

Γ



TEST REPORT				
Report Reference No	TRE1710005601 R/C: 70330			
FCC ID	2AIL4-BH149A			
Applicant's name:	VTIN TECHNOLOGY Co., Limited			
Address	ROOM 603,6/F,HANG PONT COMMERCIAL BUILDING,31 TONKIN STREET,CHEUNG SHA WAN,KOWLOON Hong Kong			
Manufacturer	VTIN TECHNOLOGY Co., Limited			
Address:	ROOM 603,6/F,HANG PONT COMMERCIAL BUILDING,31 TONKIN STREET,CHEUNG SHA WAN,KOWLOON Hong Kong			
Test item description:	True Wireless Stereo Bluetooth Speaker			
Trade Mark	VTIN			
Model/Type reference:	BH149A			
Listed Model(s)				
Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	Oct.13,2017			
Date of testing	Oct.14,2017- Oct.25,2017			
Date of issue	Oct.26,2017			
Result:	PASS			
Compiled by (Position+Printed name+Signature):	File administrators Candy Liu			
Supervised by (Position+Printed name+Signature):	Project Engineer John Qiao			
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu			
Testing Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.			
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			

Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

The test report merely correspond to the test sample.

Contents

<u>1.</u>	TEST STANDARDS AND REPORT VERSION	3
1.1.	Test Standards	3
1.2.	Report version	3
<u>2.</u>	TEST DESCRIPTION	4
<u>3.</u>	SUMMARY	5_
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Operation state	6
3.4.	EUT configuration	6
3.5.	Modifications	6
<u>4.</u>	TEST ENVIRONMENT	77
4.1.	Address of the test laboratory	7
4.2.	Test Facility	7
4.3.	Environmental conditions	8
4.4.	Statement of the measurement uncertainty	8
4.5.	Equipments Used during the Test	9
<u>5.</u>	TEST CONDITIONS AND RESULTS	10
5.1.	Antenna requirement	10
5.2.	Conducted Emissions (AC Main)	11
5.3.	Conducted Peak Output Power	14
5.4.	20 dB Bandwidth	18
5.5.	Carrier Frequencies Separation	22
5.6.	Hopping Channel Number	24
5.7.	Dwell Time	26
5.8. 5.9.	Pseudorandom Frequency Hopping Sequence Restricted band (radiated)	30 31
5.9. 5.10.	Band edge and Spurious Emissions (conducted)	33
5.10. 5.11.	Spurious Emissions (radiated)	55
<u>6.</u>	TEST SETUP PHOTOS	59
7	EXTERANAL AND INTERNAL PHOTOS	61

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.26,2017	Original

2. TEST DESCRIPTION

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

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	VTIN TECHNOLOGY Co., Limited
Address: ROOM 603,6/F,HANG PONT COMMERCIAL BUILDING,31 TO STREET,CHEUNG SHA WAN,KOWLOON Hong Kong	
Manufacturer: VTIN TECHNOLOGY Co., Limited	
Address:	ROOM 603,6/F,HANG PONT COMMERCIAL BUILDING,31 TONKIN STREET,CHEUNG SHA WAN,KOWLOON Hong Kong

3.2. Product Description

Name of EUT:	True Wireless Stereo Bluetooth Speaker
Trade Mark:	VTIN
Model No.:	BH149A
Listed Model(s):	-
Power supply:	DC 4.2V 1A
Adapter information:	-
Hardware version:	-
Software version:	V1.0
Bluetooth	
Version:	Supported BT4.2+EDR
Modulation:	GFSK, π/4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	Intergral Antenna
Antenna gain:	2.51 dBi

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

> TEST MODE

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.

3.4. EUT configuration

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

supplied by the manufacturer
supplied by the lab

0			
0	PC	Manufacturer:	TOSHIBA
		Model No.:	Satellite M800
	USB cable	Manufacturer:	MIA Technologies Limited
• l		Model No.:	CB-UCV1.1
		Length:	10 cm

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	-	-	

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	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.				
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.

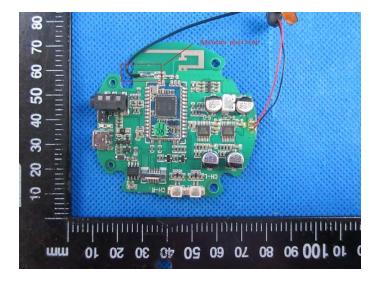
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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.

<u>Test Result:</u>

☑ 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)

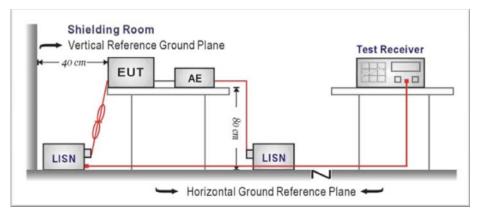
<u>LIMIT</u>

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

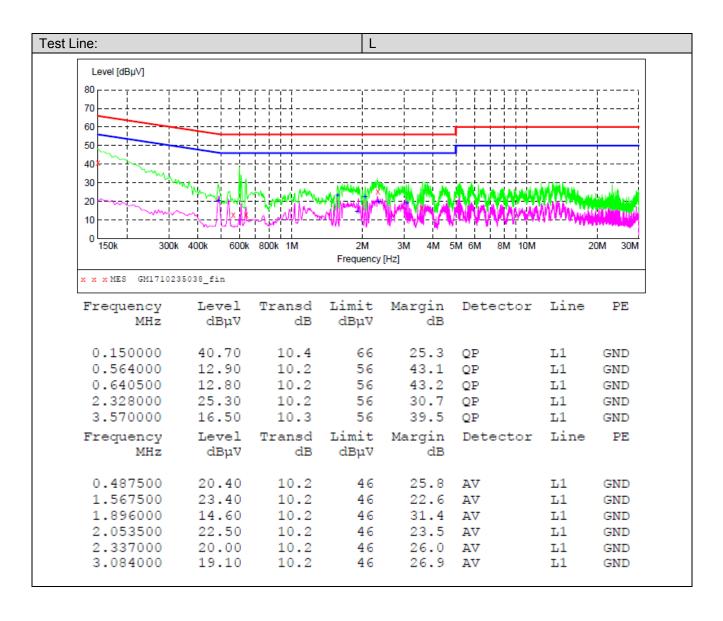
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm 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.

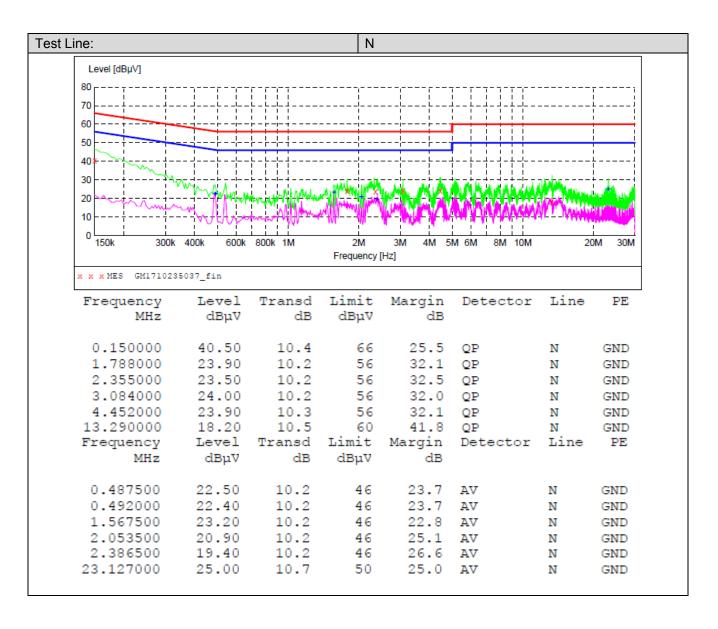
TEST RESULTS

☑ Passed □ Not Applicable

Note:

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



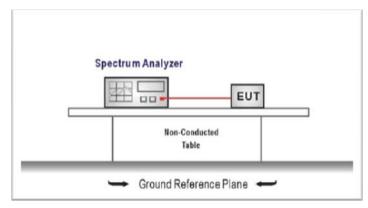


5.3. Conducted Peak Output Power

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.

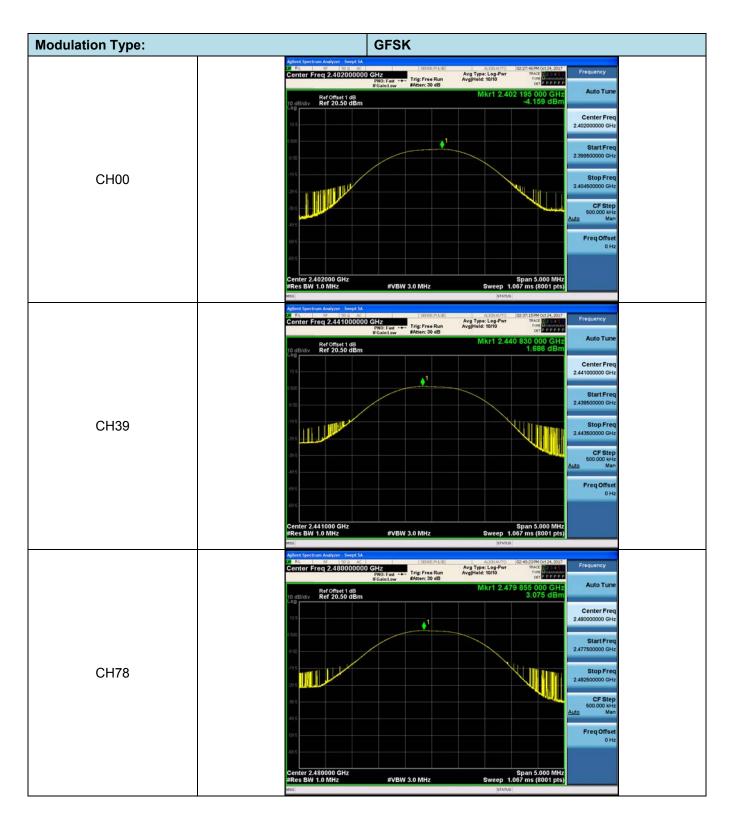
TEST MODE:

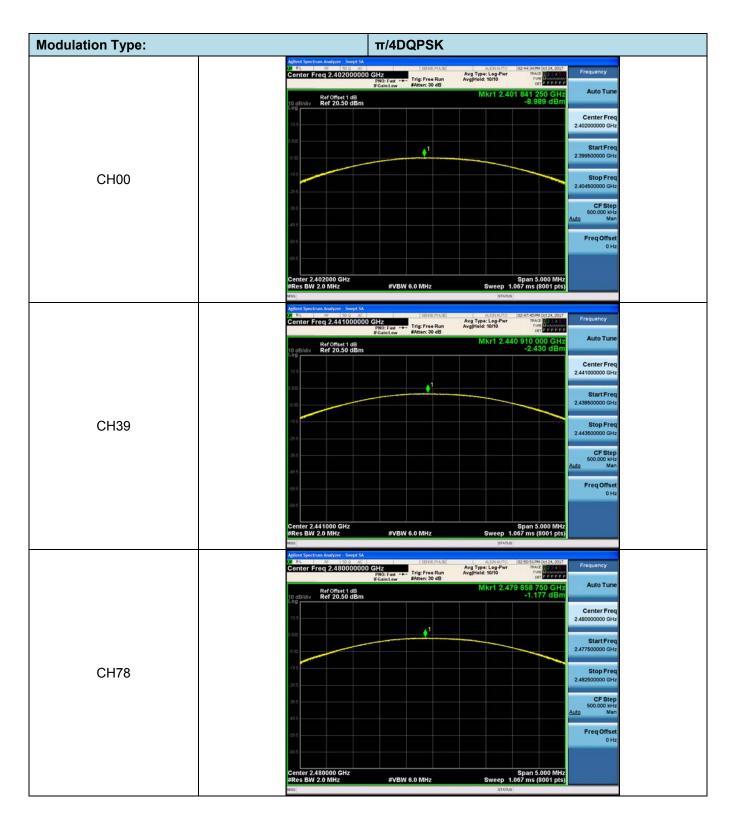
Please refer to the clause 3.3

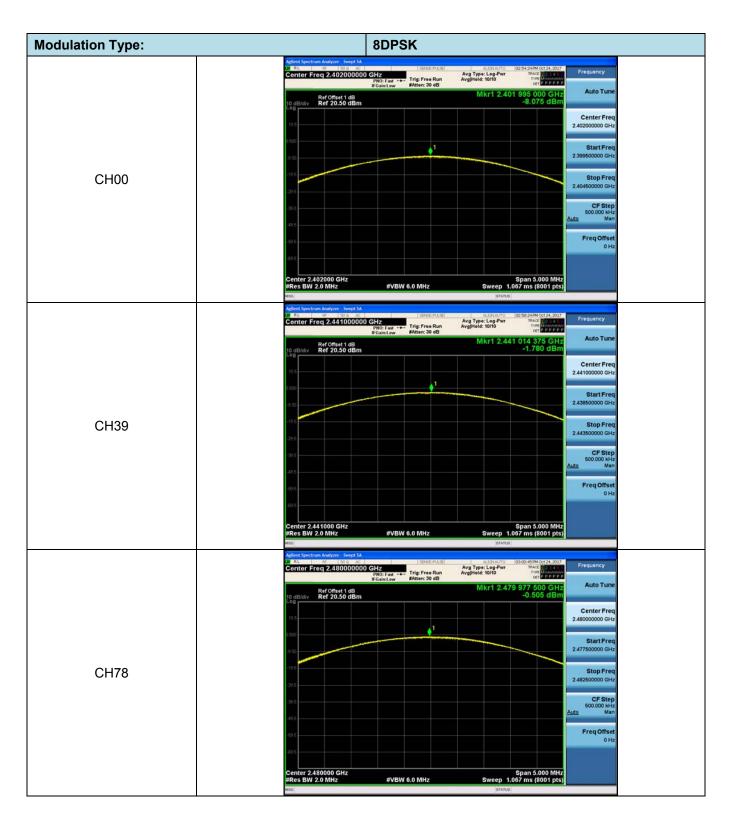
TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result	
	00	-4.159			
GFSK	39	1.686	≤ 30.00	Pass	
	78	3.075			
	00	-8.989			
π/4DQPSK	39	-2.430	≤ 21.00	Pass	
	78	-1.177			
	00	-8.075			
8DPSK	39	-1.780	≤ 21.00	Pass	
	78	-0.505			





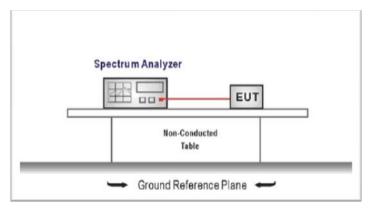


5.4. 20 dB Bandwidth

<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 ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW

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

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

TEST MODE:

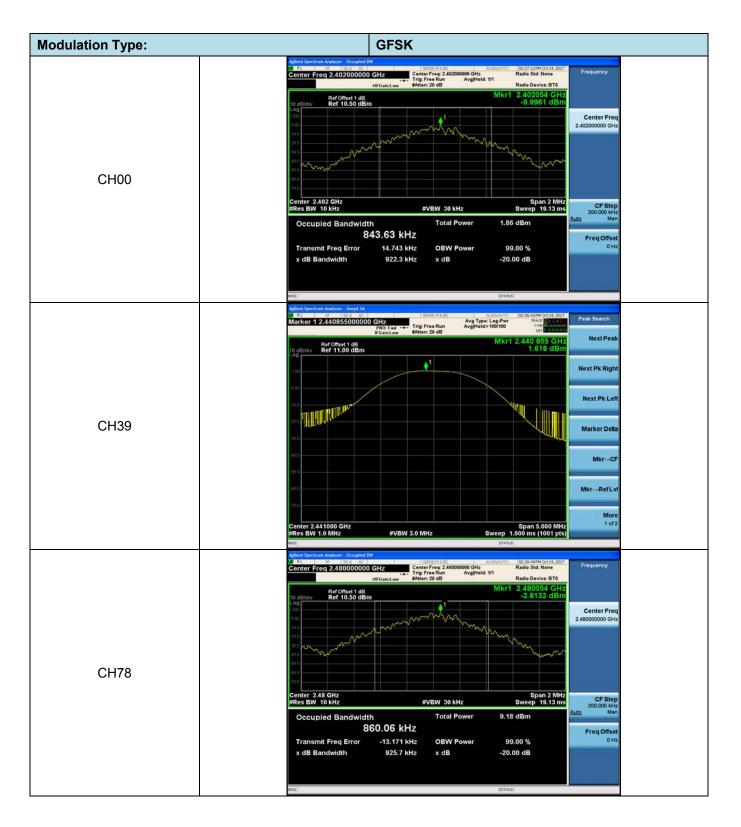
Please refer to the clause 3.3

TEST RESULTS

🛛 Passed

Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result		
	00	0.9223				
GFSK	39	0.0000	-	Pass		
	78	0.9257				
	00	1.259				
π/4DQPSK	39	1.258	-	Pass		
	78	1.256				
	00	1.236				
8DPSK	39	1.234	-	Pass		
	78	1.236				



Modulation Type:	π/4DQPSK
	Aglient Spectrum Analyzer - Occupied BW C. Rite Freq 2.402000000 GHz Centor Freq 2.402000000 GHz Freq Statis Conter Freq 2.402000 GHz Freq Statis Conter Freq 2.40200 GHz Freq Statis Conter Freq Statis Conter Freq 2.40200 GHz Freq Statis Conter Freq Statis Conter Freq Statis Conter Freq Statis Conter Freq Statis Conter Fr
CH00	Log 0.50 0.50 0.55 0.5 0.5 0.5 0.5 0.5 0.5
	Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms Occupied Bandwidth Total Power -4.94 dBm
	1.3153 MHz Transmit Freq Error 7.944 kHz OBW Power 99.00 % x dB Bandwidth 1.259 MHz x dB -20.00 dB
	NG) [TATUS] Addret Spectrum Analyzer - Occupied BW
	Aglinit Spectrum Adaryzer Document and Party Colspan="2">Aglinit Spectrum Adaryzer Document and Party Colspan="2">Aglinit Spectrum Adaryzer Document and Party Colspan="2">Aglinit Spectrum Adaryzer Document and Party Colspan="2">Frequency Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz Radio Set None Frequency ##Gaint.cov ##Frequency Radio Deck: BTS Radio Deck: BTS Ref Offset 1 dB Mkr1 2.441005 GHz - 10 dB/dv Ref 10.50 dBm -
CH39	Log 200 201 202 203 204 204 205 205 205 205 205 205 205 205
	Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms CF Step 250 000 kHz Occupied Bandwidth Total Power 1.82 dBm
	Occupied Bandwidth Total Power 1.82 dBm 1.2995 MHz 1.2995 MHz Transmit Freq Error 12.680 kHz OBW Power 99.00 % x dB Bandwidth 1.258 MHz x dB -20.00 dB
	Ang Branus AgBent Spectrum Analyzer - Occupied EW
	Image: State of the s
CH78	Lop 9.0 9.0 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5
	Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms 250 000 kHz 250 000 kHz
	Occupied Bandwidth Total Power 3.11 dBm Auto Man 1.3004 MHz Freq Offset Transmit Freq Error 10.907 kHz OBW Power 99.00 % 0142
	x dB Bandwidth 1.256 MHz x dB -20.00 dB
	MIG (TATUS)

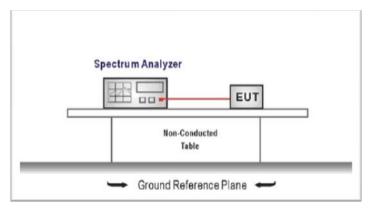
Modulation Type:	8DPSK
	Addived Spectrum Analyzer - Dicupitol BW Addived Spectrum Analyzer - Dicupitol BW Center Freq 2.402000000 GHz HIF Gaint.ow Ref Offset dB Ref offset dB Ref offset dB Ref offset dB Ref offset dB
CH00	10 ditidity Ref 10.50 dBm -13.156 dBm 200 200 200 200 200 200 200 20
	Center 2.402 GHz #VBW 100 kHz Span 2.5 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms Occupied Bandwidth Total Power -4.32 dBm 1.2455 MHz Freq Offset Transmit Freq Error -4.881 kHz OBW Power 99.00 % x dB Bandwidth 1.236 MHz x dB -20.00 dB
CH39	Addemt Spectrum Analyse Decoginal BW 2.1 B1:00:00:00:00:00:00:00:00:00:00:00:00:00
	Transmit Freq Error -2.426 kHz OBW Power 99.00 % x dB Bandwidth 1.224 MHz x dB -20.00 dB
	Addivid Spectrum Analyzer - Docupied BW ISPER PL3 ALSPANICO ODD0125MOCt 24,2017 Frequency Conter Freq 2.480000000 GHz eff Gain:Low See A /// Frequency See A /// Center Freq 2.480000000 GHz Artification Radio Set: None Frequency Frequency In dblaiv Ref Offset 1 dB Ref 10.50 dBm Mkr1 2.4800025 GHz Frequency
CH78	2 2 480000000 GHz 2 480000000 GHz 2 480000000 GHz 2 480000000 GHz
	Center 2.48 GHz Span 2.5 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.667 ms Occupied Bandwidth Total Power 3.56 dBm 1.2393 MHz Transmit Freq Error -4.383 kHz VBW Power 99.00 % 0 Hz x dB Bandwidth 1.236 MHz x dB
	MGO (BTATUS)

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

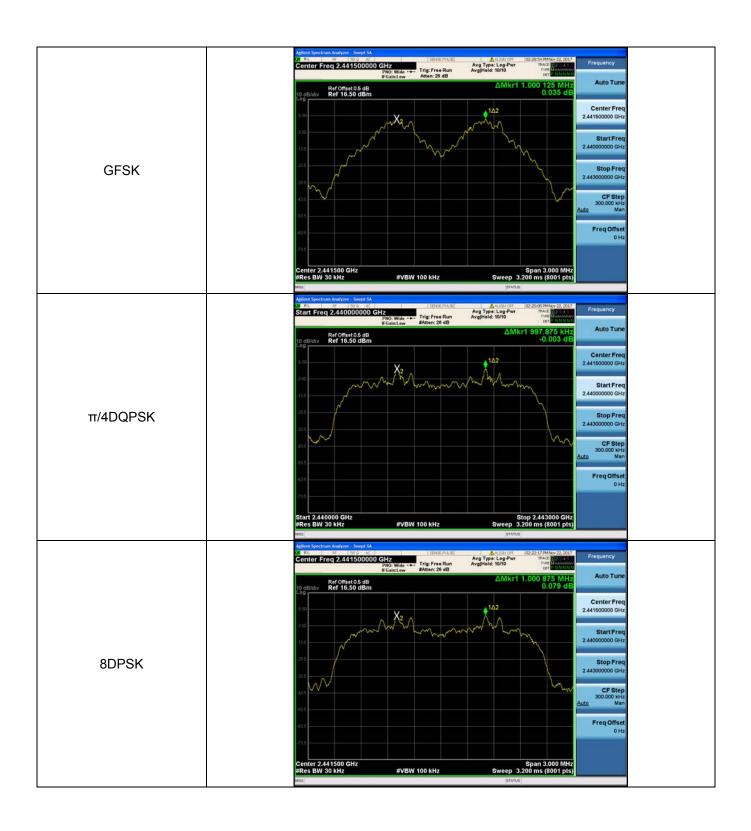
TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	GFSK 39 1.000		≥0.926	Pass
π/4DQPSK	39	0.998	≥0.839	Pass
8DPSK	39	1.000	≥0.824	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

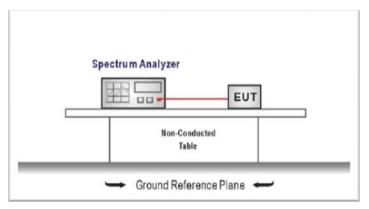


5.6. Hopping Channel Number

LIMIT

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.

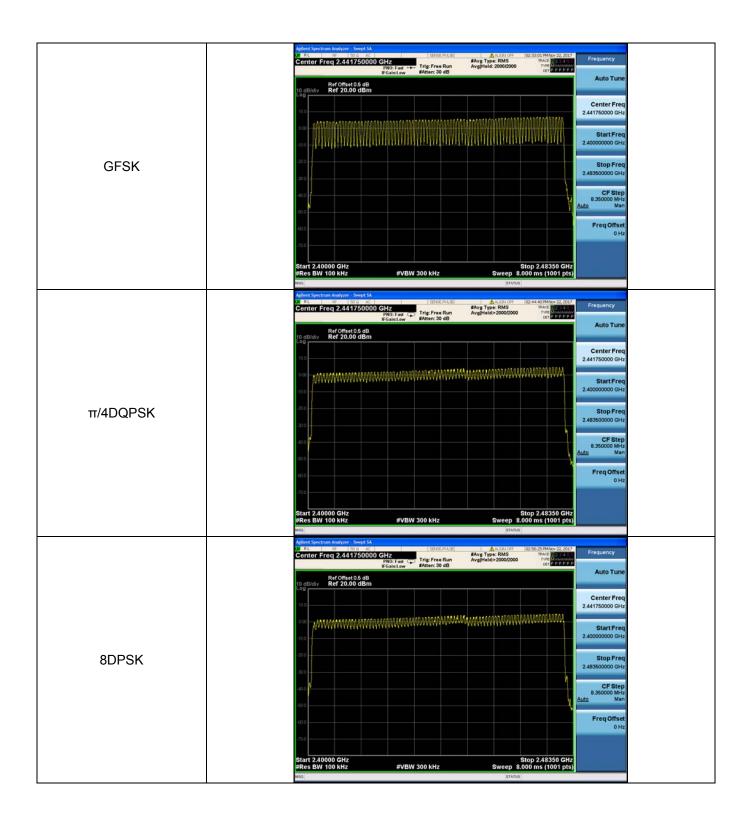
TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

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

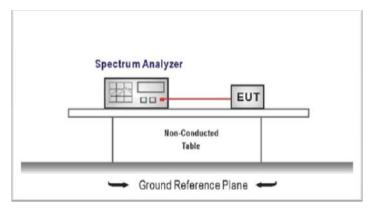


5.7. Dwell Time

<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

☑ Passed □ Not Applicable

Modulation type	Channel	Dwell time (Second)	Limit (Second)	Result	
	DH1	0.131			
GFSK	DH3	0.267	≤ 0.40	Pass	
	DH5	0.310			
	2DH1	0.134			
π/4DQPSK	2DH3	0.267	≤ 0.40	Pass	
	2DH5	0.312			
	3DH1	0.134			
8DPSK	3DH3	0.267	≤ 0.40	Pass	
	3DH5	0.312			

Note:

1. We have tested all mode at high, middle and low channel, and recoreded worst case at middle channel.

 Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second for DH1, 2DH1, 3DH1 Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second for DH3, 2DH3, 3DH3 Dwell time=Pulse time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second for DH5, 2DH5, 3DH5

Modulation Type:	GFSK
DH1	Added Spectrum Acatyons - Swept 53 This Delay-2533 ms. Avg Type: Log Pvr Trig Delay-253 ms. Avg Type: L
DH3	All of the second Analyser - Sough 54 Context Freq 2.441000000 GHz Trig Delay 2.53 ms Avg Type: Log Pur Trig Delay 2.53 ms Avg Type: Log Pur Trig Delay 2.53 ms Center Freq 2.441000000 GHz Freq 2000 dBm Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz 10 a dbtdiv Ref 20.00 dBm 102 Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz Center Freq 2.441000000 GHz 20 a 100 b 100 b 100 b 100 b 100 b 100 b 10 a dbtdiv Ref 20.00 dBm 100 b 100 b 100 b 100 b 10 a dbtdiv Ref 20.00 dBm 100 b 100 b 100 b 100 b 10 a dbtdiv Ref 20.00 dBm 100 b 100 b 100 b 100 b 10 a dbtdiv Ref 20.00 dBm 100 b 100 b 100 b 100 b 10 a 100 b 100 b 100 b 100 b 100 b 100 b 10 a 100 b 100 b 100 b 100 b 100 b 100 b 10 a 100 b 100 b 100 b 100 b 100 b 100 b 10 a 10 b 100 b 100 b 100 b 100 b 100 b 10
DH5	No. Image: No. Context Freq 2.441000000 GHz <





5.8. Pseudorandom Frequency Hopping Sequence

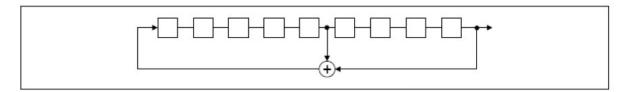
<u>LIMIT</u>

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,forexample: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	77
٦				 1		 1			1	Г	Г
						1		1		L	L
						1		1		L	L
						 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.

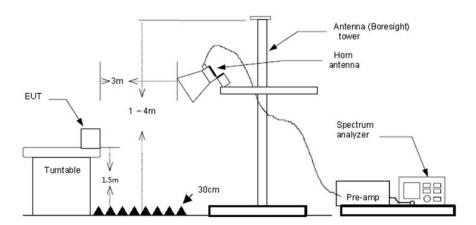
5.9. Restricted band (radiated)

<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	35.93	28.05	6.62	37.65	32.95	74.00	-41.05	Vertical	Peak		
2390.03	45.15	27.65	6.75	37.87	41.68	74.00	-32.32	Vertical	Peak		
2310.00	33.41	28.05	6.62	37.65	30.43	74.00	-43.57	Horizontal	Peak		
2390.03	34.28	27.65	6.75	37.87	30.81	74.00	-43.19	Horizontal	Peak		
2310.00	22.97	28.05	6.62	37.65	19.99	54.00	-34.01	Vertical	Average		
2390.03	23.01	27.65	6.75	37.87	19.54	54.00	-34.46	Vertical	Average		
2310.00	22.18	28.05	6.62	37.65	19.20	54.00	-34.80	Horizontal	Average		
2390.03	22.17	27.65	6.75	37.87	18.70	54.00	-35.30	Horizontal	Average		

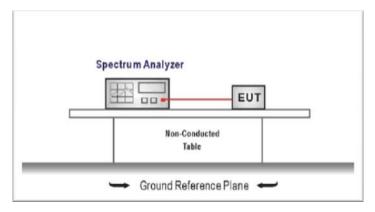
	CH78								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
2483.50	51.78	27.26	6.83	37.87	48.00	74.00	-26.00	Vertical	Peak
2500.00	41.81	27.20	6.84	37.87	37.98	74.00	-36.02	Vertical	Peak
2483.50	57.54	27.26	6.83	37.87	53.76	74.00	-20.24	Horizontal	Peak
2500.00	35.21	27.20	6.84	37.87	31.38	74.00	-42.62	Horizontal	Peak
2483.50	29.07	27.26	6.83	37.87	25.29	54.00	-28.71	Vertical	Average
2500.00	22.50	27.20	6.84	37.87	18.67	54.00	-35.33	Vertical	Average
2483.50	29.85	27.26	6.83	37.87	26.07	54.00	-27.93	Horizontal	Average
2500.00	21.59	27.20	6.84	37.87	17.76	54.00	-36.24	Horizontal	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

☑ Passed □ Not Applicable

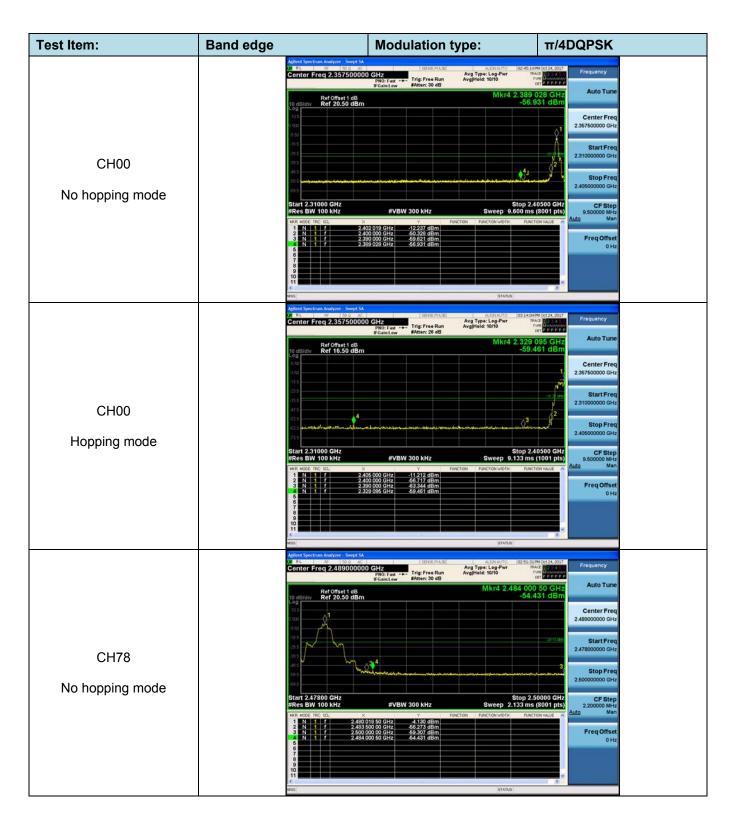
Test Item:	Band edge	Modulation type:	GFSK
CH00 No hopping mode		L 69 105 500 900 135 235 355 595 505 505 505 505 505 505 5	Auto Tune Auto Tune Auto Tune Center Freq 2.35750000 GHz Start Freq 2.1000000 GHz Stop 2.40500 GHz Stop Freq 2.40500000 GHz CF Step 9.50000 MHz Auto Man Freq Offset 0 Hz
CH00 Hopping mode		Addient Spectrum Analyzer, Swyd SA Spectrum Analyzer, Swyd SA Conter Freq 2.357500000 GHz PHO: Lest ++> Trig-Free Run Avg Ireie: Log-Pur Avg Ireie:	00:10:277M-0ct:34:007 Frequency 10:20:277M-0ct:34:007 Auto Tune 10:20:277M-0ct:34:007 Auto Tune 10:20:277M-0ct:34:007 Center Freq -54.576 Center Freq 2:37500000 CHz 2:310000000 CHz Stop 2:40500 CF Step 9:333 Function wuller Function wuller Man Freq Offset 0 Hz
CH78 No hopping mode		Ref offset 1 dB Mkr4 2. 10 dB1/db 10	00:4194HM oct 34, 307 10:4194HM oct 34, 307 10:4194HM oct 34, 307 10:4194HM oct 34, 307 453, 469 dBm 454, 469 dBm 454, 459 dBm 454,

Report No.: TRE1710005601

Page: 35 of 65

Issued: 2017-10-26

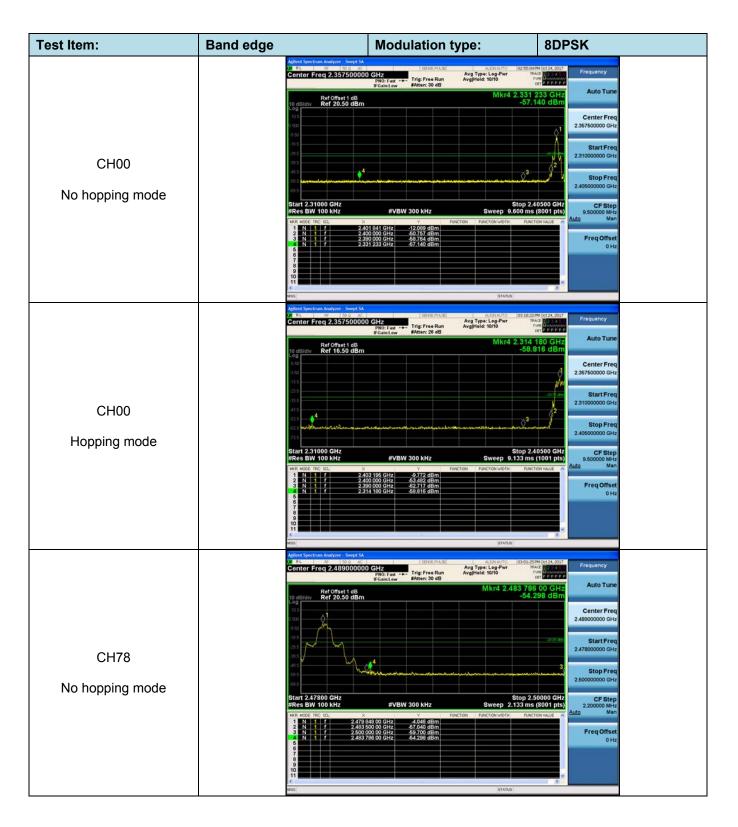
	Aglient Spectrum Analyzer - Swept SA U. R.L. PP 1509 AC Center Freq 2.489000000 CH2 Froin ++ Trig: Free Run Konicutor Sd B Center Freq 2.48900000 CH2 Froin ++ Trig: Free Run Matter: Sd B
	Ref Offset 1 dB Mkr4 2.484 006 GHz 10 dB/div Ref 16.50 dBm -47.092 dBm
	Conter Freq 2.48900000 GHz
CH78	225 335 435 44 4 4 5 4 4 4 5 4 4 4 4 4 4 4 4 4 4 4 4 4
Hopping mode	635 635 735
	Start 2.47800 GHz Stop 2.50000 GHz CF Step 2.20000 GHz 2.20000 MHz 2.2000 MHz 2.20000 MHz 2.20
	1 1 r 2403 500 GHz 510 dBm Freq Offset 3 N 1 r 2500 000 GHz 421 dBm GHz
	Mos BTATUS



Report No.: TRE1710005601

Page: 37 of 65

	Addent Spectrum Analyzer - Swipt SA Of RL IP 1002 AC 1906 PA38 AUDITO 0015652PM 00124 3037 Center Freq 2.498000000 GHz FP0in Fun ++- Frequency Avg(Hold: 1010 101 101 101 101 101 101 101 101 1
	Ref Offset 1 dB 10 dB/div Ref 16.50 dBm -57.568 dBm
	6.00 5.00 1.15 1
CH78	325 Start Free 325 W1 2 44 23
Hopping mode	535 March 2 635 March 2 735 March 2 735
nopping mode	Start 2.47800 GHz #Res BW 100 kHz Stop 2.50000 GHz #VBW 300 kHz Stop 2.50000 GHz Sweep 2.133 ms (1001 pts) Hor wood, file 50. x y Function Function worth
	1 N 1 7 2476 02 0Hz 4783 dBm 2 N 1 7 2483 500 0Hz 406 82 dBm 3 N 1 7 250 000 0Hz 409 82 dBm 7 N 1 7 250 000 0Hz 499 81 dBm 6 6 4 40 0Hz 400 0Hz 40



Report No.: TRE1710005601

Page: 39 of 65

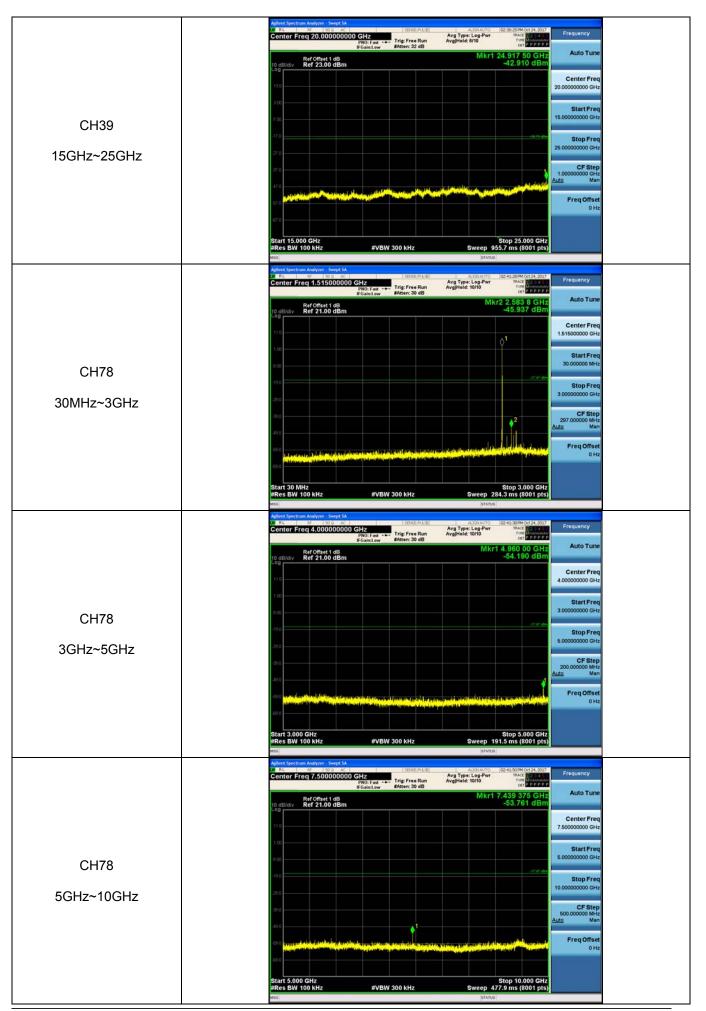
	Agilent Spectrum Analyzer - Swrgt SA. ISPREPARE ALISHAFTO IO2 000000000000000000000000000000000000
	Ref Offset 1 dB Mkr4 2.497 998 GHz Auto Tun 10 dB/div Ref 16.50 dBm -56.823 dBm
	8.00 3.00 13.5 Center Fre 2.489000000 GH
CH78	025 036 036 037 037 037 037 037 04 037 04 04 04 04 04 04 04 04 04 04 04 04 04
Hoppig mode	635 W W 2 635 Stop Fre 735 Stop Fre 735 Stop Fre
	Start 2.47800 GHz Stop 2.50000 GHz CF Step 2.50000 GHz 2220000 MH #Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (1001 Hz) 2220000 MH Mer/ work fire do. X Y Punction Punction work Punction work 1 N 1 2.490 024 GHz -4.474 dBm Punction work Punction work Punction work
	1 N 1 7 2443 560 CH2 3444 68m 3 N 1 7 2483 560 CH2 4313 100 Bm 5 3 N 1 7 2483 560 CH2 439 333 dBm 5 6 6 N 1 7 2489 598 CH2 45 333 dBm 6 0 H 6 7 2497 998 CH2 46 5/23 dBm 0 0 0 H 9 <td< td=""></td<>
	STATUS

Shenzhen Huatongwei International Inspection Co., Ltd.

Test Item:	SE		Modulation	type:	GFS	SK
		Aglent Spectrum Analyzer - Swept SA D. RC RC RC SO 2 AC Center Freq 1.515000000	GHZ PN0: Fast →→ Trig: Free Run	ALIGNAUTO (0 Avg Type: Log-Pwr Avg[Hold: 10/10	2:28:50 PM Oct 24, 2017 TRACE 2 3 4 5 TYPE MUSCOUNT DET P P P P P P	Frequency
		Ref Offset 1 dB	PN0: Fast Trig: Free Run IFGain:Low #Atten: 30 dB		2.557 8 GHz -45.559 dBm	Auto Tune
		Log 11.0				Center Freq 1.515000000 GHz
		1.00				Start Freq 30.000000 MHz
CH00		-19.0				Stop Freq
30MHz~3GHz		-29.0			-3441.094	3.00000000 GHz
		-39.0			¢ ²	CF Step 297.00000 MHz Auto Man
			energi katalan da takta ata dala sedar		il de três de la serie	Freq Offset 0 Hz
		403.0			Stop 3.000 GHz	
		Start 30 MHz #Res BW 100 kHz Msc	#VBW 300 kHz	Sweep 284.	Stop 3.000 GHz 3 ms (8001 pts)	
		Aglent Spectrum Analyzer - Swept SA D. RL IP 50 0 AC Center Freq 4.000000000	CH2 PN0: Fast ++- IFGain:Low #Atten: 30 dB	ALIGNAUTO (0 Avg Type: Log-Pwr Avg[Hold: 10/10	2:29:00 PM Oct 24, 2017 TRACE	Frequency
		Ref Offset 1 dB	IFGainClow PAtten: 30 db	Mkr1 3	.173 50 GHz -56.774 dBm	Auto Tune
		11.0				Center Freq 4.000000000 GHz
		1.00				Start Freq 3.000000000 GHz
CH00		-19.0			3441389	Stop Freq 5.00000000 GHz
3GHz~5GHz		-29.0				CF Step 200.000000 MHz
		-49.0				<u>Auto</u> Man
		69.0 en o				Freq Offset 0 Hz
		Start 3.000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sween 101	Stop 5.000 GHz 5 ms (8001 pts)	
		MSG Agilent Spectrum Analyzer - Swept SA		STATUS		
		Center Freq 7.50000000	CH2 PN0: Fast +++ IFGain:Low IFGain:Low	Avg Type: Log-Pwr Avg Hold: 10/10	2:29:127M Oct 24, 2017 194CE 2 3 4 TVPE 00 P P P P	Frequency Auto Tune
		10 dB/div Ref 21.00 dBm		Mkr1 9.	416 250 GHz -56.250 dBm	
		11.0				Center Freq 7.500000000 GHz
CH00		9.00				Start Freq 5.00000000 GHz
		-19.0			-3441 dbs	Stop Freq 10.000000000 GHz
5GHz~10GHz		-39.0				CF Step 500.000000 MHz
		-49.0	Mineterstealistic francisco de la constructione			Auto Man Freq Offset
		0.63				0 Hz
		Start 5.000 GHz #Res BW 100 kHz	#VBW 300 kHz	S Sweep 477.	op 10.000 GHz 9 ms (8001 pts)	
		MSG		STATUS		

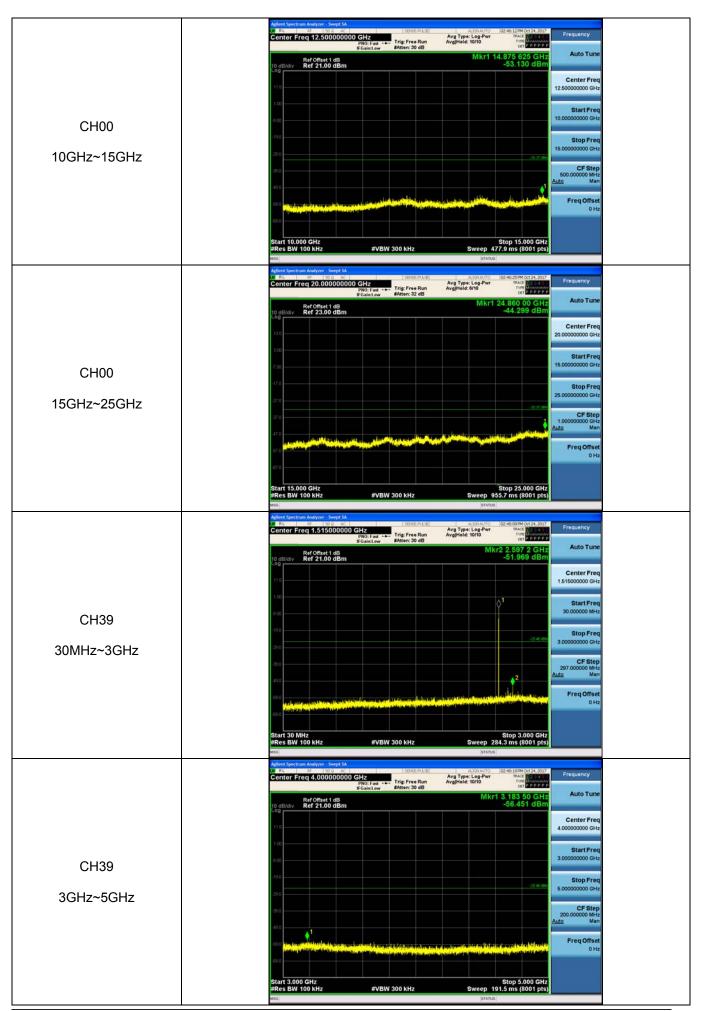
	Adlent Spectra Audyzer, Swyd SJ 27 R Stor at Stor at Stor at Storage
	Ref Offset 1 dB Mkr1 13.690 000 GHz Add 0 Tune
	Center Freq
	110 12.50000000 GHz
	9 00 Start Freq 10.00000000 GHz
CH00	JTO Stop Freq
	270
10GHz~15GHz	5010 CF Step 500.000000 MHz Auto Man
	Start 10.000 GHz Stop 15.000 GHz
	Start 10.000 GHz Stop 15.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts) mso [starts]
	Adlend Synctram Analyzer - Swyd Sh 2 H 10 10 20 20 20 20 20 20 20 20 20 20 20 20 20
	IFGainLow #Atten: 32 dB Control Auto Tune
	Ref Offset 1 dB Mkr1 24.921 25 GHz 10 dB/d/v Ref 23.00 dBm Cr3 -44.599 dBm
	130 Center Freq 20.00000000 GHz
	3100 Start Freq 15.00000000 GHz
CH00	
15GHz~25GHz	270 Stop Freq 25.00000000 GHz
	37.0 CF Step 1.0000000 GHz
	670 FreqOffset
	47.0
	Start 15.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 955.7 ms (8001 pts)
	MIG BITATUS ANALYSE - Swyle SA Adlent Synchram Analyse - Swyle SA All Strangen and San and
	Agiliers Spectrum Analyzer - Smyth SA OT R. All 100 Act Spectrum Analyzer - Smyth SA Centor Frog 1.515000000 GHz PND: Fast +- BFGsitter, Watter 20 dB
	Bart Offset 1 dB Mkr2 2.545 2 GHz Auto Tune 10 dB/d/w Ref 21.00 dBm -45.038 dBm
	110 Center Freq 1.6.1500000 GHz
	100 Q1 Start Freq
CH39	9.00 30.000000 MHz
	-1950
30MHz~3GHz	220 CESten
	30.0 297.000000 MHz Auto Man
	600 and the second and the second sec
	Start 30 MHz Stop 3.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 284.3 ms (8001 pts)

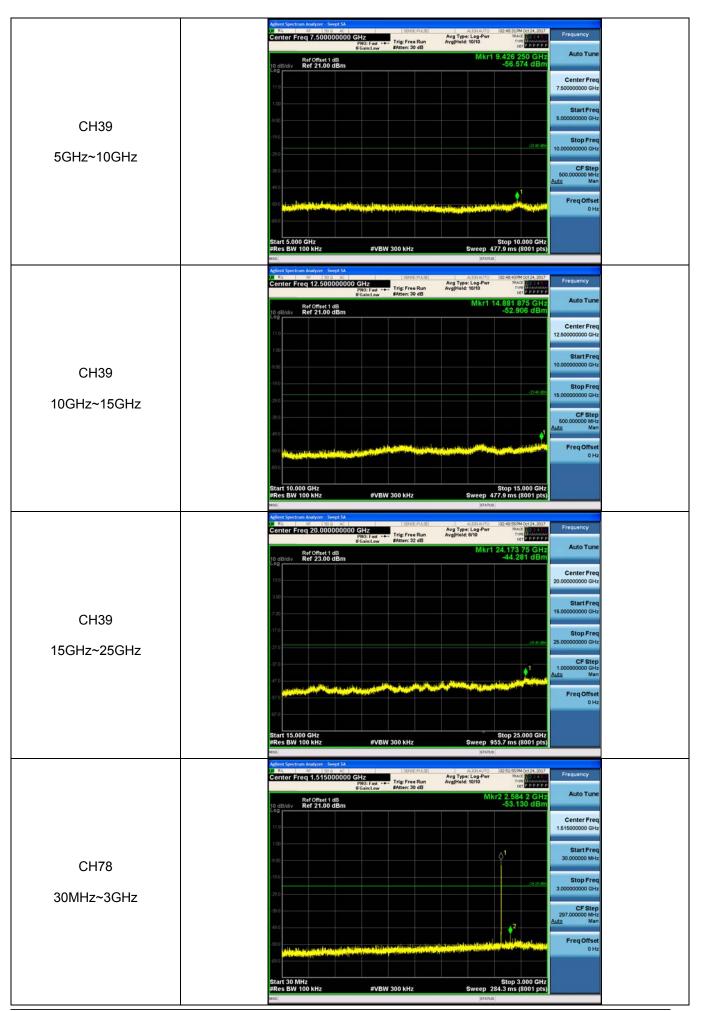
l I	Addust Spectrum Analyzer - Smert SL
	Adjener Swight St. August St.
	IFGaint.ew #Atten: 30 dB Mint 4 000 CH Auto Tune
	Nkr1 4.822 00 GHz 10 dB/div Ref 21.00 dBm 10 dB/div 10 dB/di 10 dB/di 10 dB/div 10 dB/div 1
	110 Center Freq 4.00000000 GHz
	100
	9 00 Start Freq 3.0000000 GHz
CH39	-170
	5.00000000 GHz
3GHz~5GHz	200.00000 MHz
	200.000000 MHz Auto Man
	Freq Offset
	Start 3.000 GHz Stop 5.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 191.5 ms (8001 pts)
	MNG (TATUS)
	Addent Synchrain Audyzer - Swedt SA.
	PNO: Fast Figure Run Avginera, brite con Constant
	De dB/div Ref Offset 1 dB Ref 21.00 dBm Mkr1 7.323 125 GHz Auto Tune -53.756 dBm
	Center Freq 110 7,50000000 GHz
	7,5000000 GH2
	5.0000000 GHz
CH39	
	4000 Stop Freq 10.00000000 GHz
5GHz~10GHz	
	000 CF Step 500.00000 MHz Auto Man
	60 ° providelje stale stale stranije na stranije providenje provid
	Start 5.000 GHz Stop 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts)
	#Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts)
	Addrest Spectrum Analyzer _Swigt 54. 2012 Address 2012 Ad
	FNO: Fast #Atten: 30 dB Let DPPPP
	Ref Offset 1 dB Mkr1 14.989 375 GHz Auto Tune 10 gB/div Ref 21.00 dBm -52.069 dBm
	Center Freq
	11.0 12.500000000 GHz
	100 Start Freq
CH39	900 10.000000000 GHz
	-17.0 Stop Freq
10GHz~15GHz	25.0
	50.0 00000 MHz
	49.0 Auto Man
	60 0 Instantion of the second se
	Start 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts)
	#Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts)

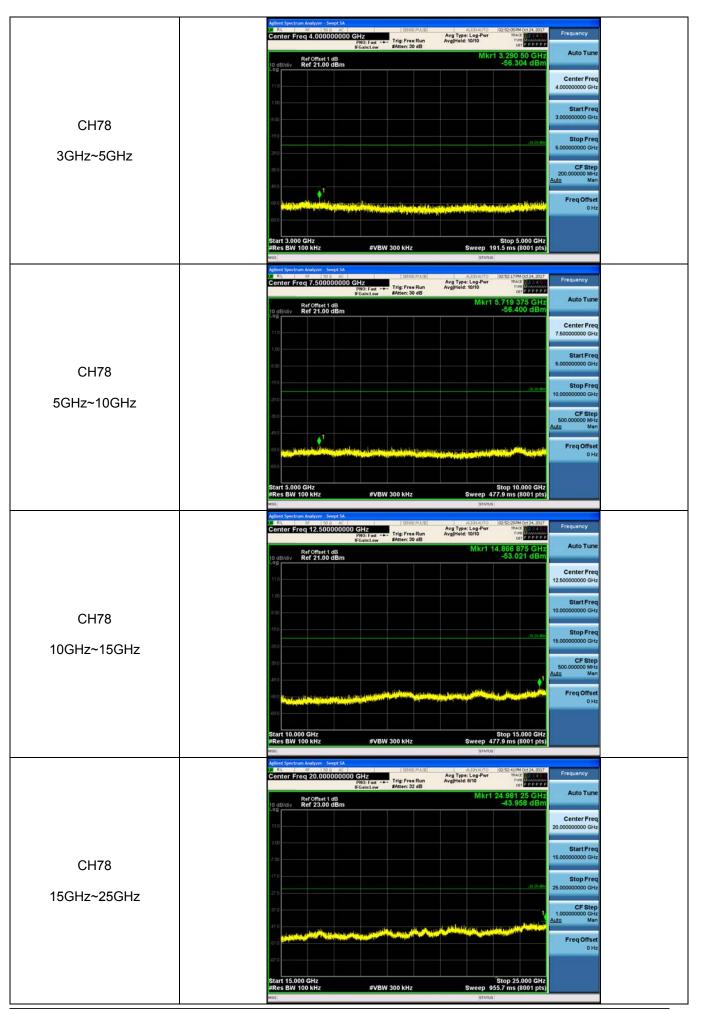


	Agtient Spectrum Analyzer - Swypt SA 00 RL 19 10 a. ac SERVE PAJE ALIOHAUTO (02:42:02PM Oct 2	i san
	Center Freq 12:5000000000 CHz ISER PASE Center Freq 12:5000000000 CHz Trig: Free Run Avgirleid: 10/10 Trig: Rea PHO: Fat Trig: Free Run Avgirleid: 10/10 Trig: Rea	4,2017 Frequency
	Ref Offset 1 dB Mkr1 14.925 625 10 dB/div Ref 21.00 dBm -53.035 (GH2 Auto Tune
		Center Freq 12.50000000 GHz
	1.00	Start Freq
CH78	110	10.00000000 GHz
10GHz~15GHz	22.0	Stop Freq 15.00000000 GHz
	.300	CF Step 500.000000 MHz Auto Man
		Freq Offset 0 Hz
	Start 10.000 GHz Stop 15.000 #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (800 #Stop 15.000 Istatus	GHz 1 pts)
	PHO: Fast →→ Trig: Free Run Avg[Held: 6/10 Trie Run IFGainLow #Atten: 32 dB	PPPP
	NKC1 24,209 75 10 dB/div Ref 23.00 dBm - 44.008 (-00	
	130	Center Freq 20.00000000 GHz
CH78	7.00	Start Freq 15.00000000 GHz
CITO	-17.0	LAL OF
		Stop Freq 25.00000000 GHz
15GHz~25GHz	37.0	25.00000000 GHz
15GHz~25GHz		25.00000000 GHz CF Step 1.00000000 GHz Auto Man
15GHz~25GHz		25.00000000 GHz CF Step 1.00000000 GHz
15GHz~25GHz		25 0000000 GHz CF Step 1.0000000 GHz <u>Auto</u> Man Freq Offset 0 Hz

Fest Item:	SE	Modulation	type:	π/4DQP	SK
	Aglent Spectra Tal. Russel Center Fr	m Analyzer - Swept SA 10 20 20 RC 00 1.515000000 GHz IFGainLow IFGainLow #Atten: 30 dB	ALIGNAUTO [02:4 Avg Type: Log-Pwr Avg[Hold: 10/10	R:38FM Oct 24, 2017 TRACE D2 14 TYPE MULLING RT D2 P P P P	ency
		IFGain:Low #Atten: 30 dB Ref Offset 1 dB Ref 21.00 dBm	Mkr2 1		to Tune
	11.0				ter Freq 1000 GHz
	1.00				artFreq
CH00	-19.0		¢1		000 MHz
	-29.0			3.000000	op Freq 1000 GHz
30MHz~3GHz	-39.0		2	297.000 Auto	CF Step 1000 MHz Man
	49.0	na na provinse na kale je jednik na tra postan problem konstruktiva se i kale i kale kale se i kale i kale kale	and the second	Free Pres	q Offset
	60 0				0 Hz
	Start 30 M #Res BW	Hz 100 kHz #VBW 300 kHz	Sweep 284.3	op 3.000 GHz ms (8001 pts)	
	MSG		STATUS		
	COT RL	m Analyzer - Swept SA IF 50 Q AC SENSE PAJE eq 4.0000000000 GHz	ALIGNAUTO (02:4 Avg Type: Log-Pwr Avg[Hold: 10/10	5/45FM Oct 24, 2017 TRACE DEFICIENT	ency
		PND: Fast Trig: Free Run IFGain:Low #Atten: 30 dB Ref 0ffset 1 dB Ref 21.00 dBm	Mkr1 3.	182 00 GHz 7.107 dBm	to Tune
		Ref 21.00 dBm			ter Freq
	1.00				artFreq
CH00	e 00			3.000000	
3GHz~5GHz	-19:0			St 5.000000	op Freq 1000 GHz
36HZ-36HZ	-39.0			200.000 Auto	CF Step 1000 MHz Man
	49.0	and the second s			qOffset
	69 0				0 Hz
	Start 3.000 #Res BW) GHz 100 kHz #VBW 300 kHz	Sweep 191.5	op 5.000 GHz ms (8001 pts)	
	MSG Agilent Spectru	an Analyzer - Swept SA	STATUS		
	Center Fr	eq 7.50000000 GHz PN0: Fast	ALIGNAUTO (02-4 Avg Type: Log-Pwr Avg Hold: 10/10	DET PPPPP	
	10 dB/div	Ref Offset 1 dB Ref 21.00 dBm	Mkr1 9.4	78 750 GHz Au 54.911 dBm	to Tune
	11 D			Cen 7.500000	ter Freq 1000 GHz
01100	4.00			St. 5.00000	art Freq 1000 GHz
CH00	-19.0				op Freq
5GHz~10GHz	-29.0			02.32.00	-
	- 38 0 - 49 0			500.000 Auto	CF Step 1000 MHz Man
	-59 0		Nederate in a second state of a	Fre	q Offset 0 Hz
	0.60				
	Start 5.000 #Res BW) GHz 100 kHz #VBW 300 kHz	Sto Sweep 477.9	p 10.000 GHz	

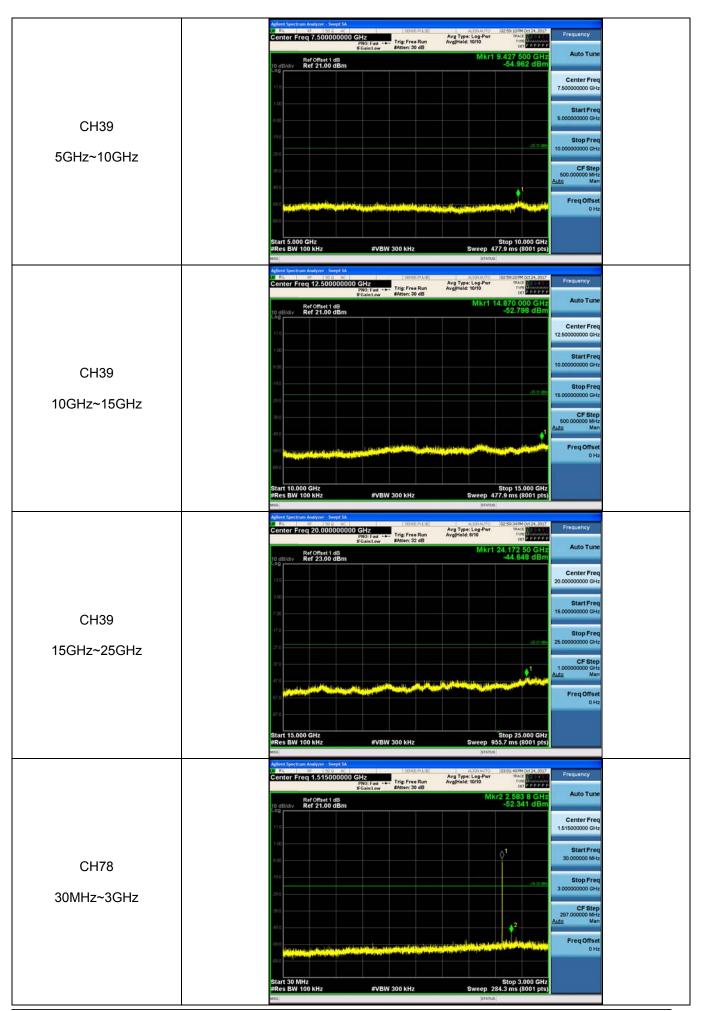


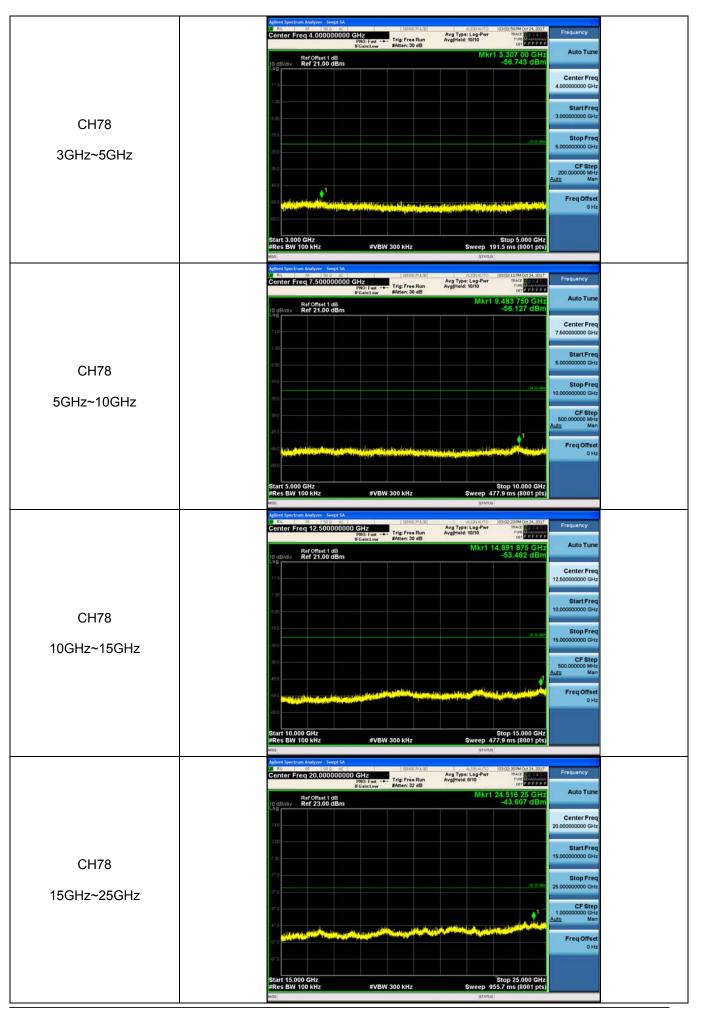




Test Item:	SE		Modulation t	ype:	8DPSK	
			PNO: Fast IFGaintLow #Atten: 30 dB		SSPM Oct 24, 2017 TAGE 12 Sectors out public properties SOS 9 CLUZ	
		10 dB/div Ref 21.00 dBm		-54	.954 dBm Center F	Freq
		1.00			1.515000000 Start F	Freq
CH00		-19.0		¢ ¹	30.000000 Stop F	Freq
30MHz~3GHz		-29.0			3.000000000 -3311.02 CF 5 297.000000	
		49.0	(provident a second second related and	aristelihoon tarakan data data data data data data data da	Auto Freq Of	Man
		Start 30 MHz #Res BW 100 kHz		Sweep 284.3 m		
		#Res BW 100 kHz Miss Addient Spectrum Analyzer - Swept SA	#VBW 300 kHz	STATUS		_
		Center Freq 4.000000000	SHE PLE PND: Fast IFGain:Low #Atten: 30 dB	Avg Hold: 10/10	SPROct 24, 2017 Trace Department cer Department 59 75 GHZ 323 dBm	
		11.0			Center F 4.000000000	
CH00		-19.0			Start F 3.000000000 Stop F	GHz
3GHz~5GHz		-29.0			5.000000000 -3211109 CF S 200.000000	GHZ
			and the second		Auto Freq Of	Man
		di o Start 3.000 GHz	an an ann an		p 5.000 GHz	U AZ
		#Res BW 100 kHz triss Agilent Spectrum Analyzer - Swept SA	#VBW 300 kHz	Sweep 191.5 m	s (8001 pts)	
		Center Freq 7.50000000 C	PNO: Fast Trig: Free Run #Atten: 30 dB	Algonation (02:551 Avg Type: Log-Pwr Avg Hold: 10/10 Mkr1 9.411 -56	OFMOCI24, 2017 TAGE D 2 SE T TYPE D P P P P 3 775 GHz Auto T 850. dBm	
		10 dB/div Ref 21.00 dBm			Center F 7.50000000	
CH00		4.00			Start F 5.000000000	
5GHz~10GHz		-29.0			Stop F 10.000000000 -2211000	GHZ
		-60			CF 5 500.000000 Auto Freq Of	Man
		48 0	n hann an brinn an long hann an direction and the state of the state o			0 Hz
		Start 5.000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop Sweep 477.9 m	10.000 GHz is (8001 pts)	

	Addres Spectrum Audyrer - swys 53 Of No. 1990 A 20 Center Freq 12,500000000 CH2 Ph0; Feat Trig: Free Run - August Trig: Free Run - August Trig: Free Run - Trig: Free Run - Trig: Free Run
	IFGaintow #Atten: 30 dB Auto Tune
	10 dBldiv Ref 21.00 dBm -54.188 dBm
	11.5 Center Freq 12.5000000 GHz
	1.00 StartFreq
CH00	9 00 10.00000000 GHz
	110 Stop Freq 15.0000000 GHz
10GHz~15GHz	310
	49.0 49.0 49.0 49.0 49.0 49.0 49.0 49.0
	60 0 an interpret of the product of the state of the stat
	Start 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (8001 pts)
	NEG (ISTATUS) Adlert Spectrum Analyze - Swept SA
	Center Freq 20.00000000 GHz Aug Type: Log-Pwr TRACE
	IFGaint.ow #Atten: 32 dB
	Ref Officet 1 dB WIKT 24,476 25 GHz 10 dBldiv Ref 23.00 dBm -44.319 dBm Center Freq
	130 20.00000000 GHz
	3:00 Start Freq 15:0000000 GHz
CH00	
15GHz~25GHz	27.0 Stop Freq 25.0000000 GHz
136112-236112	370
	47.5 Auto Man
	60 FreqOffset
	Start 15.000 GHz Stop 25.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 955.7 ms (8001 pts)
	MSG STATUS
	Agilent Spectrum Analyzer - Swept SA
	Addret Spectrum Analyzer - Swept SA ISPREPARE ALIONATO Q0259-69000000 Control Freq 1.5150000000 Control Freq 1.5150000000 Control Freq 1.5150000000 Frequency Avg Type: Log -Pur Title: Free Run Freq
	Centor Freq 1.515000000 CHz Provide Characteria Chara
	Center Freq 1.515000000 CH2 MR0 Fat BrGaintaw File Res Conter Freq 1.515000000 CH2 BrGaintaw File Res Conter File Res
	Center Freq 1.515000000 GHz PRO: Fast PRO: Fast
01100	Center Freq 1.515000000 CH2 MR0 Fat BrGaintaw File Res Conter Freq 1.515000000 CH2 BrGaintaw File Res Conter File Res
CH39	Center Freq 1.515000000 GHz Frequency Freq Frequency Frequency Frequency Frequency Frequency
CH39 30MHz~3GHz	Center Freq 1.515000000 CH2 Trig: Free Run BrGaint.aw Avg Type: Leg-Fw Twict Type: Leg-Fw
	Center Freq 1.515000000 CH2 PRO: Fast
	Ref Offset 1 dB Max Type: Leg Free Avg Type: Leg Free Truct Type: Leg Fr
	Center Freq 1.515000000 CH2 PRO: Fast
	Ref Offset 1 dB Mit Fast ++ Trig: Free Run BrGainLaw Avg Type: Leg Free Avg/Heid: 1070 Trig: Guidant FreqUency 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Auto Tune 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Ref Offset 1 dB 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Ref Offset 1 dB 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Ref Offset 1 dB 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Ref Offset 1 dB 10 dBIdiv Ref Offset 1 dB Mit r2 2.544 & SGHZ Ref Offset 1 dB 10 dBIdiv Ref Offset 1 dB Start Freq 30.00000 MHZ 10 dBIdiv Start Freq 30.00000 MHZ Start Freq 10 dBIdiv Start Freq 30.00000 MHZ Start Freq 10 dBIdiv Start Freq Start Freq 30.00000 MHZ 10 dBIdiv Start Freq Start Freq 30.000000 MHZ 10 dBIdiv Start Freq Start Freq 30.000000 MHZ 10 dBIdiv Start Freq Start Freq 30.000000 MHZ 20 dBIdiv Start Freq Start Freq 30.000000 MHZ 21 dBIdiv Start Freq Start Freq Start Freq 22 dBIdiv Start Freq
	Center Freq 1.515000000 GHz Bito: Fast +== Trig: Free Run Gallediv Ref Offset 1 dB 10 dBldiv Ref Offset 1 dB 10 dBldiv Ref Offset 1 dB 10 dBldiv Ref 21.00 dBm 10 dBldiv 10 d
	Center Freq 1.515000000 GHz Trig: Free Run BrGainLaw Avg Type: Leg Free AvgIPid: 1000 Trig: Free Run AvgIPid: 1000 Frequency 10 dBIdity Ref Offset 1 dB Mkr2 2.544 8 GHz GHZ 10 dBIdity Ref Offset 1 dB Mkr2 2.544 8 GHz GHZ 10 dBIdity Ref Offset 1 dB Mkr2 2.544 8 GHZ Center Freq 1.51500000 GHz 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ GHZ GHZ 10 dBIdity Ref Offset 1 dB GHZ GHZ GHZ GHZ GHZ GHZ GHZ 10 dBIDIT GHZ GHZ GHZ GHZ GHZ GHZ GHZ <td< td=""></td<>
	Center Freq 1.515000000 GHz Ref Offset 1 dB Ref Offset
	Avg Type: Leg Put With Control Avg Type: Leg Put With Control Frequency Mith: For an and the second of
	Center Freq 1.515000000 GHz Ref Offset 1 dB Ref Offset
	Center Freq 1.515000000 GHz Main Frances Main Frances Main Frances Main Frances Main Frances Main Frances Frances Frances Main Frances Frances Auto Tune 0 dbiddy Ref Offset 1 dB Mix 2 2 544 8 GHz Mix 2 2 544 8 GHz Auto Tune 10 dbiddy Ref Offset 1 dB Mix 2 2 544 8 GHz Generation Genet of theading frameword frameword frameword frameword
30MHz~3GHz	Center Freq 1.515000000 GHz Mag Type Leg Fue Mag Type Leg Fue Trice Fue Frequency Avg Type Leg Fue Mag Type Leg Fue Trice Fue Avg Type Leg Fue
	Center Freq 1.515000000 GHz Yes Tree Freq Units Avg Tree Leg Free Tree Office 1 dB Ref Office 1 dB Mkr2 2.644 GGHZ 10 GGHZ Start 20 dB 110 GGHZ GGHZ 120 GG
30MHz~3GHz	Center Freq 1.515000000 GHz Avg Type: Log-Port Time Market State Ref Offset1 dB Mkr2 2.545 g GHz Auto Tune 100 -52.372 dBm -52.372 dBm 100 -52.372 dBm Center Freq 100 -22 -22 200 -22 -22 200 -22 -22 200 -22 -22 200 -22 -22 200 -22 -22 200 -22 -22 200 -200 -200
30MHz~3GHz CH39	Center Freq 1.515000000 GHz Yes Tree Freq Units Avg Tree Leg Free Tree Office 1 dB Ref Office 1 dB Mkr2 2.644 GGHZ 10 GGHZ Start 20 dB 110 GGHZ GGHZ 120 GG
30MHz~3GHz CH39	Genter Freq 1.515000000 GHz Trig Free Run Bröckner 3 of B Arg Type: Log Fur Argehele: 100 B Frequency Ref Offret 1 dB Mkr2 2.54 8 GHz Center Freq 1.51500000 GHz Center Freq 1.51500000 GHz 10 GBM/V Ref 21.00 dBm -52.372 GBm Center Freq 1.51500000 GHz 10 GBM/V Ref 21.00 dBm -52.372 GBm Center Freq 1.51500000 GHz 10 GBM/V Ref 21.00 dBm -52.372 GBm Center Freq 1.51500000 GHz 10 GBM/V Ref 21.00 dBm -52.372 GBm Center Freq 1.51500000 GHz 10 GBM/V Ref 71.00 dBm -52.372 GBm Center Freq 1.51500000 GHz 10 GBM/V Ref 71.00 dBm -52.372 GBm Center Freq 3.0000000 GHz 10 GBM/V Ref 71.00 dBm -55.522 GBm Center Freq 0.12 GBM/V 10 GBM/V Ref 71.00 dBm -55.522 GBm Frequency 4.000000000 GHz 10 GBM/V Ref 71.00 dBm -55.522 GBm Frequency 4.000000000 GHz 10 GBM/V Ref 71.00 dBm -55.522 GBm Frequency 4.000000000 GHz 10 GBM/V Ref 71.00 dBm -55.522 GBm Stop Freq 3.000000000
30MHz~3GHz CH39	Center Freq 1.515000000 GHz Fr G Offre 1 dB 10 dBlody Ref 21.00 dBm Center Freq 10 dBlody Ref 21.00 dBm Center Freq 20 dBlody Ref 21.00 dBm
30MHz~3GHz CH39	Center Freq 1.51500000 GHz Ref Ornet 1 B 10 distant with the second of
30MHz~3GHz CH39	Genter Freq 1.515000000 GHz Trig free Rin Broans and Margined States Arg Type: Log Fur Argined States Trig Type Rin Argined States Mkr2 2.54 8 GHz States Auto Tune 10 GBMV Ref 21.00 dBm -52.372 dBm Center Freq 1.51500000 GHz Center Freq 1.51500000 GHz Center Freq 1.51500000 GHz 10 GBMV Ref 21.00 dBm -52.372 dBm Center Freq 1.51500000 GHz Center Freq 1.51500000 GHz 10 GBMV Ref 21.00 dBm -52.372 dBm State Freq 3.0000000 Hz State Freq 3.0000000 Hz 10 GBMV Ref 21.00 dBm -52.372 dBm State Freq 3.0000000 Hz State Freq 3.0000000 Hz 10 GBMV Ref 21.00 dBm -52.372 dBm State Freq 3.0000000 Hz State Freq 3.0000000 Hz 10 GBMV Ref 21.00 dBm -52.372 dBm Ref 21.00 dBm Freq 0frset 0.12 10 GBMV Ref 21.00 dBm -52.372 dBm Ref 21.00 dBm Freq 0frset 0.12 10 GBMV Ref 21.00 dBm -52.372 dBm Ref 21.00 dBm Freq 0frset 0.12 0.12 10 GBMV Ref 21.00 dBm -52.372 dBm Ref 21.00 dBm -55.342 dBm Frequency 10 GBMV Ref 21.00 dBm -55.342 dBm -55.342 dBm -55.342 dBm <td< td=""></td<>





5.11. Spurious Emissions (radiated)

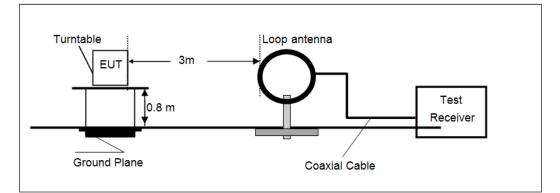
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

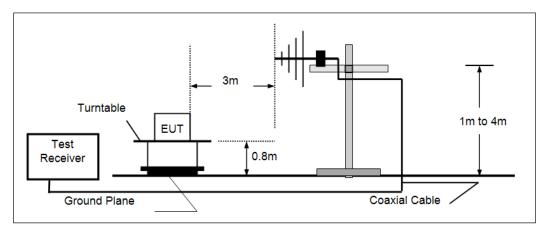
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

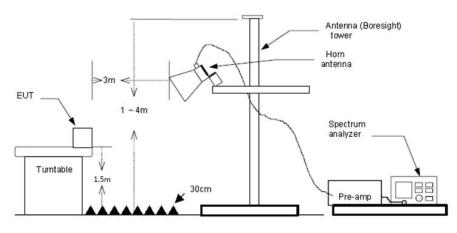
Below 30 MHz



> 30 MHz ~1000 MHz



> Above 1 GHz



TEST PROCEDURE

- 1. The EUT was tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was positioned 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.
- 5. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz, RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detectoris 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.
 - (3) Above 1 GHz, 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

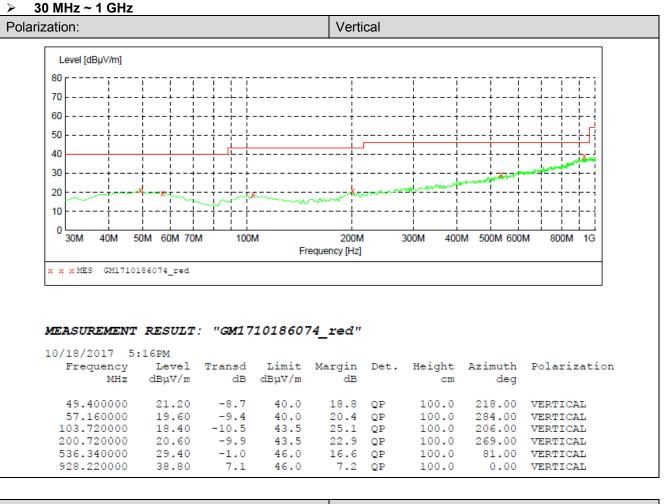
☑ Passed □ Not Applicable

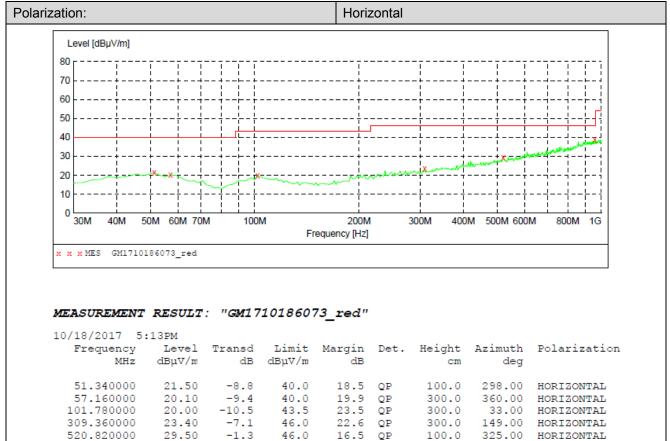
Note:

- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst case, so only the worst case's data on the test report.
- 4) Above 1 GHz, 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
- 5) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

➢ 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.





38.80

7.3

46.0

7.2 QP

300.0

957.320000

Report Template Version: H01 (2017-09)

98.00 HORIZONTAL

> Above 1 GHz

	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		
1795.84	46.79	25.39	5.95	37.13	41.00	74.00	-33.00	Vertical	Peak		
2987.92	39.88	28.59	7.47	38.24	37.70	74.00	-36.30	Vertical	Peak		
4809.50	42.82	31.58	9.55	36.93	47.02	74.00	-26.98	Vertical	Peak		
7840.75	33.00	36.35	13.06	34.96	47.45	74.00	-26.55	Vertical	Peak		
1791.27	39.44	25.38	5.94	37.12	33.64	74.00	-40.36	Horizontal	Peak		
3291.39	45.50	28.25	7.83	38.36	43.22	74.00	-30.78	Horizontal	Peak		
4354.97	35.27	30.37	9.09	37.58	37.15	74.00	-36.85	Horizontal	Peak		
7209.02	36.06	36.21	11.87	35.07	49.07	74.00	-24.93	Horizontal	Peak		

	CH39										
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		
1782.18	43.69	25.37	5.93	37.10	37.89	74.00	-36.11	Vertical	Peak		
3283.02	45.11	28.30	7.82	38.35	42.88	74.00	-31.12	Vertical	Peak		
4883.52	39.47	31.43	9.59	36.73	43.76	74.00	-30.24	Vertical	Peak		
7338.62	37.05	36.30	12.01	34.90	50.46	74.00	-23.54	Vertical	Peak		
1605.55	40.15	24.92	5.58	36.73	33.92	74.00	-40.08	Horizontal	Peak		
3283.02	45.54	28.30	7.82	38.35	43.31	74.00	-30.69	Horizontal	Peak		
4883.52	43.15	31.43	9.59	36.73	47.44	74.00	-26.56	Horizontal	Peak		
7319.96	36.49	36.30	11.99	34.92	49.86	74.00	-24.14	Horizontal	Peak		

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
1487.51	42.37	25.81	5.25	36.57	36.86	74.00	-37.14	Vertical	Peak
3184.25	37.49	28.80	7.70	38.20	35.79	74.00	-38.21	Vertical	Peak
3993.90	42.09	29.70	8.77	38.11	42.45	74.00	-31.55	Vertical	Peak
6628.18	32.76	34.20	11.39	35.31	43.04	74.00	-30.96	Vertical	Peak
1764.12	55.57	25.33	5.89	37.06	49.73	74.00	-24.27	Horizontal	Peak
3291.39	44.40	28.25	7.83	38.36	42.12	74.00	-31.88	Horizontal	Peak
4958.68	43.31	31.46	9.64	36.52	47.89	74.00	-26.11	Horizontal	Peak
7451.57	36.90	36.20	12.24	34.86	50.48	74.00	-23.52	Horizontal	Peak

6. TEST SETUP PHOTOS

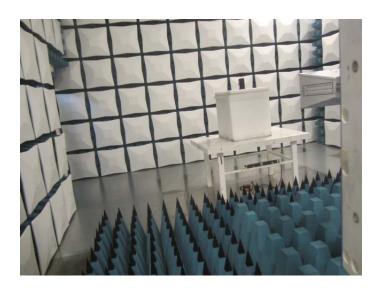
Conducted Emissions (AC Mains)



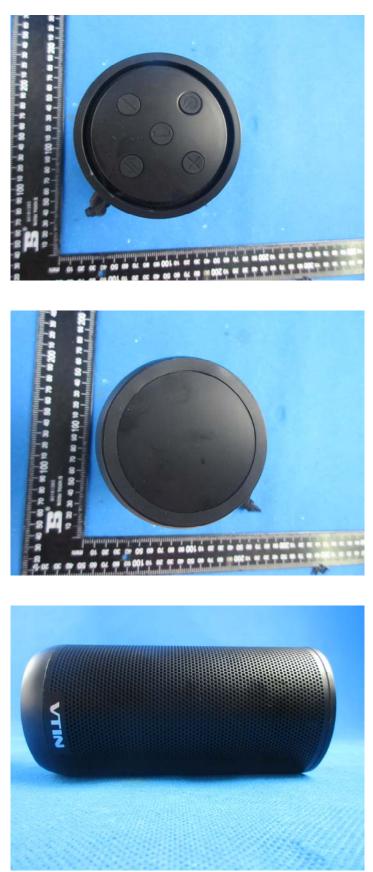
Radiated Emissions







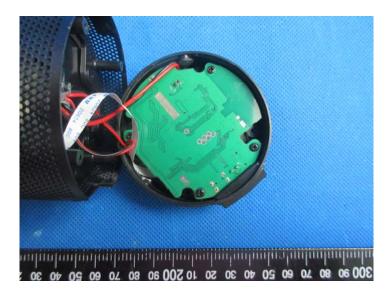
7. EXTERANAL AND INTERNAL PHOTOS External photos of the EUT

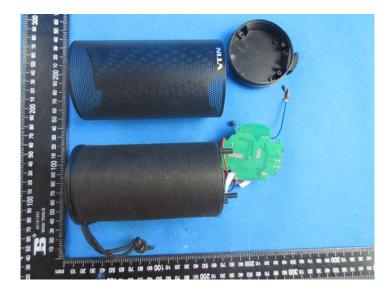


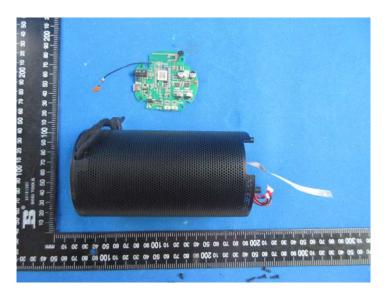


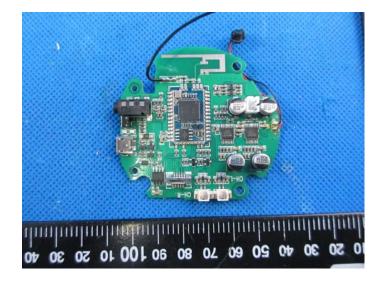
Internal photos of the EUT

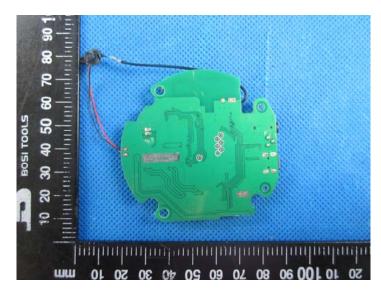


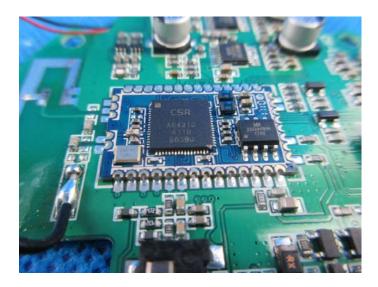
















.....End of Report.....