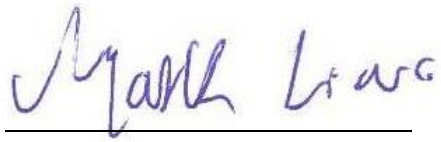
FCC RADIO TEST REPORT

Applicant	:	Sperry Corporation
Address	:	8F-7, No. 369, Fuxing N. Rd., Songshan Dist., Taipei City 105, Taiwan (R.O.C.)
Equipment	:	Dual Catchmon
Model No.	:	DC-1218
Trade Name	:	MEGACOM
FCC ID	:	2ASCN-DC1218

I HEREBY CERTIFY THAT :

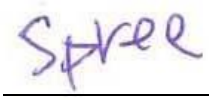
The sample was received on Jan. 25, 2019 and the testing was completed on Mar. 11, 2019 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:



Mark Liao / Supervisor

Tested by:



Spree Yeh / Engineer

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

Contents

History of this test report

Report No.	Issue Date	Description
TEFQ1901254	Mar. 13, 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

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Operation Frequency	2402MHz~2483.5MHz
Channel Spacing	2 MHz
Modulation Type	GFSK
Number of Channel	40
Power rating	DC 3V, AAA batteries*2
Data Rate	GFSK: 1Mbps
Antenna Type	ANT A / B: PCB Antenna
Antenna Gain	ANT A / B: -6.72dBi

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. An executive program was executed to transmit and receive data via Bluetooth.
c. The following test modes were performed for the test:

Radiated Emissions	
Test Mode	Operating Description
1	GFSK (1Mbps) For ANT A
2	GFSK (1Mbps) For ANT B

2.4 Description of Test System

The EUT was tested alone. No support devices are needed for testing.

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 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582	
	FCC	TW1079, TW1061,TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

2.6 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated Spurious Emission(9KHz~30MHz)	±5.007dB
Radiated Spurious Emission(30MHz~1GHz)	±5.157dB
Radiated Spurious Emission(1GHz~18GHz)	±6.383dB
Radiated Spurious Emission(18GHz~40GHz)	±6.648dB
Conducted Spurious Emission	±1.253dB
6dB Bandwidth	±6.89%
Power Spectral Density	±0.630dB
26 dB Occupied Bandwidth	±6.10%
Frequency Stability	±375KHz
Channel Frequencies Separation	±6.10%
20dB Bandwidth	±6.12%
Dwell Time	±1.34%
Peak Output Power(Conducted Power Meter)	±0.86dB
Temperature	±1.2℃
Humidity	±2.7%
Channel Move Time	±4.53%
Channel Closing Transmission Time	±6.61%
Threshold	±0.631dB
Non occupancy period	±1.17%

3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2018/09/17	2019/09/16
Active Loop Antenna	EMCO	6507	40855	2018/05/22	2019/05/21
Horn Antenna	EMCO	3115	31589	2018/04/02	2019/04/01
Horn Anrenna	EMCO	3116	31974	2018/09/07	2019/09/06
EMI Receiver	ROHDE & SCHWARZ	ESCI 3	101423	2018/06/11	2019/06/10
Spectrum Analyzer	ROHDE & SCHWARZ	FSP40	100047	2018/03/20	2019/03/19
Preamplifier	EM Electronics corp.	EM330	60659	2018/03/20	2019/03/19
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2018/09/18	2019/09/17
BLUETOOTH TESTER	ROHDE & SCHWARZ	CBT	101133	2018/04/02	2019/04/01
Cable-3in1-(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2018/04/20	2019/04/19
Cable-0.5m-(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2018/03/27	2019/03/26
Cable-3m-(1G-40G)	Rapidtek	40GHZ 300CM	38MS-38MS300314	2018/03/27	2019/03/26
Cable-8m-(1G-40G)	Rapidtek	40GHZ 800CM	38MS-38MS800314	2018/03/27	2019/03/26
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
Spectrum Analyzer	ROHDE & SCHWARZ	FSP40	100219	2018/07/03	2019/07/02
BLUETOOTH TESTER	ROHDE & SCHWARZ	CBT	101133	2018/04/02	2019/04/01
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	2018/03/23	2019/03/22

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	PCB Antenna
Gain	-6.72 dBi

5. Test of AC Power Line Conducted Emission

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

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).

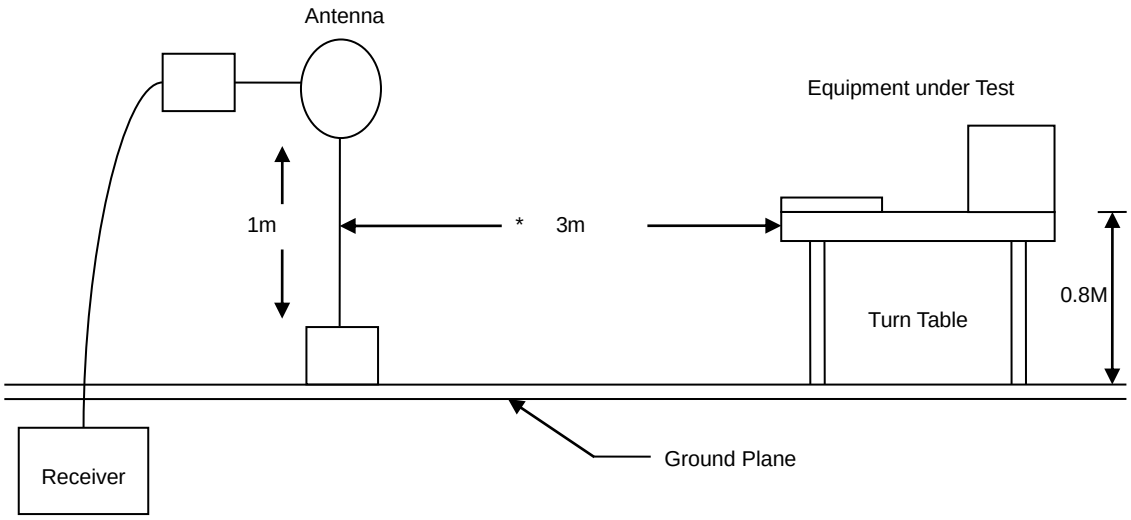
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

6.2 Test Procedures

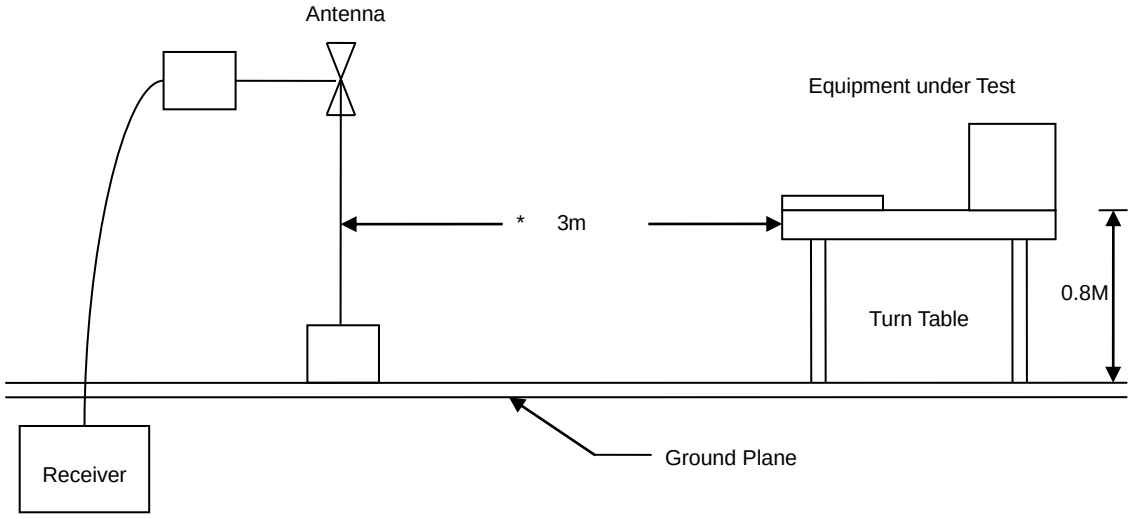
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna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

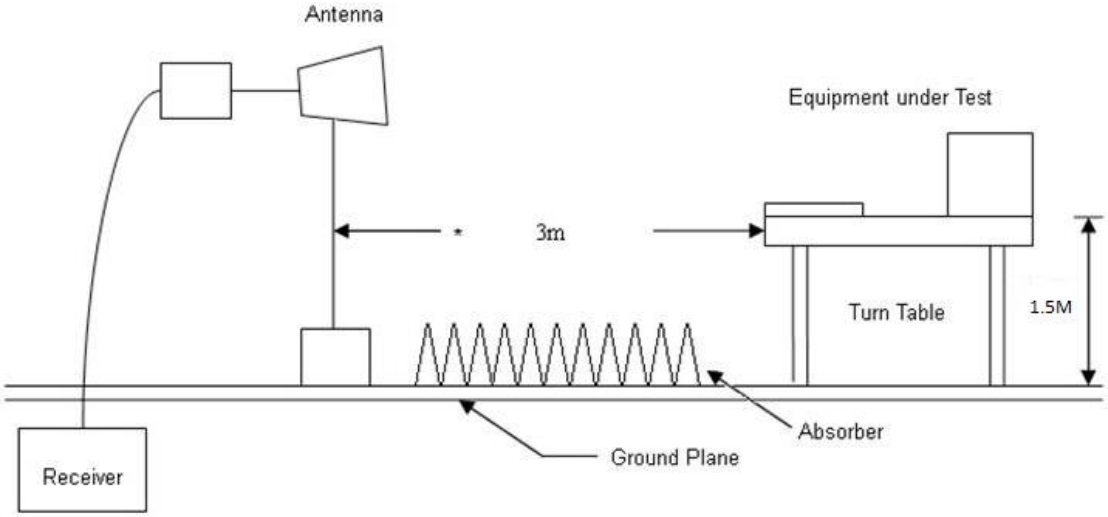
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

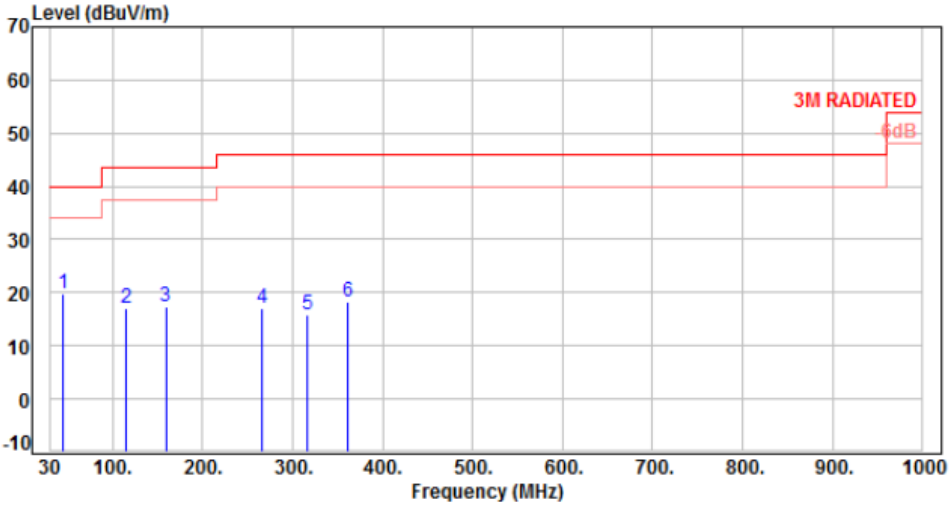


6.4 Test Result and Data (9kHz ~ 30MHz)

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

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

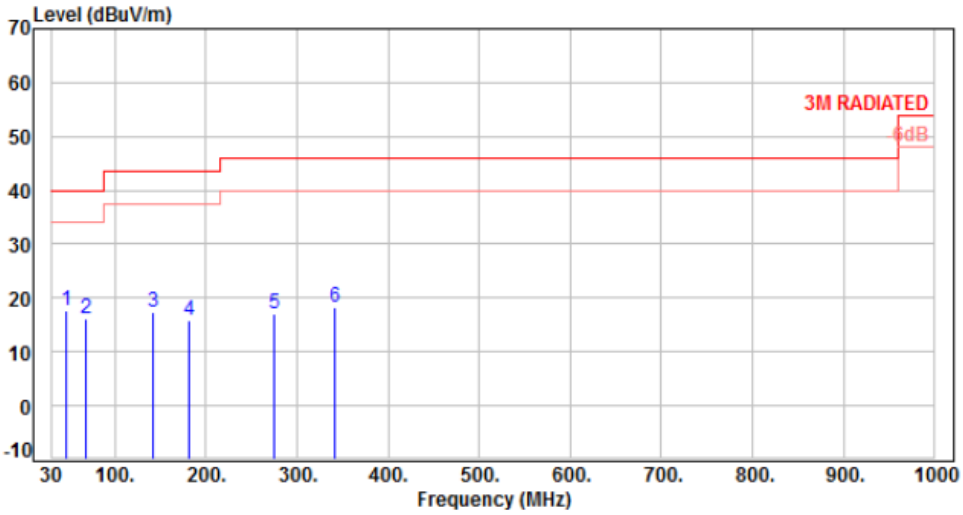
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	45.52	-9.77	29.67	19.90	40.00	-20.10	Peak	400	0	P
2	115.36	-12.53	29.69	17.16	43.50	-26.34	Peak	400	0	P
3	159.01	-9.49	26.72	17.23	43.50	-26.27	Peak	400	0	P
4	265.71	-9.99	26.93	16.94	46.00	-29.06	Peak	400	0	P
5	317.12	-8.38	24.27	15.89	46.00	-30.11	Peak	400	0	P
6	360.77	-7.13	25.28	18.15	46.00	-27.85	Peak	400	0	P

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

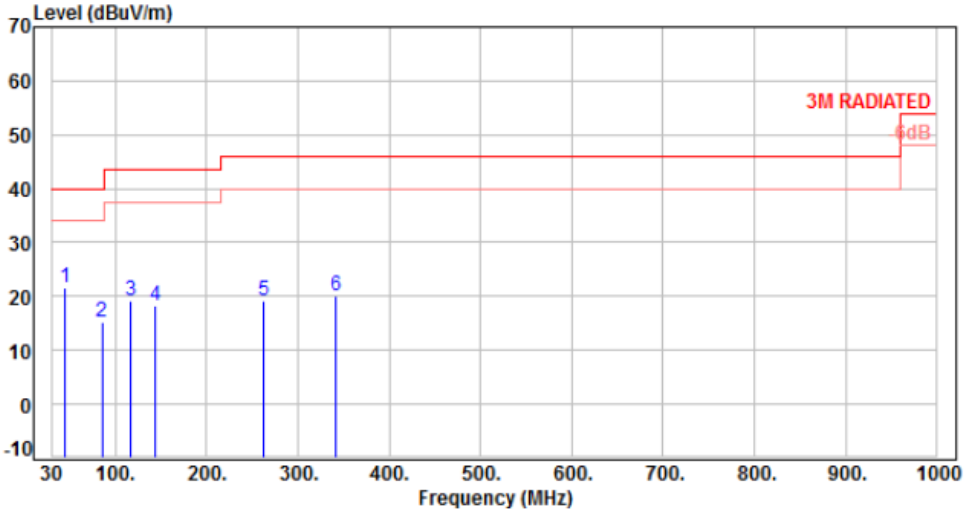
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	47.46	-9.72	27.38	17.66	40.00	-22.34	Peak	100	0	P
2	68.80	-11.55	27.56	16.01	40.00	-23.99	Peak	100	0	P
3	142.52	-9.91	27.42	17.51	43.50	-25.99	Peak	100	0	P
4	182.29	-11.42	27.41	15.99	43.50	-27.51	Peak	100	0	P
5	274.44	-9.51	26.60	17.09	46.00	-28.91	Peak	100	0	P
6	341.37	-7.61	25.90	18.29	46.00	-27.71	Peak	100	0	P

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

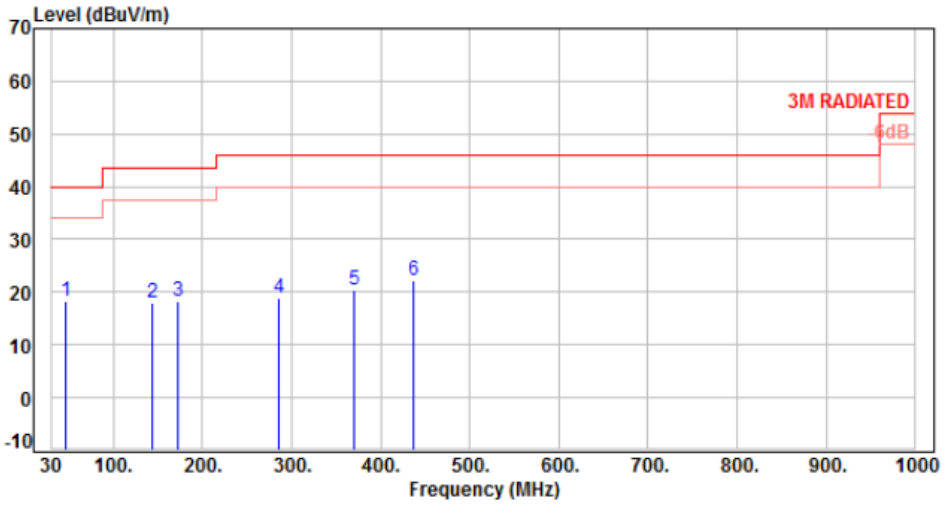
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	45.52	-9.77	31.29	21.52	40.00	-18.48	Peak	400	0	P
2	85.29	-15.06	30.39	15.33	40.00	-24.67	Peak	400	0	P
3	117.30	-12.27	31.45	19.18	43.50	-24.32	Peak	400	0	P
4	143.49	-9.86	28.27	18.41	43.50	-25.09	Peak	400	0	P
5	261.83	-10.11	29.21	19.10	46.00	-26.90	Peak	400	0	P
6	341.37	-7.61	27.63	20.02	46.00	-25.98	Peak	400	0	P

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

Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %

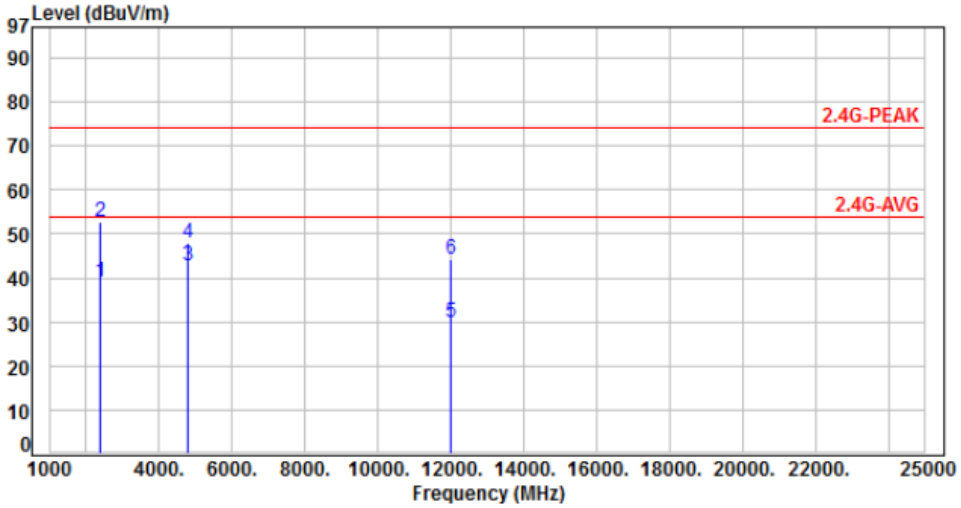


No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	47.46	-9.72	28.16	18.44	40.00	-21.56	Peak	100	0	P
2	144.46	-9.86	27.75	17.89	43.50	-25.61	Peak	100	0	P
3	171.62	-9.99	28.21	18.22	43.50	-25.28	Peak	100	0	P
4	285.11	-9.13	27.99	18.86	46.00	-27.14	Peak	100	0	P
5	370.47	-6.79	27.16	20.37	46.00	-25.63	Peak	100	0	P
6	437.40	-5.12	27.34	22.22	46.00	-23.78	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)

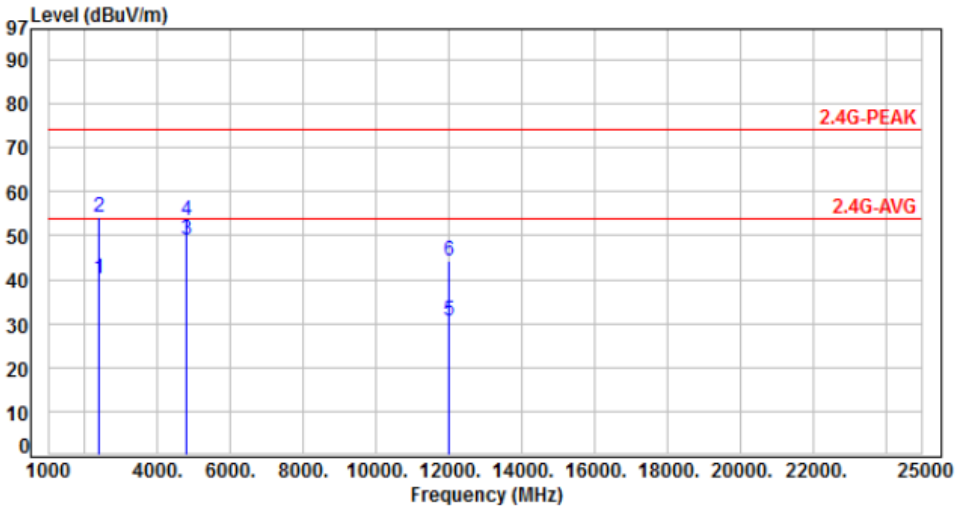
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH00	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	54.60	38.92	54.00	-15.08	Average	100	280	P
2	2390.00	-15.68	68.60	52.92	74.00	-21.08	Peak	100	280	P
3	4804.00	-8.53	51.20	42.67	54.00	-11.33	Average	100	338	P
4	4804.00	-8.53	56.60	48.07	74.00	-25.93	Peak	100	338	P
5	12010.00	1.77	28.14	29.91	54.00	-24.09	Average	100	94	P
6	12010.00	1.77	42.33	44.10	74.00	-29.90	Peak	100	94	P

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

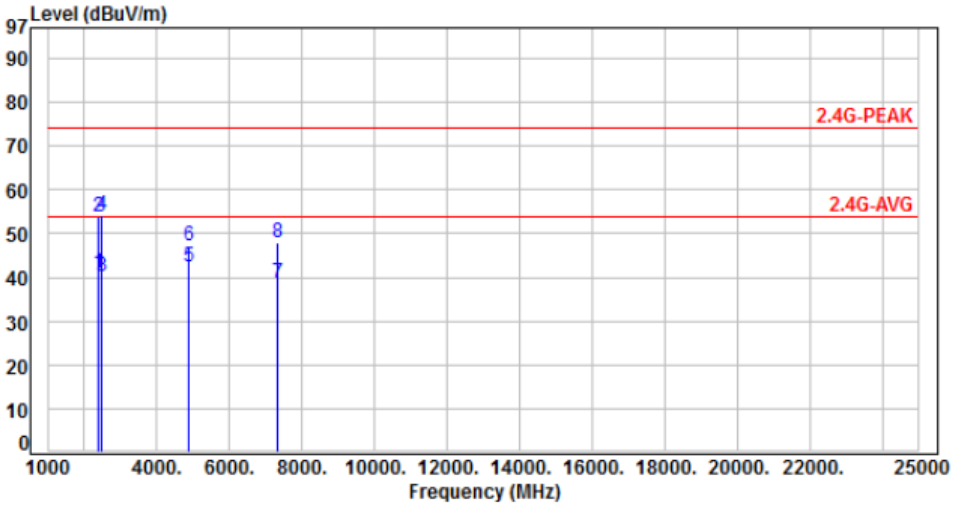
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH00	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	55.80	40.12	54.00	-13.88	Average	268	66	P
2	2390.00	-15.68	69.90	54.22	74.00	-19.78	Peak	268	66	P
3	4804.00	-8.53	57.70	49.17	54.00	-4.83	Average	100	32	P
4	4804.00	-8.53	61.98	53.45	74.00	-20.55	Peak	100	32	P
5	12010.00	1.77	28.73	30.50	54.00	-23.50	Average	100	328	P
6	12010.00	1.77	42.55	44.32	74.00	-29.68	Peak	100	328	P

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

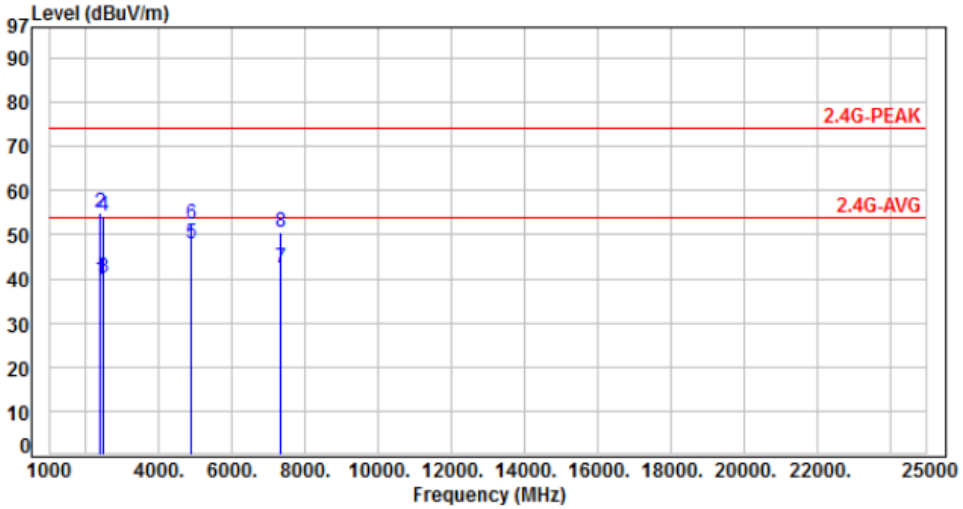
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH19	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	56.50	40.82	54.00	-13.18	Average	100	74	P
2	2390.00	-15.68	69.60	53.92	74.00	-20.08	Peak	100	74	P
3	2483.50	-15.36	55.70	40.34	54.00	-13.66	Average	100	74	P
4	2483.50	-15.36	69.40	54.04	74.00	-19.96	Peak	100	74	P
5	4880.00	-8.30	50.88	42.58	54.00	-11.42	Average	100	310	P
6	4880.00	-8.30	55.48	47.18	74.00	-26.82	Peak	100	310	P
7	7320.00	-3.83	42.68	38.85	54.00	-15.15	Average	396	340	P
8	7320.00	-3.83	51.68	47.85	74.00	-26.15	Peak	396	340	P

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

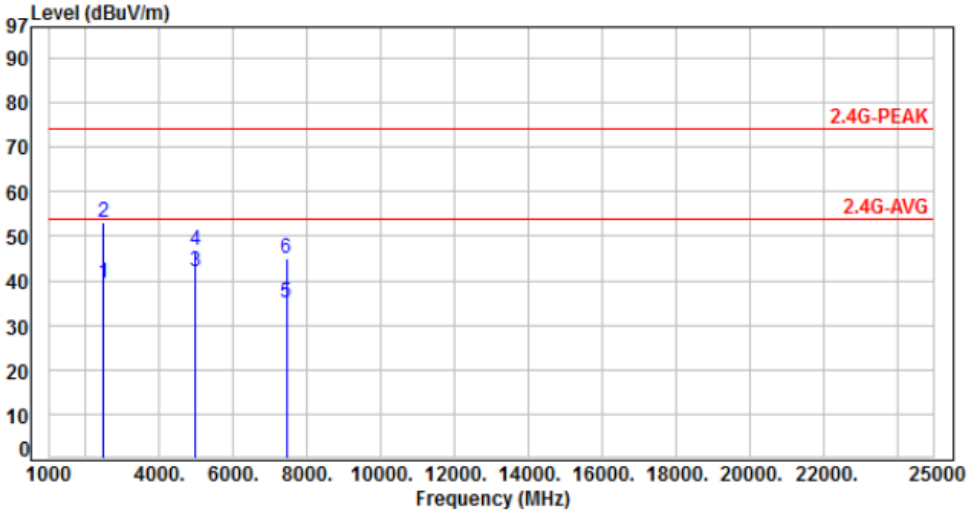
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH19	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	55.63	39.95	54.00	-14.05	Average	100	71	P
2	2390.00	-15.68	70.50	54.82	74.00	-19.18	Peak	100	71	P
3	2483.50	-15.36	55.40	40.04	54.00	-13.96	Average	100	71	P
4	2483.50	-15.36	69.56	54.20	74.00	-19.80	Peak	100	71	P
5	4880.00	-8.30	56.18	47.88	54.00	-6.12	Average	102	25	P
6	4880.00	-8.30	60.58	52.28	74.00	-21.72	Peak	102	25	P
7	7320.00	-3.83	46.38	42.55	54.00	-11.45	Average	100	360	P
8	7320.00	-3.83	54.18	50.35	74.00	-23.65	Peak	100	360	P

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

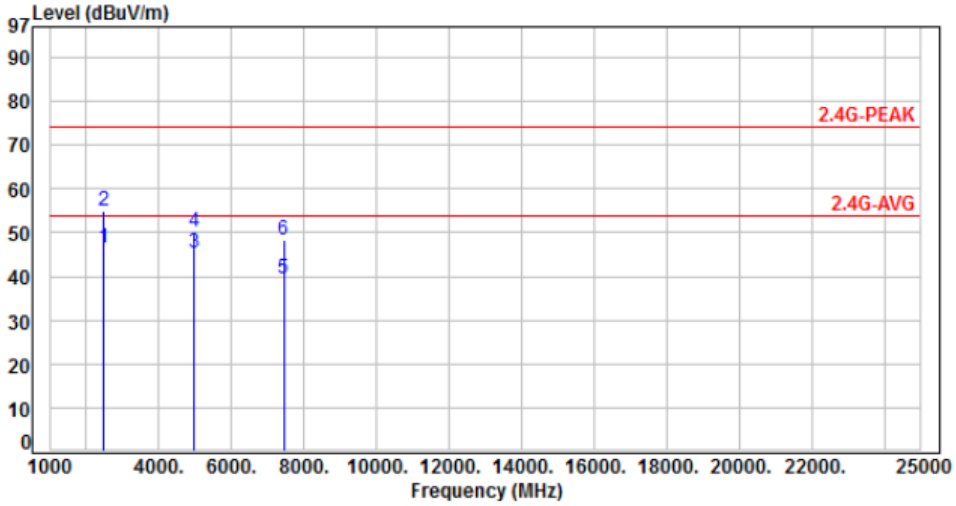
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH39	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.36	54.90	39.54	54.00	-14.46	Average	100	324	P
2	2483.50	-15.36	68.50	53.14	74.00	-20.86	Peak	100	324	P
3	4960.00	-8.07	50.08	42.01	54.00	-11.99	Average	100	120	P
4	4960.00	-8.07	54.78	46.71	74.00	-27.29	Peak	100	120	P
5	7440.00	-3.52	38.50	34.98	54.00	-19.02	Average	400	333	P
6	7440.00	-3.52	48.40	44.88	74.00	-29.12	Peak	400	333	P

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

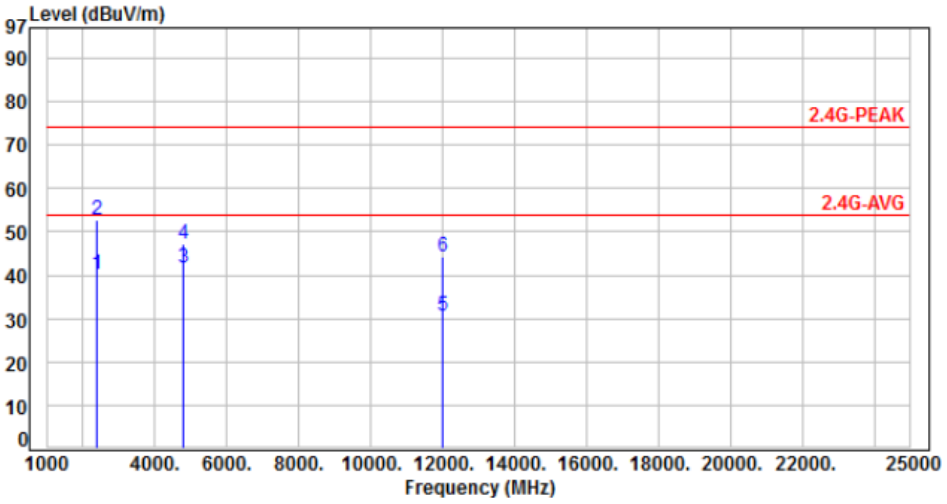
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1, CH39	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.36	61.70	46.34	54.00	-7.66	Average	190	65	P
2	2483.50	-15.36	70.20	54.84	74.00	-19.16	Peak	190	65	P
3	4960.00	-8.07	53.59	45.52	54.00	-8.48	Average	100	39	P
4	4960.00	-8.07	58.19	50.12	74.00	-23.88	Peak	100	39	P
5	7440.00	-3.52	42.90	39.38	54.00	-14.62	Average	100	16	P
6	7440.00	-3.52	51.70	48.18	74.00	-25.82	Peak	100	16	P

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

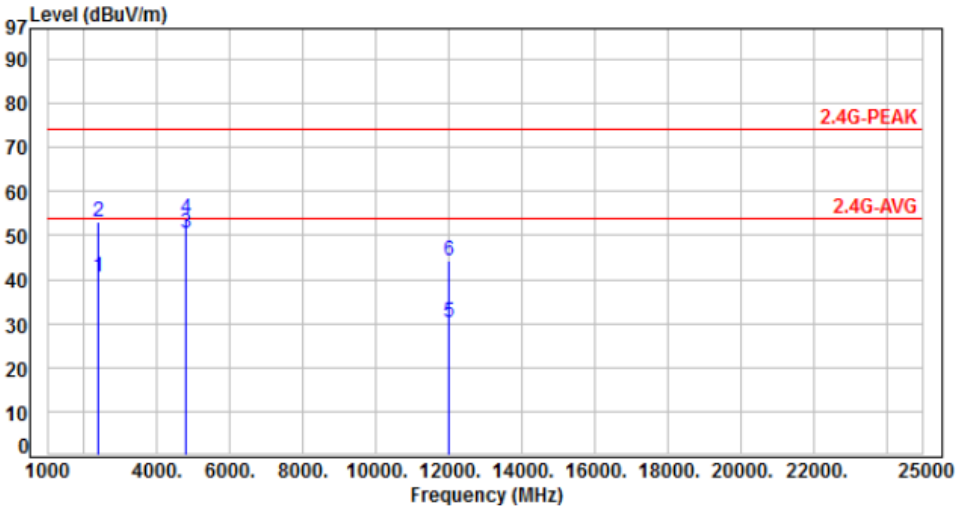
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH00	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	56.00	40.32	54.00	-13.68	Average	339	130	P
2	2390.00	-15.68	68.50	52.82	74.00	-21.18	Peak	339	130	P
3	4804.00	-8.53	50.12	41.59	54.00	-12.41	Average	368	60	P
4	4804.00	-8.53	55.90	47.37	74.00	-26.63	Peak	368	60	P
5	12010.00	1.77	28.67	30.44	54.00	-23.56	Average	100	82	P
6	12010.00	1.77	42.36	44.13	74.00	-29.87	Peak	100	82	P

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

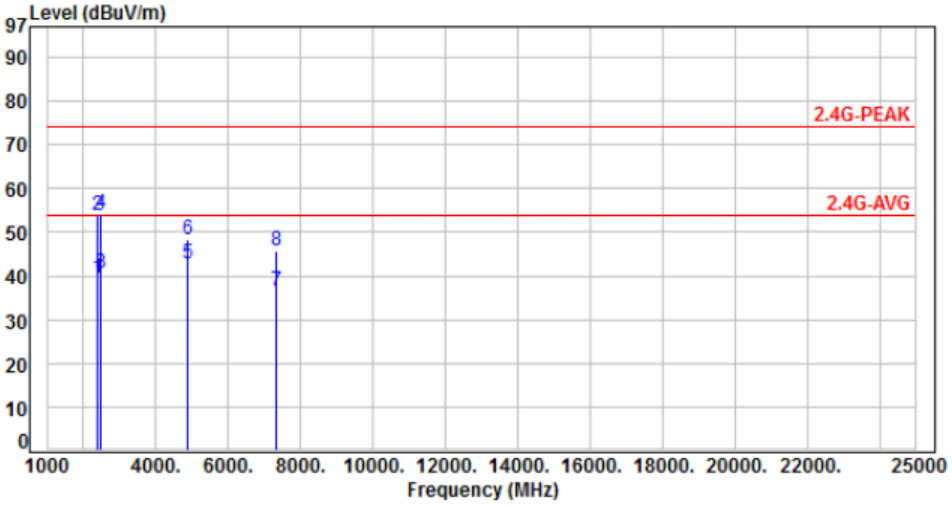
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH00	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	56.10	40.42	54.00	-13.58	Average	100	344	P
2	2390.00	-15.68	68.70	53.02	74.00	-20.98	Peak	100	344	P
3	4804.00	-8.53	58.89	50.36	54.00	-3.64	Average	130	283	P
4	4804.00	-8.53	62.50	53.97	74.00	-20.03	Peak	130	283	P
5	12010.00	1.77	28.52	30.29	54.00	-23.71	Average	100	293	P
6	12010.00	1.77	42.40	44.17	74.00	-29.83	Peak	100	293	P

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

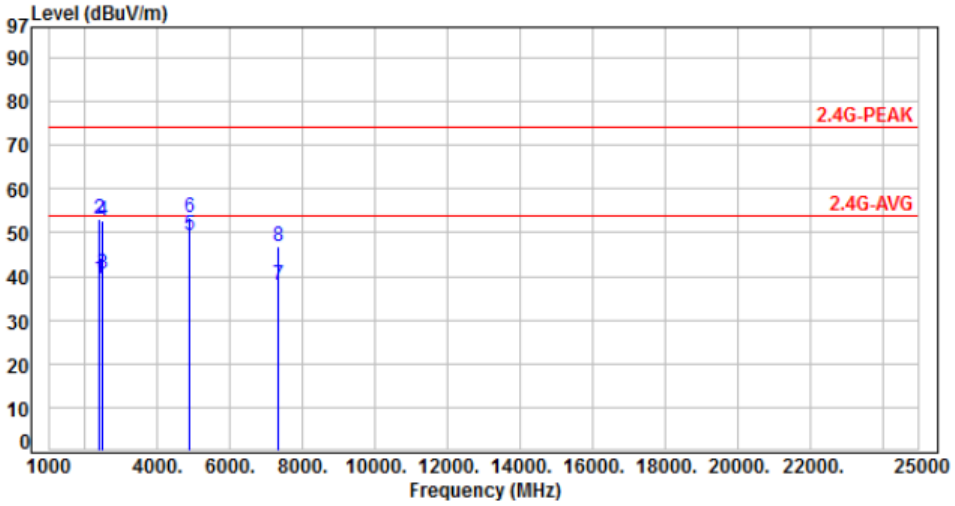
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH19	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	55.30	39.62	54.00	-14.38	Average	397	0	P
2	2390.00	-15.68	69.50	53.82	74.00	-20.18	Peak	397	0	P
3	2483.50	-15.36	56.10	40.74	54.00	-13.26	Average	397	0	P
4	2483.50	-15.36	69.41	54.05	74.00	-19.95	Peak	397	0	P
5	4880.00	-8.30	51.20	42.90	54.00	-11.10	Average	376	16	P
6	4880.00	-8.30	56.58	48.28	74.00	-25.72	Peak	376	16	P
7	7320.00	-3.83	40.18	36.35	54.00	-17.65	Average	400	57	P
8	7320.00	-3.83	49.58	45.75	74.00	-28.25	Peak	400	57	P

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

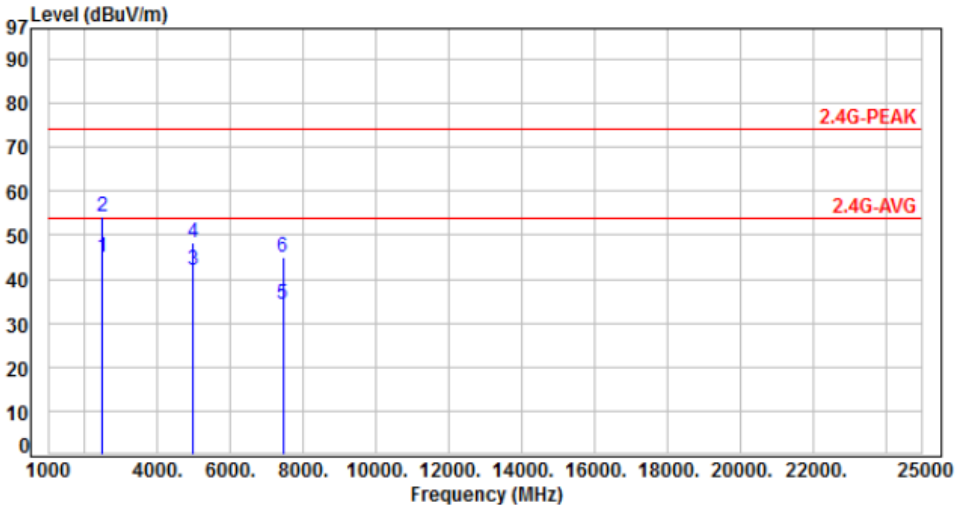
Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH19	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.68	55.20	39.52	54.00	-14.48	Average	100	159	P
2	2390.00	-15.68	68.80	53.12	74.00	-20.88	Peak	100	159	P
3	2483.50	-15.36	55.80	40.44	54.00	-13.56	Average	100	159	P
4	2483.50	-15.36	68.20	52.84	74.00	-21.16	Peak	100	159	P
5	4880.00	-8.30	57.68	49.38	54.00	-4.62	Average	100	264	P
6	4880.00	-8.30	61.81	53.51	74.00	-20.49	Peak	100	264	P
7	7320.00	-3.83	41.88	38.05	54.00	-15.95	Average	100	323	P
8	7320.00	-3.83	50.78	46.95	74.00	-27.05	Peak	100	323	P

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

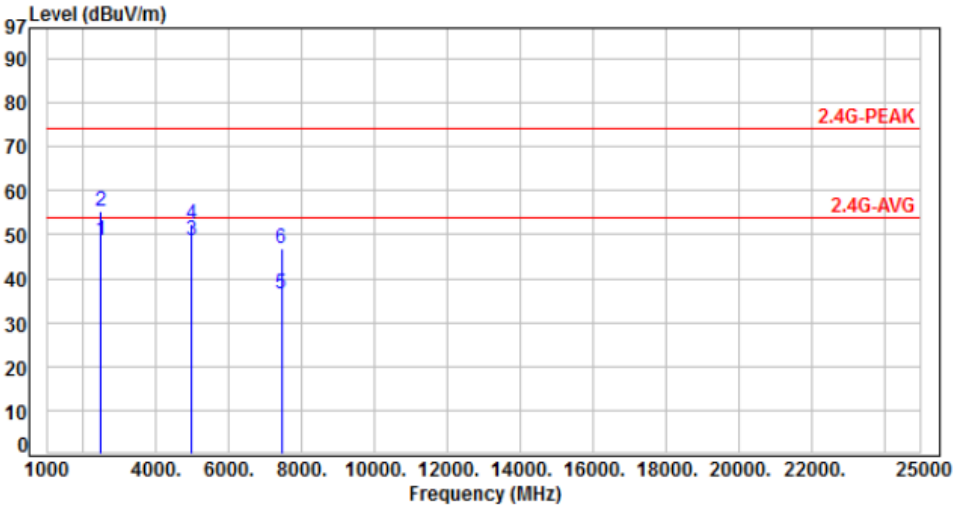
Power	:	DC 3V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2, CH39	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.36	60.50	45.14	54.00	-8.86	Average	400	6	P
2	2483.50	-15.36	69.60	54.24	74.00	-19.76	Peak	400	6	P
3	4960.00	-8.07	50.09	42.02	54.00	-11.98	Average	385	21	P
4	4960.00	-8.07	56.42	48.35	74.00	-25.65	Peak	385	21	P
5	7440.00	-3.52	37.80	34.28	54.00	-19.72	Average	400	45	P
6	7440.00	-3.52	48.50	44.98	74.00	-29.02	Peak	400	45	P

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

Power	:	DC 3V	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2, CH39	Temperature	:	23 °C
Test Date	:	Mar. 06, 2019	Humidity	:	59 %



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	-15.36	64.20	48.84	54.00	-5.16	Average	212	337	P
2	2483.50	-15.36	70.80	55.44	74.00	-18.56	Peak	212	337	P
3	4960.00	-8.07	56.68	48.61	54.00	-5.39	Average	100	280	P
4	4960.00	-8.07	60.58	52.51	74.00	-21.49	Peak	100	280	P
5	7440.00	-3.52	40.20	36.68	54.00	-17.32	Average	100	317	P
6	7440.00	-3.52	50.20	46.68	74.00	-27.32	Peak	100	317	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)

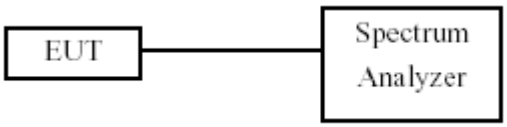
7.1 Test Limit

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

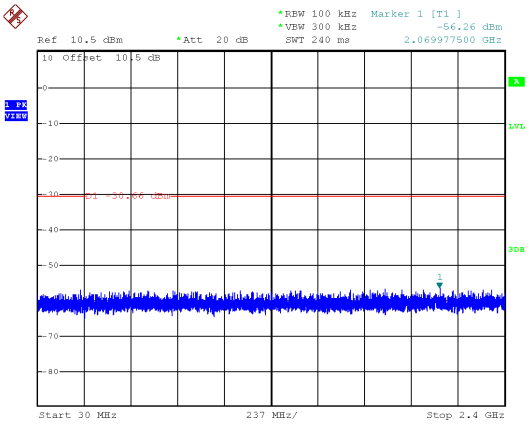


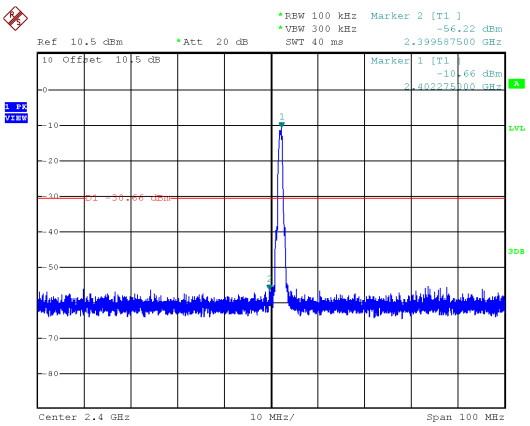
7.4 Test Result and Data

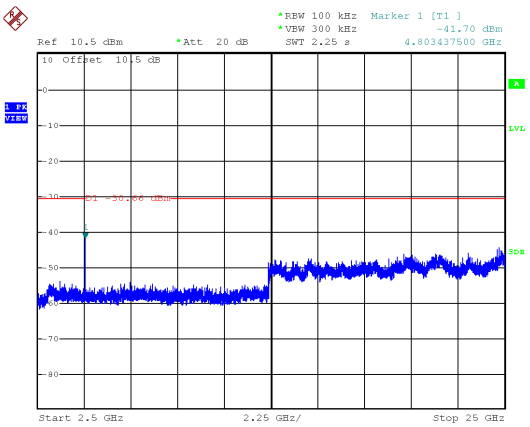
Test Result	:	PASS	Temperature	:	22°C
Test Date	:	Mar. 11, 2019	Humidity	:	63%

Note: Test plots refer to the following pages.

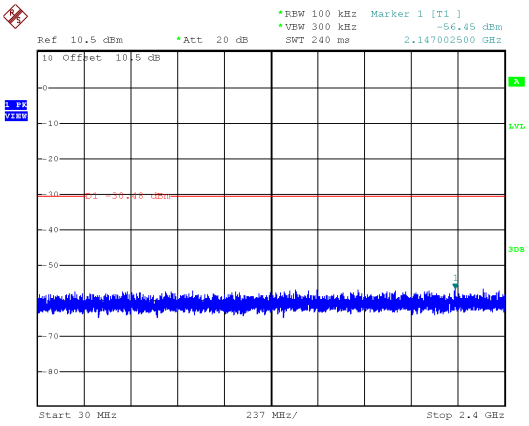
Mode 1
Modulation Type: GFSK
CH00

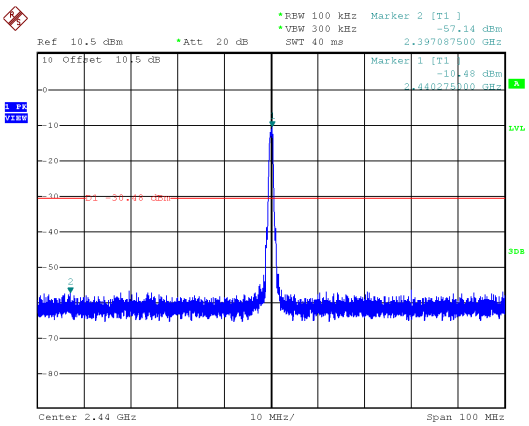


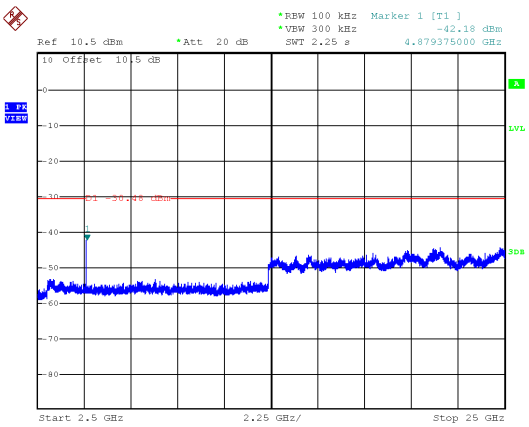




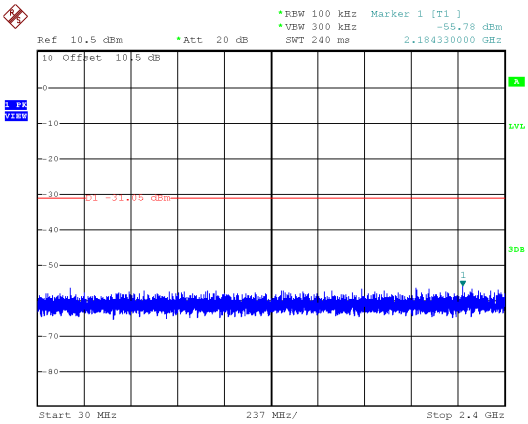
Modulation Type: GFSK
CH19

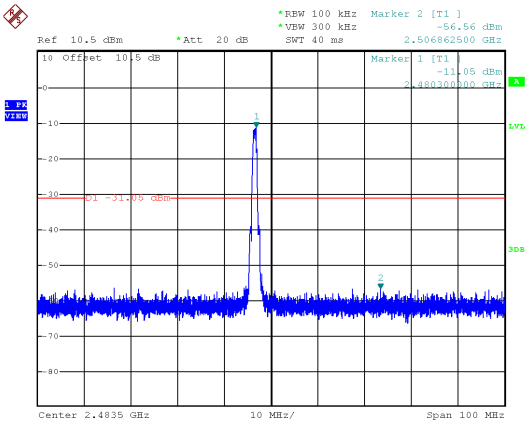


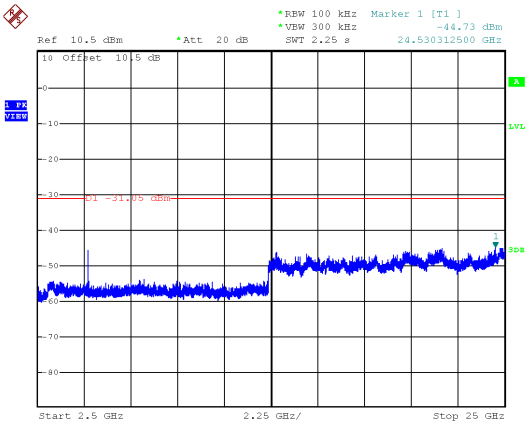




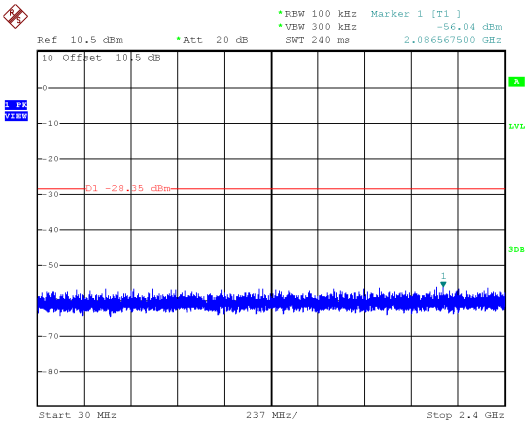
Modulation Type: GFSK
CH39



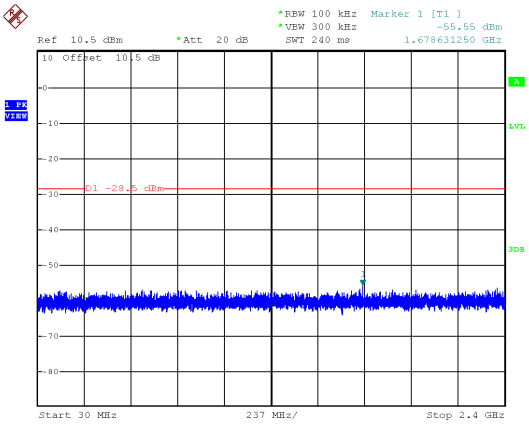


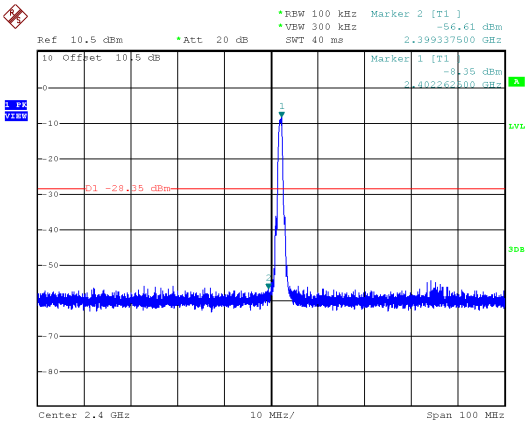


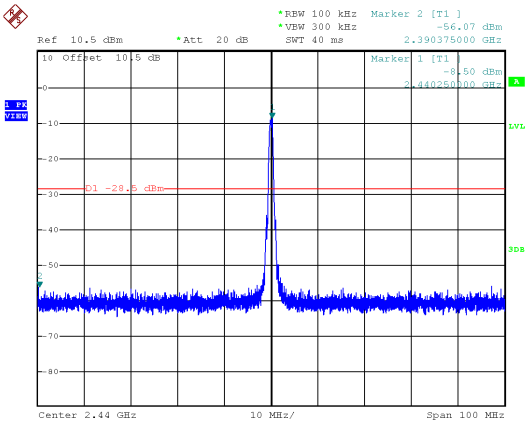
Mode 2
Modulation Type: GFSK
CH00

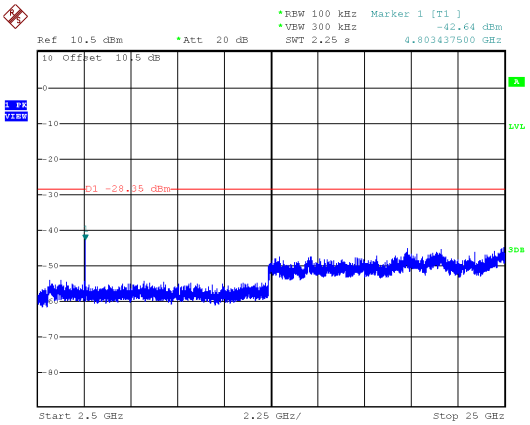


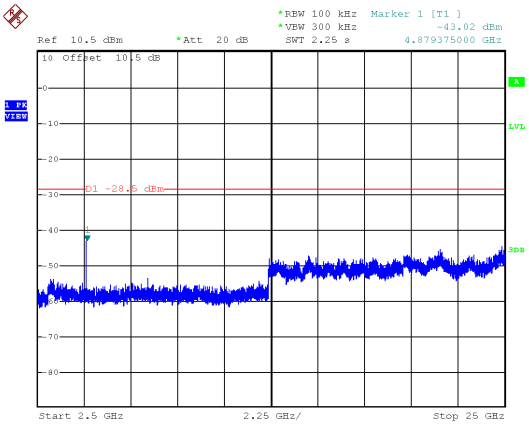
Modulation Type: GFSK
CH19



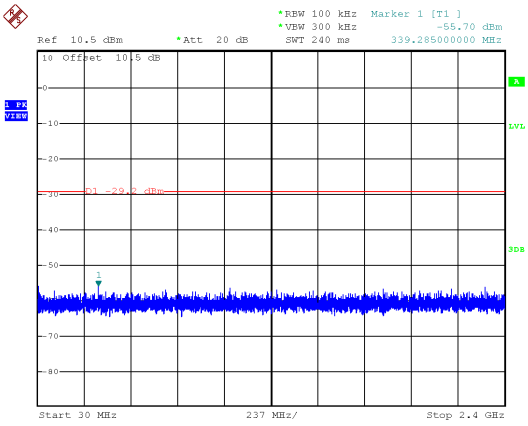


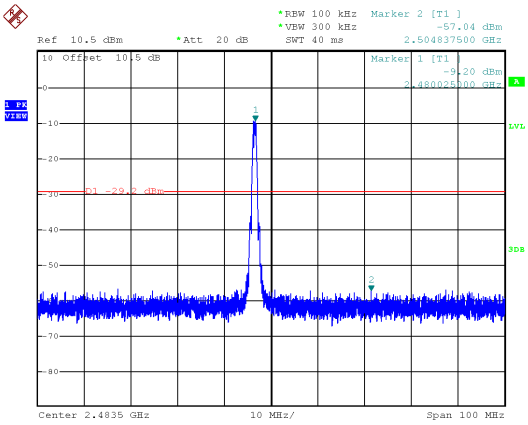


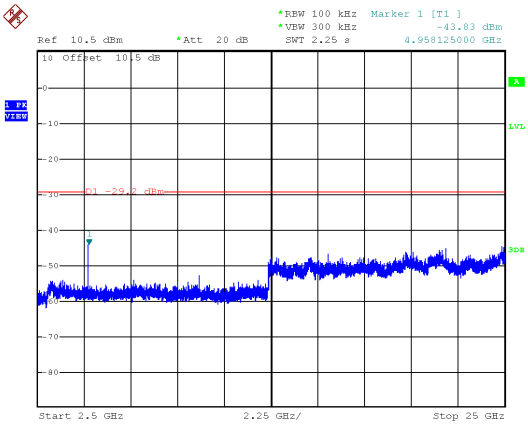




Modulation Type: GFSK
CH39







8. On Time, Duty Cycle and Measurement methods

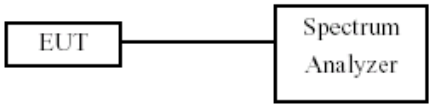
8.1 Test Limit

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

Temperature: 23°C Humidity: 59%

Test Date: Mar. 07, 2019 Test Mode 1

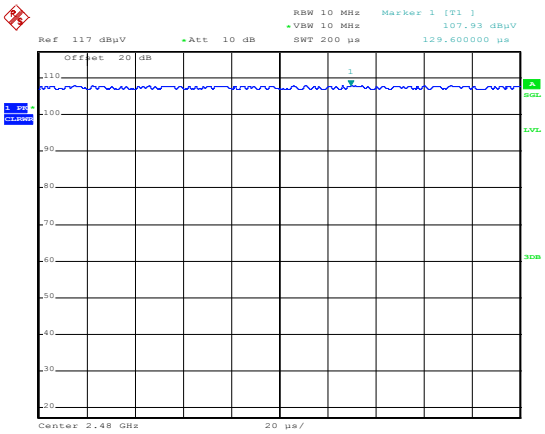
Modulation Mode	On Time (ms)	Period Time (ms)	Duty Cycle (%)
GFSK	100.00	100.00	100.00%

Temperature: 23°C Humidity: 59%

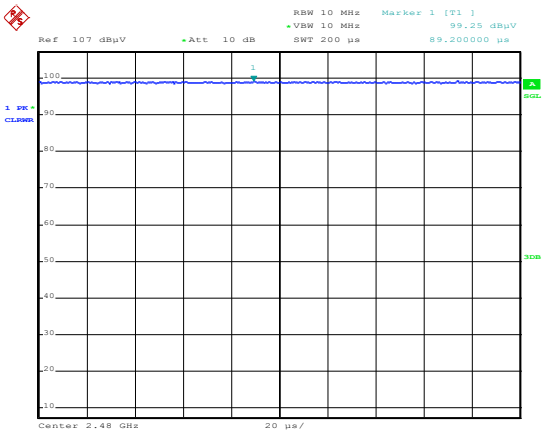
Test Date: Mar. 07, 2019 Test Mode 2

Modulation Mode	On Time (ms)	Period Time (ms)	Duty Cycle (%)
GFSK	100.00	100.00	100.00%

Mode 1
Modulation Type: GFSK



Mode 2
Modulation Type: GFSK



9. 6dB Bandwidth Measurement Data

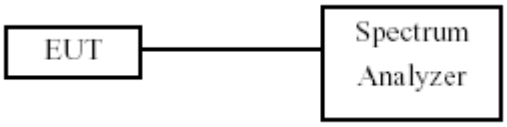
9.1 Test Limit

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

Temperature: 23°C Humidity: 59%

Test Date: Mar. 07, 2019 Test Mode 1

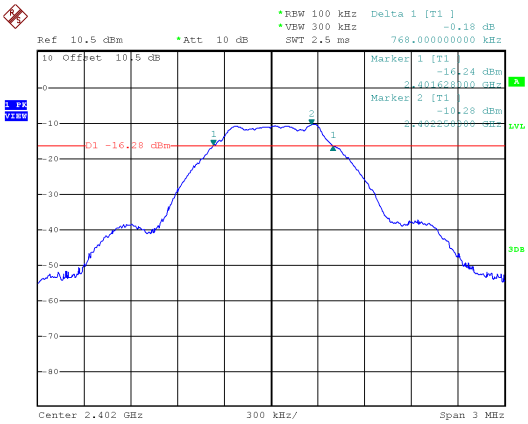
Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Occupied Bandwidth (KHz)	Limit (KHz)
GFSK(1Mbps)	0	2402	768.00	1098.00	500
	19	2440	762.00	1110.00	500
	39	2480	762.00	1104.00	500

Temperature: 23°C Humidity: 59%

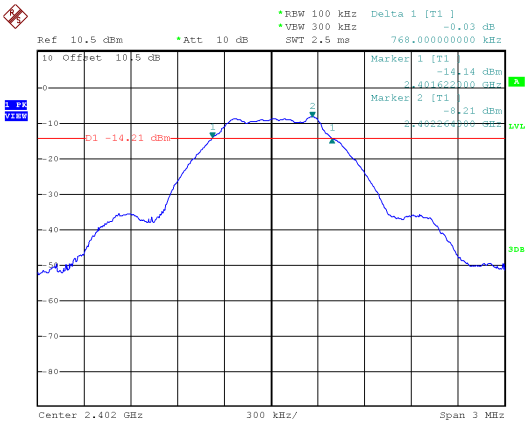
Test Date: Mar. 07, 2019 Test Mode 2

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (KHz)	Occupied Bandwidth (KHz)	Limit (KHz)
GFSK(1Mbps)	0	2402	768.00	1116.00	500
	19	2440	756.00	1110.00	500
	39	2480	762.00	1122.00	500

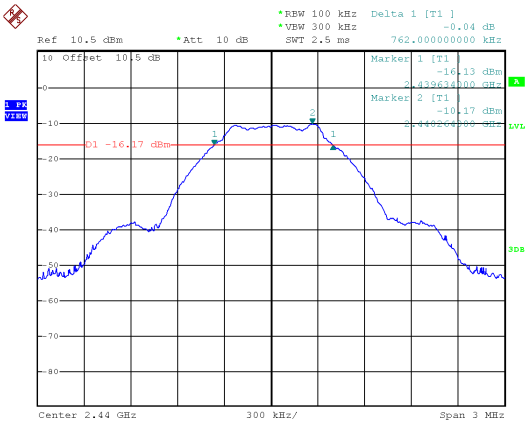
Mode 1
Modulation Type: GFSK
CH00



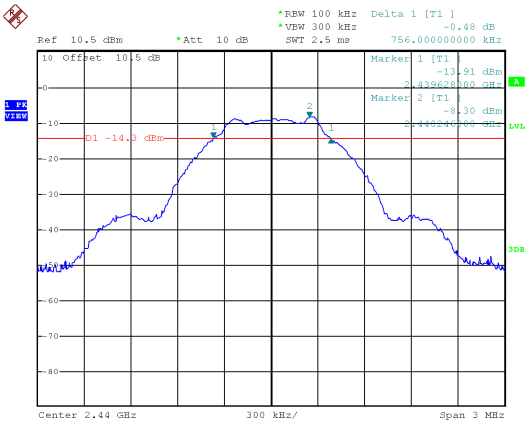
Mode 2
Modulation Type: GFSK
CH00



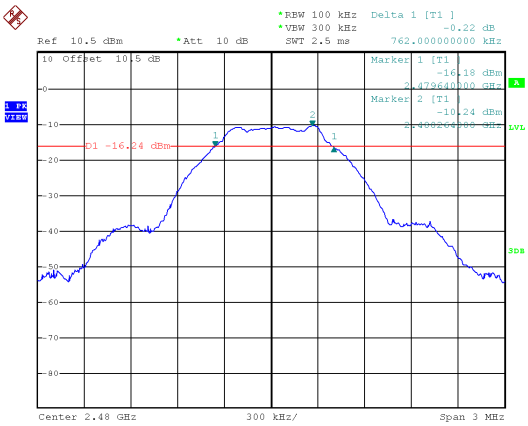
CH19



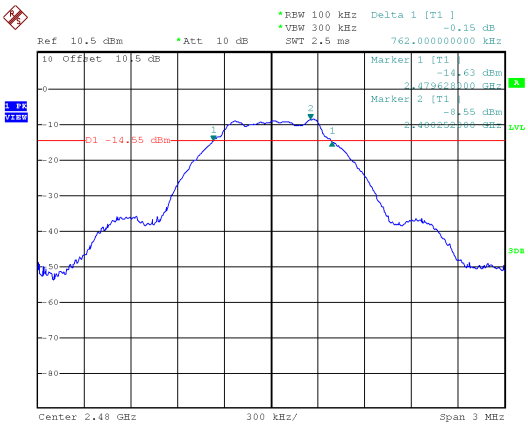
CH19



CH39

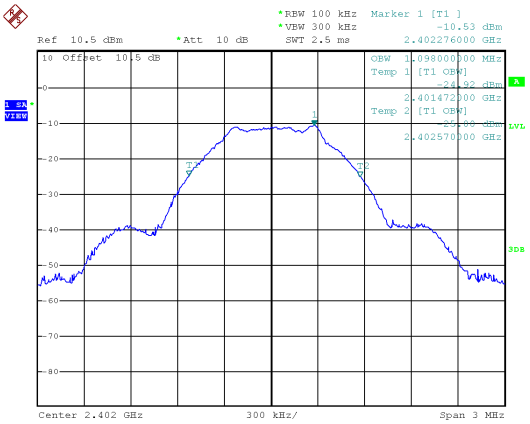


CH39

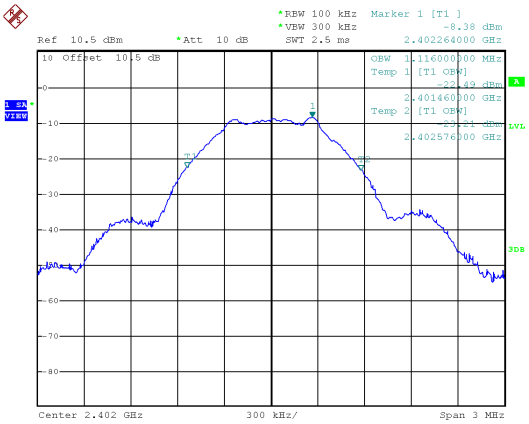


Occupied Bandwidth:

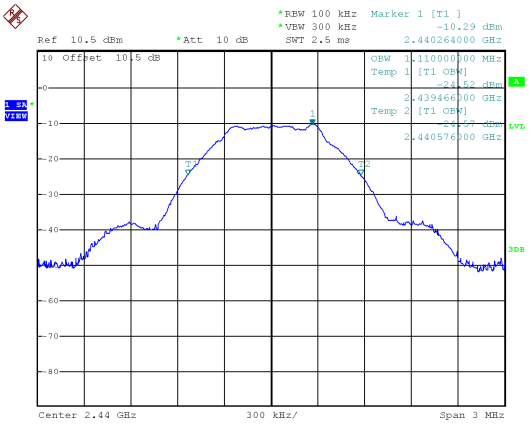
Mode 1
Modulation Type: GFSK
CH00



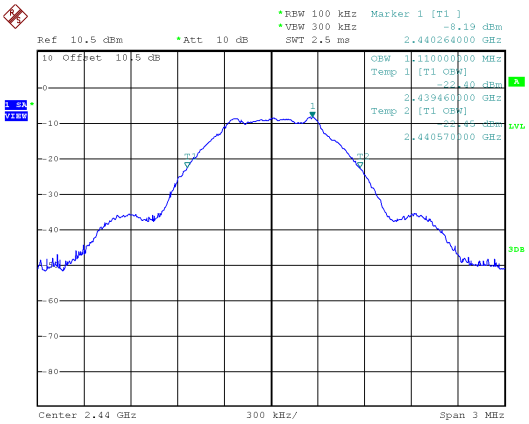
Mode 2
Modulation Type: GFSK
CH00



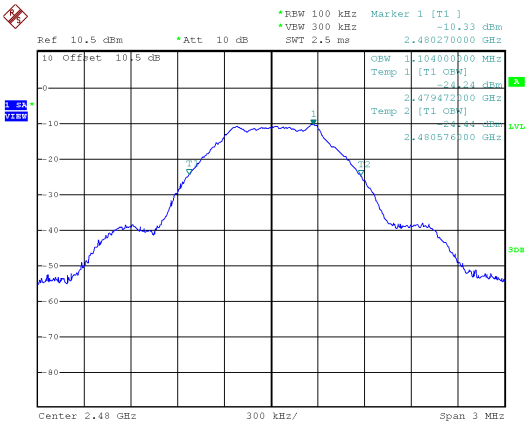
CH19



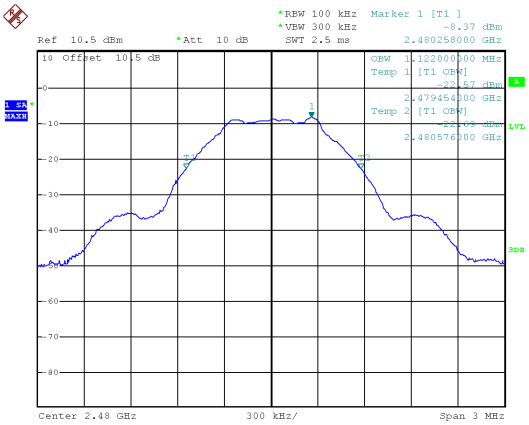
CH19



CH39



CH39



10. Maximum Peak and Average Output Power

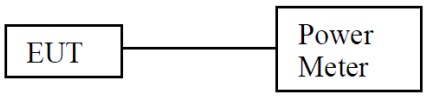
10.1 Test Limit

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

Temperature: 23°C Humidity: 59%

Test Date: Mar. 07, 2019 Test Mode 1

Modulation Type	CH	Frequency (MHz)	Power Output (dBm)		Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	0	2402	-9.13	-10.36	0.122	0.092
	19	2440	-9.12	-10.38	0.122	0.092
	39	2480	-9.18	-10.46	0.121	0.090

*Average Power is reference only

Temperature: 23°C Humidity: 59%

Test Date: Mar. 07, 2019 Test Mode 2

Modulation Type	CH	Frequency (MHz)	Power Output (dBm)		Power Output (mW)	
			Peak	Average	Peak	Average
GFSK	0	2402	-7.15	-7.9	0.193	0.162
	19	2440	-7.27	-8.04	0.187	0.157
	39	2480	-7.44	-8.23	0.180	0.150

*Average Power is reference only

11. Power Spectral Density

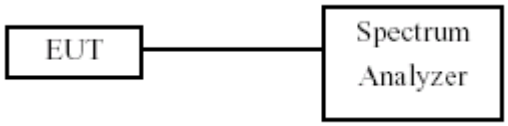
11.1 Test Limit

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

Temperature: 23°C Humidity: 59%

Test Date: Mar. 07, 2019 Test Mode 1

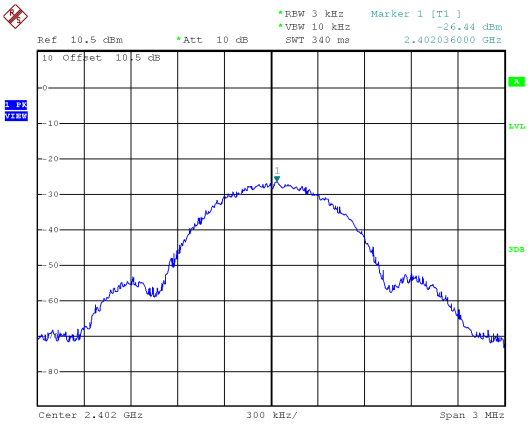
Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3KHz Bandwidth(dBm)	Limit
GFSK(1Mbps)	0	2402	-26.44	8.00
	19	2440	-25.63	8.00
	39	2480	-25.36	8.00

Temperature: 23°C Humidity: 59%

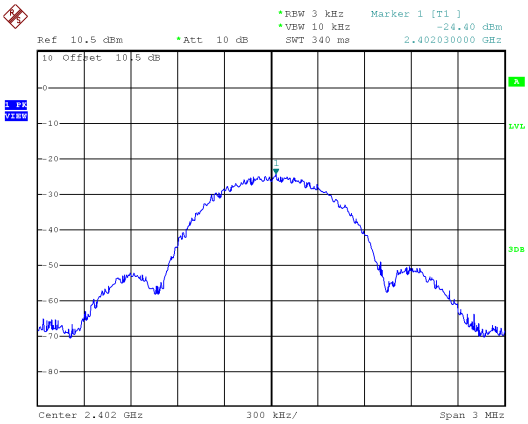
Test Date: Mar. 07, 2019 Test Mode 2

Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 3KHz Bandwidth(dBm)	Limit
GFSK(1Mbps)	0	2402	-24.4	8.00
	19	2440	-24.43	8.00
	39	2480	-24.77	8.00

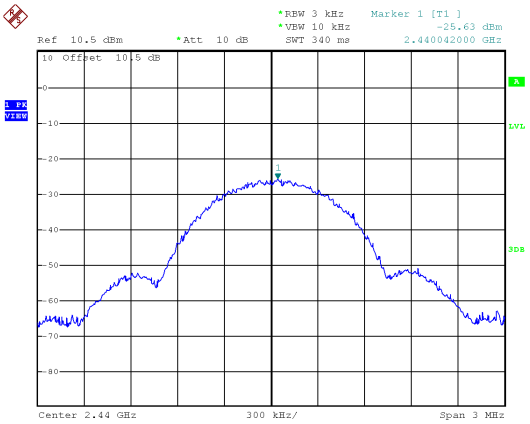
Mode 1
Modulation Type: GFSK
CH00



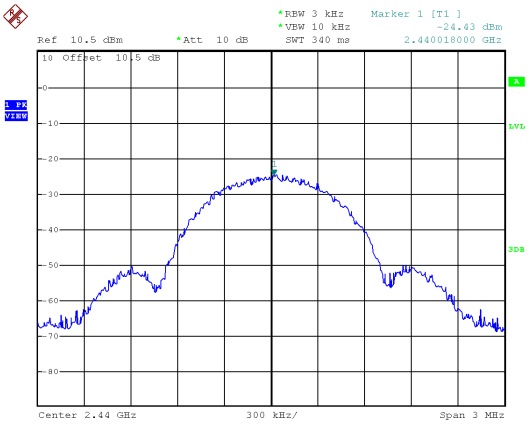
Mode 2
Modulation Type: GFSK
CH00



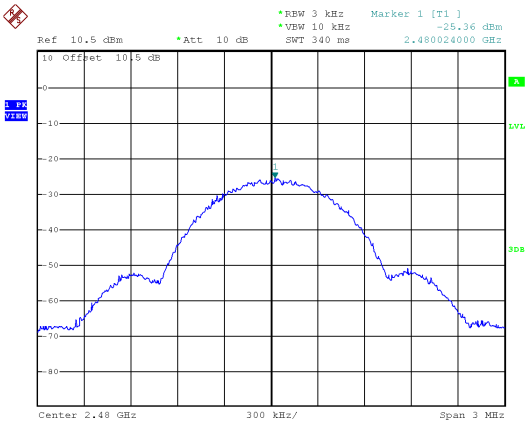
CH19



CH19



CH39



CH39