



TE	EST REPORT			
Report Reference No		: 62768		
FCC ID:	ZSW-10-010			
Applicant's name:	Flat 18; 14/F Block 1; Golden Industri	b mobile HK Limited 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.		
Test item description:	Mobile Phone			
Trade Mark	ÖWN,Bmobile			
Model/Type reference:	F1024			
Listed Model(s)				
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	Dec.19,2017			
Date of testing	Dec.20,2017- Jan.21,2018			
Date of issue:	Jan.22,2018			
Result:	PASS			
Compiled by ( position+printedname+signature):	File administrators Candy Liu	Candy Live,		
Supervised by (position+printedname+signature):	Project Engineer : Edward Pan	Edward.pan		
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty		
Testing Laboratory Name	Shenzhen Huatongwei Internationa	al Inspection Co., Ltd.		
Address	Address 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China			
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The test report merely correspond to the test sample.

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# 1. TEST STANDARDS AND REPORT VERSION

### 1.1. Test Standards

The tests were performed according to following standards:

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

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

### 1.2. Report version

Version No.	Date of issue	Description
00	Jan.22,2018	Original

# 2. TEST DESCRIPTION

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

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

# 3. <u>SUMMARY</u>

# 3.1. Client Information

Applicant:	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

Mobile Phone
ÖWN,Bmobile
F1024
-
353185089994596
352751019825250
DC 3.7V
Input:100-240Va.c.,50/60Hz,0.15A Output: 5Vd.c.,500mA
G075-MB-V1.0
F1024_OWN_CL_V001
Supported BT2.1+EDR
GFSK, π/4DQPSK, 8DPSK
2402MHz~2480MHz
79
1MHz
Integral Antenna
-1.0dBi

### 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

#### > <u>TEST MODE</u>

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated suprious emissions test item:

The 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

	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.: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** 573 11/11/2017 11/10/2018 2-Line V-3 R&S ESH3-Z5 100049 11/11/2017 11/10/2018 Network **Pulse Limiter** ESH3-Z2 101488 11/11/2017 11/10/2018 4 R&S 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) EMI Test 11/11/2017 1 R&S ESCI 101247 11/10/2018 Receiver 2 Loop Antenna R&S HFH2-Z2 100020 11/20/2017 11/19/2018 Ultra-3 Broadband 538 SCHWARZBECK VULB9163 4/5/2017 4/4/2018 Antenna 4 Preamplifier SCHWARZBECK **BBV 9743** 9743-0022 10/18/2017 10/17/2018 RF HUBER+SUHNE 5 Connection RE-7-FL N/A 11/21/2017 11/20/2018 R Cable EMI Test R&S 6 ESK1 N/A N/A N/A Software Spectrum 7 R&S FSP40 100597 11/11/2017 11/10/2018 Analyzer 8 Horn Antenna SCHWARZBECK 9120D 1011 3/26/2018 3/27/2017 9 Horn Antenna SCHWARZBECK **BBHA9170** 25841 3/27/2017 3/26/2018 Broadband 10 SCHWARZBECK BBV 9718 9718-248 10/18/2017 10/17/2018 Preamplifier High Compliance pass 11 BSU-6 34202 11/11/2017 11/10/2018 Direction systems filter RF HUBER+SUHNE 12 Connection RE-7-FH N/A 11/21/2017 11/20/2018 R Cable EMI Test N/A 13 Audix E3 N/A N/A Software TT2.0 14 Turntable MATURO 1 N/A N/A 15 Antenna Mast MATURO TAM-4.0-P 1 N/A N/A

### 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	9/21/2018
3	Power Meter	Agilent	U2021XA	178231	9/22/2017	9/21/2018
4	OSP	R&S	OSP120	101317	N/A	N/A

The Cal.Interval was one year.

# 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

### <u>Requirement</u>

#### FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

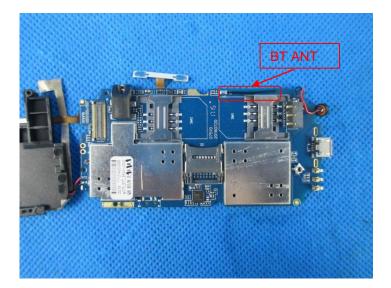
#### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

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

### Test Result:

### ☑ Passed □ Not Applicable

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



## 5.2. Conducted Emissions (AC Main)

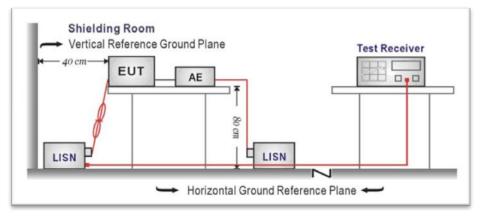
### <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

\* Decreases with the logarithm of the frequency.

### **TEST CONFIGURATION**



#### TEST PROCEDURE

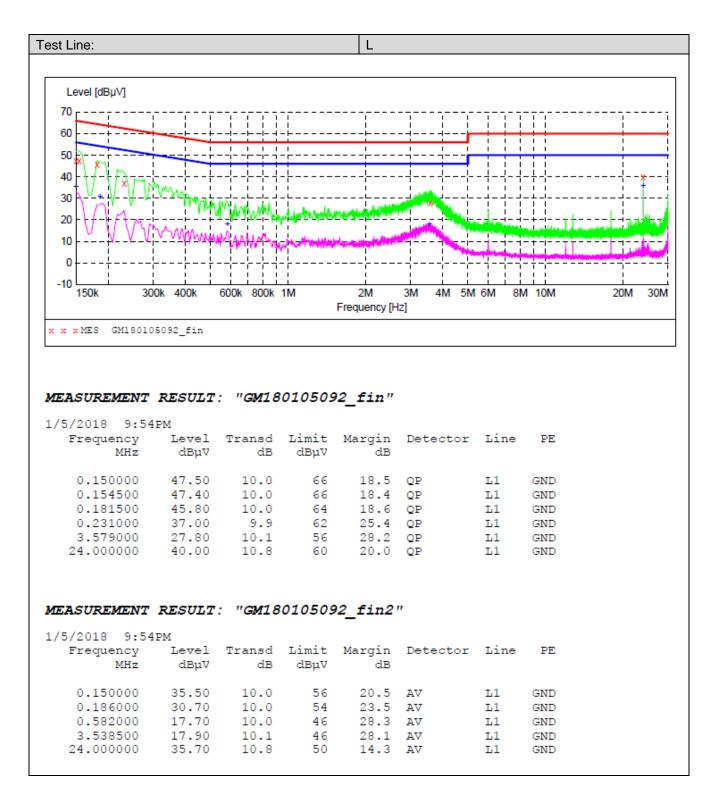
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

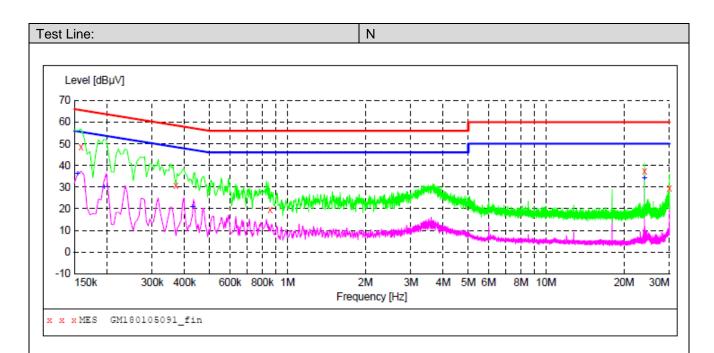
### TEST RESULTS

#### ☑ Passed □ Not Applicable

Note:

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





#### MEASUREMENT RESULT: "GM180105091\_fin"

1/5/2018 9:51PM

- /								
	Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
	0.159000	48.60	10.0	66	16.9	QP	N	GND
	0.370500	30.80	9.9	59	27.7	QP	Ν	GND
	0.856500	19.40	10.0	56	36.6	QP	Ν	GND
	24.000000	37.50	10.8	60	22.5	QP	Ν	GND
	29.994000	29.40	10.9	60	30.6	QP	N	GND

#### MEASUREMENT RESULT: "GM180105091 fin2"

1/5/2018 9:51PM Frequency Level Transd Limit Margin Detector Line PE dBµV dB dBµV dB MHz 0.15450036.3010.0560.19500030.0010.0540.42900020.909.94724.00000034.0010.850 19.5 AV N GND 23.8 AV N GND 26.4 AV GND Ν 24.000000 16.0 AV GND N

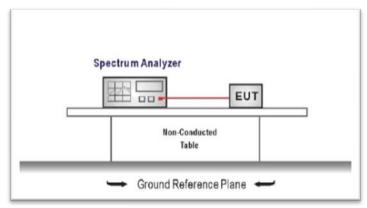
### 5.3. Conducted Peak Output Power

#### <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.

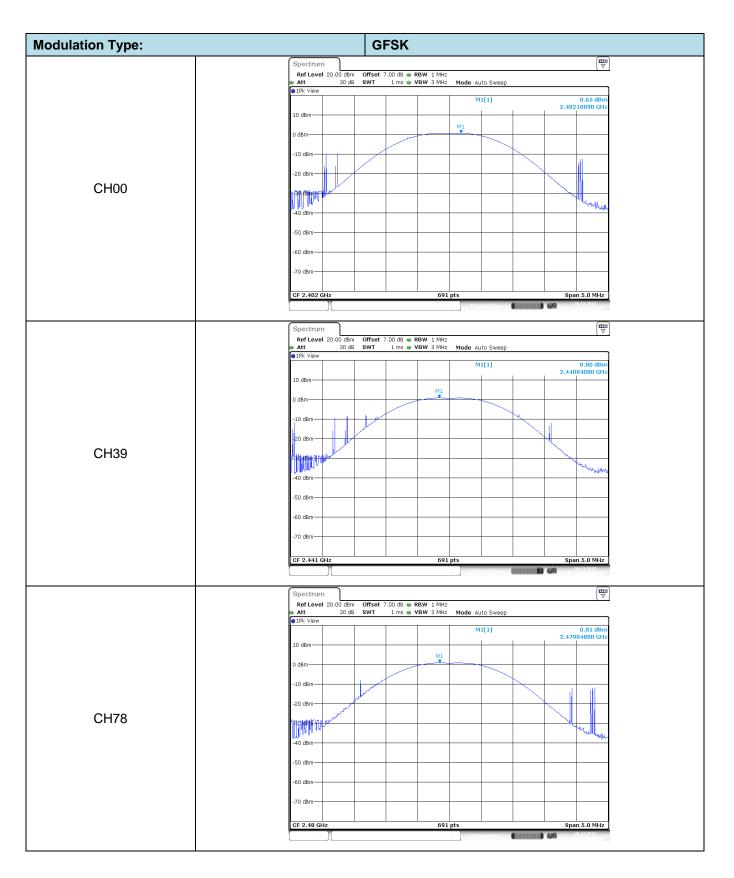
#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	0.65		
GFSK	39	0.80	≤ 30.00	Pass
	78	0.81		
	00	0.56	≤ 21.00	
π/4DQPSK	39	0.76		Pass
	78	0.80		
	00	0.56		
8DPSK	39	0.83	≤ 21.00	Pass
	78	0.47		



Modulation Type:	π/4DQPSK
	Spectrum Ref Level 20.00 dBm Offset 7.00 dB ● RBW 2 MHz
	● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep ● 1Pk View
	M1[1] 0.56 dBm 2.40181910 GHz
	0 dBm
	-10 dBm
	-20 dBm
CH00	-30 dBm
	-40 dam-
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Or 2:402 driz         Or 2:402 driz         Optimize           Maxwelline         Maxwelline         4/4         25:12:017
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 7.00 dB 🖷 RBW 2 MHz
	Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep  IPk View
	M1[1] 0.76 dBm 2.44084800 GHz
	0 dBm
	110 dbm
	-20 dBm
CH39	-30 dBm
	-40 dBm
	-50 dBm-
	-60 dBm-
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Messucino
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 7.00 dB  RBW 2 MHz Att 30 dB  SWT 1 ms VBW 5 MHz Mode Auto Sweep
	●1Pk View M1[1] 0.80 dBm
	10 dBm
	-10.dem
CH78	-20 dBm-
GH/O	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm-
	CF 2.48 GHz 691 pts Span 5.0 MHz
	Миницина. (Салана) 440 - 26.122617

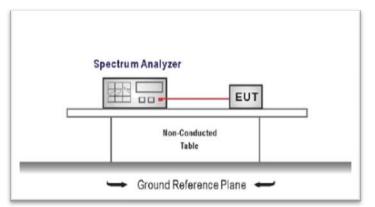
Modulation Type:	8DPSK
	Spectrum         (₩)           Ref Level 20.00 dbm         Offset 7.00 db ● RBW 2 MHz
	● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep ● 1Pk View
	M1[1] 0.56 dBm 2.40184080 GHz
	O dBm
	-10.48m
	-20 d8m
CH00	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz         691 pts         Span 5.0 MHz
	Measuring
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 7.00 dB ● RBW 2 MHz ● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep
	IPk View
	10 dBm
	M1
	-10 gbm
	-20 d8m
CH39	-30 d8m
	-40 d8m
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz         691 pts         Span 5.0 MHz
	Measuring Measurent Martinet
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 7.00 dB ● RBW 2 MHz ● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep
	19k View     M1[1] 0.47 dBm     0.47 dBm
	10 dBm
	0 dBm
	-10.48m
CH78	-20 d8m
	-30 d8m
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.48 CHz 591 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	1.24		
π/4DQPSK	39	1.24	-	Pass
	78	1.24		
	00	1.25		
8DPSK	39	1.25	-	Pass
	78	1.25		

Modulation Type:	GFSK
	Spectrum Ref Level 20.00 dBm Offset 7.00 dB  RBW 10 kHz
	Att 30 dB SWT 189.6 μs VBW 30 kHz Mode Auto FFT      (●1Pk View
	-10 dBm -20 dBm -20 dBm -20 dBm -10 -25.099 dBm -20 dBm -30 dBm -20
CH00	-so dem
	-70 dBm
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4015475 GHz         -25.63 dBm         -25.63 dBm         -25.10 dBm         -27.51 dBm         <
	Spectrum         Image: Constraint of the sector of t
	Image: Pick View         M1[1]         -25.75 dBm           Image: Pick View         M1[1]         -25.75 dBm           Image: Pick View         M2[1]         -5.21 dBm           Image: Pick View         M2[1]         -5.21 dBm           Image: Pick View         M2[1]         -5.21 dBm
CH39	-10 dBm -20 dBm -30
	-40 dBm -50 dBm -60 dBm
	-70 dBm -70 dBm CF 2.441 GHz 1001 pts Span 2.5 MHz Marker Type   Ref   Trc   X-value   Y-value   Function   Function Result
	Hype         Her
	Spectrum         Image: Constraint of the sector of t
CH78	-10 dBm -20 dBm -20 dBm -30
	-30 d8m
	-70 dBm CF 2.48 GHz 1001 pts Span 2.5 MHz Marker Type   Ref   Trc   X-value   Y-value   Function   Function Result
	Hype         Her         A value         Francian         Francian           M1         1         2.4795475 GHz         -2.5.38 dBm         -           M2         1         2.44900575 GHz         -4.95 dBm         -           D3         M1         1         927.5 kHz         -0.77 dB         -

Modulation Type:	π/4DQPSK
	Spectrum
	Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT      ● 1Pk View      10 dBm     2.40138500 GHz     1.0 dBm
	0 dBm // 2.40216500 GHz
	-20 dBm 01 -21.298 dBm
CH00	-40 dBm
	-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         2.401385 GHz         -21.47 dBm         -21.47 rdBm         -21.47 rdBm           M2         1         2.402165 GHz         -1.30 dBm         -21.47 rdBm         -21.47 rdBm           D3         M1         1         1.235 MHz         0.17 rdB         -         -
	Spectrum
	Ref Level         20.00         dBm         Offset         7.00         dB         RBW         30 kHz           Att         30 dB         SWT         63.1 µs         VBW         100 kHz         Mode         Auto FFT           ● 1Pk View           M1[1]         -21.28 dBm
	10 dBm 2.44038250 GHz 10 dBm M2[1] -1.09 dBm M2 2.44116500 GHz 0 dBm M2 2.44116500 GHz
	-10 dBm
CH39	-30 dBm
	-50 dBm
	-70 dBm
	Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4403825 GHz         -21.28 dBm <td< td=""></td<>
	Measuring 44 26:22337
	Spectrum         Image: Spectrum           Ref Level 20.00 dBm         Offset 7.00 dB ● RBW         30 kHz           ● Att         30 dB         SWT         63.1 µs         • VBW         100 kHz         Mode Auto FFT           ● IFk View
	10 d8m         M1[1]         -21.22 d8m           10 d8m         2.47938250 GHz           0 d8m         M2[1]         -1.16 d8m           M2         2.48016500 GHz
	-10 dBm / / / / / / / / / / / / / / /
CH78	-20.48m = 01 -21.162 d8m =
	-50 dBm
	-70 dBm CF 2.48 GHz 1001 pts Span 2.5 MHz
	Morker         Total pics         spain 2.5 min2           Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4793825 GHz         -21.22 dBm             M2         1         2.460165 GHz         -1.16 dBm
	Image         Image <th< td=""></th<>

Modulation Type:	8DPSK
	Spectrum         (7)           Ref Level 20.00 dBm         Offset 7.00 dB ● RBW 30 kHz
	● Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT ● 1Pk View
	M1[1] -20.99 dBm
	10 dBm 2.40136750 GHz
	0 dBm
	-10 dBm
	-20-d8m - p1 -20.576 d8m
	-30 dBm
CH00	-40 dBm
Chico	-50 d8m
	-60 dBm
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Type         Ref         Trc         X-value         Y-value         Function         Function Result
	M1         1         2.4013675 GHz         -20.99 dBm           M2         1         2.402165 GHz         -0.58 dBm
	D3 M1 1 1.2475 MHz 0.11 dB 26.122017
	Spectrum
	Ref Level 20.00 dBm Offset 7.00 dB ● RBW 30 kHz ● Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT
	●1Pk View M1[1] -20.83 dBm
	10 dBm M2[1] C.60 dBm
	0 dBm
	-10 dBm
	Mi
01100	-30 dBm
CH39	-40 dBm
	-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
	MI         1         2.4493675 GHz         -20.83 dBm           M2         1         2.441165 GHz         -0.69 dBm
	D3 M1 1 1.2475 MHz -0.10 dB
	Metasuring
	Spectrum (₩
	Ref Level 20.00 dBm Offset 7.00 dB 🖷 RBW 30 kHz
	IPk View
	10 dBm M2[1]2.47936750 GHz
	-20.d8m D1 -20.713 d8m
	-30 dBm
CH78	-40 dBm
	-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         2.4793675 GHz         -20.72 dBm
	M2         1         2.480165 GHz         -0.71 dBm           D3         M1         1         1.2475 MHz         -0.27 dB
	Mexsuring (111111) (M 26.122017

### 5.5. Carrier Frequencies Separation

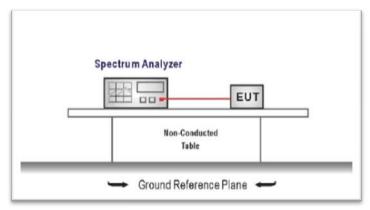
#### LIMIT

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



#### 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

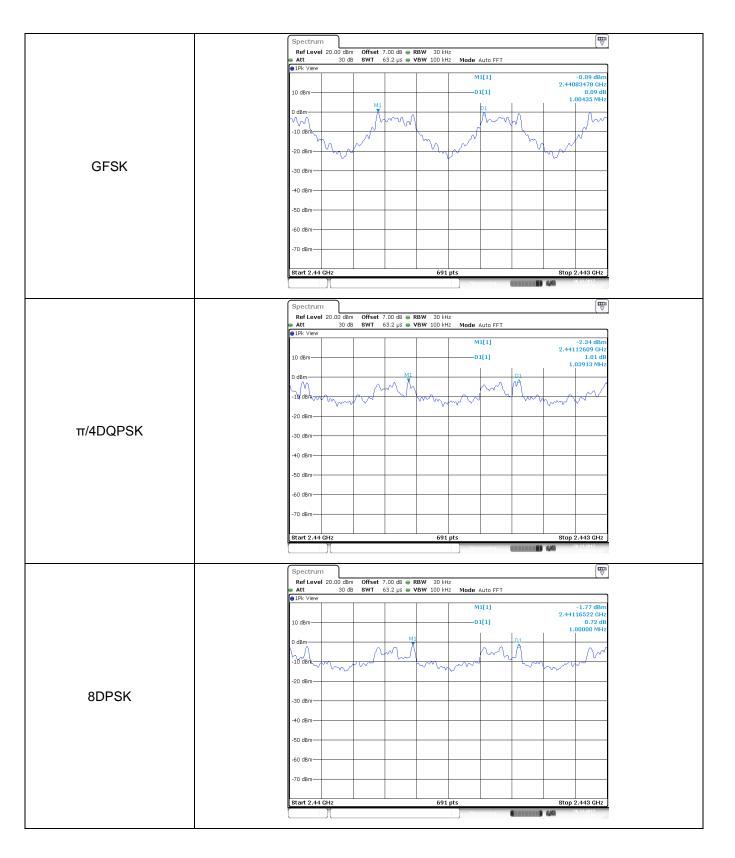
#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.930	Pass
π/4DQPSK	39	1.04	≥0.831	Pass
8DPSK	39	1.00	≥0.834	Pass

Note:

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

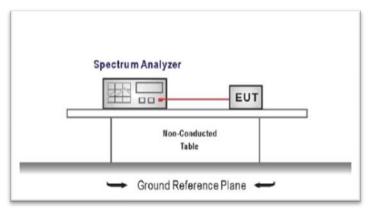


### 5.6. Hopping Channel Number

#### LIMIT

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

#### TEST CONFIGURATION



#### TEST PROCEDURE

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

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

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

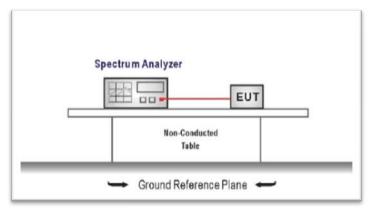
	Spectrum         []           Ref Level 20.00 dBm         Offset 7.00 dB ● RBW 100 kHz				
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep				
	10 dBm				
	┥╍╡ <del>╞╡</del> ╗┙╅┙╝┨┍╝╢╅┫╡┙╘┨╛┇╣┨┙╝╝╝╡╞╶╝╢╢╝╝╕╡╞╶╝╢╢╝╝╗┇╢╝╝╢╝╝╢╝╝╡╢╢╝╡╢╢╝┨╢╝┨╢╝┇╝╝╝╢┥				
<b>••</b> ••	-20 dBm				
GFSK	-30 d8m-				
	40 dBm				
	-50 dBm				
	-60 dBm				
	-70 dBm				
	Start 2.4 GHz         691 pts         Stop 2.4835 GHz				
	Maxweing				
	Spectrum 👦				
	Ref Level 20.00 dBm Offset 7.00 dB      RBW 100 kHz				
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep  Pk View				
	10 dBm-				
	° filita di mana di Mala tambén di mana				
	-10 ggw				
	-20 d8m				
π/4DQPSK					
	/30 dBm				
	-40 d8m				
	-50 dBm				
	-60 dBm				
	-70 dBm				
	Start 2.4 GHz 691 pts Stop 2.4835 GHz				
	Spectrum 🕎				
	RefLevel 20.00 dBm Offset 7.00 dB ● RBW 100 kHz Att 30 dB SWT 1 ms ● VBW 300 kHz Mode Auto Sweep ● IPK View				
	10 dBm				
	O dBmatana anna an anna anna anna anna anna				
	-10 dam 0. 82.04.04.04.04.04.04.04.04.04.04.04.04.04.				
	-20 dBm-				
8DPSK	/30 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.

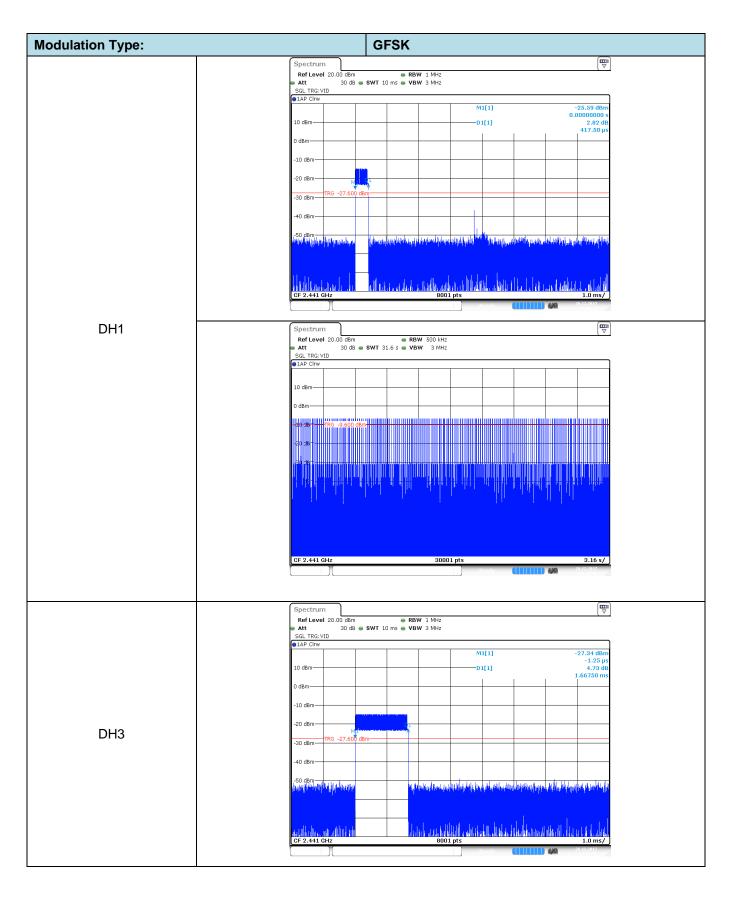
### TEST MODE:

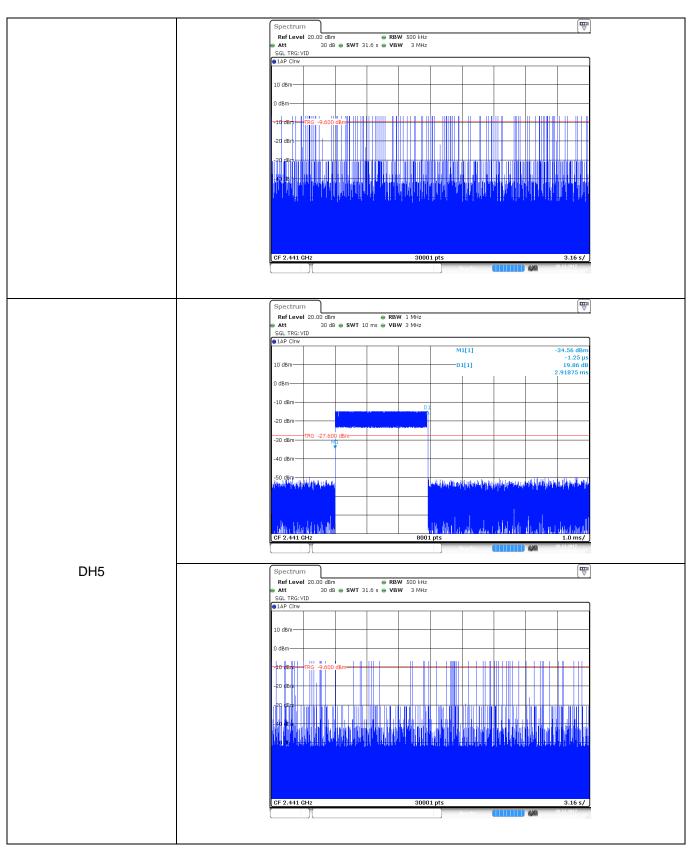
Please refer to the clause 3.3

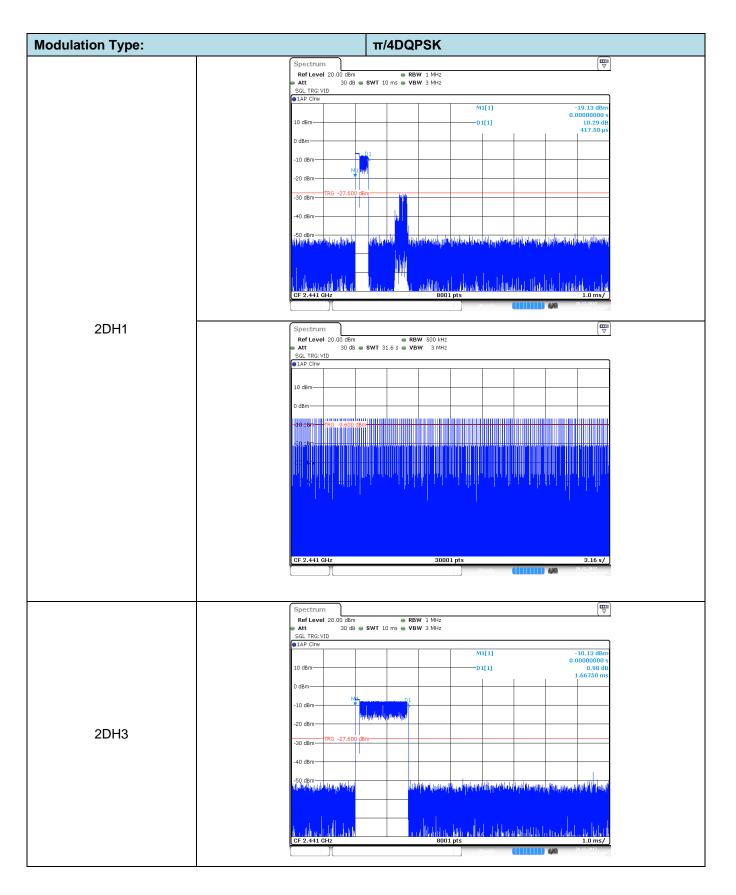
#### TEST RESULTS

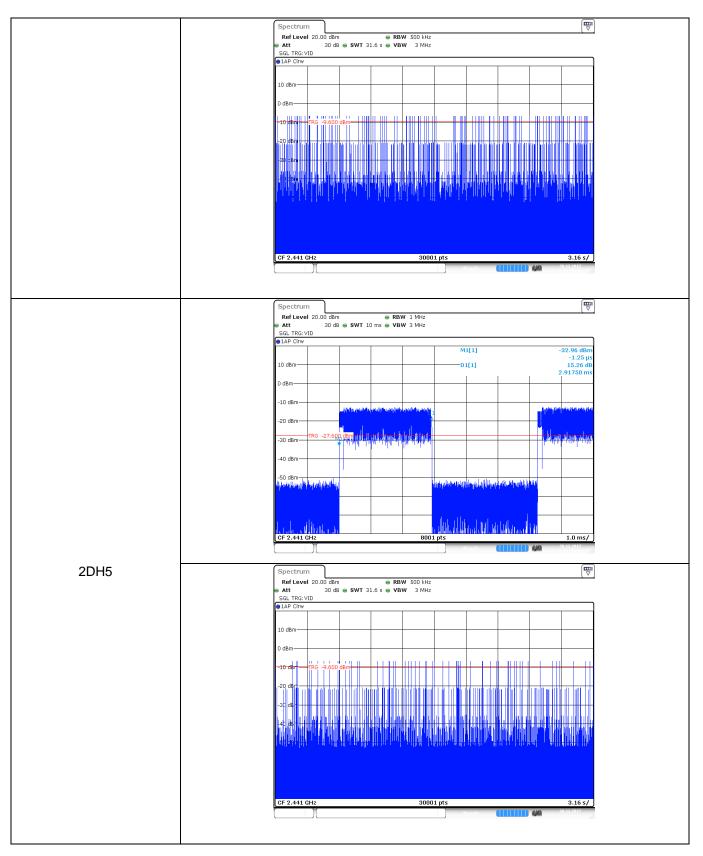
#### ☑ Passed □ Not Applicable

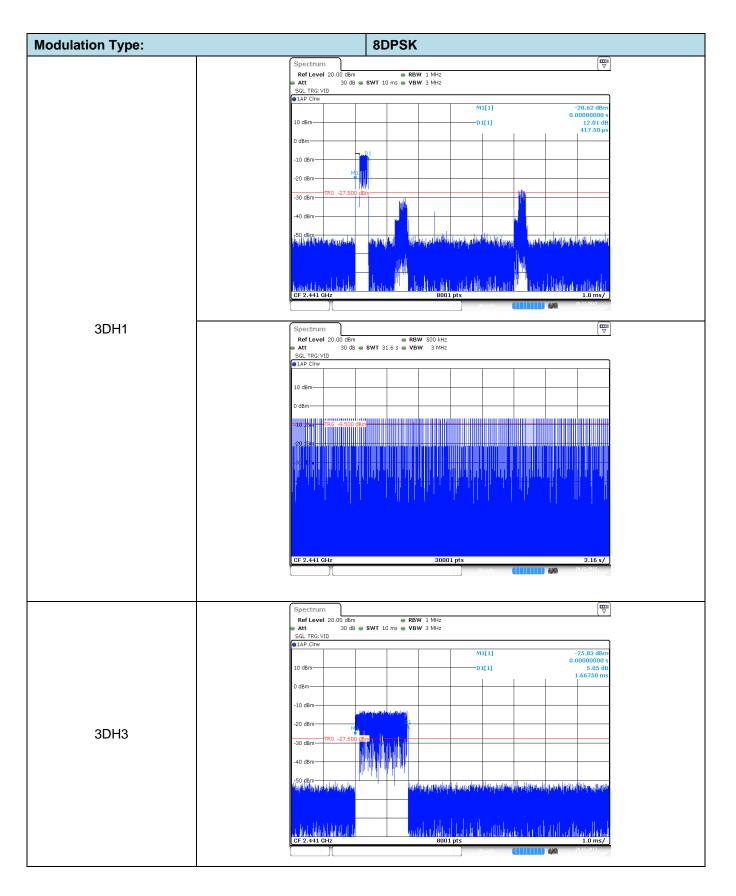
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.42	320.00	0.13		
GFSK	DH3	1.67	109.00	0.18	≤ 0.40	Pass
	DH5	2.92	63.00	0.18		
	2DH1	0.42	317.00	0.13		
π/4DQPSK	2DH3	1.67	114.00	0.19	≤ 0.40	Pass
	2DH5	2.92	58.00	0.17		
	3DH1	0.42	319.00	0.13		
8DPSK	3DH3	1.67	113.00	0.19	≤ 0.40	Pass
	3DH5	2.92	67.00	0.20		

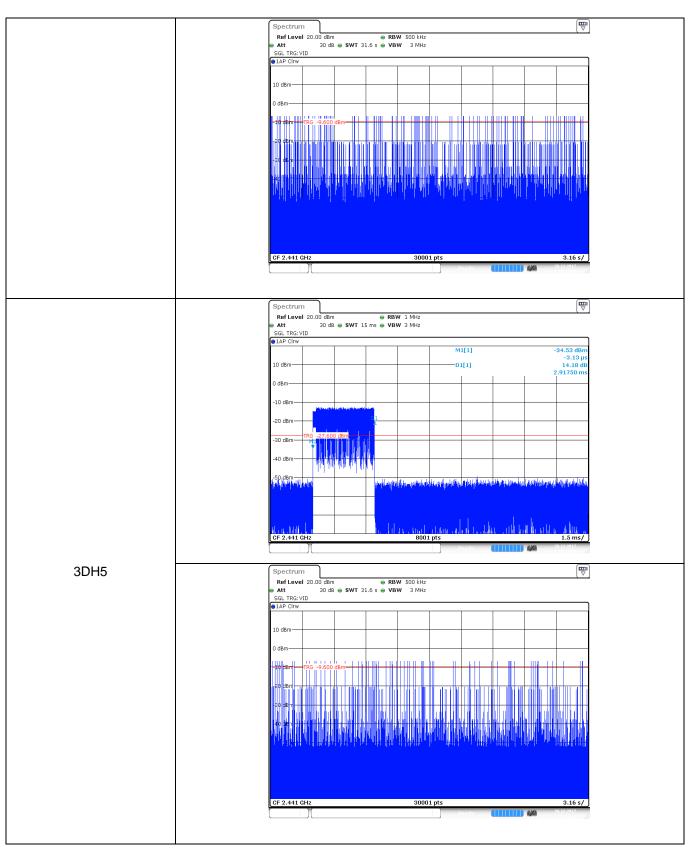












### 5.8. Pseudorandom Frequency Hopping Sequence

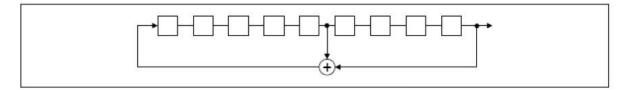
#### <u>LIMIT</u>

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 5<sup>th</sup> and 9<sup>th</sup> 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	2	4	6	e	64	78	1	73 75 7
Т	Т		T	 1		T		
				- 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.

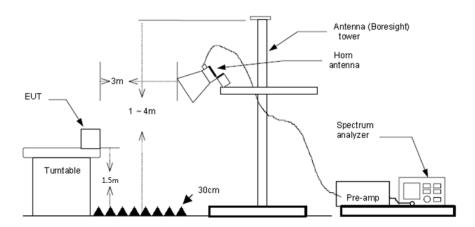
### 5.9. Restricted band (radiated)

#### <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.

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	
2483.50	71.97	27.26	6.83	37.87	68.19	74.00	-5.81	Vertical	Peak	
2500.00	46.26	27.20	6.84	37.87	42.43	74.00	-31.57	Vertical	Peak	
2483.50	66.75	27.26	6.83	37.87	62.97	74.00	-11.03	Horizontal	Peak	
2500.00	41.01	27.20	6.84	37.87	37.18	74.00	-36.82	Horizontal	Peak	
2483.50	24.94	27.26	6.83	37.87	21.16	54.00	-32.84	Vertical	Average	
2492.85	24.00	27.23	6.83	37.87	20.19	54.00	-33.81	Vertical	Average	
2500.00	18.81	27.20	6.84	37.87	14.98	54.00	-39.02	Vertical	Average	
2483.50	28.33	27.26	6.83	37.87	24.55	54.00	-29.45	Horizontal	Average	
2492.77	27.97	27.23	6.83	37.87	24.16	54.00	-29.84	Horizontal	Average	
2500.00	22.86	27.20	6.84	37.87	19.03	54.00	-34.97	Horizontal	Average	

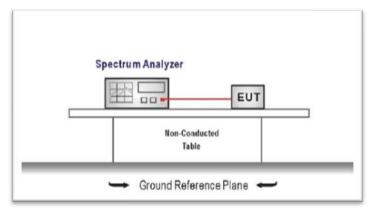
CH78										
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2310.00	30.28	28.05	6.62	37.65	27.30	74.00	-46.70	Vertical	Peak	
2388.85	47.60	27.65	6.75	37.87	44.13	74.00	-29.87	Vertical	Peak	
2390.03	42.70	27.65	6.75	37.87	39.23	74.00	-34.77	Vertical	Peak	
2310.00	31.66	28.05	6.62	37.65	28.68	74.00	-45.32	Horizontal	Peak	
2388.66	47.23	27.66	6.75	37.87	43.77	74.00	-30.23	Horizontal	Peak	
2390.03	44.65	27.65	6.75	37.87	41.18	74.00	-32.82	Horizontal	Peak	
2310.00	22.42	28.05	6.62	37.65	19.44	54.00	-34.56	Vertical	Average	
2389.05	26.34	27.65	6.75	37.87	22.87	54.00	-31.13	Vertical	Average	
2390.03	24.92	27.65	6.75	37.87	21.45	54.00	-32.55	Vertical	Average	
2310.00	22.86	28.05	6.62	37.65	19.88	54.00	-34.12	Horizontal	Average	
2388.95	26.78	27.65	6.75	37.87	23.31	54.00	-30.69	Horizontal	Average	
2390.03	25.40	27.65	6.75	37.87	21.93	54.00	-32.07	Horizontal	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 10<sup>th</sup> 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

Fest Item:	Band edge		Modul	ation type	:	GFSK	
		Spectrum	0ffeet 3 of 15	DDW 100 UV			
		RefLevel 20.00 dBm Att 30 dB 1Pk Max	Offset 7.00 dB SWT 1.1 ms		a Auto Sweep		
					M1[1]	0.27 dBm 2.402180 GHz	
		10 dBm			M2[1]	-47.98 dBm 2.400000 @Hz	
		0 dBm -10 dBm					
		-20 dBm-D1 -19.730 dE	m				
01100		-30 dBm				- NE L	
CH00		-40 dBm				M3	
No hopping mode		250 dBm	and a start and a start and a start and a start	man production	montemant		
No hopping mode		-60 dBm					
		-70 dBm					
		Start 2.31 GHz Marker		691 pts		Stop 2.405 GHz	
		Type Ref Trc M1 1	2.40218 GHz	0.27 dBm	nction	Function Result	
		M2 1 M3 1	2.4 GHz 2.39 GHz	-47.98 dBm -51.82 dBm			
		M4 1 M5 1	2.31 GHz 2.397014 GHz	-53.85 dBm -38.57 dBm			
					easuring	26.12.2017	
		Spectrum					
		Att 30 dB	Offset 7.00 dB SWT 1.1 ms	RBW 100 kHz VBW 300 kHz Mod	a Auto Sweep		
		●1Pk Max			M1[1]	-0.20 dBm	
		10 dBm			M2[1]	2.403010 GHz -51.13 dBm	
		0 dBm				2.400000 GViz	
		-10 dBm				10VV	
01100		-30 dBm					
CH00		-40 dBm					
l la serie e se a da		450 dBm	www.www.	Mundersteinenstatie	Nonunum	M3 M3 M3	
Hopping mode		-60 dBm					
		-70 dBm					
		Start 2.31 GHz Marker		691 pts		Stop 2.405 GHz	
		Type Ref Trc M1 1	2.40301 GHz	Y-value Fu -0.20 dBm	nction	Function Result	
		M2 1 M3 1	2.4 GHz 2.39 GHz	-51.13 dBm -53.86 dBm			
		M4 1 M5 1	2.31 GHz 2.395087 GHz	-53.66 dBm -50.24 dBm			
					easuring	26.12.2017	
		Spectrum					
			Offset 7.00 dB ● SWT 56.9 µs ●		e Auto FFT		
		●1Pk Max			M1[1]	0.68 dBm	
		10 dBm 			M2[1]	2.4798310 GHz -50.00 dBm	
		0 dBm				2.4835000 GHz	
		-10 dBm					
01 :=-		-20 d8m D1 -19.320 d8					
CH78		-30 dBm	M4 M2				
No homeine service			M2	www.www.hutenegen	aluta h -	M	
No hopping mode		-60 dBm	- Vind		1000 mmm	to an	
		-70 dBm					
		Start 2.478 GHz		691 pts		Stop 2.5 GHz	
		Marker Type   Ref   Trc	X-value		nction	Function Result	
		M1 1 M2 1	2.479831 GHz 2.4835 GHz	0.68 dBm -50.00 dBm			
		M3 1 M4 1	2.5 GHz 2.4855565 GHz	-52.51 dBm -37.65 dBm			
					easuring	26.12.2017	

	• 19k Max 10 dBm 	0 dBm Offset 7.00 dB ( 30 dB SWT 56.9 µs (		Mode Auto FFT M1[1] M2[1]		-0.52 dBm 4789070 GHz -51.56 dBm 4835000 GHz
CH78 Hopping mode	-60 dBm	0.520 dBm	mmmmm			M tu mana
	M2 1 M3 1	X-value 1 2.478907 GHz 1 2.4835 GHz	691 pts -0.52 dBm -51.55 dBm -52.29 dBm -50.63 dBm	Function	Function Res	Stop 2.5 GHz

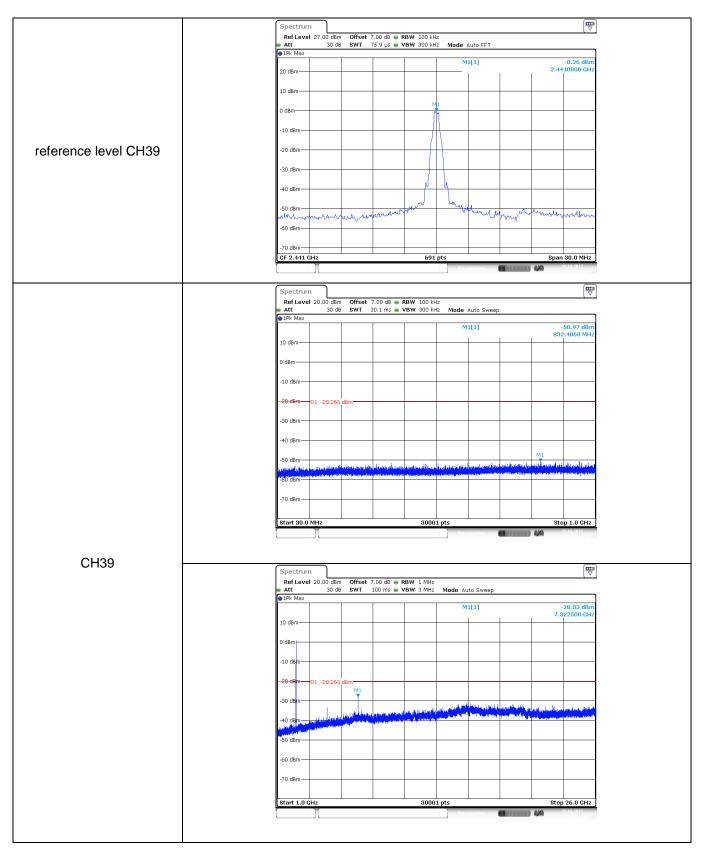
est Item:	Band edge		Modul	ation	type:		π/4D	QPSK
	ſ	Spectrum	0//	0.01				
		Ref Level 20.00 dBm Att 30 dB			Hz Hz <b>Mode</b> Aut	o Sweep		
		1Pk Max			M1[1	1		0.16 dBm
		LO dBm			M2[1	1		+01770 GHz -37.48 d卧m
		) dBm					2.0	100000 CHz
		10 dBm						
		20 dBm D1 -19.840	dBm					
CH00		40 dBm						N¥ \
		50 d8m	John han have a fellowed a		grade and the re	where where here	M3	we h
No hopping mode		60 dBm	-					
		70 dBm						
	ł	Start 2.31 GHz		691	L pts		Stop	2.405 GHz
		larker Type   Ref   Trc	X-value	Y-value	Functio	ון F	unction Resul	t l
		M1 1 M2 1	2.40177 GHz 2.4 GHz	0.16 d -37.48 d	Bm			
		M3 1 M4 1	2.39 GHz 2.31 GHz	-53.74 d -52.03 d	Bm			
	L.	M5 1	2.399906 GHz	-39.84 d	Bm	ing	4/4	26.12.2017
	L. L.					-		15:32:21
		Spectrum	00-1 7.00 10 -		1-			
		Ref Level         20.00 dBm           Att         30 dB				o Sweep		
		1Pk Max			M1[1	1		-1.19 dBm
		LO dBm			M2[1	1		102870 GHz -39.70 dBm
		) dBm					2.0	+00000 CHz
		10 dBm						
		20.dBm D1 -21.190	dBm					
CH00		30 dBm						Mag
		40 dBm					МЗ	. /
Hopping mode		60 dBm	annelement and a second	quermentende	medowenowskirw	moundante	un the matter was	ملسا
		70 dBm						
		Start 2.31 GHz		691	L pts		Ston	2.405 GHz
		larker	Y unlug					
		Type         Ref         Trc           M1         1           M2         1	X-value 2.40287 GHz 2.4 GHz	Y-value -1.19 d -39.70 d		r	unction Resul	<u> </u>
		M3 1 M4 1	2.39 GHz 2.31 GHz	-53.36 d	Bm			
		M5 1	2.399906 GHz	-39.30 d		-		26 12 2017
	L				Measu	ing	4,44	
	(	Spectrum						
		Ref Level         20.00 dBm           Att         30 dB	Offset 7.00 dB SWT 56.9 µs			D FFT		
		1Pk Max			M1[1	1		0.66 dBm
		LO dBm			M2[1			301810 GHz -49.38 dBm
		) dBm				-		335000 GHz
		10 dBm						
		20 dB n D1 -19.340	dBm	-				<b>—</b>
CH78		30'dBm			+			
01110		40 dBm	6.63		+		_	
No hopping mode		50 dBm	Water March	manan	hann	man	moun	murn
		60 dBm		www.			- min and	
		70 dBm						
		Start 2.478 GHz		691	L pts		st	pp 2.5 GHz
	P. C.	larker	X-value I		Functio		-unction Resul	
		Type         Ref         Trc           M1         1           M2         1	2.480181 GHz 2.4835 GHz	<u>Y-value</u> 0.66 d -49.38 d	Bm		unction Resul	
		M3 1 M4 1	2.4835 GHz 2.5 GHz 2.4835478 GHz	-49.38 d -54.67 d -49.22 d	Bm			
	ļ.	1071   1	2.70007/0 GHZ	49.22 U			<b>10</b> 4/0	26 10 2017

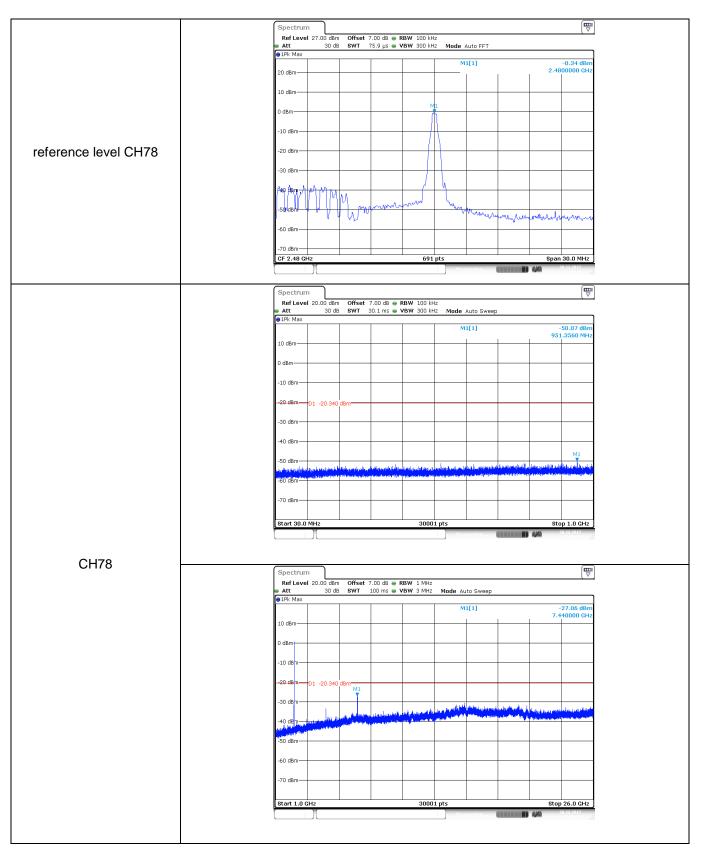
CH78 Hopping mode	Att 30 ( 9 1Pk Max 10 dBm 10 dBm -20 dBm -20 dBm -30 dBm -40 dBm -50 dBm -70 dBm -70 dBm		VBW 300 kHz	M1[1] M2[1]	M4	-4.32 dBm 2.4781110 GHz -54.31 dBm 2.4835000 GHz
	Start 2.478 GHz		691 pts			Stop 2.5 GHz
	Marker Type Ref Trc	X-value	Y-value	Function	Funct	tion Result
	M1 1 M2 1 M3 1 M4 1	2.478111 GHz 2.4835 GHz 2.5 GHz 2.493687 GHz	-4.32 dBm -54.31 dBm -52.68 dBm -50.41 dBm			
				Measuring		26.12.2017

Test Item:	Band edge		Modul	ation type:	8DPSK
		Spectrum			
		Ref Level 20.00 dBm Att 30 dB	Offset 7.00 dB SWT 1.1 ms	RBW 100 kHz VBW 300 kHz Mode Auto Sw	еер
		●1Pk Max		M1[1]	0.20 dBm
		10 dBm		M2[1]	2.402180 GHz -37.22 码m
		0 dBm			2.400000 0Hz
		-10 dBm			
		-20 dBm D1 -19.800 c	IBm		
CH00		-40 dBm			
		4-50 dBm	mahumanna	the work and the state of the s	M3 profile
No hopping mode		-60 dBm			
		-70 dBm			
		Start 2.31 GHz		691 pts	Stop 2.405 GHz
		Marker Type Ref Trc	X-value	Y-value Function	Function Result
		M1 1 M2 1	2.40218 GHz 2.4 GHz	0.20 dBm -37.22 dBm	
		M3 1 M4 1	2.39 GHz 2.31 GHz	-53.59 dBm -53.13 dBm	
		M5 1	2.399768 GHz	-36.89 dBm Neasuring.	<b>26.12.2017</b>
	_				
		Ref Level 20.00 dBm	Offset 7.00 dB 🖷	<b>RBW</b> 100 kHz	
		● Att 30 dB ● 1Pk Max		VBW 300 kHz Mode Auto Sw	eep
		10 dBm		M1[1]	0.04 dBm 2.402180 GHz
		0 dBm		M2[1]	-40.67 dBm 2.400000 ∯Ĥz
		-10 dBm			Jul
		20 dBm D1 -19.960 d	IBm		
<u>CU 100</u>		-30 dBm			
CH00		-40 dBm			Mž
Honning mode		450 dBm	manunalista		W3 N
Hopping mode		-60 dBm			
		-70 dBm			
		Start 2.31 GHz Marker		691 pts	Stop 2.405 GHz
		Type Ref Trc	X-value 2.40218 GHz	Y-value Function	Function Result
		M2 1 M3 1	2.4 GHz 2.39 GHz	-40.67 dBm -53.75 dBm	
		M4 1 M5 1	2.31 GHz 2.399906 GHz	-51.99 dBm -40.78 dBm	
				Measuring.	25.12.2017
		Spectrum			
		Ref Level 20.00 dBm Att 30 dB	Offset 7.00 dB ● SWT 56.9 µs ●		<u>.</u>
		● Att 30 0B ● 1Pk Max	ann ana ha 🖷		
		10 dBm		M1[1] M2[1]	0.37 dBm 2.4801810 GHz -48.34 dBm
		0 dBm		mz[1]	2.4835000 GHz
		-10 dBm			
		- <del>-20 dBm</del> D1 -19.630 c	IBm		
CH78		-30'dBm			
00		-40 dBm	M2 M4		
No hopping mode		-50 dBm		munimum	the manus of the second s
		-60 dBm			
		-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 M2 1 M3 1	2.480181 GHz 2.4835 GHz	0.37 dBm -48.34 dBm -53.09 dBm	
		M3 1 M4 1	2.5 GHz 2.4843449 GHz	-53.09 dBm -48.76 dBm	
				Measuring	26.12.2017

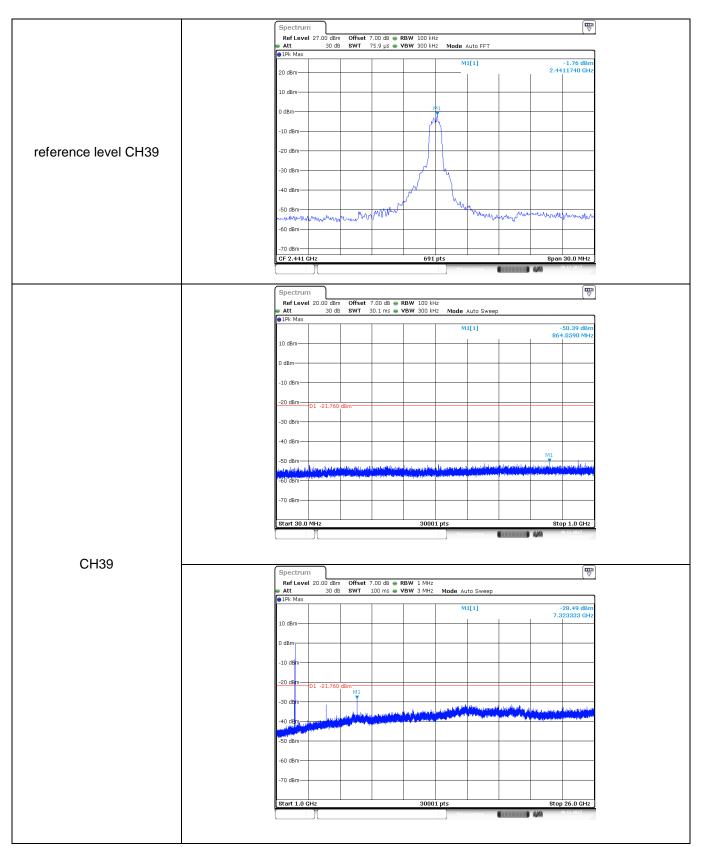
CH78         -30 dsm         -40 dsm         -		Spectrum           Ref Level 20.00 dBm           Att 30 dB           IV dBm           0 dBm           0 dBm           -00 dBm           -20.dBm           01 -20.000 dB	SWT 56.9 µs • VBW		1] 1]	-0.90 dBm 2.4799900 GHz -52.43 dBm 2.4835000 GHz
Hoppig mode         -50 dBm         -60 dBm         -70 dBm	CH78	-30 dBm				
Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.47999         GHz         -0.90 dBm         M         M         M1         2.4835         GHz         -52.43 dBm         M         M         M3         1         2.5 GHz         -53.23 dBm         M         M         M4         1         2.4857797         GHz         -51.60 dBm         M         M         M         M         M3         1         2.4857797         GHz         -51.60 dBm         M         M         M         M         M         M3         M	Hoppig mode	-50 dBm	Winner Marine	Malananana		mmmm
Type         Ref         Tr(         X-value         Y-value         Function         Function Result           M1         1         2.47990 GHz         -0.90 dHm         -0.91 dH				691 pts		Stop 2.5 GHz
Measuring		Type         Ref         Trc           M1         1           M2         1           M3         1	2.47999 GHz 2.4835 GHz 2.5 GHz	-0.90 dBm 52.43 dBm 53.23 dBm		esult

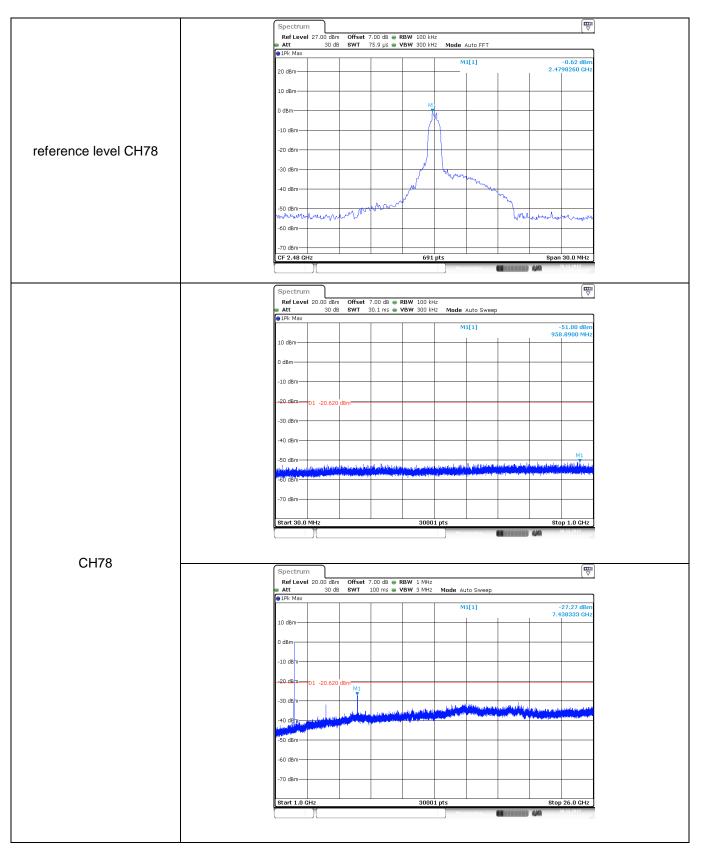
est Item:	SE		Мо	dula	tion	type:		(	GFSK	(
		Spectrum								
		Ref Level 27.00 dBr Att 30 dB 1Pk Max	m Offset 7.0 B SWT 75	JÚ dB 👄 RE .9 μs 👄 VI	5W 100 kH BW 300 kH	z z Mode	Auto FFT			
						N	1[1]		9.4r	-0.43 dBm
		20 dBm							2.10	
		10 dBm			M	1				
		0 dBm			Ì	1				
		-10 dBm								
eference level CH00		-20 dBm								
		-30 dBm								
		-40 dBm			- p	<u> </u>				
		-50 dBm	henymen	March	m	4 hore	Mun and	Murris	1.00 × 10 × 1	
		-60 dBm	w.M.					Margarian	ant the offer	and the set
		-70 dBm								
		CF 2.402 GHz	. I		691	pts Ma	suring			30.0 MHz
										(177)
		Spectrum Ref Level 20.00 dBr								
		<ul> <li>Att 30 di</li> <li>1Pk Max</li> </ul>	в <b>swт</b> зо	.1 ms 👄 V	<b>BW</b> 300 kH			)		
		10 dBm				N	1[1]		938	-50.69 dBm 3.1000 MHz
		0 dBm								
		-10 dBm								
		20 dBm	) dBm							
		-30 dBm								
		-40 dBm								
		-50 dBm	المروبا فيما يتلافظ	ومربا عادية والعامان	الأأو الخصاصات	المغالله ومراطب المامة ما	Latingheter	a di silainini	And the second second	M1
		-60 dBm	lago, en parte de la portano	digiting being soop	la presidente de Legio	n hagaar ng padawada	a decompliant the deci	- Addene file began gye	n an	rterstotiste single
		-70 dBm								
		Start 30.0 MHz			3000	1 nts			Str	p 1.0 GHz
						Mei	suring			26.12.2017
01100										
CH00		Spectrum								
		Ref Level 20.00 dBr Att 30 dB 1Pk Max	m Offset 7.0 B SWT 10				uto Sweep			
		The migx				N	1[1]		- 7.9	-27.52 dBm 205000 GHz
		10 dBm								
		0 dBm								
		-10 dBm								
		20-d8m	) dBm							
		-30 d8m	M1 T			1.4	lula a se			
		-40 dBm	Jul Harley	an ar had a lite	in a substantion and a substantion					andan san ang di bibi Ang dan san ang di bibis
		-50 dBm								
				]						
		-60 dBm								
		-70 dBm								
		Start 1.0 GHz	1		3000	1 pts				26.0 GHz
	1						sammin		a second	



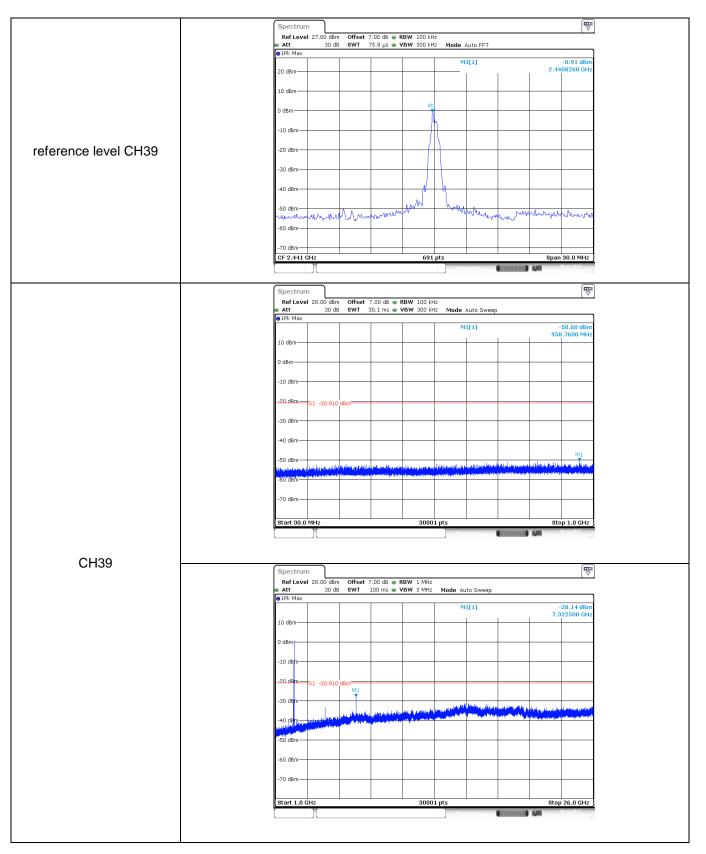


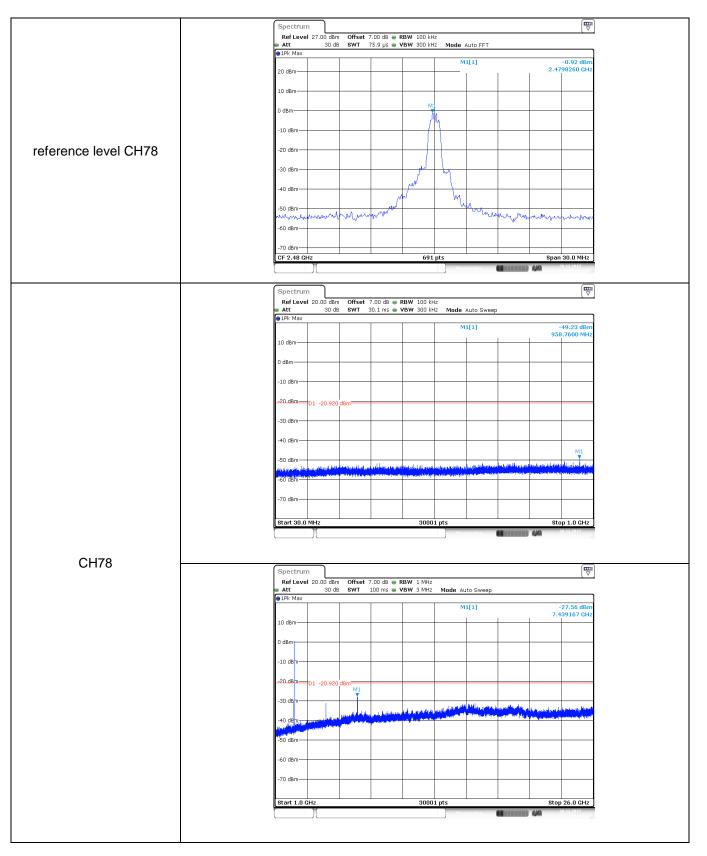
est Item:	SE		Μ	odula	tion	type:			π/4D0	QPSK
		Spectrum								
			dBm Offset DdB SWT				Auto FFT			
		● 1Pk Max				N	1[1]		0.40	-0.67 dBm )18260 GHz
		20 dBm							2.10	
		10 dBm			м					
		0 dBm			J	h				
		-10 dBm								
eference level CH00		-20 dBm								
		-30 dBm				h				
		-40 dBm			_N					
		-50 dBm		muspow		W.	mun	MAR	mmyhala	
		-60 dBm	marada.							40 Y W 10
		-70 dBm								
		CF 2.402 GHz			691	pts Ne	suring			30.0 MHz
		Spectrum								
		Ref Level 20.00		7.00 dB 👄 R 30.1 ms 👄 V	BW 100 kH	lz Iz Mode	Auto Sweer			[ \vee ]
		1Pk Max		••••	500 KI		1[1]			-50.53 dBm
		10 dBm							937	7.9710 MHz
		0 dBm								
		-10 dBm								
		-20 dBm	040 d9m							
		-30 dBm	o ro ubiir							
		-40 dBm								
										м1
		of relation of the second second	al alla the solution of the so	A SHALLAR	ر مراجع الله وروز الله ويعمد مرجع وموجع م		al or how how had	dagalaninini da Matalanganan	د دامر ایلیوری در بروی ایلیوری ا	Bala allanar Islantonahar
		460'dBm								
		-70 dBm								
		Start 30.0 MHz		1	3000	1 pts	surion -			op 1.0 GHz
									agent	
CH00		Cin a atrus sur								(mm)
		Spectrum Ref Level 20.00	dBm Offset	7.00 dB 👄 R	BW 1 MHz					
		Att 3     D1Pk Max	D dB SWT	100 ms 👄 V	ыw 3 MHz		uto Sweep			-28.10 dBm
		10 dBm					-1-1		7.2	-28.10 dBm 205833 GHz
		0 dBm								
		-10 dBm								
		-20 dBm-D1 -21.	040 dBm							
		-30 dBm	Inde Maketer	والطوفان والمراجع	la faithire		and the second second	ين بر أموانيون ا مريد أموانيون ا	alan yang karing bisaka bisa Alamba yang karing bisaka	all para de al di
		-40 dBm			an <mark>da galanin da</mark>		South 1.		a a standard for	and the second se
		-50 dBm								
		-60 dBm								
		-70 dBm								
		Start 1.0 GHz			3000	1 pts				26.0 GHz
	1	·							10.3475	26.12.2017





fest Item:	SE		Мо	dulat	ion t	ype:		8	BDPS	ĸ
		Spectrum								
		RefLevel 27.00 dBn Att 30 dB 1Pk Max		00 dB 👄 RB 5.9 µs 👄 VB			Auto FFT			
		20 dBm				м	1[1]		2.40	-0.77 dBm )18260 GHz
		10 dBm			м					
		0 dBm			Ţ	L				
		-10 dBm								
reference level CH00		-20 dBm								
		-30 d8m			- Jul	ha				
		-40 dBm			M					
		-50 dBm		- All		M	Λ.			
		Marria Marria	mymm	WY WY			wound	Www	mount	manth
		-60 dBm								
		-70 dBm CF 2.402 GHz			691	pts			Span	30.0 MHz
						Mela	suring			26.12.2017
		Spectrum								
		RefLevel 20.00 dBn Att 30 dB	n Offset 7. 3 SWT 30	00 dB 🖷 RB 1.1 ms 🖷 VB	W 100 kH	z z Mode	Auto Sweep	)		( •
		1Pk Max					1[1]		-	-51.23 dBm
		10 dBm							700	0.8460 MHz
		0 dBm								
		-10 dBm								
		-20 dBm-D1 -20.980	) dBm							
		-30 dBm								
		-40 dBm								
		-50 dBm	a al 10 silver 1 cc. 1	. List. La Ellor a coll se	ويتعار المعار	la de ader to a en 116	M	l Andreader ditte und als	المراطعة والعاسرة	
		-50 dBm	Constraint and	ne ferren en tra	al a second a second	el administra del pr	sand-total biom	politentijinosstanise	des geolections	l y II a se fy a that dea
		-70 d8m								
		Start 30.0 MHz			3000	Lpts	suring			op 1.0 GHz
CH00		Spectrum								[ □ □
		Ref Level 20.00 dBn	n Offset 7.1 3 SWT 10	00 dB 👄 RB	W 1 MHz	Mode	to Ewrer			⊽ ]
		Att 30 da     IPk Max	s awri 10	50 IIIS <b>- VB</b>	WHZ		to Sweep			-28.36 dBm
		10 dBm				м	*1*1		7.2	-28.36 dBm 206667 GHz
		0 dBm								
		-10 dBm								
		-20 dBm-D1 -20.980	dBm M1							
		-30 dBm	M1 Y			المحمد أحديثه	and the local second	ى يانىلەرمەلەرسى ا	ned a la constal	فانتوفان وبراورون
		-40 dBm		اللي والمحاولات الماري مناسبة متحدة وموجودة	a di seda di seta A secondari di seta di seta di secondari di secondari di secondari di secondari di secondari		d <sup>ist</sup> ribustitus.e	and a start of the	and an an and a statistic south	
		-50 dBm								
		-60 dBm								
			I T		7	_				
		-70 dBm								
		Start 1.0 GHz			3000:	pts				26.0 GHz
	1					I Mea	suring		1/1	10-4404





## 5.11. Spurious Emissions (radiated)

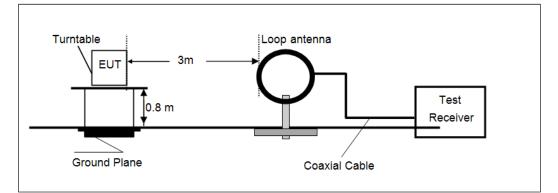
## <u>LIMIT</u>

### FCC CFR Title 47 Part 15 Subpart C Section 15.209

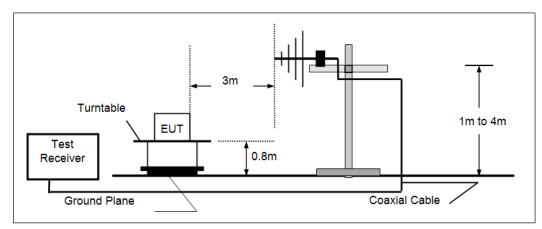
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

## **TEST CONFIGURATION**

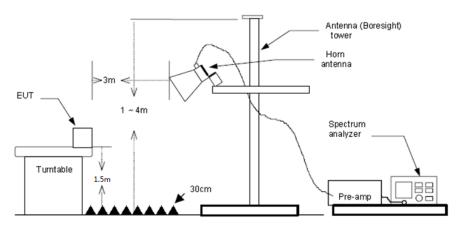
Below 30 MHz



#### > 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 10<sup>th</sup> 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

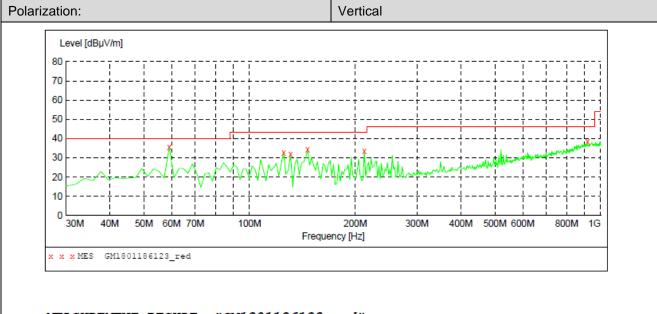
#### Note:

- 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

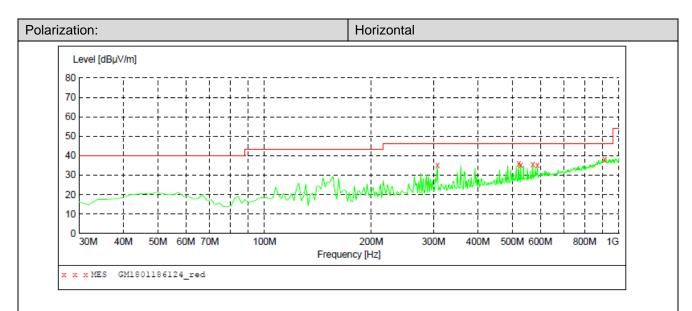
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.





#### MEASUREMENT RESULT: "GM1801186123\_red"

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
59.100000	35.50	-9.8	40.0	4.5	QP	100.0	317.00	VERTICAL
125.060000	32.90	-12.9	43.5	10.6	QP	100.0	193.00	VERTICAL
130.880000	32.00	-13.4	43.5	11.5	QP	100.0	179.00	VERTICAL
146.400000	34.40	-13.9	43.5	9.1	QP	100.0	193.00	VERTICAL
212.360000	33.50	-10.4	43.5	10.0	QP	100.0	331.00	VERTICAL
916.580000	38.50	6.9	46.0	7.5	OP	100.0	41.00	VERTICAL



#### MEASUREMENT RESULT: "GM1801186124\_red"

1/18/2018 10: Frequency MHz	:00PM Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
307.420000	35.10	-7.1	46.0	10.9	QP	100.0	77.00	HORIZONTAL
520.820000	35.80	-1.3	46.0	10.2	QP	100.0	163.00	HORIZONTAL
528.580000	35.30	-1.2	46.0	10.7	QP	100.0	163.00	HORIZONTAL
571.260000	35.60	-0.2	46.0	10.4	QP	100.0	292.00	HORIZONTAL
588.720000	35.10	0.7	46.0	10.9	QP	100.0	292.00	HORIZONTAL
910.760000	38.20	6.9	46.0	7.8	QP	300.0	336.00	HORIZONTAL

Shenzhen Huatongwei International Inspection Co., Ltd.

Report Template Version: H01 (2017-09)

$\triangleright$	1	GHz	~	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
3200.50	38.63	28.80	7.72	38.20	36.95	74.00	-37.05	Vertical	Peak
4809.50	37.39	31.58	9.55	36.93	41.59	74.00	-32.41	Vertical	Peak
7209.02	32.93	36.21	11.87	35.07	45.94	74.00	-28.06	Vertical	Peak
8996.12	31.25	37.90	13.31	34.41	48.05	74.00	-25.95	Vertical	Peak
1333.28	35.53	26.10	4.89	36.50	30.02	74.00	-43.98	Horizontal	Peak
3160.03	33.58	28.80	7.67	38.21	31.84	74.00	-42.16	Horizontal	Peak
4809.50	35.23	31.58	9.55	36.93	39.43	74.00	-34.57	Horizontal	Peak
7209.02	32.86	36.21	11.87	35.07	45.87	74.00	-28.13	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
1659.57	35.68	25.08	5.69	36.85	29.60	74.00	-44.40	Vertical	Peak
3690.85	34.32	29.30	8.37	38.25	33.74	74.00	-40.26	Vertical	Peak
4809.50	39.39	31.58	9.55	36.93	43.59	74.00	-30.41	Vertical	Peak
7209.02	35.93	36.21	11.87	35.07	48.94	74.00	-25.06	Vertical	Peak
1270.33	36.79	26.23	4.78	36.53	31.27	74.00	-42.73	Horizontal	Peak
4809.50	38.23	31.58	9.55	36.93	42.43	74.00	-31.57	Horizontal	Peak
7209.02	32.86	36.21	11.87	35.07	45.87	74.00	-28.13	Horizontal	Peak
8549.59	32.25	37.10	12.88	34.45	47.78	74.00	-26.22	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
1392.25	36.05	25.92	4.99	36.46	30.50	74.00	-43.50	Vertical	Peak
3308.19	37.59	28.20	7.85	38.39	35.25	74.00	-38.75	Vertical	Peak
4958.68	37.95	31.46	9.64	36.52	42.53	74.00	-31.47	Vertical	Peak
8996.12	31.42	37.90	13.31	34.41	48.22	74.00	-25.78	Vertical	Peak
1388.71	35.09	25.93	4.98	36.47	29.53	74.00	-44.47	Horizontal	Peak
3299.78	35.36	28.20	7.84	38.37	33.03	74.00	-40.97	Horizontal	Peak
4958.68	37.25	31.46	9.64	36.52	41.83	74.00	-32.17	Horizontal	Peak
7451.57	34.33	36.20	12.24	34.86	47.91	74.00	-26.09	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.: TRE1712017701.

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