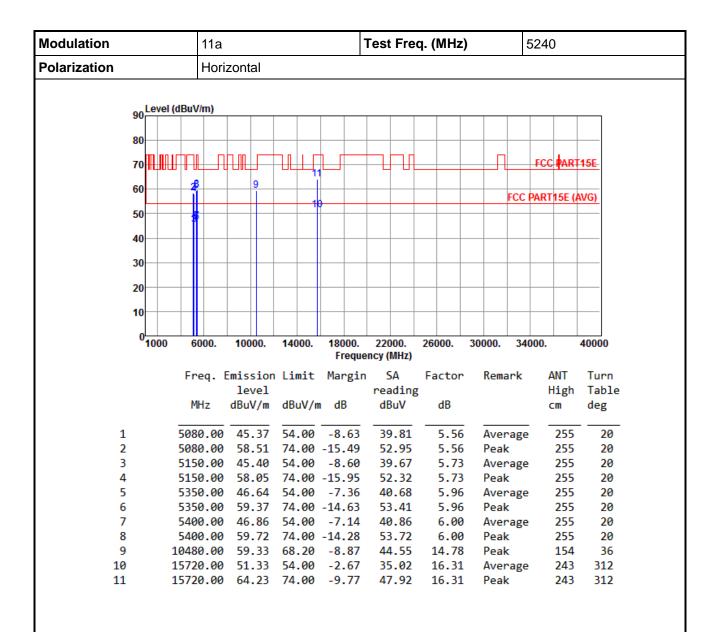


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 47 of 110



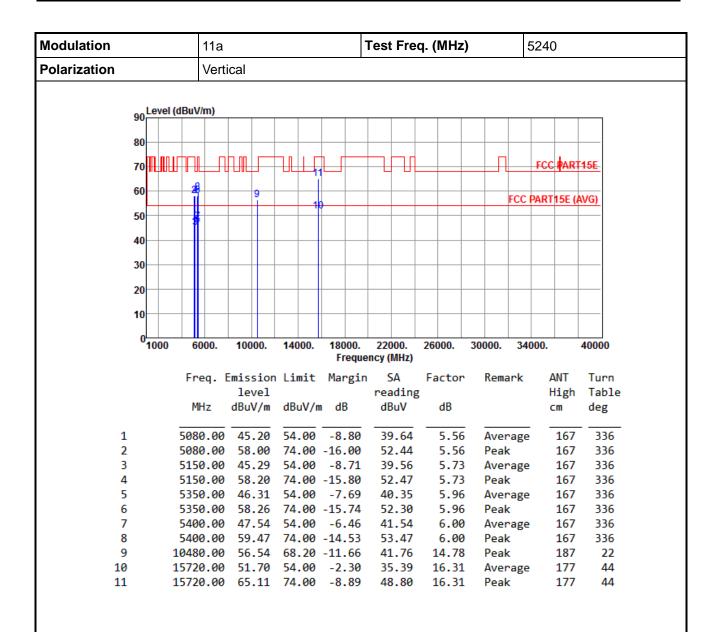


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 48 of 110



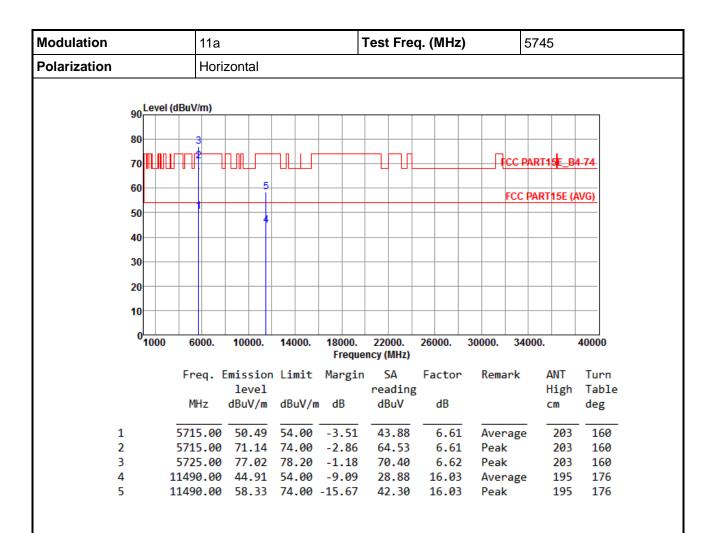


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 49 of 110



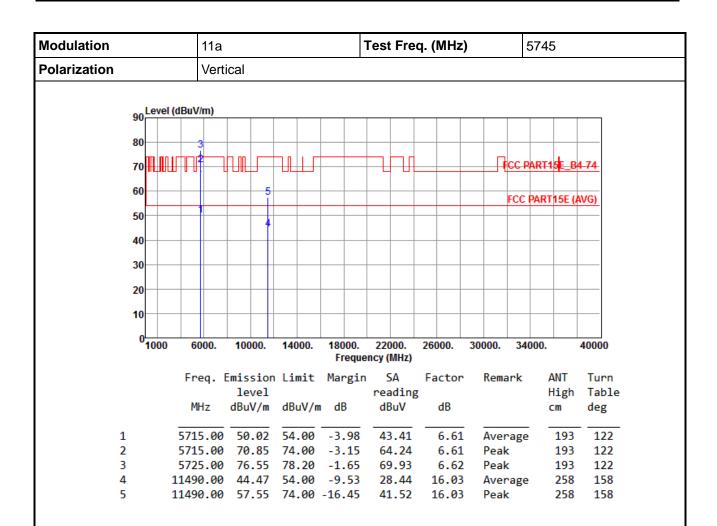


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 50 of 110



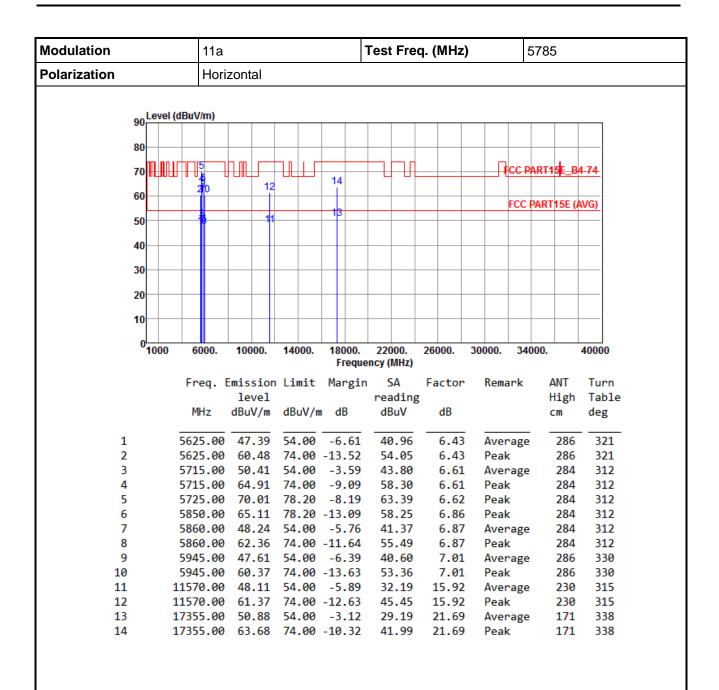


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 51 of 110



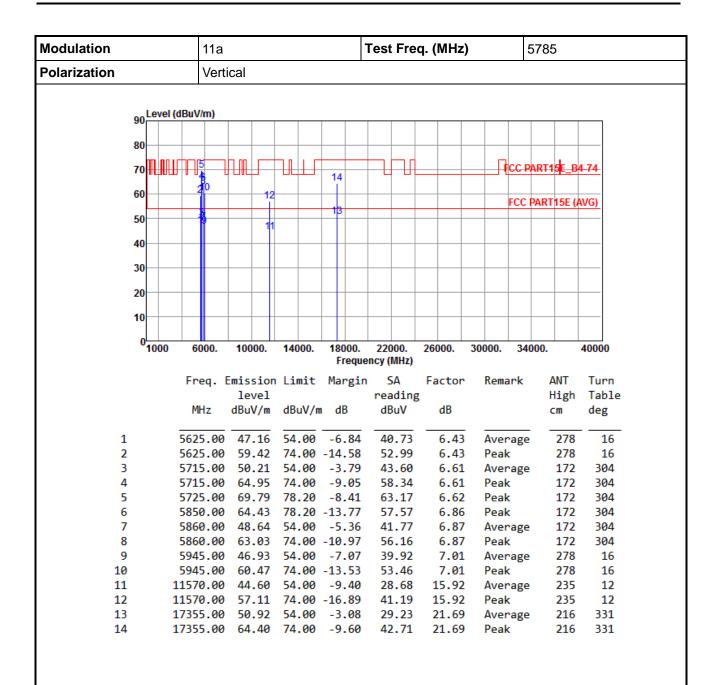


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 52 of 110



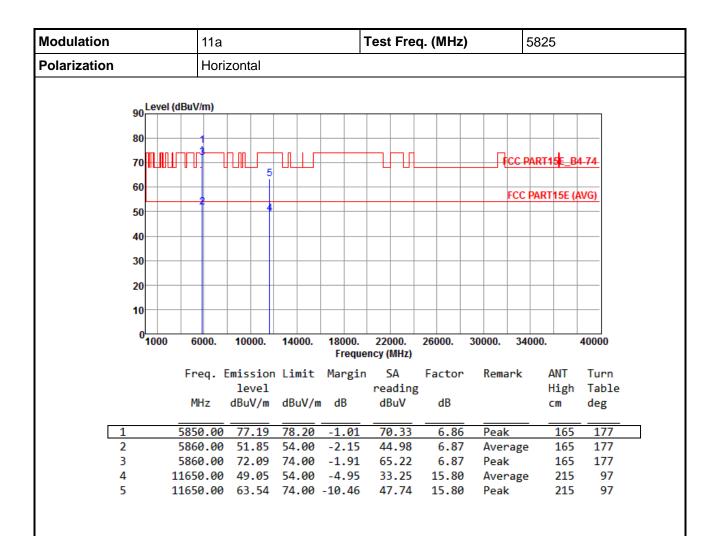


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 53 of 110



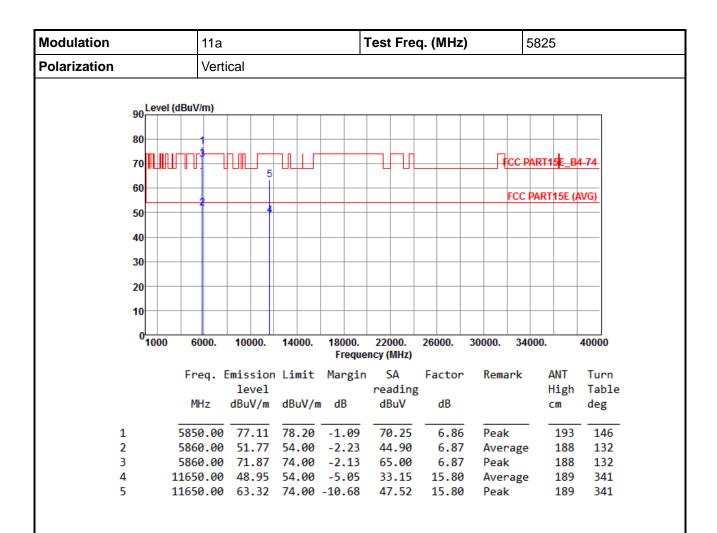


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 54 of 110





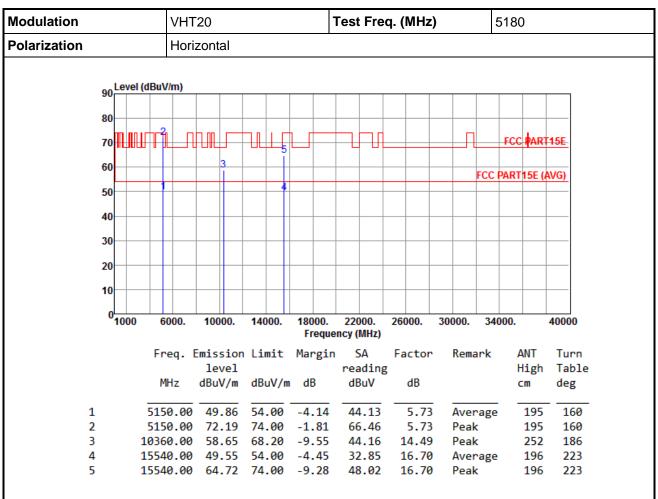
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 55 of 110



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



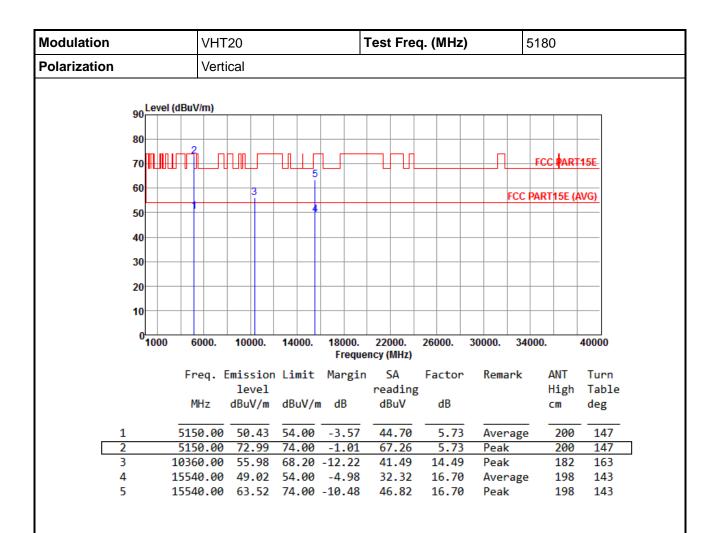
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 56 of 110



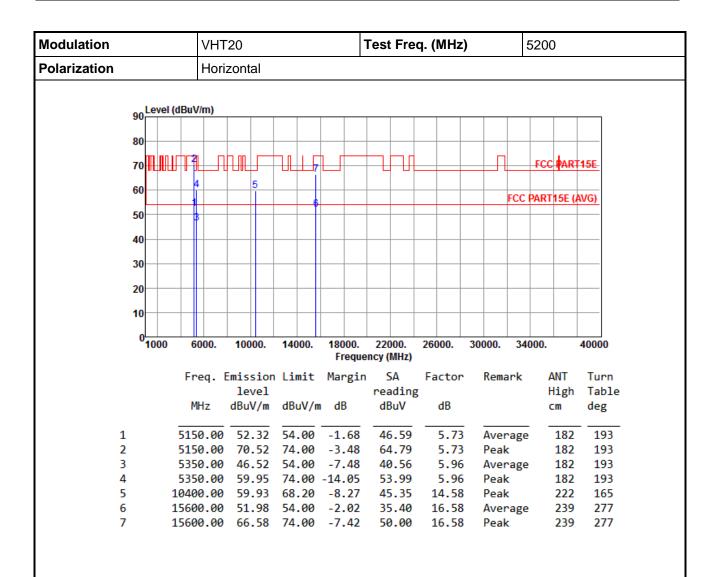


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 57 of 110



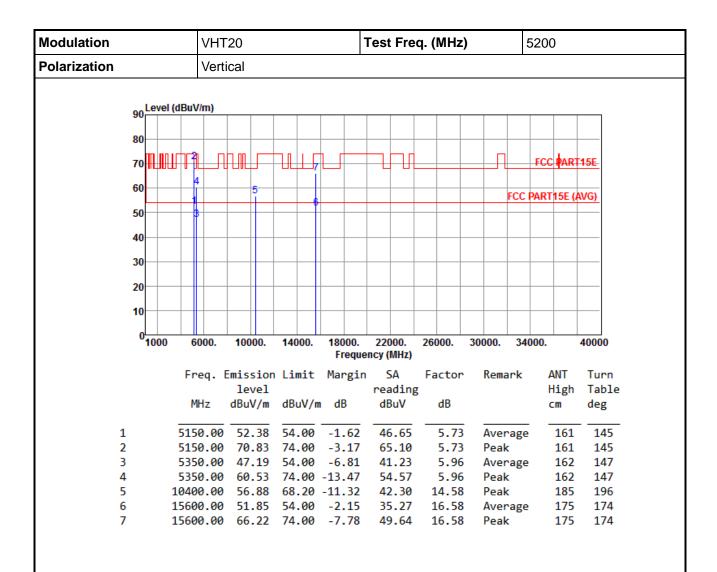


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 58 of 110



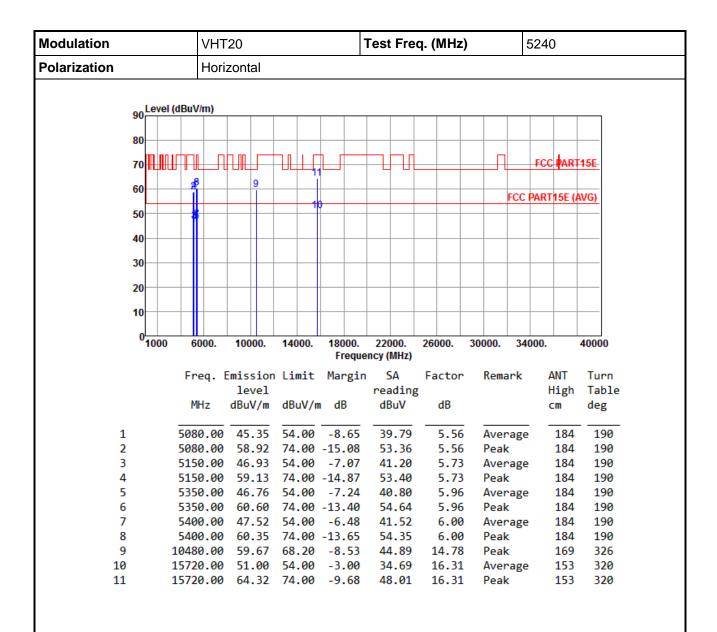


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 59 of 110



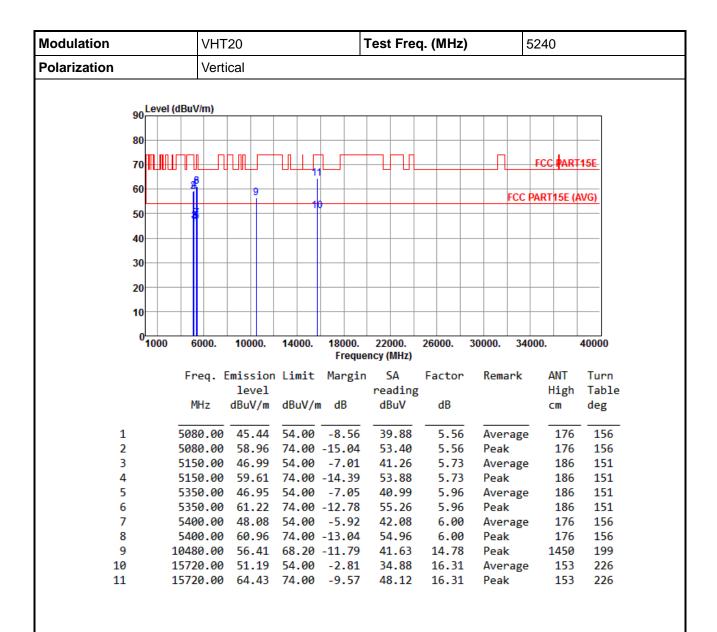


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 60 of 110



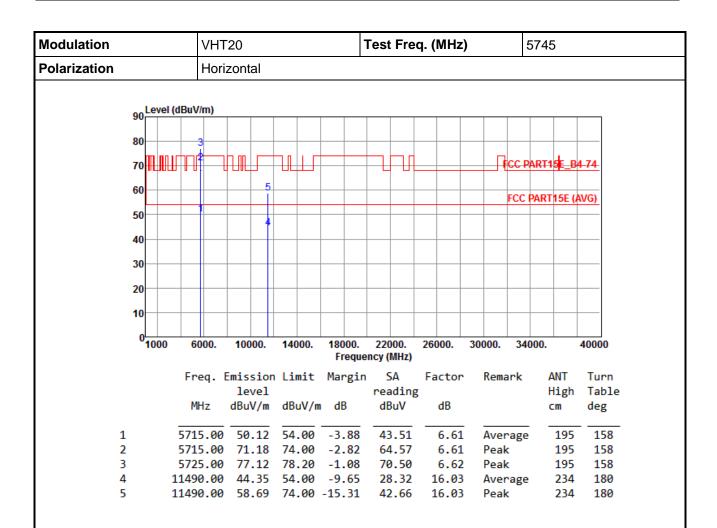


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 61 of 110



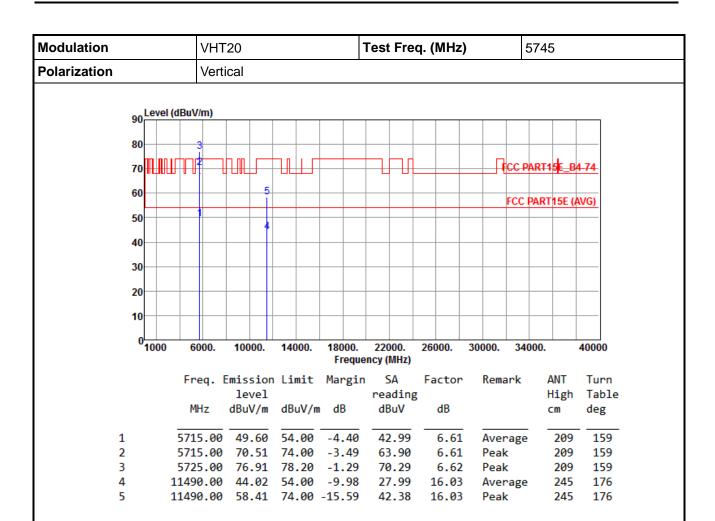


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 62 of 110



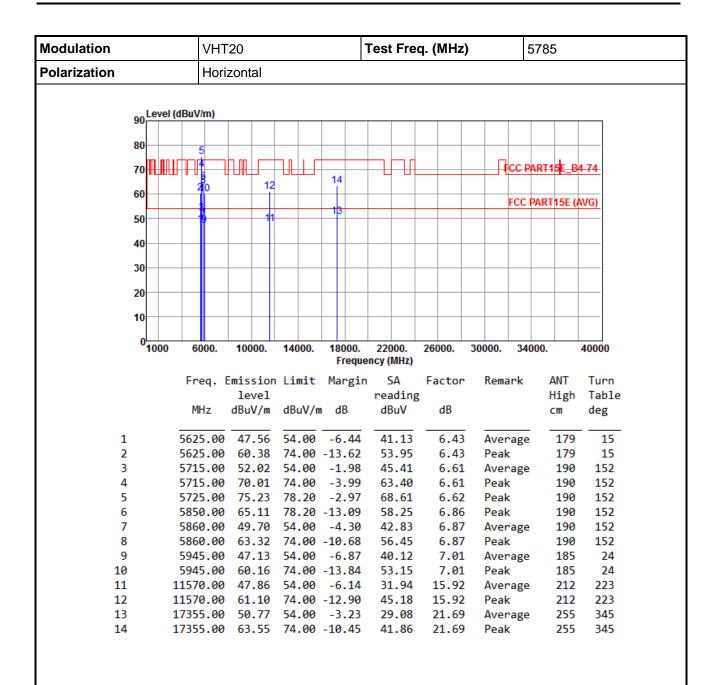


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 63 of 110



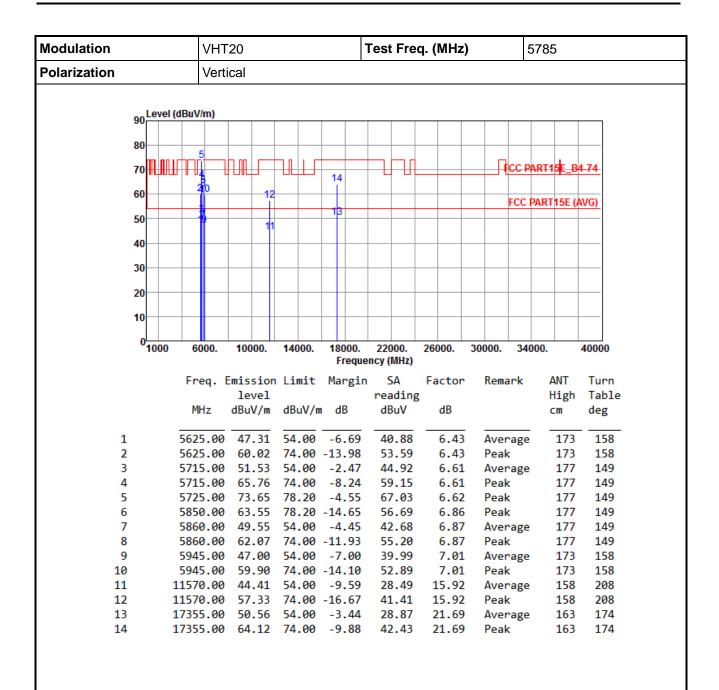


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 64 of 110



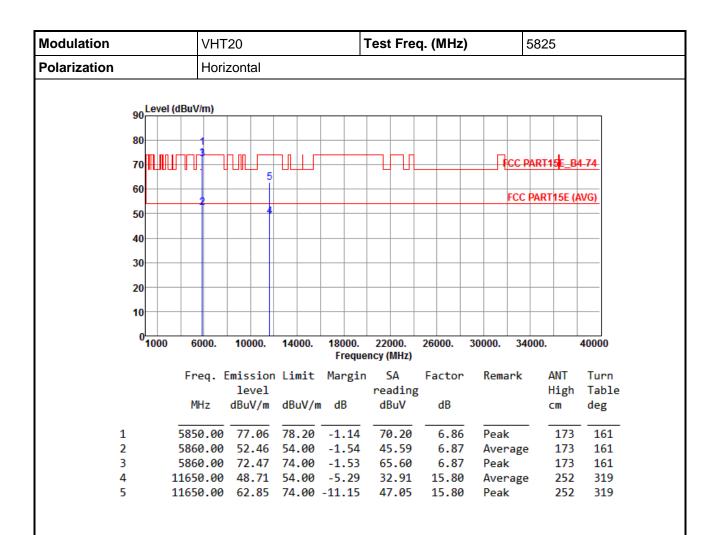


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 65 of 110



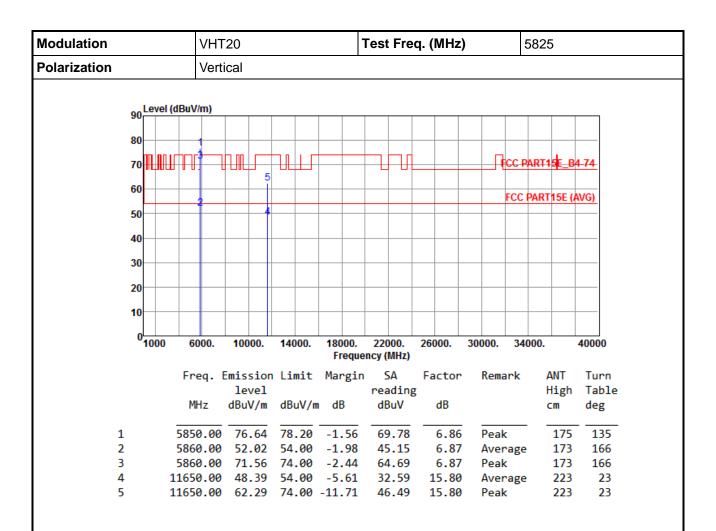


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 66 of 110





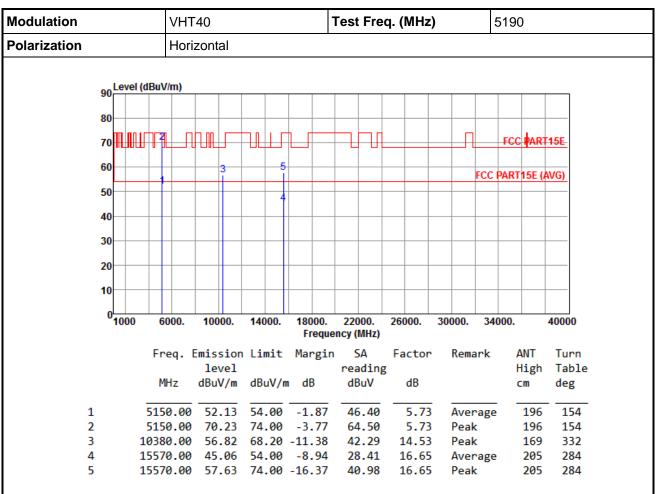
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 67 of 110



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



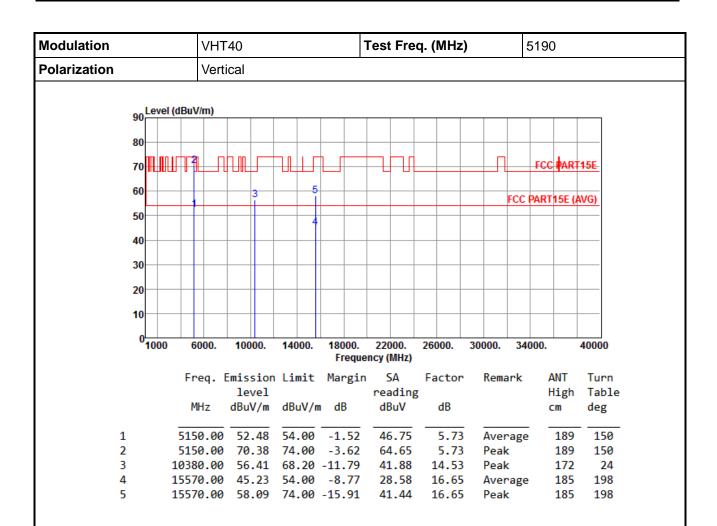
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 68 of 110



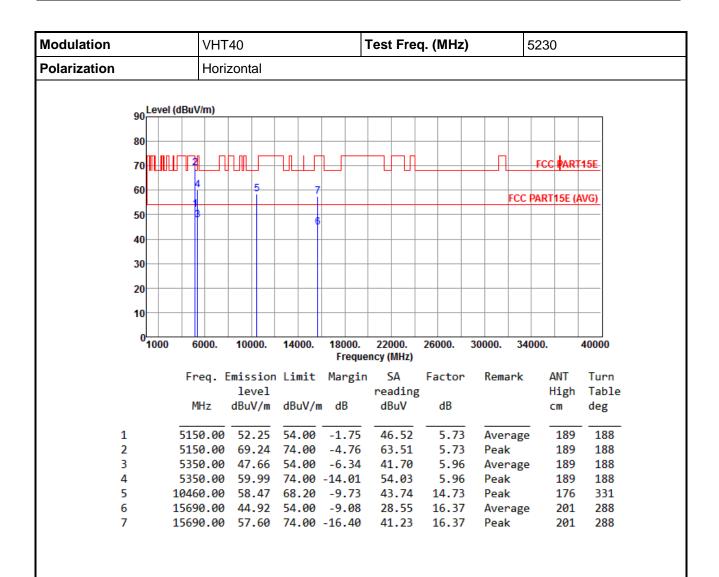


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 69 of 110



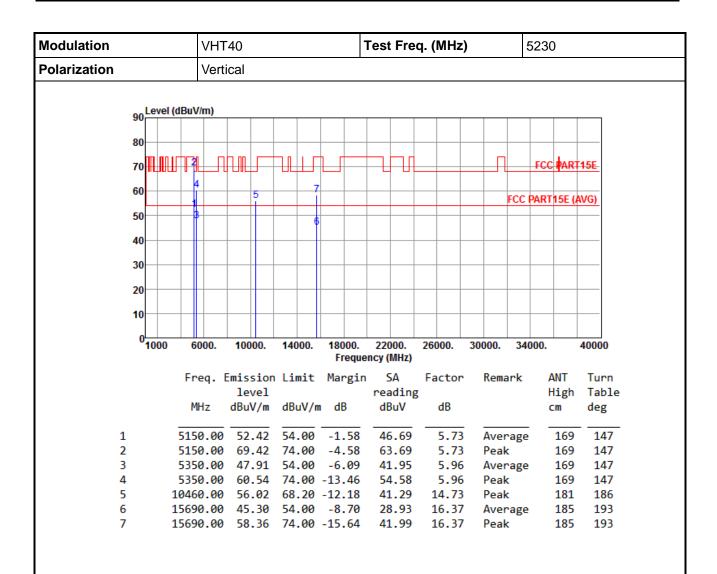


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 70 of 110



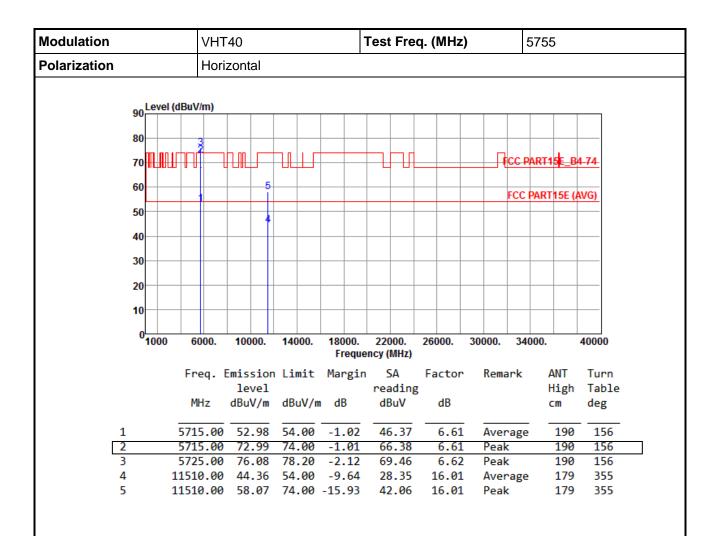


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 71 of 110



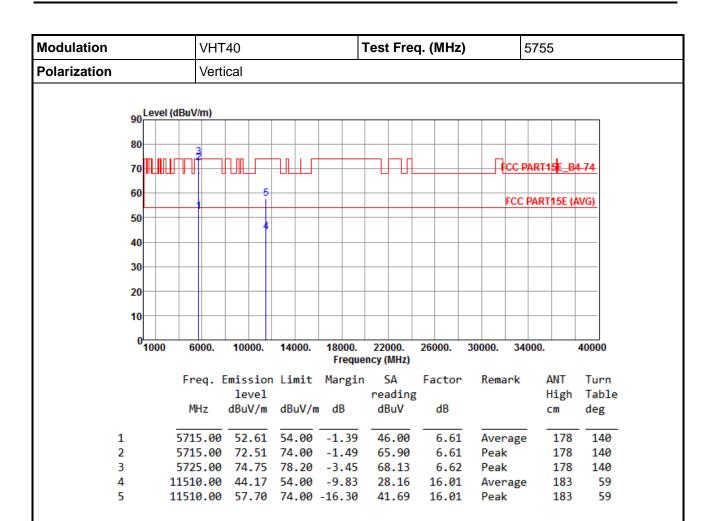


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 72 of 110



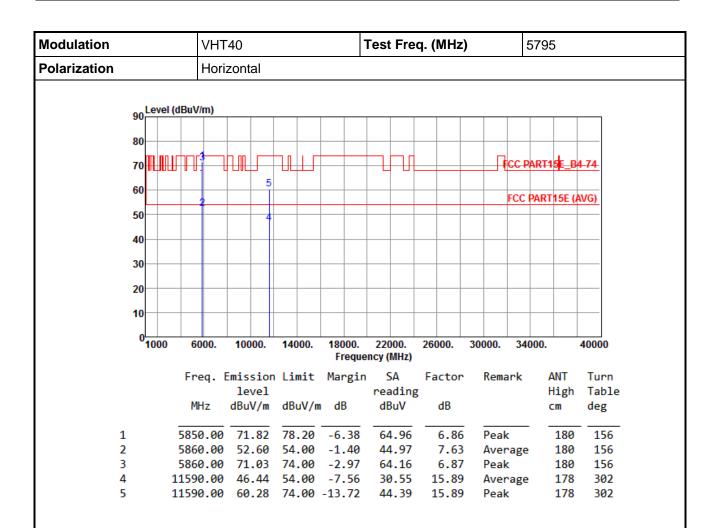


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 73 of 110



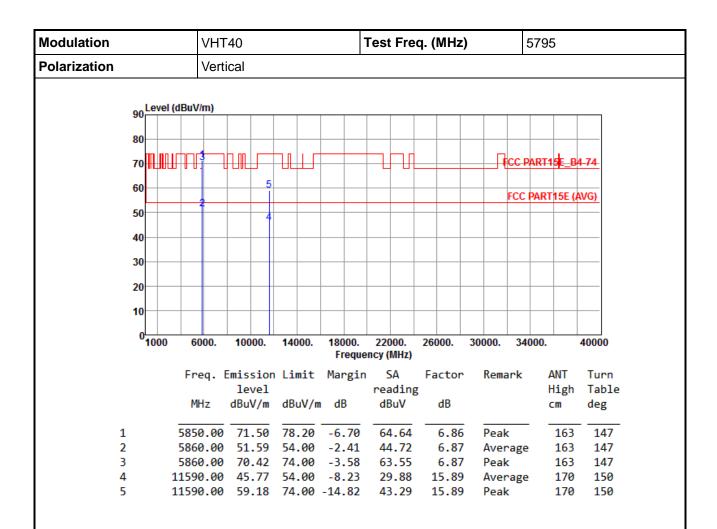


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 74 of 110





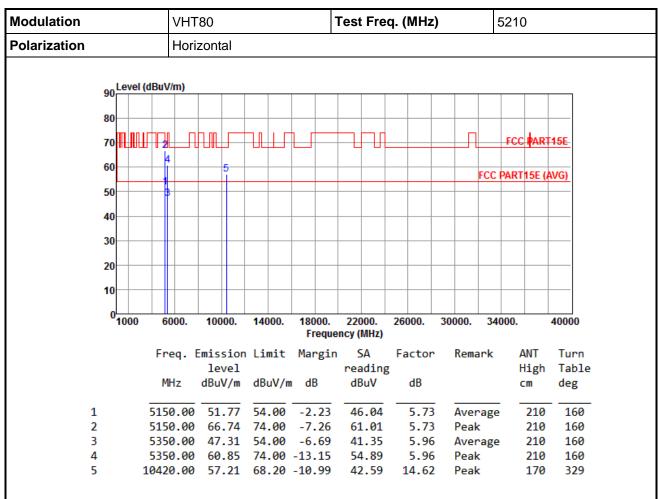
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 75 of 110



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



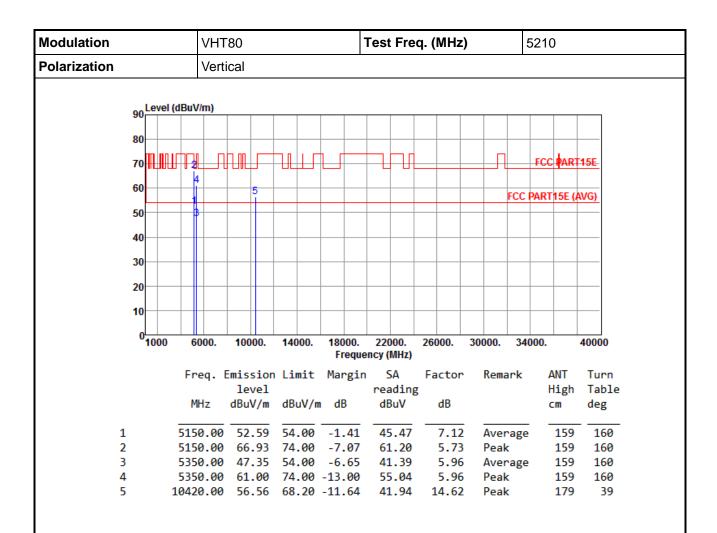
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

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

Report No.: FR593001AN Page: 76 of 110

^{*}Factor includes antenna factor, cable loss and amplifier gain



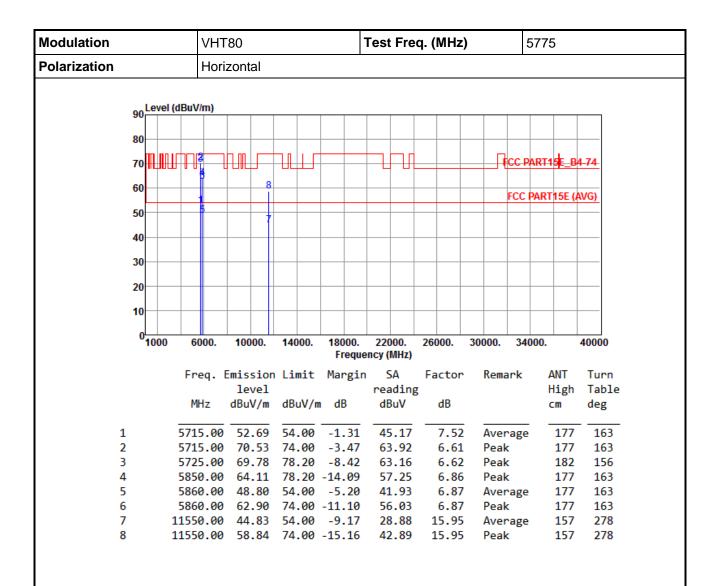


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 77 of 110



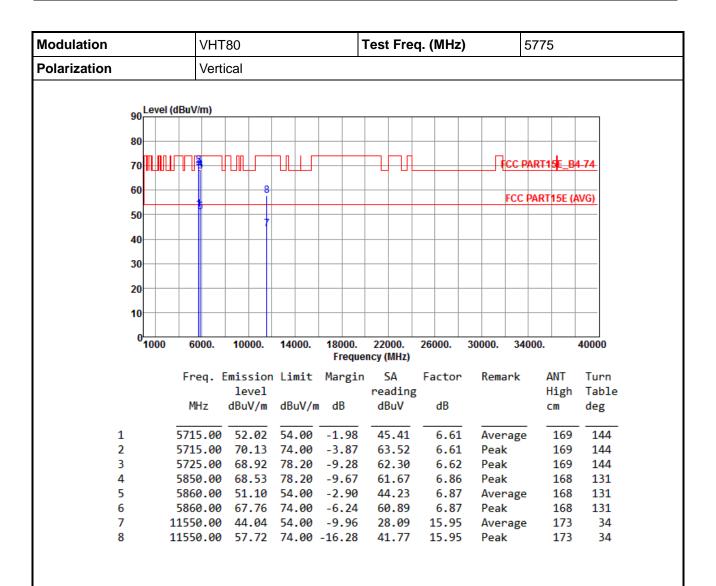


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 78 of 110





*Factor includes antenna factor, cable loss and amplifier gain

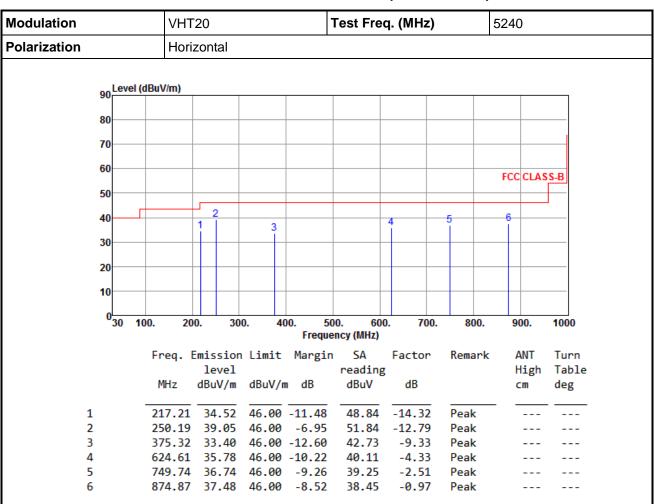
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR593001AN Page: 79 of 110



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.

Report No.: FR593001AN Page: 80 of 110



Modulation				VHT	20			Test Fre	q. (MH	z)	524	0	
Polarization				Verti	cal								
	90	Leve	l (dBu	V/m)									
	80												
	70												
	70												
	60										FCC	CLAS	S-B
	50												
	40	1	+								_		'
	40	İ			2	3			5		6 I		
	30												
	20	4											
	10												
	0	30	100.	200). 30	00.		00. 60		00. 80	00. 9	000.	1000
			г.					ency (MHz)		D		ANT	т
			FI	req. c	level	1 LIMI	t Margi	reading	Facto	r Rema		ANT High	Turn Table
			1	MHz	dBuV/m	dBuV	/m dB	dBuV	dB			cm	deg
													
1	L <u>)</u>			45.52 27.88	38.55 33.07		0 -1.45 0 -12.93	50.13 47.01		-			
	3			75.32			0 -12.93	40.45					
-							0 -15.49						
							0 -12.08	38.25					
(5		8	74.87	36.21	46.0	0 -9.79	37.18	-0.9	7 Peak	C		

*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.

Report No.: FR593001AN Page: 81 of 110



Modulation			VHT20 Test Freq. (MHz) 5785										
Polarization	Polarization				Horizontal								
	90 Lev	el (dBu\	//m)										
	00												
	80												
	70												
	60												
										FCC CL	ASS-B		
	50												
	40		1	2				4	-5	6			
	30				3								
	30												
	20												
	10												
	030	100.	200.	30	00.		00. 60	0. 700	0. 800.	900.	1000		
			F		. 1224		ency (MHz)	F	D I	ANT	т		
		Fr		ission level	ı Limit	Margir	n SA reading	Factor	Remark	c ANT Hig			
		M			dBuV/	m dB	dBuV	s dB		cm	deg		
										_			
	1					-8.99							
	2			37.01			49.80						
	3			33.90		-12.10	43.23						
	4					-10.23	40.10						
	5					-8.92							
•	6	8/	4.8/	3/.36	46.00	-8.64	38.33	-0.97	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.

Report No.: FR593001AN Page: 82 of 110



Modulation			\	VHT20 Test Freq. (MHz) 5785									
Polarization			,	Vertic	al						•		
			•										
	90	Leve	l (dBuV/ı	m)									
	80												
	70												
	60										FC	CCLAS	S-B
	50												
		1	_										'
	40	I			2	3			4	5	6		
	30	-				- 1			i				
	20												
	10												
	_												
	0	30	100.	200	. 30	0.		00. 60	0. 70	0. 80	00. 9	900.	1000
							Frequ	ency (MHz)					
			Fre	q. Er		ı Limit	t Margir		Factor	Rema		ANT	Turn
					level			reading				High	Table
			MH	Z (dBuV/m	dBuV,	/m dB	dBuV	dB			CM	deg
	1			.46	38.42	10 00	-1.58	50.03	-11.61	QP			
	2				32.82		9 -13.18	46.80	-11.61	-	,		
	3						9 -14.95	40.38	-9.33				
	4						-13.52	36.81	-4.33				
	5						-13.02	35.49	-2.51				
	6						-9.66	37.31	-0.97	Peal	<		

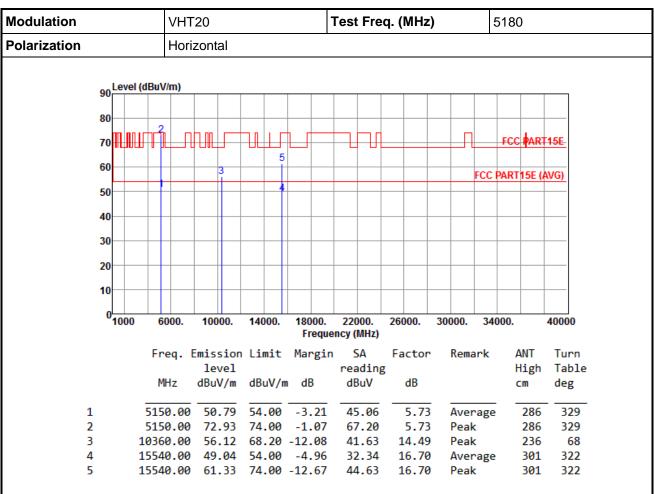
*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

Report No.: FR593001AN Page: 83 of 110



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



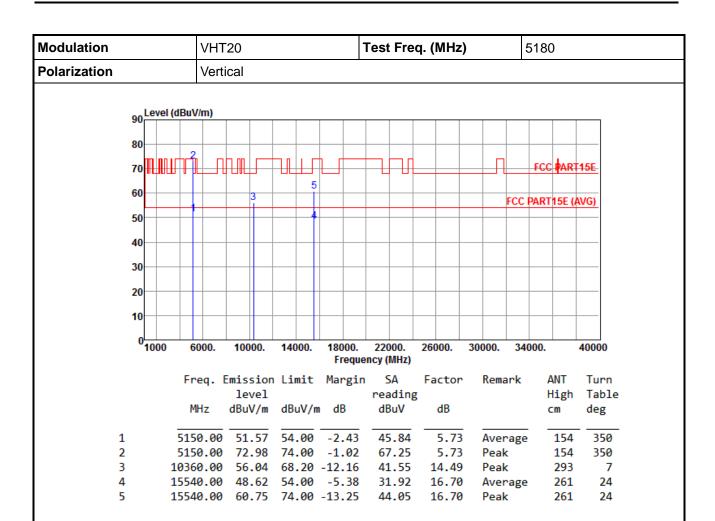
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 84 of 110



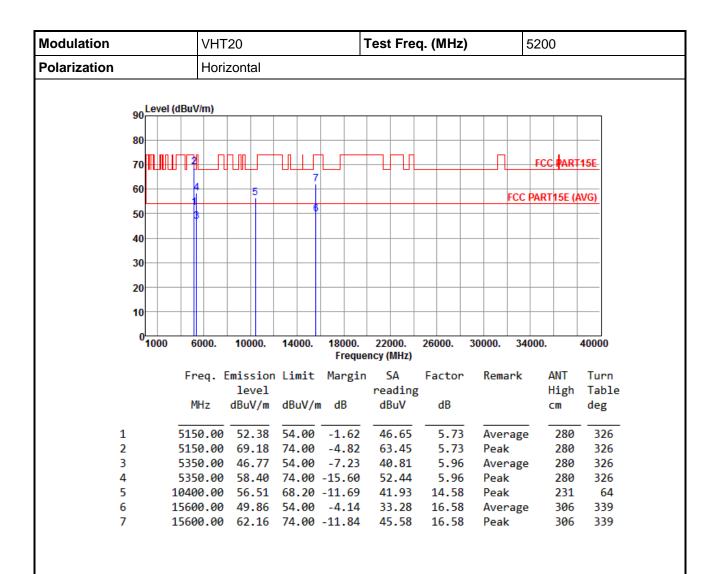


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 85 of 110



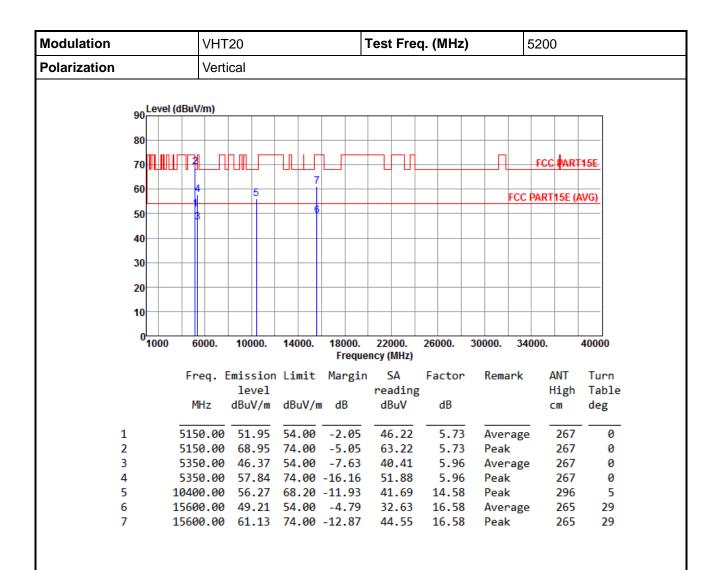


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 86 of 110



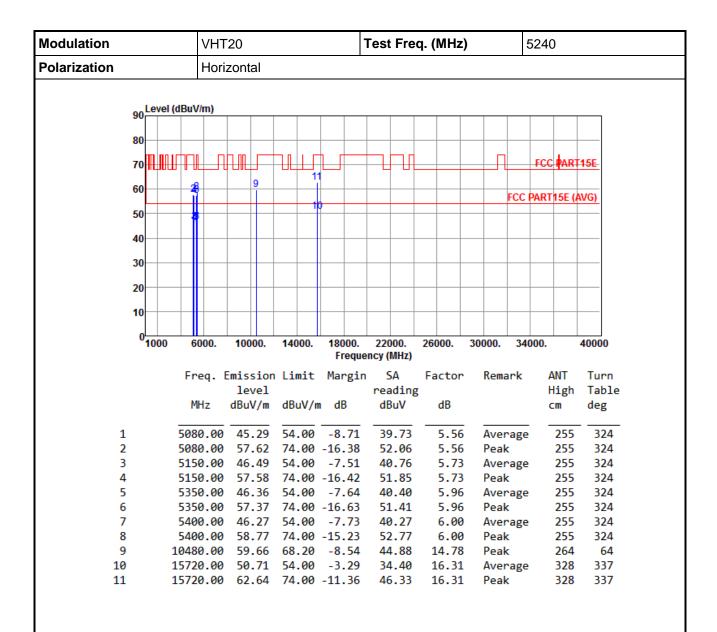


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 87 of 110



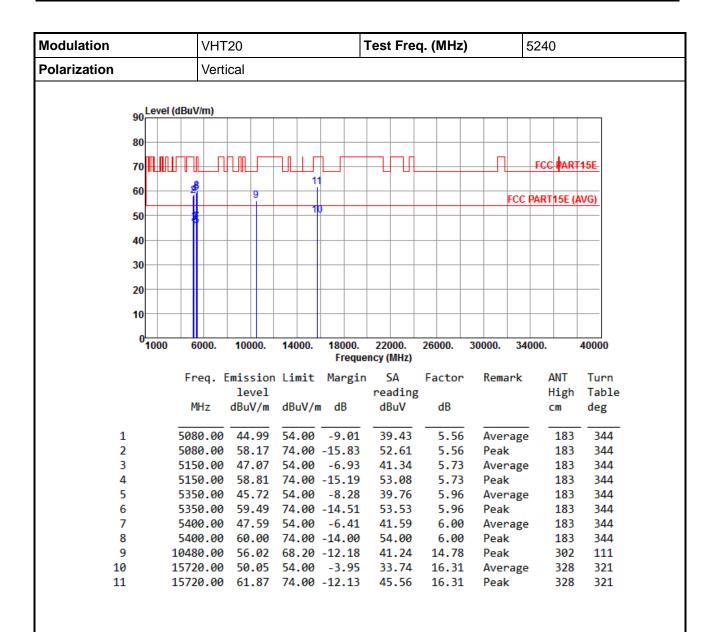


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 88 of 110



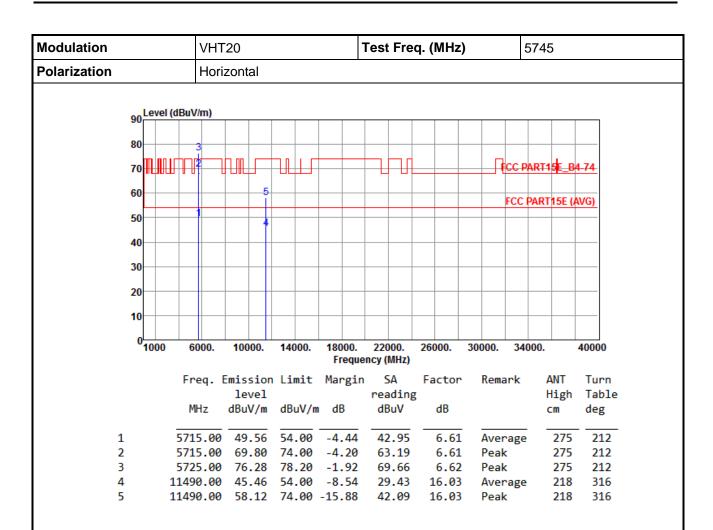


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 89 of 110



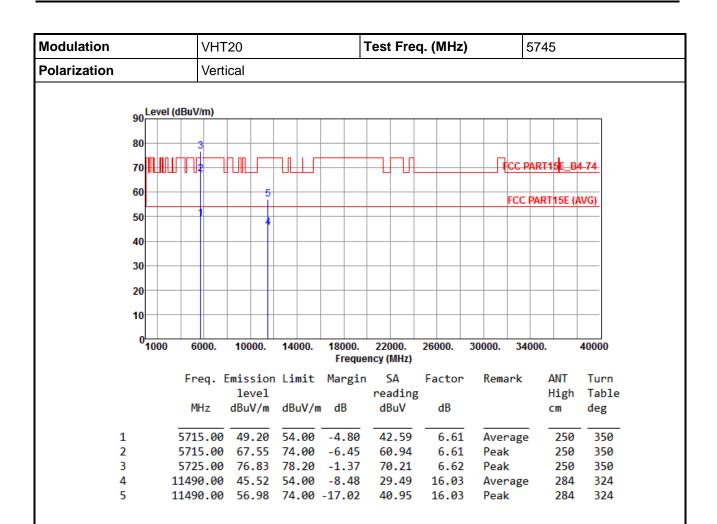


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 90 of 110



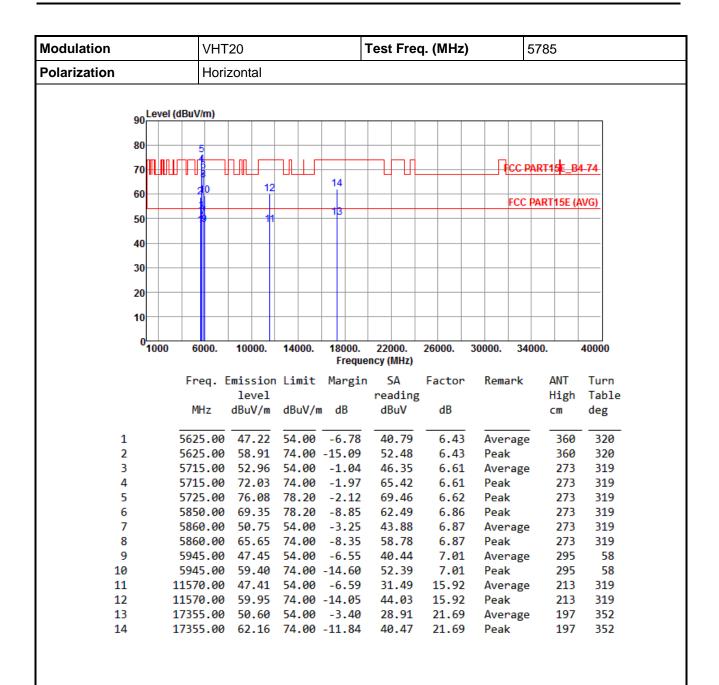


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 91 of 110



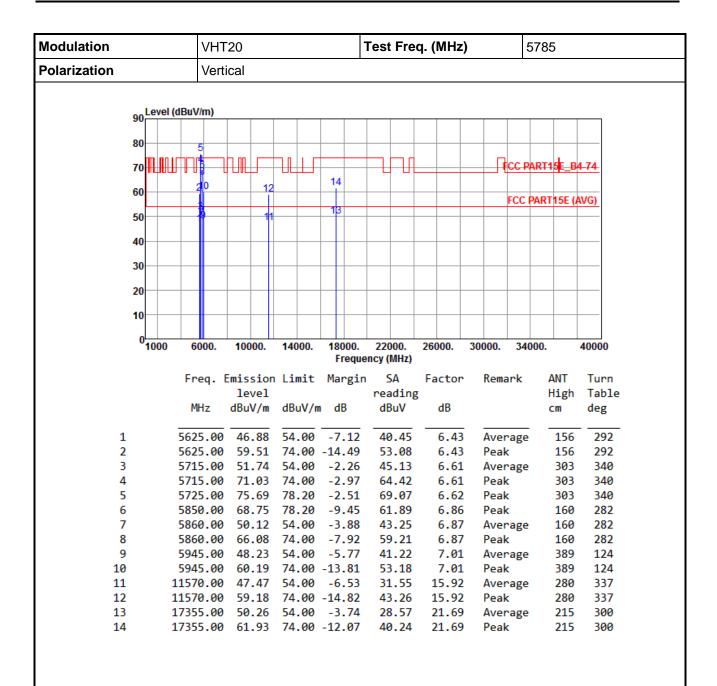


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 92 of 110



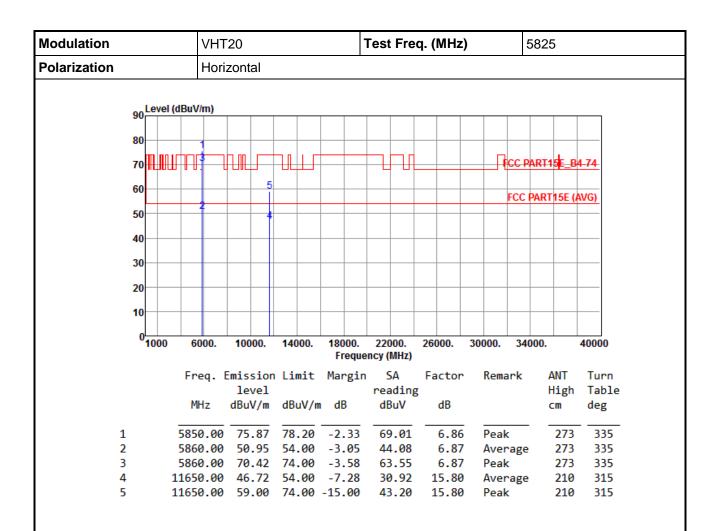


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 93 of 110



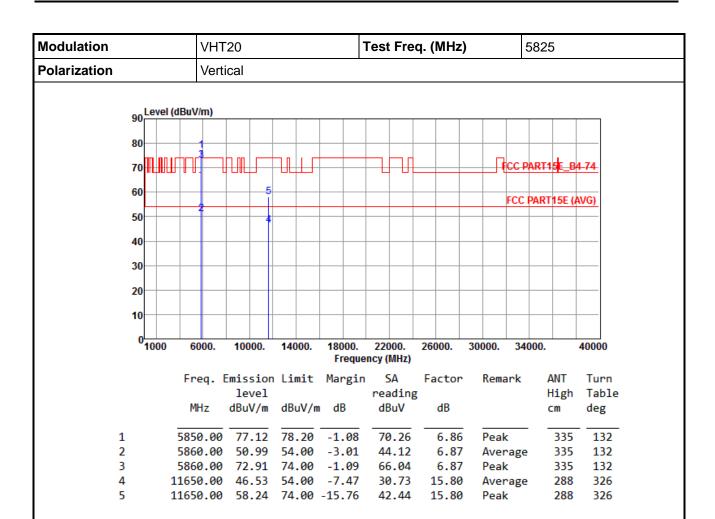


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 94 of 110





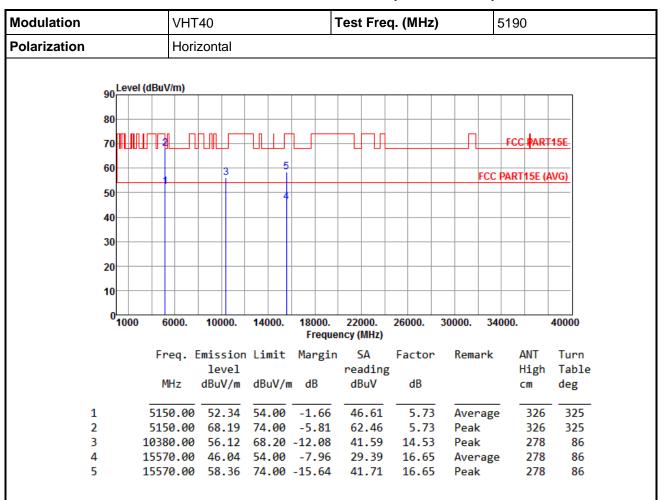
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 95 of 110



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



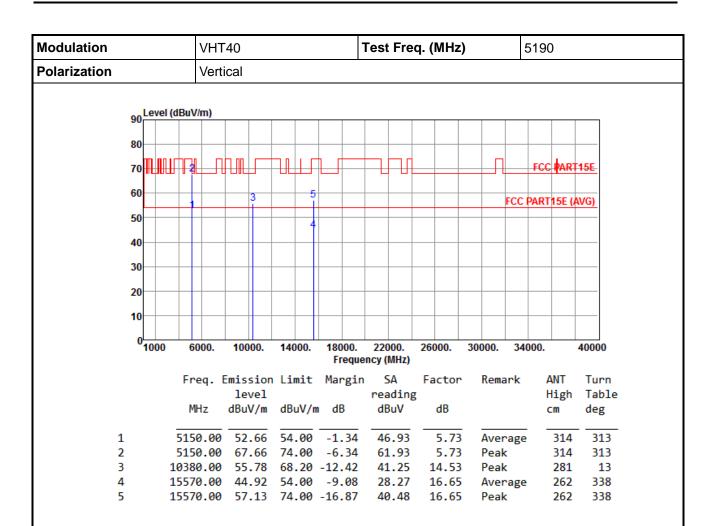
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 96 of 110



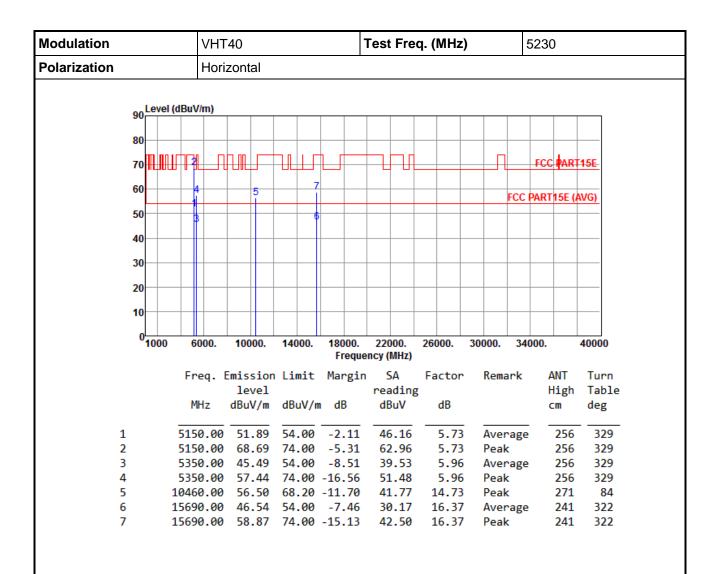


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 97 of 110



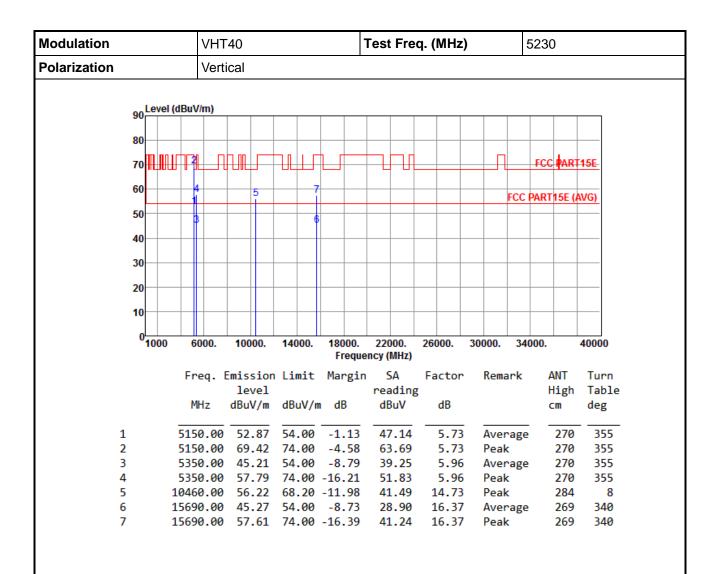


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 98 of 110



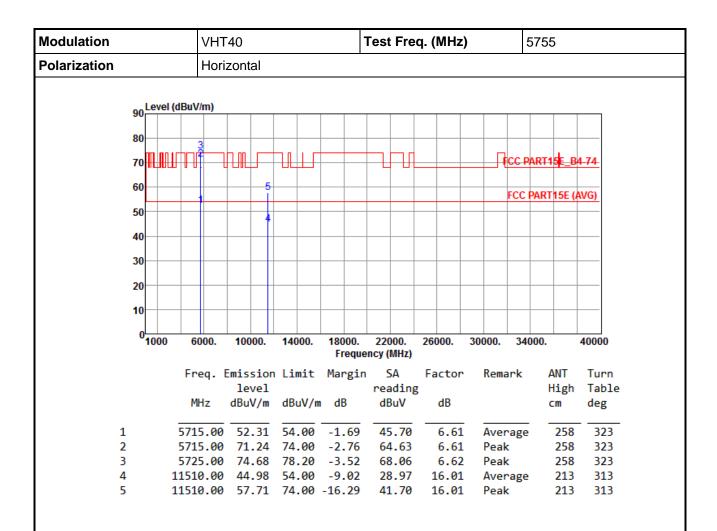


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 99 of 110



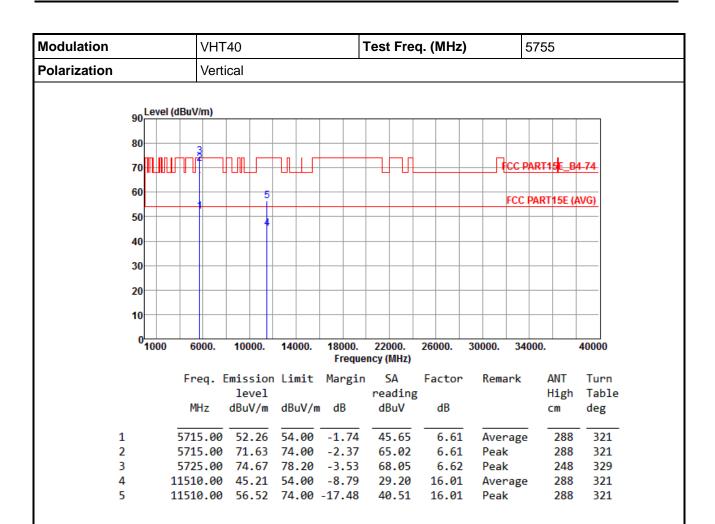


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 100 of 110



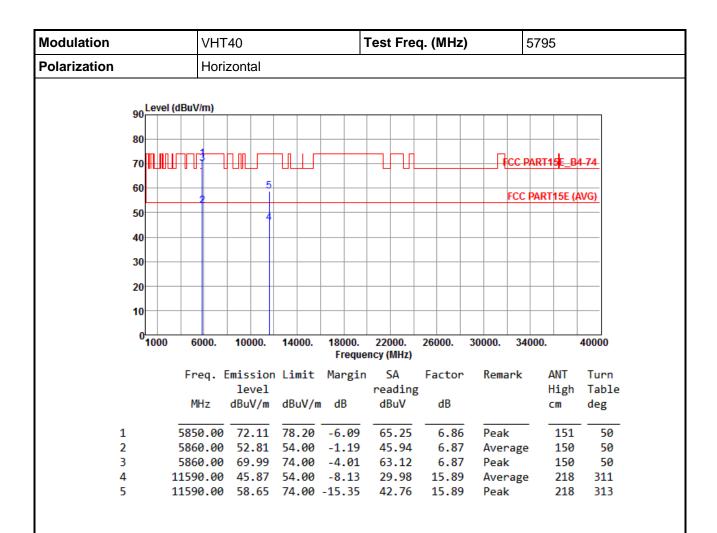


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 101 of 110



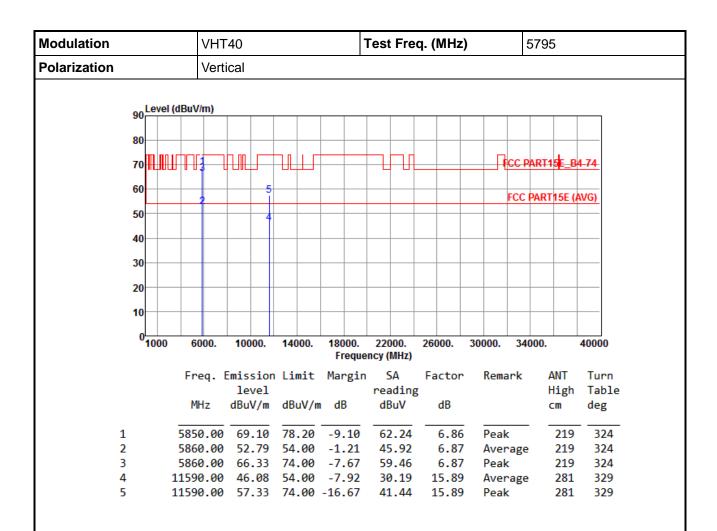


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 102 of 110





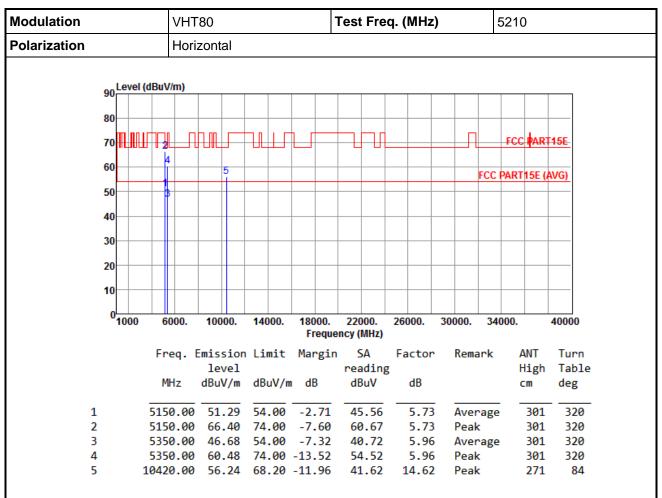
*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 103 of 110



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



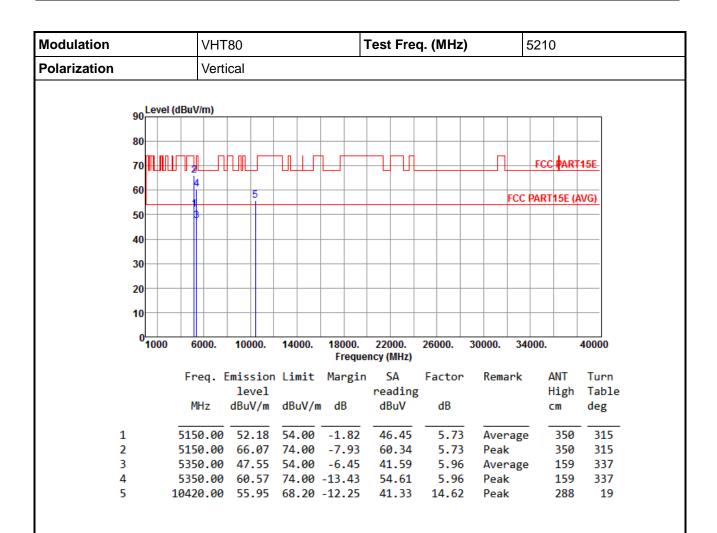
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

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

Report No.: FR593001AN Page: 104 of 110

^{*}Factor includes antenna factor, cable loss and amplifier gain



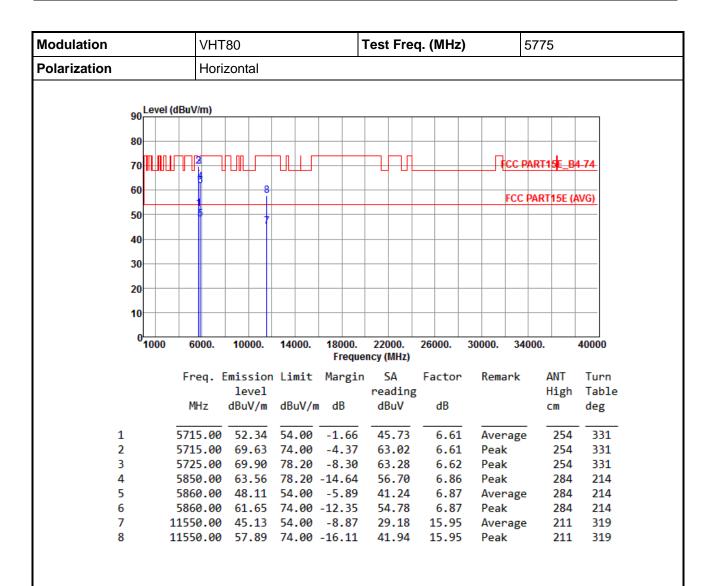


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 105 of 110



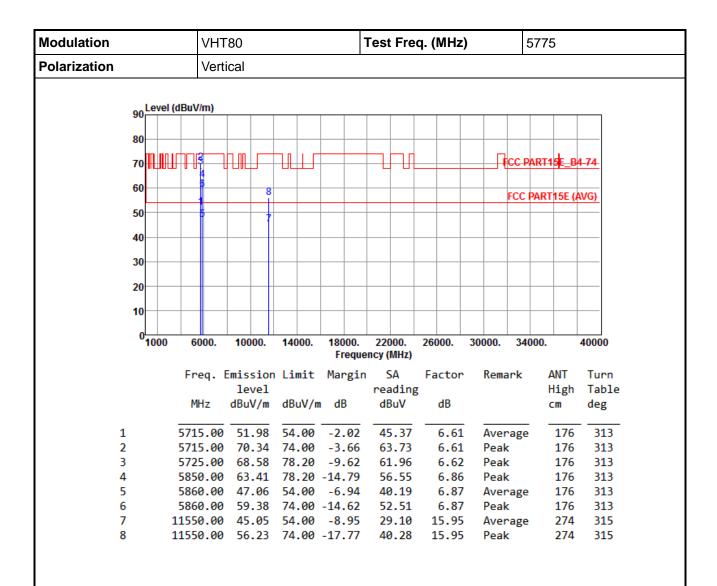


*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 106 of 110





*Factor includes antenna factor, cable loss and amplifier gain

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

Report No.: FR593001AN Page: 107 of 110



3.6 Frequency Stability

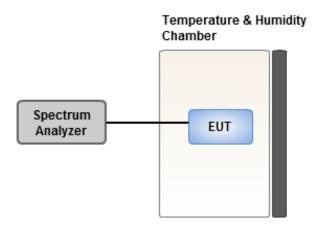
3.6.1 Limit of Frequency Stability

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



Report No.: FR593001AN Page: 108 of 110



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	-0.04	0.44	0.15	0.12						
T20°CVmin	-0.35	-0.05	0.14	0.33						
T50°CVnom	1.29	1.50	1.67	1.38						
T40°CVnom	0.10	0.86	0.42	0.24						
T30°CVnom	0.92	1.42	1.38	1.21						
T20°CVnom	-0.30	0.31	-0.05	-0.04						
T10°CVnom	0.57	0.93	0.53	0.93						
T0°CVnom	-0.07	0.06	0.18	-0.48						
T-10°CVnom	0.34	0.63	1.16	0.71						
T-20°CVnom	0.04	0.42	0.58	0.43						
T-30°CVnom	0.24	-0.10	0.36	0.55						
/nom [Vac]: 120		Vmax [Vac]: 138	Vmin [Vac]: 102							
Гпот [°С]: 20		Tmax [°C]: 50	Tmin [°C]: -30							

Frequency: 5785 MHz	Frequency Drift (ppm)									
Temperature (°C)	0 minute	2 minutes	5 mir	nutes	10 minutes					
T20°CVmax	4.82	4.77	4.63		4.53					
T20°CVmin	3.46	4.05	3.12		3.45					
T50°CVnom	4.39	4.39	4.8	84	4.59					
T40°CVnom	2.45	3.07	2.68		2.64					
T30°CVnom	2.45	3.09	2.8	85	2.60					
T20°CVnom	2.69	2.59	3.	19	2.67					
T10°CVnom	2.22	2.08	2.05		2.13					
T0°CVnom	2.49	2.10	2.48		3.04					
T-10°CVnom	1.48	1.92	1.8	87	1.60					
T-20°CVnom	0.75	0.69	0.0	85	0.32					
T-30°CVnom	1.12	1.58	0.9	97	1.14					
Vnom [Vac]: 120	V	max [Vac]: 138	V	Vmin [Vac]: 102						
Tnom [°C]: 20	T	max [°C]: 50	Т	Tmin [°C]: -30						

Report No.: FR593001AN Page: 109 of 110



4 Test laboratory information

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

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

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

Linkou

Tel: 886-2-2601-1640

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

R.O.C.

Kwei Shan

Tel: 886-3-271-8666 No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan

Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640 No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan

Hsien 333, Taiwan, R.O.C.

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

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

Email: ICC_Service@icertifi.com.tw

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

Report No.: FR593001AN Page: 110 of 110