




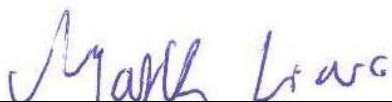
FCC RADIO TEST REPORT

Applicant : SteelSeries ApS.
Address : 656 W Randolph St., Suite 3E Chicago, IL 60661, USA
Equipment : Wireless Headset
Model No. : HS42
Trade Name : 
FCC ID : ZHK-HS42

I HEREBY CERTIFY THAT :

The sample was received on Aug. 07, 2023 and the testing was completed on Oct. 28, 2023 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
23060229-TRFCC01	Nov. 10, 2023	Original



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	Description of Test	Result
15.203	Antenna Requirement	PASS
15.207	AC Power Line Conducted Emission	PASS
15.209 15.205	Radiated Spurious Emission	PASS
15.247(d)	Conducted Spurious Emission	PASS
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Maximum Output Power	PASS
15.247(e)	Power Spectral Density	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	2400MHz-2483.5MHz
Center Frequency Range	2402MHz-2480MHz
Modulation Type	DTS: GFSK FHSS: GFSK, $\pi/4$ -DQPSK
Modulation Technology	DTS, FHSS
Data Rate	DTS: 1Mbps, 2Mbps FHSS: 1Mbps, 2Mbps
Antenna Type	Metal Antenna
Antenna Gain	4.01 dBi
Battery	Huizhou Everpower Technology Co., Ltd. \ PL603033 \ 3.7V
USB-C to USB-A Charging cable	Perfect Fortune Electric Wire & Cable (Shen Zhen) Co., Ltd. \ 122331330016 \ 1.5M
	Perfect Fortune Electric Wire & Cable (Shen Zhen) Co., Ltd. \ 122331330020 \ 1.5M

Note: For more details, please refer to the User's manual of the EUT.

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. An executive program, "RTLBTAPP Ver.: 5.2.3.44" under Windows 10 system was executed to transmit and receive data.
- c. For the EUT with two USB-C to USB-A Charging cables, so use these two cables to test, the following test modes were performed for the test:

Conducted Emissions from the AC mains power ports	
Test Mode 1	Power from System (AC 120V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
Test Mode 2	Power from System (AC 240V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
Test Mode 3	Power from System (AC 120V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330020
caused "Test Mode 1" generated the worst case, it was reported as the final data.	
Radiated Emissions (30MHz ~ 1GHz)	
Test Mode 1	Power from System (AC 120V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
Test Mode 2	Power from System (AC 240V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
Test Mode 3	Power from System (AC 120V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330020
caused "Test Mode 1" generated the worst case, it was reported as the final data.	
Radiated Emissions (1GHz ~ 25GHz)	
Test Mode 1	Power from System (AC 120V/60Hz), GFSK (1Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
Test Mode 2	Power from System (AC 120V/60Hz), GFSK (2Mbps), TX Mode, USB-C to USB-A Charging cable: 122331330016
caused "Test Mode 1,2" generated the worst case, they were reported as the final data.	

Modulation Type	TX CONFIGURATION
GFSK (1Mbps)	1TX
GFSK (2Mbps)	1TX



2.4 Description of Test System

RF Conducted				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	lenovo	S1GL2W	N/A	Adapter / 1.8m / NS
Test Fixture	YD-TECH	MCS-73LV	N/A	N/A

Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	lenovo	S1GL2W	N/A	Adapter / 1.8m / NS
Test Fixture	YD-TECH	MCS-73LV	N/A	N/A
USB Cable (A to B)	BENEVO	BUSB0301AMFB	0.8m / NS	N/A

AC Power Line Conducted Emission				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	lenovo	S1GL2W	N/A	Adapter / 1.8m / NS
Test Fixture	YD-TECH	MCS-73LV	N/A	N/A
USB Cable (A to B)	BENEVO	BUSB0301AMFB	0.8m / 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 9 kHz 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	2023/08/23 ~ 2023/09/06	26.2~26.4°C / 51~55%	Leon Huang
Radiated Emissions	3M02-NK	2023/08/25 ~ 2023/08/26	21~22°C / 53~54%	Leon Huang
Radiated Emissions	3M02-NK	2023/10/27	23°C / 41%	Leon Huang
AC Power Line Conducted Emission	CON02-NK	2023/09/14 ~ 2023/10/28	22~26°C / 57~68%	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)	±3.28dB
Radiated Spurious Emission(9KHz~30MHz)	±3.5dB
Radiated Spurious Emission(30MHz~1GHz)	±5.1dB
Radiated Spurious Emission(1GHz~25GHz)	±5.2dB
Conducted Spurious Emission	±2.1dB
6dB Bandwidth	±5.4%
20dB Bandwidth	±4.4%
Occupied Bandwidth	±4.5%
Peak Output Power (Conducted Power Meter)	±1.1dB
Dwell Time / Deactivation Time	±7.6dB
Power Spectral Density	±2.0dB
Duty Cycle	±3.5%



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions (2023/08/25 ~ 2023/08/26)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2022/11/18	2023/11/17
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	R&S	ESCI	101423	2023/07/05	2024/07/04
Spectrum Analyzer	R&S	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	2022/11/11	2023/11/10
Preamplifier	EM Electronics corp.	EM330	60658	2022/10/04	2023/10/03
Cable-6m (9kHz~300MHz)	NA	EMC5D-BM-BM-6	130606	2023/03/13	2024/03/12
Cable-3in1 (30MHz-1GHz)	HARBOUR INDUSTRIES	LL142	CCE1315	2023/02/25	2024/02/24
Cable-0.5m (1GHz-40GHz)	HUBER SUHNER	SUCOFLEX 104	805443/4	2023/03/07	2024/03/06
Cable-3m (1GHz-40GHz)	HUBER SUHNER	SUCOFLEX 104	805796/4	2023/03/07	2024/03/06
Cable-8m (1GHz-26.5GHz)	WOKEN	WCBA-WCA2 03SM	CCE1374	2023/03/07	2024/03/06
Cable-0.5m (30MHz-40GHz)	HUBER SUHNER	SUCOFLEX 102	28420/2	2023/03/07	2024/03/06
Cable-3m (10MHz-40GHz)	HUBER SUHNER	SF102	804619/2	2022/10/11	2023/10/10
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
High Pass Filter	WOKEN	WFIL-H7000-18000F-01	WR468FWC2B1	2022/09/01	2023/08/31
Notch Filter	Warison	WFIL-N5925-7125F-04	WRQ4BFWC4M1	2023/03/13	2024/03/12



Test Item	Radiated Emissions (2023/10/27)				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2022/11/18	2023/11/17
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	R&S	ESC1	101423	2023/07/05	2024/07/04
Spectrum Analyzer	R&S	FSP 40	100047	2023/02/24	2024/02/23
Preamplifier	Agilent	8449B	3008A01954	2023/03/08	2024/03/07
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2022/11/11	2023/11/10
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-WCA 203SM	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	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2022/11/29	2023/11/28
Power Meter	Anritsu	ML2495A	1224005	2023/03/07	2024/03/06
Power Sensor	Anritsu	MA2411B	1207295	2023/03/07	2024/03/06
Attenuator	KEYSIGHT	8491B	MY39250703	2023/03/08	2024/03/07

Test Item	AC Power Line Conducted Emission				
Test Site	CON02-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI	101423	2023/07/05	2024/07/04
TWO-LINE V-NETWORK	R&S	ENV216	102185	2023/08/29	2024/08/28
Cable-4m (9kHz-3GHz)	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 15.247 (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	Metal Antenna
Antenna Gain	4.01 dBi



5. Test of AC Power Line Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.10-2013. 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

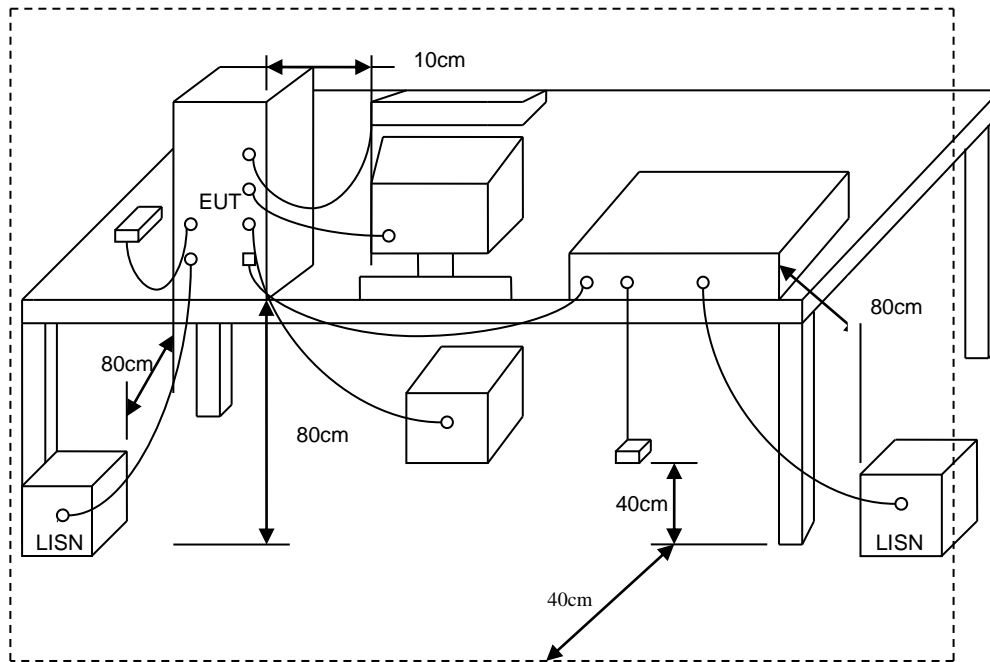
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

- 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

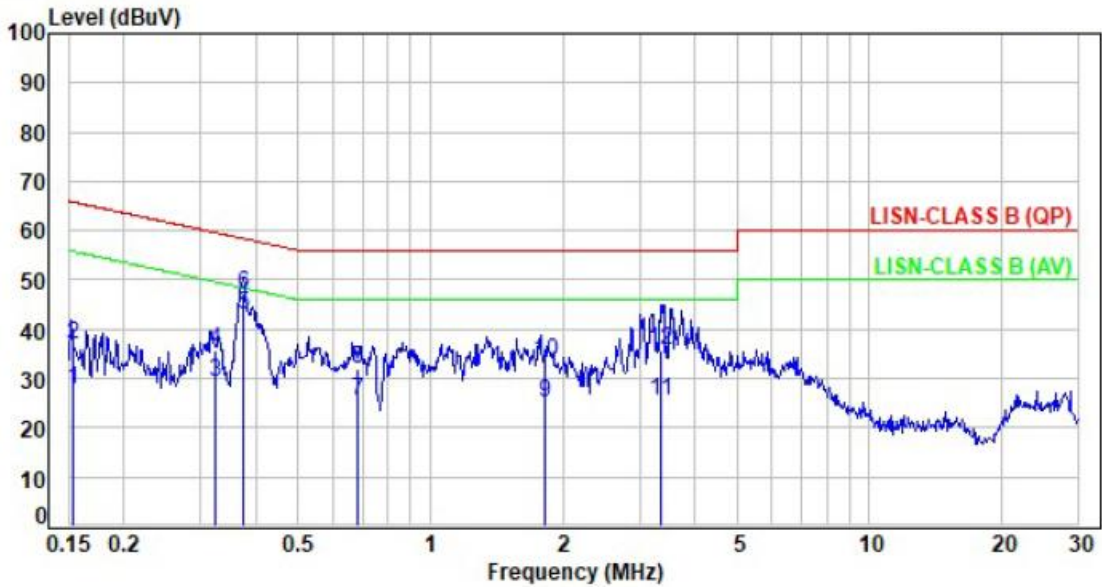




5.4 Test Result and Data

Test Mode	Mode 1	Pol/Phase	LINE
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor= (LISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

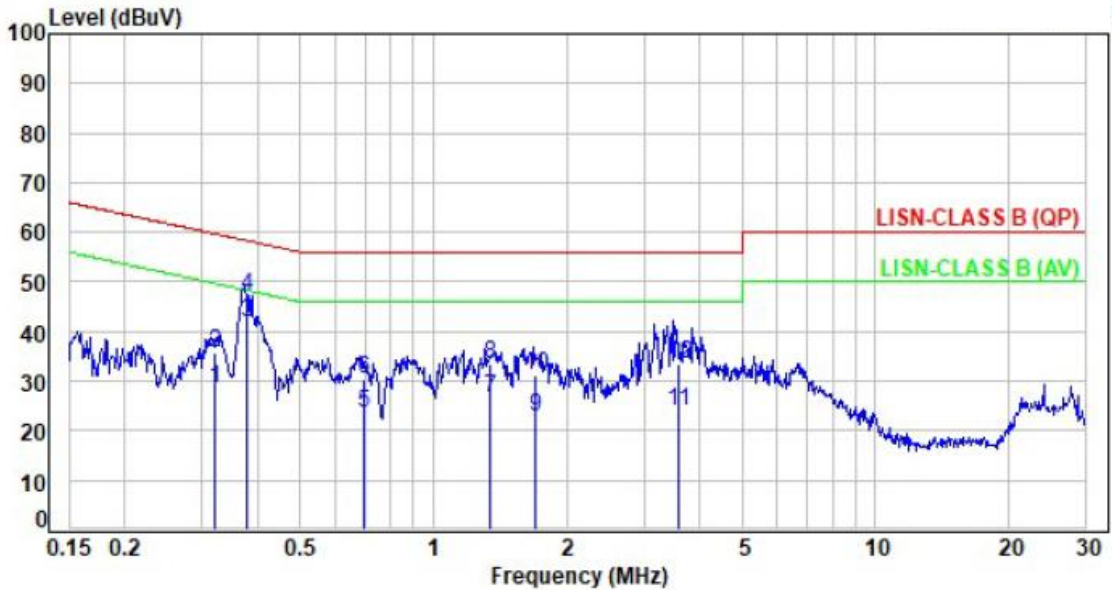


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.15	9.66	17.94	27.60	55.81	-28.21	Average	P
2	0.15	9.66	27.10	36.76	65.81	-29.05	QP	P
3	0.32	9.65	19.81	29.46	49.64	-20.18	Average	P
4	0.32	9.65	26.13	35.78	59.64	-23.86	QP	P
5	0.38	9.66	33.34	43.00	48.38	-5.38	Average	P
6	0.38	9.66	37.36	47.02	58.38	-11.36	QP	P
7	0.68	9.64	15.93	25.57	46.00	-20.43	Average	P
8	0.68	9.64	22.36	32.00	56.00	-24.00	QP	P
9	1.83	9.69	15.44	25.13	46.00	-20.87	Average	P
10	1.83	9.69	23.59	33.28	56.00	-22.72	QP	P
11	3.34	9.70	15.76	25.46	46.00	-20.54	Average	P
12	3.34	9.70	26.22	35.92	56.00	-20.08	QP	P



Test Mode	Mode 1	Pol/Phase	NEUTRAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor= (LISN or PLC or Current Probe) Factor + Cable Loss + Attenuator



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.32	9.57	18.96	28.53	49.70	-21.17	Average	P
2	0.32	9.57	26.09	35.66	59.70	-24.04	QP	P
3	0.38	9.57	32.25	41.82	48.35	-6.53	Average	P
4	0.38	9.57	37.49	47.06	58.35	-11.29	QP	P
5	0.69	9.58	13.83	23.41	46.00	-22.59	Average	P
6	0.69	9.58	20.79	30.37	56.00	-25.63	QP	P
7	1.34	9.60	17.06	26.66	46.00	-19.34	Average	P
8	1.34	9.60	24.00	33.60	56.00	-22.40	QP	P
9	1.71	9.60	13.22	22.82	46.00	-23.18	Average	P
10	1.71	9.60	21.46	31.06	56.00	-24.94	QP	P
11	3.59	9.68	14.33	24.01	46.00	-21.99	Average	P
12	3.59	9.68	23.73	33.41	56.00	-22.59	QP	P



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.

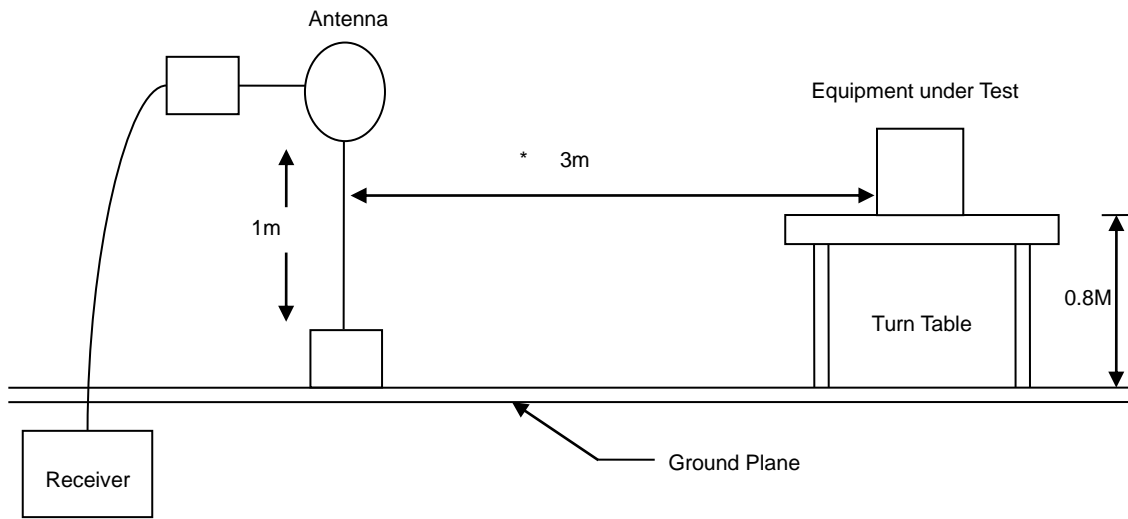
Note:

- 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. (Z-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.

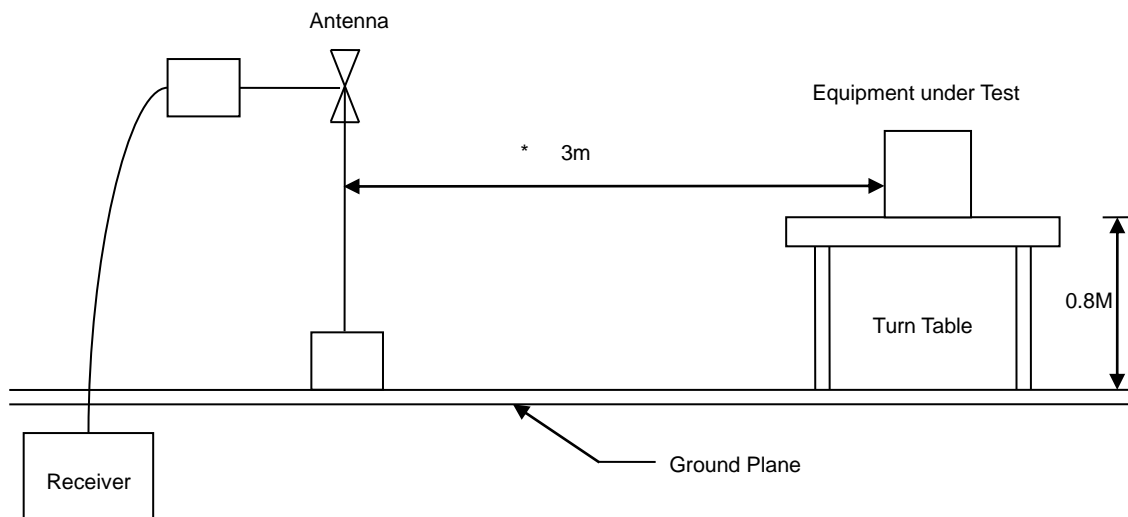


6.3 Typical Test Setup

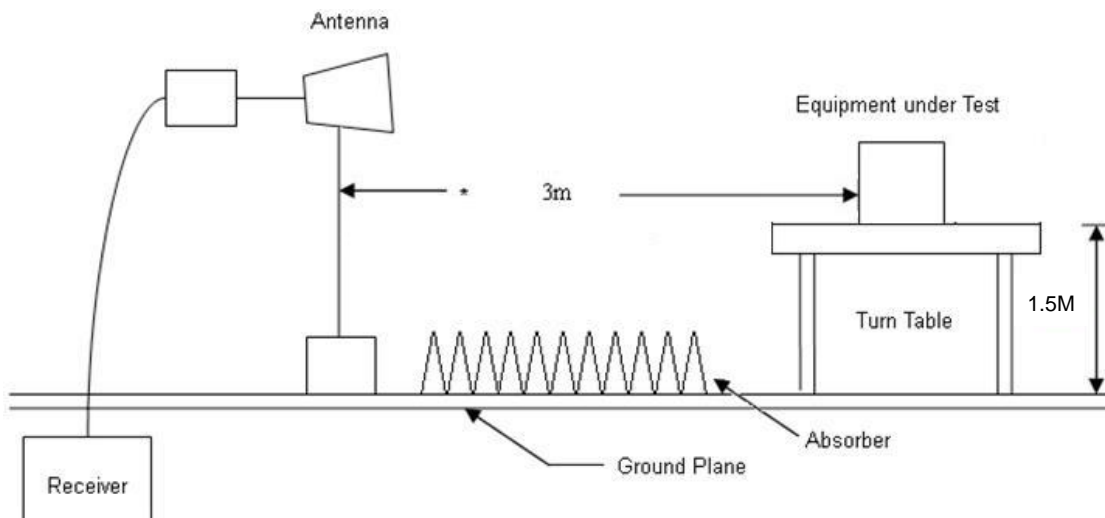
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

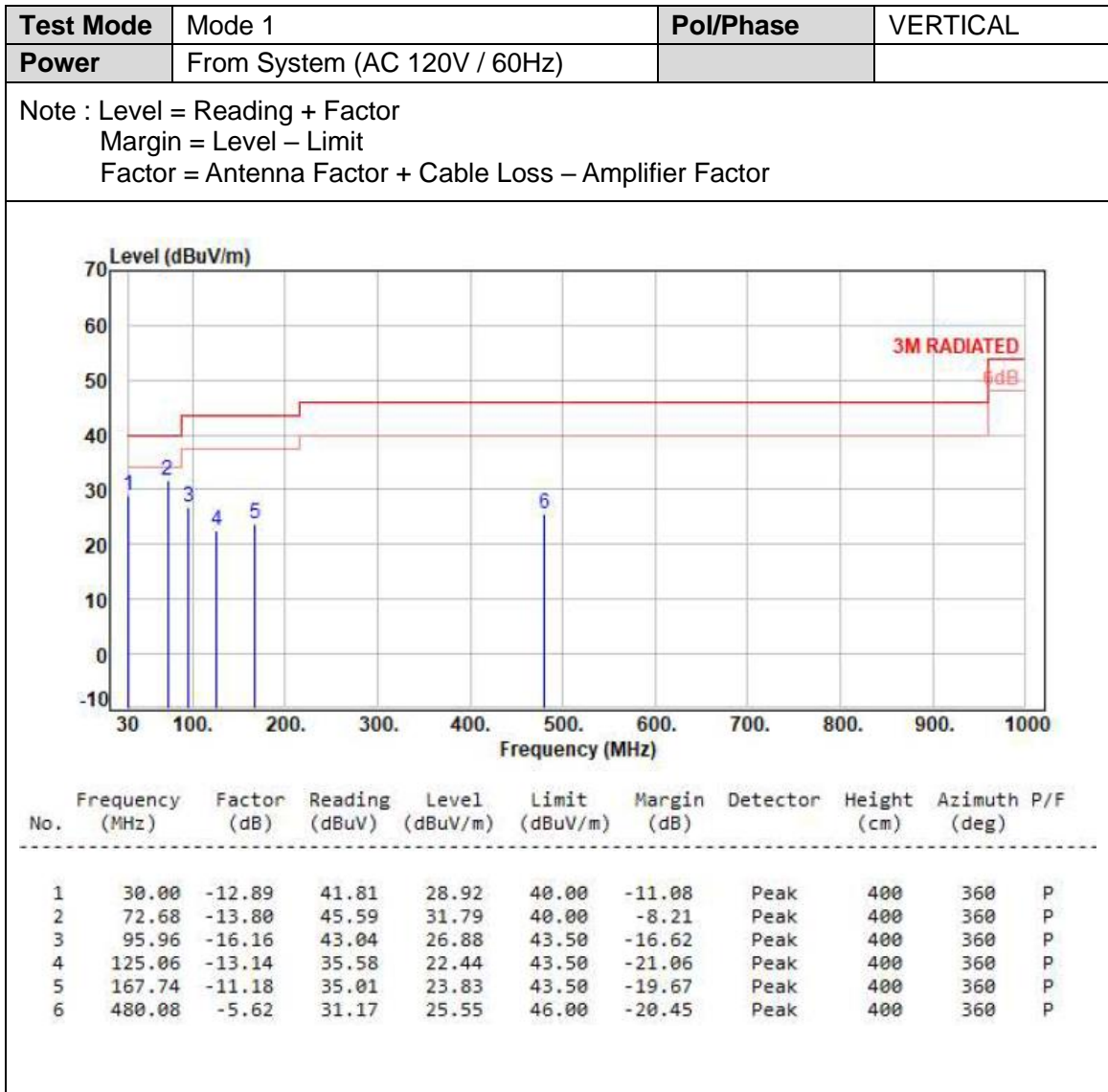




6.4 Test Result and Data (9kHz ~ 30MHz)

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

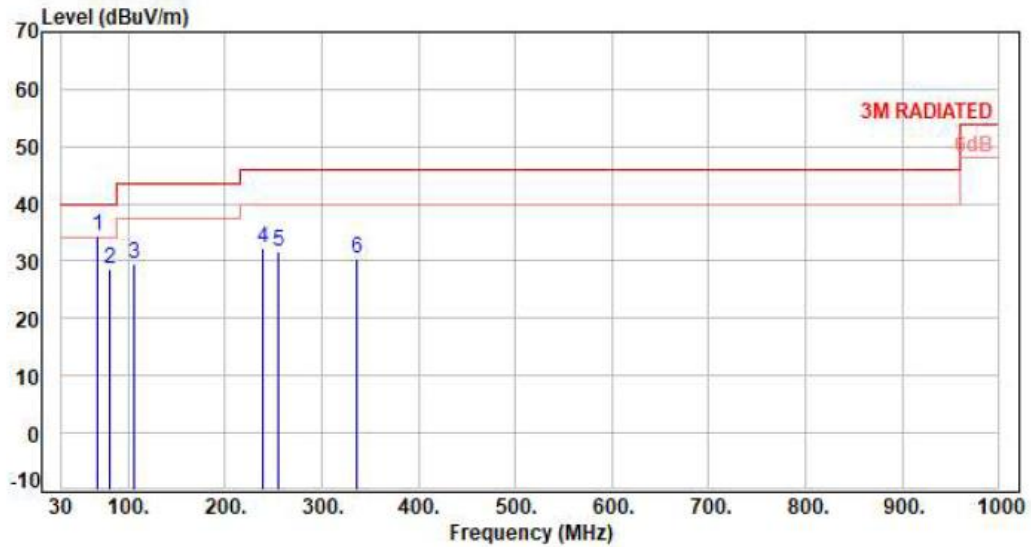
6.5 Test Result and Data (30MHz ~ 1GHz)





Test Mode	Mode 1	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

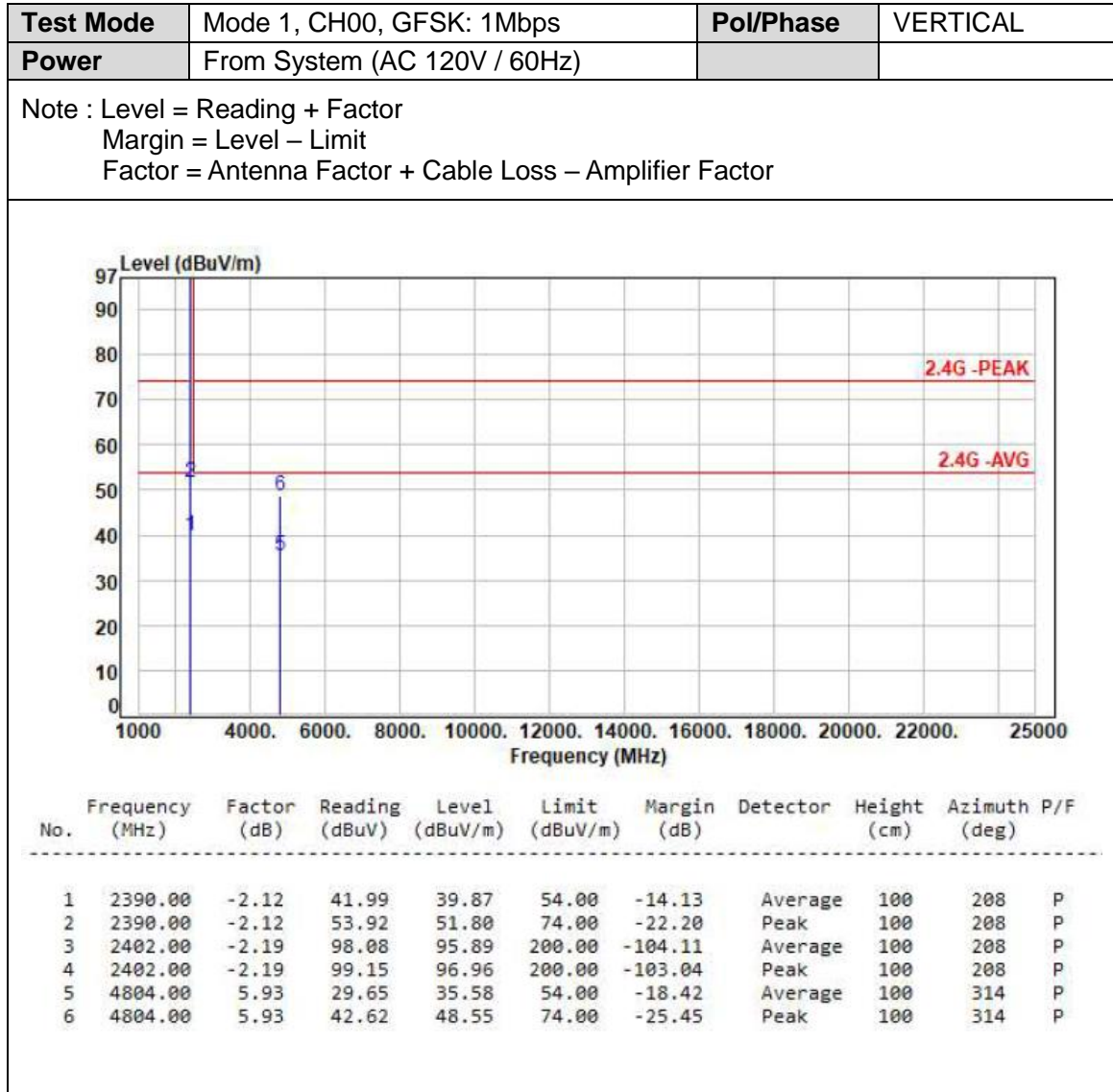
Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	68.80	-13.18	47.47	34.29	40.00	-5.71	Peak	400	360	P
2	80.44	-15.74	44.52	28.78	40.00	-11.22	QP	200	221	P
3	105.66	-14.75	44.30	29.55	43.50	-13.95	Peak	400	360	P
4	239.52	-12.61	44.80	32.19	46.00	-13.81	Peak	400	360	P
5	255.04	-11.90	43.61	31.71	46.00	-14.29	Peak	400	360	P
6	336.52	-9.06	39.51	30.45	46.00	-15.55	Peak	400	360	P



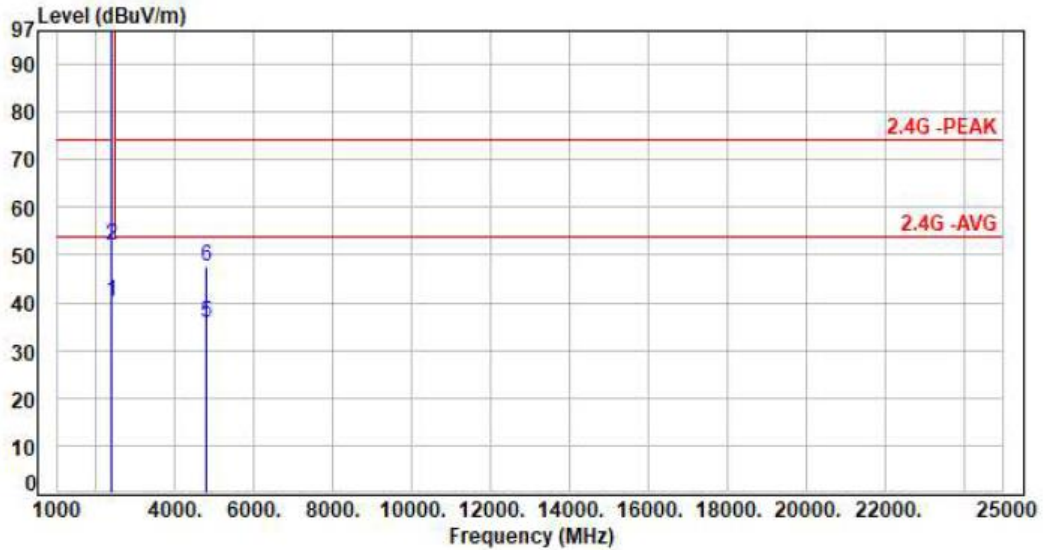
6.6 Test Result and Data (1GHz ~ 25GHz)





Test Mode	Mode 1, CH00, GFSK: 1Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

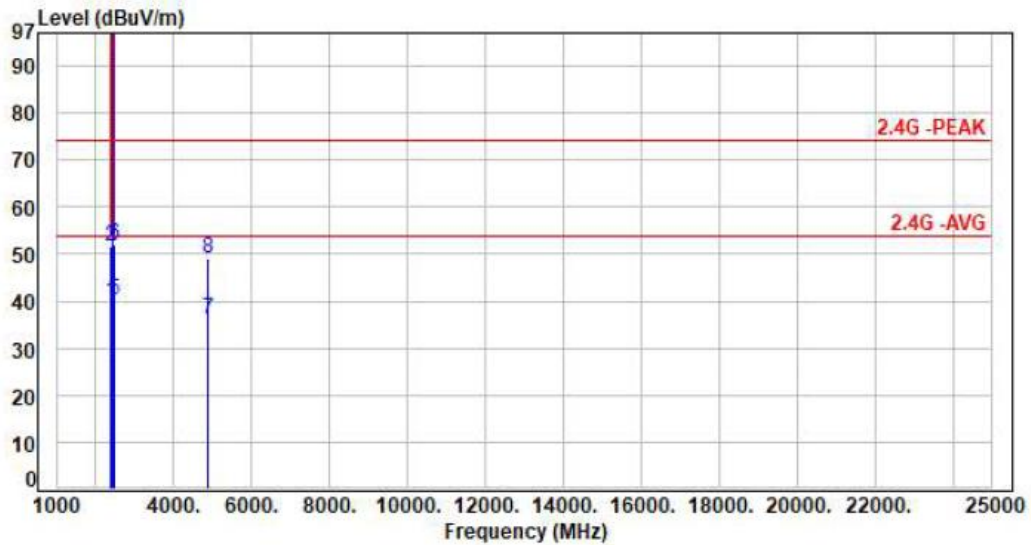


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.32	40.20	54.00	-13.80	Average	100	242	P
2	2390.00	-2.12	54.18	52.06	74.00	-21.94	Peak	100	242	P
3	2402.00	-2.19	103.94	101.75	200.00	-98.25	Average	100	242	P
4	2402.00	-2.19	104.81	102.62	200.00	-97.38	Peak	100	242	P
5	4804.00	5.93	29.87	35.80	54.00	-18.20	Average	100	221	P
6	4804.00	5.93	41.71	47.64	74.00	-26.36	Peak	100	221	P



Test Mode	Mode 1, CH19, GFSK: 1Mbps	Pol/Phase	VERTICAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

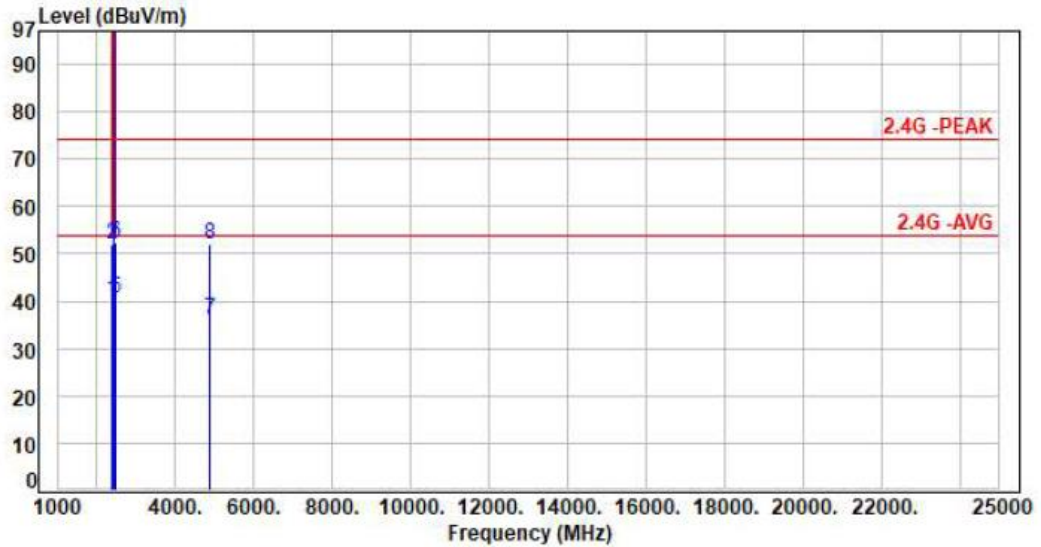


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.11	39.99	54.00	-14.01	Average	100	165	P
2	2390.00	-2.12	53.83	51.71	74.00	-22.29	Peak	100	165	P
3	2440.00	-2.06	98.46	96.40	200.00	-103.60	Average	100	165	P
4	2440.00	-2.06	99.56	97.50	200.00	-102.50	Peak	100	165	P
5	2483.50	-1.98	42.27	40.29	54.00	-13.71	Average	100	165	P
6	2483.50	-1.98	54.00	52.02	74.00	-21.98	Peak	100	165	P
7	4880.00	6.38	29.62	36.00	54.00	-18.00	Average	100	334	P
8	4880.00	6.38	42.68	49.06	74.00	-24.94	Peak	100	334	P



Test Mode	Mode 1, CH19, GFSK: 1Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

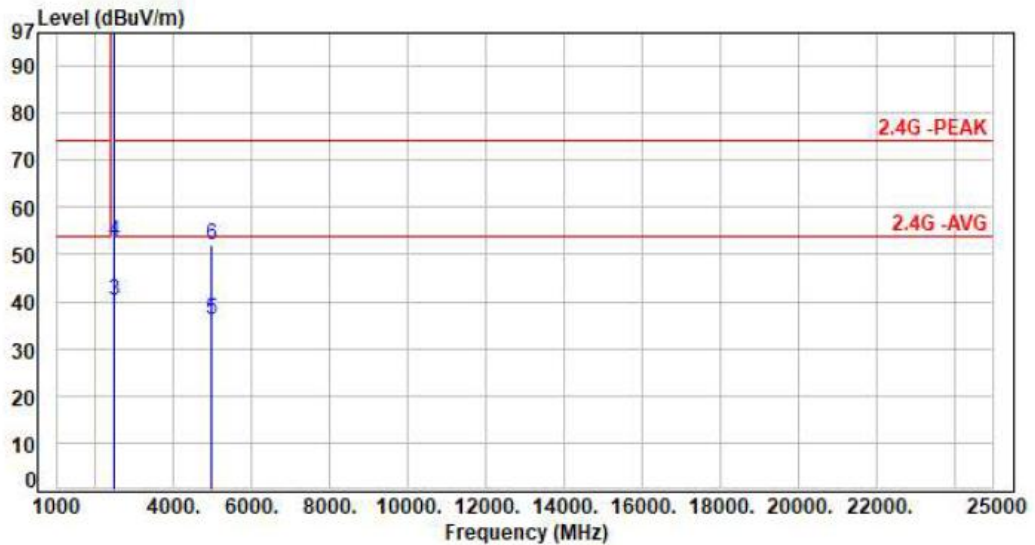


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.18	40.06	54.00	-13.94	Average	100	243	P
2	2390.00	-2.12	53.96	51.84	74.00	-22.16	Peak	100	243	P
3	2440.00	-2.06	103.93	101.87	200.00	-98.13	Average	100	243	P
4	2440.00	-2.06	105.02	102.96	200.00	-97.04	Peak	100	243	P
5	2483.50	-1.98	42.38	40.40	54.00	-13.60	Average	100	243	P
6	2483.50	-1.98	54.28	52.30	74.00	-21.70	Peak	100	243	P
7	4880.00	6.38	29.87	36.25	54.00	-17.75	Average	100	165	P
8	4880.00	6.38	45.62	52.00	74.00	-22.00	Peak	100	165	P



Test Mode	Mode 1, CH39, GFSK: 1Mbps	Pol/Phase	VERTICAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

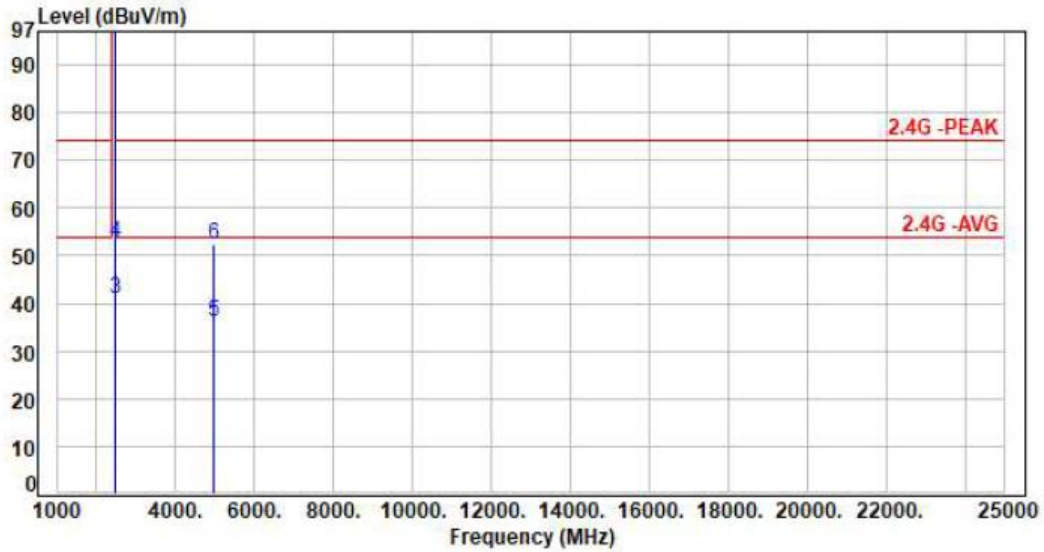


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2480.00	-2.01	99.61	97.60	200.00	-102.40	Average	100	178	P
2	2480.00	-2.01	100.68	98.67	200.00	-101.33	Peak	100	178	P
3	2483.50	-1.98	42.21	40.23	54.00	-13.77	Average	100	178	P
4	2483.50	-1.98	54.80	52.82	74.00	-21.18	Peak	100	178	P
5	4960.00	6.57	29.54	36.11	54.00	-17.89	Average	100	133	P
6	4960.00	6.57	45.52	52.09	74.00	-21.91	Peak	100	133	P



Test Mode	Mode 1, CH39, GFSK: 1Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

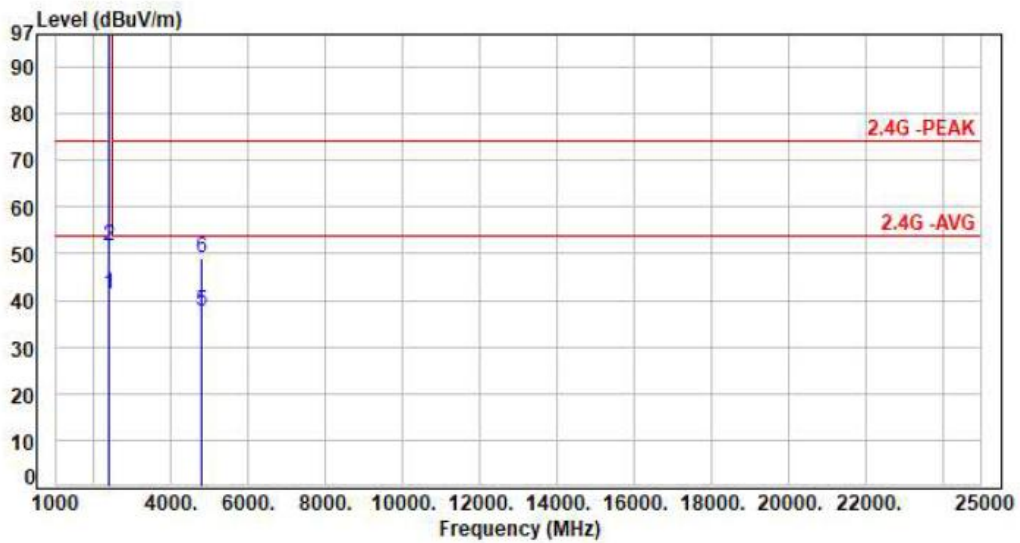


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2480.00	-2.01	102.99	100.98	200.00	-99.02	Average	100	17	P
2	2480.00	-2.01	103.90	101.89	200.00	-98.11	Peak	100	17	P
3	2483.50	-1.98	42.81	40.83	54.00	-13.17	Average	100	17	P
4	2483.50	-1.98	54.82	52.84	74.00	-21.16	Peak	100	17	P
5	4960.00	6.57	29.63	36.20	54.00	-17.80	Average	100	164	P
6	4960.00	6.57	45.82	52.39	74.00	-21.61	Peak	100	164	P



Test Mode	Mode 2, CH00, GFSK: 2Mbps	Pol/Phase	VERTICAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

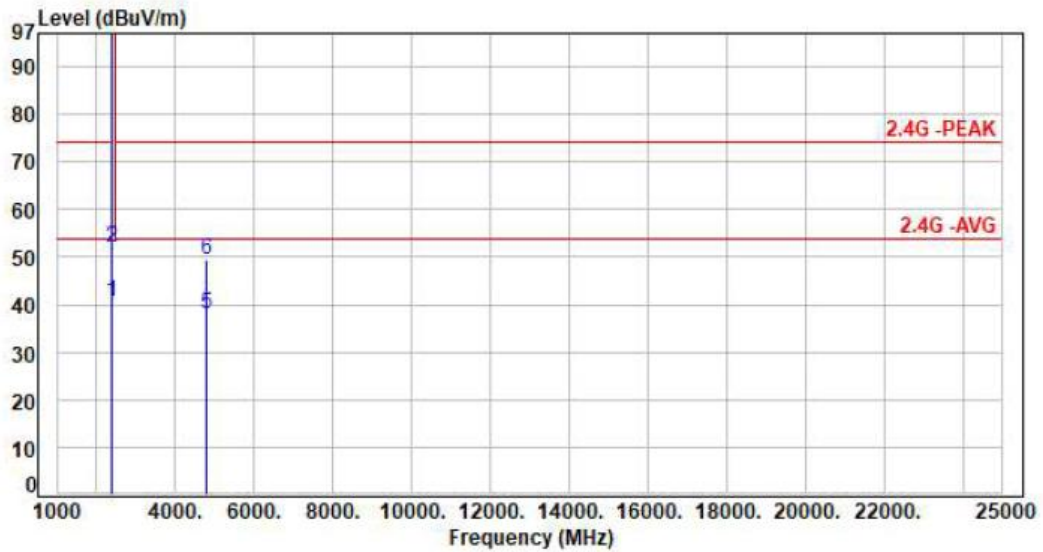


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	43.41	41.29	54.00	-12.71	Average	202	140	P
2	2390.00	-2.12	53.80	51.68	74.00	-22.32	Peak	202	140	P
3	2402.00	-2.19	103.71	101.52	200.00	-98.48	Average	202	140	P
4	2402.00	-2.19	106.37	104.18	200.00	-95.82	Peak	202	140	P
5	4804.00	5.93	31.56	37.49	54.00	-16.51	Average	100	268	P
6	4804.00	5.93	42.96	48.89	74.00	-25.11	Peak	100	268	P



Test Mode	Mode 2, CH00, GFSK: 2Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

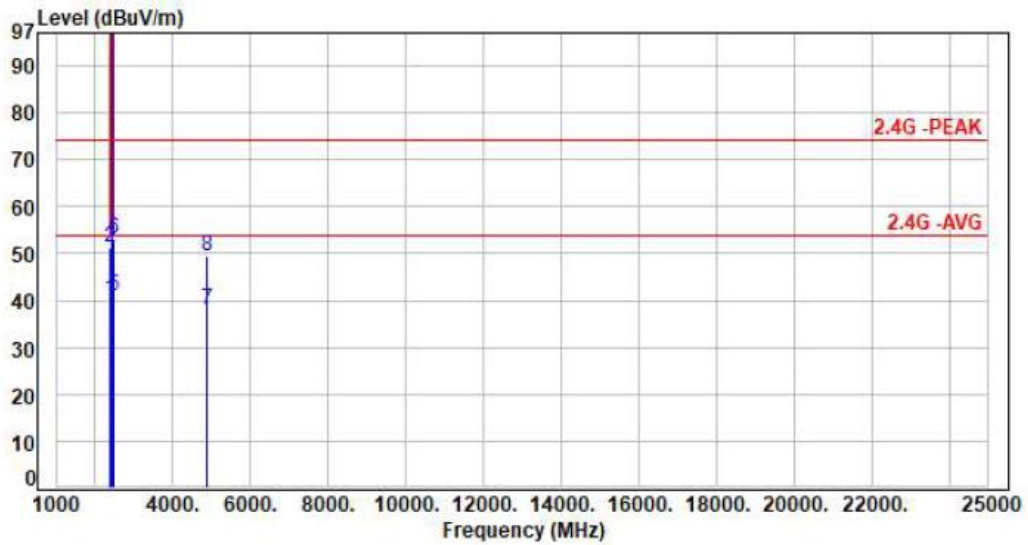


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.67	40.55	54.00	-13.45	Average	107	37	P
2	2390.00	-2.12	54.29	52.17	74.00	-21.83	Peak	107	37	P
3	2402.00	-2.19	100.57	98.38	200.00	-101.62	Average	107	37	P
4	2402.00	-2.19	103.20	101.01	200.00	-98.99	Peak	107	37	P
5	4804.00	5.93	32.19	38.12	54.00	-15.88	Average	100	321	P
6	4804.00	5.93	43.57	49.50	74.00	-24.50	Peak	100	321	P



Test Mode	Mode 2, CH19, GFSK: 2Mbps	Pol/Phase	VERTICAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

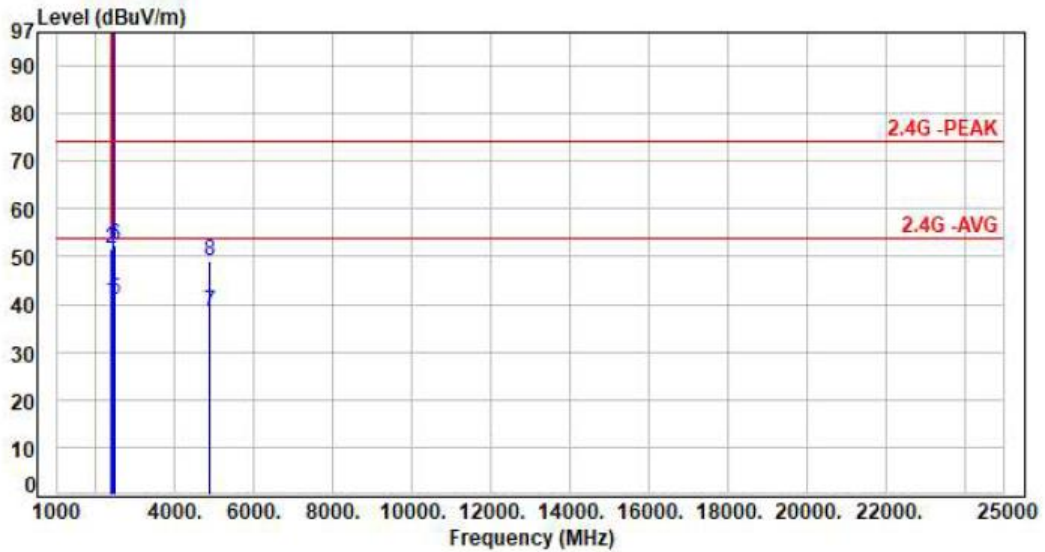


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.47	40.35	54.00	-13.65	Average	322	141	P
2	2390.00	-2.12	53.51	51.39	74.00	-22.61	Peak	322	141	P
3	2440.00	-2.06	104.34	102.28	200.00	-97.72	Average	322	141	P
4	2440.00	-2.06	107.07	105.01	200.00	-94.99	Peak	322	141	P
5	2483.50	-1.98	42.77	40.79	54.00	-13.21	Average	322	141	P
6	2483.50	-1.98	55.08	53.10	74.00	-20.90	Peak	322	141	P
7	4880.00	6.38	31.72	38.10	54.00	-15.90	Average	100	263	P
8	4880.00	6.38	43.08	49.46	74.00	-24.54	Peak	100	263	P



Test Mode	Mode 2, CH19, GFSK: 2Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

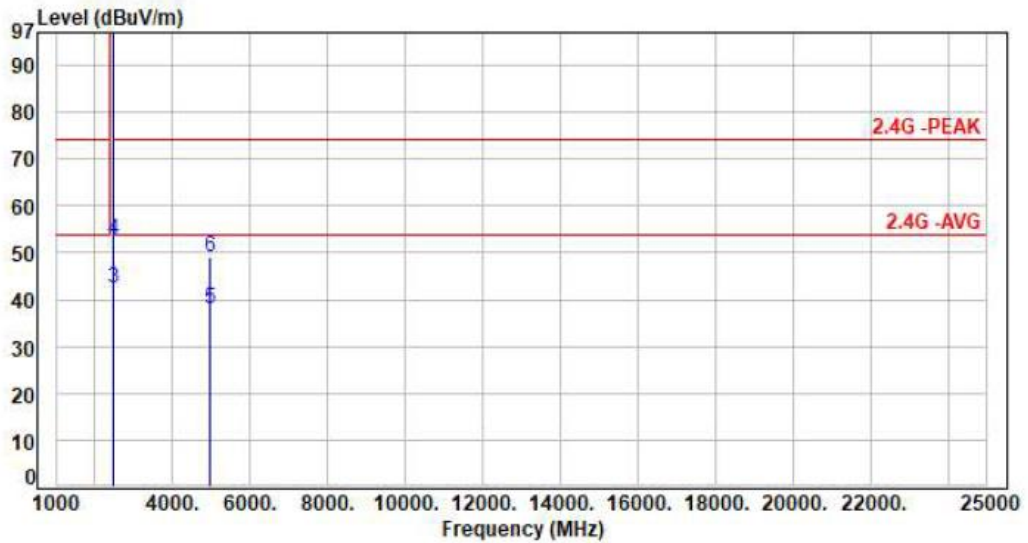


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-2.12	42.55	40.43	54.00	-13.57	Average	131	142	P
2	2390.00	-2.12	53.76	51.64	74.00	-22.36	Peak	131	142	P
3	2440.00	-2.06	102.70	100.64	200.00	-99.36	Average	131	142	P
4	2440.00	-2.06	105.44	103.38	200.00	-96.62	Peak	131	142	P
5	2483.50	-1.98	42.86	40.88	54.00	-13.12	Average	131	142	P
6	2483.50	-1.98	54.39	52.41	74.00	-21.59	Peak	131	142	P
7	4880.00	6.38	31.86	38.24	54.00	-15.76	Average	100	316	P
8	4880.00	6.38	42.77	49.15	74.00	-24.85	Peak	100	316	P



Test Mode	Mode 2, CH39, GFSK: 2Mbps	Pol/Phase	VERTICAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor

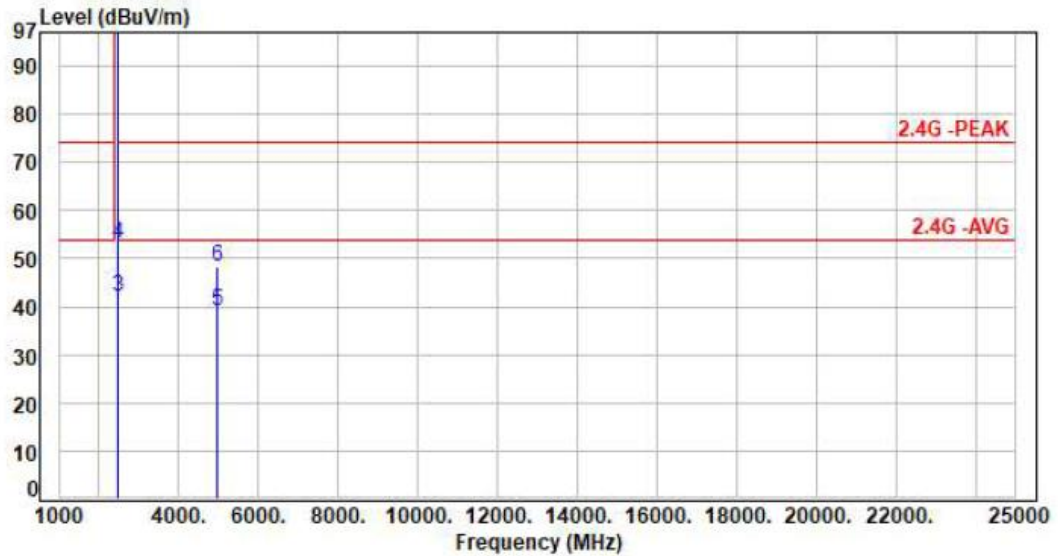


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2480.00	-2.01	102.87	100.86	200.00	-99.14	Average	315	142	P
2	2480.00	-2.01	106.00	103.99	200.00	-96.01	Peak	315	142	P
3	2483.50	-1.98	44.47	42.49	54.00	-11.51	Average	315	142	P
4	2483.50	-1.98	54.89	52.91	74.00	-21.09	Peak	315	142	P
5	4960.00	6.57	31.40	37.97	54.00	-16.03	Average	100	267	P
6	4960.00	6.57	42.39	48.96	74.00	-25.04	Peak	100	267	P



Test Mode	Mode 2, CH39, GFSK: 2Mbps	Pol/Phase	HORIZONTAL
Power	From System (AC 120V / 60Hz)		

Note : Level = Reading + Factor
 Margin = Level – Limit
 Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2480.00	-2.01	101.21	99.20	200.00	-100.80	Average	129	143	P
2	2480.00	-2.01	104.29	102.28	200.00	-97.72	Peak	129	143	P
3	2483.50	-1.98	44.11	42.13	54.00	-11.87	Average	129	143	P
4	2483.50	-1.98	54.96	52.98	74.00	-21.02	Peak	129	143	P
5	4960.00	6.57	32.51	39.08	54.00	-14.92	Average	100	259	P
6	4960.00	6.57	41.73	48.30	74.00	-25.70	Peak	100	259	P



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

According to the methods defined in ANSI C63.10-2013 Section 11.11.1

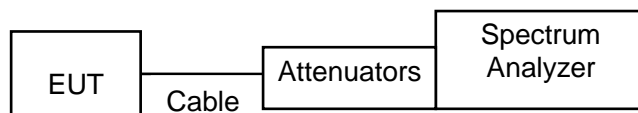
Below -30dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

7.2 Test Procedure

According to the methods defined in ANSI C63.10-2013 Section 11.11.2 & 11.11.3

- 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 30dB relative to the maximum measured in-band peak PSD level.
- d. The band edges was measured and recorded.

7.3 Test Setup Layout



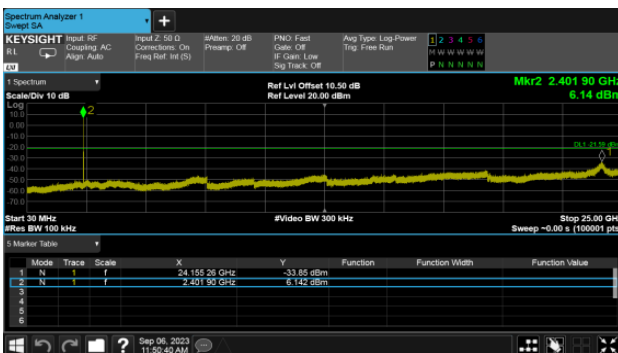
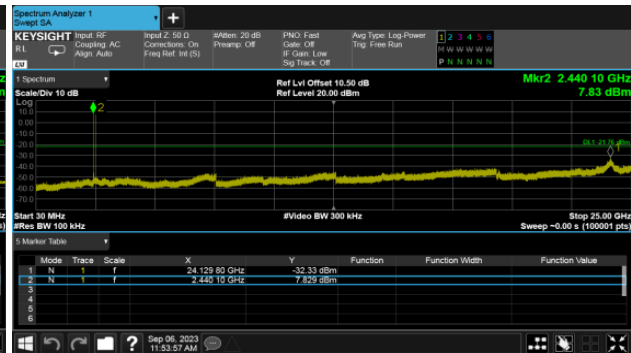
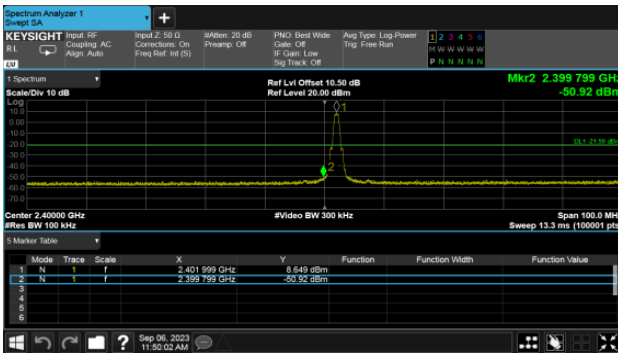
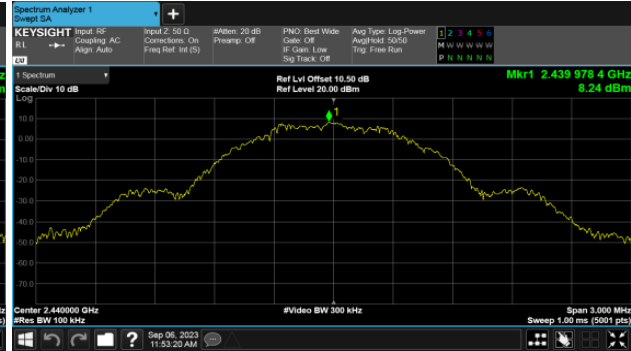
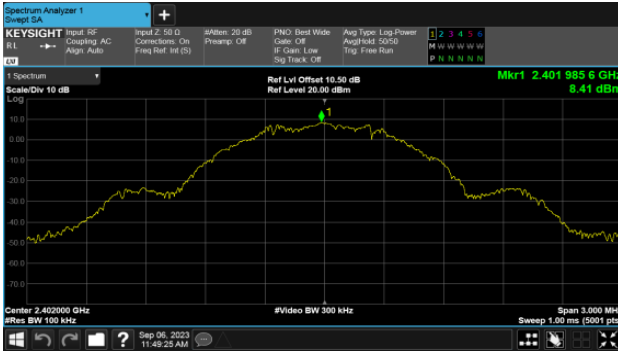
7.4 Test Result and Data

Note: Test plots refer to the following pages.



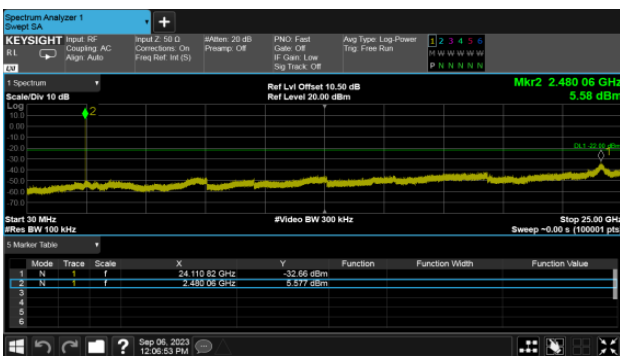
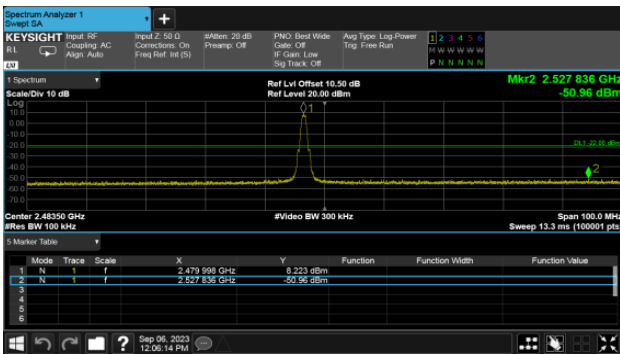
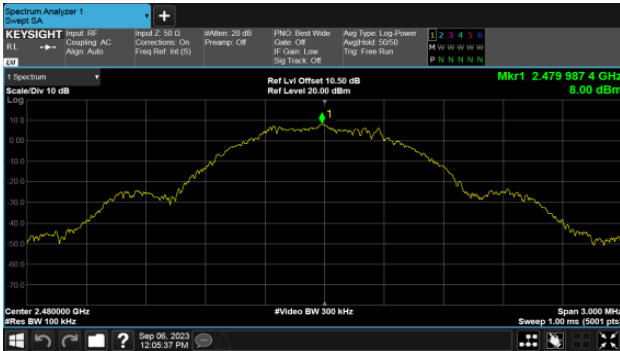
Modulation Type: GFSK(1Mbps)
CH00

Modulation Type: GFSK(1Mbps)
CH19





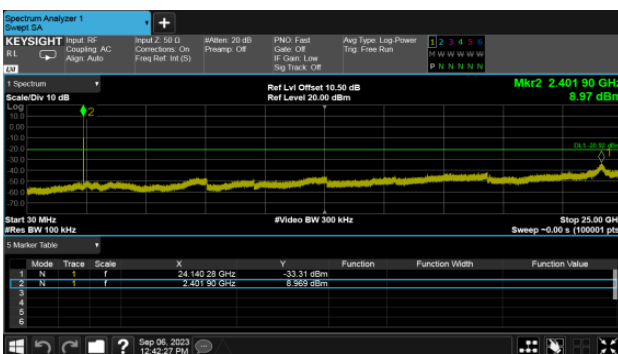
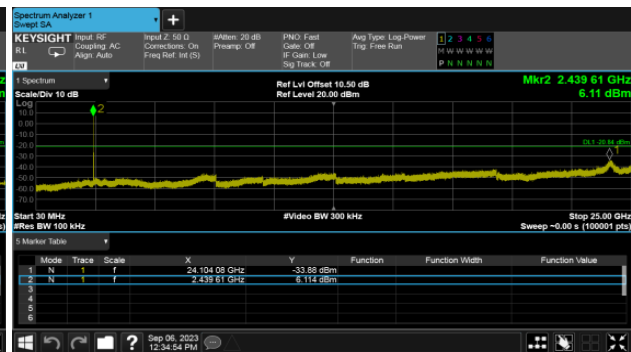
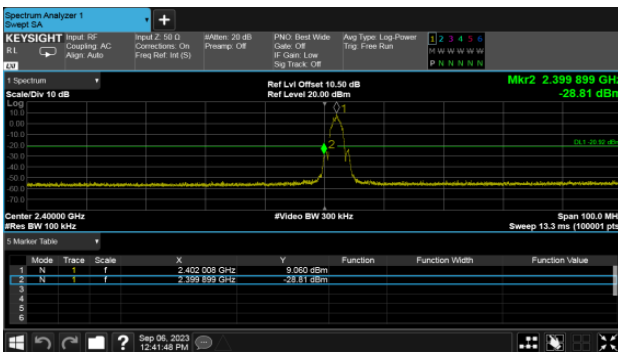
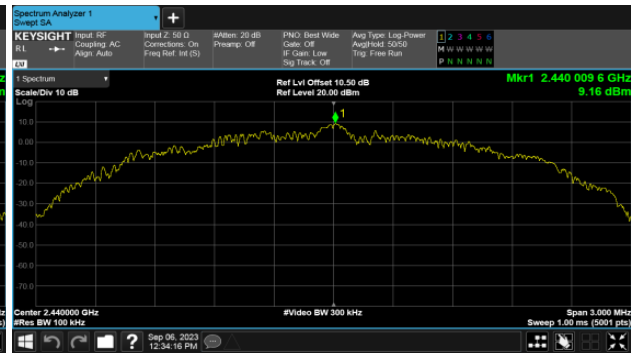
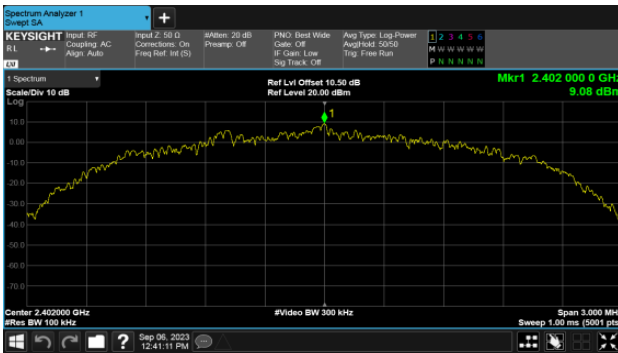
Modulation Type: GFSK(1Mbps)
CH39





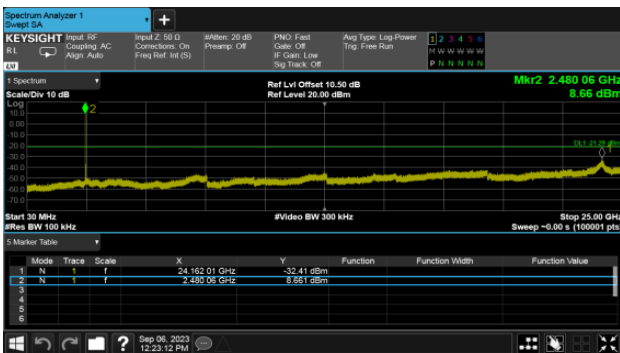
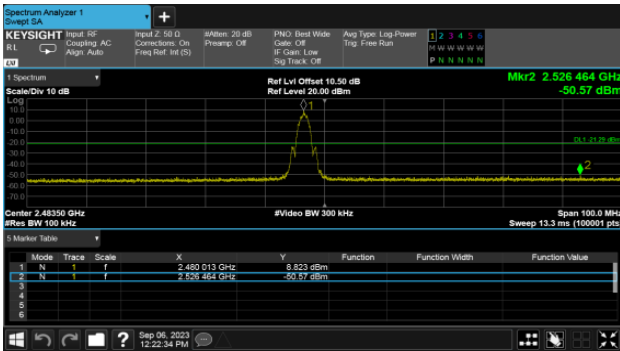
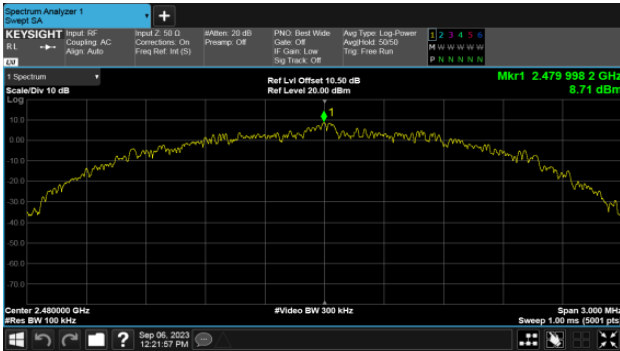
Modulation Type: GFSK(2Mbps)
CH00

Modulation Type: GFSK(2Mbps)
CH19





Modulation Type: GFSK(2Mbps)
CH39





8. On Time, Duty Cycle and Measurement methods

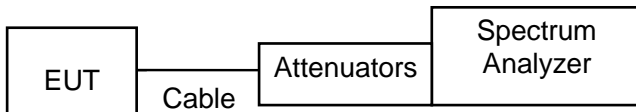
8.1 Test Limit

None; for reporting purposes only.

8.2 Test Procedure

According to the methods defined in ANSI C63.10-2013 Section 11.6 Zero-Span Spectrum Analyzer Method.

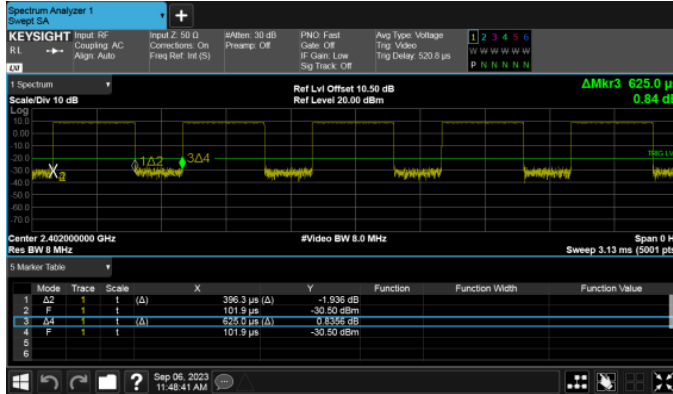
8.3 Test Setup Layout



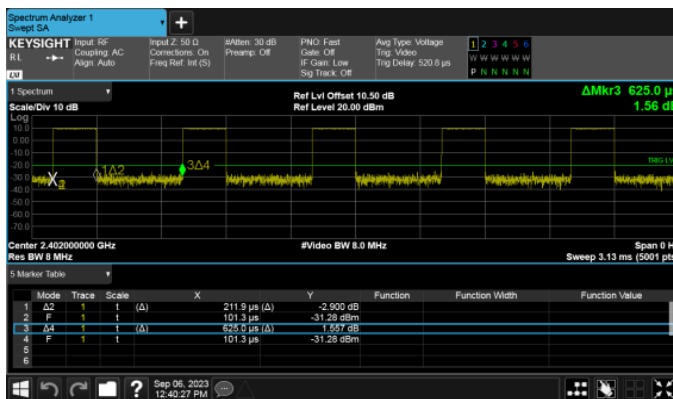
8.4 Test Result and Data

Modulation Type	On Time (ms)	Period Time (ms)	Duty Cycle (%)
GFSK(1Mbps)	0.40	0.63	63.41%
GFSK(2Mbps)	0.21	0.63	33.83%

Modulation Type: GFSK(1Mbps)



Modulation Type: GFSK(2Mbps)





9. 6dB Bandwidth Measurement Data

9.1 Test Limit

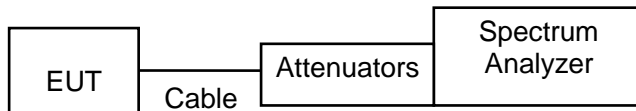
The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

9.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 11.8

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

9.3 Test Setup Layout

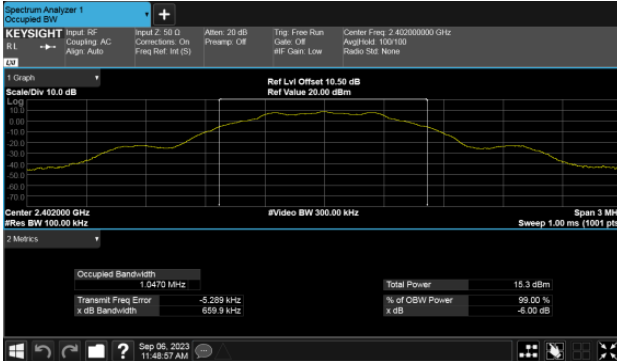


9.4 Test Result and Data

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)
GFSK(1Mbps)	0	2402	659.90	500
	19	2440	669.90	500
	39	2480	665.10	500
GFSK(2Mbps)	0	2402	1128.00	500
	19	2440	1134.00	500
	39	2480	1134.00	500



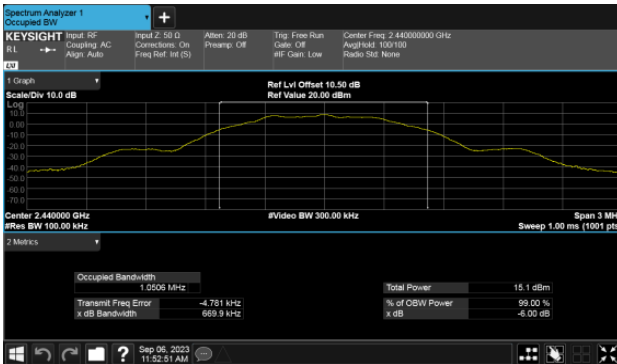
Modulation Type: GFSK(1Mbps)
CH00



Modulation Type: GFSK(2Mbps)
CH00



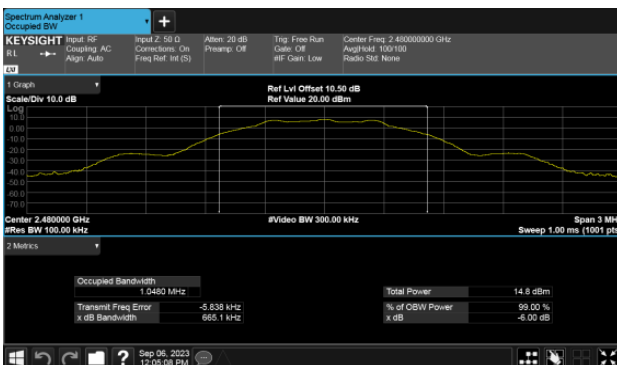
Modulation Type: GFSK(1Mbps)
CH19



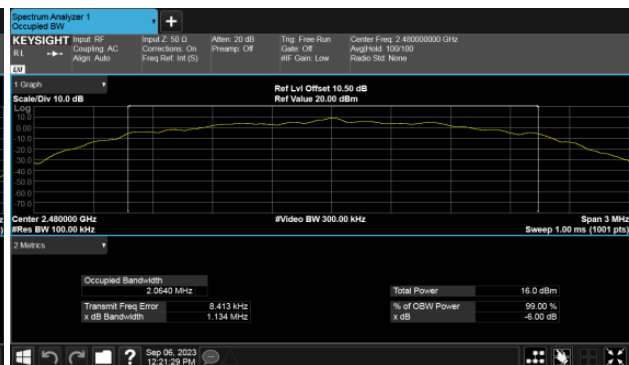
Modulation Type: GFSK(2Mbps)
CH19



Modulation Type: GFSK(1Mbps)
CH39



Modulation Type: GFSK(2Mbps)
CH39





10. Maximum Average Output Power

10.1 Test Limit

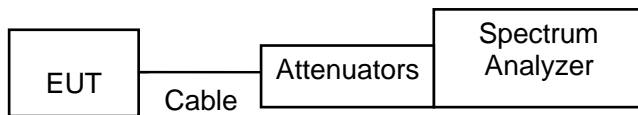
The Maximum Output Power Measurement is 30dBm.

10.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 11.9.2.3.2

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

Conducted Setting	Modulation Type	Channel	Frequency (MHz)	Power Output (dBm)	Power Output (mW)
				Average	Average
Default	GFSK (1Mbps)	0	2402	5.54	3.581
Default		19	2440	5.51	3.556
Default		39	2480	5.52	3.565
Default	GFSK (2Mbps)	0	2402	6.79	4.775
Default		19	2440	6.76	4.742
Default		39	2480	6.72	4.699



11. Power Spectral Density

11.1 Test Limit

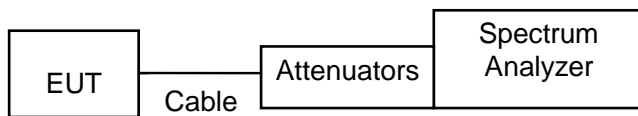
The Maximum of Power Spectral Density Measurement is 8dBm.

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

11.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 11.10.1

11.3 Test Setup Layout



11.4 Test Result and Data

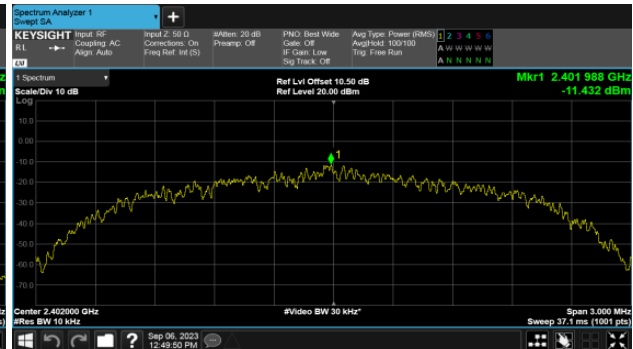
Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 10KHz Bandwidth(dBm)	Duty Cycle CF(dB)	Total PSD (dBm)	Limit
GFSK (1Mbps)	0	2402	-8.169	1.98	-6.19	8.00
	19	2440	-7.959	1.98	-5.98	8.00
	39	2480	-7.917	1.98	-5.94	8.00
GFSK (2Mbps)	0	2402	-11.432	4.71	-6.73	8.00
	19	2440	-11.199	4.71	-6.49	8.00
	39	2480	-11.169	4.71	-6.46	8.00



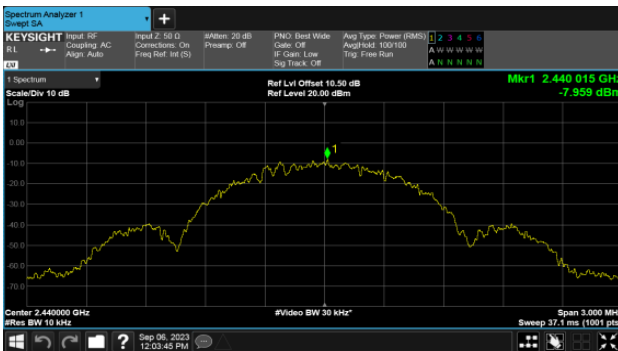
Modulation Type: GFSK(1Mbps)
CH00



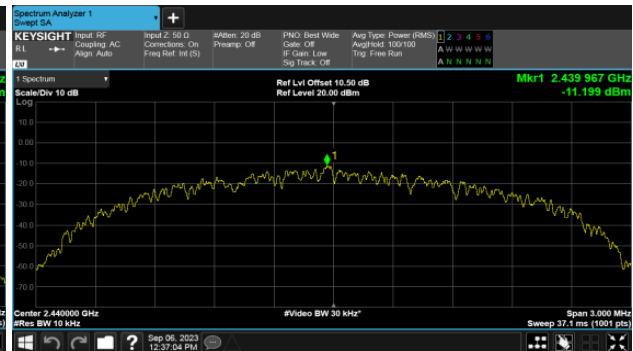
Modulation Type: GFSK(2Mbps)
CH00



Modulation Type: GFSK(1Mbps)
CH19



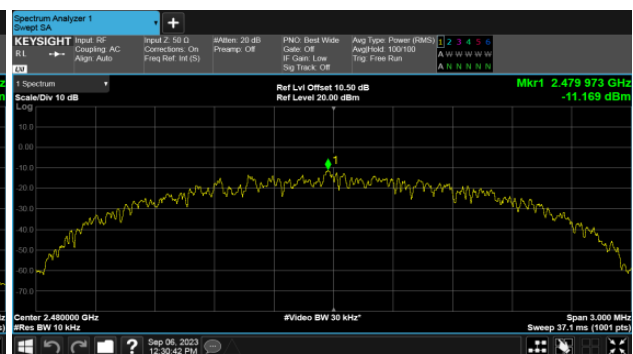
Modulation Type: GFSK(2Mbps)
CH19



Modulation Type: GFSK(1Mbps)
CH39



Modulation Type: GFSK(2Mbps)
CH39



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