FCC RADIO TEST REPORT

Applicant	:	KALI AUDIO INC.
Address	:	1455 BLAIRWOOD AVE.CHULA VISTA, CA 91913 USA
Equipment	:	Bluetooth Input Module
Model No.	:	MV-BT
Trademark	:	KALI
FCC ID	:	2ATSDBTBOX

I HEREBY CERTIFY THAT :

The sample was received on May 20, 2019 and the testing was carried out on Jun. 26, 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: Tested by:

Mark Liao / Assistant Manager Amos Zhang/ Engineer

Laboratory Accreditation:

☒ Cerpass Technology Corporation Test Laboratory

TAF LAB Code:	1439

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History of this test report

■ ORIGINAL

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description
TEFB1905222	Jun. 26, 2019	Original

Report Type		Description
■	Original report	NA
☐	Derivative Report	NA

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

ANSI C63.10: 2013
KDB 558074 D01 DTS Meas Guidance v05r02
FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	. Description of Test	Result
§ 15.203	. Antenna Requirement	Pass
§ 15.207(a)	. Conducted Emission	Pass
§ 15.209(a)	. Radiated Emission	Pass
§ 15.247(a)(1)	. Channel Carrier Frequencies Separation	Pass
§ 15.247(a)(1)	. 20dB Bandwidth Measurement	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
§ 15.247(d)	. Band Edges Measurement Data	Pass

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Product	Bluetooth Input Module
Test Model	MV-BT
Frequency Range	2402~2480MHz
Number of Channels	79
Modulation	GFSK (1Mbps), Π/4 DQPSK (2Mbps) and 8DPSK (3Mbps)
Data Rates	Bluetooth: 1, 2, 3Mbps
Antenna Type	PCB Antenna with 0dBi
EUT Power Rating:	Input: 5VDC,1A supplied by adapter
Adapter Spec.	Model:GPE053A-V050100-1 Input:100-240V~50/60Hz 0.2A Output:5.0V⎓1000mA 5W

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	---	---

2.3 Test Mode & Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10

b. The complete test system included support units and EUT for RF test.

c. Run the test software "**Blue Test3.exe**".

d. The following test mode was performed for conduction and radiation test:

Test Mode 1: GFSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.

Test Mode 2: π/4 DQPSK：CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.

Test Mode 3: 8DPSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.

2.4 Description of Test System

No	Device	Manufacturer	Model No.	Description
1	Notebook	SONY	PCG-71811P	R33021

Use Cable:

No.	Cable	Quantity	Description
1	DC Cable	1	1.0m Non Shielding
2	USB Cable	1	1.5m Shielding

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 25000MHz
Test Distance:		The test distance of radiated emission from antenna to EUT is 3 M.

2.6 Measurement Uncertainty

Measurement Item	Measurement Uncertainty
Conducted Emission	±2.71 dB
Radiation test (10m) below 1GHz	Vertical : ±3.89 dB
	Horizontal: ±4.11 dB
Radiation test (3m) below 1GHz	Vertical : ±4.11 dB
	Horizontal: ±4.10 dB
20 dB Bandwidth	7500 Hz
Maximum Peak Output Power	±1.4 dB
100kHz Bandwidth of Frequency Band Edges	±2.2 dB
Power Spectral Density	±1.3870 dB

3. Test Equipment and Ancillaries Used for Tests

Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI3	100821	2018/09/12	2019/09/11
LISN	Schwarzbeck	NSLK 8127	8127-516	2018/09/11	2019/09/10
Pulse Limiter	R&S	ESH3-Z2	101933	2018/09/04	2019/09/03
Bilog Antenna	Schwarzbeck	VULB9168	275	2018/09/17	2019/09/16
Active Loop Antenna	EMCO	6507	40855	2019/5/24	2020/5/23
Horn Antenna	EMCO	3115	31601	2018/09/26	2019/09/25
Horn Antenna	EMCO	3116	31974	2018/09/07	2019/09/06
Preamplifier	EM Electronics corp.	EM330	60658	2018/10/04	2019/10/03
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2018/09/18	2019/09/17
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2018/10/31	2019/10/30
MXG Vector Signal Generator	KEYSIGHT	N5182A	MY50141551	2018/10/07	2019/10/06
Spectrum Analyzer	R&S	FSP40	100219	2018/07/03	2019/07/02
Bluetooth Test Set	Anritsu	MT8852B	6261903476	2018/12/26	2019/12/25
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
Software	Farad	Ez-EMC	ver.ct3a1	N/A	N/A
Software	AUDIX	E3	V8.2014-8-6	N/A	N/A
Software	Keysight	N7607B Signal Studio	V3.0.0.0	N/A	N/A
Software	Keysight	Inservice MonitorUtility	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	Peak Gain
on-board antenna	0dBi

5. Test of Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT 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 as shown in section 6.2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions

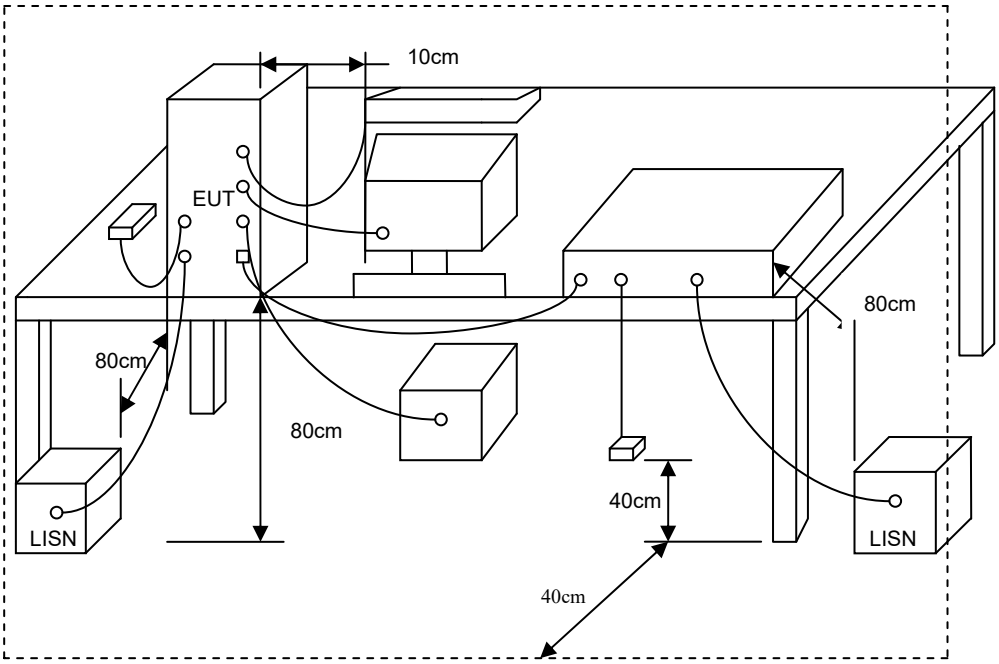
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

5.2 Test Procedures

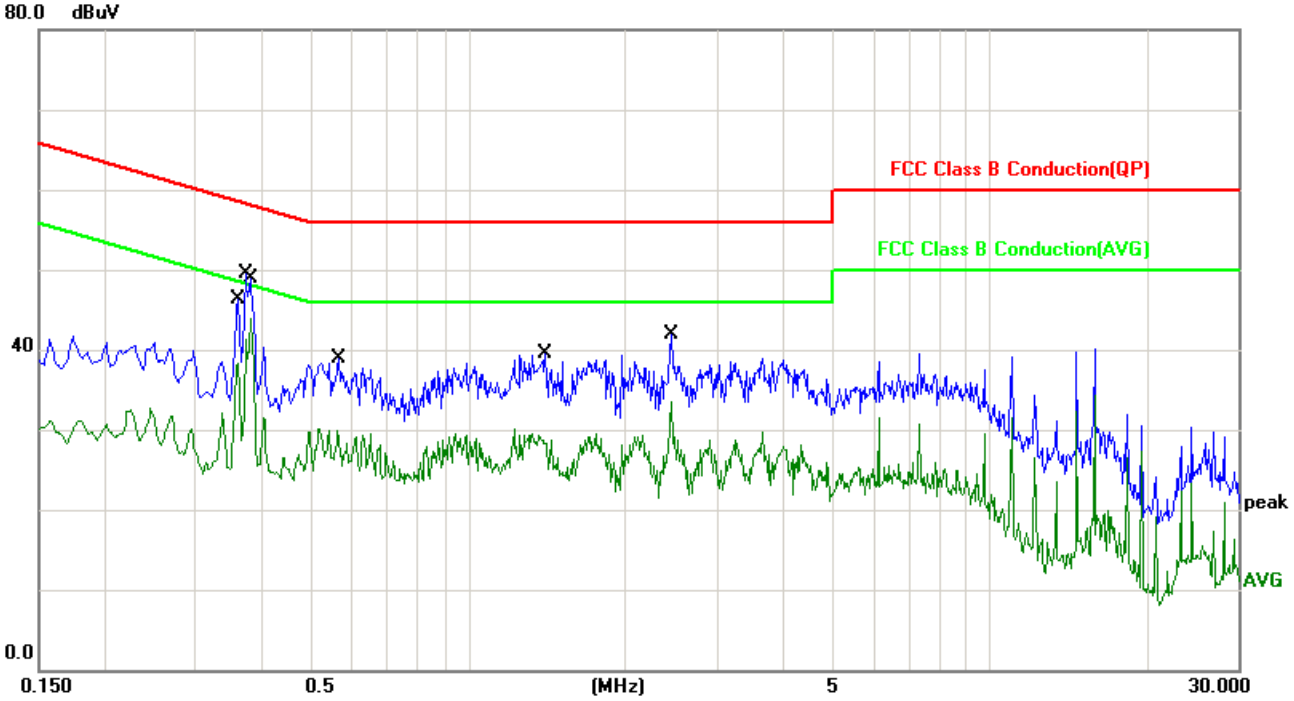
a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.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

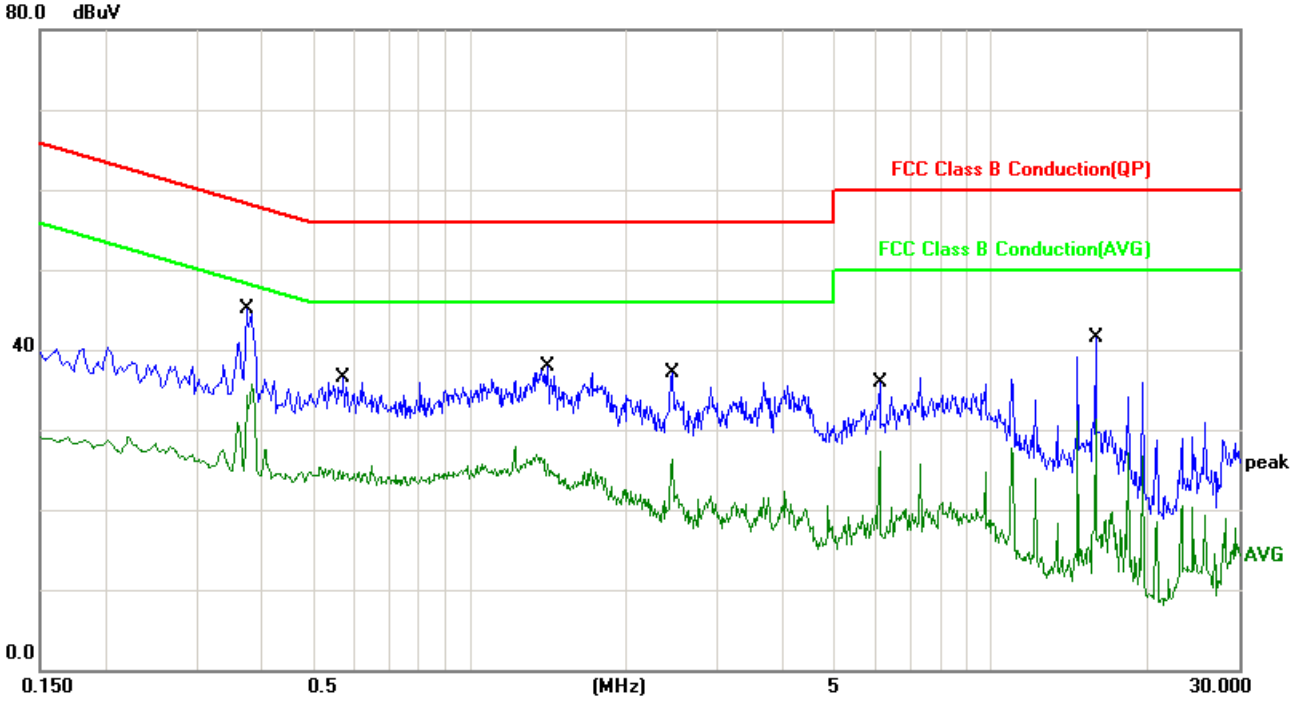
Test Mode :	Normal Link	Phase :	Line
Temperature :	20°C	Humidity:	51%
Pressure(mbar) :	1002	Date:	Jun. 24, 2019



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3620	9.97	32.94	42.91	58.68	-15.77	QP
2	0.3620	9.97	27.56	37.53	48.68	-11.15	AVG
3	0.3740	9.96	28.94	38.90	58.41	-19.51	QP
4	0.3740	9.96	20.21	30.17	48.41	-18.24	AVG
5	0.3820	9.96	37.09	47.05	58.23	-11.18	QP
6	0.3820	9.96	33.16	43.12	48.23	-5.11	AVG
7	0.5660	9.95	22.80	32.75	56.00	-23.25	QP
8	0.5660	9.95	17.72	27.67	46.00	-18.33	AVG
9	1.4100	10.51	22.60	33.11	56.00	-22.89	QP
10	1.4100	10.51	16.79	27.30	46.00	-18.70	AVG
11	2.4500	10.94	28.01	38.95	56.00	-17.05	QP
12	2.4500	10.94	20.78	31.72	46.00	-14.28	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator

Test Mode :	Normal Link	Phase :	Neutral
Temperature :	20°C	Humidity:	51%
Pressure(mbar) :	1002	Date:	Jun. 24, 2019



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3740	9.96	23.56	33.52	58.41	-24.89	QP
2	0.3740	9.96	16.27	26.23	48.41	-22.18	AVG
3	0.5740	9.96	19.28	29.24	56.00	-26.76	QP
4	0.5740	9.96	13.80	23.76	46.00	-22.24	AVG
5	1.4140	10.14	21.33	31.47	56.00	-24.53	QP
6	1.4140	10.14	14.54	24.68	46.00	-21.32	AVG
7	2.4500	10.18	23.99	34.17	56.00	-21.83	QP
8	2.4500	10.18	16.53	26.71	46.00	-19.29	AVG
9	6.1220	10.24	23.00	33.24	60.00	-26.76	QP
10	6.1220	10.24	15.90	26.14	50.00	-23.86	AVG
11	15.9180	10.40	26.89	37.29	60.00	-22.71	QP
12	15.9180	10.40	18.47	28.87	50.00	-21.13	AVG

Note: Measurement Level = Reading Level + Correct Factor+ Attenuator

6. Test of Radiated Emission

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).

FREQUENCIES(MHz)	FIELD STRENGTH(microvolts/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

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

a. The EUT was placed on a rotatable table top 0.8 meter above ground; above 1GHz, the height was 1.5m.

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.

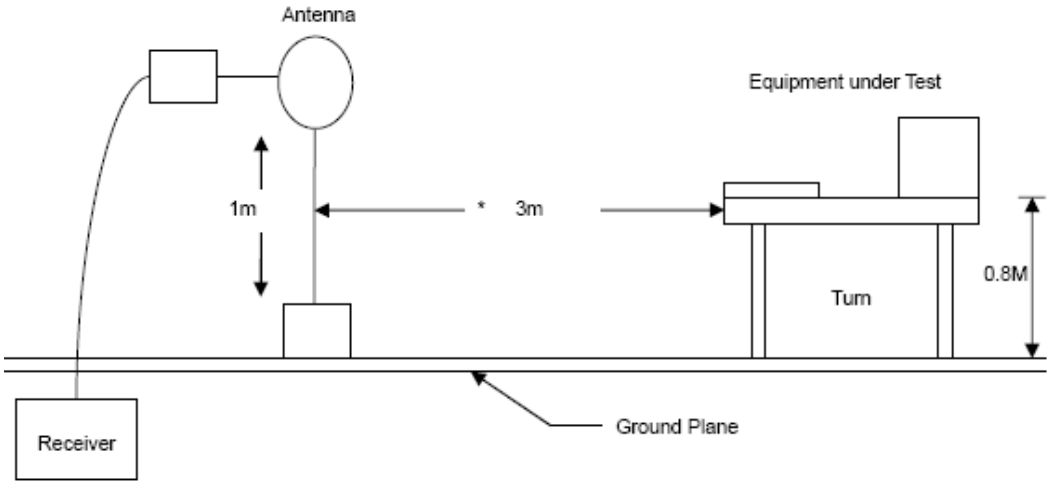
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.

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.

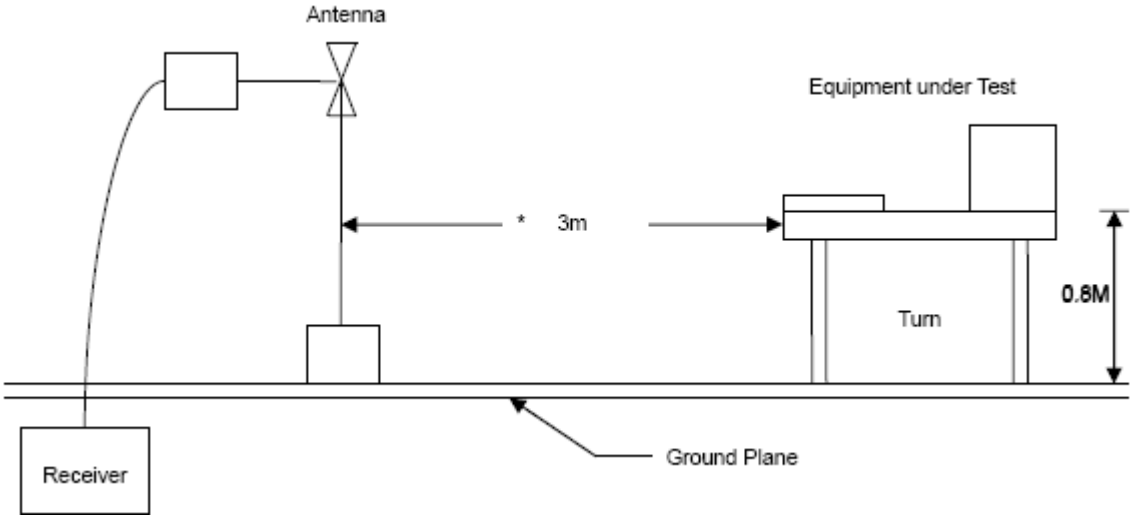
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

6.3 Typical Test Setup

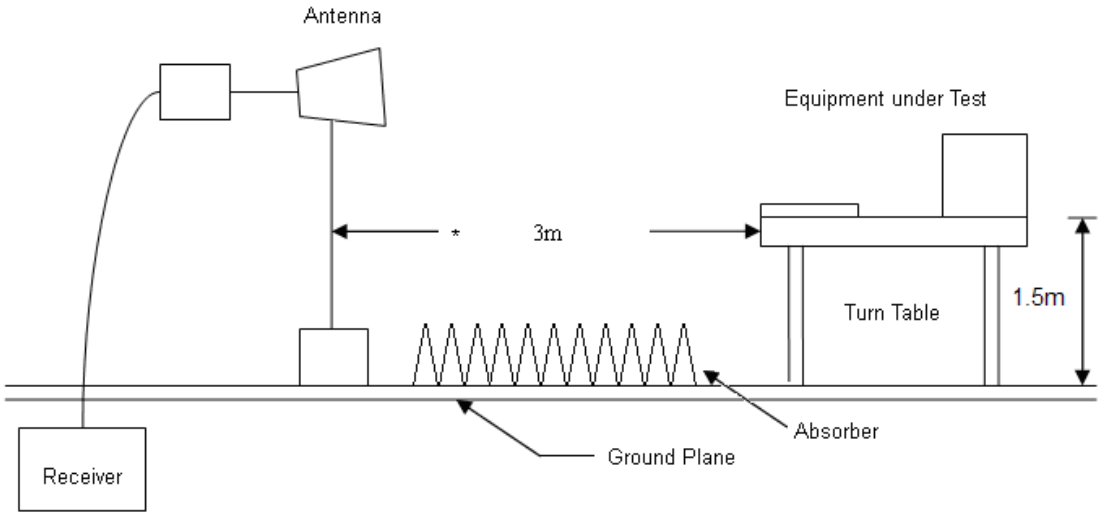
Below 30MHz Test Setup



30M - 1GHz Test Setup



Above 1GHz Test Setup

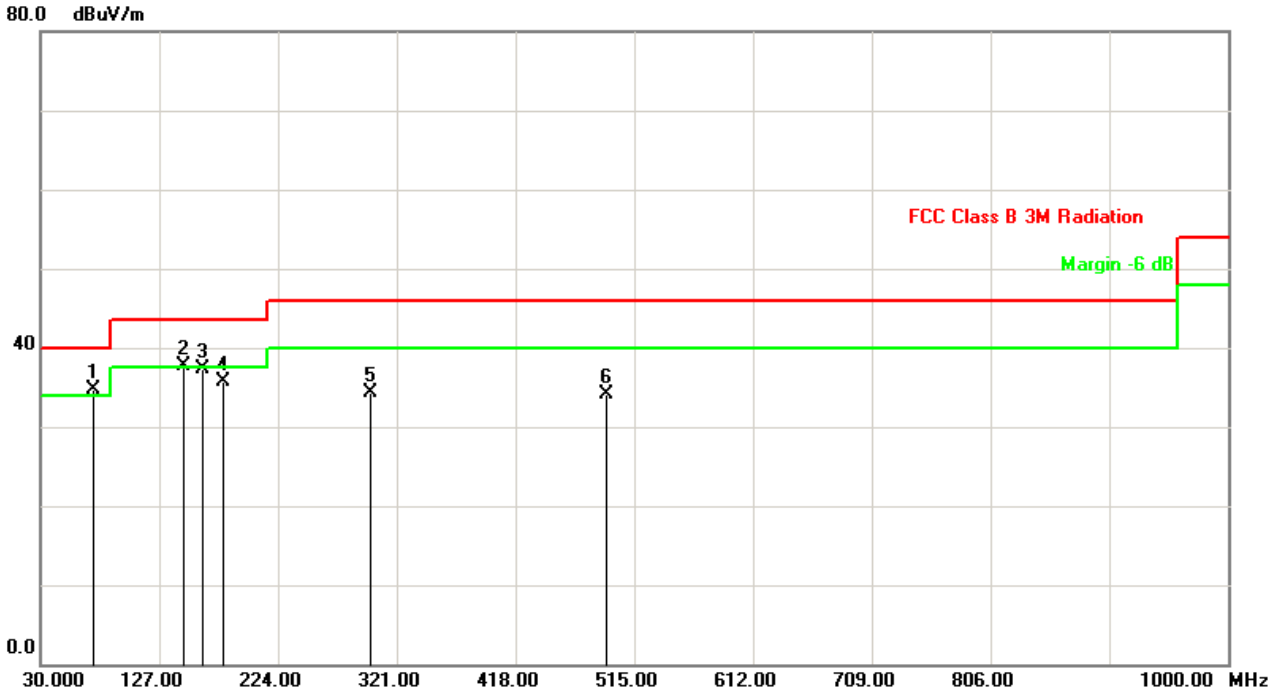


6.3.1 Test Result and Data

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

Below 1GHz

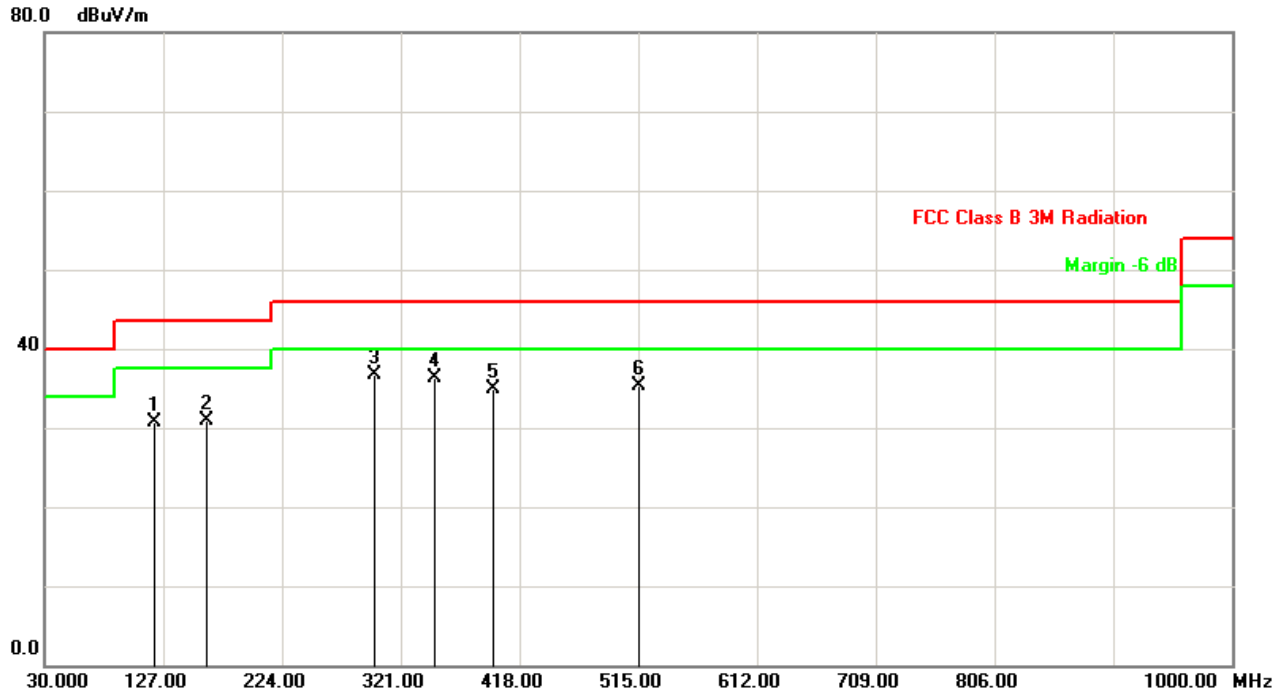
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1	Temperature	:	18 °C
Test Date	:	May. 20, 2019	Humidity	:	49 %
Memo	:	CH 00	Atmospheric Pressure	:	1008 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	73.6500	-16.56	51.30	34.74	40.00	-5.26	QP	143	72
2	147.3700	-13.03	50.82	37.79	43.50	-5.71	QP	154	304
3	161.9200	-14.36	51.68	37.32	43.50	-6.18	QP	138	15
4	179.3800	-13.91	49.57	35.66	43.50	-7.84	peak	100	116
5	299.6600	-10.49	44.80	34.31	46.00	-11.69	peak	100	204
6	492.6900	-2.60	36.65	34.05	46.00	-11.95	peak	100	58

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

Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	18 °C
Test Date	:	May. 20, 2019	Humidity	:	49 %
Memo	:	CH 00	Atmospheric Pressure	:	1008 hpa

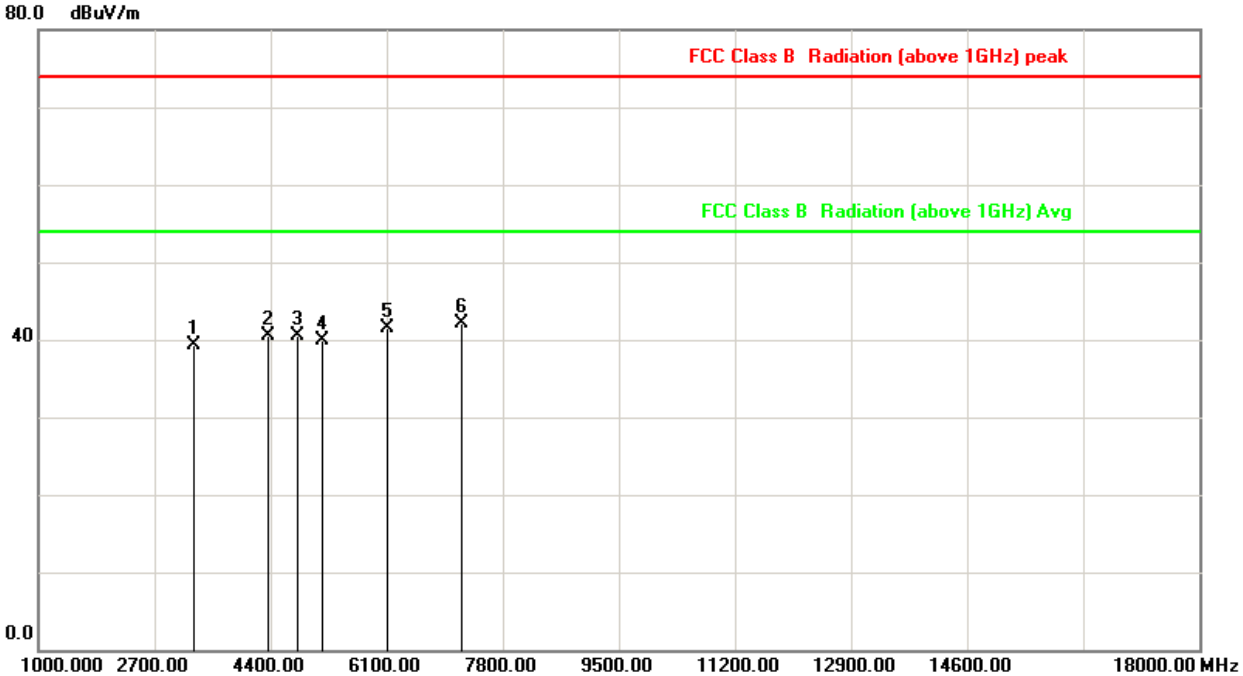


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	119.2400	-10.36	41.05	30.69	43.50	-12.81	peak	100	302
2	161.9200	-14.36	45.33	30.97	43.50	-12.53	peak	200	105
3	299.6600	-10.49	47.12	36.63	46.00	-9.37	peak	100	24
4	348.1600	-5.75	41.96	36.21	46.00	-9.79	peak	200	116
5	396.6600	-6.57	41.38	34.81	46.00	-11.19	peak	100	318
6	515.9699	-3.28	38.55	35.27	46.00	-10.73	peak	100	13

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

Above 1GHz

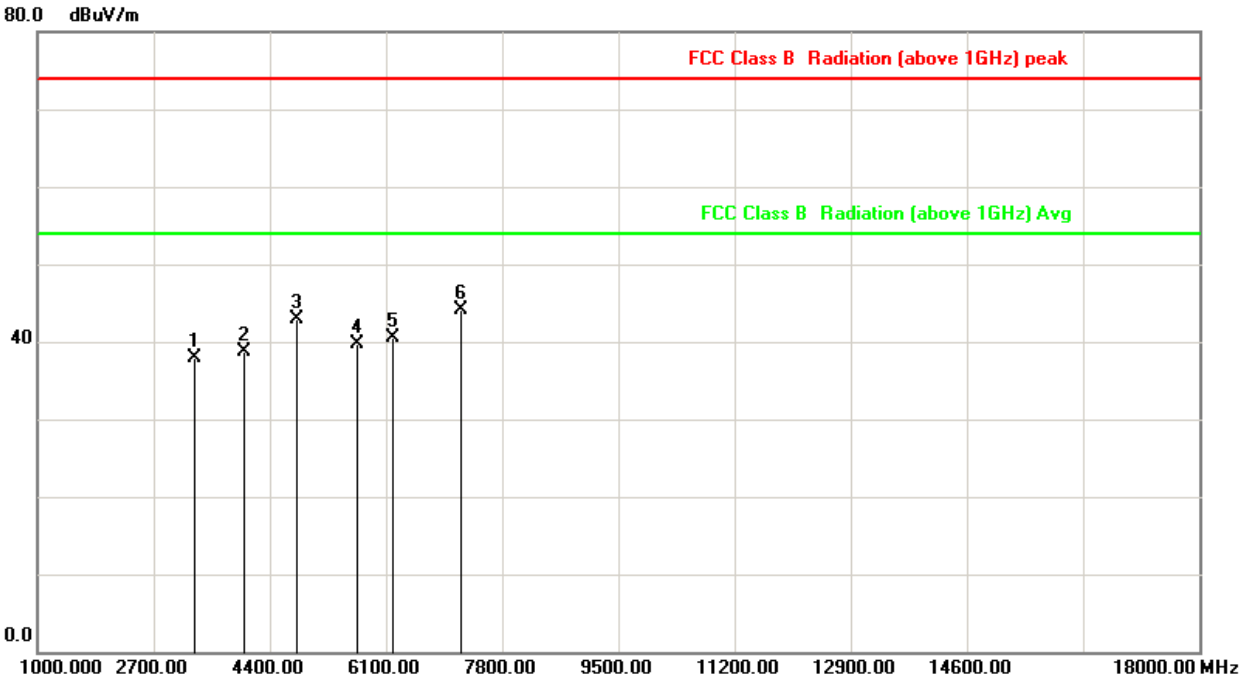
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 00	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3266.667	-4.83	44.10	39.27	74.00	-34.73	peak
2	4371.667	0.01	40.42	40.43	74.00	-33.57	peak
3	4804.000	1.23	39.33	40.56	74.00	-33.44	peak
4	5165.000	1.74	38.08	39.82	74.00	-34.18	peak
5	6100.000	3.30	38.18	41.48	74.00	-32.52	peak
6	7206.000	5.88	36.27	42.15	74.00	-31.85	peak

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

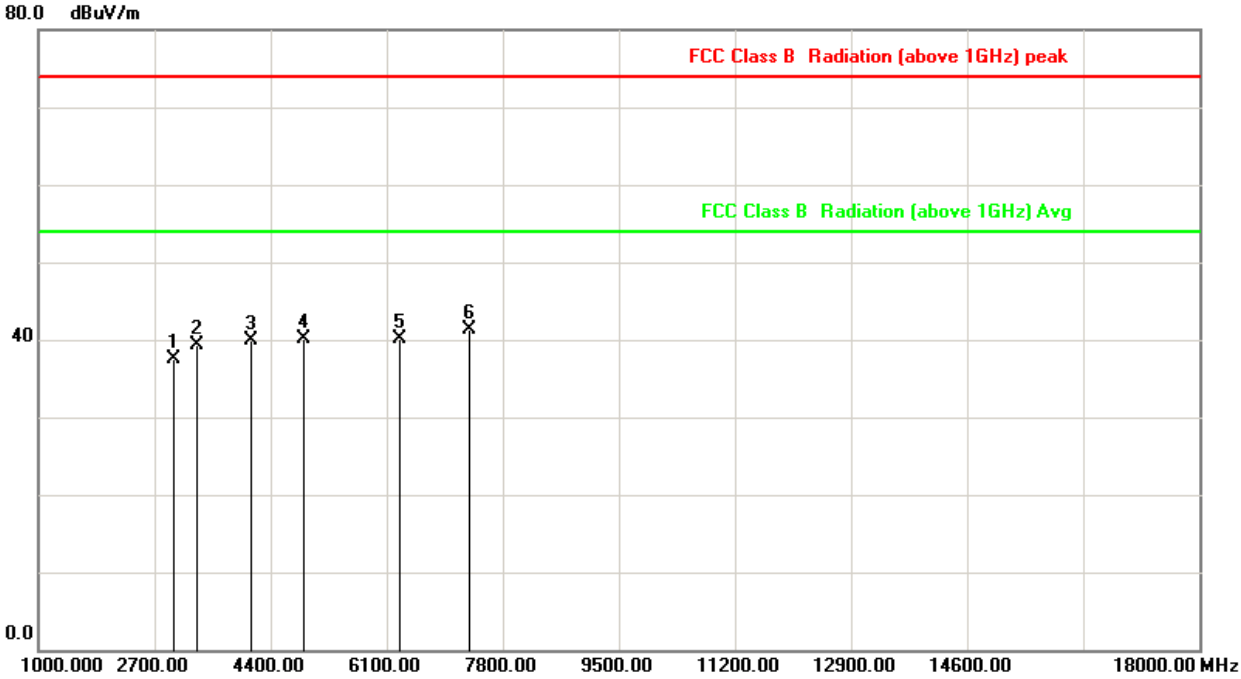
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 00	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3295.000	-4.68	42.68	38.00	74.00	-36.00	peak
2	4031.667	-1.73	40.46	38.73	74.00	-35.27	peak
3	4804.000	1.23	41.74	42.97	74.00	-31.03	peak
4	5675.000	2.45	37.23	39.68	74.00	-34.32	peak
5	6213.333	3.35	37.12	40.47	74.00	-33.53	peak
6	7206.000	5.88	38.32	44.20	74.00	-29.80	peak

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

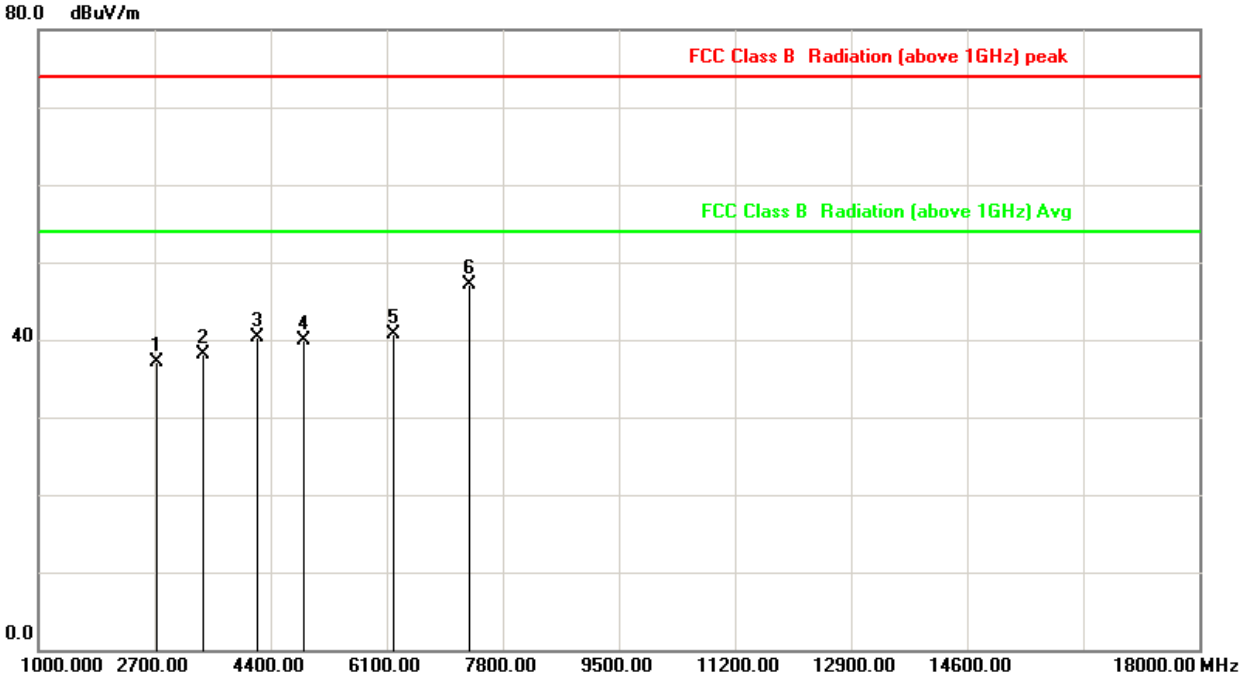
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 39	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2983.333	-6.34	43.88	37.54	74.00	-36.46	peak
2	3323.333	-4.53	43.86	39.33	74.00	-34.67	peak
3	4116.667	-1.29	41.26	39.97	74.00	-34.03	peak
4	4882.000	1.38	38.70	40.08	74.00	-33.92	peak
5	6298.333	3.38	36.81	40.19	74.00	-33.81	peak
6	7323.000	6.34	34.95	41.29	74.00	-32.71	peak

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

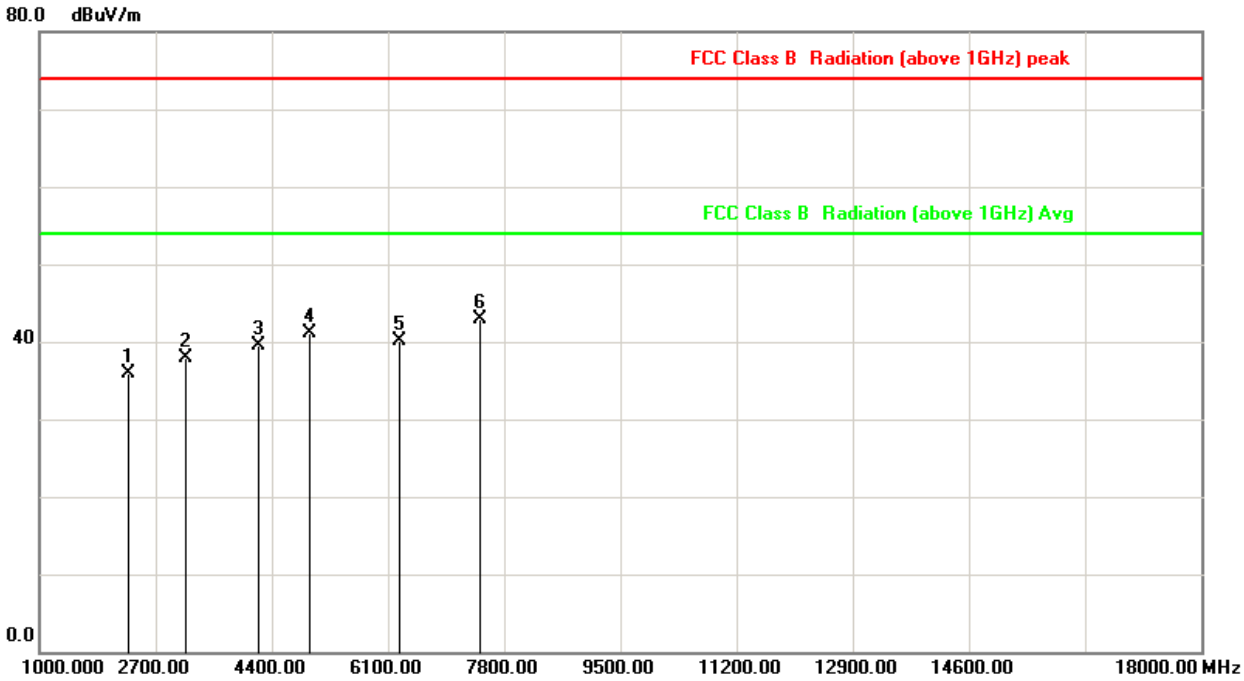
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	Mode 1	Temperature :	25 °C
Test Date :	May 26, 2019	Humidity :	52 %
Memo :	CH 39	Atmospheric Pressure :	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2728.333	-8.05	45.19	37.14	74.00	-36.86	peak
2	3408.333	-4.08	42.28	38.20	74.00	-35.80	peak
3	4201.667	-0.86	41.17	40.31	74.00	-33.69	peak
4	4882.000	1.38	38.50	39.88	74.00	-34.12	peak
5	6213.333	3.35	37.36	40.71	74.00	-33.29	peak
6	7323.000	6.34	40.69	47.03	74.00	-26.97	peak

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

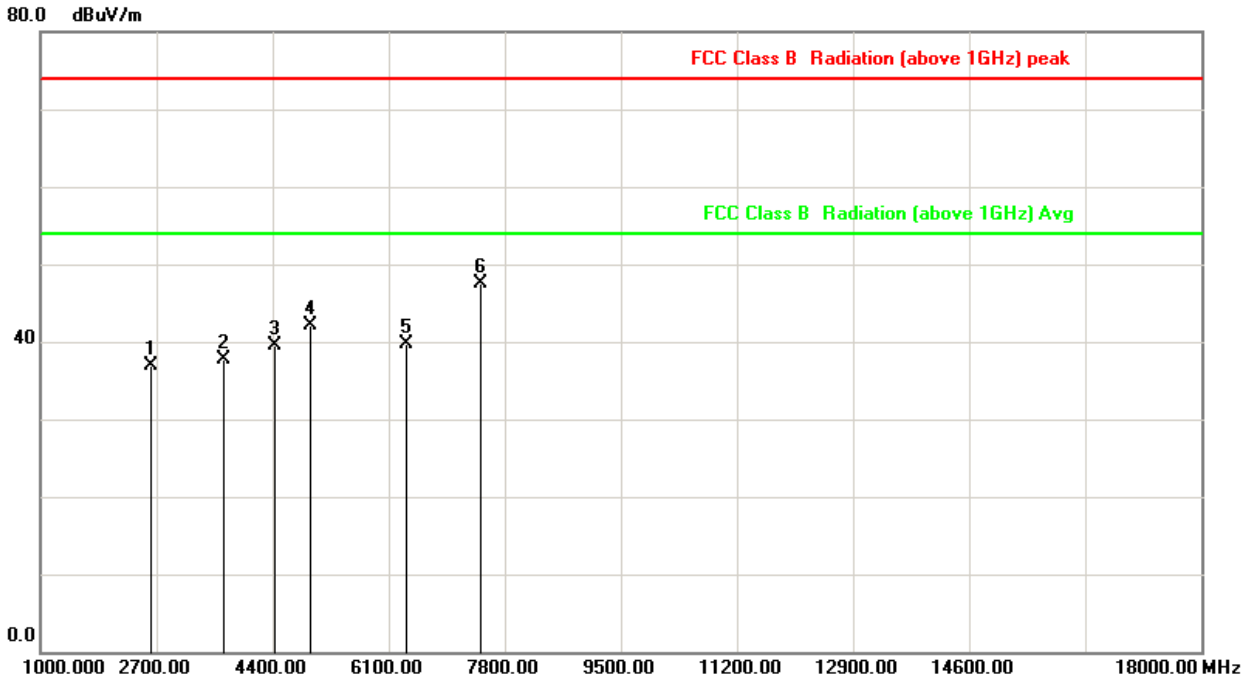
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 1	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 78	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2303.333	-10.43	46.24	35.81	74.00	-38.19	peak
2	3153.333	-5.42	43.36	37.94	74.00	-36.06	peak
3	4201.667	-0.86	40.33	39.47	74.00	-34.53	peak
4	4960.000	1.52	39.67	41.19	74.00	-32.81	peak
5	6270.000	3.37	36.70	40.07	74.00	-33.93	peak
6	7440.000	6.80	36.08	42.88	74.00	-31.12	peak

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

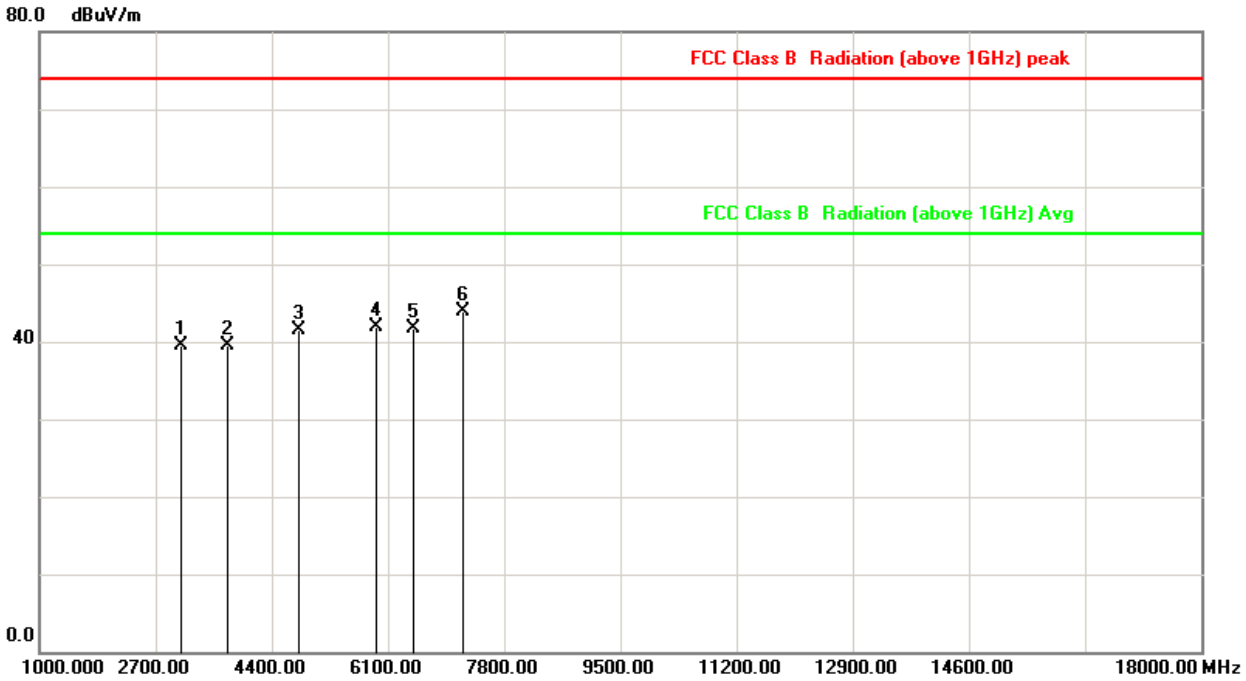
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 78	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2615.000	-8.81	45.72	36.91	74.00	-37.09	peak
2	3691.667	-2.94	40.60	37.66	74.00	-36.34	peak
3	4428.333	0.29	39.26	39.55	74.00	-34.45	peak
4	4960.000	1.52	40.67	42.19	74.00	-31.81	peak
5	6355.000	3.40	36.40	39.80	74.00	-34.20	peak
6	7440.000	6.80	40.80	47.60	74.00	-26.40	peak

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

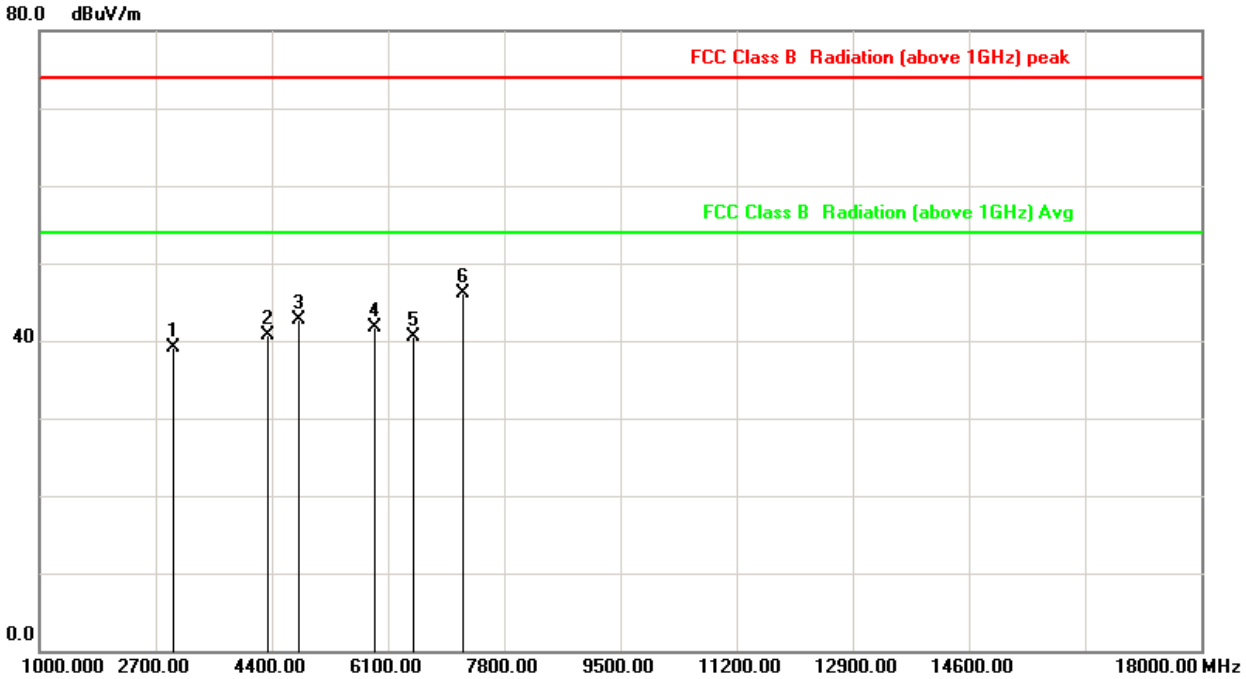
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 2	Temperature :	25 °C
Test Date :	May 26, 2019	Humidity :	52 %
Memo :	CH 00	Atmospheric Pressure :	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3068.333	-5.87	45.32	39.45	74.00	-34.55	peak
2	3748.333	-2.75	42.24	39.49	74.00	-34.51	peak
3	4804.000	1.23	40.26	41.49	74.00	-32.51	peak
4	5930.000	3.09	38.87	41.96	74.00	-32.04	peak
5	6468.333	3.45	38.21	41.66	74.00	-32.34	peak
6	7206.000	5.88	37.95	43.83	74.00	-30.17	peak

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

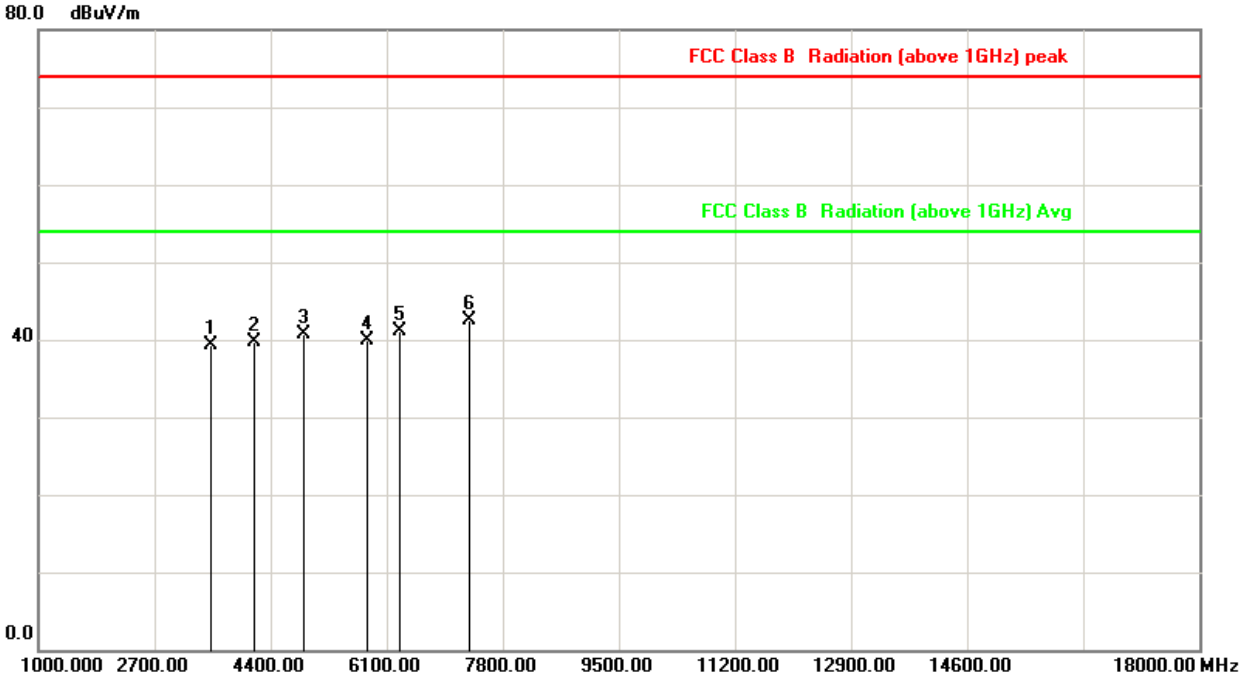
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 00	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2955.000	-6.53	45.66	39.13	74.00	-34.87	peak
2	4343.333	-0.14	40.90	40.76	74.00	-33.24	peak
3	4804.000	1.23	41.56	42.79	74.00	-31.21	peak
4	5901.667	3.02	38.65	41.67	74.00	-32.33	peak
5	6468.333	3.45	37.06	40.51	74.00	-33.49	peak
6	7206.000	5.88	40.32	46.20	74.00	-27.80	peak

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

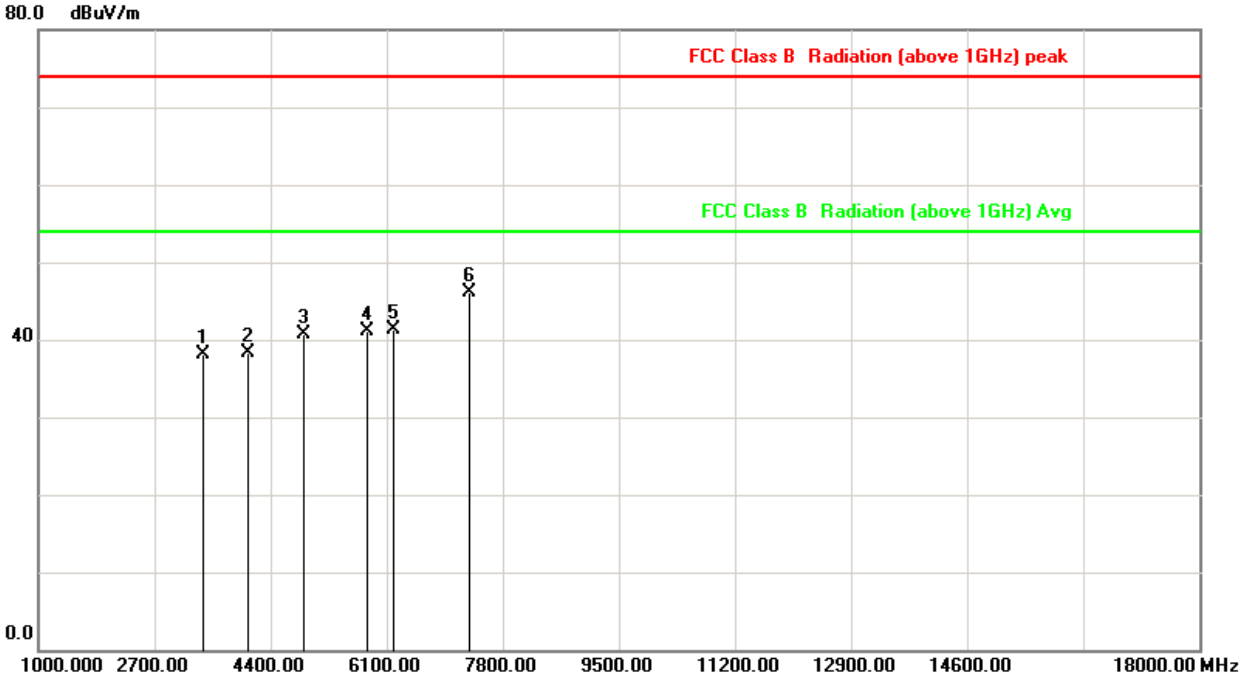
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 2	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 39	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3521.667	-3.53	42.93	39.40	74.00	-34.60	peak
2	4173.333	-1.01	40.78	39.77	74.00	-34.23	peak
3	4882.000	1.38	39.24	40.62	74.00	-33.38	peak
4	5816.667	2.81	37.19	40.00	74.00	-34.00	peak
5	6298.333	3.38	37.81	41.19	74.00	-32.81	peak
6	7323.000	6.34	36.21	42.55	74.00	-31.45	peak

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

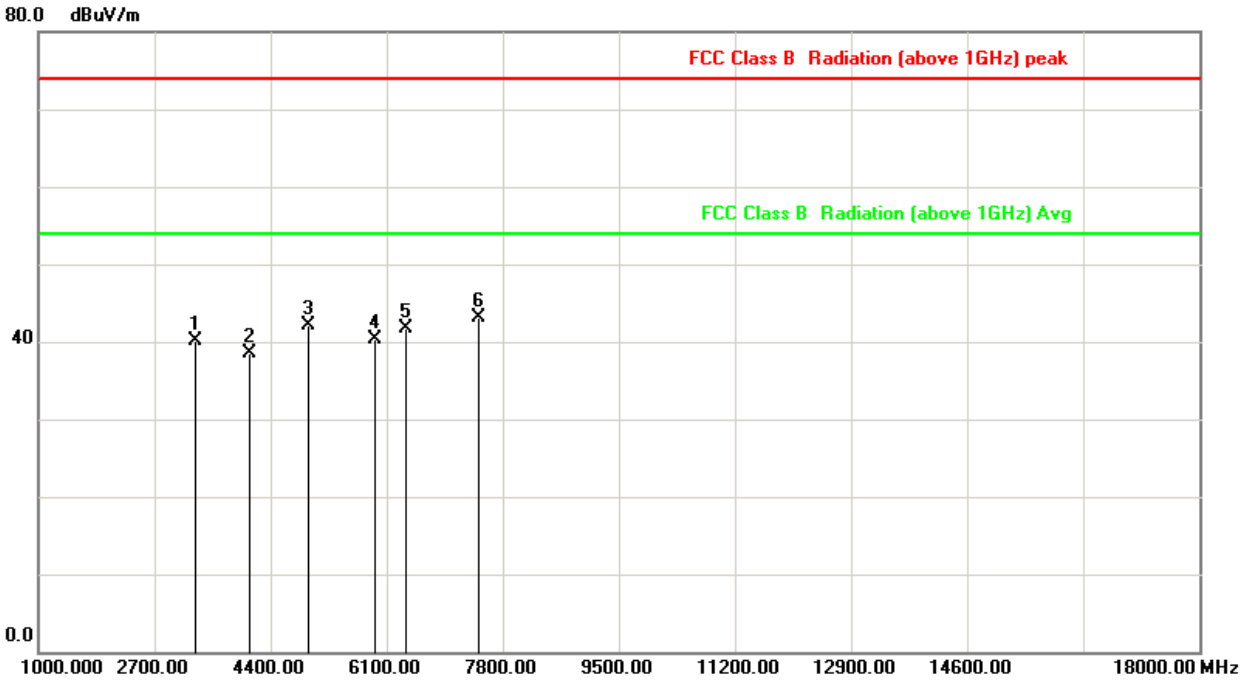
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 2	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 39	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3408.333	-4.08	42.28	38.20	74.00	-35.80	peak
2	4060.000	-1.58	39.83	38.25	74.00	-35.75	peak
3	4882.000	1.38	39.24	40.62	74.00	-33.38	peak
4	5816.667	2.81	38.30	41.11	74.00	-32.89	peak
5	6213.333	3.35	37.86	41.21	74.00	-32.79	peak
6	7323.000	6.34	39.86	46.20	74.00	-27.80	peak

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

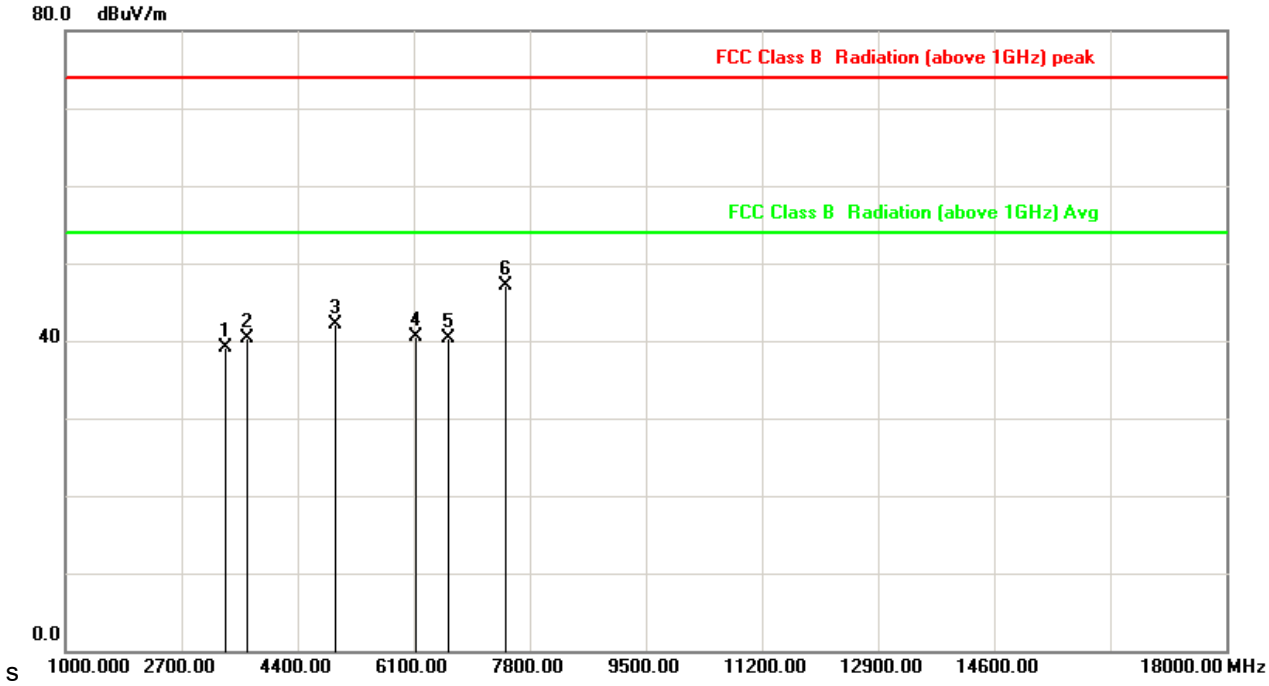
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 2	Temperature :	25 °C
Test Date :	May 26, 2019	Humidity :	52 %
Memo :	CH 78	Atmospheric Pressure :	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3295.000	-4.68	44.69	40.01	74.00	-33.99	peak
2	4088.333	-1.44	39.98	38.54	74.00	-35.46	peak
3	4960.000	1.52	40.68	42.20	74.00	-31.80	peak
4	5930.000	3.09	37.19	40.28	74.00	-33.72	peak
5	6383.333	3.41	38.23	41.64	74.00	-32.36	peak
6	7440.000	6.80	36.24	43.04	74.00	-30.96	peak

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

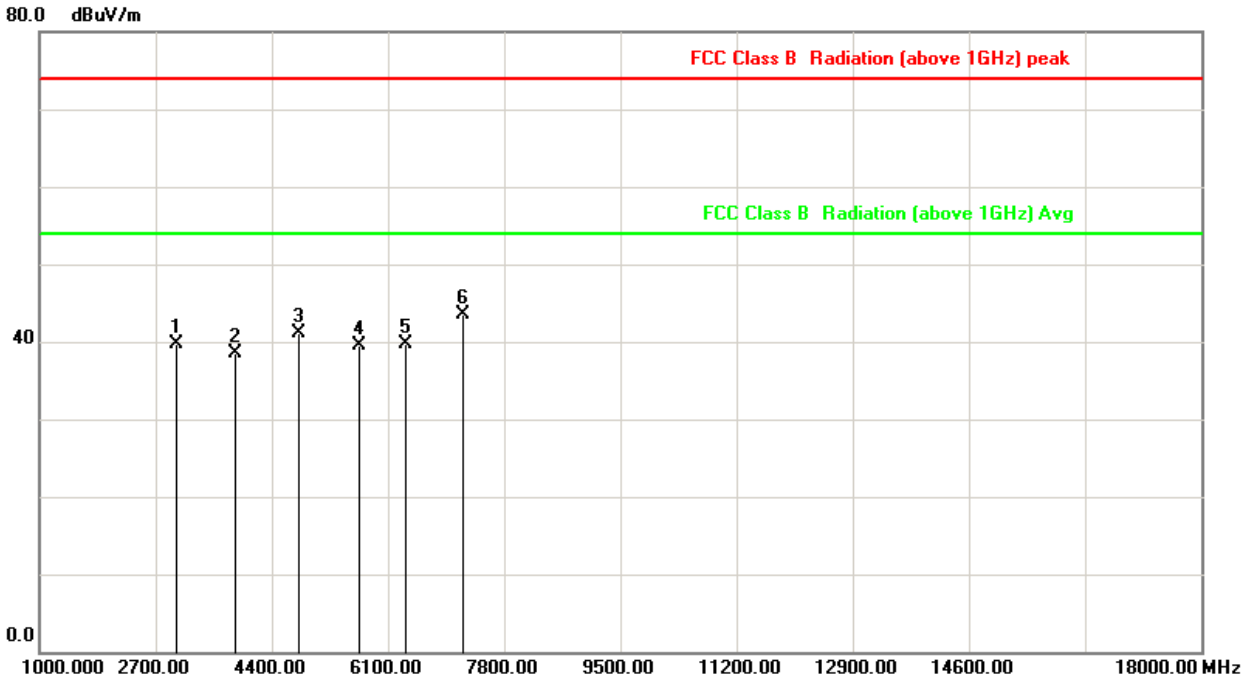
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	Mode 2	Temperature :	25 °C
Test Date :	May 26, 2019	Humidity :	52 %
Memo :	CH 78	Atmospheric Pressure :	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3351.667	-4.38	43.49	39.11	74.00	-34.89	peak
2	3663.333	-3.04	43.43	40.39	74.00	-33.61	peak
3	4960.000	1.52	40.58	42.10	74.00	-31.90	peak
4	6128.333	3.31	37.28	40.59	74.00	-33.41	peak
5	6610.000	3.82	36.41	40.23	74.00	-33.77	peak
6	7440.000	6.80	40.21	47.01	74.00	-26.99	peak

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

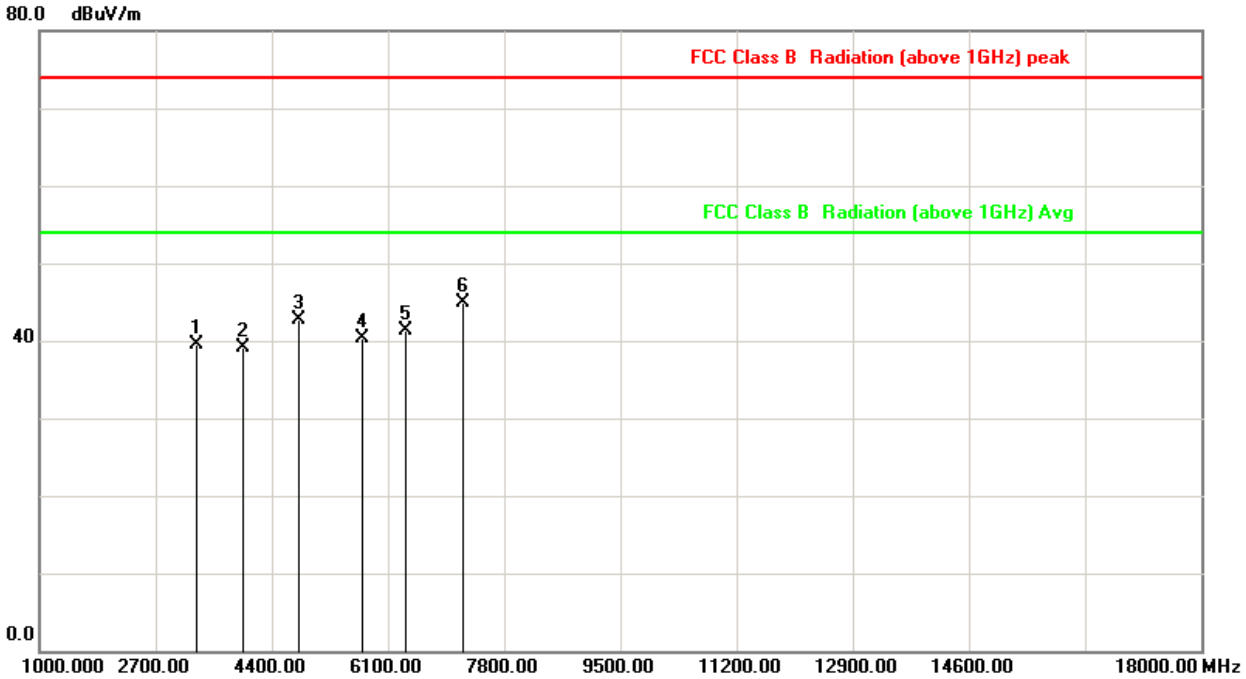
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	Mode 3	Temperature :	25 °C
Test Date :	May 26, 2019	Humidity :	52 %
Memo :	CH 00	Atmospheric Pressure :	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3011.667	-6.17	45.80	39.63	74.00	-34.37	peak
2	3861.667	-2.36	40.87	38.51	74.00	-35.49	peak
3	4804.000	1.23	39.87	41.10	74.00	-32.90	peak
4	5675.000	2.45	37.09	39.54	74.00	-34.46	peak
5	6355.000	3.40	36.32	39.72	74.00	-34.28	peak
6	7206.000	5.88	37.56	43.44	74.00	-30.56	peak

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

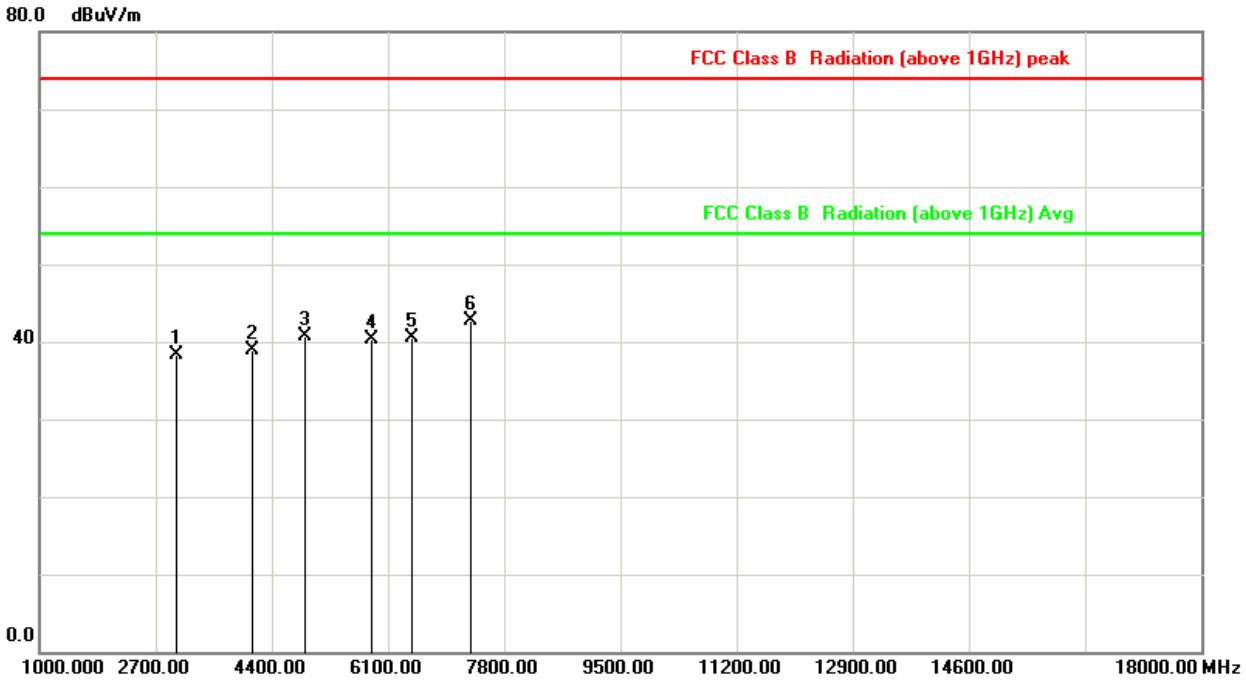
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 3	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 00	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3295.000	-4.68	44.18	39.50	74.00	-34.50	peak
2	3975.000	-1.98	41.09	39.11	74.00	-34.89	peak
3	4804.000	1.23	41.53	42.76	74.00	-31.24	peak
4	5731.667	2.59	37.75	40.34	74.00	-33.66	peak
5	6355.000	3.40	37.84	41.24	74.00	-32.76	peak
6	7206.000	5.88	38.95	44.83	74.00	-29.17	peak

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

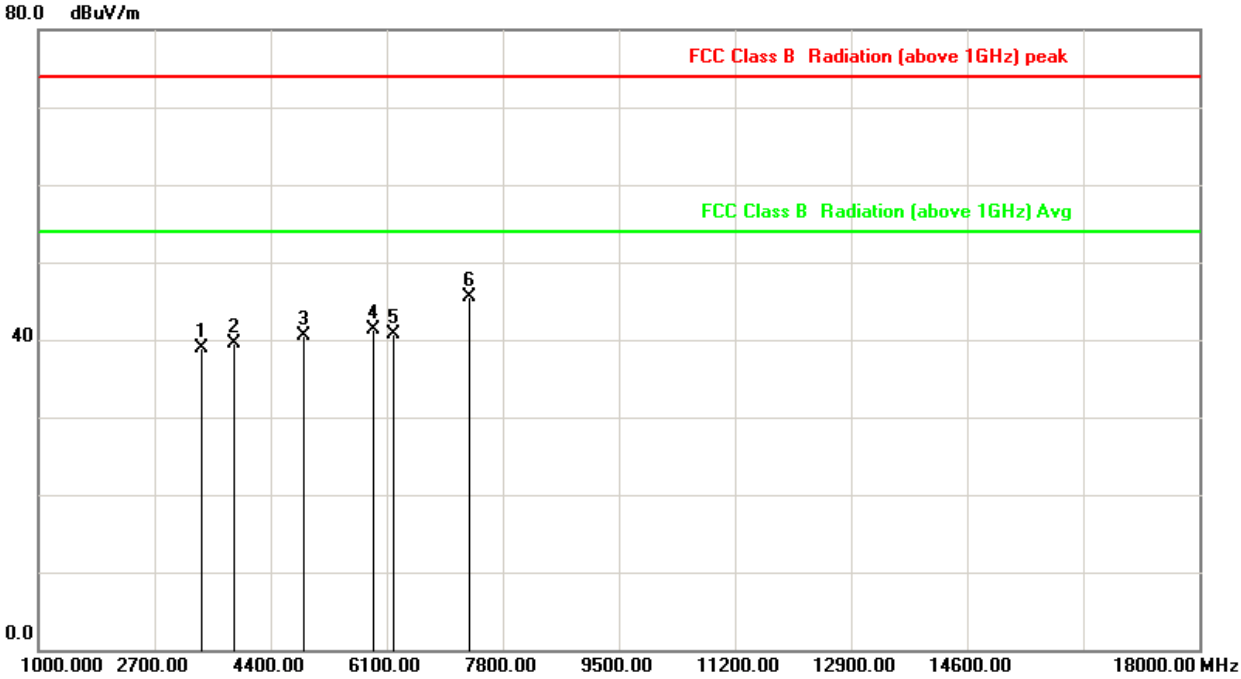
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 3	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 39	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3011.667	-6.17	44.51	38.34	74.00	-35.66	peak
2	4116.667	-1.29	40.26	38.97	74.00	-35.03	peak
3	4882.000	1.38	39.26	40.64	74.00	-33.36	peak
4	5873.333	2.95	37.30	40.25	74.00	-33.75	peak
5	6440.000	3.44	37.02	40.46	74.00	-33.54	peak
6	7323.000	6.34	36.42	42.76	74.00	-31.24	peak

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

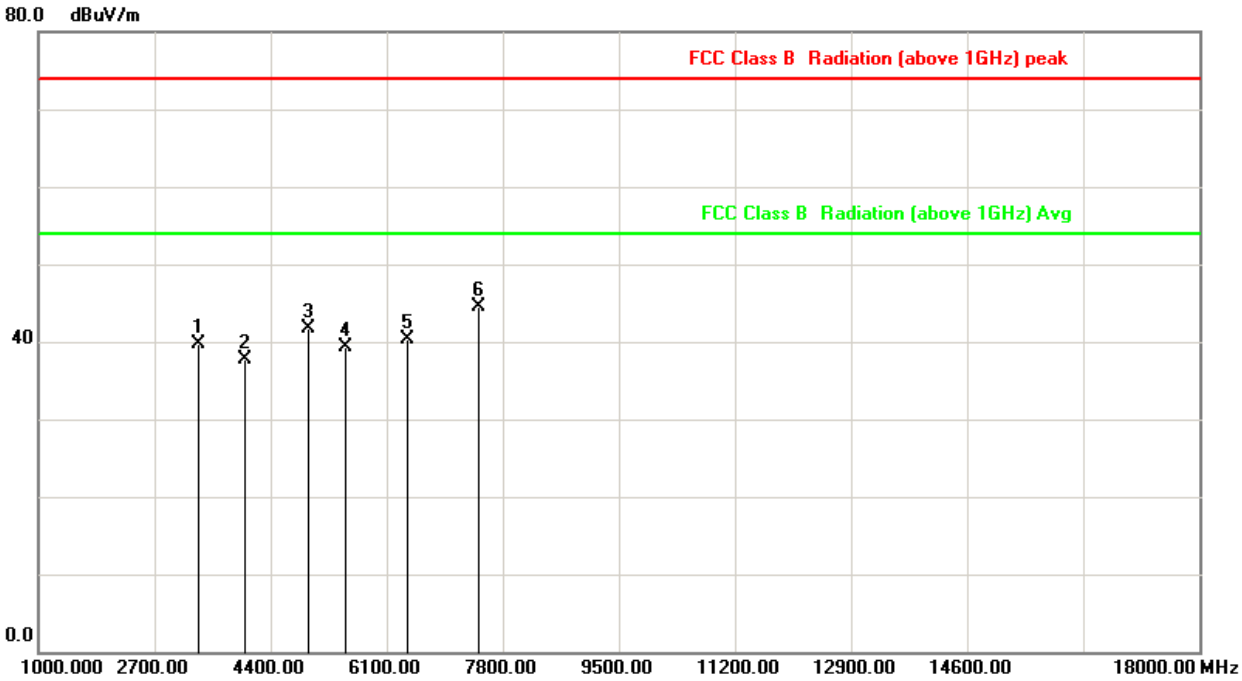
Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 3	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 39	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3380.000	-4.23	43.07	38.84	74.00	-35.16	peak
2	3861.667	-2.36	41.81	39.45	74.00	-34.55	peak
3	4882.000	1.38	39.12	40.50	74.00	-33.50	peak
4	5901.667	3.02	38.31	41.33	74.00	-32.67	peak
5	6213.333	3.35	37.36	40.71	74.00	-33.29	peak
6	7323.000	6.34	39.23	45.57	74.00	-28.43	peak

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

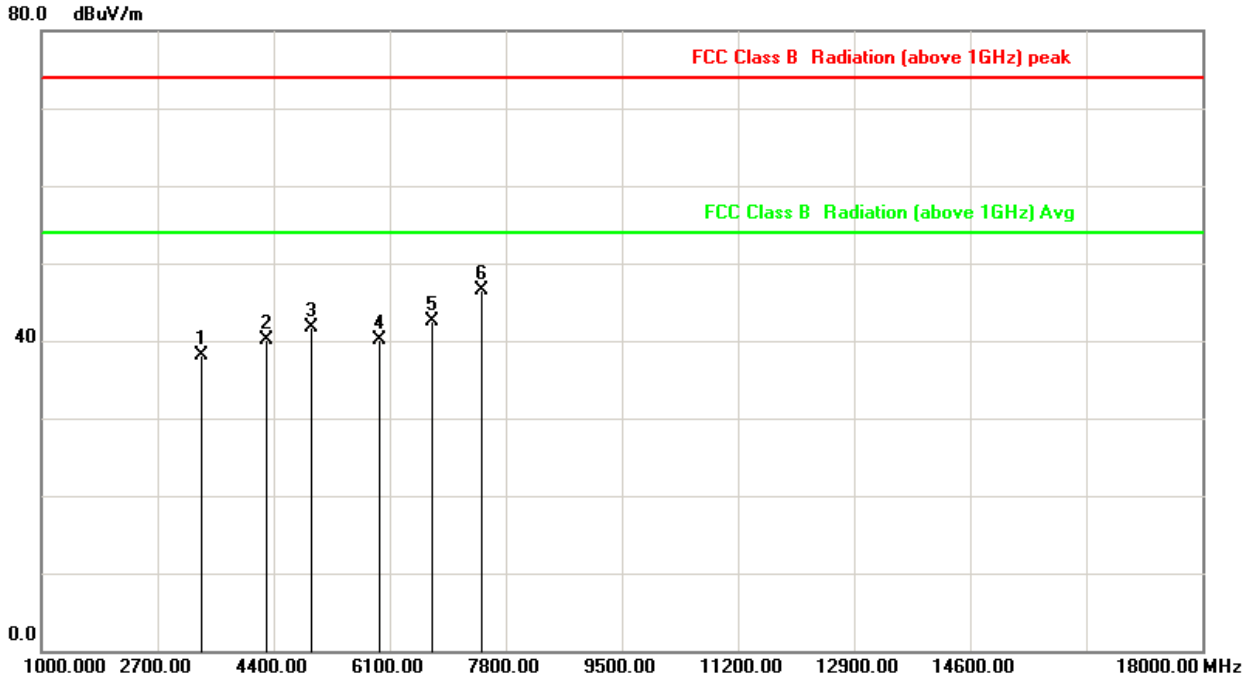
Power	:	AC120V/60Hz	Pol/Phase	:	HORIZONTAL
Test Mode	:	Mode 3	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 78	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3351.667	-4.38	44.10	39.72	74.00	-34.28	peak
2	4031.667	-1.73	39.45	37.72	74.00	-36.28	peak
3	4960.000	1.52	40.21	41.73	74.00	-32.27	peak
4	5505.000	2.03	37.26	39.29	74.00	-34.71	peak
5	6411.667	3.42	36.91	40.33	74.00	-33.67	peak
6	7440.000	6.80	37.62	44.42	74.00	-29.58	peak

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

Power	:	AC120V/60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 3	Temperature	:	25 °C
Test Date	:	May 26, 2019	Humidity	:	52 %
Memo	:	CH 78	Atmospheric Pressure	:	1010 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3351.667	-4.38	42.49	38.11	74.00	-35.89	peak
2	4286.667	-0.43	40.60	40.17	74.00	-33.83	peak
3	4960.000	1.52	40.16	41.68	74.00	-32.32	peak
4	5958.333	3.16	37.04	40.20	74.00	-33.80	peak
5	6723.333	4.18	38.35	42.53	74.00	-31.47	peak
6	7440.000	6.80	39.61	46.41	74.00	-27.59	peak

Note: Level = Reading + Factor
Margin = Level – Limit
Factor= Antenna Factor + Cable Loss - Amplifier Factor
The 18000MHz - 25000MHz spurious emission is under limit 20dB more

7. 20dB Bandwidth Measurement Data

7.1 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 than125 mW.

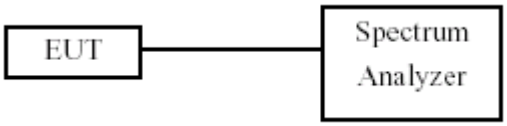
7.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.

b. Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.

c. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

7.3 Test Setup Layout



7.4 Test Result and Data

Test Date: Jun. 22, 2019 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

1M

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 of 20dB Bandwidth (MHz)
00	2402	0.944	629
39	2441	0.942	628
78	2480	0.944	629

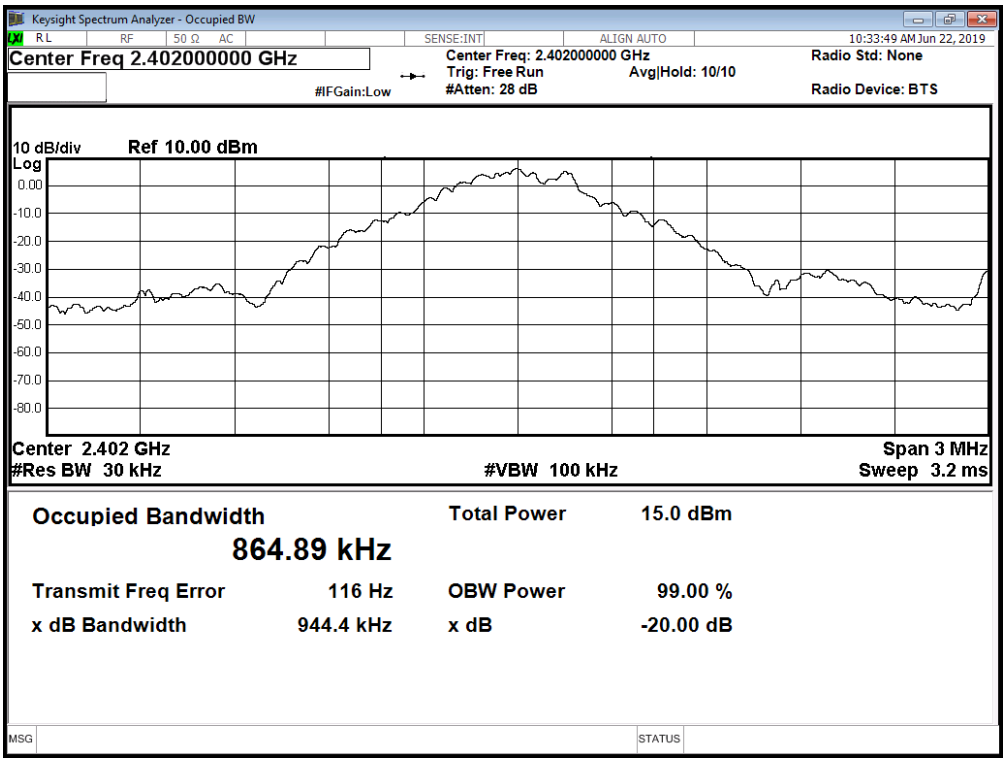
2M

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 of 20dB Bandwidth (MHz)
00	2402	1.230	820
39	2441	1.231	821
78	2480	1.229	819

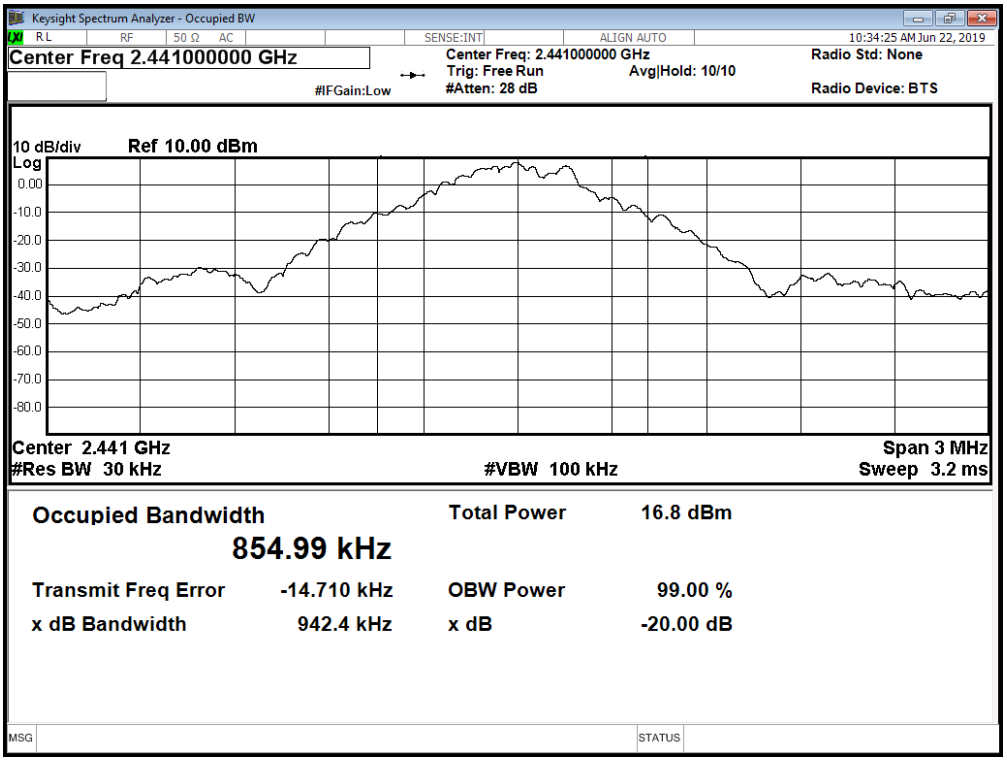
3M

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 of 20dB Bandwidth (MHz)
00	2402	1.261	841
39	2441	1.261	841
78	2480	1.262	841

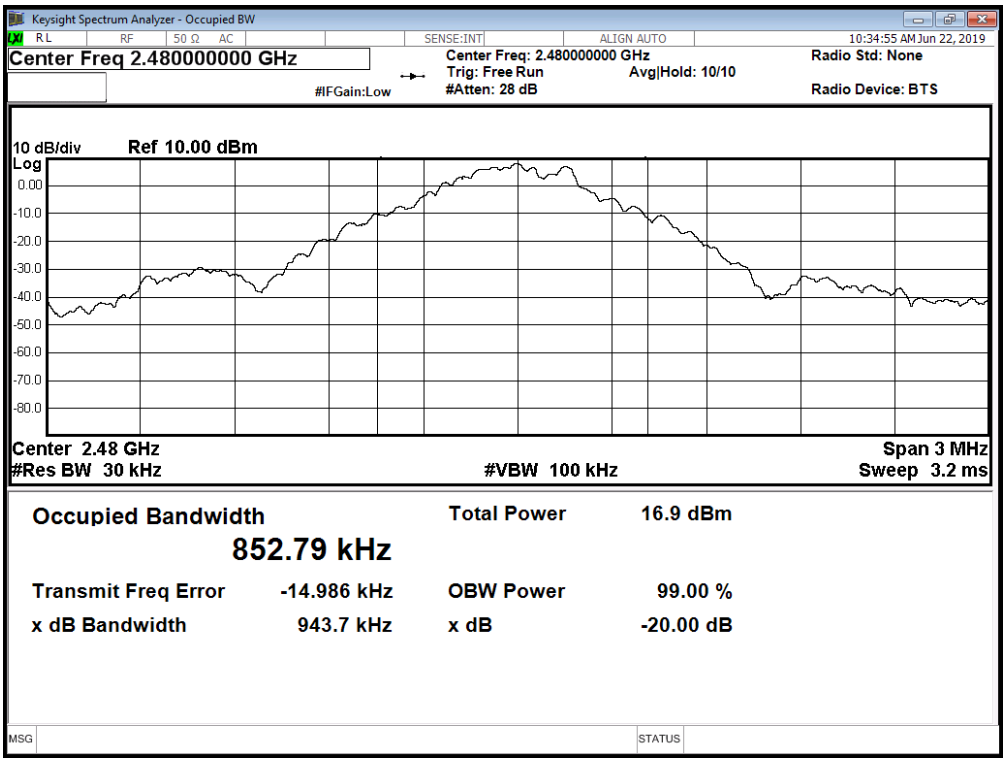
Modulation Standard: GFSK (1Mbps)
Channel: 00



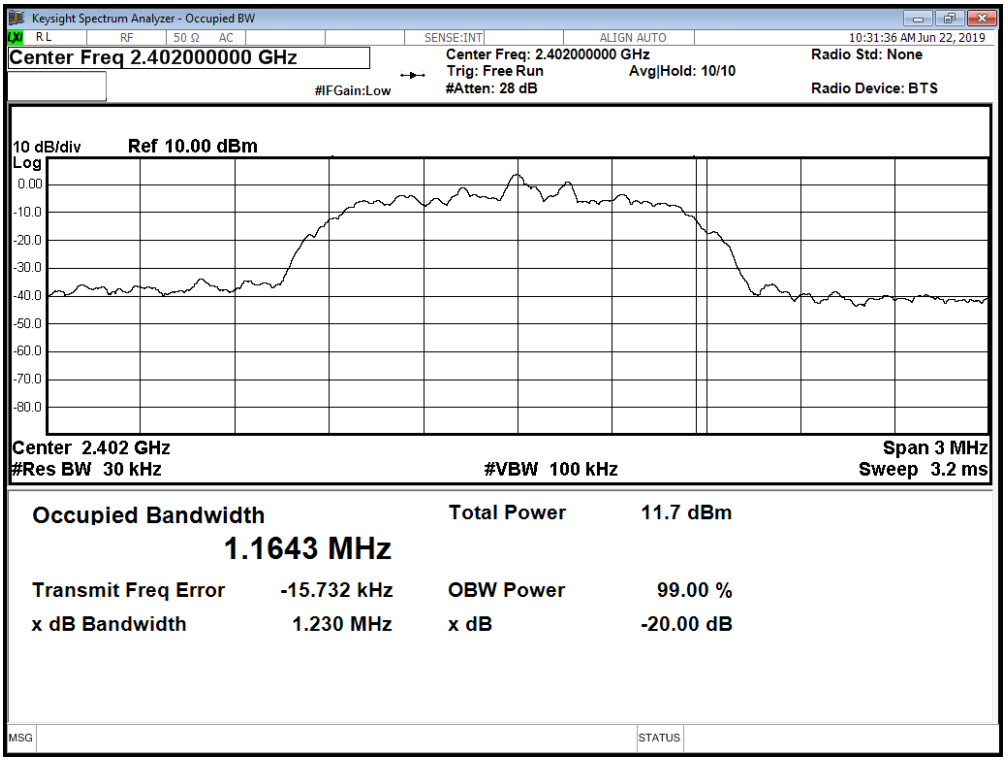
Modulation Standard: GFSK (1Mbps)
Channel: 39



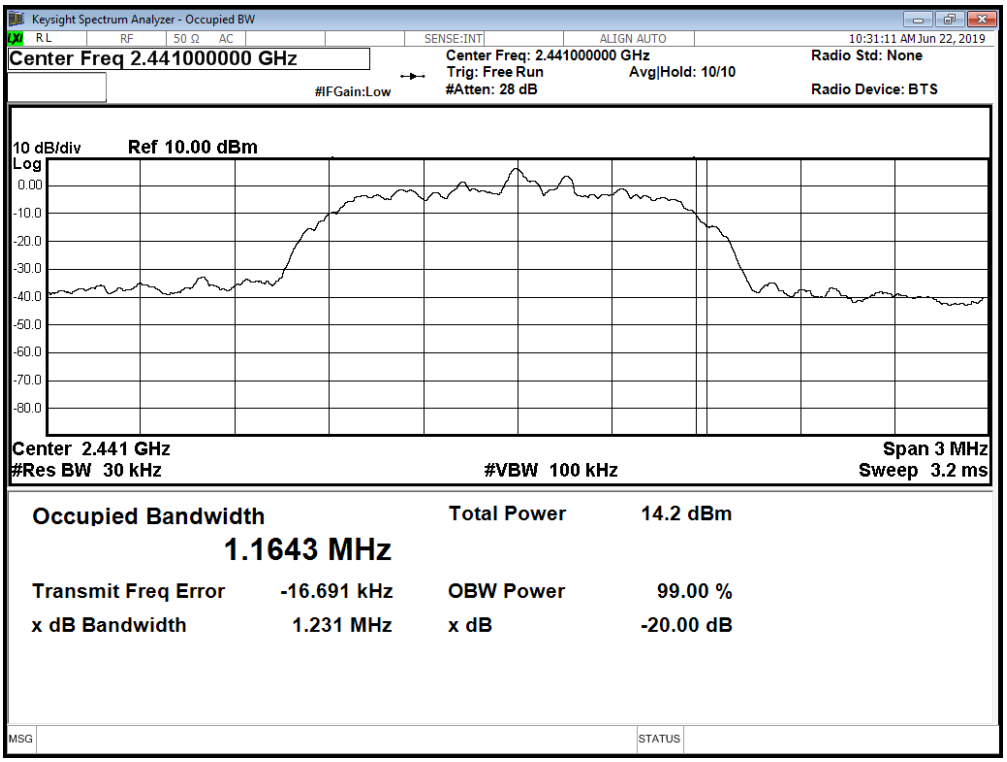
Modulation Standard: GFSK (1Mbps)
Channel: 78



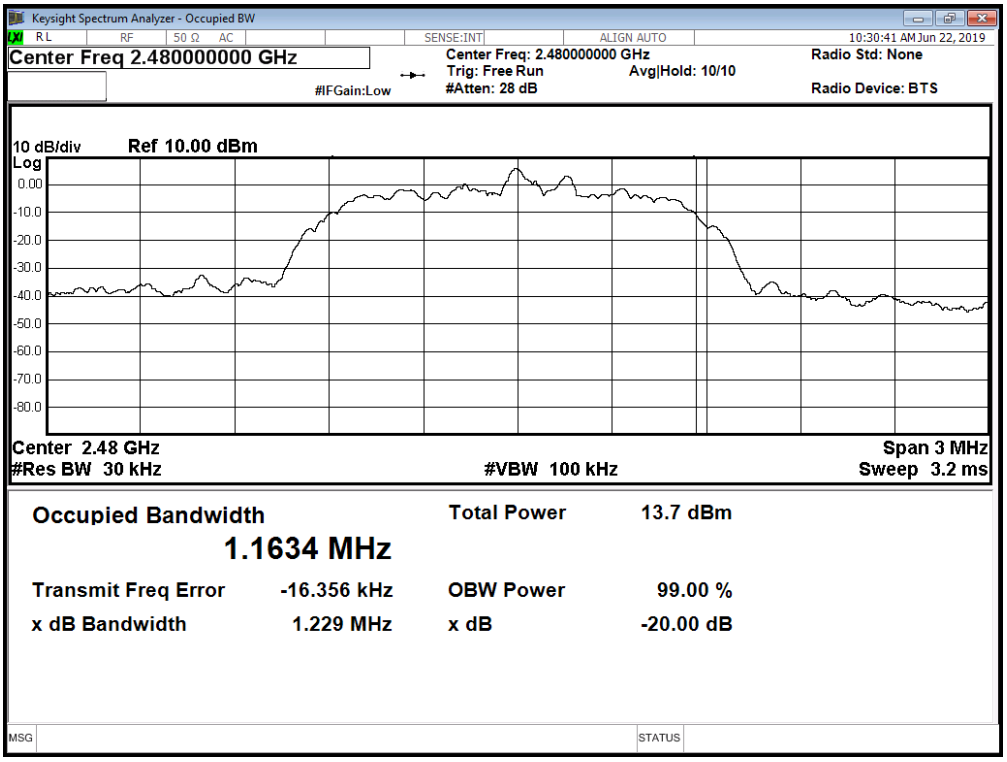
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 00



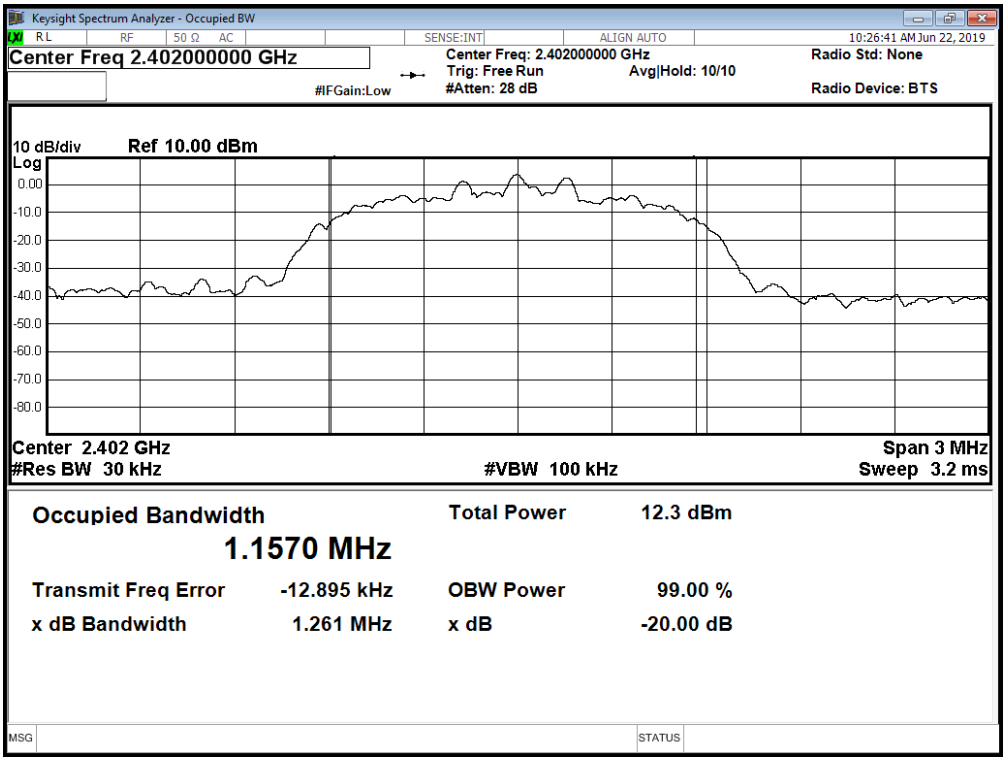
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 39



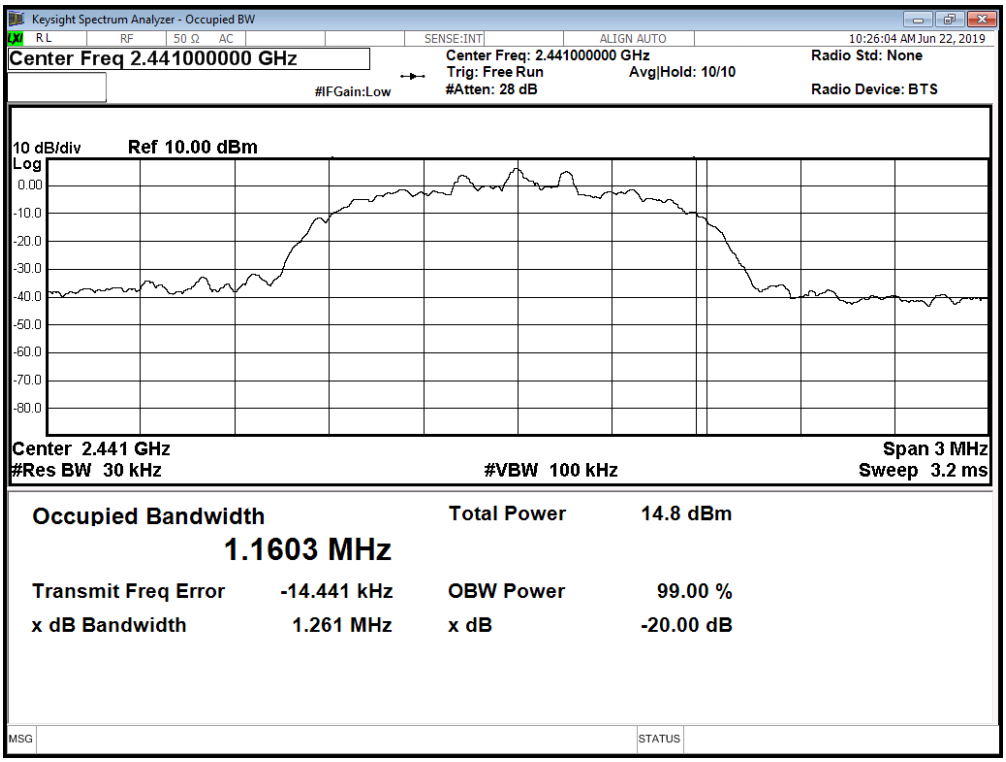
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 78



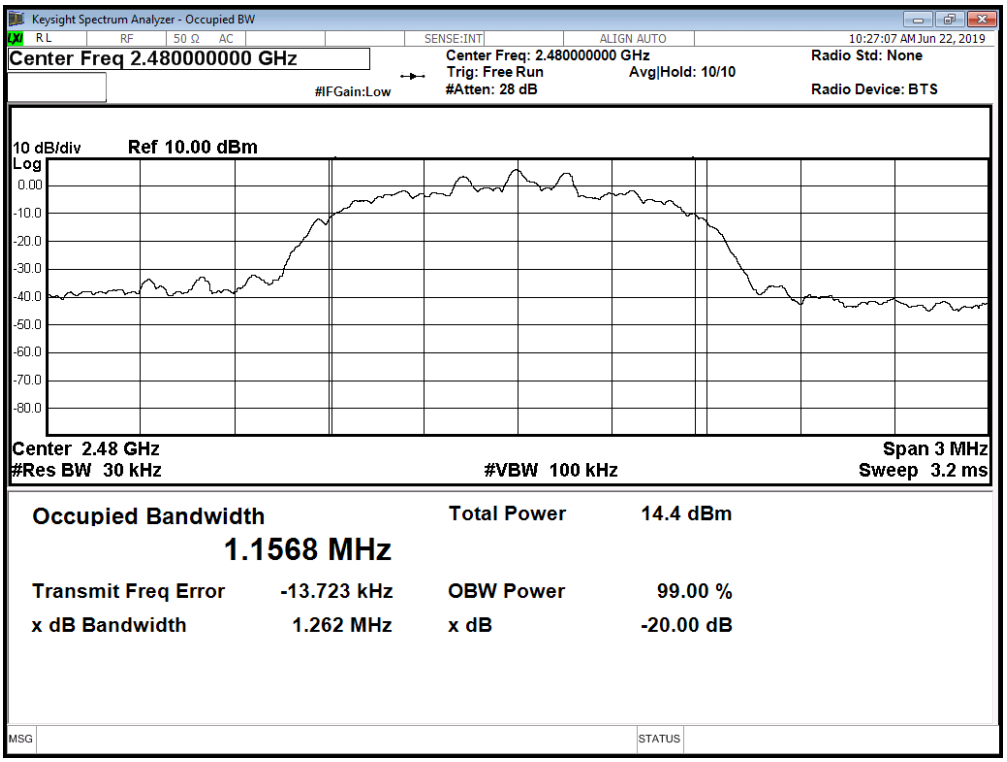
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



Modulation Standard: 8DPSK (3Mbps)
Channel: 39



Modulation Standard: 8DPSK (3Mbps)
Channel: 78



8. Frequencies Separation

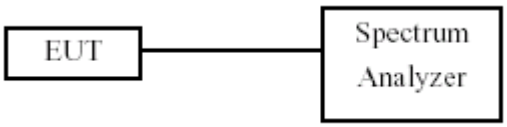
8.1 Test Limit

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.

8.2 Test Procedures

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

8.3 Test Setup Layout



8.4 Test Result and Data

Test Date: Jun. 22, 2019 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

1M

Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	2/3 of 20dB Bandwidth (MHz)
2402	1.000	≥ 2/3 of 20dB Bandwidth	0.629
2441	1.000	≥ 2/3 of 20dB Bandwidth	0.628
2480	1.000	≥ 2/3 of 20dB Bandwidth	0.629

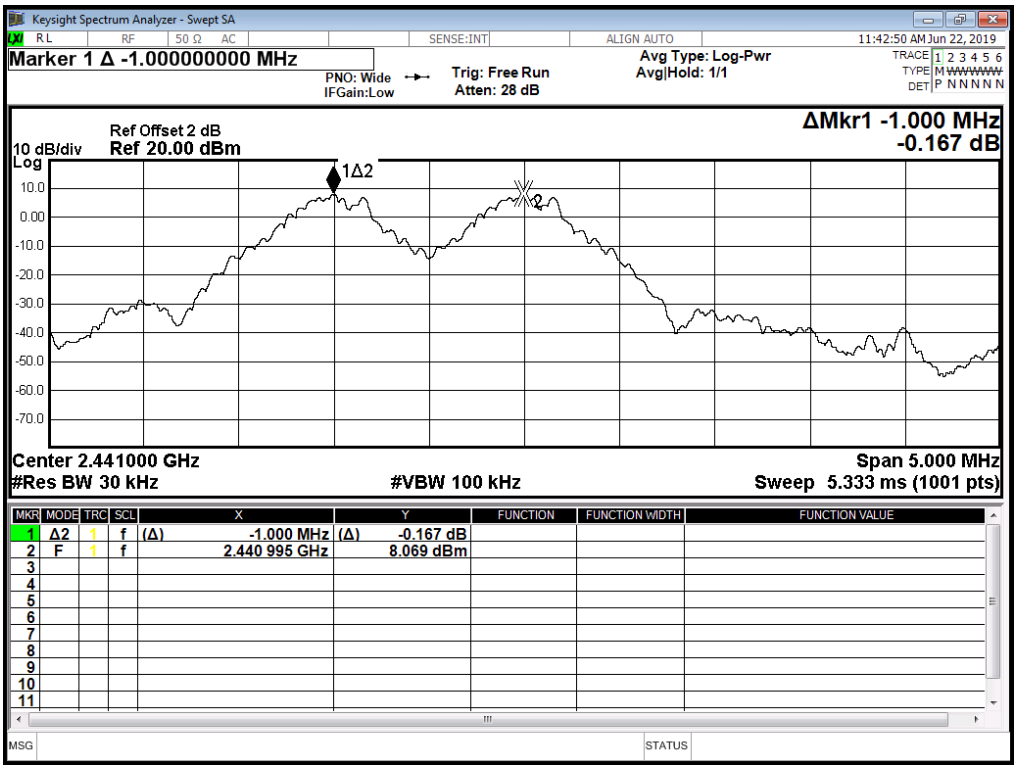
2M

Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	2/3 of 20dB Bandwidth (MHz)
2402	1.000	≥ 2/3 of 20dB Bandwidth	0.820
2441	1.000	≥ 2/3 of 20dB Bandwidth	0.821
2480	1.000	≥ 2/3 of 20dB Bandwidth	0.819

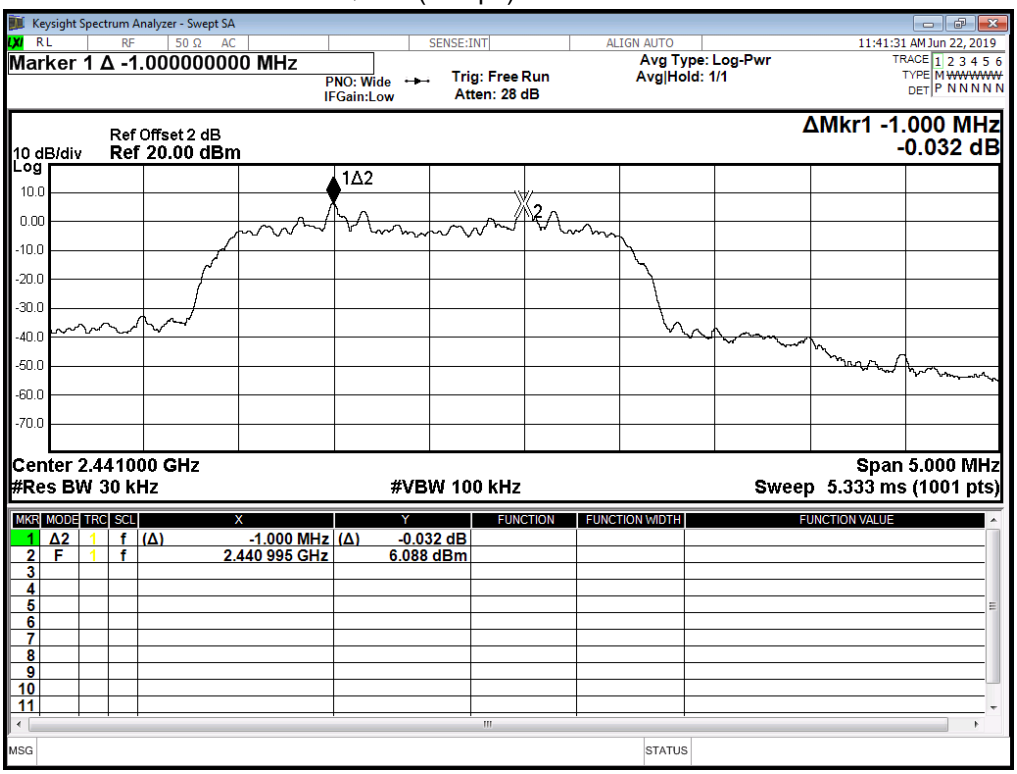
3M

Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	2/3 of 20dB Bandwidth (MHz)
2402	1.000	≥ 2/3 of 20dB Bandwidth	0.841
2441	1.000	≥ 2/3 of 20dB Bandwidth	0.841
2480	1.000	≥ 2/3 of 20dB Bandwidth	0.841

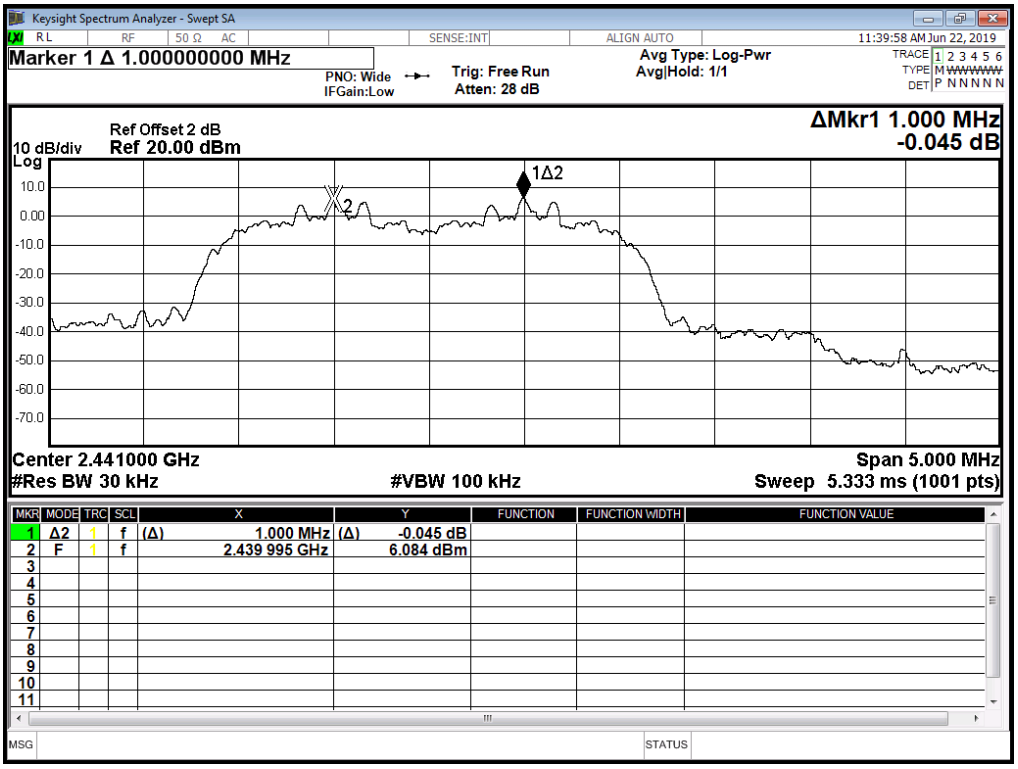
Modulation Standard: GFSK (1Mbps)



Modulation Standard: π/4 DQPSK (2Mbps)



Modulation Standard: 8DPSK(3Mbps)



9. Dwell Time on each channel

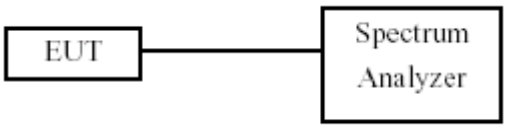
9.1 Test Limit

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.

9.2 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.

9.3 Test Setup Layout



9.4 Test Result and Data

Test Date	: Jun. 22, 2019	Temperature	: 22C
Atmospheric pressure	: 1017 hPa	Humidity	: 60 %

Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec

Modulation Standard: GFSK(1Mbps)

DH 1

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.426	136.32	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/2)/79*Period Time

DH 3

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.685	269.60	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/4)/79*Period Time

DH 5

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.93	312.53	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/6)/79*Period Time

Modulation Standard: π/4 DQPSK(2Mbps)
DH 1

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.441	141.12	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/2)/79*Period Time

DH 3

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.69	270.40	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/4)/79*Period Time

DH 5

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.94	313.60	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/6)/79*Period Time

Modulation Standard: 8DPSK(3Mbps)
DH 1

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.441	141.12	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/2)/79*Period Time

DH 3

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.69	270.40	31.6	400	PASS

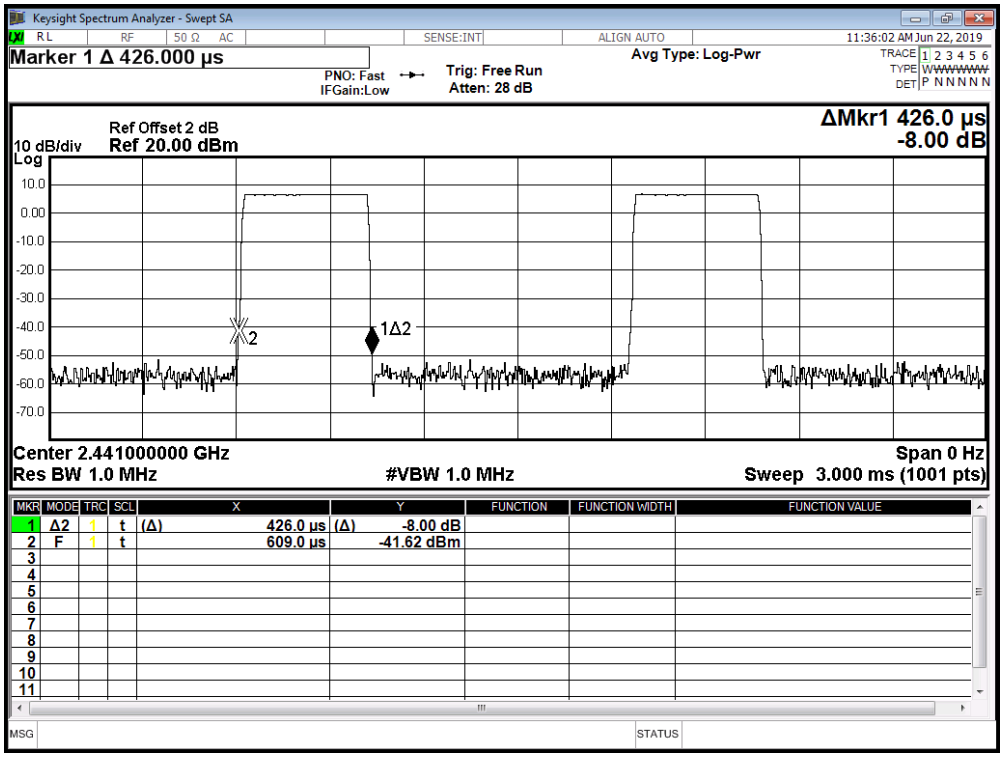
Remark:Total of Dwell =pulse Time*(1600/4)/79*Period Time

DH 5

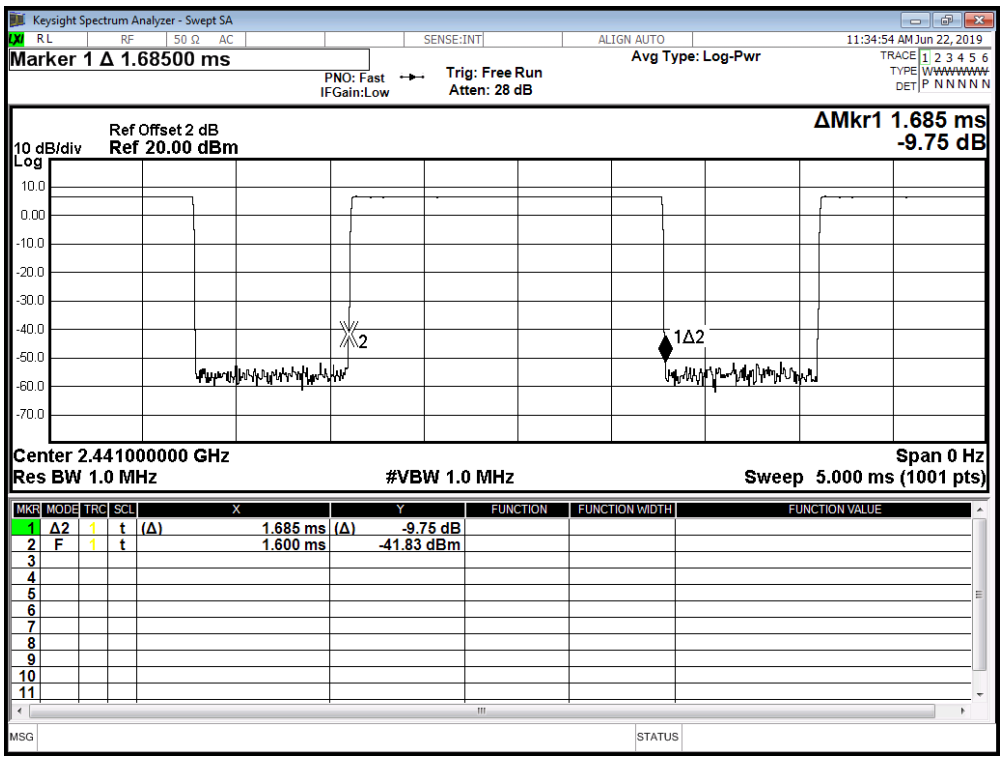
Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.94	313.60	31.6	400	PASS

Remark:Total of Dwell =pulse Time*(1600/6)/79*Period Time

Modulation Standard: GFSK (1Mbps)
DH1

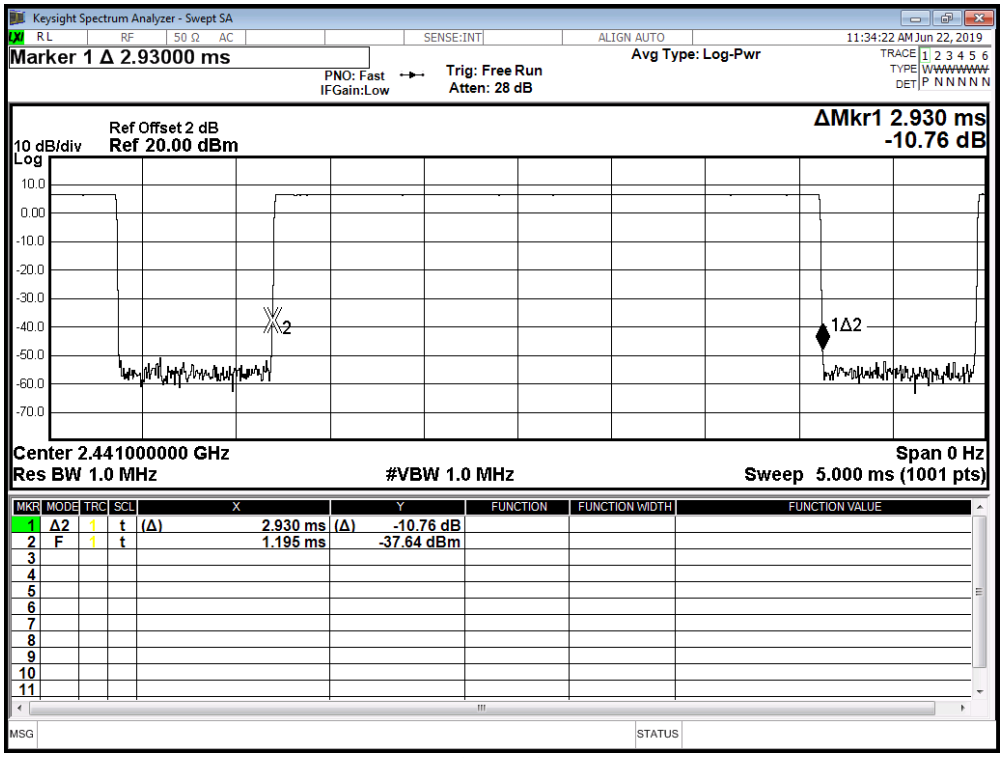


Modulation Standard: GFSK (1Mbps)
DH3



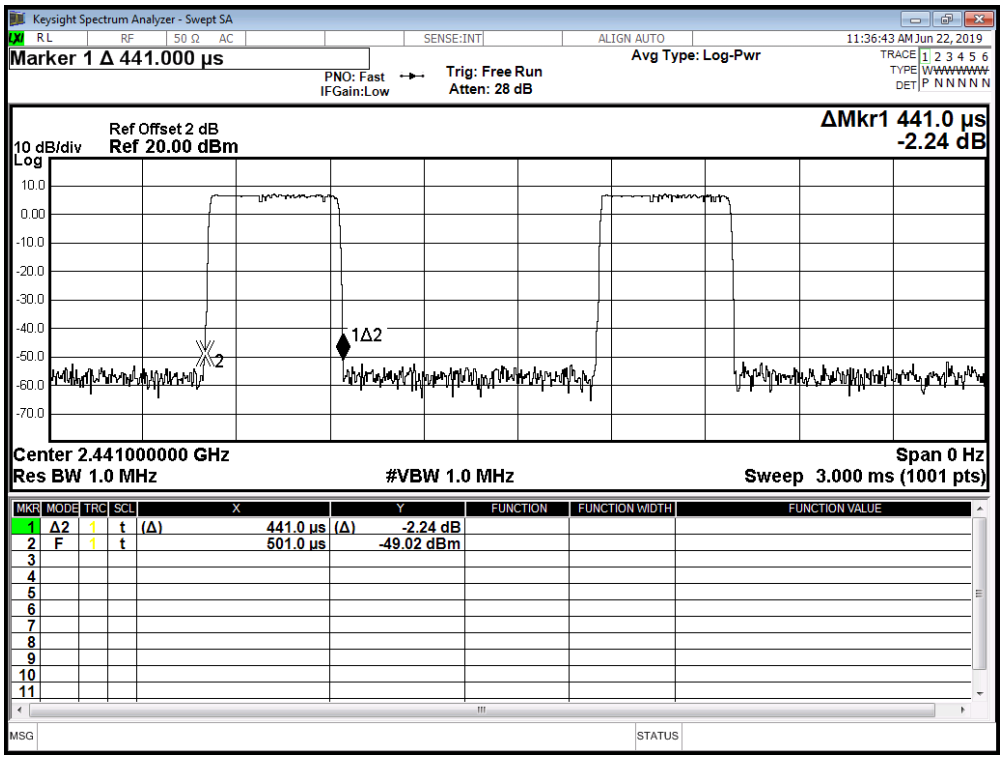
Modulation Standard: GFSK (1Mbps)

DH5

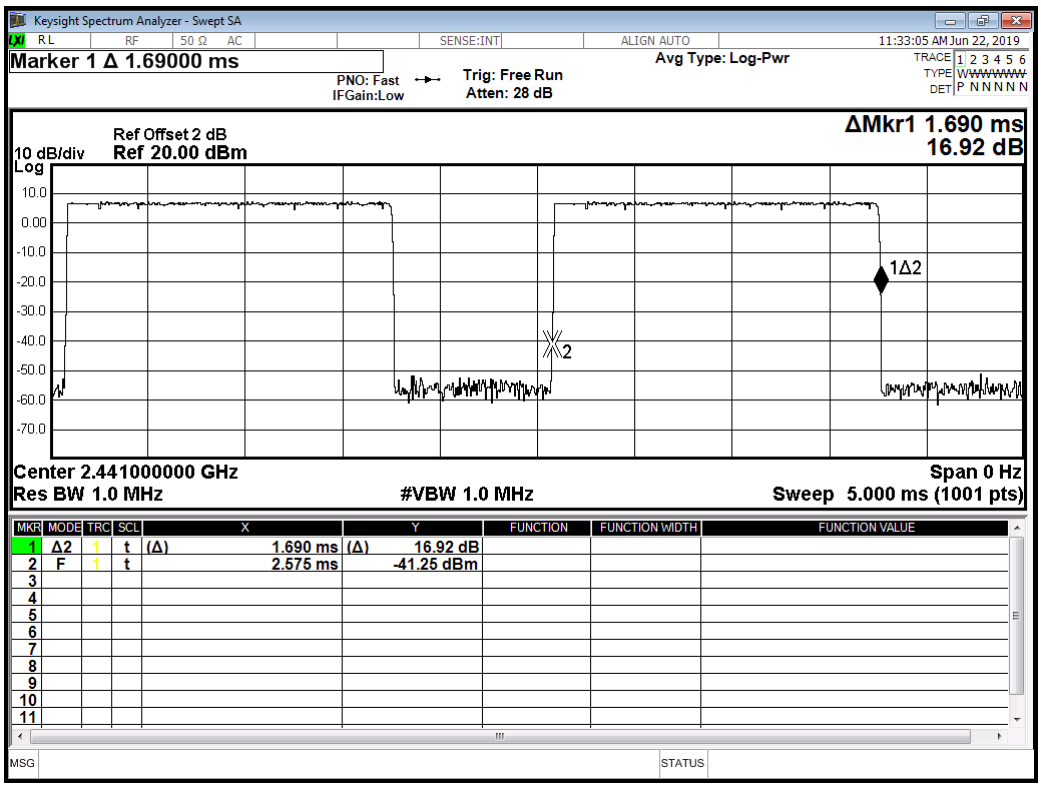


Modulation Standard: π/4 DQPSK (2Mbps)

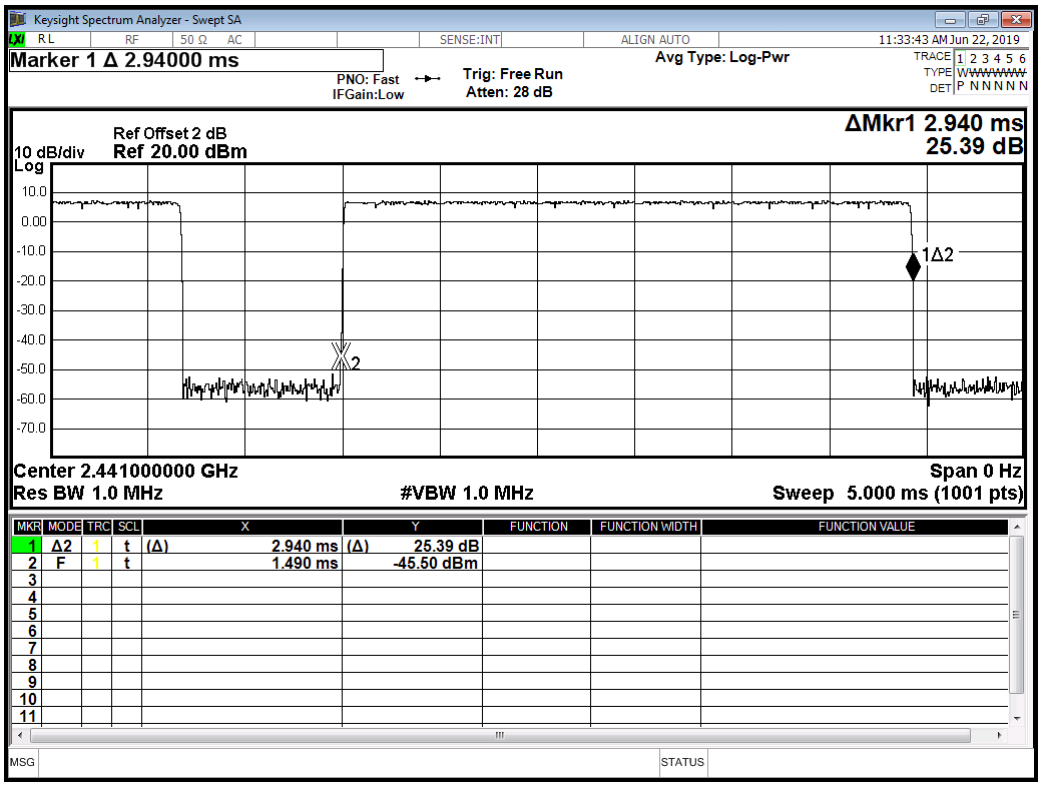
DH1



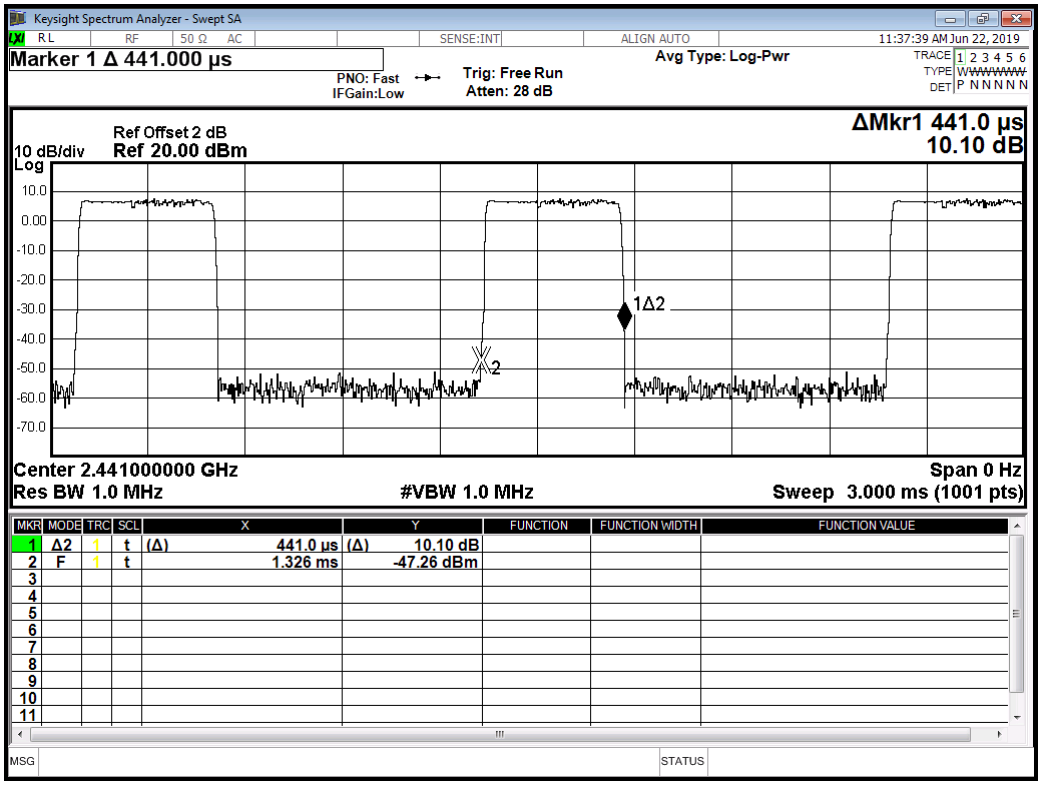
Modulation Standard: π/4 DQPSK (2Mbps)
DH3



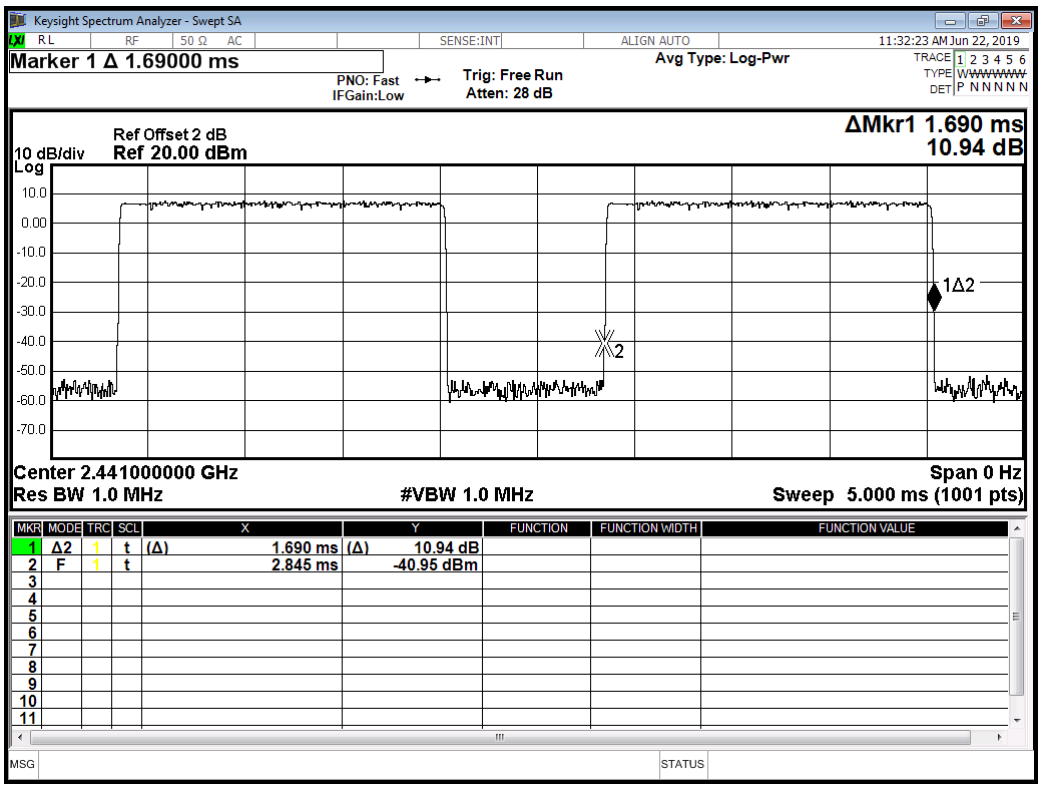
Modulation Standard: π/4 DQPSK (2Mbps)
DH5



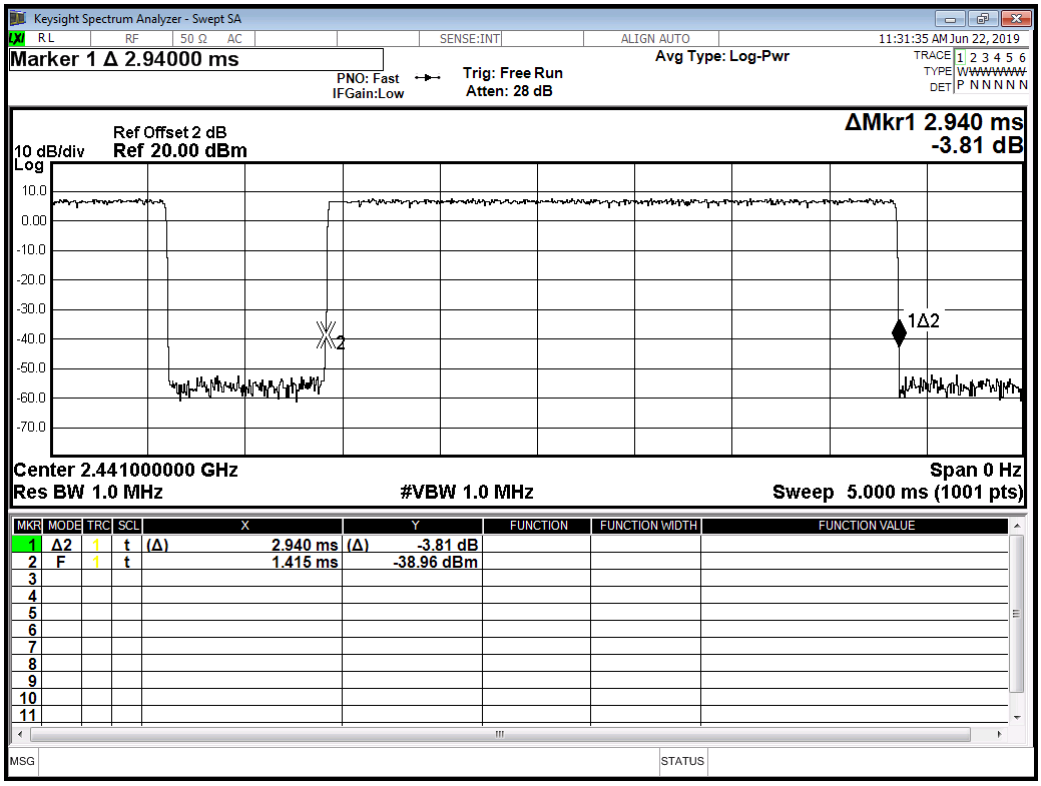
Modulation Standard: 8DPSK (3Mbps)
DH1



Modulation Standard: 8DPSK (3Mbps)
DH3



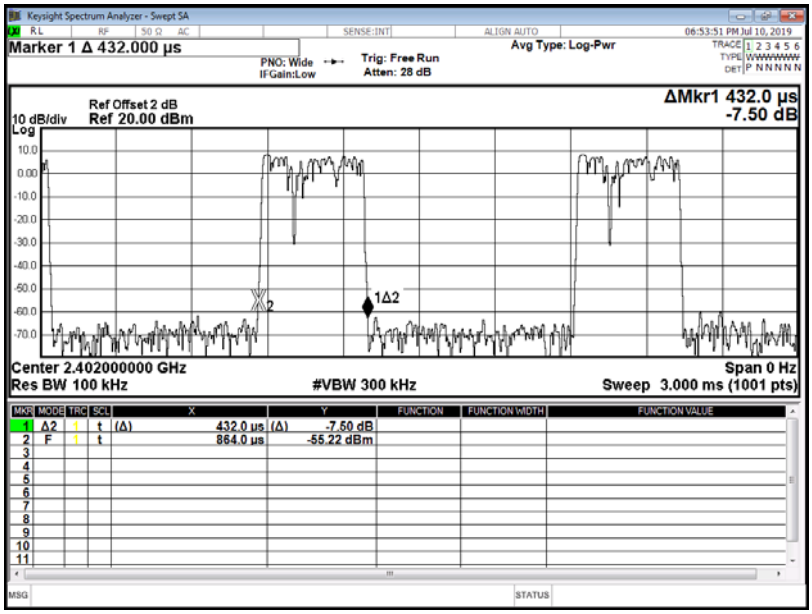
Modulation Standard: 8DPSK (3Mbps)
DH5


Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 2.94000 ms
Avg Type: Log-Pwr
Trig: Free Run
Atten: 28 dB
PNO: Fast
IFGain:Low
11:31:35 AM Jun 22, 2019
Ref Offset 2 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 2.940 ms
-3.81 dB
1Δ2
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 5.000 ms (1001 pts)
1 Δ2 1 t (Δ) 2.940 ms (Δ) -3.81 dB
2 F 1 t 1.415 ms -38.96 dBm

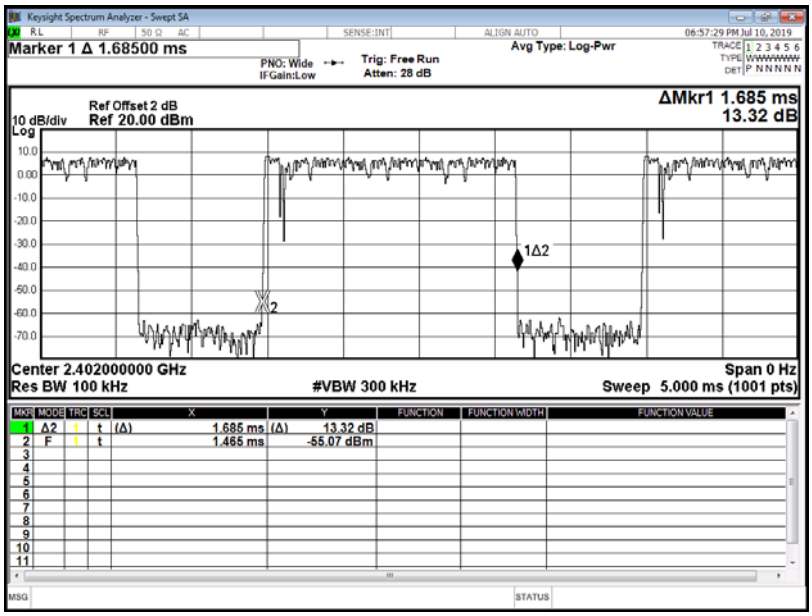
Test Period = 0.4 (second/ channel) x 20 Channel = 8 sec

Modulation Type	Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 8 (20 Hopping*0.4)	Dwell Time (ms)	Limit (ms)
AFH (DH1)	2402-2421	0.432	160	69.12	400
AFH (DH3)	2402-2421	1.685	80	134.8	400
AFH (DH5)	2402-2421	2.935	53.33	156.5236	400

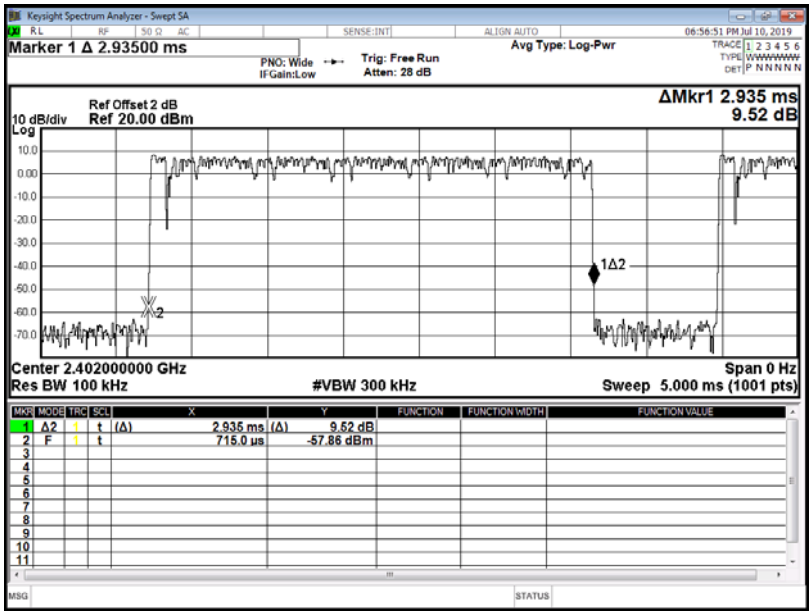
Modulation Type: AFH (DH1)



Modulation Type: AFH (DH3)



Modulation Type: AFH (DH5)



10. Number of Hopping Channels

10.1 Test Limit

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

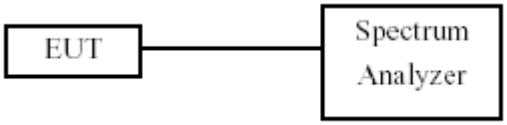
10.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.

b. 2. Set RBW of spectrum analyzer to 300 KHz and VBW to 300 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.

10.3 Test Setup Layout



10.4 Test Result and Data

Test Date: Jun. 22, 2019 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

Modulation Standard: GFSK (1Mbps)

Number of hopping channels:	79	Channels

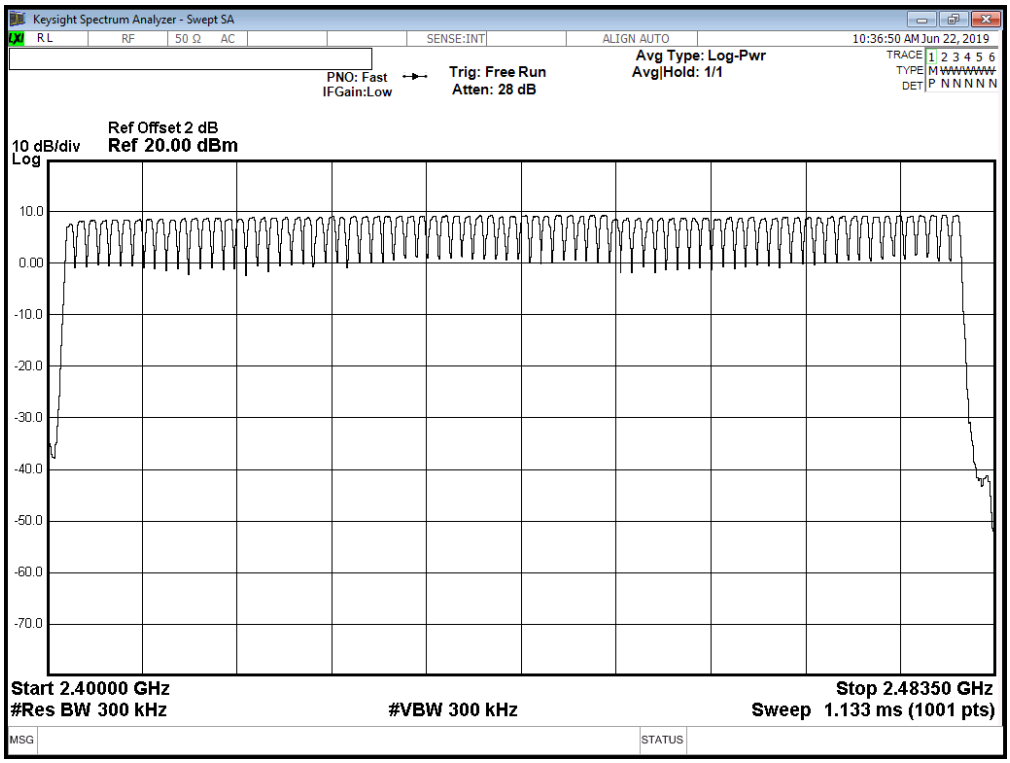
Modulation Standard: π/4 DQPSK (2Mbps)

Number of hopping channels:	79	Channels

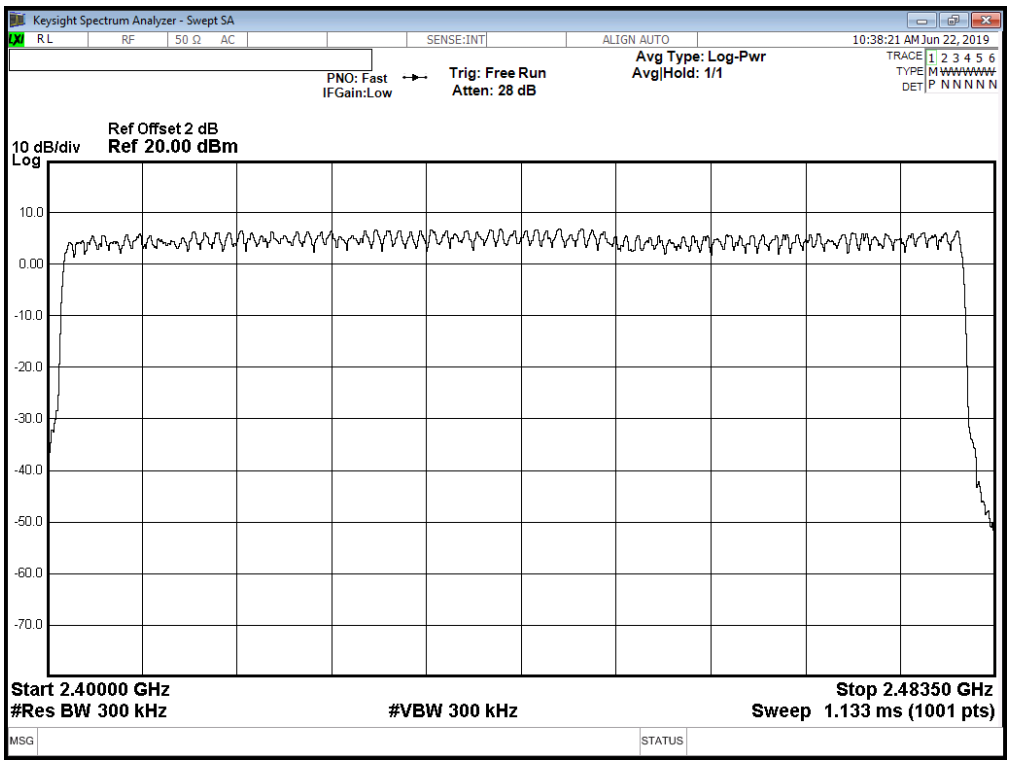
Modulation Standard: 8DPSK (3Mbps)

Number of hopping channels:	79	Channels

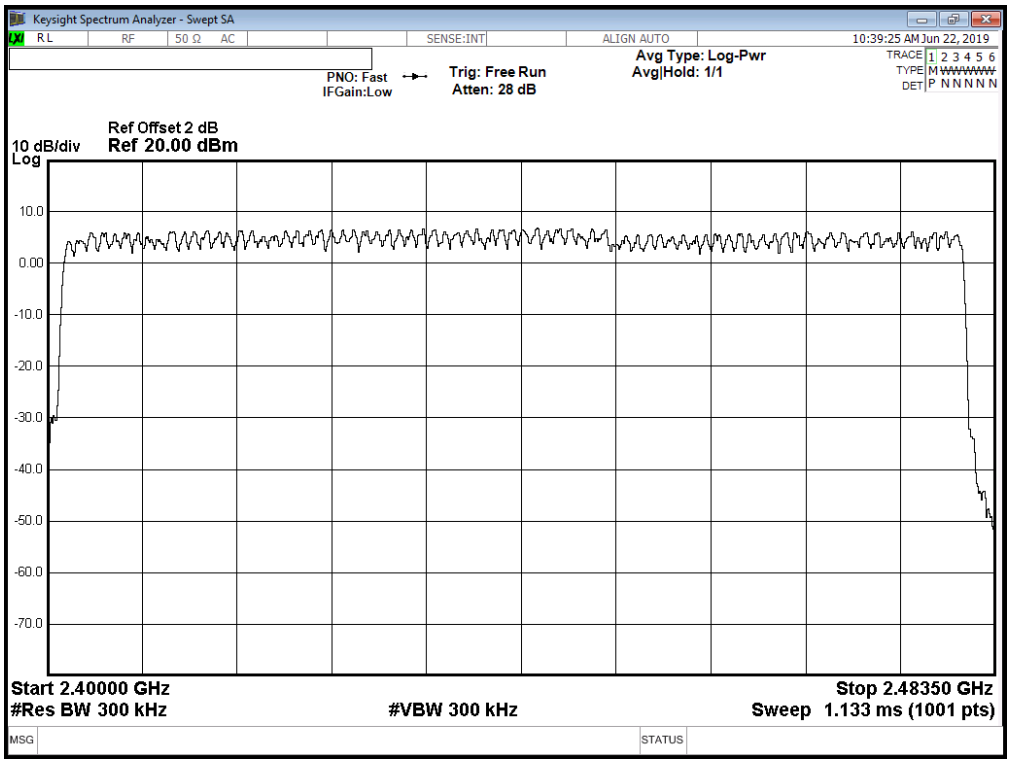
Modulation Standard: GFSK (1Mbps)



Modulation Standard: π/4 DQPSK (2Mbps)



Modulation Standard: 8DPSK (3Mbps)



11. Maximum Peak Output Power

11.1 Test Limit

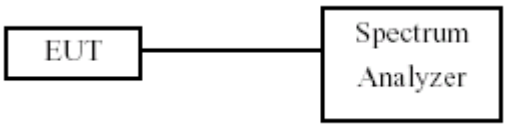
The Maximum Peak Output Power Measurement is 21dBm.

11.2 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.

11.3 Test Setup Layout



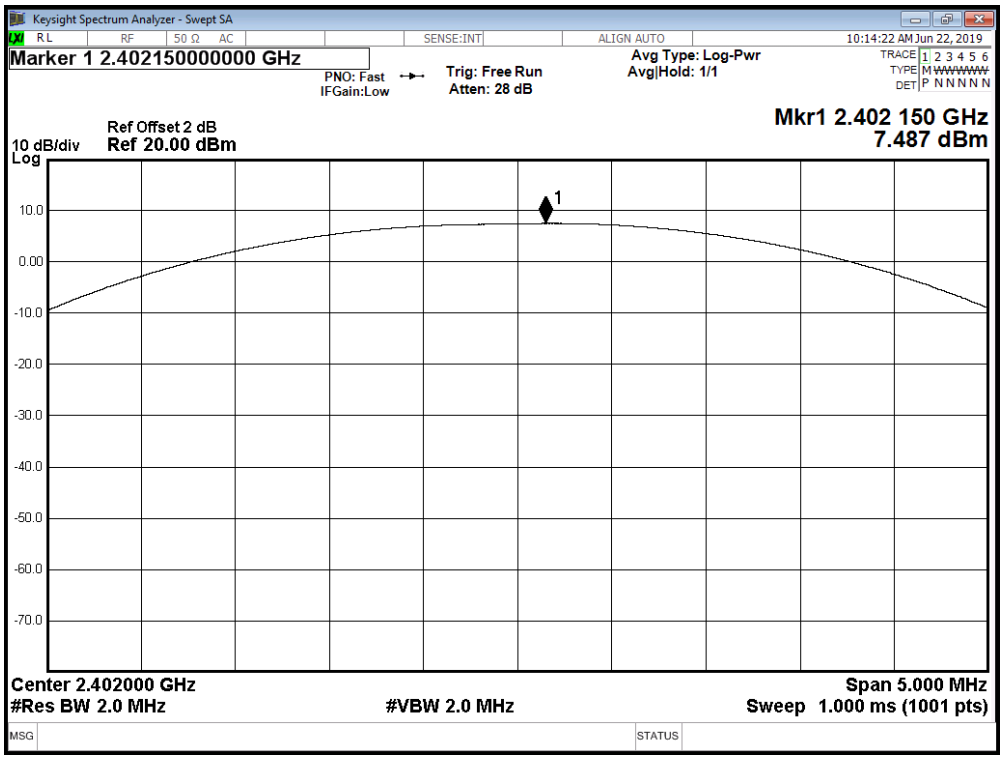
11.4 Test Result and Data

Test Date: Jun. 22, 2019 Temperature: 25℃

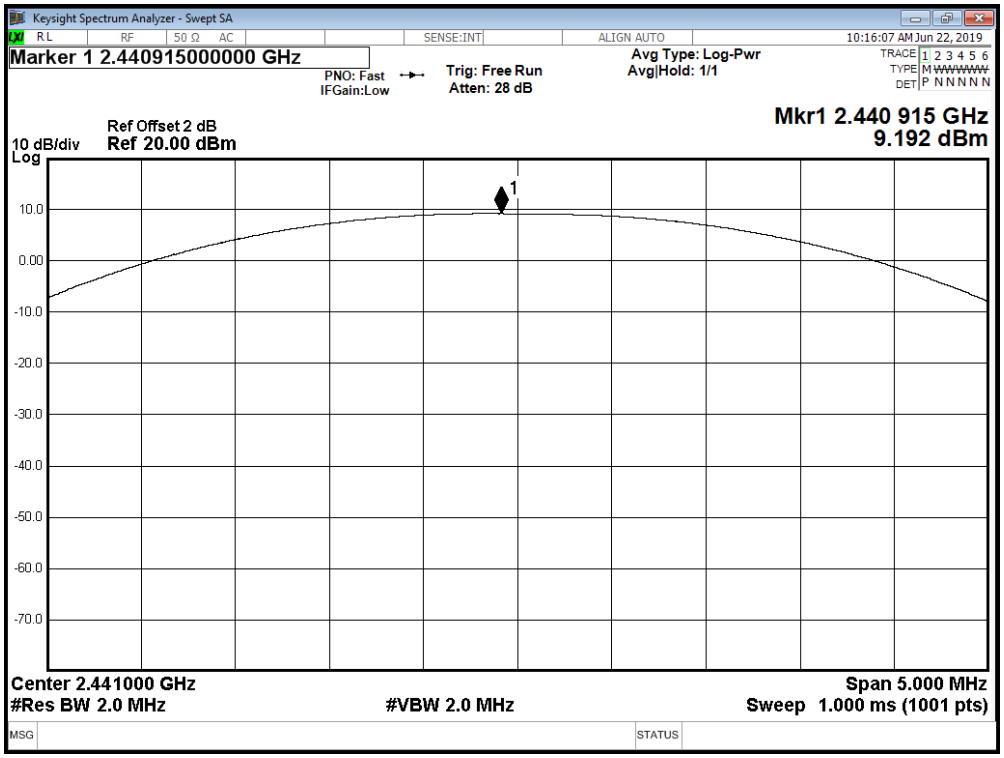
Atmospheric pressure: 1020 hPa Humidity: 55%

Modulation Type	Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
GFSK (1Mbps)	00	2402	7.487	5.607
	39	2441	9.192	8.302
	78	2480	9.322	8.555
π/4 DQPSK (2Mbps)	00	2402	5.495	3.544
	39	2441	7.828	6.065
	78	2480	7.591	5.742
8DPSK (3Mbps)	00	2402	5.897	3.888
	39	2441	8.05	6.383
	78	2480	7.867	6.119

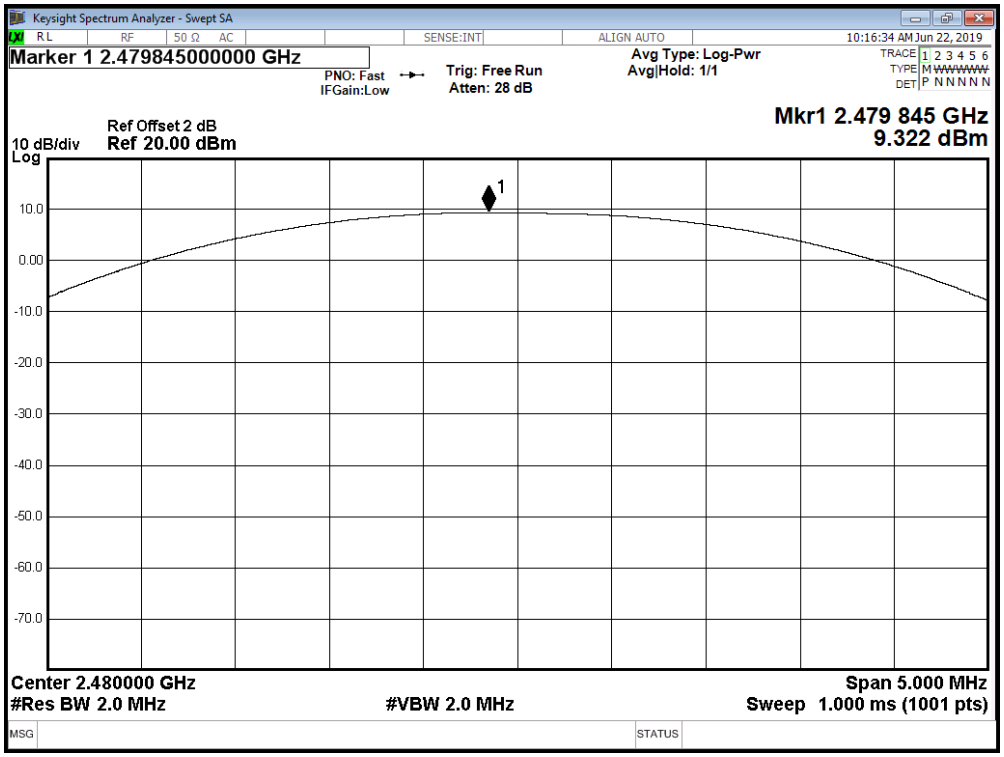
Modulation Standard: GFSK (1Mbps)
Channel: 00



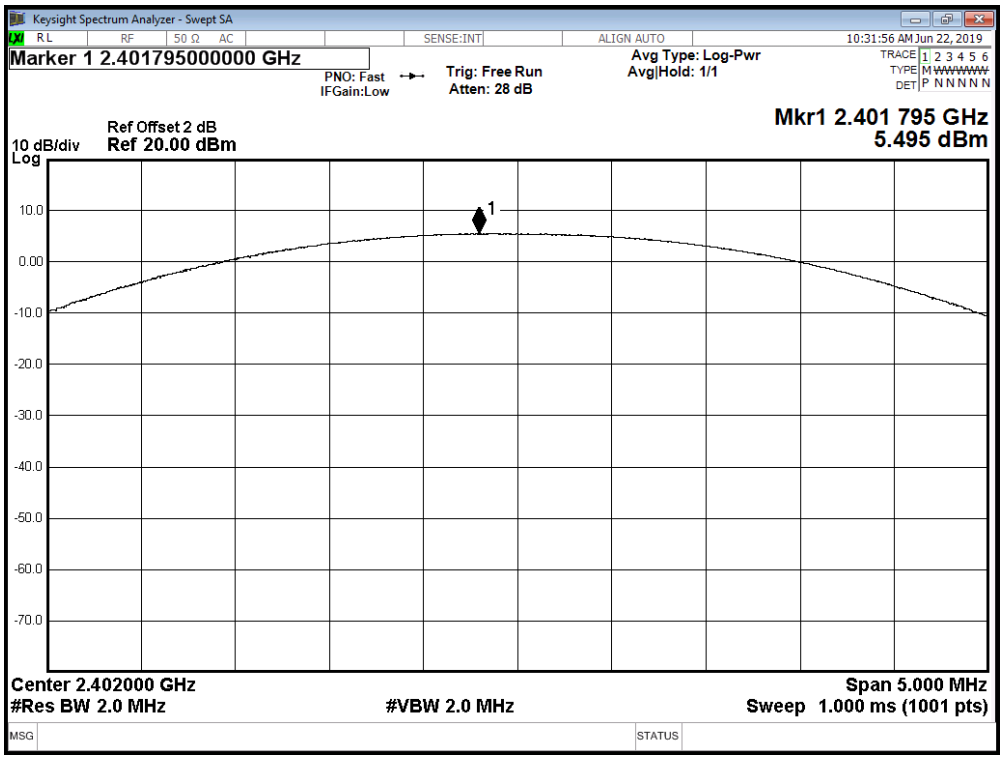
Modulation Standard: GFSK (1Mbps)
Channel: 39



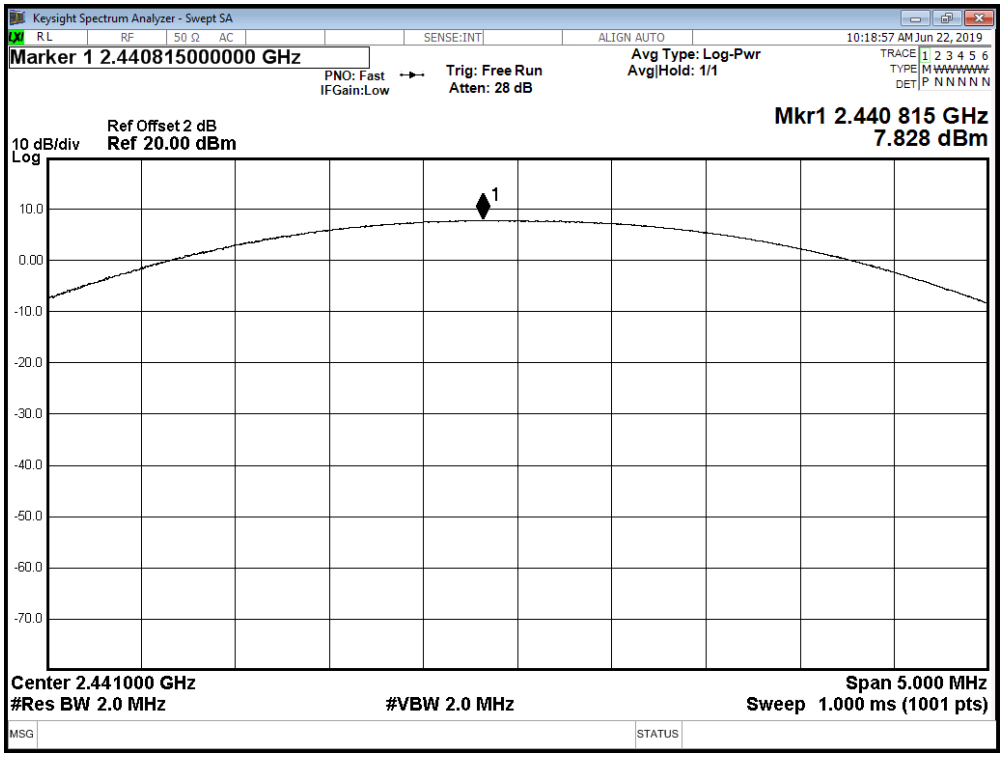
Modulation Standard: GFSK (1Mbps)
Channel: 78



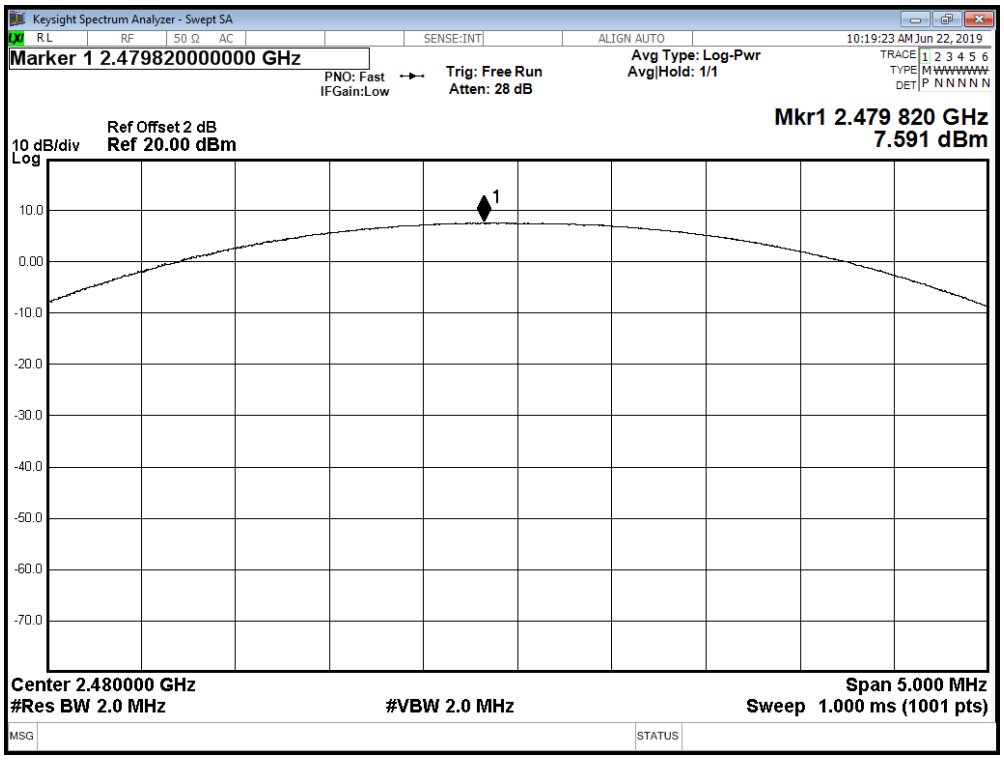
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 00



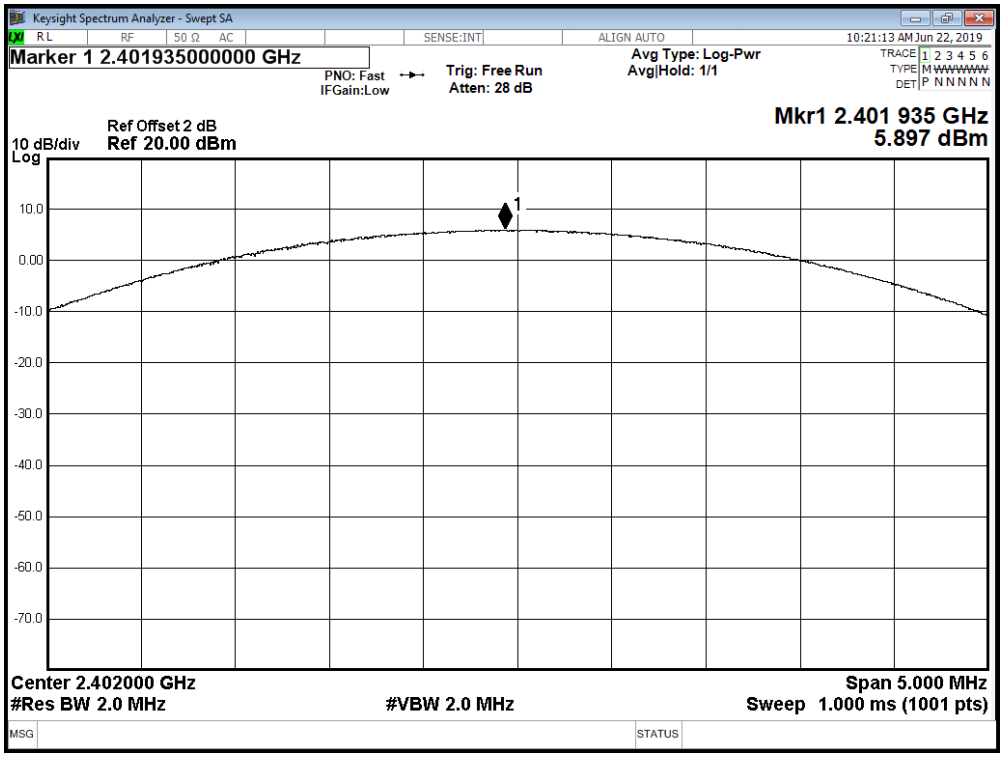
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 39



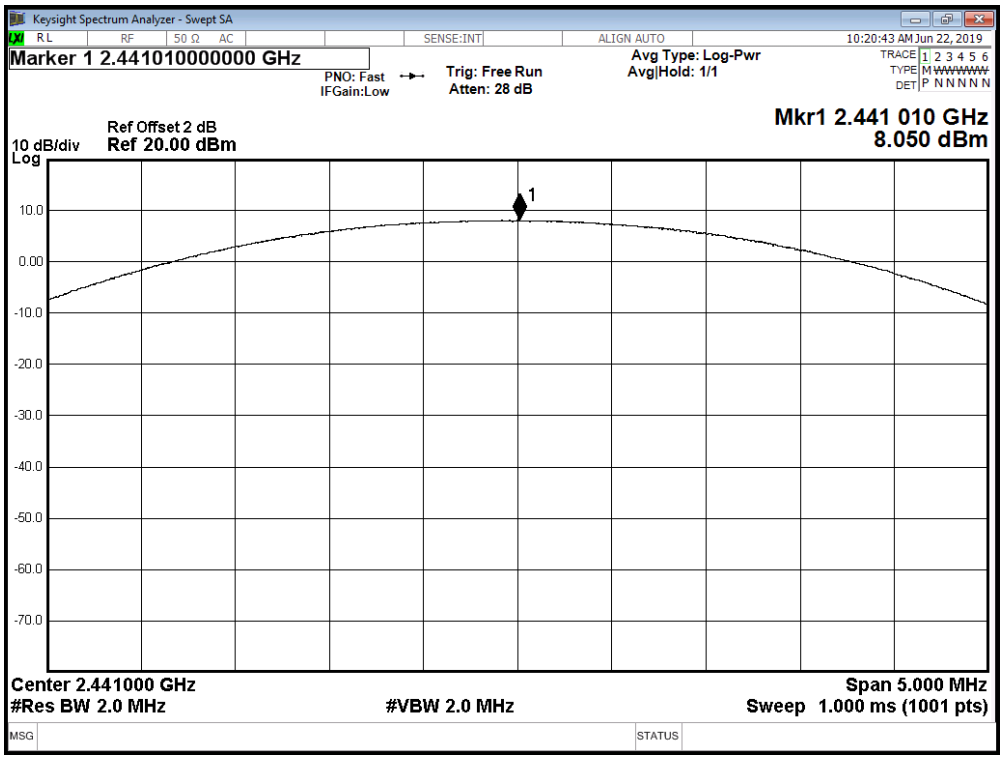
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 78



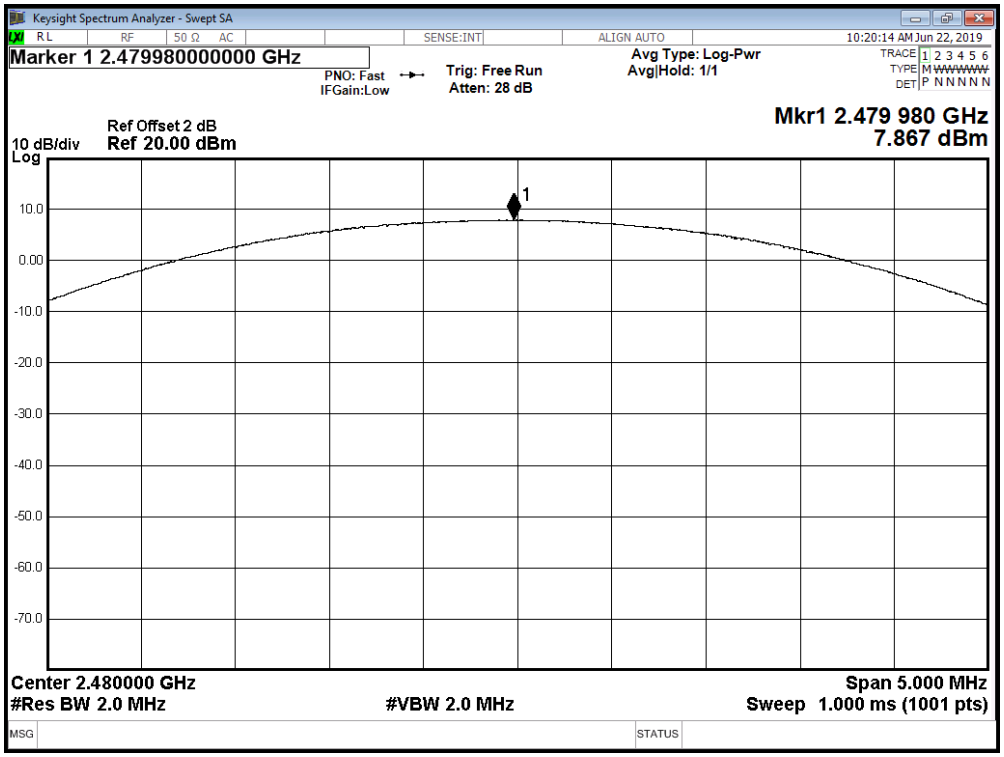
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



Modulation Standard: 8DPSK (3Mbps)
Channel: 39



Modulation Standard: 8DPSK (3Mbps)
Channel: 78



12. Band Edges Measurement

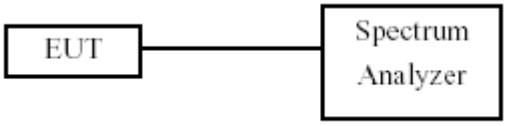
12.1 Test Limit

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

12.2 Test Procedure

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

12.3 Test Setup Layout

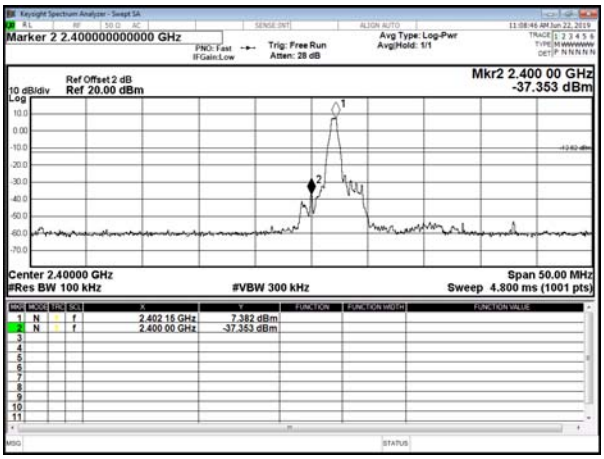


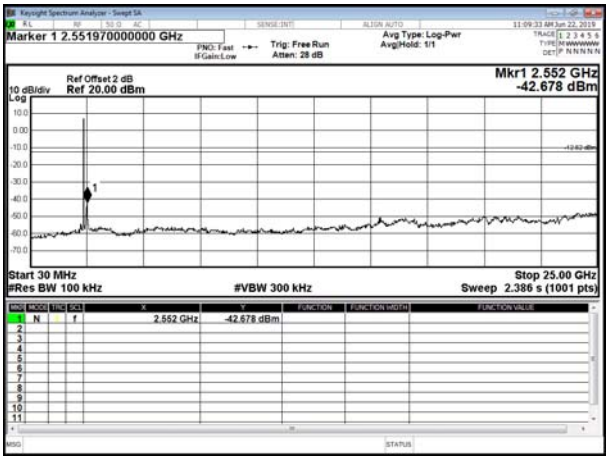
12.4 Test Result and Data

Single test

Modulation Standard: GFSK (1Mbps)

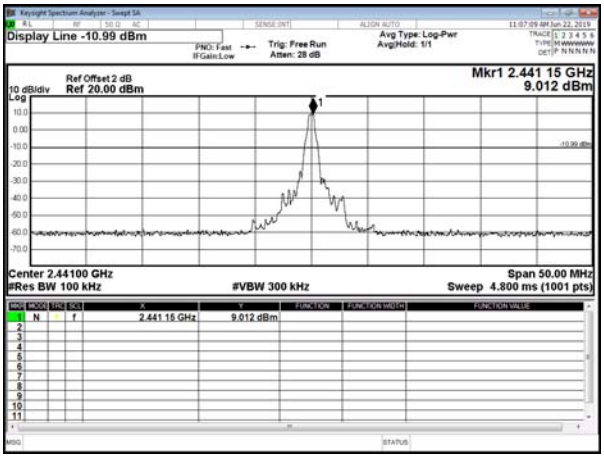
Channel: 00

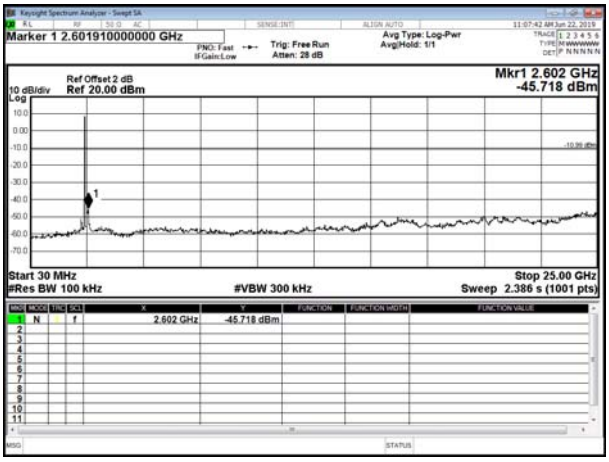




Modulation Standard: GFSK (1Mbps)

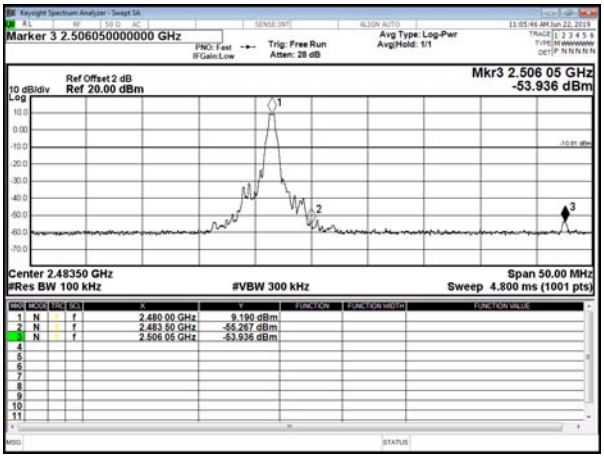
Channel: 39

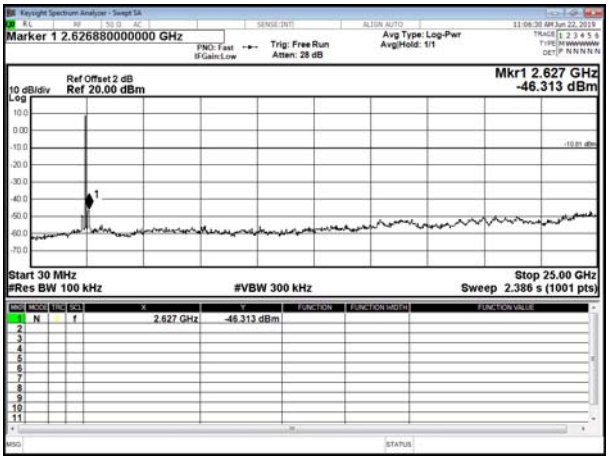




Modulation Standard: GFSK (1Mbps)

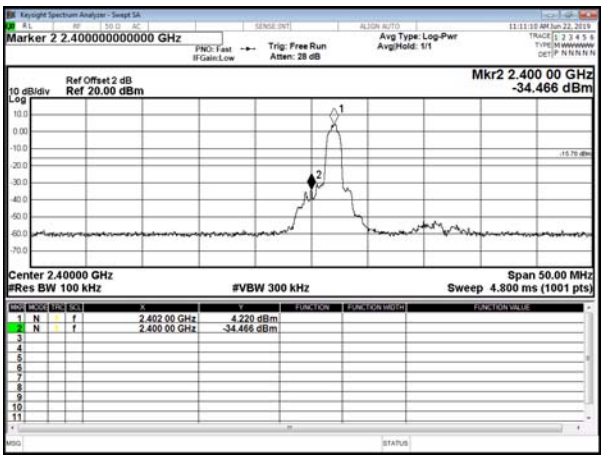
Channel: 78

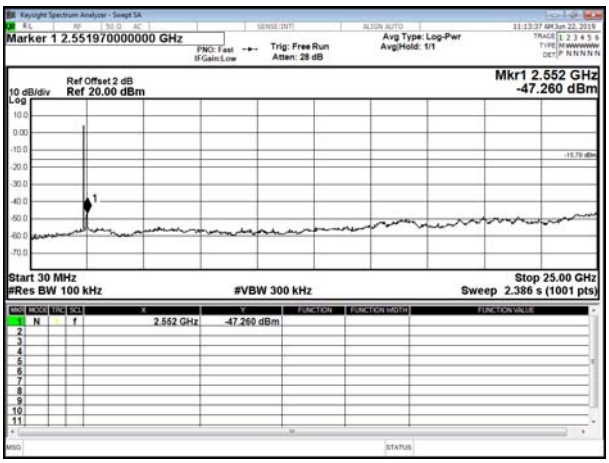




Modulation Standard: π/4 DQPSK (2Mbps)

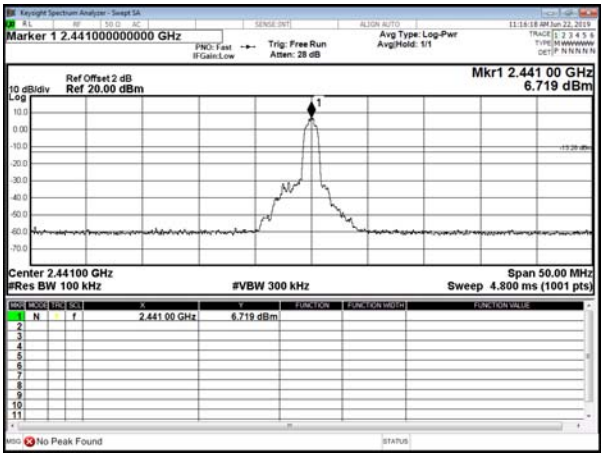
Channel: 00

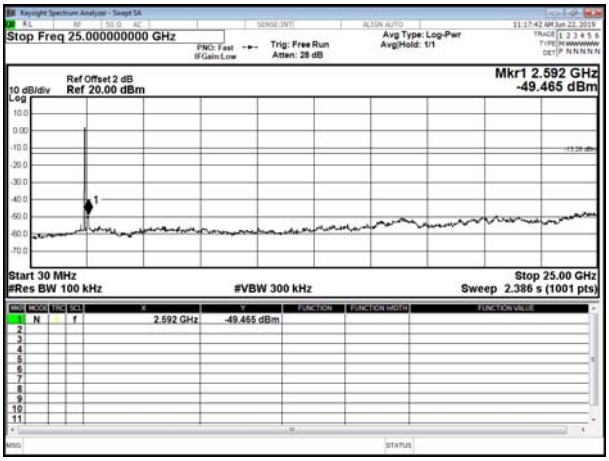




Modulation Standard: π/4 DQPSK (2Mbps)

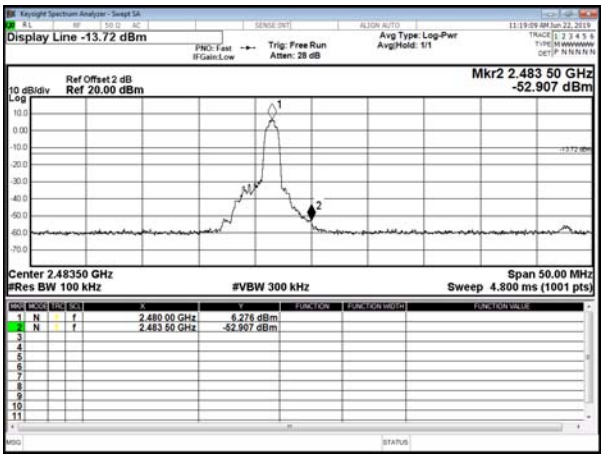
Channel: 39

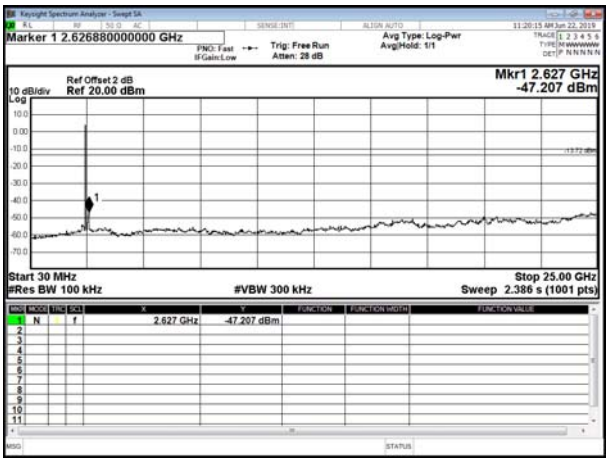




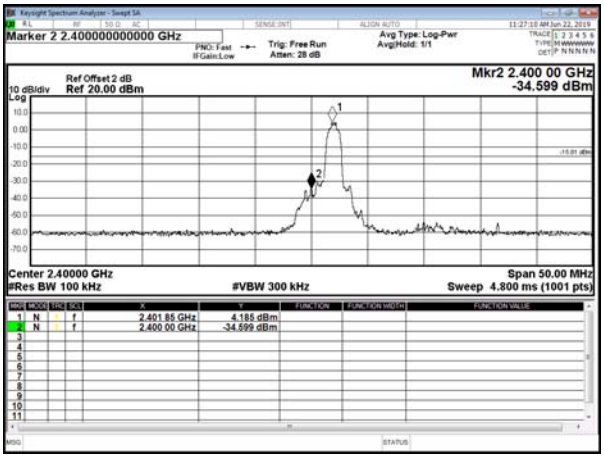
Modulation Standard: π/4 DQPSK (2Mbps)

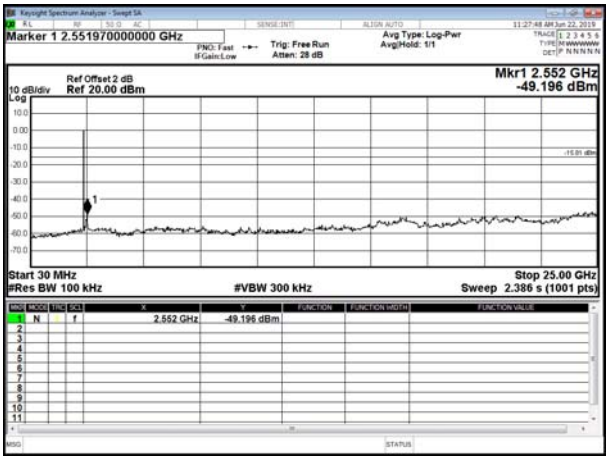
Channel: 78



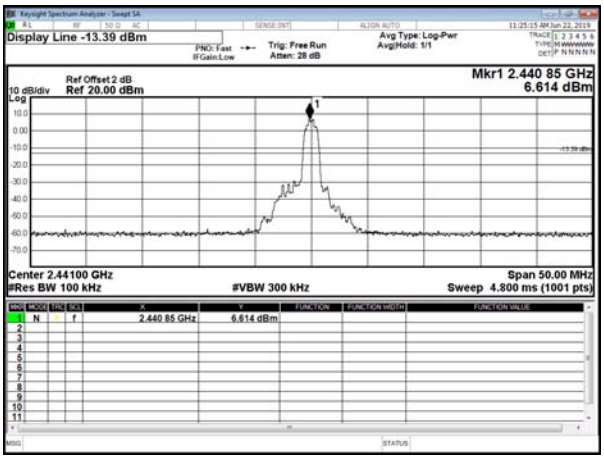


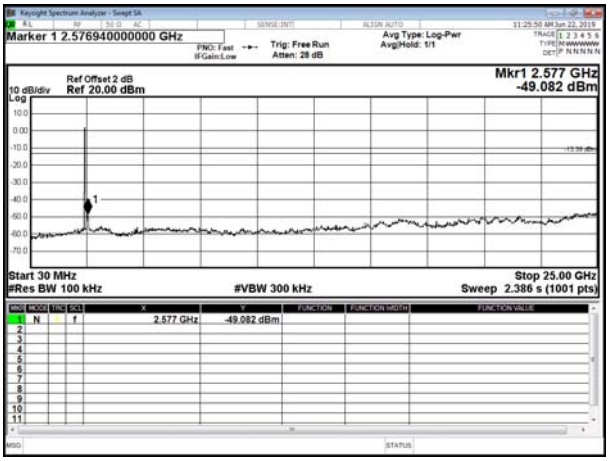
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



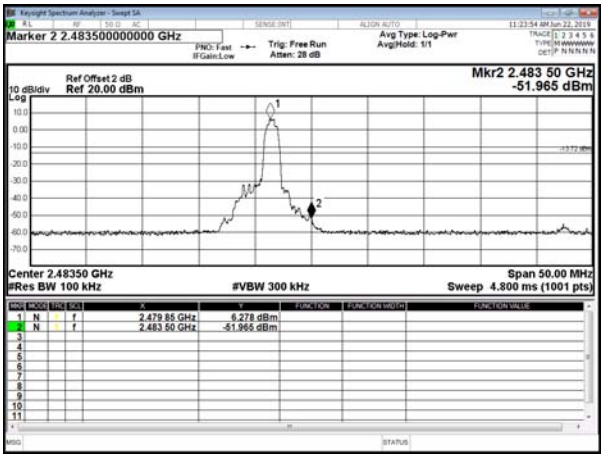


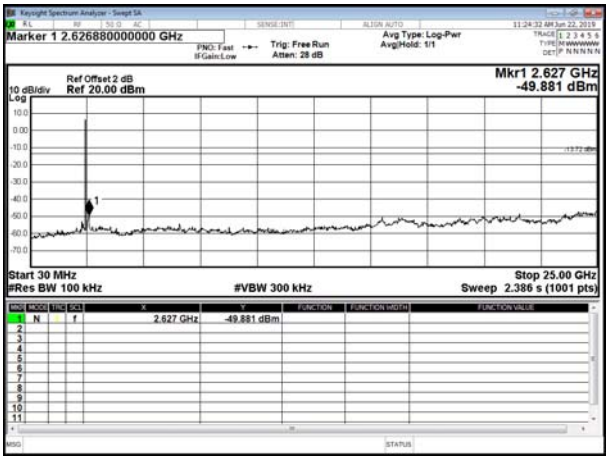
Modulation Standard: 8DPSK (3Mbps)
Channel: 39





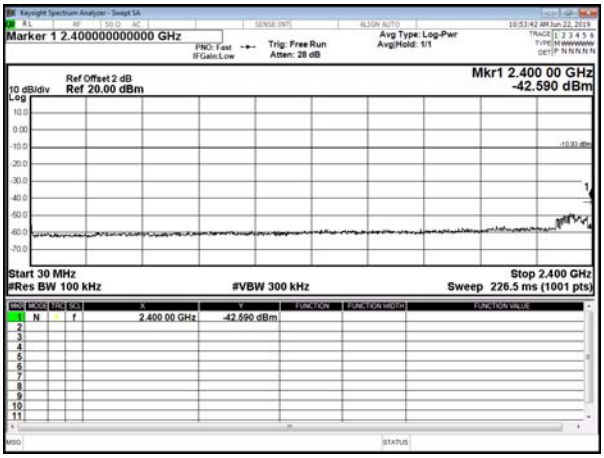
Modulation Standard: 8DPSK (3Mbps)
Channel: 78



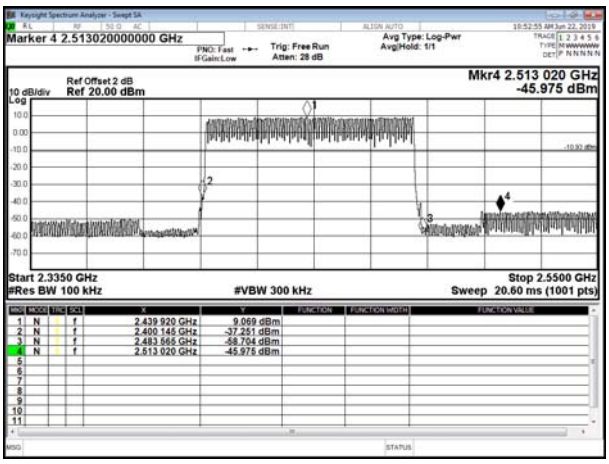


Hopping test

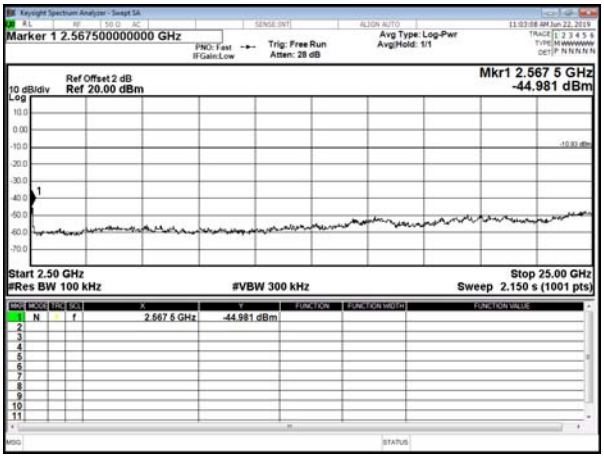
Modulation Standard: GFSK (1Mbps)



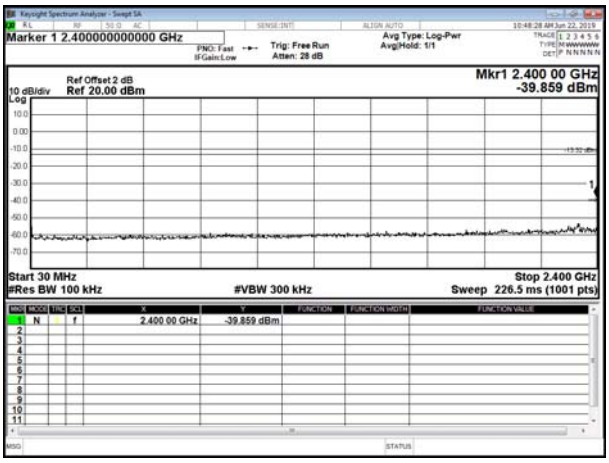
Modulation Standard: GFSK (1Mbps)



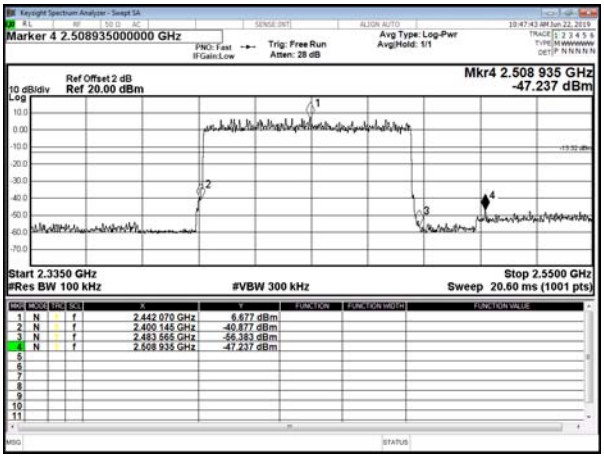
Modulation Standard: GFSK (1Mbps)



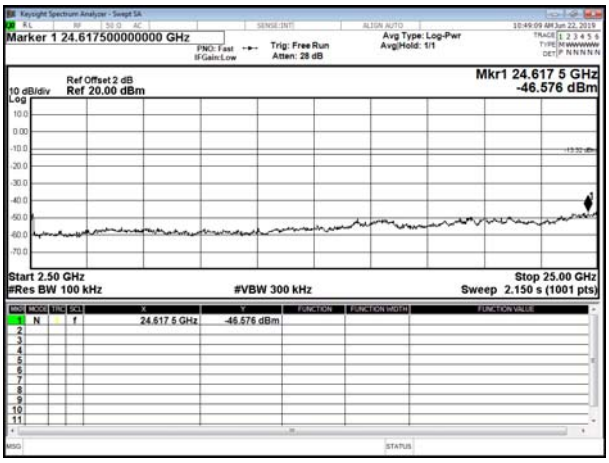
Modulation Standard: π/4 DQPSK (2Mbps)



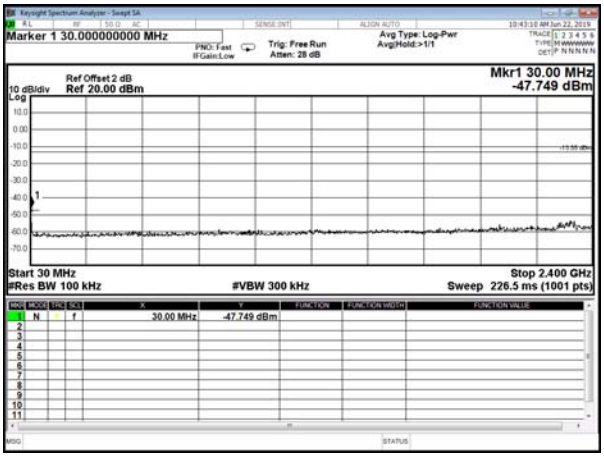
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 39



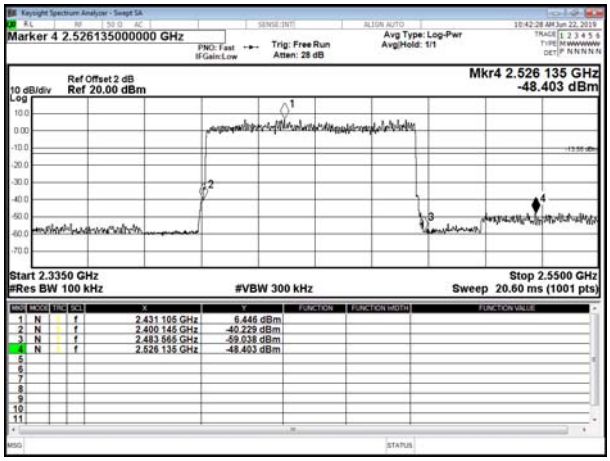
Modulation Standard: π/4 DQPSK (2Mbps)
Channel: 78



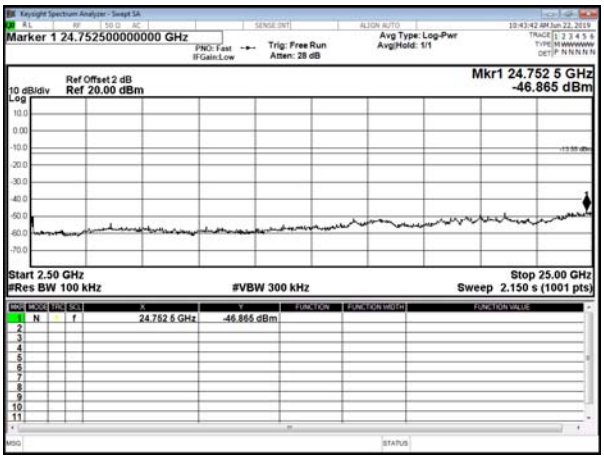
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



Modulation Standard: 8DPSK (3Mbps)
Channel: 39

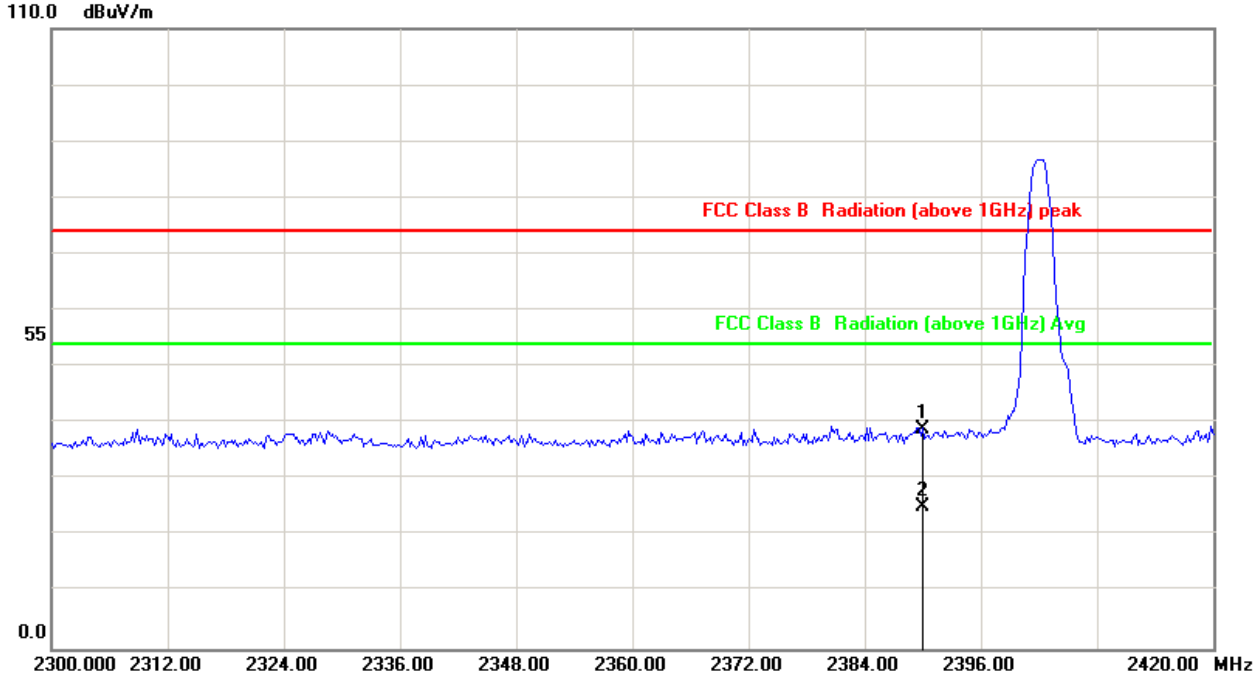


Modulation Standard: 8DPSK (3Mbps)
Channel: 78



12.5 Restrict band emission Measurement Data

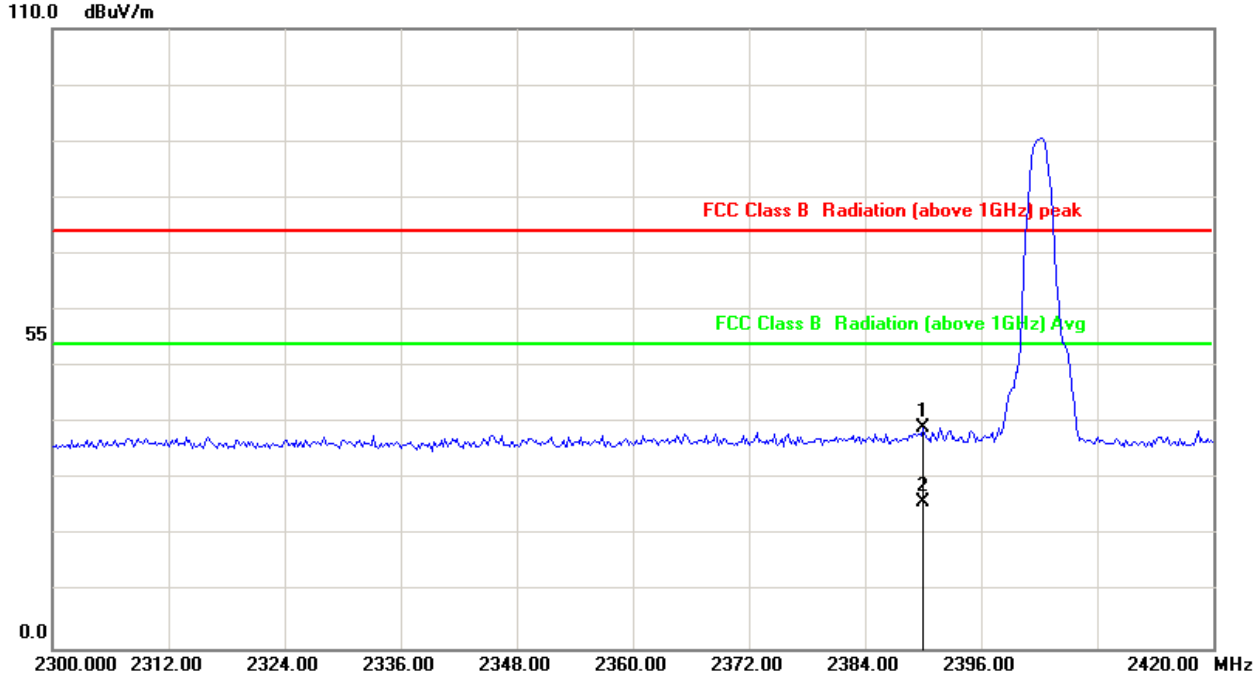
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	GFSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	49.10	39.05	74.00	-34.95	peak
2	2390.000	-10.05	35.29	25.24	54.00	-28.76	AVG

Note: Level=Reading +Factor.
Margin=Level-Limit.

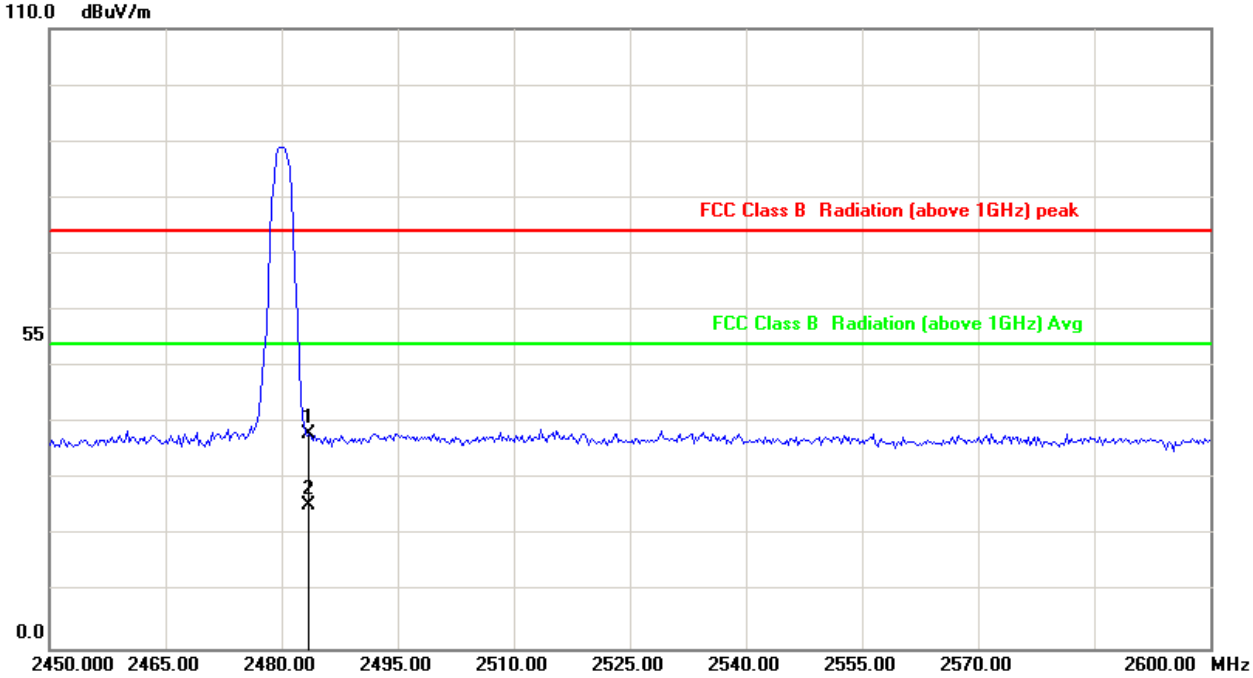
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	GFSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	49.13	39.08	74.00	-34.92	peak
2	2390.000	-10.05	36.03	25.98	54.00	-28.02	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

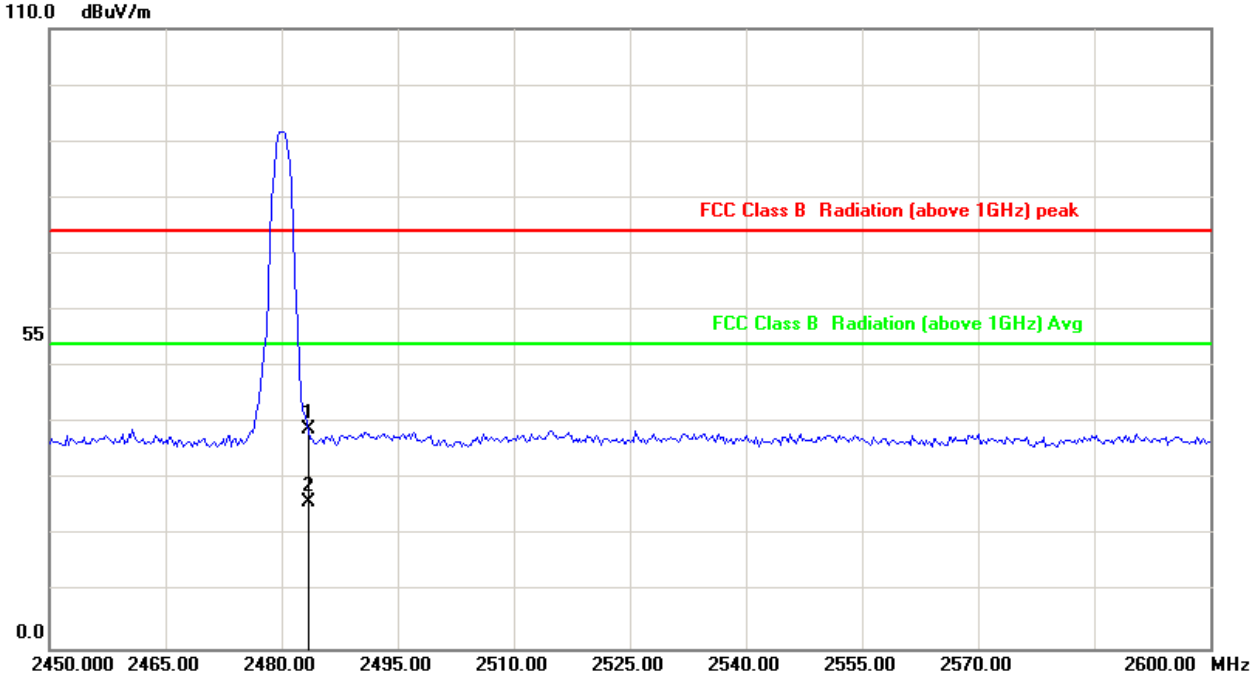
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	GFSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	47.67	38.02	74.00	-35.98	peak
2	2483.500	-9.65	35.02	25.37	54.00	-28.63	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

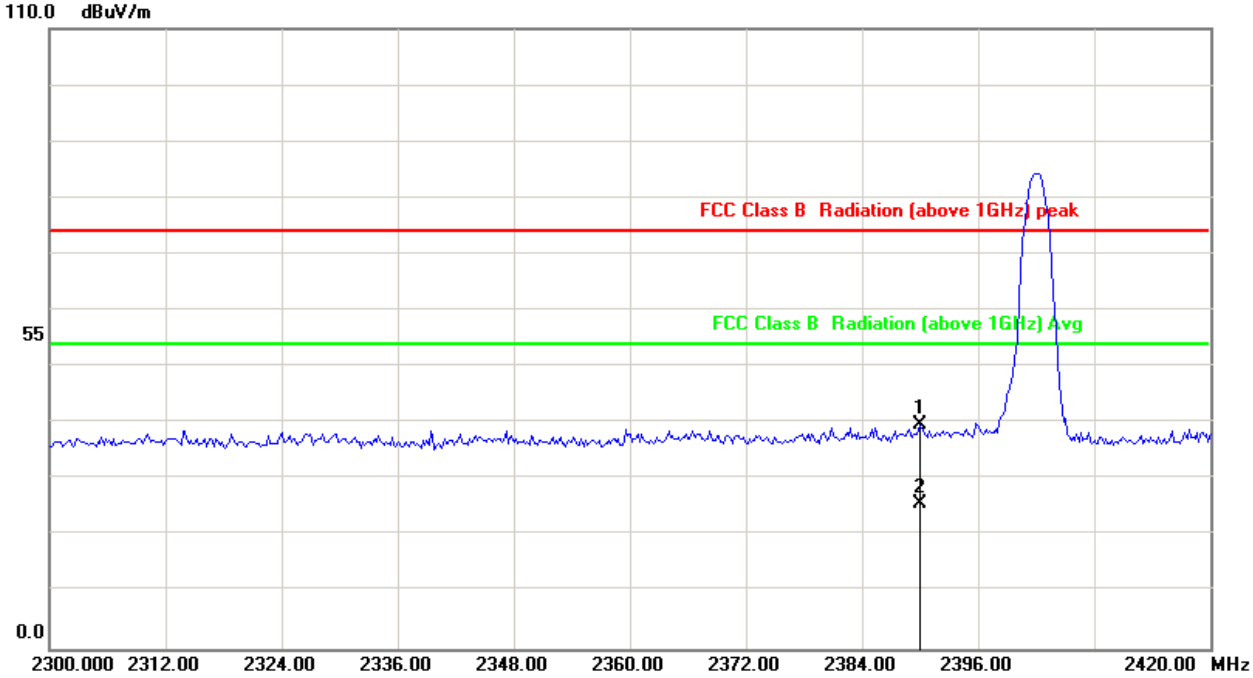
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	GFSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	48.68	39.03	74.00	-34.97	peak
2	2483.500	-9.65	35.77	26.12	54.00	-27.88	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

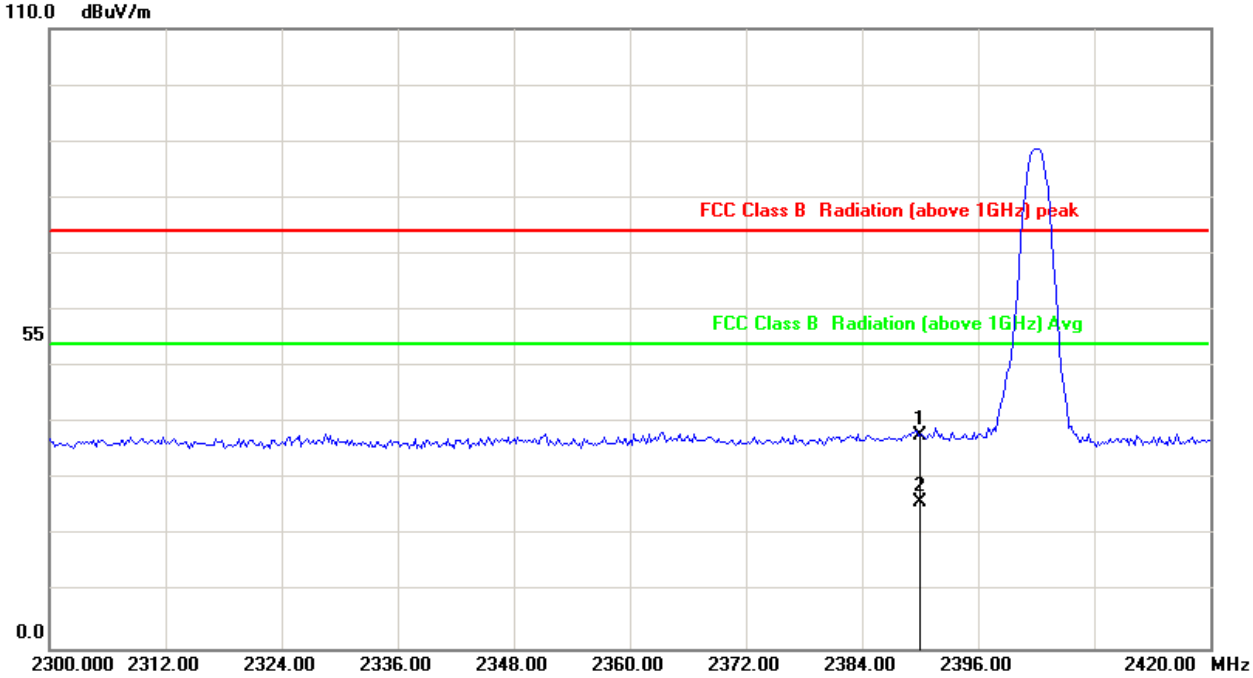
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	π/4 DQPSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	49.87	39.82	74.00	-34.18	peak
2	2390.000	-10.05	35.89	25.84	54.00	-28.16	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

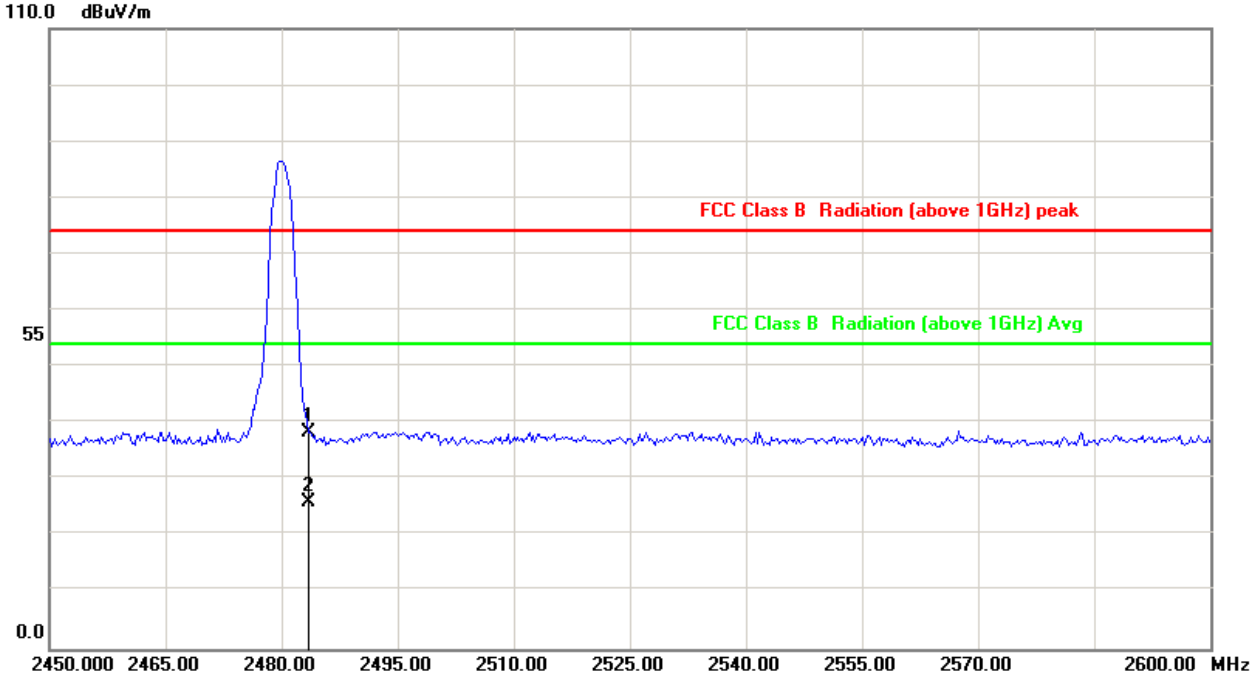
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	π/4 DQPSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	47.77	37.72	74.00	-36.28	peak
2	2390.000	-10.05	36.15	26.10	54.00	-27.90	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

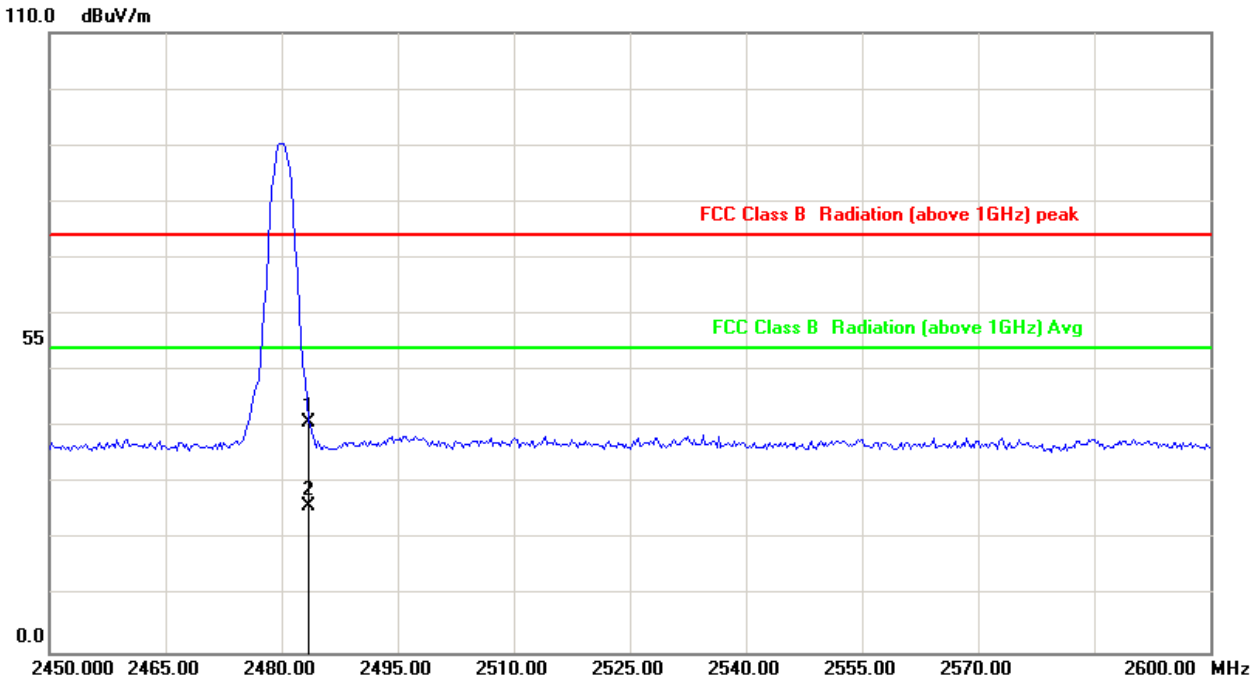
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	π/4 DQPSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	47.98	38.33	74.00	-35.67	peak
2	2483.500	-9.65	35.51	25.86	54.00	-28.14	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

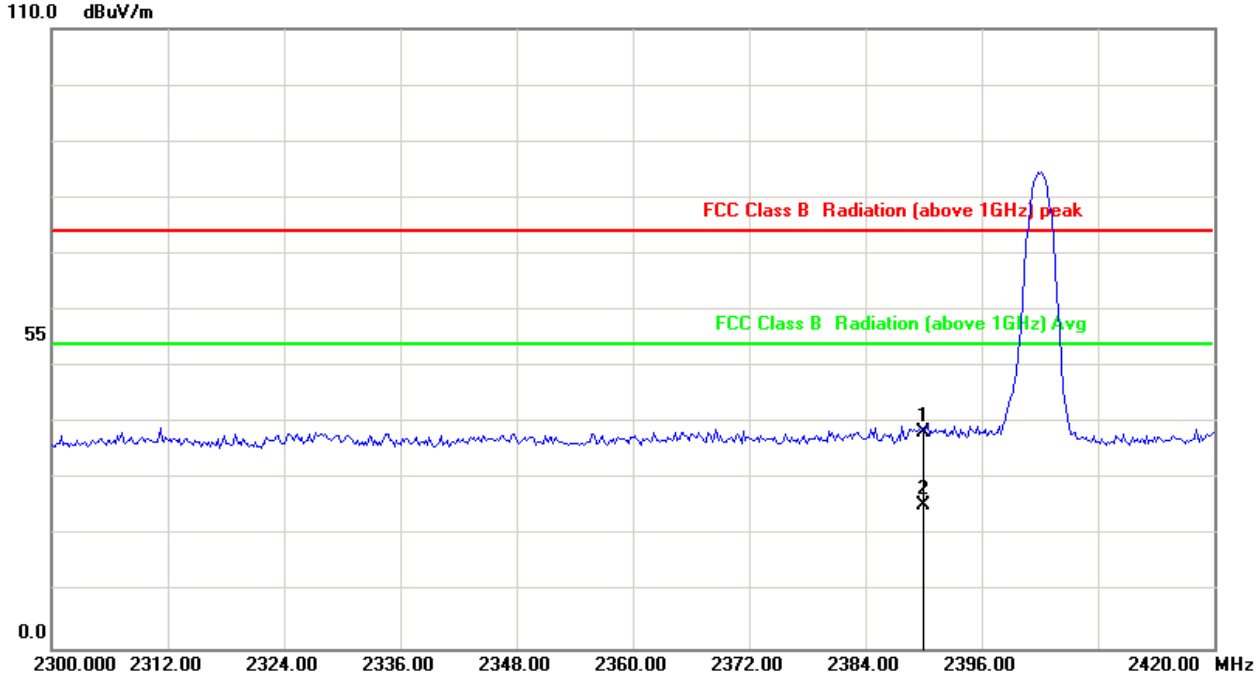
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	π/4 DQPSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	50.62	40.97	74.00	-33.03	peak
2	2483.500	-9.65	35.59	25.94	54.00	-28.06	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

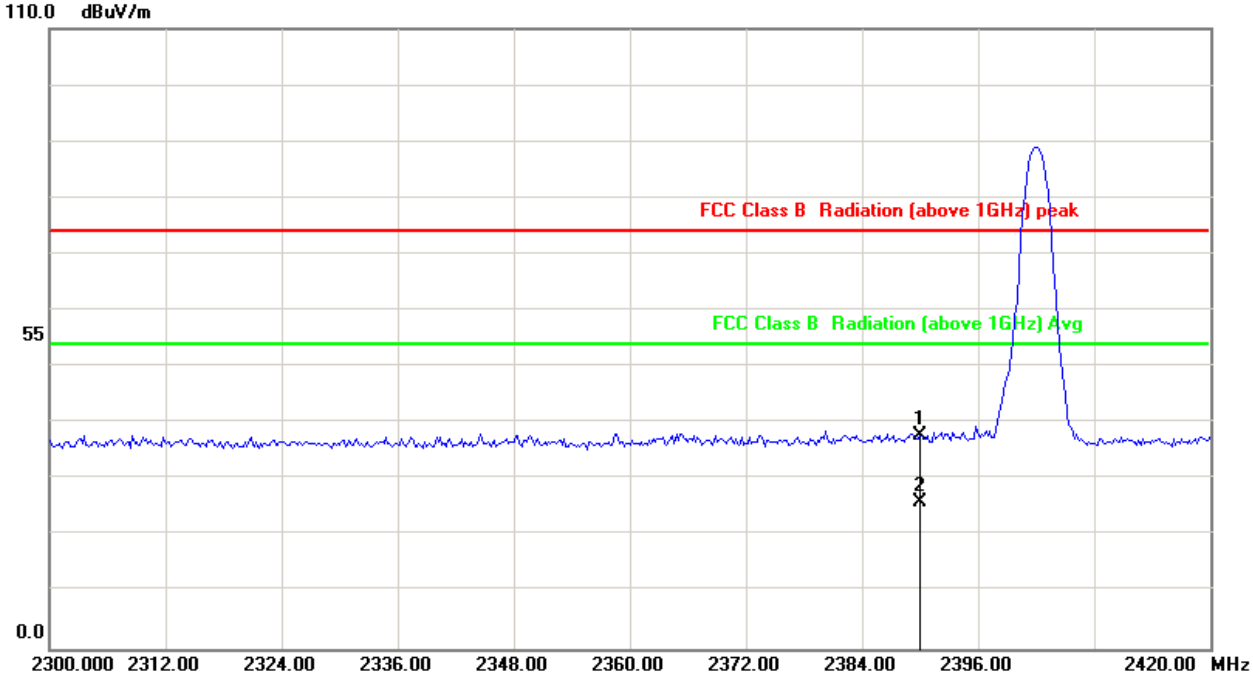
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	8DPSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	48.46	38.41	74.00	-35.59	peak
2	2390.000	-10.05	35.57	25.52	54.00	-28.48	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

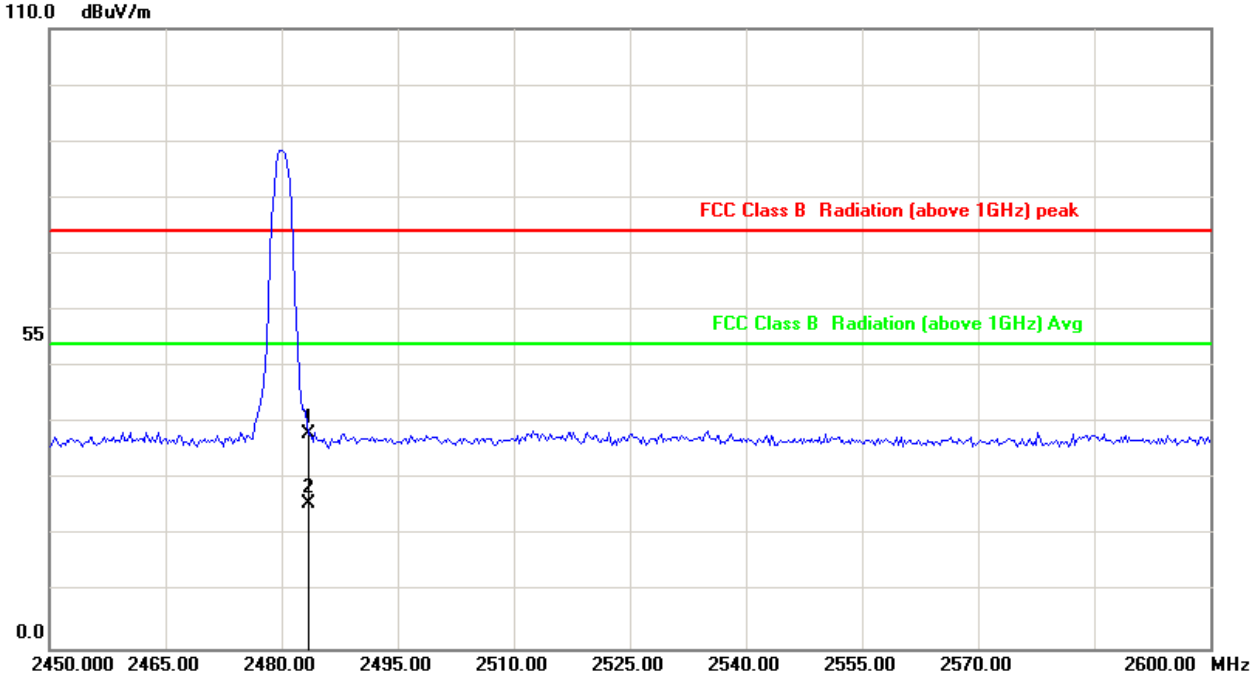
Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	8DPSK, CH00	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	-10.05	47.96	37.91	74.00	-36.09	peak
2	2390.000	-10.05	35.94	25.89	54.00	-28.11	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

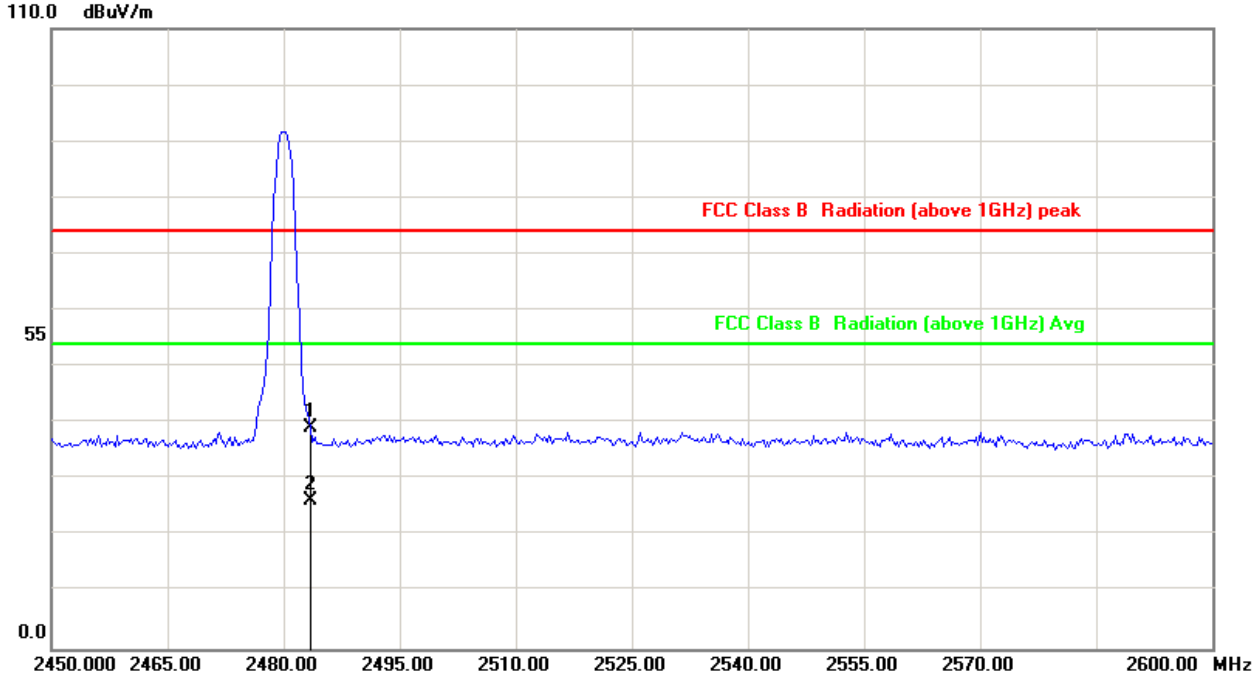
Power :	AC120V/60Hz	Pol/Phase :	VERTICAL
Test Mode :	8DPSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	47.84	38.19	74.00	-35.81	peak
2	2483.500	-9.65	35.36	25.71	54.00	-28.29	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

Power :	AC120V/60Hz	Pol/Phase :	HORIZONTAL
Test Mode :	8DPSK, CH78	Temperature :	23 °C
Test date :	May 26, 2019	Humidity :	65 %



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	-9.65	48.82	39.17	74.00	-34.83	peak
2	2483.500	-9.65	35.81	26.16	54.00	-27.84	AVG

Note: Level=Reading+Factor.
Margin=Level-Limit.

13. 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

---------- End of the report ----------