RF TEST REPORT

Test Equipment	:	X-COM2
Model Name	:	SP65
FCC ID	:	S7A-SP65
IC ID	:	8154A-SP65
Date of receipt	:	2019.01.18
Test duration	:	2019.02.11 ~ 2019.02.18
Date of issue	:	2019.02.19

Applicant (FCC) : Sena Technologies,Inc.

19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, South Korea

Applicant (IC) : Sena Technologies, Inc.

210 Yangjae-dong, Seocho-gu Seoul 137-130 Korea (Republic Of)

Test Laboratory : Lab-T, Inc.

2182-42 Baegok-daero, Mohyeon-myeon, Cheoin-gu, Yongin-si
Gyeonggi-do 17036, South Korea

Test specification	:	FCC Part 15 Subpart C 15.247
		RSS-247 Issue 2 (2017-02), RSS-GEN Issue 5(2018-04)
RF Output Power	:	17.81 dBm
Test result	:	Pass

The above equipment was tested by Lab-T Testing Laboratory for compliance
with the requirements of FCC,IC Rules and Regulations.
The test results presented in this test report are limited only to the sample supplied by applicant
and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of Lab-T, Inc

Tested by:

Engineer
Namhyoung Kwon

Reviewed by:

Technical Manager
SangHoon Yu

CONTENTS

1. Applicant Information

Applicant(FCC)	:	Sena Technologies,Inc.
Applicant(IC)	:	Sena Technologies, Inc.
Address(FCC)	:	19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, South Korea
Address(IC)	:	210 Yangjae-dong, Seocho-gu Seoul 137-130 Korea (Republic Of)
Telephone No.	:	+82-2-571-8283
Fax No.	:	+82-2-573-7710
Person in charge		SeungHyun, Kim / shkim77@sena.com
Manufacturer	:	Sena Technologies,Inc.
Address	:	19, Heolleung-ro 569-gil, Gangnam-gu, Seoul, South Korea

2. Laboratory Information

Test Laboratory	:	Lab-T, Inc.
Address	:	2182-42 Baegok-daero, Mohyeon-myeon, Cheoin-gu, Yongin-si Gyeonggi-do 17036, Korea
Telephone No.	:	+82 31-322-6767
Facsimile No.	:	+82 31-322-6768

Certificate

FCC Designation No.	:	KR0159
FCC Registration No.	:	133186
IC Site Registration No.	:	22000-1

3. Information About Test Equipment

3.1 Equipment Information

Equipment type	X-COM2
Equipment model name	SP65
Equipment add model name	-
Frequency range	2 402 ~ 2 480 MHz
Modulation type	GFSK, π/4-DQPSK, 8DPSK
Modulation technology	F1D, G1D
Power supply	DC 3.7 V
H/W version	M0 : v1.0
	M1 : v1.0
S/W version	M0 : v1.0
	M1 : v1.0

Note1:The above EUT information was declared by the manufacturer.

3.2 Antenna Information

Antenna 1 (M0)	Type	PCB Antenna
	Gain	0.87 dBi
Antenna 2 (M1)	Type	PCB Antenna
	Gain	1.02 dBi

3.3 Test Frequency

Test mode	Test frequency (MHz)		
	Lowest frequency	Middle frequency	Highest frequency
M0_GFSK	2 402	2 441	2 480
M0_π/4-DQPSK	2 402	2 441	2 480
M0_8DPSK	2 402	2 441	2 480
M1_GFSK	2 402	2 441	2 480
M1_π/4-DQPSK	2 402	2 441	2 480
M1_8DPSK	2 402	2 441	2 480

3.4 Worst-Case

M0_BDR	DH5(GFSK)
M0_EDR	3-DH5(8DPSK)
M1_BDR	DH5(GFSK)
M1_EDR	3-DH5(8DPSK)

Note:The power measurement has been conducted to determine the worst-case mode from all possible combi nations between available modulations, data rates.

3.5 Tested Companion Device and accessory Information

Type	Manufacturer	Model	Note
Adaptor	Samsung	EP-TA20KBK (S/N : R37JBGM0B11SE3)	Used Conducted Emission Input : AC 100 ~ 240 V Output : DC5V, 2.0A DC9V, 1.67A USB version : 3.0 micro usb

4. Test Report

4.1 Summary

FCC Part 15 & RSS-GEN Issue 5 & RSS-247 Issue 2				
FCC Rule	IC Rule	Parameter	Clause	Status
Transmitter Requirements				
15.203 15.247(b)(4)	-	Antenna Requirement	4.4.1	C
15.247(a)(1)	RSS-247 5.1(b)	20 dB Channel Bandwidth	4.4.2	C
-	RSS-GEN 6.7	Occupied Bandwidth	4.4.2	C
15.247(a)(1)(iii)	RSS-247 5.1(d)	Number of Hopping Frequencies	4.4.3	C
15.247(a)(1)(iii)	RSS-247 5.1(d)	Time of occupancy (Dwell Time)	4.4.4	C
15.247(a)(1)	RSS-247 5.1(b)	Carrier Frequencies Separation	4.4.5	C
15.247(b)(1)	RSS-247 5.4(b)	Peak Output Power	4.4.6	C
15.247(d) 15.205(a) 15.209(a)	RSS-247 5.5 RSS-GEN 8.9 RSS-GEN 8.10	Spurious Emission, Band Edge and Restricted bands	4.4.7	C
15.207(a)	RSS-GEN 8.8	Conducted Emissions	4.4.8	C
NOTE 1 : C = Comply N/C = Not Comply N/T = Not Tested N/A = Not Applicable				

* The general test methods used to test this device is ANSI C63.10:2013
* The method of measurement used to test this DSS device is FCC public Notice DA 00-705

4.2 Measurement Uncertainty

Mesurement items	Expanded Uncertainty	
RF Output Power	±0.72 dB	(The confidence level is about 95 %, *k*=2)
Occupied Channel Bandwidth	±11.27 kHz	(The confidence level is about 95 %, *k*=2)
Conducted Spurious Emissions	±0.39 dB	(The confidence level is about 95 %, *k*=2)
Radiated Spurious Emissions (1 GHz under)	±4.88 dB	(The confidence level is about 95 %, *k*=2)
Radiated Spurious Emissions (Above 1 GHz)	±6.14 dB	(The confidence level is about 95 %, *k*=2)
Conducted emission	±2.34 dB	(The confidence level is about 95 %, *k*=2)

4.3 Test Report Version

Test Report No.	Date	Description
TRRFCC19-0014	19.02.19	Initial issue

4.4 Transmitter Requirements

4.4.1 Antenna Requirement

4.4.1.1 Regulation

Accoding to §15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Accoding to §15.247(b)(4) e 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.

4.4.1.4 Result

Comply
(There are two transmiiters, the first one is including internal PCB antenna(M0), and the other has another PCB antenna(M1) which is connected to external by a unique connector(U.FL). The directional peak gain of the antenna is M0 : 0.87 dBi, M1 : 1.02 dBi.)

4.4.2 20 dB Bandwidth and Occupied Bandwidth

4.4.2.1 Regulation

20 dB and 99% emission bandwidth reporting only, measurement is also used to determine limits for other requirements of FHSS transmitters.

4.4.2.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
ANSI C63.10 § 6.9.2 Occupied bandwidth 20dB Relative procedure
ANSI C63.10 § 6.9.3 Occupied bandwidth 99% procedure

4.4.2.3 Result

Comply (measurement data : refer to the next page)

4.4.2.4 Measurement data

Test mode : M0_GFSK

Frequency (MHz)	20 dB Bandwidth (MHz)	Min. Limit (MHz)	Occupied Bandwidth (99 % Bandwith)(MHz)
2 402	0.81	0.25	0.86
2 441	0.81	0.25	0.86
2 480	0.81	0.25	0.85

Test mode : M0_8DPSK

Frequency (MHz)	20 dB Bandwidth (MHz)	Min. Limit (MHz)	Occupied Bandwidth (99 % Bandwith)(MHz)
2 402	1.25	0.25	1.16
2 441	1.20	0.25	1.16
2 480	1.20	0.25	1.16

Test mode : M1_GFSK

Frequency (MHz)	20 dB Bandwidth (MHz)	Min. Limit (MHz)	Occupied Bandwidth (99 % Bandwith)(MHz)
2 402	0.81	0.25	0.86
2 441	0.81	0.25	0.86
2 480	0.81	0.25	0.86

Test mode : M1_8DPSK

Frequency (MHz)	20 dB Bandwidth (MHz)	Min. Limit (MHz)	Occupied Bandwidth (99 % Bandwith)(MHz)
2 402	1.24	0.25	1.15
2 441	1.25	0.25	1.15
2 480	1.25	0.25	1.16

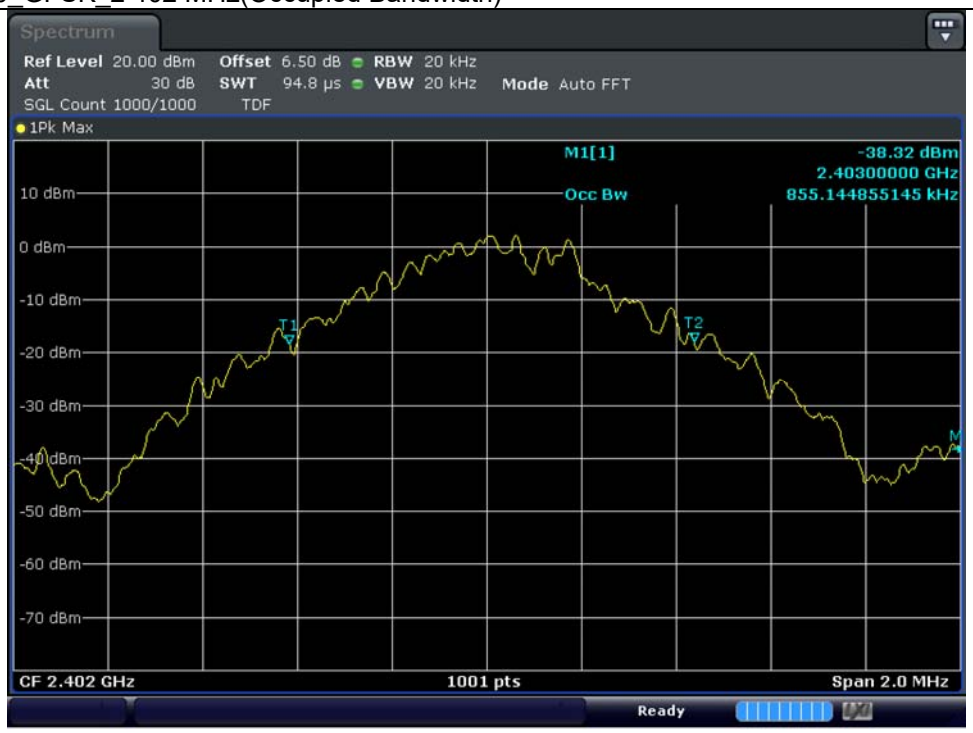
4.4.2.5 Test Plot

M0_GFSK_2 402 MHz(20 dB Bandwidth)

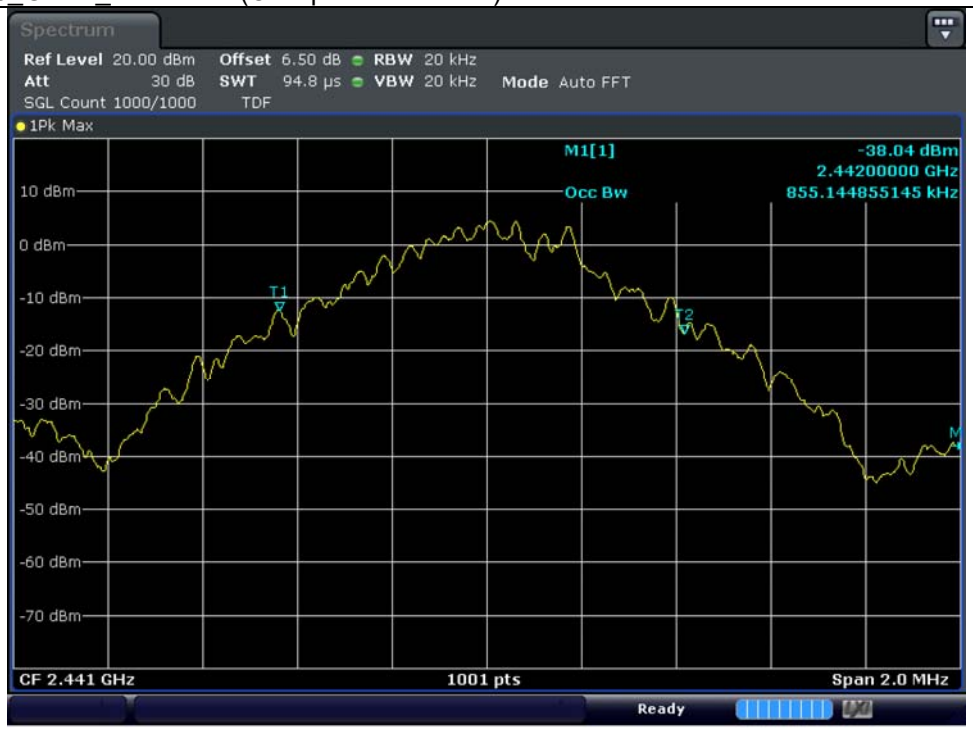
M0_GFSK_2 441 MHz(20 dB Bandwidth)

M0_GFSK_2 480 MHz(20 dB Bandwidth)

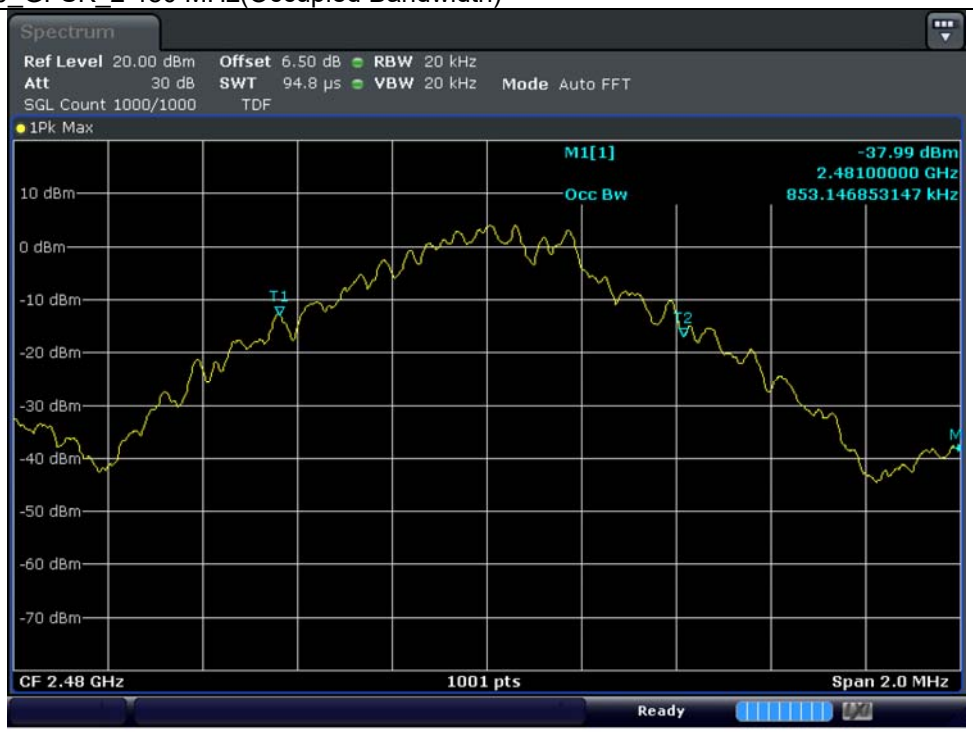
M0_GFSK_2 402 MHz(Occupied Bandwidth)



M0_GFSK_2 441 MHz(Occupied Bandwidth)



M0_GFSK_2 480 MHz(Occupied Bandwidth)

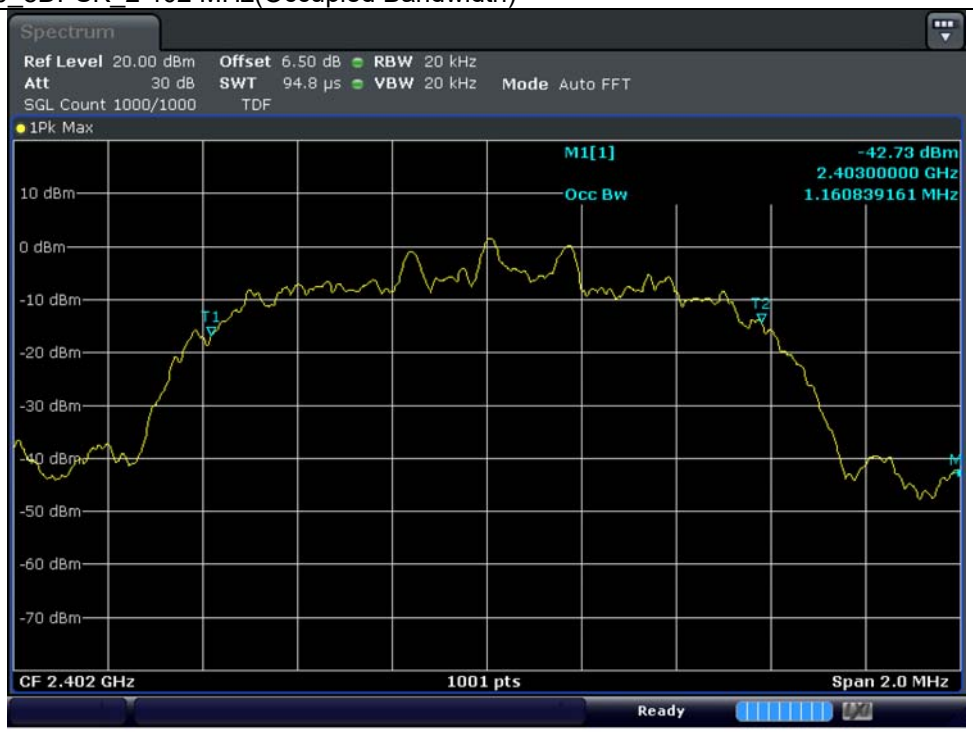


M0_8DPSK_2 402 MHz(20 dB Bandwidth)

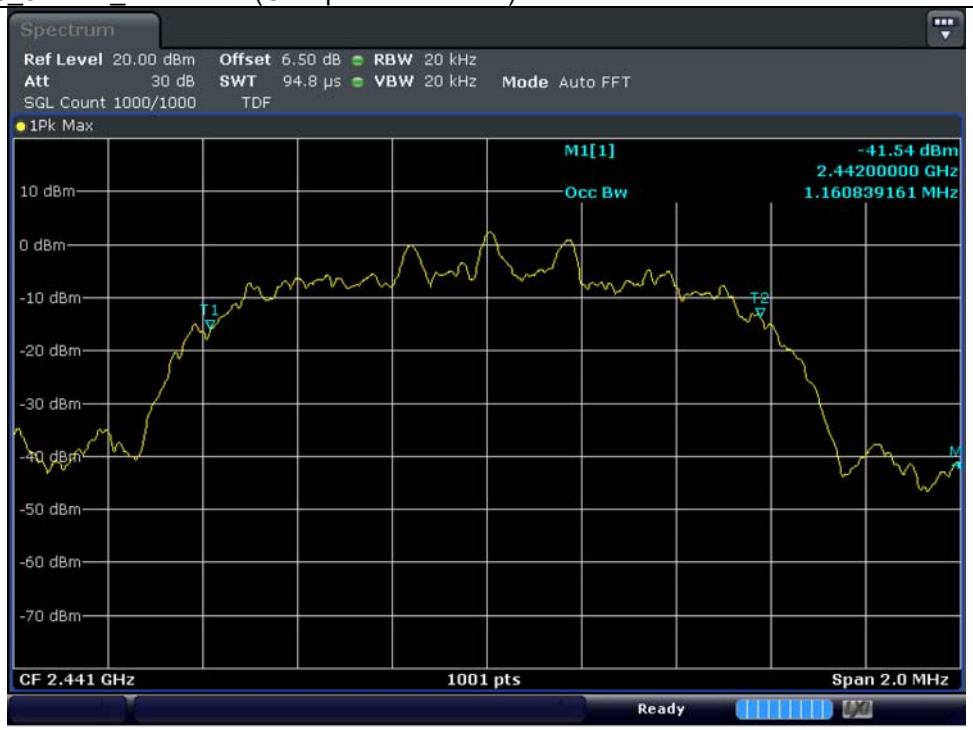
M0_8DPSK_2 441 MHz(20 dB Bandwidth)

M0_8DPSK_2 480 MHz(20 dB Bandwidth)

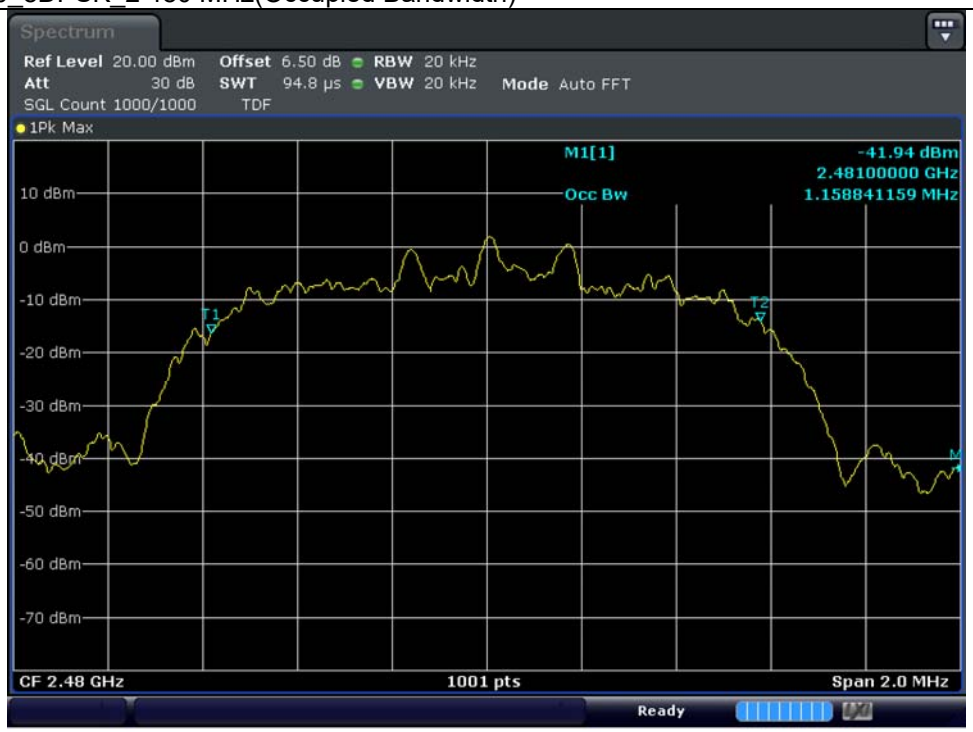
M0_8DPSK_2 402 MHz(Occupied Bandwidth)



M0_8DPSK_2 441 MHz(Occupied Bandwidth)



M0_8DPSK_2 480 MHz(Occupied Bandwidth)

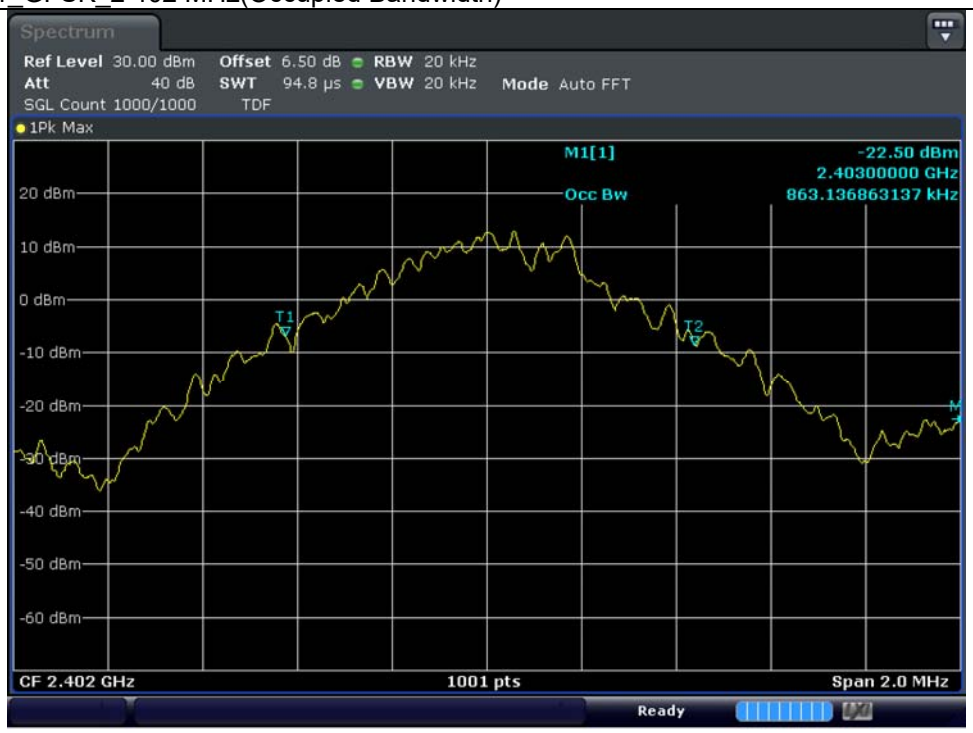


M1_GFSK_2 402 MHz(20 dB Bandwidth)

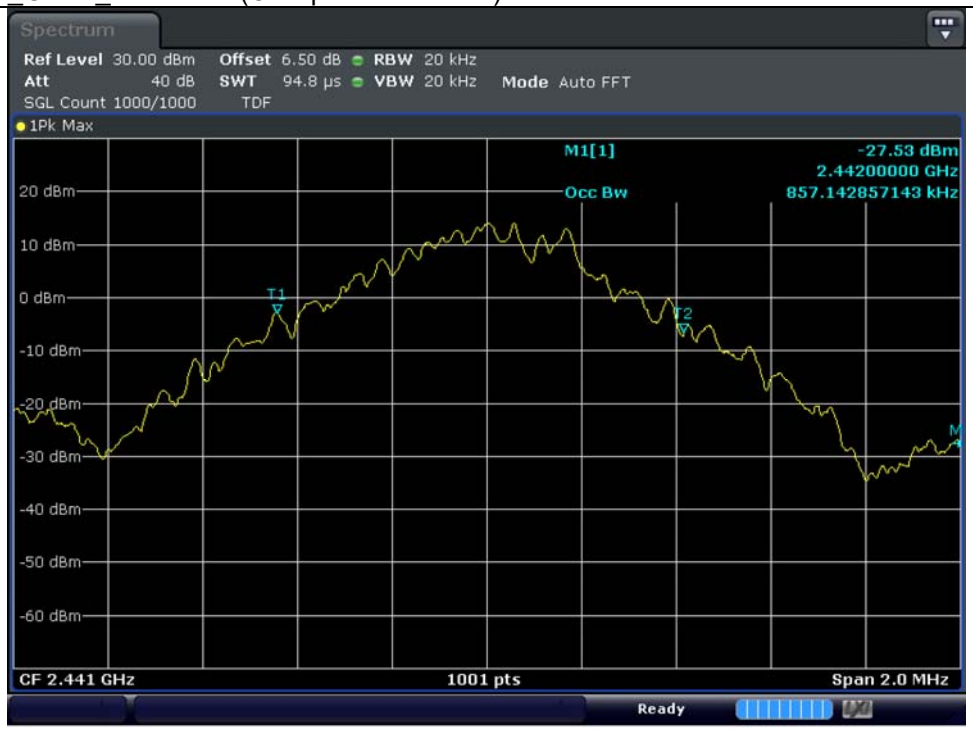
M1_GFSK_2 441 MHz(20 dB Bandwidth)

M1_GFSK_2 480 MHz(20 dB Bandwidth)

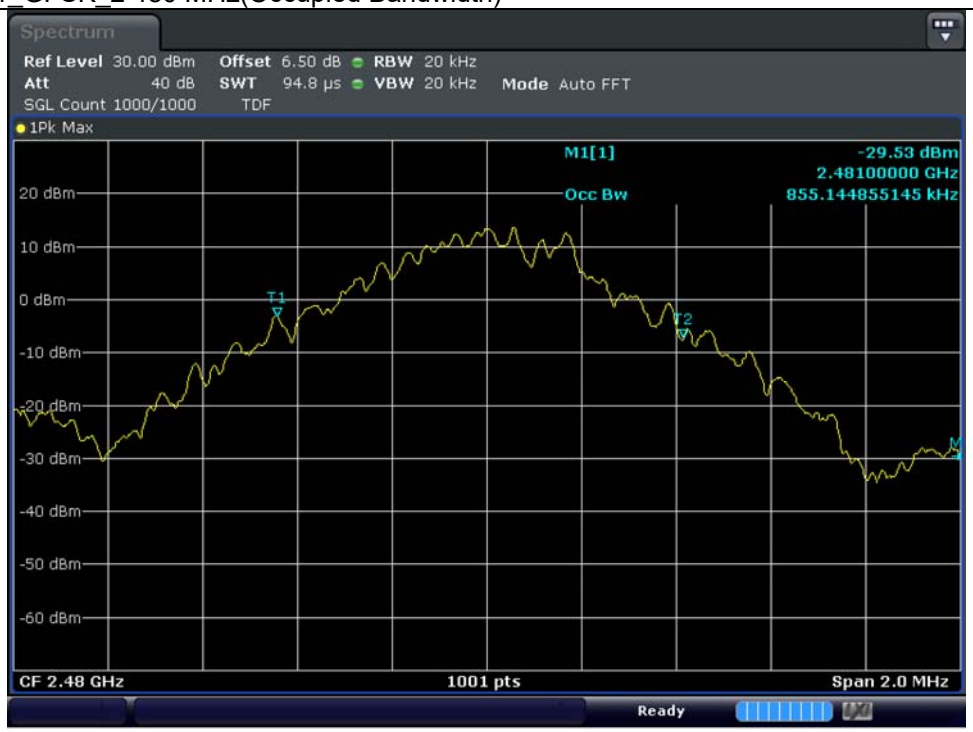
M1_GFSK_2 402 MHz(Occupied Bandwidth)



M1_GFSK_2 441 MHz(Occupied Bandwidth)



M1_GFSK_2 480 MHz(Occupied Bandwidth)

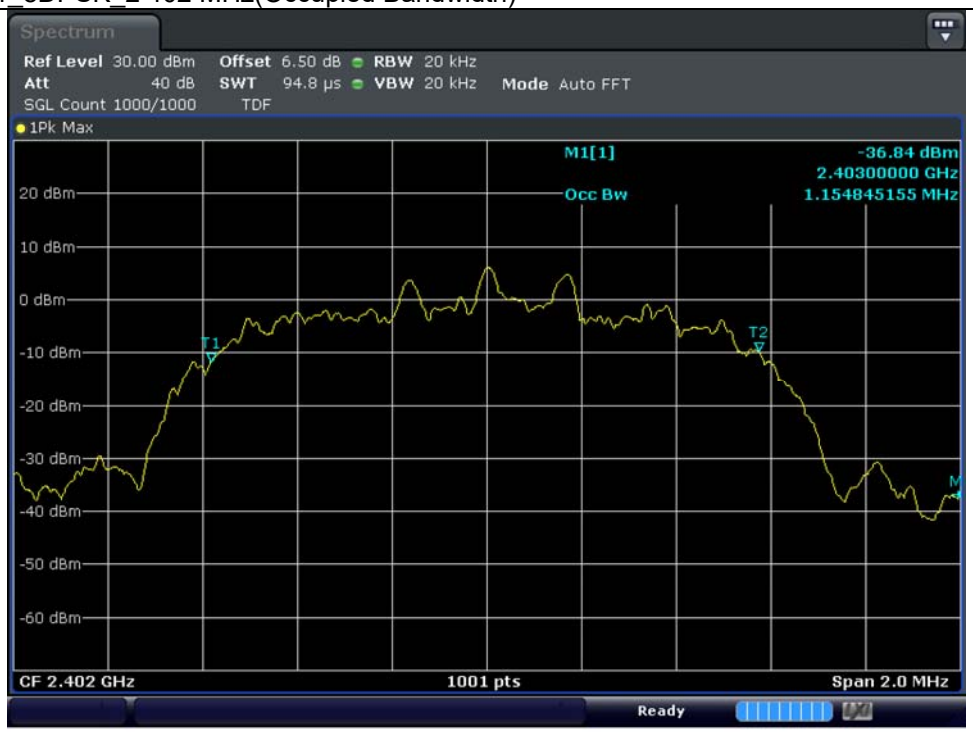


M1_8DPSK_2 402 MHz(20 dB Bandwidth)

M1_8DPSK_2 441 MHz(20 dB Bandwidth)

M1_8DPSK_2 480 MHz(20 dB Bandwidth)

M1_8DPSK_2 402 MHz(Occupied Bandwidth)



M1_8DPSK_2 441 MHz(Occupied Bandwidth)

M1_8DPSK_2 480 MHz(Occupied Bandwidth)

4.4.3 Number of Hopping Frequencies

4.4.4.2 Regulation

According to §15.247(a)(1)(iii) and RSS-247 §5.1(d) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

4.4.3.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines
ANSI C63.10 § 7.8.3 Number of hopping frequencies

4.4.3.3 Result

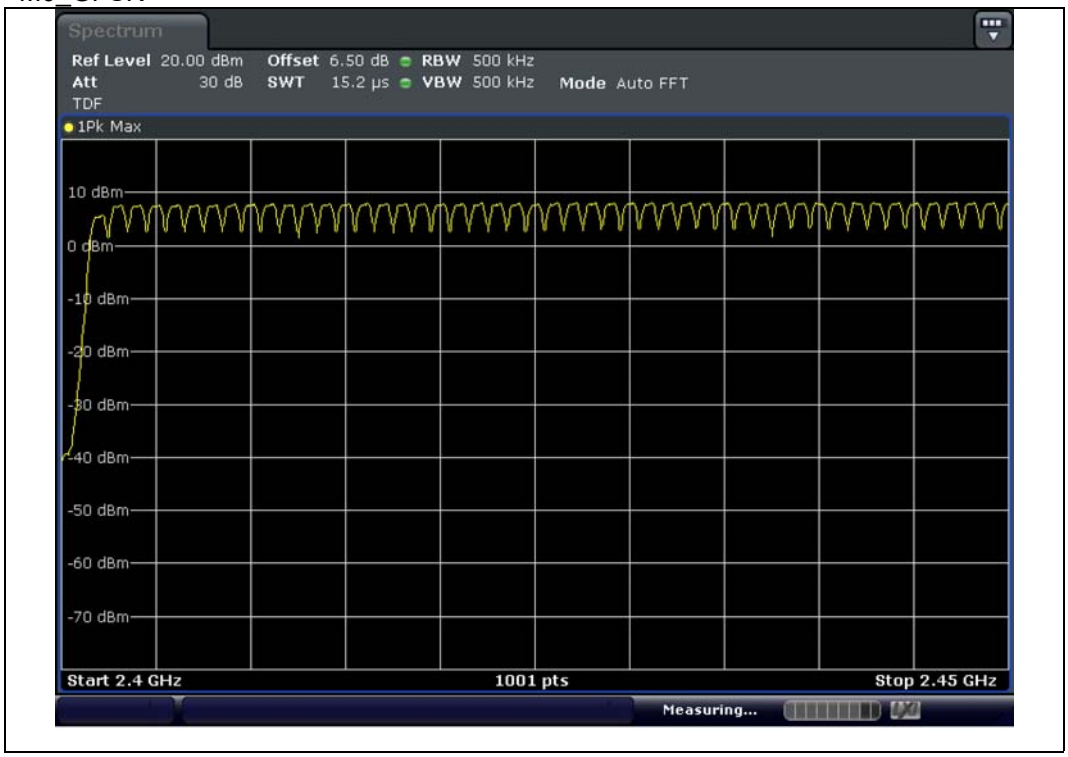
Comply (measurement data : refer to the next page)

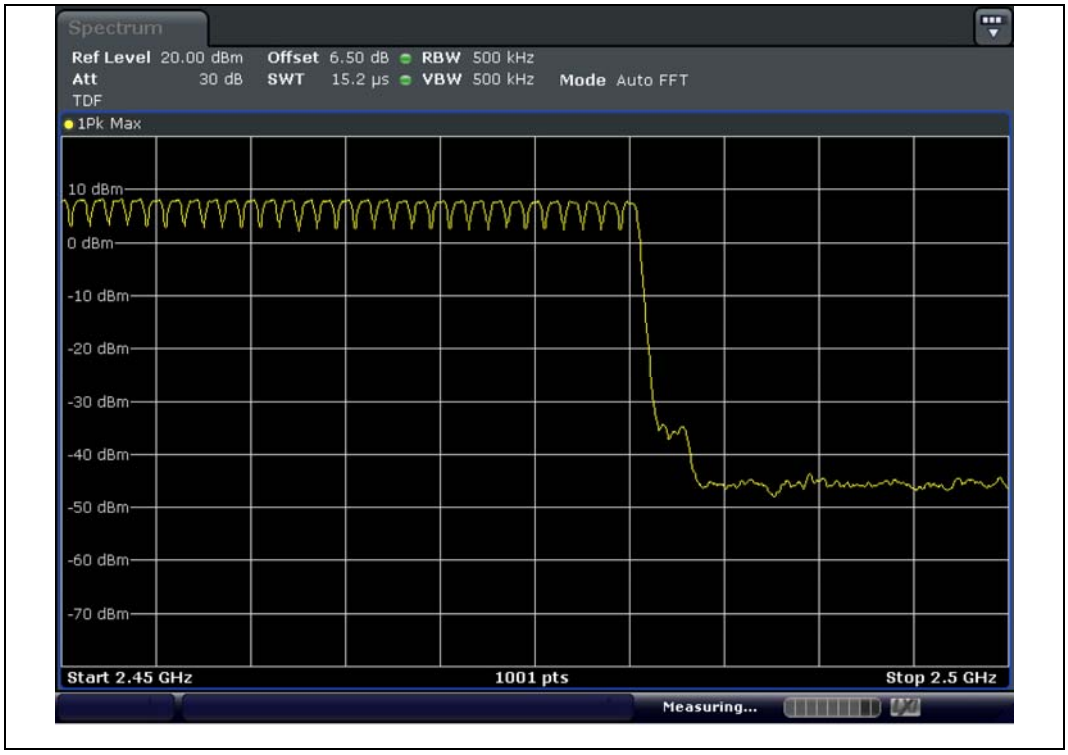
4.4.3.4 Measurement data

Total number of Hopping Channels is 79

4.4.3.5 Test Plot

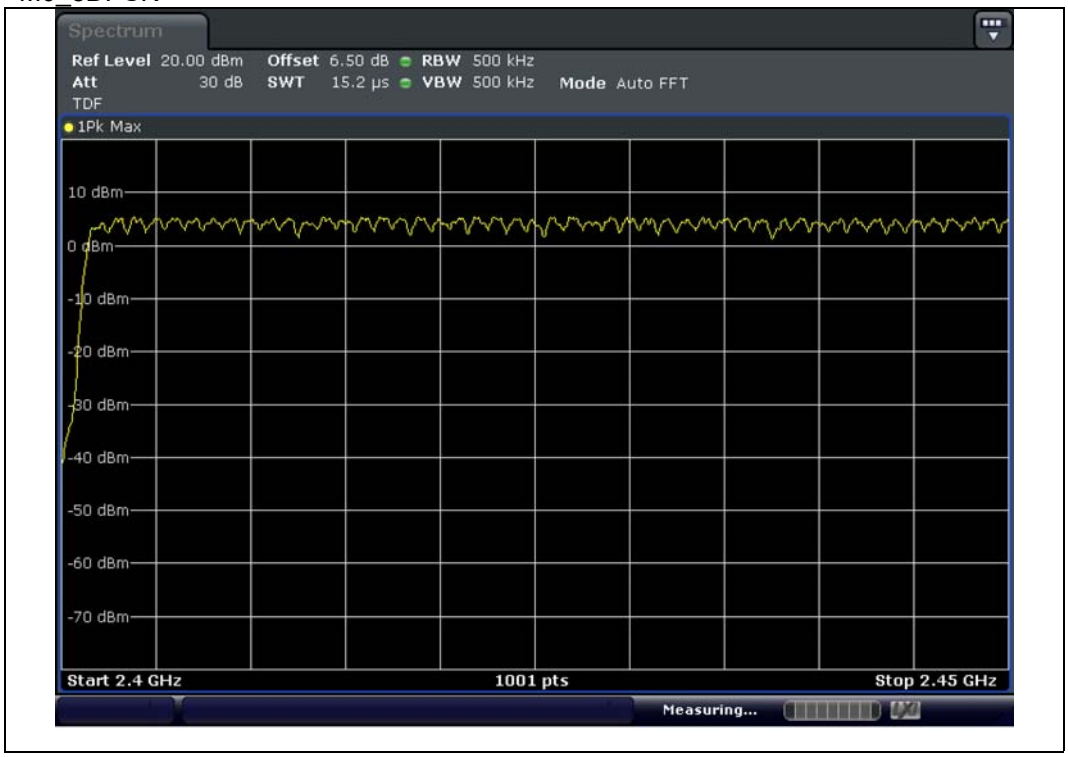
M0_GFSK





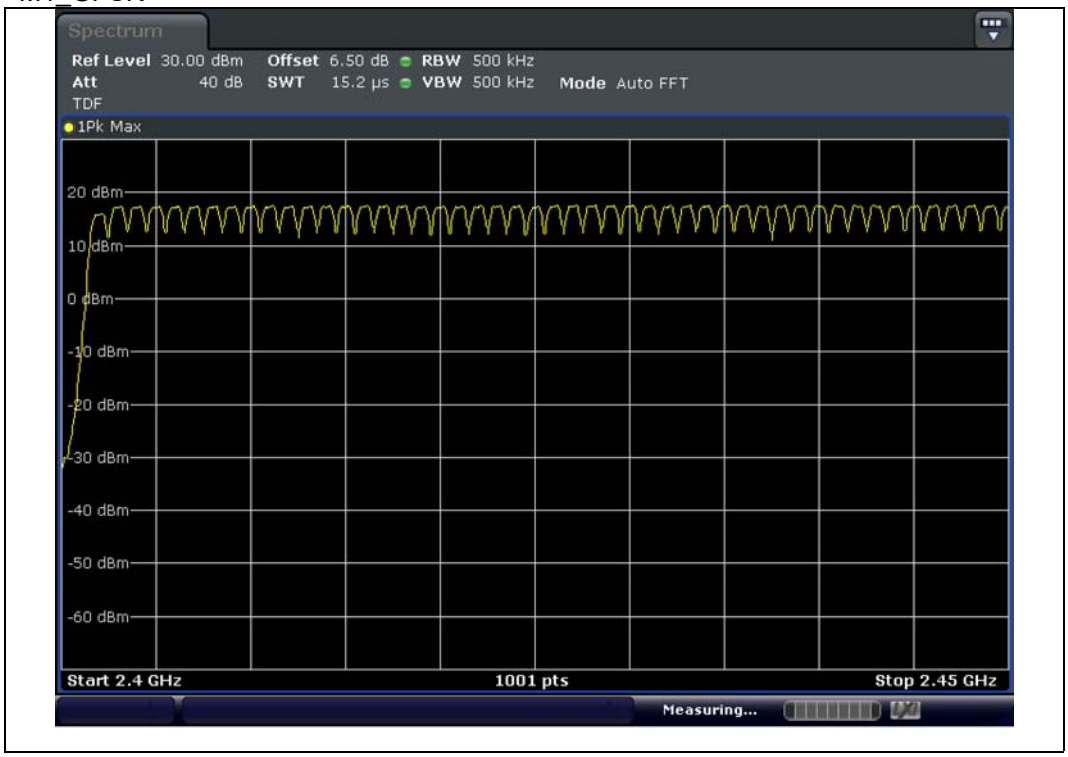
Total number of Hopping Channels is 79

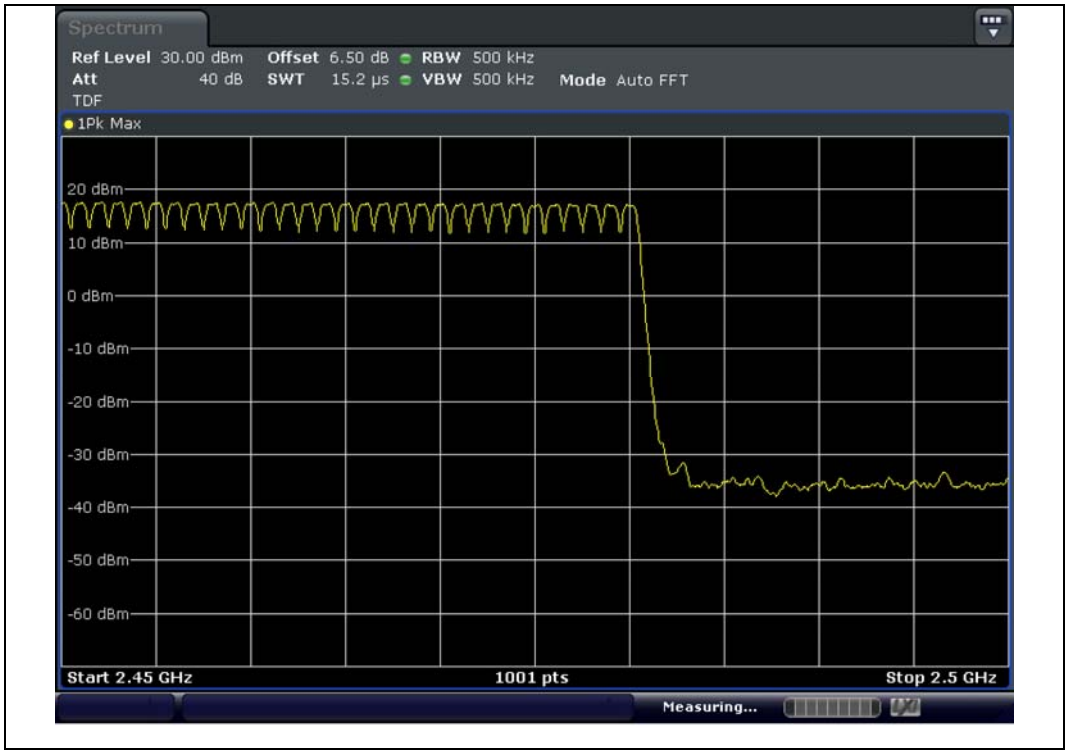
M0_8DPSK



Total number of Hopping Channels is 79

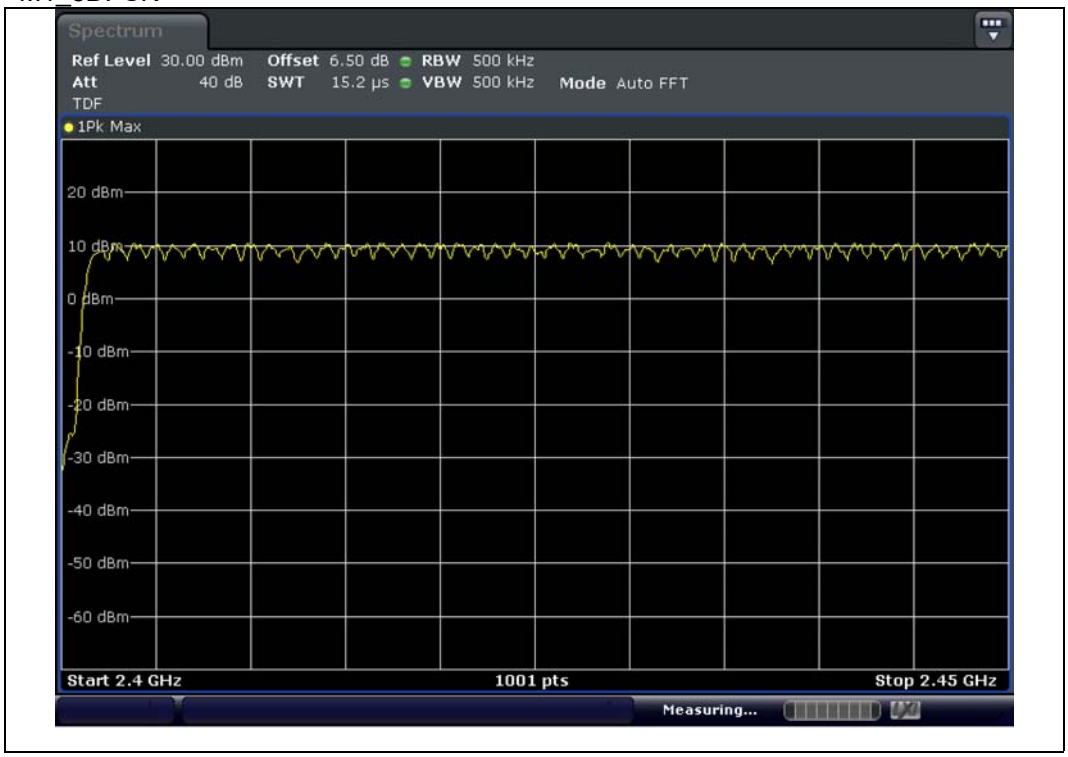
M1_GFSK





Total number of Hopping Channels is 79

M1_8DPSK



4.4.4 Time of occupancy (Dwell Time)

4.4.4.2 Regulation

According to §15.247(a)(1)(iii) and RSS-247 §5.1(d) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

4.4.4.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines
ANSI C63.10 § 7.8.3 Time of Occupancy

4.4.4.3 Result

Comply (measurement data : refer to the next page)

4.4.4.4 Measurement data

Test mode : Hopping

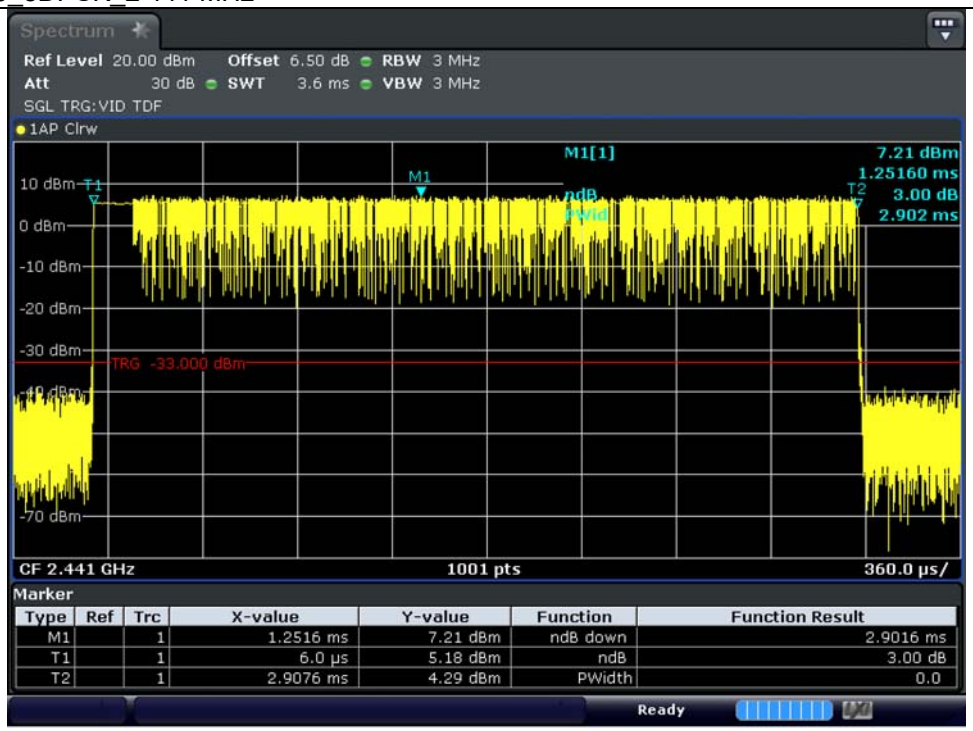
Time of occupancy				
Packet Type	Number of hopping Channels	Burst On Time (ms)	Result (sec)	Limit (sec)
M0_GFSK (non-AFH)	79	2.891	0.308	0.400
M0_GFSK(AFH)	20	2.891	0.154	0.400
M0_8DPSK (non-AFH)	79	2.902	0.310	0.400
M0_8DPSK(AFH)	20	2.902	0.155	0.400
M1_GFSK (non-AFH)	79	2.894	0.309	0.400
M1_GFSK(AFH)	20	2.894	0.154	0.400
M1_8DPSK (non-AFH)	79	2.902	0.310	0.400
M1_8DPSK(AFH)	20	2.902	0.155	0.400

NOTE1 : Result = 0.4 * Hopping Channel * Burst On Time * ((Hopping rate/Time slots)/Hopping channel)
- Time slots for DH5 = 6 slots(TX = 5 slot, RX = 1 slot)
- Hopping Rate = 1600 for FH mode
- Hopping Rate = 800 for AFH mode

4.4.4.5 Test Plot

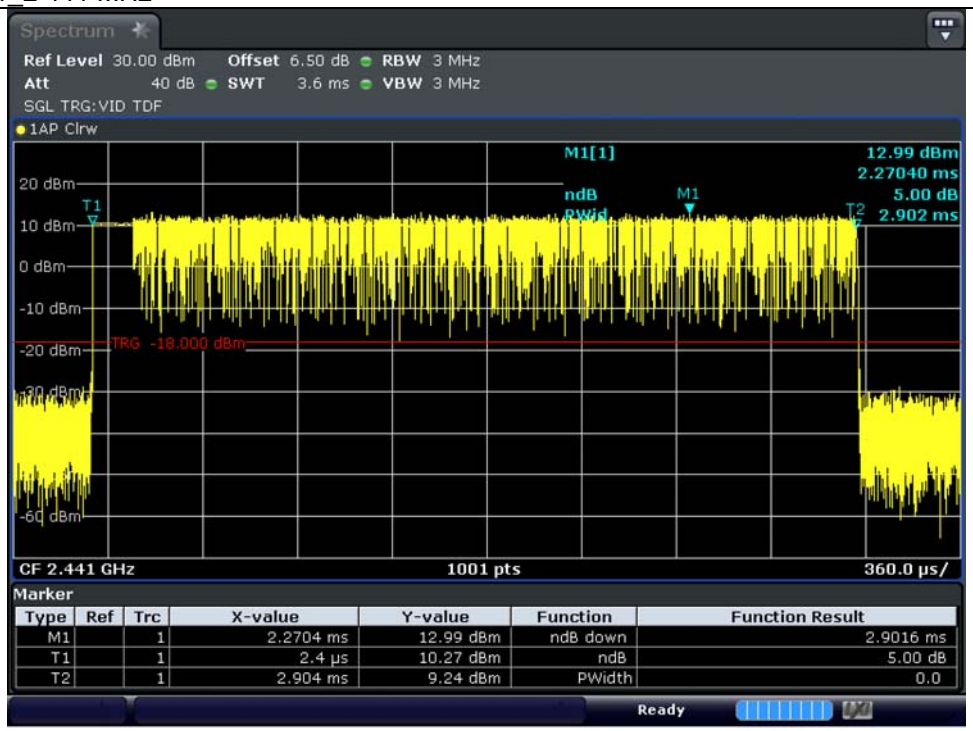
M0_GFSK_2 441 MHz

M0_8DPSK_2 441 MHz



M1_GFSK_2 441 MHz

M1_2 441 MHz



4.4.5 Carrier Frequencies Separation

4.4.5.2 Regulation

According to §15.247(a)(1) and RSS-247 §5.1(b) 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

4.4.5.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines
ANSI C63.10 § 7.8.2 Carrier frequency separation

4.4.5.3 Result

Comply (measurement data : refer to the next page)

4.4.5.4 Measurement data

Test mode : M0_GFSK

Carrier Frequency Separation		
Test Channel	Result (MHz)	Min. Limit (MHz)
Channel 1 to Channel 2	1.00	0.54
Channel 39 to Channel 40	1.00	0.54
Channel 78 to Channel 79	1.00	0.54

NOTE1 : Limit(kHz) : Result of 20 dB Bandwidth*2/3

Test mode : M0_8DPSK

Carrier Frequency Separation		
Test Channel	Result (MHz)	Min. Limit (MHz)
Channel 1 to Channel 2	1.00	0.80
Channel 39 to Channel 40	1.00	0.83
Channel 78 to Channel 79	1.00	0.83

NOTE1 : Limit(kHz) : Result of 20 dB Bandwidth*2/3

Test mode : M1_GFSK

Carrier Frequency Separation		
Test Channel	Result (MHz)	Min. Limit (MHz)
Channel 1 to Channel 2	1.00	0.54
Channel 39 to Channel 40	1.00	0.54
Channel 78 to Channel 79	1.00	0.54

NOTE1 : Limit(kHz) : Result of 20 dB Bandwidth*2/3

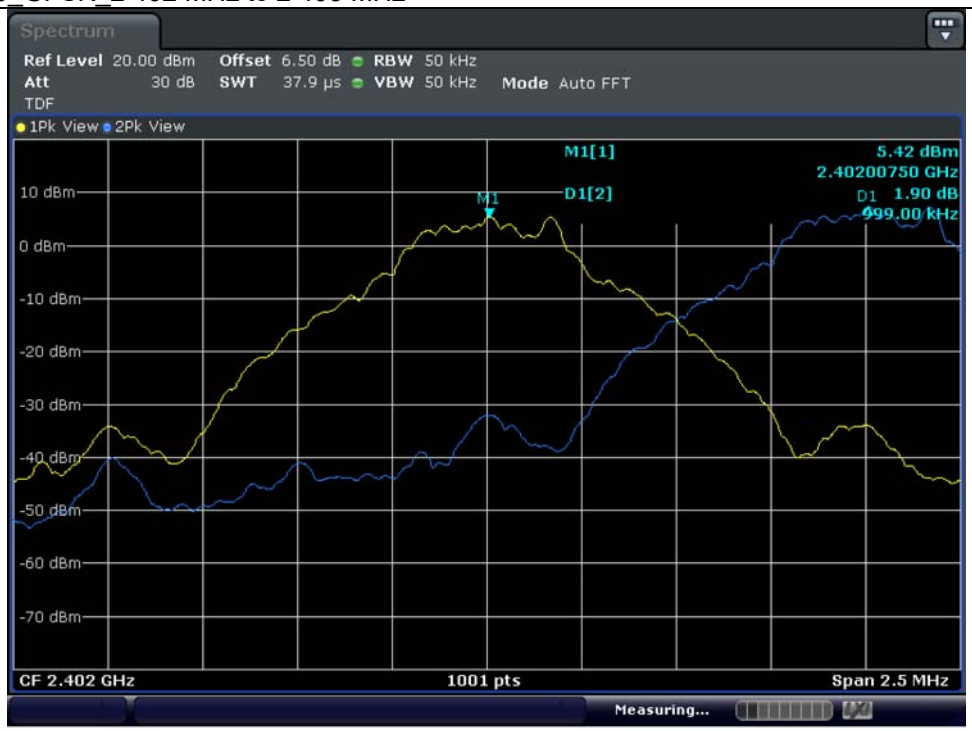
Test mode : M1_8DPSK

Carrier Frequency Separation		
Test Channel	Result (MHz)	Min. Limit (MHz)
Channel 1 to Channel 2	1.00	0.80
Channel 39 to Channel 40	1.00	0.83
Channel 78 to Channel 79	1.00	0.83

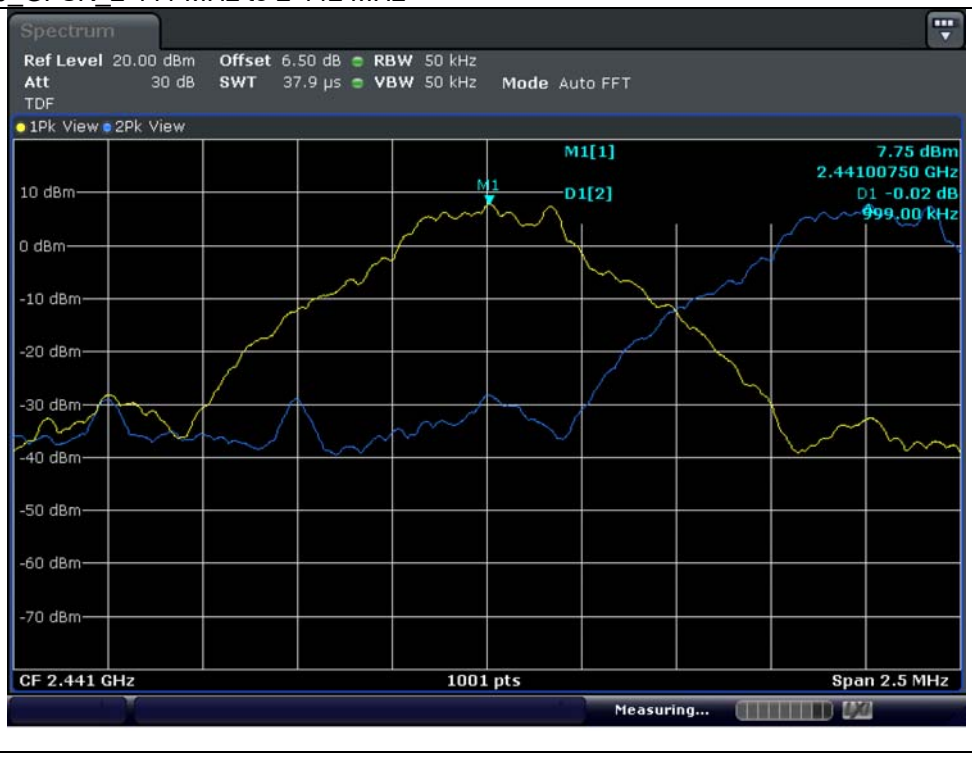
NOTE1 : Limit(kHz) : Result of 20 dB Bandwidth*2/3

4.4.5.5 Test Plot

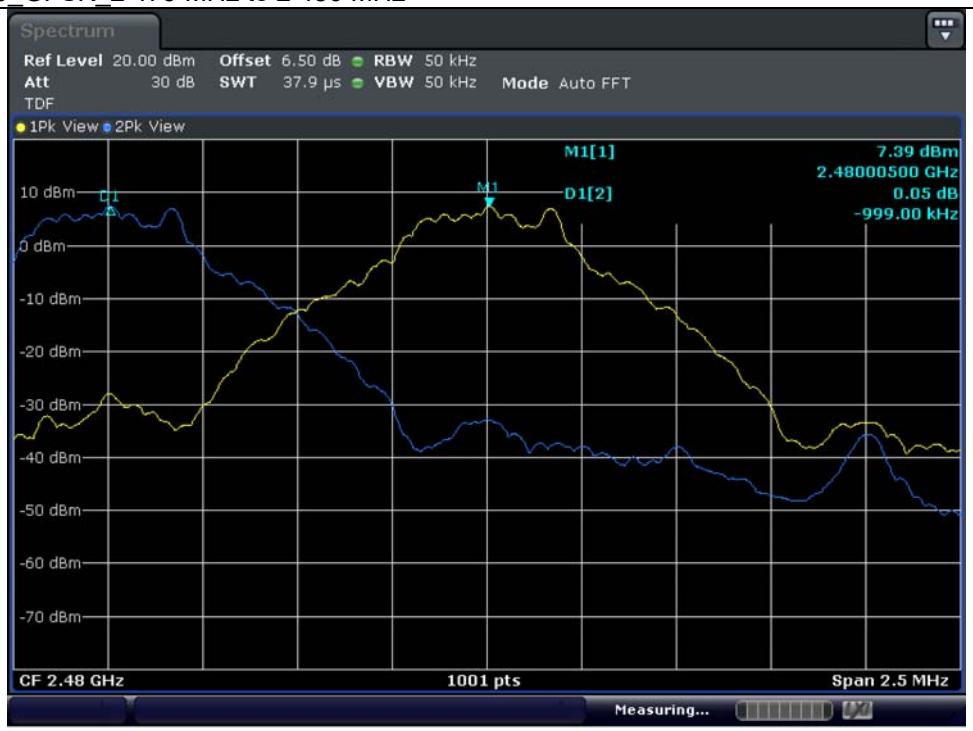
M0_GFSK_2 402 MHz to 2 403 MHz



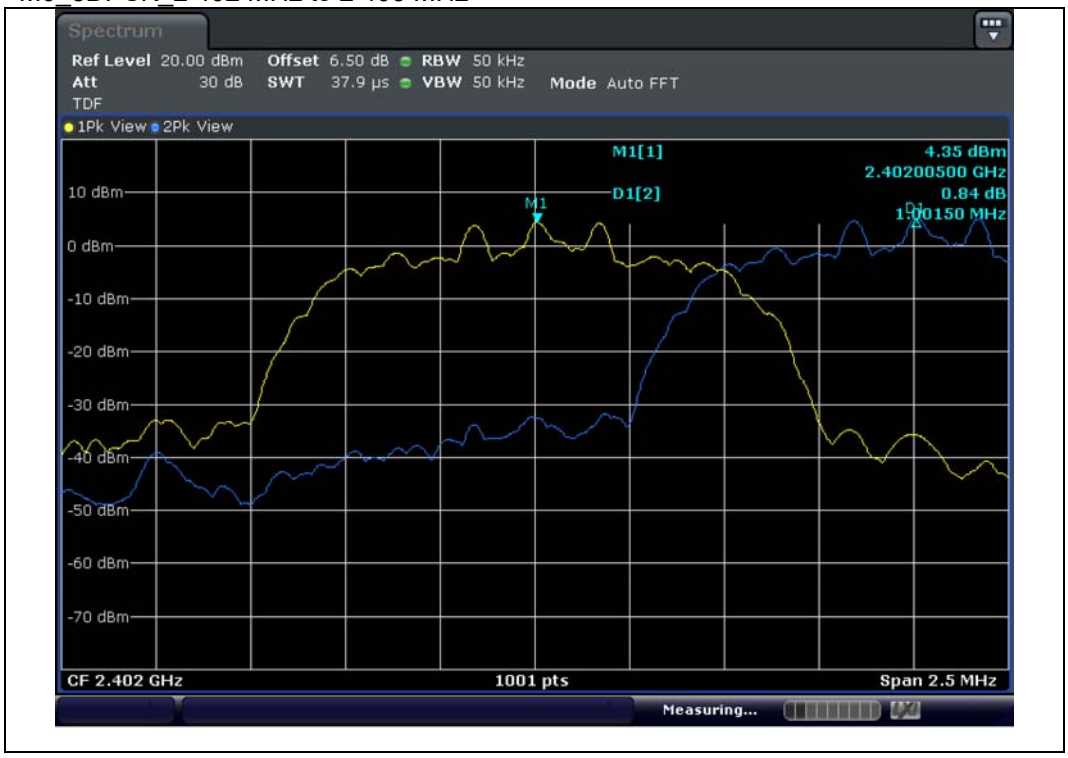
M0_GFSK_2 441 MHz to 2 442 MHz



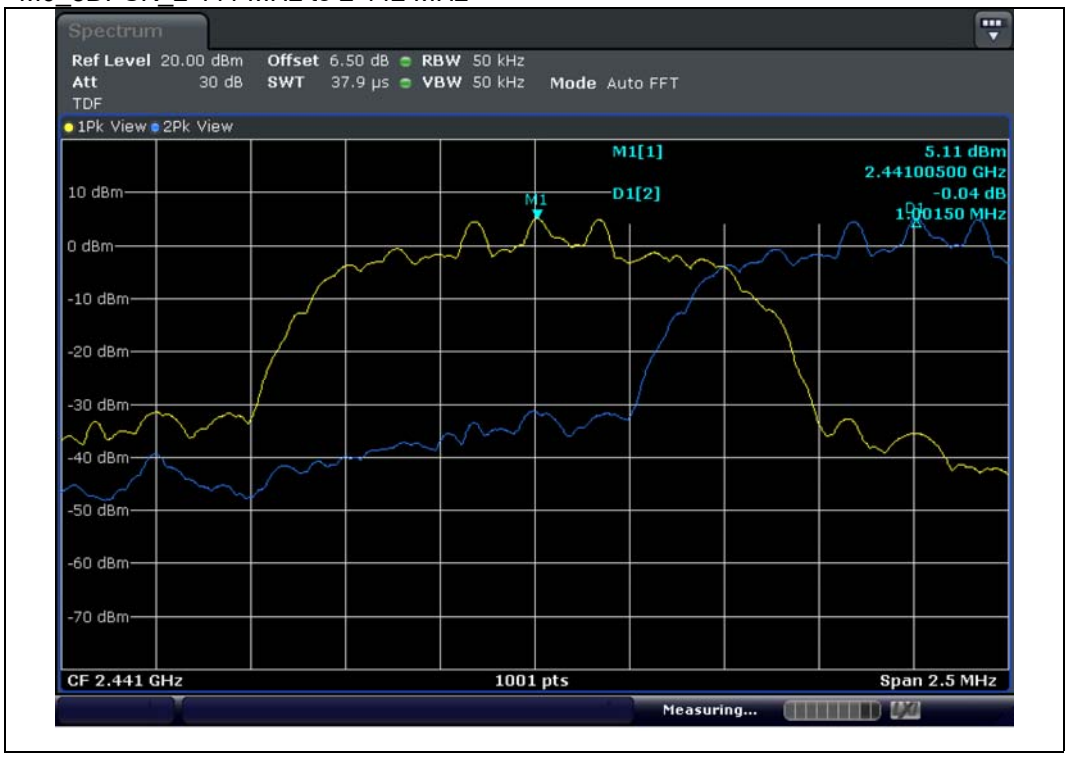
M0_GFSK_2 479 MHz to 2 480 MHz



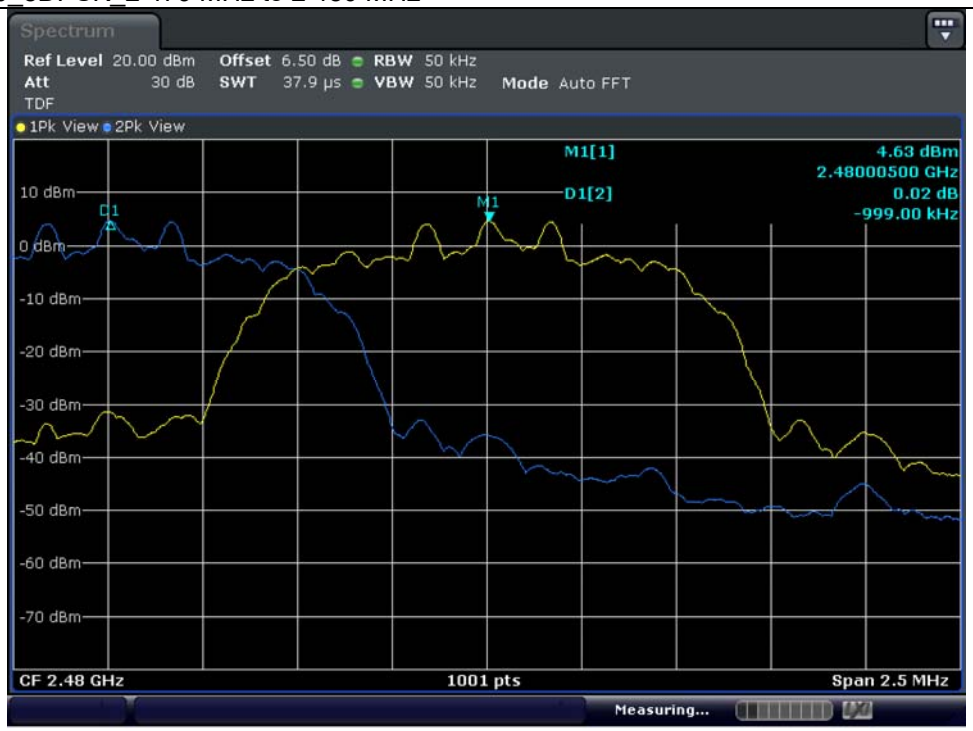
M0_8DPSK_2 402 MHz to 2 403 MHz



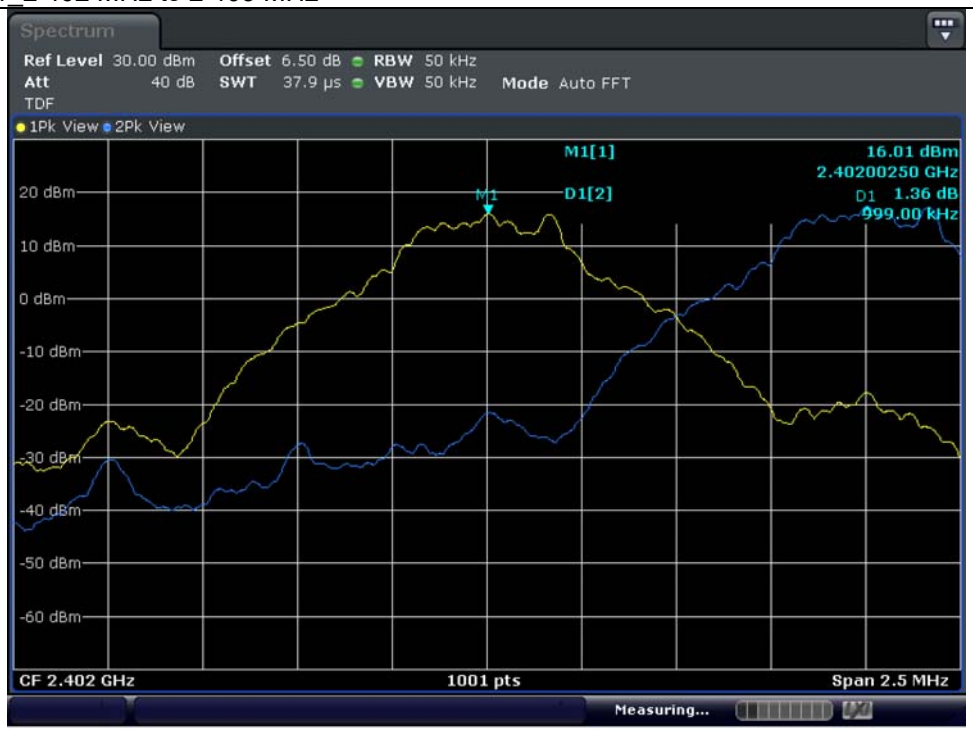
M0_8DPSK_2 441 MHz to 2 442 MHz



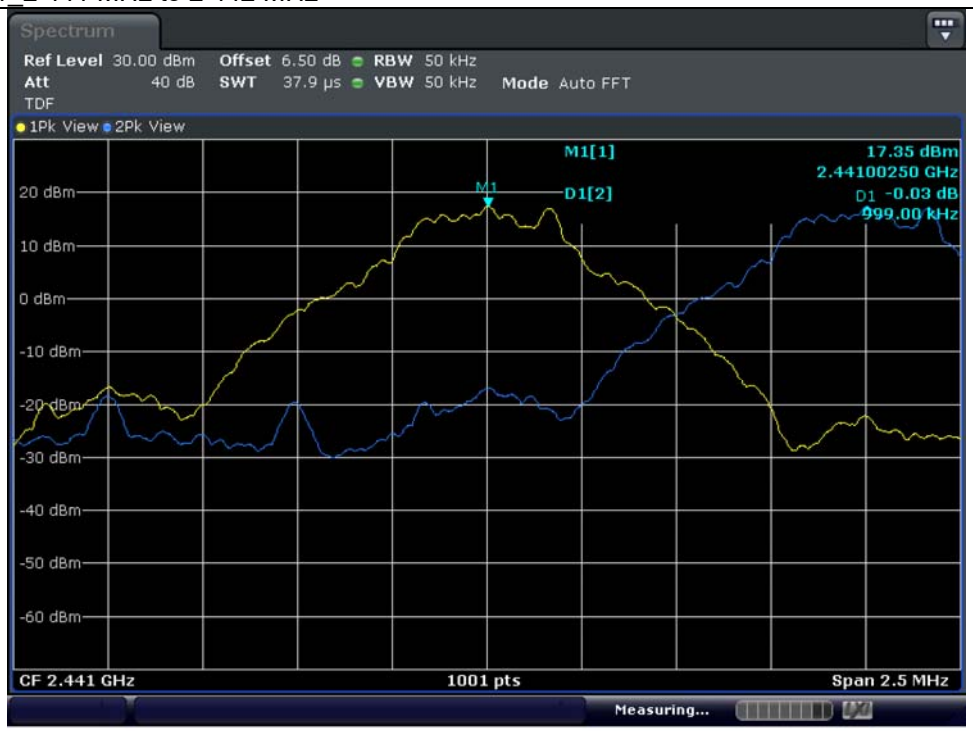
M0_8DPSK_2 479 MHz to 2 480 MHz



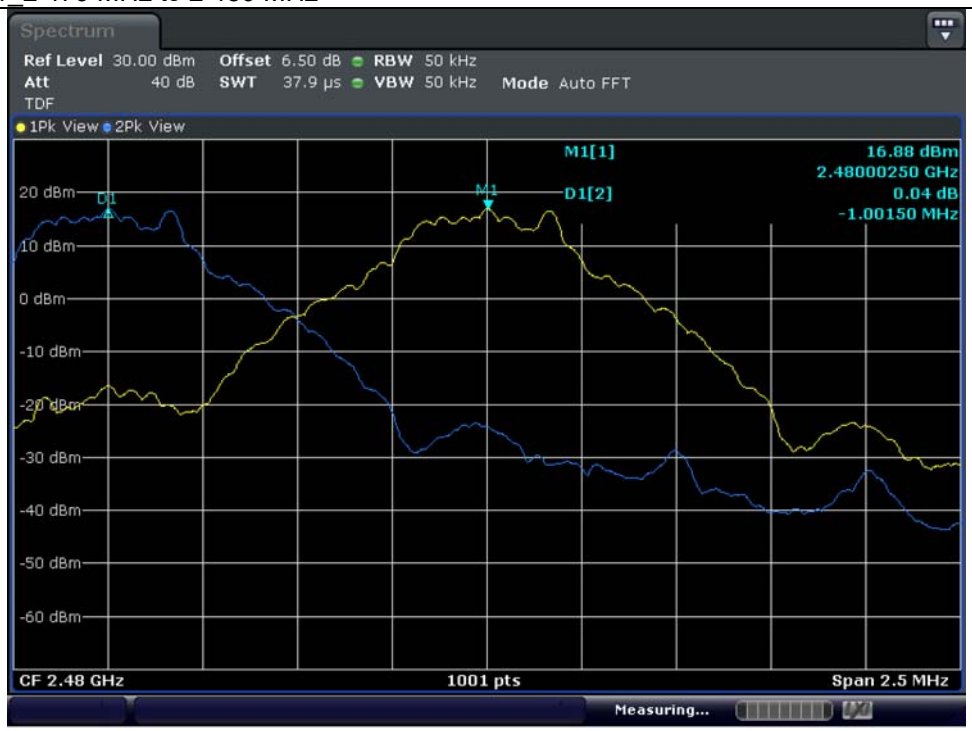
M1_2 402 MHz to 2 403 MHz



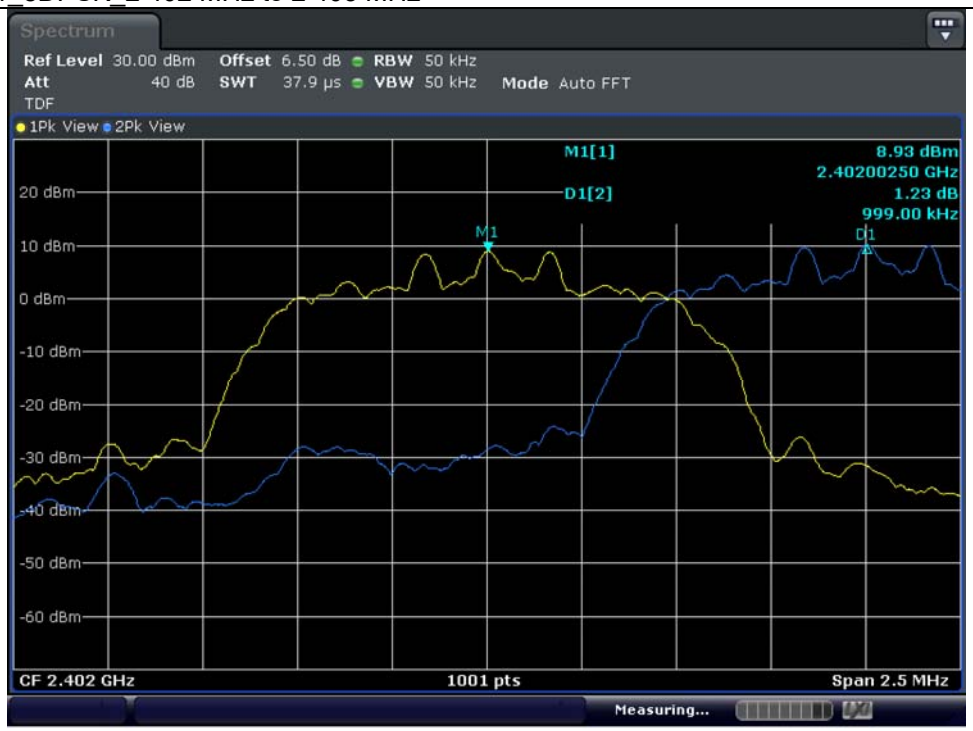
M1_2 441 MHz to 2 442 MHz



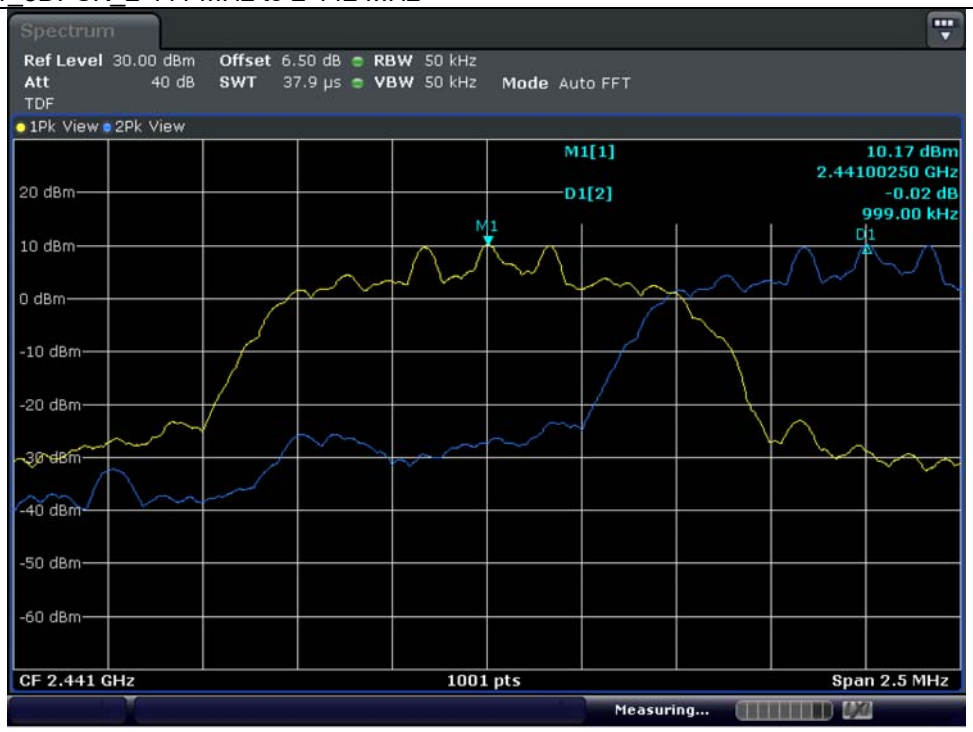
M1_2 479 MHz to 2 480 MHz



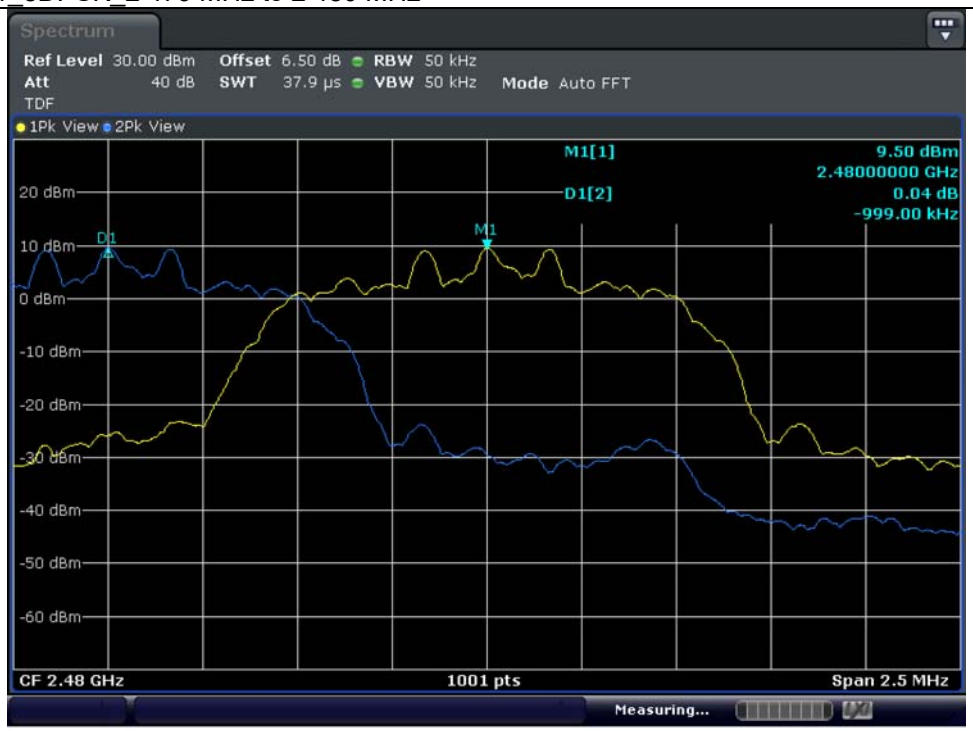
M1_8DPSK_2 402 MHz to 2 403 MHz



M1_8DPSK_2 441 MHz to 2 442 MHz



M1_8DPSK_2 479 MHz to 2 480 MHz



4.4.6 Peak Output Power

4.4.6.1 Regulation

According to §15.247(b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
According to RSS-247 §5.4(b) For FHSS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

4.4.6.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines
ANSI C63.10 § 7.8.5 Output Power test procedure for FHSS

4.4.6.3 Result

Comply (measurement data : refer to the next page)

4.4.6.4 Measurement data

Test mode : M0_GFSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	5.87	3.86	1000.00	4.85
2 441	8.23	6.65	1000.00	7.05
2 480	7.94	6.22	1000.00	6.59

NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

Test mode : M0_π/4-DQPSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	5.84	3.84	125.00	2.78
2 441	6.87	4.86	125.00	3.44
2 480	6.25	4.21	125.00	2.90

NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

Test mode : M0_8DPSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	6.28	4.25	125.00	2.77
2 441	7.23	5.28	125.00	3.44
2 480	6.52	4.49	125.00	2.89

NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

Test mode : M1_GFSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	16.53	44.98	1000.00	15.54
2 441	17.81	60.37	1000.00	16.96
2 480	17.33	54.10	1000.00	16.52

NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

Test mode : M1_π/4-DQPSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	10.78	11.97	125.00	7.41
2 441	12.01	15.89	125.00	8.47
2 480	11.16	13.05	125.00	7.87

NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

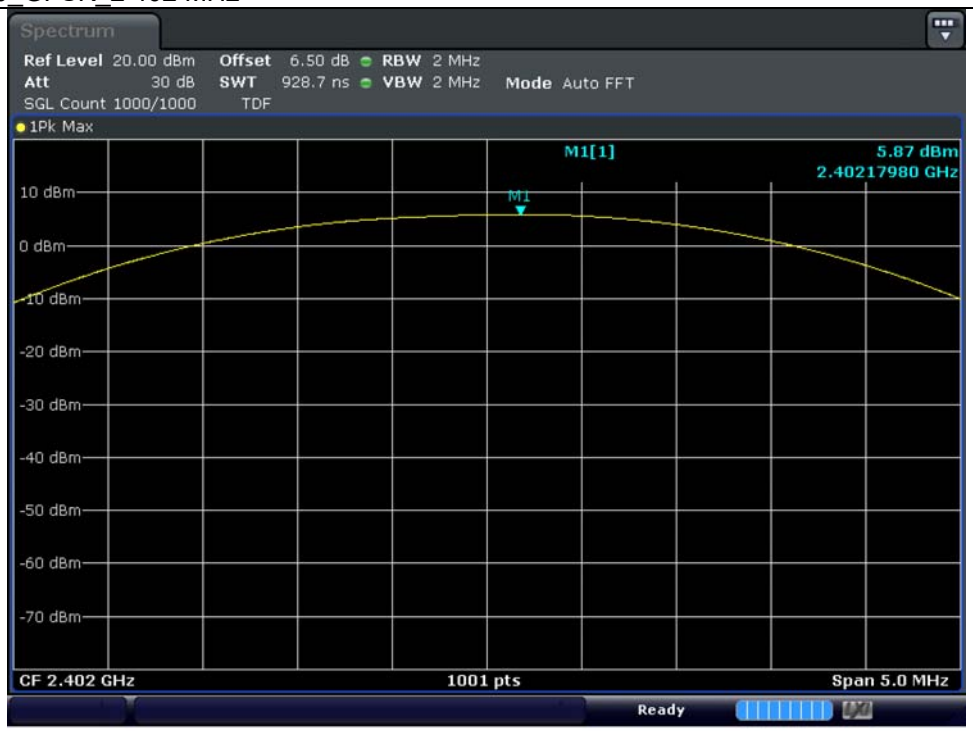
Test mode : M1_8DPSK

Frequency (MHz)	Peak Output Power Result (dBm)	Peak Output Power Result (mW)	Peak Output Power Limit (mW)	Avg Output Power Result (dBm)
2 402	11.14	12.99	125.00	7.40
2 441	12.84	19.25	125.00	8.48
2 480	11.69	14.75	125.00	7.86

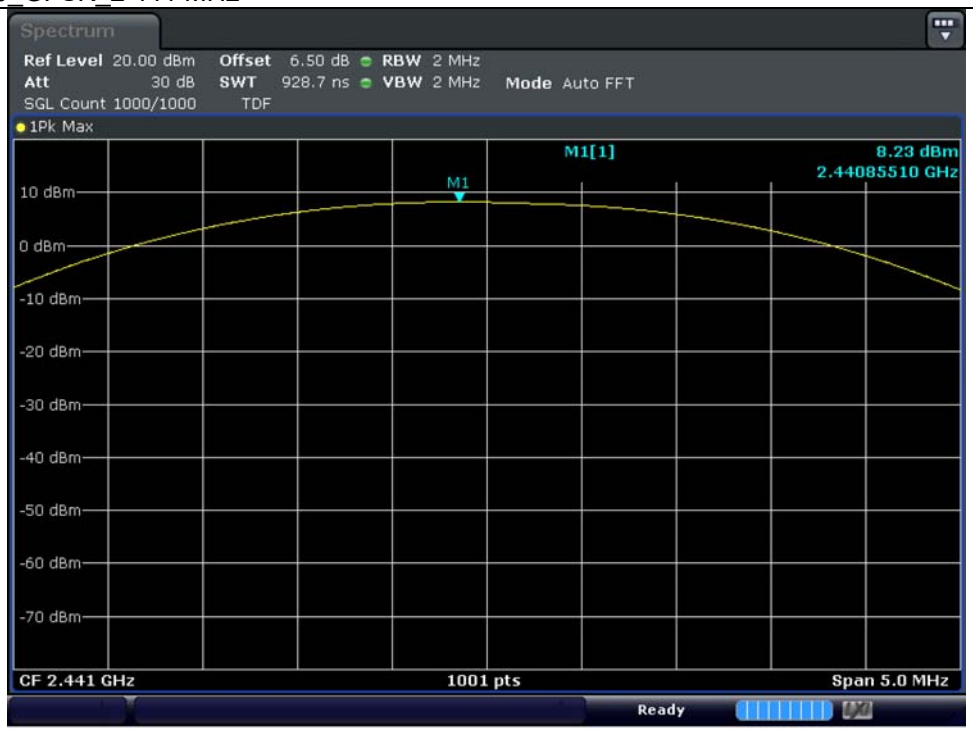
NOTE1 : Since the directional gain of the PCB Antenna declared by the manufacturer, does not exceed 6.0 dBi ,there was no need to reduce the output power.
NOTE2 : We took the insertion loss of the cable loss into consideration within the measuring instrument.
NOTE3 : Peak Output Power Result(mW) = (10^(Peak Output Power Result(dBm)/10))
NOTE4 : In the case of AFH, the limit for peak power is 0.125W

4.4.6.5 Test Plot

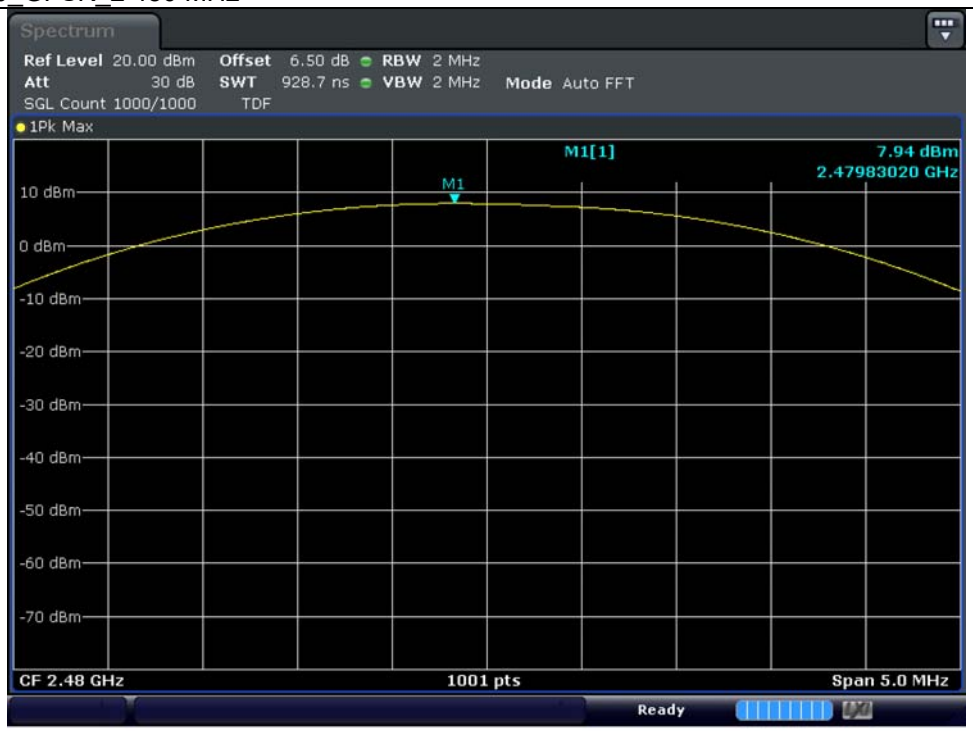
M0_GFSK_2 402 MHz



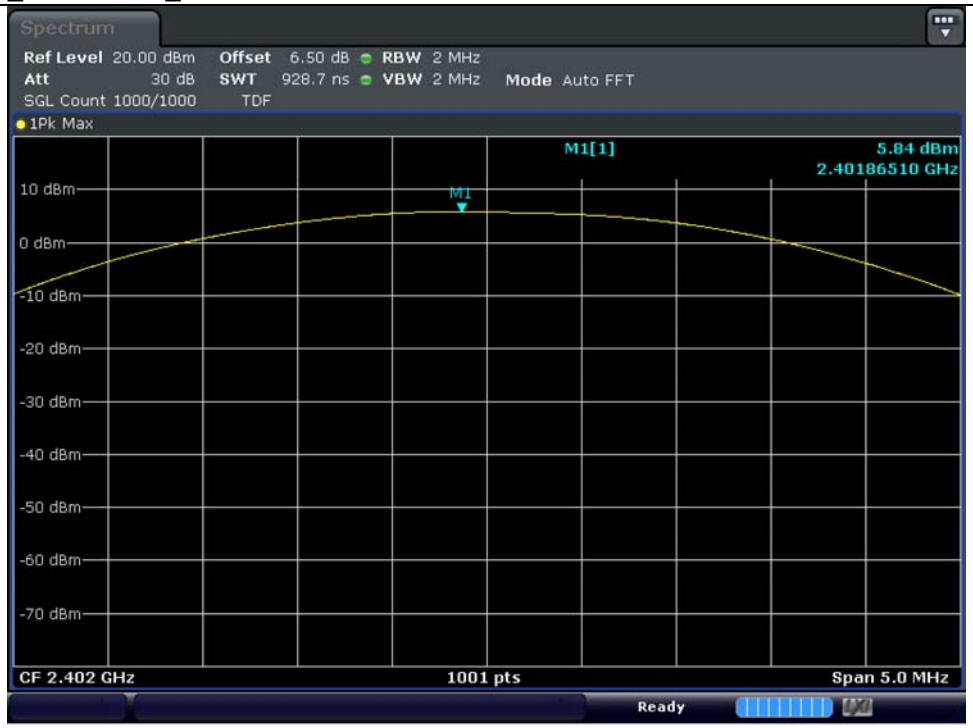
M0_GFSK_2 441 MHz



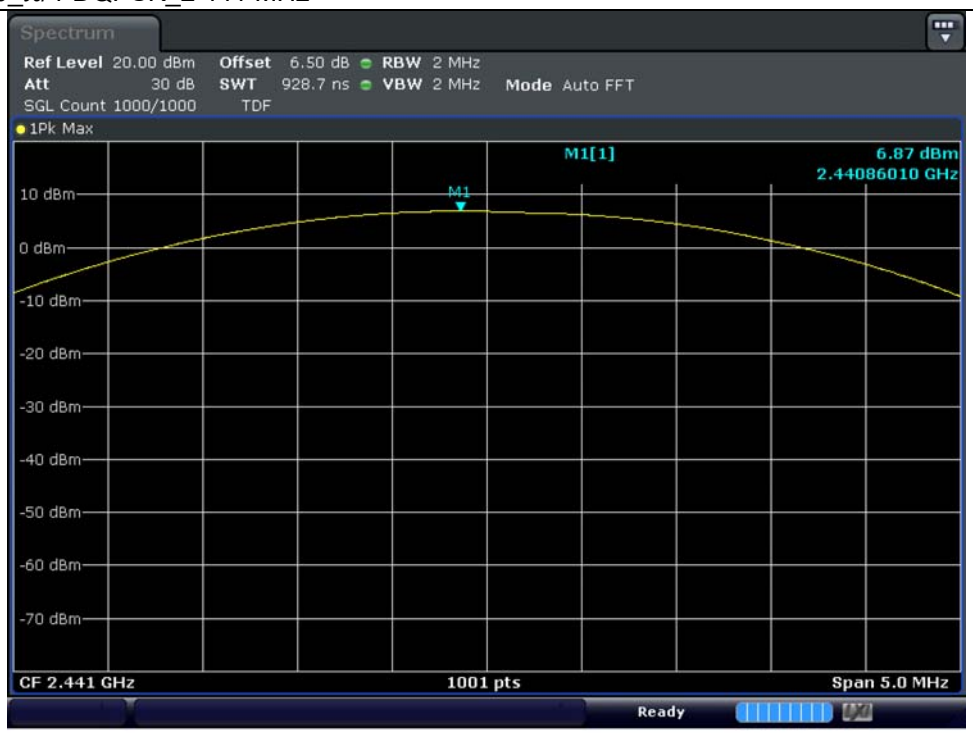
M0_GFSK_2 480 MHz



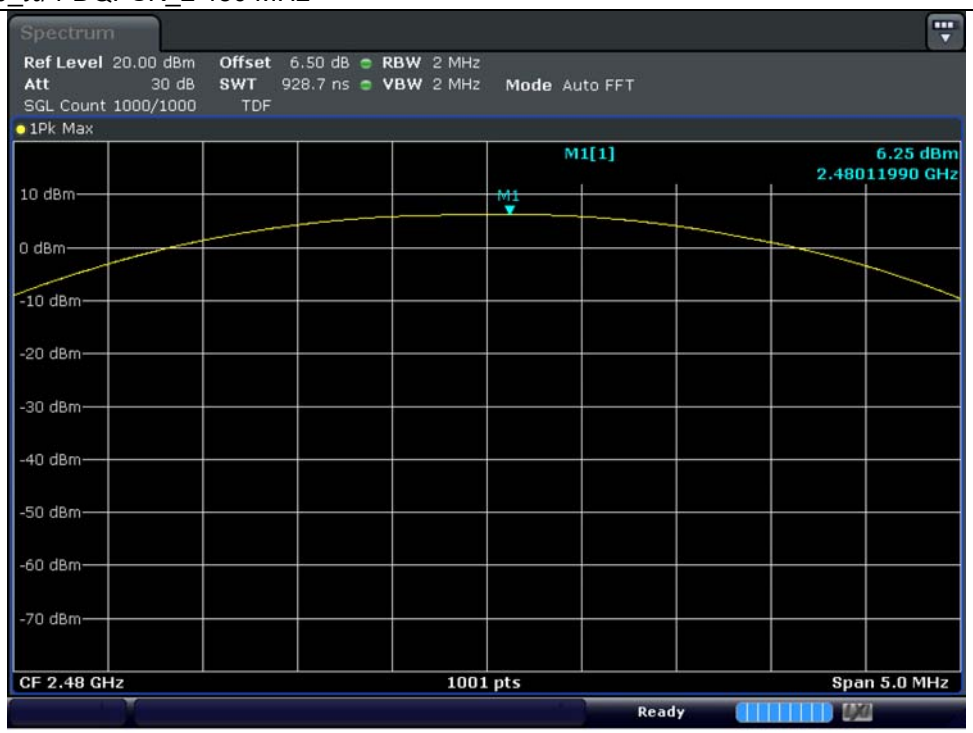
M0_π/4-DQPSK_2 402 MHz



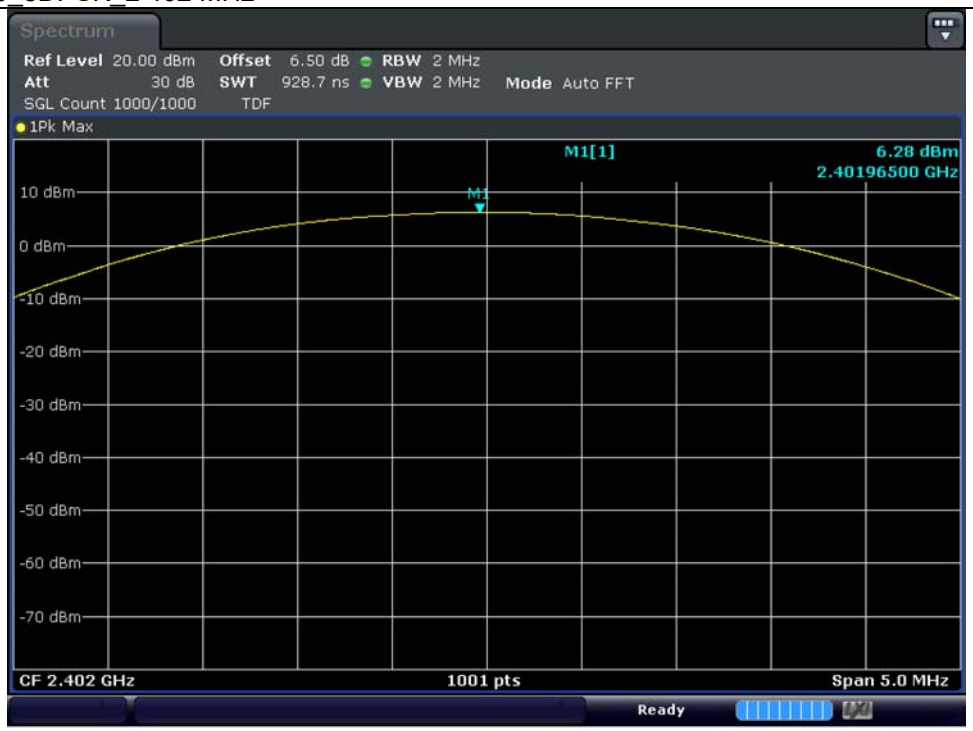
M0_π/4-DQPSK_2 441 MHz



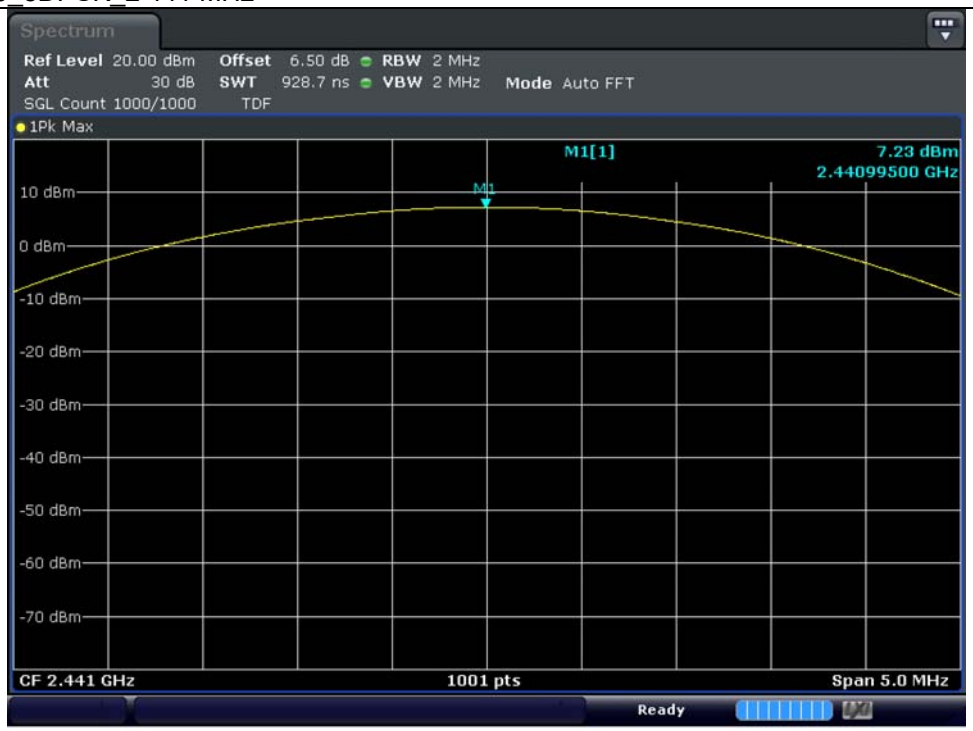
M0_π/4-DQPSK_2 480 MHz



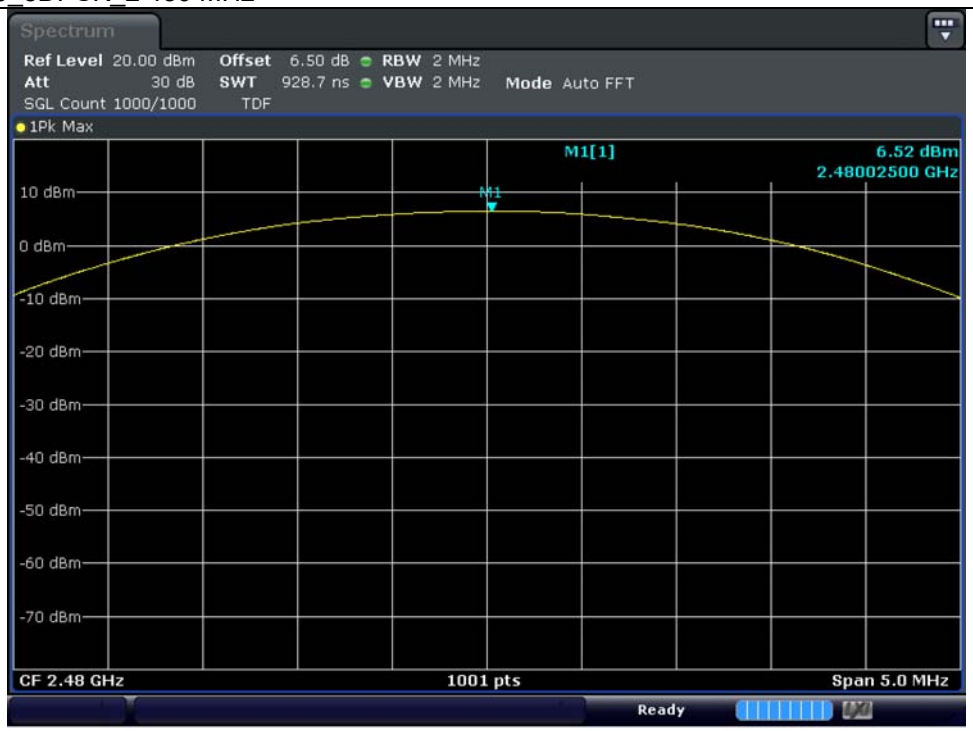
M0_8DPSK_2 402 MHz



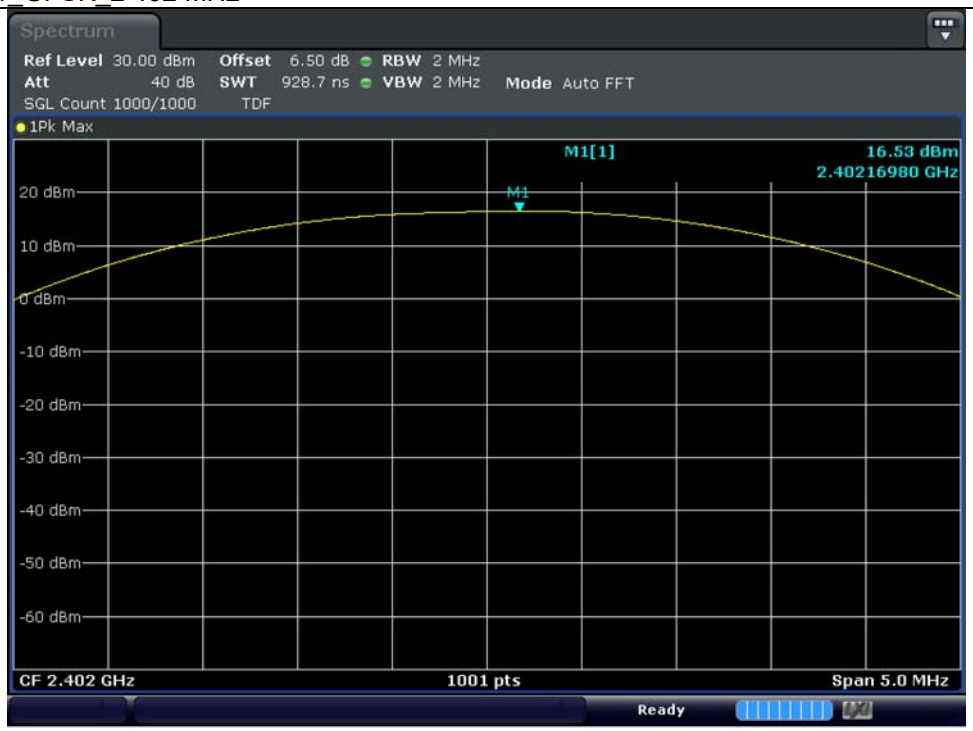
M0_8DPSK_2 441 MHz



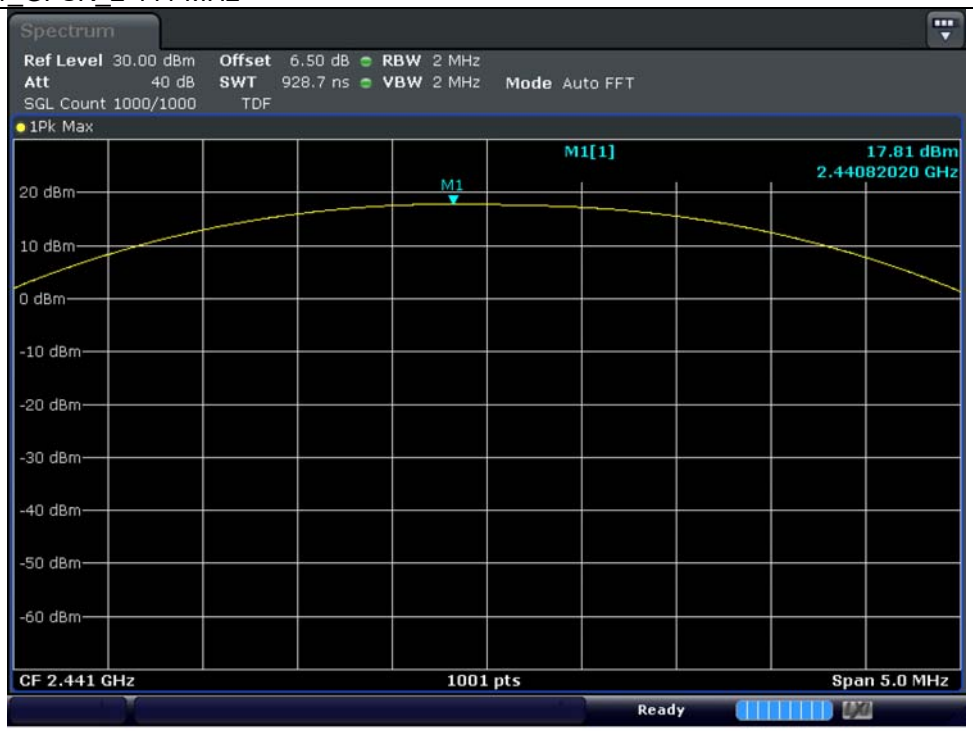
M0_8DPSK_2 480 MHz



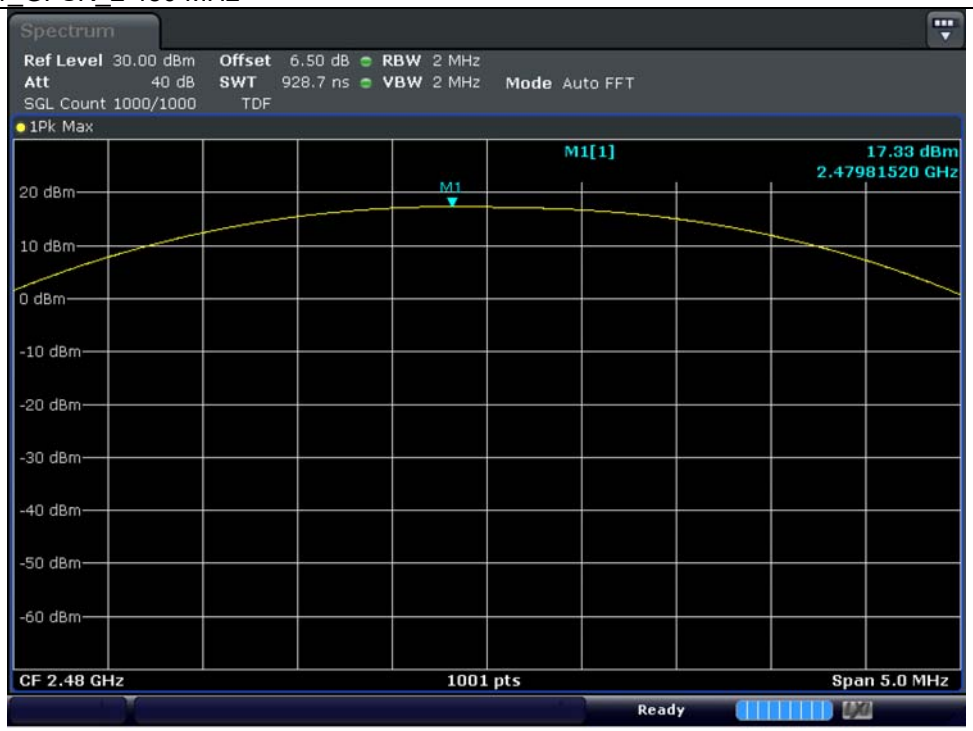
M1_GFSK_2 402 MHz



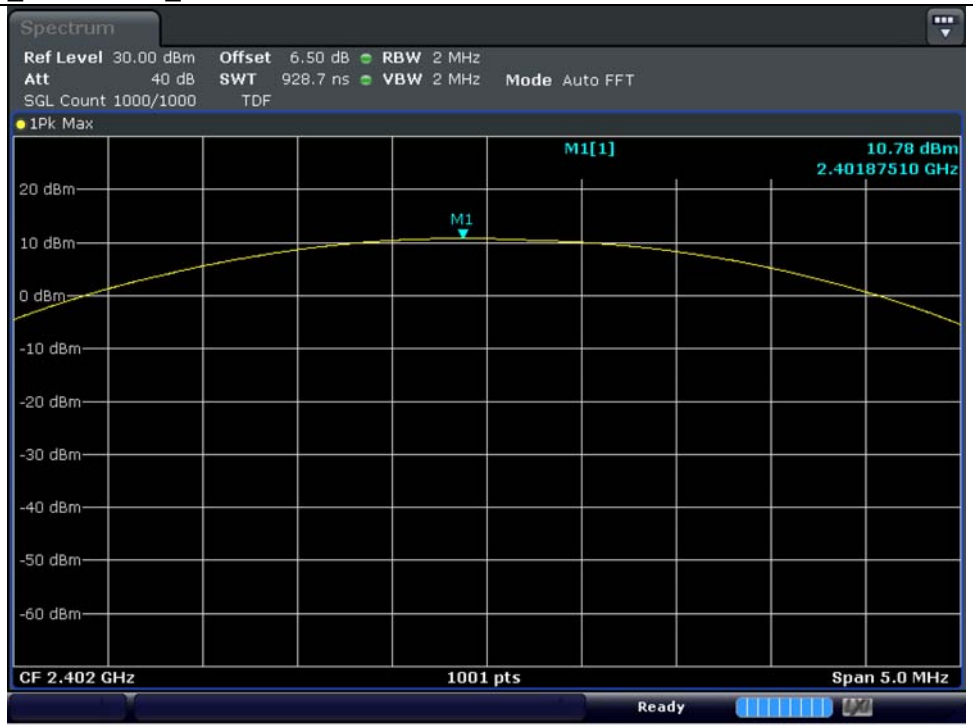
M1_GFSK_2 441 MHz



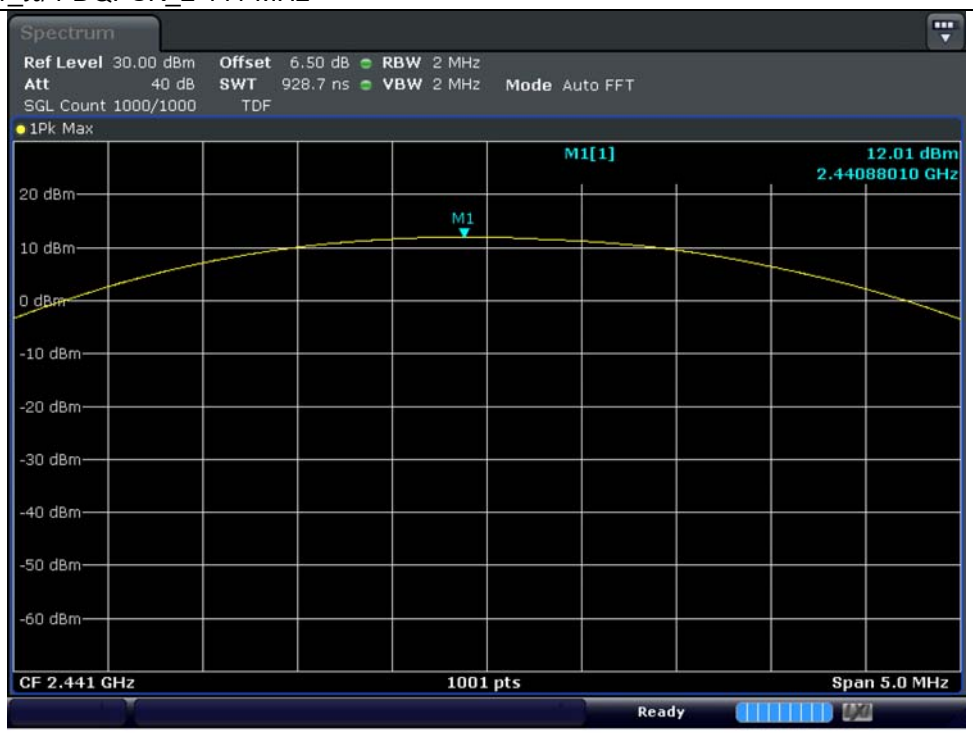
M1_GFSK_2 480 MHz



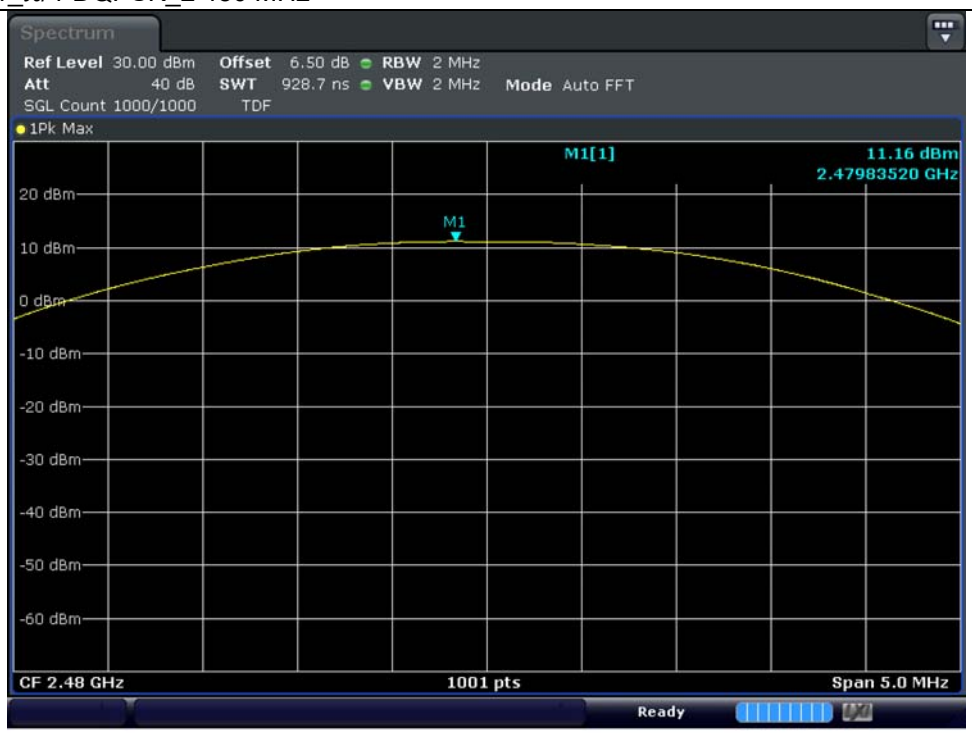
M1_π/4-DQPSK_2 402 MHz



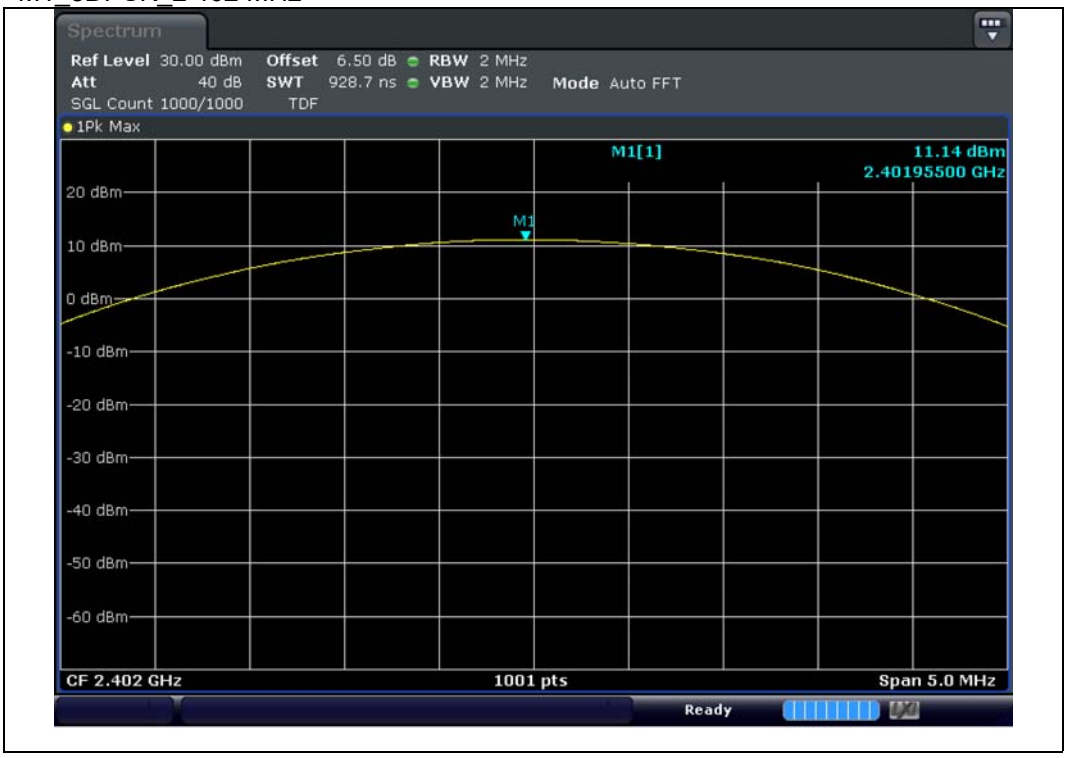
M1_π/4-DQPSK_2 441 MHz



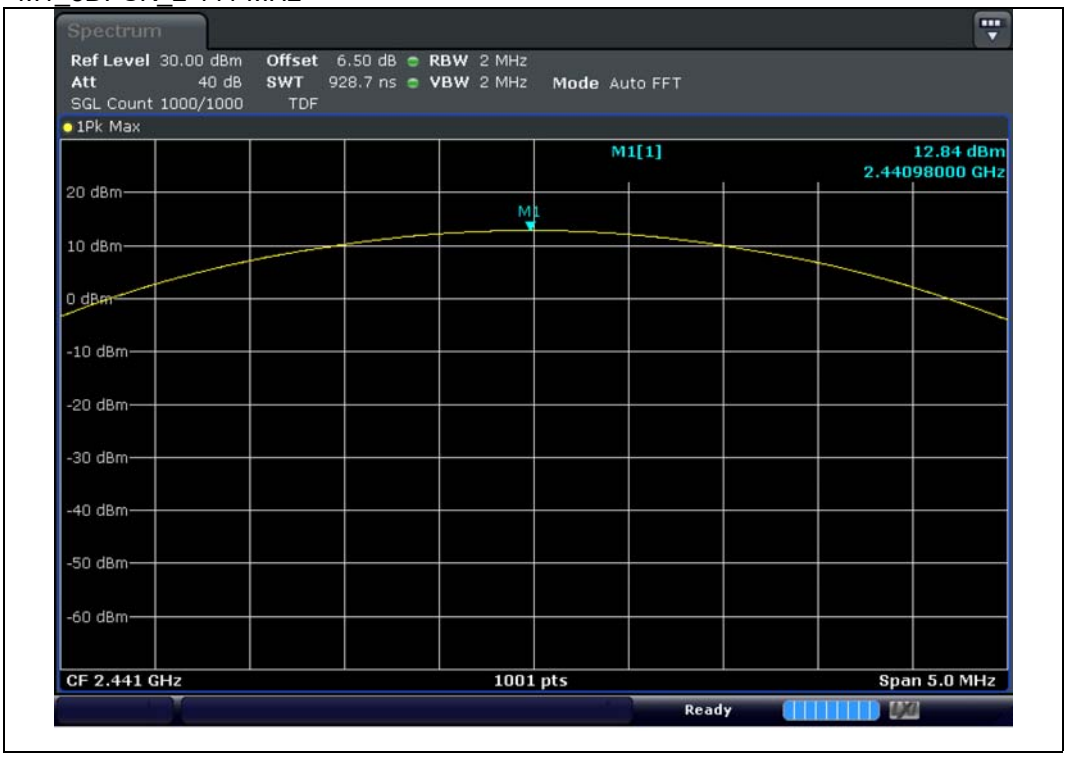
M1_π/4-DQPSK_2 480 MHz



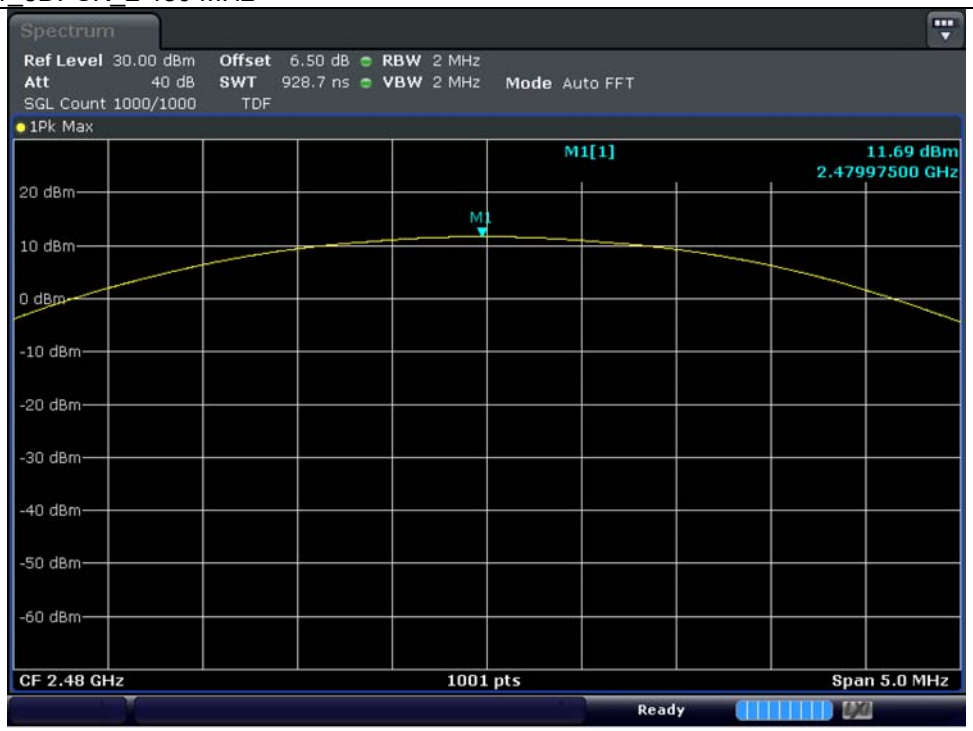
M1_8DPSK_2 402 MHz



M1_8DPSK_2 441 MHz



M1_8DPSK_2 480 MHz



4.4.7 Spurious Emission, Band Edge, and Restricted bands

4.4.7.1 Regulation

According to §15.247(d) and RSS-247 §5.5 in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

According to §15.209(a) and RSS-GEN §8.9 Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shallnot be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

According to §15.205(a),(b) and RSS-GEN §8.10 only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

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

4.4.7.2 Measurement Procedure

The testing follows FCC Public Notice DA 00-705 Measurement Guidelines
ANSI C63.10 § 6.10.4 Authorized band-edge relative method (lower bandedge)
ANSI C63.10 § 6.10.6 Marker Delta Method (upper restricted bandedge)
ANSI C63.10 § 11.11.1 General Information
ANSI C63.10 § 11.11.3 Emission level measurement

4.4.7.2.1 Band-edge Compliance of RF Conducted Emissions

Span : wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
RBW : ≥ 1% of the span
VBW : ≥ RBW
Sweep : Auto
Detector : Peak
Trace : Max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section. Submit this plot.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit. Submit this plot.

4.4.7.2.2 Conducted Spurious Emissions

Span : wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
RBW : ≥ 1% of the span
VBW : ≥ RBW
Sweep : Auto
Detector : 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. Submit these plots.

4.4.7.2.3 Radiated Spurious Emissions

1) The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 m(Below 1 GHz) and 1 m(Above 1 GHz).
2) The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the BILOG broadband antenna, and from 1 000 MHz to 10 000 MHz using the horn antenna.
4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Span : wide enough to fully capture the emission being measured
RBW : ≥ 1 MHz for f ≥1 GHz, 100 kHz for f < 1 GHz
VBW : ≥ RBW
Sweep : Auto
Detector : Peak
Trace : Max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

NOTE1 : The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
NOTE2 : The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
NOTE3 : The 0.8 m height is for below 1 GHz testing, and 1.5 m is for above 1 GHz testing

4.4.7.3 Result

Comply (measurement data : refer to the next page)

4.4.7.4 Measurement data_Radiated Spurious Emissions

Test mode : Below 1 GHz (Worst case : M1_GFSK_2 402 MHz)

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Ant Factor (dB)	Loss (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1.001	QP	H	70.60	11.10	-29.70	52.00	67.60	15.60
1.001	QP	V	67.00	11.10	-29.70	48.40	67.60	19.20
34.729	QP	V	33.90	17.80	-29.60	22.10	40.00	17.90
54.250	QP	V	36.00	18.40	-29.20	25.20	40.00	14.80
55.220	QP	H	35.20	18.40	-29.30	24.30	40.00	15.70
79.833	QP	H	36.90	14.40	-29.10	22.20	40.00	17.80
83.956	QP	H	38.40	13.80	-28.90	23.30	40.00	16.70

Note 1 : Loss : Cable loss - Amp gain
Note 2 : Result : Reading + Ant Factor + Loss

Test mode : M0_Above 1 GHz_GFSK_2 402

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Factor (dB)	DCCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 323.98	PK	H	41.60	-3.24	-	38.36	74.00	35.64
2 336.44	PK	V	41.70	-3.24	-	38.46	74.00	35.54
2 557.63	PK	H	56.30	-2.64	-	53.66	74.00	20.34
	AV	H	53.00	-2.64	-24.76	25.60	54.00	28.40
2 557.63	PK	V	56.10	-2.64	-	53.46	74.00	20.54
	AV	V	51.40	-2.64	-24.76	24.00	54.00	30.00
4 803.74	PK	H	44.00	1.76	-	45.76	74.00	28.24
4 803.74	PK	V	44.90	1.76	-	46.66	74.00	27.34
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M0_Above 1 GHz_GFSK_2 441

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBμV)	Factor (dB)	DCCF (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 497.00	PK	H	51.40	-2.74	-	48.66	74.00	25.34
2 597.22	PK	H	52.40	-2.44	-	49.96	74.00	24.04
2 597.22	PK	V	53.40	-2.44	-	50.96	74.00	23.04
4 882.12	PK	H	46.60	1.86	-	48.46	74.00	25.54
4 882.12	PK	V	47.00	1.86	-	48.86	74.00	25.14
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M0_Above 1 GHz_GFSK_2 480

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 483.51	PK	H	55.70	-2.74	-	52.96	74.00	21.04
	AV	H	44.30	-2.74	-24.76	16.80	54.00	37.20
2 483.51	PK	V	55.30	-2.74	-	52.56	74.00	21.44
	AV	V	43.90	-2.74	-24.76	16.40	54.00	37.60
4 959.39	PK	H	44.30	1.76	-	46.06	74.00	27.94
4 959.39	PK	V	46.00	1.76	-	47.76	74.00	26.24
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M0_Above 1 GHz_8DPSK_2 402

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 319.52	PK	V	43.80	-3.24	-	40.56	74.00	33.44
2 389.29	PK	H	44.10	-3.04	-	41.06	74.00	32.94
4 803.73	PK	H	44.40	1.76	-	46.16	74.00	27.84
4 803.73	PK	V	42.60	1.76	-	44.36	74.00	29.64
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M0_Above 1 GHz_8DPSK_2 441

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4 882.12	PK	H	46.60	1.86	-	48.46	74.00	25.54
4 882.12	PK	V	47.00	1.86	-	48.86	74.00	25.14
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M0_Above 1 GHz_8DPSK_2 480

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 483.51	PK	H	50.00	-2.74	-	47.26	74.00	26.74
	AV	H	35.10	-2.74	-24.76	7.60	54.00	46.40
2 483.51	PK	V	48.80	-2.74	-	46.06	74.00	27.94
	AV	V	34.80	-2.74	-24.76	7.30	54.00	46.70
4 959.33	PK	V	44.00	1.76	-	45.76	74.00	28.24
4 959.52	PK	H	42.20	1.76	-	43.96	74.00	30.04
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M1_Above 1 GHz_GFSK_2 402

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 246.29	PK	H	59.30	-3.44	-	55.86	74.00	18.14
	AV	H	55.20	-3.44	-24.76	27.00	54.00	27.00
2 359.28	PK	V	42.30	-3.04	-	39.26	74.00	34.74
2 376.73	PK	H	47.30	-3.04	-	44.26	74.00	29.74
2 532.20	PK	H	57.80	-2.64	-	55.16	74.00	18.84
	AV	H	53.50	-2.64	-24.76	26.10	54.00	27.90
2 558.15	PK	H	61.80	-2.64	-	59.16*	74.00	14.84
	AV	H	57.80	-2.64	-24.76	30.40	54.00	23.60
4 803.76	PK	V	53.90	1.76	-	55.66	74.00	18.34
	AV	V	48.40	1.76	-24.76	25.40	54.00	28.60
7 206.30	PK	V	49.20	5.76	-	54.96	74.00	19.04
	AV	V	45.20	5.76	-24.76	26.20	54.00	27.80
Above 10 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M1_Above 1 GHz_GFSK_2 441

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 284.90	PK	H	57.70	-3.34	-	54.36	74.00	19.64
	AV	H	53.20	-3.34	-24.76	25.10	54.00	28.90
2 597.24	PK	H	58.00	-2.44	-	55.56	74.00	18.44
	AV	H	53.80	-2.44	-24.76	26.60	54.00	27.40
Above 10 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M1_Above 1 GHz_GFSK_2 480

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 483.50	PK	H	55.50	-2.74	-	52.76	74.00	21.24
	AV	H	43.90	-2.74	-24.76	16.40	54.00	37.60
2 483.50	PK	V	54.90	-2.74	-	52.16	74.00	21.84
	AV	V	41.60	-2.74	-24.76	14.10	54.00	39.90
4 959.36	PK	H	51.30	1.76	-	53.06	74.00	20.94
	AV	H	46.80	1.76	-24.76	23.80	54.00	30.20
4 959.36	PK	V	53.40	1.76	-	55.16	74.00	18.84
	AV	V	49.00	1.76	-24.76	26.00	54.00	28.00
9 920.40	PK	H	42.50	9.76	-	52.26	74.00	21.74
	AV	H	38.70	9.76	-24.76	23.70	54.00	30.30
9 920.40	PK	V	43.10	9.76	-	52.86	74.00	21.14
	AV	V	39.50	9.76	-24.76	24.50	54.00	29.50
Above 10 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M1_Above 1 GHz_8DPSK_2 402

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 368.39	PK	H	42.80	-3.04	-	39.76	74.00	34.24
2 376.25	PK	V	42.60	-3.04	-	39.56	74.00	34.44
2 558.48	PK	H	55.10	-2.64	-	52.46	74.00	21.54
	AV	H	51.80	-2.64	-24.75	24.41	54.00	29.59
4 803.74	PK	H	41.70	1.76	-	43.46	74.00	30.54
4 803.74	PK	V	45.30	1.76	-	47.06	74.00	26.94
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

Test mode : M1_Above 1 GHz_8DPSK_2 441

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 597.24	PK	H	58.00	-2.44	-	55.56*	74.00	18.44
	AV	H	53.80	-2.44	-24.75	26.61	54.00	27.39
4 882.17	PK	H	43.40	1.86	-	45.26	74.00	28.74
4 882.17	PK	V	48.80	1.86	-	50.66	74.00	23.34
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

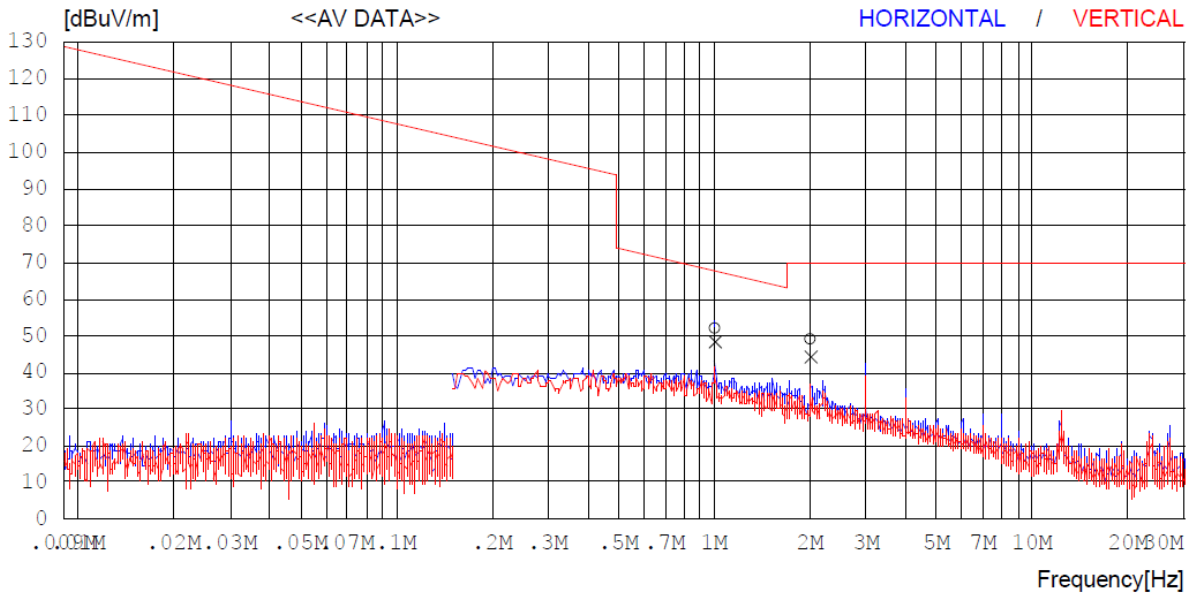
Test mode : M1_Above 1 GHz_8DPSK_2 480

Frequency (MHz)	Detector	Pol. (V/H)	Reading (dBµV)	Factor (dB)	DCCF (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 483.50	PK	H	52.10	-2.74	-	49.36	74.00	24.64
	AV	H	44.00	-2.74	-24.75	16.51	54.00	37.49
2 483.50	PK	V	47.90	-2.74	-	45.16	74.00	28.84
	AV	V	41.60	-2.74	-24.75	14.11	54.00	39.89
4 959.41	PK	H	43.80	1.76	-	45.56	74.00	28.44
4 959.41	PK	V	47.90	1.76	-	49.66	74.00	24.34
Above 5 GHz	Not Detected	-	-	-	-	-	-	-

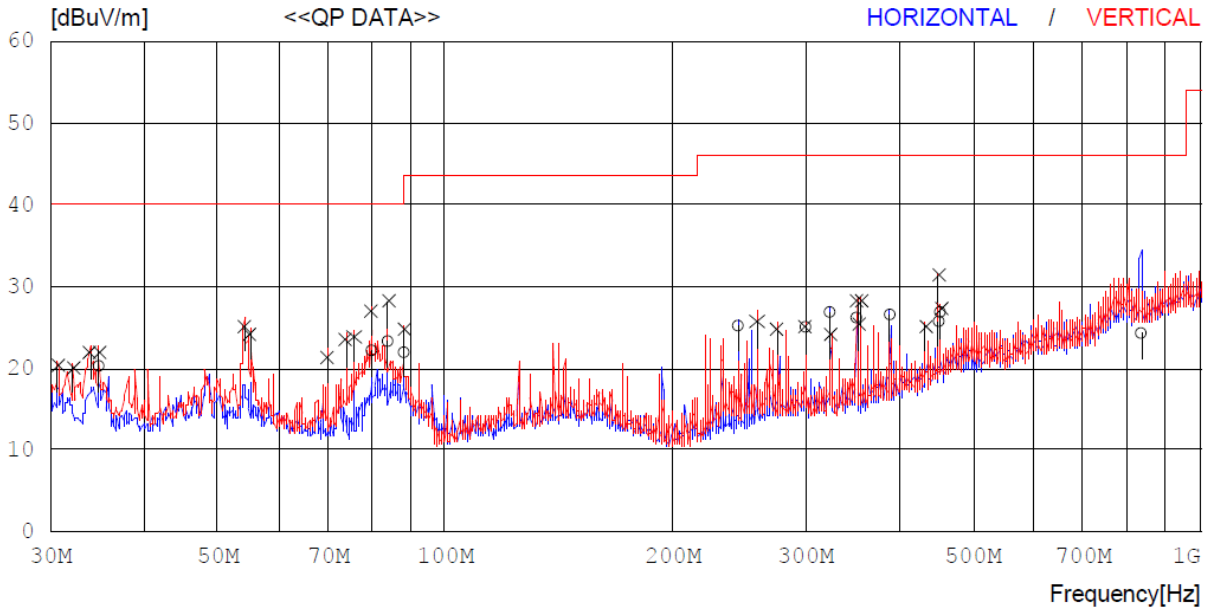
Note 1 : Factor : Ant Factor + Cable loss - Amp gain + Site Factor + Distance Factor
Note 2 : Peak Result : Reading + Factor
Note 3 : DCCF(Duty Cyle Correction Factor) : 20 x Log(worst case dwell time / 100 ms) dB, refer to 4.4.7.7
Average Reasult : Reading + Factor + DCCF
Note 4 : Below 1 GHz Measured distance : 3 m, Above 1 GHz Measured distance : 1 m
Above 1 GHz Distance Factor = 20log(1 / 3) = -9.54
Note 5 : Average measurement did not take place because the peak data did not exceed Average Limit.
Note 6 : Not Detected means that peak data does not exceed the average limit.

4.4.7.5 Measurement Plot_Radiated Spurious Emissions

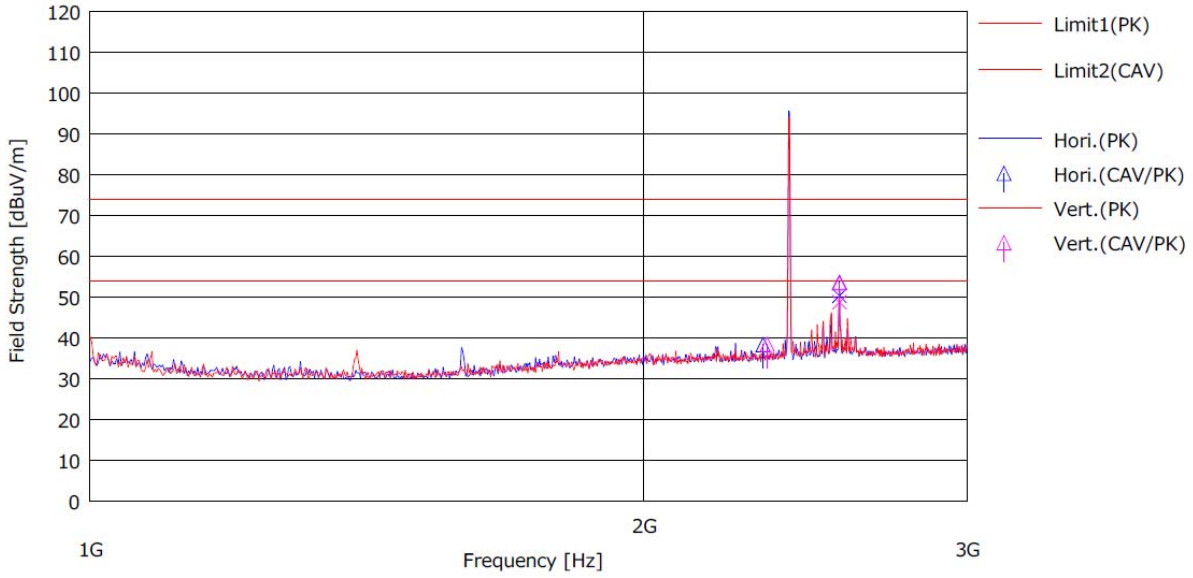
Test mode : 9 kHz ~ 30 MHz Worst Case(M1_GFSK_2 402 MHz)



Test mode : 30 MHz ~ 1 GHz Worst Case(M1_GFSK_2 402 MHz)

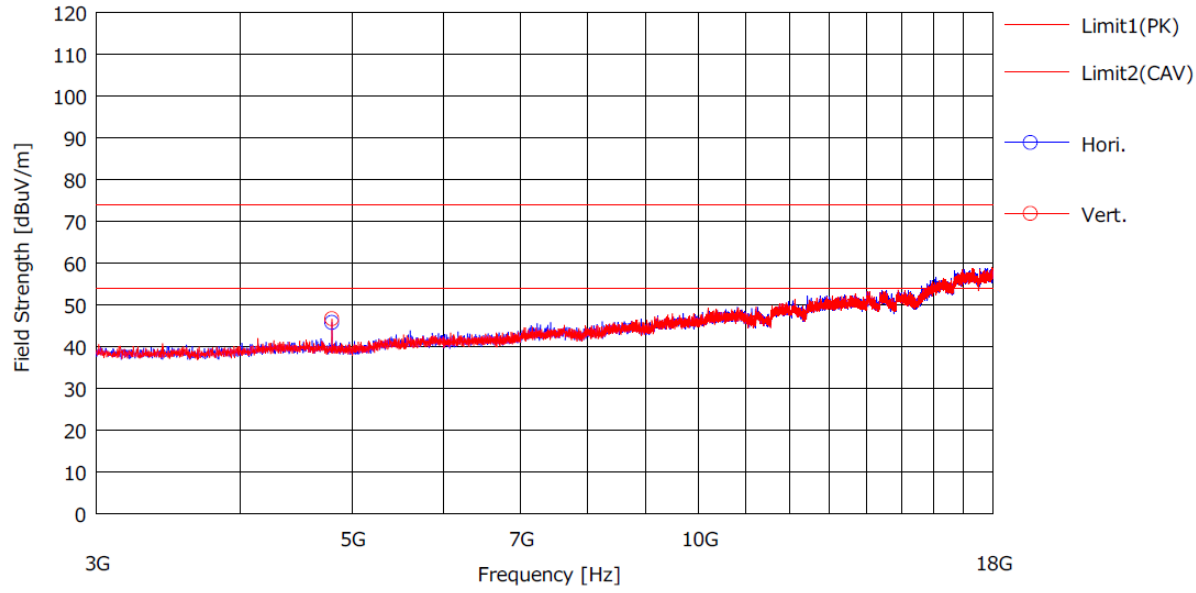


Test mode : 1 GHz ~ 3 GHz Peak Worst Case(M0_GFSK_2 402 MHz)



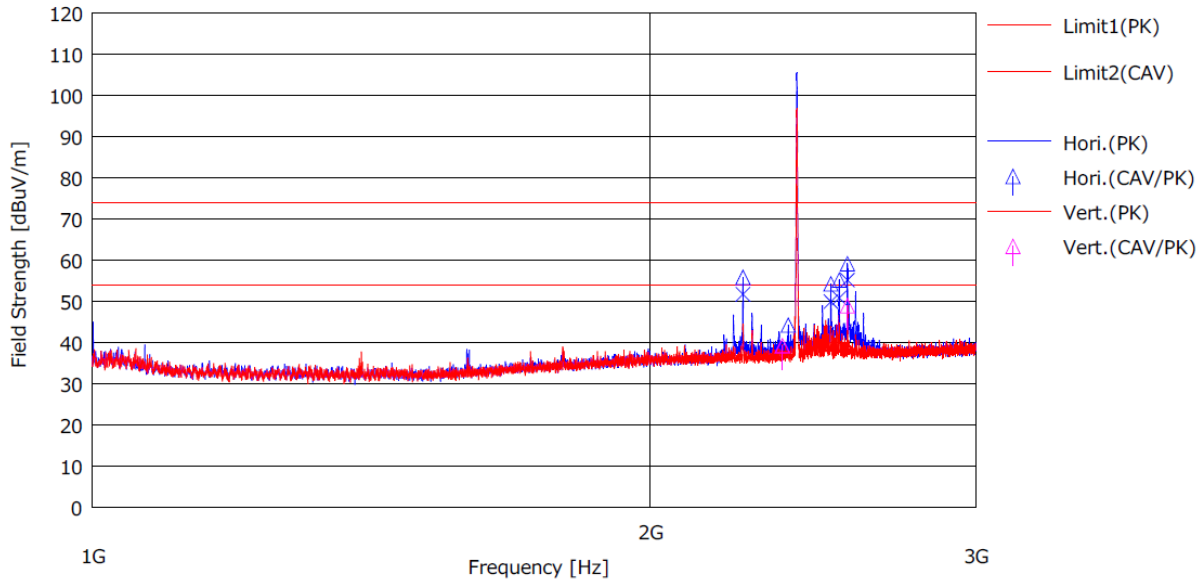
Note 1 : Measured distance : 1 m

Test mode : 3 GHz ~ 18 GHz Peak Worst Case(M0_GFSK_2 402 MHz)



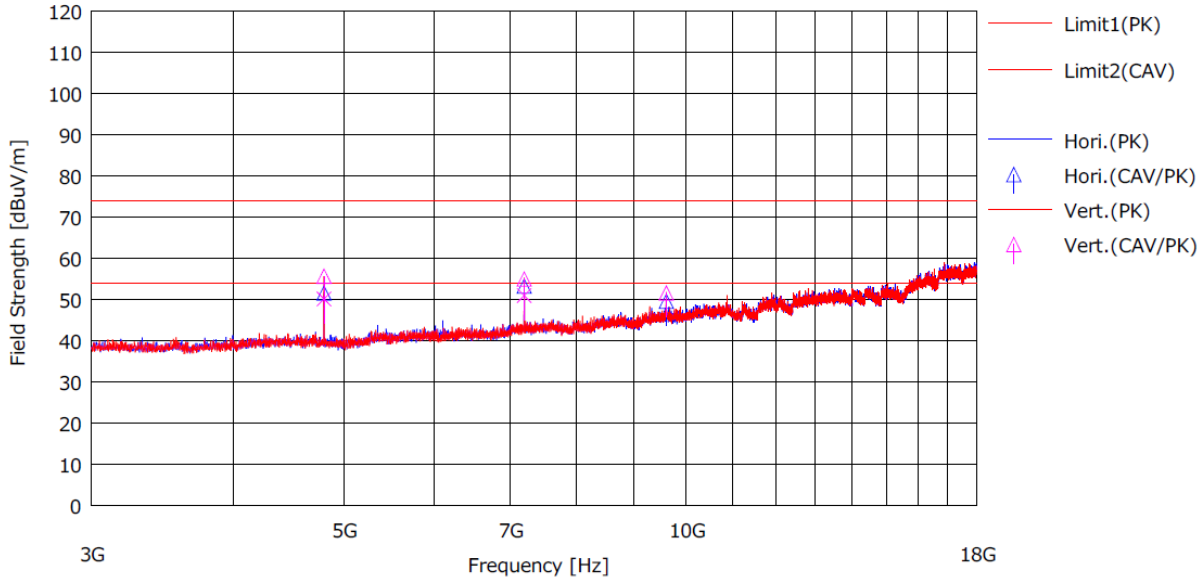
Note 1 : Measured distance : 1 m

Test mode : 1 GHz ~ 3 GHz Peak Worst Case(M1_GFSK_2 402 MHz)



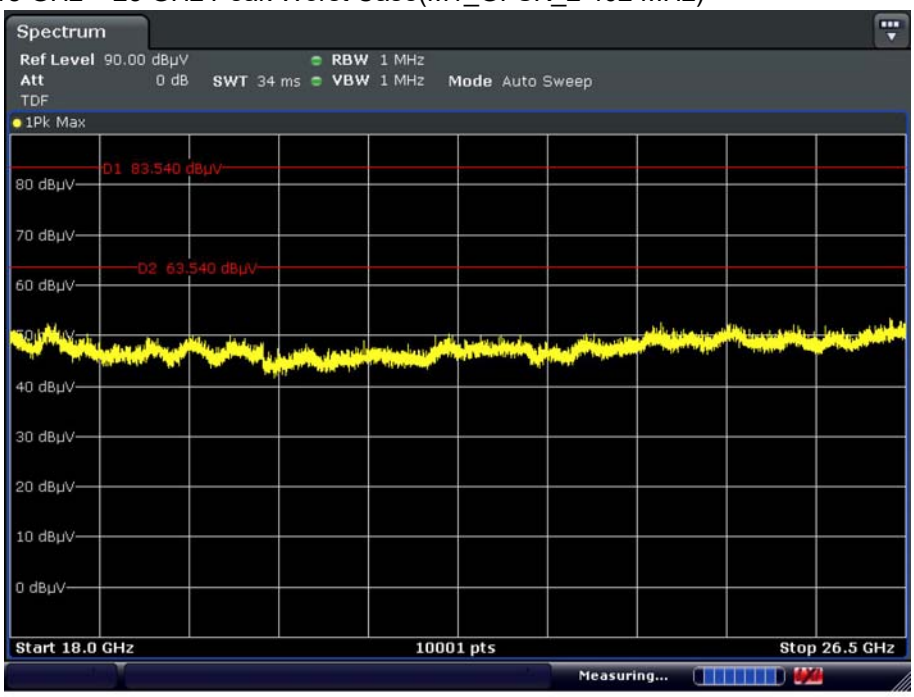
Note 1 : Measured distance : 1 m

Test mode : 3 GHz ~ 18 GHz Peak Worst Case(M1_GFSK_2 402 MHz)



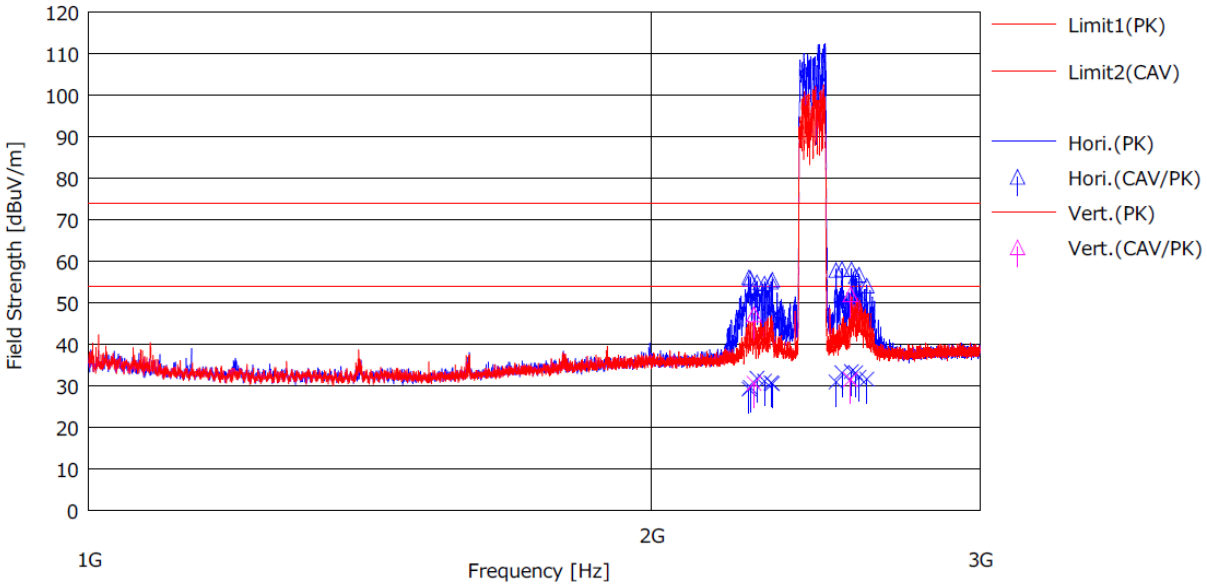
Note 1 : Measured distance : 1 m

Test mode : 18 GHz ~ 25 GHz Peak Worst Case(M1_GFSK_2 402 MHz)



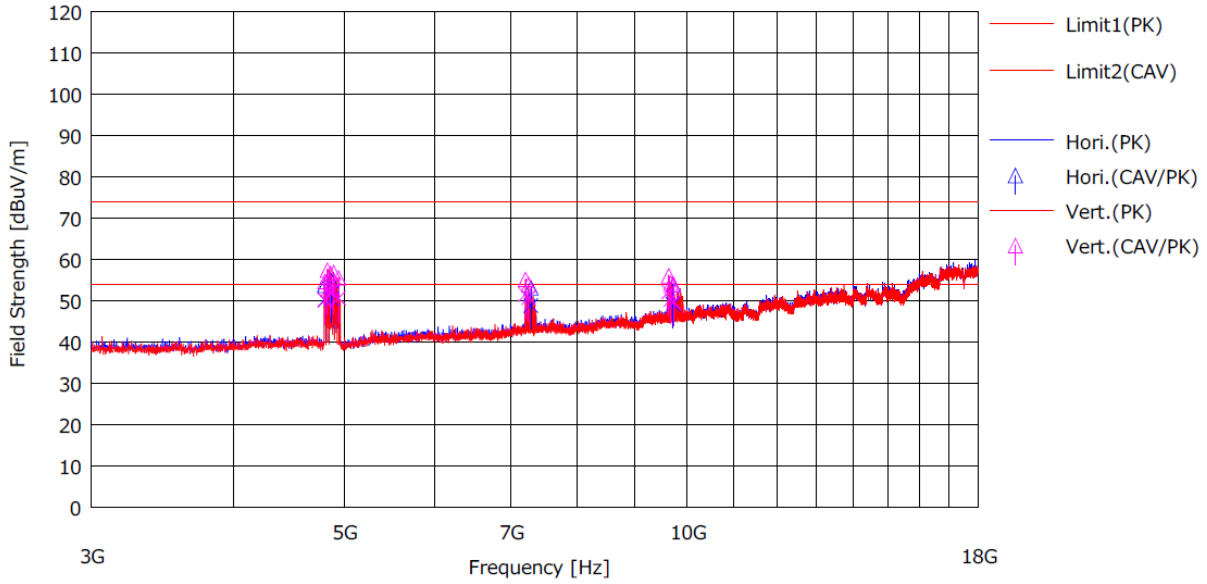
Note 1 : Measured distance : 1 m
Note 2 : Limit : Peak : 83.5 dBµV/m
Average : 63.5 dBµV/m

Test mode : 1 GHz ~ 3 GHz (M0_BT+M1_BT+M0_BLE)



Note 1 : Measured distance : 1 m
Note 2 : Limit : Peak : 83.5 dBµV/m
Average : 63.5 dBµV/m

Test mode : 3 GHz ~ 18 GHz (M0_BT+M1_BT+M0_BLE)

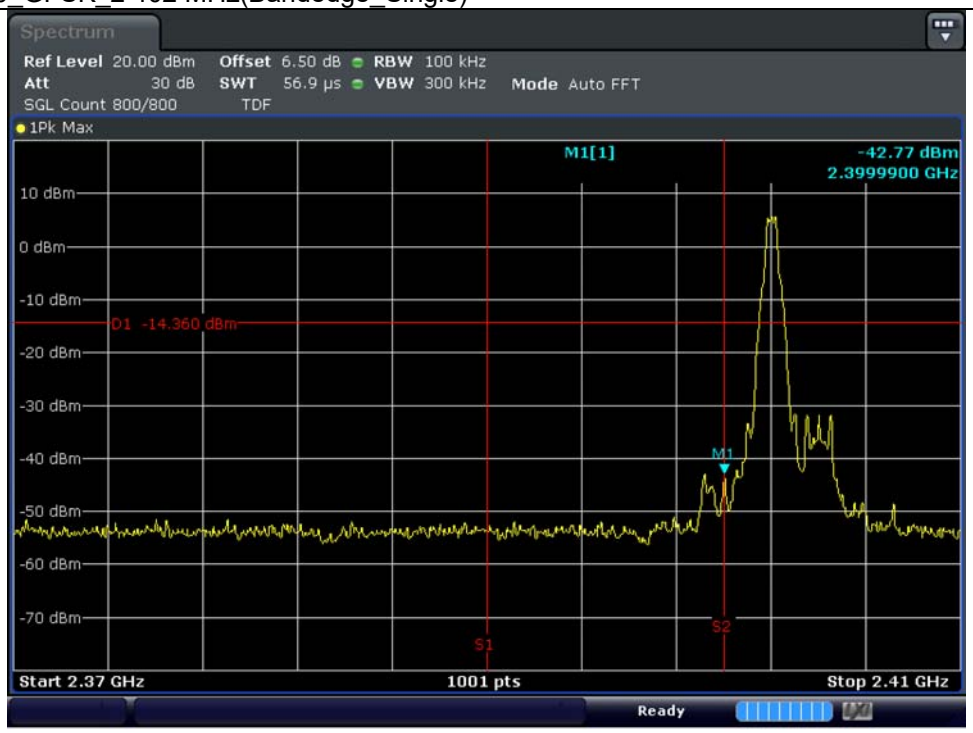


Note 1 : Measured distance : 1 m
Note 2 : Limit : Peak : 83.5 dBµV/m
Average : 63.5 dBµV/m

4.4.7.6 Measurement data_Conducted Spurious Emissions

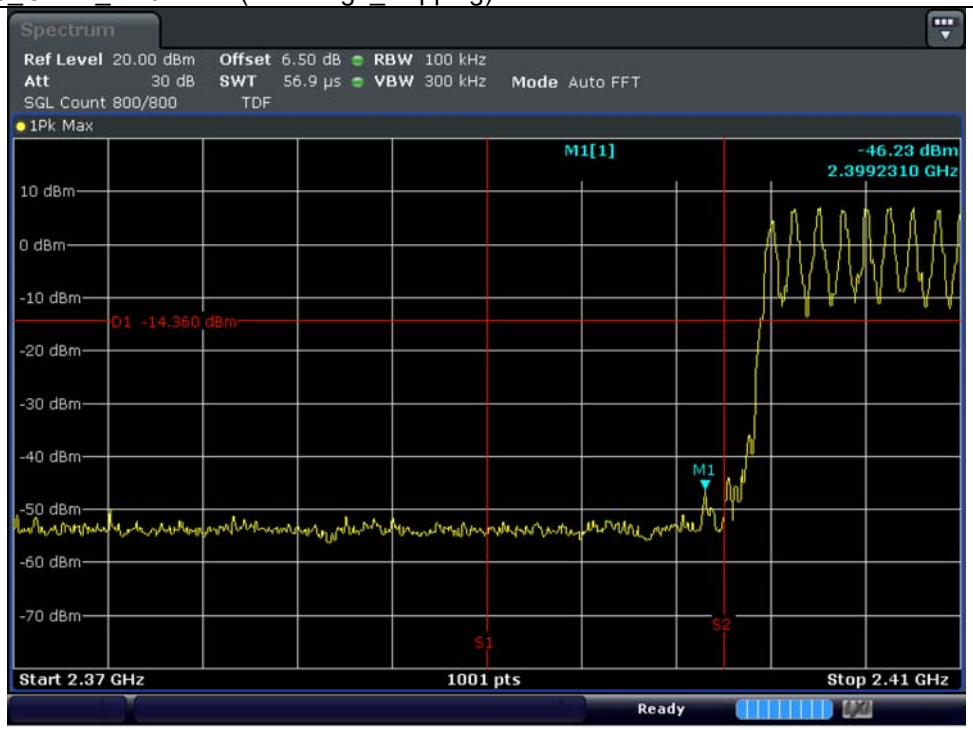
M0_GFSK_2 402 MHz(reference)

M0_GFSK_2 402 MHz(Bandedge_Single)



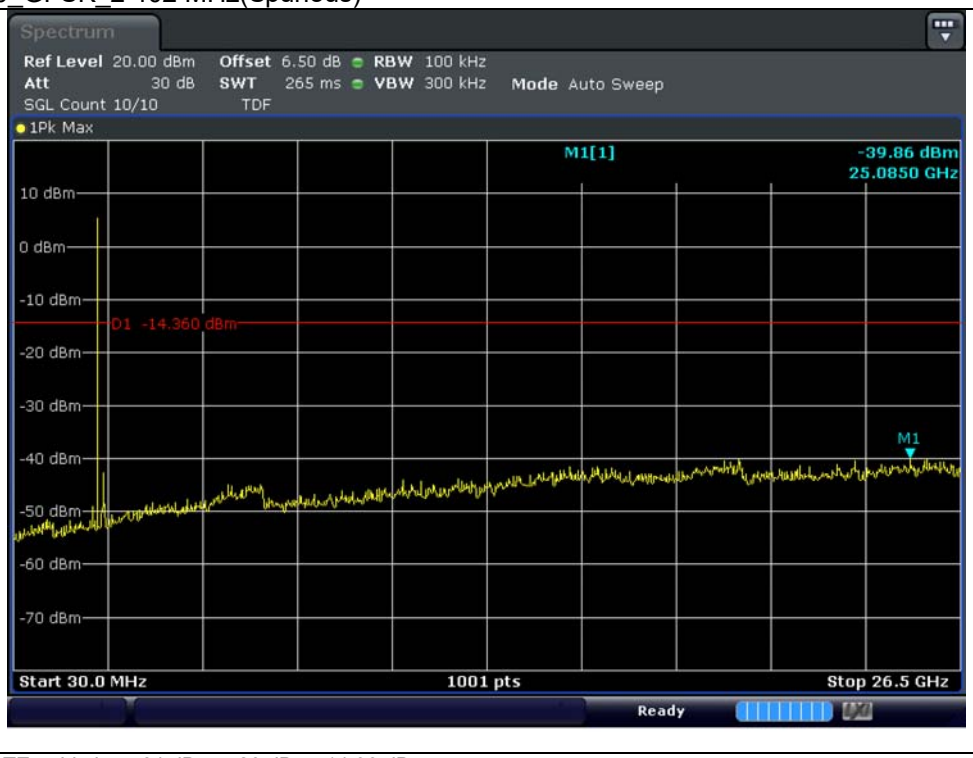
NOTE: Limit : 5.64 dBm – 20 dB = -14.36 dBm

M0_GFSK_2 402 MHz(Bandedge_Hopping)



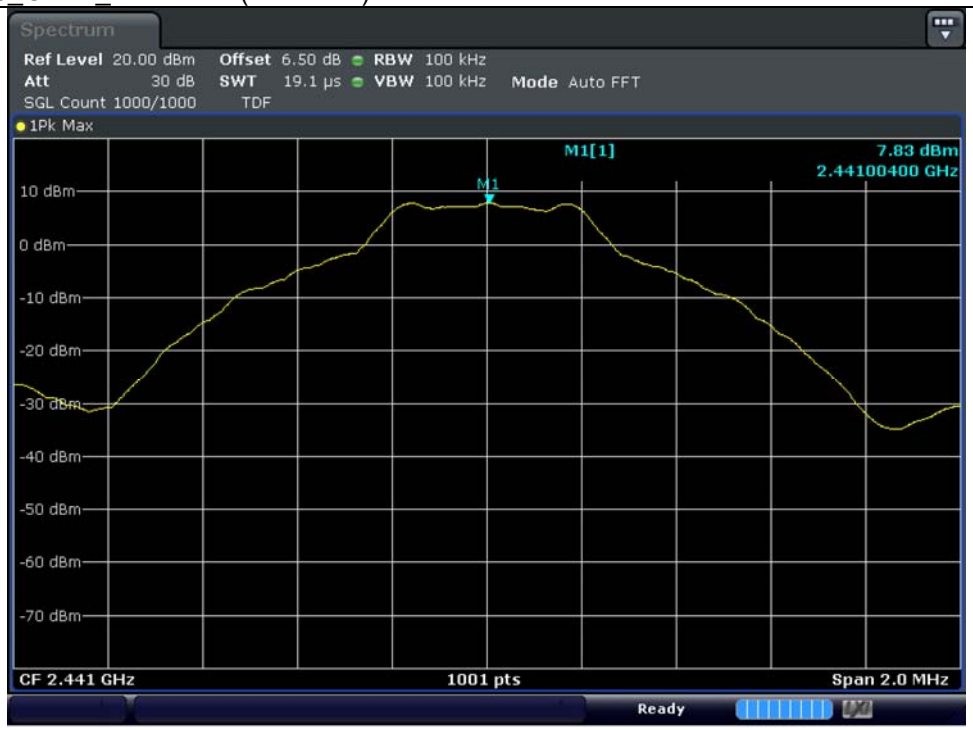
NOTE: Limit : 5.64 dBm – 20 dB = -14.36 dBm

M0_GFSK_2 402 MHz(Spurious)

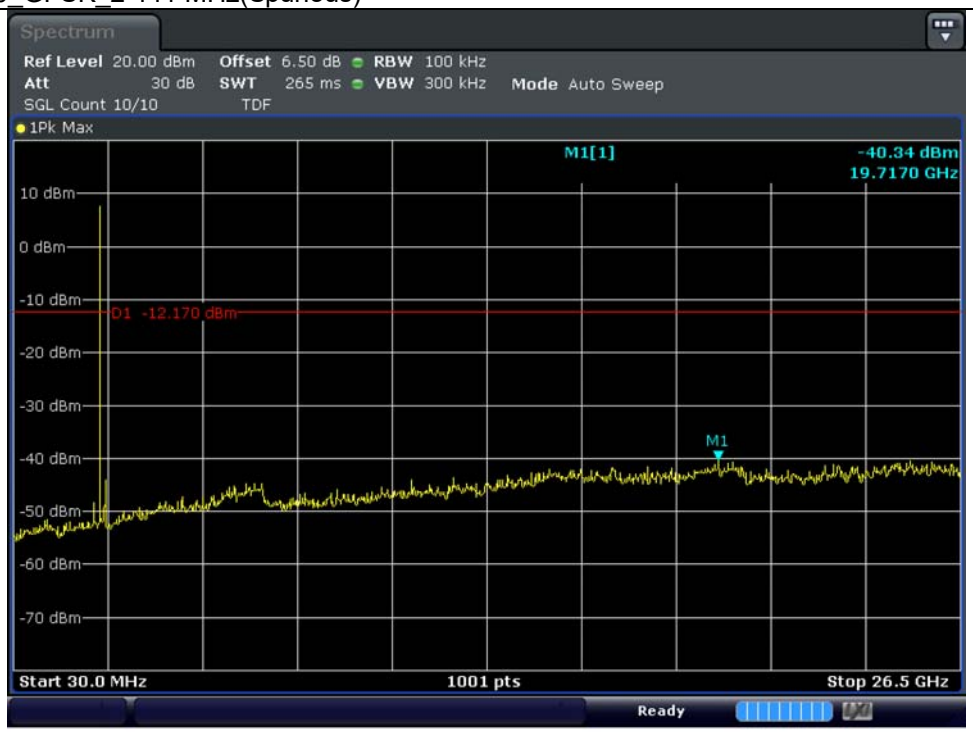


NOTE: Limit : 5.64 dBm – 20 dB = -14.36 dBm

M0_GFSK_2 441 MHz(reference)

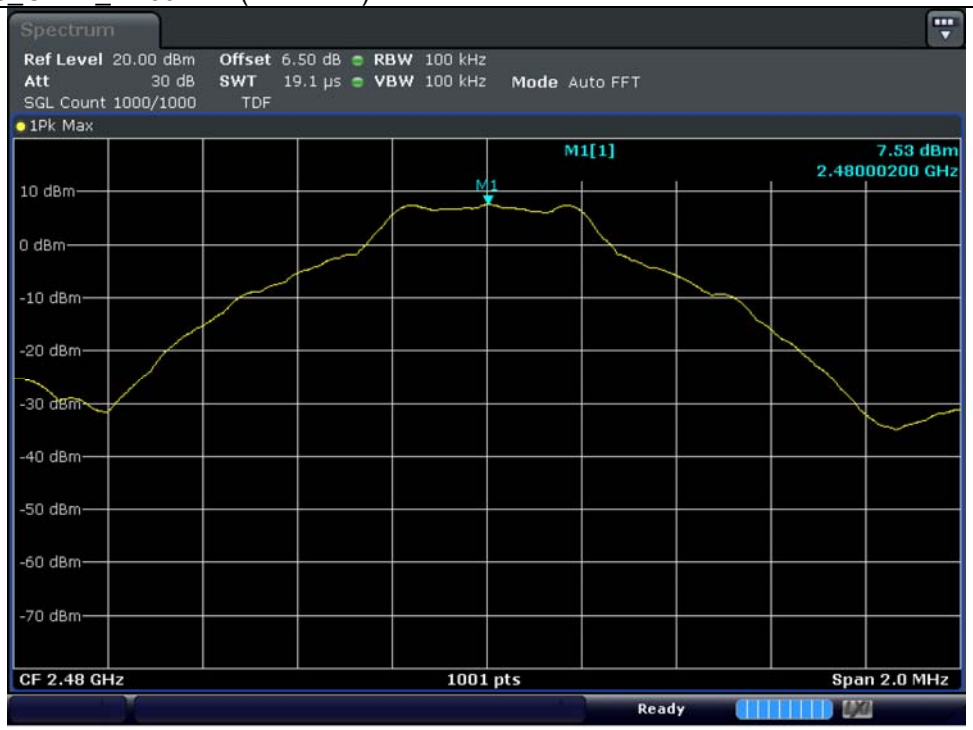


M0_GFSK_2 441 MHz(Spurious)

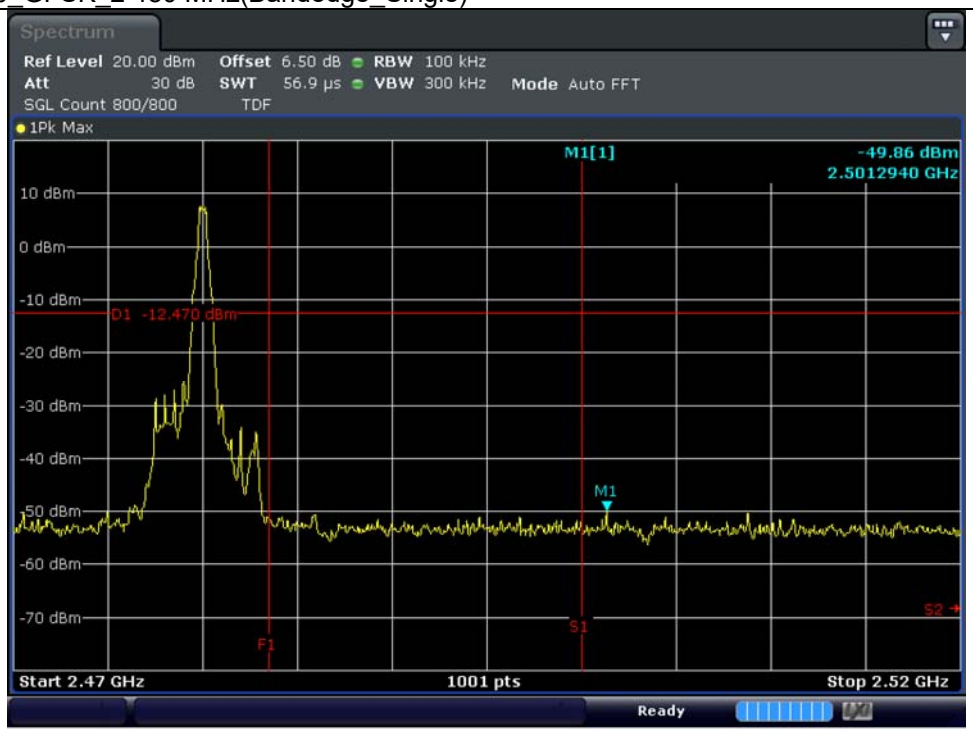


NOTE: Limit : 7.83 dBm – 20 dB = -12.17 dBm

M0_GFSK_2 480 MHz(reference)

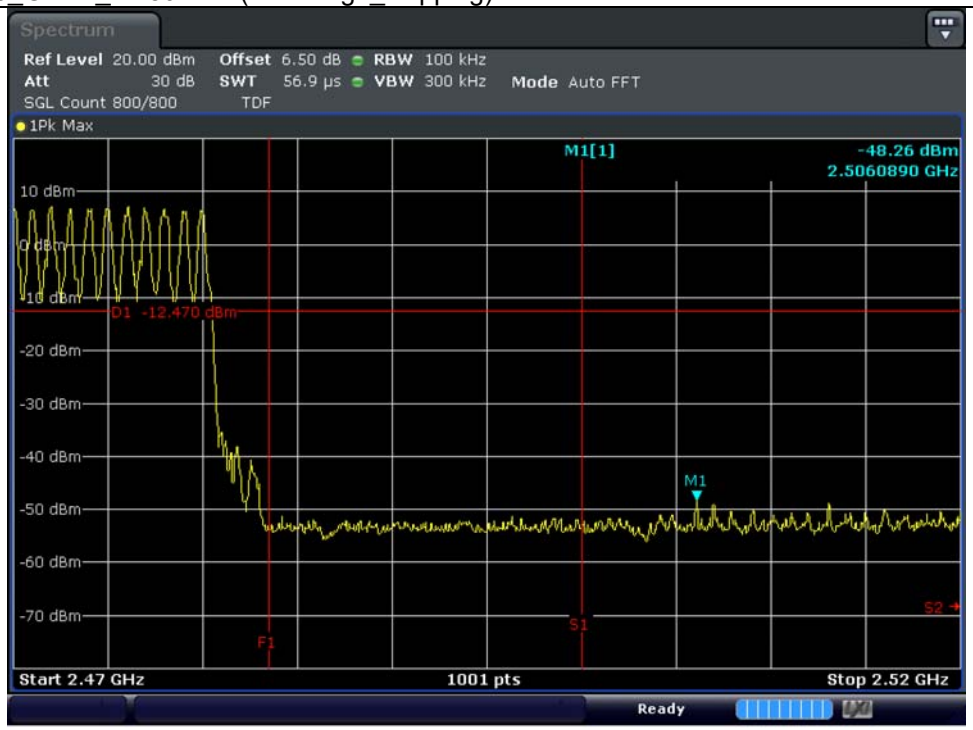


M0_GFSK_2 480 MHz(Bandedge_Single)



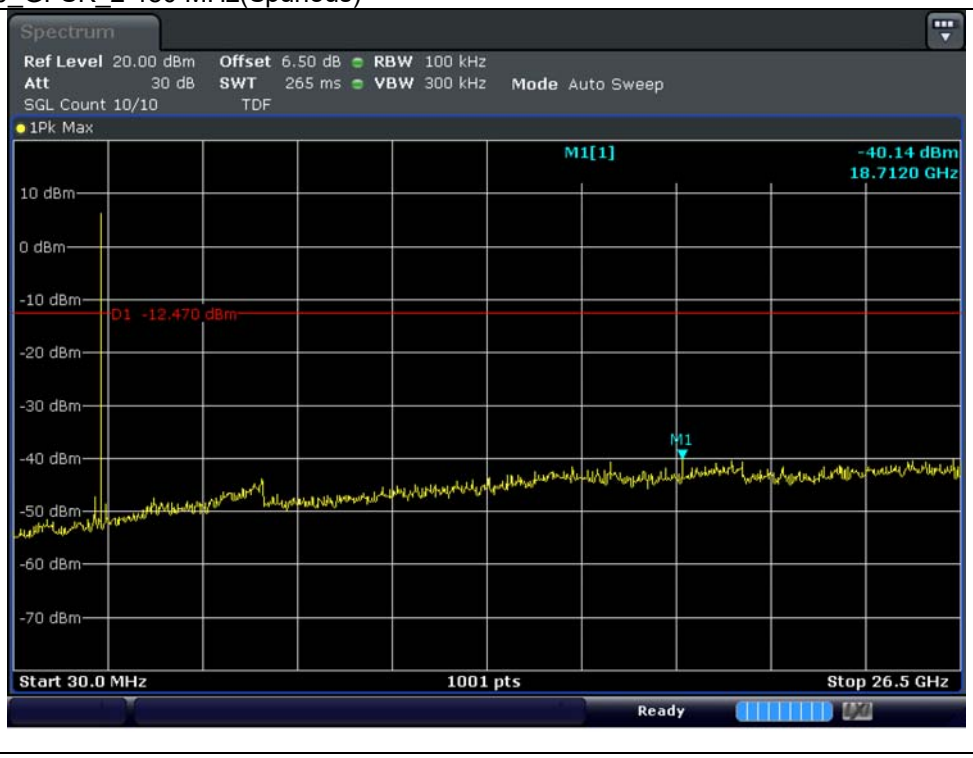
NOTE: Limit : 7.53 dBm – 20 dB = -12.47 dBm

M0_GFSK_2 480 MHz(Bandedge_Hopping)



NOTE: Limit : 7.53 dBm – 20 dB = -12.47 dBm

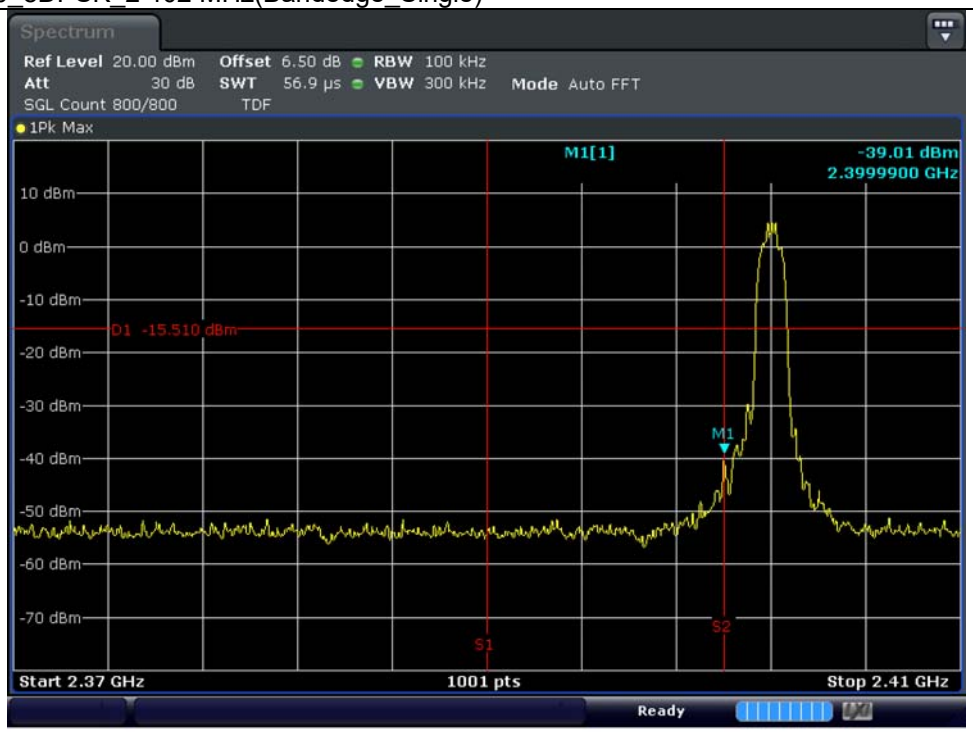
M0_GFSK_2 480 MHz(Spurious)



NOTE: Limit : 7.53 dBm – 20 dB = -12.47 dBm

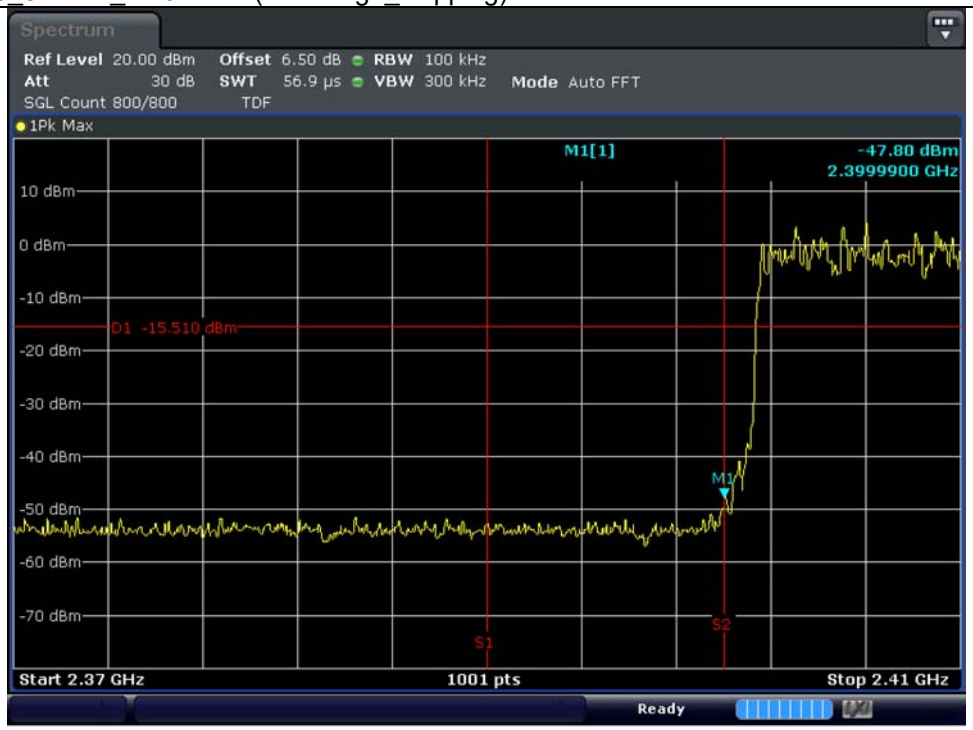
M0_8DPSK_2 402 MHz(reference)

M0_8DPSK_2 402 MHz(Bandedge_Single)



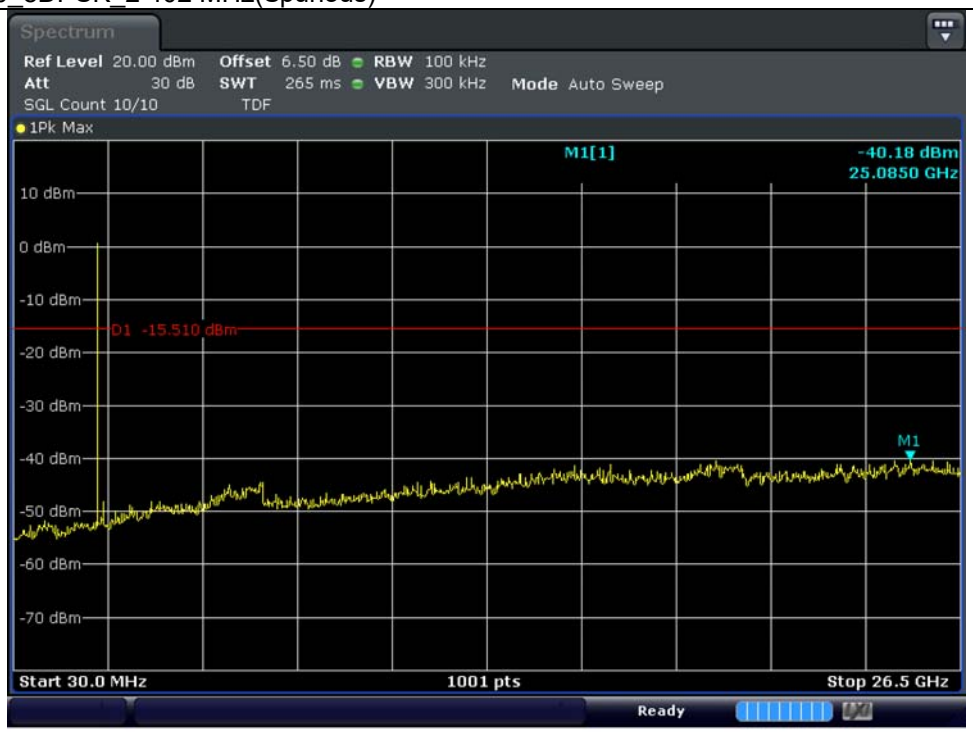
NOTE: Limit : 4.49 dBm – 20 dB = -15.51 dBm

M0_8DPSK_2 402 MHz(Bandedge_Hopping)



NOTE: Limit : 4.49 dBm – 20 dB = -15.51 dBm

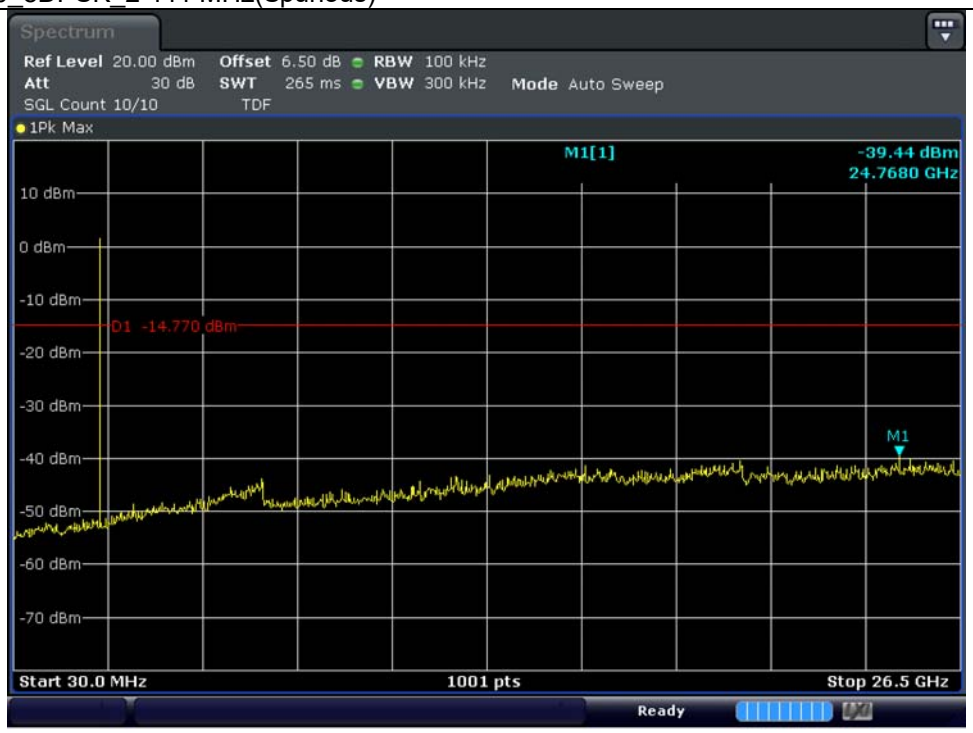
M0_8DPSK_2 402 MHz(Spurious)



NOTE: Limit : 4.49 dBm – 20 dB = -15.51 dBm

M0_8DPSK_2 441 MHz(reference)

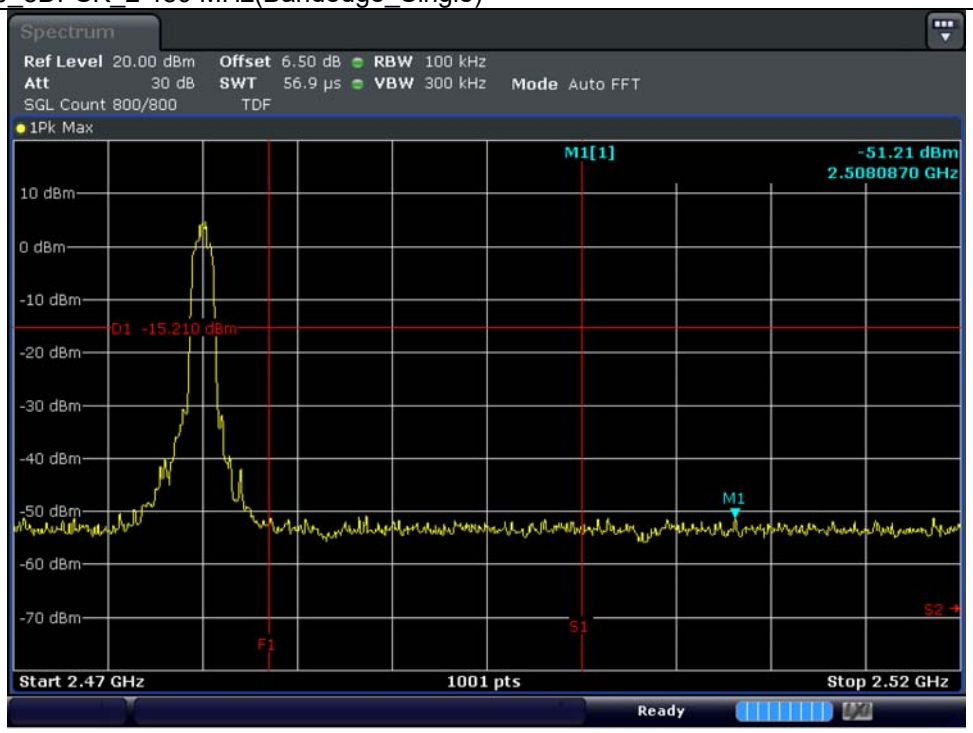
M0_8DPSK_2 441 MHz(Spurious)



NOTE: Limit : 5.23 dBm – 20 dB = -14.77 dBm

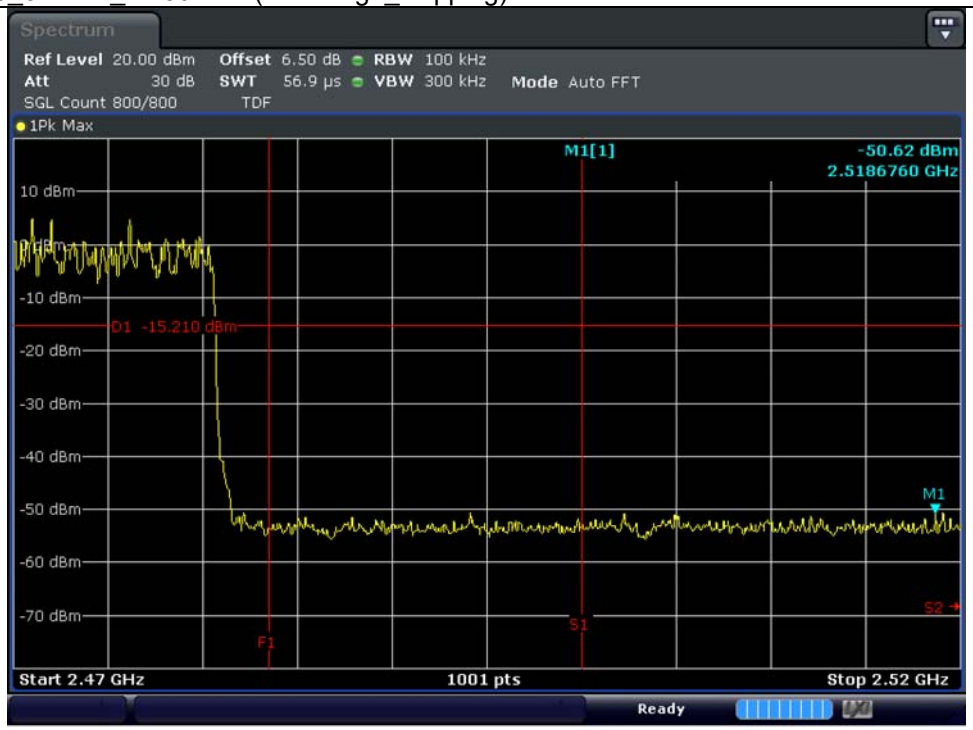
M0_8DPSK_2 480 MHz(reference)

M0_8DPSK_2 480 MHz(Bandedge_Single)



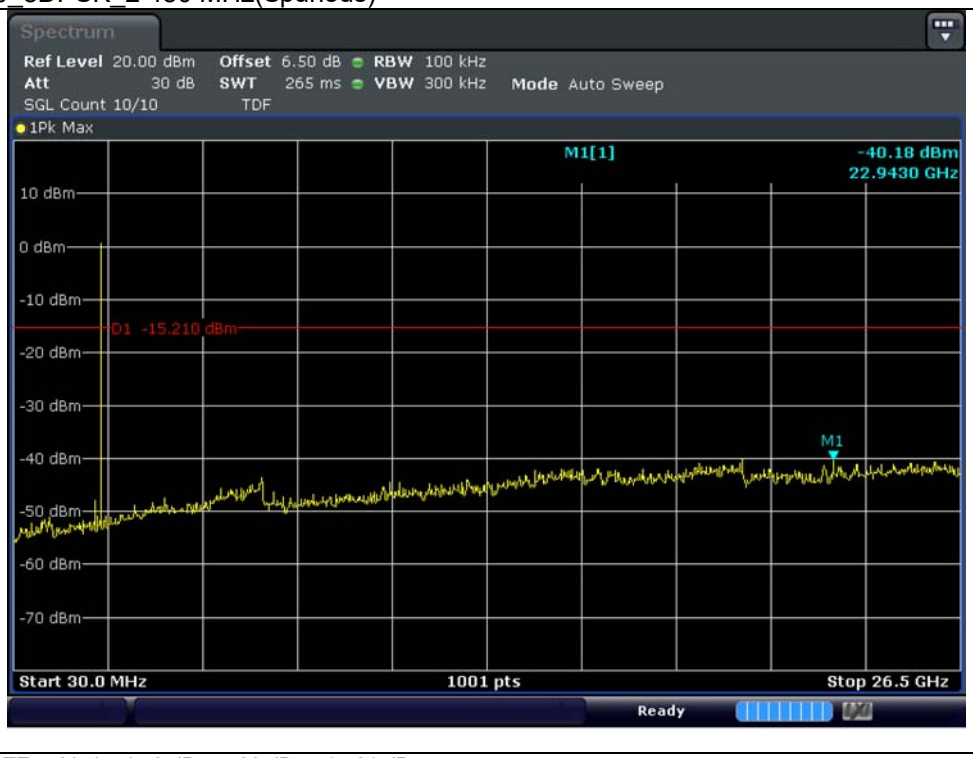
NOTE: Limit : 4.79 dBm – 20 dB = -15.21 dBm

M0_8DPSK_2 480 MHz(Bandedge_Hopping)



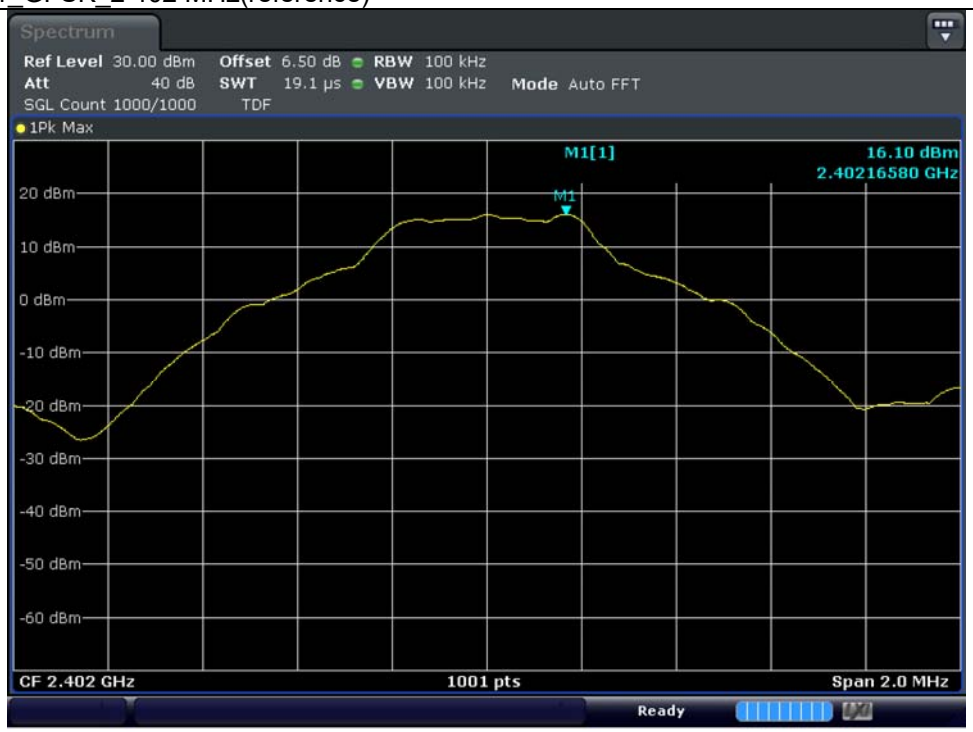
NOTE: Limit : 4.79 dBm – 20 dB = -15.21 dBm

M0_8DPSK_2 480 MHz(Spurious)

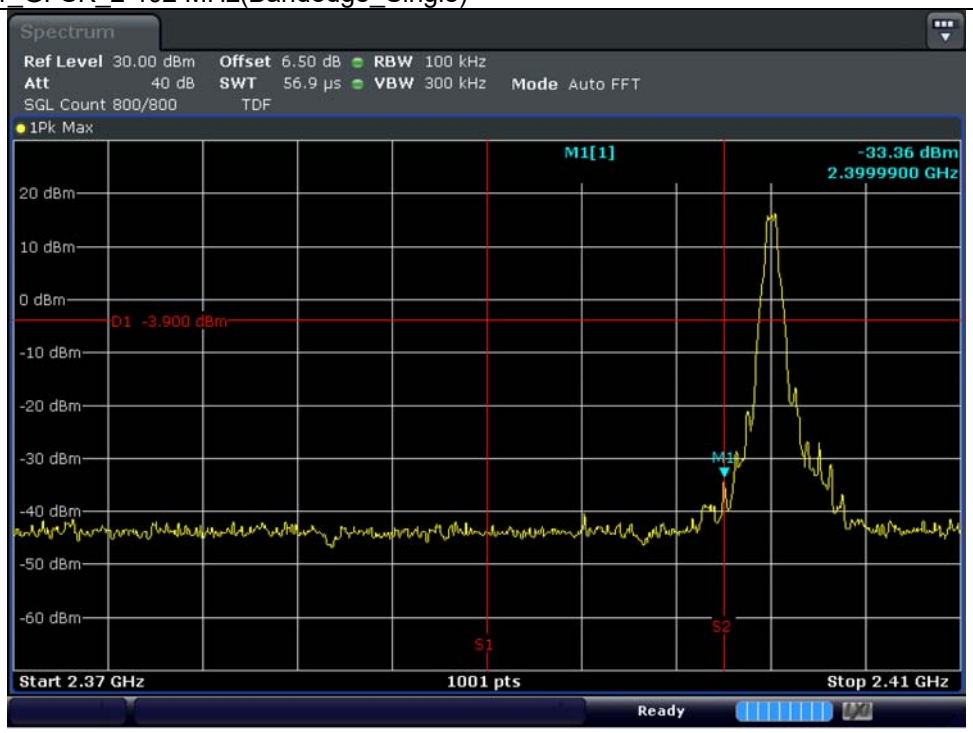


NOTE: Limit : 4.79 dBm – 20 dB = -15.21 dBm

M1_GFSK_2 402 MHz(reference)

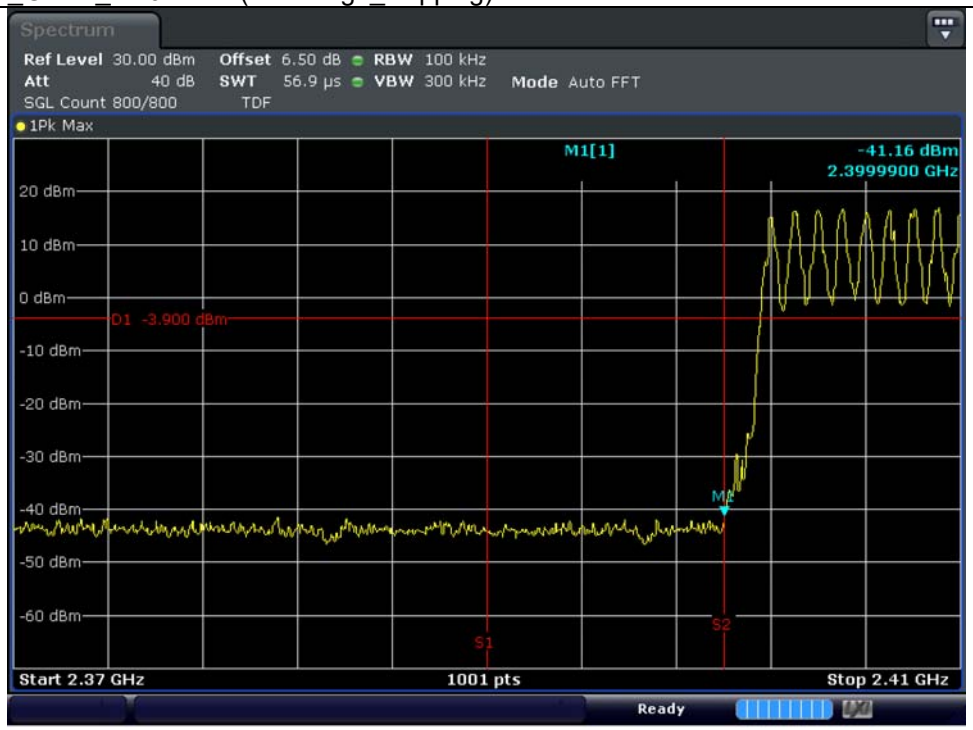


M1_GFSK_2 402 MHz(Bandedge_Single)



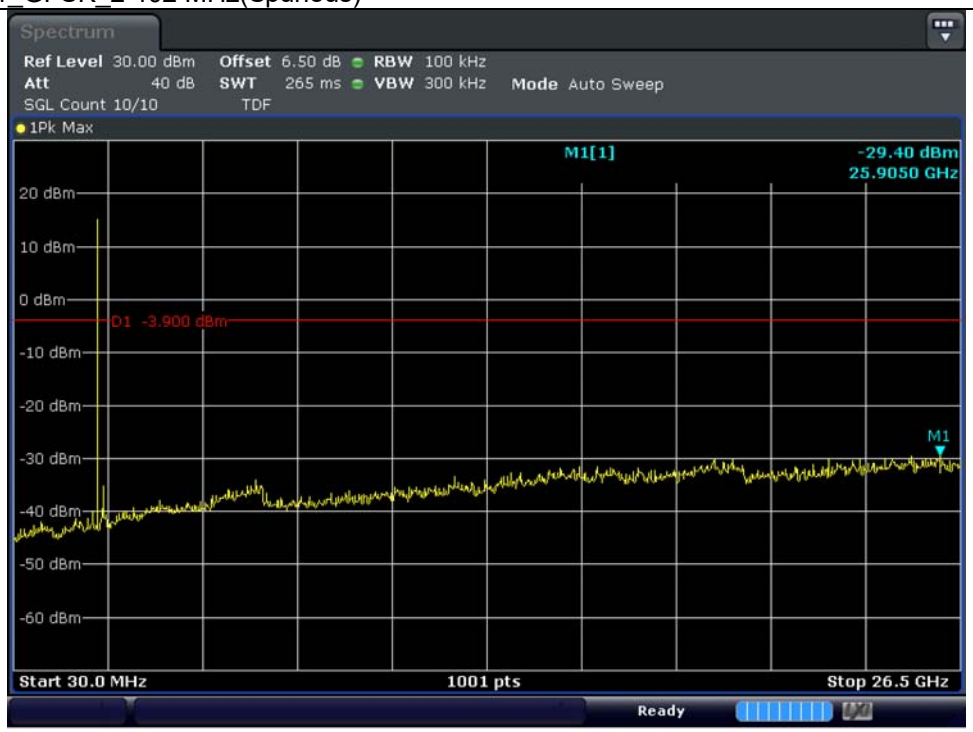
NOTE: Limit : 16.10 dBm – 20 dB = -3.90 dBm

M1_GFSK_2 402 MHz(Bandedge_Hopping)



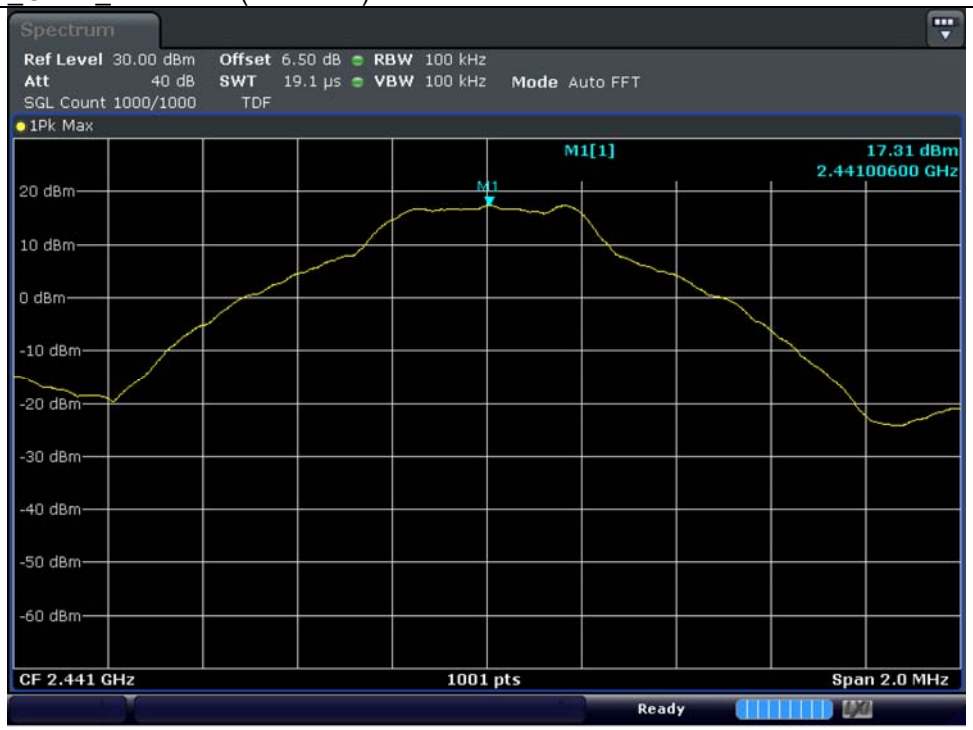
NOTE: Limit : 16.10 dBm – 20 dB = -3.90 dBm

M1_GFSK_2 402 MHz(Spurious)

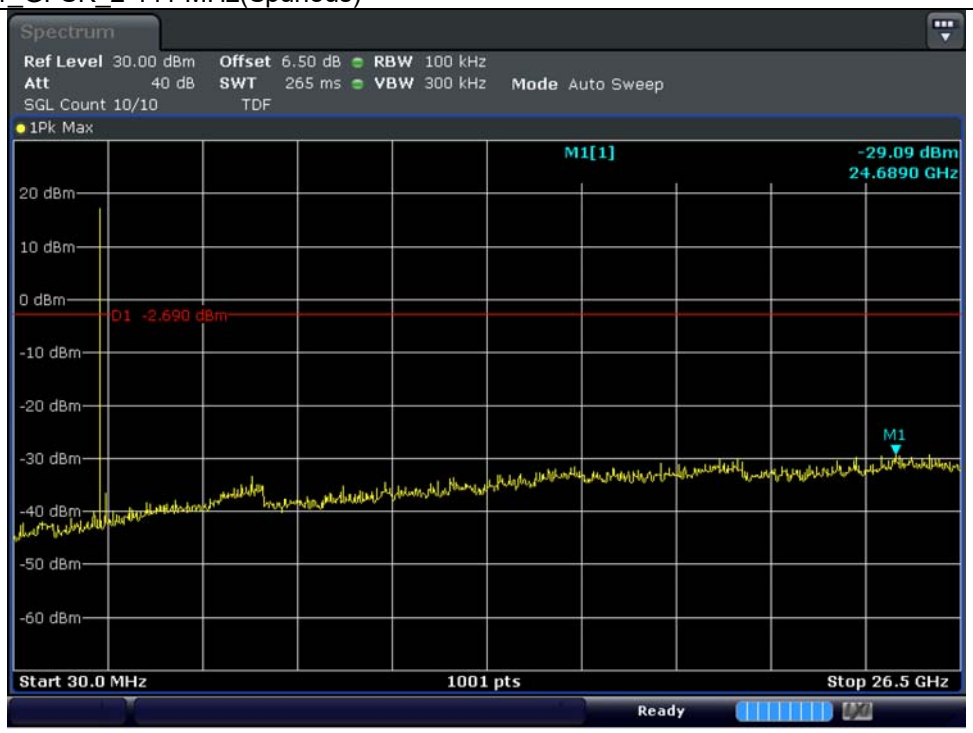


NOTE: Limit : 16.10 dBm – 20 dB = -3.90 dBm

M1_GFSK_2 441 MHz(reference)

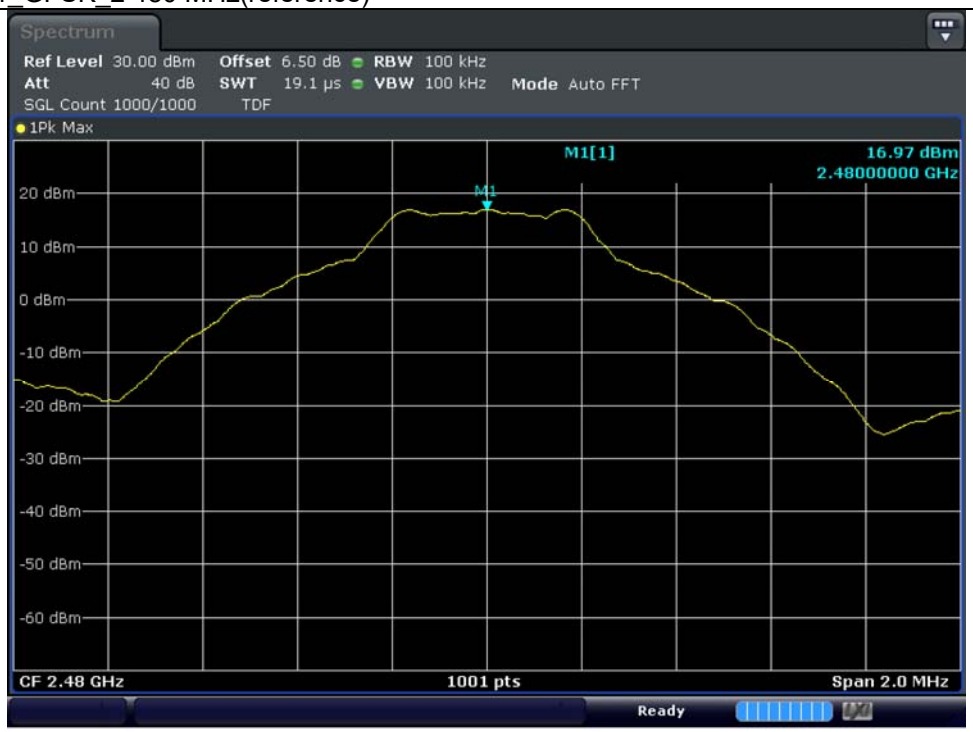


M1_GFSK_2 441 MHz(Spurious)

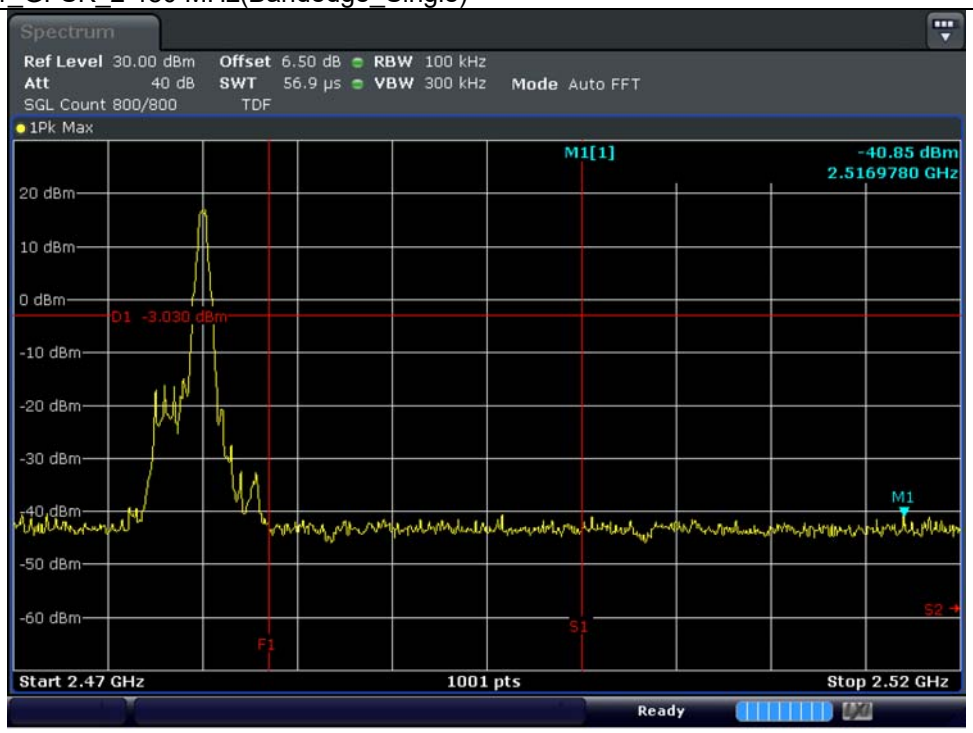


NOTE: Limit : 17.31 dBm – 20 dB = -2.69 dBm

M1_GFSK_2 480 MHz(reference)



M1_GFSK_2 480 MHz(Bandedge_Single)



NOTE: Limit : 16.97 dBm – 20 dB = -3.03 dBm