TEST REPORT

	Dt&C Co., Ltd.								
Dt&C	42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042 Tel : 031-321-2664, Fax : 031-321-1664								
1. Report No : DRTFCC2403-003	1. Report No : DRTFCC2403-0032								
2. Customer									
• Name (FCC) : Pittasoft Co., Ltd. / Na	ame (IC) : PITTASOFT CO., LTD.								
South Korea 13488	r, 331, Pangyo-ro, Bundang-gu, Seongnam-s Gyeonggi-do								
3. Use of Report : FCC & IC Certific	ation								
4. Product Name / Model Name : Ca FCC ID : YCK-DR970XBOXP IC : 23402-DR970XBOXP	ar DashCam / DR970X Box-2CH Plus								
5. FCC Regulation(s): Part 15.247 IC Standard(s): RSS-247 Issue 3, Test Method used: KDB558074 D									
6. Date of Test : 2024.01.31 ~ 2024	.02.14								
7. Location of Test : 🛛 Permanent	Testing Lab On Site Testing								
8. Testing Environment : See appen	ided test report.								
9. Test Result : Refer to the attache	d test result.								
The results shown in this test report refe This test report is not related to KOLAS	er only to the sample(s) tested unless otherwise stated. accreditation.								
Affirmation	Technical Manager								
Name : SeungMin Gil	(Signature) Name : JaeJin Lee								
	2024.03.29.								
	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
DRTFCC2403-0032	Mar. 29, 2024	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	Car DashCam
Model Name	DR970X Box-2CH Plus
Add Model Name	DR970X Box-2CH IR Plus, DR970X Box-2CH Truck Plus, DR970X Box-2CH DMS Plus
Firmware Version Identification Number	V1.000
EUT Serial Number	Conducted: 97XBK3MAE00039 Radiated: 97XBK3MAE00043
Power Supply	DC 12 V, DC 24 V
Frequency Range	2 402 MHz ~ 2 480 MHz
Max. RF Output Power	11.35 dBm (0.014 W)
Modulation Technique (Data rate)	GFSK(1 Mbps), π/4DQPSK(2 Mbps), 8DPSK(3 Mbps)
Number of Channels	79
Antenna Specification	Antenna Type: Chip Antenna Gain : 1.88 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 ~ +23 °C
 Relative Humidity 	35 % ~ 39 %

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	0.9 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)	4.9 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			

1.8. Test Equipment List

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N	
Spectrum Analyzer	bectrum Analyzer Agilent Technologies		23/12/15	24/12/15	MY50410399	
Spectrum Analyzer	Agilent Technologies	N9020A	23/06/23	24/06/23	US47360812	
Spectrum Analyzer	Agilent Technologies	N9020A	23/12/15	24/12/15	MY48010133	
DC Power Supply	H.P	6622A	23/12/15	24/12/15	3448A03760	
DC Power Supply	SM techno	SDP30-5D	23/06/23	24/06/23	305DMG291	
DC Power Supply	SM techno	SDP30-5D	23/06/23	24/06/23	305DMG304	
BlueTooth Tester	TESCOM	TC-3000C	23/12/15	24/12/15	3000C000678	
Power Splitter	Anritsu	K241B	23/12/15	24/12/15	1301183	
Multimeter	FLUKE	17B+	23/12/15	24/12/15	36390701WS	
Signal Generator	Rohde Schwarz	SMBV100A	23/12/15	24/12/15	255571	
Signal Generator	ANRITSU	MG3695C	23/12/15	24/12/15	173501	
Thermohygrometer	BODYCOM	BJ5478	23/12/15	24/12/15	120612-1	
Thermohygrometer	BODYCOM	BJ5478	23/12/15	24/12/15	120612-2	
Thermohygrometer	BODYCOM	BJ5478	23/06/23	24/06/23	N/A	
Loop Antenna	ETS-Lindgren	6502	23/11/09	24/11/09	00060496	
Hybrid Antenna	Schwarzbeck	VULB 9160	23/12/15	24/12/15	3362	
Horn Antenna	ETS-Lindgren	3117	23/06/23	24/06/23	00143278	
Horn Antenna	A.H.Systems Inc.	SAS-574	23/06/23	24/06/23	155	
PreAmplifier	tsj	MLA-0118-B01-40	23/12/15	24/12/15	1852267	
PreAmplifier	tsj	MLA-1840-J02-45	23/06/23	24/06/23	16966-10728	
PreAmplifier	H.P	8447D	23/12/15	24/00/23	2944A07774	
		WHKX12-935-1000-				
High Pass Filter	Wainwright Instruments	15000-40SS WHKX10-2838-3300-	23/06/23	24/06/23	8	
High Pass Filter	Wainwright Instruments	18000-60SS	23/06/23	24/06/23	1	
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	23/06/23	24/06/23	3	
Attenuator	Hefei Shunze	SS5T2.92-10-40	23/06/23	24/06/23	16012202	
Attenuator	Aeroflex/Weinschel	56-3	23/06/23	24/06/23	Y2370	
Attenuator	SMAJK	SMAJK-2-3	23/06/23	24/06/23	3	
Attenuator	SMAJK	SMAJK-2-3	23/06/23	24/06/23	2	
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	23/12/15	24/12/15	1338004 1911481	
Cable	DT&C	Cable	24/01/03	25/01/03	G-2	
Cable	HUBER+SUHNER	SUCOFLEX 100	24/01/03	25/01/03	G-3	
Cable	DT&C	Cable	24/01/03	25/01/03	G-4	
Cable	OMT	YSS21S	24/01/03	25/01/03	G-5	
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-1	
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-4	
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-1	
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-2	
Cable	JUNKOSHA	MWX241/B	24/01/03	25/01/03	M-3	
Cable	JUNKOSHA	J12J101757-00	24/01/03	25/01/03	M-7	
Cable	HUBER+SUHNER	SUCOFLEX106	24/01/03	25/01/03	M-9	
Cable	DT&C	Cable			RFC-46	
Test Software tsj		Radiated Emission NA		NA	Version 2.00.0185	

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)	RSS section(s)	Test DescriptionLimitTest(Using in 2 400~ 2 483.5 MHz)Condition		Status Note 1	
15.247(a) 15.247(b)	RSS-247[5.1] RSS-247[5.4]	Maximum Peak Conducted Output Power	For FCC =< 0.125 W(conducted) For IC =< 0.125 W(conducted) =< 4 Watt(e.i.r.p)		с
		20 dB Bandwidth	NA		С
15.247(a) RSS-247[5.1]	Carrier Frequency Separation	>= 25 kHz or >= Two thirds of the 20 dB BW, whichever is greater.		С	
	100-247[0.1]	Number of Hopping >= 15 hops		Conducted	С
		Time of Occupancy =< 0.4 seconds			С
-	RSS-Gen[6.7]	Occupied Bandwidth (99 %)	NA		с
15.247(d)	RSS-247[5.5]	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	RSS-247[5.5] RSS-Gen[8.9] RSS-Gen[8.10]	Unwanted Emissions (Radiated)	Part 15.209 Limits (Refer to section 9)	Radiated	C Note2
15.207	RSS-Gen[8.8]	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)		1-	С

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.

IC Requirements

- RSS-247[5.1] (b), For FHSs 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, FHSs operating in the band 2 400-2 483.5 MHz 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 that the systems operate with an output power no greater than 0.125 W.
- 2. RSS-247[5.4] (b), For FHSS operating in the band 2 400 MHz 2 483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels, the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p shall not exceed 4 W, except as provided in section 5.4(e)

4.3. 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

- Power Supply: 24 V

Modulation	Tested Channel	Burst Average Output Power		Peak Output Power		Antenna Gain	e.i.r.p ^{Note3}
	Tested Ghanner	dBm	mW	dBm	mW	(dBi)	(dBm)
	Lowest	3.62	2.30	3.76	2.38	1.88	5.64
<u>GFSK</u>	Middle	5.54	3.58	5.65	3.67	1.88	7.53
	Highest	7.66	5.83	7.83	6.07	1.88	9.71
	Lowest	4.68	2.94	6.94	4.94	1.88	8.82
<u>π/4DQPSK</u>	Middle	6.36	4.33	8.73	7.46	1.88	10.61
	Highest	8.41	6.93	10.74	11.86	1.88	12.62
	Lowest	4.66	2.92	7.36	5.45	1.88	9.24
<u>8DPSK</u>	Middle	6.34	4.31	9.18	8.28	1.88	11.06
	Highest	8.41	6.93	11.15	13.03	1.88	13.03

- Power Supply: 12 V

Modulation	Tested Channel		Average t Power		Output wer	Antenna Gain	e.i.r.p ^{Note3}
		dBm	mW	dBm	mW	(dBi)	(dBm)
	Lowest	3.65	2.32	3.82	2.41	1.88	5.70
<u>GFSK</u>	Middle	5.52	3.56	5.70	3.72	1.88	7.58
	Highest	7.65	5.82	7.85	6.10	1.88	9.73
	Lowest	4.71	2.96	7.03	5.05	1.88	8.91
<u>π/4DQPSK</u>	Middle	6.36	4.33	8.84	7.66	1.88	10.72
	Highest	8.43	6.97	10.84	12.13	1.88	12.72
<u>8DPSK</u>	Lowest	4.75	2.99	7.48	5.60	1.88	9.36
	Middle	6.40	4.37	9.31	8.53	1.88	11.19
	Highest	8.54	7.14	11.35	13.65	1.88	13.23

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.

Note 3: e.i.r.p = $P_{cond} + G_{EUT}$

 P_{cond} = measured power at feedpoint of the EUT antenna, in dBm (Peak Conducted Output Power) G_{EUT} = gain of the EUT radiating element (antenna), in dBi

Dt&C

- Power Supply: 24 V Peak Output Power



Peak Output Power

Middle Channel & Modulation : GFSK

Lowest 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













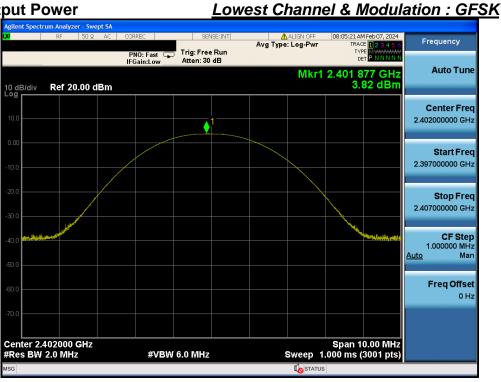


Highest Channel & Modulation : 8DPSK





- Power Supply: 12 V Peak Output Power



Peak Output Power

Middle Channel & Modulation : GFSK



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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















Highest Channel & Modulation : 8DPSK



5. 20 dB BW & Occupied 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 & Occupied BW
 - $VBW \ge 3 \times RBW$

Span = between two times and five times the 20 dB bandwidth & Occupied BW

Sweep = auto

Detector function = peak

Trace = max hold

5.4. Test Results

- Power Supply: 24 V

Modulation	Tested Channel	20 dB BW (MHz)	Occupied BW (MHz)
	Lowest	0.928	0.843
<u>GFSK</u>	Middle	0.933	0.838
	Highest	0.930	0.848
	Lowest	1.196	1.146
<u>π/4DQPSK</u>	Middle	1.182	1.149
	Highest	1.197	1.151
	Lowest	1.227	1.148
<u>8DPSK</u>	Middle	1.228	1.146
	Highest	1.231	1.149



- Power Supply: 12 V

Modulation	Tested Channel	20 dB BW (MHz)	Occupied BW (MHz)
	Lowest	0.927	0.841
<u>GFSK</u>	Middle	0.928	0.840
	Highest	0.934	0.846
	Lowest	1.184	1.155
<u>π/4DQPSK</u>	Middle	1.195	1.147
	Highest	1.253	1.155
	Lowest	1.231	1.146
<u>8DPSK</u>	Middle	1.228	1.145
	Highest	1.231	1.153



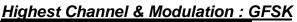
- Power Supply: 24 V 20 dB BW & Occupied BW













20 dB BW & Occupied BW

Lowest Channel & Modulation : π/4DQPSK







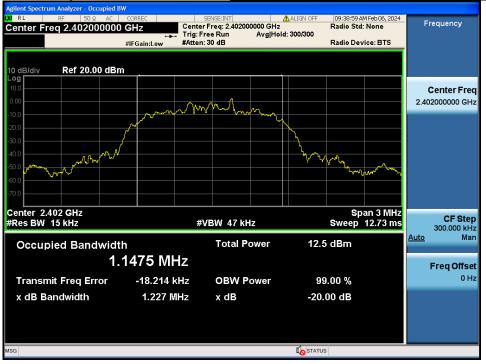
20 dB BW & Occupied BW

Highest Channel & Modulation : π/4DQPSK



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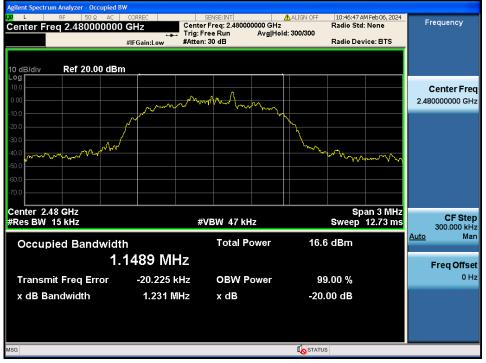














- Power Supply: 12 V 20 dB BW & Occupied BW

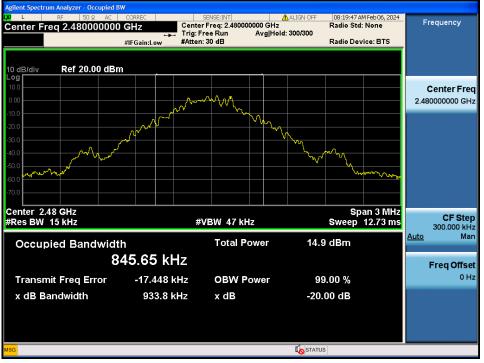










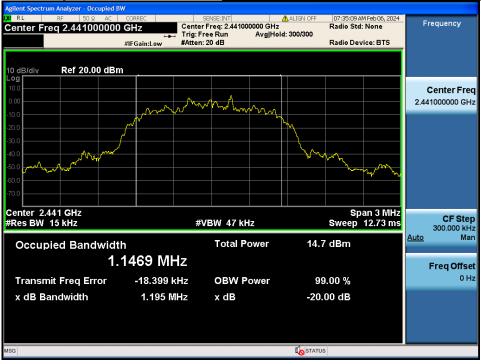


20 dB BW & Occupied BW

Lowest Channel & Modulation : π/4DQPSK







20 dB BW & Occupied BW

Highest Channel & Modulation : π/4DQPSK



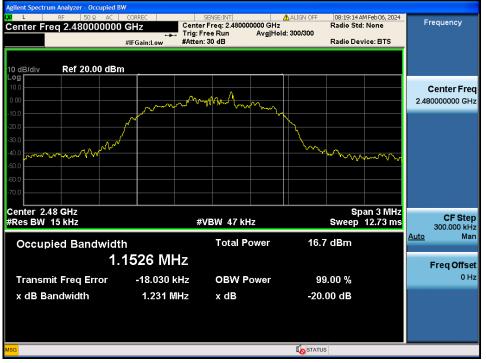














6. Carrier Frequency Separation

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.

 $VBW \ge RBW$ Sweep = auto Detector function = peak Trace = max hold

6.4. Test Results

- Power Supply: 24 V FH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
Enable	GFSK	2 441.150	2 442.151	1.001
	π/4DQPSK	2 441.145	2 442.150	1.005
	8DPSK	2 442.152	2 441.151	-1.001

AFH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
Enable	GFSK	2 442.153	2 441.151	-1.002
	π/4DQPSK	2 442.154	2 441.150	-1.004
	8DPSK	2 442.150	2 441.149	-1.001

- Power Supply: 12 V

FH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
Enable	GFSK	2 441.153	2 442.153	1.000
	π/4DQPSK	2 441.149	2 442.153	1.004
	8DPSK	2 441.150	2 442.151	1.001

AFH mode

Hopping Mode	Modulation	Peak of reference channel(MHz)	Peak of adjacent Channel(MHz)	Test Result (MHz)
Enable	GFSK	2 442.151	2 441.151	-1.000
	π/4DQPSK	2 442.151	2 441.147	-1.004
	8DPSK	2 442.151	2 441.150	-1.001

Note 1 : See next pages for actual measured spectrum



Frequency

Auto Tune

- Power Supply: 24 V

Carrier Frequency Separation (FH) Hopping mode : Enable&GFSK Avg Type: Log-Pwr TRACE Center Freq 2.441000000 GHz Trig: Free Run Atten: 30 dB DET P P P P P PNO: Wide 🖵 IFGain:Low ∆Mkr1 1.001 MHz -0.06 dE Ref 20.00 dBm 0 dB/div

~^	X	2		~~~~	han	2.441000000 GH
						Start Fre 2.439500000 GH
						Stop Fre 2.442500000 GH
lz #VE	3W 150 kHz		Sweep 1.			CF Ste 300.000 kH
× 1.001 MHz (, 2.441 150 GHz	Δ) -0.06 dB 5.33 dBm	FUNCTION FU	INCTION WIDTH	FUNCTION	N VALUE	Auto Ma Freq Offs 0 H
	#VE × 1.001 MHz (#VBW 150 kHz	12 #VBW 150 kHz 1.001 MHz((Δ) = 0.06 dB	12 #VBW 150 kHz Sweep 1. 1.001 MHz (Δ) -0.06 dB	12 Span 3. #VBW 150 kHz Sweep 1.200 ms (3 1.001 MHz (Δ) -0.06 dB	iz #VBW 150 kHz Span 3.000 MHz 1001 MHz (Δ) - 0.06 dB

Carrier Frequency Separation (FH)

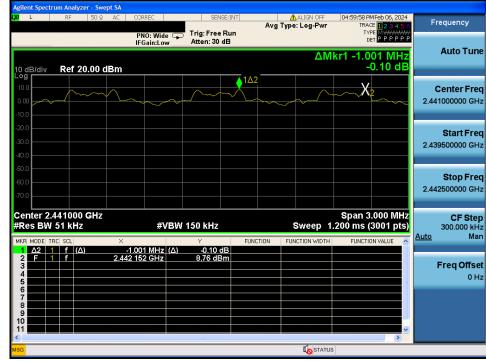
Hopping mode : Enable&π/4DQPSK





Carrier Frequency Separation (FH)

Hopping mode : Enable&8DPSK





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



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





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





- Power Supply: 12 V Carrier Frequency Separation (FH)

Agilent Spectrum Analyzer - Swept S	A								
LXIRL RF 50 Q AC		SENS	EINT		ALIGN OFF		1 Feb 06, 2024	En	equency
Center Freq 2.4410000	00 GHz		_	Avg Type	e: Log-Pwr		123456	FD	equency
	PNO: Wide 🕞 IFGain:Low	Trig: Free F Atten: 30 d					E MWWWWW T P P P P P P		
		Auto Tune							
		Auto Tune							
10 dB/div Ref 20.00 dBn	n					().02 dB		
Log						<u> </u>	Δ2		
10.0			$\sqrt{\lambda_2}$					C	enter Freq
0.00	<u></u>		<u>~nz</u>			\sim		2.441	000000 GHz
-10.0	han -			~			m		
				\sim					
-20.0									Start Freq
-30.0								2 439	500000 GHz
-40.0								2.400	
-50.0									Stop Freq
-60.0									
-70.0								2.442	500000 GHz
Center 2.441000 GHz						Span 3.	000 MHz		CF Step
#Res BW 51 kHz	#VBW	150 kHz			Sweep 1	.200 ms (:	3001 pts)		300.000 kHz
					-			Auto	Man
	×	Y	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	N VALUE		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.000 MHz (Δ) .441 153 GHz	0.02 d 5.60 dBr							
3	441 100 0112	5.00 dBi	"					F	reg Offset
4									0 Hz
5									
7									
8									
9									
10									
<		111					>		
MSG					STATUS	2			
WIGG					No STATUS	,		_	

Carrier Frequency Separation (FH)

Hopping mode : Enable&π/4DQPSK

Hopping mode : Enable&GFSK





Carrier Frequency Separation (FH)

Hopping mode : Enable&8DPSK





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



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





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



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, v	vhichever is smaller.	
VBW ≥ RBW	Sweep = auto	
Detector function = peak	Trace = max hold	

7.4. Test Results

- Power Supply: 24 V 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



- Power Supply: 12 V

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.



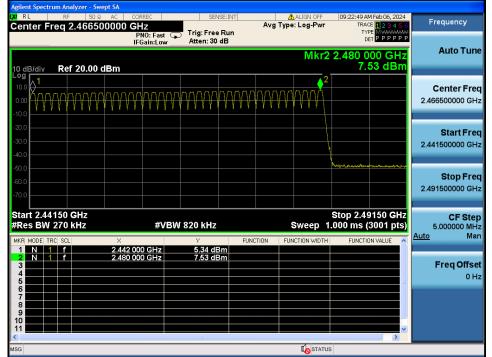
- Power Supply: 24 V Number of Hopping Channels 1(FH)

Hopping mode : Enable & GFSK

	nt Spe	curu																									
L XI F			RF			AC		CORR				SEP	ISE:IN	Т				ALIGN		_	09:2		M Feb 06			Freque	ncv
Cer	nter	Fre	ed 2	2.41	650	1000	J0 (Trie	: Free	Rue		1	۹vg '	ype	: Log	-Pwr			TY	CE <mark>1 2 3</mark> 'PE M MM	الململمة		Treque	
								PN IEG:	0: Fas ain:Lo	st⊊ w		en: 30										D	ET P P P	PPP			
	_		_	_	_	_	-	0.	E0			_	-	_	-	-	-				-					Aut	o Tune
																		N	TKr2	2 2	2.44		00 0				
10 c	IB/di∖	1	Ref	f 20	.00	dBm																5.	27 d	вm			
Log						1																		2			
10.0						\Diamond																				Cent	er Freq
0.00						ÅΛ	nr	M	٦Ar	γnρ	MAG	λA	AΛ	ΠΛΙ	M	٦A	ΠΛ	ΛΛ	AAI	ŊΓ	ΥL	γn	MAL	ДΛ		2.4165000	000 GHz
-10.0						11	γY	V	ΥŶ	γ¥	11	Ϋ́́	I Y I	TY Y	Y	Ył	Y	14	Υļ	١	γγ	Ϋ́	Y Y Y	ΥΥ			
						1																					
-20.0	<u>⊣</u> ⊢]																				Sta	rt Freq
-30.0																										2.3915000	•
																										2.3915000	JOU GHZ
-40.0					1																						
-50.0	(In Aut	i Angerturi	ar line	manna fe	and all																						
-60.0																										Sto	p Freq
																										2.4415000	000 GHz
-70.0																											_
-	<u> </u>	0.04			_																14.00		450				
	rt 2.																						4150				F Step
#Re	es B	W 2	70	KHZ					#	VBW	820	KHZ					,	swe	ер	1.0	uυ	ms ((3001	pts)			000 MHz
MKR	MODE	TRC	SCL			>	<				Y			FUN	стю	N	FUN	ICTION	WIDTH	-	F	UNCTI	ON VALUE	~	1E	Auto	Man
1	N	1				2.	402 (000	GHz			36 di															
2	N	1	f			2.	4411	000	GHz		5.	27 di	3m													Erer	Offeret
3																										Freq	Offset
45																											0 Hz
6																											
7																											
8																											
10																				+							
11																								~			
<																											
MSG																		- (0	STATU	JS							
_	_	_	_	_	_	_	_	-	_	_	_	_	_	_	_	_	_	_	-	_	_	_	_	_			

Number of Hopping Channels 2(FH)

Hopping mode : Enable & GFSK





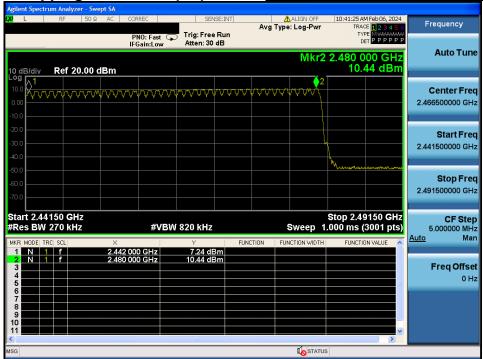
Number of Hopping Channels 1(FH)

Hopping mode : Enable&π/4DQPSK

Frequency	4 Feb 06, 2024 E <mark>1 2 3 4 5</mark> 6	TRAC	ALIGN OFF		ISE:INT			CORREC	Ω AC	50 S	RF	U L
Auto Tune	00 GHz 31 dBm	DI 2.441 0	Mkr2			Trig: Free Atten: 30	ast 🖵 Low	PNO: Fa	dBm	f 20.00	v Rei	10 dB/d
Center Freq 2.416500000 GHz	`	ψ	~~~~~	$\sqrt{\sqrt{2}}$	~~~~~	$\sqrt{\sqrt{1}}$	~~~~	$\sqrt{\sqrt{2}}$	_∆1			10.0 0.00
Start Freq 2.391500000 GHz												-20.0
Stop Freq 2.441500000 GHz										Manya Jaga Ha	44000000	-50.0
5.000000 MHz Auto Man	1150 GHz 3001 pts)	.000 ms (Sweep 1		FUN	820 kHz Y 6.51 de		≠ 02 000 GH	×	kHz	39150 W 270	#Res E
Freq Offset 0 Hz					3m	8.31 dE		41 000 GH	2.4		1 f	2 N 3 4 5 6
												7 8 9 10 11
		5										ISG

Number of Hopping Channels 2(FH)

Hopping mode : Enable &π/4DQPSK





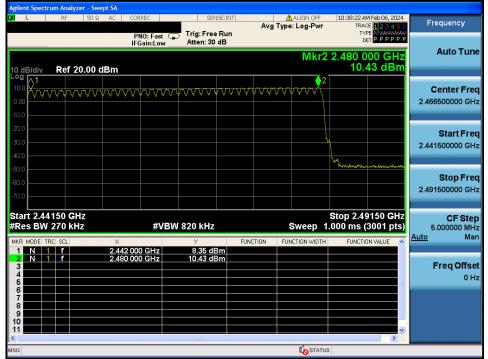
Number of Hopping Channels 1(FH)

Hopping mode : Enable&8DPSK

Agile	Agilent Spectrum Analyzer - Swept SA																							
L X I	L		RF	5	50 Ω	AC	COF	REC			SENSE	:INT				ALIGN		10:		M Feb 06, 2				
														Ave	ј Туре	: Log	-Pwr		TRA	.CE 1234	5.6	F	requency	/
								NO: Fas		Trig: F									T)		P P			
		_					IFC	Gain:Lo	w	Atten	: 30 d	B												
																M	lkr2	24	<u>41 (</u>	000 GI	17		Auto T	une
			_			_												-		35 dE				
10 c Log	IB/di∖	/	ĸС	20.0)0 d	вm													<u> </u>	30 UE	-			
						∧1																		
10.0						¥		m m m		~~~	<u>n</u> m m	i m m	m m	mmi	1 m. m	nn	n n r	mm	m m n	naar	n M		Center F	Freq
0.00	1 —					rγv	VVV	V V V	ΥVY	/ V V V	ΥΨ	ΥΥN	/ / /	(V V	VV	V V V	ΥV	Y Y Y	I A A	$\gamma\gamma\gamma\gamma\gamma\gamma$	Υ.	24	16500000	GHZ
					/																			0112
-10.0	י⊢																				_			
-20.0																								
																							Start F	req
-30.0	י ⊢ ר																					2.3	91500000	GHz
-40.0					1																			
				ward	~																			
-50.0	1000																							
-60.0																							Stop F	req
																						2.4	41500000	GHz
-70.0	י ⊢ י																				_			
Sta	rt 2.	391	50	GHz														Sto	p 2.4	4150 G	Ηz		CFS	Sten
#Re	es Bl	W 2	70	kНz				#\	/BW	820 k	Ηz					Swee	ep 1	.000	ms	(3001 p	ts)		5.000000	
		_	_																		<u> </u>	Auto		Man
MKR	MODE	TRC	SCL			×				Y			FUNC	TION	FUN	ICTION:	WIDTH		FUNCT	ON VALUE	^	Hato		man
1	N	1	f			2.4	02 00) GHz) dBr													
2	N	1	f			2.4	41 00) GHz		8.3	5 dBr	n											Eron Of	Foot
3																							Freq Of	
5																					-			0 Hz
6																								
7																								
8																								
9																								
10																								
11																								
MSG	g 🚺																							
_	_	_	_	_	_	_	_	_	_		_	_	_	_	_	-	-		_		_	_		_

Number of Hopping Channels 2(FH)

Hopping mode : Enable & 8DPSK





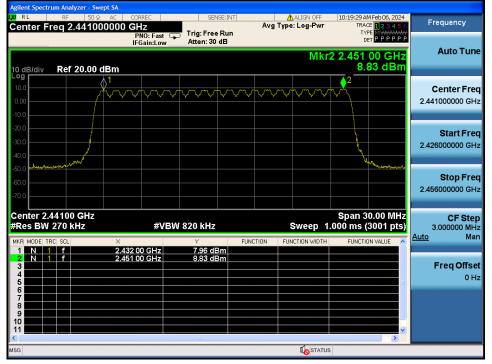
Number of Hopping Channels 1(AFH)

Hopping mode : Enable & GFSK

Agilent Spectrum Analyzer - Swept SA		SENSE:INT	ALIGN OFF	10:10:54 AM Feb 06, 2024 TRACE 1 2 3 4 5 6	Frequency										
Center Freq 2.44 100000	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB		TYPE MWWWWW DET PPPPP	Auto Tune										
10 dB/div Ref 20.00 dBm															
Log 10.0 0.00 -10.0			VVVVV		Center Freq 2.441000000 GHz										
-20.0					Start Freq 2.426000000 GHz										
-50.0				"when we have the	Stop Freq 2.456000000 GHz										
Center 2.44100 GHz #Res BW 270 kHz MKR MODE TRC SCL ×	#VBW 8	Y FUNC		Span 30.00 MHz 000 ms (3001 pts) FUNCTION VALUE	CF Step 3.000000 MHz <u>Auto</u> Man										
2 N 1 f 2, 3 4 5	432 00 GHz 451 00 GHz	4.84 dBm 5.69 dBm			Freq Offset 0 Hz										
6 7 8 9 10 11															
MSG		10	STATUS												

Number of Hopping Channels 1(AFH)

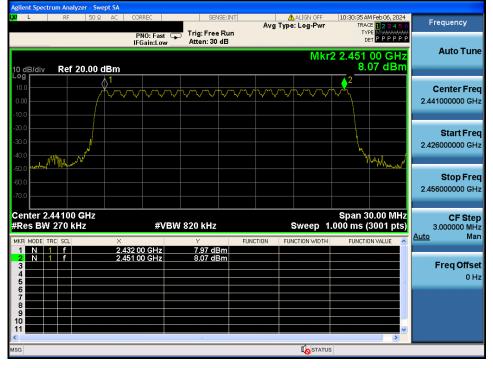
Hopping mode : Enable &π/4DQPSK





Number of Hopping Channels 1(AFH)

Hopping mode : Enable & 8DPSK





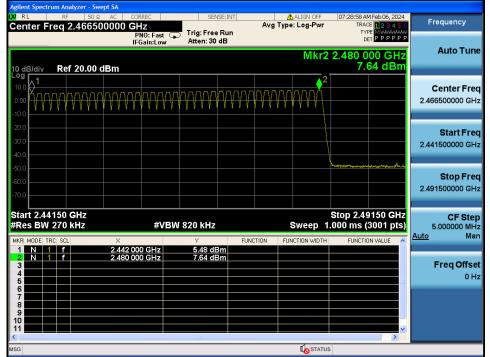
- Power Supply: 12 V Number of Hopping Channels 1(FH)

Hopping mode : Enable & GFSK

Agilent Spectrum A													
	RF 50 Ω		RREC	SEN	SE:INT		ALIGN OFF		M Feb 06, 2024	Frequency			
Center Freq	2.41650	00000 GI		Trig: Free	Dun	Avg Type	: Log-Pwr	TRA	CE 123456 PE MWWWWW	requeries			
		F	NO: Fast 🖵 Gain:Low	Atten: 30				D	FTPPPPP				
			Gam.cow				_			Auto Tune			
							Mkr2		00 GHz	riato rune			
10 dB/div R	ef 20.00	dBm						5.	40 dBm				
									2				
10.0		\wedge								Center Freq			
0.00		Annnr	1 NAAAAA	ηπηπη	NAAAA	ηηηηη	MAAAA	NNAA	ΛΛΛΛΛ	2.416500000 GHz			
		1 V V V V	****		YYYY	Y Y Y Y Y '	Y Y Y Y Y	¥ ¥ ¥ ¥ ¥	* * * * * *				
-10.0													
-20.0										Start Freq			
-30.0													
										2.391500000 GHz			
-40.0	<u> </u>												
-50.0 ***************	andreamed												
-60.0										Stop Freq			
										2.441500000 GHz			
-70.0													
Start 2.39150									1150 GHz	CF Step			
#Res BW 270) kHz		#VBW	820 kHz			Sweep 1	.000 ms (3001 pts)	5.000000 MHz			
MKR MODE TRC SO	7	×		Y	ELIM	TION FUN	ICTION WIDTH	FUNCTI	ON VALUE	<u>Auto</u> Man			
1 N 1 f		2.402 00	IN GHZ	3.50 dE		TION FOR	CTION WIDTH	FUNCTI					
2 N 1 f		2.441 00		5.40 dE									
3										Freq Offset			
4					_					0 Hz			
5													
7													
8													
9													
10													
<													
MSG													
Mod							No status	,					

Number of Hopping Channels 2(FH)

Hopping mode : Enable & GFSK





Number of Hopping Channels 1(FH)

Hopping mode : Enable&π/4DQPSK

Agilent Spect													
Center F	RF	50 Ω				SENS	E:INT		ALIGN OFF		M Feb 06, 2024	Fre	equency
Center	-req z	.41050	0000	PNO: Fast		g: Free		ULA IN	e. Log-i wi	T)	PE MWWWWW ET P P P P P P		
				IFGain:Low	, Att	ten: 30 d	3B				et e e e e e		Auto Tune
									Mkr2		000 GHz		Auto Tune
10 dB/div	Ref	20.00	dBm							7.	90 dBm		
Log			A1								2		
10.0			Mr.m	\sim	ww	NW	ᡃᡞᢧᡳᢧᠬᡘᡢ	~~~~~	$\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma\gamma$	www	WWW		enter Freq
0.00			1									2.416	500000 GHz
-10.0			{										
-20.0													Start Freq
-30.0												2 391	500000 GHz
-40.0		لم										2.001	000000 0112
-50.0 40,000		mand											
-60.0													Stop Freq
-70.0												2.441	500000 GHz
-70.0													
Start 2.3	9150 0	GHz								Stop 2.4	4150 GHz		CF Step
#Res BW	270	(Hz		#V	BW 820	kHz			Sweep 1	.000 ms	(3001 pts)	5.	000000 MHz
MKR MODE	TRC SCL		×			1	FUN	CTION FL	INCTION WIDTH	FUNCTI	ON VALUE 🔥	<u>Auto</u>	Man
1 N	1 f		2.402	000 GHz		.48 dB							
2 N 3			2.441	000 GHz	/	<u>.90 dB</u>	m					F	req Offset
4 5													0 Hz
6													
7							_						
9													
10							_						
<						Ш					>		
MSG									I o STATU	S			
						_				-			

Number of Hopping Channels 2(FH)

Hopping mode : Enable &π/4DQPSK

Agilent Spectrum Analyzer - Swept SA								
RL RF 50 Ω AC Center Freq 2.466500000	CORREC GHz	SENS			ALIGN OFF : Log-Pwr	TRAC	4 Feb 06, 2024 E 123456	Frequency
	PNO: Fast 🕞 IFGain:Low	Trig: Free F Atten: 30 d				TYI	E MWWWWW T P P P P P	
					Mkr2	2.480 0	00 GHz	Auto Tune
10 dB/div Ref 20.00 dBm						10.:	28 dBm	
	<u> </u>	<u></u>		<u></u>				Center Freq
10.0 X Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	,	¢Ψ.Υ.Υ.Υ.	P.V. V.V V I				2.466500000 GHz
-10.0								
-20.0								Otort From
-30.0					\			Start Freq 2.441500000 GHz
-40.0								2.441000000 0112
-50.0						M monenera		
-60.0								Stop Freq
-70.0								2.491500000 GHz
Start 2.44150 GHz						Stop 2.49	150 CH7	0.5.04
#Res BW 270 kHz	#VBW	820 kHz		:		.000 ms (CF Step 5.000000 MHz
MKR MODE TRC SCL X		Y	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Man
1 N 1 f 2.44	2 000 GHz 0 000 GHz	8.24 dBr 10.28 dBr	n					
3		10.20 001						Freq Offset
5							=	0 Hz
6								
8								
10								
11 <							>	
MSG					I o status	5		



Number of Hopping Channels 1(FH)



		ctrun	n An	alyzer	- Swe	pt SA																			
L XI F			RF		50 Ω	AC		RREC			SEN:	SE:INT				ALIGN		08		M Feb 06, 2			Freque		
Cer	nter	Fre	eq 2	2.41	650	000	0 GH	z		.	-	-		Av	з Туре	: Log	-Pwr		TR4	ACE 1 2 3 4	56		Freque	ncy	
							P	NO: Fa Gain:Li			:Free n:30								1	DET P P P P	ΡP				
		_					IF	sain:Li	w	Aue	in. 30	uD									_		Διπ	o Tun	10
																- N	lkr2	2.4		000 GI			Au	orun	
10 c	lB/di∖	,	Rei	f 20.	00 d	IBm													8.	17 dB	m				
Log						. 1					Ī										2				
10.0) —					\\										10.00		4 04 04		T 05 A 03 A			Cent	er Fre	a
0.00						ſνν	$\sim \sim$	$\psi \psi \psi$	Ŵ	vvv	vvy	vγ	٧V٩	7 V V	ΥYM	$\checkmark \lor \lor$	rγγ	ΨVŸ	7V'V	WWW	۲ ۱	2		000 GH	- 1
																						Z .	410500	000 GF	12
-10.0	·⊢																								
-20.0																									
																							Sta	art Fre	p
-30.0					- {																	2.	391500	000 GH	١z
-40.0)—				_/																				
-50.0	ىرىدىد	han shaher	m	how	X																				
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-60.0	v⊢																							000 G⊦	- 11
-70.0																						Z.	44 1500	000 GF	12
Sta	rt 2.:	391	50	GHz														Sto	n 2.4	4150 G	H7			F Ste	-
	es Bl							#	VBIA	820	kH7					Swee	en 1			(3001 p				ooo M⊢	
<i>"</i> , 140	.5 8	. 2	v	11112				"	U-11	0ZV	112					-	- - -				~	Auto		Ma	
MKR	MODE	TRC	SCL			×				Y			FUNC	CTION	FUN	ICTION	WIDTH		FUNCT	ION VALUE	^	Auto	<u>.</u>	INTO	
1	N	1	f			2.4	02 00	0 GHz	-		17 dB							<u> </u>							
2	N	1	_ T_			2.4	41 00	0 GHz	-	8.	<u>17 dB</u>	m											Free	Offse	et
4																							1100		
5																								0 H	
6																									
7																									
9																									
10																									
11																					¥				
<										11	1)					
MSG																- (₀	STATU	s							
	-	-	-	-	-	-	-	-	-	_	-	-	-	-	-	-	-		-		-	-	_	_	-

Number of Hopping Channels 2(FH)



Agilent Spectrum Analyzer															
Center Freq 2.46	50 Ω AC CORREC 6500000 GHz	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	08:06:37 AM Feb 06, 2024 TRACE 123456	Frequency										
10 dB(div Ref 20)	PN0: Fast IFGain:Low Trig: Free Run Atten: 30 dB Trig: Free Run Mkr2 2.480 000 GHz 10.76 dBm B/div Ref 20.00 dBm 10.76 dBm														
Log 1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	VWW VVVVVVVV	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Center Freq 2.466500000 GHz										
-20.0 -30.0 -40.0				w[Start Freq 2.441500000 GHz										
-50.0				"พิปัญมาและการการการการการการการการการการการการการก	Stop Freq 2.491500000 GHz										
Start 2.44150 GHz #Res BW 270 kHz	#VI	BW 820 kHz	Sweep 1	Stop 2.49150 GHz .000 ms (3001 pts)	CF Step 5.000000 MHz Auto Man										
1 N 1 F 2 N 1 F 3 4 5 6	2.442 000 GHz 2.480 000 GHz	8.24 dBm 10.76 dBm	PUNCTION WIDTH		Freq Offset 0 Hz										
7 8 9 10 11 4				×											
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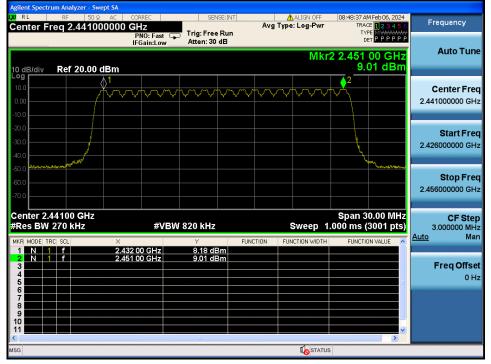
Number of Hopping Channels 1(AFH)

Hopping mode : Enable & GFSK

Agilent Spectrum Analyzer - S LXI RL RF 50		SENSE:INT	ALIGN OFF	08:45:27 AM Feb 06, 2024	
Center Freq 2.4410			Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast	Trig: Free Run Atten: 30 dB		TYPE MWWWWWW DET PPPPP	
	IFGain:Low	Atten: 30 dB			Auto Tune
			Mkr	2 2.451 00 GHz	riato rano
10 dB/div Ref 20.00) dBm			5.87 dBm	
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-60.0					Stop Freq
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Center 2.44100 GHz				Span 30.00 MHz	CF Step
#Res BW 270 kHz		W 820 kHz	Sweep 1	.000 ms (3001 pts)	3.000000 MHz
MKR MODE TRC SCL	×	Y FUN	CTION FUNCTION WIDTH	FUNCTION VALUE	Auto Man
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2 N 1 f	2.451 00 GHz	5.87 dBm			Freq Offset
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<		illii			
MSG				5	

Number of Hopping Channels 1(AFH)

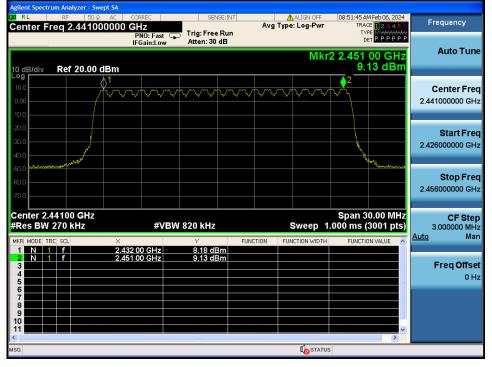
Hopping mode : Enable &π/4DQPSK





Number of Hopping Channels 1(AFH)

Hopping mode : Enable & 8DPSK



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

Detector function = peak

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

Trace = max hold

8.4. Test Results

- Power Supply: 24 V FH mode

Hopping mode	Packet Type	Number of hopping Channels	Burst On Time (ms)	Period (ms)	Test Result (sec)
	DH 5	79	2.880	3.750	0.307
Enable	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)
	DH 5	20	2.880	3.750	0.154
Enable	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.



- Power Supply: 12 V

FH mode

Hopping mode	Packet Type	Number of hopping Channels	Burst On Time (ms)	Period (ms)	Test Result (sec)
	DH 5	79	2.880	3.750	0.307
Enable	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)
	DH 5	20	2.880	3.750	0.154
Enable	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.

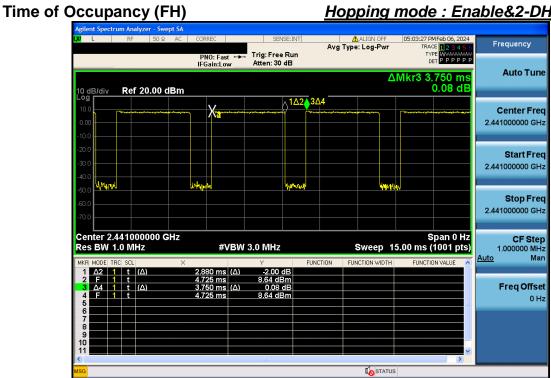


- Power Supply: 24 V Time of Occupancy (FH)

		ectru		alyzer - S																	
L <mark>XI</mark>	L		RF	50	Ω AC	CORR	EC		SEI	NSE:INT		Ava T		LIGN OFF Log-Pwr	05:04			06, 2024 3 4 5		Frequer	icy
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						IFG	ain:Low	<i>'</i>	Atten: 30	aB										Auto	Tune
			_											4	۵Mkr) ms 2 dE			
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-20.0												_	++							Star	tFreq
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	nter s BV			00000	GHz		443.7	DVA	3.0 MHz				6	Voon	15 00 .	S	pan	0 Hz			Step
_				ΠZ			#V	DWW						weep					- 1	1.00000 Auto	00 MHz Man
MKR	MODE			(A)	×		0 ms	(A)	۲ 0.13	dB	FUNC	TION	FUNC	FION WIDTH	i Fi	UNCTIC)N VAL	UE 🔼			
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8																					
10 11																					
<									Ш									>	9		
MSG															JS						

Hopping mode : Enable&2-DH5

Hopping mode : Enable&DH5

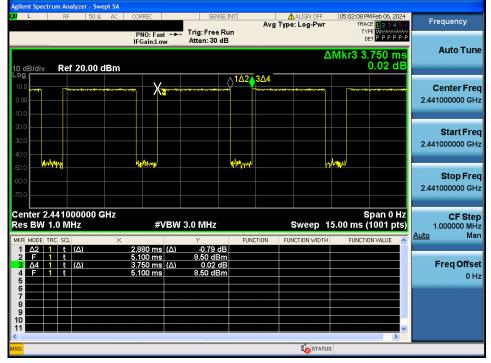


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Hopping mode : Enable&3-DH5

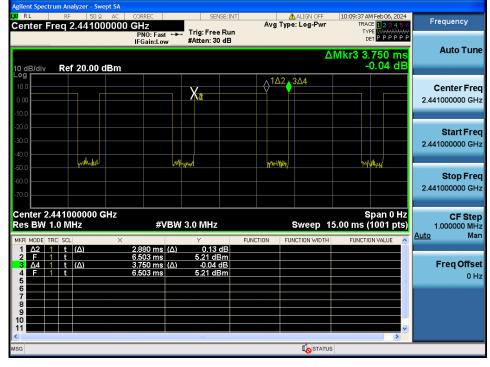
Time of Occupancy (FH)



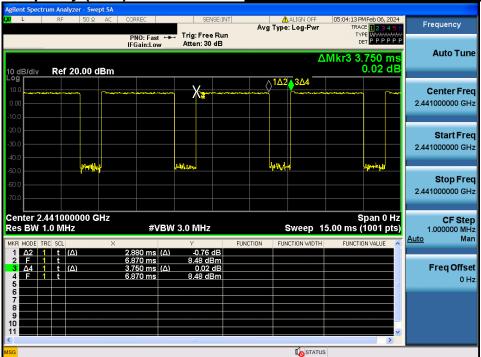


Time of Occupancy (AFH)

Hopping mode : Enable&DH5



Time of Occupancy (AFH) <u>Hopping mode : Enable&2-DH5</u>





Time of Occupancy (AFH)

Hopping mode : Enable&3-DH5

LXI RL		RF	50 Ω	AC	CORREC		SI	ENSE:IN	VT	0.1.0		ALIGN OFF	10:2		4 Feb 06, 20)E <mark>1 2 3</mark> 4		Frequency
Cente	er Fred	2.4 4	1000	0000	PNO:	Fast 🔸	. Trig: Fre		n	Avg	Type	. Log-Pwr		TYE	E V ANNA T P P P P P	686F	
					IFGain	Low	Atten: 5				_	/	Mkr	33	750 m		Auto Tune
10 dB/	div	lef 20	.00 dE	3m											0.03 d		
10.0	n under,	Chargenet		-	-	γ			<u> </u>	34	u/~~~~			-0	ang makang maka sa		Center Fred
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-10.0 —		+															
-20.0																	Start Fred
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-50.0	իչիչներ	W			h ha	শ			WHAN				Yumu			-	Stop Fred
-60.0																	2.441000000 GHz
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	er 2.44 ⁻ SW 1.0		00 Gł	z		#VBW	3.0 MH	7			5	weep 1	5.00	S msí	pan 0 H 1001 pi	iz S)	CF Step 1.000000 MHz
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7 8 9																	
10 11																	
<							Ш					1	ļ				
MSG												I o statu	S				



- Power Supply: 12 V Time of Occupancy (FH)

Hopping mode : Enable&DH5 RL ALIGN OFF Avg Type: Log-Pwr 12 AM TRACE Frequency Center Freq 2.441000000 GHz Trig: Free Run Atten: 30 dB DET P P P P P NO: Fast IFGain:Low Auto Tune ΔMkr3 3.750 ms 0.01 dE Ref 20.00 dBm 10 dB/div _og **r** ∆1∆2 3∆4 **Center Freq** X 2.441000000 GHz Start Freq 2.441000000 GHz putroput marth HANNA Stop Freq 2.441000000 GHz Center 2.441000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 15.00 ms (1001 pts) CF Step 1.000000 MHz #VBW 3.0 MHz Man Auto MKR MODE TRO FUNCTION FUNCTION WIDTH FUNCTION VALUE
 Δ2
 1
 t
 (Δ)

 F
 1
 t
 (Δ)

 GA4
 1
 t
 (Δ)

 F
 1
 t
 (Δ)
 0.19 dB 4.43 dBm 0.01 dB 4.43 dBm ms (Δ) 3.926 ms 3.750 ms (Δ) 3.926 ms **Freq Offset** 4 0 Hz 6 10 11 **I**STATUS /ISG

Time of Occupancy (FH)







Time of Occupancy (FH)

Hopping mode : Enable&3-DH5

Agilent Spectrum Analyzer - Swept SA	CORREC	SENSE:INT	ALIGN OFF	07:57:51 AM Feb 06, 2024	
Center Freq 2.441000000	GHz	Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE WWWWWW	Frequency
	PNO: Fast 🔸	Atten: 30 dB		DETPPPPP	
			/	\Mkr3 3.750 ms	Auto Tune
10 dB/div Ref 20.00 dBm				0.02 dB	
Log			3∆4		
		1 4 4 7 8 7 9 7 4 7 8 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9	The generation and a generation of the second states of the second state	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Freq 2.441000000 GHz
					2.441000000 GHz
-10.0					
-20.0					Start Freq
-30.0					2.441000000 GHz
-40.0	langer	14 mar	l l l l l l l l l l l l l l l l l l l	and and	
-50.0					Stop Freq
-60.0					2.441000000 GHz
-70.0					
Center 2.441000000 GHz			II	Span 0 Hz	CF Step
Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	5.00 ms (1001 pts)	1.000000 MHz
MKR MODE TRC SCL X			CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.880 ms (Δ) 5.080 ms	-0.75 dB 8.45 dBm			
3 Δ4 1 t (Δ)	3.750 ms (Δ)	0.02 dB			Freq Offset
4 F 1 t	5.080 ms	8.45 dBm			0 Hz
6					
8					
9					
11				~	
MSG		-112			
			NO STATO	-	