



FCC RADIO TEST REPORT

Applicant : Shenzhen Holatek Co., Ltd.

Address : #12,Building 1,Chongwen Park, Nanshan Zhiyuan,3370
Liuxian Ave, Nanshan District, Shenzhen, China.

Equipment : Smart projector

Model No. : J61-7K5, J61-7K6, J61-7K7, J61-7K8, J61-7KR,
J61-7KS, J61-7KT, J61-7KU, J61-7KV, J61-7KW,
J61-7KX, J61-7KY, J61-7KZ

Trade Name : JMGO

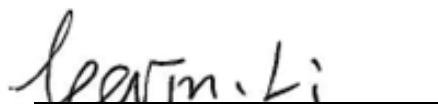
FCC ID. : SMC-7K5

Standard : FCC part 15 Subpart C §15.247

I HEREBY CERTIFY THAT:

The sample was received on Sept. 09, 2024 and the testing was completed on Sept. 18, 2024 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass 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

Version No.	Report No	Date	Description
Rev.01	24060213-DRFCC04	Jul. 19, 2024	Initial Issue
Rev.02	24080464-DRFCC03	Sept. 20, 2024	1. The FPC shape, area size and antenna layout of BT antenna and WiFi antenna B was changed.



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
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.		
This is an amended report application based on Cerpass Report No.: 24060213-DRFCC04. The details as below: 1. The FPC shape, area size and antenna layout of BT antenna and WiFi antenna B was changed. After engineering evaluation, Conducted Emission and Radiated Spurious Emission need to be retested and shown in this report.		



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Equipment	Smart projector
Model Name	J61-7K5, J61-7K6, J61-7K7, J61-7K8, J61-7KR, J61-7KS, J61-7KT, J61-7KU, J61-7KV, J61-7KW, J61-7KX, J61-7KY, J61-7KZ
Model Discrepancy	All models are identical to each other except for appearance color. Model J61-7K5 is the representative for final test.
Frequency Range	BT/BLE/ WIFI 2.4G: 2400MHz-2483.5MHz WIFI 5G: 5150MHz-5250MHz, 5250MHz-5350MHz, 5470MHz -5725MHz, 5725MHz -5850MHz
Modulation Type	BT: GFSK, $\pi/4$ -DQPSK, 8DPSK BLE: GFSK 2.4GHz 802.11b: CCK, DQPSK, DBPSK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM 5GHz 802.11a/n: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM
Data Rate	BT: GFSK:1Mbps, $\pi/4$ -DQPSK: 2Mbps, 8DPSK:3Mbps BLE: GFSK: 1Mbps, 2Mbps, 125kbps, 500kbps WIFI 2.4GHz: 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0-MCS15, HT20/HT40 WIFI 5GHz: 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0-MCS15, HT20/HT40 802.11ac: MCS0-MCS9, VHT20/40/80
Working Temperature	0°C to 35°C
EUT Power Rating:	DC 20V supplied by adapter DC 7.3V from Battery
Adapter Spec.	Mode: XY-PD065U75 Input: 100-240V~ 50/60Hz 1.5A Max Output: 5V =3A, 9V =3A, 12V =3A, 15V =3A, 20V =3.25A 65.0W

Note:

1. The EUT not support TPC Function.
2. EUT support Client mode without radar detection.
3. For more details, please refer to the User's manual of the EUT.



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 support units and EUT for RF test.
- An executive program, "SecureCRT.exe (Ver.: 6.2.3.313)" under Windows 10 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	
Test Mode	Operating Description
1	802.11b for 120V
2	802.11g for 120V
3	802.11n HT20 for 120V
4	802.11n HT40 for 120V
5	802.11n HT40 for 240V
caused "Test Mode 4 at CH6:2437" 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 4 at CH6:2437" generated the worst case, it was reported as the final data.	
Radiated emission (1GHz ~ 25GHz) for 1TX	
1	802.11b (1Mbps)
2	802.11g (6Mbps)
caused "Test Mode 1~2 for Ant B" generated the worst case, it was reported as the final data.	
Radiated emission (1GHz ~ 25GHz) for 2TX	
1	802.11n HT20 (6.5Mbps)
2	802.11n HT40 (13.5Mbps)
caused "Test Mode 1~2" generated the worst case, it was reported as the final data.	

Modulation Type	TX CONFIGURATION
802.11b	1TX
802.11g	1TX
802.11n HT20	2TX
802.11n HT40	2TX



2.4 Power Parameter Value of the test software

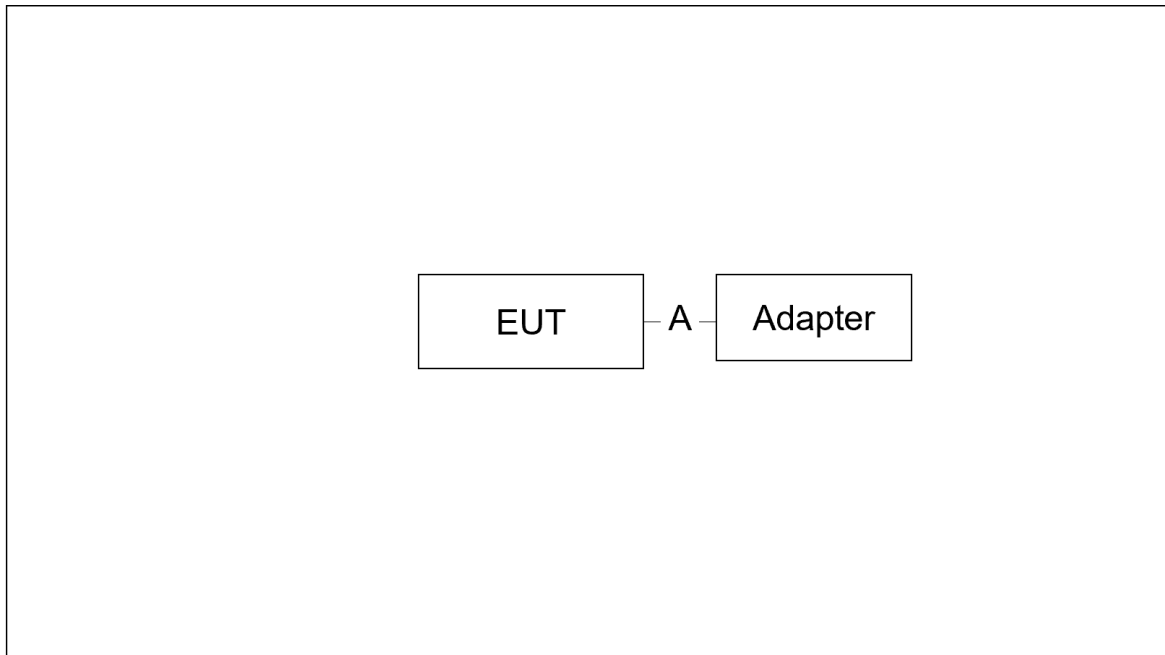
Mode	Frequency (MHz)	Setting level			
		1TX		2TX	
		Ant 1	Ant 2	Ant 1	Ant 2
802.11b	2412	17	17	N/A	N/A
	2437	17	17	N/A	N/A
	2462	17	17	N/A	N/A
802.11g	2412	15	15	N/A	N/A
	2437	15	15	N/A	N/A
	2462	15	15	N/A	N/A
802.11n (20MHz)	2412	N/A	N/A	14	14
	2437	N/A	N/A	14	14
	2462	N/A	N/A	14	14
802.11n (40MHz)	2422	N/A	N/A	14	14
	2442	N/A	N/A	14	14
	2452	N/A	N/A	14	14



2.5 Description of Test System

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Notebook	Dell	Latitude 5530	GFXJML3	Non-Shielded, 1.8m
2 Adapter	XuYuan	XY-PD065U75	N/A	1.0m NonShielding with one Core

Connection Diagram



Signal Cable Type		Quantity	Signal cable Description
A	DC Cable	1	1.0m NonShielding with one Core



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 9kHz 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
Radiated Emissions	3M01-DG	2024/09/11~2024/09/18	24~26℃ / 57~58%	Amos Zhang
AC Power Line Conducted Emission	CON01-DG	2024/09/13	26℃ / 55%	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)	±2.52dB
Radiated Spurious Emission(9KHz~30MHz)	±4.10dB
Radiated Spurious Emission(30MHz~1GHz)	±4.23dB
Radiated Spurious Emission(1GHz~18GHz)	±5.49dB
Radiated Spurious Emission(18GHz~40GHz)	±4.39dB
6dB Bandwidth&20dB Bandwidth	±5.2%
Occupied Bandwidth	±4.5%
Peak Output Power(Conducted Power Meter)	±0.90dB
Power Spectral Density	±0.89dB
Dwell Time / Deactivation Time	±3.5%



3. Test Equipment and Ancillaries Used for Tests

AC Power Line Conducted Emission					
Test Site	CON01-DG				
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100564	2024/01/03	2025/01/02
LISN	SCHWARZBECK	NSLK 8127	8127749	2024/08/01	2025/07/31
LISN	R&S	ENV216	100024	2024/01/03	2025/01/02
Cable	Aoda	RG214	Cable-06	2024/01/03	2025/01/02
Pulse Limiter with 10dB Attenuation	SCHWARZBECK	VTSD 9561-F	9561-F106	2024/01/03	2025/01/02
Temperature/ Humidity Meter	GEMLEAD	STH200A	N/A	2024/08/02	2025/08/01
Software	AUDIX	E3	Version: 8.14806b	N/A	N/A

Radiated Emissions					
Test Site	3M01-DG				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Test Receiver	R&S	ESCI	100565	2024/08/01	2025/07/31
Amplifier	EMCI	EMC330	980082	2024/01/03	2025/01/02
Loop Antenna	R&S	HFH2-Z2	100150	2024/01/03	2026/01/02
Bilog Antenna	Sunol Science	JB1	A072414-3	2023/06/18	2025/06/17
Preamplifier	Agilent	8449B	3008A02342	2024/08/01	2025/07/31
Preamplifier	COM-POWER	PA-840	711885	2024/01/03	2025/01/02
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120 D	9120D-619	2024/01/03	2026/01/02
Standard Gain Horn Antenna	TRC	HA-2640	18050	2024/01/03	2026/01/02
Standard Gain Horn Antenna	TRC	HA-1726	18051	2024/01/03	2026/01/02
FSQ Signal Analyzer	R&S	FSQ40	200012	2024/01/03	2025/01/02
Cable	EMCI	EM104-NM SM-8.5M	Cable-03	2024/08/01	2025/07/31
Cable	Jiuzhoubona	T-SMA	SMA48AL-7000	2024/08/01	2025/07/31
Cable	CH-CoDesign	CCXA81-S MAMNM-1 M	Cable-05	2024/08/01	2025/07/31
Cable	CH-CoDesign	CCXA40-2.92-2.92-1M	21071954	2024/08/02	2025/08/01
Cable	CH-CoDesign	CCX40-2.92 M-2.92M-9 M	21070892	2024/08/02	2025/08/01
Temperature/ Humidity Meter	GEMLEAD	STH200A	N/A	2024/08/02	2025/08/01
Software	AUDIX	E3	Version: 8.14806b	N/A	N/A



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	FPC Antenna
Antenna Gain	Antenna A: 1.6dBi Antenna B: 1.7dBi

(Non-Beamforming)

2400MHz-2483.5MHz

For 2TX

For Power/PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / NANT]$
= 4.66(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

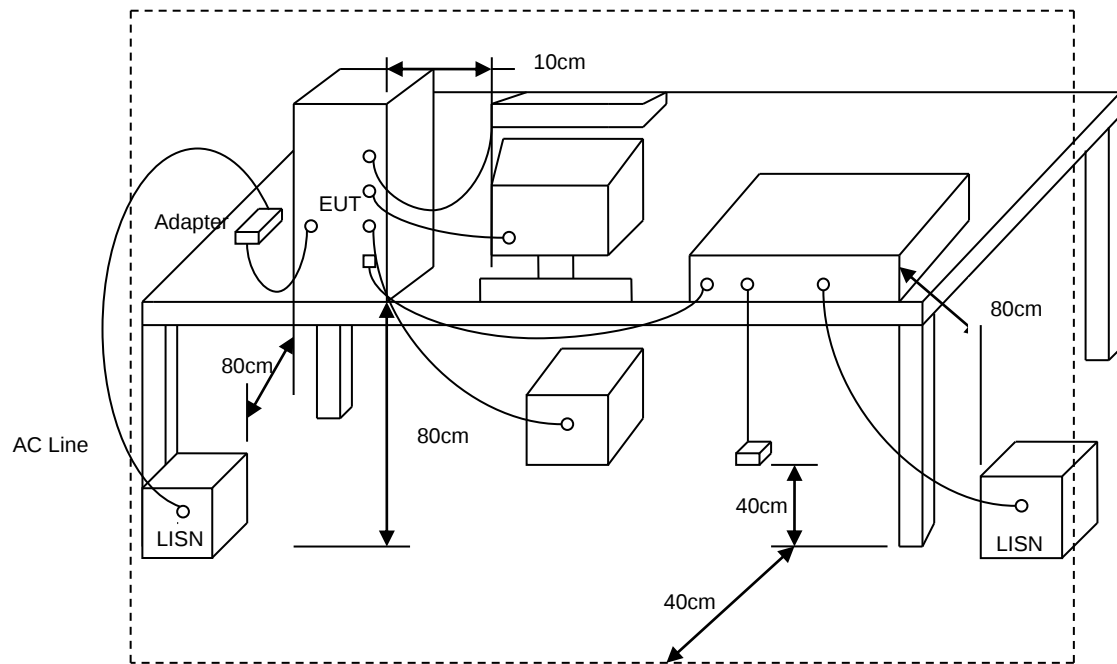
*Decreases with the logarithm of the frequency.

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.

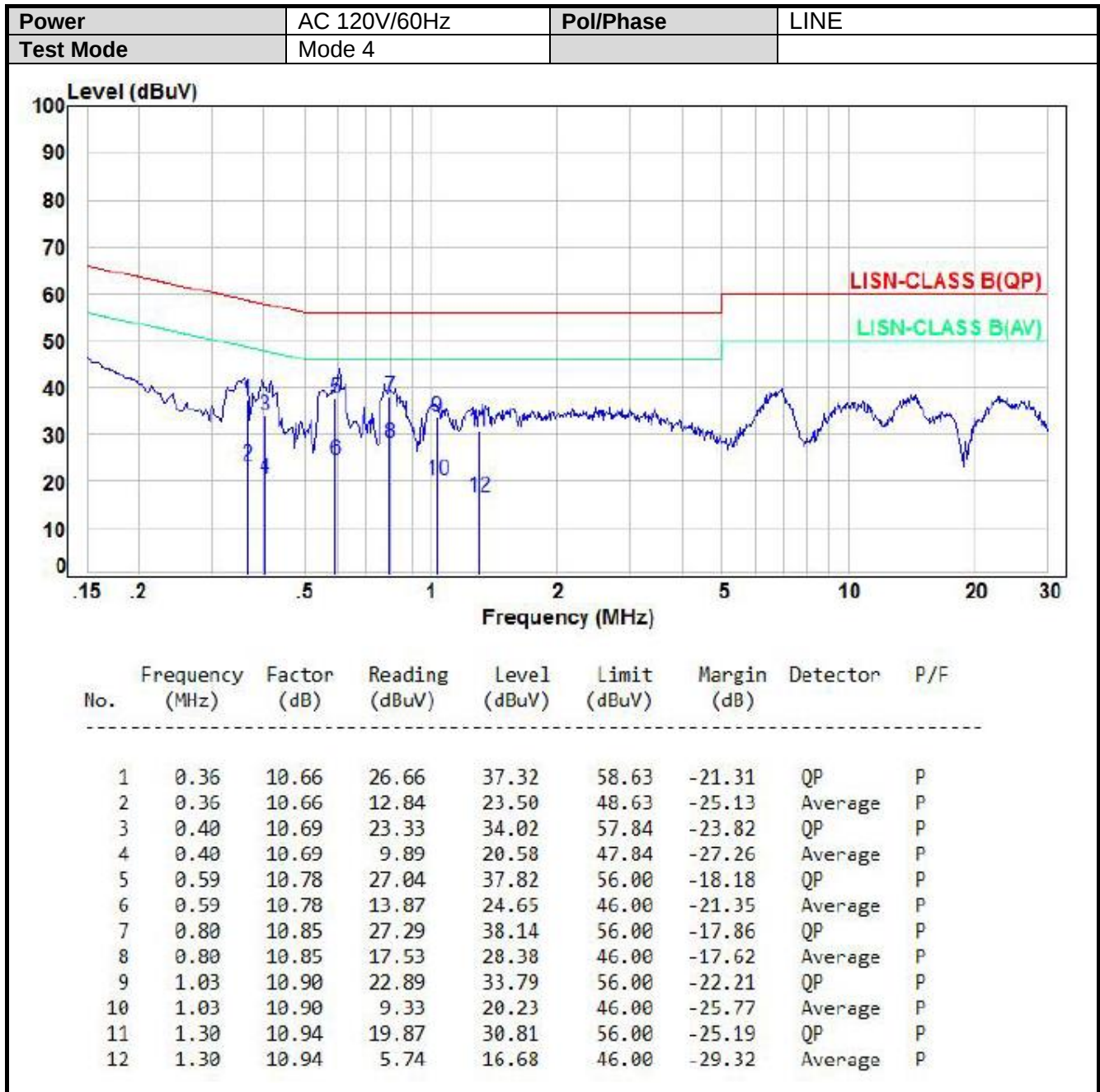


5.3 Typical Test Setup





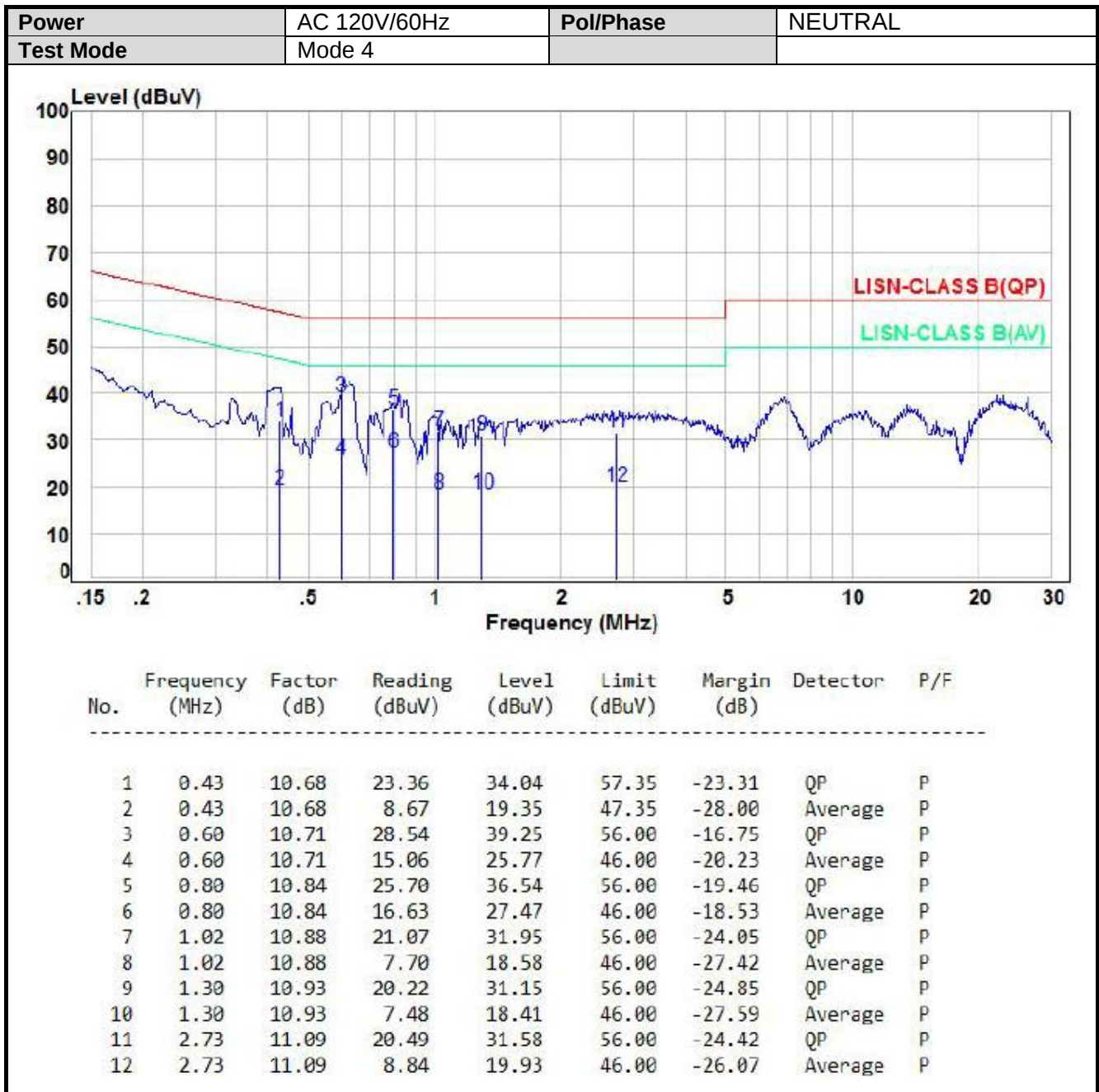
5.4 Test Result and Data



Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



Note: Level = Reading + Factor

Margin = Level – Limit

Factor = (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



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

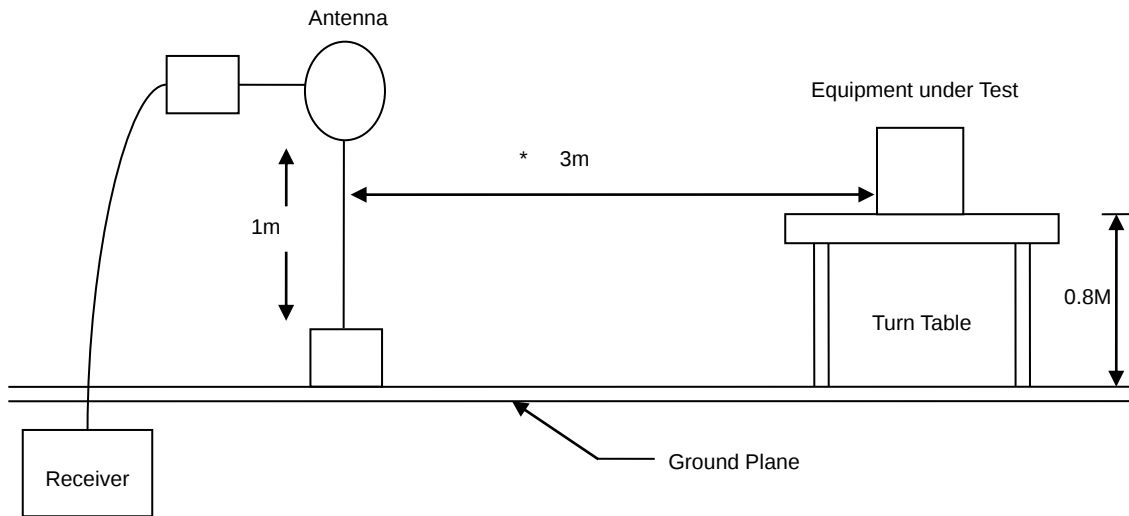
- The EUT was placed on a rotatable table top 0.8 meter for frequency below 1GHz and 1.5meter for frequency above 1GHz above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees 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.)

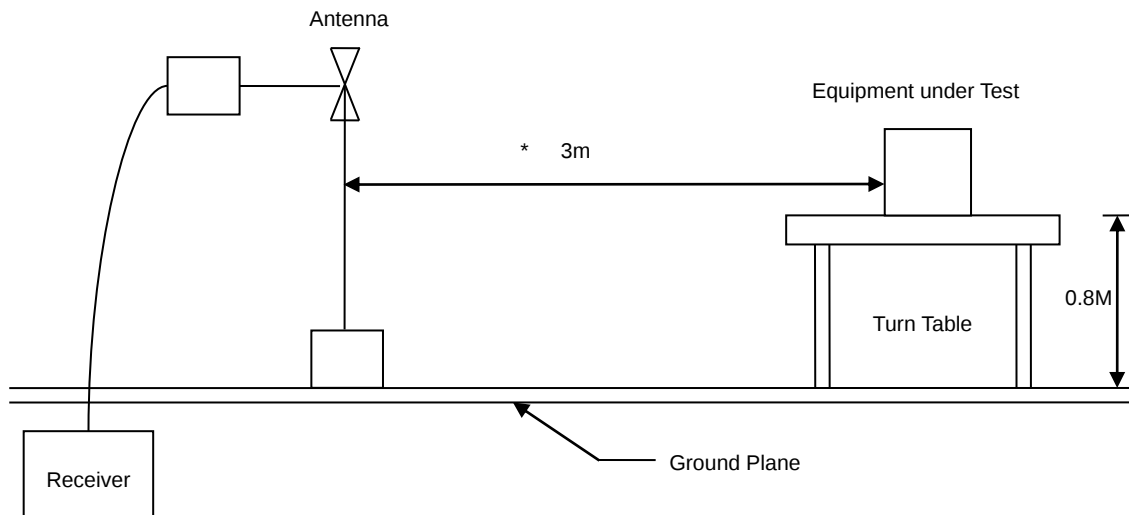


6.3 Typical Test Setup

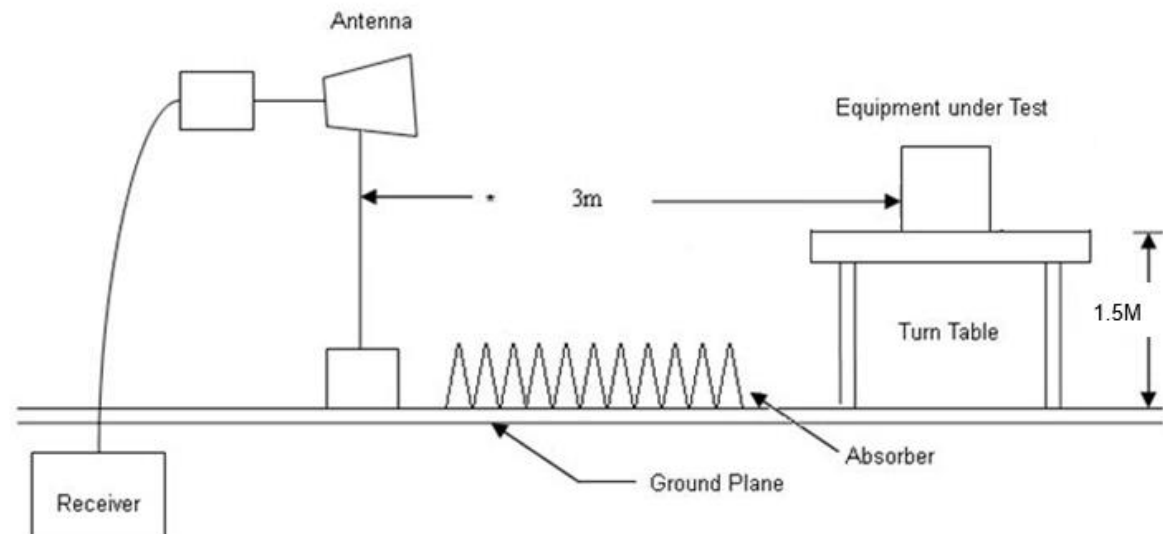
Below 30MHz test setup



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)

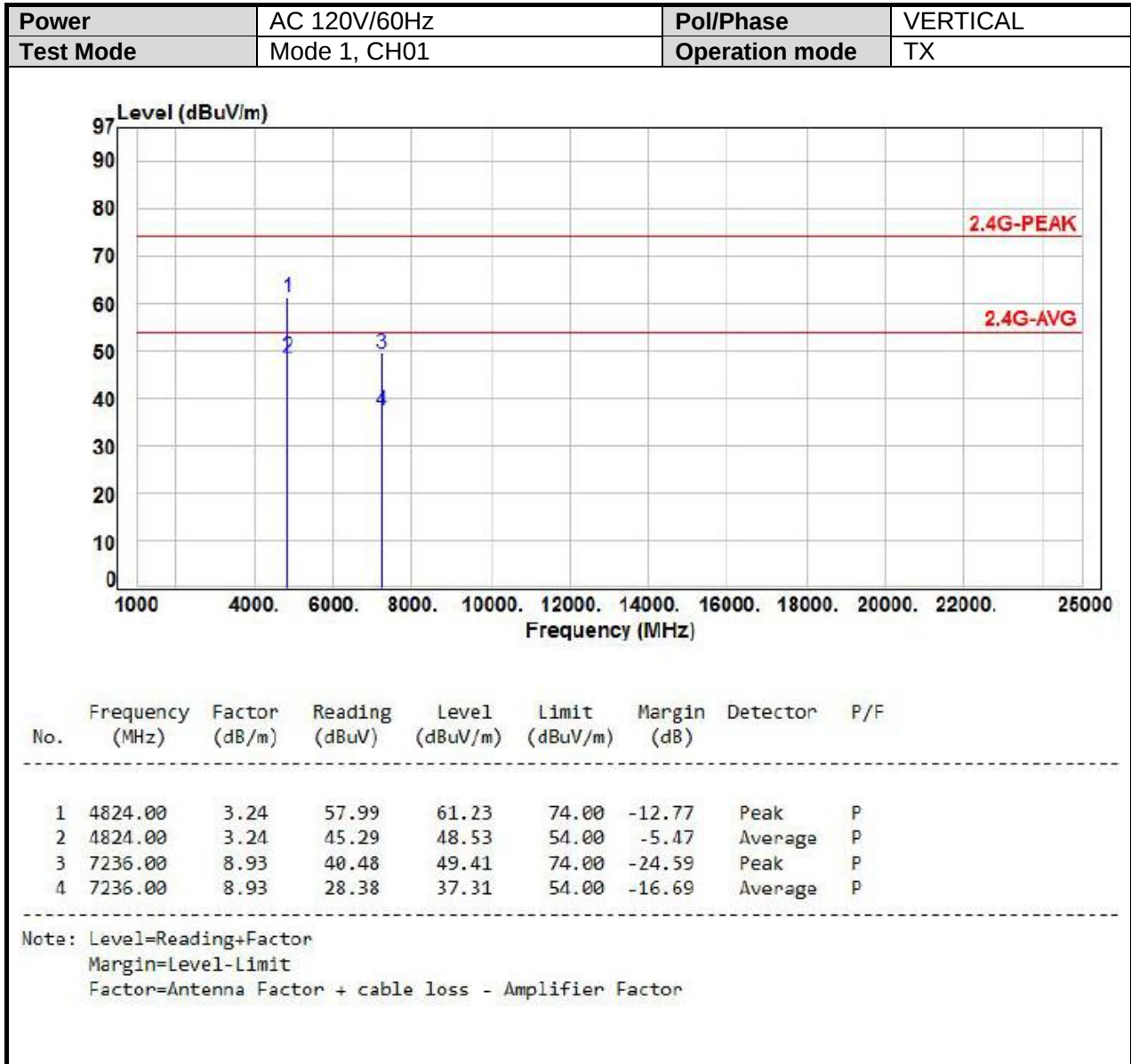


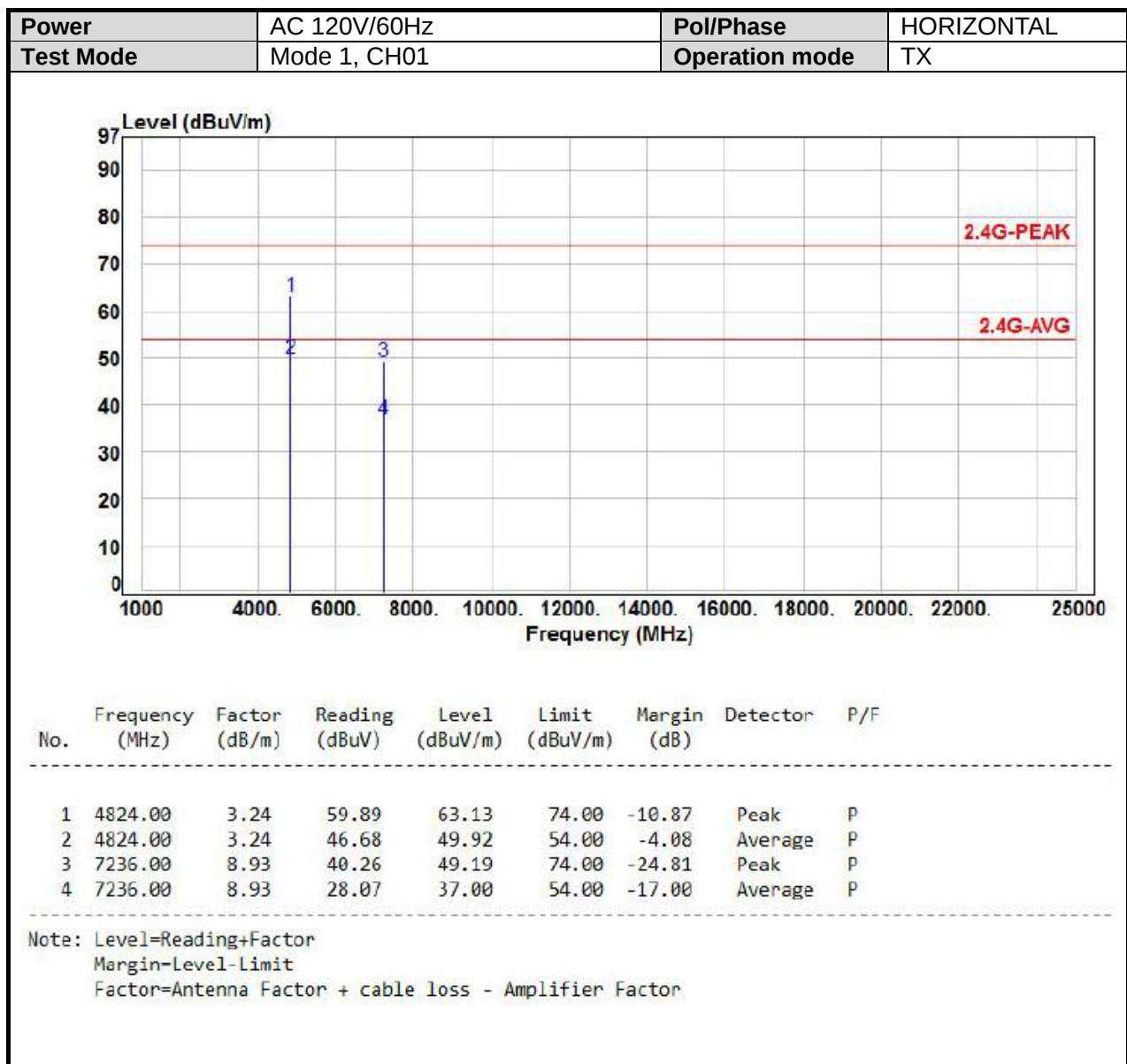


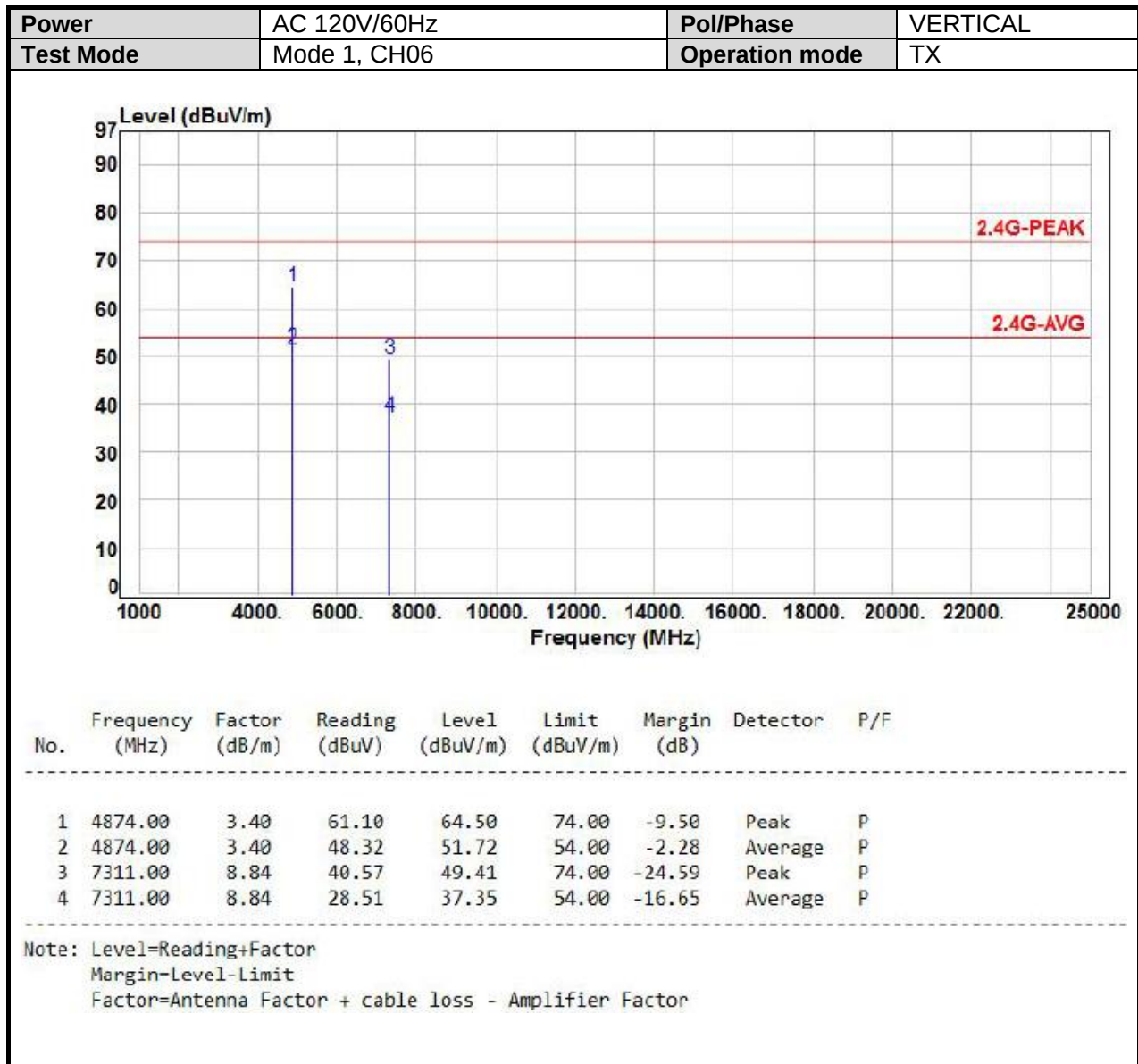


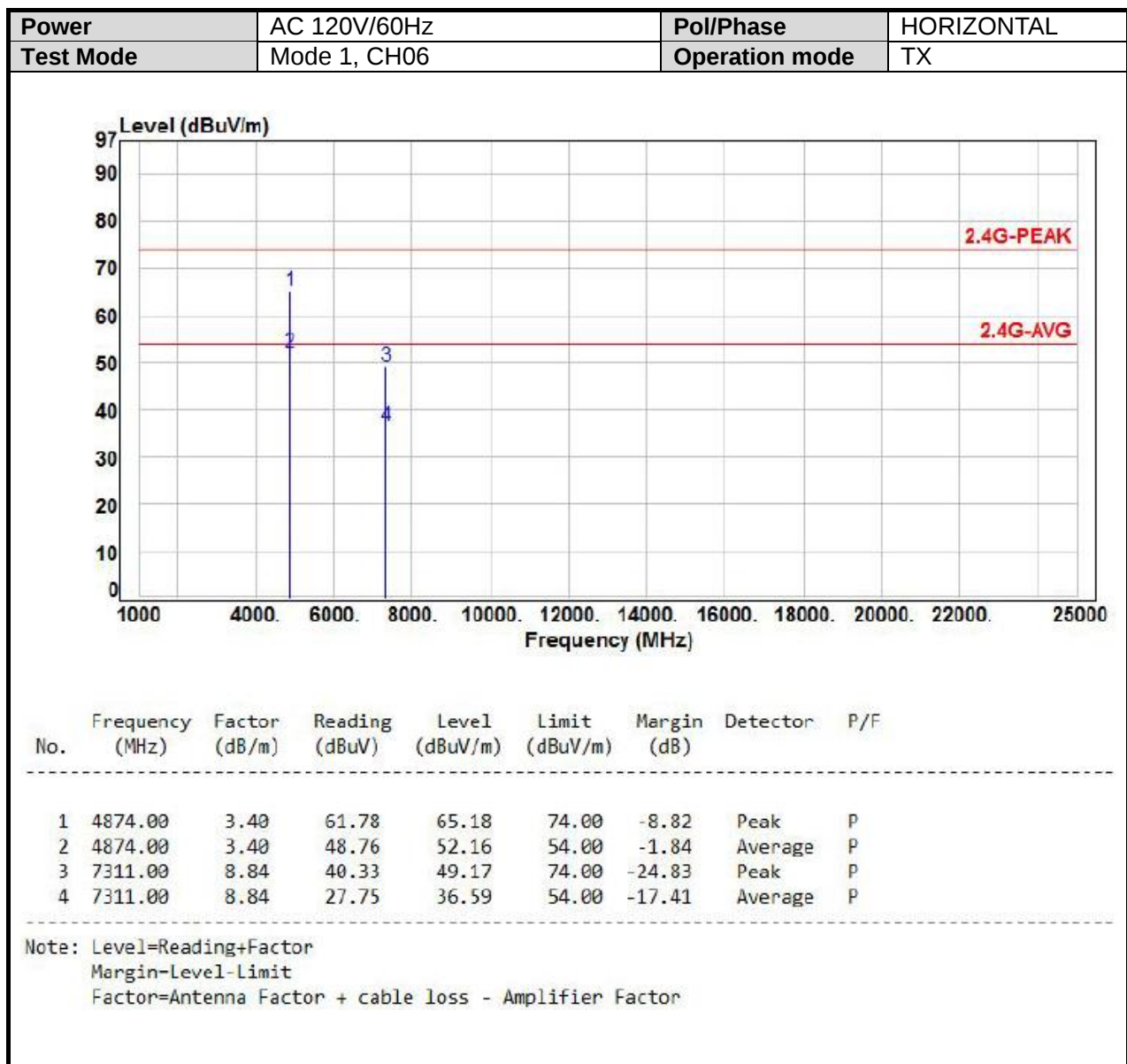
6.6 Test Result and Data (1GHz ~ 25GHz)

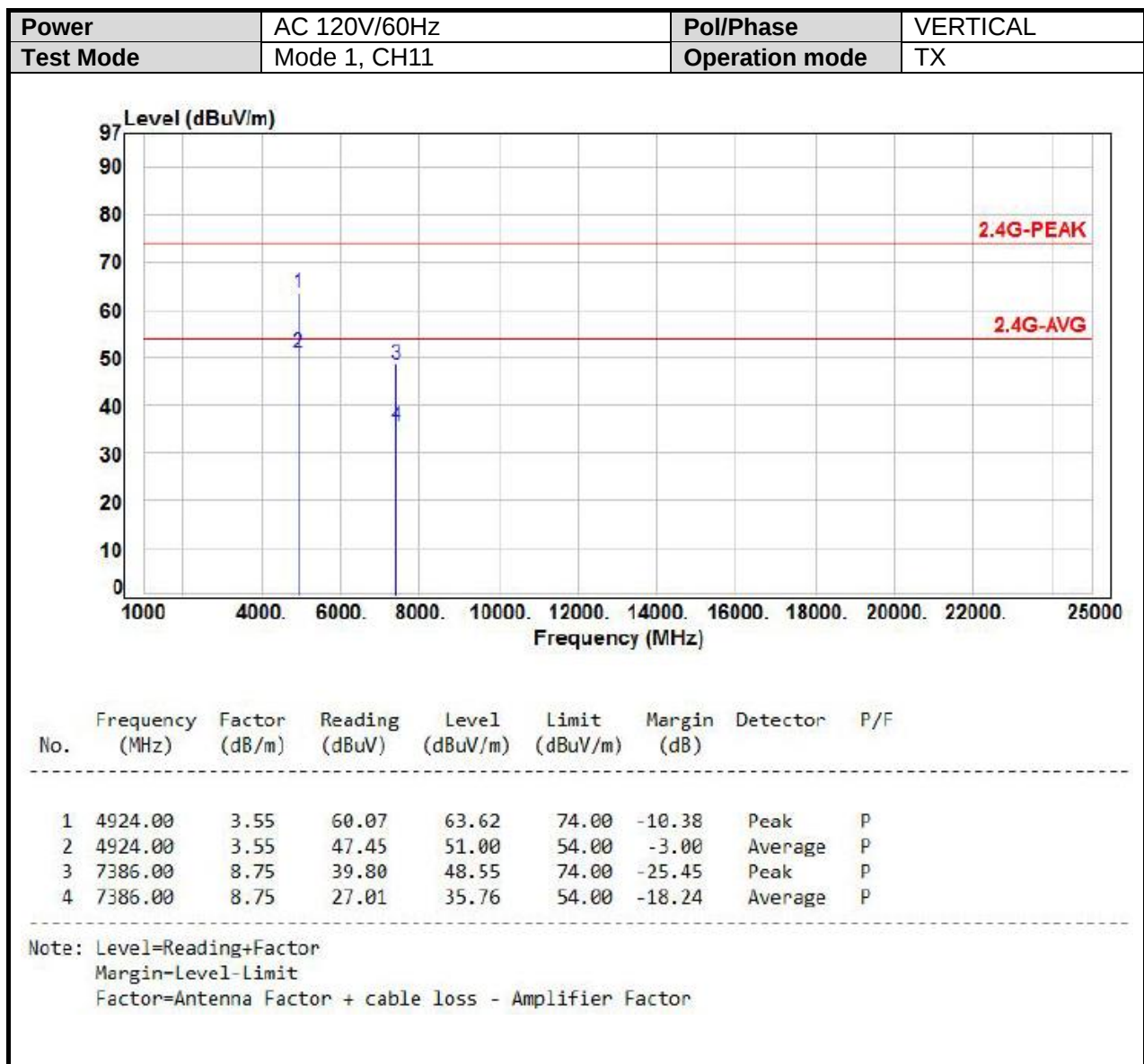
SISO-1TX-Ant B

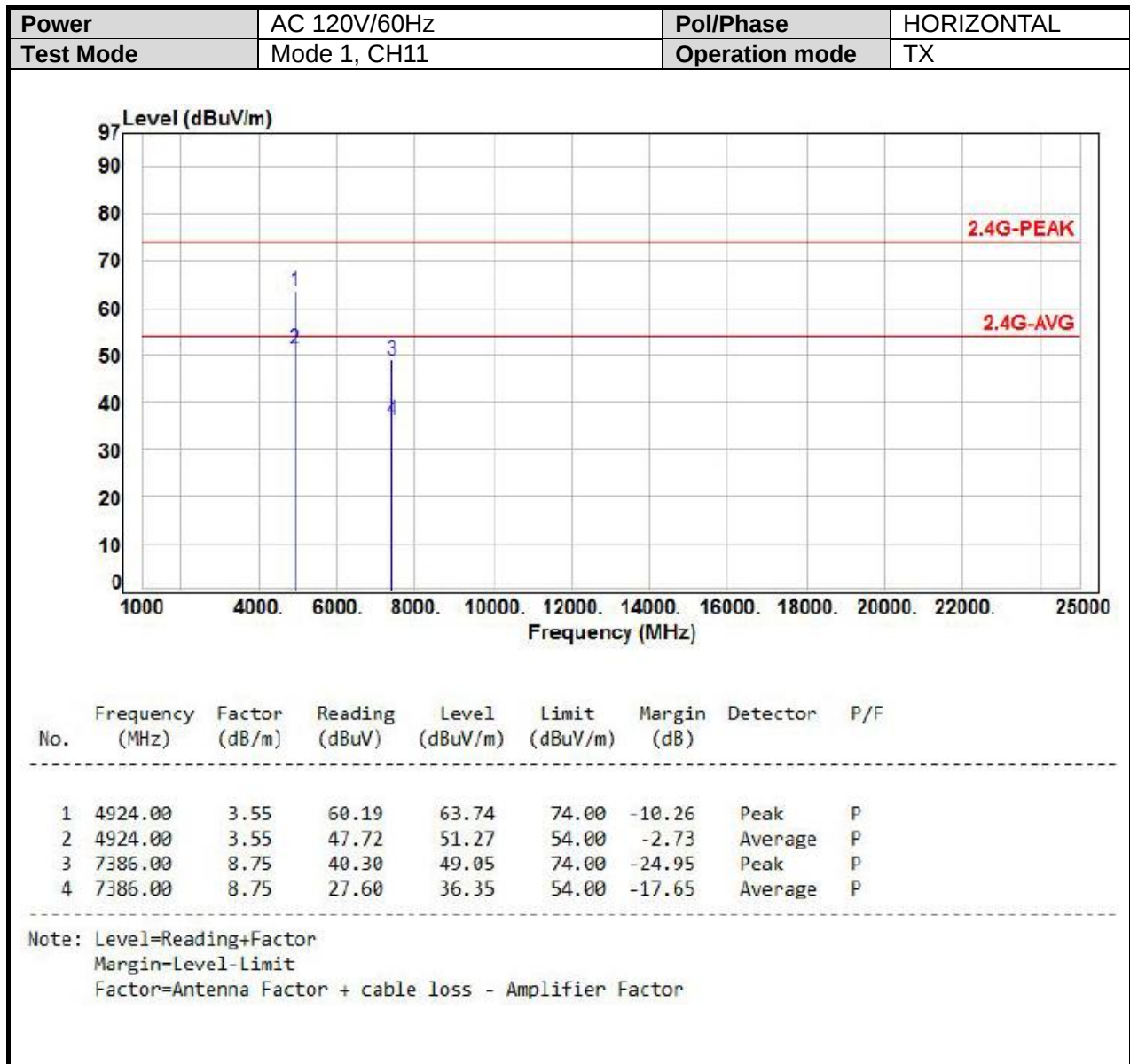


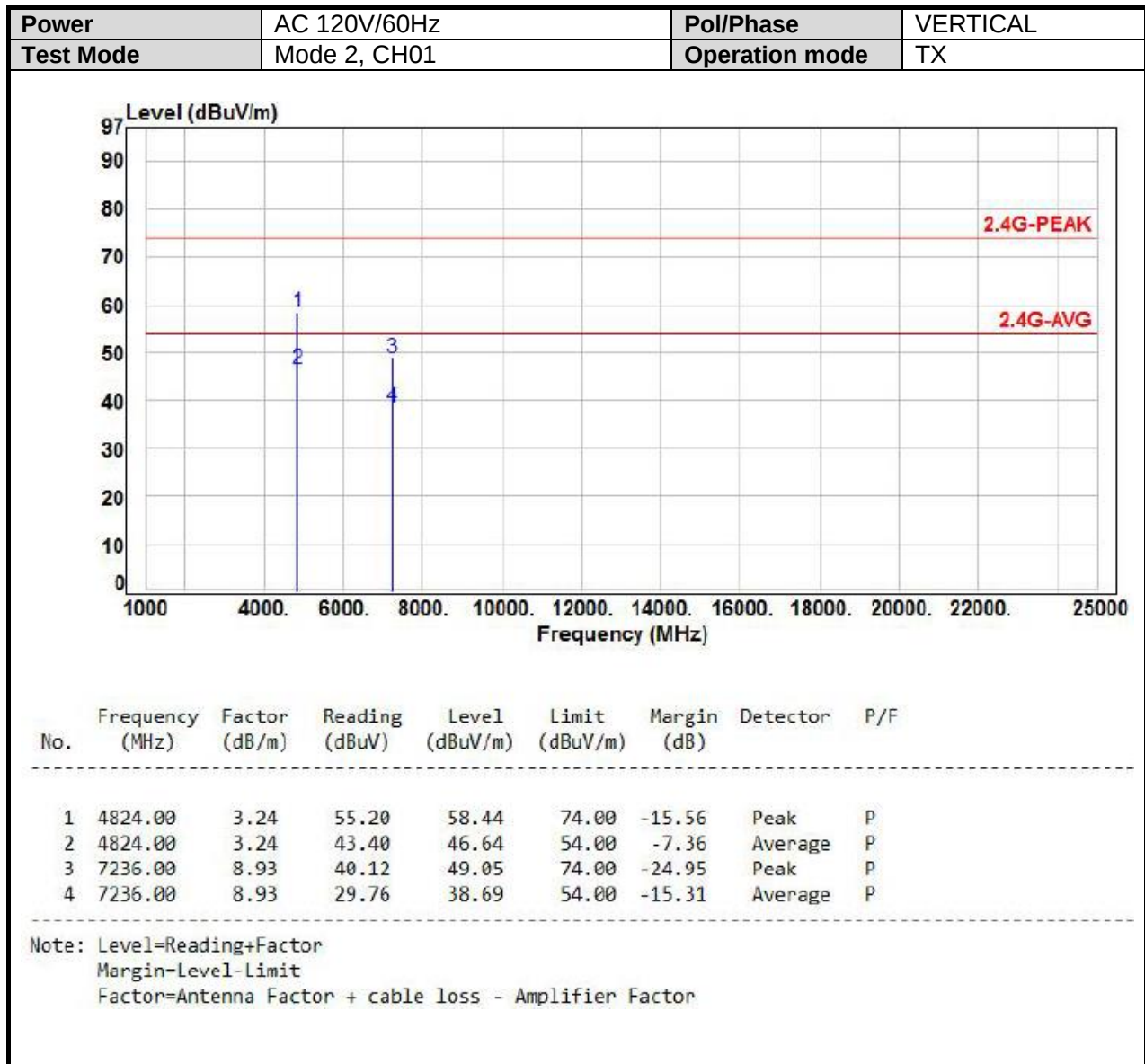


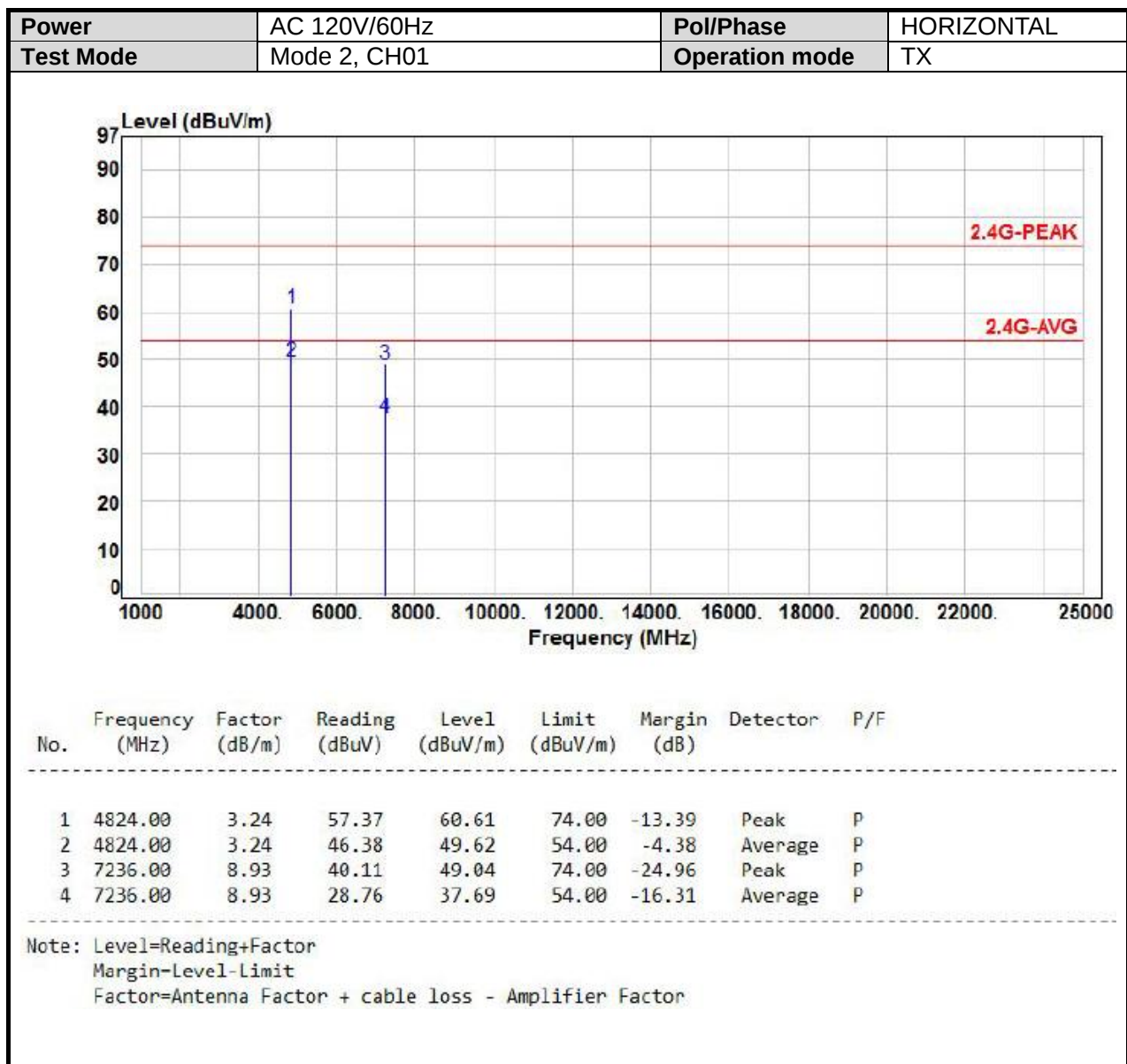


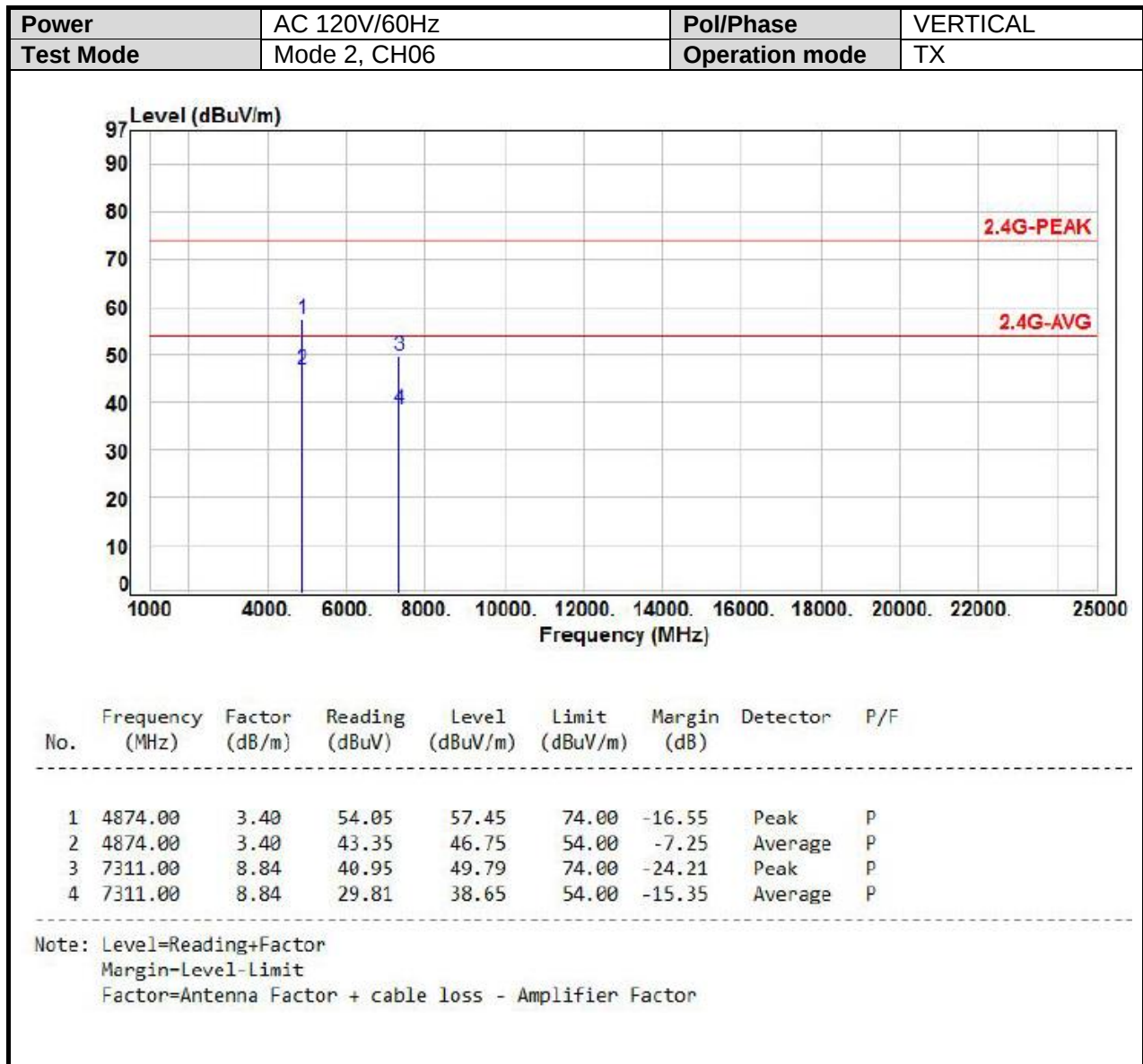


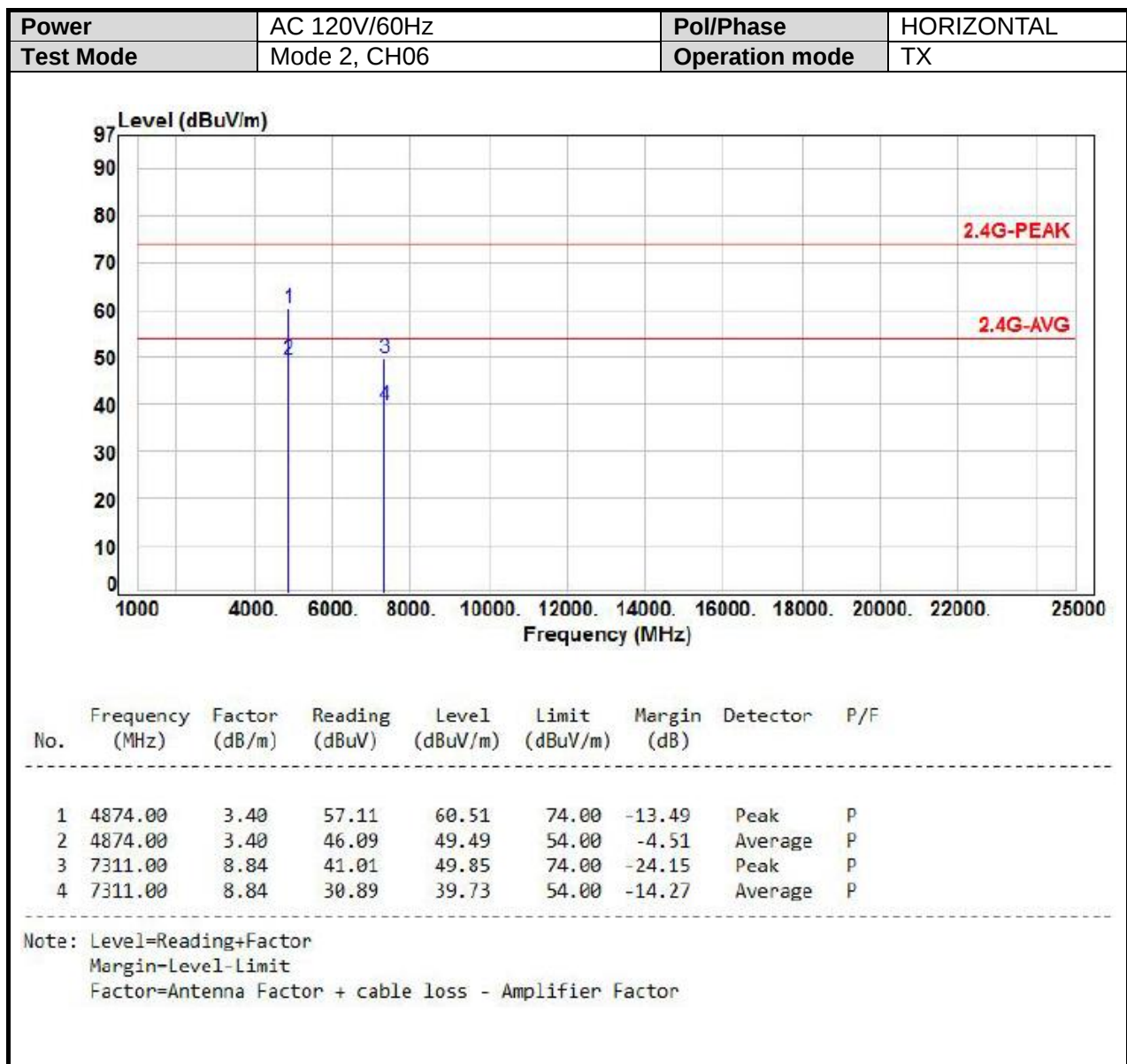


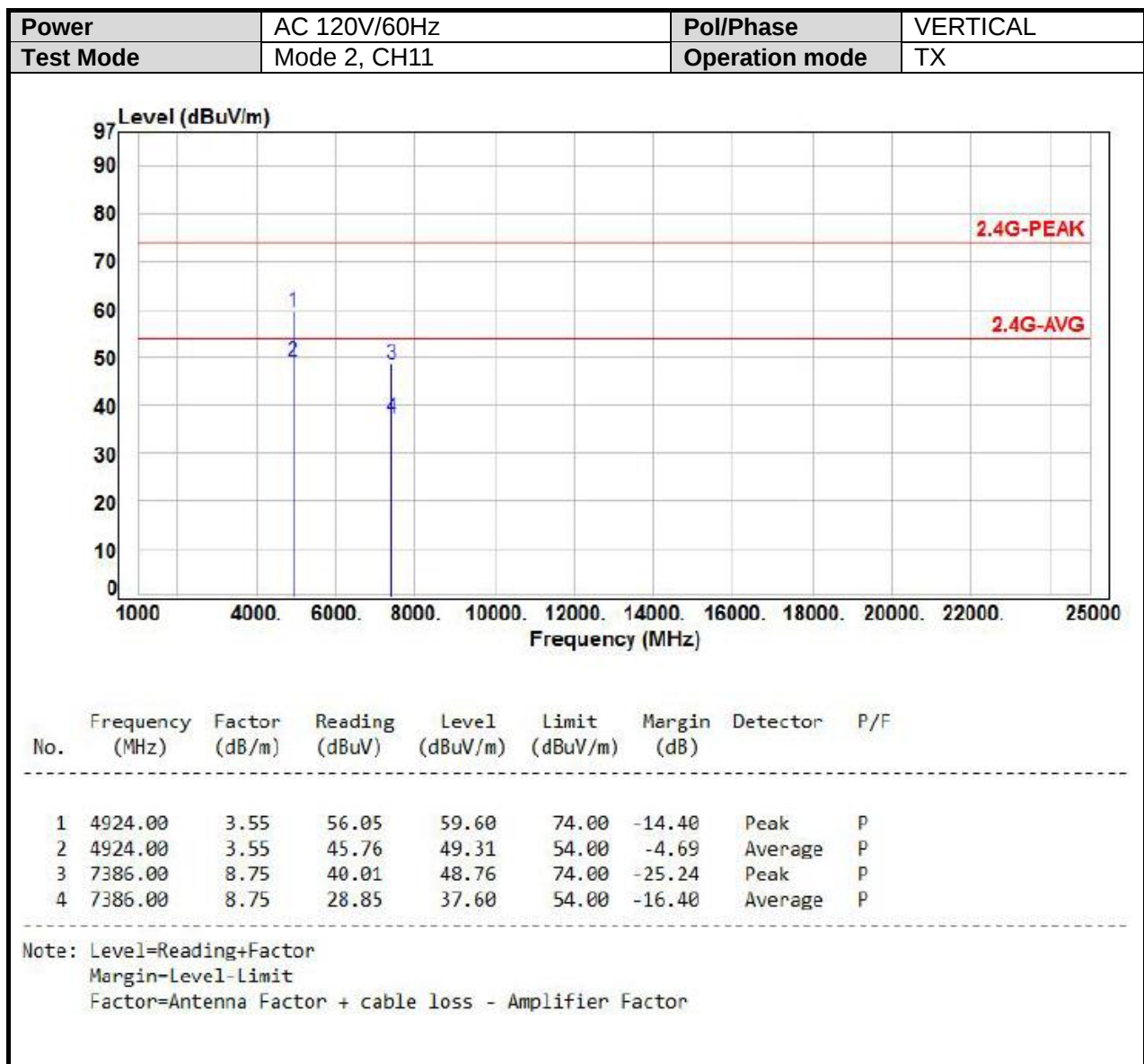


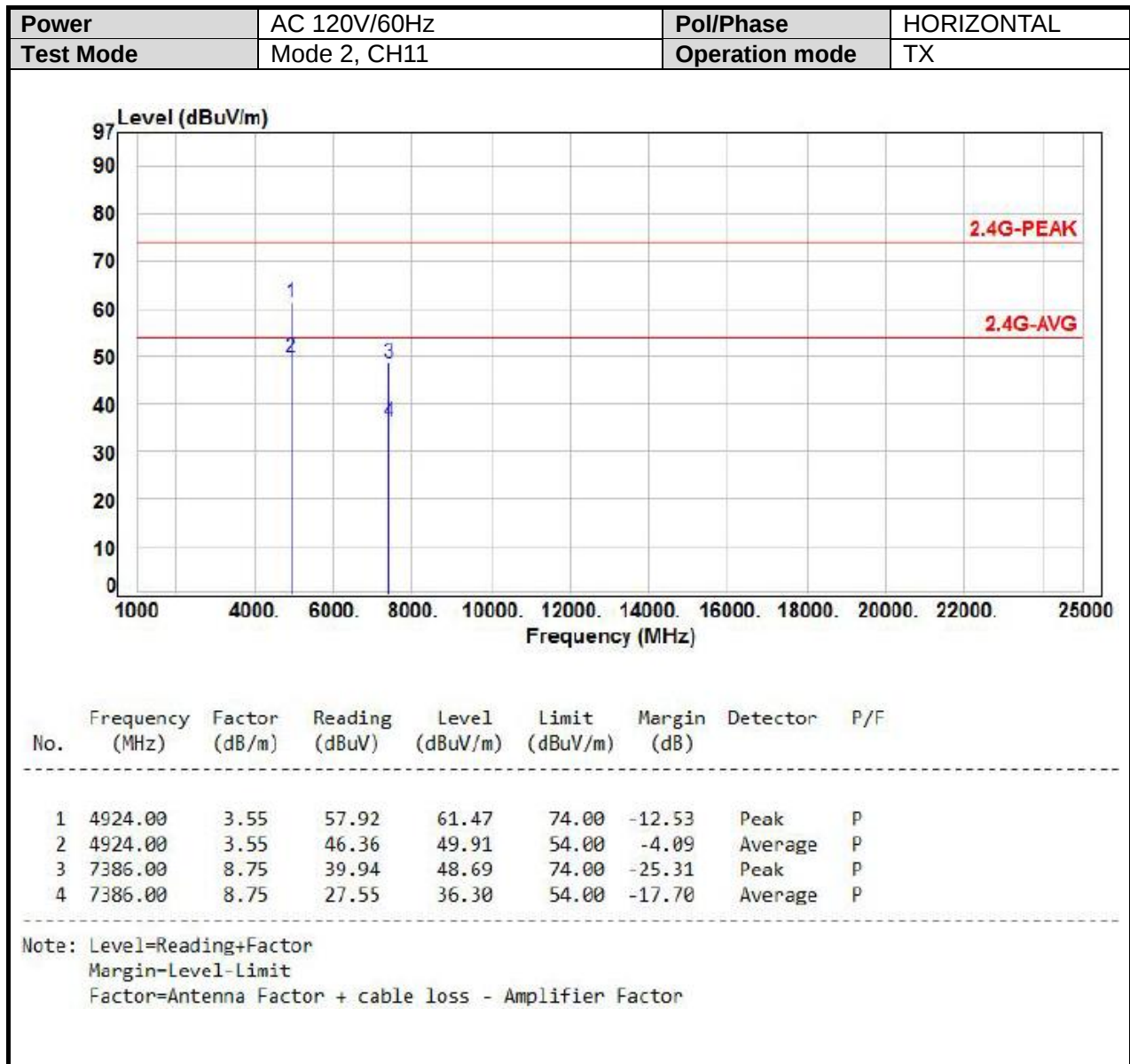






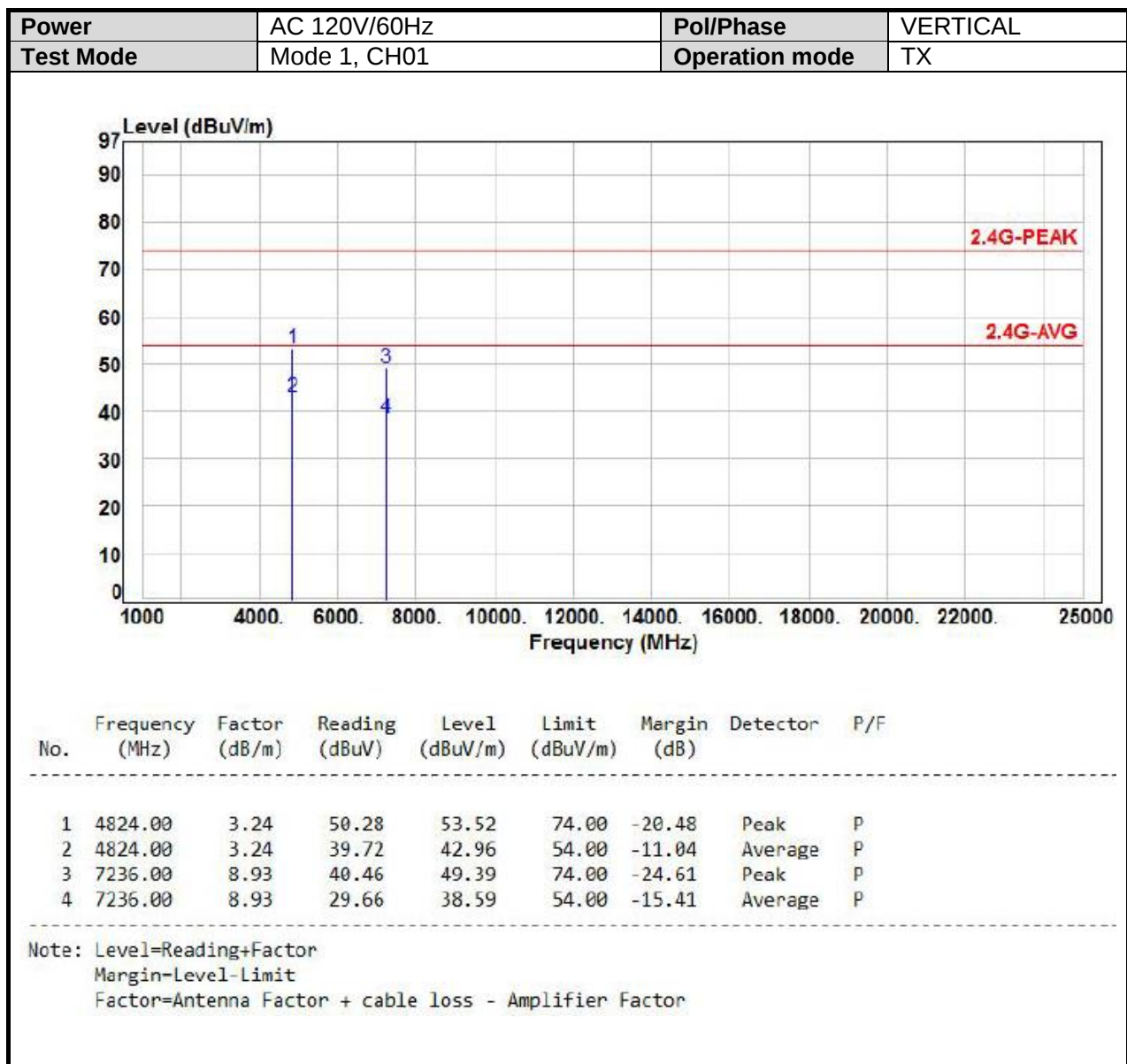


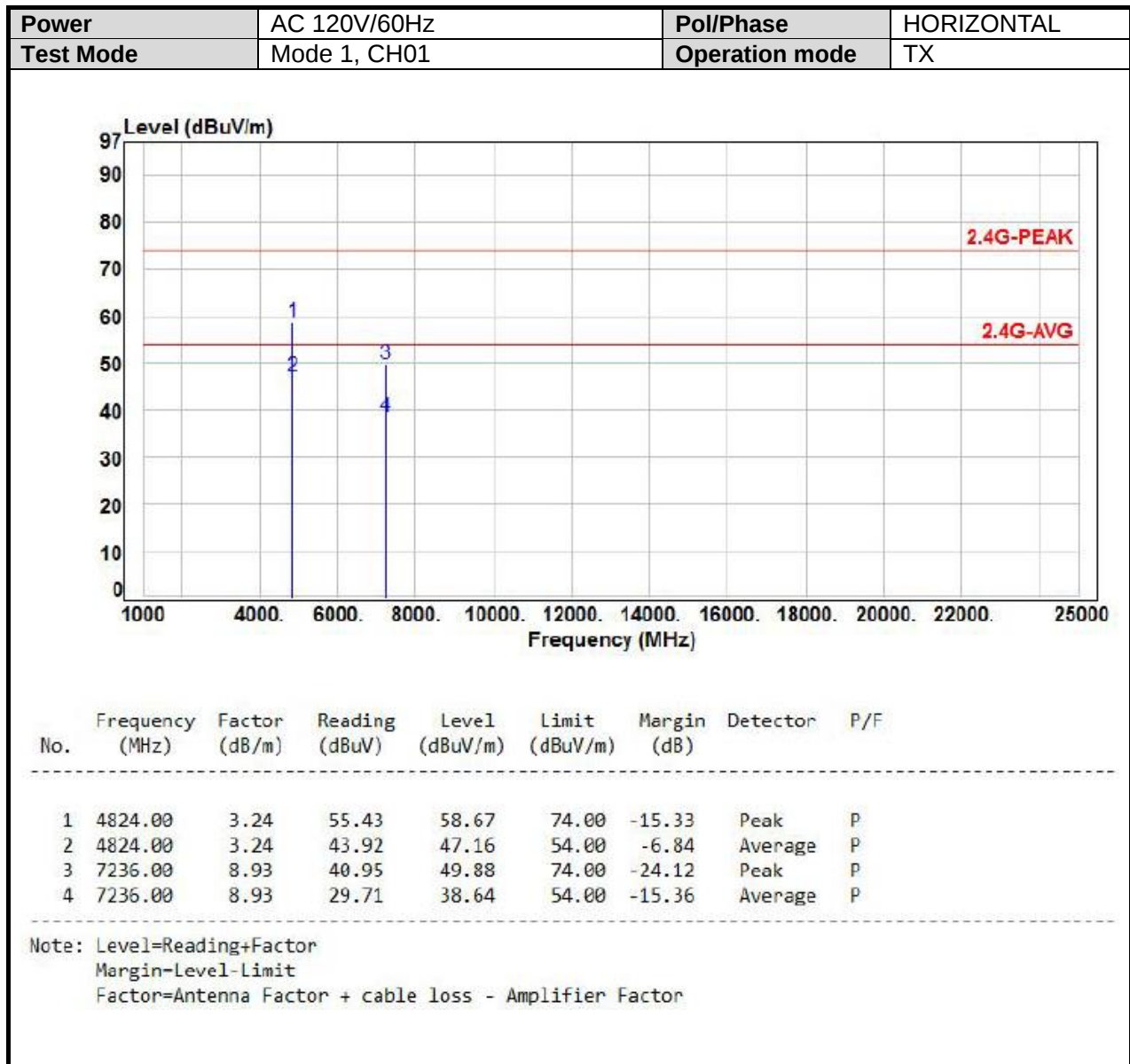


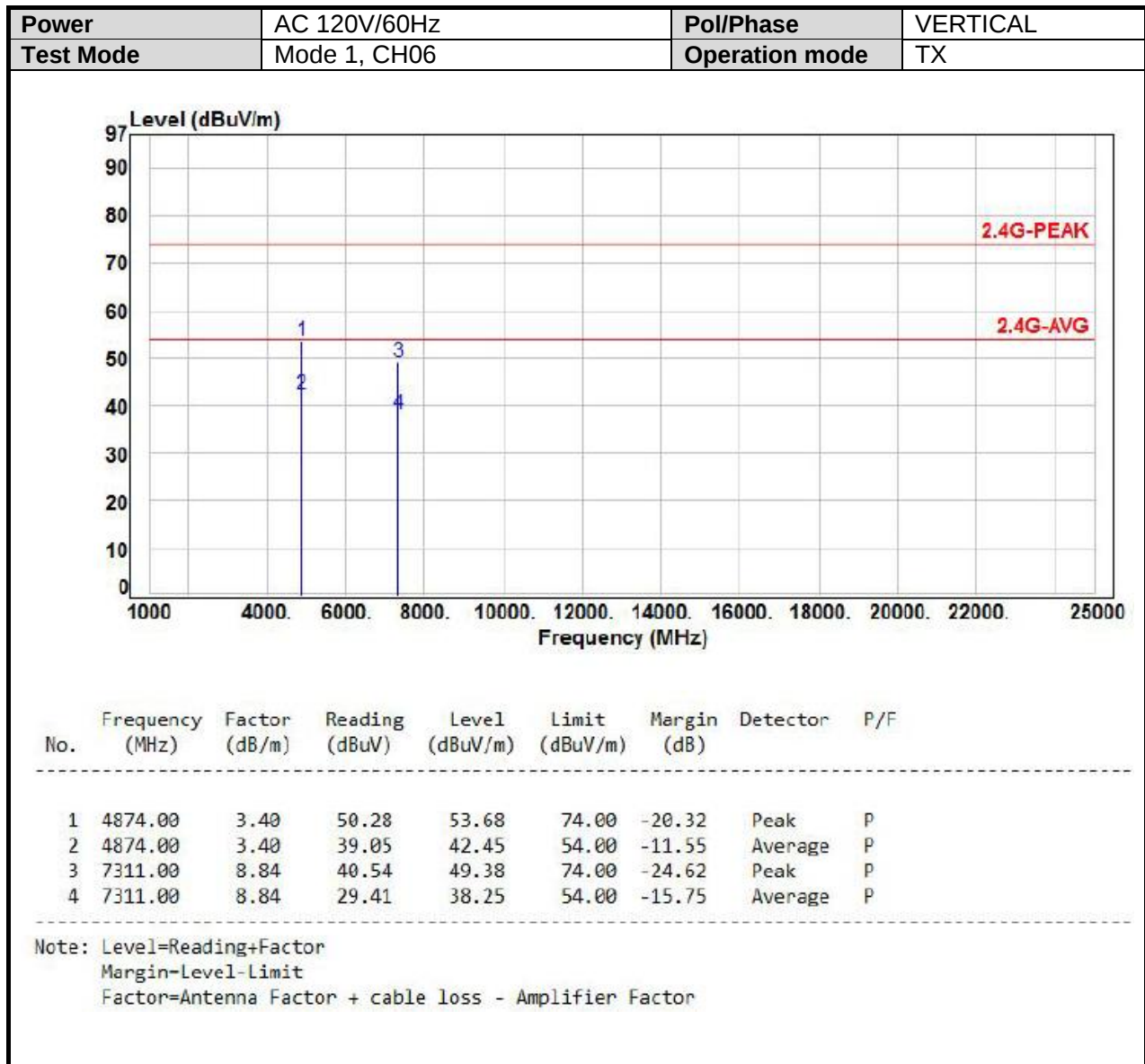


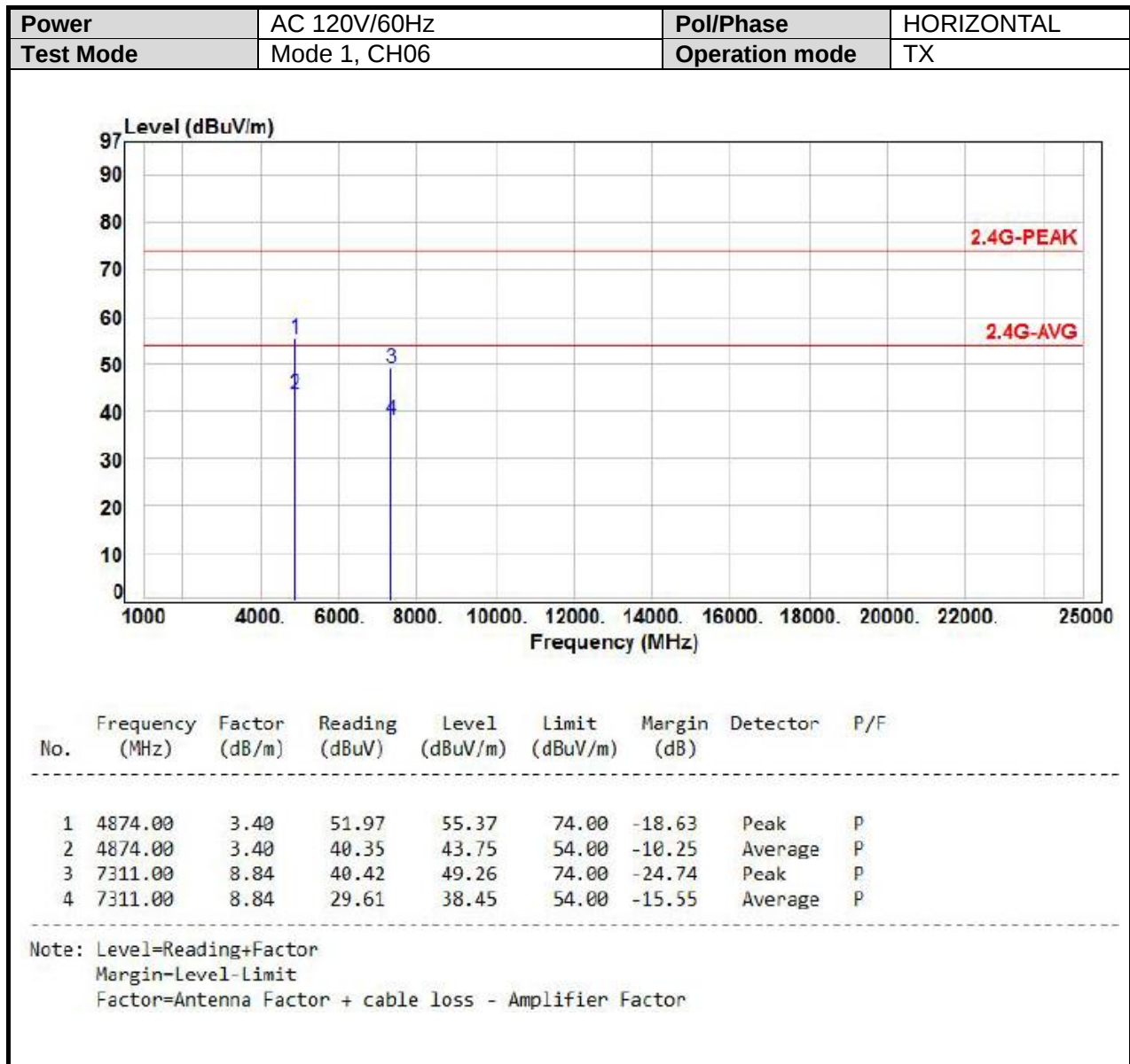


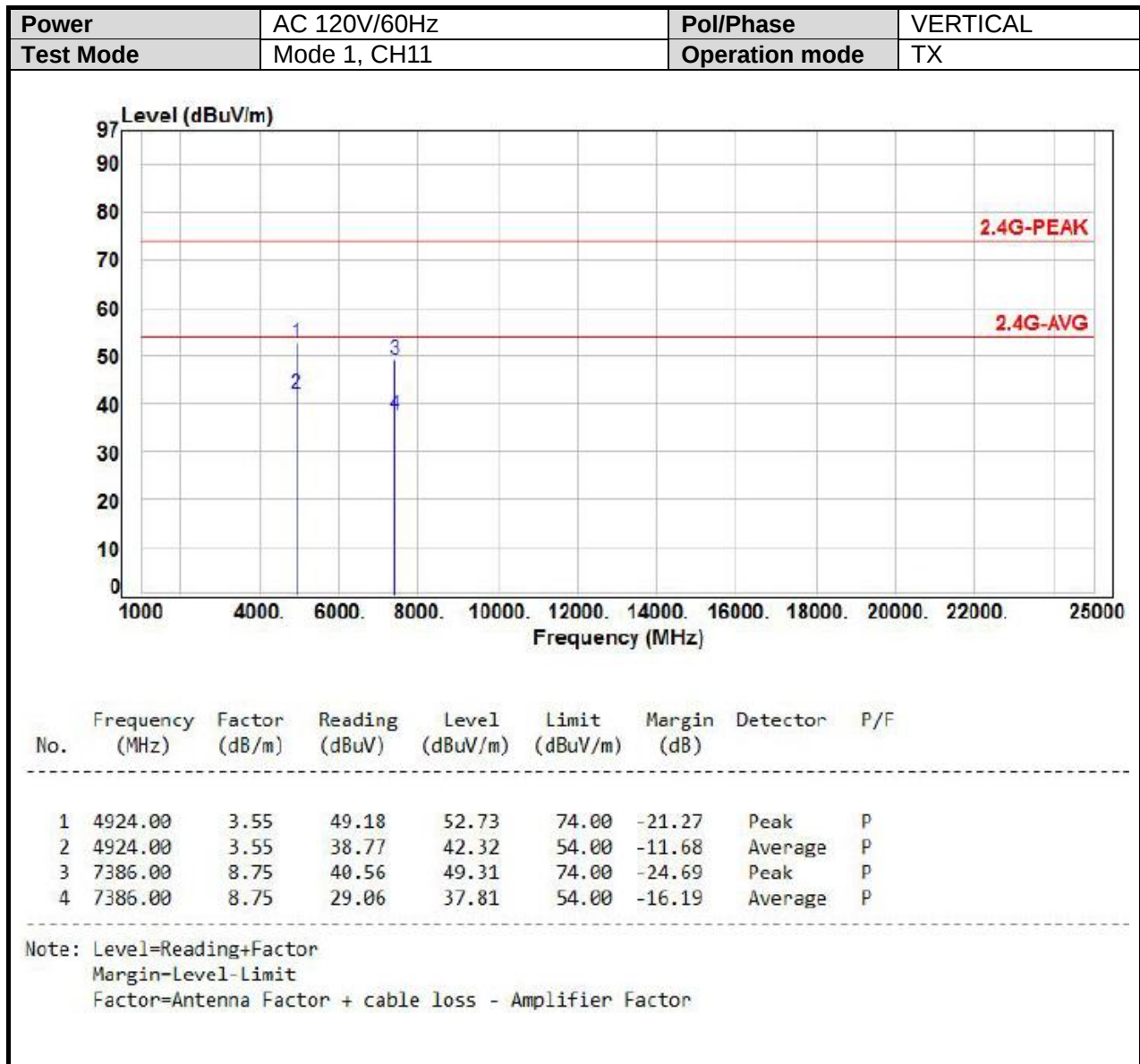
MIMO-2TX

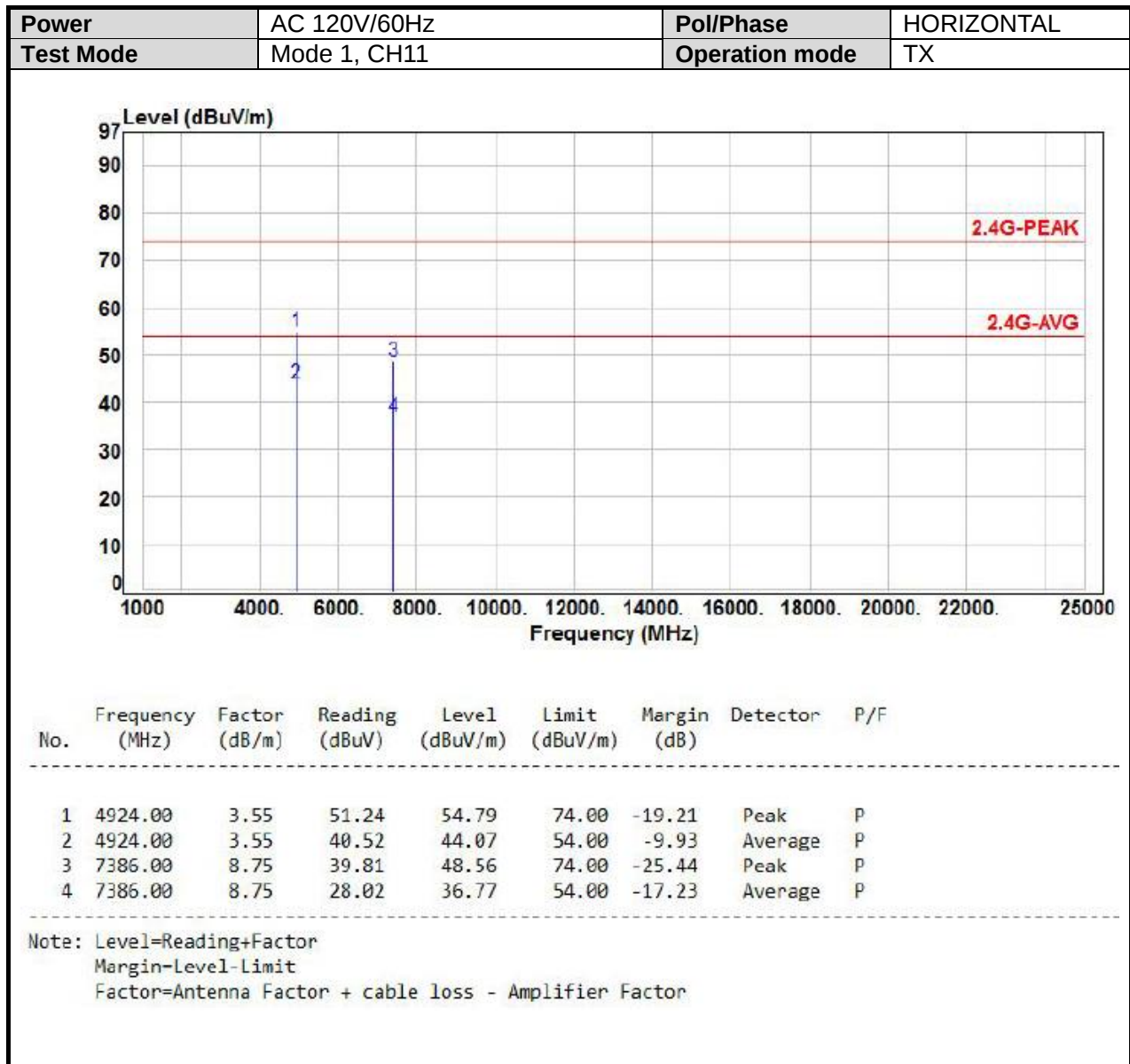


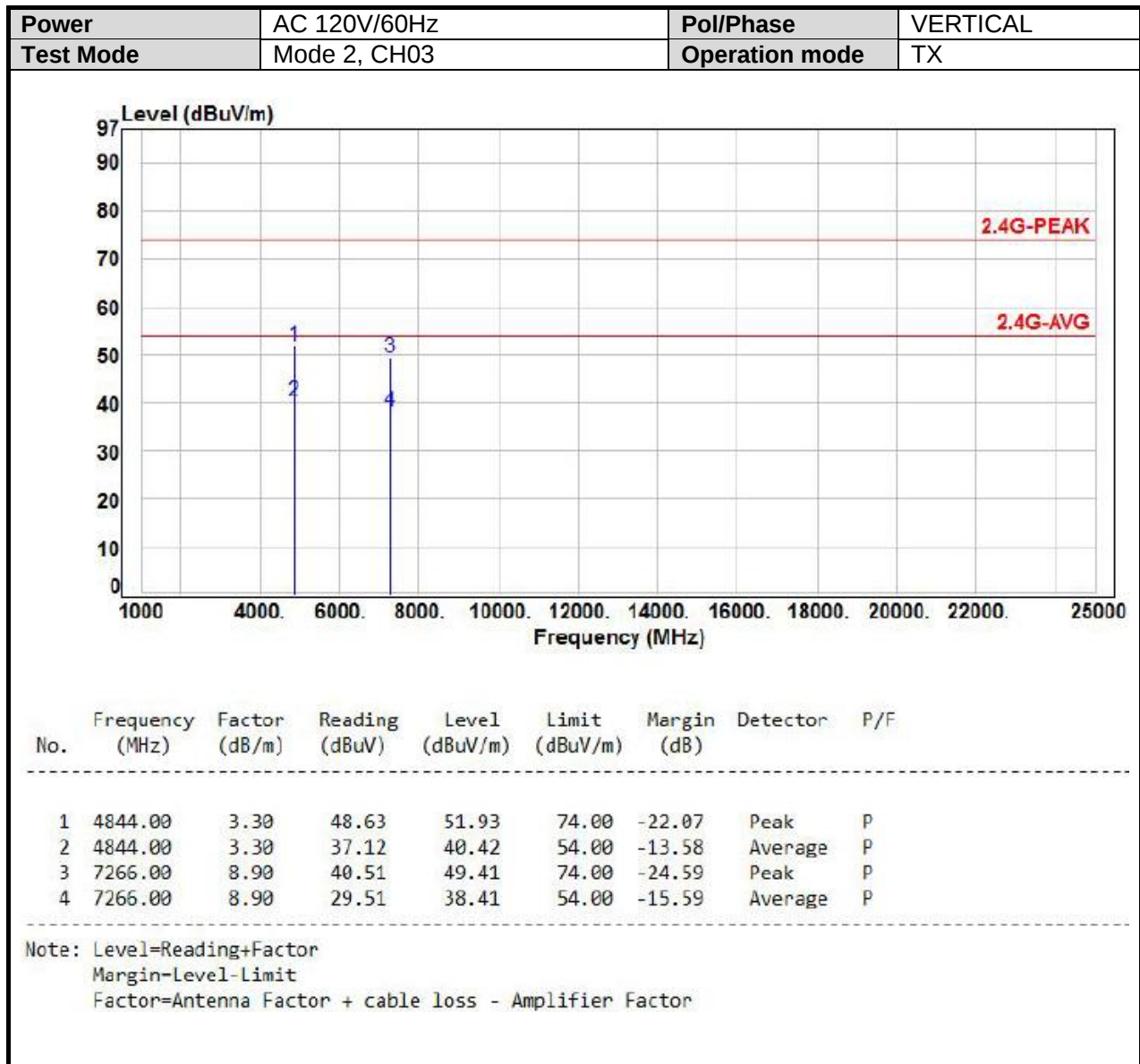


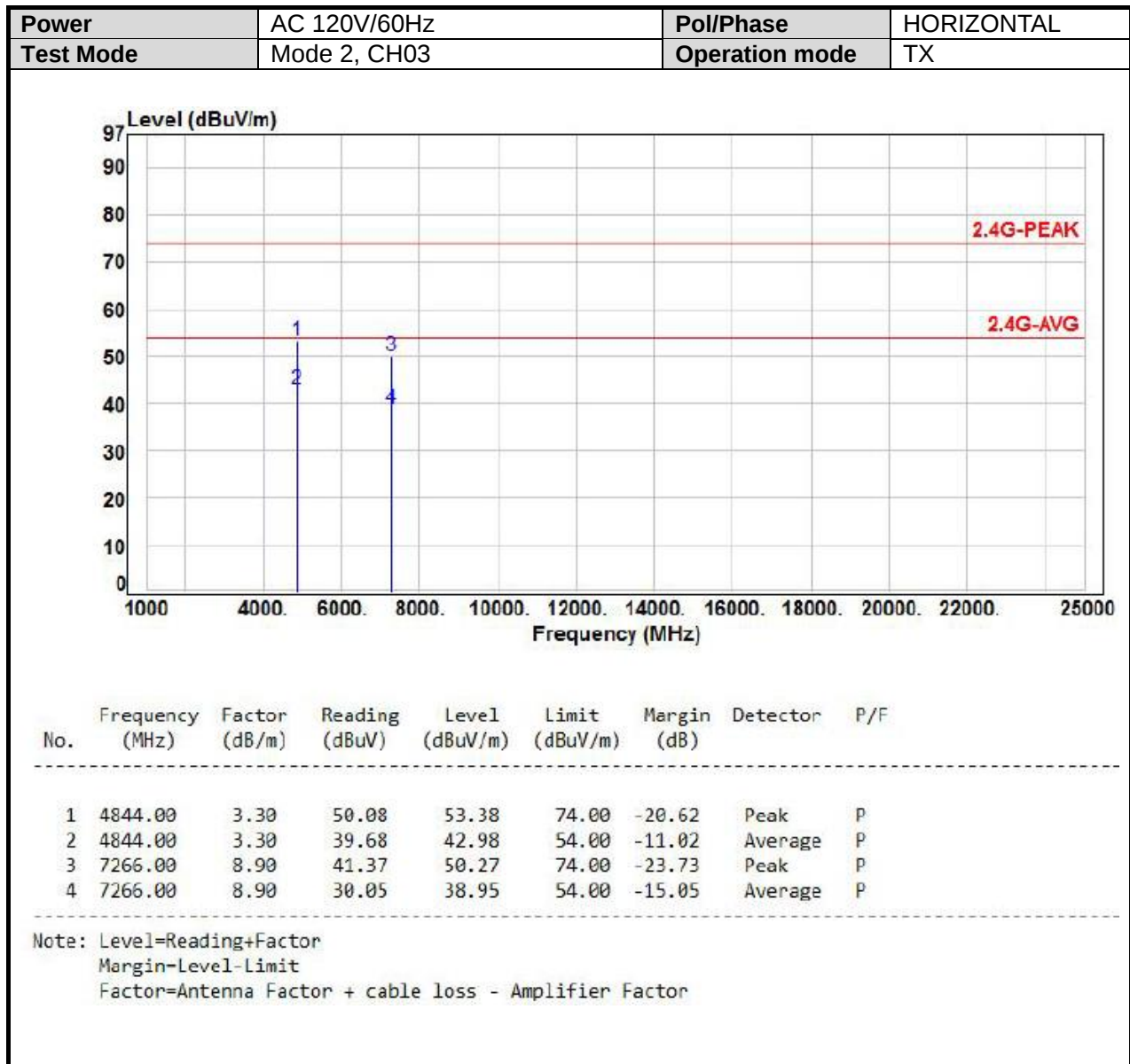


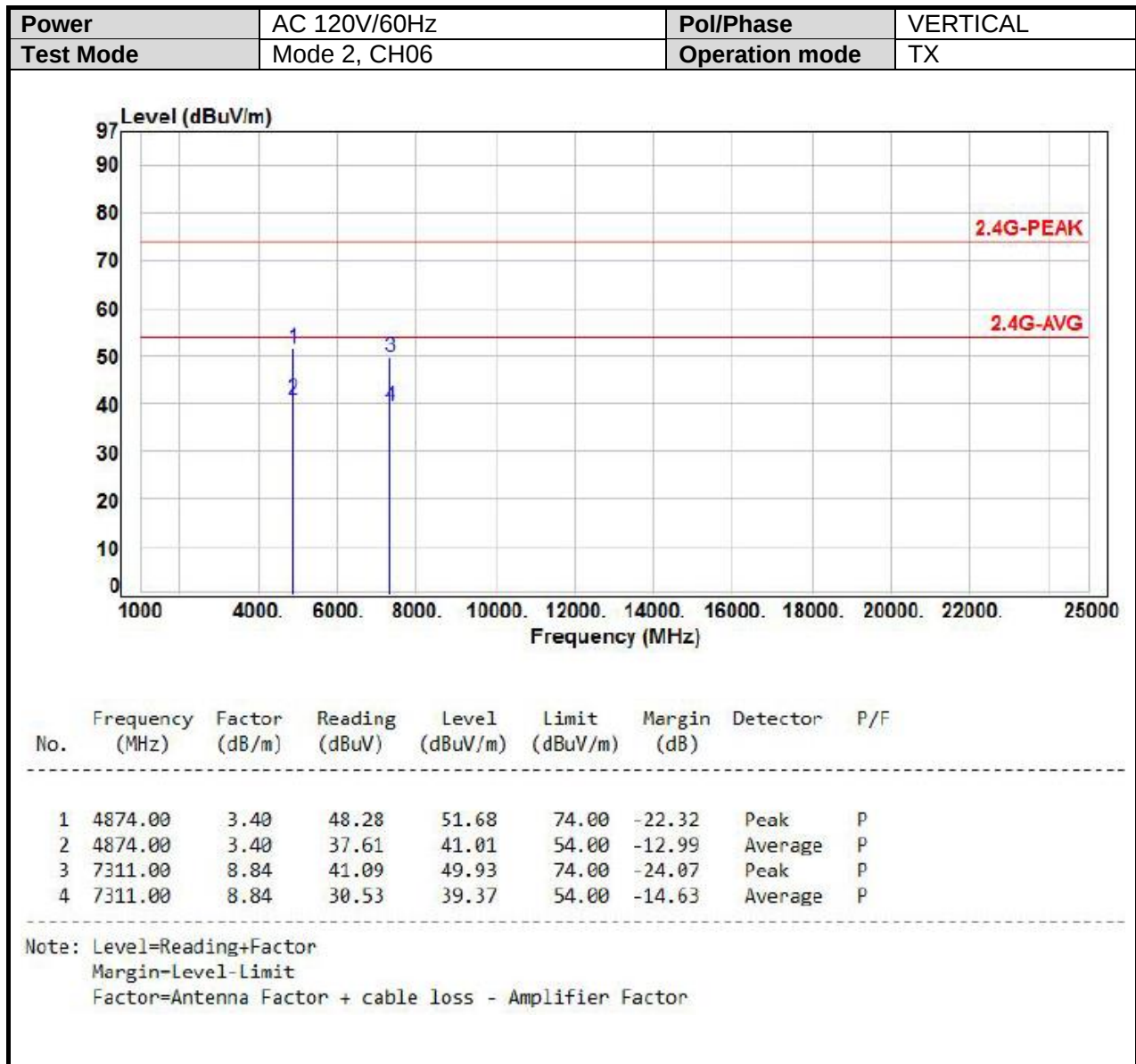


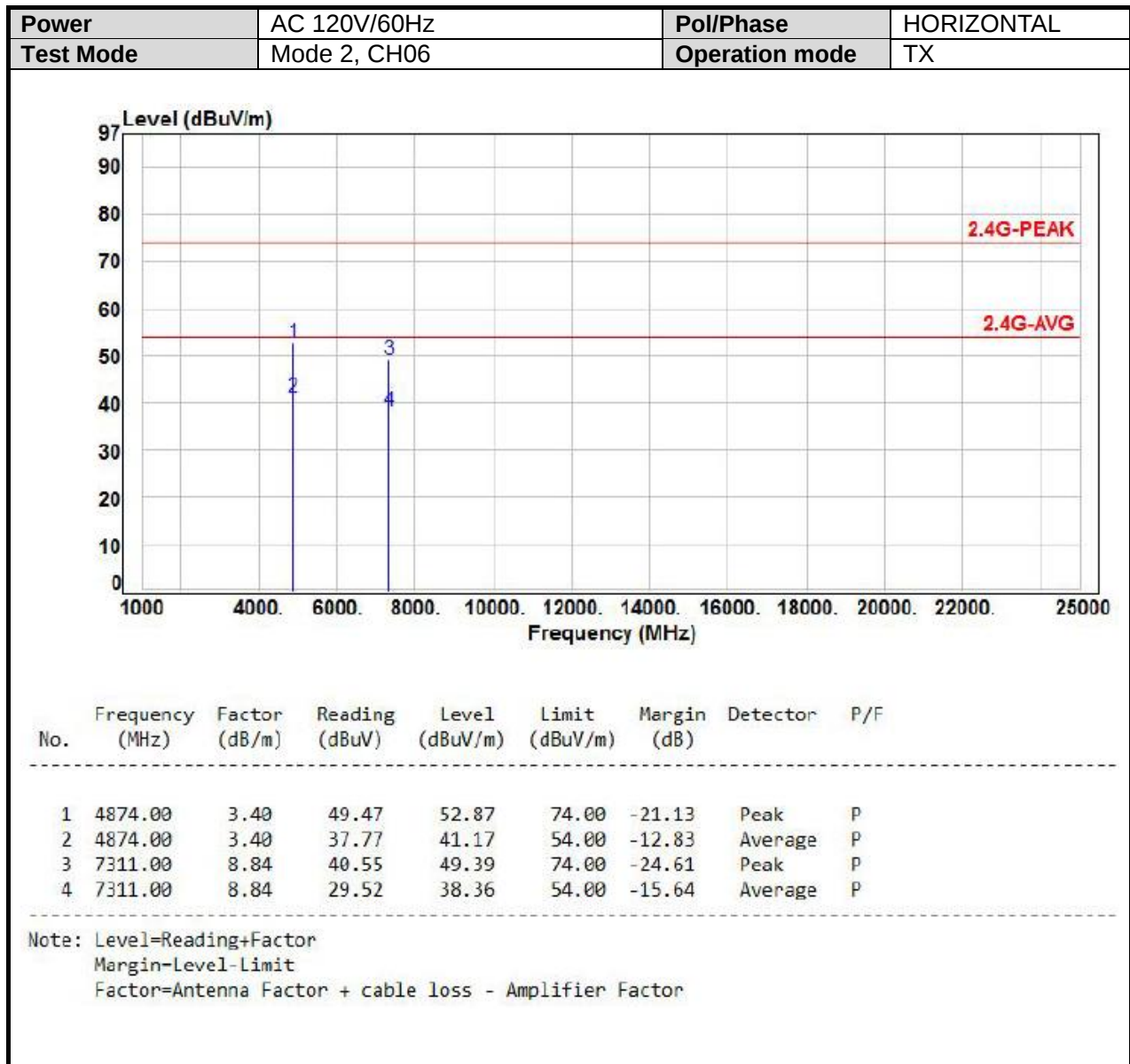


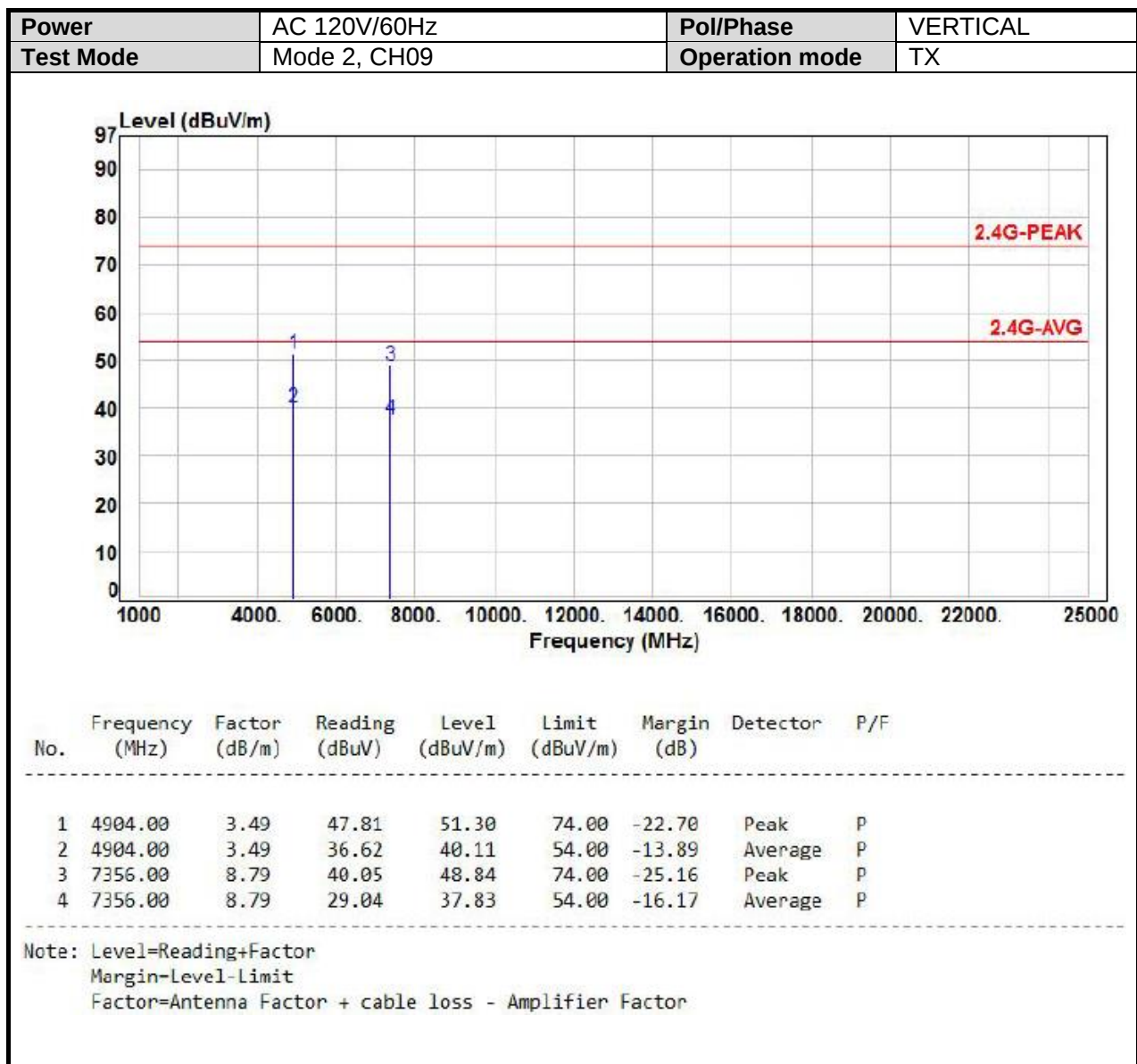


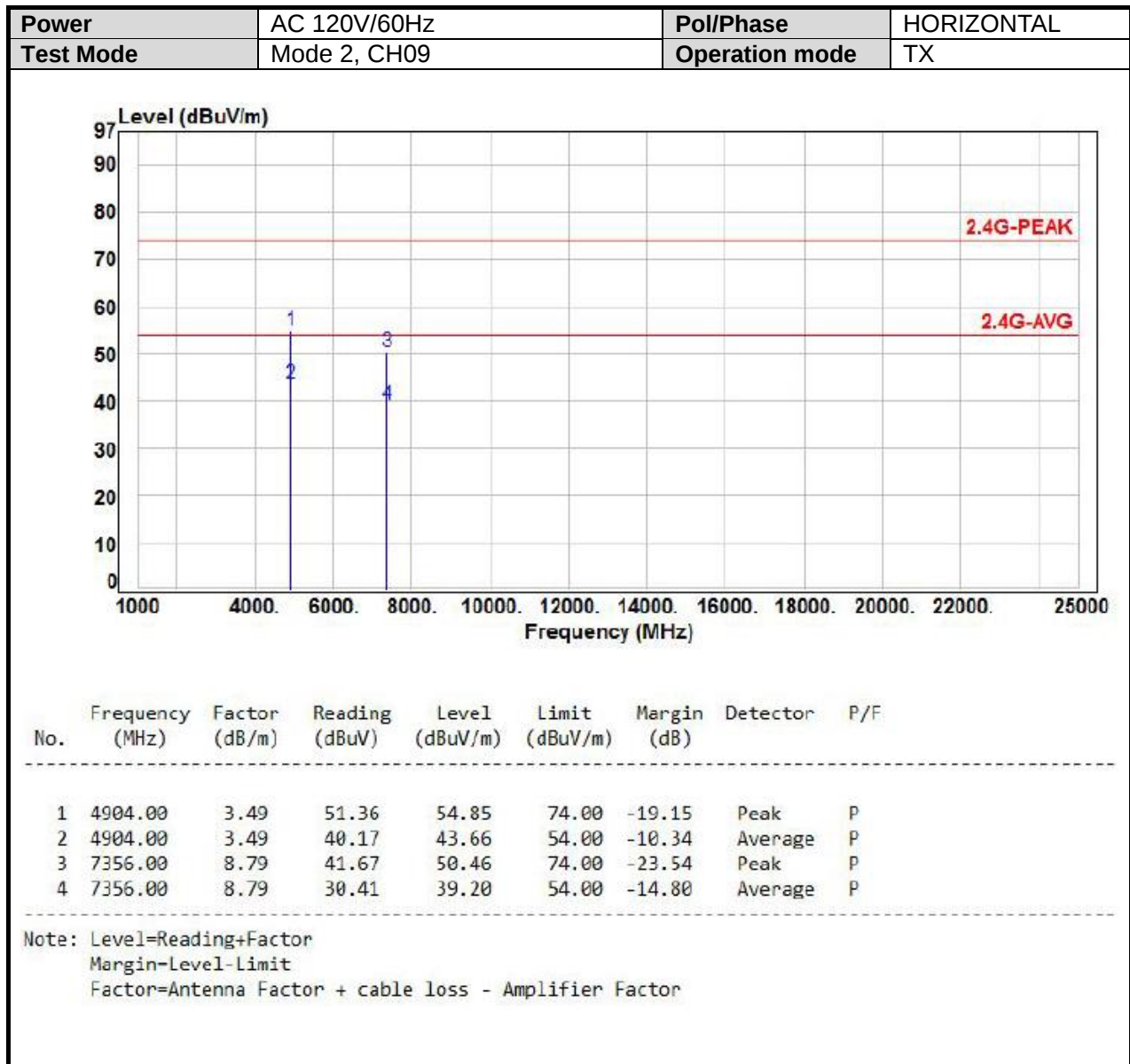














6.7 Restricted Bands of Operation

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

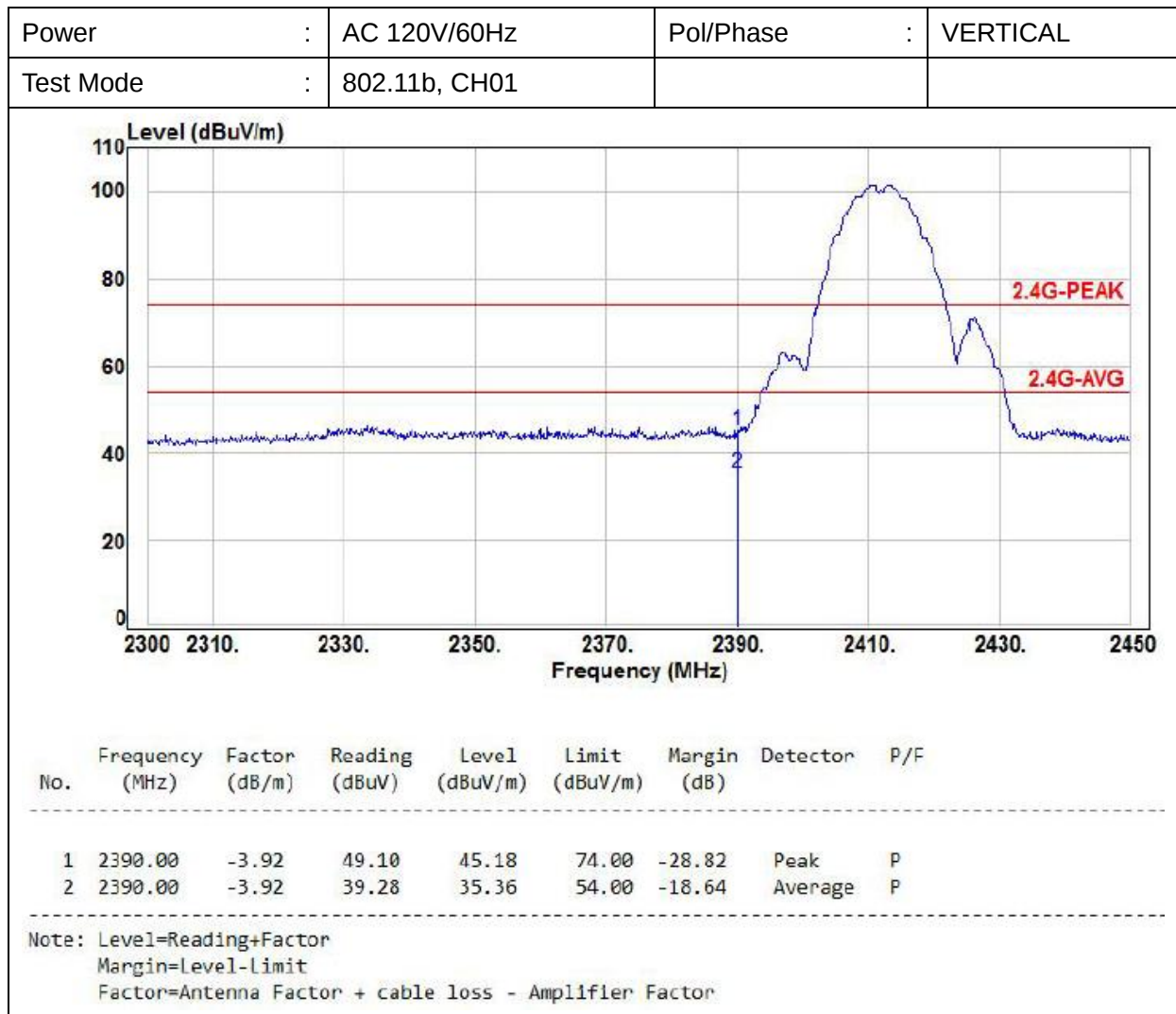
MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	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			

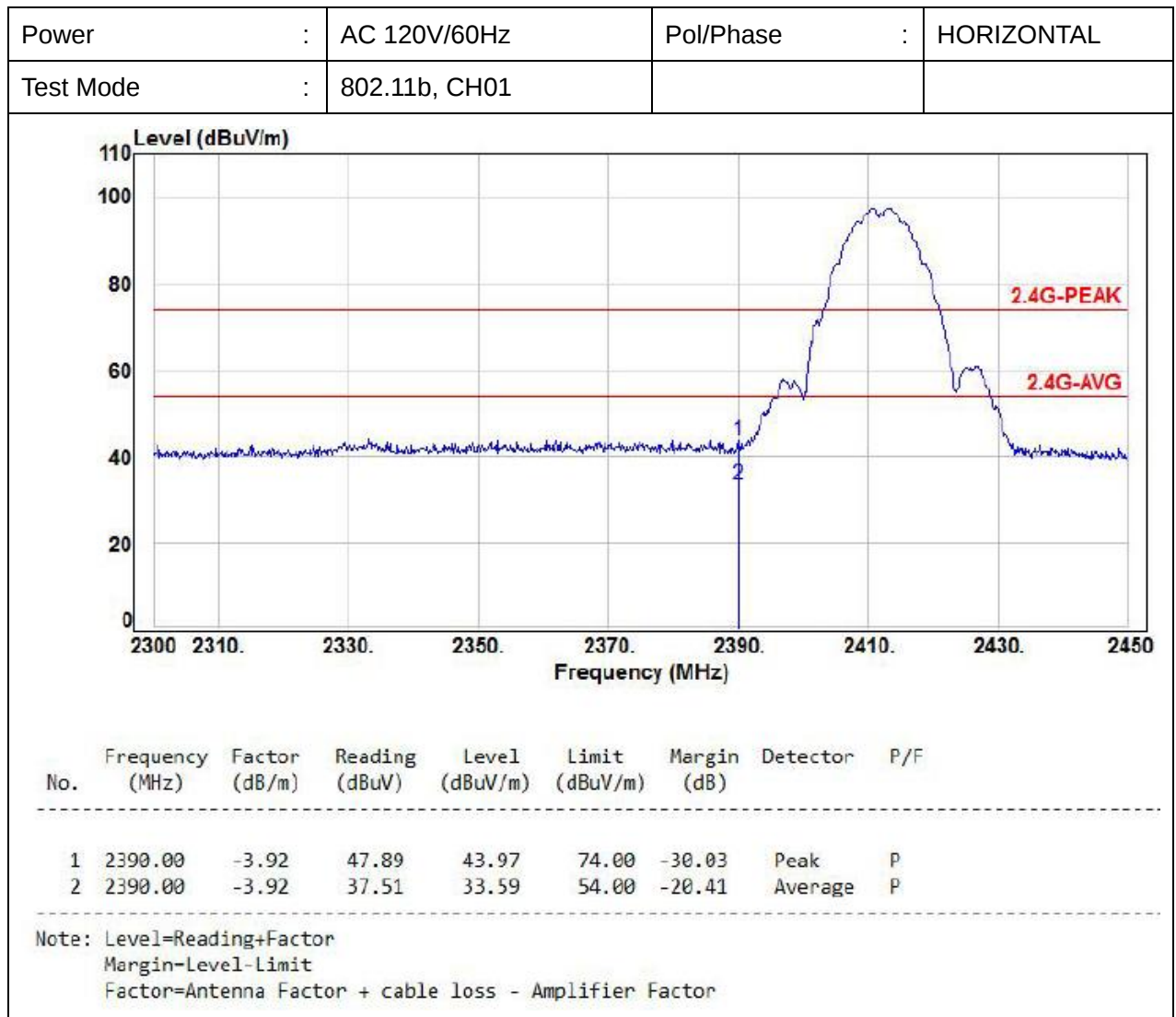
** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

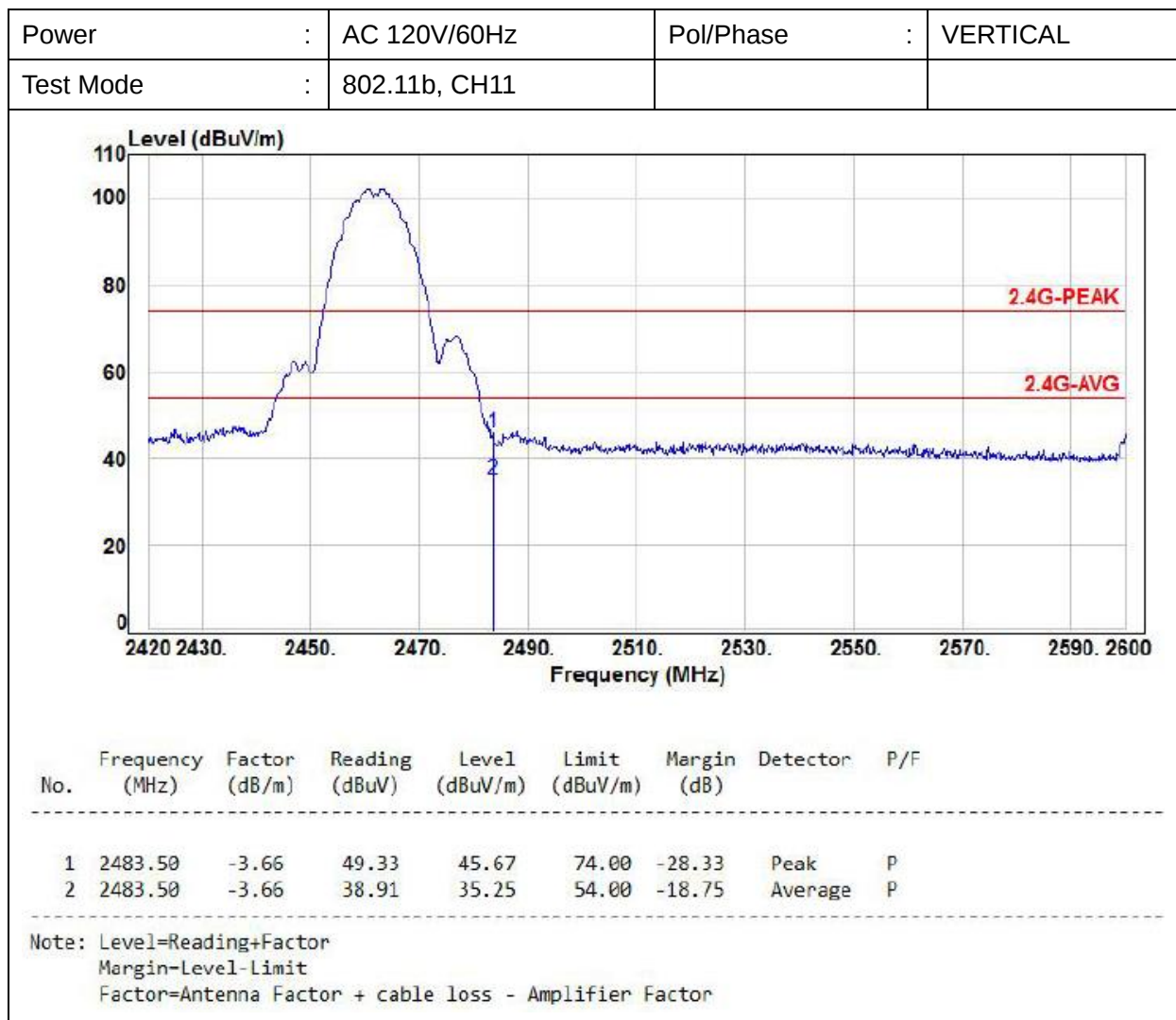


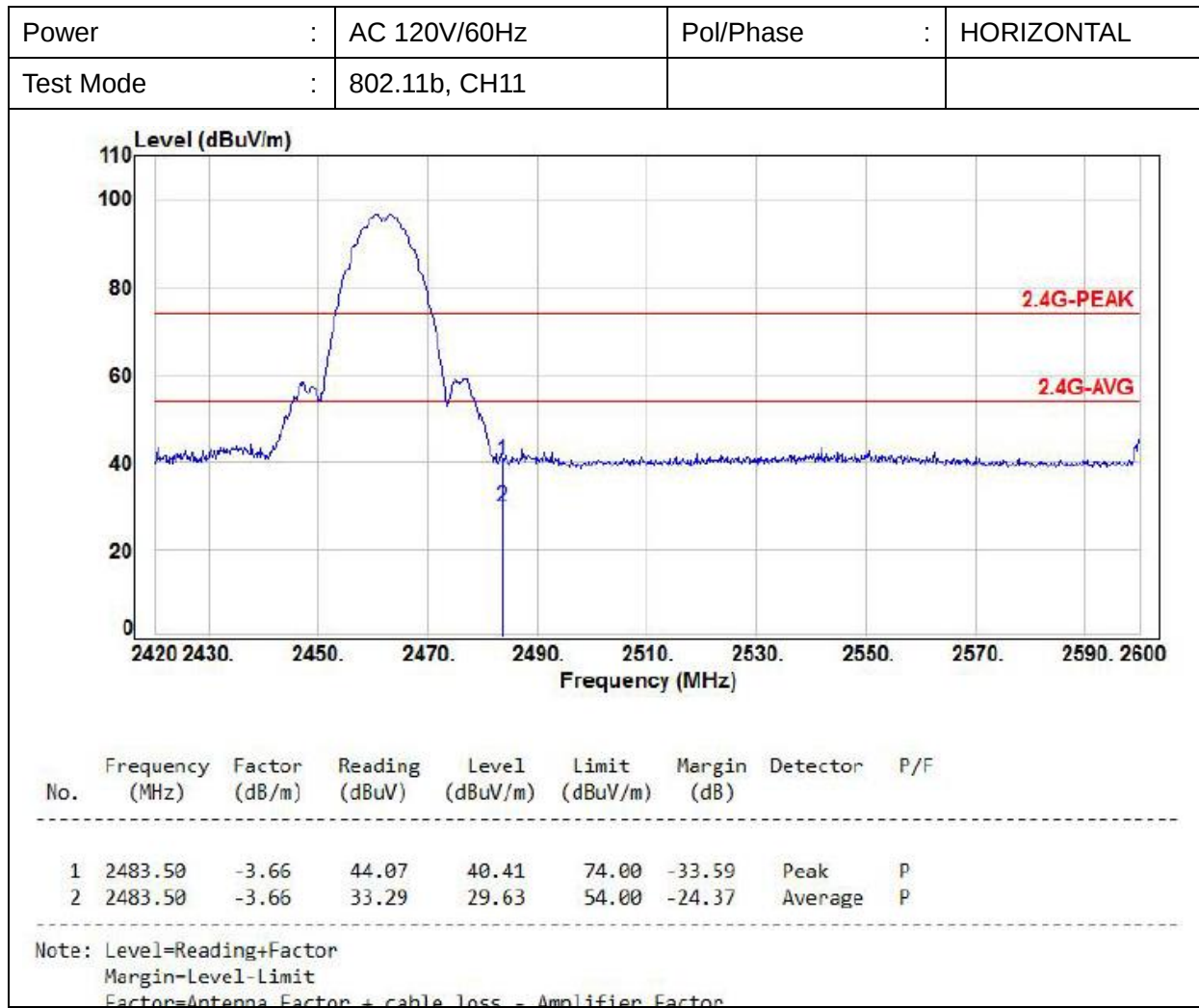
6.8 Restrict Band Emission Measurement Data

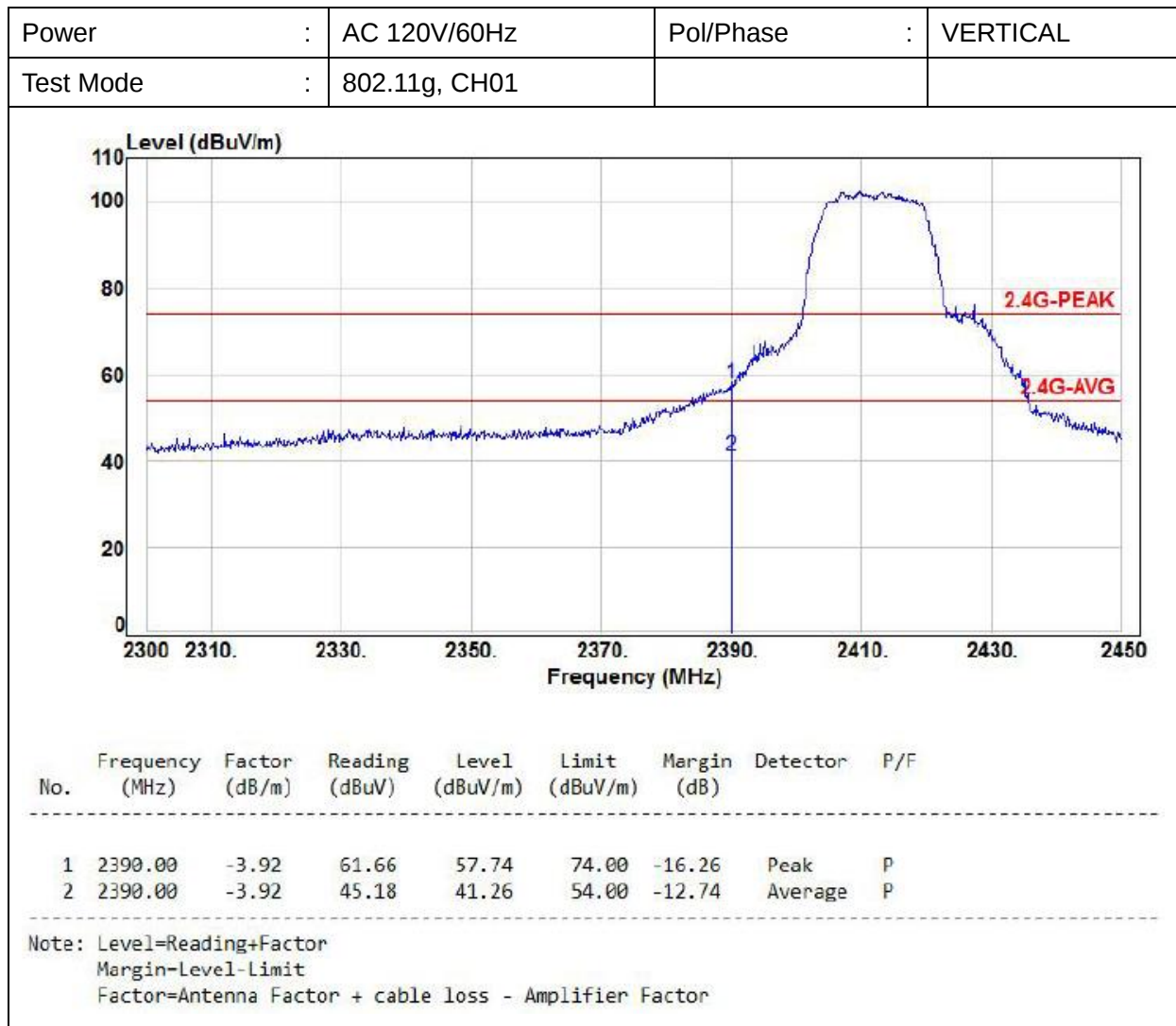
SISO-1TX-Ant B

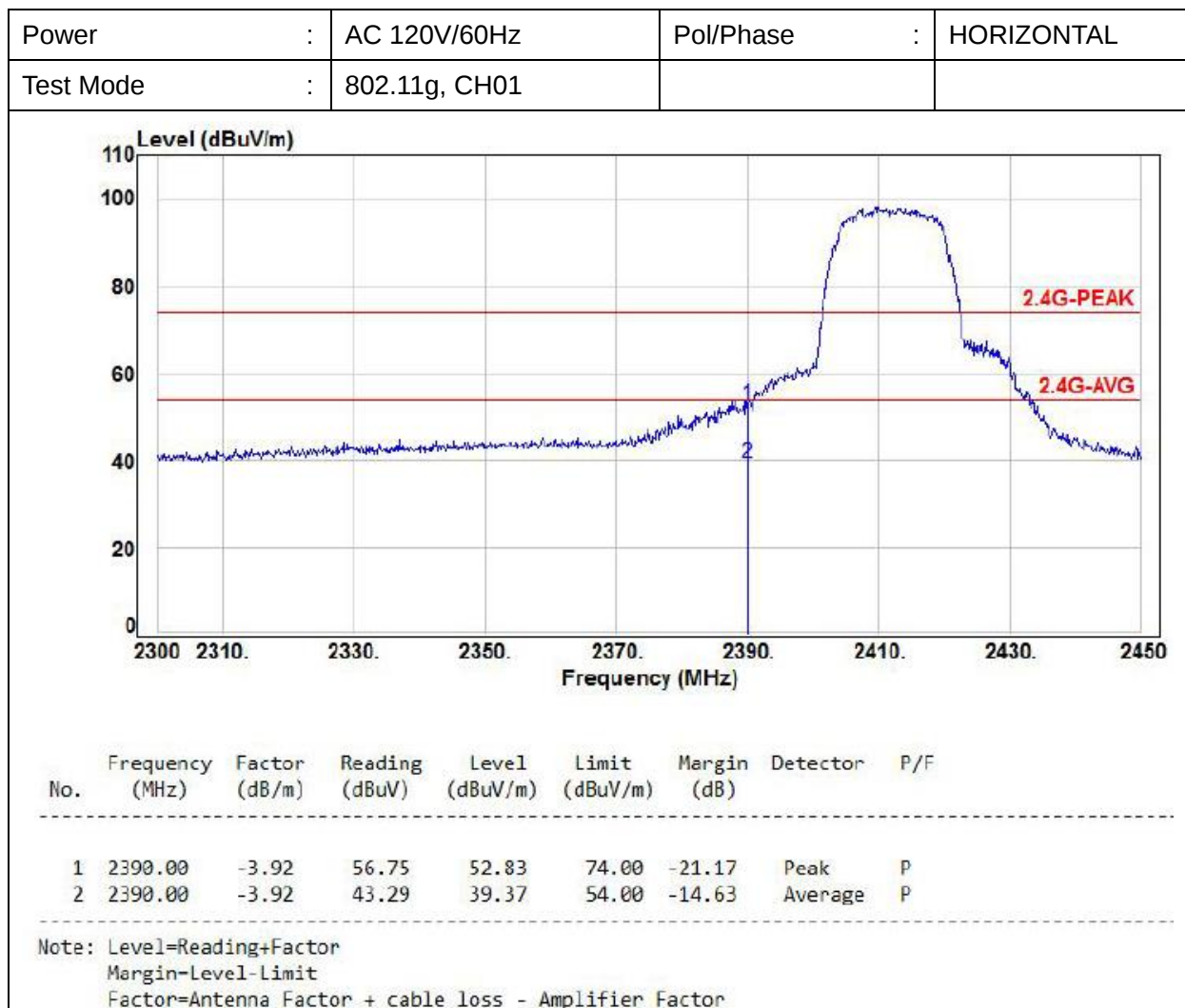


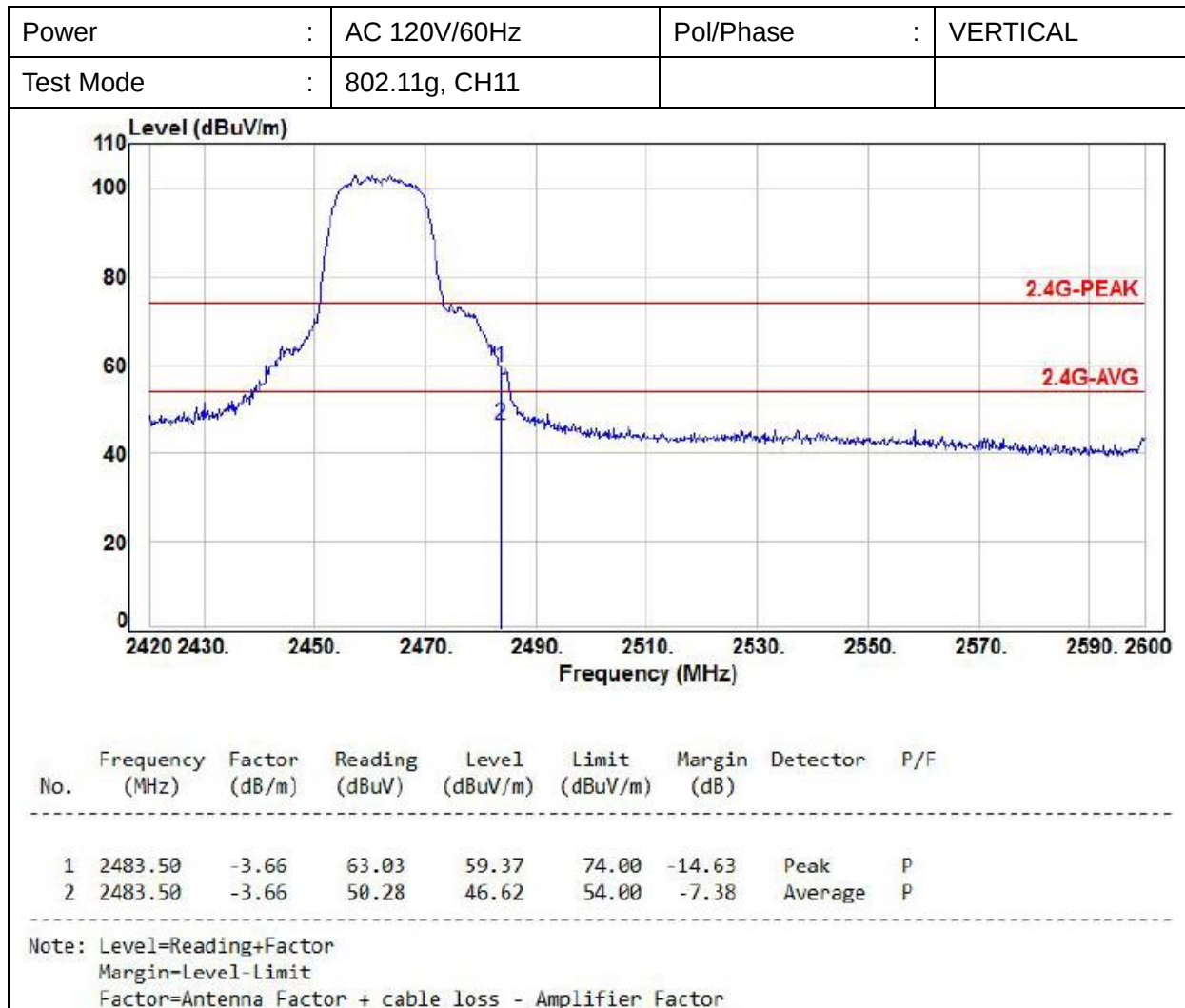


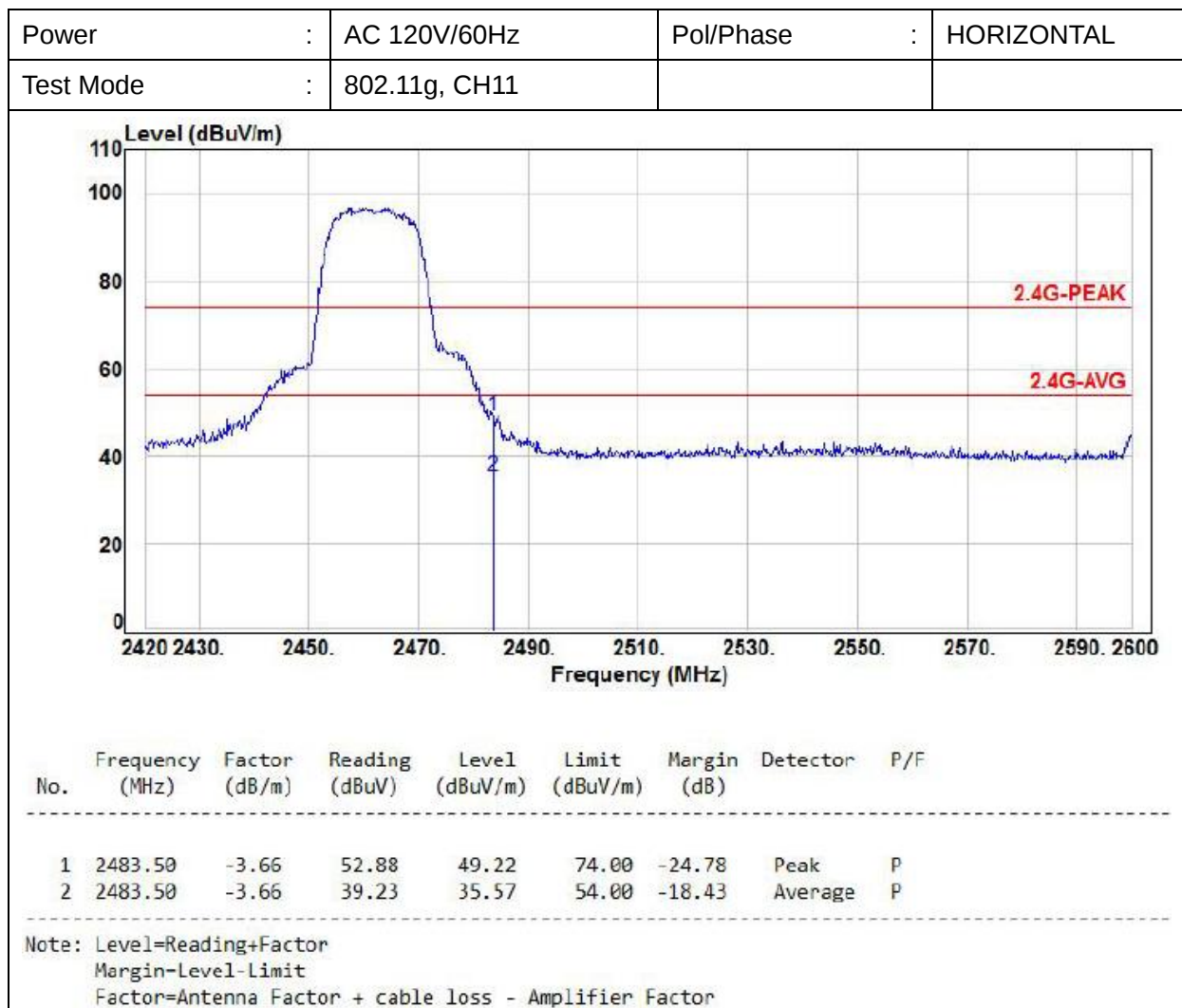








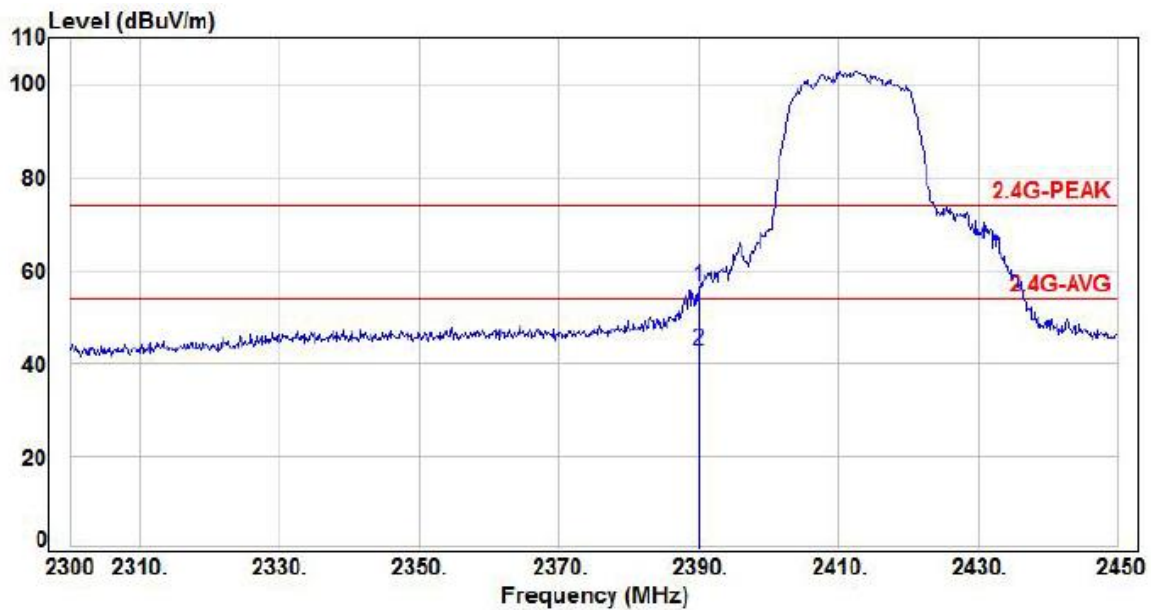






MIMO-2TX

Power	: AC 120V/60Hz	Pol/Phase	: VERTICAL
Test Mode	: 802.11n HT20, CH01		

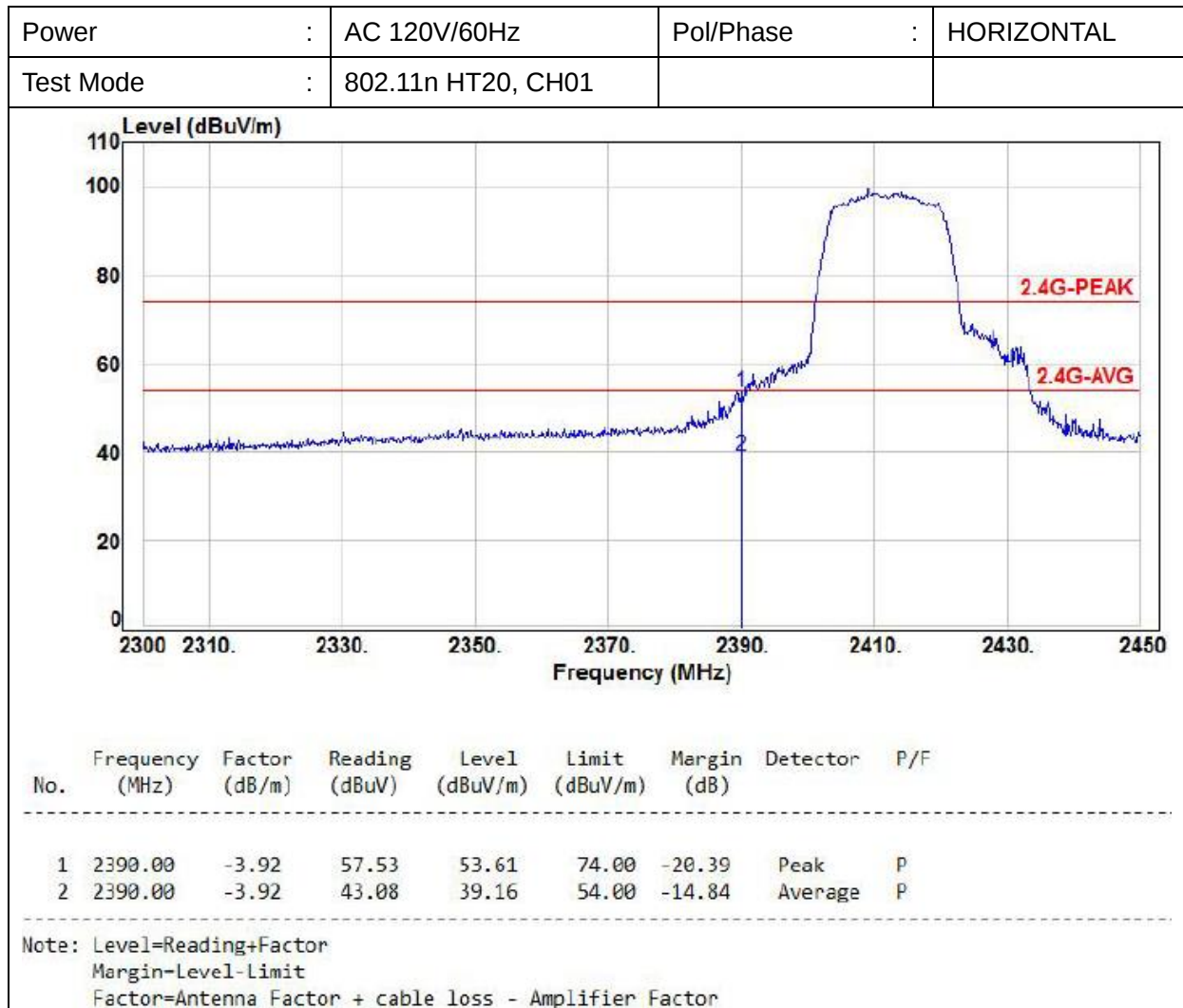


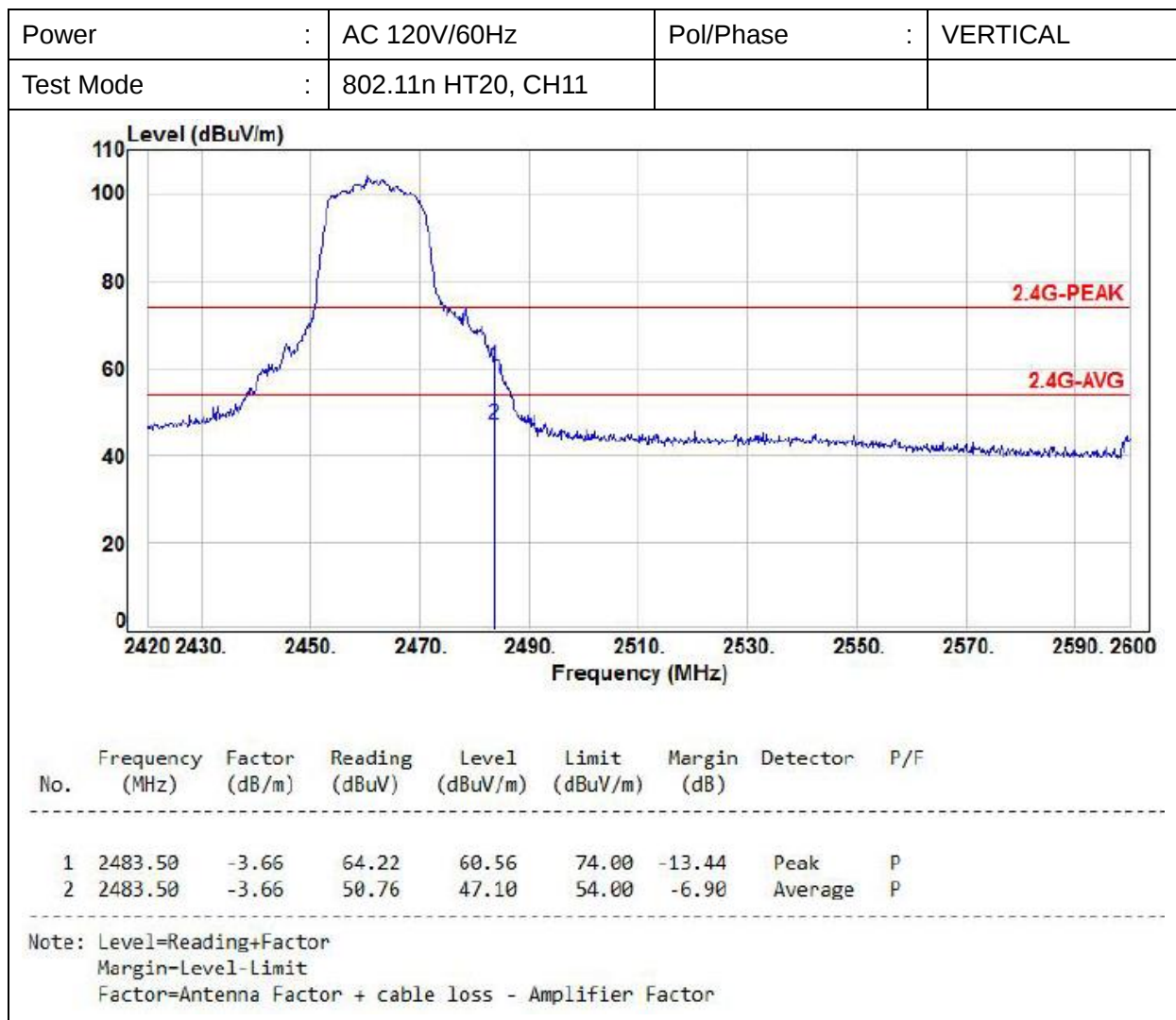
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	2390.00	-3.92	60.49	56.57	74.00	-17.43	Peak	P
2	2390.00	-3.92	46.71	42.79	54.00	-11.21	Average	P

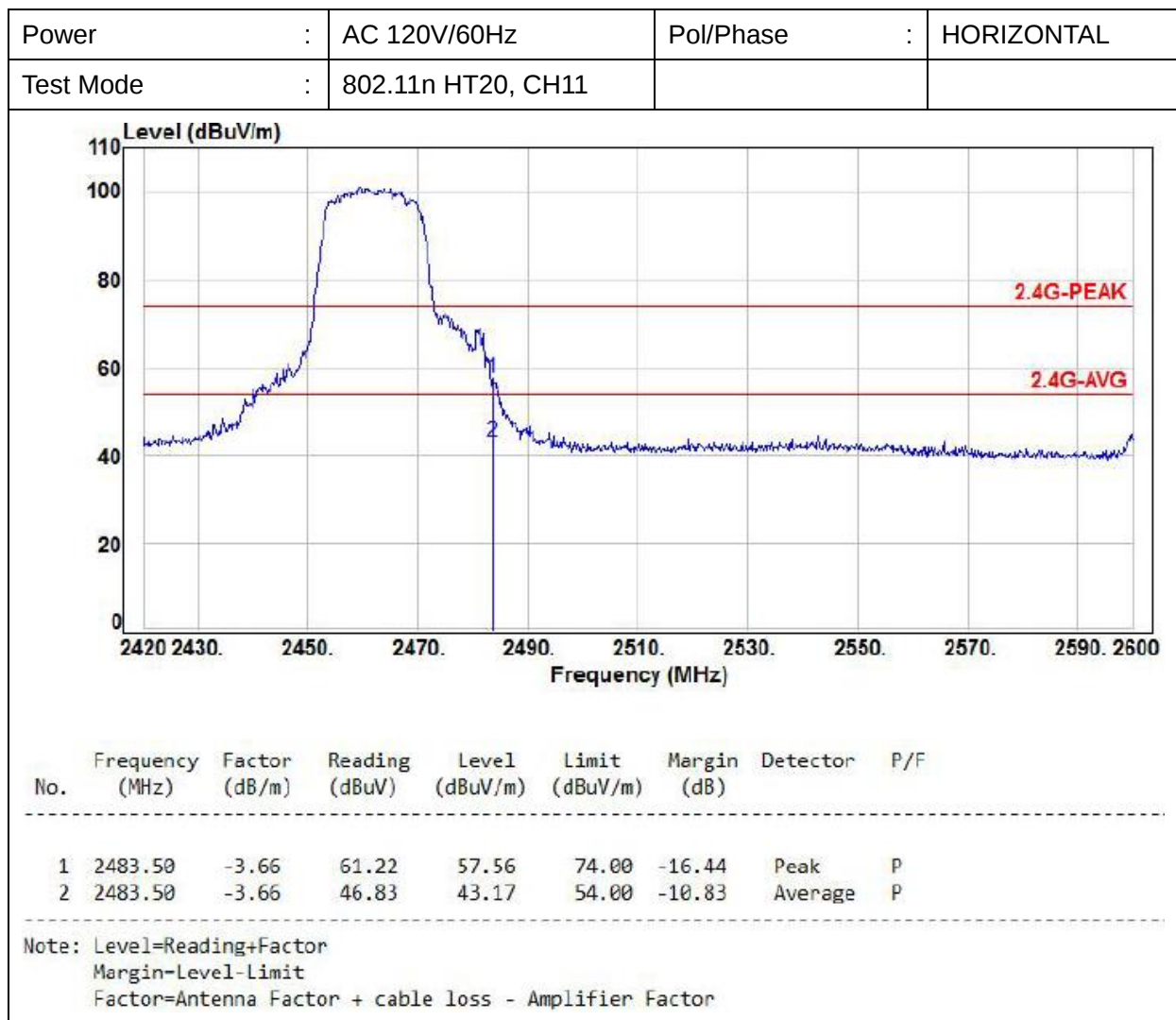
Note: Level=Reading+Factor

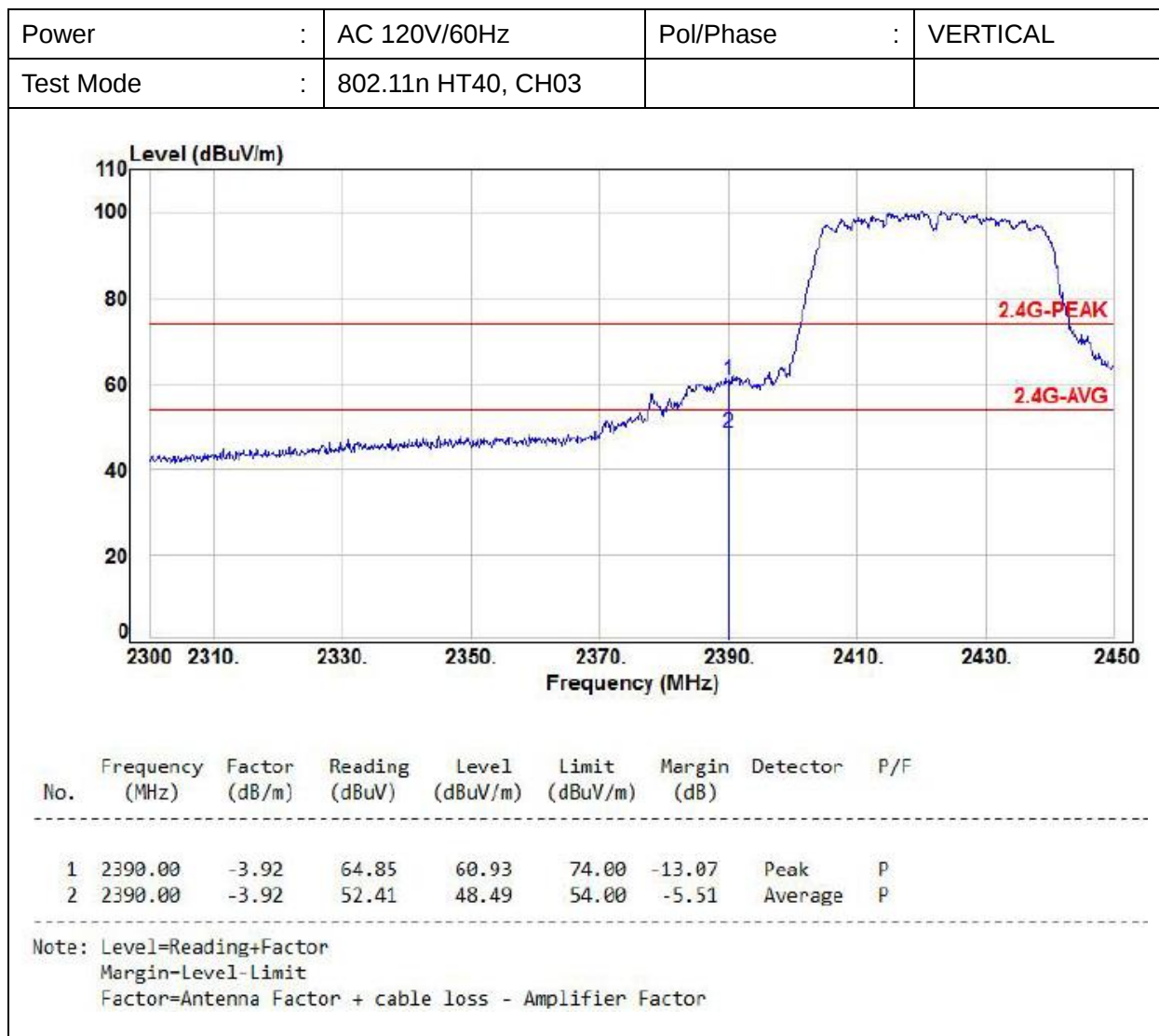
Margin=Level-Limit

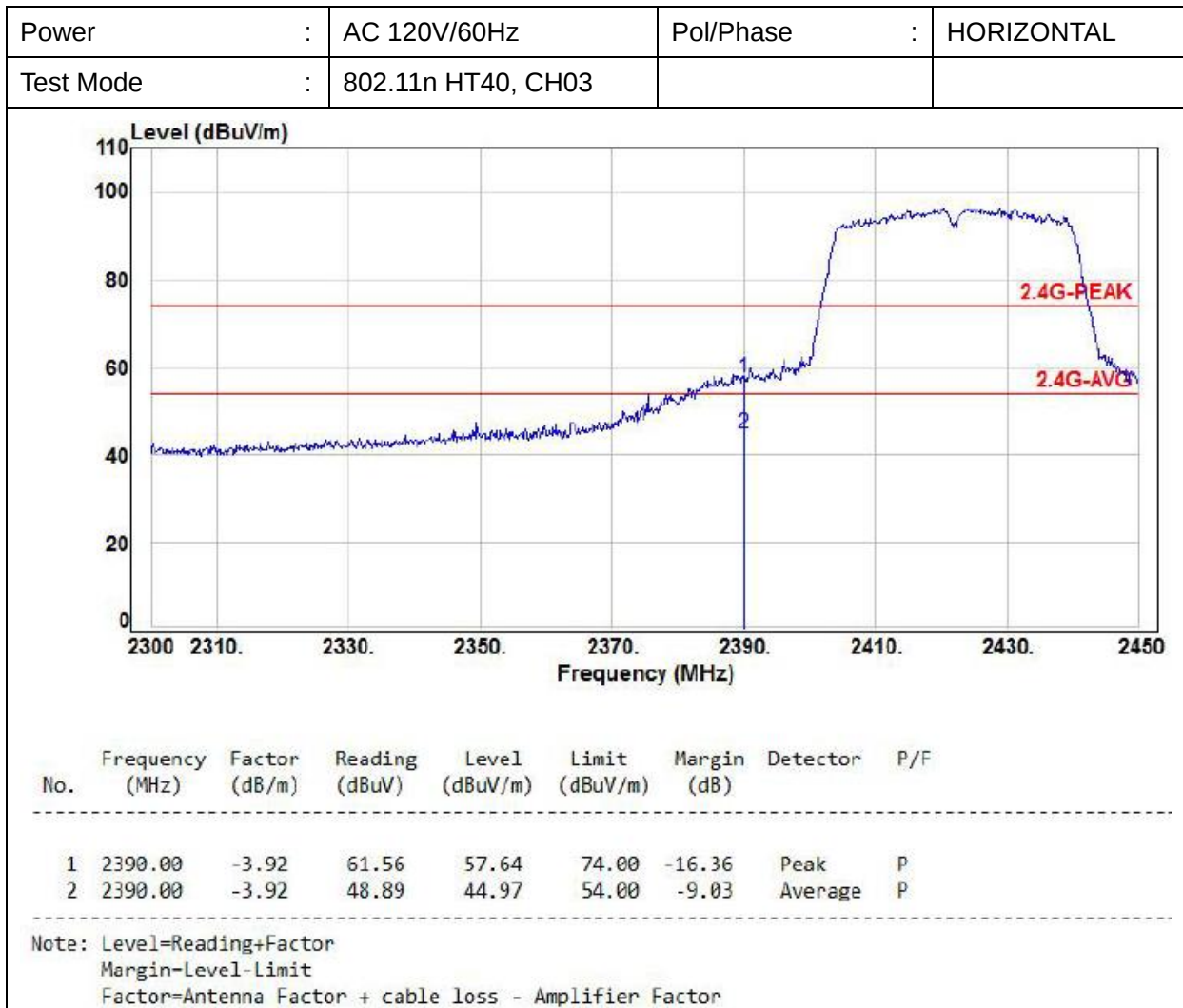
Factor=Antenna Factor + cable loss - Amplifier Factor

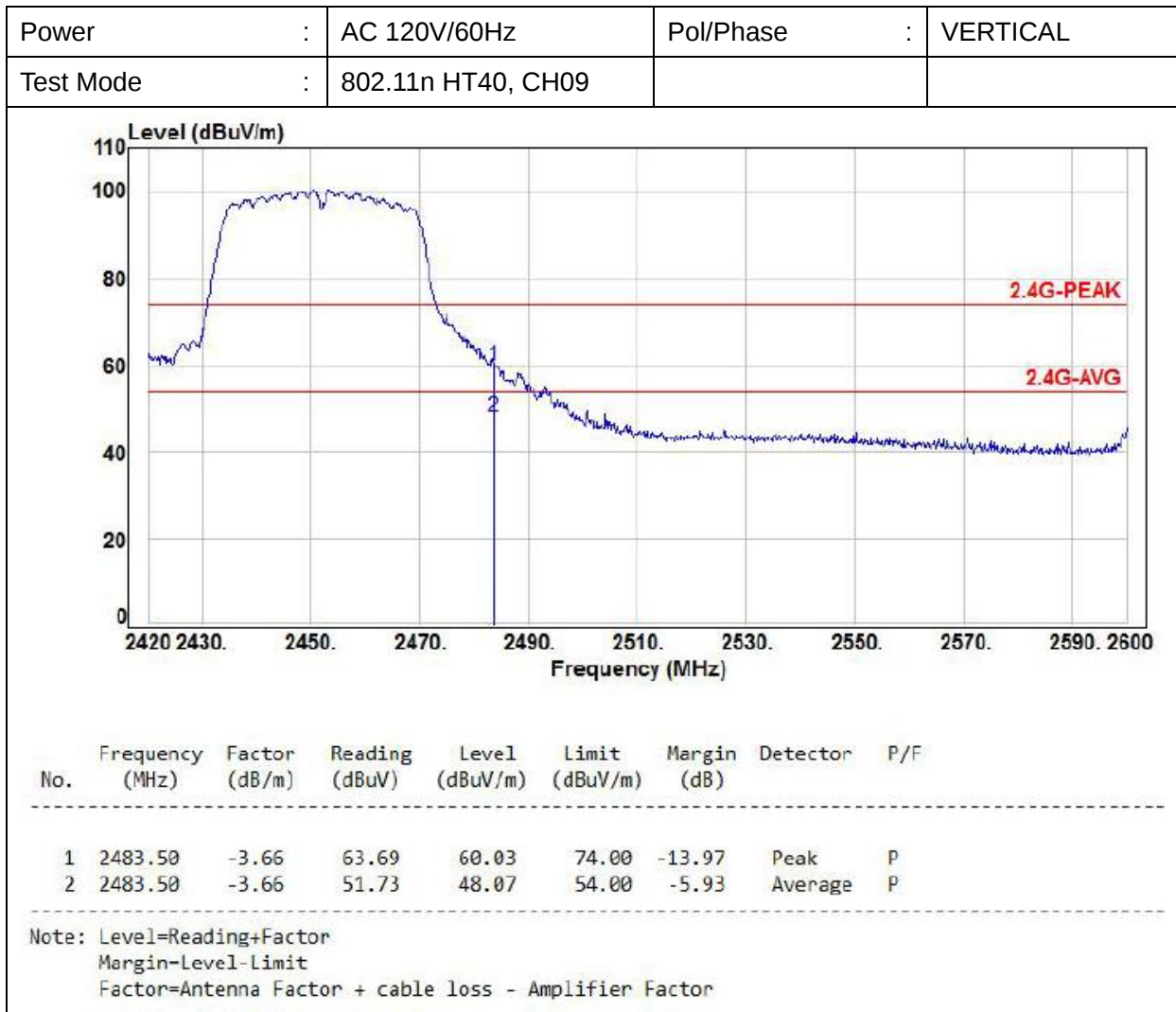


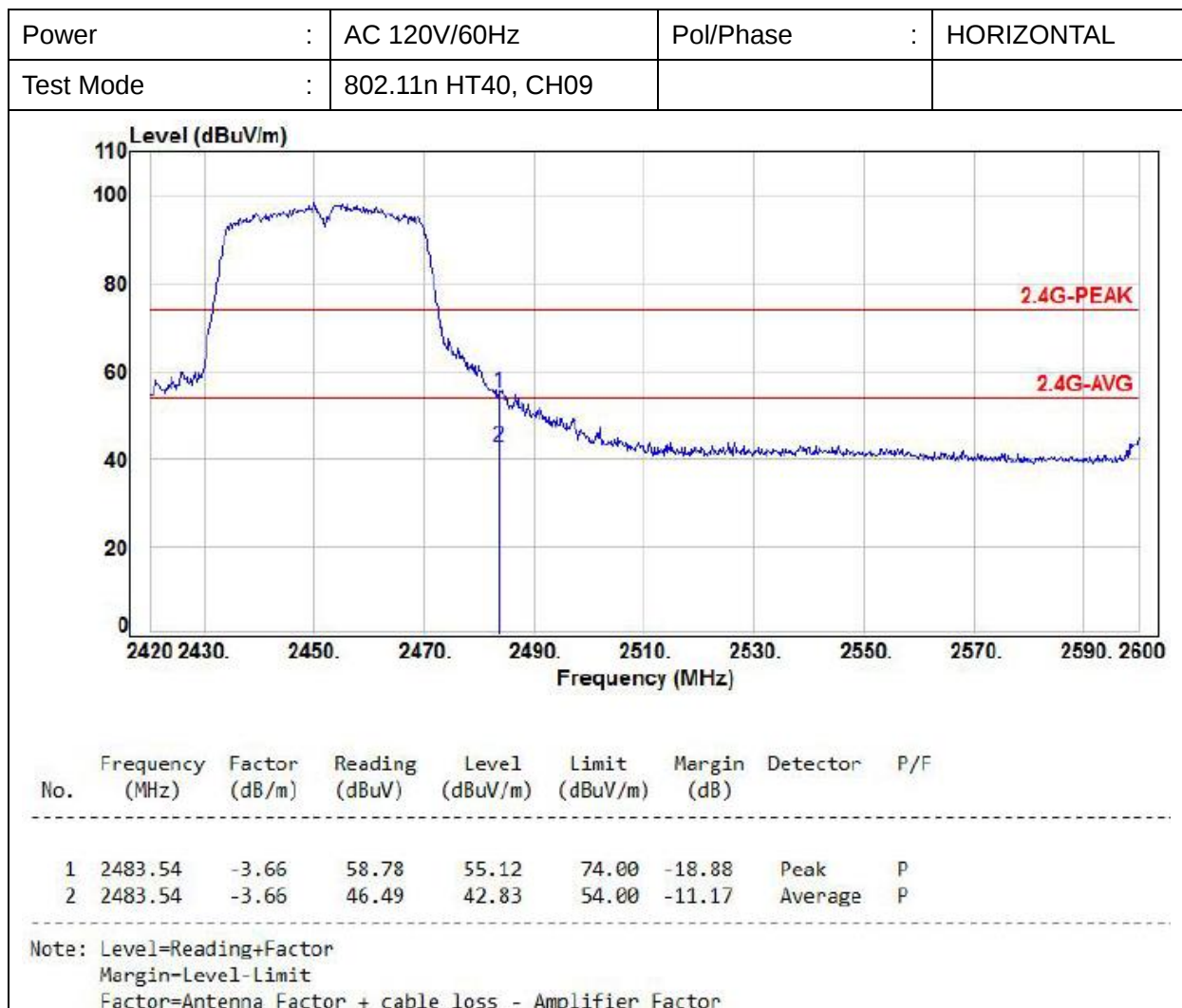












----- End of the report -----