




FCC RADIO TEST REPORT

Applicant : Intracom Asia Co., Ltd

Address : 4F., No 77, Sec. 1, Xintai 5th Rd, Xizhi Dist., New Taipei City 221,
Taiwan

Equipment : Numeric Wireless Keypad

Model No. : 179928, 178846, TSKP-1001, TSKP-1002, TSKP-1003, TSKP-1004,
TSKP-1005, TSKP-1006, TSKP-1007, TSKP-1008, TSKP-1009,
TSKP-1010, TSKP-1011, TSKP-1012, TSKP-1013, TSKP-1014,
TSKP-1015, TSKP-1016, TSKP-1017, TSKP-1018

Trade Name : 


FCC ID : 2ADQY178846928

Standard : FCC part 15 Subpart C §15.249

I HEREBY CERTIFY THAT :

The sample was received on Mar. 03, 2021 and the testing was completed on Apr. 20, 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

Report No.	Issue Date	Description
DEFC2103013	Apr. 22, 2021	Original



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.249

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	N/A
15.209	. Radiated Emission	Pass
15.215	. 20dB Bandwidth Measurement	Pass
15.249	. Band Edges Measurement Data	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	Numeric Wireless Keypad
Model No.	179928, 178846, TSKP-1001, TSKP-1002, TSKP-1003, TSKP-1004, TSKP-1005, TSKP-1006, TSKP-1007, TSKP-1008, TSKP-1009, TSKP-1010, TSKP-1011, TSKP-1012, TSKP-1013, TSKP-1014, TSKP-1015, TSKP-1016, TSKP-1017, TSKP-1018
Model Discrepancy	All models are identical to each other except for model name.
Frequency	2405MHz~2470MHz
Number of Channel	8
Spreading Method	GFSK
Power Supply	DC 1.5V AA battery
Antenna Specification	PCB Antenna 2.34dBi

2.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)
*00	2405	*04	2440
01	2413	05	2450
02	2422	06	2460
03	2430	*07	2470

Note: Channels remarked * are selected to perform test.



2.3 Test Mode and Test Software

- a. The complete test system included EUT for the RF test.
- b. Press the "*" button to power up, the keyboard will enter the test mode, and different test modes will be entered through different keys
- c. The following test modes were performed for the test:

Radiation Emissions (30MHz ~ 1GHz)	
Test Mode	Operating Description
1	GFSK (2405)
2	GFSK (2440)
3	GFSK(2470)
caused "Test Mode 1 " generated the worst case, they were reported as the final data.	
Radiation Emissions (1GHz ~ 25GHz)	
Test Mode	Operating Description
1	GFSK (2405)
2	GFSK (2440)
3	GFSK(2470)
caused "Test Mode 1,2, 3" generated the worst case, they were reported as the final data.	

2.4 Description of Test System

The EUT has been tested as an independent unit together without any other necessary accessories or support units.



2.5 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	2021/03/03~2021/04/20	22~25°C / 50~60%	Amos Zhang
Radiated Emissions	3M02-DG	2021/03/03~2021/04/20	22~25°C / 50~60%	Amos Zhang

2.6 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated Spurious Emission(9KHz~30MHz)	±3.405dB
Radiated Spurious Emission(30MHz~1GHz)	±5.326dB
Radiated Spurious Emission(1GHz~25GHz)	±5.918dB
Conducted Spurious Emission	±2.156dB
6dB Bandwidth	±4.401%
20dB Bandwidth	±4.40%
Occupied Bandwidth	±4.41%
Peak Output Power(Conducted Power Meter)	±1.31dB
Dwell Time	±0.11%
Power Spectral Density	±2.146dB
Duty Cycle	±0.17%



3. Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Test Receiver	R&S	ESCI	100565	2020.06.08	2021.06.07
Amplifier	EMCI	EMC330	980082	2020.06.08	2021.06.07
Bilog Antenna	Sunol Science	JB1	A072414-2	2020.06.08	2022.06.07
Preamplifier	EMCI	EMC-051835	980085	2020.06.08	2021.06.07
Preamplifier	COM-POWER	PA-840	711885	2020.06.08	2021.06.07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2020.06.08	2022.06.07
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	1163.039.02	2020.06.08	2021.06.07
MXA Signal Analyzer	KEYSIGHT	N9020A	US46220290	2020.05.15	2021.05.14
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY45092582	2020.05.15	2021.05.14
MXG VECTOR SIGNAL GENERATOR	Agilent	N5182B	MY53050127	2020.05.15	2021.05.14
Temperature/ Humidity Meter	mingle	ETH529	N/A	2021.01.07	2022.01.06
Wideband Radio Communication Tester	R&S	CMW500	101133	2021.01.07	2022.01.06
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A
USB Average Power Sensor	Boonton	55006	9778	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.

4.2 Antenna Construction and Directional Gain

No.	Antenna Type	Antenna Gain
1	PCB Antenna	2.34dBi



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 C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

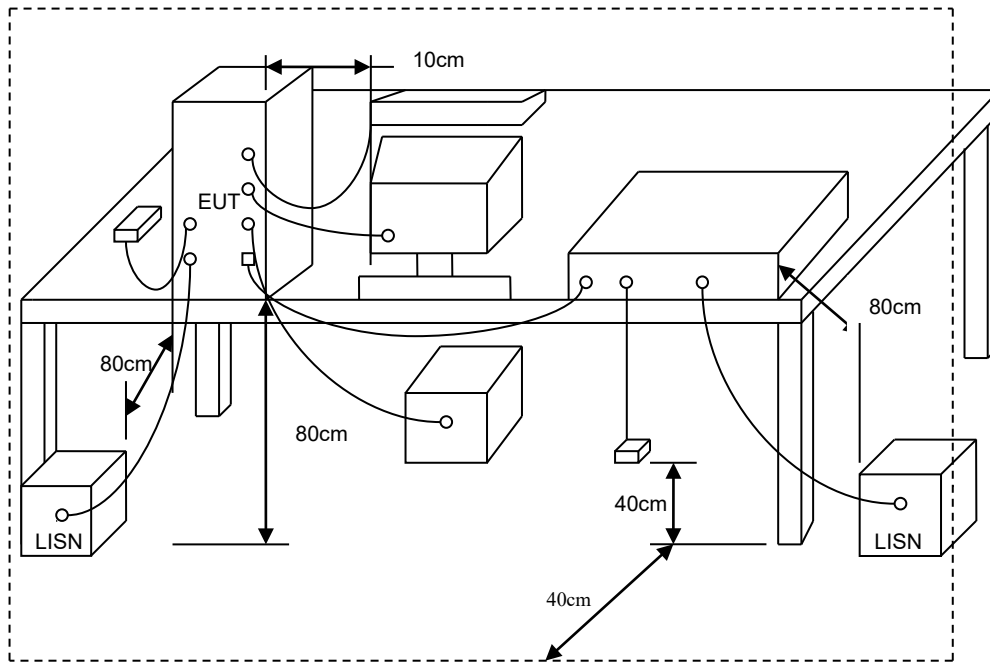
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.2 Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3 Typical Test Setup



5.4 Test Result and Data

Not applicable since the EUT supplied by battery.



6. Test of Spurious Emission (Radiated)

6.1 Test Limit

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2014. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions for unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance Meters	Radiated (μ V / M)	Radiated (dB μ V/ M)
30-88	3	100	40.0
88-216	3	150	43.5
216-960	3	200	46.0
Above 960	3	500	54.0

For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the below table.

Frequency (MHz)	Distance Meters	Radiated (dB μ V/ M)
30-230	10	30
230-1000	10	37

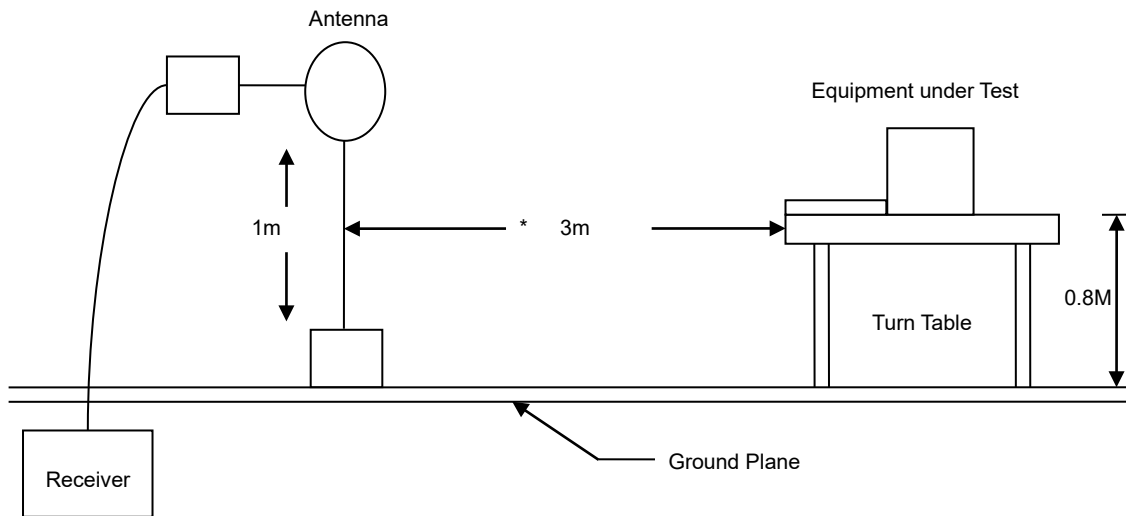
6.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter 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 average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

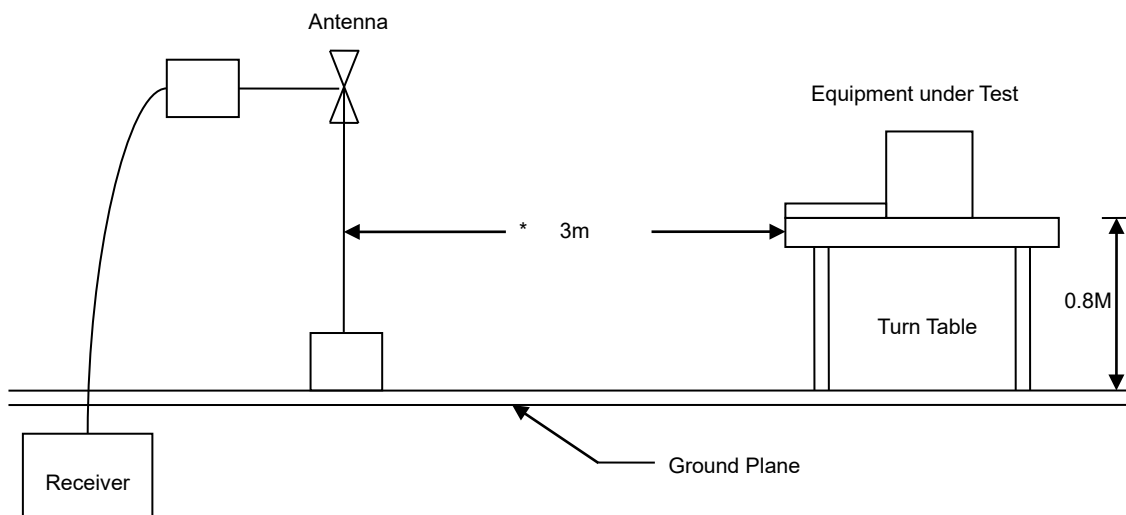


6.3 Typical Test Setup

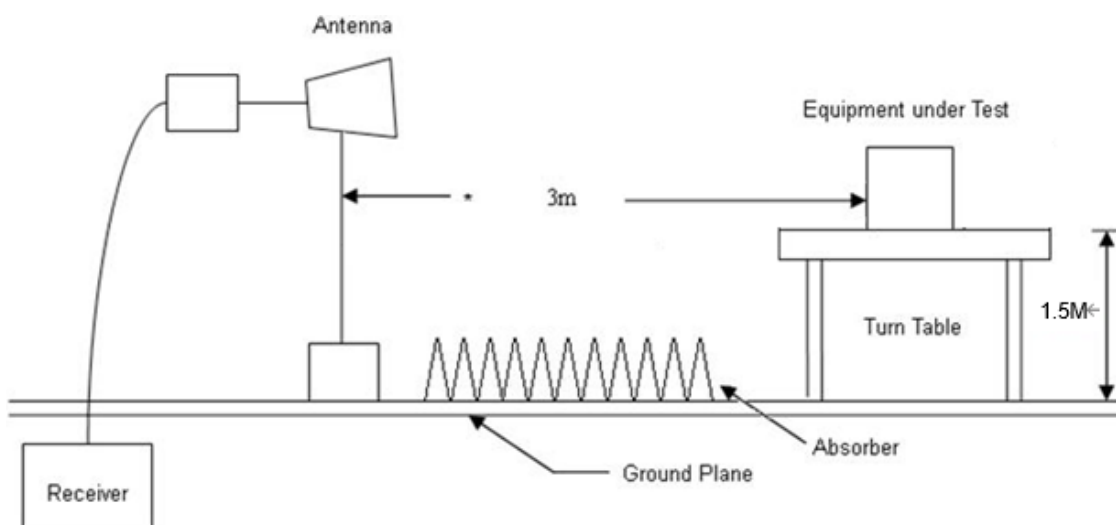
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup





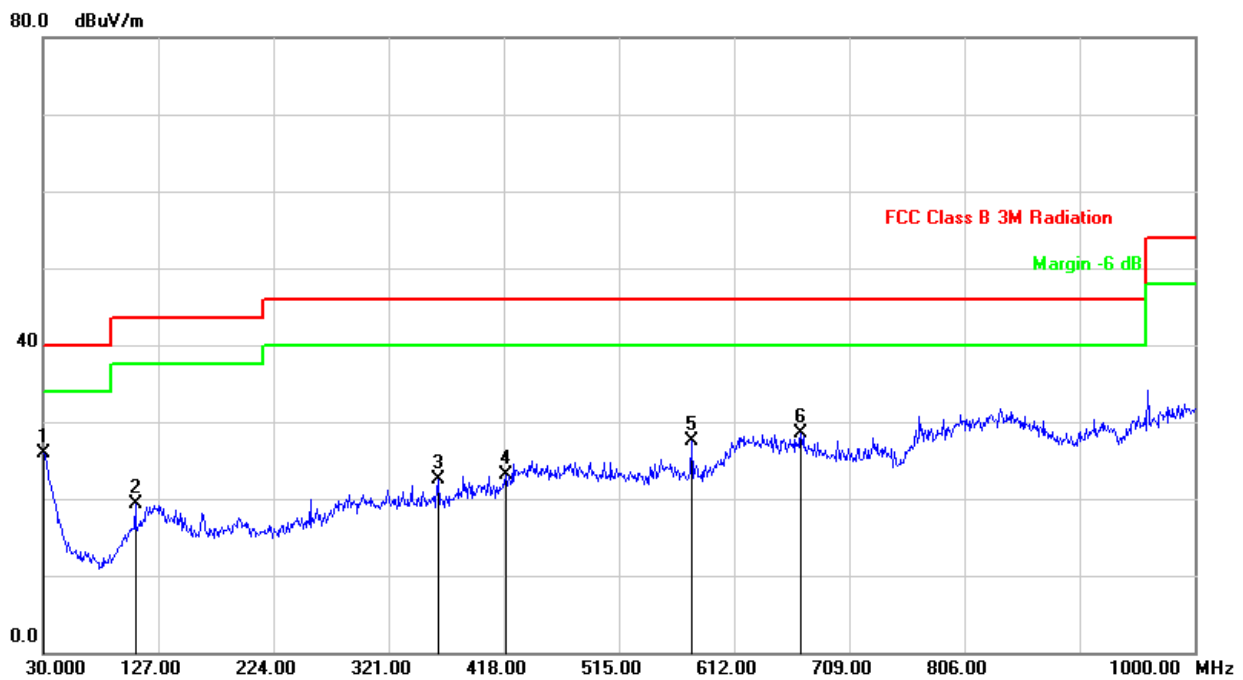
6.4 Test Result and Data (9kHz ~ 30MHz)

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

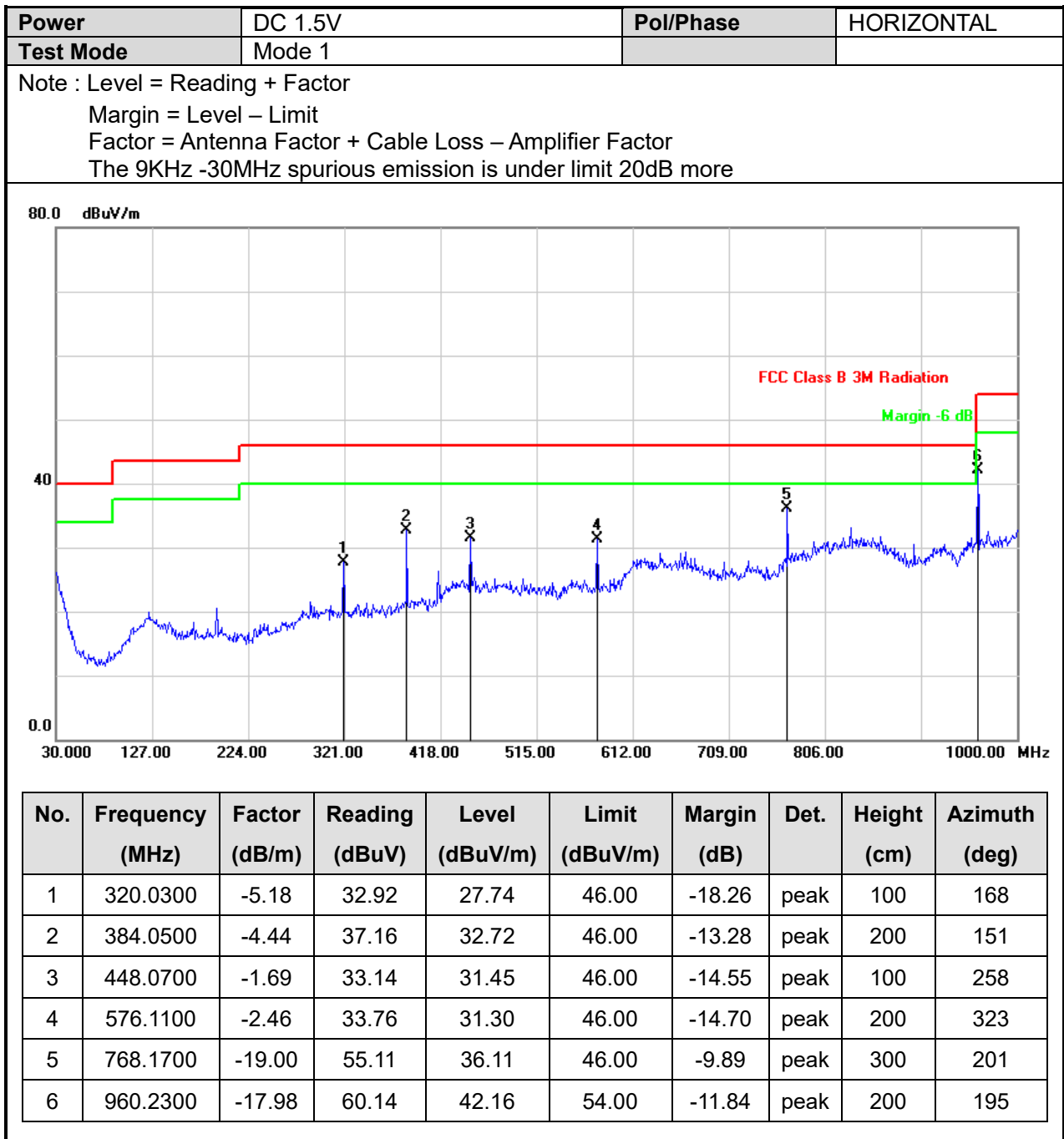
6.5 Test Result and Data (30MHz ~ 1GHz)

Power	DC 1.5V	Pol/Phase	VERTICAL
Test Mode	Mode 1		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor
 The 9KHZ -30MHz spurious emission is under limit 20dB more



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	30.0000	-21.87	47.86	25.99	40.00	-14.01	peak	100	167
2	107.6000	-21.13	40.42	19.29	43.50	-24.21	peak	100	215
3	362.7100	-5.16	27.67	22.51	46.00	-23.49	peak	100	324
4	419.9400	-2.84	26.01	23.17	46.00	-22.83	peak	100	165
5	576.1100	-2.46	29.98	27.52	46.00	-18.48	peak	100	289
6	668.2600	1.55	27.02	28.57	46.00	-17.43	peak	100	205

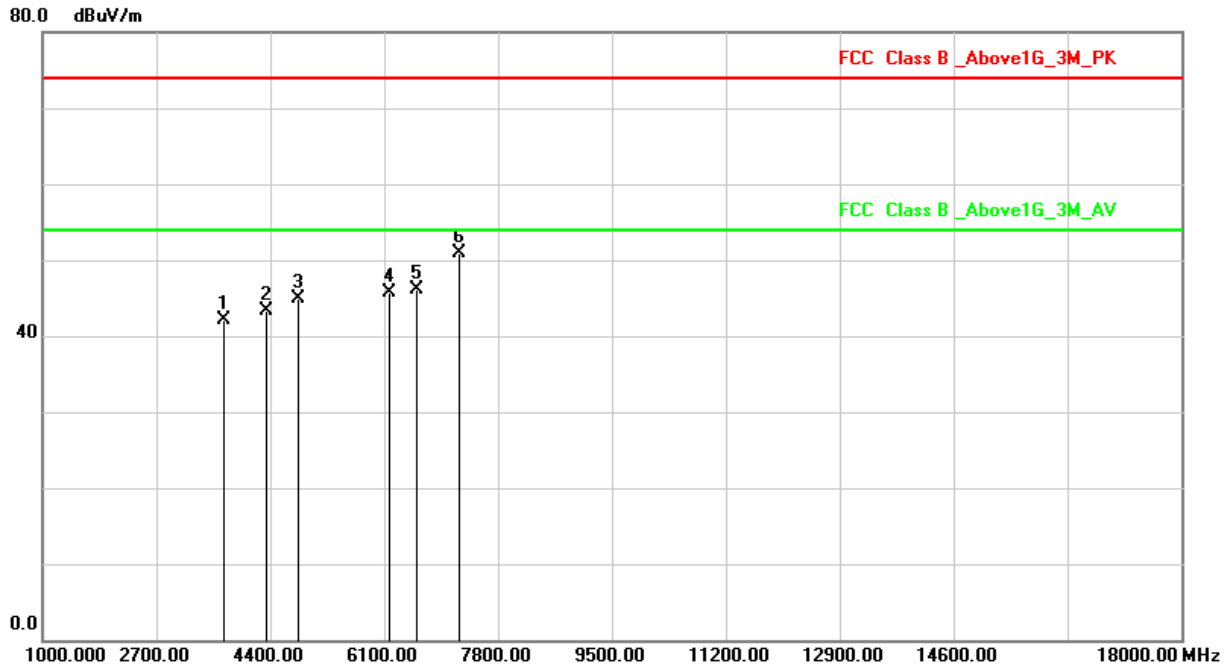




6.6 Test Result and Data (1GHz ~ 25GHz)

Power	DC 1.5V	Pol/Phase	VERTICAL
Test Mode	Mode 1, CH 00	Operation mode	TX

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor
 The 18000MHz - 25000MHz spurious emission is under limit 20dB more.

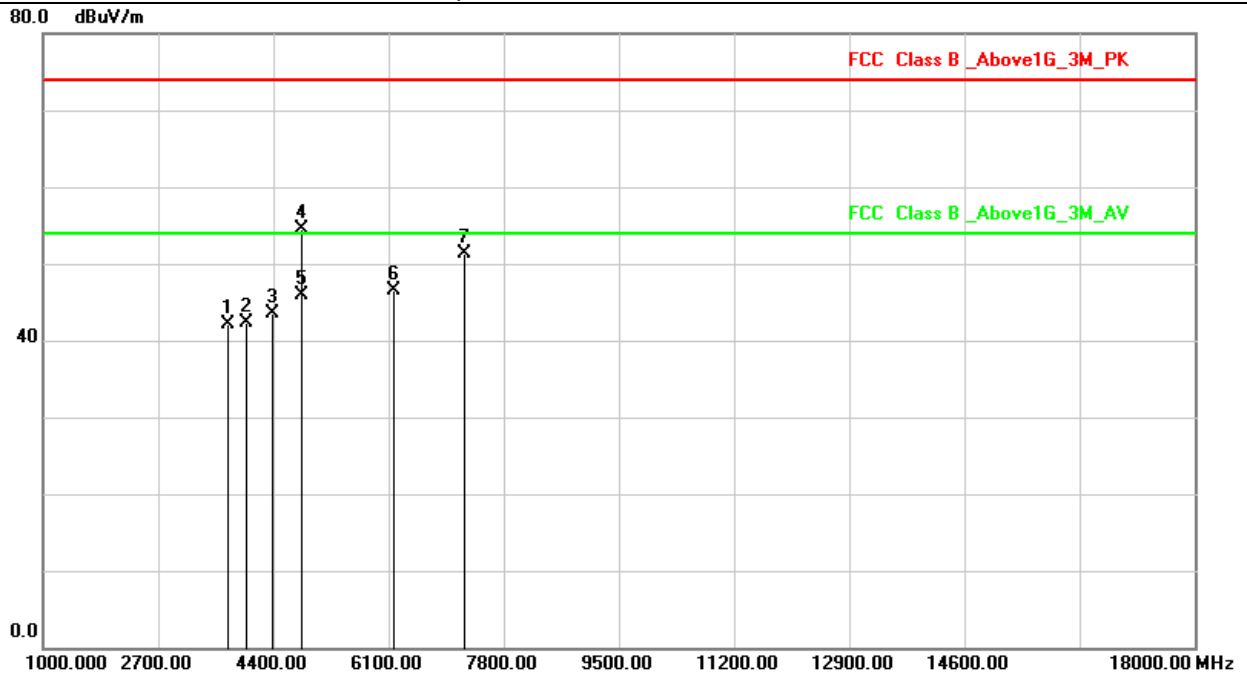


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	3703.000	-33.02	75.05	42.03	74.00	-31.97	peak
2	4349.000	-32.36	75.75	43.39	74.00	-30.61	peak
3	4810.000	-32.46	77.43	44.97	74.00	-29.03	peak
4	6185.000	-31.38	77.18	45.80	74.00	-28.20	peak
5	6593.000	-31.22	77.28	46.06	74.00	-27.94	peak
6	7215.000	-31.86	82.84	50.98	74.00	-23.02	peak



Power	DC 1.5V	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, CH 00	Operation mode	TX

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor
The 18000MHz - 25000MHz spurious emission is under limit 20dB more.

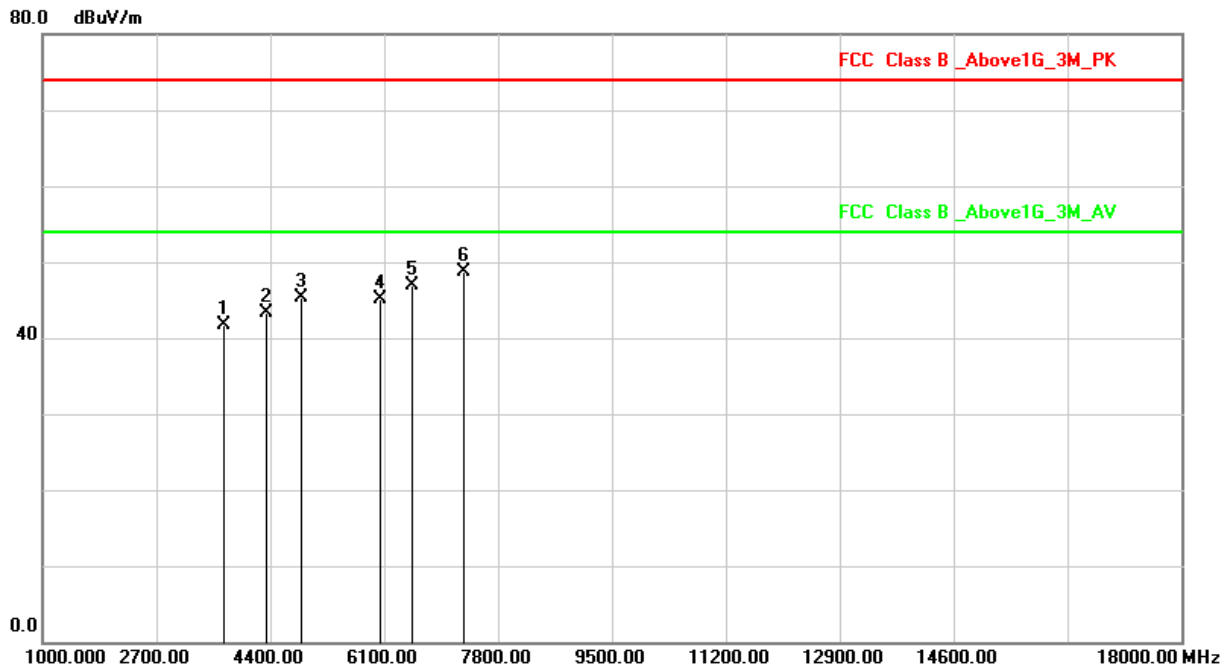


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	3737.000	-32.98	75.00	42.02	74.00	-31.98	peak
2	4009.000	-32.86	75.20	42.34	74.00	-31.66	peak
3	4383.000	-32.42	75.84	43.42	74.00	-30.58	peak
4	4810.000	-32.46	86.87	54.41	74.00	-19.59	peak
5	4810.000	-32.46	78.43	45.97	54.00	-8.03	AVG
6	6185.000	-31.38	77.91	46.53	74.00	-27.47	peak
7	7215.000	-31.86	83.20	51.34	74.00	-22.66	peak



Power	DC 1.5V	Pol/Phase	VERTICAL
Test Mode	Mode 1, CH 04	Operation mode	TX

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor
 The 18000MHz - 25000MHz spurious emission is under limit 20dB more.

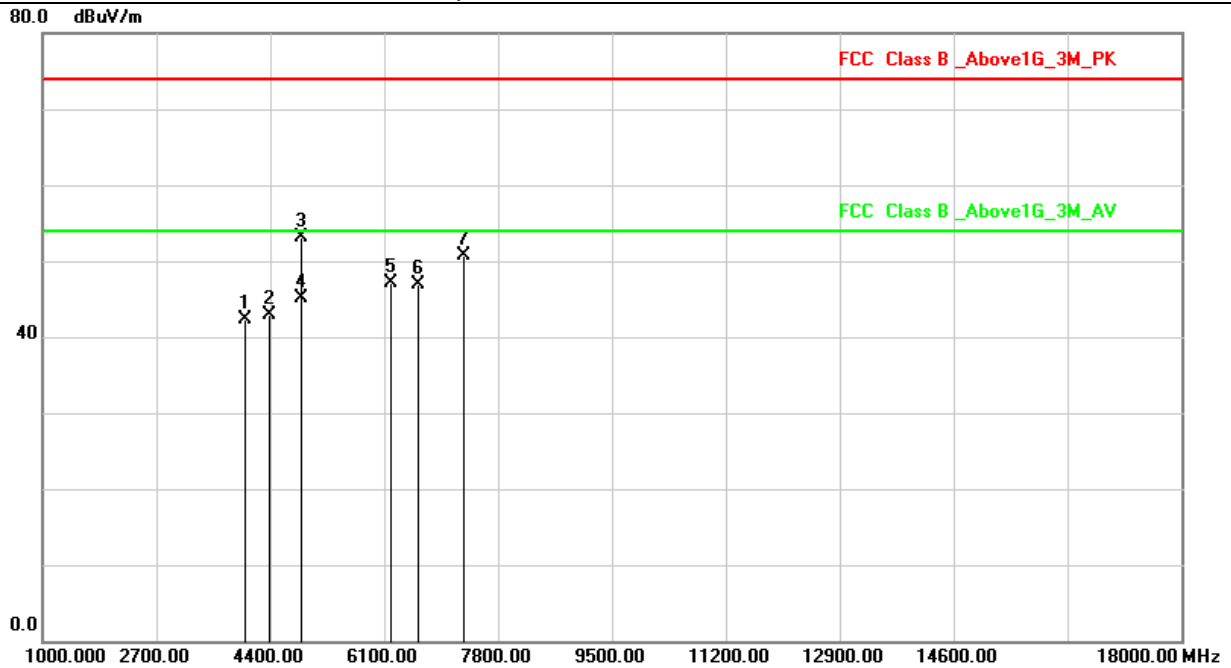


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	3703.000	-33.02	74.66	41.64	74.00	-32.36	peak
2	4349.000	-32.36	75.68	43.32	74.00	-30.68	peak
3	4860.000	-32.33	77.69	45.36	74.00	-28.64	peak
4	6049.000	-31.63	76.68	45.05	74.00	-28.95	peak
5	6525.000	-31.27	78.11	46.84	74.00	-27.16	peak
6	7290.000	-31.69	80.39	48.70	74.00	-25.30	peak



Power	DC 1.5V	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, CH 04	Operation mode	TX

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor
The 18000MHz - 25000MHz spurious emission is under limit 20dB more.

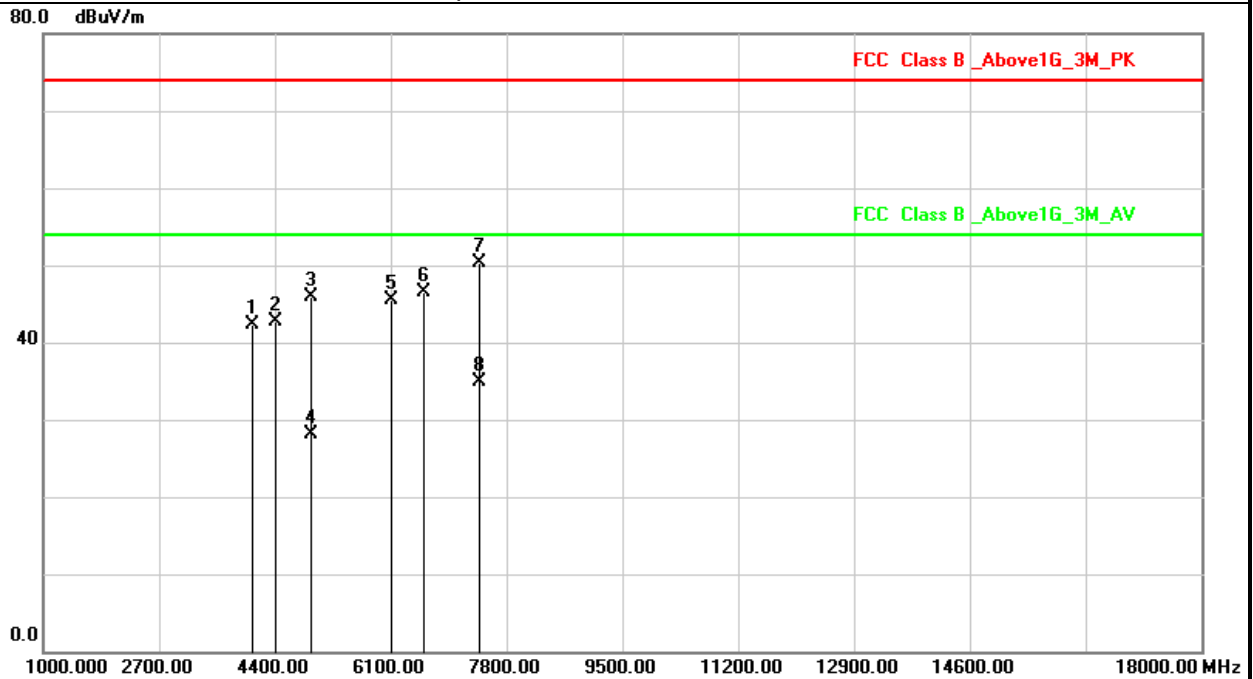


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4026.000	-32.80	75.16	42.36	74.00	-31.64	peak
2	4383.000	-32.42	75.28	42.86	74.00	-31.14	peak
3	4860.000	-32.33	85.40	53.07	74.00	-20.93	peak
4	4860.000	-32.33	77.43	45.10	54.00	-8.90	AVG
5	6202.000	-31.35	78.46	47.11	74.00	-26.89	peak
6	6610.000	-31.23	78.08	46.85	74.00	-27.15	peak
7	7290.000	-31.69	82.30	50.61	74.00	-23.39	peak



Power	DC 1.5V	Pol/Phase	VERTICAL
Test Mode	Mode 1, CH 07	Operation mode	TX

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor
 The 18000MHz - 25000MHz spurious emission is under limit 20dB more.

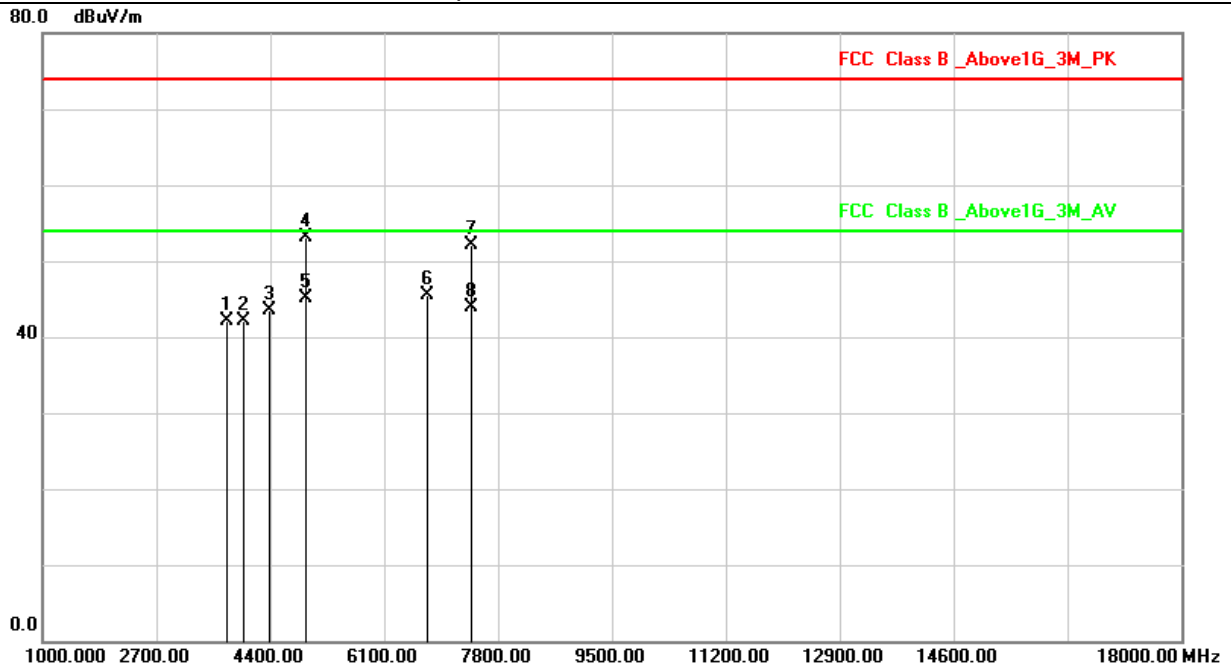


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4077.000	-32.59	74.83	42.24	74.00	-31.76	peak
2	4400.000	-32.45	75.24	42.79	74.00	-31.21	peak
3	4940.000	-32.12	77.94	45.82	74.00	-28.18	peak
4	4940.000	-32.12	60.17	28.05	54.00	-25.95	AVG
5	6117.000	-31.50	76.95	45.45	74.00	-28.55	peak
6	6576.000	-31.23	77.82	46.59	74.00	-27.41	peak
7	7410.000	-31.44	81.80	50.36	74.00	-23.64	peak
8	7410.000	-31.44	66.34	34.90	54.00	-19.10	AVG



Power	DC 1.5V	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, CH 07	Operation mode	TX

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor
 The 18000MHz - 25000MHz spurious emission is under limit 20dB more.



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	3754.000	-32.96	75.04	42.08	74.00	-31.92	peak
2	4009.000	-32.86	75.04	42.18	74.00	-31.82	peak
3	4383.000	-32.42	76.02	43.60	74.00	-30.40	peak
4	4940.000	-32.12	85.18	53.06	74.00	-20.94	peak
5	4940.000	-32.12	77.19	45.07	54.00	-8.93	AVG
6	6746.000	-31.44	77.03	45.59	74.00	-28.41	peak
7	7410.000	-31.44	83.54	52.10	74.00	-21.90	peak
8	7410.000	-31.44	75.26	43.82	54.00	-10.18	AVG



7. 20dB Bandwidth Measurement Data

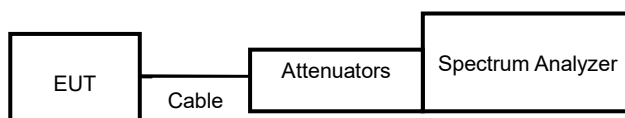
7.1 Test Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

7.2 Test Procedure

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set RBW of spectrum analyzer to 30 KHz and VBW to 100KHz.
- c. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

7.3 Test Setup Layout

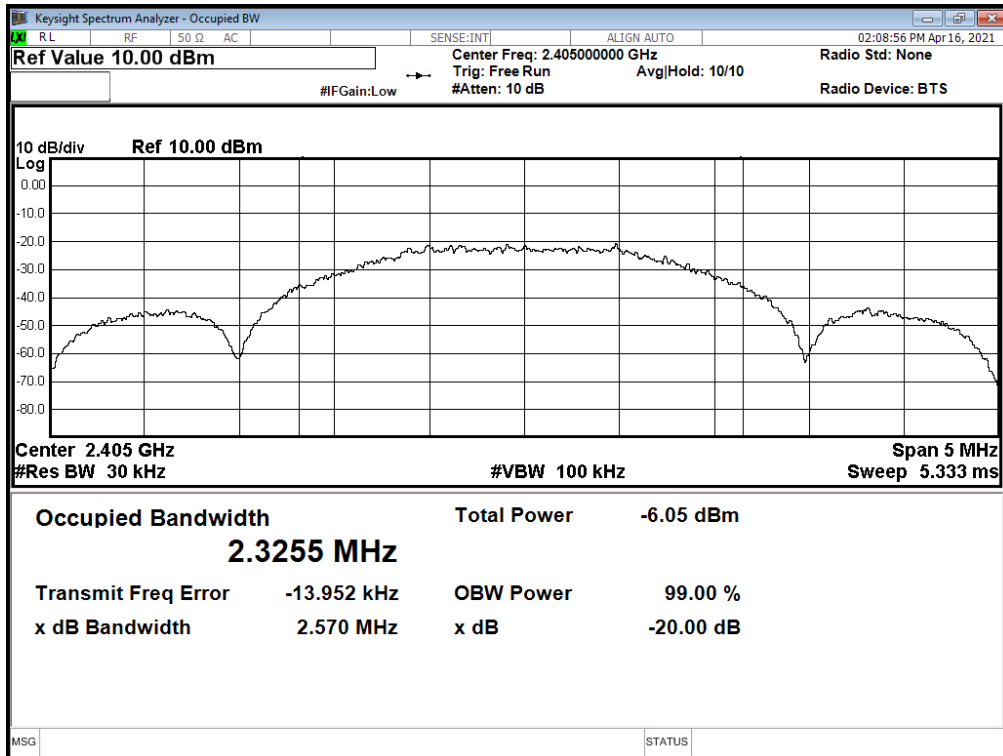


7.4 Test Result and Data

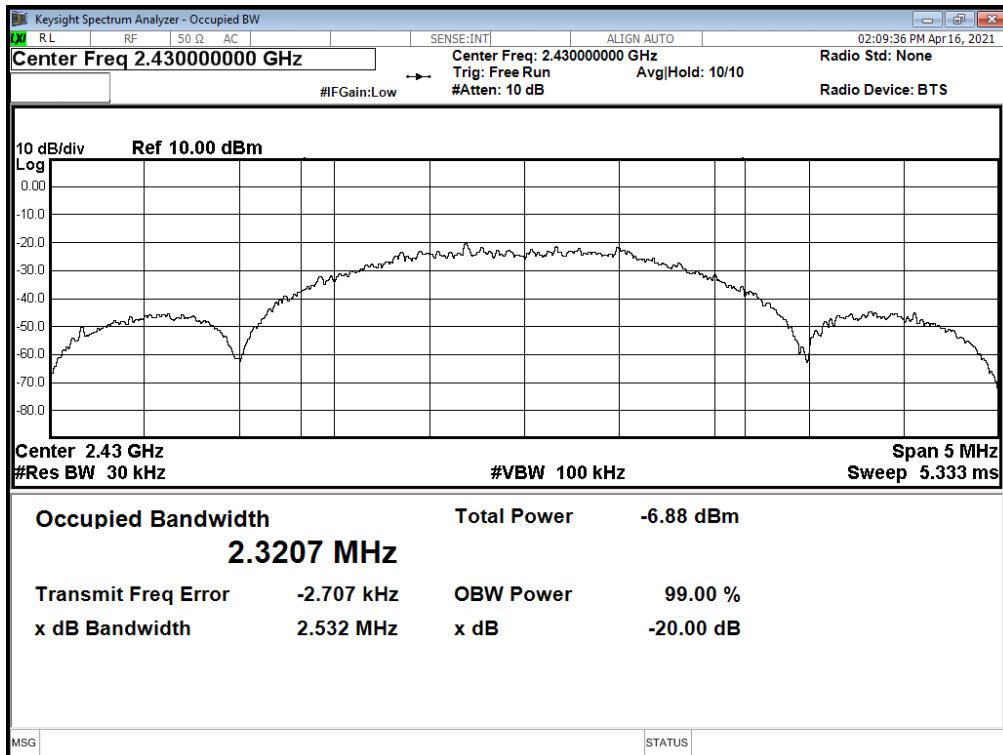
Channel	Frequency (MHz)	20dB Bandwidth (KHz)
Low	2405	2570
Mid	2440	2532
High	2470	2574



Channel: Low

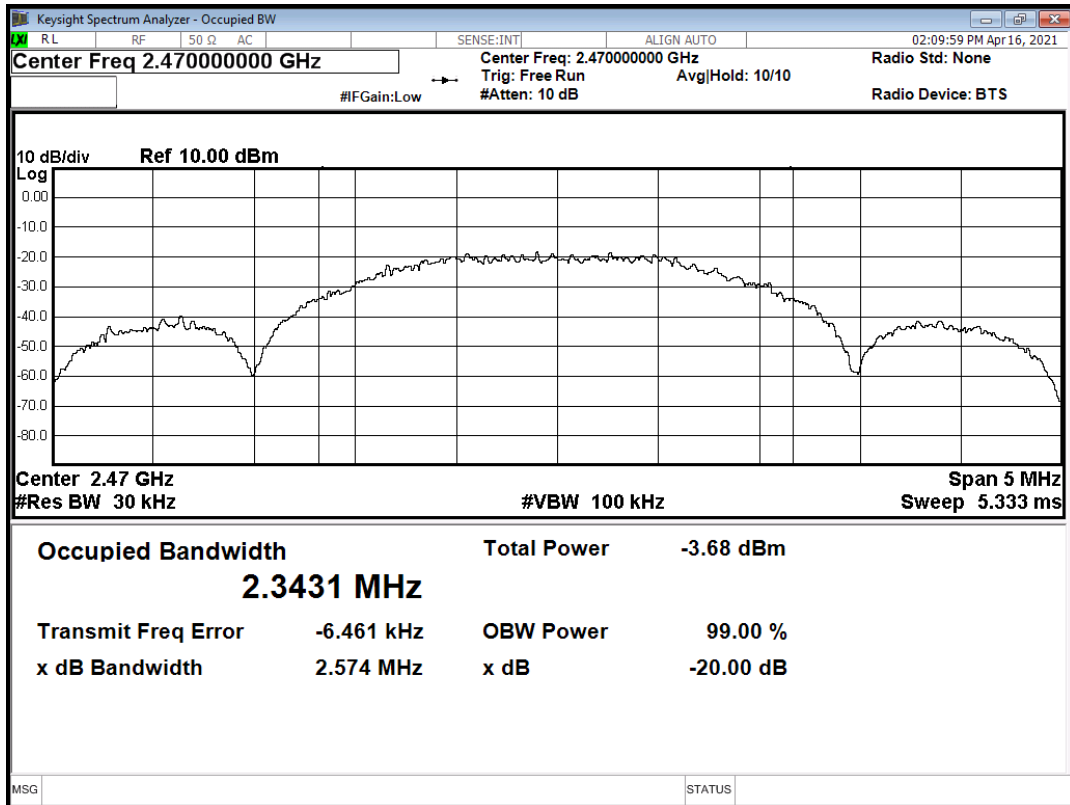


Channel: Mid





Channel: High





8. Band Edges Measurement

8.1 Test Limit

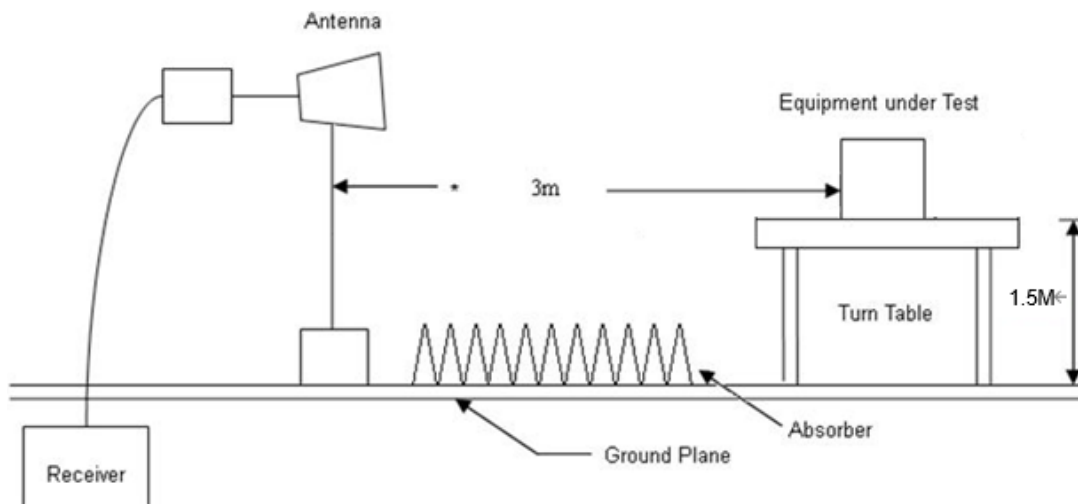
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

8.2 Test Procedure

- The EUT was placed on a rotatable table top 1.5 meter 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 resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz.
- The band edges was measured and recorded.

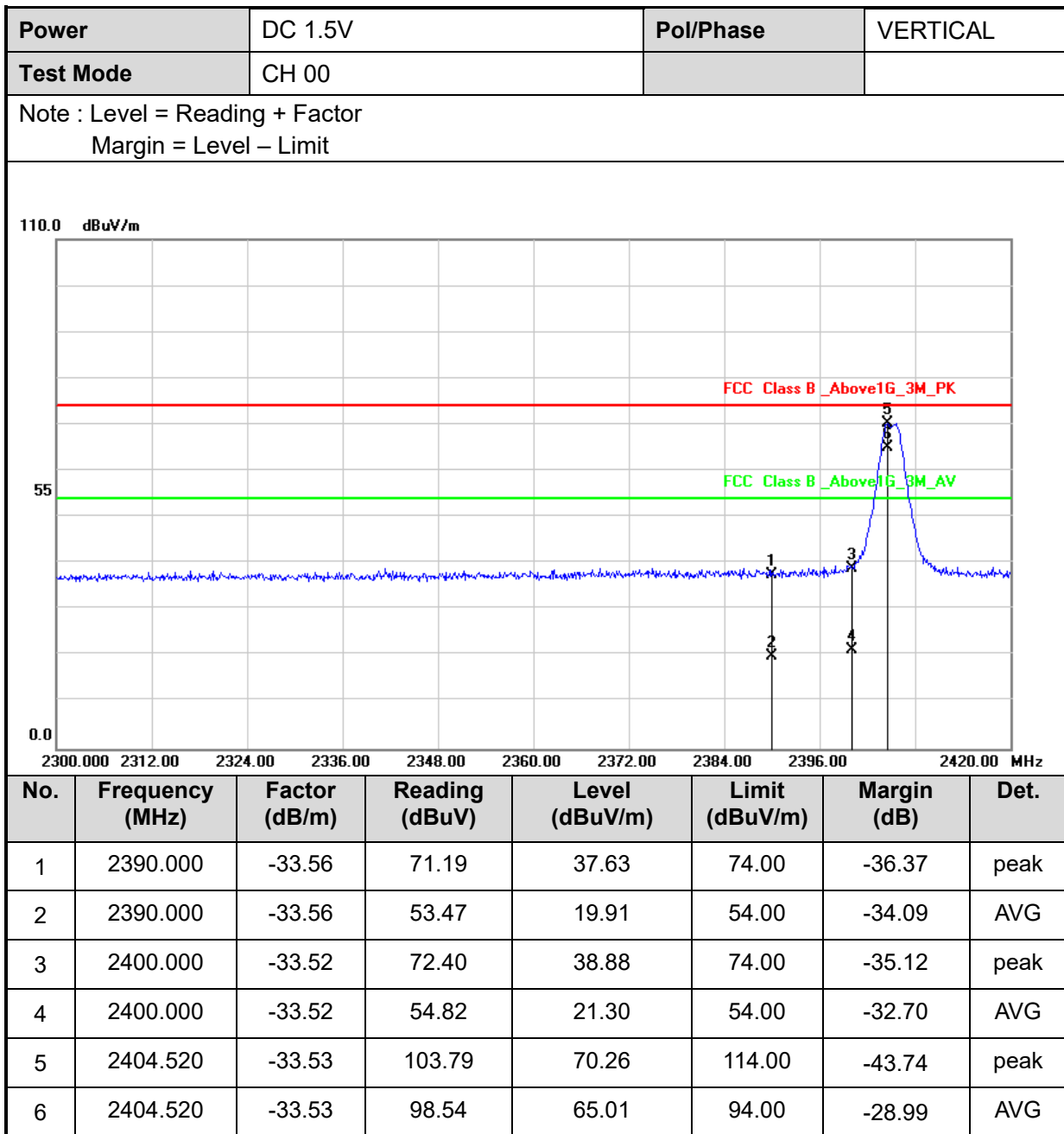
8.3 Test Setup Layout

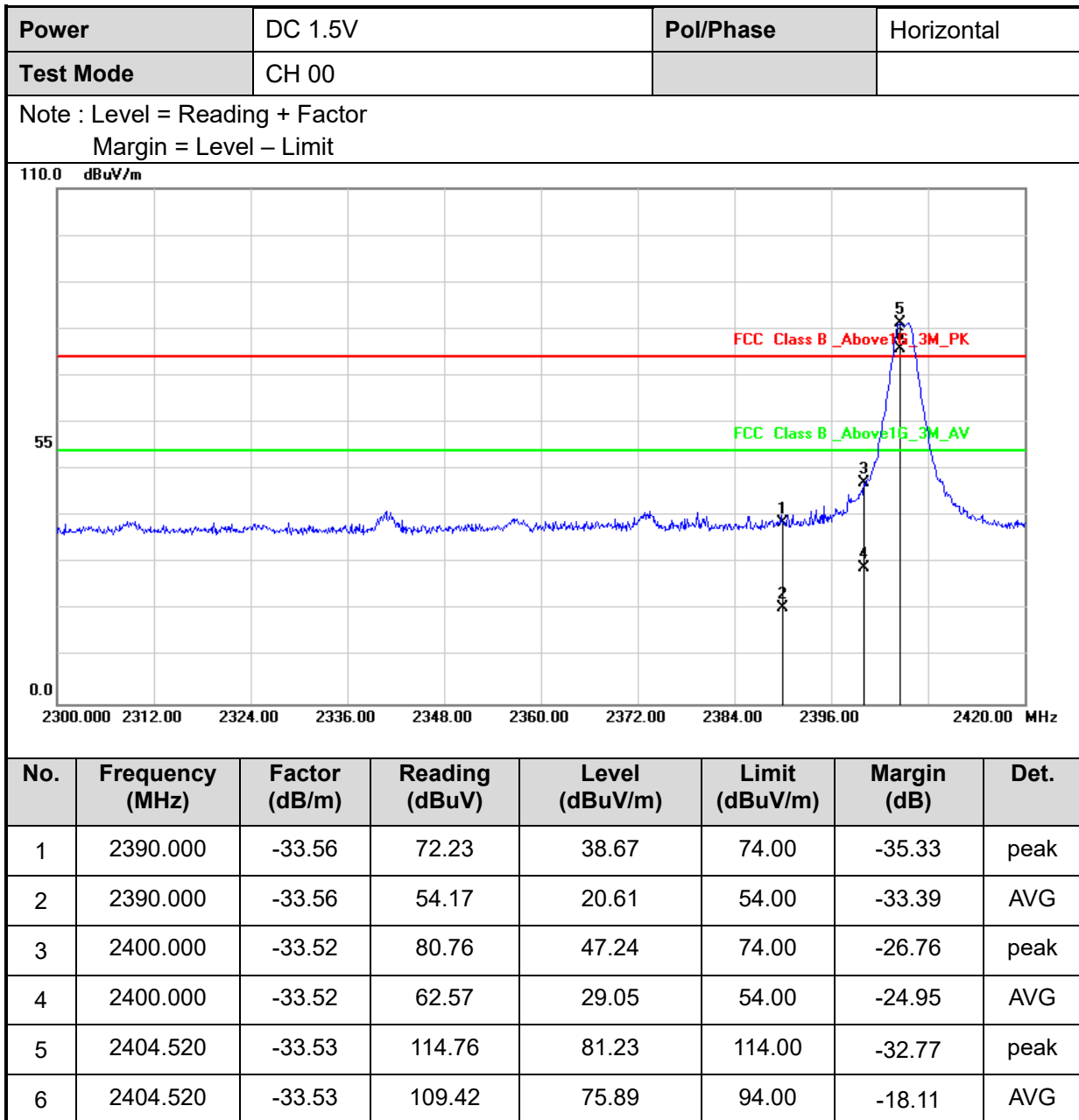
Above 1GHz Test Setup

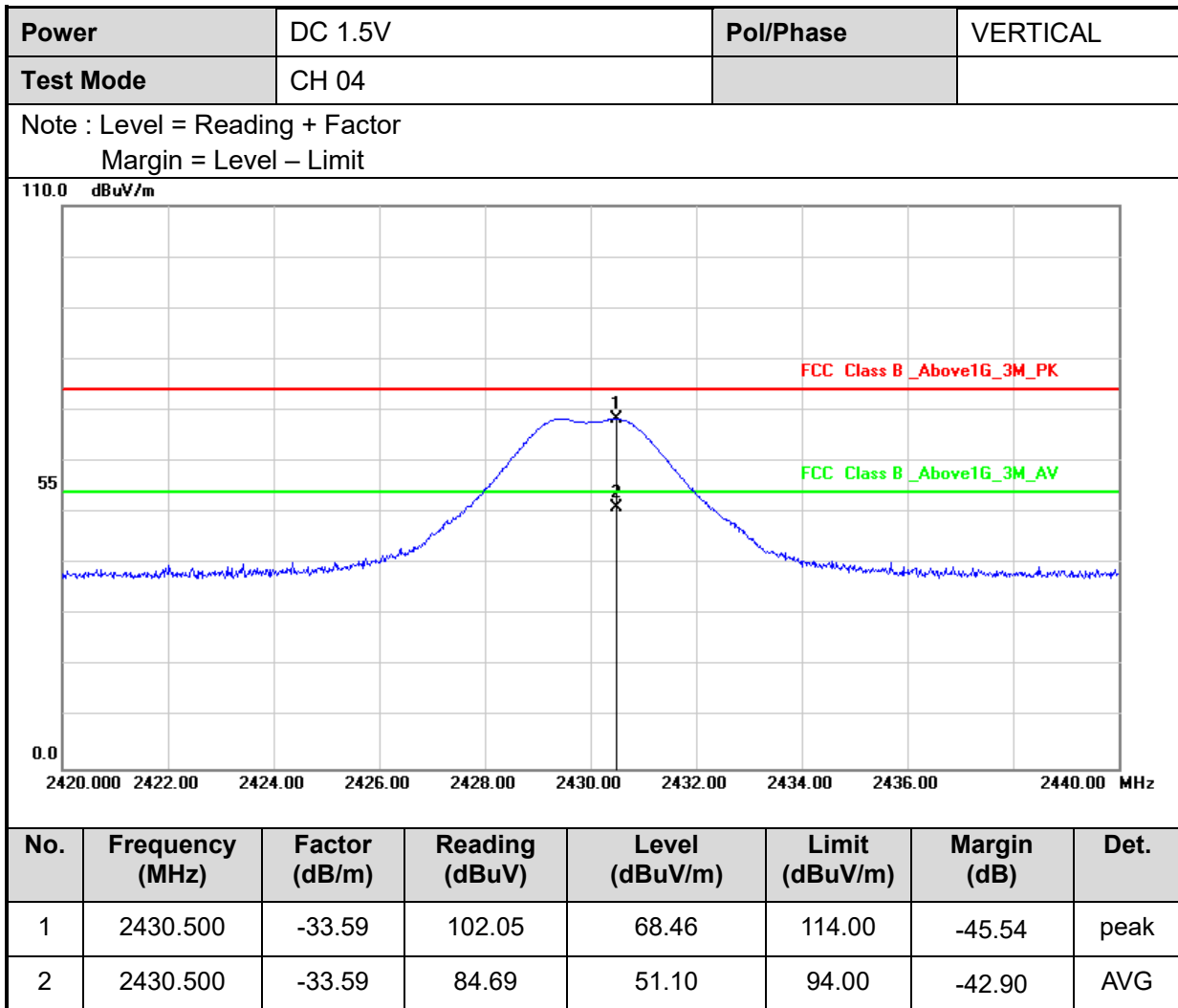


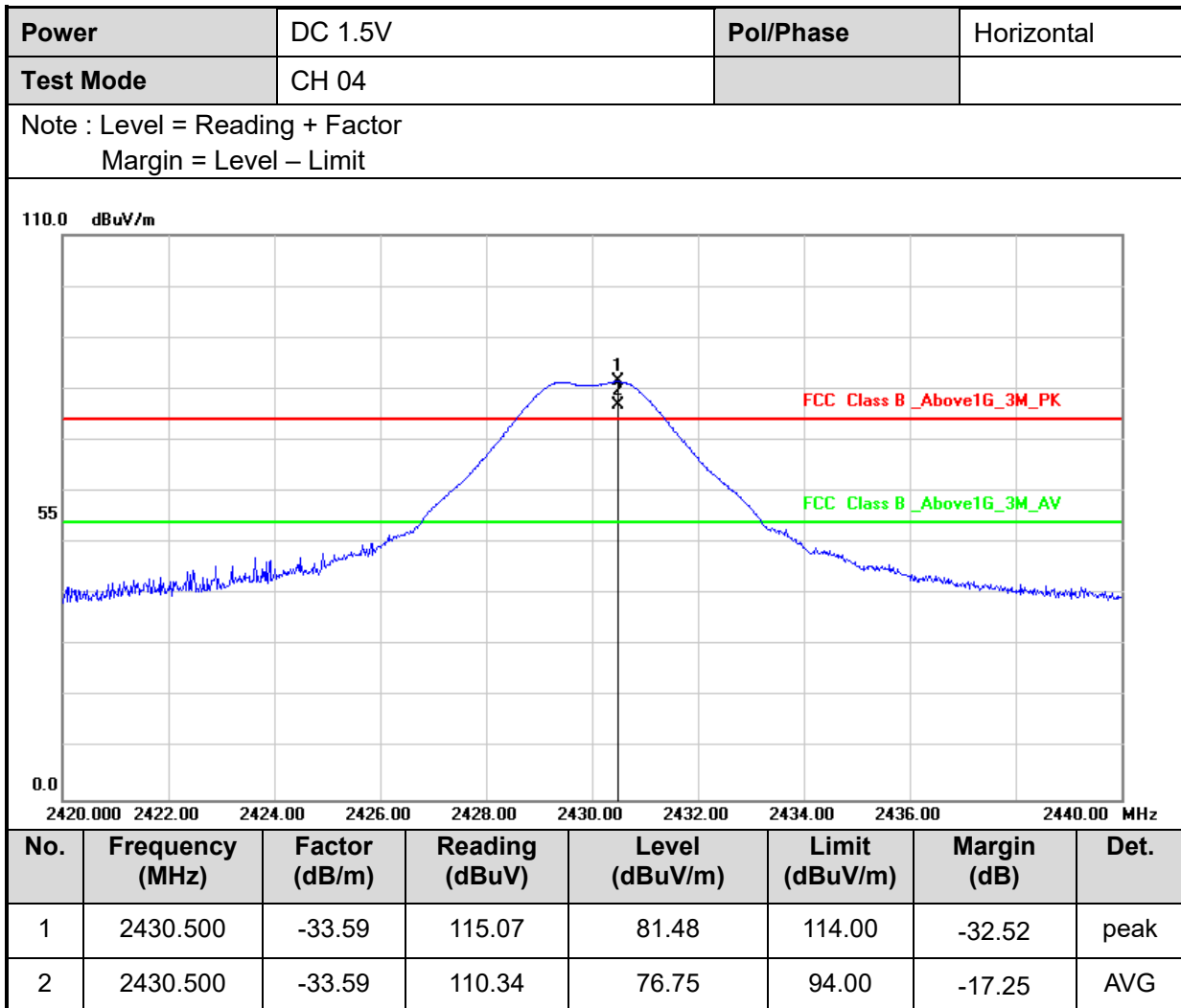


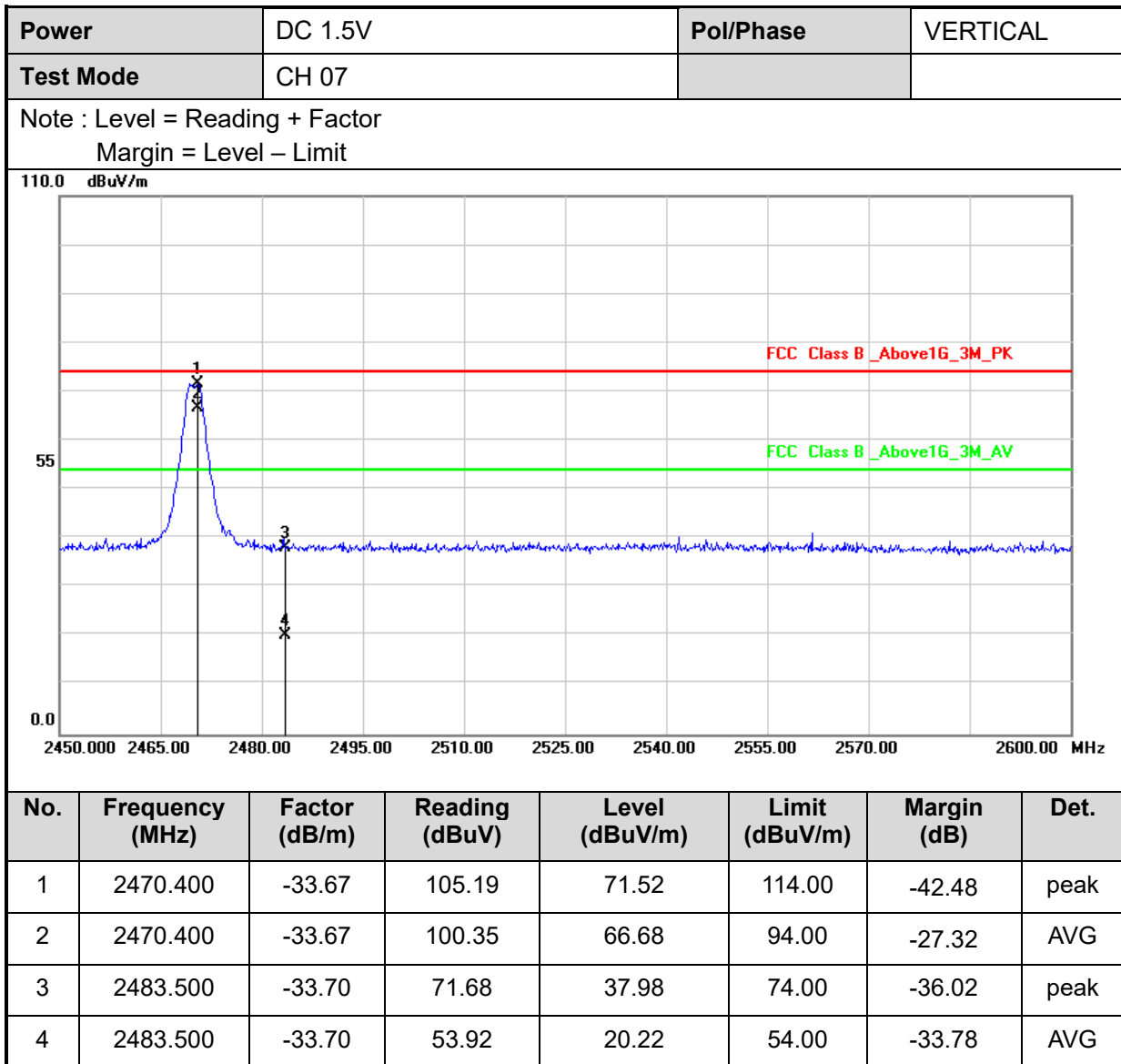
8.4 Restrict band emission Measurement Data

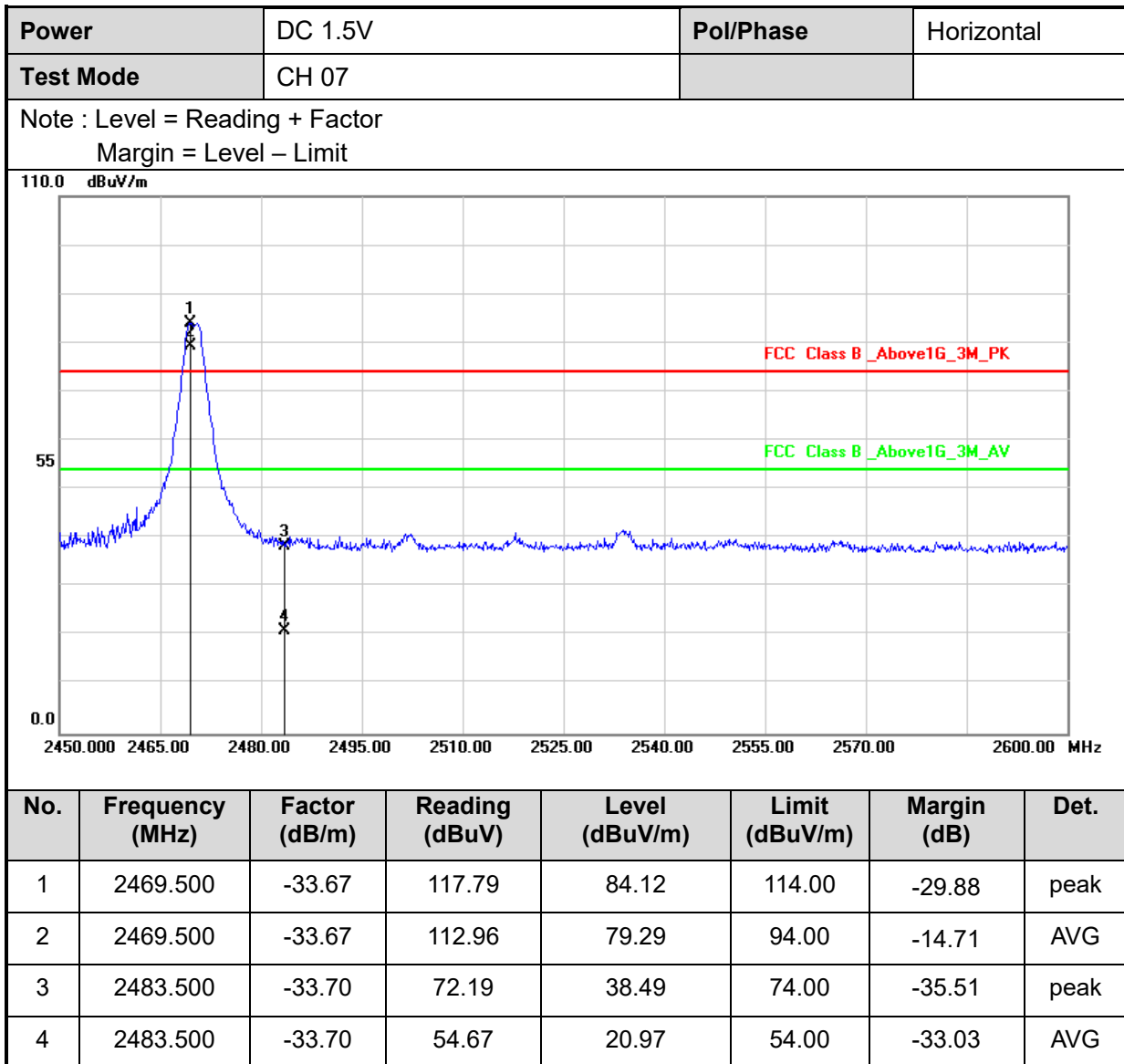














9. Restricted Bands of Operation

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

-----THE END OF REPORT-----