



Report Reference No	TRE1710006801	R/C: 73304		
FCC ID:	2ANSP-SPE30			
Applicant's name:	SPRITE (Group) LIMITED			
Address	ShenLiang Group, No.299 Gu ShenZhen, China	uanPing Road, LongHua District,		
Manufacturer	SPRITE (Group) LIMITED			
Address:	ShenLiang Group, No.299 Gu ShenZhen, China	uanPing Road, LongHua District,		
Test item description:	Wireless Bluetooth Earphone	ne		
Trade Mark	SPRITE			
Model/Type reference:	SPE30			
Listed Model(s)	SPE31			
Standard:	: FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample	Oct. 17, 2017			
Date of testing	Oct. 17, 2017 - Oct. 30, 2017			
Date of issue	Oct. 30, 2017			
Result:	PASS			
Compiled by		Beepy Ling		
(Position+Printed name+Signature):	File administrators Becky Liar	ng		
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Approved by		Ltona CHM		
(Position+Printed name+Signature):	RF Manager Hans Hu			
Testing Laboratory Name	Shenzhen Huatongwei Inter	rnational Inspection Co., Ltd.		
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

<u>FCC Rules Part 15.247:</u> Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devicese

1.2. Report version

Version No.	Date of issue	Description
00	Oct. 30, 2017	Original

2. TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Antenna Requirement	15.203/15.247 (c)	Pass	Jerry Wang
AC Power Line Conducted Emissions	15.207	Pass	Shower Dai
Conducted Peak Output Power	15.247 (b)(1)	Pass	Baozhu Hu
20 dB Bandwidth	15.247 (a)(1)	Pass	Baozhu Hu
Carrier Frequencies Separation	15.247 (a)(1)	Pass	Baozhu Hu
Hopping Channel Number	15.247 (a)(1)	Pass	Baozhu Hu
Dwell Time	15.247 (a)(1)	Pass	Baozhu Hu
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	Pass	Baozhu Hu
Restricted band	15.247(d)/15.205	Pass	Baozhu Hu
Radiated Emissions	15.247(d)/15.209	Pass	Si Ding

Note: The measurement uncertainty is not included in the test result.

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	SPRITE (Group) LIMITED
Address:	ShenLiang Group, No.299 GuanPing Road, LongHua District, ShenZhen, China
Manufacturer:	SPRITE (Group) LIMITED
Address:	ShenLiang Group, No.299 GuanPing Road, LongHua District, ShenZhen, China

3.2. Product Description

Name of EUT:	Wireless Bluetooth Earphone		
Trade Mark:	SPRITE		
Model No.:	SPE30		
Listed Model(s):	SPE31		
Power supply:	DC 5V for USB port and DC 3.7V for internal battery		
Adapter information:	-		
Hardware version:	V2.0		
Software version:	V1.3		
Bluetooth			
Version:	Supported BT4.1+EDR		
Modulation:	GFSK, π/4DQPSK, 8DPSK		
Operation frequency:	2402MHz~2480MHz		
Channel number:	79		
Channel number: Channel separation:	79 1MHz		

3.3. Operation state

Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Channel Frequency (MHz)	
00	2402
01	2403
:	÷
39	2441
:	:
77	2479
78	2480

> <u>TEST MODE</u>

For RF test items:

The engineering test program was provided and enabled to make EUT continuous transmit

For AC power line conducted emissions:

The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.

For Radiated suprious emissions test item:

The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report.

Note: The EUT comprises left and right channel earphone, both are the same and only the test data of left earphone recorded in this report.

3.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

	c.	Manufacturer:	TOSHIBA
• PC		Model:	Satellite M800
/		Manufacturer:	/
	7	Model No.:	/

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd. Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4.2. Test Facility

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

IC-Registration No.:5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.39 dB	(1)
Radiated Emissions 30~1000MHz	4.24 dB	(1)
Radiated Emissions 1~18GHz	5.16 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth		(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.5. Equipments Used during the Test

Cond	Conducted Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	
1	Artificial Mains	Rohde&Schwarz	ESH2-Z5	100028	2016/11/13	
2	EMI Test Receiver	Rohde&Schwarz	ESCI3	100038	2016/11/13	
3	Pulse Limiter	Rohde&Schwarz	ESHSZ2	100044	2016/11/13	
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	-	-	

Radia	Radiated Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	
1	EMI test receiver	Rohde&Schwarz	ESI 26	100009	2016/11/13	
2	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2016/11/13	
3	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2016/11/13	
4	Horn antenna	ShwarzBeck	9120D	1011	2016/11/13	
5	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2016/11/13	
6	Amplifier	Sonoma	310N	E009-13	2016/11/13	
7	JS Amplifier	Rohde&Schwarz	JS4-00101800- 28-5A	F201504	2016/11/13	
8	Amplifier	Compliance Direction systems	PAP1-4060	120	2016/11/13	
9	High pass filter	Compliance Direction systems	BSU-6	34202	2016/11/13	
10	EMI test Software	Rohde&Schwarz	ESK1	-	-	
11	EMI test Software	Audix	E3	-	-	
12	TURNTABLE	MATURO	TT2.0	-	-	
13	ANTENNA MAST	MATURO	TAM-4.0-P	-	-	

RF Conducted methods								
Item	tem Test Equipment Manufacturer Model No. Serial No. Las							
1	Spectrum Analyzer	Rohde&Schwarz	FSP	1164.4391.40	2016/11/13			
2	MXA Signal Analyzer	Agilent Technologies	N9020A	MY5050187	2016/11/13			

The Cal.Interval was one year.

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

<u>Requirement</u>

FCC CFR Title 47 Part 15 Subpart C Section 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. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, 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.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

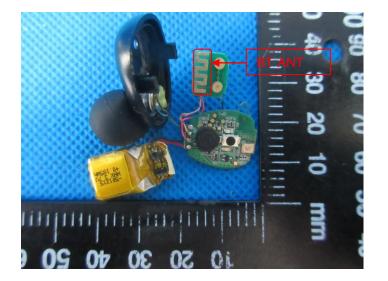
(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Test Result:

🛛 Passed

Not Applicable

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. Conducted Emissions (AC Main)

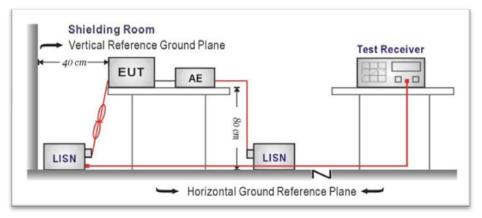
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (dBuV)			
Frequency range (MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

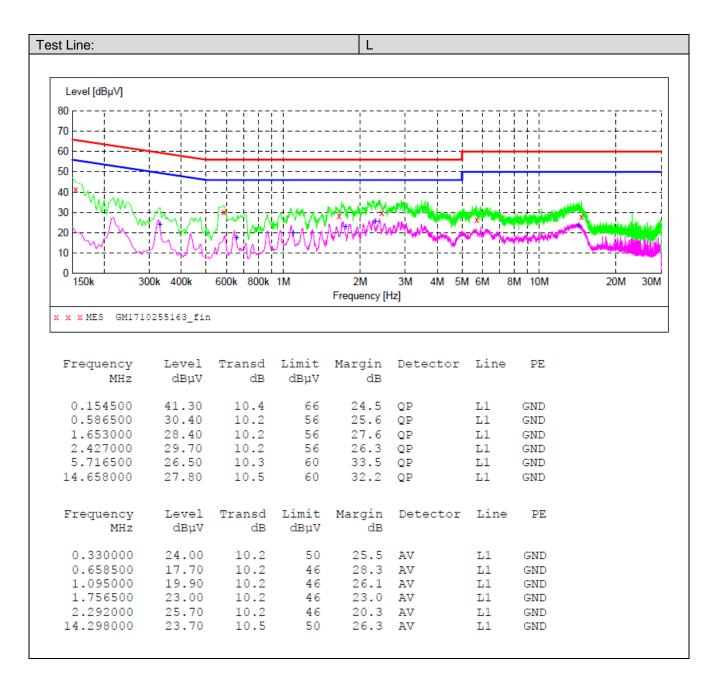
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

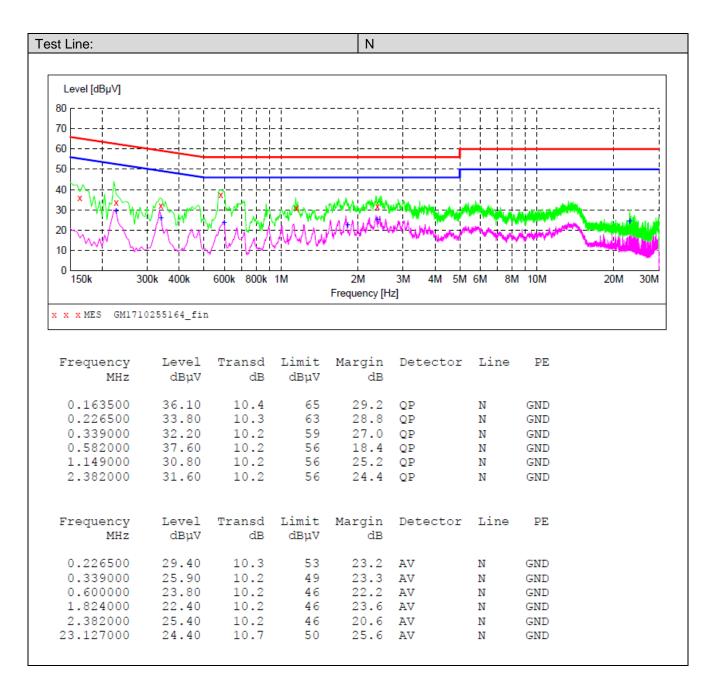
TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Transd= Cable lose + Pulse Limiter Factor + Artificial Mains Factor
- 2) Margin= Limit Level



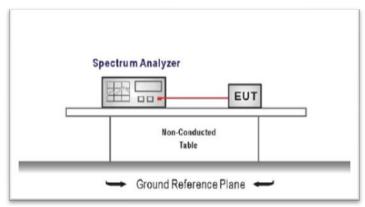


5.3. Conducted Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

TEST CONFIGURATION



TEST PROCEDURE

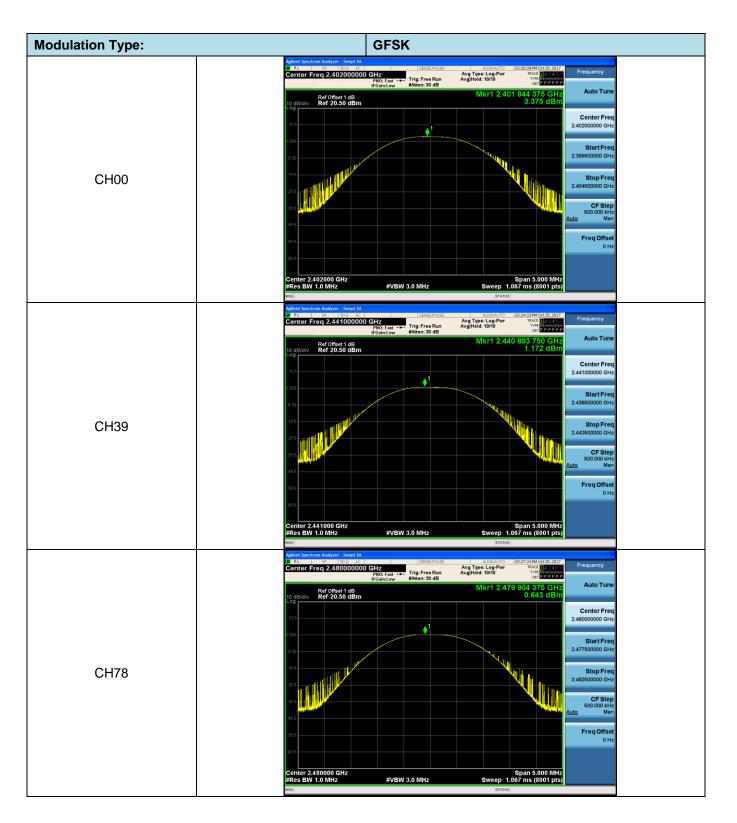
- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings:
 Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW
 Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

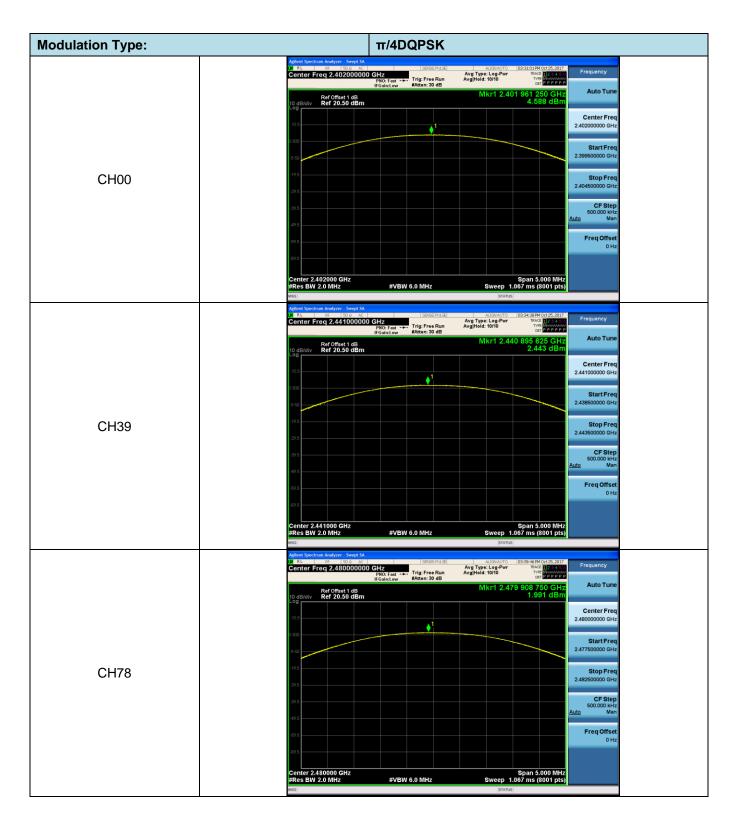
TEST MODE:

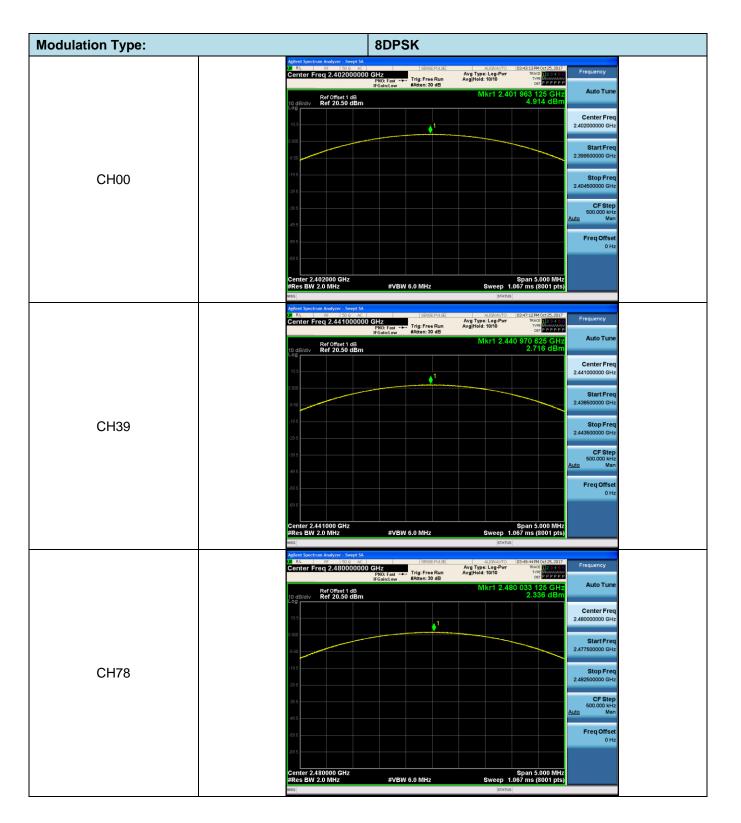
Please refer to the clause 3.3

TEST RESULTS

Modulation type	Modulation type Channel Output power (dBm)		Limit (dBm)	Result	
	00	3.375			
GFSK	39	1.172	≤ 30.00	Pass	
	78	0.643			
	00	4.588			
π/4DQPSK	39	2.443	≤ 21.00	Pass	
	78	1.991			
	00	4.914			
8DPSK	39	2.716	≤ 21.00	Pass	
	78	2.336			





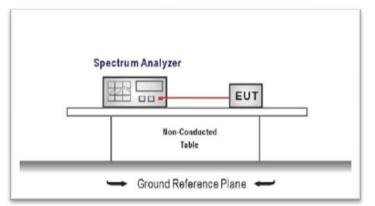


5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- 3. Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW \ge 1% of the 20 dB bandwidth, VBW \ge RBW

Sweep = auto, Detector function = peak, Trace = max hold

4. Measure and record the results in the test report.

TEST MODE:

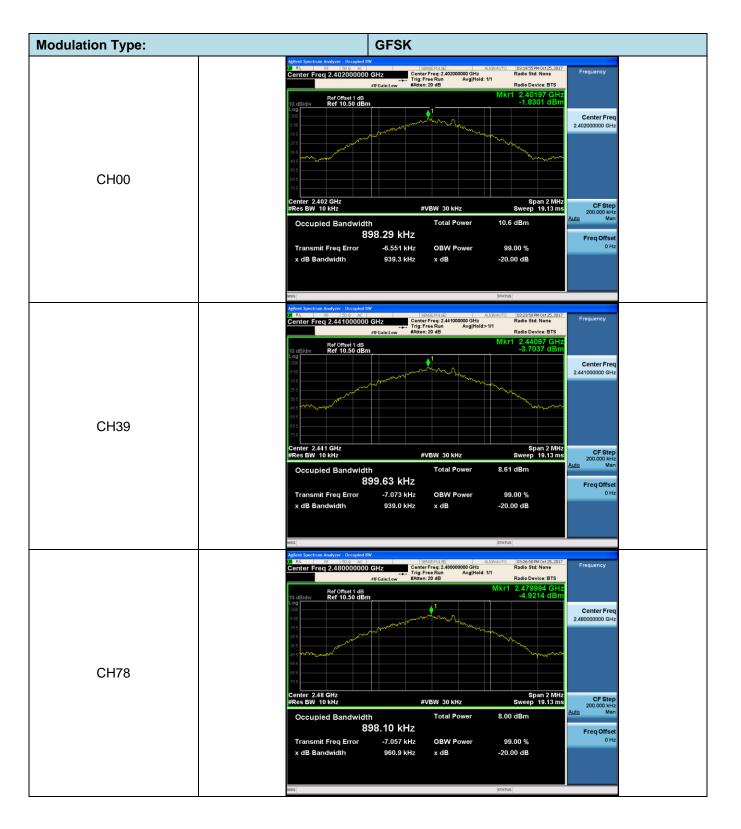
Please refer to the clause 3.3

TEST RESULTS

🛛 Passed

Not Applicable

Modulation type	Modulation type Channel 20 dB Bandwidth (M		Limit (MHz)	Result
	00	0.9393		
GFSK	39	0.9390	-	Pass
	78	0.9609		
	00	1.291		
π/4DQPSK	39	1.295	-	Pass
	78	1.292		
	00	1.296		
8DPSK	39	1.293	-	Pass
	78	1.296		



Modulation Type:	π/4DQPSK
	Adjenit Spectrum Analyzer, Occupied BV Issues PLASI RUDRATO IO330281MOct.25, 2022 Frequency Center Freq 2,402000000 GHz Center Freq: 2,40200000 GHz Center Freq: 2,4020000 GHz Frequency Frequency If Gains.ovv Ratio Static StaticStatic Static Static Static Static Static Static Static Static Sta
	10 dBidly Ref 10.50 dBm 2.1760 dBm 0.0 0 0 0 0.0 <t< td=""></t<>
CH00	Center 2.402 GHz #Res BW 30 kHz Ccupled Bandwidth 1.1862 MHz Total Power Total
	Transmit Freq Error -12.174 kHz OBW Power 99.00 % x dB Bandwidth 1.291 MHz x dB -20.00 dB
01100	Addret Spectrum Andrycer, Oroughd BW Conter Freq 2.441000000 GHz Conter Freq 2.441000000 GHz Frequency Genter Freq 2.441000000 GHz Frequency Genter Freq 2.441000000 GHz Ref Offset 1 dB Ref Offset 1 dB 10 dB dy Ref Offset 1 dB 10 dB dy State: 20 dB 10 dB dy Ref Offset 1 dB State: 20 dB State: 2
CH39	Center 2.441 GHz FRes BW 30 kHz Cocupied Bandwidth Total Power 9.22 dBm 1.1881 MHz Transmit Freq Error x dB Bandwidth 1.295 MHz x dB -20.00 dB CF Step 260.00 kHz Auto Man Freq Offset 0 Hz
	MSG Istatus Agternit Spectrum Analyzer - Decepted BW Automatic Spectrum Analyzer - Decepted BW TraceID elector TraceID elector MIFGaint.dow TraceID elector Radio Device: BTS Radio Device: BTS Radio Device: BTS 10 Gef OnSec1 dB MIFGaint.dow - 0.39790 dBm -0.39790 dBm
01170	Log 9.0 19.5 29
CH78	Image: Stress BW 30 kHz #VBW 100 kHz Span 2.5 MHz Image: Stress BW 30 kHz #VBW 100 kHz Sweep 2.667 ms Image: Stress BW 30 kHz Total Power 8.85 dBm Image: Stress BW 30 kHz Total Power 8.85 dBm Image: Stress BW 30 kHz Total Power 8.85 dBm Image: Stress BW 30 kHz Total Power 8.85 dBm Image: Stress BW 30 kHz Total Power 99.00 %
	x dB Bandwidth 1.298 MHz x dB -20.00 dB

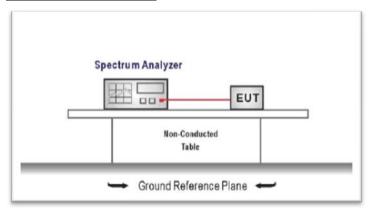


5.5. Carrier Frequencies Separation

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3*20 dB bandwidth of the hopping channel, whichever is greater.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.002	≥0.961	Pass
π/4DQPSK	39	1.071	≥0.863	Pass
8DPSK	39	1.003	≥0.864	Pass

Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the section 5.4. $\pi/4DQPSK$ limit = 2/3 * The maximum 20 dB Bandwidth for $\pi/4DQPSK$ modulation on the section 5.4. 8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the section 5.4

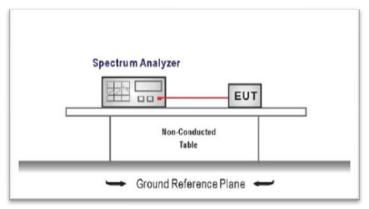
1	Anthree Separtrum Anabezer - Sumet SA
	Addred Spectrum Analyzer, Swedt SA D. R.L. 59: E20 620 42 SOBE PLLCE ALSOLANDO (04044/SPLOT 25:2017 Center Freq 2.441500000 GHz Trig: Free Run FRO: Wide The Run Analyzer Se B
	Ref Officet 1 dB Auto 1 une
	6:0 Center Freq
	225 Start Freq 2.44050000 GHz 2.44050000 GHz
GFSK	635 Stop Freq
	0.5 73.5 74.0 (1000 GHz) (1000 GHz) (1000 GHz)
	Start 2,449500 CHz Stop 2,442500 CHz Stop 2,442500 CHz CF Step 2,0000 CHz #Res BW 30 kHz #VBW 100 kHz Sweep 2,133 ms (8001 pts) 200000 Hz 20000 Hz 20000 Hz 20000 Hz 20000
	1 02 1 f (Δ) 1002 25 MHz (Δ) 0.286 48 2 F 1 f 2.440 985 60 GHz 4270 dBm 5 3 F 1 f 2.440 985 60 GHz 4270 dBm 6 6 4 6 6 6 6 0 Hz 0 Hz 6 6 6 6 6 0 Hz 7 6 6 6 6 0 Hz 9 6 6 6 6 6
	MSG STATUS Aglent Spectrum Analyzer - Swept SA
	00 R. 16 99 9.0 AC 1996 FALSE ALAND 0402-2990 002.5.207 Marker 1 1.07/1000000 MHz Floatikew Platen: 26 dB 100 100 100 100 100 100 100 100 100 10
	In Data Lew Address of B AMkr1 1.071 00 MHz NextPeak 10 dBM/w Ref 0ffset 1 dB -1.857 dB -1.857 dB
	135 mar M
	-33 5 Next Pk Left
π/4DQPSK	435 Marker Delta
	73.5 Start 2.440500 GHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.133 ms (8001 pts) Mkr→CF
	MKR MODELTRC SCLI X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE
	1 A2 1 1 f1 (A) 1071 00 MH2 (A) -1 957 48 2 F 1 f 2.440 947 00 GH2 -3.417 48m 4 MKr→RefLvi
	9 10 11 11
	MIG
	Dr R.L PF Store Stores FLIGE AllSNAUTO Okt1508 PM Okt25, 2017 Marker 1 1.0003000000 MHz Marker 1 1.0003000000 MHz Avg Type: Log-Www Trig: Free Run Avg Type: Log-Www Trig: Store Run & Store Run
	Ref Offset 1 dB AMkr1 1.003 00 MHz Next Peak
	6.00
	3.00 135
	226 Next Pk Left
8DPSK	43 5 63 5 63 5 Marker Deta
	-73.5
	Start 2.440500 GHz Stop 2.442500 GHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.133 ms (8001 pts) MM HOCK THC SQL X Y Function water
	Molecular A2 T X X X Y <th< td=""></th<>
	7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
	and a more a second sec

5.6. Hopping Channel Number

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = the frequency band of operation RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

Modulation type	Channel number	Limit	Result	
GFSK	79			
π/4DQPSK	79	≥15.00	Pass	
8DPSK	79			

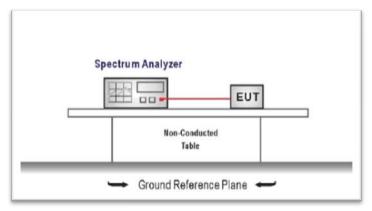
	Agilent Spectrum Analyzer - Swept SA
	OT RL RF 50.9. AC SBISE-PULSE ALIGNAUTO 04/03/49PM Oct 25, 2017 Center Freq 2.441750000 GHz Avg Type: Log-Pwr TRACE 1/2/3/4 975 Frequency
	PPO: Fast Trig: Free Run IF-Gein:tow Arg Hold: 10/10 trie ppepper Atten: 26 dB Adden: 26 dB Adden: 27 53 dB Auto Tune 10 dB/dv Ref 16:50 dBm -2.753 dB
	2.441750000 GHz 2.441750000 GHz
	22.5 33.6 2.40000000 GHz
GFSK	415 435 432 432 432
	Start 2.40000 GHz Stop 2.48350 GHz CF Step 2.48350 GHz
	HAR MODE THC SCI X T 699 MHZ (A) 2753 dB FARCTON FUNCTION WOTH FUNCTION VALUE F A AZ 1 / / / 2.052 070 GHZ 0.125 dBm FARCTON VALUE F 3 / / / / 2.052 070 GHZ 0.125 dBm FARCTON VALUE F
	Mile granus Adlent Spectrum Analyzer - Swept SA granus UL RL RF S0.0 AC SPRE-PULSE ALIONAUTO D406t12PM0ct25, 2017 Constor E-Sono 2.044 25:0000 Event Section 2.042 25:0000 Frequency
	Center Flog 2.44FT 50000 GHZ PNO: Feat →→- IFGeint.ew #Atten: 25 dB CALLER Avg Held: 10/10 Tree #Atten: 25 dB CALLER CALLER Auto Tune
	Ref f06±01 dB ΔINKT // .0 19 Win2 10 dB(div Ref 16:50 dBm -2.652 dB 0 3 x0 ↓Δ2 2
	135 Start Freq
π/4DQPSK	33.5 2.40000000 GHz 43.5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
11/4DQF3K	73 5 2.48350000 GHz
	Start 2.40000 GHz Stop 2.43390 GHz CF 5 tep Were 1.113 ms (8350 pts) #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.113 ms (8350 pts) Mark Mode Tirc Sci. × Y Function Function Function Mark Mode Tirc Sci. × Y Function Function Function 10 1 f 2.402 220 GHz 3497 dBm S474 dBm S474 dBm
	Freq Offset
	S 2 Mild ptartus Aplient Spectrum Analyzer: Swept SA SENSE PULSE WIL RF SD
	Center Freq 2.441750000 GHz PRO: Fast IFGeint.ew Fasten: 26 dB
	Ref Offset 1 dB ΔMkr1 78.259 MHz Auto 1 une 10 dB/div Ref 16.50 dBm -2.322 dB 100 Center Freq 8.00 V 100 Center Freq 100 Center Freq
	9.50 135 22.5 23.5 23.5 23.5 23.5 24.41750000 GHz Start Freq
	335 2.40000000 GHz
8DPSK	43.5 Stop Freq 73.5 2.48350000 GHz
	Start 2.40000 GHz Stop 2.48350 GHz CF Step 2.48350 GHz Start 2.483500 GHz Start 2.483500 GHz
	1 02 1 f (Δ) 78.259 MHz (Δ) 2.322 dB 2 F 1 r 2.401 870 GHz 3.823 dB Freq Offset 3 4 4 4 4 6 6 0 Hz
	11 STATUS

5.7. Dwell Time

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

TEST CONFIGURATION



TEST PROCEDURE

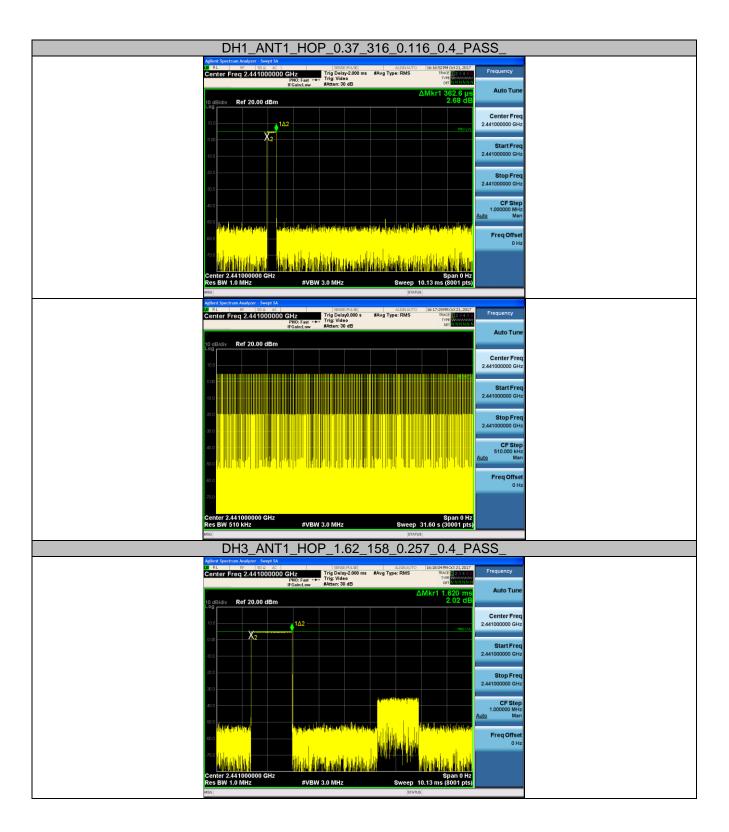
- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

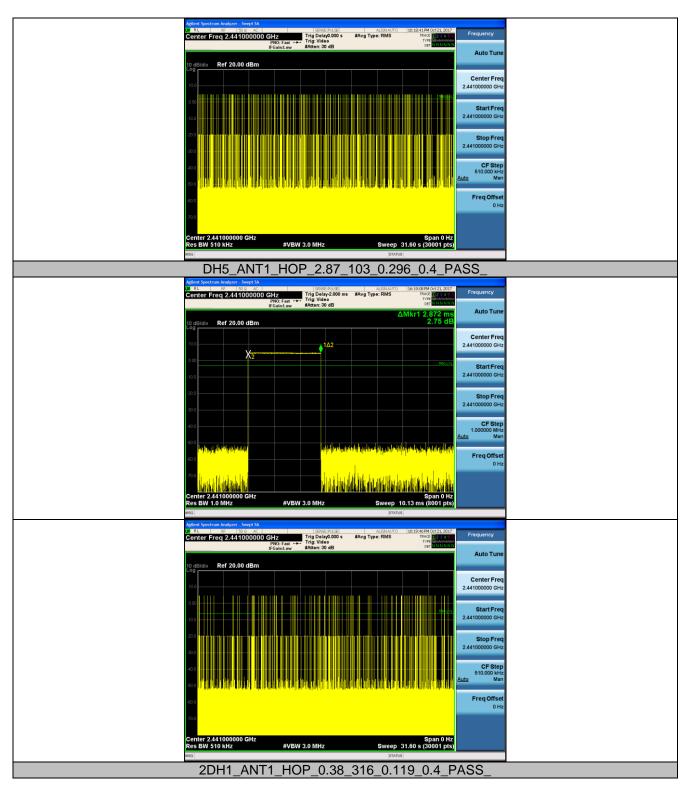
TEST MODE:

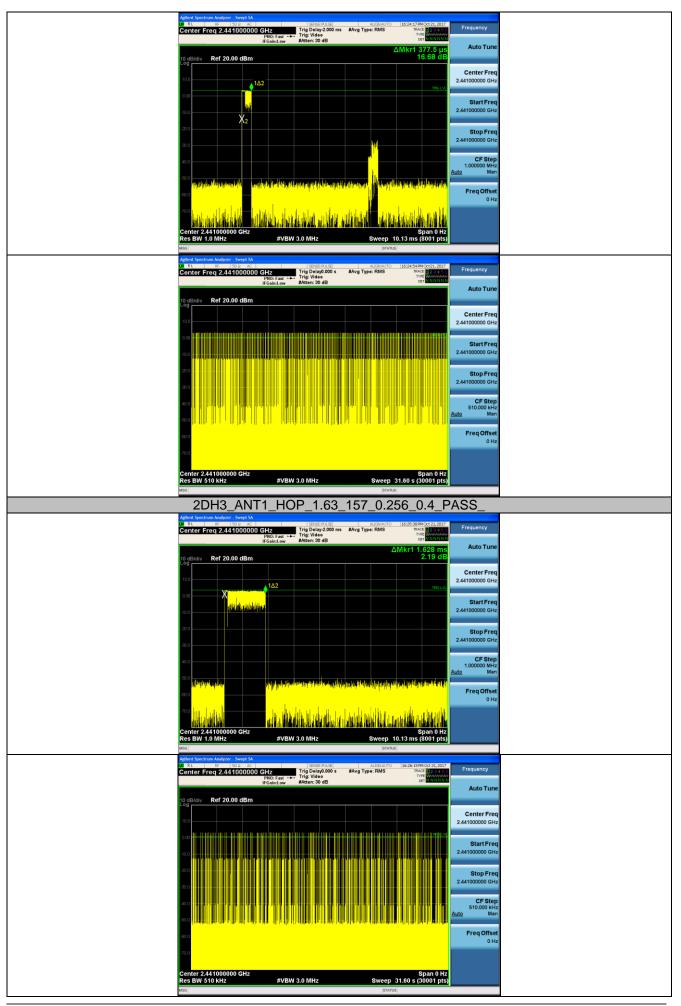
Please refer to the clause 3.3

TEST RESULTS

TestMode	Antenna	Channel	BurstWidth(ms)	TotalHops	Result(s)	Limit(s)	Verdict
DH1	ANT1	HOP	0.36	316	0.114	0.4	PASS
DH3	ANT1	HOP	1.62	158	0.257	0.4	PASS
DH5	ANT1	HOP	2.87	103	0.296	0.4	PASS
2DH1	ANT1	HOP	0.38	316	0.119	0.4	PASS
2DH3	ANT1	HOP	1.63	157	0.256	0.4	PASS
2DH5	ANT1	HOP	2.88	104	0.299	0.4	PASS
3DH1	ANT1	HOP	0.38	316	0.119	0.4	PASS
3DH3	ANT1	HOP	1.63	157	0.255	0.4	PASS
3DH5	ANT1	HOP	2.88	104	0.299	0.4	PASS

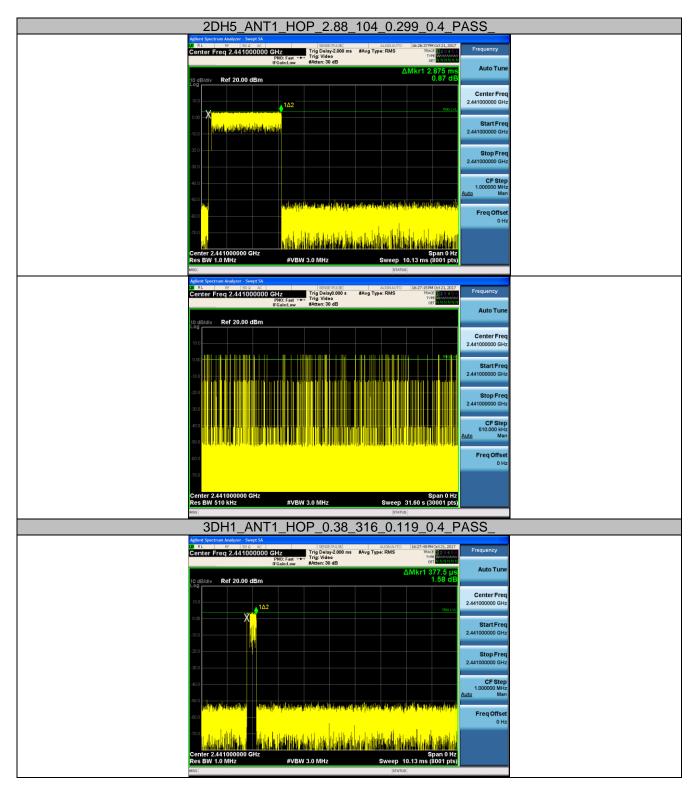


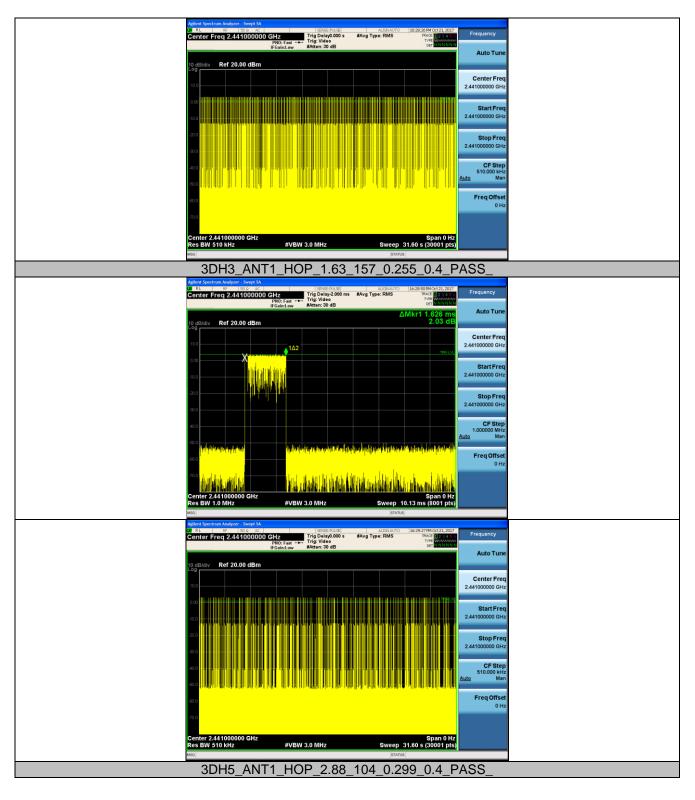


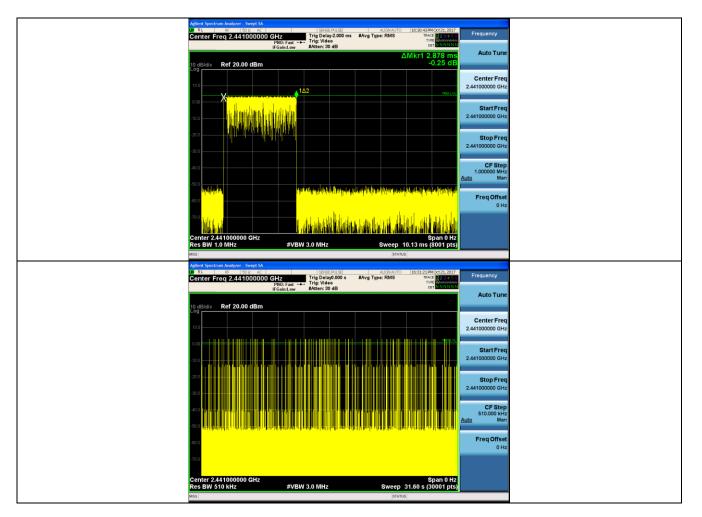


Shenzhen Huatongwei International Inspection Co., Ltd.

Report Template Version: H01 (2017-09)







5.8. Pseudorandom Frequency Hopping Sequence

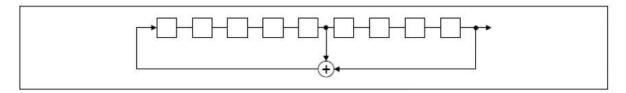
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies 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. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the friststage. The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0	2	4	6	62	64	78	1	73	75 7
٦				 1		 1		 <u> </u>	
				1	}	1		İ.	
				1		1			
						 1		 L	

Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

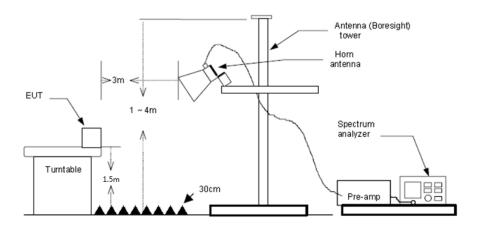
5.9. Restricted band (radiated)

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
- 2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
- The receiver set as follow: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
- 2) Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report.
- 3) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

	CH00										
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value		
2310.00	31.85	28.05	6.62	37.65	28.87	74.00	-45.13	Horizontal	Peak		
2390.03	32.24	27.65	6.75	37.87	28.77	74.00	-45.23	Horizontal	Peak		
2310.00	32.36	28.05	6.62	37.65	29.38	74.00	-44.62	Vertical	Peak		
2390.03	34.73	27.65	6.75	37.87	31.26	74.00	-42.74	Vertical	Peak		
2310.00	20.09	28.05	6.62	37.65	17.11	54.00	-36.89	Horizontal	Average		
2390.03	19.43	27.65	6.75	37.87	15.96	54.00	-38.04	Horizontal	Average		
2310.00	20.06	28.05	6.62	37.65	17.08	54.00	-36.92	Vertical	Average		
2390.03	18.84	27.65	6.75	37.87	15.37	54.00	-38.63	Vertical	Average		

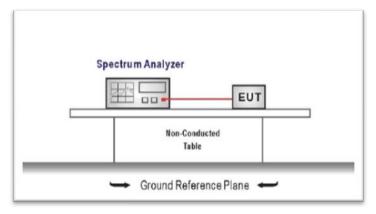
CH78											
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value		
2483.50	39.21	27.26	6.83	37.87	35.43	74.00	-38.57	Horizontal	Peak		
2495.48	50.84	27.22	6.84	37.87	47.03	74.00	-26.97	Horizontal	Peak		
2500.00	31.19	27.20	6.84	37.87	27.36	74.00	-46.64	Horizontal	Peak		
2483.50	39.37	27.26	6.83	37.87	35.59	74.00	-38.41	Vertical	Peak		
2488.97	45.65	27.24	6.83	37.87	41.85	74.00	-32.15	Vertical	Peak		
2500.00	32.13	27.20	6.84	37.87	28.30	74.00	-45.70	Vertical	Peak		
2483.50	35.01	27.26	6.83	37.87	31.23	54.00	-22.77	Horizontal	Average		
2500.00	16.98	27.20	6.84	37.87	13.15	54.00	-40.85	Horizontal	Average		
2483.50	44.65	27.26	6.83	37.87	40.87	54.00	-13.13	Vertical	Average		
2500.00	20.94	27.20	6.84	37.87	17.11	54.00	-36.89	Vertical	Average		

5.10. Band edge and Spurious Emissions (conducted)

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

TEST CONFIGURATION



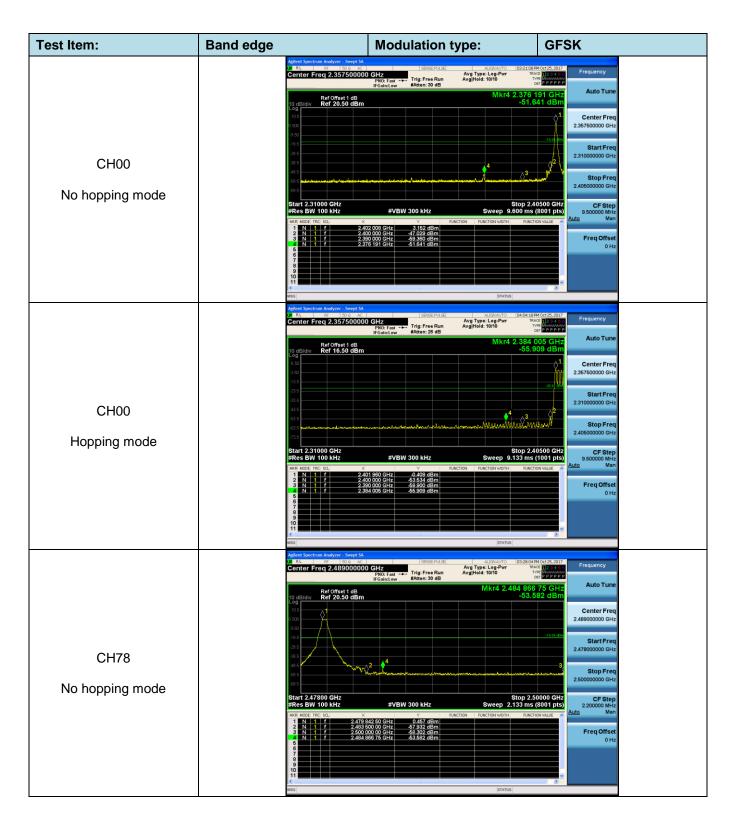
TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW
 Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

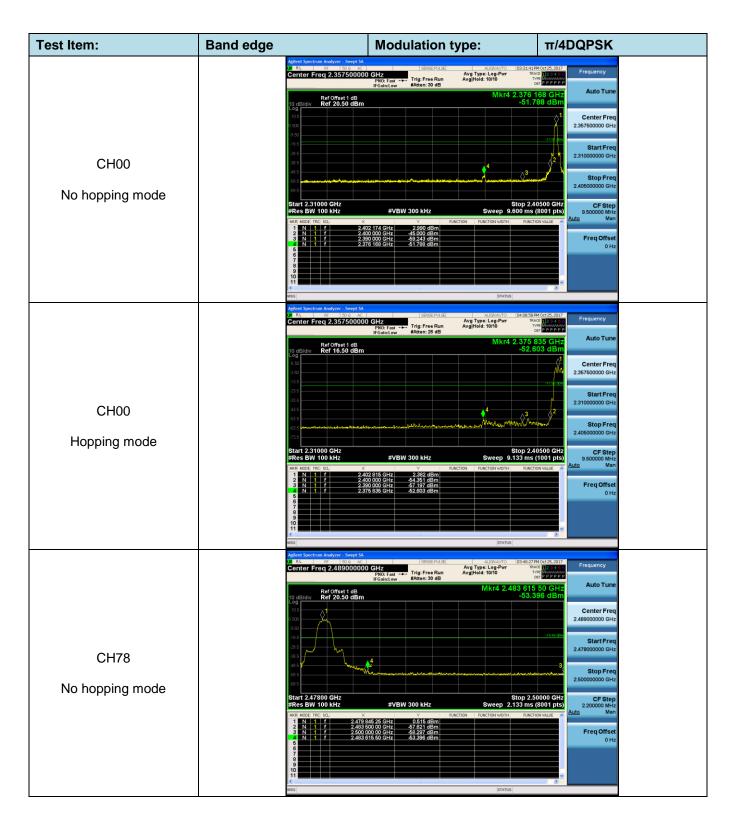
TEST MODE:

Please refer to the clause 3.3

TEST RESULTS



	Aglent Spectrum Analyzer Swept SA Spectrum Spectrum Analyzer Swept SA Val RL RF 30.9 AC Spectrum Spectrum Analyzer Auguration 04:06:39M OC125, 2017 Center Freq 2.4189000000 GHz PH0 (Fast ->- Trig: Free Run Avg Type: Log-Par Trig: Free Run AvgHeld: 10/10 Trig: Free Run AvgHeld: 10/10 Trig: Free Run Fre	Frequency
	Ref Offset 1 dB Mkr4 2.486 030 GHz 10 dB/div Ref 16.50 dBm -58.056 dBm	Auto Tune
	-13.5	Center Freq 489000000 GHz
CH78	2215 2271.404 305 405 405 405 405 405 405 405 405 405 4	Start Freq 478000000 GHz
Hopping mode	63.6 63.5 72.5	Stop Freq 500000000 GHz
	Start 2.47800 GHz Stop 2.50000 GHz #Res BW 100 kHz #VBW 300 kHz Stweep 2.133 ms (1001 pts) Mon work for SL x y Function work Autor	CF Step 2.200000 MHz Man
	1 N 1 F 247886 GHz 477806 GHz 2 N 1 F 248500 GHz 42750 dBm 3 N 1 F 248500 GHz 451300 dBm 4 N 1 F 2480 030 GHz 458.056 dBm 6 F	Freq Offset 0 Hz
	9	



	Aginet Spectrum Analyzer Sweet SA Sense Fridge Alionautro (Hoto Scatter) Frequency 20 R.L 8F 50.9 AC Sense Fridge Alionautro (Hoto Scatter) Frequency Center Freq 2.469000000 GHz Frig. Free Run Arg Type: Log-Pur Frequency Frequency IFGsint.cov Frequency Arg Type: Log-Pur Frequency Frequency
	Ref Offset 1 dB Mkr4 2.485 810 GHz Auto Tune 10 dB/dW Ref 16.50 dBm -55.720 dBm
	5.00 Center Freq 3.00 (2.48900000 GHz 3.10
CH78	225
Hopping mode	635 3 635 3 736 2 736 2 736 3 3 3 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5
hopping mode	Start 2.47800 GHz stop 2.50000 GHz stop 2.50000 GHz CF Step 2.20000 Hz #Res BW 100 kHz \$
	1 N 1 f 2479 926 GHz -0.441 dBm 2 N 1 f 2483 500 GHz -62.201 dBm -62.201 dBm
	MSG STATUS

