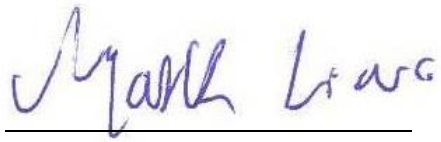
FCC RADIO TEST REPORT

Applicant	:	Ubiquiti Inc.
Address	:	685 Third Avenue, New York, New York 10017 USA
Equipment	:	UniFi PROTECT
Model No.	:	UFP-VIEWPORT
Trade Name	:	UBIQUITI
FCC ID	:	SWX-UFPVP

I HEREBY CERTIFY THAT :

The sample was received on Jul. 15, 2019 and the testing was completed on Jul. 19, 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

Contents

History of this test report

Report No.	Issue Date	Description
TEFQ1907135	Jul. 23, 2019	Original

1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.4:2014

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	N/A
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 Output Power	PASS
15.247(e)	. Power Spectral Density	PASS

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

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency Range	2400-2483.5MHz
Modulation Mode	GFSK
Modulation Technology	DTS
Data Rate	BLE: GFSK: 1Mbps GFSK: 2Mbps GFSK: 125kps GFSK: 500kps
Antenna Type	Dipole Antenna
Antenna Gain	2400-2483.5MHz: 2.2 dBi

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
***00**	**2402**	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	***19**	**2440**	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	***39**	**2480**
12	2426	26	2454	--	--
13	2428	27	2456	--	--

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 Notebook and EUT for RF test.
c. An executive program, ” QRCT V 4.0.00129” under win7 was executed to transmit and receive data via Bluetooth.
d. The following test modes were performed for the test:

Conducted Emissions from the AC mains power ports	
Test Mode	Operating Description
1	GFSK: 1Mbps
2	GFSK: 2Mbps
3	GFSK: 125kps
4	GFSK: 500kps
caused “Test Mode 1,2” generated the worst case, it was reported as the final data.	
Radiation Emissions (30MHz ~ 1GHz)	
Test Mode	Operating Description
1	GFSK: 1Mbps
2	GFSK: 2Mbps
3	GFSK: 125kps
4	GFSK: 500kps
caused “Test Mode 1,2” generated the worst case, it was reported as the final data.	
Radiation Emissions (1GHz ~ 25GHz)	
Test Mode	Operating Description
1	GFSK: 1Mbps
2	GFSK: 2Mbps
3	GFSK: 125kps
4	GFSK: 500kps
caused “Test Mode 1,2” generated the worst case, it was reported as the final data.	

2.4 Description of Test System

RF Conducted				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	DELL	Latitude E5470	N/A	Adapter / 1.8m / NS
Network cable	N/A	N/A	1.2m / NS	N/A
Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	DELL	Latitude E5470	N/A	Adapter / 1.8m / NS
Network cable	N/A	N/A	15m / NS	N/A
PoE	UBIQUITI	GP-H480-050G	N/A	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
Network cable	N/A	N/A	15m / NS	N/A
PoE	UBIQUITI	GP-H480-050G	N/A	N/A

2.5 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	
	FCC	TW1439, TW1079
	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	Tested Date	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2019/07/19	22℃ / 63%	Leon Huang
Radiated Emissions	3M02-NK	2019/07/17	26℃ / 51%	Nick Guan
AC Power Line Conducted Emission	CON01-NK	2019/07/18	25℃ / 48%	Leon Huang

2.6 Measurement Uncertainty

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

3. 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	2019/05/24	2020/05/23
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	2019/05/14	2020/05/13
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100047	2019/03/28	2020/03/27
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	100047	2019/03/28	2020/03/27
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	2018/09/12	2019/09/11
Line Impedance Stabilization Network	Schwarzbeck	NSLK 8127	8127-740	2019/05/22	2020/05/21
Pulse Limiter	ROHDE & SCHWARZ	ESH3-Z2	101933	2018/09/04	2019/09/03
Cable-6m(9k~300M)	NA	CFD300-NL	NA	2019/03/28	2020/03/27
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 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Antenna Construction and Directional Gain

Antenna Type	Dipole Antenna
Antenna Gain	2.2 dBi

5. Test of AC Power Line Conducted Emission

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

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.

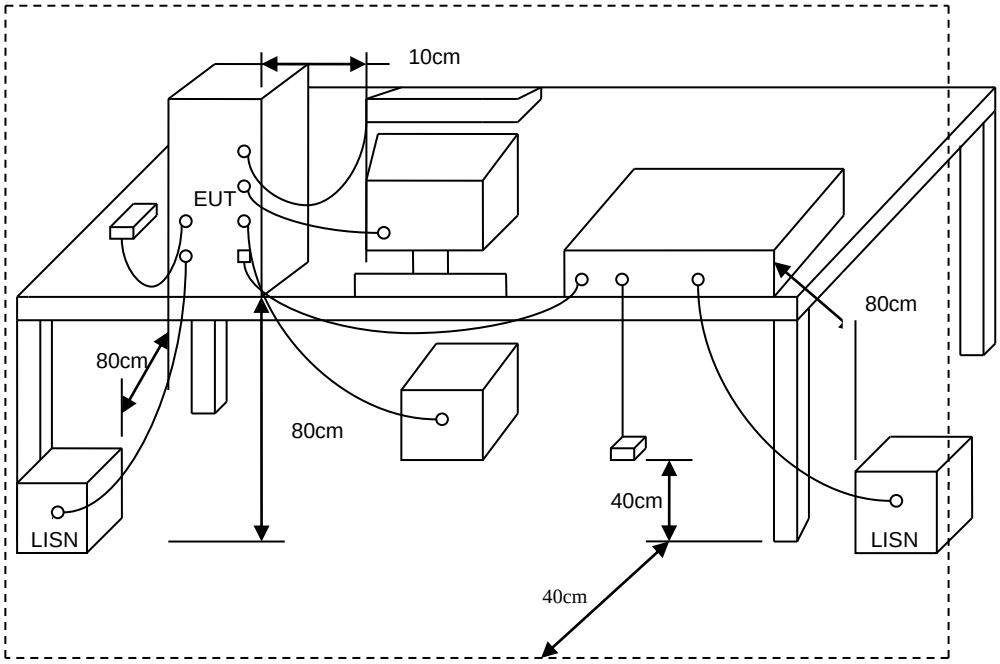
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.2 Test Procedures

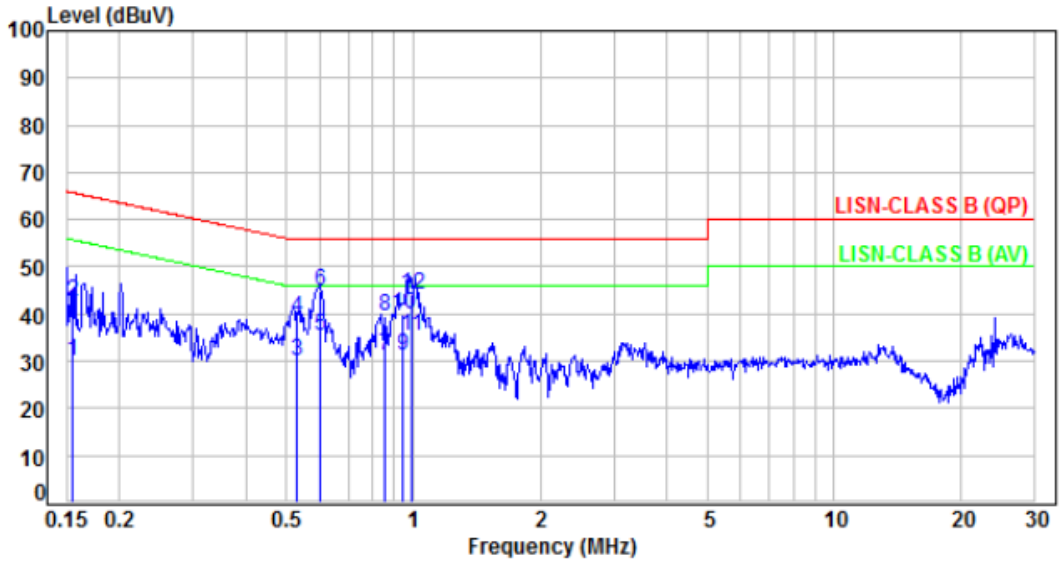
a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
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

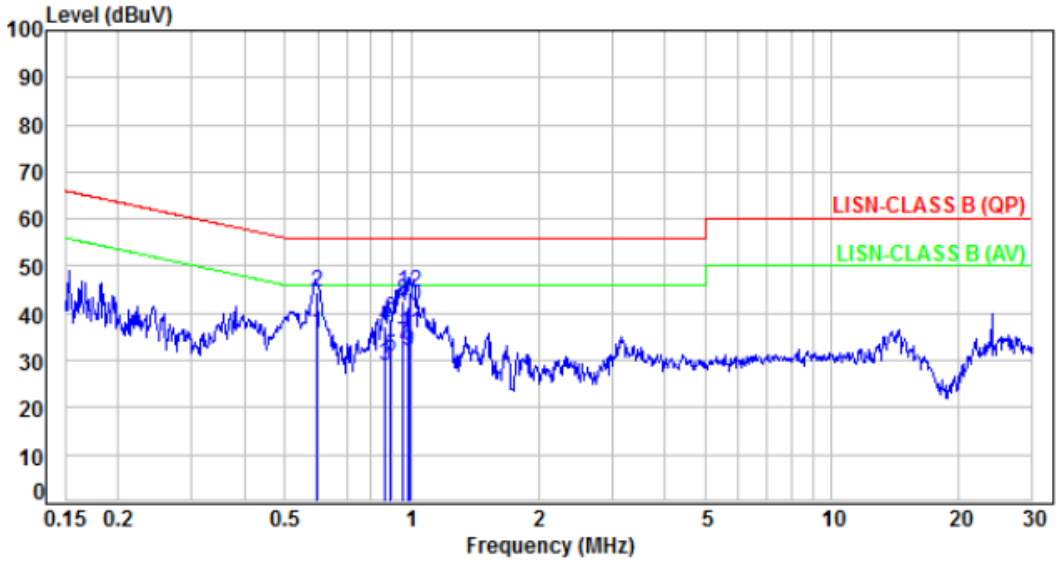
Power	:	AC 120V / 60Hz	Pol/Phase	:	LINE
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.15	9.94	20.03	29.97	55.75	-25.78	Average	P
2	0.15	9.94	32.57	42.51	65.75	-23.24	QP	P
3	0.53	9.97	19.98	29.95	46.00	-16.05	Average	P
4	0.53	9.97	29.04	39.01	56.00	-16.99	QP	P
5	0.60	9.98	25.43	35.41	46.00	-10.59	Average	P
6	0.60	9.98	34.86	44.84	56.00	-11.16	QP	P
7	0.86	10.00	21.24	31.24	46.00	-14.76	Average	P
8	0.86	10.00	29.43	39.43	56.00	-16.57	QP	P
9	0.94	10.01	21.06	31.07	46.00	-14.93	Average	P
10	0.94	10.01	29.91	39.92	56.00	-16.08	QP	P
11	0.99	10.01	25.33	35.34	46.00	-10.66	Average	P
12	0.99	10.01	33.95	43.96	56.00	-12.04	QP	P

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

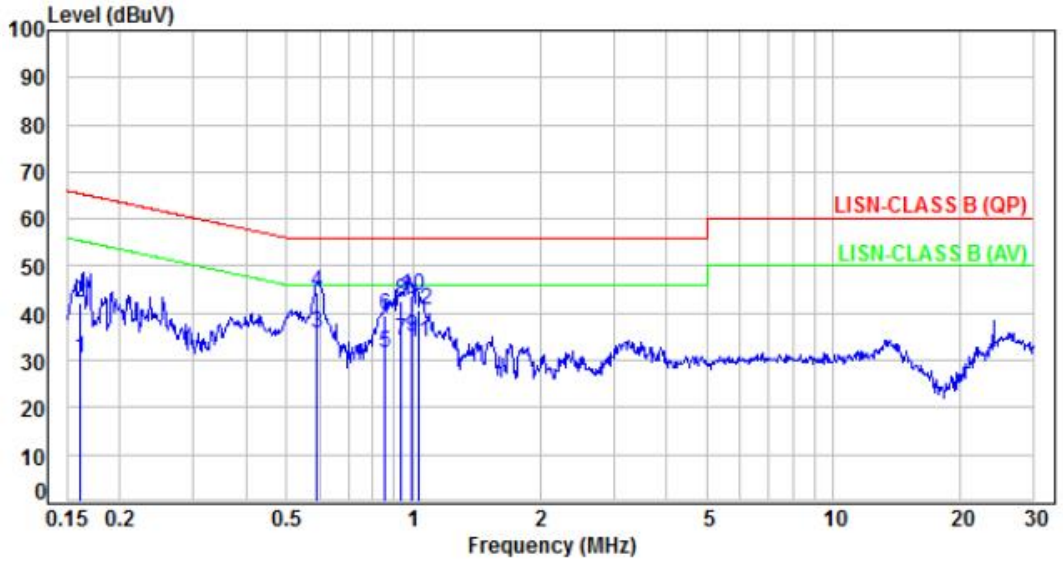
Power	:	AC 120V / 60Hz	Pol/Phase	:	NEUTRAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.59	9.96	25.66	35.62	46.00	-10.38	Average	P
2	0.59	9.96	34.66	44.62	56.00	-11.38	QP	P
3	0.86	9.98	18.95	28.93	46.00	-17.07	Average	P
4	0.86	9.98	27.21	37.19	56.00	-18.81	QP	P
5	0.89	9.98	20.71	30.69	46.00	-15.31	Average	P
6	0.89	9.98	28.92	38.90	56.00	-17.10	QP	P
7	0.95	9.99	23.33	33.32	46.00	-12.68	Average	P
8	0.95	9.99	32.49	42.48	56.00	-13.52	QP	P
9	0.98	9.99	21.87	31.86	46.00	-14.14	Average	P
10	0.98	9.99	31.47	41.46	56.00	-14.54	QP	P
11	0.99	9.99	25.77	35.76	46.00	-10.24	Average	P
12	0.99	9.99	34.33	44.32	56.00	-11.68	QP	P

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

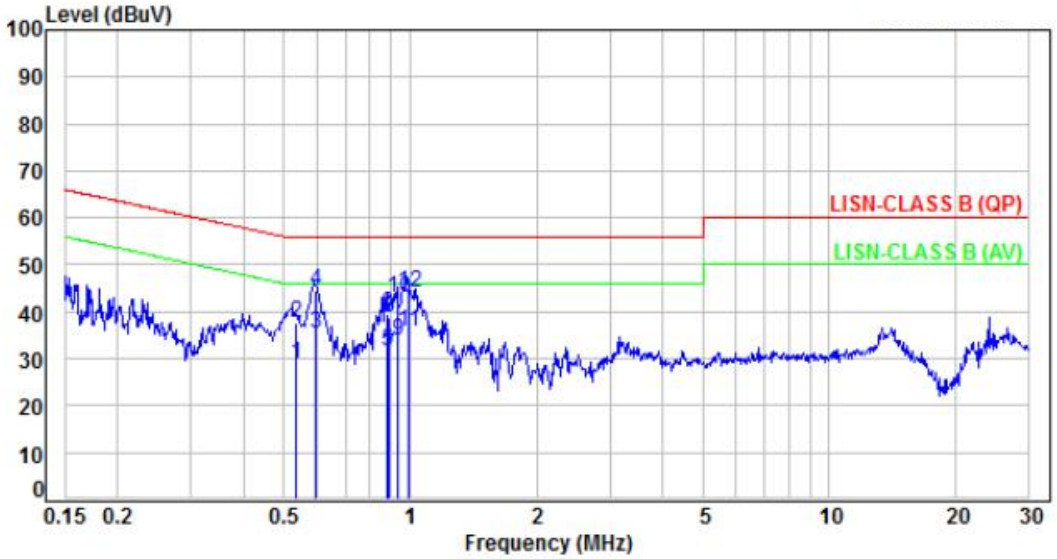
Power	:	AC 120V / 60Hz	Pol/Phase	:	LINE
Test Mode	:	Mode 2		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.16	9.94	20.49	30.43	55.41	-24.98	Average	P
2	0.16	9.94	32.08	42.02	65.41	-23.39	QP	P
3	0.59	9.98	25.90	35.88	46.00	-10.12	Average	P
4	0.59	9.98	34.53	44.51	56.00	-11.49	QP	P
5	0.86	10.00	21.43	31.43	46.00	-14.57	Average	P
6	0.86	10.00	29.38	39.38	56.00	-16.62	QP	P
7	0.93	10.01	24.09	34.10	46.00	-11.90	Average	P
8	0.93	10.01	32.69	42.70	56.00	-13.30	QP	P
9	0.99	10.01	24.99	35.00	46.00	-11.00	Average	P
10	0.99	10.01	33.86	43.87	56.00	-12.13	QP	P
11	1.03	10.01	23.71	33.72	46.00	-12.28	Average	P
12	1.03	10.01	30.60	40.61	56.00	-15.39	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 2		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.53	9.95	18.90	28.85	46.00	-17.15	Average	P
2	0.53	9.95	27.59	37.54	56.00	-18.46	QP	P
3	0.59	9.96	25.41	35.37	46.00	-10.63	Average	P
4	0.59	9.96	34.40	44.36	56.00	-11.64	QP	P
5	0.88	9.98	21.68	31.66	46.00	-14.34	Average	P
6	0.88	9.98	29.50	39.48	56.00	-16.52	QP	P
7	0.89	9.98	20.75	30.73	46.00	-15.27	Average	P
8	0.89	9.98	28.89	38.87	56.00	-17.13	QP	P
9	0.93	9.99	24.03	34.02	46.00	-11.98	Average	P
10	0.93	9.99	32.81	42.80	56.00	-13.20	QP	P
11	0.99	9.99	25.66	35.65	46.00	-10.35	Average	P
12	0.99	9.99	34.30	44.29	56.00	-11.71	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

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).

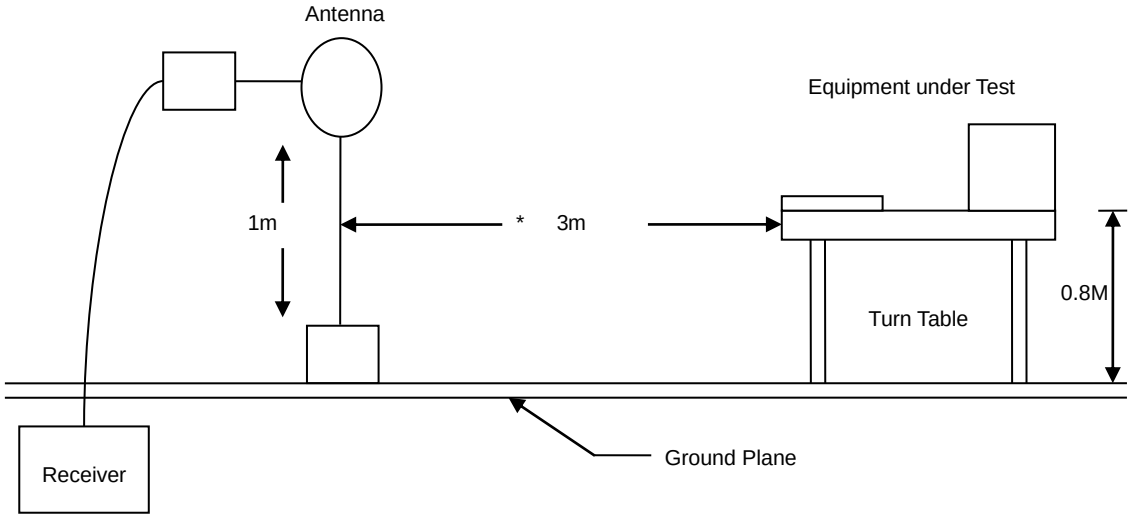
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

6.2 Test Procedures

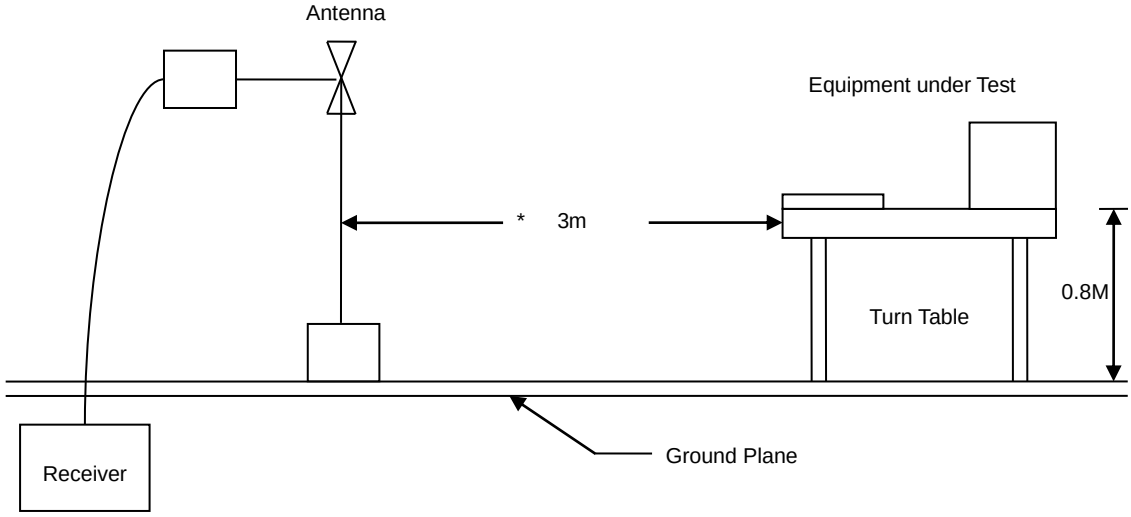
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna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

6.3 Typical Test Setup

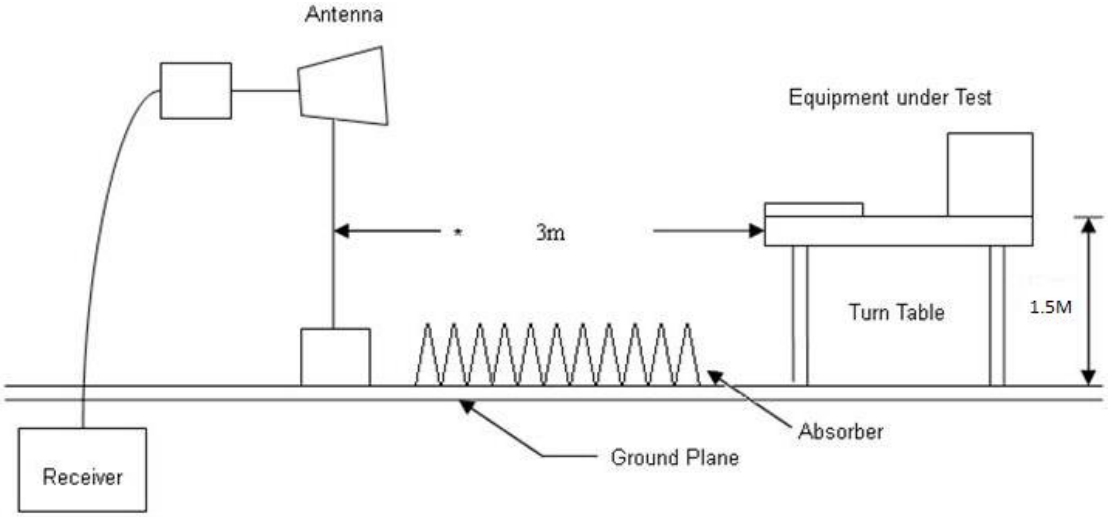
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

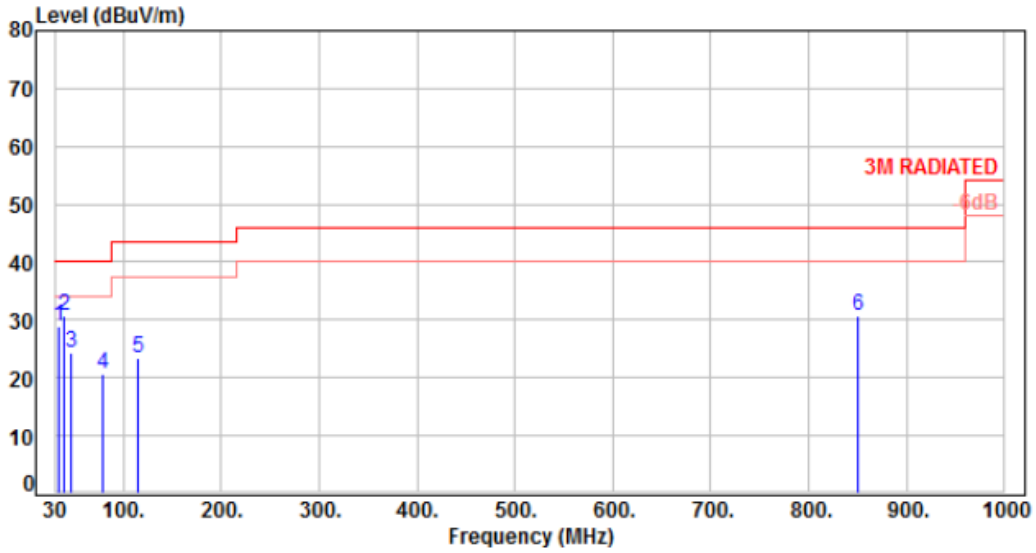


6.4 Test Result and Data (9kHz ~ 30MHz)

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

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

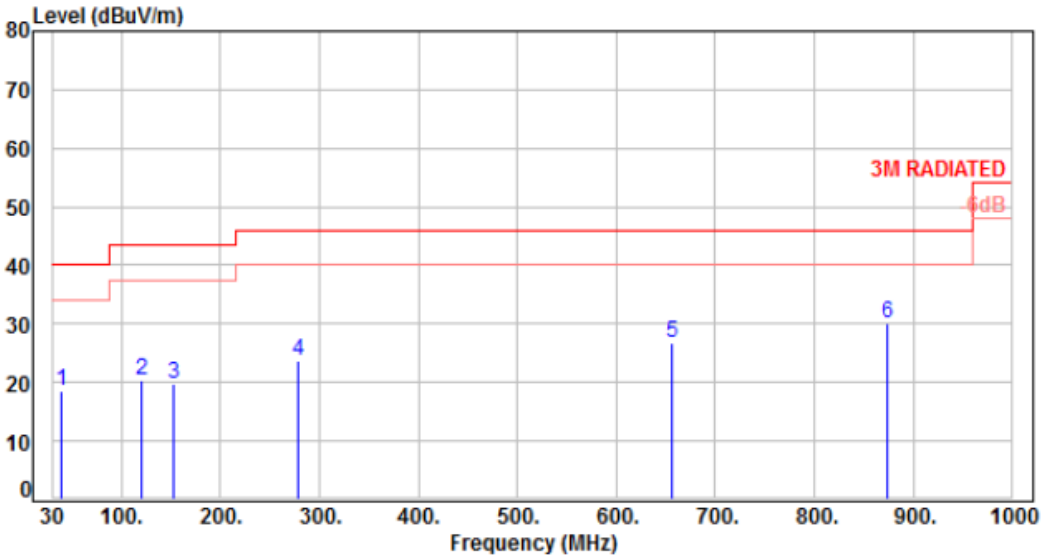
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	33.88	-10.71	39.58	28.87	40.00	-11.13	Peak	100	0	P
2	39.70	-9.71	40.50	30.79	40.00	-9.21	Peak	100	0	P
3	47.46	-9.37	33.60	24.23	40.00	-15.77	Peak	100	0	P
4	78.50	-13.36	33.95	20.59	40.00	-19.41	Peak	100	0	P
5	115.36	-12.32	35.69	23.37	43.50	-20.13	Peak	100	0	P
6	850.62	2.05	28.63	30.68	46.00	-15.32	Peak	100	0	P

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

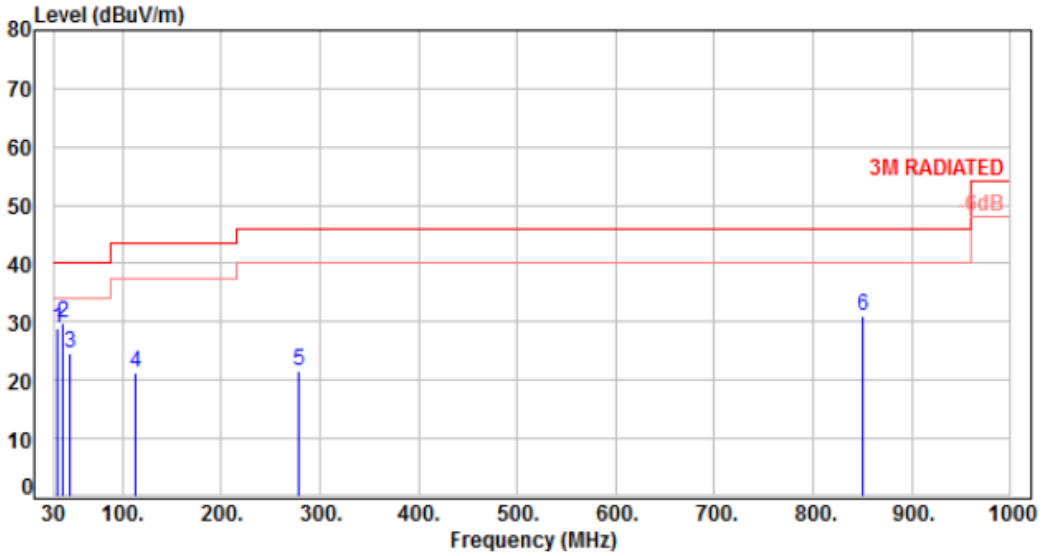
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	39.70	-9.71	28.41	18.70	40.00	-21.30	Peak	100	0	P
2	121.18	-11.73	32.07	20.34	43.50	-23.16	Peak	100	0	P
3	152.22	-9.58	29.38	19.80	43.50	-23.70	Peak	100	0	P
4	278.32	-9.21	33.06	23.85	46.00	-22.15	Peak	100	0	P
5	656.62	-1.08	27.76	26.68	46.00	-19.32	Peak	100	0	P
6	873.90	2.37	27.72	30.09	46.00	-15.91	Peak	100	0	P

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

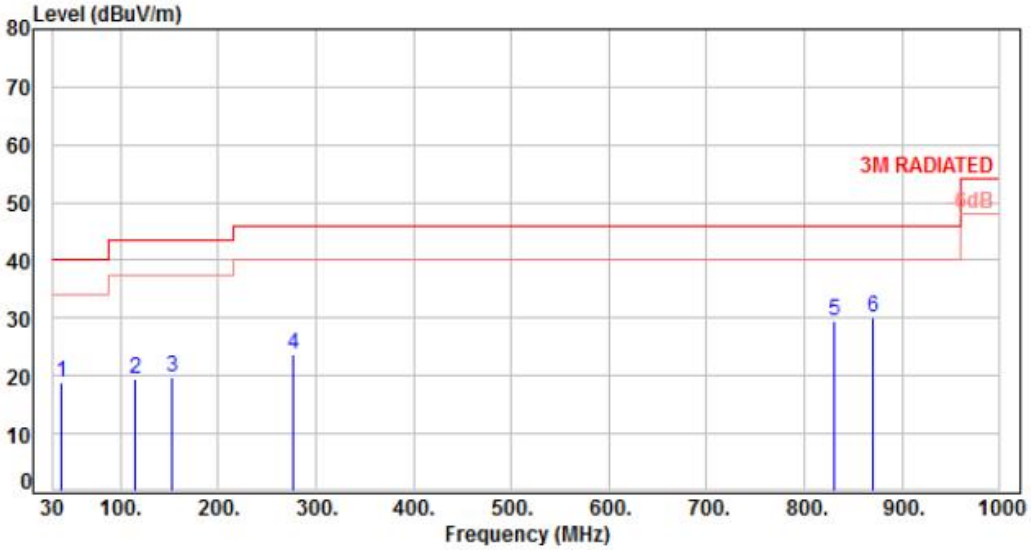
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	33.88	-10.71	39.60	28.89	40.00	-11.11	Peak	100	0	P
2	39.70	-9.71	39.59	29.88	40.00	-10.12	Peak	100	0	P
3	47.46	-9.37	34.13	24.76	40.00	-15.24	Peak	100	0	P
4	113.42	-12.41	33.57	21.16	43.50	-22.34	Peak	100	0	P
5	278.32	-9.21	30.70	21.49	46.00	-24.51	Peak	100	0	P
6	850.62	2.05	29.02	31.07	46.00	-14.93	Peak	100	0	P

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

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

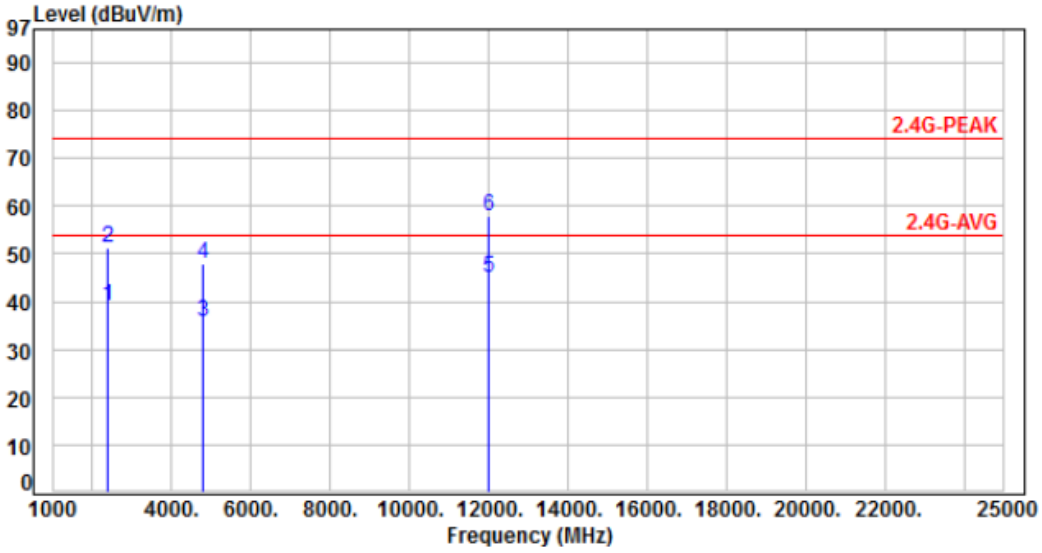


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	39.70	-9.71	28.58	18.87	40.00	-21.13	Peak	100	0	P
2	115.36	-12.32	31.84	19.52	43.50	-23.98	Peak	100	0	P
3	152.22	-9.58	29.30	19.72	43.50	-23.78	Peak	100	0	P
4	276.38	-9.30	33.07	23.77	46.00	-22.23	Peak	100	0	P
5	831.22	1.99	27.62	29.61	46.00	-16.39	Peak	100	0	P
6	870.02	2.28	27.69	29.97	46.00	-16.03	Peak	100	0	P

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

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

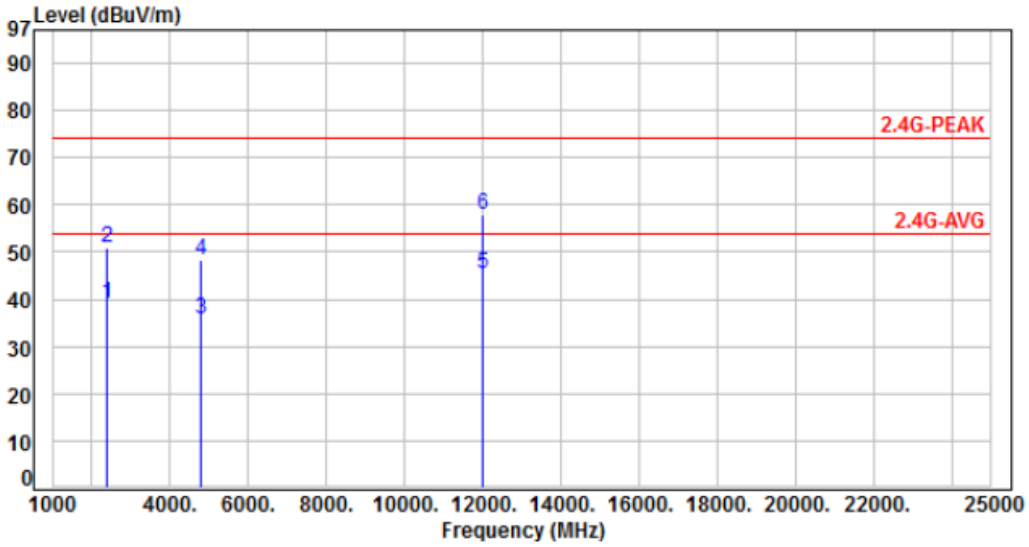
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH00		:	



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	-3.64	42.67	39.03	54.00	-14.97	Average	100	59	P
2	2390.00	-3.64	54.74	51.10	74.00	-22.90	Peak	100	59	P
3	4804.00	3.65	32.19	35.84	54.00	-18.16	Average	164	224	P
4	4804.00	3.65	44.40	48.05	74.00	-25.95	Peak	164	224	P
5	12010.00	13.50	31.68	45.18	54.00	-8.82	Average	100	236	P
6	12010.00	13.50	44.50	58.00	74.00	-16.00	Peak	100	236	P

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

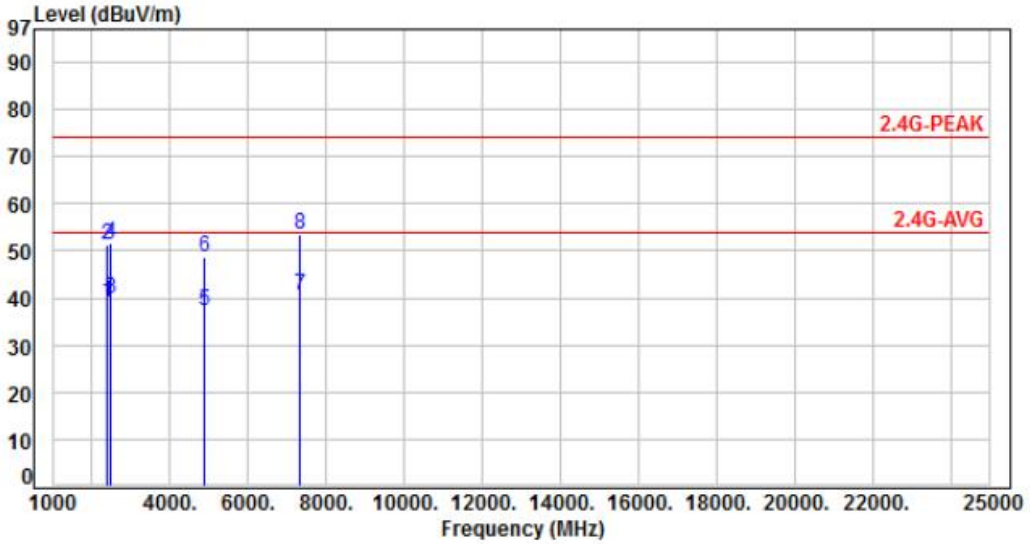
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH00		:	



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	-3.64	42.86	39.22	54.00	-14.78	Average	217	83	P
2	2390.00	-3.64	54.46	50.82	74.00	-23.18	Peak	217	83	P
3	4804.00	3.65	32.18	35.83	54.00	-18.17	Average	100	312	P
4	4804.00	3.65	44.57	48.22	74.00	-25.78	Peak	100	312	P
5	12010.00	13.50	31.90	45.40	54.00	-8.60	Average	100	298	P
6	12010.00	13.50	44.30	57.80	74.00	-16.20	Peak	100	298	P

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

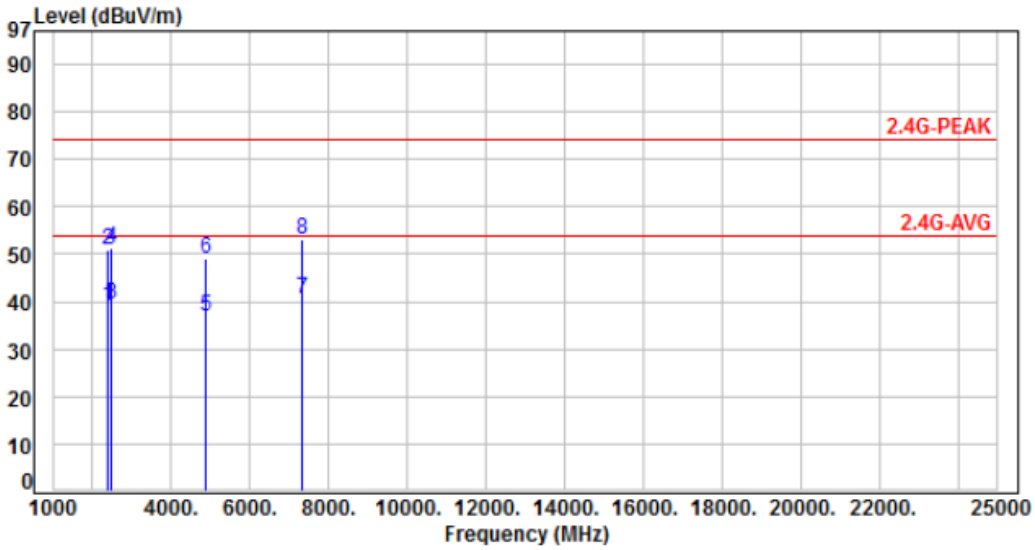
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH19		:	



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	-3.64	42.72	39.08	54.00	-14.92	Average	100	63	P
2	2390.00	-3.64	54.86	51.22	74.00	-22.78	Peak	100	63	P
3	2483.50	-3.30	43.07	39.77	54.00	-14.23	Average	100	63	P
4	2483.50	-3.30	55.09	51.79	74.00	-22.21	Peak	100	63	P
5	4880.00	3.97	33.20	37.17	54.00	-16.83	Average	113	212	P
6	4880.00	3.97	44.65	48.62	74.00	-25.38	Peak	113	212	P
7	7320.00	8.83	31.85	40.68	54.00	-13.32	Average	100	233	P
8	7320.00	8.83	44.67	53.50	74.00	-20.50	Peak	100	233	P

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

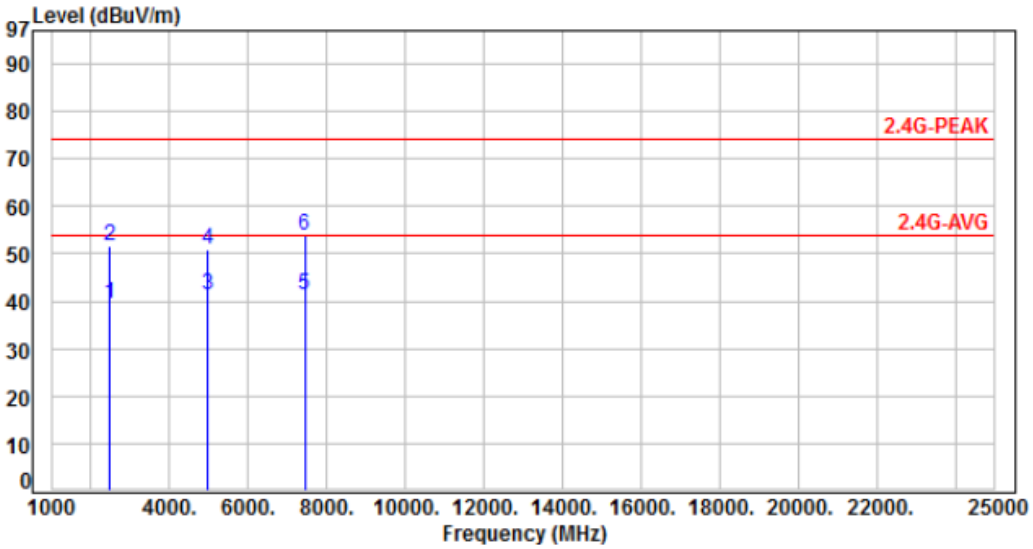
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH19		:	



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	-3.64	42.78	39.14	54.00	-14.86	Average	212	94	P
2	2390.00	-3.64	54.35	50.71	74.00	-23.29	Peak	212	94	P
3	2483.50	-3.30	42.92	39.62	54.00	-14.38	Average	212	94	P
4	2483.50	-3.30	54.66	51.36	74.00	-22.64	Peak	212	94	P
5	4880.00	3.97	32.75	36.72	54.00	-17.28	Average	134	280	P
6	4880.00	3.97	45.19	49.16	74.00	-24.84	Peak	134	280	P
7	7320.00	8.83	31.79	40.62	54.00	-13.38	Average	100	286	P
8	7320.00	8.83	44.16	52.99	74.00	-21.01	Peak	100	286	P

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

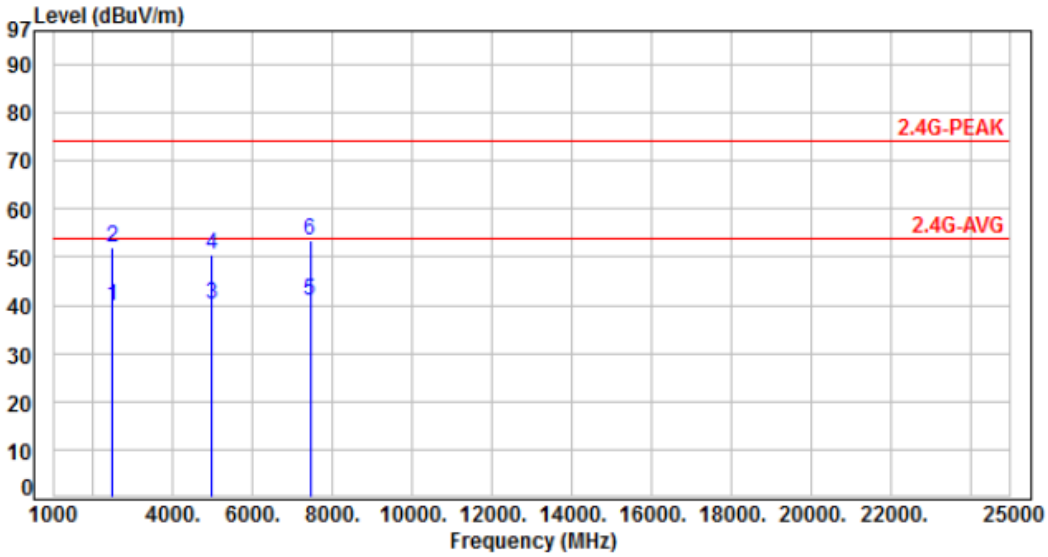
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH39		:	



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	-3.30	42.74	39.44	54.00	-14.56	Average	100	68	P
2	2483.50	-3.30	54.83	51.53	74.00	-22.47	Peak	100	68	P
3	4960.00	4.21	37.22	41.43	54.00	-12.57	Average	102	347	P
4	4960.00	4.21	46.52	50.73	74.00	-23.27	Peak	102	347	P
5	7440.00	8.98	32.15	41.13	54.00	-12.87	Average	100	249	P
6	7440.00	8.98	44.85	53.83	74.00	-20.17	Peak	100	249	P

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

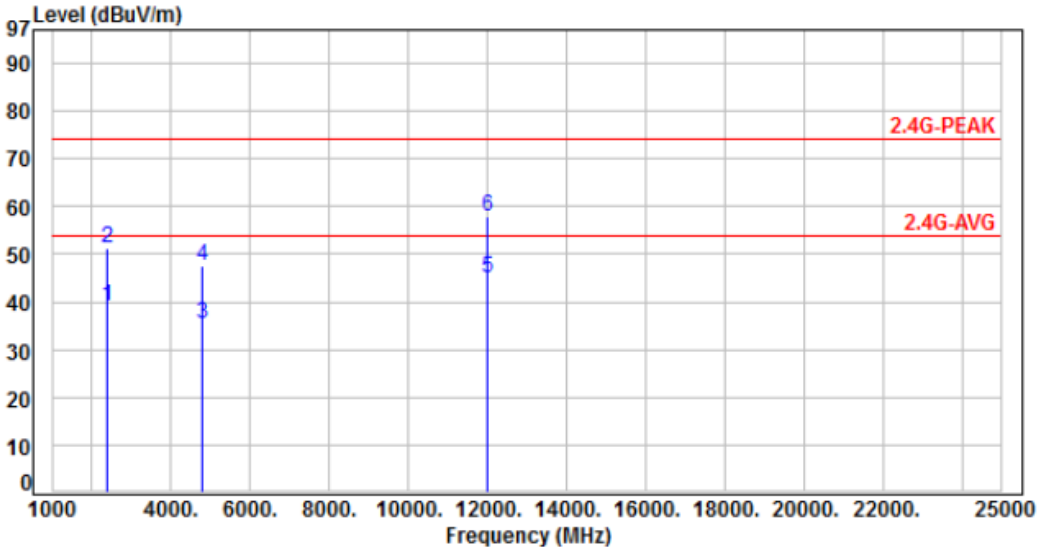
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH39		:	



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	-3.30	43.27	39.97	54.00	-14.03	Average	118	81	P
2	2483.50	-3.30	55.15	51.85	74.00	-22.15	Peak	118	81	P
3	4960.00	4.21	35.97	40.18	54.00	-13.82	Average	100	280	P
4	4960.00	4.21	46.31	50.52	74.00	-23.48	Peak	100	280	P
5	7440.00	8.98	32.14	41.12	54.00	-12.88	Average	100	292	P
6	7440.00	8.98	44.62	53.60	74.00	-20.40	Peak	100	292	P

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

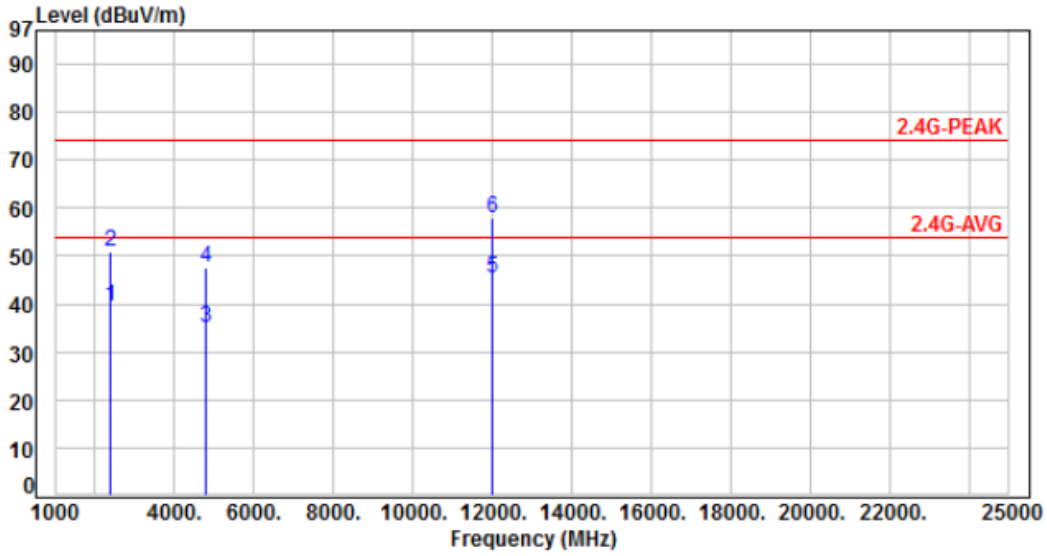
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH00		:	



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	-3.64	42.73	39.09	54.00	-14.91	Average	100	62	P
2	2390.00	-3.64	54.85	51.21	74.00	-22.79	Peak	100	62	P
3	4804.00	3.65	31.73	35.38	54.00	-18.62	Average	161	226	P
4	4804.00	3.65	43.97	47.62	74.00	-26.38	Peak	161	226	P
5	12010.00	13.50	31.59	45.09	54.00	-8.91	Average	100	241	P
6	12010.00	13.50	44.38	57.88	74.00	-16.12	Peak	100	241	P

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

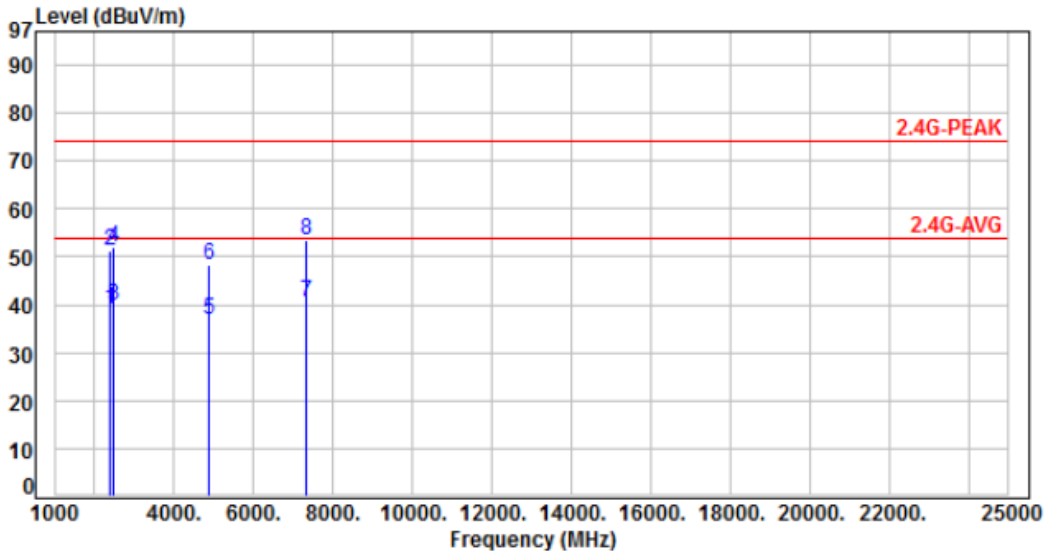
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH00		:	



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	-3.64	42.94	39.30	54.00	-14.70	Average	213	86	P
2	2390.00	-3.64	54.61	50.97	74.00	-23.03	Peak	213	86	P
3	4804.00	3.65	31.21	34.86	54.00	-19.14	Average	100	308	P
4	4804.00	3.65	43.79	47.44	74.00	-26.56	Peak	100	308	P
5	12010.00	13.50	31.84	45.34	54.00	-8.66	Average	100	296	P
6	12010.00	13.50	44.23	57.73	74.00	-16.27	Peak	100	296	P

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

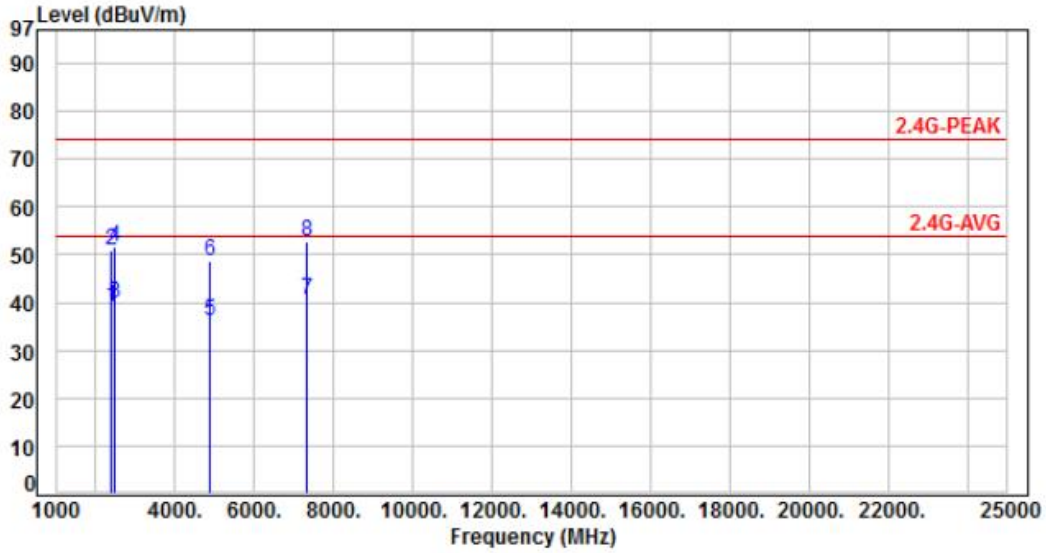
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH19		:	



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	-3.64	42.76	39.12	54.00	-14.88	Average	100	66	P
2	2390.00	-3.64	54.93	51.29	74.00	-22.71	Peak	100	66	P
3	2483.50	-3.30	43.13	39.83	54.00	-14.17	Average	100	66	P
4	2483.50	-3.30	55.20	51.90	74.00	-22.10	Peak	100	66	P
5	4880.00	3.97	32.85	36.82	54.00	-17.18	Average	111	208	P
6	4880.00	3.97	44.21	48.18	74.00	-25.82	Peak	111	208	P
7	7320.00	8.83	31.77	40.60	54.00	-13.40	Average	100	229	P
8	7320.00	8.83	44.54	53.37	74.00	-20.63	Peak	100	229	P

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

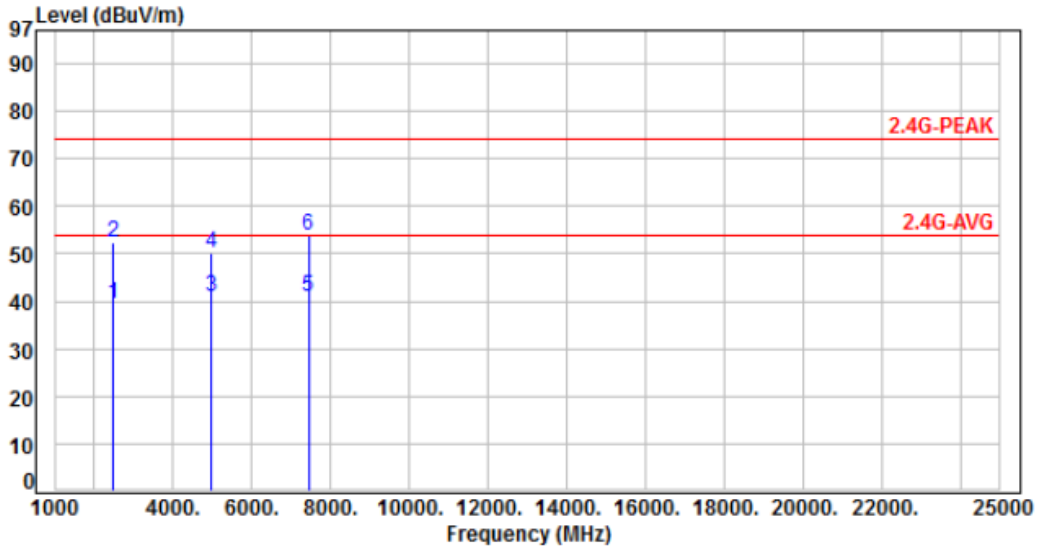
Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH19		:	



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	-3.64	42.83	39.19	54.00	-14.81	Average	208	96	P
2	2390.00	-3.64	54.47	50.83	74.00	-23.17	Peak	208	96	P
3	2483.50	-3.30	43.01	39.71	54.00	-14.29	Average	208	96	P
4	2483.50	-3.30	54.78	51.48	74.00	-22.52	Peak	208	96	P
5	4880.00	3.97	32.31	36.28	54.00	-17.72	Average	128	279	P
6	4880.00	3.97	44.83	48.80	74.00	-25.20	Peak	128	279	P
7	7320.00	8.83	31.74	40.57	54.00	-13.43	Average	100	282	P
8	7320.00	8.83	44.05	52.88	74.00	-21.12	Peak	100	282	P

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

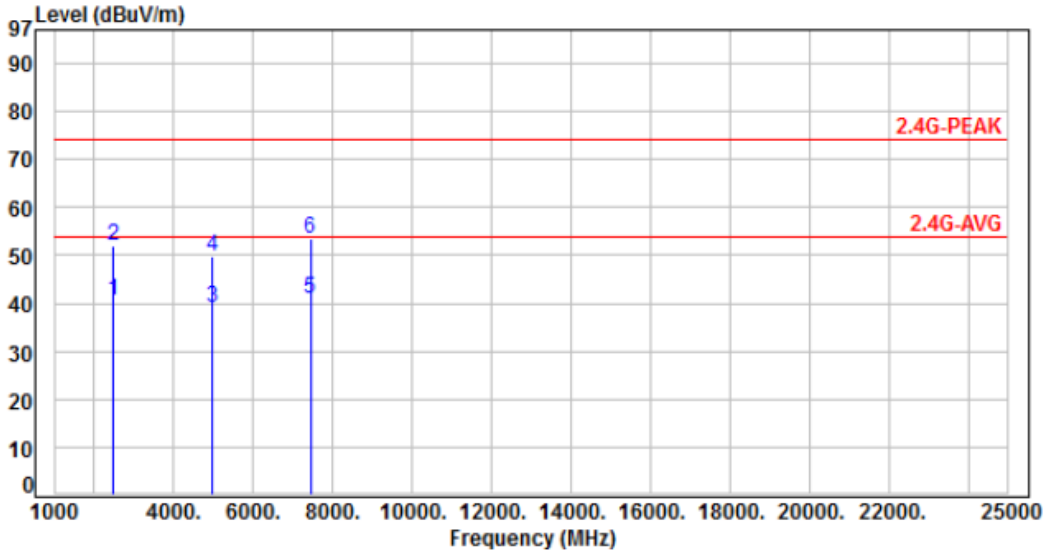
Power	:	120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH39		:	



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	-3.30	42.81	39.51	54.00	-14.49	Average	101	70	P
2	2483.50	-3.30	55.81	52.51	74.00	-21.49	Peak	101	70	P
3	4960.00	4.21	36.89	41.10	54.00	-12.90	Average	100	345	P
4	4960.00	4.21	46.11	50.32	74.00	-23.68	Peak	100	345	P
5	7440.00	8.98	32.05	41.03	54.00	-12.97	Average	100	252	P
6	7440.00	8.98	44.74	53.72	74.00	-20.28	Peak	100	252	P

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

Power	:	120V / 60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH39		:	



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	-3.30	43.97	40.67	54.00	-13.33	Average	119	85	P
2	2483.50	-3.30	55.38	52.08	74.00	-21.92	Peak	119	85	P
3	4960.00	4.21	34.78	38.99	54.00	-15.01	Average	100	280	P
4	4960.00	4.21	45.51	49.72	74.00	-24.28	Peak	100	280	P
5	7440.00	8.98	32.09	41.07	54.00	-12.93	Average	100	295	P
6	7440.00	8.98	44.53	53.51	74.00	-20.49	Peak	100	295	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 Spurious Emission (Conducted)

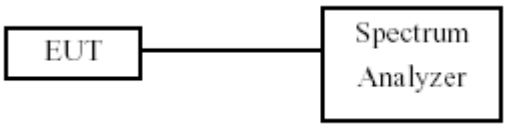
7.1 Test Limit

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.

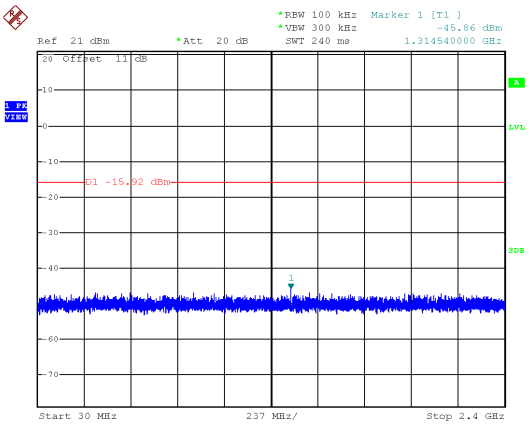
7.3 Test Setup Layout



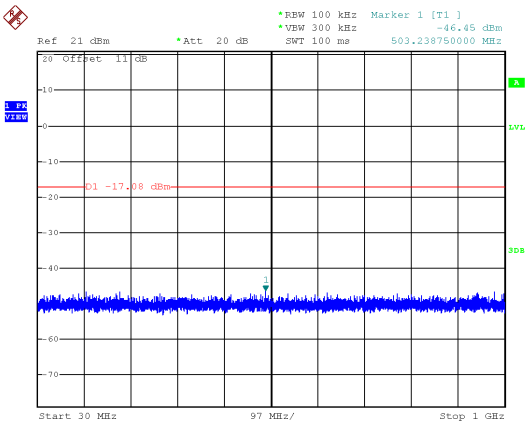
7.4 Test Result and Data

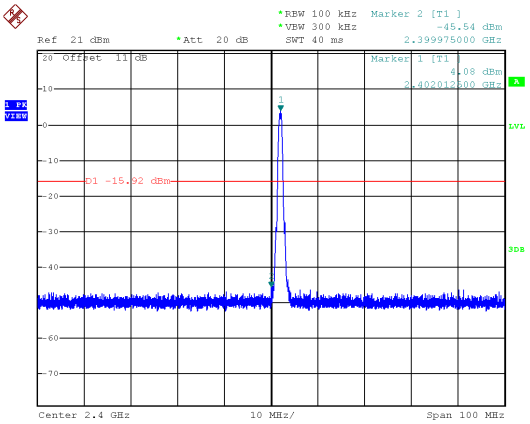
Note: Test plots refer to the following pages.

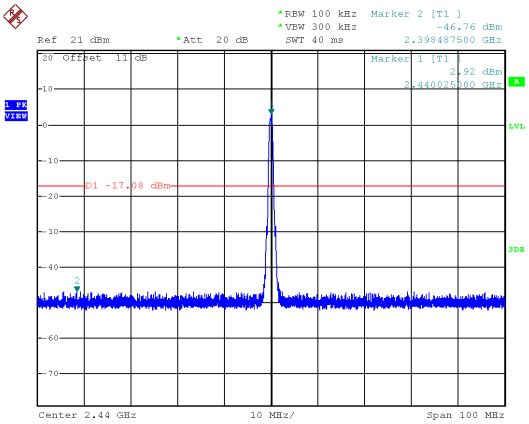
Modulation Mode: GFSK(1Mbps)
CH00

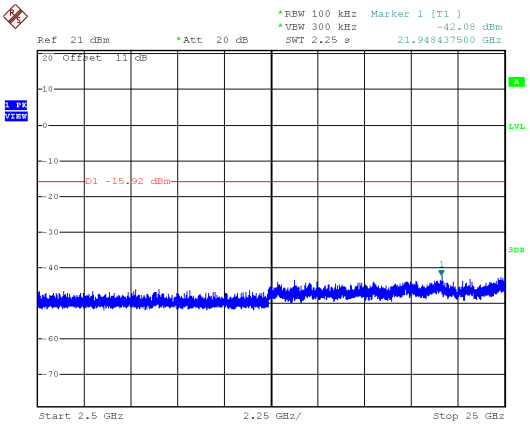


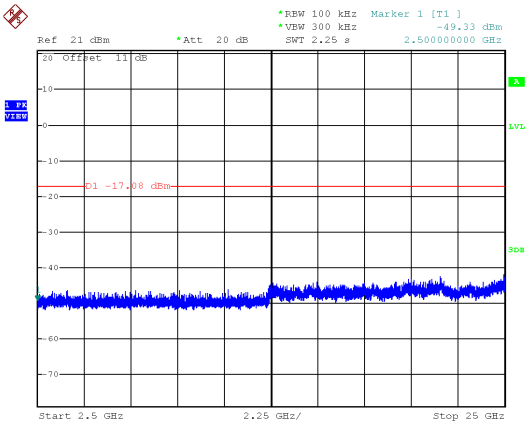
Modulation Mode: GFSK(1Mbps)
CH19



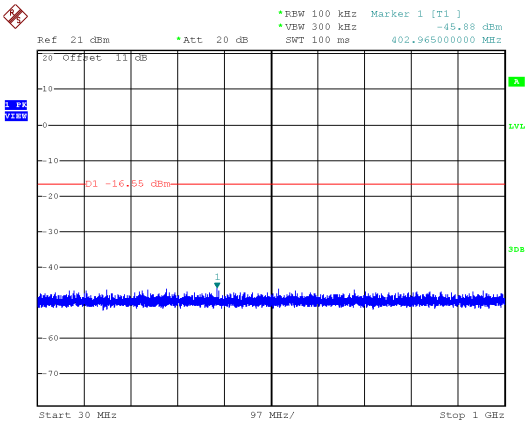


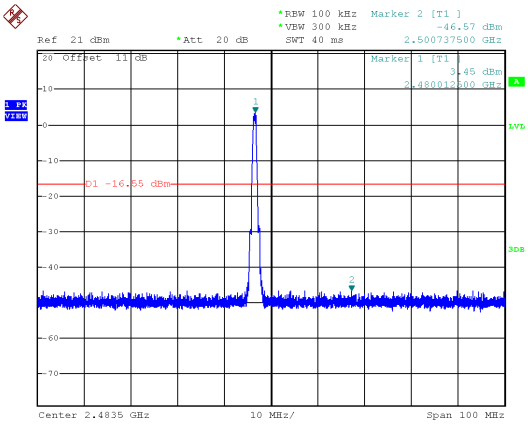


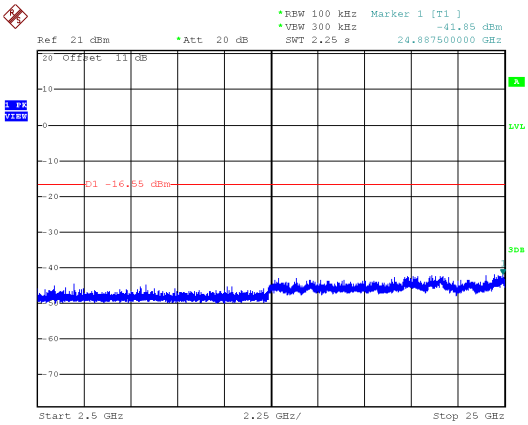




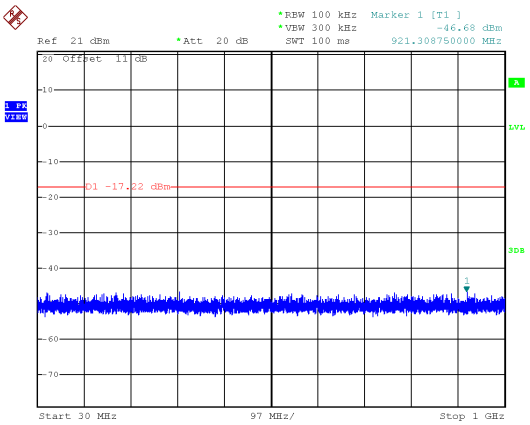
Modulation Mode: GFSK(1Mbps)
CH39



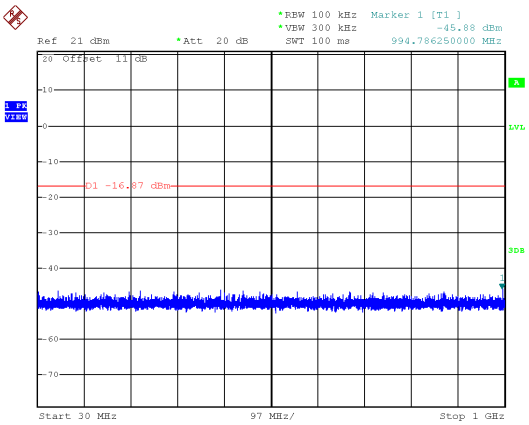


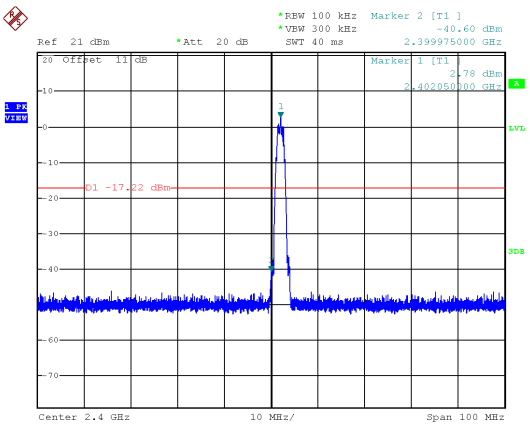


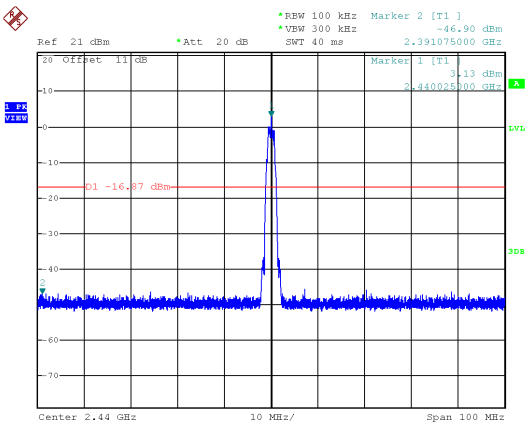
Modulation Mode: GFSK(2Mbps)
CH00

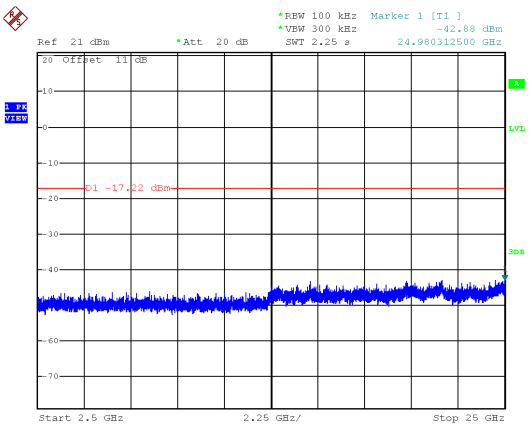


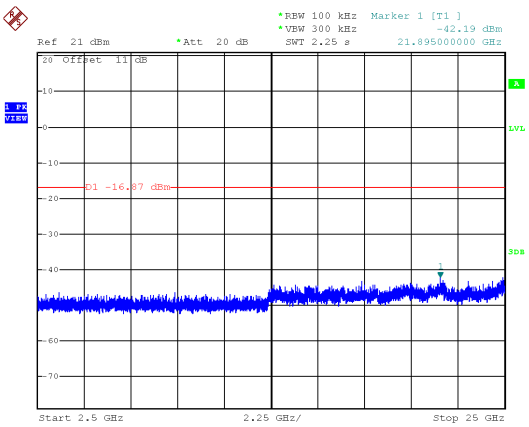
Modulation Mode: GFSK(2Mbps)
CH19



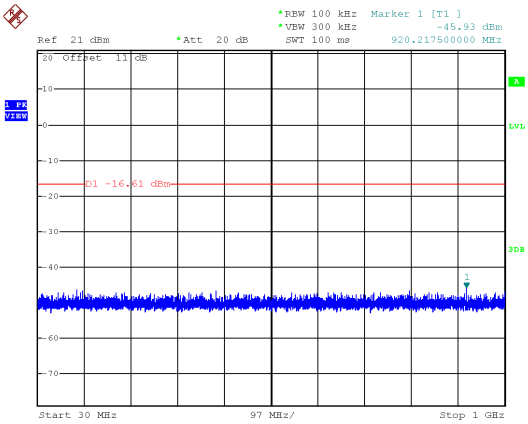


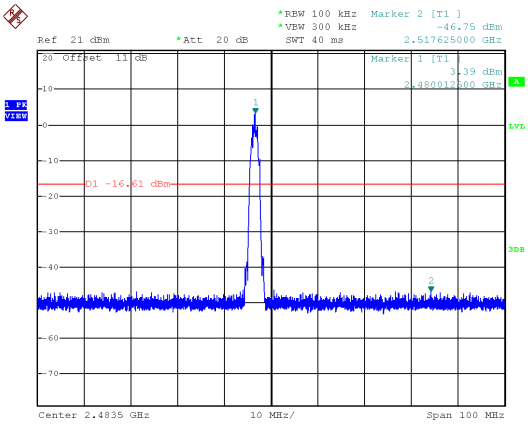


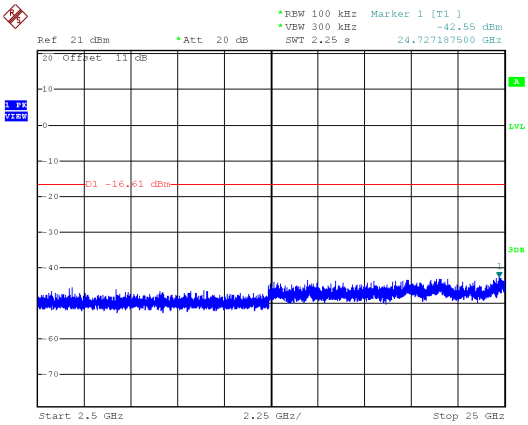




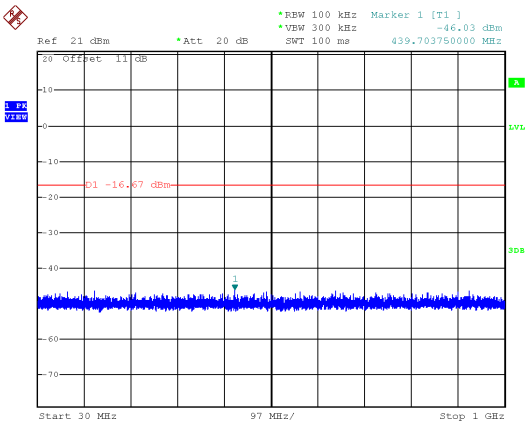
Modulation Mode: GFSK(2Mbps)
CH39



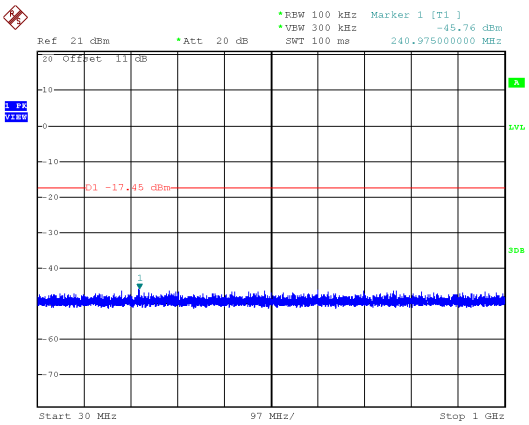


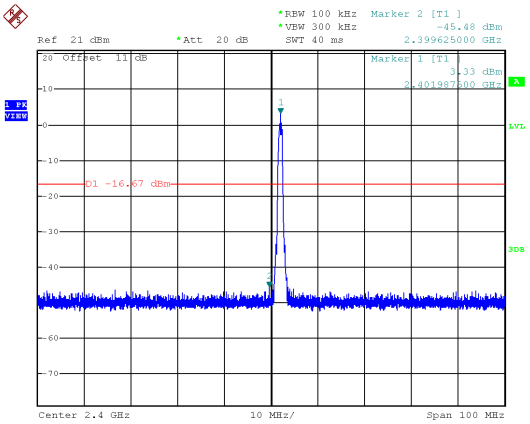


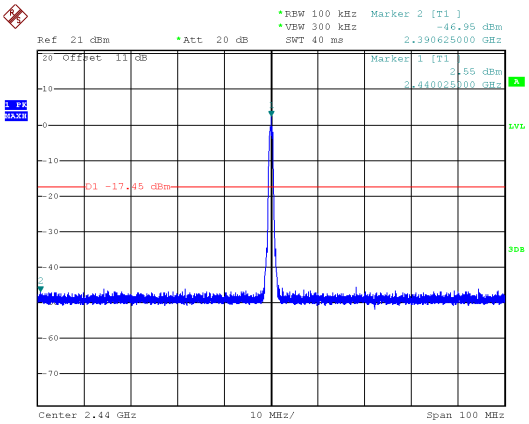
Modulation Mode: GFSK(125Kbps)
CH00

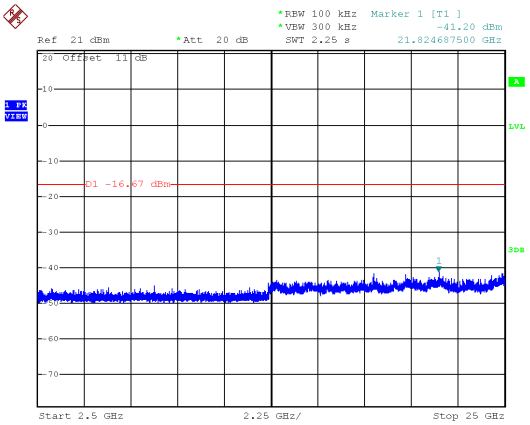


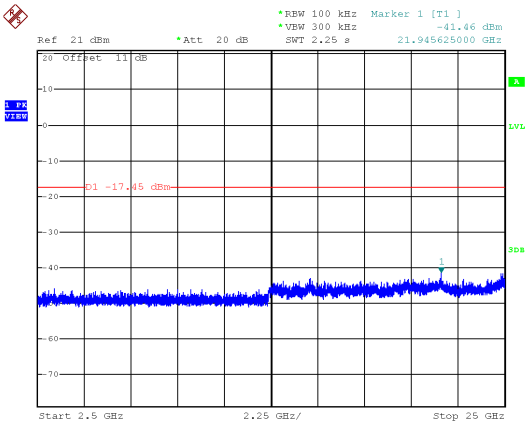
Modulation Mode: GFSK(125Kbps)
CH19



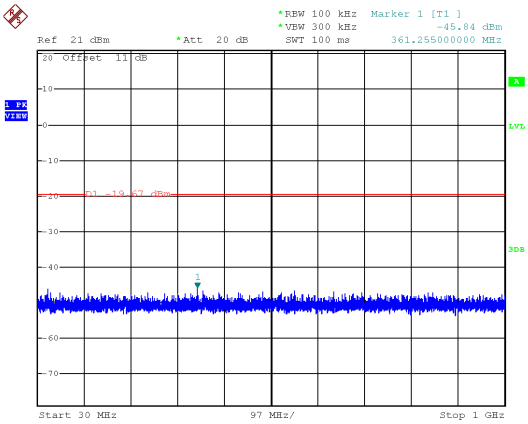


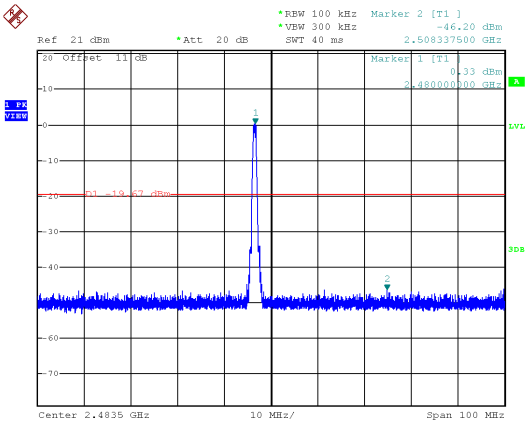


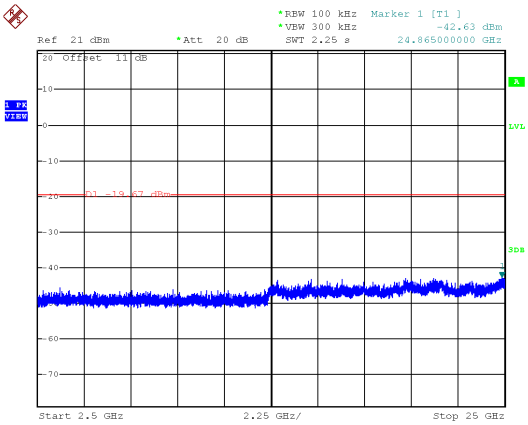




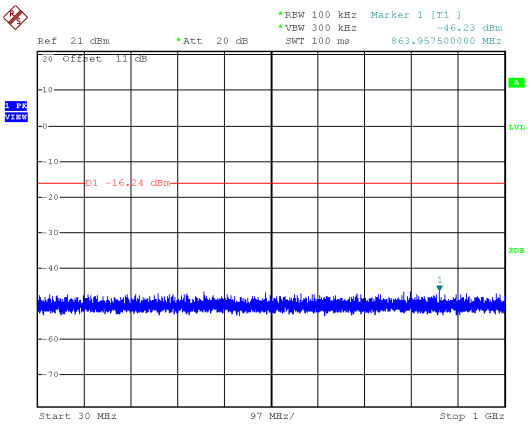
Modulation Mode: GFSK(125Kbps)
CH39



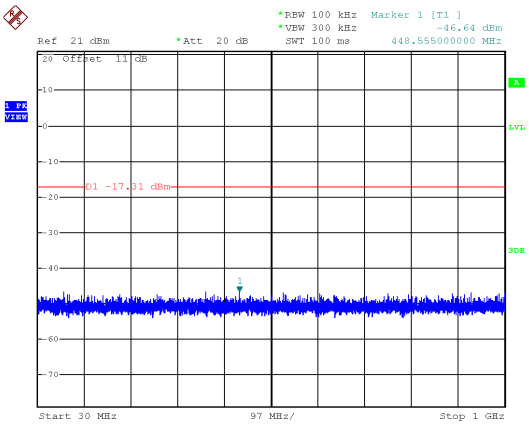


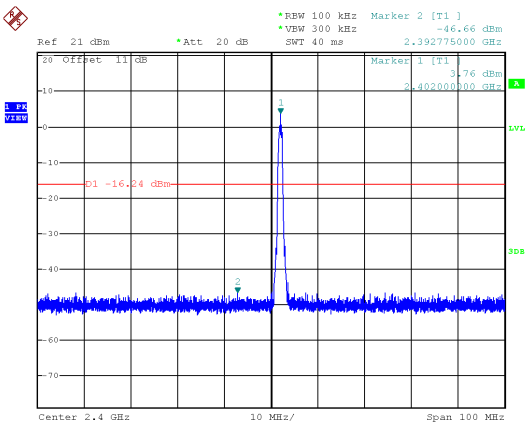


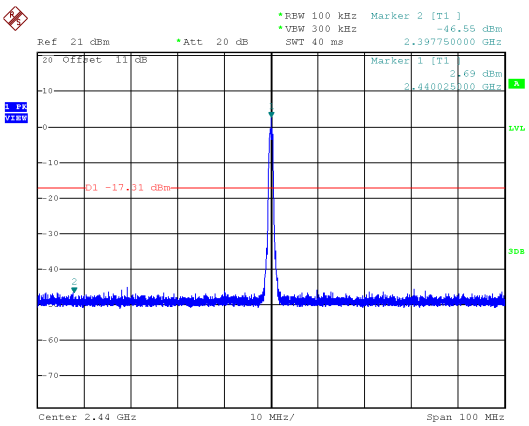
Modulation Mode: GFSK(500Kbps)
CH00

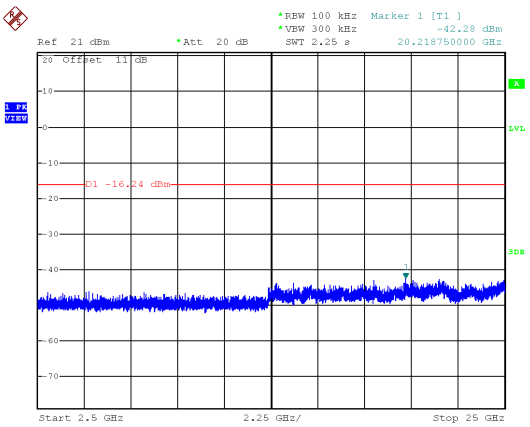


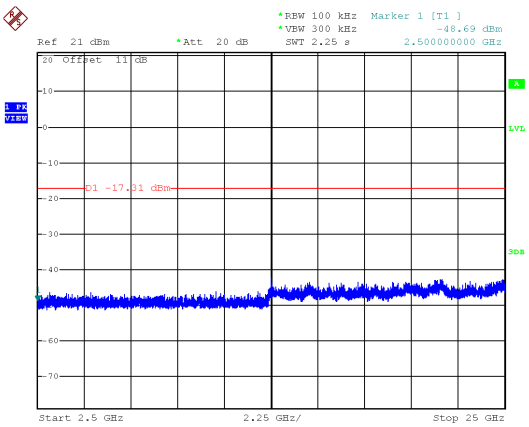
Modulation Mode: GFSK(500Kbps)
CH19



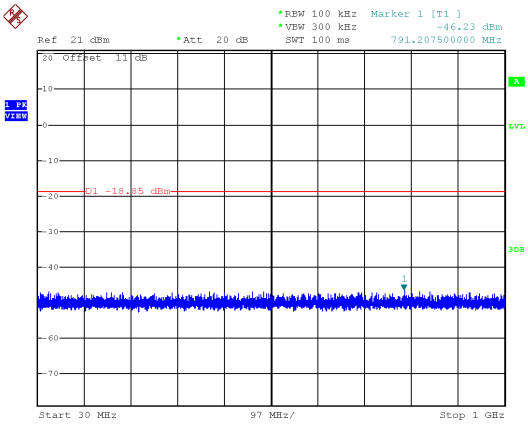


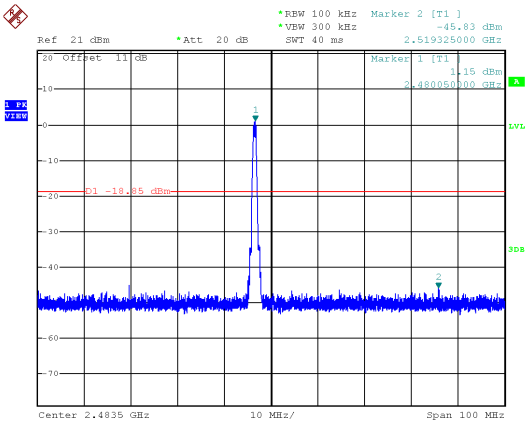


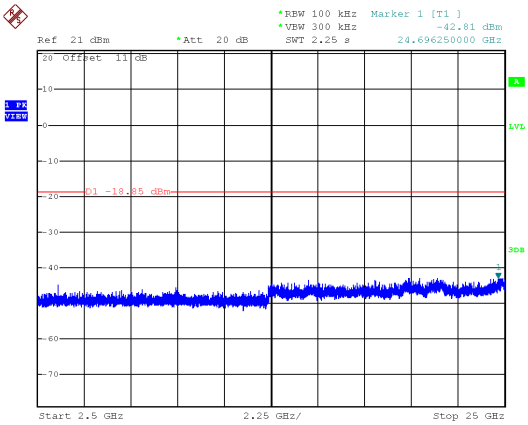




Modulation Mode: GFSK(500Kbps)
CH39







8. On Time, Duty Cycle and Measurement methods

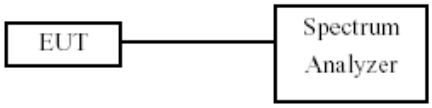
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

KDB 558074 Zero-Span Spectrum Analyzer Method.

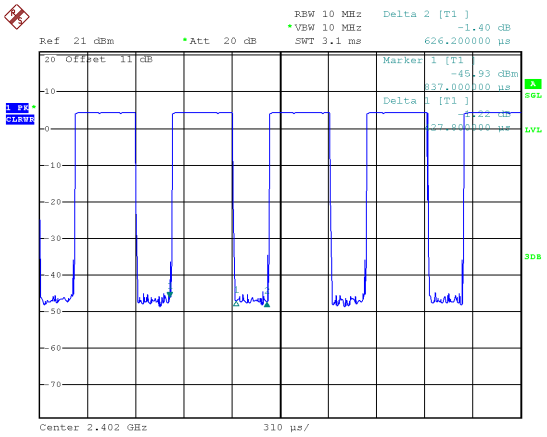
8.3 Test Setup Layout



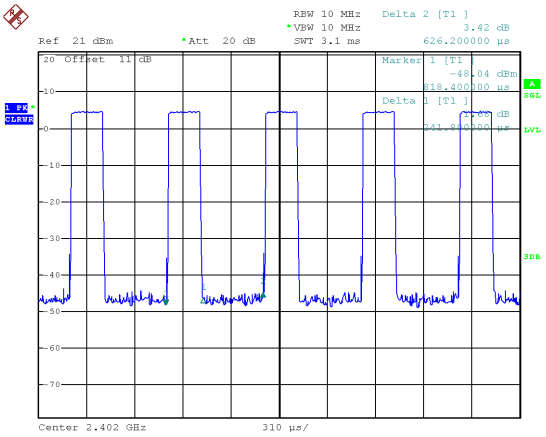
8.4 Test Result and Data

Modulation Mode	On Time (ms)	Period Time (ms)	Duty Cycle (%)
GFSK(1M)	0.43	0.63	68.32%
GFSK(2M)	0.24	0.63	38.61%
GFSK(125K)	3.16	3.76	84.18%
GFSK(500K)	1.15	1.89	60.82%

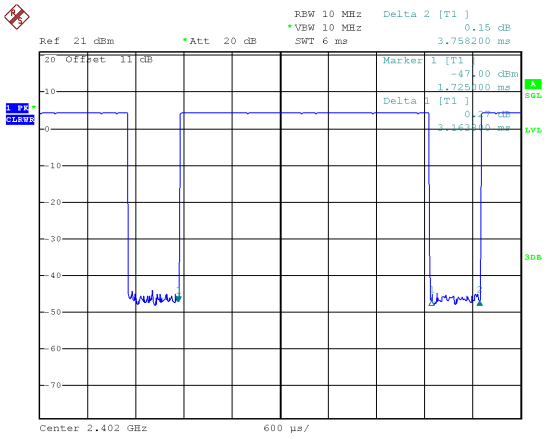
Modulation Mode: GFSK (1Mbps)



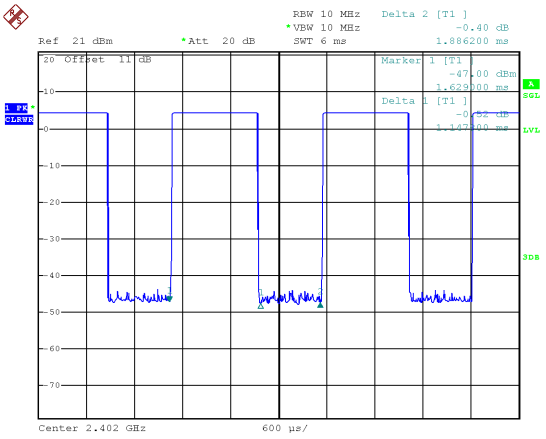
Modulation Mode: GFSK (2Mbps)



Modulation Mode: GFSK (125Kbps)



Modulation Mode: GFSK (500Kbps)



9. 6dB Bandwidth Measurement Data

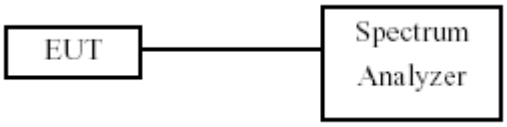
9.1 Test Limit

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 1~5% of the emission bandwidth and VBW ≥ 3x RBW.
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

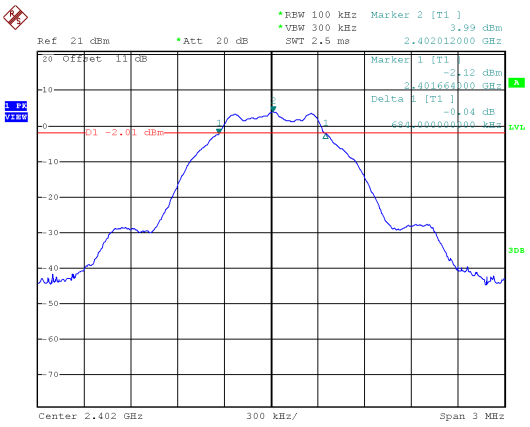
Modulation Mode	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)
GFSK(1Mbps)	00	2402	684.00	500
	19	2440	684.00	500
	39	2480	**678.00**	500

Modulation Mode	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)
GFSK(2Mbps)	0	2402	**1150.00**	500
	19	2440	1160.00	500
	39	2480	1160.00	500

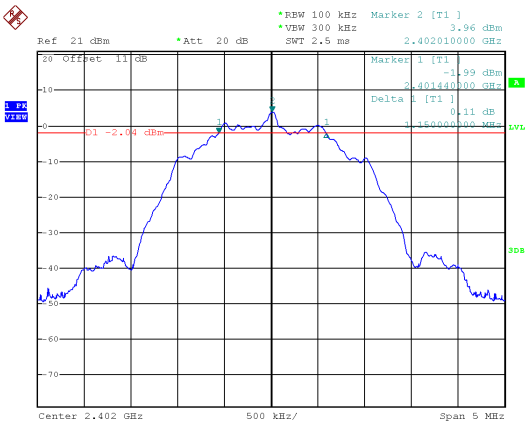
Modulation Mode	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)
GFSK(125Kbps)	0	2402	612.00	500
	19	2440	612.00	500
	39	2480	**606.00**	500

Modulation Mode	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)
GFSK(500Kbps)	0	2402	678.00	500
	19	2440	**660.00**	500
	39	2480	666.00	500

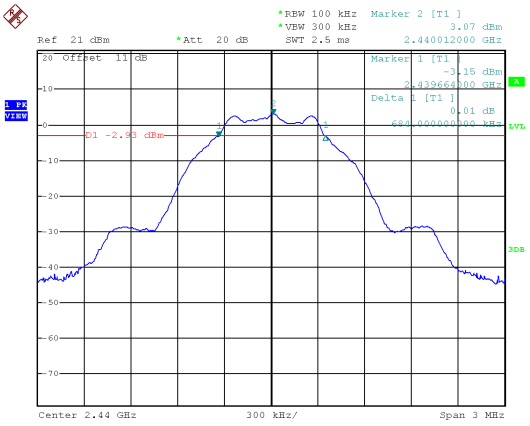
Modulation Mode: GFSK(1Mbps)
CH00



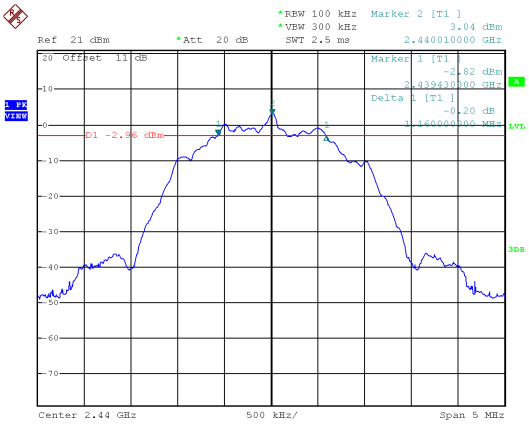
Modulation Mode: GFSK(2Mbps)
CH00



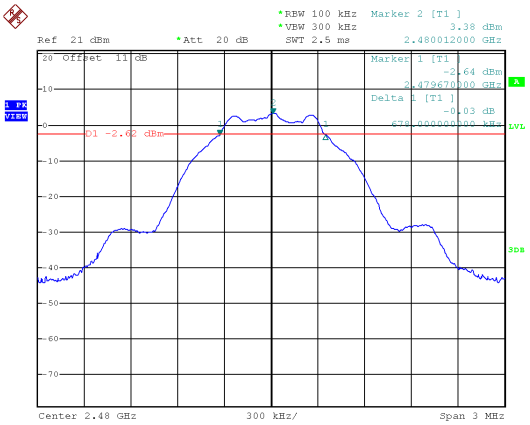
CH19



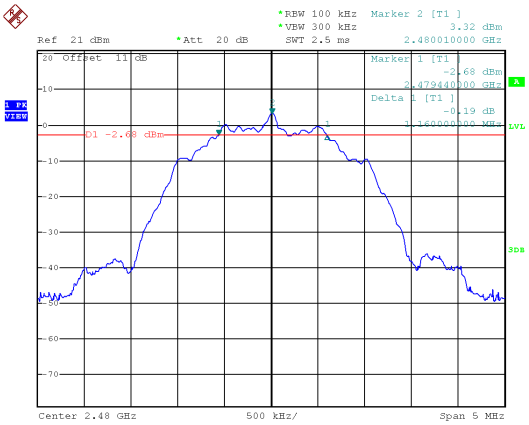
CH19



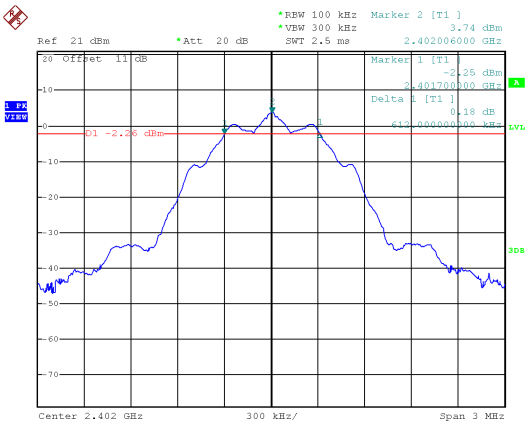
CH39



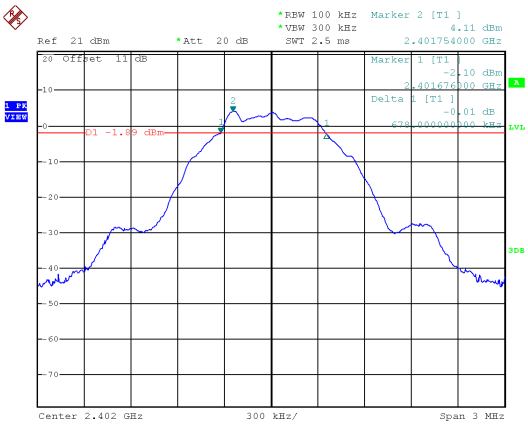
CH39



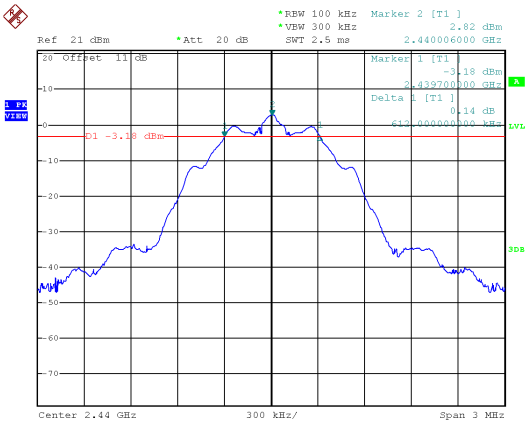
Modulation Mode: GFSK(125Kbps)
CH00



Modulation Mode: GFSK(500Kbps)
CH00



CH19



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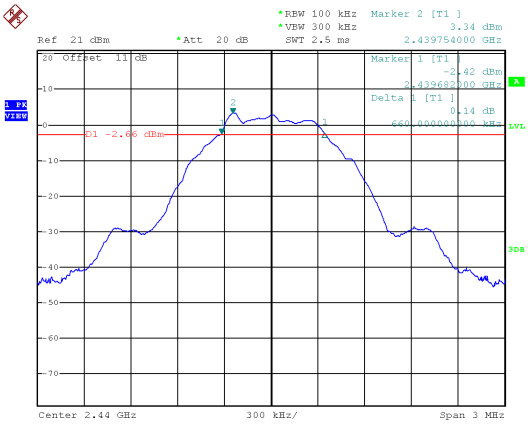

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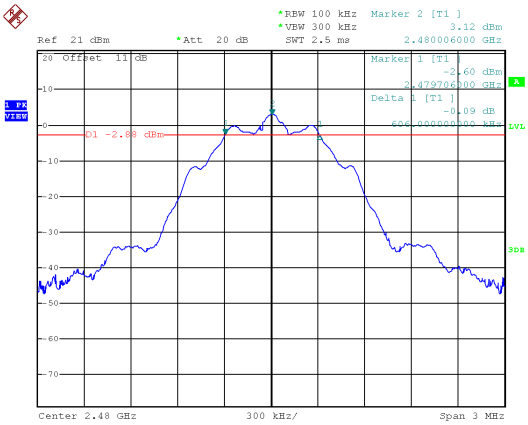

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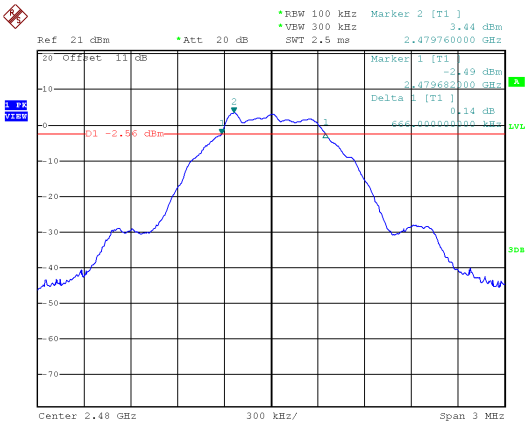


10. Maximum Peak and Average Output Power

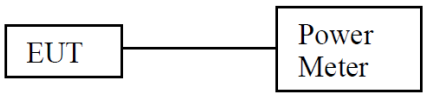
10.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

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

BT5(1M bps)

Modulation Mode	Channel	Frequency (MHz)	Power Output (dBm)		Peak Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	00	2402	3.94	3.81	2.477	2.404
	19	2440	3.1	2.95	2.042	1.972
	39	2480	3.4	3.23	2.188	2.104

BT5(2M bps)

Modulation Mode	Channel	Frequency (MHz)	Power Output (dBm)		Peak Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	00	2402	4.18	3.72	2.618	2.355
	19	2440	3.31	2.9	2.143	1.950
	39	2480	3.67	3.18	2.328	2.080

BT5(125K bps)

Modulation Mode	Channel	Frequency (MHz)	Power Output (dBm)		Peak Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	00	2402	3.96	3.8	2.489	2.399
	19	2440	3.1	2.94	2.042	1.968
	39	2480	3.4	3.23	2.188	2.104

BT5(500K bps)

Modulation Mode	Channel	Frequency (MHz)	Power Output (dBm)		Peak Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	00	2402	3.94	3.81	2.477	2.404
	19	2440	3.12	2.95	2.051	1.972
	39	2480	3.41	3.24	2.193	2.109

*Average Power is for reference only

11. Power Spectral Density

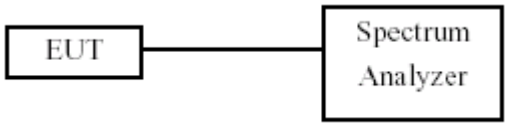
11.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

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 30KHz 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

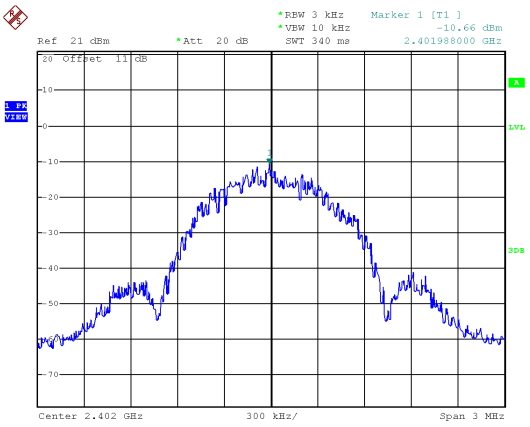
Modulation Mode	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Limit
GFSK(1Mbps)	0	2402	**-10.66**	8.00
	19	2440	-11.61	8.00
	39	2480	-11.31	8.00

Modulation Mode	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Limit
GFSK(2Mbps)	0	2402	**-14.2**	8.00
	19	2440	-15.04	8.00
	39	2480	-14.87	8.00

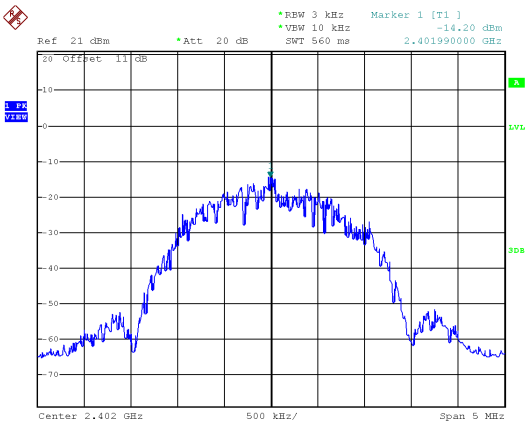
Modulation Mode	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Limit
GFSK(125Kbps)	0	2402	**-1.78**	8.00
	19	2440	-2.67	8.00
	39	2480	-2.39	8.00

Modulation Mode	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)	Limit
GFSK(500Kbps)	0	2402	**-1.94**	8.00
	19	2440	-2.76	8.00
	39	2480	-2.55	8.00

Modulation Mode: GFSK(1Mbps)
CH00



Modulation Mode: GFSK(2Mbps)
CH00



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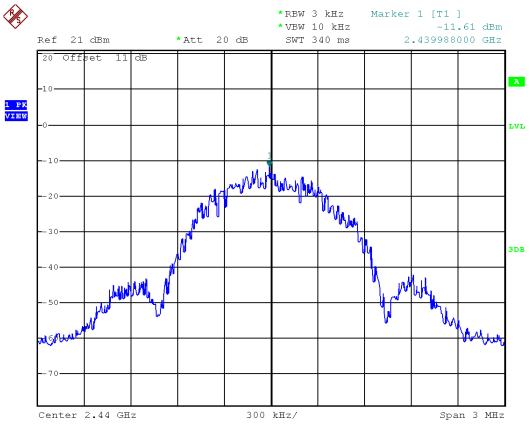

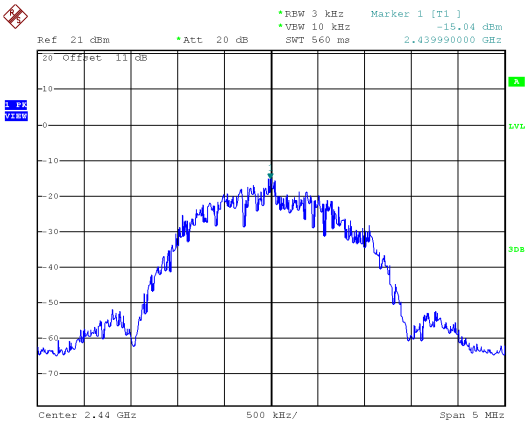

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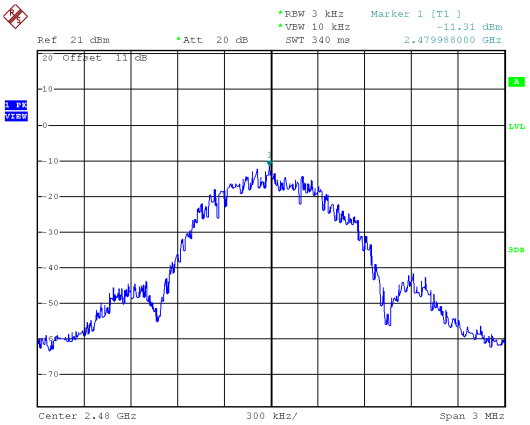
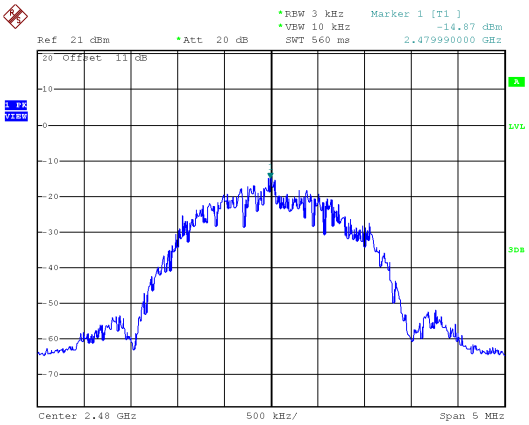
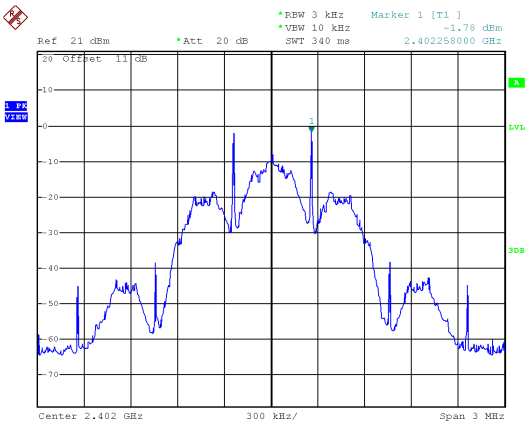
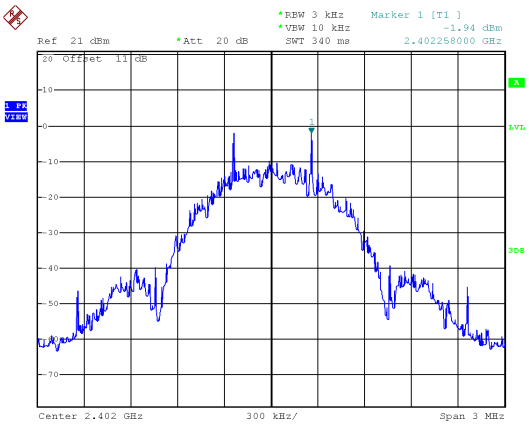




Modulation Mode: GFSK(125Kbps)
CH00



Modulation Mode: GFSK(500Kbps)
CH00



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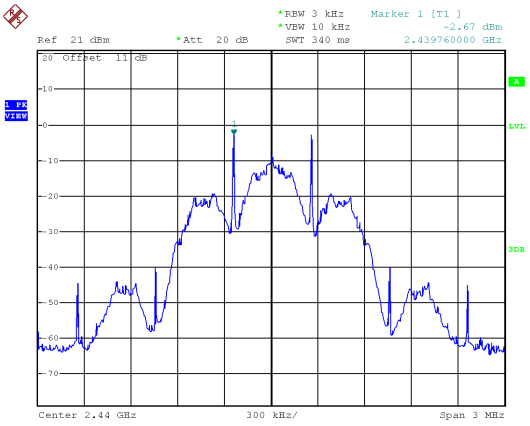

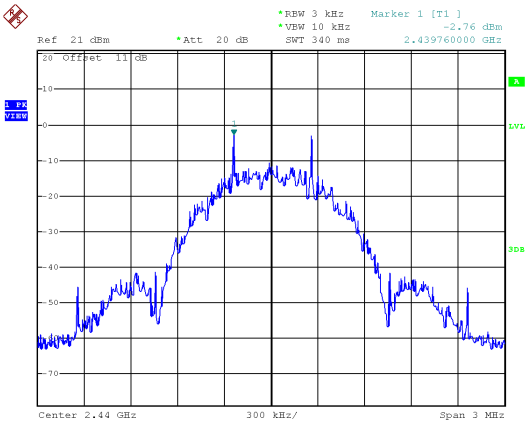

CH39