FCC RADIO TEST REPORT

Applicant	:	COMTREND CORPORATION
Address	:	3F-1, No. 10, Lane 609, Chung Hsin Road, Section 5, SanChung District, New Taipei City, Taiwan 241
Equipment	:	Home Gateway
Model No.	:	VR-3053
Trade Name	:	COMTREND
FCC ID	:	L9VVR3053

I HEREBY CERTIFY THAT :

The sample was received on Apr. 16, 2019 and the testing was completed on May. 11, 2019 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

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History of this test report

Report No.	Issue Date	Description
TEFU1901103	May. 13, 2019	Original

1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.4:2014

ANSI C63.10:2013

FCC Rule	. Description of Test	Result
15.203	. CO-LOCATION	PASS

*The principle of judgment is made according to the laboratory's reporting control and measurement uncertainty standard procedures.

*This EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report(TEFD1901103).

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Model No.	VR-3053
Brand Name	COMTREND
Product Description	Please refer to User's Manual.
Connecting I/O Port(s)	Please refer to User's Manual.
AC ADAPTER	Adapter Brand: AMIGO Model No.: AMS115-1202000FU I/P: AC 100-240V~, 50-60Hz, 0.8A MAX. ; O/P: DC 12V, 2.0A
Frequency Range	802.11b/g/n: 2400MHz-2483.5MHz 802.11a/n/ac: 5150MHz-5250MHz,5725MHz-5850MHz
Modulation Type	OFDM, DSSS
Data Rate	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, VHT20/40 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	PCB Antenna
Antenna Gain	2400MHz-2483.5MHz: ANT A: 3.90 dBi ; ANT B: 3.58 dBi 5150MHz-5250MHz: ANT A: 3.53 dBi ; ANT B: 3.41 dBi 5725MHz-5850MHz: ANT A: 3.32 dBi ; ANT B: 3.59 dBi

2.2 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
b. The complete test system included Notebook and EUT for RF test.
c. An executive program, ” Lantiq DUT v1.1”under win7 was executed to transmit and receive data via Bluetooth.
d. The following test modes were performed for the test:
Test Mode 1.802.11n HT40 CH6 + 802.11ac VHT80 CH155

2.3 Description of Test System

RF Conducted						
Equipment	**Brand**	**Model**	**Serial No**	**Inspection mark**	**Length/Type**	**Power cord/Length/Type**
Notebook	ASUS	P2430U	GBNXCV13M066465	R31018	N/A	Adapter / 1.8m / NS
Network cable	N/A	N/A		N/A	1.2m / NS	N/A

Radiated Emissions						
Equipment	**Brand**	**Model**	**Serial No**	**Inspection mark**	**Length/Type**	**Power cord/Length/Type**
Notebook	ASUS	P2430U	GBNXCV13M066465	R31018	N/A	Adapter / 1.8m / NS
Network cable	N/A	N/A		N/A	1.2m / NS	N/A

AC Power Line Conducted Emission						
Equipment	**Brand**	**Model**	**Serial No**	**Inspection mark**	**Length/Type**	**Power cord/Length/Type**
Notebook	ASUS	P2430U	GBNXCV13M066465	R31018	N/A	Adapter / 1.8m / NS
Network cable	N/A	N/A		N/A	15m / NS	N/A

2.4 General Information of Test

Test Site	**Cerpass 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 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582	
	FCC	TW1079, TW1061,TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4399, 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	Tested Date	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2019/05/11	23℃ / 60%	Nick Guan
Radiated Emissions	3M02-NK	2019/05/06	22℃ / 50%	Spree Yeh
RF Conduction	CON02-NK	2019/05/04	22℃ / 47%	Spree Yeh

2.5 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated Spurious Emission(9KHz~30MHz)	±3.405dB
Radiated Spurious Emission(30MHz~1GHz)	±5.326dB
Radiated Spurious Emission(1GHz~40GHz)	±5.011dB
6dB Bandwidth	±4.407%
26dB Bandwidth	±4.459%
Occupied Bandwidth	±4.403%
Peak Output Power(Conducted Power Meter)	±1.31dB
Power Spectral Density	±2.106dB
Duty Cycle	±0.17%
Frequency Stability	±156.543Hz
Temperature	±1.2°C
Humidity	±2.7%

3. Test Equipment and Ancillaries Used for Tests

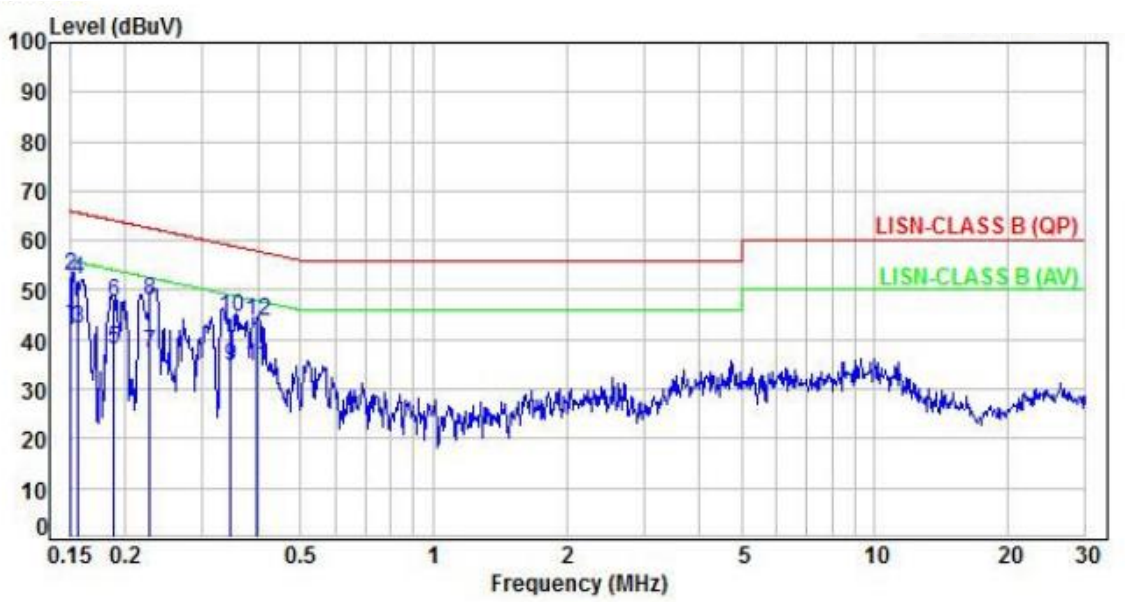
Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	**Manufacturer**	**Model No**	**Serial No**	**Calibration Date**	**Valid Date**
Bilog Antenna	Schwarzbeck	VULB9168	275	2018/09/17	2019/09/16
Active Loop Antenna	EMCO	6507	40855	2018/05/22	2019/05/21
Horn Antenna	EMCO	3115	31589	2019/04/01	2020/03/31
Horn Anrenna	EMCO	3116	31974	2018/09/07	2019/09/06
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2018/06/11	2019/06/10
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100219	2018/07/03	2019/07/02
Preamplifier	EM Electronics corp.	EM330	60660	2019/03/11	2020/03/10
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2018/09/18	2019/09/17
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2019/04/07	2020/04/06
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1316	2018/09/12	2019/09/11
Cable-0.5m(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2019/04/09	2020/04/08
Cable-3m(1G-40G)	Rapidtek	40GHZ 300CM	38MS-38MS300314	2019/04/09	2020/04/08
Cable-8m(1G-40G)	Rapidtek	40GHZ 800CM	38MS-38MS800314	2019/04/10	2020/04/09
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	FSP 40	100219	2018/07/03	2019/07/02
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2019/04/07	2020/04/06
Attenuator	KEYSIGHT	8491B	MY39250705	2018/09/04	2019/09/03
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2018/08/30	2019/08/29
Power Sensor	Anritsu	MA2411B	1207295	2019/04/11	2020/04/10

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	ESCI	100821	2018/9/12	2019/09/11
Line Impedance Stabilization Network	Schwarzbeck	NSLK 8127	8127-740	2018/6/13	2019/06/12
Pulse Limiter	ROHDE & SCHWARZ	ESH3-Z2	101933	2018/9/4	2019/09/03
E3	AUDIX	v8.2014-8-6	RK-000531	NA	NA

4. Test of AC Power Line Conducted Emission

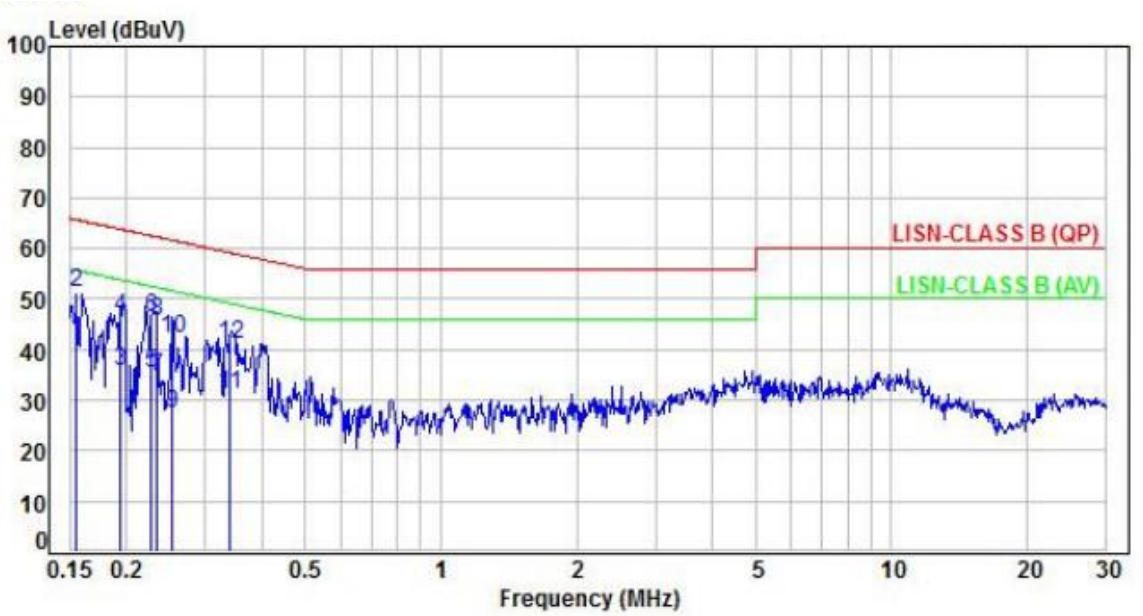
Power	:	AC 120V / 60Hz	Pol/Phase	:	LINE
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.15	9.92	32.96	42.88	56.00	-13.12	Average	P
2	0.15	9.92	43.06	52.98	66.00	-13.02	QP	P
3	0.16	9.92	32.11	42.03	55.69	-13.66	Average	P
4	0.16	9.92	42.18	52.10	65.69	-13.59	QP	P
5	0.19	9.92	28.06	37.98	54.14	-16.16	Average	P
6	0.19	9.92	37.63	47.55	64.14	-16.59	QP	P
7	0.23	9.92	27.22	37.14	52.52	-15.38	Average	P
8	0.23	9.92	37.90	47.82	62.52	-14.70	QP	P
9	0.35	9.94	24.57	34.51	49.02	-14.51	Average	P
10	0.35	9.94	34.45	44.39	59.02	-14.63	QP	P
11	0.40	9.94	24.67	34.61	47.93	-13.32	Average	P
12	0.40	9.94	33.61	43.55	57.93	-14.38	QP	P

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

Power	:	AC 120V / 60Hz	Pol/Phase	:	NEUTRAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.15	9.95	31.92	41.87	55.76	-13.89	Average	P
2	0.15	9.95	41.29	51.24	65.76	-14.52	QP	P
3	0.19	9.95	25.90	35.85	53.90	-18.05	Average	P
4	0.19	9.95	36.27	46.22	63.90	-17.68	QP	P
5	0.23	9.95	25.23	35.18	52.58	-17.40	Average	P
6	0.23	9.95	36.31	46.26	62.58	-16.32	QP	P
7	0.23	9.95	24.53	34.48	52.33	-17.85	Average	P
8	0.23	9.95	35.75	45.70	62.33	-16.63	QP	P
9	0.25	9.95	17.53	27.48	51.64	-24.16	Average	P
10	0.25	9.95	32.40	42.35	61.64	-19.29	QP	P
11	0.34	9.96	21.22	31.18	49.24	-18.06	Average	P
12	0.34	9.96	31.20	41.16	59.24	-18.08	QP	P

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

5. Test of Spurious Emission (Radiated)

5.1 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).

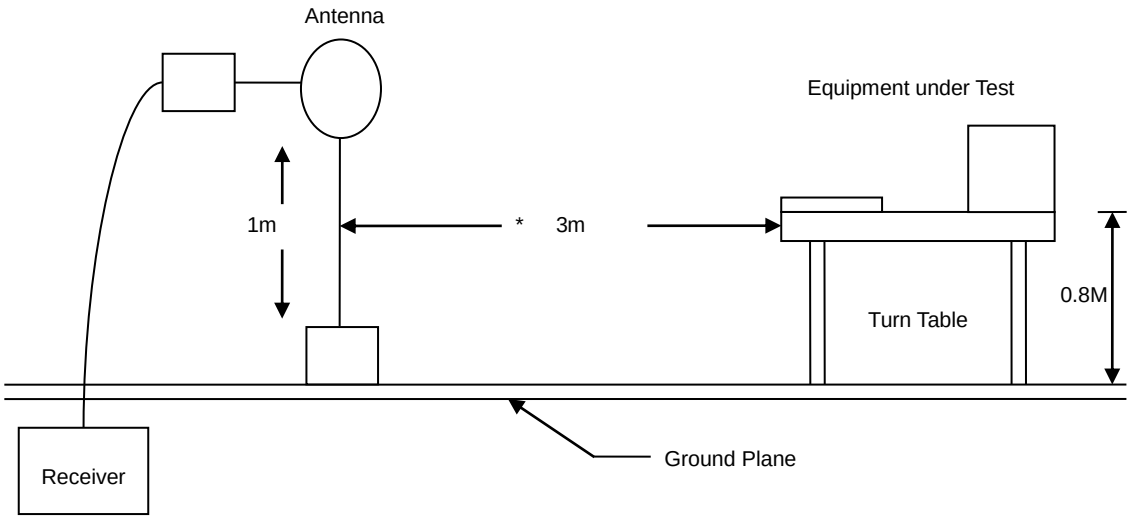
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

5.2 Test Procedures

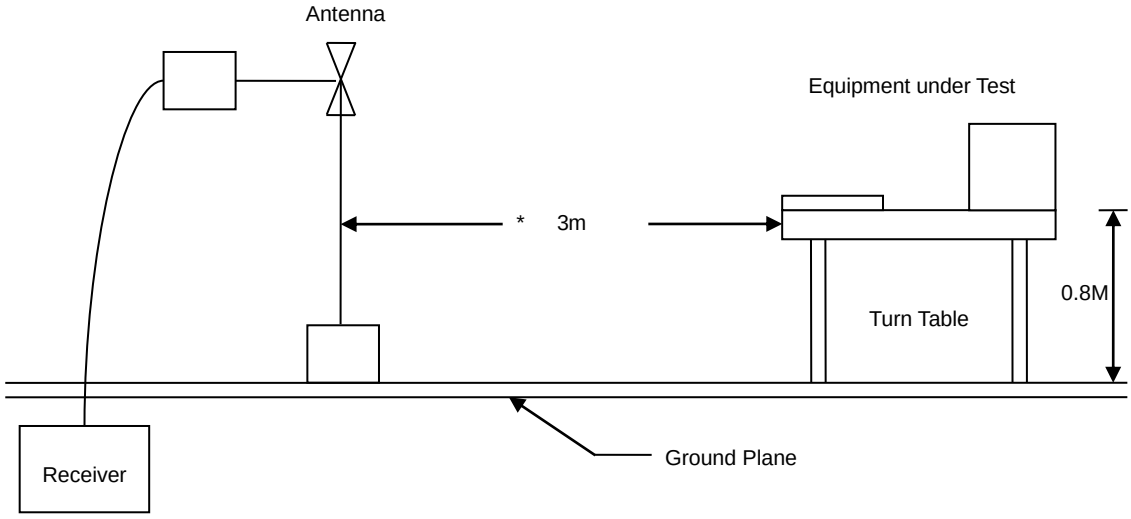
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna 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.

5.3 Typical Test Setup

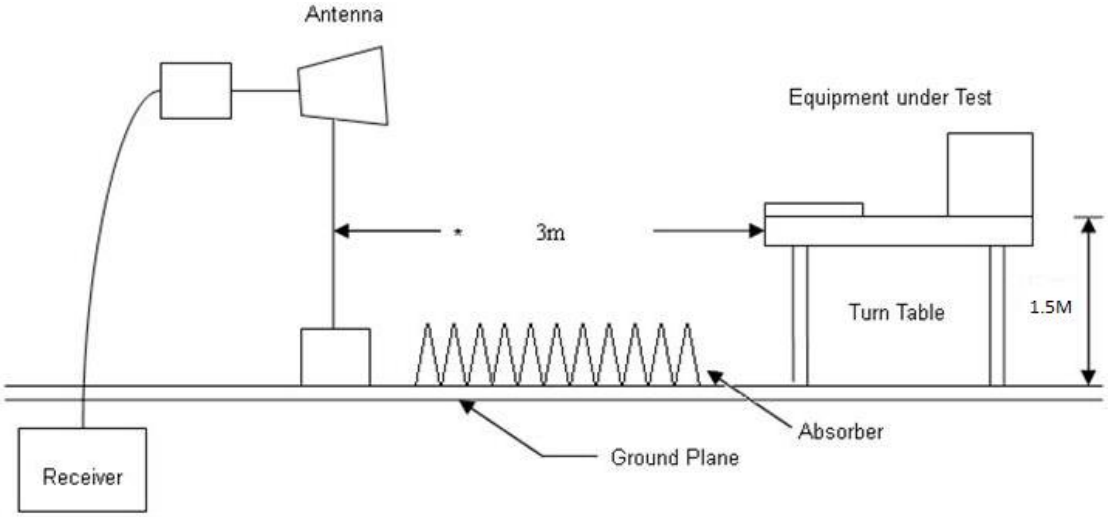
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

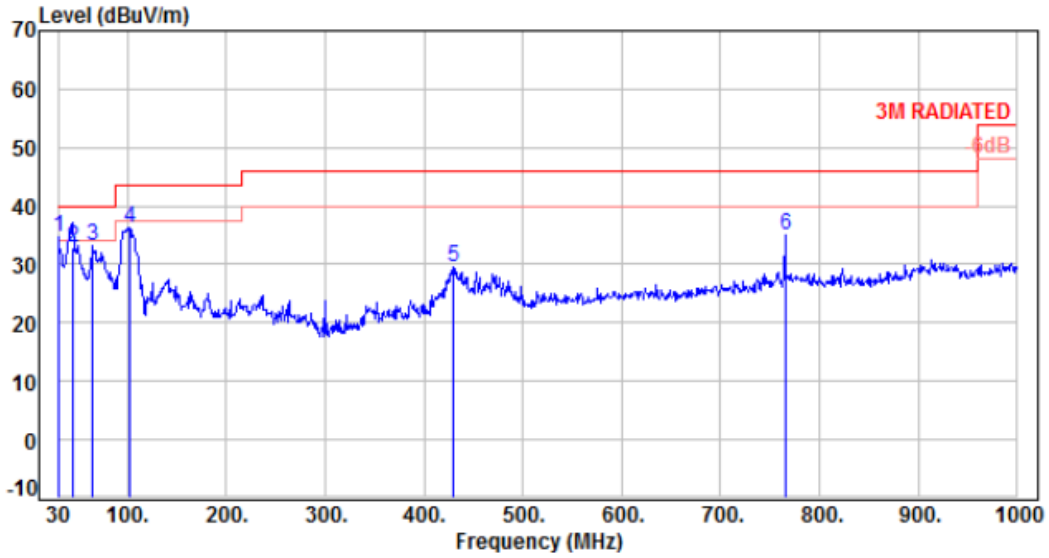


5.4 Test Result and Data (9kHz ~ 30MHz)

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

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

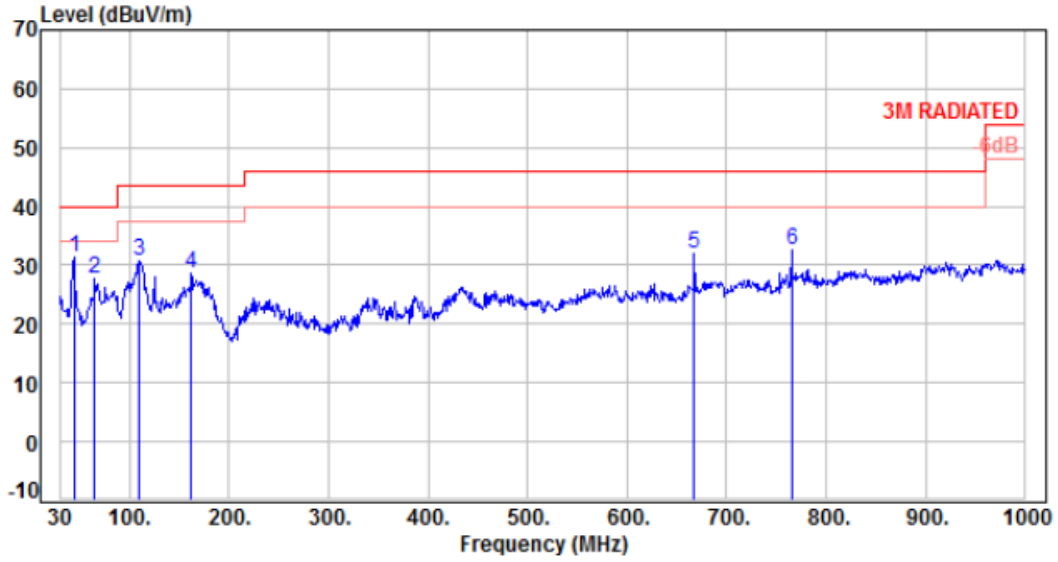
Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1		:	



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	-10.51	45.28	34.77	40.00	-5.23	Peak	400	0	P
2	44.55	-9.44	42.33	32.89	40.00	-7.11	QP	100	202	P
3	64.92	-10.73	43.89	33.16	40.00	-6.84	Peak	400	0	P
4	101.78	-14.23	50.38	36.15	43.50	-7.35	Peak	400	0	P
5	429.64	-5.26	34.70	29.44	46.00	-16.56	Peak	400	0	P
6	765.26	0.95	34.03	34.98	46.00	-11.02	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 1			:		

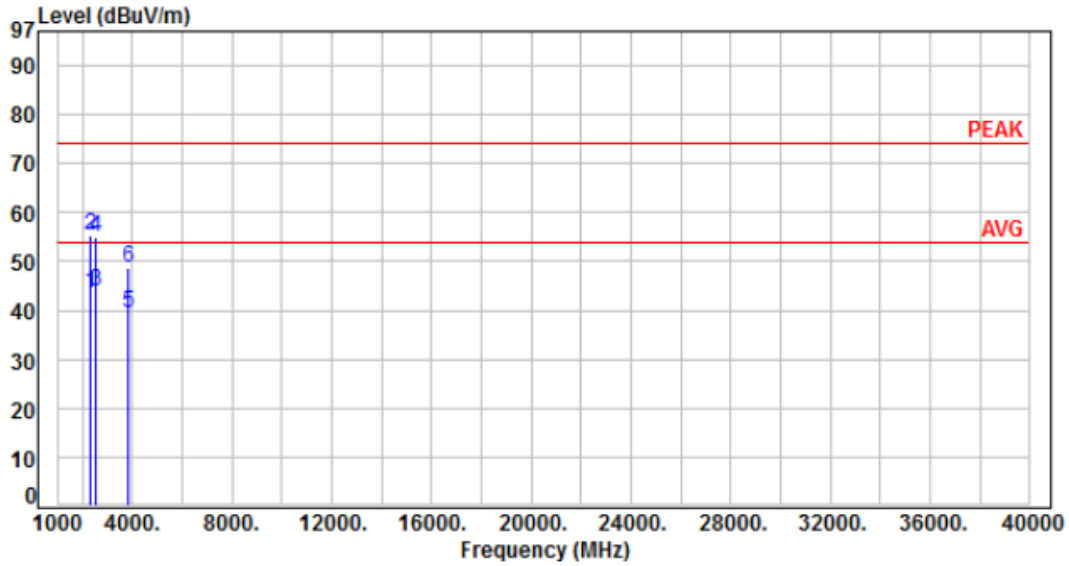


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	44.55	-9.44	40.77	31.33	40.00	-8.67	Peak	100	0	P
2	64.92	-10.73	38.42	27.69	40.00	-12.31	Peak	100	0	P
3	109.54	-12.91	43.79	30.88	43.50	-12.62	Peak	100	0	P
4	161.92	-9.33	37.96	28.63	43.50	-14.87	Peak	100	0	P
5	667.29	-0.84	32.83	31.99	46.00	-14.01	Peak	100	0	P
6	765.26	0.95	31.61	32.56	46.00	-13.44	Peak	100	0	P

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

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

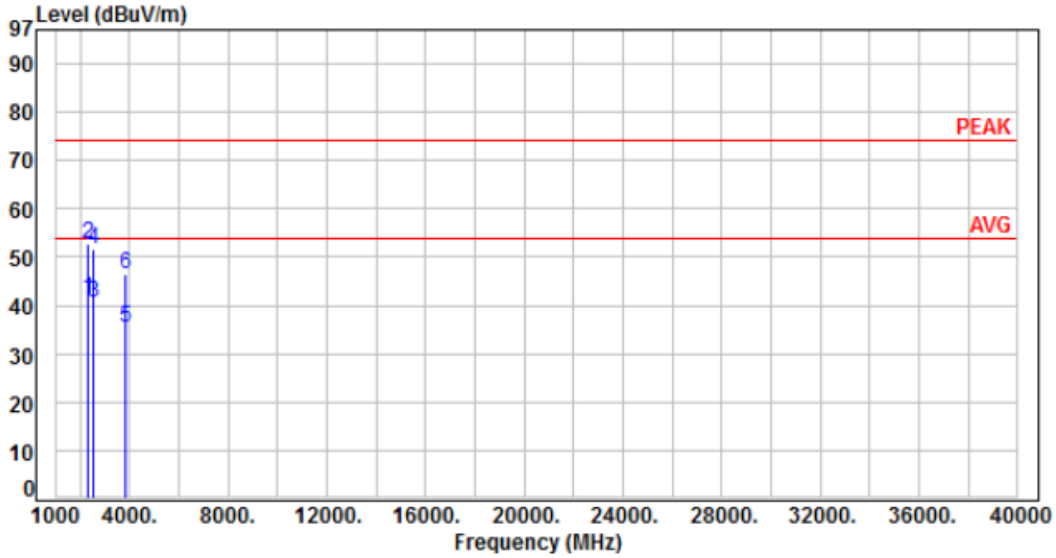
Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2326.00	-15.90	59.57	43.67	54.00	-10.33	Average	100	275	P
2	2326.00	-15.90	71.20	55.30	74.00	-18.70	Peak	100	275	P
3	2530.00	-15.17	59.04	43.87	54.00	-10.13	Average	100	270	P
4	2530.00	-15.17	70.30	55.13	74.00	-18.87	Peak	100	270	P
5	3840.00	-10.31	49.93	39.62	54.00	-14.38	Average	100	250	P
6	3840.00	-10.31	59.11	48.80	74.00	-25.20	Peak	100	250	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			:		



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2326.00	-15.90	57.29	41.39	54.00	-12.61	Average	100	260	P
2	2326.00	-15.90	68.75	52.85	74.00	-21.15	Peak	100	260	P
3	2530.00	-15.17	55.79	40.62	54.00	-13.38	Average	100	250	P
4	2530.00	-15.17	66.98	51.81	74.00	-22.19	Peak	100	250	P
5	3840.00	-10.31	45.60	35.29	54.00	-18.71	Average	100	240	P
6	3840.00	-10.31	56.87	46.56	74.00	-27.44	Peak	100	240	P

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

5.7 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