



FCC RADIO TEST REPORT

Applicant : Alarm.com Incorporated

Address : 8281 Greensboro Drive, Suite 100, Tysons,
VA 22102

Equipment : Wireless Video Doorbell

Model No. : ADC-VDB780B

Trade Name : ALARM.COM

FCC ID : YL6-VDB780B

I HEREBY CERTIFY THAT :

The sample was received on Mar. 03, 2021 and the testing was completed on Mar. 23, 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:

Mark Liao / Supervisor

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory





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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
15.203	. Antenna Requirement	PASS
15.207	. AC Power Line Conducted Emission	PASS
15.209 15.205	. Radiated Spurious Emission	PASS
15.247(d)	. Conducted Spurious Emission	PASS
15.247(a)(2)	. 6dB Bandwidth	PASS
15.247(b)	. Maximum Peak and Average Output Power	PASS
15.247(e)	. Power Spectral Density	PASS
2.1091	. Radio Frequency Exposure	PASS

*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 EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report(21030013-TEFV01).



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment

Frequency Range	802.11b/g/n: 2412-2462MHz
Modulation Type	802.11b: CCK, DQPSK, DBPSK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM
Modulation Technology	DSSS, OFDM
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS7, HT20
Antenna Type	PCB Antenna
Antenna Gain	2.4dBi
Battery	Brand: APack Technology Co., LTD. Model: APP00324
Firmware Number	100.3.1.042
MAC ID	B8:3A:9D:60:02:22

Note: 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 HT20 (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	---	---

Note: Channels remarked * are selected to perform test.



2.3 Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
- b. The complete test system included Remote workstation and EUT for RF test. The Remote workstation included Notebook.
- c. An executive program, "wl command" under Windows OS system was executed to transmit and receive data via WLAN.
- d. The following test modes were performed for the test:

Conducted Emissions from the AC mains power ports	
Test Mode	Operating Description
1	802.11b (11Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
caused "Test Mode 2" generated the worst case, it was reported as the final data.	
Radiation Emissions (Below 1GHz)	
Test Mode	Operating Description
1	802.11b (11Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
caused "Test Mode 2" generated the worst case, it was reported as the final data.	
Radiation Emissions (Above 1GHz)	
Test Mode	Operating Description
1	802.11b (11Mbps)
2	802.11g (6Mbps)
3	802.11n HT20 (6.5Mbps)
caused "Test Mode 1~3" generated the worst case, they were reported as the final data.	

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

2.4 Description of Test System

N/A



2.5 General Information of Test

Test Site	CerpPASS Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881	
	FCC	TW1079, TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
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-NK	2021/03/23	23°C / 48%	Nick Guan
Radiated Emissions (Below 1GHz)	3M02-NK	2021/03/22	22°C / 48%	Nick Guan
Radiated Emissions (Above 1GHz)	3M02-NK	2020/10/17~2021/03/15	24~25°C / 40~46%	Leon Huang Nick Guan

2.6 Measurement Uncertainty

Measurement Item	Uncertainty
AC Power Line Conduction(150K~30MHz)	±3.63dB
Radiated Spurious Emission(9KHz~30MHz)	±3.404dB
Radiated Spurious Emission(30MHz~1GHz)	±5.686dB
Radiated Spurious Emission(1GHz~25GHz)	±6.597dB
Conducted Spurious Emission	±2.022dB
6dB Bandwidth	±4.482%
20dB Bandwidth	±4.40%
Occupied Bandwidth	±4.40%
Peak Output Power(Conducted Power Meter)	±1.02dB
Dwell Time	±3.49%
Power Spectral Density	±1.963dB
Duty Cycle	±3.47%



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions(Below 1GHz)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	369	2020/04/10	2021/04/09
Active Loop Antenna	EMCO	6507	40855	2020/05/21	2021/05/20
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2020/06/23	2021/06/22
Preamplifier	EM Electronics corp.	EM330	60658	2020/10/20	2021/10/19
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2020/04/09	2021/04/08
Cable-6m(9k~300M)	NA	EMC5D-BM-BM-6	130605	2020/09/18	2021/09/17
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA

Test Item	Radiated Emissions(Above 1GHz)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Horn Antenna	EMCO	3115	31601	2020/10/16	2021/10/15
Horn Antenna	EMCO	3116	31970	2020/03/26	2021/03/25
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2020/08/03	2021/08/02
Preamplifier	Agilent	8449B	3008A01954	2020/03/16	2021/03/15
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2019/11/07	2022/11/06
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2020/11/06	2021/11/05
Cable-0.5m(1G-18G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2020/05/27	2021/05/26
Cable-3m(1G-18G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2020/05/27	2021/05/26
Cable-8m(1G-18G)	HUBER SUHNER	SUCOFLEX 104	805795/4	2020/05/27	2021/05/26
Cable-0.5m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2020/04/01	2021/03/31
Cable-3m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	MY2608/2	2020/04/01	2021/03/31
Cable-0.5m(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50 314	2020/04/09	2021/04/08
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA

Test Item	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	101329	2020/07/07	2021/07/06
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2020/04/07	2021/04/06
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2020/12/25	2021/12/24
Attenuator	KEYSIGHT	8491B	MY39250703	2020/04/17	2021/04/16
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2020/08/25	2021/08/24
Power Meter	Anritsu	ML2495A	1224005	2020/04/17	2021/04/16
Power Sensor	Anritsu	MA2411B	1207295	2020/04/17	2021/04/16



4. Antenna Requirements

4.1 Antenna Construction and Directional Gain

Antenna Type	PCB Antenna
Antenna Gain	2.40 dBi

2412-2462MHz

For Power directional gain= $G_{ant}= 2.40$ dBi

For PSD directional gain = $G_{ant}= 2.40$ 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, 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. 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

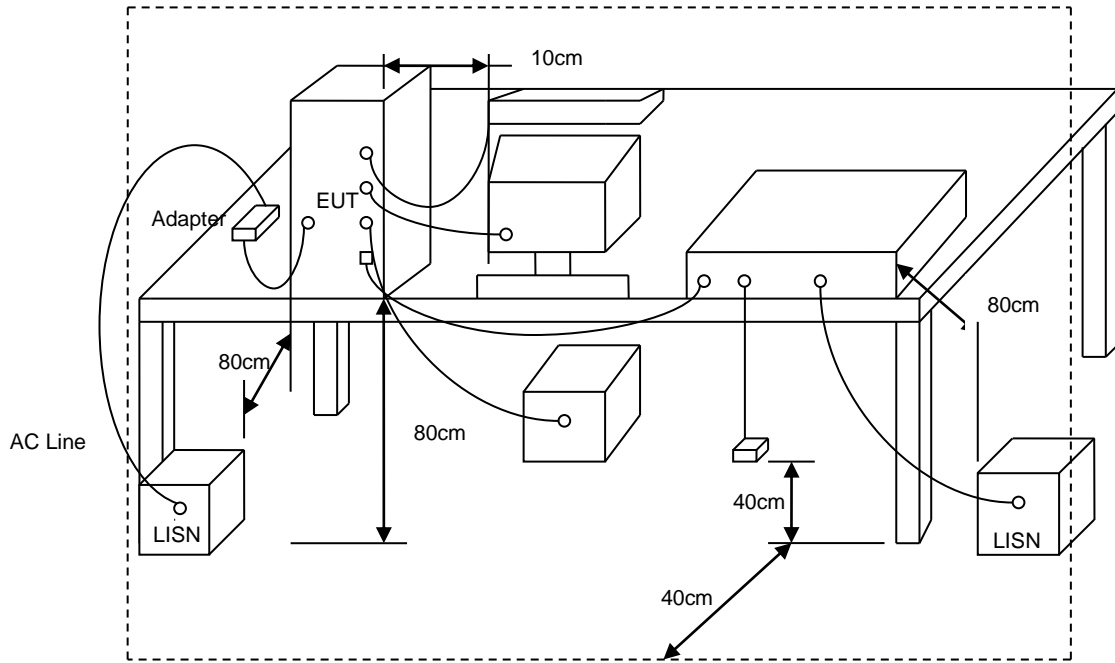
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

- a. 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.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connecting to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. 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

The power supply is DC source, so this item doesn't require testing.



6. Test of Radiated Spurious Emission

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).

Frequency (MHz)	Field Strength (microvolt/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

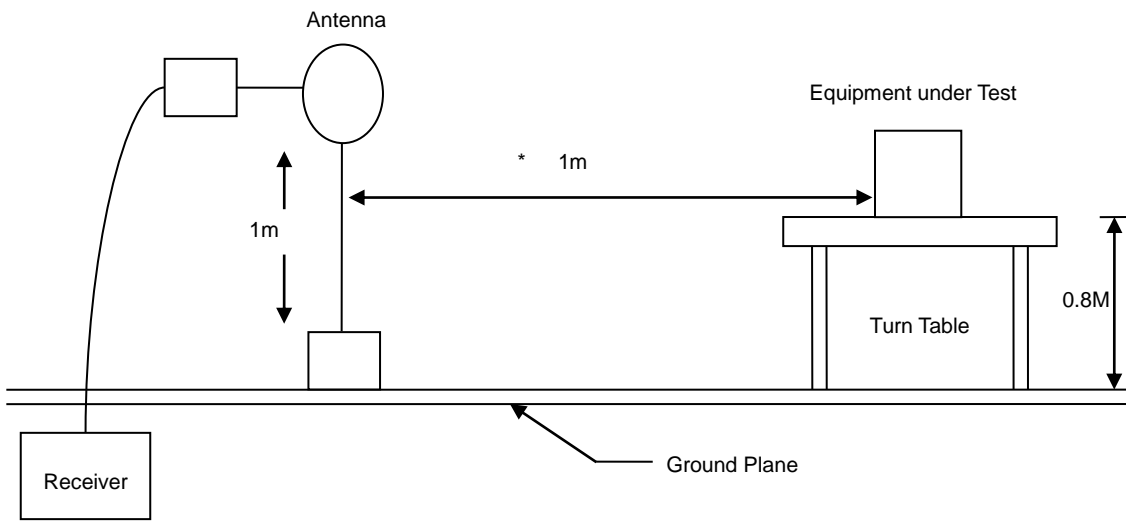
- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. 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.
- e. 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.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. 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.
- h. 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.
- i. "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 such that emissions from the EUT are maximized.
(Y-AXIS is the worst.)

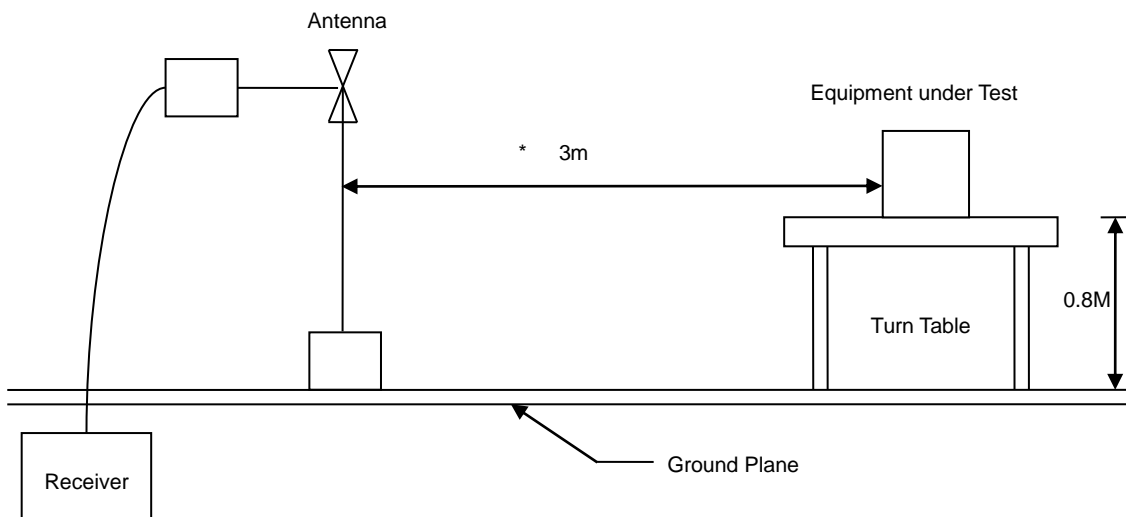


6.3 Typical Test Setup

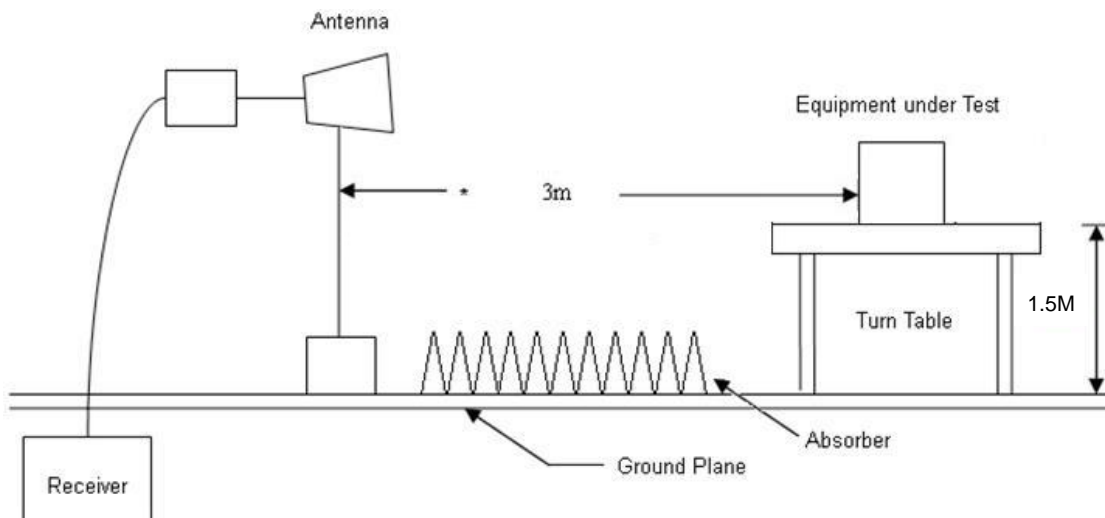
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



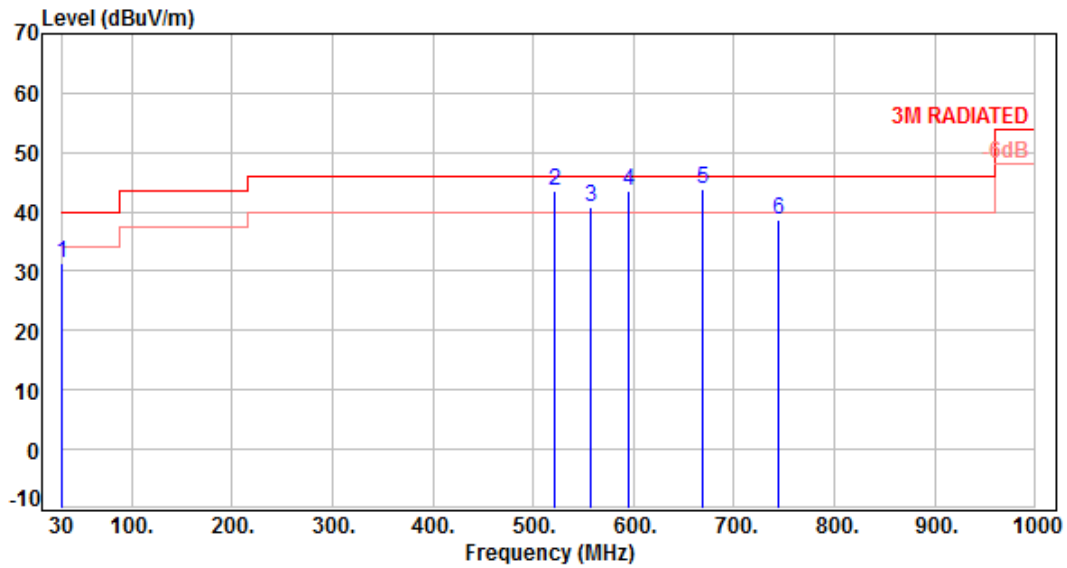


6.4 Test Result and Data (9KHz ~ 30MHz)

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

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

Power	: AC 120V / 60Hz	Pol/Phase	: VERTICAL
Test Mode	: Mode 2		:

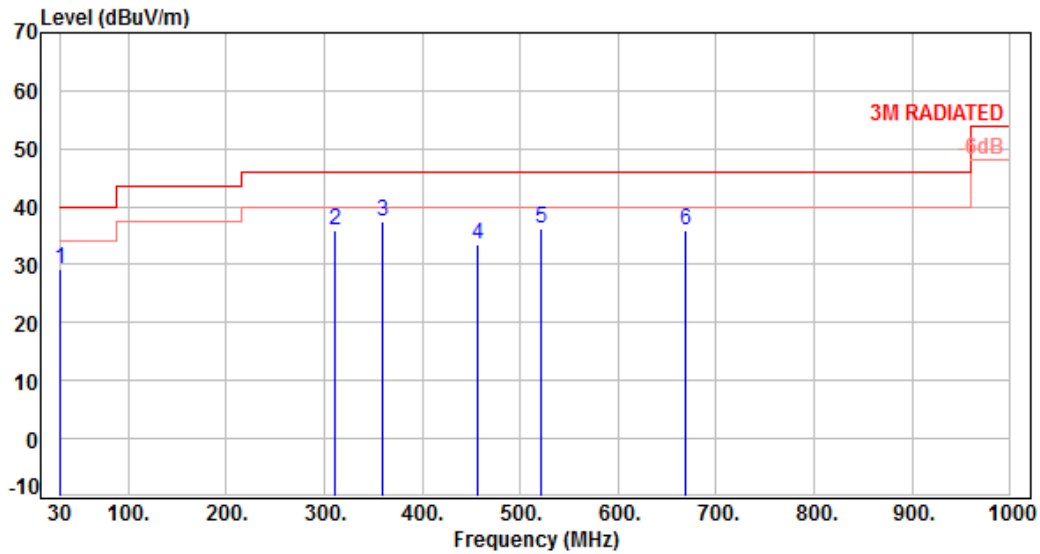


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-11.50	42.75	31.25	40.00	-8.75	Peak	400	0	P
2	520.82	-4.22	47.61	43.39	46.00	-2.61	QP	100	152	P
3	557.68	-3.55	44.30	40.75	46.00	-5.25	Peak	400	0	P
4	594.54	-2.55	46.01	43.46	46.00	-2.54	QP	100	74	P
5	668.26	-1.58	45.29	43.71	46.00	-2.29	QP	100	121	P
6	743.92	0.21	38.39	38.60	46.00	-7.40	Peak	400	0	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2		:



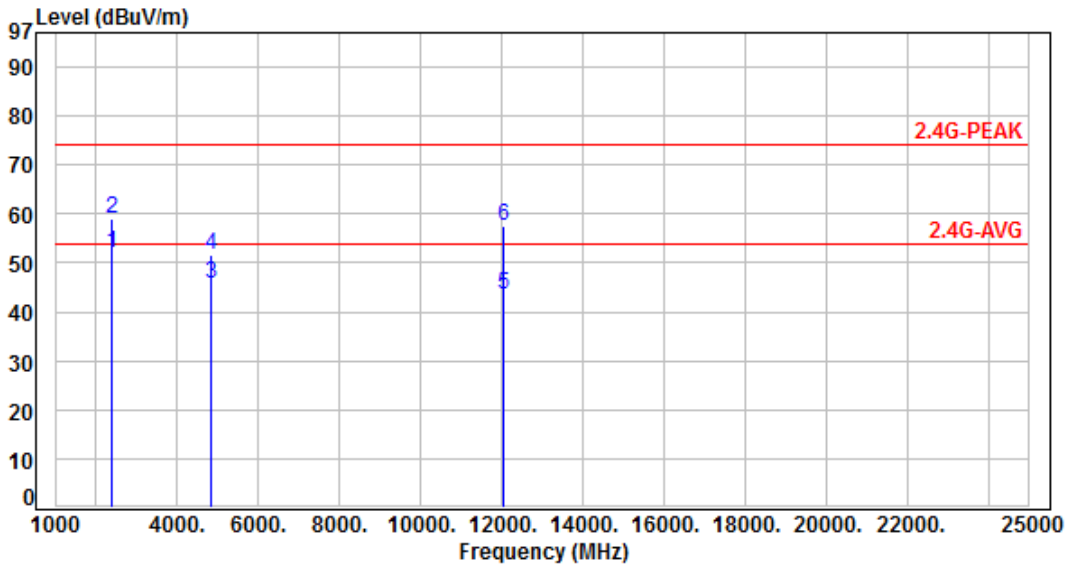
No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	30.00	-11.50	40.77	29.27	40.00	-10.73	Peak	400	360	P
2	311.30	-9.20	45.09	35.89	46.00	-10.11	Peak	400	360	P
3	359.80	-7.96	45.30	37.34	46.00	-8.66	Peak	400	360	P
4	456.80	-5.50	39.15	33.65	46.00	-12.35	Peak	400	360	P
5	520.82	-4.22	40.56	36.34	46.00	-9.66	Peak	400	360	P
6	668.26	-1.58	37.66	36.08	46.00	-9.92	Peak	400	360	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor



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

Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH01		:

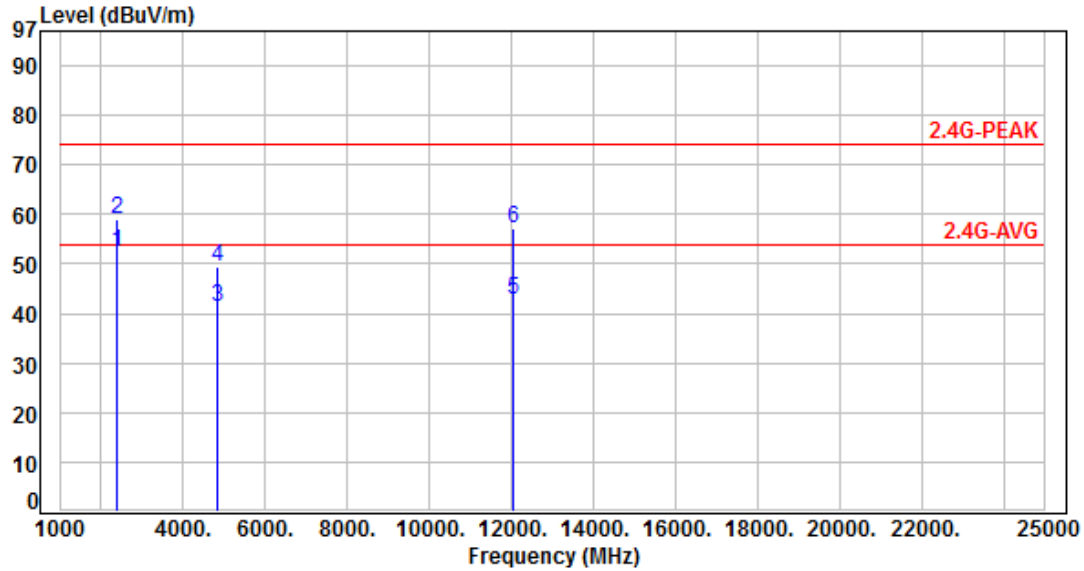


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	55.01	52.12	54.00	-1.88	Average	290	235	P
2	2390.00	-2.89	61.74	58.85	74.00	-15.15	Peak	290	235	P
3	4824.00	4.73	41.09	45.82	54.00	-8.18	Average	205	205	P
4	4824.00	4.73	46.94	51.67	74.00	-22.33	Peak	205	205	P
5	12060.00	14.70	28.85	43.55	54.00	-10.45	Average	100	75	P
6	12060.00	14.70	42.94	57.64	74.00	-16.36	Peak	100	75	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH01		:

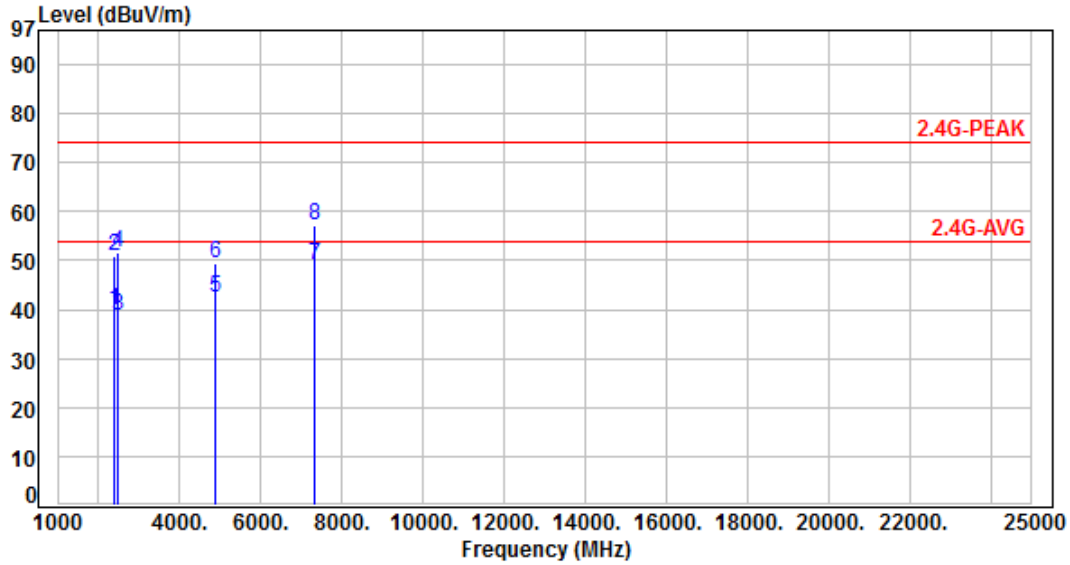


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	55.33	52.44	54.00	-1.56	Average	240	225	P
2	2390.00	-2.89	62.04	59.15	74.00	-14.85	Peak	240	225	P
3	4824.00	4.73	36.61	41.34	54.00	-12.66	Average	365	135	P
4	4824.00	4.73	44.82	49.55	74.00	-24.45	Peak	365	135	P
5	12060.00	14.70	28.14	42.84	54.00	-11.16	Average	100	235	P
6	12060.00	14.70	42.53	57.23	74.00	-16.77	Peak	100	235	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH06		:

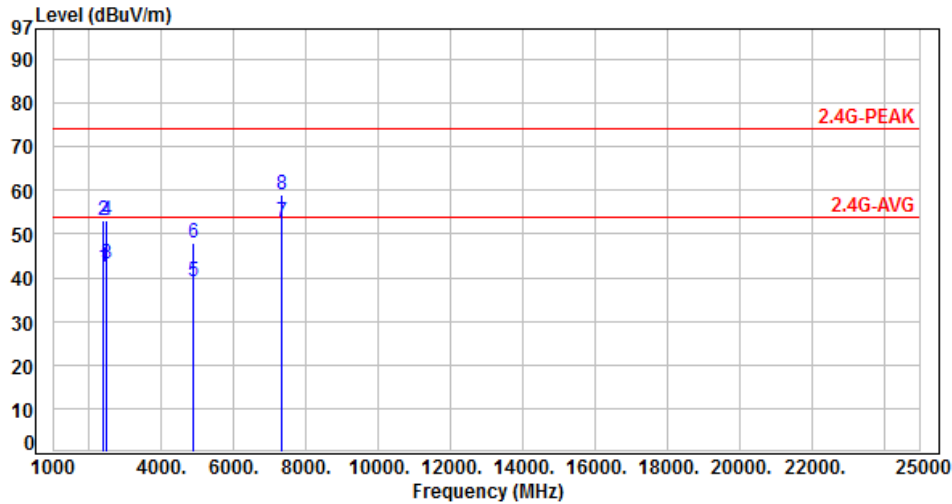


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	42.70	39.81	54.00	-14.19	Average	117	248	P
2	2390.00	-2.89	53.90	51.01	74.00	-22.99	Peak	117	248	P
3	2483.50	-2.66	41.57	38.91	54.00	-15.09	Average	117	248	P
4	2483.50	-2.66	54.25	51.59	74.00	-22.41	Peak	117	248	P
5	4874.00	4.89	37.65	42.54	54.00	-11.46	Average	215	185	P
6	4874.00	4.89	44.51	49.40	74.00	-24.60	Peak	215	185	P
7	7311.00	9.81	39.24	49.05	54.00	-4.95	Average	220	225	P
8	7311.00	9.81	47.24	57.05	74.00	-16.95	Peak	220	225	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH06		:

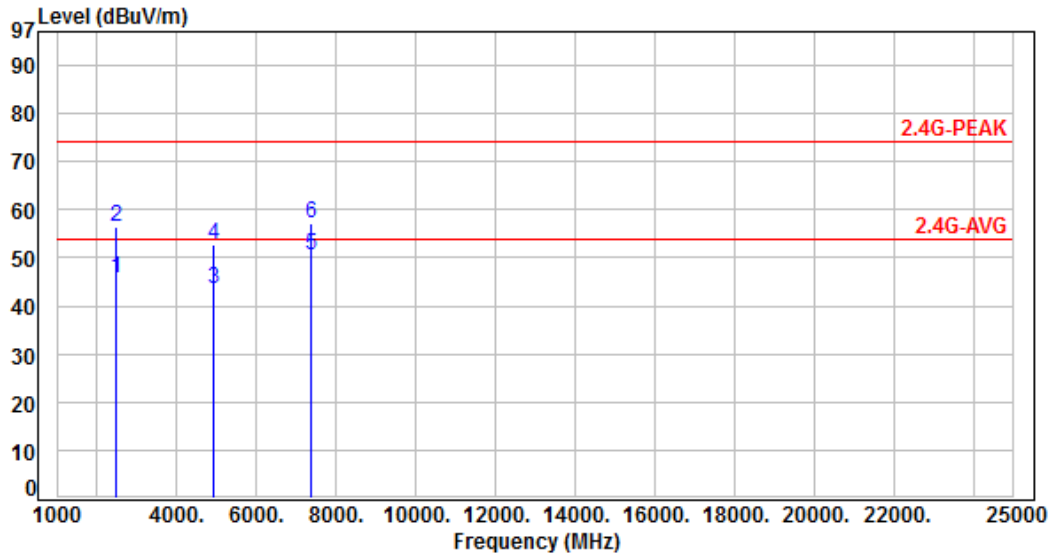


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	45.21	42.32	54.00	-11.68	Average	235	262	P
2	2390.00	-2.89	55.89	53.00	74.00	-21.00	Peak	235	262	P
3	2483.50	-2.66	45.81	43.15	54.00	-10.85	Average	235	262	P
4	2483.50	-2.66	55.90	53.24	74.00	-20.76	Peak	235	262	P
5	4874.00	4.89	34.32	39.21	54.00	-14.79	Average	310	165	P
6	4874.00	4.89	42.97	47.86	74.00	-26.14	Peak	310	165	P
7	7311.00	9.81	42.90	52.71	54.00	-1.29	Average	290	230	P
8	7311.00	9.81	49.28	59.09	74.00	-14.91	Peak	290	230	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH11		:

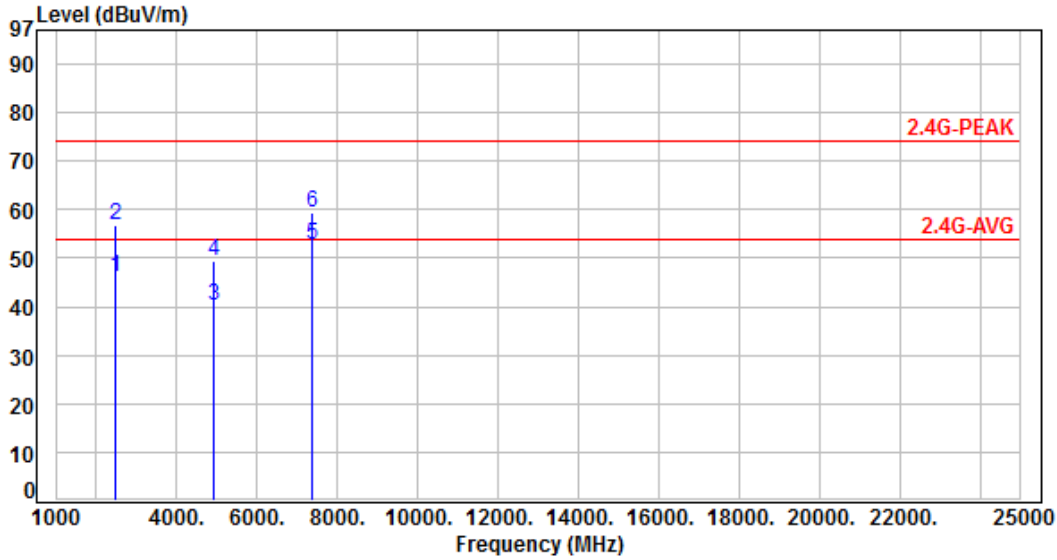


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	48.27	45.61	54.00	-8.39	Average	392	170	P
2	2483.50	-2.66	59.03	56.37	74.00	-17.63	Peak	392	170	P
3	4924.00	5.10	38.25	43.35	54.00	-10.65	Average	190	155	P
4	4924.00	5.10	47.49	52.59	74.00	-21.41	Peak	190	155	P
5	7386.00	9.94	40.47	50.41	54.00	-3.59	Average	379	145	P
6	7386.00	9.94	47.30	57.24	74.00	-16.76	Peak	379	145	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH11		:

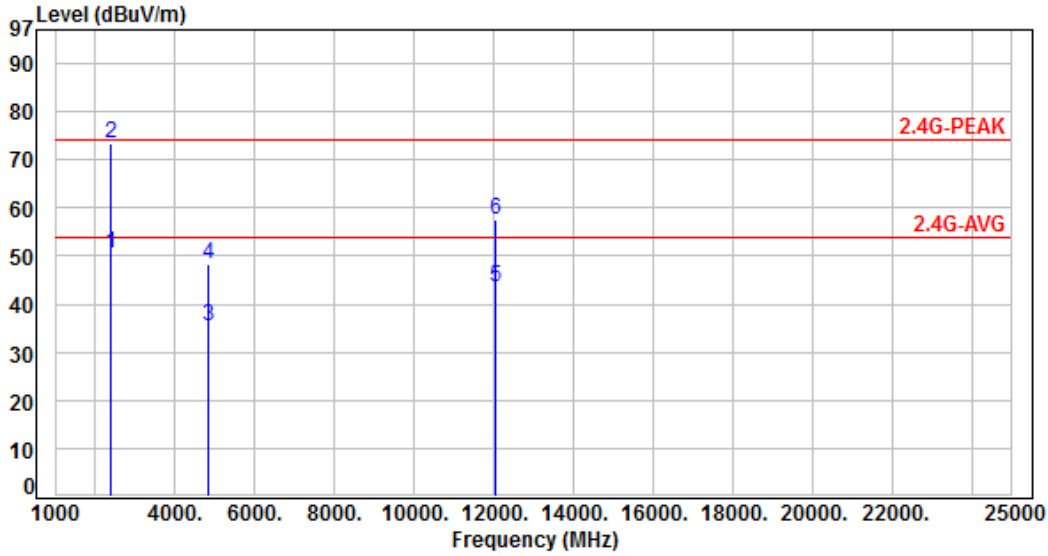


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	48.86	46.20	54.00	-7.80	Average	252	257	P
2	2483.50	-2.66	59.54	56.88	74.00	-17.12	Peak	252	257	P
3	4924.00	5.10	35.19	40.29	54.00	-13.71	Average	355	200	P
4	4924.00	5.10	44.14	49.24	74.00	-24.76	Peak	355	200	P
5	7386.00	9.94	42.71	52.65	54.00	-1.35	Average	215	225	P
6	7386.00	9.94	49.33	59.27	74.00	-14.73	Peak	215	225	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH01		:

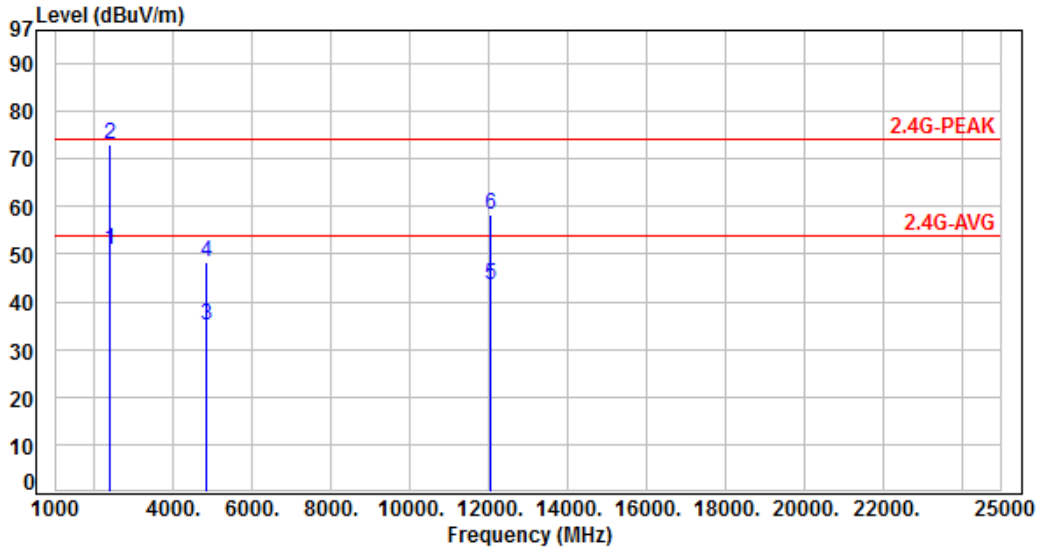


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.52	50.63	54.00	-3.37	Average	310	340	P
2	2390.00	-2.89	76.46	73.57	74.00	-0.43	Peak	310	340	P
3	4824.00	4.73	30.67	35.40	54.00	-18.60	Average	293	172	P
4	4824.00	4.73	43.53	48.26	74.00	-25.74	Peak	293	172	P
5	12060.00	14.70	28.76	43.46	54.00	-10.54	Average	100	83	P
6	12060.00	14.70	42.85	57.55	74.00	-16.45	Peak	100	83	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH01		:

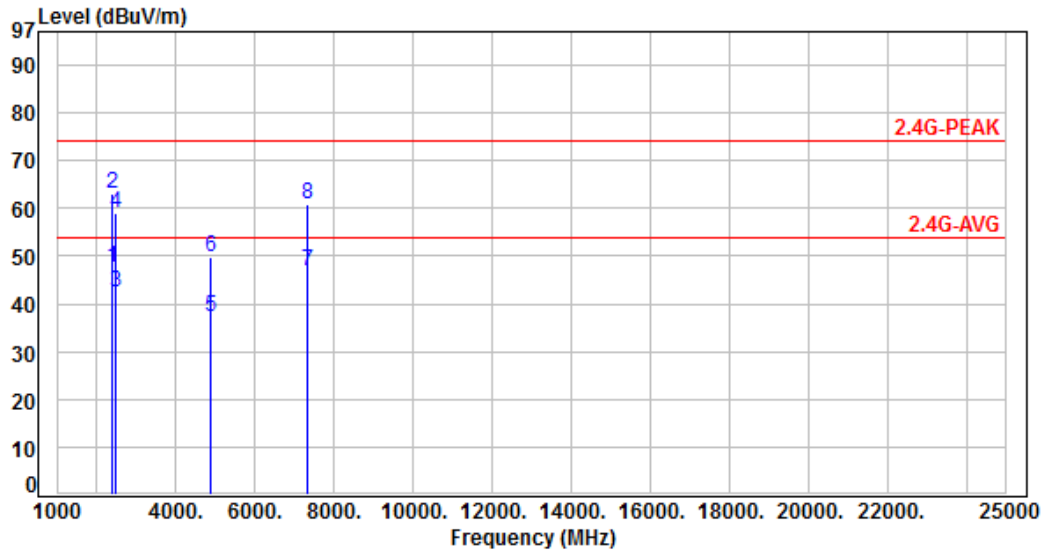


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.64	50.75	54.00	-3.25	Average	378	275	P
2	2390.00	-2.89	76.07	73.18	74.00	-0.82	Peak	378	275	P
3	4824.00	4.73	30.21	34.94	54.00	-19.06	Average	236	116	P
4	4824.00	4.73	43.61	48.34	74.00	-25.66	Peak	236	116	P
5	12060.00	14.70	28.88	43.58	54.00	-10.42	Average	100	237	P
6	12060.00	14.70	43.40	58.10	74.00	-15.90	Peak	100	237	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH06		:

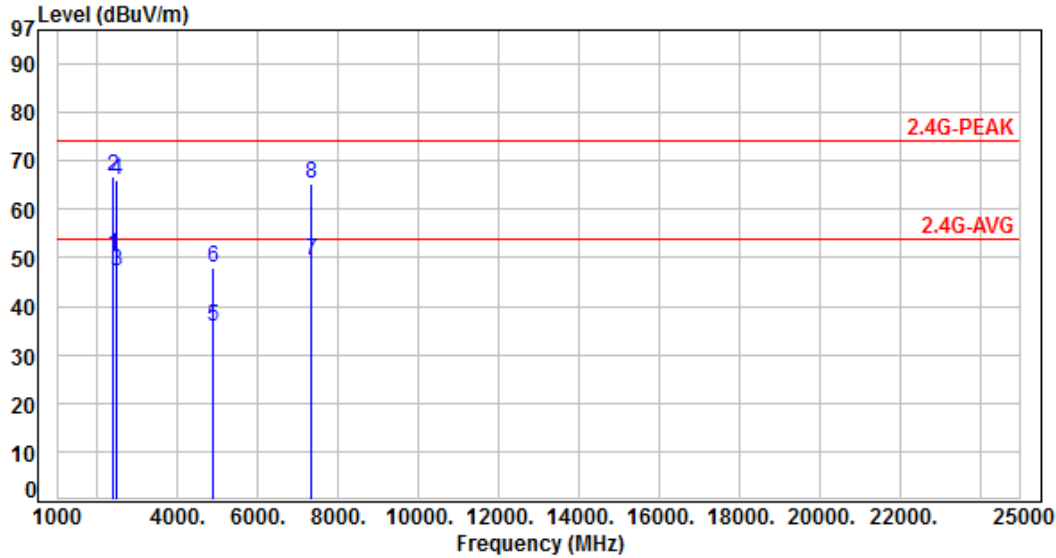


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	50.59	47.70	54.00	-6.30	Average	313	251	P
2	2390.00	-2.89	65.80	62.91	74.00	-11.09	Peak	313	251	P
3	2483.50	-2.66	45.05	42.39	54.00	-11.61	Average	313	251	P
4	2483.50	-2.66	61.80	59.14	74.00	-14.86	Peak	313	251	P
5	4874.00	4.89	32.24	37.13	54.00	-16.87	Average	324	193	P
6	4874.00	4.89	44.88	49.77	74.00	-24.23	Peak	324	193	P
7	7311.00	9.81	36.94	46.75	54.00	-7.25	Average	220	225	P
8	7311.00	9.81	51.11	60.92	74.00	-13.08	Peak	220	225	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH06		:

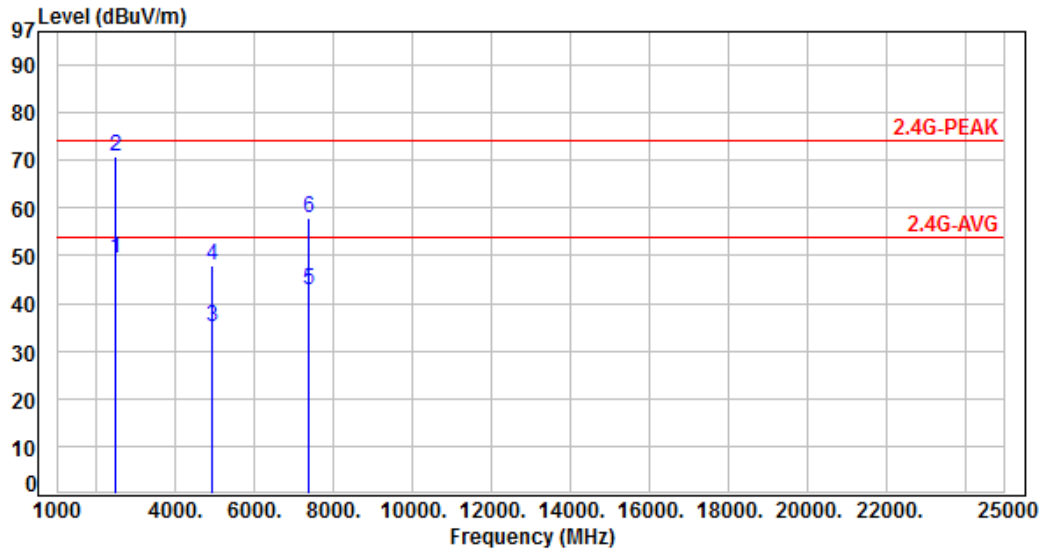


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.51	50.62	54.00	-3.38	Average	238	257	P
2	2390.00	-2.89	69.63	66.74	74.00	-7.26	Peak	238	257	P
3	2483.50	-2.66	49.71	47.05	54.00	-6.95	Average	238	257	P
4	2483.50	-2.66	68.84	66.18	74.00	-7.82	Peak	238	257	P
5	4874.00	4.89	30.82	35.71	54.00	-18.29	Average	229	131	P
6	4874.00	4.89	43.22	48.11	74.00	-25.89	Peak	229	131	P
7	7311.00	9.81	39.59	49.40	54.00	-4.60	Average	295	230	P
8	7311.00	9.81	55.36	65.17	74.00	-8.83	Peak	295	230	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 2, CH11		:

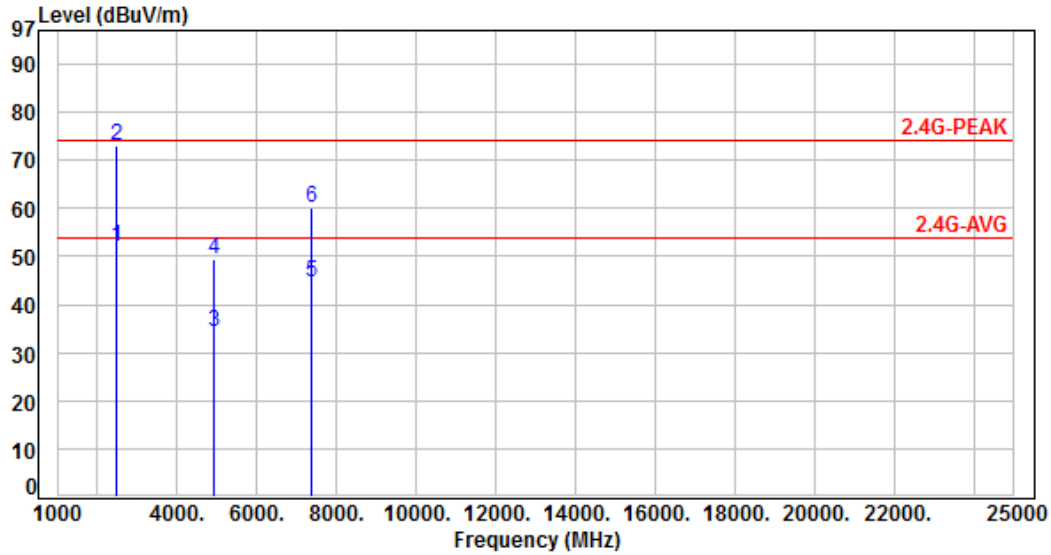


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	52.23	49.57	54.00	-4.43	Average	300	241	P
2	2483.50	-2.66	73.61	70.95	74.00	-3.05	Peak	300	241	P
3	4924.00	5.10	29.91	35.01	54.00	-18.99	Average	321	185	P
4	4924.00	5.10	42.86	47.96	74.00	-26.04	Peak	321	185	P
5	7386.00	9.94	32.85	42.79	54.00	-11.21	Average	271	210	P
6	7386.00	9.94	47.93	57.87	74.00	-16.13	Peak	271	210	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 2, CH11		:

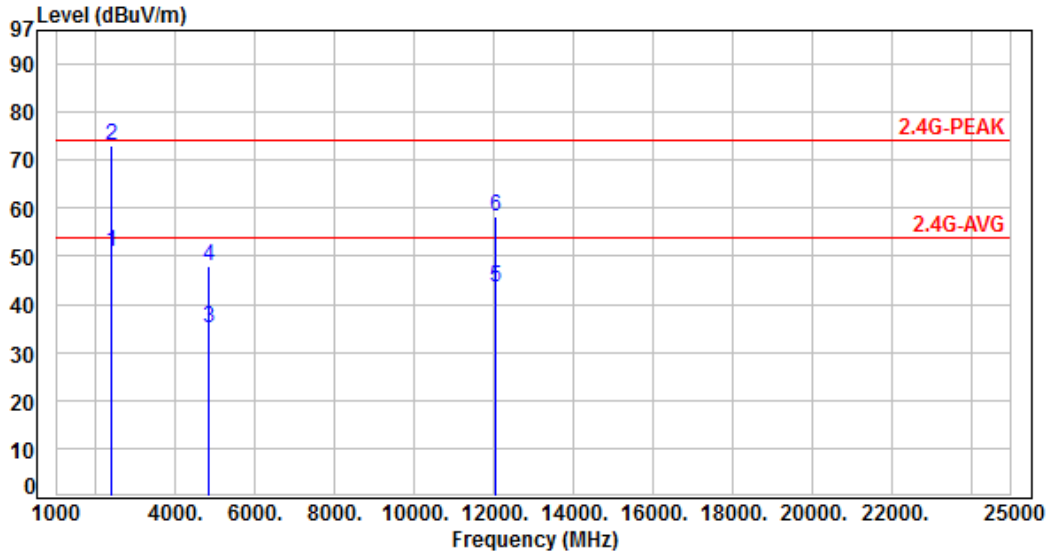


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	54.72	52.06	54.00	-1.94	Average	320	208	P
2	2483.50	-2.66	75.56	72.90	74.00	-1.10	Peak	320	208	P
3	4924.00	5.10	29.32	34.42	54.00	-19.58	Average	231	112	P
4	4924.00	5.10	44.16	49.26	74.00	-24.74	Peak	231	112	P
5	7386.00	9.94	34.61	44.55	54.00	-9.45	Average	312	225	P
6	7386.00	9.94	50.03	59.97	74.00	-14.03	Peak	312	225	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH01		:

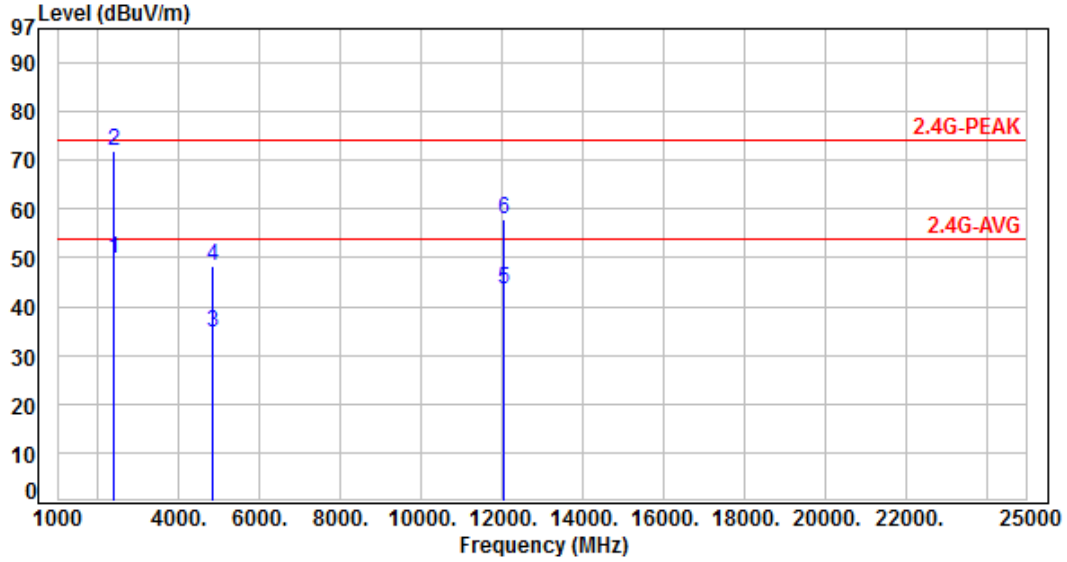


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.75	50.86	54.00	-3.14	Average	310	340	P
2	2390.00	-2.89	75.80	72.91	74.00	-1.09	Peak	310	340	P
3	4824.00	4.73	30.49	35.22	54.00	-18.78	Average	298	161	P
4	4824.00	4.73	43.32	48.05	74.00	-25.95	Peak	298	161	P
5	12060.00	14.70	28.99	43.69	54.00	-10.31	Average	100	78	P
6	12060.00	14.70	43.62	58.32	74.00	-15.68	Peak	100	78	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH01		:

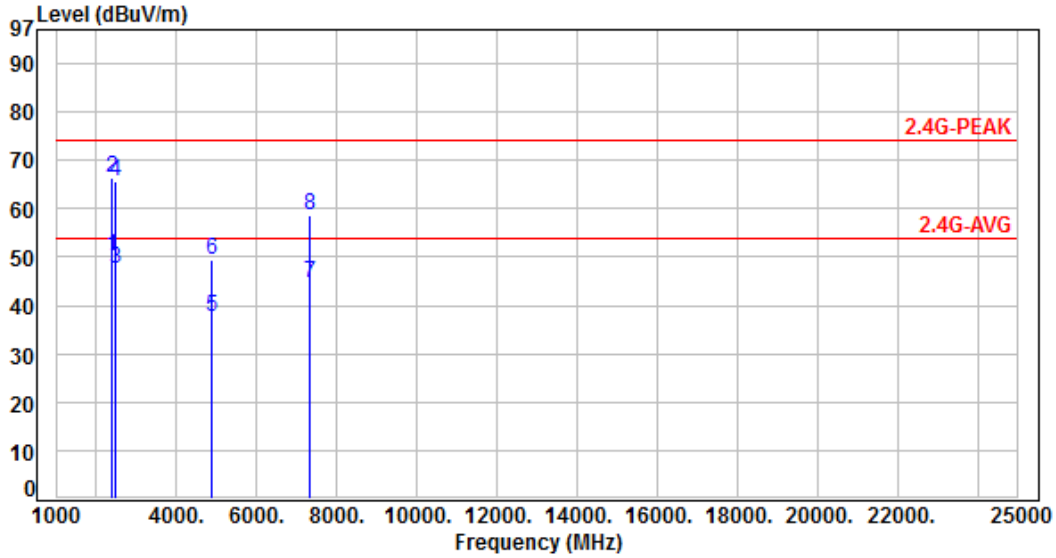


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	52.70	49.81	54.00	-4.19	Average	380	270	P
2	2390.00	-2.89	74.79	71.90	74.00	-2.10	Peak	380	270	P
3	4824.00	4.73	30.02	34.75	54.00	-19.25	Average	231	112	P
4	4824.00	4.73	43.49	48.22	74.00	-25.78	Peak	231	112	P
5	12060.00	14.70	28.79	43.49	54.00	-10.51	Average	100	245	P
6	12060.00	14.70	43.27	57.97	74.00	-16.03	Peak	100	245	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH06		:

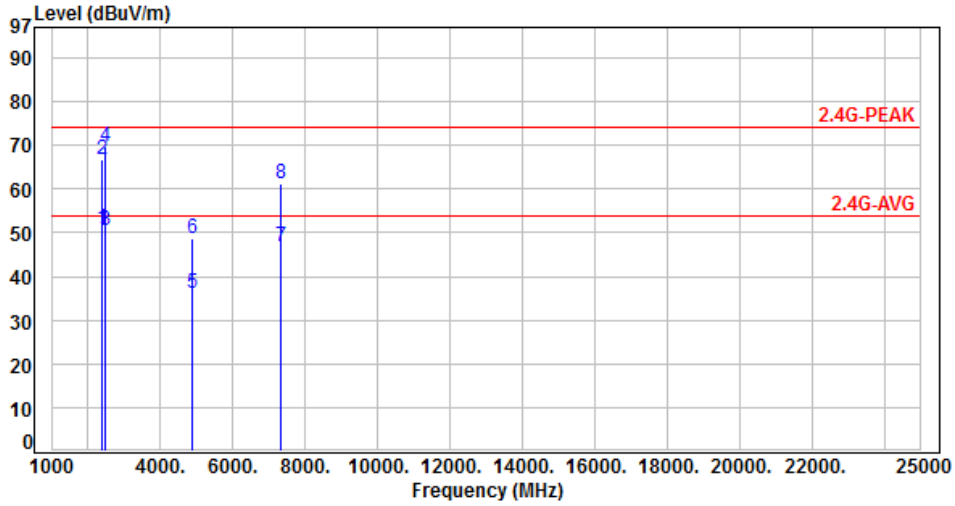


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.21	50.32	54.00	-3.68	Average	285	255	P
2	2390.00	-2.89	69.27	66.38	74.00	-7.62	Peak	285	255	P
3	2483.50	-2.66	50.21	47.55	54.00	-6.45	Average	295	235	P
4	2483.50	-2.66	68.15	65.49	74.00	-8.51	Peak	295	235	P
5	4874.00	4.89	32.81	37.70	54.00	-16.30	Average	100	40	P
6	4874.00	4.89	44.35	49.24	74.00	-24.76	Peak	100	40	P
7	7311.00	9.81	34.97	44.78	54.00	-9.22	Average	375	160	P
8	7311.00	9.81	48.66	58.47	74.00	-15.53	Peak	375	160	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH06		:

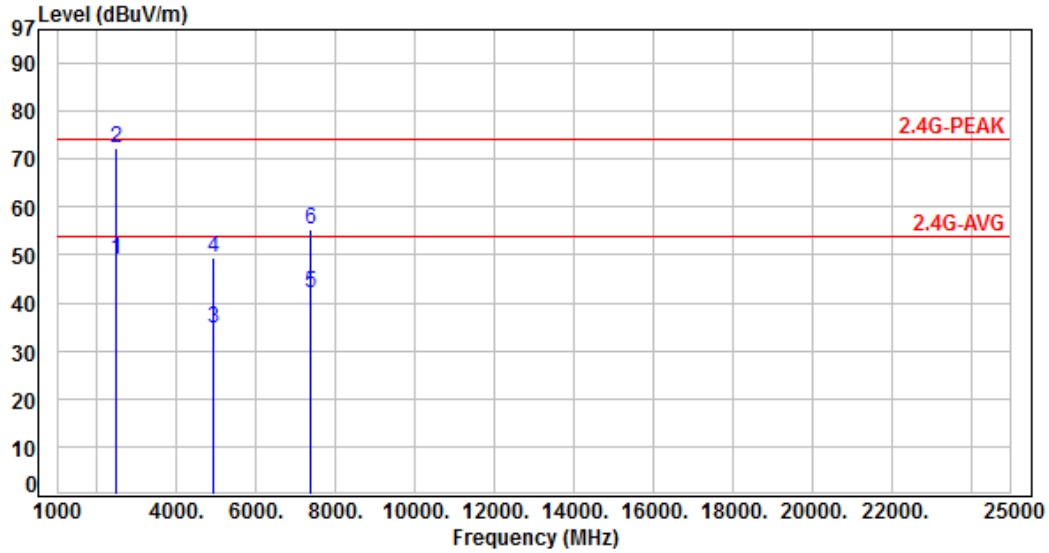


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.89	53.87	50.98	54.00	-3.02	Average	180	255	P
2	2390.00	-2.89	69.82	66.93	74.00	-7.07	Peak	180	255	P
3	2483.50	-2.66	53.36	50.70	54.00	-3.30	Average	280	260	P
4	2483.50	-2.66	72.31	69.65	74.00	-4.35	Peak	280	260	P
5	4874.00	4.89	31.33	36.22	54.00	-17.78	Average	100	150	P
6	4874.00	4.89	43.98	48.87	74.00	-25.13	Peak	100	150	P
7	7311.00	9.81	37.02	46.83	54.00	-7.17	Average	200	120	P
8	7311.00	9.81	51.33	61.14	74.00	-12.86	Peak	200	120	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: VERTICAL
Test Mode	: Mode 3, CH11		:

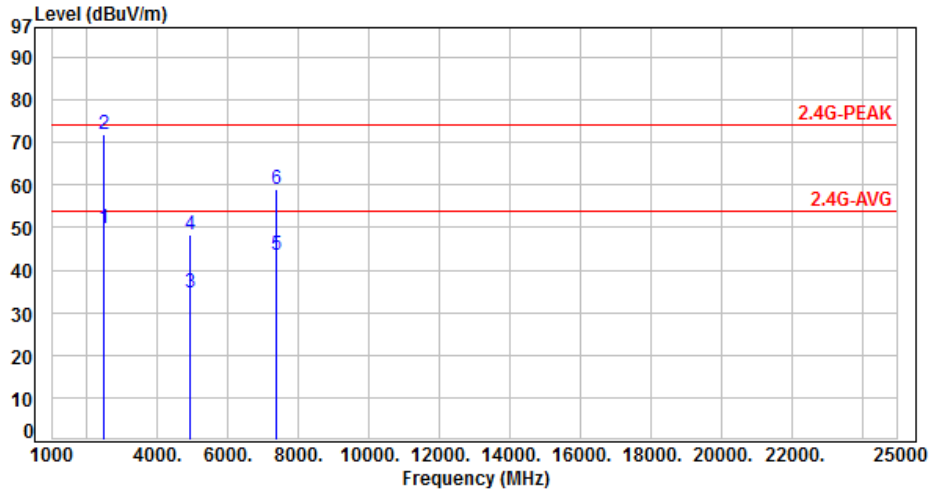


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	51.74	49.08	54.00	-4.92	Average	302	238	P
2	2483.50	-2.66	75.07	72.41	74.00	-1.59	Peak	302	238	P
3	4924.00	5.10	29.45	34.55	54.00	-19.45	Average	321	195	P
4	4924.00	5.10	44.28	49.38	74.00	-24.62	Peak	321	195	P
5	7386.00	9.94	32.28	42.22	54.00	-11.78	Average	268	207	P
6	7386.00	9.94	45.33	55.27	74.00	-18.73	Peak	268	207	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60HZ	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 3, CH11		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2483.50	-2.66	52.42	49.76	54.00	-4.24	Average	320	190	P
2	2483.50	-2.66	74.44	71.78	74.00	-2.22	Peak	320	190	P
3	4924.00	5.10	29.56	34.66	54.00	-19.34	Average	235	121	P
4	4924.00	5.10	43.15	48.25	74.00	-25.75	Peak	235	121	P
5	7386.00	9.94	33.70	43.64	54.00	-10.36	Average	314	226	P
6	7386.00	9.94	49.22	59.16	74.00	-14.84	Peak	314	226	P

Note: Level=Reading+Factor
 Margin=Level-Limit
 Factor=Antenna Factor + cable loss - Amplifier Factor



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



7. Test of Conducted Spurious Emission

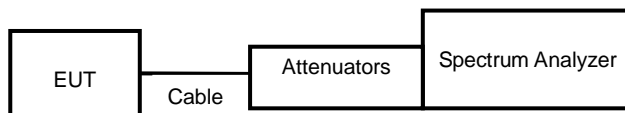
7.1 Test Limit

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

7.2 Test Procedure

- a. The transmitter output was connected to the spectrum analyzer via a low loss cable.
- b. 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.
- c. 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.
- d. The band edges was measured and recorded.

7.3 Test Setup Layout

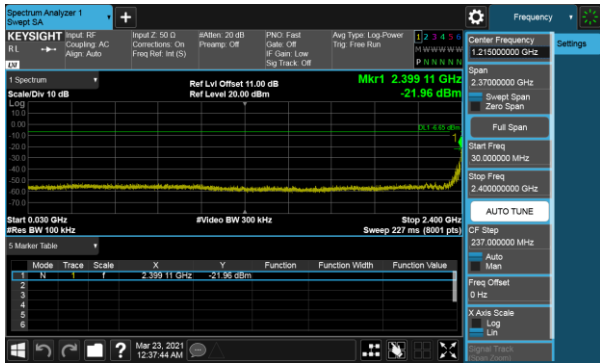


7.4 Test Result and Data

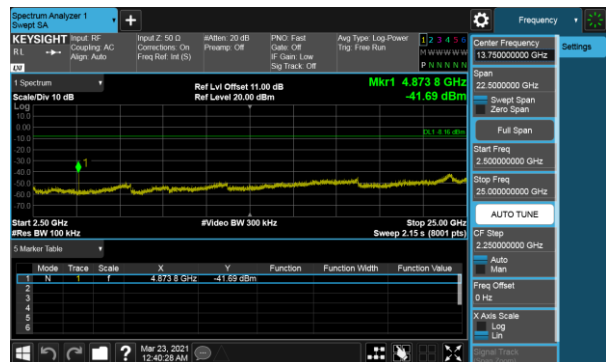
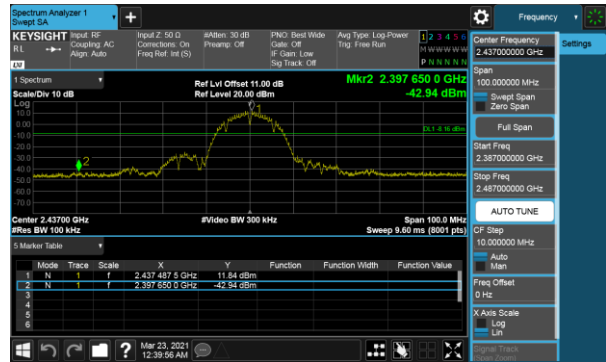
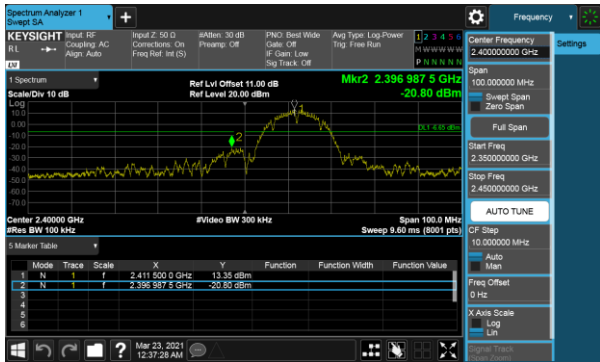
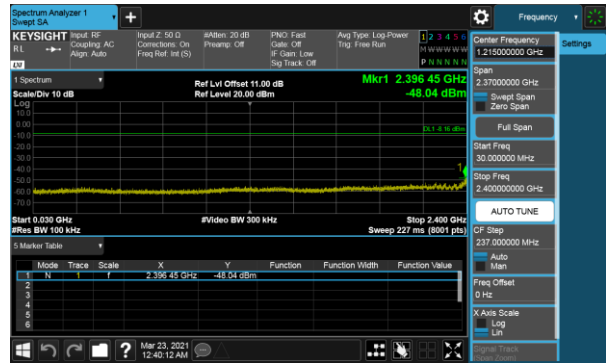
Note: Test plots refers to the following pages.



Modulation Type: 802.11b, CH 01



Modulation Type: 802.11b, CH 06





Modulation Type: 802.11b, CH 11

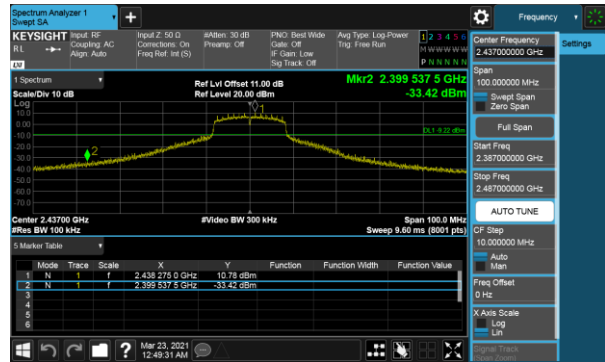
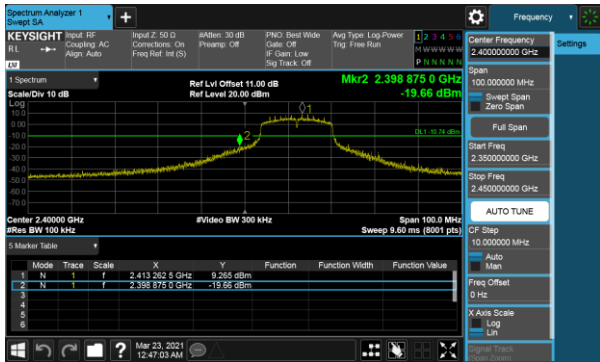
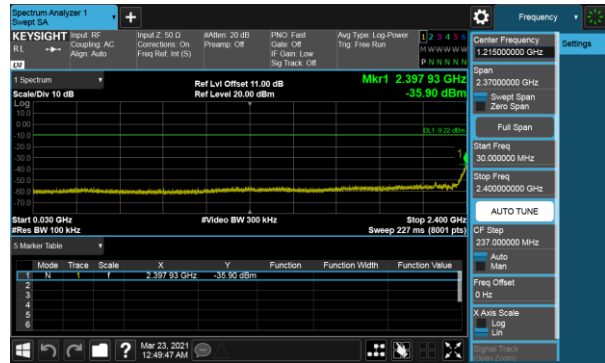




Modulation Type: 802.11g, CH 01



Modulation Type: 802.11g, CH 06



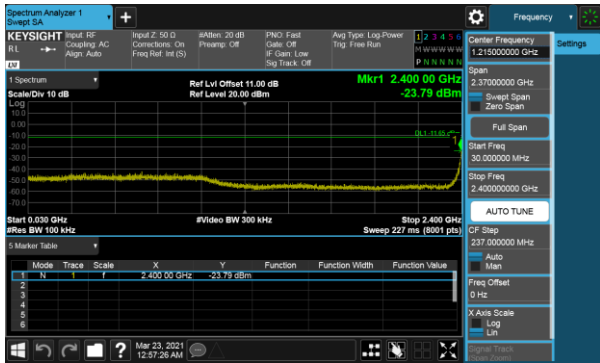


Modulation Type: 802.11g, CH 11

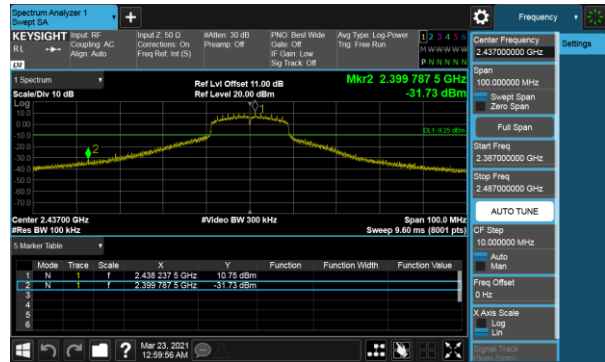
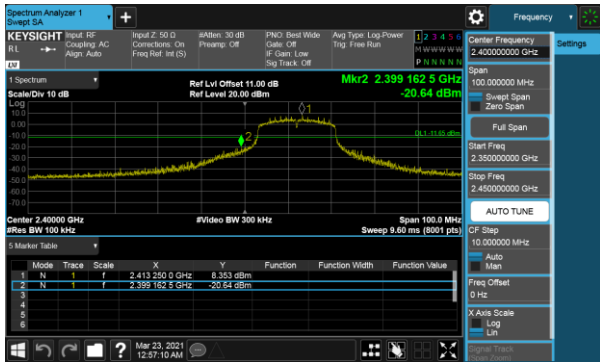
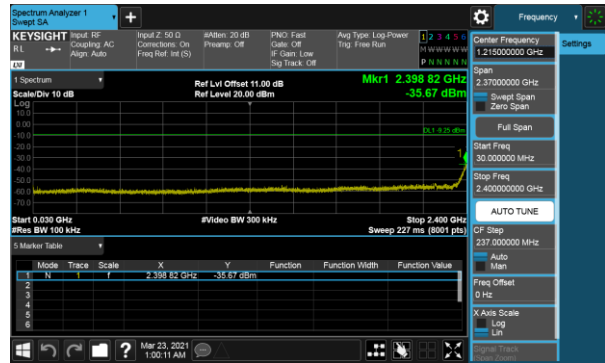




Modulation Type: 802.11n HT20, CH01

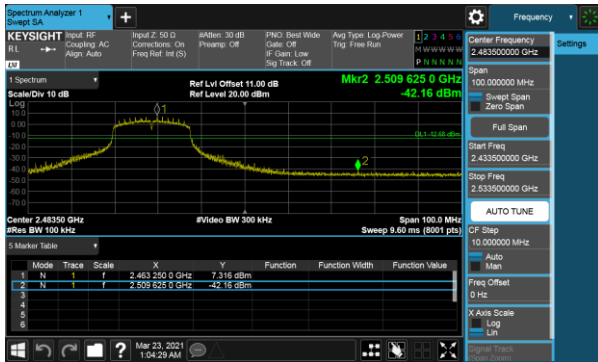
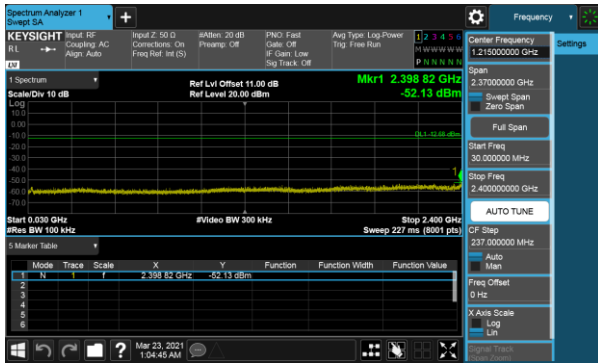


Modulation Type: 802.11n HT20, CH06





Modulation Type: 802.11n HT20, CH11





8. On Time, Duty Cycle and Measurement methods

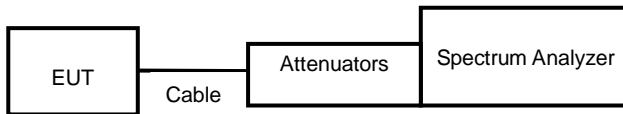
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

Zero-Span Spectrum Analyzer Method.

8.3 Test Setup Layout

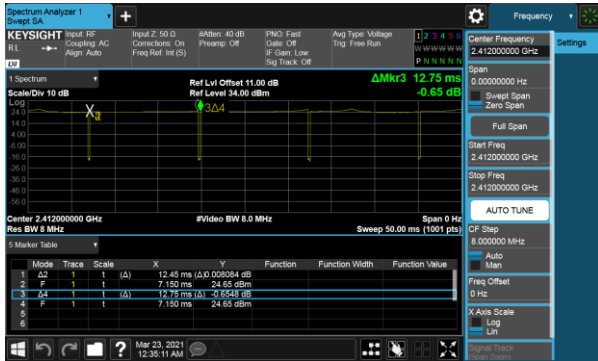


8.4 Test Result and Data

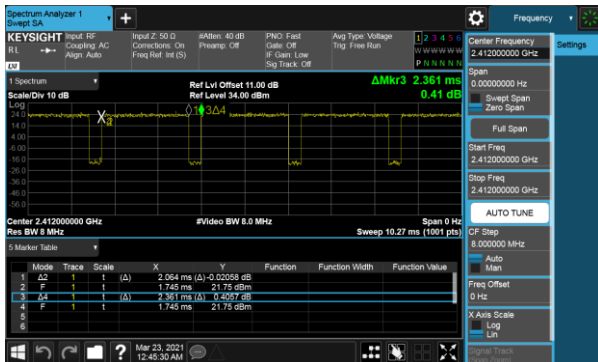
Modulation Type	On Time (ms)	Period Time (ms)	Duty Cycle (%)
11b,1M	12.45	12.75	97.65%
11g,6M	2.06	2.36	87.42%
11n HT20	1.92	2.22	86.56%



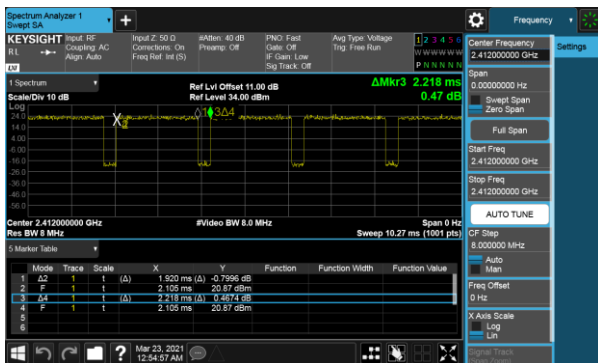
Modulation Type: 802.11b(1Mbps)



Modulation Type: 802.11g(6Mbps)



Modulation Type: 802.11n HT20(6.5Mbps)





9. 6dB Bandwidth Measurement Data

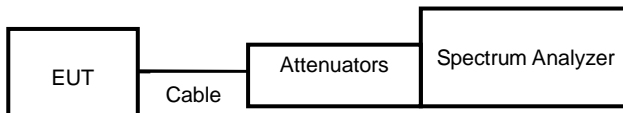
9.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

9.2 Test Procedures

- a. The transmitter output was connected to the spectrum analyzer.
- b. Set RBW of spectrum analyzer to 100 KHz and VBW to 300 KHz.
- c. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
- d. The 6dB Bandwidth was measured and recorded.

9.3 Test Setup Layout



9.4 Test Result and Data

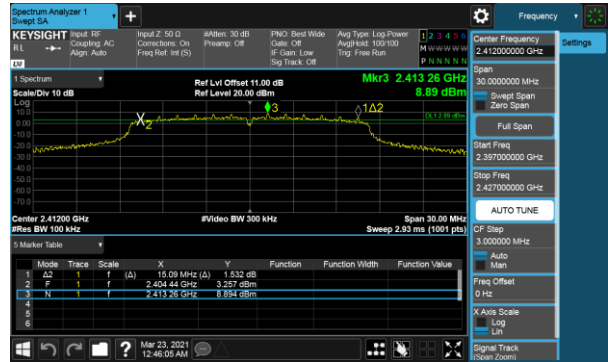
Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
			ANT A	
11b	1	2412	9.03	0.5
	6	2437	9.06	0.5
	11	2462	9.03	0.5
11g	1	2412	15.09	0.5
	6	2437	15.09	0.5
	11	2462	15.12	0.5
11n HT20	1	2412	15.09	0.5
	6	2437	15.12	0.5
	11	2462	15.12	0.5



Modulation Type: 802.11b
CH01



Modulation Type: 802.11g
CH01



CH06



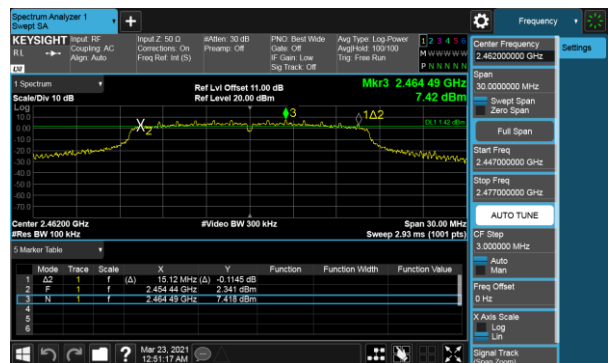
CH06



CH11

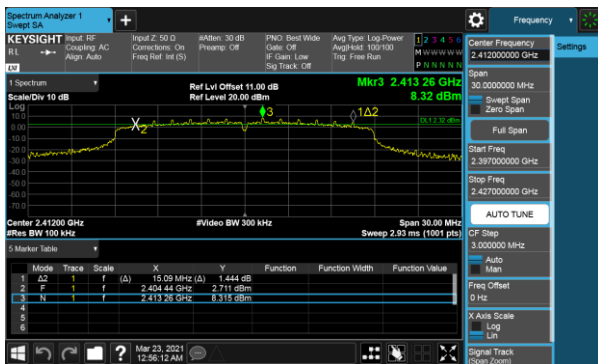


CH11

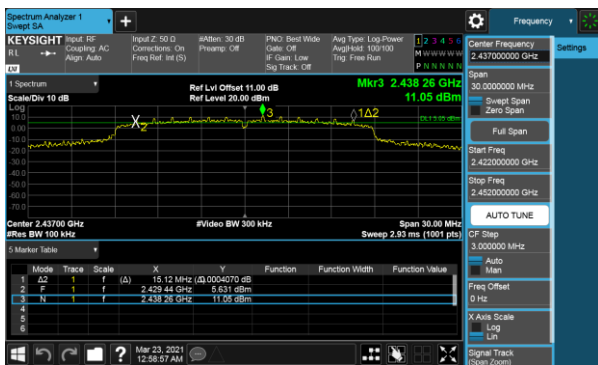




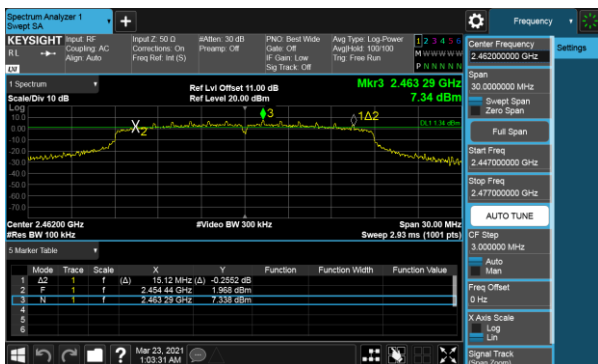
Modulation Type: 802.11n HT20
CH01



CH06



CH11





10. Maximum Peak and Average Output Power

10.1 Test Limit

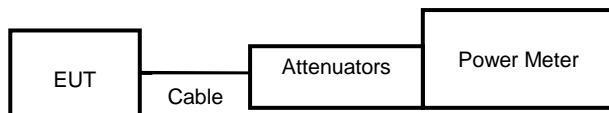
The Maximum Peak Output Power Measurement is 30dBm.

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

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**

Setting	Modulation Mode	Channel	Frequency (MHz)	Conducted(peak) output power (dBm)	Total PK power (dBm)	Total PK power (mW)	Power Limit (dBm)
				ANT A			
80	11b	1	2412	22.77	22.77	189.234	30.00
78		6	2437	21.73	21.73	148.936	30.00
78		11	2462	21.42	21.42	138.676	30.00
74	11g	1	2412	25.78	25.78	378.443	30.00
80		6	2437	25.41	25.41	347.536	30.00
72		11	2462	25.09	25.09	322.849	30.00
72	11n HT20	1	2412	25.56	25.56	359.749	30.00
81		6	2437	25.37	25.37	344.350	30.00
70		11	2462	24.76	24.76	299.226	30.00

Setting	Modulation Mode	Channel	Frequency (MHz)	Conducted(average) output power (dBm)	Total AV power (dBm)	Total AV power (mW)	Power Limit (dBm)
				ANT A			
80	11b	1	2412	20.45	20.45	110.917	NA
78		6	2437	19.47	19.47	88.512	NA
78		11	2462	19.15	19.15	82.224	NA
74	11g	1	2412	18.32	18.32	67.920	NA
80		6	2437	20.20	20.20	104.713	NA
72		11	2462	17.32	17.32	53.951	NA
72	11n HT20	1	2412	17.60	17.60	57.544	NA
81		6	2437	20.31	20.31	107.399	NA
70		11	2462	16.71	16.71	46.881	NA

Note: Average power is for reference only.



11. Power Spectral Density

11.1 Test Limit

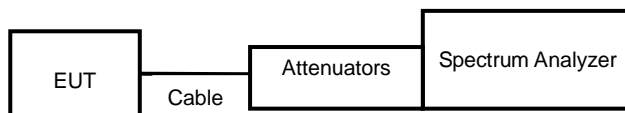
The Maximum of Power Spectral Density Measurement is 8dBm.

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

- a. The transmitter output was connected to spectrum analyzer.
- b. 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.
- c. The power spectral density was measured and recorded.

11.3 Test Setup Layout



11.4 Test Result and Data

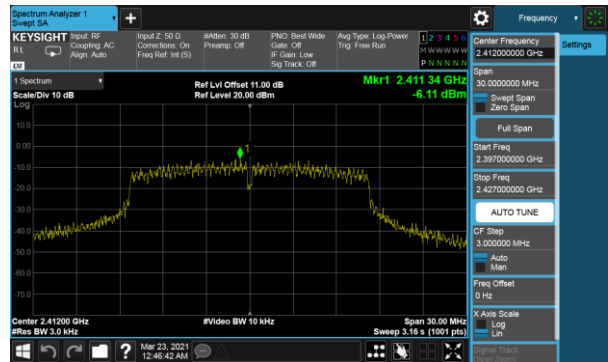
Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3KHz Bandwidth(dBm)	Sum chain (dBm)	Duty Cycle CF(dB)	Total PSD (dBm)	Limit (dBm)
			ANT A				
11b	1	2412	-0.54	-0.54	0.00	-0.54	8.00
	6	2437	-3.00	-3.00	0.00	-3.00	8.00
	11	2462	-3.35	-3.35	0.00	-3.35	8.00
11g	1	2412	-6.11	-6.11	0.00	-6.11	8.00
	6	2437	-4.15	-4.15	0.00	-4.15	8.00
	11	2462	-7.00	-7.00	0.00	-7.00	8.00
11n HT20	1	2412	-6.75	-6.75	0.00	-6.75	8.00
	6	2437	-4.35	-4.35	0.00	-4.35	8.00
	11	2462	-7.89	-7.89	0.00	-7.89	8.00



Modulation Type: 802.11b
CH01



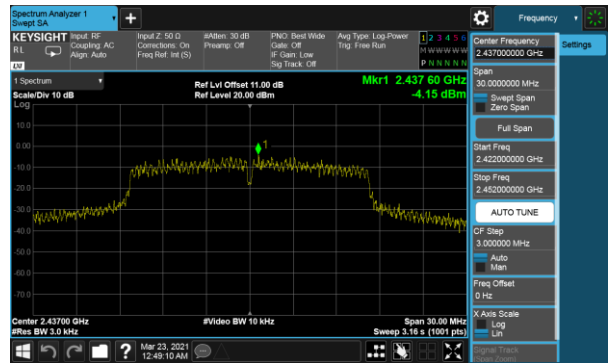
Modulation Type: 802.11g
CH01



CH06



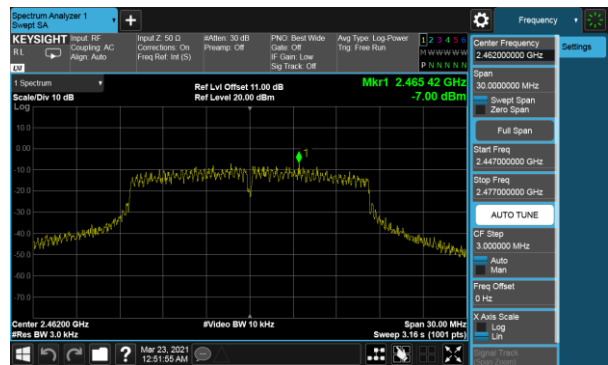
CH06



CH11

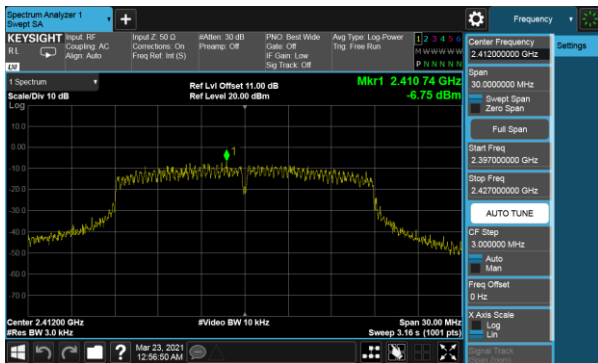


CH11

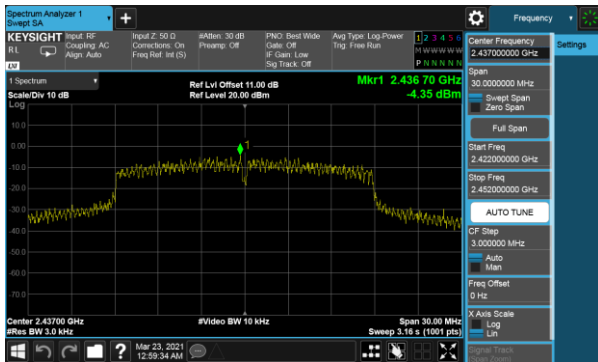




Modulation Type: 802.11n HT20
CH01



CH06



CH11

