



TE	EST REPOR	T
Report Reference No	TRE1803009306	R/C: 72536
FCC ID :	ZSW-30-064	
Applicant's name:	b mobile HK Limited	
Address	Flat 18; 14/F Block 1; Gold Street; Kwai Chung;New Te	en Industrial Building; 16-26 Kwai Tak erritories, HONG KONG
Manufacturer	b mobile HK Limited	
Address	Flat 18; 14/F Block 1; Gold Street; Kwai Chung; New T	len Industrial Building;16-26 Kwai Tak erritories; HONG KONG
Test item description::	Mobile Phone	
Trade Mark:	Bmobile	
Model/Type reference:	AX1016	
Listed Model(s)	-	
Standard:	FCC CFR Title 47 Part 15	Subpart C Section 15.247
Date of receipt of test sample:	Mar. 13, 2018	
Date of testing	Mar. 13, 2018 - Mar. 23, 20	018
Date of issue	Mar. 23, 2018	
Result:	PASS	
Compiled by ( Position+Printed name+Signature):	File administrators Shayne	Zhu Shayne Zhu
Supervised by (Position+Printed name+Signature):	Project Engineer Cary Luo	Cary Luo
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Hamsty
Testing Laboratory Name :	Shenzhen Huatongwei Int	ternational Inspection Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Tianliao, Gongming, Shenz	n Industrial Park, Genyu Road,

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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 information

Revision No.	Date of issue	Description
N/A	2018-03-23	Original

# 2. TEST DESCRIPTION

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

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 S         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.:	AX1016		
Listed Model(s):	-		
IMEI Code:	Conducted: 355184090052211		
IMEI COUE.	Radiated: 355184090052294		
Power supply:	DC 3.8V		
Adapter information:	Input:100-240Va.c.,50/60Hz,0.2A		
	Output: 5Vd.c.,700mA		
Hardware version:	W4G01_MB_V3.0_20170406		
Software version:	re version: Bmobile_AX1016_TIGO_LAT_V009		
Bluetooth			
Version:	Supported BT 4.0+EDR		
Modulation:	GFSK, π/4DQPSK, 8DPSK		
Operation frequency:	2402MHz~2480MHz		
Channel number:	79		
Channel separation:	1MHz		
Antenna type:	PIFA		
Antenna gain:	-0.8 dBi		

# 3.3. Operation state

### Test frequency list

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

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

### > TEST MODE

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated suprious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report.

# 3.4. EUT configuration

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

- supplied by the manufacturer
- supplied by the lab

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

## 3.5. Modifications

No modifications were implemented to meet testing criteria.

# 4. TEST ENVIRONMENT

### 4.1. Address of the test laboratory

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

## 4.2. Test Facility

### CNAS-Lab Code: L1225

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

### A2LA-Lab Cert. No.: 3902.01

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

### FCC-Registration No.: 762235

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

### IC-Registration No.:5377B-1

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

### ACA

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

## 4.3. Environmental conditions

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

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

### 4.4. Statement of the measurement uncertainty

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

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

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

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

# 4.5. Equipments Used during the Test

Condu	cted 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	11/11/2017	11/10/2018
2	Artificial Mains	SCHWARZBECK	NNLK 8121	573	11/11/2017	11/10/2018
3	2-Line V- Network	R&S	ESH3-Z5	100049	11/11/2017	11/10/2018
4	Pulse Limiter	R&S	ESH3-Z2	101488	11/11/2017	11/10/2018
5	RF Connection Cable	HUBER+SUHNER	EF400	N/A	11/21/2017	11/20/2018
6	Test Software	R&S	ES-K1	N/A	N/A	N/A
Radiat	ed 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	11/11/2017	11/10/2018
2	Loop Antenna	R&S	HFH2-Z2	100020	11/20/2017	11/19/2018
3	Ultra- Broadband Antenna	SCHWARZBECK	VULB9163	538	4/5/2017	4/4/2018
4	Preamplifier	SCHWARZBECK	BBV 9743	9743-0022	10/18/2017	10/17/2018
5	RF Connection Cable	HUBER+SUHNE R	RE-7-FL	N/A	11/21/2017	11/20/2018
6	EMI Test Software	R&S	ESK1	N/A	N/A	N/A
7	Spectrum Analyzer	R&S	FSP40	100597	11/11/2017	11/10/2018
8	Horn Antenna	SCHWARZBECK	9120D	1011	3/27/2017	3/26/2018
9	Horn Antenna	SCHWARZBECK	BBHA9170	25841	3/27/2017	3/26/2018
10	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-248	10/18/2017	10/17/2018
11	High pass filter	Compliance Direction systems	BSU-6	34202	11/11/2017	11/10/2018
12	RF Connection Cable	HUBER+SUHNE R	RE-7-FH	N/A	11/21/2017	11/20/2018
13	EMI Test Software	Audix	E3	N/A	N/A	N/A
14	Turntable	MATURO	TT2.0	/	N/A	N/A
15	Antenna Mast	MATURO	TAM-4.0-P	/	N/A	N/A

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 -0.8 dBi, please refer to the below antenna photo.



# 5.2. Conducted Emissions (AC Main)

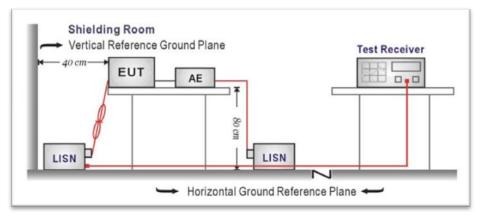
# <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

\* Decreases with the logarithm of the frequency.

## **TEST CONFIGURATION**



### TEST PROCEDURE

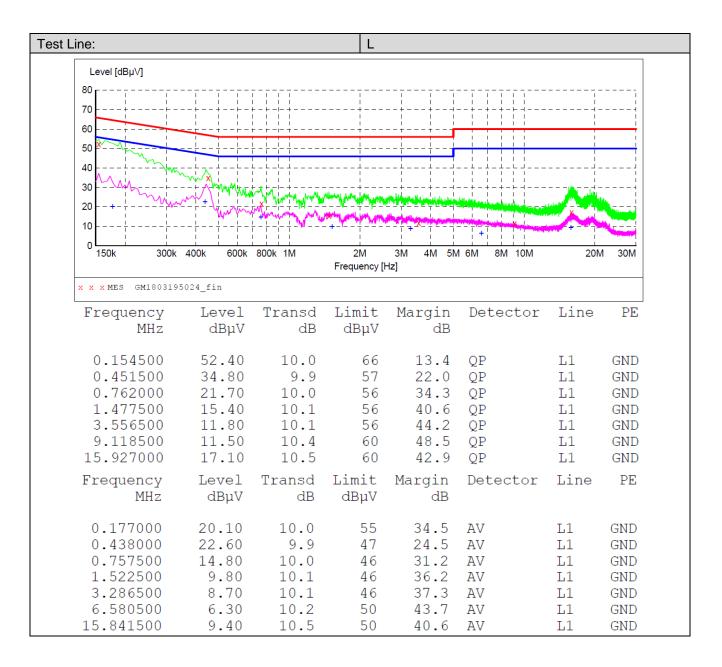
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

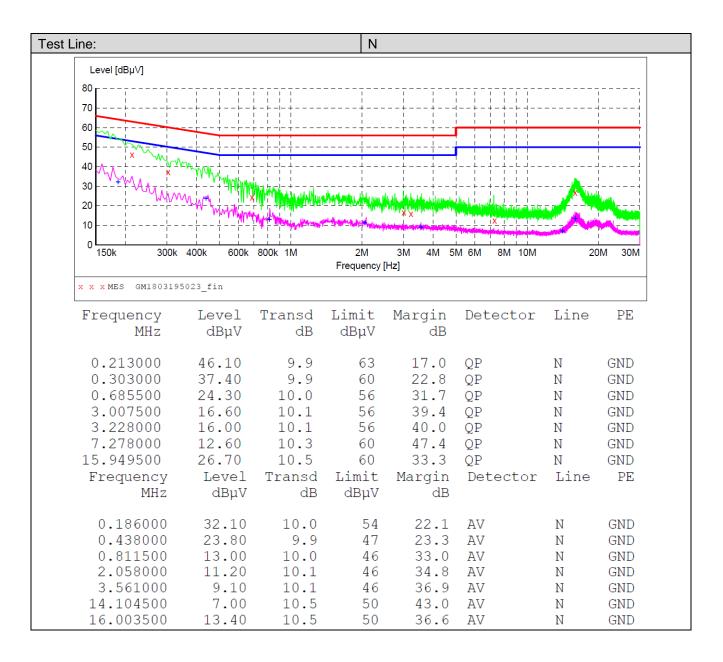
## TEST RESULTS

### ☑ Passed □ Not Applicable

Note:

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



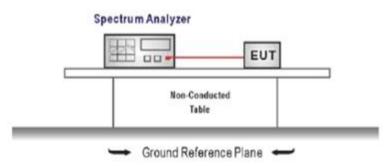


## 5.3. Conducted Peak Output Power

### <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.

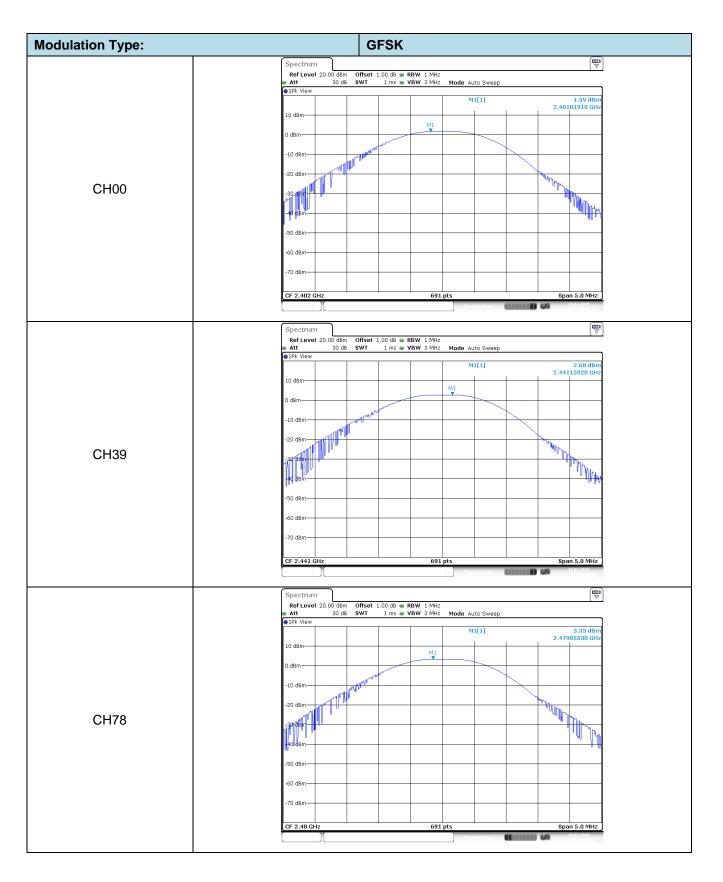
### TEST MODE:

Please refer to the clause 3.3

### TEST RESULTS

### ☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	1.59		
GFSK	39	2.68	≤ 30.00	Pass
	78	3.33		
	00	3.12		
π/4DQPSK	39	3.61	≤ 21.00	Pass
	78	4.76		
8DPSK	00	3.33		
	39	3.73	≤ 21.00	Pass
	78	4.87		



Modulation Type:	π/4DQPSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB ● RBW 2 MHz ● Att 30 dB SWT 1 ms ● VBW 5 MHz Mode Auto Sweep ● IPK View
	M1[1] 3.12 dBm 2.40214470 GHz
	10 dBm M1
	0 dBm
	-10-0Em
	-20 dBm
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
	(1)     (1)     (1)     (1)     (1)     (2)     (1)     (2)     (
	10 dBm- 2.44115200 GHz
	0 dBm
	-10 0Em
	-20 dBm-
CH39	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum (👦
	RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz
	●1Pk View M1[1] 4.76 dBm
	10 dBm M1
	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

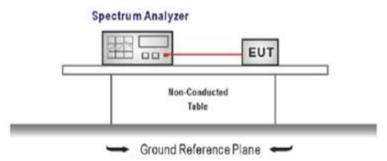
Iodulation Type:	8DPSK
	Spectrum         Image: Construction of the set of the
CH00	1Pk View     10     10    10    10    10    10    10    10    10    10    10    10
	10 dBm M1
	_10 dBm
	-20 dBm
	-40 dBm-
	-50 dBm
	-70 dBm-
	CF 2.402 GHz         691 pts         Span 5.0 MHz           Messared         10002010
	Spectrum (♥) RefLevel 20.00 dBm Offset 1.00 dB ● RBW 2 MHz
	Att         30 dB         SWT         1 ms         VBW         5 MHz         Mode         Auto Sweep           IPR View           M1[1]         3.73 dBm
	10 dBm M Z.44095660 GHz
	0 dBm
01100	-20 dBm
CH39	-30 dBm
	-50 dBm
	-60 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           ● IFk View          It
	10 dBm
	O dBm
	~10 dBm
CH78	-30 dBm
	-40 dBm
	-60 dBm
	-70 dBm CF 2.48 GHz 691 pts Span 5.0 MHz
	CF 2.48 GHZ B91 pts Span 5.0 WHZ

# 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	1	
	00	1.29		
π/4DQPSK	39	1.28	-	Pass
	78	1.29		
	00	1.30		
8DPSK	39	1.30	-	Pass
	78	1.30		

Iodulation Type:	GFSK
	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
	●1Pk View M1[1] -25.07 dBm
	10 dBm 2.40154750 GHz M2[1] -4.32 dBm
	0 dBm 2.40205750 GHz
	-20 UBIII 01 -24.318 dBm 102 01
CH00	-90 dBm
	-50 damanda
	-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         2.4015475 GHz         -25.07 dBm         -         -         -
	M2         1         2.4020575 GHz         -4.32 dBm           D3         M1         1         925.0 kHz         0.21 dB
	Measuring
	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
	M1[1] -23.95 dBm 2 44054750 GHz
	10 dBm M2[1] -3.20 dBm 2.44105750 GHz
	-20 dBm 01 -23.199 dBm 01 -23.199 dBm
	-30 dBm
CH39	-40 dBm
	-50 dBm dution
	-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         2.4405475 GHz         -23.95 dBm         -23.95 dBm         -
	M2         1         2.4410575         GHz         -3.20         dBm           D3         M1         1         925.0         kHz         0.43         dB
	Measurainean 🗰 19492219
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB  RBW 10 kHz
	● 1Pk View
	10 dBm
	M2 - 2.48005750 GHz
	-20 dBm 01 -22.569 dB
01/70	
CH78	-40 dBm
	-S0.d8m2
	-60 dBm
	-70 dBm
	CF 2.48 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref   Trc   X-value   Function   Function Result
	M1         1         2.4795475 GHz         -23.21 dBm           M2         1         2.4800575 GHz         -2.57 dBm
	D3 M1 1 925.0 kHz 0.14 dB

Iodulation Type:	π/4DQPSK
	Spectrum (♥
	Ref Level         20.00 dBm         Offset         1.00 dB         RBW         30 kHz           Att         30 dB         SWT         63.1 µs         ♥ BW         100 kHz         Mode         Auto FFT
	IPk View
	10 dBm M1[1] -21.04 dBm 2.40136250 GHz -1.01 dBm
	10 dBm M2[1] -1.01 dBm M2 2,4020000 GHz
	-20.dBm D1 -21.006 dBm
	-30 dBm
CH00	/40'38m
	-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         2.4013625 GHz         -21.04 dBm
	M2 1 2.402 GHz -1.01 dBm
	D3 M1 1 1.2925 MHz -0.13 dB Heavenee 100000 100000
	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
	●1Pk View M1[1] -20.72 dBm
	10 dBm 2.44036250 GHz 2.460360 GHz 2.4603600 GHz 2.4603600 GHz 2.46000 GHz _
	0 dBm
	-10 dBm
	ML J
	-20.d8m-01 -20.642 d8m
	-30 d8m
CH39	
	-50 dBm-
	-60 d8m
	-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         2.4403625 GHz         -20.72 dBm
	M2         1         2.4409975 GHz         20.72 dbm           M2         1         2.4409975 GHz         -0.64 dbm           D3         M1         1         1.2825 MHz         -0.27 db
	DG         III         1.2023 mill         0.27 kB         IIII         1.2023 mill         IIIII         IIIIII         IIIIIIIIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB  RBW 30 kHz
	Att 30 dB SWT 63.1 µs SVBW 100 kHz Mode Auto FFT
	●1Pk View M1[1] -19.30 dBm
	10 dBm 2.47935750 GHz M2[1] 0.81 dBm
	0 dBm 2.47999750 GHz
	M1-~
	-30 dBm
CH78	-40 dBm
	-50 dBm
	-60 d8m
	-70 d8m
	CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
	Type Ref Trc X-value Y-value Function Function Result
	M1         1         2.4793575 GHz         -19.30 dBm           M2         1         2.4799975 GHz         0.81 dBm
	Ma         1         Drove drift         Order down           D3         M1         1         1.285 MHz         0.06 dB

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
	IPk View
	2.40135250 GHz
	M2         2.4020000 GHz           0 dBm         0
	-10 dBm
	-20 dBm 01 -20,975 dBm
	-20 000 p1 -20,9/5 dBm7
CH00	
CHUU	
	-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         2.4013525 GHz         -21.08 dBm           M2         1         2.402 GHz         -0.97 dBm           Construction         Construction         Construction
	D3 M1 1 1.2975 MHz 0.06 d8
	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
	●1Pk View M1[1] -20.84 dBm
	10 dBm 2.44035250 GHz M2[1] -0.70 dBm
	0 dBm 0 dBm0 dBm0 dBm0 dBm
	-10 dBm
	-20.48m D1 -20.701,48m
	-30 dBm
CH39	-487 (Barr)
	-50 dBm
	-60 dBm
	-70 dBm
	-/0 08m
	CF 2.441 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4403525 GHz         -20.84 dBm
	M1         1         2.4403525 GHz         -20.84 0Bm           M2         1         2.441 GHz         -0.70 dBm           D3         M1         1         3.3 MHz         -0.16 dB
	US         III         IIII         IIIIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
	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
	HPK View     M1[1] -19.80 dBm     2.47935000 GHz
	10 dBm M2[1] 0.73 dBm 2.47993000 GH2
	0 dBm
	-10 dBm
	-20 dBm D1 -19.274 dBm
	-30 dBm-
CH78	-46 dBm
	-50 d8m
	-60 dBm
	-70 dBm
	CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.47935 GHz         -19.80 dBm
	M2 1 2.4799975 GHz 0.73 dBm D3 M1 1 1.3025 MHz 0.29 dB
	M2         1         2.4799975 GHz         0.73 dBm           D3         M1         1         1.3025 MHz         0.29 dB

## 5.5. Carrier Frequencies Separation

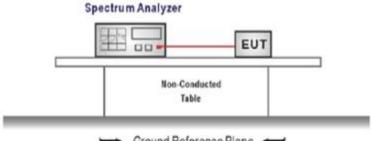
### LIMIT

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

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

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

### **TEST CONFIGURATION**



- Ground Reference Plane

### TEST PROCEDURE

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

### TEST MODE:

Please refer to the clause 3.3

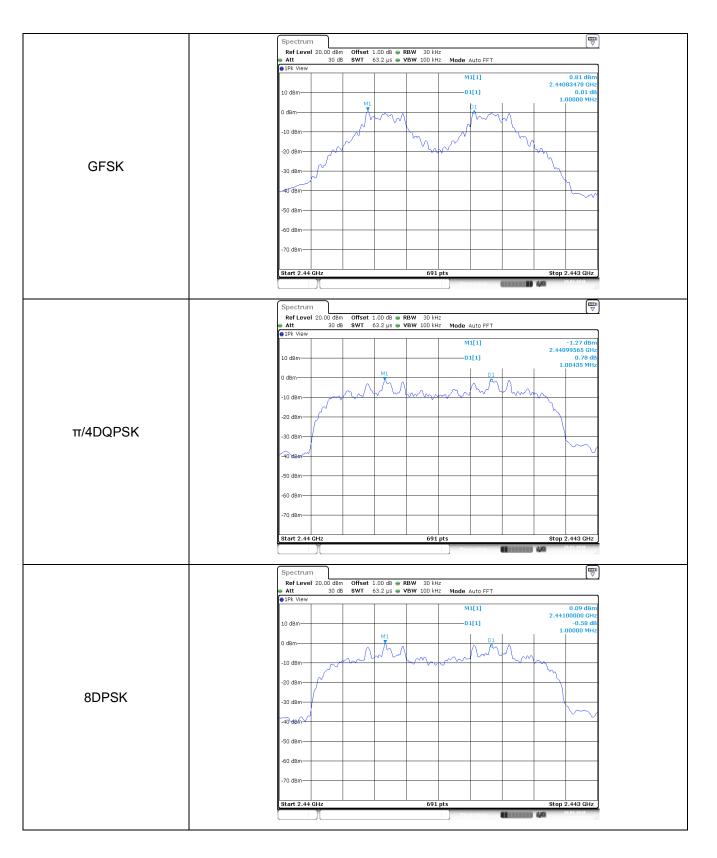
### TEST RESULTS

### ☑ Passed □ Not Applicable

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

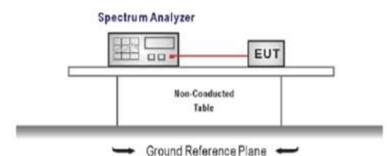


# 5.6. Hopping Channel Number

### 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	π/4DQPSK 79		Pass
8DPSK	79		

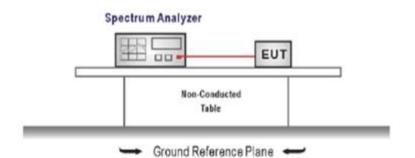
	Spectrum         mm           Ref Level 20.00 dBm         Offset 1.00 dB ● RBW 100 kHz
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep
	10 dBm
	OW#RETENTATION OF THE AND A CONTRACT AND A CONTRACT AND A DESCRIPTION AND A DESCRIPTION AND A DESCRIPTION AND A
	-19 #em
	-20 dBm
GFSK	
	-30 dBm
	40 d8m
	-50 dBm
	-60 dBm
	-70 d8m-
	Start 2.4 GHz         691 pts         Stop 2.4835 GHz           resconting         (1002011)         (1002011)
	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     IPk View
	10 dBm
	operational and the second of
	-10 dBm
	-20 dBm
π/4DQPSK	-30 dBm-
	-40 dBm-
	-50 dBm
	-60 dBm
	-60 dBm
	-70 dBm
	-70 dBm
	-70 dBm Start 2.4 GHz 691 pts Stop 2.4835 GHz Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	.70 dBm
	-70 dBm       -70 dBm       -70 dBm         Start 2.4 GHz       691 pts       Stop 2.4835 GHz         Spectrum
	-70 dBm       -70 dBm       -70 dBm         Start 2.4 GHz       691 pts       Stop 2.4835 GHz         Spectrum       Image: Spectrum       Image: Spectrum         Ref Level 20.00 dBm       Offset 1.00 dB @ RBW 100 kHz       Mode Auto Sweep         Att       30 dB       SWT       1ms @ VBW 300 kHz         Image: Spectrum       Image: Spectrum       Image: Spectrum         Image: Spectrum
	Start 2.4 GHz         691 pts         Stop 2.4835 GHz           Start 2.4 GHz         691 pts         Stop 2.4835 GHz           Not works         Not works         Not works           Ref Level 20.00 dBm         Offset 1.00 dB @ RBW 100 kHz         Node Auto Sweep           Att         30 dB         SWT         1 ms @ VBW 300 kHz           It with the set of the
	.70 dBm
	-70 dBm       -70 dBm         Start 2.4 GHz       691 pts         Node Auto Sweep       10 dBm         0 pts       10
8DPSK	.70 dBm
8DPSK	-70 dBm
8DPSK	-70 dBm
8DPSK	-70 dBm
8DPSK	-70 dBm
8DPSK	-70 dBm
8DPSK	.70 dsm

### 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.

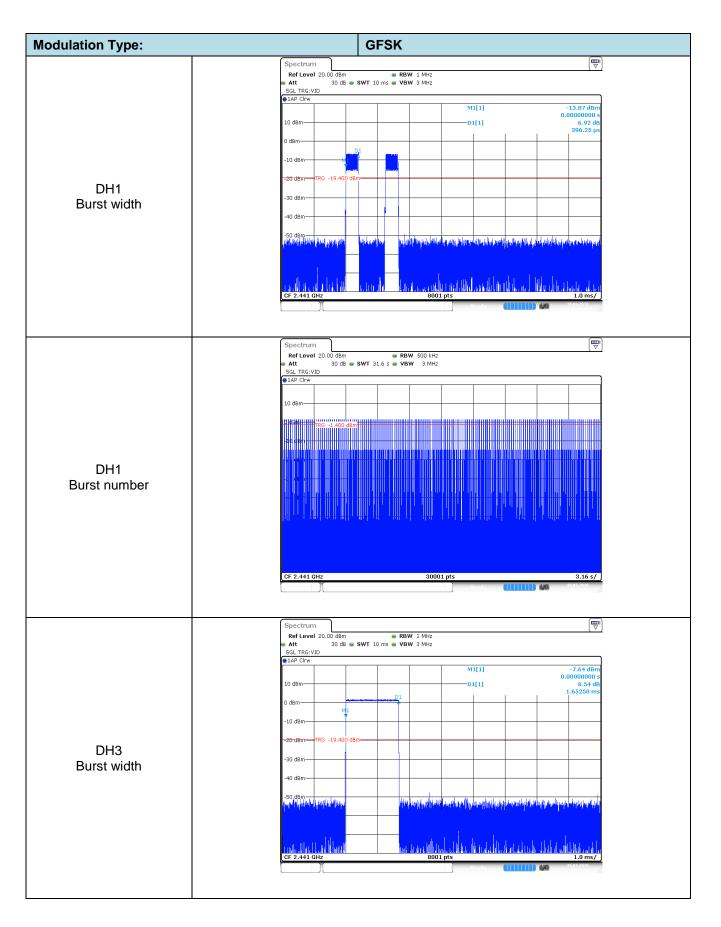
### TEST MODE:

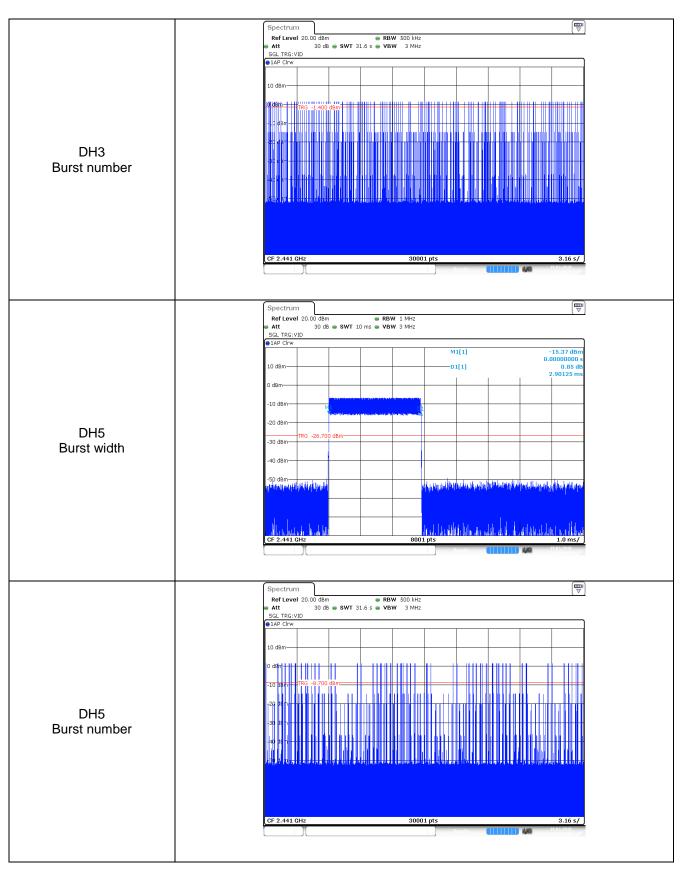
Please refer to the clause 3.3

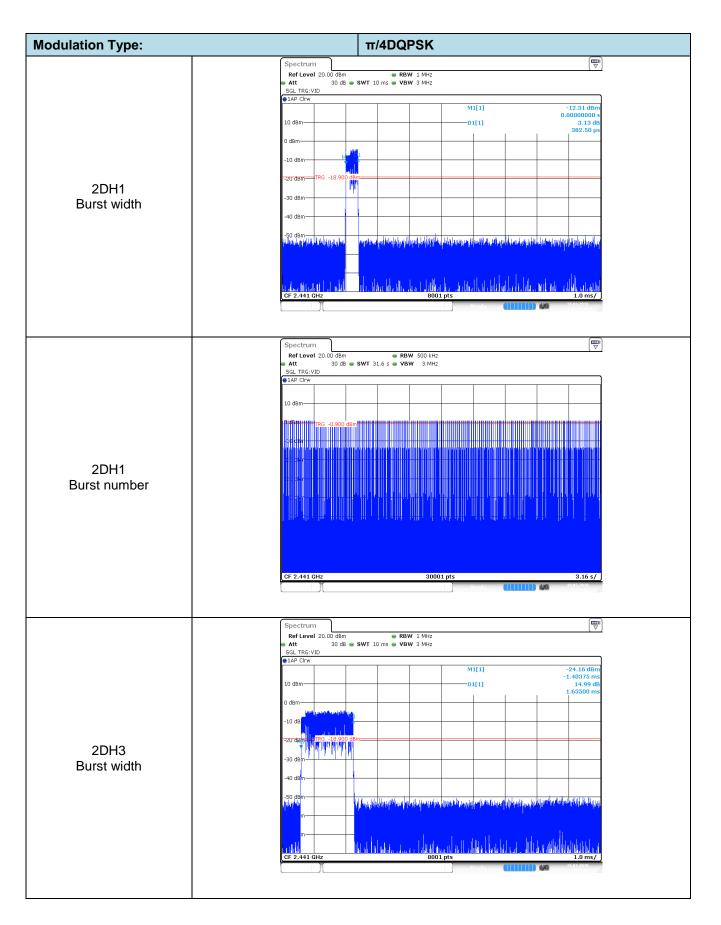
### TEST RESULTS

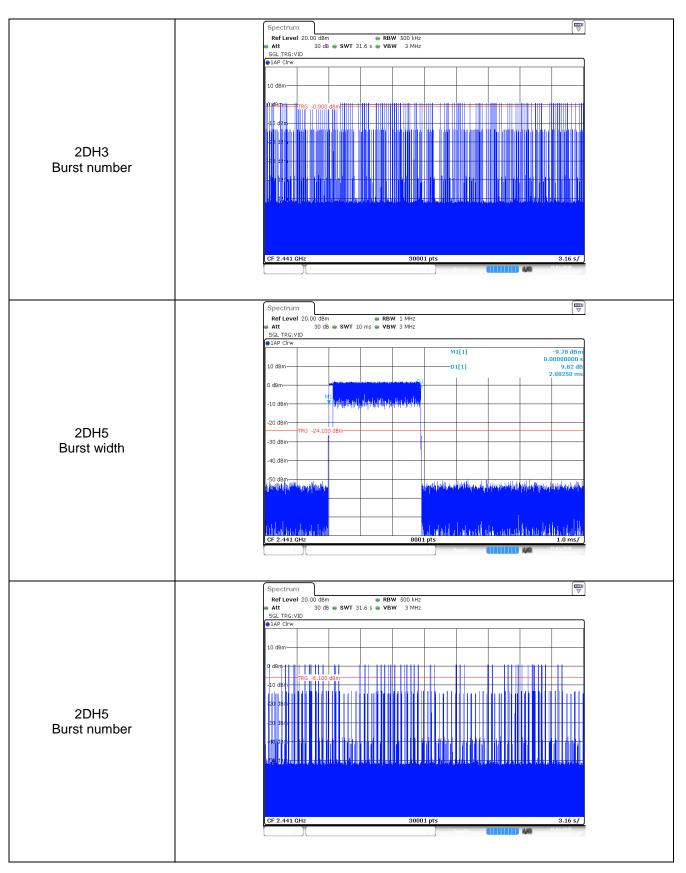
### ☑ Passed □ Not Applicable

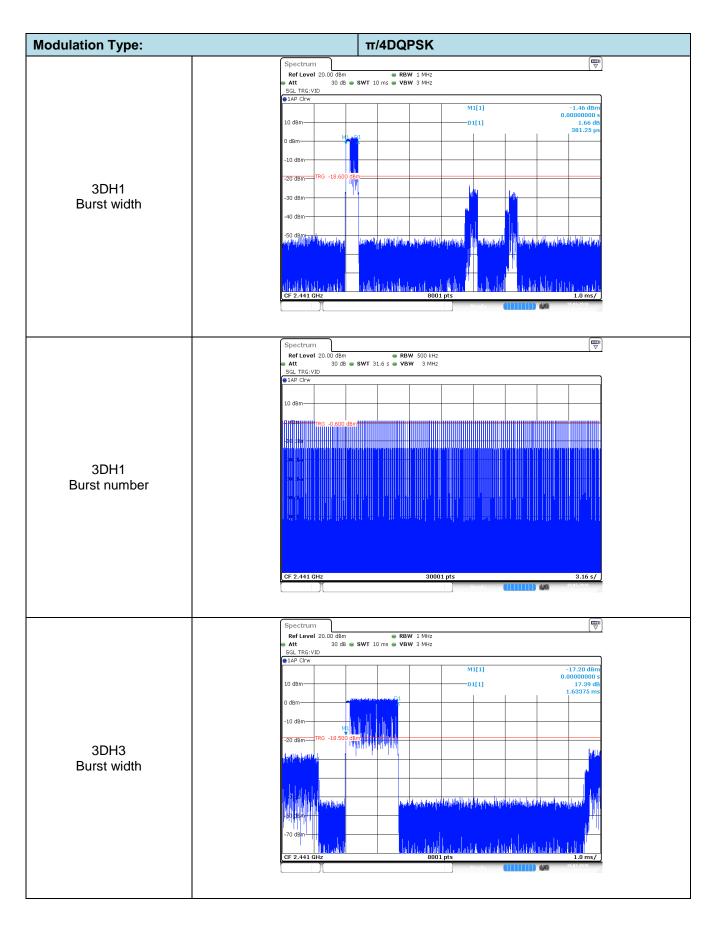
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.40	318.00	0.13		
GFSK	DH3	1.65	158.00	0.26	≤ 0.40	Pass
	DH5	2.90	106.00	0.31		
	2DH1	0.38	319.00	0.12		
π/4DQPSK	2DH3	1.64	159.00	0.26	≤ 0.40	Pass
	2DH5	2.88	98.00	0.28		
	3DH1	0.38	319.00	0.12		
8DPSK	3DH3	1.63	164.00	0.27	≤ 0.40	Pass
	3DH5	2.88	98.00	0.28		

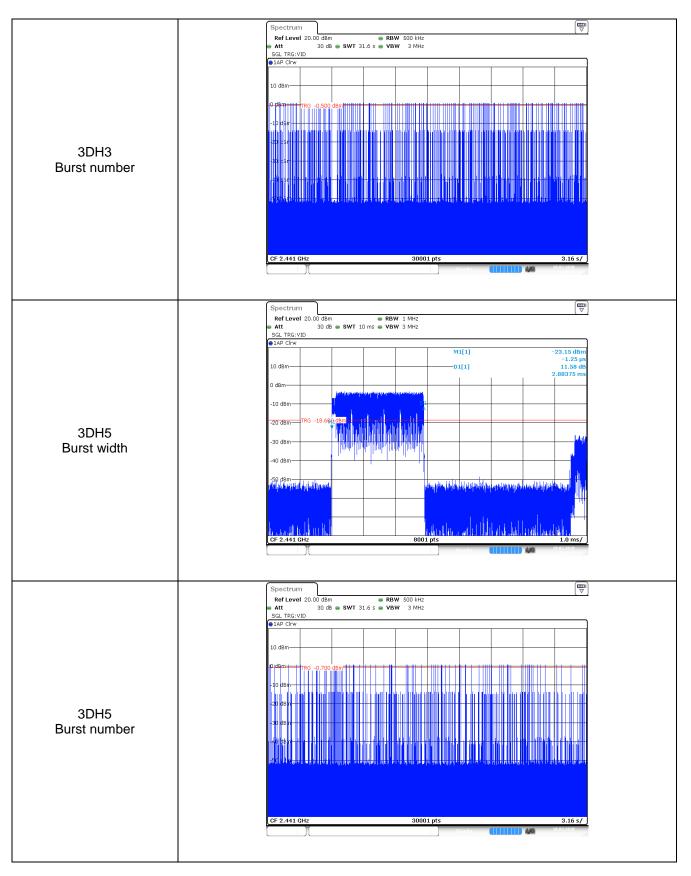












# 5.8. Pseudorandom Frequency Hopping Sequence

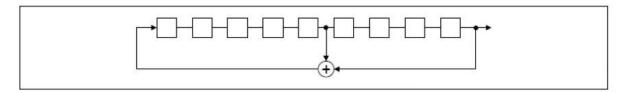
### <u>LIMIT</u>

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	4	6	62	64	-	78	1	73	75	77
٦				 1			1			Г	Г
				1			i i				L
				1			1				L
				 1			<u>i</u>		 L		L

Each frequency used equally one the average by each transmitter.

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

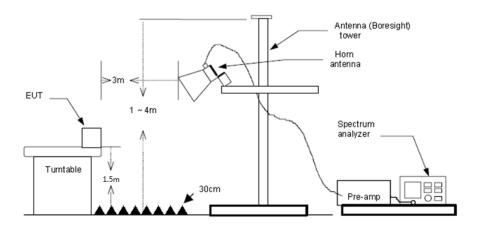
# 5.9. Restricted band (radiated)

### <u>LIMIT</u>

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

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

### TEST CONFIGURATION



### TEST PROCEDURE

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

### TEST MODE:

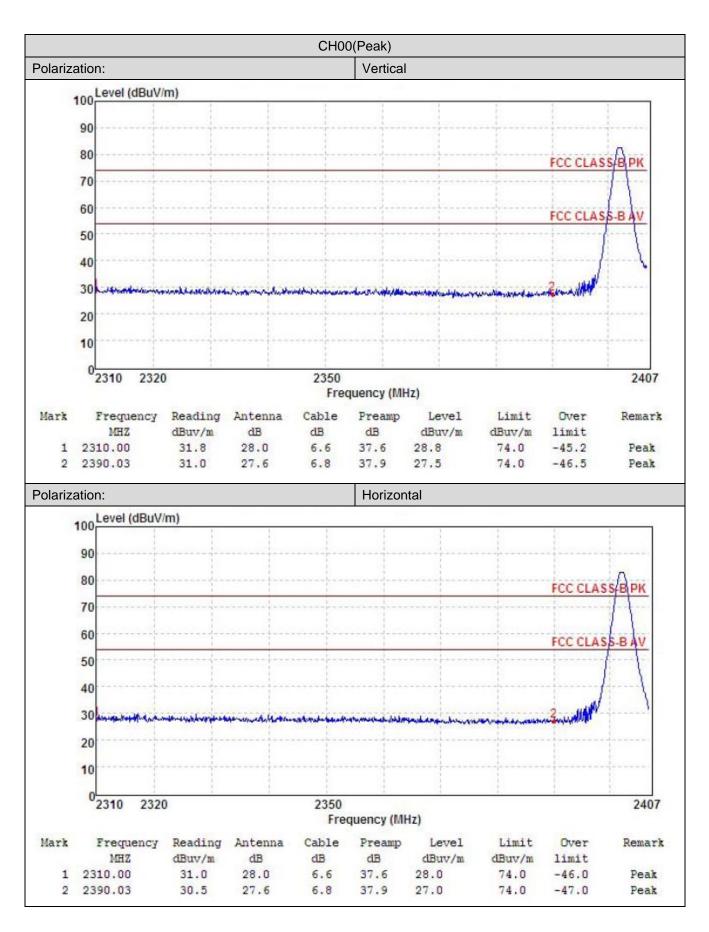
Please refer to the clause 3.3

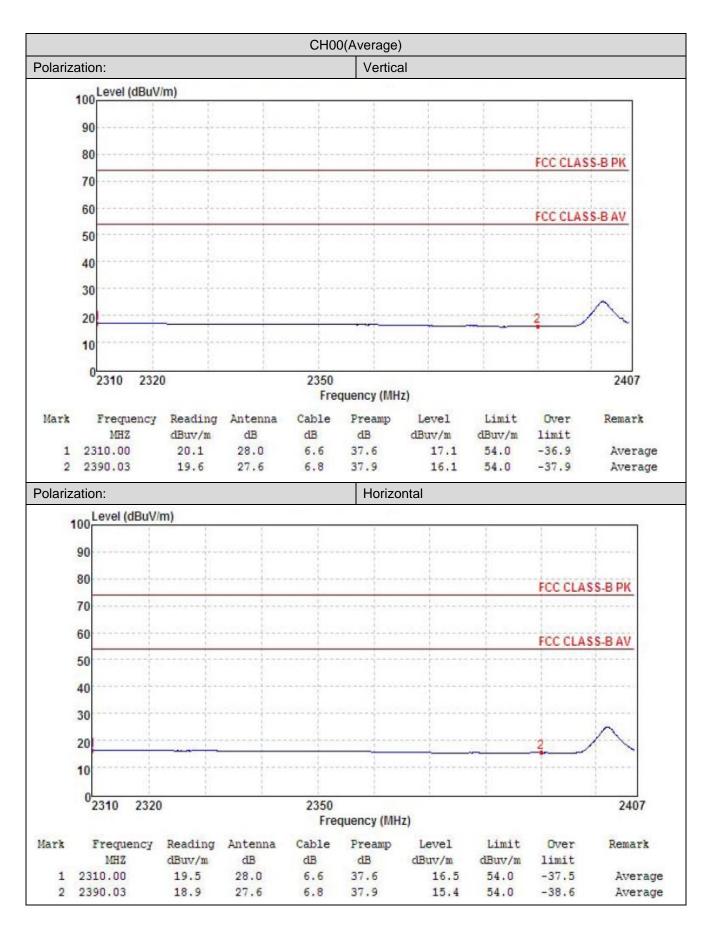
### TEST RESULTS

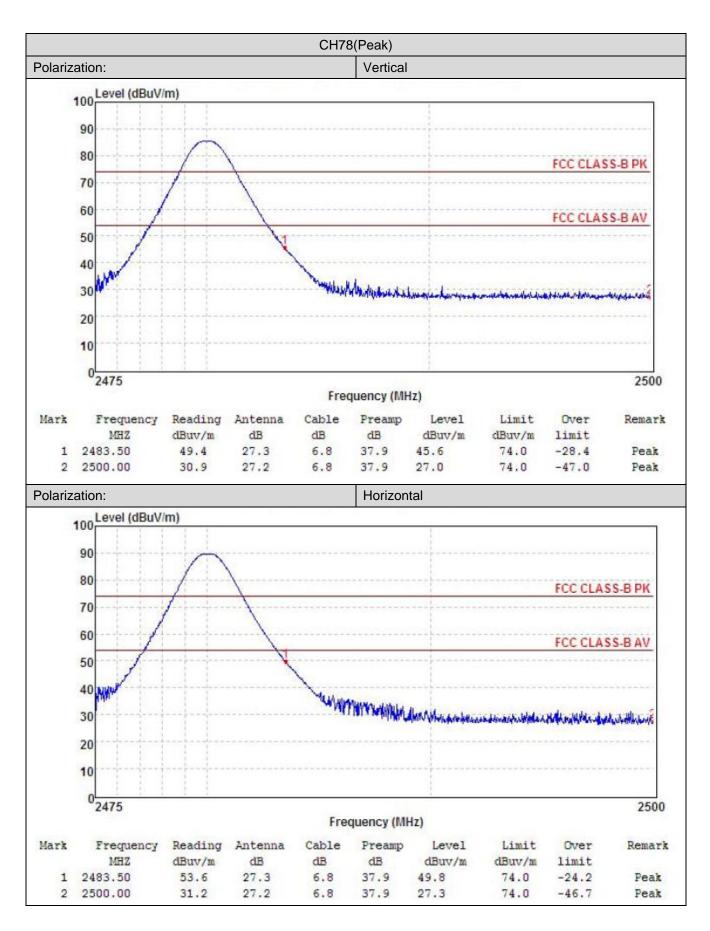
☑ Passed □ Not Applicable

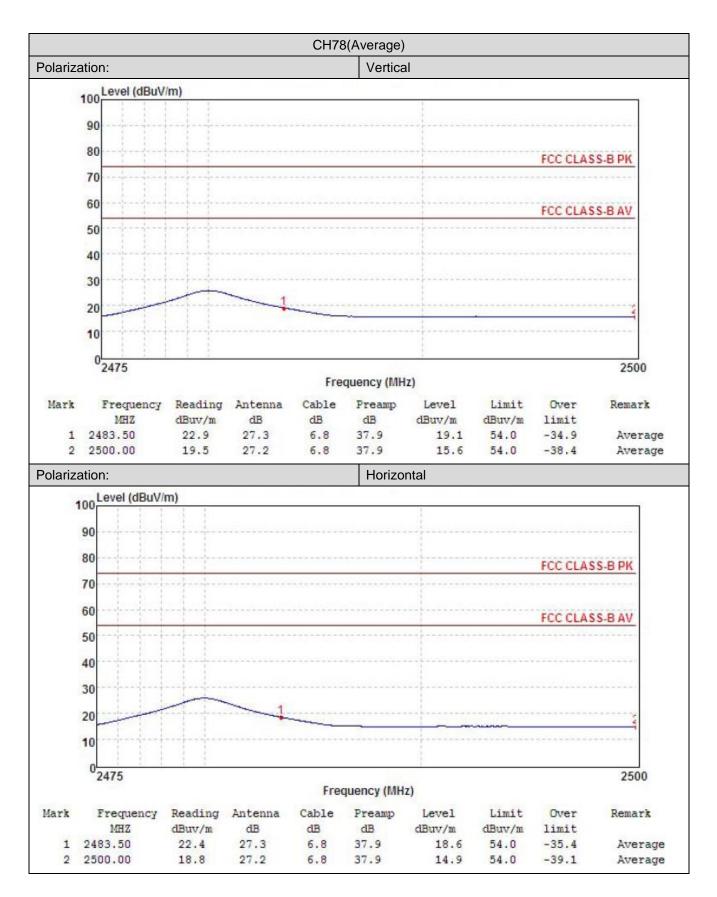
Note:

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







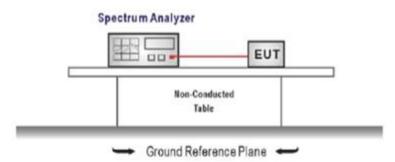


## 5.10. Band edge and Spurious Emissions (conducted)

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

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, 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	Modulation type:	GFSK
	Spectrum		
		dBm Offset 1.00 dB  RBW 100 kHz O dB SWT 1.1 ms VBW 300 kHz Mode Auto Sw	eep
	IPk Max	M1[1]	1.08 dBm
	10 dBm		2.402180 GHz -55.20 ¢ <u>β</u> m
	0 dBm		2.400000 <b>0</b> Hz
	-10 dBm		
	-20 dBm-D1 -18	.920 dBm	
	-30 dBm		
CH00	-40 dBm		
No hopping mode	-50 dBm		M3 M2
11 5	*BD-GEM-molecome	the second second second the second	M3
	-70 dBm		
	Start 2.31 GHz	691 pts	Stop 2.405 GHz
	Marker	X-value Y-value Function	Function Result
	Type         Ref         Trc           M1         1           M2         1	2.40218 GHz 1.08 dBm	Function Result
	M3 1	2.39 GHz -59.81 dBm	
	M4 1 M5 1		
		Measuring	(IIIIIII) 🚧 10.02010
	Chartering		
	Spectrum Ref Level 20.00	dBm Offset 1.00 dB 👄 RBW 100 kHz	
		0 dB SWT 1.1 ms • VBW 300 kHz Mode Auto Sw	eep J
	TEN MGA	M1[1]	1.08 dBm
	10 dBm	M2[1]	2.403830 GHz -58.48 d <del>0</del> m
	0 dBm		2.400000 GHZ
	-10 dBm		
	-20 dBm-D1 -18	.920 dBm	
	-30 dBm		
CH00	-40 dBm		
Hopping mode	-50 dBm	M5	M3 M3
-	650 USH	with a discuss where a second stand and a second	ant de fan en de fan
	-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	2.40383 GHz 1.08 dBm	
	M3 1 M4 1	2.39 GHz -58.84 dBm	
	M5 1	2.327623 GHz -57.03 dBm	
		Measuring	(Internet) 4/4 10.03.2019
	Spectrum		
	Ref Level 20.00		<u>.</u>
	Att 3	0 dB SWT 56.9 μs 👄 VBW 300 kHz Mode Auto FF1	
	10 40 m	M1[1]	3.03 dBm 2.4798310 GHz
	10 dBm M1	M2[1]	-56.83 dBm 2.4835000 GHz
	0 dBm		
	-10 dBm	.970_d8m	
	-20 dBm		
CH78	-30 dBm		
	-40 dBm		
No hopping mode	50 dBm	Ma han han ha	
	-60 dBm	- minter and	
	-70 dBm		
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker		
	Type Ref Trc M1 1	2.479831 GHz 3.03 dBm	Function Result
	M2 1 M3 1	2.5 GHz -59.12 dBm	
	M4 1		10.02.2019
		Measuring	19.03.2012

		0 dB <b>e RBW</b> 100 kHz 9 µs <b>e VBW</b> 300 kHz	Mode Auto FFT	
	• 1Pk Max		M1[1] M2[1]	2.45 dBm 2.4781430 GHz -60.35 dBm 2.4835000 GHz
	-10 dBm			
CH78 Hopping mode	-40 dBm	M4		
	-60 dBm	<u></u>	ntun and a start and a start and a start	
	Start 2.478 GHz Marker	691 pt	s	Stop 2.5 GHz
	Type   Ref   Trc   X-value	Y-value	Function	Function Result
	M1 1 2.478143	GHz 2.45 dBm		
	M2 1 2.4835 M3 1 2.5	GHz -60.35 dBm GHz -59.92 dBm		
	M4 1 2.4872464			
			Measuring	(19,03,2018 (19,03,2018

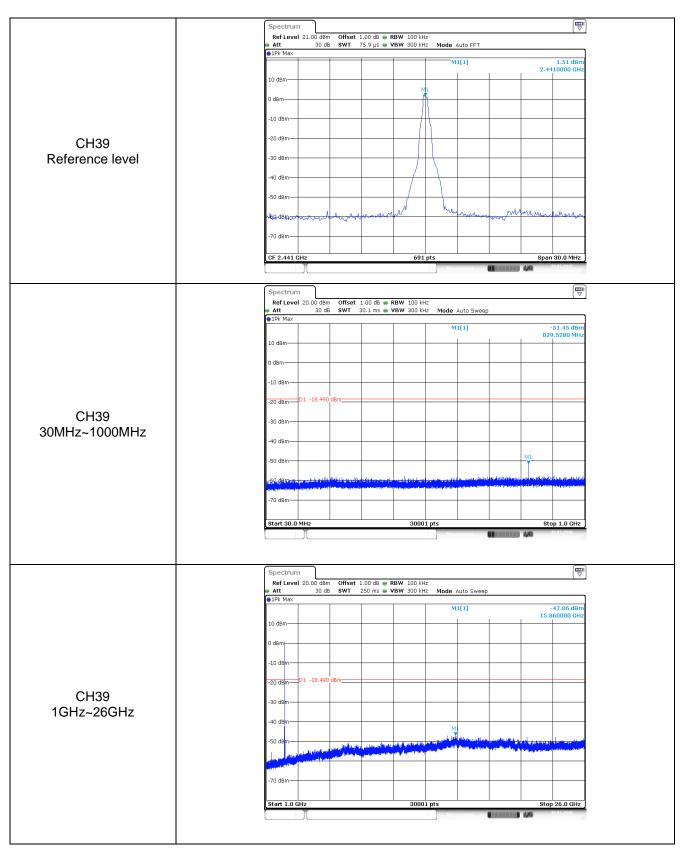
Test Item:	Band edge	Modulation type:	π/4DQPSK
	Spectrum		
		dBm Offset 1.00 dB ● RBW 100 kHz 20 dB SWT 1.1 ms ● VBW 300 kHz Mode Au	to Sweep
	● 1Pk Max	M1[	1] 0.91 dBm
	10 dBm		2.402180 GHz 1] -53.17 dBm
	0 dBm		2.400000 GHz
	-10 dBm		
	-20 dBm-01 -19	.090 dBm	
01100	-30 dBm		
CH00	-40 dBm		
No hopping mode	-50 dBm		Ma
	120-08m2-04		
	-70 dBm		
	Start 2.31 GHz Marker	691 pts	Stop 2.405 GHz
	Type Ref Trc M1 1		n Function Result
	M2 1 M3 1	2.4 GHz -53.17 dBm	
	M4 1 M5 1	2.31 GHz -58.79 dBm	
		Measu	ring 19.03.2018
	(		m
	Spectrum Ref Level 20.00	dBm Offset 1.00 dB 👄 RBW 100 kHz	
		30 dB SWT 1.1 ms • VBW 300 kHz Mode Au	to Sweep
		M1[	
	10 dBm	M2[	2.402320 GHz 1] -57.31 dBm
	0 dBm		2.400000 KHz
	-10 dBm		
		.490 dBm	
01100	-30 dBm		
CH00	-40 dBm		
Hopping mode	-50 dBm 4 1=60-dBm	and the second	
	-70 dBm		
	Start 2.31 GHz Marker	691 pts	Stop 2.405 GHz
	Type Ref Trc M1 1		n Function Result
	M2 1 M3 1	2.4 GHz -57.31 dBm 2.39 GHz -59.32 dBm	
	M4 1 M5 1	2.31 GHz -59.34 dBm	
		Measu	ring 🗰 19.03.2018
			m
	Spectrum Ref Level 20.00	dBm Offset 1.00 dB 🖷 RBW 100 kHz	
	● Att :: ● 1Pk Max	80 dB SWT 56.9 μs 🖷 VBW 300 kHz Mode Au	to FFT
		M1[	1] 3.09 dBm 2.4798310 GHz
	10 dBm 11	M2[	1] -56.34 dBm 2.4835000 GHz
	0 dBm		
	-10 dBm	.910 dBm	
	-20 aBm		
CH78	-30 dBm		
	- <b>4</b> 0 dBm		
No hopping mode	,∕50 dBm	M2 M2	
	-60 dBm	- With marging and a daman the strain of the second	on har from the second
	-70 dBm		
	Start 2.478 GHz	691 pts	Stop 2.5 GHz
	Marker _ Type   Ref   Trc		
	M1 1 M2 1	2.479831 GHz 3.09 dBm	
	M3 1	2.5 GHz -59.36 dBm	
	M4 1	2.4835159 GHz -56.38 dBm	ring 19.03.2018

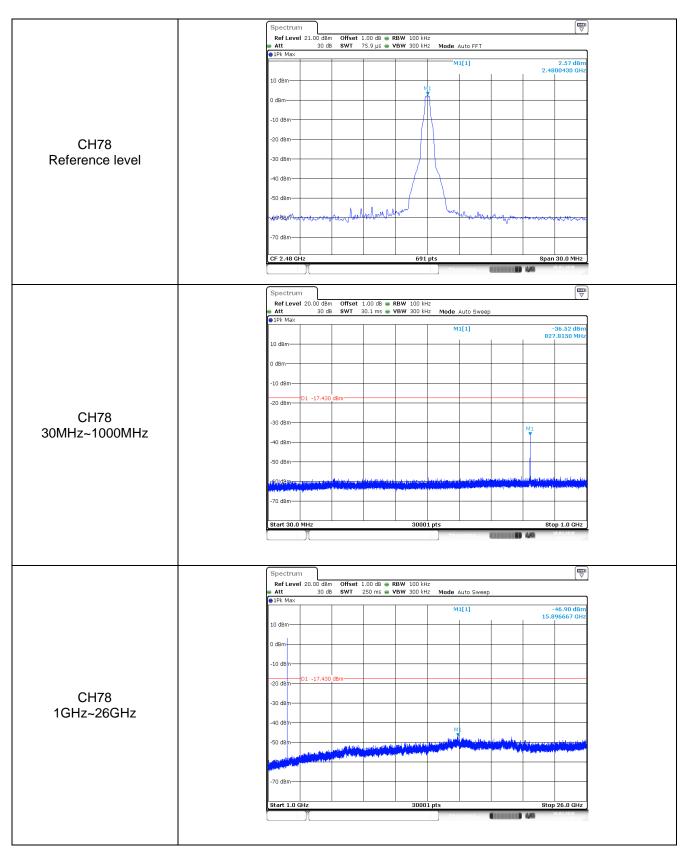
		t 1.00 dB      RBW 100 kHz     S6.9 µs     VBW 300 kHz	Mode Auto FFT	
			M1[1]	2.54 dBm 2.4790030 GHz -59.16 dBm 2.4835000 GHz
	-10 dBm -20 dBm D1 -17.460 dBm			
CH78 Hopping mode	-30 d8m			M4
	-60 dBm	·	www.end	-and the approximation of the second se
	Start 2.478 GHz	691 pt	s	Stop 2.5 GHz
	Marker Type Ref Trc X-va		Function	Function Result
		9003 GHz 2.54 dBm 4835 GHz -59.16 dBm 2.5 GHz -60.66 dBm		
		2.5 GH2 -50.66 dBm 8348 GHz -57.39 dBm		19.03.2018

Test Item:	Band edge		Modula	ation ty	ype:	80	OPSK		
	Spec	Spectrum         Image: Spectrum           Ref Level 20.00 dBm         Offset 1.00 dB ● RBW 100 kHz           Att         30 dB         SWT         1.1 ms         VBW 300 kHz         Mode Auto Sweep							
	Att © 1Pk 10 dB -10 dB	14ax	SWT 1.1 ms •	VBW 300 kHz	Mode Auto Swer		1.04 dBm 2.402180 GHz -53.22 dBm 2.400000 gHz		
CH00 No hopping mode	-20 d£ -30 d£ -40 d£ -50 d8	m	3m				M3 m M		
	Marke Type M	2.31 GHz - - Ref Trc 1	X-value 2.40218 GHz	691 pt 7-value 1.04 dBm	Function		Stop 2.405 GHz		
			2.4 GHz 2.39 GHz 2.31 GHz 2.39963 GHz	-53.22 dBm -59.09 dBm -59.22 dBm -52.00 dBm		<b>(1</b> ) 4	Im		
	Att	evel 20.00 dBm 30 dB 1ax	Offset 1.00 dB • SWT 1.1 ms •		Mode Auto Swe M1[1]	eb			
	10 dB 0 dBm -10 dE <del>-20 d</del> E	m	3m		M2[1]		-58.10 dBm 2.400000 GHP		
CH00 Hopping mode	-30 d£ -40 d£ -50 d£ *950 d£	m h h		and a And a star of a	de mitente de constituent de présidence de la constituent de la constituent de la constituent de la constituent	تەرىكىلامىلار مە	M3 M2		
	Marke Type M	2.31 GHz - Ref Trc 1	X-value 2.40424 GHz	691 pt	Function	Functio	Stop 2.405 GHz		
	M M M M	1	2.4 GHz 2.39 GHz 2.31 GHz 2.326935 GHz	-58.10 dBm -59.03 dBm -58.73 dBm -35.13 dBm		•	19.03.2019		
		30 dB	Offset 1.00 dB ● SWT 56.9 µs ●		Mode Auto FFT				
	10 dB 0 dBm -10 dt	M			M1[1] M2[1]		3.05 dBm 2.4798310 GHz -56.24 dBm 2.4835000 GHz		
CH78 No hopping mode	-20 de -30 de	m D1 -16.950 de	3m						
	,450 de -60 de -70 de	m	Man Maria						
	Marke	Ref         Trc           1         1	X-value 2.479831 GHz 2.4835 GHz 2.5 GHz	691 pt Y-value 3.05 dBm -56.24 dBm -60.02 dBm	Function	Functio	Stop 2.5 GHz		
	M		2.4835159 GHz	-56.82 dBm		4	19.03.2018		

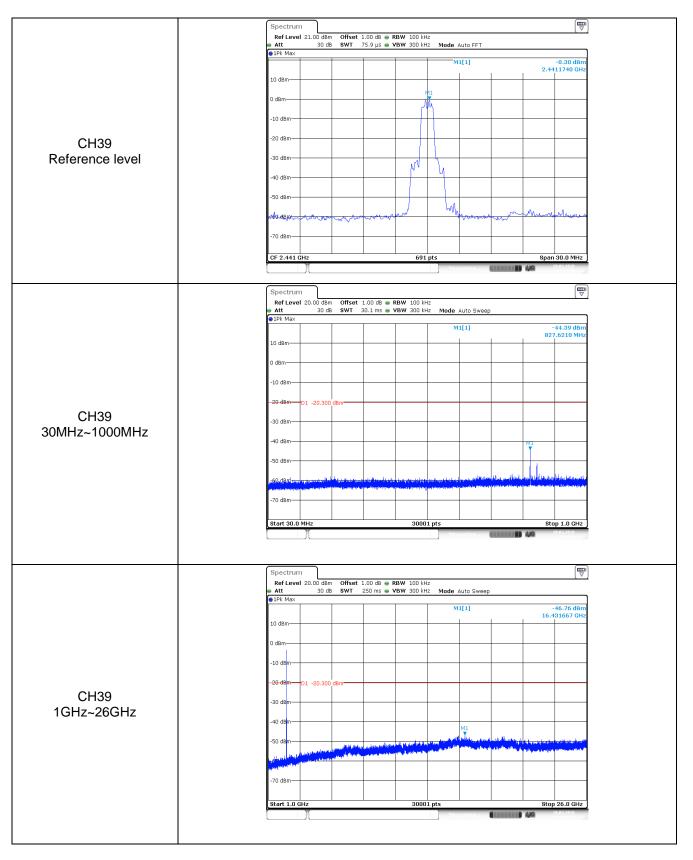
	Spectrum Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 56.	dB ● <b>RBW</b> 100 kHz ) μs ● <b>VBW</b> 300 kHz <b>Mode</b> Auto	FFT
	10 dBm	M1[1] M2[1]	2.4789070 GHz
CH78 Hoppig mode	40 dBm −10 dBm −20 dBm −30 dBm −40 dBm −50 dBm −50 dBm −50 dBm		Net and a second a second a second a second a
	Type         Ref         Trc         X-value           Marker         M1         1         2.478907           M2         1         2.479907           M3         1         2.49927           M4         1         2.499275	GHz -60.30 dBm GHz -60.24 dBm	Stop 2.5 GHz
		Measurin	10.03.2018 11.17.07

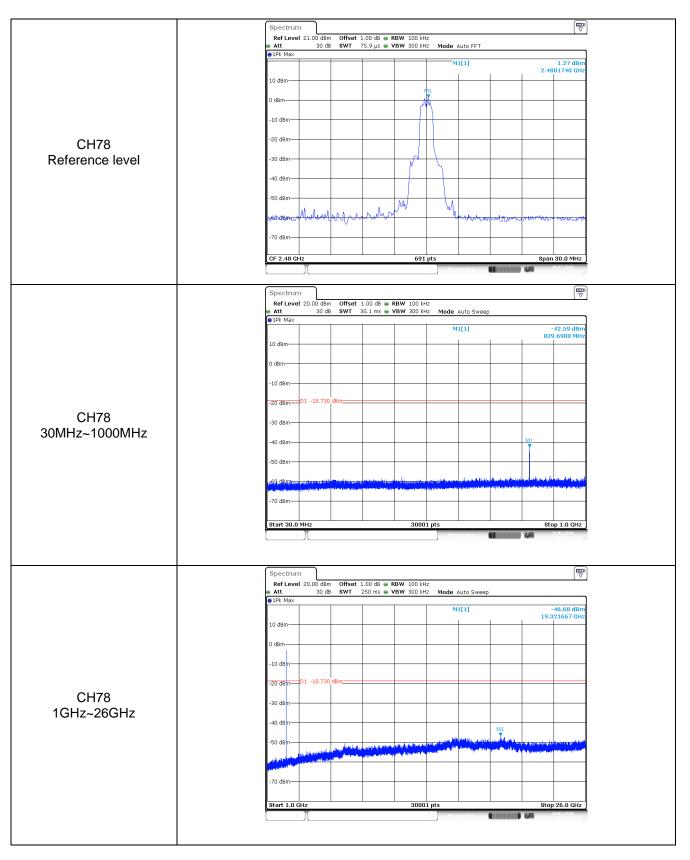
est Item:	SE		Modu	lation	type:		GFS	
		Spectrum	Bm Offset 1.00 dB	- PRW 100 H	17			
		Att 30	dB SWT 75.9 µs	KBW 100 KH VBW 300 kH	12 12 <b>Mode</b> Auto F	FT		
					M1[1]		2	0.45 dBm 4020000 GHz
		10 dBm						
		0 dBm		- M			_	
		-10 dBm		/				
		-20 dBm		$ \downarrow \downarrow$				
CH00		-30 dBm						
Reference level		-40 dBm						
		-50 dBm		weller	hyperten			
		66 dBmmy Mind	Mary round	A solution	~ VICLOUP	to we want	-	Wind the work of the
		-70 dBm						
		CF 2.402 GHz		691	pts			an 30.0 MHz
					Measuring		4/0	10:43:52
								_
		Ref Level 20.00 dB	3m Offset 1.00 dB	RBW 100 kH	+z			
			dB SWT 30.1 ms			Sweep		
					M1[1]	1		-26.94 dBm 27.5240 MHz
		10 dBm						
		0 dBm						
		-10 dBm						
		-20 dBm-D1 -19.55	50 dBm				M1	
CH00		-30 dBm						
30MHz~1000MHz		-40 dBm						
		-50 dBm						
				noti lavo i na stanist a st	and which retilize the state	والغفراران فروران	والمراقع والدوسيا	undum aite de la de l
		-70 dBm		approximation and an	v Automatication (and a finite state of	najani tinga kutot (1935) A	your dece agendig	n per se
		, o dom						
		Start 30.0 MHz		3000	1 pts Measuring			Stop 1.0 GHz
		Spectrum						
		Ref Level 20.00 de	Bm Offset 1.00 dB dB SWT 250 ms			weep		(v
		IPk Max			M1[1]			-43.94 dBm
		10 dBm		_				L.899167 GHz
		0 dBm						
		-10 dBm						
CH00		20 d8mD1 -19.55	ou uBM					
1GHz~26GHz		-30 dBm						
		-491dBm					-	
		-50 dBm	les mul phills by the second stars		A state of the sta	and a straight and a		
			and a second design of the second sector					
		-70 dBm					_	
		Start 1.0 GHz	1 1	3000	1 ptc		~	op 26.0 GHz



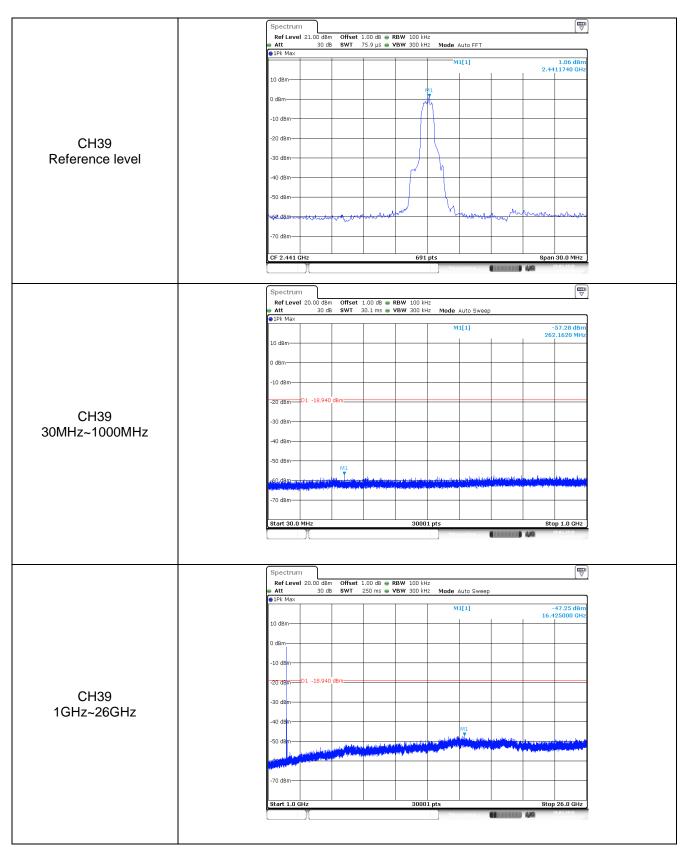


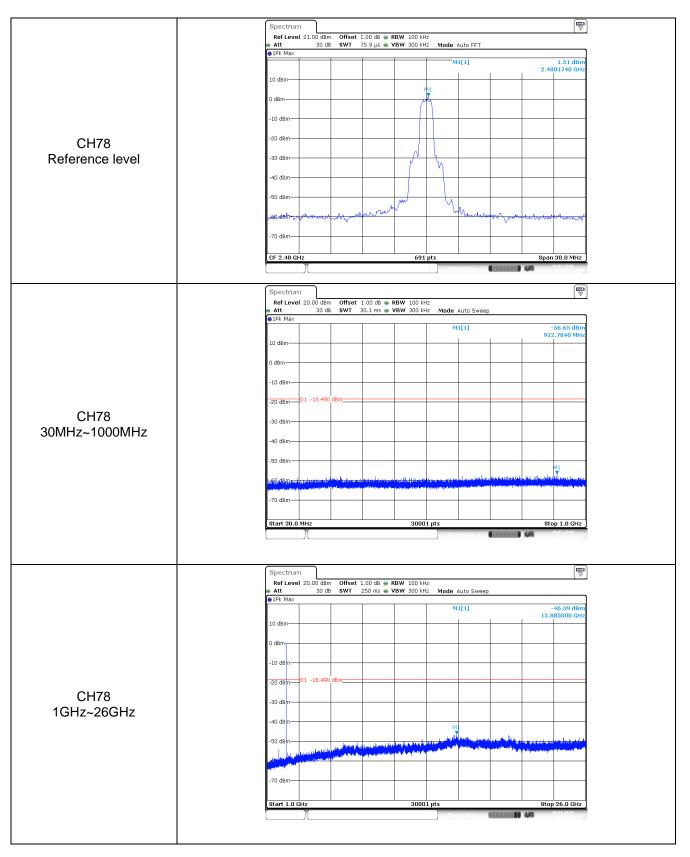
est Item:	SE		Modu	lation t	уре:	T	т/4D0	QPSK
		Spectrum	m Off+ + 00 'r	DBW 1001				
		Att 30	Bm Offset 1.00 dB ∈ dB SWT 75.9 μs €	VBW 300 kHz	Mode Auto FFT			
		IPR Max			M1[1]		2.4	0.16 dBm 021740 GHz
		10 dBm					-	
		0 dBm			1			
		-10 dBm		<u> </u>				
		-20 dBm						
CH00		-30 dBm-						
Reference level				/	Ч –			
		-40 dBm						
		-50 dBm		M	hu.			
		readerantic	www.www.	-vn	- Mu algorit	meren two	howwa	montonto
		-70 dBm						
		CF 2.402 GHz		691 p	its			n 30.0 MHz
					Measuring		4,40	19.03.2018
		Spectrum Ref Level 20.00 dB	3m Offset 1.00 dB (	- PRW 100 ku-				
		Att 30  1Pk Max	dB SWT 30.1 ms (	• VBW 300 kHz	Mode Auto Swee	p		
					M1[1]		82	-44.23 dBm 7.8470 MHz
		10 dBm						
		0 dBm						
		-10 dBm						
		-20 dBm-D1 -19.84	10 dBm	_				
CH00		-30 dBm						
0MHz~1000MHz		-40 dBm						
							Ĭ	
		-50 dBm						
		, <mark>16,0,14,0,0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,</mark>	and a second		n i tona i gana parte a lever de la 1996. A secondario de la constante de			n Marina (Marina) n Marina padataga
		-70 dBm						
		Start 30.0 MHz		30001	pts		St	op 1.0 GHz
					Measuring		4,90	19.03.2018
		Spectrum Ref Level 20.00 df	3m Offset 1.00 dB (					
		Att 30  1Pk Max	dB SWT 250 ms e	VBW 300 kHz	Mode Auto Swee	p		
					M1[1]			-47.29 dBm 818333 GHz
		10 dBm						
		0 dBm		+ +				-
		-10 dem						
			10 dBm					
CH00		-30 dBm		_				
1GHz~26GHz		-40 dBm						
					Ma Antipatrial and a			
		-50 dBm	de la la contra de la deservación de la contra della de la contra de la contra de la contra de la contra de la				linger (der sterfensen) Angeler (der sterfensen) Angeler (der sterfensen)	an an tag an
		-70 dBm						
							01-	
		Start 1.0 GHz		30001	pts			p 26.0 GHz





est Item:	SE		Modu	lation ty	pe:	8	DPS	K
		Spectrum			-			
		👄 Att 30 d	m Offset 1.00 dB е iB SWT 75.9 µs е		Mode Auto FFT			
		●1Pk Max			M1[1]		9.4	0.18 dBm 018260 GHz
		10 dBm					2.4	
		0 dBm		M:				
		-10 dBm		(M				
		-20 dBm						
CH00		-30 dBm-						
Reference level					4			
		-40 dBm						
		-50 dBm		. N	ha.			
		Light dation of the second sec	of which we are a start of the	mu -	- " the start of t	Why have	ሳምረ ለስ <mark>ም</mark> መስ	how
		-70 dBm						
		CF 2.402 GHz		691 pts				n 30.0 MHz
					Measuring		4,70	105718
		Spectrum Ref Level 20.00 dB	m Offset 1.00 dB (	• RBW 100 kHz				
			IB SWT 30.1 ms (		Mode Auto Sweep	p		
					M1[1]		82	-35.13 dBm 9.6900 MHz
		10 dBm						
		0 dBm						
		-10 dBm						
		-20 dBm-D1 -19.82	0 dBm					
CH00		-30 dBm					M1	
30MHz~1000MHz		-40 dBm						
		-50 dBm						
		J-60.d8mmmm.t-mt	alitication of the later live of	while an encoded as		المروية والمعامل	والمتلح والمع	و و التروية المارية
		where the property of the second second second	a paparata a canada papara a sa		a il an airean a sharafa shakat shina	ta ell'aperbéna goo	politic princes	din bing synthesis and
		-70 dBm						
		Start 30.0 MHz		30001 p	S Measuring			op 1.0 GHz
		Spectrum						
		Ref Level 20.00 dB	m Offset 1.00 dB		Modo Auto C			[ 7
		Att 30 c     IPk Max	iB SWT 250 ms (	, YDW JUU KHZ	Mode Auto Sweep M1[1]	J		-47.27 dBm
		10 dBm			wi[1]		16.	-47.27 dBm 247500 GHz
		0 dBm						
		-10 dBm						
CH00		<del>-20 dB</del> m-D1 -19.82	0 dBm					
1GHz~26GHz		-30 dEm						
		-40 dBm		+ +	M1			
		-50 dBm	and the second	and a state of the			nya dina anta da	
					A CONTRACTOR OF	The second se	a alata ana da	and and the second life
		-70 dBm						
		Start 1.0 GHz		30001 p	Measuring			p 26.0 GHz
		1 1 11						





## 5.11. Spurious Emissions (radiated)

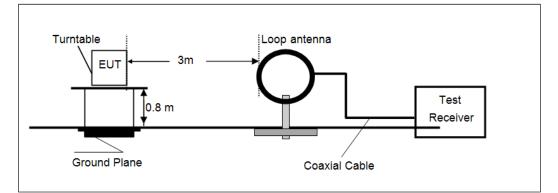
### <u>LIMIT</u>

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

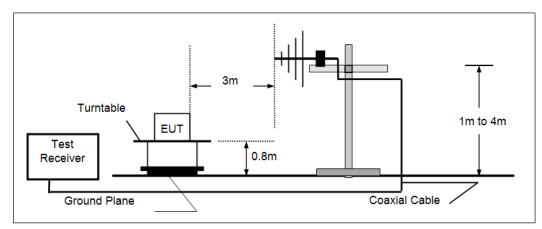
Frequency	Limit (dBuV/m @3m)	Value		
30 MHz ~ 88 MHz	40.00	Quasi-peak		
88 MHz ~ 216 MHz	43.50	Quasi-peak		
216 MHz ~ 960 MHz	46.00	Quasi-peak		
960 MHz ~ 1 GHz	54.00	Quasi-peak		
Above 1 GHz	54.00	Average		
	74.00	Peak		

## **TEST CONFIGURATION**

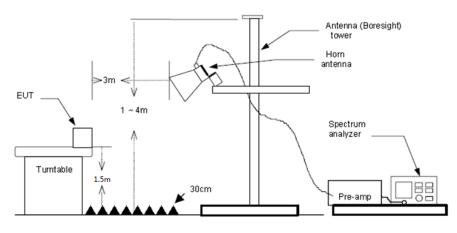
Below 30 MHz



#### > 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

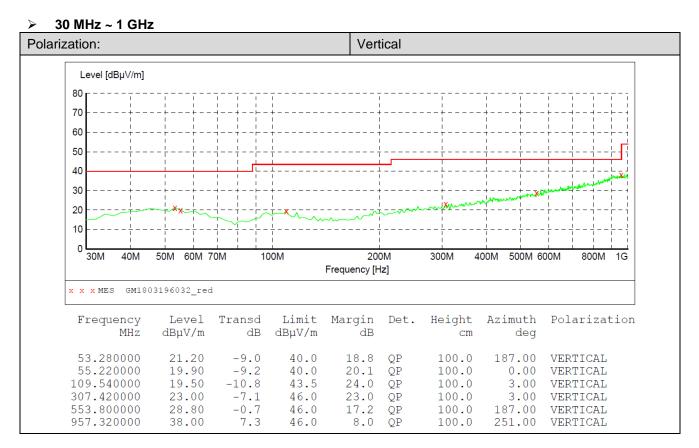
☑ Passed □ Not Applicable

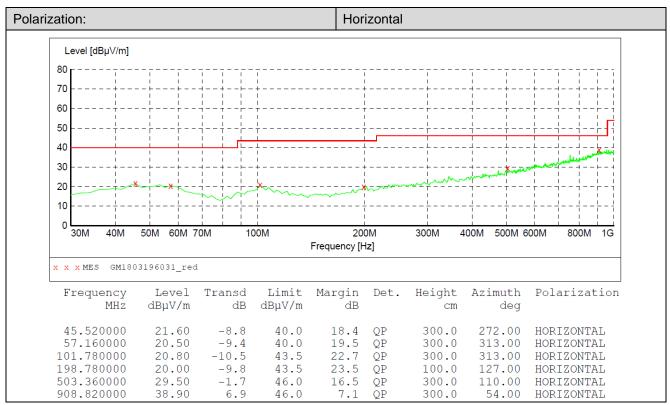
#### Note:

- 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.





#### > 1 GHz ~ 25 GHz

	CH00												
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value				
1257.47	36.95	26.24	4.76	36.54	31.41	74.00	-42.59	Vertical	Peak				
3672.11	34.84	29.30	8.35	38.26	34.23	74.00	-39.77	Vertical	Peak				
6781.78	36.70	34.04	11.58	35.02	47.30	74.00	-26.70	Vertical	Peak				
9587.23	31.44	39.06	13.74	35.17	49.07	74.00	-24.93	Vertical	Peak				
1313.08	34.74	26.16	4.85	36.51	29.24	74.00	-44.76	Horizontal	Peak				
4004.08	32.42	29.71	8.78	38.10	32.81	74.00	-41.19	Horizontal	Peak				
4809.50	34.95	31.58	9.55	36.93	39.15	74.00	-34.85	Horizontal	Peak				
7880.77	30.94	36.59	12.87	34.85	45.55	74.00	-28.45	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				
1141.53	35.82	25.84	4.53	36.60	29.59	74.00	-44.41	Vertical	Peak				
3993.90	32.40	29.70	8.77	38.11	32.76	74.00	-41.24	Vertical	Peak				
5112.49	32.54	31.85	9.76	36.29	37.86	74.00	-36.14	Vertical	Peak				
7566.25	32.72	36.17	12.61	34.95	46.55	74.00	-27.45	Vertical	Peak				
1283.34	35.59	26.22	4.80	36.52	30.09	74.00	-43.91	Horizontal	Peak				
3644.18	32.85	29.30	8.32	38.26	32.21	74.00	-41.79	Horizontal	Peak				
4883.52	42.60	31.43	9.59	36.73	46.89	74.00	-27.11	Horizontal	Peak				
8725.48	31.17	37.85	13.02	34.37	47.67	74.00	-26.33	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
1267.10	35.39	26.23	4.77	36.53	29.86	74.00	-44.14	Vertical	Peak
3057.17	33.37	28.72	7.55	38.22	31.42	74.00	-42.58	Vertical	Peak
4958.68	37.12	31.46	9.64	36.52	41.70	74.00	-32.30	Vertical	Peak
7319.96	31.21	36.30	11.99	34.92	44.58	74.00	-29.42	Vertical	Peak
1326.51	34.91	26.12	4.88	36.50	29.41	74.00	-44.59	Horizontal	Peak
4958.68	33.48	31.46	9.64	36.52	38.06	74.00	-35.94	Horizontal	Peak
5791.65	31.42	32.06	10.58	35.34	38.72	74.00	-35.28	Horizontal	Peak
8593.22	32.53	37.27	12.89	34.51	48.18	74.00	-25.82	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 OF THE EUT

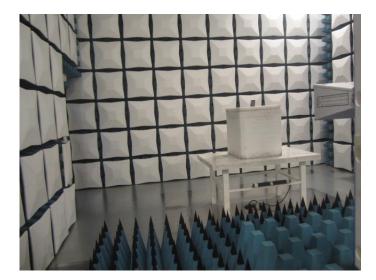
## Conducted Emissions (AC Mains)



Radiated Emissions







## 7. EXTERANAL AND INTERNAL PHOTOS OF THE EUT

Reference to the test report No.: TRE1803009301.

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