

FCC - TEST REPORT

Report Number : **65.920.16.006.01** Date of Issue: **May 31, 2017**

Model : **F6**

Product Type : **Bluetooth Speaker**

Applicant : **Dongguan Jin wen hua digital technology Co., LTD.**

Address : **NO.1 Hua Da Road, Long Bei Ling Village, Tangxia Town,**

: Dongguan City, Guangdong, China

Manufacturer : **Dongguan Jin wen hua digital technology Co., LTD.**

Address : **NO.1 Hua Da Road, Long Bei Ling Village, Tangxia Town,**

: Dongguan City, Guangdong, China

Test Result : **Positive** **Negative**

Total pages including Appendices : **45**

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch is a subcontractor to TÜV SÜD Product Service GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval



1 Table of Contents

- 1 Table of Contents.....2
- 2 Details about the Test Laboratory3
- 3 Description of the Equipment Under Test4
- 4 Summary of Test Standards5
- 5 Summary of Test Results6
- 6 General Remarks.....7
- 7 Test Setups.....8
- 8 Systems test configuration9
- 9 Technical Requirement10
 - 9.1 Conducted Emission.....10
 - 9.2 Conducted peak output power15
 - 9.3 20 dB bandwidth21
 - 9.4 Carrier Frequency Separation.....26
 - 9.5 Number of hopping frequencies29
 - 9.6 Dwell Time31
 - 9.7 Spurious RF conducted emissions.....34
 - 9.8 Band edge testing36
 - 9.9 Spurious radiated emissions for transmitter and receiver.....41
- 10 Test Equipment List.....44
- 11 System Measurement Uncertainty45



2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

Site 2

Company name: Dongguan Yaxu (AiT) Technology Limited.
No.22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan,
Guangdong,523753 China

FCC Registration Number: 248337

Telephone: 86-769-82020499
Fax: 86-769-82020495

3 Description of the Equipment Under Test

Product:	Bluetooth Speaker
Model no.:	F6
FCC ID:	2AFSGF6
Options and accessories:	Nil
Rating:	3.7VDC (Supplied by rechargeable battery) 5VDC, 1000mA(Charged by the mini-USB port)
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Antenna Type:	Internal Antenna
Antenna Gain:	1.0dBi
Description of the EUT:	The Equipment Under Test (EUT) is Bluetooth Speaker operated at 2.4GHz



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2016 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2014).

5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	10	Site 2	Pass
§15.247(b)(1)	Conducted peak output power	15	Site 2	Pass
§15.247(a)(2)	6dB bandwidth	---	---	N/A
§15.247(a)(1)	20dB bandwidth	21	Site 2	Pass
§15.247(a)(1)	Carrier frequency separation	26	Site 2	Pass
§15.247(a)(1)(iii)	Number of hopping frequencies	29	Site 2	Pass
§15.247(a)(1)(iii)	Dwell Time	31	Site 2	Pass
§15.247(e)	Power spectral density*	---	---	N/A
§15.247(d)	Spurious RF conducted emissions	34	Site 2	Pass
§15.247(d)	Band edge	36	Site 2	Pass
§15.247(d) & §15.209	Spurious radiated emissions for transmitter and receiver	41	Site 2	Pass
§15.203	Antenna requirement	See note 2		Pass

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an integral antenna, which gain is 1.0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AFSGF6 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: October 27, 2016

Testing Start Date: October 27, 2016

Testing End Date: May 17, 2017

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:



Phoebe Hu
EMC Section Manager

Prepared by:



Mark Chen
EMC Project Engineer

Tested by:

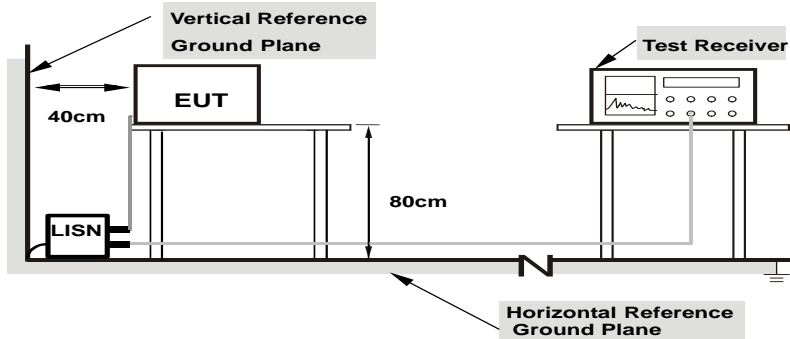


Seal Chen
EMC Test Engineer

7 Test Setups

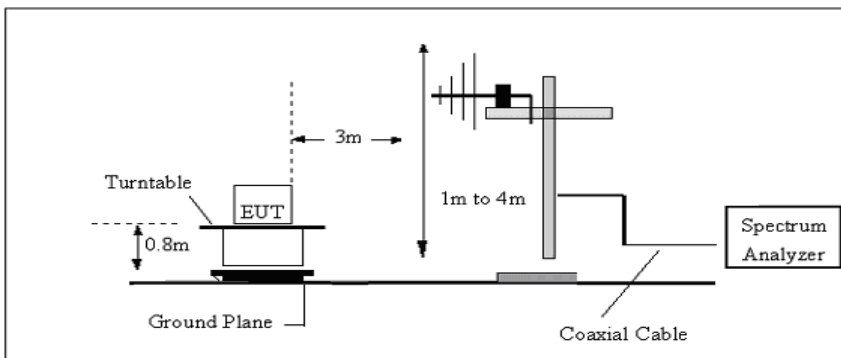
7.1 Radiated test setups

Conducted emission(150KHz-30MHz)

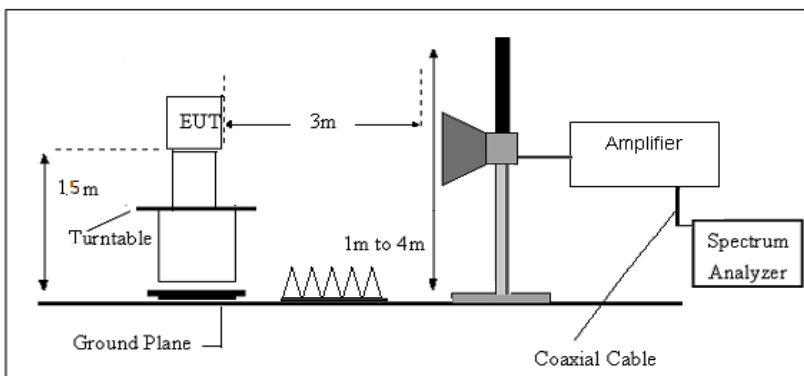


- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

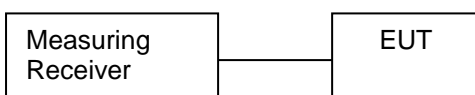
Below 1GHz



Above 1GHz



7.2 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

Name	Model	Manufacturer	S/N	Cal Due Date
Personal computer	HP	500-320cx	4CV428DQYN	---
Mobile phone	huawei	---	---	---
Adapter	---	---	---	---

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

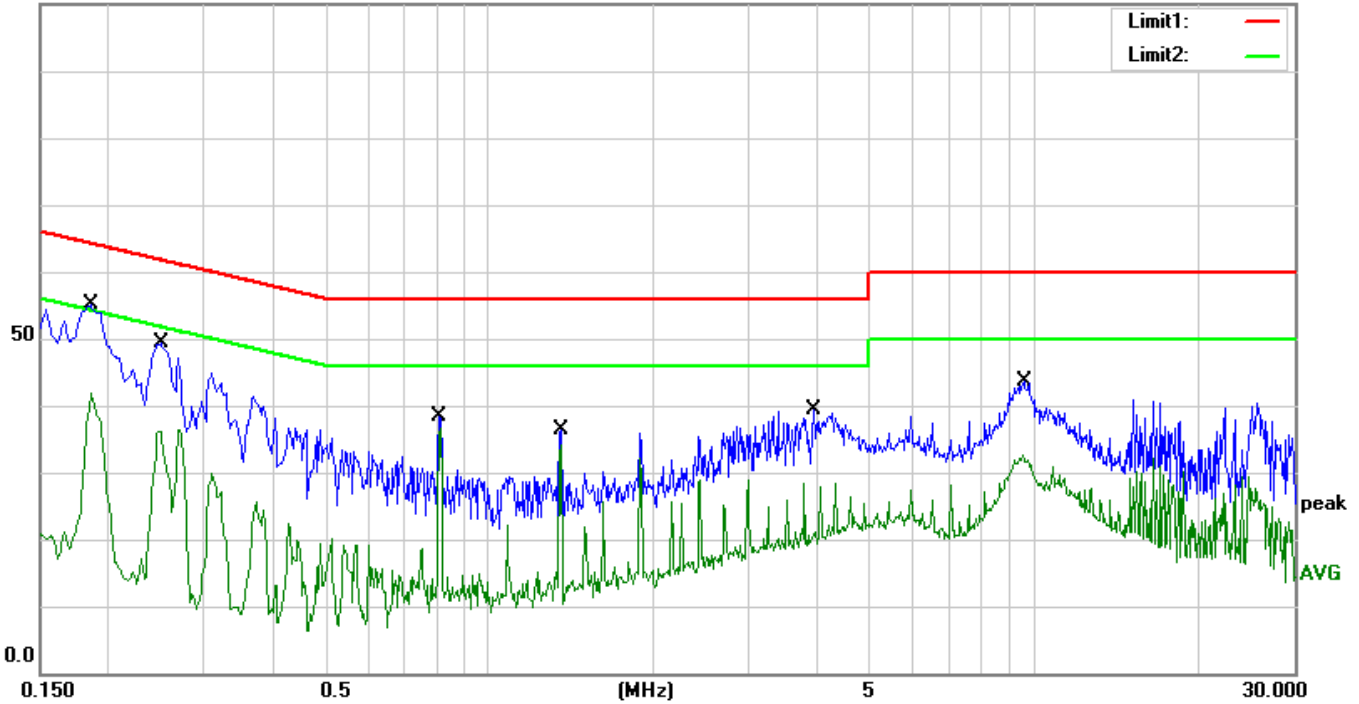
Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : Bluetooth Speaker
 M/N : F6
 Operating Condition : Charging+ BT TX
 Test Specification : Live
 Comment : AC 120V/60Hz

100.0 dBuV

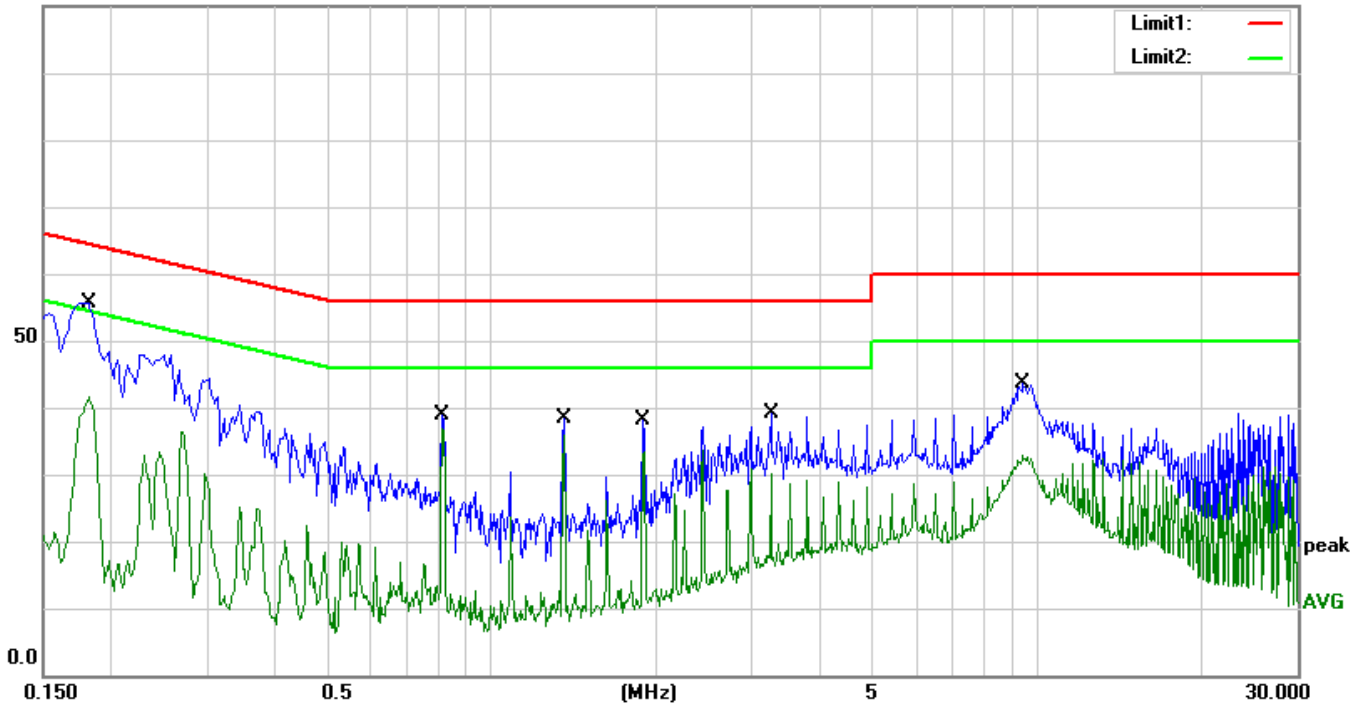


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	0.1860	45.83	9.23	55.06	64.21	-9.15			QP
2	0.1860	31.63	9.23	40.86	54.21	-13.35			AVG
3	0.2500	40.08	9.18	49.26	61.76	-12.50			QP
4	0.2500	26.02	9.18	35.20	51.76	-16.56			AVG
5	0.8100	29.18	9.21	38.39	56.00	-17.61			QP
6	0.8100	26.77	9.21	35.98	46.00	-10.02			AVG
7	1.3540	27.26	9.19	36.45	56.00	-19.55			QP
8	1.3540	24.98	9.19	34.17	46.00	-11.83			AVG
9	3.9540	30.11	9.26	39.37	56.00	-16.63			QP
10	3.9540	11.62	9.26	20.88	46.00	-25.12			AVG
11	9.5900	34.14	9.47	43.61	60.00	-16.39			QP
12	9.5900	22.22	9.47	31.69	50.00	-18.31			AVG



Product Type : Bluetooth Speaker
 M/N : F6
 Operating Condition : Charging+ BT TX
 Test Specification : Neutral
 Comment : AC 120V/60Hz

100.0 dBuV

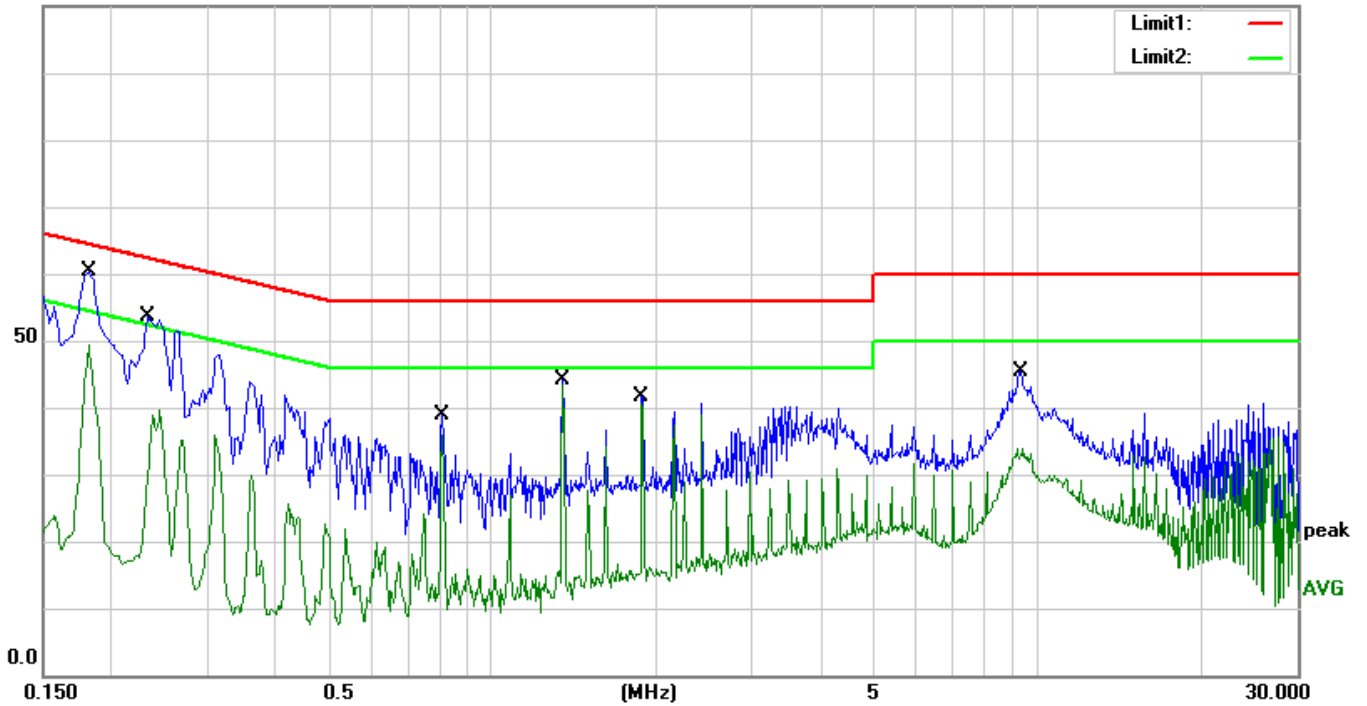


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	0.1820	46.45	9.23	55.68	64.39	-8.71			QP
2	0.1820	32.09	9.23	41.32	54.39	-13.07			AVG
3	0.8100	29.70	9.25	38.95	56.00	-17.05			QP
4	0.8100	27.70	9.25	36.95	46.00	-9.05			AVG
5	1.3540	29.17	9.25	38.42	56.00	-17.58			QP
6	1.3540	26.62	9.25	35.87	46.00	-10.13			AVG
7	1.8940	28.82	9.25	38.07	56.00	-17.93			QP
8	1.8940	23.81	9.25	33.06	46.00	-12.94			AVG
9	3.2500	29.92	9.26	39.18	56.00	-16.82			QP
10	3.2500	8.11	9.26	17.37	46.00	-28.63			AVG
11	9.4300	34.34	9.38	43.72	60.00	-16.28			QP
12	9.4300	23.38	9.38	32.76	50.00	-17.24			AVG



Product Type : Bluetooth Speaker
 M/N : F6
 Operating Condition : Charging+ AUX IN Playing
 Test Specification : Live
 Comment : AC 120V/60Hz

100.0 dBuV

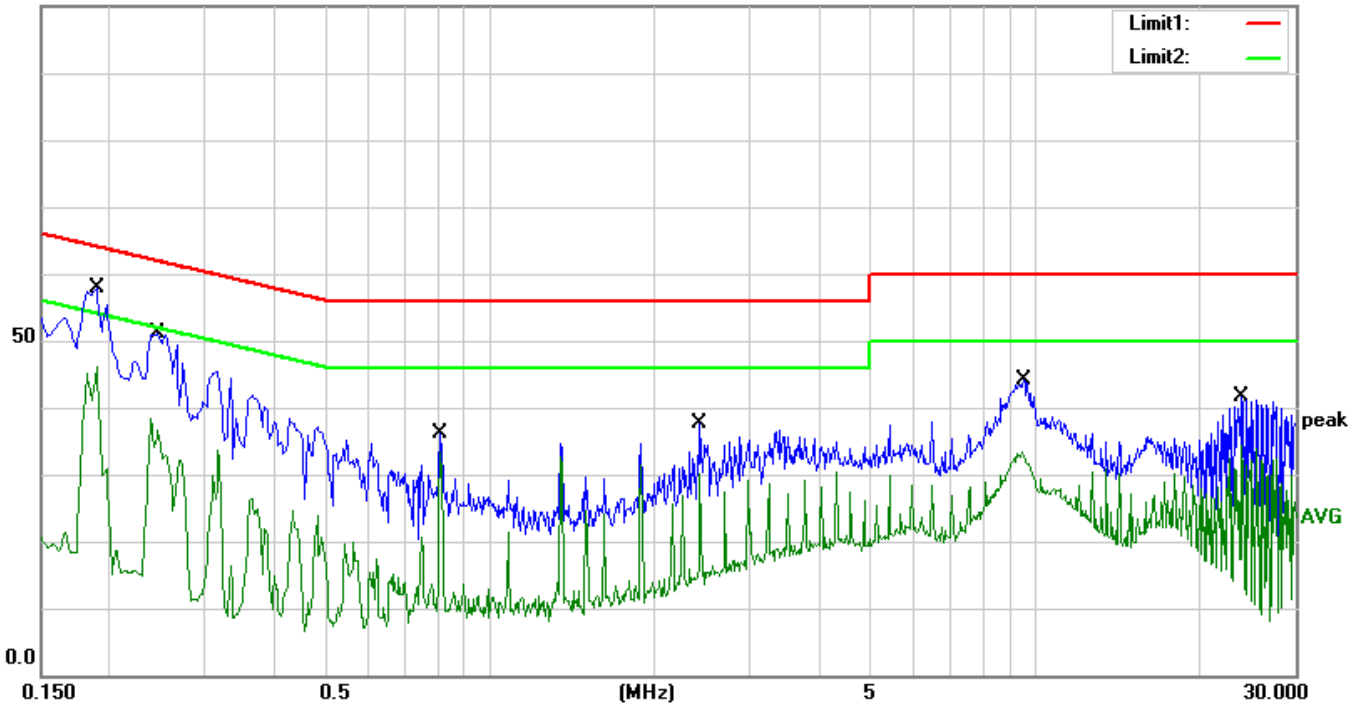


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	0.1820	51.19	9.23	60.42	64.39	-3.97			QP
2	0.1820	39.28	9.23	48.51	54.39	-5.88			AVG
3	0.2340	44.38	9.20	53.58	62.31	-8.73			QP
4	0.2340	21.41	9.20	30.61	52.31	-21.70			AVG
5	0.8100	29.67	9.21	38.88	56.00	-17.12			QP
6	0.8100	26.66	9.21	35.87	46.00	-10.13			AVG
7	1.3473	22.31	9.18	31.49	56.00	-24.51			QP
8	1.3473	21.07	9.18	30.25	46.00	-15.75			AVG
9	1.8860	32.46	9.24	41.70	56.00	-14.30			QP
10	1.8860	31.45	9.24	40.69	46.00	-5.31			AVG
11	9.3260	35.93	9.46	45.39	60.00	-14.61			QP
12	9.3260	23.58	9.46	33.04	50.00	-16.96			AVG



Product Type : Bluetooth Speaker
 M/N : F6
 Operating Condition : Charging+ AUX IN Playing
 Test Specification : Neutral
 Comment : AC 120V/60Hz

100.0 dBuV



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	0.1900	48.70	9.23	57.93	64.04	-6.11			QP
2	0.1900	35.31	9.23	44.54	54.04	-9.50			AVG
3	0.2460	41.99	9.18	51.17	61.89	-10.72			QP
4	0.2460	27.33	9.18	36.51	51.89	-15.38			AVG
5	0.8100	26.83	9.25	36.08	56.00	-19.92			QP
6	0.8100	24.12	9.25	33.37	46.00	-12.63			AVG
7	2.4300	28.48	9.26	37.74	56.00	-18.26			QP
8	2.4300	20.77	9.26	30.03	46.00	-15.97			AVG
9	9.5020	34.81	9.38	44.19	60.00	-15.81			QP
10	9.5020	23.46	9.38	32.84	50.00	-17.16			AVG
11	23.7820	31.84	9.87	41.71	60.00	-18.29			QP
12	23.7820	3.10	9.87	12.97	50.00	-37.03			AVG

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW,
Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30



Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

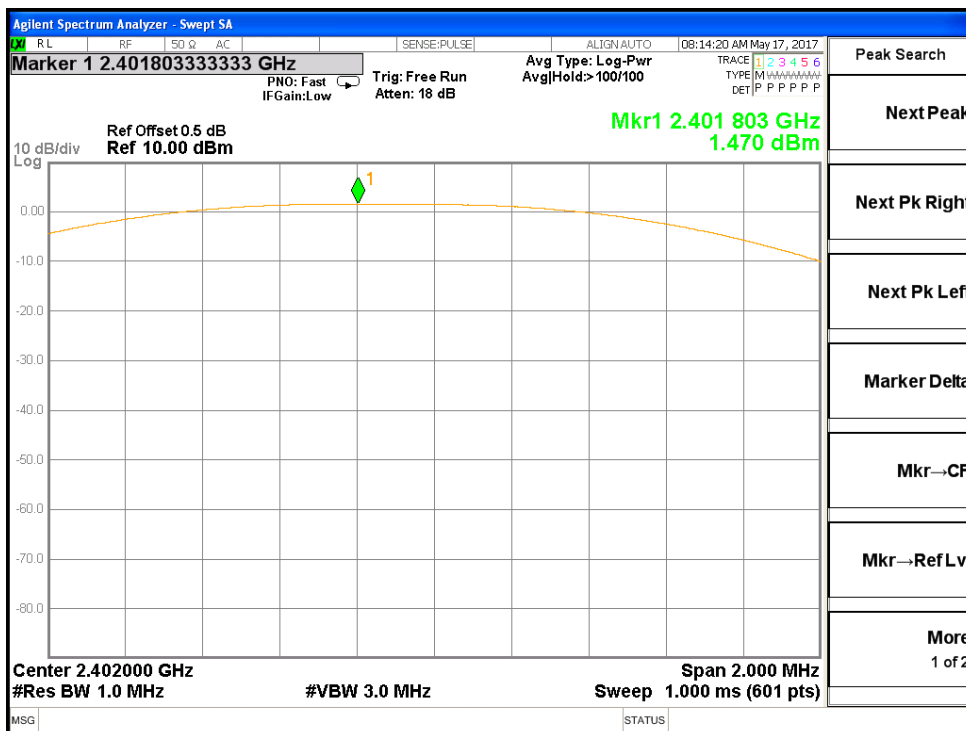
Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	1.470	Pass
Middle channel 2441MHz	2.544	Pass
High channel 2480MHz	3.566	Pass

Bluetooth Mode π/4-DQPSK modulation Test Result

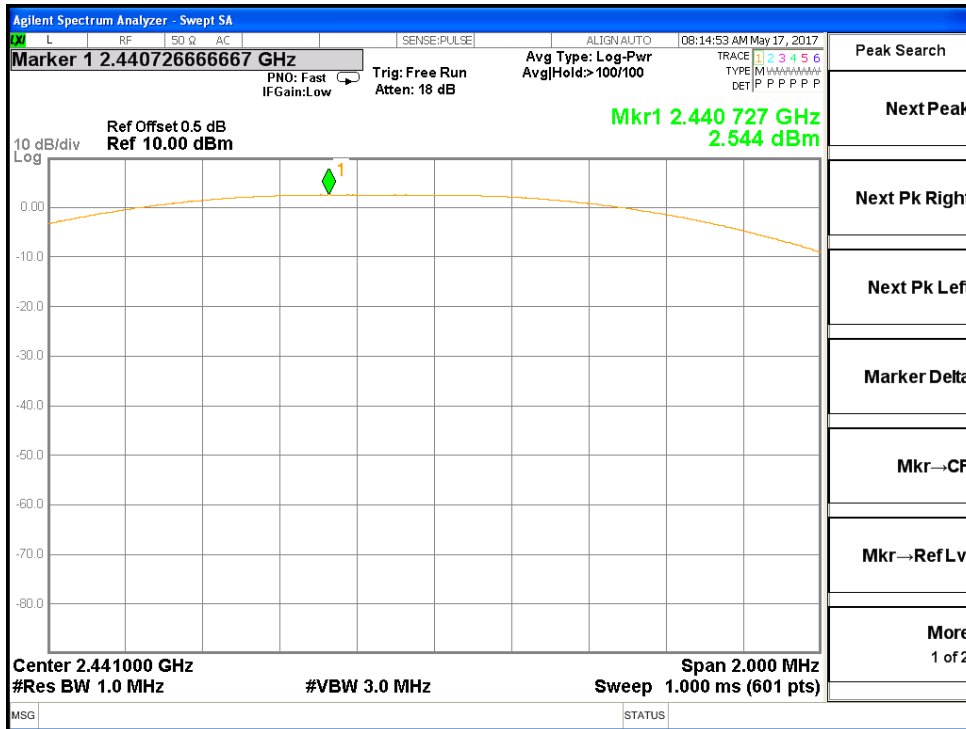
Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	1.694	Pass
Middle channel 2441MHz	2.560	Pass
High channel 2480MHz	3.370	Pass

Bluetooth Mode 8DPSK modulation Test Result

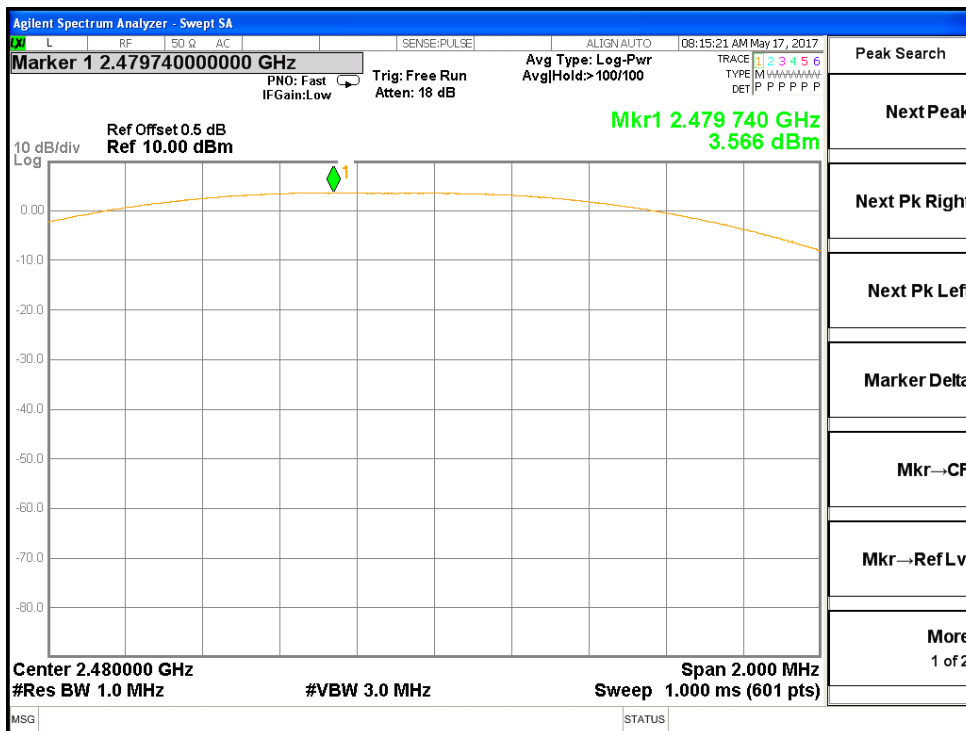
Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	1.674	Pass
Middle channel 2441MHz	2.638	Pass
High channel 2480MHz	3.630	Pass



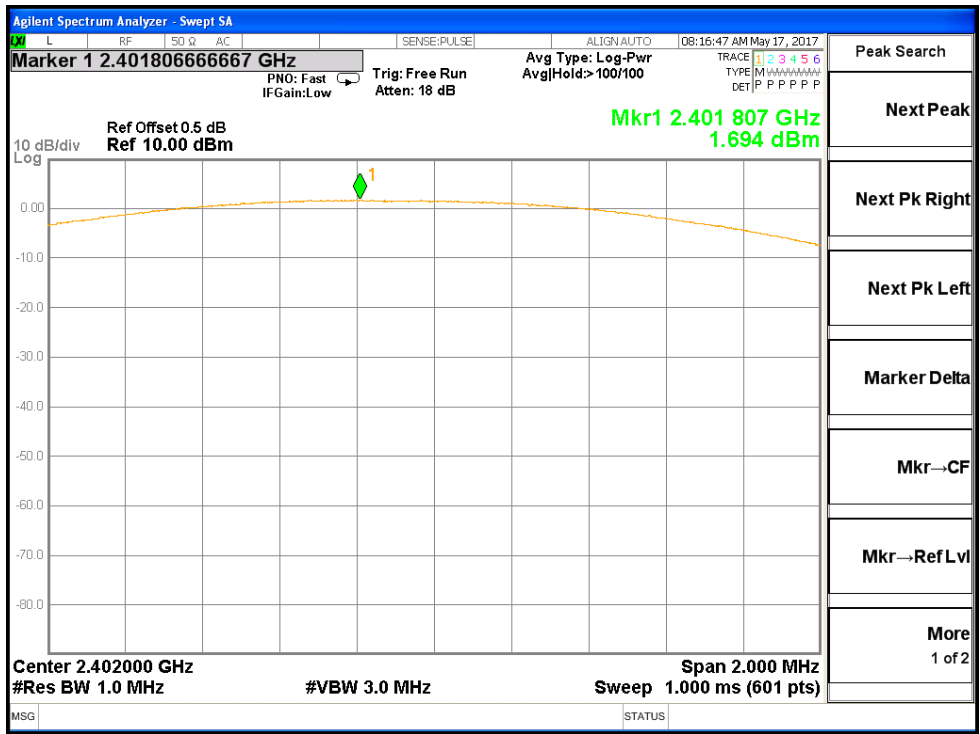
GFSK: 2402MHz



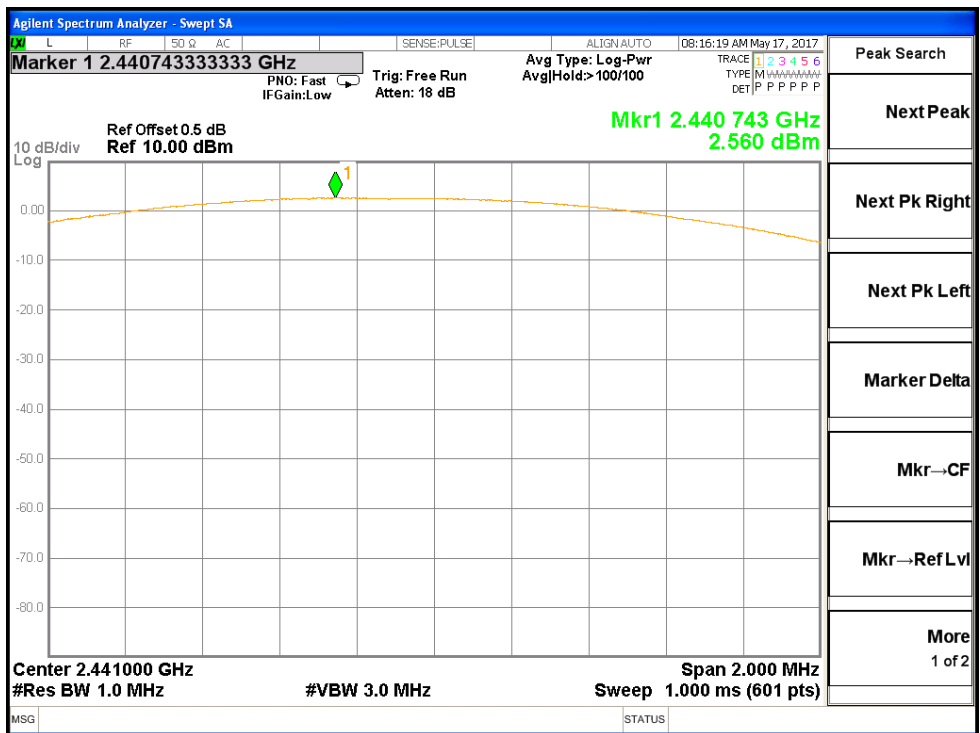
GFSK: 2441MHz



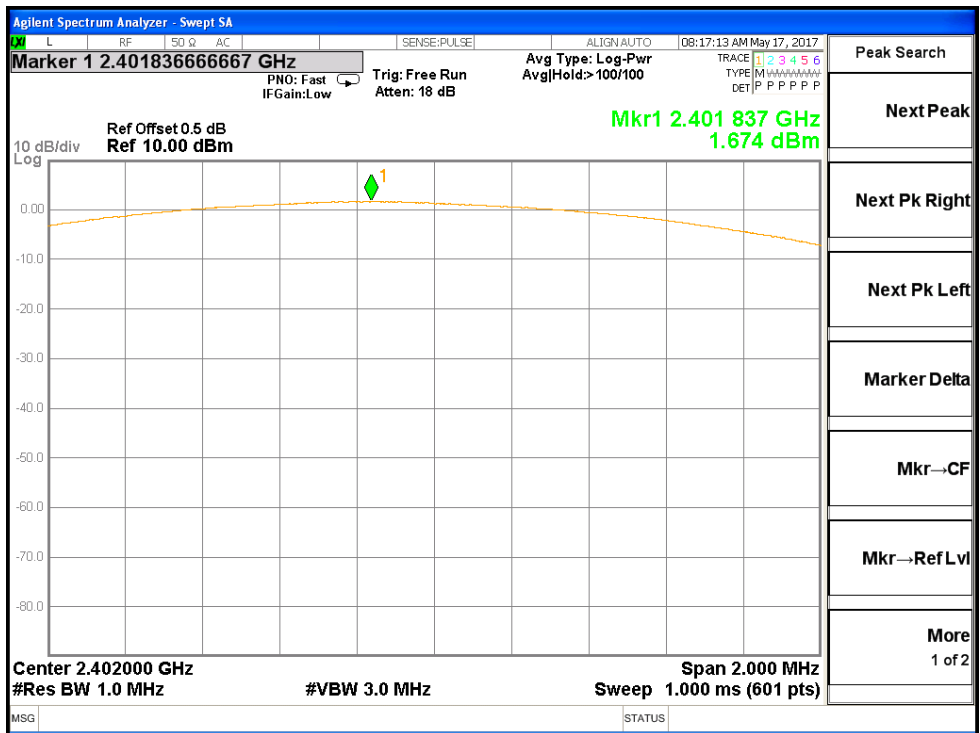
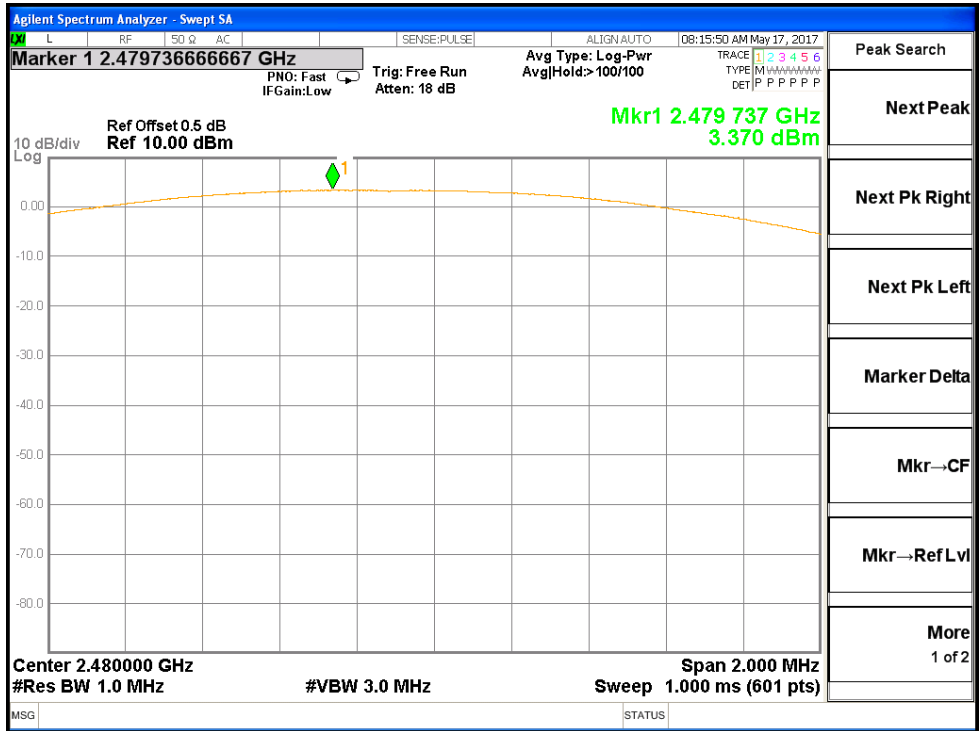
GFSK: 2480MHz

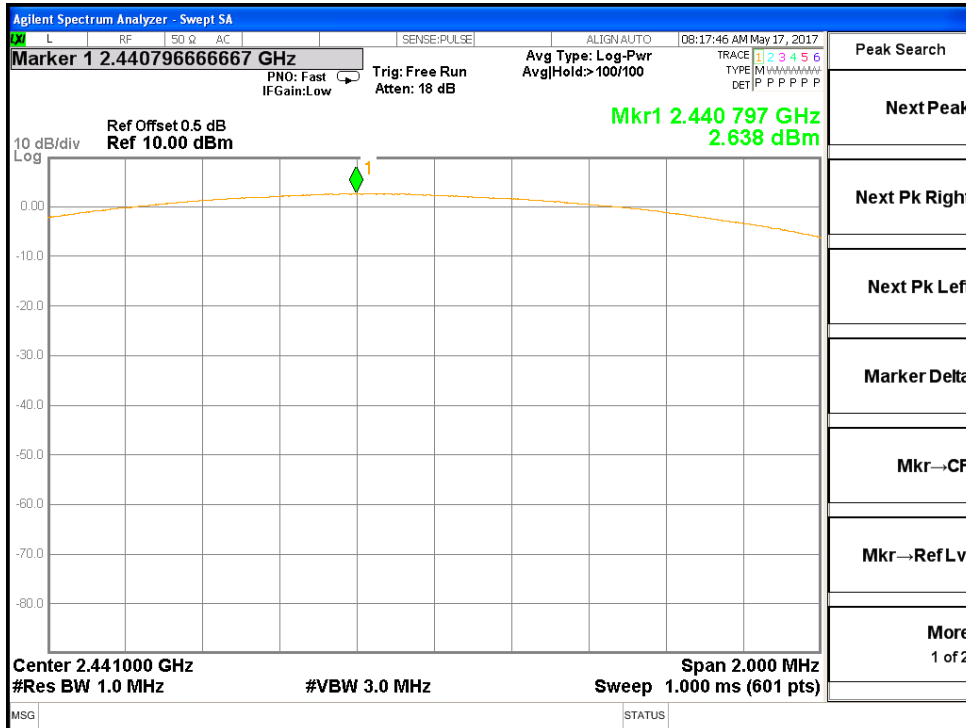


$\pi/4$ -DQPSK: 2402MHz

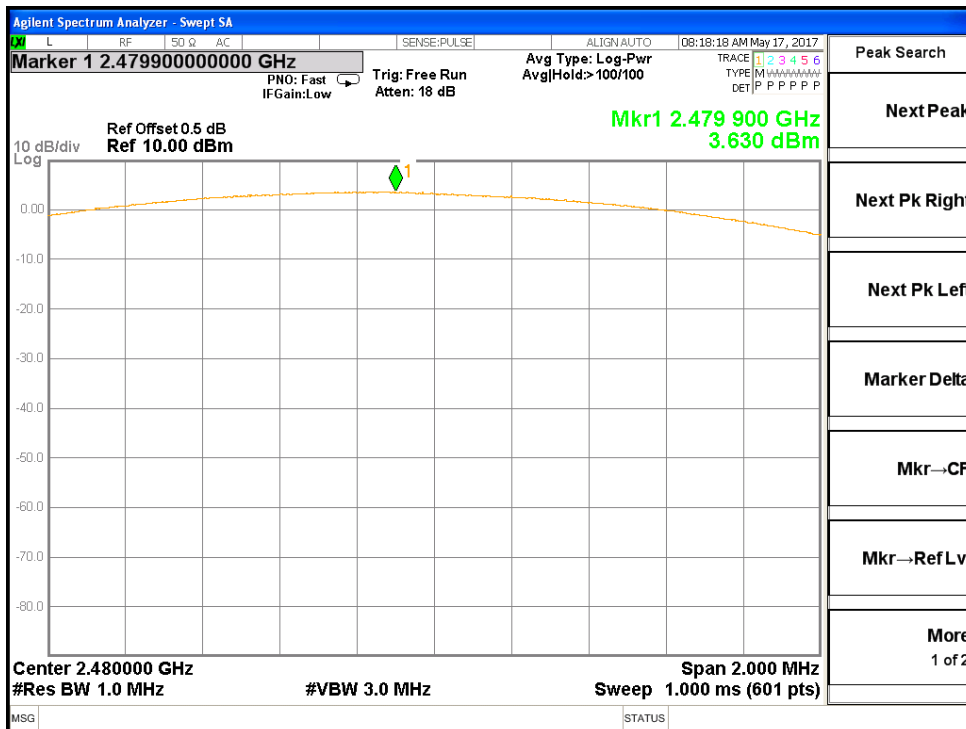


$\pi/4$ -DQPSK: 2441MHz





8-DPSK: 2441MHz



8-DPSK: 2480MHz



9.3 20 dB bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

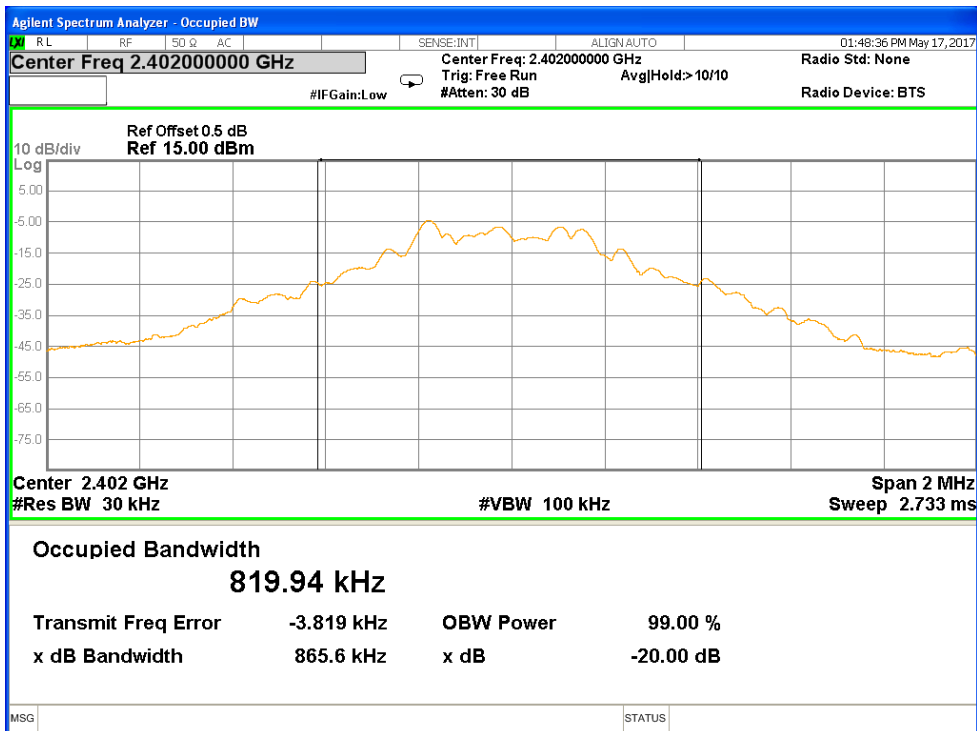
Limit

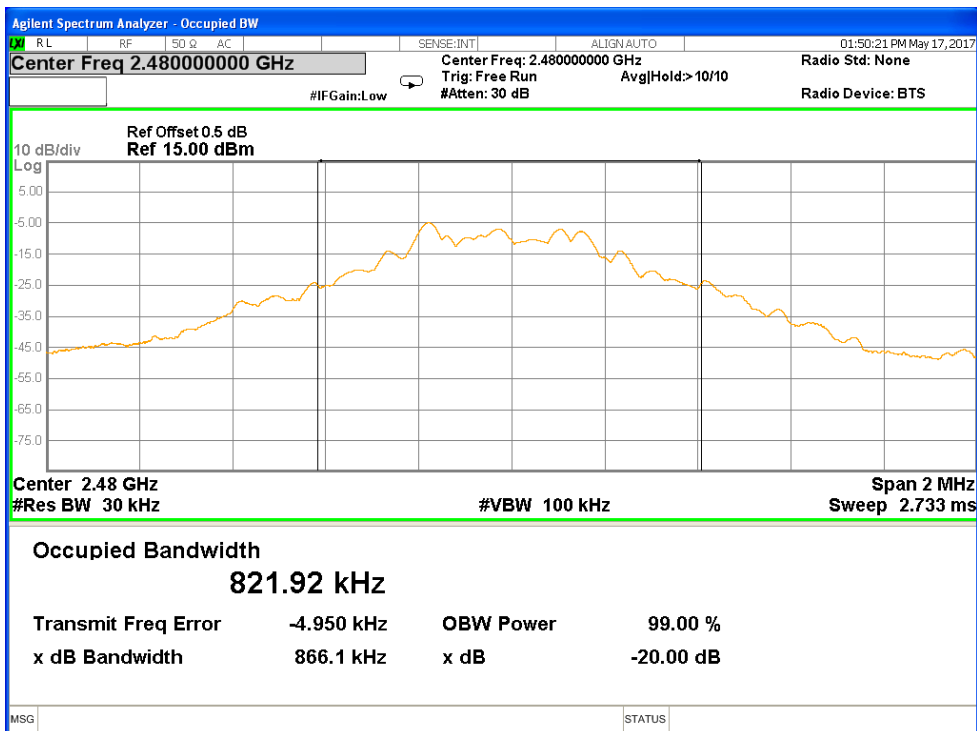
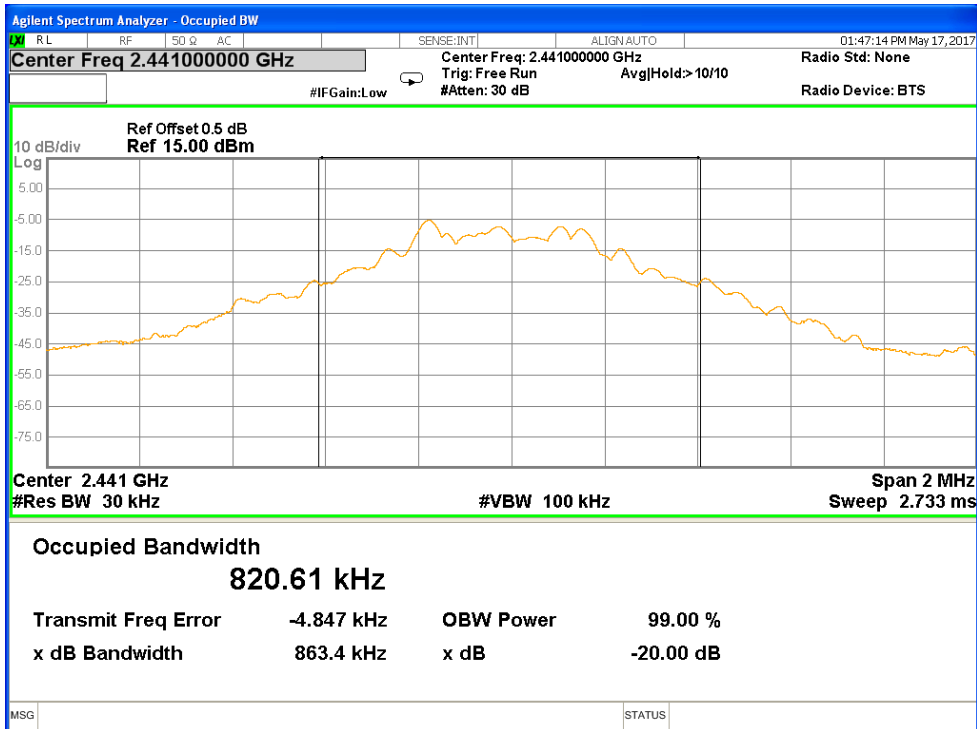
Limit [kHz]

N/A

Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	Limit kHz	Result
2402	865.6	--	Pass
2441	863.4	--	Pass
2480	866.1	--	Pass

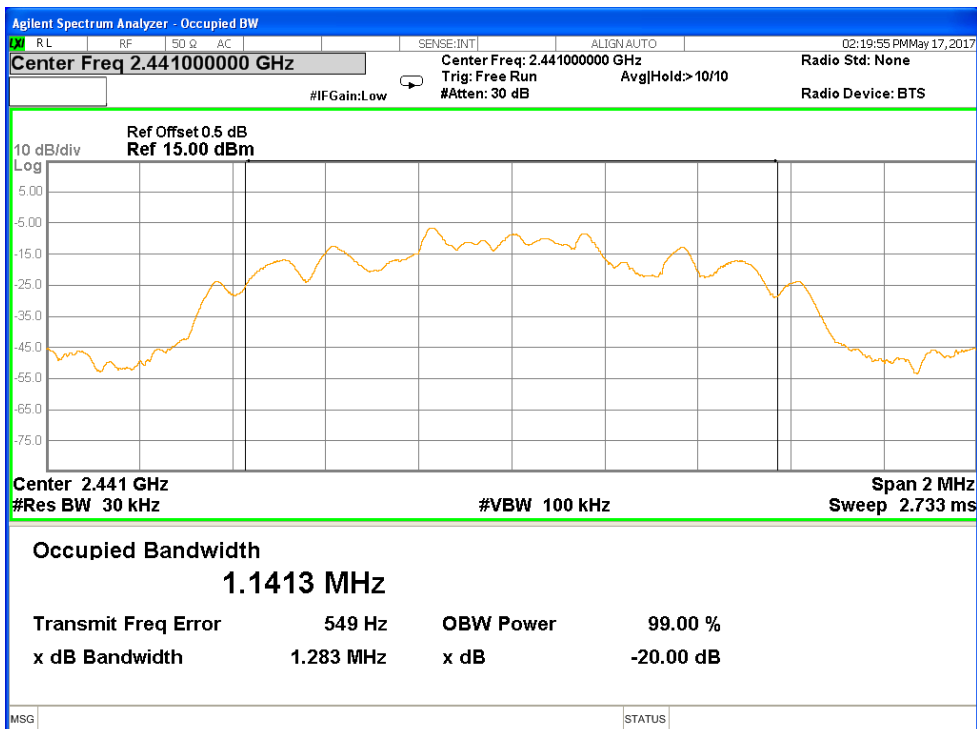
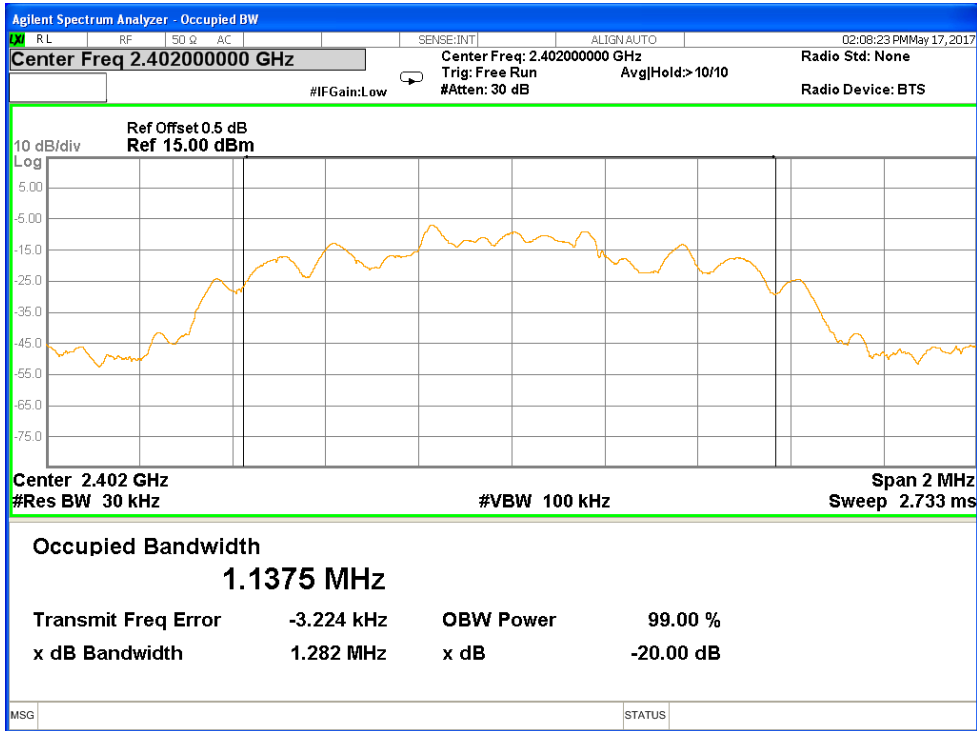


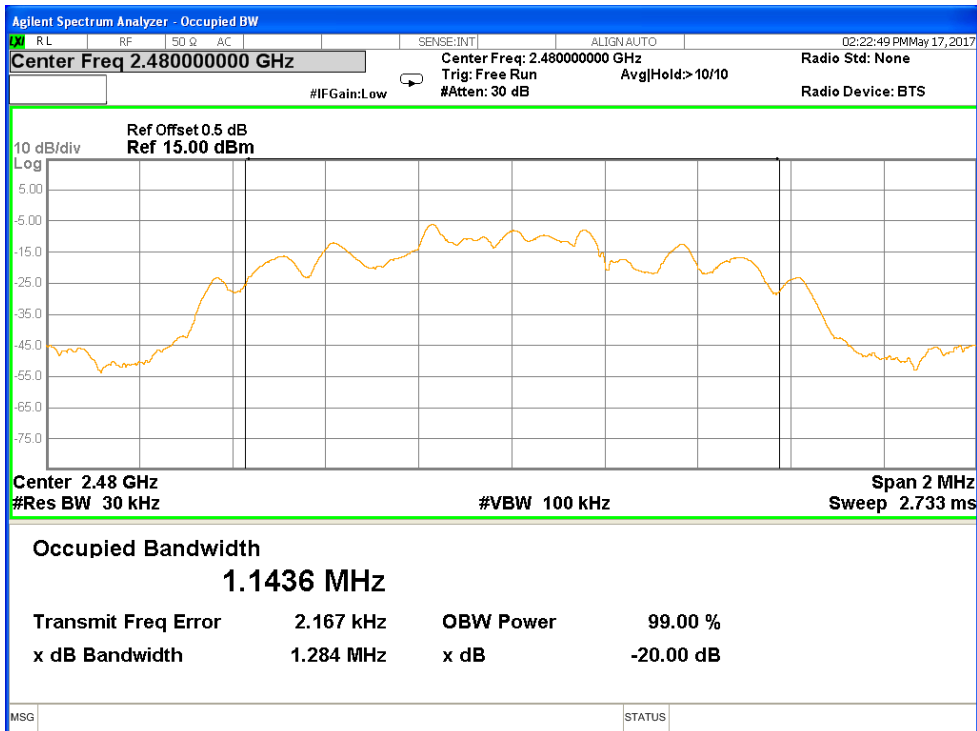




Bluetooth Mode $\pi/4$ -DQPSK Modulation test result

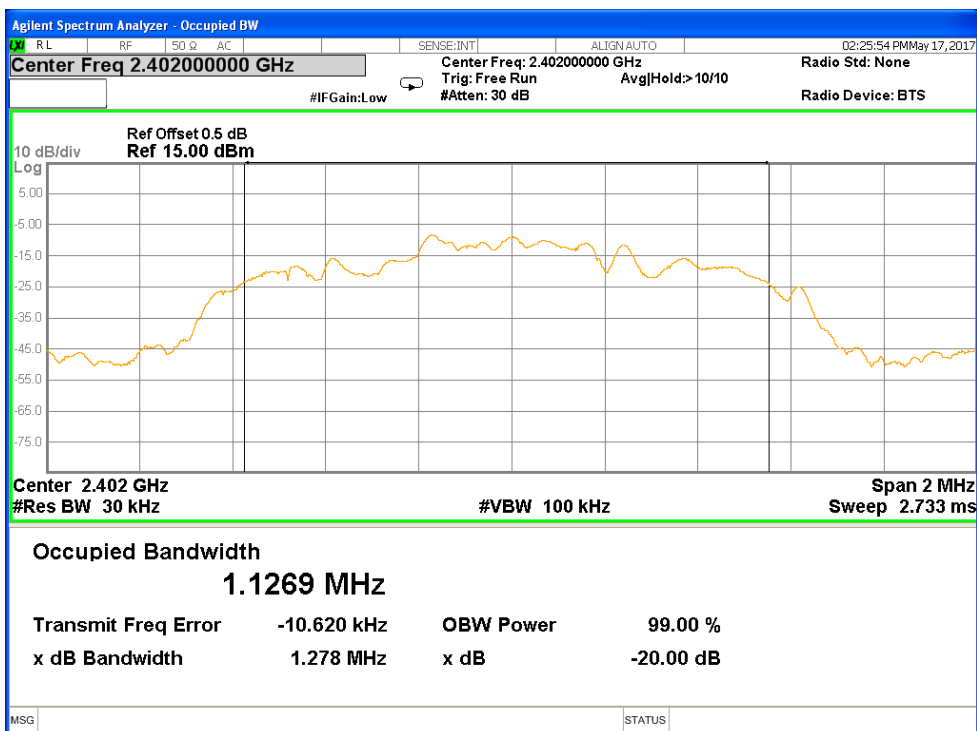
Frequency MHz	20 dB Bandwidth kHz	Limit kHz	Result
2402	1282	--	Pass
2441	1283	--	Pass
2480	1284	--	Pass

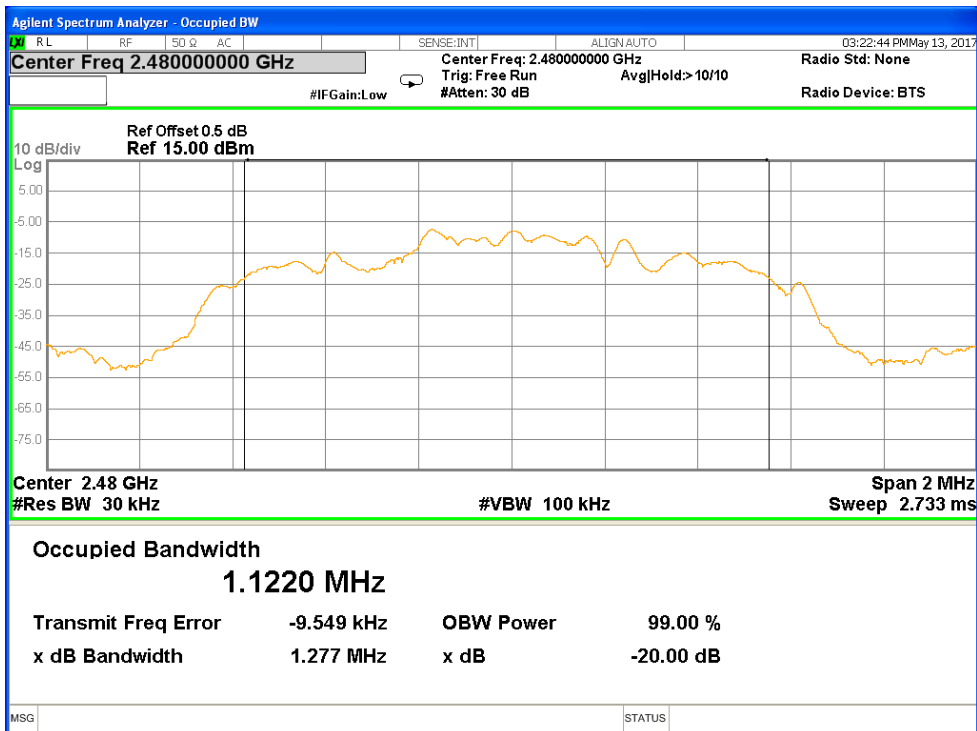
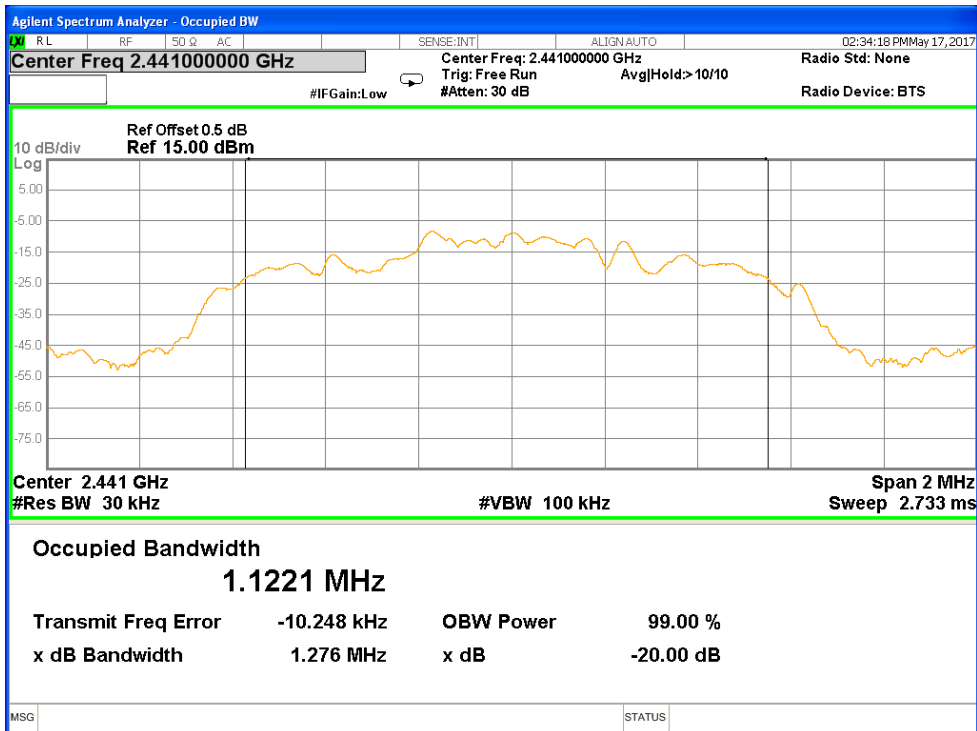




Bluetooth Mode 8DPSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	Limit kHz	Result
2402	1278	--	Pass
2441	1276	--	Pass
2480	1277	--	Pass





9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, RBW \geq 1% of the span, VBW \geq RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit
kHz

≥25kHz or 2/3 of the 20 dB bandwidth which is greater

8DPSK Modulation Limit

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	852
2441	850.7
2480	851.3

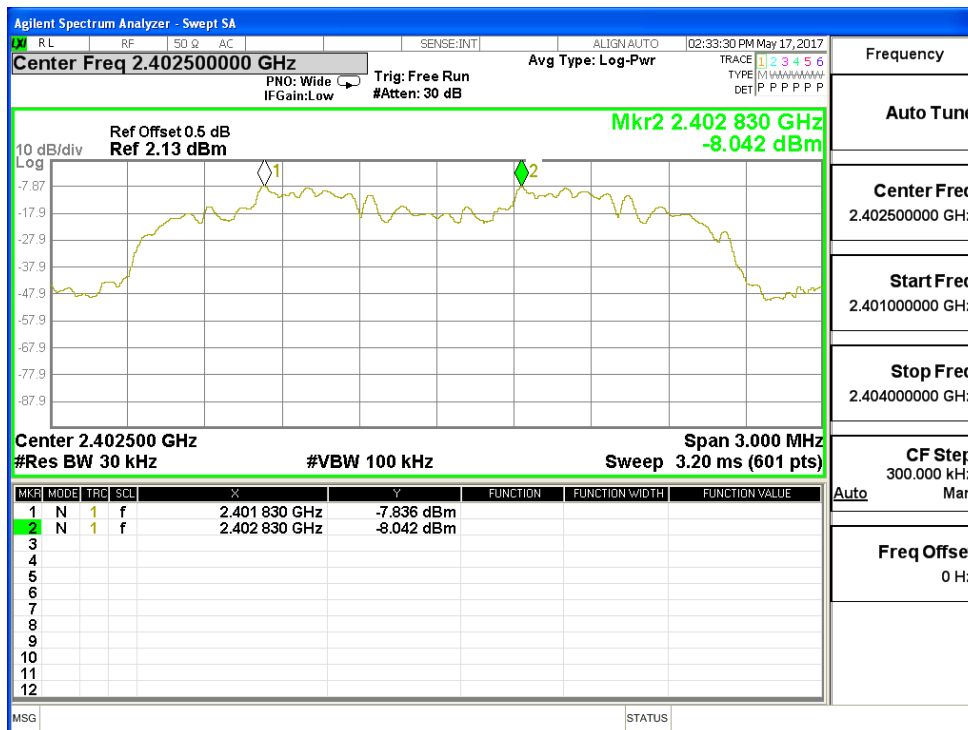


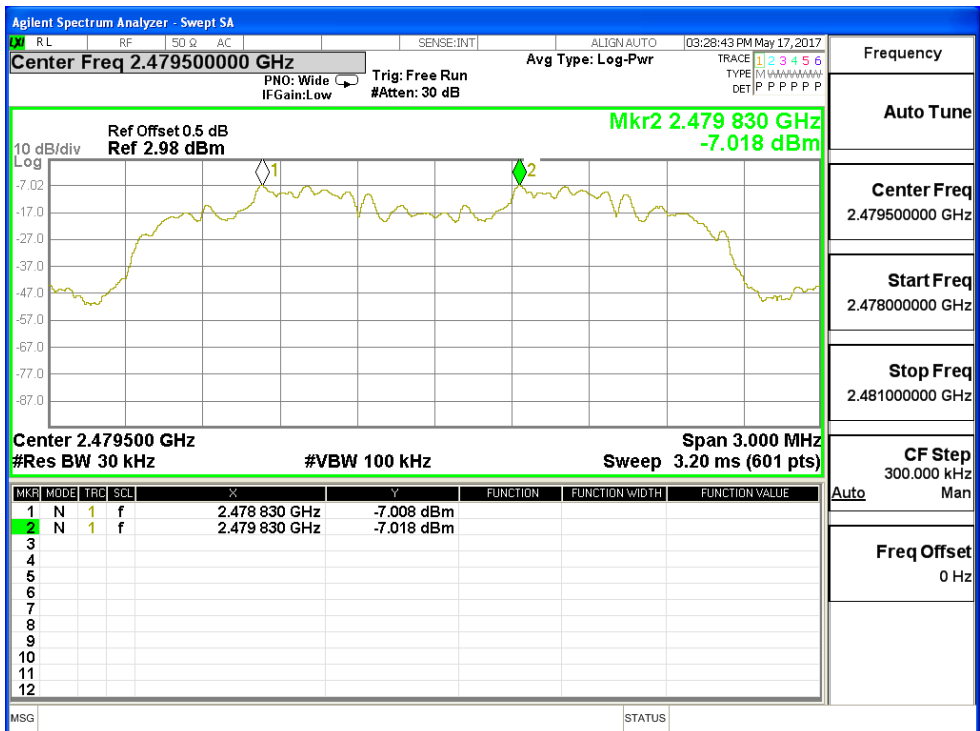
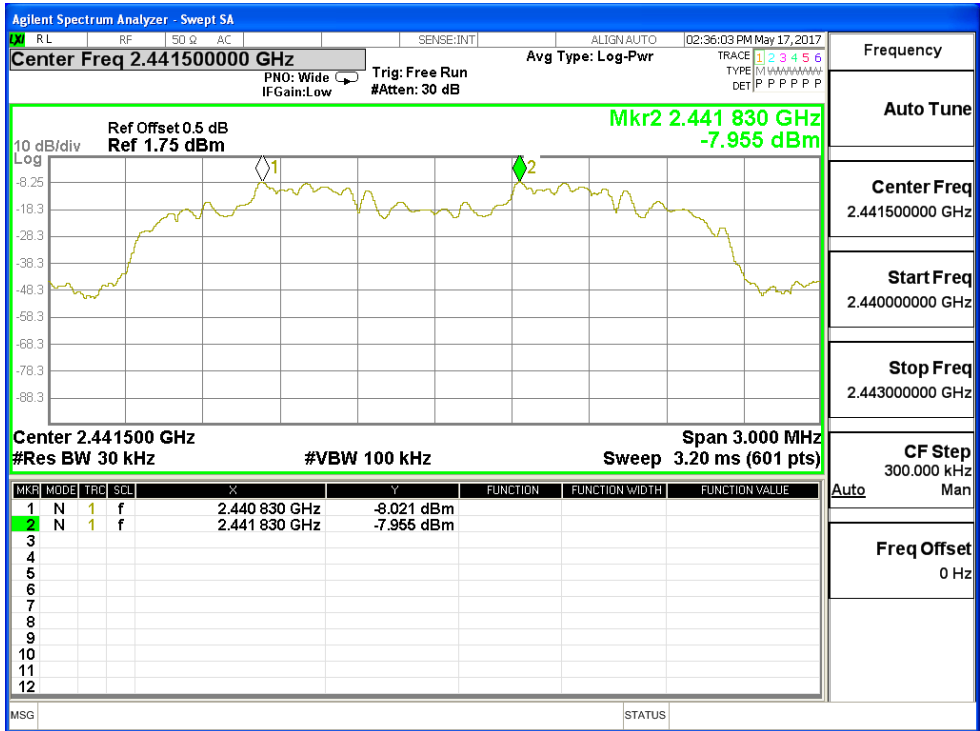
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here 8DPSK modulation mode was used to show compliance.

8DPSK Modulation test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass





9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, RBW \geq 1% of the span, VBW \geq RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

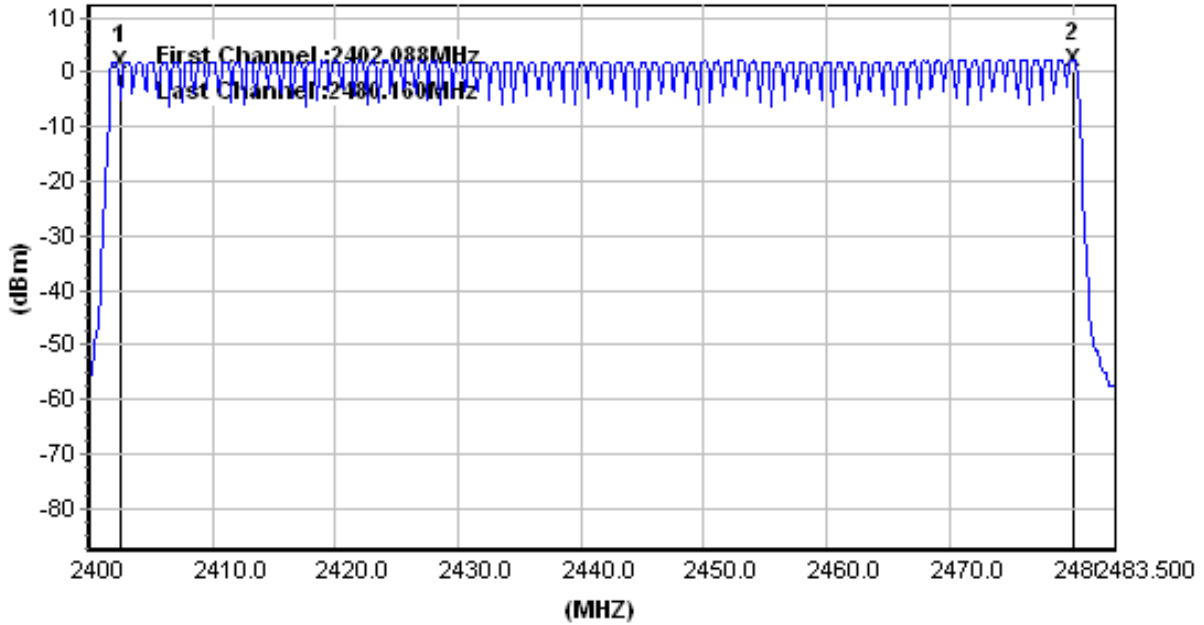
**Limit
number**

≥ 15

Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass



9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

According to §15.247(a)(1)(iii). The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Dwell Time

Dwell time

The maximum dwell time shall be 0.4 s.

According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:

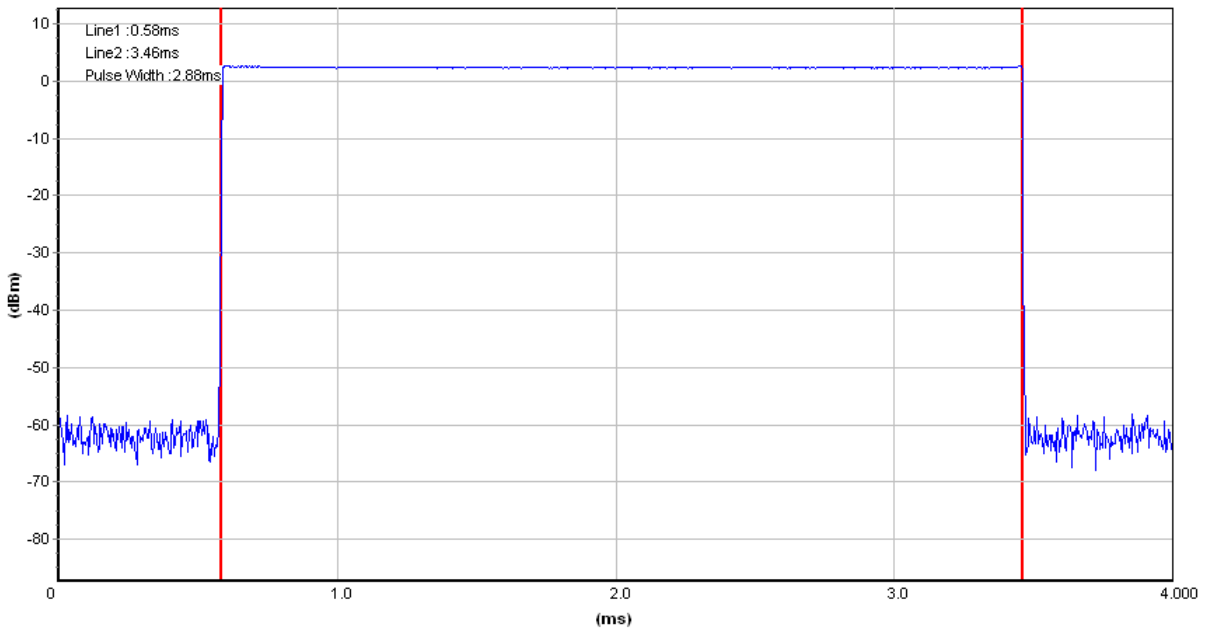
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

The burst width, which is directly measured, refers to the duration on one channel hop.

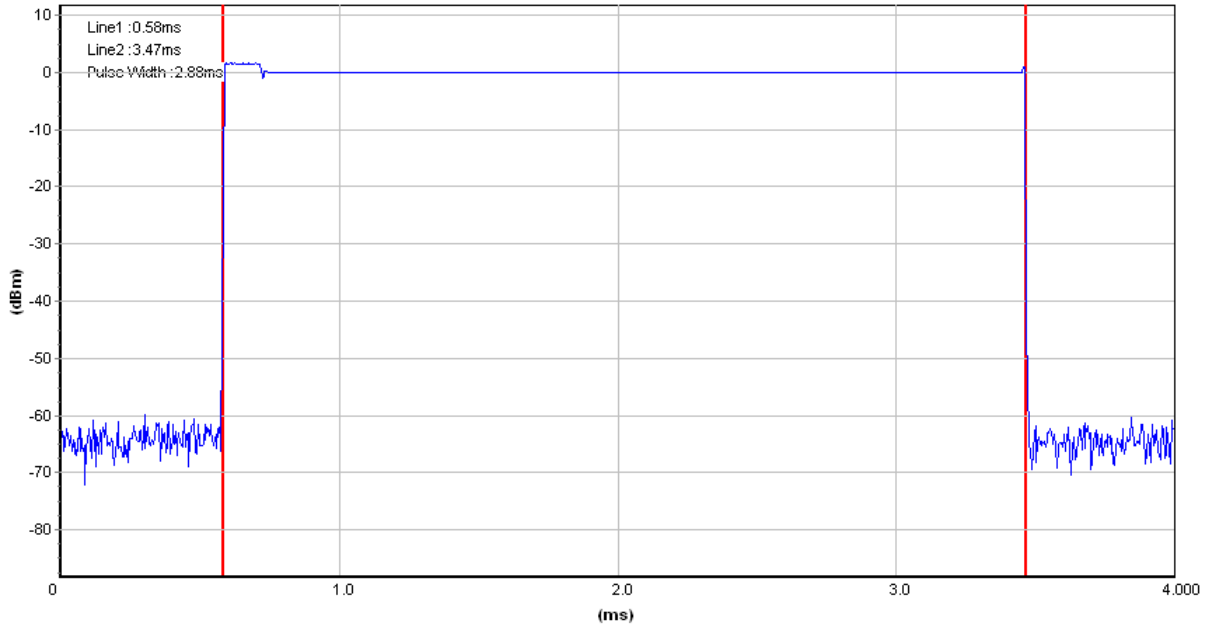
Test Result

Modulation	Mode	Reading (μs)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	2.88	106.67	307.21	< 400	Pass
π/4-DQPSK	2DH5	2.88	106.67	307.21	< 400	Pass
8-DPSK	3DH5	2.89	106.67	308.28	< 400	Pass

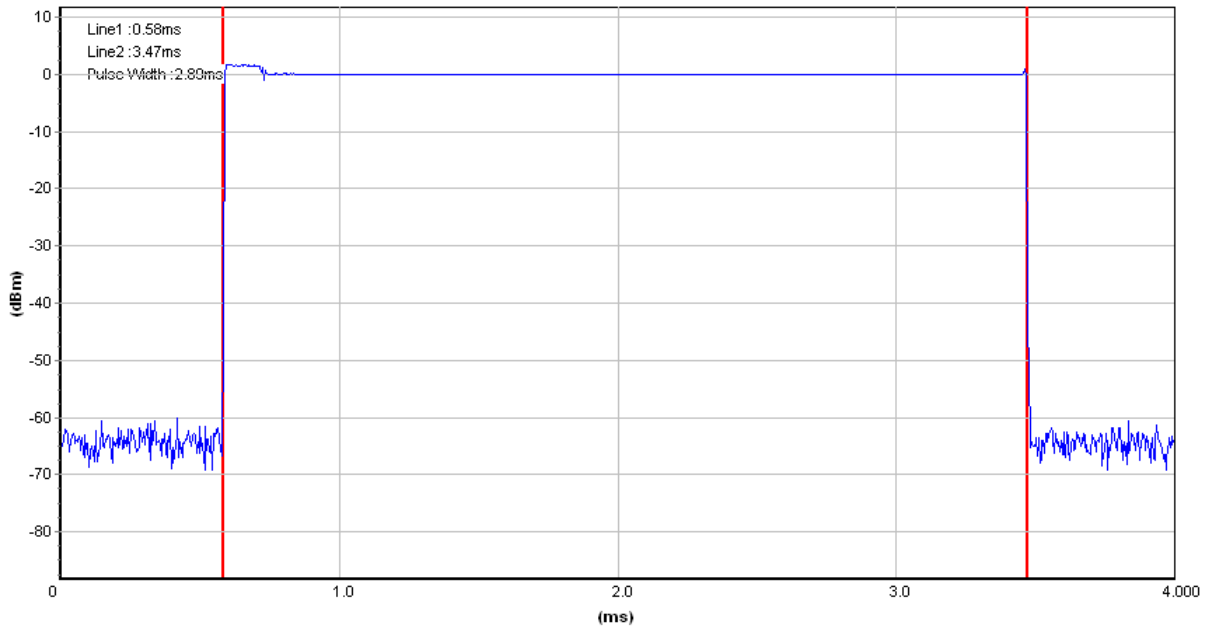
GFSK Modulation



DH5



2DH5



3DH5

9.7 Spurious RF conducted emissions

Test Method

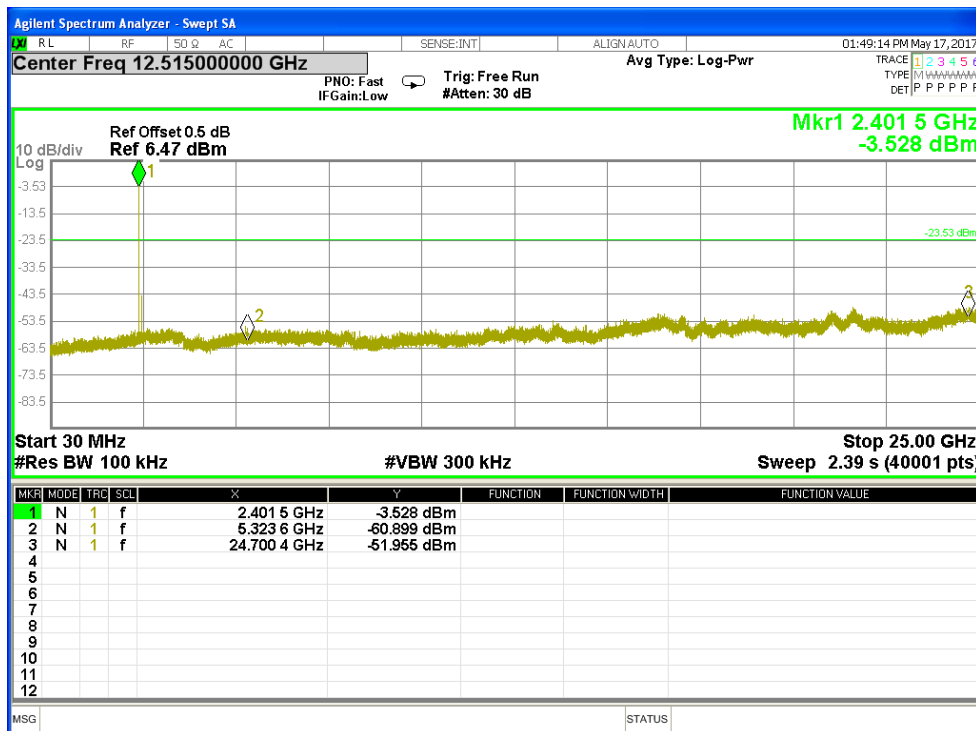
1. Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
 RBW = 100 kHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

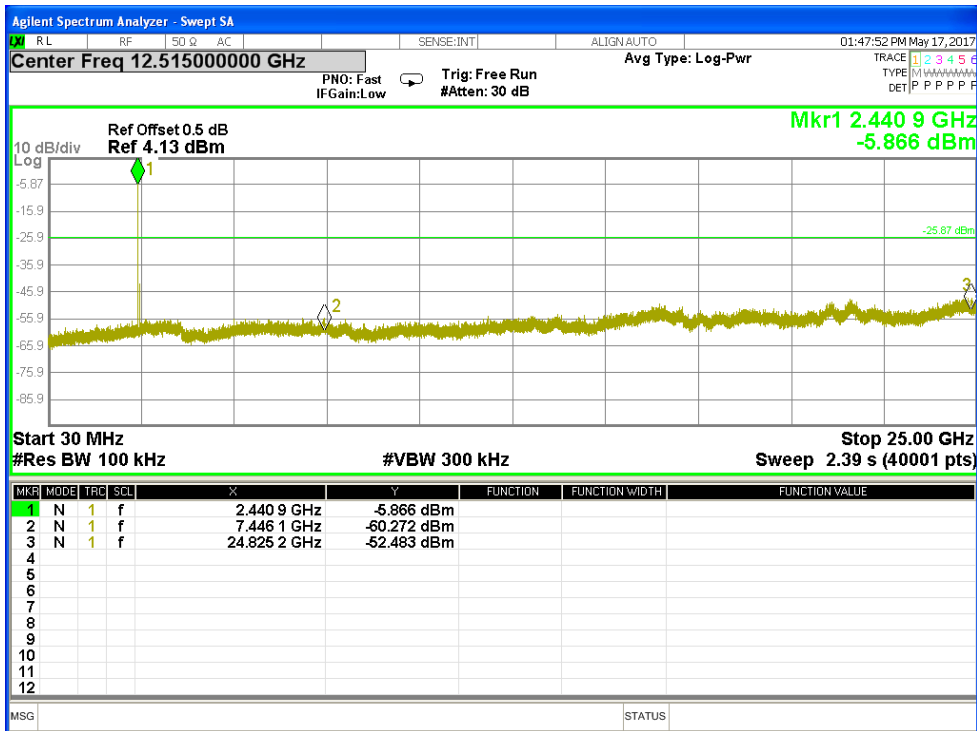
Frequency Range MHz	Limit (dBc)
30-25000	-20

Only the worse case (which is subject to the maximum EIRP, GFSK mode) test result is listed in the report.

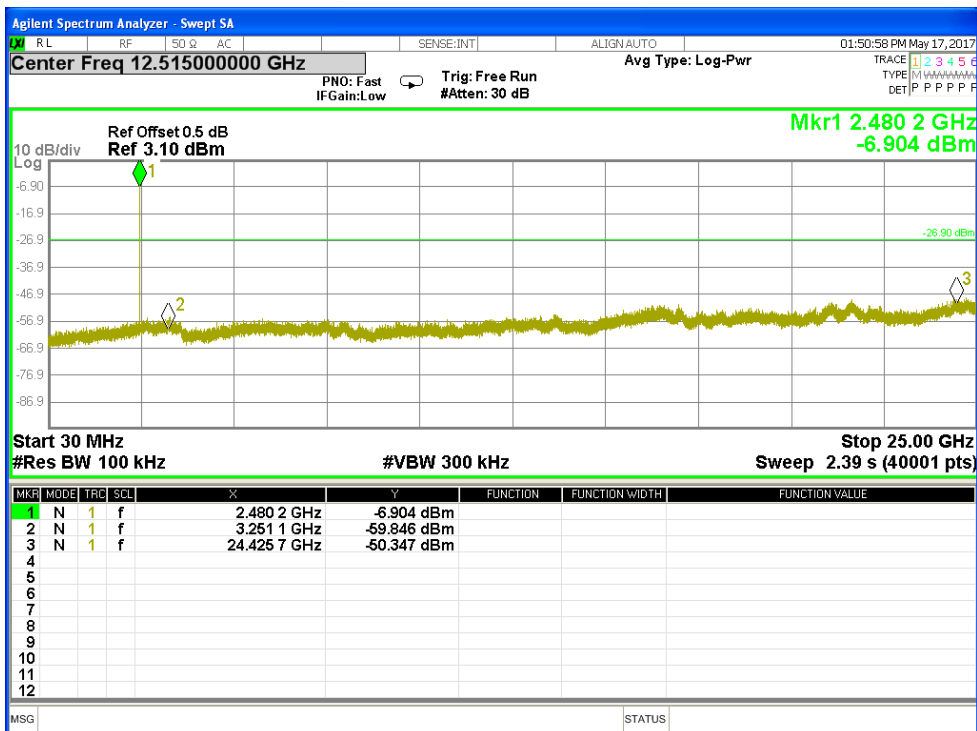
2402MHz



2441MHz



2480MHz



9.8 Band edge testing

Test Method

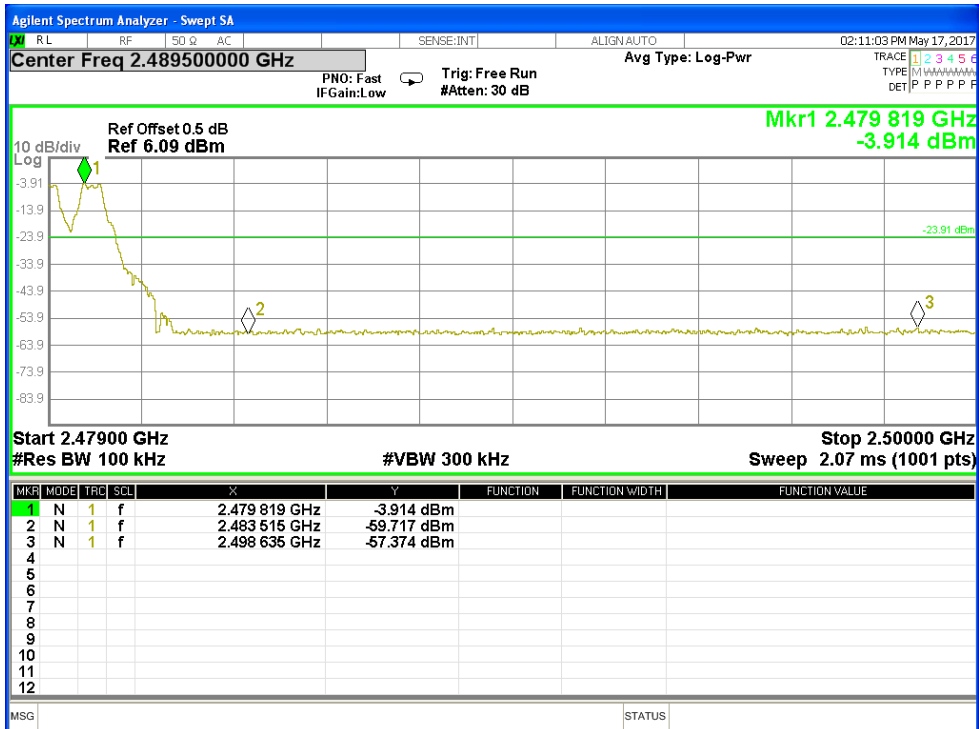
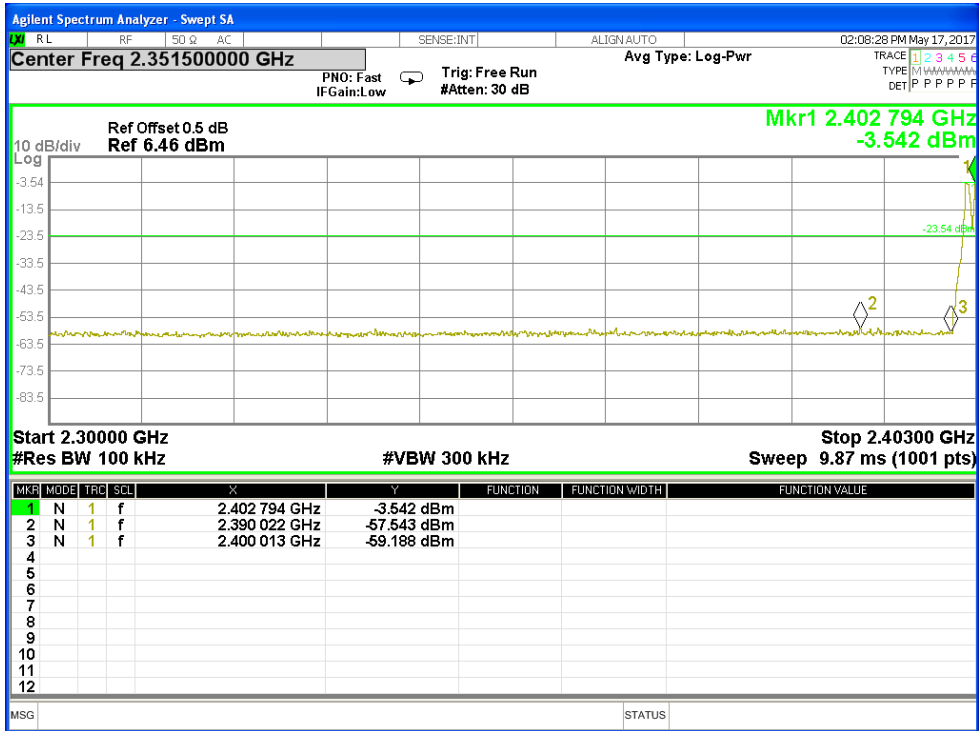
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section. .
- 4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

According to §15.247(d) and RSS-210 A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) and RSS-Gen7.2.2, must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)) and RSS-Gen.

Band edge testing

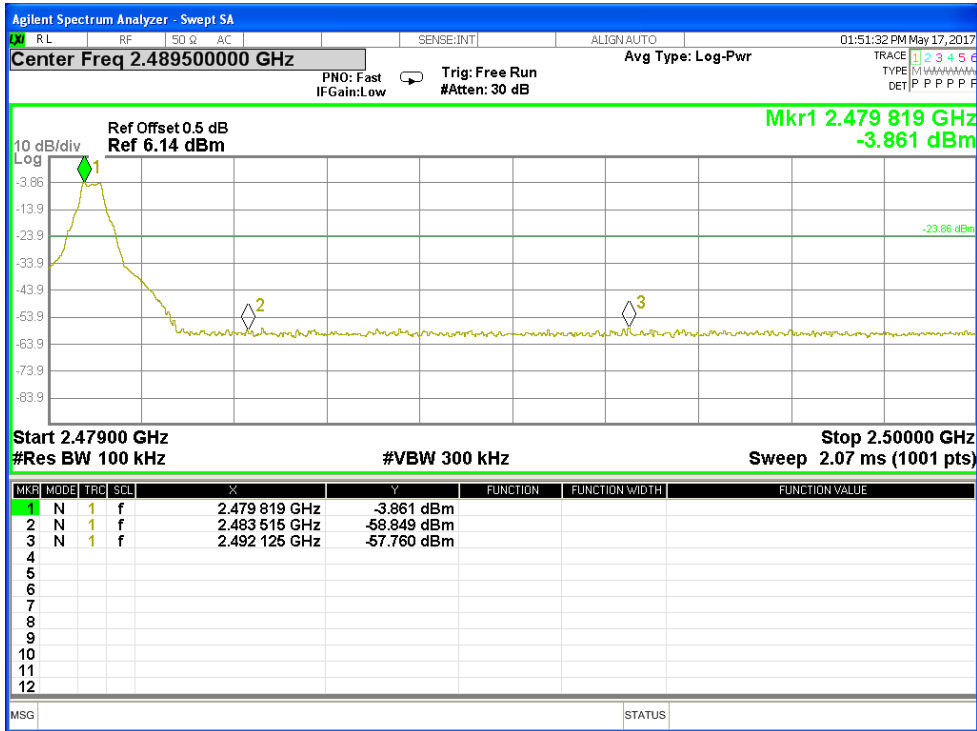
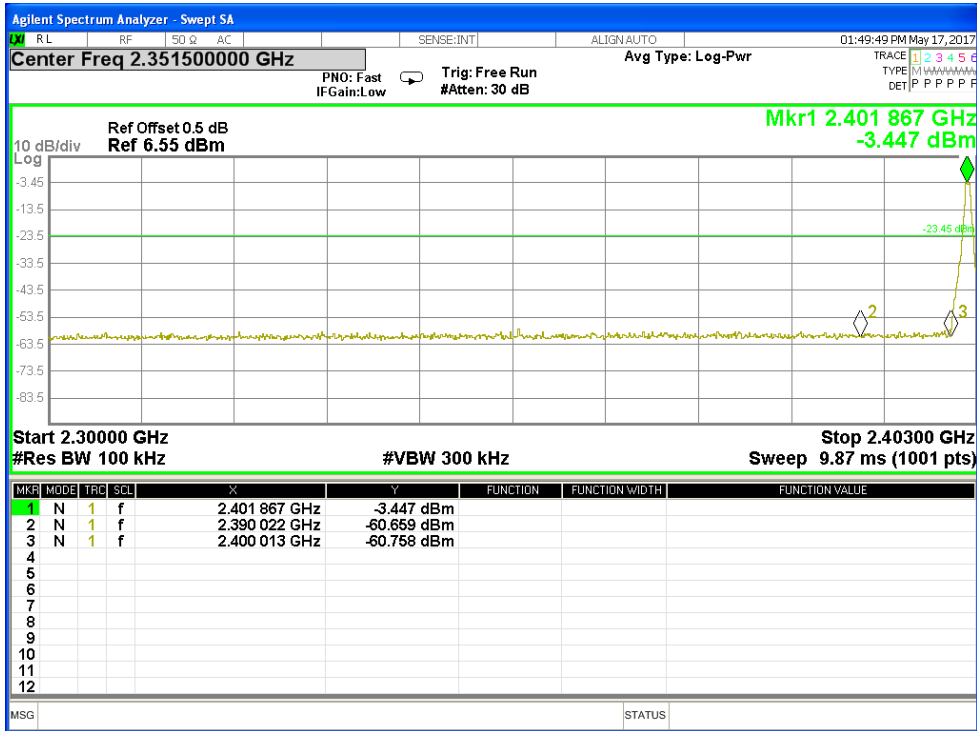
GFSK Modulation Test Result:
Hopping on mode:





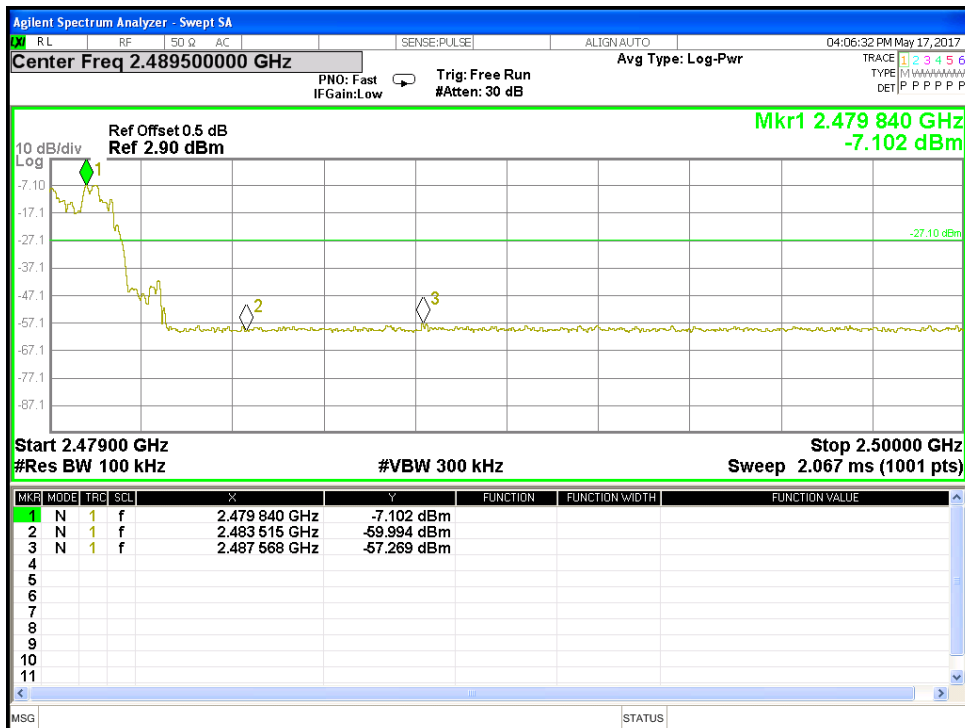
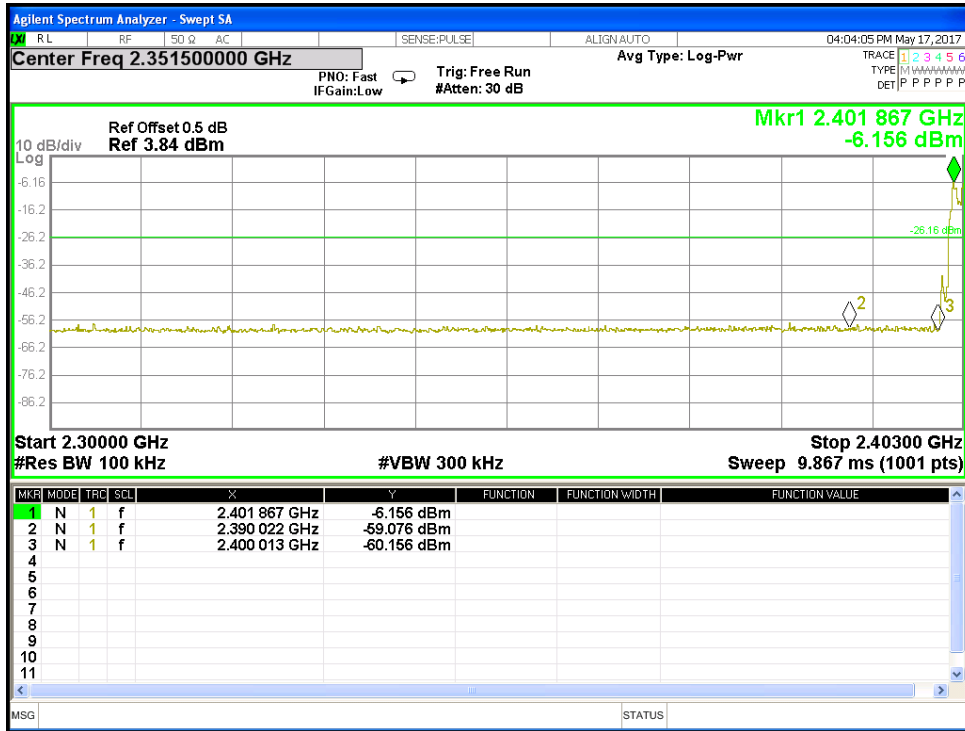
Band edge testing

Hopping off mode:



Band edge testing

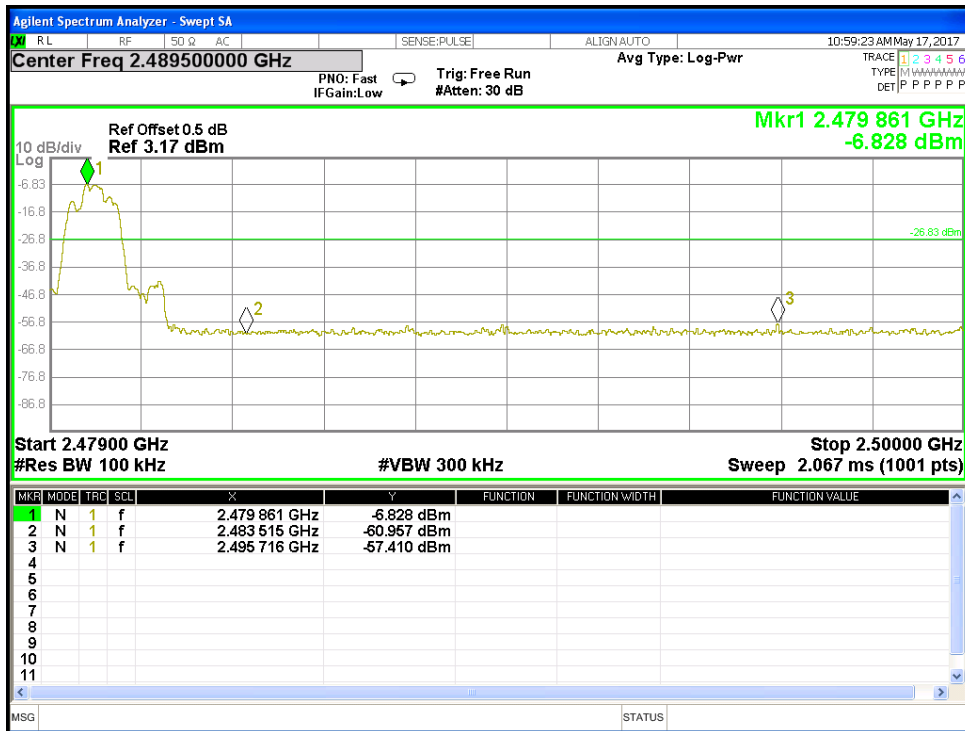
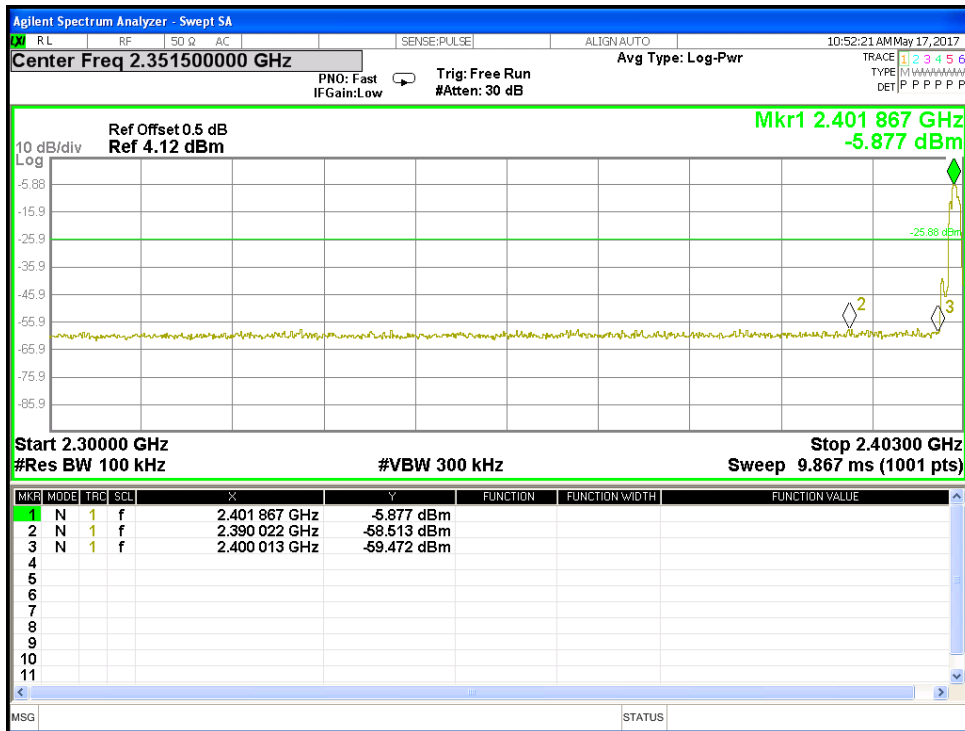
8DPSK Modulation Test Result:
Hopping on mode:





Band edge testing

Hopping off mode:



9.9 Spurious radiated emissions for transmitter and receiver

Test Method

1. The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned
5. Use the following spectrum analyzer settings According to C63.10:
For Above 1GHz
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.
For Below 1GHz
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($20\log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter and receiver

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (which is subject to the maximum EIRP, GFSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

Bluetooth Mode GFSK Modulation 2402MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBuV/m		dBuV/m	
895.99	41.69	Horizontal	46.00	QP	4.31	Pass
956.46	38.52	Vertical	46.00	QP	7.48	Pass
*4804	---	Horizontal	74.00	PK	---	Pass
7206	---	Horizontal	74.00	PK	---	Pass
*4804	---	Vertical	74.00	PK	---	Pass
7206	---	Vertical	74.00	PK	---	Pass

Bluetooth Mode GFSK Modulation 2441MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBuV/m		dBuV/m	
895.99	39.51	Horizontal	46.00	QP	6.49	Pass
866.96	38.58	Vertical	46.00	QP	7.42	Pass
*4882	---	Horizontal	74.00	PK	---	Pass
*7323	---	Horizontal	74.00	PK	---	Pass
*4882	---	Vertical	74.00	PK	---	Pass
*7323	---	Vertical	74.00	PK	---	Pass

Bluetooth Mode GFSK Modulation 2480MHz Test Result

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBuV/m		dBuV/m	
895.99	40.69	Horizontal	46.00	QP	5.31	Pass
155.79	29.83	Vertical	43.5	QP	13.67	Pass
*4960	---	Horizontal	74.00	PK	---	Pass
*7440	---	Horizontal	74.00	PK	---	Pass
*4960	---	Vertical	74.00	PK	---	Pass
*7440	---	Vertical	74.00	PK	---	Pass

Remark:

- (1) Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (2) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

10 Test Equipment List

List of Test Instruments

Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
SIGNAL ANALYZER	R&S	FSV40	101470	2016.06.29	2017.06.28
EMI Measuring Receiver	R&S	ESR	101660	2016.06.29	2017.06.28
Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2016.06.29	2017.06.28
Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2016.06.29	2017.06.28
TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2016.06.29	2017.06.28
Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2017.01.29	2018.01.28
SHF-EHF Horn	SCHWARZBECK	BBHA9170	BBHA9170367	2016.06.29	2017.06.28
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.29	2017.06.28
EMI Test Receiver	R&S	ESCI	100124	2016.06.29	2017.06.28
LISN	Kyoritsu	KNW-242	8-837-4	2016.06.29	2017.06.28
LISN	Kyoritsu	KNW-407	8-1789-3	2016.06.29	2017.06.28
Loop Antenna	ETS	6512	00165355	2016.06.29	2017.06.28

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY49100060	2016.10.23	2017.10.22

11 System Measurement Uncertainty

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.70dB
4	Spurious emissions,conducted	±1.19dB
5	All emissions,radiated(<30M) (9KHz-30MHz)	±2.45dB
6	All emissions,radiated(<1G) 30MHz-200MHz	±2.83dB
7	All emissions,radiated(<1G) 200MHz-1000MHz	±2.94dB
8	All emissions,radiated(>1G)	±3.03dB
9	Temperature	±0.5°C
10	Humidity	±2%