

FCC Part 15 Subpart C Test Report

for FHSS System

Product Name : Android Mobile Data Terminal
Model Name : Z-220X

Prepared for:
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Date of Report : 05-01-2015
Date of Test : 05-11-2014~04-01-2015

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: ZEBEX INDUSTRIES INC.
B1-1,NO.207 SEC3,BEIXIN ED,XINDIAN DIST,NEW TAIPEI CITY
23142,TAIWAN

Manufacturer: Mexzen Technology(ShangHai)INC.
Unit B,12F,Building 11,No. 518,xinzhuhan Rd., Songjiang
District,Shanghai,China

Product Name: Android Mobile Data Terminal

Brand Name: ZEBEX

Model Name: Z-220X

FCC ID: JNF-Z-220X

Serial Number: N/A

EUT Voltage: AC input for adapter: AC 100~240V 50/60Hz
Battery: 3.6V~4.2V

Date of Receipt: 04-11-2014

Date of Test: 05-11-2014~04-01-2015

Test Standard: FCC CFR Title 47 Part 15 Subpart C
ANSI C 63.4: 2009
DA 00705

Test Result: PASS

Prepared by :

Andy Wei

(Technical Engineer: Andy Wei)

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1. GENERAL INFORMATION

1.1 EUT DESCRIPTION

Product Name:	Android Mobile Data Terminal
Model Name:	Z-220X
Hardware Version:	V3.0
Software Version:	GST_A81_M20_4500XXXX_MUL_V03_20141201
RF Exposure Environment:	Uncontrolled
Bluetooth	
Frequency Range:	2402MHz~2480MHz
Carrier Frequency of Each Channel:	2402+N*1MHz(N=0~78)
Type of Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Channel Separation:	1MHz
Channel Number:	79
Antenna Type:	Internal
Antenna Peak Gain:	3.0dBi
Component	
AC Adapter:	Model Name: TS22-501000U
	Input: AC 100-240V 50/60Hz 0.2A
	Output: DC 5V/1A
The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

NOTE:

This Bluetooth module of the EUT confirm the following:

- 1) This system is hopping pseudo-randomly.
- 2) Each frequency is used equally on the average by each transmitter.
- 3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters. and The receiver shifts frequencies in synchronization with the transmitted signals.

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 is the worst test mode. All pre-test and final test mode see below:

Test Mode:

Test Mode
Mode 1: GFSK CH0
Mode 2: GFSK CH39
Mode 3: GFSK CH78
Mode 4: $\pi/4$ -DQPSK CH0
Mode 5: $\pi/4$ -DQPSK CH39

Mode 6: Π/4-DQPSK CH78
Mode 7: 8-DPSK CH0
Mode 8: 8-DPSK CH39
Mode 9: 8-DPSK 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 the 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) and 8-DPSK(3 Mbps) Channel Low (2402MHz) 、 Mid (2441MHz) and High (2480MHz), these were chosen for full testing.

3. TECHNICAL 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	Cal interval
Receiver	Agilent	N9038A	MY51210142	26/12/2015	1 year
LISN	R&S	ENV216	100069	22/08/2015	1 year
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	26/11/2017	3 years
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	28/02/2015	1 year
Power Splitter	Agilent	11667C/52401	MY53806148	28/02/2015	1 year
Loop Antenna	Schwarzbeck	FMZB1519	1519-020	25/03/2016	2 years
Biconilog Antenna	Schwarzbeck	VULB 9160	3316	19/09/2016	2 years
Horn Antenna	Schwarzbeck	BBHA9120D	942	19/09/2016	2 years
Horn Antenna	Schwarzbeck	BBHA9120D	943	19/09/2016	2 years
Horn Antenna(18-40GHz)	ETS	3116	00070497	18/07/2016	2 years
Wireless Connectivity Test Set	Agilent	N4010A	MY49080305	23/10/2015	1 year

3.4 TEST FACILITY

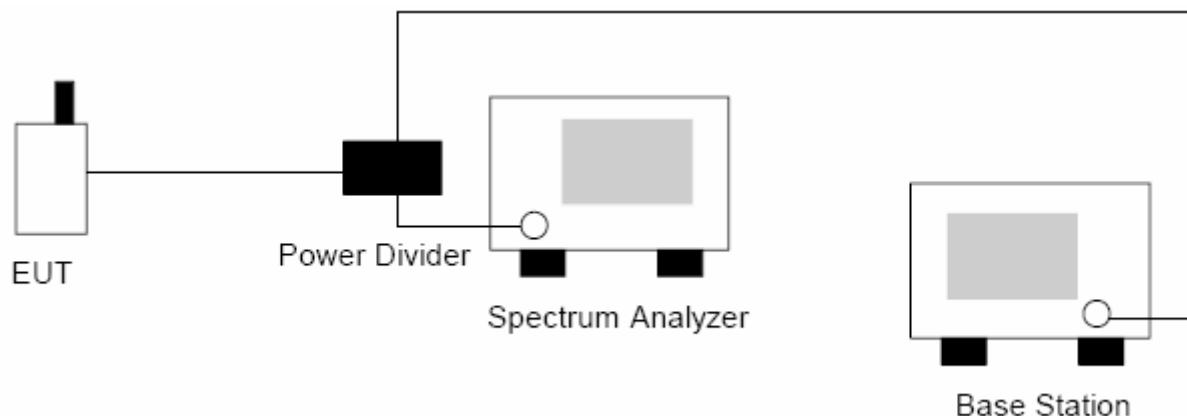
All test facilities used to collect the test data are located at Shanghai Institute of Measurement and Testing Technology EMC Lab.,Shanghai, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4: 2009, CISPR 16-1-1 and other equivalent standards. The laboratory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

3.5 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) $\geq 1\%$ of the span

Video (or Average) Bandwidth (VBW) \geq RBW

Sweep = auto

Detector function = peak

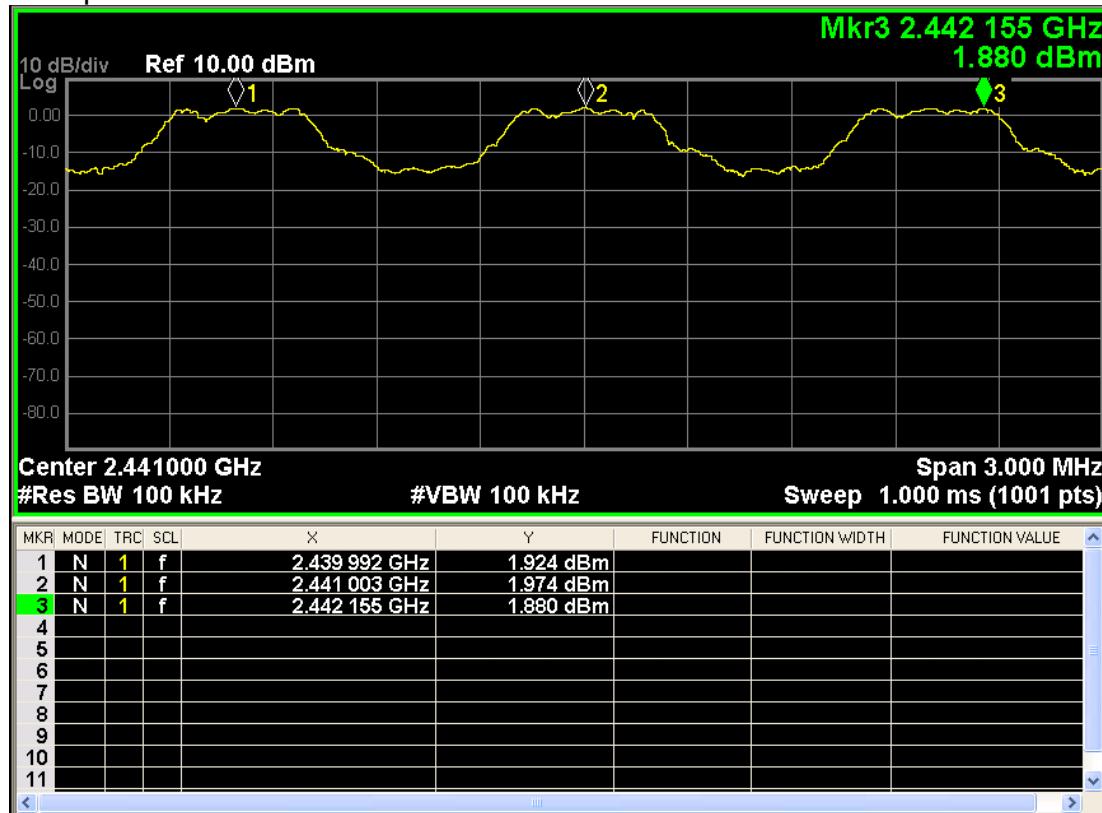
Trace = max hold

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

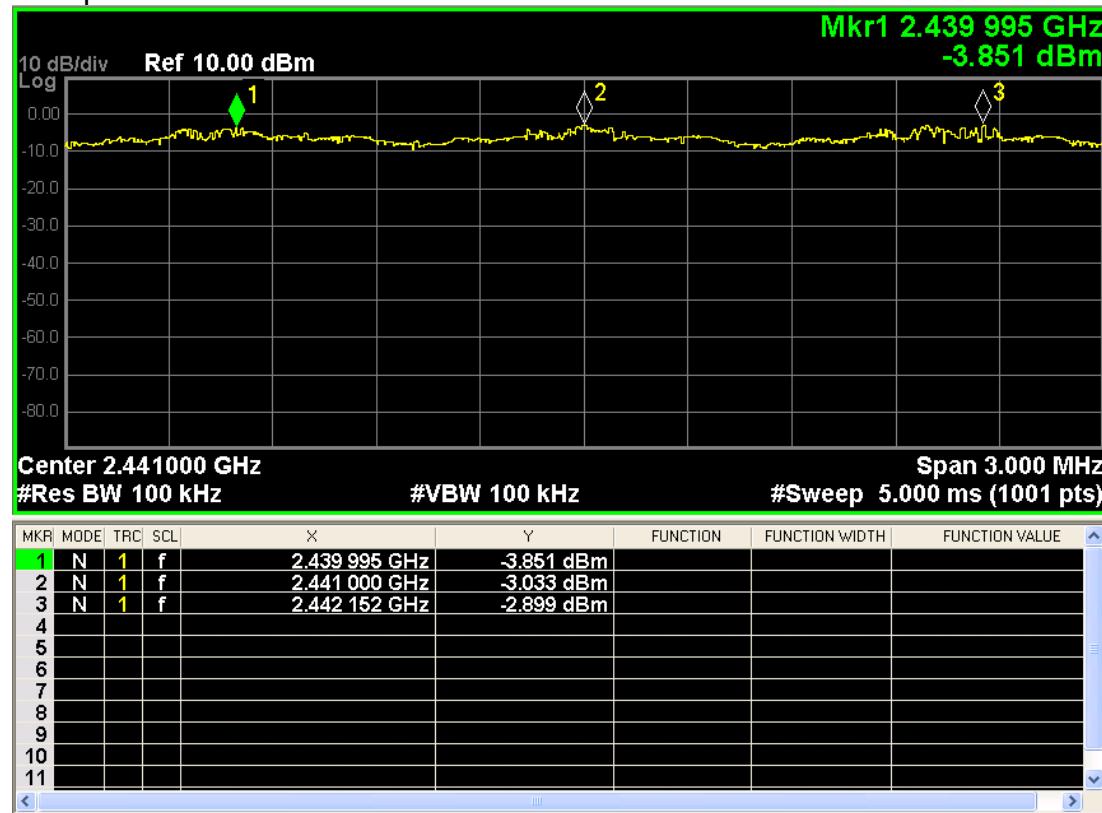
BT GFSK

Channel Separation: 1.000MHz



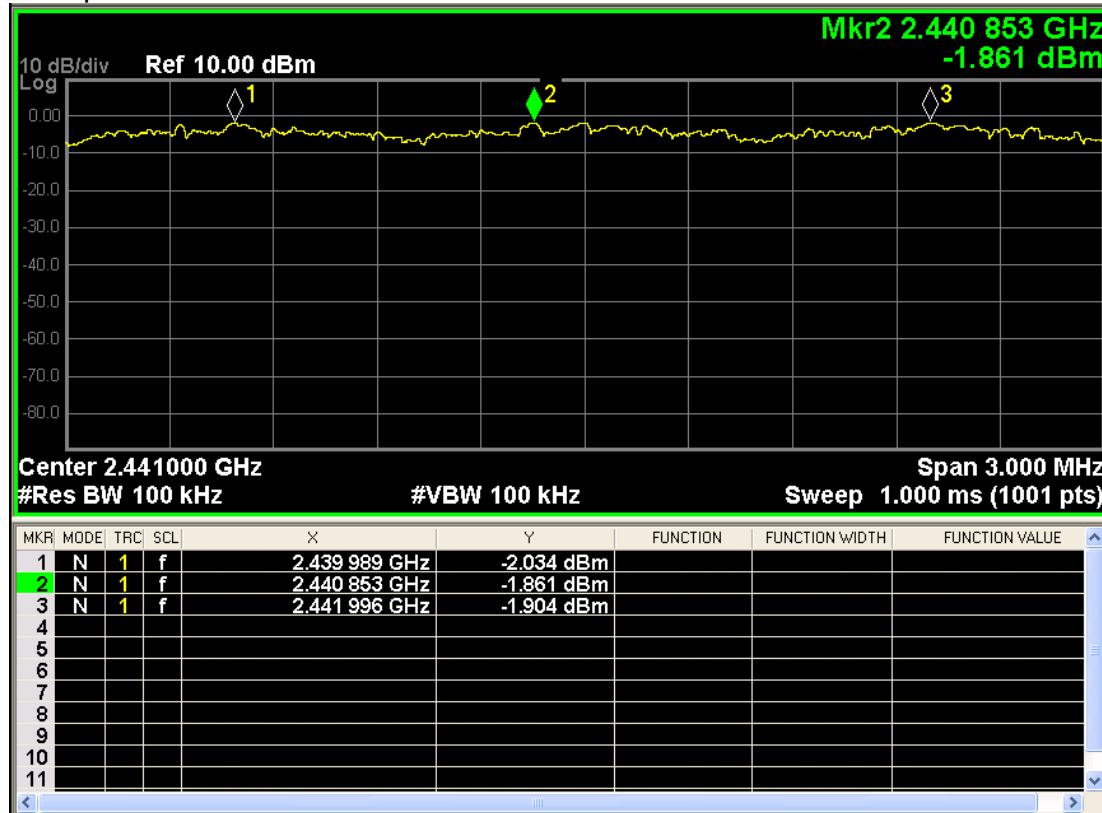
Π/4-DQPSK

Channel Separation: 1.000MHz



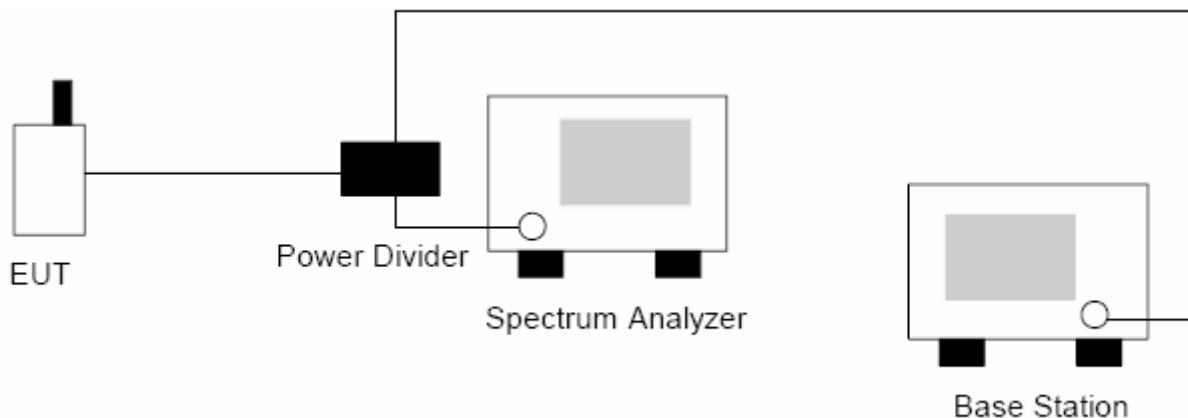
BT 8-DPSK

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 $\geq 1\%$ of the span

VBW \geq RBW

Sweep = auto

Detector function = peak

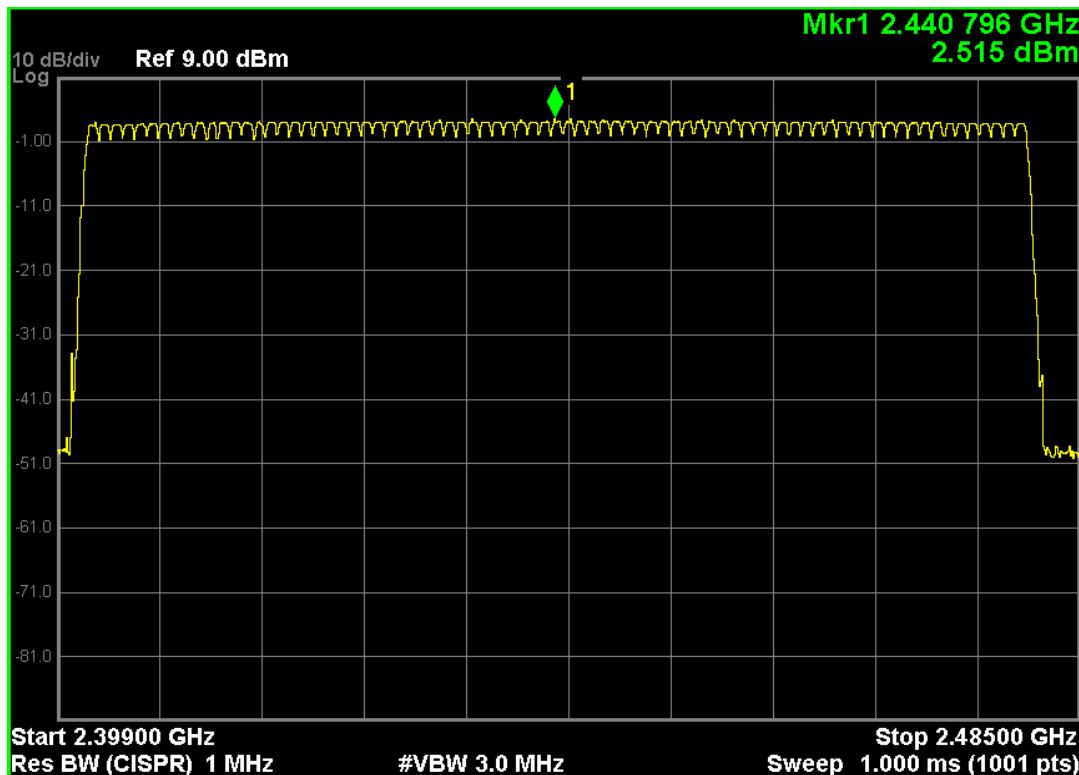
Trace = max hold

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

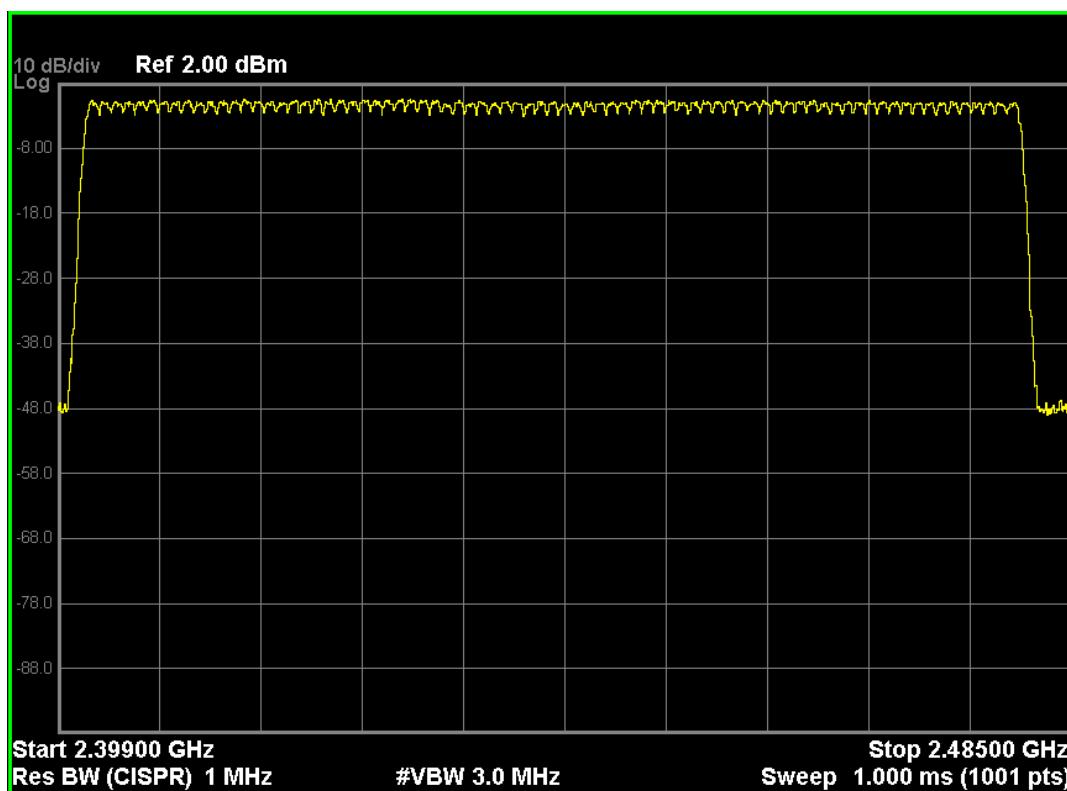
BT GFSK

Hopping Channel: 79 channels



π/4-DQPSK

Hopping Channel: 79 channels



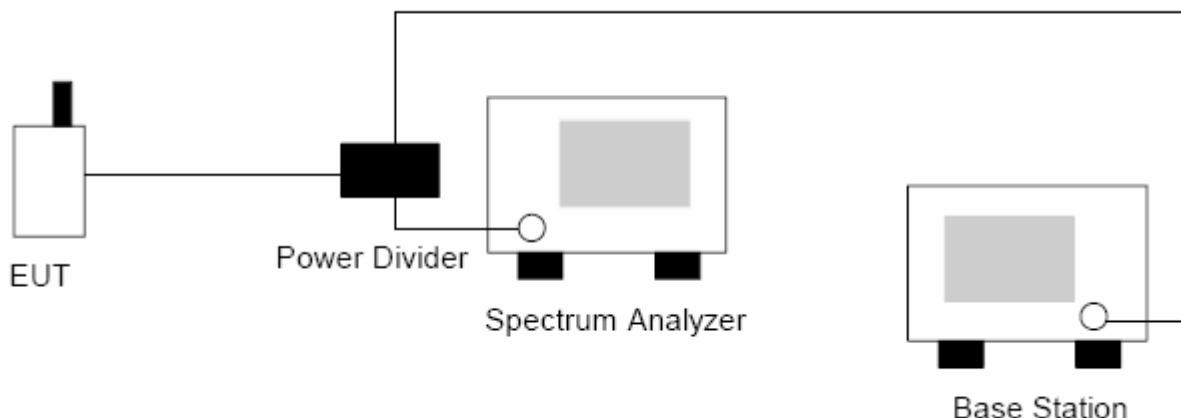
BT 8-DPSK

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.

WIFI: Low(1), Middle(6) and High (11).

Using occupied BW measurement function of spectrum analyzer and settings are:

XdB = -20dB

RBW =20KHz

VBW \geq RBW

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

Sweep = auto

Detector function = peak

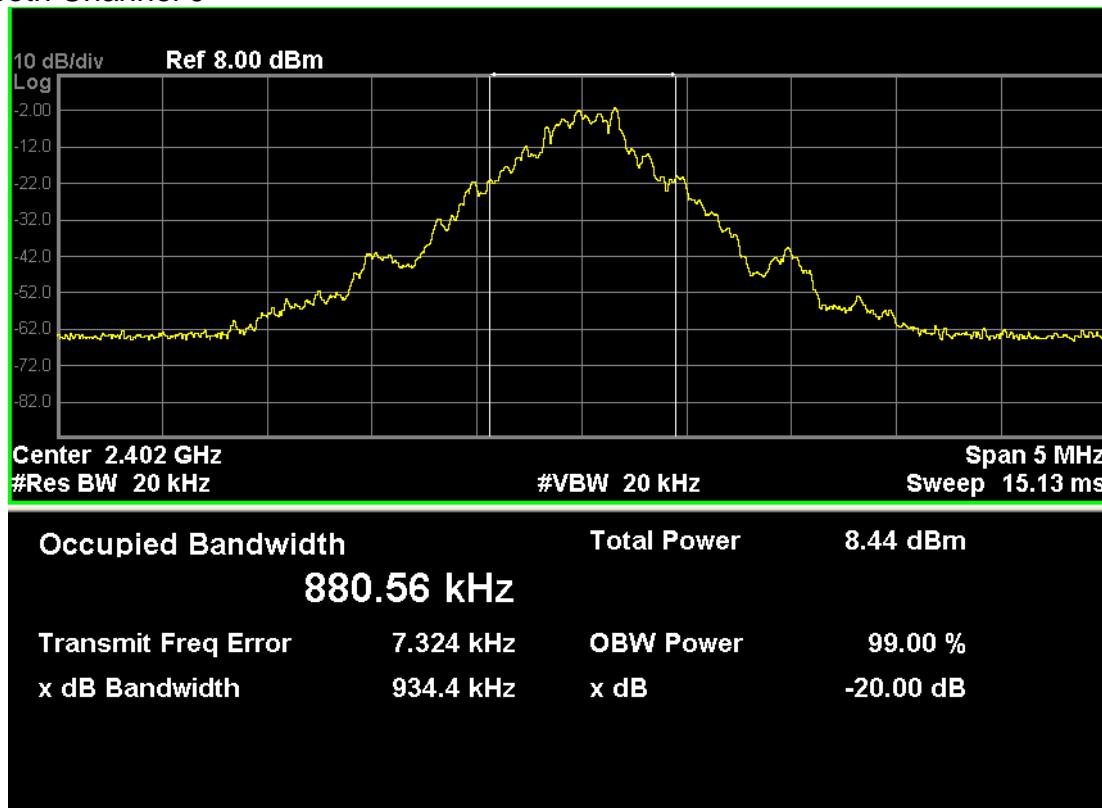
Trace = max hold

6.4 TEST RESULTS

Channel	20dB bandwidth (MHz)	99% bandwidth (MHz)
GFSK		
BT CH0	0.9344	0.88056
BT CH39	0.9313	0.87845
BT CH78	0.9336	0.88062
π/4-DQPSK		
BT CH0	1.328	1.2005
BT CH39	1.331	1.2088
BT CH78	1.331	1.2043
8-DPSK		
BT CH0	1.352	1.2157
BT CH39	1.350	1.2114
BT CH78	1.341	1.2180

BT GFSK

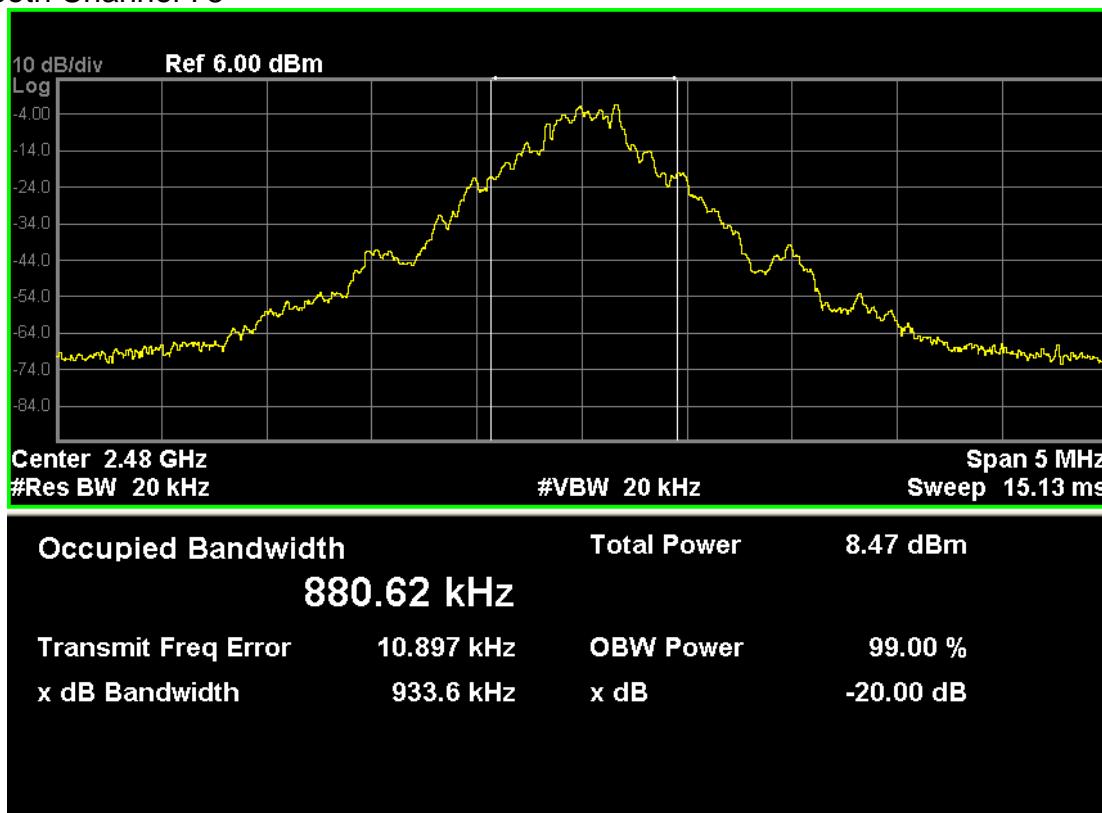
Bluetooth Channel 0



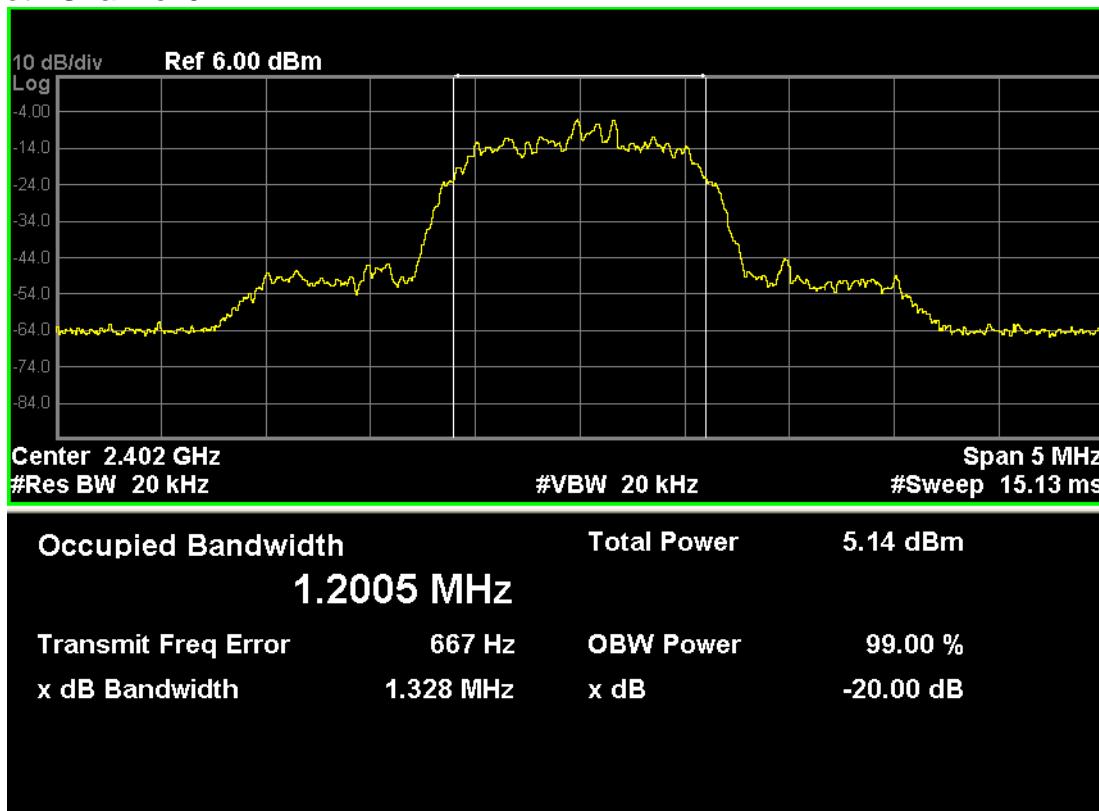
Bluetooth Channel 39



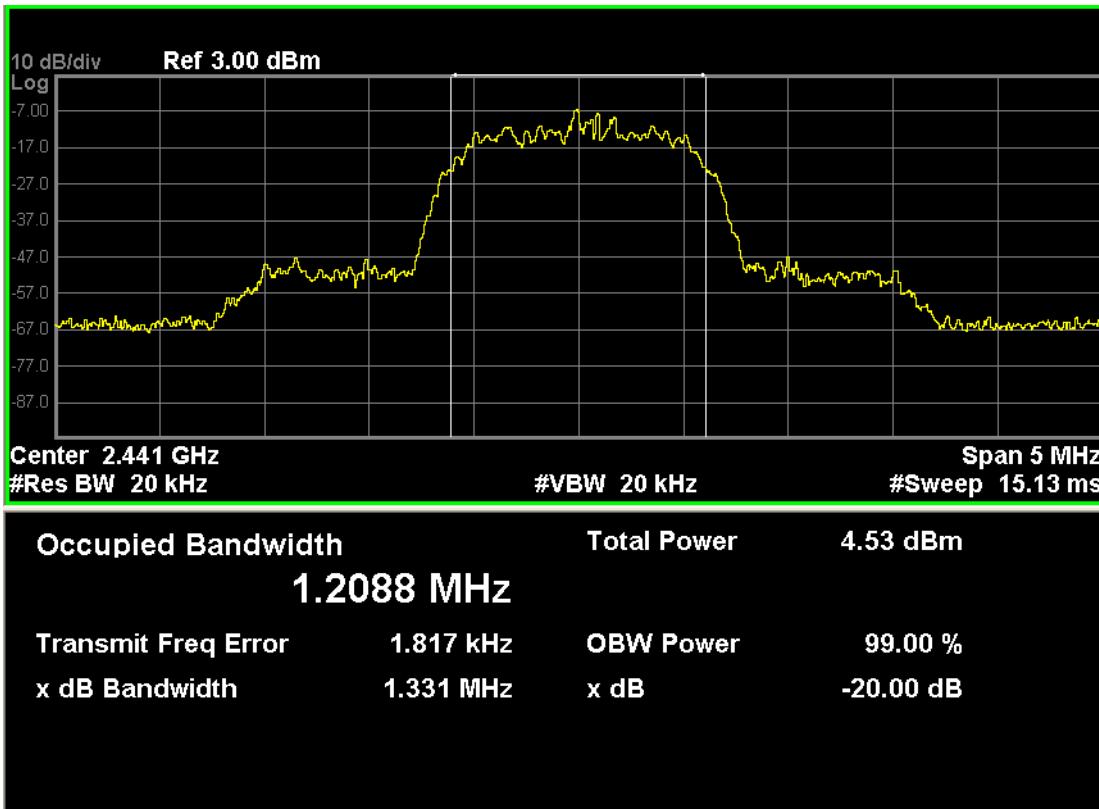
Bluetooth Channel 78



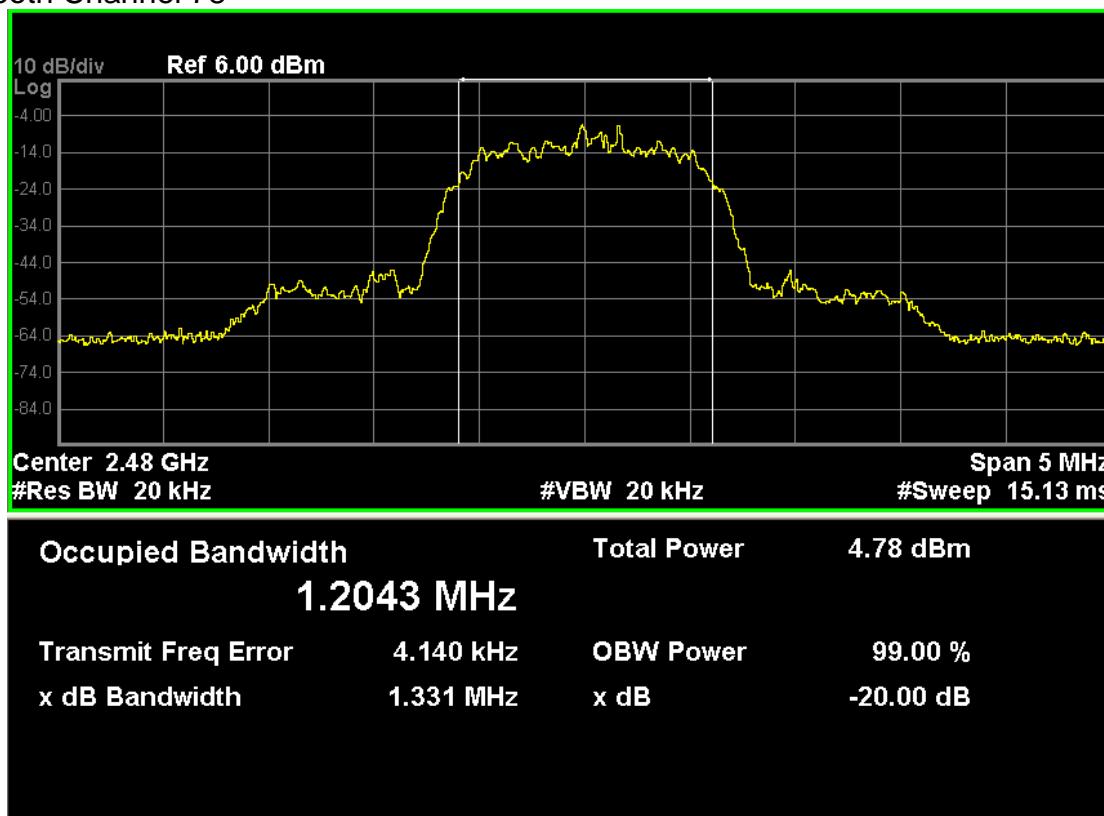
Π/4-DQPSK
Bluetooth Channel 0



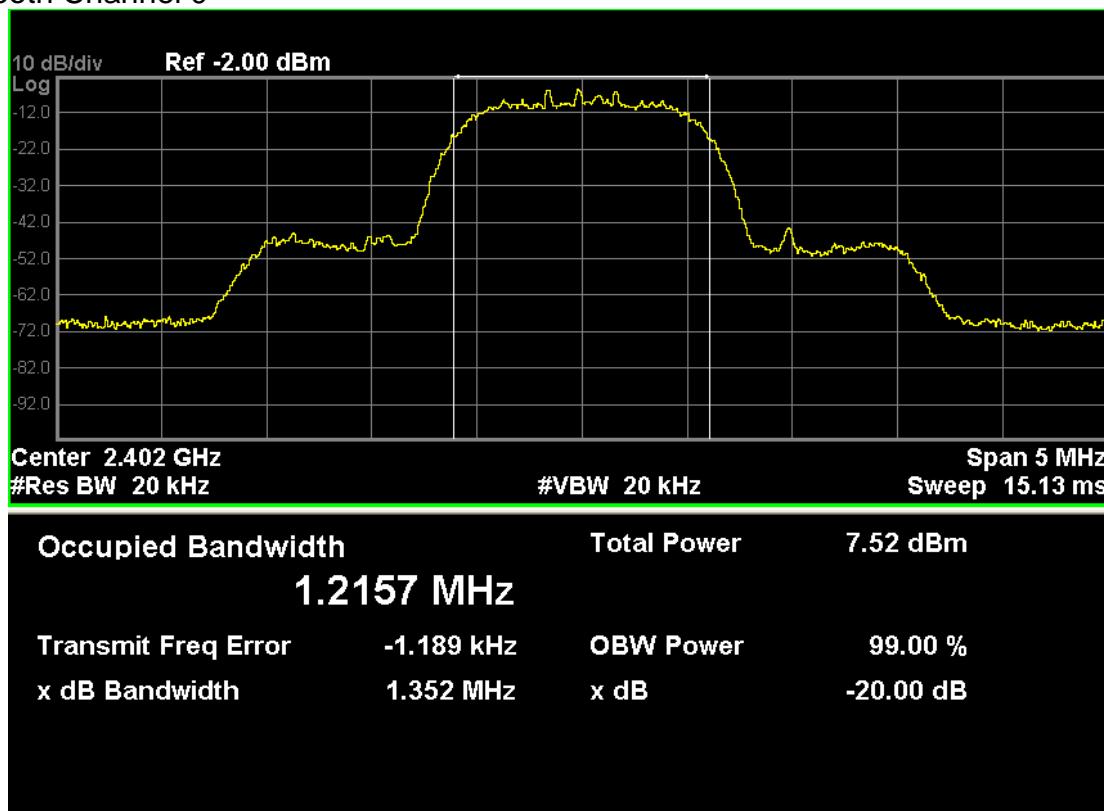
Bluetooth Channel 39



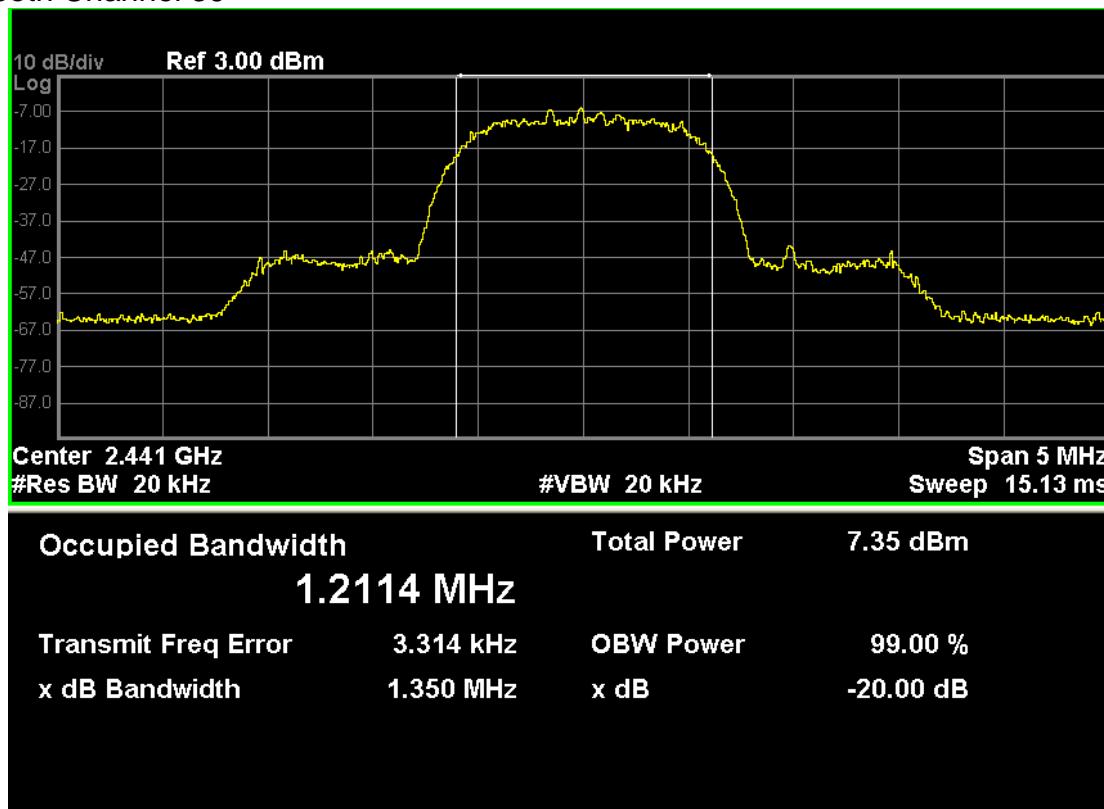
Bluetooth Channel 78



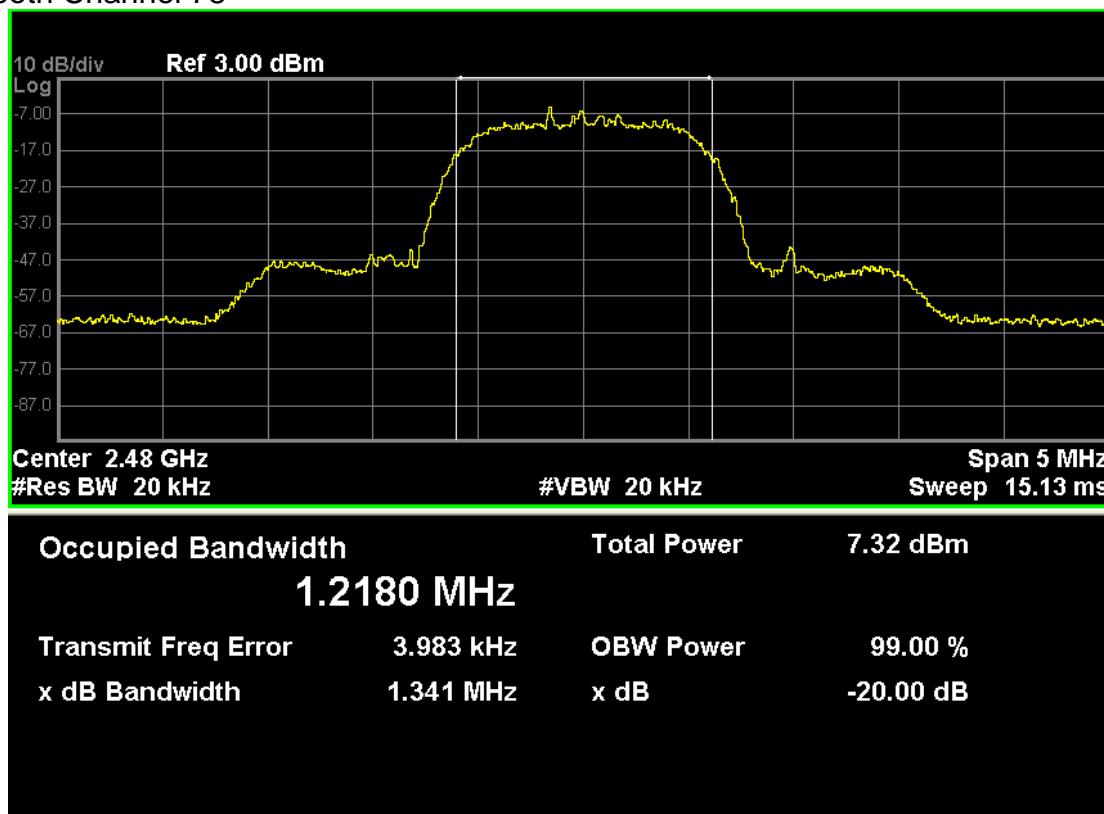
BT 8-DPSK
Bluetooth Channel 0



Bluetooth Channel 39

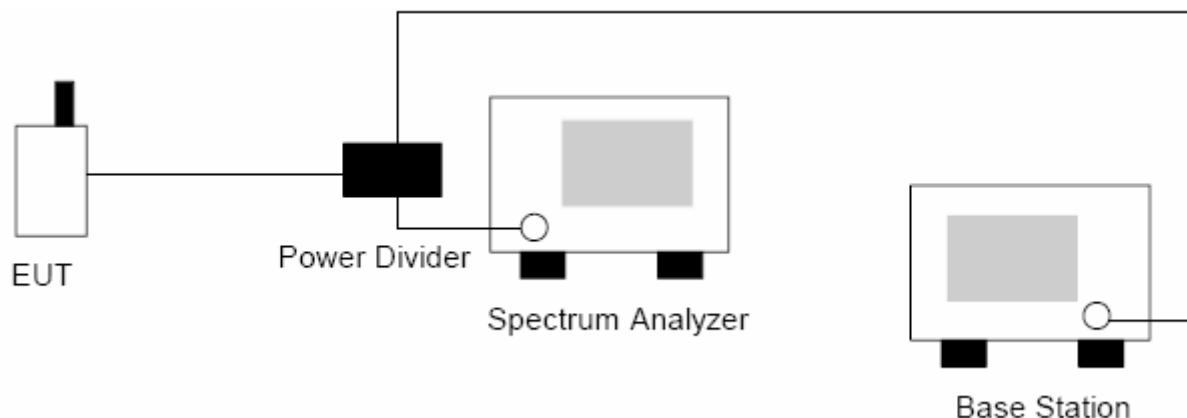


Bluetooth Channel 78



7. DWELL TIME

7.1 TEST SETUP



7.2 LIMITS

Limits	<400.00ms
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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 \leq Channel Separation

VBW \geq 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	0.366	$T = \frac{1600}{79 \times N} \times x \times (0.4 \times 79) = \frac{1600}{79 \times N} \times x \times 31.6$ DH1, N=2; DH3, N=4; DH5, N=6	117.12
DH3	4	1.603		256.48
DH5	6	2.885		307.73

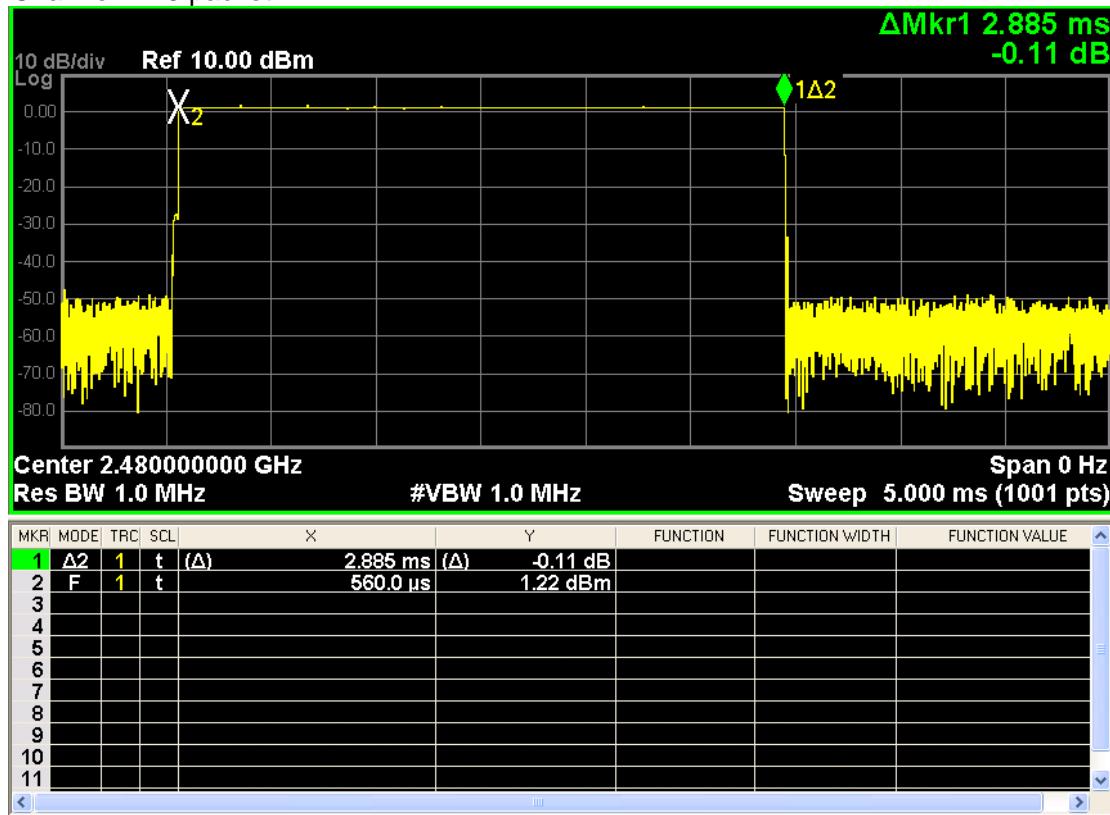
Π/4-DQPSK

Packet	N	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.386	$T = \frac{1600}{79 \times N} \times x \times (0.4 \times 79) = \frac{1600}{79 \times N} \times x \times 31.6$ DH1, N=2; DH3, N=4; DH5, N=6	123.52
DH3	4	1.630		260.80
DH5	6	2.880		307.20

8-DPSK

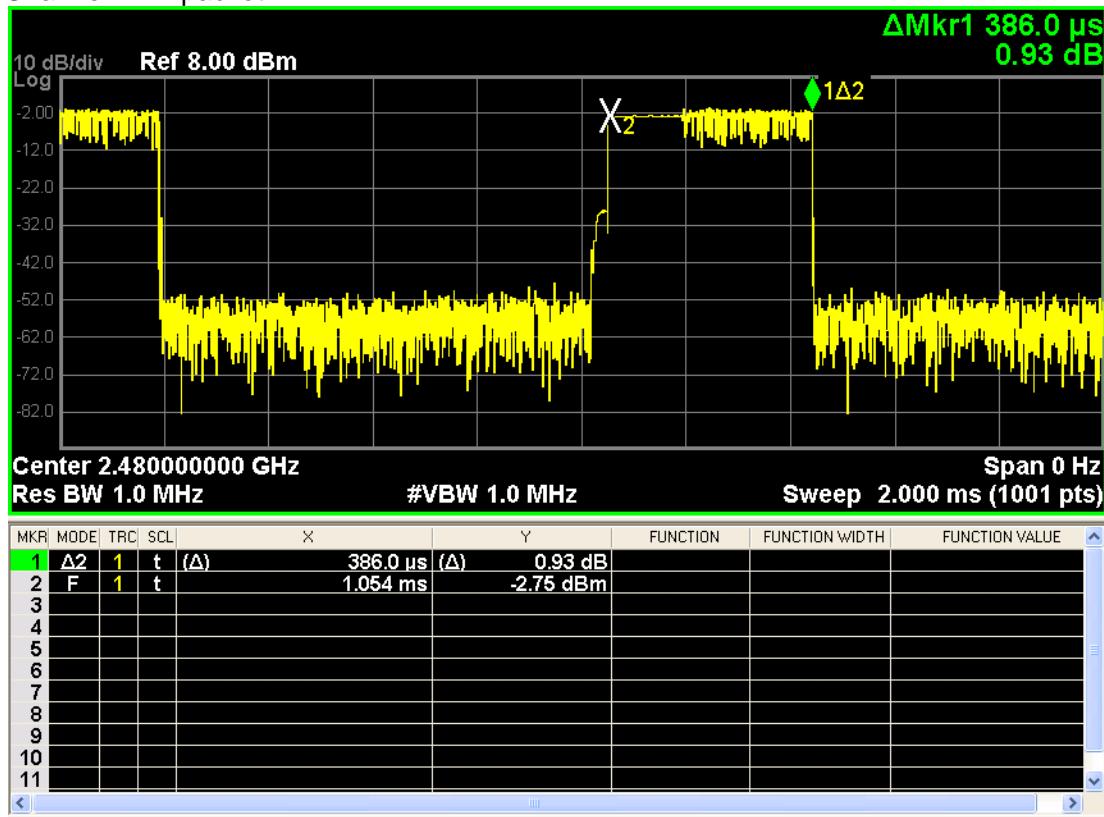
Packet	N	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.386	$T = \frac{1600}{79 \times N} \times x \times (0.4 \times 79) = \frac{1600}{79 \times N} \times x \times 31.6$ DH1, N=2; DH3, N=4; DH5, N=6	123.52
DH3	4	1.640		262.40
DH5	6	2.885		307.73

Single Channel-DH5 packet

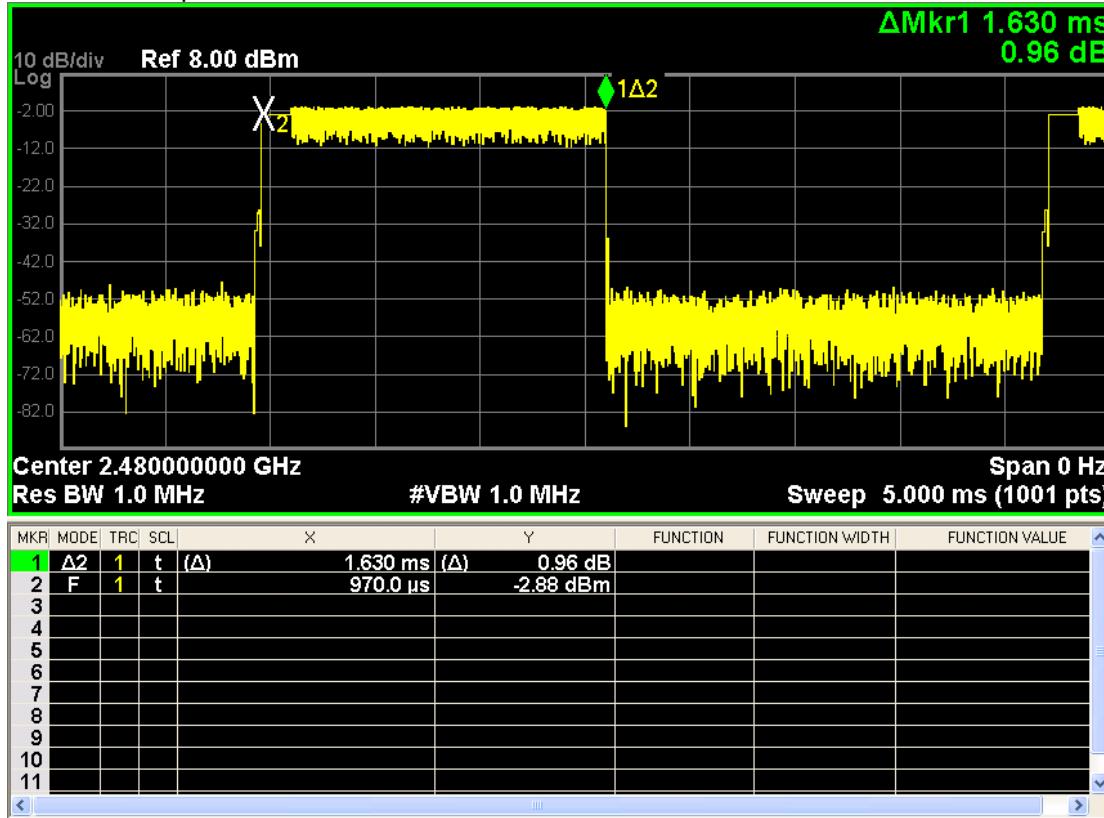


Π/4-DQPSK

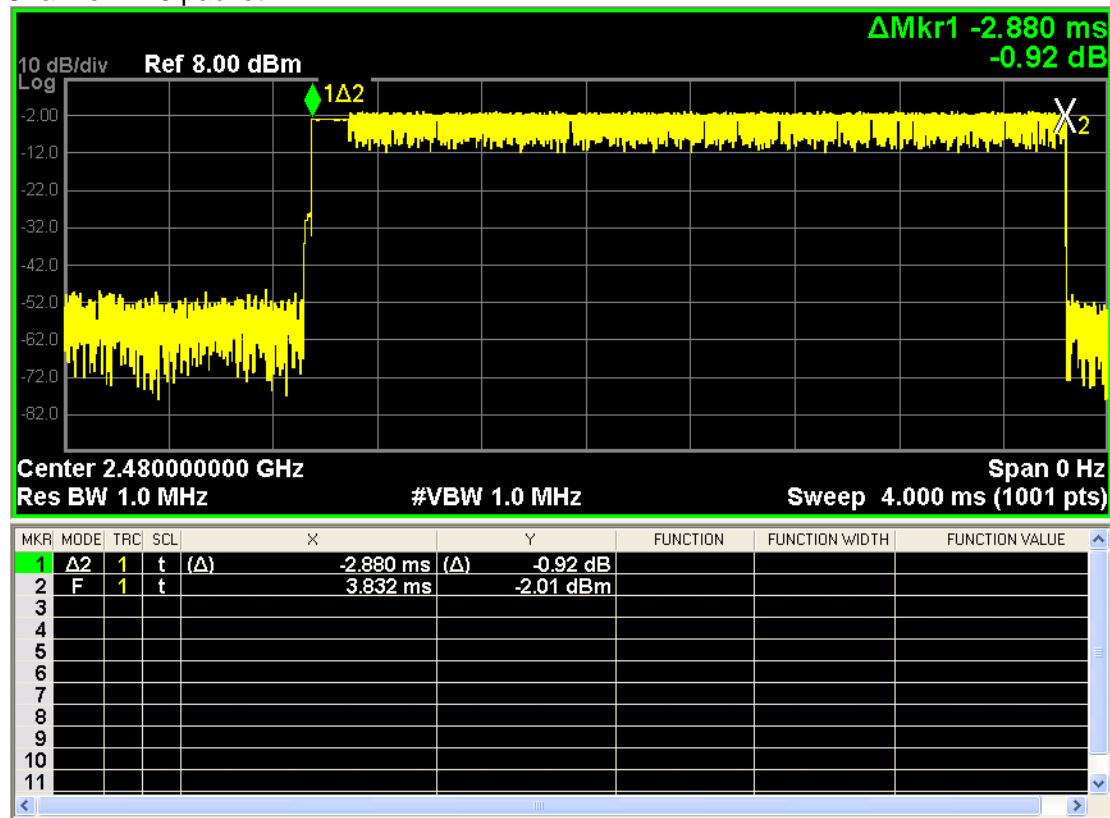
Single Channel-DH1 packet



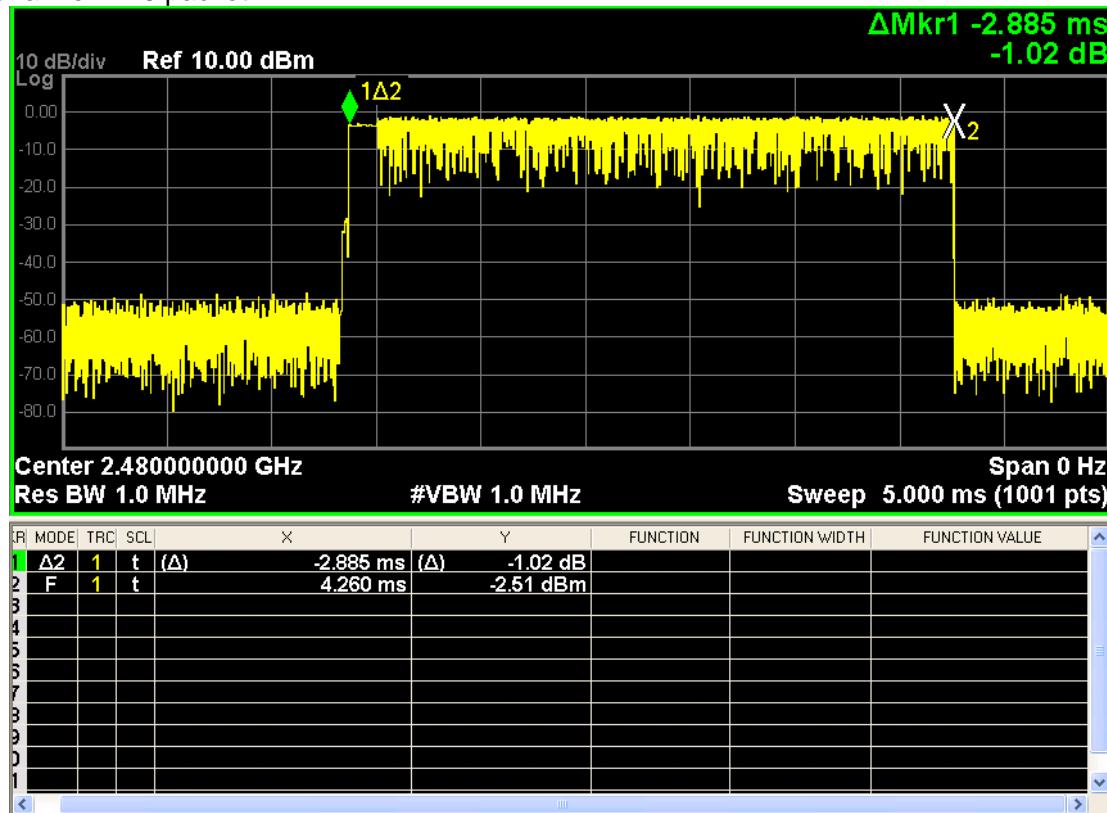
Single Channel-DH3 packet



Single Channel-DH5 packet

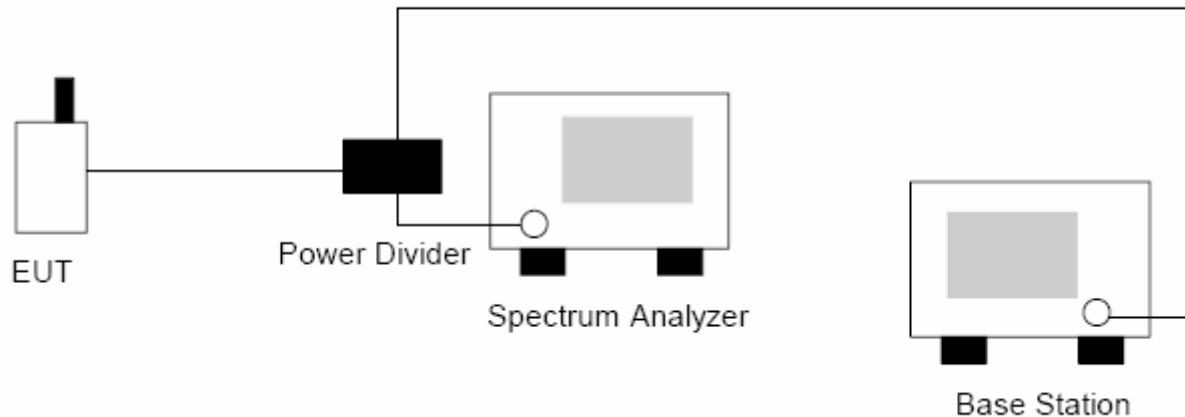


Single Channel-DH5 packet



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),

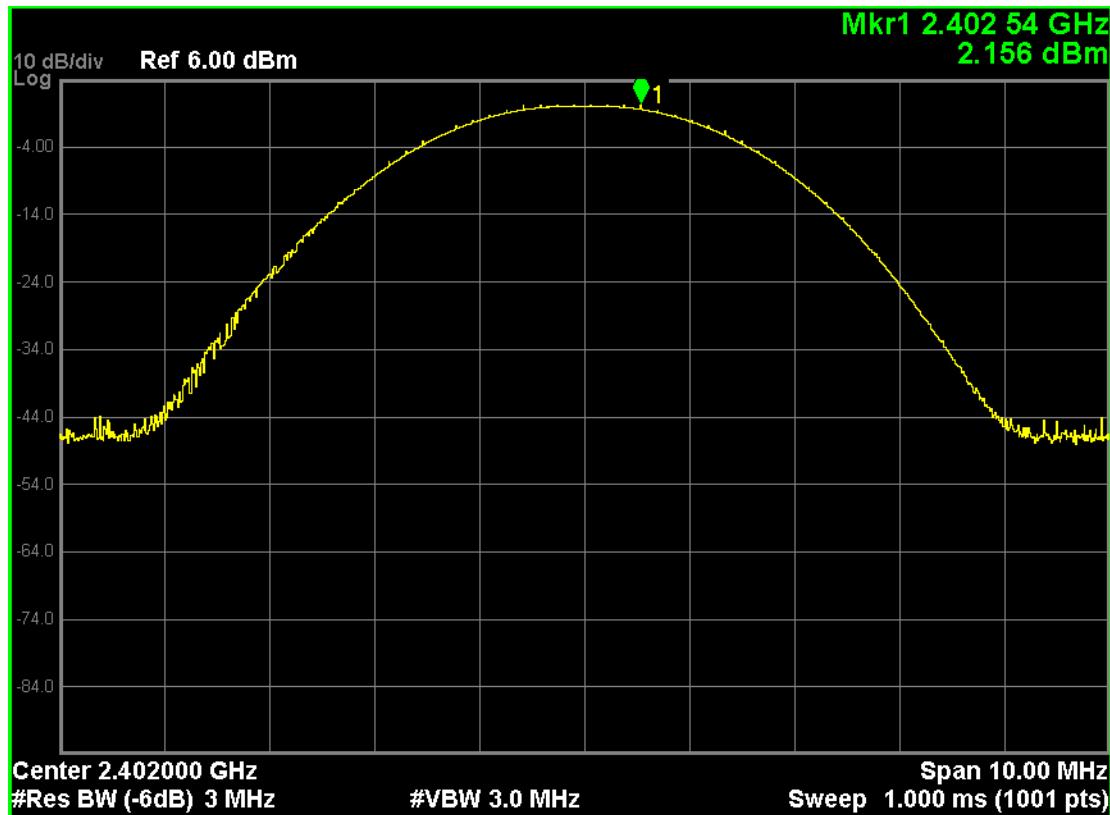
Set the spectrum analyzer as RBW = 3MHz, VBW = 3MHz, Span = 10MHz, Sweep = auto
Detector = Peak, Trace mode = max hold

8.4 RESULTS & PERFORMANCE

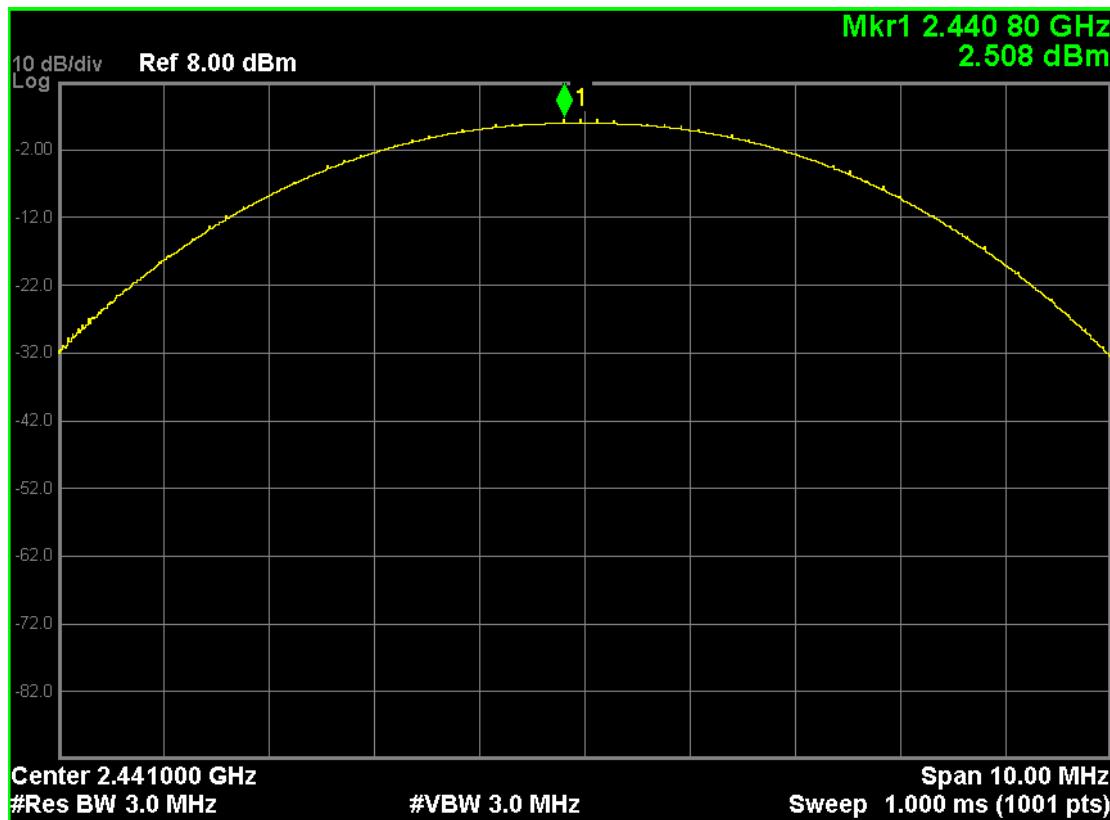
GFSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	2.156	1.64	125	Pass
39 (2441MHz)	2.508	1.78		Pass
78 (2480MHz)	2.411	1.74		Pass
π/4-DQPSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	0.322	1.08	125	Pass
39 (2441MHz)	0.297	1.07		Pass
78 (2480MHz)	0.200	1.05		Pass
8-DPSK				
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	0.286	1.07	125	Pass
39 (2441MHz)	0.965	1.25		Pass
78 (2480MHz)	0.171	1.04		Pass

BT GFSK

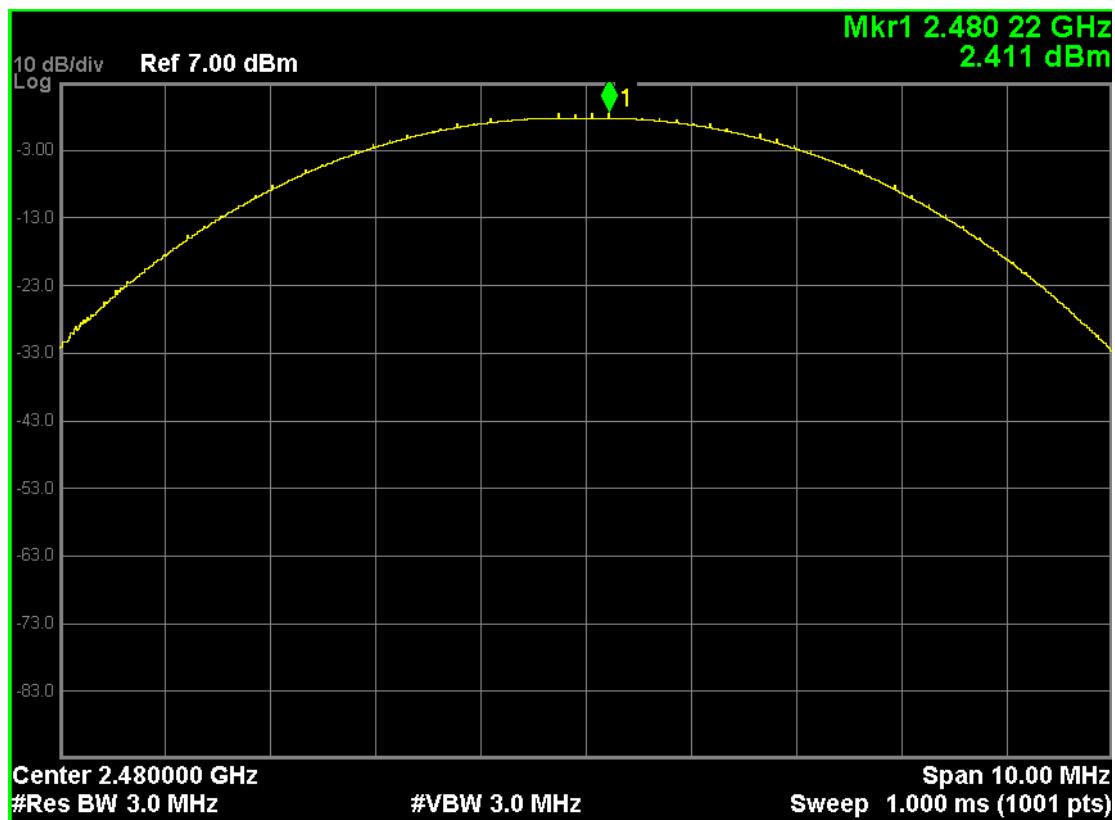
Bluetooth GFSK Channel 0



Bluetooth GFSK Channel 39

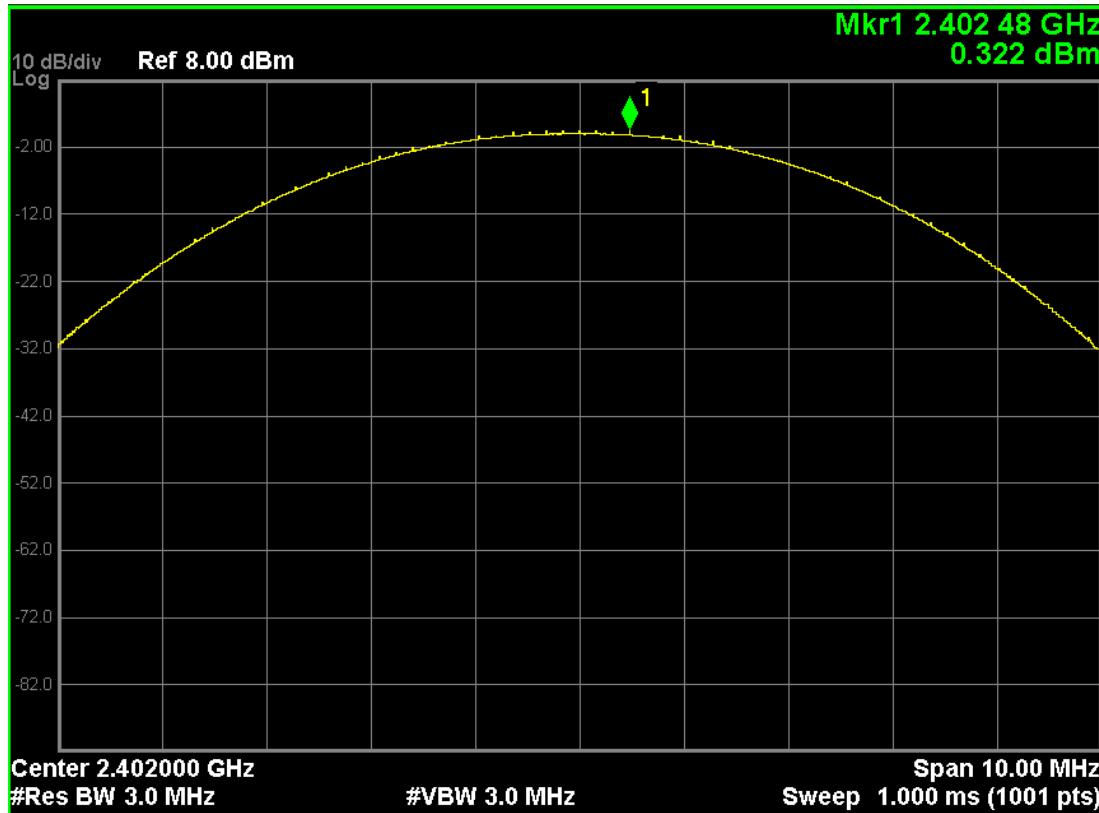


Bluetooth GFSK Channel 78

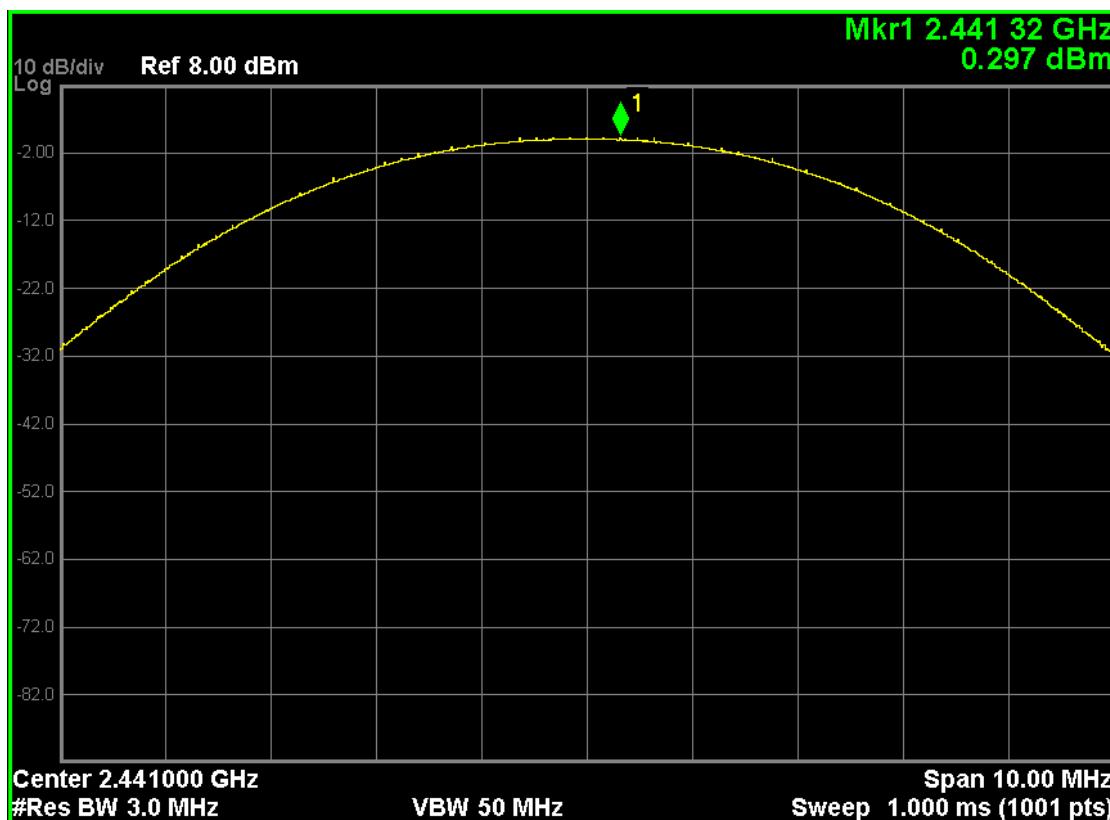


Π/4-DQPSK

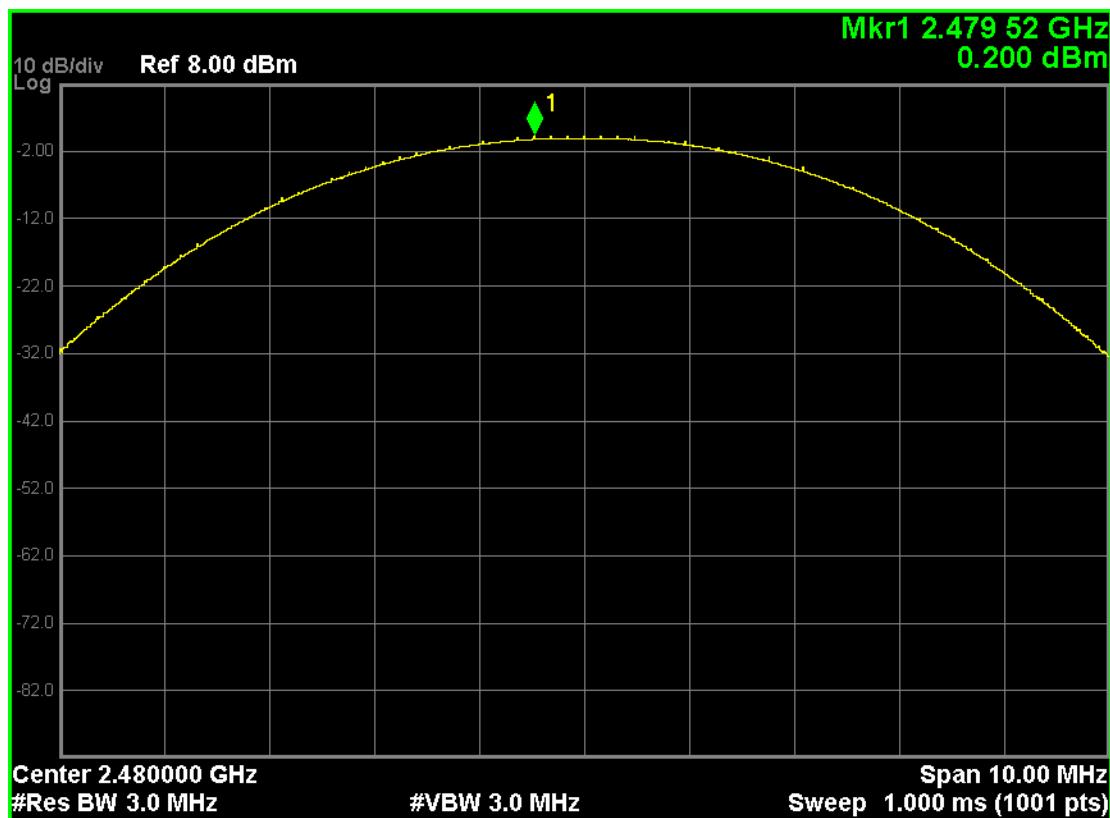
Bluetooth Π/4-DQPSK Channel 0



Bluetooth Π/4-DQPSK Channel 39

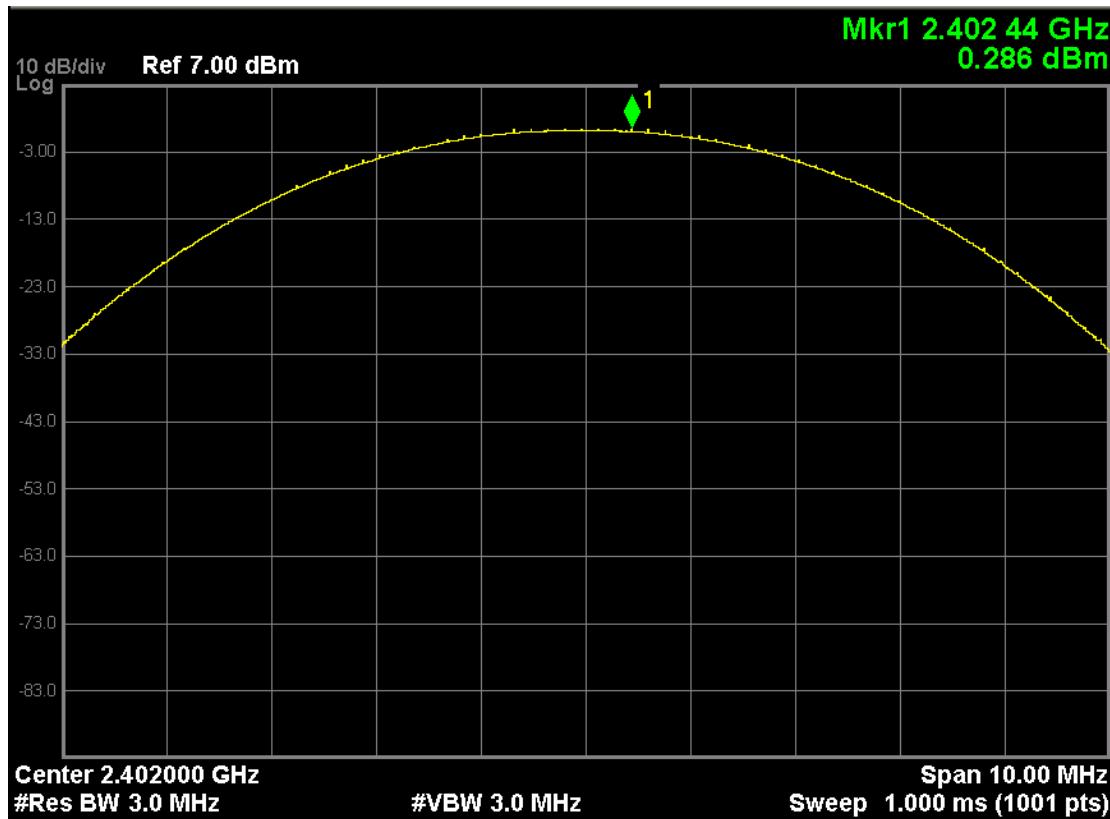


Bluetooth Π/4-DQPSK Channel 78

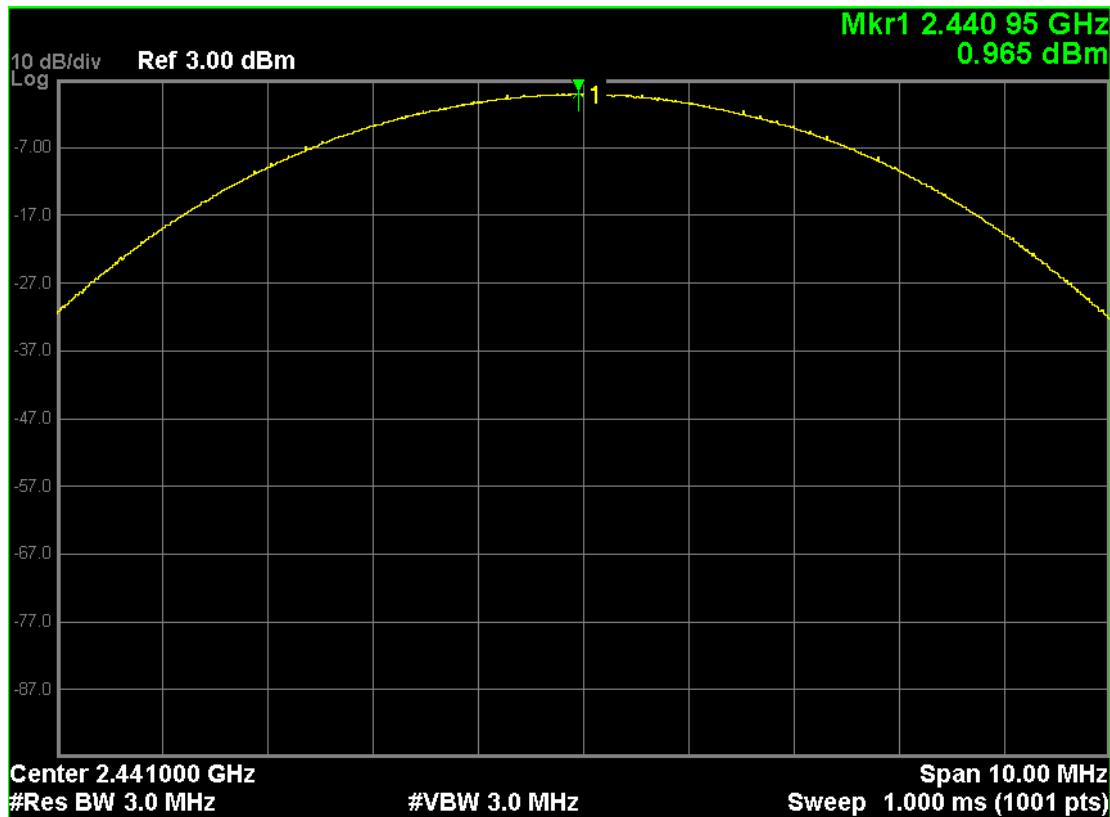


BT 8-DPSK

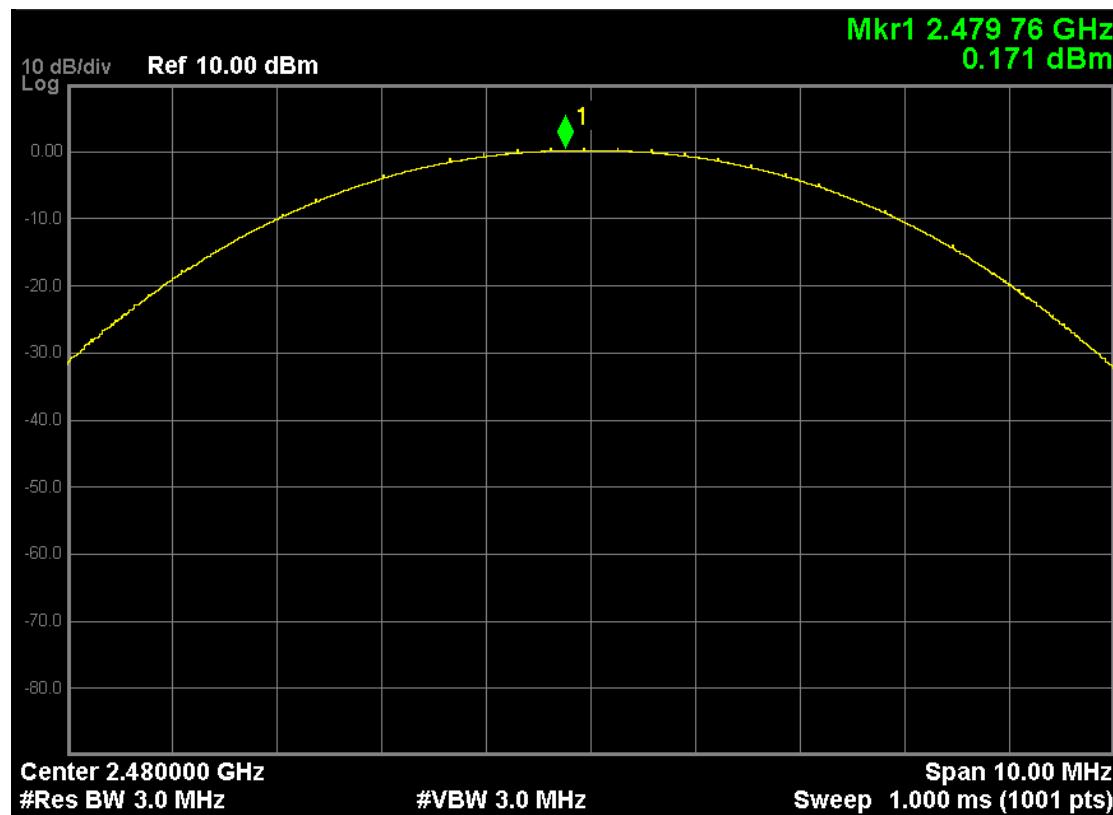
Bluetooth 8-DPSK Channel 0



Bluetooth 8-DPSK Channel 39

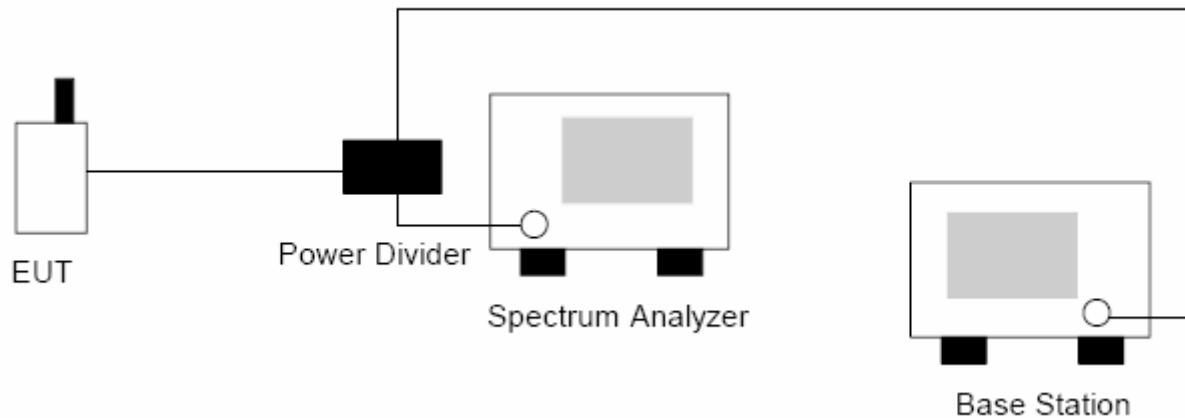


Bluetooth 8-DPSK Channel 78



9. SPURIOUS EMISSIONS (CONDUCTION)

9.1 TEST SETUP



9.2 LIMITS

Limit	$<(P-20\text{dB})$
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:

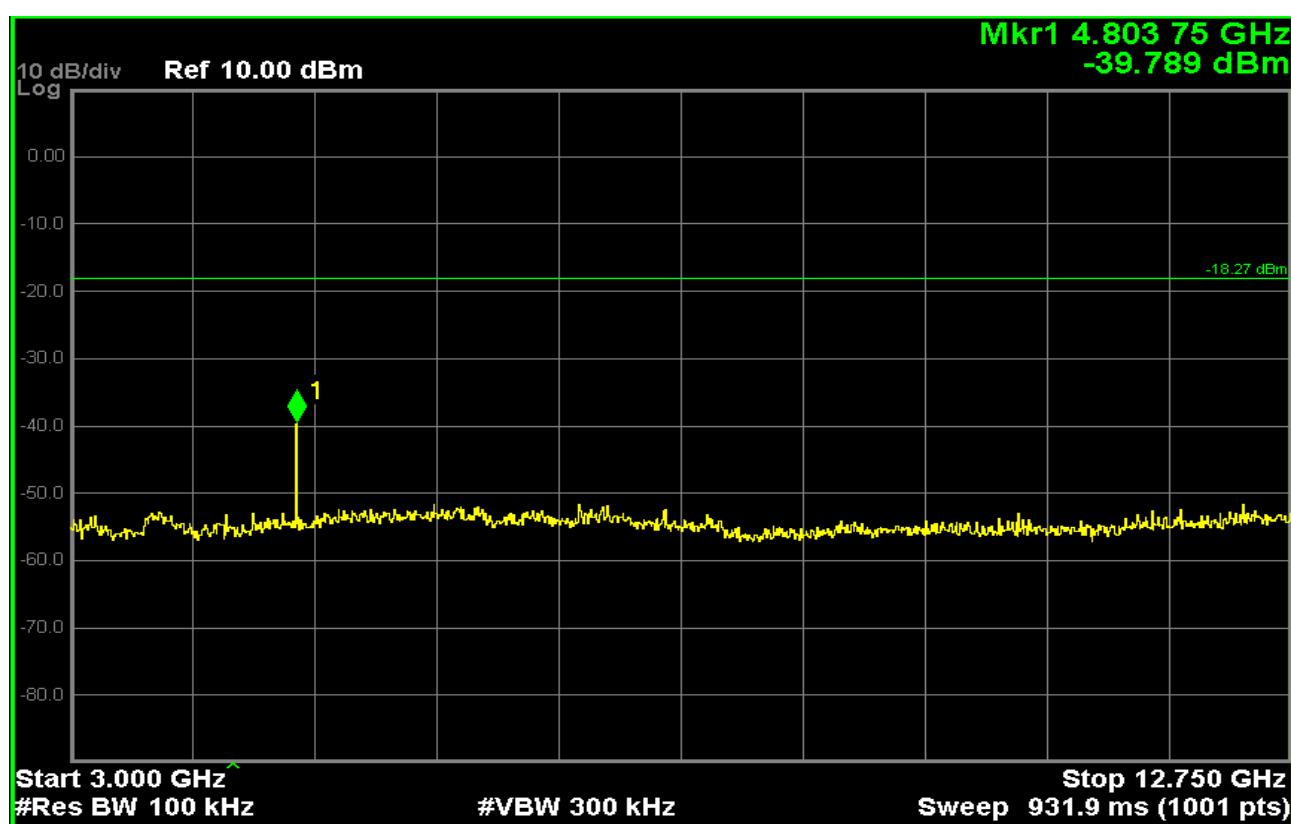
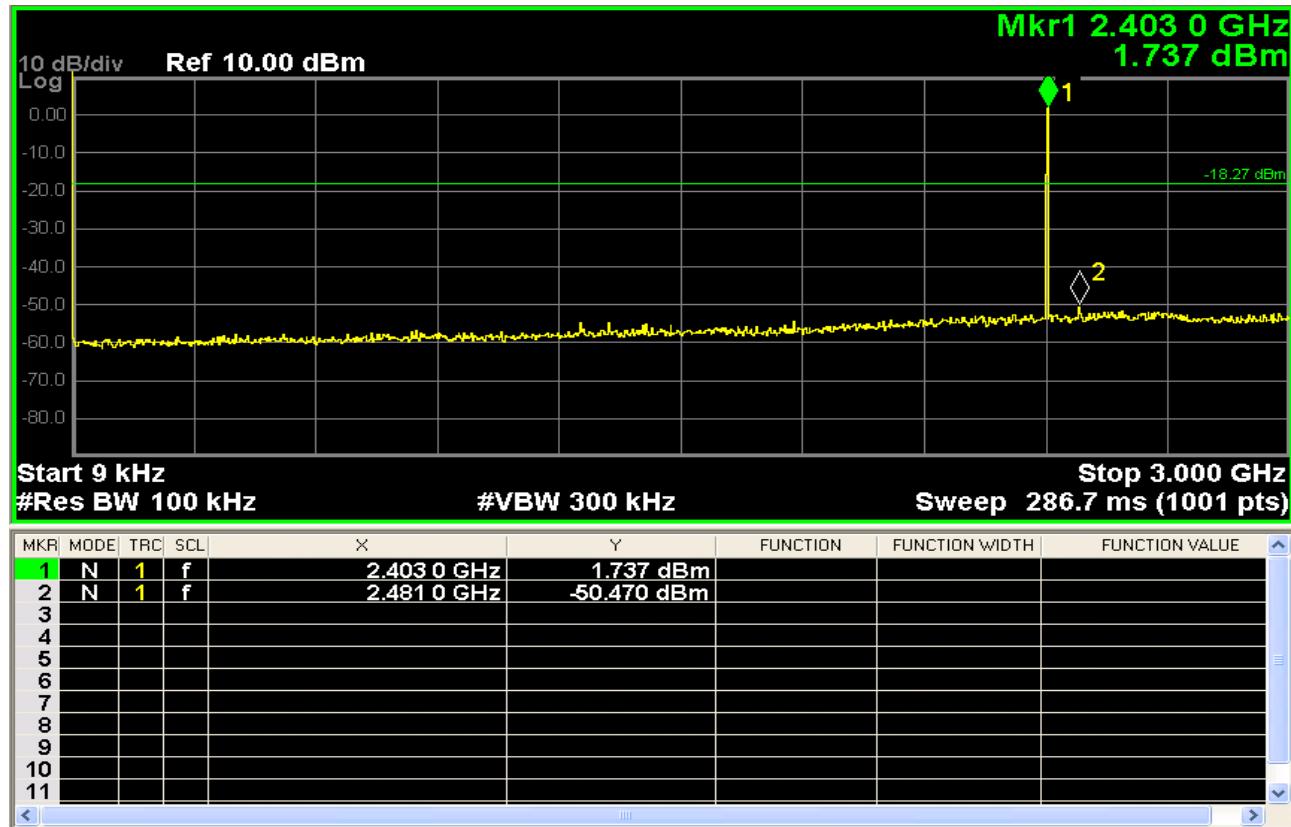
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz VBW =300KHz; 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

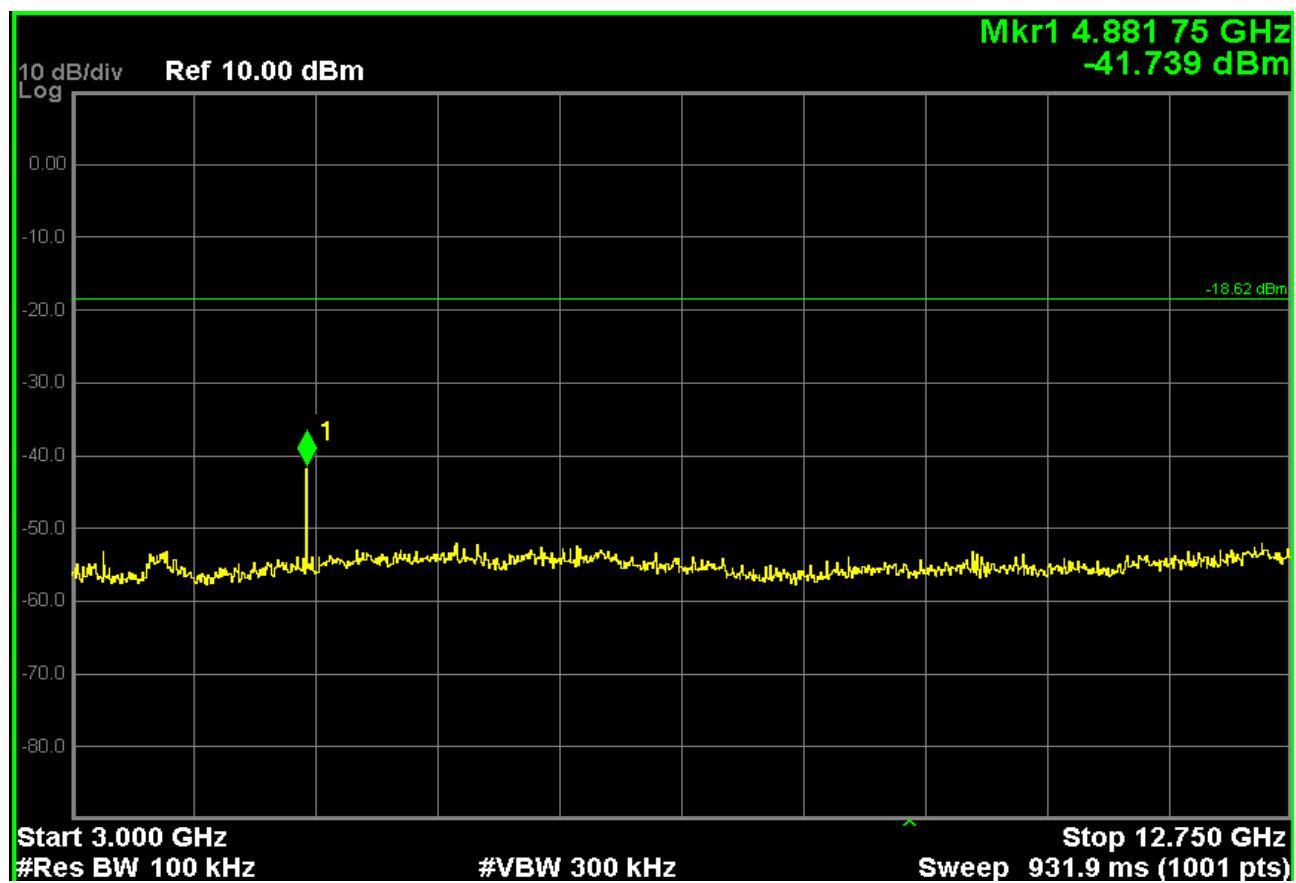
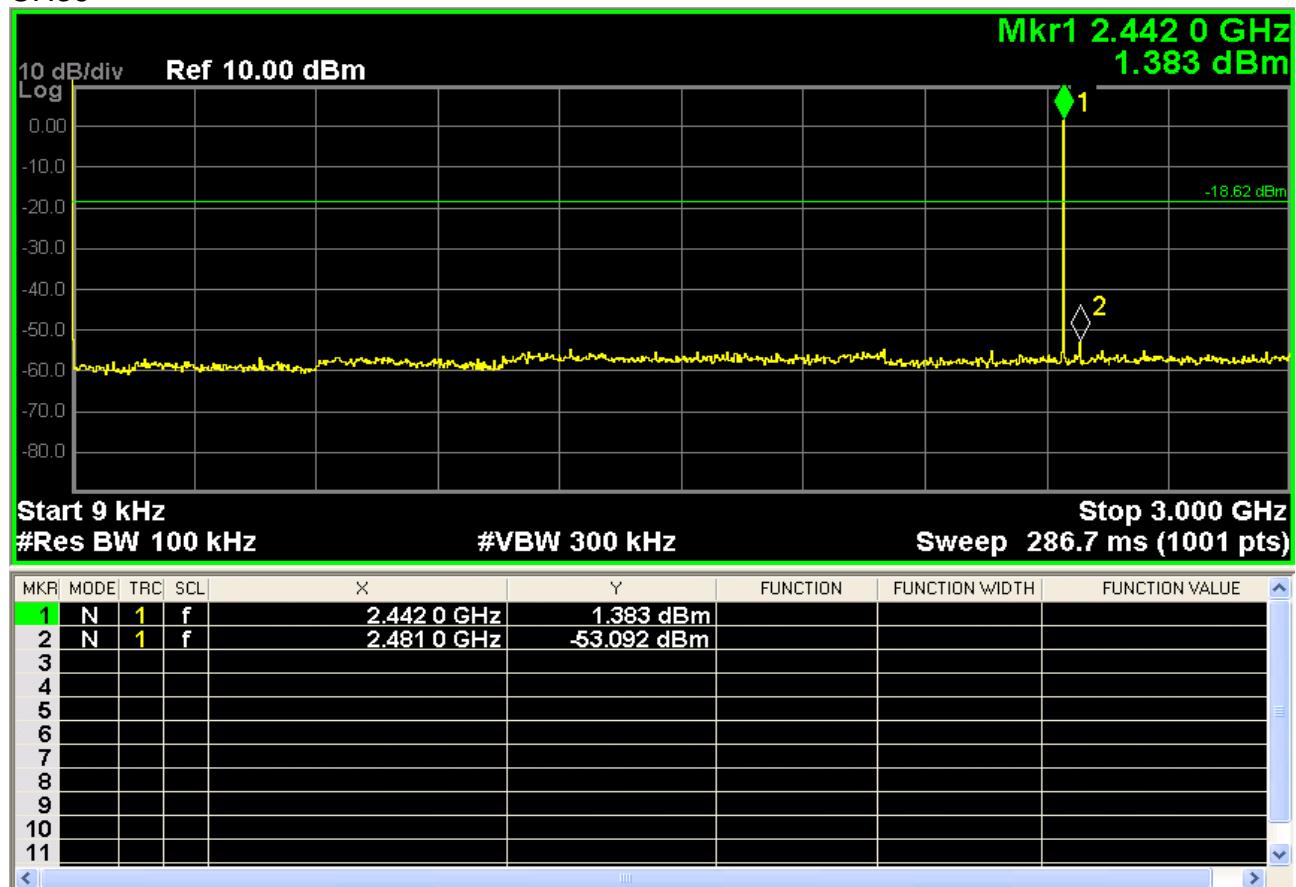
Bluetooth;traffic mode;GFSK

CH0



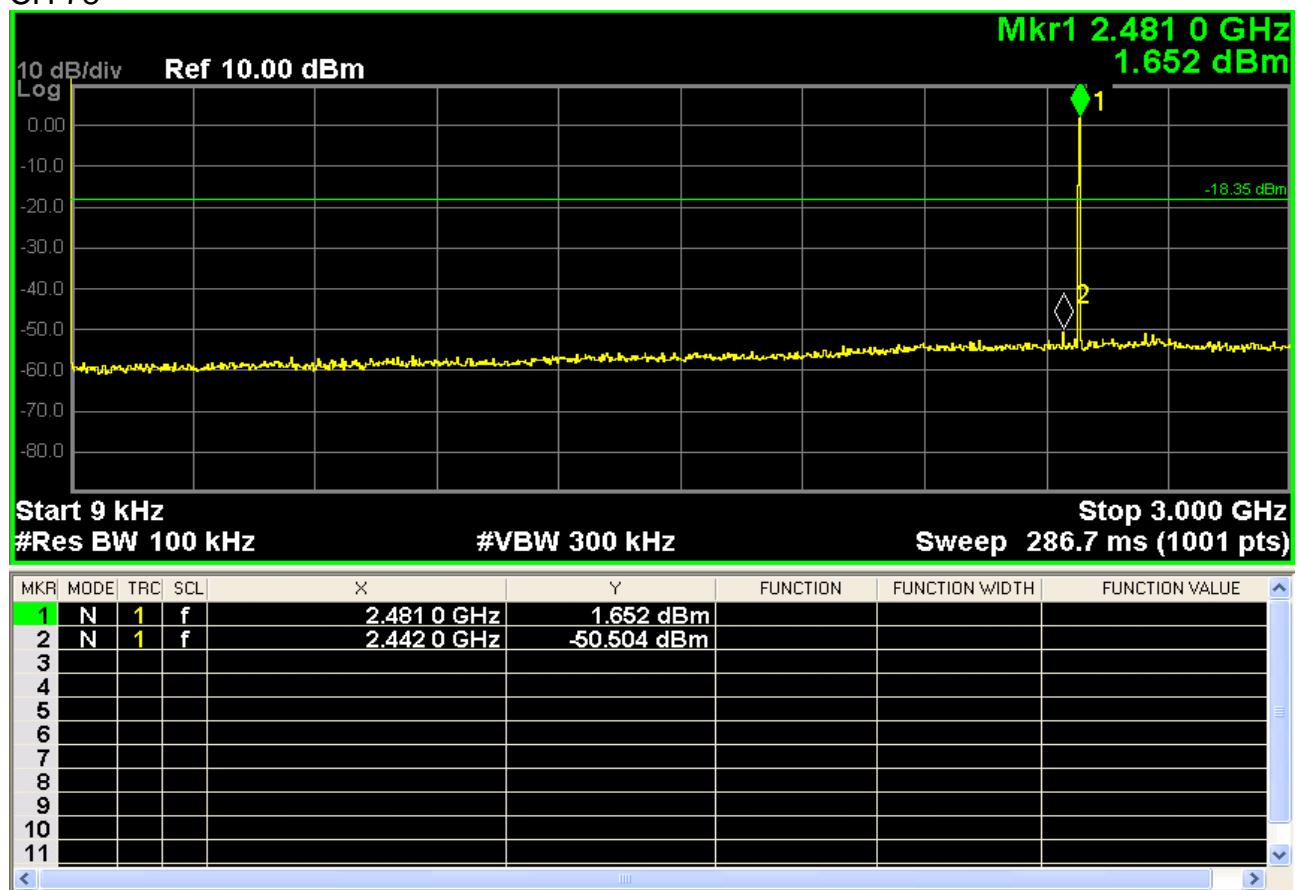


CH39

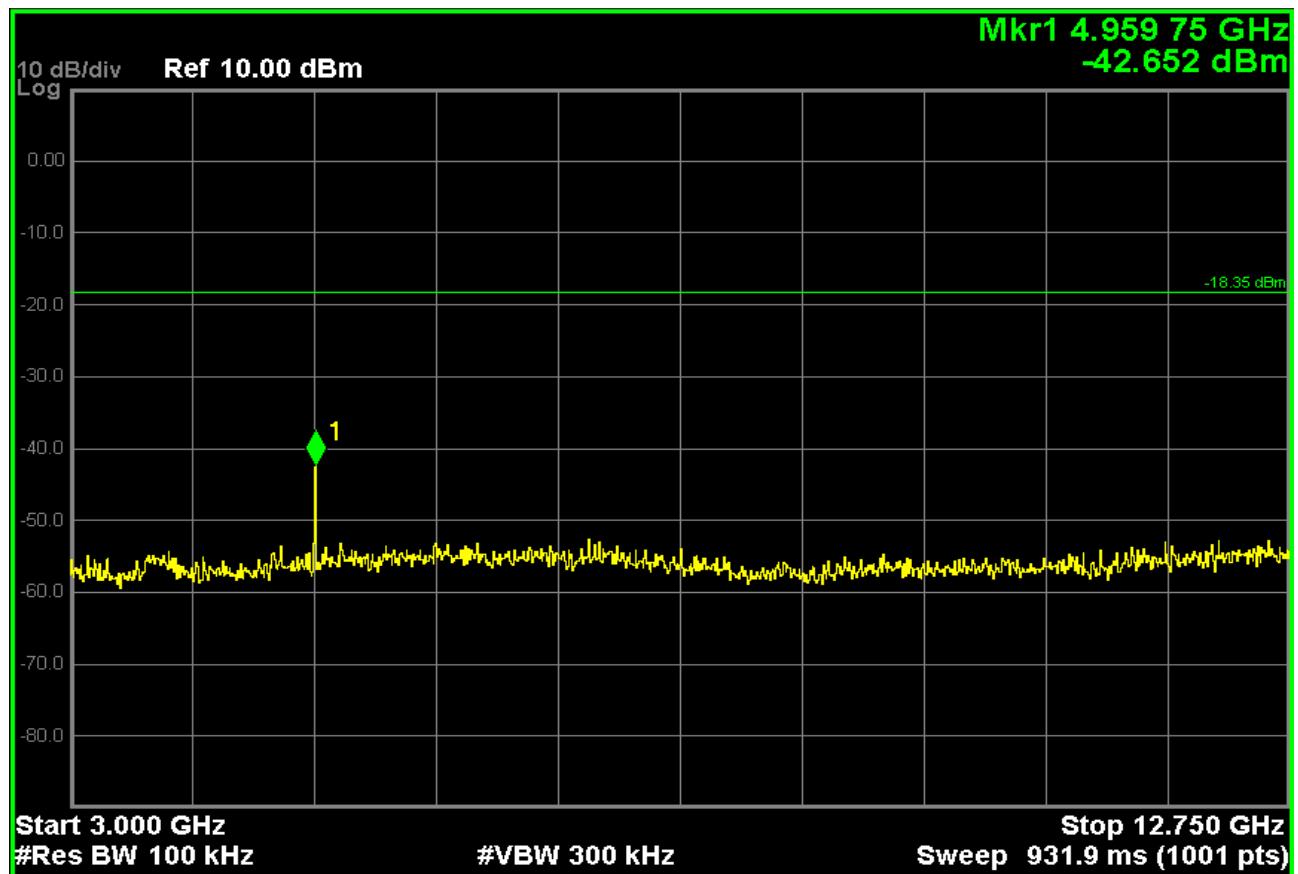


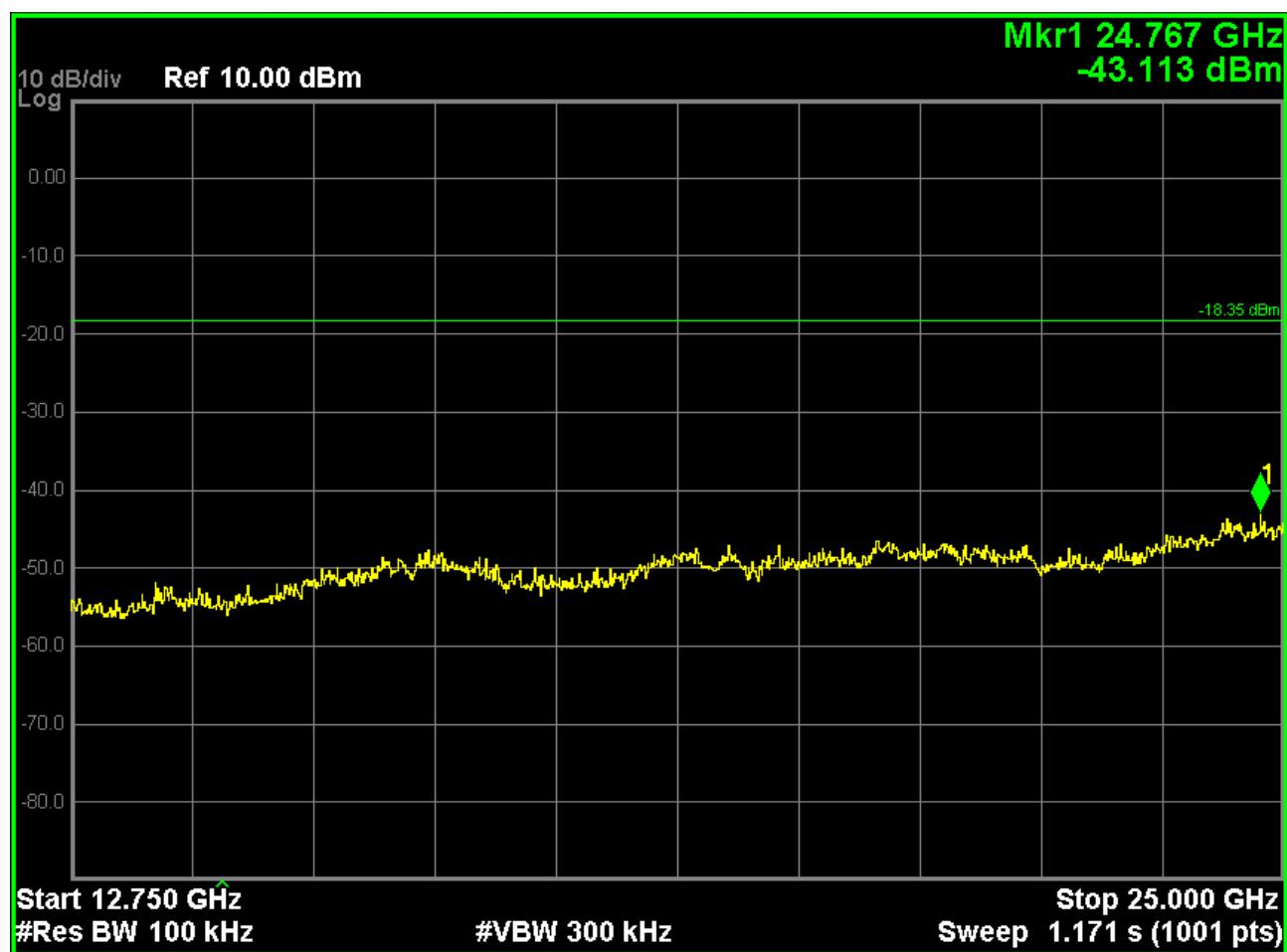


CH 78



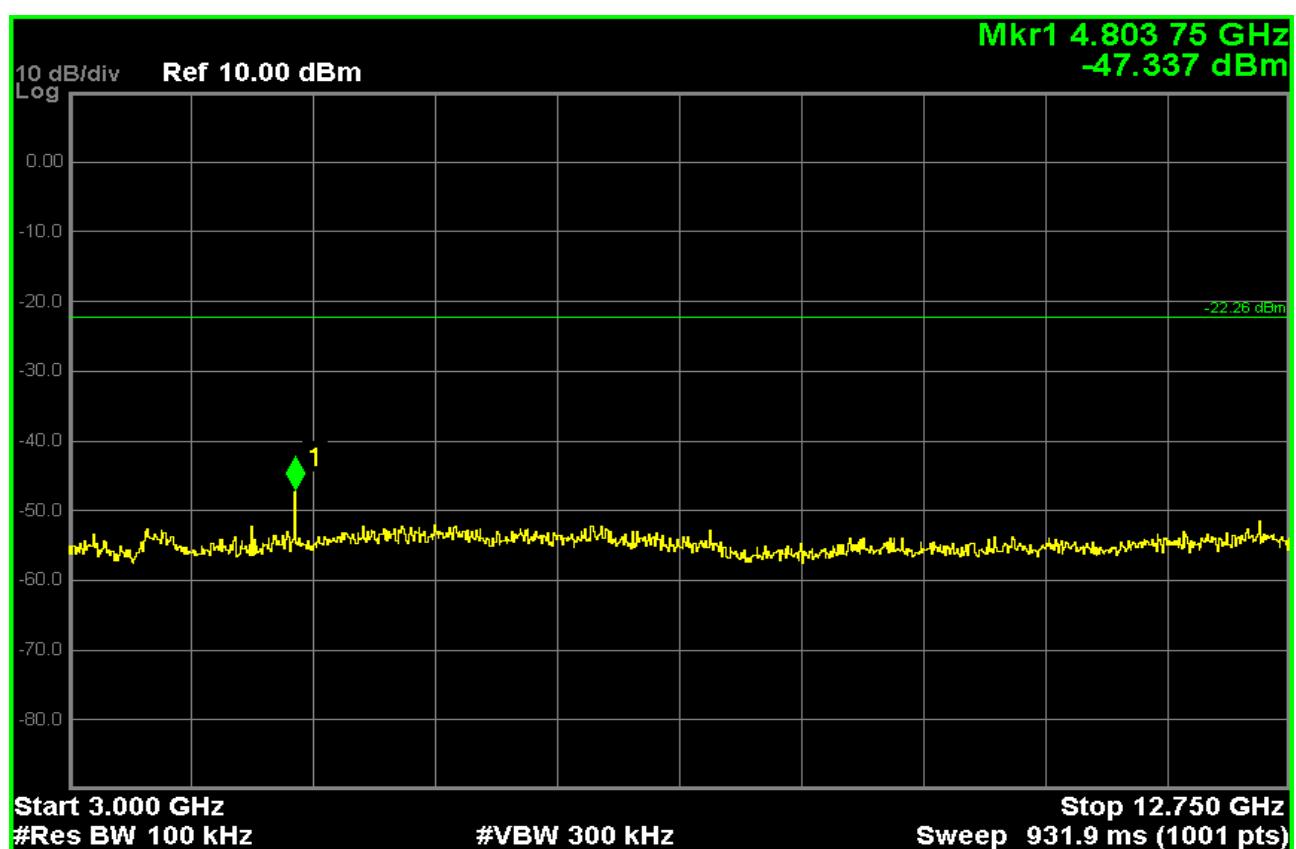
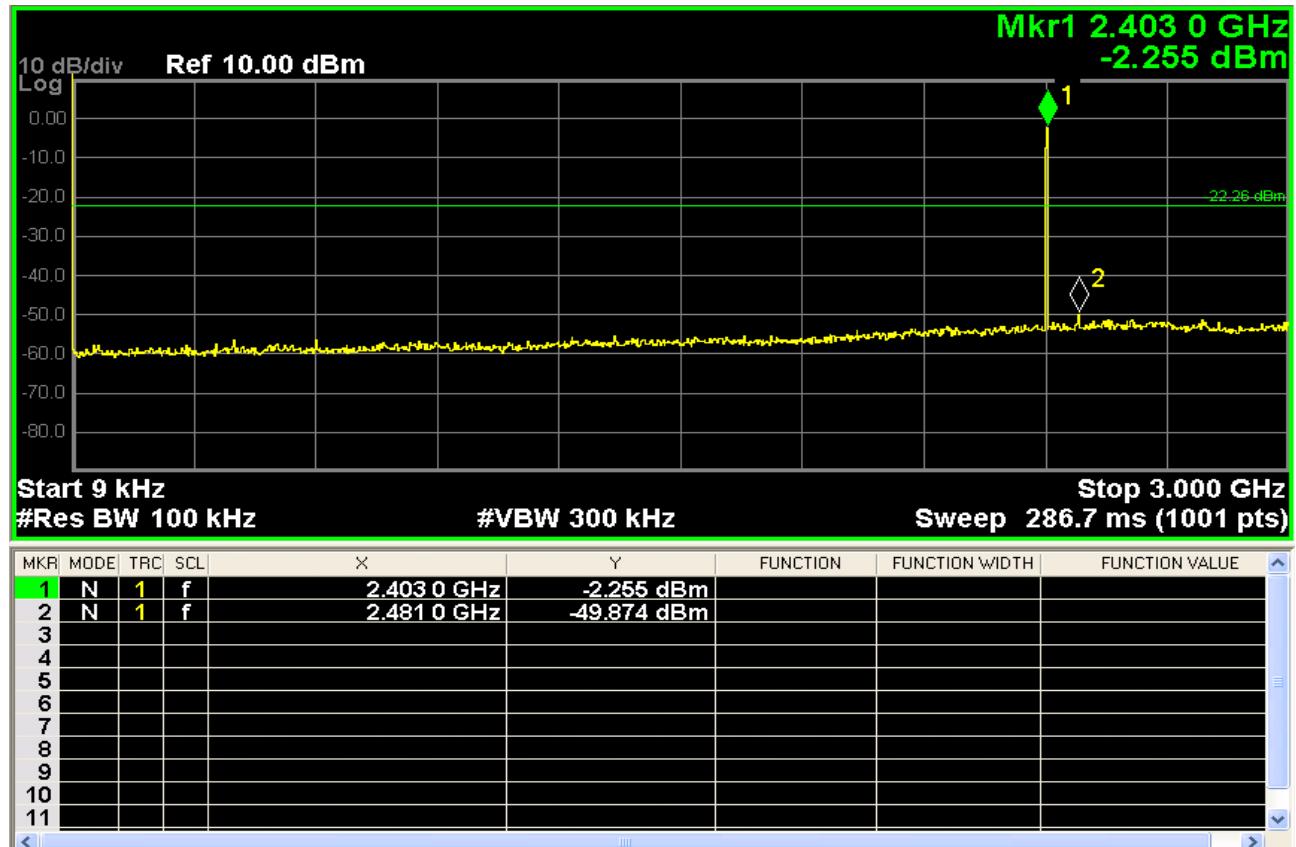
Note: The point mark1 is carrier, and the point mark 2 is the DL signal of the test instrument(N4010A).





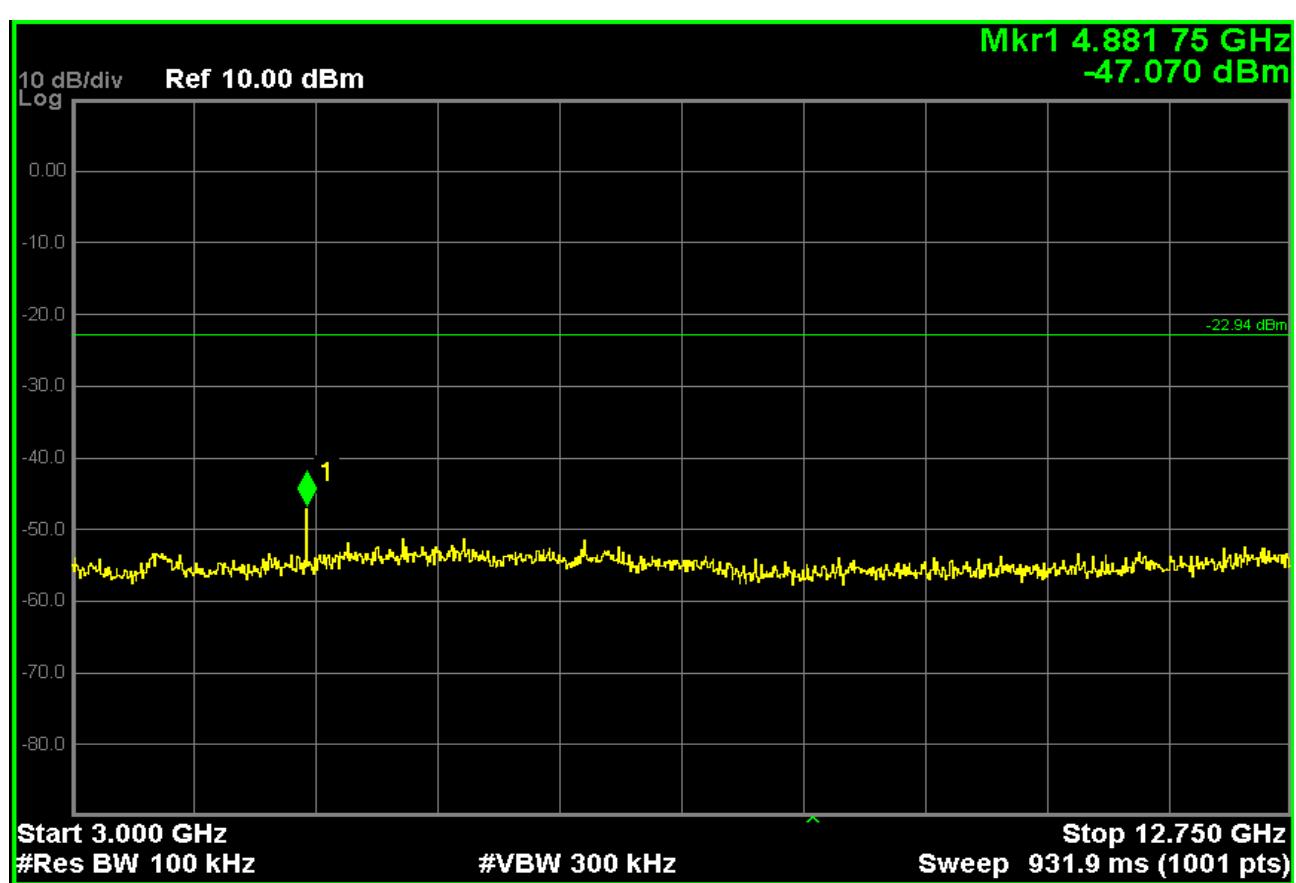
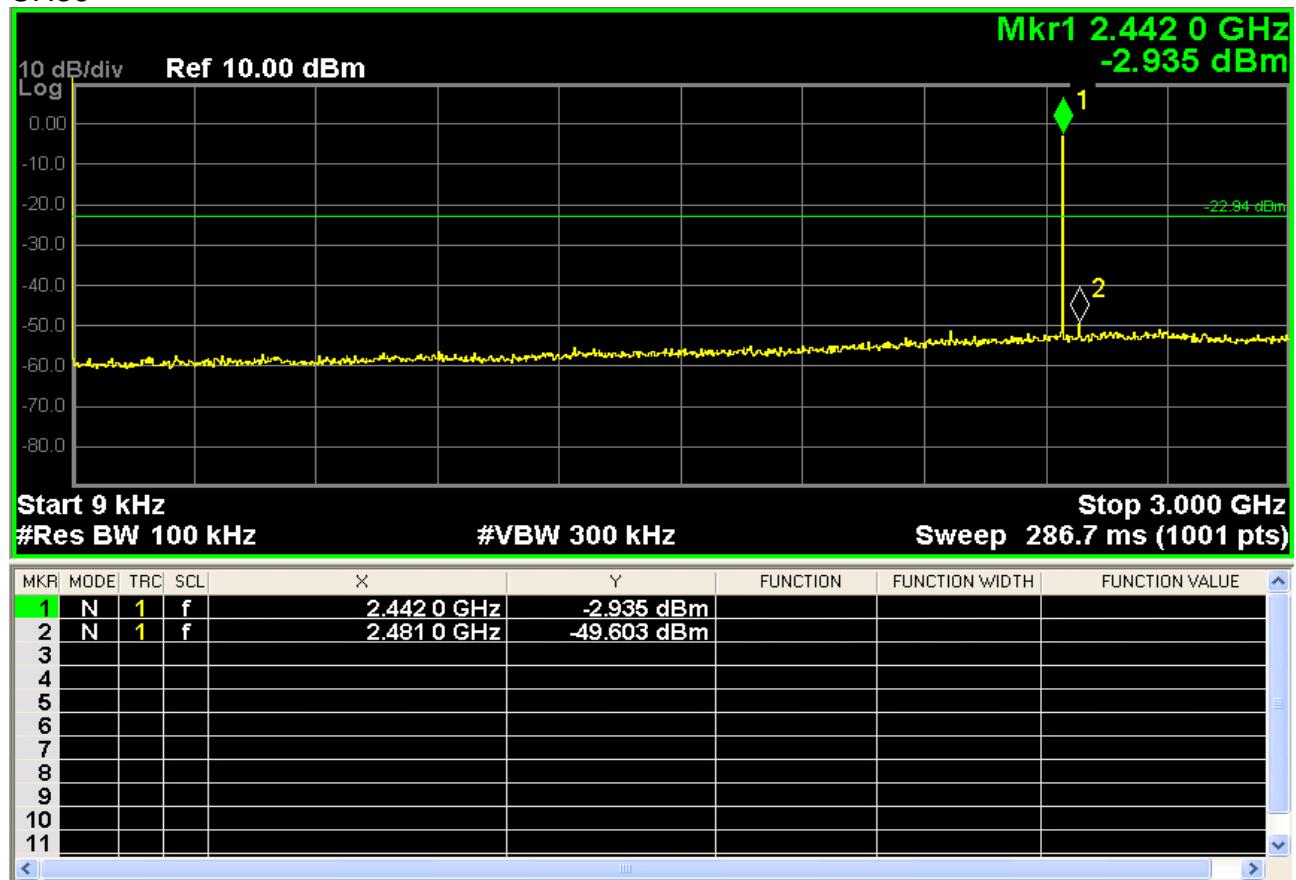
Bluetooth;traffic mode; $\Pi/4$ -DQPSK

CH0



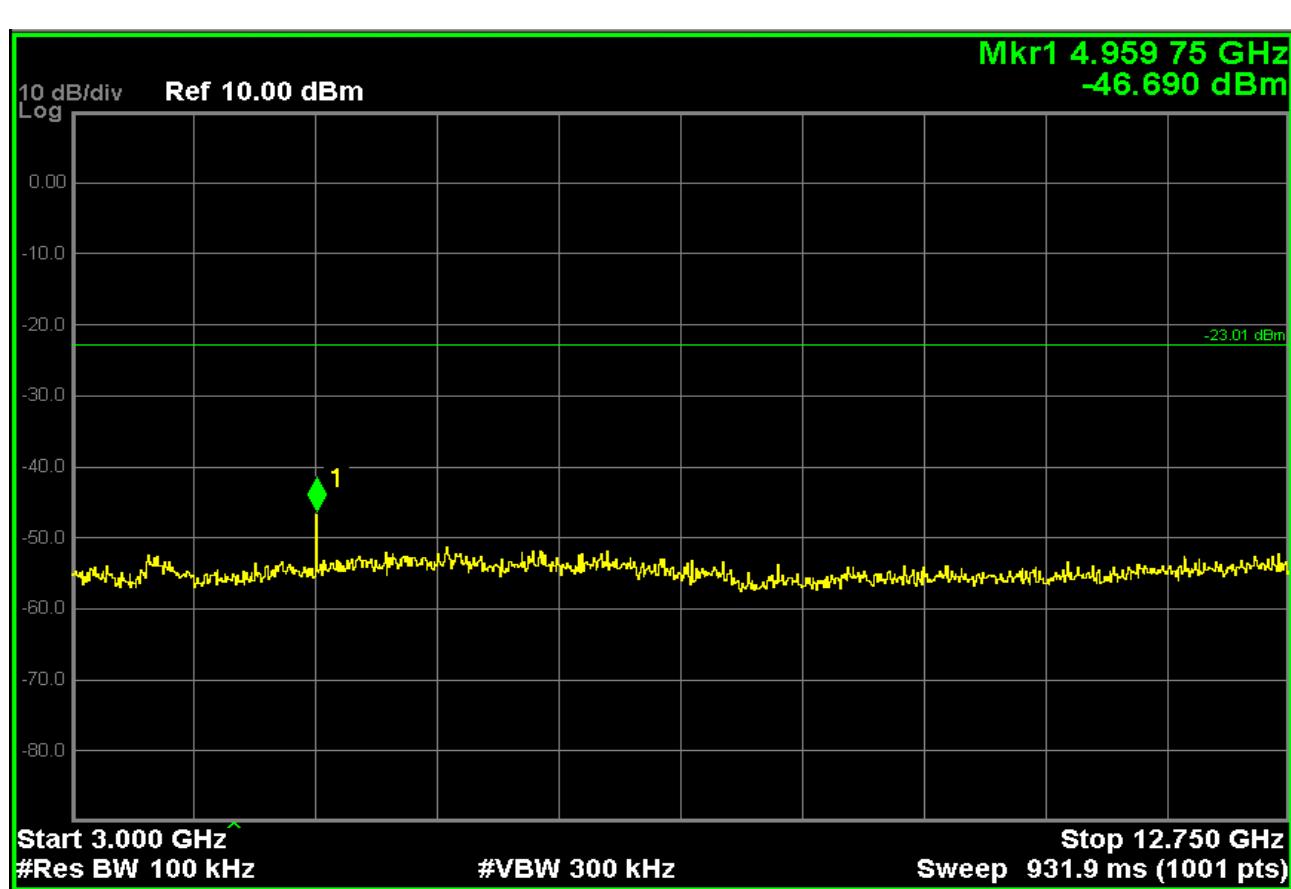
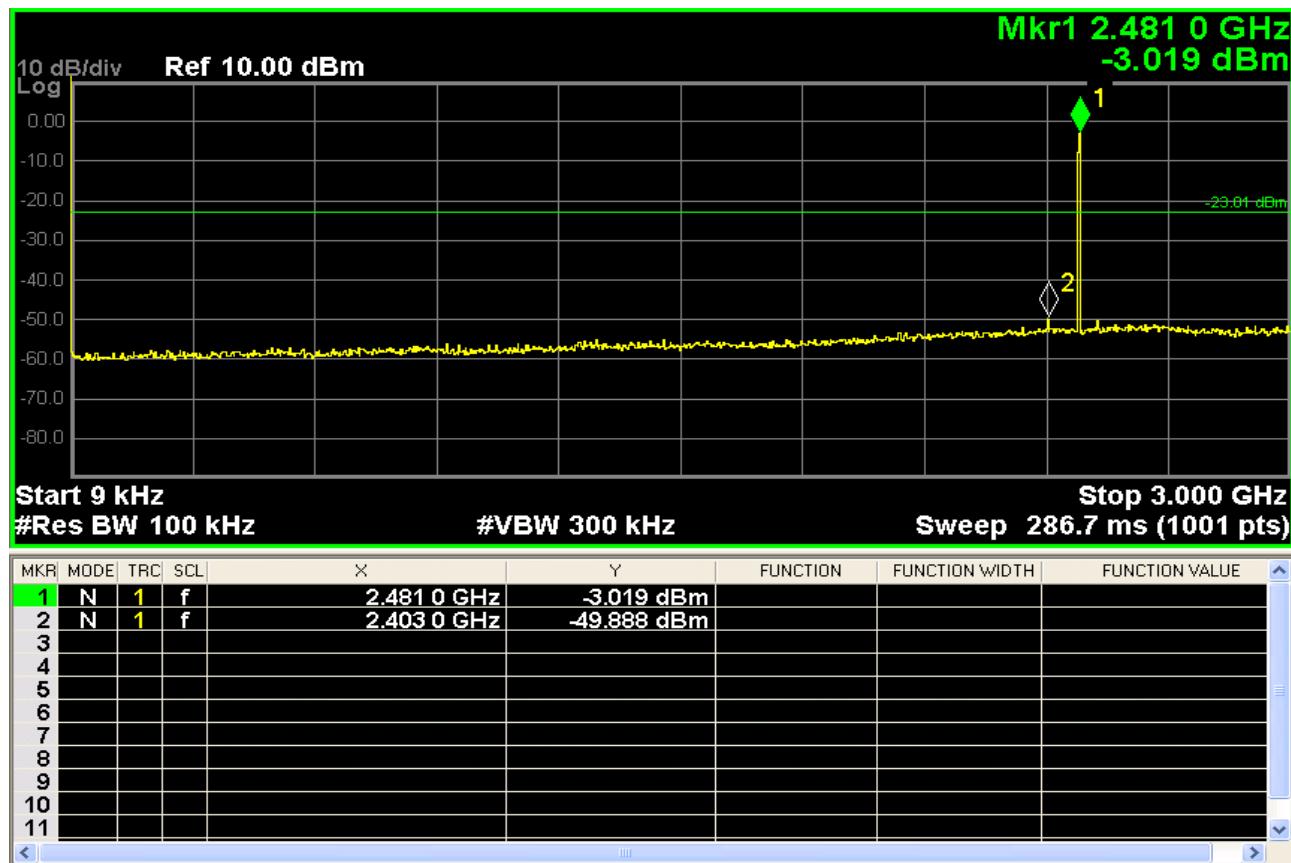


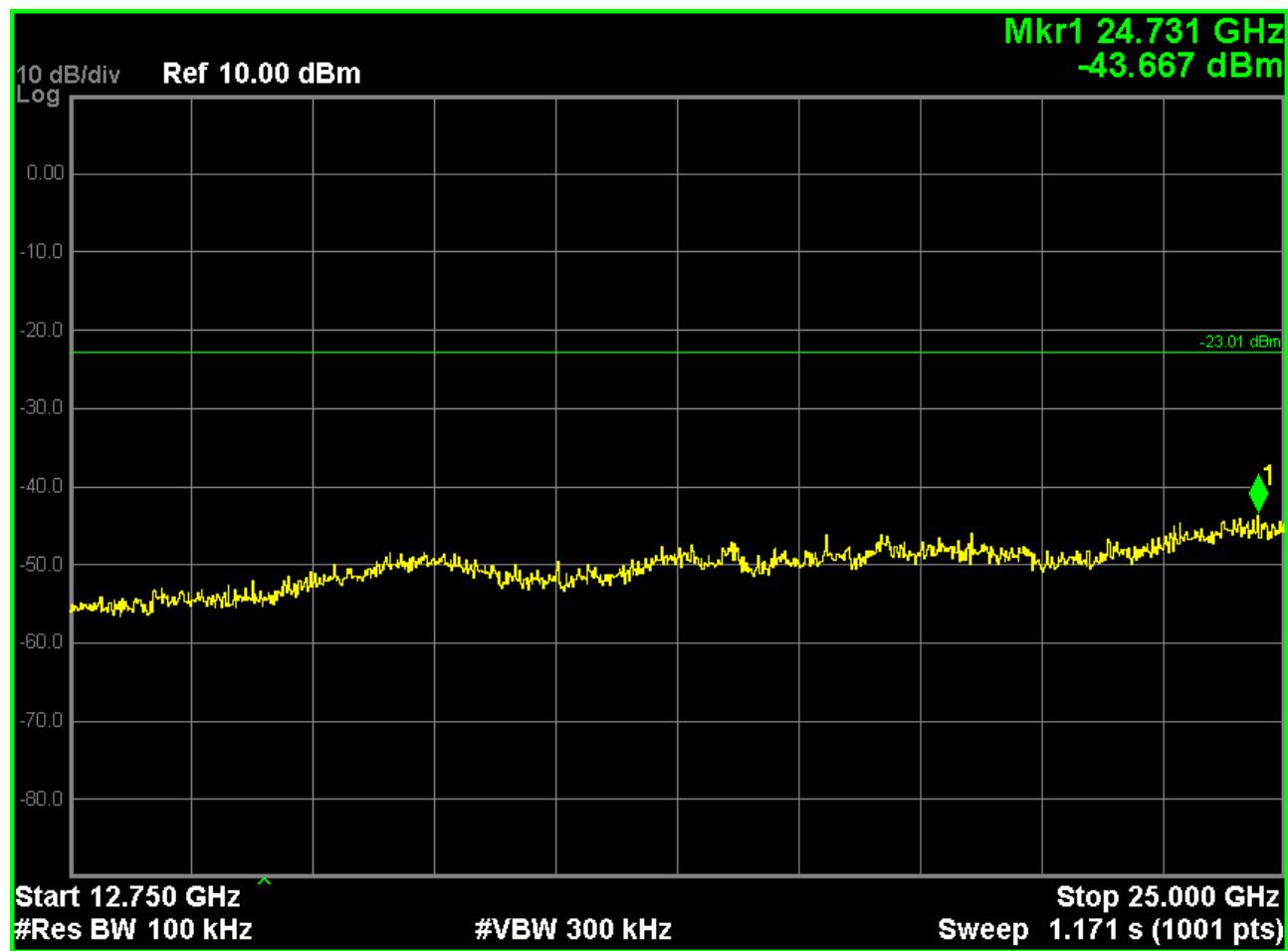
CH39





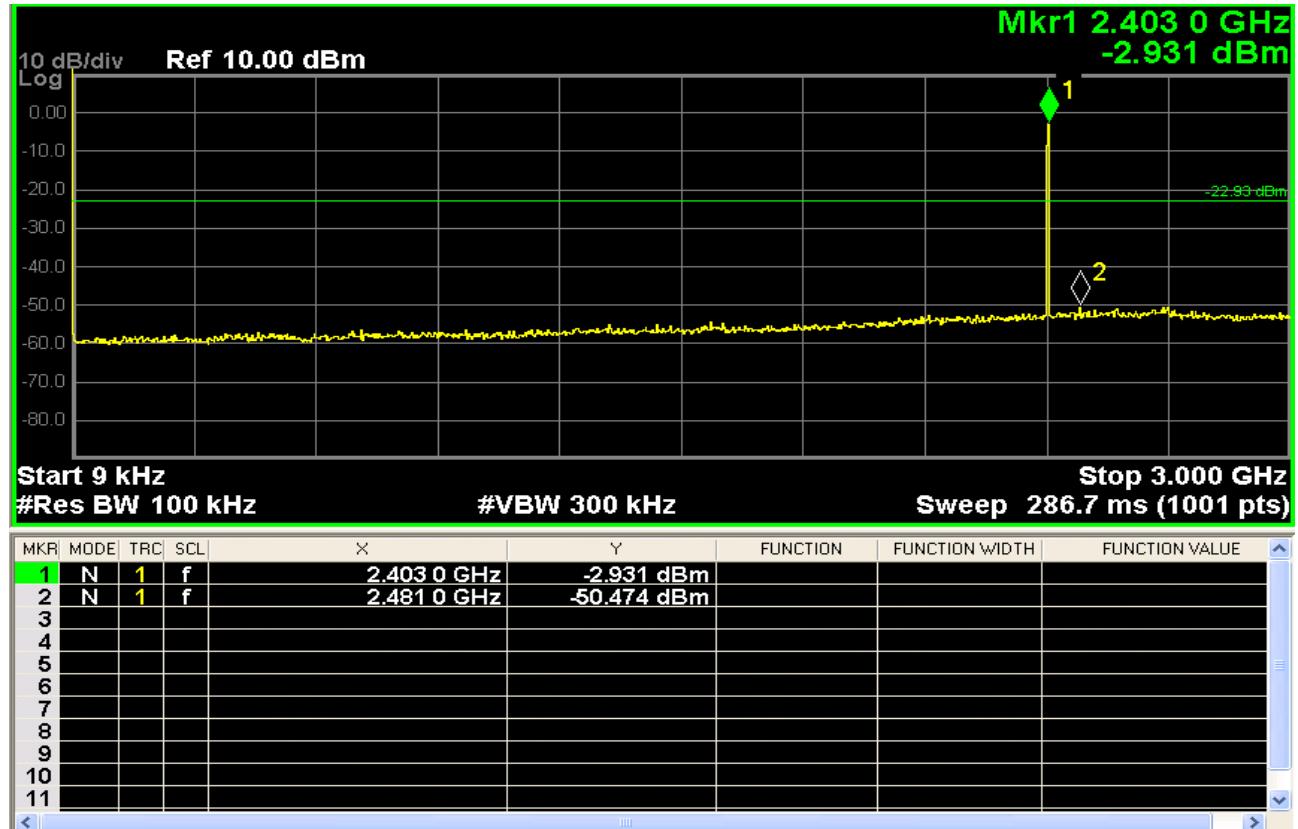
CH 78



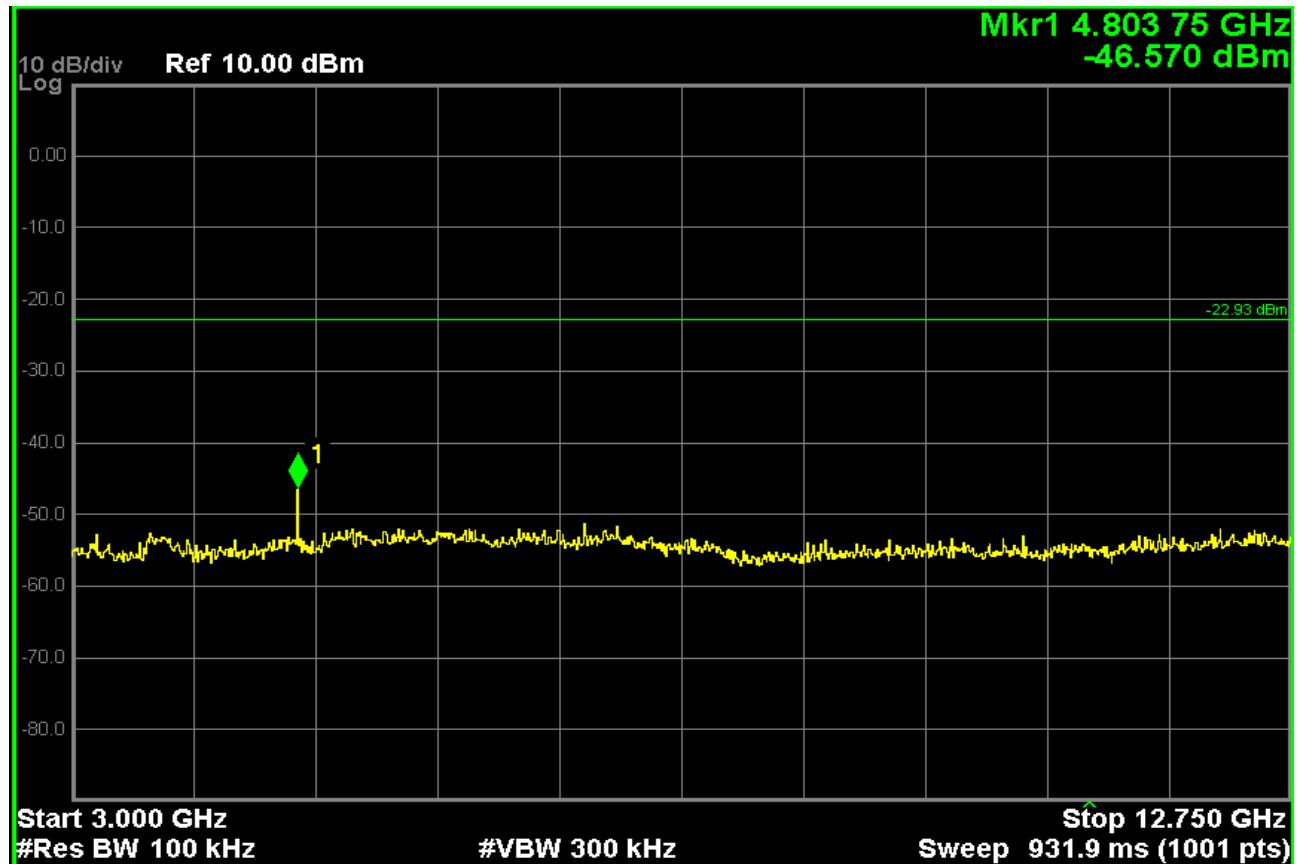


Bluetooth traffic mode 8-DPSK

CH0

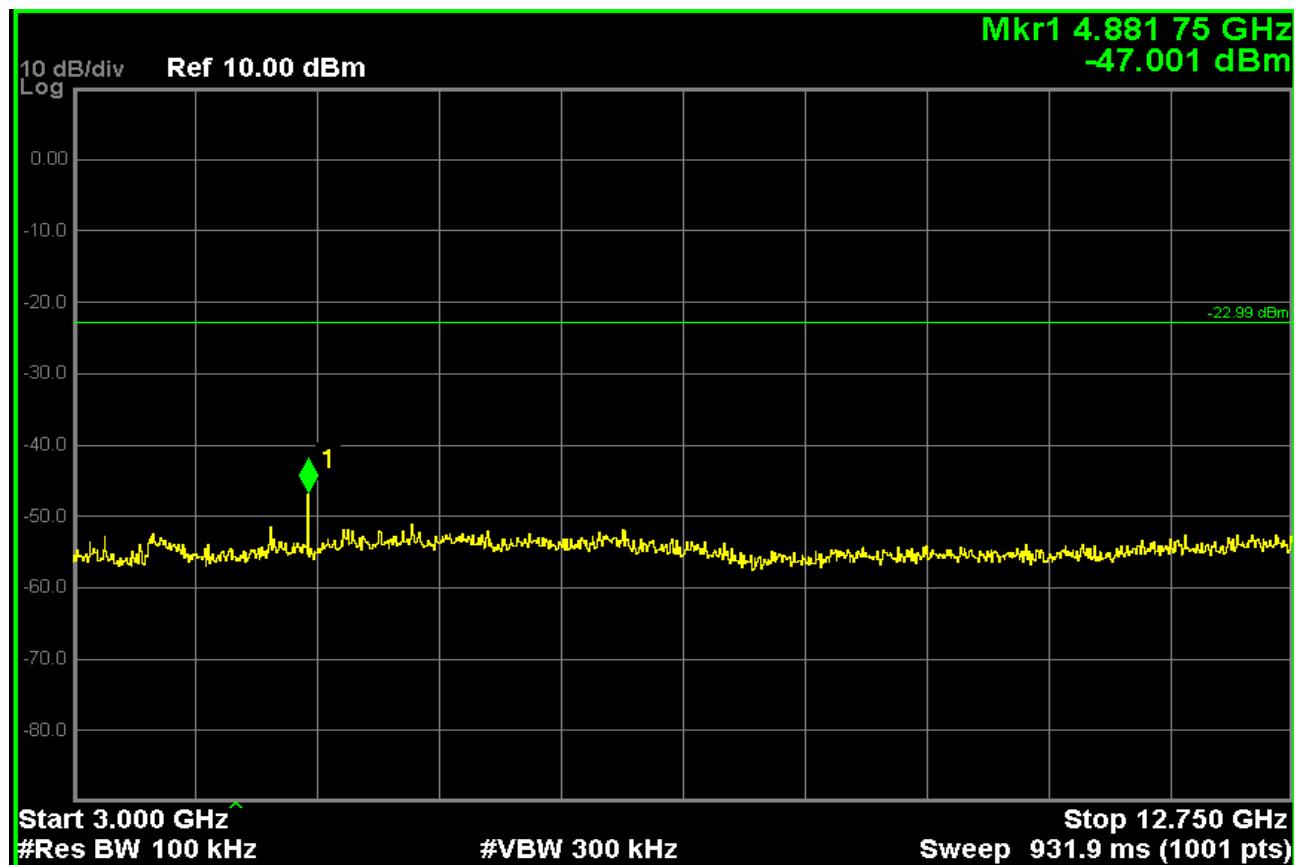
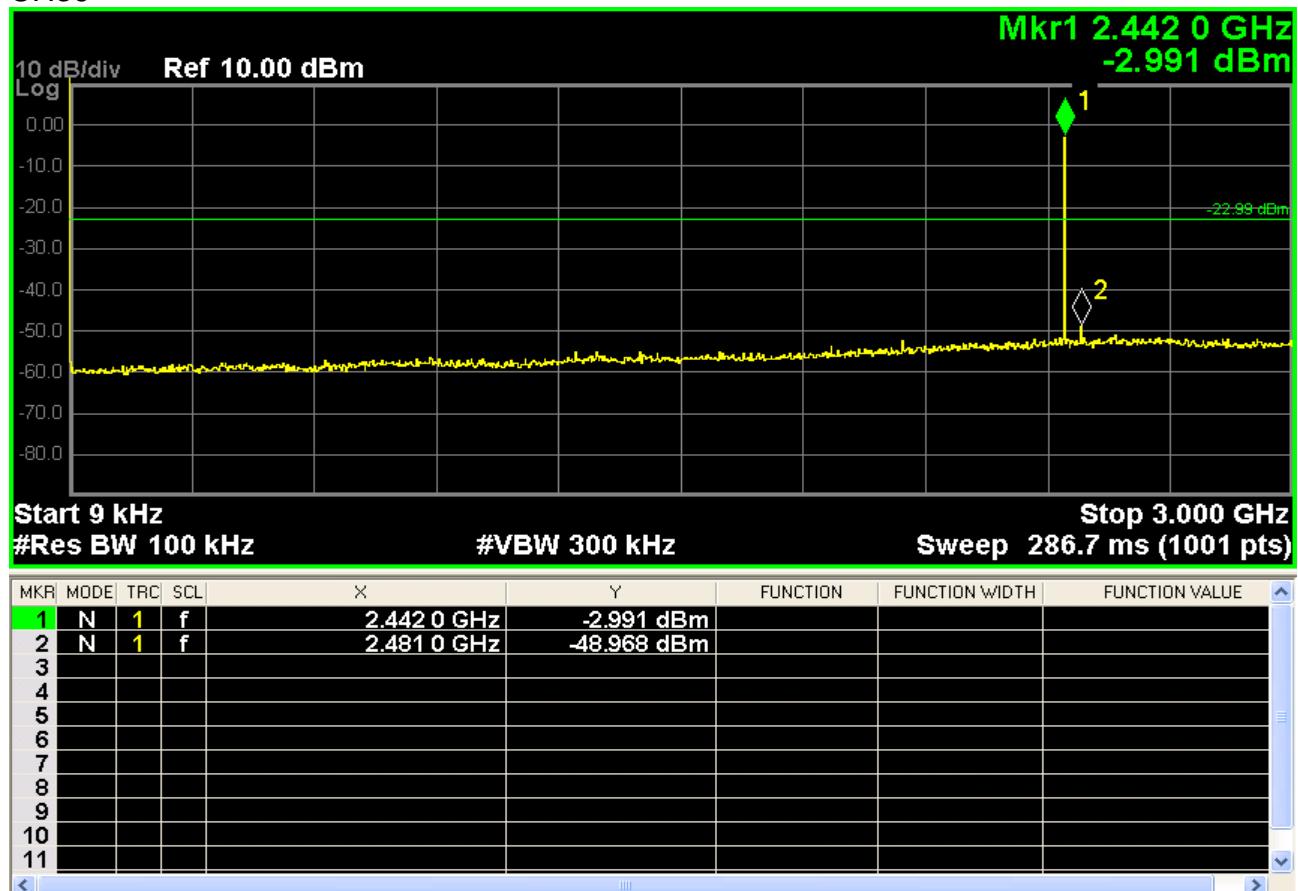


Note: The point mark1 is carrier, and the point mark 2 is the DL signal of the test instrument(N4010A).



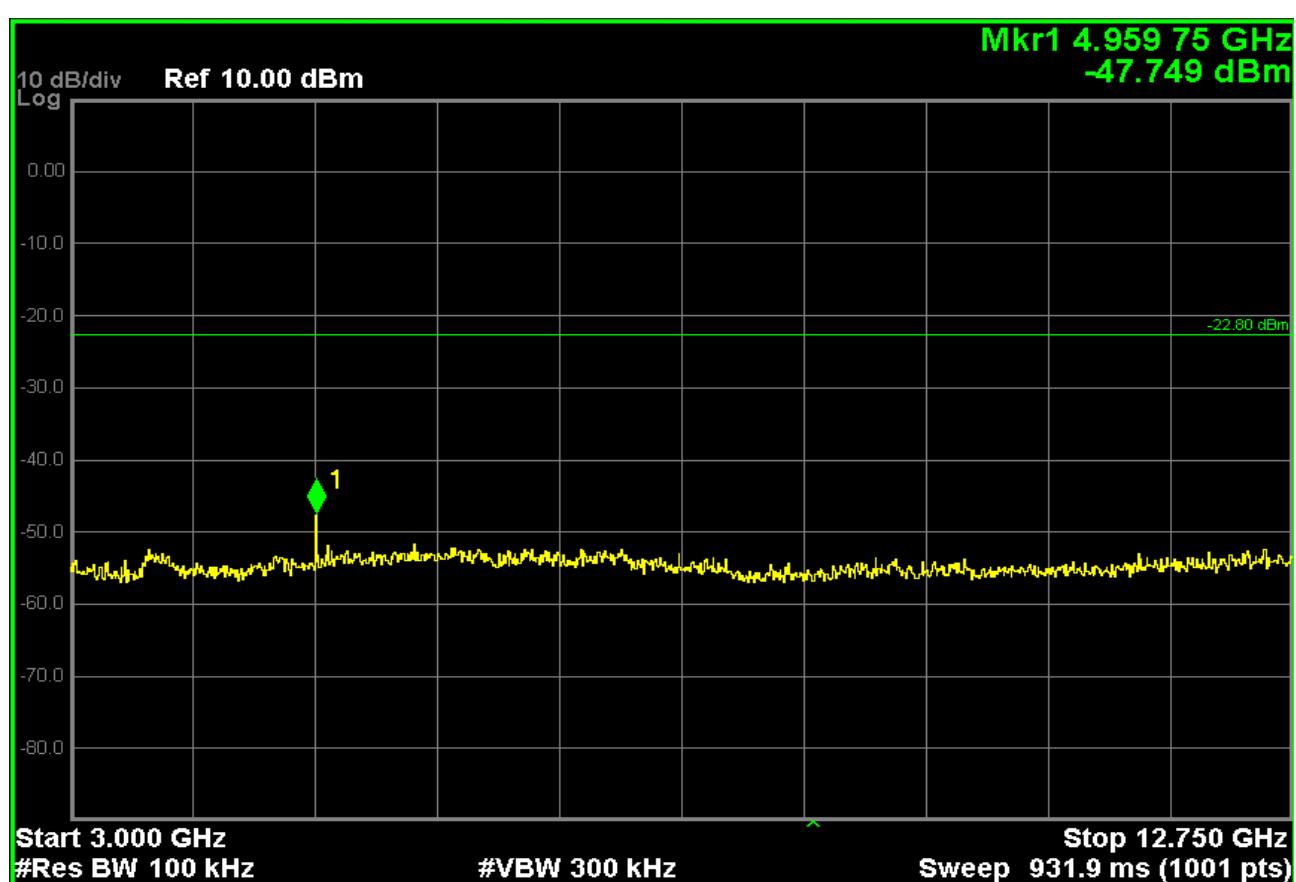
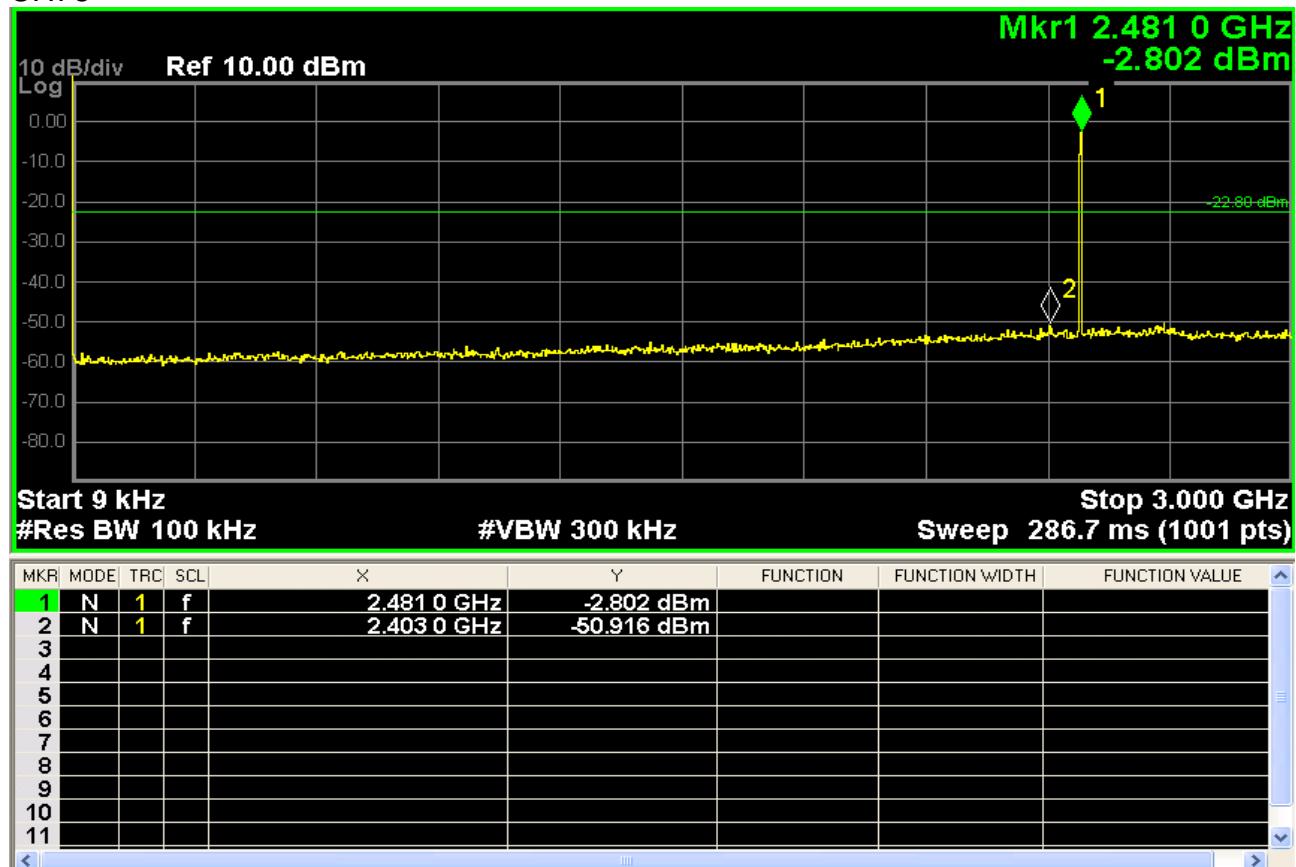


CH39





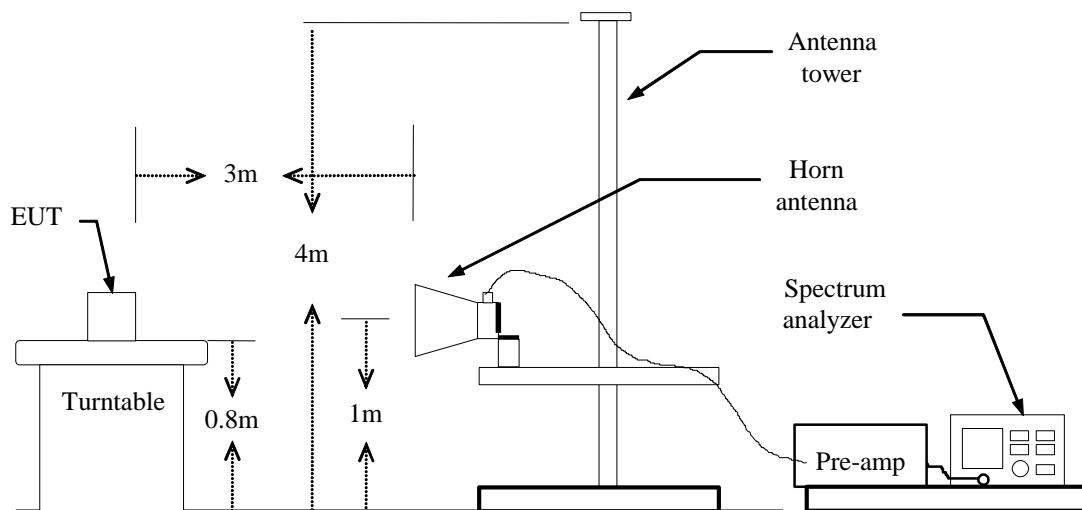
CH78





10. BAND EDGE MEASUREMENT

10.1 TEST SETUP



10.2 LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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 in 15.209(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.

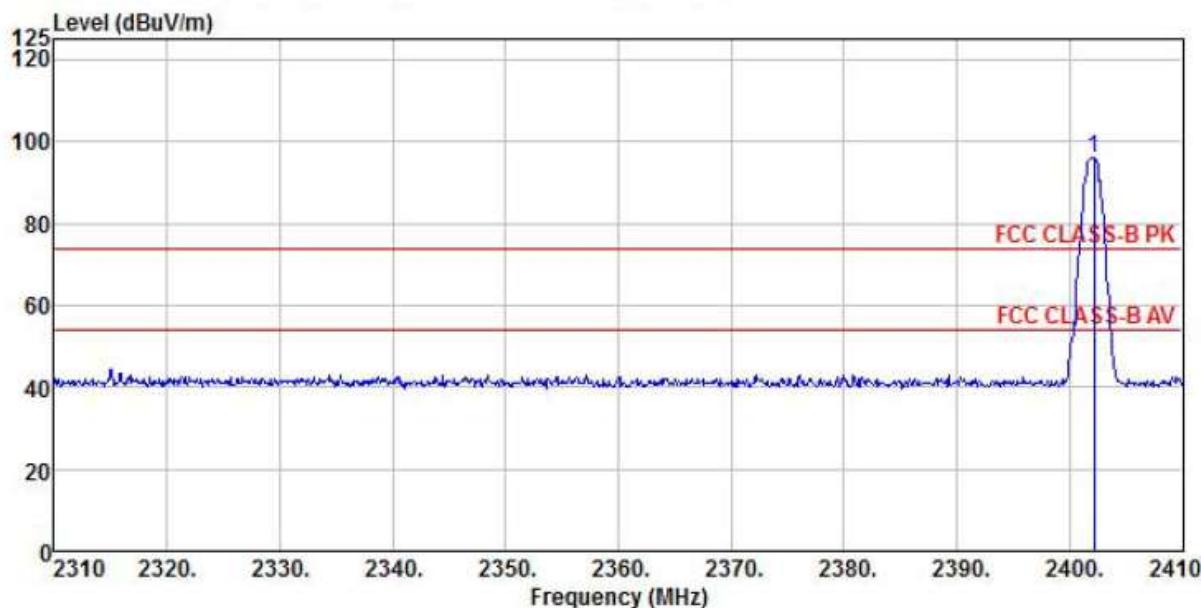
10.4 RESULTS & PERFORMANCE

Radiated Band Edge:

BT GFSK (Ch0)

Detector mode: Peak

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : GFSK CH0

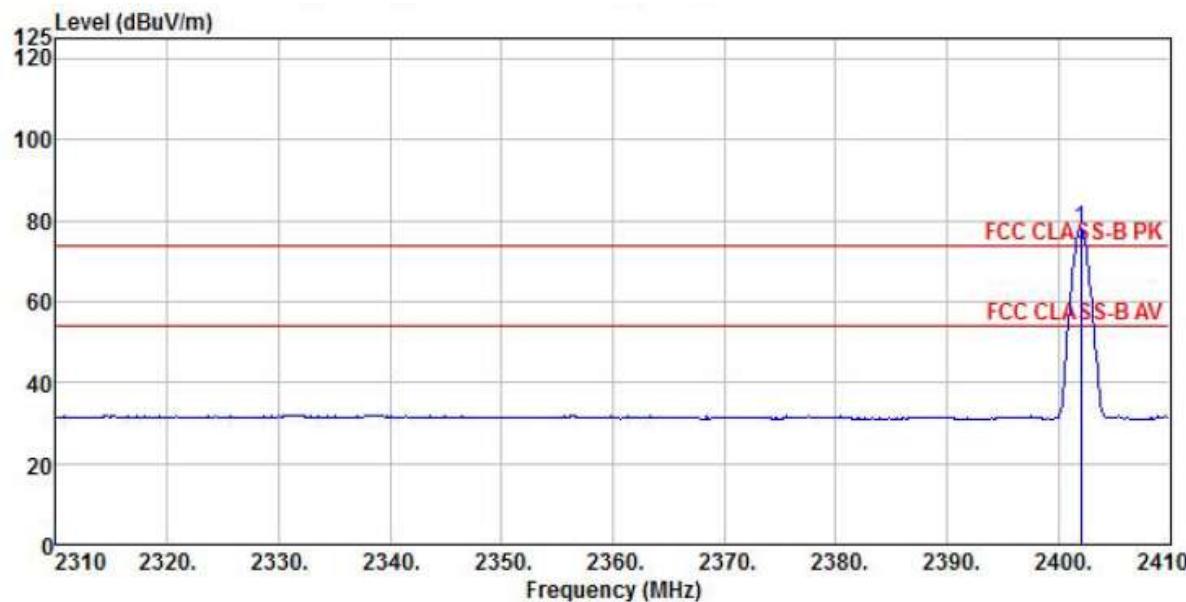
Memo :

	ReadAntenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m

1 pp	2402.20	99.72	27.54	7.13	38.34	96.05	74.00	22.05	Peak
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Detector mode: Average

Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

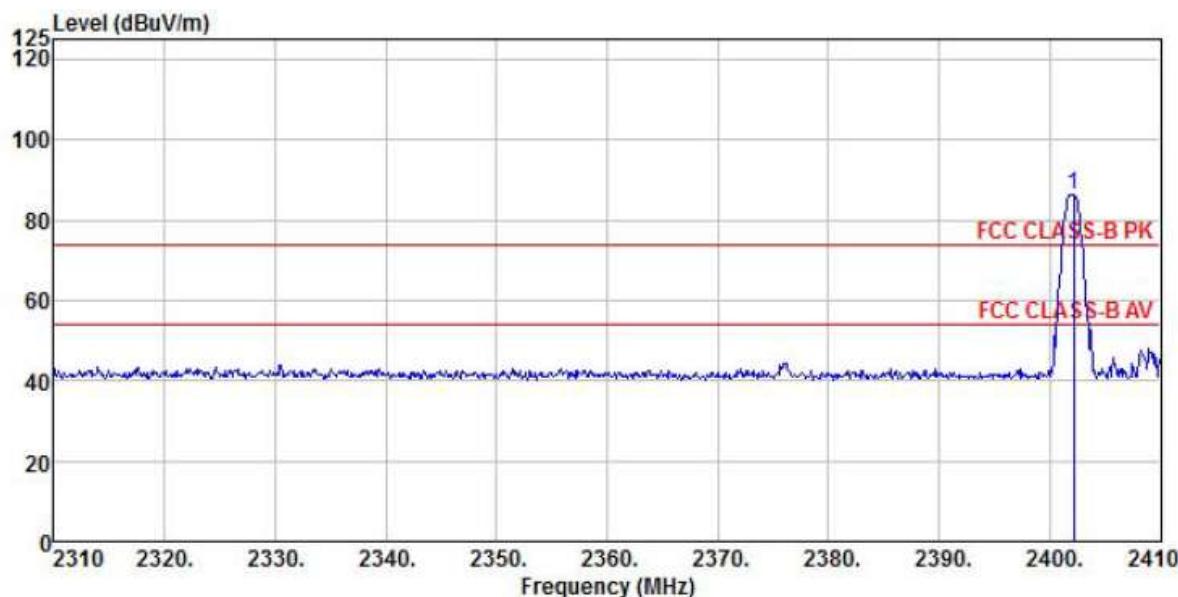
Mode : GFSK CH0

Memo :

Freq	ReadAntenna	Cable	Preamp	Limit	Over	Limit	Remark
	Level	Factor	Loss				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pp	2402.00	81.69	27.54	7.13	38.34	78.02	54.00 24.02 Average

Detector mode: Peak

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

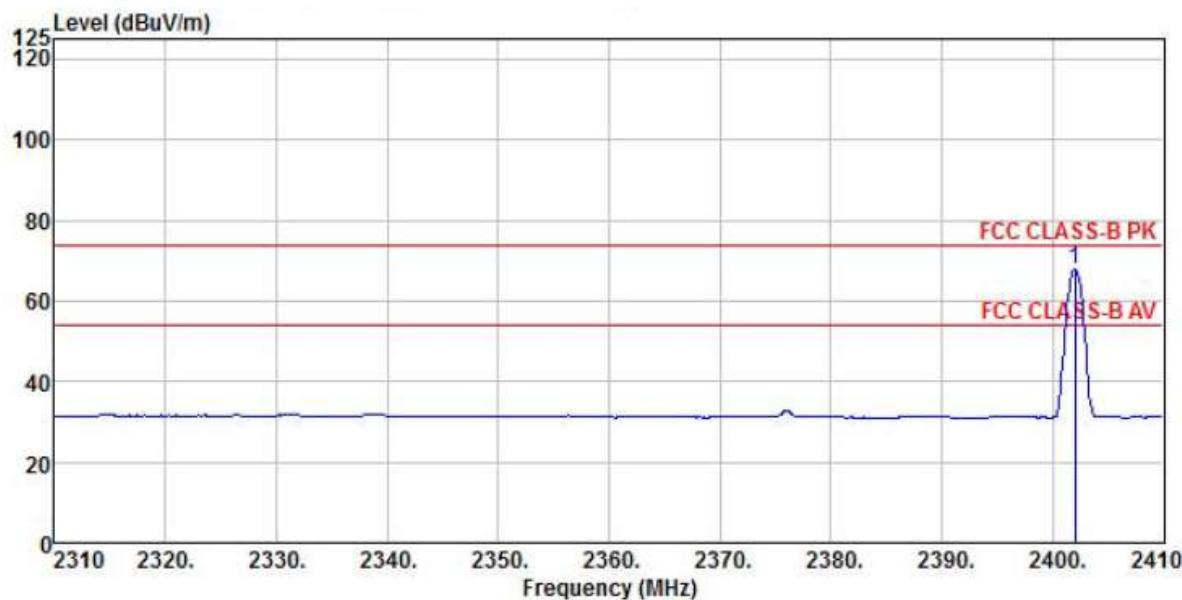
Mode : GFSK CH0

Memo :

Freq	Read	Antenna	Cable	Preamp	Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2402.20	90.11	27.54	7.13	38.34	86.44	74.00	12.44 Peak

Detector mode: Average

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : GFSK CH0

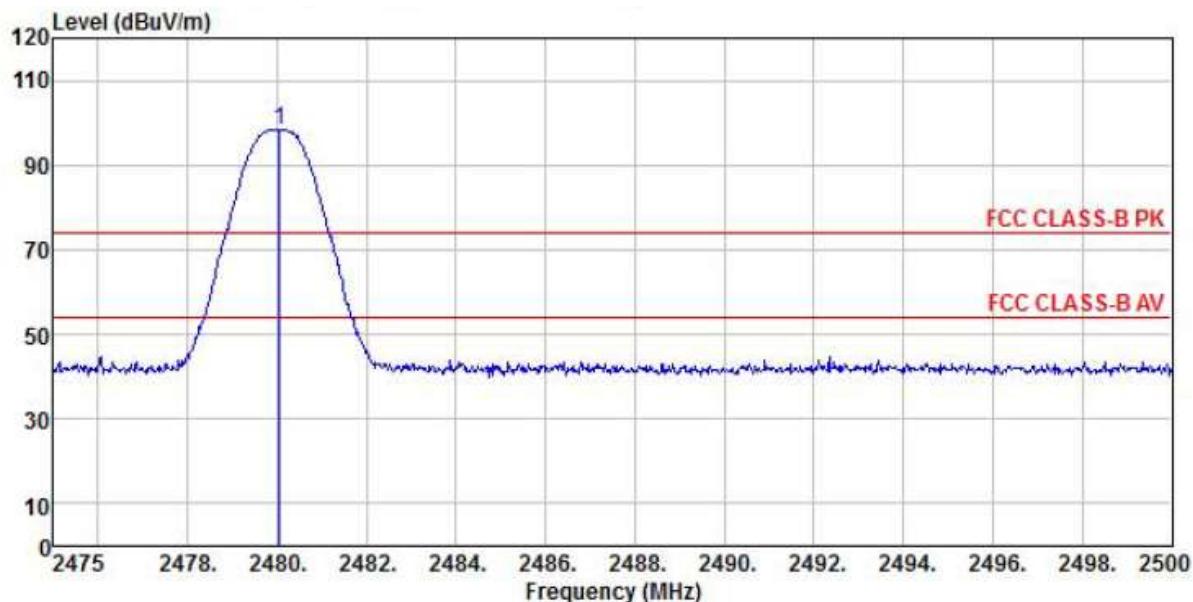
Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2402.00	71.62	27.54	7.13	38.34	67.95	54.00	13.95 Average

BT GFSK (Ch78)

Detector mode: Peak

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

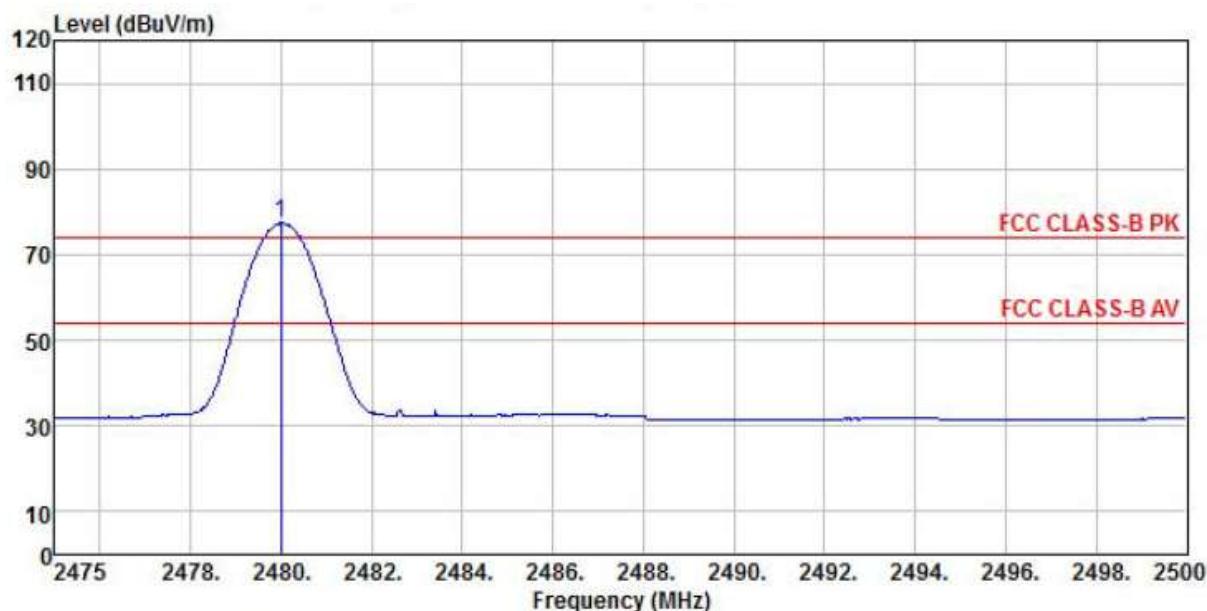
Mode : GFSK CH78

Memo :

	ReadAntenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1 pp	2480.05	101.72	27.52	7.41	38.31	98.34
					74.00	24.34
						Peak

Detector mode: Average

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

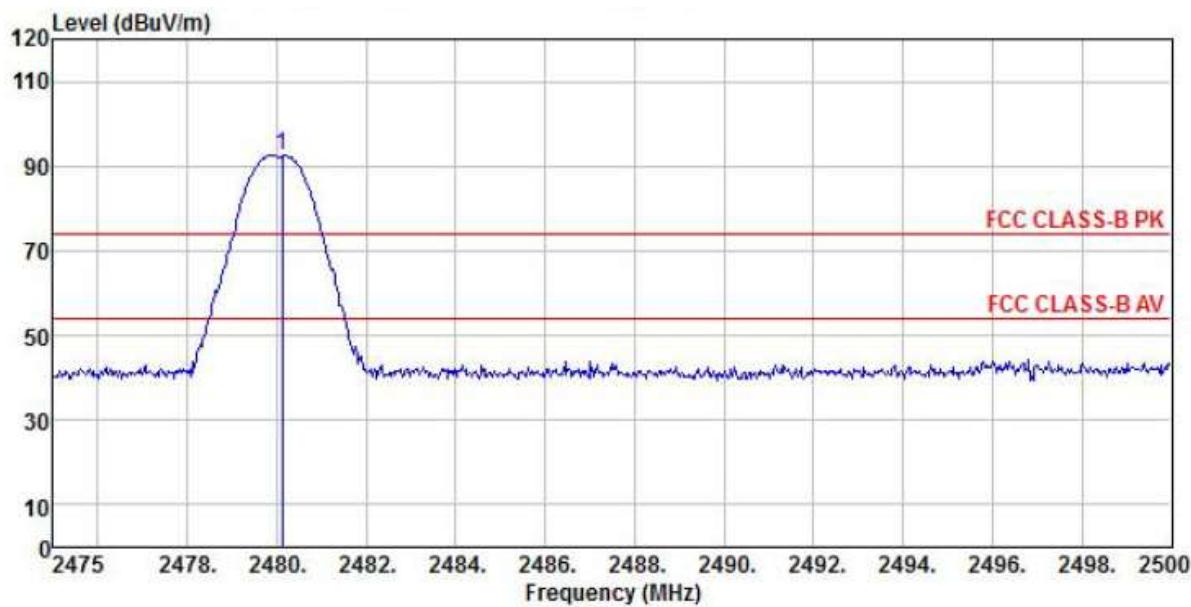
Mode : GFSK CH78

Memo :

	ReadAntenna Freq	Cable Level	Preamp Factor	Limit Loss Factor	Line Level	Over dBuV/m	Limit dBuV/m	Over dB	Remark
1 pp	2480.00	80.67	27.52	7.41	38.31	77.29	54.00	23.29	Average

Detector mode: Peak

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

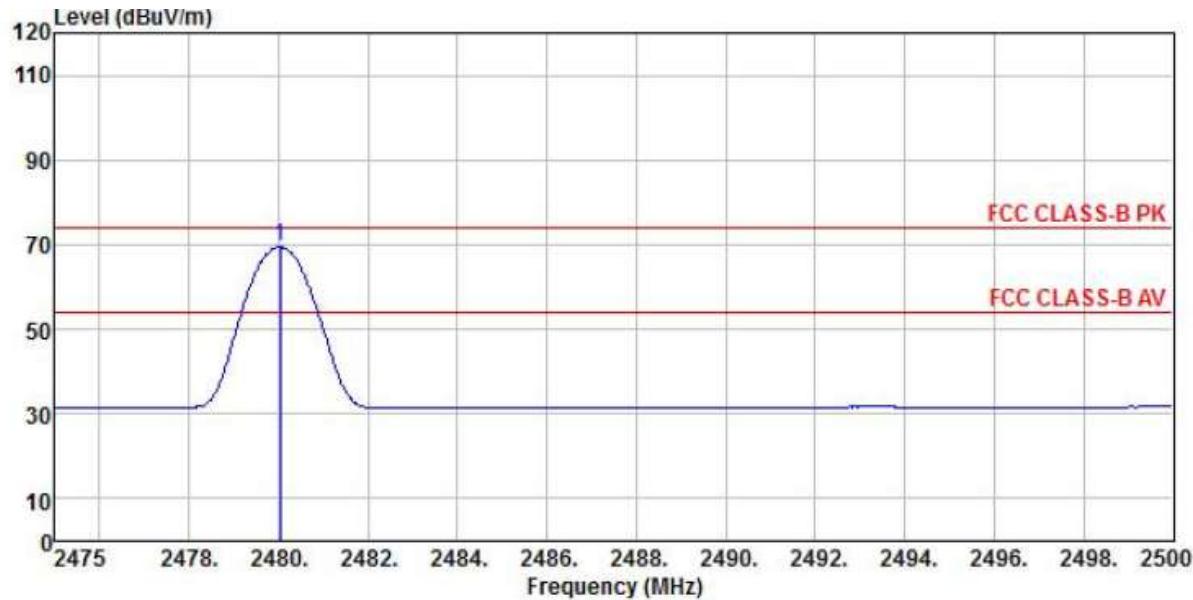
Mode : GFSK CH78

Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Limit	Remark
	MHz	dBuV	Level Factor	Loss Factor				
1 pp	2480.11	95.72	27.52	7.41	38.31	92.34	74.00	18.34 Peak

Detector mode: Average

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : GFSK CH78

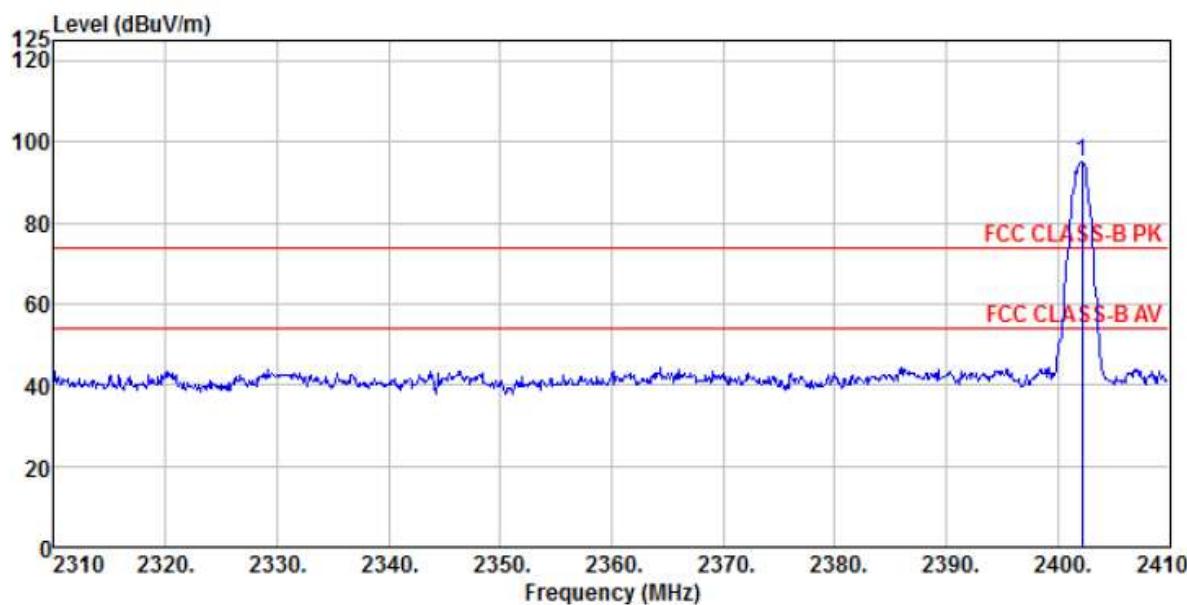
Memo :

Freq	ReadAntenna		Cable Preamp		Limit Level	Limit Line	Over Limit	Remark
	MHz	dBuV	Level Factor	Loss Factor	dB	dBuV/m	dBuV/m	dB
1 pp	2480.03	72.82	27.52	7.41	38.31	69.44	54.00	15.44 Average

BT $\Pi/4$ -DQPSK(Ch0)

Detector mode: Peak

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

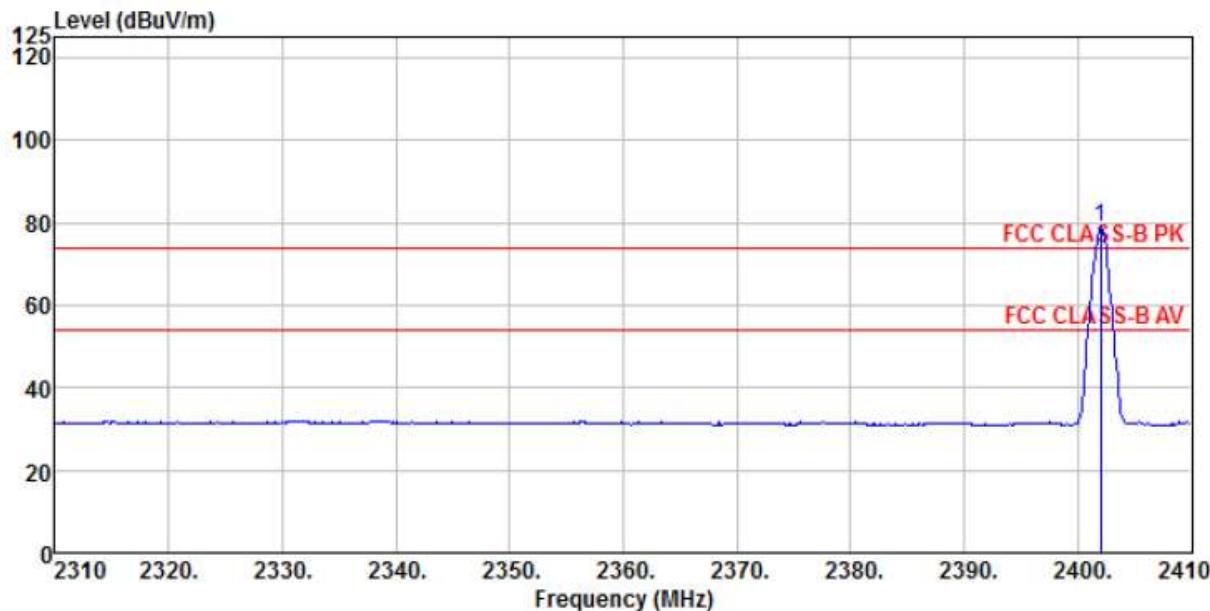
Mode : Pi/4-DPSK CH0

Memo :

Freq	ReadAntenna		Cable		Preamp	Limit	Over	Line	Limit	Remark
	Level	Factor	Loss	Factor						
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	dB	
1 pp	2402.20	98.72	27.54	7.13	38.34	95.05	74.00	21.05	Peak	

Detector mode: Average

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

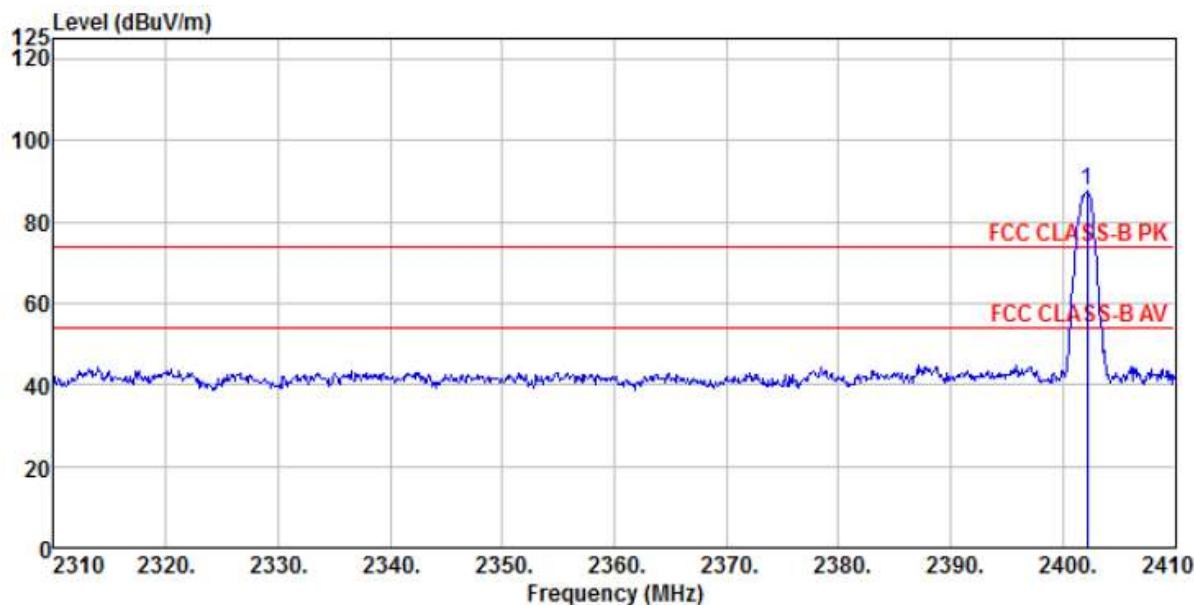
Mode : Pi/4-DPSK CH0

Memo :

Freq	ReadAntenna		Cable Preamp		Limit Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pp	2402.00	82.69	27.54	7.13	38.34	79.02	54.00	25.02 Average

Detector mode: Peak

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

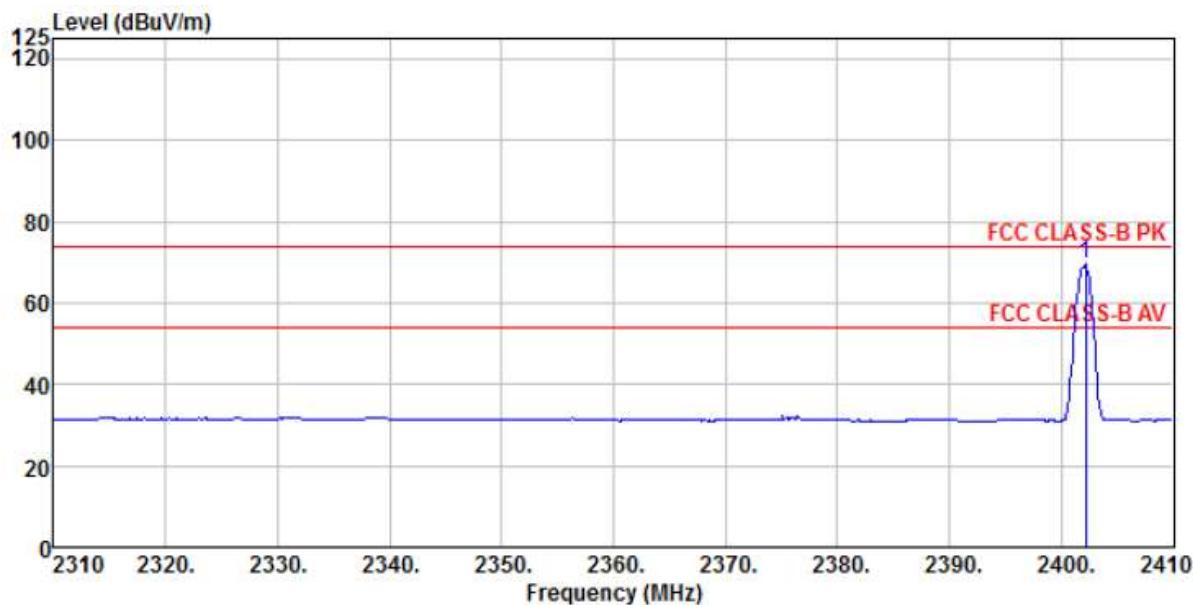
Mode : Pi/4-DPSK CH0

Memo :

Freq	ReadAntenna		Cable		Preamp		Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 pp	2402.20	91.11	27.54	7.13	38.34	87.44	74.00	13.44	Peak	

Detector mode: Average

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : Pi/4-DPSK CH0

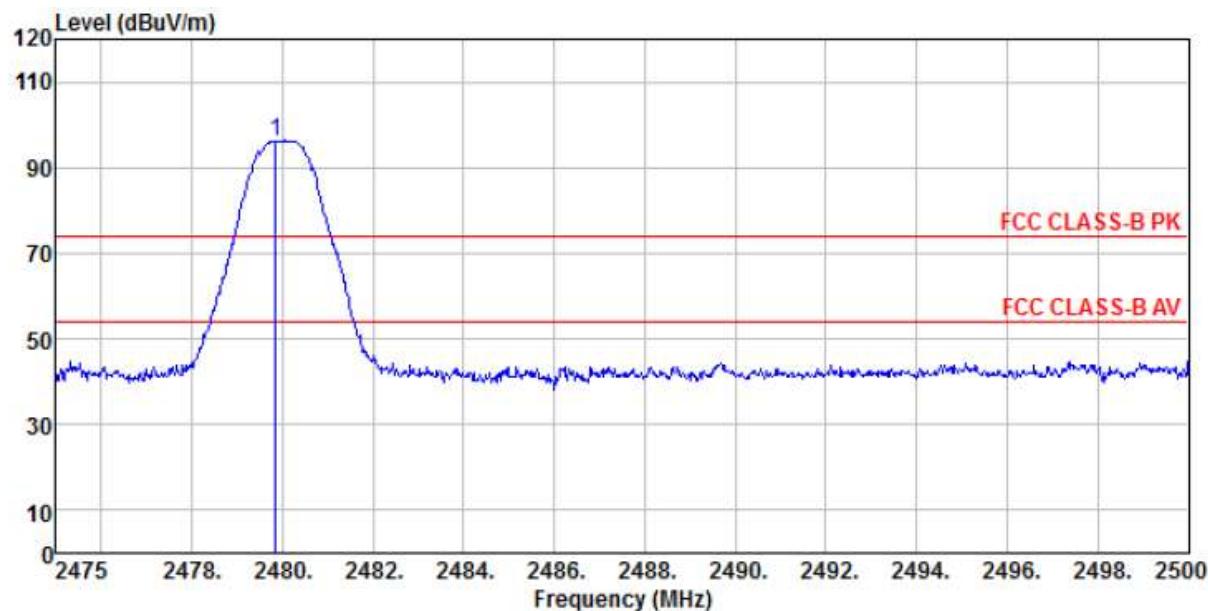
Memo :

Freq	ReadAntenna		Cable		Preamp		Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor	Level	dBuV/m				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	dB	
1 pp	2402.20	73.20	27.54	7.13	38.34	69.53	54.00	15.53	Average	

BT $\pi/4$ -DQPSK(Ch78)

Detector mode: Peak

Polarity: Horizontal



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

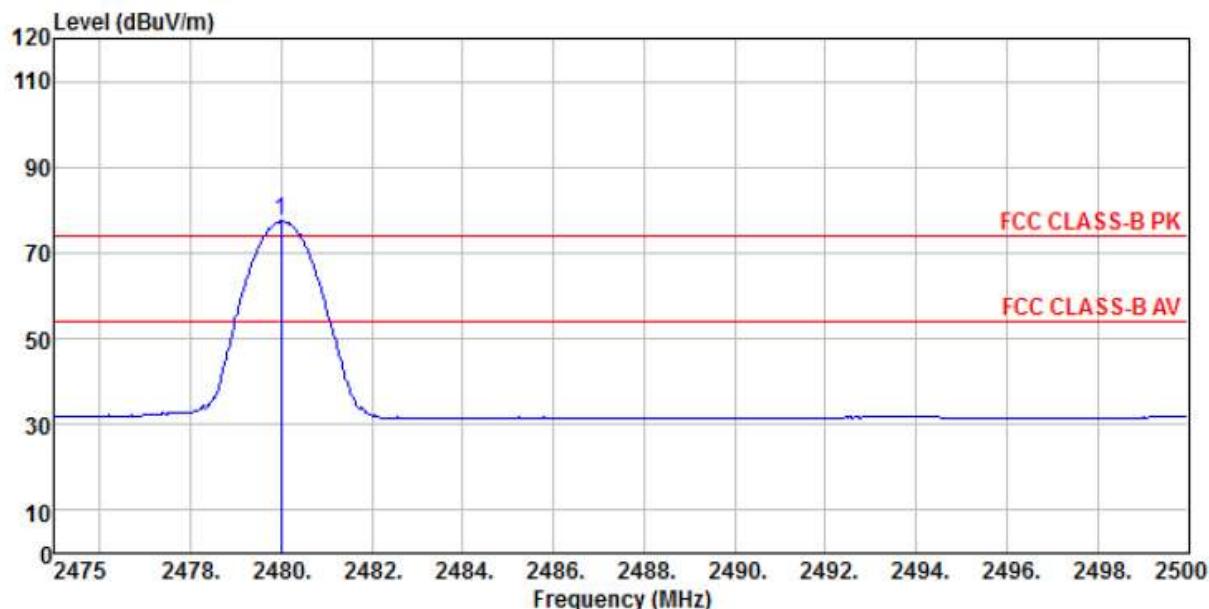
Mode : $\pi/4$ -DPSK CH78

Memo :

	ReadAntenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit
	MHz	dBuV	dB/m	dB	dB	dBuV/m
1 pp	2479.85	99.68	27.52	7.41	38.31	96.30
					74.00	22.30 Peak

Detector mode: Average

Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

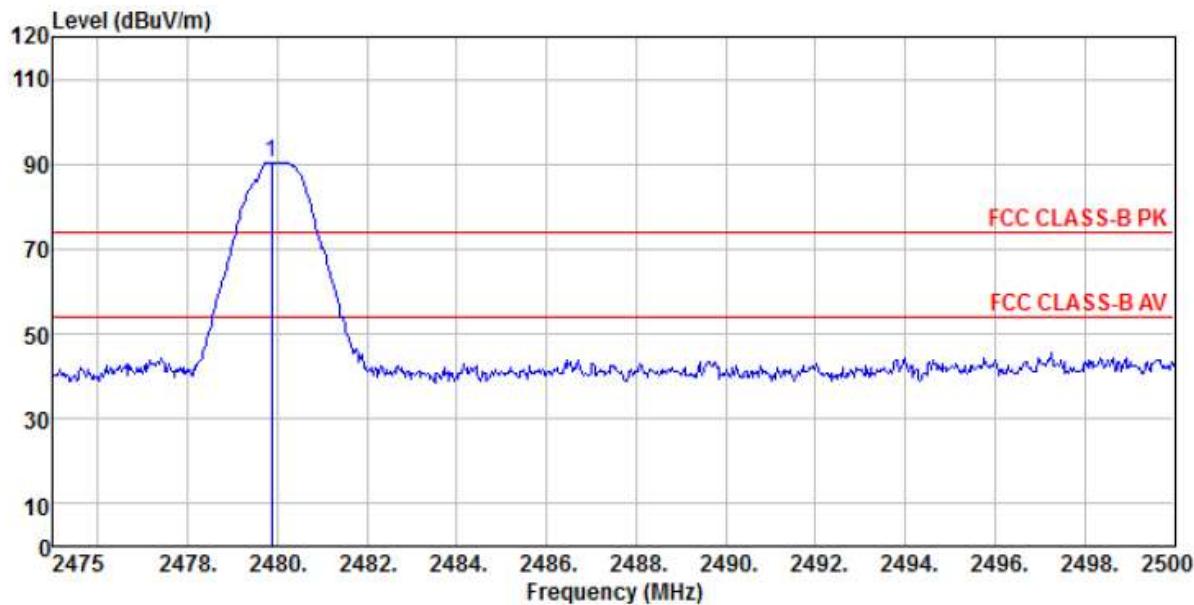
Mode : Pi/4-DPSK CH78

Memo :

Freq	ReadAntenna		Cable		Preamp Loss Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB					
1 pp	2480.00	80.67	27.52	7.41	38.31	77.29	54.00	23.29	Average

Detector mode: Peak

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

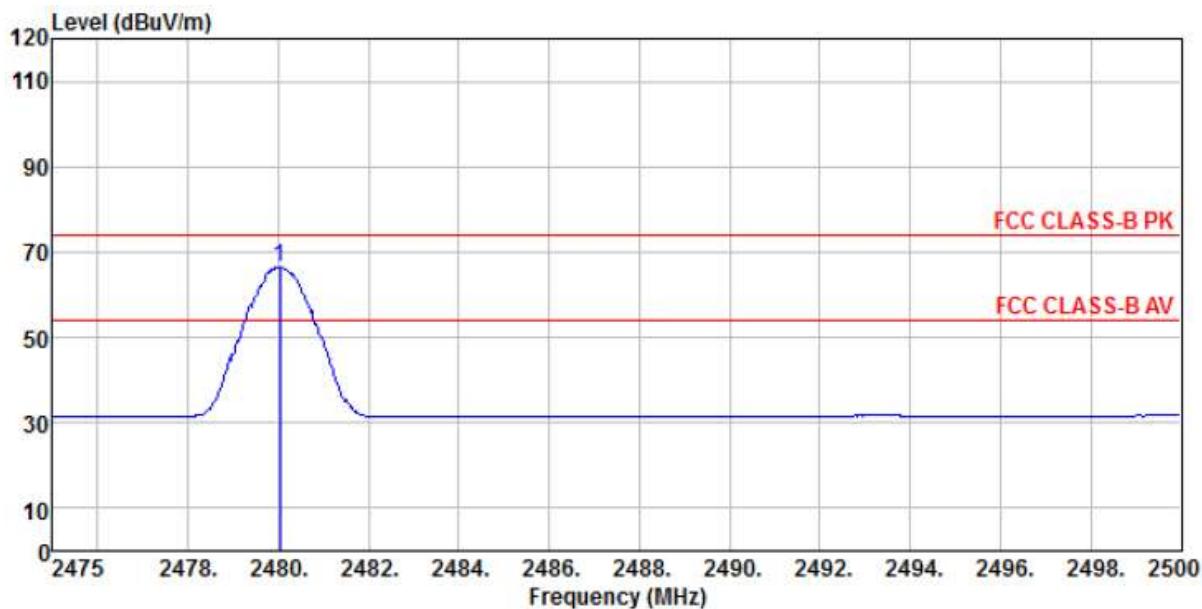
Mode : Pi/4-DPSK CH78

Memo :

Freq	ReadAntenna		Cable		Preamp		Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 pp	2479.87	93.84	27.52	7.41	38.31	90.46	74.00	16.46	Peak	

Detector mode: Average

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : Pi/4-DPSK CH78

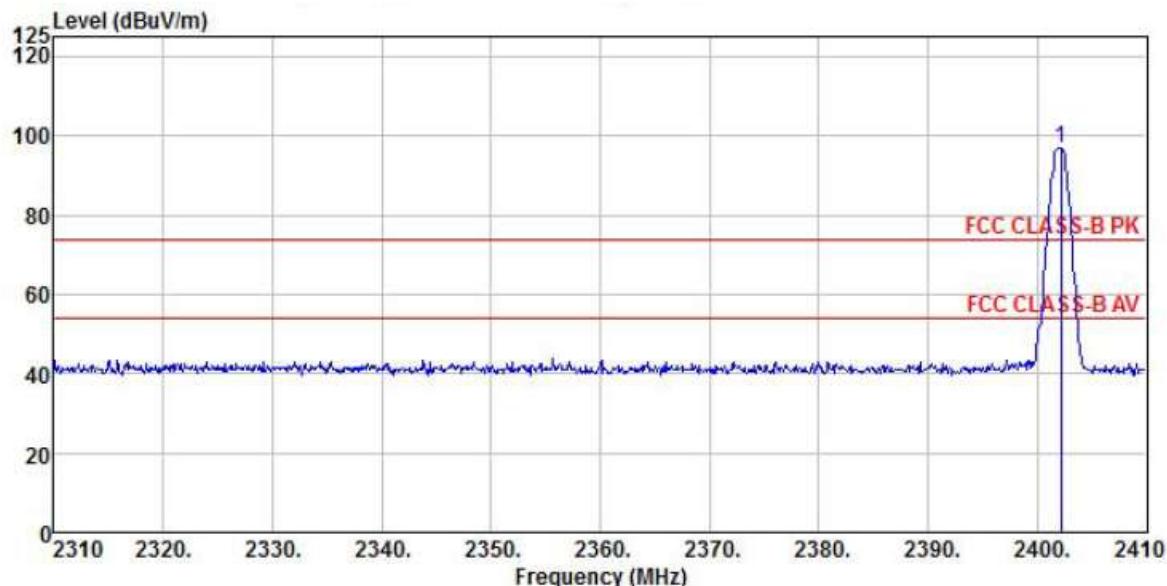
Memo :

Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Remark
	Level	Factor	Loss	Factor				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2480.03	69.82	27.52	7.41	38.31	66.44	54.00	12.44 Average

BT 8-DPSK (Ch0)

Detector mode: Peak

Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH0

Memo :

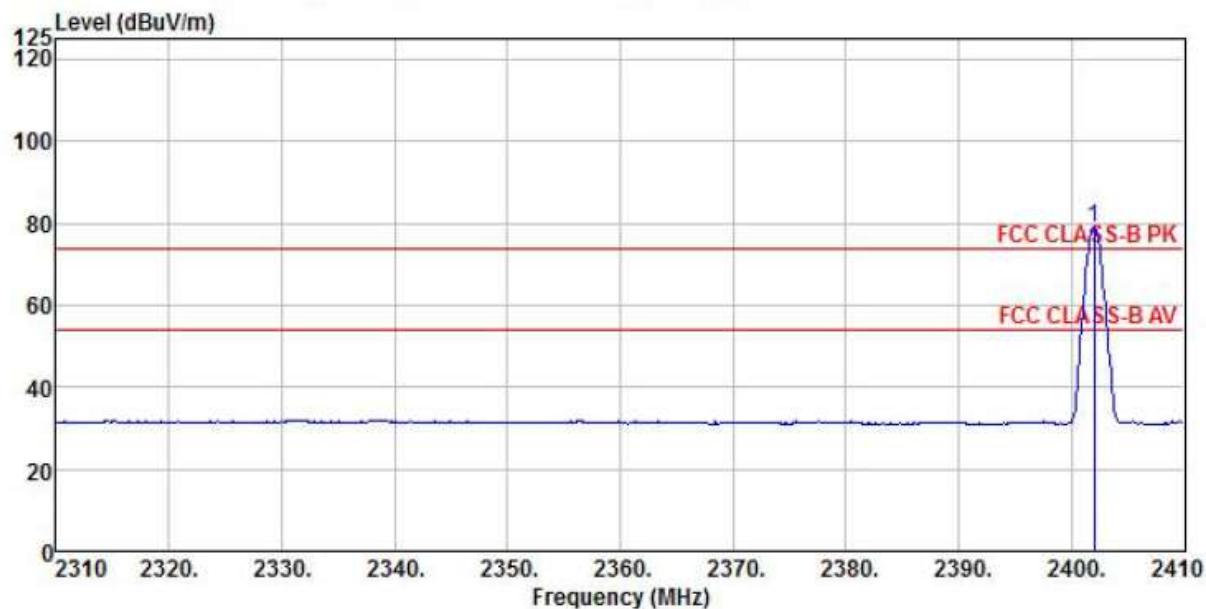
Read	Antenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark

MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
-----	------	------	----	----	--------	--------	----	--

1 pp	2402.20	100.72	27.54	7.13	38.34	97.05	74.00	23.05 Peak
------	---------	--------	-------	------	-------	-------	-------	------------

Detector mode: Average

Polarity: Horizontal

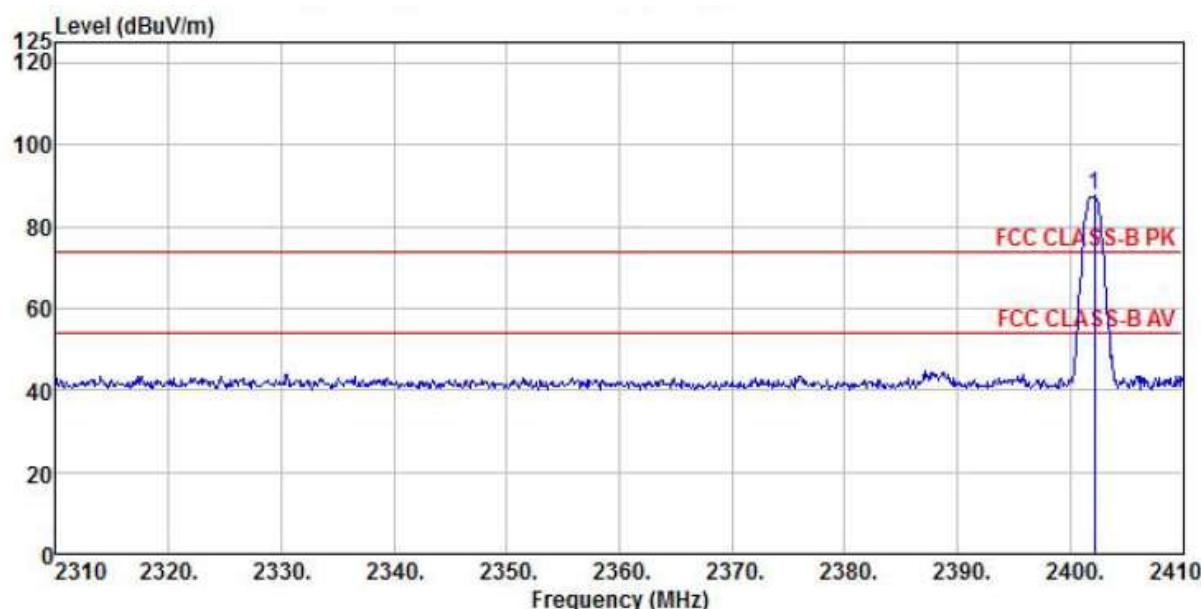


Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : 8DPSK CH0
Memo :

Freq	ReadAntenna		Cable		Preamp Loss Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB					
1 pp	2402.00	82.69	27.54	7.13	38.34	79.02	54.00	25.02	Average

Detector mode: Peak

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

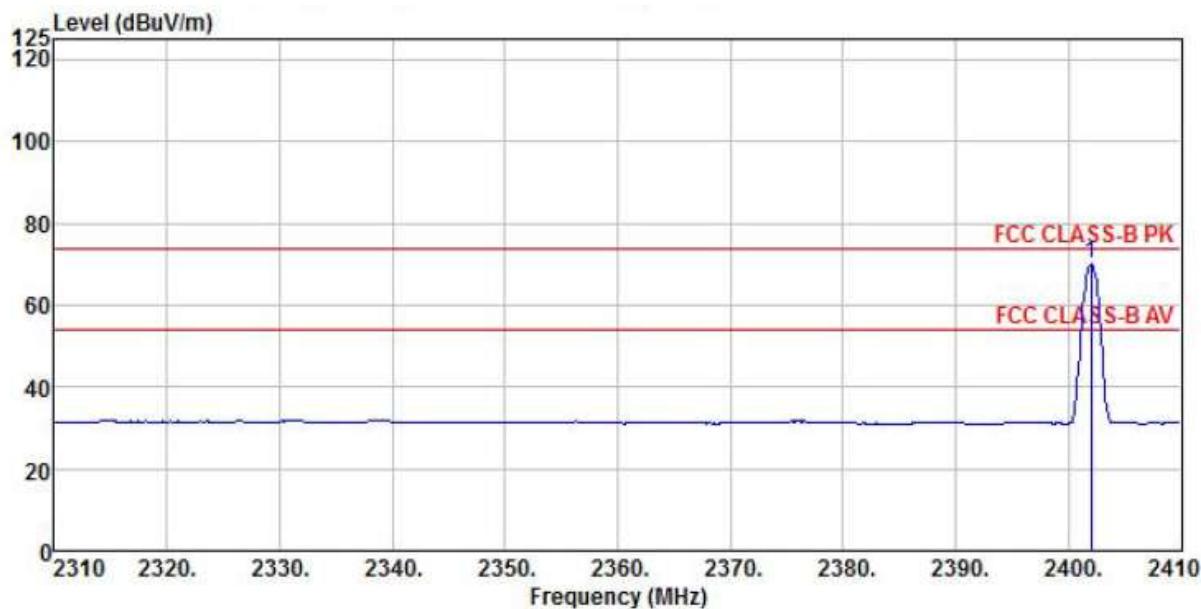
Mode : 8DPSK CH0

Memo :

Freq	ReadAntenna		Cable		Preamp	Limit	Over	Line	Limit	Remark
	Level	Factor	Loss	Factor						
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	dB	dB
1 pp	2402.20	91.11	27.54	7.13	38.34	87.44	74.00	13.44	Peak	

Detector mode: Average

Polarity: Vertical



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH0

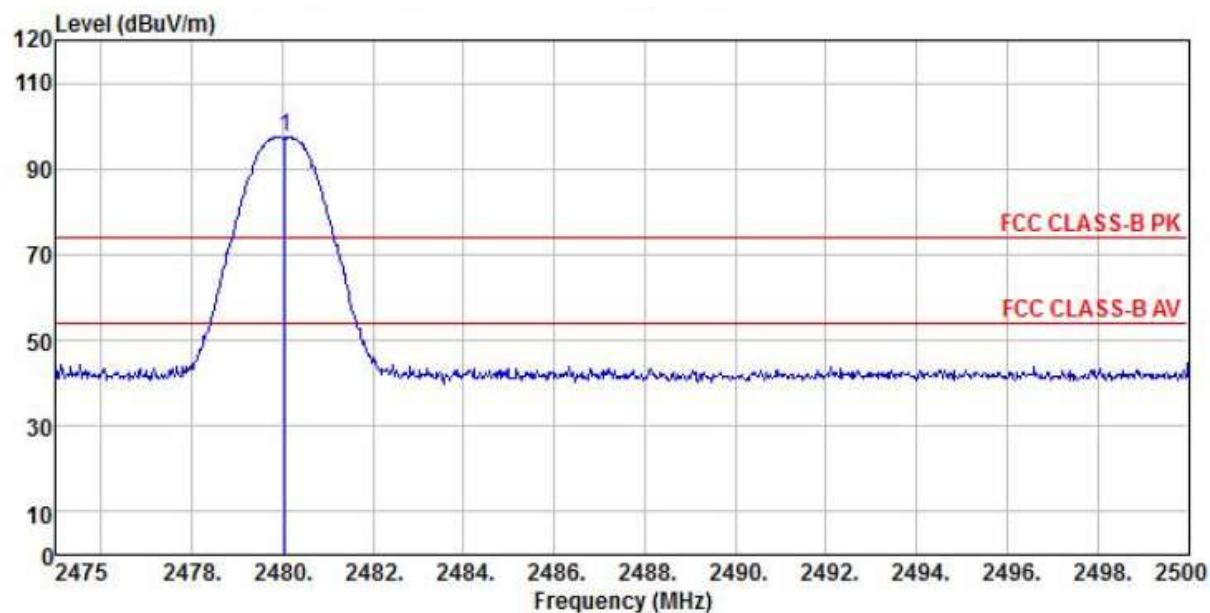
Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Remark
	Level	Factor	Loss	Factor			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pp	2402.00	73.62	27.54	7.13	38.34	69.95	54.00 15.95 Average

BT 8-DPSK (Ch78)

Detector mode: Peak

Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH78

Memo :

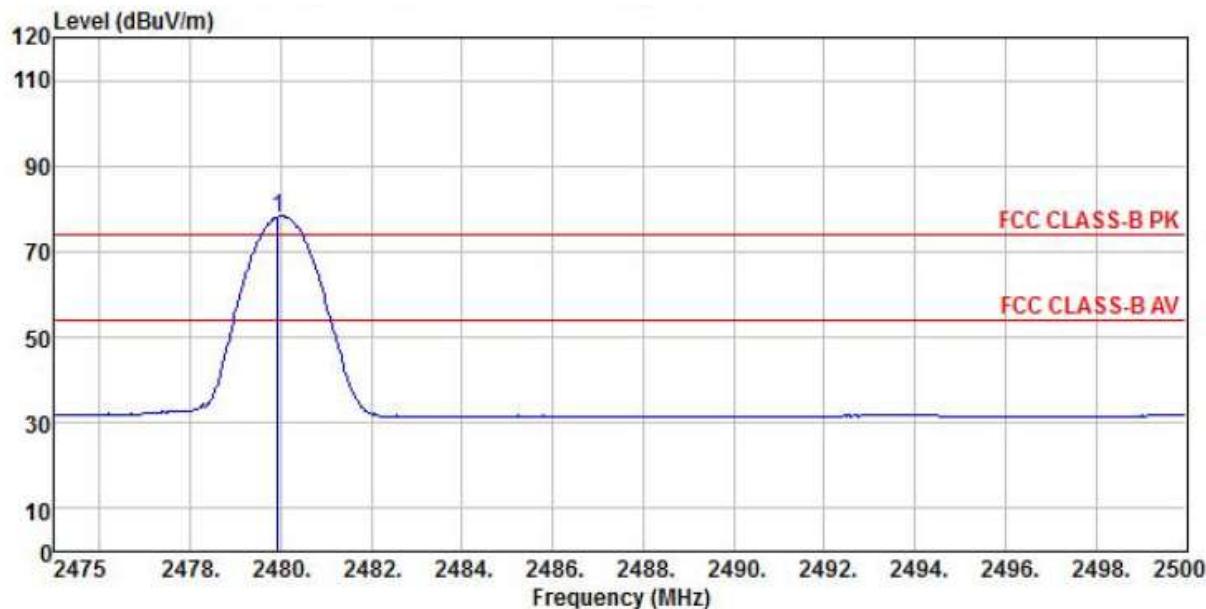
	ReadAntenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Level	Line	Limit	Remark

MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
-----	------	------	----	----	--------	--------	----

1 pp	2480.05	100.72	27.52	7.41	38.31	97.34	74.00	23.34 Peak
------	---------	--------	-------	------	-------	-------	-------	------------

Detector mode: Average

Polarity: Horizontal



Site : chamber
Condition : FCC CLASS-B PK 3m BBHA9120D(943) HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH78

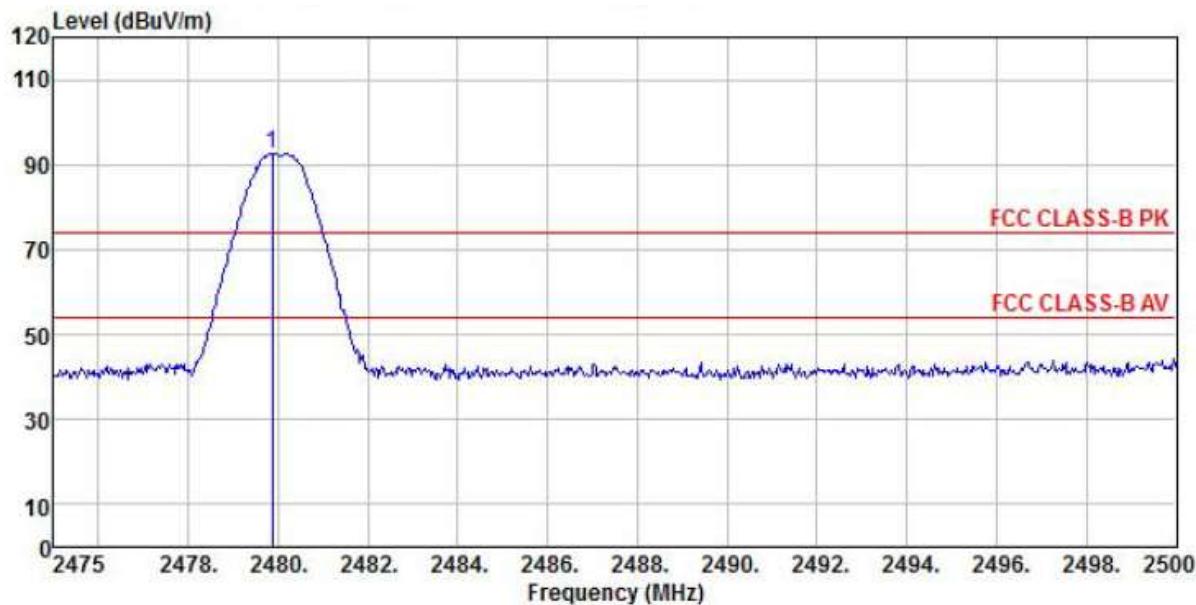
Memo :

Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Preamp Factor	Limit Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	

1 pp	2479.93	81.52	27.52	7.41	38.31	78.14	54.00	24.14 Average
------	---------	-------	-------	------	-------	-------	-------	---------------

Detector mode: Peak

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH78

Memo :

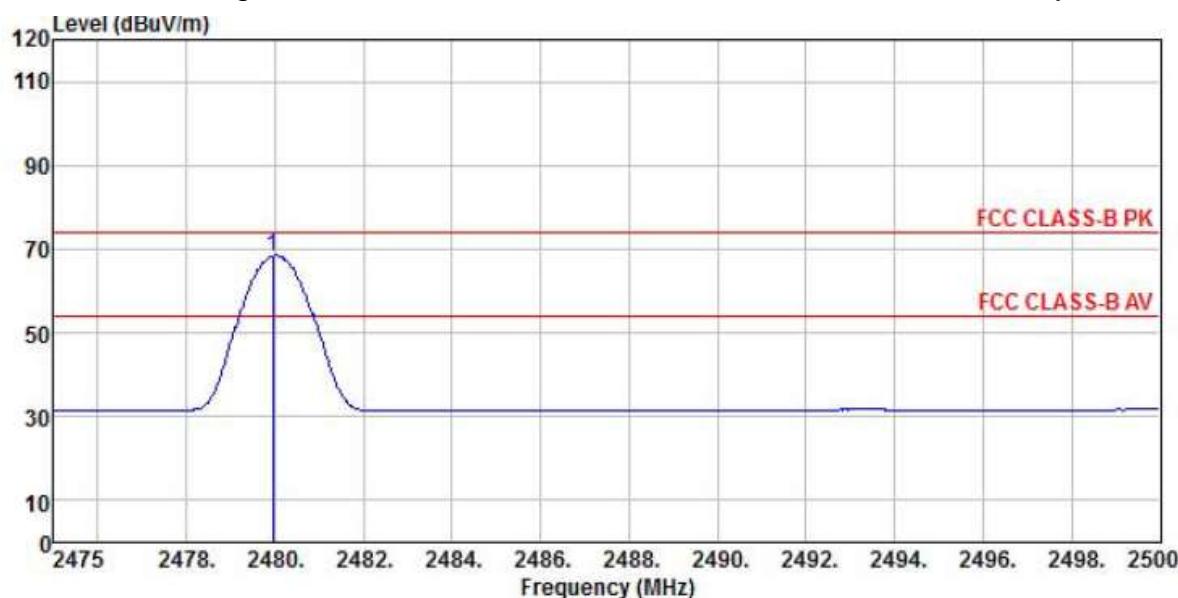
Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Limit Factor	Limit Level	Line Level	Over Limit	Remark
------	-------------------	--------------	-------------	--------------	-------------	------------	------------	--------

MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
-----	------	------	----	----	--------	--------	----	--

1 pp	2479.87	95.84	27.52	7.41	38.31	92.46	74.00	18.46 Peak
------	---------	-------	-------	------	-------	-------	-------	------------

Detector mode: Average

Polarity: Vertical



Site : chamber

Condition : FCC CLASS-B PK 3m BBHA9120D(943) VERTICAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

Power Rating: AC 120V/60Hz

Mode : 8DPSK CH78

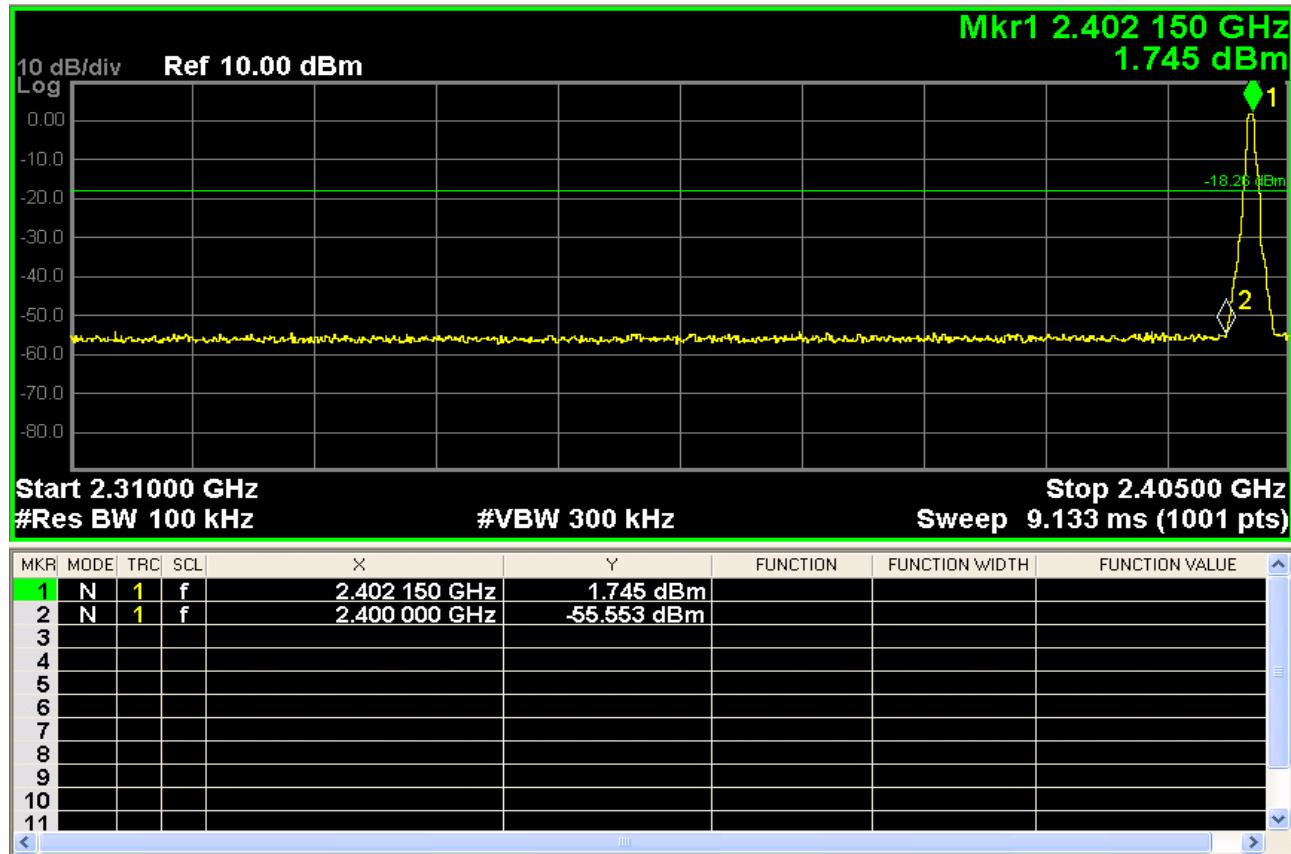
Memo :

	ReadAntenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit

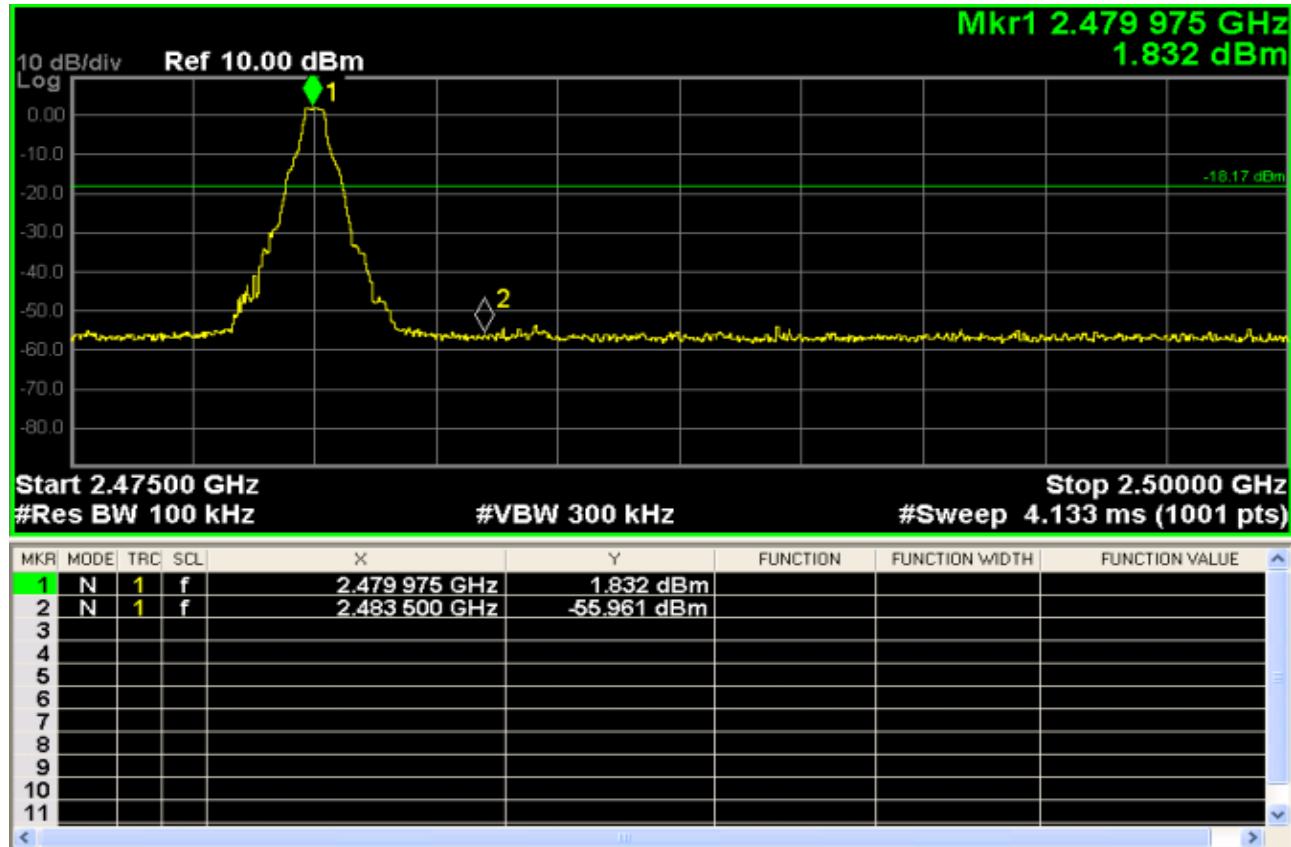
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 pp	2479.95	71.73	27.52	7.41	38.31	68.35	54.00	14.35	Average

Conducted Band Edge:

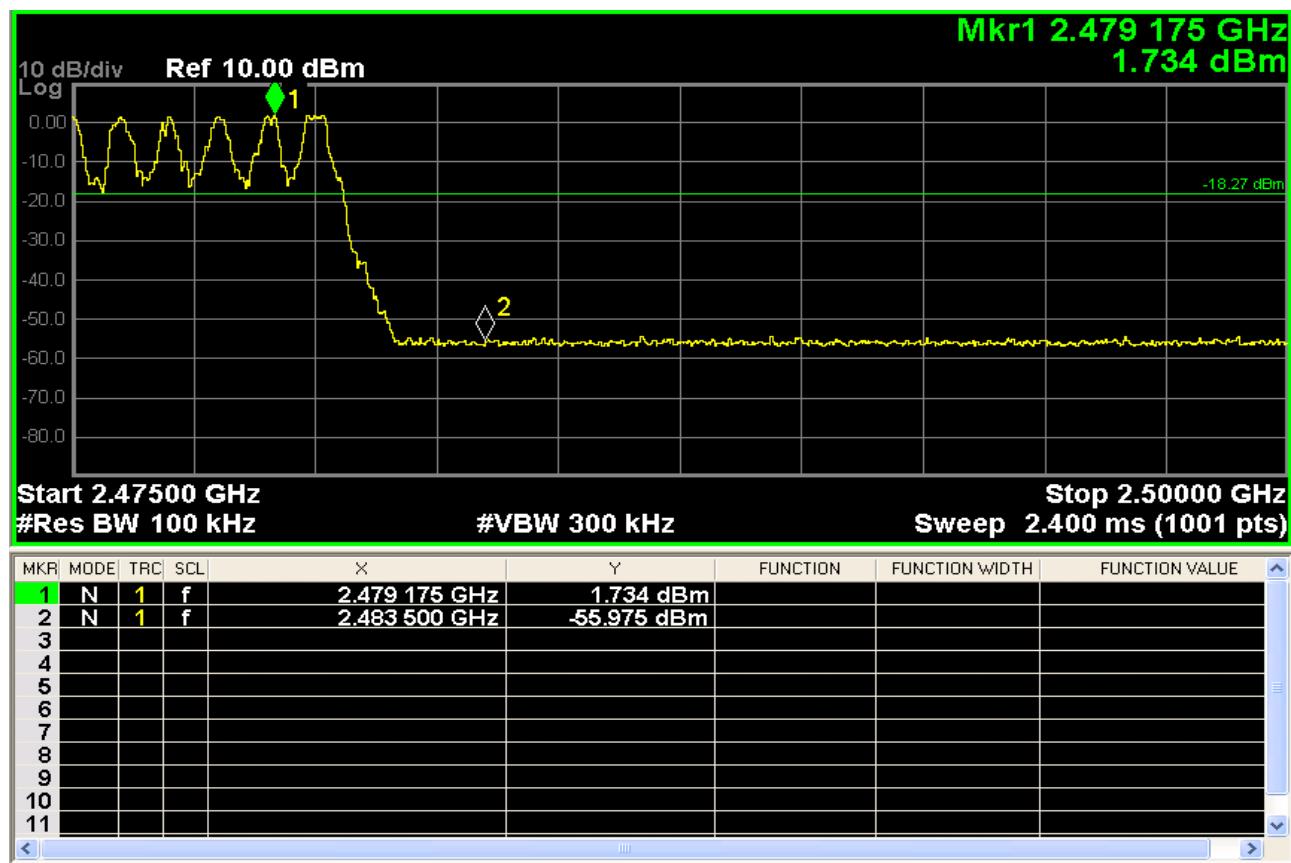
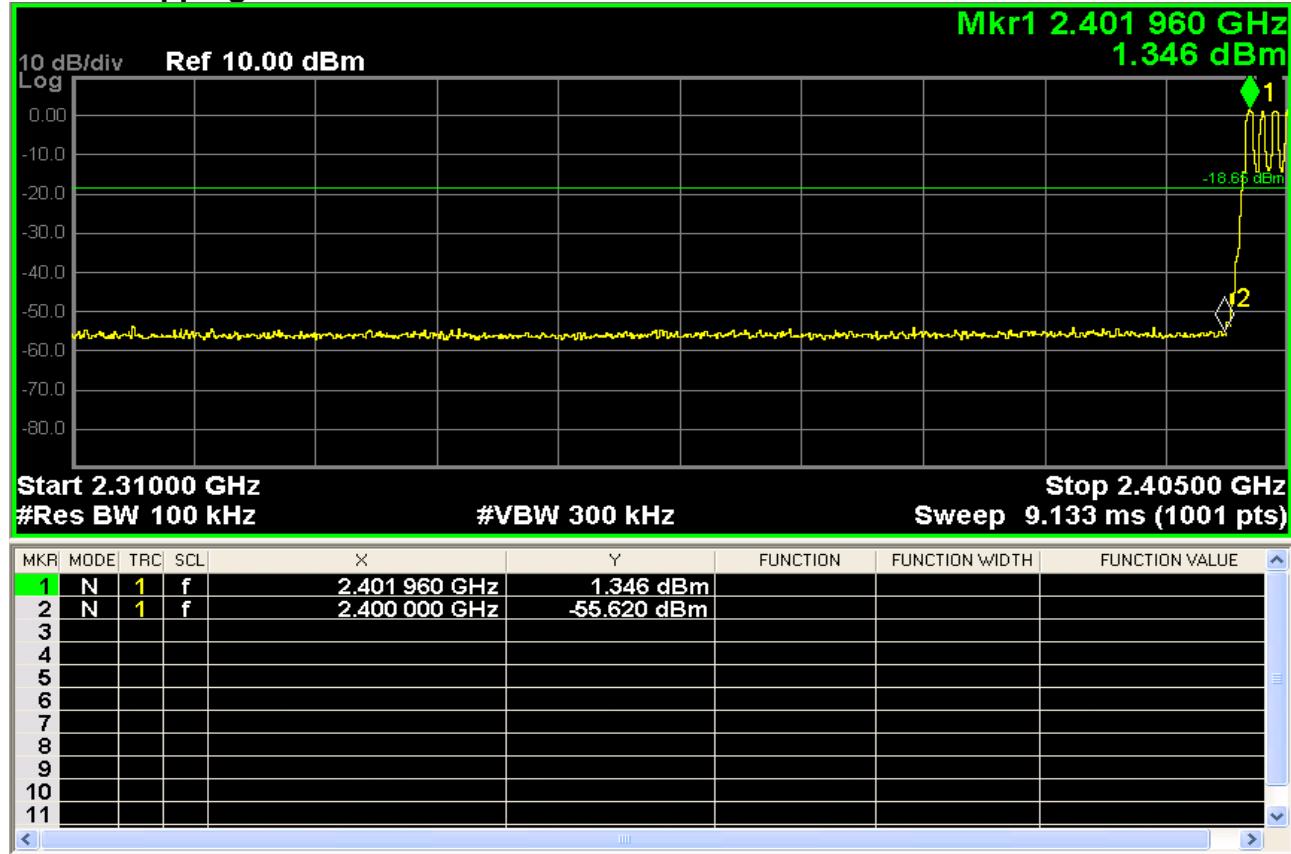
GFSK CH0



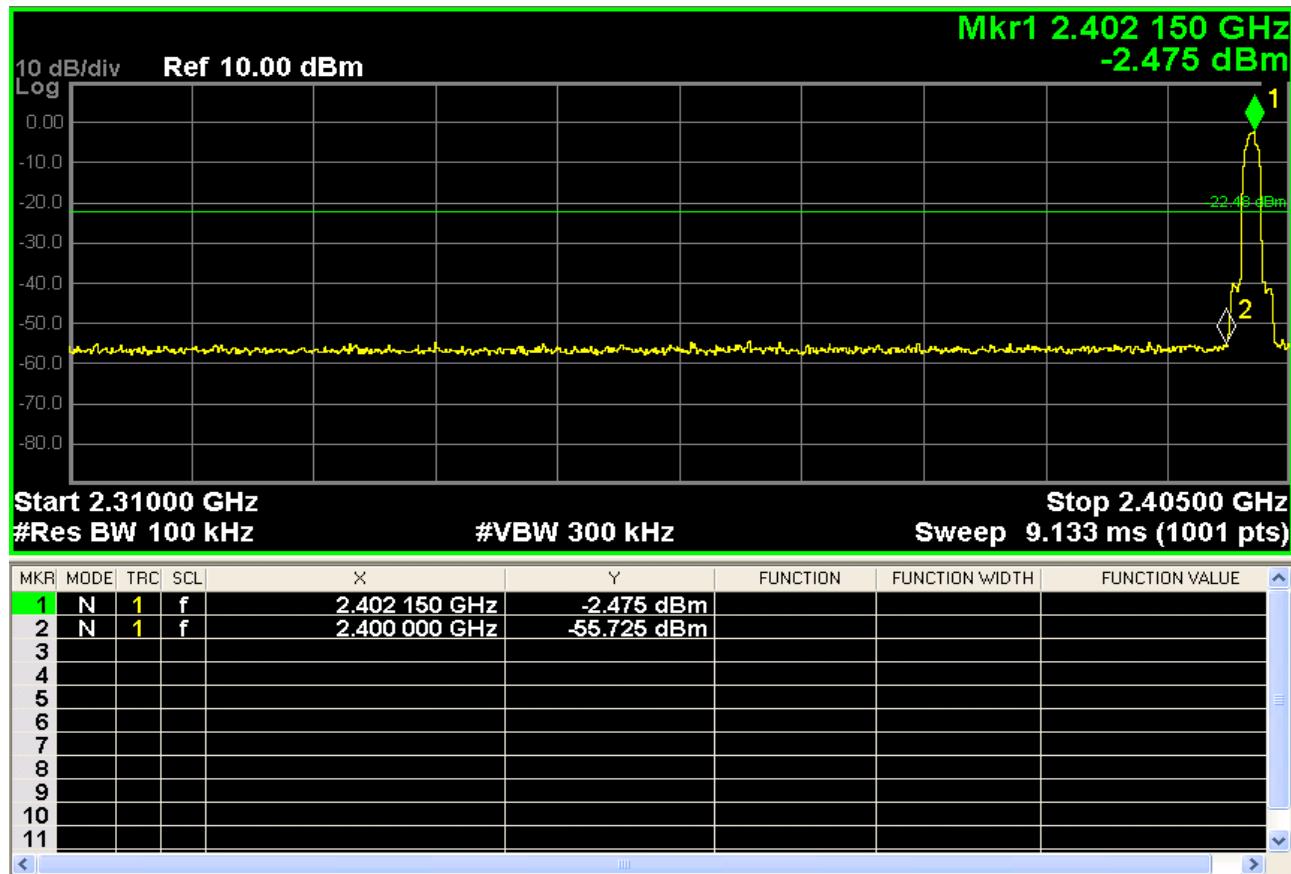
GFSK CH78



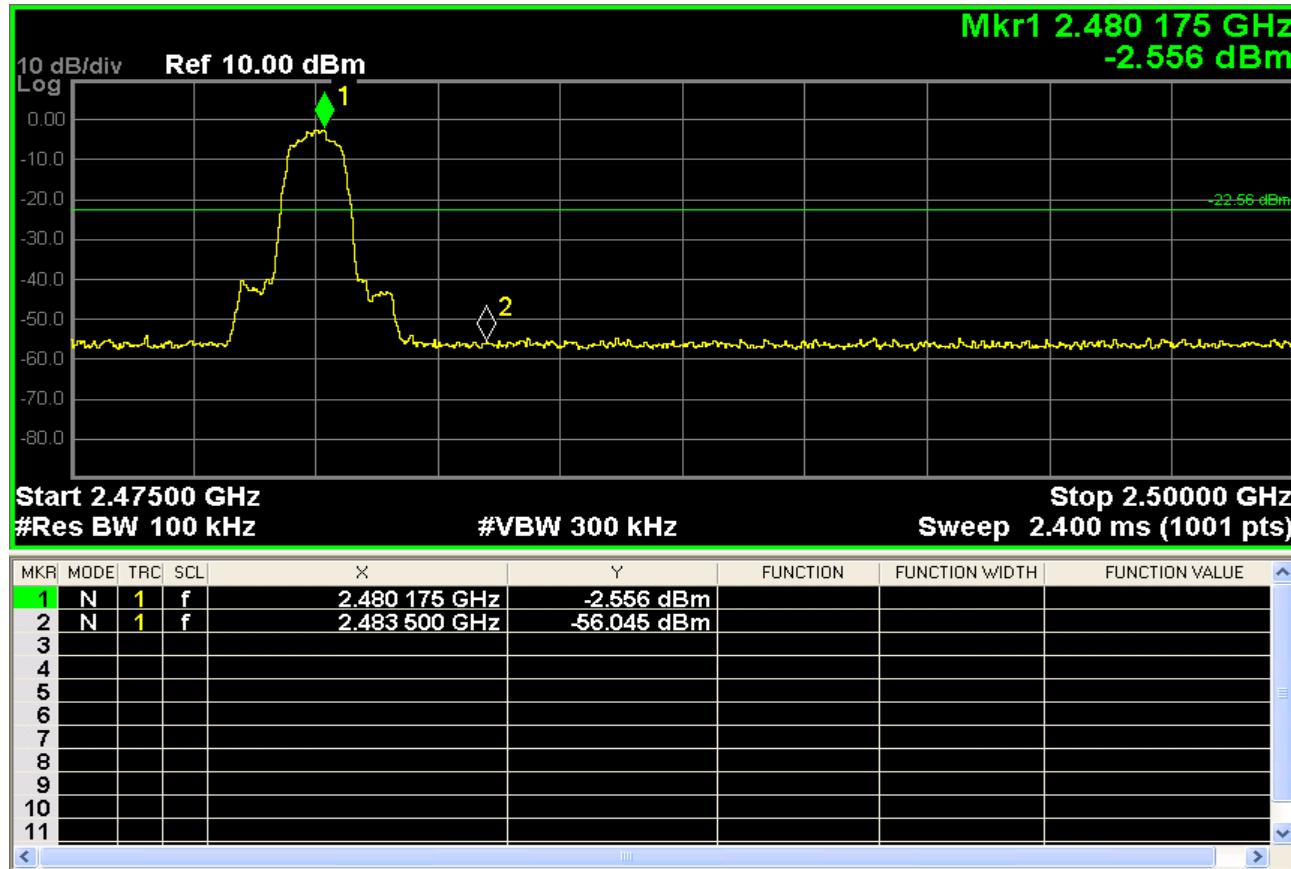
GFSK (Hopping Mode)



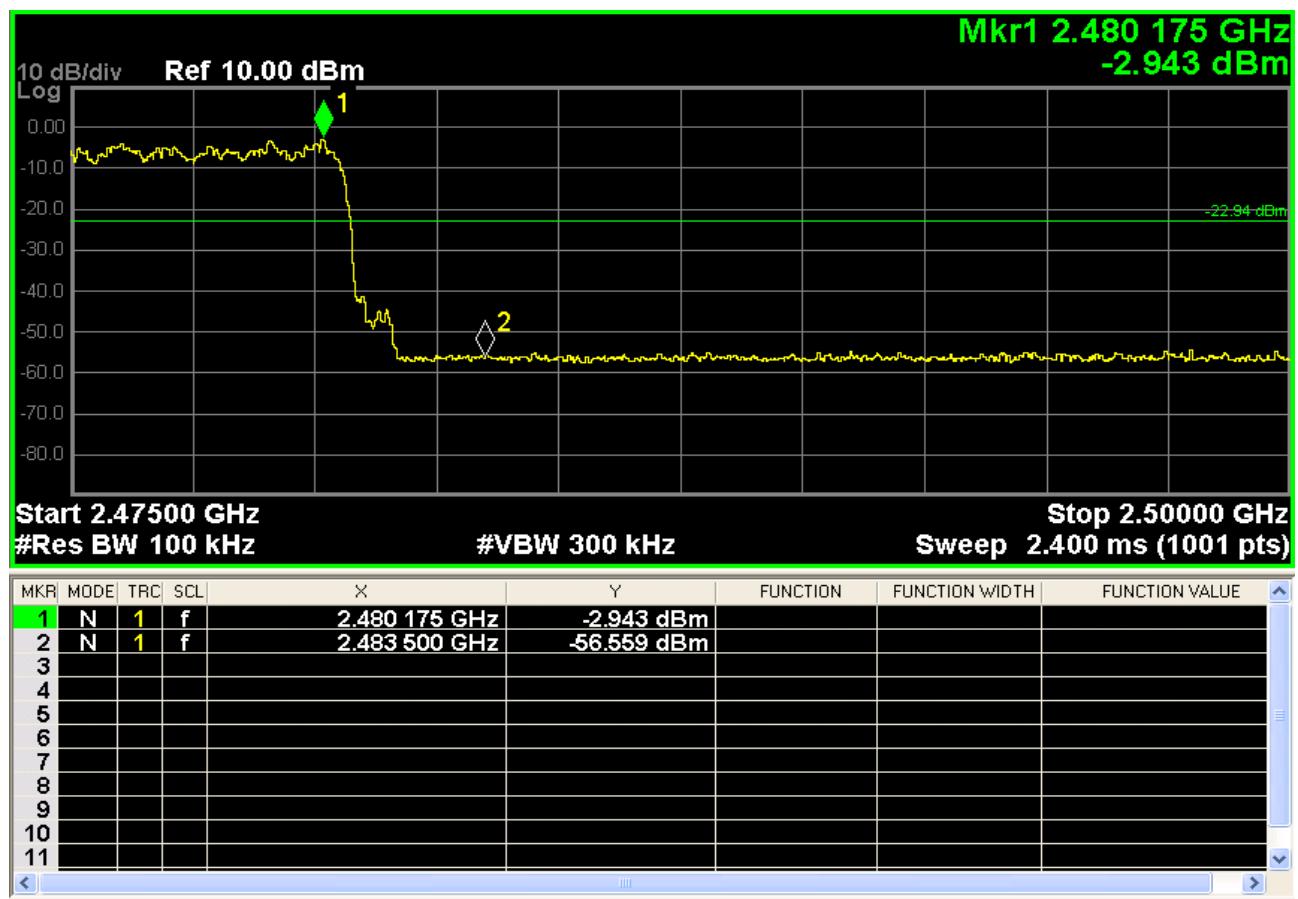
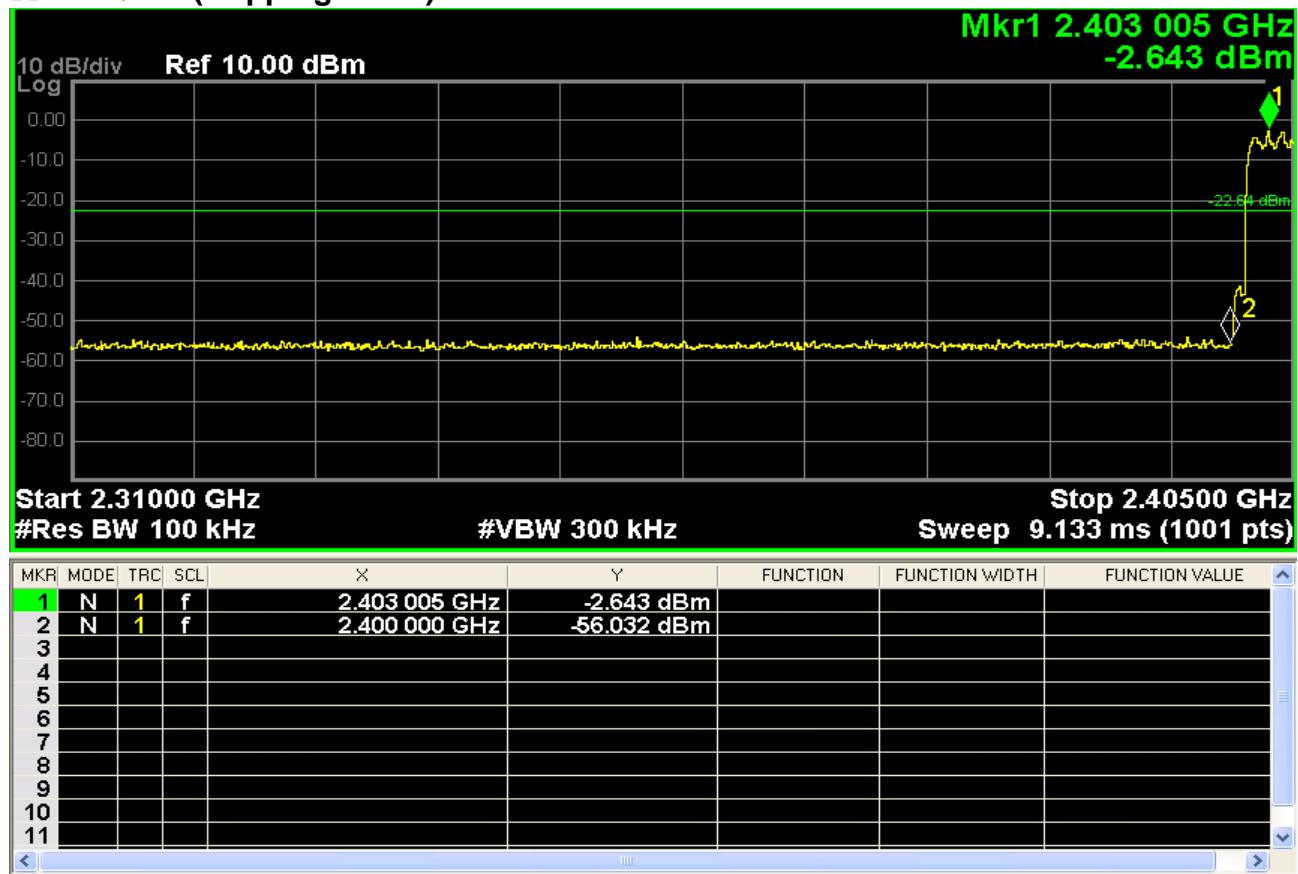
Π/4-DQPSK CH0



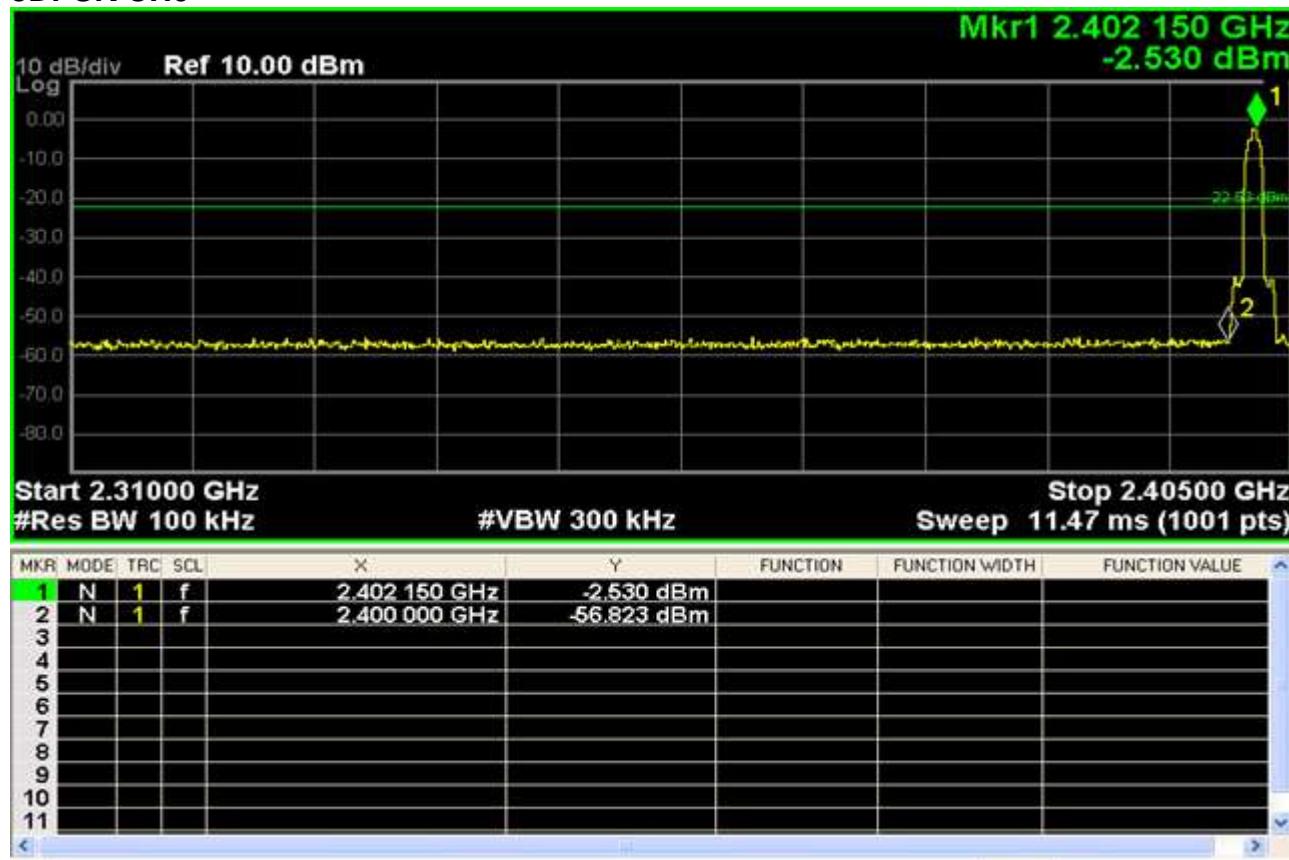
Π/4-DQPSK CH78



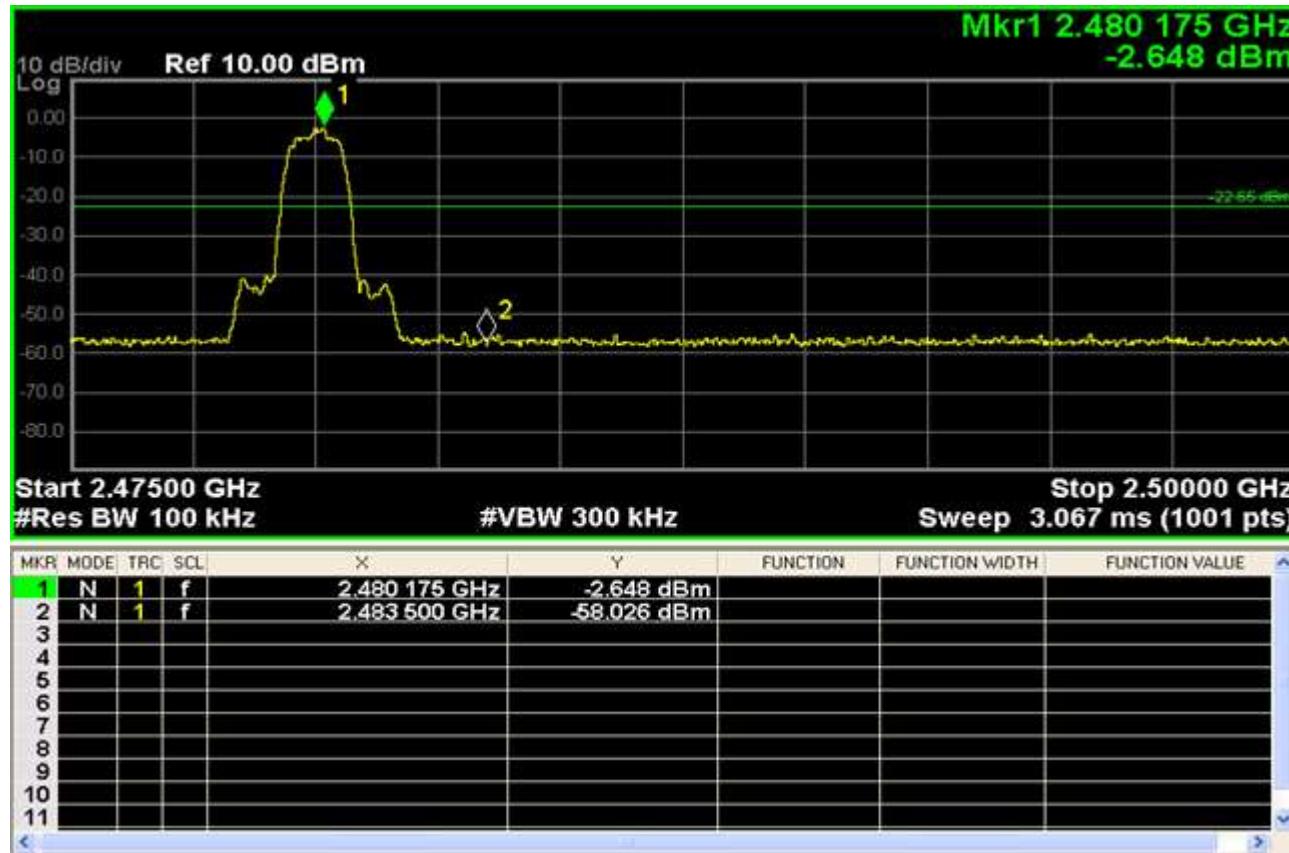
Π/4-DQPSK(Hopping Mode)



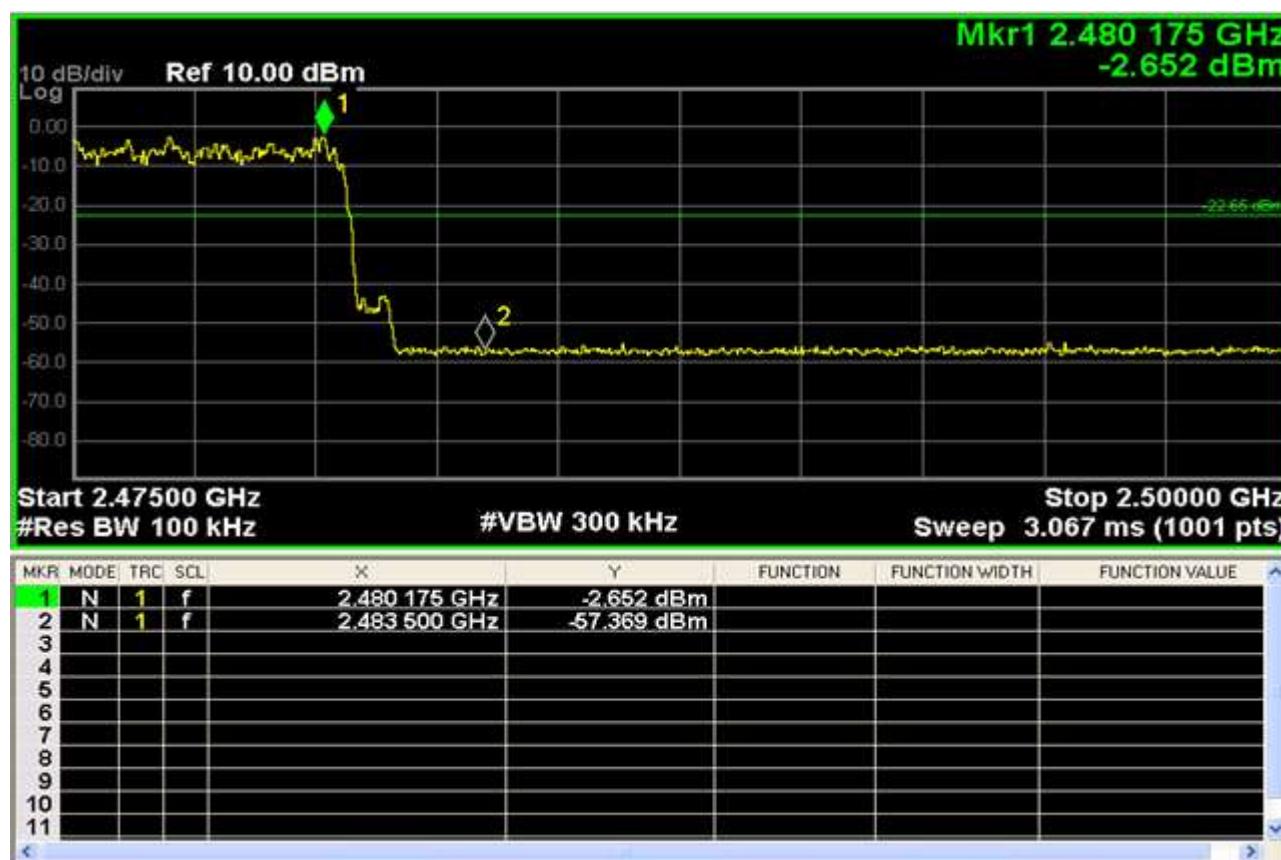
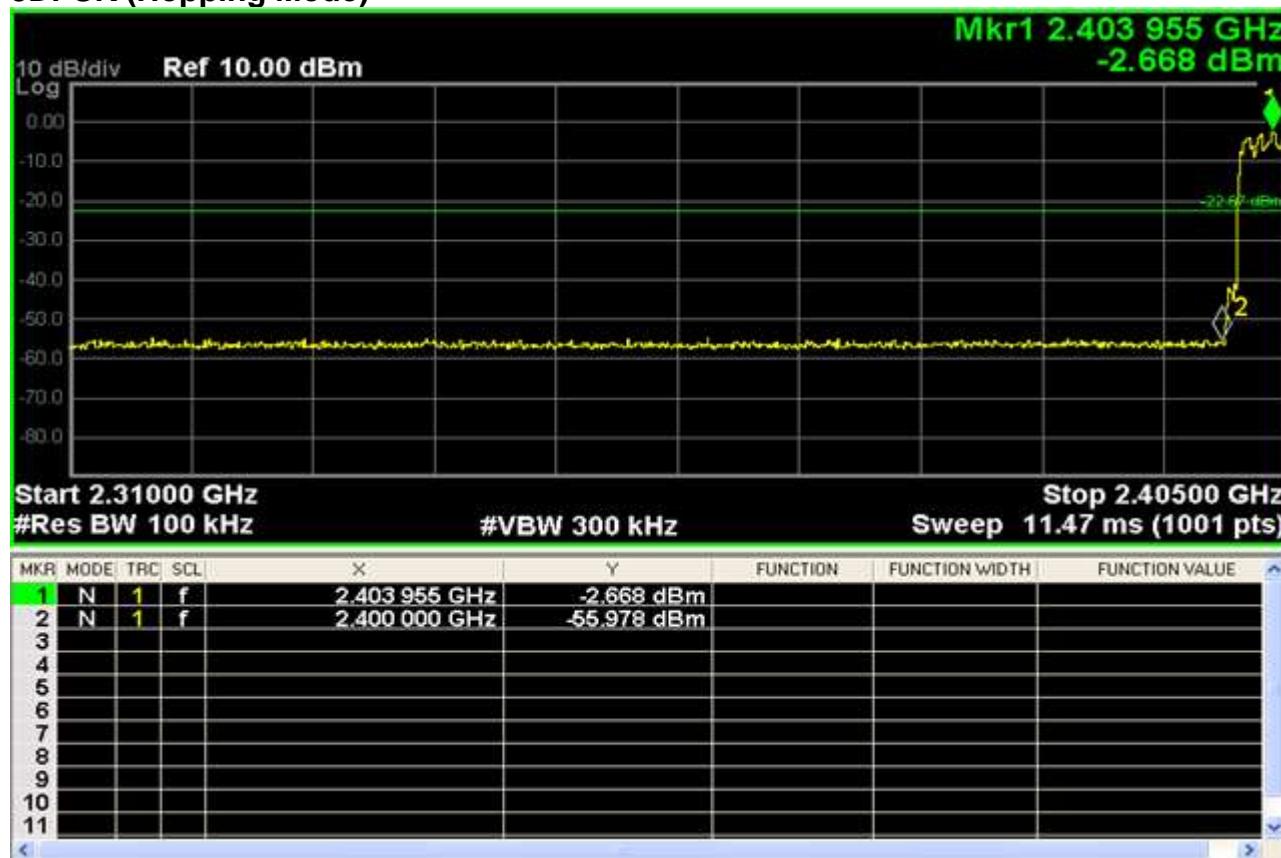
8DPSK CH0



8DPSK CH78



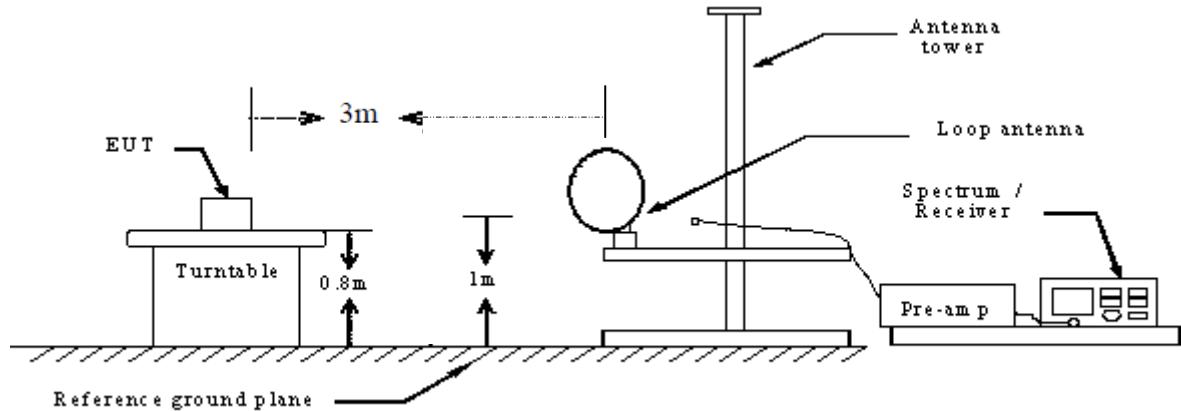
8DPSK (Hopping Mode)



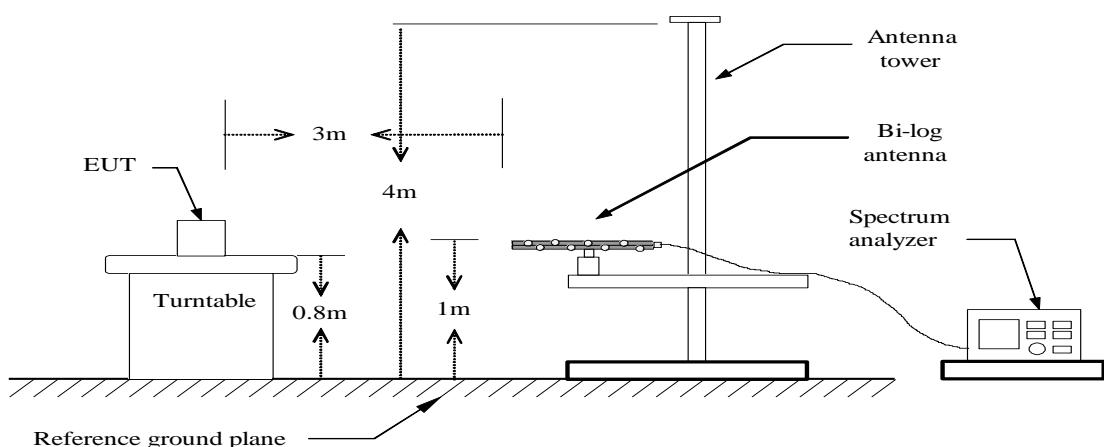
11. SPURIOUS EMISSIONS (RADIATION)

11.1 TEST SETUP

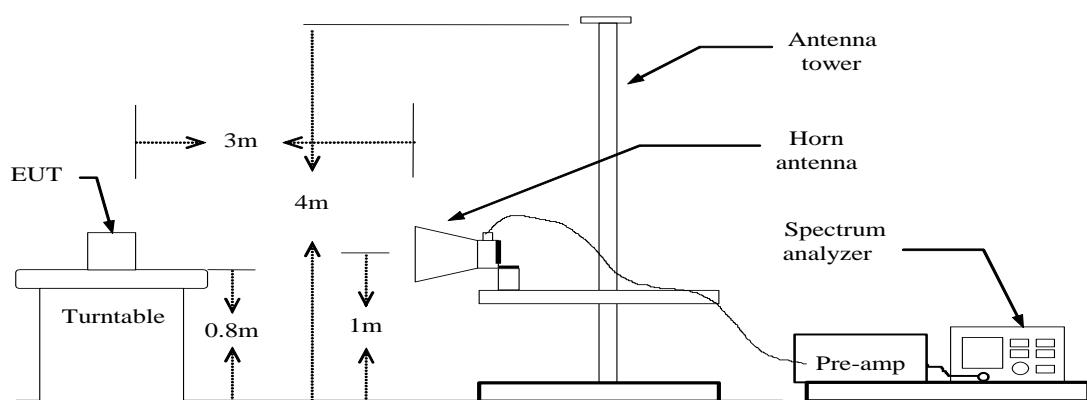
Radiated Spurious Measurement: below 30MHz



Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



11.2 LIMITS

Frequency (MHz)	Limits (uV/m)	Measurement Distance (Meters)	Limits(dBuV/m) at 3m
0.009-0.490	2400/F(KHz)	300	128.5~93.80
0.490-1.705	24000/F(KHz)	30	73.80~63.00
1.705-30.0	30	30	69.5
30~88	100	3	40
88~216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Notes: the calculate formula for below 30MHz

$$L2 = 20\lg(L1) + 40\lg(d1/d2)$$

L2: is the specified limit in dB microvolts per metre at distance d2.

L1: is the specified limit in microvolts per metre at distance d1.

For example:

L1 = 2400/9 (μ V/m), d1 = 300 (m), d2 = 3 (m), so L2 as follows:

$$20\lg(2400/9) + 40\lg(300/3) = 128.5(\text{dB}\mu\text{V/m})$$

11.3 TEST PROCEDURE

Radiated Emission (9 kHz – 30 MHz) :

Spurious emissions from the EUT are measured in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 3 meters horizontally from the EUT. The RBW of the spectrum analyzer is set to 200Hz(measured frequency range was 9KHz~150KHz) or 9KHz(measured frequency range was 150KHz~30MHz). Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz(these two bands employing a average detector).

Radiated Emission (30 MHz – 1000 MHz) :

According to description of ANSI C63.4: 2009 sec.13.4, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT. The EUT configuration (in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements. The measurement is carried out using a spectrum analyzer or receiver. The Quasi-peak detector is used and RBW is set to 120kHz .The antenna height and turn table rotation is adjusted until the maximum power value is founded on spectrum analyzer or receiver.

Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4: 2009 sec.13.4, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT. The EUT configuration (in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 1GHz to 25GHz (higher than the 10th harmonic of the carrier). The peak detector is used for Peak limit and RBW is set to 1MHz ,VBW \geq 3RBW. The peak detector is used for Average limit and RBW is set to 1MHz ,VBW=1KHz is not smaller than 1/T, T = to the shortest pulse width. The antenna height and turn table rotation is adjusted until the maximum power value is founded on spectrum analyzer or receiver.

11.4 RESULTS & PERFORMANCE

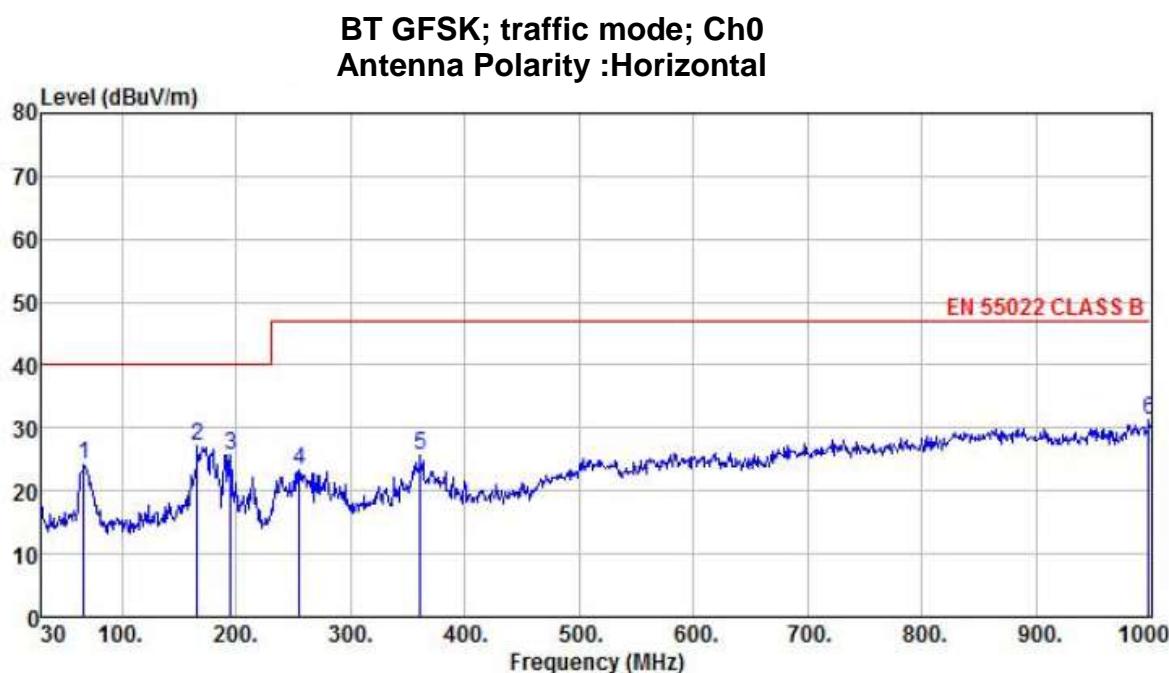
From 9KHz to 30MHz:

The test data was 20dB lower than the permissible limit was not recorded in the report.

From 30MHz to 1GHz:

Only show the worst test data when eut was operated on different mode.

EUT operation mode : BT GFSK(Ch0/Ch39/Ch78); BT Π/4-DQPSK(Ch0/Ch39/Ch78);
BT 8-DPSK(Ch0/Ch39/Ch78).



Site : chamber
Condition : EN 55022 CLASS B 3m VULB9160 HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

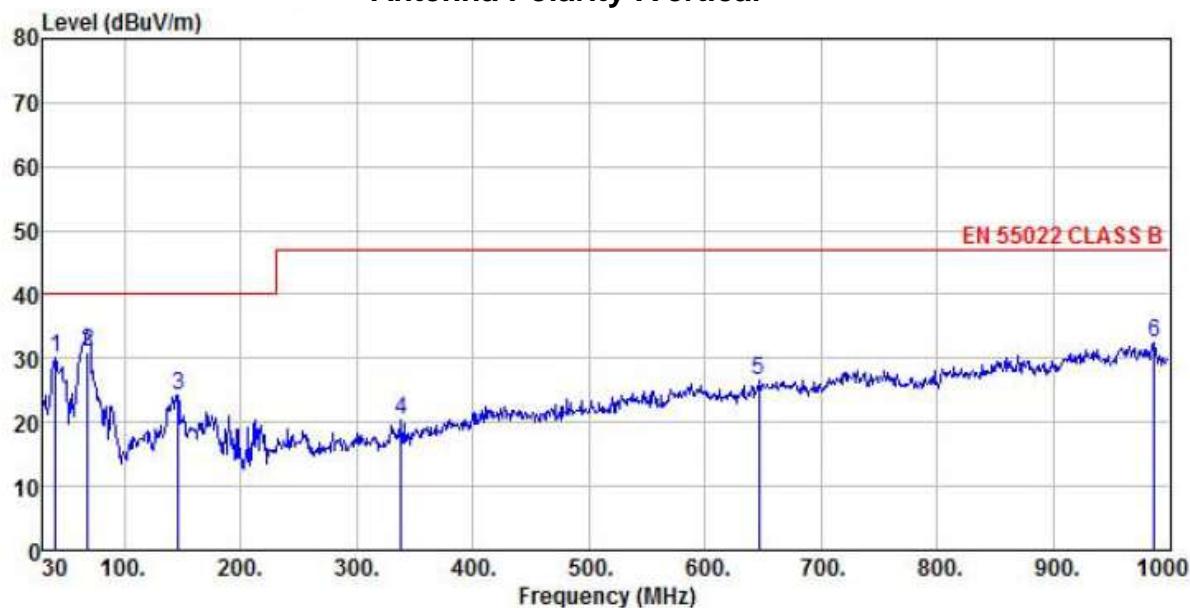
Power Rating: AC 120V/60Hz

Mode : BT GFSK CH0

Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Remark
	Level	Factor	Loss	Factor			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	66.86	11.17	11.89	1.10	0.00	24.16	40.00 -15.84 Peak
2 pp	165.80	11.85	13.55	1.77	0.00	27.17	40.00 -12.83 Peak
3	194.90	13.12	10.81	1.89	0.00	25.82	40.00 -14.18 Peak
4	255.04	9.06	12.00	2.17	0.00	23.23	47.00 -23.77 Peak
5	360.77	8.64	14.39	2.66	0.00	25.69	47.00 -21.31 Peak
6	998.06	3.40	23.44	4.35	0.00	31.19	47.00 -15.81 Peak

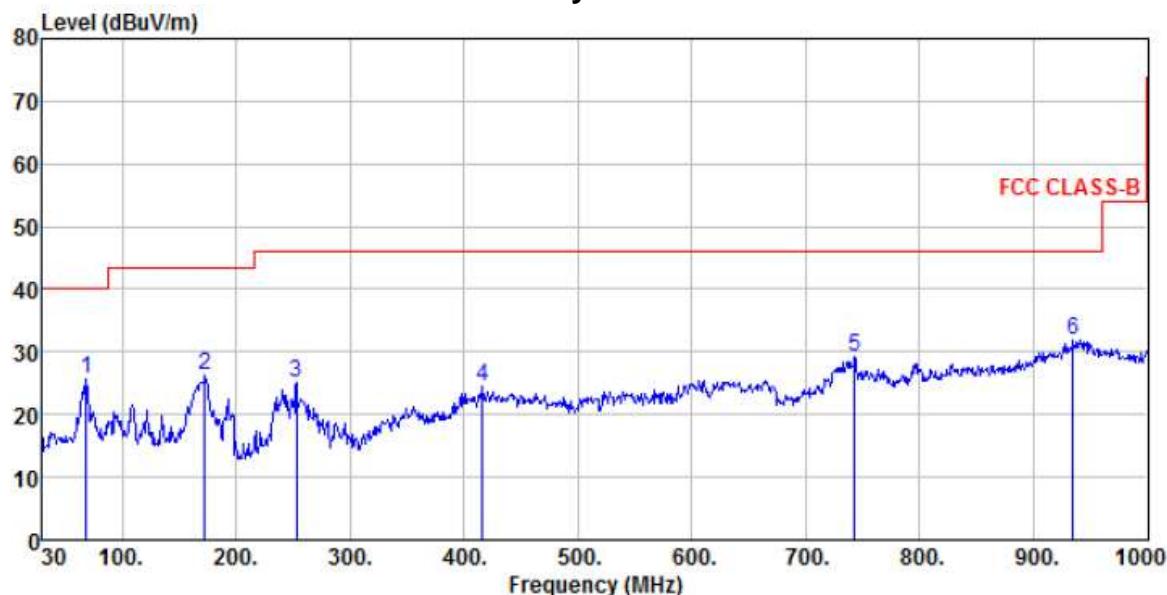
BT GFSK; traffic mode; Ch0
Antenna Polarity :Vertical



Site : chamber
Condition : EN 55022 CLASS B 3m VULB9160 VERTICAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

Freq	ReadAntenna		Cable Preamp		Limit Level	Over Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB				
1 pk	40.67	16.65	12.71	0.83	0.00	30.19	40.00	-9.81 Peak
2 pp	68.68	18.53	11.44	1.11	0.00	31.08	40.00	-8.92 QP
3	146.40	8.94	13.68	1.63	0.00	24.25	40.00	-15.75 Peak
4	338.46	3.89	14.09	2.51	0.00	20.49	47.00	-26.51 Peak
5	645.95	3.50	19.53	3.53	0.00	26.56	47.00	-20.44 Peak
6	986.42	4.72	23.43	4.32	0.00	32.47	47.00	-14.53 Peak

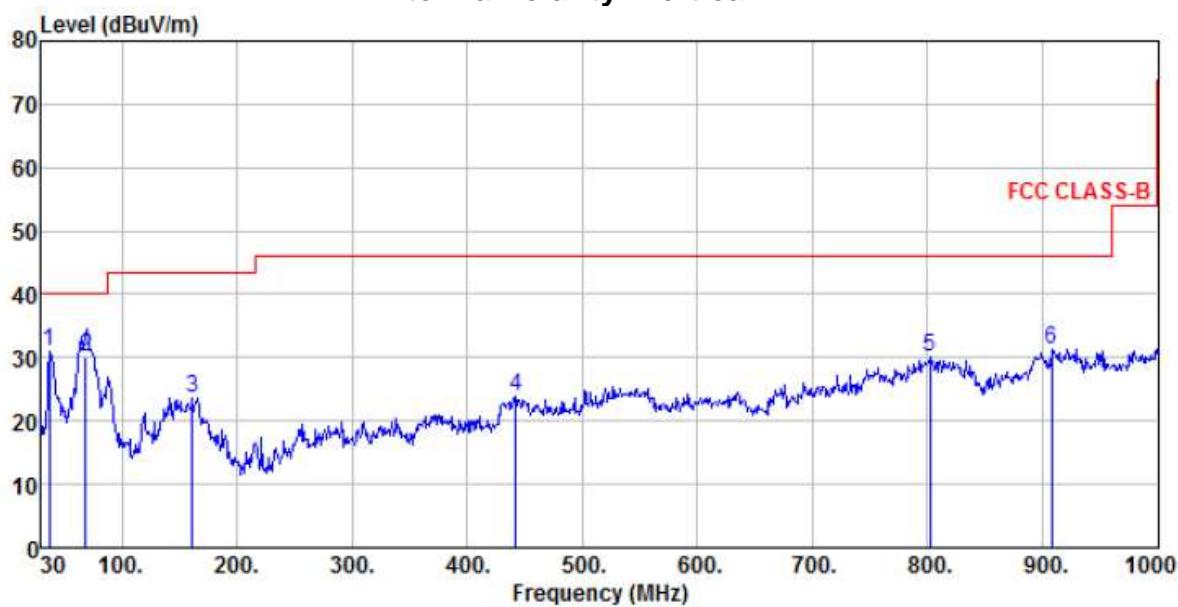
BT $\Pi/4$ -DQPSK; traffic mode; Ch0
Antenna Polarity :Horizontal



Site : chamber
Condition : FCC CLASS-B 3m VULB9160 HORIZONTAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : $\Pi/4$ -DPSK ch0
Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Limit	Remark
	Level	Factor	Loss	Factor				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	68.80	13.12	11.44	1.11	0.00	25.67	40.00	-14.33 Peak
2	172.59	11.36	12.97	1.86	0.00	26.19	43.50	-17.31 Peak
3	253.10	11.08	11.96	2.16	0.00	25.20	46.00	-20.80 Peak
4	416.06	6.11	15.62	2.83	0.00	24.56	46.00	-21.44 Peak
5	742.95	4.23	21.18	3.78	0.00	29.19	46.00	-16.81 Peak
6 pp	935.01	4.52	23.15	4.12	0.00	31.79	46.00	-14.21 Peak

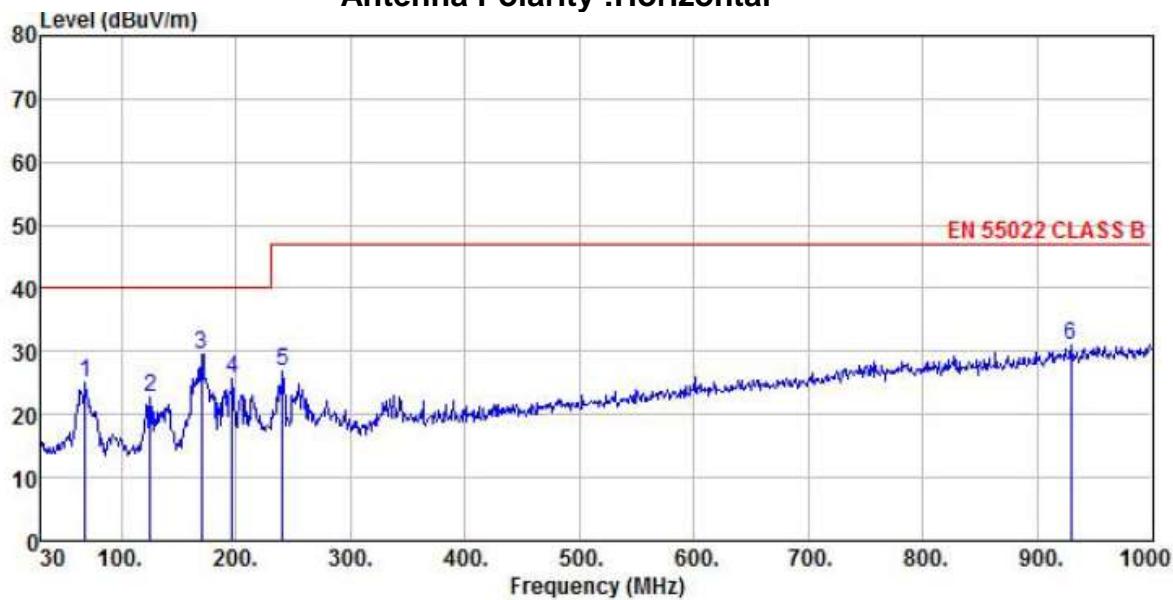
BT $\Pi/4$ -DQPSK; traffic mode; Ch0
Antenna Polarity :Vertical



Site : chamber
Condition : FCC CLASS-B 3m VULB9160 VERTICAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : Pi/4-DPSK ch0
Memo :

Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB				
1 pp	36.79	17.78	12.51	0.77	0.00	31.06	40.00	-8.94 Peak
2 qp	68.78	17.57	11.44	1.11	0.00	30.12	40.00	-9.88 QP
3	160.95	8.20	13.77	1.69	0.00	23.66	43.50	-19.84 Peak
4	442.25	4.89	16.24	2.86	0.00	23.99	46.00	-22.01 Peak
5	802.12	4.63	21.77	3.81	0.00	30.21	46.00	-15.79 Peak
6	907.85	4.53	22.69	4.07	0.00	31.29	46.00	-14.71 Peak

BT 8-DPSK; traffic mode; Ch39
Antenna Polarity :Horizontal



Site : chamber

Condition : EN 55022 CLASS B 3m VULB9160 HORIZONTAL

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

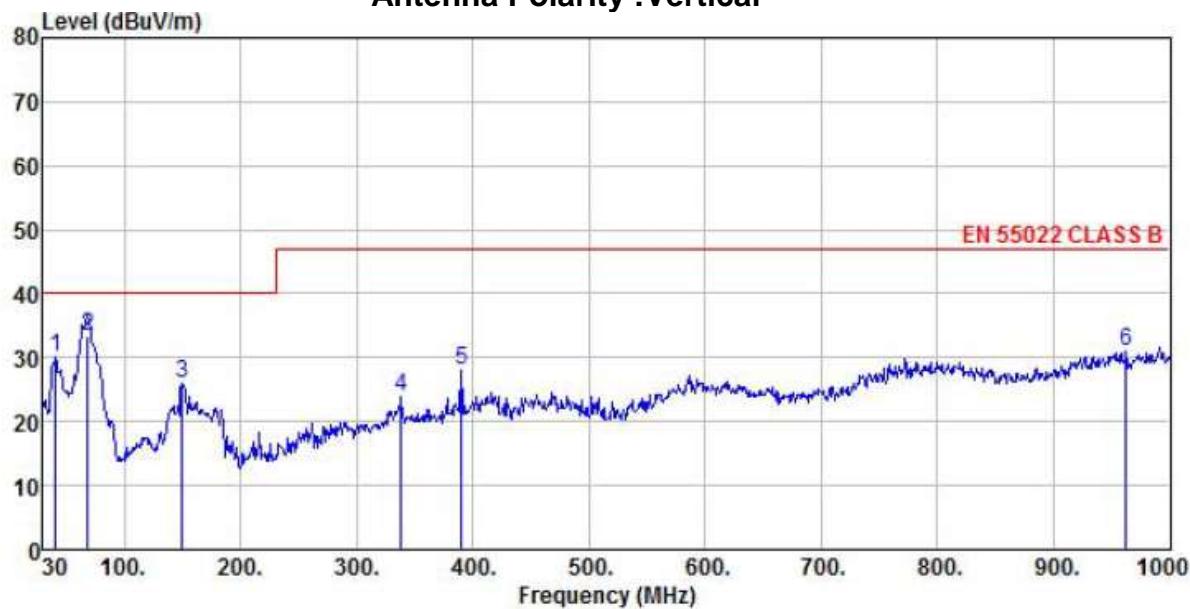
Power Rating: AC 120V/60Hz

Mode : BT 8-DPSK CH39

Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Over
	Level	Factor	Loss	Factor			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	68.80	12.59	11.44	1.11	0.00	25.14	40.00 -14.86 Peak
2	125.06	8.91	12.39	1.53	0.00	22.83	40.00 -17.17 Peak
3 pp	169.68	14.38	13.33	1.84	0.00	29.55	40.00 -10.45 Peak
4	196.84	13.16	10.67	1.89	0.00	25.72	40.00 -14.28 Peak
5	240.49	13.06	11.71	2.12	0.00	26.89	47.00 -20.11 Peak
6	929.19	3.74	23.03	4.10	0.00	30.87	47.00 -16.13 Peak

BT 8-DPSK; traffic mode; Ch39
Antenna Polarity :Vertical



Site : chamber
Condition : EN 55022 CLASS B 3m VULB9160 VERTICAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : BT 8-DPSK CH39
Memo :

Freq	ReadAntenna		Cable Preamp		Limit	Over	Remark	
	Level	Factor	Loss	Factor				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 pk	40.67	16.44	12.71	0.83	0.00	29.98	40.00	-10.02 Peak
2 pp	68.80	20.75	11.44	1.11	0.00	33.30	40.00	-6.70 QP
3	149.31	10.45	13.90	1.63	0.00	25.98	40.00	-14.02 Peak
4	338.46	7.26	14.09	2.51	0.00	23.86	47.00	-23.14 Peak
5	389.87	10.20	15.10	2.71	0.00	28.01	47.00	-18.99 Peak
6	962.17	3.45	23.43	4.21	0.00	31.09	47.00	-15.91 Peak

From 1GHz to 25GHz:

Only show the worst test data when eut was operated on different mode.

EUT operation mode :BT GFSK(Ch0/Ch39/Ch78);BT 8-DPSK(Ch0/Ch39/Ch78).

BT GFSK; traffic mode; Ch78

Frequency (MHz)	Reading (dBuV)	Correct factor(dB)	Antenna Polarity	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2480	75.34	-2.88	Horizontal	72.46	/	/	PEAK
4960	47.11	5.23	H	52.34	74	21.66	PEAK
7440	33.10	13.15	H	46.25	74	27.75	PEAK
2480	74.68	-2.88	Vertical	71.80	/	/	PEAK
4960	46.33	5.23	V	51.56	74	22.44	PEAK
7440	32.33	12.85	V	45.18	74	28.82	PEAK

Note:1: Total=Reading+Correct factor

2: 2480 MHz was fundamental signal which can be ignored.

3: Average measurement was not performed if peak level were lower than the average limit.

4: Other harmonics are lower than background noise.

BT Π/4-DQPSK; traffic mode; Ch39

Frequency (MHz)	Reading (dBuV)	Correct factor(dB)	Antenna Polarity	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2441	71.53	-3.29	Horizontal	68.24	/	/	PEAK
4882	44.98	5.02	H	50.00	74	24.00	PEAK
7323	32.02	11.86	H	43.88	74	30.12	PEAK
2441	70.19	-3.29	Vertical	66.90	/	/	PEAK
4882	41.87	5.02	V	46.89	74	27.11	PEAK
7323	30.35	12.36	V	42.71	74	31.29	PEAK

Note:1: Total=Reading+Correct factor

2: 2480 MHz was fundamental signal which can be ignored.

3: Average measurement was not performed if peak level were lower than the average limit.

4: Other harmonics are lower than background noise.

BT 8-DPSK; traffic mode; Ch39

Frequency (MHz)	Reading (dBuV)	Correct factor(dB)	Antenna Polarity	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
2441	71.59	-3.29	Horizontal	68.30	/	/	PEAK
4882	45.12	5.02	H	50.14	74	23.86	PEAK
7323	31.71	11.86	H	43.57	74	30.43	PEAK
2441	70.29	-3.29	Vertical	67.00	/	/	PEAK
4882	42.36	5.02	V	47.38	74	26.62	PEAK
7323	30.23	12.36	V	42.59	74	31.41	PEAK

Note:1: Total=Reading+Correct factor.

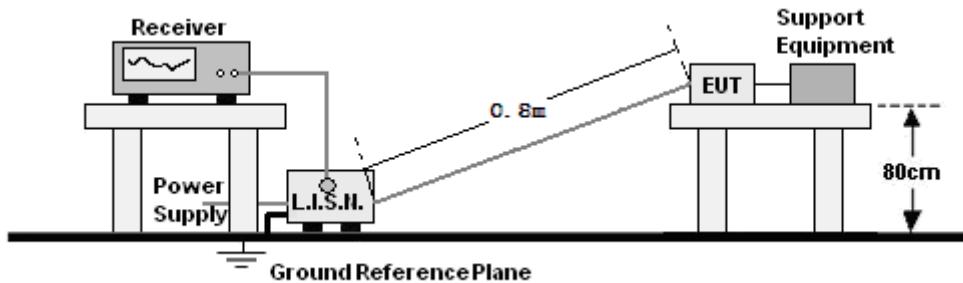
2: 2441 MHz was fundamental signal which can be ignored.

3: Average measurement was not performed if peak level were lower than the average limit.

4: Other harmonics are lower than background noise.

12. AC POWER LINE CONDUCTED EMISSIONS

12.1 TEST SETUP



12.2 LIMITS

Frequency range (MHz)	Limits dB(µV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

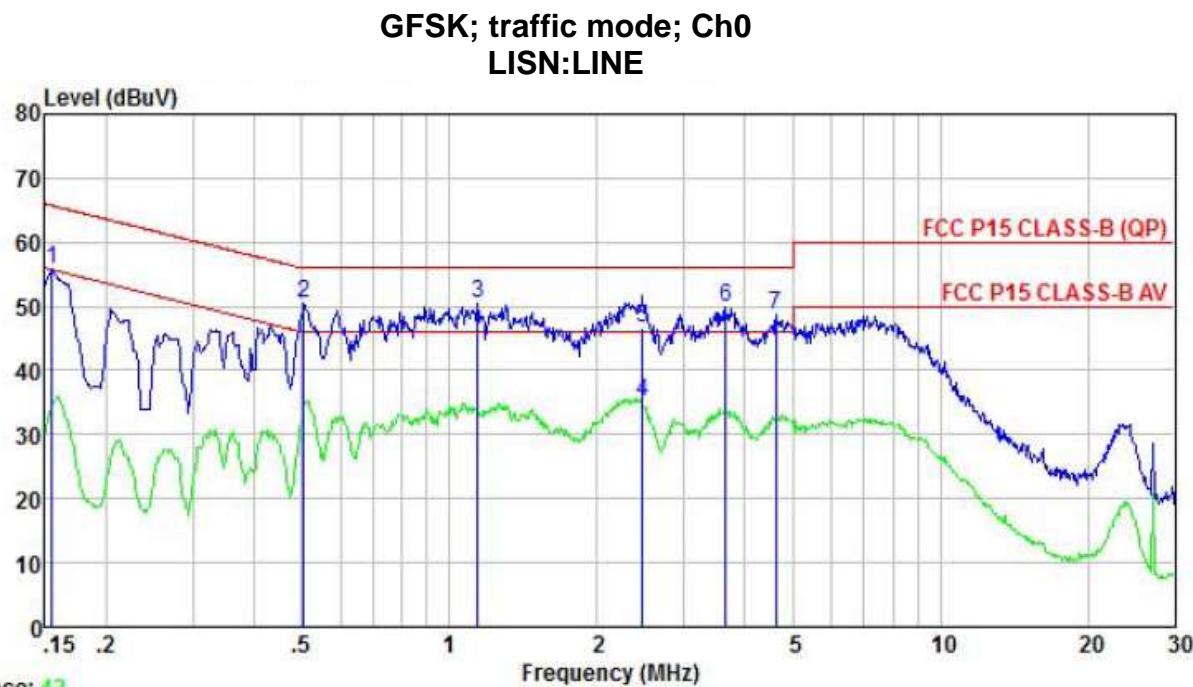
12.3 TEST PROCEDURE

According to description of ANSI C63.4: 2009 sec.13.3, the AC power line preliminary conducted emissions measurements were carried out. The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT. The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for final AC power line conducted emissions measurements. The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT is connected to LISN and LISN is connected to the reference ground. All other supplemental devices are connected with EUT through other LISN. The distance between EUT and LISN is 80cm. A radio link is established between EUT and the tester. The output power of the EUT is controlled by the tester and driven to maximum value. An initial pre-scan was performed on the live L line and neutral line with peak detector (9kHz RBW). Both average detector and quasi-peak detector are performed at the frequencies with maximized peak emission. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

12.4 RESULTS & PERFORMANCE

Only show the worst test data when eut was operated on different mode.

EUT operation mode : BT GFSK(Ch0/Ch39/Ch78); BT II/4-DQPSK(Ch0/Ch39/Ch78);
BT 8-DPSK(Ch0/Ch39/Ch78).



Site : chamber

Condition : FCC P15 CLASS-B (QP) ENV216(L)-20120730 LINE

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

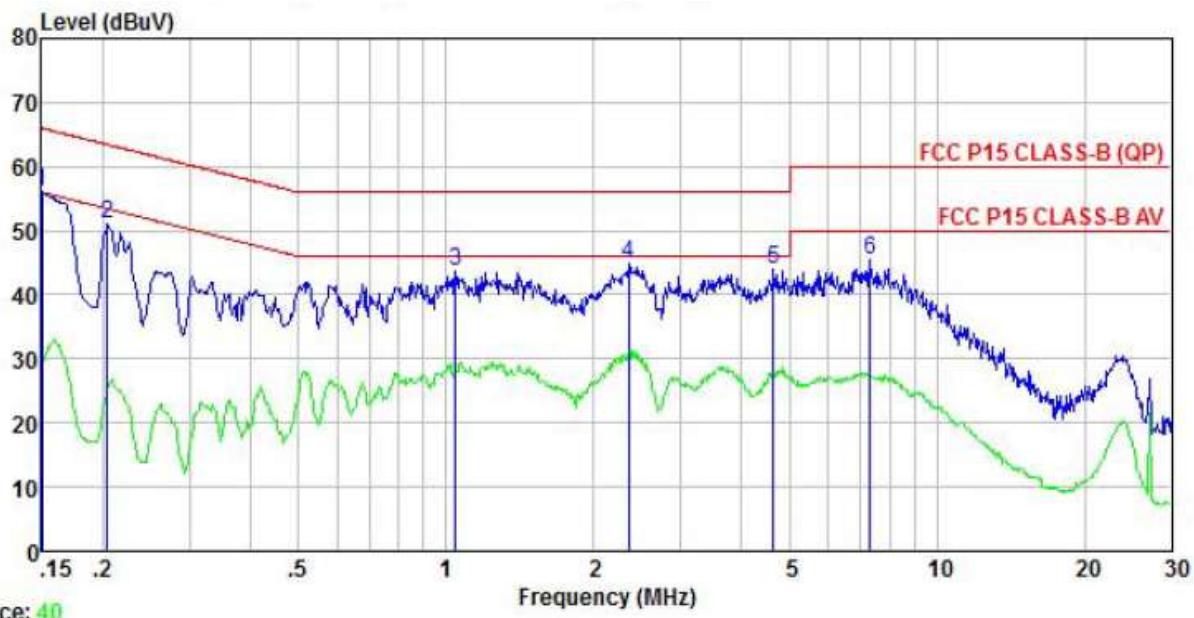
Power Rating: AC 120V/60Hz

Mode : BT GFSK CH0

Memo :

	Read Freq	LISN Level	Cable Factor	Preamp Loss	Level Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB
1	0.15	45.29	10.38	0.09	0.00	55.76	65.74	-9.98 Peak
2 pp	0.50	39.93	10.56	0.10	0.00	50.59	56.00	-5.41 Peak
3	1.14	39.68	10.52	0.14	0.00	50.34	56.00	-5.66 Peak
4 av	2.47	24.48	10.52	0.15	0.00	35.15	46.00	-10.85 Average
5 qp	2.47	35.92	10.52	0.15	0.00	46.59	56.00	-9.41 QP
6	3.66	39.24	10.52	0.14	0.00	49.90	56.00	-6.10 Peak
7	4.62	37.94	10.52	0.14	0.00	48.60	56.00	-7.40 Peak

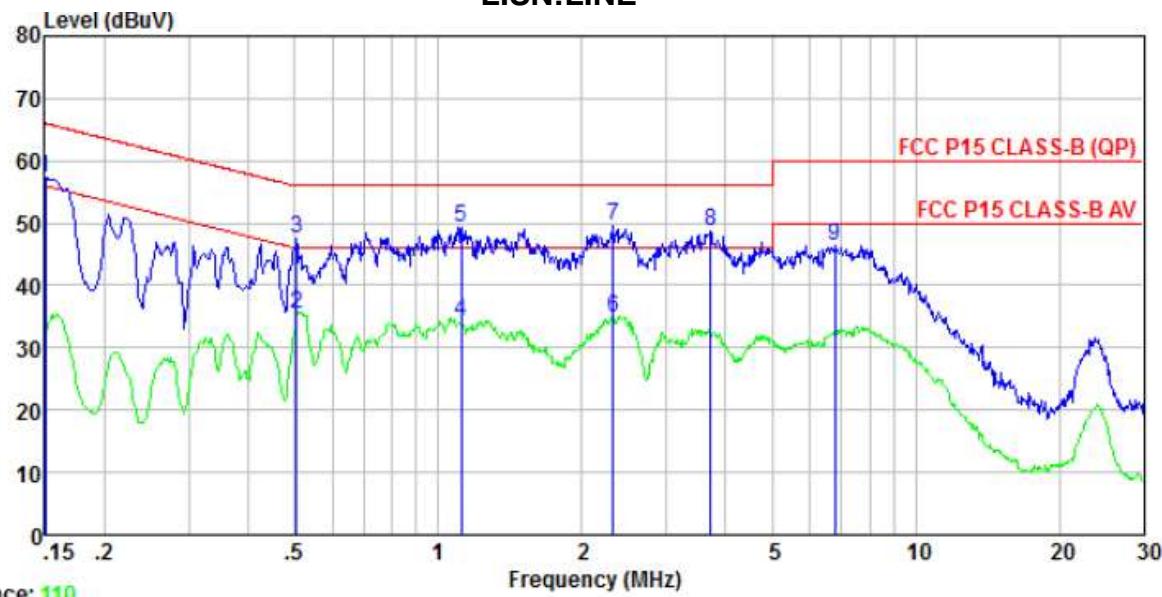
GFSK; traffic mode; Ch0
LISN:NEUTRAL



Site : chamber
Condition : FCC P15 CLASS-B (QP) ENV216(N)-20120730 NEUTRAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : BT GFSK CH0
Memo :

Freq	Read	LISN	Cable	Preamp	Limit	Over	Remark
	Level	Factor	Loss	Factor			
0.15	45.59	10.29	0.09	0.00	55.97	66.00	-10.03 Peak
0.20	40.31	10.43	0.22	0.00	50.96	63.45	-12.49 Peak
1.04	33.16	10.31	0.14	0.00	43.61	56.00	-12.39 Peak
2.36	34.29	10.32	0.15	0.00	44.76	56.00	-11.24 Peak
4.65	33.48	10.32	0.14	0.00	43.94	56.00	-12.06 Peak
7.29	34.95	10.34	0.31	0.00	45.60	60.00	-14.40 Peak

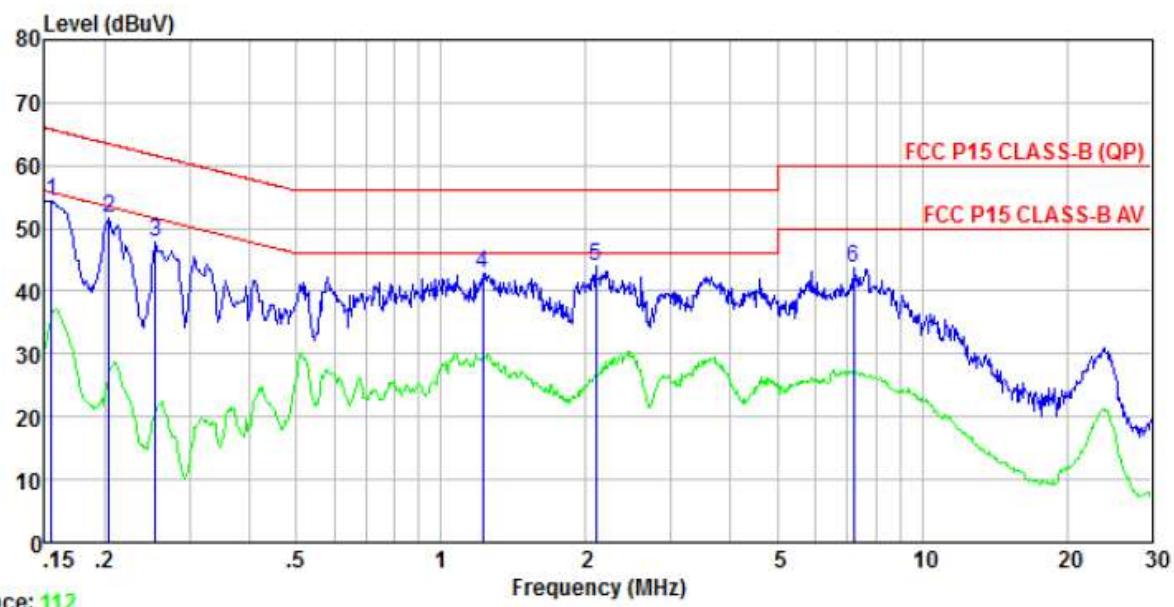
II/4-DQPSK; traffic mode; Ch39
LISN:LINE



Trace: 110
Site : chamber
Condition : FCC P15 CLASS-B (QP) ENV216(L)-20120730 LINE
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : Pi/4-DPSK ch39
Memo :

		Read Freq	LISN Level	Cable Factor	Preamp Loss Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.15	46.83	10.36	0.09	0.00	57.28	66.00	-8.72	Peak
2 av	0.50	24.62	10.56	0.10	0.00	35.28	46.00	-10.72	Average
3	0.50	36.83	10.56	0.10	0.00	47.49	56.00	-8.51	Peak
4	1.12	23.57	10.52	0.14	0.00	34.23	46.00	-11.77	Average
5	1.12	38.68	10.52	0.14	0.00	49.34	56.00	-6.66	Peak
6	2.32	24.29	10.52	0.15	0.00	34.96	46.00	-11.04	Average
7 pp	2.32	38.79	10.52	0.15	0.00	49.46	56.00	-6.54	Peak
8	3.72	38.14	10.52	0.14	0.00	48.80	56.00	-7.20	Peak
9	6.77	35.69	10.47	0.30	0.00	46.46	60.00	-13.54	Peak

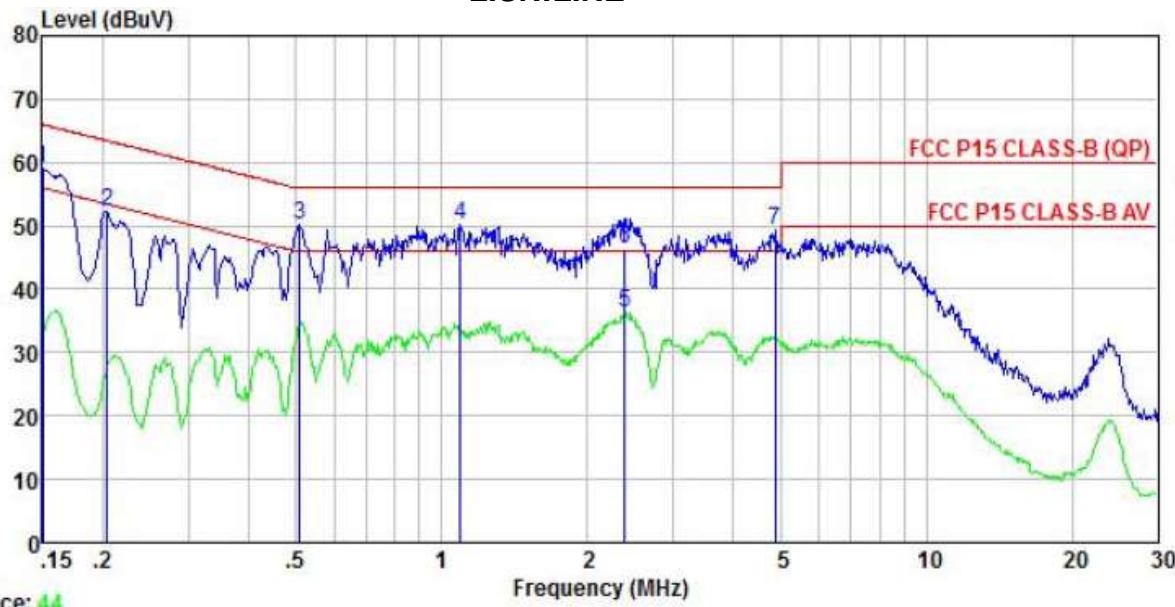
Π/4-DQPSK; traffic mode; Ch39
LISN:NEUTRAL



Site : chamber
Condition : FCC P15 CLASS-B (QP) ENV216(N)-20120730 NEUTRAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : Pi/4-DPSK ch39
Memo :

		Read Freq	LISN Level	Cable Factor	Preamp Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1 pp	0.15	43.97	10.29	0.09	0.00	54.35	65.74	-11.39	Peak
2	0.20	40.95	10.43	0.22	0.00	51.60	63.45	-11.85	Peak
3	0.25	37.19	10.43	0.20	0.00	47.82	61.60	-13.78	Peak
4	1.22	32.44	10.31	0.14	0.00	42.89	56.00	-13.11	Peak
5	2.10	33.65	10.31	0.15	0.00	44.11	56.00	-11.89	Peak
6	7.21	32.95	10.34	0.31	0.00	43.60	60.00	-16.40	Peak

8-DPSK; traffic mode; Ch39
LISN:LINE



Trace: 44

Site : chamber
Condition : FCC P15 CLASS-B (QP) ENV216(L)-20120730 LINE

EUT :

Model Name :

Temp/Humi : 23 °C /52 %

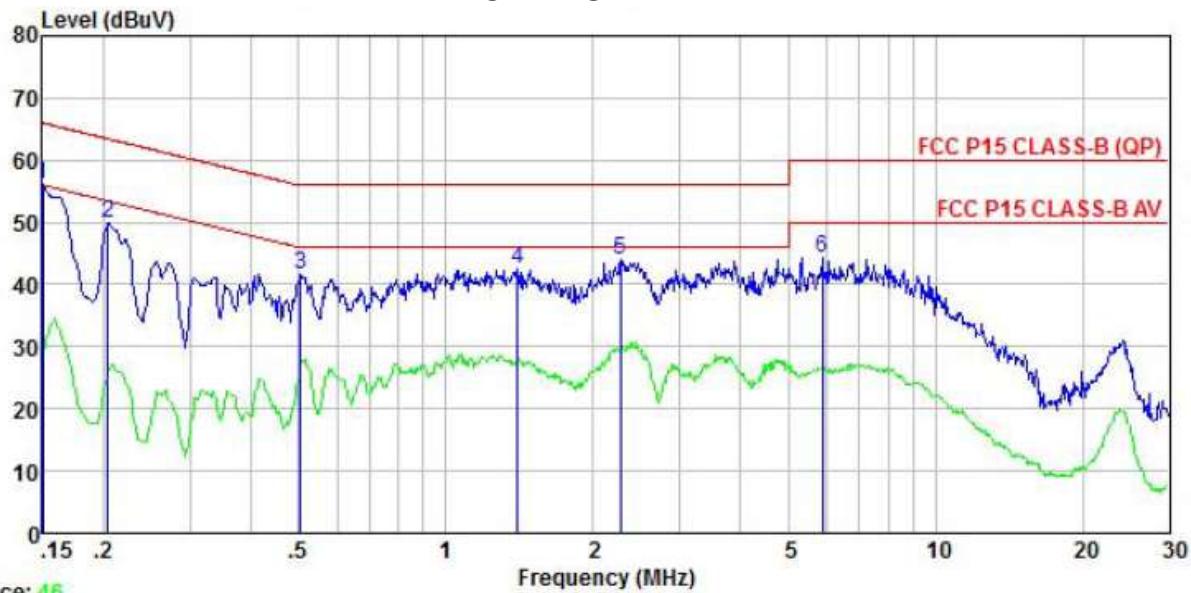
Power Rating: AC 120V/60Hz

Mode : BT 8DPSK CH39

Memo :

Freq	Read	LISN	Cable	Preamp	Limit	Over	Limit	Remark
	MHz	Level	Factor	Loss				
1	0.15	48.67	10.36	0.09	0.00	59.12	66.00	-6.88 Peak
2	0.20	41.74	10.42	0.22	0.00	52.38	63.45	-11.07 Peak
3 pp	0.51	39.40	10.56	0.10	0.00	50.06	56.00	-5.94 Peak
4	1.09	39.38	10.52	0.14	0.00	50.04	56.00	-5.96 Peak
5 av	2.38	25.63	10.52	0.15	0.00	36.30	46.00	-9.70 Average
6 qp	2.38	35.59	10.52	0.15	0.00	46.26	56.00	-9.74 QP
7	4.87	38.56	10.52	0.14	0.00	49.22	56.00	-6.78 Peak

**8-DPSK; traffic mode; Ch39
LISN:NEUTRAL**



Site : chamber
Condition : FCC P15 CLASS-B (QP) ENV216(N)-20120730 NEUTRAL
EUT :
Model Name :
Temp/Humi : 23 °C /52 %
Power Rating: AC 120V/60Hz
Mode : BT 8DPSK CH39
Memo :

Freq	Read	LISN	Cable	Preamp	Limit	Over	Over	
	MHz	Level	Factor	Loss	Level	Line	Limit	Remark
1 pp	0.15	45.61	10.29	0.09	0.00	55.99	66.00	-10.01 Peak
2	0.20	39.35	10.43	0.22	0.00	50.00	63.45	-13.45 Peak
3	0.50	31.22	10.42	0.10	0.00	41.74	56.00	-14.26 Peak
4	1.40	32.00	10.31	0.14	0.00	42.45	56.00	-13.55 Peak
5	2.27	33.58	10.32	0.15	0.00	44.05	56.00	-11.95 Peak
6	5.87	33.87	10.33	0.22	0.00	44.42	60.00	-15.58 Peak

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Please refer to the file named "JNF-Z-220X_Part 15C Setup Photos".

APPENDIX 2 PHOTOGRAPHS OF EUT

Please refer to the two files named "JNF-Z-220X_EUT External Photos" and "JNF-Z-220X_EUT Internal Photos".

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