FCC Part 15 Subpart C Test Report

for FHSS System

Product Name	**:**	**Android Moblie Data Terminal**
Model Name	**:**	**MX-5050-1D, MX-5050-2D, MX-5050-EX**

Prepared for:

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Report Number	**:**	UL32220150710FCC009-4
Date of Report	**:**	08-03-2015
Date of Test	**:**	07-17-2015~08-03-2015

Notes：
The test results only relate to these samples which have been tested.
Partly using this report will not be admitted unless been allowed by Unilab.
Unilab is only responsible for the complete report with the reported stamp of Unilab.

Applicant:	Mexxen Technology(ShangHai)INC. Unit B,12F,Building 11,No. 518,xinzhuan Rd., Songjiang District,Shanghai,China
Manufacturer:	Mexxen Technology(ShangHai)INC. Unit B,12F,Building 11,No. 518,xinzhuan Rd., Songjiang District,Shanghai,China
Product Name:	Android Moblie Data Terminal
Brand Name:	MEXXEN
Model Name:	MX-5050-1D
Model Description:	See Part1.1 NOTE
FCC ID:	2ADXO-MX-5050
Serial Number:	N/A
EUT Voltage:	AC input: AC 100~240V 50/60Hz 0.4A Output: DC 5V 2A
Date of Receipt:	07-10-2015
Test Standard:	FCC CFR Tile 47 Part 15 Subpart C ANSI C 63.4: 2009 DA 00705
Test Result:	PASS
Date of Test	07-17-2015~08-03-2015

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(Supervisor: Eva Wang)

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1. GENERAL INFORMATION

1.1 EUT DESCRIPTION

Product Name:	Android Moblie Data Terminal
Model Name:	MX-5050-1D
Hardware Version:	V3.0
Software Version:	GST_A82_M30_3110955E_MUL_V02_20150619
RF Exposure Environment:	Uncontrolled
Bluetooth	
Frequency Range:	2402MHz~2480MHz
Carrier Frequency of Each Channel	2402+N*1MHz(N=0~78)
Type of Modulation:	GFSK, π /4-DQPSK, 8-DPSK
Channel Separation:	1MHz
Channel Number:	79
Antenna Type:	Internal
Antenna Peak Gain:	2.6dBi
Component	
AC Adapter:	Input: AC 100-240V 50/60Hz 0.4A
	Output: DC 5V 2A

Note: We Mexxen Technology(ShangHai)INC.hereby declaration that the Model MX-5050-1D,MX-5050-2D,and Model MX-5050-EX, have the same PCBA design, and same accessories;And no any other difference except for model name.

1.2 TEST MODE

Unilab has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: GFSK CH0
Mode 2: GFSK CH39
Mode 3: GFSK CH78
Mode 4: 8-DPSK CH0
Mode 5: 8-DPSK CH39
Mode 6: 8-DPSK CH78
Mode 7: Π/4-DQPSK CH0
Mode 8: Π/4-DQPSK CH39
Mode 9: Π/4-DQPSK CH78

Note:
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application

2.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.3 of ANSI C63.4: 2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m

away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.4 of ANSI C63.4: 2009.

2.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2 Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

2.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below GFSK(1Mbps), Π/4-DQPSK (2Mbps)and 8-DPSK(3 Mbps) Channel Low (2402MHz),Mid (2441MHz) and High (2480MHz), these were chosen for full testing.

3. TECHNIACL SUMMARY

3.1 SUMMARY OF STANDARDS AND TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Test Item	FCC	Result
Channel Separation	§15.247 (a)	P
Minimum Hopping Channel	§15.247 (a)	P
Occupied Bandwidth	§15.247 (a)	P
Dwell Time	§15.247 (a)	P
Peak Output Power (Conduction)	§15.247 (b)	P
Spurious Emissions (Conduction)	§15.247 (d)	P
Band edge measurement	§15.247 (d)	P
Spurious Emissions (Radiation)	§15.247 (d) §15.35 (b) §15.209 (a)	P
AC Power Line Conducted Emissions	§15.207 (a)	P

Note: P means pass, F means failure, N/A means not applicable

3.2 TEST UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance	3.4
Radiated disturbance	4.2

3.3 TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	Agilent	N9038A	MY51210142	11/11/2015
Wireless Connectivity Test Set	Agilent	N4010A	MY49080305	10/23/2015
Loop Antenna	Schwarzbeck	FMZB1519	1519-020	03/25/2016
LISN	R&S	ENV216	100069	08/22/2015
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	11/26/2017
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	02/27/2016
Power Splitter	Agilent	11667C/ 52401	MY53806148	02/27/2016

Bilog Antenna	Schwarzbeck	VULB9160	9160-3316	09/19/2016
VHF-UHF-Biconical Antenna	Schwarzbeck	VUBA9117	9117-263	09/19/2016
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-942	09/19/2016
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-943	09/19/2016
Horn Antenna(18-40GHz)	ETS	3116	00070497	07/18/2016.

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and has been calibrated by accredited calibration laboratories.

3.4 SUPPORT EQUIPMENT

Equipment	Manufacturer	Model	Serial No.	Due Date
Signal Generator	Agilent	N4010A	MY50140938	10/23/2015

3.5 TEST FACILITY

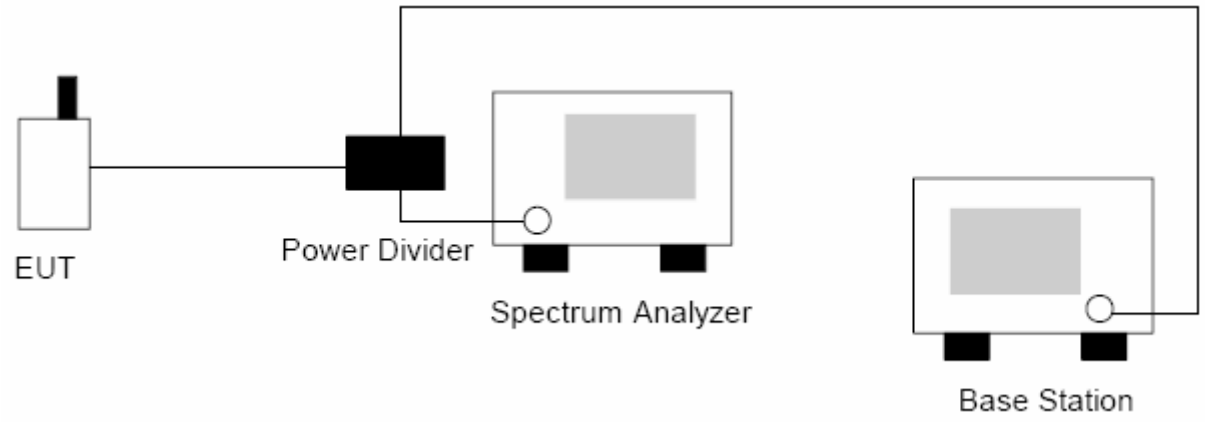
All test facilities used to collect the test data are located at Shanghai Institute of Measurement and Testing Technology EMC Lab., Shanghai, China.
The site and apparatus are constructed in conformance with the requirements of ANSI C63.4: 2009, CISPR 16-1-1 and other equivalent standards. The laboratory is compliance with the requirements of the ISO/IEC/E 17025.

3.6 TEST SETUP CONFIGURATION

The information contained within this report is intended to show verification of compliance of the EUT to the requirements of CFR 47 FCC Part 15.247.
Unilab has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report .

4. CHANNEL SEPARATION

4.1 TEST SETUP



4.2 LIMITS

Limits	⩾25 kHz or 20 dB bandwidth of hopping channel

4.3 TEST PROCEDURE

The EUT 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.

4.4 TEST RESULT

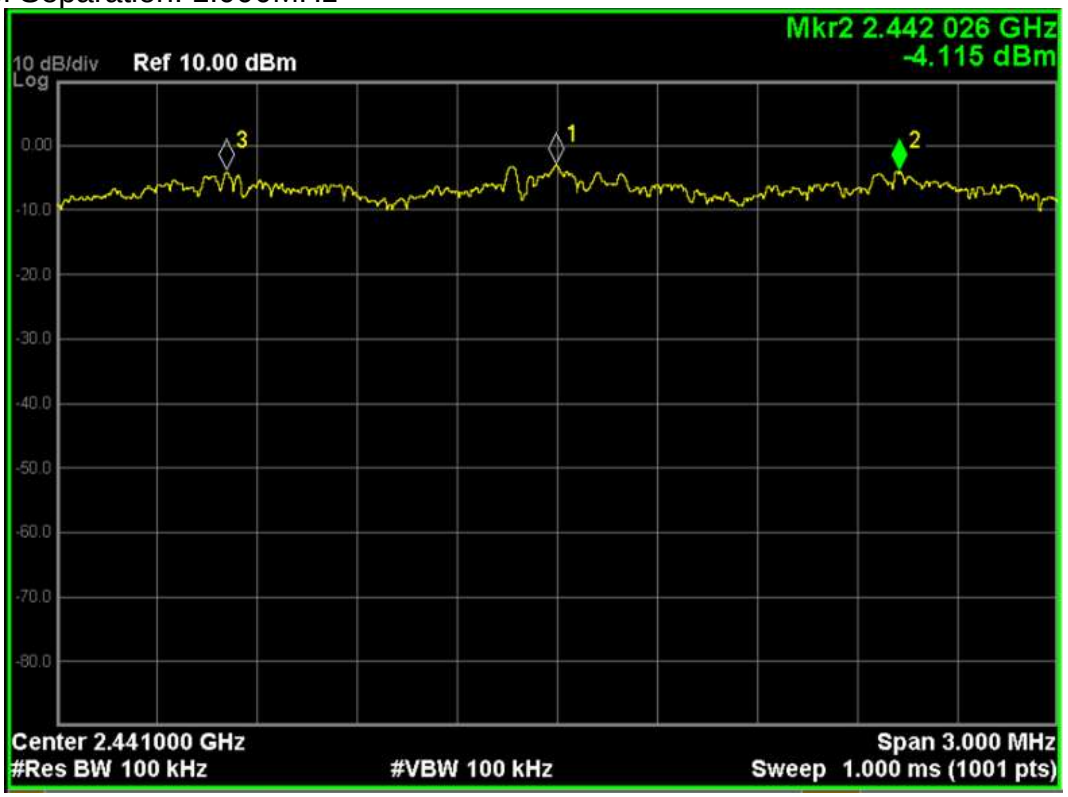
GFSK

Channel Separation: 1.000MHz

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.442 035 GHz	-1.011 dBm			
2	N	1	f	2.440 988 GHz	-1.209 dBm			
3	N	1	f	2.440 010 GHz	-0.648 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

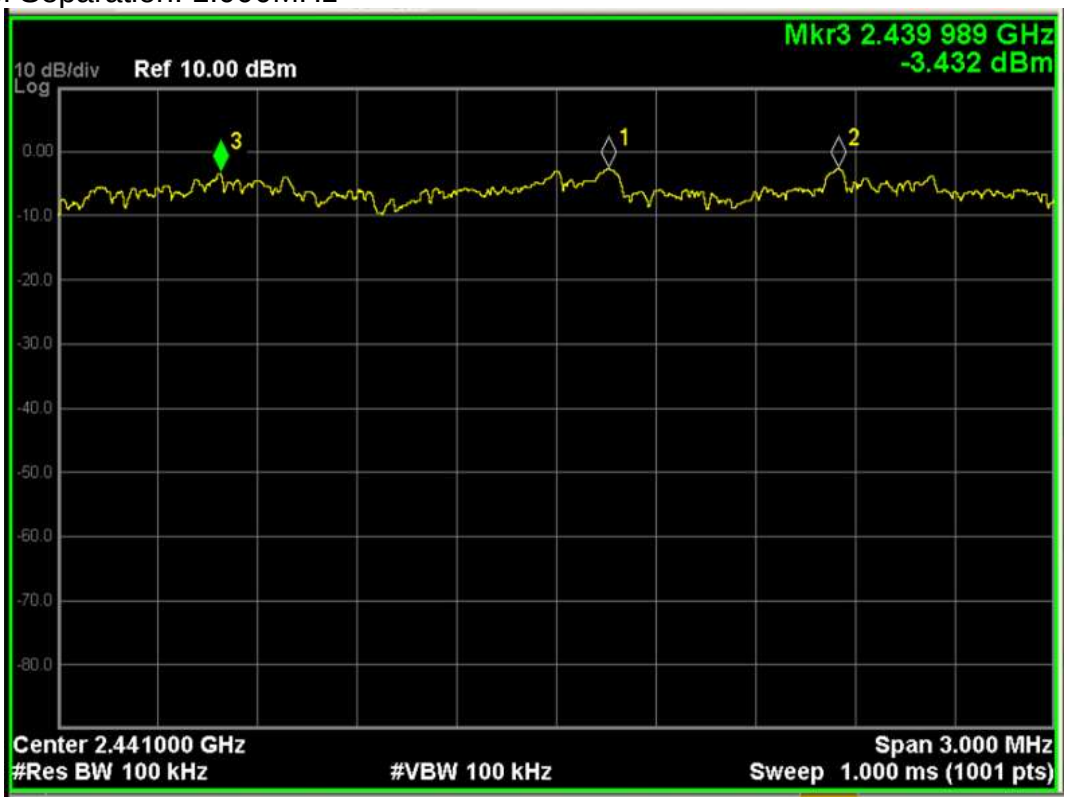
Π /4-DQPSK

Channel Separation: 1.000MHz



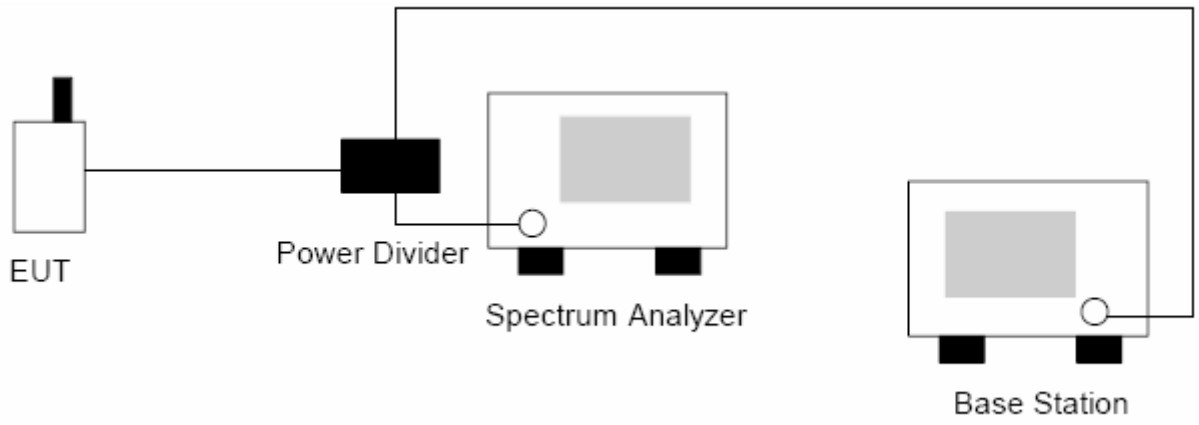
8-DPSK

Channel Separation: 1.000MHz



5. MINIMUM HOPPING CHANNELS

5.1 TEST SETUP



5.2 LIMITS

Limits	≥15 Channels

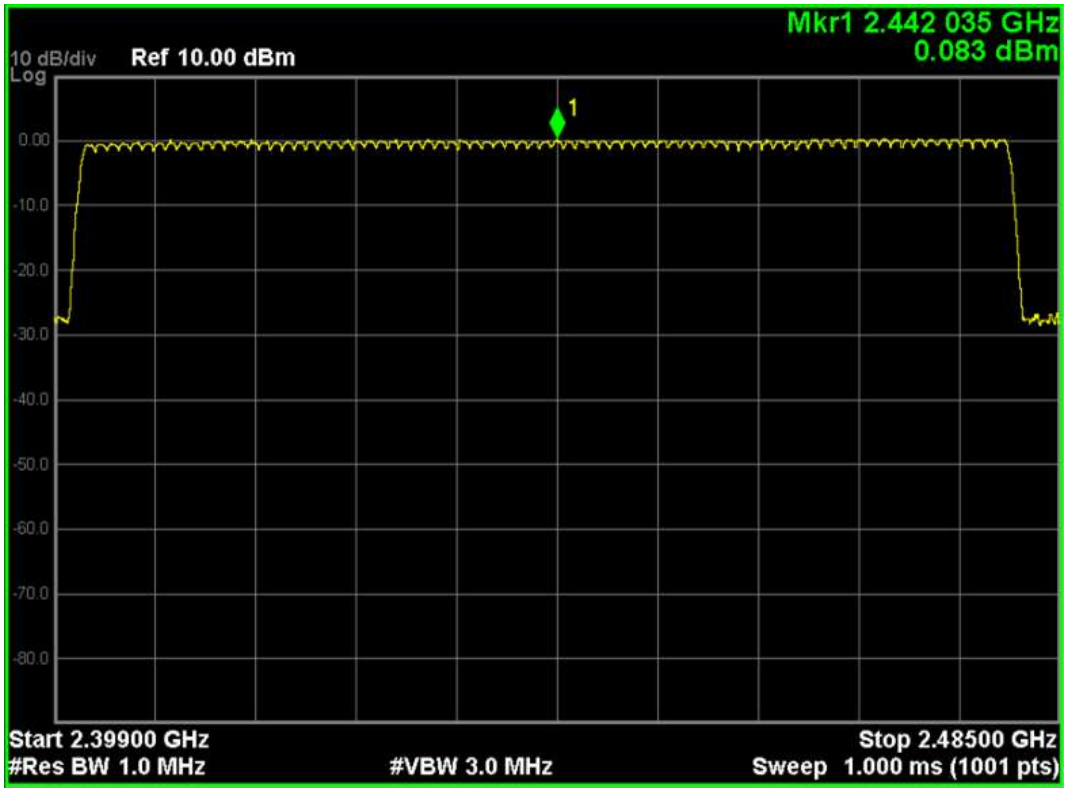
5.3 TEST PROCEDURE

The EUT 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. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

5.4 TEST RESULT

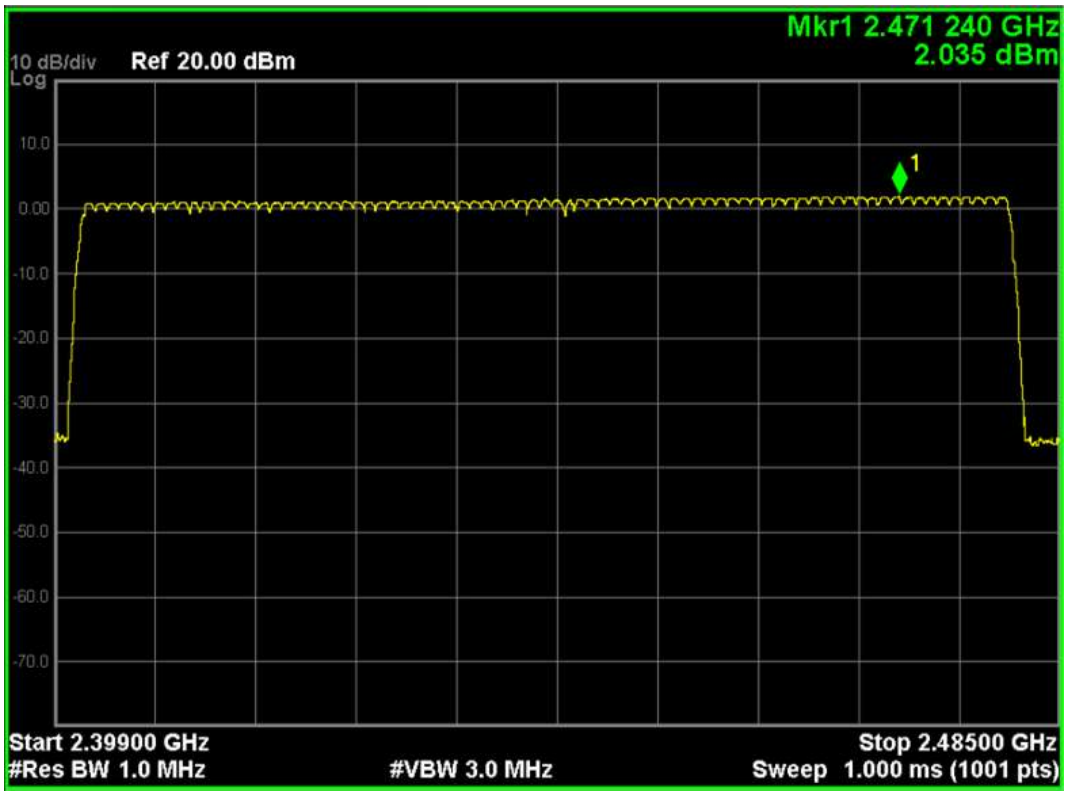
GFSK

Hopping Channel: 79 channels



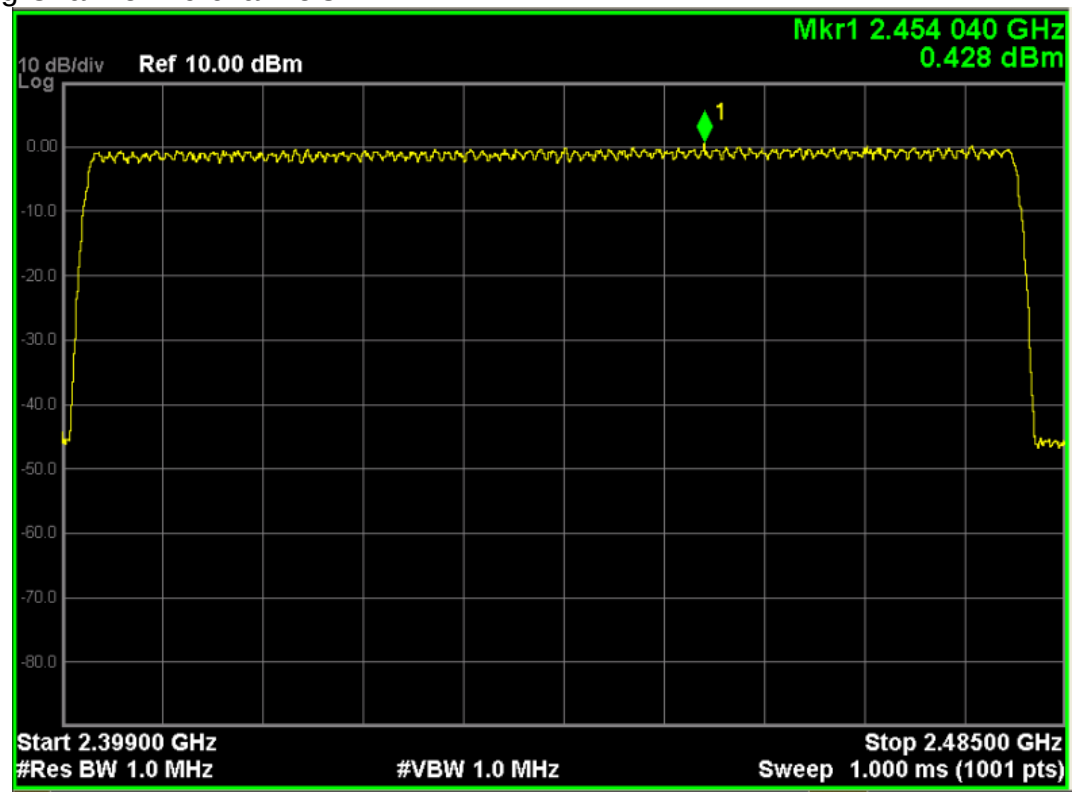
Π */4-DQPSK**

Hopping Channel: 79 channels



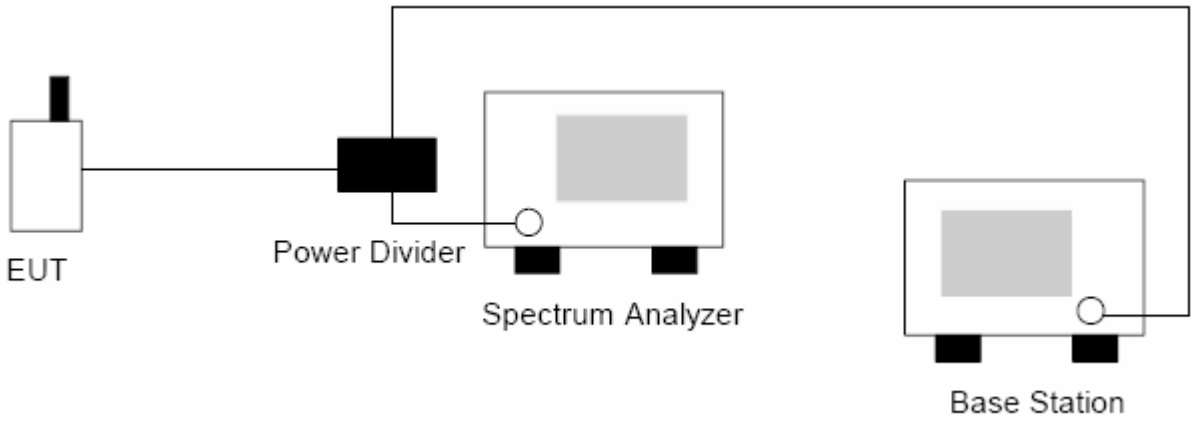
8-DPSK

Hopping Channel: 79 channels



6. OCCUPIED BANDWIDTH

6.1 TEST SETUP



6.2 LIMITS

Limits	≥25 kHz or 2 to 3 times the 20 dB bandwidth

6.3 TEST PROCEDURE

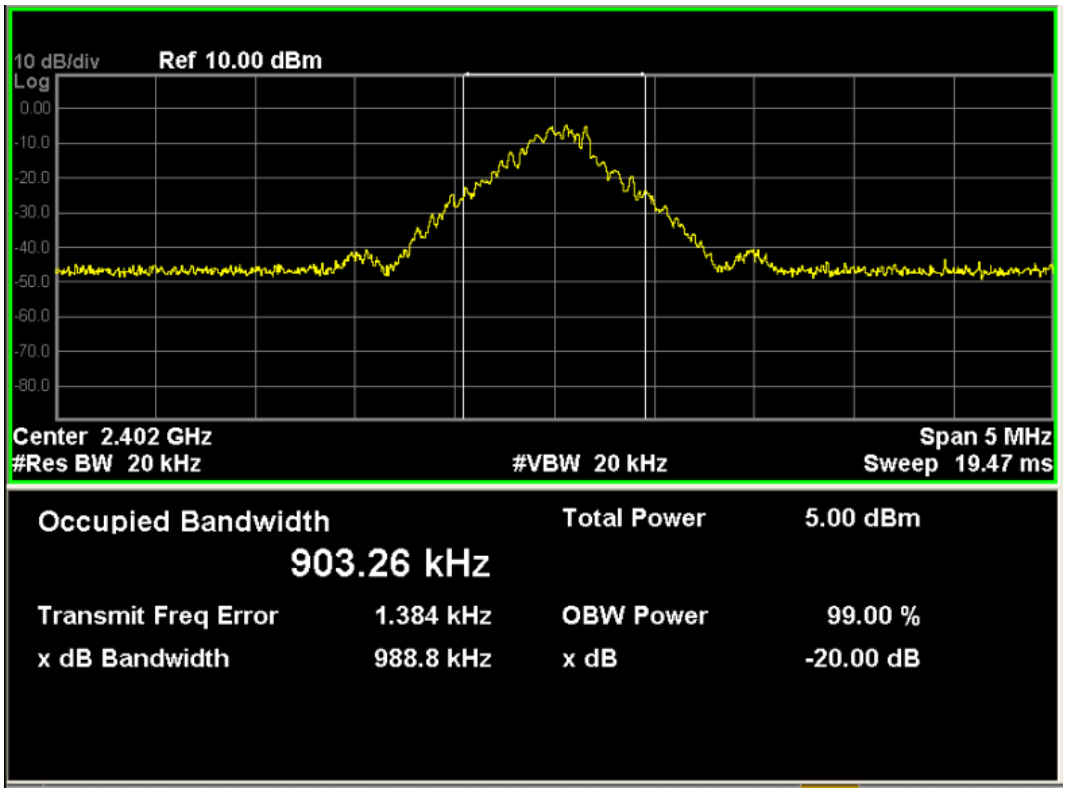
Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
Bluetooth: Low(0), Middle(39) and High (78).
Using occupied BW measurement function of spectrum analyzer and settings are:
XdB = -20dB
RBW =20KHz
VBW ≥RBW
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a channel
Sweep = auto
Detector function = peak
Trace = max hold

6.4 TEST RESULTS

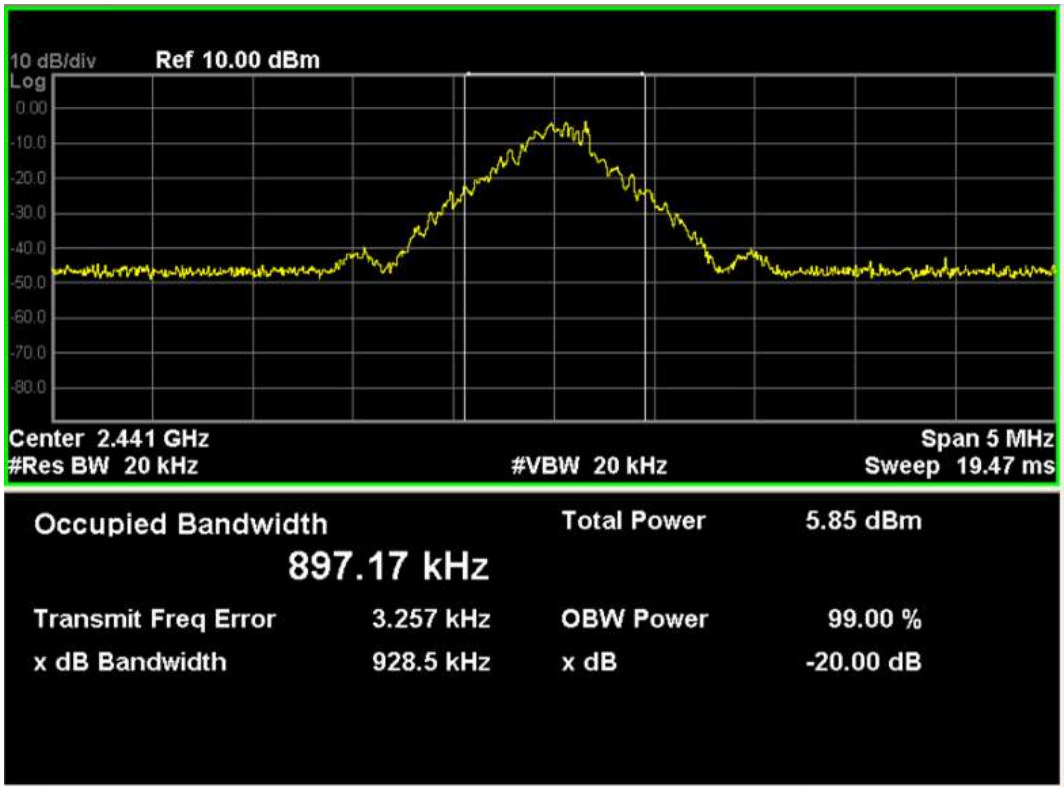
Channel	20dB bandwidth (kHz)	99% bandwidth (kHz)
GFSK		
BT CH0	988.8	903.26
BT CH39	928.5	897.17
BT CH79	928.3	906.57
Π /4-DQPSK		
BT CH0	1334	1203.3
BT CH39	1332	1209.6
BT CH79	1339	1215.9
8-DPSK		
BT CH0	1322	1203.5
BT CH39	1341	1217.9
BT CH79	1332	1211.0

GFSK

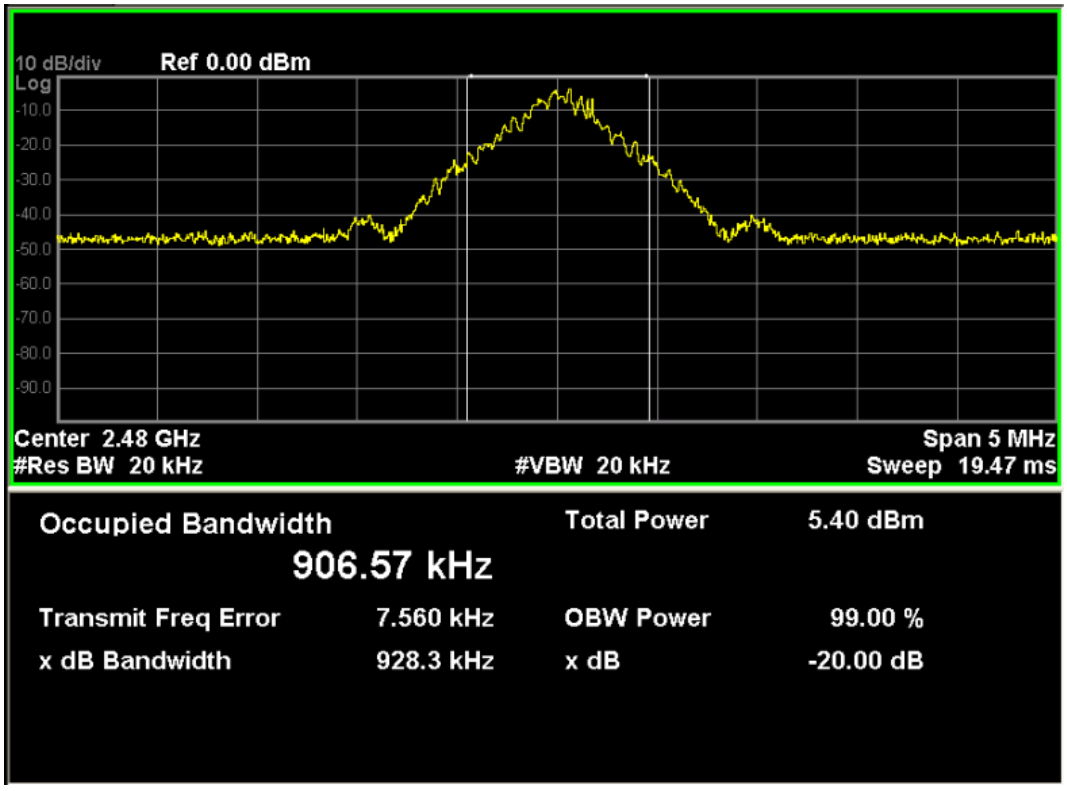
Bluetooth Channel 0



Bluetooth Channel 39

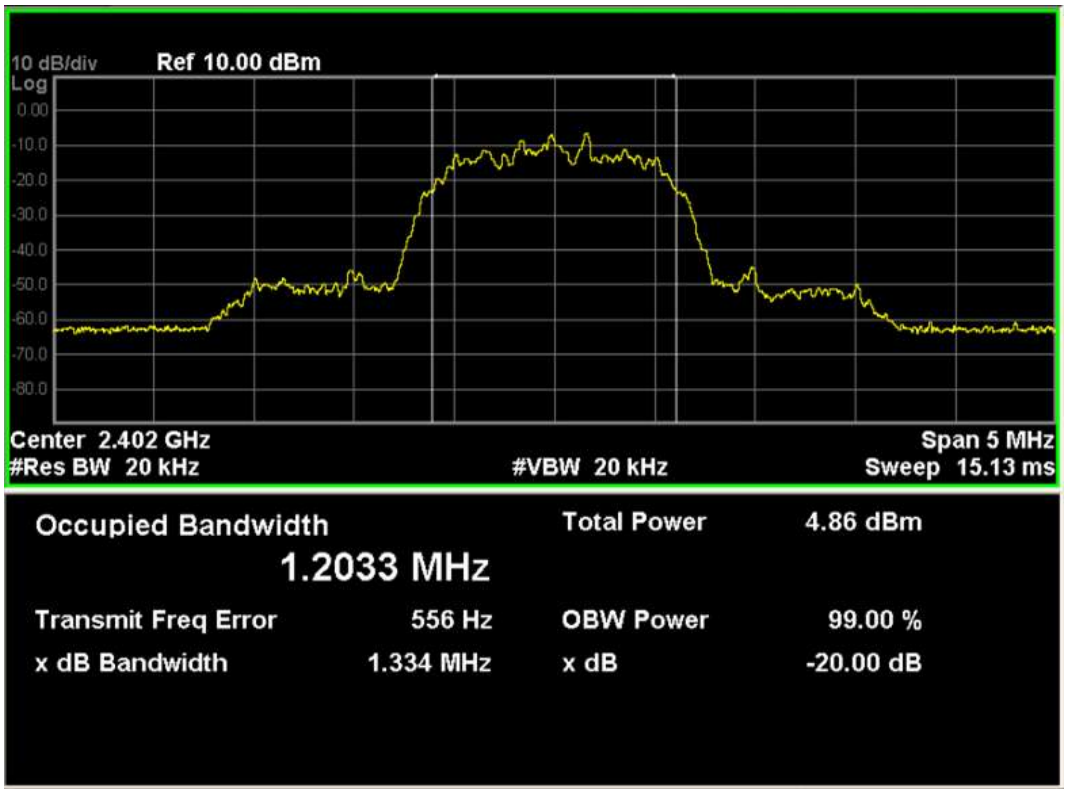


Bluetooth Channel 78

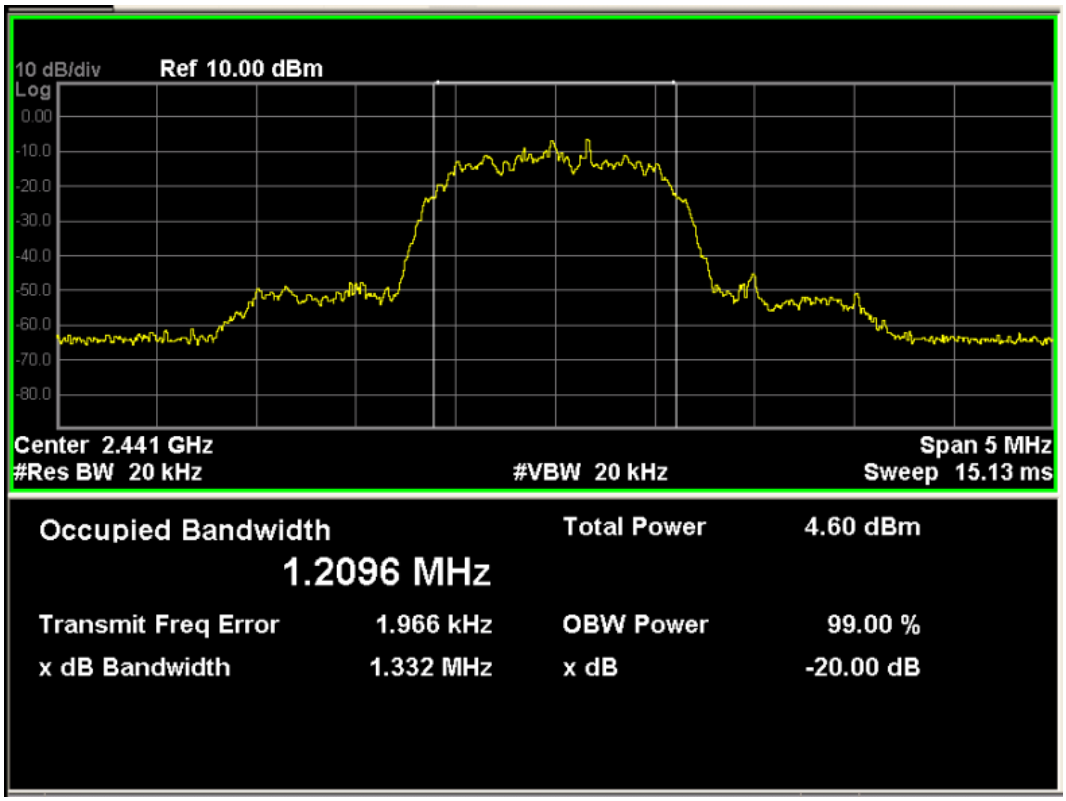


Π /4-DQPSK

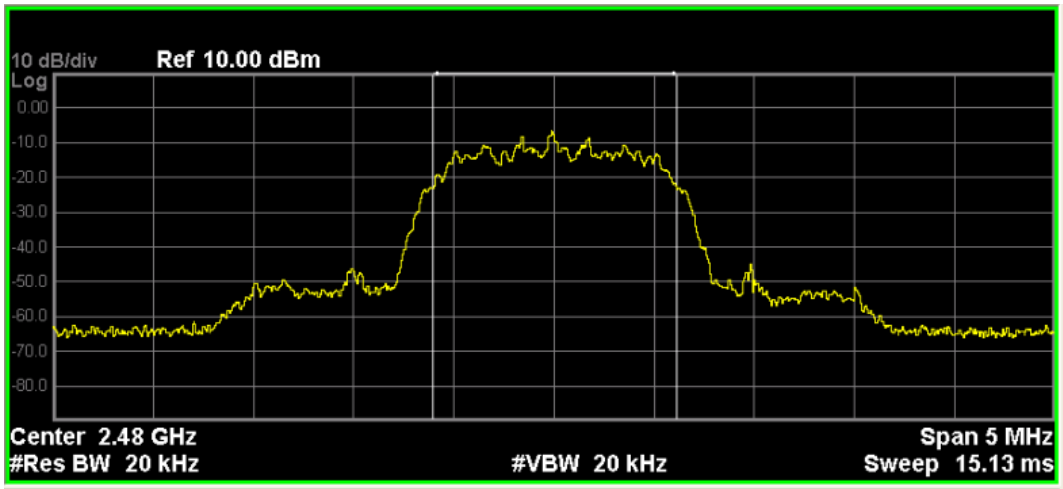
Bluetooth Channel 0



Bluetooth Channel 39



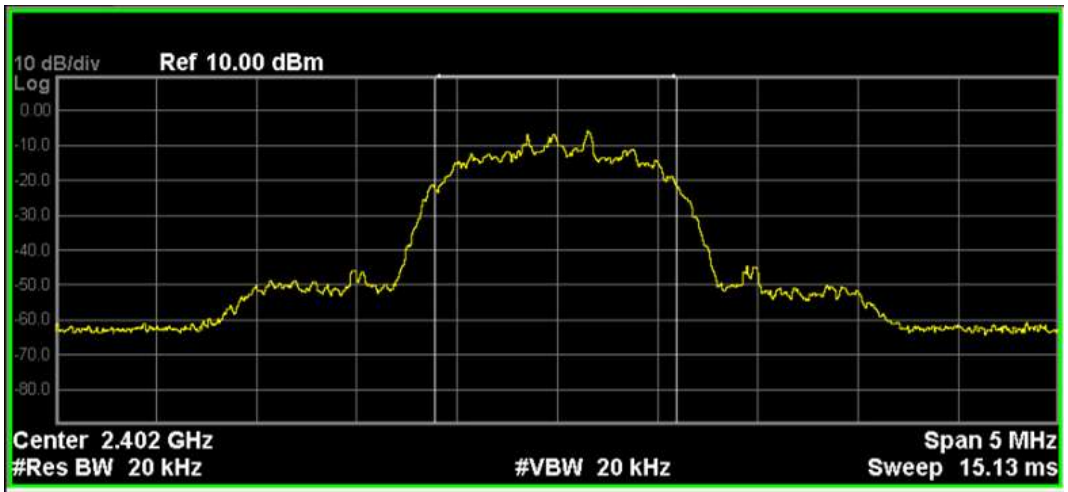
Bluetooth Channel 78



Occupied Bandwidth		Total Power	4.59 dBm
1.2159 MHz			
Transmit Freq Error	3.830 kHz	OBW Power	99.00 %
x dB Bandwidth	1.339 MHz	x dB	-20.00 dB

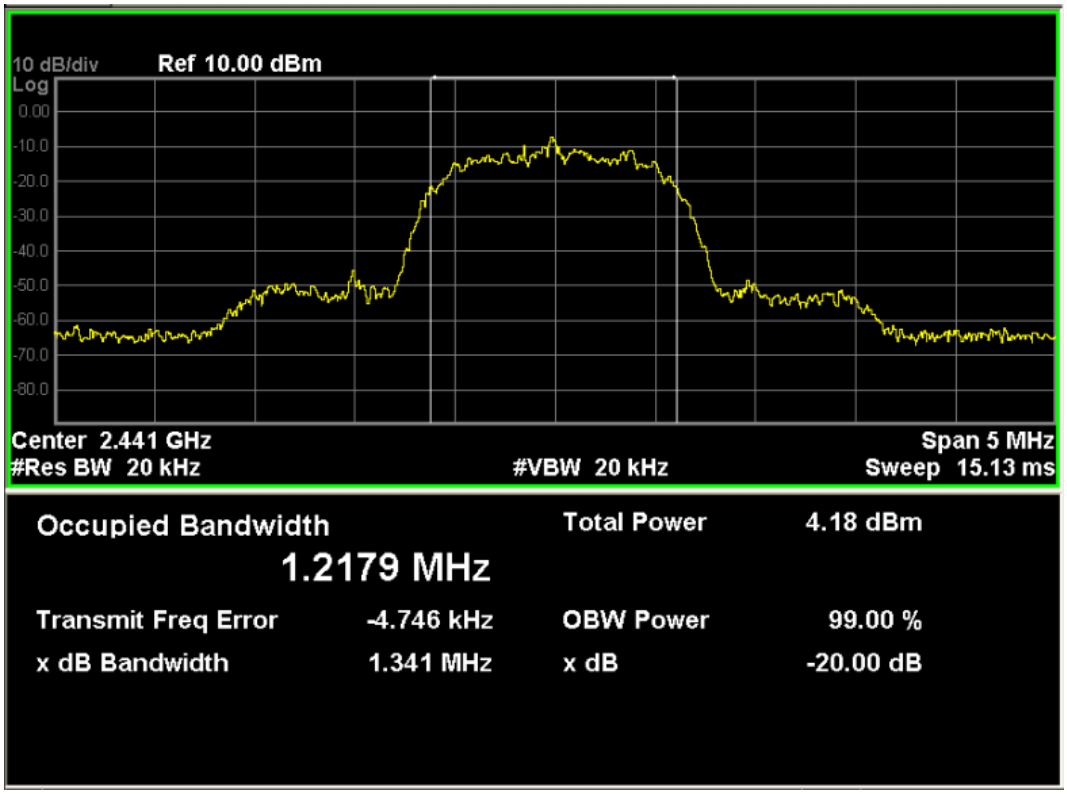
8-DPSK

Bluetooth Channel 0

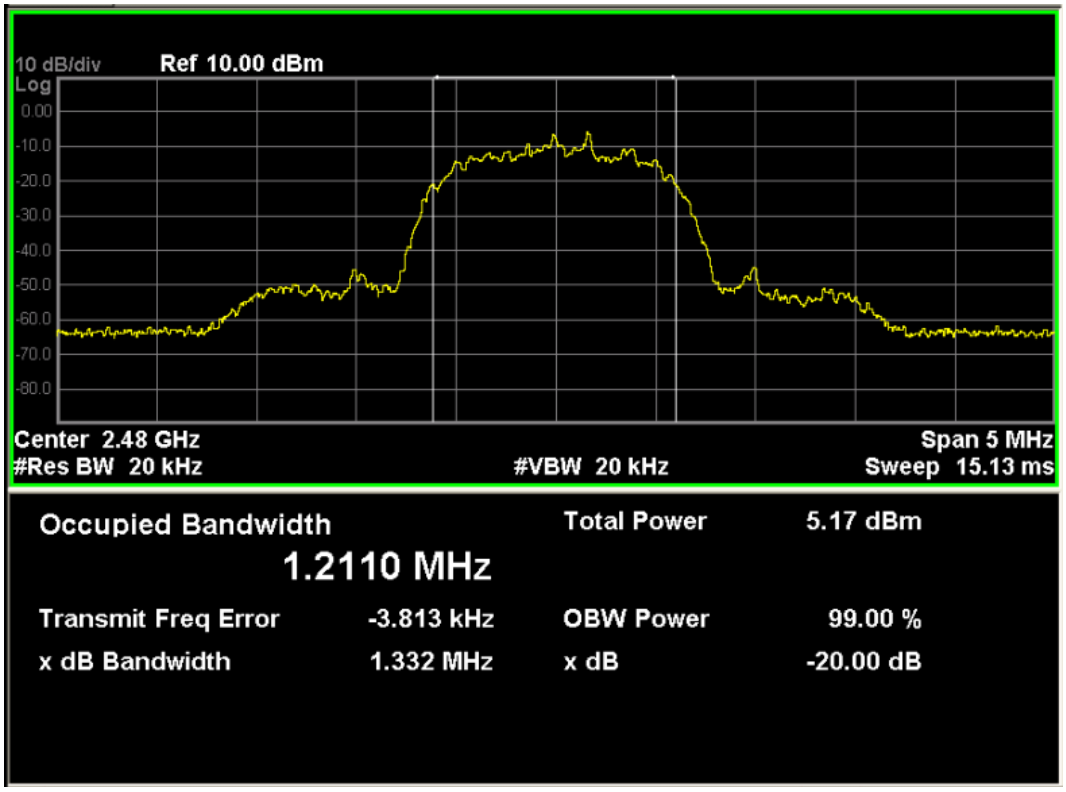


Occupied Bandwidth		Total Power	5.17 dBm
1.2035 MHz			
Transmit Freq Error	-7.855 kHz	OBW Power	99.00 %
x dB Bandwidth	1.322 MHz	x dB	-20.00 dB

Bluetooth Channel 39

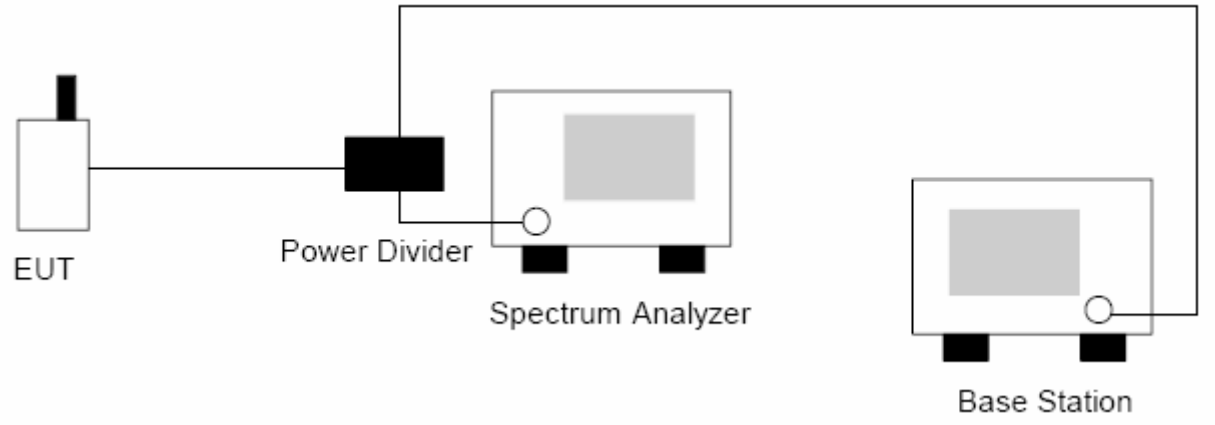


Bluetooth Channel 78



7. DWELL TIME

7.1 TEST SETUP



7.2 LIMITS

Limits	<400.00ms

7.3 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 ≤ Channel Separation
VBW ≥ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

7.4 TEST RESULTS

GFSK

Packet	N	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.382	$T=\frac{1600}{79\times N}\times x\times(0.4\times 79)=\frac{1600}{79\times N}\times x\times 31.6$	122.24
DH3	4	1.635	DH1, N=2;	260.8
DH5	6	2.875	DH3, N=4; DH5, N=6	306.7

Π /4-DQPSK

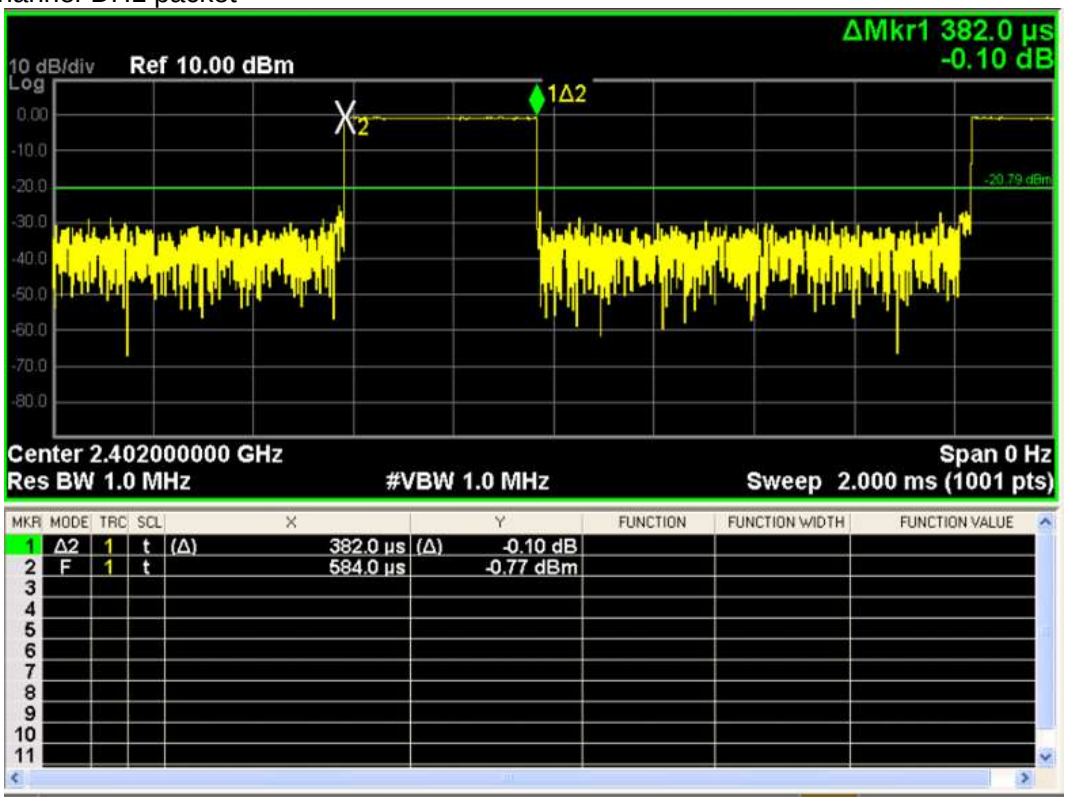
Packet	N	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.386	$T=\frac{1600}{79\times N}\times x\times(0.4\times 79)=\frac{1600}{79\times N}\times x\times 31.6$	123.5
DH3	4	1.640	DH1, N=2;	262.4
DH5	6	2.890	DH3, N=4; DH5, N=6	308.3

8-DPSK

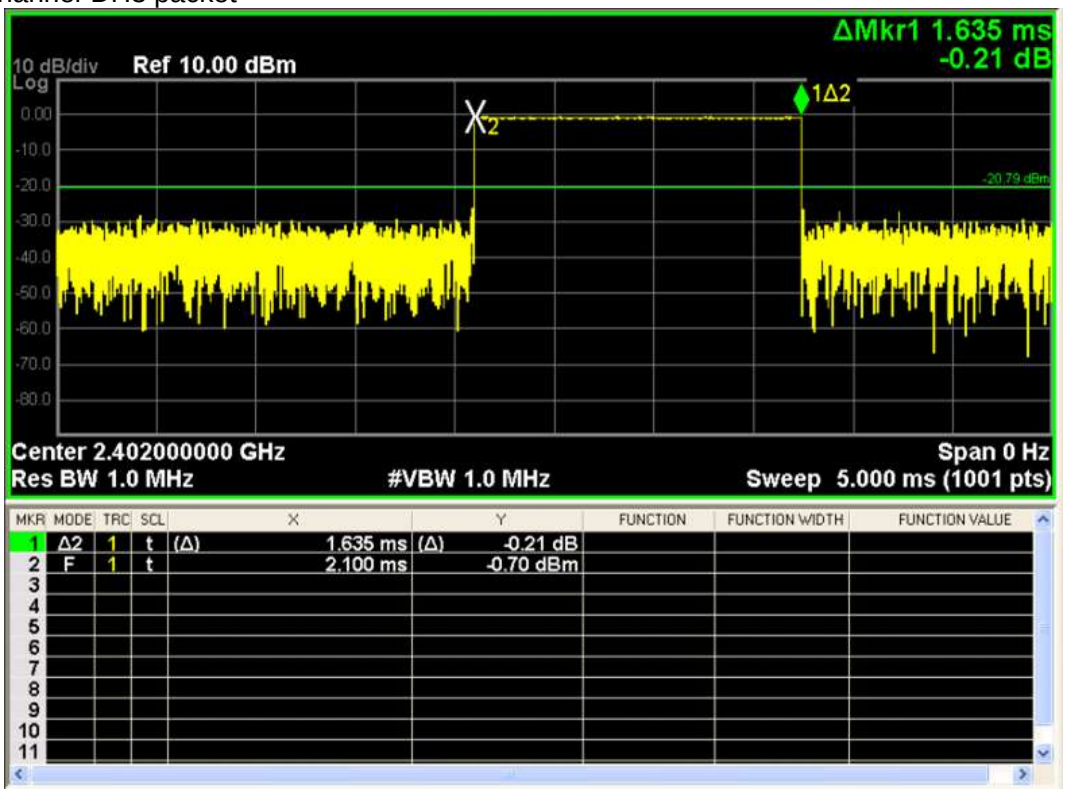
Packet	N	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.388	$T=\frac{1600}{79\times N}\times x\times(0.4\times 79)=\frac{1600}{79\times N}\times x\times 31.6$	124.2
DH3	4	1.640	DH1, N=2;	262.4
DH5	6	2.890	DH3, N=4; DH5, N=6	308.3

GFSK

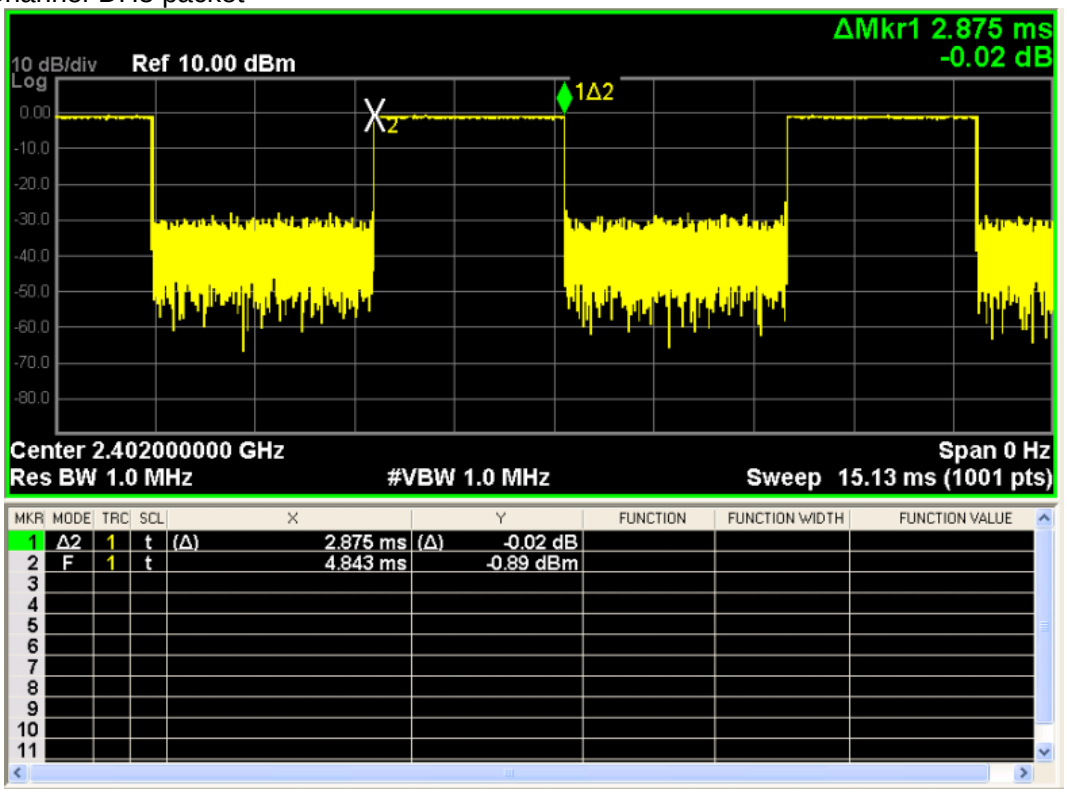
Single Channel-DH1 packet



Single Channel-DH3 packet

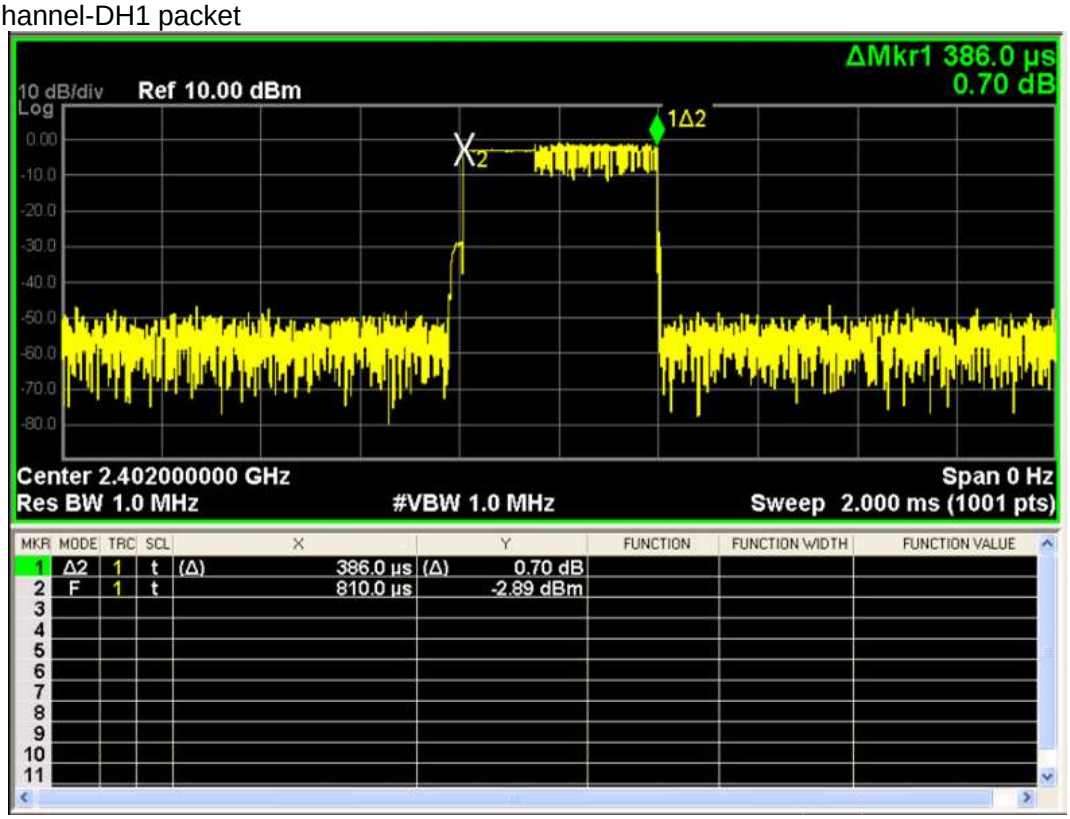


Single Channel-DH5 packet

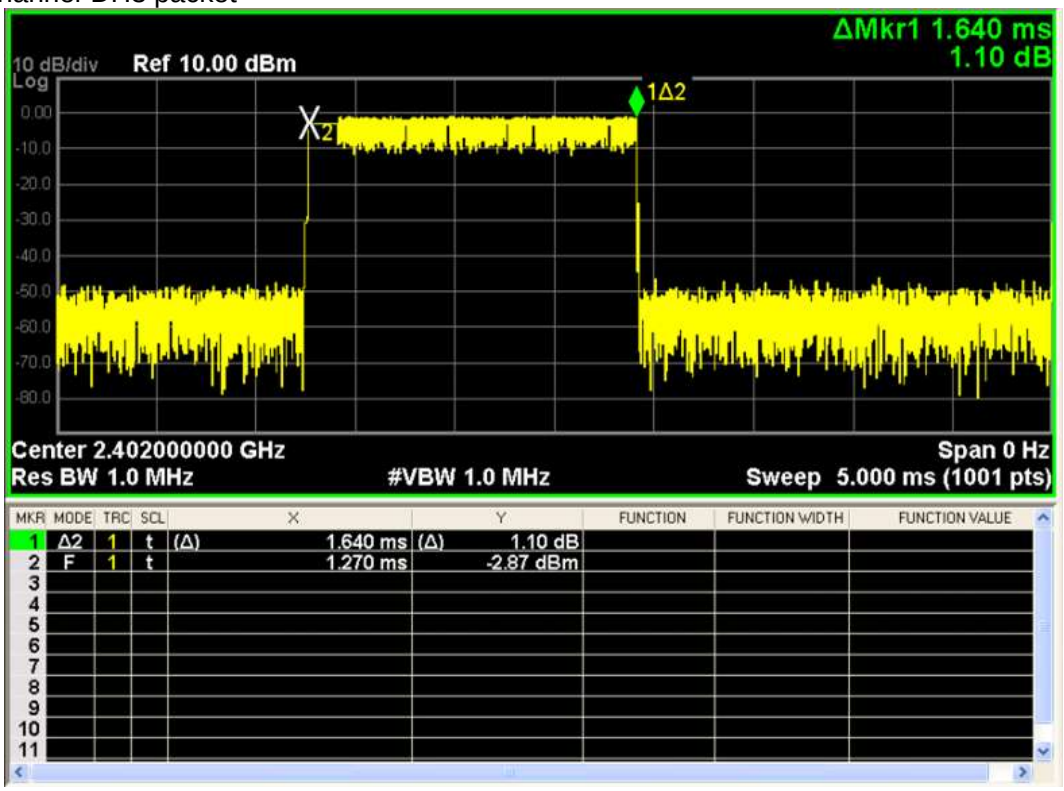


Π /4-DQPSK

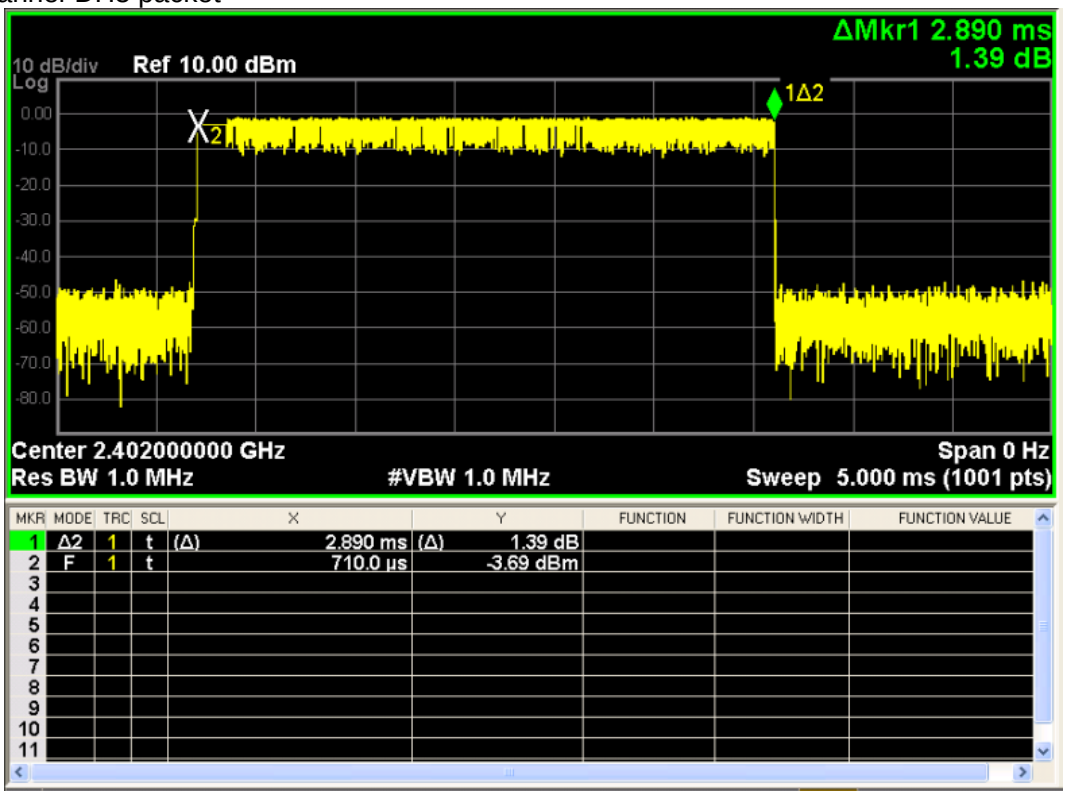
Single Channel-DH1 packet



Single Channel-DH3 packet

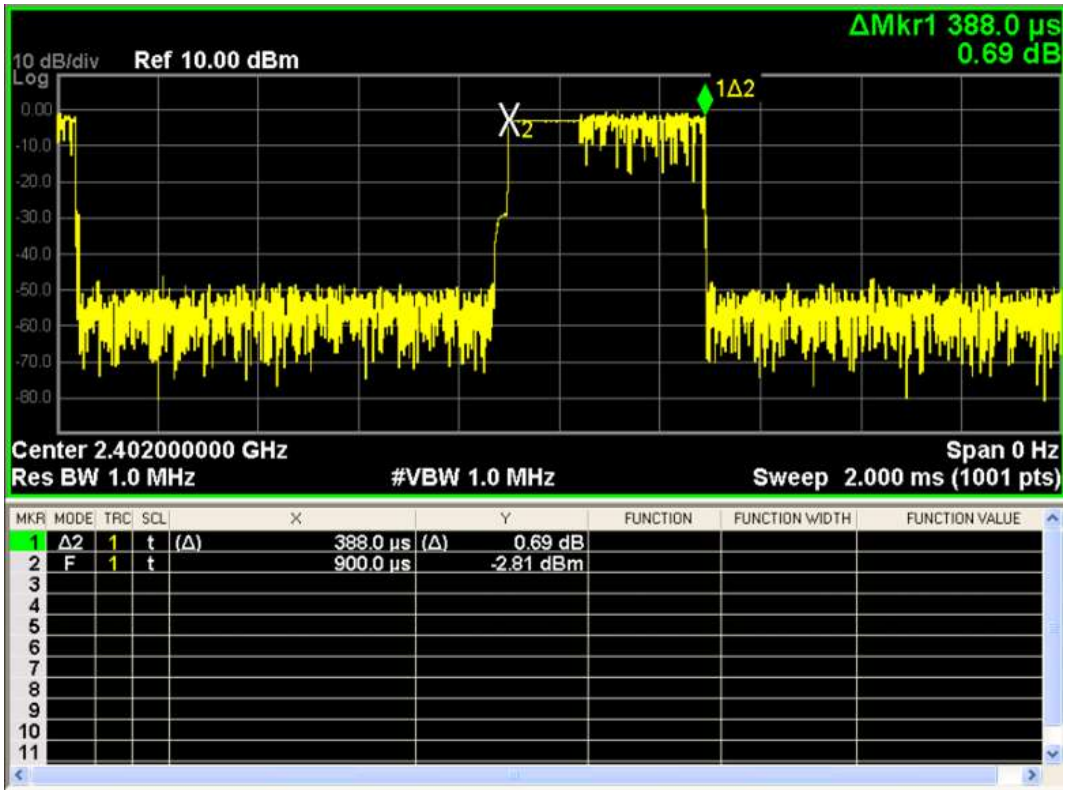


Single Channel-DH5 packet

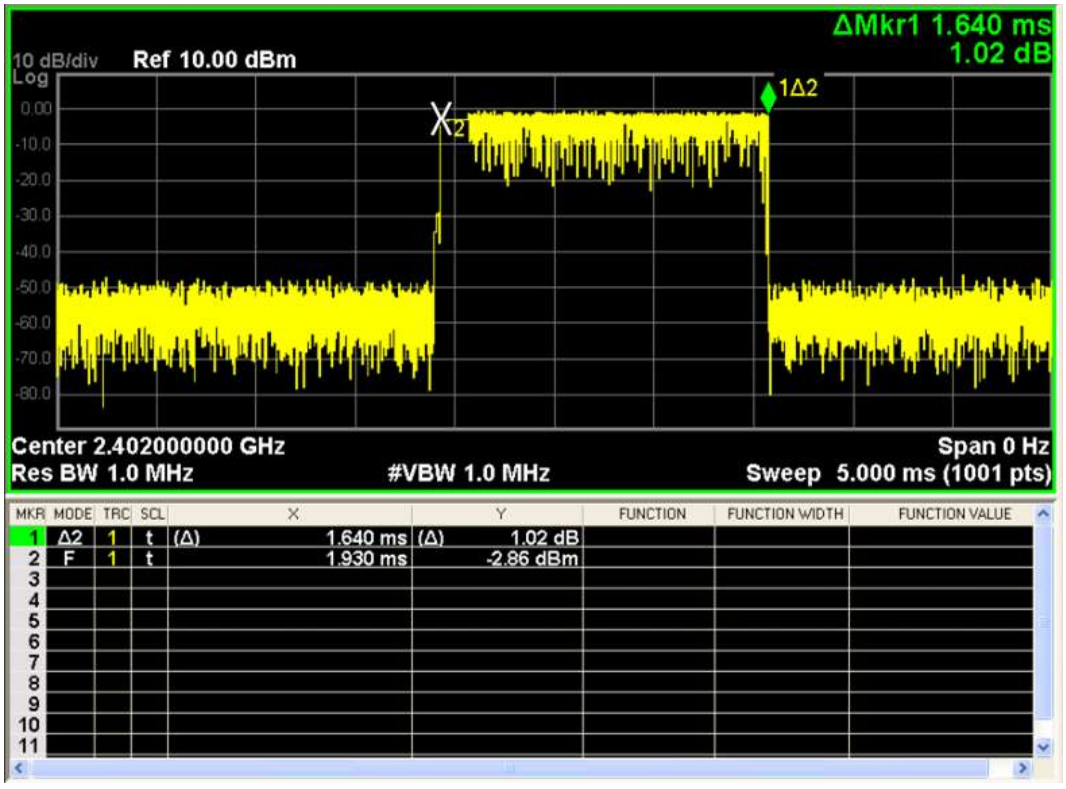


8-DPSK

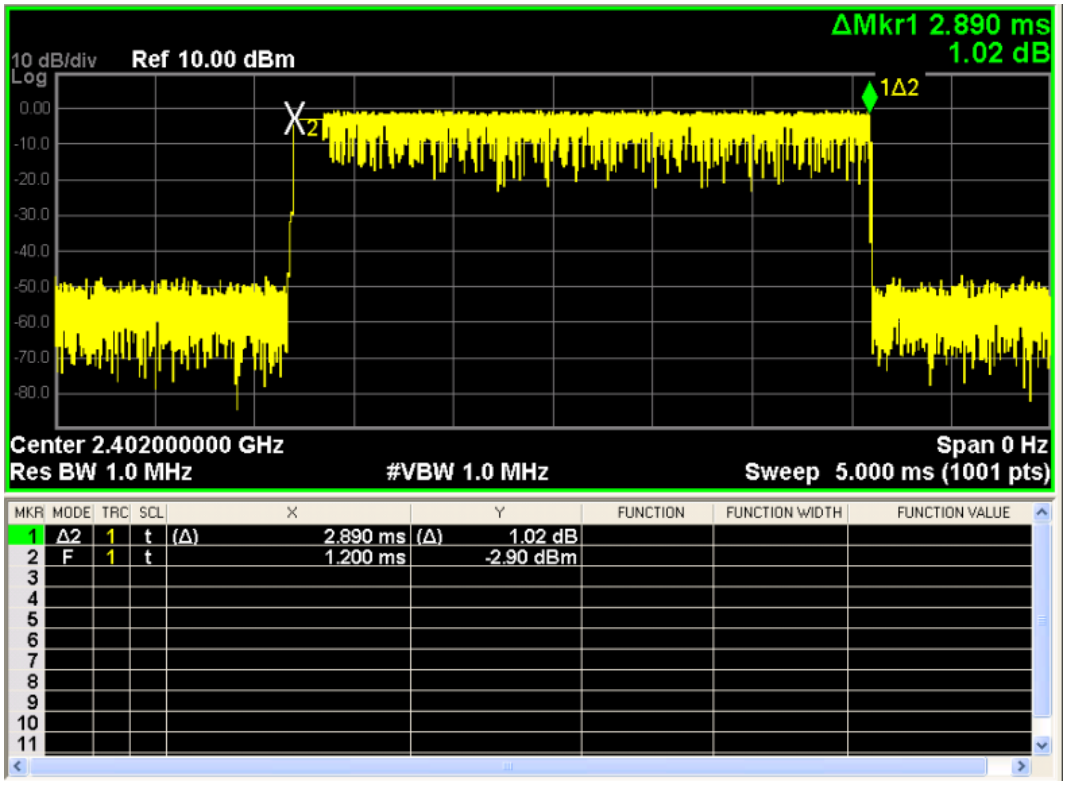
Single Channel-DH1 packet



Single Channel-DH3 packet

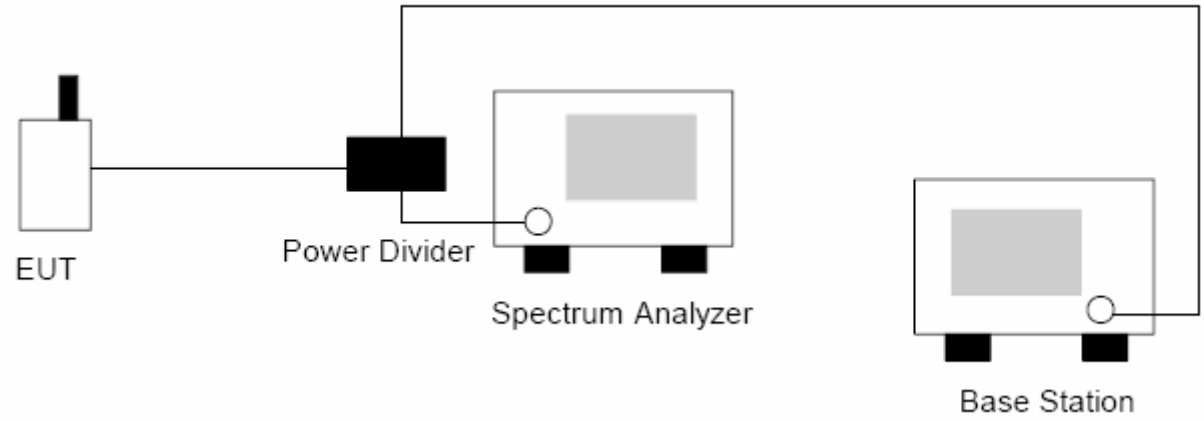


Single Channel-DH5 packet



8. PEAK OUTPUT POWER (CONDUCTION)

8.1 TEST SETUP



8.2 LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

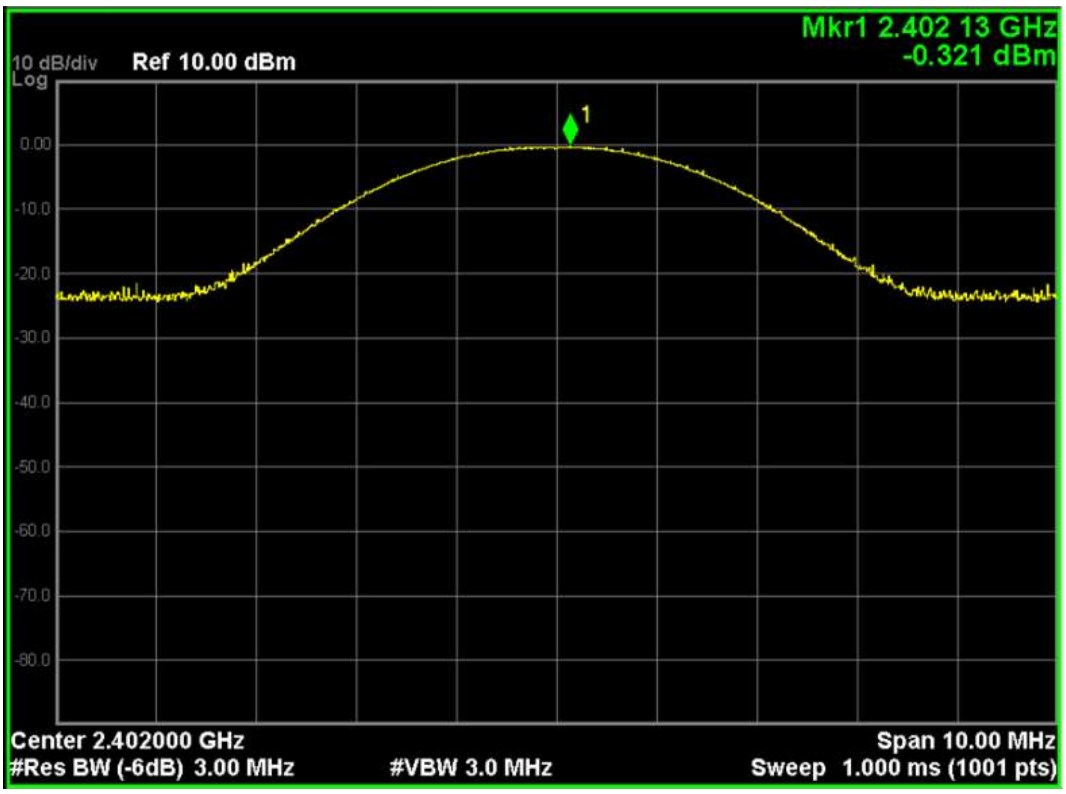
8.3 TEST PROCEDURE

After a radio link has been established between EUT and Base station, using spectrum analyzer to measure the output power of the cell signal of the EUT, and record the max. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels:
Bluetooth: Low(0), middle(39) and High (78),
Set the spectrum analyzer as RBW = 3MHz, VBW = 3MHz, Span = 10MHz, Sweep = auto
Detector = Peak, Trace mode = max hold

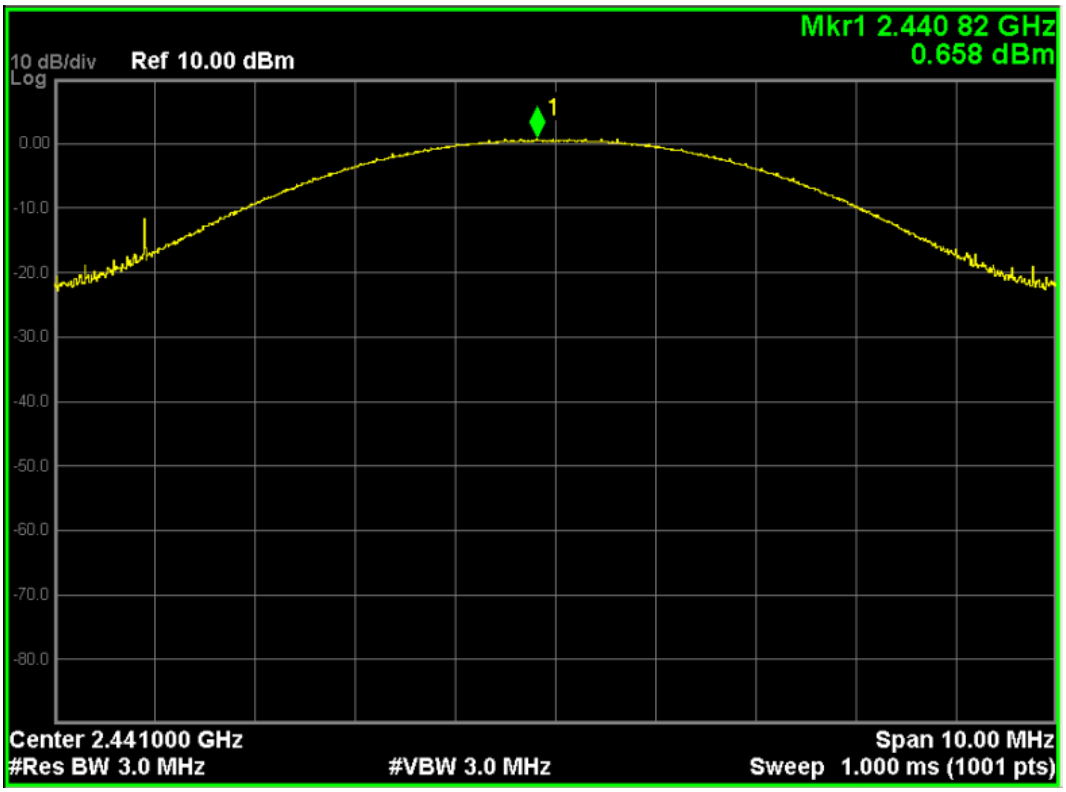
8.4 RESULTS & PERFORMANCE

GFSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	-0.321	0.93	125	Pass
39 (2441MHz)	0.658	1.16		Pass
78 (2480MHz)	0.556	1.14		Pass
Π /4-DQPSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	0.051	1.01	125	Pass
39 (2441MHz)	0.028	1.01		Pass
78 (2480MHz)	0.602	1.15		Pass
8-DPSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (dBm)	Result
0 (2402MHz)	0.446	1.11	125	Pass
39 (2441MHz)	0.721	1.18		Pass
78 (2480MHz)	1.257	1.34		Pass

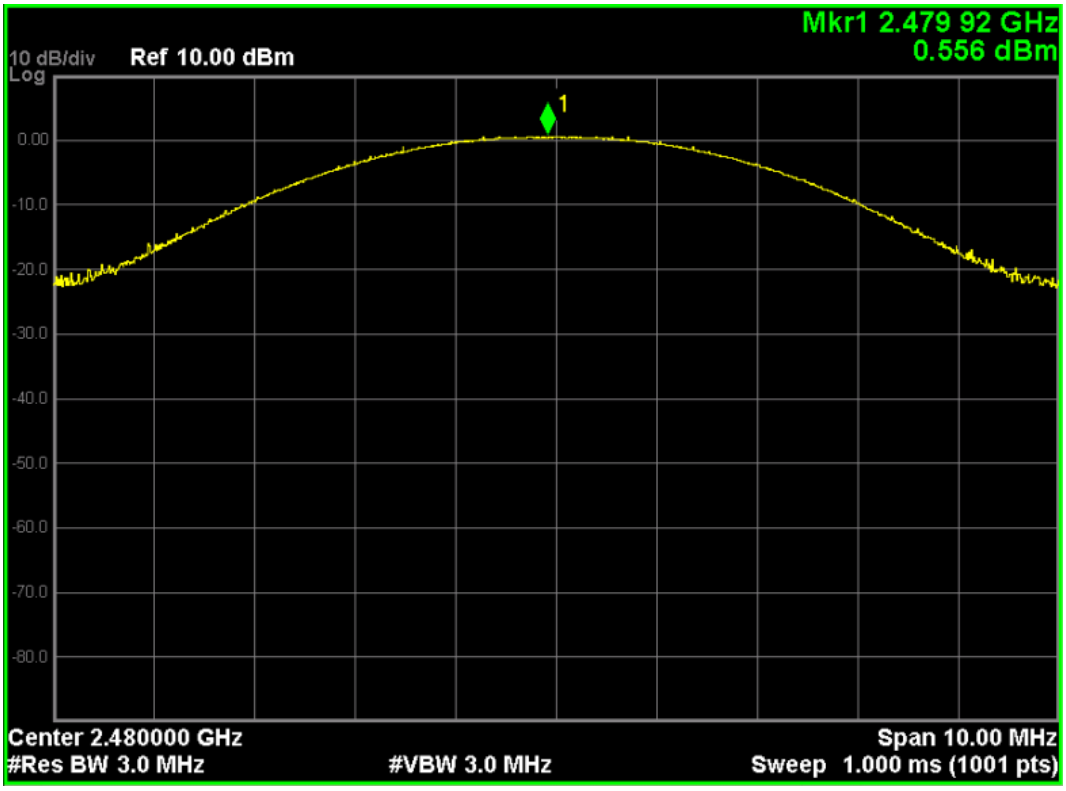
Bluetooth GFSK Channel 0



Bluetooth GFSK Channel 39

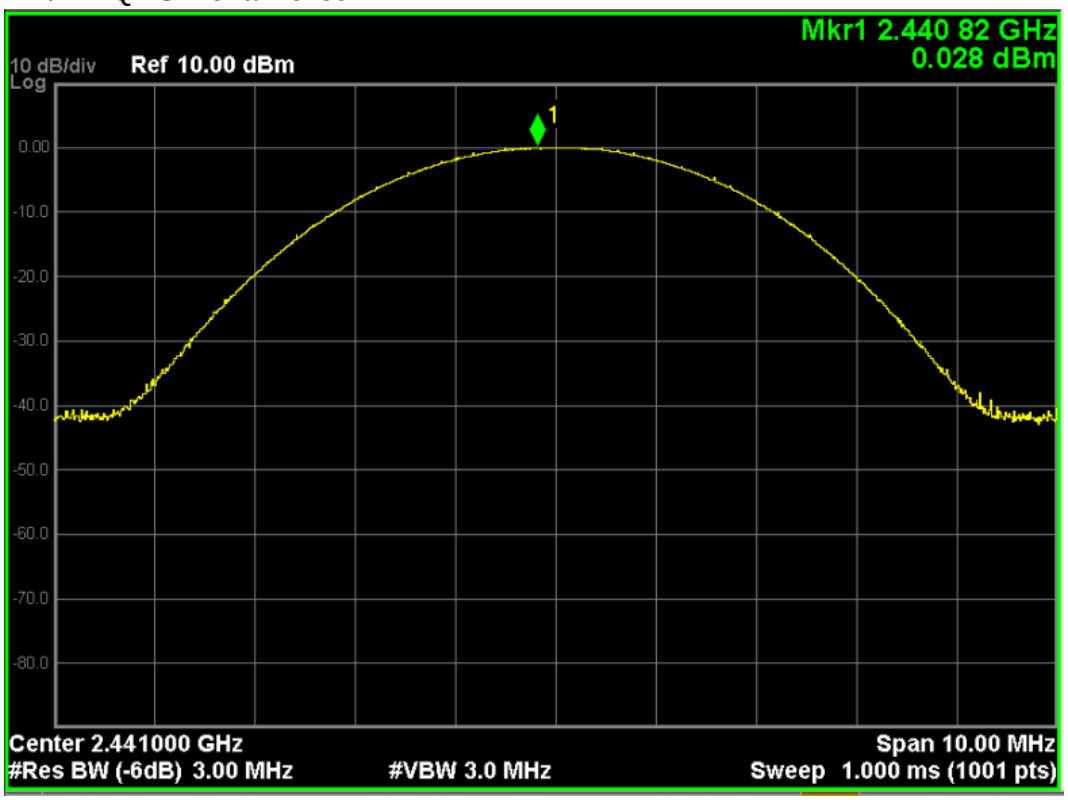


Bluetooth GFSK Channel 78

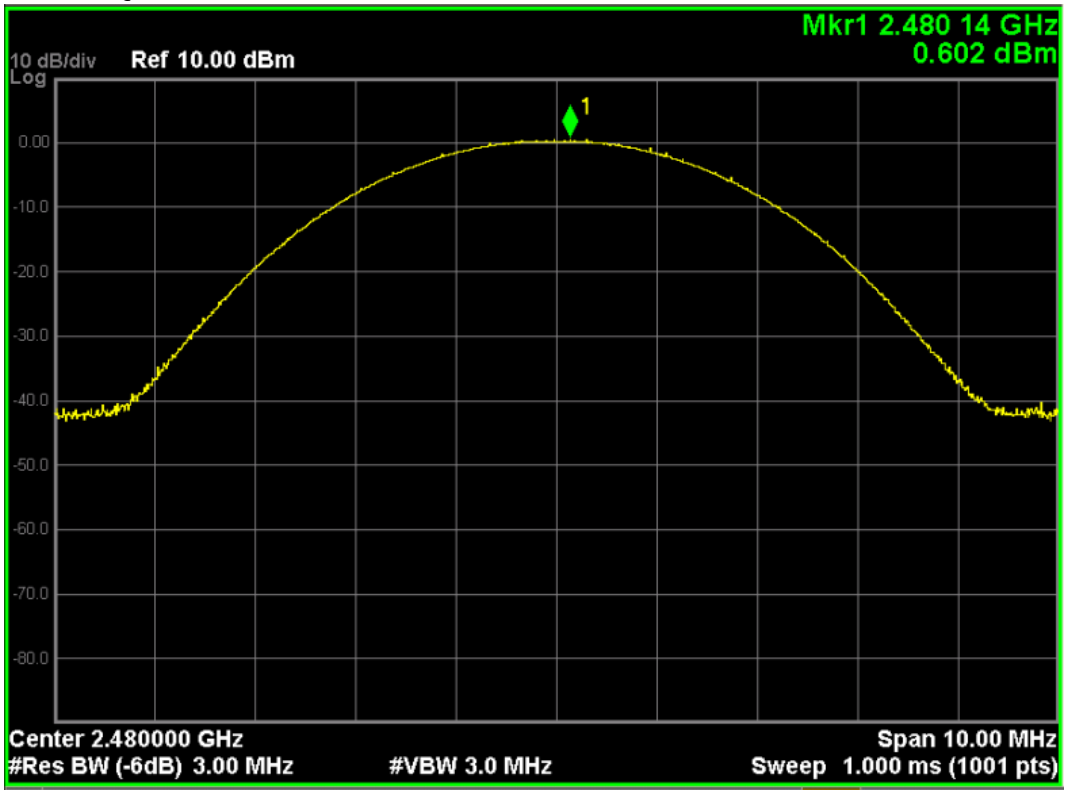


Bluetooth Π /4-DQPSK Channel 0

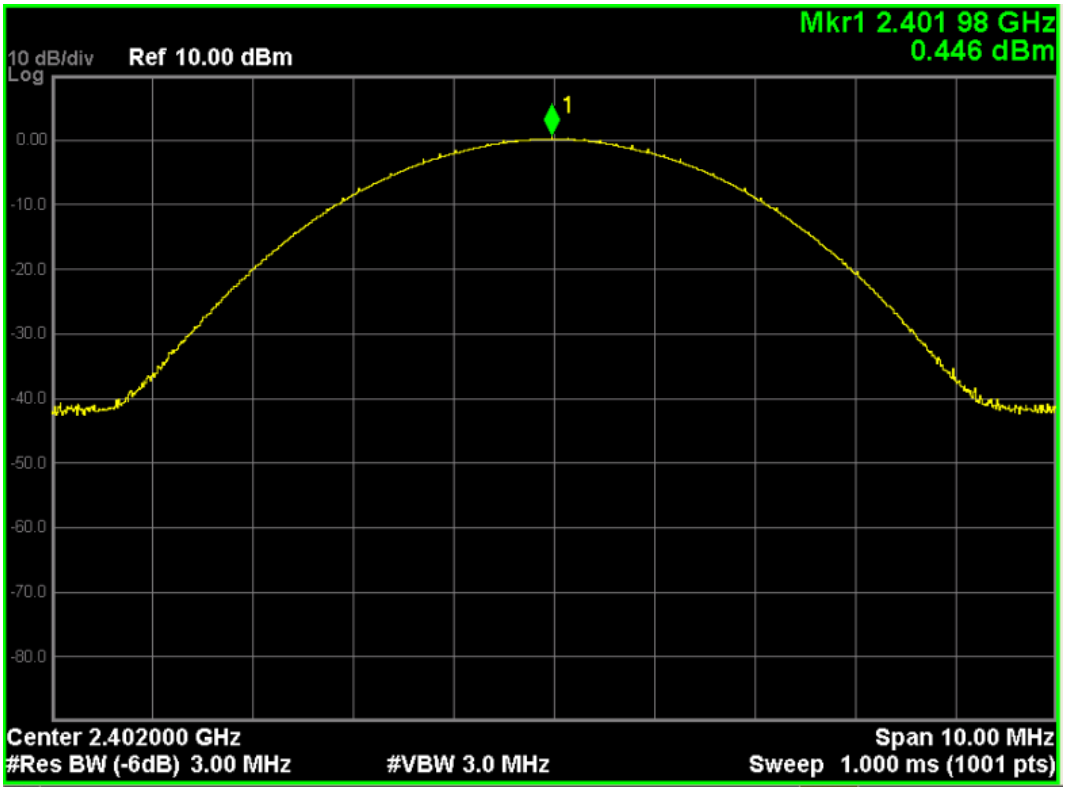
Bluetooth Π /4-DQPSK Channel 39



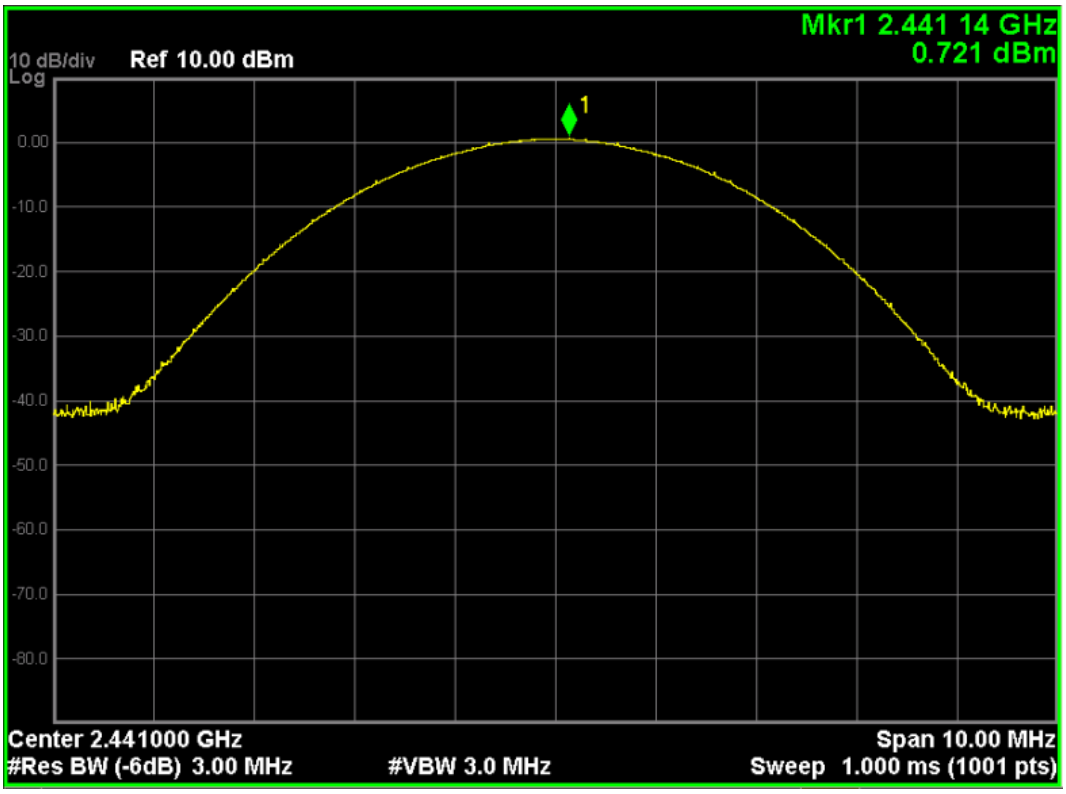
Bluetooth Π /4-DQPSK Channel 78



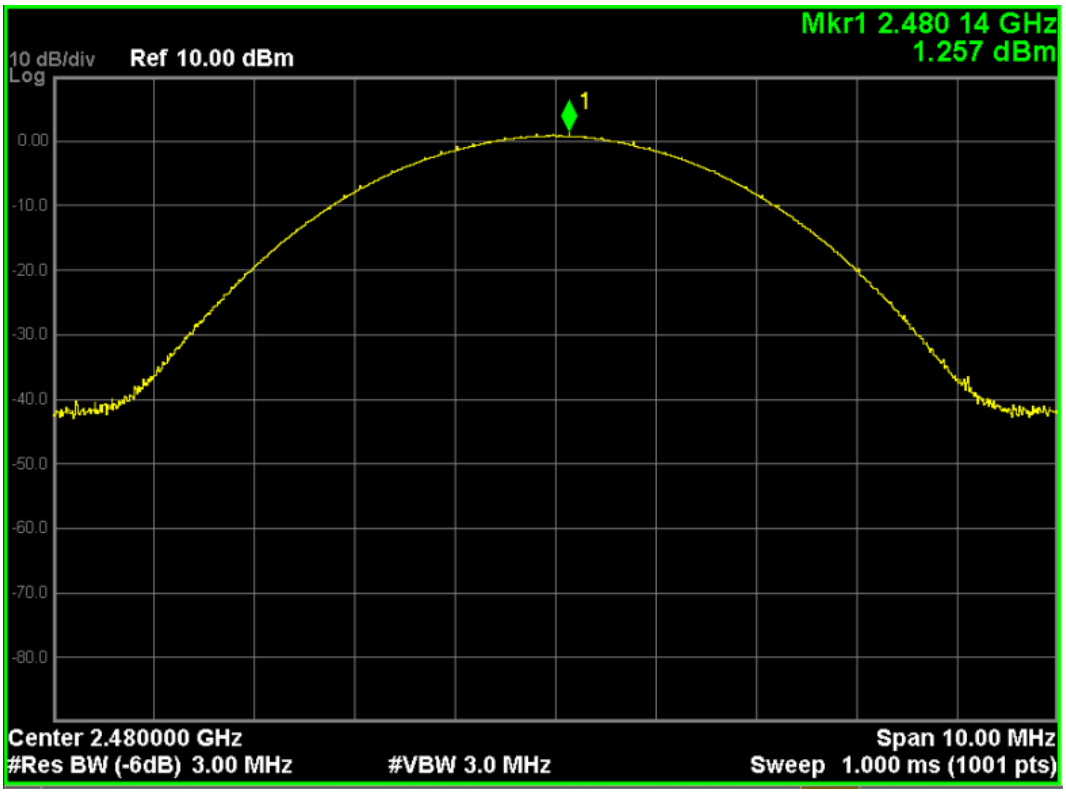
Bluetooth 8-DPSK Channel 0



Bluetooth 8-DPSK Channel 39

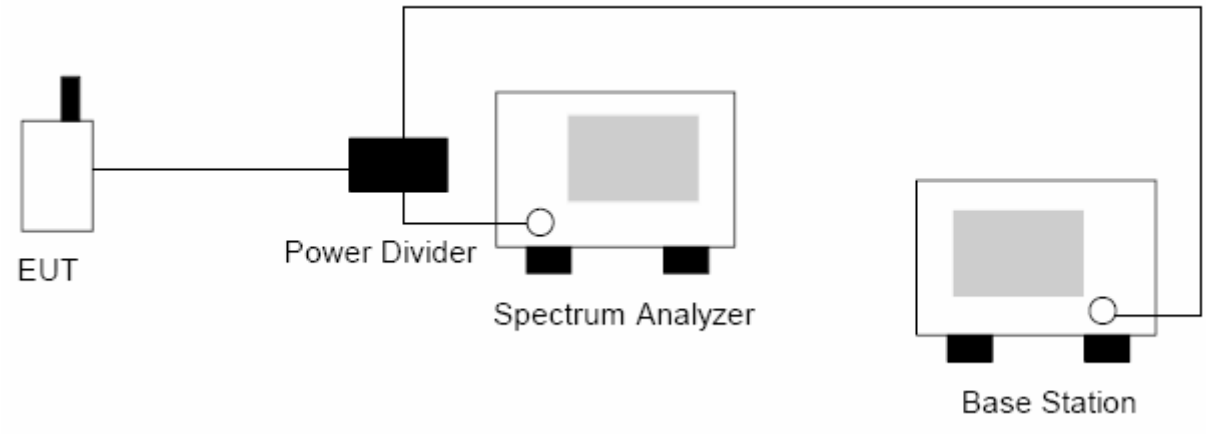


Bluetooth 8-DPSK Channel 78



9. SPURIOUS EMISSIONS (CONDUCTION)

9.1 TEST SETUP



9.2 LIMITS

Limit	<(P-20dB)
Note: P is the highest level of the desired power	

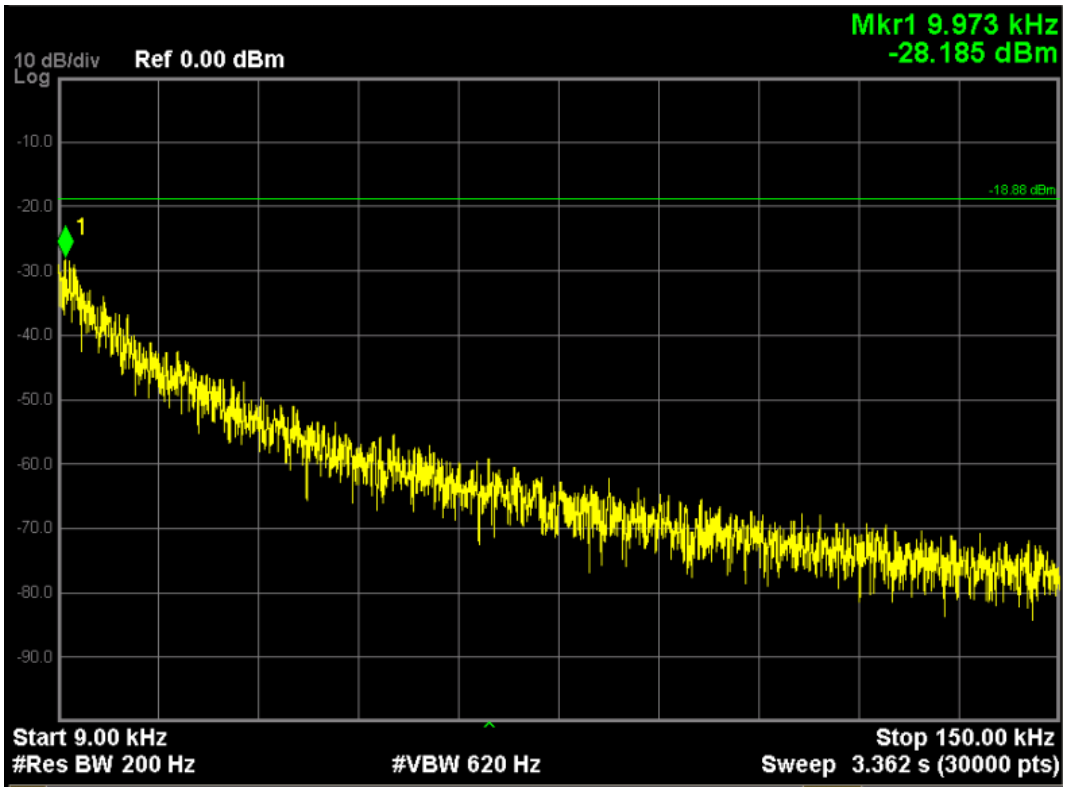
9.3 TEST PROCEDURE

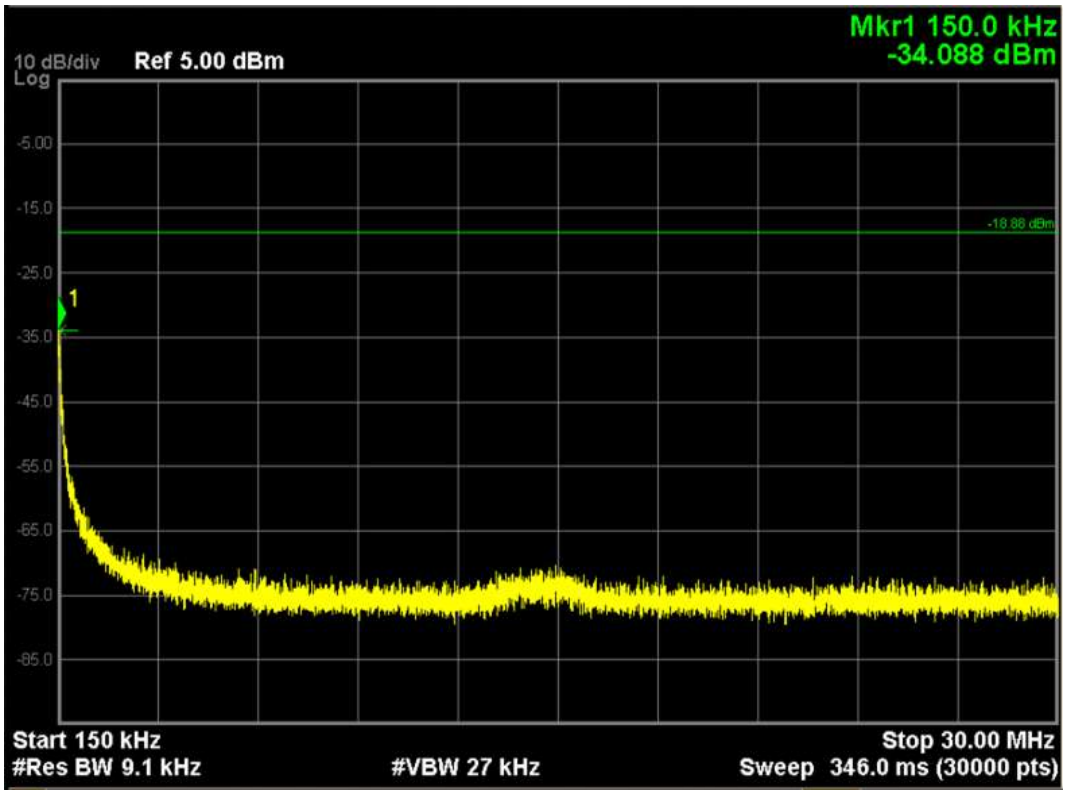
The EUT was connected to Spectrum Analyzer and Base Station via power divider. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz; VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

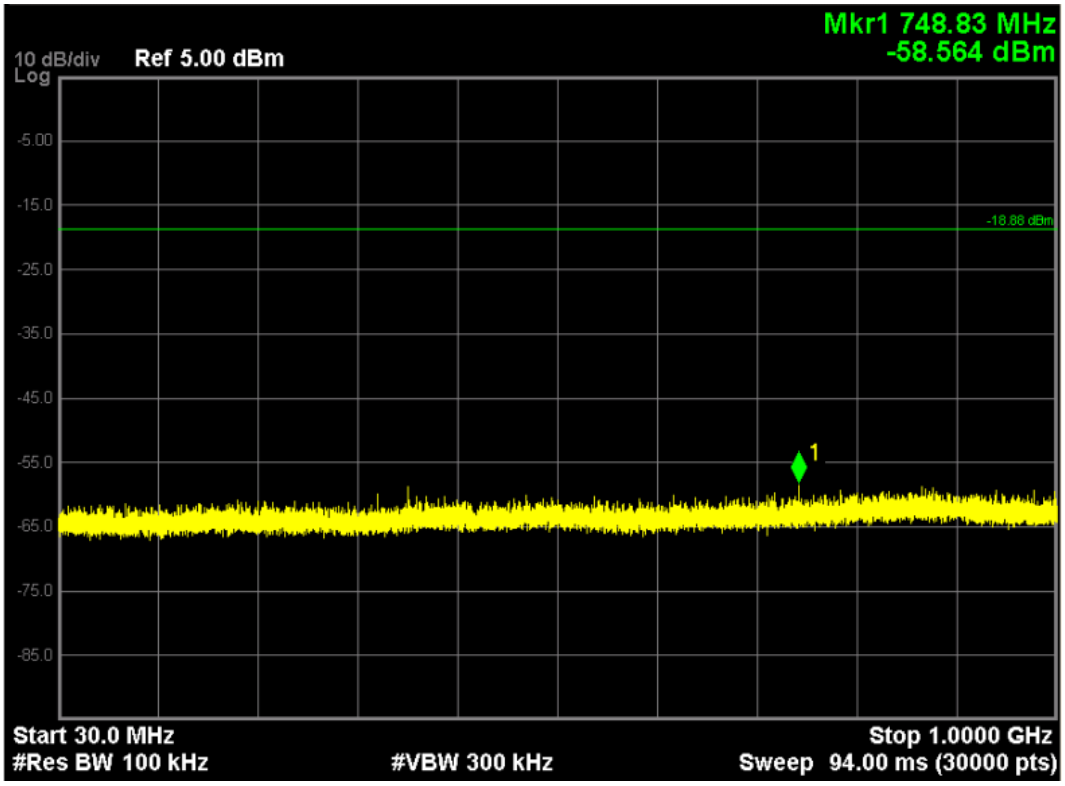
9.4 RESULTS & PERFORMANCE

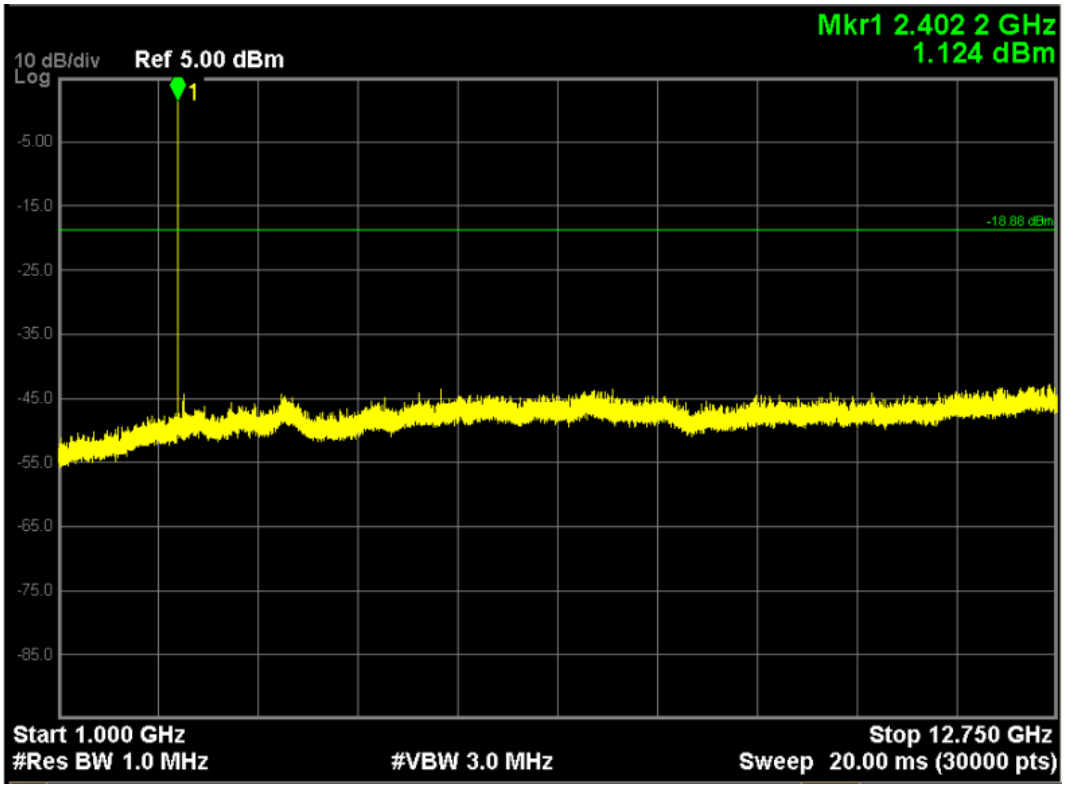
Bluetooth traffic mode GFSK

Channel 0

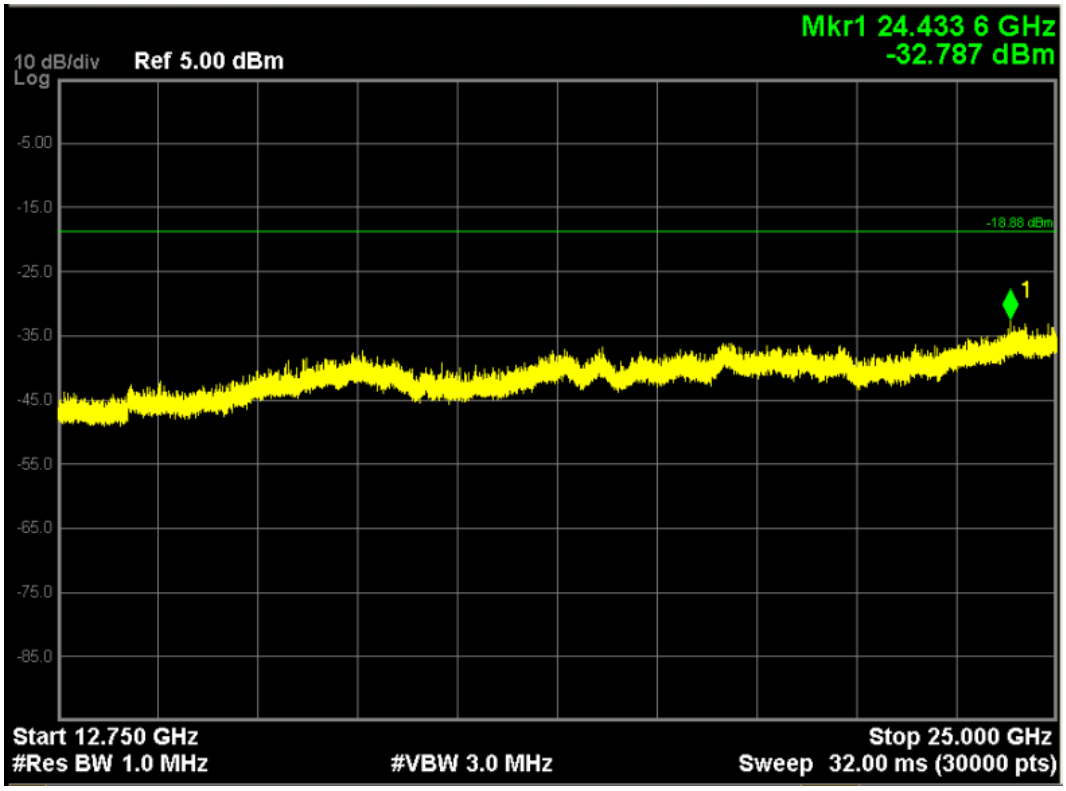




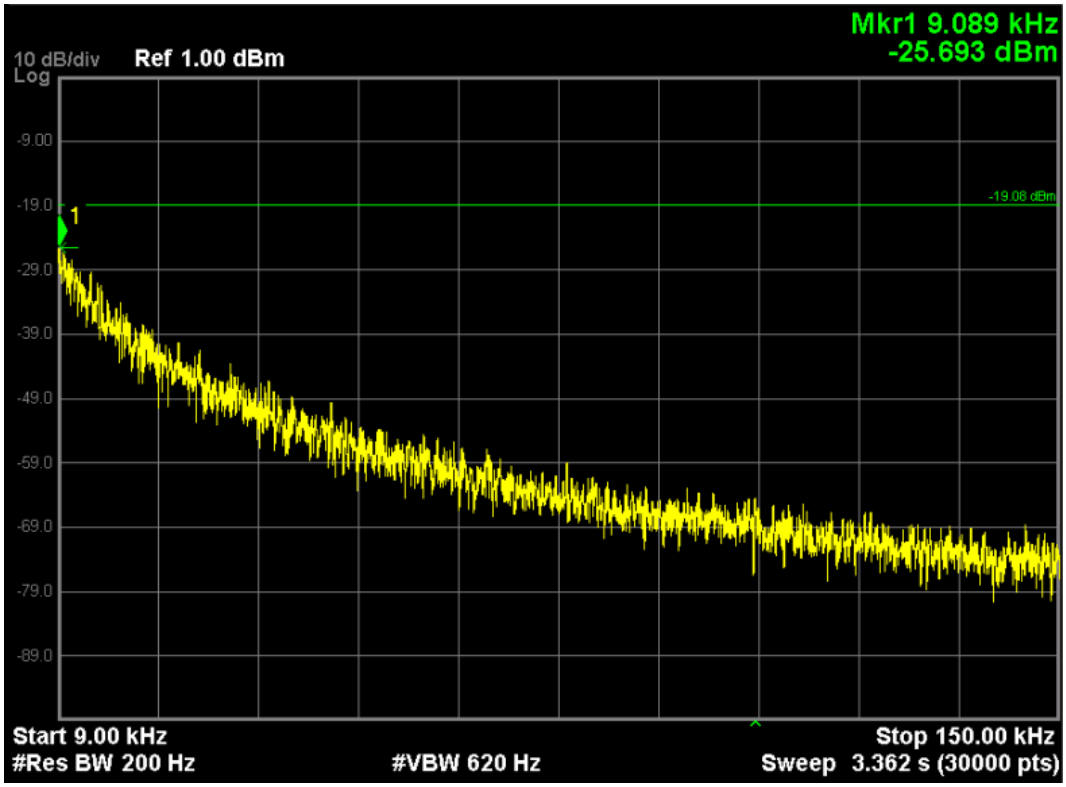


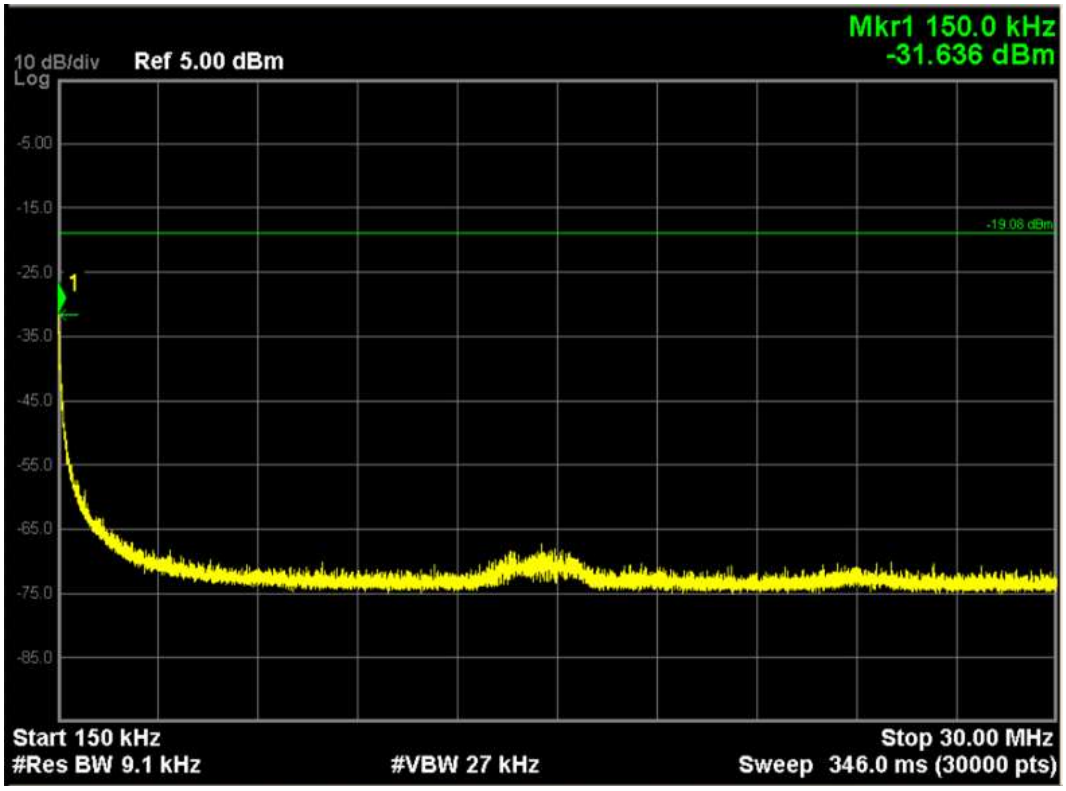


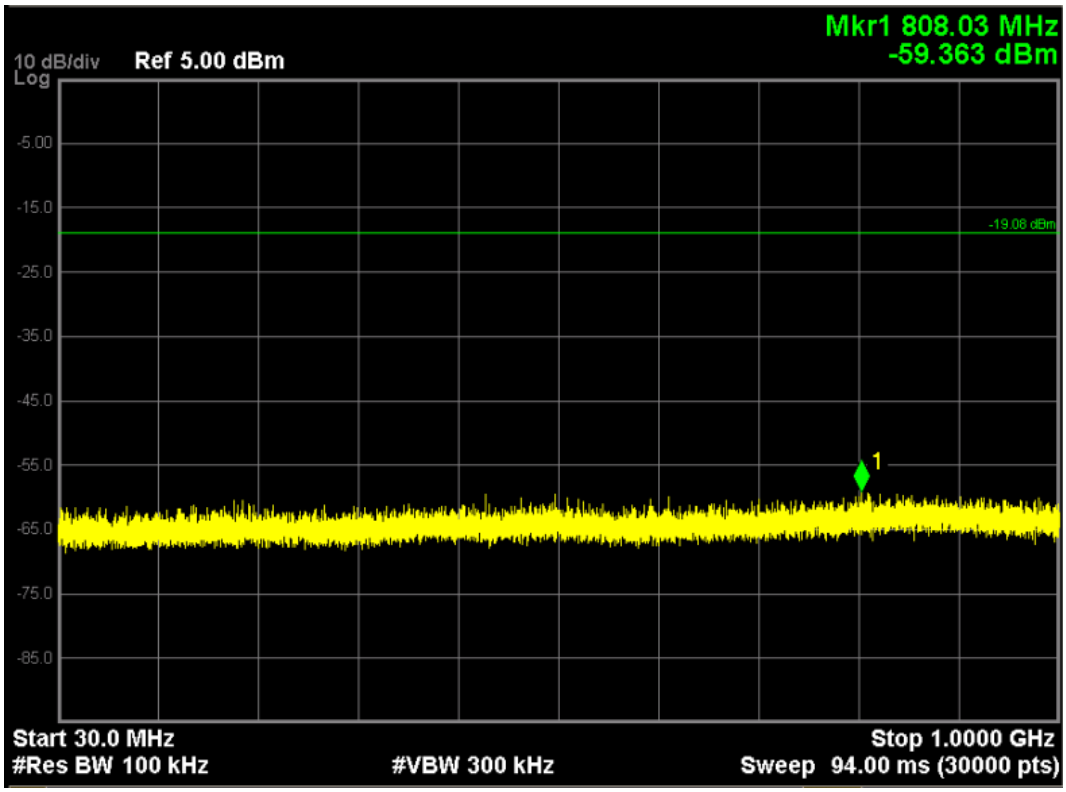
Note: The point mark1 is carrier.

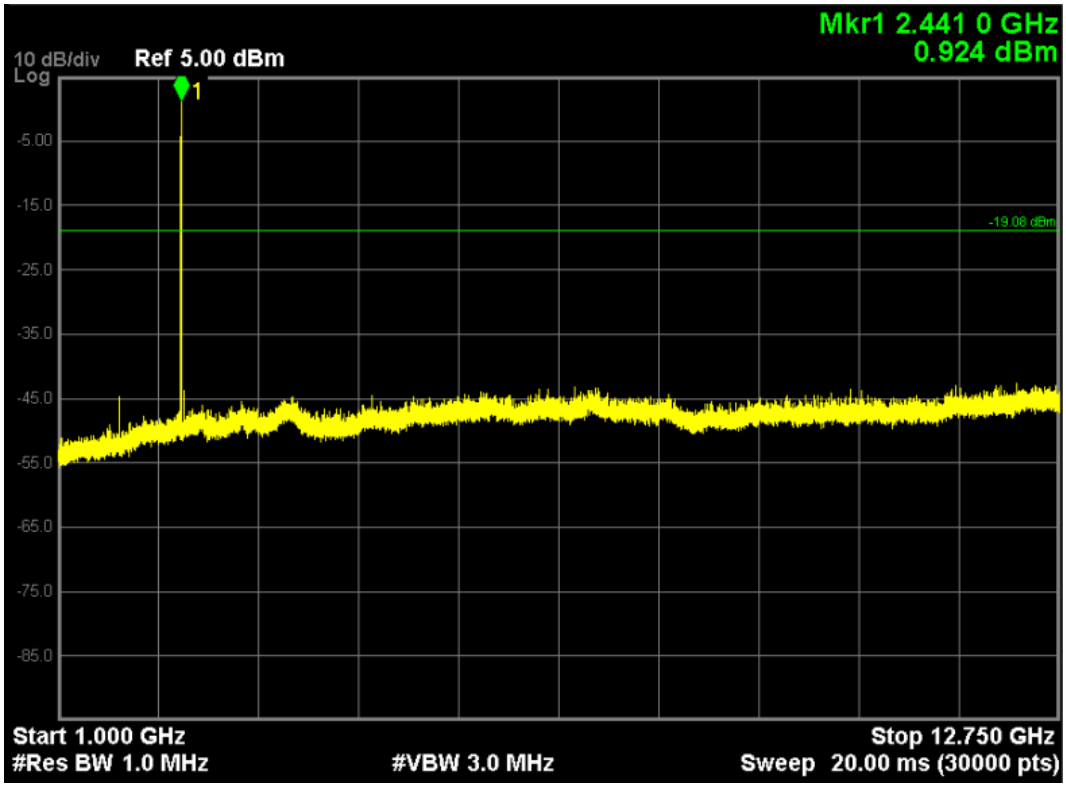

Mkr1 24.433 6 GHz
-32.787 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-18.86 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 25.000 GHz
Sweep 32.00 ms (30000 pts)

Channel 39

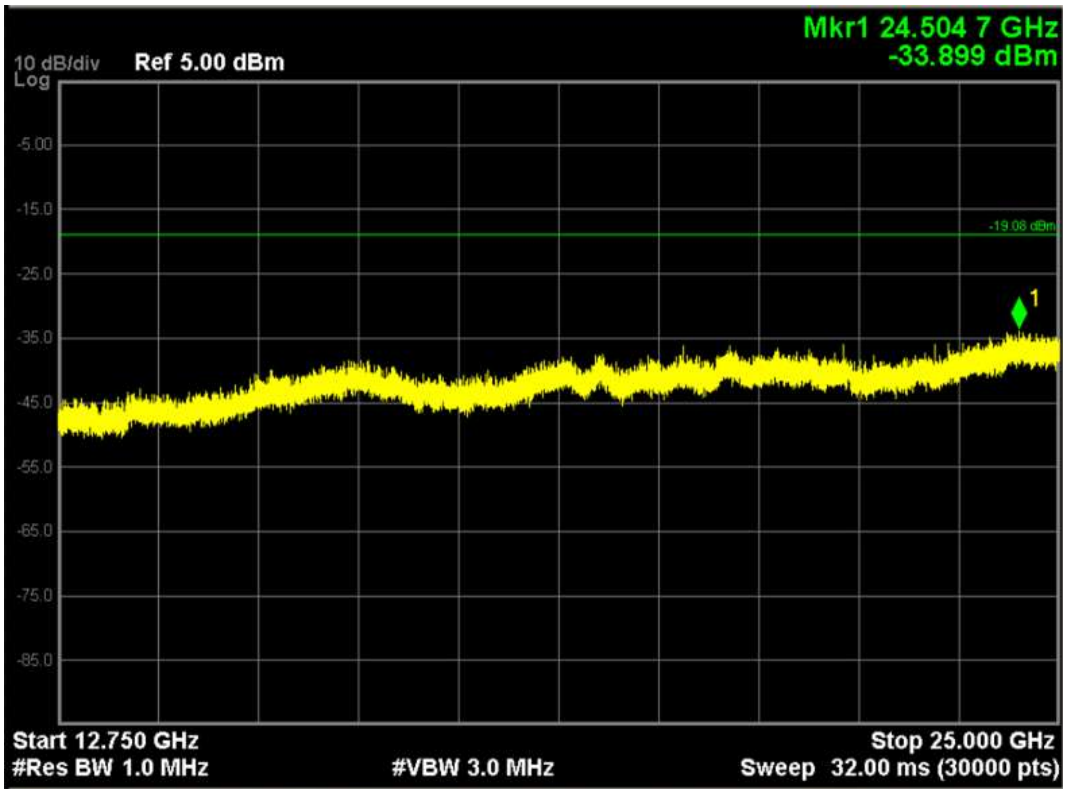

Mkr1 9.089 kHz
-25.693 dBm
10 dB/div
Log
Ref 1.00 dBm
-9.00
-19.0
-19.08 dBm
-29.0
-39.0
-49.0
-59.0
-69.0
-79.0
-89.0
1
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-31.636 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-19.08 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

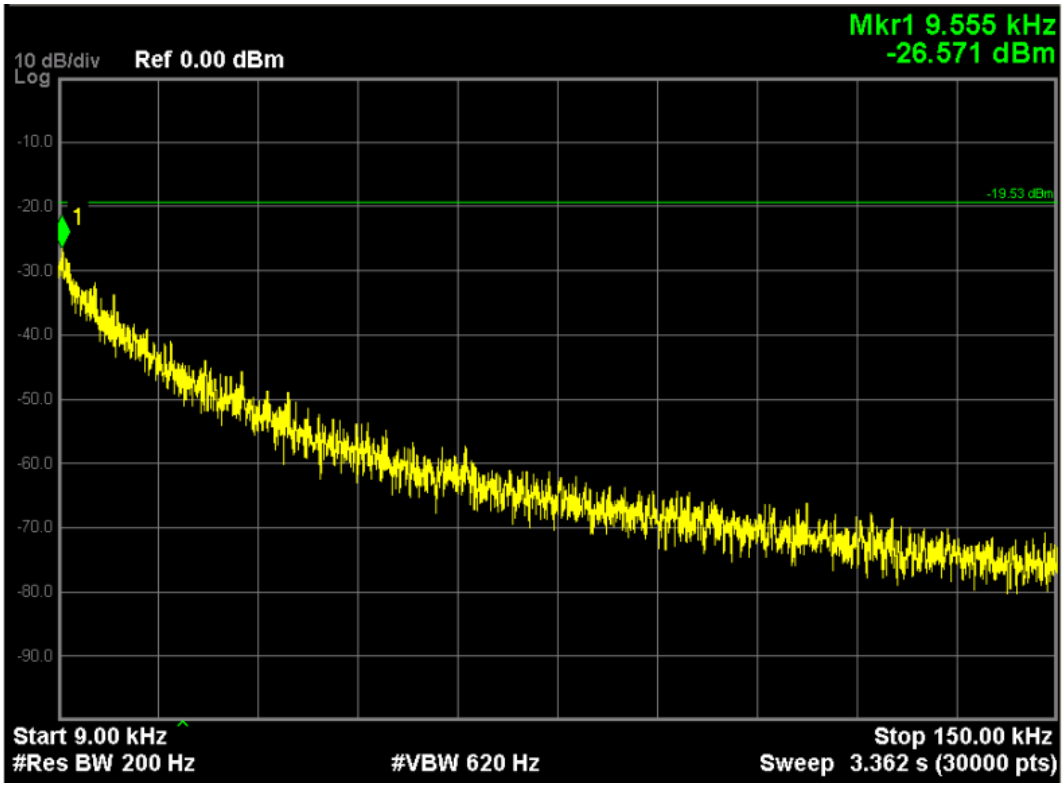

Mkr1 808.03 MHz
-59.363 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-19.08 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

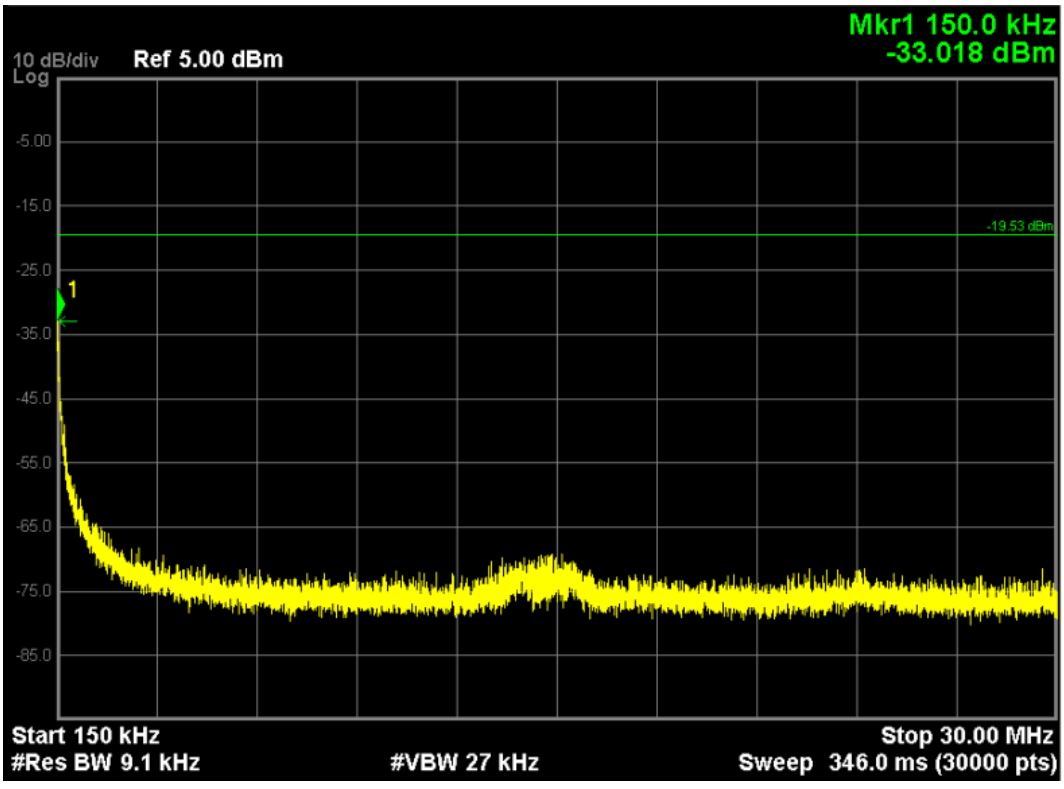


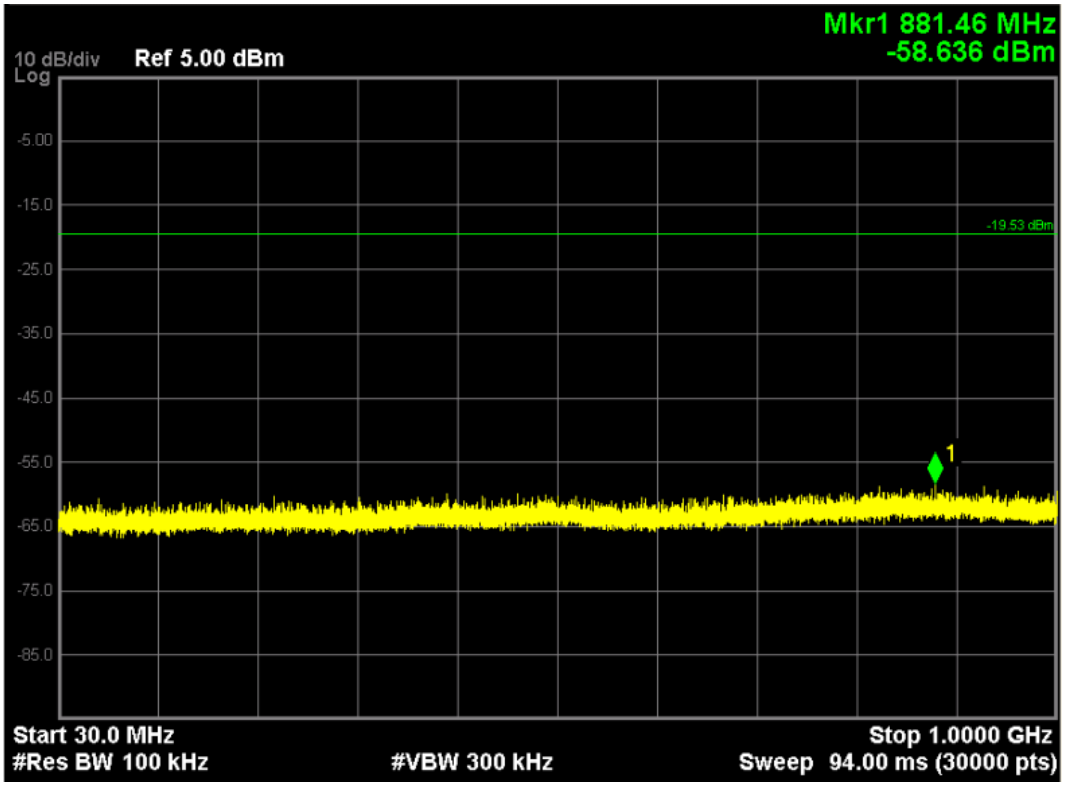
Note: The point mark1 is carrier.

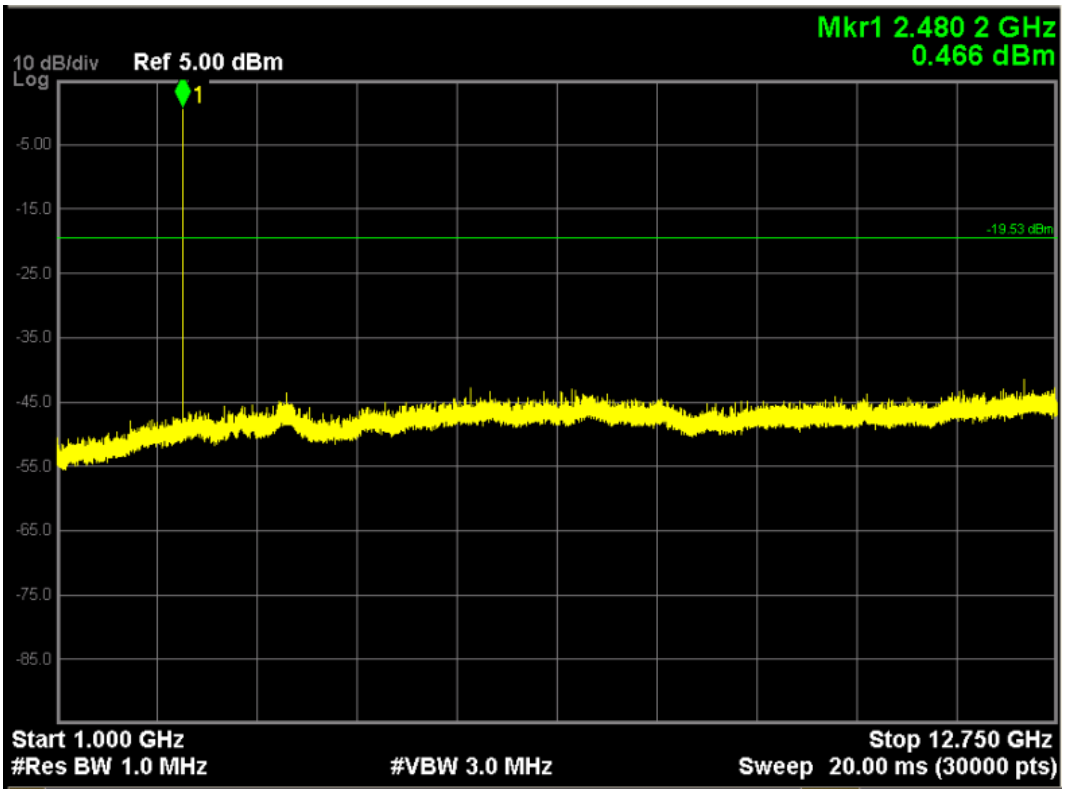


Channel 78

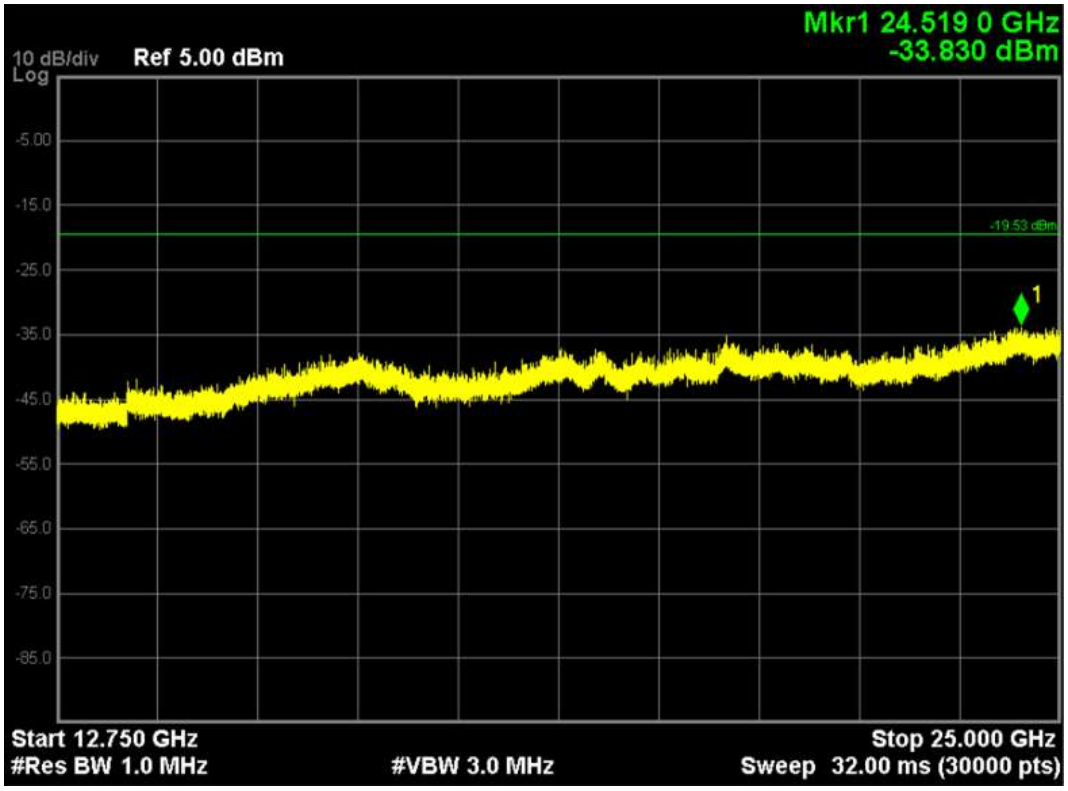

Mkr1 9.555 kHz
-26.571 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
-19.53 dBm
1
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-33.018 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
-19.53 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

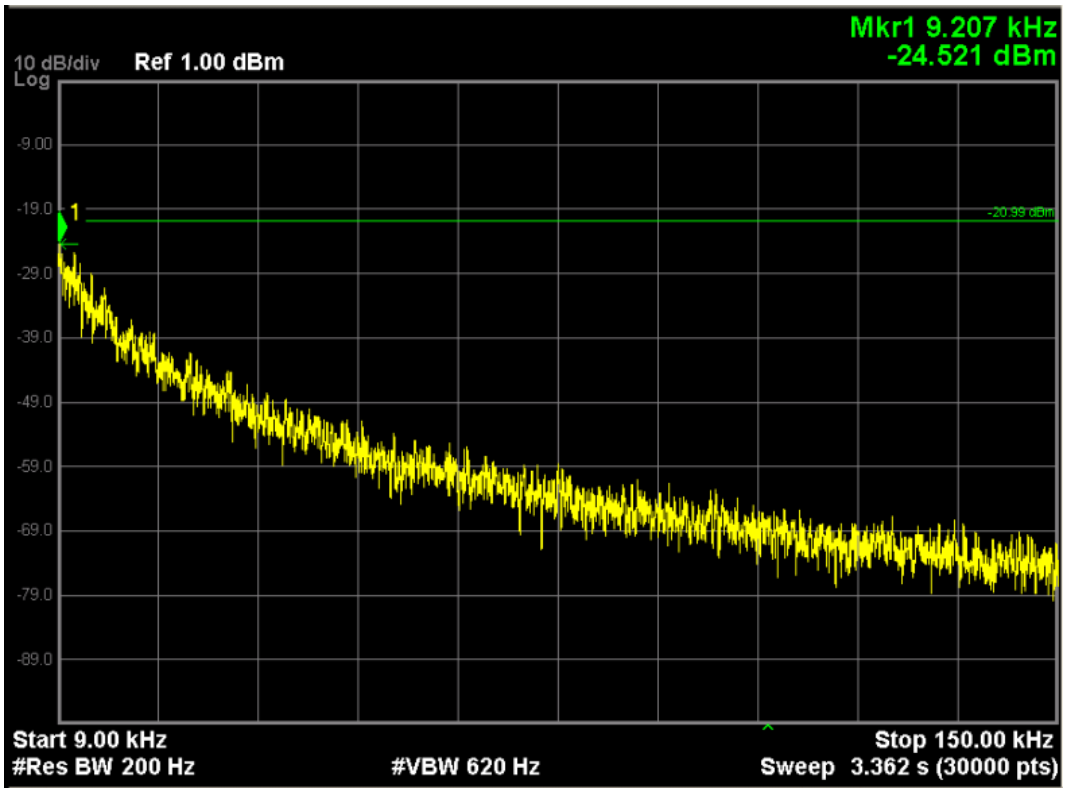


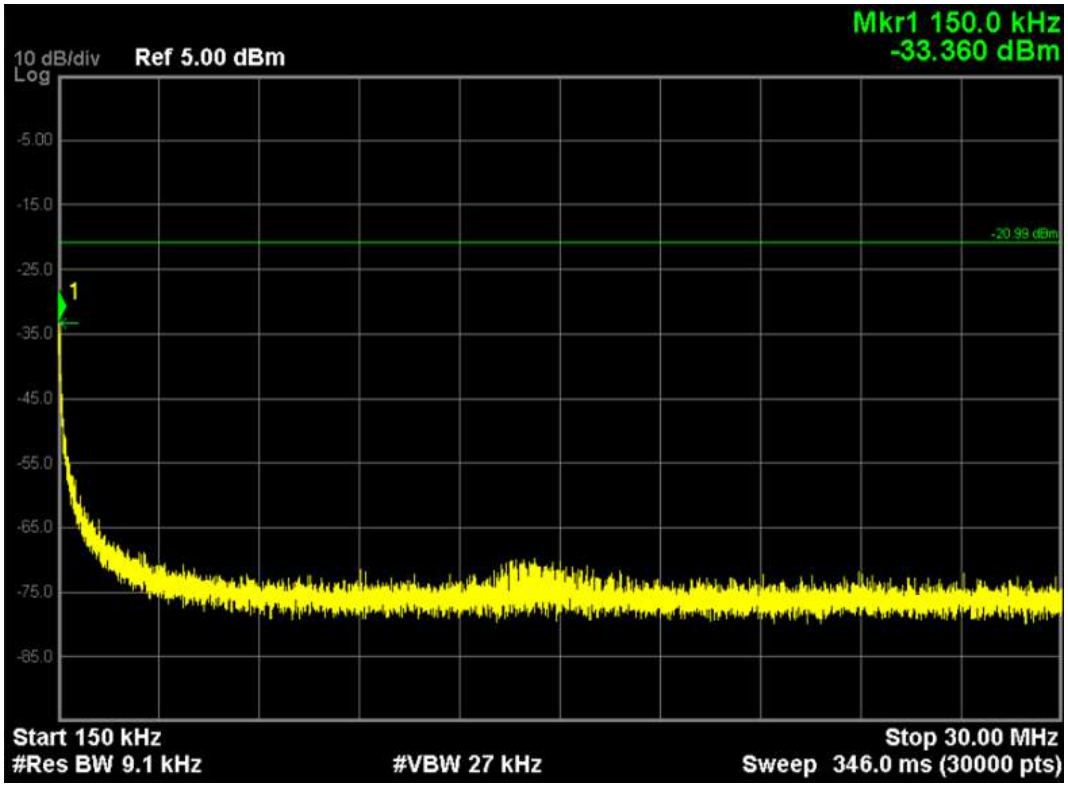


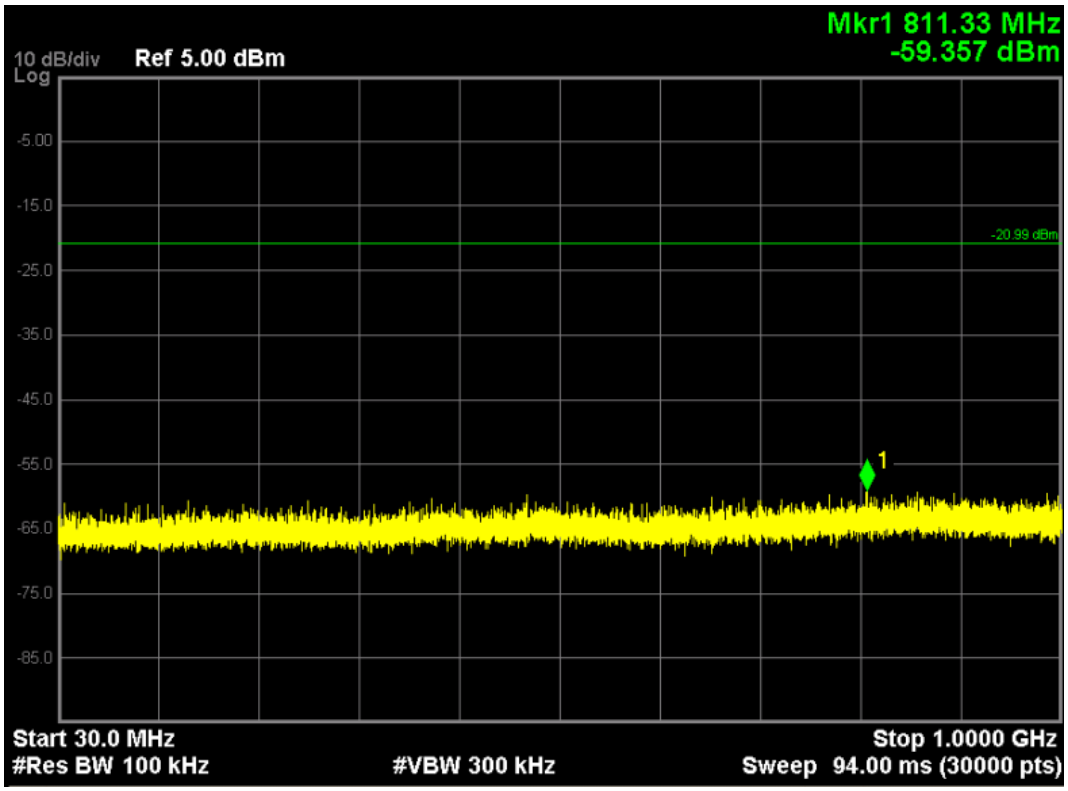
Note:The point mark1 is carrier.

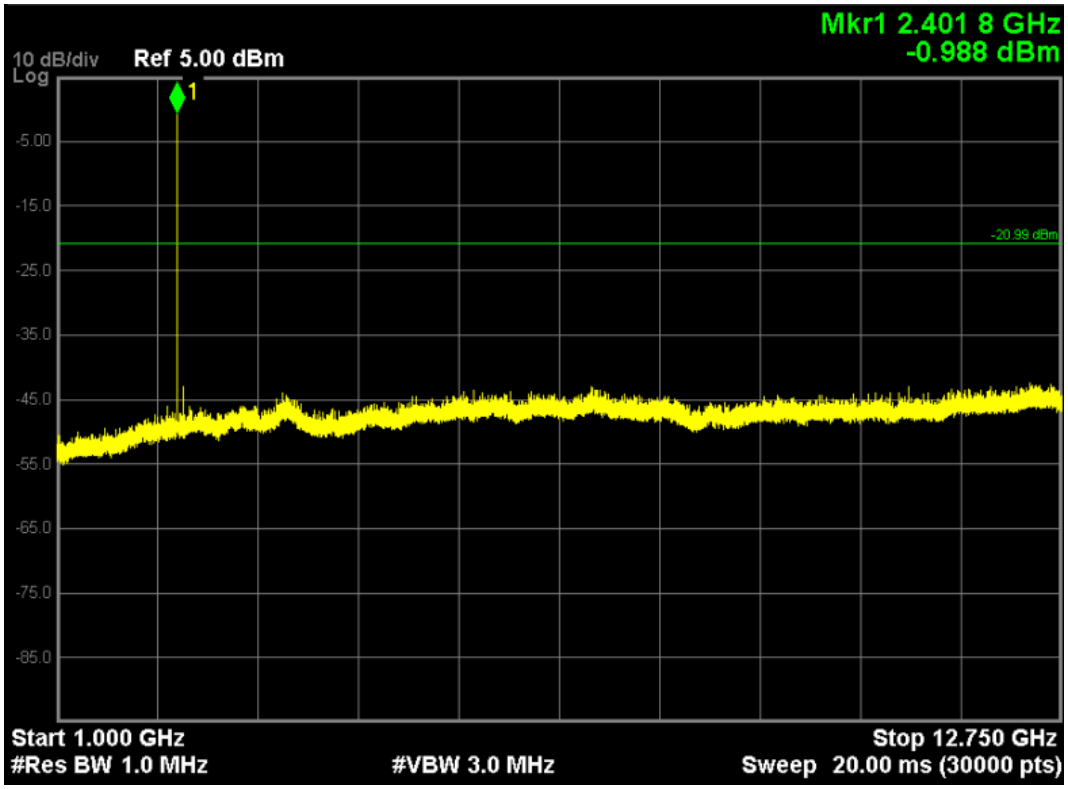


Bluetooth; traffic mode; Π /4-DQPSK
Channel 0

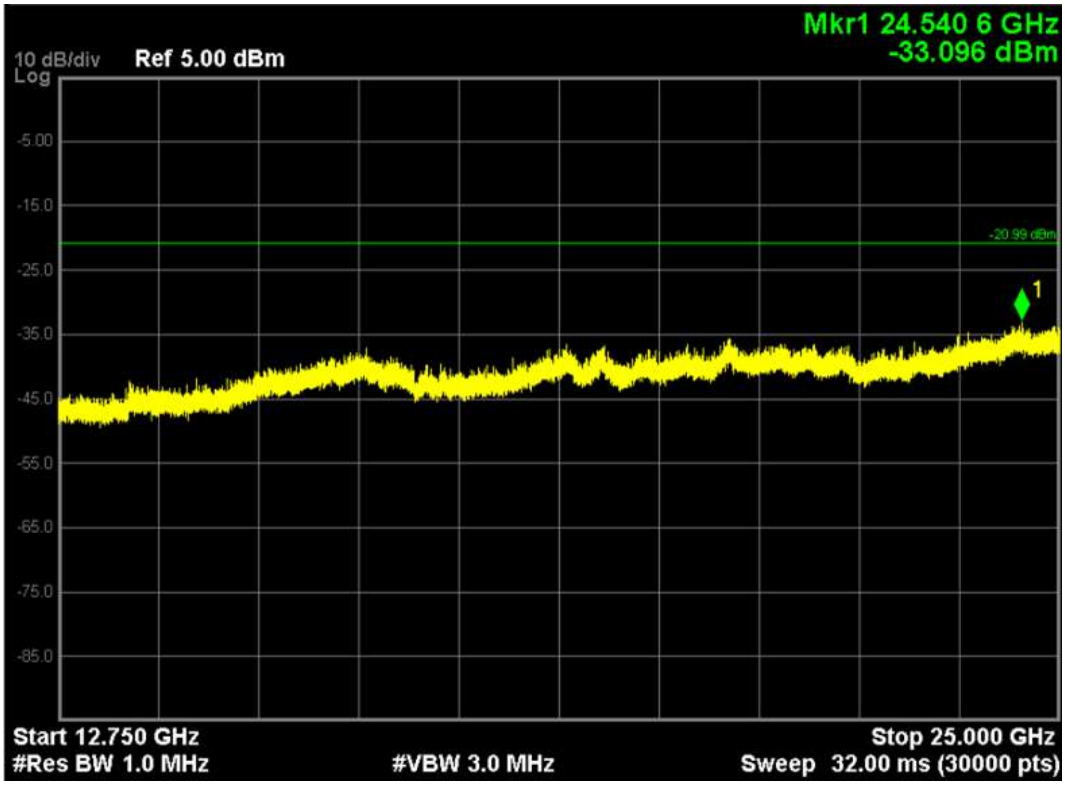



Mkr1 150.0 kHz
-33.360 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-20.99 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

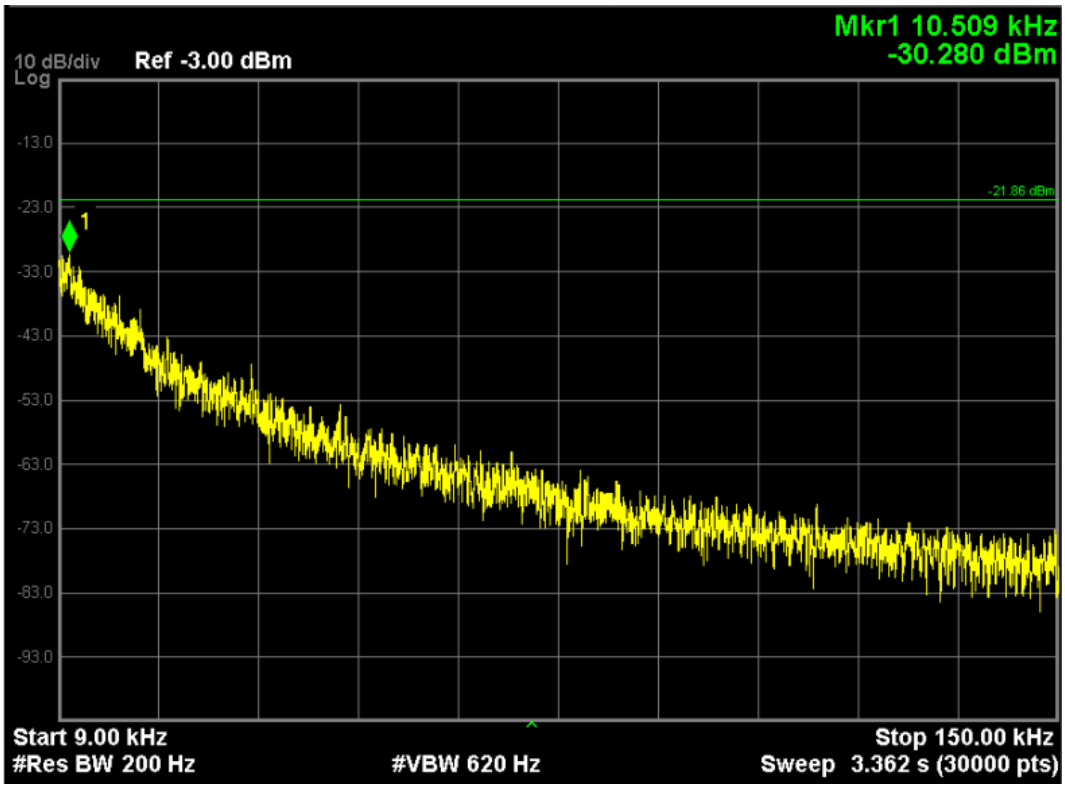

Mkr1 811.33 MHz
-59.357 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-20.99 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

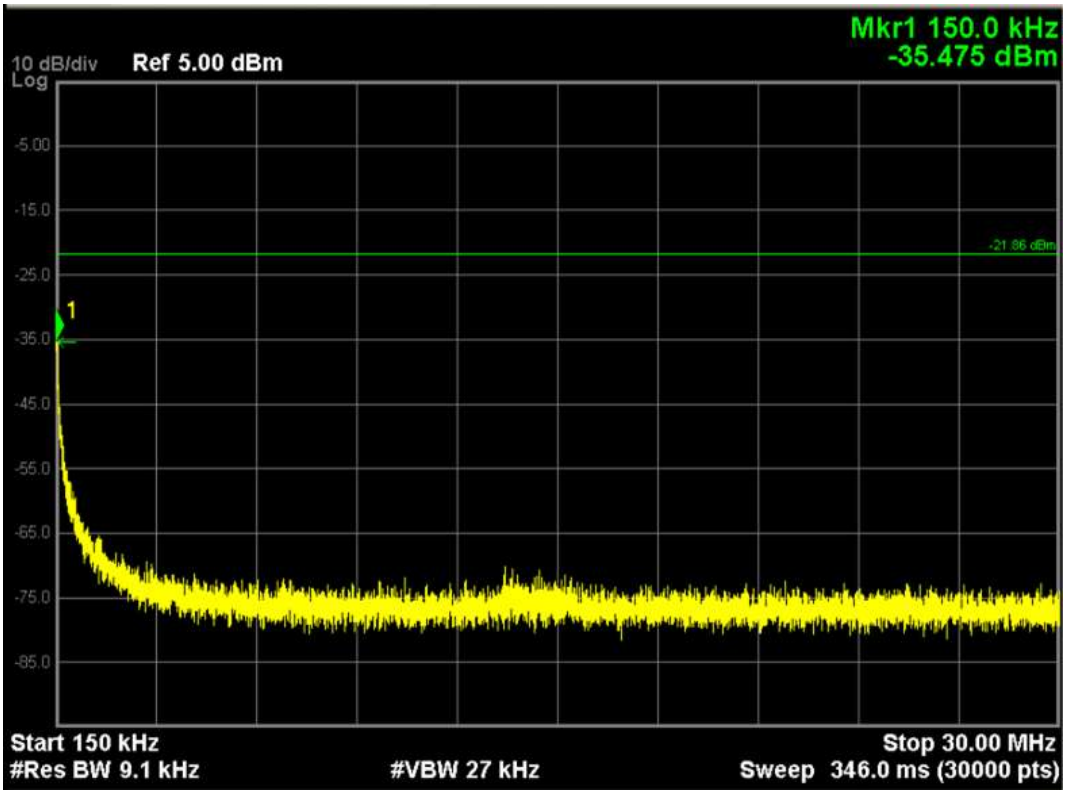


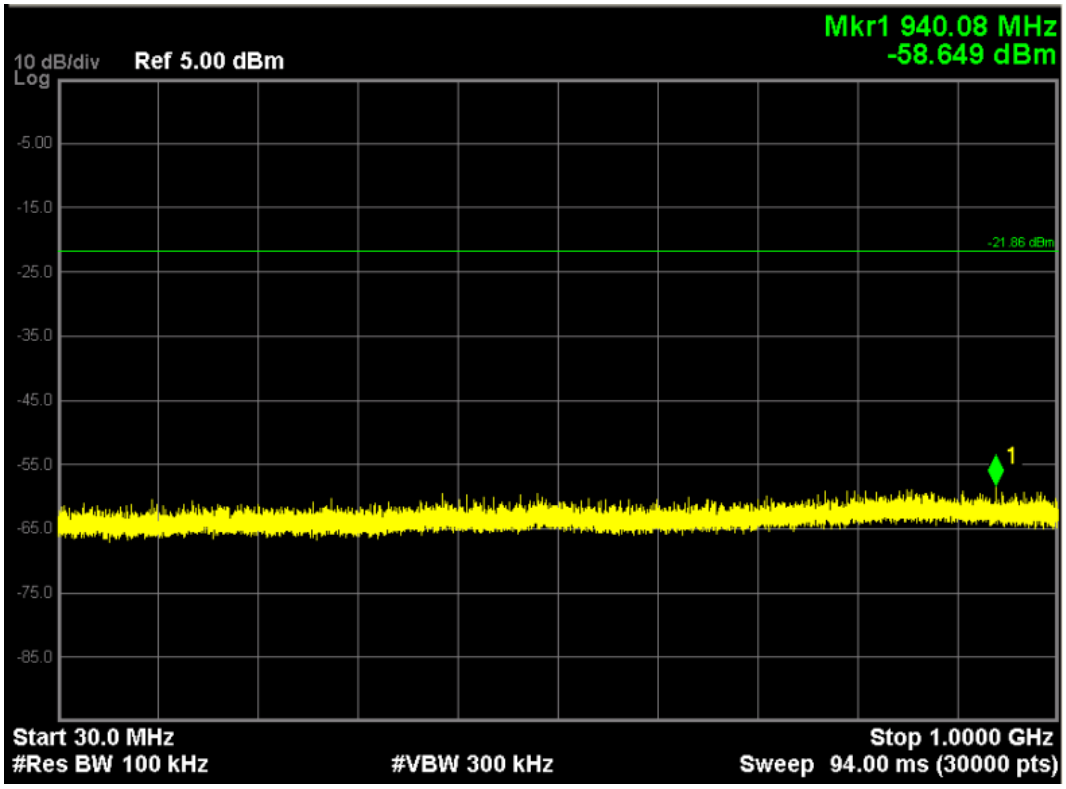
Note:The point mark1 is carrier.

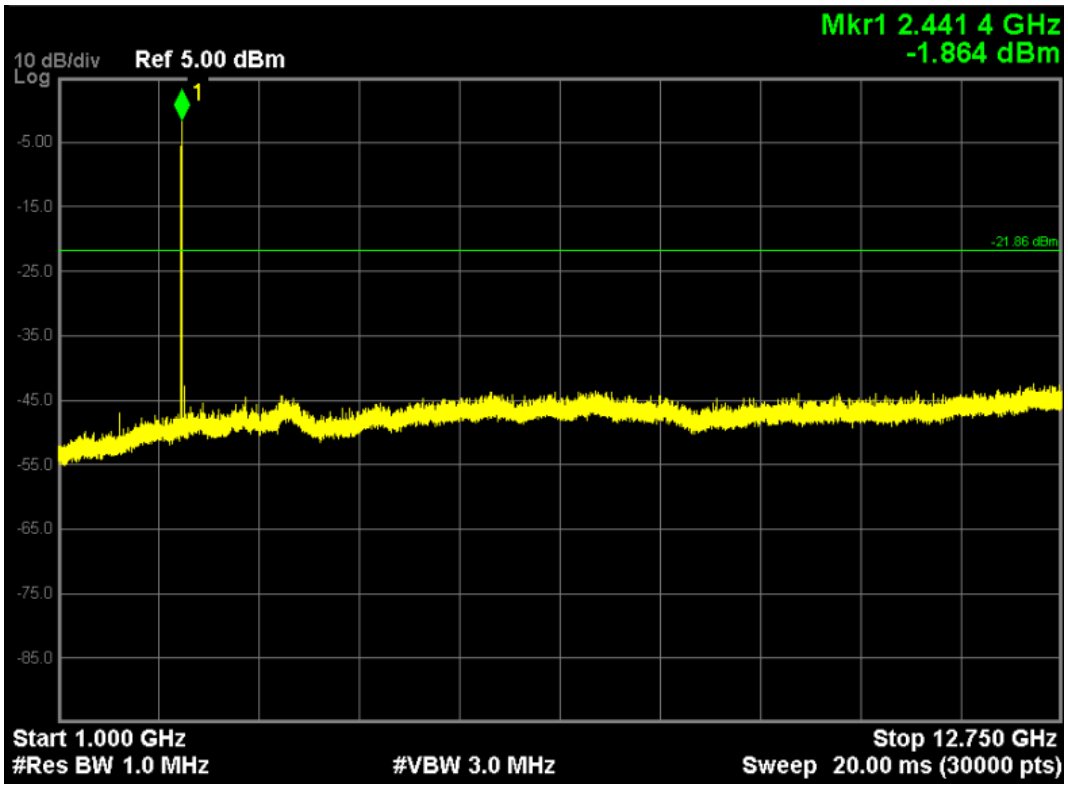


Channel 39

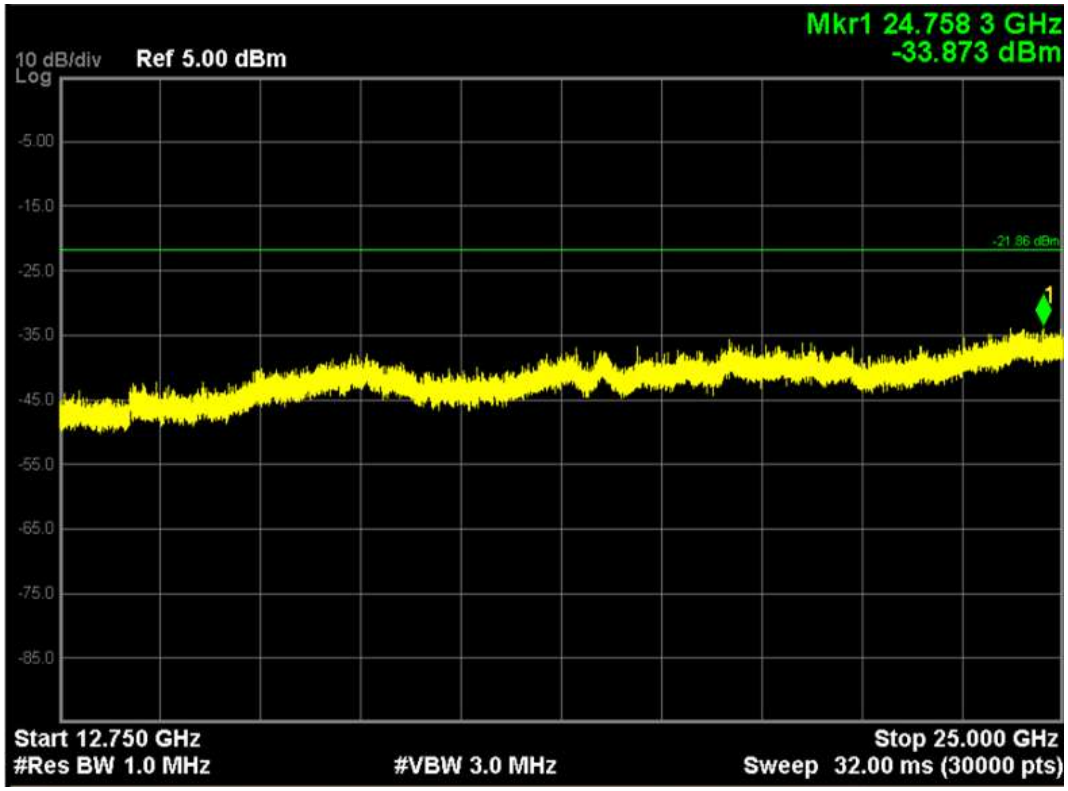

Mkr1 10.509 kHz
-30.280 dBm
10 dB/div
Log
Ref -3.00 dBm
-13.0
-23.0
-33.0
-43.0
-53.0
-63.0
-73.0
-83.0
-93.0
-21.86 dBm
1
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-35.475 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
-21.86 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

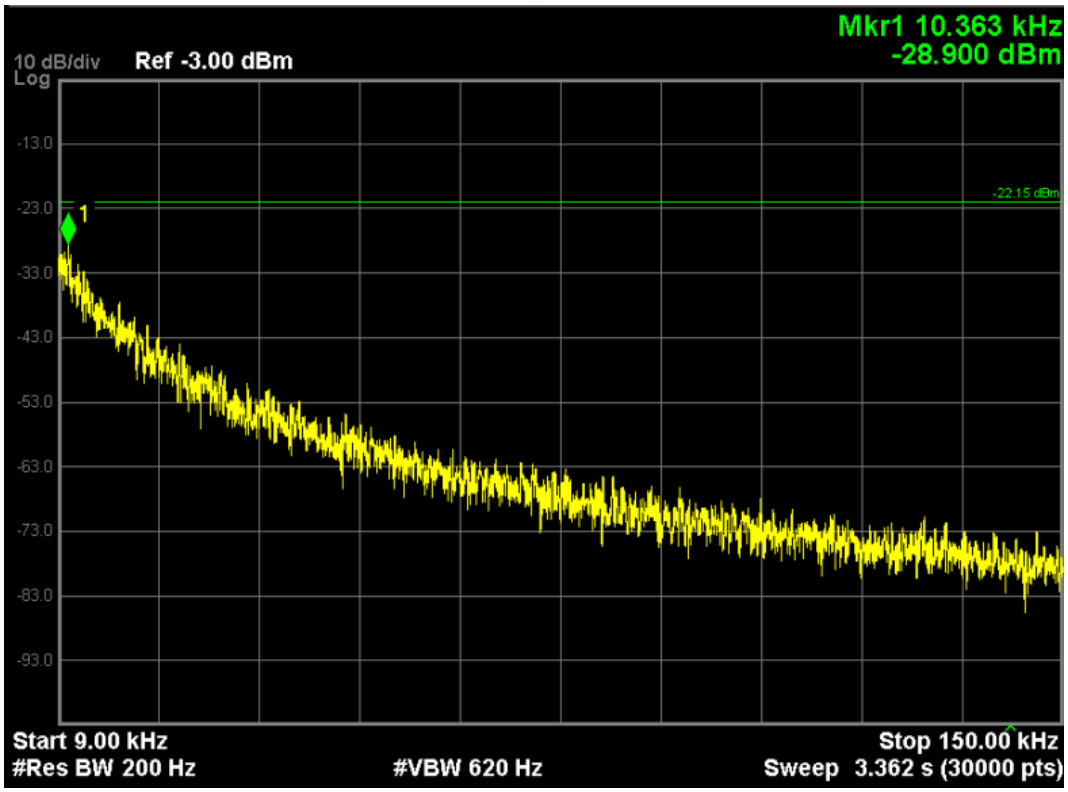


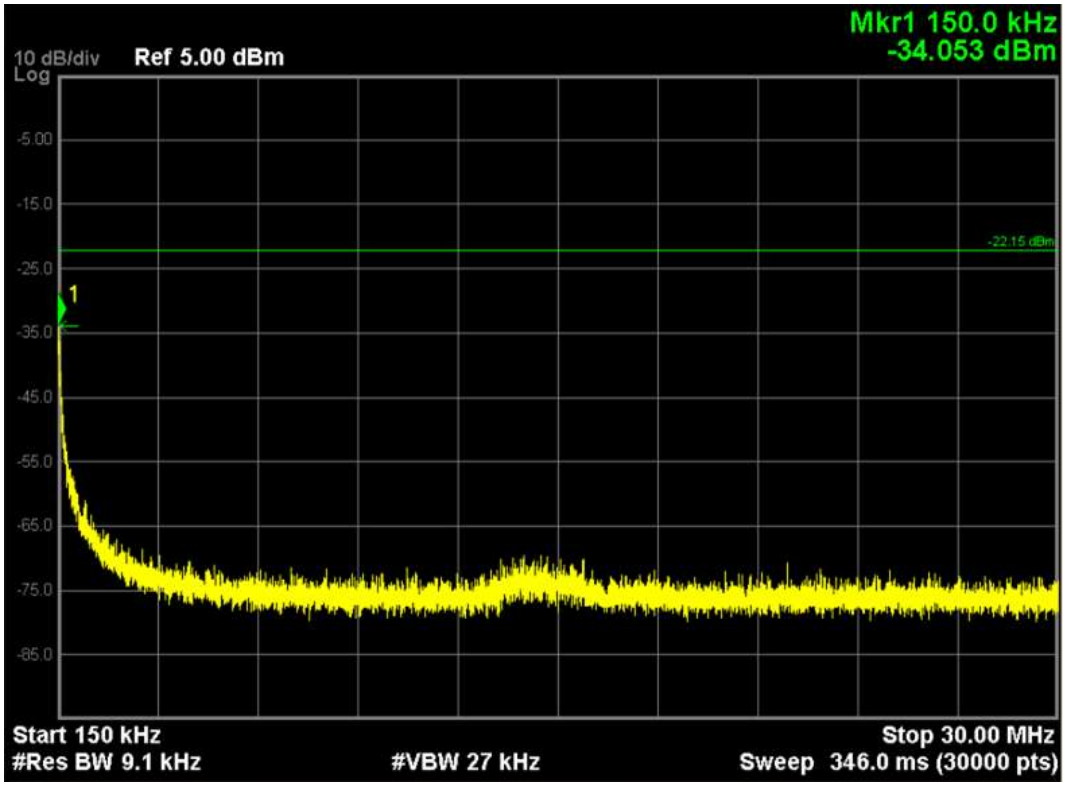


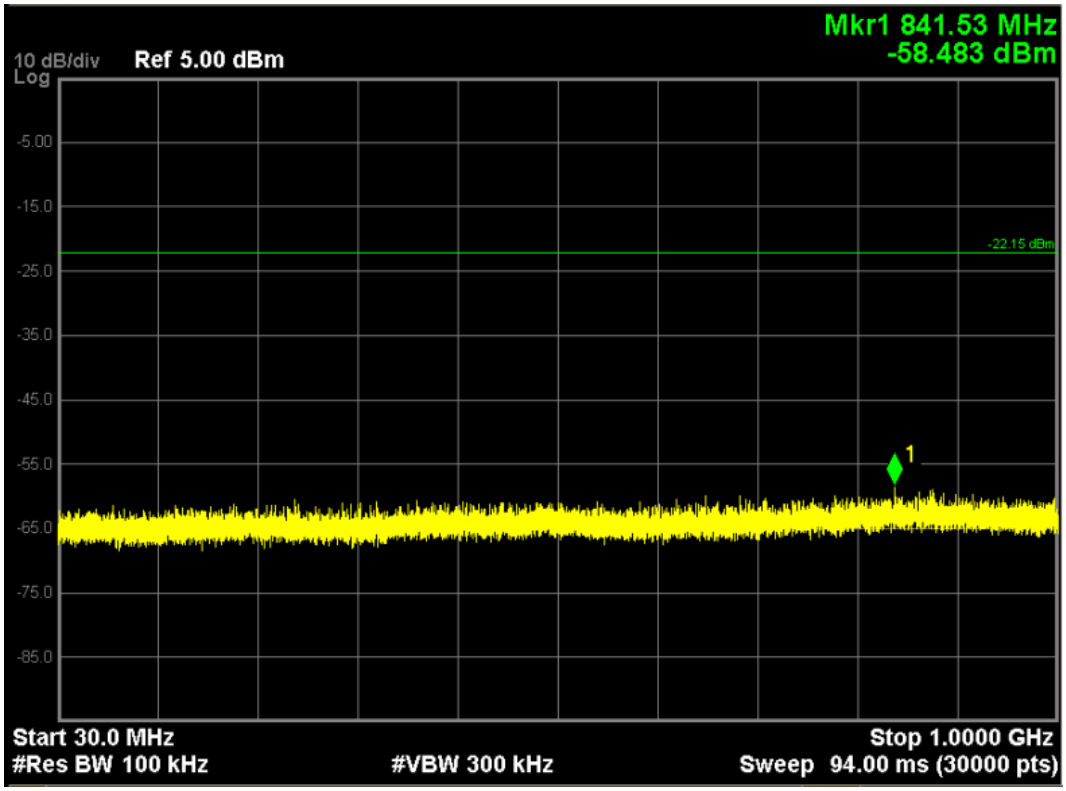
Note:The point mark1 is carrier.

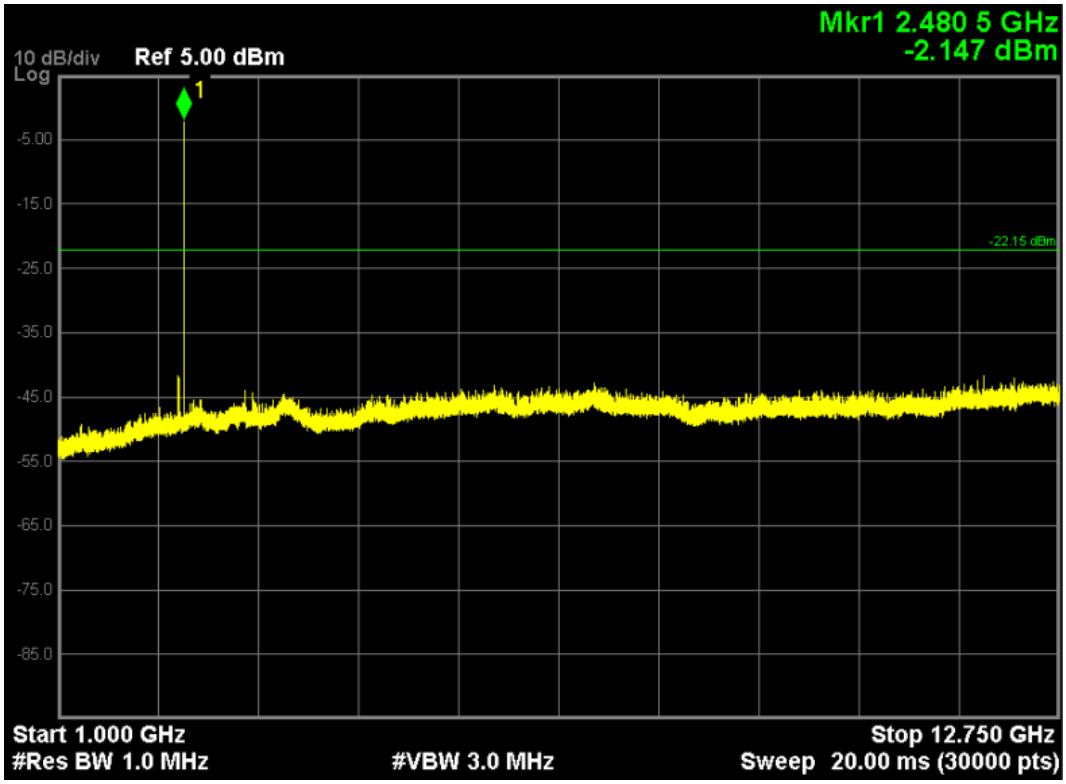

Mkr1 24.758 3 GHz
-33.873 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-21.86 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 25.000 GHz
Sweep 32.00 ms (30000 pts)

Channel 78

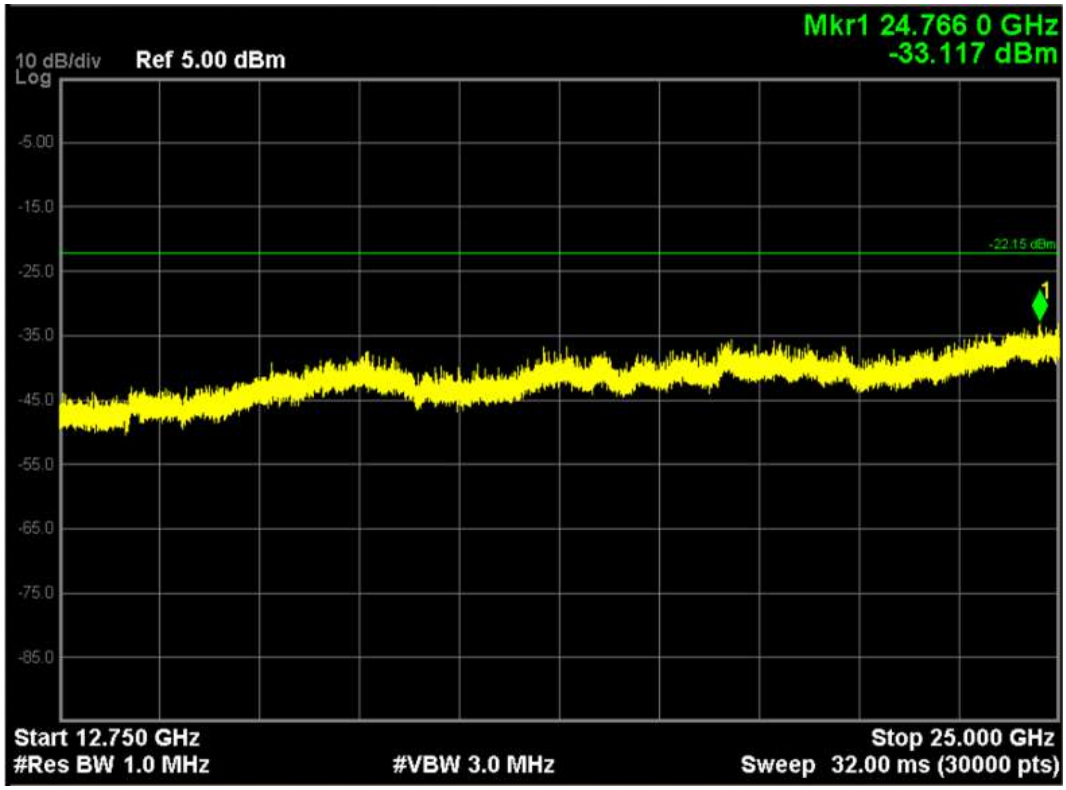

Mkr1 10.363 kHz
-28.900 dBm
10 dB/div
Log
Ref -3.00 dBm
-13.0
-22.15 dBm
-23.0
-33.0
-43.0
-53.0
-63.0
-73.0
-83.0
-93.0
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-34.053 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-22.15 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)


Mkr1 841.53 MHz
-58.483 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-22.15 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

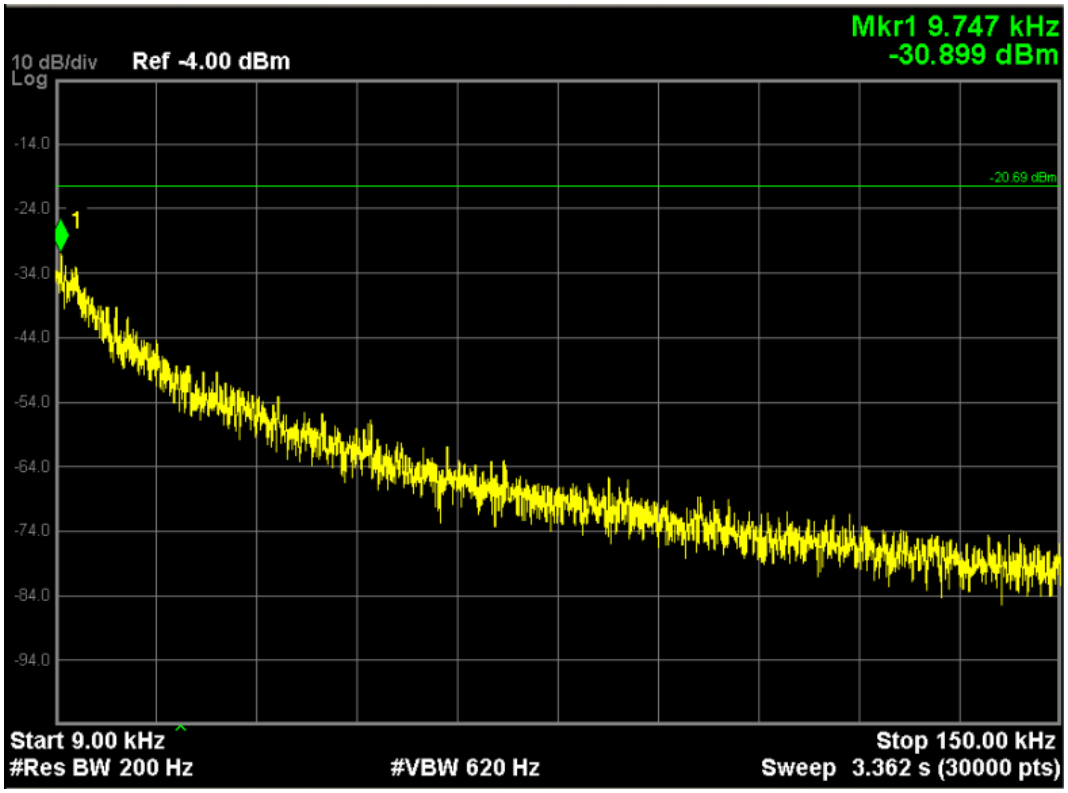


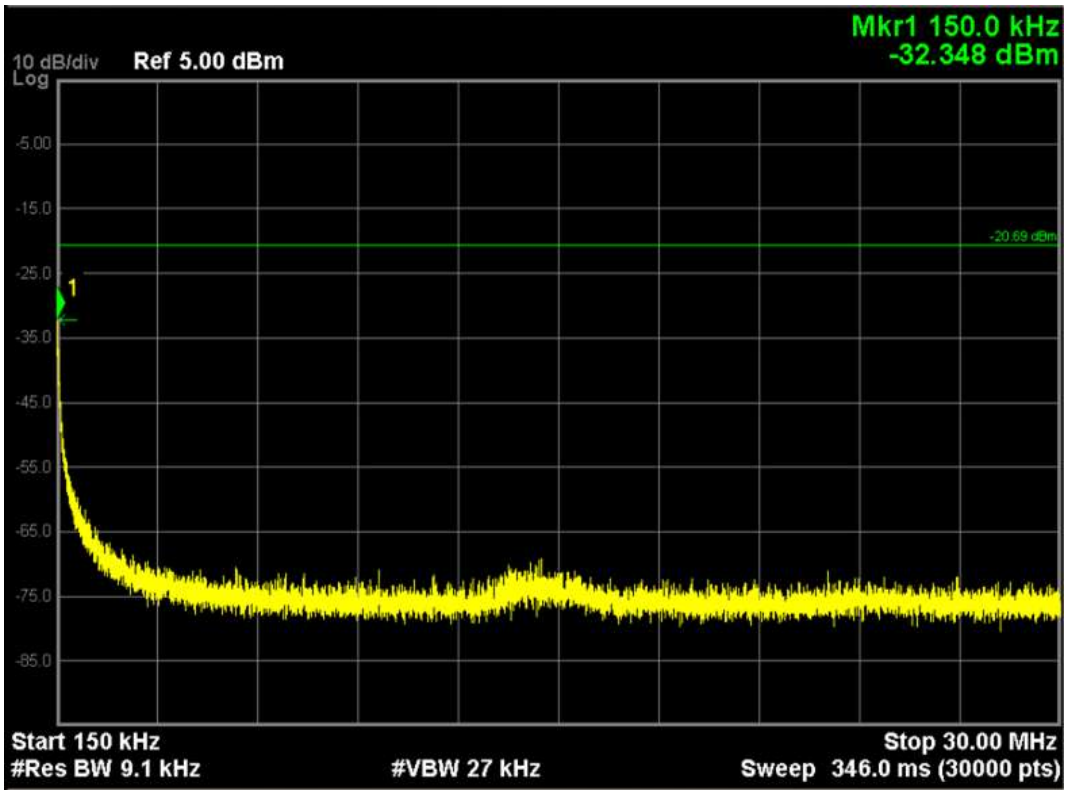
Note:The point mark1 is carrier.

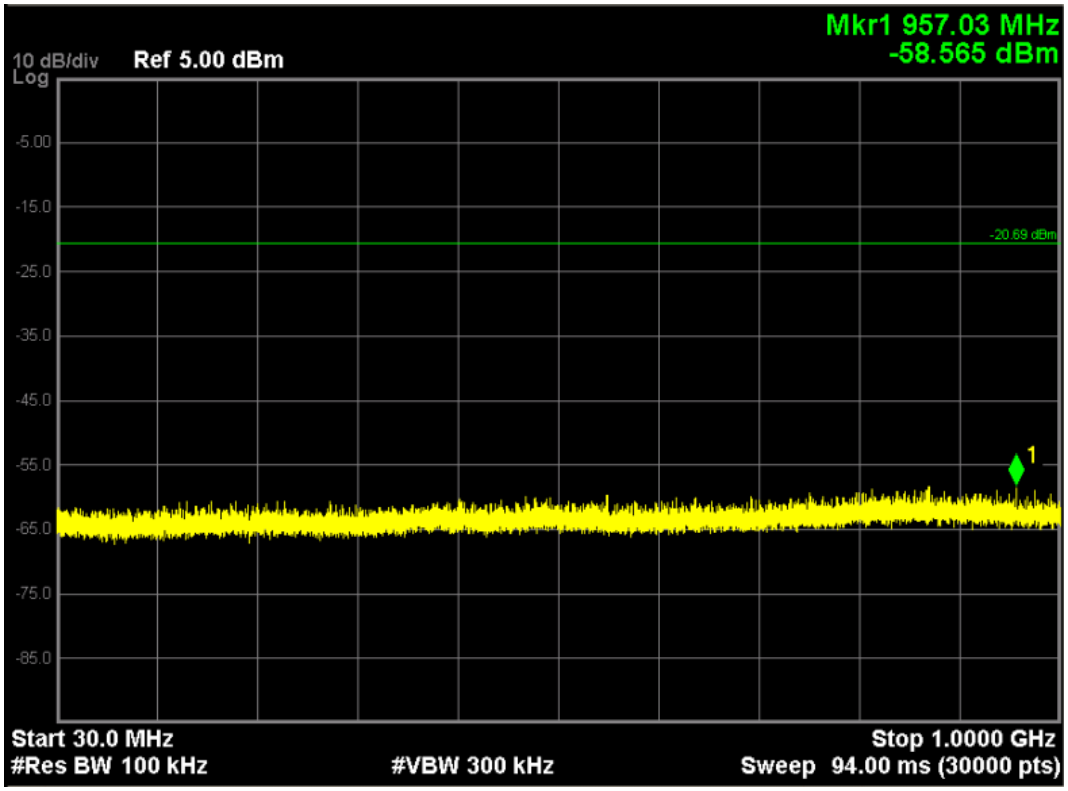


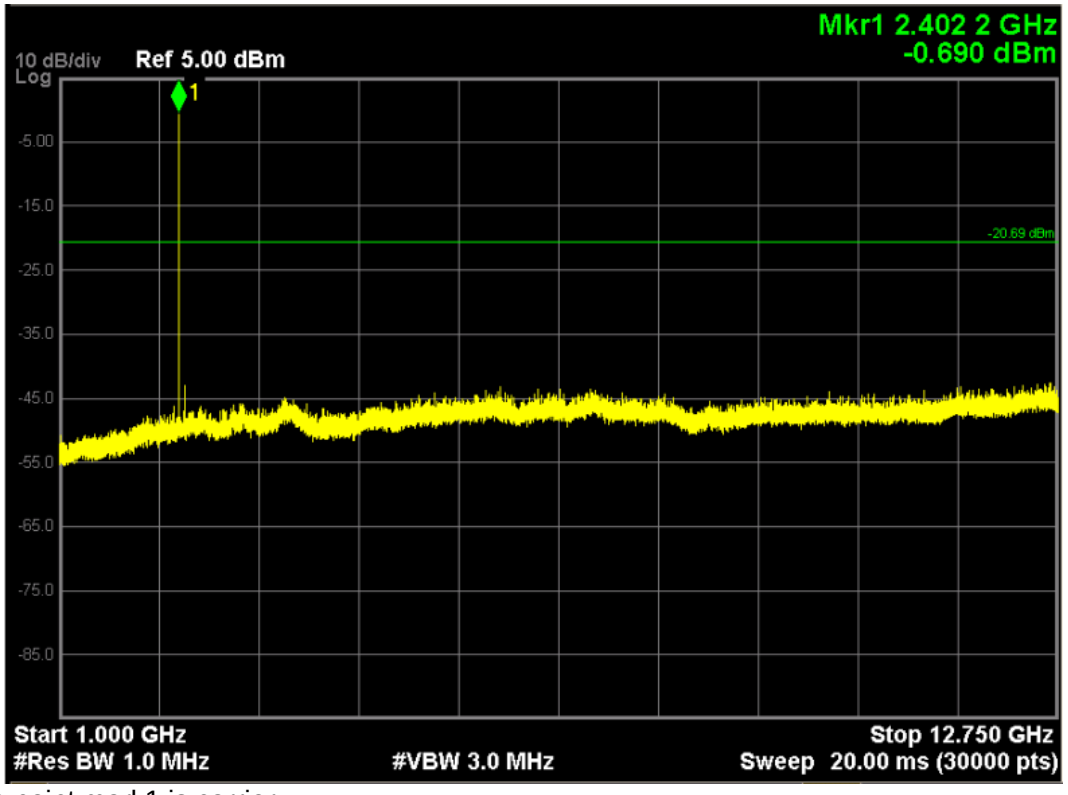
Bluetooth traffic mode 8-DPSK

Channel 0

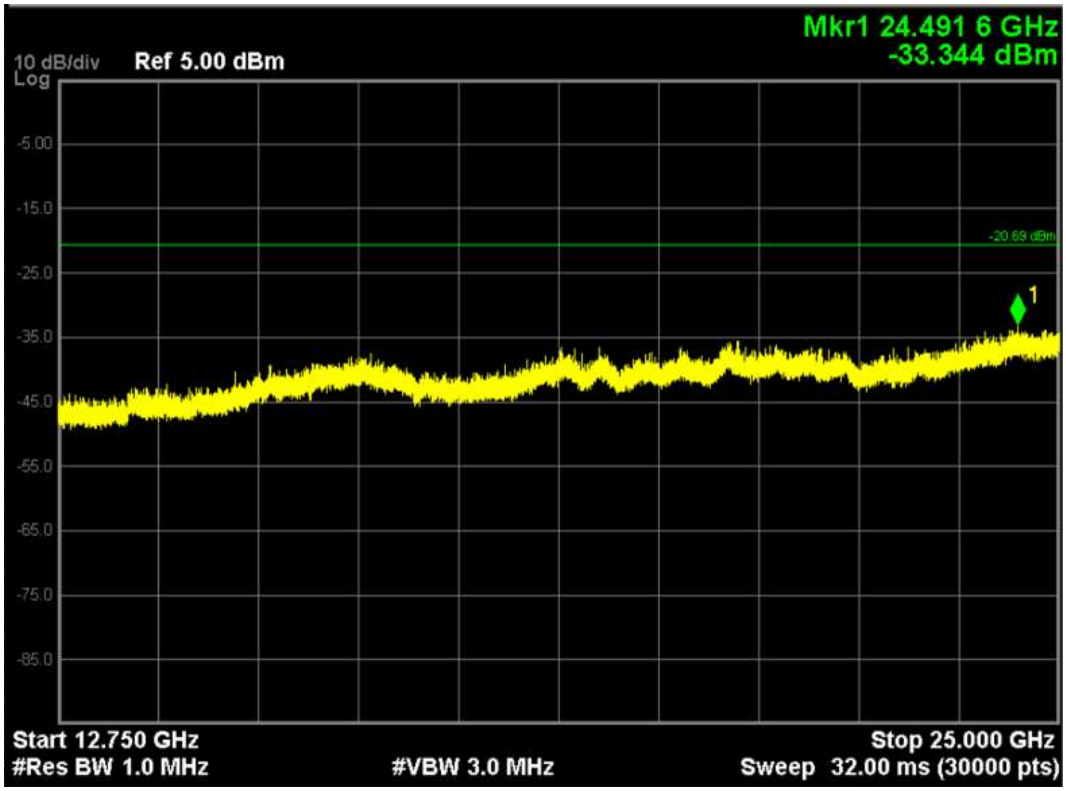




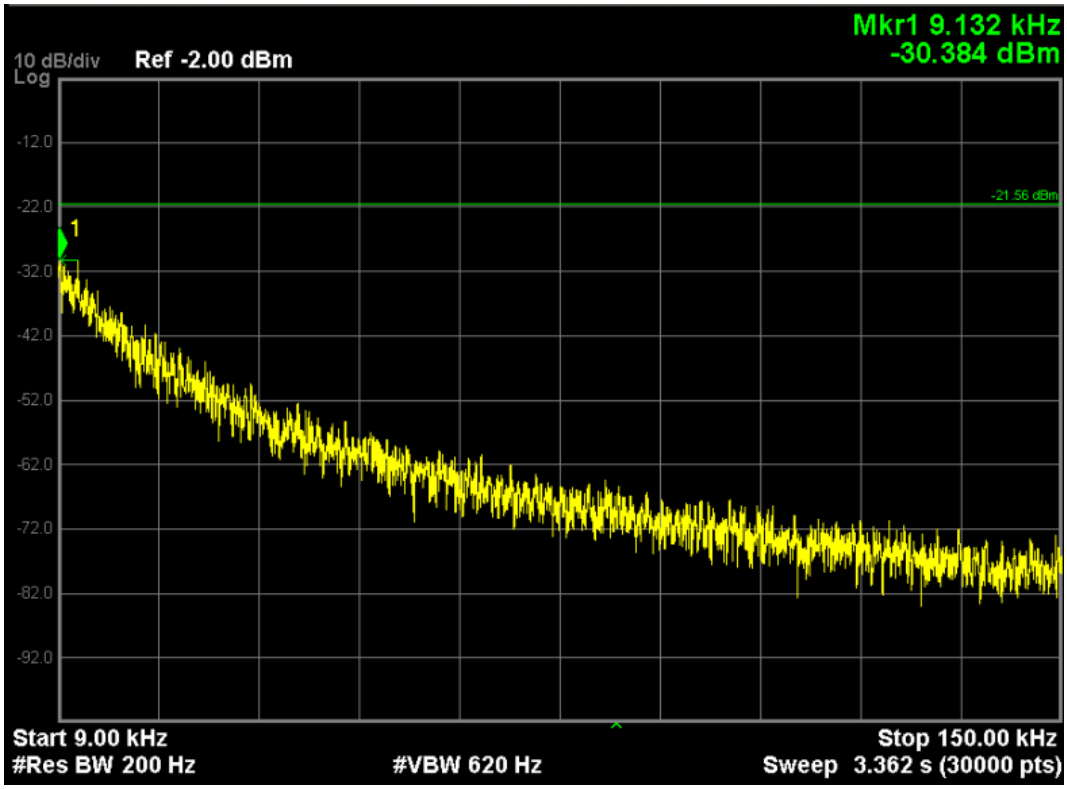


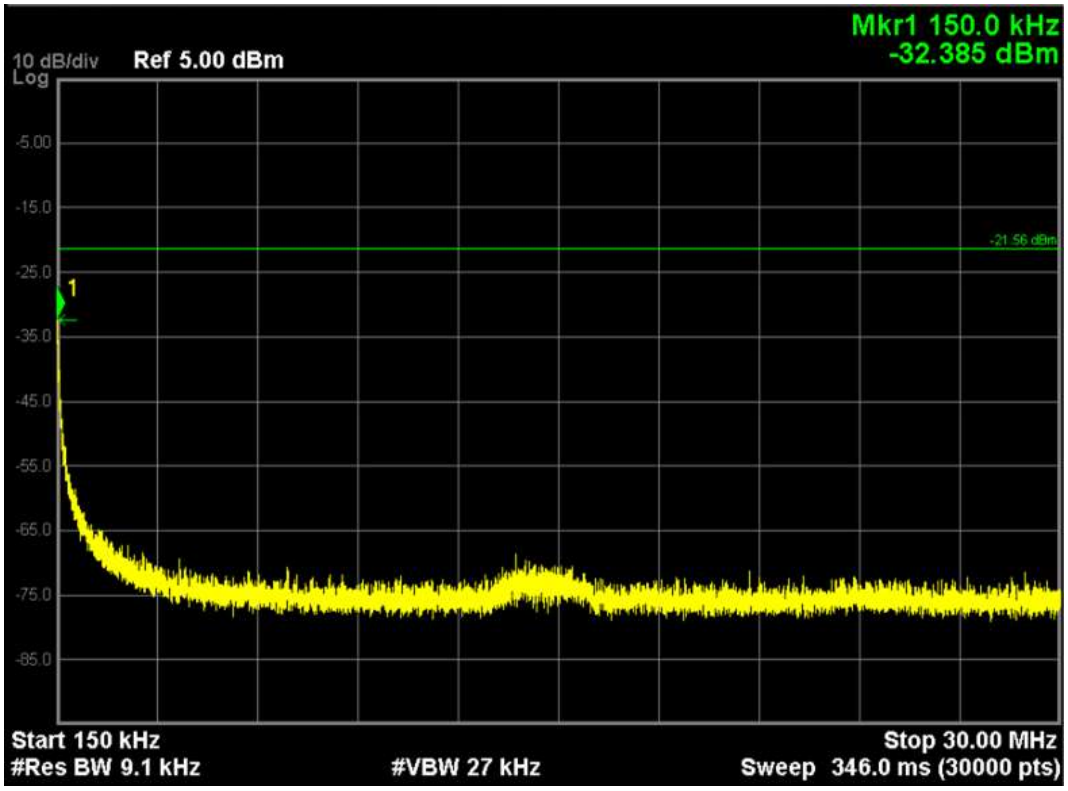


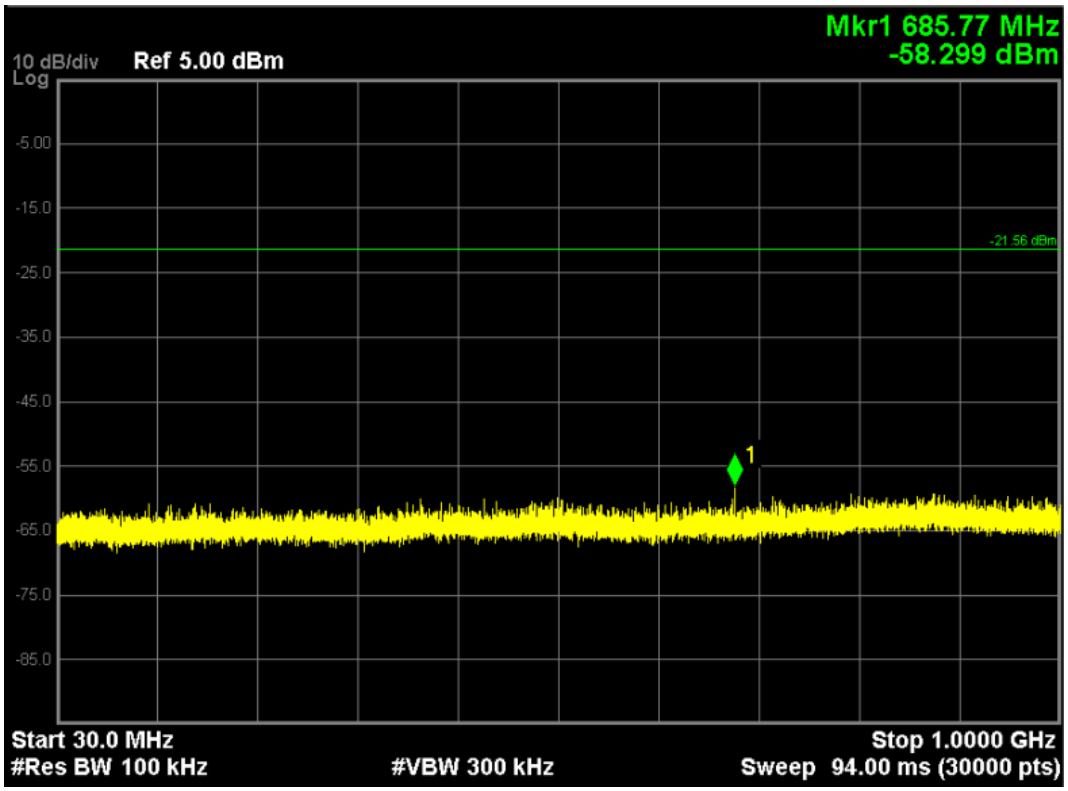
Note:The point mark1 is carrier.

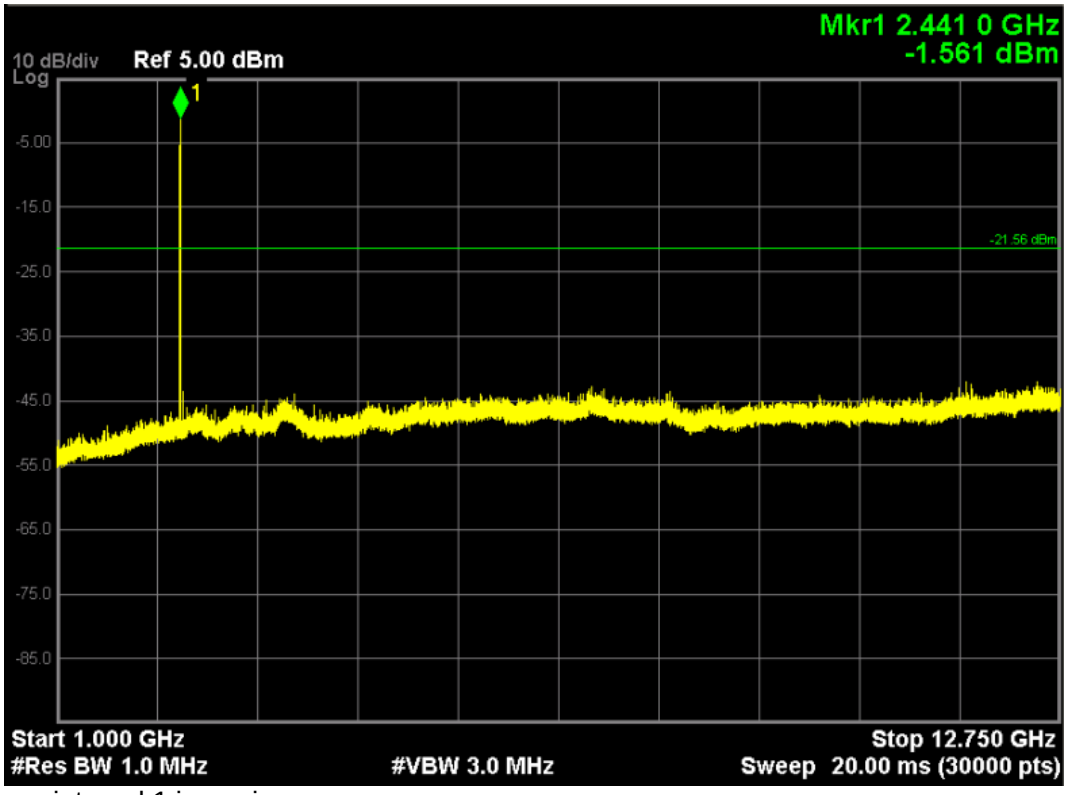

Mkr1 24.491 6 GHz
-33.344 dBm
10 dB/div
Log
Ref 5.00 dBm
-20.69 dBm
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 25.000 GHz
Sweep 32.00 ms (30000 pts)

Channel 39

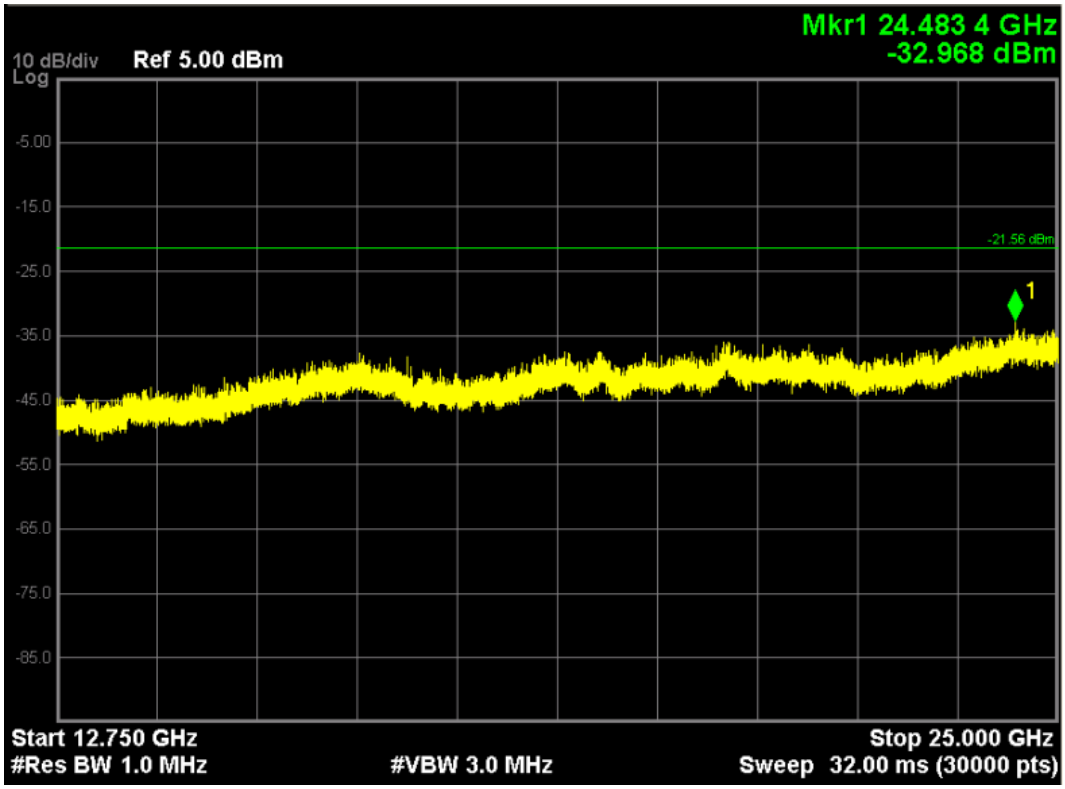

Mkr1 9.132 kHz
-30.384 dBm
10 dB/div
Log
Ref -2.00 dBm
-21.56 dBm
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-32.385 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-21.56 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

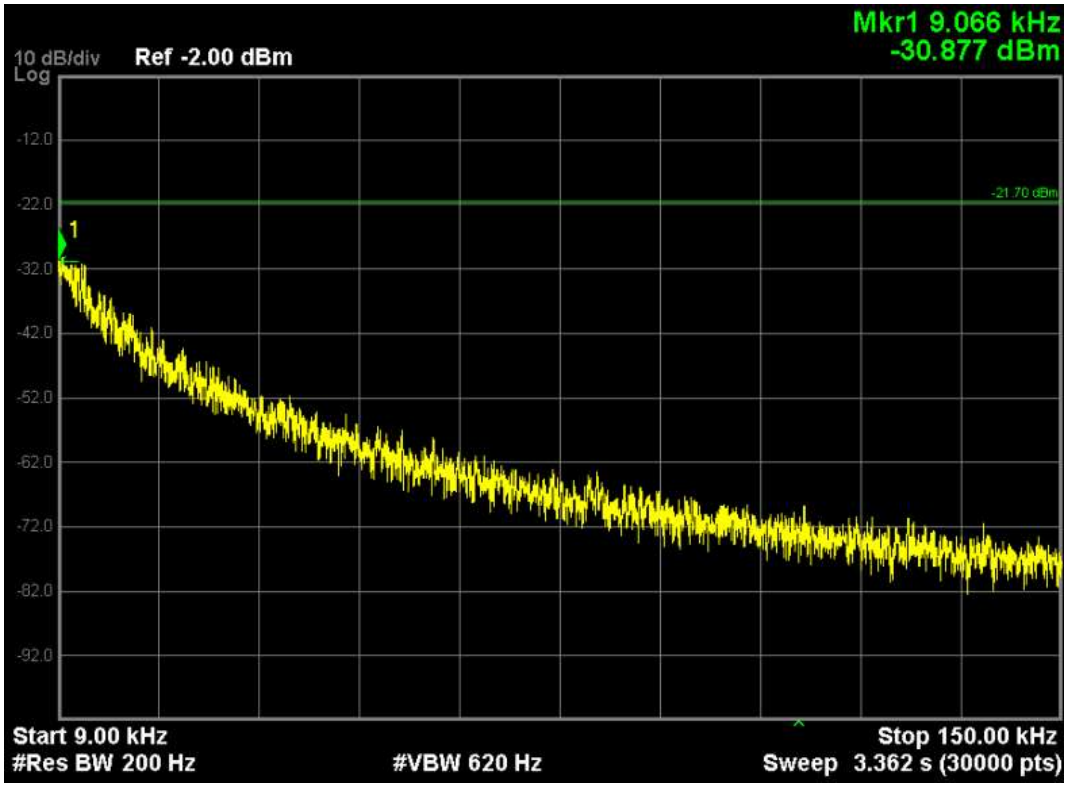

Mkr1 685.77 MHz
-58.299 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-21.56 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

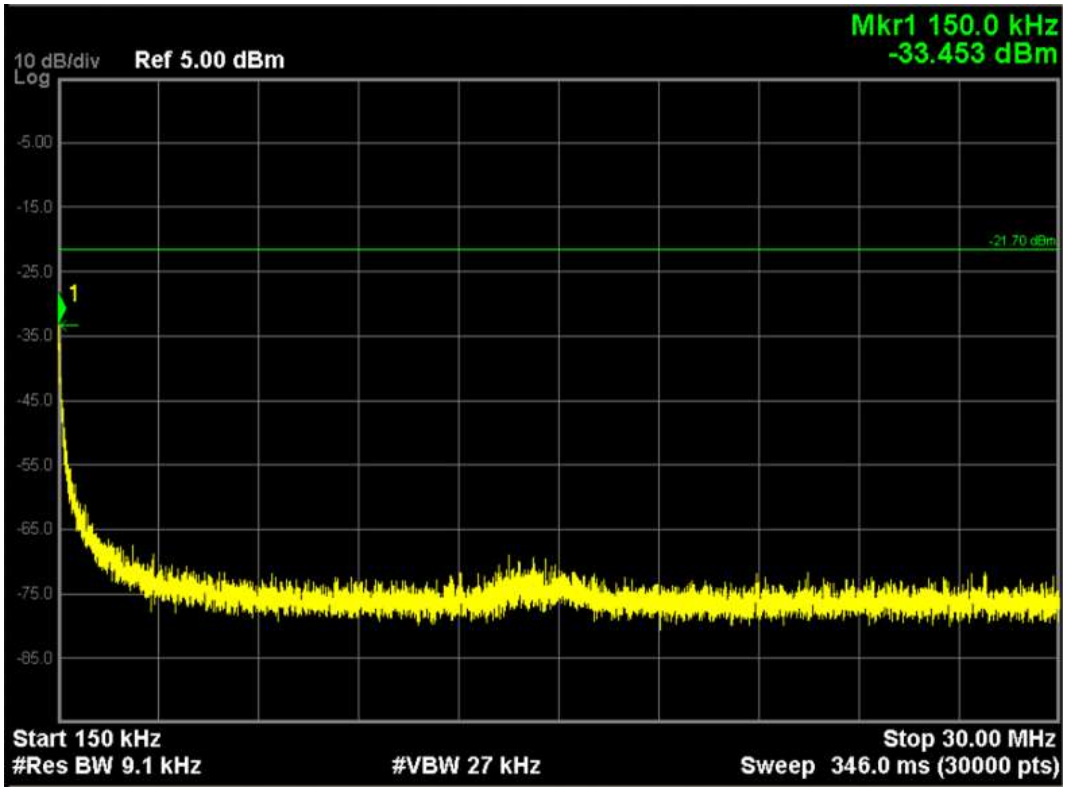


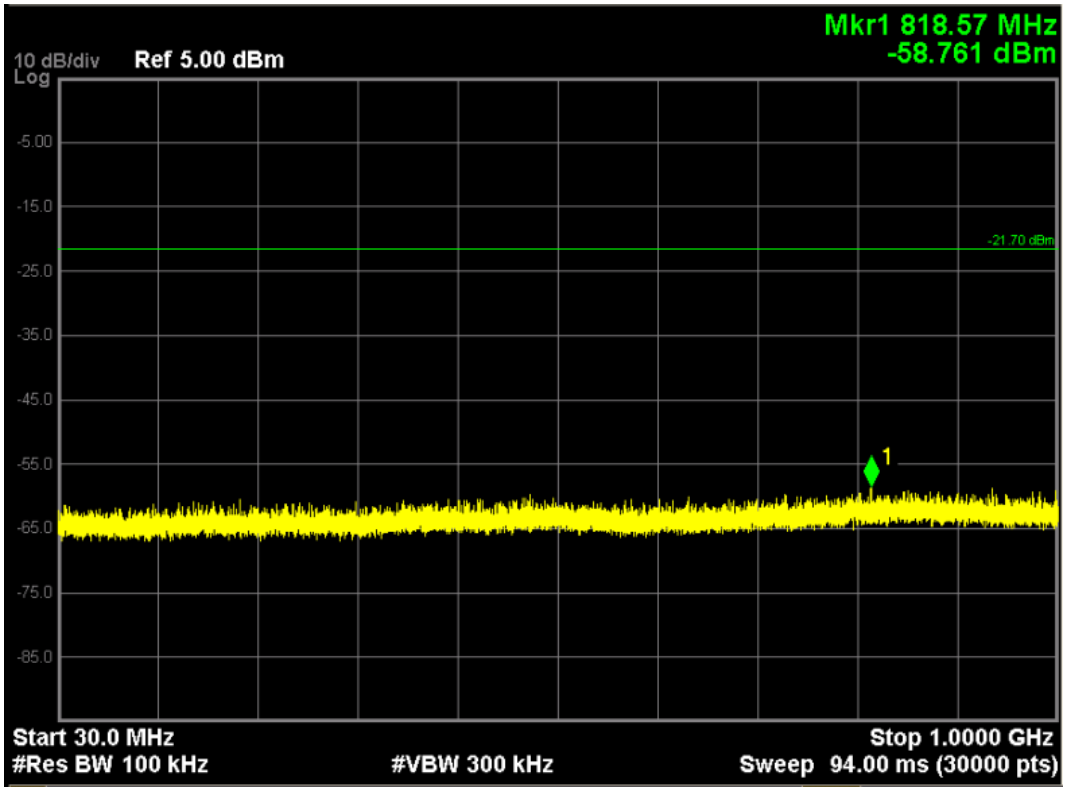
Note: The point mark1 is carrier.

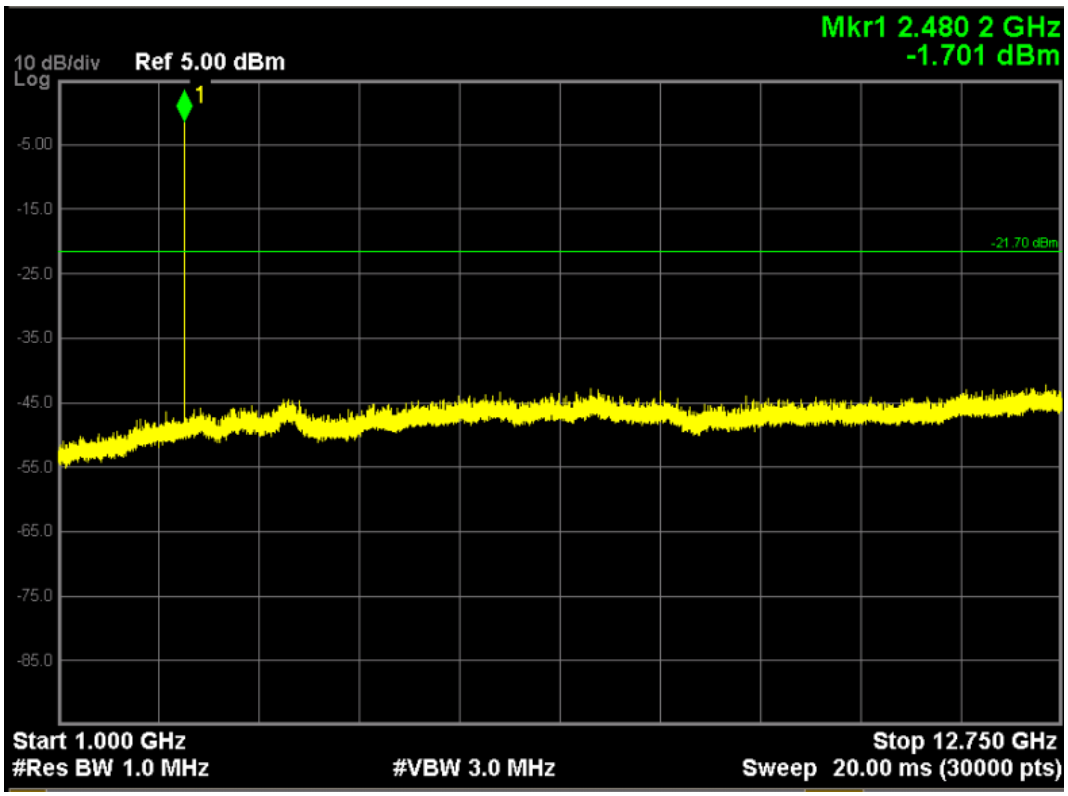


Channel 78

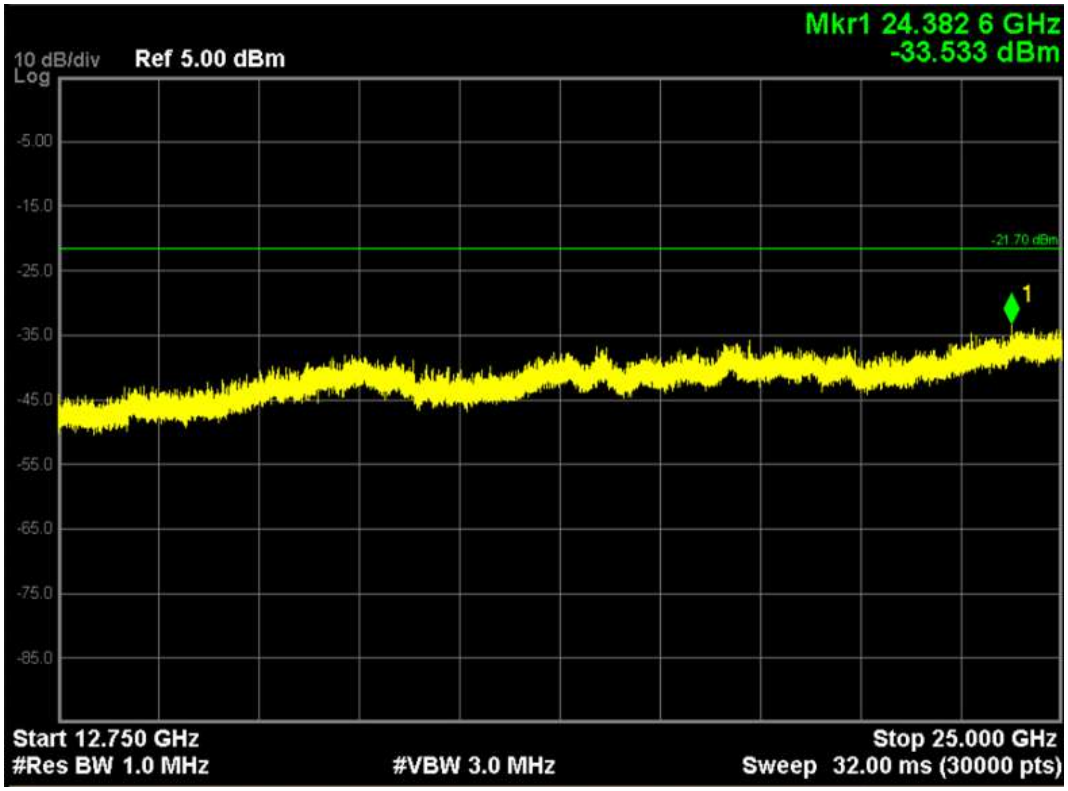

Mkr1 9.066 kHz
-30.877 dBm
10 dB/div
Log
Ref -2.00 dBm
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
-82.0
-92.0
-21.70 dBm
1
Start 9.00 kHz
#Res BW 200 Hz
#VBW 620 Hz
Stop 150.00 kHz
Sweep 3.362 s (30000 pts)


Mkr1 150.0 kHz
-33.453 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
-21.70 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)



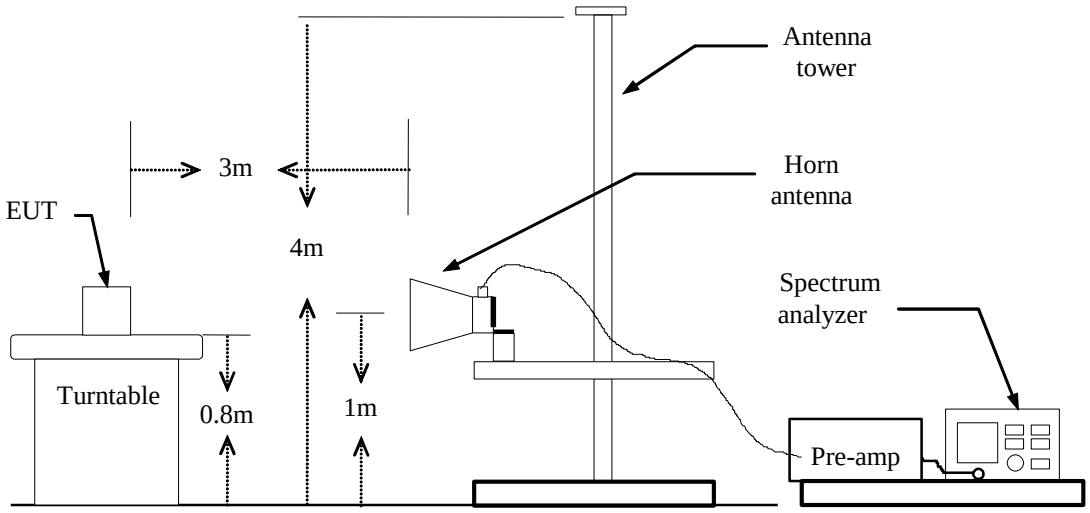


Note: The point mark1 is carrier.


Mkr1 24.382 6 GHz
-33.533 dBm
10 dB/div
Log
Ref 5.00 dBm
-5.00
-15.0
-21.70 dBm
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
-85.0
1
Start 12.750 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 25.000 GHz
Sweep 32.00 ms (30000 pts)

10. BAND EDGE MEASUREMENT

10.1 TEST SETUP



10.2 LIMITS

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in15.209(a).

10.3 TEST PROCEDURE

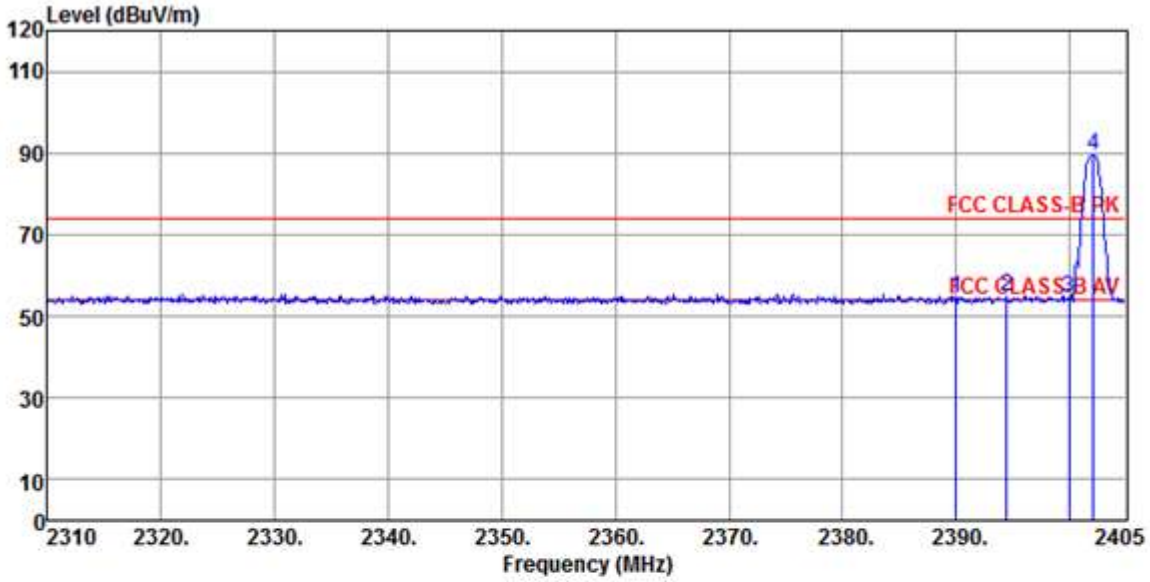
The EUT is placed on a turntable, which is 0.8m above the ground plane.
The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
PEAK: RBW=VBW=1MHz / Sweep=AUTO
AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

10.4 RESULTS & PERFORMANCE

Radiated Band Edge:

BT GFSK (Low Channel)

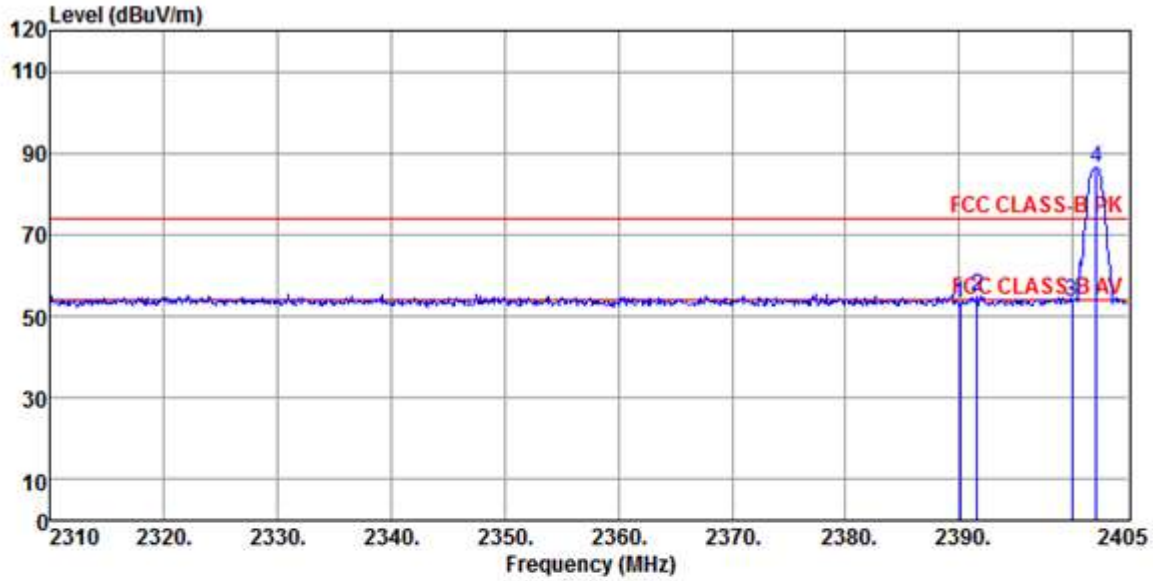
Detector mode: Peak Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) HORIZONTAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2389.99	58.03	27.58	7.13	38.34	54.40	74.00	-19.60	Peak
2	2394.46	58.68	27.58	7.13	38.34	55.05	74.00	-18.95	Peak
3	2399.97	57.88	27.58	7.13	38.34	54.25	74.00	-19.75	Peak
4 pp	2402.15	93.12	27.54	7.13	38.34	89.45	74.00	15.45	Peak

Detector mode: Peak Polarity: Vertical

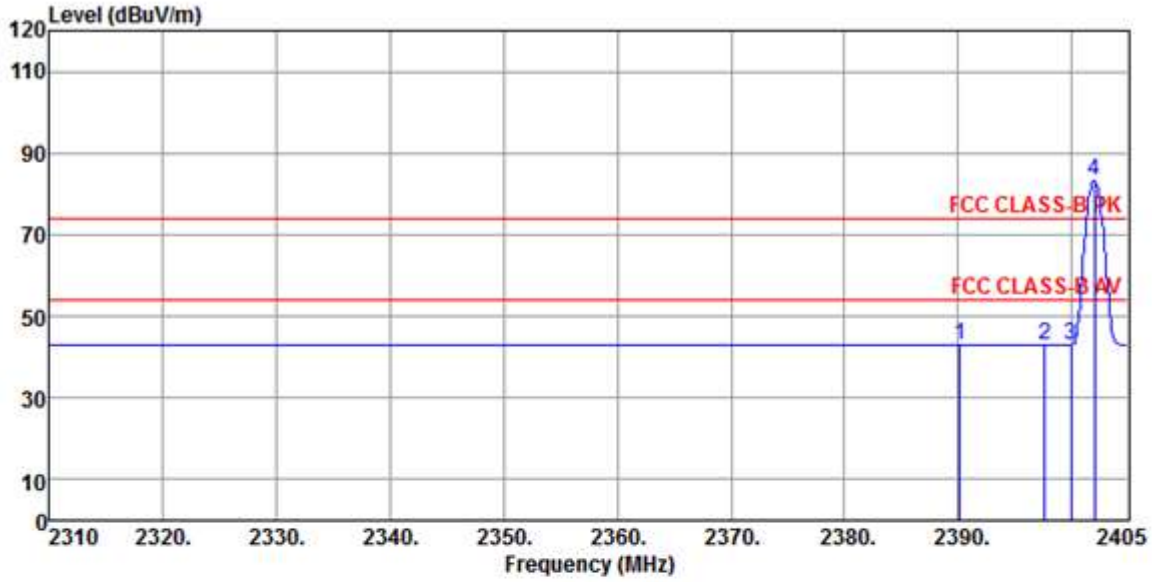


Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) VERTICAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.09	56.73	27.58	7.13	38.34	53.10	74.00	-20.90	Peak
2	2391.61	58.60	27.58	7.13	38.34	54.97	74.00	-19.03	Peak
3	2399.97	57.25	27.58	7.13	38.34	53.62	74.00	-20.38	Peak
4 pp	2402.15	89.87	27.54	7.13	38.34	86.20	74.00	12.20	Peak

Detector mode: Average

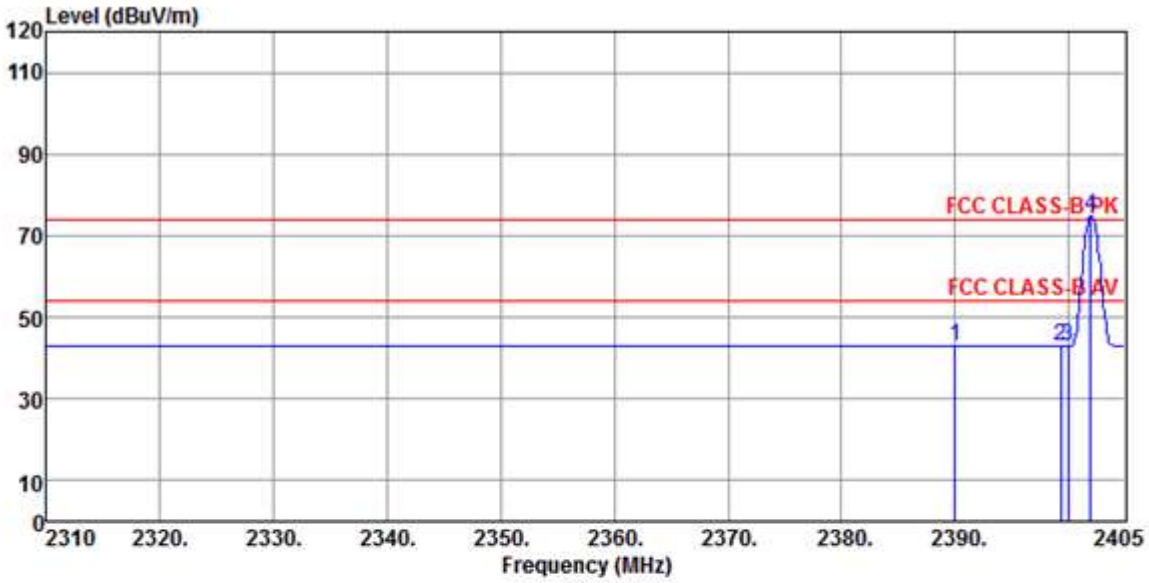
Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) HORIZONTAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.18	46.57	27.58	7.13	38.34	42.94	54.00	-11.06	Average
2	2397.69	46.70	27.58	7.13	38.34	43.07	54.00	-10.93	Average
3	2399.97	46.73	27.58	7.13	38.34	43.10	54.00	-10.90	Average
4 pp	2402.06	87.11	27.54	7.13	38.34	83.44	54.00	29.44	Average

Detector mode: Average Polarity: Vertical

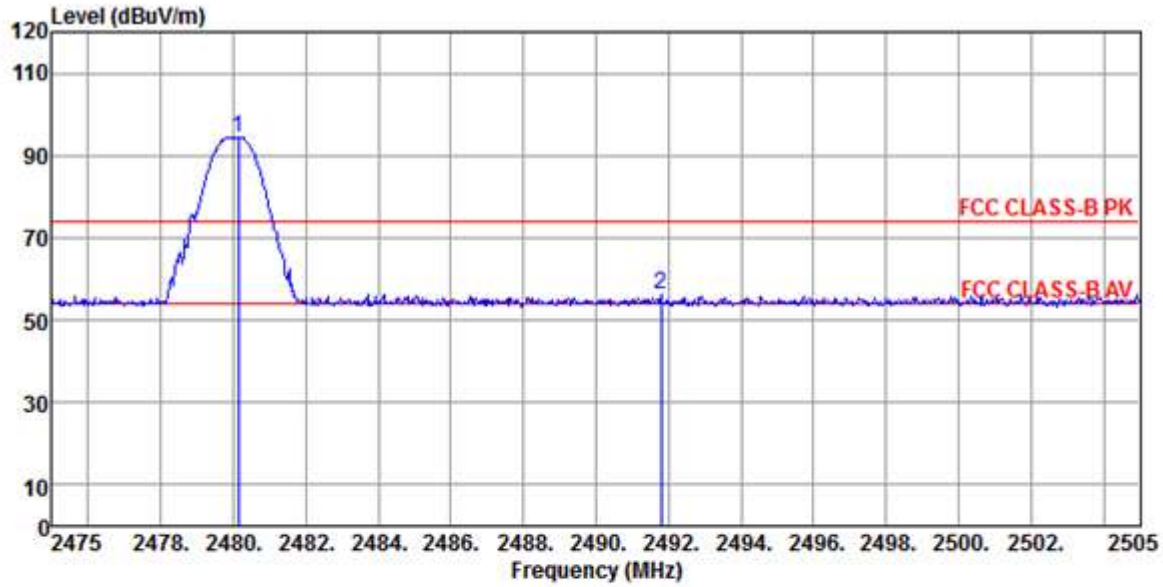


Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) VERTICAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2389.99	46.56	27.58	7.13	38.34	42.93	54.00	-11.07	Average
2	2399.30	46.69	27.58	7.13	38.34	43.06	54.00	-10.94	Average
3	2399.97	46.66	27.58	7.13	38.34	43.03	54.00	-10.97	Average
4 pp	2401.96	78.56	27.54	7.13	38.34	74.89	54.00	20.89	Average

BT GFSK (High Channel)

Detector mode: Peak Polarity: Horizontal

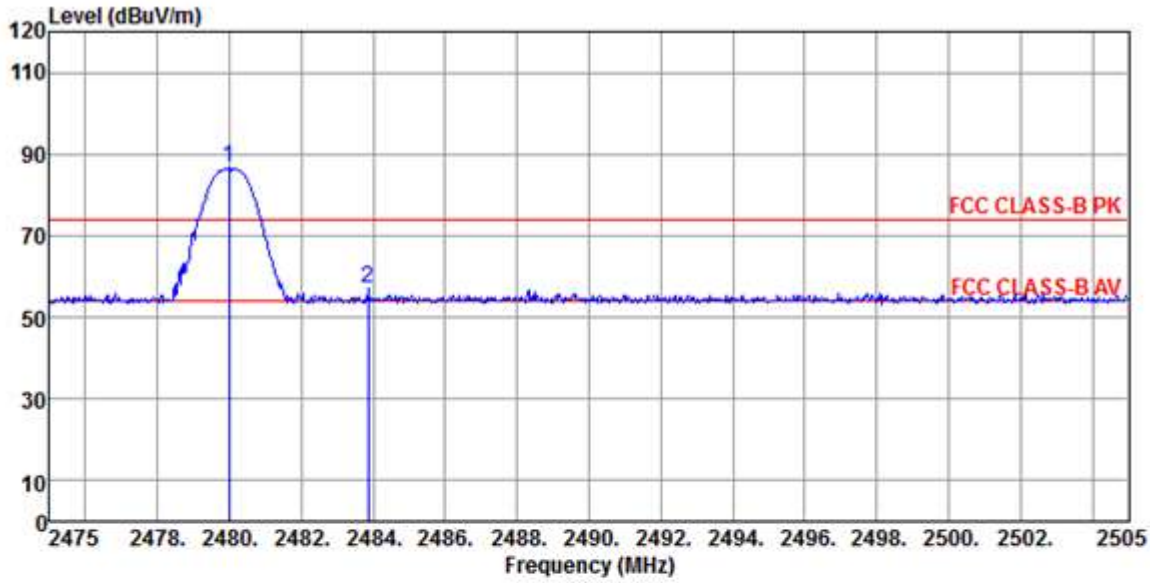


Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) HORIZONTAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH78
Memo :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2480.13	97.59	27.52	7.41	38.31	94.21	74.00	20.21	Peak
2	2491.80	59.35	27.55	7.43	38.30	56.03	74.00	-17.97	Peak

Detector mode: Peak

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(942) VERTICAL
EUT :
Model Name :
Temp/Humi : 23 ℃ / 54 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH78
Memo :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2479.98	90.11	27.52	7.41	38.31	86.73	74.00	12.73	Peak
2	2483.85	60.34	27.52	7.41	38.31	56.96	74.00	-17.04	Peak