

TEST REPORT

Applicant: Hunan GM innovation technology co.,Ltd

Address of Applicant: No.46 Jiefang East Road,Furong District,Changsha City,Hunan Province,China

Manufacturer/Factory: Hunan GM innovation technology co.,Ltd

Address of Manufacturer/Factory: No.46 Jiefang East Road,Furong District,Changsha City,Hunan Province,China

Equipment Under Test (EUT)

Product Name: Vaxis wireless video system

Model No.: Vaxis Atom 500 SDI TX, Vaxis Atom 600 SDI TX
Vaxis Atom 600 KV TX, Vaxis Atom 600 ZV TX
Vaxis Atom 600 DS SDI TX

Trade Mark: N/A

FCC ID: 2AJOF-ATOM500SDI-TX

Applicable standards: FCC CFR Title 47 Part 15 Subpart E Section 15.407

Date of sample receipt: September 27, 2020

Date of Test: September 27~ October 26, 2020

Date of report issued: October 28, 2020

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Luo

Laboratory Manager

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2 Version

Version No.	Date	Description
00	2020-10-28	Original

Prepared By:

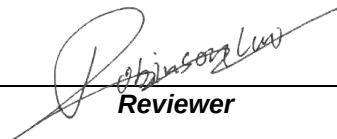


Date:

2020-10-28

Project Engineer

Check By:


Reviewer

Date:

2020-10-28

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 GENERAL DESCRIPTION OF EUT	5
5.2 TEST MODE	7
5.3 DESCRIPTION OF SUPPORT UNITS AND TEST SCENARIO	7
5.4 DEVIATION FROM STANDARDS	8
5.5 ABNORMALITIES FROM STANDARD CONDITIONS	8
5.6 TEST FACILITY	9
5.7 TEST LOCATION	9
6 TEST INSTRUMENTS LIST	10
7 TEST RESULTS AND MEASUREMENT DATA	12
7.1 ANTENNA REQUIREMENT	12
7.2 CONDUCTED EMISSIONS	13
7.3 CONDUCTED PEAK OUTPUT POWER	16
7.4 CHANNEL BANDWIDTH	22
7.5 POWER SPECTRAL DENSITY	27
7.6 BAND EDGE	30
7.6.1 Radiated Emission Method	30
7.7 SPURIOUS EMISSION	42
7.7.1 Radiated Emission Method	42
7.8 FREQUENCY STABILITY	77
8 TEST SETUP PHOTO	80
9 EUT CONSTRUCTIONAL DETAILS	80

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass
Frequency Stability	15.407(g)	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	Vaxis wireless video system
Model No.:	Vaxis Atom 500 SDI TX, Vaxis Atom 600 SDI TX Vaxis Atom 600 KV TX, Vaxis Atom 600 ZV TX Vaxis Atom 600 DS SDI TX
Serial No.:	N/A
Hardware Version:	HDIP_SDI_TX
Software Version:	1.1.5S
Test sample(s) ID:	GTS202010000204-01
Sample(s) Status:	Engineer sample
Operation Frequency:	802.11a: 5745MHz ~ 5825MHz 802.11n (HT20): 5755MHz ~ 5795MHz
Channel numbers:	802.11a: 5 802.11n(HT20): 5
Channel bandwidth:	802.11a: 20MHz 802.11n(HT20) : 20MHz
Modulation technology:	802.11a/802.11n(H20) Orthogonal Frequency Division Multiplexing (OFDM) MIMO: 802.11n SISO: 802.11a
Antenna Type:	Integral Antenna
Antenna gain:	Antenna number: 2 ANTA:2.5dBi ANTB:2.5dBi MIMO technology Directional gain=5.51
Power supply:	DC 5V(Powered by adapter)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	151	/	153	5765MHz	155	/
157	5785MHz	159	/	161	5805MHz	163	/
165	5825MHz						

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)		
	802.11 a/n		
Lowest channel	5745		
Middle channel	/		
Highest channel	5825		

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a (SISI mode)	6 Mbps
802.11n(HT20) (SISI mode)	MCS 0
802.11n(HT20) (MIMO mode)	MCS 8

5.3 Description of Support Units and test scenario

1. Notebook

Manufacturer: Lenovo
Model: ThinkPad E15
P/N: SL10W47275
S/N: PF-26227L 20/04

2. LED TV

Manufacturer: Hisense
Model: LED32K300
S/N: N/A

3. Power supply

Manufacturer: VIVO
Model: V18208-CN
Input: 100V-240V 50/60Hz 0.5A
Output: 5V/2A

4.USB Cable

Manufacturer: HUAWEI
Model: AP51
S/N: N/A

5. Describe the test scenario

The transmitter is powered by the USB cable (about one meter long, unshielded, without magnetic ring) of the power adapter, adjust the function keys to select different transmitting frequencies for transmission, and test

6. Describe the test scenario

During the test, the transmitter is powered by the USB cable of the power adapter, and the video player provides signal to the HDMI input port of the transmitter through the HDMI cable, and then adjust the function keys to select different transmission frequencies.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

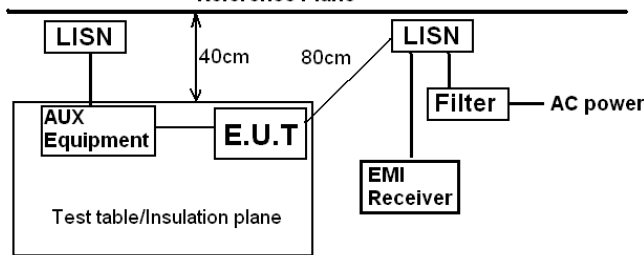
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
<i>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i>	
E.U.T Antenna:	
<i>The antennas are integral antenna, the best case gain of the antennas are 2.5dBi, reference to the appendix II for details</i>	

7.2 Conducted Emissions

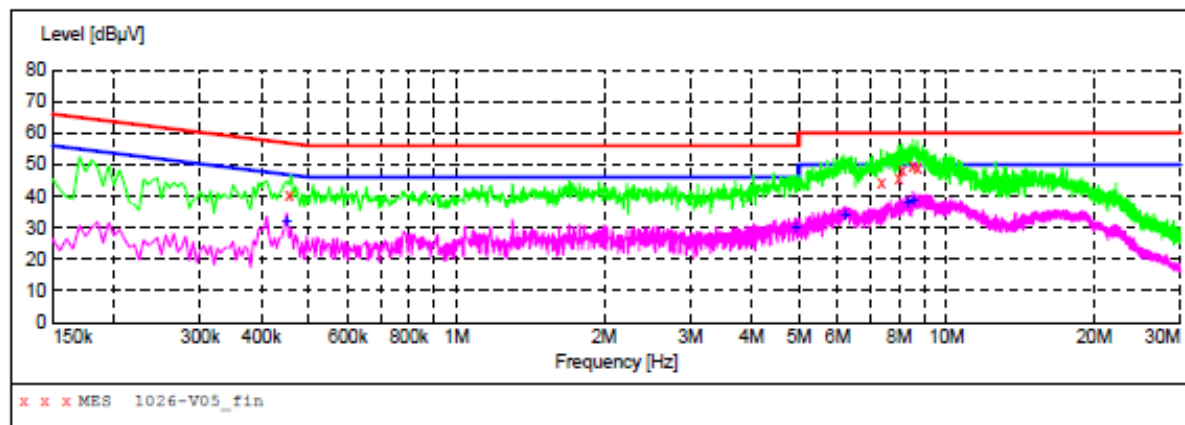
Test Requirement:	FCC Part15 C Section 15.207																			
Test Method:	ANSI C63.10:2013																			
Test Frequency Range:	150KHz to 30MHz																			
Class / Severity:	Class B																			
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																			
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * Decreases with the logarithm of the frequency.						Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)																			
	Quasi-peak	Average																		
0.15-0.5	66 to 56*	56 to 46*																		
0.5-5	56	46																		
5-30	60	50																		
Test setup:	Reference Plane  Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m																			
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.																			
Test Instruments:	Refer to section 6.0 for details																			
Test mode:	Refer to section 5.2 for details																			
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar														
Test voltage:	AC 120V, 60Hz																			
Test results:	Pass																			

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

Measurement data

Line:

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "1026-V05_fin"

2020-10-26 22:49

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.455000	40.30	11.0	57	16.5	QP	L1	GND
7.360000	44.10	11.3	60	15.9	QP	L1	GND
7.980000	45.90	11.3	60	14.1	QP	L1	GND
8.120000	48.50	11.3	60	11.5	QP	L1	GND
8.540000	49.60	11.3	60	10.4	QP	L1	GND
8.730000	49.00	11.3	60	11.0	QP	L1	GND

MEASUREMENT RESULT: "1026-V05_fin2"

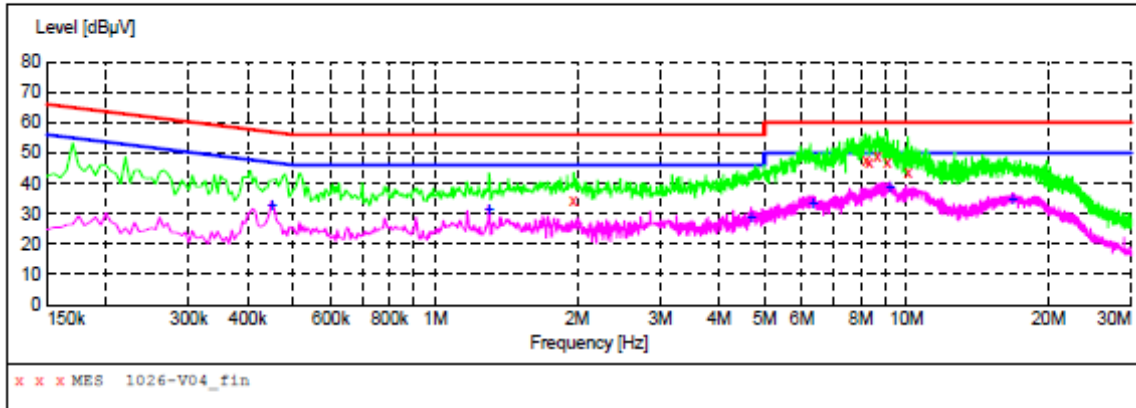
2020-10-26 22:49

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.450000	32.50	11.0	47	14.4	AV	L1	GND
4.910000	30.40	11.2	46	15.6	AV	L1	GND
6.190000	34.10	11.2	50	15.9	AV	L1	GND
8.320000	38.20	11.3	50	11.8	AV	L1	GND
8.540000	38.90	11.3	50	11.1	AV	L1	GND

Neutral:

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "1026-V04_fin"

2020-10-26 22:44

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
1.965000	34.70	10.9	56	21.3	QP	N	GND
8.200000	47.70	11.3	60	12.3	QP	N	GND
8.340000	47.10	11.3	60	12.9	QP	N	GND
8.680000	48.90	11.3	60	11.1	QP	N	GND
9.100000	47.00	11.3	60	13.0	QP	N	GND
10.075000	44.00	11.3	60	16.0	QP	N	GND

MEASUREMENT RESULT: "1026-V04_fin2"

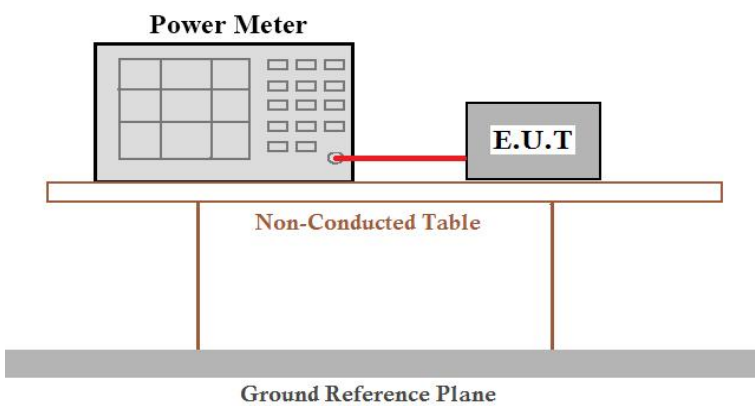
2020-10-26 22:44

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.450000	33.30	11.0	47	13.6	AV	N	GND
1.300000	31.90	11.0	46	14.1	AV	N	GND
4.680000	29.10	11.2	46	16.9	AV	N	GND
6.320000	33.60	11.3	50	16.4	AV	N	GND
9.230000	38.80	11.3	50	11.2	AV	N	GND
16.780000	35.00	11.4	50	15.0	AV	N	GND

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm
Test setup:	 The diagram illustrates the test setup. A 'Power Meter' is connected to an 'E.U.T.' (Equipment Under Test) by a red cable. Both components are positioned on a 'Non-Conducted Table'. This table is supported by two vertical legs. Below the table, a 'Ground Reference Plane' is indicated by a horizontal line.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Modulation	Frequency (MHz)	Duty cycle		Duty Factor	
		ANTENNA-A	ANTENNA-B	ANTENNA-A	ANTENNA-B
802.11a	5745	96.22%	96.16%	0.17	0.17
	5825	96.20%	96.20%	0.17	0.17
802.11n(HT20)	5745	96.27%	96.17%	0.17	0.17
	5825	96.26%	96.25%	0.17	0.17

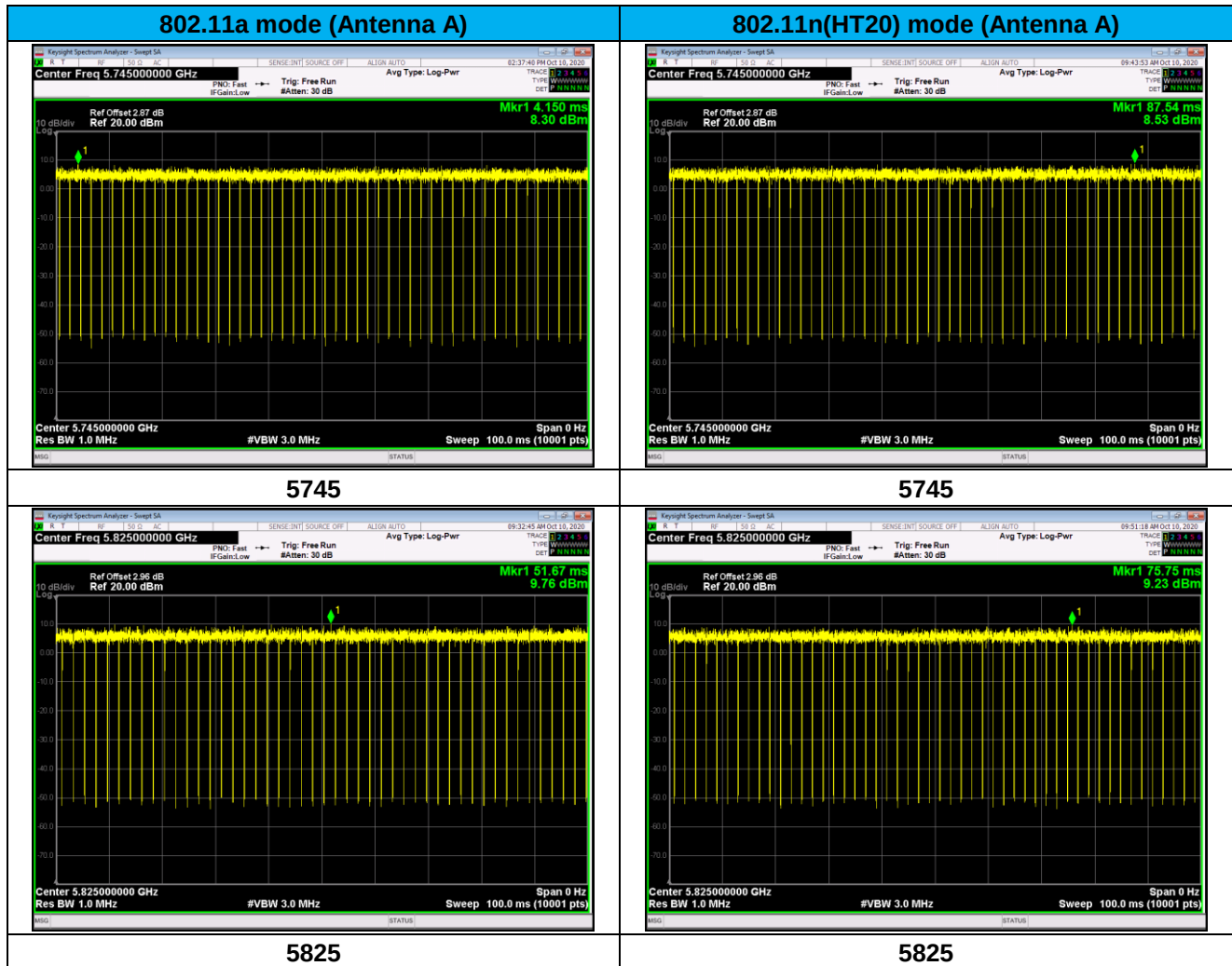
802.11a mode										
CH No.	Frequency (MHz)	Measured Power (dBm)			Duty Factor	Output Power (dBm)			Limit (dBm)	Result
		ANT A	ANT B	ANT A+B		ANT A	ANT B	ANT A+B		
36	5745	12.35	12.40	--	0.17	12.52	12.57	--	30	Pass
48	5825	12.14	12.01	--	0.17	12.31	12.18	--		
802.11n(HT20) mode										
CH No.	Frequency (MHz)	Measured Power (dBm)			Duty Factor	Output Power (dBm)			Limit (dBm)	Result
		ANT A	ANT B	ANT A+B		ANT A	ANT B	ANT A+B		
36	5745	12.27	12.27	15.258	0.17	12.44	13.91	15.428	30	Pass
48	5825	12.33	12.65	15.410	0.17	12.50	12.82	15.580		

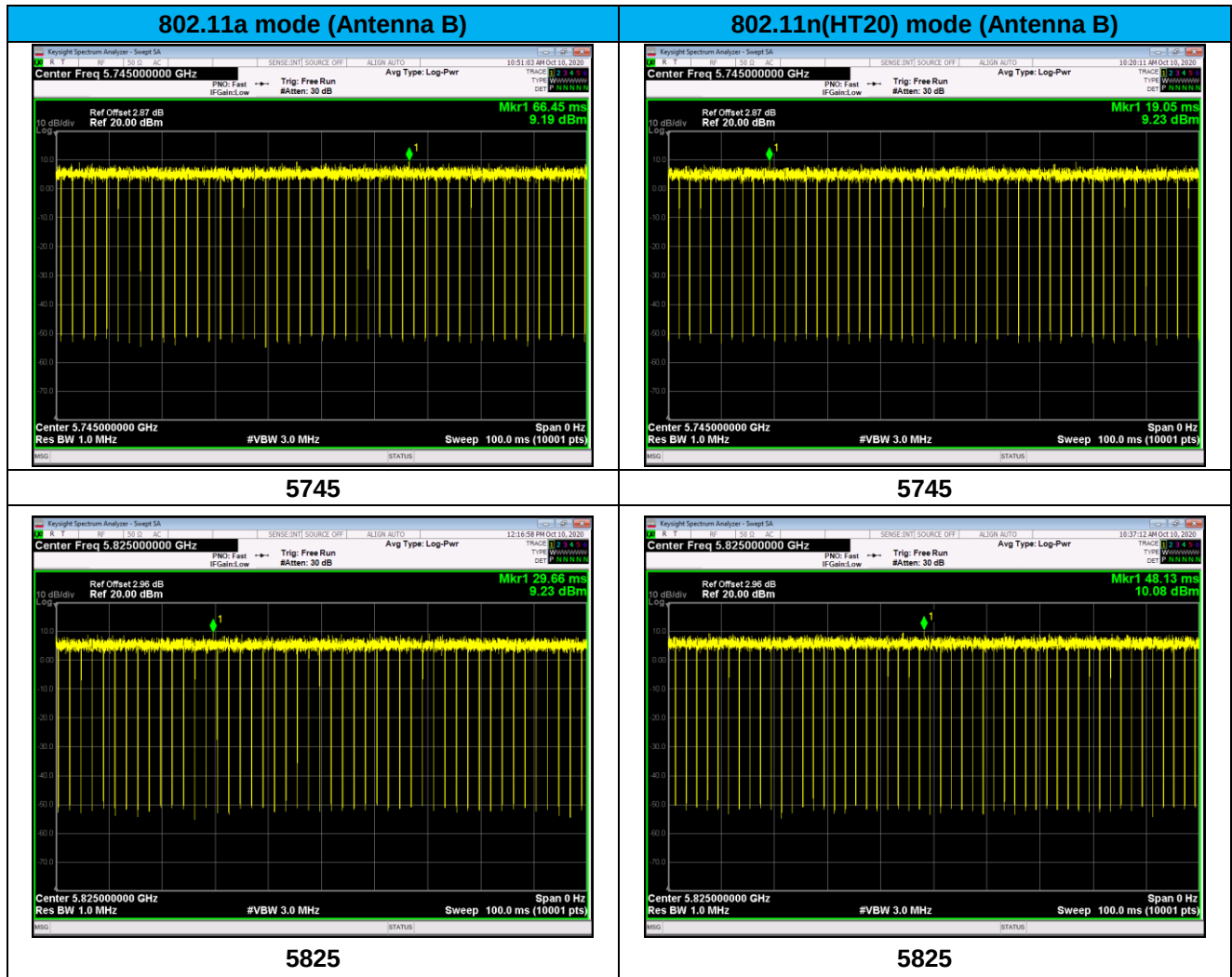
Note: Output Power = Measured Power + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)

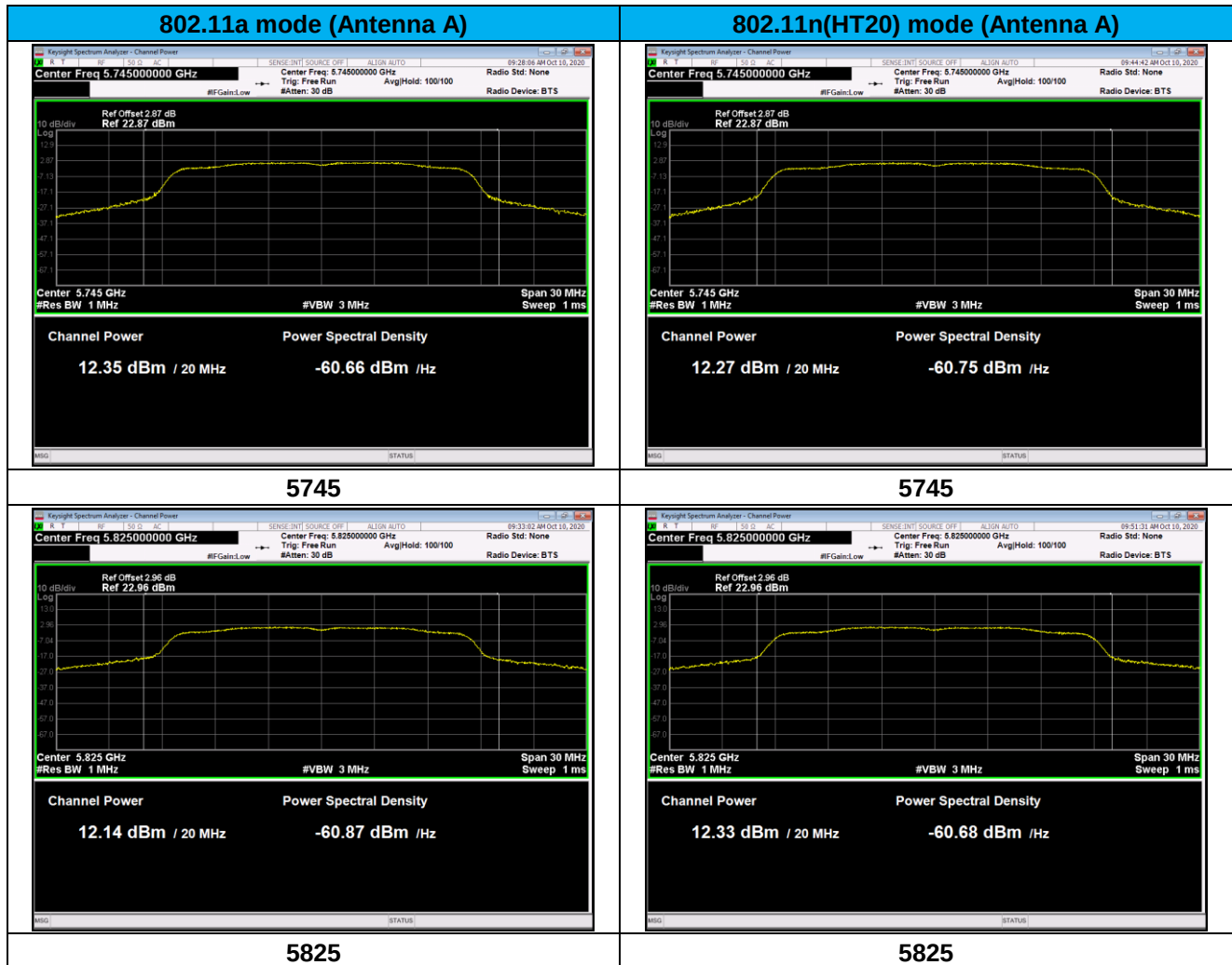
“---“is not applicable

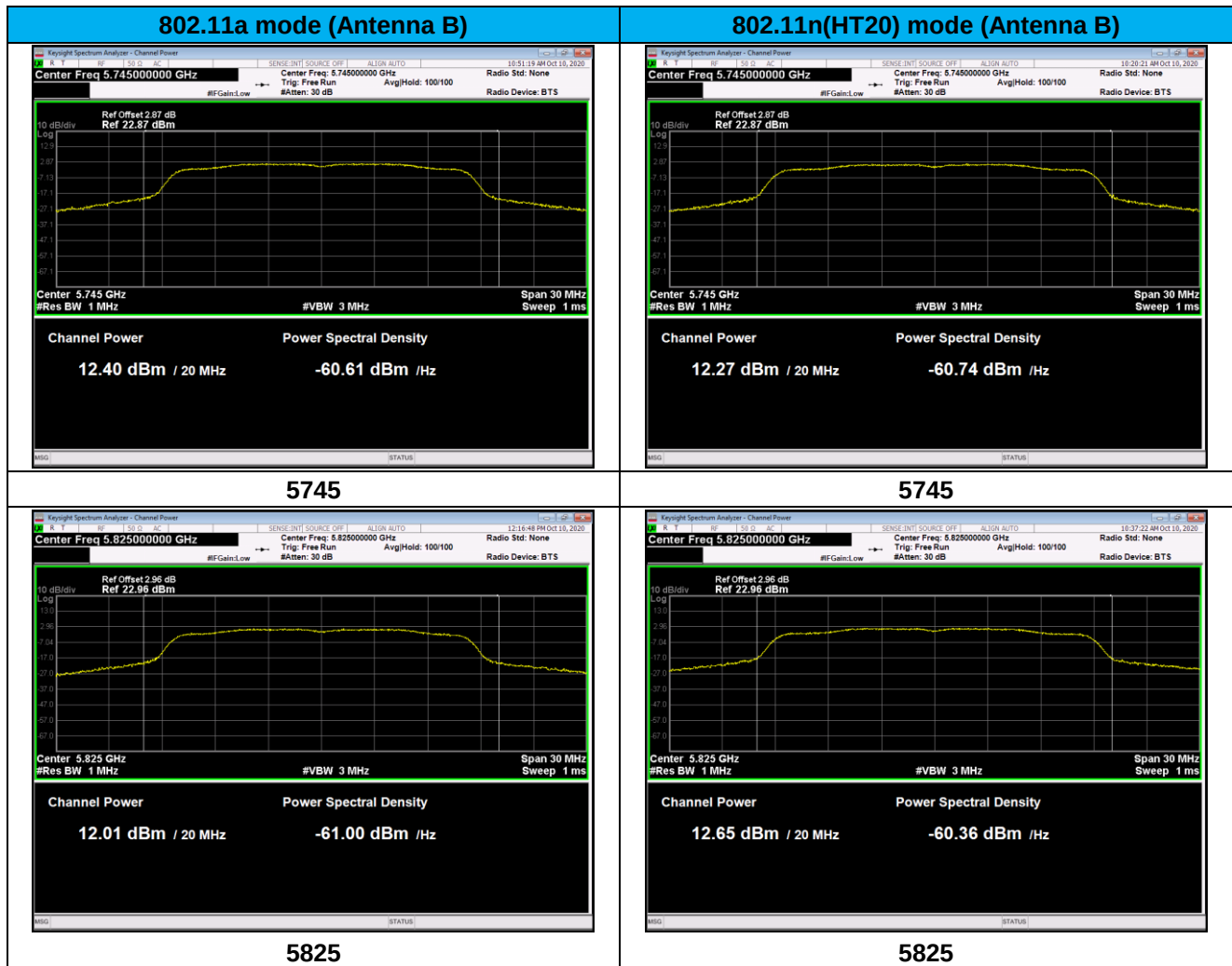
Test plots as followed:





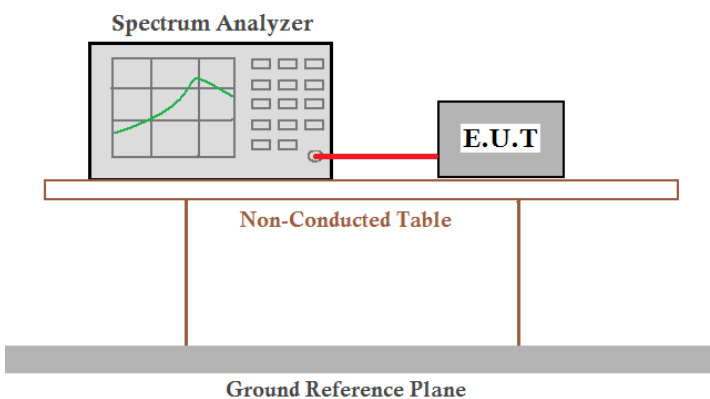
Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.





Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	>500KHz
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

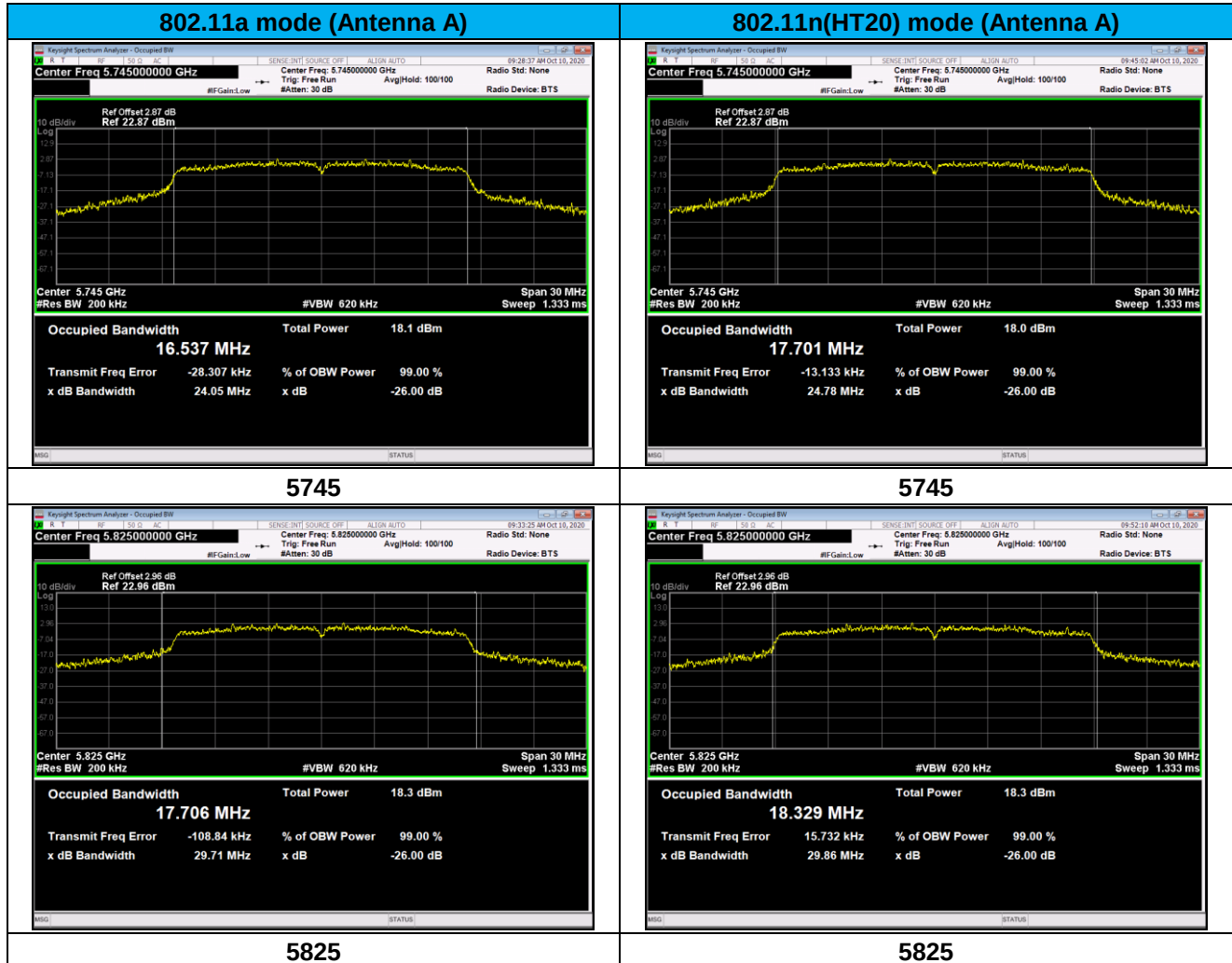
Measurement Data

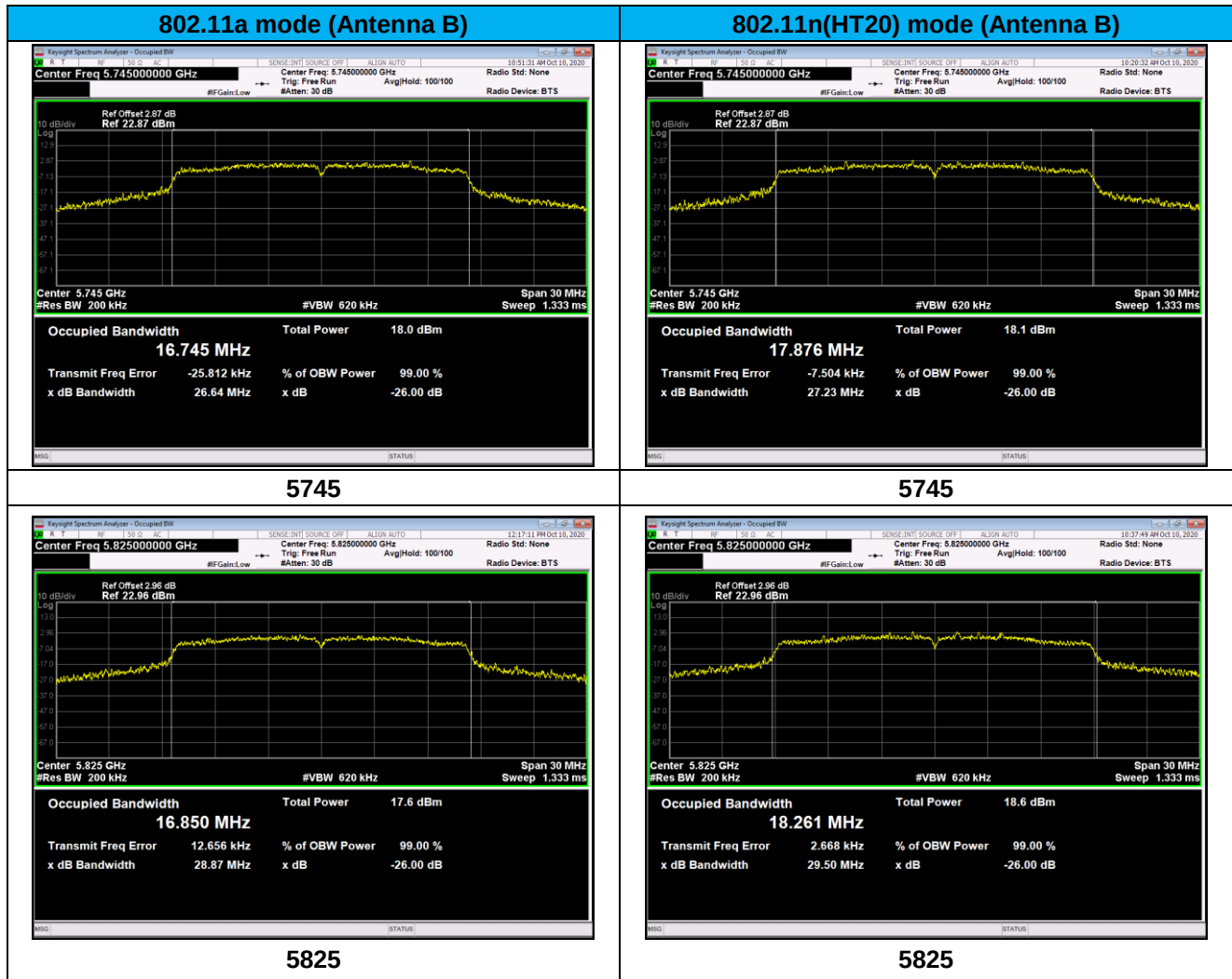
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)				6dB Occupied Bandwidth (MHz)				
		802.11a		802.11n(HT20)		802.11a		802.11n(HT20)		Limit (MHz)
		ANT-A	ANT-B	ANT-A	ANT-B	ANT-A	ANT-B	ANT-A	ANT-B	> 0.5MHz
36	5180	16.537	16.745	17.701	17.876	13.72	15.00	13.46	14.96	> 0.5MHz
48	5240	17.706	16.850	18.329	18.261	14.03	15.07	14.10	16.51	> 0.5MHz

Remark: “---”is not applicable

Test plot as follows:

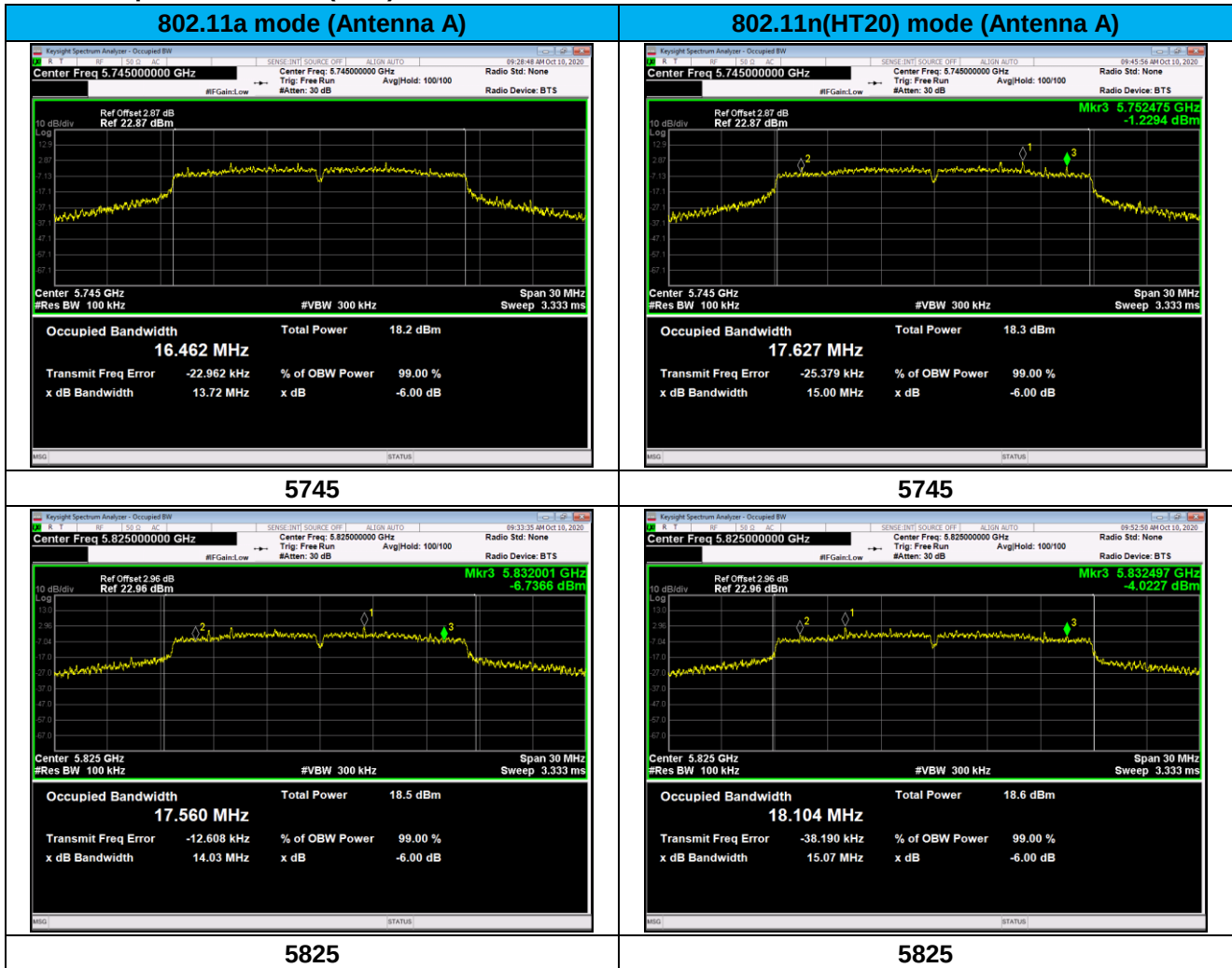
99% Occupied Bandwidth (MHz)

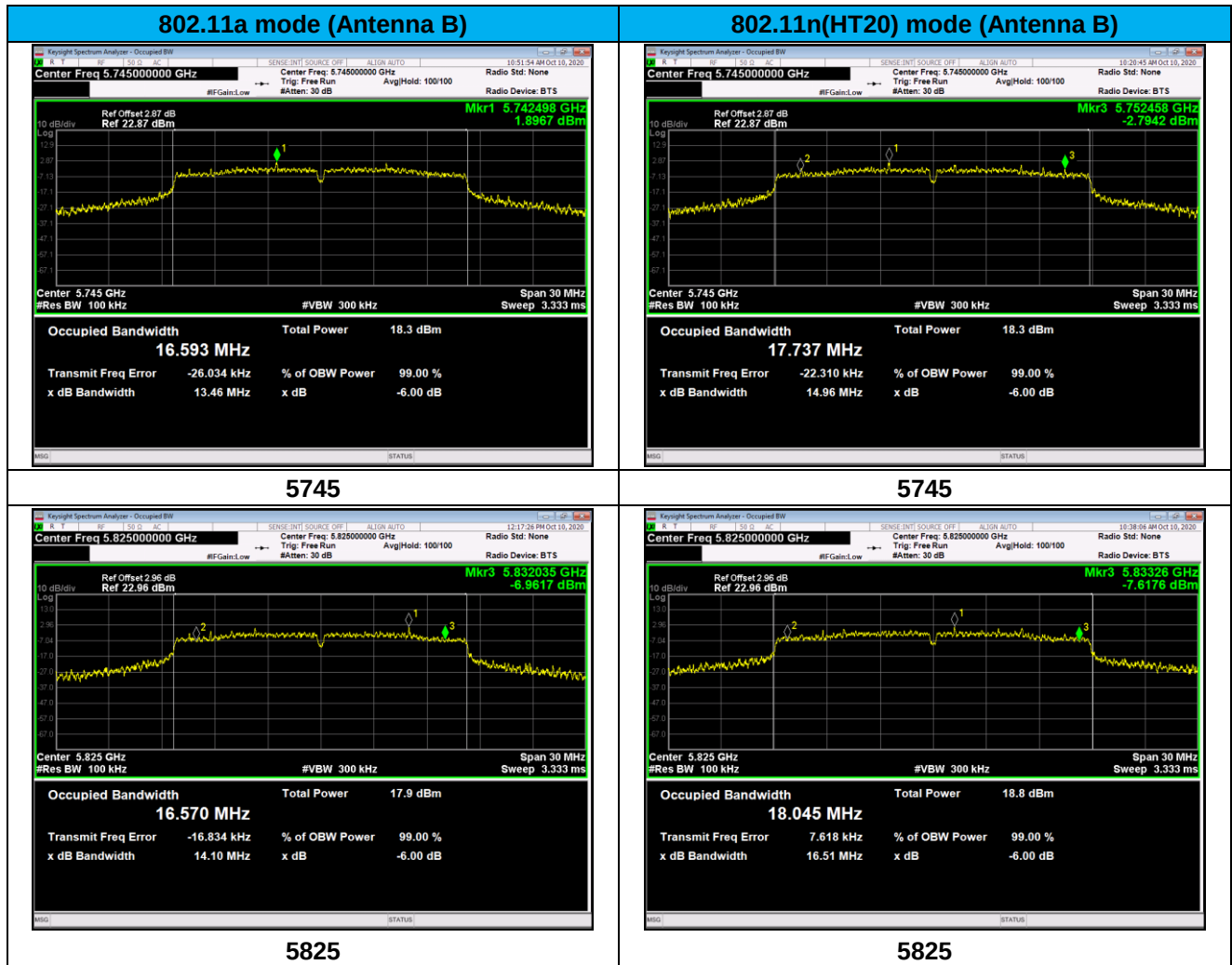




Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

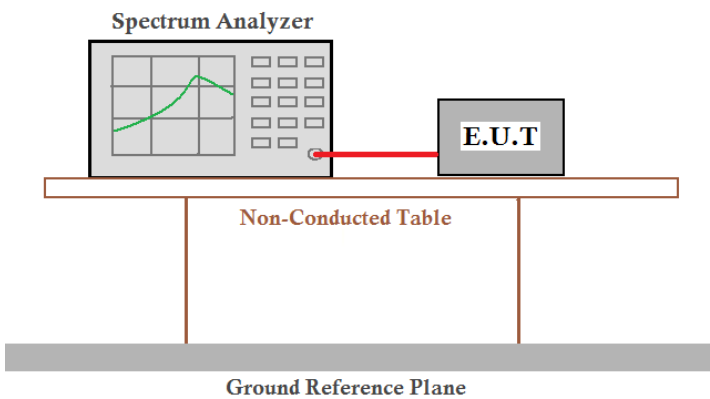
6dB Occupied Bandwidth (MHz)





Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

7.5 Power Spectral Density

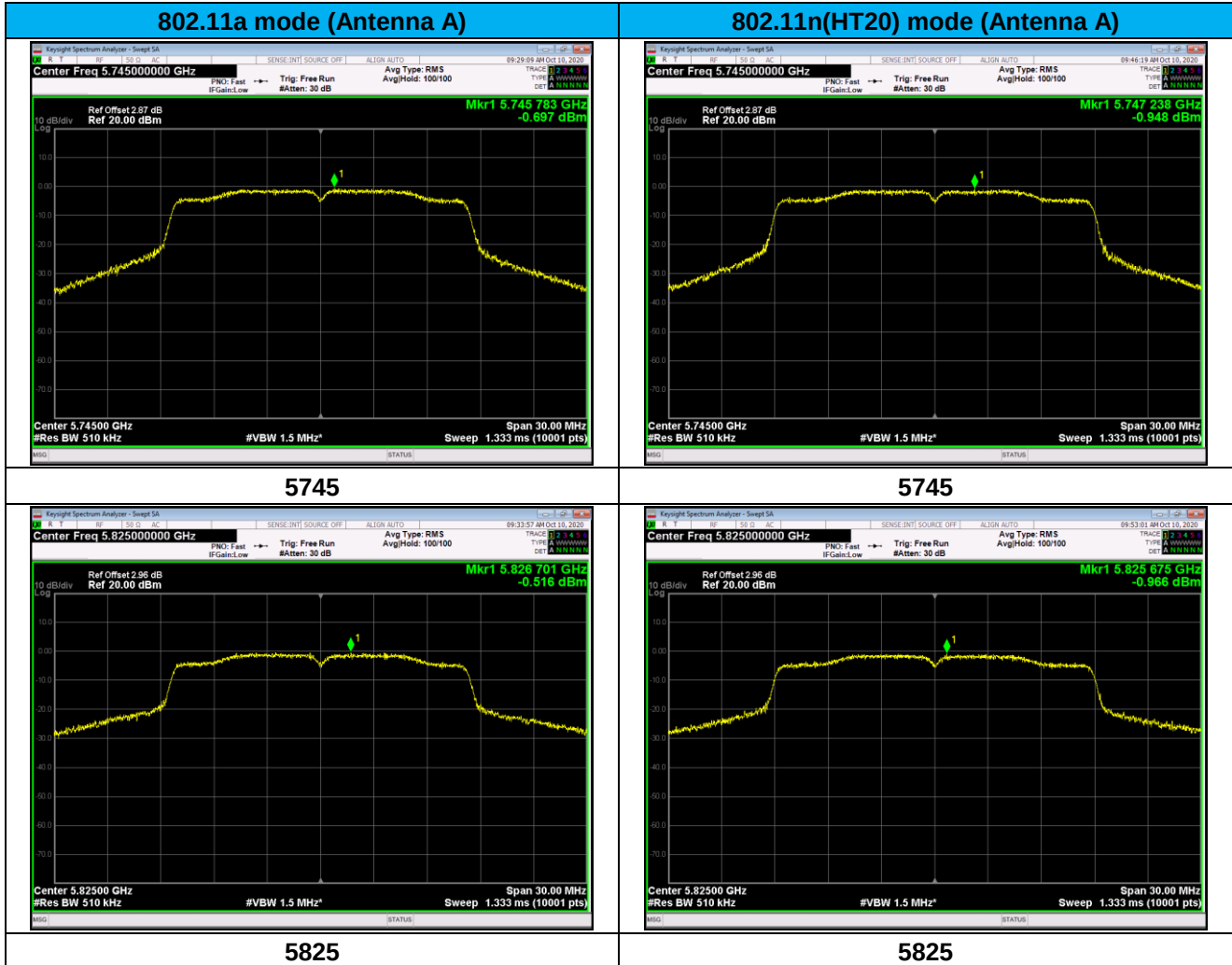
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm/500kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

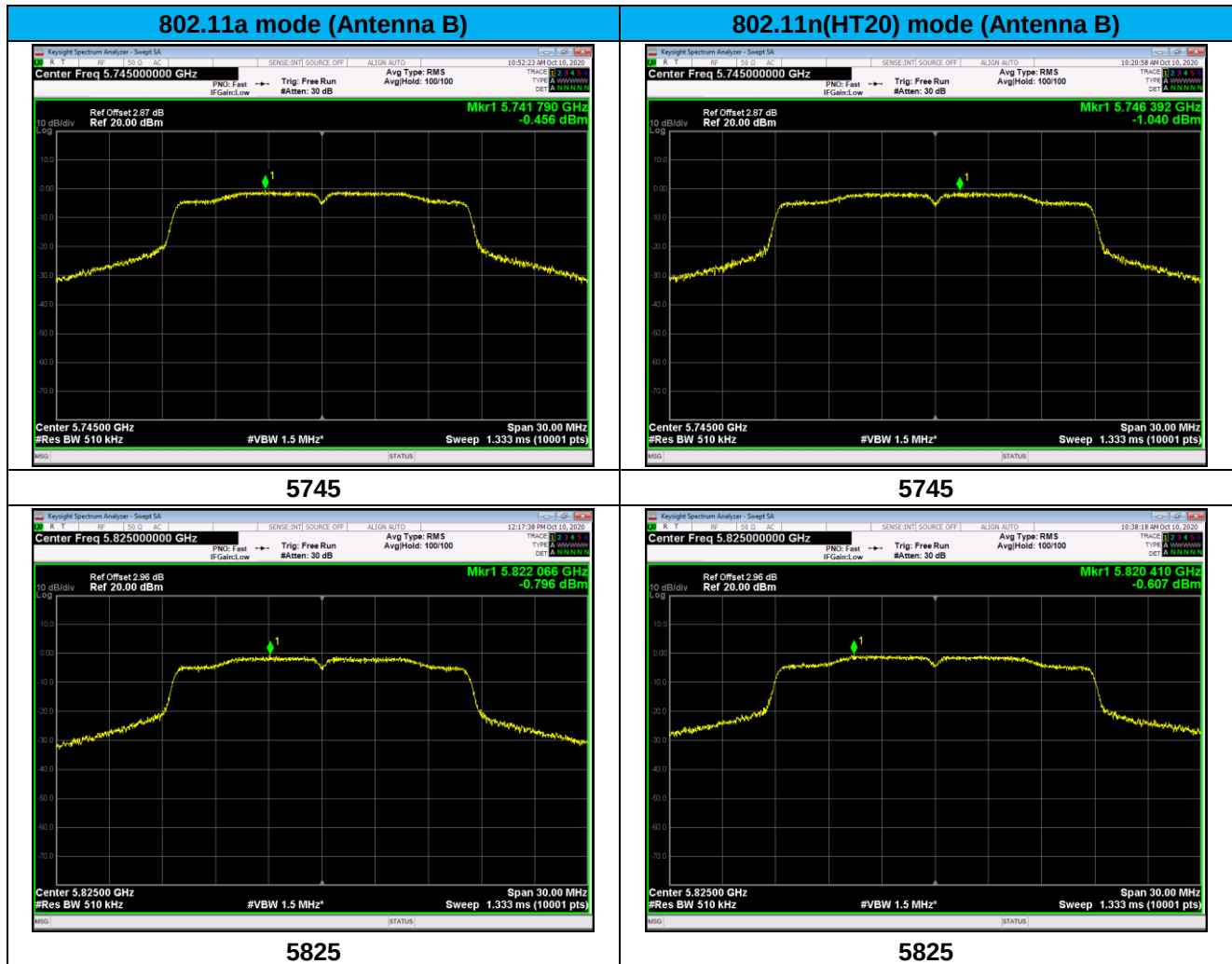
Measurement Data

Test CH	Power Spectral Density (dBm)						Limit (dBm/500k Hz)	Result
	802.11a			802.11n(HT40)				
	ANT A	ANT B	ANT A+B	ANT A	ANT B	ANT A+B		
5745	-0.697	-0.456	---	-0.948	-1.040	2.053	30.00	Pass
5825	-0.516	-0.796	---	-0.966	-0.607	2.247		

Remark: "---"is not applicable

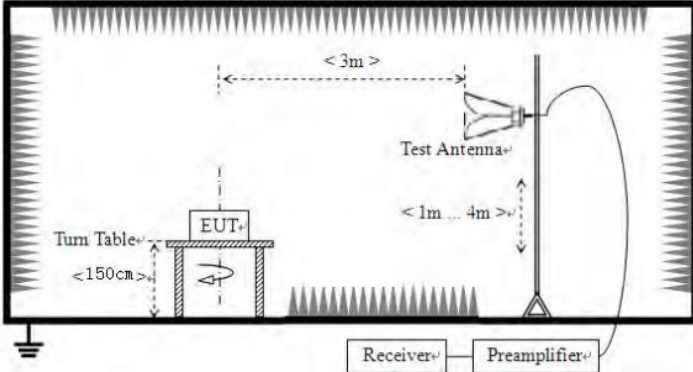
Test plot as follows:





7.6 Band edge

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	9kHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		RMS	1MHz	3MHz	RMS
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.				
Test setup:					
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.				

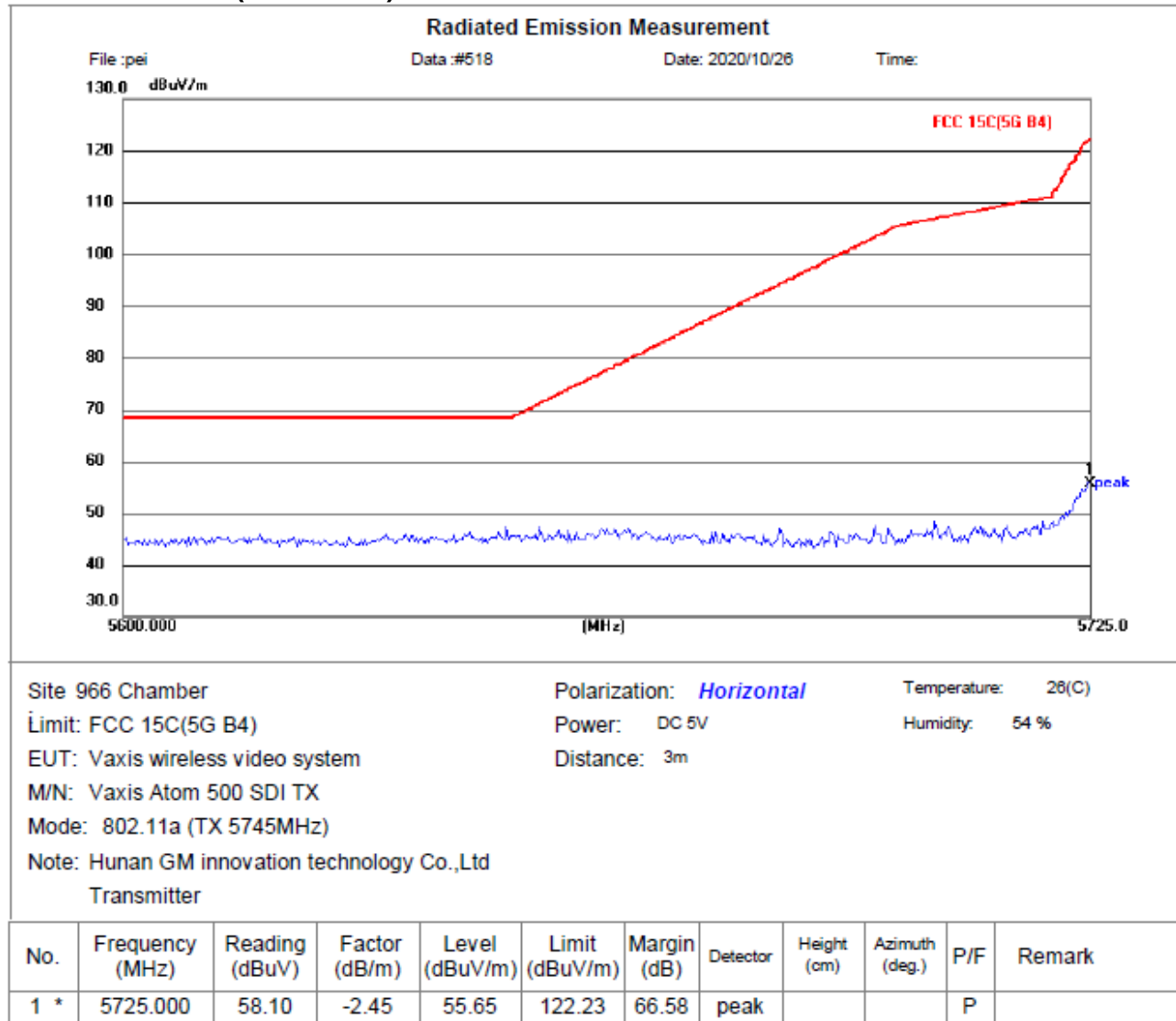
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remarks:

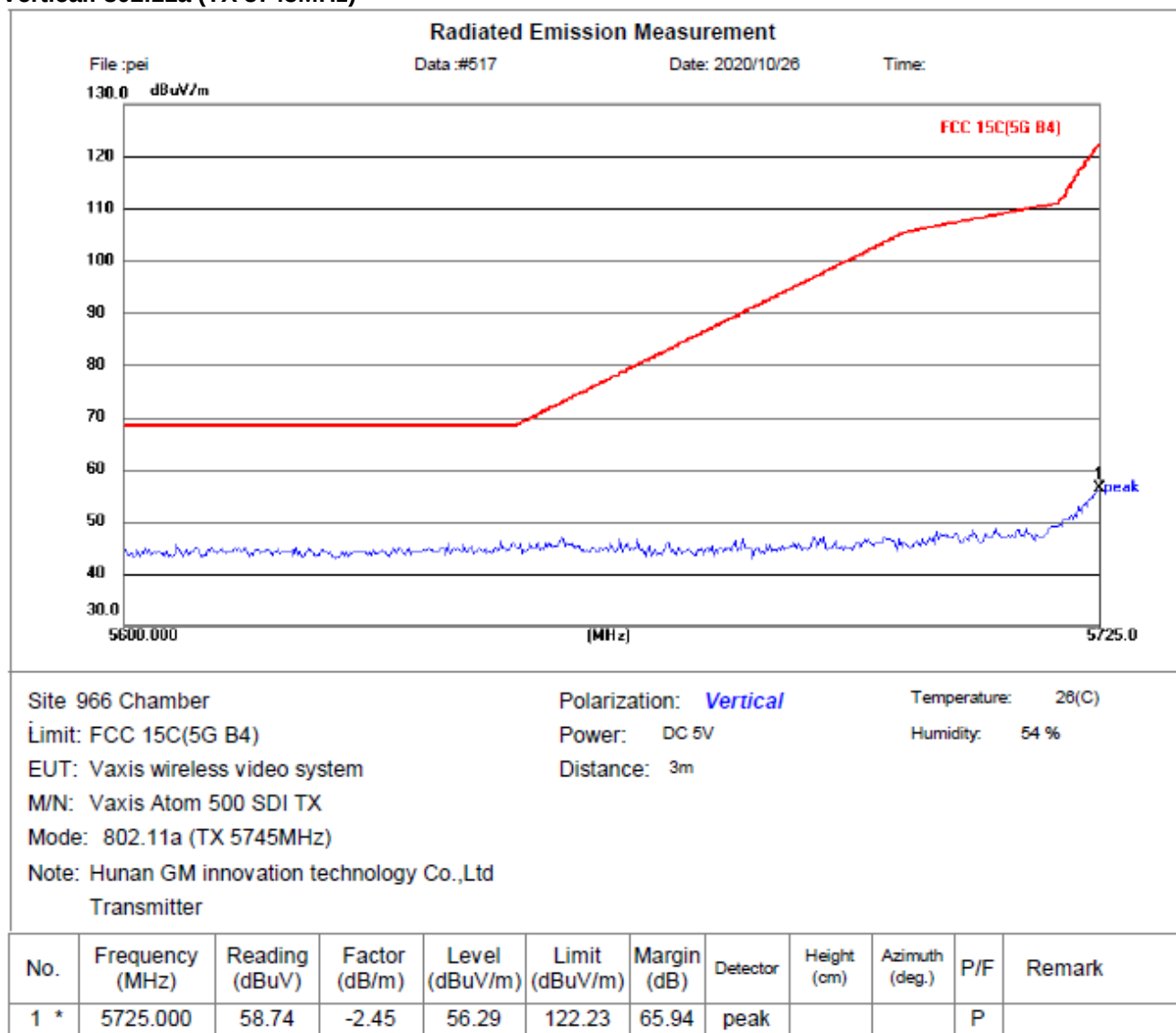
- 1. Only the worst case Main Antenna test data..*
- 2. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.*
- 4. The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
- 5. According to KDB 789033 D02v02r01 section G) 1) d),for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:*
$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$
$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$
$$E[\text{dBuV/m}] = 10 + 95.2 = 105.2\text{dBuV/m}.$$
$$E[\text{dBuV/m}] = 15.6 + 95.2 = 110.8\text{dBuV/m}.$$
$$E[\text{dBuV/m}] = 27 + 95.2 = 122.2\text{dBuV/m}$$

Radiated Band Edge Result

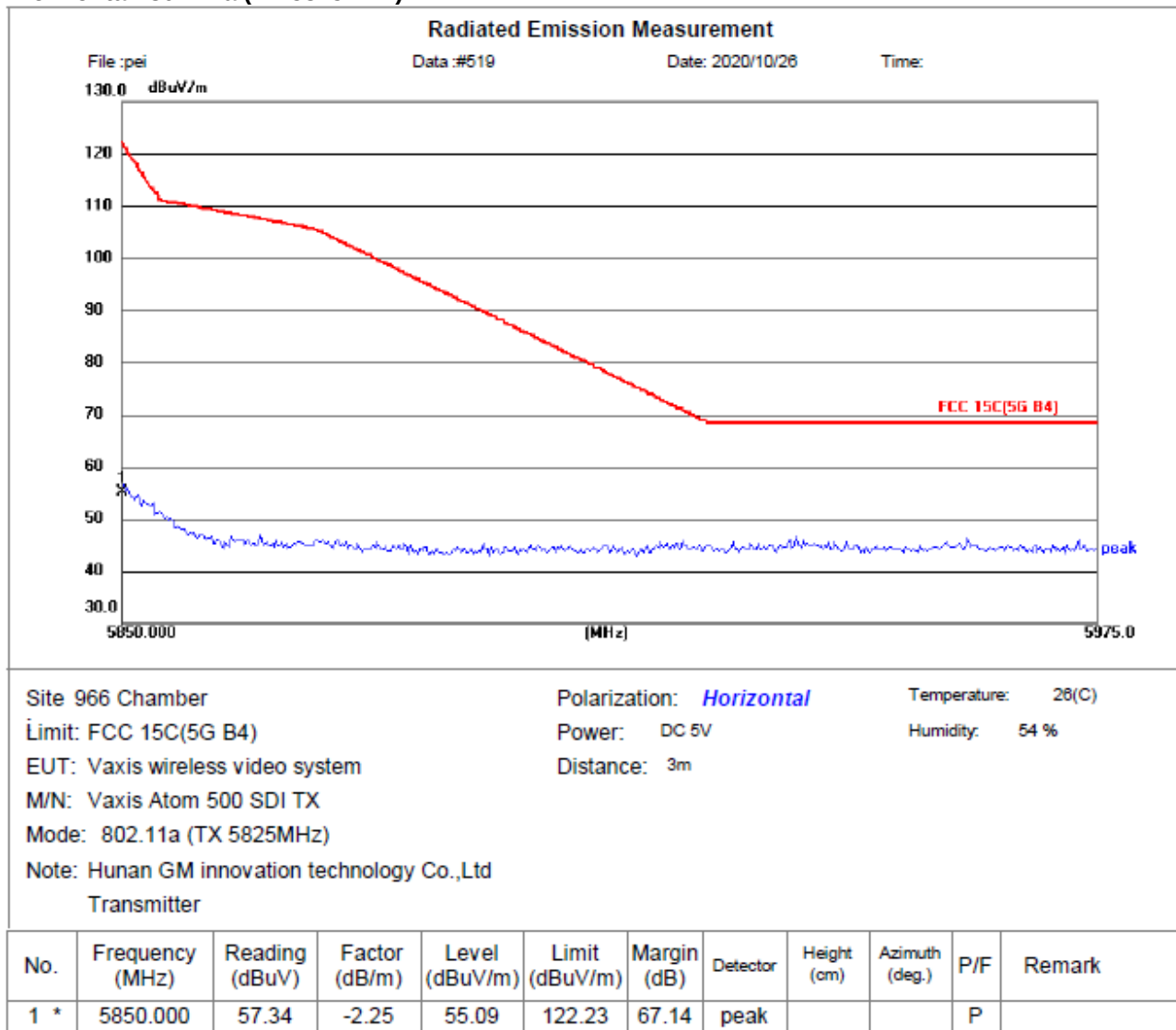
Horizontal: 802.11a (TX 5745MHz)



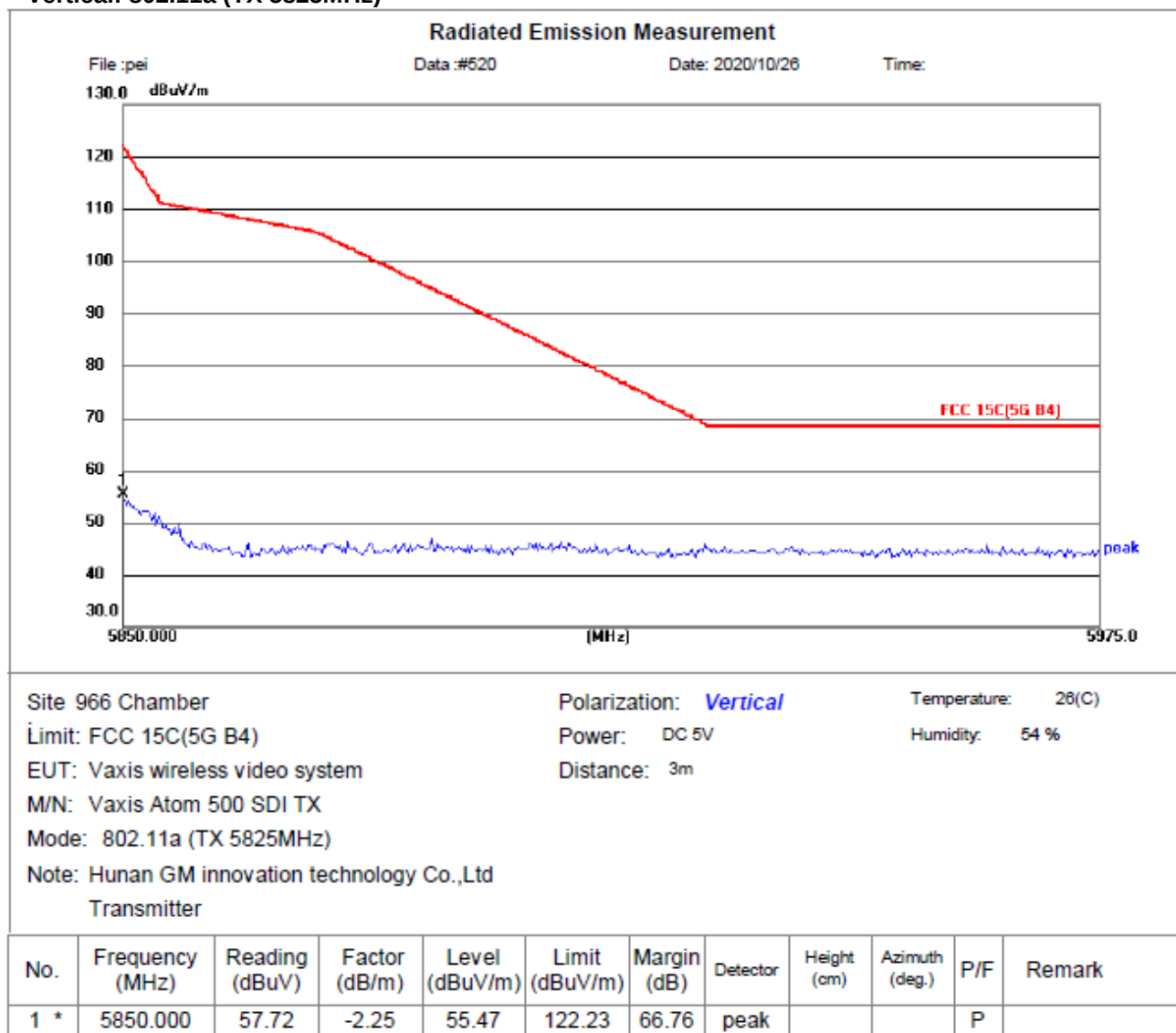
Vertical: 802.11a (TX 5745MHz)



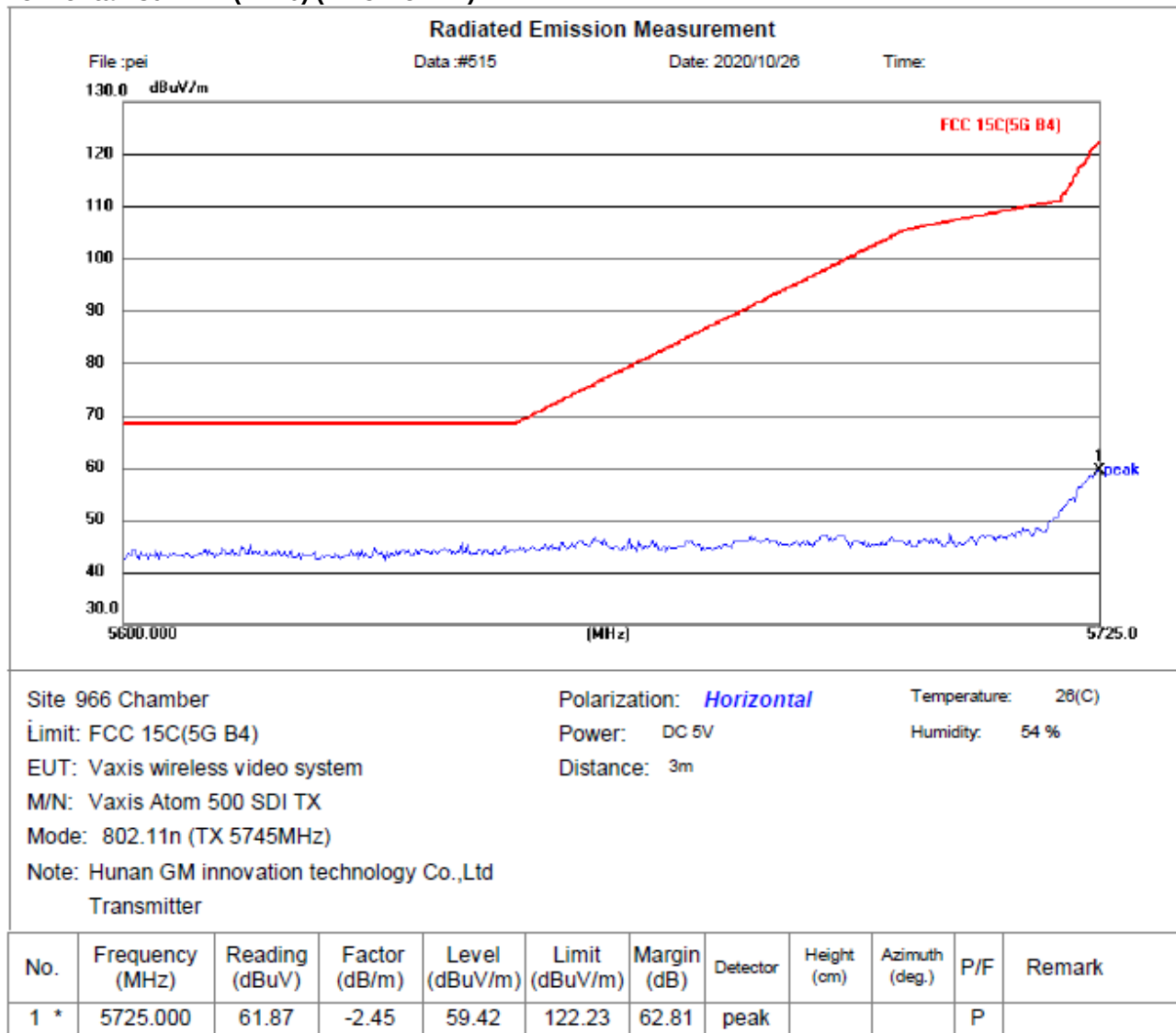
Horizontal: 802.11a (TX 5825MHz)



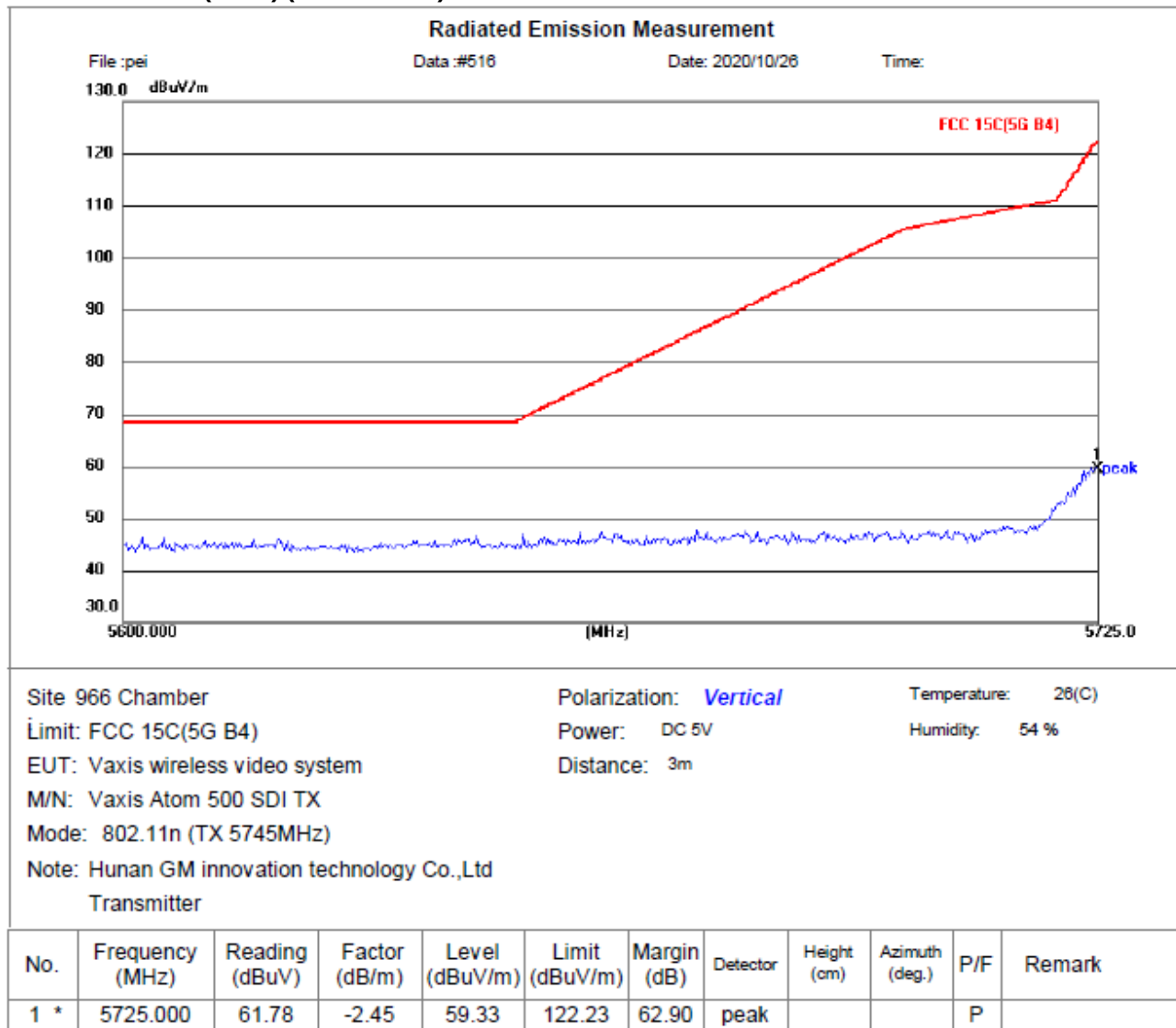
Vertical: 802.11a (TX 5825MHz)



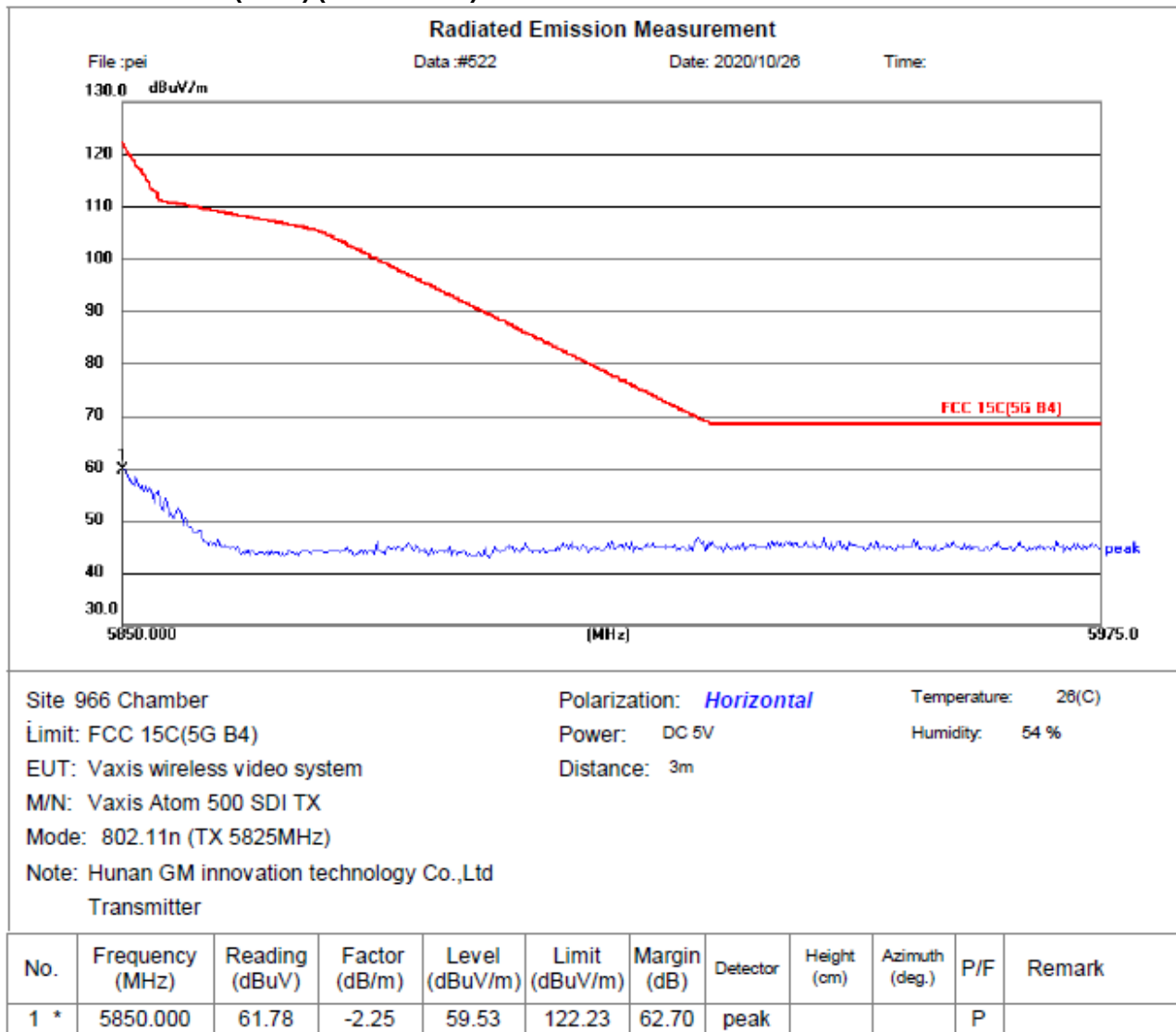
Horizontal: 802.11n (HT20) (TX 5745MHz)



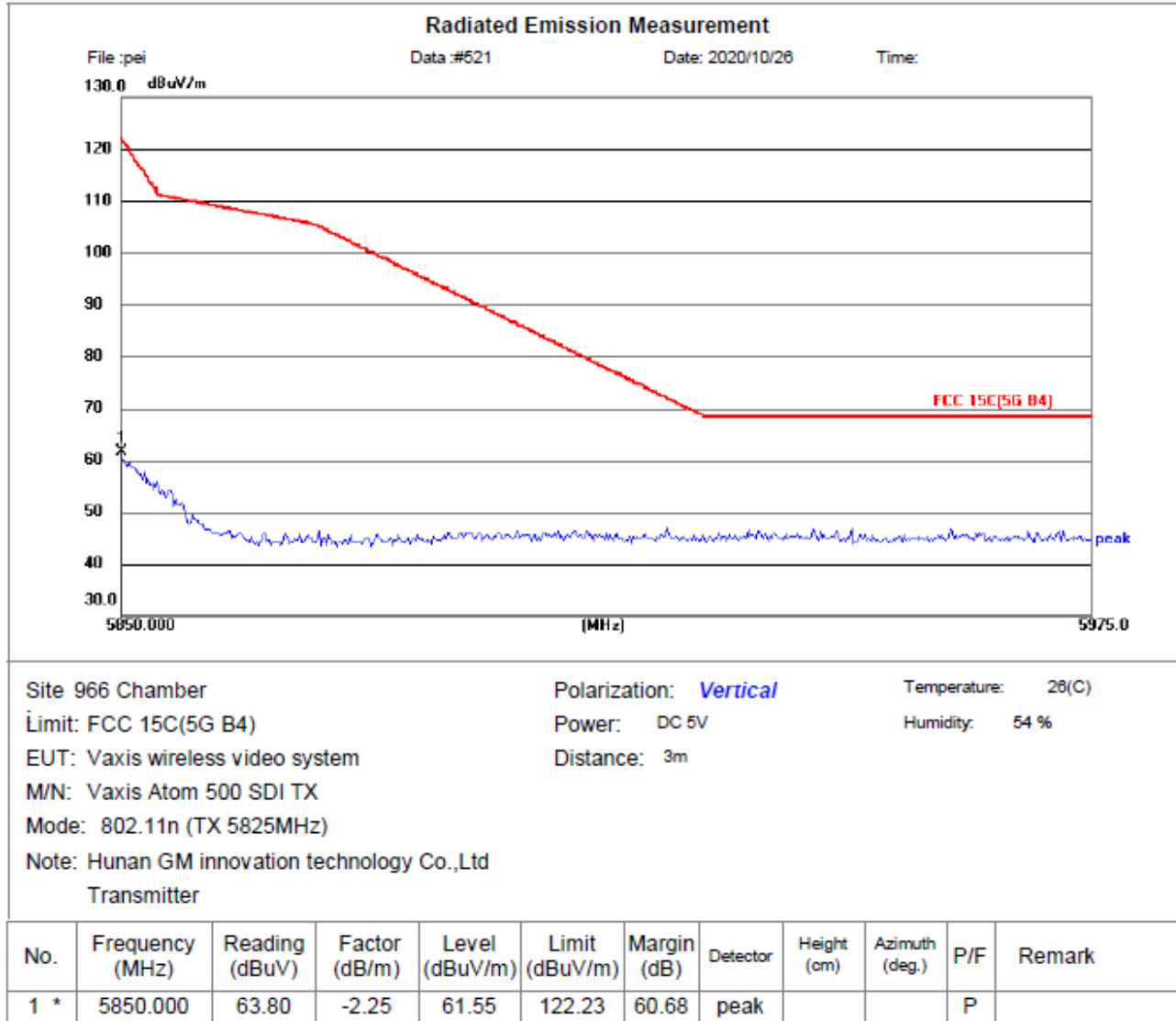
Vertical: 802.11n (HT20) (TX 5745MHz)



Horizontal: 802.11n (HT20) (TX 5825MHz)



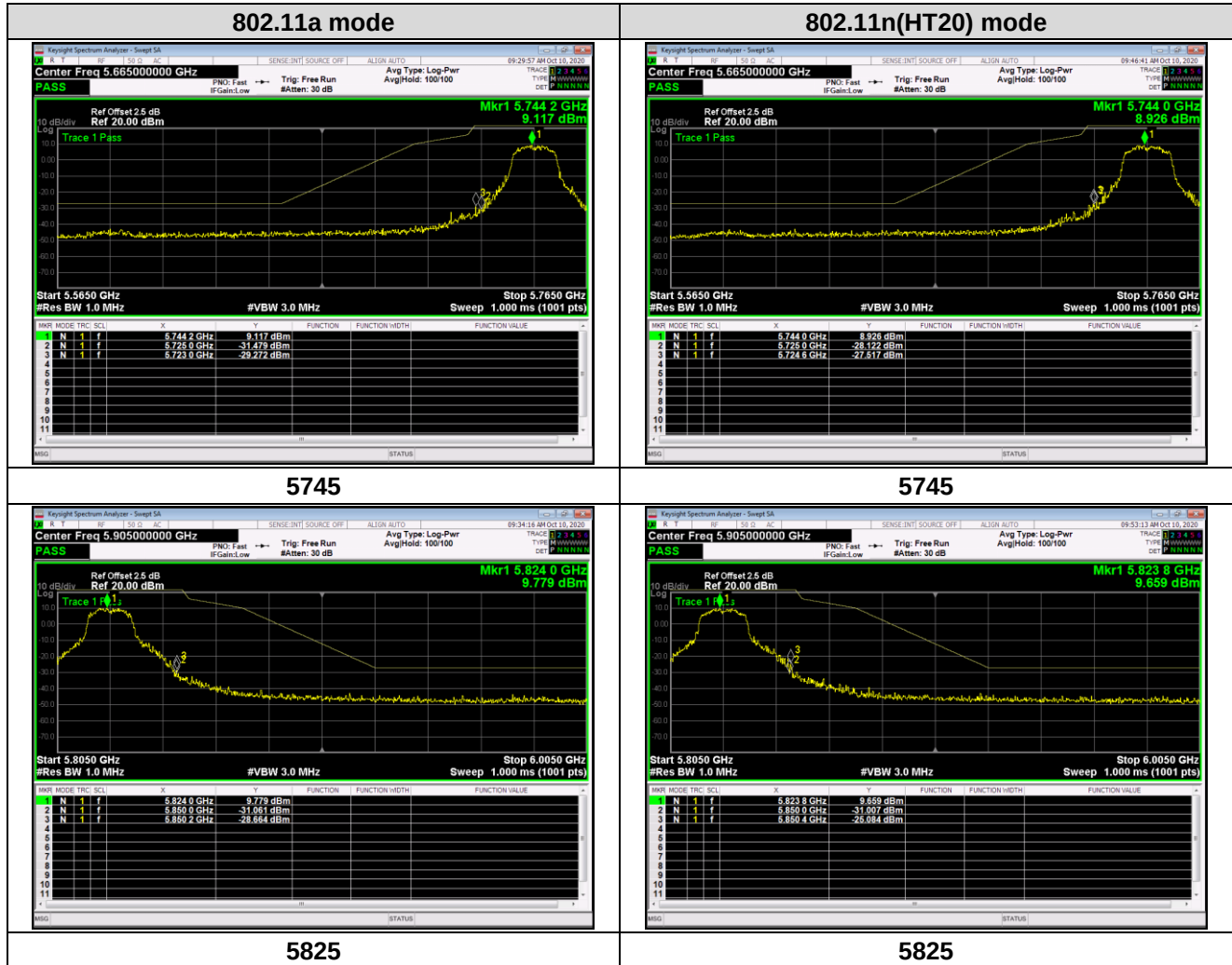
Vertical: 802.11n (HT20) (TX 5825MHz)



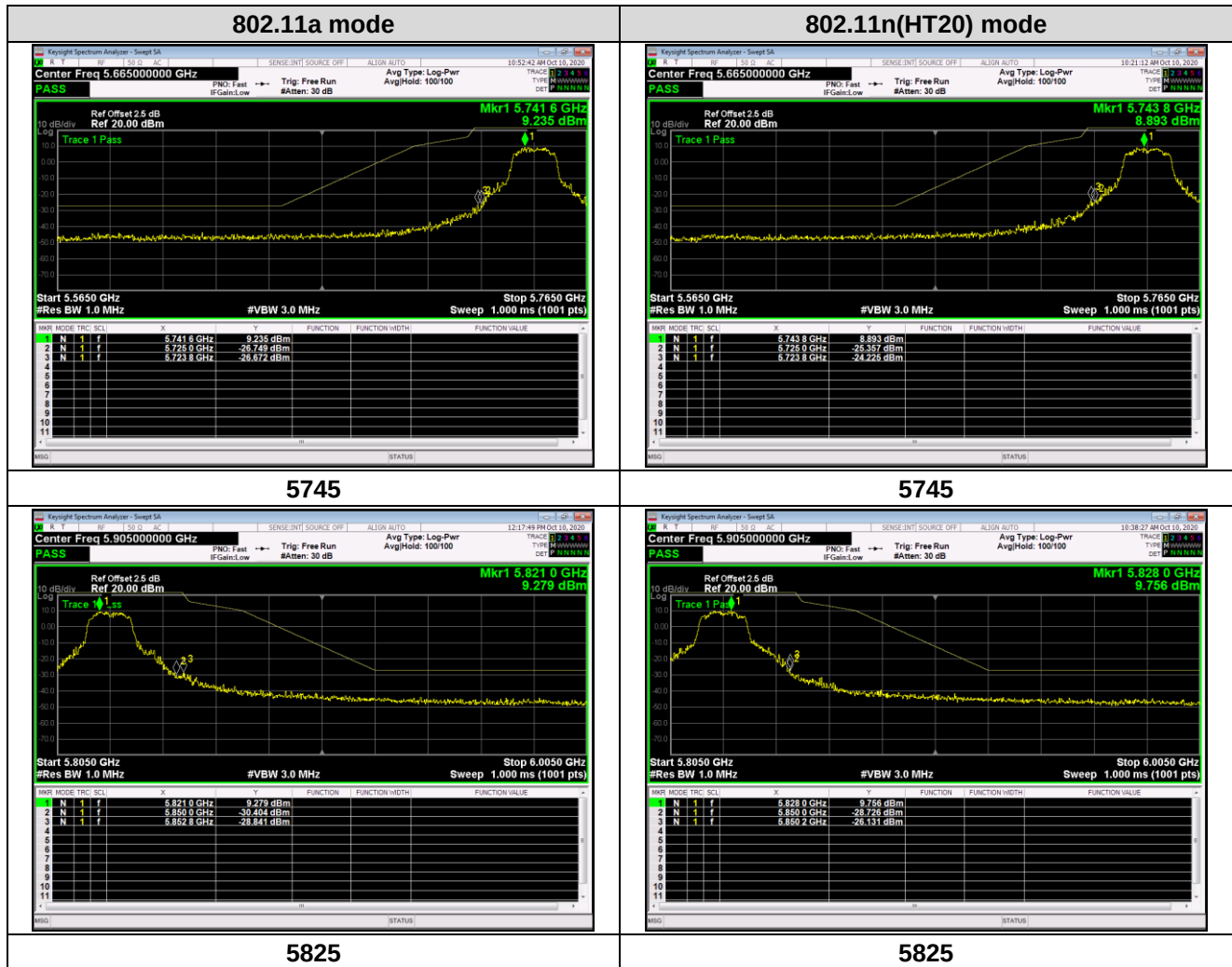
Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

Conducted Band Edge Result

Antenna A



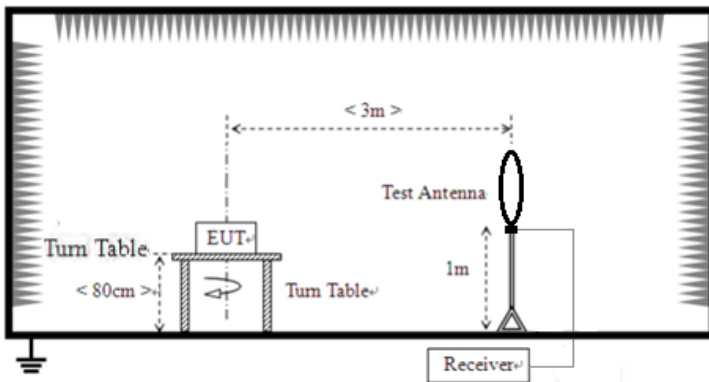
Antenna B

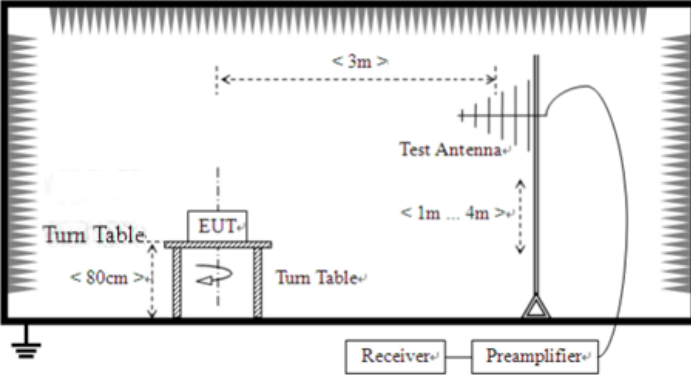
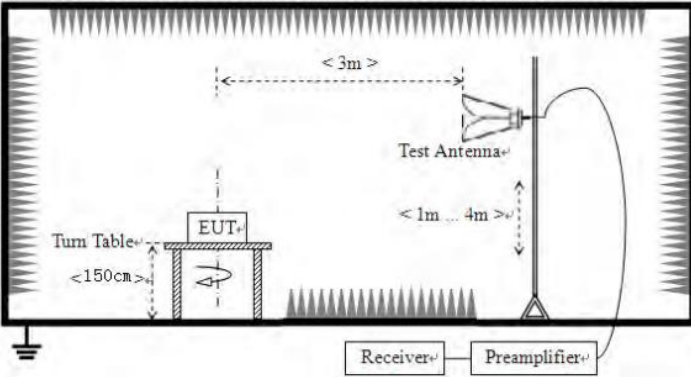


Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

7.7 Spurious Emission

7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9kHz-150KHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (uV/m)	Value	Measurement Distance
	0.009MHz-0.490MHz		2400/F(KHz)	QP	300m
	0.490MHz-1.705MHz		24000/F(KHz)	QP	300m
	1.705MHz-30MHz		30	QP	30m
	30MHz-88MHz		100	QP	3m
	88MHz-216MHz		150	QP	
	216MHz-960MHz		200	QP	
	960MHz-1GHz		500	QP	
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz		-27.0		Peak Value
Test setup:	For radiated emissions from 9kHz to 30MHz				
					
For radiated emissions from 30MHz to1GHz					

	 For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test

	worst case mode is recorded in the report.					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	26 °C	Humid.:	54%	Press.:	1012mbar
Test voltage:	DC 5V					
Test results:	Pass					

Remarks:

1. Only the worst case Main Antenna test data.
2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Please refer to following plots of the worst case

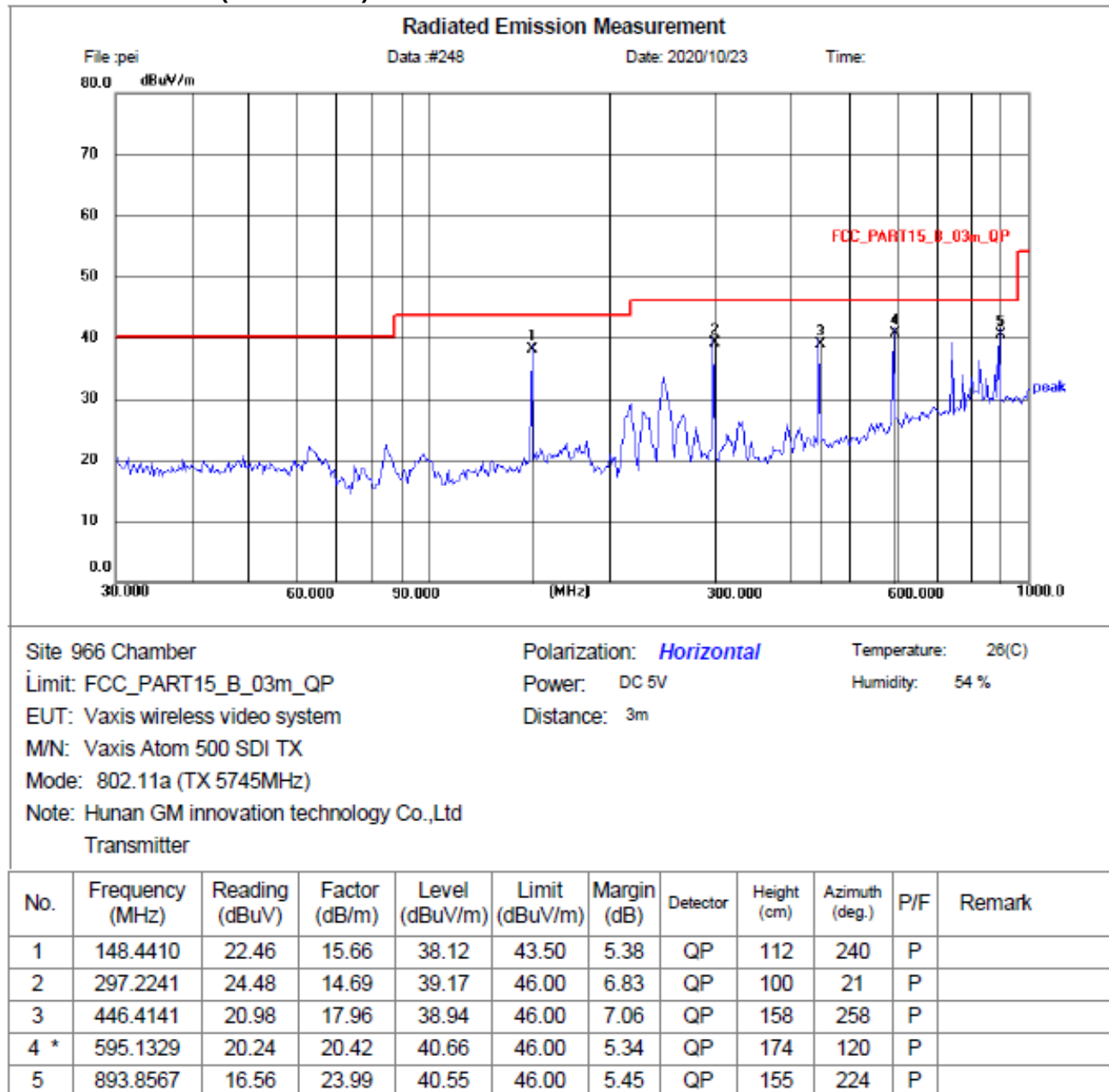
Note: We tested 802.11a/n mode the all data rate and recorded the worst case data for this channel to be 6Mbps for 802.11a mode and MCS0 for 802.11n mode.

9 kHz ~ 30 MHz

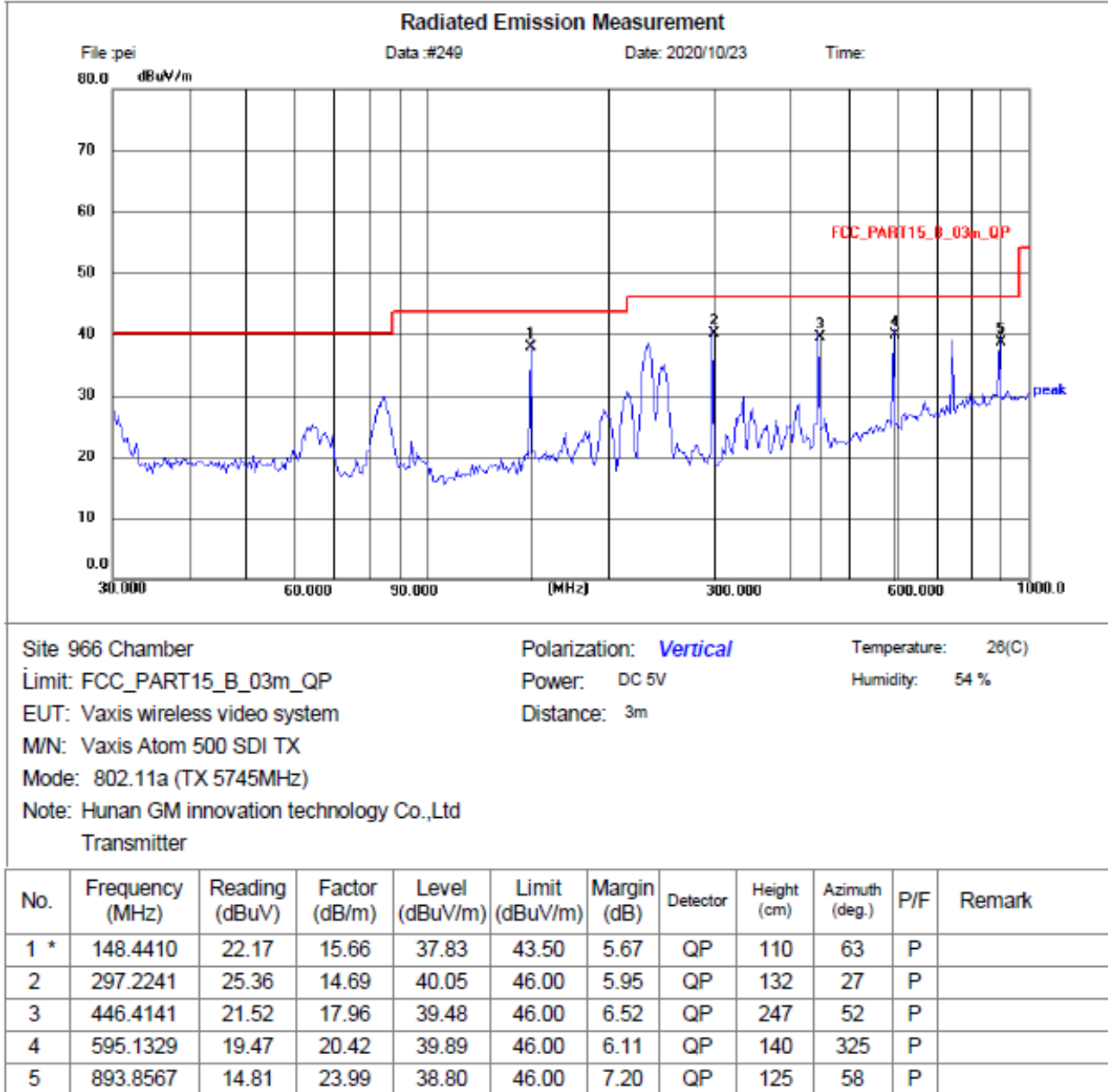
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

30MHz~ 1GHz

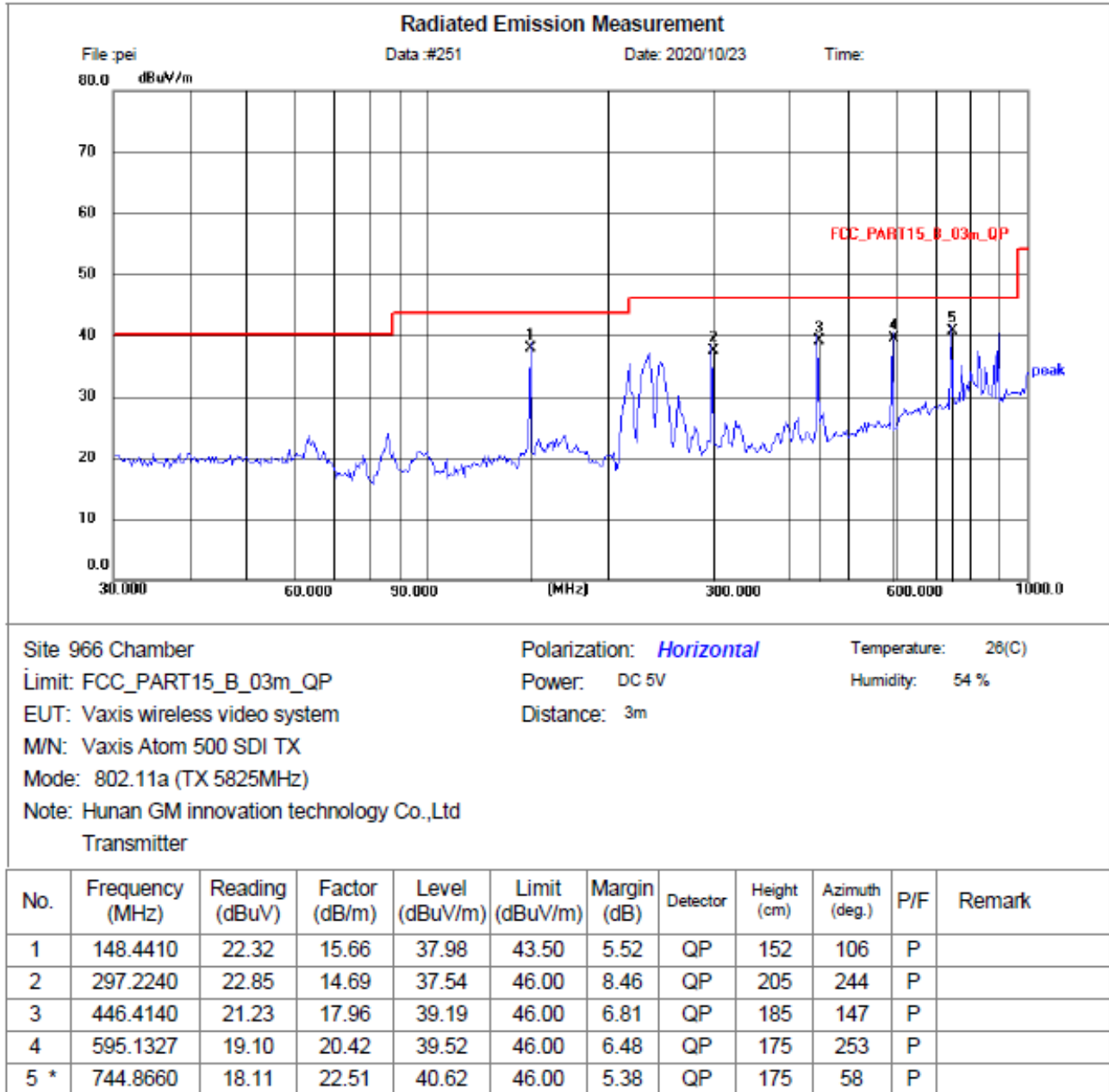
Horizontal: 802.11a (TX 5745MHz)



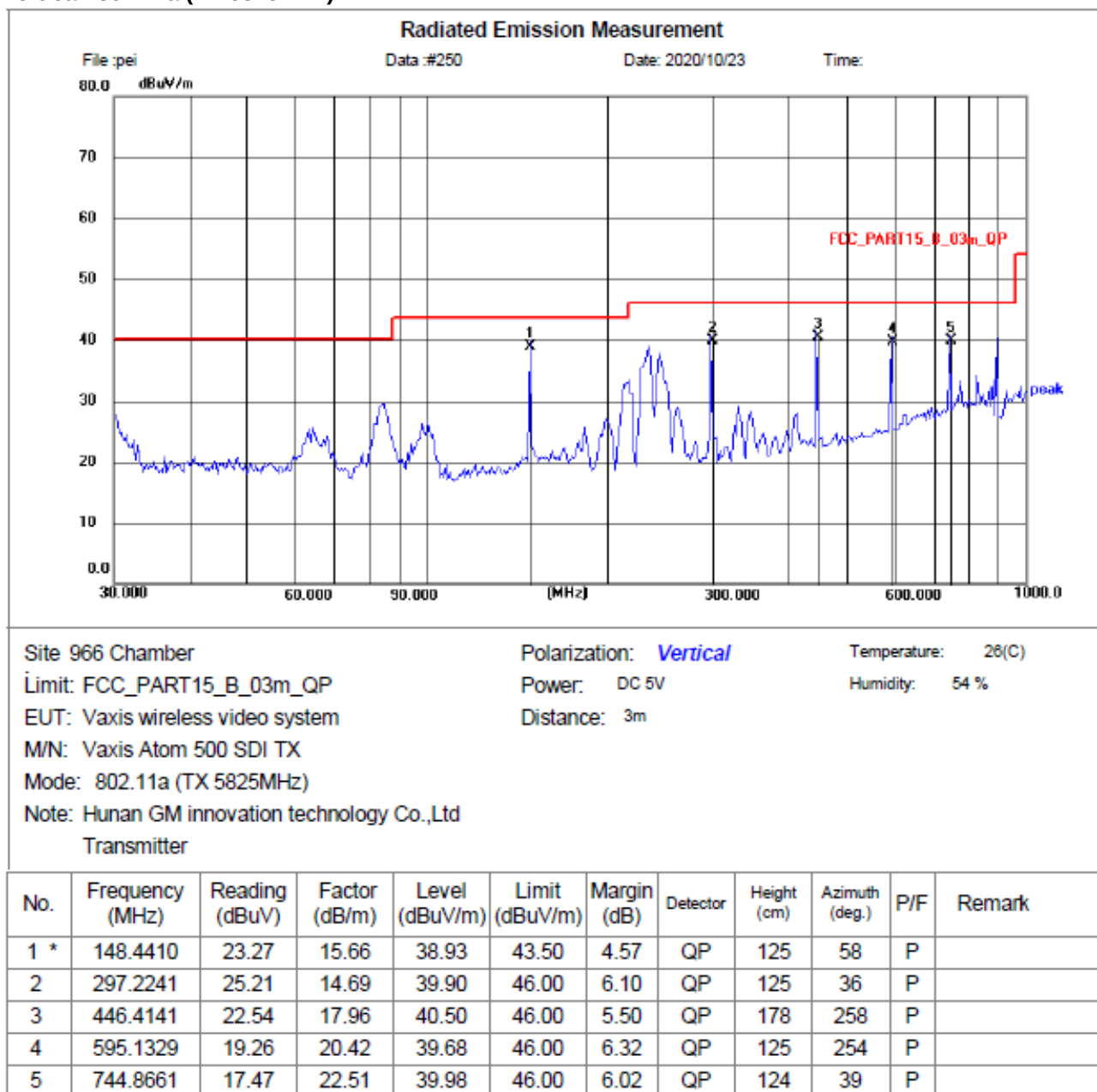
Vertical: 802.11a (TX 5745MHz)



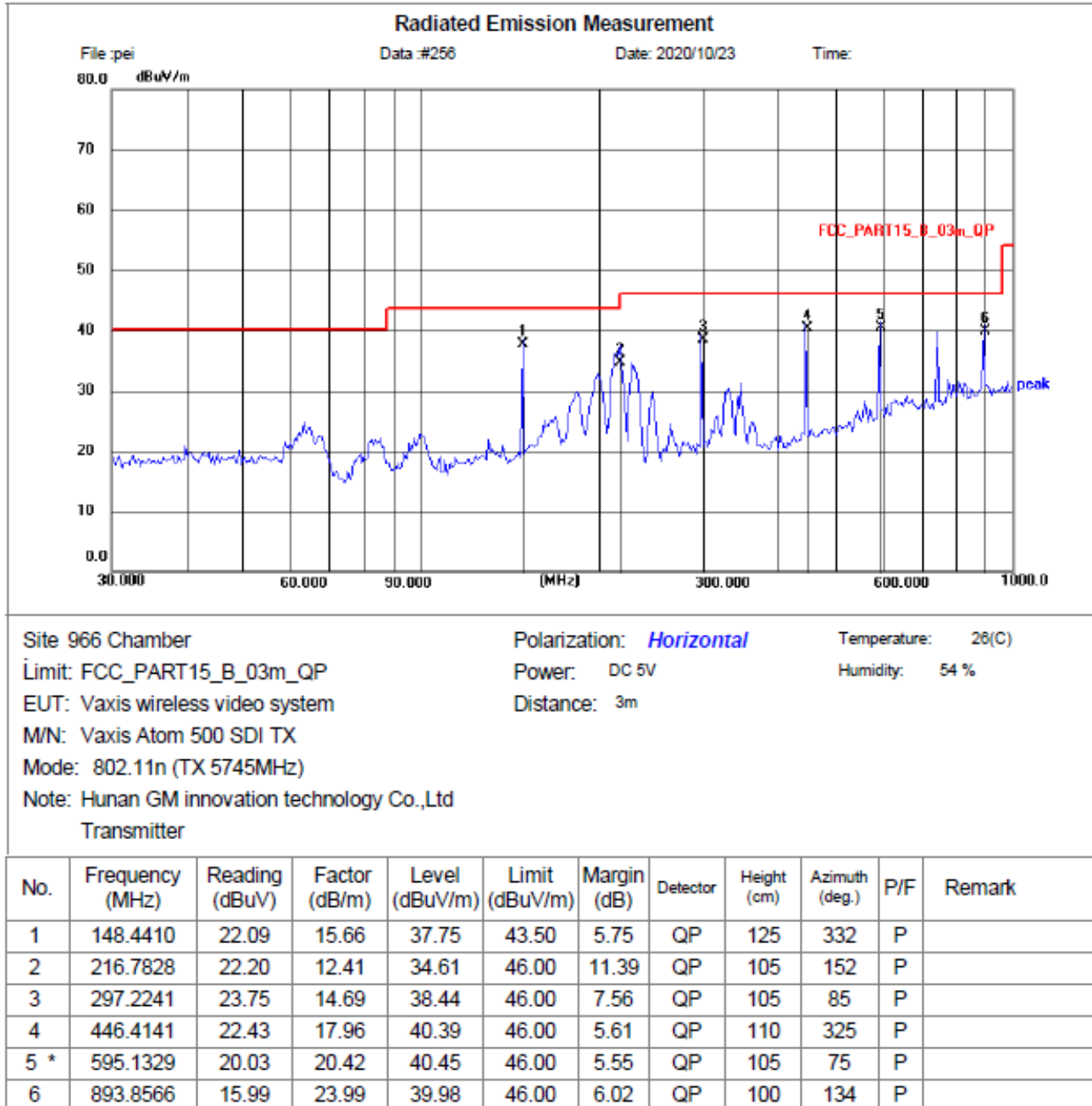
Horizontal: 802.11a (TX 5825MHz)



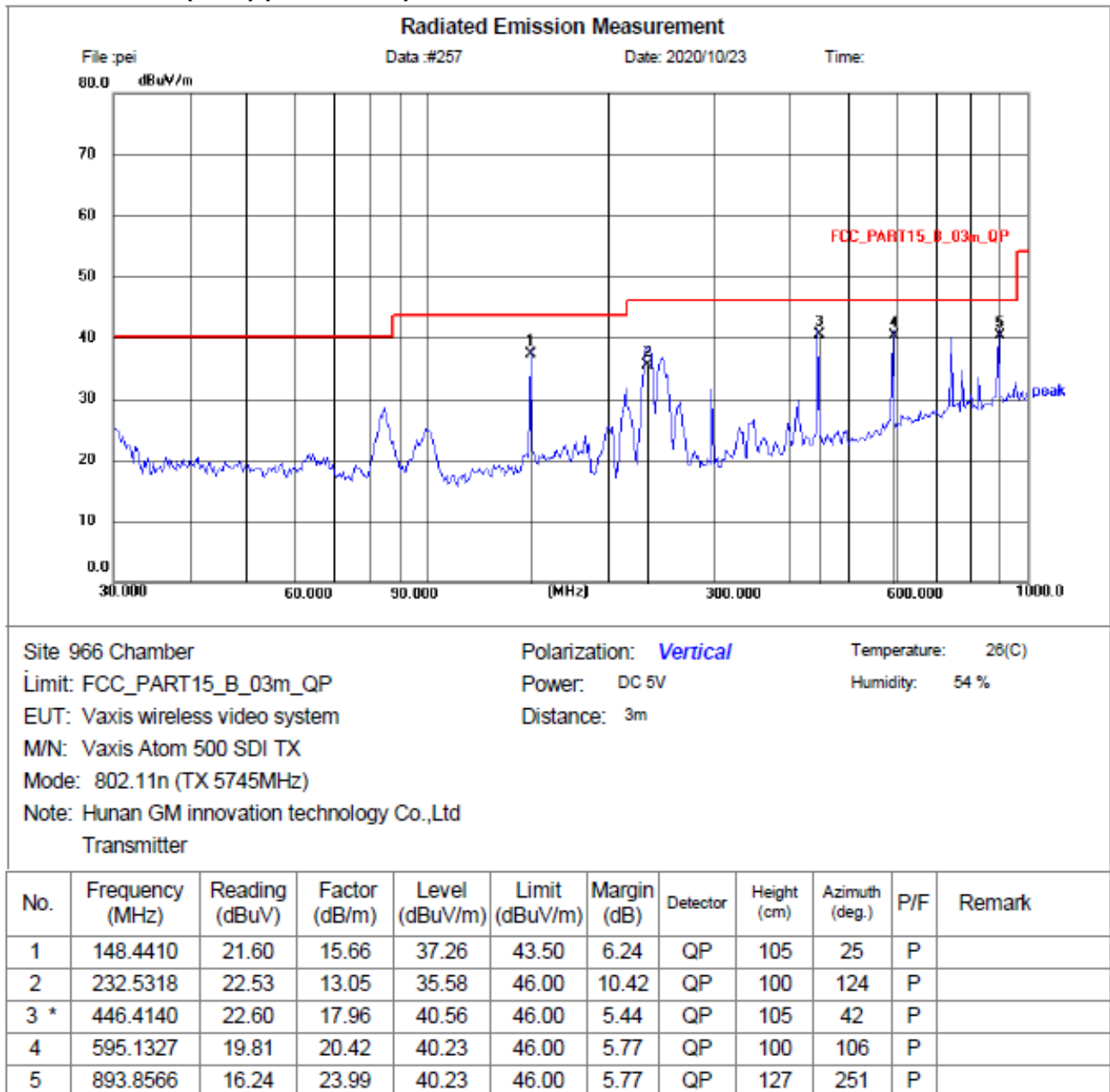
Vertical: 802.11a (TX 5825MHz)

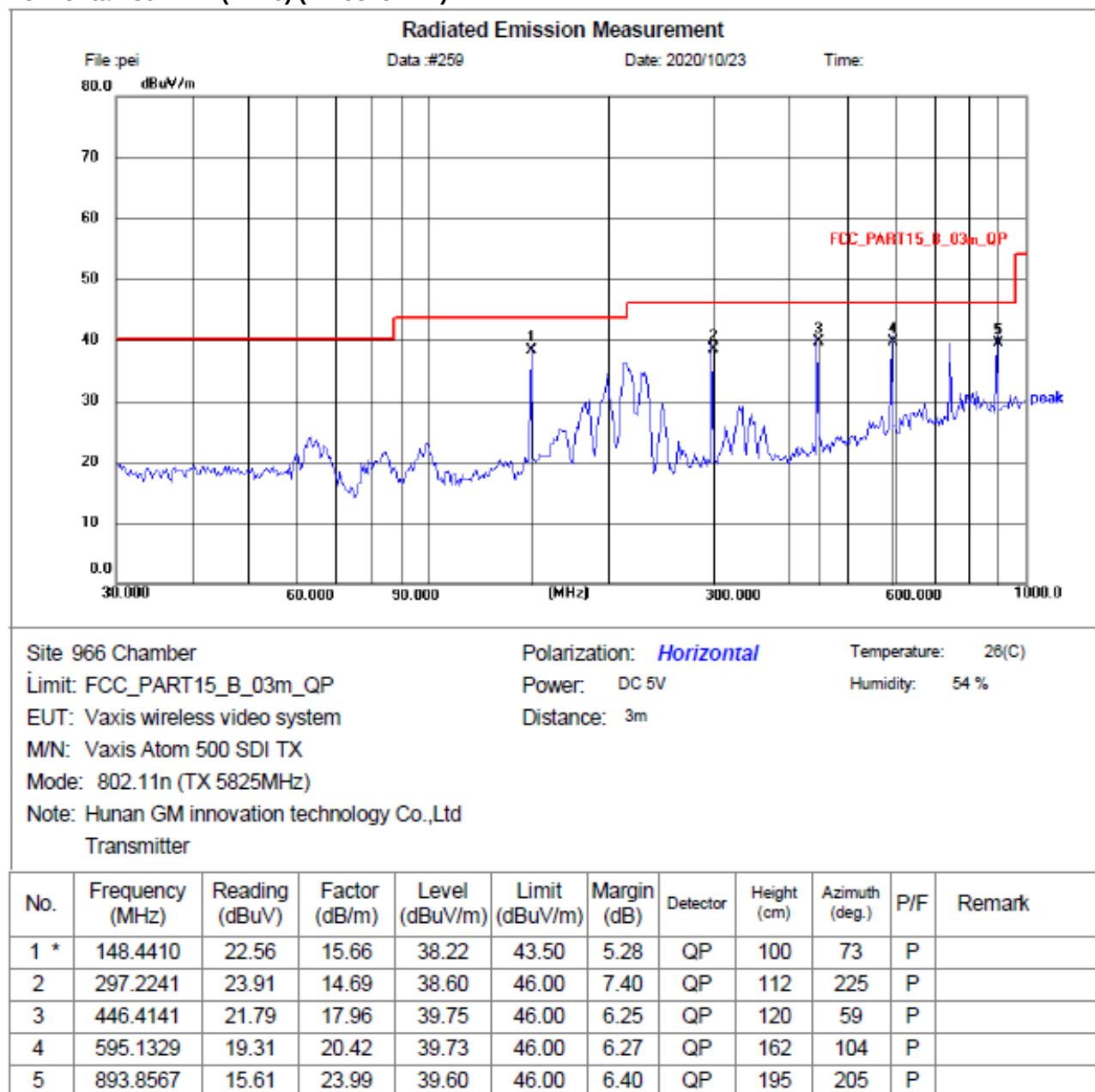


Horizontal: 802.11n (HT20) (TX 5745MHz)

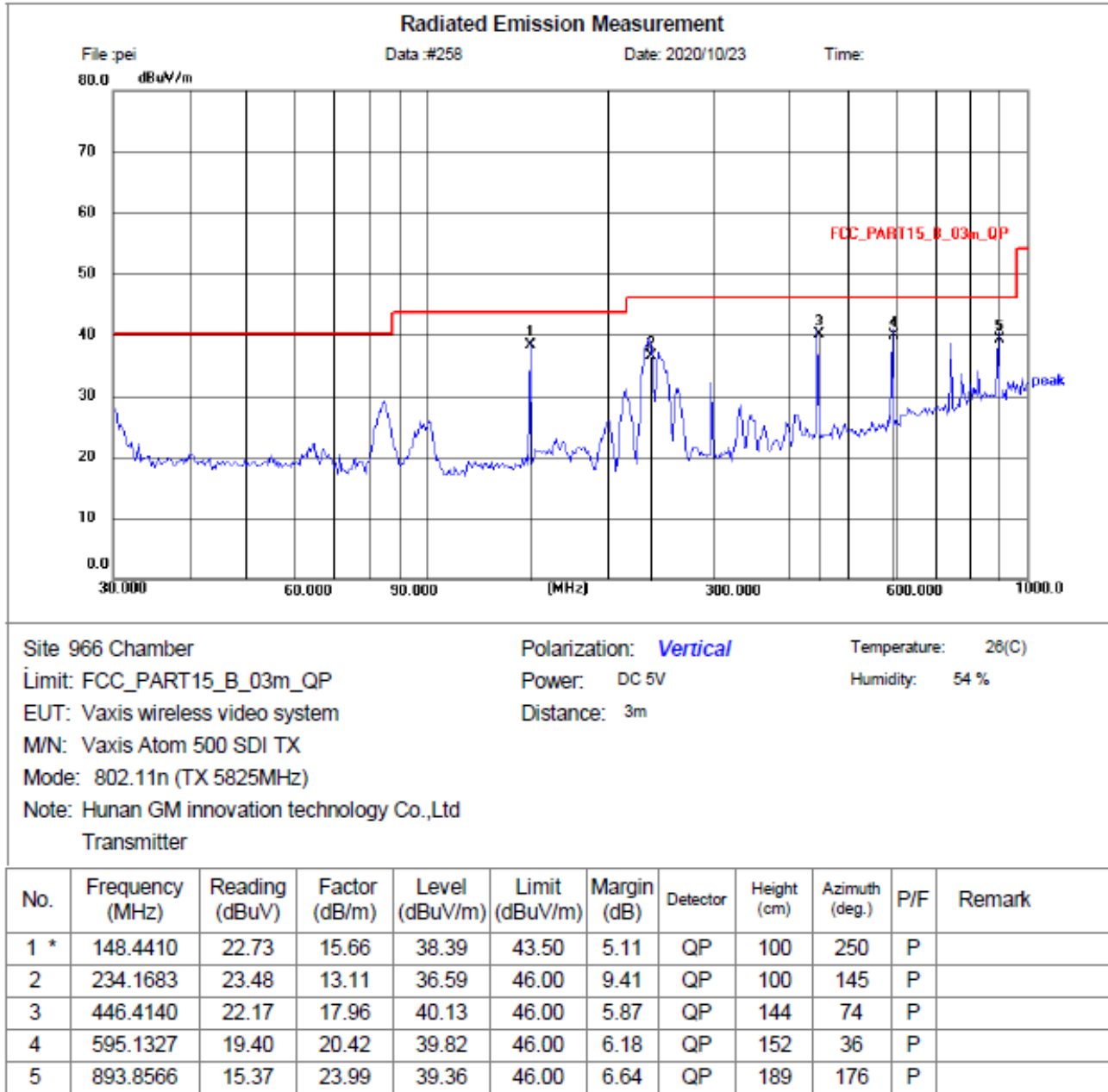


Vertical: 802.11n (HT20) (TX 5745MHz)



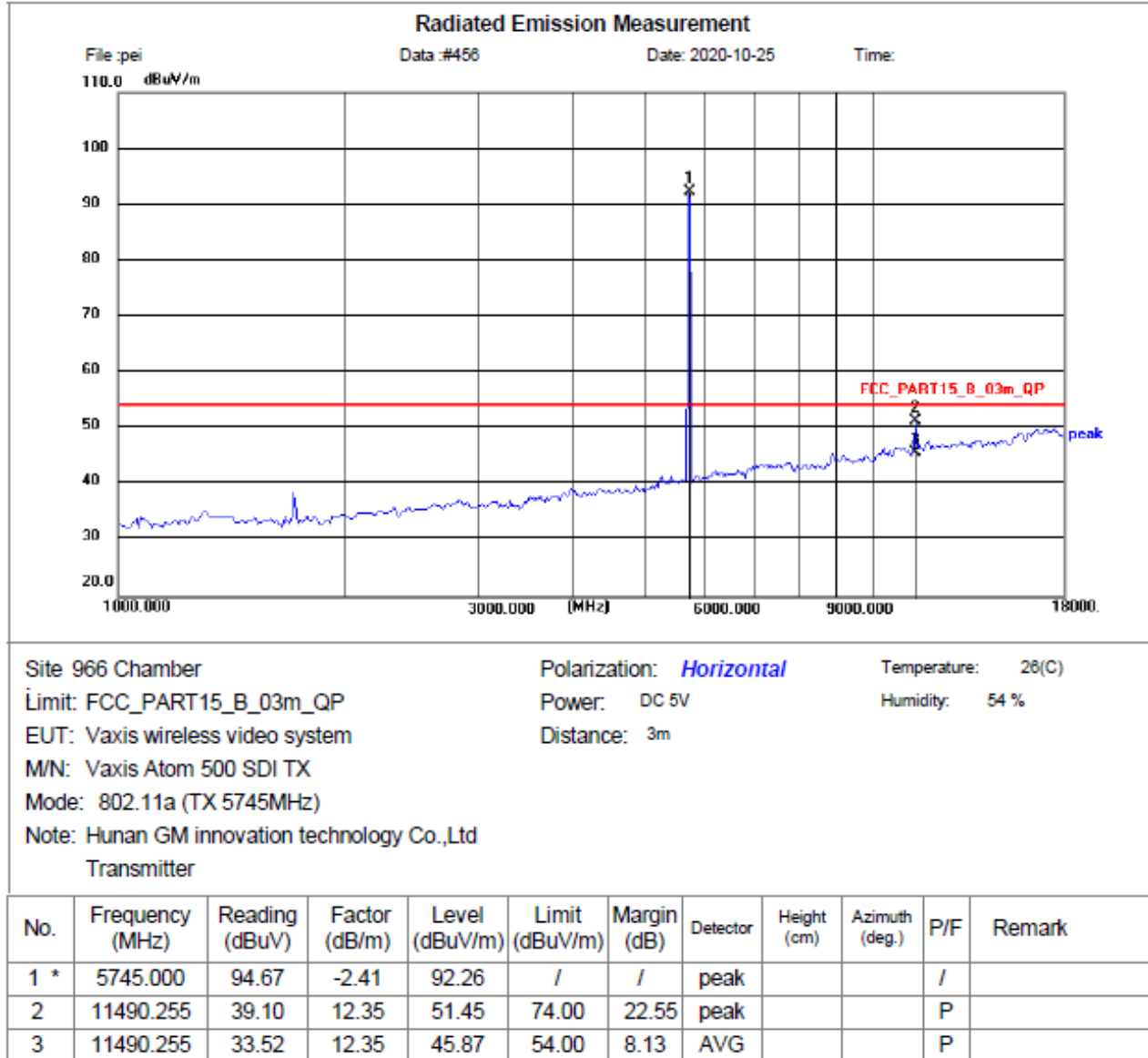
Horizontal: 802.11n (HT20) (TX 5825MHz)


Vertical: 802.11n (HT20) (TX 5825MHz)

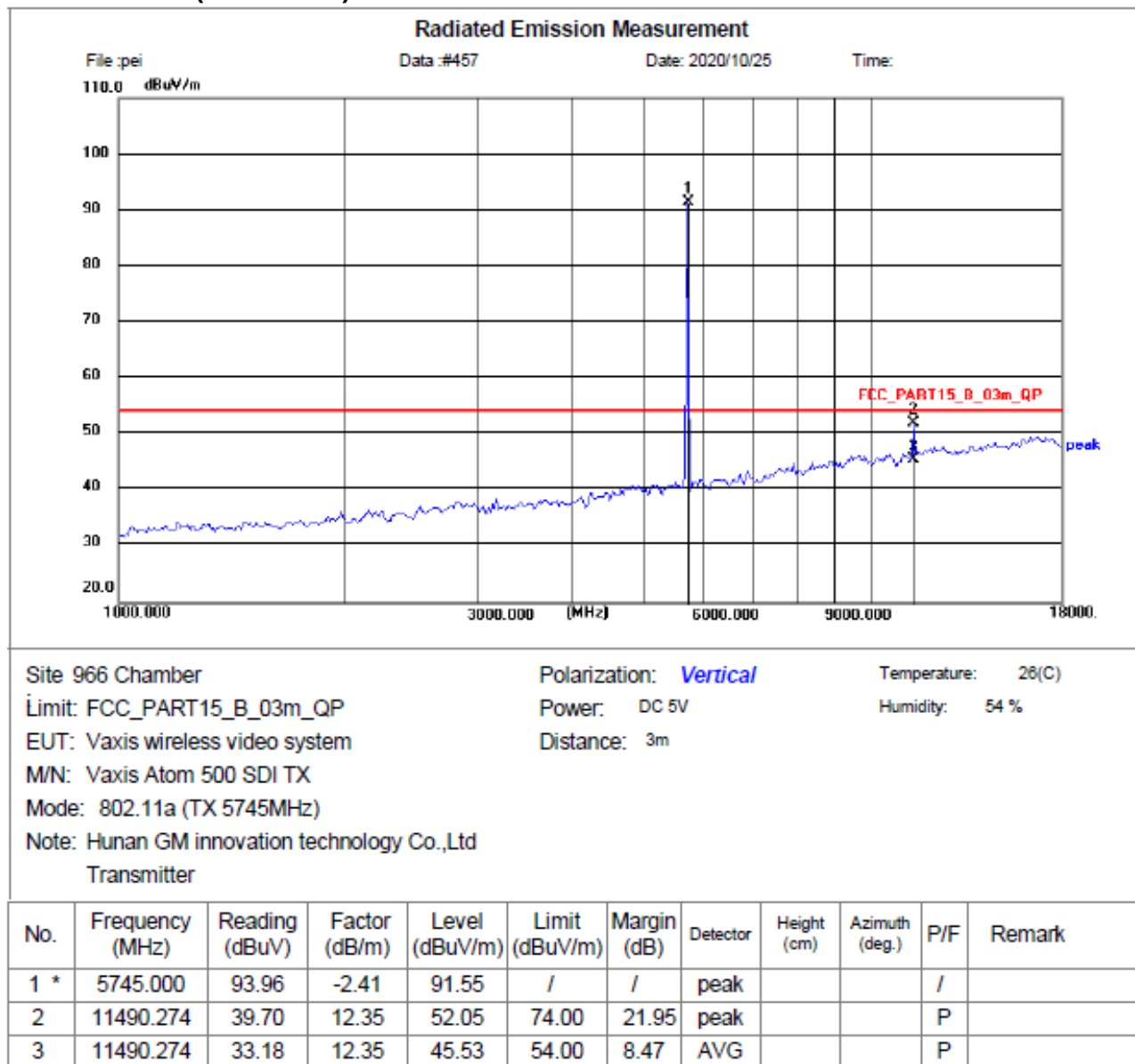


1GHz~ 18GHz

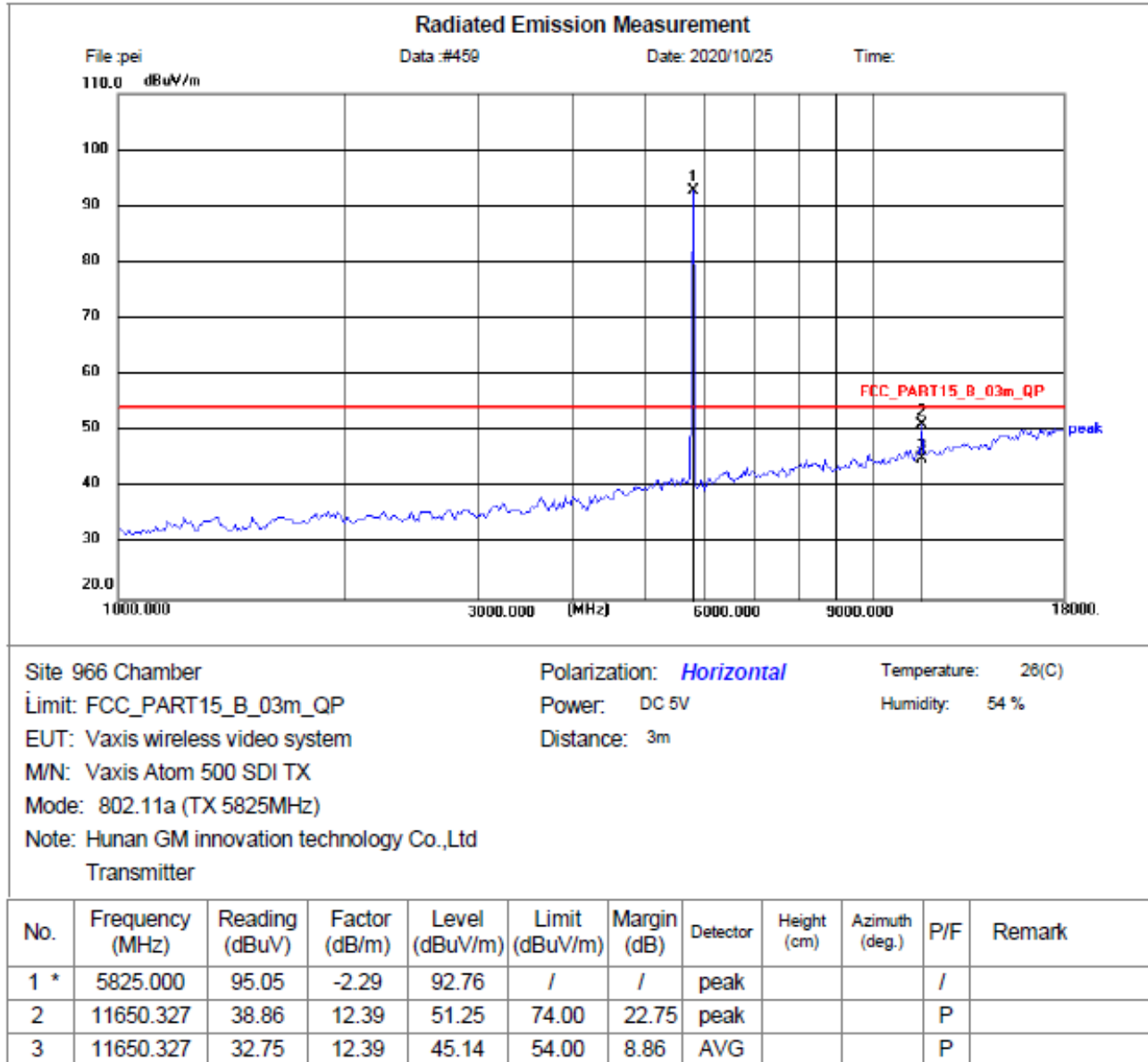
Horizontal: 802.11a (TX 5745MHz)



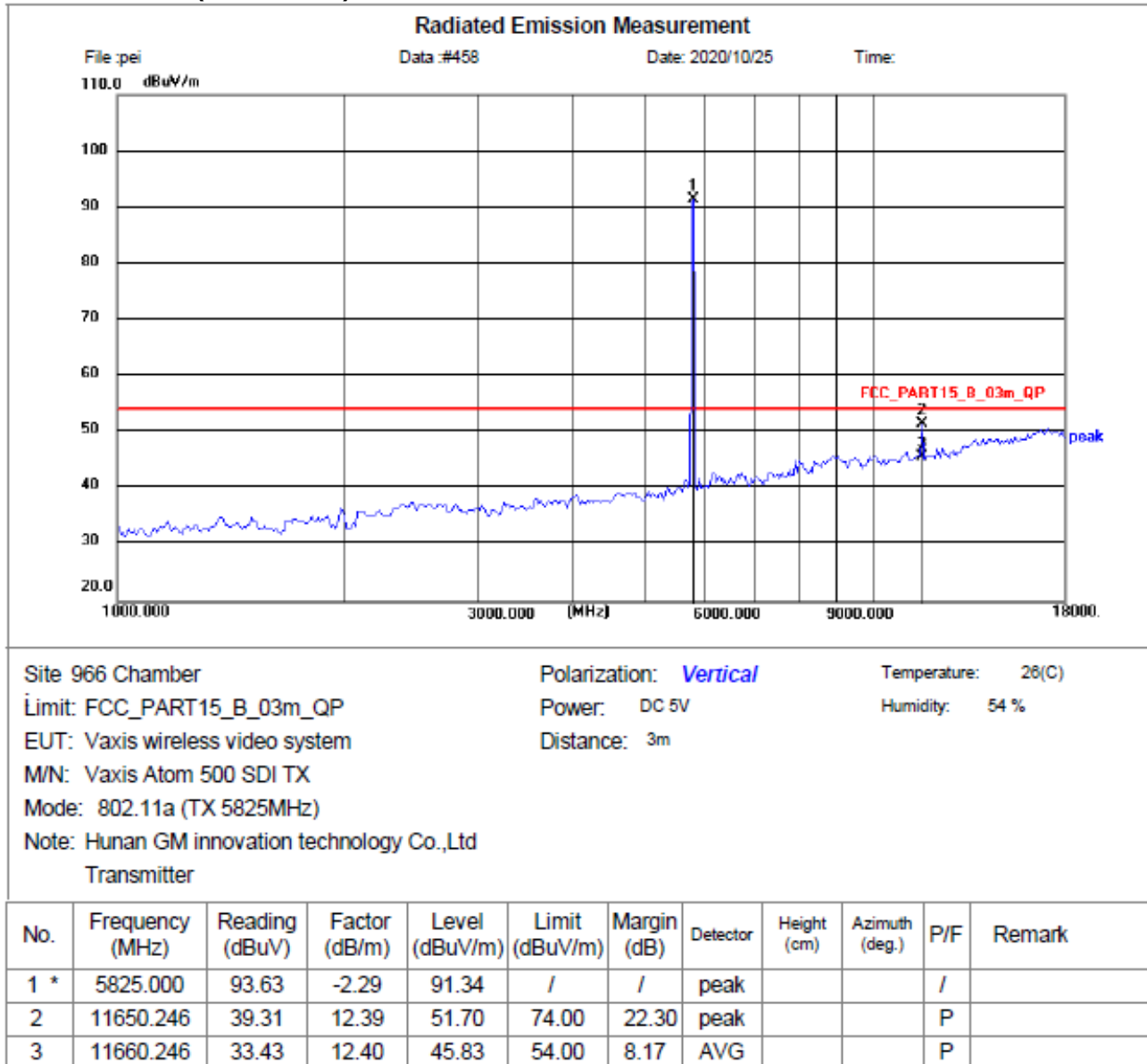
Vertical: 802.11a (TX 5745MHz)



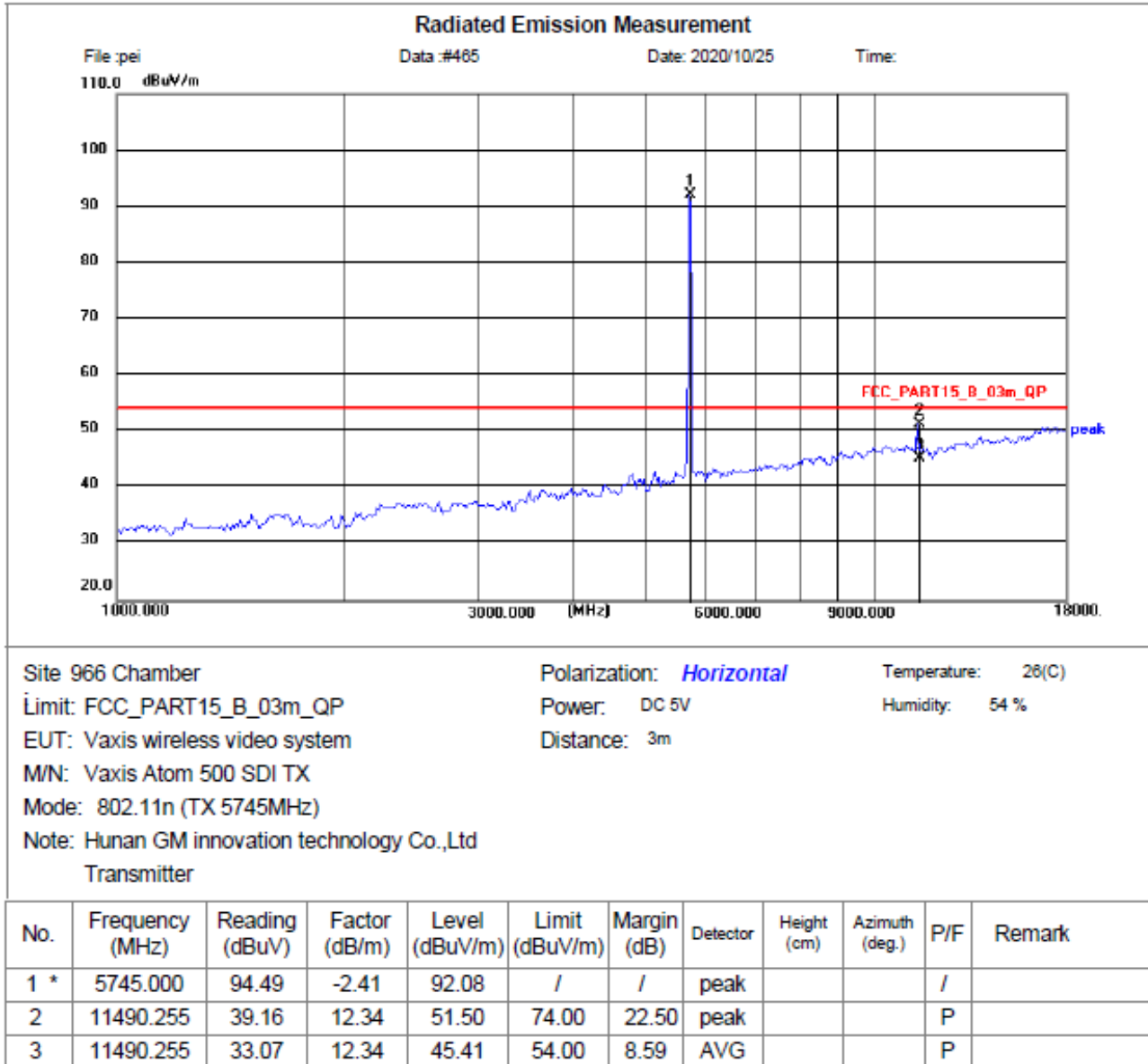
Horizontal: 802.11a (TX 5825MHz)



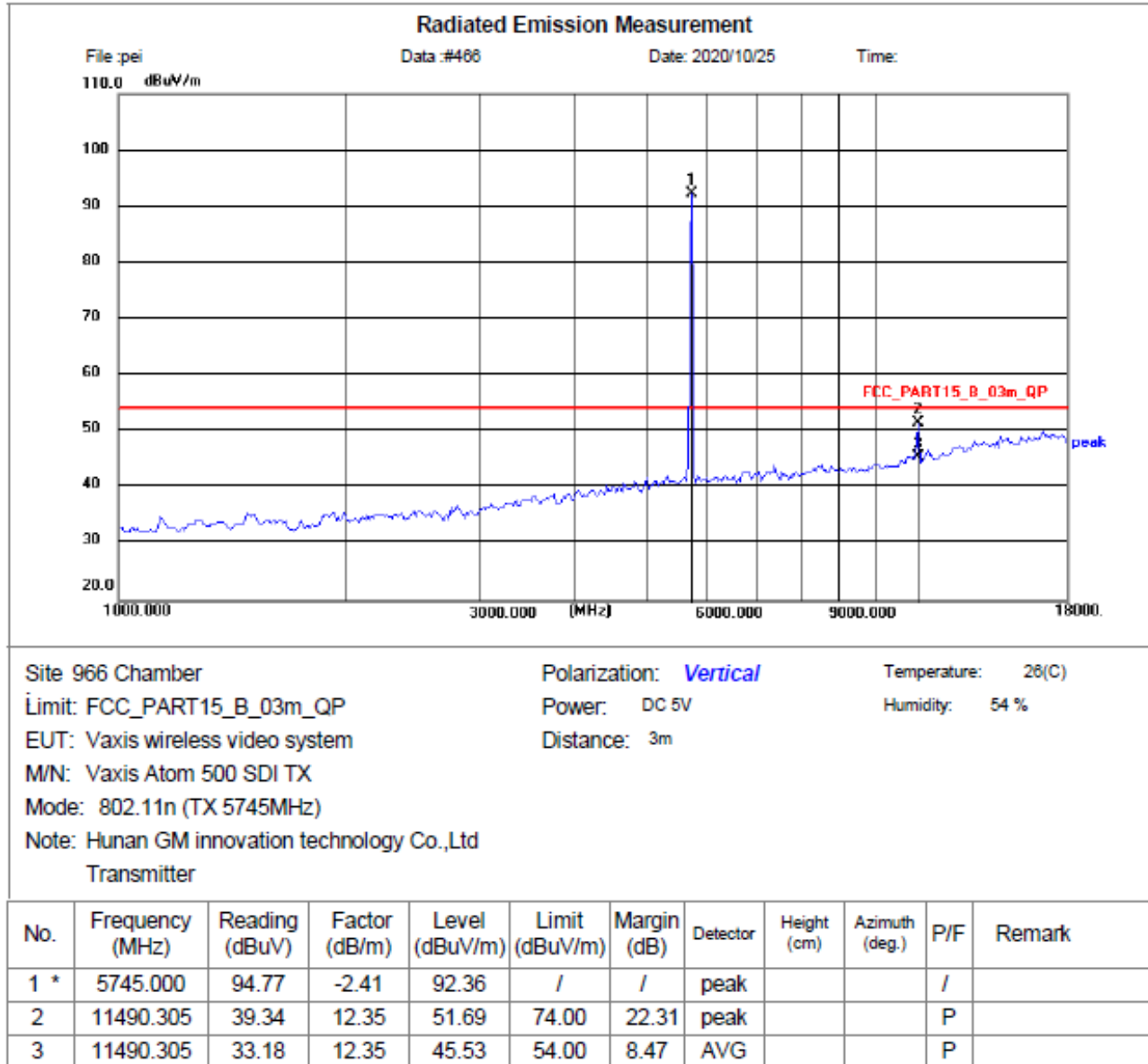
Vertical: 802.11a (TX 5825MHz)

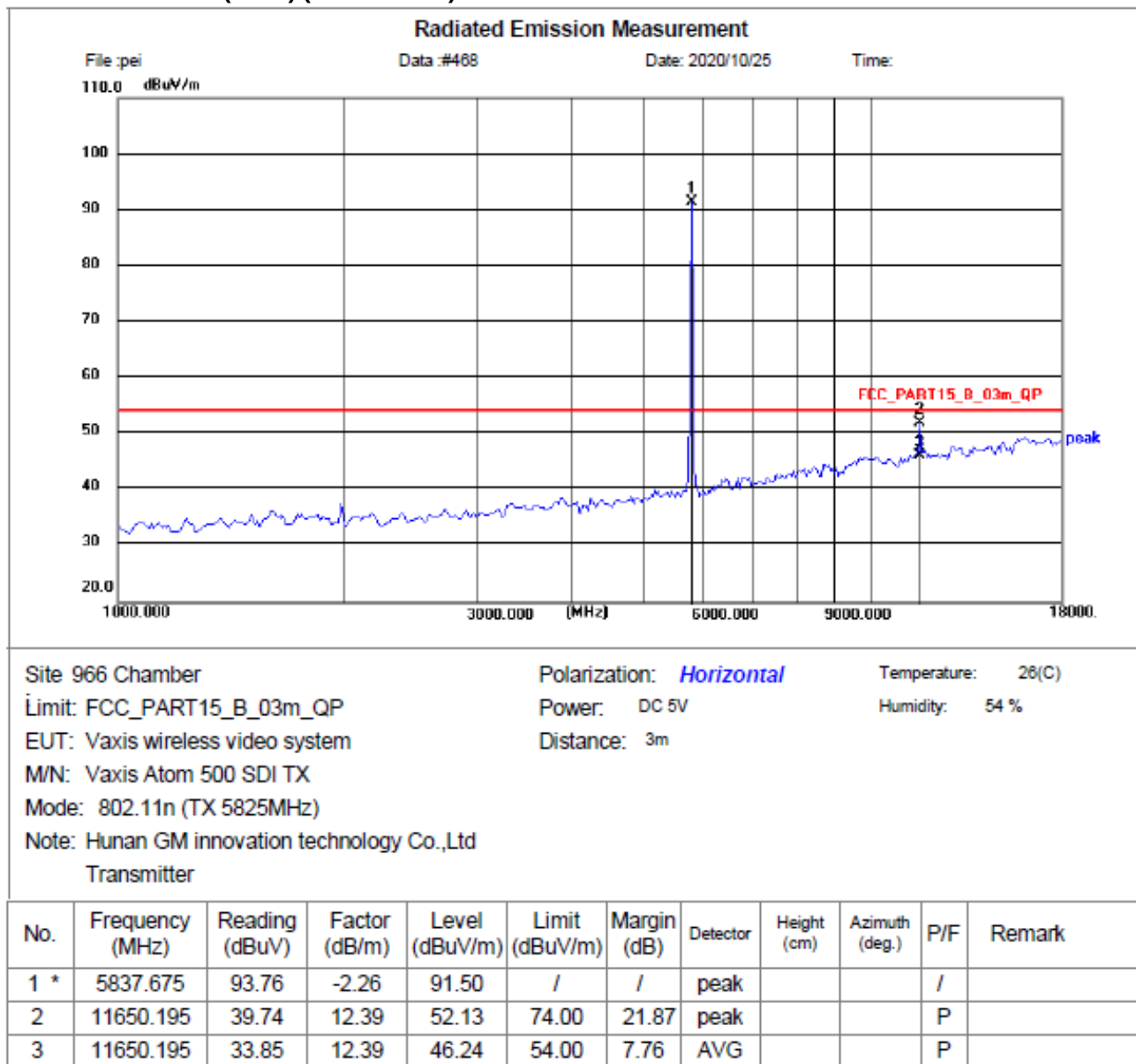


Horizontal: 802.11n (HT20) (TX 5745MHz)

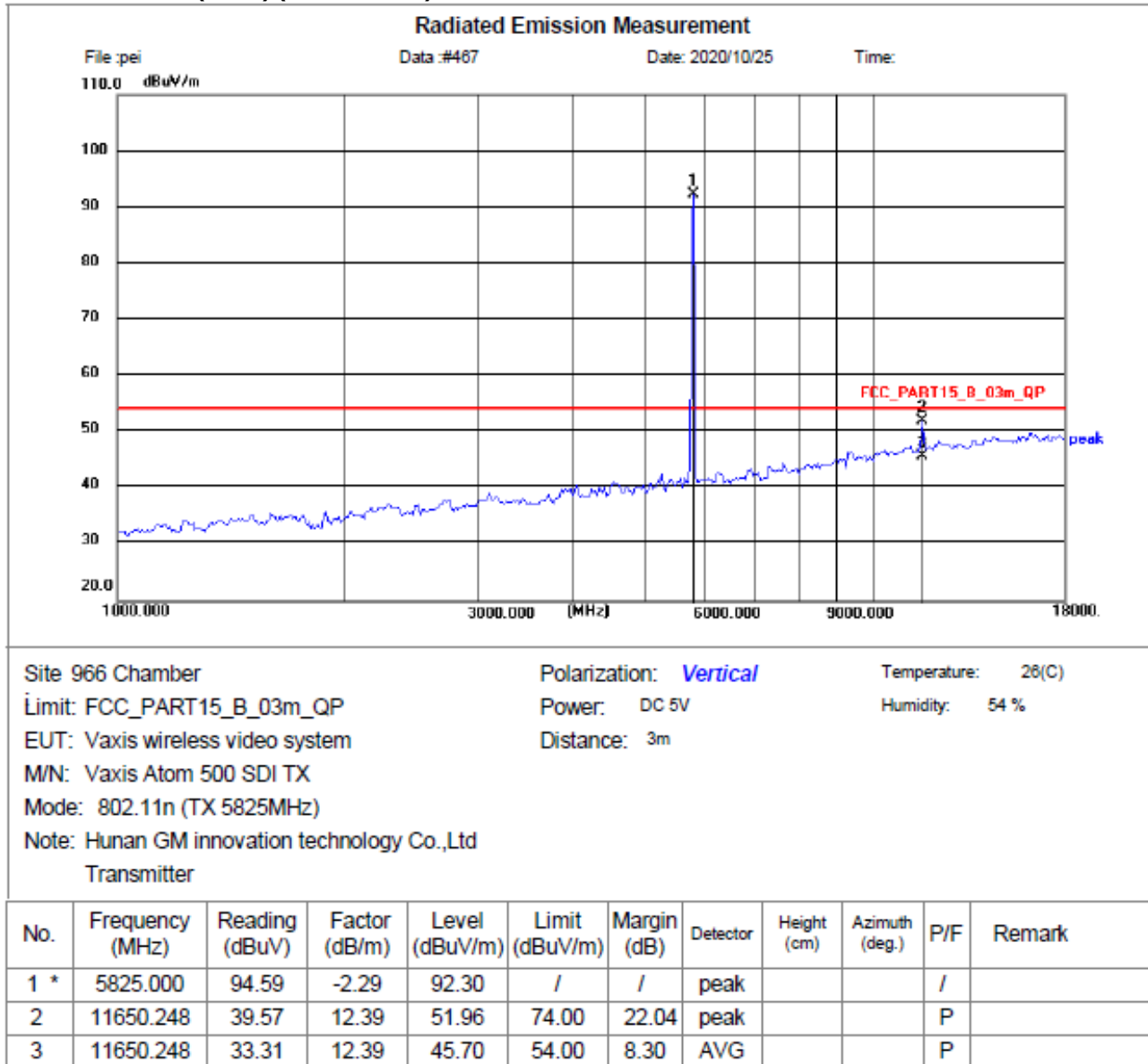


Vertical: 802.11n (HT20) (TX 5745MHz)



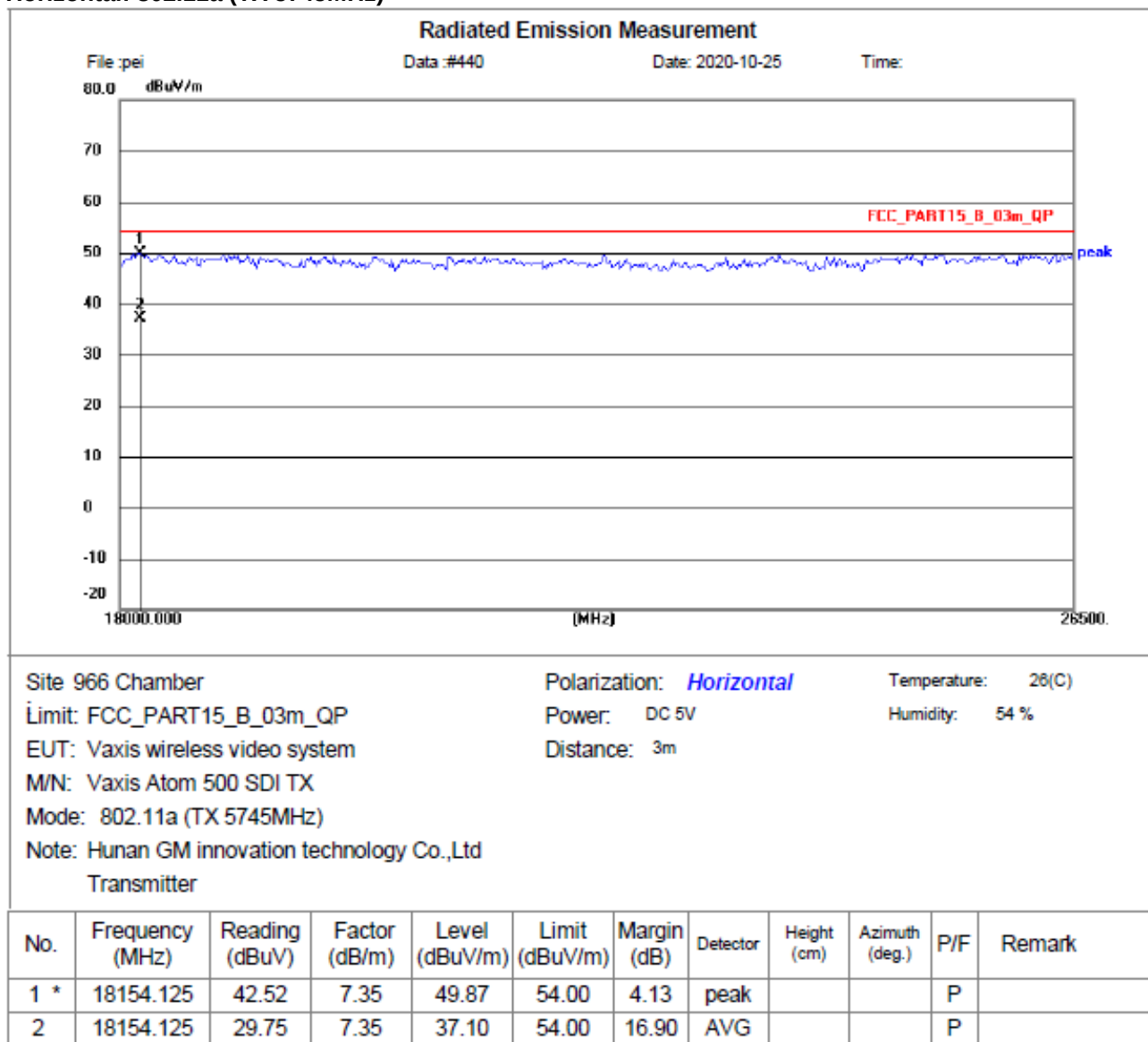
Horizontal: 802.11n (HT20) (TX 5825MHz)


Vertical: 802.11n (HT20) (TX 5825MHz)

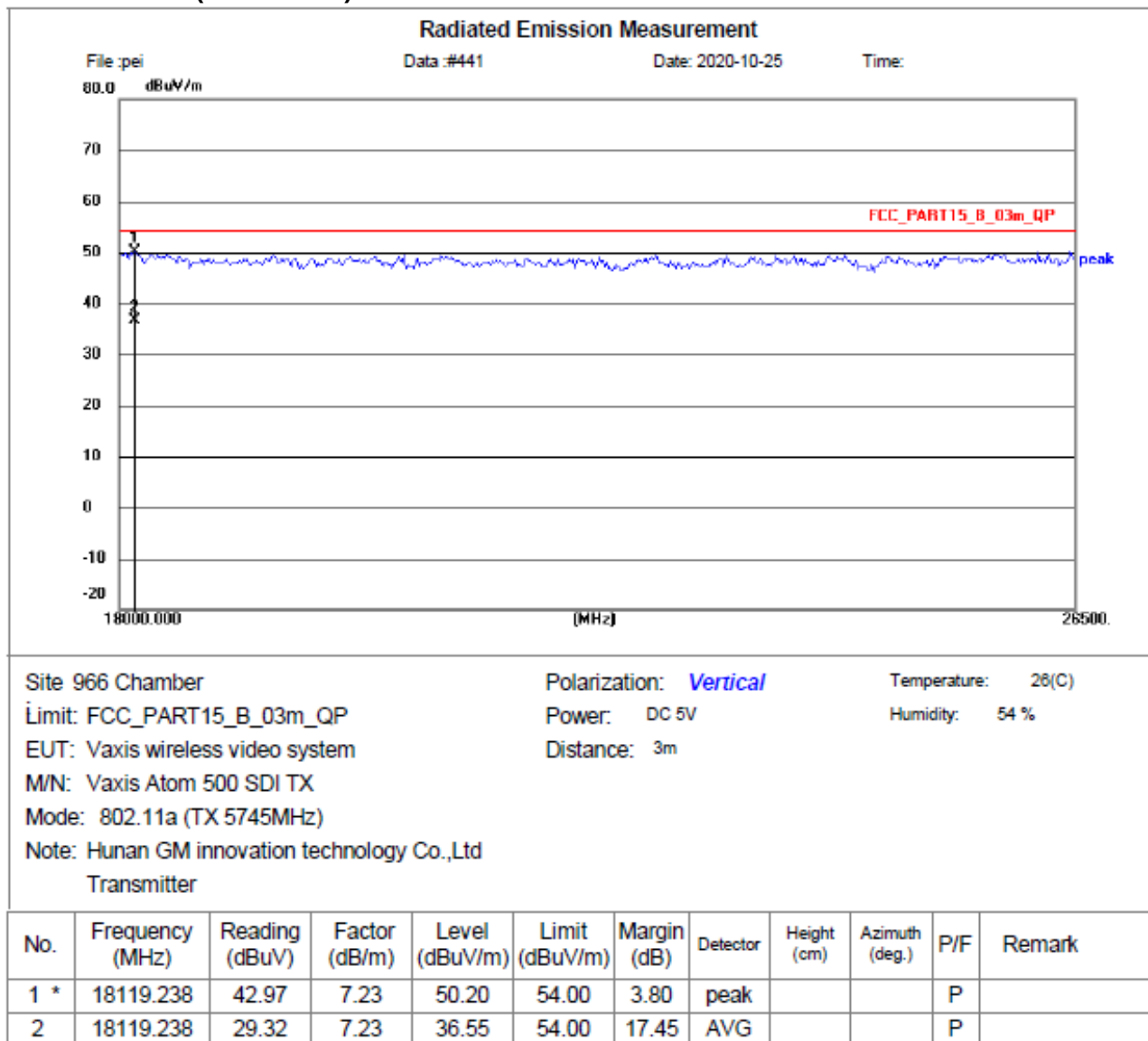


18GHz~ 26.5GHz

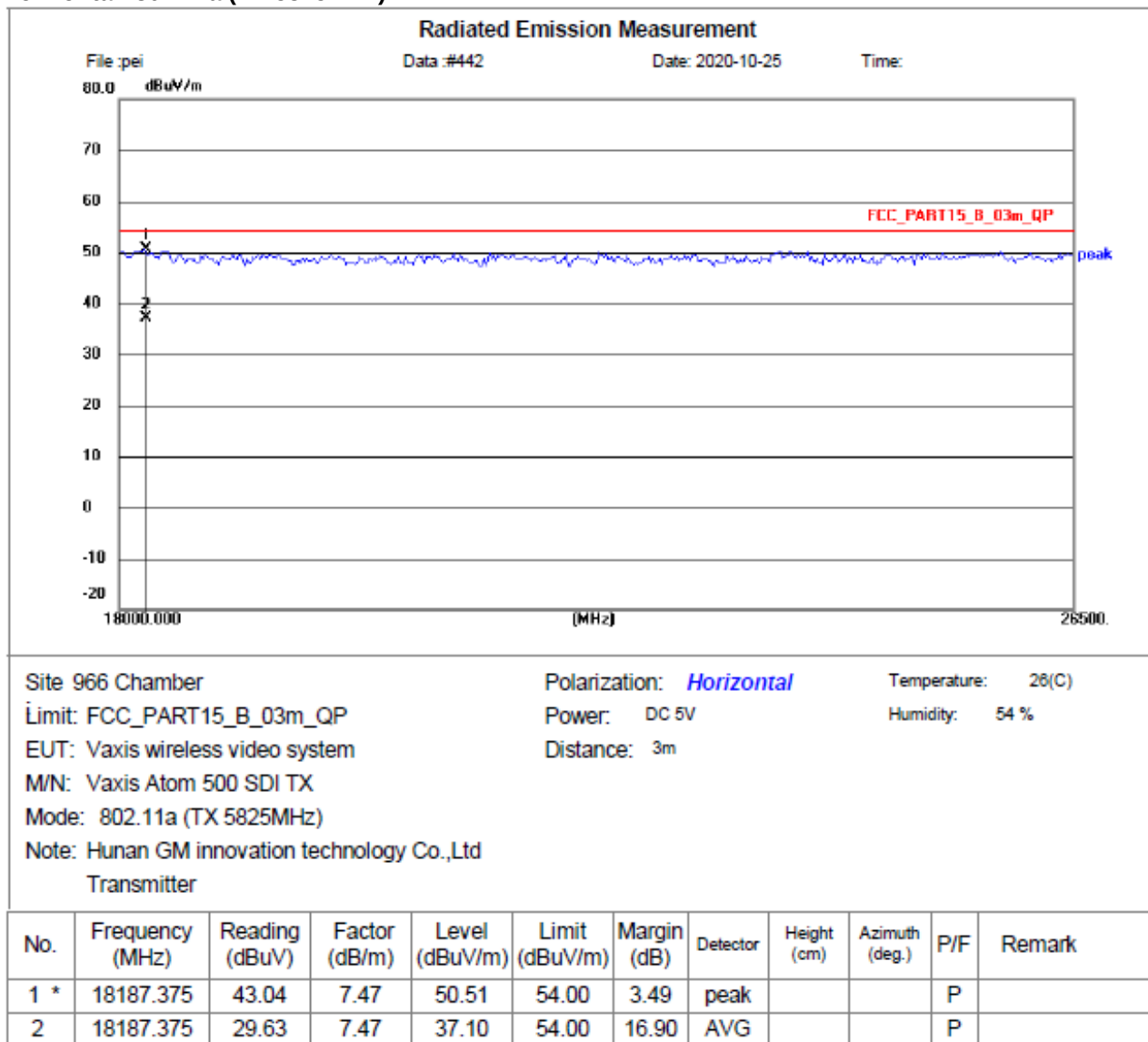
Horizontal: 802.11a (TX 5745MHz)



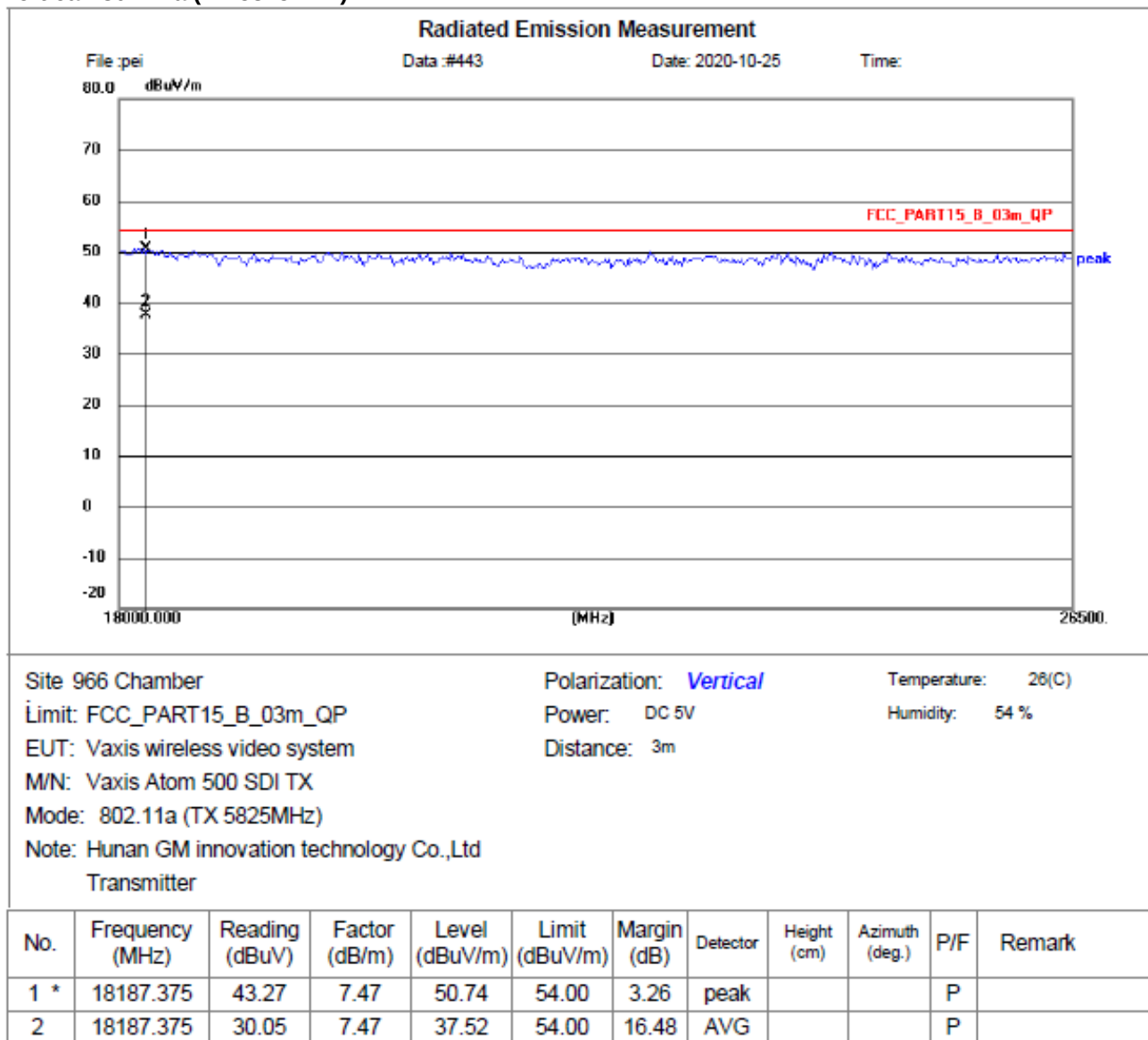
Vertical: 802.11a (TX 5745MHz)



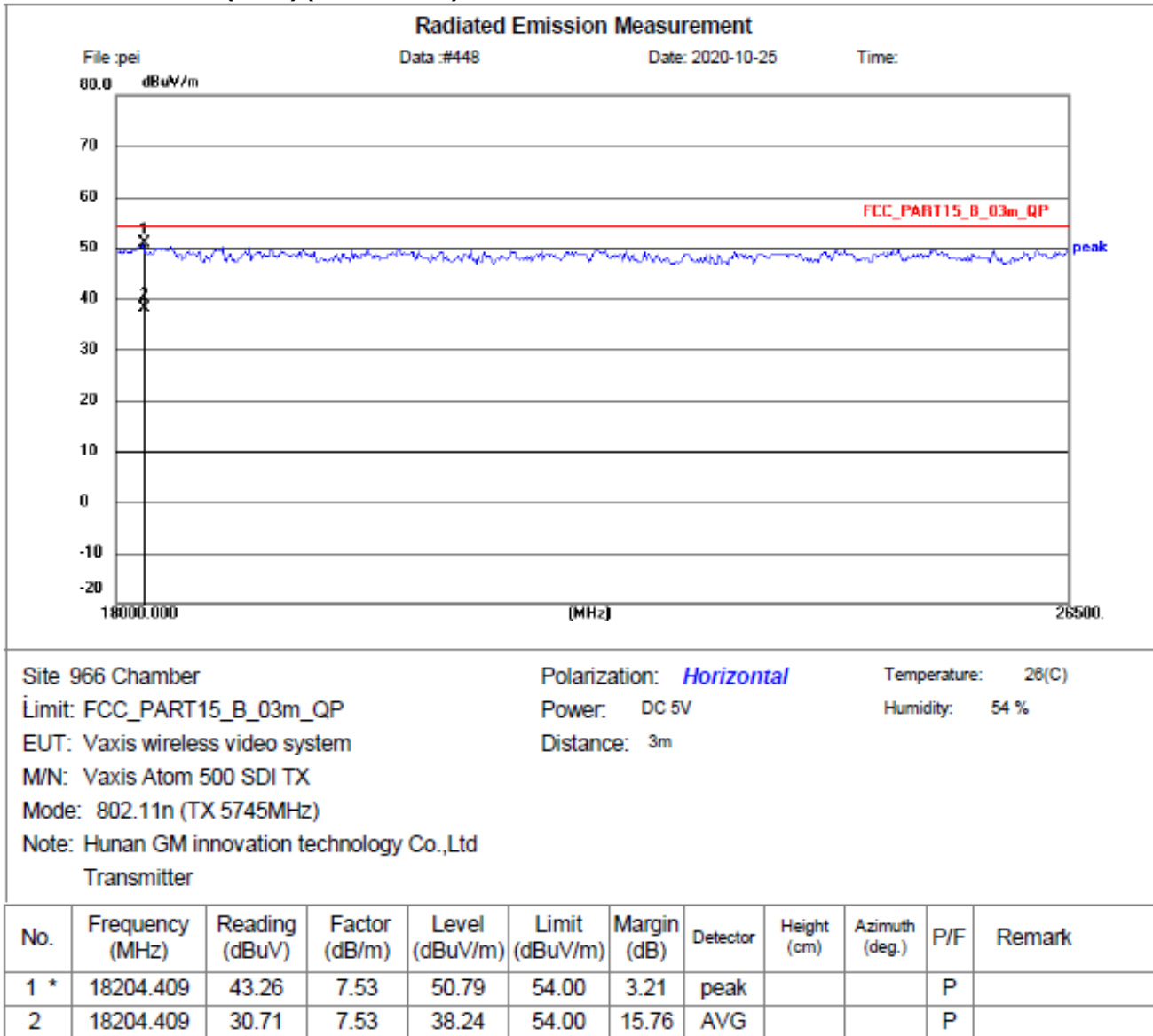
Horizontal: 802.11a (TX 5825MHz)



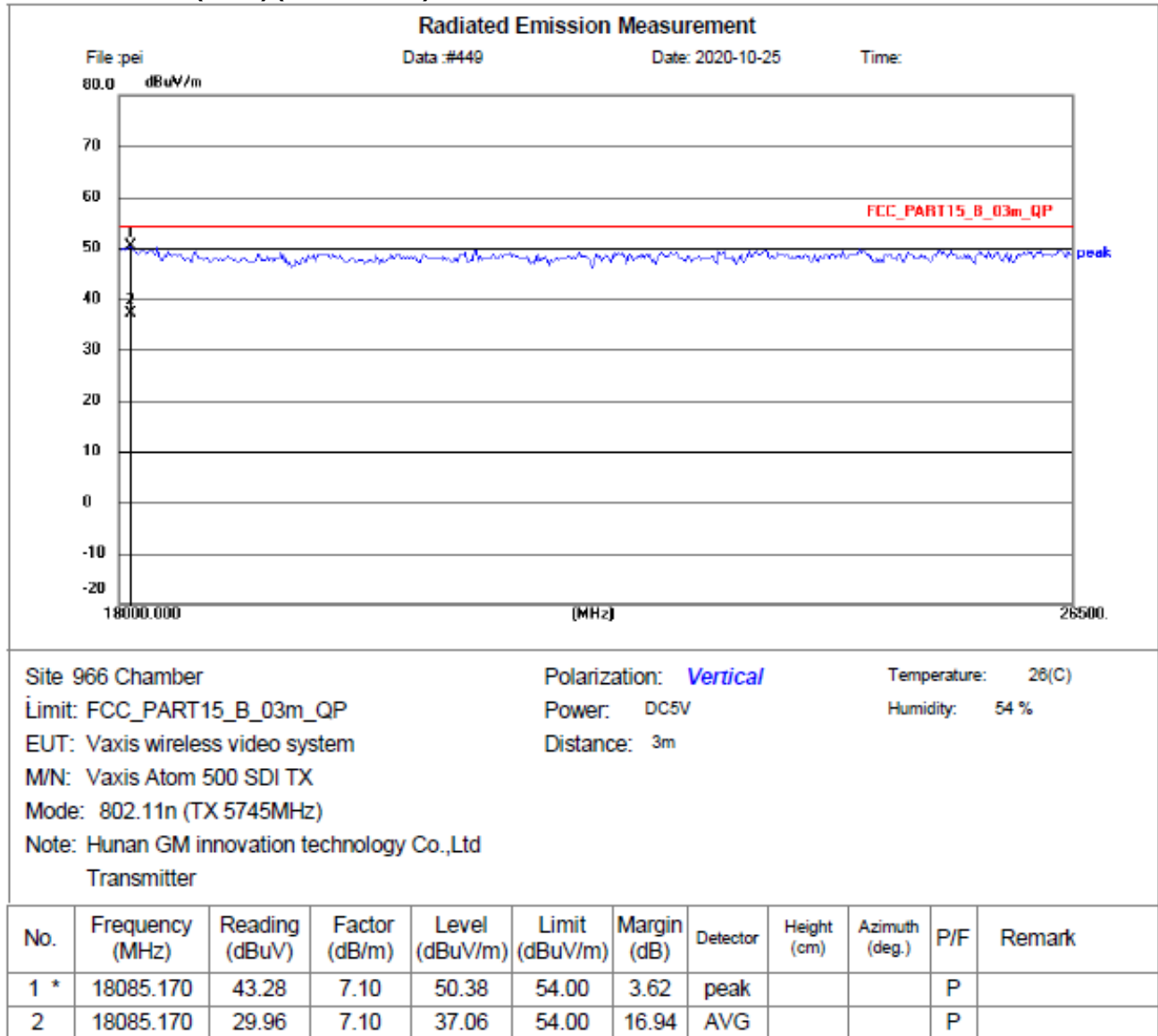
Vertical: 802.11a (TX 5825MHz)



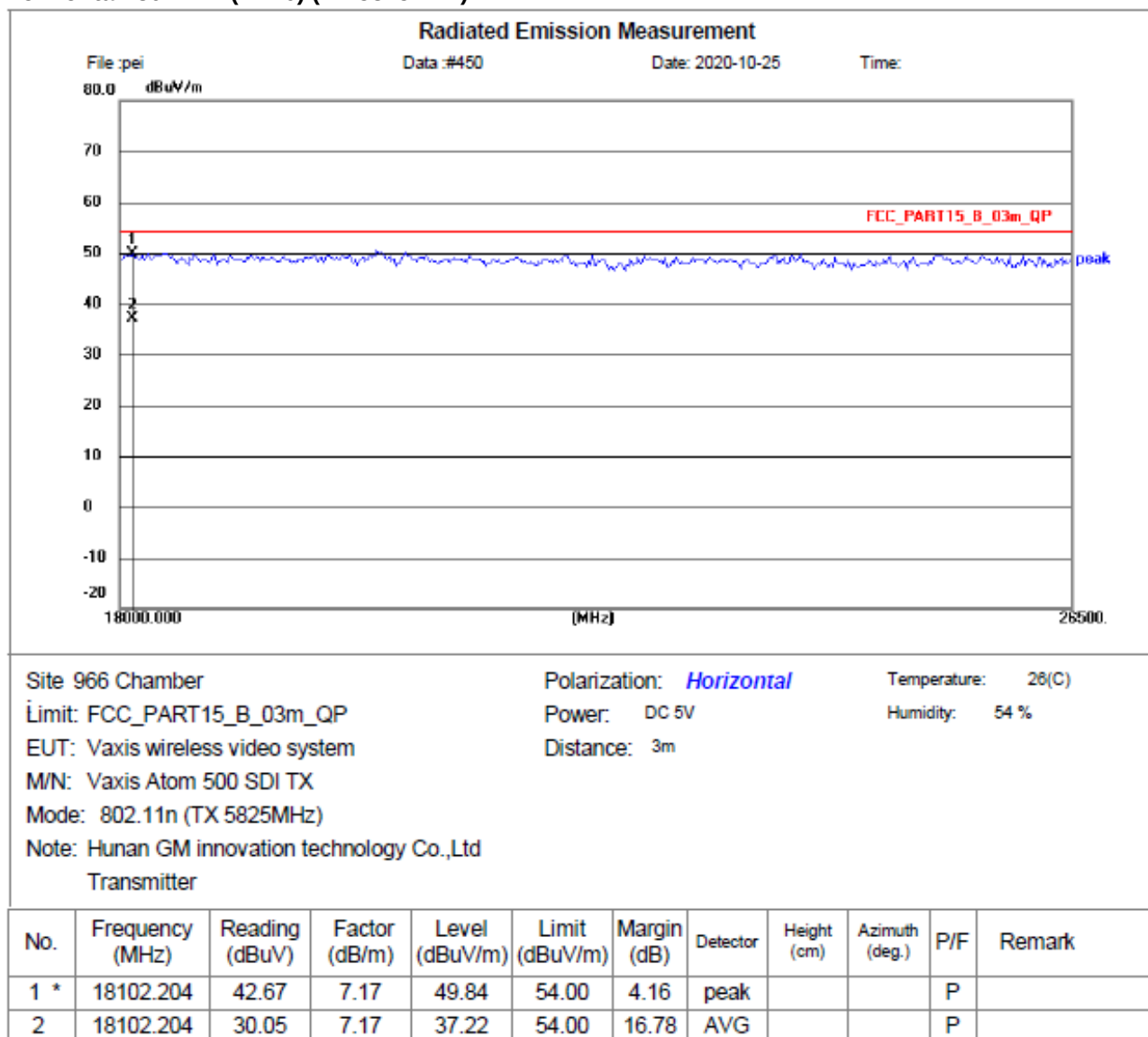
Horizontal: 802.11n (HT20) (TX 5745MHz)



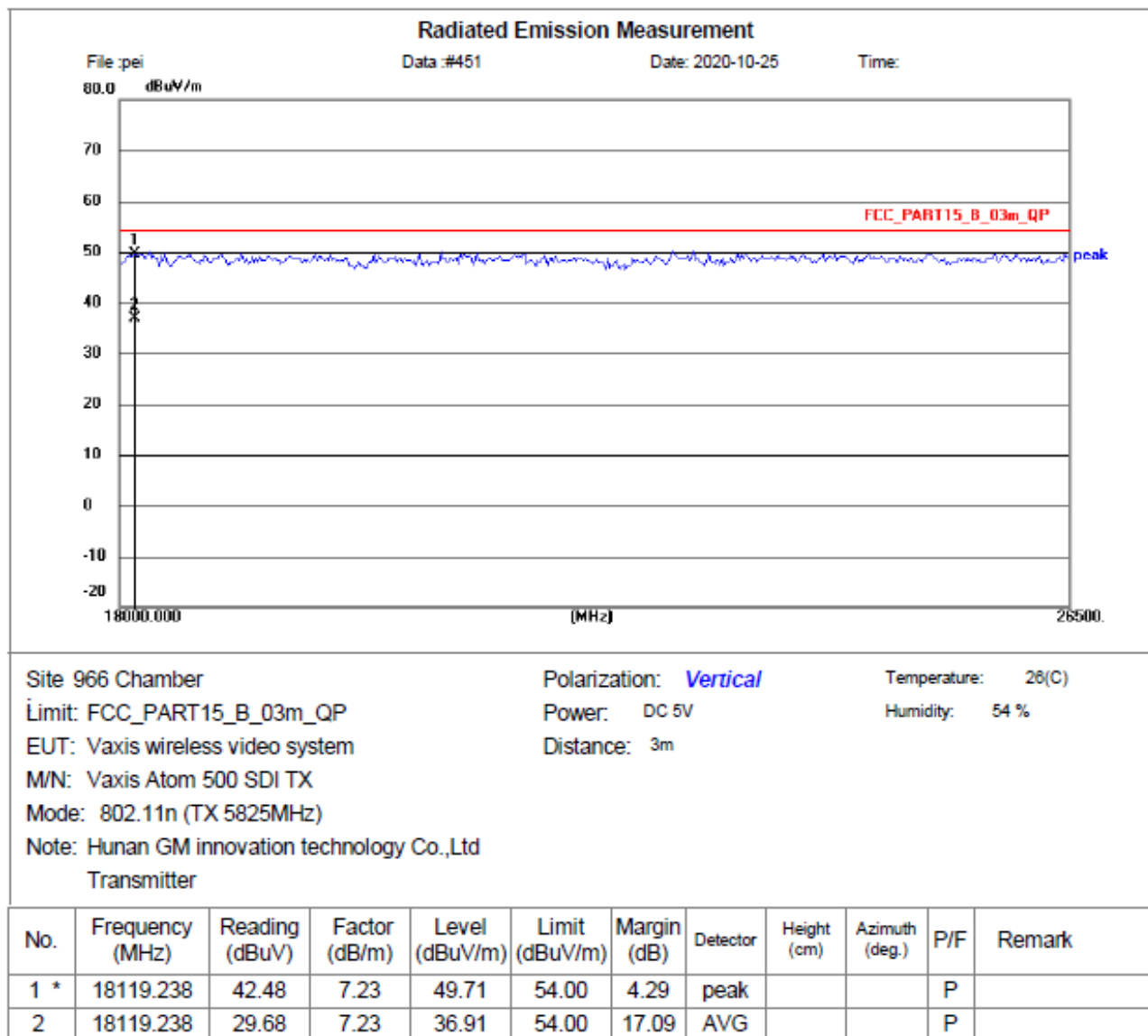
Vertical: 802.11n (HT20) (TX 5745MHz)



Horizontal: 802.11n (HT20) (TX 5825MHz)



Vertical: 802.11n (HT20) (TX 5825MHz)



26.5GHz~ 40GHz

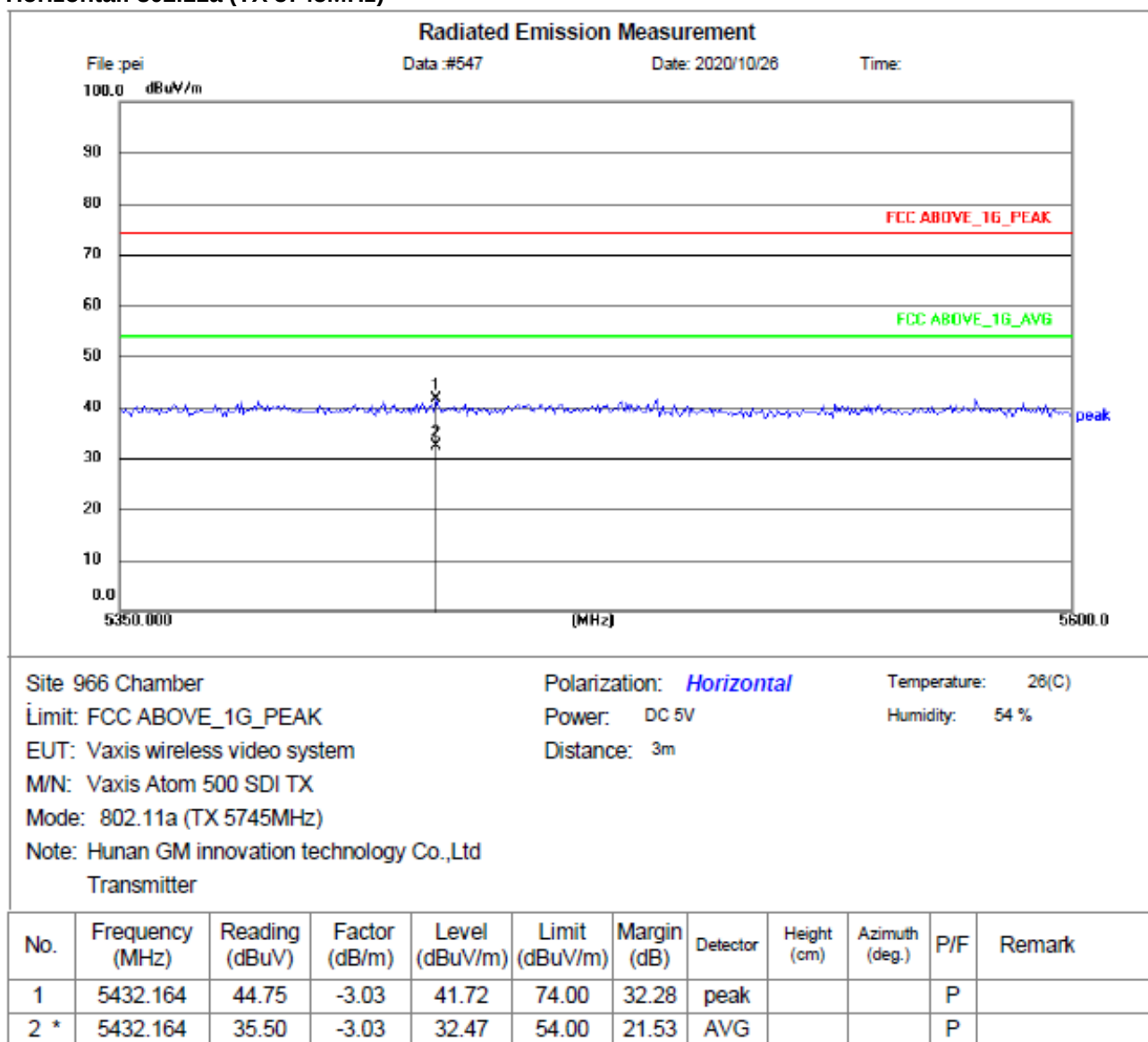
The test trace is same as the ambient noise (the test frequency range: 26.5GHz~40GHz), therefore no data appear in the report.

Notes:

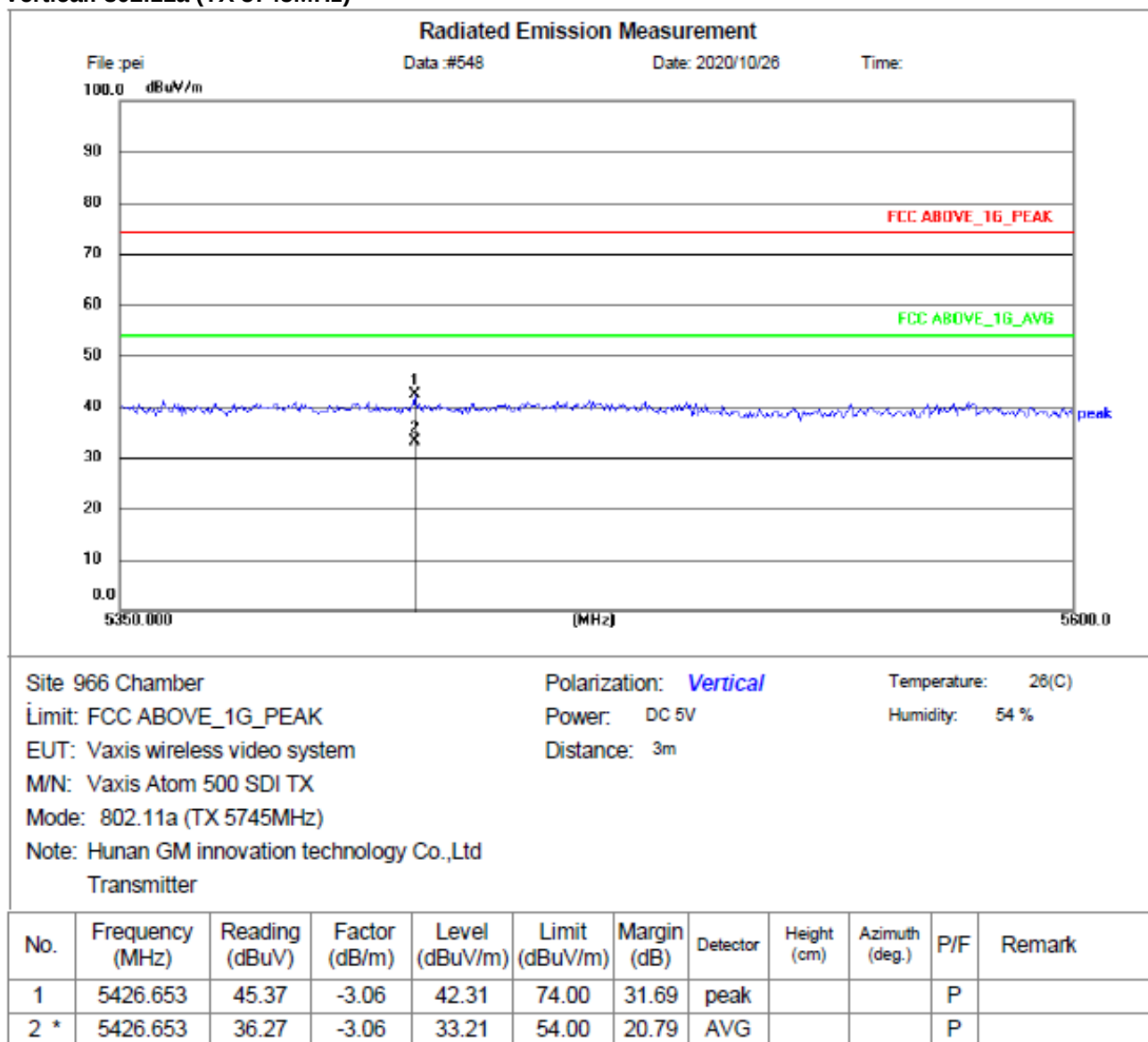
1. Level = Read Level + Antenna Factor+ Cable loss- Preamp Factor.
2. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Spurious Emission in restricted band:

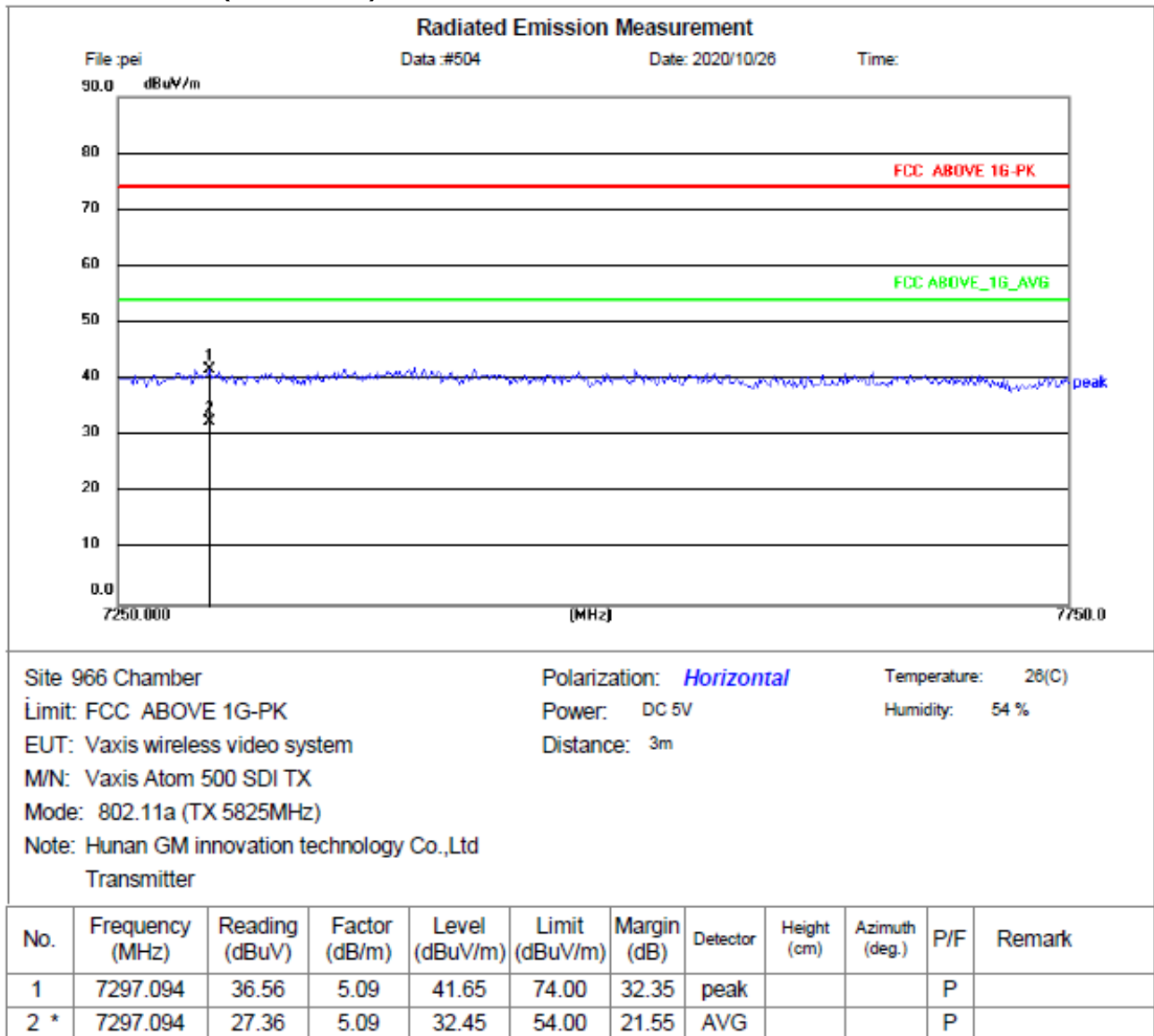
Horizontal: 802.11a (TX 5745MHz)



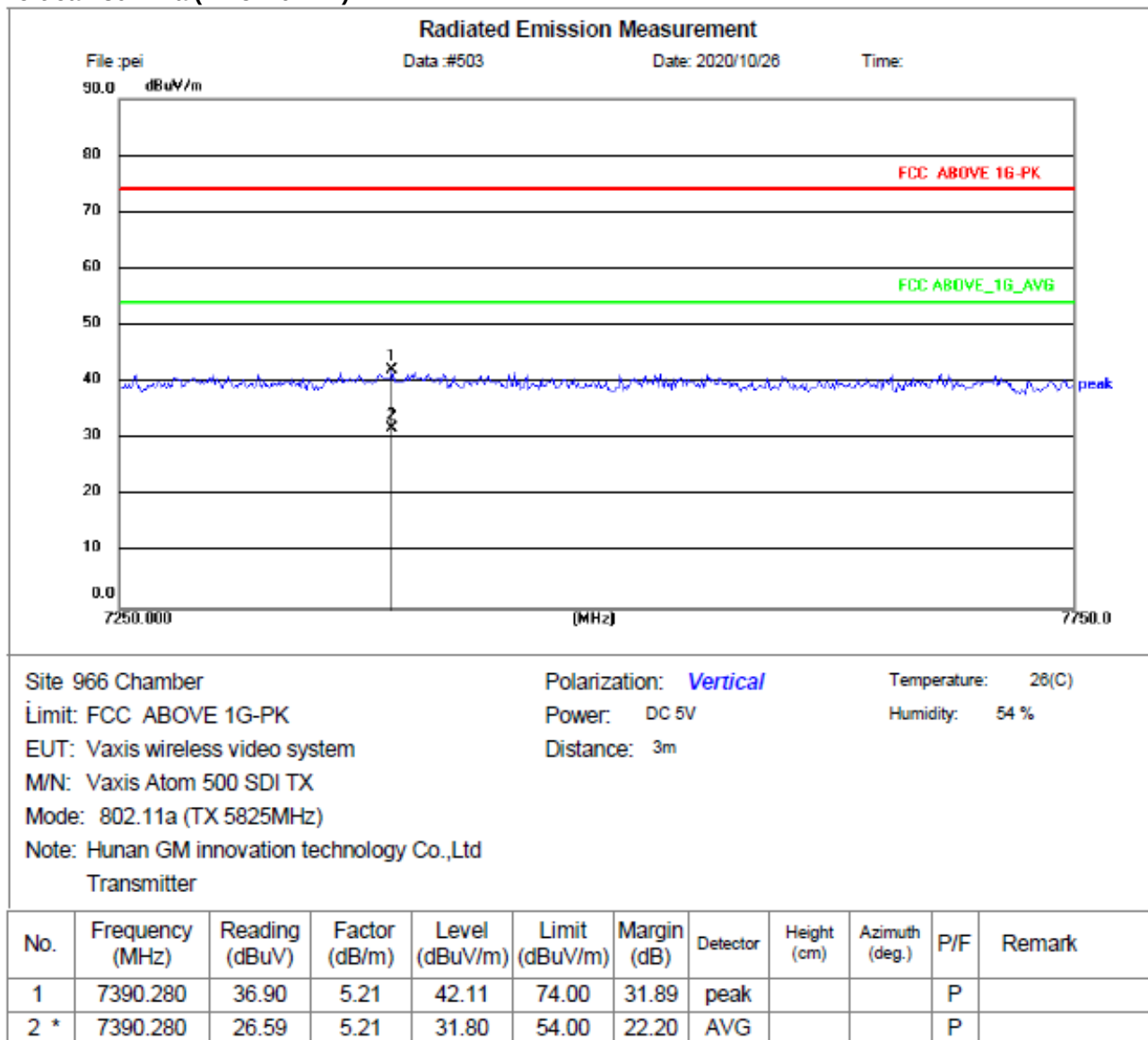
Vertical: 802.11a (TX 5745MHz)



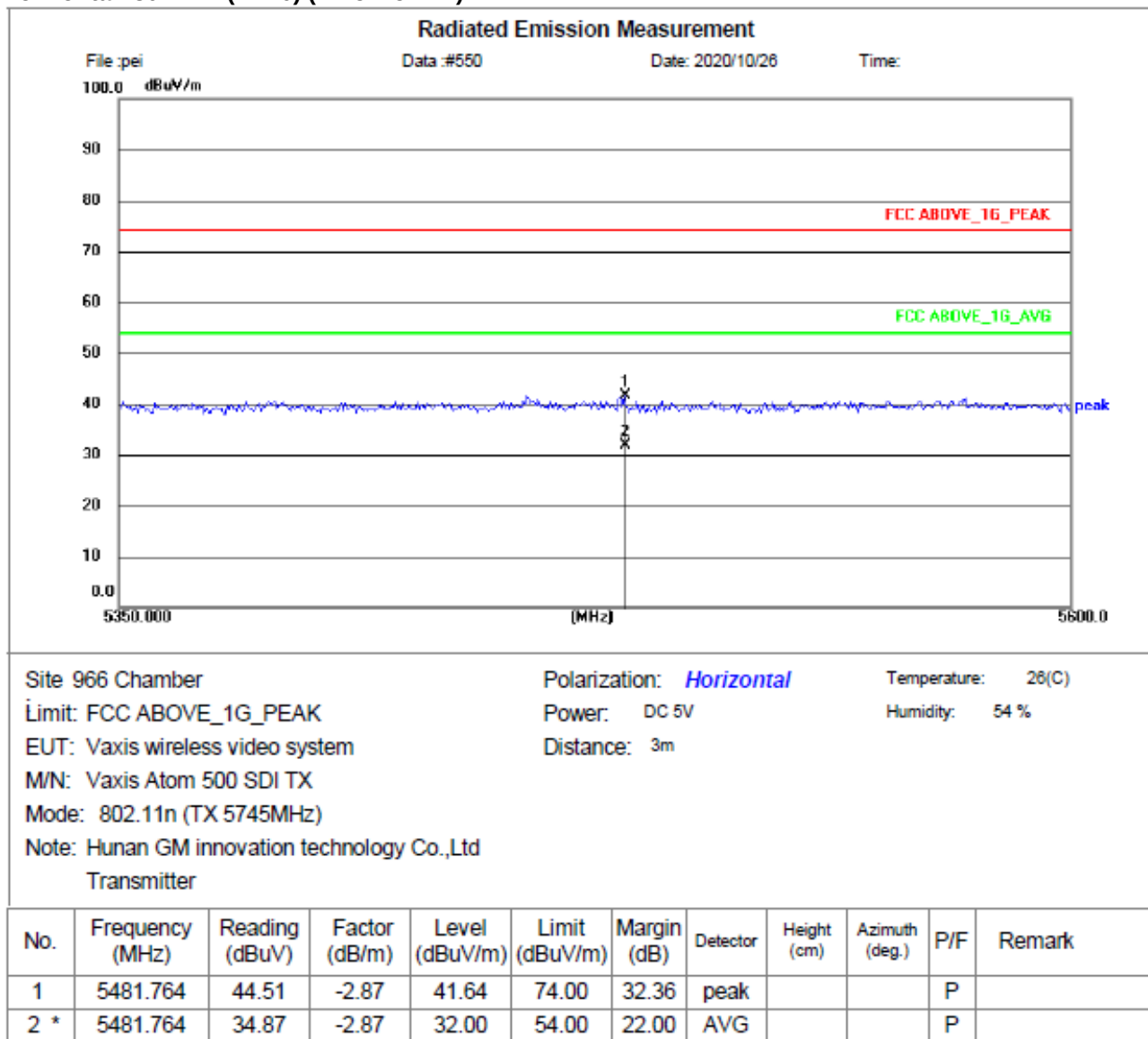
Horizontal: 802.11a (TX 5825MHz)



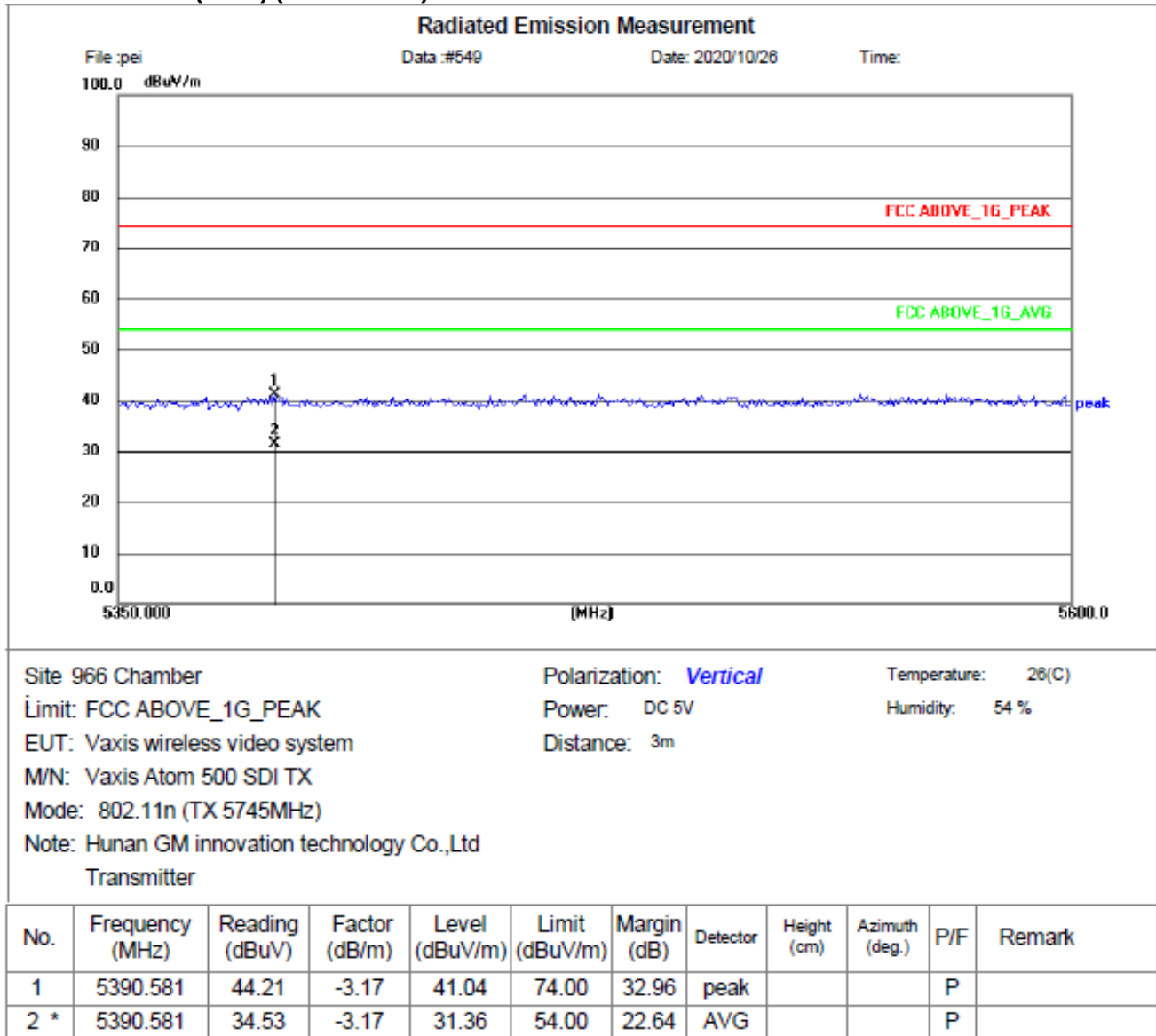
Vertical: 802.11a (TX 5240MHz)



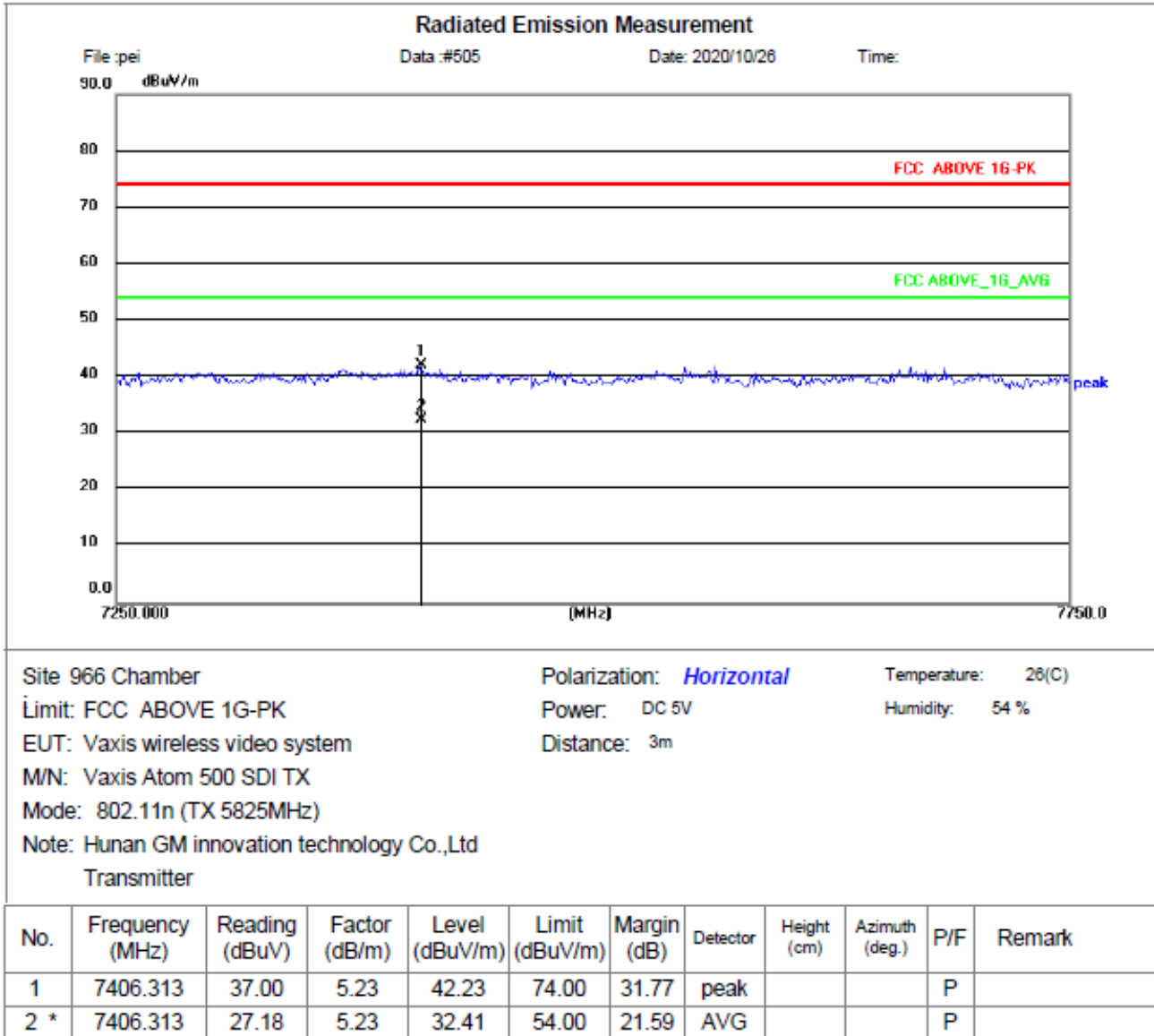
Horizontal: 802.11n (HT20) (TX 5745MHz)

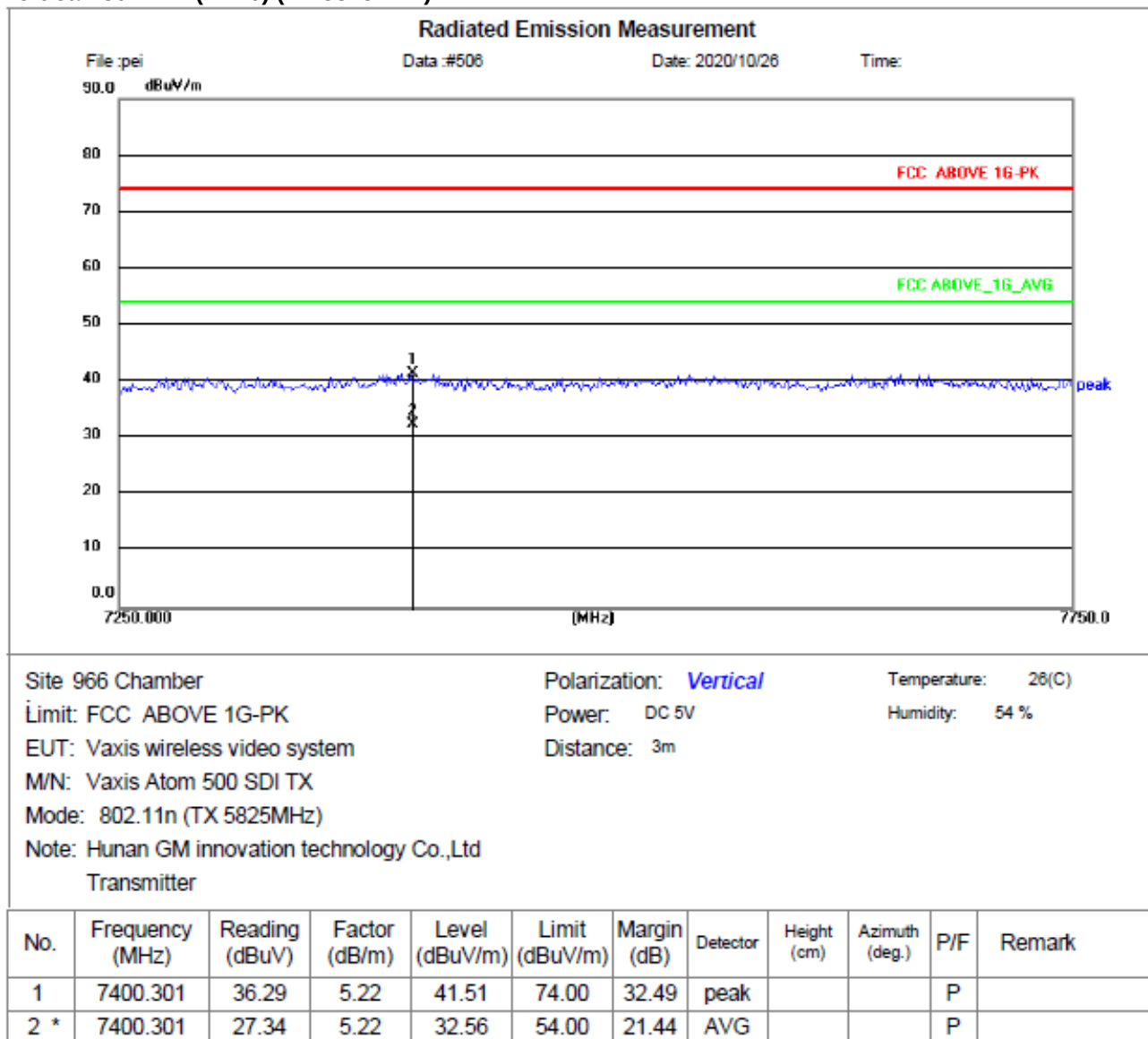


Vertical: 802.11n (HT20) (TX 5745MHz)

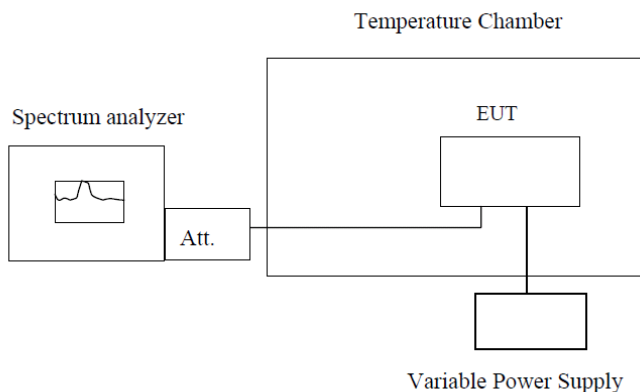


Horizontal: 802.11n (HT20) (TX 5825MHz)



Vertical: 802.11n (HT20) (TX 5825MHz)


7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures 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
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Frequencies Stability test result: 5745MHz

Test Conditions	Measured Frequency(MHz) 5745
V nor(V)	5745.0047
V max(V)	5745.0055
V min(V)	5745.0064
Max. Deviation Frequency	0.0064
Max. Frequency Error (ppm)	1.11

Frequency Error vs. Temperature:

Test Conditions (°C)	Measured Frequency(MHz) 5745
-5	5745.0099
5	5745.0092
15	5745.0054
25	5745.0043
35	5745.0090
45	5745.0072
50	5745.0066
Max. Deviation Frequency	0.0099
Max. Frequency Error (ppm)	1.72

Frequencies Stability test result: 5825MHz

Test Conditions	Measured Frequency(MHz) 5825
V nor(V)	5825.0071
V max(V)	5825.0054
V min(V)	5825.0024
Max. Deviation Frequency	0.0071
Max. Frequency Error (ppm)	1.22

Frequency Error vs. Temperature:

Test Conditions (°C)	Measured Frequency(MHz) 5825
-5	5825.0014
5	5825.0033
15	5825.0082
25	5825.0014
35	5825.0067
45	5825.0051
50	5825.0029
Max. Deviation Frequency	0.0082
Max. Frequency Error (ppm)	1.41

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

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