TEST REPORT

Dt&C

DT	20	6-	I A al
	au	Co.,	Lta.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042 Tel : 031-321-2664, Fax : 031-321-1664

1. Report No: DRTFCC2210-0165	
2. Customer	
• Name (FCC) : HYUNDAI MOBIS CO	O., LTD.
• Address (FCC) : 203, Teheran-ro Ga	angnam-gu Seoul South Korea 135-977
3. Use of Report : FCC Original Grant	
4. Product Name / Model Name : DISF FCC ID : TQ8-DAC30WZAN	PLAY CAR SYSTEM / DAC30WZAN
5. FCC Regulation(s): Part 15.247 Test Method used: KDB558074 D01	v05r02, ANSI C63.10-2013
6. Date of Test : 2022.10.05 ~ 2022.10	0.13
7. Location of Test : 🛛 Permanent Te	esting Lab 🔲 On Site Testing
8. Testing Environment : See appende	ed test report.
9. Test Result : Refer to the attached to	est result.
The results shown in this test report refer of This test report is not related to KOLAS ac	only to the sample(s) tested unless otherwise stated. creditation.
Affirmation	Technical Manager
Name : JaeHyeok Bang	(Signature) Name : JaeJin Lee (Šignature)
	2022.10.19.
D	T&C Co., Ltd.
If the new out is new just the second	mation of authenticity places contact to report dates not

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
DRTFCC2210-0165	Oct. 19, 2022	Initial issue	JaeHyeok Bang	JaeJin Lee



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1. General Information

1.1. Description of EUT

Equipment Class	DSS-Part 15 Spread Spectrum Transmitter	
Product Name	DISPLAY CAR SYSTEM	
Model Name	DAC30WZAN	
Add Model Name -		
Firmware Version Identification Number	1.0	
EUT Serial Number	Conducted: 7BKYZDCZ, Radiated: ATJXZD00	
Power Supply	DC 24 V	
Frequency Range	2 402 MHz ~ 2 480 MHz	
Max. RF Output Power	3.26 dBm (0.002 W)	
Modulation Technique GFSK(1 Mbps), π/4DQPSK(2 Mbps), 8DPSK(3 Mbps) (Data rate) GFSK(1 Mbps), π/4DQPSK(2 Mbps), 8DPSK(3 Mbps)		
Number of Channels	79	
Antenna Specification	Antenna Type: Chip Antenna Gain: -0.10 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 & IC 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	+20 °C ~ +22 °C		
 Relative Humidity 	41 % ~ 43 %		

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)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (1 GHz ~ 18 GHz)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated emission (18 GHz Above)	5.3 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 /4DQPSK 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	





Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	21/12/16	22/12/16	MY48010133
Spectrum Analyzer	Agilent Technologies	N9020A	21/12/16	22/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	22/06/24	23/06/24	US47360812
DC Power Supply	SM techno	SDP30-5D	22/06/24	23/06/24	305DMG305
DC Power Supply	SM techno	SDP30-5D	22/06/24	23/06/24	305DNF079
DC Power Supply	DIGITAL	DPR-303D	22/06/24	23/06/24	2090097
BlueTooth Tester	TESCOM	TC-3000B	21/12/16	22/12/16	3000B770243
BlueTooth Tester	TESCOM	TC-3000C	21/12/16	22/12/16	3000C000396
Power Splitter	Anritsu	K241B	21/12/16	22/12/16	1301182
Reciver	Rohde Schwarz	ESCI3	22/09/19	23/09/19	100798
Multimeter	FLUKE	17B+	21/12/16	22/12/16	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	21/12/16	22/12/16	255571
Signal Generator	ANRITSU	MG3695C	21/12/16	22/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	N/A
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	120612-2
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	120612-2
Loop Antenna	ETS-Lindgren	6502	21/01/28	23/01/28	00226186
Hybrid Antenna	Schwarzbeck	VULB 9160	21/12/16	22/12/16	3362
Horn Antenna	ETS-Lindgren	3117	22/06/24	23/06/24	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	22/06/24	23/06/24	155
PreAmplifier	H.P	8447D	21/12/16	22/12/16	2944A07774
PreAmplifier	tsj	MLA-0118-B01-40	21/12/16	22/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	22/06/24	23/06/24	16966-10728
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5- 6SS	22/06/24	23/06/24	3
High Pass Filter	Wainwright Instruments	WHKX10-2838- 3300-18000-60SS	22/06/24	23/06/24	1
High Pass Filter	Wainwright Instruments	WHKX12-935- 1000-15000-40SS	22/06/24	23/06/24	8
Attenuator	Aeroflex/Weinschel	56-3	22/06/24	23/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	22/06/24	23/06/24	3
Attenuator	SMAJK	SMAJK-2-3	22/06/24	23/06/24	2
Attenuator	Hefei Shunze	SS5T2.92-10-40	22/06/24	23/06/24	16012202
Attenuator	Aeroflex/Weinschel	86-10-11	22/06/24	23/06/24	408
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A ML2490A	21/12/16	22/12/16	1338004 1249303
Cable	HUBER+SUHNER	SUCOFLEX100	22/01/04	23/01/04	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	22/01/04	23/01/04	M-02
Cable	JUNFLON	MWX241/B	22/01/04	23/01/04	M-03
Cable	JUNFLON	J12J101757-00	22/01/04	23/01/04	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	22/01/04	23/01/04	M-09
Cable	DT&C	Cable	22/01/04	23/01/04	G-1
Cable	DT&C	Cable	22/01/04	23/01/04	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	22/01/04	23/01/04	G-3
Cable	OMT	YSS21S	22/06/08	23/06/08	G-5
Cable	Junkosha	MWX241	22/00/08	23/01/04	mmW-1
Cable	DT&C	Cable	22/01/04	23/01/04	RFC-45
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0177

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 on the device. 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(a)	Carrier Frequency Separation	>= 25 kHz or >= Two thirds of the 20 dB BW, whichever is greater.	Conducted	с
13.247 (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 Note3
15.203	Antenna Requirement	Part 15.203 (Refer to section 2)	-	С

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS. Note 3: This device is installed in a car. Therefore the power 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

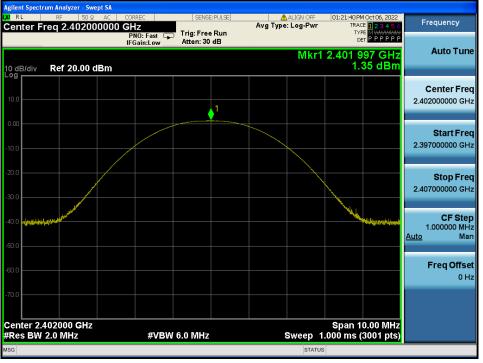
4.4. Test Results

Modulation	Tested Channel		Average t Power	Peak Output Power	
Modulation	resteu Ghanner	dBm	mW	dBm	mW
	Lowest	0.16	1.04	1.35	1.36
<u>GFSK</u>	Middle	0.44	1.11	1.83	1.52
	Highest	0.02	1.00	1.55	1.43
	Lowest	-1.52	0.70	2.14	1.64
<u>π/4DQPSK</u>	Middle	-1.24	0.75	2.58	1.81
	Highest	-1.71	0.67	2.34	1.71
	Lowest	-1.53	0.70	2.45	1.76
<u>8DPSK</u>	Middle	-1.25	0.75	2.91	1.95
	Highest	-1.73	0.67	3.26	2.12

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.







Peak Output Power

Middle Channel & Modulation : GFSK





Highest Channel & Modulation : GFSK



Peak Output Power

Lowest Channel & Modulation : π/4DQPSK





Middle Channel & Modulation : π/4DQPSK



Peak Output Power

Highest Channel & Modulation : π/4DQPSK



Lowest Channel & Modulation : 8DPSK



Peak Output Power

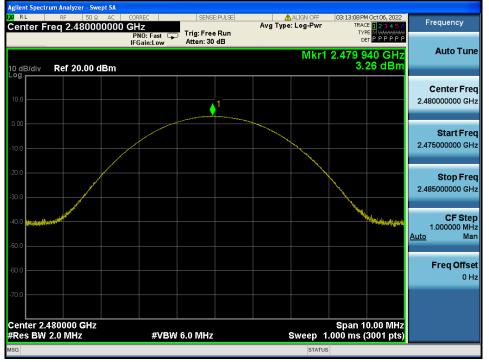


Peak Output Power <u>Middle Channel & Modulation : 8DPSK</u>





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	0.888
<u>GFSK</u>	Middle	0.888
	Highest	0.888
	Lowest	1.207
<u>π/4DQPSK</u>	Middle	1.312
	Highest	1.300
	Lowest	1.245
<u>8DPSK</u>	Middle	1.265
	Highest	1.261

Lowest Channel & Modulation : GFSK



20 dB BW

Middle Channel & Modulation : GFSK

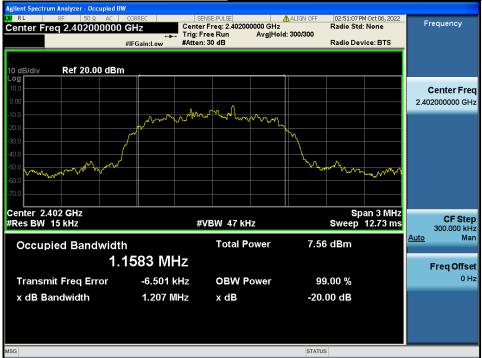


Highest Channel & Modulation : GFSK

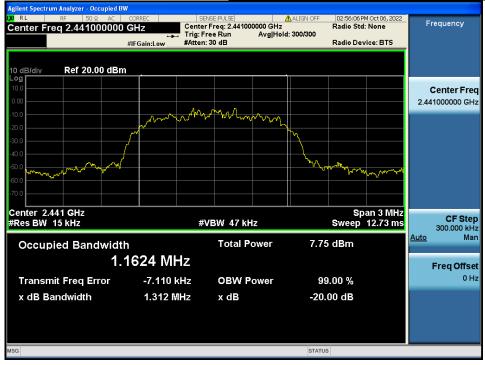


20 dB BW

Lowest Channel & Modulation : π/4DQPSK



Middle Channel & Modulation : π/4DQPSK

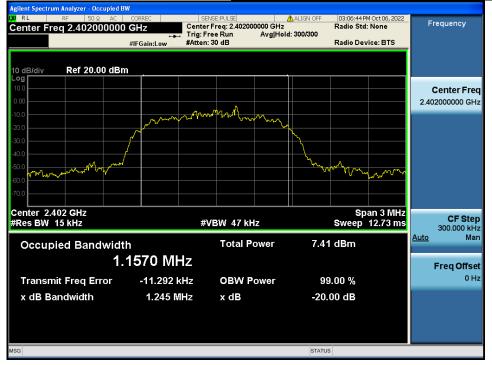


20 dB BW

Highest Channel & Modulation : π/4DQPSK



Lowest Channel & Modulation : 8DPSK

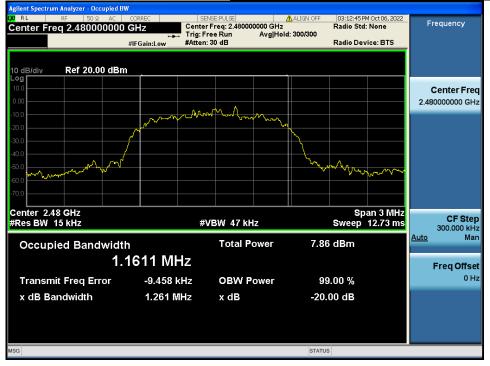


20 dB BW

Middle Channel & Modulation : 8DPSK



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	2 441.052	2 442.053	1.001
Enable	π/4DQPSK	2 441.006	2 442.013	1.007
	8DPSK	2 441.002	2 441.997	0.995

AFH mode

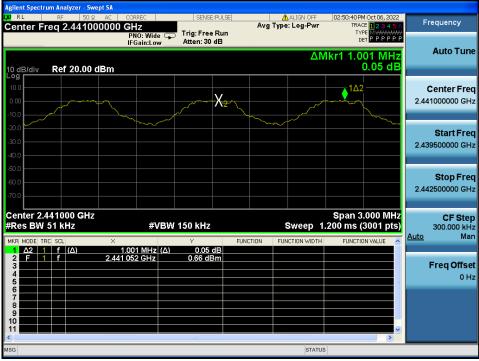
Hopping Mode	Modulation	Modulation Peak of reference channel(MHz)		Test Result (MHz)
	GFSK 2 441.047		2 442.045	0.998
Enable	π/4DQPSK	2 440.996	2 442.004	1.008
	8DPSK	2 440.996	2 442.001	1.005

Note 1 : See next pages for actual measured spectrum



Carrier Frequency Separation (FH)

Hopping mode : Enable&GFSK



Carrier Frequency Separation (FH)

Hopping mode : Enable&π/4DQPSK





Carrier Frequency Separation (FH)

Hopping mode : Enable&8DPSK

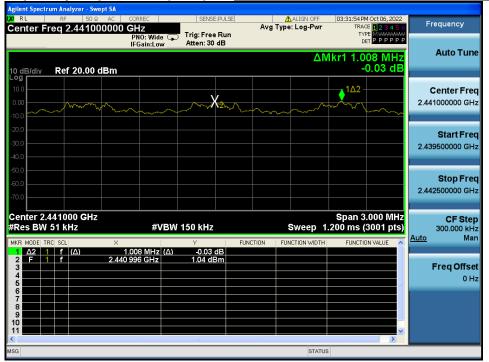
Agilent Spectrum Analyzer - Swept SA				
Center Freq 2.441000000		Avg Type: Log-Pwr	03:22:05 PM Oct 06, 2022 TRACE 1 2 3 4 5 6 TYPE MIANAMAN	Frequency
10 dB/div Ref 20.00 dBm	PNO: Wide Trig: Free Run IFGain:Low Atten: 30 dB		TYPE DET P P P P P P → P P P P P P → P P P P P P → P P P P P P P P → P P P P P P P P P → P P P P P P P P P P P P P P P P P P P	Auto Tune
Log 10.0 .00 -10.0	~~~~X~~		1Δ2	Center Freq 2.441000000 GHz
-20.0				Start Freq 2.439500000 GHz
-50.0 -60.0 -70.0				Stop Freq 2.442500000 GHz
Center 2.441000 GHz #Res BW 51 kHz MKR MODE TRC SCL X	#VBW 150 kHz	Sweep 1.	Span 3.000 MHz 200 ms (3001 pts) FUNCTION VALUE	CF Step 300.000 kHz <u>Auto</u> Man
3 4 5 6 7 8 9 9	995 kHz (Δ) 0.02 dB 11 002 GHz 1.12 dBm			Freq Offset 0 Hz
MSG	HI .	STATUS		



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

Agilent Spectrum Analyzer - Swept SA				
X RL RF 50 Ω AC Center Freq 2.44100000	0 GHz	Avg Type	e: Log-Pwr TRA	M Oct 06, 2022 CE 1 2 3 4 5 6 Frequency
	PNO: Wide Trig: Fre IFGain:Low Atten: 30		0	er P P P P P 998 KHz Auto Tun
10 dB/div Ref 20.00 dBm				0.04 dB
10.0 0.00 .10.0		X2m		Center Free 2.441000000 GH
-20.0				2.439500000 GH
-50.0				Stop Free 2.442500000 GH
Center 2.441000 GHz #Res BW 51 kHz	#VBW 150 kHz	<u>.</u>	Span 3 Sweep 1.200 ms (
MKR MODE TRC SCL X	998 kHz (Δ) 0.04		NCTION WIDTH FUNCTI	ON VALUE ALLO MAI
2 F 1 f 2.4 3 4 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	141 047 GHz 0.98 d			Freq Offse 0 H
6 7 8 9 10				
< MSG	iiii		STATUS	
			onnioo	

Carrier Frequency Separation (AFH) <u>Hopping mode : Enable&π/4DQPSK</u>





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

	um Analyzer - Swej							
LXI RL	RF 50 Ω req 2.44100		SENSE:P		ALIGN OFF		4 Oct 06, 2022 E 1 2 3 4 5 6	Frequency
Genter I	Cq 2.44100	PNO: Wide IFGain:Lov		lun		TYF		
		II Galil.20			Δ٨	/kr1 1.0	05 MHz	Auto Tune
10 dB/div	Ref 20.00 d	Bm					0.06 dB	
Log 10.0						<u>1Δ2</u> -		Center Freq
0.00	m	~	X	~				2.441000000 GHz
-10.0		· www	~~~ •		~~~~	~~ \	\sim	
-20.0								Start Freq
-30.0								2.439500000 GHz
-40.0								
-50.0								Stop Freq
-60.0								2.442500000 GHz
Center 2.4 #Res BW	441000 GHz	#1	/BW 150 kHz		Sweep 1	Span 3	.000 MHz	CF Step
				FUNCTION				300.000 kHz <u>Auto</u> Man
MKR MODE TR	f (Δ)	× 1.005 MHz	γ (Δ) -0.06 dE		FUNCTION WIDTH	FUNCTIO	IN VALUE	
2 F 1 3	f	2.440 996 GHz	1.17 dBn	1				Freq Offset
4 5								0 Hz
6								
8								
10								
<			Ш					
MSG					STATUS	5		

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	vidual channels, set the RBW to lea	ss than 30 % of the channel spacing						
or the 20 dB bandwidth, whichever is smaller.								
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/4DQPSK	79
	8DPSK	79

AFH mode

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

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



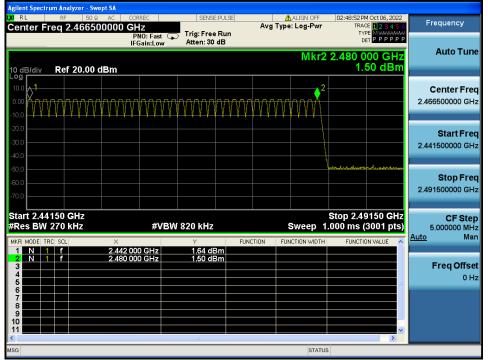
Number of Hopping Channels 1(FH)

Hopping mode : Enable & GFSK

Agilent Spectru												
Center Fr	RF					SENSE	EPULSE		ALIGN OFF		M Oct 06, 2022 CE 123456	Frequency
Center III	5 Y 2	41030		PNO: Fas	t 😱	Trig: Free				TY	PE MWWWWW ET P P P P P P	
				IFGain:Lo	w	Atten: 30	dB					Auto Tune
									Mkr2		00 GHz	Autorune
10 dB/div	Ref	20.00 c	dBm							1.	69 dBm	
Log 10.0			4								2	
			10									Center Freq
0.00			AAA	MAAA	M	NAAAA	NNAN	INNAA	พากกกก	NANAL	เกกกกก	2.416500000 GHz
-10.0			<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	A A A A	¥ΥΥ	<u> </u>	I I I I I I	<u> </u>	4 4 1 4 4	IIII	<u> </u>	
-20.0			(Start Freq
-30.0												2.391500000 GHz
-40.0												2.591500000 GHZ
-50.0		- the second										
												Stop Freq
-60.0												2.441500000 GHz
-70.0												
	160	<u> </u>								Oton 2.4		
Start 2.391 #Res BW 2				#\	/B)A/	820 kHz			Sweep 1	510p 2.44	4150 GHz	CF Step
		ATTZ				OZV KHZ						5.000000 MHz Auto Man
MKR MODE TRO	SCL		×	000 GHz		Y 4.44.40		CTION FU	NCTION WIDTH	FUNCTI	ON VALUE	<u>Auto</u> mart
1 N 1 2 N 1	f		2.402	000 GHz		<u>1.11 dE</u> 1.69 dE	3m 3m					
3												Freq Offset
4 5												0 Hz
6												
8												
9												
10												
<					-						>	
MSG									STATUS	5		
			_									

Number of Hopping Channels 2(FH)

Hopping mode : Enable & GFSK





Number of Hopping Channels 1(FH)

<u>Hopping mode : Enable&π/4DQPSK</u>

Agilent Spectrum Analyzer					
Center Freq 2.41	50 Ω AC CORREC 6500000 GHz	SENSE:PULSE	ALIGN OFF	03:04:27 PM Oct 06, 2022 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.0	PNO: Fast G IFGain:Low	☐ Trig: Free Run Atten: 30 dB	Mkr2	2.441 000 GHz 1.24 dBm	Auto Tune
10.0 0.00			$\overline{\psi}$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Freq 2.416500000 GHz
-20.0 -30.0 -40.0					Start Freq 2.391500000 GHz
-50.0					Stop Freq 2.441500000 GHz
Start 2.39150 GHz #Res BW 270 kHz	#VBM ×			Stop 2.44150 GHz .000 ms (3001 pts) FUNCTION VALUE	CF Step 5.000000 MHz <u>Auto</u> Man
1 N 1 f 2 N 1 f 3 4 5 6	2.402 000 GHz 2.441 000 GHz	0.78 dBm 1.24 dBm		3	Freq Offset 0 Hz
7 8 9 10 11				~	
MSG			STATUS	,	

Number of Hopping Channels 2(FH) <u>Hopping mode : Enable & $\pi/4DQPSK$ </u>

Agilent Spectrum Analyzer - Swept SA					
Center Freq 2.466500000	GHz	Avg Typ	e: Log-Pwr TRA	M Oct 06, 2022 CE 123456 PE MWWWW	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast 🖵 Trig: Fr IFGain:Low Atten: 3		Mkr2 2.480	ETPPPPP	Auto Tune
Log 10.0 1 0.00 10.0 10 10 10 10 10 10 10 10 10 10 10 10 10	ᢦᡐ᠇ᠮᠮ᠈ᡔᢆᢦᠻᡟ᠈ᡔᢌᢦ			2.	Center Freq 466500000 GHz
-20.0				2.	Start Freq 441500000 GHz
-50.0 -60.0 -70.0				2.	Stop Freq 491500000 GHz
Start 2.44150 GHz #Res BW 270 kHz	#VBW 820 kH		Sweep 1.000 ms	9150 GHz (3001 pts)	CF Step 5.000000 MHz <u>0</u> Man
1 1 f 2.44 2 N 1 f 2.48 3		dBm			Freq Offset 0 Hz
6 7 8 9 10 11					
MSG			STATUS		



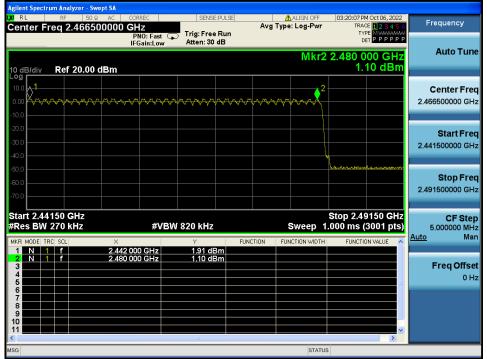
Number of Hopping Channels 1(FH)

Hopping mode : Enable&8DPSK

Agilent Spectr											
LXI RL	RF	50 Ω		REC	SENSE	PULSE		ALIGN OFF		M Oct 06, 2022	Frequency
Center Fi	req 2.4	16500				_	Avg Type	: Log-Pwr	TRA	CE 123456	riequency
				NO: Fast 🔾	Trig: Free				د ا ٦	PE MWWWWW ET P P P P P P	
			IFC	Gain:Low	Atten: 30	dB					
								Mkr2	2 441 (000 GHz	Auto Tune
	-									69 dBm	
10 dB/div	Ref 20	0.00 dE	m							os ubili	
Log											
10.0		/	1							<u>+~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</u>	Center Freq
0.00		X	~ ~ ~ ~ ~	~~~~	nanna	annac	LAMM.M	anan	manna	LAMAMX	2.416500000 GHz
		1	V V V V	T Y Y Y Y	******	V V V V		*****	1 1 1 1 1	Y V V Y V 1	2.41000000000112
-10.0											
-20.0											
-20.0											Start Freq
-30.0		<u> </u>								<u> </u>	2.391500000 GHz
-40.0											2.391500000 GH2
-40.0		T.									
-50.0	Auronalia	when									
											Stop Freq
-60.0											2.441500000 GHz
-70.0											2.44 1500000 GHZ
Start 2.39	150 00				1		1		Stop 2.4	4150 GHz	
											CF Step
#Res BW	270 KH	Z		#VBW	/ 820 kHz			sweep 1	.000 ms	(3001 pts)	5.000000 MHz
MKR MODE TH	aci scul		×		Y	ELINI	TION FUN	ICTION WIDTH	FUNCT	ON VALUE	<u>Auto</u> Man
1 N 1			2.402 00		1.39 dE				TONCH		
2 N 1			2.441 00		1.69 dE						
3			2.44100		1.03 uL						Freq Offset
4											
5											0 Hz
6											
7											
8											
9											
10											
					100					~	
					111						
MSG								STATUS	S		

Number of Hopping Channels 2(FH)

Hopping mode : Enable & 8DPSK





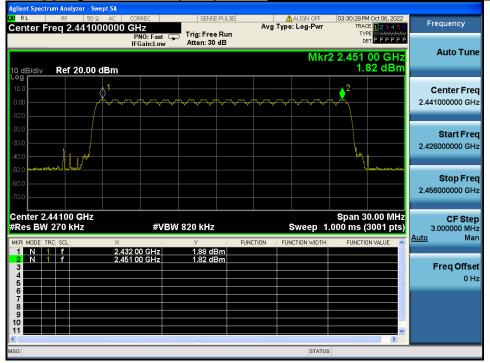
Number of Hopping Channels 1(AFH)

Hopping mode : Enable & GFSK

Agilent Spectrum Analyzer - Swept SA				
LX RL RF 50Ω AC CORREC	SENSE:PULSE	ALIGN OFF	03:26:12 PM Oct 06, 2022	Frequency
Center Freq 2.441000000 GHz	Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE M WWWWW	riequency
PNO: Fast ⊂ IFGain:Low	Atten: 30 dB		DETPPPPP	
In Galit. Edw				Auto Tune
		MKR	2 2.451 00 GHz	riato rano
10 dB/div Ref 20.00 dBm			1.95 dBm	
Log				
10.0			2	Center Freq
	hnnhnn	h a m a a a		2.441000000 GHz
		V V V V V V	V	
			* \	
-20.0				Start Freq
-30.0				•
A day			h.	2.426000000 GHz
-40.0				
-50.0 marganetic builty			halunateration	
-60.0				Stop Freq
				2.456000000 GHz
-70.0				
Center 2.44100 GHz			Span 30.00 MHz	CF Step
#Res BW 270 kHz #VB	W 820 kHz	Sweep 1	.000 ms (3001 pts)	3.000000 MHz
MKRI MODEL TRCI SCL X	Y FUN	TION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f 2.432 00 GHz	1.98 dBm			
2 N 1 f 2.451 00 GHz	1.95 dBm			
3				Freq Offset
5			=	0 Hz
6				
7				
8				
10				
11			~	
<			>	
MSG		STATUS		

Number of Hopping Channels 1(AFH)

Hopping mode : Enable &π/4DQPSK





Number of Hopping Channels 1(AFH) Hopping mode : Enable & 8DPSK

Agilent Spectrum Analyze					
LX/RL RF	50 Ω AC CORREC	SENSE:PULSE	\Lambda ALIGN OFF	03:33:50 PM Oct 06, 2022	Frequency
Center Freq 2.4	41000000 GHz	7.1. F B	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast (IFGain:Low	Trig: Free Run Atten: 30 dB		TYPE MWWWW	
	IFGain:Low	Atten: 30 dB			Auto Tune
			Mkr	2 2.451 00 GHz	Autorune
10 dB/div Ref 20).00 dBm			1.81 dBm	
10.0	1			2	Center Freq
	Φ				•
0.00	$-/\uparrow \sim \sim \sim \uparrow \sim \sim \sim \sim$	ᠵ᠋ᠯᢦᡗᢇᢦ᠁ᢆᢦᡘᢪᢦ᠁ᢦᠵ᠆ᢦ	ᠿᢦ᠆ᢅᢦ᠆᠋ᢦᡗᠯᢦ᠆᠋ᢦᡟ		2.441000000 GHz
-10.0					
-20.0					
-20.0					Start Freq
-30.0					2.426000000 GHz
-40.0				<u> </u>	2.42000000 0112
h l d d d	· · · · · · · · · · · · · · · · · · ·				
1.50.0 -50.0 -50.0 -50.0				Ver March Property	a , a
-60.0					Stop Freq
-70.0					2.456000000 GHz
-70.0					
0				O	
Center 2.44100 G				Span 30.00 MHz	CF Step
#Res BW 270 kH	z #VB	W 820 kHz	Sweep 1	.000 ms (3001 pts)	3.000000 MHz
MKR MODE TRC SCL	X	Y EUN	CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f	2.432 00 GHz	1.80 dBm			
2 N 1 f	2.451 00 GHz	1.81 dBm			
3					Freq Offset
4					0 Hz
5				=	
7					
8					
9					
10					
11				~	
MSG			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			Period (ms)	Test Result (sec)
Enable	DH 5	79	2.880	3.750	0.307
	2 DH 5	79	2.880	3.750	0.307
	3 DH 5	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	DH 5	20	2.880	3.750	0.154
	2 DH 5	20	2.880	3.750	0.154
	3 DH 5	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 DH5 = 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.



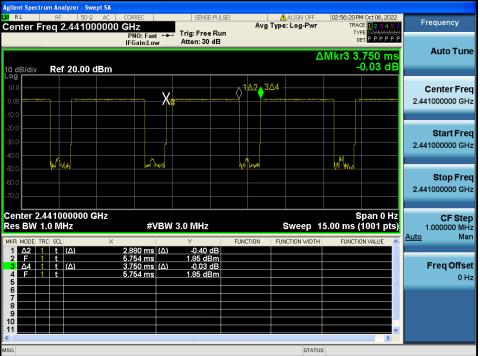
Time of Occupancy (FH)

Agilent Spectrum Analyzer - Swept S						
M RL RF 50Ω A Center Freq 2.4410000	000 GHz	SENSE:PULSE	ALIGN	-Pwr TRACI	Oct 06, 2022	Frequency
	PNO: Fast ↔ IFGain:Low	Trig: Free Run Atten: 30 dB		ΔMkr3 3.	750 ms	Auto Tune
10 dB/div Ref 20.00 dB/ Log 10.0 0.00 -10.0	m Xa		3∆4).01 dB	Center Freq 2.441000000 GHz
-20.0 -30.0 -40.0 -50.0						Start Freq 2.441000000 GHz
-60.0						Stop Freq 2.441000000 GHz
Center 2.441000000 GHZ Res BW 1.0 MHz	#VBW		Swee	ep 15.00 ms (1		CF Step 1.000000 MHz <u>Auto</u> Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.880 ms (Δ) 5.155 ms 3.750 ms (Δ) 5.155 ms	-0.13 dB 1.73 dBm -0.01 dB 1.73 dBm				Freq Offset 0 Hz
7 8 9 10 11		Li				
MSG				STATUS		

Hopping mode : Enable&DH5

Time of Occupancy (FH)







Time of Occupancy (FH)

Hopping mode : Enable&3-DH5

	rum Analyzer - Swept SA							
Center F	RF 50 Ω AC reg 2.44100000	CORREC	SENSE:PULS	Avg 1	ALIGN OFF	TRA	M Oct 06, 2022 CE 123456	Frequency
10 dB/div	Ref 20.00 dBm	PNO: Fast ↔ IFGain:Low	. Trig: Free Run Atten: 30 dB		Δ	Mkr3 3	.750 ms 0.00 dB	Auto Tune
10.0 0.00		X	and a state of the second	102 3/	4-		erenykereenskereensk	Center Fred 2.441000000 GHz
-20.0 -30.0 -40.0		Jun and						Start Fred 2.441000000 GHz
-50.0 -60.0 -70.0				N MAN				Stop Fred 2.441000000 GHz
Center 2. Res BW 1			3.0 MHz	FUNCTION	Sweep 1	5.00 ms (Span 0 Hz (1001 pts)	CF Step 1.000000 MHz <u>Auto</u> Mar
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t (Δ) t t t t t t t t	2.880 ms (Δ) 5.739 ms 3.750 ms (Δ) 5.739 ms	0.10 dB 1.65 dBm 0.00 dB 1.65 dBm	PORCHON		TONCIN		Freq Offset 0 Hz
8 9 10 11 <			III		STATUS		×	

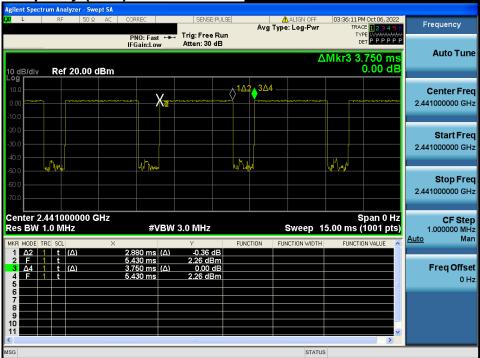


Time of Occupancy (AFH)

Hopping mode : Enable&DH5

Agilent Spectrum Analyzer - Swept SA						
₩ RL RF 50Ω AC Center Freq 2.441000000	CORREC GHz PNO: Fast ↔	SENSE:PULSE	Avg Type: Lo	a-Pwr TRA	M Oct 06, 2022 CE 1 2 3 4 5 6 (PE WWWWWWW DET P P P P P P	Frequency
10 dB/div Ref 20.00 dBm		Atten: 30 dB		ΔMkr3 3		Auto Tune
10.0 -10.0	Xa -		1 <u>∆2</u> ,3∆4			Center Freq 2.441000000 GHz
-20.0			Waw	yu baya		Start Freq 2.441000000 GHz
-50.0 47 1000 -60.0				10. 6.014		Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz MKR MODE TRC SCL X	#VBW 3			eep 15.00 ms		CF Step 1.000000 MHz <u>Auto</u> Man
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5.544 ms 3.750 ms (Δ) 5.544 ms	2.16 dBm 0.00 dB 2.16 dBm				Freq Offset 0 Hz
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9					×	
MSG				STATUS		







Time of Occupancy (AFH)

Hopping mode : Enable&3-DH5

Agilent Spectre								
LXI RL	RF	50 Ω AC	CORREC	SENSE:PULSE		ALIGN OFF	03:32:27 PM Oct 06, 2022	Frequency
Center Fr	eq 2.44	1100000		Trig: Free Run	Avg T	/pe: Log-Pwr	TRACE 123456 TYPE WWWWARAAAAA	
			PNO: Fast +++ IEGain:Low	Atten: 30 dB			DETPPPP	
			II Galli.Low					Auto Tune
						Δ	Mkr3 3.750 ms	
10 dB/div	Ref 20	.00 dBm					-0.01 dB	
				44.0				
10.0					3∆4			Center Freq
0.00	*****		X	-	۵۰۰ مین مین دو میرون میرون ورو میرون میرون ورو میرون میرو مرد از میرون می	-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2.441000000 GHz
-10.0								
-20.0								Start Freq
-30.0								2.441000000 GHz
-40.0								2.441000000 6112
h. 1			unun	w line		y Yum		
-50.0 Y ••• /1						701 60 1		Oton From
-60.0								Stop Freq
-70.0								2.441000000 GHz
-70.0								
Center 2.4	410000				I		Span 0 Hz	OF Otom
Res BW 1		00 0112	#\/B\A(3.0 MHz		Sween 1	5.00 ms (1001 pts)	
			#*D**	5.0 10112		Oweep 1		Auto Man
MKR MODE TR		Х		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto
$1 \Delta 2 1$	t (∆)		2.880 ms (Δ)	0.24 dB				
2 F 1 3 Δ4 1	t (A)		4.540 ms 3.750 ms (Δ)	2.26 dBm -0.01 dB				Freq Offset
4 F 1	t (22)		4.540 ms	2.26 dBm				0 Hz
5							=	0 H2
6	+							
8								
9								
10								
11				111			~	
				113				
MSG						STATUS		

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.

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		

- Part 15.205(a): Restricted band of operation

9.3. Test Procedures

9.3.1. Test Procedures for Unwanted Emissions(Radiated)

- 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.



Dt&C

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 were investigated 9 kHz 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) = -24.79 dB

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

9 kHz ~ 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)
2 389.82	V	Х	PK	50.33	4.60	N/A	N/A	54.93	74.00	19.07
2 389.82	V	Х	AV	50.33	4.60	-24.79	N/A	30.14	54.00	23.86
4 803.79	Н	Х	PK	50.43	2.43	N/A	N/A	52.86	74.00	21.14
4 803.79	Н	Х	AV	50.43	2.43	-24.79	N/A	28.07	54.00	25.93

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)
4 882.02	Н	Х	PK	49.44	2.39	N/A	N/A	51.83	74.00	22.17
4 882.02	Н	Х	AV	49.44	2.39	-24.79	N/A	27.04	54.00	26.96

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)
2 484.46	V	Х	PK	51.35	5.63	N/A	N/A	56.98	74.00	17.02
2 484.46	V	Х	AV	51.35	5.63	-24.79	N/A	32.19	54.00	21.81
4 960.64	Н	Х	PK	49.53	2.69	N/A	N/A	52.22	74.00	21.78
4 960.64	Н	Х	AV	49.53	2.69	-24.79	N/A	27.43	54.00	26.57



9 kHz ~ 25 GHz Data (Modulation : π /4DQPSK)

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)
2 388.43	Н	Х	PK	50.21	4.60	N/A	N/A	54.81	74.00	19.19
2 388.43	Н	Х	AV	50.21	4.60	-24.79	N/A	30.02	54.00	23.98
4 803.86	Н	Х	PK	49.42	2.43	N/A	N/A	51.85	74.00	22.15
4 803.86	Н	Х	AV	49.42	2.43	-24.79	N/A	27.06	54.00	26.94

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)
4 882.32	Н	Х	PK	48.82	2.40	N/A	N/A	51.22	74.00	22.78
4 882.32	Н	Х	AV	48.82	2.40	-24.79	N/A	26.43	54.00	27.57

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)
2 484.71	Н	Х	PK	50.25	5.63	N/A	N/A	55.88	74.00	18.12
2 484.71	Н	Х	AV	50.25	5.63	-24.79	N/A	31.09	54.00	22.91
4 959.54	Н	Х	PK	49.51	2.69	N/A	N/A	52.20	74.00	21.80
4 959.54	Н	Х	AV	49.51	2.69	-24.79	N/A	27.41	54.00	26.59

9 kHz ~ 25 GHz Data (Modulation : 8DPSK)

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)
2 389.82	Н	Х	PK	50.07	4.60	N/A	N/A	54.67	74.00	19.33
2 389.82	Н	Х	AV	50.07	4.60	-24.79	N/A	29.88	54.00	24.12
4 804.09	Н	Х	PK	49.75	2.43	N/A	N/A	52.18	74.00	21.82
4 804.09	Н	Х	AV	49.75	2.43	-24.79	N/A	27.39	54.00	26.61

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)
4 881.57	Н	Х	PK	50.27	2.38	N/A	N/A	52.65	74.00	21.35
4 881.57	Н	Х	AV	50.27	2.38	-24.79	N/A	27.86	54.00	26.14

Highest Channel

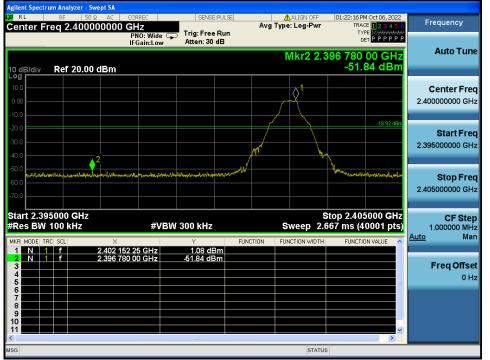
Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 483.91	Н	Х	PK	49.57	5.62	N/A	N/A	55.19	74.00	18.81
2 483.91	Н	Х	AV	49.57	5.62	-24.79	N/A	30.40	54.00	23.60
4 959.76	Н	Х	PK	48.82	2.69	N/A	N/A	51.51	74.00	22.49
4 959.76	Н	Х	AV	48.82	2.69	-24.79	N/A	26.72	54.00	27.28





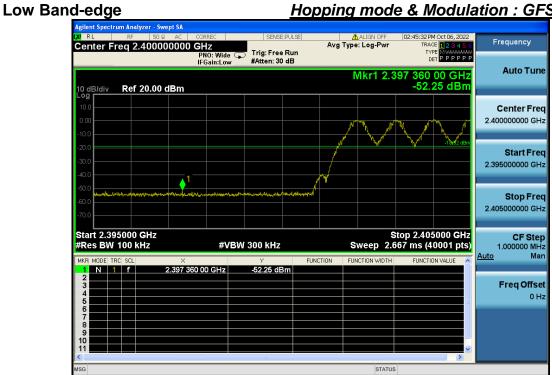
9.4.2. Unwanted Emissions(Conducted)

Low Band-edge



Lowest Channel & Modulation : GFSK

Hopping mode & Modulation : GFSK





Lowest Channel & Modulation : GFSK

				Swept SA								
LXI RL		RF) Ω <u>Λ</u> DC	CORREC	SI	INSE:PULSE	Aun	ALIGN OFF		4 Oct 06, 2022 E 1 2 3 4 5 6	Frequency
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					IFGain:Lov		30 dB			D	т <mark>РРРРР</mark>	
										Mkr1 28	1 9 kHz	Auto Tune
10 dE	1746.	Pot	20.00	0 dBm							00 dBm	
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10.0												Center Freq
0.00												15.004500 MHz
												15.004500 MIHZ
-10.0											10.00.00.	
-20.0											-18.92 dBm	Start Freq
-30.0												
	1											9.000 kHz
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-50.0	ξ.											
-60.0	White	up de se la	, and the latter	with the second	enteresteren anderes a	warmen landes and	weinden Aprilië	a set of the last state	********	and the basis of the		Stop Freq
-70.0												30.000000 MHz
-70.0												
Star	t 9 kH	7								Ston 3	0.00 MHz	CF Step
	s BW		kH7		#V	'BW 300 k	H7		Sweep 5.			2.999100 MHz
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	IODE TR			×	281.9 kHz	-46.00		UNCTION	FUNCTION WIDTH	FUNCTIO	ON VALUE	
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RL RF 50	wept SA Ω AC CORREC	SENSE:PULSE	ALIGN OFF	01:23:03 PM Oct 06, 2022	_
enter Freq 5.0150	000000 GHz PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	Frequency
0 dB/div Ref 20.00) dBm		Mkı	r5 7.456 40 GHz -37.75 dBm	Auto Tune
.og 10.0 0.00 10.0	1				Center Free 5.015000000 GH:
20.0 30.0 40.0			2 4 5	-18.92 dBm	Start Free 30.000000 MH
50.0 60.0 70.0					Stop Fre 10.000000000 GH
Start 30 MHz Res BW 1.0 MHz	#VE	3W 3.0 MHz	Sweep 18	Stop 10.000 GHz 3.67 ms (40001 pts)	CF Ste 997.000000 MH Auto Ma
MKR MODE TRC SCL	× 2.402 11 GHz	∀ 1.34 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	5.569 33 GHz 9.413 02 GHz 6.878 89 GHz 7.456 40 GHz	-36.83 dBm -37.00 dBm -37.16 dBm -37.75 dBm			Freq Offse 0 H
6 7 8 9 10					
11					



Lowest Channel & Modulation : GFSK





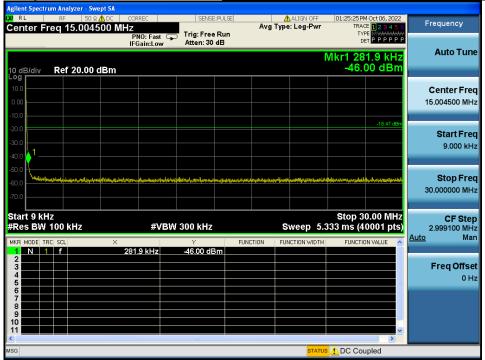
Reference for limit

Middle Channel & Modulation : GFSK



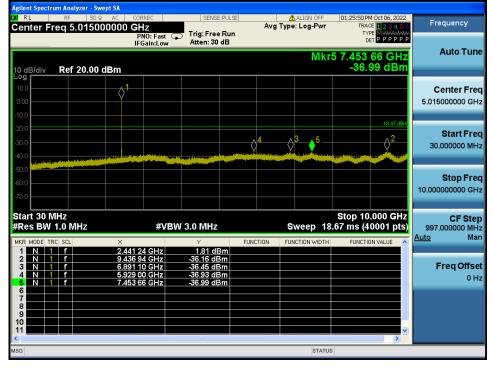
Conducted Spurious Emissions

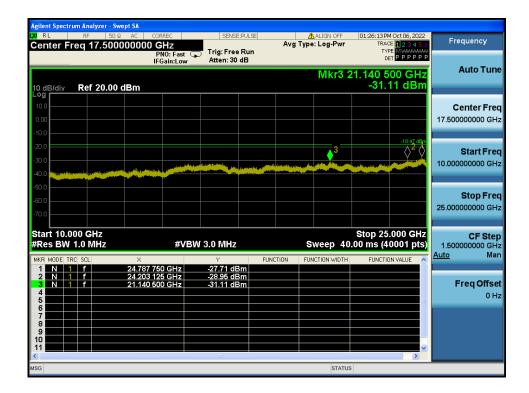






Middle Channel & Modulation : GFSK

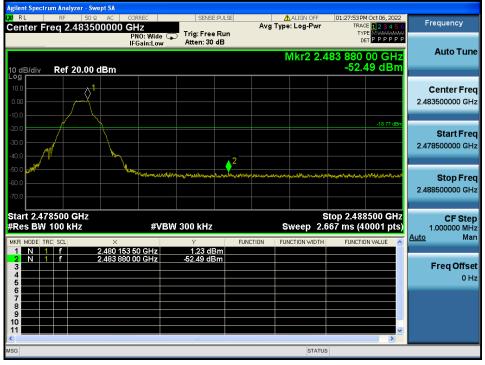






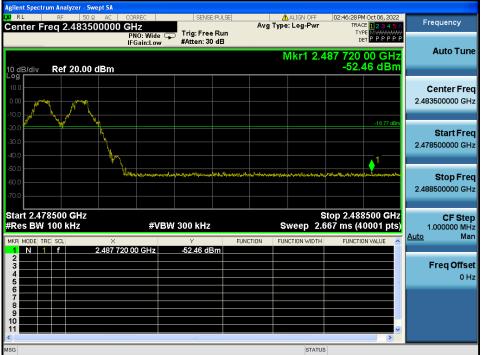
High Band-edge

Highest Channel & Modulation : GFSK



High Band-edge

Hopping mode & Modulation : GFSK





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

Agilent Spectrum Analyzer - Swept SA				
₩ RL RF 50 Ω ▲ DC Center Freq 15.004500 MI		Avg Type:	Log-Pwr TRAC	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast Free F IFGain:Low Atten: 30 d		Mkr1 28	Auto Tu 1.9 kHz 31 dBm
10.0 0.00 -10.0				Center Fr 15.004500 M
-20.0 -30.0 -40.0				-18.77 dBm Start Fr 9.000 k
-50.0 -60.0 -70.0	ele di narlanti di da dedini na palanti na p	مريد بر اودا الدو مطرود أمريك فرما مكر مري المريد بر اودا الدو مطرود أمريك فرما مكر مري	nai, ay, wide and institution with specific and	Stop Fr 30.000000 M
Start 9 kHz #Res BW 100 kHz	#VBW 300 kHz		Stop 30 veep 5.333 ms (40	Auto N
N 1 f 2 - - 3 - - 4 - - 5 - - 6 - - 7 - -	281.9 kHz 45.31 dBn	n		Freq Offs 0
8 9 10 11 11	in			
MSG			STATUS 🦺 DC Cou	ipiea

gilent Spectrum Analyzer - So RL RF 50 Center Freq 5.0150	Ω AC CORREC	SENSE:PULSE → Trig: Free Run Atten: 30 dB	ALIGN OFF	TYPE	Et 06, 2022 2 3 4 5 6 Awwww P P P P P P	Frequency
0 dB/div Ref 20.00	dBm		Mkr	5 8.407 79 -37.55		Auto Tune
.og 10.0 0.00 10.0	1 					Center Free 5.015000000 GH
20.0 30.0 40.0			2	5	-18.77 dBm	Start Fre 30.000000 MH
50.0 60.0 70.0						Stop Fre 10.000000000 GH
Start 30 MHz Res BW 1.0 MHz	#VB	W 3.0 MHz	Sweep 18	Stop 10.00 .67 ms (400	01 pts)	CF Ste 997.000000 MH <u>Auto</u> Ma
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.480 13 GHz 7.481 08 GHz 9.386 10 GHz 5.494 31 GHz 8.407 79 GHz	1.50 dBm -36.83 dBm -36.84 dBm -37.22 dBm -37.55 dBm		FONCTION		Freq Offse 0 H
6 7 8 9 10 11						
SG		Ш	 STATUS	3		

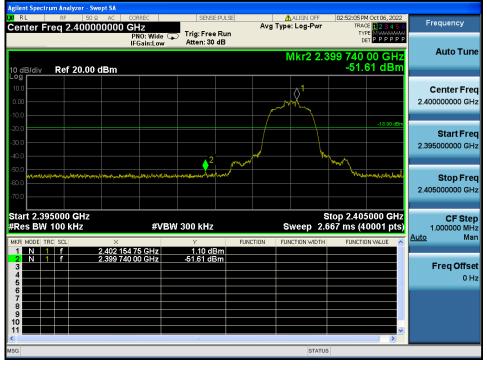


Conducted Spurious Emissions <u>Highest Channel & Modulation : GFSK</u>

	um Analyzer - S									
IXI RL	RF 50		ORREC	SENSE:			ALIGN OFF		M Oct 06, 2022	Frequency
Center Fr	eq 17.500		GHZ PNO: Fast	Trig: Free		Avg Type	: Log-Pwr	TY	CE 123456 PE MWWWWW	
			IFGain:Low	Atten: 30 d				[ET PPPPP	
							Mkr3 2	1.865	750 GHz	Auto Tune
10 dB/div	Ref 20.00	dBm							76 dBm	
10.0										Center Free
0.00										17.50000000 GH
-10.0										
-20.0								·	-18.77 dBm	
-30.0							<u> </u>		$\Diamond^2 \chi$	Start Free
-40.0	سطى رور	alitel	and the second second					and the later of the		10.00000000 GHz
The states					diam'r a					
-50.0										Stop Free
-60.0										25.00000000 GH
-70.0										23.0000000000000
Start 10.0 #Res BW			-43 (15)	N 0 0 MU-				Stop 2:	5.000 GHz	CF Step
#Res bw			#VD	A/ 3.0 MHz		5	weep 40	.00 ms (4	.0001 pts)	1.500000000 GH: Auto Mar
MKR MODE TR		×		Y COLOR ID	FUNCTIO	DN FUN	ICTION WIDTH	FUNCT	ON VALUE	Auto Mai
1 N 1 2 N 1	f	23.696	375 GHz 125 GHz	-28.03 dBi -30.33 dBi	m m					
3 N 1	f	21.865 7	750 GHz	-30.76 dB						Freq Offset
4 5									=	0 H:
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MSG							STATUS	5		
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Low Band-edge

Lowest Channel & Modulation : π/4DQPSK



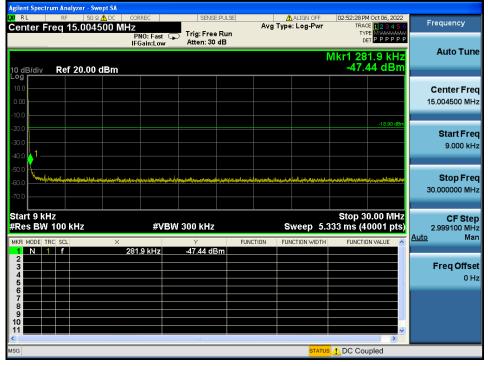
Low Band-edge

Hopping mode & Modulation : π/4DQPSK





Lowest Channel & Modulation : π/4DQPSK



		RF			RREC	SEN	SE:PULSE			LIGN OFF		M Oct 06, 2022	Frequency
Center	Fre	q 5.01	50000	Р	NO: Fast	Trig: Fr		Avg	j Type:	Log-Pwr	TR4	CE 123456 PE MANANA DET PPPPP	
	_			IF	Gain:Low	Atten: 3	0 dB						Auto Tune
I0 dB/di	v	Ref 20.	.00 dBi	m						Mkr		88 GHz 45 dBm	
- og 10.0				.∧1									Center Fred
0.00				<u> </u>									5.015000000 GH:
10.0													
20.0												-18.90 dBm	Start Free
30.0								6		—() ³ —		<u> </u>	30.000000 MHz
40.0	العادي وروان	and processed	Cardinal Street of							and the property of the proper			
50.0	1999 (1999) 1999 (1999)												Stop Free
60.0													10.00000000 GH
70.0													
Start 3					-40.0		_	·				0.000 GHz	CF Step
		.0 MHz			#VE	3W 3.0 MH				•		0001 pts)	997.000000 MH Auto Mar
MKR MODE	1 1	f		× 2.402 1	1 GHz	۲ 1.51 c		FUNCTION	FUNC	TION WIDTH	FUNCI	ION VALUE	
2 N 3 N	1	f		9.466 6	1 GHz	-36.26 o	IBm						Freq Offse
3 N 4 N	1	f		7.460 3	'8 GHz	-36.58 (iBm						0 H
5 N	1	f		6.050 8	8 GHz	-37.45 c	IBm 📃					=	0 8.
6	+												
8													
9	+												
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Conducted Spurious Emissions <u>Lowest Channel & Modulation : π/4DQPSK</u>

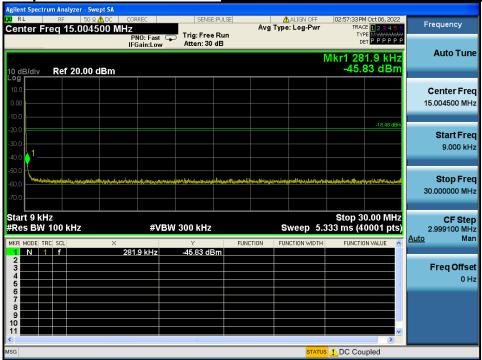
Agilent Spectrum Analyzer - Swept SA				
Center Freq 17.50000000	CORREC SENSE:PULSE	ALIGN OFF Avg Type: Log-Pwr	02:53:16 PM Oct 06, 2022 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast	Mkr3	түре Мининин Det P P P P P P P 18.764 125 GHz -32.03 dBm	Auto Tune
Log				Center Freq 17.50000000 GHz
-20.0			-18.90 dBn	Start Freq 10.000000000 GHz
-50.0 -60.0 -70.0				Stop Freq 25.00000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 40	Stop 25.000 GHz 0.00 ms (40001 pts)	CF Step 1.50000000 GHz <u>Auto</u> Man
1 N 1 f 24.860 2 N 1 f 21.19 3 N 1 f 18.764 4 5	0 125 GHz 28.56 dBm 1 875 GHz -31.88 dBm 4 126 GHz -32.03 dBm			Freq Offset 0 Hz
6				
MSG		STATU		

Reference for limit

Middle Channel & Modulation : π/4DQPSK



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





Middle Channel & Modulation : π/4DQPSK









High Band-edge

Highest Channel & Modulation : π/4DQPSK



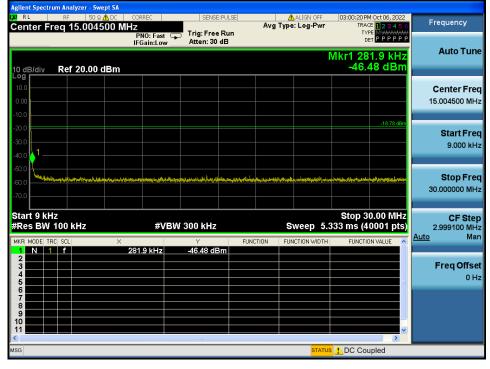
High Band-edge

Hopping mode & Modulation : π/4DQPSK





Highest Channel & Modulation : π/4DQPSK



RL RF 50 Ω Center Freq 5.01500		Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	03:00:45 PM Oct 06, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P P P P P	Frequency
0 dB/div Ref 20.00		Atten: 00 th	Mkr	5 5.894 35 GHz -37.37 dBm	Auto Tun
-og 10.0 0.00 10.0	1				Center Fre 5.015000000 GH
20.0				-18.78 dBm	Start Fre 30.000000 M⊦
50.0 70.0					Stop Fre 10.000000000 GH
Start 30 MHz Res BW 1.0 MHz	#VB\ ×	N 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Ste 997.000000 Mł <u>Auto</u> Ma
1 N 1 F 2 N 1 F 3 N 1 F 4 N 1 F 5 N 1 F 6	2.480 38 GHz 9.483 80 GHz 6.910 80 GHz 7.386 61 GHz 5.894 35 GHz	1.83 dBm -36.41 dBm -36.78 dBm -37.30 dBm -37.37 dBm			Freq Offs 0 ⊦
9					



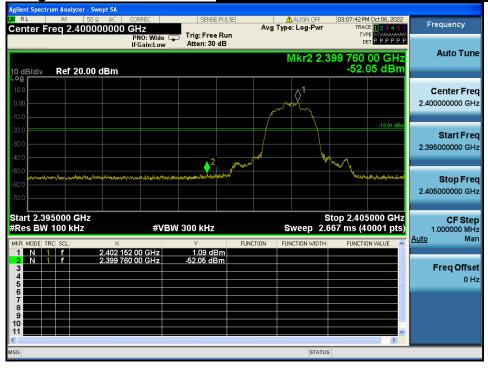
Highest Channel & Modulation : π/4DQPSK





Low Band-edge

Lowest Channel & Modulation : 8DPSK



Low Band-edge

Hopping mode & Modulation : 8DPSK





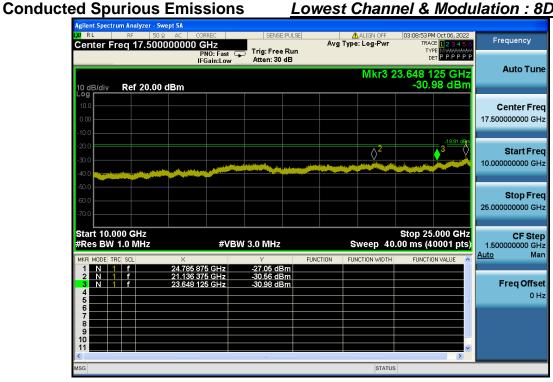
Conducted Spurious Emissions <u>Lowest Channel & Modulation : 8DPSK</u>

Agiten LXI R I		RF		Swept SA	CORRE	c I		SENS	:PULSE			•	ALIGN OFF	03:08	-05 DM	Oct 06, 2022		
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					PNO IFGai	: Fast n:Low	, , p	Trig: Free Atten: 30							DET	PPPPP		
														Mkr1	281	.9 kHz	Ĩ.	Auto Tune
10 di	3/div	Ref	20.00) dBm												5 dBm		
Log																		
10.0																		Center Freq
0.00																		15.004500 MHz
-10.0																-18.91 dBm		
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-70.0																		
Star	t9kH	z												Sto	p 30	.00 MHz		CF Step
	s BW		kHz			#V	BW :	300 kHz				S	weep 5.					2.999100 MHz
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	nalyzer - Swept SA RF 50 Ω AC		SENSE:F	1195		ALIGN OFF	03:08:30 PM	Oct 06, 2022		
	5.01500000	0 GHz				: Log-Pwr	TRACE	123456	Frequency	
		PNO: Fast (IFGain:Low	Atten: 30 d				DE	PPPPP	Auto Tune	
10 dB/div R	Mkr5 6.805 86 GHz dB/div Ref 20.00 dBm -37.68 dBm									
10.0		⟩ ¹							Center Fred 5.015000000 GHz	
-10.0								-18.91 dBm	5.01500000 GH.	
-20.0					•5	3		<mark>2</mark>	Start Free 30.000000 MH;	
-40.0 -50.0								~	Oton Eng	
-60.0									Stop Fre 10.000000000 GH	
Start 30 MHz #Res BW 1.0		#VB	W 3.0 MHz		ST	weep 18	Stop 10. .67 ms (40	000 GHz)001 pts)	CF Step 997.000000 MH	
MKR MODE TRC S		2.402 11 GHz	۲ 1.44 dBr	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Mai	
2 N 1 3 N 1	- <u>9</u>	9.419 00 GHz 7.486 81 GHz	-36.29 dBn -36.85 dBn	n n					Freq Offse	
4 N 1 1 5 N 1 1		5.677 26 GHz 5.805 86 GHz	-37.66 dBn -37.68 dBn	n					0 Hz	
7 8 9 10										
11			Ш					×		
SG						STATUS				



Lowest Channel & Modulation : 8DPSK

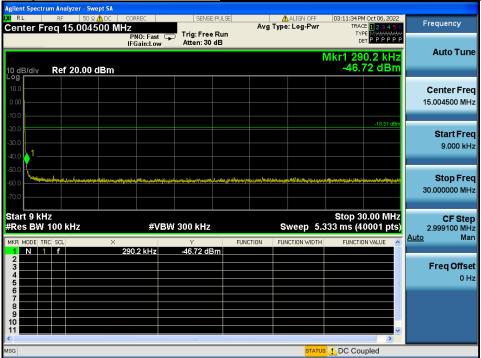


Reference for limit

Middle Channel & Modulation : 8DPSK



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





Middle Channel & Modulation : 8DPSK

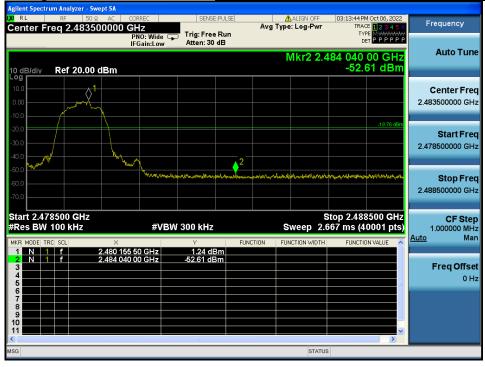






High Band-edge

Highest Channel & Modulation : 8DPSK



High Band-edge

Hopping mode & Modulation : 8DPSK





Highest Channel & Modulation : 8DPSK

LXI RI	L	RF	50 15.00	Ω <u>Λ</u> Ι	DC CO O MHz	DRREC			E:PULS		Avg		ALIGN OFF : Log-Pwr	TRA	M Oct 06, 2022 CE 123456 /PE M MANANA		Frequency
10 d	B/div	Ref	f 20.0	0 dB		PNO: Fa FGain:L		Atten: 30						Mkr1 28	атререре 81.9 kHz 82 dBm		Auto Tune
Log 10.0 0.00 -10.0																	Center Freq 15.004500 MHz
-20.0 -30.0 -40.0	1														-18.76 dBm		Start Freq 9.000 kHz
-50.0 -60.0 -70.0		rt i jan i i ana	initali filadiri	detti getan	ekolijakov		inje tre depter	allan an a	t bineta	والبرامة الإرام	-haidha	in de sine	مراجيار <mark>خطاطيتم يفاجينه</mark>	p _{en} ing filmstong of in	مىرىمەن بەرەل <i>تەرەپىل</i> ەن		Stop Freq 30.000000 MHz
#Re	t9kH sBW	100	kHz		×	#	¢VBW	/ 300 kHz Y		FUNC	CTION		weep 5.3	133 ms (4	80.00 MHz 10001 pts)	Aut	CF Step 2.999100 MHz to Man
1 2 3 4 5 6	N 1	f			28	1.9 kH		-46.82 dE	3m								Freq Offset 0 Hz
7 8 9 10 11																	
MSG													STATUS	LDC Co	upled		





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

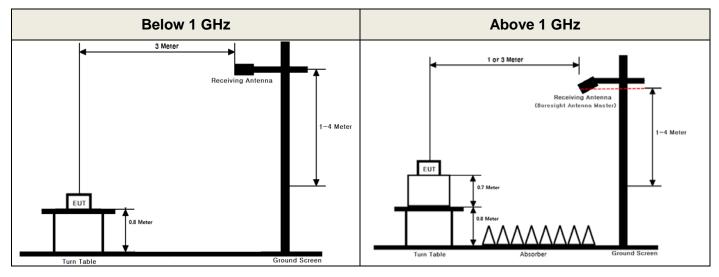
NA



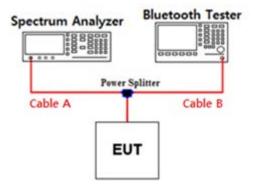
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)	
0.03	6.22	15	7.74	
1	6.74	20	8.10	
2.402 & 2.441 & 2.480	7.19	25	8.91	
5	7.88	-	-	
10	8.34	-	-	

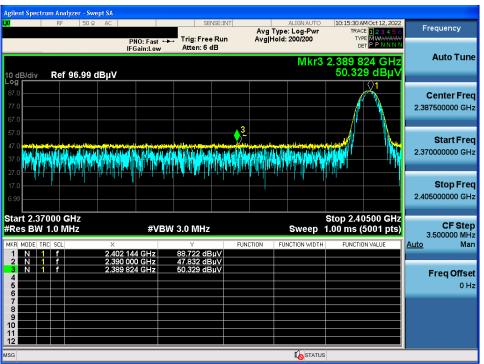
Note 1: The path loss from EUT to Spectrum analyzer was measured and used for test. Path loss (S/A's correction factor) = Cable A + Power Splitter



APPENDIX II

Unwanted Emissions (Radiated) Test Plot

GFSK & Lowest & X & Ver



GFSK & Highest & X & Ver

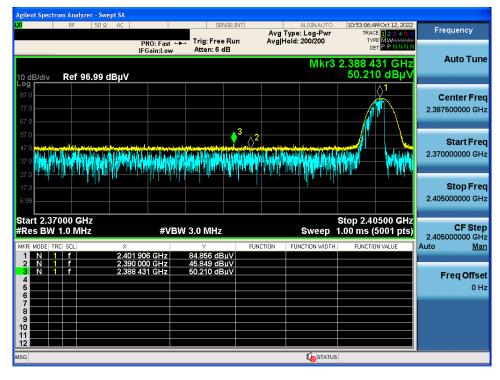
Agilent Spectrum Analyzer - Swept SA				
ΙΧΙ RF 50 Ω AC		E:INT ALIGN AU Avg Type: Log-P	Mr TRACE 123456	Frequency
	PNO: Fast +++ Trig: Free F IFGain:Low Atten: 6 dE		TYPE MWWWWW DET P P N N N N	
10 dB/div Ref 96.99 dBµV		Mkr3	2.484 463 6 GHz 51.345 dBµV	Auto Tune
Log 87.0 77.0 67.0	3			Center Freq 2.489000000 GHz
57.0 47.0 37.0 27.0	ni lanakalika da mila		nininininini	Start Freq 2.478000000 GHz
6.99				Stop Fred 2.500000000 GHz
Start 2.47800 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Swee	Stop 2.50000 GHz p 1.00 ms (5001 pts)	CF Step 2.200000 MHz
MKR MODE TRC SCL X	Y 74 4 GHz 87.541 dBµ	FUNCTION FUNCTION WI	DTH FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 2.483 50 3 N 1 f 2.484 40 4 5 6 6	00 0 GHz 47.563 dBu 63 6 GHz 51.345 dBu	V V		Freq Offset 0 Hz
7 8 9 10 11				
12 MSG		Land Contract of C	ATUS	

Detector Mode : PK

Detector Mode : PK

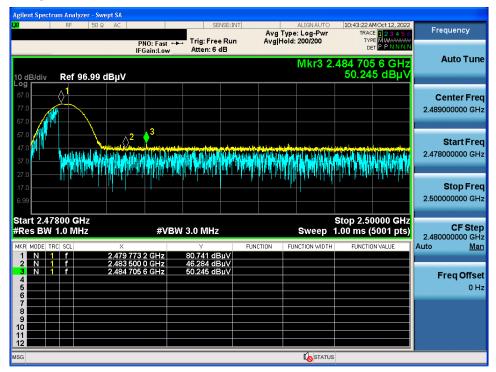


$\pi/4DQPSK$ & Lowest & X & Hor



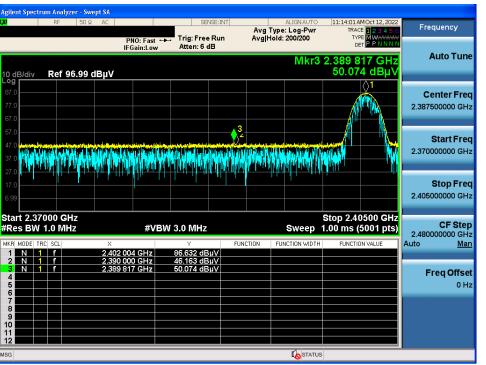
Detector Mode : PK

π /4DQPSK & Highest & X & Hor





8DPSK & Lowest & X & Hor



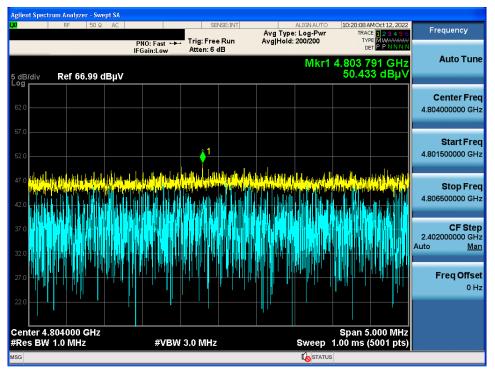
8DPSK & Highest & X & Hor

ent Spectrum Analyzer - Swept SA SENSE:INT 11:06:24 Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 Trig: Free Run PNO: Fast ← IFGain:Low Atten: 6 dB Auto Tune Mkr3 2.483 913 6 GH: 49.572 dBµ\ Ref 96.99 dBµV **Center Freq** 2.489000000 GHz **3** Start Freq 2.478000000 GHz Stop Freq 2.50000000 GHz Start 2.47800 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (5001 pts) **CF Step** 2.48000000 GHz #VBW 3.0 MHz Sweep Auto Man FUN N 1 f 1 f 47.629 dBµ\ 49.572 dBµ\ 2.483 500 0 GHz 2.483 913 6 GHz **Freq Offset** 456789 0 Hz 9 10 11 12 MSG **I**STATUS

Detector Mode : PK

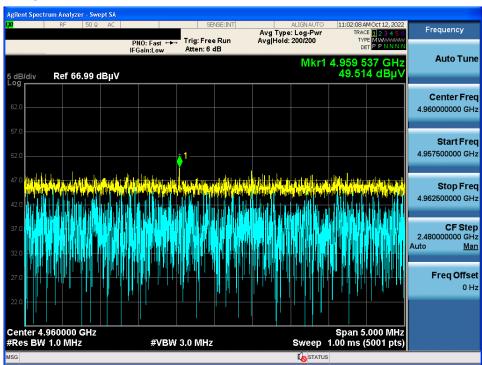


GFSK & Lowest & X & Hor



$\pi/4DQPSK$ & Highest & X & Hor

Detector Mode : PK





8DPSK & Middle & X & Hor

