



TEST REPORT

Report Reference No	CHTEW2012013502	Report verification:		
Project No:	SHT2012030407EW			
FCC ID:	ZSW-30-075			
Applicant's name:	b mobile HK Limited			
Address:	Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.			
Manufacturer	b mobile HK Limited			
Address	Flat 18; 14/F Block 1; Golden In Street; Kwai Chung; New Territ	ndustrial Building;16-26 Kwai Tak tories; Hong Kong.		
Test item description:	Mobile Phone			
Trade Mark	Bmobile			
Model/Type reference:	AX687			
Listed Model(s)	AX687+, AX689			
Standard:	FCC CFR Title 47 Part 15 Sub	opart C Section 15.247		
Date of receipt of test sample:	Dec. 09, 2020			
Date of testing	Dec. 10, 2020- Dec. 21, 2020			
Date of issue	Dec. 22, 2020			
Result:	PASS			
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li	Silvia Li		
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Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty		
Testing Laboratory Name: :	Shenzhen Huatongwei Intern	ational Inspection Co., Ltd.		
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

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

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

1.2. Report version

Revision No.	Date of issue	Description
N/A	2020-12-22	Add list models, update supplier of power IC,make difference test on Spurious Emissions (radiated), others are the same as report No. TRE1810027103

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	Pan Xie

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	b mobile HK Limited
Address:	Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.
Manufacturer:	b mobile HK Limited
Address:	Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.

3.2. Product Description

Name of EUT:	Mobile Phone	
Trade Mark:	Bmobile	
Model No.:	AX687	
Listed Model(s):	AX687+, AX689	
IMEI:	Conducted: 863595039996835 Radiated: 863595039996892	
Power supply:	DC 3.7V	
Adapter information:	Input:100-240Va.c. 50/60Hz 0.2A Output:5.0Vd.c. 500mA	
Hardware version:	FS280-MB-V7.0	
Software version:	V01	
Bluetooth		
Version:	Supported BT4.2+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	PIFA Antenna	
Antenna gain:	0.5dBi	

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:	/
7	Model No.:	/
	Manufacturer:	/
7	Model No.:	/

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

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

4.2. Test Facility

CNAS-Lab Code: L1225

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

A2LA-Lab Cert. No.: 3902.01

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

FCC-Registration No.: 762235

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

IC-Registration No.:5377A

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.: 5377A.

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.

Conduc	Conducted Emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)	
1	EMI Test Receiver	R&S	ESCI	101247	10/27/2018	10/26/2019	
2	Artificial Mains	SCHWARZBECK	NNLK 8121	573	10/27/2018	10/26/2019	
3	Pulse Limiter	R&S	ESH3-Z2	101488	10/27/2018	10/26/2019	
4	RF Connection Cable	HUBER+SUHNER	EF400	N/A	11/21/2017	11/20/2018	
5	Test Software	R&S	ES-K1	N/A	N/A	N/A	

4.5. Equipments Used during the Test

Radia	Radiated Emissions(Below 1GHz)						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)	
1	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	C11121	2018/09/30	2021/09/29	
2	EMI Test Receiver	R&S	ESCI	100900	2020/10/19	2021/10/18	
3	Loop Antenna	R&S	HFH2-Z2	100020	2018/04/02	2021/04/02	
4	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2020/04/28	2023/04/27	
5	Pre-amplifer	SCHWARZBECK	BBV 9742	N/A	2020/11/12	2021/11/11	
6	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2020/05/27	2021/05/26	
7	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2020/05/27	2021/05/26	
8	Test Software	R&S	ES-K1	N/A	N/A	N/A	
9	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A	
10	Antenna Mast	Maturo Germany	TAM-4.0-P	N/A	N/A	N/A	
11	Temperature and Humidity Meter	KEJIAN	KJ03	N/A	N/A	N/A	

Radia	Radiated Emissions(Above 1GHz)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)
1	Anechoic Chamber	Albatross projects	SAC-3m-01	C11121	09/30/2018	09/29/2021
2	Horn Antenna	SCHWARZBECK	9120D	1011	03/27/2017	03/26/2020
3	Preamplifier	BONN	BLWA0160-2M	1811887	11/14/2018	11/13/2019
4	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	04/28/2018	04/27/2019
5	Spectrum Analyzer	R&S	FSP40	100597	10/27/2018	10/26/2019
6	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	11/15/2018	11/14/2019
7	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	11/15/2018	11/14/2019
8	Test Software	Audix	E3	N/A	N/A	N/A
9	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
10	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A
11	Temperature and Humidity Meter	MINGLE	YH101	N/A	10/30/2018	10/29/2019

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	9/29/2018	9/28/2019
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.

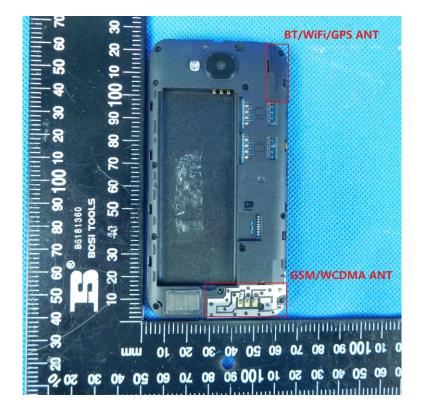
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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)

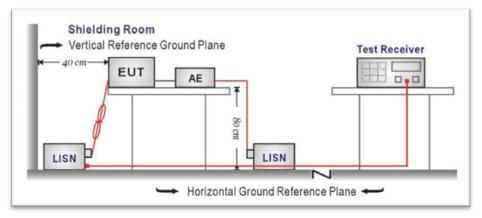
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (d	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

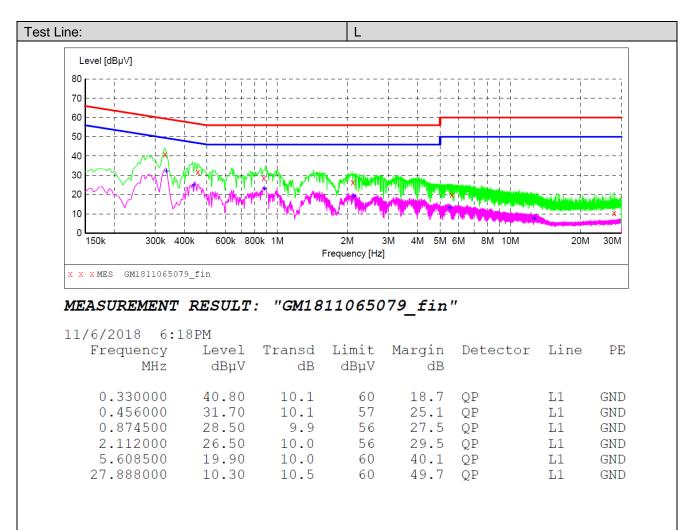
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

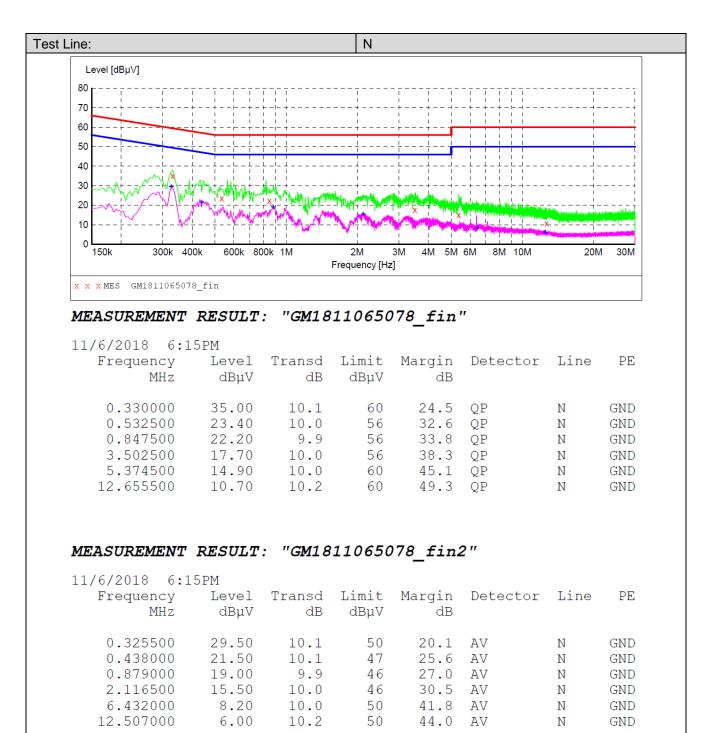
Note:

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



MEASUREMENT RESULT: "GM1811065079 fin2"

	11/6/2018 6:1							
	Frequency				_	Detector	Line	PE
	MHz	dBµV	dB	dBµV	dB			
	0 224500	22.20	10 1	10	1 17 1	77 7 7	T 1	CNID
	0.334500	32.20	10.1	49	17.1	AV	L1	GND
	0.438000	24.90	10.1	47	22.2	AV	L1	GND
	0.879000	23.20	9.9	46	22.8	AV	L1	GND
	2.130000	19.00	10.0	46	27.0	AV	L1	GND
	5.505000	13.20	10.0	50	36.8	AV	L1	GND
	12.718500	7.90	10.2	50	42.1	AV	L1	GND
L								

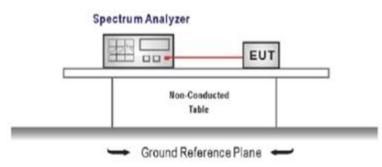


5.3. Conducted Peak Output Power

<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	3.82		
GFSK	39	4.61	≤ 30.00	Pass
	78	4.24		
	00	3.35		
π/4DQPSK	39	4.61	≤ 21.00	Pass
	78	4.46		
	00	3.64		
8DPSK	39	4.88	≤ 21.00	Pass
	78	4.75		

Modulation Type:	GFSK
	Spectrum 🕎
	Ref Level 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
	IPk View
	M1[1] 3.82 dBm 2.40186250 GHz
	10 dBm
	D dBm
	-10 dBm
CH00	-20 dBm
Child	-30.dBm
	-40 dBm-
	-50 dBm
	-60 dBm-
	-70 dBm-
	*/0 dbii
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Measuring
	Spectrum 🕎
	Ref Level 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
	● 1Pk View
	M1[1] 4.61 dBm 2.44087700 GHz
	10 dBm
	0 dBm
	-10 dBm
CH39	-20 dBm
01155	-39°8m
	-40 dBm-
	-50 dBm
	-60 dBm-
	-70 dBm-
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Nextorio - Mexico - Martin Ma
	Spectrum
	Ref Level 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
	●1Pk View M1[1] 4.24 dBm
	2.47985530 GHz
	M1 V
	0 dBm
	-10 dBm
	-20 dBm
CH78	
	-30 dBm
	-40 dBm
	-50 dBm-
	-60 dBm-
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz

odulation Type:	π/4DQPSK
	Spectrum V
	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
	● 1Pk View M1[1] 3.35 dBm
	10 dBm
	MI
	0 dBm
	-10 fBm
	-20 d8m-
CH00	
	-30 dBm
	-40 dBm-
	-50 dBm
	-60 dBm-
	-70 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
	M1[1] 4.61 dBm 2.44084800 GHz
	10 dBm
	0 dBm
	-10 dBm
CH20	-20 dBm
CH39	-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 Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep
	Count 500/500
	M1[1] 4.46 dBm 2.48009410 GHz
	10 dBm M1 0 dBm
	~10 d8m
	-20 dBm
CH78	-30 dBm-
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz

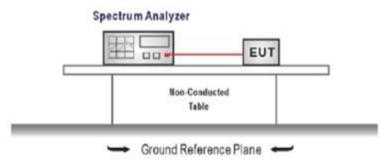
Modulation Type:	8DPSK
	RefLevel 20.00 dBm Offset 1.00 dB e RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500
	1Pk View 10 dBm 10 dBm
	0 dBm
	-10 d5m
CH00	-20 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Spectrum V
	RefLevel 20.00 dBm Offset 1.00 dB e RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500
	0 dBm
	-10 dBm
CH39	-20 BBIT
	-40 dBm
	-50 dBm
	-70 dBm
	CF 2.441 CHz 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
	1Pk View 10 dBm 10 dBm
	0 dBm
	-10 dBm
CH78	-20 GBM
	-40 dBm
	-50 d8m
	-70 dBm-
	CF 2.48 GHz 691 pts Span 5.0 MHz

5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

TEST CONFIGURATION



TEST PROCEDURE

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

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

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

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

🛛 Passed

Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result
	00	0.92		
GFSK	39	0.92	-	Pass
	78	0.92		
	00	1.28		
π/4DQPSK	39	1.28	-	Pass
	78	1.28		
8DPSK	00	1.31		
	39	1.31	-	Pass
	78	1.30		

GFSK
Spectrum V
RefLevel 20.00 dBm Offset 1.00 dB ● RBW 10 kHz ● Att 30 dB SWT 189.6 µs ● VBW 30 kHz Mode Auto FFT
Count 500/500
M1[1] -23.37 dBm
10 UBIII M2[1] -1.96 dBm M2 2 2 0005550 CH2
-20 dBm 01 -21,958 dBm + + + + + + + + + + + + + + + + + + +
-30 dBm
-50, demanda
-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 2.4015425 GHz -23.37 dBm
M2 1 2.4020525 GHz -1.96 dBm D3 M1 1 922.5 kHz 0.91 dB
Measuring (Although Although A
Spectrum 🕎
Ref Level 20.00 dBm Offset 1.00 dB 🖷 RBW 10 kHz
● Att 30 dB SWT 189.6 μs ● VBW 30 kHz Mode Auto FFT Count 500/500
●1Pk View M1[1] -22.22 dBm
10 dBm 2.44054250 GHz M2[1] -1.19 dBm
M2 2.44105000 GHz
-10 dBm
-20.d8m D1 -21.195 d8m
-30 dBm
-50.dshufunut
-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 2.4405425 GHz -22.22 dBm M2 1 2.44105 GHz -1.19 dBm
D3 M1 1 922.5 kHz 0.53 dB
Spectrum 🕎
RefLevel 20.00 dBm Offset 1.00 dB ● RBW 10 kHz ● Att 30 dB SWT 189.6 µs ● VBW 30 kHz Mode Auto FFT
Count 500/500
M1[1] -22.23 dBm 2.47954250 GHz
-20.dBm 01 -21.546 dBm 1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/
manuful the second second
-60 dBm
CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
Type Ref Trc X-value Y-value Function Function Result M1 1 2.4795425 GHz -22.23 dBm
M2 1 2.14 Strate State 22.25 dblm M2 1 2.46005 GHz -1.55 dbm D3 M1 1 920.0 kHz 0.65 db
Measuring

Modulation Type:	π/4DQPSK
3	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
	●1Pk View M1[1] -20.67 dBm
	10 dBm 2.40156000 GHz
	0 dBm M2[1] 0.01 dBm M2[1] 2.40215000 GHz
	-10 dBm
	-20 dBm D1 -19.986 dBm 2
CH00	-30 dBm
CHOO	-10 dem
	-50 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 2.40136 GHz -20.67 dBm
	M2 1 2.40215 GHz 0.01 dBm D3 M1 1 1.2825 MHz 0.57 dB
	Measuring
	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
	M1[1] -19.43 dBm 2 4005600 GM
	10 UBII M2 M2[1] 1.18 dBm
	0 dBm 2.44115000 GHz
	-10 dBm
	-20 d8m 01 -18.820 d8m 3
	-30 d8m
CH39	40 Ubm
	-50 d8m-
	-60 d8m
	-70 dBm
	-70 ubm
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.44036 GHz -19.43 dBm M2 1 2.44115 GHz 1.18 dBm
	D3 M1 1 1.2825 MHz 0.47 dB
	Measuring
	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
	●1Pk View M1[1] -19.48 dBm
	0 dBm 2.48015000 GHz
	and the second s
	-20 dBm 01 -18.991 dBm 2
CH78	-30 dBm
CITO	-40 d8m
	-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 2.47936 GHz -19.48 dBm -
	M2 1 2.49015 GHz 1.01 dBm D3 M1 1 1.2825 MHz 0.31 dB
	US WI 1 1.2023 WH2 U.S. US MAR US 1 1.2023 WH2 U.S. US MAR US 1 1.2023 WH2 U.S. US MAR US 1 1.2023 WH2 US 1 1.

Modulation Type:	8DPSK
	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
	P1Pk View M1[1] -22.00 dBm
	10 dBm 2.40134250 GHz
	-10 dBm
CH00	-30 dBm
61160	
	-50 d8m
	-60 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz Marker
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.4013425 GHz -22.00 dBm -
	M2 1 2.4021525 GHz -1.73 dBm D3 M1 1 1.305 MHz 0.10 dB
	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
	1Pk View 1Pl View 1Pl View 1Pl View 1Pl View 1Pl View
	10 d8m 2.44034250 GHz M2[1] -0.54 d8m M2 2.4415250 GHz
	0 dBm
	-20.48m D1 -20.542 dBm
CH39	-30 dBm
61135	-40 0 d6m
	-50 d8m
	-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 2.4403425 GHz -21.01 dBm - -
	M2 1 2.4411525 GHz -0.54 dBm D3 M1 1 1.305 MHz 0.25 dB
	Measuring (11111)
	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
	M1[1] -21.00 dBm
	10 deni M2[1]
	-10 dBm
	-20 dBm 01 -20,729 dBm 4
CH78	-30 dBm
	-50 dBm
	-50 GBm
	-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 2.4793425 GHz -21.08 dBm - -
	M2 1 2.4801525 GHz -0.73 dBm D3 M1 1 1.3025 MHz 0.31 dB
	Measurging.

5.5. Carrier Frequencies Separation

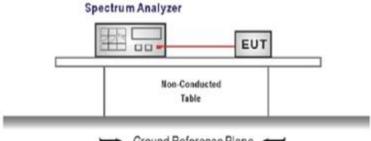
<u>LIMIT</u>

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

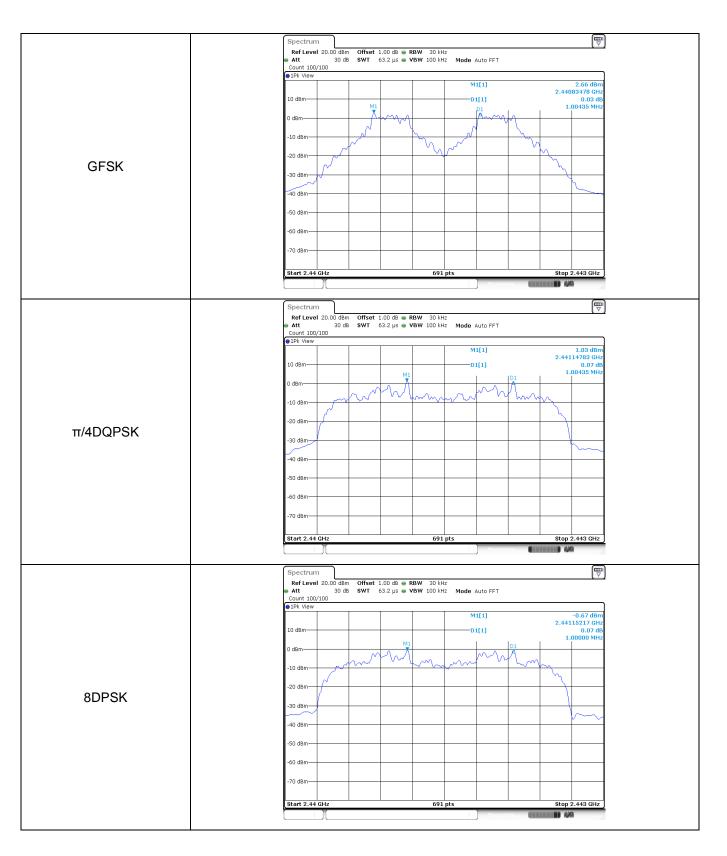
TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.92	Pass
π/4DQPSK	39	1.00	≥0.85	Pass
8DPSK	39	1.00	≥0.87	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

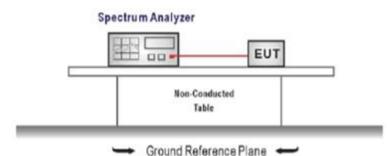


5.6. Hopping Channel Number

<u>LIMIT</u>

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

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

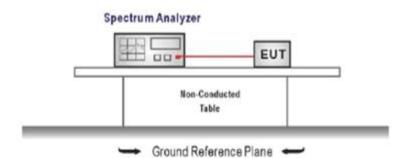
	Spectrum ♥ Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	Att 30 dB SWT 1 ms • VBW 300 kHz Mode Auto Sweep
	10 dBm-
	₀ <mark>₽₽₽₩</mark> ₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽
	-10 days
GFSK	-20 dBm-
GFSK	-90 dBm
	40 dBm-
	+50 dBm
	-60 dBm-
	-70 dBm-
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Nexemino
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1 ms VBW 3000 kHz Mode Auto Sweep
	IPk View
	10 dBm-
	D #Bmin + + + + - + + + + + + + + + + + + + +
	o. her a second second and a second
	-10 dBm-
	-20 dBm
π/4DQPSK	-B0 dBm
	40 dBm
	-50 dBm
	-60 dBm-
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Measuring.
	Spectrum 🕎
	RefLevel 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-
	o warman warm
	-10 dBm-
	-20 dBm
8DPSK	-50 dBm
	40 dbm
	-50 dBm
	-60 dBm
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz

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.

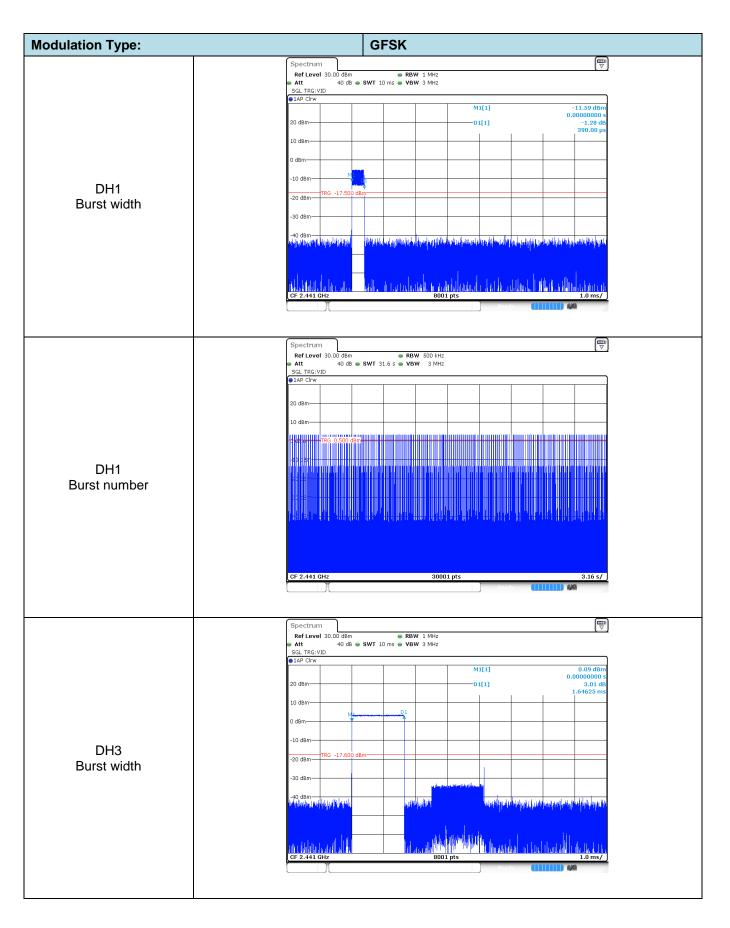
TEST MODE:

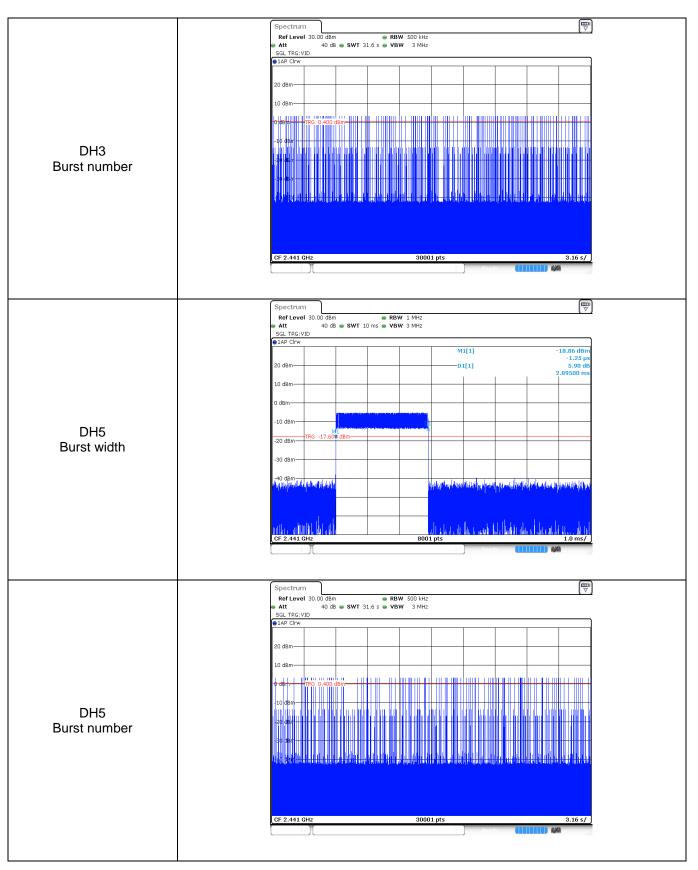
Please refer to the clause 3.3

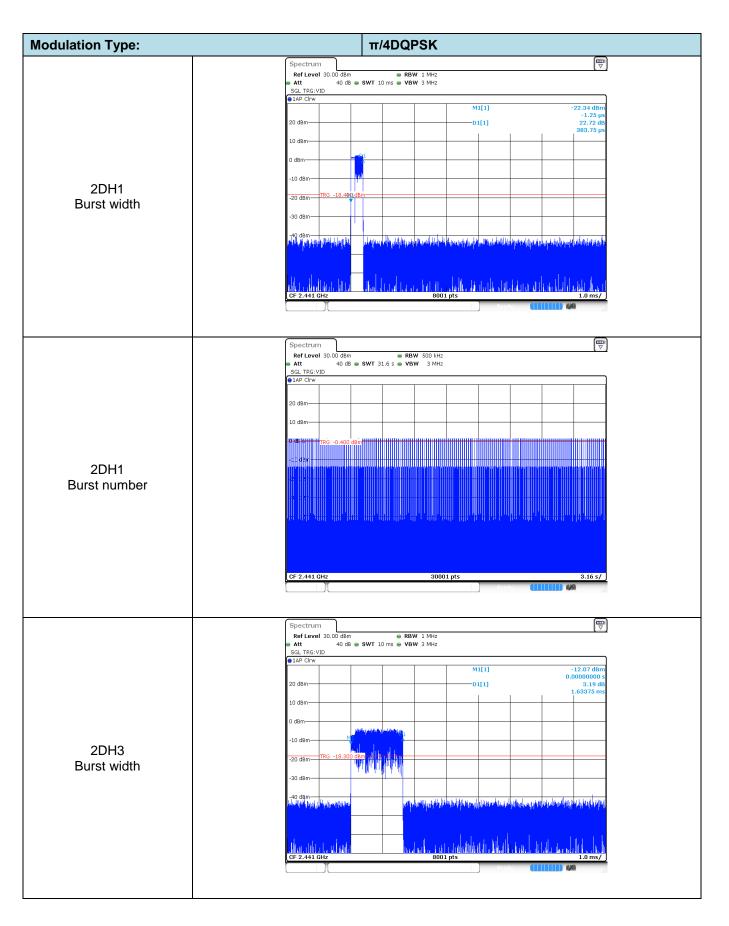
TEST RESULTS

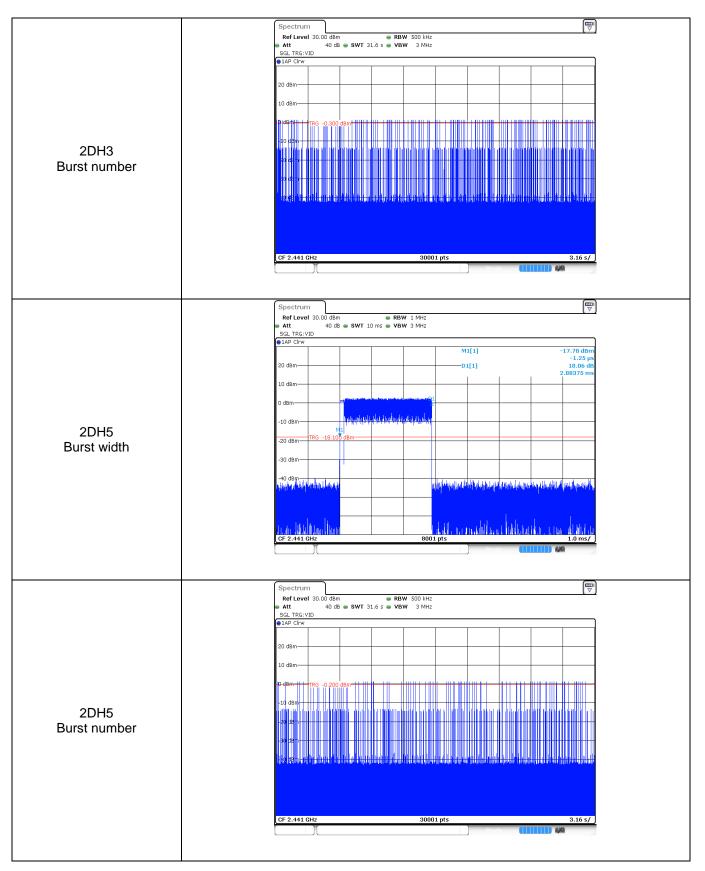
☑ Passed □ Not Applicable

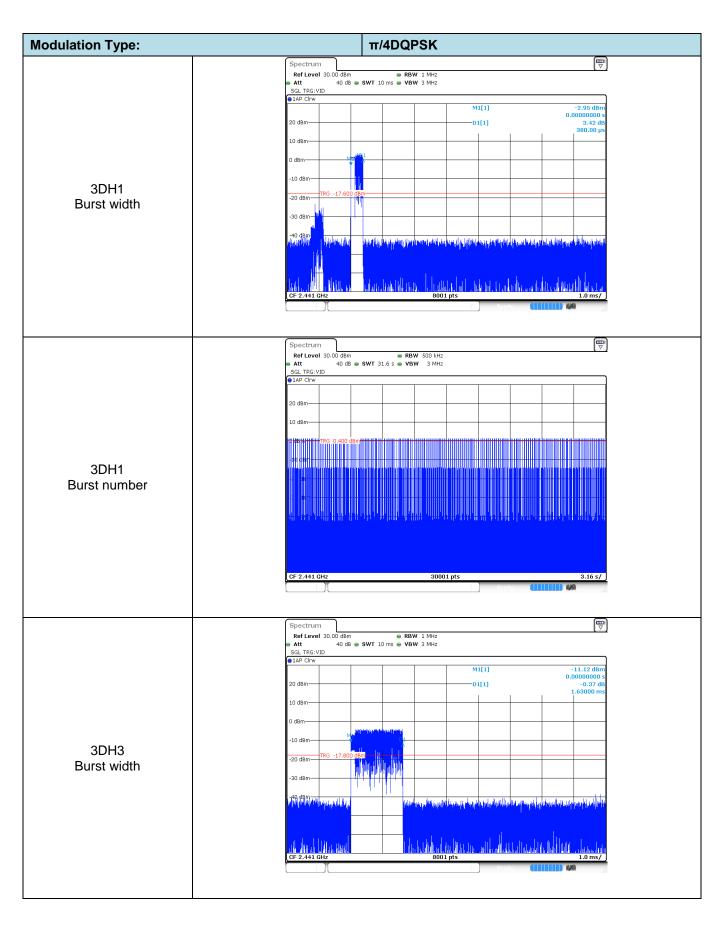
Modulation type	Channel	Burst Width Total [ms/hop/ch] Hops[hop*ch]		Dwell time (Second)	Limit (Second)	Result
	DH1	0.39	317.00	0.12		
GFSK	C DH3	1.65	163.00	0.27	≤ 0.40	Pass
	DH5	2.90	110.00	0.32		
	2DH1	0.38	319.00	0.12		
π/4DQPSK	2DH3	1.63	159.00	0.26	≤ 0.40	Pass
	2DH5	2.88	96.00	0.28		
	3DH1	0.38	318.00	0.12		
8DPSK	3DH3	1.63	164.00	0.27	≤ 0.40	Pass
	3DH5	2.88	109.00	0.31		

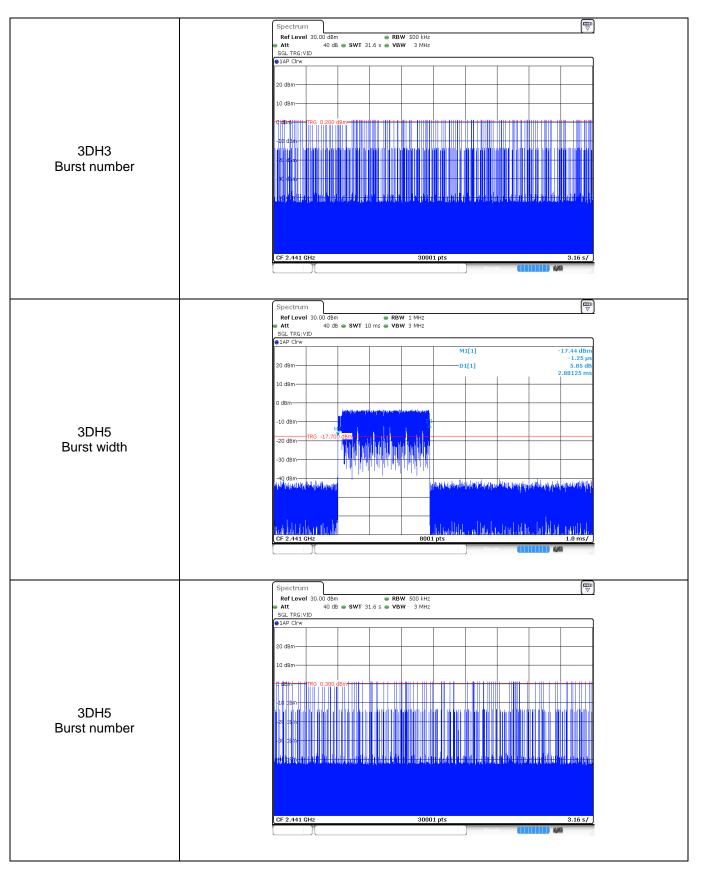












5.8. Pseudorandom Frequency Hopping Sequence

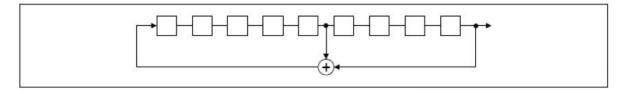
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):Frequency hopping systems shall have hopping channel carrier fre-quencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier fre-quencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to chan-nel frequencies that are selected at the system hopping rate from a pseudo ran-domly ordered list of hopping fre-quencies. Each frequency must be used equally on the average by each trans-mitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST RESULTS

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

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0	2	4	6	62	64	-	78	1	73	75 7
٦				 ·····			1			П
							i i			
				1			1			
				 			<u>i</u>		 _Ĺ_	

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.

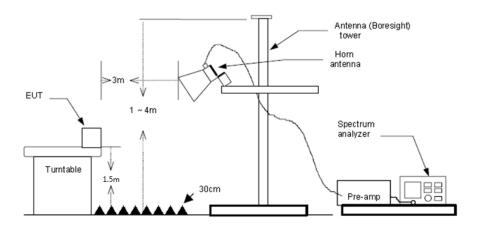
5.9. Restricted band (radiated)

<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	29.34	28.05	6.62	37.59	26.42	74.00	-47.58	Horizontal	Peak	
2390.03	29.76	27.65	6.75	37.59	26.57	74.00	-47.43	Horizontal	Peak	
2310.00	31.88	28.05	6.62	37.59	28.96	74.00	-45.04	Vertical	Peak	
2390.03	31.58	27.65	6.75	37.59	28.39	74.00	-45.61	Vertical	Peak	
2310.00	17.48	28.05	6.62	37.59	14.56	54.00	-39.44	Horizontal	Average	
2390.03	17.53	27.65	6.75	37.59	14.34	54.00	-39.66	Horizontal	Average	
2310.00	19.20	28.05	6.62	37.59	16.28	54.00	-37.72	Vertical	Average	
2390.03	19.17	27.65	6.75	37.59	15.98	54.00	-38.02	Vertical	Average	

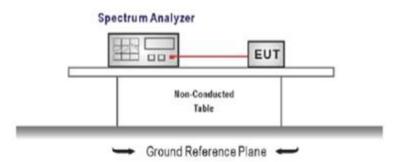
Test channel:					СН78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	53.38	27.26	6.83	37.59	49.88	74.00	-24.12	Horizontal	Peak	
2500.00	30.47	27.20	6.84	37.59	26.92	74.00	-47.08	Horizontal	Peak	
2483.50	52.35	27.26	6.83	37.59	48.85	74.00	-25.15	Vertical	Peak	
2500.00	31.22	27.20	6.84	37.59	27.67	74.00	-46.33	Vertical	Peak	
2483.50	22.34	27.26	6.83	37.59	18.84	54.00	-35.16	Horizontal	Average	
2500.00	17.70	27.20	6.84	37.59	14.15	54.00	-39.85	Horizontal	Average	
2483.50	22.34	27.26	6.83	37.59	18.84	54.00	-35.16	Vertical	Average	
2500.00	18.36	27.20	6.84	37.59	14.81	54.00	-39.19	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

est Item:	Band edge		Мо	dula	tion	type:		C	GFSK		
	Att Count	evel 20.00 dBm 30 dB 500/500			BW 100 kH BW 300 kH		Auto Sweep			V	
	● 1Pk N	ax				N	1[1]			3.26 dBm	
	10 dBm					N	2[1]		-	02040 GHz 54.19 dBm	
	0 dBm- -10 dBi								2.4	00000 GHz	
	-10 dBi	01 -16 740	dBm								
	-30 dB									-	
CH00	-40 dB	1								-++	
No hopping mode	-50 dBi t								M3		
	-70 dB			40.0001000	1989 Constanting of the Constant of the Consta			adite alleright			
		.31 GHz			601				Oton (405 0115	
	Marker				691					2.405 GHz	
		Ref Trc 1 1	X-value 2.40204	4 GHz 4 GHz	Y-value 3.26 dE -54.19 dE		tion	Funci	tion Result		
	M3 M4	1	2.39	9 GHz L GHz	-59.55 de	Im					
	M5	1	2.399768		-54.42 dE		Measuri				
										- 111	
	Speci	rum	Offcet 1	no de 👄 P	BW 100 kH	7				₽	
	👄 Att	30 dB 500/500					Auto Sweep				
	1Pk N						1[1]			2.99 dBm	
	10 dBm						2[1]		2.4	03010 GHz 56.29 dam	
	0 dBm-								2.4	00000 GHz.	
	-10 dBi -20 dBi	01 17 010	dBm							(44)	
	-20 dBi										
CH00	-40 dB	1									
Hopping mode	-50 gBi								МЗ	Ma	
	⊷60 dan		hander of the state	ann an Albanair	anne an the second s		and many adaptations	at white we have	and all and the	adawl	
	-70 dBi										
	Marker	.31 GHz			691					2.405 GHz	
		Ref Trc 1 1	X-value 2.40301	L GHz 4 GHz	2.99 dE -56.29 dE		tion	Funct	tion Result		
	M3 M4	1	2.39	9 GHz L GHz	-58.63 de	Im					
	M5	1	2.313167	7 GHz	-57.05 dE	Im	Measuri				
)			- 111	
	Speci	rum e vel 20.00 dBm	Offset 1	00 dB 👄 B	BW 100 kH	7					
	👄 Att	30 dB 500/500			BW 300 kH		Auto FFT				
	● 1Pk N					N	1[1]			3.97 dBm	
	10 dBm	M1					2[1]		-	98310 GHz 57.46 dBm	
	0 dBm-	Л							2.48	35000 GHz	
	-10 dBi -20 dBi	D1 -16.030	dBm								
	-20 dB										
CH78	-40 dBi										
No hopping mode	-50 dBi		M2 M4								
	-60 dBi		M2 M4	m ~~~~			have the second	man	~^~~~	M فیسیمیست	
	-70 dBi										
		.478 GHz			691	pts			Sto	p 2.5 GHz	
	Marker 	Ref Trc	X-value 2.479831	L GHz	Y-value 3.97 de	Fund	tion	Funct	tion Result		
	M1 M2 M3	1 1	2.4835		-57.46 dE -58.21 dE	Im					
	M4	1	2.4846638	B GHz	-56.47 dB	Im					

Report No.: CHTEW2012013502

	Count 500/500	● RBW 100 kHz ● VBW 300 kHz Mode Auto F	FT
CH78 Hopping mode	• IPk Max 10,dBm b dBm -10 dBm -20 dBm -30 dBm -30 dBm -50 dBm -60 dBm -70 dBm	M1[1] M2	3.87 dBm 2.4788440 GHz -58.92 dBm 2.4835000 GHz
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker Type Ref Trc X-value M1 1 2.478844 GHz M2 1 2.43834 GHz M3 1 2.5 GHz M4 1 2.4837391 GHz	Y-value Function 3.87 dBm - -58.92 dBm - -59.88 dBm - -57.42 dBm -	Function Result

Test Item:	Band edge		Modula	ation type	:	π/4DQP	SK
		Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500	Offset 1.00 dB e SWT 1.1 ms e	RBW 100 kHz VBW 300 kHz Mod	e Auto Sweep		
	<u>(</u>	0 dBm			M1[1] M2[1]	0.78 2.40218 -50.78 2.40000	3 dBm
	-	10 dBm D1 -19.220 df	3m				<u>A</u>
CH00 No hopping mode	4	30 dBm				M3	
		50 dBm		691 pts		Stop 2.405	GHZ
		Interver Type Ref Trc M1 1 1 M2 1 1 M3 1 1 M4 1 1 M5 1 1	X-value 2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.399906 GHz	Y-value Fu 0.78 dBm -50.78 dBm -59.28 dBm -59.02 dBm -50.86 dBm -50.86 dBm	nction	Function Result	
		Spectrum			Measuring		
		Ref Level 20.00 dBm Att 30 dB Count 500/500 IPk Max	Offset 1.00 dB • 1 SWT 1.1 ms • 1	RBW 100 kHz VBW 300 kHz Mod			
		LO dBm			M1[1] M2[1]	0.67 2.40218 -55.93 2.40000) dBm
01100	-	10 dBm D1 -19.330 df	3m-				
CH00 Hopping mode	t b	40 dBm	and the state of the second	han and the second s	adapter and a second	M3	
		70 dBm Start 2.31 GHz larker Type Ref Trc	X-value	691 pts	nction	Stop 2.405 Function Result	GHz
		M1 1 M2 1 M3 1 M4 1 M5 1	2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.39963 GHz	0.67 dBm -55.93 dBm -59.66 dBm -58.82 dBm -51.99 dBm			
		Spectrum			Measuring	()	
		Ref Level 20.00 dBm Att 30 dB Count 500/500 0 1Pk Max 0	Offset 1.00 dB ● 1 SWT 56.9 µs ● '		e Auto FFT		
		LO dBm M1			M1[1] M2[1]	2.18 2.480149 -56.72 2.483500	2 dBm
CH78		10 dBm D1 -17.850 df 20 dBm D1 -17.850 df	3m				
No hopping mode		40 dBm	M2 M4	han han han	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
		70 dBm		691 pts		Stop 2.5	GHz
		Marker Type Ref Trc M1 1 1 M2 1 1 M3 1 1 M4 1 1	X-value 2.480149 GHz 2.4835 GHz 2.5 GHz 2.4843768 GHz	Y-value Fu 2.15 dBm -56.72 dBm -59.43 dBm -56.98 dBm	nction	Function Result	
				contro dann	Measuring	() 4/A	

Report No.: CHTEW2012013502

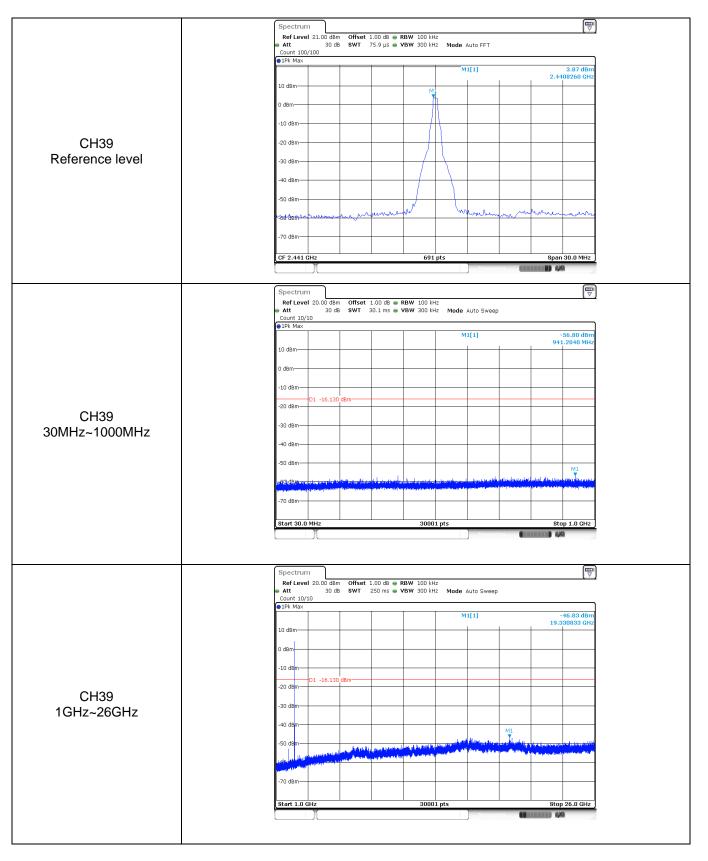
	Count 500/500	RBW 100 kHz VBW 300 kHz Mode Auto FF	т
	IPk Max	M1[1]	1.85 dBm
	10 dBm	M2[1]	2.4801490 GHz -58.47 dBm 2.4835000 GHz
	2, dath and		2.463000 GH2
	-10 dBm 01 -18.150 dBm		
	-30 dBm		
CH78 Hopping mode	-40 dBm		
Hopping mode	-50 dBm	M4	
	-60 dBm		K
	-70 dBm		
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker Type Ref Trc X-value	Y-value Function	Function Result
	M1 1 2.480149 GHz M2 1 2.4835 GHz	1.85 dBm -58.47 dBm	
	M3 1 2.5 GHz M4 1 2.4877565 GHz	-58.19 dBm -57.31 dBm	
		Me.	asuring

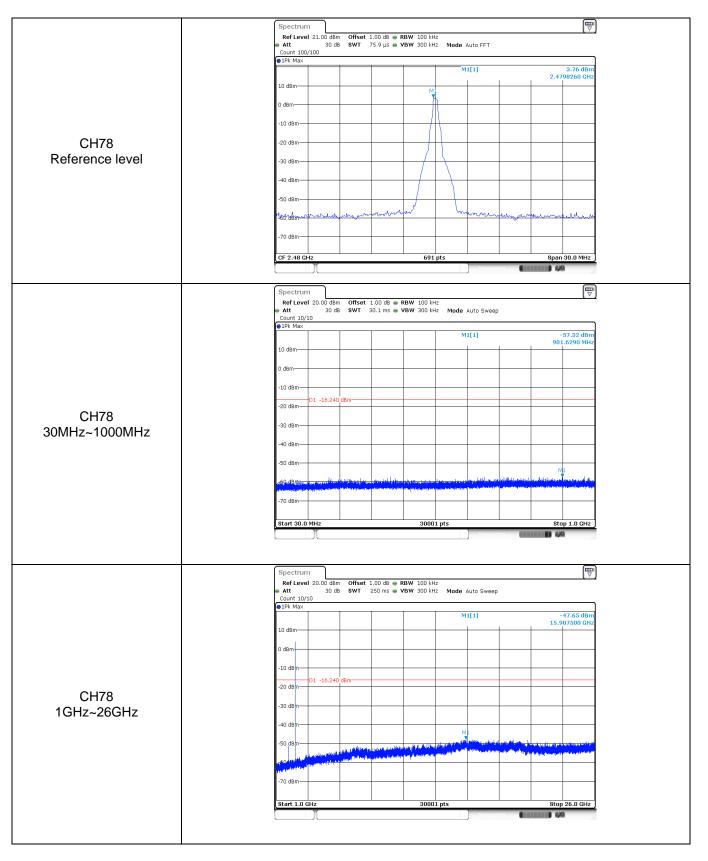
Fest Item:	Band edge		Modula	ation type:	8DPSK
		Count 500/500		RBW 100 kHz YBW 300 kHz Mode Auto Sweep	
		• 1Pk Max 10 dBm		M1[1] M2[1]	0.75 dBm 2.402180 GHz - 52.08 dBm 2.400000 @Hz
		-10 dBm -20 dBm D1 -19.250 d -30 dBm	Bm		
CH00 No hopping mode		-40 dBm -50 dBm 4 *80 ⁴ dBm atrip 1444-1444	anadorenterationalio		M3 M3
		-70 dBm Start 2.31 GHz Marker		691 pts	Stop 2.405 GHz
		Type Ref Trc M1 1 M2 1 M3 1 M4 1 M5 1	X-value 2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.399768 GHz	Y-value Function 0.75 dBm - -52.06 dBm - -59.50 dBm - -59.50 dBm - -50.50 dBm -	Function Result
		Spectrum		Neasuri	
		Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk Max		VBW 300 kHz Mode Auto Sweep	
		10 dBm		M1[1] M2[1]	0.76 dBm 2.403140 GHz -58.28 dBm 2.400000 ណ្ដីក្
CH00		-10 dBm	Bm		
Hopping mode		-40 dBm -50 dBm 4 -60 dBm	and grower takes but have a start of the	and almost a second	M3
		-70 dBm Start 2.31 GHz Marker		691 pts	Stop 2.405 GHz
		Type Ref Trc M1 1 M2 1 M3 1 M4 1 M5 1	X-value 2.40314 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.399768 GHz	Y-value Function 0.76 dBm - -53.26 dBm - -58.36 dBm - -58.14 dBm - -51.22 dBm -	Function Result
		Spectrum		Neasuri	
		Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk Max	Offset 1.00 dB ● SWT 56.9 μs ●		2.10 dBm
		10 dBm		M2[1]	2.4801490 GHz -58.17 dBm 2.4835000 GHz
CH78		-10 dBm D1 -17.900 d -30 dBm D1 -17.900 d	Bm		
No hopping mode		-40 dBm	Met		
		-70 dBm Start 2.478 GHz Marker		691 pts	Stop 2.5 GHz
		Type Ref Trc M1 1 M2 1 M3 1 M4 1	X-value 2.480149 GHz 2.4835 GHz 2.5 GHz 2.4835478 GHz	Y-value Function 2.10 dBm - -58.17 dBm - -60.47 dBm - -57.57 dBm -	Function Result
				Measuri	na (((1999)) 🚧

Report No.: CHTEW2012013502

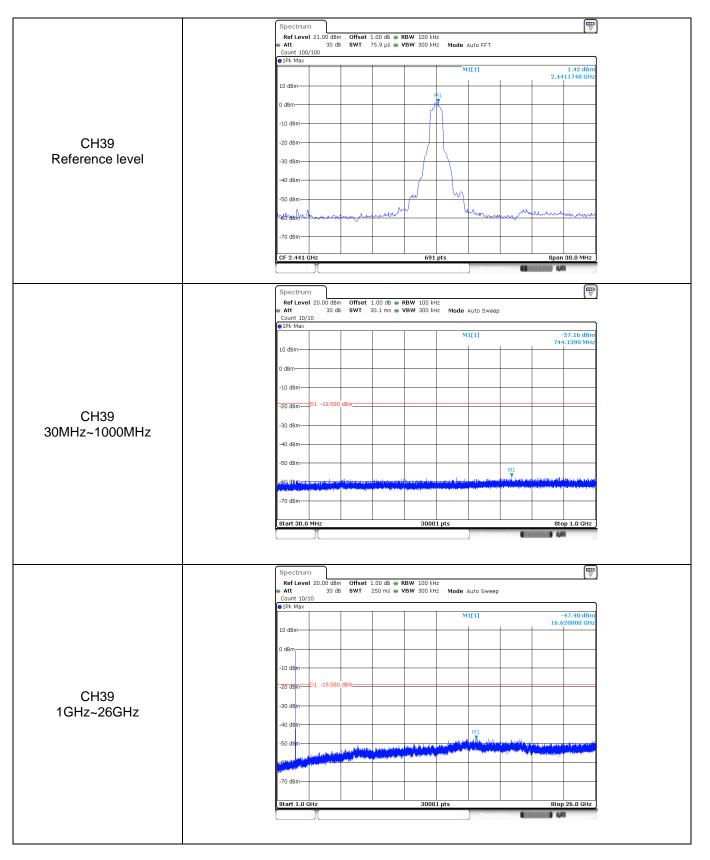
	Spectrum Image: Constant of the second
CH78 Hoppig mode	• IFK Max M1[1] 2.05 dBm 2.4791620 GHz -59.00 dBm -59.00 dBm 2.4791620 GHz -59.00 dBm -59.00 dBm 2.4835000 GHz -59.00 dBm -20 dBm 2.4835000 GHz -59.00 dBm 2.4835000 GHz -59.00 dBm -10 dBm -50.00 dBm </th
	Start 2.478 GHz 691 pts Stop 2.5 GHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.479162 GHz 2.05 dBm 100 mm
	M3 1 2.5 GHz -59.12 dBm M4 1 2.489 GHz -56.65 dBm Streture

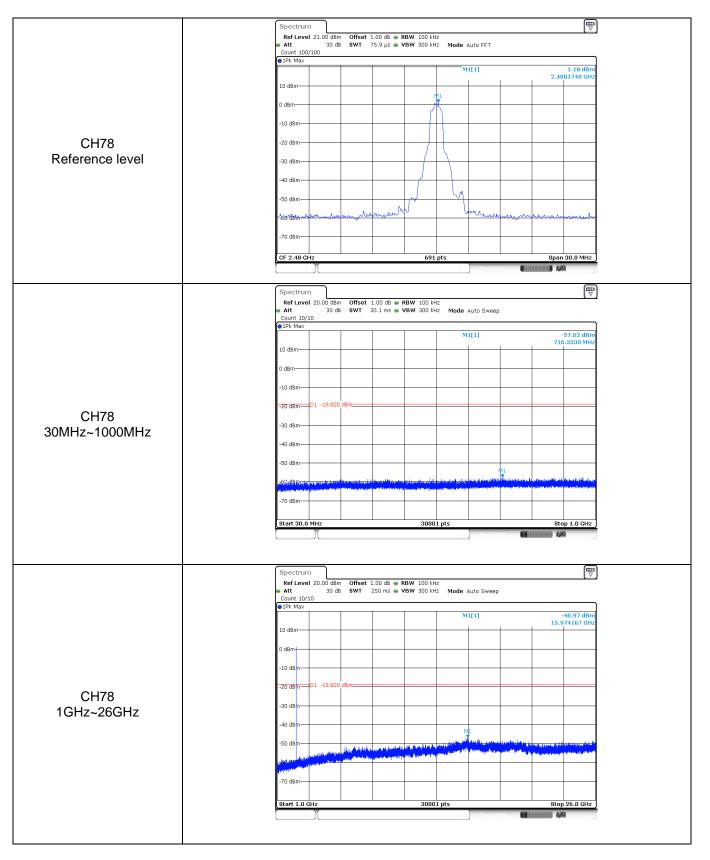
Test Item:	SE	Modulation type: GFSK
		Spectrum Image: Constraint of the section of the sectio
		0 dBm
CH00 Reference level		-20 dBm
		-50 dBm-
		-70 dBm
		Spectrum 🕎
		Ref Level 20.00 d/m Offset 1.00 d/lie RBW 100 kHz Att 30 d/lie SWT 30.1 ms VBW 300 kHz Count 10/10
		10 dBm
CH00		-10 dBm
30MHz~1000MHz		-40 dBm
		-50 dBm
		Start 30.0 MHz 30001 pts Stop 1.0 GHz
		Spectrum Image: Constraint of the sector of t
		0 dBm -10 dEm -20 dEm -20 dEm
CH00 1GHz~26GHz		-30 dEm
		-70 dBm -70 dBm Start 1.0 GHz 30001 pts Stort 1.0 GHz 30001 pts



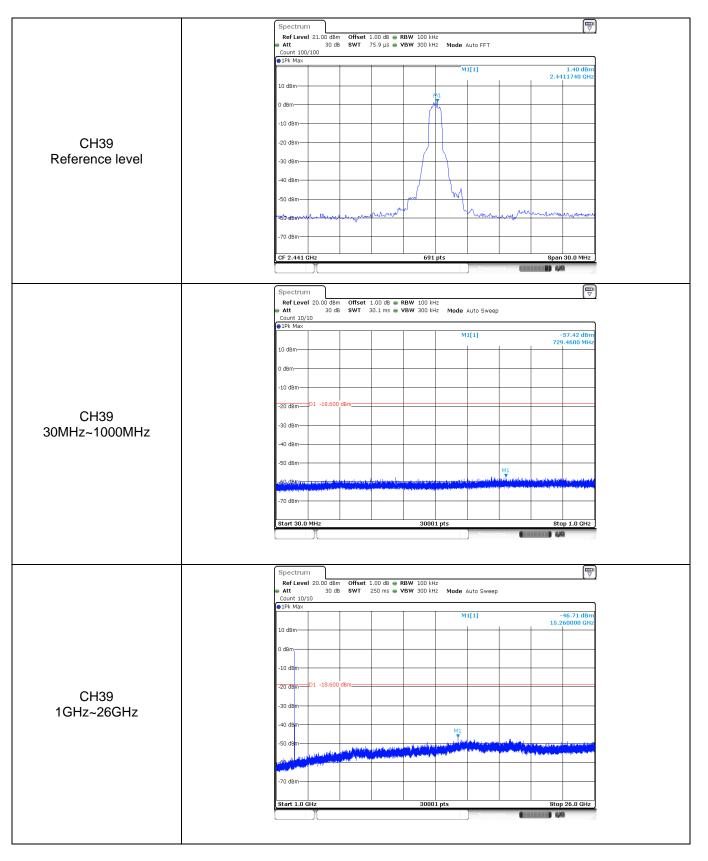


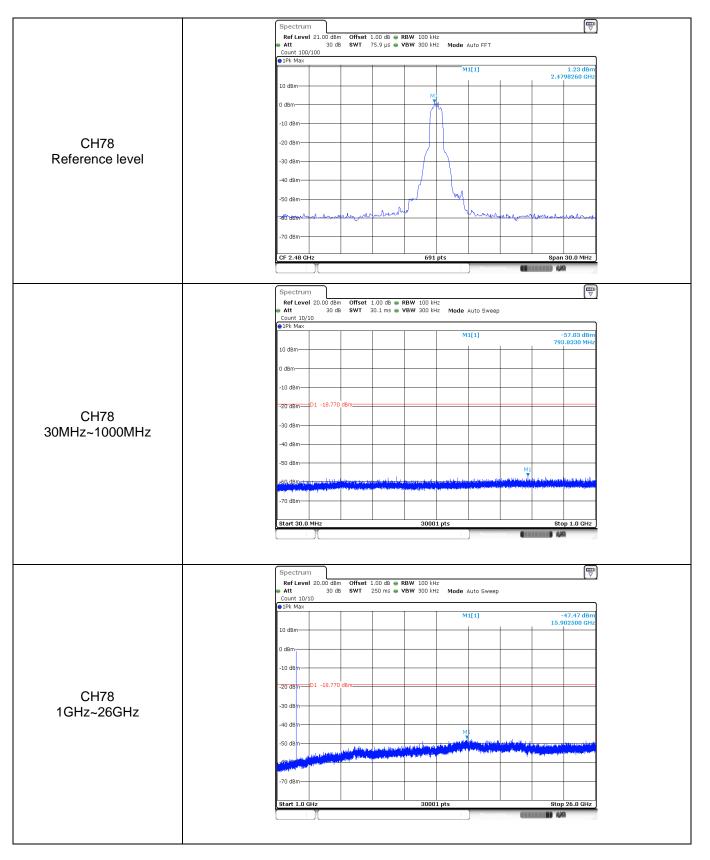
Test Item:	SE		Modula	ation type:		π/4DQPSK	·
		Spectrum					
CH00 Reference level	- - - -	Ref Level 21.00 dBm	Offset 1.00 dB = 1 SWT 75.9 µs = 1	VBW 300 kHz Mode	Auto FFT		
		F 2.402 GHz		691 pts	Measuring	Span 30.0 MHz	
CH00 30MHz~1000MHz		Ref Level 20.00 dBm Att 30 dB Joint 10/10 30 dB 0 dBm 0 dBm 0 dBm 0 dBm 10 dBm 0 dBm 20 dBm 01 -19.640 d 30 dBm 30 dBm 30 dBm 30 dBm 40 dBm 91 -19.640 d 30 dBm 30 dBm 10 dBm 11 -19.640 d 30 dBm 11 -19.640 d 30 dBm 11 -19.640 d 10 dBm 11 -19.640 d	SWT 30.1 ms	VBW 300 kHz Mode	Auto Sweep	-57.62 dBm 493.9520 MHz	
CH00 1GHz~26GHz		Spectrum Ref Level 20.00 dBm Att 30 dB 30 dB Count 10/10 IPk Max 0 dBm 0 dBm	SWT 250 ms • 1	VBW 300 kHz Mode		-47.17 dBm 15.680833 GHz	





Test Item:	SE		Modul	ation type	e:	8DPS	К	
		Spectrum						
		RefLevel 21.00 dBm Att 30 dB	Offset 1.00 dB SWT 75.9 μs	RBW 100 kHz VBW 300 kHz Mo	de Auto FFT			
		Count 100/100						
					M1[1]	2.40	0.19 dBm 21740 GHz	
		10 dBm		N1				
		0 dBm		t A				
		-10 dBm						
01100		-20 dBm						
CH00		-30 dBm						
Reference level		-40 dBm						
					. 1			
		-50 dBm		and	₩\			
		1~60-d8m 	the property of the second		- Maria Mary	www.abhahahaha	the second	
		-70 dBm						
		CF 2.402 GHz		691 pts		Span	30.0 MHz	
					Measuring.	() 4 <u>4</u>		
		Spectrum						
		RefLevel 20.00 dBm Att 30 dB		RBW 100 kHz VBW 300 kHz Mc	de Auto Sweep			
		Count 10/10 Pk Max						
					M1[1]	- 906	57.20 dBm .6410 MHz	
		10 dBm						
		0 dBm						
		-10 dBm						
01100		-20 dBm-D1 -19.810 d	Bm					
		-30 dBm						
30MHz~1000MHz		-40 dBm						
		-50 dBm						
			a tau bitata a			N National de cubiter all com	1 Marine all or n	
		.50.dBm	and a standard of the standard standard sector of the standard sector sector sector of the	li ja alkitette ette line televenette line televenette line televenette line televenette line televenette line I	ana ang ang ang ang ang ang ang ang ang	adata a para da ana da ana da ana ana da ana ana an	Contrast of Delivery	
		-70 dBm						
		Start 30.0 MHz		30001 pts			p 1.0 GHz	
					Measuring.	44		
		Spectrum Ref Level 20.00 dBm	Offset 1.00 dB =	RBW 100 kHz				
		Att 30 dB Count 10/10	SWT 250 ms .	VBW 300 kHz Mo	de Auto Sweep			
		IPk Max			M1[1]	-	+7.29 dBm	
		10 dBm		<u> </u>	-	16.2	24167 GHz	
		0 dBm						
		-10 dgm						
CH00		-20 d8 m D1 -19.810 d	BIII					
1GHz~26GHz		-30 dBm						
		-40 dBm			M1			
		-50 dBm	اللغد واستريد واربقته الأردي		and Merchanson and		taiwaa haybar din	
		-BB-H	an a farifate dan apinikan des		a data la fagara		and the second se	
		-70 dBm			_			
		Start 1.0 GHz		30001 pts	Measuring.	Stop	26.0 GHz	





5.11. Spurious Emissions (radiated)

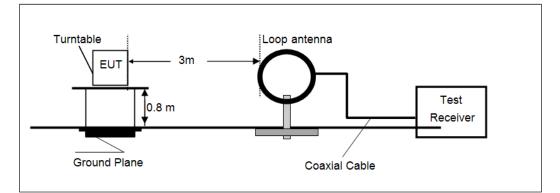
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

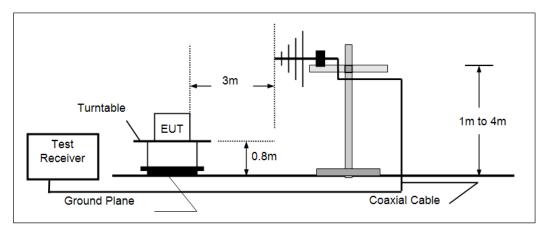
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

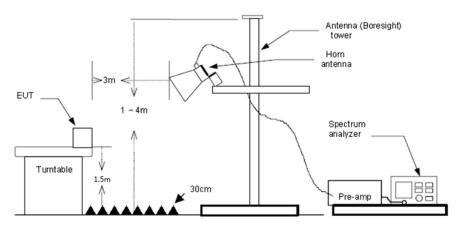
Below 30 MHz



> 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 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) 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

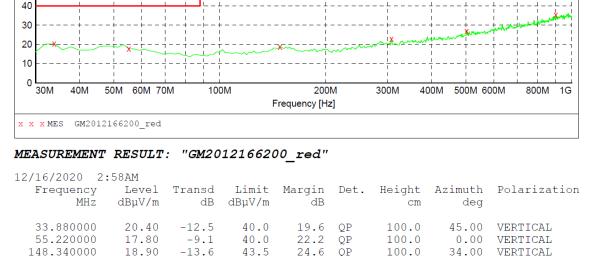
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

22.80

-6.8

46.0

307.420000

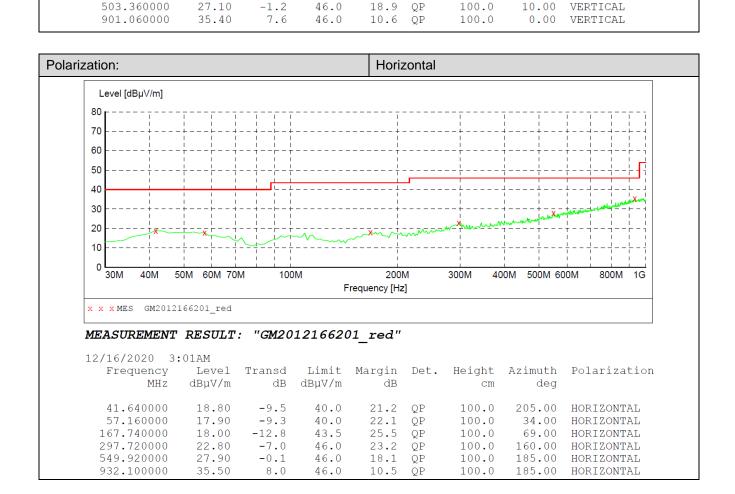


23.2 QP

100.0

69.00

VERTICAL



>	1 (ЭHz	~	25	GHz
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	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					
1150.28	36.56	25.91	4.55	37.25	29.77	74.00	-44.23	Vertical	Peak					
3143.98	35.15	28.80	7.65	37.45	34.15	74.00	-39.85	Vertical	Peak					
5099.49	31.47	31.90	9.75	35.18	37.94	74.00	-36.06	Vertical	Peak					
8002.06	31.81	37.10	12.30	33.07	48.14	74.00	-25.86	Vertical	Peak					
1689.41	35.38	25.17	5.74	37.29	29.00	74.00	-45.00	Horizontal	Peak					
3873.75	34.81	29.67	8.60	36.85	36.23	74.00	-37.77	Horizontal	Peak					
6109.67	31.50	32.54	10.86	34.03	40.87	74.00	-33.13	Horizontal	Peak					
8002.06	31.23	37.10	12.30	33.07	47.56	74.00	-26.44	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	
1232.12	35.89	26.27	4.71	37.21	29.66	74.00	-44.34	Vertical	Peak	
3128.01	34.84	28.80	7.63	37.46	33.81	74.00	-40.19	Vertical	Peak	
4547.56	32.17	30.80	9.37	36.20	36.14	74.00	-37.86	Vertical	Peak	
8002.06	31.64	37.10	12.30	33.07	47.97	74.00	-26.03	Vertical	Peak	
1759.64	35.23	25.32	5.88	37.36	29.07	74.00	-44.93	Horizontal	Peak	
3672.11	34.36	29.30	8.35	37.00	35.01	74.00	-38.99	Horizontal	Peak	
5588.88	31.81	31.81	10.26	34.37	39.51	74.00	-34.49	Horizontal	Peak	
7921.00	31.65	36.78	12.68	33.06	48.05	74.00	-25.95	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	
1232.12	36.36	26.27	4.71	37.21	30.13	74.00	-43.87	Vertical	Peak	
3128.01	35.52	28.80	7.63	37.46	34.49	74.00	-39.51	Vertical	Peak	
6235.36	31.80	32.97	11.01	33.90	41.88	74.00	-32.12	Vertical	Peak	
7663.17	31.76	36.14	12.89	33.04	47.75	74.00	-26.25	Vertical	Peak	
1176.94	36.14	26.12	4.61	37.24	29.63	74.00	-44.37	Horizontal	Peak	
3072.77	34.83	28.75	7.57	37.51	33.64	74.00	-40.36	Horizontal	Peak	
5603.13	31.47	31.79	10.28	34.36	39.18	74.00	-34.82	Horizontal	Peak	
7781.10	31.36	36.10	13.21	33.05	47.62	74.00	-26.38	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)

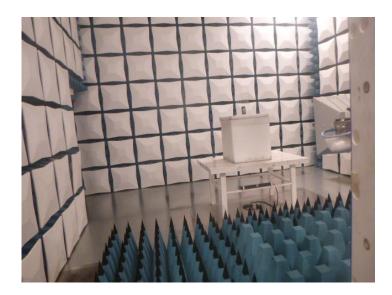


Radiated Emissions





Shenzhen Huatongwei International Inspection Co., Ltd.



7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW20120135

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