RF TEST REPORT

Report No.:	SET2015-08576
Product Name:	EYE1
FCC ID:	2AE44EYE1
Model No. :	EYE1
Applicant:	Sioeye LLC
Address:	4265 San Felipe #1100 Houston TX 77027 USA
Dates of Testing:	06/02/2015 — 06/19/2015
Issued by:	CCIC-SET
Lab Location:	Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China
	Tel: 86 755 26627338 **Fax:** 86 755 26627238

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Test Report

Product Name.....:	EYE1
Brand Name.....:	SIOEYE
Trade Name.....:	SIOEYE
Applicant.....:	Sioeye LLC
Applicant Address.....:	4265 San Felipe #1100 Houston TX 77027 USA
Manufacturer.....:	CK Telecom Limited
Manufacturer Address .....:	Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.
Test Standards.....:	47 CFR Part 15 Subpart C 2013：Radio Frequency Devices ANSI C63.10:2013：American National Standard for Testing Unlicensed Wireless Devices DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
Test Result.....:	PASS

Tested by .....: 2015.06.19

Lu Lei，Test Engineer

Reviewed by .....: 2015.06.19

Zhu Qi, Senior Egineer

Approved by .....: 2015.06.19

Wu Li'an，Manager

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Change History		
Issue	Date	Reason for change
1.0	2015.06.19	First edition

1. General Information

1.1. EUT Description

EUT Type	:	EYE1
Hardware Version	:	HICAM-V2.0
Software Version	:	HICAM01A-S10A_Sioeye_L2EN_140_150618
Frequency Range	:	The frequency range used is 2402MHz - 2480MHz (79 channels, at intervals of 1MHz); The frequency block is 2400MHz to 2483.5MHz.
Modulation Type	:	Bluetooth: FHSS (GFSK(1Mbps), π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps))
Antenna Type	:	PIFI Antenna
Antenna Gain	:	-3dBi

Note 1: The EUT is a LTE camera, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 3: a. When power on, the EUT will scan the whole frequency until a Connection command from the other BT devices.

b. When receiving the signal from the other BT devices, The EUT transmit are sponse signal.

c. The other devices receive the response signal and recognize it, then send a connection command to establish the connection.

d. After the connection establish successfully, the data transmission is beginning. At the same time, the both devices will shift frequencies in synchronization per a same pseudo randomly ordered list of hopping frequencies, the hopping rate is1600 times per second. This device conforms to the criteria in FCC Public Notice DA 00-705.

e. The bandwidth of the receiver, which is set to a fixed width by the software.

Note 4: Bluetooth signal has 9 packages DH1, DH3, DH5, 3DH1, 3DH3, 3DH5, 5DH1, 5DH3, 5DH5, DH5 package is largest, we are testing DH5 in the document.

Note 5: The antenna of EUT is designed with permanent attachment and no consideration of replacement, it is printed on the circuit board with a maximum gain of -3dBi, and it is used to radiate the RF emissions

1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C 2013	Radio Frequency Devices
2	ANSI C63.10 2013	American National Standard for Testing Unlicensed Wireless Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Description	Result
1	15.203	Antenna Requirement	PASS
2	15.247(a)	Number of Hopping Frequency	PASS
3	15.247(b)	Peak Output Power	PASS
4	15.247(a)	20dB Bandwidth	PASS
5	15.247(a)	Carrier Frequency Separation	PASS
6	15.247(a)	Time of Occupancy (Dwell time)	PASS
7	15.247(d)	Conducted Spurious Emission	PASS
8	15.247(d)	Band Edge	PASS
9	15.207	Conducted Emission	N/A
10	15.209 15.247(c)	Radiated Emission	PASS

Note 1: The tests were performed according to the method of measurements prescribed in DA-00-705.

Note 2: The test of Radiated Emission was performed according to the method of measurements prescribed in ANSI C63.10 2013.

1.3. Facilities and Accreditations

1.3.1. Facilities

CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

1.3.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (℃):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

And according to FCC 47 CFR Section 15.247(c), 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.

2.1.2. Antenna Information

Antenna Category: External antenna
An External antenna was soldered to the antenna port of EUT via an adaptor cable, can't be removed.
Antenna General Information:

No.	EUT Model	Ant. Cat.	Ant. Type	Gain(dBi)
1	LTE Mobile Phone	External	PIFI	-3

2.1.3. Result: comply

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

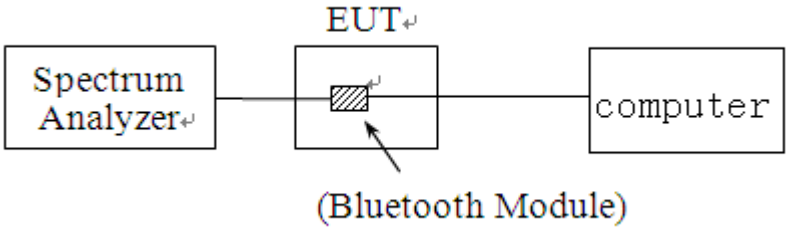
2.2. Number of Hopping Frequency

2.2.1. Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.2.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Date	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.2.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize

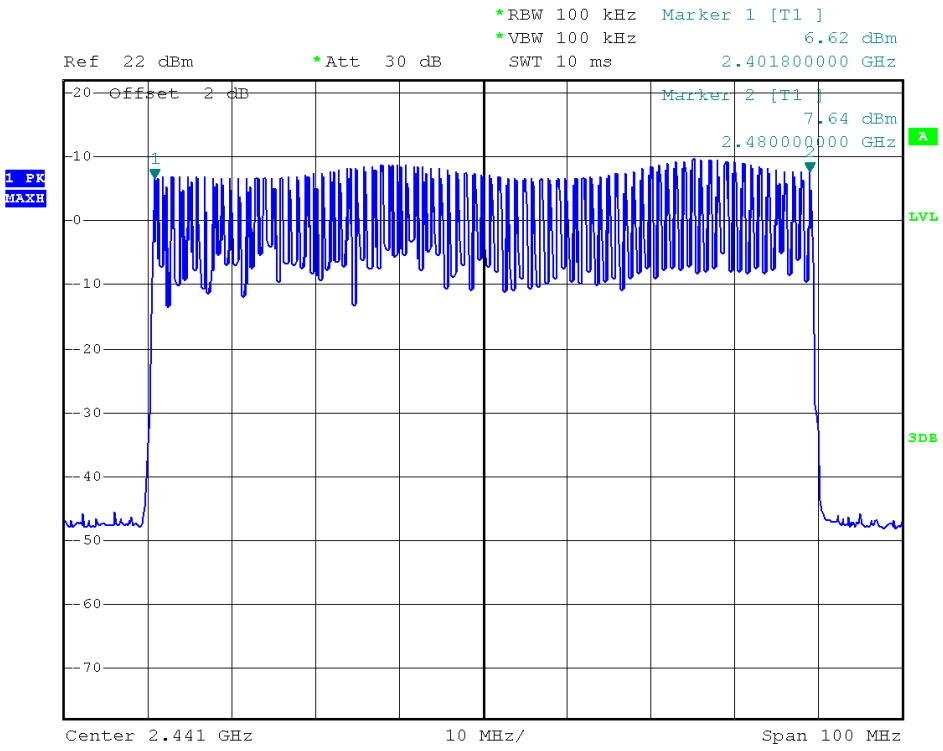
2.2.4. Test Result

The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

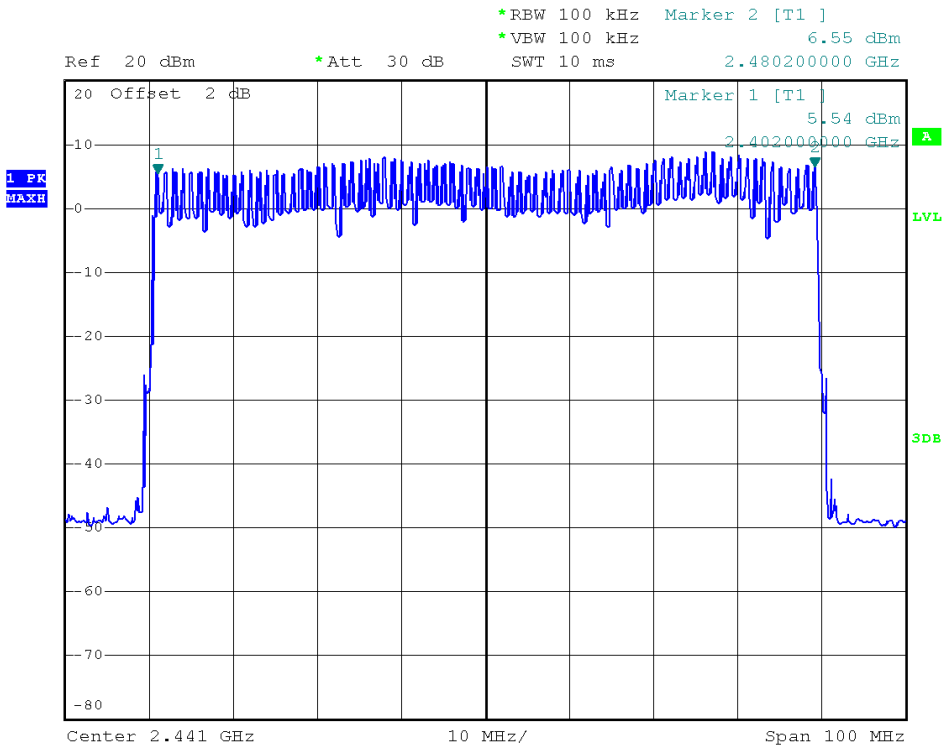
A. Test Verdict:

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	15	Plot A	PASS
π/4-DQPSK	2400 - 2483.5	79	15	Plot B	PASS
8-DPSK	2400 - 2483.5	79	15	Plot C	PASS

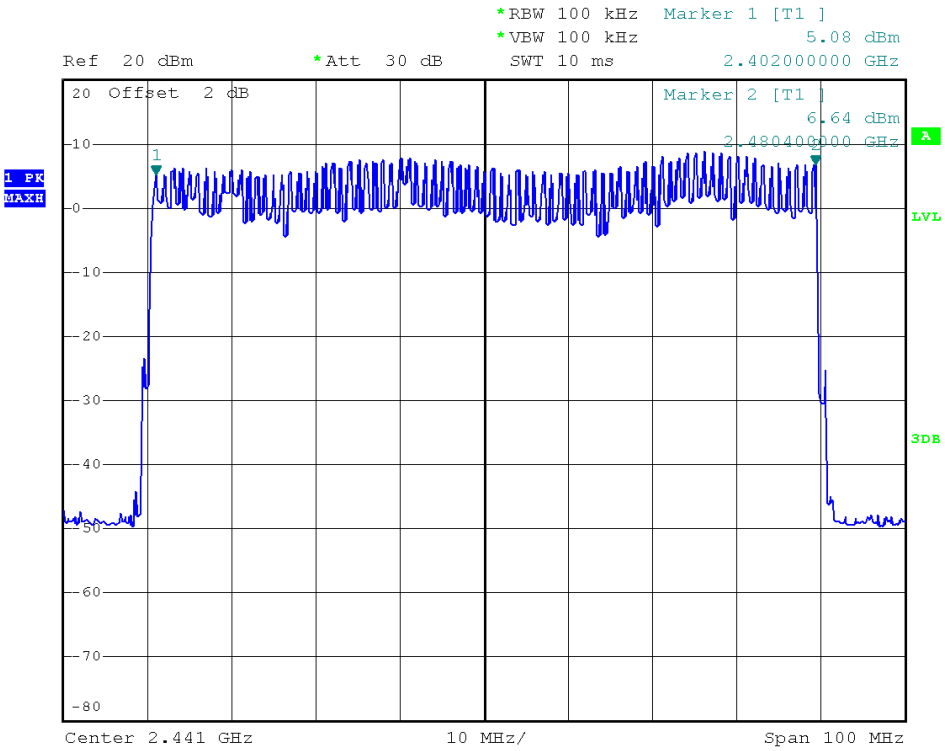
Test Plots:



(Plot A: GFSK)



(Plot B: π/4-DQPSK)



(Plot C: 8- DPSK)

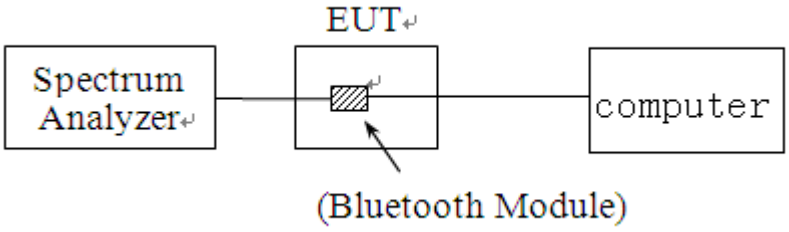
2.3. Peak Output Power

2.3.1. Requirement

According to FCC §15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.3.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.3.3. Test Result

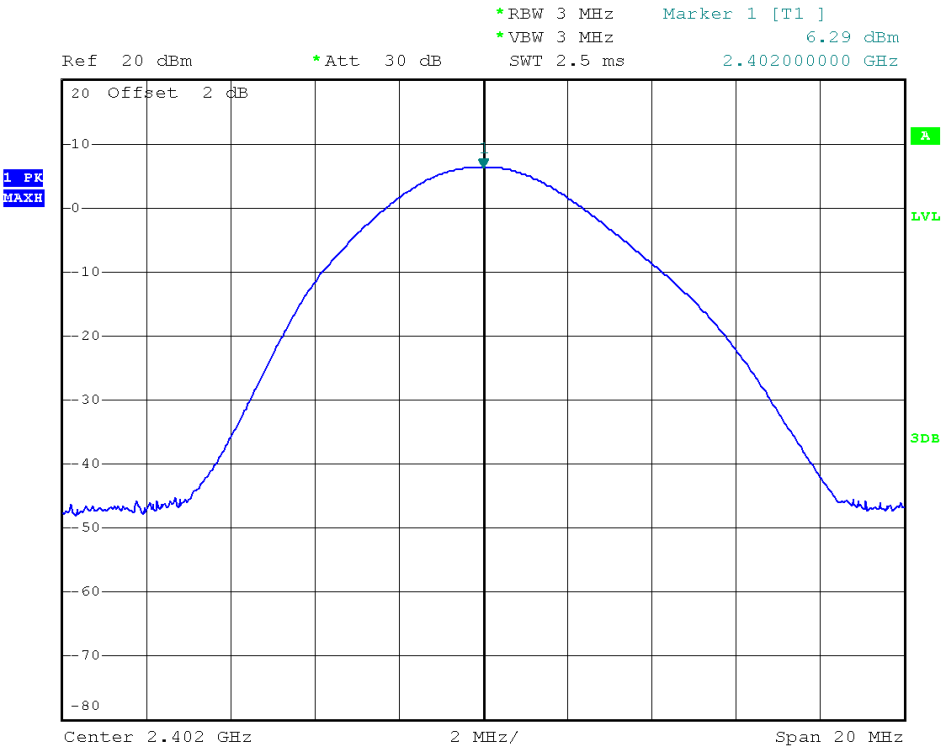
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module. The lowest, middle and highest channel were tested by Spectrum Analyzer.

2.3.3.1. GFSK Mode

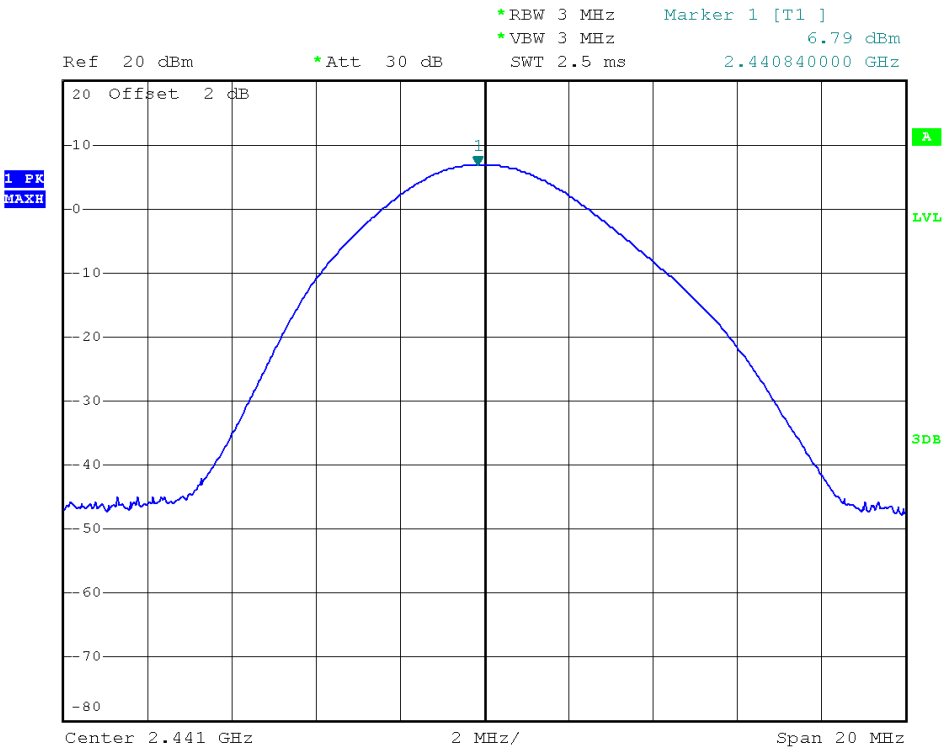
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power	Limit	Refer to Plot	Verdict
		dBm	dBm		
0	2402	6.29	21	Plot A1	PASS
39	2441	6.79		Plot A2	PASS
78	2480	7.34		Plot A3	PASS

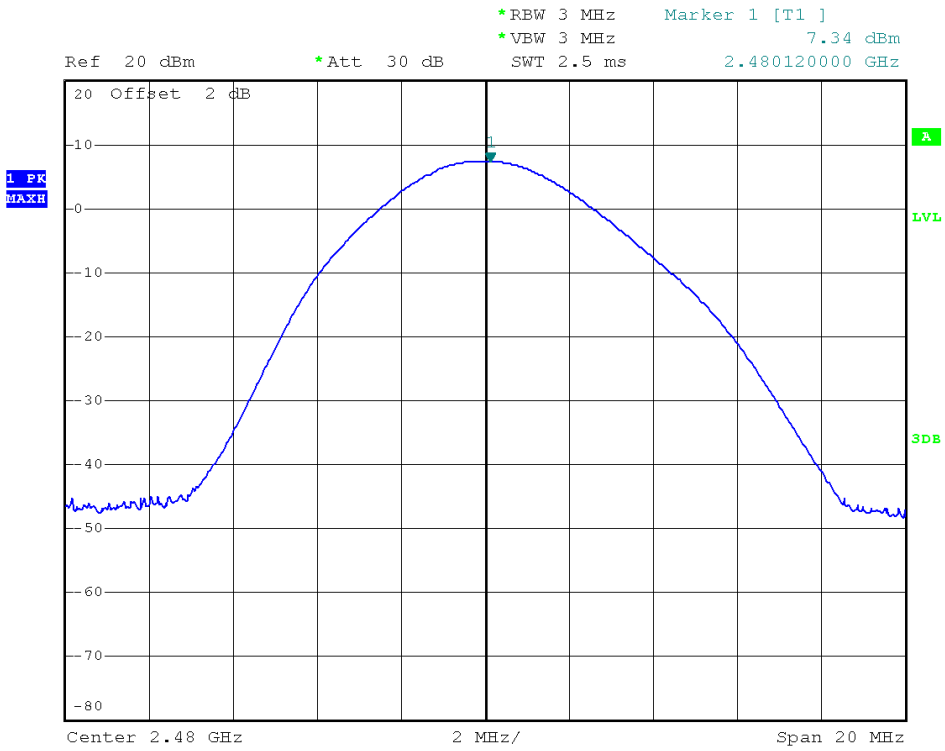
Test Plots:



Plot A1: GFSK



Plot A2: GFSK



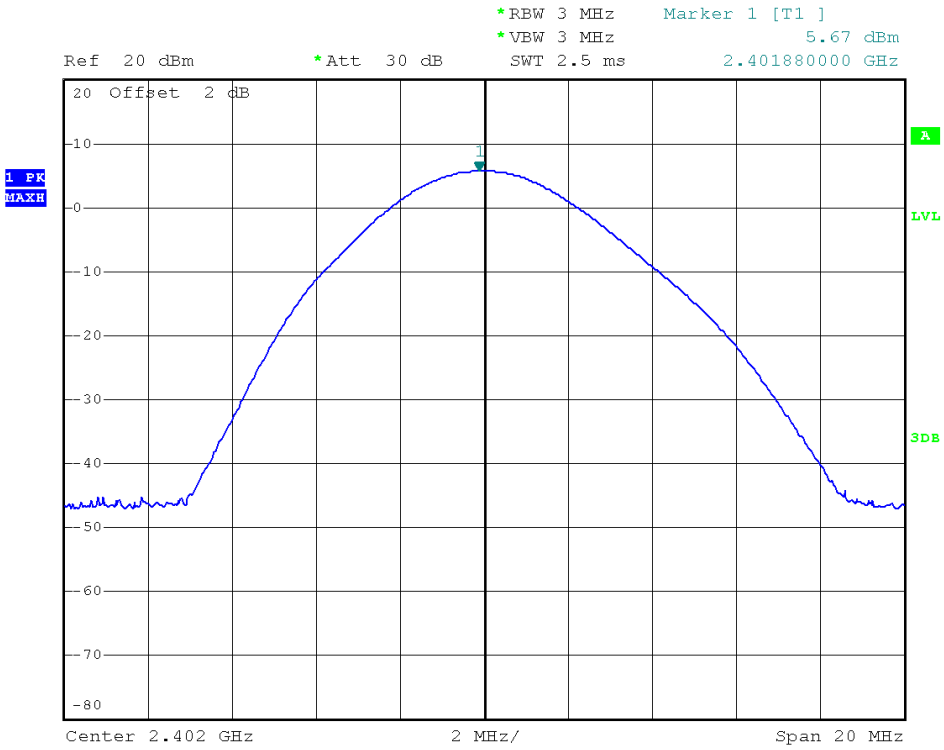
Plot A3: GFSK

2.3.3.2. π/4-DQPSK Mode

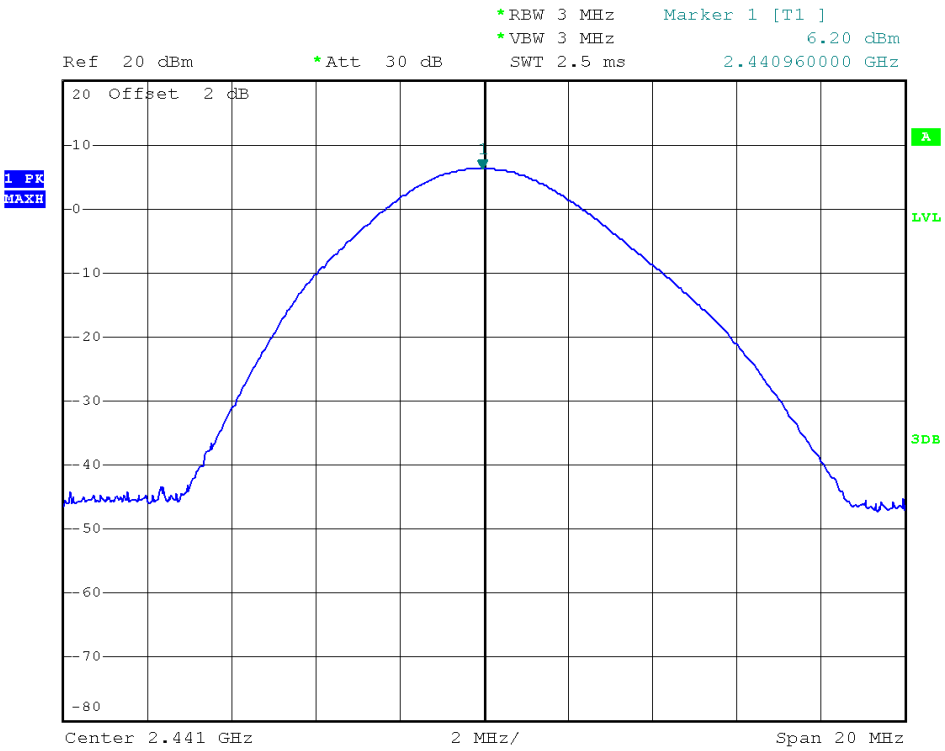
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power	Limit	Refer to Plot	Verdict
		dBm	dBm		
0	2402	5.67	21	Plot B1	PASS
39	2441	6.20		Plot B2	PASS
78	2480	6.66		Plot B3	PASS

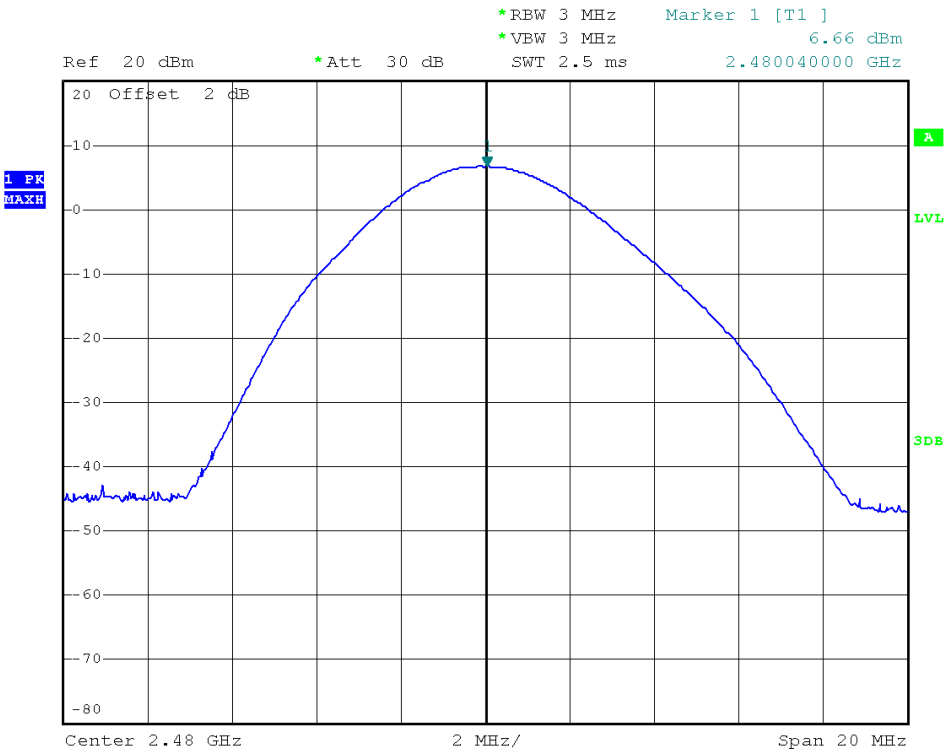
Test Plots:



Plot B1: π/4-DQPSK



Plot B2: π/4-DQPSK



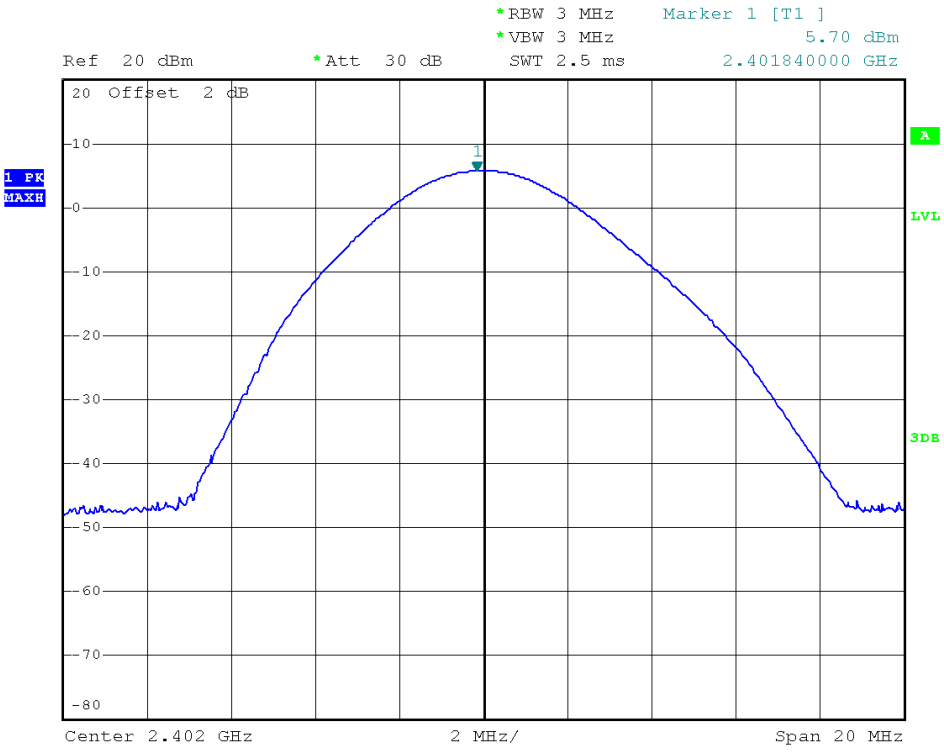
Plot B3: π/4-DQPSK

2.3.3.3. 8-DPSK Mode

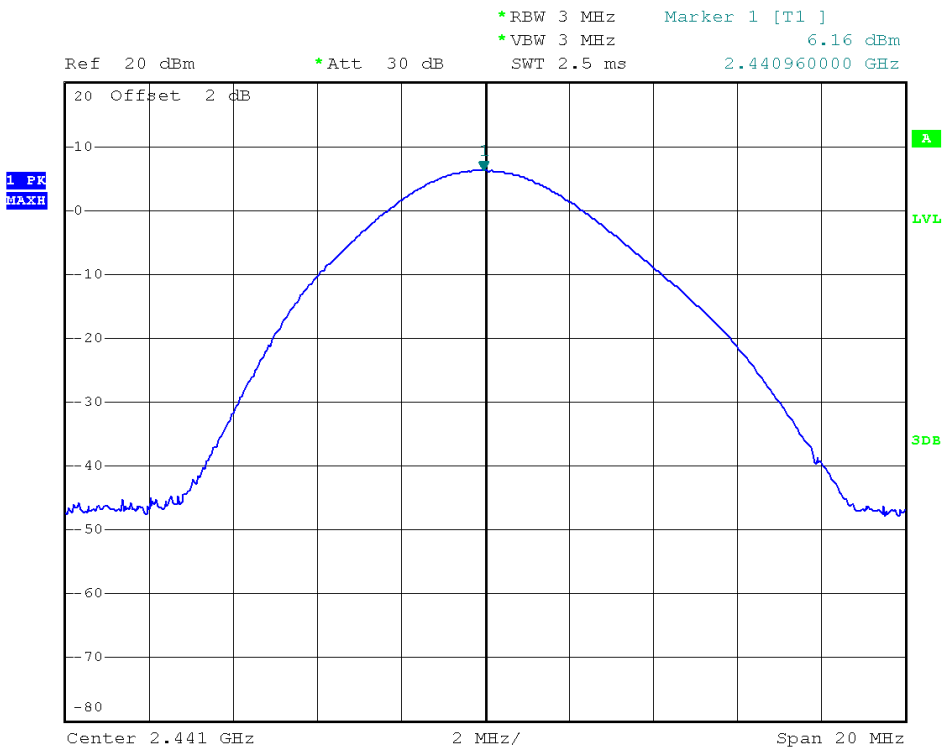
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power	Limit	Refer to Plot	Verdict
		dBm	dBm		
0	2402	5.70	21	Plot C1	PASS
39	2441	6.16		Plot C2	PASS
78	2480	6.47		Plot C3	PASS

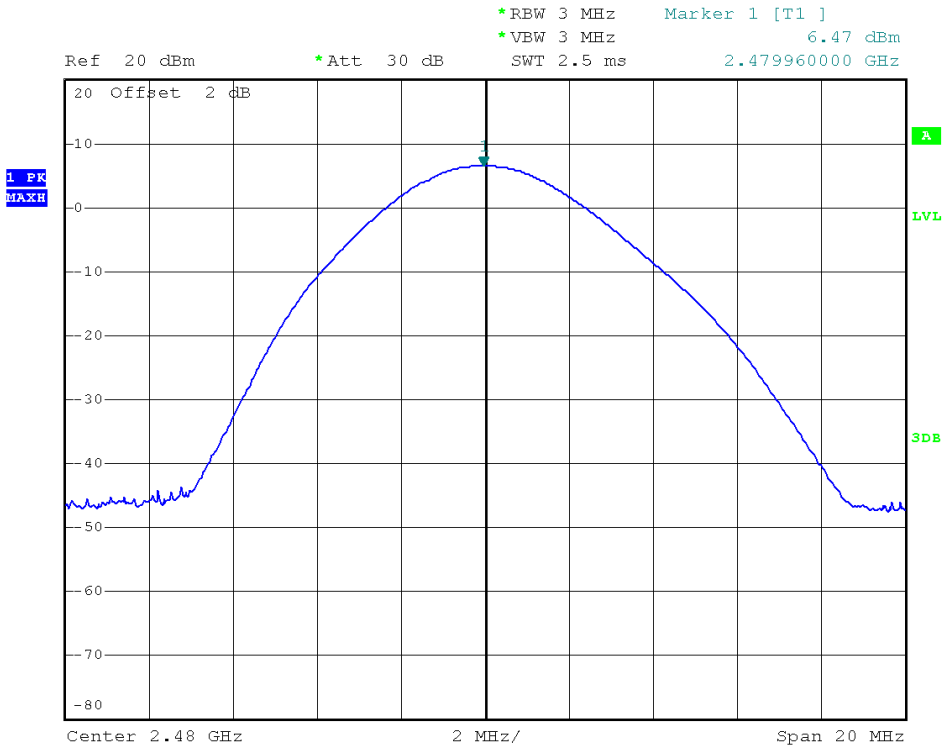
Test Plots:



Plot C1: 8-DPSK



Plot C2: 8-DPSK



Plot C3: 8-DPSK

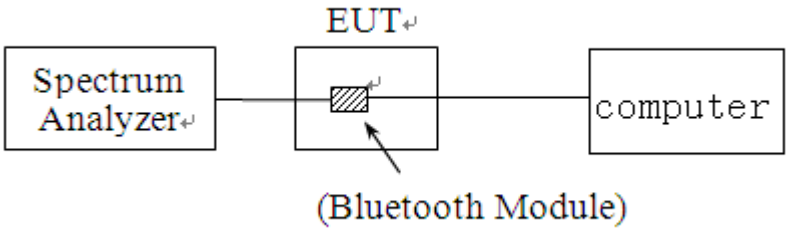
2.4. 20dB Bandwidth

2.4.1. Definition

According to FCC §15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.4.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.4.1. Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW ≥ 1% of the 20 dB bandwidth

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

2.4.2. Test Result

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

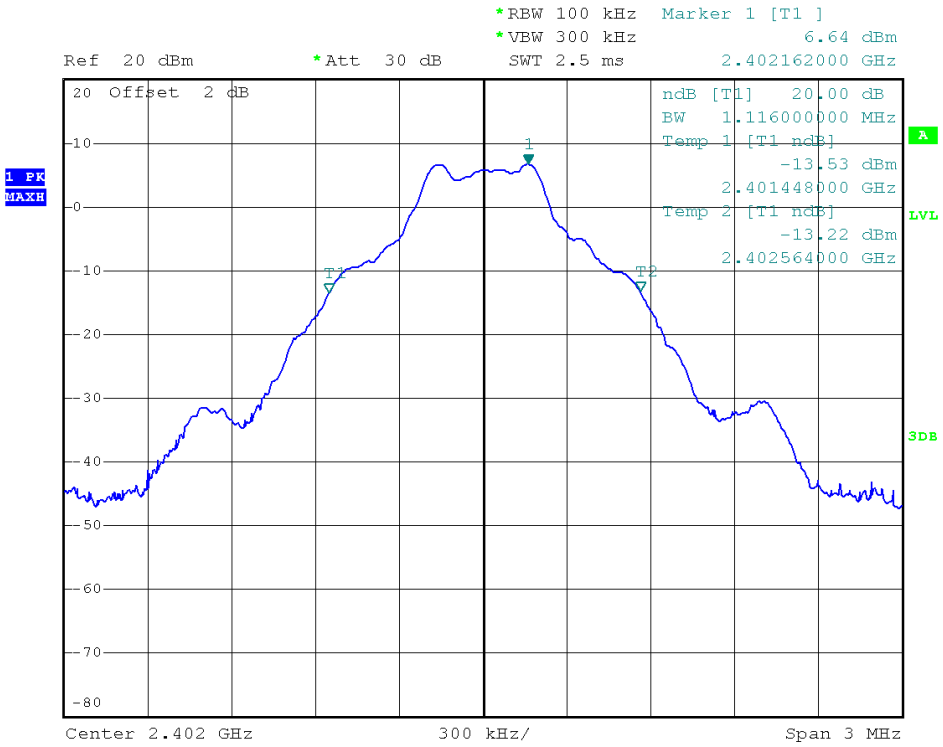
2.4.2.1. GFSK Mode

A. Test Verdict:

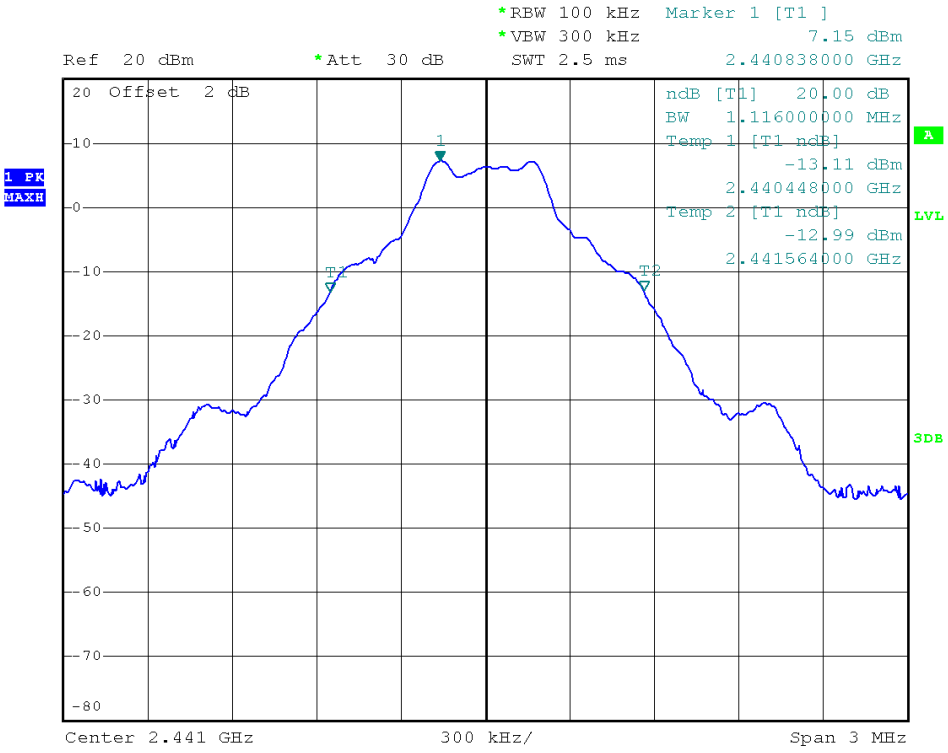
The maximum 20dB bandwidth measured is 1.116MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.116	Plot A
39	2441	1.116	Plot B
78	2480	1.110	Plot C

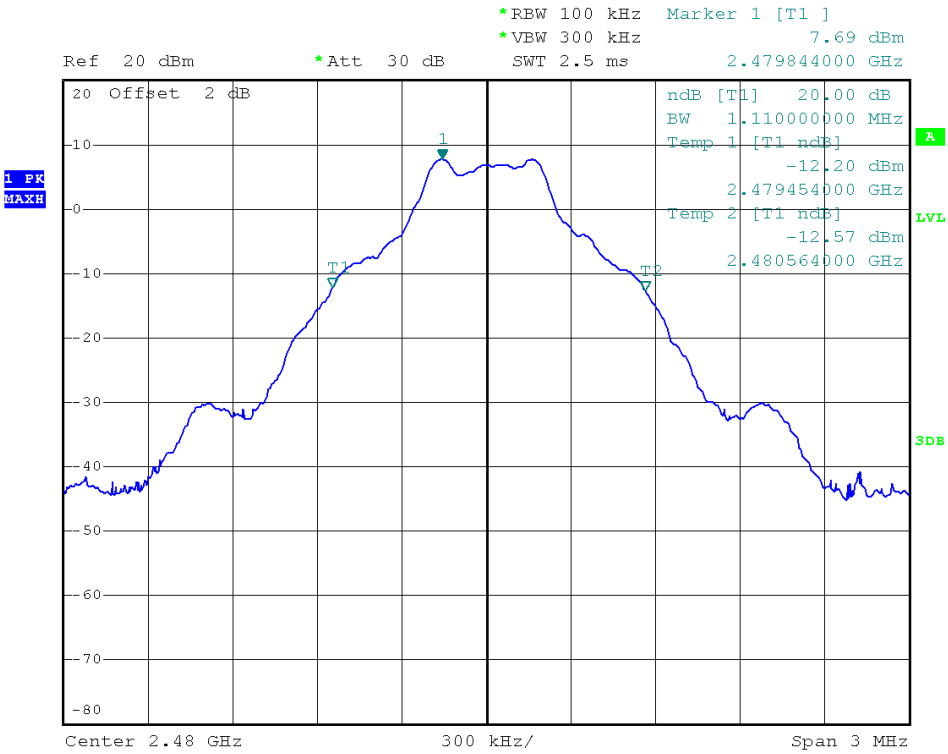
Test Plots:



(Plot A: Channel = 2402 @ GFSK)



(Plot B: Channel = 2441 @ GFSK)



(Plot C: Channel = 2480 @ GFSK)

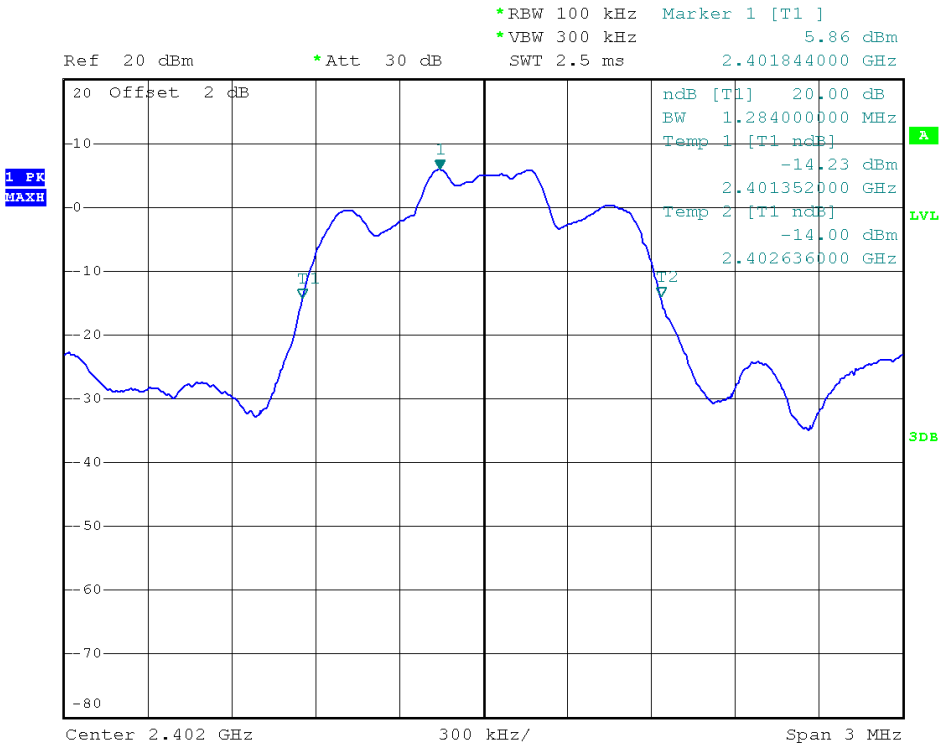
2.4.2.2. π/4-DQPSK Mode

A. Test Verdict:

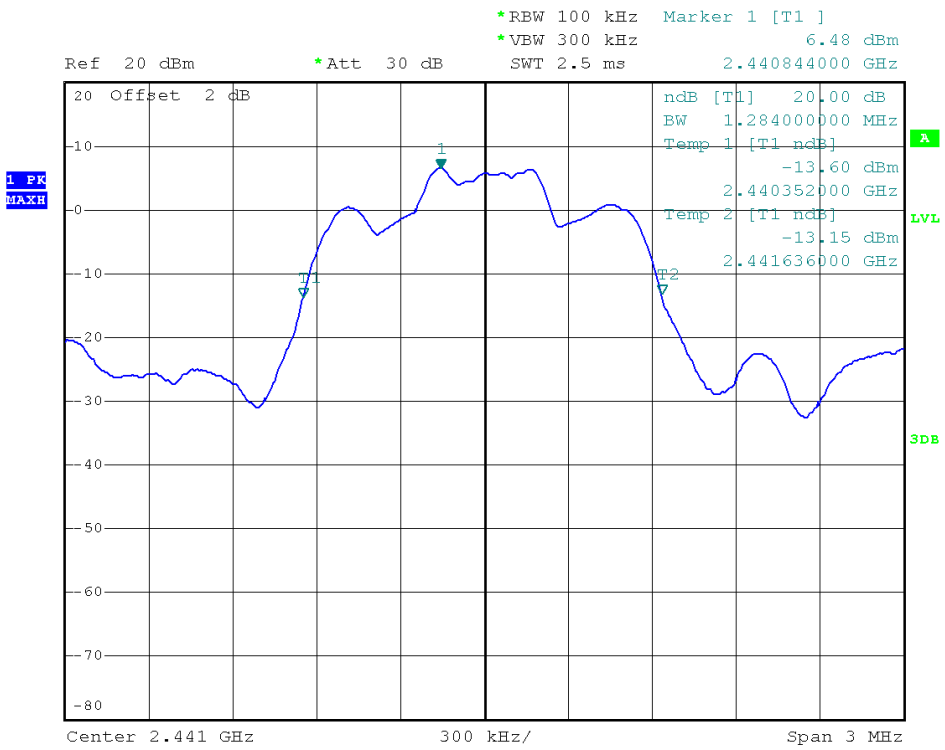
The maximum 20dB bandwidth measured is 1.296MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.284	Plot D
39	2441	1.284	Plot E
78	2480	1.290	Plot F

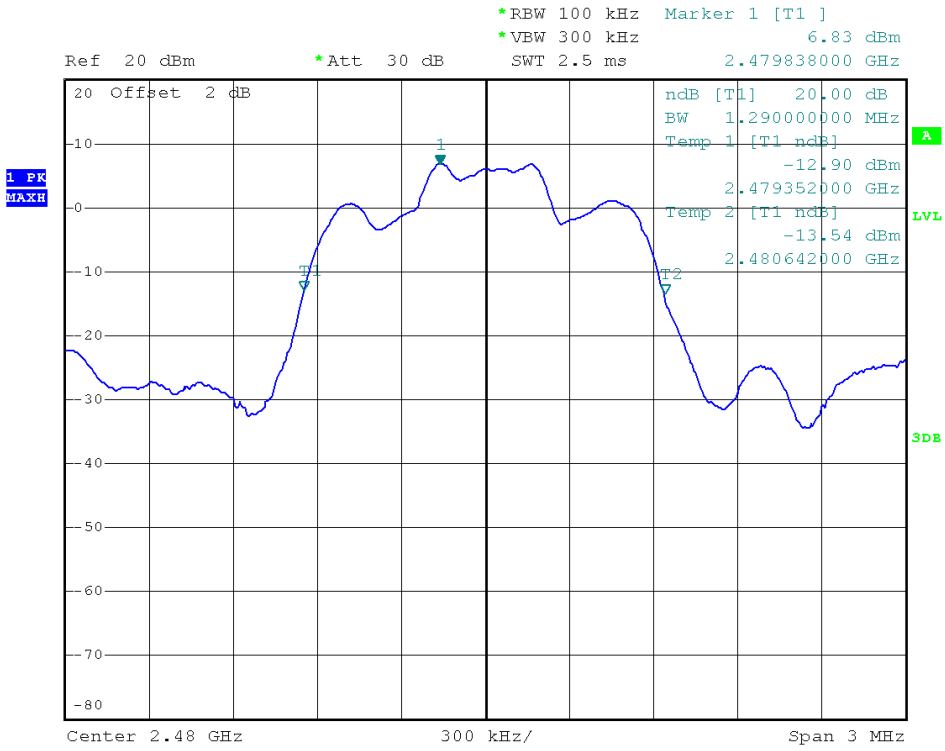
Test Plots:



(Plot D: Channel = 2402 @π/4-DQPSK)



(Plot E: Channel = 2441 @π/4-DQPSK)



(Plot F: Channel = 2480 @π/4-DQPSK)

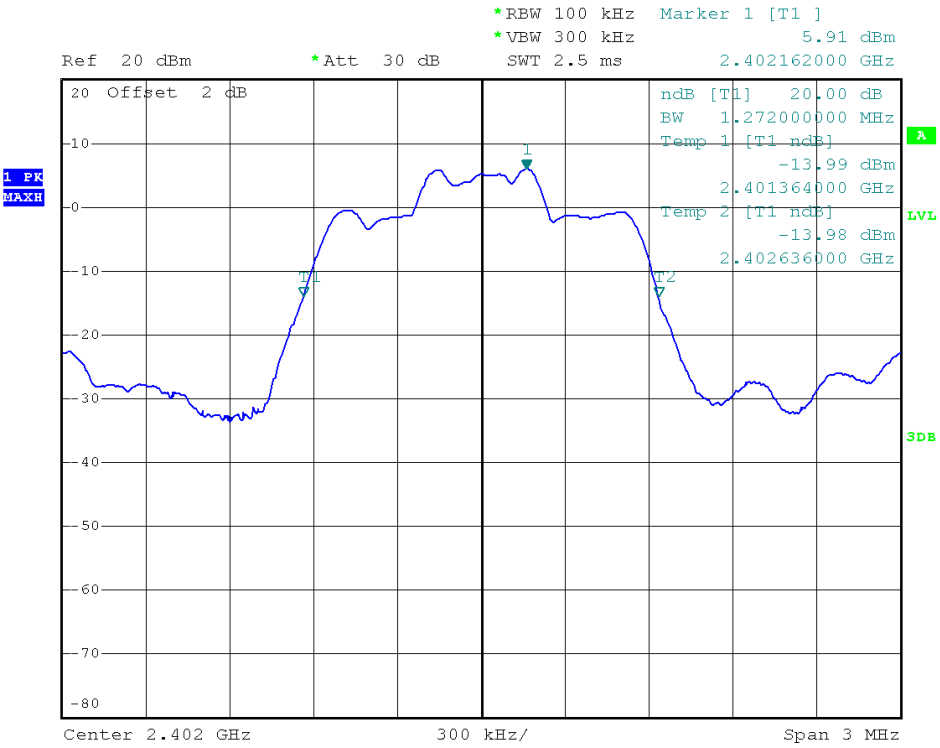
2.4.2.3. 8-DPSK Mode

A. Test Verdict:

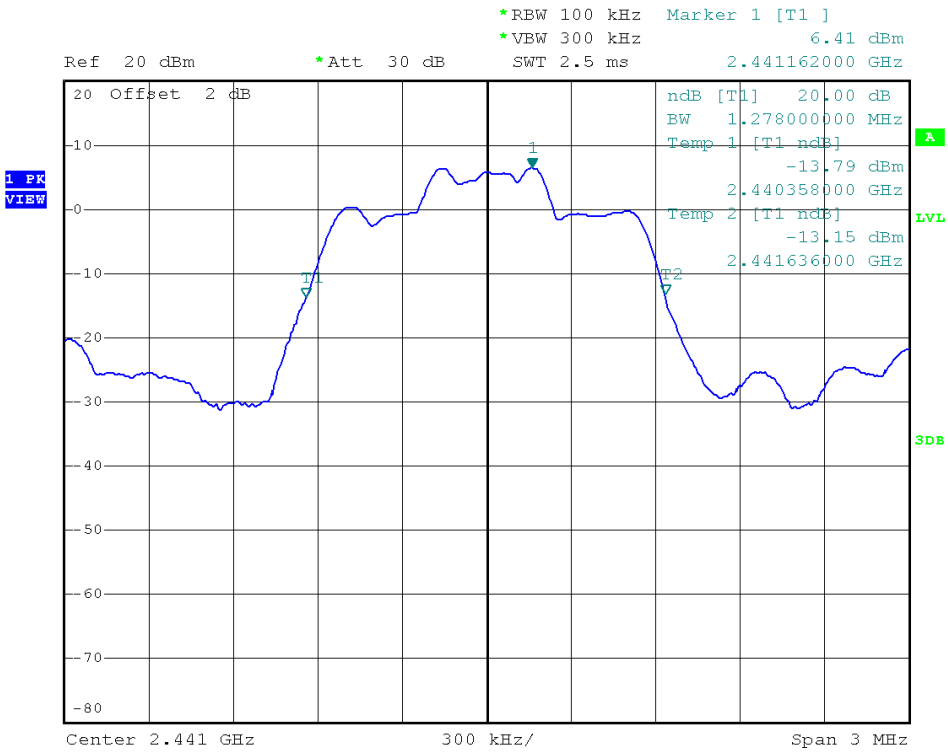
The maximum 20dB bandwidth measured is 1.284MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.272	Plot G
39	2441	1.278	Plot H
78	2480	1.278	Plot I

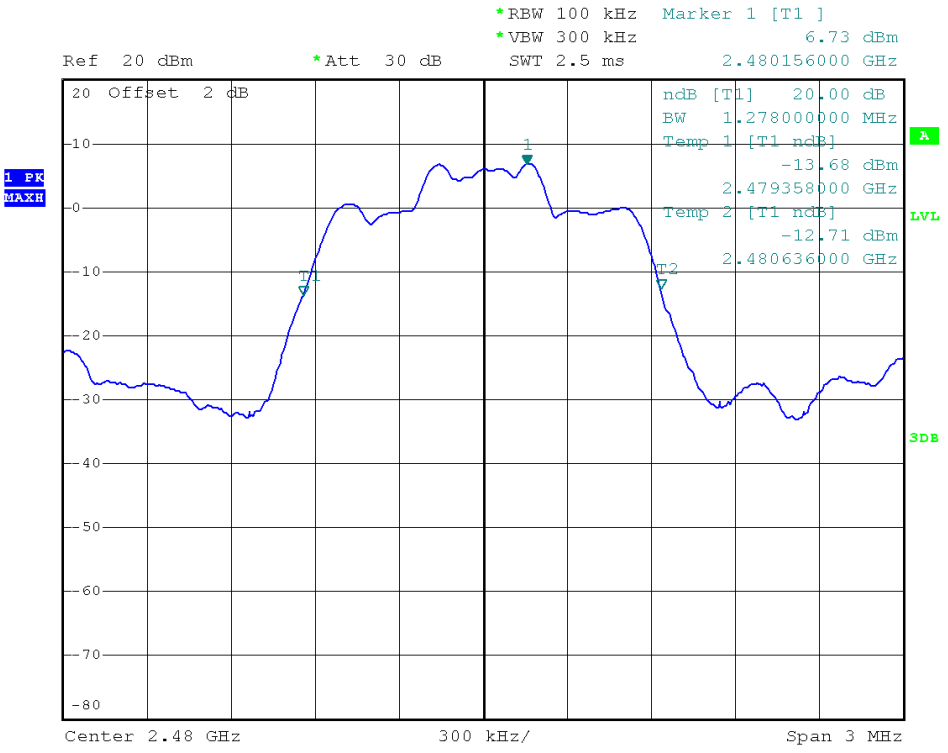
B. Test Plots:



(Plot G: Channel = 2402 @ 8-DPSK)



(Plot H: Channel = 2441 @ 8-DPSK)



(Plot I: Channel = 2480 @ 8-DPSK)

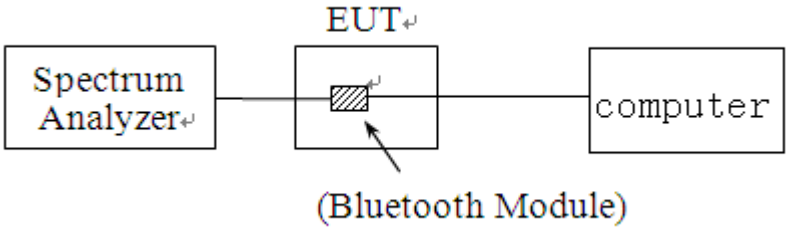
2.5. Carried Frequency Separation

2.5.1. Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

2.5.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Date	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.5.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span

Video (or Average) Bandwidth (VBW) ≥ RBW

Sweep = auto

Detector function = peak

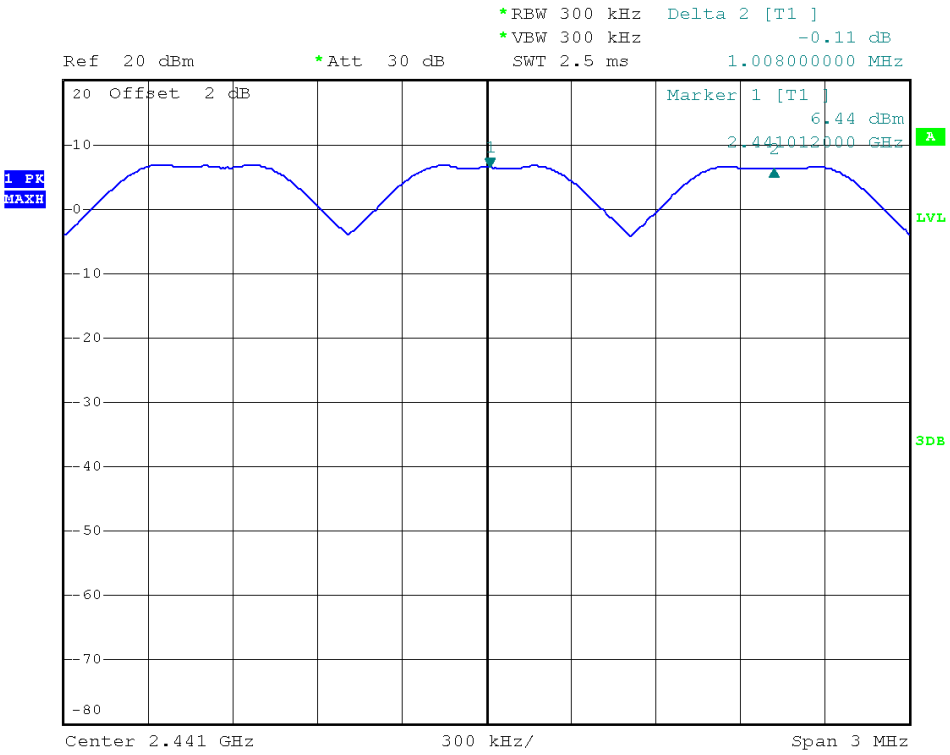
Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

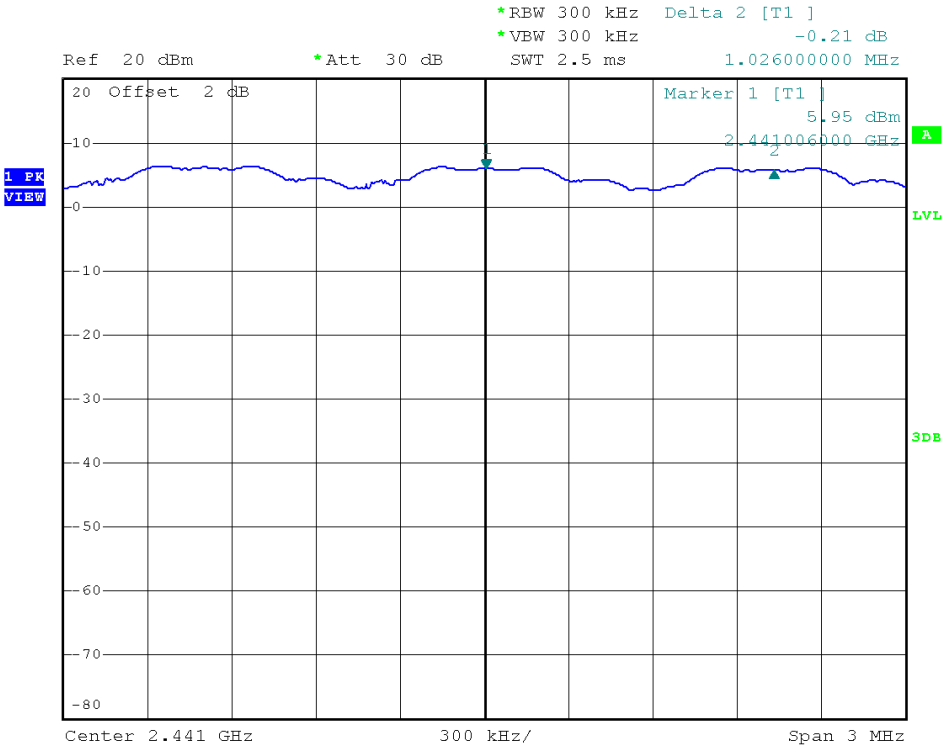
2.5.4. Test Result

The Bluetooth Module operates at hopping-on test mode.

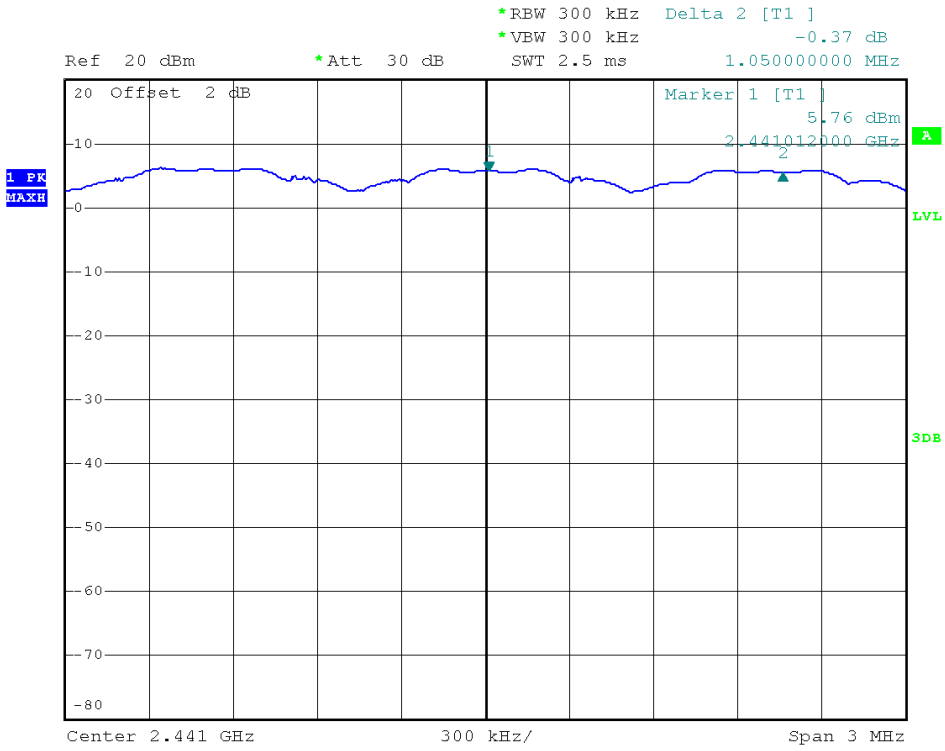
For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (1.116MHz for GFSK mode, 1.290MHz for π/4-DQPSK mode and 1.278MHz for 8-DPSK mode, refer to section 2.4.1), whichever is greater. So, the verdict is PASSING



(Plot A: GFSK)



(Plot B: π/4-DQPSK)



(Plot C: 8-DPSK)

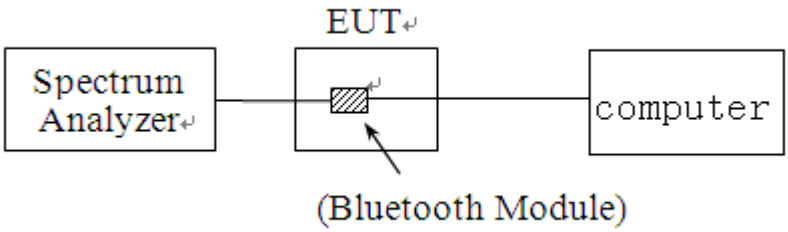
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC §15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.6.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal.Date	Cal.Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.6.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1 MHz

VBW ≥ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

2.6.4. Test Result

The average time of occupancy on any channel within the Period can be calculated with formulas (for DH5 package type):

{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

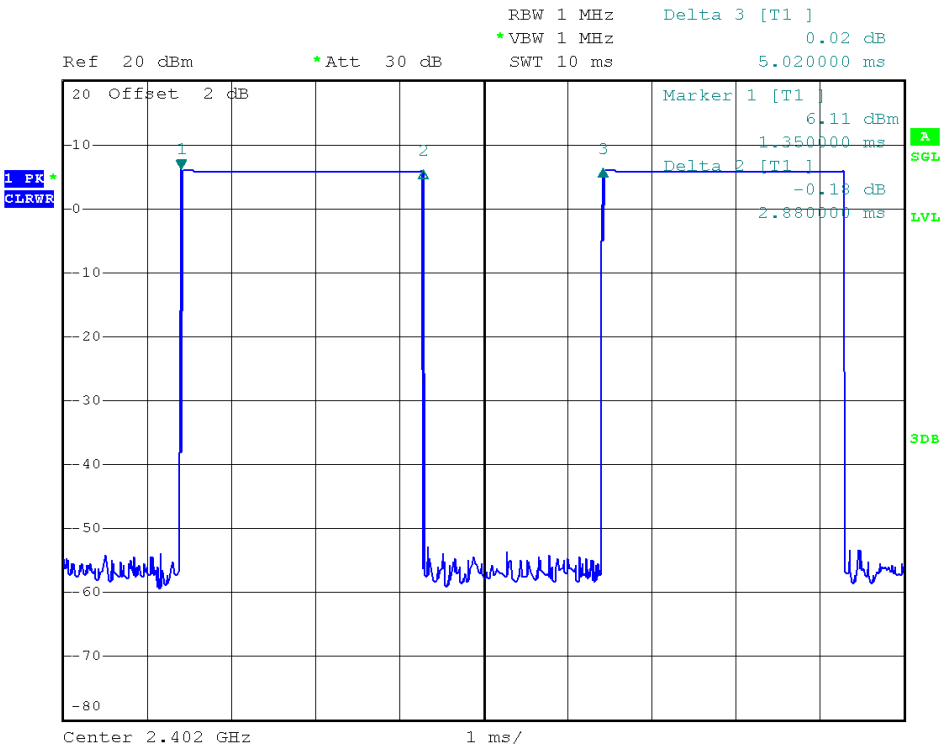
2.6.4.1. GFSK Mode

A. Test Verdict:

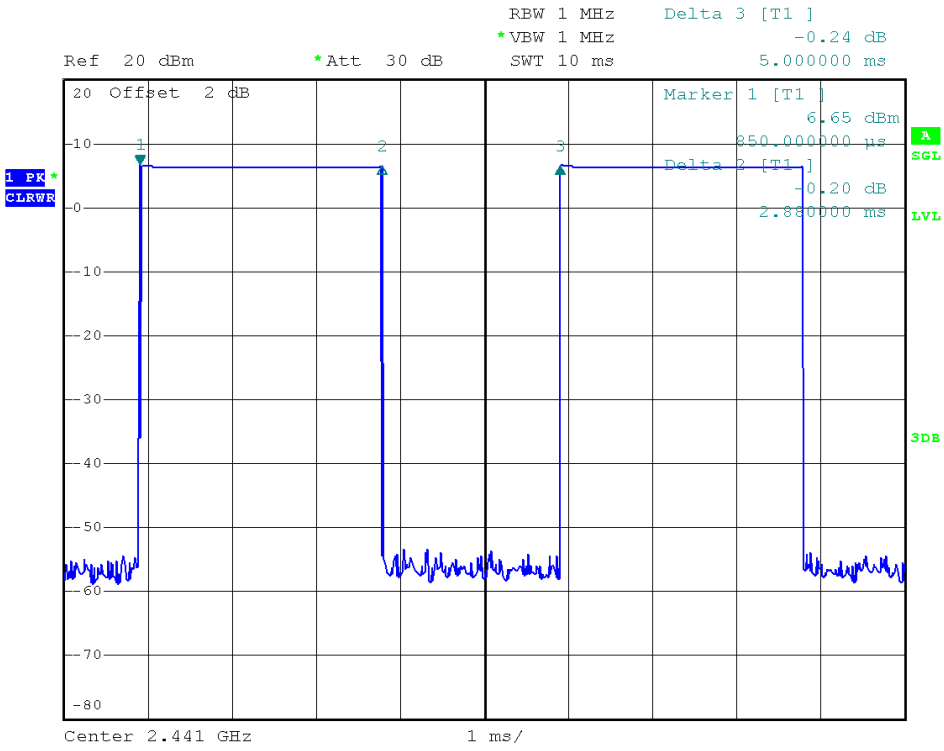
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.88	Plot A	307.200	400	PASS
39	2441	2.88	Plot B	307.200		PASS
78	2480	2.88	Plot C	307.200		PASS

Test Plots:

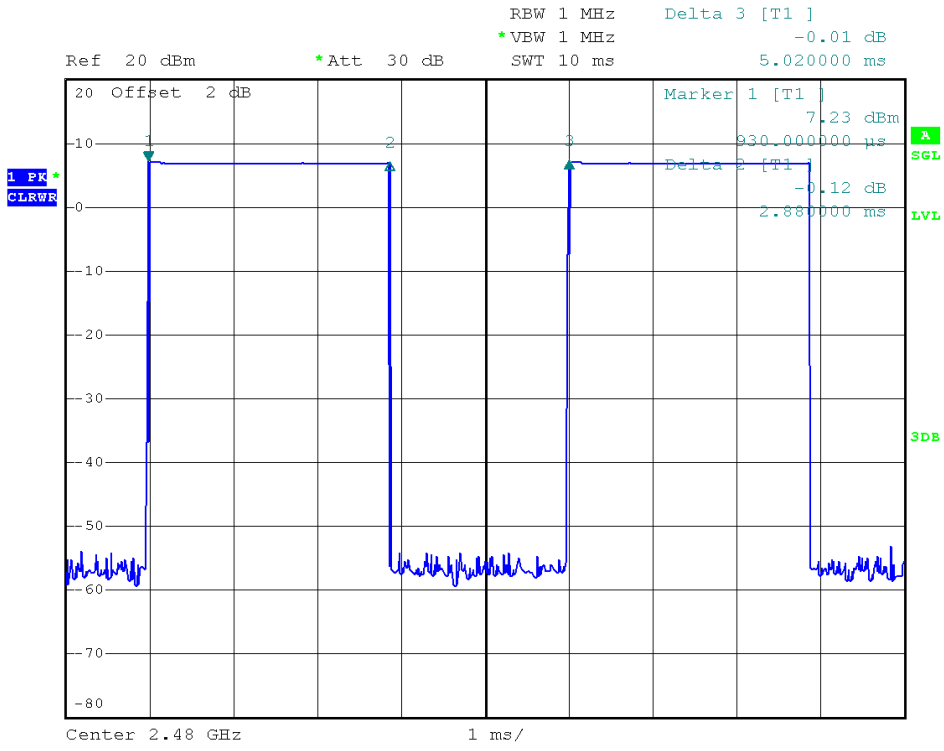
Note: the following plots record the Pulse Time of the Module carrier.



(Plot A: Channel = 2402 @ GFSK)



(Plot B: Channel = 2441 @ GFSK)



(Plot C: Channel = 2480 @ GFSK)

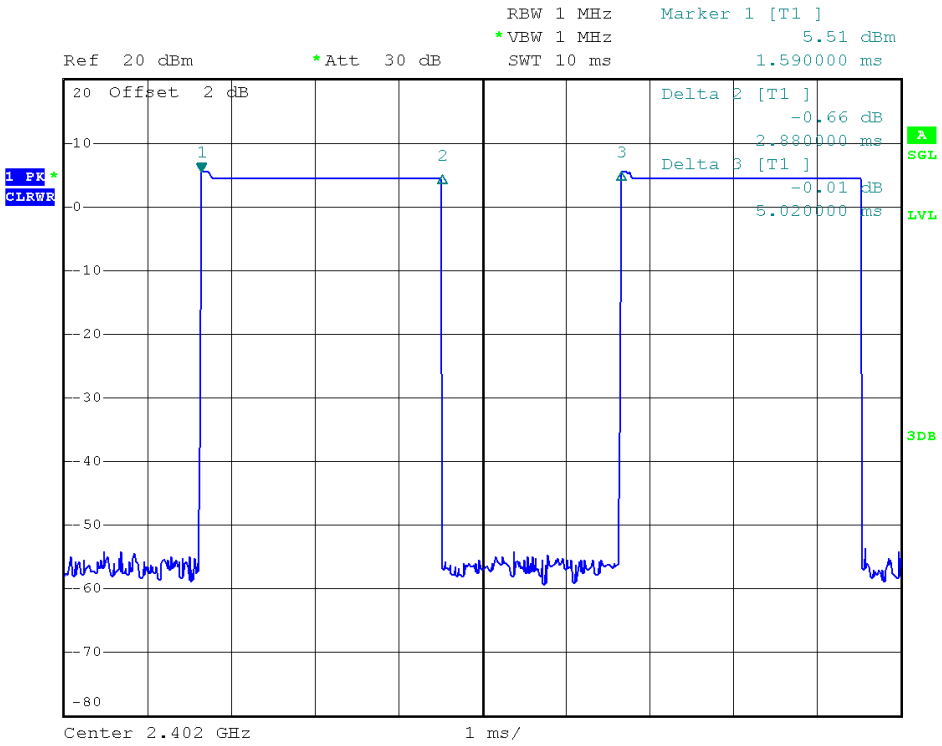
2.6.4.2. π/4-DQPSK Mode

A. Test Verdict:

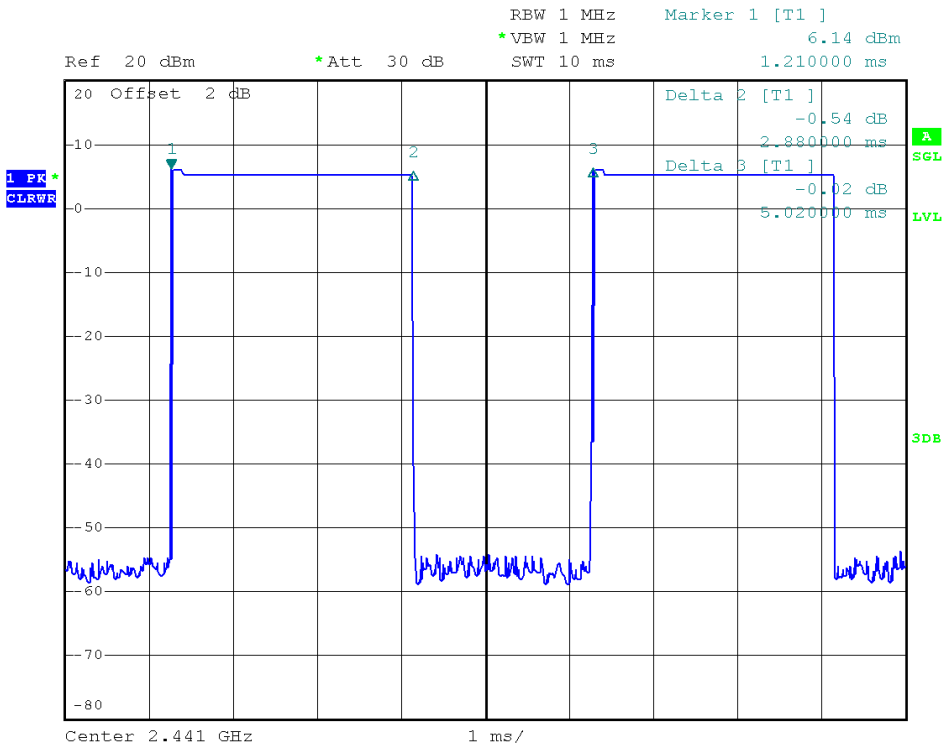
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.88	Plot D	307.200	400	PASS
39	2441	2.88	Plot E	307.200		PASS
78	2480	2.88	Plot F	307.200		PASS

Test Plots:

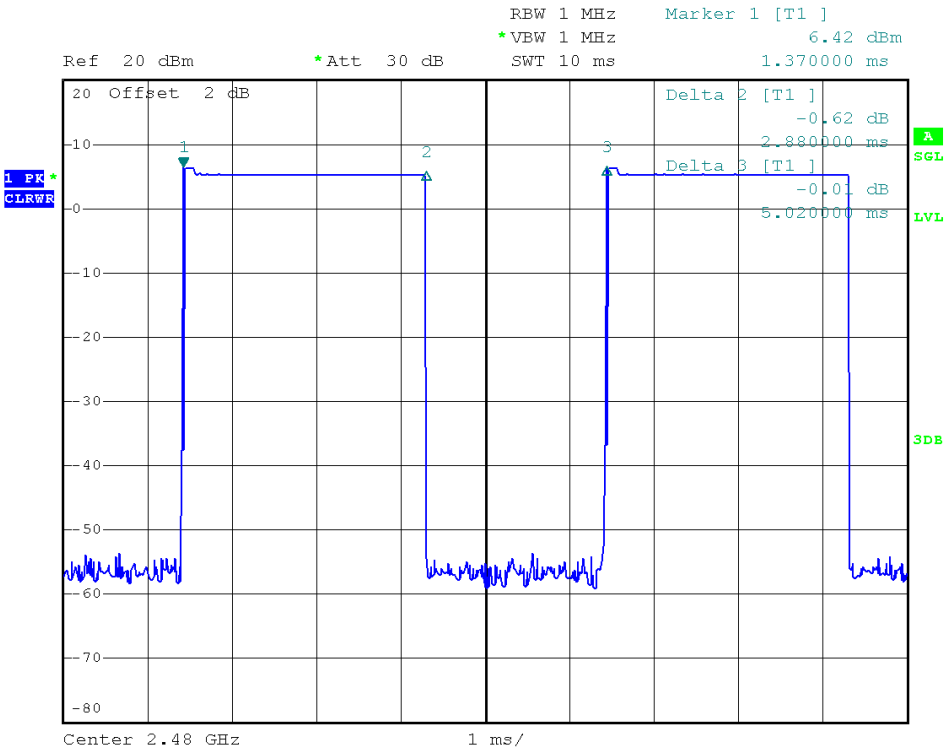
Note: the following plots record the Pulse Time of the Module carrier.



(Plot D: Channel = 2402 @π/4-DQPSK)



(Plot E: Channel = 2441 @π/4-DQPSK)



(Plot F: Channel = 2480 @π/4-DQPSK)

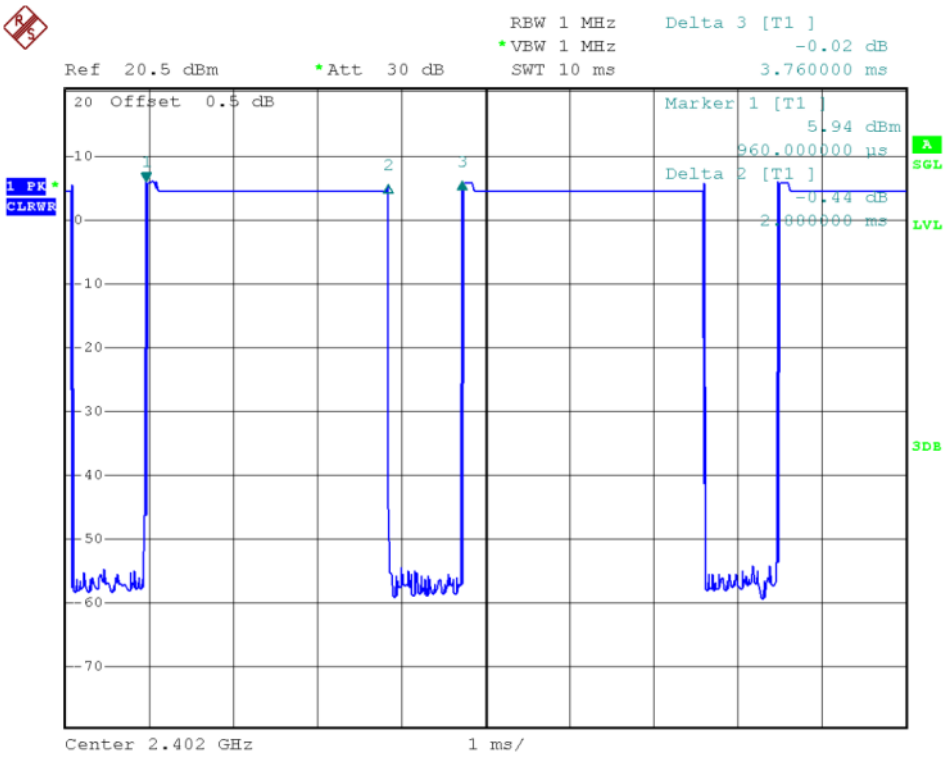
2.6.4.3. 8-DPSK mode

A. Test Verdict:

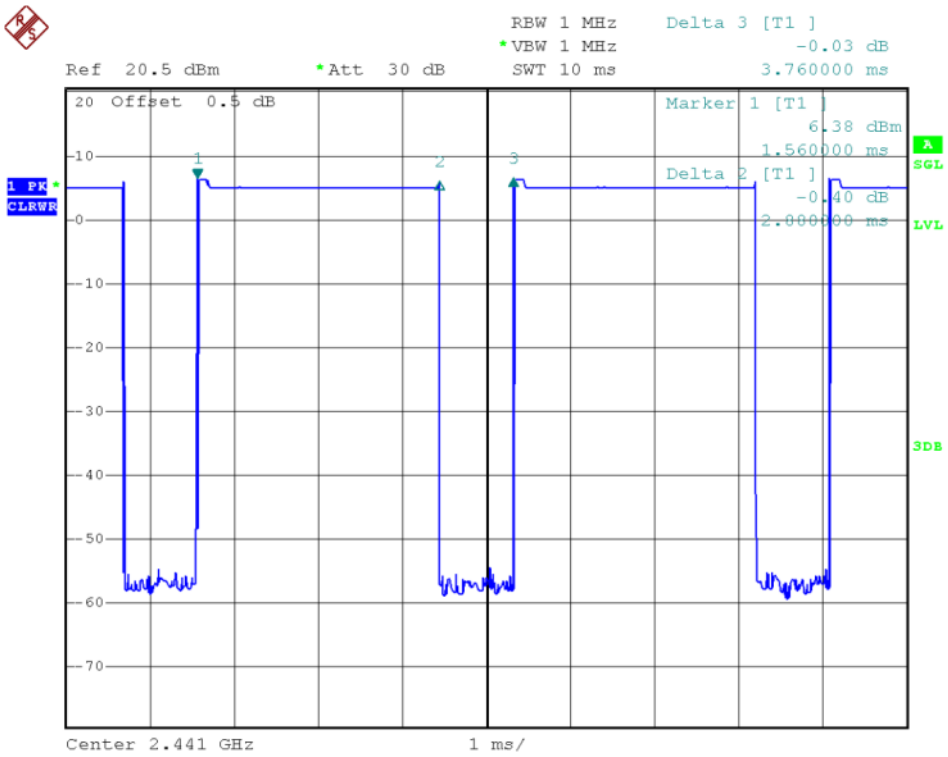
Channel	Frequency (MHz)	Pulse Time		Total of Dwell (ms)	Limit (ms)	Verdict
		ms	Refer to Plot			
0	2402	2.88	Plot G	307.200	400	PASS
39	2441	2.88	Plot H	307.200		PASS
78	2480	2.88	Plot I	307.200		PASS

Test Plots:

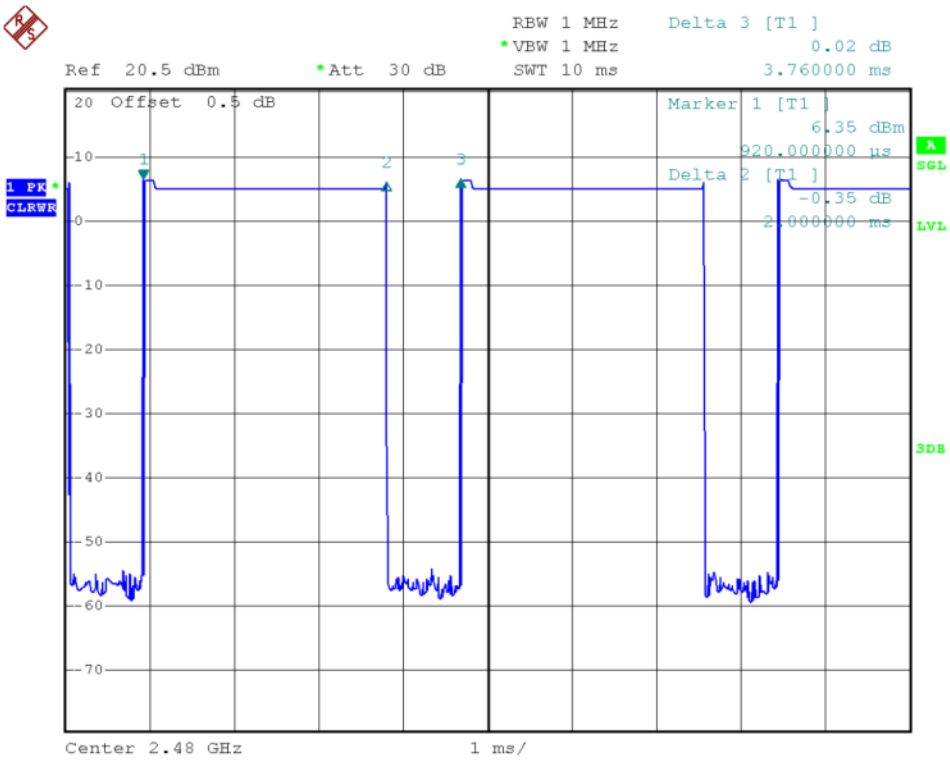
Note: the following plots record the Pulse Time of the Module carrier.



(Plot G: Channel = 2402 @ 8-DPSK)



(Plot H: Channel = 2441 @ 8-DPSK)



(Plot I: Channel = 2480 @ 8-DPSK)

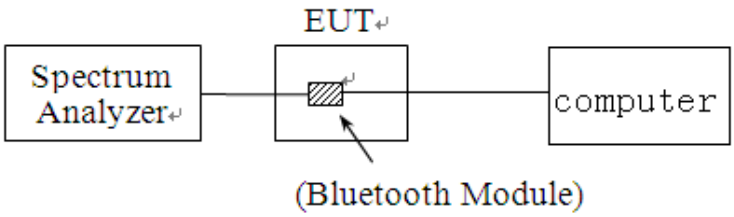
2.7. Conducted Spurious Emissions

2.7.1. Requirement

According to FCC §15.247(d), 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.

2.7.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is connected to the Spectrum Analyzer (SA), the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the PC, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.7.3. Test Procedure

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

Allow the trace to stabilize.

2.7.4. Test Result

The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

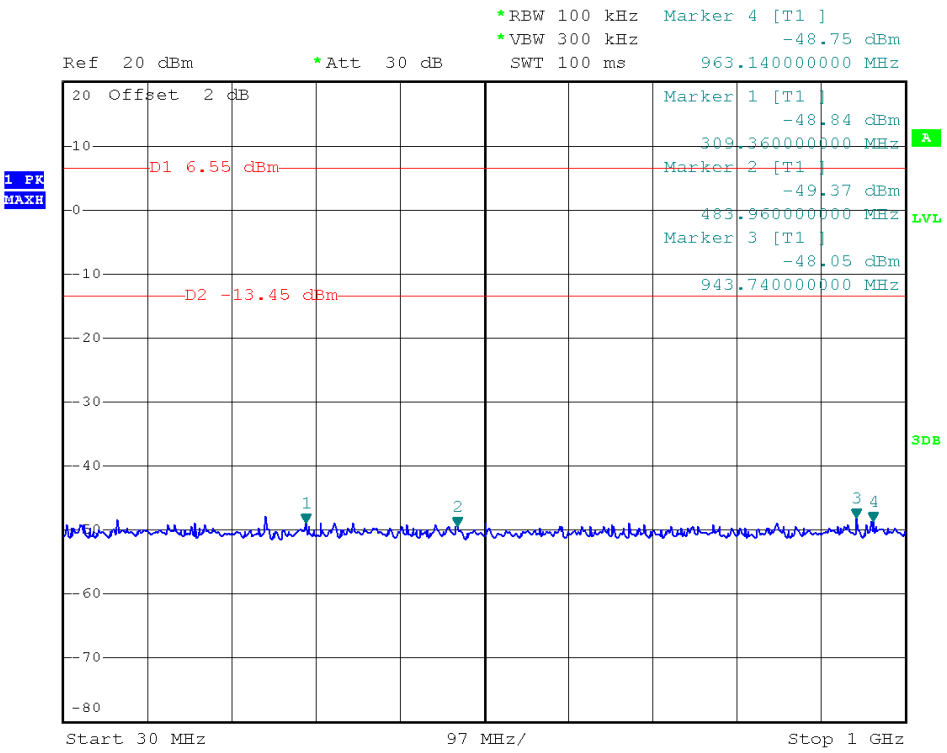
2.7.4.1. GFSK Mode

A. Test Verdict:

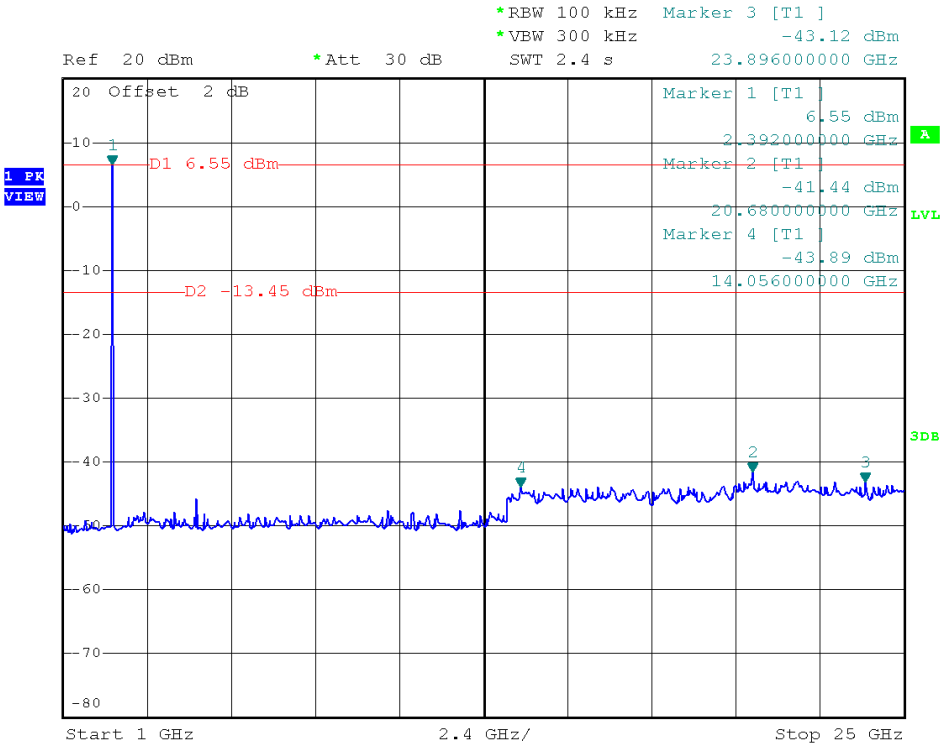
Channel	Frequency (MHz)	Measured Max. Out of Band EmissiondBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-41.44	Plot A.1 to A.2	6.55	-13.45	PASS
39	2441	-42.35	Plot B.1 to B.2	7.14	-12.86	PASS
78	2480	-42.02	Plot C.1 to B.2	7.61	-12.39	PASS

B. Test Plots:

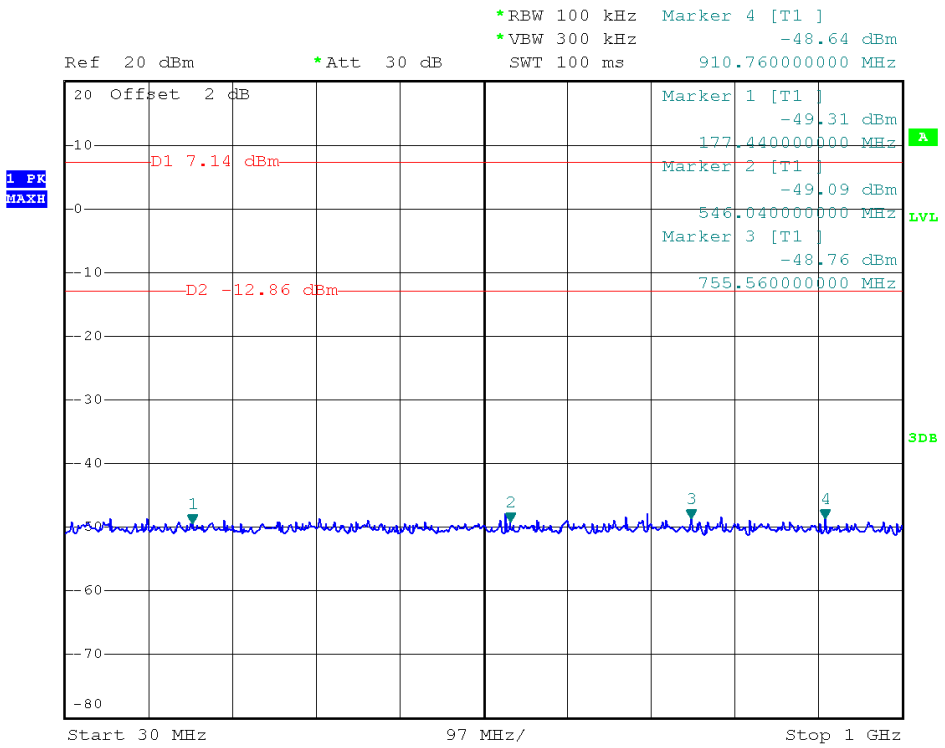
Note: the power of the Module transmitting frequency should be ignored.



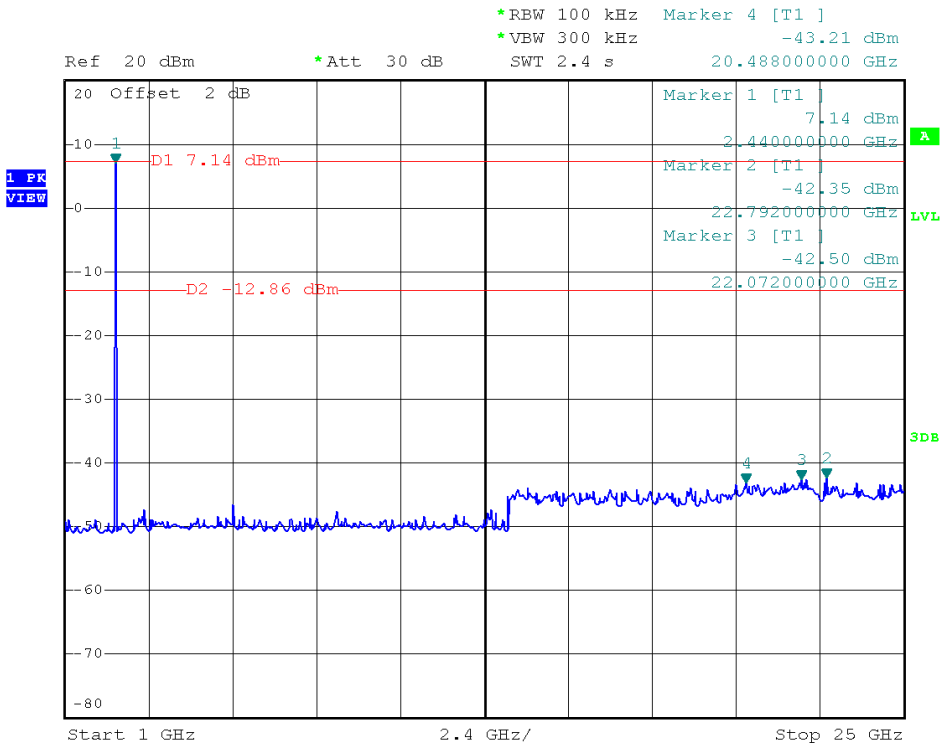
(Plot A.1: Channel = 0, 30MHz to 1GHz @ GFSK Mode)



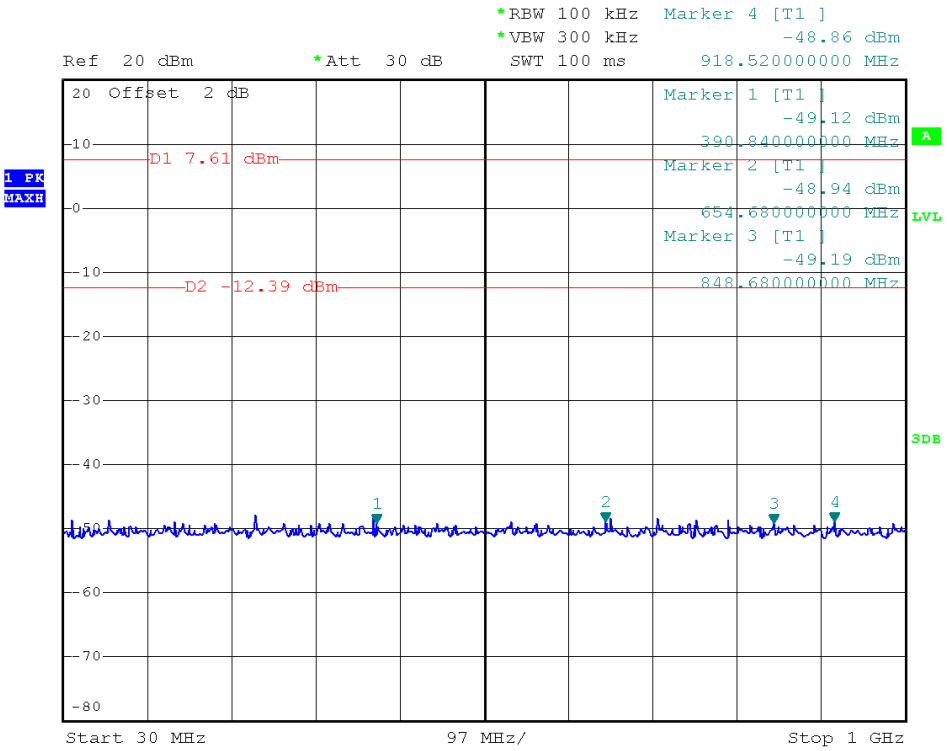
(Plot A.2: Channel = 0, 1GHz to 25GHz @ GFSK Mode)



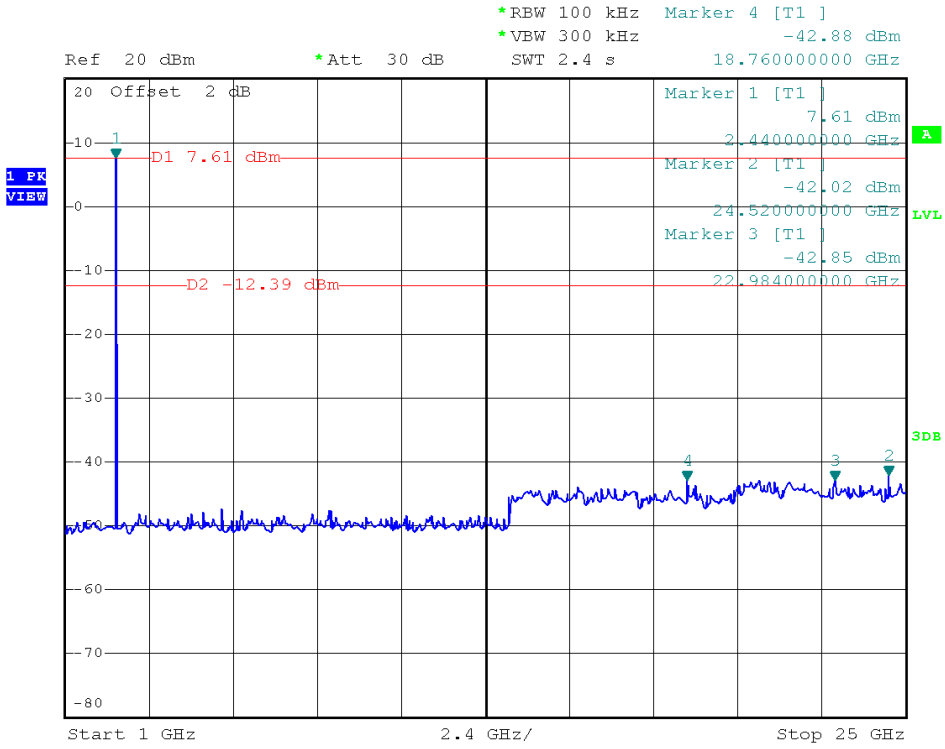
(Plot B.1: Channel = 39, 30MHz to 1GHz @ GFSK Mode)



(Plot B.2: Channel = 39, 1GHz to 25GHz @ GFSK Mode)



(Plot C.1: Channel = 78, 30MHz to 1GHz @ GFSK Mode)



(Plot C.2: Channel = 78, 1GHz to 25GHz @ GFSK Mode)

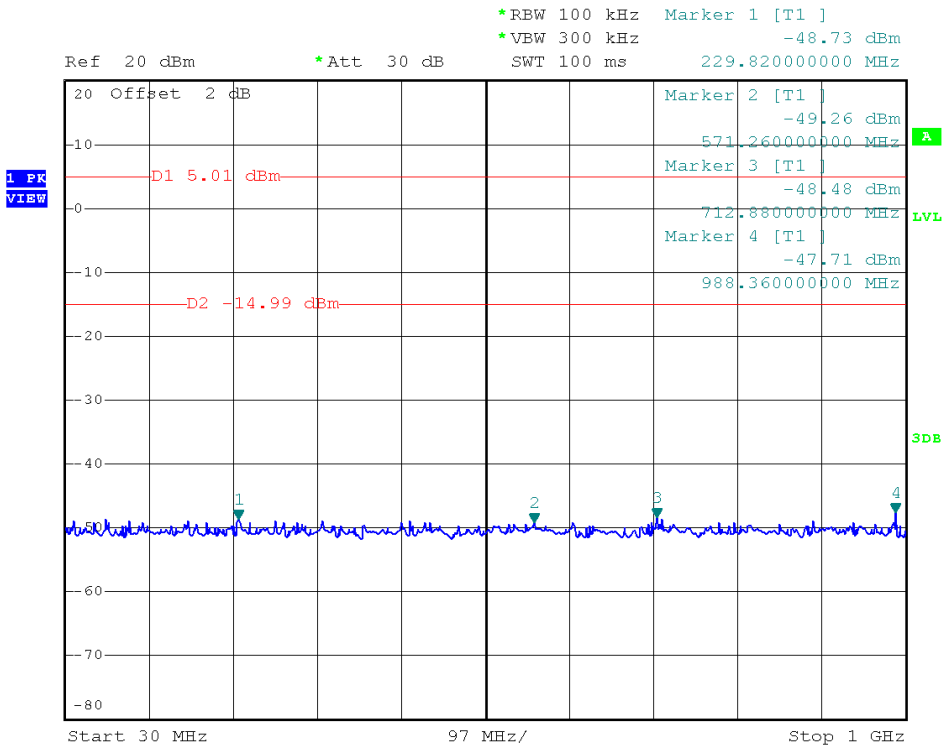
2.7.4.2. π/4-DQPSK Mode

A. Test Verdict:

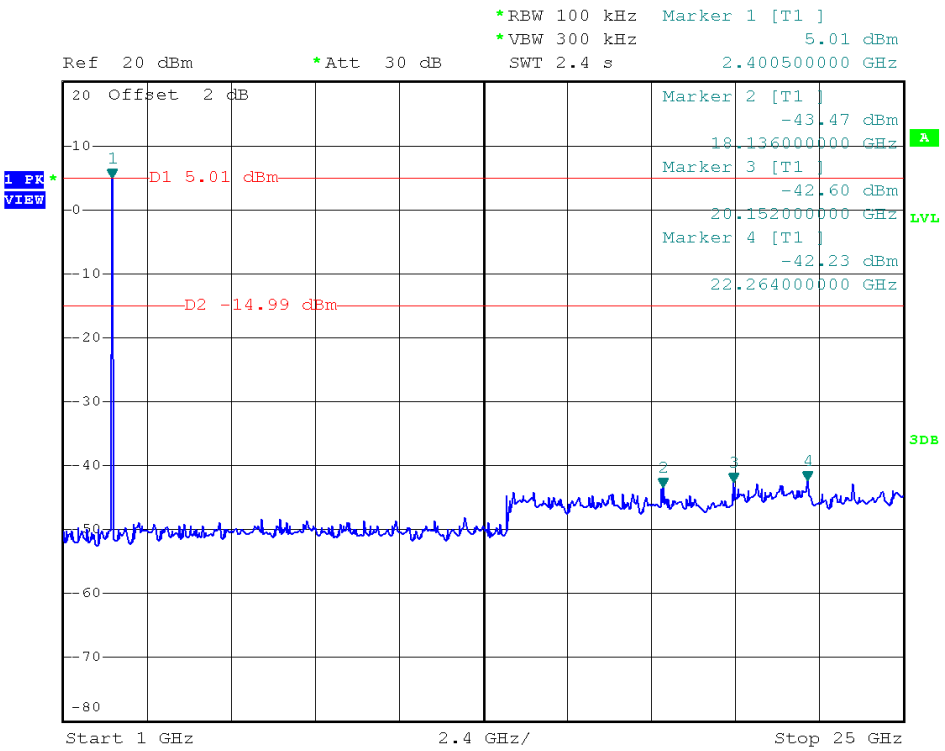
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-42.23	Plot D.1 to D.2	5.01	-14.99	PASS
39	2441	-42.57	Plot E.1 to E.2	5.75	-14.25	PASS
78	2480	-42.68	Plot F.1 to F.2	5.91	-14.09	PASS

B. Test Plots:

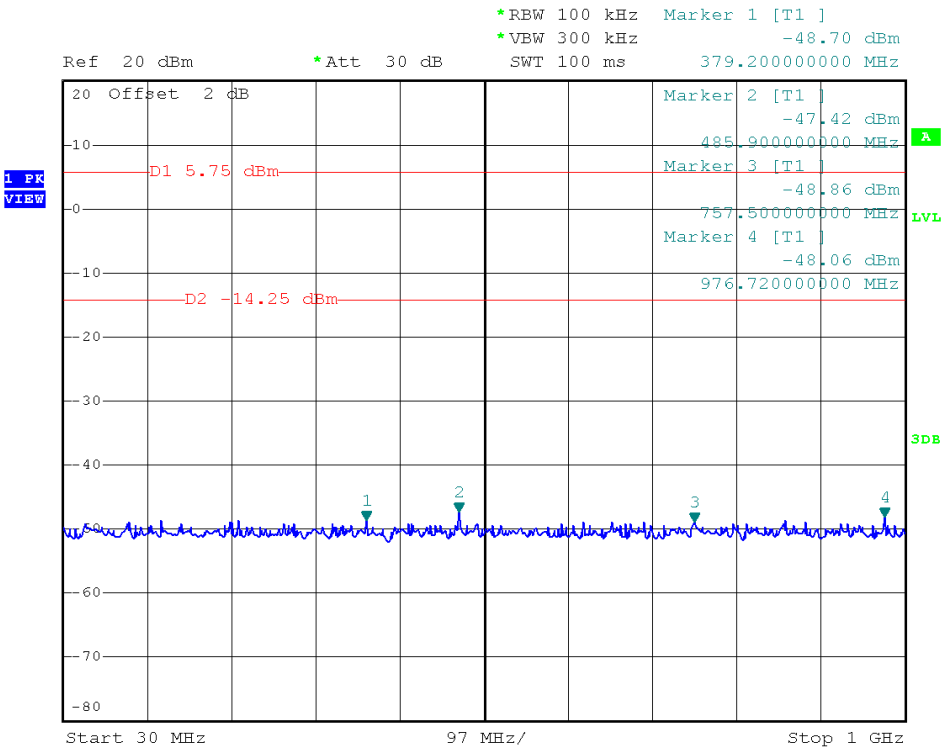
Note: the power of the Module transmitting frequency should be ignored.



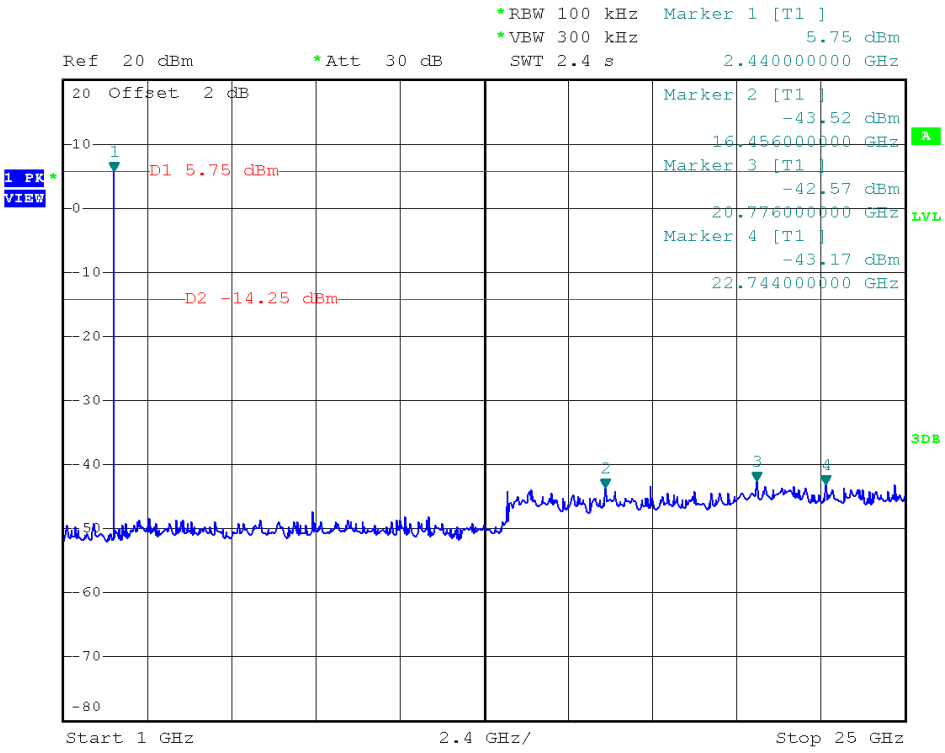
(Plot D.1: Channel = 0, 30MHz to 1GHz @π/4-DQPSK)



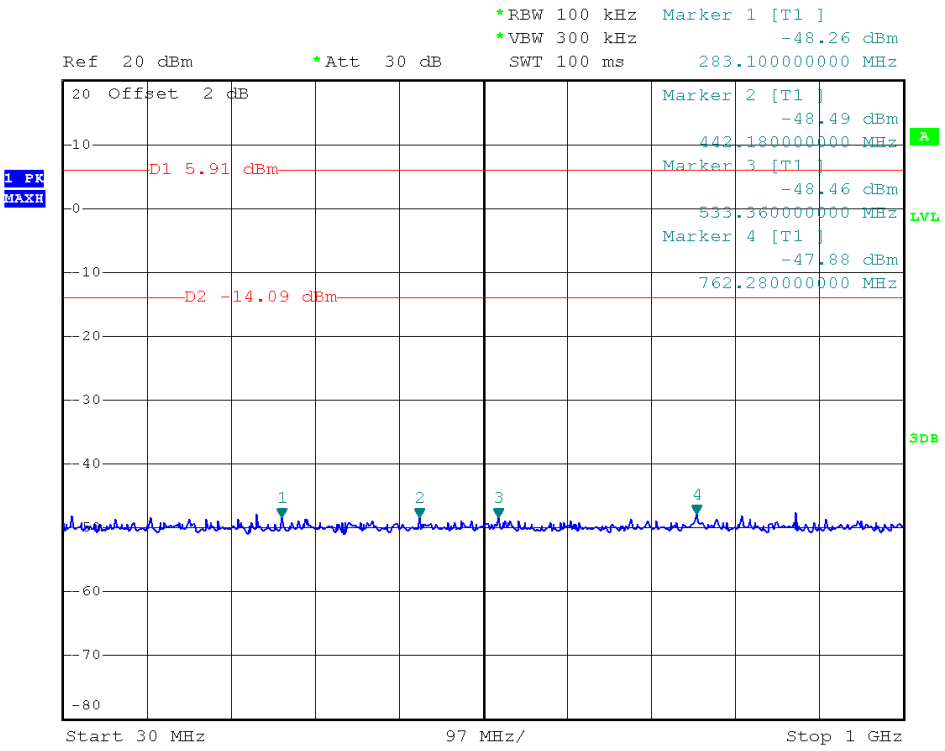
(Plot D.2: Channel = 0, 1GHz to 25GHz @π/4-DQPSK)



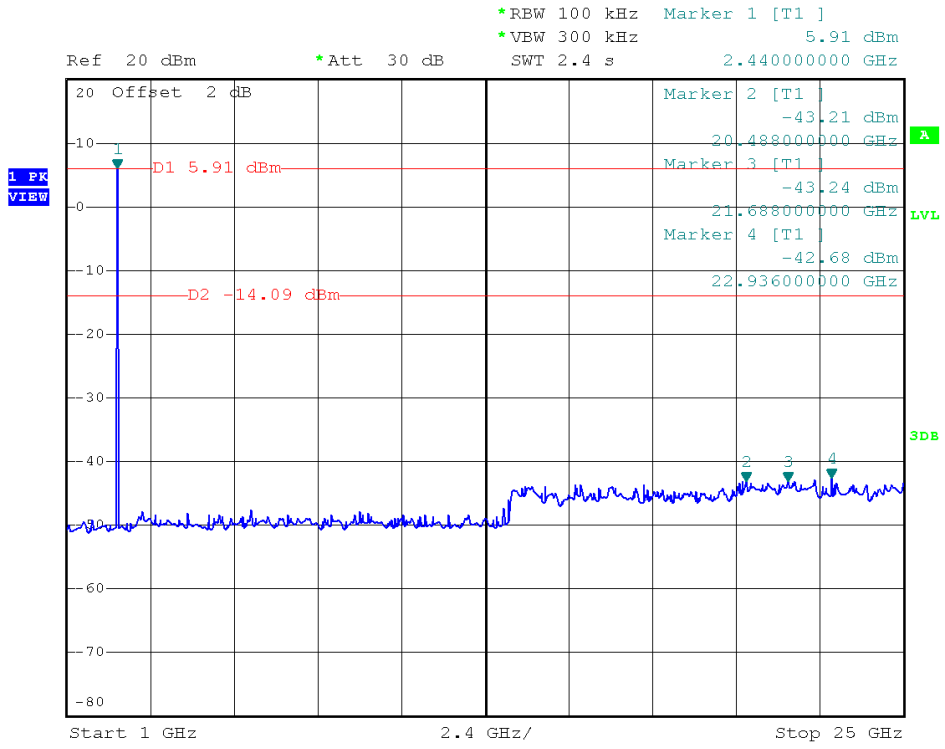
(Plot E.1: Channel = 39, 30MHz to 1GHz @π/4-DQPSK)



(Plot E.2: Channel = 39, 1GHz to 25GHz @π/4-DQPSK)



(Plot F.1: Channel = 78, 30MHz to 1GHz @π/4-DQPSK)



(Plot F.2: Channel = 78, 1GHz to 25GHz @π/4-DQPSK)

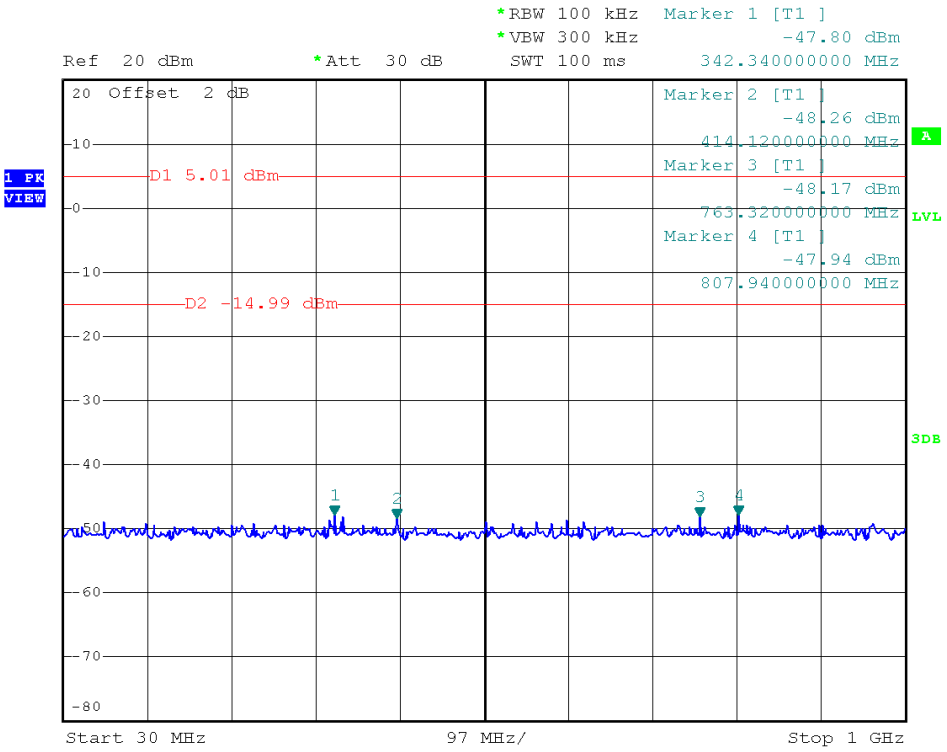
2.7.4.3. 8-DPSK Mode

A. Test Verdict:

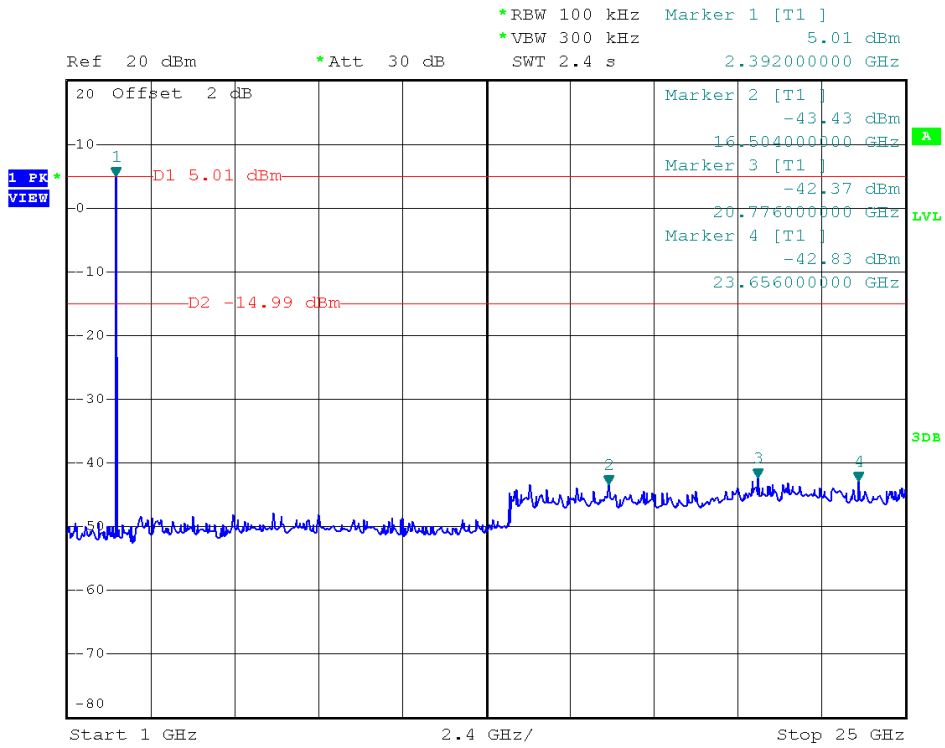
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-42.37	Plot G.1 to G.2	5.01	-14.99	PASS
39	2441	-42.67	Plot H.1 to H.2	5.71	-14.29	PASS
78	2480	-42.31	Plot I.1 to I.2	5.85	-14.15	PASS

Test Plots:

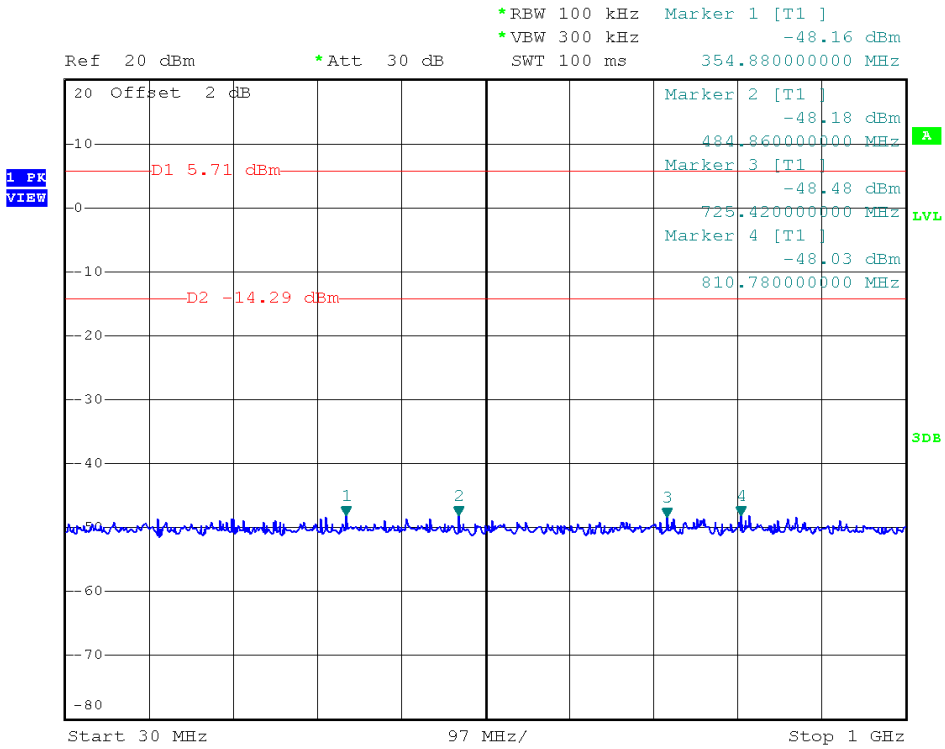
Note: the power of the Module transmitting frequency should be ignored.



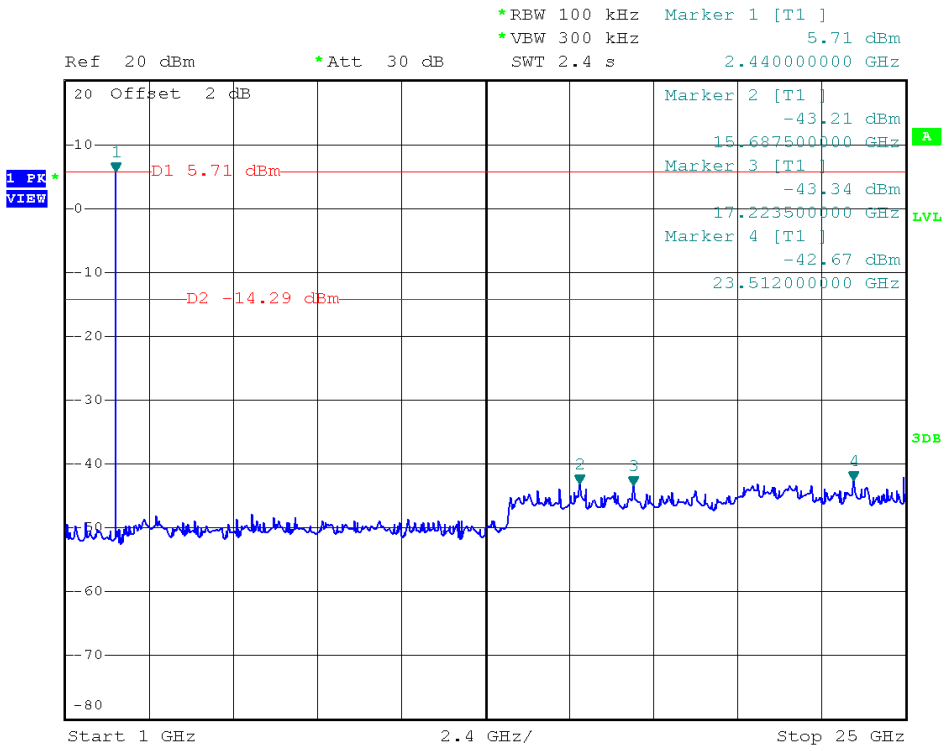
(Plot G.1: Channel = 0, 30MHz to 1GHz @ 8-DPSK)



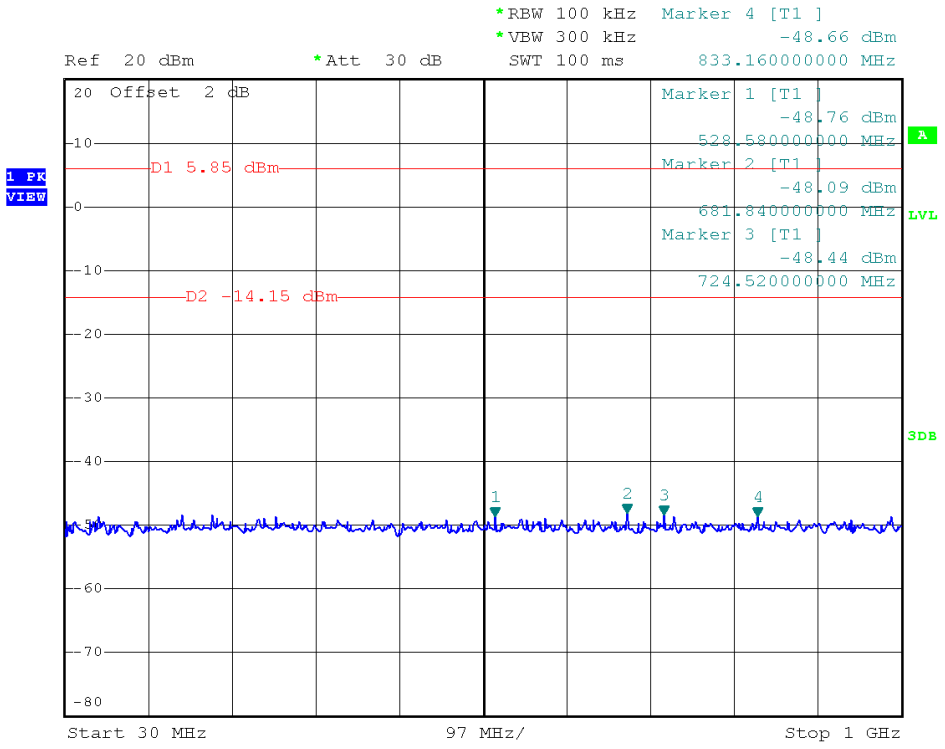
(Plot G.2: Channel = 0, 1GHz to 25GHz @ 8-DPSK)



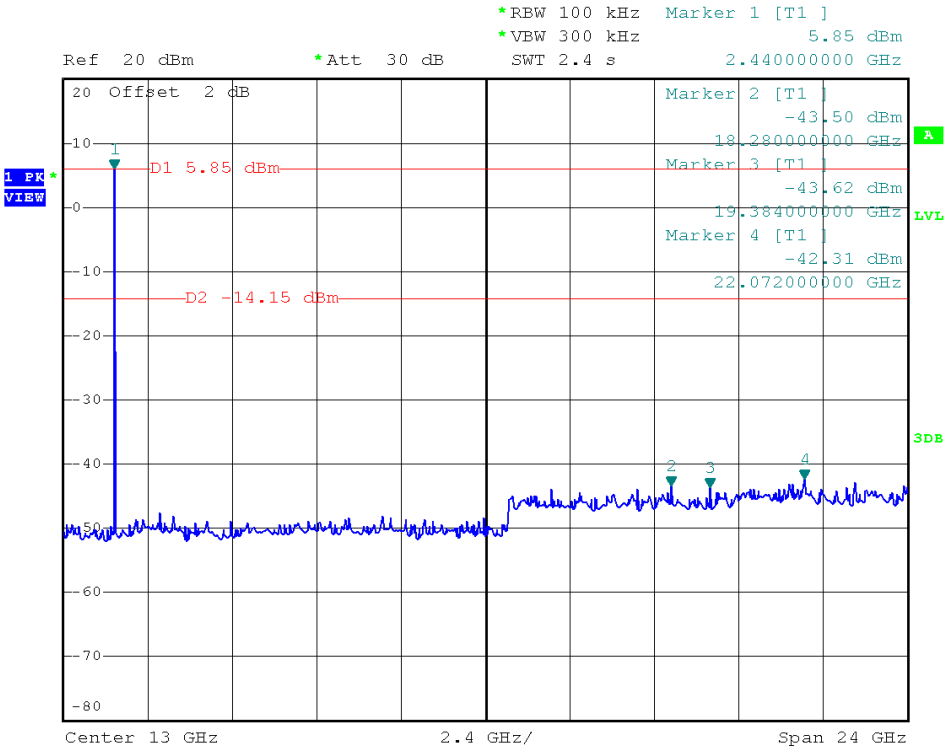
(Plot H.1: Channel = 39, 30MHz to 1GHz @ 8-DPSK)



(Plot H.2: Channel = 39, 1GHz to 25GHz @ 8-DPSK)



(Plot I.1: Channel = 78, 30MHz to 1GHz @ 8-DPSK)



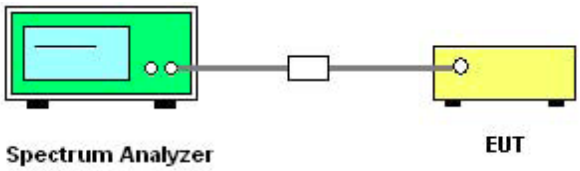
(Plot I.2: Channel = 78, 1GHz to 25GHz @ 8-DPSK)

2.8. Conducted Band Edge

2.8.1. Requirement

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.

2.8.2. Test Description



Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2014.07.07	2015.07.06

2.8.3. Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle ≥ 98%). Use the procedure described in 13.2.3 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent). Use the procedure described in 13.2.4 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2 percent).
When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

Set span to 2 MHz
RBW = 100 kHz.
VBW ≥ 3 x RBW.
Detector = peak.
Sweep time = auto.
Trace mode = max hold.
Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)

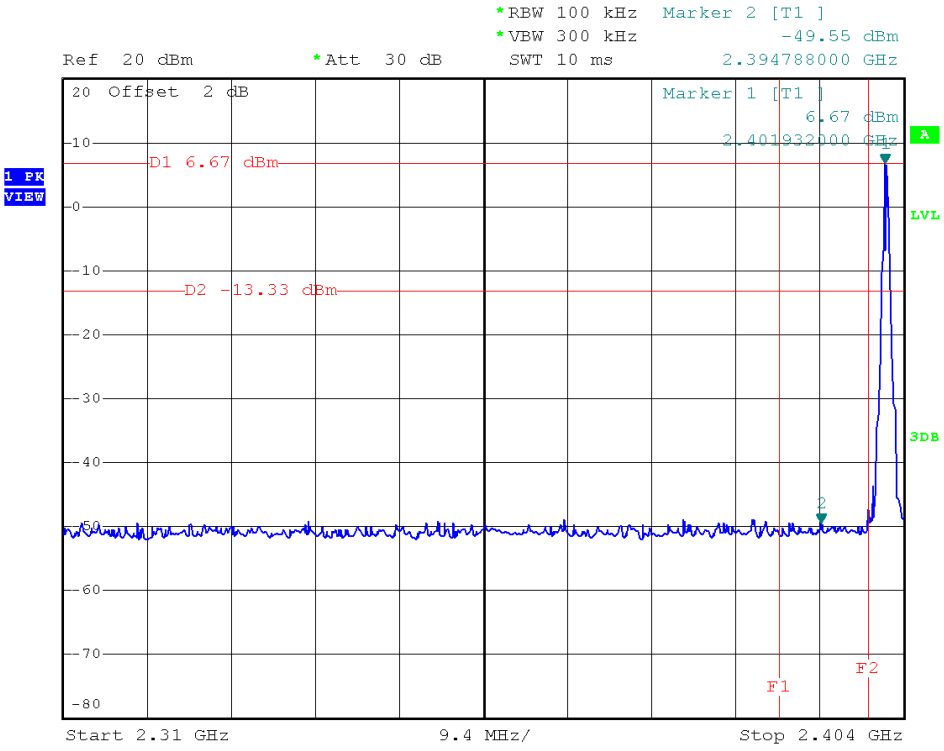
Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

2.8.4. Test Result

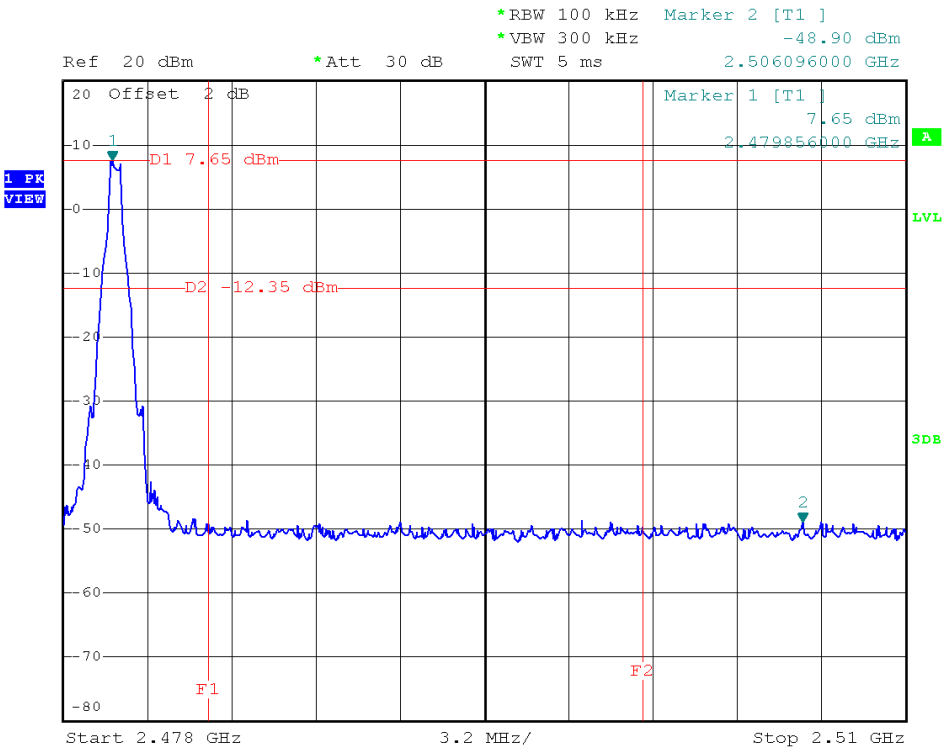
The Bluetooth Module operates at hopping-off test mode. The lowest and highest channels are tested to verify the band edge emissions.

2.8.4.1. GFSK Mode

Un-hopping mode

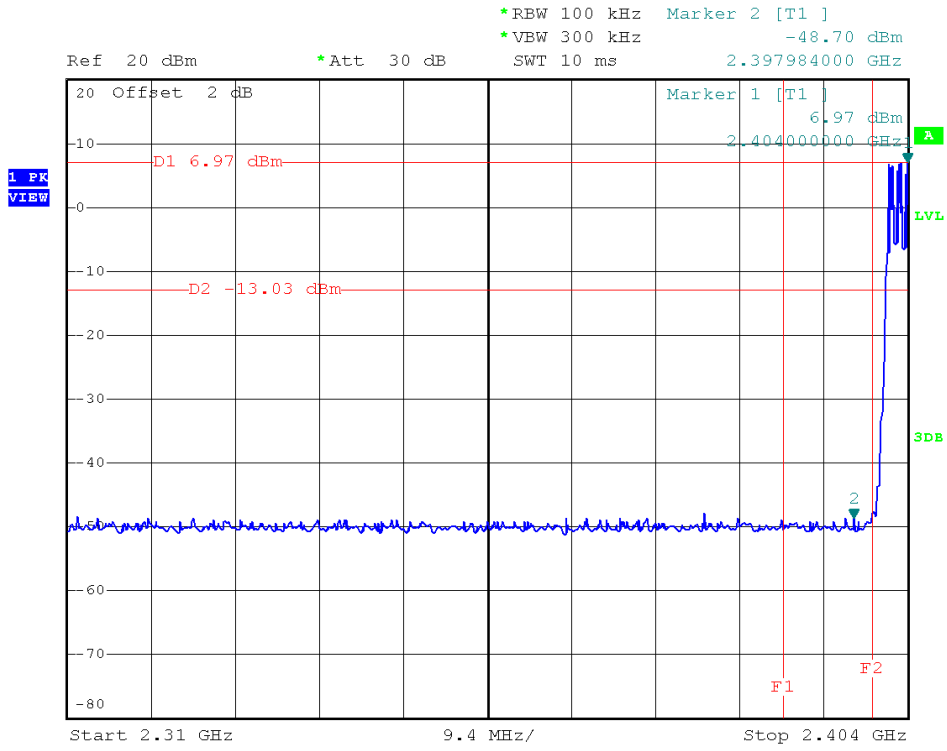


Channel = 0 @ GFSK

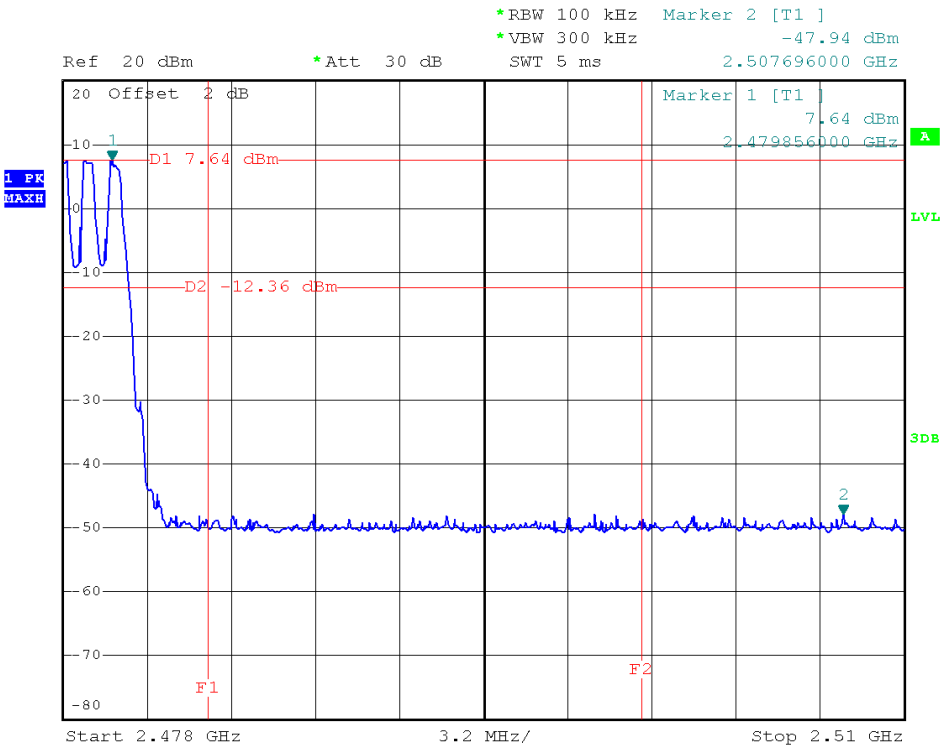


Channel = 78 @ GFSK

Hopping mode



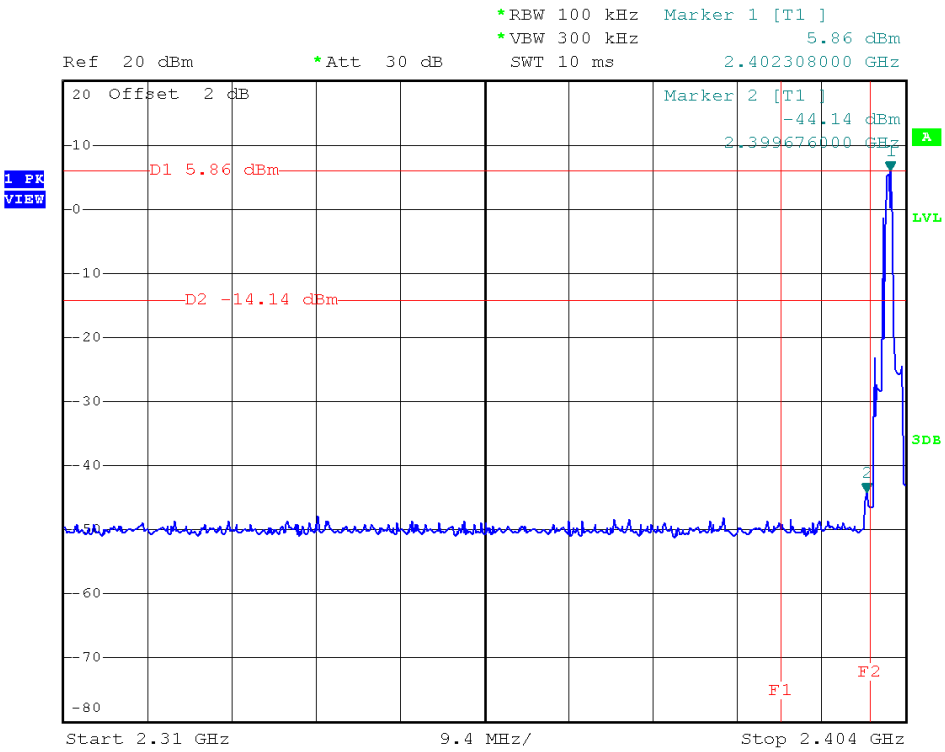
Channel = 0 @ GFSK



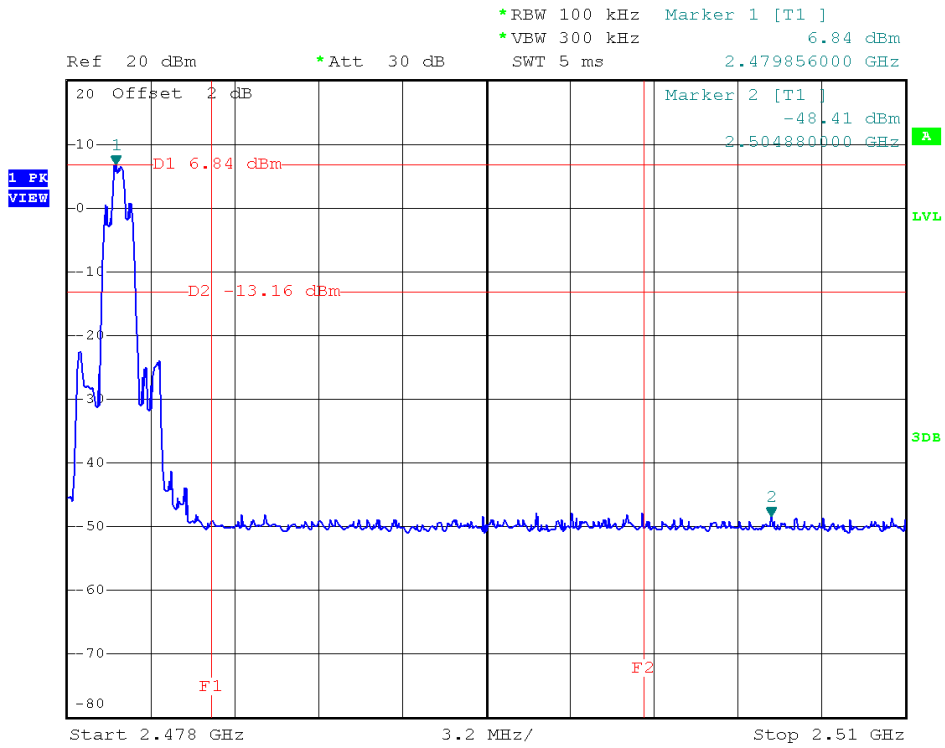
Channel = 78 @ GFSK

2.8.4.2. π/4-DQPSK Mode

Un-hopping mode

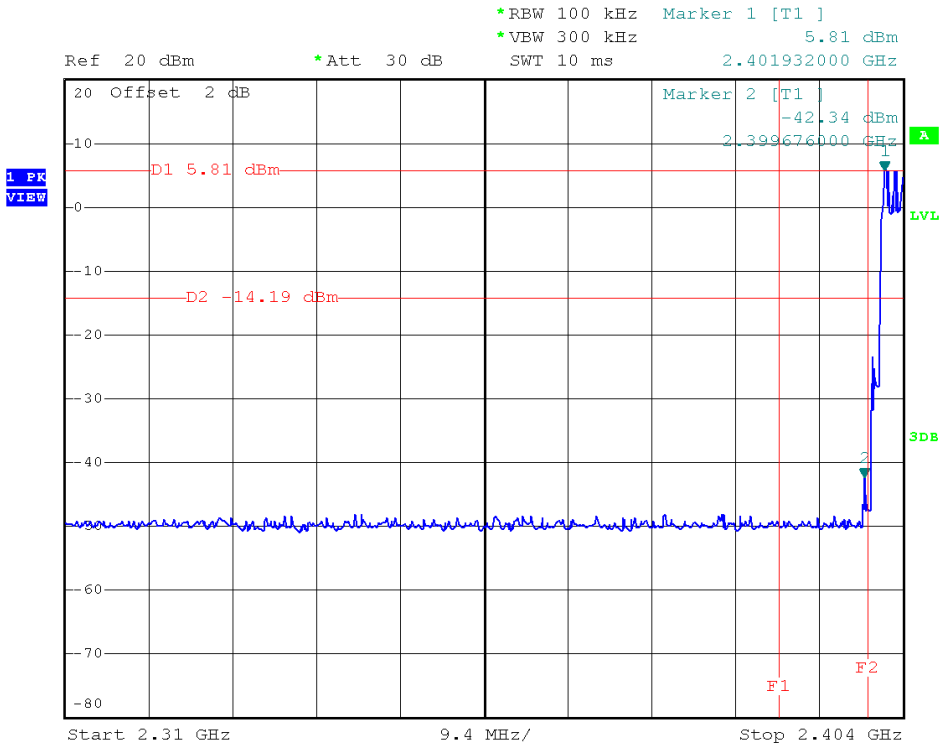


Channel = 0 @π/4-DQPSK

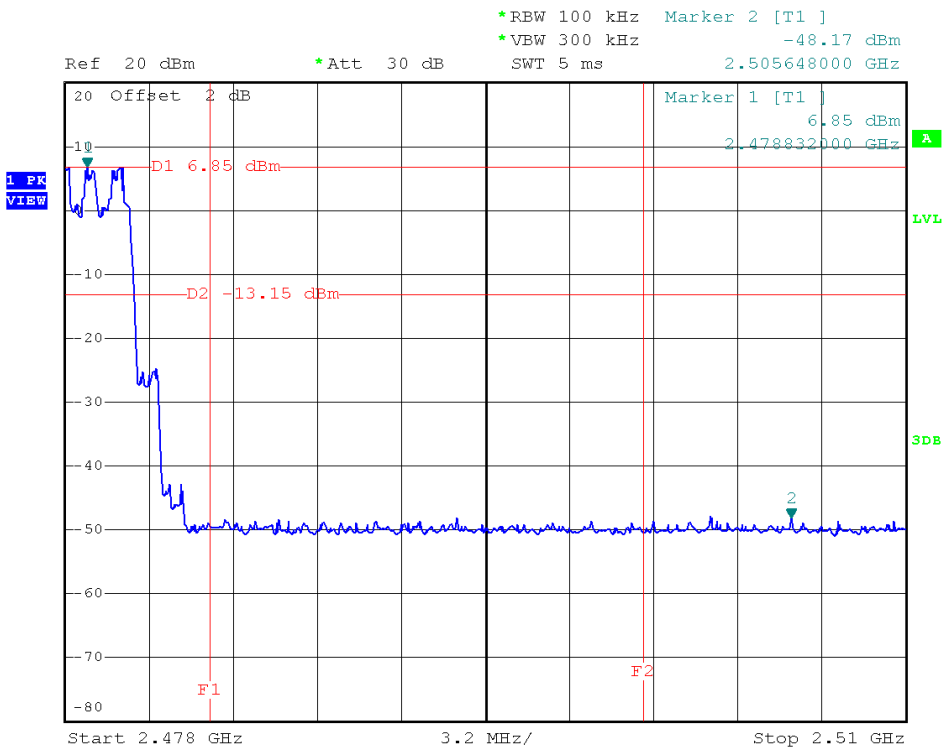


Channel = 78 @π/4-DQPSK

Hopping mode



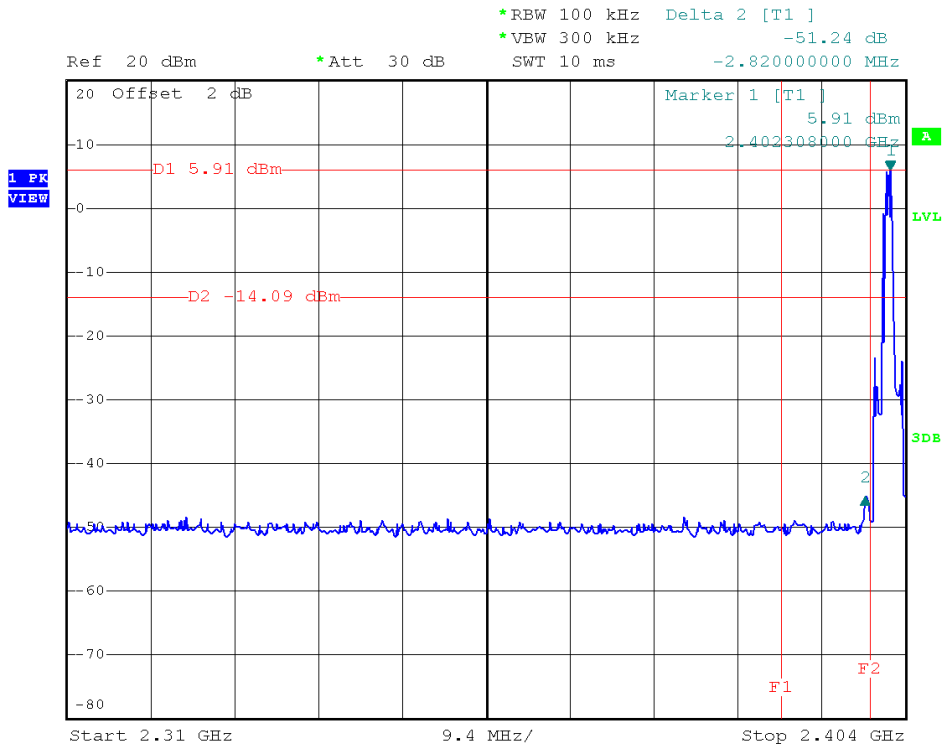
Channel = 0 @π/4-DQPSK



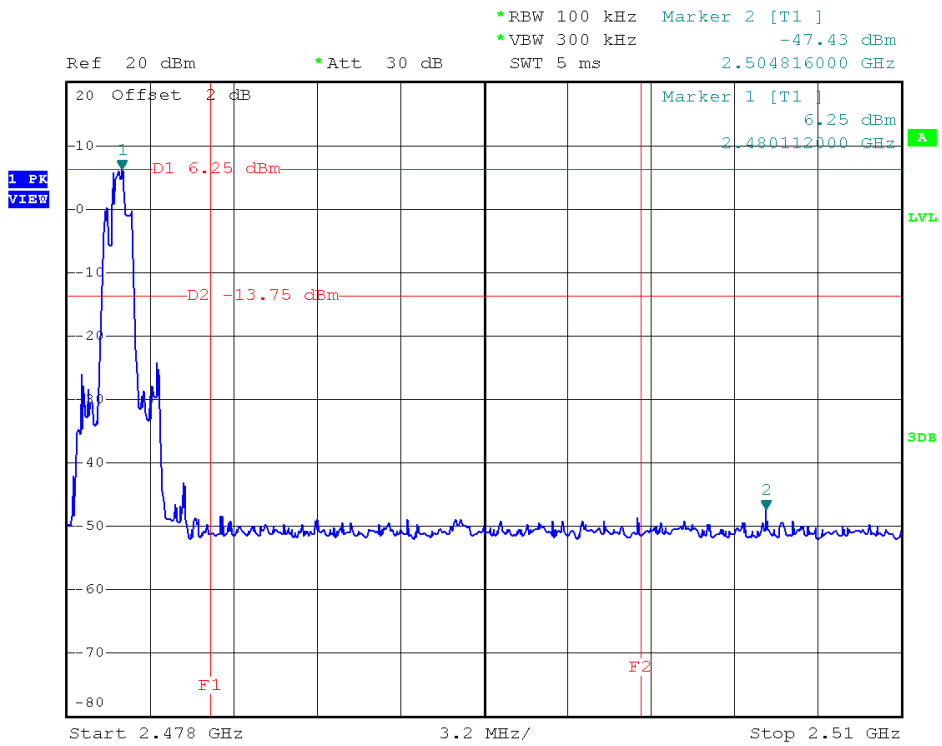
Channel = 78 @π/4-DQPSK

2.8.4.3. 8-DPSK Mode

Un-hopping mode

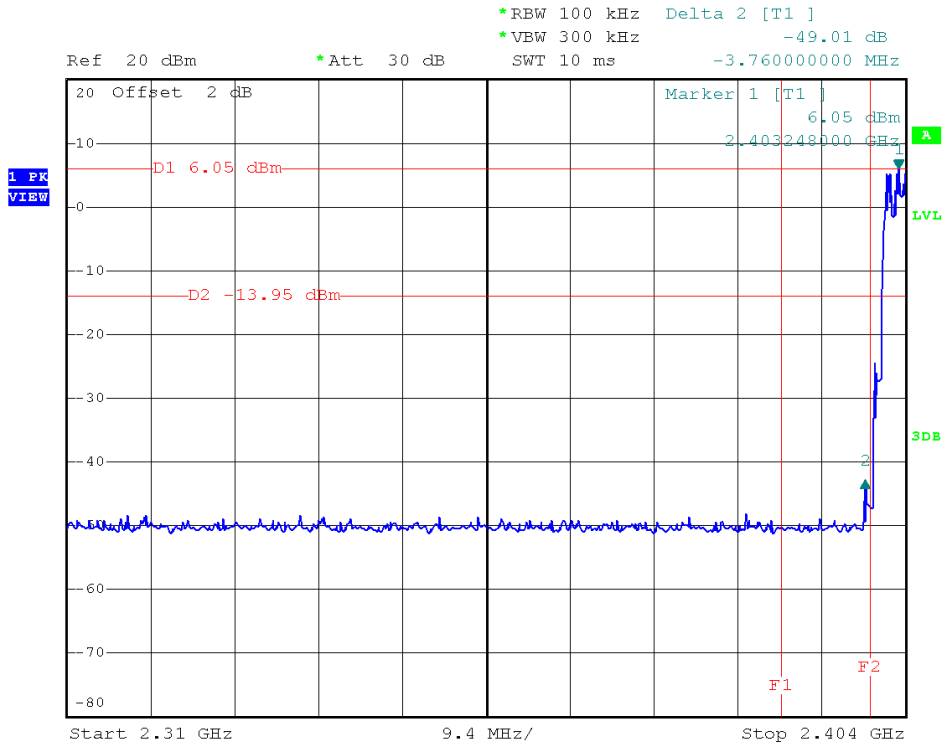


Channel = 0 @ 8-DPSK

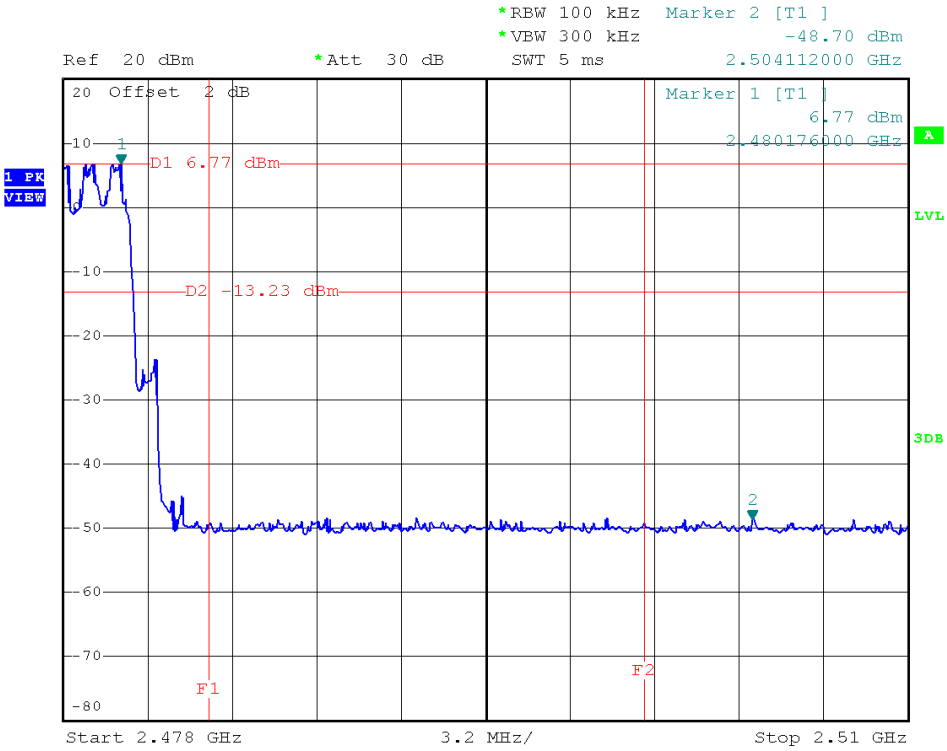


Channel = 78 @ 8-DPSK

Hopping mode



Channel = 0@ 8-DPSK



Channel = 78@ 8-DPSK

2.9. Conducted Emission

2.9.1. Requirement

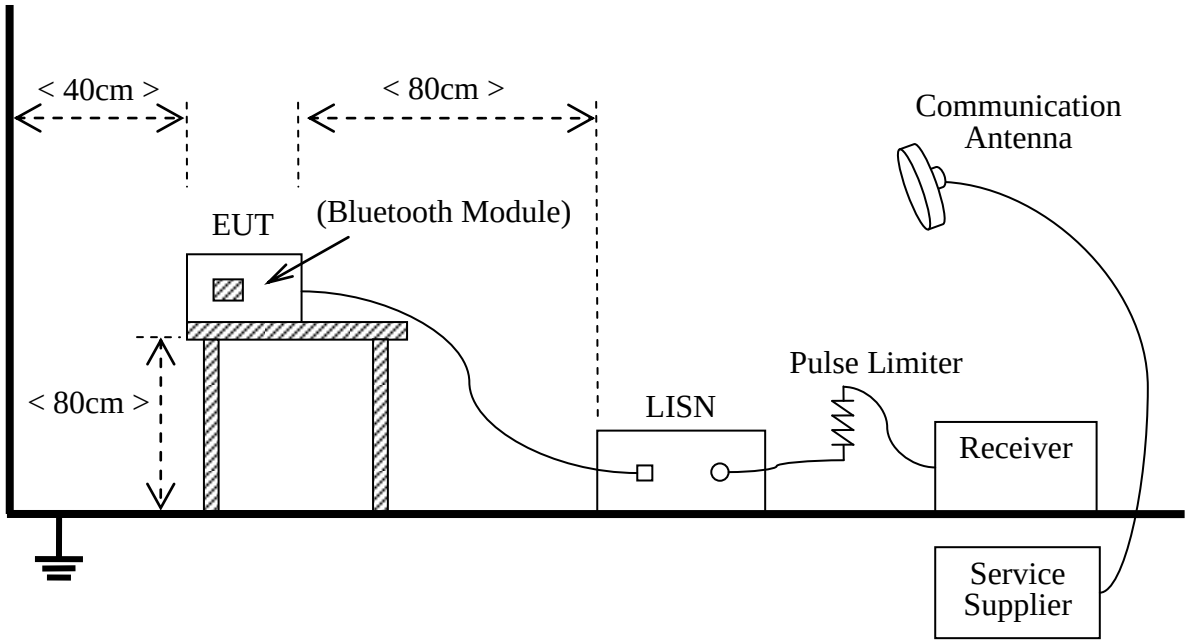
According to FCC section 15.207 and RSS- Gen section 7.2.4, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.9.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2013

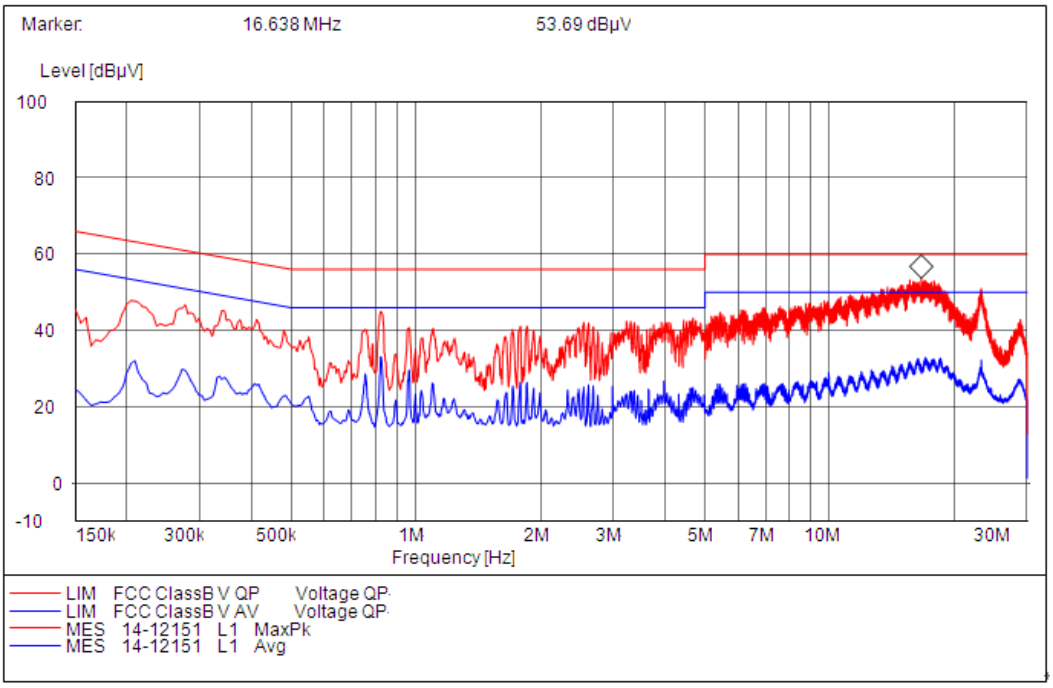
The Bluetooth Module of the EUT is powered by the Battery charged with USB port of PC, PC is powered by 120V, 60Hz AC mains supply. The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Test Receiver	R&S	ESCS30	A0304260	2015.06.02	2016.06.02
LISN	R&S	ESH2-Z5	A0304221	2015.06.02	2016.06.02
Service Supplier	R&S	CMU200	A0304252	2015.06.02	2016.06.02

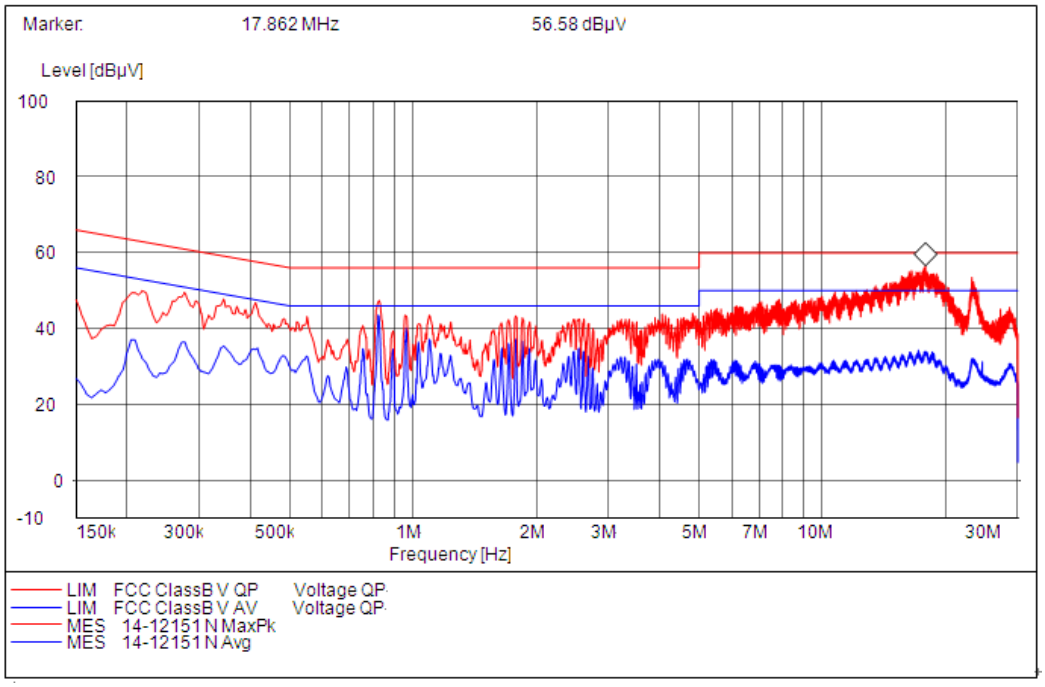
2.9.3. Test Result

The EUT configuration of the emission tests is EUT + PC.



(Plot A: L Phase)

Conducted Disturbance at Mains Terminals							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.2760	60.90	44.75	16.15	0.2760	50.90	29.58	21.32
0.8205	56.00	42.94	13.06	0.8205	46.00	33.12	12.88
16.6380	60.00	49.98	10.02	16.6380	50.00	30.04	19.96



(Plot B: N Phase)

Conducted Disturbance at Mains Terminals							
QP				AV			
Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)	Frequency (MHz)	Limits (dBµV)	Measurement Value (dBµV)	Margin (dB)
0.4110	57.60	44.90	12.70	0.4110	47.60	34.48	13.12
0.8250	56.00	45.63	10.37	0.8250	46.00	42.55	3.45
17.8620	60.00	54.09	5.91	17.8620	50.00	33.86	16.14

2.10. Radiated Band Edge and Spurious Emission

2.10.1. Requirement

According to FCC section 15.247(c) and RSS-A8.5, radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Note:

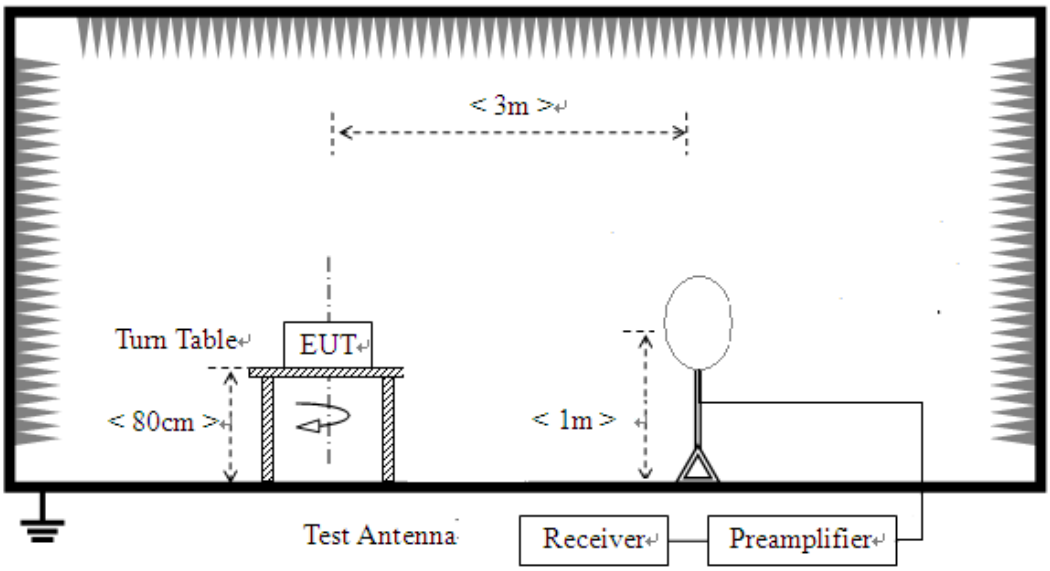
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

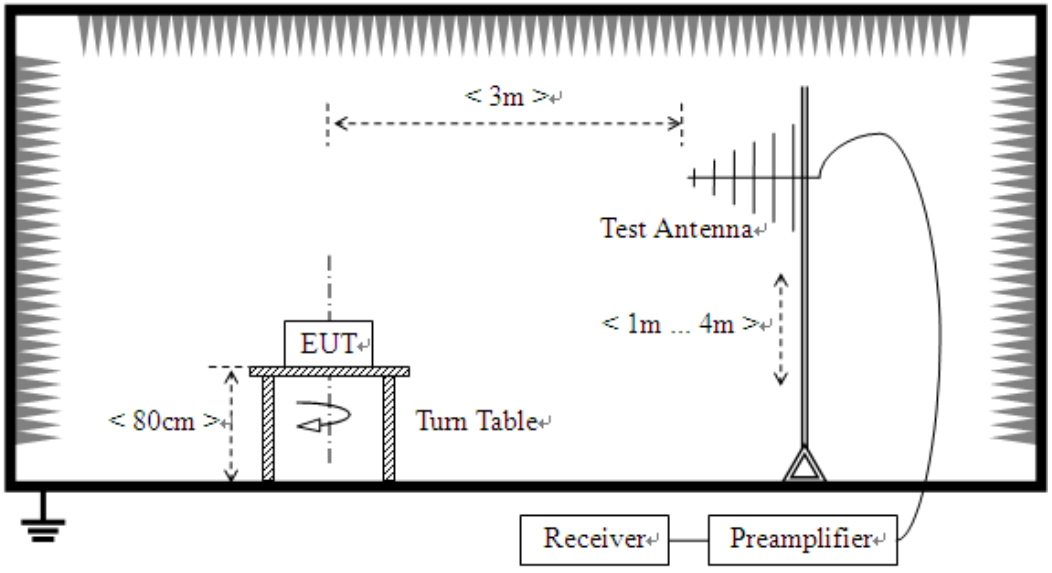
2.10.2. Test Description

A. Test Setup:

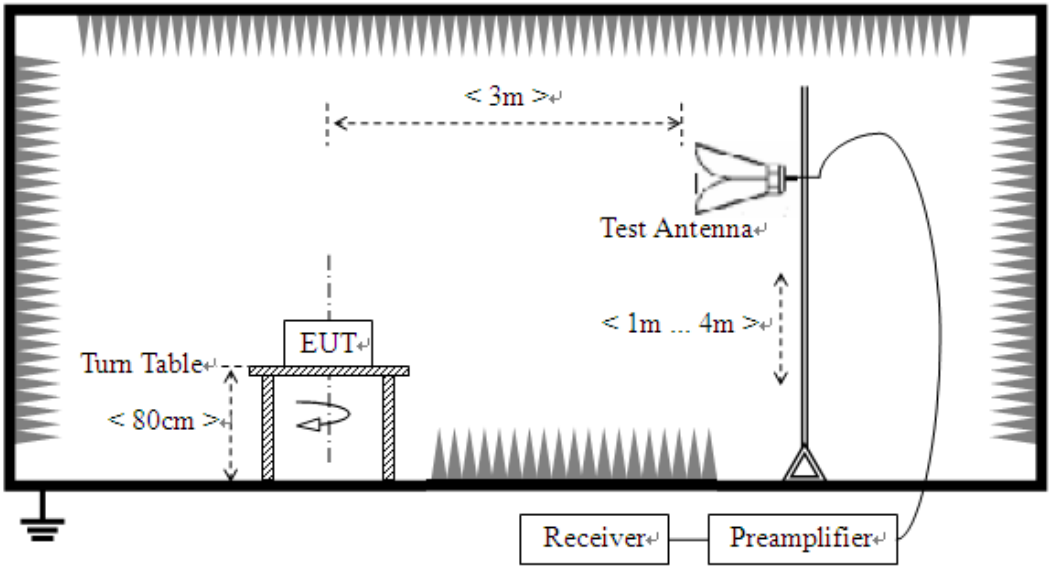
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 2013. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The Bluetooth Module of the EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 2GHz) and Horn Test Antenna (above 2GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2015.06.02	2016.06.02
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2015.01.05	2016.01.04
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2015.06.02	2016.06.02
Test Antenna - Horn	R&S	BBHA 9120D	9120C-963	2015.06.02	2016.06.02

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Test Antenna - Horn	R&S	HF960	100150	2015.06.02	2016.06.02
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2015.06.02	2016.06.02
Test Antenna -Loop	Schwarzbeck	HFH2-Z2	100047	2015.06.02	2016.06.02
Amplifier 1G~18GHz	R&S	MITEQ AFS42-00101800	25-S-42	2015.06.02	2016.06.02
Amplifier 18G~40GHz	R&S	JS42-18002600-28-5A	12111.0980.00	2015.06.02	2016.06.02
amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.02

2.10.3. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

2.10.4. Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis

test condition was recorded in this test report.

Note: 1.The radiated measurement are performed the each test mode (GFSK/ π /4-DQPSK /8-DPSK) and channel (low/mid/high), the datum recorded below (GFSK mode, the middle channel) is the worst case for all the test mode and channel.

2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.

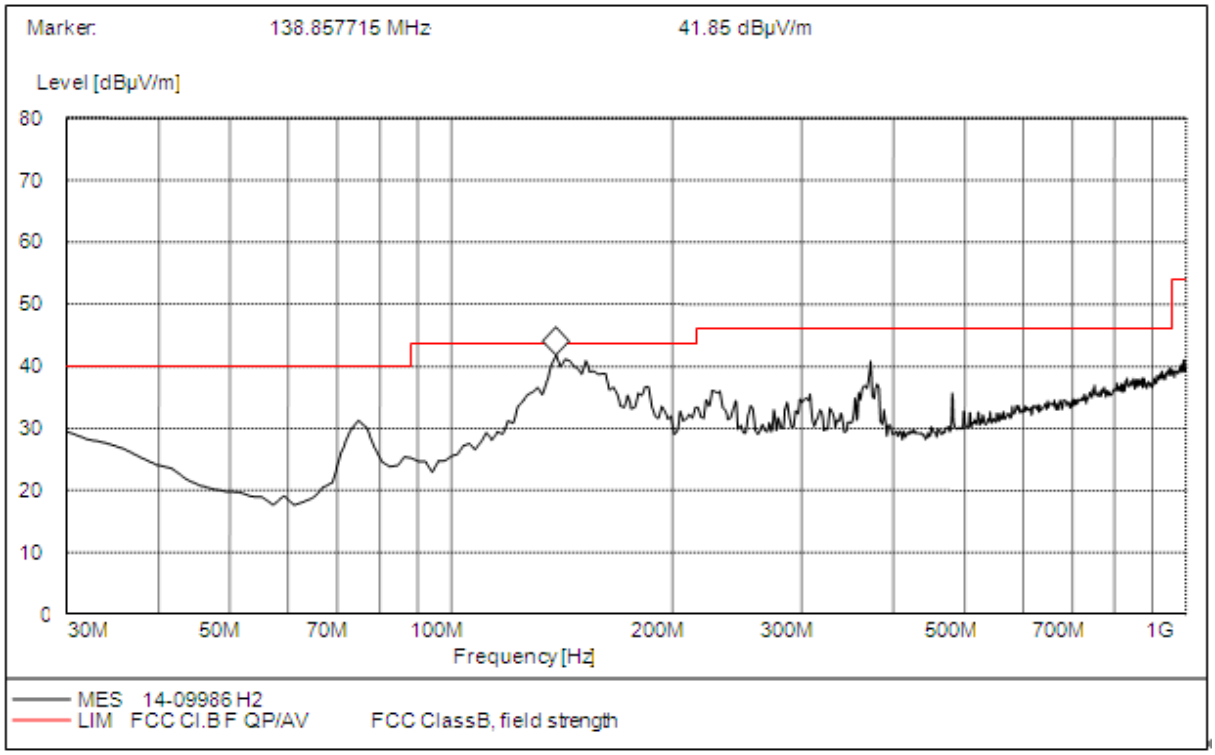
3. HORN ANTENNA for the radiation emission test above 1G.

Test plots for the whole measurement frequency range：

For 9KHz to 30MHz

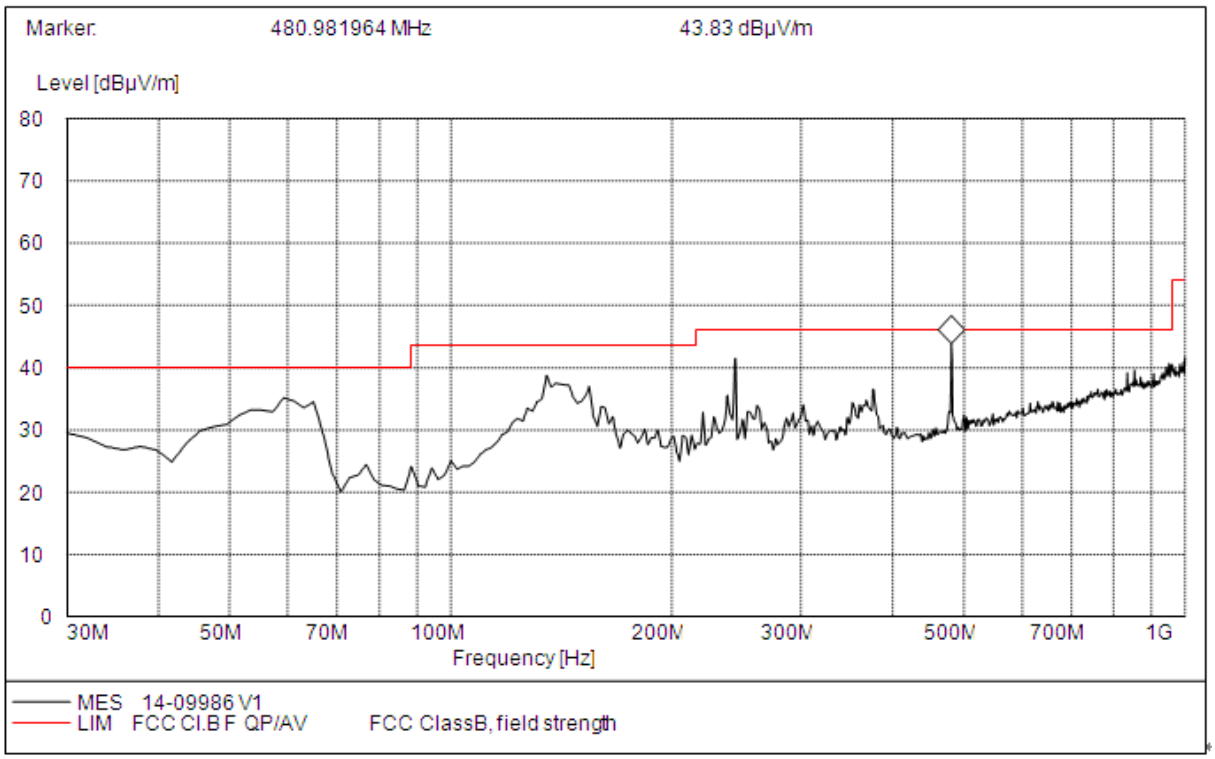
The test has been performed， and the Radiated Emission level is too low to the limit.

For 30MHz to 1000MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Verdict
74.710000	31.27	120.000	100.0	40.00	8.73	Horizontal	Pass
138.850000	40.15	120.000	100.0	43.50	3.35	Horizontal	Pass
152.460000	40.02	120.000	100.0	43.50	5.98	Horizontal	Pass
372.124000	40.56	120.000	100.0	46.00	5.54	Horizontal	Pass
580.120000	33.45	120.000	100.0	46.00	13.58	Horizontal	Pass

(Plot A: 30MHz to 1GHz, Antenna Vertical)



Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dBµV/m)	Margin (dB)	Antenna	Verdict
59.150000	32.68	120.000	100.0	40.00	7.32	Vertical	Pass
138.260000	38.56	120.000	100.0	43.50	4.94	Vertical	Pass
239.450000	40.35	120.000	100.0	46.00	5.65	Vertical	Pass
480.240000	43.26	120.000	100.0	46.00	2.74	Vertical	Pass

(Plot B: 30MHz to 1GHz, Antenna Horizontal)

For 1GHz to 25GHz

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK-2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.4	PK	74.0	-17.6	1.01 H	228	24.20	32.20
2	2390.00	43.7	AV	54.0	-10.3	1.01 H	228	11.50	32.20
3	*2402.00	104.4	PK	/	/	1.03 H	112	72.20	32.20
4	*2402.00	102.0	AV	/	/	1.03 H	112	69.80	32.20
5	4804.00	50.8	PK	74.00	-23.2	1.00 H	254	45.50	5.30
6	4804.00	42.6	AV	54.00	-11.4	1.00 H	254	37.30	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK-2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.0.	PK	74.0	-17.0	1.11 V	228	24.80	32.20
2	2390.00	44.2	AV	54.0	-9.8	1.11 V	228	12.00	32.20
3	*2402.00	117.1	PK	/	/	1.09 V	112	84.90	32.20
4	*2402.00	113.6	AV	/	/	1.03 V	112	81.40	32.20
5	4804.00	54.4	PK	74.00	-19.6	1.21 V	254	49.10	5.30
6	4804.00	44.7	AV	54.00	-9.3	1.21 V	254	39.40	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK_2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	107.5	PK	/	/	1.01 H	210	75.30	32.20
2	*2441.00	105.9	AV	/	/	1.01 H	210	73.70	32.20
3	4882.00	53.8	PK	74.00	-20.2	1.03 H	272	48.50	5.30
4	4882.00	43.2	AV	54.00	-10.8	1.03 H	272	37.90	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK_2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	109.0	PK	/	/	1.09 V	112	76.80	32.20
2	*2441.00	105.3	AV	/	/	1.09 V	112	73.10	32.20
3	4884.00	56.5	PK	74.00	-17.5	1.21 V	254	51.20	5.30
4	4884.00	41.5	AV	54.00	-12.5	1.21 V	254	36.20	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（GFSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	108.2	PK	/	/	1.05 V	215	75.90	32.30
2	*2480.00	106.8	AV	/	/	1.05 V	215	74.50	32.30
3	2483.50	57.3	PK	74.0	-16.7	1.05 V	211	24.90	32.40
4	2483.50	45.0	AV	54.0	-9.0	1.05 V	211	12.60	32.40
5	4960.00	52.4	PK	74.0	-21.6	1.45 V	320	46.90	5.50
6	4960.00	45.3	AV	54.0	-8.7	1.45 V	320	39.80	5.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（GFSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	118.7	PK	/	/	1.05 V	174	86.40	32.30
2	*2480.00	116.8	AV	/	/	1.05 V	174	84.50	32.30
3	2483.50	55.5	PK	74.0	-18.5	1.05 V	177	23.10	32.40
4	2483.50	45.7	AV	54.0	-8.3	1.05 V	177	13.30	32.40
5	4960.00	55.9	PK	74.0	-18.1	1.45 V	201	50.40	5.50
6	4960.00	40.9	AV	54.0	-13.1	1.45 V	201	35.40	5.50

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK -2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	56.7	PK	74.0	-17.3	1.01 H	228	24.50	32.20
2	2390.00	43.9	AV	54.0	-10.1	1.01 H	228	11.70	32.20
3	*2402.00	107.4	PK	/	/	1.03 H	112	75.20	32.20
4	*2402.00	107.0	AV	/	/	1.03 H	112	74.80	32.20
5	4804.00	51.8	PK	74.00	-22.2	1.00 H	254	46.50	5.30
6	4804.00	44.6	AV	54.00	-9.4	1.00 H	254	39.30	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK -2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.0	PK	74.0	-17.0	1.11 V	228	24.80	32.20
2	2390.00	43.6	AV	54.0	-10.4	1.11 V	228	11.40	32.20
3	*2402.00	107.1	PK	/	/	1.09 V	112	74.90	32.20
4	*2402.00	104.6	AV	/	/	1.03 V	112	72.40	32.20
5	4804.00	54.4	PK	74.00	-19.6	1.21 V	254	49.10	5.30
6	4804.00	44.0	AV	54.00	-10.0	1.21 V	254	38.70	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK _2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	110.3	PK	/	/	1.01 H	210	78.10	32.20
2	*2441.00	110.1	AV	/	/	1.01 H	210	77.90	32.20
3	4882.00	54.8	PK	74.00	-19.2	1.03 H	272	49.50	5.30
4	4882.00	41.2	AV	54.00	-12.8	1.03 H	272	35.90	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK _2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	110.0	PK	/	/	1.09 V	112	77.80	32.20
2	*2441.00	107.3	AV	/	/	1.09 V	112	75.10	32.20
3	4884.00	55.8	PK	74.00	-18.2	1.21 V	254	50.50	5.30
4	4884.00	41.5	AV	54.00	-12.5	1.21 V	254	36.20	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（π/4-DQPSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	110.2	PK	/	/	1.05 V	215	77.90	32.30
2	*2480.00	108.1	AV	/	/	1.05 V	215	75.80	32.30
3	2483.50	57.3	PK	74.0	-16.7	1.05 V	211	24.90	32.40
4	2483.50	43.0	AV	54.0	-11.0	1.05 V	211	10.60	32.40
5	4960.00	52.4	PK	74.0	-21.6	1.45 V	320	46.90	5.50
6	4960.00	44.3	AV	54.0	-9.7	1.45 V	320	38.80	5.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（π/4-DQPSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	109.5	PK	/	/	1.05 V	174	77.20	32.30
2	*2480.00	106.8	AV	/	/	1.05 V	174	74.50	32.30
3	2483.50	55.5	PK	74.0	-18.5	1.05 V	177	23.10	32.40
4	2483.50	43.7	AV	54.0	-10.3	1.05 V	177	11.30	32.40
5	4960.00	55.9	PK	74.0	-18.1	1.45 V	201	50.40	5.50
6	4960.00	42.9	AV	54.0	-11.1	1.45 V	201	37.40	5.50

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DQPSK -2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	53.7	PK	74.0	-20.3	1.01 H	228	21.50	32.20
2	2390.00	43.9	AV	54.0	-10.1	1.01 H	228	11.70	32.20
3	*2402.00	111.4	PK	/	/	1.03 H	112	79.20	32.20
4	*2402.00	108.0	AV	/	/	1.03 H	112	75.80	32.20
5	4804.00	51.8	PK	74.00	-22.2	1.00 H	254	46.50	5.30
6	4804.00	43.6	AV	54.00	-10.4	1.00 H	254	38.30	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DQPSK -2402MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.0	PK	74.0	-17.0	1.11 V	228	24.80	32.20
2	2390.00	43.6	AV	54.0	-10.4	1.11 V	228	11.40	32.20
3	*2402.00	117.1	PK	/	/	1.09 V	112	84.90	32.20
4	*2402.00	113.6	AV	/	/	1.03 V	112	81.40	32.20
5	4804.00	54.4	PK	74.00	-19.6	1.21 V	254	49.10	5.30
6	4804.00	44.4	AV	54.00	-9.6	1.21 V	254	39.10	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DQPSK _2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	107.3	PK	/	/	1.01 H	210	75.10	32.20
2	*2441.00	104.1	AV	/	/	1.01 H	210	71.90	32.20
3	4882.00	53.8	PK	74.00	-20.2	1.03 H	272	48.50	5.30
4	4882.00	46.2	AV	54.00	-7.8	1.03 H	272	40.90	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DQPSK _2441MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	109.0	PK	/	/	1.09 V	112	76.80	32.20
2	*2441.00	105.3	AV	/	/	1.09 V	112	73.10	32.20
3	4884.00	56.8	PK	74.00	-17.2	1.21 V	254	51.50	5.30
4	4884.00	43.5	AV	54.00	-10.5	1.21 V	254	38.20	5.30

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M（8-DQPSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	116.2	PK	/	/	1.05 V	215	83.90	32.30
2	*2480.00	112.8	AV	/	/	1.05 V	215	80.50	32.30
3	2483.50	57.3	PK	74.0	-16.7	1.05 V	211	24.90	32.40
4	2483.50	43.5	AV	54.0	-10.5	1.05 V	211	11.10	32.40
5	4960.00	52.4	PK	74.0	-21.6	1.45 V	320	46.90	5.50
6	4960.00	44.3	AV	54.0	-9.7	1.45 V	320	38.80	5.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M（8-DQPSK _2480MHz）									
No.	Frequency (MHz)	Emssion Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	116.8	PK	/	/	1.05 V	174	84.50	32.30
2	*2480.00	114.8	AV	/	/	1.05 V	174	82.50	32.30
3	2483.50	55.5	PK	74.0	-18.5	1.05 V	177	23.10	32.40
4	2483.50	42.7	AV	54.0	-11.3	1.05 V	177	10.30	32.40
5	4960.00	55.9	PK	74.0	-18.1	1.45 V	201	50.40	5.50
6	4960.00	42.9	AV	54.0	-11.1	1.45 V	201	37.40	5.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
   － Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level － Limit value
5. " * ": Fundamental frequency.

** END OF REPORT **