



FCC RADIO TEST REPORT

Applicant	: KeyOvation LLC
Address	: 1320 Arrow Point Drive,Building 1,Suite 101 Cedar Park,Texas 78613,USA
Equipment	: Bluetooth mouse
Model No.	: KOVGTMB
Trade Name	: Goldtouch
FCC ID.	: YVL-KOVGTMBV2

I HEREBY CERTIFY THAT :

The sample was received on Jul. 25, 2018 and the testing was carried out on Aug. 21, 2018 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:

Tested by:

Mark Liao /Assistant Manager

Allen Yo / Engineer

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory





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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)(1)	. Channel Carrier Frequencies Separation	Pass
15.247(a)(1)	. 20dB Bandwidth	Pass
15.247(a)(1)	. Dwell Time	Pass
15.247(b)	. Number of Hopping Channels	Pass
15.247(b)	. Peak Output Power Measurement Data	Pass

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



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency Range	2400 MHz-2483.5MHz
Number of Channels	79 Channels
Modulation	GFSK (1Mbps)
Data Rates	1Mbps
Antenna Type/ gain	Printed / 2.78dBi
Module Number	YFBT07

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)	Channel	Frequency (MHz)
*00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	*78	2480
19	2421	*39	2441	59	2461	---	---

Note: Channels remarked * are selected to perform test.

2.3 Test Mode & Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
- The complete test system included NB and EUT for RF test.
- The following test modes were performed for the test:
Test Mode 1. GFSK (1Mbps)

2.4 Description of Test System

Device	Manufacturer	Model No.	Description
NB	DELL	LatitudeE5450/5450, TX	Adapter, Unshielded, 1.8m



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-4218, R-4399 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	±1.2oC
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	Valid Date	Cal. Interval
Bilog Antenna	Schwarzbeck	VULB9168	369	2019/03/23	1 year
Active Loop Antenna	EMCO	6507	40855	2019/05/21	1 year
Horn Antenna	EMCO	3115	31589	2019/04/01	1 year
Horn Antenna	EMCO	3116	31970	2019/03/22	1 year
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200207	2019/03/28	1 year
Preamplifier	EM	EM330	060660	2019/03/07	1 year
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2018/09/19	1 year
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2018/11/09	1 year
MXG MW Analog Signal Generator	KEYSIGHT	N5183A	MY50142931	2019/04/09	1 year
MXG-B RF Vector Signal Generator	KEYSIGHT	N5182B	MY53051383	2019/04/01	1 year
BLUETOOTH TESTER	R&S	CBT	101133	2019/04/01	1 year
Attenuator	KEYSIGHT	8491B	MY39250705	2018/09/03	1 year
Rotary Attenuator	Agilent	8495B	MY42146680	2019/03/28	1 year
Temp & Humi chamber	T-MACHINE	TMJ-9712	T-12-040111	2018/09/03	1 year
Series Power Meter	Anritsu	ML2495A	1224005	2019/03/22	1 year
Power Sensor	Anritsu	MA2411B	1207295	2019/03/22	1 year
USB Average Power Sensor	Theda	4PS6A	TW5451013~16	2018/11/07	2 year
Software	AUDIX	E3	V8.2014-8-6	N/A	N/A
Software	Keysight	Console	v0.01	N/A	N/A
Software	Keysight	ETSI Standard Test System	1.00.21	N/A	N/A
Software	Keysight	N7607B Signal Studio	V3.0.0.0	N/A	N/A
Software	Keysight	Inservice Monitor Utility	N/A	N/A	N/A



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	Antenna Gain
Dipole Antenna	2.78 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 Radiated Spurious Emission

6.1 Test Limit

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2014. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions. For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance Meters	Radiated (μ V / M)	Radiated (dB μ V / M)
30-88	3	100	40.0
88-216	3	150	43.5
216-960	3	200	46.0
Above 960	3	500	54.0

For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the above table.

Frequency (MHz)	Distance Meters	Radiated (dB μ V / M)
30-230	10	30
230-1000	10	37

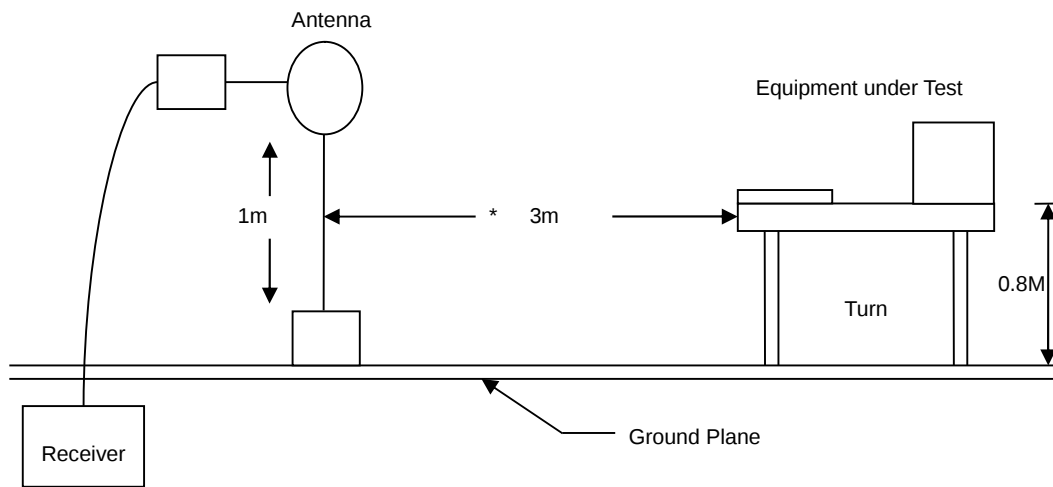
6.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- 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.
- 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.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- 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.
- 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.

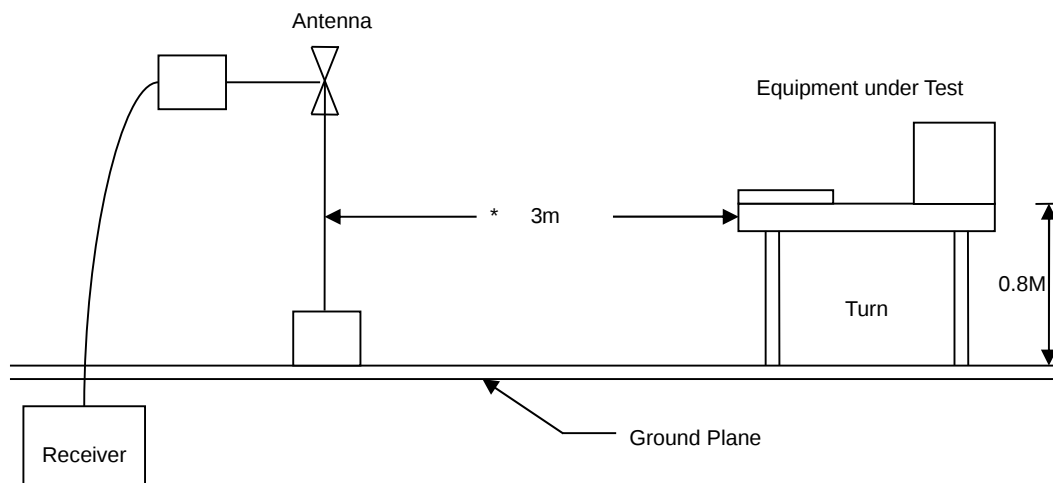


6.3 Typical Test Setup

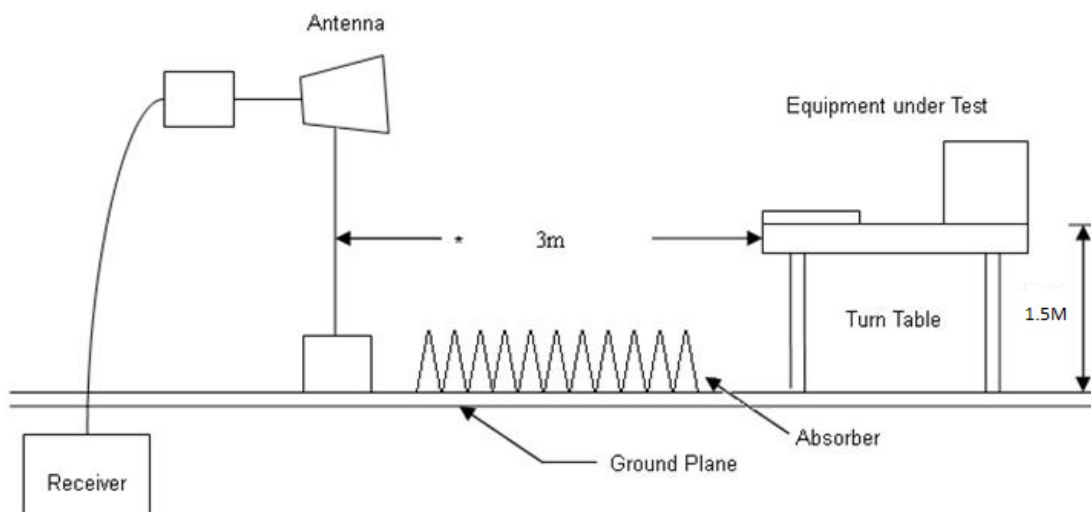
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



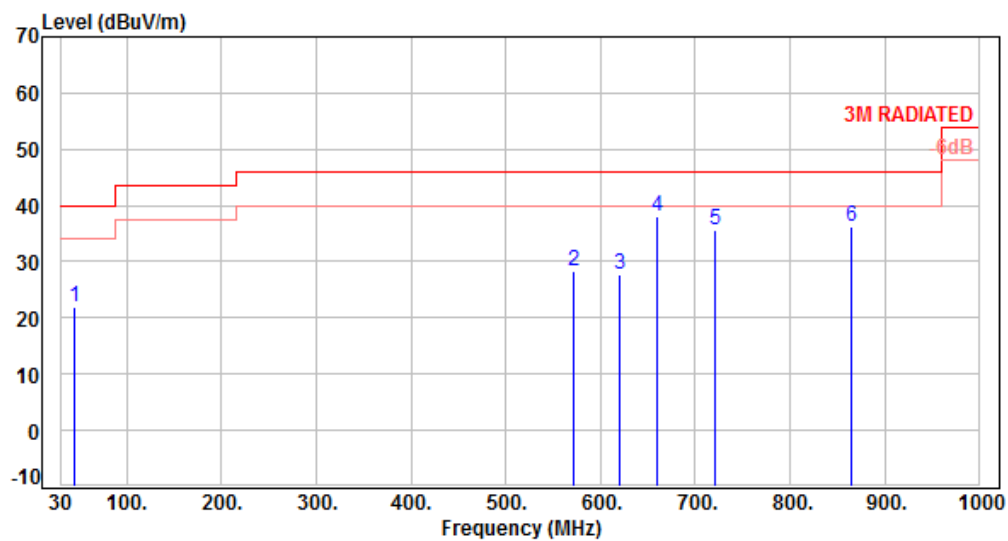


6.4 Test Result and Data (9kHz ~ 30MHz)

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

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

Power	: DC 3.7V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



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	-10.74	32.65	21.91	40.00	-18.09	Peak	400	0	P
2	572.23	-3.51	31.74	28.23	46.00	-17.77	Peak	400	0	P
3	620.73	-2.54	30.31	27.77	46.00	-18.23	Peak	400	0	P
4	660.50	-1.99	40.02	38.03	46.00	-7.97	Peak	400	0	P
5	720.64	-0.91	36.49	35.58	46.00	-10.42	Peak	400	0	P
6	864.20	1.23	35.00	36.23	46.00	-9.77	Peak	400	0	P

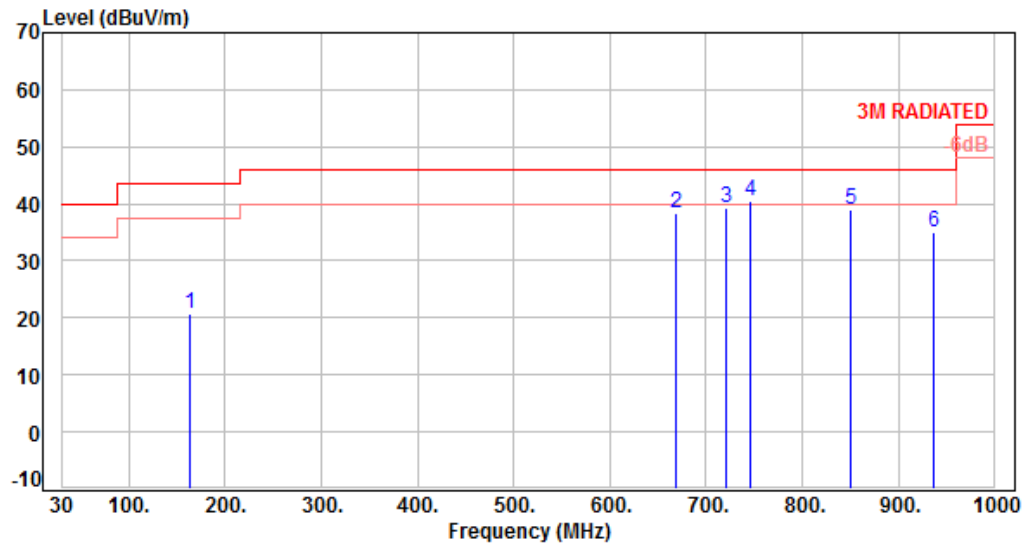
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	163.86	-10.93	31.76	20.83	43.50	-22.67	Peak	100	0	P
2	668.26	-1.85	40.10	38.25	46.00	-7.75	Peak	100	0	P
3	720.64	-0.91	40.16	39.25	46.00	-6.75	Peak	100	0	P
4	746.83	-0.40	40.82	40.42	46.00	-5.58	Peak	100	0	P
5	850.62	1.05	37.95	39.00	46.00	-7.00	Peak	100	0	P
6	936.95	2.35	32.81	35.16	46.00	-10.84	Peak	100	0	P

Note: Level=Reading+Factor

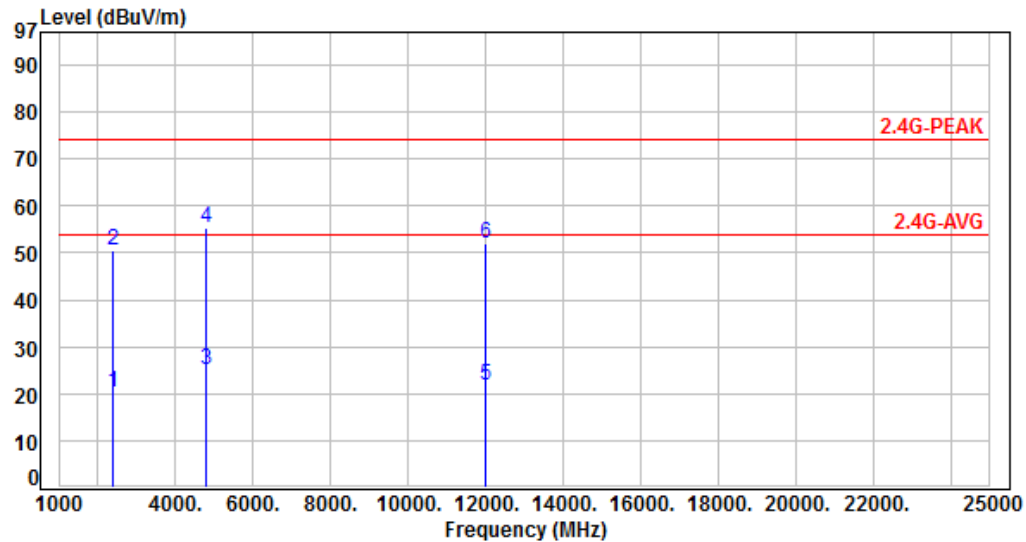
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



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

Power	:	DC 3.7V	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH00	Temperature	:	24 °C
Test Date	:	Aug. 08, 2018	Humidity	:	62 %



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	-15.96	36.34	20.38	54.00	-33.62	Average	364	300	P
2	2390.00	-15.96	66.44	50.48	74.00	-23.52	Peak	364	300	P
3	4804.00	-8.87	34.10	25.23	54.00	-28.77	Average	340	31	P
4	4804.00	-8.87	64.20	55.33	74.00	-18.67	Peak	340	31	P
5	12010.00	1.17	20.60	21.77	54.00	-32.23	Average	386	360	P
6	12010.00	1.17	50.70	51.87	74.00	-22.13	Peak	386	360	P

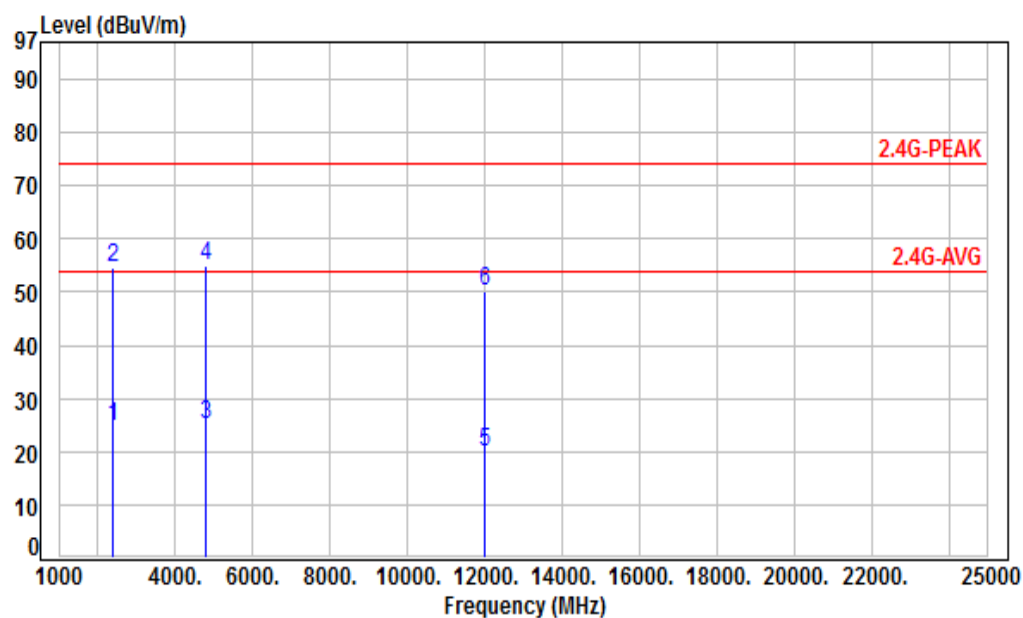
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH00	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



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	-15.96	40.51	24.55	54.00	-29.45	Average	170	245	P
2	2390.00	-15.96	70.61	54.65	74.00	-19.35	Peak	170	245	P
3	4804.00	-8.87	33.80	24.93	54.00	-29.07	Average	100	38	P
4	4804.00	-8.87	63.90	55.03	74.00	-18.97	Peak	100	38	P
5	12010.00	1.17	18.80	19.97	54.00	-34.03	Average	100	170	P
6	12010.00	1.17	48.90	50.07	74.00	-23.93	Peak	100	170	P

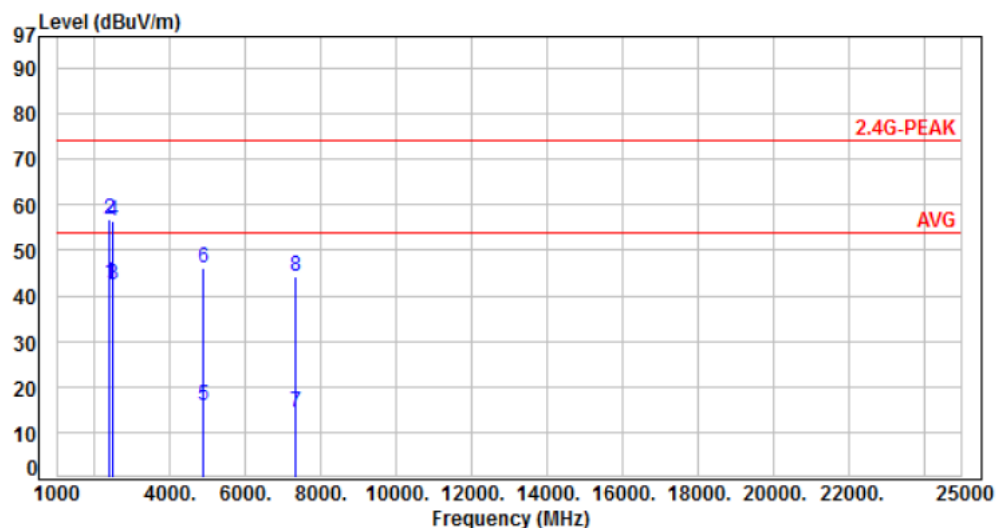
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH39	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2390.00	-15.75	58.60	42.85	54.00	-11.15	Average	100	229	P
2	2390.00	-15.75	72.37	56.62	74.00	-17.38	Peak	100	229	P
3	2483.50	-15.48	57.87	42.39	54.00	-11.61	Average	100	229	P
4	2483.50	-15.48	71.92	56.44	74.00	-17.56	Peak	100	229	P
5	4882.00	-7.35	23.28	15.93	54.00	-38.07	Average	351	166	P
6	4882.00	-7.35	53.38	46.03	74.00	-27.97	Peak	351	166	P
7	7323.00	-3.48	17.80	14.32	54.00	-39.68	Average	348	182	P
8	7323.00	-3.48	47.90	44.42	74.00	-29.58	Peak	348	182	P

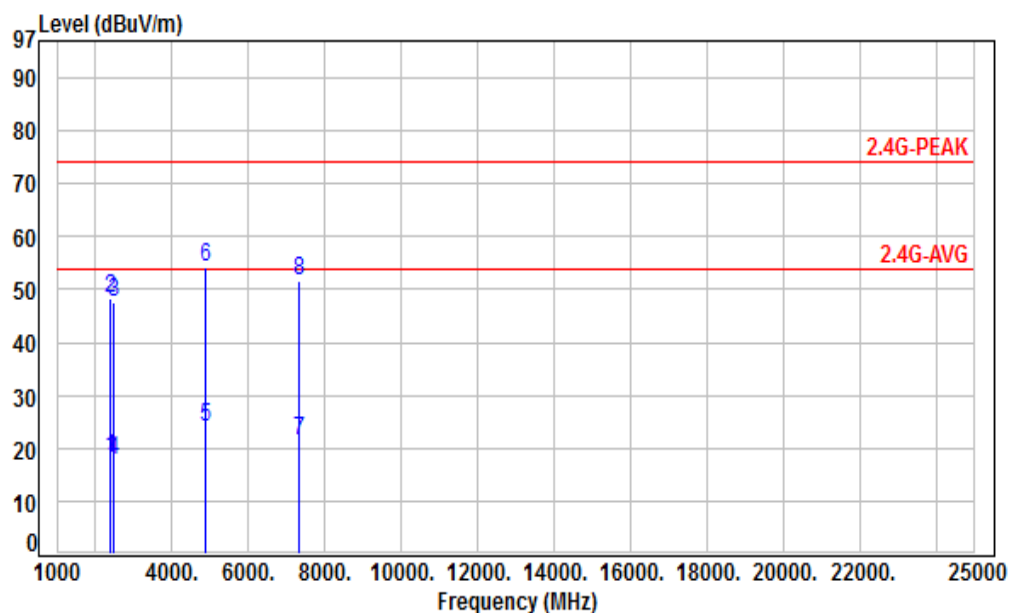
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH39	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



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	-15.96	34.21	18.25	54.00	-35.75	Average	100	110	P
2	2390.00	-15.96	64.31	48.35	74.00	-25.65	Peak	100	110	P
3	2483.50	-15.65	63.30	47.65	74.00	-26.35	Peak	100	110	P
4	2483.50	-15.65	33.20	17.55	74.00	-56.45	Peak	100	110	P
5	4882.00	-8.63	32.70	24.07	54.00	-29.93	Average	103	45	P
6	4882.00	-8.63	62.80	54.17	74.00	-19.83	Peak	103	45	P
7	7323.00	-4.66	26.10	21.44	54.00	-32.56	Average	100	49	P
8	7323.00	-4.66	56.20	51.54	74.00	-22.46	Peak	100	49	P

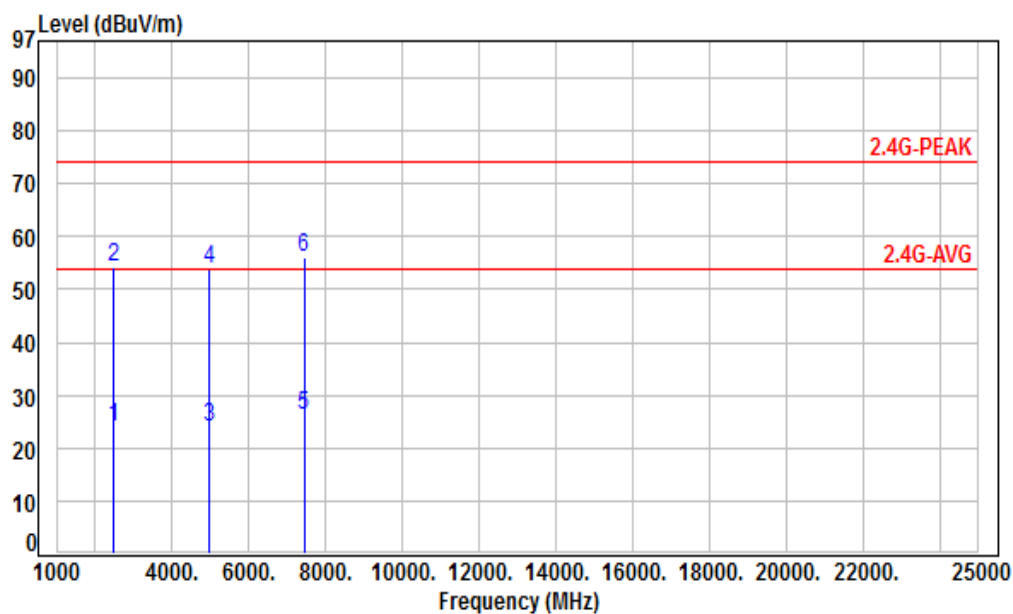
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH78	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



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	-15.65	39.80	24.15	54.00	-29.85	Average	390	192	P
2	2483.50	-15.65	69.90	54.25	74.00	-19.75	Peak	390	192	P
3	4960.00	-8.38	32.20	23.82	54.00	-30.18	Average	393	264	P
4	4960.00	-8.38	62.30	53.92	74.00	-20.08	Peak	393	264	P
5	7440.00	-4.33	30.40	26.07	54.00	-27.93	Average	386	41	P
6	7440.00	-4.33	60.50	56.17	74.00	-17.83	Peak	386	41	P

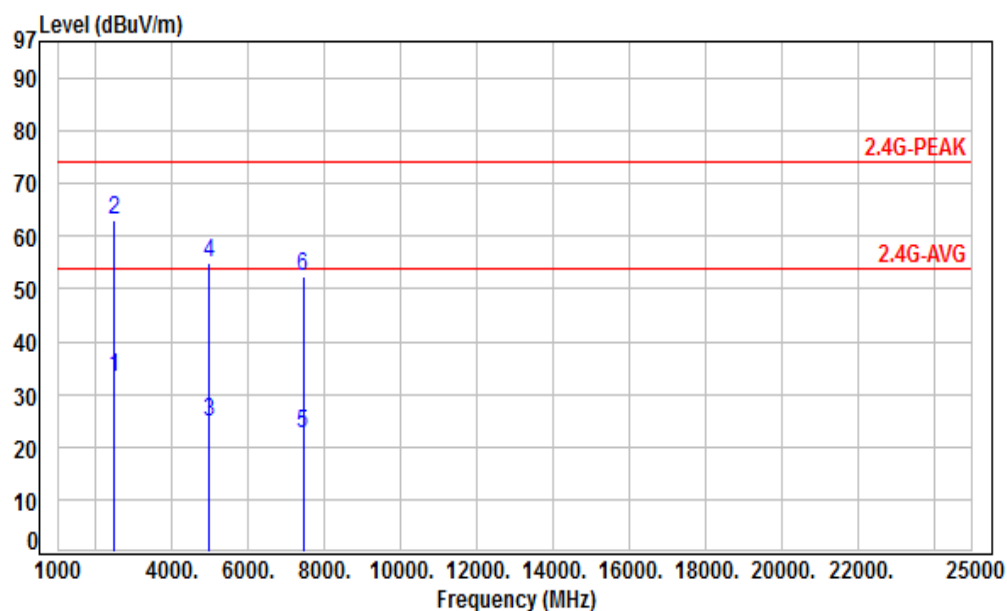
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: DC 3.7V	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH78	Temperature	: 24 °C
Test Date	: Aug. 08, 2018	Humidity	: 62 %



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	-15.65	48.80	33.15	54.00	-20.85	Average	157	240	P
2	2483.50	-15.65	78.90	63.25	74.00	-10.75	Peak	157	240	P
3	4960.00	-8.38	33.10	24.72	54.00	-29.28	Average	142	360	P
4	4960.00	-8.38	63.20	54.82	74.00	-19.18	Peak	142	360	P
5	7440.00	-4.33	26.70	22.37	54.00	-31.63	Average	100	207	P
6	7440.00	-4.33	56.80	52.47	74.00	-21.53	Peak	100	207	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

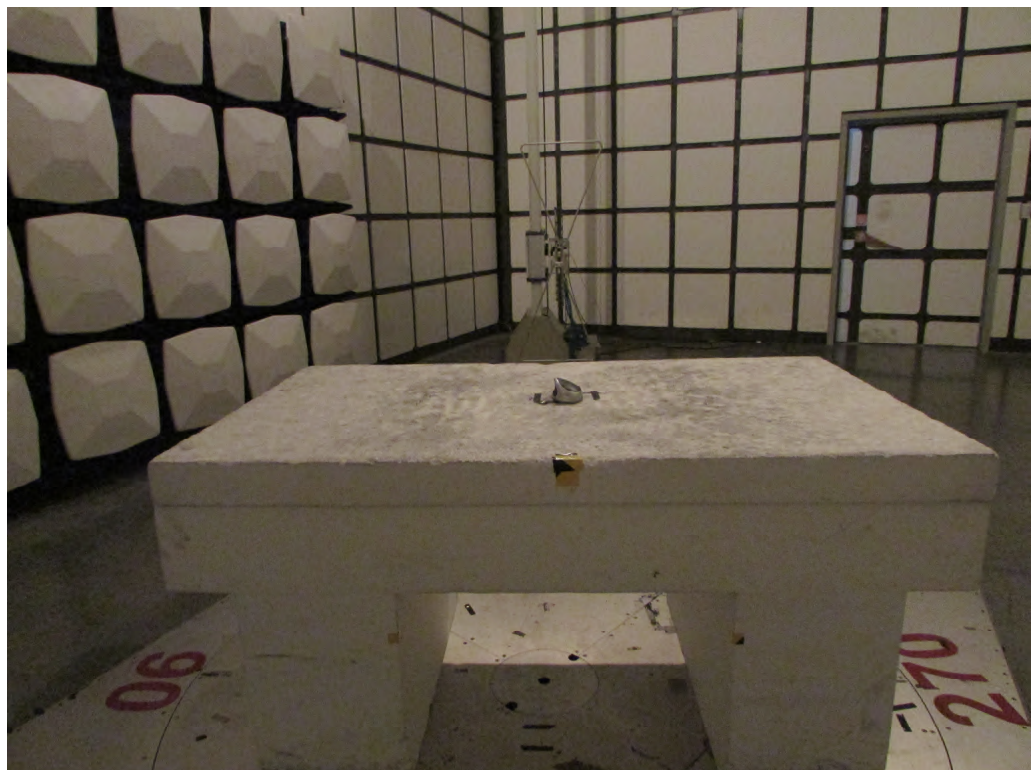


6.8 Test Photographs (30MHz ~ 1GHz)

Front View



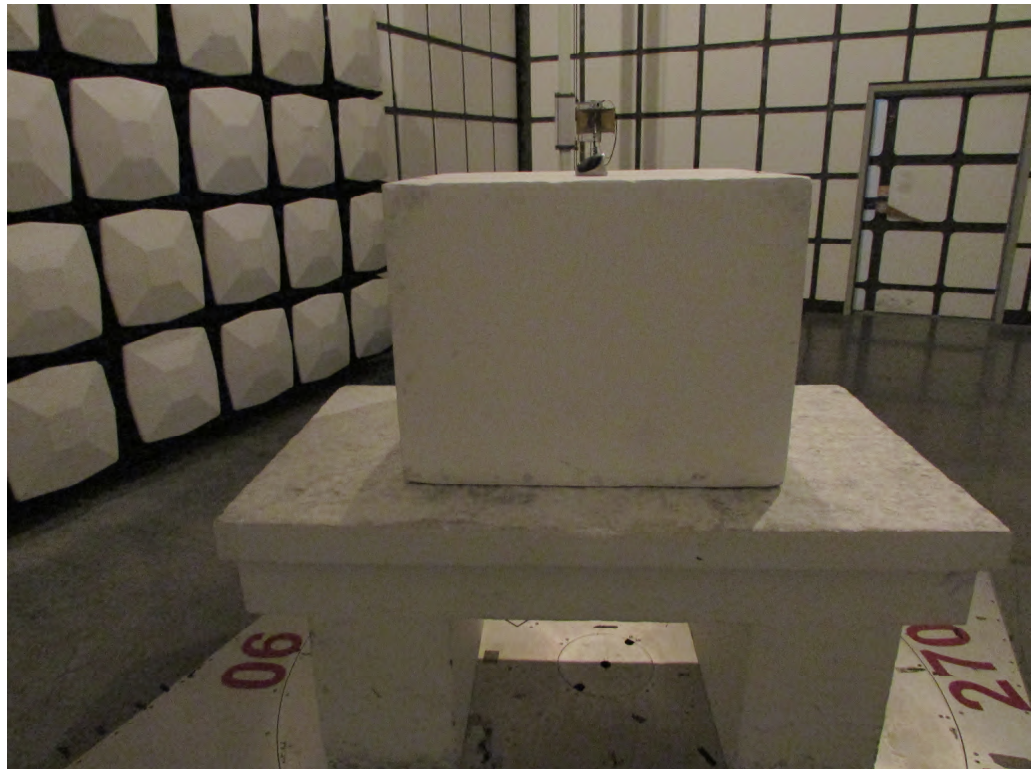
Rear View



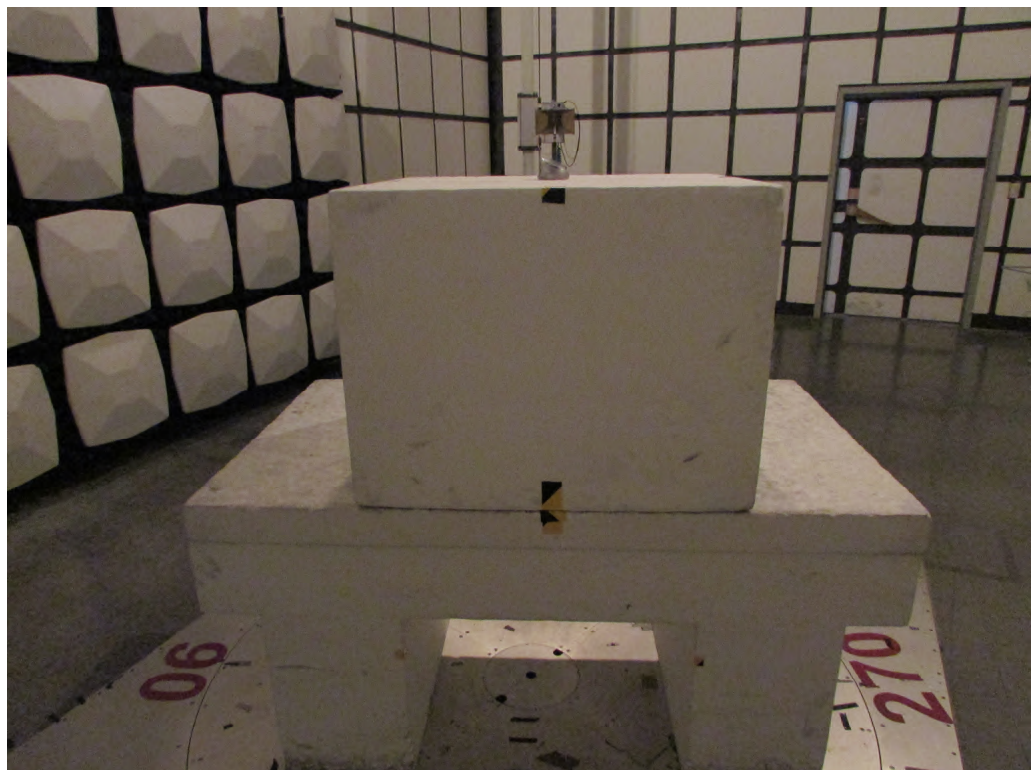


6.9 Test Photographs (1GHz ~ 25GHz)

Front View



Rear View





7. Test of Conducted Spurious Emission

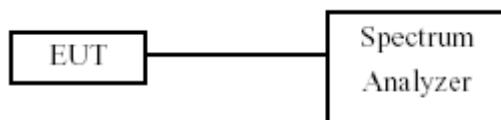
7.1 Test Limit

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

7.2 Test Procedure

- The transmitter output was connected to the spectrum analyzer via a low lose cable.
- Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- The band edges was measured and recorded.

7.3 Test Setup Layout



7.4 Test Result and Data

Test Result : PASS

Temperature : 22°C

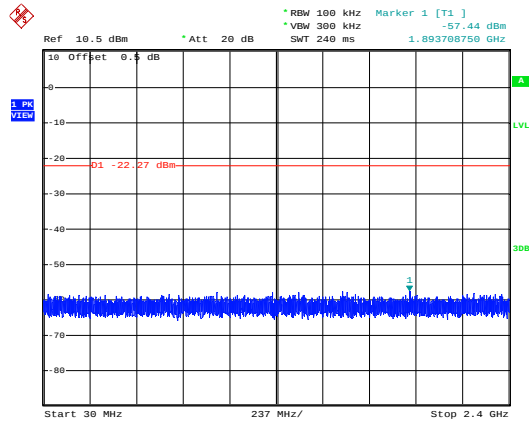
Test Date : Aug. 21, 2018

Humidity : 62%

Note: Test plots refer to the following pages.

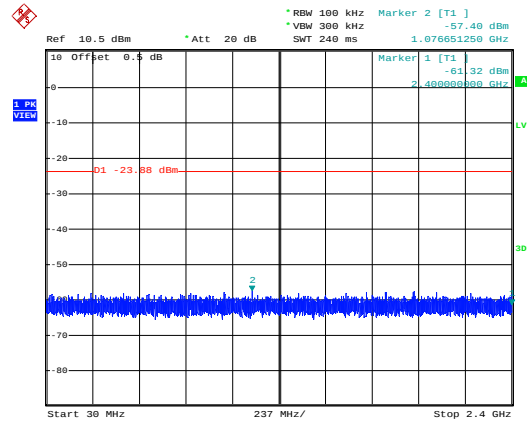


Modulation Type: GFSK, CH00

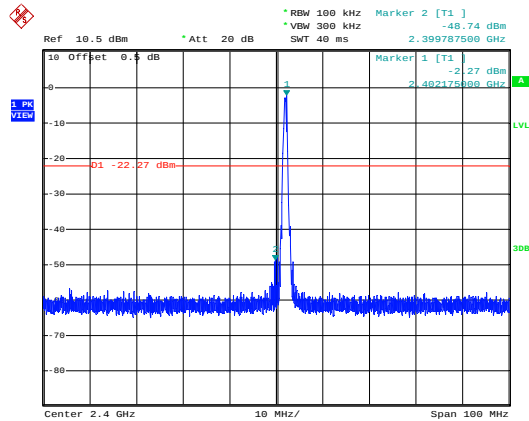


Date: 13.AUG.2018 10:11:52

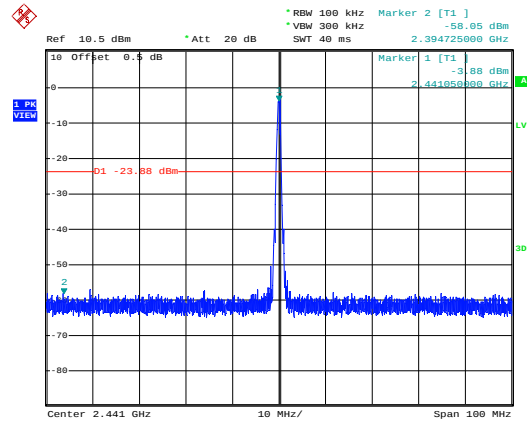
Modulation Type: GFSK, CH39



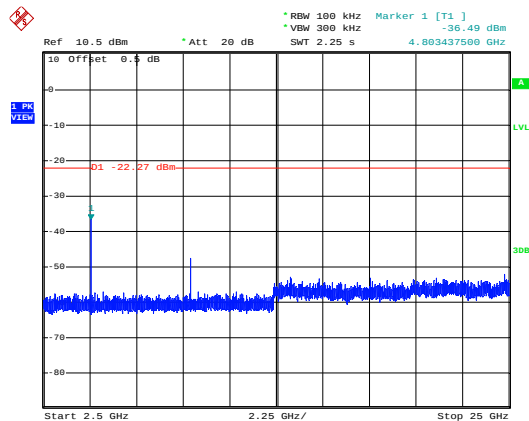
Date: 13.AUG.2018 10:09:55



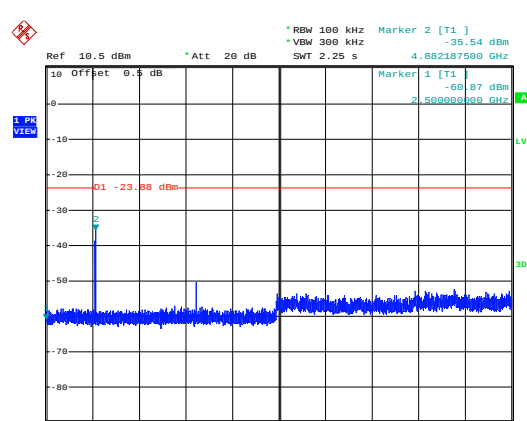
Date: 13.AUG.2018 10:07:25



Date: 13.AUG.2018 10:08:58



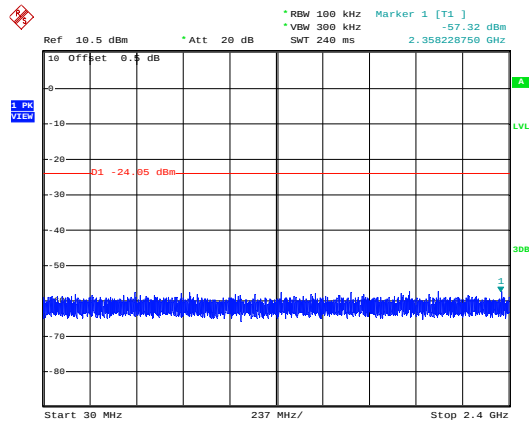
Date: 13.AUG.2018 10:08:20



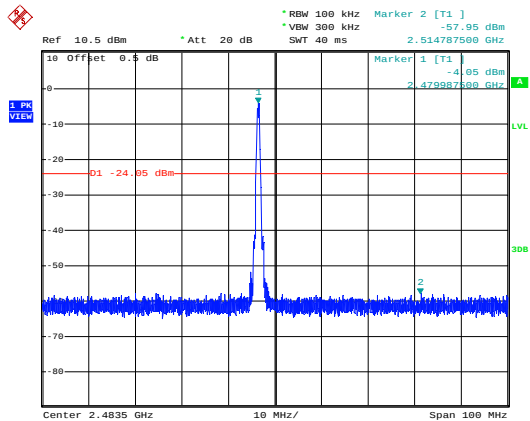
Date: 13.AUG.2018 10:11:02



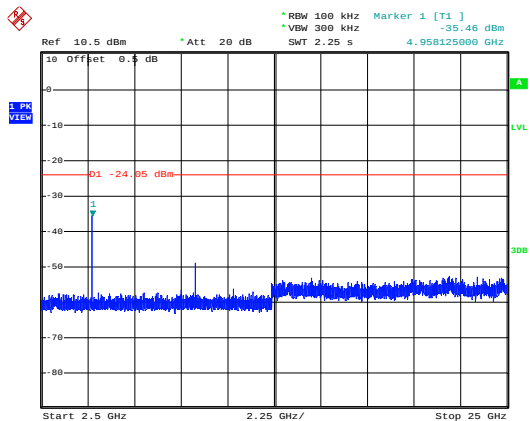
Modulation Type: GFSK, CH78



Date: 13.AUG.2018 10:13:14



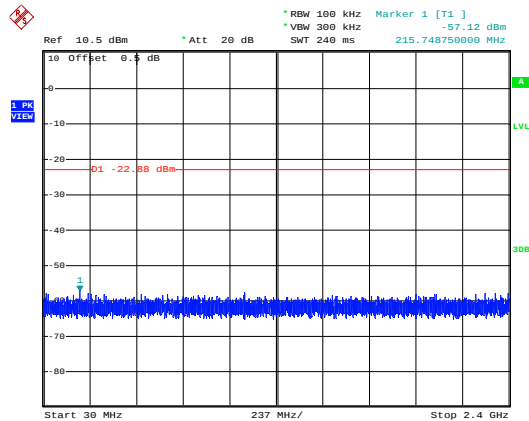
Date: 13.AUG.2018 10:12:50



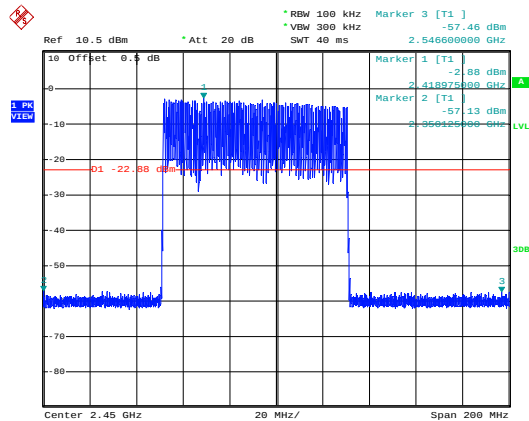
Date: 13.AUG.2018 10:13:48



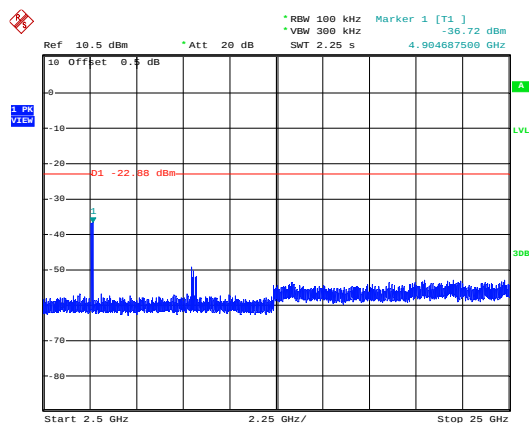
Hopping Mode:
Modulation Type: GFSK



Date: 13.AUG.2018 10:05:03



Date: 13.AUG.2018 10:04:37



Date: 13.AUG.2018 10:06:15



8. 20dB Bandwidth Measurement Data

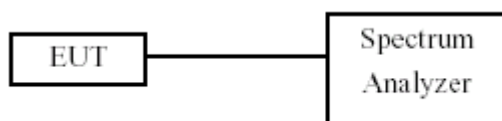
8.1 Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

8.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
- The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

8.3 Test Setup Layout



8.4 Test Result and Data

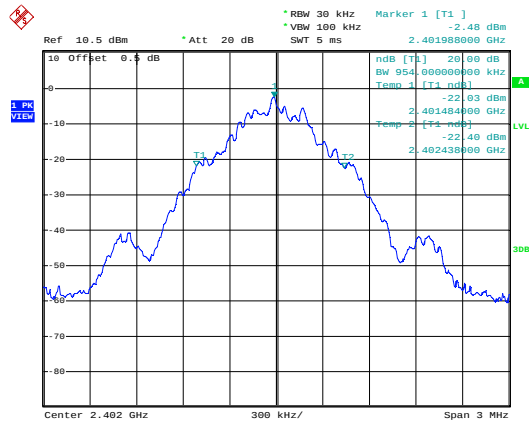
Test Result : PASS
Test Date : Aug. 21, 2018

Temperature : 22°C
Humidity : 62%

Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 20dB Bandwidth (MHz)
GFSK	00	2402	0.954	0.636
	39	2441	0.912	0.608
	78	2480	0.912	0.608

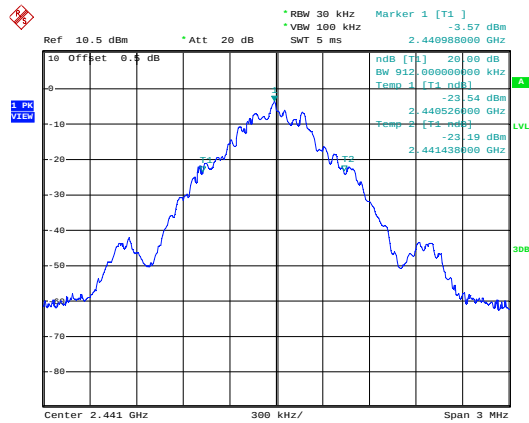


Modulation Type: GFSK
CH00



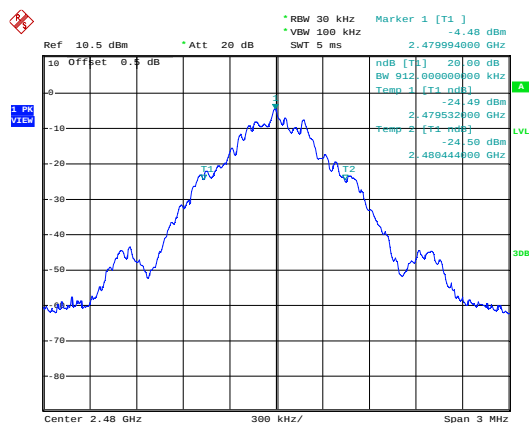
Date: 13.AUG.2018 09:53:09

CH39



Date: 13.AUG.2018 09:53:45

CH78



Date: 13.AUG.2018 09:52:06



9. Frequencies Separation

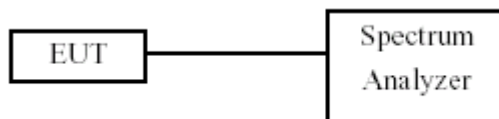
9.1 Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

9.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels.

9.3 Test Setup Layout



9.4 Test Result and Data

Test Result : PASS

Temperature : 22°C

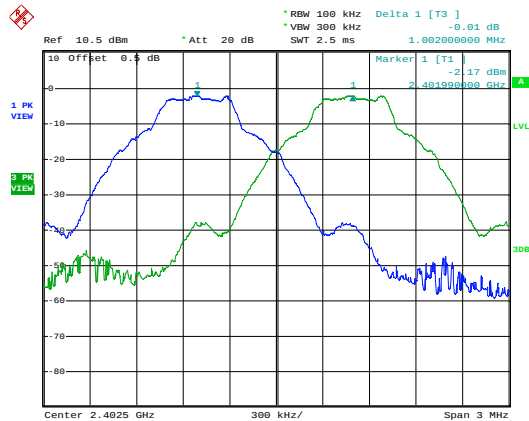
Test Date : Aug. 21, 2018

Humidity : 62%

Modulation Type	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	00	2402	1.002	0.636
	39	2441	1.002	0.608
	78	2480	1.002	0.608

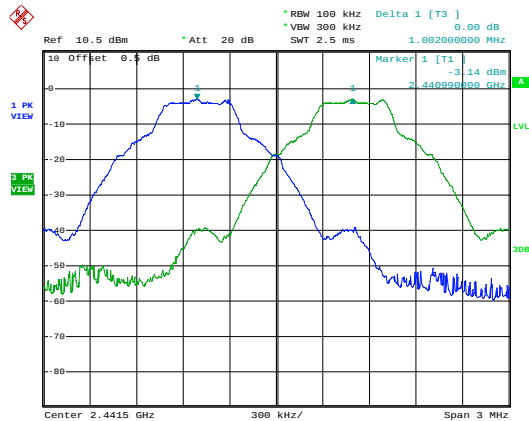


Modulation Type: GFSK
CH00



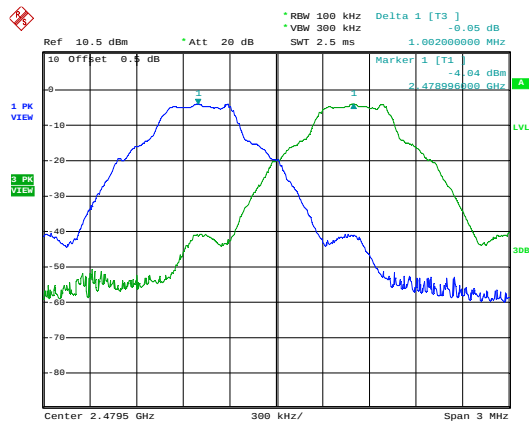
Date: 13.AUG.2018 09:55:35

CH39



Date: 13.AUG.2018 09:56:41

CH78



Date: 13.AUG.2018 09:57:44



10. Dwell Time on each channel

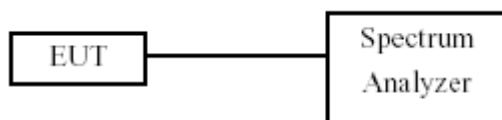
10.1 Test Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the time duration of one transmission on the measured frequency.

10.3 Test Setup Layout



10.4 Test Result and Data

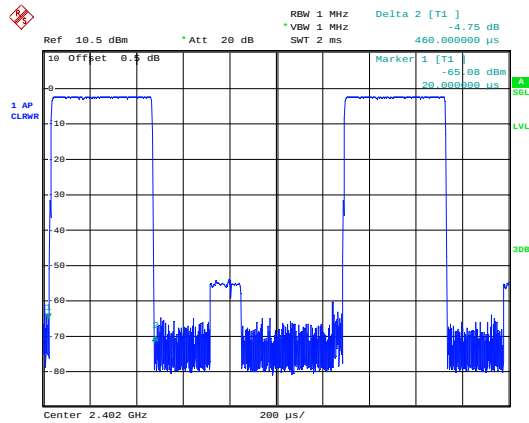
Test Result : PASS
Test Date : Aug. 21, 2018
Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec

Temperature : 22°C
Humidity : 62%

Modulation Type	Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 31.6 (79 Hopping*0.4)	Dwell Time (ms)	Limit (ms)
GFSK (DH1)	2402	0.460	320.10	147.25	400
GFSK (DH3)	2402	1.730	159.90	276.63	400
GFSK (DH5)	2402	3.000	106.81	320.43	400

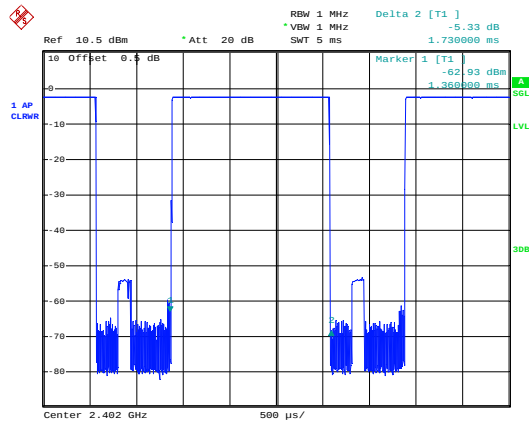


Modulation Type: GFSK(DH1)



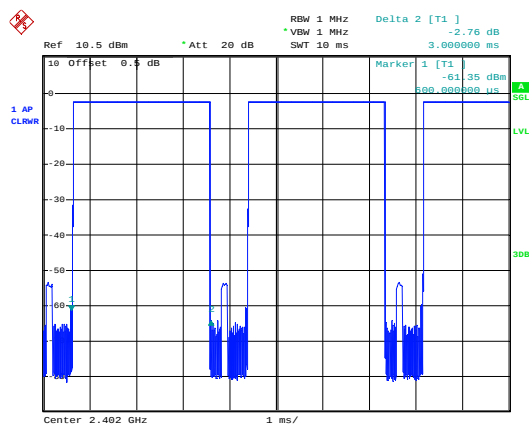
Date: 13.AUG.2018 10:00:00

Modulation Type: GFSK(DH3)



Date: 13.AUG.2018 09:59:30

Modulation Type: GFSK(DH5)



Date: 13.AUG.2018 09:58:51



11. Number of Hopping Channels

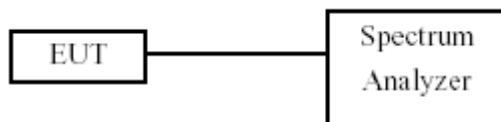
11.1 Test Limit

Frequency hopping systems in the 2400 ~ 2483.5 MHz band shall use at least 15 channels.

11.2 Test Procedures

- a. The transmitter output was connected to the spectrum analyzer.
- b. 2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
- c. 3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

11.3 Test Setup Layout



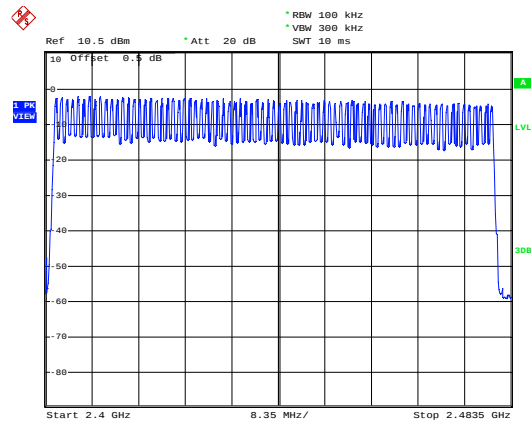
11.4 Test Result and Data

Test Result : PASS Temperature : 22°C
Test Date : Aug. 21, 2018 Humidity : 62%

Modulation Type	Hopping Channels
GFSK	79



Modulation Type: GFSK



Date: 13.AUG.2018 10:02:39



12. Maximum Peak Output Power

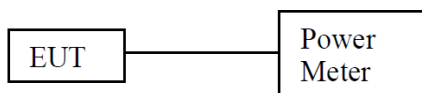
12.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

12.2 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 worst case test result.

12.3 Test Setup Layout



**12.4 Test Result and Data**

Test Result : PASS

Temperature : 22°C

Test Date : Aug. 21, 2018

Humidity : 62%

Modulation Type	Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
GFSK	00	2402	-2.31	0.587
	39	2441	-2.54	0.557
	78	2480	-3.22	0.476

Modulation Type	Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)
GFSK	00	2402	-2.60	0.550
	39	2441	-2.90	0.513
	78	2480	-3.61	0.436

Note: Average power is for reference only.