



FCC RADIO TEST REPORT

Applicant	: IGRS Engineering Lab (Shenzhen) Ltd
Address	: 6F, Block A3, Cyber-tech Zone, Gaoxin Ave. 7th. S. Hi-Tech Industrial Park, Nanshan District, Shenzhen, China
Equipment	: Wireless module
Model No.	: MW50A
Trade Name	: N/A
FCC ID.	: 2A3LP-MW50A
Standard	: FCC part 15 Subpart C §15.247

I HEREBY CERTIFY THAT :

The sample was received on Sept. 27, 2021 and the testing was completed on Oct. 26, 2021 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:



Leevin Li / Supervisor



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History of this test report

☒ Original.

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description
DEF12109065	Oct. 26, 2021	Initial Issue



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	Description of Test	Result
FCC CFR Title 47 Part 15 Subpart C: Section 15.203/15.247 (b)	. Antenna Requirement	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.207	. AC Power Line Conducted Emission	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.205/15.209	. Spurious Emission(Radiated)	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(d)	. Spurious Emission(Conducted)	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(a)(2)	. 6dB Bandwidth	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(b)	. Maximum Peak Output Power	Pass
FCC CFR Title 47 Part 15 Subpart C: Section 15.247(e)	. Power Spectral Density	Pass
Note: Deviations Yes ☐ No ☒ *The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.		



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Equipment	Wireless module
Model Name	MW50A
Model Discrepancy	N/A
Frequency Range	BT/BLE/ WIFI 2.4G: 2400MHz-2483.5MHz WIFI 5G: 5150MHz-5350MHz, 5470-5725MHz, 5725MHz -5850MHz
Modulation Type	BT: GFSK, $\pi/4$ -DQPSK, 8DPSK BLE: GFSK 802.11b: CCK, DQPSK, DBPSK 802.11a/g: 64-QAM, 16-QAM, QPSK, BPSK 802.11n: 64-QAM, 16-QAM, QPSK, BPSK 802.11ac: 256-QAM, 64-QAM, 16-QAM, QPSK, BPSK
Data Rate	BT: GFSK: 1Mbps, $\pi/4$ -DQPSK: 2Mbps, 8DPSK: 3Mbps BLE: GFSK: 1Mbps&2Mbps WIFI 2.4G: 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: HT20 reach up to 144.4Mbps, HT40 reach up to 300Mbps WIFI 5G: 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: HT20 reach up to 144.4Mbps, HT40 reach up to 300Mbps 802.11ac: VHT20 reach up to 173.3Mbps, VHT40 reach up to 400Mbps, VHT80 reach up to 866.7Mbps
Antenna Type	BT/BLE: PIFA Antenna WIFI 2.4G/5G: PIFA Antenna
Operating Voltage	5 V $\pm$ 10%

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20 (2412MHz~2462MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	*11	2462
*06	2437	---	---

802.11n HT40 (2422MHz~2452MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
---	---	07	2442
---	---	08	2447
*03	2422	*09	2452
04	2427	---	---
05	2432	---	---
*06	2437	---	---

Note: Channels remarked * are selected to perform test.



2.3 Test Mode and Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
- The complete test system included Notebook and EUT for RF test.
- An executive program, "REALTEK 11ac 8822CU USB WLAN NIC Massproduction Kit.exe" under Windows 7 system was executed to transmit and receive data via WLAN.
- The following test modes were performed for the test:

Conducted Emissions from the AC mains power ports / Radiation Emissions (30MHz ~ 1GHz)	
Test Mode	Operating Description
1	802.11b (1Mbps) for AC 120V
2	802.11g (6Mbps) for AC 120V
3	802.11n HT20 (6.5Mbps) for AC 120V
4	802.11n HT40 (13.5Mbps) for AC 120V
5	802.11g (6Mbps) for AC 240V
caused "Test Mode 2 at CH11:2462" generated the worst case, it was reported as the final data.	
Radiated emission (below 1GHz)	
Test Mode	Operating Description
1	802.11b (1Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
4	802.11n HT40 (13.5Mbps)
caused "Test Mode 2 at CH11:2462" generated the worst case, it was reported as the final data.	
Radiated emission (above 1GHz)	
1	802.11b (1Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
4	802.11n HT40 (13.5Mbps)
caused "Test Mode 1~4" generated the worst case, it was reported as the final data.	

Modulation Type	TX CONFIGURATION
802.11b	2TX
802.11g	2TX
802.11n HT20	2TX
802.11n HT40	2TX



2.4 Power Parameter Value of the test software

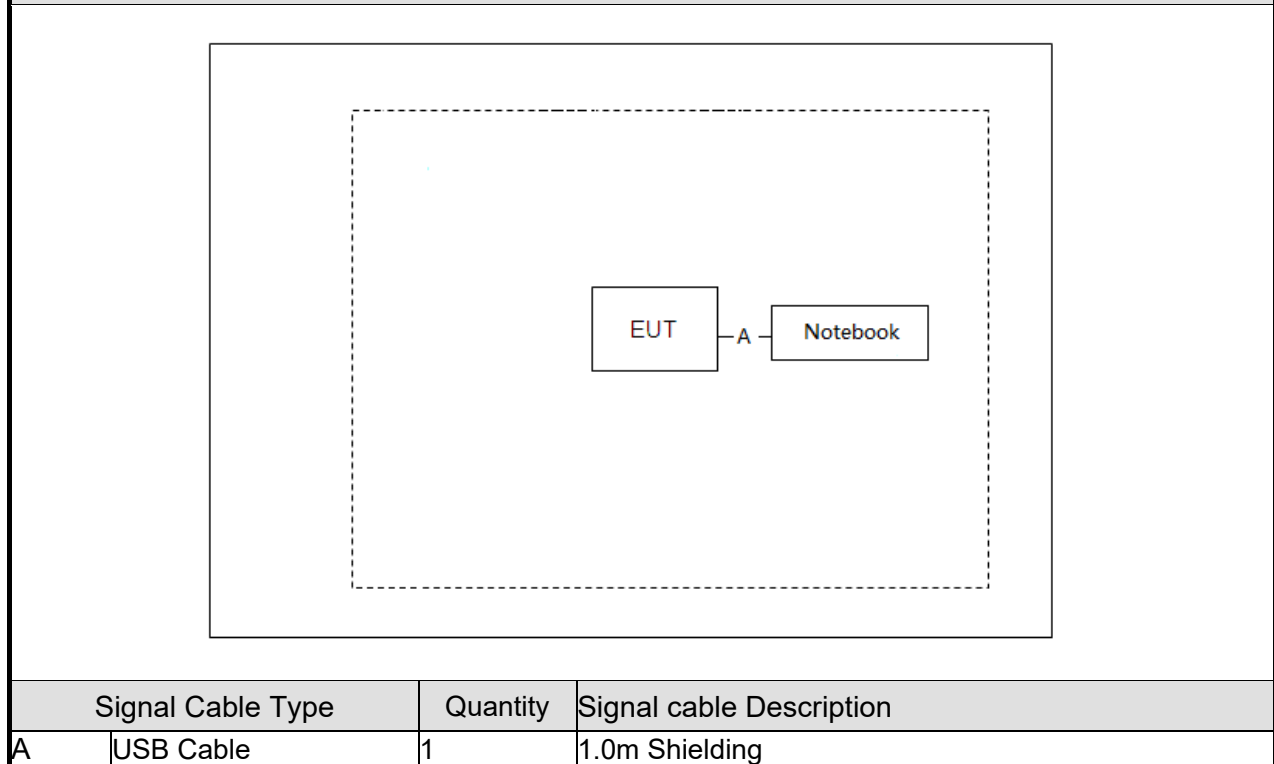
Mode	Frequency (MHz)	Power Setting			
		Ant 1	Ant 2	Ant 1+2	
				Ant 1	Ant 2
802.11b	2412	N/A	N/A	Default	Default
	2437	N/A	N/A	Default	Default
	2462	N/A	N/A	Default	Default
802.11g	2412	N/A	N/A	Default	Default
	2437	N/A	N/A	Default	Default
	2462	N/A	N/A	Default	Default
802.11n (20MHz)	2412	N/A	N/A	Default	Default
	2437	N/A	N/A	Default	Default
	2462	N/A	N/A	Default	Default
802.11n (40MHz)	2422	N/A	N/A	Default	Default
	2437	N/A	N/A	Default	Default
	2452	N/A	N/A	Default	Default



2.5 Description of Test System

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Notebook	SONY	PCG-71811P	N/A	Non-Shielded, 1.8m

Connection Diagram





2.6 General Information of Test

Test Site	CerpPASS Technology Corporation(CerpPASS Laboratory) Address: Room 102, No. 5, Xing'an Road, Chang'an Town, Dongguan City, Guangdong Province Tel: +86-769-8547-1212 Fax: +86-769-8547-1912
FCC Designation No.:	CN1288
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25,000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

Test Item	Test Site	Test period	Environmental Conditions	Tested By
RF Conducted	RFCON01-DG	2021/09/27~2021/10/26	22~26°C / 50~60%	Amos Zhang
Radiated Emissions	3M02-DG	2021/09/27~2021/10/26	22~26°C / 50~60%	Amos Zhang
AC Power Line Conducted Emission	CON01-DG	2021/09/27~2021/10/26	22~26°C / 50~60%	Amos Zhang

2.7 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 Item	Uncertainty
AC Power Line Conduction(150K~30MHz)	±2.88dB
Radiated Spurious Emission(9KHz~30MHz)	±2.15dB
Radiated Spurious Emission(30MHz~1GHz)	±4.95dB
Radiated Spurious Emission(1GHz~18GHz)	±3.24dB
Radiated Spurious Emission(18GHz~40GHz)	±5.43dB
6dB Bandwidth&26dB Bandwidth	±4.422%
Occupied Bandwidth	±4.244%
Peak Output Power(Conducted Power Meter)	±1.4 dB
Power Spectral Density	±1.387 dB
Frequency Stability	±0.6338Hz



3. Test Equipment and Ancillaries Used for Tests

AC Power Line Conducted Emission					
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100564	2021.01.07	2022.01.06
LISN	SCHWARZBECK	NSLK 8127	8127748	2021.01.07	2022.01.06
LISN	SCHWARZBECK	NSLK 8127	8127749	2021.01.07	2022.01.06
ISN	TESEQ	ISN T800	42809	2021.05.10	2022.05.09
Pulse Limiter with 10dB Attenuation	SCHWARZBECK	VTSD 9561-F	9561-F106	2021.01.07	2022.01.06
Temperature/ Humidity Meter	GEMLEAD	STH200A	N/A	2021.08.17	2022.08.16

Radiated Emissions					
Test Site	3M02-DG				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Test Receiver	R&S	ESCI	100563	2021.05.14	2022.05.13
H64 Preamplifier	HP	8447F	3113A05582	2021.01.07	2022.01.06
Loop Antenna	R&S	HFH2-Z2	100150	2020.06.08	2022.06.07
Bilog Antenna	Sunol Science	JB1	A072414-1	2020.11.25	2022.11.24
Preamplifier	EMEC	EM01G18G	060739	2021.06.29	2022.06.28
Preamplifier	COM-POWER	PA-840	711885	2021.05.14	2022.05.13
Horn Antenna	Sunol	DRH-118	A072913	2021.08.22	2023.08.21
Standard Gain Horn Antenna	TRC	HA-2640	18050	2020.06.08	2022.06.07
Standard Gain Horn Antenna	TRC	HA-1726	18051	2020.06.08	2022.06.07
FSQ Signal Analyzer	R&S	FSQ40	200012	2021.05.14	2022.05.13
Temperature/ Humidity Meter	GEMLEAD	STH200A	N/A	2021.08.17	2022.08.16

Test Item	RF Conducted				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
MXA Signal Analyzer	KEYSIGHT	N9020A	US46220290	2021.05.14	2022.05.13
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY45092582	2021.05.14	2022.05.13
MXG VECTOR SIGNAL GENERATOR	Agilent	N5182B	MY53050127	2021.05.14	2022.05.13
USB Wideband Power Sensor	Boonton	55006	9778	2021.01.07	2022.01.06
Temperature/ Humidity Meter	mingle	ETH529	N/A	2021.01.07	2022.01.06



4. Antenna Requirements

4.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Antenna Construction and Directional Gain

WIFI 2.4G:

Antenna Type	PIFA Antenna
Antenna Gain	Antenna A: 4.6dBi Antenna B: 4.1dBi

(Non-Beamforming)

2412-2462MHz

For Power directional gain= G_{ant} = 4.6 dBi

For PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / NANT]$
= 7.36(dBi)



5. Test of AC Power Line Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 6.2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

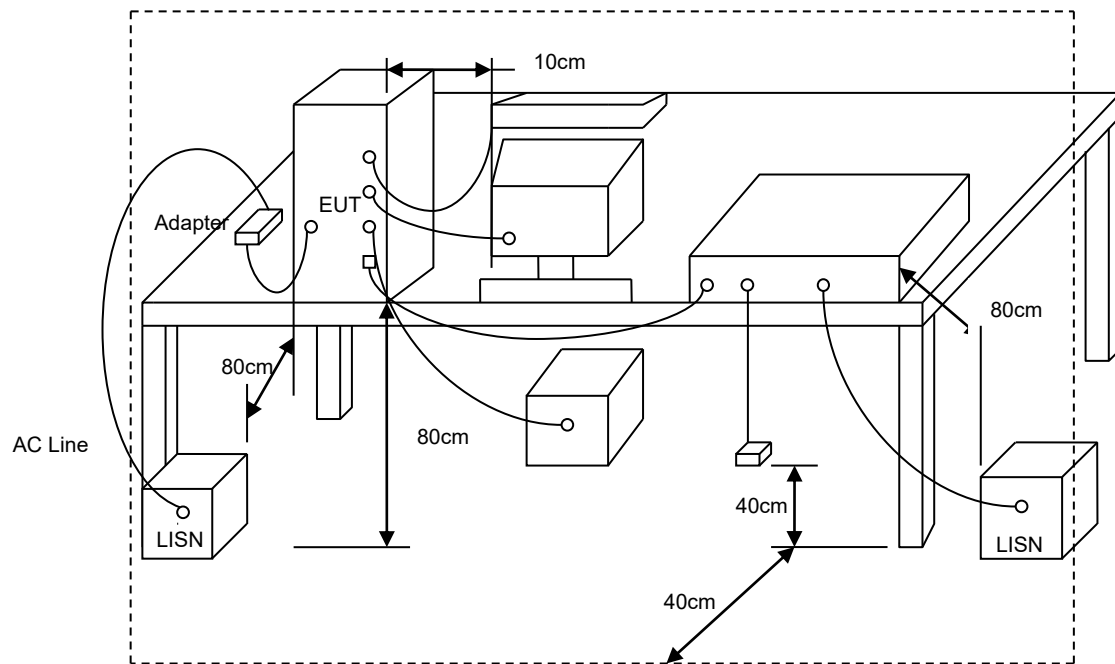
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of Oct 2014 KDB558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

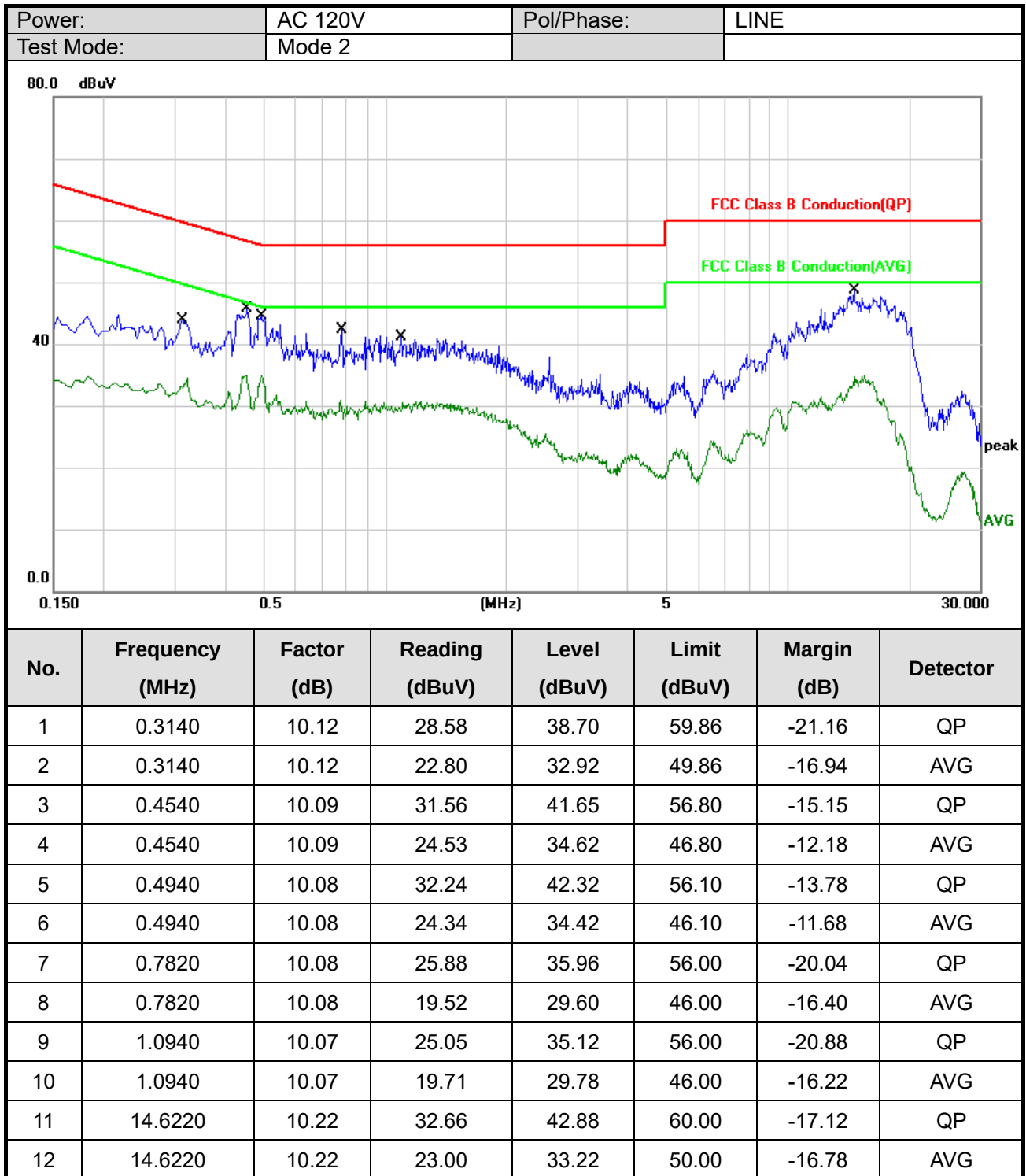


5.3 Typical Test Setup

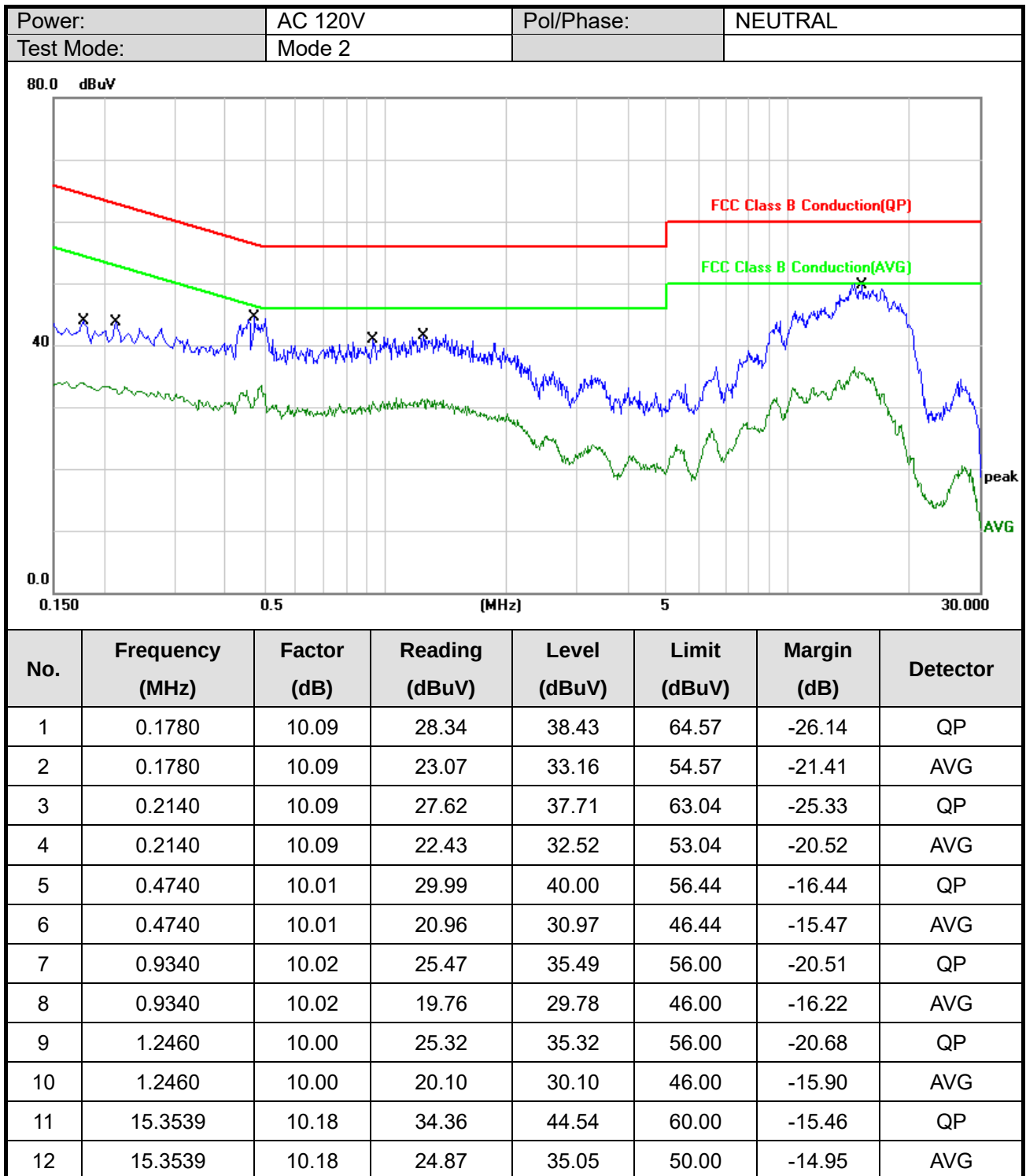




5.4 Test Result and Data



Note: Level = Reading + Factor
Margin = Level – Limit



Note: Level = Reading + Factor
Margin = Level – Limit



6. Test of Spurious Emission (Radiated)

6.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

FREQUENCIES(MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE(meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

6.2 Test Procedures

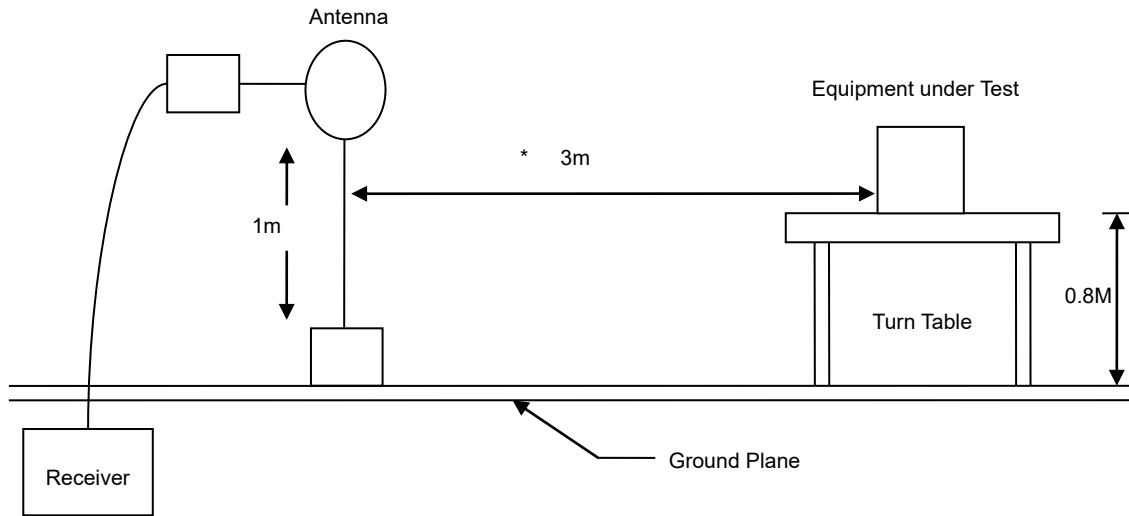
- The EUT was placed on a rotatable table top 0.8 meter for frequency below 1GHz and 1.5meter for frequency above 1GHz above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than AVG limit (that means the emission level in peak mode also complies with the limit in AVG mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in AVG mode again and reported.
- "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.
Note: The supporting fixture shall permit orientation of the EUT in each of three orthogonal axis positions sch that emissions from the EUT are maximized.

(X-AXIS is the worst.)

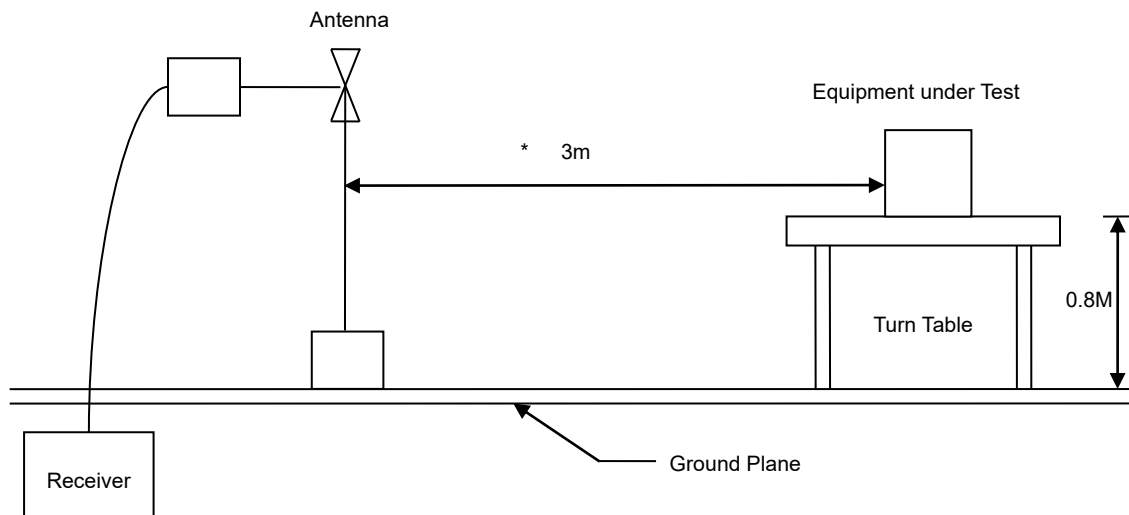


6.3 Typical Test Setup

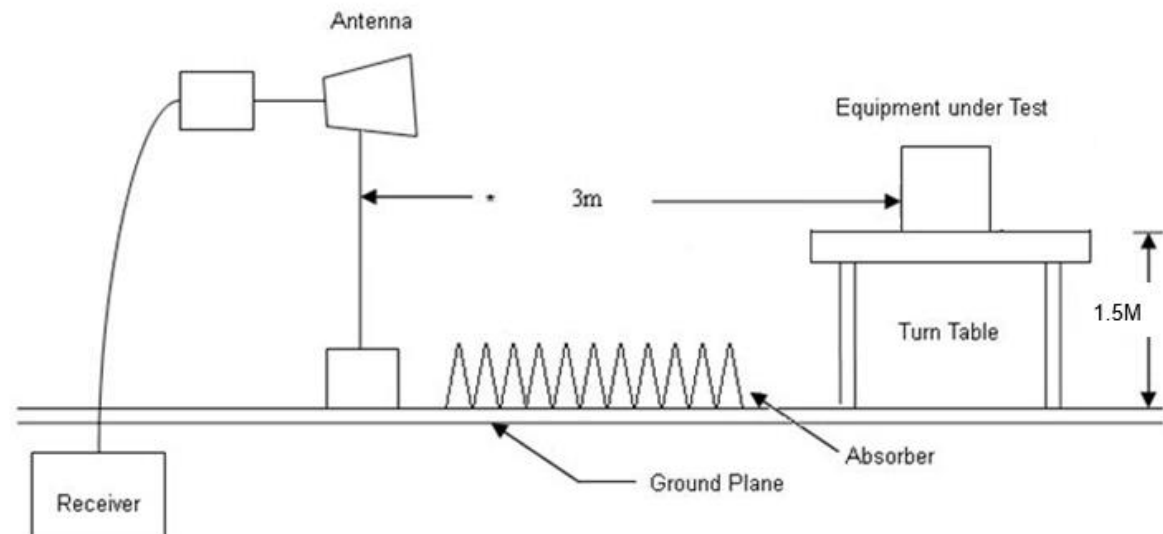
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

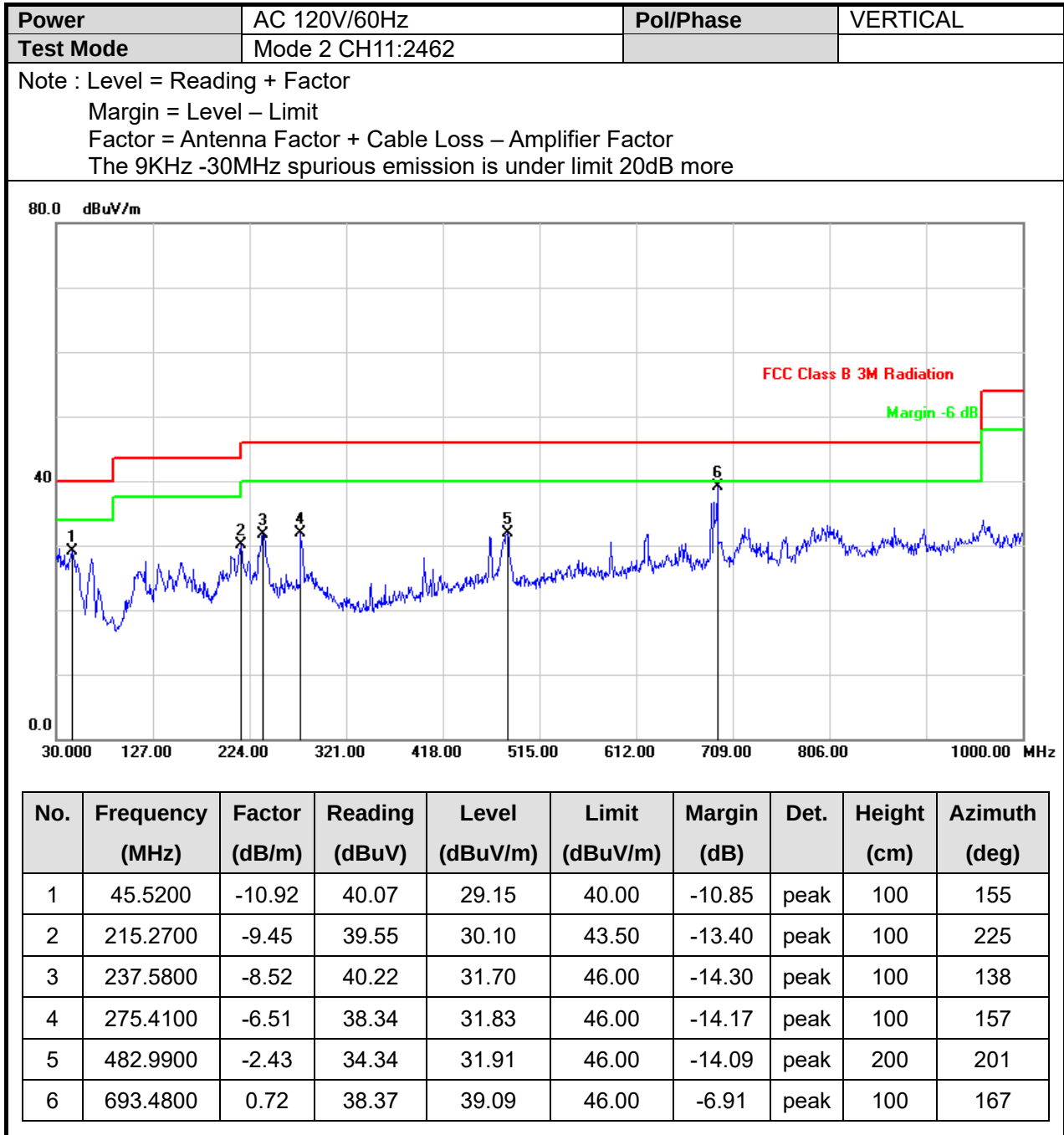


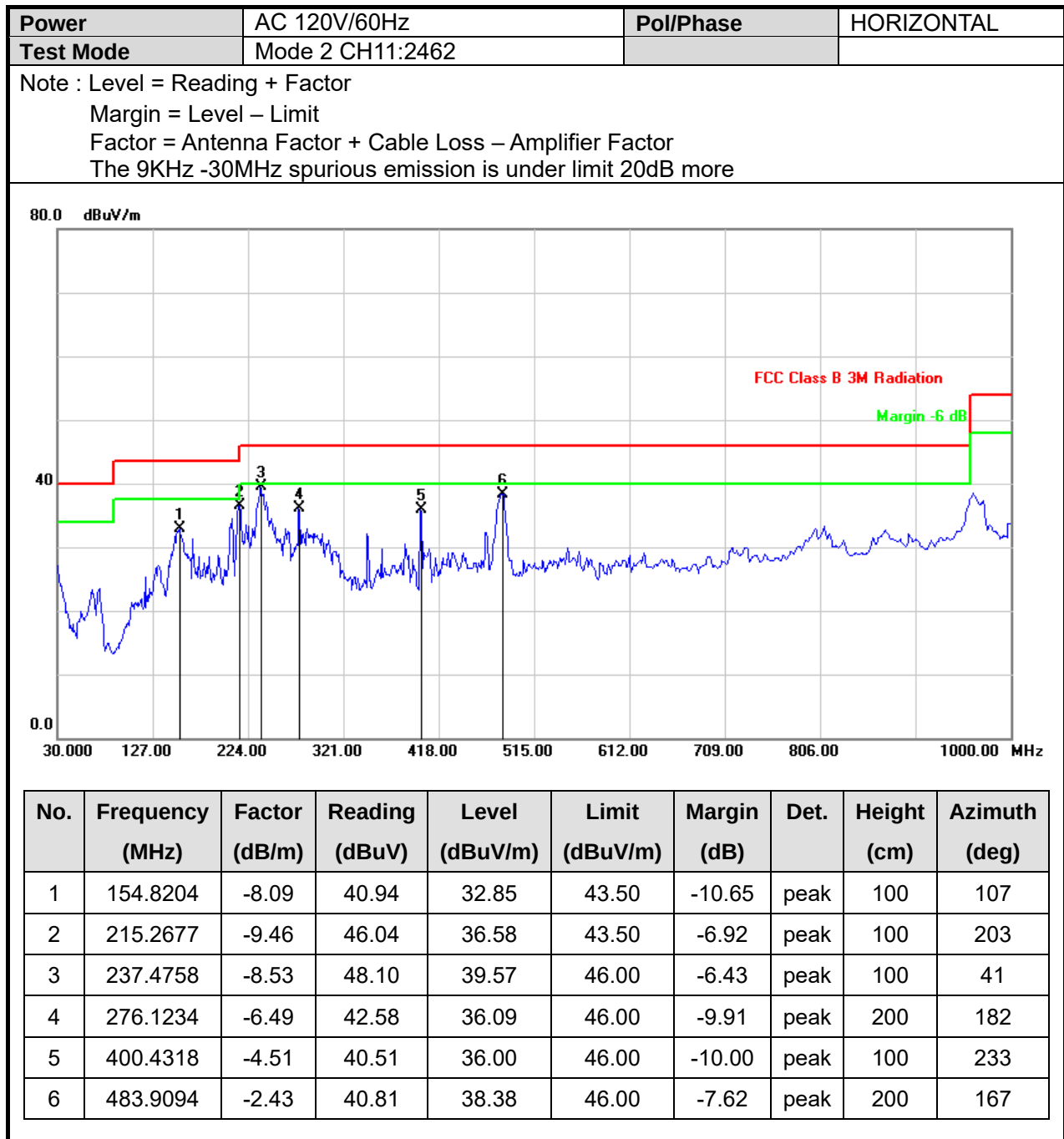


6.4 Test Result and Data (9KHz ~ 30MHz)

The 9kHz-30MHz spurious emission is under limit 20dB more.

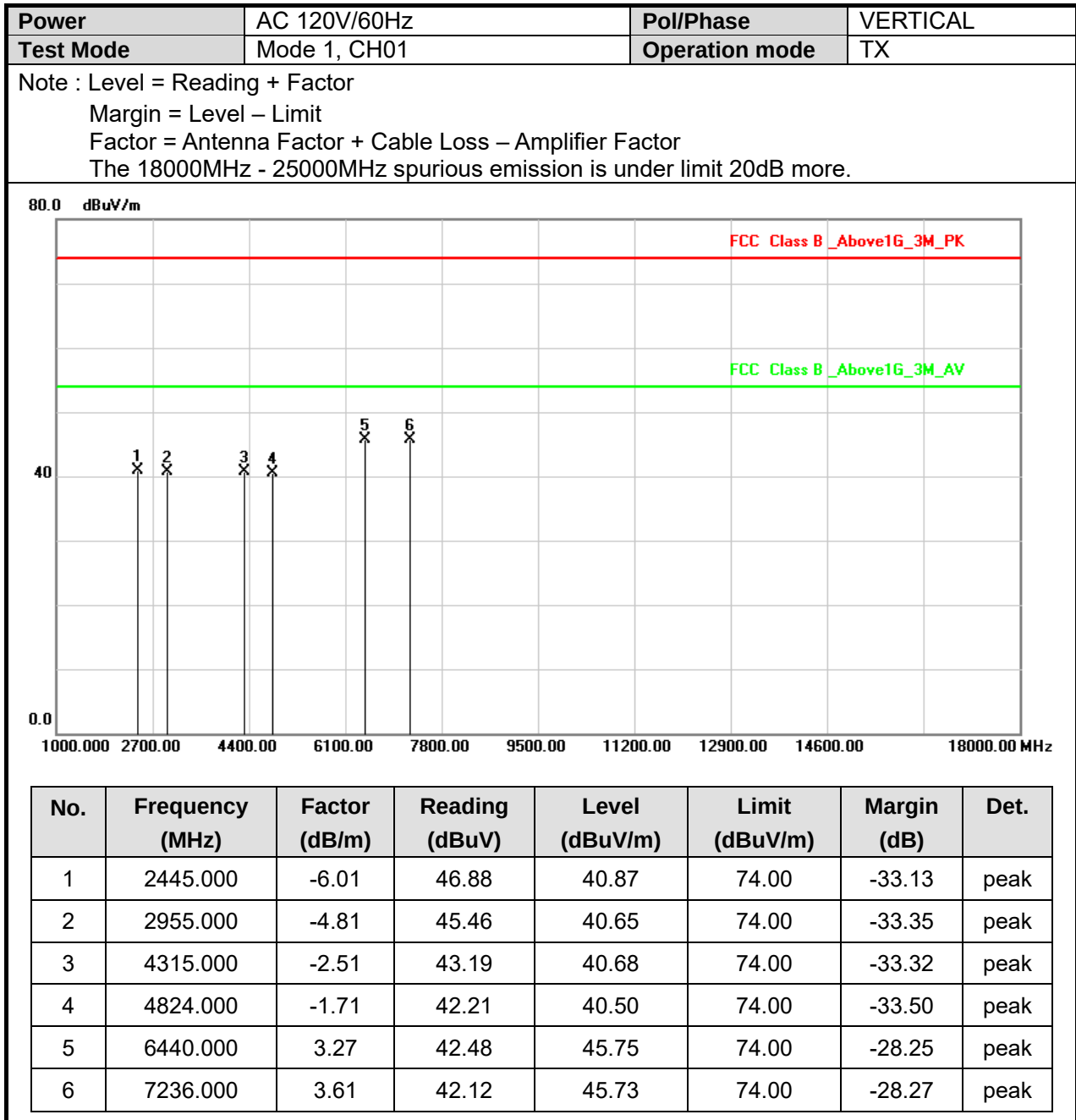
6.5 Test Result and Data (30MHz ~ 1GHz)

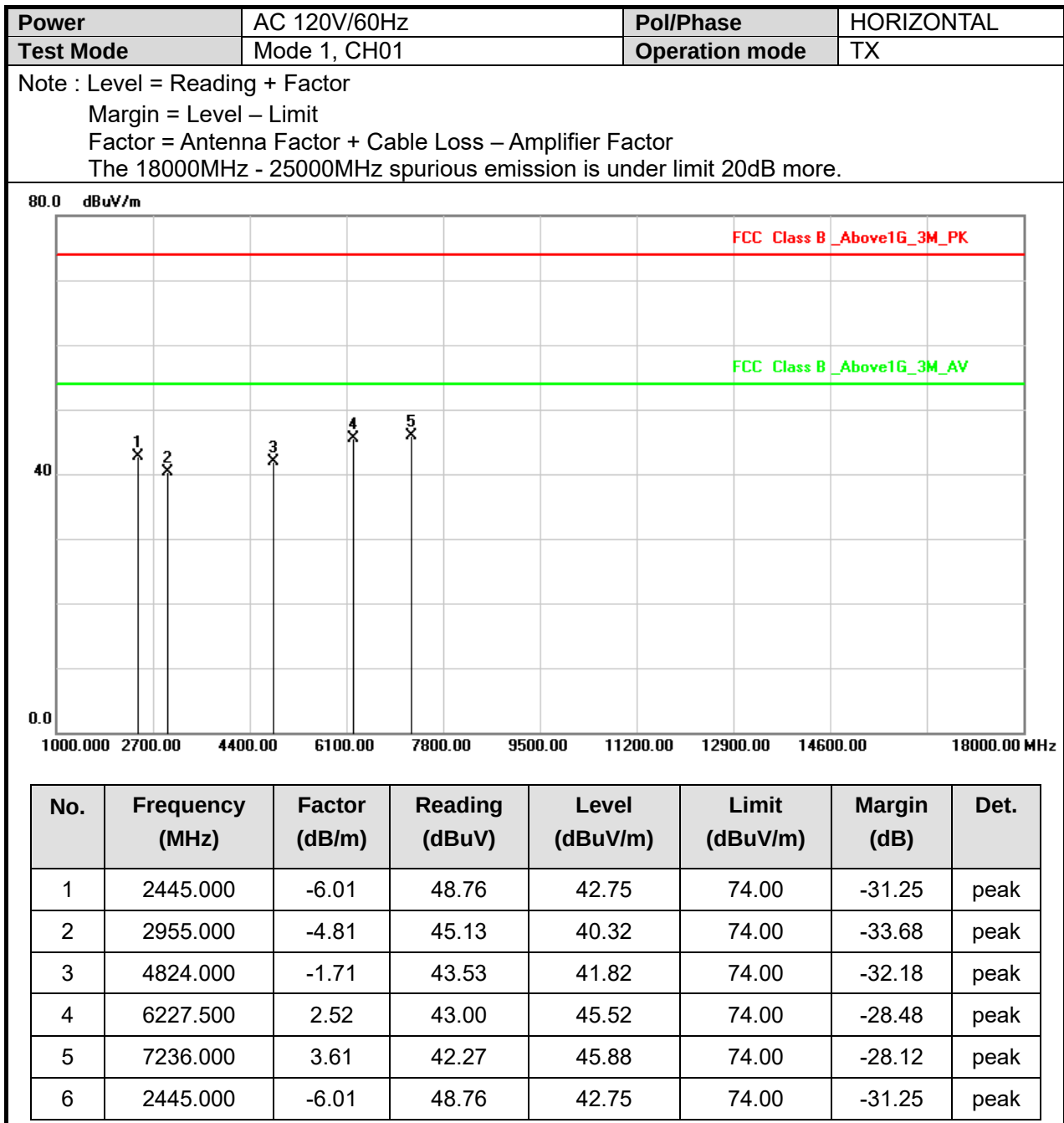


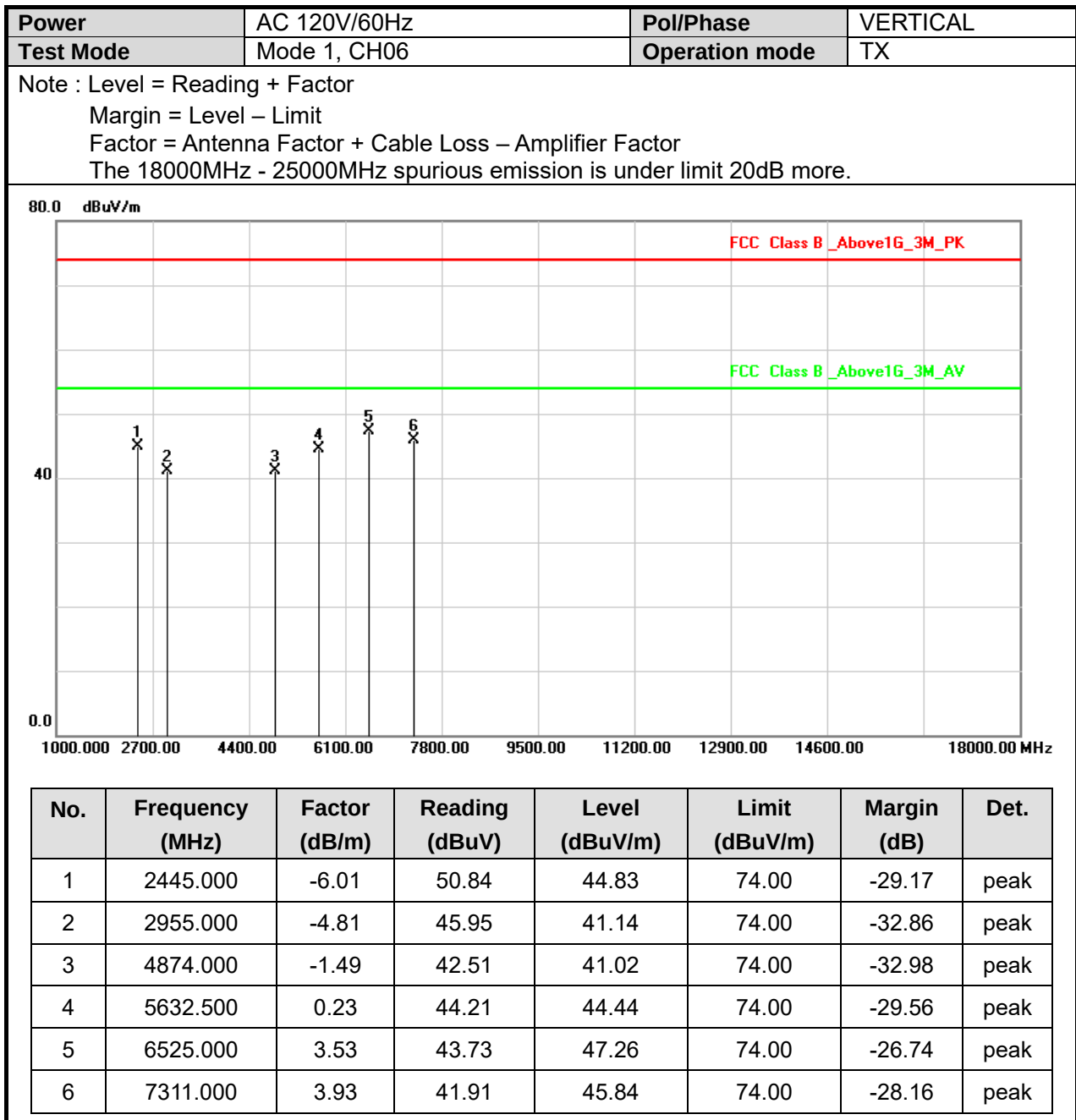


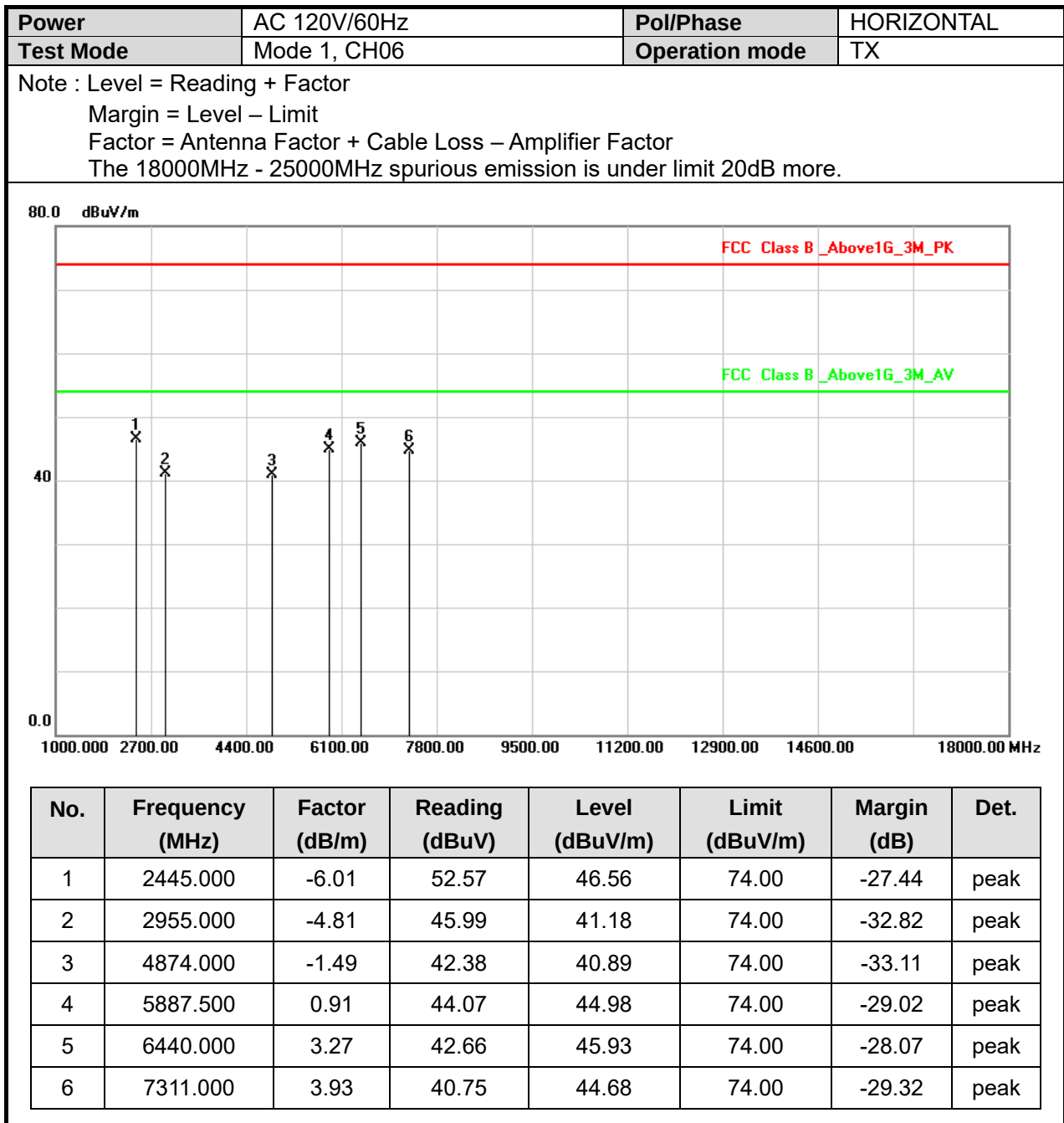


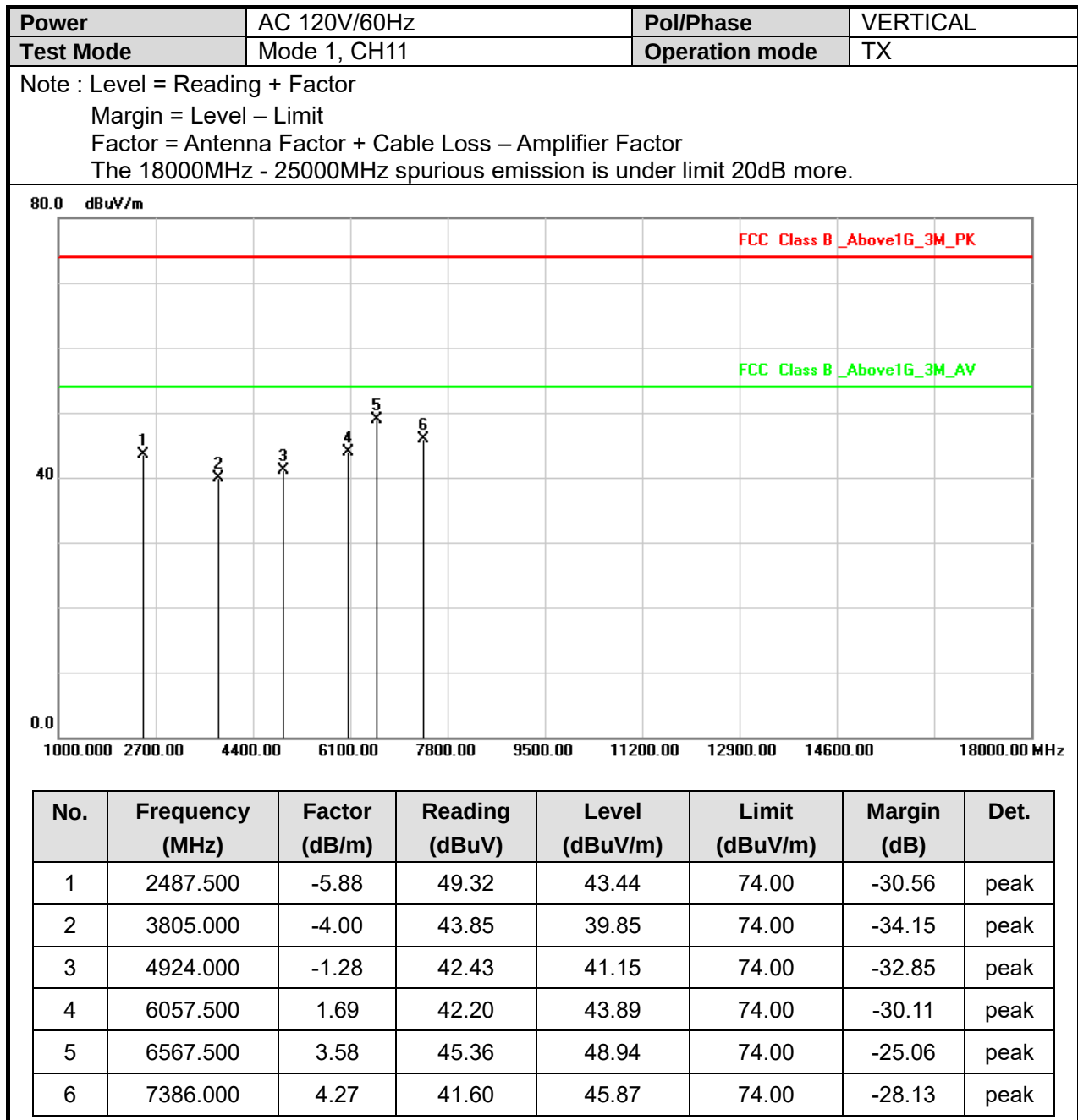
6.6 Test Result and Data (1GHz ~ 25GHz)

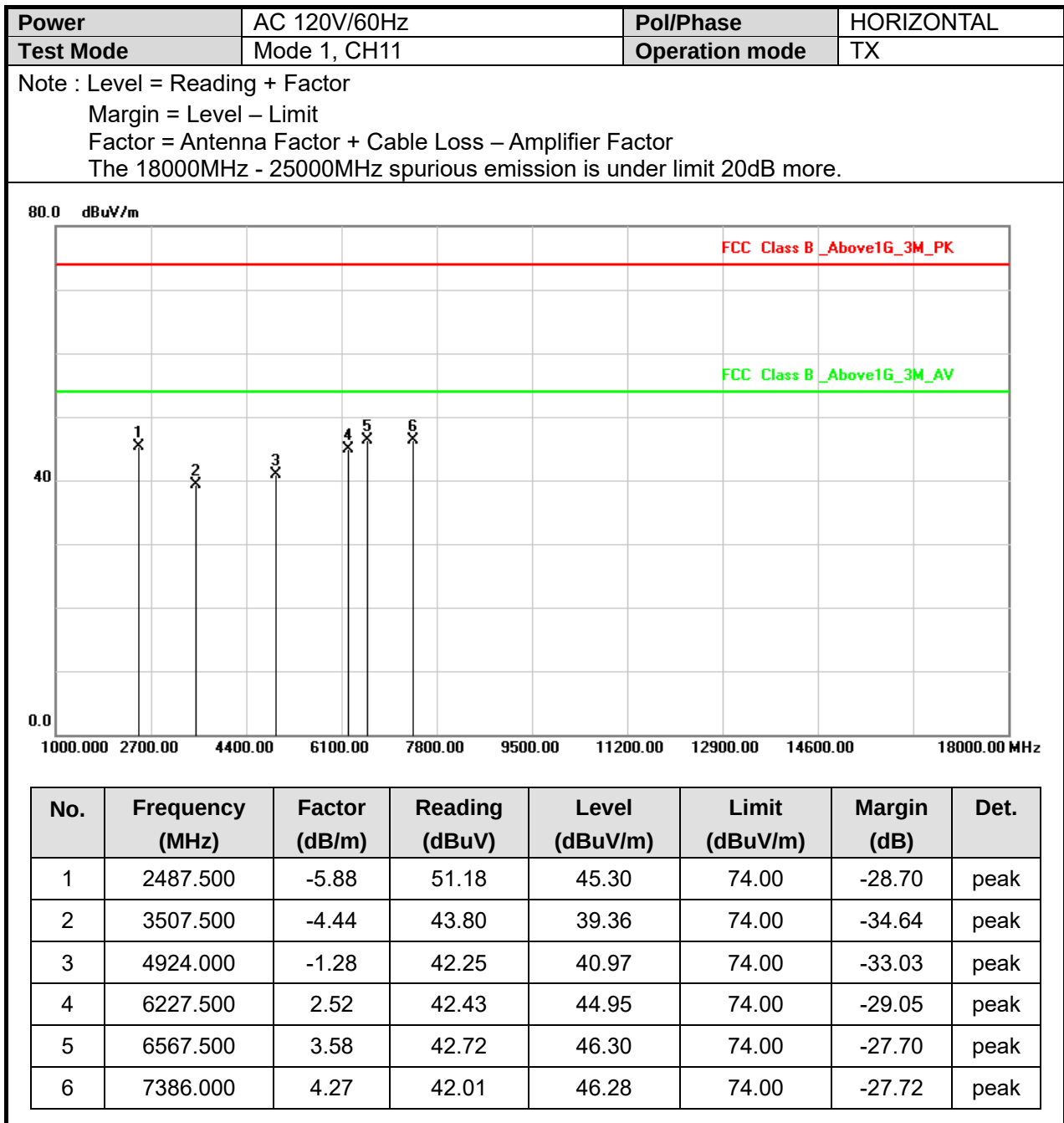


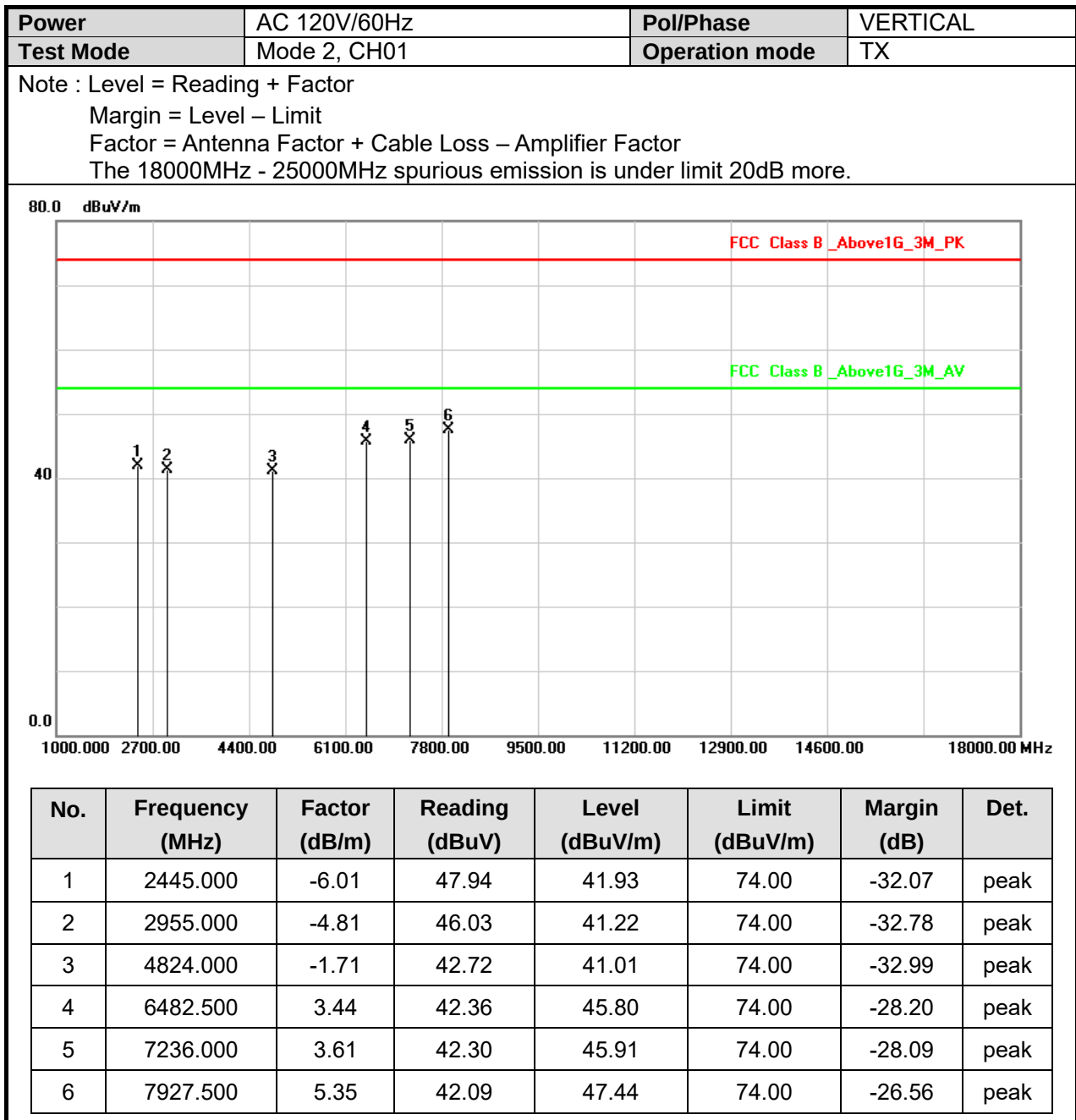


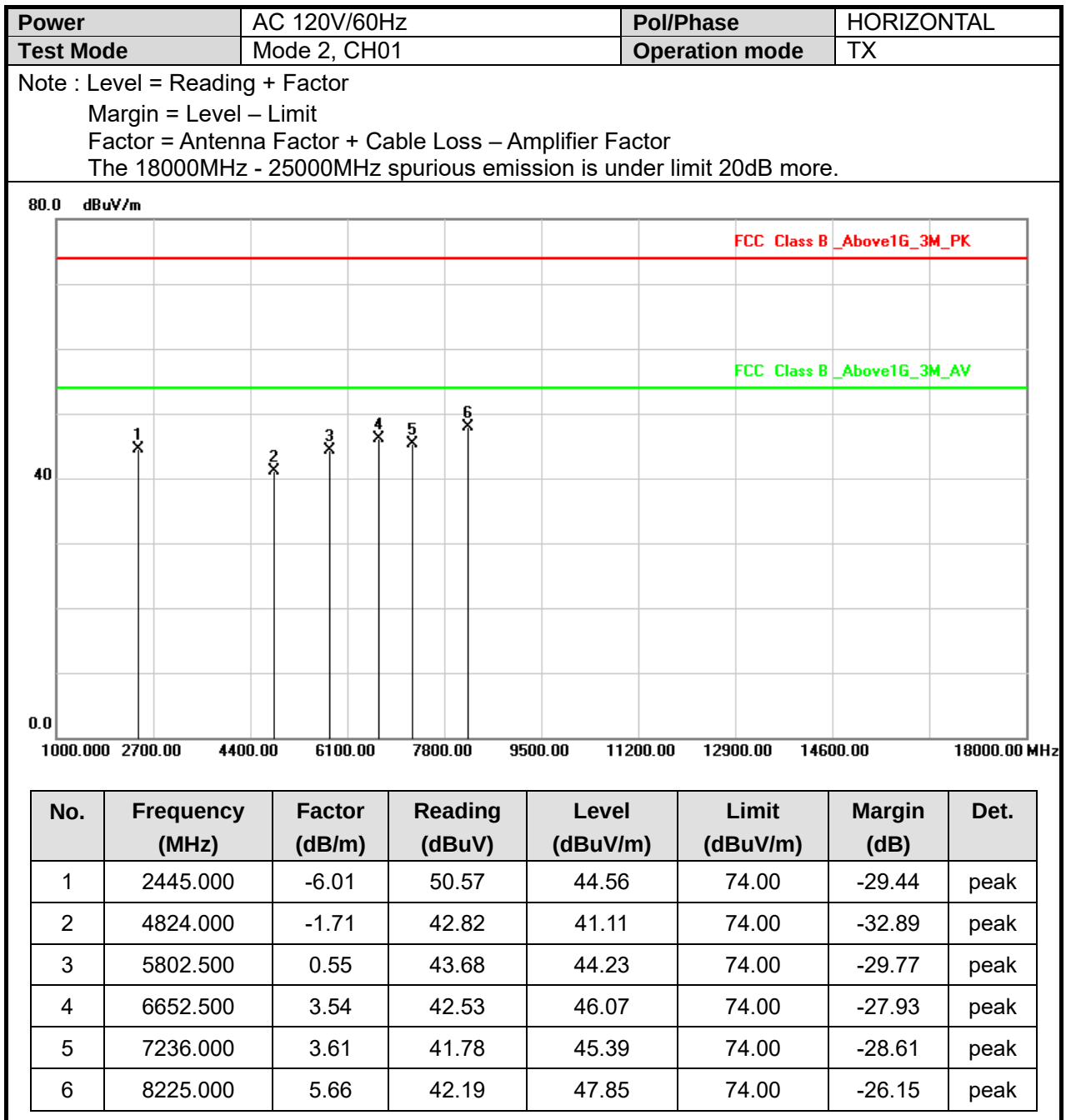


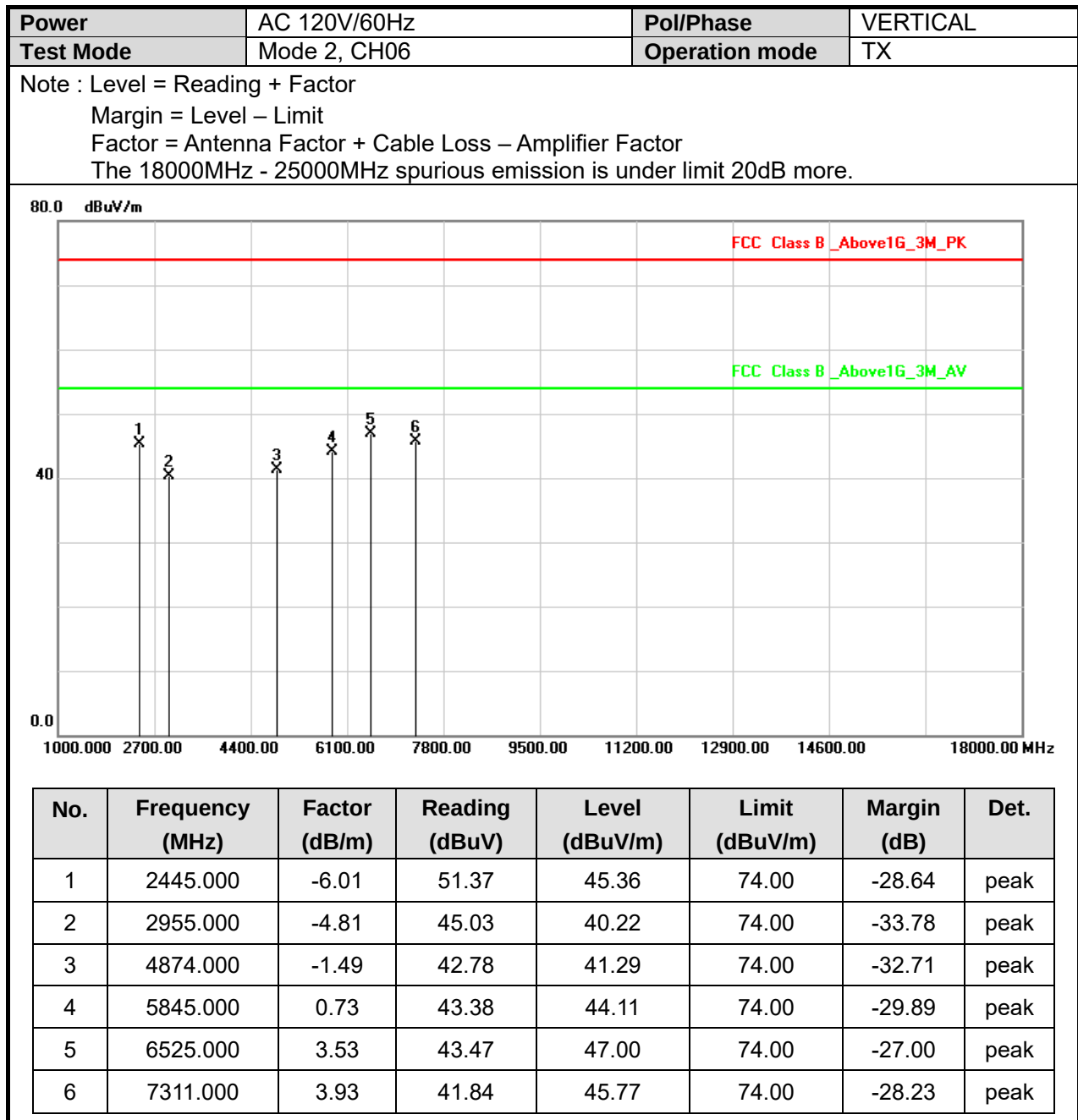


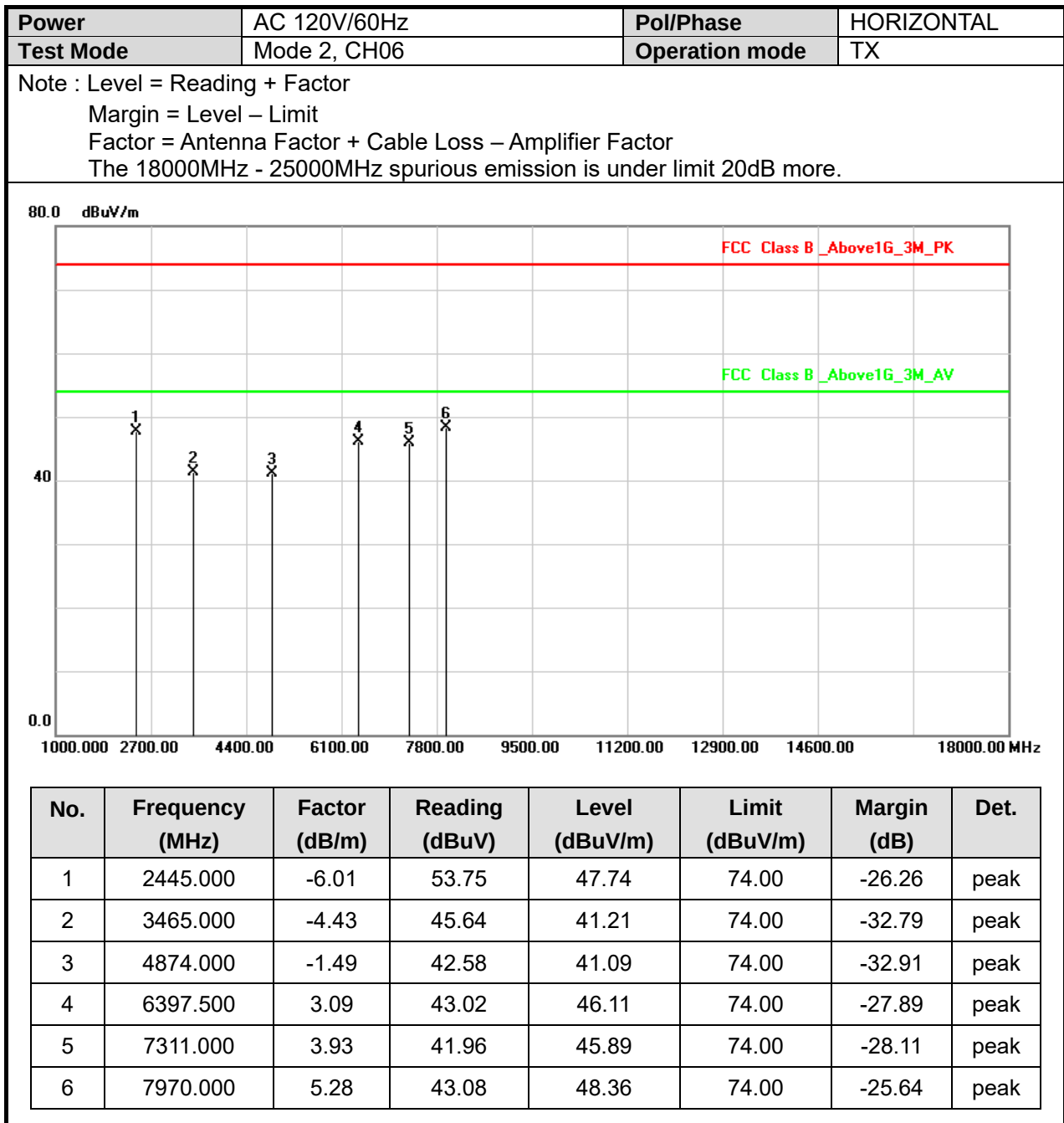


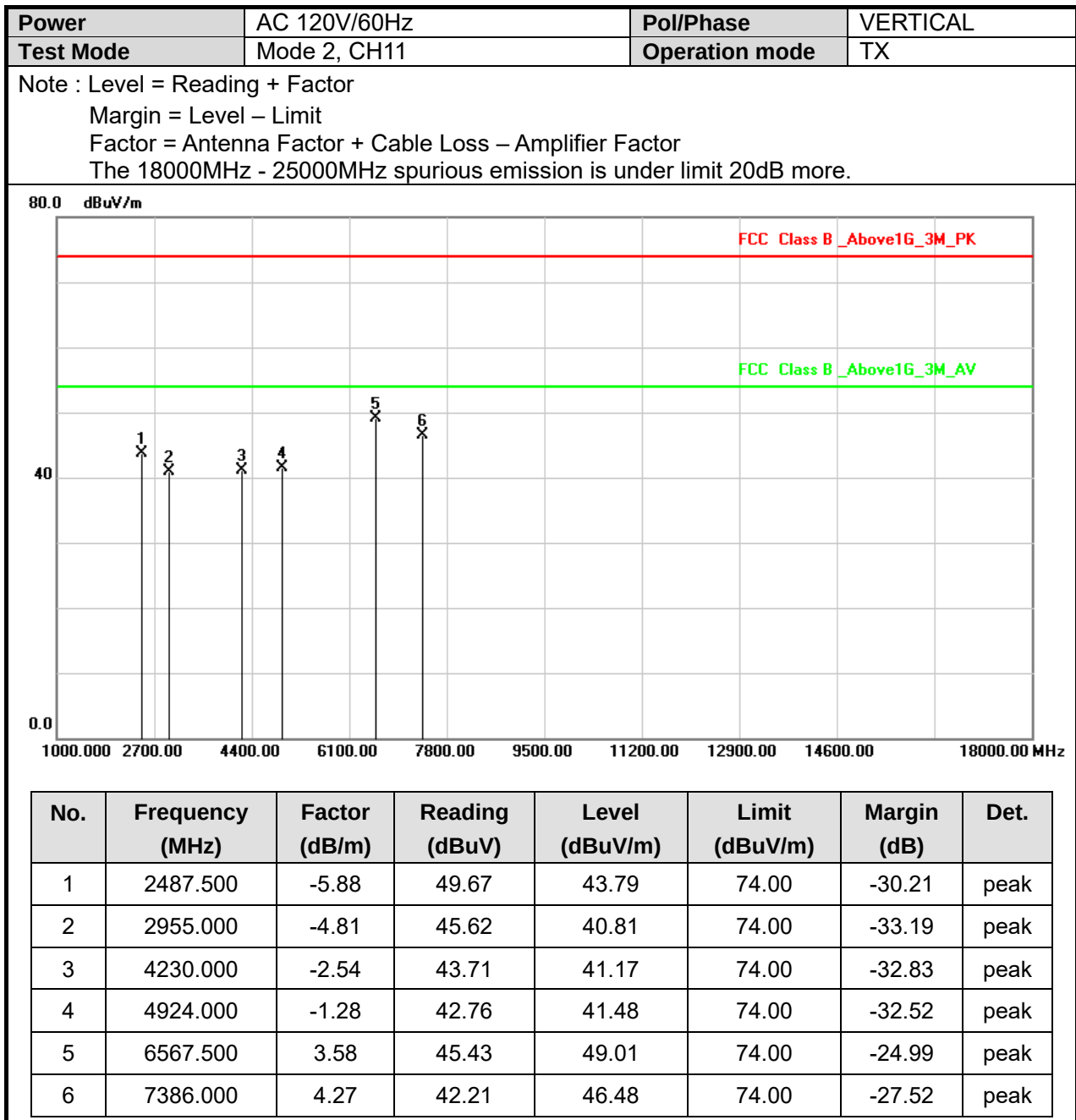


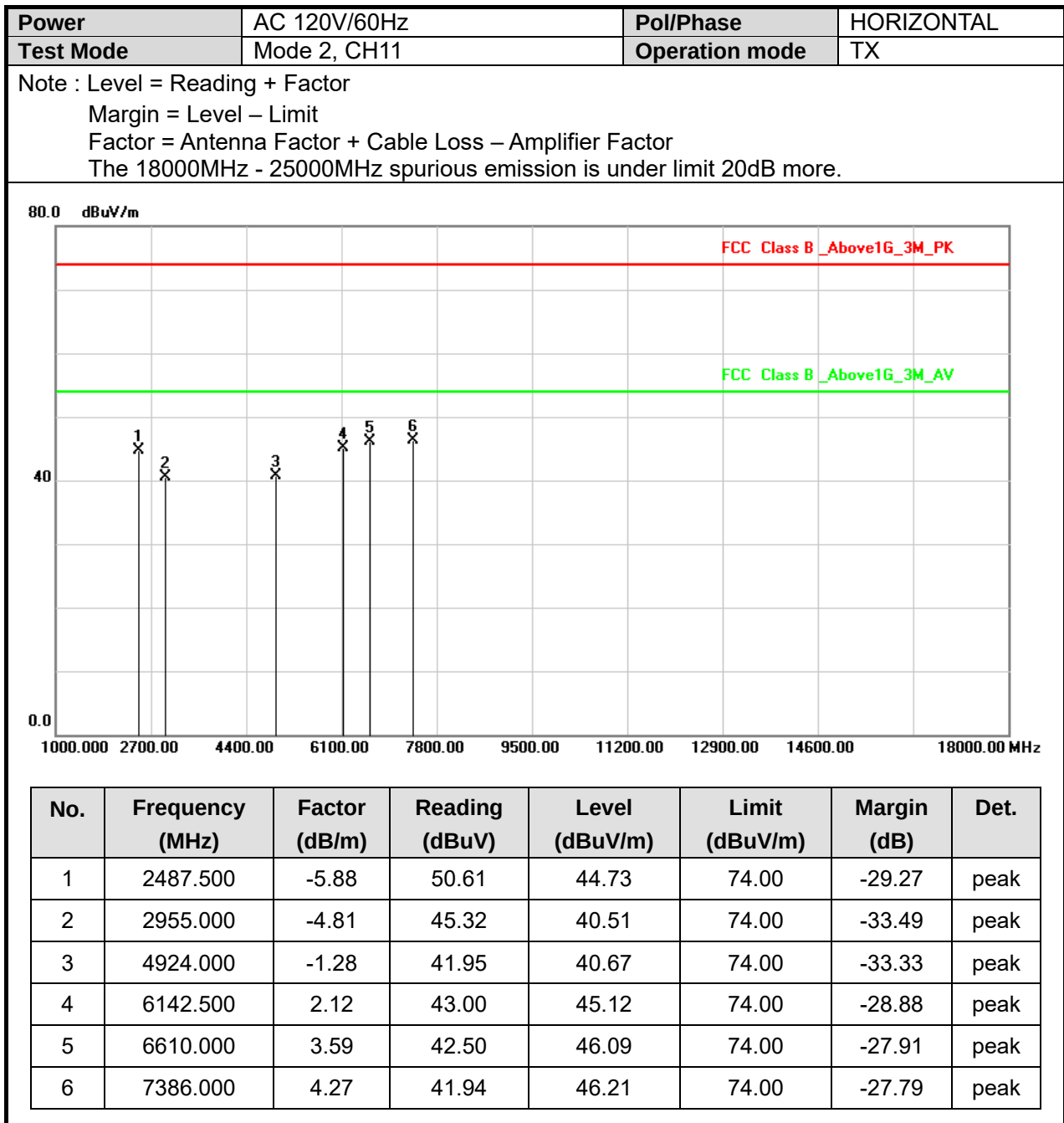


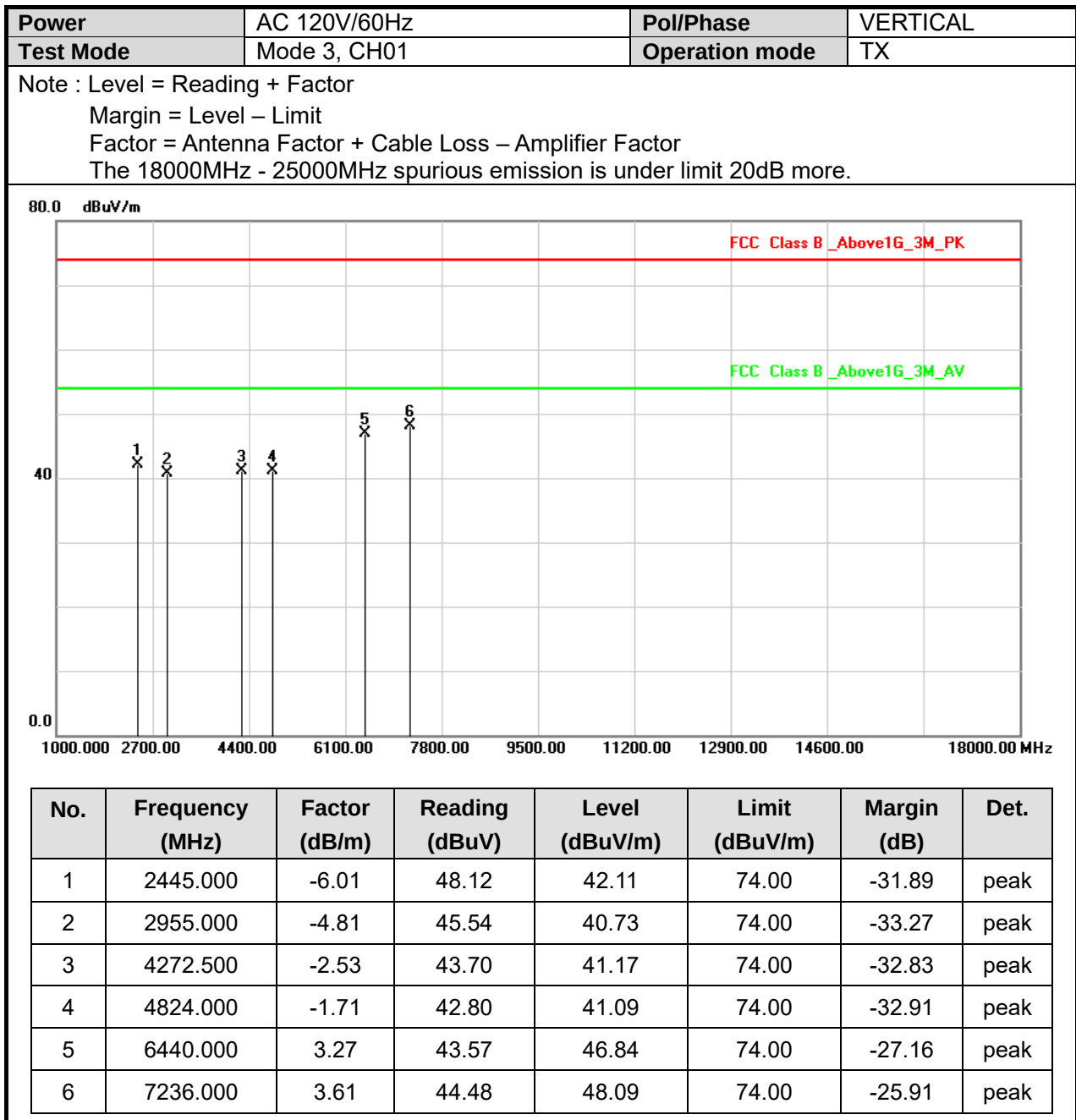


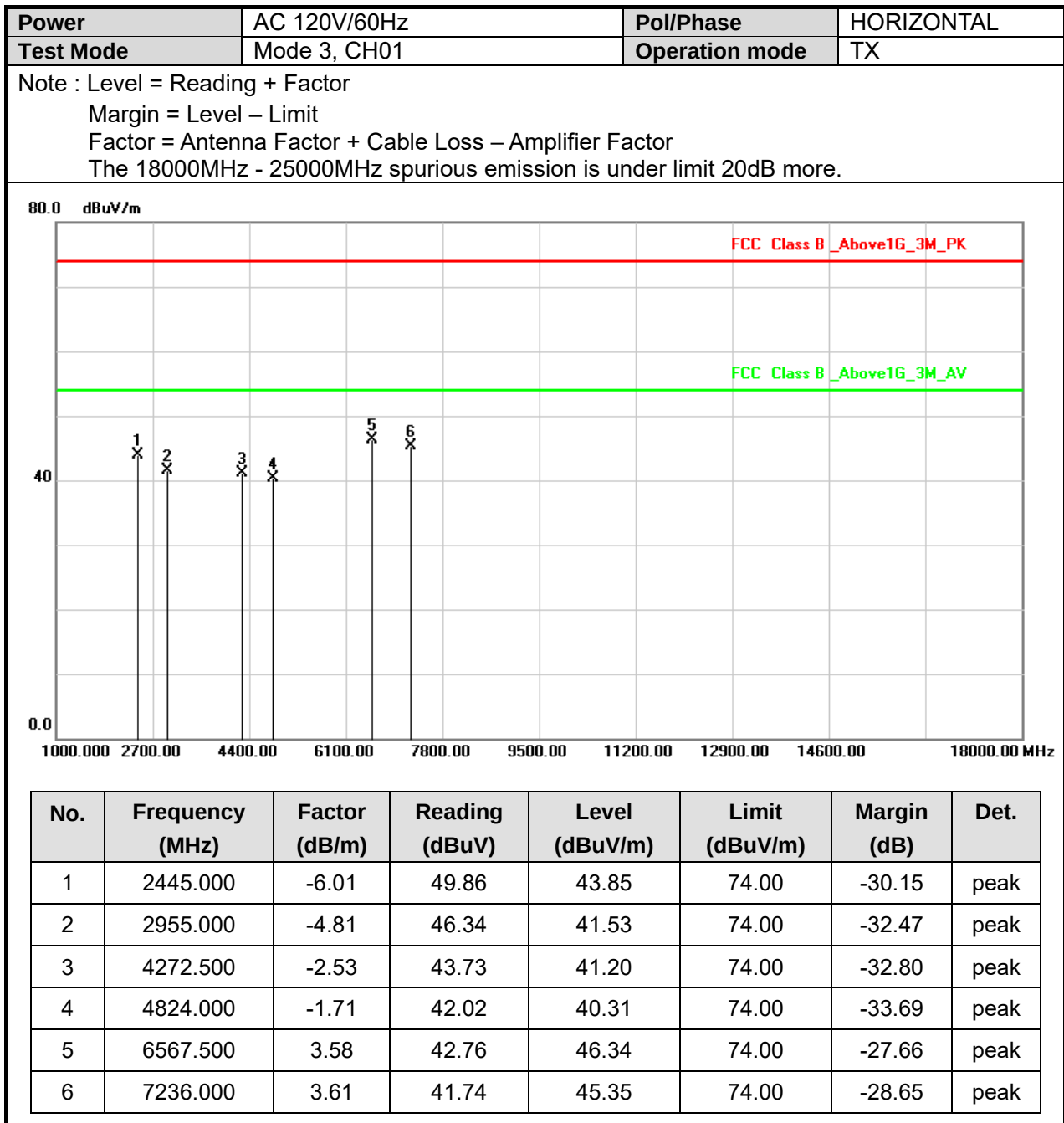


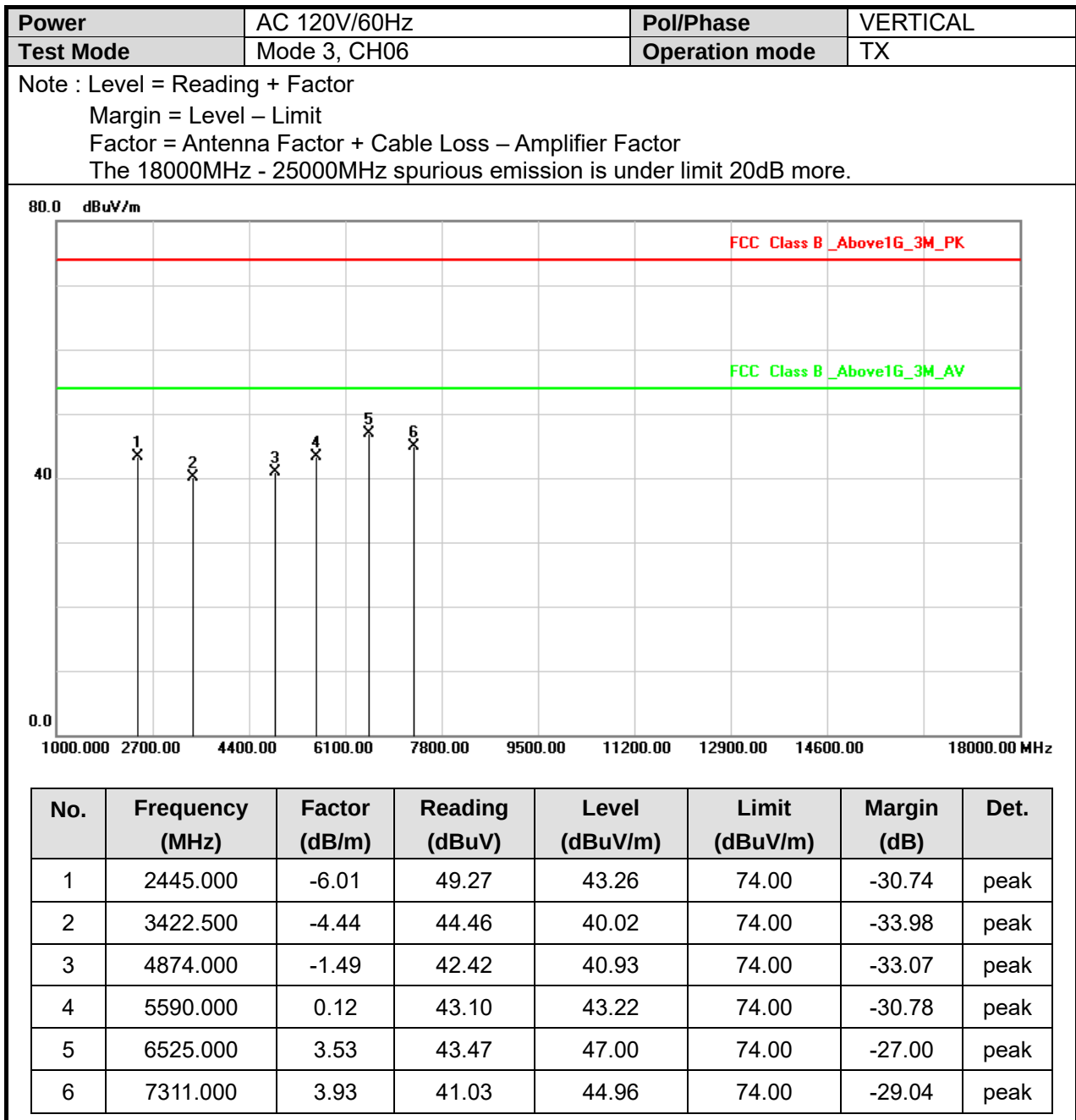


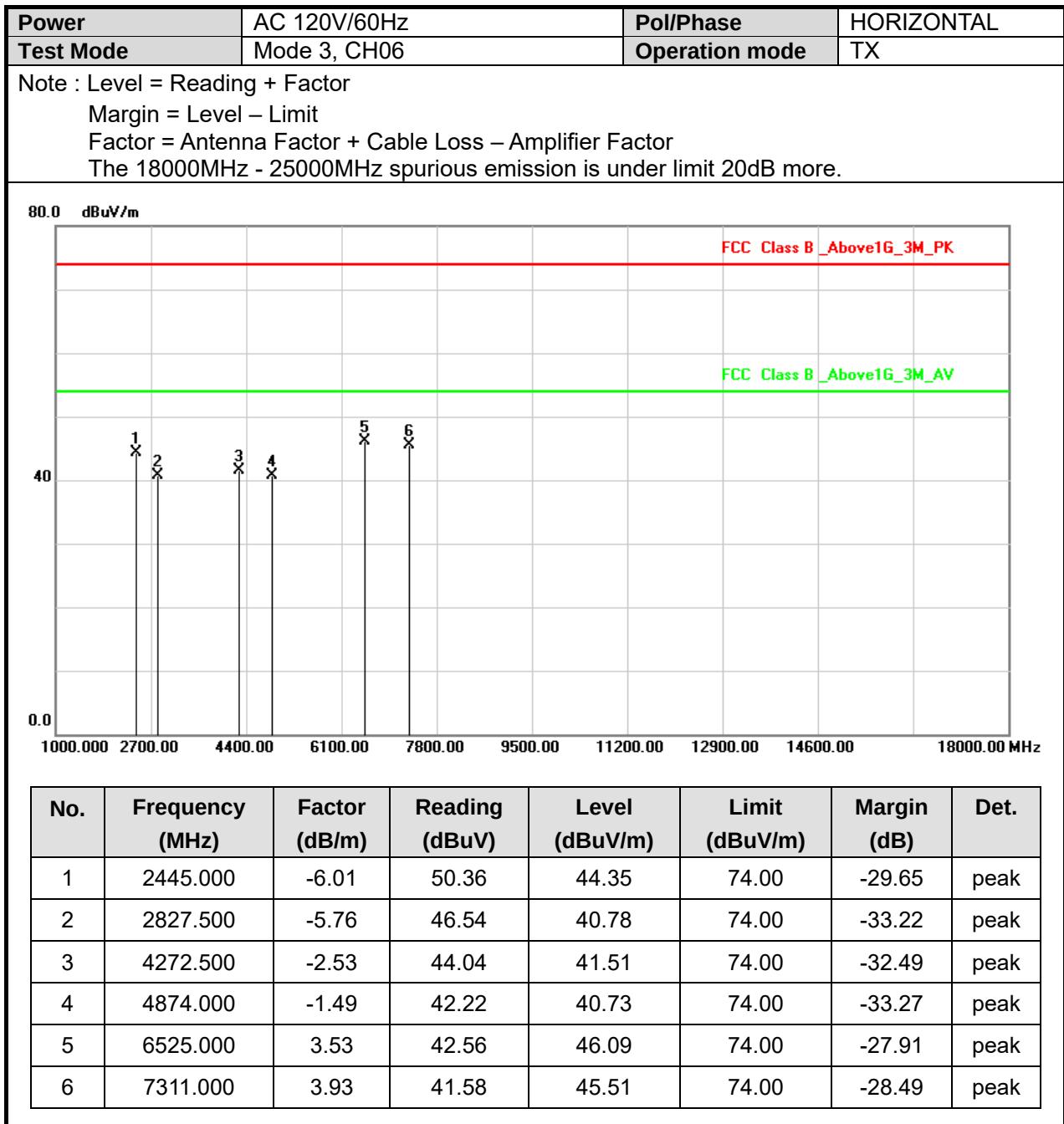


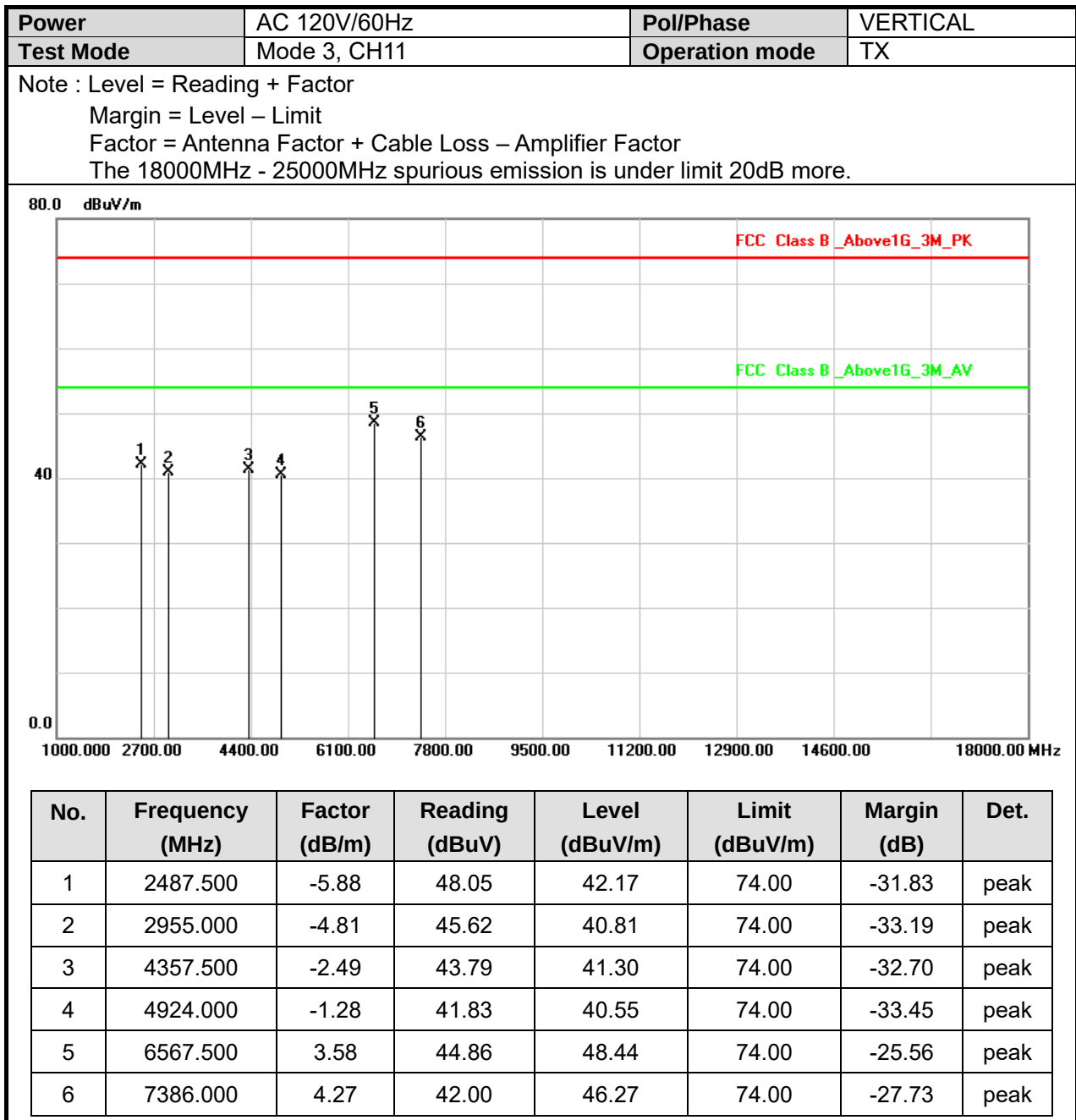


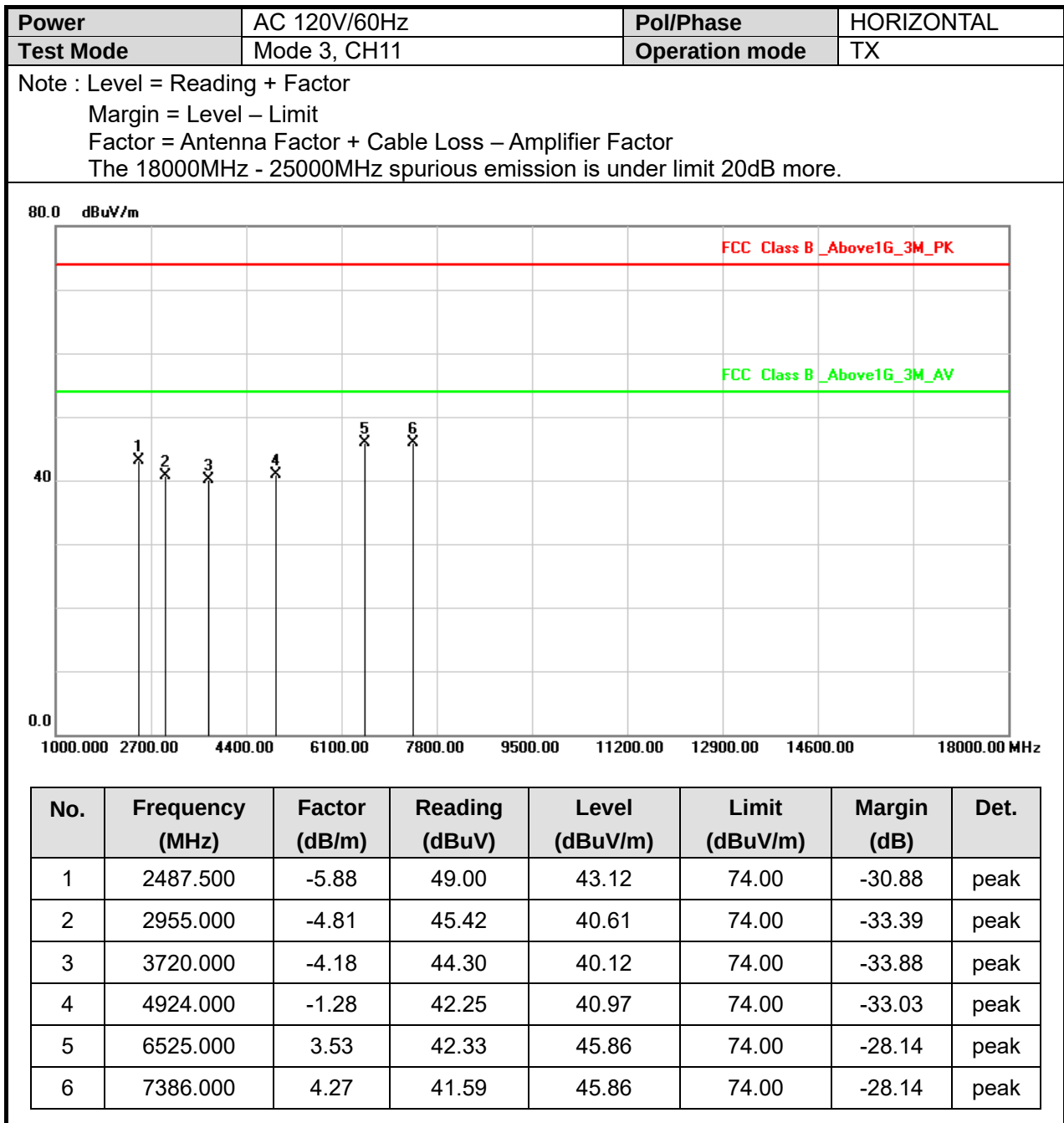


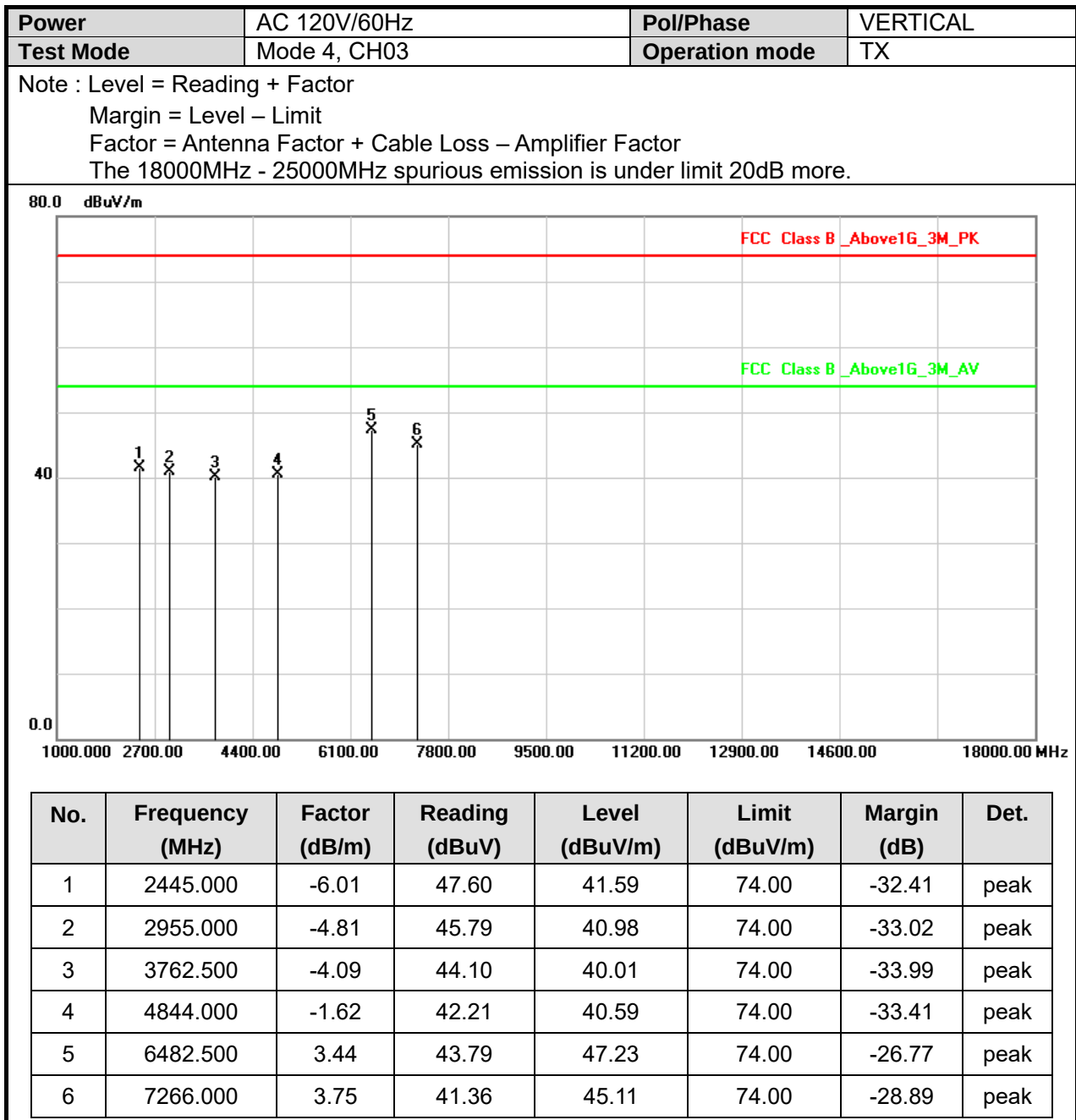


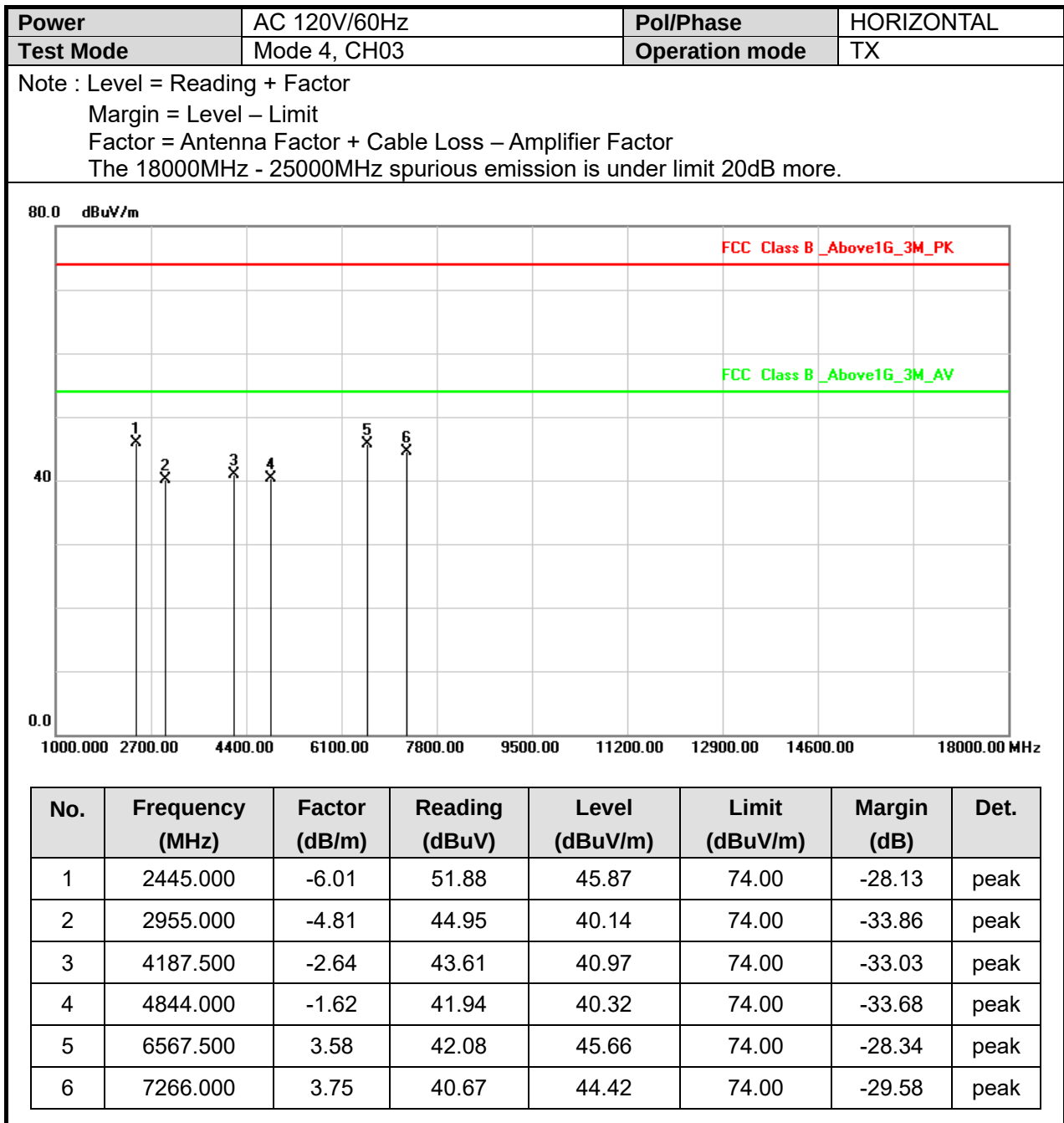


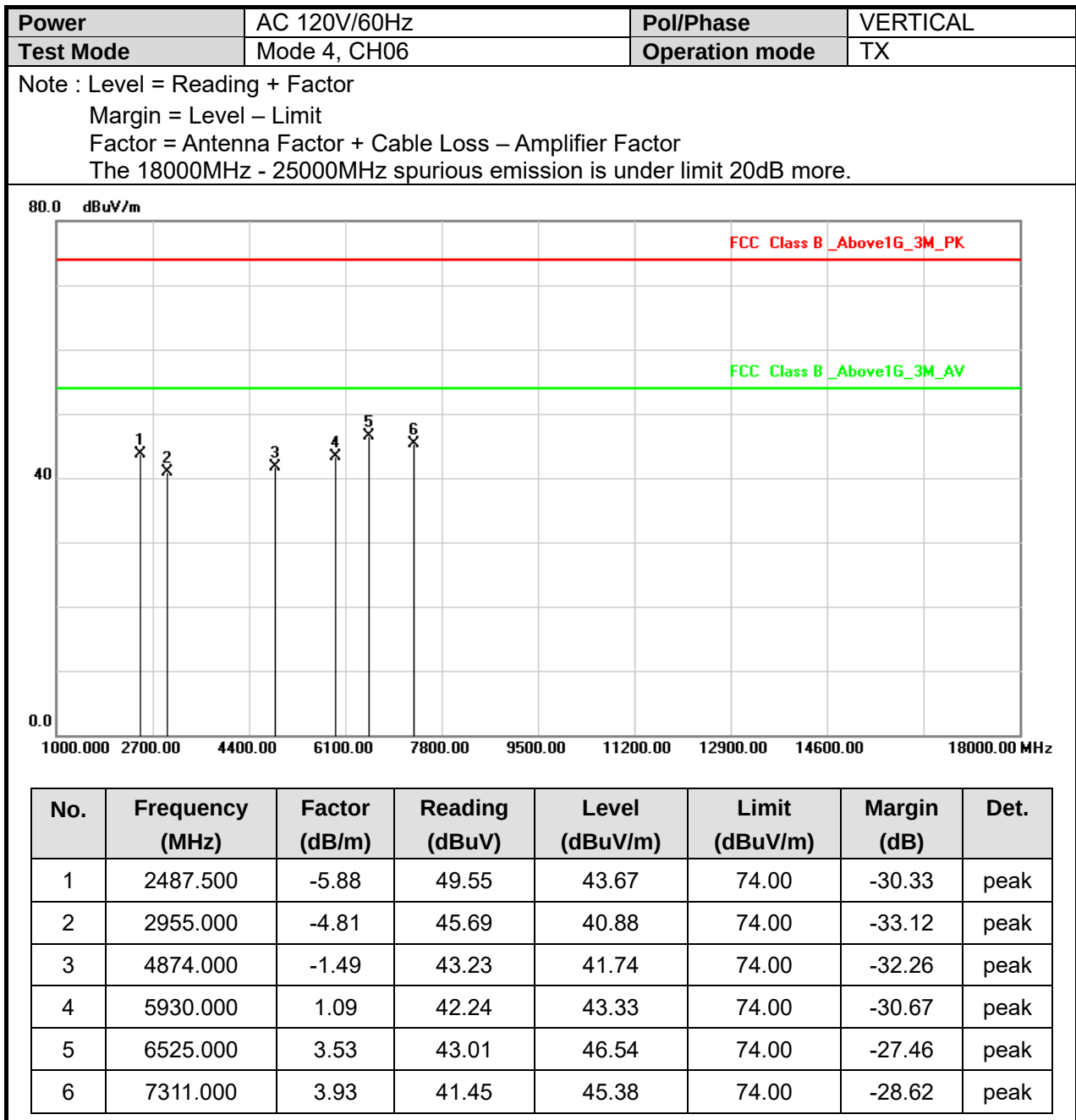


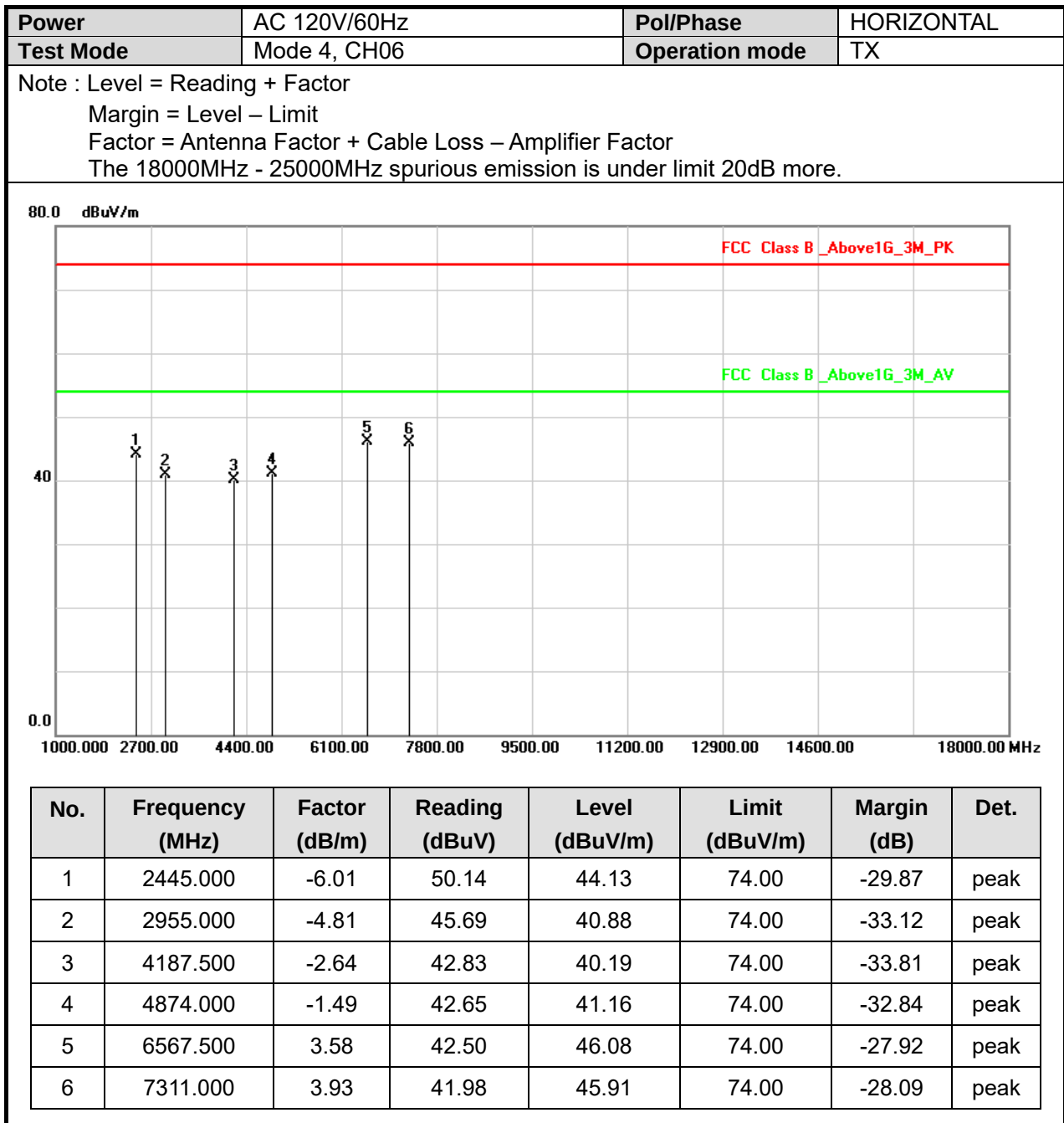


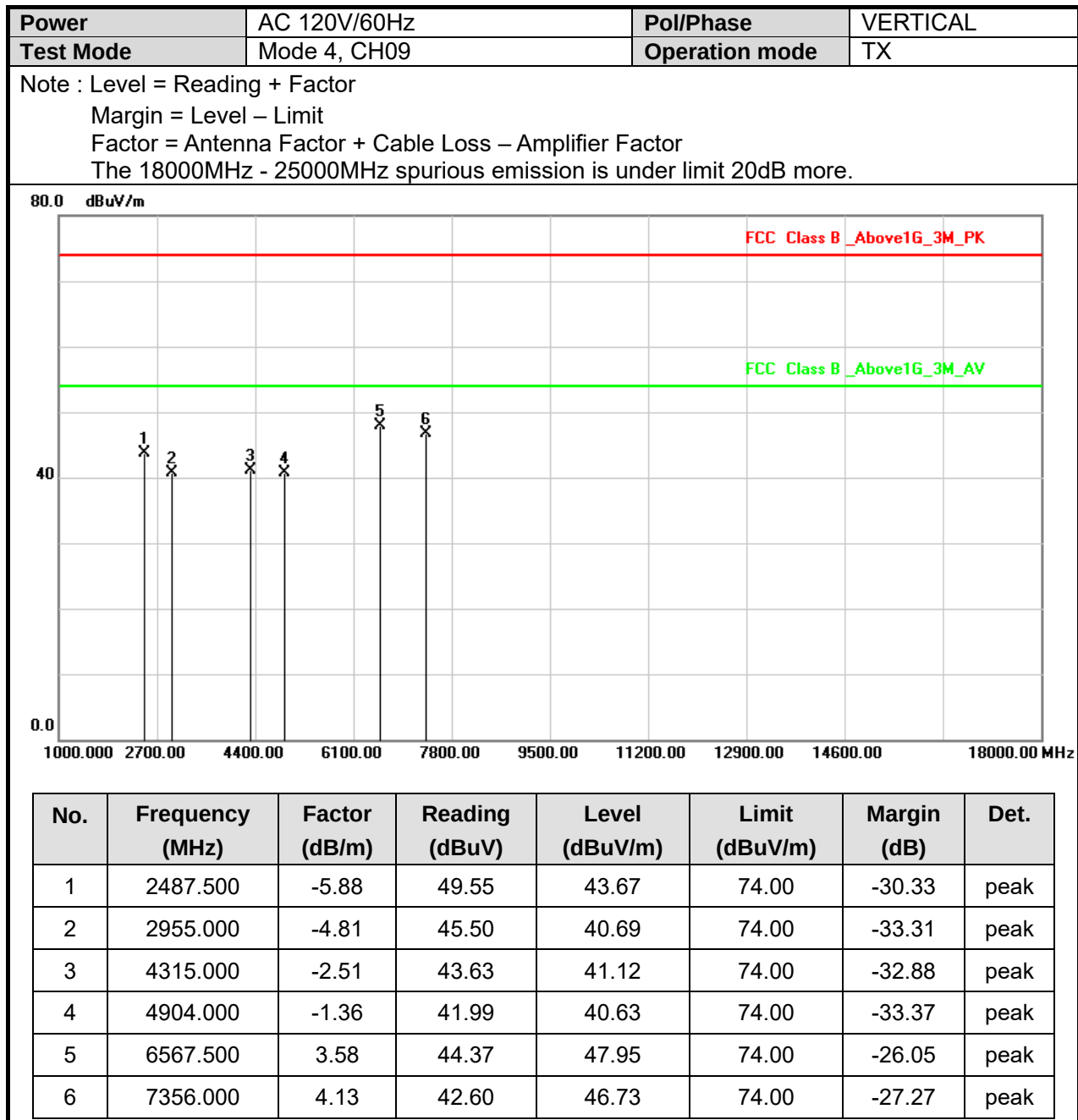


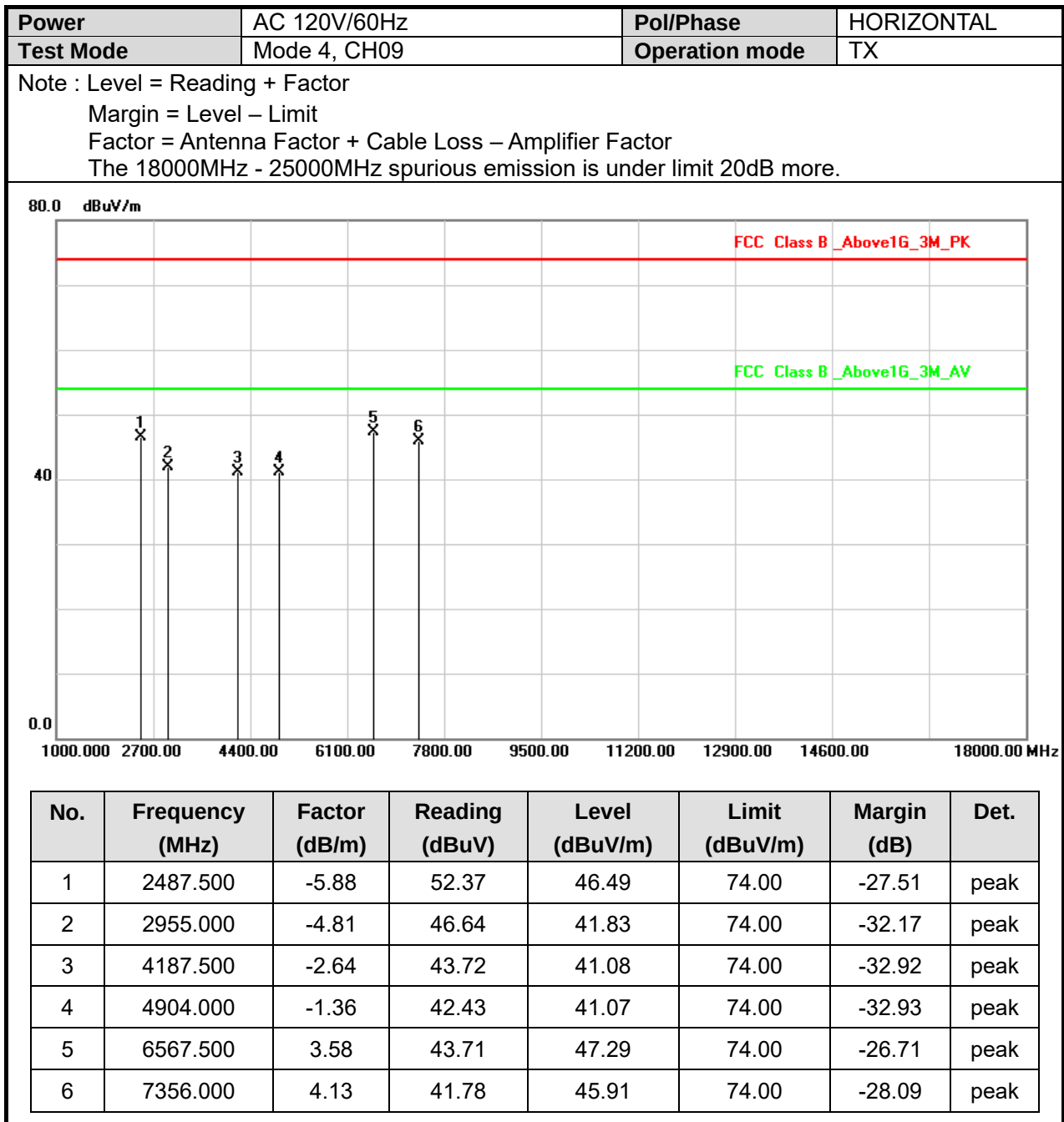














6.7 Restricted Bands of Operation

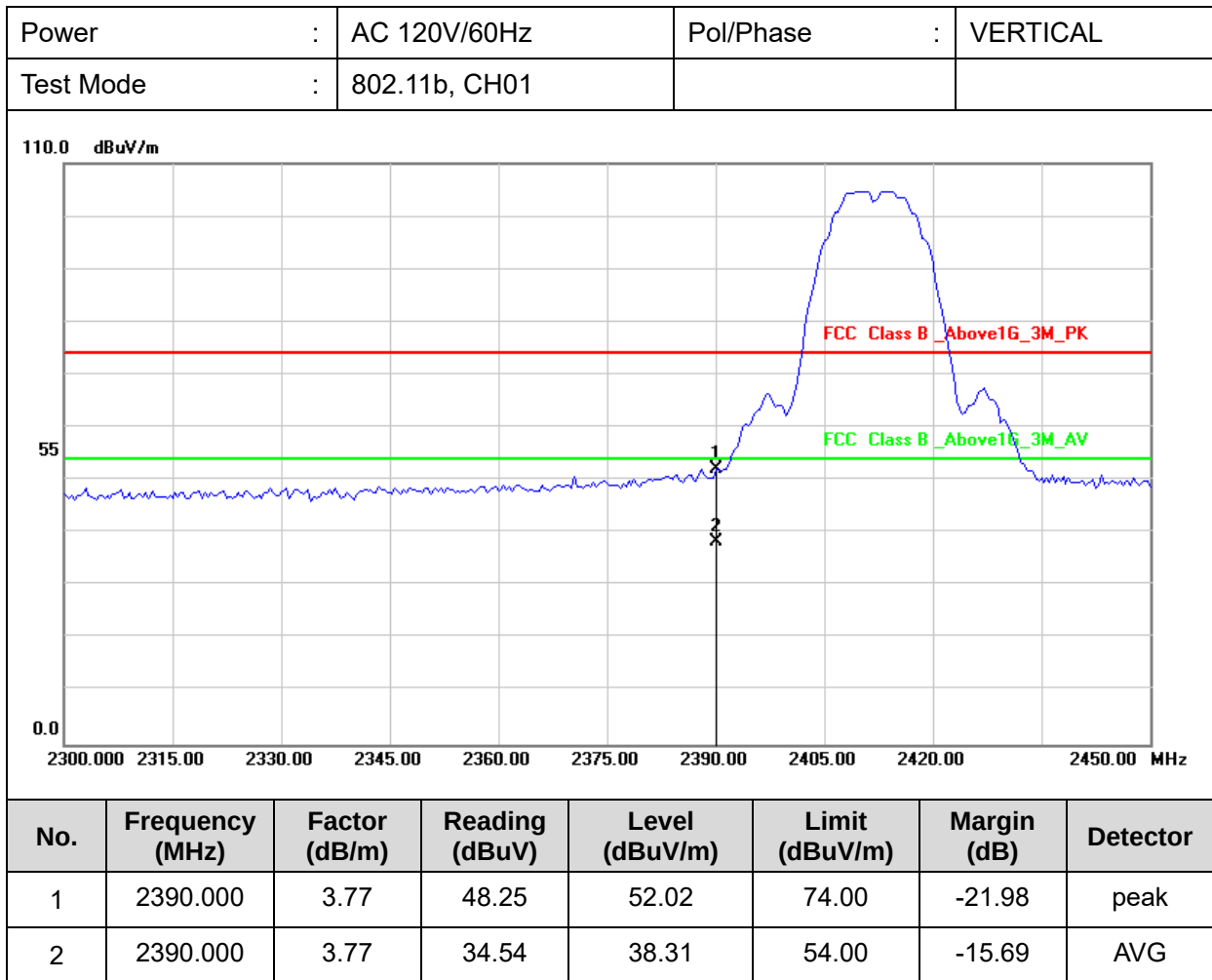
Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

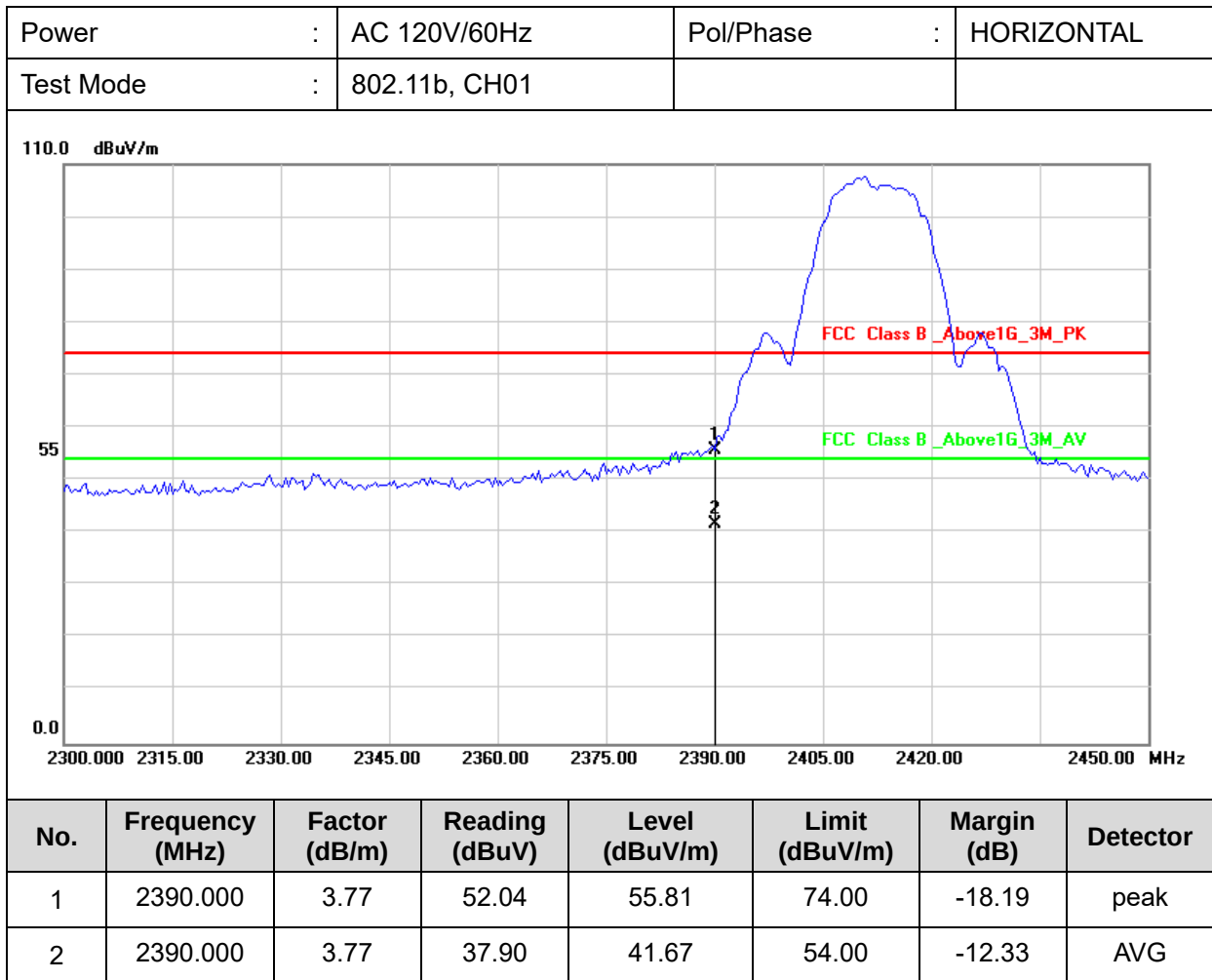


6.8 Restrict Band Emission Measurement Data



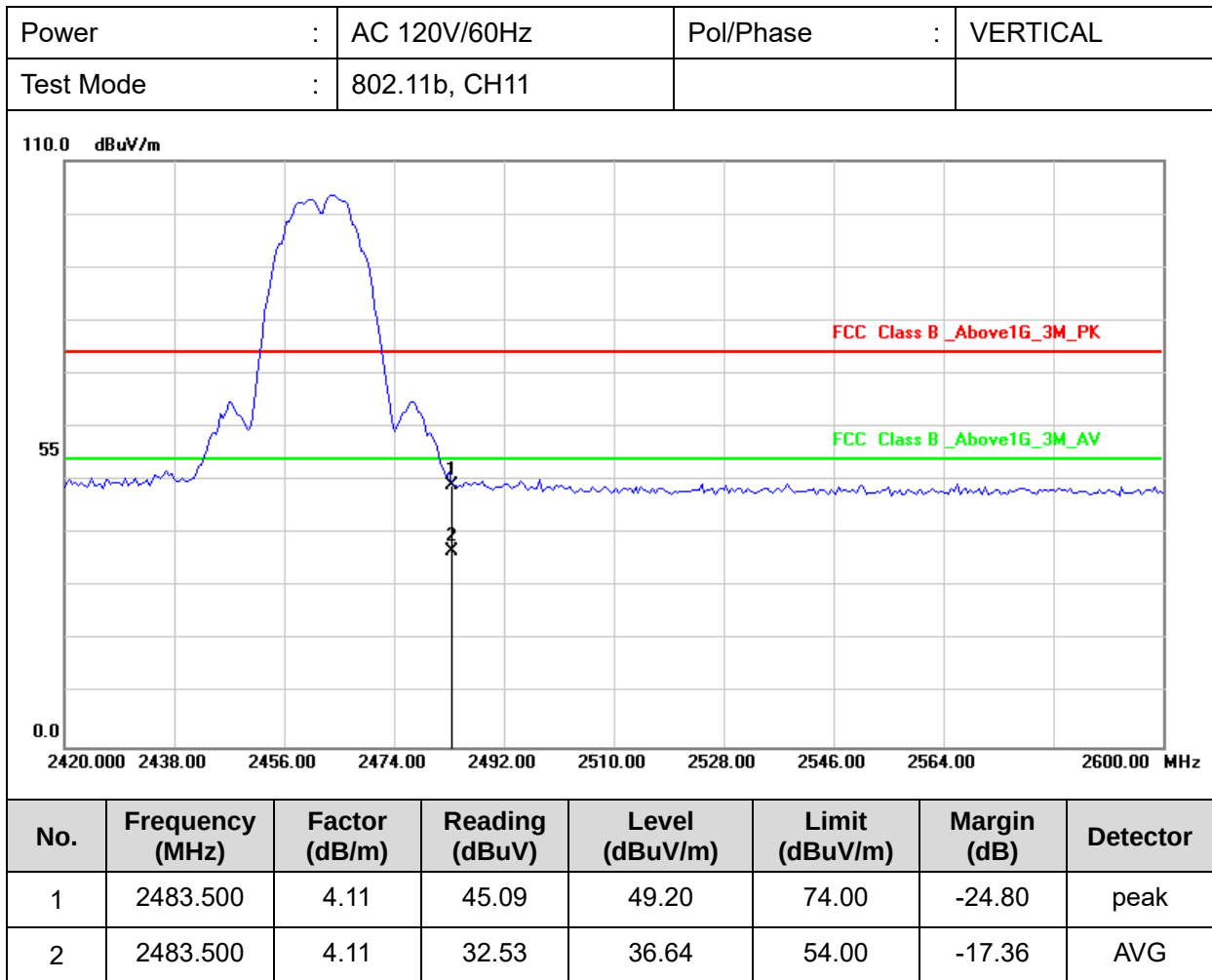
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



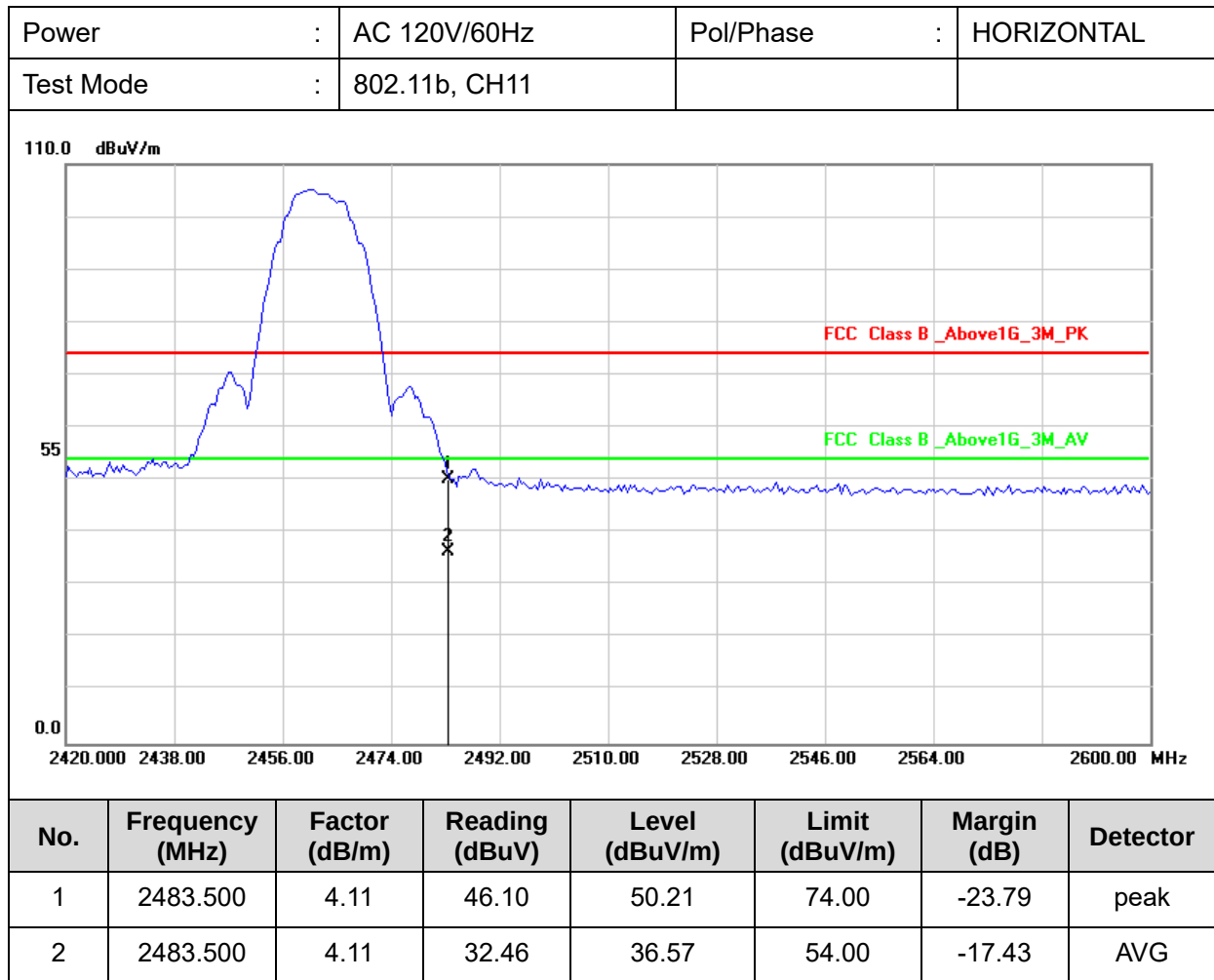
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



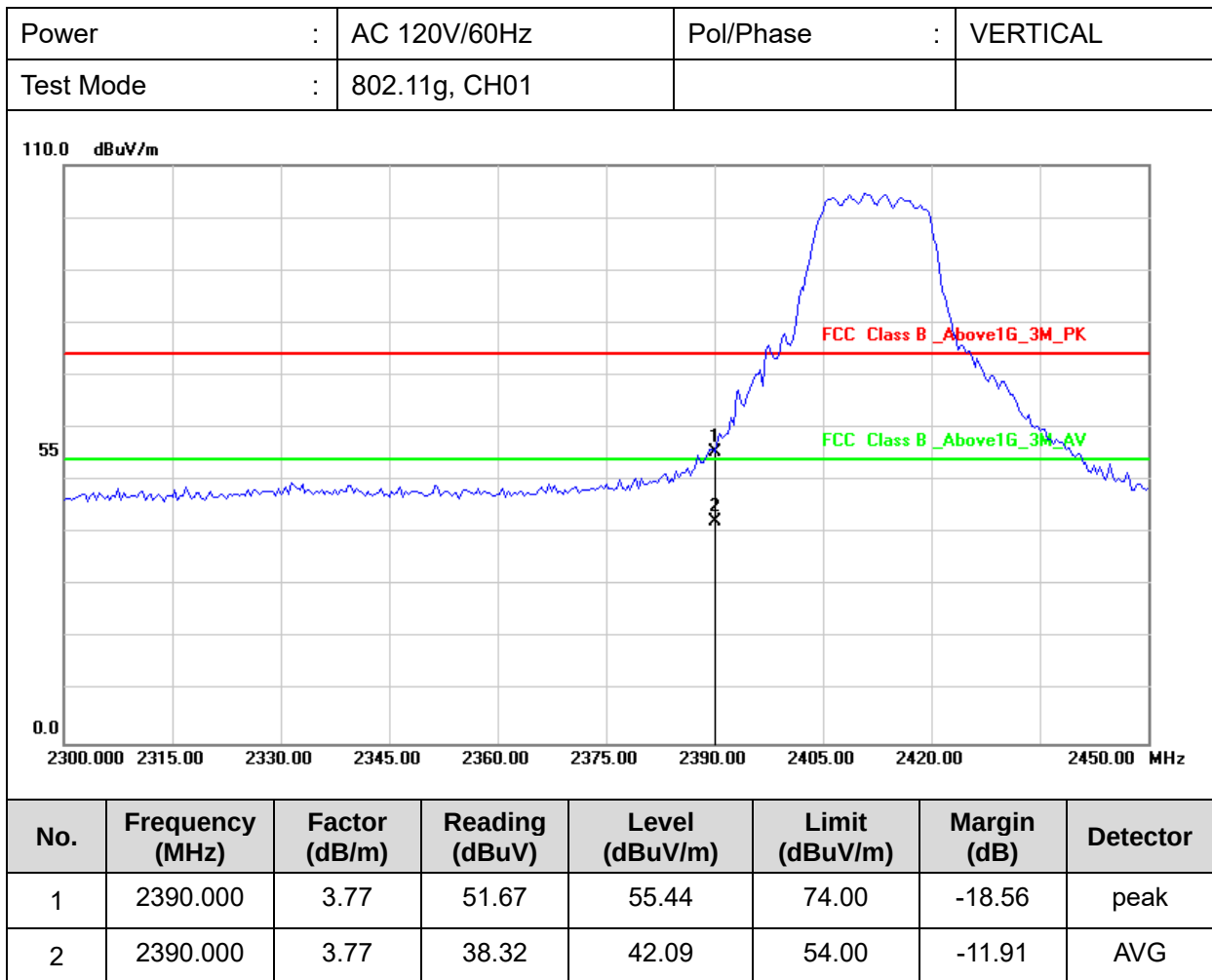
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



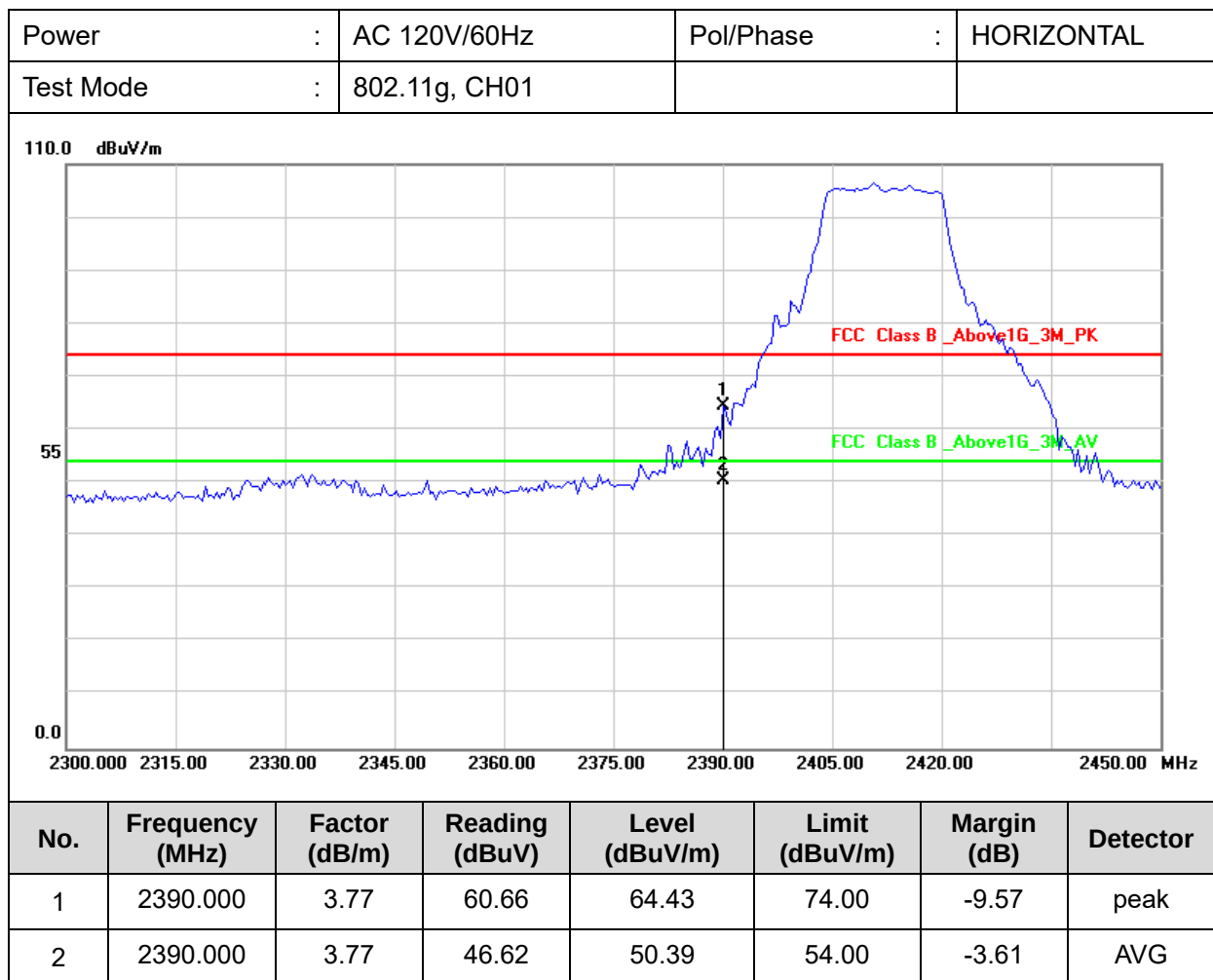
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



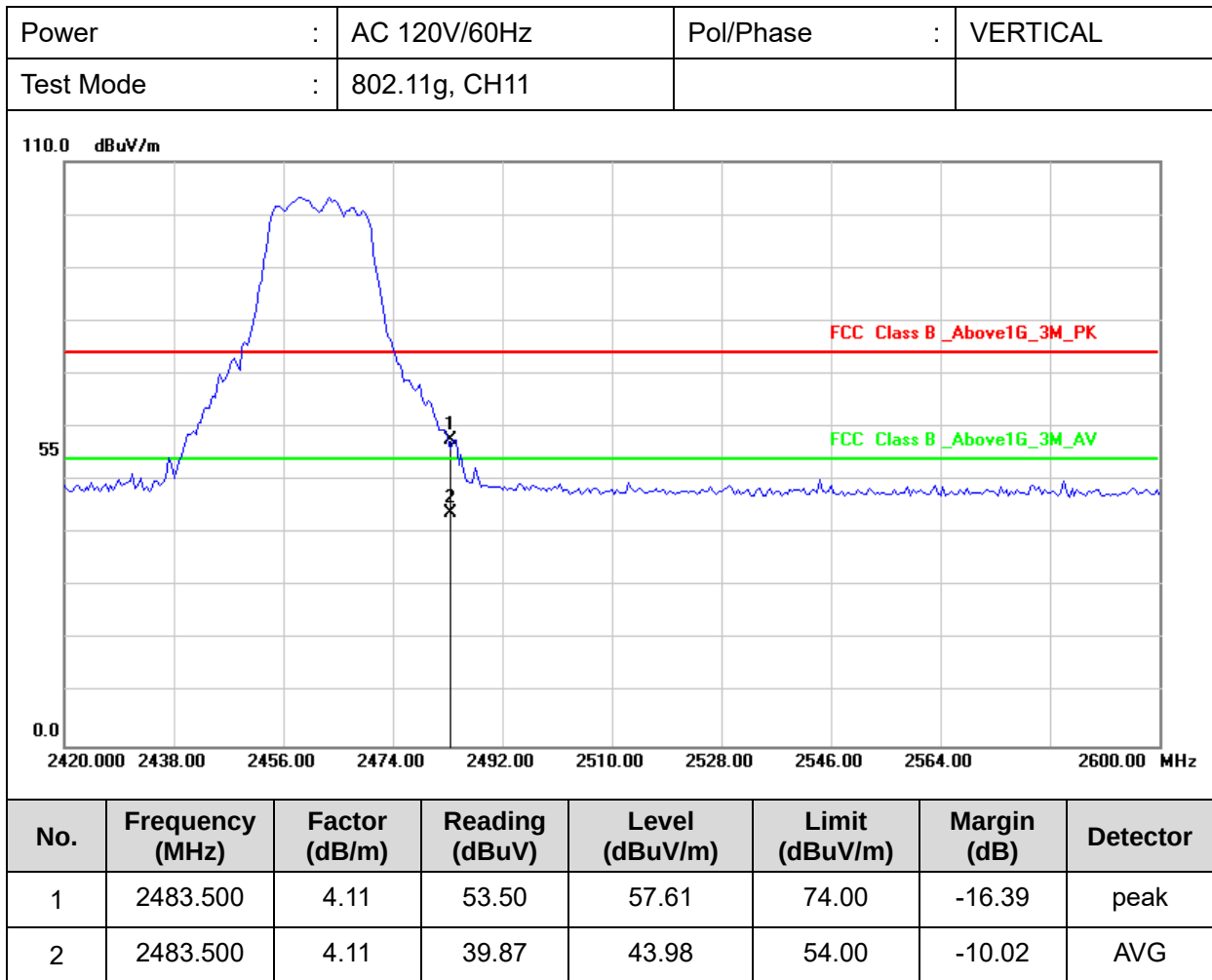
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



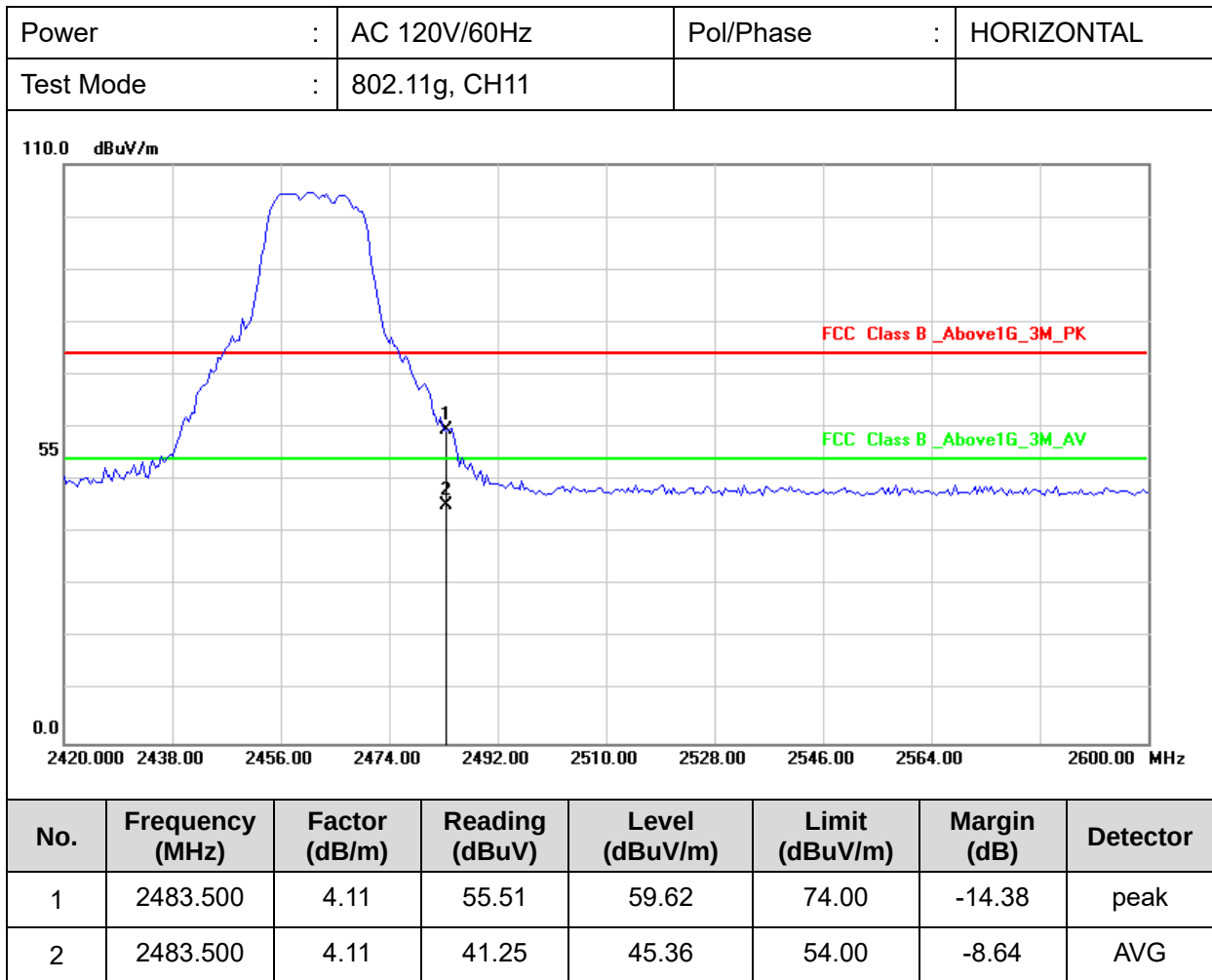
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



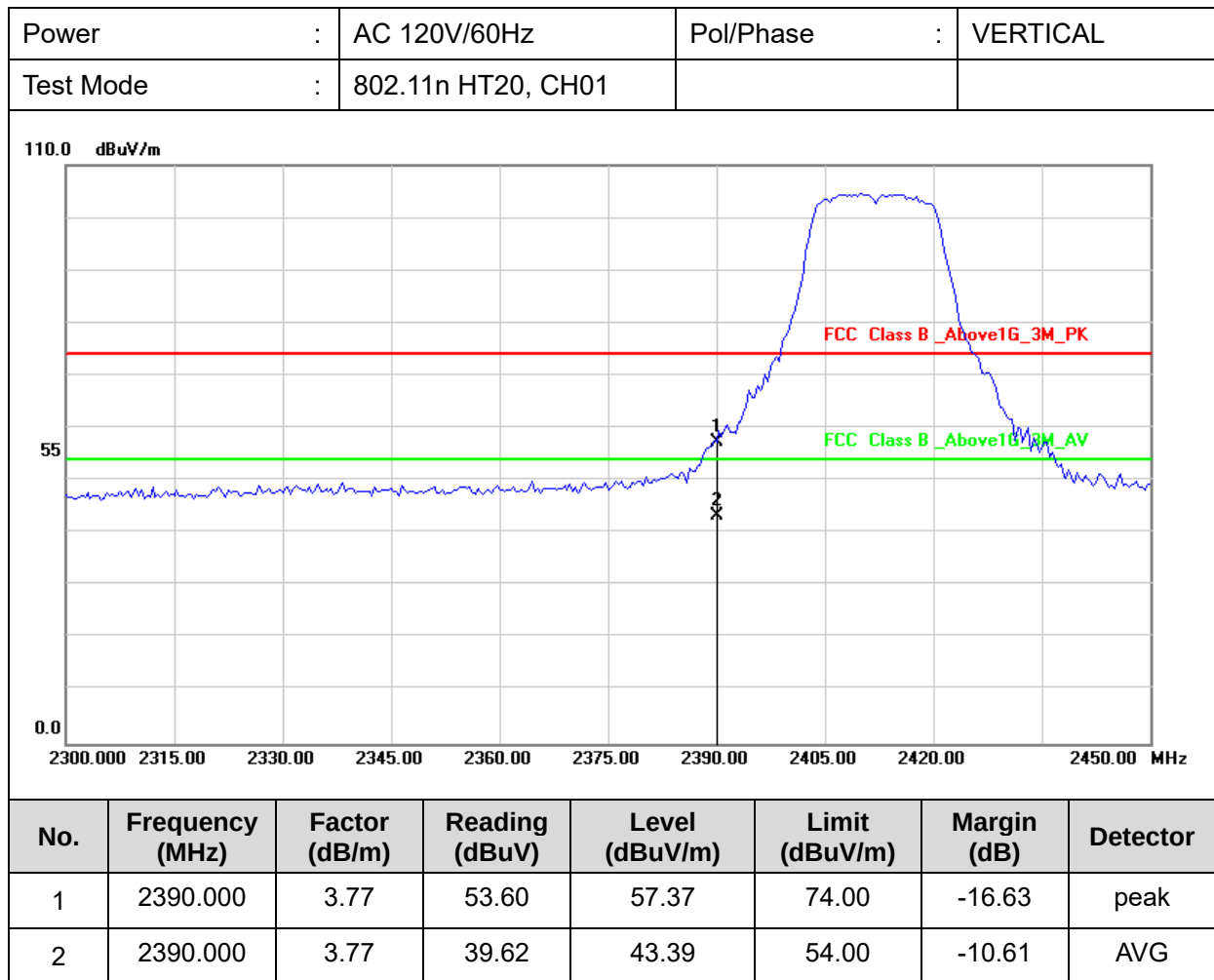
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



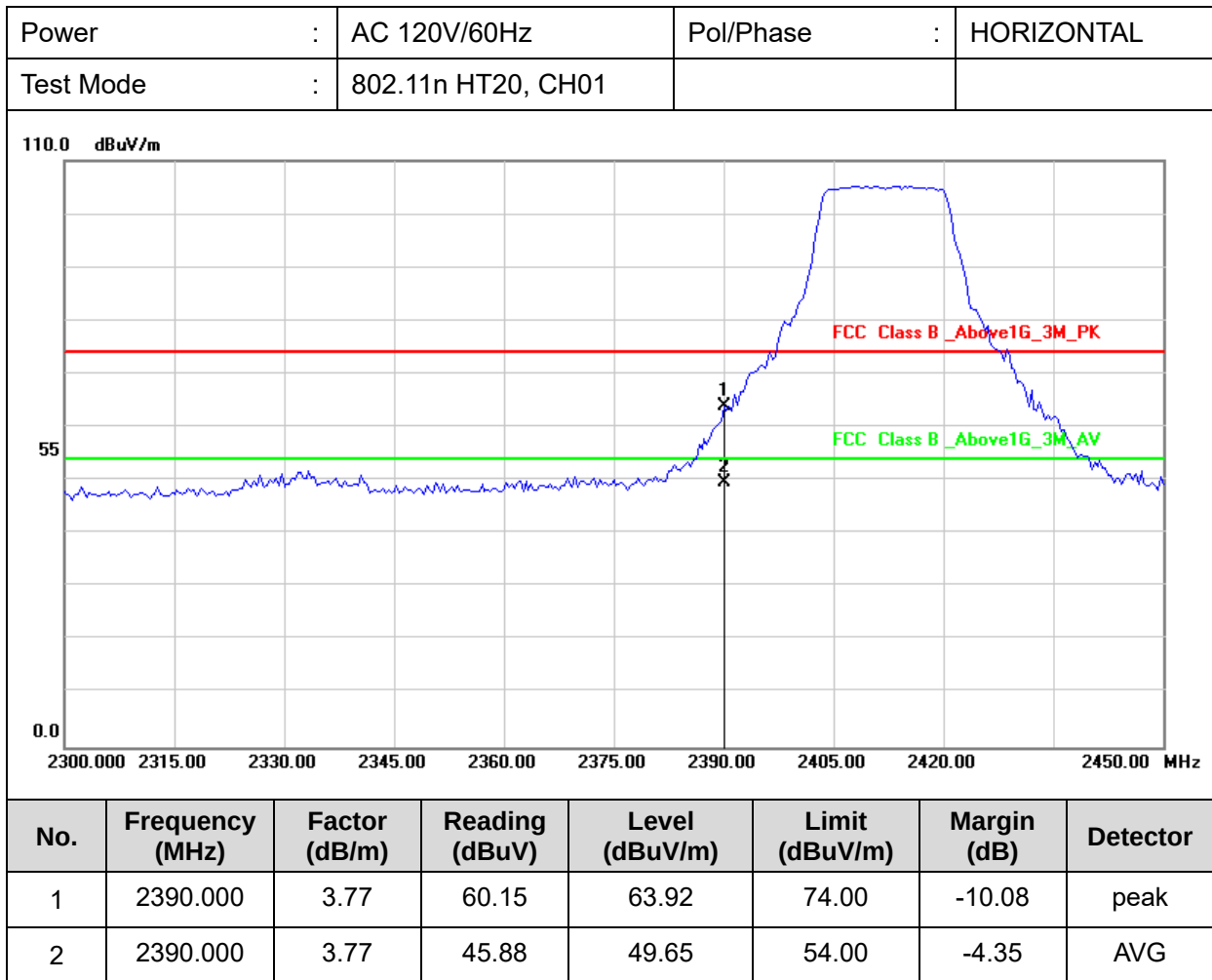
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



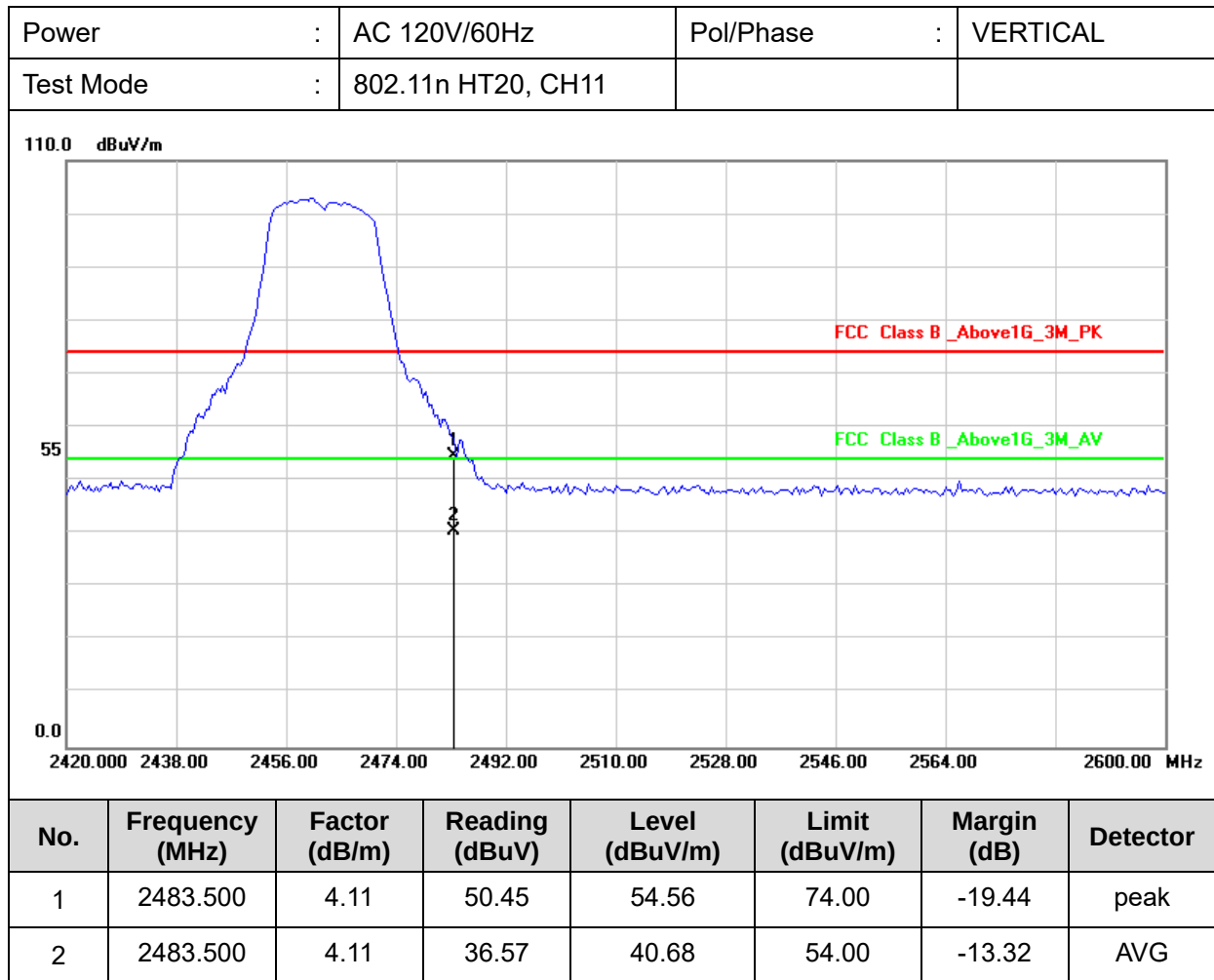
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



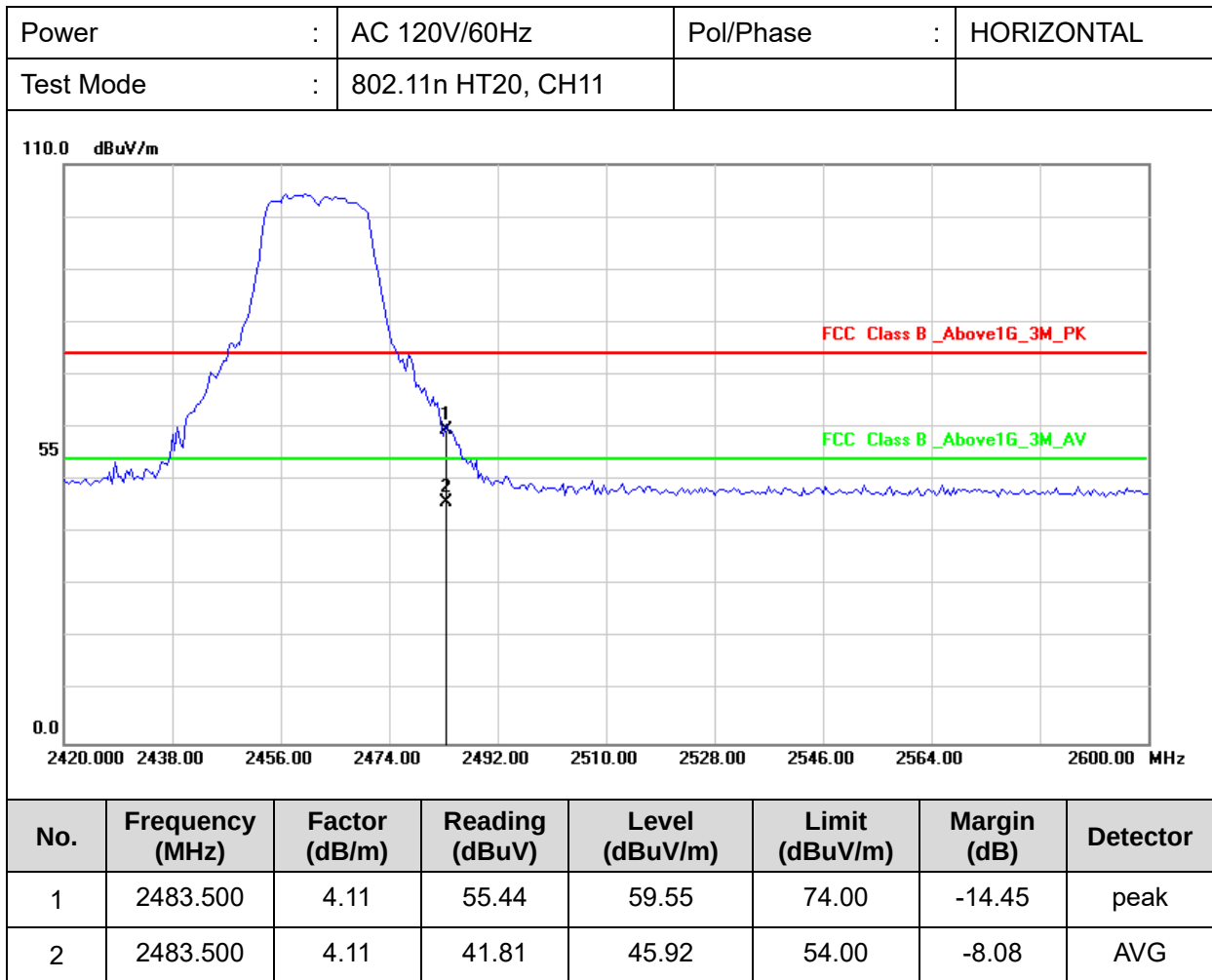
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



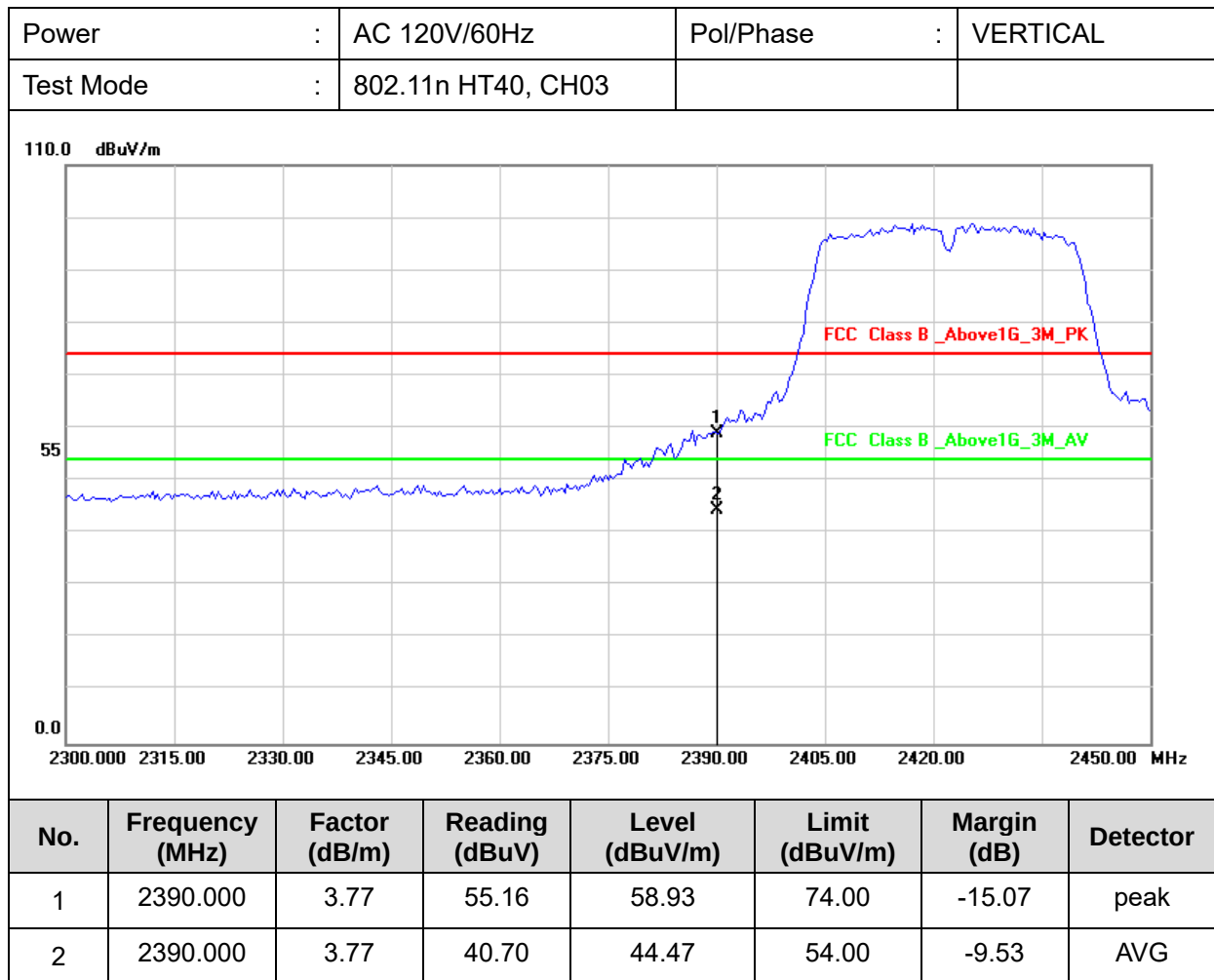
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



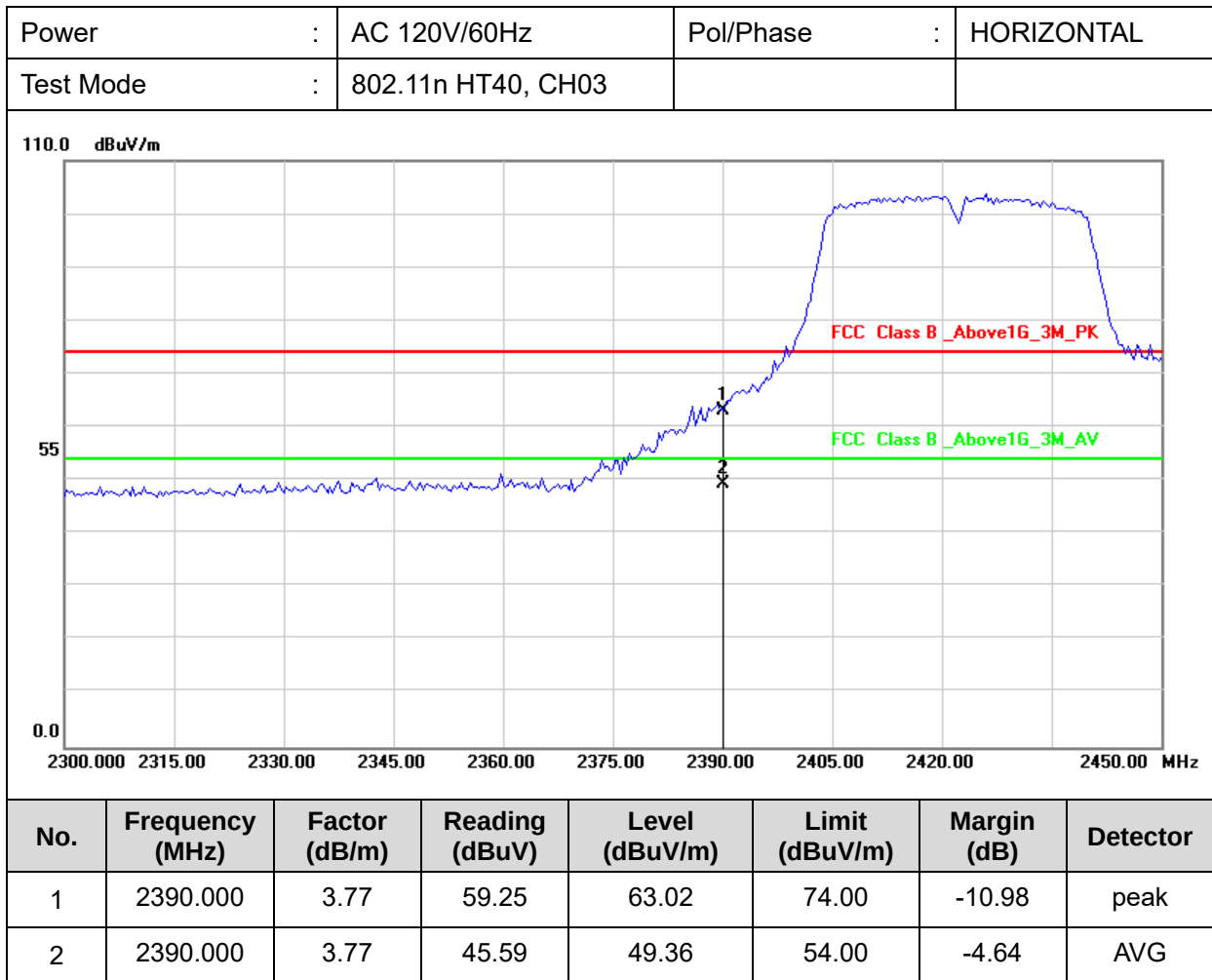
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



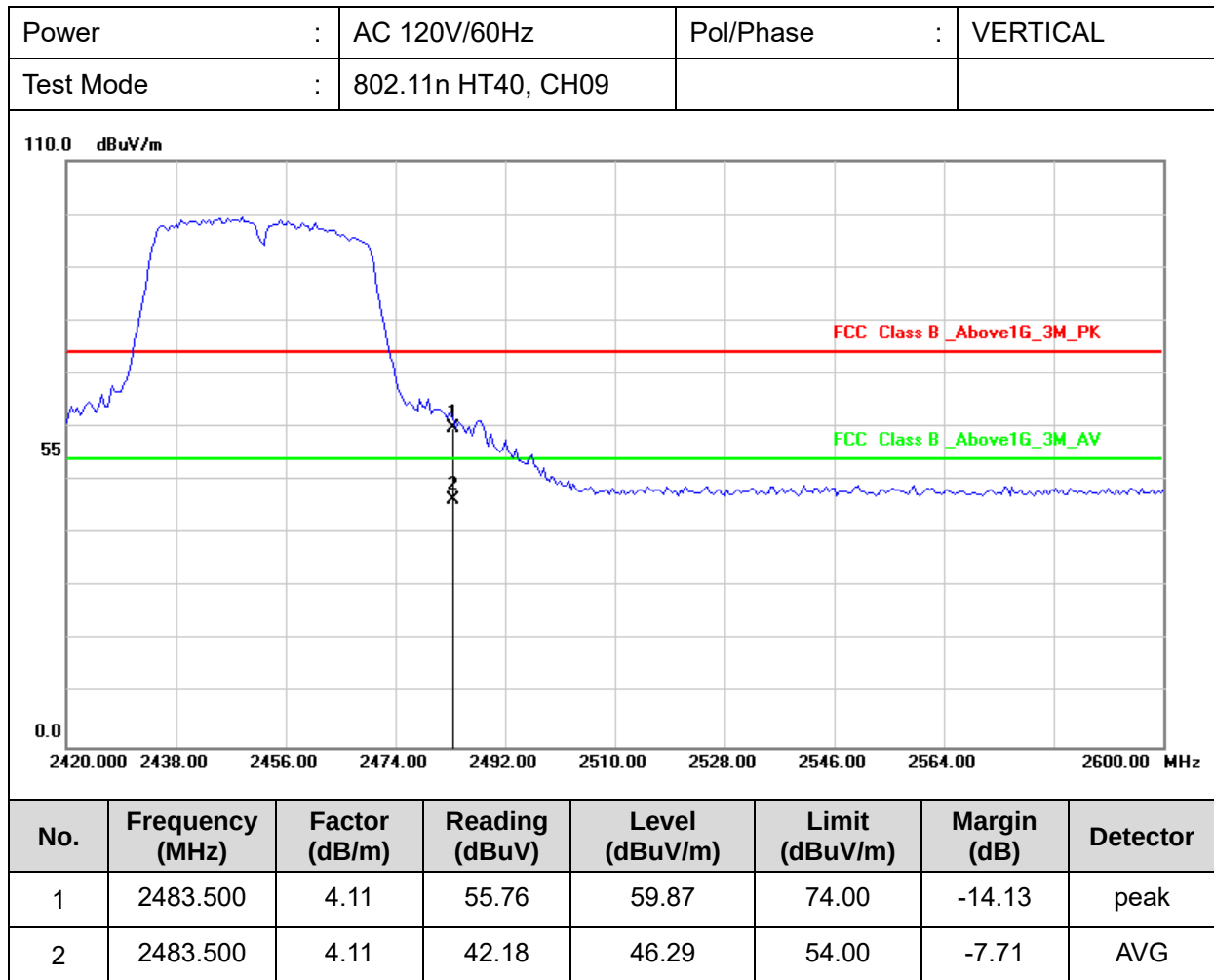
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



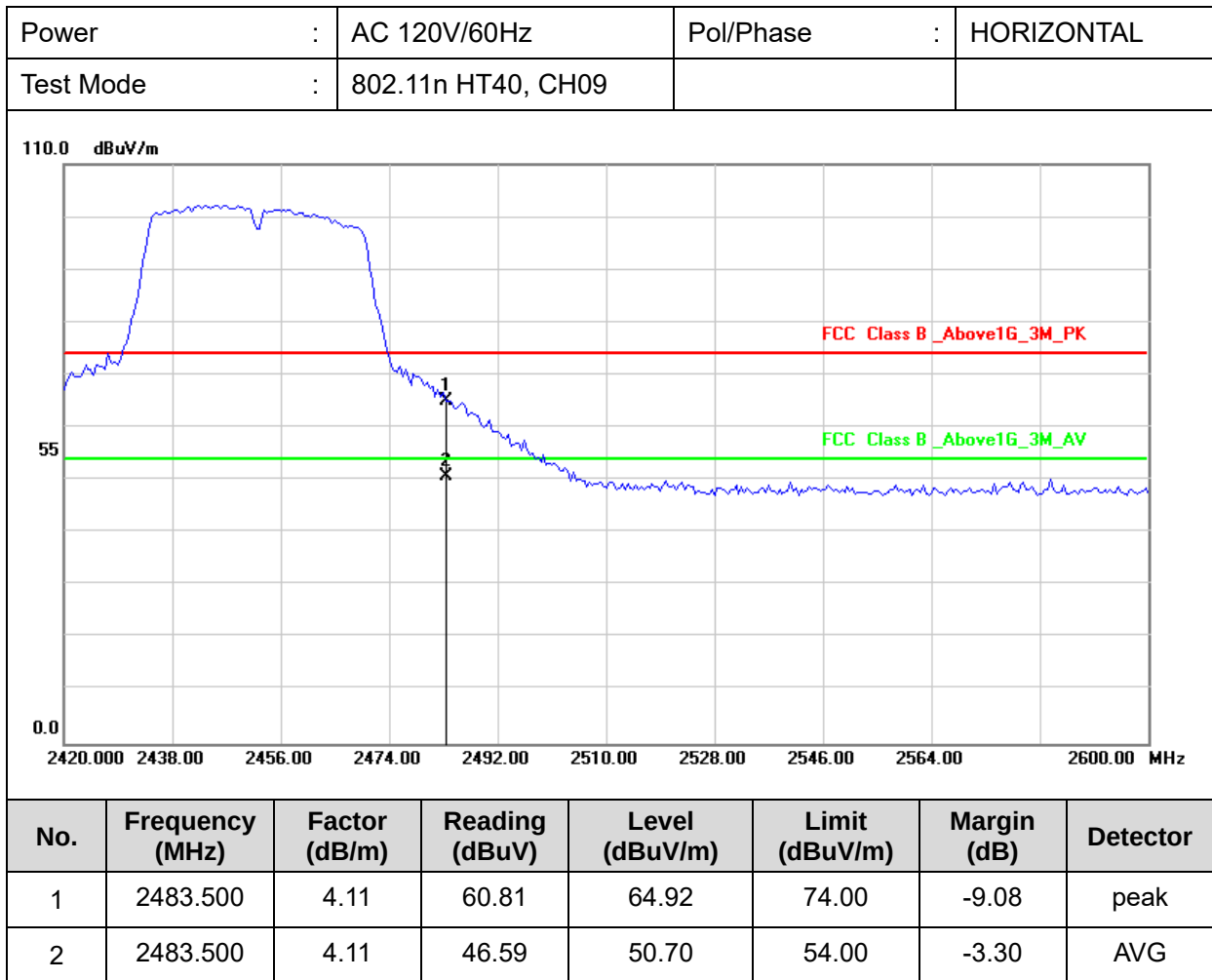
Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor



7. Test of Conducted Spurious Emission

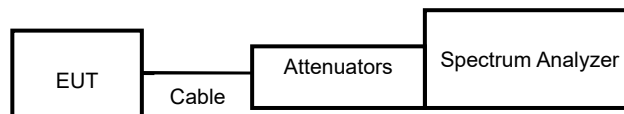
7.1 Test Limit

Below -20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- The band edges was measured and recorded.

7.3 Test Setup Layout



7.4 Test Result and Data

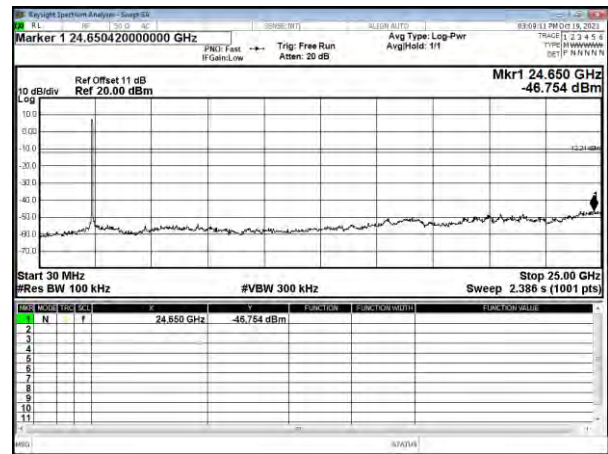
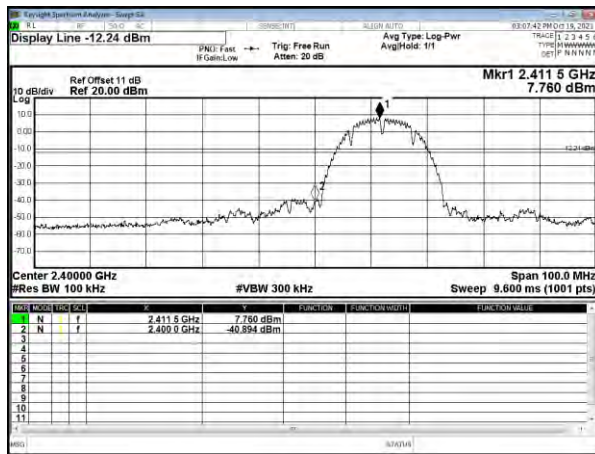
Note: Test plots refers to the following pages.



ANT A

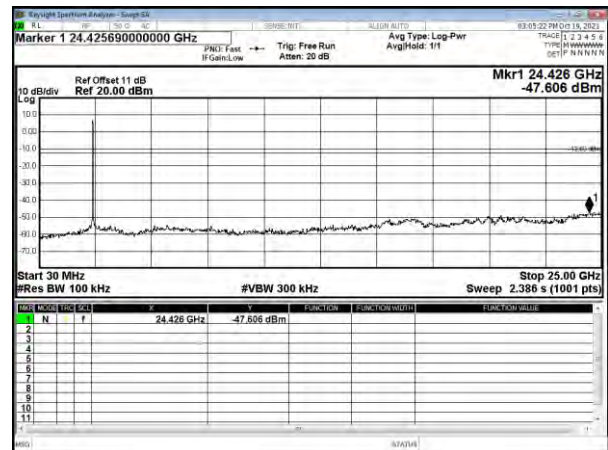
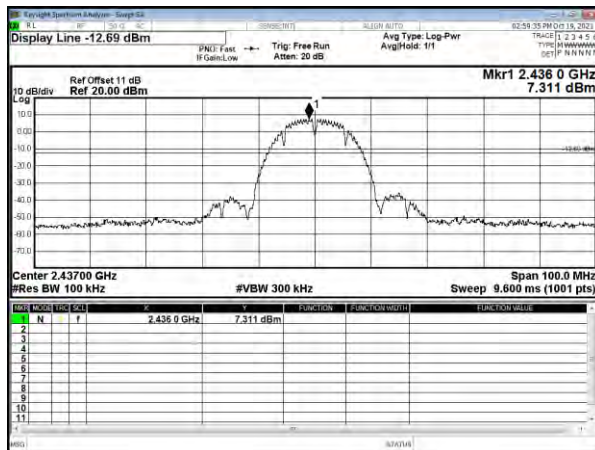
Modulation Standard: 802.11b

Channel: 01



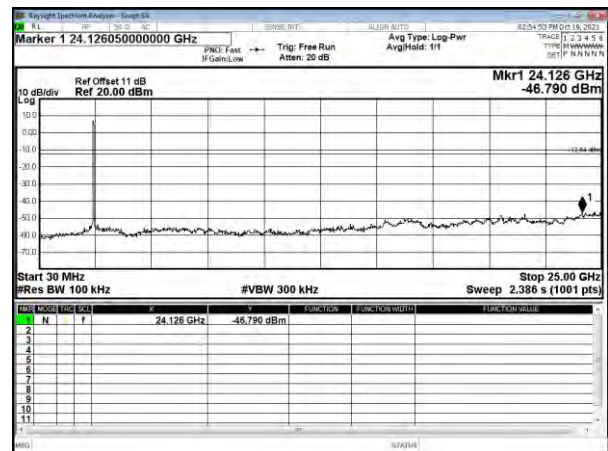
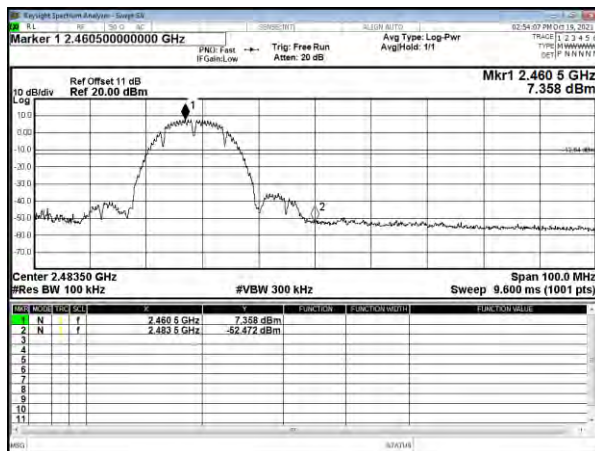
Modulation Standard: 802.11b

Channel: 06



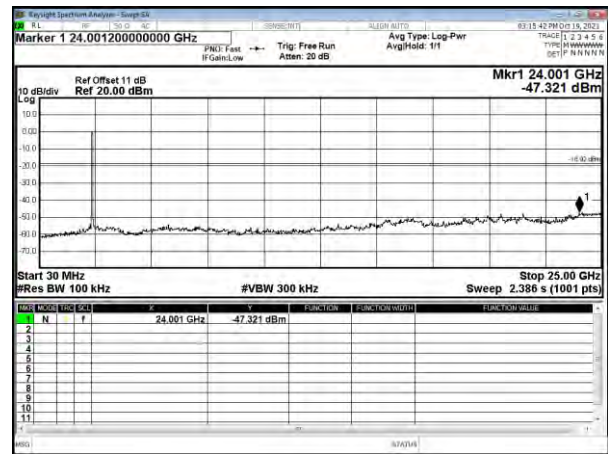
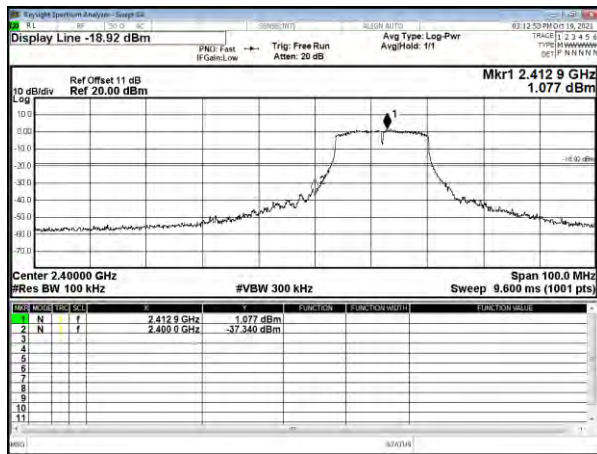
Modulation Standard: 802.11b

Channel: 11

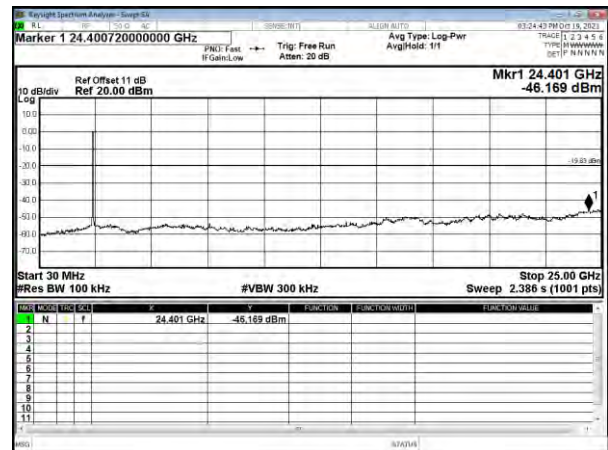
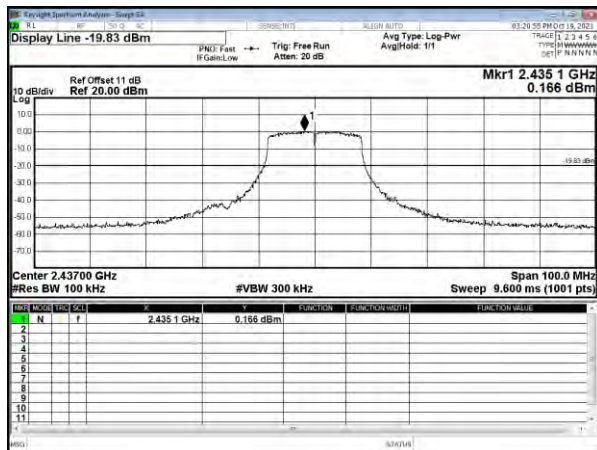




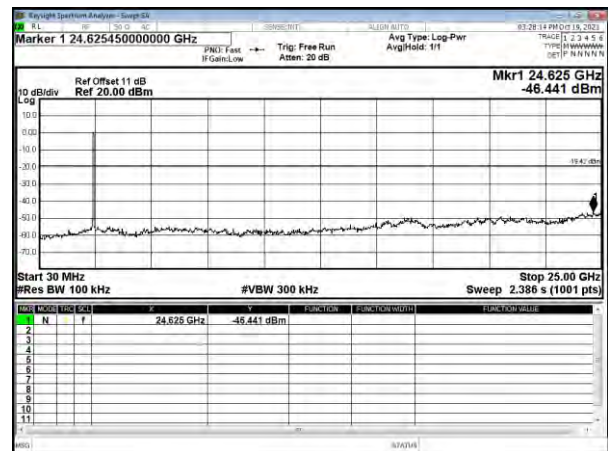
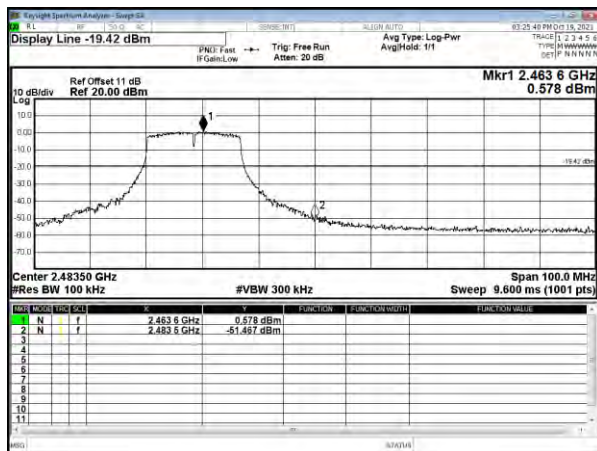
Modulation Standard: 802.11g
Channel: 01



Modulation Standard: 802.11g
Channel: 06

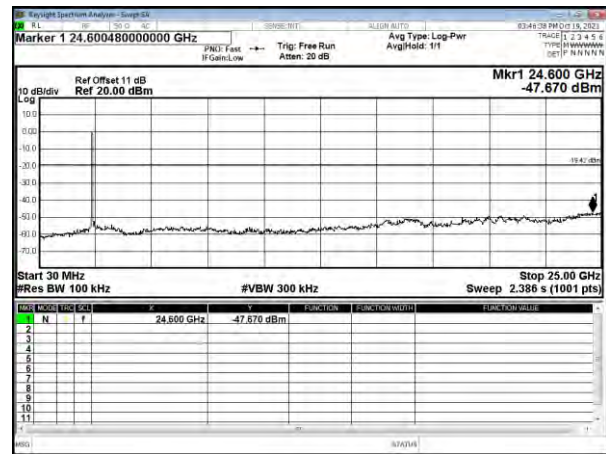
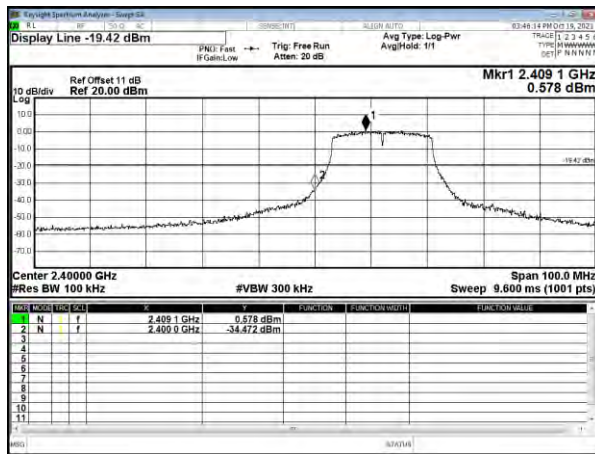


Modulation Standard: 802.11g
Channel: 11

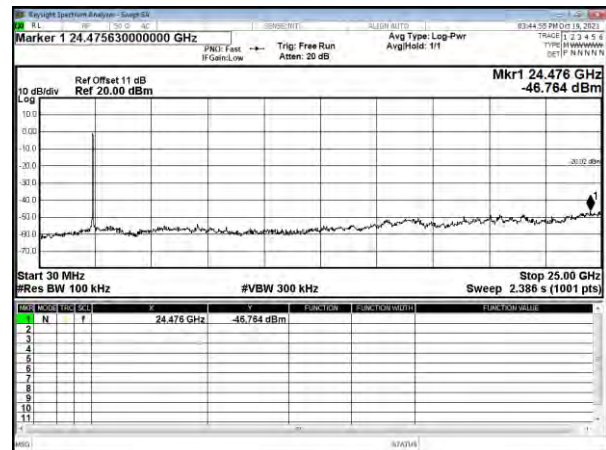
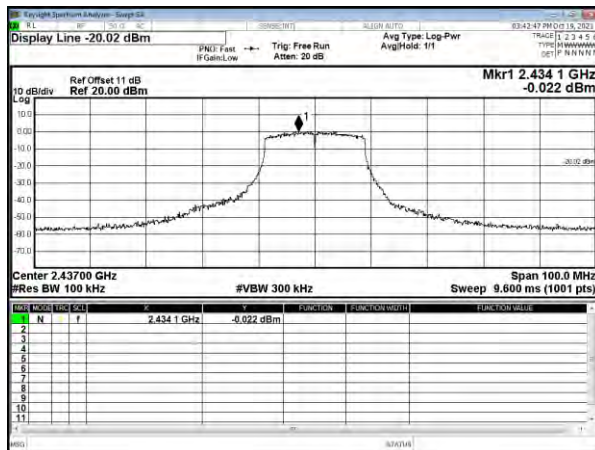




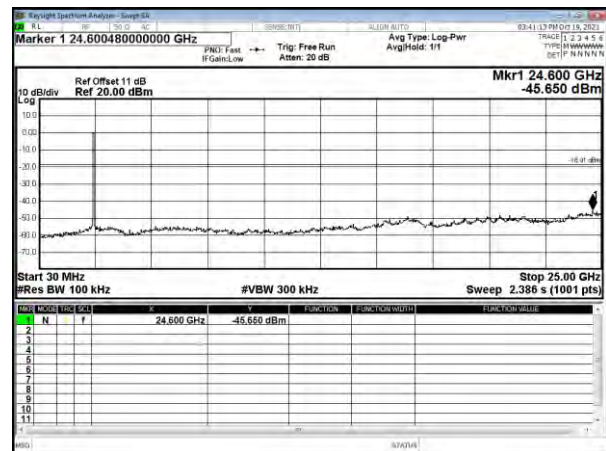
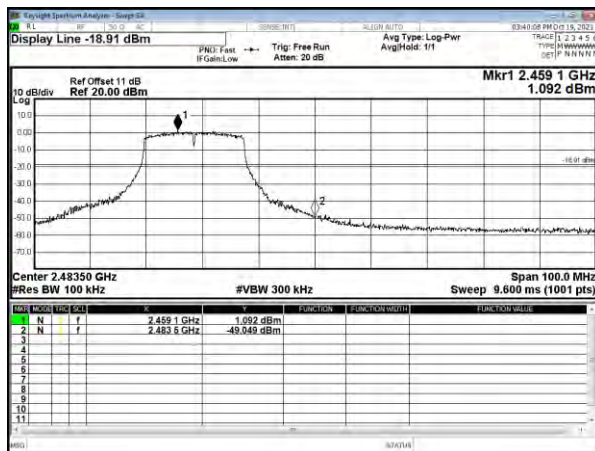
Modulation Standard: 802.11n HT20
Channel: 01



Modulation Standard: 802.11n HT20
Channel: 06

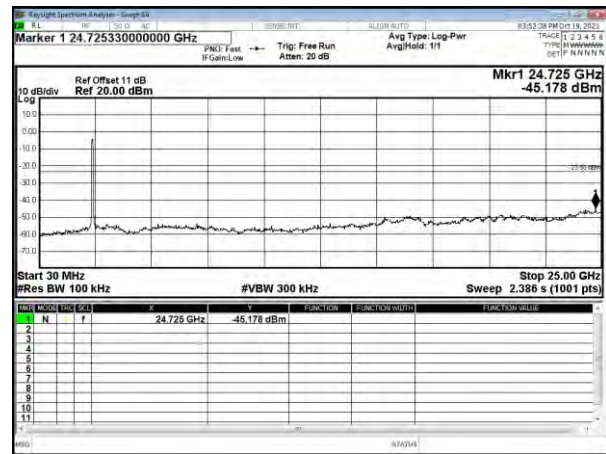
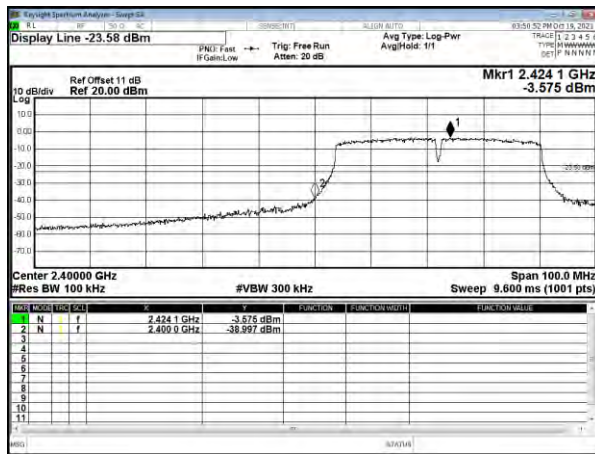


Modulation Standard: 802.11n HT20
Channel: 11

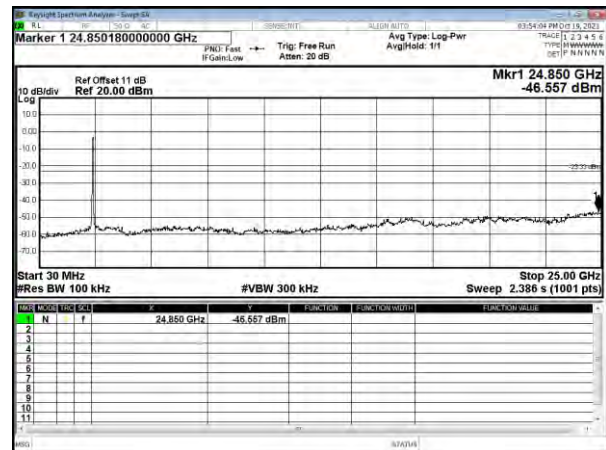
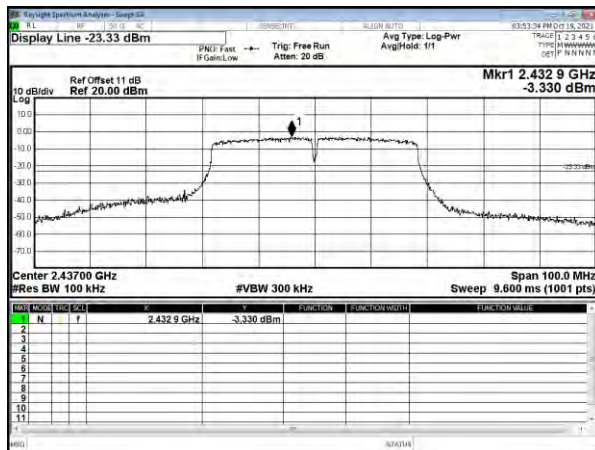




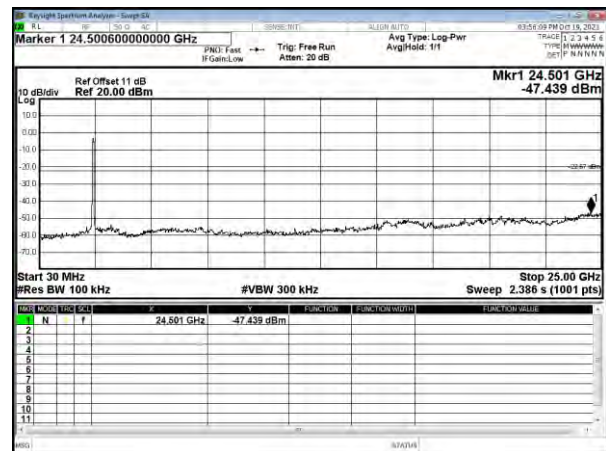
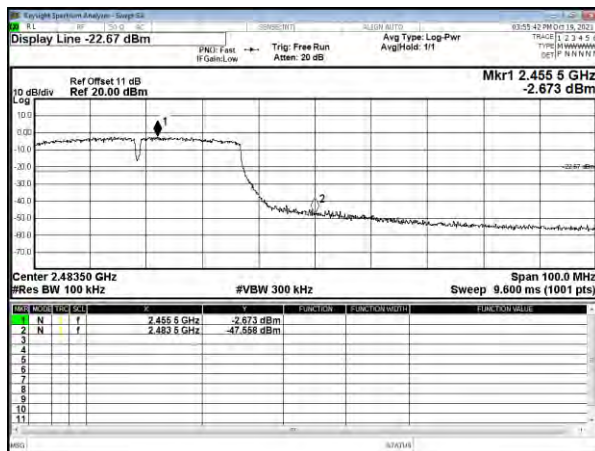
Modulation Standard: 802.11n HT40
Channel: 03



Modulation Standard: 802.11n HT40
Channel: 06



Modulation Standard: 802.11n HT40
Channel: 09

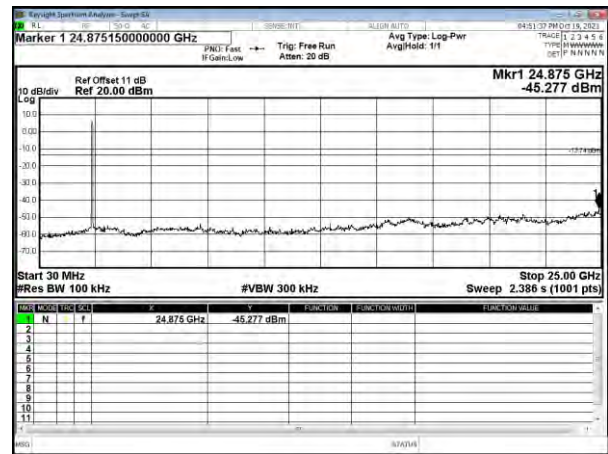
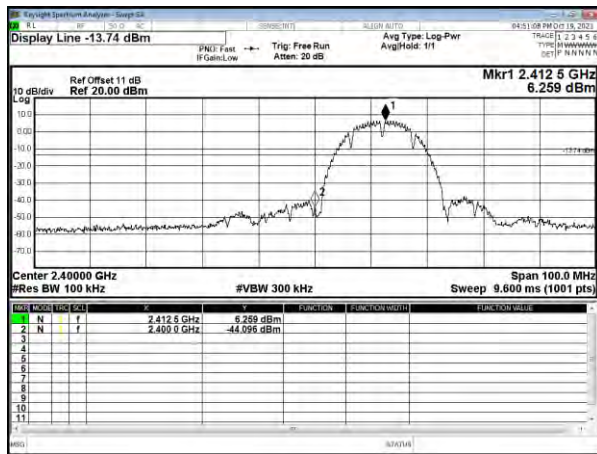




ANT B

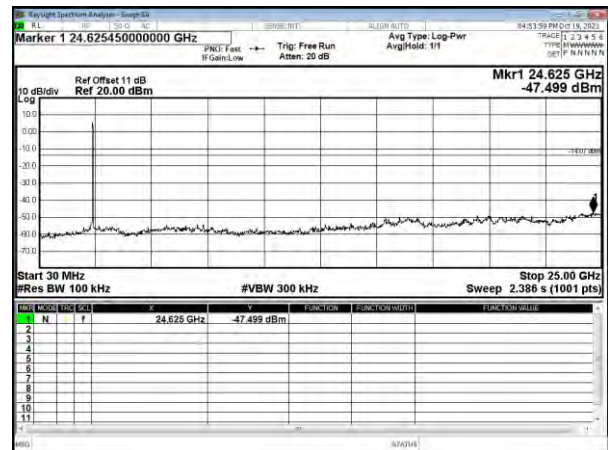
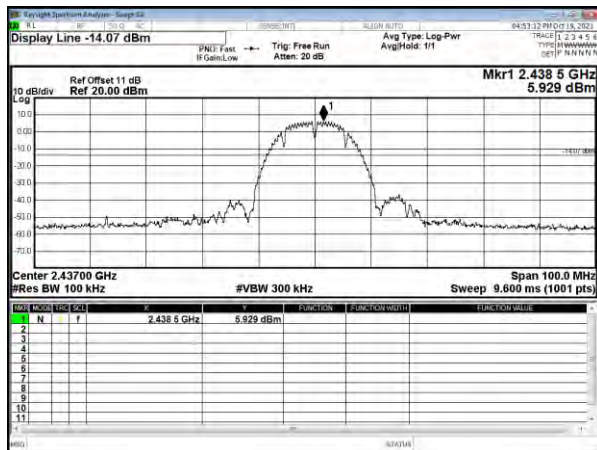
Modulation Standard: 802.11b

Channel: 01



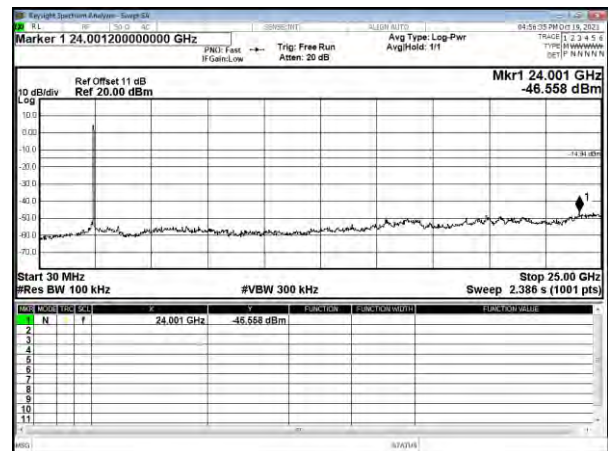
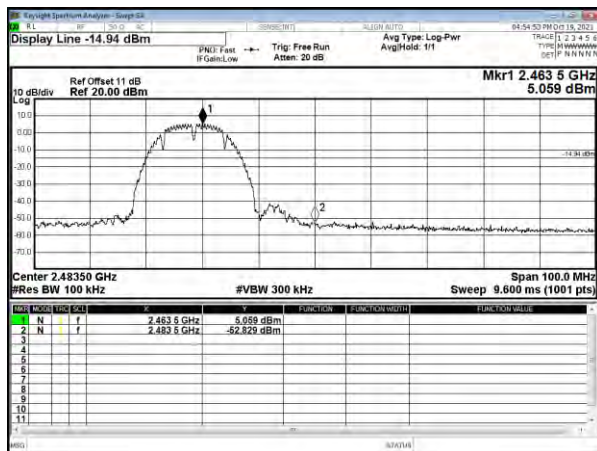
Modulation Standard: 802.11b

Channel: 06



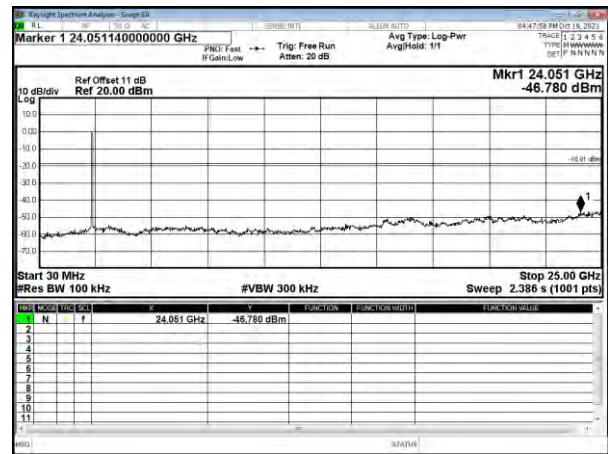
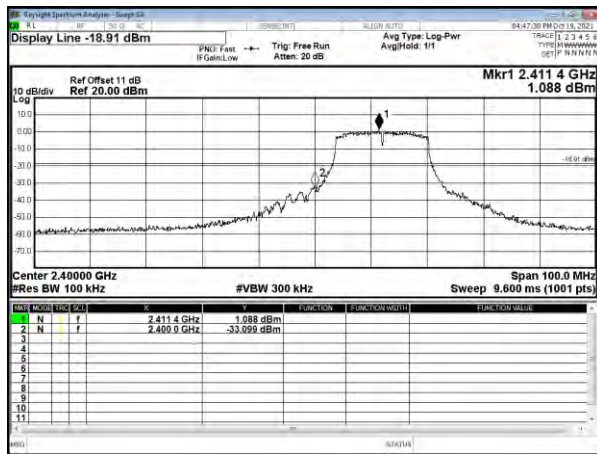
Modulation Standard: 802.11b

Channel: 11

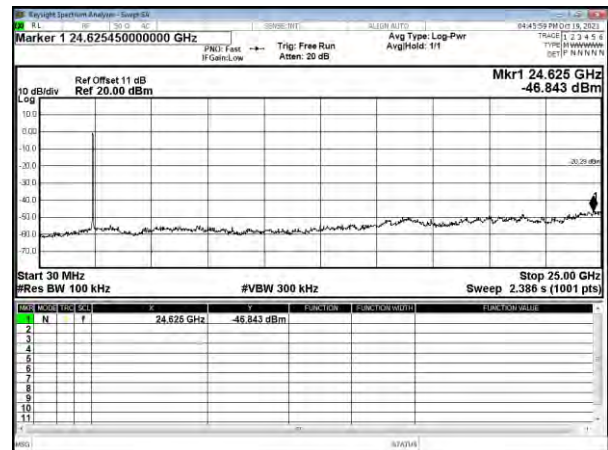
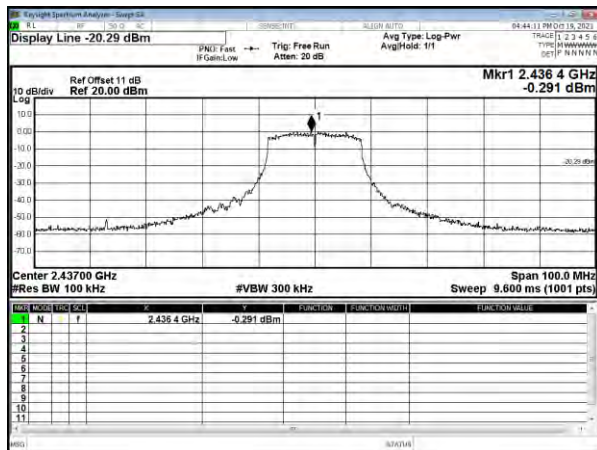




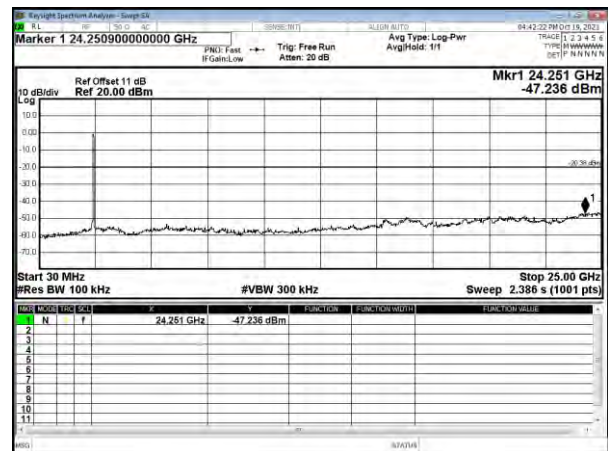
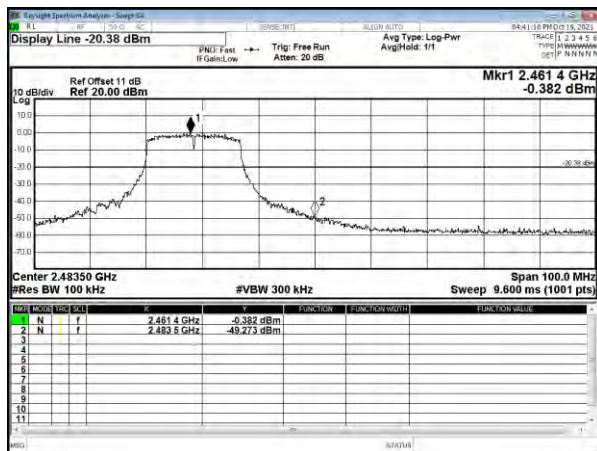
Modulation Standard: 802.11g
Channel: 01



Modulation Standard: 802.11g
Channel: 06

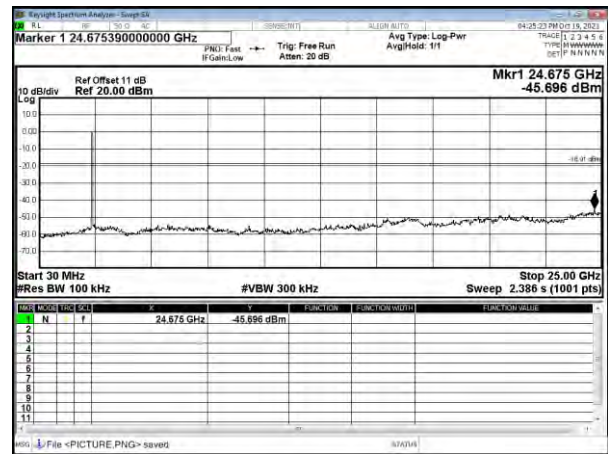
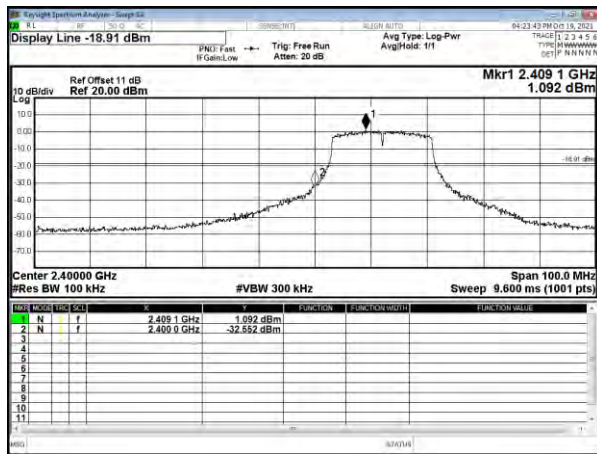


Modulation Standard: 802.11g
Channel: 11

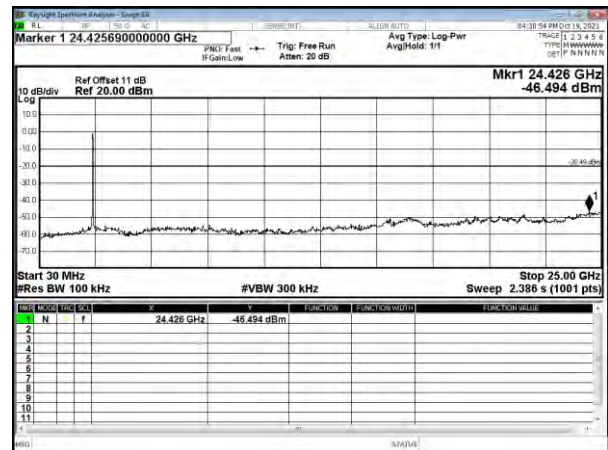
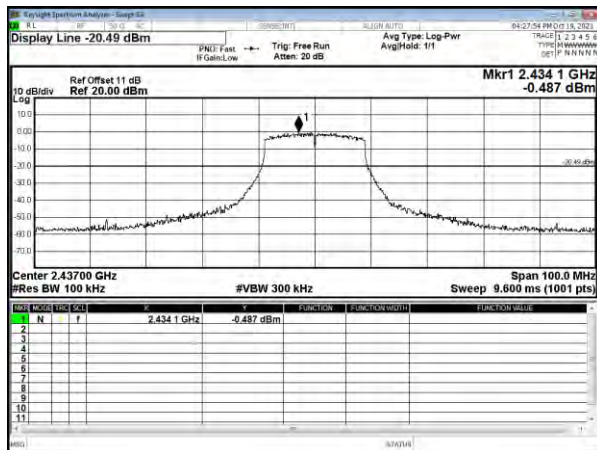




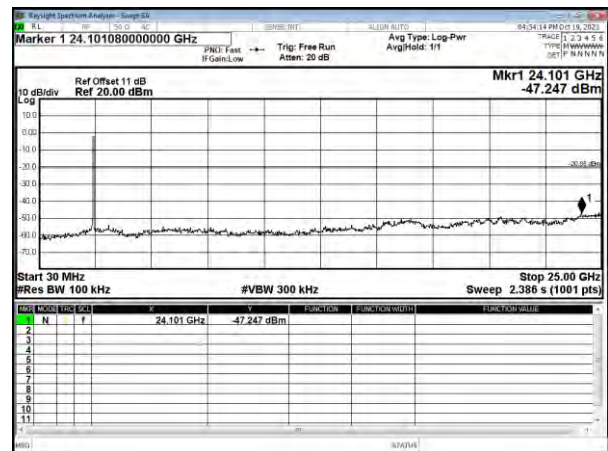
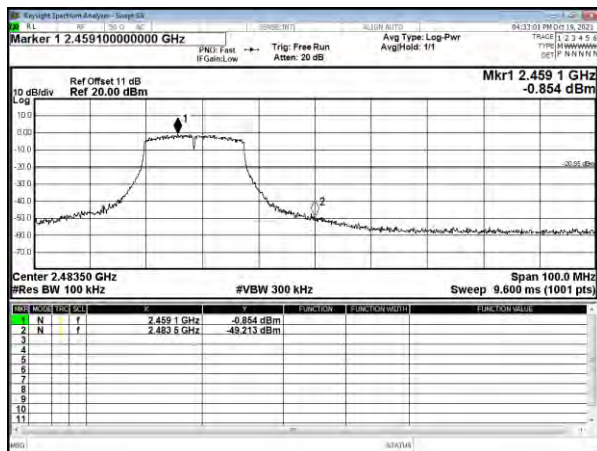
Modulation Standard: 802.11n HT20
Channel: 01



Modulation Standard: 802.11n HT20
Channel: 06

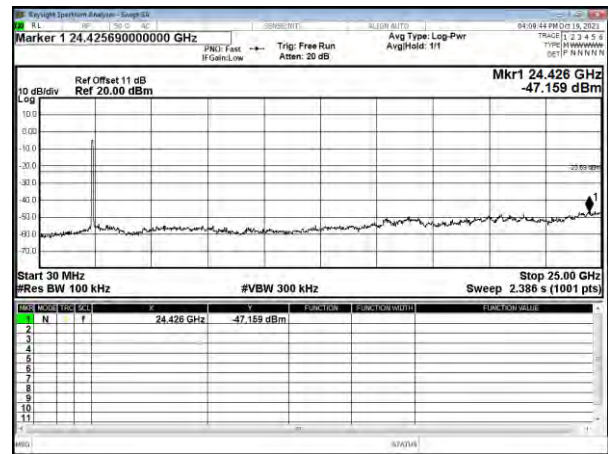
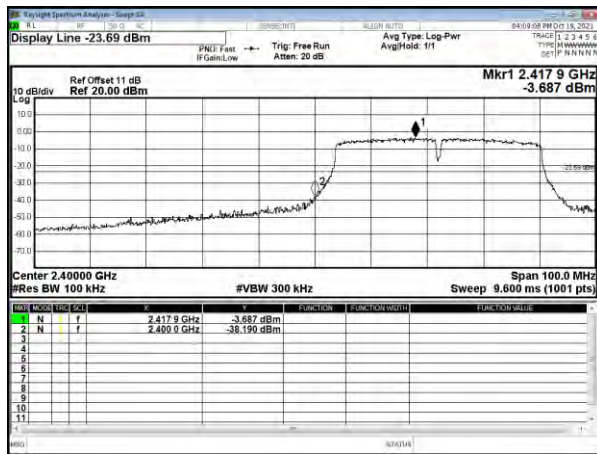


Modulation Standard: 802.11n HT20
Channel: 11

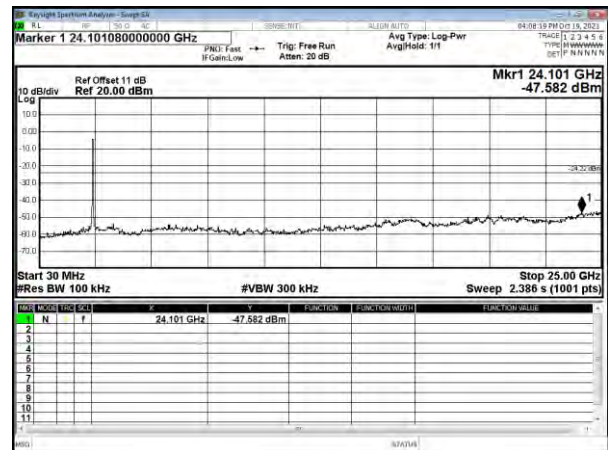
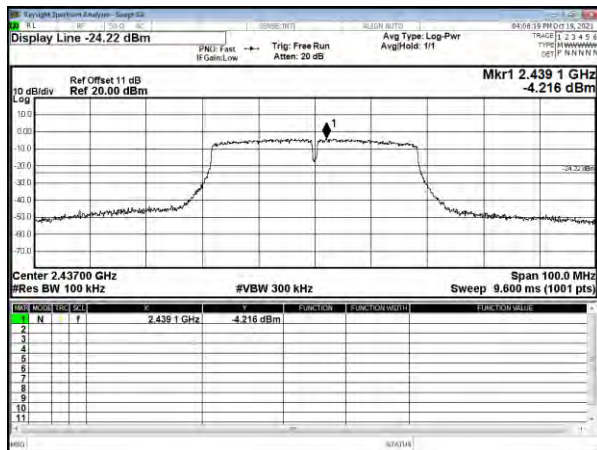




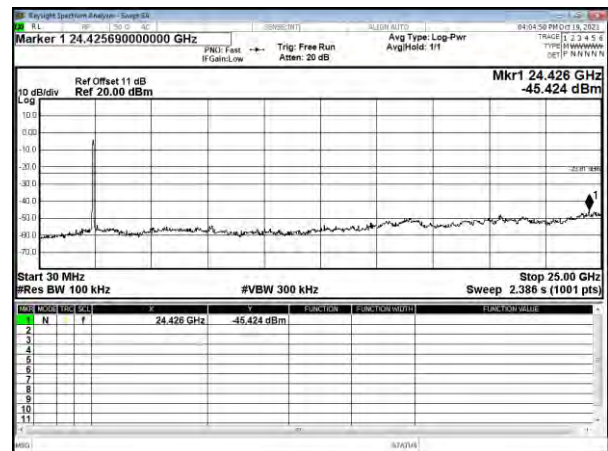
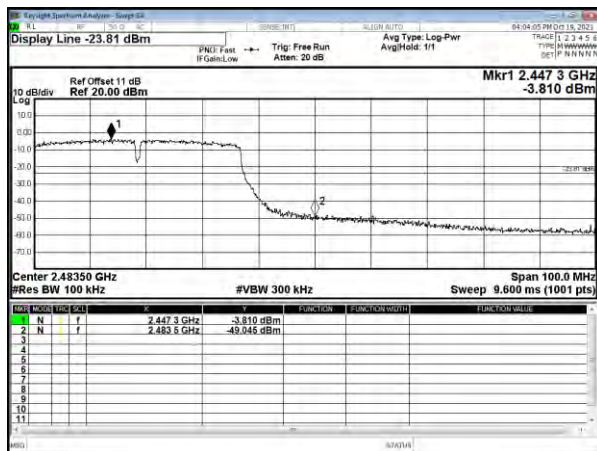
Modulation Standard: 802.11n HT40
Channel: 03



Modulation Standard: 802.11n HT40
Channel: 06



Modulation Standard: 802.11n HT40
Channel: 09





8. On Time, Duty Cycle and Measurement methods

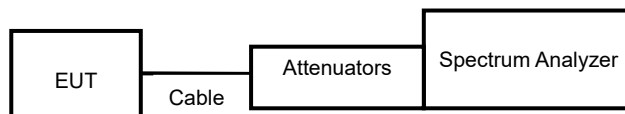
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

Zero-Span Spectrum Analyzer Method.

8.3 Test Setup Layout

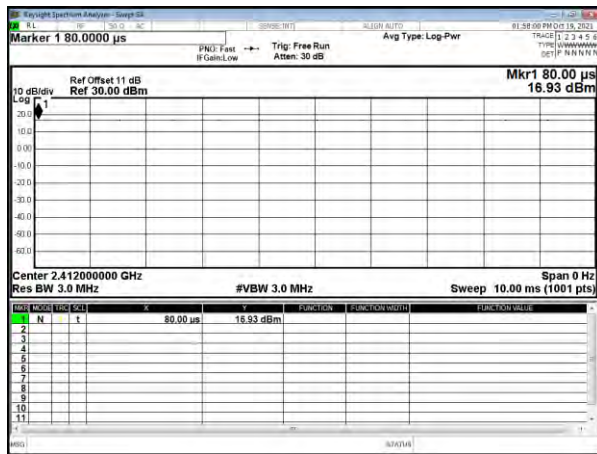


8.4 Test Result and Data

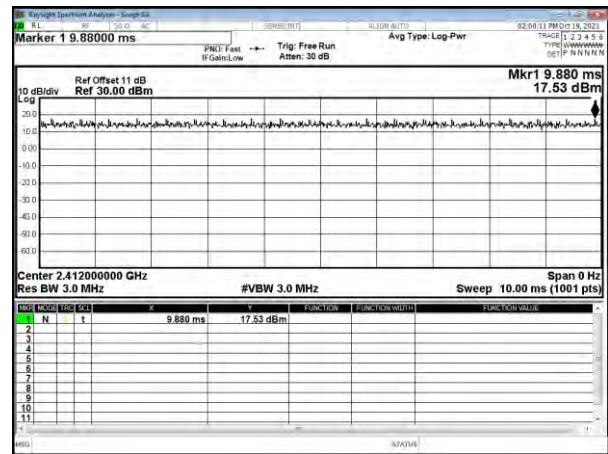
Modulation Type	On Time (ms)	Period Time (ms)	Duty Cycle (%)
11b	100.00	100.00	100.00%
11g	100.00	100.00	100.00%
11n HT20	100.00	100.00	100.00%
11n HT40	100.00	100.00	100.00%



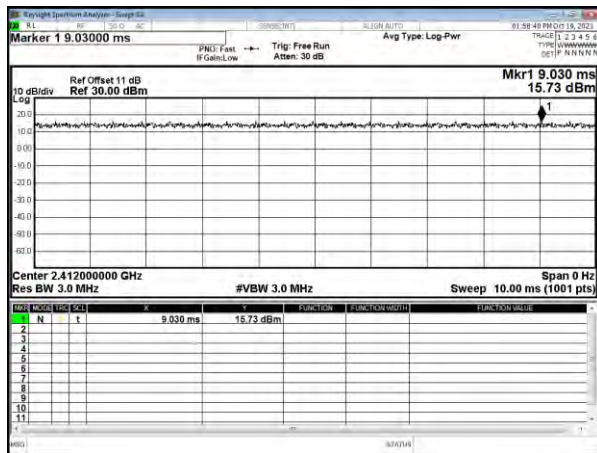
Modulation Type: 802.11b(1Mbps)



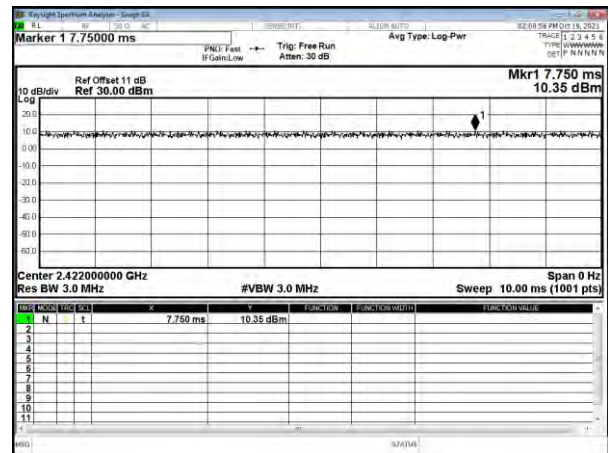
Modulation Type: 802.11n HT20(6.5Mbps)



Modulation Type: 802.11g(6Mbps)



Modulation Type: 802.11n HT40(13.5Mbps)





9. 6dB Bandwidth Measurement Data

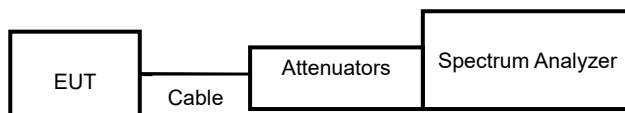
9.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

9.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 100 KHz and VBW to 300 KHz.
- Set spectrum analyzer X dB to 6 dB.
- Set spectrum analyzer peak detector with maximum hold.

9.3 Test Setup Layout



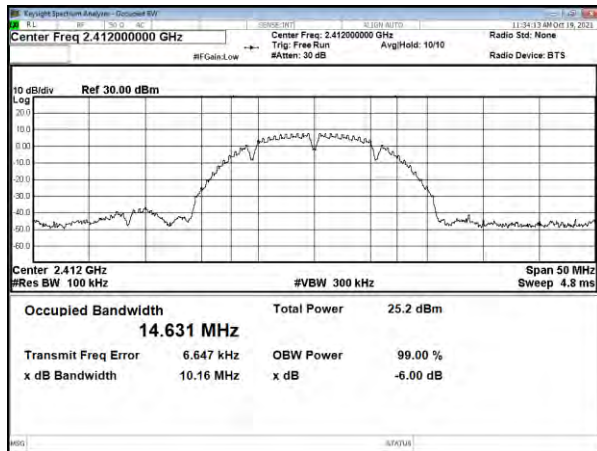
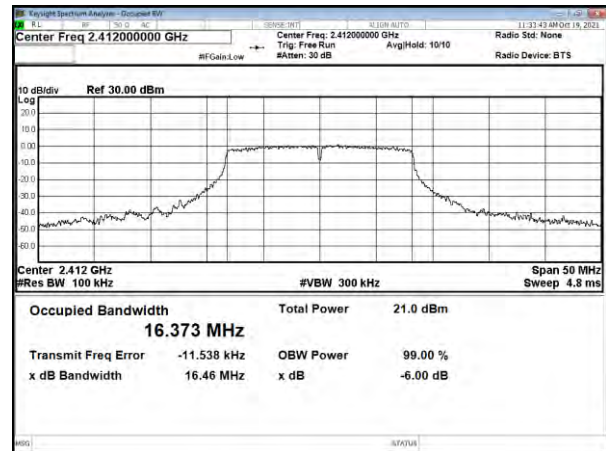


9.4 Test Result and Data

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			ANT A	ANT B	
IEEE 802.11b	01	2412	10.16	10.17	0.5
	06	2437	9.92	10.16	0.5
	11	2462	10.16	10.18	0.5
IEEE 802.11g	01	2412	16.46	16.46	0.5
	06	2437	16.48	16.45	0.5
	11	2462	16.48	16.46	0.5
IEEE 802.11n HT20	01	2412	17.66	17.66	0.5
	06	2437	17.67	17.68	0.5
	11	2462	17.66	17.67	0.5
IEEE 802.11n HT40	03	2422	36.43	36.41	0.5
	06	2437	36.42	36.42	0.5
	09	2452	36.44	36.44	0.5



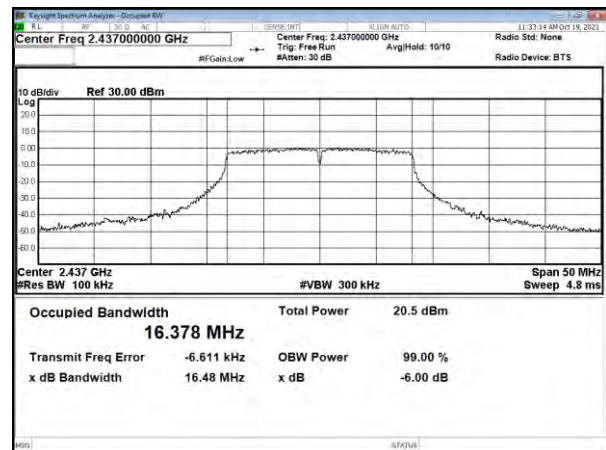
ANT A

Modulation Type: 802.11b
CH01Modulation Type: 802.11g
CH01

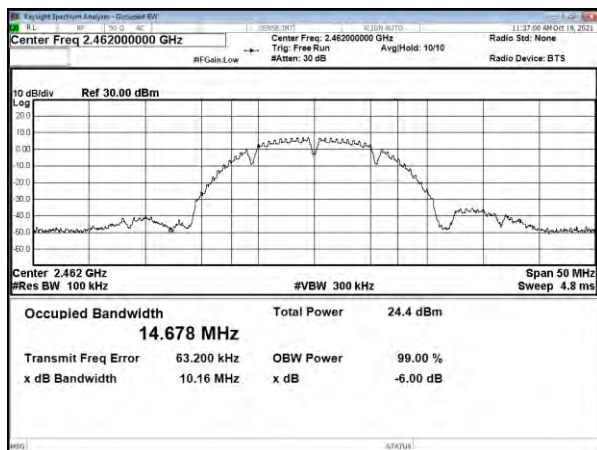
CH06



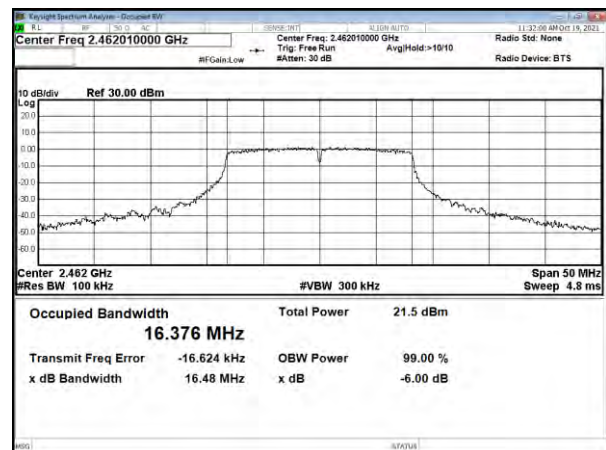
CH06



CH11

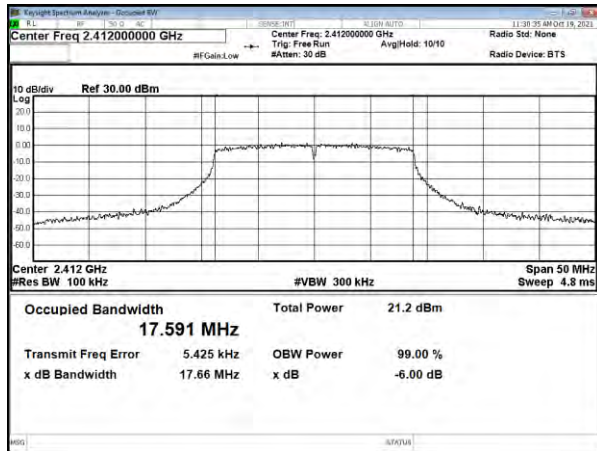


CH11

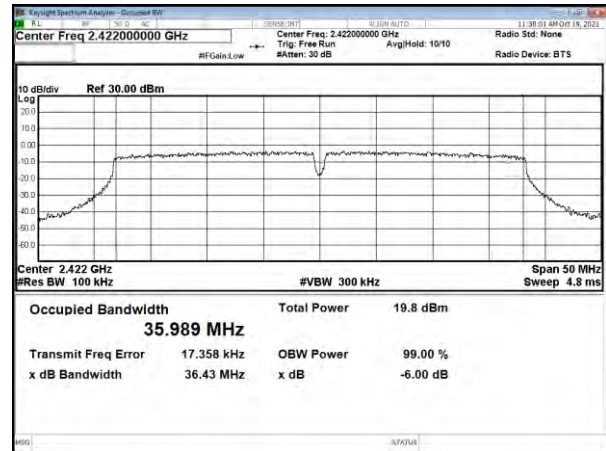




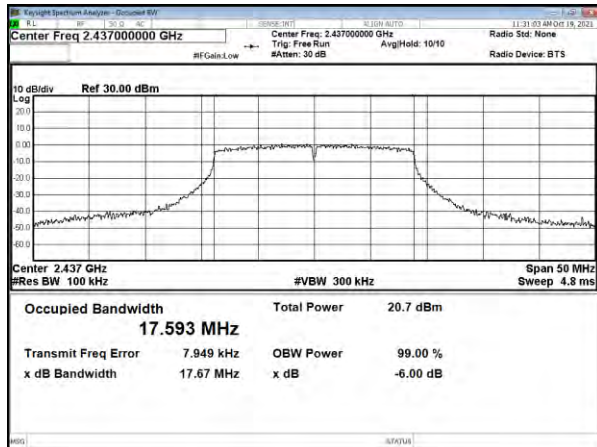
Modulation Type: 802.11n HT20
CH01



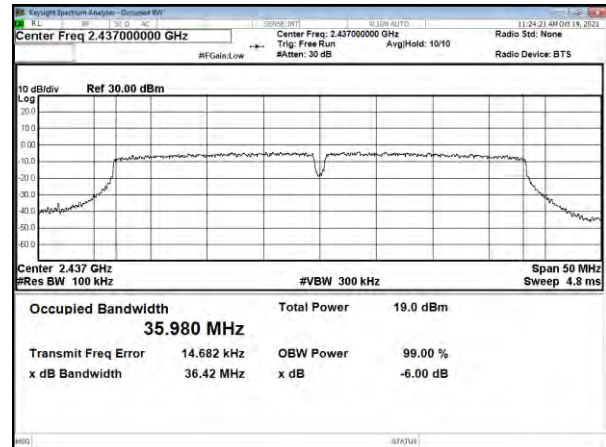
Modulation Type: 802.11n HT40
CH03



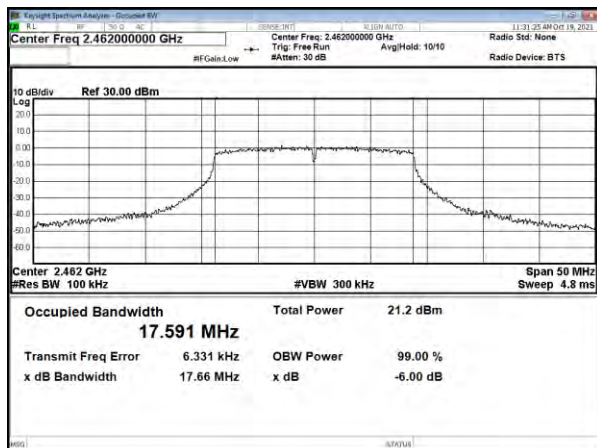
CH06



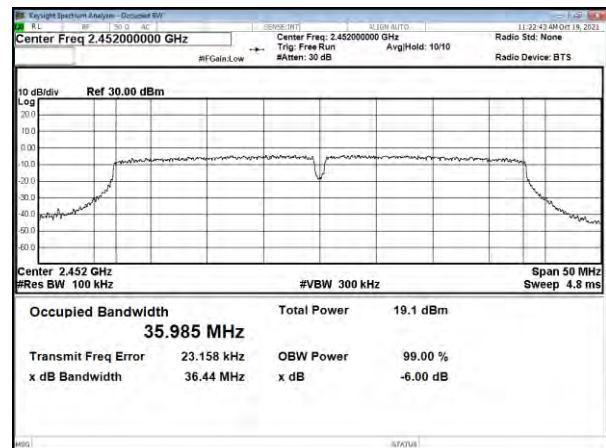
CH06

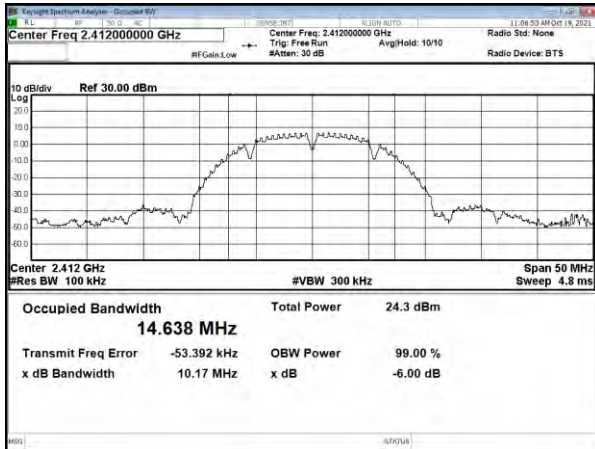
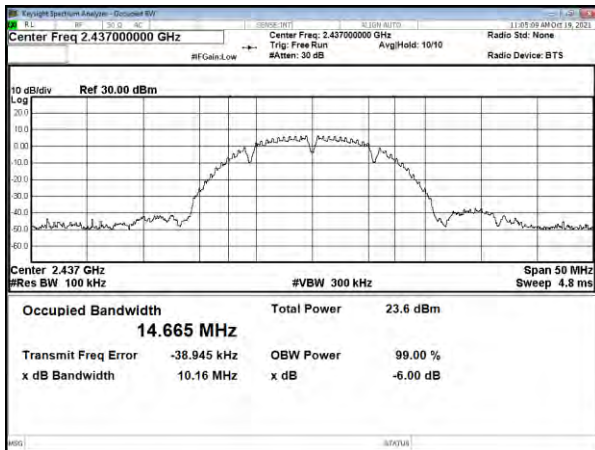
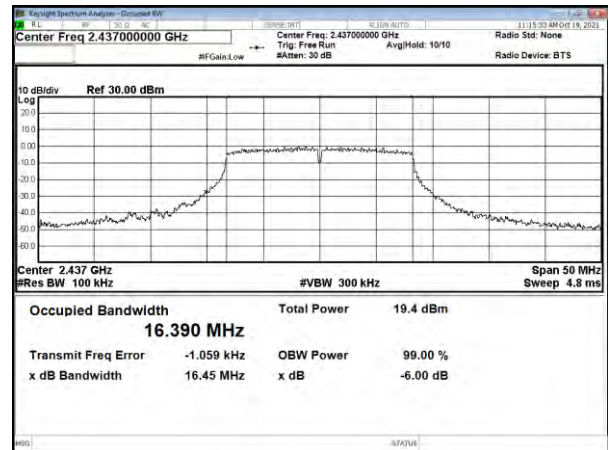
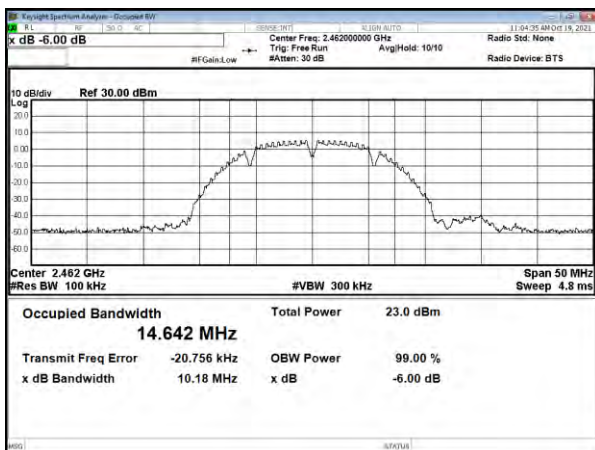
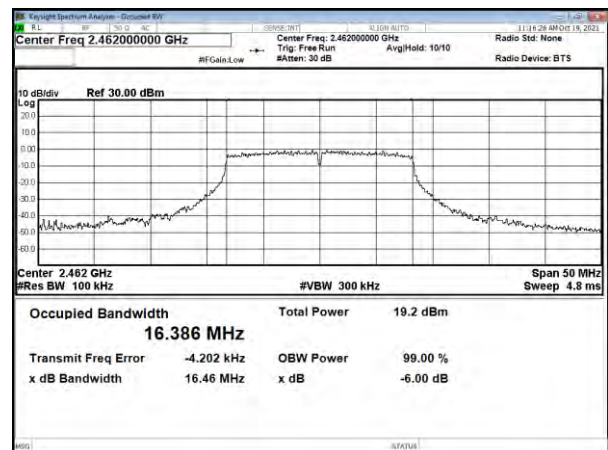


CH11



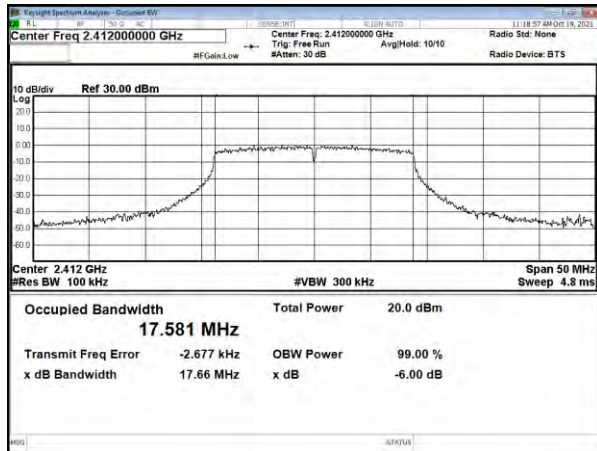
CH09



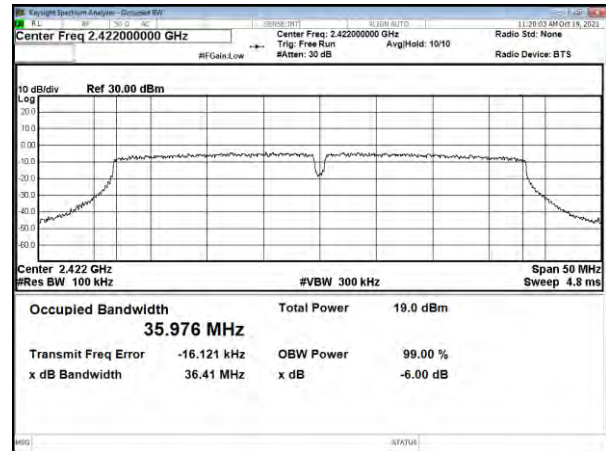
**ANT2**Modulation Type: 802.11b
CH01Modulation Type: 802.11g
CH01**CH06****CH06****CH11****CH11**



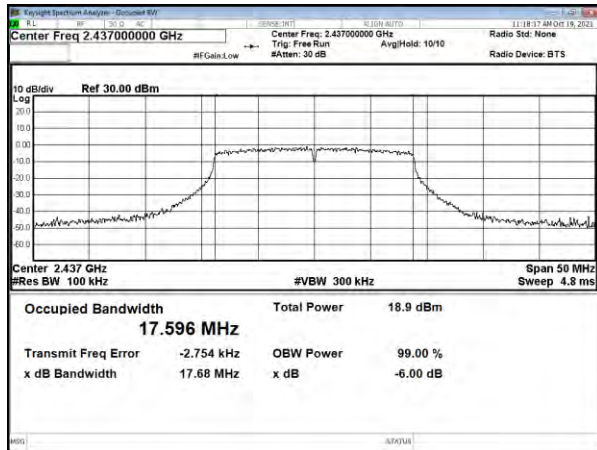
Modulation Type: 802.11n HT20
CH01



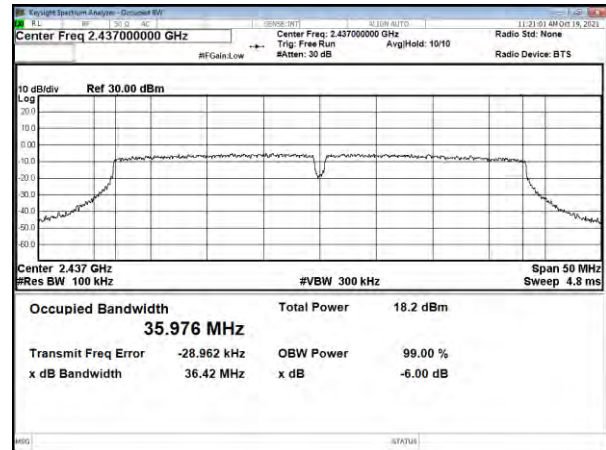
Modulation Type: 802.11n HT40
CH03



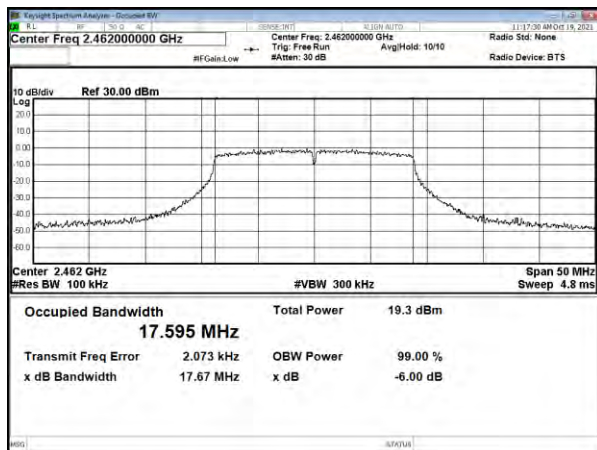
CH06



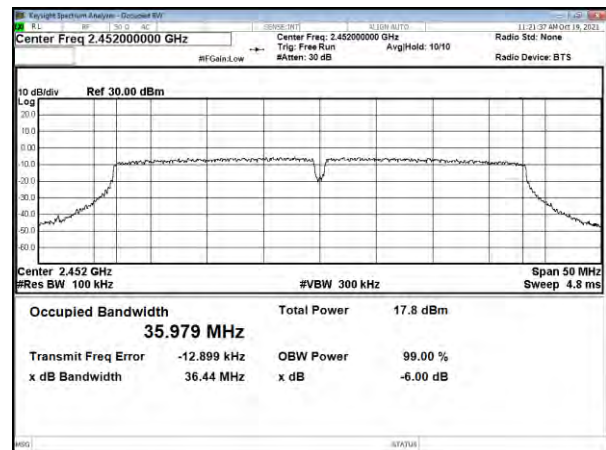
CH06



CH11



CH09





10. Maximum Peak Output Power

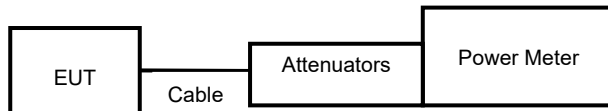
10.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

10.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

10.3 Test Setup Layout



**10.4 Test Result and Data**

Modulation Type	Channel	Frequency (MHz)	Conducted(peak) output power (dBm)		Total peak power (dBm)	Total peak power (mW)	Power Limit (dBm)
			ANT A	ANT B			
11b	1	2412	20.70	19.95	23.35	216.35	30.00
	6	2437	19.16	19.48	22.33	171.13	30.00
	11	2462	19.20	19.18	22.20	165.97	30.00
11g	1	2412	21.16	21.62	24.41	275.83	30.00
	6	2437	20.81	21.11	23.97	249.63	30.00
	11	2462	21.01	20.60	23.82	241.00	30.00
11n HT20	1	2412	22.21	21.83	25.03	318.75	30.00
	6	2437	22.09	21.09	24.63	290.34	30.00
	11	2462	22.32	20.71	24.60	288.37	30.00
11n HT40	3	2422	20.99	20.00	23.53	225.60	30.00
	6	2437	20.54	19.45	23.04	201.34	30.00
	9	2452	20.57	19.57	23.11	204.60	30.00



11. Power Spectral Density

11.1 Test Limit

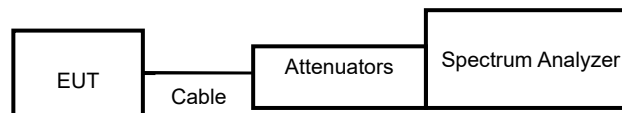
The Maximum of Power Spectral Density Measurement is 8dBm.

If transmitting antennas of directional gain greater than 6 dBi are used, the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

11.2 Test Procedures

- The transmitter output was connected to spectrum analyzer.
- The spectrum analyzer's resolution bandwidth were set at 3kHz RBW and 10KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
- The power spectral density was measured and recorded.

11.3 Test Setup Layout

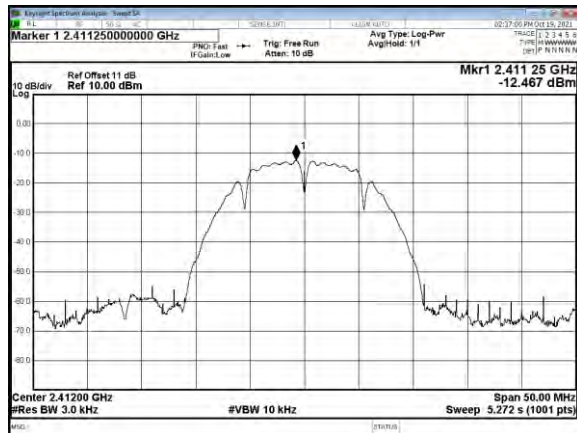
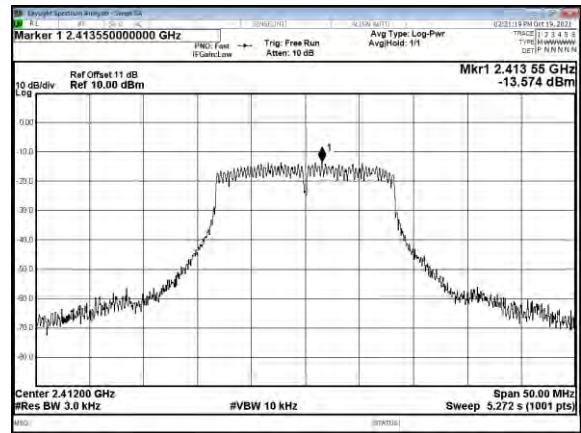


**11.4 Test Result and Data**

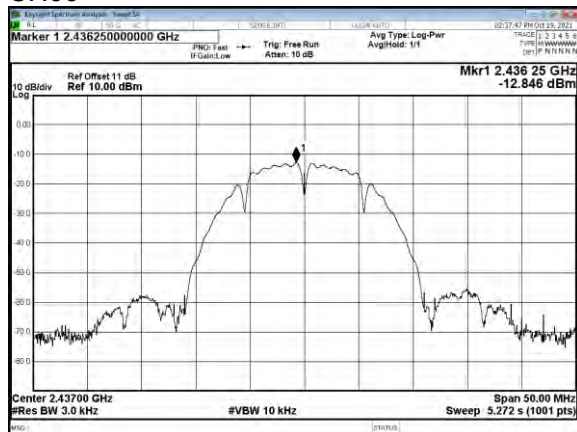
Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3KHz Bandwidth(dBm)		Sum chain (dBm)	Limit (dBm)
			ANT A	ANT B		
11b	1	2412	-12.467	-13.954	-10.14	6.64
	6	2437	-12.846	-14.429	-10.56	6.64
	11	2462	-12.236	-14.667	-10.27	6.64
11g	1	2412	-13.574	-14.911	-11.18	6.64
	6	2437	-13.392	-15.312	-11.24	6.64
	11	2462	-13.608	-15.767	-11.54	6.64
11n HT20	1	2412	-13.013	-13.218	-10.10	6.64
	6	2437	-13.528	-14.01	-10.75	6.64
	11	2462	-13.805	-15.067	-11.38	6.64
11n HT40	3	2422	-17.449	-17.517	-14.47	6.64
	6	2437	-17.238	-17.522	-14.37	6.64
	9	2452	-16.365	-16.468	-13.41	6.64



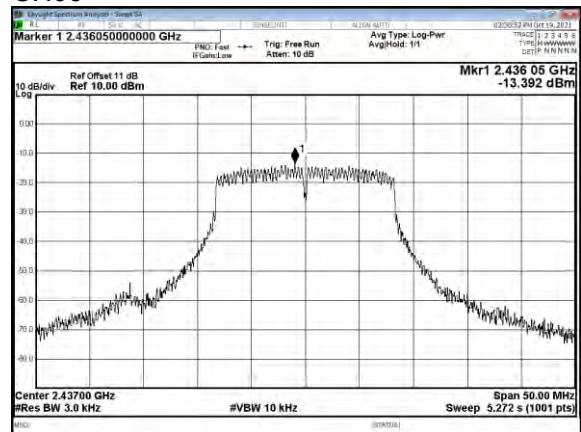
ANT A

Modulation Type: 802.11b
CH01Modulation Type: 802.11g
CH01

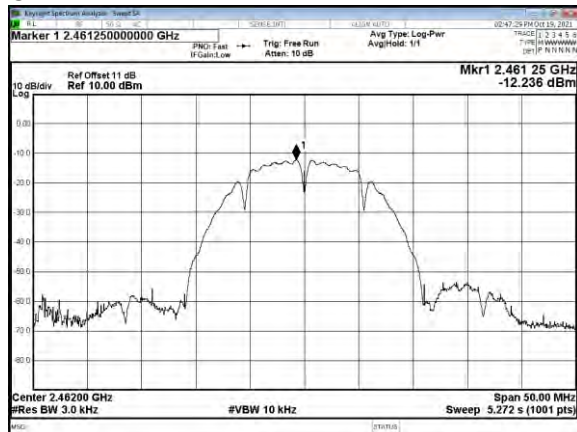
CH06



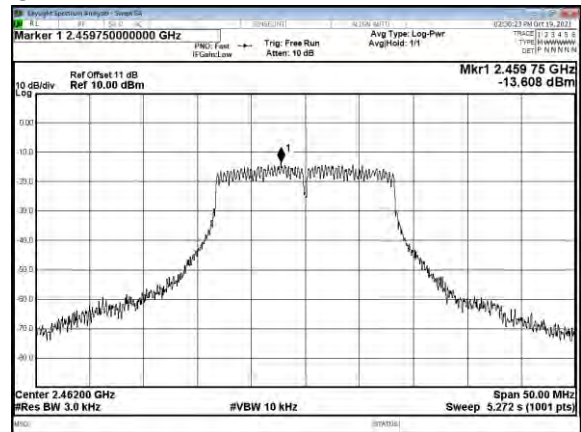
CH06

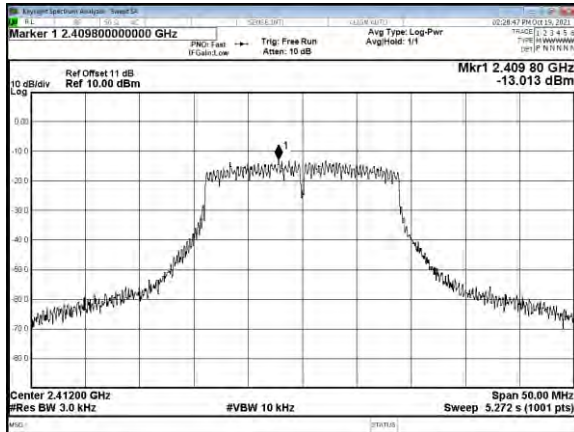
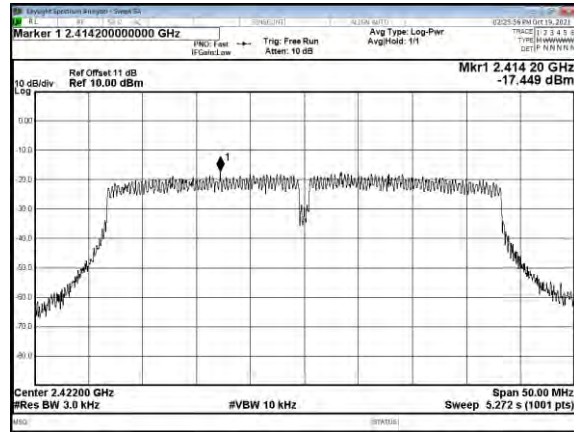


CH11

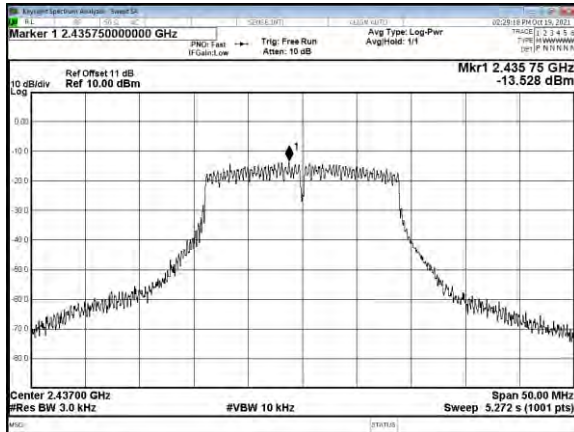


CH11

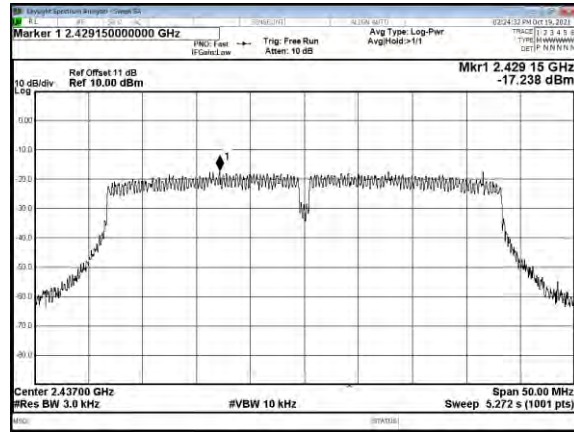


Modulation Type: 802.11n HT20
CH01Modulation Type: 802.11n HT40
CH03

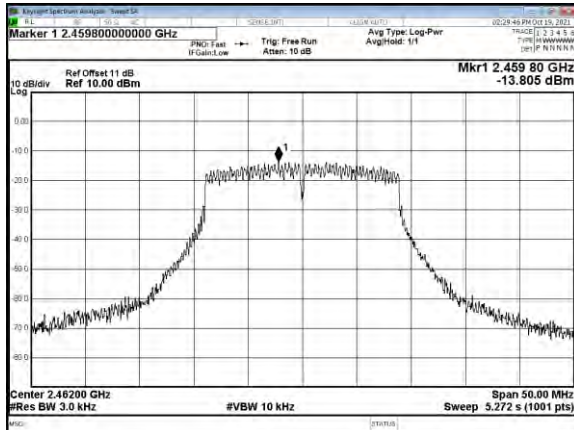
CH06



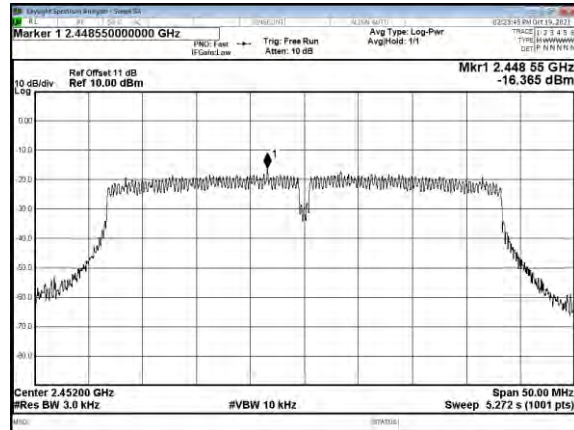
CH06



CH11

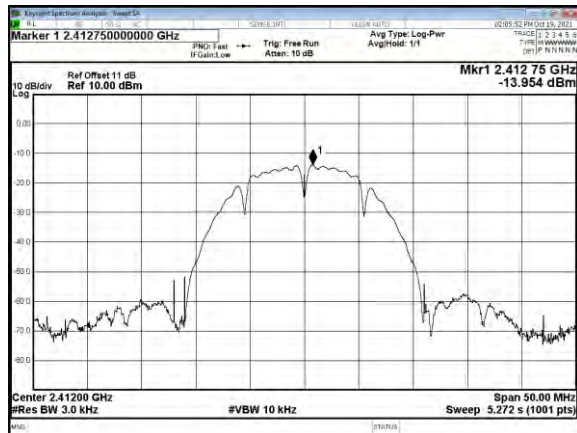
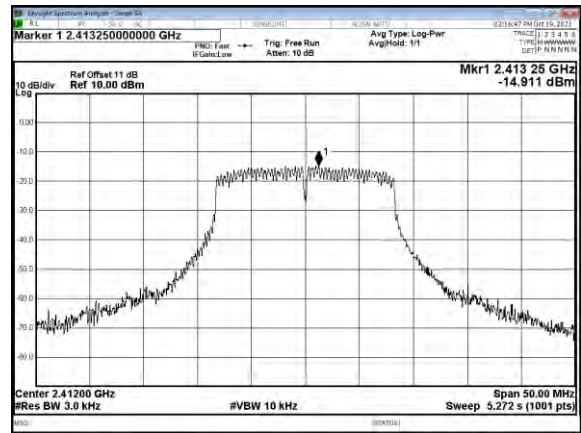


CH09

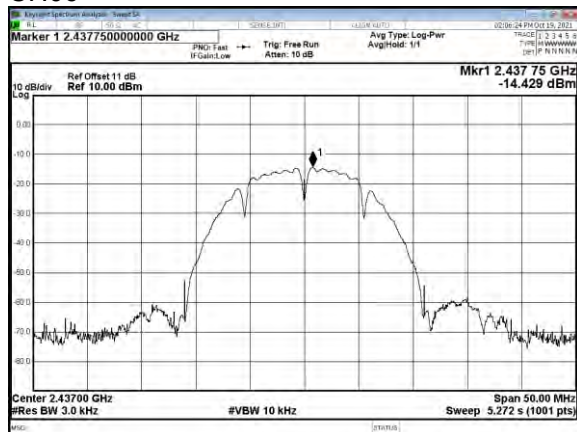




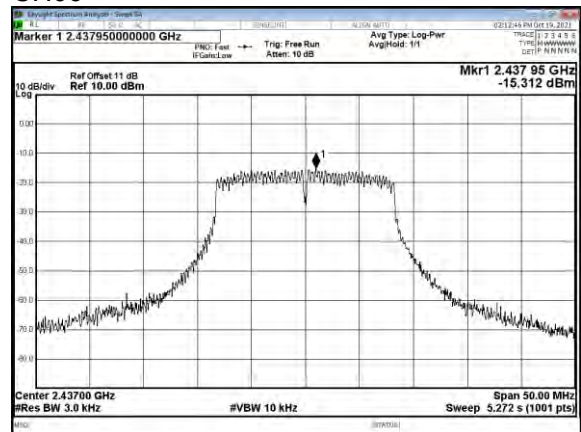
ANT B

Modulation Type: 802.11b
CH01Modulation Type: 802.11g
CH01

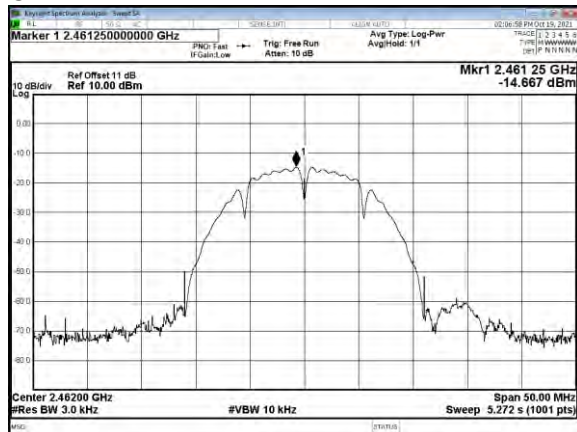
CH06



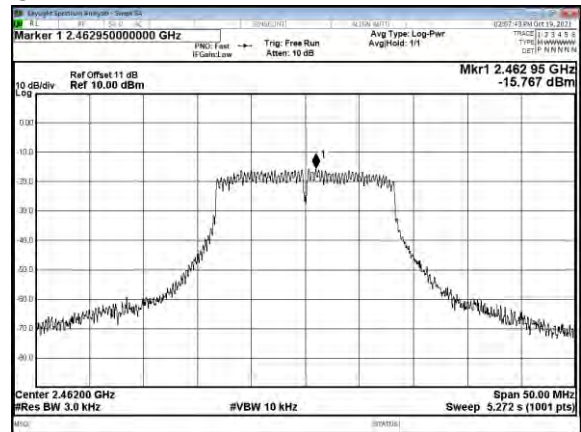
CH06

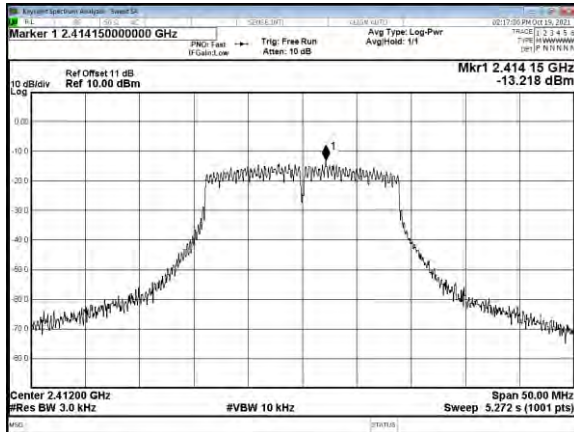
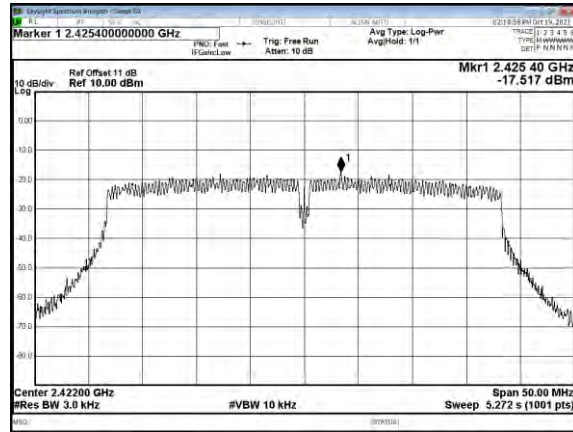


CH11

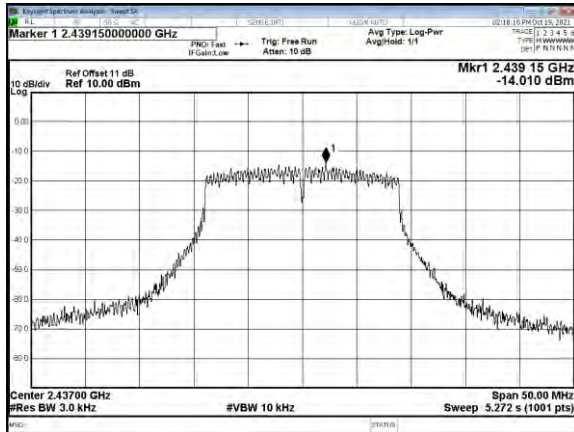


CH11

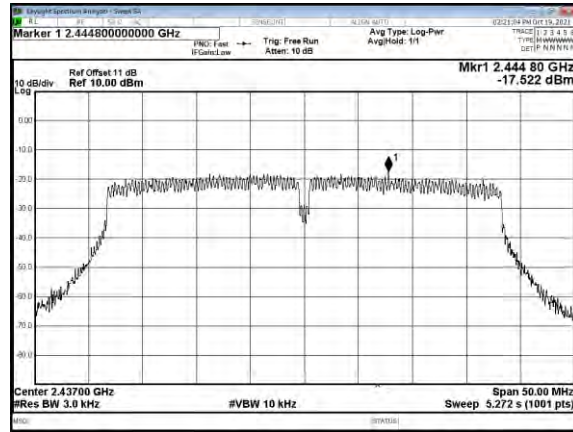


Modulation Type: 802.11n HT20
CH01Modulation Type: 802.11n HT40
CH03

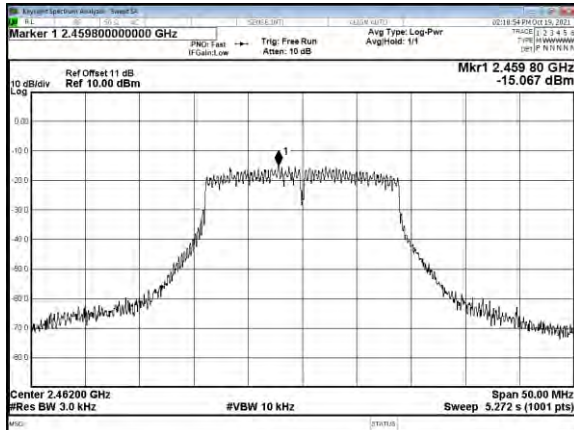
CH06



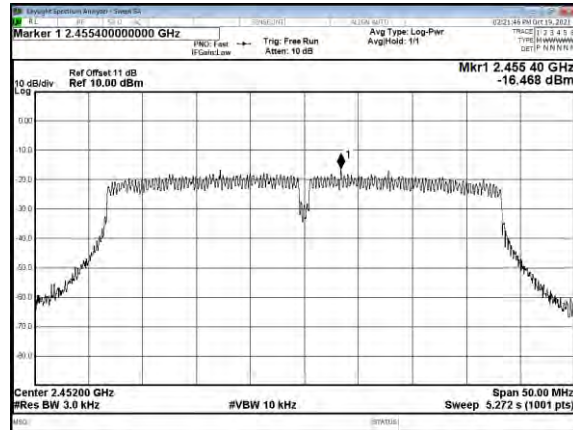
CH06



CH11



CH09



----- End of the report -----