

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

Phone:86-755-26748019 Fax:86-755-26748089 http://www.szhtw.com.cn



Report Reference No	TRE1810002603	R/C	.: 32853	
FCC ID:	Q5EDSJH9			
Applicant's name:	Shenzhen Kirisun Comm	unications C	o.,Ltd.	
Address	3rd Floor, Building A, Tong Langshan Road, Nanshan			
Manufacturer	Shenzhen Kirisun Commur	nications Co.,	Ltd.	
Address:	3rd Floor, Building A, Tong Langshan Road, Nanshan			
Test item description:	Body Worn Camera			
Trade Mark:	KIRISUN			
Model/Type reference:	DSJ-H9	DSJ-H9		
Listed Model(s):	DSJ-H9s,DSJ-H9x,DSJ-E9,DSJ-G9,DSJ-I9,DSJ-J9,DSJ-K9, DSJ-M9			
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	Oct 08,2018			
Date of testing	Oct 09,2018- Oct 18,2018			
Date of issue	Oct 19,2018			
Result:	PASS			
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li		Silvia Li	
Supervised by (Position+Printed name+Signature):	Project Engineer Aaron Fa	ng	Aaron.Fang	
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu		Homsty	
Testing Laboratory Name::	Shenzhen Huatongwei In	ternational l	nspection Co., Ltd.	
Address :	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the 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	7
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	11
5.1.	Antenna requirement	11
5.2.	Conducted Emissions (AC Main)	12
5.3.	Conducted Peak Output Power	15
5.4.	20 dB Bandwidth	19
5.5.	Carrier Frequencies Separation	23
5.6.	Hopping Channel Number	25
5.7.	Dwell Time	27
5.8.	Pseudorandom Frequency Hopping Sequence	34
5.9.	Restricted band (radiated)	35
5.10.	Band edge and Spurious Emissions (conducted)	37
5.11.	Spurious Emissions (radiated)	53
<u>6.</u>	TEST SETUP PHOTOS	57
<u>7.</u>	EXTERANAL AND INTERNAL PHOTOS	58

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

Revision No.	Date of issue	Description
N/A	2018-10-19	Original

2. TEST DESCRIPTION

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

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	Shenzhen Kirisun Communications Co.,Ltd.		
Address:	3rd Floor, Building A, Tongfang Information Habour, No.11 Langshar Road, Nanshan District, Shenzhen 518057, P.R.China		
Manufacturer:	Shenzhen Kirisun Communications Co.,Ltd.		
Address:	3rd Floor, Building A, Tongfang Information Habour, No.11 Langshan Road, Nanshan District, Shenzhen 518057, P.R.China		

3.2. Product Description

Name of EUT:	Body Worn Camera	
Trade Mark:	KIRISUN	
Model No.:	DSJ-H9	
Listed Model(s):	DSJ-H9s,DSJ-H9x,DSJ-E9,DSJ-G9,DSJ-I9,DSJ-J9,DSJ-K9,DSJ-M9	
Power supply:	DC 3.7V	
Adapter information:	Model:ZAU-B050100A-02 Input: 100-240Va.c., 50/60Hz, 0.2A Output: 5.0Vd.c., 1000mA	
Hardware version:	V4.0	
Software version:	V67	
Bluetooth		
Version:	Supported BT4.1+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	Ceramic Antenna	
Antenna gain:	-4.0dBi	

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

1	Manufacturer:	/
·	Model No.:	/
1	Manufacturer:	/
1	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.

Conducted Emissions Last Cal. Next Cal. Test Item Model No. Serial No. Manufacturer Equipment (mm-dd-yy) (mm-dd-yy) **EMI** Test R&S ESCI 101247 11/11/2017 11/10/2018 1 Receiver 2 Artificial Mains SCHWARZBECK **NNLK 8121** 11/11/2017 11/10/2018 573 2-Line V-3 R&S 11/11/2017 ESH3-Z5 100049 11/10/2018 Network **Pulse Limiter** ESH3-Z2 11/11/2017 4 R&S 101488 11/10/2018 RF 5 Connection HUBER+SUHNER EF400 N/A 11/21/2017 11/20/2018 Cable 6 **Test Software** R&S ES-K1 N/A N/A N/A Radiated Emissions Last Cal. Next Cal. Test Item Manufacturer Model No. Serial No. Equipment (mm-dd-yy) (mm-dd-yy) Semi-Anechoic C11121 1 Albatross projects SAC-3m-01 10/16/2016 10/15/2019 Chamber **EMI** Test 2 R&S ESCI 100900 11/11/2017 11/10/2018 Receiver 11/19/2020 3 HFH2-Z2 100020 11/20/2017 Loop Antenna R&S Ultra-4 Broadband SCHWARZBECK **VULB9163** 538 4/5/2017 4/4/2020 Antenna Horn Antenna 5 SCHWARZBECK 9120D 1011 3/27/2017 3/26/2020 Broadband **BBHA9170** 6 SCHWARZBECK **BBHA9170** 3/27/2017 3/26/2020 Horn Antenna 472 7 BBV 9743 Pre-amplifier SCHWARZBECK 9743-0022 10/15/2019 10/16/2018 Broadband 8 SCHWARZBECK BBV 9718 9718-248 10/16/2018 10/15/2019 Pre-amplifier Spectrum 9 R&S FSP40 100597 11/11/2017 11/10/2018 Analyzer **RF** Connection HUBER+SUHNE 10 RE-7-FL N/A 11/21/2017 11/20/2018 Cable R **RF** Connection HUBER+SUHNE 11/20/2018 RE-7-FH N/A 11/21/2017 11 Cable R 12 **Test Software** Audix E3 N/A N/A N/A 13 **Test Software** R&S N/A ES-K1 N/A N/A 14 N/A N/A N/A Turntable Maturo Germany TT2.0-1T 15 Antenna Mast CAM-4.0-P-12 N/A N/A N/A Maturo Germany

4.5. Equipments Used during the Test

RF Con	RF Conducted Test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)
1	Spectrum Analyzer	R&S	FSV40	100048	11/11/2017	11/10/2018
2	EXA Signal Analyzer	Agilent	N9020A	184247	9/22/2017	10/18/2019
3	OSP	R&S	OSP120	101317	N/A	N/A

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.

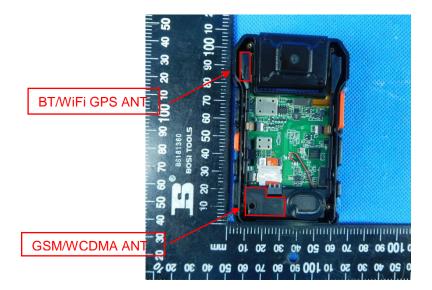
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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)

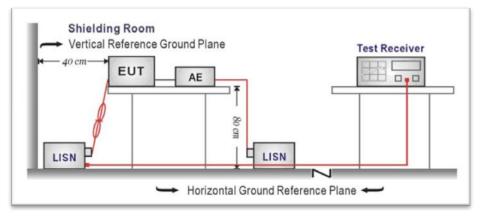
<u>LIMIT</u>

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

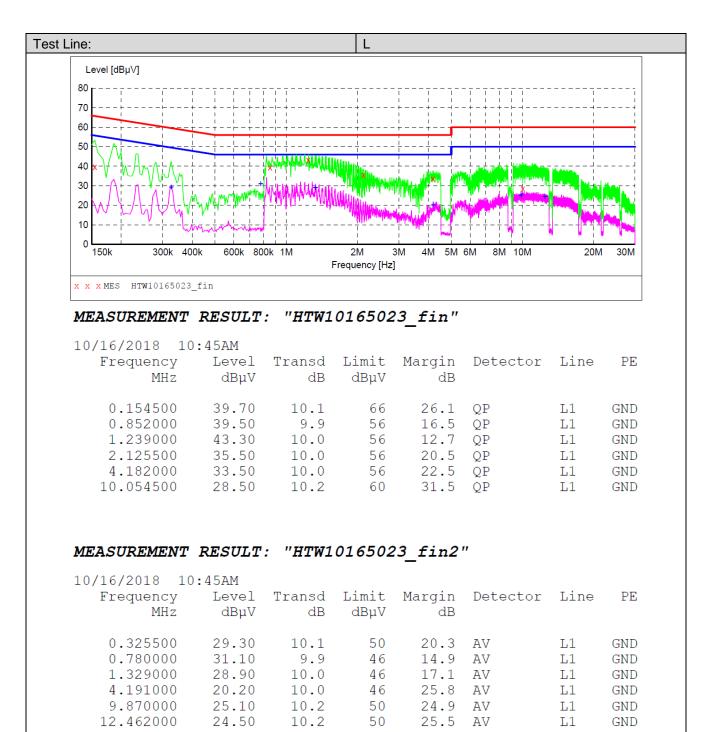
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

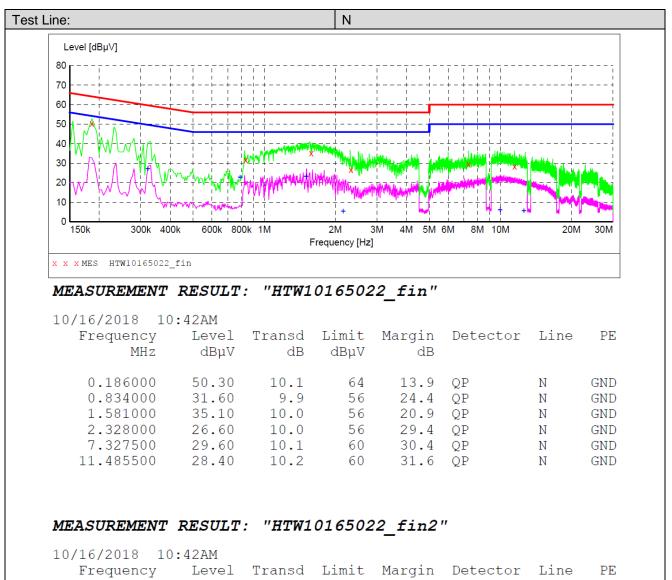
TEST RESULTS

☑ Passed □ Not Applicable

Note:

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





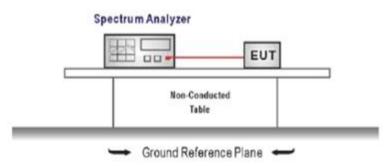
Frequency MHz		Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.321000 0.789000 1.504500	27.10 22.80 23.20	10.1 9.9 10.0	50 46 46	22.6 23.2 22.8	AV AV	N N N	GND GND GND
2.157000 9.982500 12.579000	5.30 6.00 5.60	10.0 10.2 10.2	46 50 50	40.7 44.0 44.4	AV	N N N	GND GND GND

5.3. Conducted Peak Output Power

<u>LIMIT</u>

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 nonoverlapping 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	3.92		
GFSK	39	4.13	≤ 30.00	Pass
	78	2.32		
	00	3.11		
π/4DQPSK	39	3.41	≤ 21.00	Pass
	78	1.66		
	00	3.20		
8DPSK	39	3.50	≤ 21.00	Pass
	78	1.69		

Modulation Type:	GFSK
	Spectrum 🕎
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 1 MHz
	Att 30 dB SWT 1 ms WBW 3 MHz Mode Auto Sweep Count 500/500
	IPk View
	M1[1] 3.92 dBm 2.40204340 GHz
	10 dBm 6/1
	0 dBm
	-10 dBm
	-20 dBm
CH00	
	-30 dBm
	-40,#6m
	-50 d8m
	-60 d8m-
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Cr z. tuz unz ustra ust Ustra ustra ust
	Spectrum
	RefLevel 20.00 dBm Offset 1.00 dB RBW 1 MHz Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 4.13 dBm 2.44108680 GHz
	10 dBm
	0 dBm
	-10 dBm
CH39	-20 dBm
61109	-30 dBm
	-40 dBm
	-50 dBm-
	-60 d8m
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB RBW 1 MHz Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 2.32 dBm 2.47986250 GHz
	10 dBm
	0 dBm
	-10 dBm
CH78	-20 d8m
	-30 dBm
	-49.46m
	-50 d8m-
	-60 d8m-
	-70 d8m-
	CF 2.48 GHz 691 pts Span 5.0 MHz

Modulation Type:	π/4DQPSK
wodulation Type.	
	Spectrum Image: Constraint of the section of the sectio
	01Pk View M1[1] 3.11.dBm
	10 dBm //1
	0 dBm
	10 d8m
CH00	-20 dBm
01100	-30 dBm
	40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 CHz 691 pts Span 5.0 MHz
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 2 MHz
	● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep Count 500/500
	PIrk View M1[1] 3.41 dBm 2.44111580 GHz
	0 dBm
	210 dBm
CH39	-20 dBm
	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz
	Count 500/500
	10 dBm
	-10.48m
	-20 dBm
CH78	-30 d8m
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz
	CF-2.48 GHZ 691 pts span 5.0 mHz () () Maximum ()

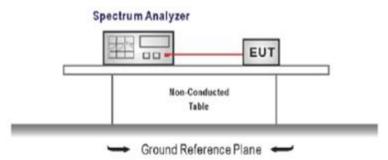
Modulation Type:	8DPSK
	Spectrum Time Spectrum Time State 1.00 dB RBW 2 MHz Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 IF/R View
	10 dBm M1[1] 3.20 dBm 2.40195660 GHz
	0 dBm
CHOO	-20 dBm
CH00	-30 dBm
	-50 d8m
	-60 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 If IR: View
	10 dBm M1[1] 3.50 dBm 2.44097110 CHz
	0 dBm
СН39	-20 dBm-
	-30 dBm
	-50 dBm
	-60 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum Image: Constraint of the sector of t
	Count 500/500 PIPk View M1[1] 1.69 dBm 2.47989150 CHz
	10 dBm
	-10.d8m
CH78	-20 dBm
	-40 dBm-
	-50 dBm
	-70 dBm-
	CF 2.48 GHz 691 pts Span 5.0 MHz

5.4. 20 dB Bandwidth

LIMIT

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	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result
	00	0.93		
GFSK	39	0.93	-	Pass
	78	0.93		
	00	1.29		
π/4DQPSK	39	1.28	-	Pass
	78	1.30		
	00	1.29		
8DPSK	39	1.29	-	Pass
	78	1.29		

GFSK Ref Level 20.00 dBm 0ffset 1.00 dB RBW 10 kHz Att 30 dB SWT 189.6 µs VBW 30 kHz Mode Auto FFT Count 500/500 ● 19k View
0 dBm M2 2.40205750 GHz -10 dBm
-36 dem -70 dem -70 dem -70 dem CF 2.402 GHz 1001 pts
Marker Y-value Function Function Result M1 1 2.4015475 GHz -22.41 dBm M2 1 2.402575 GHz -1.77 dBm D3 M1 1 927.5 KHz -0.22 dB
Spectrum Image: Ward of the sector of the sec
● IPk View 10 dBm 0 dBm 0 dBm 0 dBm 0 dBm 10
-10 dBm
Gold Bin CF CH <
M1 1 2.4405475 GHz 22.15 dBm M2 1 2.4410575 GHz -1.54 dBm D3 M1 927.5 kHz -0.33 dB
Spectrum Image: Construction of the sector of
10 dBm M1[1]23.80 dBm2.47954750 GHz
0 dBm M2[1] -3.38 dBm -10 dBm -2.48005750 GHz -20 dBm -2.384 dBm -40 dBm -30 dBm -40 dBm -40 dBm
-50 day 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
CF 2.48 GHz 1001 pts Span 2.5 MHz Marker Yupe Ref Trc X-value Y-value Function Function Result M1 1 2.4795475 GHz -23.88 dBm

Iodulation Type:	π/4DQPSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB ● RBW 30 kHz ● Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT Count 500/500 ● JPk View
	M1[1] -20.99 dBm
	10 dBm 2.40136750 GHz M2[1] -0.65 dBm M2 2 2 40136500 GHz
	0 dBm
	-10 dBm
	-20 dBm 01 -20.651 dBm
	-30 dBm
CH00	
	-10 dBm
	-60 dBm-
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.4013675 GHz -20.99 dBm M2 1 2.402165 GHz -0.65 dBm
	D3 M1 1 1.285 MHz 0.03 dB
	Spectrum
	Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count 500/500
	IPk View
	M1[1] -20.54 dBm 2.44036750 GHz
	M2[1] -0.33 dBm M2 2 44116500 GHz
	-10 dBm
	-20-dBm D1 -20.330 dBm
	-30 dBm
CH39	
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Function Function Result
	M1 1 2.4403675 GHz -20.54 dBm M2 1 2.441165 GHz -0.33 dBm
	D3 M1 1 1.2825 MHz 0.18 dB
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB RBW 30 kHz Atta 20.48 SWT 53 Ltc VBW 100 kHz Made Atta FFT
	Count 500/500
	●1Pk View M1[1] -22.13 dBm
	10 dBm 2.47935000 GHz M2[1] -2.01 dBm
	0 dBm M2 2.48016500 GHz
	-10 dBm
	-20 dBm D1 -22.014 dBm 2
	-30 dBm
CH78	
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.48 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.47935 GHz -22.13 dBm M2 1 2.490165 GHz -2.01 dBm
	03 M1 1 1.3 MHz -0.04 dB
I	

Iodulation Type:	8DPSK
	Spectrum Image: Constraint of the section
	Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count 500/500
	● 1Pk View
	10 dBm M1[1] -20.54 dBm 2.40135500 GHz
	0 dBm 0 dBm 2.40216250 GHz
	-10 dBm
	-20 dbm D1 -22.056 dbm
	-20 dbm D1 -20,030 dbm
CH00	
01100	AD ABOUT THE ADDRESS ADDRE
	-50 d8m
	-60 d8m
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.401355 GHz -20.54 dBm M2 1 2.4021625 GHz -0.06 dBm
	D3 M1 1 1.2875 MHz 0.35 dB Mesoring
	Vestering.
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB ● RBW 30 kHz ● Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT
	Count 500/500
	M1[1] -20.13 dBm
	10 UBIN M2[1] 0.25 dBm
	0 dBm
	-20 dBm D1 -19.748 dBm
	-30 d8m
CH39	All dem and a second and a se
	-50 dBm
	-60 dBm-
	-70 dBm-
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.440355 GHz -20.13 dBm
	M2 1 2.4411625 GHz 0.25 dBm D3 M1 1 1.2875 MHz 0.31 dB
	Spectrum
	Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count 500/500
	● 1Pk View
	10 dBm M1[1] -22.05 dBm 2.47935250 GHz
	0 dBm M2 2.48016250 GHz
	-10 dBm
	Mk Mk
CH78	-30 dBm
00	
	-50 d8m
	-60 dBm
	-70 dBm-
	CF 2.48 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.4793525 GHz -22.05 dBm M2 1 2.4801625 GHz -1.48 dBm
	D3 M1 1 1.29 MHz 0.56 dB
	Neasuring. Extension 🖡

5.5. Carrier Frequencies Separation

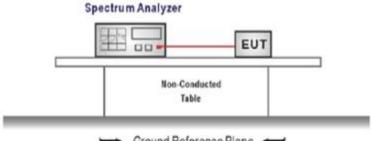
LIMIT

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

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

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST CONFIGURATION



- Ground Reference Plane

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

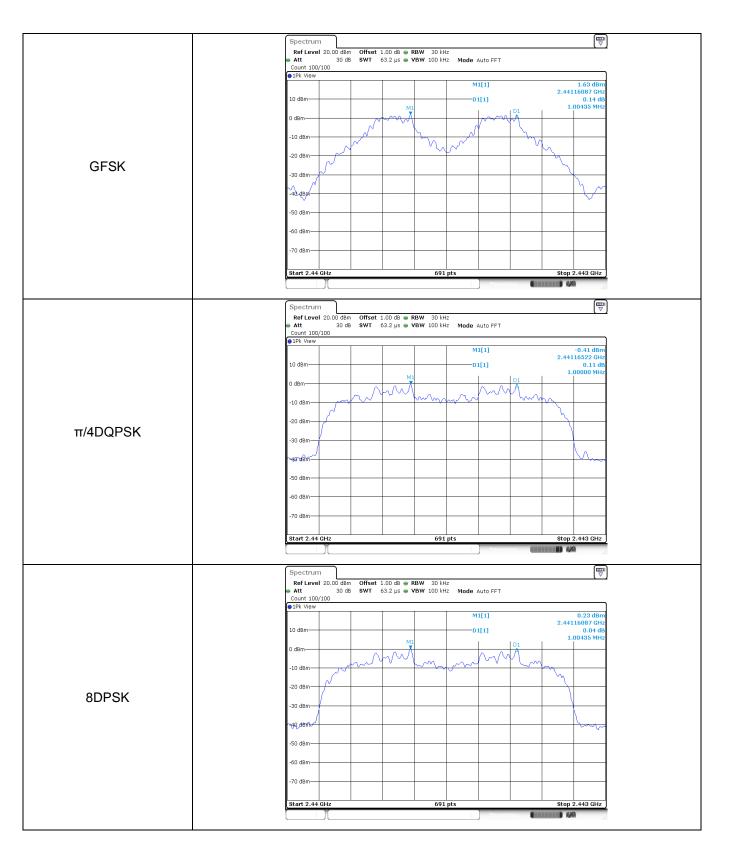
TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.93	Pass
π/4DQPSK	39	1.00	≥0.87	Pass
8DPSK	39	1.00	≥0.86	Pass

Note:

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



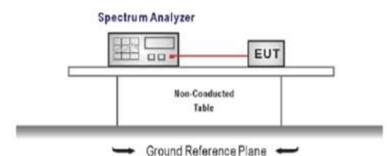
Shenzhen Huatongwei International Inspection Co., Ltd.

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		

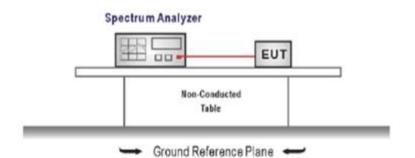
	Spectrum (TTD) Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	● Att 30 dB SWT 1 ms ● VBW 300 kHz Mode Auto Sweep
	IPk View
	10 dBm
	0 dsm
	-18.98% A A A A A A A A A A A A A A A A A A A
	-20 dBm-
GFSK	
	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm-
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Measuring
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep P1Pk View
	10 dBm
	olastic and the second states and the second states and the second states and the second
	-10 dBm
	-0 dum
	-20 dBm-
π/4DQPSK	-B0 dBm
	// // // // // // // // // // // // //
	-50 d8m-
	-60 dBm
	-70 dBm-
	-70 dBm-
	-70 dBm
	-70 dBm
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Stop 2.4835 GHz Spectrum
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Start 2.4 GHz 691 pts Stop 2.4835 GHz Traversen Spectrum Ref Level 20.00 dBm Offset 1.00 dB Start 3.4 GHz WT 1 ms VBW 300 KHz
	-70 dBm Btart 2.4 GHz 691 pts Stop 2.4835 GHz Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Start 2.4 GHz 691 pts Stop 2.4835 GHz Traversen Spectrum Ref Level 20.00 dBm Offset 1.00 dB Start 3.4 GHz WT 1 ms VBW 300 KHz
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Workshow Walk Start 2.4 GHz 691 pts Start 2.4 GHz 691 pts Start 2.4 GHz Walk Start 2.4 GHz </td
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Workshow Workshow Start 2.4 GHz 691 pts Start 2.4 GHz 691 pts Workshow Workshow Start 2.4 GHz 691 pts Work 00 dBm Offset 1.00 dBm Offset 1.00 dBm WBW 300 dB SWT 1 ms WBW 300 dBm SWT 1 ms SWT
	-70 dBm -70 dBm Start 2.4 GHz 691 pts Workshow Walk Start 2.4 GHz 691 pts Start 2.4 GHz 691 pts Start 2.4 GHz Walk Start 2.4 GHz </td
	-70 dBm
8DPSK	-70 dBm -70 dBm Stert 2.4 GHz 691 pts Stert 1.00 dBm Offset 1.00 dB Ref Level 20.00 dBm Offset 1.00 dB Offset 1.00 dB SWT 1 ms VBW 300 KHz Mode Auto Sweep
8DPSK	-70 dBm
8DPSK	-70 dBm -70 dBm Stert 2.4 GHz 691 pts Stert 1.00 dBm Offset 1.00 dB Ref Level 20.00 dBm Offset 1.00 dB Offset 1.00 dB SWT 1 ms VBW 300 KHz Mode Auto Sweep
8DPSK	-70 dBm stort 2.4 GHz 691 pts Stop 2.4835 GHz Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Stop 2.4835 GHz Image: Spectrum Image: Stop 2.4835 GHz Image: Stop 2.4835

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.

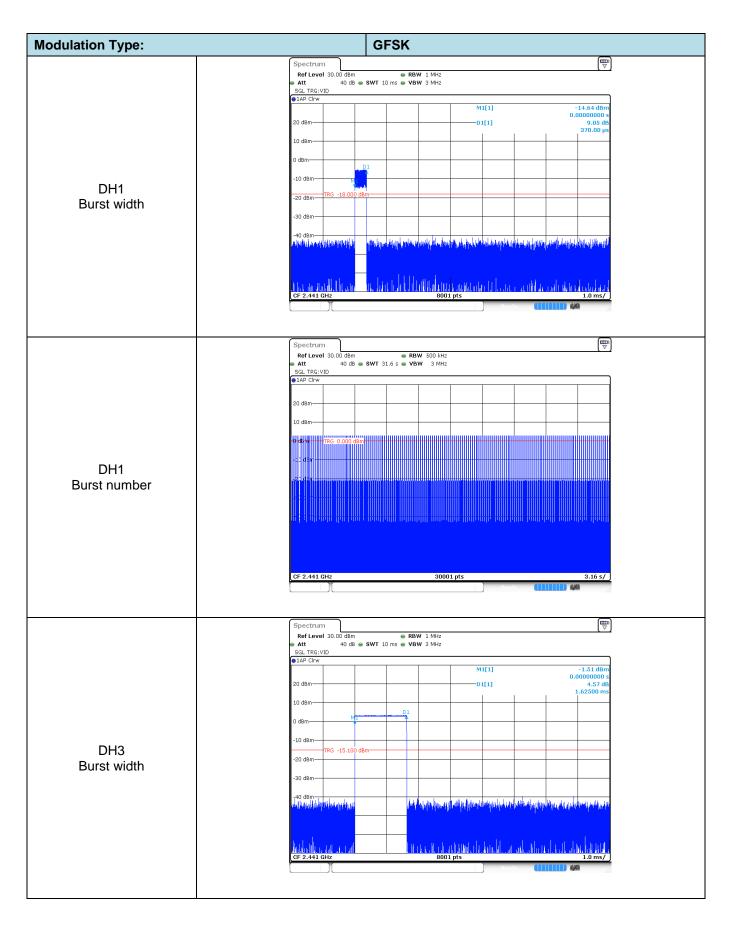
TEST MODE:

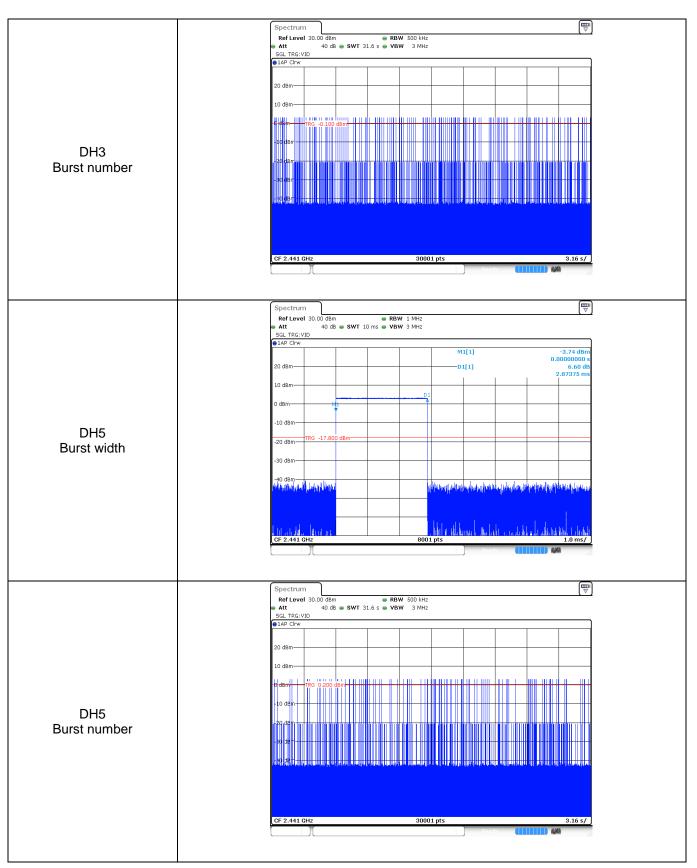
Please refer to the clause 3.3

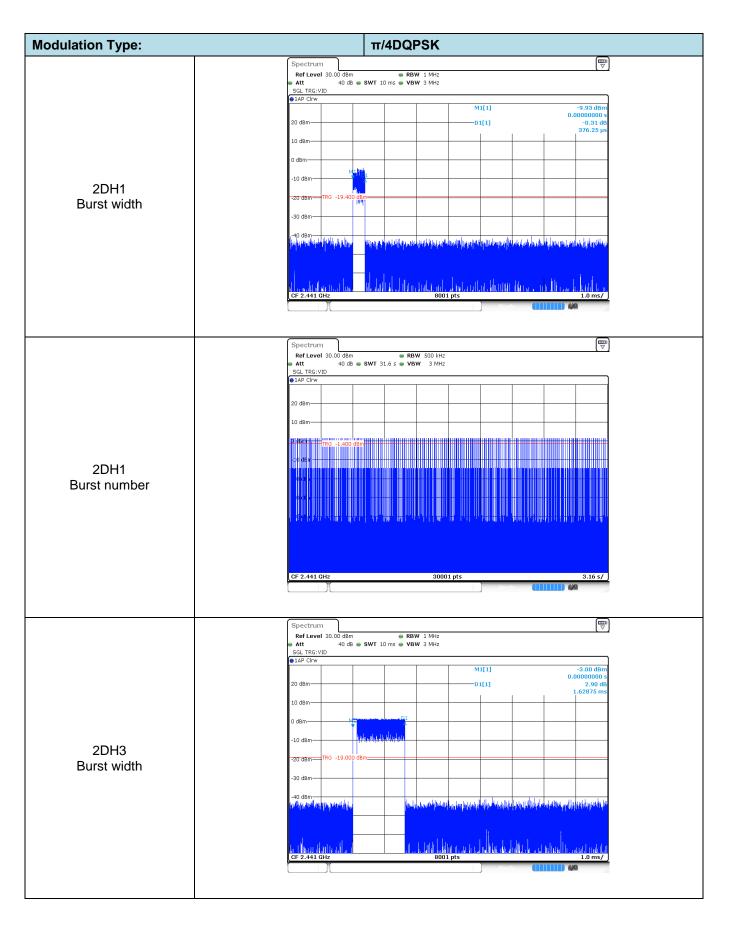
TEST RESULTS

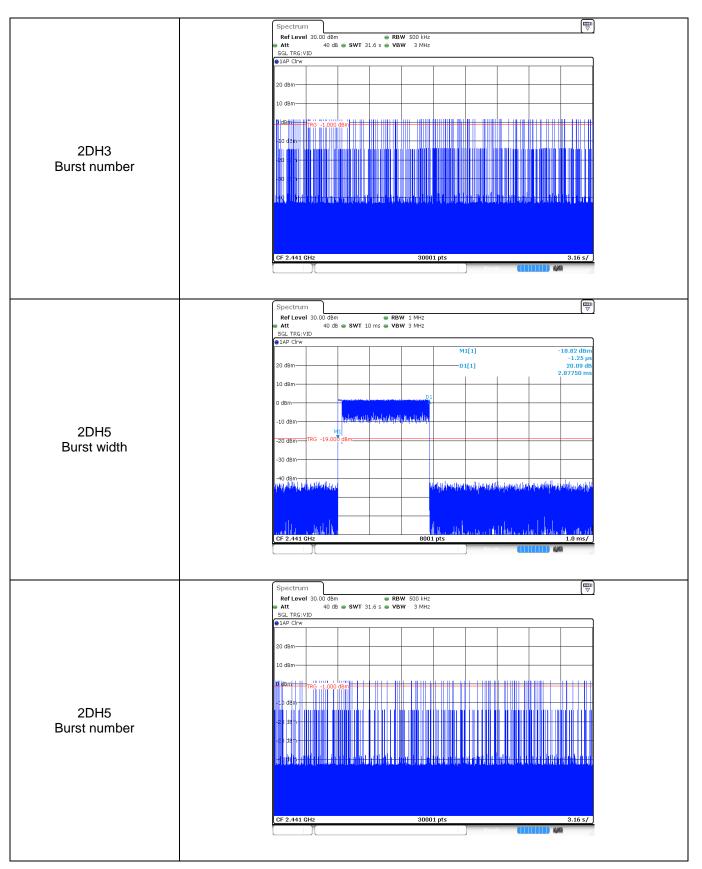
☑ Passed □ Not Applicable

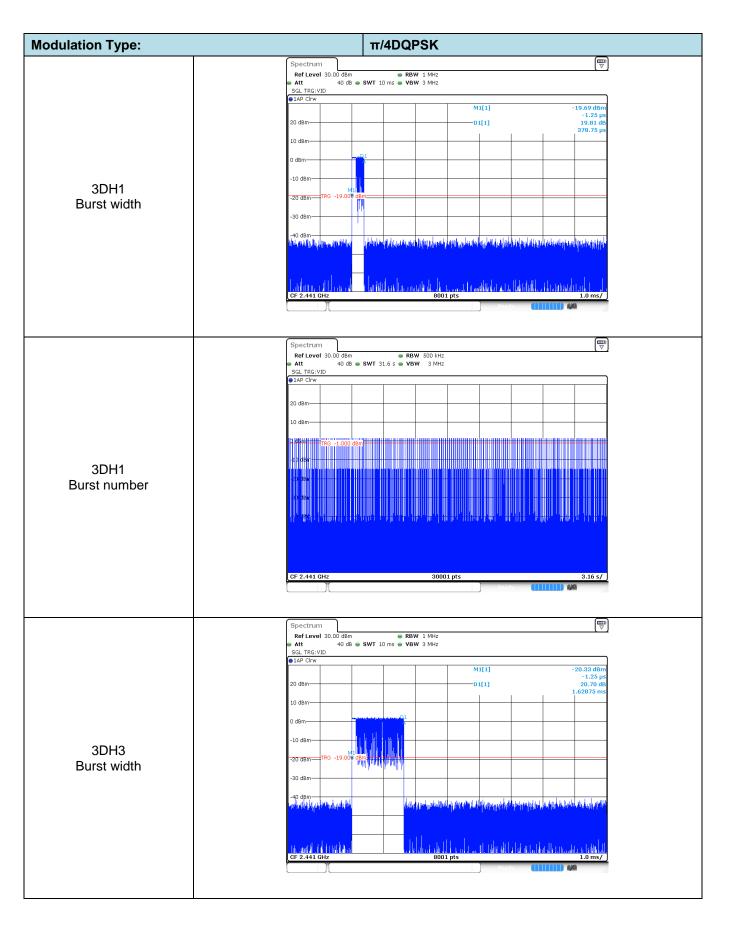
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result	
	DH1	0.37	314.00	0.12	≤ 0.40		
GFSK	DH3	1.63	158.00	0.26		Pass	
	DH5	2.87	109.00	0.31			
	2DH1	0.38	315.00	0.12		Pass	
π/4DQPSK	2DH3	1.63	158.00	0.26	≤ 0.40		
	2DH5	2.88	108.00	0.31			
8DPSK	3DH1	0.38	316.00	0.12			
	3DH3	1.63	168.00	0.27	≤ 0.40	Pass	
	3DH5	2.88	110.00	0.32			

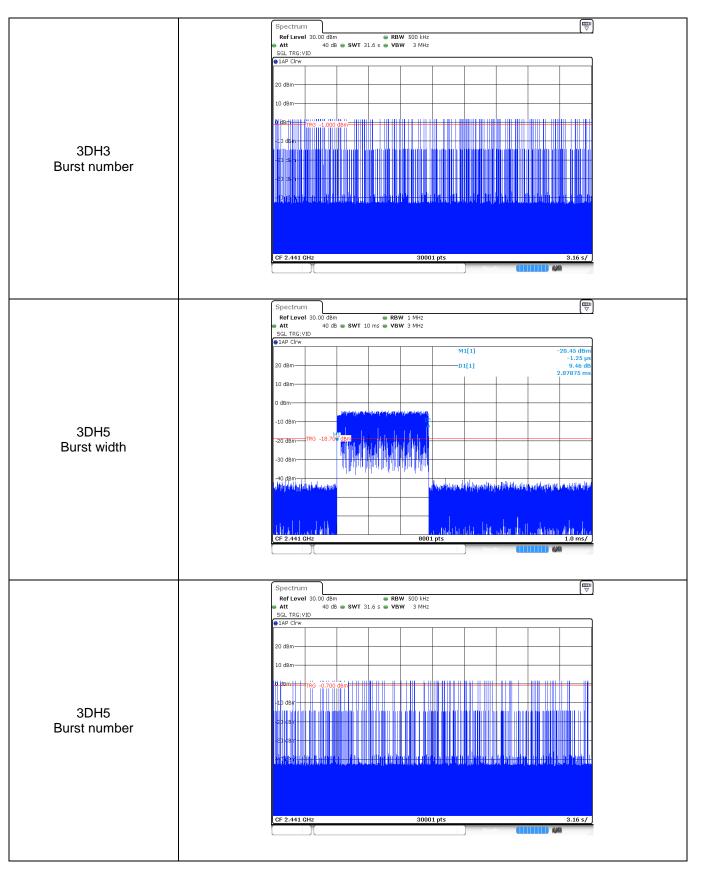












5.8. Pseudorandom Frequency Hopping Sequence

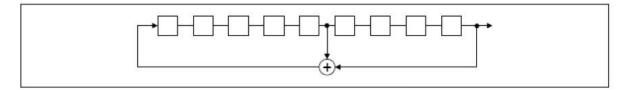
<u>LIMIT</u>

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:

5 7	73 7		1	78	64	62	1	ł	4	2	0
		 		1			 Τ	Т	Г		Т
				1		1		Т			
				1							

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.

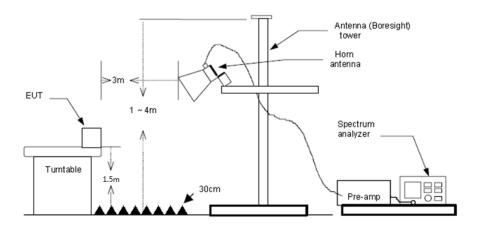
5.9. Restricted band (radiated)

<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
- 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.

Test chann	el:				СН00					
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	31.27	28.05	6.62	37.59	28.35	74.00	-45.65	Horizontal	Peak	
2390.03	31.27	27.65	6.75	37.59	28.08	74.00	-45.92	Horizontal	Peak	
2310.00	31.81	28.05	6.62	37.59	28.89	74.00	-45.11	Vertical	Peak	
2390.03	31.49	27.65	6.75	37.59	28.30	74.00	-45.70	Vertical	Peak	
2310.00	19.03	28.05	6.62	37.59	16.11	54.00	-37.89	Horizontal	Average	
2390.03	18.67	27.65	6.75	37.59	15.48	54.00	-38.52	Horizontal	Average	
2310.00	19.48	28.05	6.62	37.59	16.56	54.00	-37.44	Vertical	Average	
2390.03	19.30	27.65	6.75	37.59	16.11	54.00	-37.89	Vertical	Average	

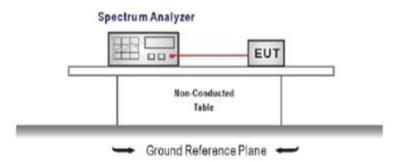
Test chann	el:				CH78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	48.32	27.26	6.83	37.59	44.82	74.00	-29.18	Horizontal	Peak	
2500.00	32.42	27.20	6.84	37.59	28.87	74.00	-45.13	Horizontal	Peak	
2483.50	53.41	27.26	6.83	37.59	49.91	74.00	-24.09	Vertical	Peak	
2500.00	31.69	27.20	6.84	37.59	28.14	74.00	-45.86	Vertical	Peak	
2483.50	22.16	27.26	6.83	37.59	18.66	54.00	-35.34	Horizontal	Average	
2500.00	19.00	27.20	6.84	37.59	15.45	54.00	-38.55	Horizontal	Average	
2483.50	22.11	27.26	6.83	37.59	18.61	54.00	-35.39	Vertical	Average	
2500.00	18.97	27.20	6.84	37.59	15.42	54.00	-38.58	Vertical	Average	

5.10. Band edge and Spurious Emissions (conducted)

LIMIT

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, scan up through 10th harmonic. 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		Modula	ation type:		GFSK	
	Sp R		Offset 1.00 dB .	RBW 100 kHz			
		tt 30 dB unt 500/500	SWT 1.1 ms	VBW 300 kHz Mode	Auto Sweep	3.35	
	0 d	dBm			12[1]	2.402180 -55.71 2.400000	GHZ Marm €HZ
	-20	dBm D1 -16.650 dB	m				
CH00 No hopping mode		dBm				M3 M4	
		dBm	منا مدرجين محاور يعيمه فراه	ىئەرىبى رۇنى دېرى لىيارلۇمۇرىلىكە يېرىمى			
		rt 2.31 GHz ker pe Ref Trc M1 1	X-value 2.40218 GHz	3.35 dBm	ction	Stop 2.405 Function Result	
		M2 1 M3 1 M4 1 M5 1	2.4 GHz 2.39 GHz 2.31 GHz 2.399768 GHz	-55.71 dBm -58.77 dBm -60.08 dBm -56.71 dBm			
		ectrum			Measuring	(anna 🎲 4/4	
		ef Level 20.00 dBm tt 30 dB unt 500/500	Offset 1.00 dB ● SWT 1.1 ms ●	RBW 100 kHz VBW 300 kHz Mode	Auto Sweep		
	10	dBm			A1[1] A2[1]	2.83 2.403010 -57.56 2.400000	dEm
		dBmD1 -17.170 dB	m				
CH00	-40	dBm					
Hopping mode	4 ™⊕0	dBm dBm dBm	ndore Proceeding and the conduction	2, 20, 1, 0, 20, 20, 20, 20, 20, 20, 20, 20, 20,	alte consective additions south	M3 M5M	
	Sta Mai	nt 2.31 GHz ker		691 pts		Stop 2.405	GHz
		pe Ref Trc M1 1 M2 1 M3 1 M4 1	X-value 2.40301 GHz 2.4 GHz 2.39 GHz 2.31 GHz	Y-value Fun 2.83 dBm -57.56 dBm -59.48 dBm -59.35 dBm	ction	Function Result	
		M5 1	2.397978 GHz	-57.62 dBm	Measuring	(
	R A	ectrum ef Level 20.00 dBm tt 30 dB unt 500/500		RBW 100 kHz VBW 300 kHz Mode	Auto FFT		
	• 11	dBm			41[1]	2.20 2.4801490 -59.00	GHz
	0 d -10	dBm				2.4835000	
CH78	-30	dBm D1 -17.800 dB	m				
No hopping mode	-50	dBm dBm dBm	M2	han and the second	M4	www.eepo	N N
	-70	dBm		691 pts		Stop 2.5	GHz
	Mar T	ker pe Ref Trc M1 1 M2 1	X-value 2.480149 GHz 2.4835 GHz	Y-value Fun 2.20 dBm -59.00 dBm	ction	Function Result	
		M3 1 M4 1	2.5 GHz 2.4929217 GHz	-61.12 dBm -58.08 dBm	Measuring	••••	

Report No.: TRE1810002603

	Count 500/500	BW 100 kHz BW 300 kHz Mode Auto FFT	♥
CH78 Hopping mode	19 IPk Max 10 dBm 19 dBm 19 dBm 20 dBm -20 dBm -30 dBm -50 dBm -50 dBm -50 dBm -70 dBm -70 dBm	M1[1] M2	1.96 dBm 2.4780480 CHz -60.87 dBm 2.4835000 GHz
	Start 2.478 GHz Marker Ype [Ref] Trc X-value M1 1 2.478048 GHz M2 1 2.4835 GHz M3 1 2.5 GHz M4 1 2.4938464 GHz	691 pts Y-value Function 1.96 dBm - -60.36 dBm - -58.07 dBm -	Stop 2.5 GHz

Test Item:	Band edge		Modula	ation t	уре:	π/4D	QPSK	
	Spe Re • At	t 30 dB	Offset 1.00 dB .	RBW 100 kHz))		
					M1[1] M2[1]		1.76 dBm 402180 GHz -54.41 dBm 400000 dHz	
CH00 No hopping mode	-10	/BmD1 -18.240 dB	3m					
	-40 -50 4 5669-	IBm			Late way and a start and a start and a start a	M3 J	N 9	
	Mark	t 2.31 GHz er	X-value	691 j Y-value	ots	Stop	2.405 GHz	
		e Ref Trc 41 1 1 42 1 1 43 1 1 44 1 1 45 1 1	2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.31 GHz 2.399906 GHz	1.76 dBr -54.41 dBr -60.33 dBr -58.11 dBr -54.50 dBr	n			
		ctrum	Offset 1.00 dB 👄	RBW 100 kHz				
	🕳 At	: 30 dB nt 500/500			Mode Auto Sweep M1[1]		1.60 dBm	
	10 d 0 dB -10 r	m			M2[1]		402180 GHz -56.02 88m 400000 447	
CH00	-20 1 -30 1 -40 1		3m <u></u>				N	
Hopping mode	-50 / 4 №601 -70 /	IBM ^W	women and the second concerns	and the second	service account of the second service service second service service service service service service service se	M3	the second se	
		e Ref Trc 11 1	X-value 2.40218 GHz	691 Y-value 1.60 dBr	Function	Stop	1 2.405 GHz	
	1	12 1 13 1 14 1 15 1	2.4 GHz 2.39 GHz 2.31 GHz 2.399768 GHz	-56.02 dBr -58.82 dBr -58.92 dBr -56.09 dBr	n 🛛	ting		
		ctrum f Level 20.00 dBm 30 dB	Offset 1.00 dB ● SWT 56.9 µs ●					
	Cou () 19) 10 d	nt 500/500 : Max			M1[1] M2[1]		0.97 dBm 798310 GHz -58.62 dBm	
	0 d8 -10 i -20 i	IBm	Jm			2.4	835000 GHz	
CH78 No hopping mode	-30 -40 -50	IBm M						
	-60 - -70 - Star	IBm	M2 100	691	or downor our of			
		t 2.478 GHz er 11 1 12 1 13 1	X-value 2.479831 GHz 2.4835 GHz 2.5 GHz	691 Y-value 0.97 dBr -58.62 dBr -59.62 dBr	Function	S Function Resu	It	
		14 1	2.4879159 GHz	-58.37 dBr		ring	268	

Report No.: TRE1810002603

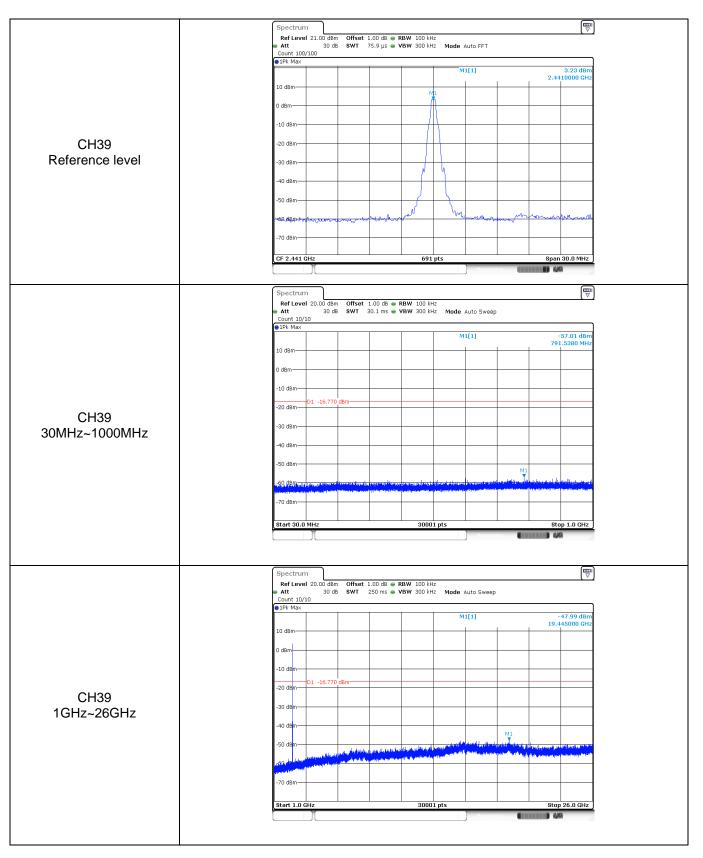
	Spectrum Ref Level 20.00 dBm Offset 1.00 d Att 30 dB SWT 56.9 μ Count 500/500 9 JPk Max	3 ● RBW 100 kHz 5 ● VBW 300 kHz Mode Auto Ff	ET
	10 dBm	M1[1]	0.53 dBm 2.4801490 GHz -59.03 dBm 2.4835000 GHz
CH78 Hopping mode	-10 d8m -20 d8m D1 -19.470 d8m -30 d8m		
Hopping mode	-50 d8m50 d8		M#
	Start 2.478 GHz Marker Type Ref Trc X-value	691 pts	Stop 2.5 GHz
	Type Ref TrC X-Value M1 1 2.400149 GH M2 M2 1 2.4935 GH M3 M3 1 2.5 GH M4 1 2.4955043 GH	0.53 dBm -59.03 dBm -59.12 dBm	
		ME	easuring 🗰

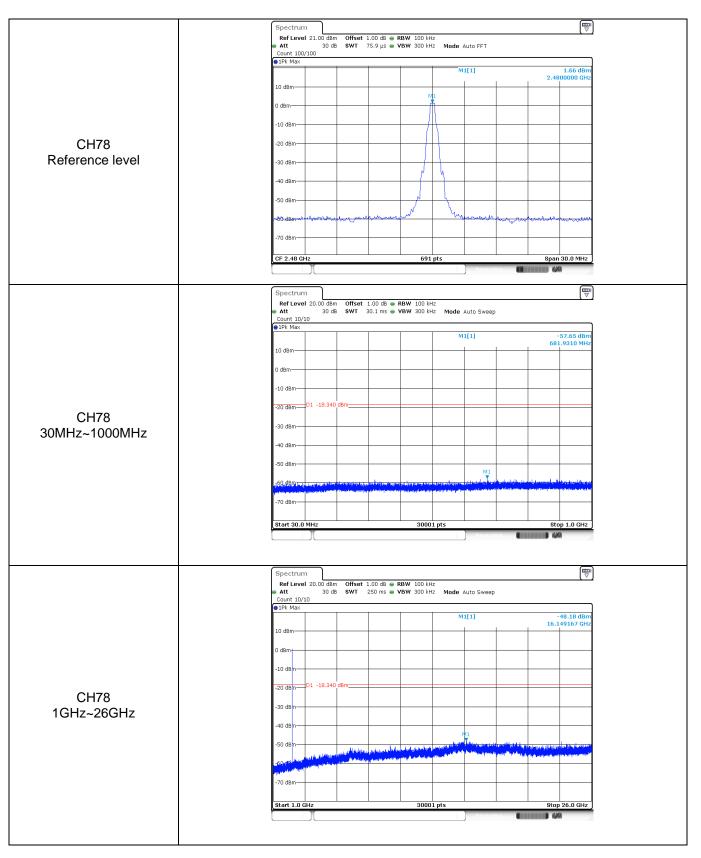
Test Item:	Band edge		Modula	ation type:	8DPSK	
CH00 No hopping mode	- Ref • Att Cour • 19k • 10 de • 10 de • 10 de • 20 d • 30 d • 30 d • 40 d • 50 d	30 dB s ht 500/500 Max mm mm mm mm pm p1 -18.180 dBm Bm Bm Bm Bm Bm Bm C 2.31 GHz sr b [Ref Trc	Offset 1.00 dB ● 1 WT 1.1 ms ● 1		Sweep	
		2 1 3 1 4 1	2.46245 GHz 2.49 GHz 2.39 GHz 2.31 GHz 2.399768 GHz	-54.07 dBm -59.63 dBm -59.51 dBm -54.50 dBm	Messening (
CH00 Hopping mode	Ref Att Cour 9 JPk 0 dBn -10 d -20 d -20 d -30 d -30 d -40 d -50 d -70 d -70 d	30 dB s Hax Max Max Max Max Max Max Max M		You You <td>1.45 dBr 2.40140 GH - 56.57 dBr 2.400000 GB </td> <td></td>	1.45 dBr 2.40140 GH - 56.57 dBr 2.400000 GB 	
CH78 No hopping mode	Ref ● Att Cour ● 1Pk 10 dE -10 d -20 d -30 d -40 d -50 d -50 d -50 d -50 d -50 d -50 d	it 500/500 Max m Mi Mi	S6.9 μs • Υ	XBW 100 kHz Mode Auto XBW 300 kHz Mode Auto XBW 300 kHz Mode Auto MI[1] M2[1] M2[1] M2[1] Generalized M1[1] M2[1] M2[1] Generalized M2[1]	0.76 dB 2.480.190 GH -57.93 dB 2.4835000 GH	

Report No.: TRE1810002603

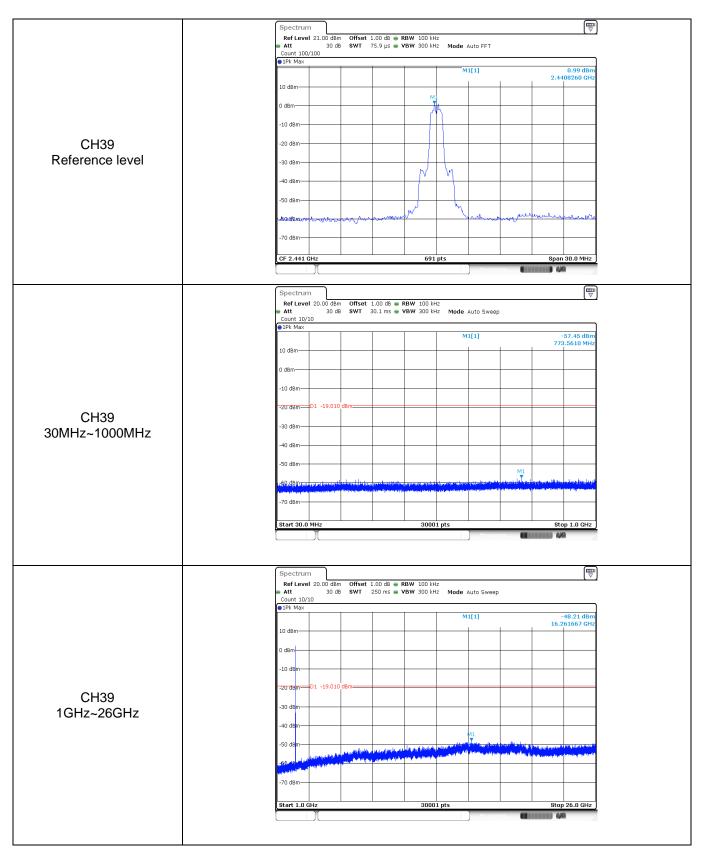
	Spectrum Ref Level 20.00 dBm Offset 1.00 d Att 30 dB SWT 56.9 µ Count 500/500	 RBW 100 kHz VBW 300 kHz Mode Auto F 	FT FT
	Pk Max		
	10 dBm	M1[1] M2[1]	0.70 dBm 2.4780480 GHz -58.94 dBm 2.4835000 GHz
	0 dBm		
01170	-30 dBm		
CH78 loppig mode	-40 dBm		
	-60 dBm		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	-70 dBm	691 pts	Stop 2.5 GHz
	Marker	051 pr3	000p 2.0 GHz
	Type Ref Trc X-value M1 1 2.478048 GH	Y-value Function	Function Result
	M2 1 2.49635 GH M3 1 2.5 GH	-58.94 dBm	
	M4 1 2.4874377 GH	-57.92 dBm	
		M [easuring 🚺 🗰 👘

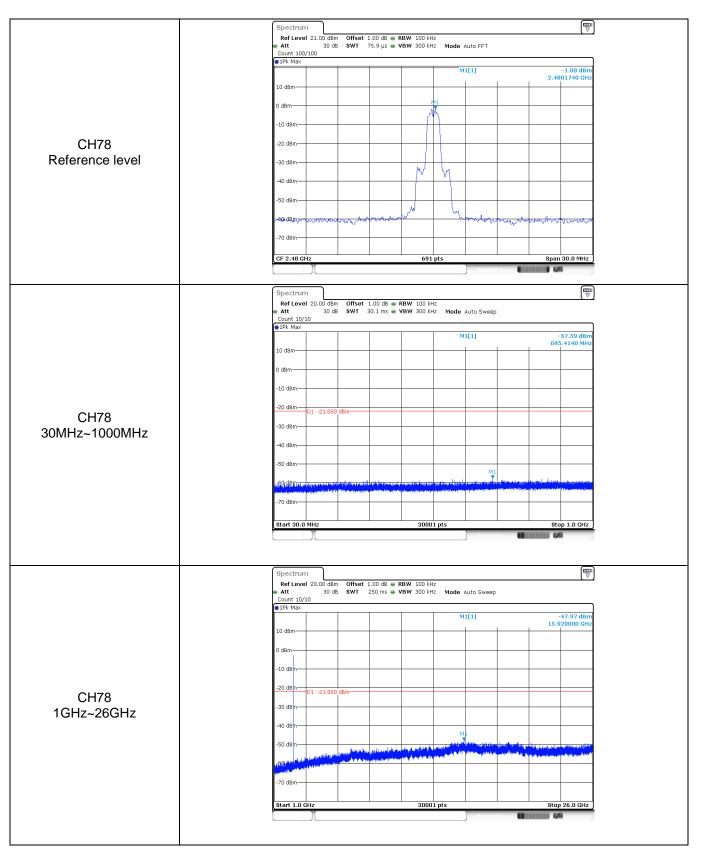
Fest Item:	SE	Modulation type: GFSK
		Spectrum 🐨
		Ref Level 21.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 75.9 μs VBW 300 kHz Mode Auto FFT
		Count 100/100 10k Max
		M1[1] 3.29 dBm 2.4020000 GHz
		10 dBm
		0 dBm
		-10 dBm
CH00		-20 d8m
Reference level		-30 dBm
		-40 dBm
		-50 dBm
		v6Q.QBW growing with the second of the secon
		-70 dBm
		CF 2.402 GHz 691 pts Span 30.0 MHz
		Spectrum Image: Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
		att 30 dB SWT 30.1 ms
		●1Pk Max M1[1] -57.94 dBm
		10 dBm 766.3830 MHz
		0 dBm
		-10 dBm
		-20 dBm
CH00		
30MHz~1000MHz		-30 dBm
		-40 dBm
		-70 dBm
		8tart 30.0 MHz 30001 pts Stop 1.0 GHz
		Maasurdoo (ABBABA) (A
		Spectrum 🕎
		Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 250 ms VBW 300 kHz Mode Auto Sweep
		Count 10/10 JPk Max
		10 d8m 48.28 d8m
		0 dBm
		-10 dEm
CH00		-20 dEm
1GHz~26GHz		-30 d2m
		-40 dem
		-70 dBm
		Start 1.0 GHz 30001 pts Stop 26.0 GHz



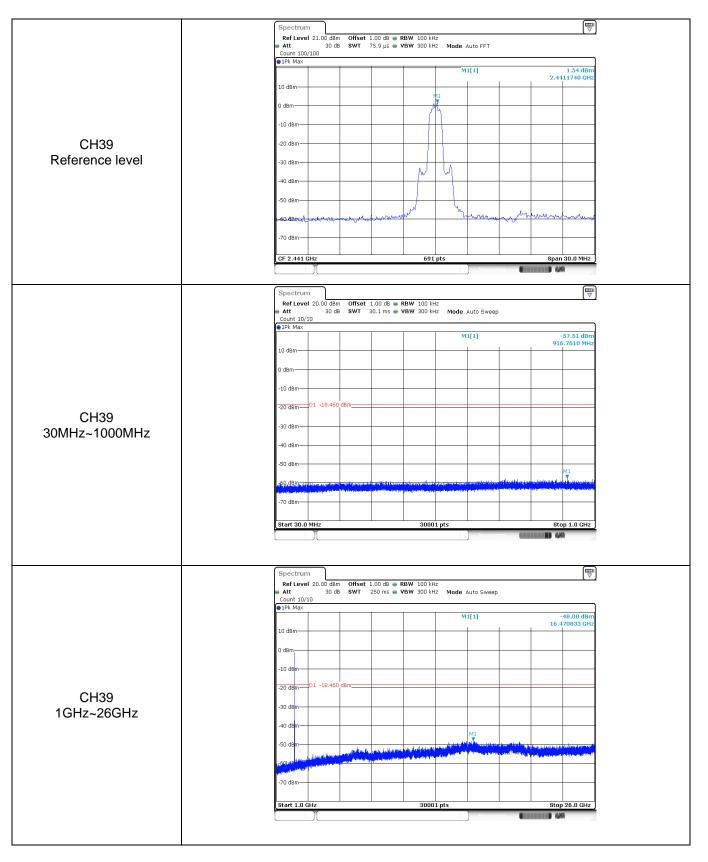


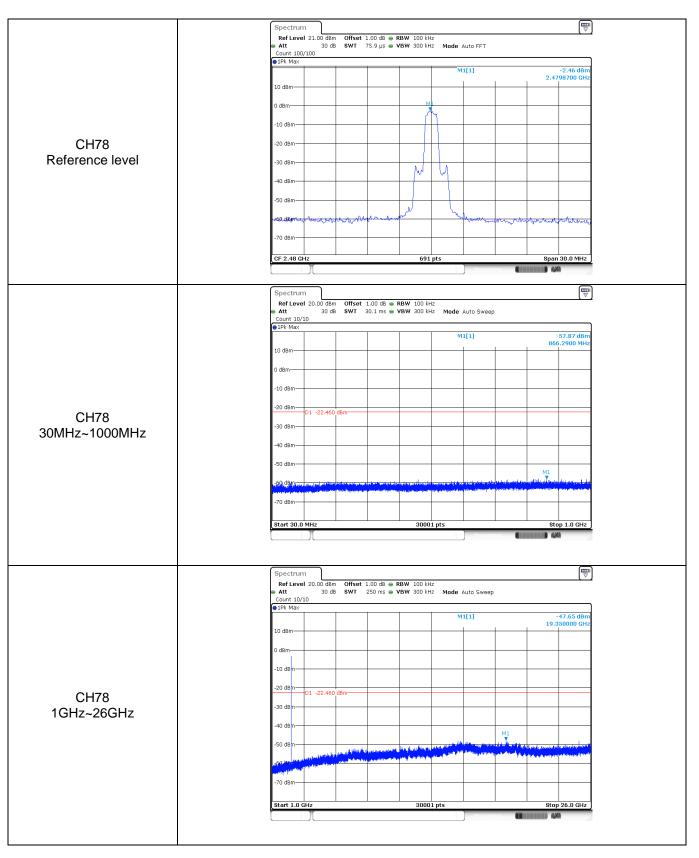
fest Item:	SE	Modulation type:	π/4DQPSK
		Spectrum RefLevel 21.00 dBm Offset 1.00 dB RBW 100 kHz	
		 Att 30 dB SWT 75.9 μs SVBW 300 kHz Mode Auto FF1 Count 100/100 	
		PPk Max M1[1]	0.72 dBm
		10 dBm-	2.4018260 GHz
		0 dBm	
		-10 dBm	
CH00		-20 dBm	
Reference level		-30 dBm	
		-40 dBm	
		-50 dBm	
		-68,d800	a Barrow Andrew Contract and the Antonia
		-70 dBm	
		CF 2.402 GHz 691 pts	Span 30.0 MHz
		Mes	suring 🗰 a a a a a a a a a a a a a a a a a a
		Spectrum	(III) (V)
		RefLevel 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 30.1 ms VBW 300 kHz Mode Auto Sw	eep
		Count 10/10 IPK Max	
		10 dBm	-58.01 dBm 678.5690 MHz
		0 dBm	
		-10 dBm	
CH00		-20 dBm-D1 -19.280 dBm-	
30MHz~1000MHz		-30 dBm	
		-40 dBm	
		-50 dBm	
		p60.4Bm	in the second
		-70 dBm	
		Start 30.0 MHz 30001 pts	Stop 1.0 GHz
		Spectrum	Ţ
		Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 250 ms VBW 300 kHz	
		Count 10/10 1Pk Max]
		10 dBm	-48.05 dBm 15.925833 GHz
		0 dBm	
		-10 dEm	
CH00		-20 dzm-D1 -19.280 dBm-	
1GHz~26GHz		-30 dEm	+ + + +
		-40 dEm	
		-50 dem	
			ann an Airtíneacht Airte an Airte ann an Airte ann an Airte ann an Airtíne an Airtíne an Airtíne ann an Airtíne
		-70 dBm	
		Start 1.0 GHz 30001 pts	Stop 26.0 GHz





est Item:	SE		Modulation type:	8DPSK	
		Spectrum			
			ffset 1.00 dB ● RBW 100 kHz WT 75.9 μs ● VBW 300 kHz Mode	Auto FFT	
		Count 100/100 IPk Max		1[1] 1.3	6 dBm
		10 dBm			io GHz
			M1 ¥		
		0 dBm	1		
		-10 dBm			
CH00		-20 dBm			
Reference level		-30 dBm	- wh		
		-40 dBm			
		-50 dBm			
		v60.dBarrowwww.	manner m	Marcal and and an all and a start of the second second	w Mary Ary
		-70 dBm	·		
		ar a 100 au			
		CF 2.402 GHz	691 pts	Span 30.0 Measuring	J MH2 J
		Spectrum			
		Ref Level 20.00 dBm O	ffset 1.00 dB ⊜ RBW 100 kHz NT 30.1 ms ⊜ VBW 300 kHz Mode	Auto Sween	<u> </u>
		Count 10/10	THE PLANE PLANE	·····	
			N	1[1] -57.5 639.447	6 dBm /0 MHz
		10 dBm			
		0 dBm			
		-10 dBm			
01100		-20 dBm01 -18.640 dBm			
CH00 30MHz~1000MHz		-30 dBm			
3010112~10001011Z		-40 dBm			
		-50 dBm			
		a60, dBm and the second of the second		M1 Technicalis, discharged and decay laws	
		-70 dBm	annan san ya gan Andridan da ta managan ya yang gata dika hapina t		a, Kalingalar
		Start 30.0 MHz	30001 pts	Stop 1.1	D GHz
			ffset 1.00 dB 🖷 RBW 100 kHz		
		 Att 30 dB S[*] Count 10/10 1Pk Max 	NT 250 ms o VBW 300 kHz Mode	Auto Sweep	
			N	1[1] -48.0 15.61410	3 dBm 57 GHz
		10 dBm			
		0 dBm			
		-10 dBm			
01100		-20 dBm01 -18.640 dBm			
		-30 dBm			
1GHz~26GHz		-40 dBm			
		-50 dBm	Mi		
		1.4.1	hilipiten al. Andre andre statistical de la seconda de Referencia de la seconda de		and an a second s
		Successful and the set			
		-70 dBm			
		Start 1.0 GHz	30001 pts	Stop 26.	D GHz
				Measuring 🚺	





5.11. Spurious Emissions (radiated)

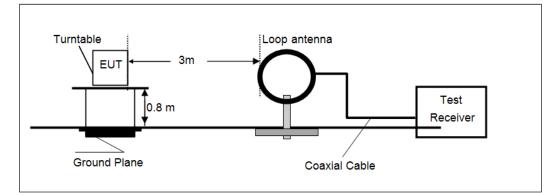
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

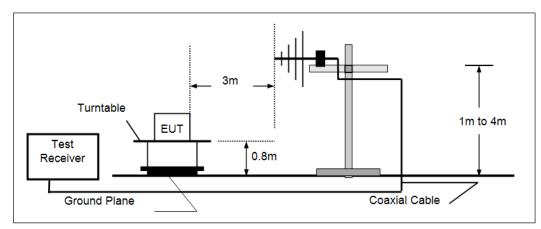
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

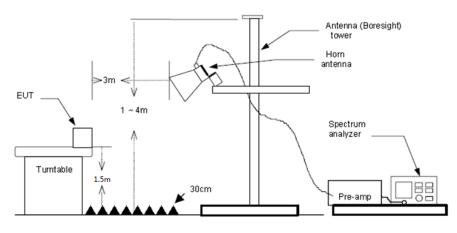
Below 30 MHz



> 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 with 0.8 meter above ground for below 1GHz, 1.5 meter above ground for above 1GHz.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. 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 detector 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) From 1 GHz to 10th harmonic: 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

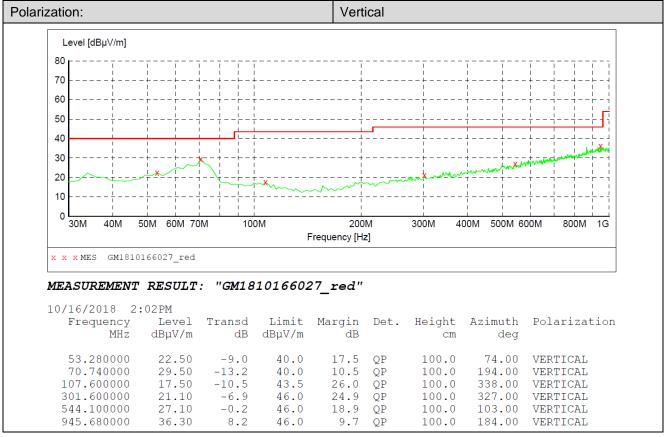
Note:

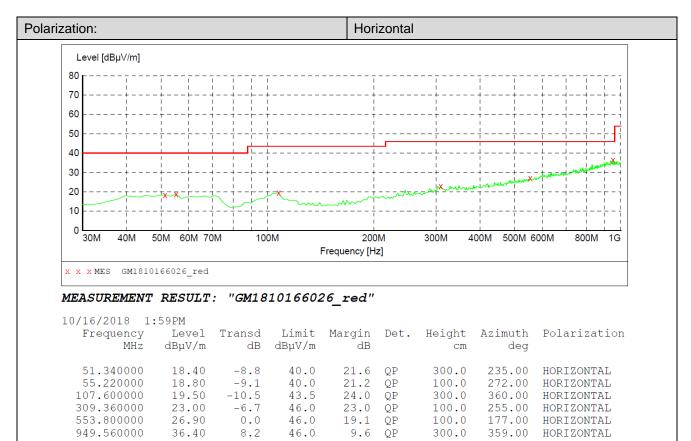
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst 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.

➢ 30 MHz ~ 1 GHz





➢ 1 GHz ~ 25 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				
1176.94	38.00	26.12	4.61	37.24	31.49	74.00	-42.51	Vertical	Peak				
4096.88	35.57	29.89	8.86	36.66	37.66	74.00	-36.34	Vertical	Peak				
6267.19	32.79	33.03	11.00	33.86	42.96	74.00	-31.04	Vertical	Peak				
8571.38	32.04	37.19	12.88	32.93	49.18	74.00	-24.82	Vertical	Peak				
1502.73	38.82	25.77	5.29	37.07	32.81	74.00	-41.19	Horizontal	Peak				
3151.99	36.03	28.80	7.66	37.44	35.05	74.00	-38.95	Horizontal	Peak				
5073.59	33.02	31.80	9.73	35.23	39.32	74.00	-34.68	Horizontal	Peak				
6696.01	32.81	34.20	11.48	33.72	44.77	74.00	-29.23	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				
1293.17	37.15	26.21	4.82	37.17	31.01	74.00	-42.99	Vertical	Peak				
2281.32	36.36	27.99	6.57	37.59	33.33	74.00	-40.67	Vertical	Peak				
5022.19	32.71	31.59	9.69	35.34	38.65	74.00	-35.35	Vertical	Peak				
6696.01	32.65	34.20	11.48	33.72	44.61	74.00	-29.39	Vertical	Peak				
1498.91	37.13	25.80	5.28	37.07	31.14	74.00	-42.86	Horizontal	Peak				
2298.80	36.35	28.09	6.60	37.59	33.45	74.00	-40.55	Horizontal	Peak				
4547.56	34.08	30.80	9.37	36.20	38.05	74.00	-35.95	Horizontal	Peak				
8042.90	32.08	37.06	12.40	33.06	48.48	74.00	-25.52	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
1340.09	37.13	26.08	4.90	37.15	30.96	74.00	-43.04	Vertical	Peak
3216.84	36.06	28.70	7.74	37.38	35.12	74.00	-38.88	Vertical	Peak
4652.95	33.31	31.06	9.48	36.00	37.85	74.00	-36.15	Vertical	Peak
8187.50	32.14	36.74	12.74	33.01	48.61	74.00	-25.39	Vertical	Peak
1525.86	37.06	25.56	5.36	37.10	30.88	74.00	-43.12	Horizontal	Peak
3534.54	35.62	29.10	8.17	37.11	35.78	74.00	-38.22	Horizontal	Peak
6156.51	32.02	32.73	10.94	33.98	41.71	74.00	-32.29	Horizontal	Peak
7721.91	32.75	36.10	13.05	33.04	48.86	74.00	-25.14	Horizontal	Peak

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor

2. The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

3. The emission levels of other frequencies are very lower than the limit and not show in test report.

6. TEST SETUP PHOTOS

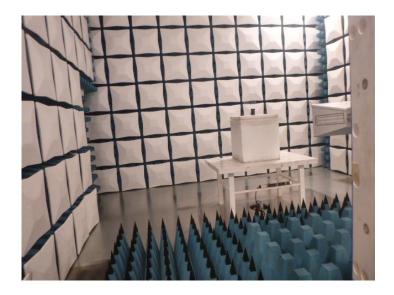
Conducted Emissions (AC Mains)



Radiated Emissions







7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: TRE1810002601

-----End of Report------