

			GEOR IVI	ddie Channe	1	
	ctrum Analyzer - Swept S					
<mark>W</mark> RL Marker 1	RF 50 Ω 2.440870000		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	11:49:35 AM Jun 07, 2021 TRACE 2 3 4 5 6	Peak Search
marker	2	PNO: Fast IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	
			Atten: 20 db	Mkr	1 2.440 87 GHz	Next Peak
10 dB/div Log	Ref Offset 0.5 d Ref 10.00 dB	B im		WIKI	0.341 dBm	
			▲ 1			Next Dk Dight
0.00						Next Pk Right
-10.0						Next Pk Left
-20.0						NCAL FR LOIL
-30.0						Marker Delta
-40.0						Marker Della
-40.0						
-50.0						Mkr→CF
						WIKI→CF
-60.0						
-70.0						Mkr→RefLvl
-70.0						WIKI → KEI LVI
-80.0						
						More
Center 2.	441000 GHz				Span 10.00 MHz	1 of 2
#Res BW		#VBW	3.0 MHz	Sweep 1	.000 ms (1001 pts)	
VISG				STATUS		

GFSK Middle Channel

GFSK High Channel

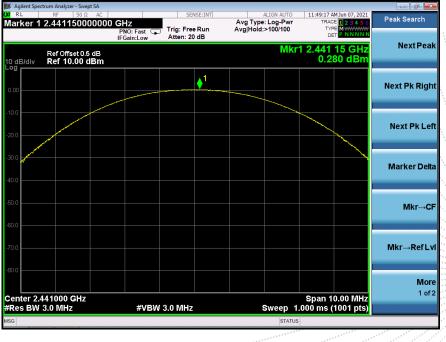






Pi/4 DQPSK Low Channel

Pi/4 DQPSK Middle Channel

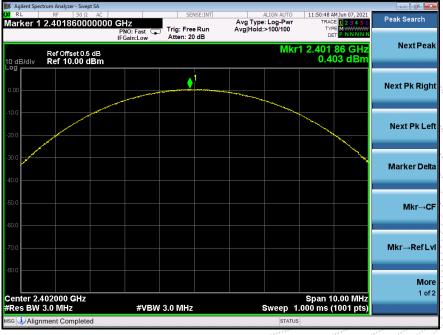






Pi/4 DQPSK High Channel

8DPSK Low Channel

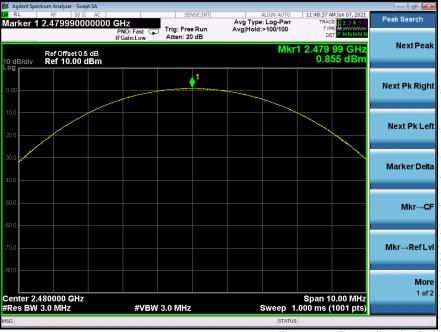




	OBI		onanio		
📕 Agilent Spectrum Analyzer - Swept SA					
RL RF 50Ω AC		ENSE:INT	ALIGN AUTO	11:48:58 AM Jun 07, 2021	
Marker 1 2.440970000000			pe: Log-Pwr	TRACE 1 2 3 4 5 (TYPE M WWWWW	
	PNO: Fast Trig: Fre	e Run Avg Hol	d:>100/100	DET P NNNN	
	IFGain:Low Atten: 2	.0 00			
Ref Offset 0.5 dB			Mkr1	2.440 97 GHz	
10 dB/div Ref 10.00 dBm				0.718 dBm	
		1			
		🔶 ' 🔰 👘			Next Pk Righ
0.00		and the second s			Heat I king
10.0					
-10.0					
					Next Pk Le
20.0					
and the second s					
-30.0					
					Marker Delt
-40.0					
50.0					
					Mkr→C
60.0					
					Min Defi
70.0					Mkr→RefL
80.0					
					Mor
					1 of
Center 2.441000 GHz				Span 10.00 MHz	
#Res BW 3.0 MHz	#VBW 3.0 MHz	2	Sweep 1.0	00 ms (1001 pts)	
ISG			STATUS		
			314103		

8DPSK Middle Channel

8DPSK High Channel





12. HOPPING CHANNEL SEPARATION

12.1 Block Diagram Of Test Setup



12.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port

to the spectrum.

2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

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12.4 Test Result

Modulation	odulation Test Channel		Limit(MHz)	Result
GFSK	Low	1.002	0.621	PASS
GFSK	Middle	1.002	0.623	PASS
GFSK	High	1.000	0.617	PASS
Pi/4 DQPSK	Low	0.996	0.833	PASS
Pi/4 DQPSK	Middle	1.000	0.819	PASS
Pi/4 DQPSK	High	0.998	0.836	PASS
8DPSK	Low	1.000	0.814	PASS
8DPSK	Middle	1.000	0.815	PASS
8DPSK	High	0.998	0.812	PASS

Test plots GFSK Low Channel





	rum Analyzer - Swept SA								
L <mark>XI</mark> RL	RF 50 Ω AC Δ 1.002000000	AL 1-	SEN	ISE:INT		ALIGN AUTO e: Log-Pwr		M Jun 07, 2021	Peak Search
Marker 1.	Δ 1.002000001	PNO: Wide 🗔	Trig: Free		Avg Hold		TYP	PE M WWWWW	
		IFGain:Low	Atten: 20	dB					Next Peak
	Ref Offset 0.5 dB					ΔN	1kr1 1.0	02 MHz	NEXTFEAK
10 dB/div Log	Ref 10.00 dBm						-0	.388 dB	
209									
0.00						<u>1∆2</u>			Next Pk Right
	Xem	m			ļ (\sim	\sim		
-10.0	~~~		L.	ſ	\sim			\sim	Next Pk Left
-20.0			m	\sim					
-30.0									
									Marker Delta
-40.0									
-50.0									Mkr→CF
-60.0									
-70.0									Mkr→RefLvl
-80.0									
									More
	41500 GHz						Span 2	.000 MHz 1001 pts)	1 of 2
#Res BW 3	30 kHz	#VBW	100 kHz			Sweep 2	.133 ms (1001 pts)	
MSG						STATUS			

GFSK Middle Channel

GFSK High Channel







Pi/4 DQPSK Low Channel

Pi/4 DQPSK Middle Channel







Pi/4 DQPSK High Channel

8DPSK Low Channel





🎉 Agilent Spec	ctrum Analyzer - Swept SA					
LXI RL	RF 50 Ω AC		SENSE:INT	ALIGN AUTO	12:18:56 PM Jun 07, 2021	Peak Search
Marker 1	Δ 1.00000000	PNO: Wide IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET PNNNNN	
10 dB/div Log	Ref Offset 0.5 dB Ref 10.00 dBm			ΔN	kr1 1.000 MHz 0.046 dB	Next Peak
0.00	X2 ~~	\wedge				Next Pk Right
-10.0						Next Pk Left
-30.0						Marker Delta
-50.0						Mkr→CF
-70.0						Mkr→RefLvl
	441500 GHz				Span 2.000 MHz	More 1 of 2
#Res BW	30 kHz	#VBW	100 kHz		.133 ms (1001 pts)	
MSG				STATUS		

8DPSK Middle Channel

8DPSK High Channel





13. NUMBER OF HOPPING FREQUENCY

13.1 Block Diagram Of Test Setup



13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

13.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

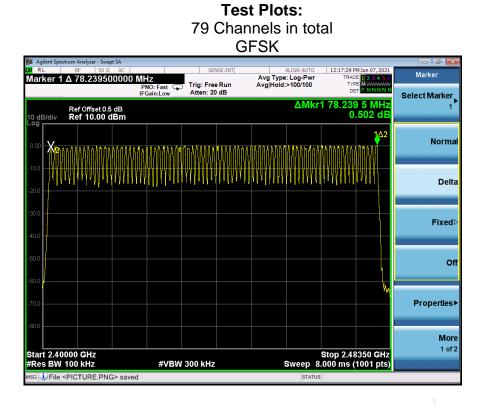
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;



13.4 Test Result

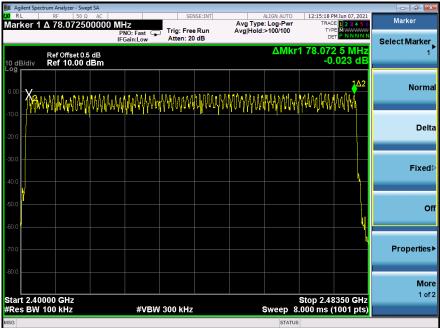


\sim		QPSK	Pi/4 [
						Analyzer - Swep		
Marker Select Marker	12:16:25 PM Jun 07, 2021 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	SENSE:INT Free Run n: 20 dB	ast 👝 Trig: F	AC OOOO MH PNO IFGO	F 50 Ω 78.07250		v _{RI} Mari
1	1 78.072 5 MHz 0.777 dB	ΔΜki				f Offset 0.5 ef 10.00 d		10 dE
Norma	102 Na 486 M. NA 1. NA	ንቆቤሽታ ዓስ ለ የሰ ዩ የ	ANALMANA	La God Alla Ha Al		n i a k i d d d	Xanna	Log 0.00
Delt	IAA AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	An	ans al Bhoradh	IN LUUR A MARA	IWYY I I'WYY	unanihu	-10.0
Fixed								-30.0
							Í	-40.0
0								60.0
Properties								70.0
Mo 1 of	Stop 2.48350 GHz					GH7	2.40000	
	.000 ms (1001 pts)	Sweep 8	Hz	#VBW 300 kH			BW 100	

STATUS







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14. DWELL TIME

14.1 Block Diagram Of Test Setup



14.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

14.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).



Test Result 14.4

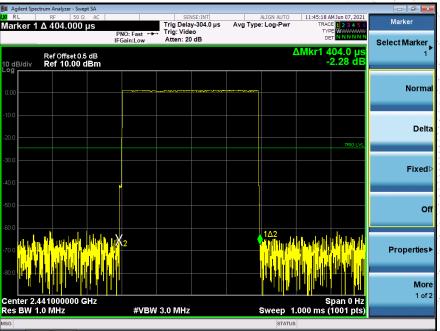
DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

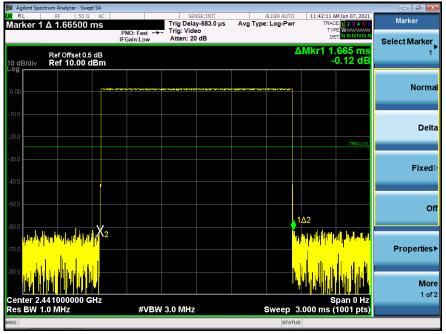
DH5:1600/79/6*0.4*79*(MkrDelta)/1000 DH3:1600/79/4*0.4*79*(MkrDelta)/1000 DH1:1600/79/2*0.4*79*(MkrDelta)/1000 Remark: Mkr Delta is once pulse time.

Modulation	Channel Data	Packet	pulse time(ms)	Dwell Time(s)	Limits(s)
		DH1	0.404	0.129	0.4
GFSK	Middle	DH3	1.665	0.266	0.4
		DH5	2.940	0.314	0.4
		2DH1	0.414	0.132	0.4
Pi/4DQPSK	Middle	2DH3	1.665	0.266	0.4
		2DH5	2.930	0.313	0.4
		3DH1	0.416	0.133	0.4
8DPSK	Middle	3DH3	1.665	0.266	0.4
		3DH5	2.930	0.313	0.4



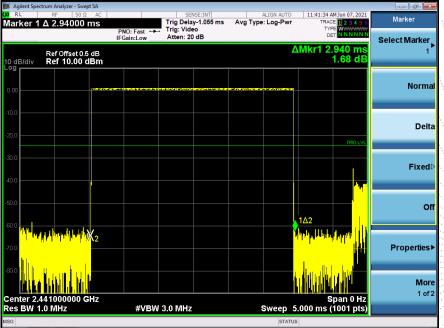
Test Plots GFSK DH1 Middle Channel



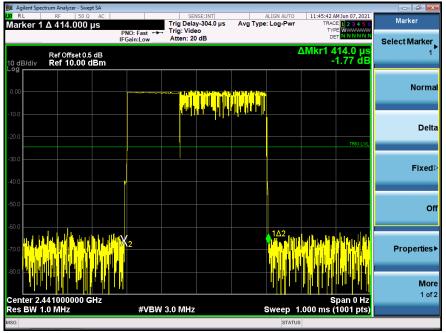


GFSK DH3 Middle Channel

GFSK DH5 High Middle Channel

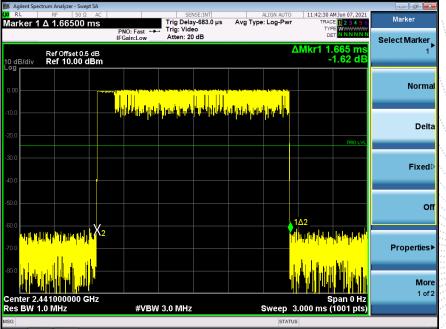




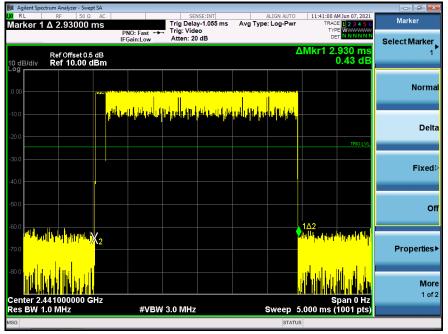


Pi/4DQPSK DH1 Middle Channel

Pi/4DQPSK DH3 Middle Channel

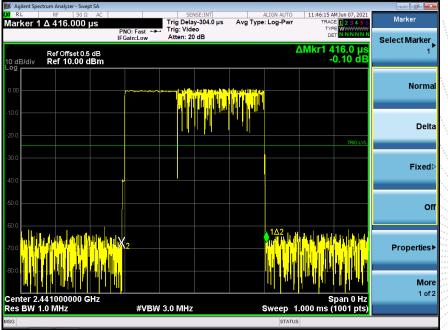




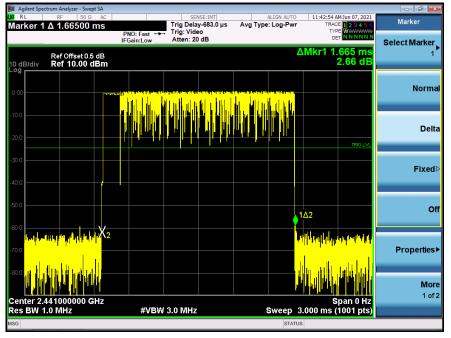


Pi/4DQPSK DH5 Middle Channel

8DPSK DH1 Middle Channel

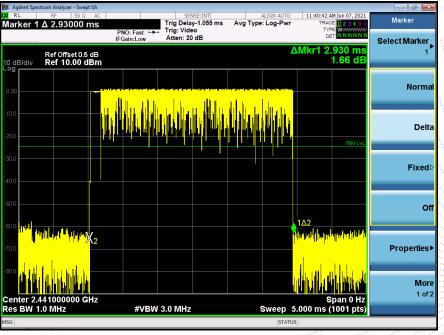






8DPSK DH3 Middle Channel

8DPSK DH5 Middle Channel





15. ANTENNA REQUIREMENT

15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall

be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.2 Test Result

The EUT antenna is PCB antenna, fulfill the requirement of this section.

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16. EUT PHOTOGRAPHS

EUT Photo 1







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17. EUT TEST SETUP PHOTOGRAPHS

Conducted emissions



Radiated Measurement Photos



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STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without stamp of laboratory.

4. The test report is invalid without signature of person(s) testing and authorizing.

5. The test process and test result is only related to the Unit Under Test.

6. The quality system of our laboratory is in accordance with ISO/IEC17025.

7.If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website : http://www.chnbctc.com

E-Mail : <u>bctc@bctc-lab.com.cn</u>

***** END ****

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