

ISSUED BY Shenzhen BALUN Technology Co., Ltd.



FOR

Libratone AIR Color

ISSUED TO Little Bird Co., Ltd

18F, Building D, No.7 Zhichun Road, Beijing, PRC



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Revision History

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Initial Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation	The laboratory is a testing organization accredited by FCC as a
Certificate	accredited testing laboratory. The designation number is CN1196.
	All measurement facilities used to collect the measurement data are
Description	located at Block B, FL 1, Baisha Science and Technology Park, Shahe
Description	Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	518055

1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

- (1) The test report reference to the report template version v5.7.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.



2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Little Bird Co., Ltd
Address	18F, Building D, No.7 Zhichun Road, Beijing, PRC

2.2 Manufacturer Information

Manufacturer	Little Bird Co., Ltd
Address	18F, Building D, No.7 Zhichun Road, Beijing, PRC

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Libratone AIR Color
Model Name Under Test	LTW306
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	R0
Software Version	v44
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A



2.5 Technical Information

	Network and Wireless connectivity	Bluetooth 5.2 (BR+EDR+BLE)
The req	uirement for the following t	echnical information of the EUT was tested in this report:
	Modulation Technology	FHSS
	Modulation Type	GFSK, π/4-DQPSK, 8-DPSK
	Product Type	⊠ Portable
		Fix Location
		DH5: 1 Mbps
	Transfer Rate	2DH5: 2 Mbps
		3DH5: 3 Mbps
	Frequency Range	The frequency range used is 2400 MHz to 2483.5 MHz.
	Number of Channel	79 (at intervals of 1 MHz)
	Tested Channel	0 (2402 MHz), 39 (2441 MHz), 78 (2480 MHz)
	Antenna Type	FPC Antenna
	Antonno Opin	2 dBi (In test items related to antenna gain, the final results reflect
	Antenna Gain	this figure. This value is provided by the applicant.)
	Antenna Impedance	50Ω
	Antenna System	
	(MIMO Smart Antenna)	N/A

All channel was listed on the following table:

Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.
number	(MHz)	number	(MHz)	number	(MHz)	number	(MHz)
0	2402	21	2423	42	2444	63	2465
1	2403	22	2424	43	2445	64	2466
2	2404	23	2425	44	2446	65	2467
3	2405	24	2426	45	2447	66	2468
4	2406	25	2427	46	2448	67	2469
5	2407	26	2428	47	2449	68	2470
6	2408	27	2429	48	2450	69	2471
7	2409	28	2430	49	2451	70	2472
8	2410	29	2431	50	2452	71	2473
9	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458	77	2479
15	2417	36	2438	57	2459	78	2480
16	2418	37	2439	58	2460	-	-
17	2419	38	2440	59	2461	-	-
18	2420	39	2441	60	2462	-	-
19	2421	40	2442	61	2463	-	-
20	2422	41	2443	62	2464	-	-



2.6 Additional Instructions

EUT Software Settings:

	Special software is used.
Mode	The software provided by client to enable the EUT under
WOUE	transmission condition continuously at specific channel frequencies
	individually.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power level setup in software				
Test Software Version	BlueTest 3			
Support Units	Description	Manufacturer	Model	
(Software installation media)	Notebook	Lenovo	X220	
Mode	Channel	Frequency (MHz)	Soft Set	
	CH0	2402		
DH5	CH39	2441		
	CH78	2480		
	CH0	2402	Dowor parameter Settings	
2DH5	CH39	2441	Power parameter Settings is 5	
	CH78	2480	15 0	
	CH0	2402		
3DH5	CH39	2441		
	CH78	2480		

Run Software:

🗹 BlueTest3 - Test Command Mode 🦳 🗌 🗙

Test Commands	Test Argu				
CW TX	Packet Ty	npe ∣DH5	-	A	
CONTINUOUS TX				Close	1
PACKET TX	Power (0-	-9) 5			
PACKET RX	-			Help	
OHS	BT Addres	s 00025B0	OFF01		
RF TEST STOP		- p			
	Hop Chann	els Specifi	ad E	Execut	e
POWER TABLE GET	nop chiad	jopeorri	rea o 📑		_
POWER TABLE SET	D 1 4 1	neth 339		Dent	
	Packet 1 (hytor)	ingth 339		Reset	
ENABLE DUT MODE		(
ENADLE DOI MODE	LT Addres	s (0-7) 1			
value).					~
Channel frequency	= 2402MHz				
CONTINUOUS TX suc					
Channel frequency	= 2402MHz				
CONTINUOUS TX suc					
RF TEST STOP succ	essful				
Channel frequency	= 2441MHz				
ACKET TX success					
ACKET TX success	ful				
Channel frequency	= 2402MHz				
ACKET TX success					
RF TEST STOP succ	essful				
Channel frequency					
	= 2441MHz				
ACKET TX success					



3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Miscellaneous Wireless Communications Services
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

3.2 Verdict

No.	Description	FCC Part No.	Channel	Test Result	Verdict	Remark
1	Antenna Requirement	15.203	N/A		Pass	Note ¹
2	Number of Hopping Frequencies	15.247(a)	Hopping Mode	ANNEX A.1	Pass	Note ²
3	Peak Output Power and E.I.R.P	15.247(b)	Low/Middle/High	ANNEX A.2	Pass	
4	Occupied Bandwidth	15.247(a)	Low/Middle/High	ANNEX A.3	Pass	Note ²
5	Carrier Frequency Separation	15.247(a)	Hopping Mode	ANNEX A.4	Pass	Note ²
6	Time of Occupancy (Dwell time)	15.247(a)	Hopping Mode	ANNEX A.5	Pass	Note ²
7	Conducted Spurious Emission & Authorized- band band-edge	15.247(d)	Low/Middle/High	ANNEX A.6	Pass	Note ²
8	Conducted Emission	15.207	Low/Middle/High	ANNEX A.7	Pass	Note ²
9	Radiated Spurious Emission	15.209 15.247(d)	Hopping Mode, Low/Middle/High	ANNEX A.8	Pass	Note ²
10	Band Edge(Restricted- band band-edge)	15.209 15.247(d)	Hopping Mode, Low/Middle/High	ANNEX A.9	Pass	Note ²
11	Receiver Spurious Emissions				N/A	N/A
Note	¹ : Please refer to section 5.1					

Note ²: $\pi/4$ -DQPSK is the EDR 2M rate mode, 8-DPSK is the EDR 3M rate mode. The consistency of test results in $\pi/4$ -DQPSK and 8-DPSK is very high. So we chose 8-DPSK as a typical representative to appear on the report. Another we will show all the modes on the RF output power test item.



4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	DC 3.7V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2021.04.01	2022.03.31
Bluetooth Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2021.06.01	2022.05.31
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.06.01	2022.05.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.06.01	2022.05.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.01	2022.05.31
Test Antenna- Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna- Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Test Antenna- Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01
Test Antenna- Horn (18-40 GHz)	A-INFO	LB- 180400KF	J211060273	2021.07.02	2023.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2022.02.20
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60 *7.35m	N/A	2019.08.08	2022.08.07
Shielded Enclosure	ChangNing	CN-130701	130703		

4.3 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.82°C
Humidity	4.1%

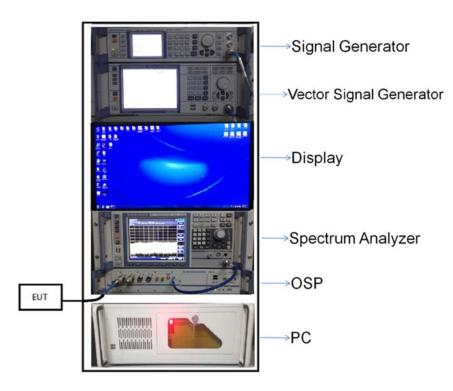


4.4 Description of Test Setup

4.4.1 For Antenna Port Test

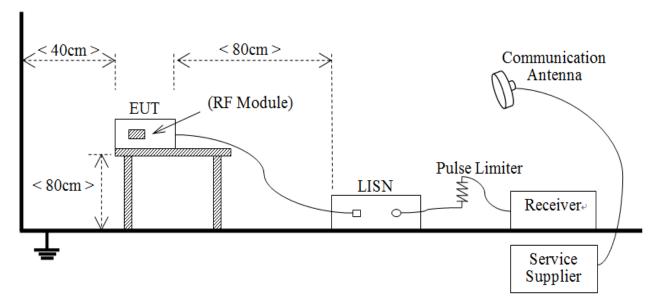
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT: Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm



(Diagram 1)

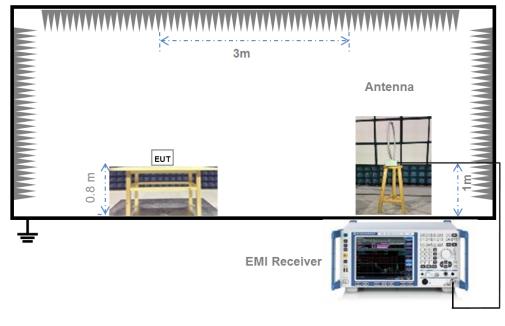




(Diagram 2)

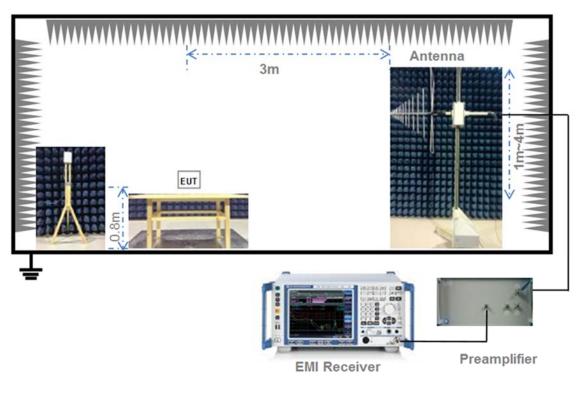


4.4.3 For Radiated Test (Below 30 MHz)



(Diagram 3)

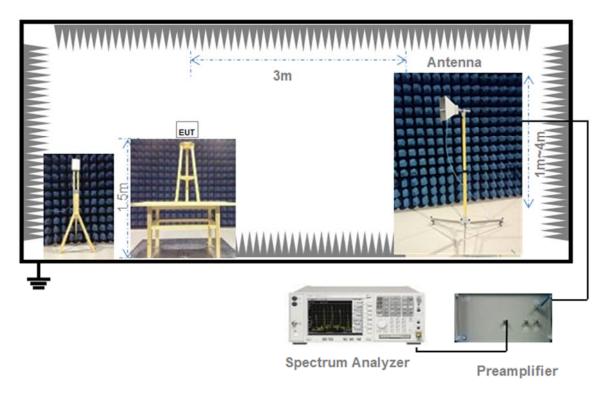
4.4.4 For Radiated Test (30 MHz-1 GHz)







4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)



4.5 Measurement Results Explanation Example

4.5.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.





5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b); RSS-247, 5.4 (f)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the	An embedded-in antenna design is used.
product.	

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



5.2 Frequency Hopping Systems

5.2.1 Relevant Standards

FCC §15.247(a) (1) (i) (ii) (iii) (iv); FCC §15.247(g); FCC §15.247(h)

Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, to demonstrate that the sequence meets the requirement specified in the definition of an FHSS system. Per the definition in Section 2.1(c), the hop set shall appear as random in the near term, shall appear as evenly distributed in the long term, and sequential hops shall be randomly distributed in both direction and magnitude of change.

Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g., that each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event).

Describe how the associated receiver(s) complies with the requirement that the input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.

Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals.

For short burst systems, describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system. Specifically, the device shall comply with the equal frequency use and pseudorandom hopping sequence requirement when transmitting in short bursts, and shall be designed to comply when presented with continuous data (or information) stream.

Describe how the EUT complies with the requirement that it not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

5.2.2 Description of the systems

- According to the preset procedure of the whole network, all the stations in the automatic control network synchronously change the frequency multiple times within one second, and temporarily stay on each frequency hopping channel. Periodic synchronization signaling is sent from the primary station, instructing all slaves to simultaneously change the operating frequency, then the hopping sequence is generated.
- 2. The hop set shall appear as random in the near term, shall appear as evenly distributed in the long term, and sequential hops shall be randomly distributed in both direction and magnitude of change.





- 3. Channels are classified into two categories, used and unused, where used channels are part of the hopping sequence and unused channels are replaced in the hopping sequence by used channels in a pseudo-random way. Make each individual EUT meets the requirement that each of its hopping channels is used equally on average.
- 4. The input bandwith and transmitted bandwith are both 1MHz, the associated receiver(s) complies with the requirement that the input bandwidth matches the bandwidth of the transmitted signal.
- 5. Connected devices communicate on the same physical channel by synchronizing with a common clock and hopping sequence.
- 6. EUT isn't short burst systems.
- 7. EUT can't have the ability to be coordinated with other FHSS systems in an effort.



5.3 Number of Hopping Frequencies

5.3.1 Limit

FCC §15.247(a) (1) (iii); RSS-247, 5.1 (d)

Frequency hopping systems operating in the 2400 MHz to 2483.5 MHz bands shall use at least 15 hopping frequencies.

5.3.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = The frequency band of operation RBW = To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize 5.3.4 Test Result

Please refer to ANNEX A.1.



5.4 Peak Output Power and E.I.R.P

5.4.1 Test Limit

FCC § 15.247(b)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247, 5.4 (b)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels (see Section 5.4(5) for exceptions).

5.4.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

The Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

 $\mathsf{VBW} \geq \mathsf{RBW}$

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize.

5.4.4 Test Result

Please refer to ANNEX A.2.



5.5 Occupied Bandwidth

5.5.1 Limit

FCC §15.247(a); RSS-247, 5.1 (a)

Measurement of the 20dB bandwidth of the modulated signal.

5.5.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = in the range of 1% to 5% of the OBW

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

5.5.4 Test Result

Please refer to ANNEX A.3.



5.6 Carrier Frequency Separation

5.6.1 Limit

FCC §15.247(a); RSS-247, 5.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 2/3 of the 20 dB bandwidth of the hopping channel, whichever is greater.

5.6.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

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

Resolution (or IF) Bandwidth (RBW) \geq 1% of the span

Video (or Average) Bandwidth (VBW) \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

5.6.4 Test Result

Please refer to ANNEX A.4.



5.7 Time of Occupancy (Dwell time)

5.7.1 Limit

FCC §15.247(a); RSS-247, 5.1 (d)

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

5.7.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

Span: Zero span, centered on a hopping channel

RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel

Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel

Detector function: Peak

Trace: Max hold

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

The average time of occupancy on any channel within the Period can be calculated with formulas: For GFSK and 8-DPSK:

For DH1 package type
{Total of Dwell} = {Pulse Time} * (1600 / 2) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH3 package type
{Total of Dwell} = {Pulse Time} * (1600 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH5 package type
{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For AFH Mode:
For DH1 package type
{Total of Dwell} = {Pulse Time} * (800 / 2) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH3 package type
{Total of Dwell} = {Pulse Time} * (800 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH5 package type
{Total of Dwell} = {Pulse Time} * (800 / 6) / {Number of Hopping Frequency} * {Period}
22 / 81



{Period} = 0.4 s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

5.7.4 Test Result

Please refer to ANNEX A.5.



5.8 Conducted Spurious Emission & Authorized-band band-edge

5.8.1 Limit

FCC §15.247(d); RSS-247, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.8.2 Test Setup

See section 4.4.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3 Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz VBW = 300 kHz Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize

5.8.4 Test Result

Please refer to ANNEX A.6.



5.9 Conducted Emission

5.9.1 Limit

FCC §15.207; RSS-GEN, 8.8

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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μ H/50 Ω line impedance stabilization network (LISN).

Frequency range	Conducted Limit (dBµV)					
(MHz)	Quai-peak	Average				
0.15 - 0.50	66 to 56	56 to 46				
0.50 - 5	56	46				
0.50 - 30	60	50				

5.9.2 Test Setup

See section 4.4.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.9.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.9.4 Test Result

Please refer to ANNEX A.7.



5.10 Radiated Spurious Emission

5.10.1 Limit

FCC §15.209&15.247(d); RSS-247, 5.5

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)		
0.009 - 0.490	2400/F(kHz)	300		
0.490 - 1.705	24000/F(kHz)	30		
1.705 - 30.0	30	30		
30 - 88	100	3		
88 - 216	150	3		
216 - 960	200	3		
Above 960	500	3		

Note:

1. Field Strength (dB μ V/m) = 20*log[Field Strength (μ V/m)].

- 2. In the emission tables above, the tighter limit applies at the band edges.
- 3. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
- 4. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.10.2 Test Setup

See section 4.4.3 to 4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.10.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1 GHz VBW \ge RBW



Sweep = auto Detector function = peak Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

5.10.4 Test Result

Please refer to ANNEX A.8.



5.11 Band Edge (Restricted-band band-edge)

5.11.1 Limit

FCC §15.209&15.247(d)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.11.2 Test Setup

See section 4.4.3 to 4.4.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.11.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1 GHz VBW \ge RBW Sweep = auto Detector function = peak Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

5.11.4 Test Result

Please refer to ANNEX A.9.



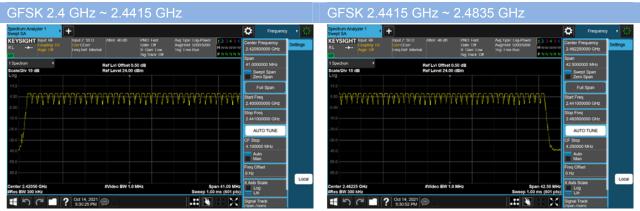
ANNEX A TEST RESULT

A.1 Number of Hopping Frequency

Test Data

Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	Pass
8-DPSK	2400 - 2483.5	79	15	Pass

Test plots



um Analyzer 1 🔹 🛨					Frequency	Spectrum Analyzer 1 Swept SA	• 🛨				Frequency	
Coupling DG Go	ut Z: 50 D Atten: 40 dB I OCerr g Ref: Internal	Gate Off AugH	ne Run M .	3456 ////////////////////////////////////	2.420500000 GHz	RL +- Augur C		Atten: 40 dB PNO F Gate: 0 IF Gain Sig Tra	# Avg/Hold 5000/5000 Low Ting Free Run	123456 Mww.www PNNNNN	Center Frequency 2.462250000 GHz	Setting
trum v Div 10 dB	Ref Lvi Offset (Ref Level 24.0				Span 41.0000000 MHz Swept Span Zero Span	1 Spectrum Scale/Div 10 dB Log		Ref Lvi Offset 0.50 dB Ref Level 24.00 dBm			Span 42.5000000 MHz Swept Span Zero Span	
				_	Full Span	14.0					Full Span	
hand		meren and a second		~~~	Start Freq 2.400000000 GHz	4.00	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	****	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~	Start Freq 2.441000000 GHz	
					Stop Freq 2.441000000 GHz	-16 0					Stop Freq 2.483500000 GHz	
}				_	AUTO TUNE	.76.0					AUTO TUNE	
· · · · · · · · · · · · · · · · · · ·					CF Step 4.100000 MHz	-36.0					CF Step 4.250000 MHz	
					Auto Man	45.0					Auto Man	
					Freq Offset 0 Hz	-05.0					Freq Offset 0 Hz	
2.42050 GHz W 300 kHz	#Video BW 1.	0 MHz	Span 41 Sweep 1.00 ms	1.00 MHz	X Axis Scale	Local Center 2.46225 GHz #Res BW 300 kHz		#Video BW 1.0 MHz	Spi Sweep 1.00	in 42.50 MHz	X Axis Scale Log	•





A.2 Peak Output Power and E.I.R.P

Peak Power Test Data

	Measured Out	out Peak Power	l			
Channel	GF	SK	dBm	mW	Verdict	
	dBm	dBm mW dBm		TIIVV		
Low	6.83	4.82			Pass	
Middle	6.83	4.82	21	125	Pass	
High	6.68	4.66			Pass	

		Measured Outp	•	L			
Channel	π/4-DQPSK		8-D	PSK	dBm	mW	Verdict
	dBm	mW	dBm	mW	UDIII	IIIVV	
Low	4.77	3.00	5.43	3.49			Pass
Middle	4.72	2.96	5.43	3.49	21	125	Pass
High	4.43	2.77	5.13	3.26			Pass



Test plots

CHECK LOW CHANNEL

Spectrum Analyzer 1	+					¢	Marker	1
RL +++ Augn Of	Input 2: 50 0 Corr CCorr Freq Ref: Internal	#Atten: 30 dB	PNO: Fast Gate: Off IF-Gain' Low Sig Track: Off	Avg Type: Log-F Avg(Hold: 1/1 Ting: Free Run		Select Mar Marker 1		
1 Spectrum 🔹				Mkr1	2.440 85 GHz	Marker Fr 2.440850		Settings
Scale/Div 10 dB		Ref Level 15.00	dBm		6.83 dBm	Peak	Search	Peak Search
5.00		•				Nex	d Peak	Pk Search Config
5.00						Next	Pk Right	Properties
						Next	PkLet	Marker Function
						Minim	um Peak	Function
						Pk-Pi	k Search	Counter
						Mark	er Delta	Counter
						Mk	r→CF	
						Miz-	-Ref Lvi	
Center 2.441000 GHz Res BW 3.0 MHz		#Video BW 8.0	MHz		Span 6.000 MHz wep 1.00 s (601 pts)	Continuou Search On	is Peak	Loca

GFSK HIGH CHANNEL



π/4-DQPSK LOW CHANNEL

Coupling, DC Align, Of	Con OCon Frug Ref. Internal		PNO. Fest Galo, Off IF Gain, Low Sig Track, Off	Awg Type, Log-Power Awg[Hold, 1/1 Trig, Free Run	123456 MWWWWW PNNNNN		
Spectrum v		Level 15.00 d			01 96 GHz 4.77 dBm	Marker Frequency 2.401960000 GHz	Settings
20 10 10 de	Kert	Level 15.00 0	e m		4.77 dBm	Peak Search	Peak Search
						Next Peak	Pk Searc Config
00						Next Pk Right	Propertie
						Next Pk Left	Marker Function
						Minimum Peak	Marker
						Pk-Pk Search	Counter
						Marker Delta	
						MirCF	
						Mkr→Ref Lvi	_
enter 2.402000 GHz tes BW 3.0 MHz	evic	ieo BW 8.0 N	#Hz	Sp #Sweep 1.	an 6.000 MHz 00 s (601 pts)	Continuous Peak Search On Off	Loca

π /4-DQPSK MIDDLE CHANNEL

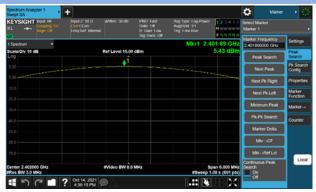
WEPT SA CEYSIGHT Input HF	Input Z: 50 0	4Atten: 30 dB	PNO: Fast	Avg Type: Log-Power	123456	Select Marker	10
LL Coupling DC Align Light	Corr CCorr Freq Ref: Internal		Gate: Off IF Gain: Low Sig Track: Off	Avg(Hold >1/1 Trig: Free Run	MWWWWW	Marker 1	
Spectrum +			sig max or	Mkr1 2.4	41 05 GHz	Marker Frequency 2:441050000 GHz	Settings
cale/Div 10 dB		Ref Level 15.00	dBm		4.72 dBm	Peak Search	Peak Search
		•				Next Peak	Pk Search Config
00						Next Pk Right	Properties
						Next Pk Left	Marker Function
						Minimum Peak	Marker-+
						Pk-Pk Search	Counter
						Marker Delta	
						Mkr→CF	
						MizRef Lvi	
nter 2.441000 GHz tes BW 3.0 MHz		#Video BW 8.0	MHz	Sp #Sweep 1	an 6.000 MHz 00 s (601 pts)	Continuous Peak Search On	Local
	Oct 14, 2021	€∆			- X	or	



π/4-DQPSK HIGH CHANNEL



8-DPSK LOW CHANNEL



8-DPSK MIDDLE CHANNEL

RL Augy Of	Input Z: 50 0 Corr CCorr Freq Ref: Internal	4Atten: 30 dB	PNO: Fast Gale: Off IF Gain: Low Sig Track: Off	Avg Type Log-Power Avg(Hold 1/1 Ing Free Run	123456 MWWWWW PNNNNN	Select Marker Marker 1	
l Spectrum 🔹				Mkr1 2.4	40 89 GHz	Marker Frequency 2.440890000 GHz	Settings
cale/Div 10 dB		Ref Level 15.00	dBm		5.43 dBm	Peak Search	Peak Search
		•'				Next Peak	Pk Search Config
5.00						Next Pk Right	Properties
						Next Pk Left	Marker Function
						Minimum Peak	Marker-+
						Pk-Pk Search	Counter
						Marker Delta	
						Mkr-+CF	1
						MizRef Lvi	1 —
enter 2.441000 GHz Res BW 3.0 MHz		#Video BW 8.0	MHz	Sj #Sweep 1	pen 6.000 MHz .00 s (601 pts)	On	Local
¶ ≌ ? I ?	Oct 14, 2021	€∆		.11 📎	- X	or	

8-DPSK HIGH CHANNEL

Spectrum Analyzer 1	+					🗘 Marker	• #
RL Coupling DC Augur Off	Input Z: 50 0 Carr CCorr Freq Ref: Internal	#Atten: 30 dt5	PNO: Fest Gale: Off IF-Gain: Low Sig Track: Off	Avg Type Log-Power Avg[Hold: 1/1 Ing: Free Run	123456 MWWWWWW PNNNNN	Select Marker Marker 1	
1 Spectrum +				Mkr1 2.4	79 91 GHz	Marker Frequency 2.479910000 GHz	Settings
Scale/Div 10 dB	'	Ref Level 15.00	dBm		5.13 dBm	Peak Search	Peak Search
5.00		•				Next Peak	Pk Search Config
5.00						Next Pk Right	Properties
						Next Pk Left	Marker Function
						Minimum Peak	Marker-+
						Pk-Pk Search	Counter
						Marker Delta	
						Mkr⊸CF	
						Miz-→Ref Lvi	Local
Center 2.480000 GHz #Res BW 3.0 MHz		FVideo BW 8.01	MHz		an 6.000 MHz 00 s (601 pts)	Continuous Peak Search On	
- - - - - - - - - - - - - -	Oct 14, 2021 4:44:26 PM	€A			X	- or	



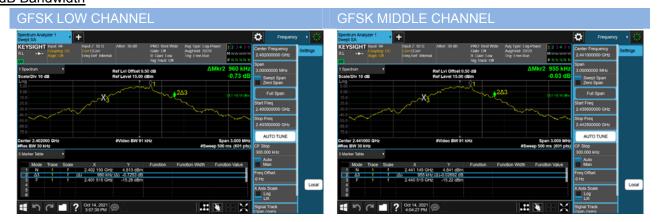
A.3 20 dB and 99% bandwidth

<u>Test Data</u>

	GFSK						
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)					
Low	0.960205	0.876347					
Middle	0.955078	0.875074					
High	0.955078	0.872745					
π/4-DQPSK							
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)					
Low	1.340088	1.188718					
Middle	1.340088	1.188309					
High	1.340088	1.188854					
	8-DPSK						
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)					
Low	1.310059	1.184736					
Middle	1.310059	1.187992					
High	1.304932	1.183710					

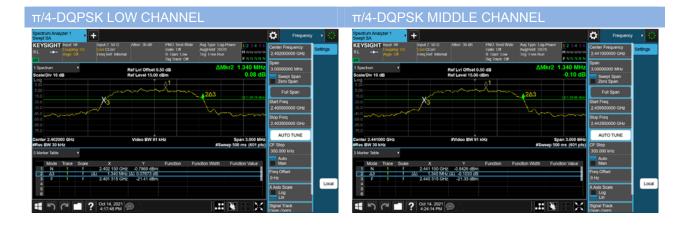


Test plots 20 dB Bandwidth



GFSK HIGH CHANNEL

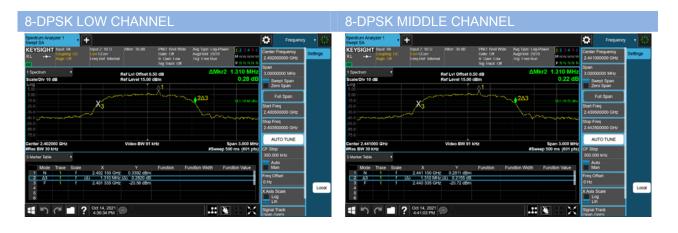






π/4-DQPSK HIGH CHANNEL





8-DPSK HIGH CHANNEL





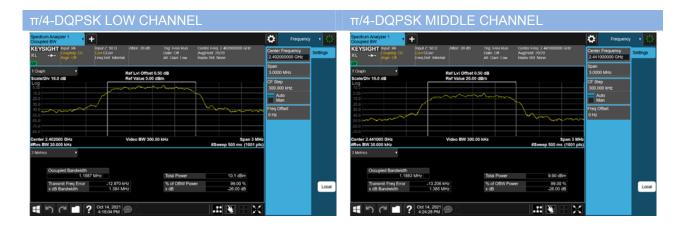
99% Bandwidth





GFSK HIGH CHANNEL







π/4-DQPSK HIGH CHANNEL



8-DPSK LOW CHANNEL



8-DPSK MIDDLE CHANNEL



8-DPSK HIGH CHANNEL





A.4 Hopping Frequency Separation

<u>Test Data</u>

Mode	Frequency separation (MHz)	2/3 of the 20 dB Bandwidth (MHz)	Verdict
GFSK	0.970	0.640137	Pass
8-DPSK	1.050	0.873373	Pass

Test Plots

Spectrum Analyzer 1	+		🔯 Marker 🔹 🔆	Spectrum Analyzer 1			C Marker
RL Algor Off	Input Z: 50 0 4Atten: 30 dt5 PNO: Best V Ganr Coor Freq Ref: Internal IF Gain: Low Sag Track O Sag Track O	AugiHold > 1/1 M WWWWWW Ing: Free Run M WWWWWW	Marker 1 •	KEYSIGHT Input Ho RL Cooping DC Con CC Augus Cit Feng Re	ser Gale Of	Ng Type Log-Power 123456 Ng Hold >1/1 Ing: Free Run P. N.N.N.N.N	
1 Spectrum + Scale/Div 10 dB	Ref Level 15.00 dBm	ΔMkr1 970 kH 0,64 dl	01010001010	1 Spectrum	Ref Level 15.00 dBm	ΔMkr1 1.050 MHz -0.89 dB	Marker & Frequency 1.050000 MHz Pe
Log 5.00	-X ₂ 142		Marker Mode Peak Search Normal Pk Search	Log			Marker Mode S
5.00			Delta (Δ)	5.00			Delta (Δ)
			Fixed Marker	-35 0			Fixed M
-55.0 -85.0			Of Function	-55.0 -65.0			eor E
75.0 Denter 2.441000 GHz	#Video BW 300 kHz	Span 3.000 MH		-75.0 Center 2.441000 GHz	#Video BW 300 kHz	Span 3.000 MHz	Delta Marker (Reset Delta)
Res BW 100 kHz 5 Marker Table V		Sweep 1.00 ms (601 pt	Marker Table On Of	#Res BW 100 kHz 5 Marker Table *		Sweep 1.00 ms (601 pts)	Marker Table Co
Mode Trace Scale	X Y Function (Δ) 970 kHz (Δ) 0.6405 dB	Function Width Function Value	Marker Settings Diagram	Mode Trace Scale X	Y Function Func 050 MHz (Δ) -0.8922 dB	tion Width Function Value	Marker Settings Diagram
2 F 1 1	2.440 180 GHz 6.216 dBm		Al Markers Of		985 GHz 0.8467 dBm		Al Markers Of
6			Couple Markers	3			Couple Markers





A.5 Average Time of Occupancy

<u>Test Data</u>

GFSK							
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict			
DH 1	0.380	121.600	0.4	Pass			
DH 3	1.635	261.600	0.4	Pass			
DH 5	2.889	308.160	0.4	Pass			
	8-DPSK						
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict			
DH 1	0.383	122.560	0.4	Pass			
DH 3	1.635	261.600	0.4	Pass			
DH 5	2.878	306.987	0.4	Pass			
		AFH Mode					
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict			
DH 1	0.380	60.800	0.4	Pass			
DH 3	1.633	130.640	0.4	Pass			
DH 5	2.882	153.707	0.4	Pass			

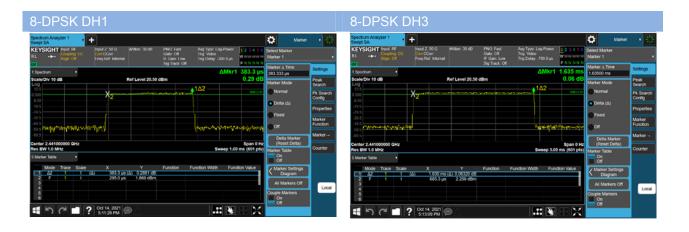


Test Plots

GFSK DH1	GFSK DH3
Construit Analyzer 1 Product 20 Mater 2 Mater 1	Spectrum Analyzer 1 Banget CA KEYSGIGHT Insut RF RL ++- Tangeton Bang ban sternal data to dis state of the sternal data to dis state of t
1 Spectrum	1 Spectrum
Center 2.4100000 0Hz Fear W1 Diale Steves 1.00 ms (611 ph) Mode Trace Scale X Y Function Function Water Table Conter Table	Conter 2 4100000 01th Pre BY 04 bits Statue Table

GFSK DH5







8-DPSK DH5

Spectrum Analyzer 1 Swept SA	• +					🗘 Marker	·
KEYSIGHT hout H		#Atten: 30 dts	FINO: Fast Gale: Off IF Gain: Low Sig Track: Off	Aug Type: Log-Power Tng: Video Tng Delwy: #50.0 µs	123456 WWWWWWW PNNNNN		
1 Spectrum + Scale/Div 10 dB		Ref Level 20.50		ΔMkr1	2.878 ms 2.08 dB		Settings Peak
Log 10.5 0.500	X					Marker Mode Normal	Search Pk Search
-9.50 -19.5 -79.5						Dolta (Δ) Fixed	Config Properties
maquaderium	4.M			64-94	airsonathe	or	Marker Function
-00.5 Center 2.441000000 GH Res BW 1.0 MHz	łz			Serveo 4.52	Span 0 Hz ms (601 pts)	Delta Marker (Reset Delta) Marker Table	Marker+ Counter
5 Marker Table •						On Of	
Mode Trace 5 1 <u>A2</u> 1 2 F 1 3	Scale X t (Δ) 2,878 me t 864.9 μt	Υ (Δ) 2.082.68 2.196.dBm	Function P	unction Width Func	tion Value	Marker Settings Diagram All Markers Off	
4 5 6						Couple Markers On Of	Local
100	Oct 14, 2021 5:18:12 PM	\mathbb{P}			\mathbf{x}		

AFH Mode DH1

KEYSIGHT	Coupling Align: D	DC	Input Z: 50 0 Corr CCorr Freq Ref: Inter	WAlton: 30 dts	PNO: Fast Gate: Off IF Gate: Low Sig Track: Off	Avg Type Lo Trig: Video Trig Delay -3		123456 WWWWWWW PNNNNN	Select Mari Marker 1		*
Spectrum Icale/Div 10 c	8			Ref Level 20.50	dBm		∆Mkr1	380.0 μs 1.01 dB	Marker & T 380.000 µ Marker Mo	6	Settings Peak
Log 10.5 0.500 .9.50			X ₂			1∆2		PRO IN	Normal		Search Pk Search Config
-19.5 -29.5 -39.5 -49.5			ſ						Fixed	ы)	Properties Marker Function
-50.5 NYSpar			mpaul			Anothery	(Alforano			Marker	Marker-+
Center 2,4410 Res BW 1.0 M 5 Marker Table		tz.				Se	eep 1.00	Span 0 Hz ms (601 pts)	(Rese Marker Tat On Of	t Delta) Sle	Counter
Mode	Trace	Scale	χ (Δ) 380.0 293.3	Υ μs (Δ) 1011 dB μs 5.516 dBm	Function	Function Width	Fund	tion Value	/ Marker	Settings gram	
3466			200.0						Couple Ma	rkers Off Irkers	Local
	-		Oct 14, 2021 5:21:57 PM) (mgar)	X	or		í .

pectrum Analyzei wept SA							🗘 Amplit	ude 🔹 👬
C	uping DC gri Off	Input Z: 50 0 Corr CCorr Freq Ref: Internal	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log-Power Ing: Video Ing Delay: -1 200 ms		Ref Level 20.50 dBm	Y Scale
Spectrum	•			sej mick on	ΔMkr	1 1.633 ms	Scale/Div 10 dB	Attenuatio
cale/Div 10 dB		X ₂	Ref Level 20.50	dBm	•162	-0.42 dB	Display Scale Log Lin	Signal Pat
8.50 19.5 29.5		_					Y Axis Unit dBm	
10.5 40.5 50.5 50.5	he for a survey and	- Brue			-	-norteninga	Ref Level Offset 0.00 dB On Off	
Inter 2.4410000 Is BW 1.0 MHz	00 GHz				Sweep 4.1	Span 0 Hz 00 ms (601 pts)	Number of Division	
Marker Table Mode Tra 2 F 3 4 5 6		X 5) 1.633 ms (1.180 ms	Υ Δ) -0.4196 σB 6.037 dBm	Function P	unction Width Fu	nction Value		Local

AFH Mode DH5

EYSIGHT Input HF Couping DC Augu Off	Input Z: 50 0 4Ats Corr CCorr Freq Ref: Internal	en: 30 dB PNO: Fest Gale: 0t IF Gan: Low Sig Tinck: 0t	Avg Type Log-Power 12 3 Ing: Video Ing Delay -2 000 ms W W/W P N N	Marker 1	_
Spectrum • cale/Div 10 dB	Ref L	evel 20.50 dBm	∆Mkr1 2.882 -0.4	4 dB	Settings
og 10 5 500 9.50 19 5 79 5 30 5	X2		142	Marker Mode Normal Dotta (Δ) Fixed	Search Pk Search Config Propertie Marker
40 5 50 5 50 5 50 5 enter 2.441000000 GHz	approved			n 0 Hz (Reset Delta)	Function Marker
es BW 1.0 MHz Marker Table • Mode Trace Scale 1 02 1 1 3 1 1 4 5 6	X (Δ) 2.852 ms (Δ) - 1.962 ms (Sweep 7.00 ms (60	On	Counter



A.6 Conducted Spurious Emissions & Authorized-band band-edge

Test Data

	GFSK							
	Measured Max. Out of	Limit (
Channel	Band Emission (dBm)	Carrier Level	Calculated 20 dBc Limit	Verdict				
Low	-45.15	6.63	-13.37	Pass				
Middle	-51.18	6.68	-13.32	Pass				
High	-51.18	6.22	-13.78	Pass				
		π/4-DQPSK						
	Measured Max. Out of	Limit (
Channel	Band Emission (dBm)	Carrier Level	Calculated	Verdict				
			20 dBc Limit					
Low	-49.71	2.03	-17.97	Pass				
Middle	-52.86	1.99	-18.01	Pass				
High	-50.81	1.73	-18.27	Pass				
		8-DPSK						
	Measured Max. Out of	Limit (
Channel	Band Emission (dBm)	Carrier Level	Calculated	Verdict				
		Carrier Lever	20 dBc Limit					
Low	-49.06	2.13	-17.87	Pass				
Middle	-52.98	2.15	-17.85	Pass				
High	-52.18	1.08	-18.92	Pass				

Hopping Mode							
	Measured Max. Out of	Limit (
Mode	Band Emission (dBm)			Verdict			
			20 dBc Limit				
GFSK	-47.09	6.96	-13.04	Pass			
π/4-	E1 E0	1 0 /	-18.16	Deee			
DQPSK	-51.59	1.84	-10.10	Pass			
8-DPSK	-51.74	2.10	-17.90	Pass			



Ö

Test Plots



 KETSIGHT pod 40 NL
 and 1 / 2 0 member 20 membe

GFSK LOW CHANNEL, BAND EDGE





GFSK LOW CHANNEL, SPURIOUS 3 GHz ~ 25



GESK MIDDLE CHANNEL, CARRIER LEVEL

GFSK MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



GFSK MIDDLE CHANNEL, SPURIOUS 3 GHz ~





GFSK HIGH CHANNEL, CARRIER LEVEL



GFSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



GFSK HIGH CHANNEL, SPURIOUS 3 GHz ~ 25 GHz





 π /4-DQPSK LOW CHANNEL, SPURIOUS 30 MHz





$\pi/4\text{-}D\textsc{QPSK}$ LOW CHANNEL, SPURIOUS 3 GHz ~



GFSK HIGH CHANNEL, BAND EDGE





π /4-DQPSK MIDDLE CHANNEL, CARRIER

LEVEL



$\pi/4\text{-}D\textsc{QPSK}$ MIDDLE CHANNEL, SPURIOUS 30 MHz \sim 3 GHz



π /4-DQPSK MIDDLE CHANNEL, SPURIOUS 3







π /4-DQPSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



$\pi/4\text{-}D\text{QPSK}$ HIGH CHANNEL, SPURIOUS 3 GHz



