



FCC RADIO TEST REPORT

Applicant : Ubiquiti Inc.

Address : 685 Third Avenue, New York, New York 10017,
USA

Equipment : UniFi Display Cast Pro

Model No. : UC-Cast-Pro

Trade Name : UBIQUITI

FCC ID : SWX-UCCASTP

I HEREBY CERTIFY THAT :

The sample was received on Jan. 17, 2024 and the testing was completed on Jun. 20, 2024 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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History of this test report

Report No.	Issued Date	Description
24010270-TRFCC06	Jun. 26, 2024	Original



1. Summary of Test Procedure and Test Results

1.1. Applicable Standards

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart E §15.407

KDB 789033

FCC Rule	Description of Test	Result
15.203	Antenna Requirement	PASS
15.207(a)	AC Power Line Conducted Emission	PASS
15.407(b) 15.209	Radiated Spurious Emission	PASS
15.407(a)	26 dB & Occupied Bandwidth	PASS
15.407	6 dB Bandwidth	PASS
15.407 (a) & (a)(3)	Average Power	PASS
15.407(a)	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, measurement uncertainty evaluation is not considered.



2. Test Configuration of Equipment under Test

2.1. Feature of Equipment under Test

Operation Frequency Range	BT / BLE: 2400-2483.5MHz 2.4GHz: 802.11b/g/n: 2400-2483.5MHz 5GHz: 802.11a/n/ac: 5150-5250MHz, 5250-5350MHz, 5470-5725MHz, 5725-5850MHz
Center Frequency Range	BT / BLE: 2402MHz-2480MHz 2.4GHz:802.11b/g/n: 2412MHz-2462MHz 5GHz:802.11a/n/ac: 5180-5240MHz, 5260-5320MHz, 5500-5720MHz, 5745-5825MHz
Modulation Type	BT: GFSK, $\pi/4$ -DQPSK, 8DPSK BLE: GFSK WLAN: 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
Modulation Technology	DSSS, OFDM, FHSS, DTS
Data Rate	BT: GFSK: 1Mbps, $\pi/4$ -DQPSK: 2Mbps, 8DPSK: 3Mbps BLE: GFSK: 1Mbps WLAN: 2.4GHz: 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS15, HT20/40 5GHz: 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS15, HT20/40 802.11ac: MCS0 – MCS9, VHT20/40/80
Antenna Type	Dipole Antenna
Antenna Gain	BT / BLE: 2400-2500MHz: ANT A: 3dBi WLAN: 2400-2500MHz: ANT A: 3dBi, ANT B: 3dBi 5150-5850MHz: ANT A: 5dBi, ANT B: 5dBi

Note:

1. EUT supports TPC function.
2. WLAN and BT can simultaneously transmission.
3. EUT supports DFS client mode, without radar detection.
4. For more details, please refer to the user's manual of the EUT.



2.2. Carrier Frequency of Channels

Band: 5150MHz-5250MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*36	5180	44	5220
*40	5200	*48	5240

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*38	5190	*46	5230

802.11ac VHT80

Channel	Frequency(MHz)
*42	5210

Band: 5250MHz-5350MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*52	5260	*60	5300
56	5280	*64	5320

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*54	5270	*62	5310

802.11ac VHT80

Channel	Frequency(MHz)
*58	5290

Band: 5470MHz -5725MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*100	5500	124	5620
104	5520	128	5640
108	5540	132	5660
112	5560	136	5680
116	5580	*140	5700
*120	5600		

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*102	5510	126	5630
110	5550	*134	5670
*118	5590		

802.11ac VHT80

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*106	5530	*122	5610



Band 3: Straddle Channel

802.11a, 802.11n HT 20, 802.11ac VHT20

Channel	Frequency(MHz)
*144	5720

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)
*142	5710

802.11ac VHT80

Channel	Frequency(MHz)
*138	5690

Band: 5725MHz-5850MHz

802.11a, 802.11n HT20, 802.11ac VHT20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*149	5745	161	5805
153	5765	*165	5825
*157	5785		

802.11n HT40, 802.11ac VHT40

Channel	Frequency(MHz)	Channel	Frequency(MHz)
*151	5755	*159	5795

802.11ac VHT80

Channel	Frequency(MHz)
*155	5775

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 remote workstation and EUT for RF test. The remote workstation included Notebook.
- An executive program, "wifitest command" under Windows OS 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	802.11a (6Mbps)
2	802.11n HT20 (6.5Mbps)
3	802.11n HT40 (13.5Mbps)
4	802.11ac VHT20 (6.5Mbps)
5	802.11ac VHT40 (13.5Mbps)
6	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1" generated the worst case, it was reported as the final data.	
Radiation Emissions (Below 1GHz)	
Test Mode	Operating Description
1	802.11a (6Mbps)
2	802.11n HT20 (6.5Mbps)
3	802.11n HT40 (13.5Mbps)
4	802.11ac VHT20 (6.5Mbps)
5	802.11ac VHT40 (13.5Mbps)
6	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1" generated the worst case, it was reported as the final data.	
Radiation Emissions (Above 1GHz)	
Test Mode	Operating Description
1	802.11a (6Mbps)
2	802.11n HT20 (6.5Mbps)
3	802.11n HT40 (13.5Mbps)
4	802.11ac VHT20 (6.5Mbps)
5	802.11ac VHT40 (13.5Mbps)
6	802.11ac VHT80 (29.3Mbps)
caused "Test Mode 1,4~6" generated the worst case, they were reported as the final data.	

Note:

- There are two kinds of EUT Power Type: Power From Adapter and Power From PoE
For AC Power Line Conducted Emission, Power From PoE is worst case.
For Radiated Spurious Emission, Power From Adapter is worst case.
- There are two kinds of test voltage: AC 120V / 60Hz and AC 240V / 60Hz.
For AC Power Line Conducted Emission, AC 120V / 60Hz is worst case.
For Radiated Spurious Emission(Below 1GHz), AC 240V / 60Hz is worst case.
For Radiated Spurious Emission(Above 1GHz), AC 120V / 60Hz is worst case.



The EUT incorporates a MIMO function

Modulation Type	TX CONFIGURATION
802.11a	2TX
802.11n HT20	2TX
802.11n HT40	2TX
802.11ac VHT20	2TX
802.11ac VHT40	2TX
802.11ac VHT80	2TX



2.4. Description of Test System

RF Conducted				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	lenovo	S1GL2W	N/A	N/A
Type-c USB	kolin	KEX-DLCP08	1m / NS	N/A
RJ45 Cable	TE CONNECTIVITY	CAT5E	1.2m / NS	N/A
POE	UBIQUITI	GP-H480-050G	N/A	0.6m / NS
Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	DELL	Latitude E5470	N/A	Adapter / 1.8m / NS
RJ45 Cable	TE CONNECTIVITY	CAT5E	1.2m / NS	N/A
Power Cord	Longwell	LS-33	1.8/NS	N/A
Type-C Adapter	UI	GP-M015-QC	N/A	Adapter / 1.8m / NS
POE	UI	GP-V480-032G	N/A	N/A
Type-c USB	kolin	KEX-DLCP08	1m / NS	N/A
AC Power Line Conducted Emission				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	DELL	Latitude E5470	N/A	Adapter / 1.8m / NS
RJ45 Cable	TE CONNECTIVITY	CAT5E	1.2m / NS	N/A
Power Cord	Longwell	LS-33	1.8/NS	N/A
Type-C Adapter	UI	GP-M015-QC	N/A	Adapter / 1.8m / NS
POE	UI	GP-V480-032G	N/A	N/A
Type-c USB	kolin	KEX-DLCP08	1m / NS	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	TW1439, TW1079
	IC	4934E-1, 4934E-2
Frequency Range Investigated	Conducted: from 150kHz to 30 MHz Radiation: from 9kHz to 40,000MHz	
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	2024/1/26~2024/1/29	22.5~22.8℃ / 52~58%	Leon Huang
RF Conducted	RFCON01-NK	2024/06/20	25.1℃ / 46%	Leon Huang
Radiated Emissions	3M02-NK	2024/1/23~2024/1/30	16.2~19.1℃ / 46~52%	Leon Huang
Radiated Emissions	3M02-NK	2024/06/17	24.1℃ / 44%	Park Chen
AC Power Line Conducted Emission	CON02-NK	2024/01/30	17.5℃ / 50%	Leon Huang



2.6. 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)	$\pm 3.12\text{dB}$
Radiated Spurious Emission(9KHz~30MHz)	$\pm 3.5\text{dB}$
Radiated Spurious Emission(30MHz~1GHz)	$\pm 5.1\text{dB}$
Radiated Spurious Emission(1GHz~40GHz)	$\pm 5.2\text{dB}$
6dB Bandwidth	$\pm 5.4\%$
26dB Bandwidth	$\pm 4.4\%$
Occupied Bandwidth	$\pm 4.5\%$
Peak Output Power(Conducted Power Meter)	$\pm 1.1\text{dB}$
Power Spectral Density	$\pm 2.0\text{dB}$
Duty Cycle	$\pm 3.5\%$
Frequency Stability	$\pm 0.23\text{KHz}$



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)(2024/1/23~2024/1/30)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	369	2023/03/15	2024/03/14
Active Loop Antenna	Schwarzbeck	FMZB 1513	414	2023/02/03	2024/02/02
Horn Antenna	EMCO	3115	31589	2023/03/23	2024/03/22
Horn Antenna	EMCO	3116	31970	2023/03/03	2024/03/02
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2023/07/05	2024/07/04
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2023/08/15	2024/08/14
Preamplifier	Agilent	8449B	3008A01954	2023/03/08	2024/03/07
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2023/10/13	2024/10/12
Preamplifier	EM Electronics corp.	EM330	60659	2023/03/10	2024/03/09
Cable-6m(9k~300M)	NA	EMC5D-BM-BM-6	130606	2023/03/13	2024/03/12
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2023/02/25	2024/02/24
Cable-0.5m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2023/03/07	2024/03/06
Cable-3m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2023/03/07	2024/03/06
Cable-8m(1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2023/03/07	2024/03/06
Cable-1m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	552450	2023/06/08	2024/06/07
Cable-3m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	552451	2023/06/08	2024/06/07
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
High Pass Filter	Warison	WFIL-H3000-18000F-03	WRJ5CFWC2J1	2023/07/03	2024/07/02
Notch Filter	Warison	WFIL-N5925-7125F-04	WRQ4BFWC4M1	2023/03/13	2024/03/12
Hipass Filter	Warison	WFIL-H7500-18000F	WRQ4BFWC2J1	2023/03/13	2024/03/12



Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)(2024/6/17)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	369	2024/02/19	2025/02/18
Active Loop Antenna	Schwarzbeck	FMZB 1513	414	2024/01/16	2025/01/15
Horn Antenna	EMCO	3115	31589	2024/02/26	2025/02/25
Horn Antenna	EMCO	3116	31974	2023/10/16	2024/10/15
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2023/07/05	2024/07/04
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2023/08/15	2024/08/14
Preamplifier	Agilent	8449B	3008A01954	2024/03/01	2025/02/28
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2023/10/13	2024/10/12
Preamplifier	EM Electronics corp.	EM330	60659	2024/02/17	2025/02/16
Cable-4m(9k-3G)	EMEC	RG-223	18274M	2023/07/31	2024/07/30
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2024/02/23	2025/02/22
Cable-0.5m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2024/03/05	2025/03/04
Cable-3m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2024/03/05	2025/03/04
Cable-8m(1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2024/03/05	2025/03/04
Cable-1m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	804398/2	2023/10/12	2024/10/11
Cable-3m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	804619/2	2023/10/12	2024/10/11
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
High Pass Filter	Warison	WFIL-H3000-18000F-03	WRJ5CFWC2 J1	2023/07/03	2024/07/02
Notch Filter	Warison	WFIL-N5925-7125F-04	WRQ4BFWC4 M1	2024/03/11	2025/03/10
Hipass Filter	Warison	WFIL-H7500-18000F	WRQ4BFWC2 J1	2024/03/11	2025/03/10

Test Item	RF Conducted(2024/1/26~2024/1/29)				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100047	2023/02/24	2024/02/23
Attenuator	KEYSIGHT	8491B	MY39250703	2023/03/07	2024/03/06
Cable-0.5m(1G-26.5G)	HUBER SUHNER	SUCOFLEX 102	28422/2	2023/03/07	2024/03/06
Power Meter	Anritsu	ML2495A	1224005	2023/03/07	2024/03/06
Power Sensor	Anritsu	MA2411B	1207295	2023/03/07	2024/03/06
Switch Box	Theda	1-4	TW5451159	NA	NA



Test Item	RF Conducted(2024/6/20)				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100047	2024/03/01	2025/02/28
Attenuator	KEYSIGHT	8491B	MY39250703	2024/02/20	2025/02/19
Cable-0.5m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2023/10/12	2024/10/11
Power Meter	Anritsu	ML2495A	1224005	2024/02/17	2025/02/16
Power Sensor	Anritsu	MA2411B	1207295	2024/02/17	2025/02/16
Switch Box	Theda	1-4	TW5451159	NA	NA

Test Item	AC Power Line Conducted Emission				
Test Site	CON02-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
EMI Receiver	ROHDE & SCHWARZ	ESR 7	101906	2023/05/08	2024/05/07
TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	102185	2023/08/29	2024/08/28
Cable-4m(9k-3G)	EMEC	RG-223	18274M	2023/07/31	2024/07/30
E3	AUDIX	v8.2014-8-6	RK-000536	NA	NA



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 15.407 (a), 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

Antenna Type	Dipole Antenna
Antenna Gain	5150-5850MHz: ANT A: 5dBi, ANT B: 5dBi

5150MHz -5850MHz
For Power directional gain= $G_{ant} = 5.00$ dBi For PSD directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ = 8.01 (dBi)

*MIMO type: Cyclic Delay Diversity (CDD) mode.



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 C63.10-2013. 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

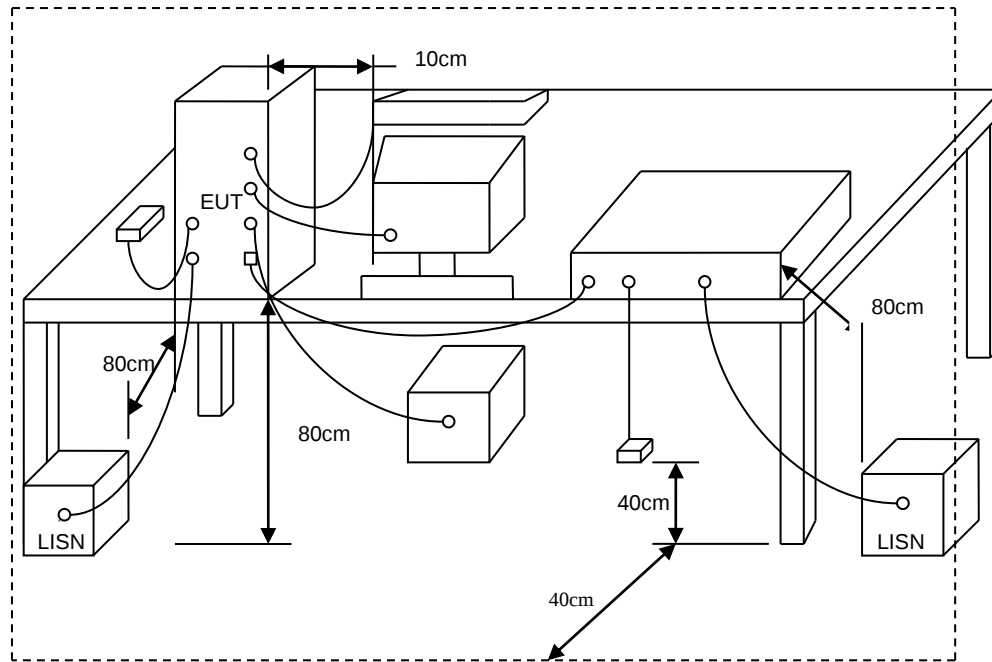
*Decreases with the logarithm of the frequency.

5.2. Test Procedures

- 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

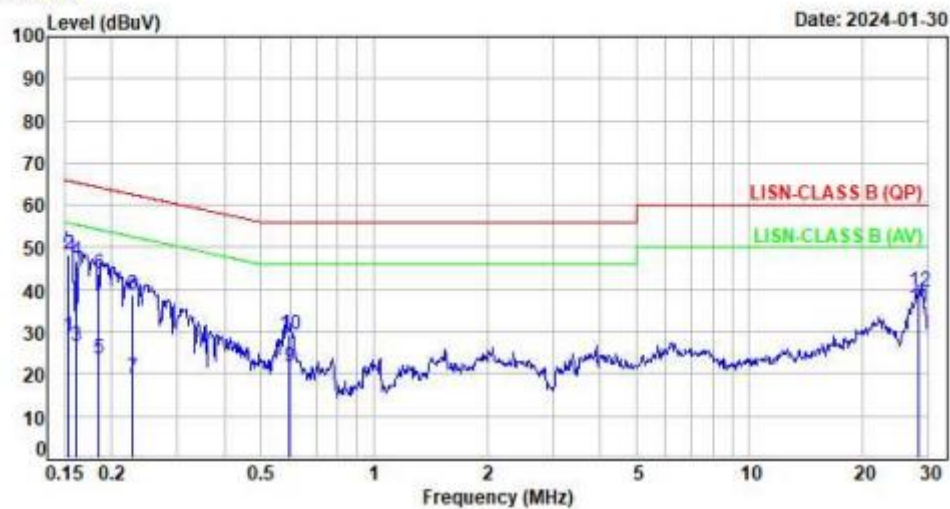




5.4. Test Result and Data

Test Mode : 2TX 11a CH64 6Mbps
Voltage : From POE(AC 120V/60Hz)
Phase : Line

Data: 15



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1528	9.66	19.20	28.86	55.85	-26.99	Average	P
2	0.1528	9.66	38.49	48.15	65.85	-17.70	QP	P
3	0.1610	9.66	17.01	26.67	55.41	-28.74	Average	P
4	0.1610	9.66	37.15	46.81	65.41	-18.60	QP	P
5	0.1845	9.65	13.80	23.45	54.28	-30.83	Average	P
6	0.1845	9.65	34.13	43.78	64.28	-20.50	QP	P
7	0.2282	9.64	9.38	19.02	52.52	-33.50	Average	P
8	0.2282	9.64	29.08	38.72	62.52	-23.80	QP	P
9	0.5926	9.65	11.88	21.53	46.00	-24.47	Average	P
10	0.5926	9.65	19.63	29.28	56.00	-26.72	QP	P
11	28.2167	9.95	25.97	35.92	50.00	-14.08	Average	P
12	28.2167	9.95	29.76	39.71	60.00	-20.29	QP	P

Note: Level=Reading+Factor

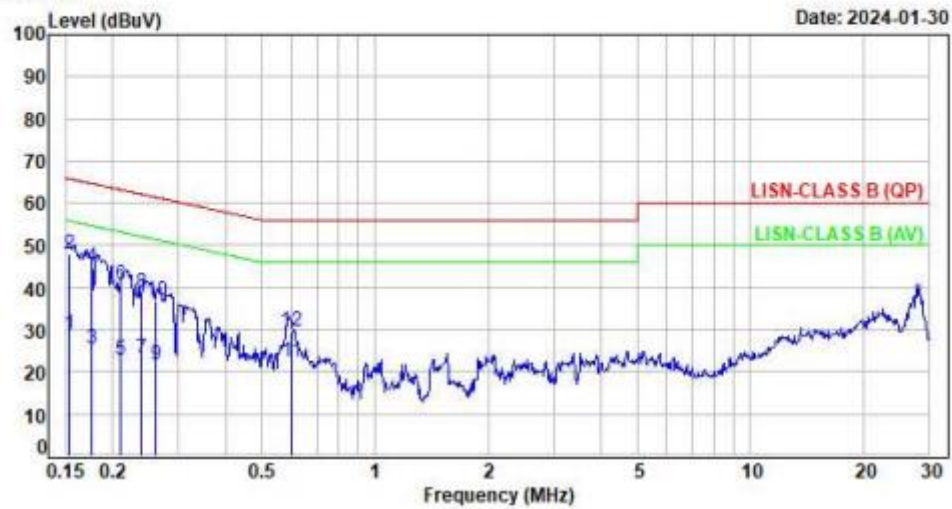
Margin=Level-Limit

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



Test Mode : 2TX 11a CH64 6Mbps
Voltage : From POE(AC 120V/60Hz)
Phase : Neutral

Data: 16



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1536	9.56	19.30	28.86	55.80	-26.94	Average	P
2	0.1536	9.56	38.40	47.96	65.80	-17.84	QP	P
3	0.1764	9.58	16.04	25.62	54.65	-29.03	Average	P
4	0.1764	9.58	35.20	44.78	64.65	-19.87	QP	P
5	0.2103	9.59	13.07	22.66	53.19	-30.53	Average	P
6	0.2103	9.59	31.28	40.87	63.19	-22.32	QP	P
7	0.2382	9.58	13.74	23.32	52.16	-28.84	Average	P
8	0.2382	9.58	29.35	38.93	62.16	-23.23	QP	P
9	0.2601	9.58	12.23	21.81	51.43	-29.62	Average	P
10	0.2601	9.58	27.23	36.81	61.43	-24.62	QP	P
11	0.5979	9.58	12.86	22.44	46.00	-23.56	Average	P
12	0.5979	9.58	20.09	29.67	56.00	-26.33	QP	P

Note: Level=Reading+Factor
Margin=Level-Limit
Factor=(LISN or ISN or Current Probe)Factor + Cable Loss



6. Test of Spurious Emission (Radiated)

6.1. Test Limit

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.



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.

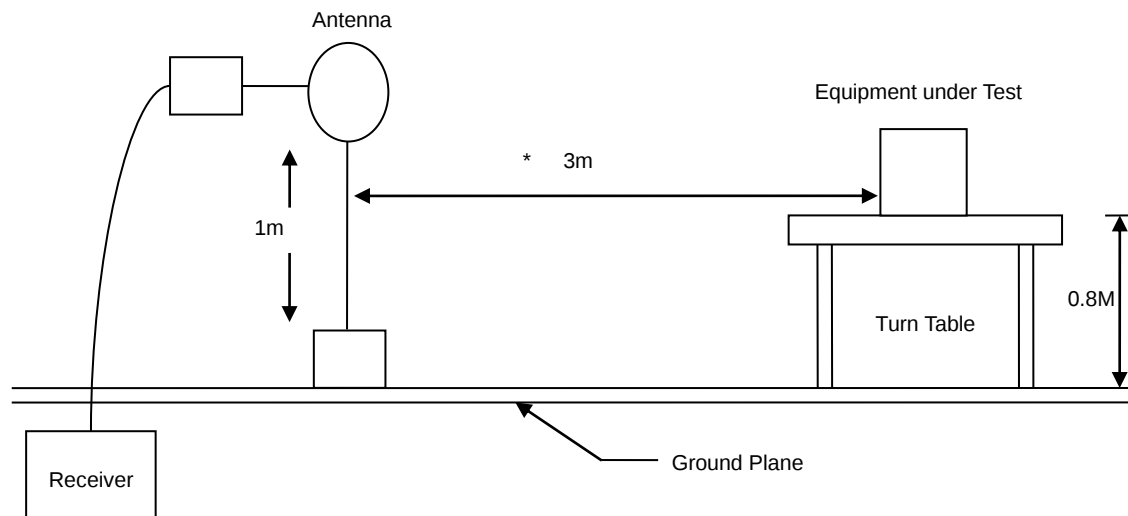
Note:

- 1.The supporting fixture shall permit orientation of the EUT in each of three orthogonal axis positions such that emissions from the EUT are maximized.
(X -AXIS is the worst.)
- 2.Due to the test software function limit the operation band setting(200dBuV/m). There's no corresponding limitation in the actual test item.

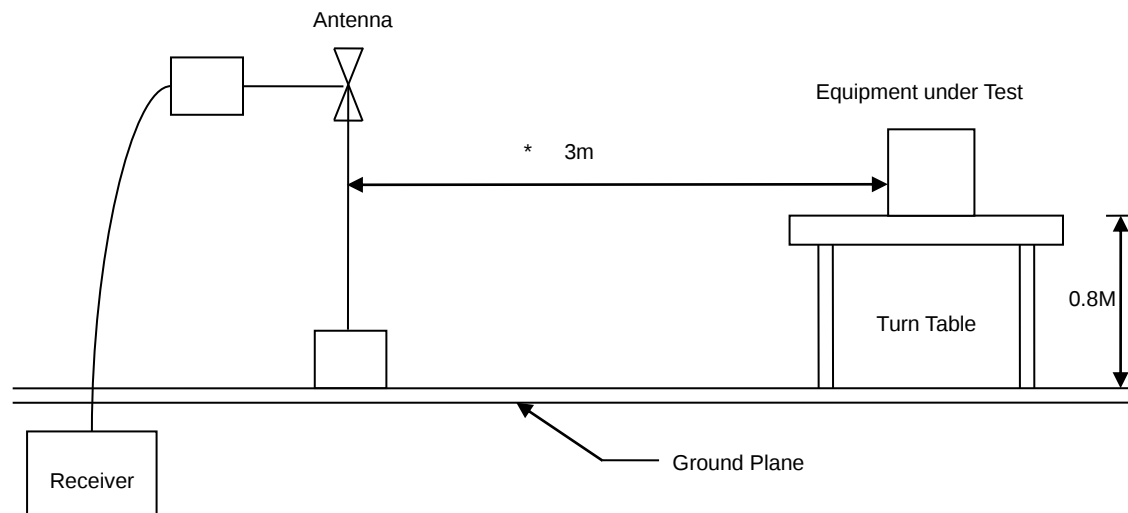


6.3. Typical Test Setup

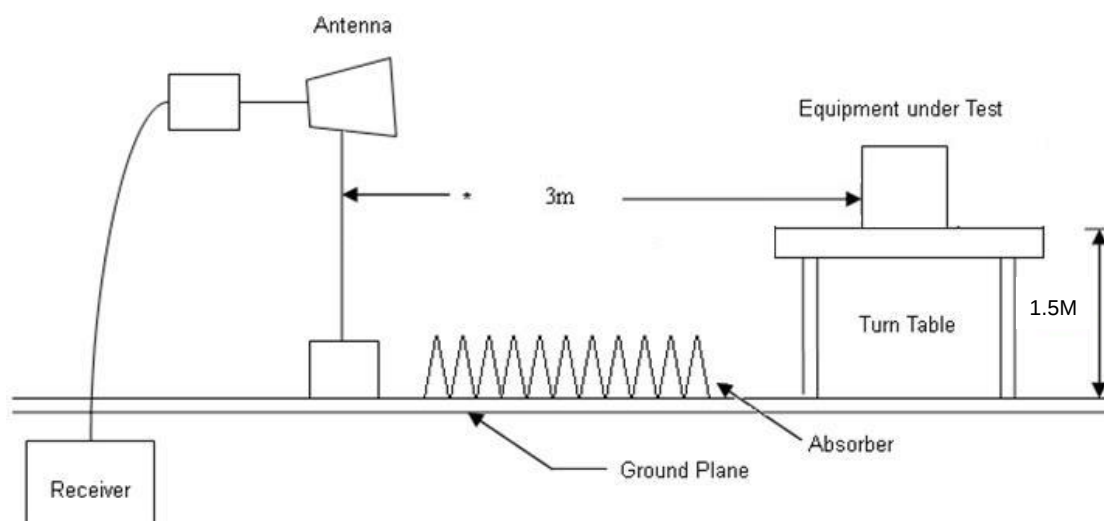
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



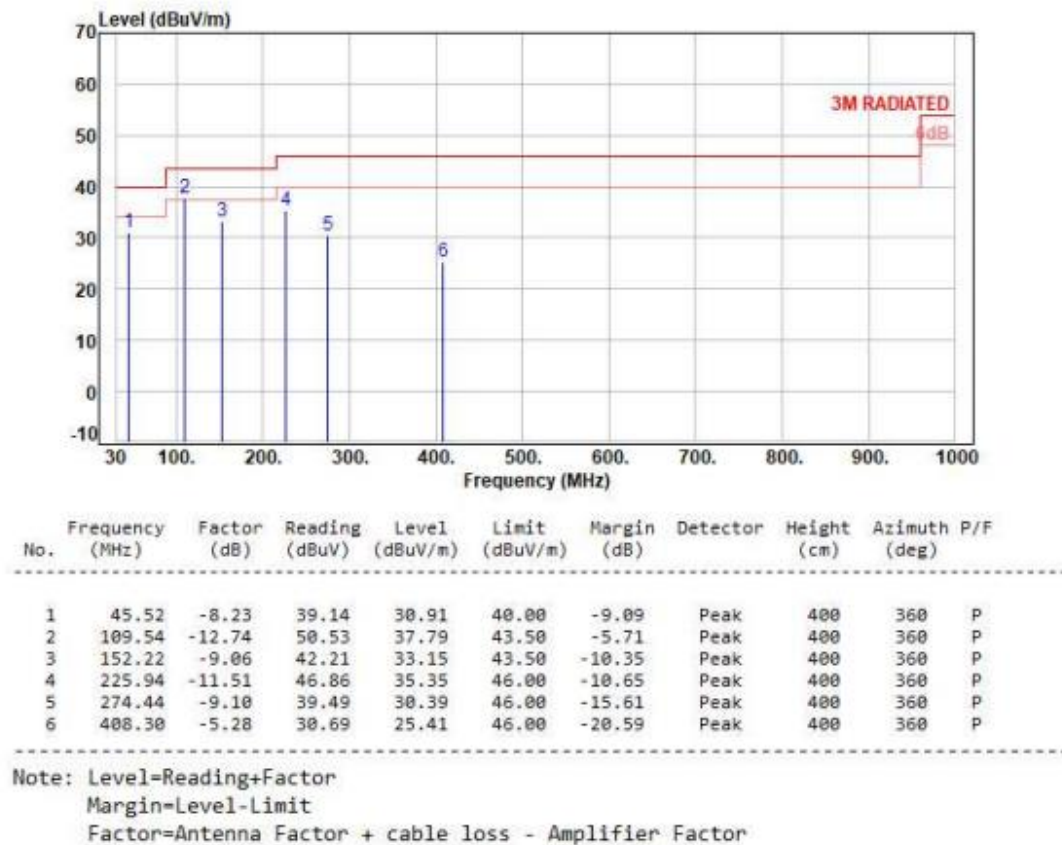


6.4. Test Result and Data (9kHz ~ 30MHz)

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

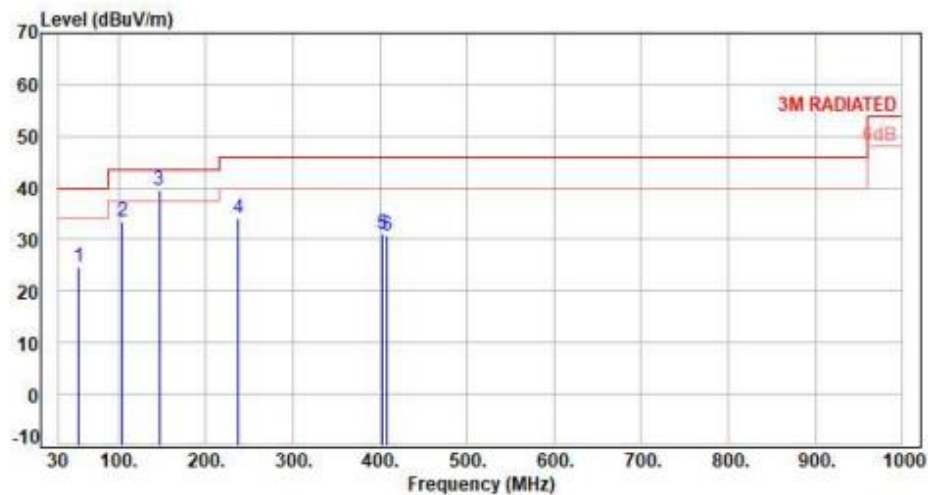
6.5. Test Result and Data (30MHz ~ 1GHz)

Test Mode : 2TX 11a CH64 6Mbps
Voltage : Adapter(AC240V/60Hz)
Pol : Vertical





Test Mode : 2TX 11a CH64 6Mbps
Voltage : Adapter(AC240V/60Hz)
Pol : Horizontal



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	53.28	-8.46	33.15	24.69	40.00	-15.31	Peak	400	360	P
2	104.69	-13.24	46.65	33.41	43.50	-10.09	Peak	400	360	P
3	146.40	-9.23	48.71	39.48	43.50	-4.02	Peak	400	360	P
4	237.58	-10.15	44.28	34.13	46.00	-11.87	Peak	400	360	P
5	402.48	-5.48	36.47	30.99	46.00	-15.01	Peak	400	360	P
6	408.30	-5.28	35.99	30.71	46.00	-15.29	Peak	400	360	P

Note: Level=Reading+Factor

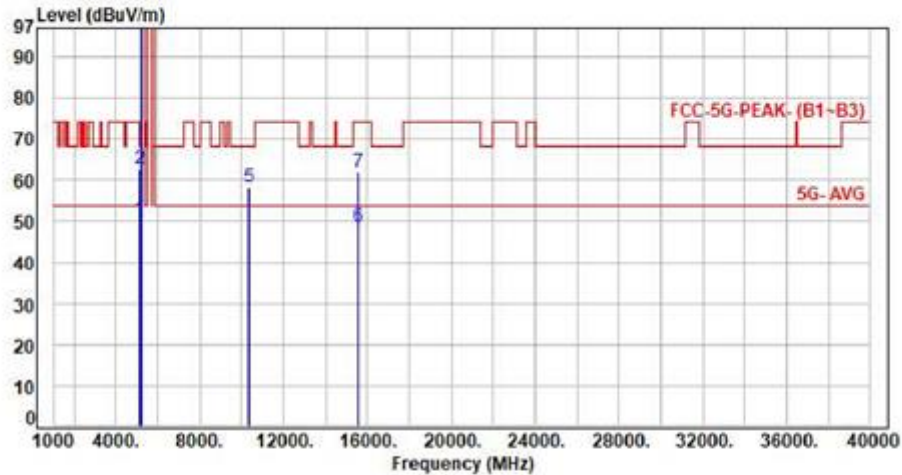
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



6.6. Test Result and Data (1GHz ~ 40GHz)

Test Mode : 2TX 11a CH36 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.95	50.65	54.00	-3.35	Average	322	117	P
2	5150.00	6.70	56.18	62.88	74.00	-11.12	Peak	322	117	P
3	5180.00	6.85	93.62	100.47	200.00	-99.53	Average	322	117	P
4	5180.00	6.85	103.74	110.59	200.00	-89.41	Peak	322	117	P
5	10360.00	14.69	43.73	58.42	68.20	-9.78	Peak	100	157	P
6	15540.00	18.37	30.35	48.72	54.00	-5.28	Average	100	157	P
7	15540.00	18.37	43.45	61.82	74.00	-12.18	Peak	100	157	P

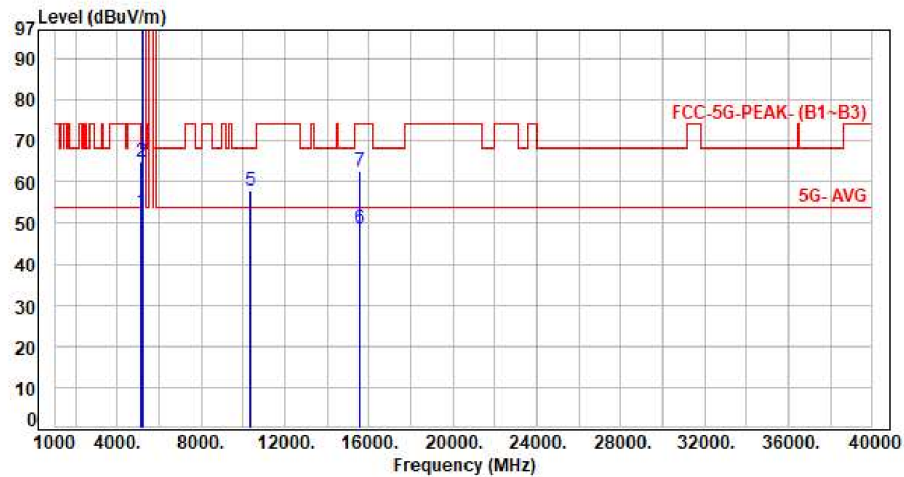
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Test Mode : 2TX 11a CH36 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

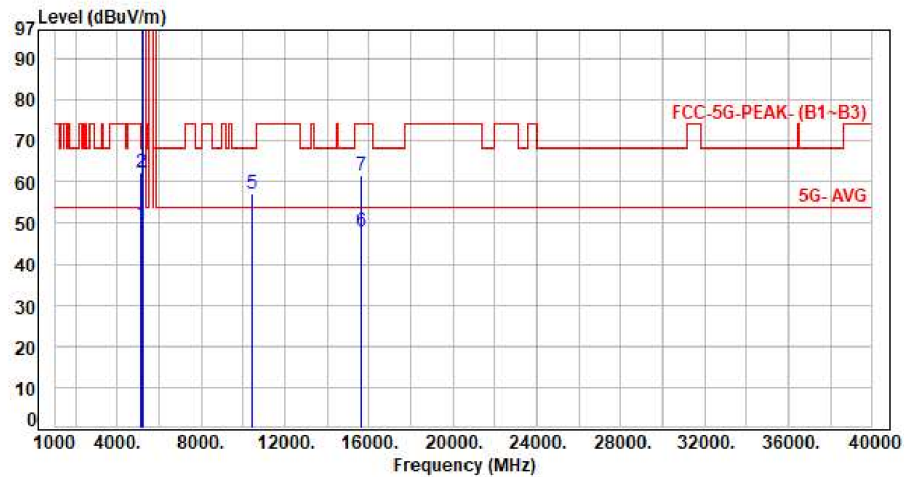


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	46.13	52.83	54.00	-1.17	Average	111	135	P
2	5150.00	6.70	58.24	64.94	74.00	-9.06	Peak	111	135	P
3	5180.00	6.85	98.88	105.73	200.00	-94.27	Average	111	135	P
4	5180.00	6.85	108.55	115.40	200.00	-84.60	Peak	111	135	P
5	10360.00	14.69	43.35	58.04	68.20	-10.16	Peak	100	152	P
6	15540.00	18.37	30.17	48.54	54.00	-5.46	Average	100	163	P
7	15540.00	18.37	44.40	62.77	74.00	-11.23	Peak	100	163	P

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



Test Mode : 2TX 11a CH40 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical

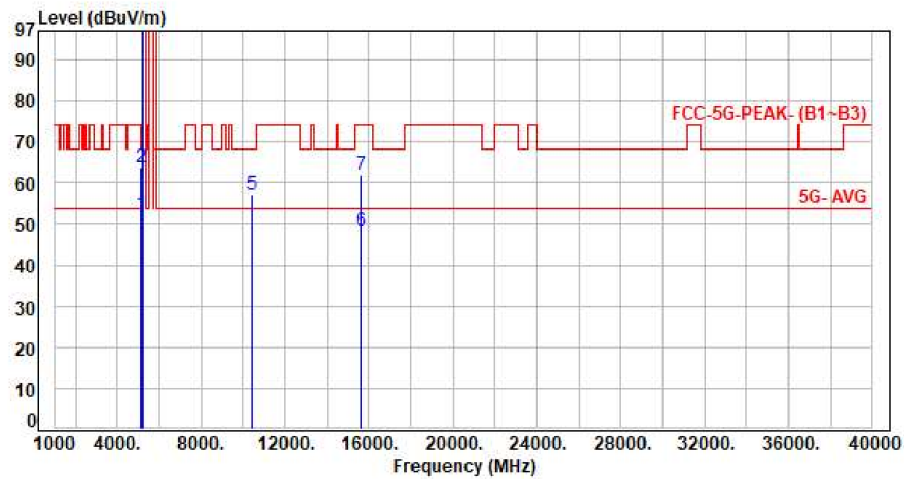


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.10	49.80	54.00	-4.20	Average	400	308	P
2	5150.00	6.70	55.62	62.32	74.00	-11.68	Peak	400	308	P
3	5200.00	6.95	92.17	99.12	200.00	-100.88	Average	400	308	P
4	5200.00	6.95	101.67	108.62	200.00	-91.38	Peak	400	308	P
5	10400.00	14.61	42.55	57.16	68.20	-11.04	Peak	100	152	P
6	15600.00	18.32	29.67	47.99	54.00	-6.01	Average	100	162	P
7	15600.00	18.32	43.19	61.51	74.00	-12.49	Peak	100	162	P

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



Test Mode : 2TX 11a CH40 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

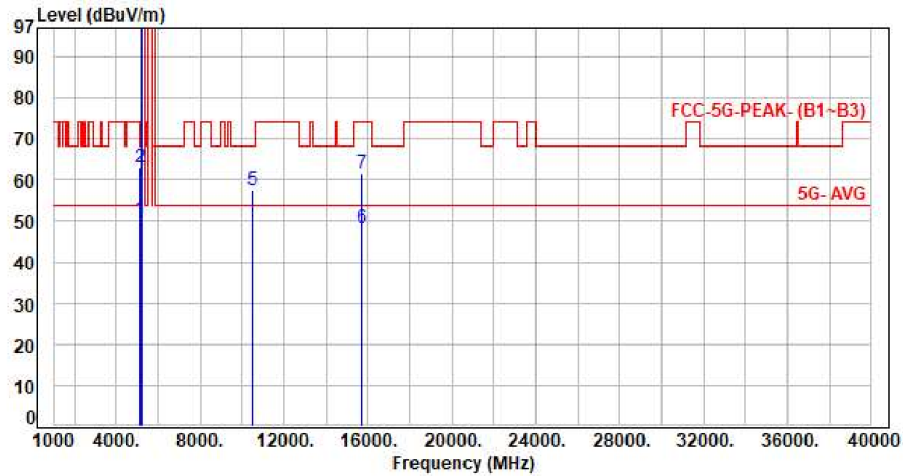


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	45.58	52.28	54.00	-1.72	Average	112	130	P
2	5150.00	6.70	57.07	63.77	74.00	-10.23	Peak	112	130	P
3	5200.00	6.95	98.13	105.08	200.00	-94.92	Average	112	130	P
4	5200.00	6.95	107.98	114.93	200.00	-85.07	Peak	112	130	P
5	10400.00	14.61	42.62	57.23	68.20	-10.97	Peak	100	156	P
6	15600.00	18.32	29.88	48.20	54.00	-5.80	Average	100	256	P
7	15600.00	18.32	43.57	61.89	74.00	-12.11	Peak	100	256	P

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



Test Mode : 2TX 11a CH48 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical

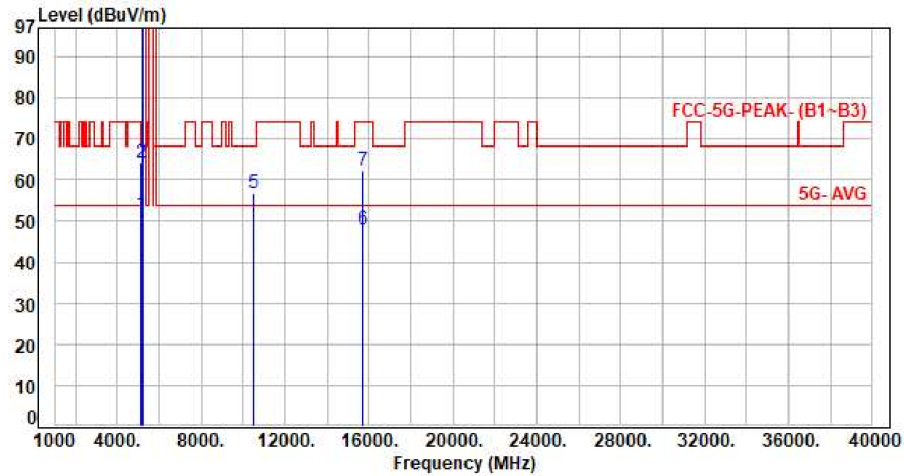


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.73	50.43	54.00	-3.57	Average	307	80	P
2	5150.00	6.70	56.37	63.07	74.00	-10.93	Peak	307	80	P
3	5240.00	7.00	94.65	101.65	200.00	-98.35	Average	307	80	P
4	5240.00	7.00	104.20	111.20	200.00	-88.80	Peak	307	80	P
5	10480.00	14.74	42.94	57.68	68.20	-10.52	Peak	100	153	P
6	15720.00	17.93	30.21	48.14	54.00	-5.86	Average	100	114	P
7	15720.00	17.93	43.62	61.55	74.00	-12.45	Peak	100	114	P

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



Test Mode : 2TX 11a CH48 6Mbps
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

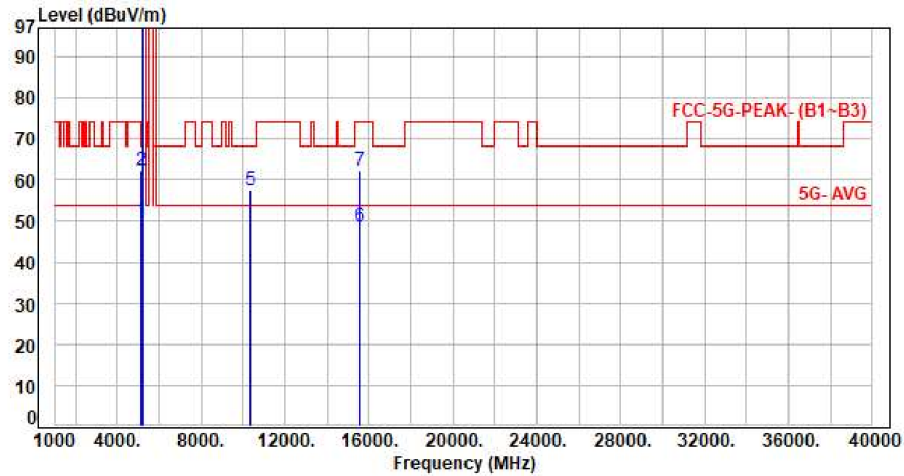


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	44.86	51.56	54.00	-2.44	Average	115	135	P
2	5150.00	6.70	57.62	64.32	74.00	-9.68	Peak	115	135	P
3	5240.00	7.00	98.93	105.93	200.00	-94.07	Average	115	135	P
4	5240.00	7.00	108.06	115.06	200.00	-84.94	Peak	115	135	P
5	10480.00	14.74	42.22	56.96	68.20	-11.24	Peak	100	164	P
6	15720.00	17.93	30.13	48.06	54.00	-5.94	Average	100	152	P
7	15720.00	17.93	44.35	62.28	74.00	-11.72	Peak	100	152	P

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



Test Mode : 2TX 11ac20 CH36 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical

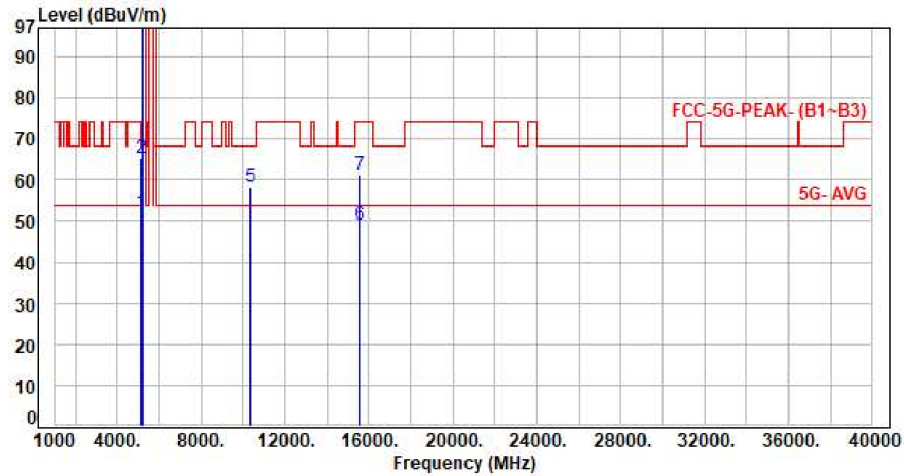


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.52	50.22	54.00	-3.78	Average	388	278	P
2	5150.00	6.70	55.67	62.37	74.00	-11.63	Peak	388	278	P
3	5180.00	6.85	92.23	99.08	200.00	-100.92	Average	388	278	P
4	5180.00	6.85	101.55	108.40	200.00	-91.60	Peak	388	278	P
5	10360.00	14.69	42.96	57.65	68.20	-10.55	Peak	100	112	P
6	15540.00	18.37	30.30	48.67	54.00	-5.33	Average	100	251	P
7	15540.00	18.37	43.97	62.34	74.00	-11.66	Peak	100	251	P

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



Test Mode : 2TX 11ac20 CH36 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

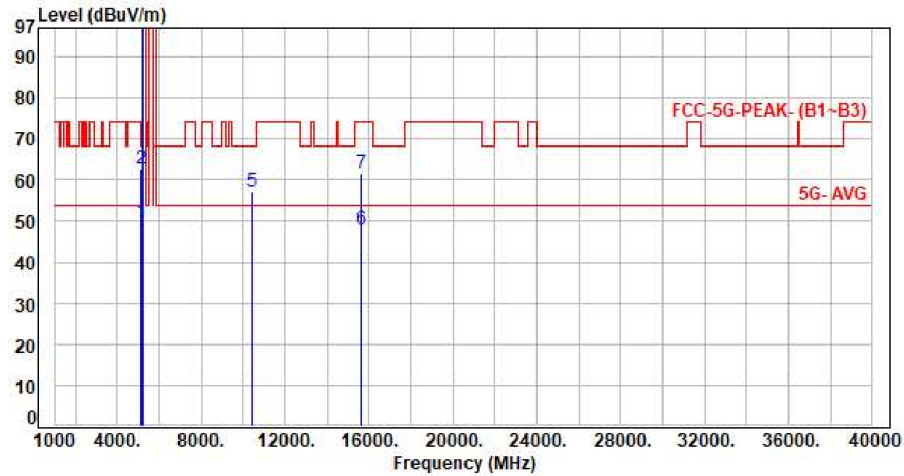


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	45.48	52.18	54.00	-1.82	Average	111	140	P
2	5150.00	6.70	58.55	65.25	74.00	-8.75	Peak	111	140	P
3	5180.00	6.85	97.21	104.06	200.00	-95.94	Average	111	140	P
4	5180.00	6.85	107.27	114.12	200.00	-85.88	Peak	111	140	P
5	10360.00	14.69	43.55	58.24	68.20	-9.96	Peak	100	135	P
6	15540.00	18.37	30.62	48.99	54.00	-5.01	Average	100	135	P
7	15540.00	18.37	42.96	61.33	74.00	-12.67	Peak	100	135	P

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



Test Mode : 2TX 11ac20 CH40 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical

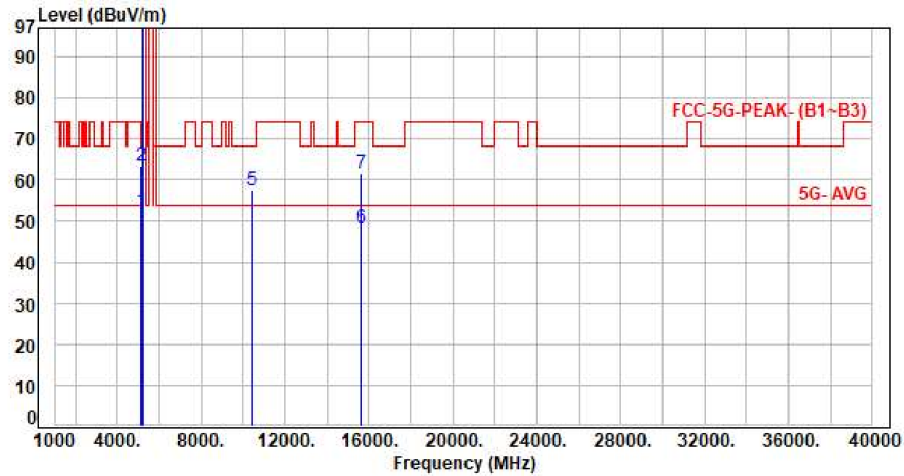


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.05	49.75	54.00	-4.25	Average	100	144	P
2	5150.00	6.70	56.13	62.83	74.00	-11.17	Peak	100	144	P
3	5200.00	6.95	91.22	98.17	200.00	-101.83	Average	100	144	P
4	5200.00	6.95	101.09	108.04	200.00	-91.96	Peak	100	144	P
5	10400.00	14.61	42.55	57.16	68.20	-11.04	Peak	100	115	P
6	15600.00	18.32	29.68	48.00	54.00	-6.00	Average	100	235	P
7	15600.00	18.32	43.20	61.52	74.00	-12.48	Peak	100	235	P

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



Test Mode : 2TX 11ac20 CH40 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

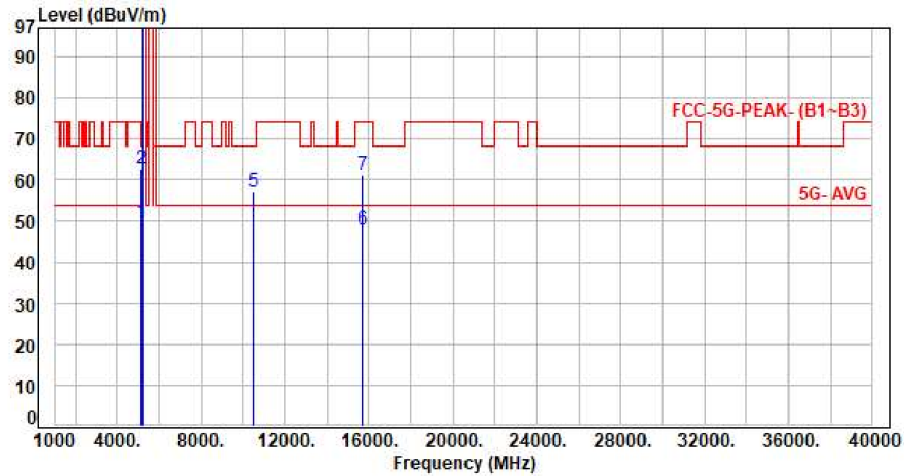


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	45.71	52.41	54.00	-1.59	Average	114	134	P
2	5150.00	6.70	56.87	63.57	74.00	-10.43	Peak	114	134	P
3	5200.00	6.95	96.95	103.90	200.00	-96.10	Average	114	134	P
4	5200.00	6.95	107.44	114.39	200.00	-85.61	Peak	114	134	P
5	10400.00	14.61	42.89	57.50	68.20	-10.70	Peak	100	195	P
6	15600.00	18.32	29.88	48.20	54.00	-5.80	Average	100	153	P
7	15600.00	18.32	43.40	61.72	74.00	-12.28	Peak	100	153	P

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



Test Mode : 2TX 11ac20 CH48 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical

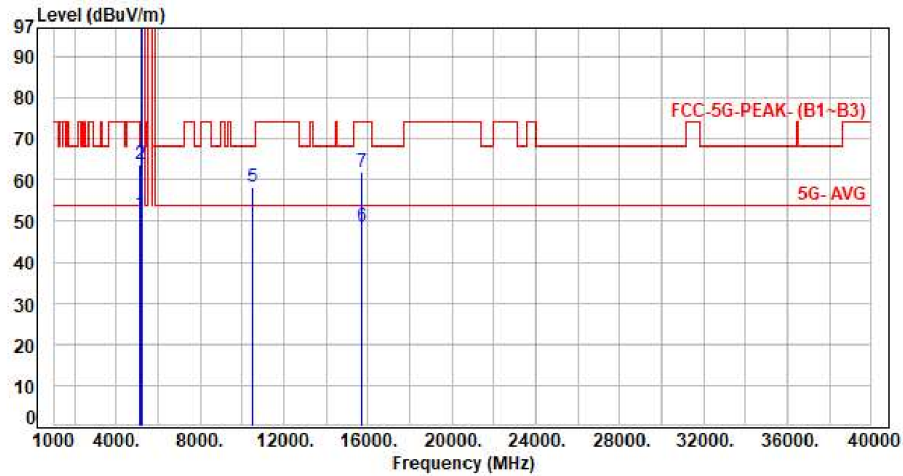


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.08	49.78	54.00	-4.22	Average	100	128	P
2	5150.00	6.70	56.04	62.74	74.00	-11.26	Peak	100	128	P
3	5240.00	7.00	92.67	99.67	200.00	-100.33	Average	100	128	P
4	5240.00	7.00	102.35	109.35	200.00	-90.65	Peak	100	128	P
5	10480.00	14.74	42.42	57.16	68.20	-11.04	Peak	100	118	P
6	15720.00	17.93	30.18	48.11	54.00	-5.89	Average	100	320	P
7	15720.00	17.93	43.27	61.20	74.00	-12.80	Peak	100	320	P

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



Test Mode : 2TX 11ac20 CH48 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Horizontal

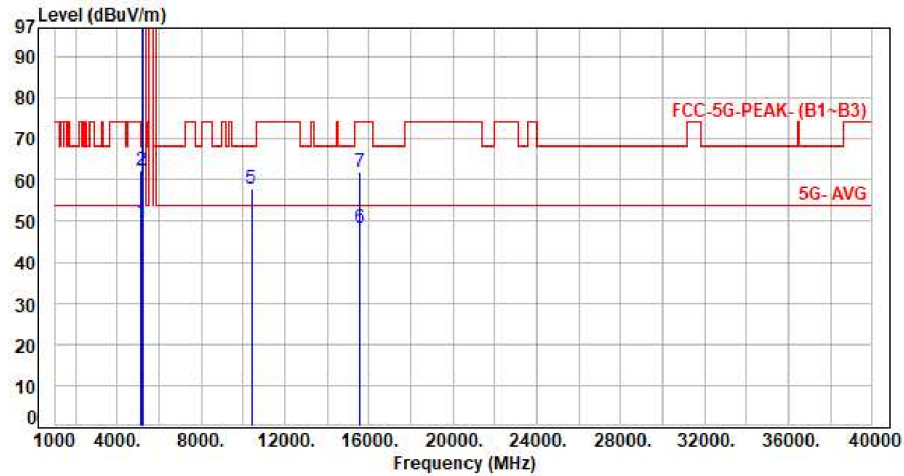


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	44.79	51.49	54.00	-2.51	Average	114	132	P
2	5150.00	6.70	57.20	63.90	74.00	-10.10	Peak	114	132	P
3	5240.00	7.00	97.34	104.34	200.00	-95.66	Average	114	132	P
4	5240.00	7.00	107.65	114.65	200.00	-85.35	Peak	114	132	P
5	10480.00	14.74	43.46	58.20	68.20	-10.00	Peak	100	164	P
6	15720.00	17.93	30.74	48.67	54.00	-5.33	Average	100	116	P
7	15720.00	17.93	44.10	62.03	74.00	-11.97	Peak	100	116	P

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



Test Mode : 2TX 11ac40 CH38 NSS1 MCS0
Voltage : From Adapter(AC120V/60Hz)
Pol : Vertical



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	5150.00	6.70	43.22	49.92	54.00	-4.08	Average	100	129	P
2	5150.00	6.70	55.69	62.39	74.00	-11.61	Peak	100	129	P
3	5190.00	6.90	88.86	95.76	200.00	-104.24	Average	100	129	P
4	5190.00	6.90	98.88	105.78	200.00	-94.22	Peak	100	129	P
5	10380.00	14.66	43.35	58.01	68.20	-10.19	Peak	100	220	P
6	15570.00	18.33	29.87	48.20	54.00	-5.80	Average	100	145	P
7	15570.00	18.33	43.74	62.07	74.00	-11.93	Peak	100	145	P

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