TEST REPORT

T Dt&C	Dt&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042 Tel : 031-321-2664, Fax : 031-321-1664				
1. Report No : DRTFCC2505-002	25				
2. Customer					
• Name (FCC) : MOTREX CO., L	TD.				
• Address (FCC) : 1-1301, 56, Ge South Korea	eumto-ro 80beon-gil, Sujeong-gu, Seongnam-si, Gyeonggi-do,				
3. Use of Report : FCC Original Ce	ertification				
4. Product Name / Model Name : S FCC ID : BP9-MH310L-H01	SMART DISPLAY / MH310L-H01				
5. FCC Regulation(s): Part 15.247 Test Method used: KDB558074					
6. Date of Test : 2025.04.21 ~ 202	5.05.15				
7. Location of Test : 🔀 Permaner	nt Testing Lab 🛛 On Site Testing				
8. Testing Environment : See appe	ended test report.				
9. Test Result : Refer to the attach	ed test result.				
The results shown in this test report re This test report is not related to KOLA	efer only to the sample(s) tested unless otherwise stated. S accreditation.				
Affirmation	Technical Manager				
Name : SeungMin Gil	Name : JaeJin Lee				
	2025.05.19.				
Dt&C Co., Ltd.					

If this report is required to confirmation of authenticity, please contact to report@dtnc.net



Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2505-0025	May. 19, 2025	Initial issue	SeungMin Gil	JaeJin Lee



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1. General Information

1.1. Description of EUT

Equipment Class	Spread Spectrum Transmitter (DSS)
Product Name	SMART DISPLAY
Model Name	MH310L-H01
Add Model Name	MH310L-H02, MH310L-K01, MH310L-K02
Firmware Version Identification Number	Rev 01.
EUT Serial Number	Conducted : MTXNQ5PEAAR81F10001 , Radiated : NQ5PEMXPV0JA0001
Power Supply	DC 12 V
Frequency Range	2 402 MHz ~ 2 480 MHz
Max. RF Output Power	2.13 dBm (0.002 W)
Modulation Technique (Data rate)	GFSK(1 Mbps) , π/4-DQPSK(2 Mbps), 8DPSK(3 Mbps)
Number of Channels	79
Antenna Specification	Antenna Type: Chip Antenna Gain : 0.95 dBi (PK)

1.2. Declaration by the applicant / manufacturer

- NA

1.3. Testing Laboratory

Dt&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014.

- FCC & ISED MRA Designation No. : KR0034

- ISED#: 5740A

www.dtnc.net			
Telephone	:	+ 82-31-321-2664	
FAX	:	+ 82-31-321-1664	

1.4. Testing Environment

Ambient Condition	
Temperature	+22 °C ~ +26 °C
 Relative Humidity 	35 % ~ 47 %

1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Antenna-port conducted emission	1.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz Below)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz ~ 18 GHz)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated emission (18 GHz Above)	5.8 dB (The confidence level is about 95 %, k = 2)

1.6. Information about the FHSS characteristics

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following :
 - A) The hopping sequence is pseudorandom
 - Note 1 : Pseudorandom Frequency Hopping Sequence Table as below:
 - Channel: 08, 24, 40, 56, 42, 54, 72, 09, 01, 11, 33, 41, 34, 42, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 41, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 52, 71, 08, 24, 06, 24, 48, 56, 45, 46, 70, 01, 72, 06, 25, 33, 12, 28, 49, 60, 45, 58, 74, 13, 05, 18, 37, 49 etc

The System receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchroniztation with the transmit ted signals.

- B) All channels are used equally on average
- C) The receiver input bandwidth equals the transmit bandwidth
- D) The receiver hops in sequenc e with the transmit signal
- 15.247(g) : In accordance with the Bluetooth Industry Standard, the system is designed to comply with all
 of the regulations in Section 15.247 when the transmitter is presented with a continuous data
 (or information) system.
- 15.247(h) : In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection / hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.
- 15.247(h): The EUT employs Adaptive Frequency Hopping (AFH) which identifies sources of interference namely devices operating in 802.11 WLAN and excludes them from the list of available channels. The process of re-mapping reduces the number of test channels from 79 channels to a minimum number of 20 channels.

1.7. Conclusion of worst-case and operation mode

The EUT has three types of modulation (GFSK, π /4-DQPSK and 8DPSK). Therefore all applicable requirements were tested with all the modulations. And packet type was tested at the worst case(DH5).

EUT Operation test setup

Bluetooth tester was used to control the transmit parameters during test.

Tested frequency information,

- Hopping Function : Enable

	Tested Frequency (MHz)		
Hopping Band	2 402 ~ 2 480		

- Hopping Function : Disable

	Tested Frequency (MHz)		
Lowest Channel	2 402		
Middle Channel	2 441		
Highest Channel	2 480		



1.8. Test Equipment List

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	24/11/26	25/11/26	MY46471172
Spectrum Analyzer	Agilent Technologies	N9020A	24/06/03	25/06/03	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	24/11/26	25/11/26	MY50410399
DC Power Supply	Agilent Technologies	66332A	24/12/09	25/12/09	GB42110592
DC Power Supply	DIGITAL	DPR-303D	24/06/05	25/06/05	2090097
DC Power Supply	SM techno	SDP30-5D	24/06/05	25/06/05	305DMG304
Multimeter	FLUKE	17B	24/11/27	25/11/27	26030065WS
BlueTooth Tester	TESCOM	TC-3000C	24/06/05	25/06/05	3000C000563
Power Splitter	Anritsu	K241B	24/11/26	25/11/26	016681
Signal Generator	Rohde Schwarz	SMBV100A	24/12/10	25/12/10	255571
Signal Generator	KEYSIGHT	M9383A	24/12/10	25/12/10	E76F804A28
Thermohygrometer	BODYCOM	BJ5478	24/12/17	25/12/17	090205-4
Thermohygrometer	BODYCOM	BJ5478	24/12/05	25/12/05	120612-2
Thermohygrometer	BODYCOM	BJ5478	24/06/05	25/06/05	N/A
Loop Antenna	ETS-Lindgren	6502	24/11/08	26/11/08	00060496
Hybrid Antenna	Schwarzbeck	VULB 9160	24/12/13	25/12/13	3362
Horn Antenna	ETS-Lindgren	3117	24/06/04	25/06/04	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	24/06/11	25/06/11	155
PreAmplifier	tsj	MLA-0118-B01-40	24/00/11	25/11/26	1852267
PreAmplifier		MLA-1840-J02-45	24/06/03	25/06/03	16966-10728
PreAmplifier	tsj H.P	8447D	24/06/03	25/06/03	2944A07774
PreAmpliner	H.P		24/12/11	23/12/11	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935- 1000-15000-40SS	24/06/12	25/06/12	8
High Pass Filter	Wainwright Instruments	WHKX10-2838- 3300-18000-60SS	24/06/12	25/06/12	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5- 6SS	24/06/12	25/06/12	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	24/06/12	25/06/12	16012202
Attenuator	Aeroflex/Weinschel	56-3	24/06/12	25/06/12	Y2370
Attenuator	SMAJK	SMAJK-2-3	24/06/12	25/06/12	3
Attenuator	SMAJK	SMAJK-2-3	24/06/12	25/06/12	2
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2490A	24/12/12	25/12/12	1338004 1249303
Cable	Dt&C	Cable	25/01/02	26/01/02	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	25/01/02	26/01/02	G-3
Cable	Dt&C	Cable	25/01/02	26/01/02	G-4
Cable	OMT	YSS21S	25/01/02	26/01/02	G-5
Cable	Junkosha	MWX241	25/01/02	26/01/02	mmW-1
Cable	Junkosha	MWX241	25/01/02	26/01/02	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	25/01/02	26/01/02	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	25/01/02	26/01/02	M-02
Cable	JUNKOSHA	MWX241/B	25/01/02	26/01/02	M-03
Cable	JUNKOSHA	J12J101757-00	25/01/02	26/01/02	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	25/01/02	26/01/02	M-09
Cable	Dt&C	CABLE	25/01/02	26/01/02	RFC-46
Test Software (Radiated)	tsj	EMI Measurement	25/01/02 NA	26/01/02 NA	Version 2.00.0185
3m Semi Anechoic Chamber	SYC	3m-SAC	24/06/14(NSA) 24/06/19(VSWR)	25/06/14(NSA) 25/06/19(VSWR)	3m-SAC-1
3m Semi Anechoic Chamber	SYC	3m-SAC	25/01/14(NSA) 25/01/17(VSWR)	26/01/14(NSA) 26/01/17(VSWR)	3m-SAC-2

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017

Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.



2. Antenna Requirement

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.

Conclusion: Comply

The antenna is permanently attached.(Refer to Internal Photo file.) Therefore this E.U.T complies with the requirement of Part 15.203

3. Summary of Test Results

FCC part section(s)	Test Description	Limit (Using in 2 400~ 2 483.5 MHz)	Test Condition	Status Note 1
15.247(a) 15.247(b)	Maximum Peak Conducted Output Power	=< 0.125 W(conducted)		с
	20 dB Bandwidth	NA		С
15 247(2)	Carrier Frequency Separation	>= 25 kHz or >= Two thirds of the 20 dB BW, whichever is greater.	Conducted	С
15.247(a)	Number of Hopping Channels	>= 15 hops		С
	Time of Occupancy	=< 0.4 seconds		С
15.247(d)	Unwanted Emissions (Conducted)	The radiated emission to any 100 kHz of out-band shall be at least 20 dB below the highest in-band spectral density.		с
15.247(d) 15.205 15.209	Unwanted Emissions (Radiated)	Part 15.209 Limits (Refer to section 9)	Radiated	С
15.207	AC Power-Line Conducted Emissions	Part 15.207 Limits (Refer to section 10)	AC Line Conducted	NA Note 2
15.203	Antenna Requirement	Part 15.203 (Refer to section 2)	-	С
1,5	Not Comply NT = Not Test			
Note 2: I his device is instal	ed in a car. Therefore the pow	er source is a battery of car.		



4. Maximum Peak Conducted Output Power

4.1. Test Setup

Refer to the APPENDIX I.

4.2. Limit

FCC Requirements

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

- 1. §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 2 400 MHz 2 483.5 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. §15.247(b)(1), For frequency hopping systems operating in the 2 400 2 483.5 MHz employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5 725 MHz 5 805 MHz band : 1 Watt. For all other frequency hopping systems in the 2 400 MHz 2 483.5 MHz band: 0.125 watts.

4.3. Test Procedure

- 1. The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.
- 2. The peak output power of the fundamental frequency was measured with the spectrum analyzer using ; Span = approximately 5 times of the 20 dB bandwidth, centered on a hopping channel RBW ≥ 20 dB BW VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold

4.4. Test Results

Modulation	Tested Channel	Burst Average Output Power		Peak Output Power	
		dBm	mW	dBm	mW
	Lowest	0.47	1.11	0.69	1.17
<u>GFSK</u>	Middle	1.44	1.39	1.77	1.50
	Highest	1.77	1.50	2.13	1.63
	Lowest	-2.09	0.62	0.46	1.11
<u>π/4-DQPSK</u>	Middle	-1.46	0.71	1.07	1.28
	Highest	-1.22	0.76	1.33	1.36
<u>8DPSK</u>	Lowest	-2.13	0.61	0.69	1.17
	Middle	-1.46	0.71	1.32	1.36
	Highest	-1.24	0.75	1.64	1.46

Note 1: The average output power was tested using an average power meter for reference only. Note 2: See next pages for actual measured spectrum plots.



Lowest Channel & Modulation : GFSK



Peak Output Power







Highest Channel & Modulation : GFSK



Peak Output Power

Lowest Channel & Modulation : π/4-DQPSK





Middle Channel & Modulation : π/4-DQPSK



Peak Output Power

Highest Channel & Modulation : π/4-DQPSK











Peak Output Power

Middle Channel & Modulation : 8DPSK





Highest Channel & Modulation : 8DPSK



5. 20 dB BW

5.1. Test Setup

Refer to the APPENDIX I.

5.2. Limit

Limit : Not Applicable

5.3. Test Procedure

- 1. The 20 dB bandwidth was measured with a spectrum analyzer connected to RF antenna Connector (conducted measurement) while EUT was operating in transmit mode. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer.
- 2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using below setting:

RBW = 1 % to 5 % of the 20 dB BW

 $VBW \ge 3 \times RBW$

Span = between two times and five times the 20 dB bandwidth

Sweep = auto

Detector function = peak

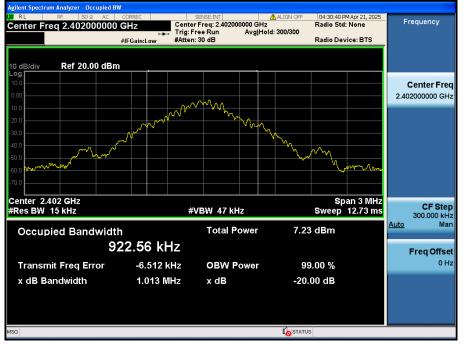
Trace = max hold

5.4. Test Results

Modulation	Tested Channel	20 dB BW (MHz)
	Lowest	1.013
<u>GFSK</u>	Middle	1.012
	Highest	1.015
	Lowest	1.345
<u>π/4-DQPSK</u>	Middle	1.349
	Highest	1.346
	Lowest	1.348
<u>8DPSK</u>	Middle	1.345
	Highest	1.350



Lowest Channel & Modulation : GFSK

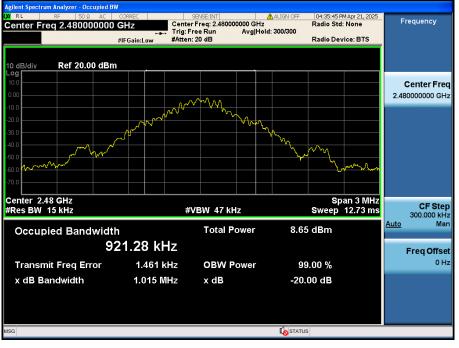


20 dB BW

Middle Channel & Modulation : GFSK

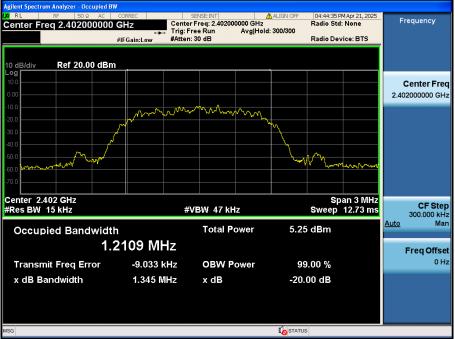


Highest Channel & Modulation : GFSK

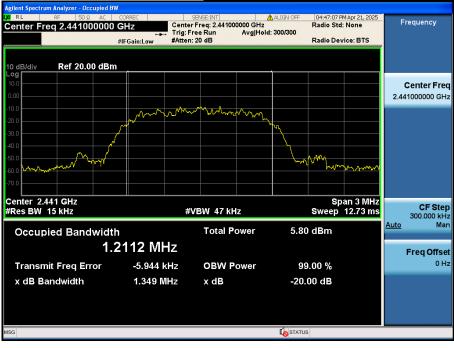


20 dB BW

Lowest Channel & Modulation : π/4-DQPSK



Middle Channel & Modulation : π/4-DQPSK



20 dB BW

Highest Channel & Modulation : π/4-DQPSK

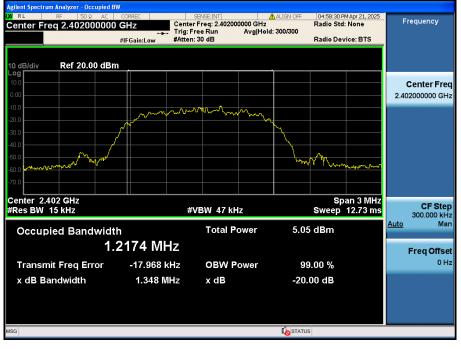




Dt&C

20 dB BW

Lowest Channel & Modulation : 8DPSK

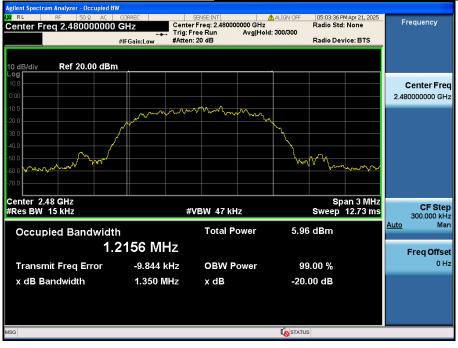


20 dB BW

Middle Channel & Modulation : 8DPSK m Analyzer - Occupied BW int Sn Center Freq: 2.441000000 GHz Trig: Free Run Avg|Hold: 300/300 #Atten: 20 dB 05:01:05 PM Apr 21, 2025 Radio Std: None Center Freq 2.441000000 GHz Frequency #IFGain:Low Radio Device: BTS Ref 20.00 dBm dB/div **Center Freq** 2.441000000 GHz Center 2.441 GHz #Res BW 15 kHz Span 3 MHz Sweep 12.73 ms CF Step 300.000 kHz #VBW 47 kHz Auto Mar Occupied Bandwidth Total Power 5.67 dBm 1.2161 MHz Freq Offset 0 Hz -14.268 kHz 99.00 % Transmit Freq Error **OBW Power** x dB Bandwidth 1.345 MHz x dB -20.00 dB **I**STATUS



Highest Channel & Modulation : 8DPSK





6. Carrier Frequency Separation

6.1. Test Setup

Refer to the APPENDIX I.

6.2. Limit

Limit : ≥ 25 kHz or ≥ Two-Thirds of the 20 dB BW whichever is greater.

6.3. Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the markerdelta function was recorded as the measurement results.

The spectrum analyzer is set to :

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

RBW = Start with the RBW set to approximately 30 % of the channel spacing; adjust as necessary to best identify the center of each individual channel.

VBW ≥ RBW Sweep = auto

Detector function = peak Trace = max hold

6.4. Test Results

FH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
	GFSK	2 440.992	2 441.993	1.001
Enable	π/4-DQPSK	2 440.989	2 441.987	0.998
	8DPSK	2 440.990	2 441.989	0.999

AFH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
	GFSK	2 440.991	2 441.994	1.003
Enable	π/4-DQPSK	2 440.990	2 441.995	1.005
	8DPSK	2 440.995	2 441.998	1.003

Note 1 : See next pages for actual measured spectrum



Carrier Frequency Separation (FH)

Hopping mode : Enable & GFSK

Agilent Spectrum Analyzer - Swept SA					
LX/RL RF 50Ω AC				M Apr 21, 2025	Frequency
Center Freq 2.441000000			: Log-Pwr TRA		requercy
	PNO: Wide Trig: Free IFGain:Low Atten: 30		1		
			ΔMkr1 1.0	001 MHz	Auto Tune
10 dB/div Ref 20.00 dBm				-0.02 dB	
Log 10.0			1Δ2		
0.00		/			Center Freq 2.441000000 GHz
		12~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2.441000000 GHZ
-10.0				-	
-20.0					Start Freq
-30.0					2.439500000 GHz
-40.0					
-50.0					Stop Freq
-60.0					2.442500000 GHz
-70.0					
Center 2.441000 GHz			Span :	3.000 MHz	CF Step
#Res BW 51 kHz	#VBW 150 kHz	\$	Sweep 1.200 ms		300.000 kHz
MKR MODE TRC SCL X	Y	FUNCTION FUN	ICTION WIDTH FUNCT	ION VALUE	<u>Auto</u> Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.001 MHz (Δ) -0.02 0 992 GHz 1.11 dE	dB			
3 2.44	0 992 GHZ 1.11 di	sm			Freq Offset
4 5					0 Hz
6					
7 8					
9					
11				∼	
MSG			I STATUS		
			N 00		

Carrier Frequency Separation (FH)

<u>Hopping mode : Enable & π/4-DQPSK</u>





Carrier Frequency Separation (FH) <u>Hopping mode : Enable & 8DPSK</u>

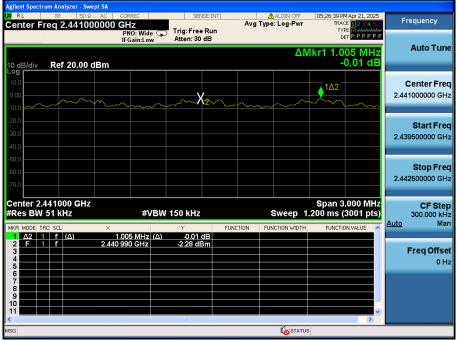
Agilent Spectrum Analyzer - Sw						
<mark>(X)</mark> RL RF 50 Ω		SENSE			M Apr 21, 2025	Frequency
Center Freq 2.4410	00000 GHz	te 💭 Trig: Free R	Avg Type:	- TY	CE 123456 PE MWAAAAAAA	, solitory
	PNO: Wie IFGain:Lo			D	ЕТ Р Р Р Р Р Р	
				ΔMkr1		Auto Tune
					0.01 dB	
10 dB/div Ref 20.00	dBm				0.01 UB	
10.0						Contor From
				▲1∆2		Center Freq
0.00	<u>.</u>	X	~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2.441000000 GHz
-10.0		~~~~~				
-20.0						
-30.0						Start Freq
						2.439500000 GHz
-40.0						
-50.0						
-60.0						Stop Freq
-70.0						2.442500000 GHz
-70.0						
Center 2.441000 GHz				Snan 3	.000 MHz	05.04.0
#Res BW 51 kHz		VBW 150 kHz	9	weep 1.200 ms (3001 nts)	CF Step 300.000 kHz
	"	VDW 150 KHZ				Auto Man
MKR MODE TRC SCL	×	Y		TION WIDTH FUNCTION	ON VALUE 🔥	Hatto Marr
1 Δ2 1 f (Δ) 2 F 1 f	999 kH: 2.440 990 GHz					
3	2.440 330 0112	-2.40 dBil				Freq Offset
4						0 Hz
5						
7						
8						
9						
11					~	
<						
MSG				I STATUS		



Carrier Frequency Separation (AFH) <u>Hopping mode : Enable & GFSK</u>



Carrier Frequency Separation (AFH) <u>Hopping mode : Enable & $\pi/4$ -DQPSK</u>





Carrier Frequency Separation (AFH) <u>Hopping mode : Enable & 8DPSK</u>



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7. Number of Hopping Channels

7.1. Test Setup

Refer to the APPENDIX I.

7.2. Limit

Limit : >= 15 hops

7.3. Test Procedure

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, two frequency ranges for FH mode within the 2 400 MHz ~ 2 483.5 MHz were examined.

The spectrum analyzer is set to :

Span for FH mode = 50 MHz	Start Frequency = 2 391.5 MHz,	Stop Frequency = 2 441.5 MHz
	Start Frequency = 2 441.5 MHz,	Stop Frequency = 2 491.5 MHz
Span for AFH mode = 30 MHz	Start Frequency = 2 426.0 MHz,	Stop Frequency = 2 456.0 MHz
RBW = To identify clearly the indiv or the 20 dB bandwidth, w		ss than 30 % of the channel spacing
VBW ≥ RBW	Sweep = auto	
Detector function = peak	Trace = max hold	

7.4. Test Results

FH mode

Hopping mode	Modulation	Test Result (Total Hops)
	GFSK	79
Enable	π/4-DQPSK	79
	8DPSK	79

AFH mode

Hopping mode	Modulation	Test Result (Total Hops)
	GFSK	20
Enable	π/4-DQPSK	20
	8DPSK	20

Note 1 : See next pages for actual measured spectrum plots.





Number of Hopping Channels 1(FH) Hopping mode : Enable & GFSK

X/RL	rum Analyzer - Sw RF 50 s req 2.4165	2 AC CORI 00000 GH	z		SE:INT		ALIGN OFF e: Log-Pwr	TRAG	M Apr 21, 2025 CE 1 2 3 4 5 6 PE M WANNAMAN	Frequency
10 dB/div	Ref 20.00	IFG	IO: Fast 😱 iain:Low	Atten: 30			Mkr2	D 2.441 0	00 GHz	Auto Tune
10.0 0.00 -10.0			NΛΛΛ			MW	WW	MM		Center Fred 2.416500000 GHz
-20.0										Start Fred 2.391500000 GHz
-50.0										Stop Fred 2.441500000 GHz
#Res BW	9150 GHz / 270 kHz IRC SCL	× 2.402.000		7 820 kHz Y 0.90 d⊟	FUNC		Sweep 1	.000 ms (150 GHz 3001 pts)	CF Step 5.000000 MHz <u>Auto</u> Mar
	1 f	2.441 000		1.68 dB						Freq Offset 0 Hz
7 8 9 10 11									~	
WSG								3		

Number of Hopping Channels 2(FH)



Agilent Spectrum Analyzer - Swept SA					
X RL RF 50 Ω AC Center Freg 2.466500000		SENSE:INT	ALIGN OFF	04:42:30 PM Apr 21, 2025 TRACE 1 2 3 4 5 6	Frequency
Center Freq 2.486500000	PNO: Fast 😱	Trig: Free Run	ing type. Log t m	TYPE MWWWWWW DET P P P P P P	
	IFGain:Low	Atten: 30 dB			Auto Tune
			Mkr2	2.480 000 GHz 1.82 dBm	riato rano
10 dB/div Ref 20.00 dBm				1.82 aBm	
10.0 1			2		Center Freq
0.00 Kanananananan	ллаллал	лллллллл			2.466500000 GHz
			<u> </u>		
-20.0					
-30.0					Start Freq
-40.0					2.441500000 GHz
-50.0				mannenan	
-50.0					Stop Freq
					2.491500000 GHz
-70.0					
Start 2.44150 GHz				Stop 2.49150 GHz	CF Step
#Res BW 270 kHz	#VBW	820 kHz	Sweep 1	.000 ms (3001 pts)	5.000000 MHz
MKR MODE TRC SCL X			CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2.44 2 N 1 f 2.48	2 000 GHz 0 000 GHz	1.59 dBm 1.82 dBm			
3	0000 9H2	1.02 UDIII			Freq Offset
4 5					0 Hz
6 7					
8					
9					
11				~	
<		111	1	>	
MSG				5	



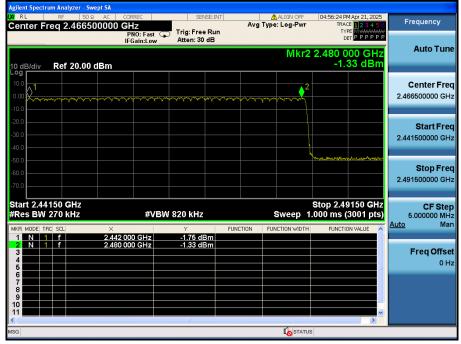
Number of Hopping Channels 1(FH)

Hopping mode : Enable & $\pi/4$ -DQPSK

gilent Spectrum Analyzer - Swe RL RF 50 Ω	AC CORREC	SENSE:INT	ALIGN OFF	04:55:12 PM Apr 21, 2025	
enter Freq 2.41650	00000 GHz		Avg Type: Log-Pwr	104:55:12 PM Apr 21, 2025 TRACE 2 3 4 5 6 TYPE M AMAAAAA	Frequency
) dB/div Ref 20.00 d	PNO: Fast (IFGain:Low	Atten: 30 dB	Mkr2	2.441 000 GHz -2.13 dBm	Auto Tun
og 10.0 0.00					Center Fre 2.416500000 GH
					Start Free 2.391500000 GH
50.0					Stop Fred 2.441500000 GH;
tart 2.39150 GHz Res BW 270 kHz	#VB	W 820 kHz	Sweep 1	Stop 2.44150 GHz .000 ms (3001 pts)	CF Step 5.000000 MH <u>Auto</u> Mar
1 N 1 f 2 N 1 f 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	2.402 000 GHz 2.441 000 GHz	-2.47 dBm -2.13 dBm			Freq Offset
6 7 8 9 9 9 10 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
SG			STATUS	>	

Number of Hopping Channels 2(FH)

Hopping mode : Enable & π/4-DQPSK







Number of <u>Hopping Channels 1(FH)</u><u>Hopping mode : Enable & 8DPSK</u>

Original Ref SDQ AC CORREC SENSEINT Autom CF Costo DeMan 22,225 Frequency Center Freq 2.416500000 GHz IFGain:Low Trig: Free Run Atten: 30 dB Avg Type: Log-Pwr Trace 22 at 5 Type: Dog PP P P Frequency Auto Tun 10 dB/div Ref 20.00 dBm -2.14 dBm Center Fre 2.416500000 GHz Auto Tun 10 dB/div Ref 20.00 dBm -2.14 dBm Start Fre 2.391500000 GH Start Fre 2.39150000 GH 200 1
PNO: Fast IFGain:Low Trig: Free Run Atten: 30 dB Trig: Free Run Der PPPPP Auto Tun 10 dB/div Ref 20.00 dBm -2.14 dBm -2.14 dBm -2.14 dBm 10 dB/div Ref 20.00 dBm -2.14 dBm -2.14 dBm -2.14 dBm 10 dB/div 1 -2.14 dBm -2.14 dBm -2.14 dBm 200 1 -2.14 dBm -2.14 dBm -2.14 dBm 2.00 1 -2.01 dBm -2.14 dBm -2.14 dBm 2.00 1 -2.14 dBm -2.14 dBm -2.14 dBm 2.00 1 -2.01 dBm -2.14 dBm -2.14 dBm 2.00 1 -2.14 dBm -2.31 dBm -2.14 dBm 2.00 1 -2.14 dBm -2.31 dBm -2.31 dBm 2.00 1 -2.14 dBm -2.31 dBm -2.31 dBm
Mkr2 2.441 000 GHz Auto Tun 10 dB/div Ref 20.00 dBm -2.14 dBm 10 dB/div Ref 20.00 dBm -2.14 dBm 10 dB/div 1 -2.14 dBm 2.00 -2.14 dBm -2.14 dBm 2.41650000 GF -2.41650000 GF 40.0 -2.39150000 GF 50.0 -2.39150000 GF 60.0 -2.44150000 GF 2.44150000 GF -2.44150000 GF
Mikr2 2.441 000 GHz Center Fre 10 dB/div 1
Log Log Center Fre 100 1 2.41650000 GH 200 2.301 3.00 400 4.00 3.00 500 4.00 5.00 600 7.00 4.00
10.0 1 Center Fre 0.00 1 2.41650000 GF 10.0 2.00 300 30.0 300 300 40.0 300 300 50.0 300 300 70.0 300 300 70.0 300 300 60.0 300 300 70.0 300 300 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0
0.00 1 2.416500000 GH 10.0 2.416500000 GH 20.0 30.0 30.0 30.0 40.0 30.0 50.0 30.0 60.0 30.0 70.0 30.0
10.0 Start Fre 20.0 30.0 30.0 40.0 40.0 40.0 60.0 40.0 70.0 40.0 70.0 40.0
20.0 30.0 Start Free 30.0 40.0 2.391500000 GH 40.0 50.0 Stop Free 60.0 2.441500000 GH
30.0
40 0 50 0 60 0 70 0 50 0
500 Stop Fre 600 Stop Fre 2.44150000 GH
Stop Fre 2.44150000 GH
2.44150000 GH
Start 2.39150 GHz Stop 2.44150 GHz CF Ste
#Res BW 270 kHz #VBW 820 kHz Sweep 1.000 ms (3001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE A
2 N 1 f 2,441,000 GHz -2,14 dBm
3 Freq Offse
MSG ISTATUS

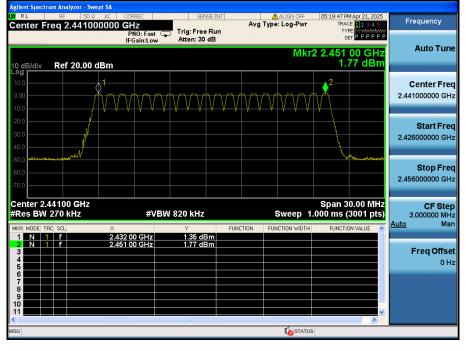
Number of Hopping Channels 2(FH)



Agilent Spectrum Analyzer - Swept SA						
M RL RF 50Ω AC Center Freg 2.466500000		ALIGN OFF Avg Type: Log-Pwr	05:10:22 PM Apr 21, 2025 TRACE 1 2 3 4 5 6	Frequency		
	PNO: Fast IFGain:Low Atten: 30 dB		туре Миници DET P P P P P P 2.480 000 GHz	Auto Tune		
10 dB/div Ref 20.00 dBm		2	-1.20 dBm	Center Freq		
-10.0	ada and a contraction of the con			2.466500000 GHz		
-20.0				Start Freq 2.441500000 GHz		
-50.0 -60.0 -70.0				Stop Freq 2.491500000 GHz		
Start 2.44150 GHz #Res BW 270 kHz	#VBW 820 kHz		top 2.49150 GHz 000 ms (3001 pts)	CF Step 5.000000 MHz <u>Auto</u> Man		
1 N 1 f 2.44 2 N 1 f 2.48 3 4 5 5	12 000 GHz -2.00 dBm 20 000 GHz -1.20 dBm			Freq Offset 0 Hz		
6 6 7 7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9						
Kan ka						

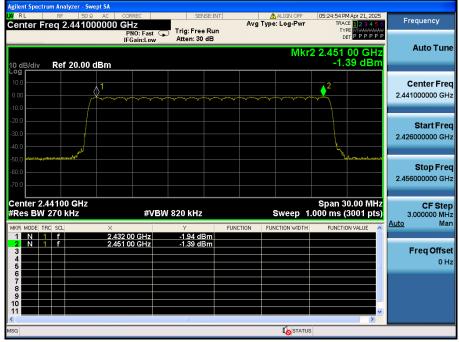
Number of Hopping Channels 1(AFH)

Hopping mode : Enable & GFSK



Number of Hopping Channels 1(AFH)

Hopping mode : Enable & π/4-DQPSK



Number of <u>Hopping Channels 1(AFH)</u><u>Hopping mode : Enable & 8DPSK</u>

enter Freq	ະ⊧ 50 Ω 2.44100	0000 GH	z		ISE:INT		ALIGN OFF	TRAG	M Apr 21, 2025	Frequency
0 dB/div R	ef 20.00 d	IFG	IO: Fast C ain:Low	Atten: 30	dB		Mkr	2 2.451	00 GHz	Auto Tur
		,1 ~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~	~~~~		2		Center Fre 2.441000000 GF
20.0 30.0 40.0										Start Fre 2.426000000 GH
50.0	ahardhad ^d								ahlannan an a	Stop Fre 2.456000000 GF
Res BW 27	0 kHz	X		W 820 kHz Y		CTION FL	Sweep 1.	.000 ms (0.00 MHz 3001 pts) DN VALUE	CF Ste 3.000000 MH <u>Auto</u> Ma
1 N 1 1 2 N 1 1 3		2.432 00 2.451 00		-1.62 dE -1.10 dE	3m 3m					Freq Offs 0 H
7 8 9 0 1										
G							I STATUS			



8. Time of Occupancy

8.1. Test Setup

Refer to the APPENDIX I.

8.2. Limit

The maximum permissible time of occupancy is 400 ms within a period of 400 ms multiplied by the number of hopping channels employed.

8.3. Test Procedure

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to :

Center frequency = 2 441 MHz

Span = zero

RBW = 1 MHz (RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel)

VBW ≥ RBW

Detector function = peak

Trace = max hold

8.4. Test Results

FH mode

Hopping mode	Packet Type	Number of hopping Channels	Burst On Time (ms)	Period (ms)	Test Result (sec)
Enable	DH5	79	2.880	3.750	0.307
	2-DH5	79	2.880	3.750	0.307
	3-DH5	79	2.880	3.750	0.307

AFH mode

Hopping mode	Packet Type	Number of hopping Channels	Burst On Time (ms)	Period (ms)	Test Result (sec)
Enable	DH5	20	2.880	3.750	0.154
	2-DH5	20	2.880	3.750	0.154
	3-DH5	20	2.880	3.750	0.154

Note 1 : Dwell Time = 0.4 × Hopping channel × Burst ON time ×

((Hopping rate ÷ Time slots) ÷ Hopping channel)

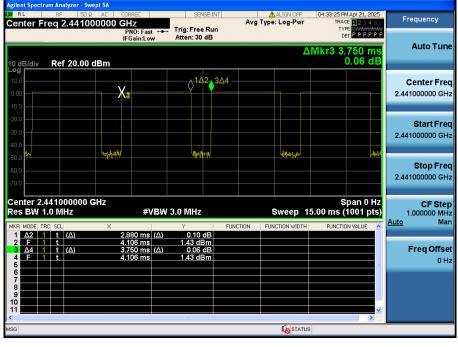
- Time slots for DH 5 = 6 slots (TX = 5 slots / RX = 1 slot)
- Hopping Rate = 1 600 for FH mode & 800 for AFH mode

Note 2 : See next pages for actual measured spectrum plots.



Hopping mode : Enable & DH5

Time of Occupancy (FH)



Time of Occupancy (FH)

Hopping mode : Enable & 2-DH5





Hopping mode : Enable & 3-DH5

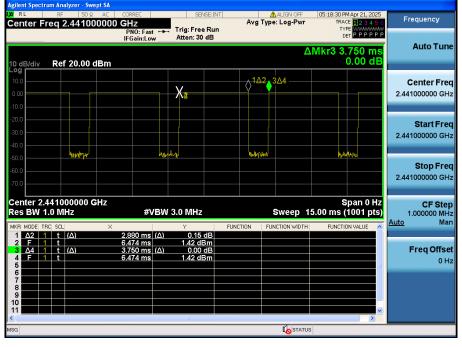
Time of Occupancy (FH)





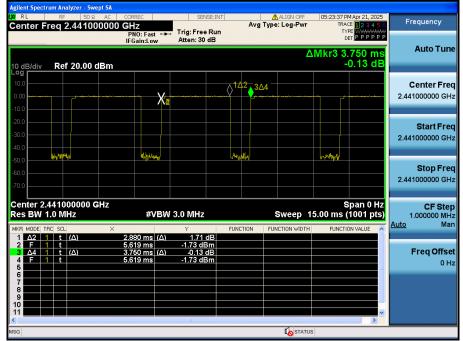
Hopping mode : Enable & DH5

Time of Occupancy (AFH)



Time of Oc<u>cupancy (AFH)</u>

Hopping mode : Enable & 2-DH5





Time of Occupancy (AFH)

Hopping mode : Enable & 3-DH5





9. Unwanted Emissions

9.1. Test Setup

Refer to the APPENDIX I.

9.2. Limit

Part 15.247(d), Part 15.205, Part 15.209

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 Part 15.247 the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c)).

- Part 15.209: General requirement

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
0.009 - 0.490	2 400 / F (kHz)	300
0.490 – 1.705	24 000 / F (kHz)	30
1.705 - 30.0	30	30

Frequency (MHz)	FCC Limit (uV/m)	Measurement Distance (m)
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 shall not 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.

- Part 15.205	(a): Restricted	band of operation
---------------	-----------------	-------------------

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108 ~ 121.94	1 300 ~ 1 427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1 435 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.173 5 ~ 2.190 5	12.519 75 ~ 12.520 25	149.9 ~ 150.05	1 645.5 ~ 1 646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.576 75 ~ 12.577 25	156.524 75 ~ 156.525 25	1 660 ~ 1 710	8.025 ~ 8.5	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.42 ~ 16.423	162.012 5 ~ 167.17	2 200 ~ 2 300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.2	2 310 ~ 2 390	10.6 ~ 12.7	36.43 ~ 36.5
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500	13.25 ~ 13.4	Above 38.6
6.311 75 ~ 6.312 25	25.5 ~ 25.67	322 ~ 335.4	2 655 ~ 2 900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3 260 ~ 3 267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3 332 ~ 3 339		
8.376 25 ~ 8.386 75	74.8 ~ 75.2	960 ~ 1 240	3 345.8 ~ 3 358		
			3 600 ~ 4 400		



9.3. Test Procedures

9.3.1. Test Procedures for Unwanted Emissions(Radiated)

- 1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 or 3 meter away from the interference-receiving antenna.
- For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.
- 4. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 7. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Measurement Instrument Setting

- Frequencies less than or equal to 1 000 MHz The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasipeak detection (QP) at frequency below 1 GHz.

 Frequencies above 1 000 MHz
 The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
 The result of Average measurement is calculated using PK result and duty correction factor.



9.3.2. Test Procedures for Unwanted Emissions(Conducted)

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. The **reference level** of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 kHz, VBW = 300 kHz.
- 3. The conducted spurious emission was tested each ranges were set as below.

Frequency range : 9 kHz ~ 30 MHz RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40 001

Frequency range : 30 MHz ~ 10 GHz, 10 GHz ~ 25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40 001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2 001 to get accurate emission level within 100 kHz BW.

Also the path loss for conducted measurement setup was used as described on the Appendix I of this test report.

9.4. Test Results

9.4.1. Unwanted Emissions(Radiated)

Test Notes.

1. The radiated emissions below 1 GHz were investigated 9 kHz to 1 GHz and the worst case data was reported.

2. Information of Distance Correction Factor

For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.

In this case, the distance factor is applied to the result.

- Calculation of distance correction factor

At frequencies below 30 MHz = 40 log(tested distance / specified distance)

At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)

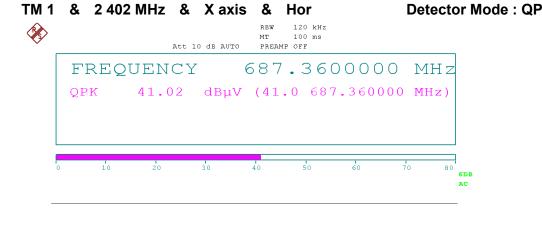
When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.

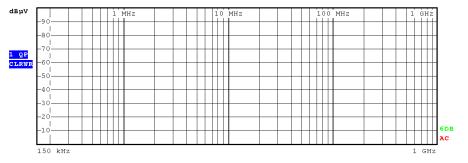
3. Sample Calculation.

Margin = Limit – Result / Result = Reading + TF+ DCCF + DCF / TF = AF + CL + HL + AL – AG Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss, AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

9 kHz ~ 1 GHz Data (Modulation : GFSK)

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
687.36	Н	Х	QP	41.02	3.85	N/A	N/A	44.87	46.02	1.15
700.66	V	Х	QP	37.50	4.05	N/A	N/A	41.55	46.02	4.47
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-





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Test Notes.

- 1. The radiated emissions were investigated 1 GHz to 25 GHz. And no other spurious and harmonic emissions were found below listed frequencies.
- 2. Information of Distance Correction Factor

For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.

- In this case, the distance correction factor is applied to the result.
- Calculation of distance factor

At frequencies below 30 MHz = 40 log(tested distance / specified distance)

At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)

When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied. 3. DCCF Calculation. (DCCF = Duty Cycle Correction Factor)

- Time to cycle through all channels = Δt = T [ms] X 20 minimum hopping channels , where T = pulse width = 2.88 ms

- 100 ms / Δt [ms] = H -> Round up to next highest integer, to account for worst case, H' = 100 / (2.88 X 20) = 1.74 = 2

- The Worst Case Dwell Time = T [ms] x H' = 2.88 ms X 2 = 5.76 ms
- DCCF = 20 Log(The Worst Case Dwell Time / 100 ms) dB = **20 log(5.76 / 100)** = <u>-24.79 dB</u> 4. Sample Calculation.

Margin = Limit – Result / Result = Reading + TF + DCCF + DCF / TF = AF + CL + HL + AL – AG

Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss,

AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

1 GHz ~ 25 GHz Data (Modulation : GFSK)

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 378.15	Н	Х	PK	50.10	4.90	N/A	N/A	55.00	74.00	19.00
2 378.15	Н	Х	AV	50.10	4.90	-24.79	N/A	30.21	54.00	23.79
4 804.88	Н	Х	PK	50.02	2.47	N/A	N/A	52.49	74.00	21.51
4 804.88	Н	Х	AV	50.02	2.47	-24.79	N/A	27.70	54.00	26.30

Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4 881.42	Н	Х	PK	50.18	2.86	N/A	N/A	53.04	74.00	20.96
4 881.42	Н	Х	AV	50.18	2.86	-24.79	N/A	28.25	54.00	25.75

Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 488.34	Н	Х	PK	50.11	5.74	N/A	N/A	55.85	74.00	18.15
2 488.34	Н	Х	AV	50.11	5.74	-24.79	N/A	31.06	54.00	22.94
4 960.76	Н	Х	PK	48.84	3.32	N/A	N/A	52.16	74.00	21.84
4 960.76	Н	Х	AV	48.84	3.32	-24.79	N/A	27.37	54.00	26.63



1 GHz ~ 25 GHz Data (Modulation : π /4-DQPSK)

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 388.66	Н	Х	PK	50.13	4.96	N/A	N/A	55.09	74.00	18.91
2 388.66	Н	Х	AV	50.13	4.96	-24.79	N/A	30.30	54.00	23.70
4 804.96	Н	Х	PK	50.00	2.47	N/A	N/A	52.47	74.00	21.53
4 804.96	Н	Х	AV	50.00	2.47	-24.79	N/A	27.68	54.00	26.32

Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4 881.31	Н	Х	PK	50.46	2.85	N/A	N/A	53.31	74.00	20.69
4 881.31	Н	Х	AV	50.46	2.85	-24.79	N/A	28.52	54.00	25.48

Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 486.82	Н	Х	PK	50.56	5.71	N/A	N/A	56.27	74.00	17.73
2 486.82	Н	Х	AV	50.56	5.71	-24.79	N/A	31.48	54.00	22.52
4 960.46	Н	Х	PK	49.38	3.32	N/A	N/A	52.70	74.00	21.30
4 960.46	Н	Х	AV	49.38	3.32	-24.79	N/A	27.91	54.00	26.09



1 GHz ~ 25 GHz Data (Modulation : <u>8DPSK</u>)

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 388.96	Н	Х	PK	50.05	4.96	N/A	N/A	55.01	74.00	18.99
2 388.96	Н	Х	AV	50.05	4.96	-24.79	N/A	30.22	54.00	23.78
4 803.13	Н	Х	PK	50.35	2.47	N/A	N/A	52.82	74.00	21.18
4 803.13	Н	Х	AV	50.35	2.47	-24.79	N/A	28.03	54.00	25.97

Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4 882.41	Н	Х	PK	50.02	2.90	N/A	N/A	52.92	74.00	21.08
4 882.41	Н	Х	AV	50.20	2.90	-24.79	N/A	28.31	54.00	25.69

Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 484.07	Н	Х	PK	49.93	5.66	N/A	N/A	55.59	74.00	18.41
2 484.07	Н	Х	AV	49.93	5.66	-24.79	N/A	30.80	54.00	23.20
4 960.45	Н	Х	PK	48.75	3.32	N/A	N/A	52.07	74.00	21.93
4 960.45	Н	Х	AV	48.75	3.32	-24.79	N/A	27.28	54.00	26.72



9.4.2. Unwanted Emissions(Conducted)

Low Band-edge



Lowest Channel & Modulation : GFSK

Low Band-edge

Hopping mode & Modulation : GFSK





Lowest Channel & Modulation : GFSK

		er - Swept SA									
LXI RL	RF	50 Ω <u>Å</u> DC	CORREC		SENSE:			ALIGN OFF		M Apr 21, 2025	Frequency
Center	Freq 15	.004500 N		Tr	ig: Free Ru		vg Type	e: Log-Pwr	D	CE 123456	requeriey
			PNO: Fas IFGain:Lo		tten: 20 dB				E	_{ЕТ} Р Р Р Р Р Р	
									Milesed Of	0.7.60-	Auto Tune
									2.7 kHz		
10 dB/div Log	Ref 1	0.00 dBm							-40.	19 dBm	
0.00											
											Center Freq
-10.0											15.004500 MHz
-20.0										-19.42 dBm	
-30.0											
											Start Freq
-40.0											9.000 kHz
-50.0											
-60.0											
-70.0	ution and	والمراجع والمراجع والمراجع والمراجع	Minister Australia	alian harandadaa	ماري بيروم يترويا			فيصار ووالدار ومراولة فرسا	ومعادية بعالما فطرها	ويدار معامدتهم والمعرانية	Stop Freq
											30.000000 MHz
-80.0											
Start 9 k								_	Stop 3	0.00 MHz	CF Step
#Res BV	V 100 KH	Z	#	VBW 30	U KHZ		S	weep 5.	333 ms (4	0001 pts)	2.999100 MHz
MKR MODE	TRC SCL	×			Y	FUNCTION	I FUI	NCTION WIDTH	FUNCTI	ON VALUE 🛛 🔼	<u>Auto</u> Man
	1 f		282.7 kHz	z -4	5.19 dBm						
2							_				Freq Offset
4											0 Hz
5										3	UHZ
6											
8											
9											
10							_				
<										~	
MSG								The STATIS	DC Co	unled	
mod								- No STATUS		upieu	

Agilent Spectrum Analyzer - Swept SA					
LXU RL RF 50Ω AC		SENSE:INT	ALIGN OFF	04:32:29 PM Apr 21, 2025	Frequency
Center Freq 5.015000000		ree Run	\vg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW	riequency
	PNO: Fast Trig: F IEGain: I ow Atten:			DETPPPP	
	II OUIIIEON		B.A.L.		Auto Tune
			IVIKIS	5 2.514 52 GHz	
10 dB/div Ref 10.00 dBm				-44.41 dBm	
0.00					
0.00					Center Freq
-10.0					5.015000000 GHz
-20.0				-19.42 dBm	
-30.0					
	5				Start Freq
-40.0					30.000000 MHz
-50.0	terter operations and the Party of the second second	THE OWNER WHEN THE PARTY OF	And in the last of	and a line of a state	
-60.0	Solution in the local division of the local	and the second se		in the second	
					Stop Freq
-70.0					10.00000000 GHz
-80.0					10.00000000000000
Start 30 MHz				Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VBW 3.0 MH	IZ	Sweep 18.	67 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL X	Y	FUNCTION	N FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2.40		dBm			
	46 05 GHz -34.65				Ener Offert
3 N 1 f 5.70	50 54 GHz -38.39 51 53 GHz -40.73	dBm			Freq Offset
	14 52 GHz -44.41			-	0 Hz
6					
7 8					
9					
10					
11				~	
			-		
MSG					



Lowest Channel & Modulation : GFSK





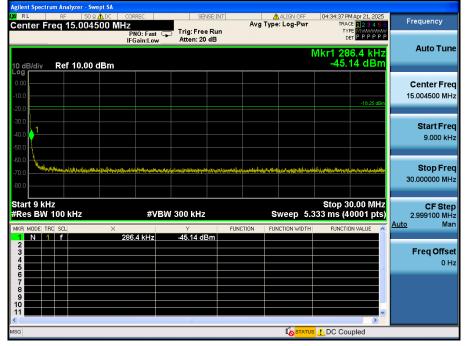
Reference for limit

Middle Channel & Modulation : GFSK



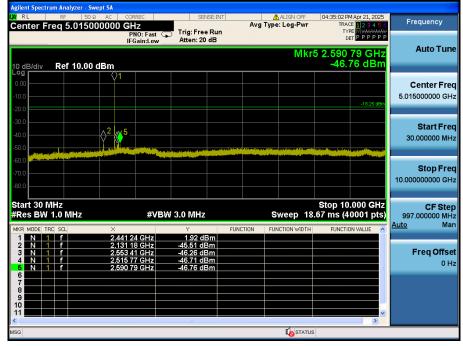
Conducted Spurious Emissions

Middle Channel & Modulation : GFSK





Middle Channel & Modulation : GFSK



Agilent Spectr							
Center Fr		0 Ω AC CORREC 00000000 GHz PNO: Fast		Avg	ALIGN OFF	04:35:26 PM Apr 21, 20 TRACE 2 3 4 TYPE M	Frequency
10 dB/div	Ref 10.0	IFGain:Lov 0 dBm	Atten: 20 dB		Mkr3 2	1.650 875 GH -42.13 dB	Auto Tune
Log 0.00 -10.0 -20.0						-18.25 c	Center Freq 17.500000000 GHz
-30.0 -40.0			ويعاد المحمد المحمد والمراجع				1 Start Free 10.000000000 GHz
-60.0 -70.0 -80.0							Stop Fred 25.000000000 GHz
Start 10.0 #Res BW	1.0 MHz	#V	'BW 3.0 MHz		Sweep 40	Stop 25.000 Gl .00 ms (40001 p	HZ CF Step ts) 1.500000000 GHz Auto Mar
MKR MODE TF	C SCL	× 24,585 250 GHz	۲ -38.81 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 3 N 1 4 5	f	21.115 750 GHz 21.650 875 GHz	-42.11 dBm -42.13 dBm				Freq Offset
6 7 8 9							
10						>	~
MSG					Ko status	;	



High Band-edge

Highest Channel & Modulation : GFSK



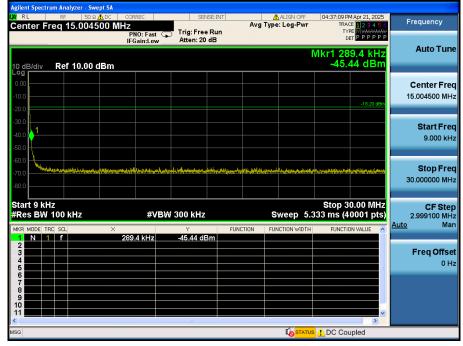
High Band-edge

Hopping mode & Modulation : GFSK





Highest Channel & Modulation : GFSK



MKR. MODEL TRCI SCLI X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE Auto Man 1 N 1 f 2.480 13 GHz 2.05 dBm Environmentation For the second seco	Agilent Spectrum Analyzer - Sw	vept SA				
Center Pred 3.01300000 GHz Pro: Fast Pro			SENSE:IN			Frequency
WIKPS 2:355 40 CGHz Log -47.59 dBm Start 30 MHz Stop 10.000 GHz Res BW 10 MHz V BW 3.0 MHz Sweep 18.67 ms (40001 pts) Start 30 MHz Y Function Function width Function width Res BW 10 MHz Y BW 3.0 MHz Sweep 18.67 ms (40001 pts) Part 10.0000000 MHz All n 1 1 2 2 44.37 dBm 45.03 dBm 44.37 dBm <t< td=""><td>Center Freq 5.0150</td><td>PNO: Fa</td><td></td><td></td><td>TYPE M WAAMAAAAA</td><td></td></t<>	Center Freq 5.0150	PNO: Fa			TYPE M WAAMAAAAA	
0.00 0.01 0.01 0.01 0.00	10 dB/div Ref 10.00	dBm		М		Auto Tune
400 40 40 40 40 50 60 7	-10.0				-18 20 dBm	•
Xtart 30 MHz Stop Freq Stop Freq 10.0000000 GHz Start 30 MHz #VBW 3.0 MHz Sweep 18.67 ms (40001 pts) G<	-40.0	\$ ²	and the specific sector of the		a na mana a sa sa ta ta sa sa ta sa	
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.67 ms (40001 pts) 997.00000 MHz MKR MODE TRCI SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE Auto Man 1 N 1 f 2.490 13 GHz 2.05 dBm FUNCTION FUNCTION VALUE Auto Man 1 N 1 f 2.192 19 Ct 4.43.7 dBm FUNCTION FUNCTION VALUE Freq Offset 0 Hz 3 N 1 f 2.192 0 CHz 4.63.0 dBm 0 Hz 0 Hz 0 Hz 6 N 1 f 2.655 40 GHz -47.59 dBm 0 Hz 0 Hz 0 Hz 9 0 0 0 0 0 0 0 Hz 0 Hz 0 Hz	-70.0					
MRR MODE TRC StL X Y FUNCTION FUNCTION VALUE 1 1 1 1 1 2.05 dBm FUNCTION VALUE 2 N 1 1 1 2.05 dBm Freq Offset 3 N 1 1 2.131 18 GHz 2.05 dBm Freq Offset 3 N 1 1 2.134 14 GHz -46.93 dBm Freq Offset 4 N 1 1 2.144 14 GHz -45.91 dBm - 5 N 1 1 2.555 40 GHz -47.59 dBm - 6 - - - - - 7 - - - - - 8 - - - - - 9 - - - - - 10 - - - - - 11 - - - - -	Start 30 MHz #Res BW 1.0 MHz	#	VBW 3.0 MHz	Sweep	Stop 10.000 GHz 18.67 ms (40001 pts)	997.000000 MHz
2 N 1 f 2.131 18 GHz 44.37 dBm 3 N 1 f 2.592 29 GHz -45.03 dBm -45.03 dBm -6 4 N 1 f 2.144 14 GHz -45.91 dBm -6 0 Hz 5 N 1 f 2.555 40 GHz -47.59 dBm -6 0 Hz 6 - - - - - - 0 Hz 9 - - - - - - 0 Hz 10 - - - - - - - - 11 - - - - - - - -				FUNCTION FUNCTION WE	TH FUNCTION VALUE	Auto Man
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	2 N 1 F 3 N 1 F 4 N 1 F 5 N 1 F	2.131 18 GH 2.592 29 GH 2.144 14 GH	z -44.37 dBm z -45.03 dBm z -45.91 dBm			
	7 8 9 10					
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	MSG			In st		



Highest Channel & Modulation : GFSK

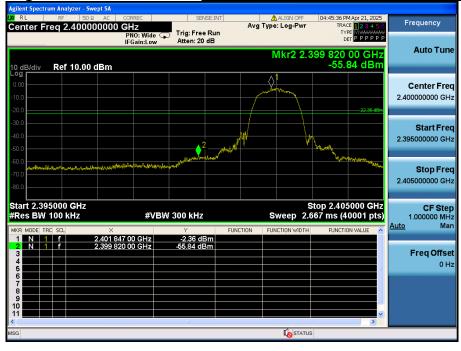






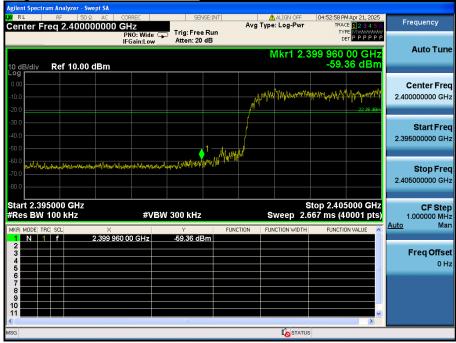
Low Band-edge

Lowest Channel & Modulation : π/4-DQPSK



Low Band-edge

Hopping mode & Modulation : π/4-DQPSK





Lowest Channel & Modulation : π/4-DQPSK

gilent Spectrum Analyz							
RL RF	50 Ω 🔔 DC CORF	EC	SENSE:INT	ALIGN OF		Apr 21, 2025	Frequency
enter Freq 15.	004500 MHZ		Free Run	Avg Type: Log-Pv	TYPE	MIAAAAAAAAA	
	IFG	ain:Low Atte	n: 20 dB		DET	PPPPP	A
					Mkr1 281		Auto Tune
0 dB/div Ref 1	0.00 dBm				-44.6	7 dBm	
.og 0.00							
							Center Free
0.0							15.004500 MH
20.0						22.36 dBm	
30.0							Start Fred
10.0 🔶 📥 🚽							9.000 kH:
0.0							
60.0							
70.0 ******************************	Madalah Salah yang salah s	n his south of the second second second	hand the second second second	والمتحادث والمتحاد والمتحاد والمتحاد والمتحاد والمتحاد والمتحاد والمتحاد والمتحاد والمتحاد والمحاد والم	naholist Manual Advances	and a second	Stop Free
30.0							30.000000 MH
tart 9 kHz	_	#) (D)W 000	-11-	•		.00 MHz	CF Step
Res BW 100 kH	Z	#VBW 300 I	KHZ		5.333 ms (40		2.999100 MH: Auto Mar
KR MODE TRC SCL	× 2011	y kHz -44.6	FUNI	CTION FUNCTION WID	TH FUNCTION	I VALUE 🔼	<u>1010</u> III0
2	281.3	7 KHZ -44.0					
3							Freq Offse
5						-	0 H:
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ISG					<mark>เรมร</mark> 🥂 DC Coup	bied	

	um Analyzer - S									
LXI RL			ORREC	SENS	E:INT		ALIGN OFF	04:46:24 PM		Frequency
Center Fi	req 5.0150	000000		Trig: Free	Dun	Avg T ₃	/pe: Log-Pwr	TRACE	123456 M WWWWW	rrequency
			PNO: Fast (IFGain:Low	Atten: 20 d				DE	PPPPP	
			II Galli.Eow		-					Auto Tune
							MKR	5 5.746		
10 dB/div	Ref 10.00	dBm						-38.1	4 dBm	
Log		(1								
0.00		Y								Center Freq
-10.0										5.015000000 GHz
-20.0									22.36 dBm	
					& ŝ				22.00 (10)	
-30.0					6 5					Start Freq
-40.0					Y					30.000000 MHz
-50.0		- I III								00.000000 Mil 12
presenting.								a state of hitse of h		
-60.0										Stop Freq
-70.0										
-80.0										10.00000000 GHz
00.0										
Start 30 M	4Hz							Stop 10.	000 GHz	CF Step
#Res BW			#VB	W 3.0 MHz			Sweep 18	.67 ms (40	001 pts)	997.000000 MHz
MKR MODE TH		×		Y		TION	FUNCTION WIDTH	FUNCTION		Auto Man
1 N 1	IL SLL		36 GHz	-0.32 dB		TIUN	FUNCTION WIDTH	FUNCTION		
2 N 1	f		06 GHz	-35.18 dBi						
3 N 1	f	5.750	29 GHz	-37.21 dB	m					Freq Offset
4 N 1	f		53 GHz 80 GHz	-37.44 dBi -38.14 dBi						0 Hz
5 N 1	- T	5./40	80 GHZ	-38.14 dB	m				. =	
7										
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MSG							I STATUS			
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Lowest Channel & Modulation : π/4-DQPSK





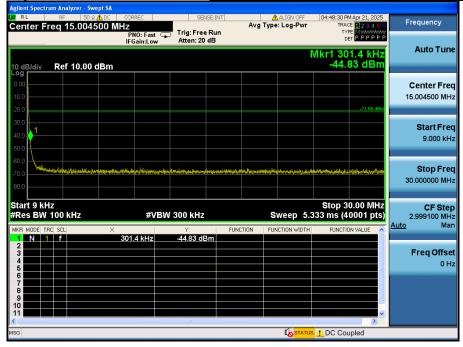
Reference for limit

Middle Channel & Modulation : π/4-DQPSK



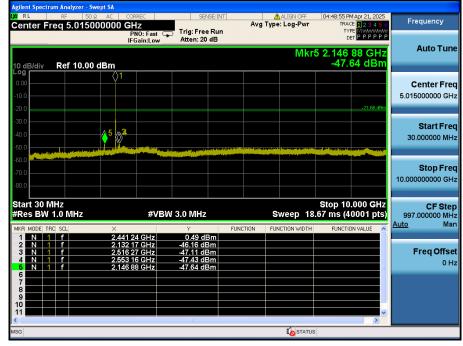
Conducted Spurious Emissions

Middle Channel & Modulation : π/4-DQPSK





Middle Channel & Modulation : π/4-DQPSK



Agilent Spectrum An							
LXIRL RF		CORREC	SENSE:IN		ALIGN OFF	04:49:19 PM Apr 21, 2025	
Center Freq	17.50000000	UGHZ PN0: Fast C	Trig: Free Run		Type: Log-Pwr	TRACE 12345 TYPE MWWWWW	
		IFGain:Low	Atten: 20 dB			DETPPPP	
					Mkr3 2	0.546 125 GHz	Auto Tune
10 dB/div Re	f 10.00 dBm					-43.92 dBm	
Log 0.00							O and an Error
							Center Freq
-10.0							17.500000000 GHz
-20.0						-21.66 dBr	
-30.0			. 2		3	<u>1</u>	Start Freq
-40.0							10.000000000 GHz
-50.0	The second se	A DESCRIPTION OF THE OWNER OF THE	in a stand with the stand with the				
-60.0	كنطائع فالتثكير والتكري						
-70.0							Stop Freq
							25.00000000 GHz
-80.0							
Start 10.000 G	H7					Stop 25.000 GHz	CF Step
#Res BW 1.0		#VB۱	N 3.0 MHz		Sweep 40	.00 ms (40001 pts	1.500000000 GHz
MKR MODE TRC SCL	X		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Man
1 N 1 f		5 875 GHz	-39.02 dBm				
2 N 1 f 3 N 1 f		4 875 GHz 6 125 GHz	-43.36 dBm -43.92 dBm				Freq Offset
4							0 Hz
5							
7							
8							
10							
11							
MSG					I STATUS		





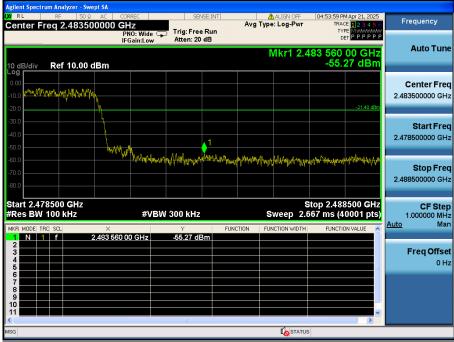
High Band-edge

Highest Channel & Modulation : π/4-DQPSK



High Band-edge

Hopping mode & Modulation : π/4-DQPSK





Conducted Spurious Emissions <u>Highest Channel & Modulation : $\pi/4$ -DQPSK</u>

RL RF 50 ຊ. enter Freq 15.0045		SENSE:IN	Avg	ALIGN OFF Type: Log-Pwr	04:51:03 PM Apr 21, 2025 TRACE 1 2 3 4 5 TYPE MWWWW	Frequency
0 dB/div Ref 10.00 c	IFGain:Low	Atten: 20 dB			_{Det} PPPPPP Vkr1 281.9 kHz -44.94 dBm	Auto Tur
					-21.49 xiBir	Center Fre 15.004500 Mł
30.0 40.0 50.0						Start Fro 9.000 ki
30.0	destation in the state of the stat	ginalyondh <u>allaidhalanannion</u> aghtan	tere teretari	astastastastastastastastastast	iya din distanti ya disha yaka yaka yaka yaka yaka yaka yaka ya	Stop Fr 30.000000 M
tart 9 kHz Res BW 100 kHz	#VB	W 300 kHz		Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts	2.999100 M
KR MODE TRC SCL	× 281.9 kHz	-44.94 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto M
2 3 4 5						Freq Offs 0
6 7 8 9 9						
		ш			>	
G					L DC Coupled	

Agilent Spectrum Analy	yzer - Swept SA					
LX/RL RF	50 Ω AC CORRE	SENSE: I			04:51:28 PM Apr 21, 2025	Frequency
Center Freq 5.	015000000 GHz	Fast 🕞 Trig: Free Ru	Avg Type:	: Log-Pwr	TRACE 123456 TYPE MWWWWW	rrequeriey
	IFGai				DETPPPP	
				Mkr5	2.146 63 GHz	Auto Tune
				WIKIO	-47.32 dBm	
10 dB/div Ref	10.00 dBm				-47.52 ubm	
0.00	≬1					Center Freq
-10.0						5.015000000 GHz
-20.0					-21.40 dBm	
-30.0						01
-40.0	▲5∧4					Start Freq
						30.000000 MHz
-50.0	Property in the second second second	And the second s		in a britter for a set of a s	NAMES OF THE OWNER OF THE DESIGN OF	
-60.0		Statistics and a second se			استخاذات فيتعاقل	
-70.0						Stop Freq
-80.0						10.00000000 GHz
-80.0						
Start 30 MHz					Stop 10.000 GHz	05.04.0
#Res BW 1.0 M	Hz	#VBW 3.0 MHz	S	weep 18.6	7 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	×	Y	FUNCTION FUN	CTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f	2.480 38 0					
2 N 1 f	2.131 68 0	GHz -45.60 dBm GHz -46.14 dBm				Freq Offset
4 N 1 f	2.592 54 0	Hz -46.74 dBm				0 Hz
5 N 1 f	2.146 63 (Hz -47.32 dBm			3	0 H2
6						
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MSG				STATUS		
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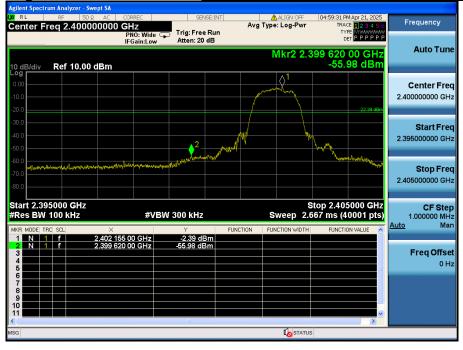
Highest Channel & Modulation : π/4-DQPSK





Low Band-edge

Lowest Channel & Modulation : 8DPSK



Low Band-edge

Hopping mode & Modulation : 8DPSK





Conducted Spurious Emissions Lowest Channel & Modulation : 8DPSK

Center Fre	RF 50 Ω	ADC COF	RREC		NSE:INT	Avg	ALIGN (Type: Log-		TRA	M Apr 21, 2025 De 1 2 3 4 5 6 Pe M WWWWWW ET P P P P P P	Frequency
10 dB/div	Ref 10.00	, IFO	Gain:Low	Atten: 20	dB			M	kr1 28	6.4 kHz 42 dBm	Auto Tune
Log 0.00 -10.0 -20.0										22.39 dBm	Center Free 15.004500 MH
-30.0 -40.0 -50.0											Start Free 9.000 kH:
-60.0 -70.0 -80.0	se de la constanta de la const La constanta de la constanta de	agadusta a suga biy	adadar wiyang	utraciations technology	ومروانه (۲۰۱۹ ورود)	deren allek	فراد بداوداو المعدولين ا	<u>unidado</u>	ettersetterstrade	Andrea Andrean Andrean Andrean Andrean A	Stop Free 30.000000 MH:
Start 9 kHz #Res BW 1	SCL	×	#VB	W 300 kHz Y		ACTION	Sweep		33 ms (4	0.00 MHz 0001 pts) IN VALUE	CF Step 2.999100 MH Auto Mar
1 N 1 2 3 4 4 5 6	f	286	.4 kHz	-45.42 dl	3m						Freq Offse 0 H
7 8 9 10 11											
MSG							L Cost		L DC Co	upled	

Agilent Spectrum Analyzer - Swept SA					
RE RE 50 Ω AC Center Freq 5.015000000	GH7		ALIGN OFF	05:00:20 PM Apr 21, 2025 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast 🖵 Trig: Fi IFGain:Low Atten:	ree Run 20 dB		TYPE MUMMAMM	
10 dB/div Ref 10.00 dBm			Mk	r5 877.70 MHz -49.07 dBm	Auto Tune
-10.0					Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0		and the second sec	City of First 17 H International States	etterane (and national and a full state of a state of the state	Start Freq 30.000000 MHz
-60.0 -70.0 -80.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MH	lz	Sweep 18.	Stop 10.000 GHz 67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL X	02 11 GHz 0.11	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 2.1 3 N 1 f 2.1 4 N 1 f 2.5 5 N 1 f 8	31 93 GHz 44.15 42 14 GHz 45.87 14 77 GHz 46.32 77.70 MHz 49.07	dBm dBm dBm			Freq Offset 0 Hz
6 7 8 9 9					
10				×	
MSG			I STATUS		



Lowest Channel & Modulation : 8DPSK





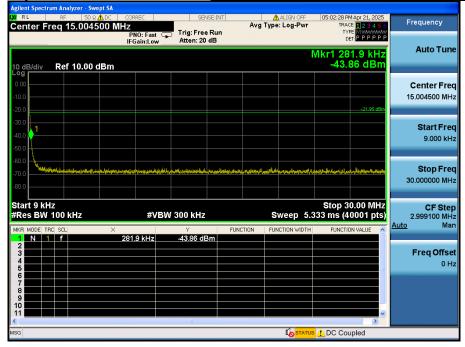
Reference for limit

Middle Channel & Modulation : 8DPSK



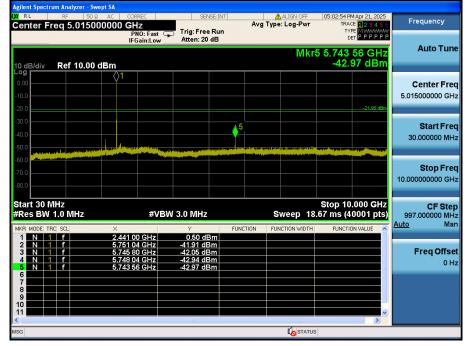
Conducted Spurious Emissions

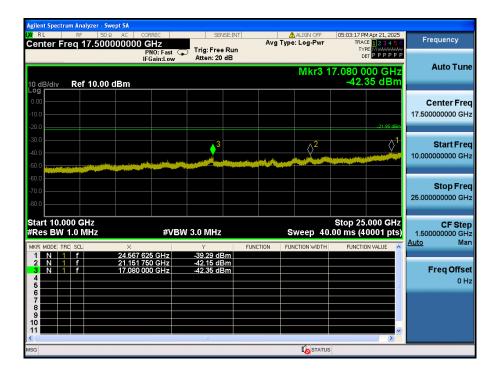
Middle Channel & Modulation : 8DPSK





Middle Channel & Modulation : 8DPSK







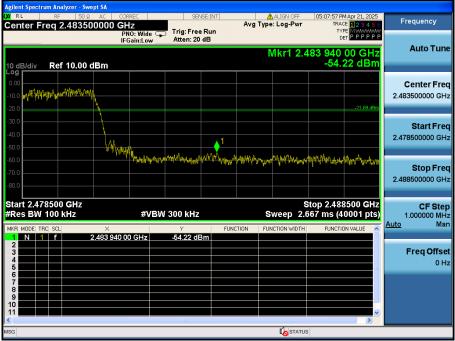
High Band-edge

Highest Channel & Modulation : 8DPSK



High Band-edge

Hopping mode & Modulation : 8DPSK





Conducted Spurious Emissions <u>Highest Channel & Modulation : 8DPSK</u>

RL RF 50 Ω▲DC Center Freq 15.004500 M		SENSE:IN	Avg	ALIGN OFF	05:05:01 PM TRACE TYPE	123456	Frequency
10 dB/div Ref 10.00 dBm	PNO: Fast 🖵 IFGain:Low	Atten: 20 dB			Mkr1 281	9 kHz	Auto Tun
-10.0						-21.69.dBm	Center Fre 15.004500 MH
-30.0							Start Fre 9.000 kH
-60.0 -70.0 -80.0	forigitifysign softworks that the	leffel hypothesis and the optimization	il synthesis air an Angelsia	es promitikis waa mitara na ila din k	ayalandayi kur dalaqafan kati ku	لەر مەر مەر ئەر ئەر ئەر ئەر ئەر ئەر ئەر ئەر ئەر ئ	Stop Fre 30.000000 MH
Start 9 kHz #Res BW 100 kHz	#VBW	300 kHz		Sweep 5.3	333 ms (40		CF Ste 2.999100 MH Auto Ma
MKR MODE TRC SCL X	281.9 kHz	√ -44.54 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION	VALUE	
3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2							Freq Offse 0 H
6 7 8 9							
10 11		nui				~	
MSG					DC Cou	pled	

Agilent Spectrum Analyzer -					
	IOΩ AC CORREC	SENSE:INT	ALIGN OFF	05:05:26 PM Apr 21, 2025 TRACE 1 2 3 4 5 6	Frequency
Center Freq 5.015	PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Type. Log-Fwi		
10 dB/div Ref 10.0			Mkr	5 5.746 80 GHz -43.89 dBm	Auto Tune
-10.0	 			21.69.dBm	Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0	I				Start Freq 30.000000 MHz
-60.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VB	W 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	X		NCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.480 13 GHz 5.745 80 GHz 5.744 31 GHz 5.751 04 GHz 5.746 80 GHz	0.89 dBm -41.06 dBm -41.61 dBm -42.65 dBm -43.89 dBm			Freq Offset 0 Hz
6 7 8 9 10					
11				~	
MSG					
1100			No STATU:	,	



Highest Channel & Modulation : 8DPSK





10. AC Power-Line Conducted Emissions

10.1. Test Setup

NA

10.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)			
	Quasi-Peak	Average		
0.15 ~ 0.50	66 to 56 *	56 to 46 *		
0.5 ~ 5.0	56	46		
5 ~ 30	60	50		

* Decreases with the logarithm of the frequency

10.3. Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10.

- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

10.4. Test Results

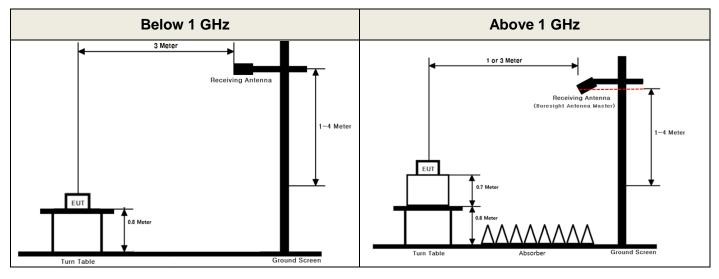
NA



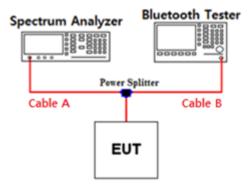
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	5.94	15	7.85
1	6.34	20	8.23
2.402 & 2.441 & 2.480	6.86	25	9.38
5	6.94	-	-
10	7.35	-	-

Note 1: The path loss from EUT to Spectrum analyzer was measured and used for test. Path loss (S/A's correction factor) = Cable A + Power Splitter

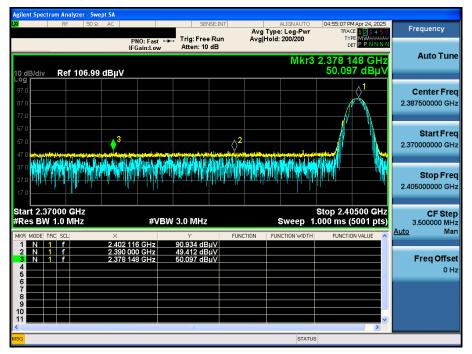


Detector Mode : PK

APPENDIX II

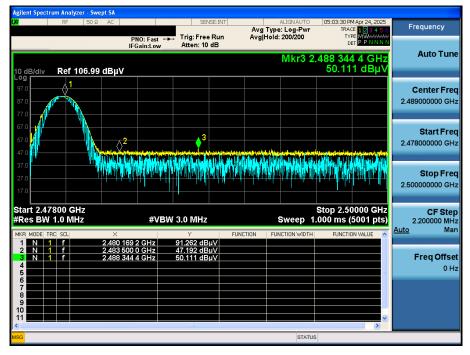
Unwanted Emissions (Radiated) Test Plot

GFSK & Lowest & X & Hor



Detector Mode : PK

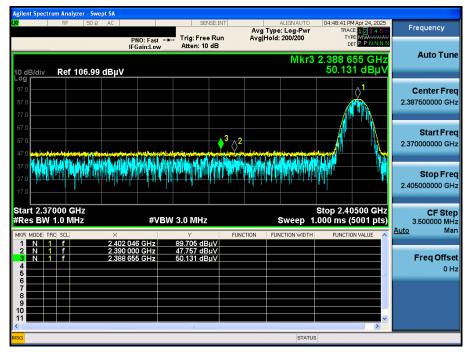
GFSK & Highest & X & Hor





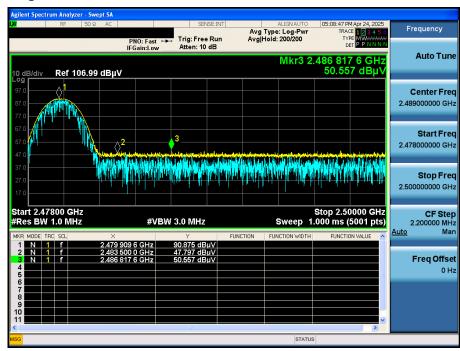
π /4-DQPSK & Lowest & X & Hor

Detector Mode : PK



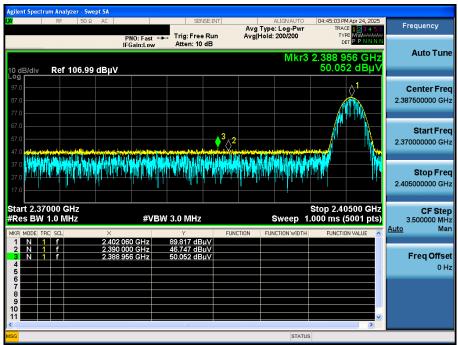
Detector Mode : PK

π /4-DQPSK & Highest & X & Hor



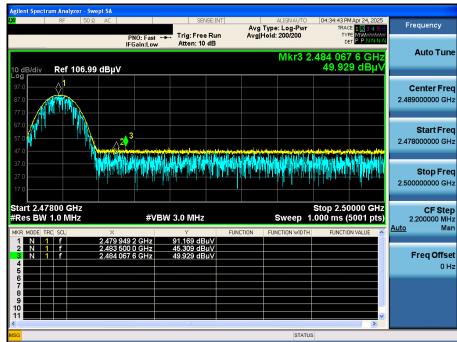


8DPSK & Lowest & X & Hor



8DPSK & Highest & X & Hor

Detector Mode : PK

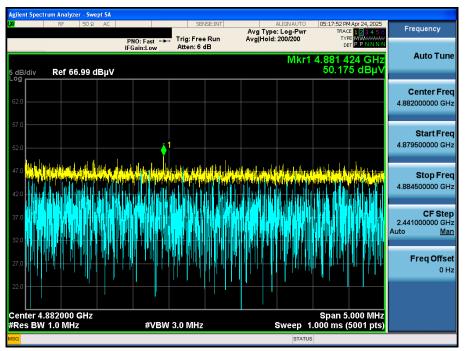


Detector Mode : PK

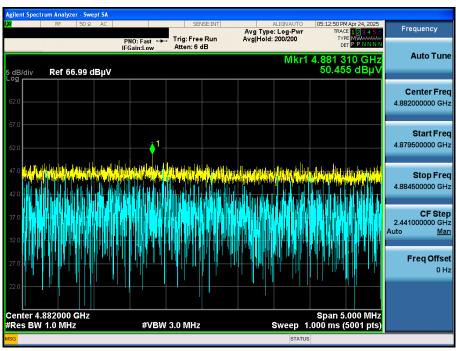
Detector Mode : PK



GFSK & Middle & X & Ver



$\pi/4\text{-}DQPSK$ & Middle & X & Ver



Detector Mode : PK

Detector Mode : PK



8DPSK & Middle & X & Ver

