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TEST REPORT							
Report Reference No	<b>TRE1801023804</b> R/C: 50309						
FCC ID:	ZSW-30-063						
Applicant's name:	b mobile HK Limited						
Address:	Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.						
Manufacturer	b mobile HK Limited						
Address	Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak Street; Kwai Chung; New Territories; Hong Kong.						
Test item description:	Mobile Phone						
Trade Mark	Bmobile						
Model/Type reference:	AX925						
Listed Model(s)	-						
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247						
Date of receipt of test sample	Jan.31,2018						
Date of testing	Feb.01-Mar.06,2018						
Date of issue	Mar.07,2018						
Result:	PASS						
Compiled by ( position+printedname+signature):	File administrators Candy Liu						
Supervised by (position+printedname+signature):	Project Engineer Edward Pan 3dward Pan						
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu						
Testing Laboratory Name: :	Shenzhen Huatongwei International Inspection Co., Ltd.						
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China						
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The test report merely correspond to the test sample.

# Contents

<u>1.</u>	TEST STANDARDS AND REPORT VERSION	3
1.1.	Test Standards	3
1.2.	Report version	3
<u>2.</u>	TEST DESCRIPTION	4
<u>3.</u>	SUMMARY	5
3.1.	Client Information	5
3.2.	Product Description	5
3.3.	Operation state	6
3.4.	EUT configuration	6
3.5.	Modifications	6
<u>4.</u>	TEST ENVIRONMENT	7
4.1.	Address of the test laboratory	7
4.2.	Test Facility	7
4.3.	Environmental conditions	8
4.4.	Statement of the measurement uncertainty	8
4.5.	Equipments Used during the Test	9
<u>5.</u>	TEST CONDITIONS AND RESULTS	11
5.1.	Antenna requirement	11
5.2.	Conducted Emissions (AC Main)	12
5.3.	Conducted Peak Output Power	15
5.4.	20 dB Bandwidth	19
5.5.	Carrier Frequencies Separation	23
5.6.	Hopping Channel Number	25
5.7.	Dwell Time	27
5.8.	Pseudorandom Frequency Hopping Sequence	34
5.9. 5.10.	Restricted band (radiated) Band edge and Spurious Emissions (conducted)	35
5.10. 5.11.	Spurious Emissions (radiated)	38 54
<u>6.</u>	TEST SETUP PHOTOS	58
7.	EXTERANAL AND INTERNAL PHOTOS	59
		00

# 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	Mar.07,2018	Original

# 2. TEST DESCRIPTION

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

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 Stre 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.:	AX925	
Listed Model(s):	-	
IMEI:	Conducted: 356038070002605 Radiated: 356038070001722	
Power supply:	DC 3.8V	
Adapter information:	Input:100-240Va.c.,50/60Hz,0.2A Output: 5Vd.c.,1000mA	
Hardware version:	ZH193-MB-V0.1	
Software version:	SW01	
Bluetooth		
Version:	Supported BT4.0+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	Integral Antenna	
Antenna gain:	0.5dBi	

# 3.3. Operation state

## Test frequency list

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

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

## > <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

<u> </u>			
	1	Manufacturer:	/
	7	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

Conduc	Conducted Emissions							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)		
1	EMI Test Receiver	R&S	ESCI	101247	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		
			•					
Radiate	d Emissions							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)		

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.

# <u>Test Result:</u>

# ☑ Passed □ Not Applicable

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



# 5.2. Conducted Emissions (AC Main)

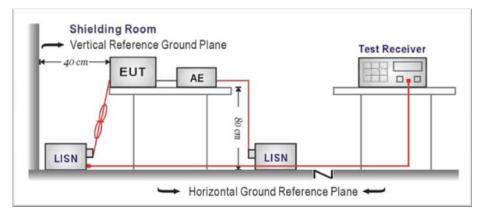
# <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (d	BuV)
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

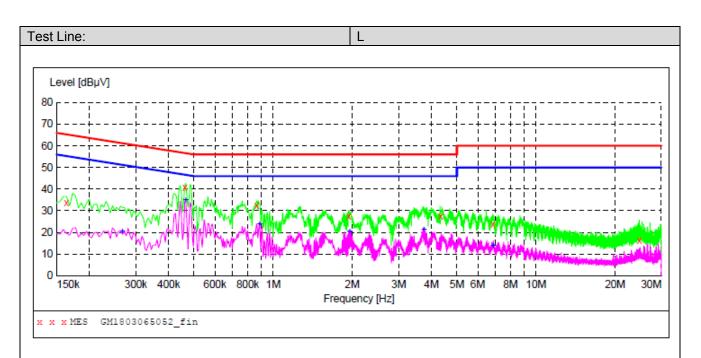
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

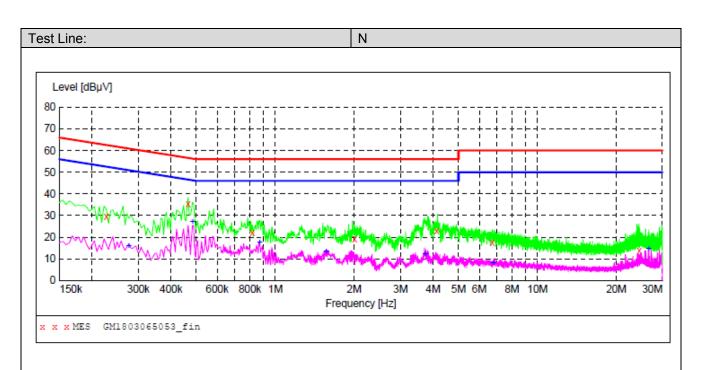


#### MEASUREMENT RESULT: "GM1803065052\_fin"

3/6/2018 5:28PM Frequency Level Transd Limit Margin Detector Line PE MHz dBµV dB dBµV dB 0.163500 33.70 10.0 65 31.6 QP L1 GND 16.0 QP L1 0.460500 40.70 10.0 9.9 57 GND 0.865500 32.40 56 23.6 QP L1 GND 10.1 28.4 QP 28.6 QP 1.936500 27.60 56 GND ь1 4.335000 27.40 10.2 56 г1 GND 10.2 10.8 10.2 36.3 QP 23.70 6.841500 60 L1GND 43.6 QP 24.729000 16.40 60 ь1 GND

#### MEASUREMENT RESULT: "GM1803065052 fin2"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.267000	20.50	9.9	51	30.7	AV	L1	GND
0.465000	35.10	9.9	47	11.5	AV	ь1	GND
0.888000	23.90	10.0	46	22.1	AV	L1	GND
1.954500	20.30	10.1	46	25.7	AV	L1	GND
3.750000	21.10	10.1	46	24.9	AV	L1	GND
6.859500	13.70	10.2	50	36.3	AV	L1	GND



#### MEASUREMENT RESULT: "GM1803065053\_fin"

3/6/2018 5:32PM Frequency Level Transd Limit Margin Detector Line PE MHz dBµV dB dBµV dB 0.226500 29.40 9.9 63 33.2 QP GND Ν 0.465000 35.30 9.9 57 21.3 QP Ν GND 0.816000 22.00 10.0 56 34.0 QP GND N 10.1 10.1 10.2 10.8 2.008500 19.40 56 36.6 QP N GND 4.123500 23.00 56 33.0 QP N GND 42.4 QP 46.0 QP 6.720000 17.60 60 Ν GND 24.454500 14.00 60 Ν GND

#### MEASUREMENT RESULT: "GM1803065053 fin2"

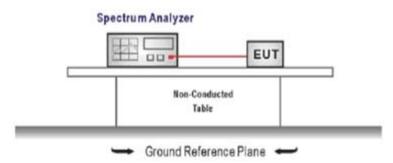
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.276000	16.00	9.9	51	34.9	AV	N	GND
0.483000	27.00	9.9	46	19.3	AV	N	GND
0.870000	17.40	10.0	46	28.6	AV	N	GND
1.563000	13.20	10.1	46	32.8	AV	N	GND
3.732000	12.30	10.1	46	33.7	AV	N	GND
6.783000	8.00	10.2	50	42.0	AV	N	GND
26.610000	14.60	10.8	50	35.4	AV	Ν	GND

## 5.3. Conducted Peak Output Power

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

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 nonoverlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW≥ the 20 dB bandwidth of the emission being measured, VBW≥RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

## TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	2.15		
GFSK	39	1.91	≤ 30.00	Pass
	78	2.24		
	00	1.94		
π/4DQPSK	39	1.74	≤ 21.00	Pass
	78	2.06		
	00	1.99		
8DPSK	39	1.83	≤ 21.00	Pass
	78	2.16		

Modulation Type:	GFSK
	Spectrum
	Ref Lovel         20.00 dBm         Offset         1.00 dB         RBW         1 MHz                • Att             30 dB               SWT               1 ms              • VBW 3 MHz               Mode             Auto Sweep
	PIPk View     M1[1]     2.15 dBm
	10 dBm
	0 d0m
	-10 dBm
	-20 dBm
CH00	
	-30 dem
	-40 (Refi
	-50 dbm
	-60 dBm
	-70 dBm
	05.0 400 044 000 000 000 000 000 000 000 0
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Spectrum 🕎
	Speed of in         Image: Speed
	ATT 30 05 SW1 1 m5 VBW 3 MH2 MODE AUTO SWEEP     OTPk View     M1[1] 1.91 dBm
	10 dBm
	O dBm
	-10 dBm
01120	-20 dBm
CH39	-30 d8m
	-40 gam
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB ⊕ RBW 1 MHz
	e Att 30 dB SWT 1 ms ee VBW 3 MHz Mode Auto Sweep ●1Pk View
	10 d8m
	0 d0m
	-10 dBm
	-20 dBm
CH78	-30 dBm
	-40 g8tm
	-50 dbm
	-60 d8m
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz
	Networkson (Children) 44

Modulation Type:	π/4DQPSK
	Spectrum 🕎
	Ref Level         20.00 dBm         Offset         1.00 dB         ⊕ RBW         2 MHz           ⊕ Att         30 dB         SWT         1 ms ⊕         VBW         5 MHz         Mode         Auto Sweep
	(0.19k View     [1]     [1.94 dBm]
	10 dBm
	o dBm
	-10.dem
	-20 dBm
CH00	
	-30 dem-
	-40 dBm-
	-50 dbm
	-60 dBm-
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Mesuring
	Spectrum T
	Ref Level         20.00 dBm         Offset         1.00 dB         @ RBW         2 MHz           Att         30 dB         SWT         1 ms         O WBW         5 MHz         Mode         Auto Sweep
	Pik View     M1[1]     1.74 dBm
	10 d8m
	0 dbm
	-10 dam
	-20 dBm
CH39	-30 dem-
	-40 dBm
	-50 dBm
	-60 dam-
	-70 dbm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Spectrum         Imp           Ref Lovel 20.00 dBm         Offset 1.00 dB ⊕ RBW 2 MHz
	Att 30 dB SWT 1 ms      VBW 5 MHz Mode Auto Sweep     O1Pk View
	M1[1] 2.06 dBm 2.48009410 GHz
	10 d8m
	0 dBm
	-10 dem
	-20 dBm
CH78	-30 dam
	-40 dBm
	-50 d8m
	+60 dBm-
	-70 dbm
	CF 2.48 GHz 691 pts Span 5.0 MHz

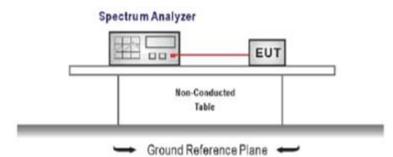
Modulation Type:	8DPSK
	Spectrum IIII
	Ref Lovel 20.00 dBm Offset 1.00 dB ⊕ RBW 2 MH₂ ■ Att 30 dB 8WT 1 ms ⊕ VBW 5 MH₂ Mode Auto Sweep
	● 1Pk View M1[1] 1.99 dBm
	10 dBm
	Mg.
	0 dbm
	-10.dem
	-20 dBm-
CH00	-30 dam-
	-40 dBm-
	-50 d8m
	-60 d8m-
	-70 d8m
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Spectrum         Image: Constraint of the second seco
	what 20.00 dam Ontwist 1.00 da w KHW 2 min2 w Att 30 dB SWT 1 mis ⊕ VBW 5 Mi42 Mode Auto Sweep ● 1Pk View
	M1[1] 1.83 dBm 2.44099200 GHz
	10 dBm
	0 dBm
	-10 dem
	-20 d8m
CH39	-30 d8m
	-40 dBm-
	-50 d8m
	-60 dem
	-70 d8m
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Newsering And
	Spectrum 🕎
	Ref Level         20.00 dBm         Offset         1.00 dB         RBW         2 MHz <ul></ul>
	PIk View     M1[1] 2.16 dBm
	10 dBm 2,49001450 GHz
	0 dBm
	-10,dam
CH78	-20 dBm-
	-30 d8m-
	-40 dBm-
	-50 d8m
	-60 d8m-
	-70 d8m
	CF 2.48 GHz 691 pts Span 5.0 MHz

# 5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

## **TEST CONFIGURATION**



## TEST PROCEDURE

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

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

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

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

#### TEST MODE:

Please refer to the clause 3.3

## TEST RESULTS

#### ☑ Passed □ Not Applicable

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

Modulation Type:	GFSK
	Spectrum
	Att 30 dB SWT 189.5 ⊭ SW WBW 30 kH₂ Mode Auto FFT      PIPk View
	0 dBm - 2.40205750 GHz
СН00	-40 dbm
	-50 dbm
	CF 2.402 GHz         1001 pts         Span 2.5 MHz           Marker         Type Ref         Trc         X-value         Function         Function Result           M1         1         2.4015475 GHz         -24.22 dBm         Function         Function Result
	M2         1         2-442.5 dbm           D3         M1         1         927.5 kHz         -0.46 db
	Spectrum         Image: Constraint of the section of the sectio
	• 1% view         M1[1]         -24.38 dam           10 d8m
	-10 dBm
CH39	-30 dBm
	-50 dBm
	CF 2.441 GHz         1001 pts         Span 2.5 MHz           Marker         Type         Ref         Trc         X-value         Function         Function Result           M1         1         2.4405475 GHz         -24.38 dBm         Function         Function           M2         1         2.4410575 GHz         -30.1 dBm         Function         Function
	D3 M1 1 927.5 kHz -0.66 d8
	Spectrum         Image: spectrum           Ref Lovel 20.00 dBm         Offset 1.00 dB @ RBW 10 kHz           Att         30 dB           SWT         189.6 µs @ VBW 30 kHz           Mode Auto FFT           Strik View
	10 dBm         M1[1]         -23.79 dbm           10 dBm         2.47954750 GHz         -3.07 dbm           0 dBm         M2[1]         -3.07 dbm           0 dBm         M2         2.48005750 GHz
	-10 dBm -20 dBm -30 dBm -30 dBm
CH78	-40 dBm
	.60 (38m)
	Marker         You pes         Applies         Applies <thapplies< th=""> <thapplies< th=""> <thap< td=""></thap<></thapplies<></thapplies<>

lodulation Type:	π/4DQPSK
	Spectrum III
	Ref Level 20.00 dBm Offset 1.00 dB  RBW 30 kHz
	Att 30 dB SWT 63.1 µs      WBW 100 kH₂ Mode Auto FFT     PPk View
	M1[1] -22.32 dBm 2.40136750 GHz
	10 d8m M2[1] -1.07 d0m M2 2.40216500 GHz
	-10 dBm
	-20 dBm 01 -21.873 dBm
	-30 dBm
CH00	-so dem
	-50 d8m
	-60 dBm
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker           Type         Ref         Trc         X-value         Y-value         Function         Function Result
	M1 1 2.4013675 GHz -22.32 d8m M2 1 2.402165 GHz -1.07 d8m
	D3 M1 1 1.2875 MHz 0.15 dB
	Messeries (ELERED) 4/2
	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
	10 dBm
	ma(1) -2.10 00m
	-10 dBm
	-20 dBm 01 -22.156 dBm 2
	-30 d8m
CH39	-40 dBm
	-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         2.4403675 GHz         -22.65 dBm
	M2         1         2.44030 s cm2         -22.03 cm           M2         1         2.441165 GHz         -2.16 dbm           D3         M1         1         1.2875 MHz         0.11 dB
	Spectrum
	Ref Level         20.00 dBm         Offset         1.00 dB         RBW         30 kHz           Att         30 dB         SWT         63.1 µs         VBW         100 kHz         Mode         Auto FFT
	●1% View M1[1] -22.52 dBm
	10 d8m 2.47936750 GHz
	0 d8m M2 2.48016500 CHz
	-10 dBm
CH79	-30 dBm
CH78	-40 dbm
	Ve0'dem
	-60 dBm
	-70 dBm
	CF 2.40 GHz 1001 pts Span 2.5 MHz
	Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4793675 GHz         -22.52 dbm         Function         Function Result
	M2 1 2.480165 GHz -1.93 dBm
	M2         1         2.460105 GHz         -1.93 00m           D3         M1         1         1.2875 MHz         0.17 dB

Modulation Type:	8DPSK
	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 PIPk View
	M1[1] -21.28 d8m 2 40135750 GHz
	10 dBm M2[1] -1.22 dBm M2 2.40216250 GHz
	-10 dBm
	-211dBm 01 -21.224 dBm
CU 100	-30 dBm
CH00	
	-50 dam
	-60 d8m
	-70 dBm-
	CF 2.402 GHz 1001 pts Span 2.5 MHz Marker
	Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4013575 GHz         -21.28 dBm         <
	M2         1         2.4021625 GHz         -1.22 dBm           D3         M1         1         1.28 MHz         -0.01 dB
	Manager (Carrier Add
	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
	10 dBm M1[1]2.44035750 GHz
	10 dBm M2[1] -1.49 dBm M2[1] 2.44116250 GHz
	-10 dBm
	-20 dam 01 -21.493 dam
	-30 dBm
CH39	-40 dBm
	-50 diem
	-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         2.4403575 GHz         -21.74 dBm           M2         1         2.441625 GHz         -1.49 dBm
	D3 M1 1 1.28 MHz 0.09 dB
	Spectrum T
	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] -21.79 dBm
	10 dBm M2[1] - 1.27 dbm
	0 d8m
	-10 dBm
	-20. dBm 01 -21.270 dBm 2
	-30 dBm-
CH78	-40 dBm
	-50 dam
	-60 dBm
	-70 dBm
	CF 2.40 GHz 1001 pts Span 2.5 MHz
	Marker         Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.4/92575 GHz         ~21.79 dBm
	M1         1         2.4793575 GHz         ~21.79 dBm           M2         1         2.4601625 GHz         ~1.27 dBm           D3         M1         1         1.28 MHz         0.30 dB

# 5.5. Carrier Frequencies Separation

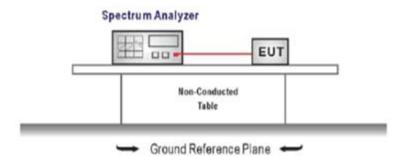
## <u>LIMIT</u>

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

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

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

## **TEST CONFIGURATION**



## 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

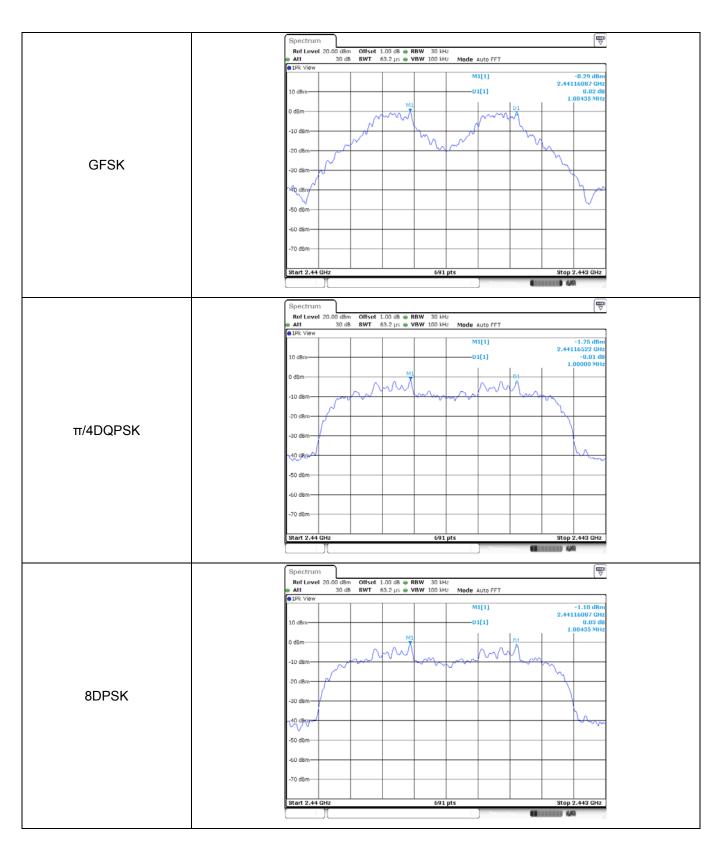
## TEST RESULTS

## ☑ Passed □ Not Applicable

Modulation type	GFSK 39 4DQPSK 39	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	≥0.86	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

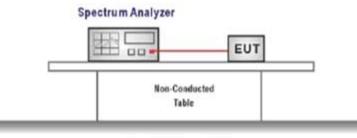


## 5.6. Hopping Channel Number

## <u>LIMIT</u>

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

## **TEST CONFIGURATION**



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 = the frequency band of operation RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

## TEST MODE:

Please refer to the clause 3.3

## TEST RESULTS

☑ Passed □ Not Applicable

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

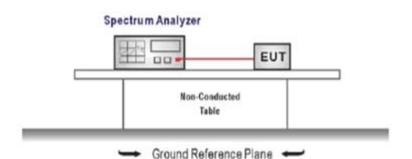
	Spectrum T
	Ref Lovel         20.00 dBm         Offset         1.00 dB         @ RBW         100 kHz           # Att         30 dB         SWT         1 ms         VBW         300 kHz         Mode         Auto Sweep
	IPk View
	10 dBm
	08560187844444444444444444444444444444444444
	-10 cm/2
	-20 dBm
GFSK	-30 dam
	-40 dBm
	/50 dBm
	-60 dam-
	-70 dbm
	Start 2.4 GHz         691 pts         Stop 2,4835 GHz
	Spectrum T
	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-
	. saana maana m
	-10 dam-
	-20 dBm-
π/4DQPSK	-90 diam
	-40 dBm
	-50 dbm
	-60 dam-
	-70 dBm
	Start 2.4 GHz         691 pts         Stop 2.4835 GHz
	Spectrum T
	Ref Level 20.00 dBm         Offset 1.00 dB         RBW 100 kH₂           Att         30 dB         SWT         1 ms         VBW 300 kH₂         Mode Auto Sweep
	IPk View
	10 dBm
	. See white many many many many many many many many
	-10 dam
	-20 dBm
8DPSK	-Bo dam
	40 dBm
	-50 d8m
	-60 dam-
	-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:

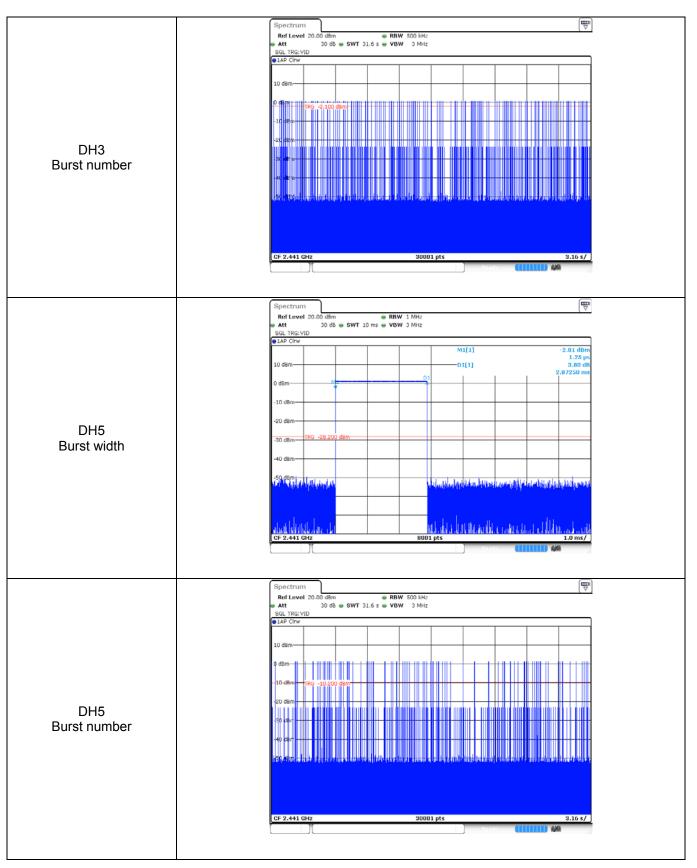
Please refer to the clause 3.3

#### TEST RESULTS

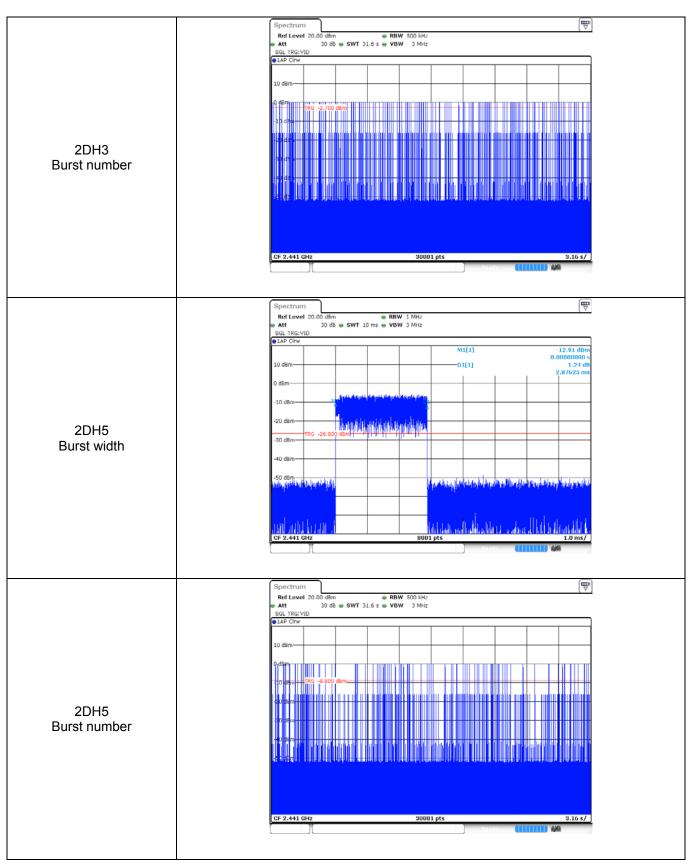
## ☑ Passed □ Not Applicable

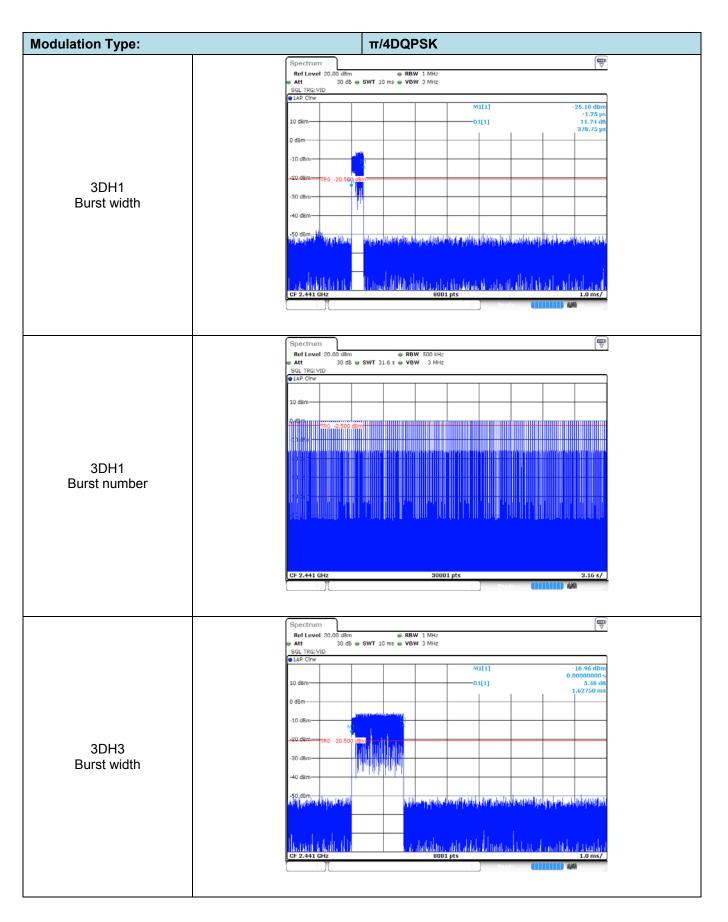
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result	
	DH1	0.37	315.00	0.12		Pass	
GFSK	DH3	1.63	160.00	0.26	≤ 0.40		
	DH5	2.87	95.00	0.27			
	2DH1		315.00	0.12			
π/4DQPSK	2DH3	1.63	160.00	0.26	≤ 0.40	Pass	
	2DH5		102.00	0.29			
	3DH1	0.38	314.00	0.12			
8DPSK	DPSK 3DH3 1.63		159.00	0.26	≤ 0.40	Pass	
	3DH5	2.88	106.00	0.31	Ĩ		

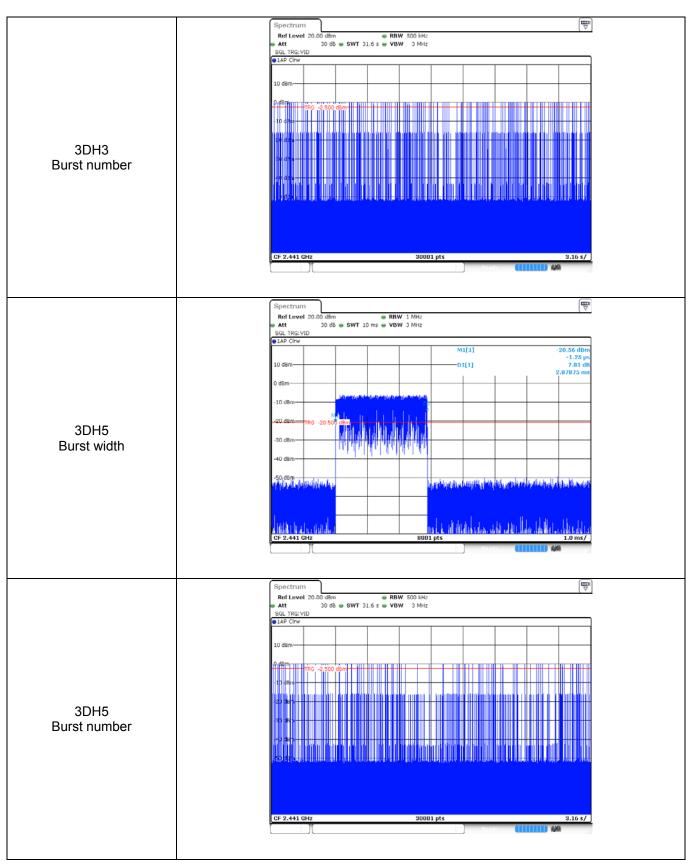
Modulation Type:	GFSK
DH1 Burst width	GFSK           Ref Level 20.00 dbm         RBW 1 MHz           Att         30 db = SWT 10 ms = YBW 3 MHz         SGL TRG: VID
DH1 Burst number	Spectrum     Refueel 20.00 dbm     BWW 500 kHz     Mt     Difference     Difference     Attraction     Difference     Difference     Attraction     Difference
DH3 Burst width	CF 2.441 CHz       30001 pts       3.16 s/         Spectrum       CC         Ref Lovel 20.00 dbm       9 RBW 1 MHz         SGL TRS://DB       30 db = SWT 10 ms + VDW 3 MHz         SGL TRS://DB       0 dbm         0 dbm       0 111         -10 dbm       -1.48 dbm         -30 dbm       -10 dbm         -30 dbm       -10 dbm         -10 dbm       -10 ms/



Modulation Type:	π/4DQPSK
2DH1 Burst width	Spectrum
2DH1 Burst number	Spectrum       Image: BRW 500 kHz         * Att       30 0 # SWT 31.6 s * VBW         SGL, TG: VLD       Image: Att in the second
2DH3 Burst width	Spectrum         Image: Spectrum <thimage: spectrum<="" th="">         Image: Spectrum         Image: Spectrum</thimage:>







# 5.8. Pseudorandom Frequency Hopping Sequence

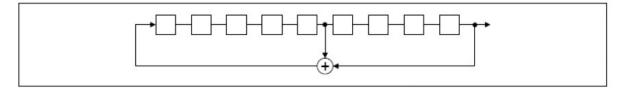
### LIMIT

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

#### TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 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,forexample:the shift register is initialized with nine ones.

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0	2	4	6	62	64		78	1	 73	75 7	7
				 Γ					 		_
				1							
					LE	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.

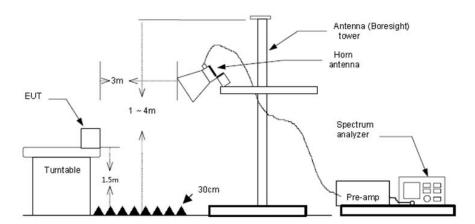
## 5.9. Restricted band (radiated)

#### <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:

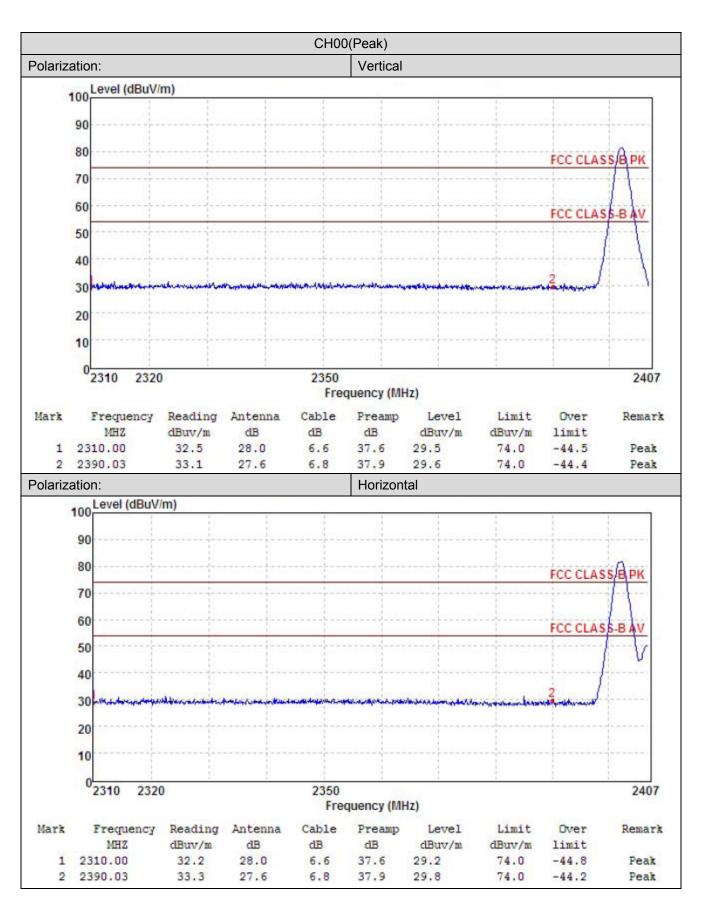
Please refer to the clause 3.3

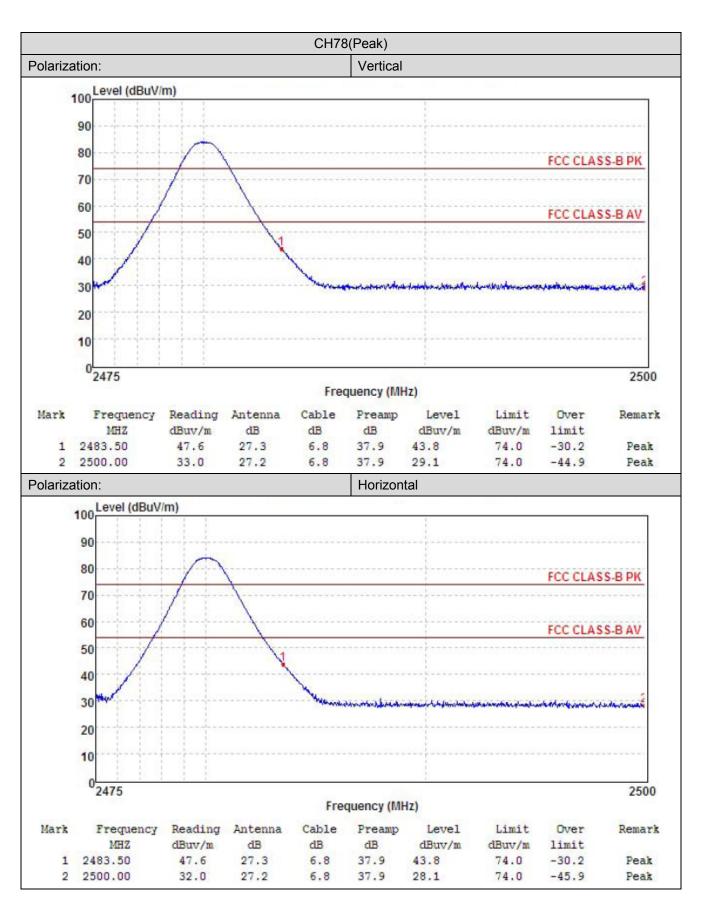
#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Note:

- 1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
- 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.



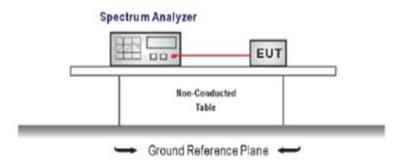


# 5.10. Band edge and Spurious Emissions (conducted)

## <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

Test Item:	Band edge		Modul	ation ty	pe:	GFSP	(	
		Spectrum Ref Level 20.00 dBm	Offset 1.00 dB 🖷					
		Att 30 dB	SWT 1.1 ms	VBW 300 kHz	Mode Auto Sweep			
		10 dBm-			M1[1]	2.	1.58 dBm 402180 GHz	
		0 dBm			M2[1]	2.	-55.89 dBm 400000 dHz	
		-10 dBm					<u>+                                    </u>	
		-20 dBm D1 -18.420 dBn	n					
01100		-30 dBm						
CH00		-40 dBm -50 dBm						
No hopping mode		too deminant				M3	ALL	
		-70 dBm						
		Start 2.31 GHz		691 pt	s	Stop	2.405 GHz	
		Marker Type Ref Trc M1 1	2.40218 GHz	Y-value 1.58 dBm	Function	Function Resu	lt	
		M2 1 M3 1	2.4 GHz 2.39 GHz	-55.89 dBm -58.26 dBm				
		M4 1 M5 1	2.31 GHz 2.399906 GHz	-59.70 dBm -56.48 dBm				
					Measurio	(11111) A		
		Spectrum						
		Att 30 dB 4	Offset 1.00 dB 🖷 SWT 1.1 ms 🖷		Mode Auto Sweep			
		• 1Pk Max			M1[1]		1.85 dBm	
		10 dBm		+	M2[1]		402100 GHz -59.00 ởBm 100000 được	
		0 d8m				2.	400000 <b>C</b> H2	
		-20 dBm 01 -10.150 dBm	n					
		-30 dBm						
CH00		-40 dBm						
Hopping mode		-50 dBm				M3	ME	
		-70 dBm						
		Start 2.31 GHz		691 pt		Ston	2.405 GHz	
		Marker	X-value	Y-value	Function	Function Resu		
		M1 1 M2 1	2.40218 GHz 2.4 GHz	1.85 dBm -59.00 dBm				
		M3 1 M4 1 M5 1	2.39 GHz 2.31 GHz 2.32487 GHz	-57.84 dBm -59.22 dBm -56.93 dBm				
					Measurin	(11111) A		
		Spectrum						
		Ref Level 20.00 dBm		RBW 100 kHz VBW 300 kHz	Mode Auto FFT		( *	
		e1Pk Max			M1[1]		1.96 dBm	
		10 d8m			M2[1]		801490 GHz -58.64 dBm	
		0 dBm		+ +		2.4	835000 GHz	
		-10 dBm D1 -18.040 dBn						
		-20 dBm 01 -18.040 dBm						
CH78		-40 gBm					<u>                                      </u>	
No hopping mode		-50'd8m	140		M4		<u> </u>	
		-60 dBm	M2		-met	anna		
		-70 dBm		+ +			+	
		Start 2.478 GHz		691 pts	5	st	op 2.5 GHz	
		Marker Type Ref Trc M1 1	2.480149 GHz	Y-value 1.96 dBm	Function	Function Resu	<u>t</u>	
		M2 1 M3 1	2.4835 GHz 2.5 GHz	-58.64 dBm -59.52 dBm				
			2.4915826 GHz	-57.30 dBm	Monorio	6	10	

# Report No.: TRE1801023804

		RBW 100 kHz     VBW 300 kHz     Mode Auto FF1	(₩ ∇
	1Pk Max     10 dBm	M1[1]	1.76 dBm 2.4600540 GHz -60.13 dBm 2.4835000 GHz
	10 dBm -20 dBm 01 -19.240 dBm		
CH78 lopping mode	-30 dBm		M4
	-70 dBm	al la da se al filma da se al de se al	, and a market and a second
	Start 2.478 GHz Marker	691 pts	Stop 2.5 GHz
	Type         Ref         Trc         X-value           M1         1         2.480054 GHz         GHz           M2         1         2.4835 GHz         GHz	Y-value Function 1.76 dBm -60.13 dBm	Function Result
	M2         1         2.4835 GHz           M3         1         2.5 GHz           M4         1         2.4948029 GHz	-60.13 dBm -60.10 dBm -57.39 dBm	
			44

Test Item:	Band edge		Modu	ation	type:	π	/4DQPSP
	Spec	trum					(III)
	Ref Att		Offset 1.00 dB SWT 1.1 ms	RBW 100 kH VBW 300 kH	łz łz Mode Auto Swe	eep	
	e 1Pk	Max			M1[1]		0.78 dBr
	10 dB	n		_			2.402180 GH
	0 dBm				M2[1]		-52.80 dBr 2.400000 dH
	-10 d	m		_			
	-20 dž	m-01 -19.220 d8	m	_			
	-30 dž	m					
CH00	-40 dt						N Y
No hopping mode	-50 dž						ME
No hopping mode	+ **6**8		uman		miles are and a creek	manue	M3
	-70 d8						
	Start	2.31 GHz r		691	pts		Stop 2.405 GHz
	Type	Ref Trc 1	2.40218 GHz	Y-value 0.78 d8	Function	Functi	on Result
	M	2 1	2.4 GHz 2.39 GHz	-52.80 de	3m		
	M	1	2.31 GHz 2.399906 GHz	-58.79 dt -52.86 dt	3m		
			Stassson and	02100 02	Mea		44
		trum Level 20.00 dBm	Offset 1.00 dB	RBW 100 kH	la la		
	👄 Att	30 dB		VBW 300 kH		eep	
	• 1Pk	Max			M1[1]		-0.01 dBr
	10 dB	n		_	M2[1]		2.402040 GH -55.88 dBr
	0 dBm				<u> </u>	1 1	2.400000 CH
	-10 dB	m				++	
	-20 df	m D1 -20.010 d8	m				
	-30 d8	m					
CH00	-40 di	m					
Hopping mode	-50 da	m		_			NO MY
	- <del></del>	ferrier and an and a star	an kana na kana			********	M3
	-70 d8	m		_			
	Start	2.31 GHz		691	pts		Stop 2.405 GHz
	Marke	r .					
	M		X-value 2.40204 GHz	Y-value -0.01 dB	Function	Functi	on Result
	M	3 1	2.4 GHz 2.39 GHz	-55.88 dE -59.25 dE	3m		
	M		2.31 GHz 2.399906 GHz	-58.32 dE			
					Meas		44
	(	trum					Ē
	Ref	trum Level 20.00 dBm					
	Att     IPk	30 dB			Iz Mode Auto FFT		
					M1[1]		1.01 dBr 2.4798310 GH
	10 dB	M1			M2[1]		-60.13 dBr
	0 dBm	╧		-			2.4835000 GH
	-10 dē	∲ <del> }  </del>		-		+ +	
	-20 de	m D1 -10.990 dB	m				
	-30 dž	m					
CH78	-40 🖗	m					
No hopping mode	-50 dž	- m -		_			
	-60 dt	m.	M2 M4	-		monul	مصبعهممسيه
	-70 d8						
		2.478 GHz	1	691	pts		Stop 2.5 GHz
	Marke Type	Ref Trc	X-value	Y-value	Function	Functi	on Result
	M	2 1	2.479831 GHz 2.4835 GHz	1.01 de -60.13 de	3m		
	M	1	2.5 GHz 2.4859391 GHz	-60.63 de			
		)[			Meas		449

# Report No.: TRE1801023804

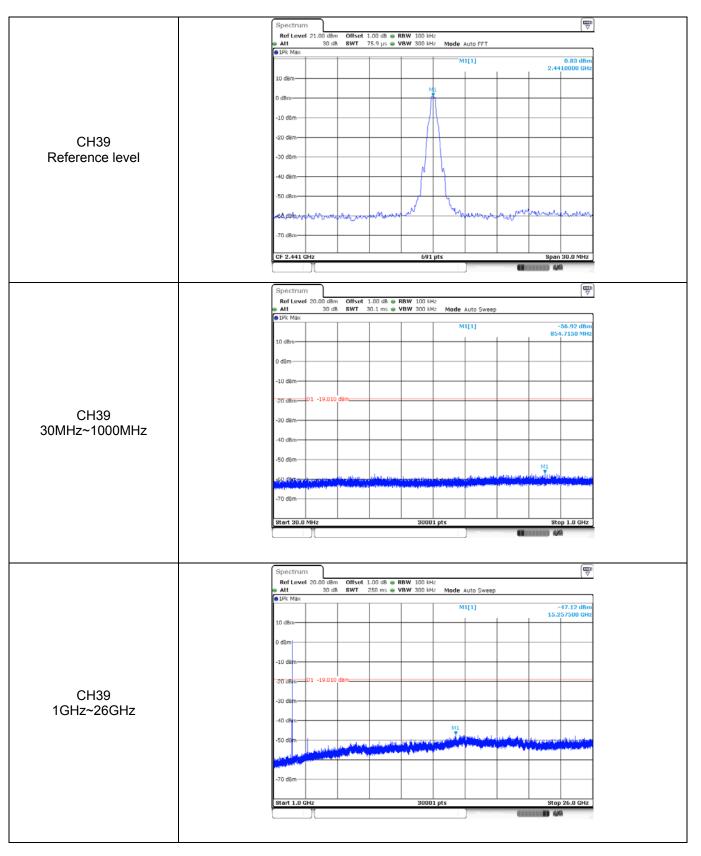
	1Pk Max     10 dBm     1     0 dBm				M1[1]			
					M2[1]			0.05 dBm 80480 GHz 59.29 dBm 835000 GHz
	-10 dBm-01 -19.95	0 dBm						
CH78 opping mode	-30 dBm -40 dBm -50 dBm							
	-60 dBm	M2			warnen of	Mp Manaaaa		
	Start 2.478 GHz Marker	I		691 pts			Sto	p 2.5 GHz
	Type         Ref         Trc           M1         1           M2         1	2.478048 2.4835		.05 dBm .29 dBm	Function	Fun	ction Result	
	M3 1 M4 1	2.5	GHz -60	.09 dBm .95 dBm				

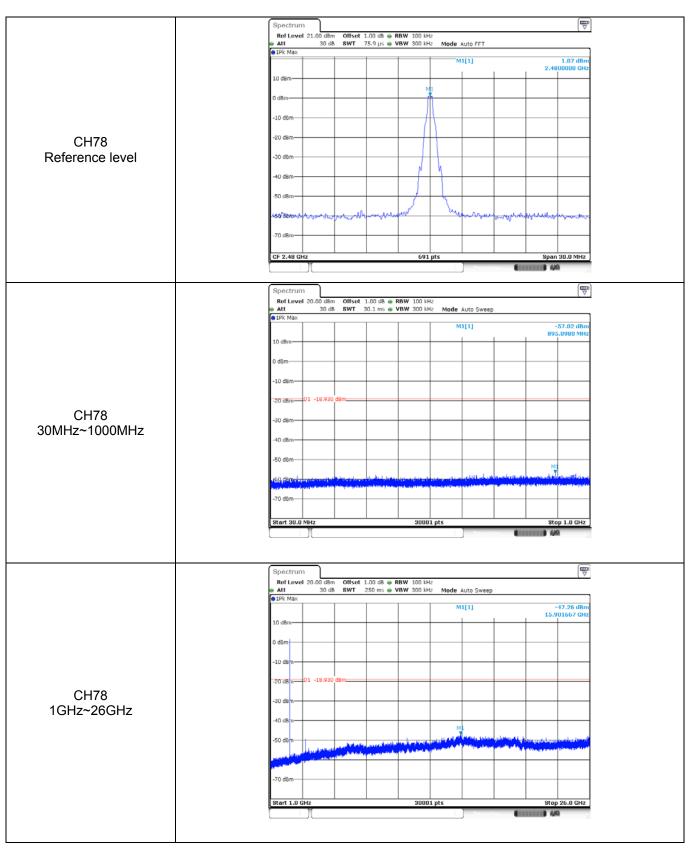
Fest Item:	Band edge		Modula	ation type:		8DPSK	
		Spectrum					Ţ
		Ref Level 20.00 dBm Att 30 dB		RBW 100 kHz VBW 300 kHz Mode	Auto Sweep		
		• 1Pk Max			1[1]		J.85 dBm
		10 dBm			2[1]	2.402	2180 GHz 2.31 dBm
		0 dBm				2.400	000 gHz
		-10 dBm					- <u>A</u> -
		-20-dBm-01 -19.220	d8m-				
		-30 dBm					N M
CH00		-40 dBm					MA
No hopping mode		-50 d8m	he day a shellow as			M3	<u> </u>
		Pod damo- Reversion					
		-70 dBm					
		Start 2.31 GHz Marker		691 pts		Stop 2.4	105 GHz
		Type Ref Trc M1 1	X-value 2.40218 GHz	Y-value Func 0.85 dBm	tion	Function Result	
		M2 1 M3 1	2.4 GHz 2.39 GHz	-52.31 dBm -58.72 dBm			
		M4 1 M5 1	2.31 GHz 2.39963 GHz	-50.05 dBm -50.68 dBm			
					Measuring	44	
		Spectrum					
		Ref Level 20.00 dBm Att 30 dB	Offset 1.00 dB @ SWT 1.1 ms @	RBW 100 kHz VBW 300 kHz Mode	Auto Sween		1 *
		IPk Max	1		1[1]	-1	1.67 dBm
		10 d8m			2[1]	2.402	2870 GHz 5.71 dBm
		0 dBm-				2.400	
		-10 dBm					
		-20 dBm 01 -21.670	d8m				
		-30 dBm					P
CH00		-40 dBm					
Hopping mode		-50 dBm 4 50 dBmm	d. and rates in the second	Lawrence and the second second second		M3	
		-70 dBm					
		Start 2.31 GHz Marker		691 pts		Stop 2.4	IUS GHZ
		Type Ref Trc M1 1	2.40287 GHz	Y-value Func -1.67 dBm -55.71 dBm	tion	Function Result	
		M2 1 M3 1 M4 1	2.4 GHz 2.39 GHz 2.31 GHz	-59.50 dBm -59.75 dBm			
		M5 1	2.399768 GHz	-53.04 dBm			
					Measuring	4/9	
		Spectrum					
		Ref Level 20.00 dBm Att 30 dB			Auto FFT		
		• 1Pk Max		M	1[1]		1.95 dBm
		10 dBm		M	2[1]	-59	490 GHz 0.42 dBm
		0 dBm				2.4835	6000 GHz
		-10 dBm					
		-20 dBm D1 -19.050	dem				
CH78		-30 dBm					
		-40 dBm					
No hopping mode		-\$0 dBm	M2		M4		M
		-60 dBm		and the second			an a
		-70 dBm					
		Start 2.478 GHz Marker		691 pts		Stop	2.5 GHz
		Type Ref Trc M1 1	2.480149 GHz	Y-value Func 0.95 dBm	tion	Function Result	
		M2 1 M3 1	2.4835 GHz 2.5 GHz	-59.42 dBm -60.26 dBm			
		M4 1	2.4929855 GHz	-57.70 dBm		44	
					)		

# Report No.: TRE1801023804

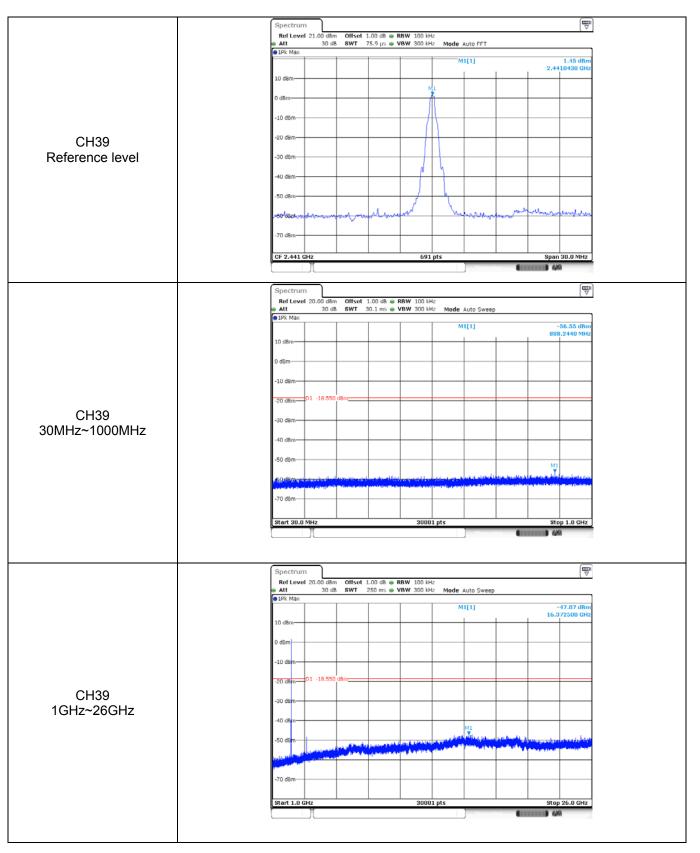
		RBW 100 kHz     VBW 300 kHz     Mode Auto FF	(₩ T
	IPk Max     I0 dBm     b dBm	M1[1] M2[1]	-2.39 dBm 2.4780480 GHz -59.32 dBm 2.4835000 GHz
	-10 dBm 01 -22.390 dBm		
CH78 loppig mode	-30 dBm -40 dBm -50 dBm M2		Me
	-60 dBm	and antices and a second or a second s	
	Start 2.478 GHz Marker Type   Ref   Trc   X-value	691 pts Y-value Function	Stop 2.5 GHz Function Result
	M1         1         2.478048 GHz           M2         1         2.4885 GHz           M3         1         2.5 GHz           M4         1         2.4973855 GHz	-2.39 dBm -59.32 dBm -58.43 dBm -57.00 dBm	
	[ m*] 1 2.4973855 G42	-57.00 dbm	

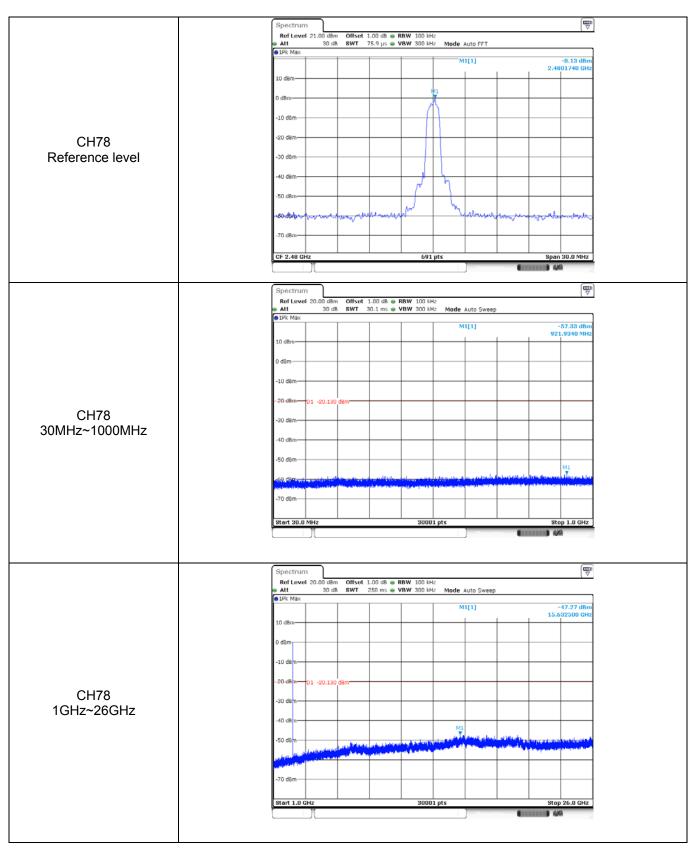
Test Item:	SE	I	Nodula	ation t	ype:		(	GFSK	
	Spectru	m							
	Ref Lev Att 1Pk Max	30 dB SWT	et 1.00 dB 👄 I 75.9 µs 👄 1			Auto FFT			
	AFR INde				М	1[1]		2.40	1.13 dBm 120430 GHz
	10 d8m								
	0 dBm			1	<u>;</u>				
	-10 dBm								
	-20 dBm—								
CH00	-30 dBm								
Reference level	-40 dBm—			L N	4				
	-50 dBm-								
	+60-d8m/s	munt the	يهرهين عربيم		has	monu	no ho	madad	Marchan
	-70 dBm—						~~~~~		· · • · •
	CF 2.402	GHZ		691	pts	Measuri	- 60	Span	30.0 MHz
	Spectru								
	Att	el 20.00 dBm Offs 30 dB SWT	at 1.00 dB 👄 30.1 ms 👄	RBW 100 kH VBW 300 kH	iz Iz Mode i	Auto Sweep			
	e 1Pk Max				М	1[1]		784	-57.18 dBm 4.8770 MHz
	10 dBm							70-	
	0 dBm								
	-10 dBm—								
	-20 d8m-	D1 -18.870 d8m							
CH00	-30 dBm—								
30MHz~1000MHz	-40 dBm—								
	-50 dBm								
	:50 d8mm	La contraction di la contra		and set of the set of	t lentra se a	الحربان أتجمير	M1 LINEA - YN	ليعممهم	dar-olashidi
	-70 dBm-	ye in my see yet first face of	unda - Persident Philo				NY AVAINA NY A	1. (A. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	
	Start 30.	0 MHz		3000	1 pts	Measuri	- 60	Sto	op 1.0 GHz
	Spectru								
	Ref Lev Att 1Pk Max	el 20.00 dBm Offs 30 dB SWT	at 1.00 dB 👄 1 250 ms 👄 1	RBW 100 kH VBW 300 kH	z z Mode /	Auto Sweep			
	• 1Pk Max				M	1[1]		15.2	-46.75 dBm 240000 GHz
	10 d8m-								
	0 dBm								
	-10 dBm—								
	-20 dBm—	D1 -18.870 d8m	_						
	-30 dEm-								
1GHz~26GHz	-40 dBm—								
	-50 d2m		un and the second s	and Patrick	M1	and the second second	ور والما العرب	1 Augusta	and black
	1. Second Street, Se	la serie di la	alles plantations	- Alteria	Alexandra de la constitución de la	Concelline a	and the day of		and the sector of
	-70 dBm-								
	Start 1.0	GHz		3000	1 pts				26.0 GHz
				5000		) Measuri	•		



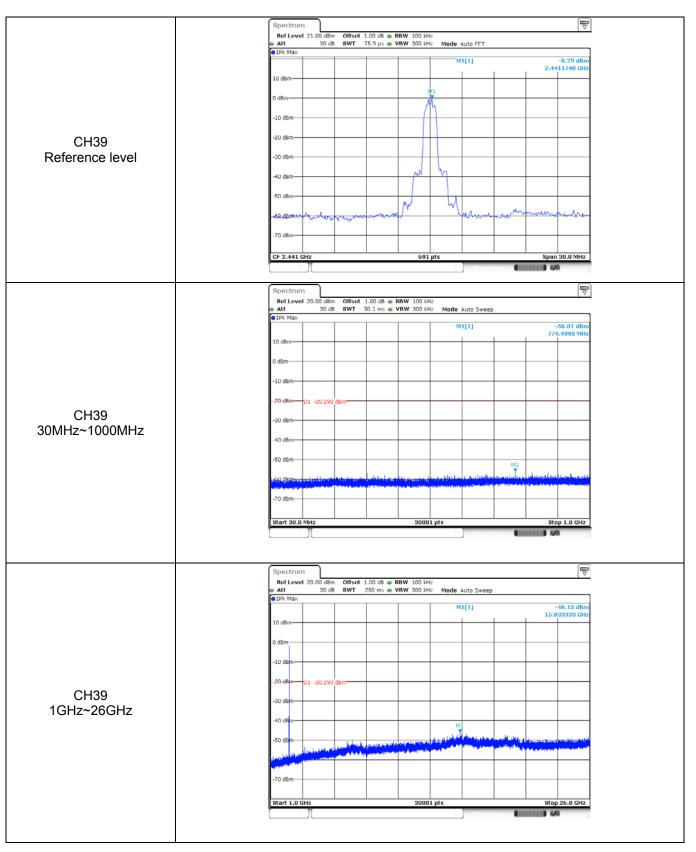


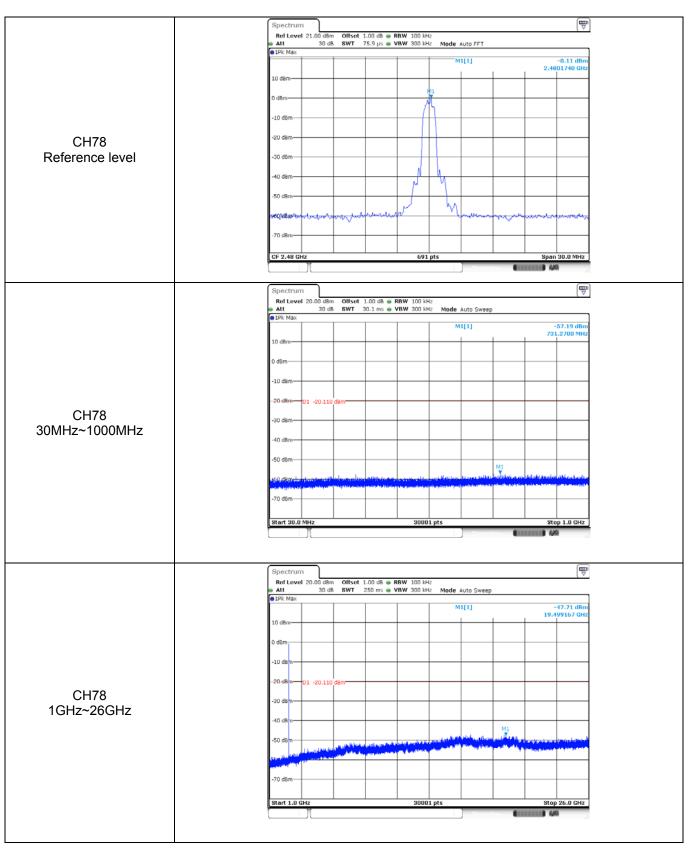
est Item:	SE		М	odula	tion t	ype:		1	т/4D0	QPSK
		pectrum								(₩ ▽
	•	Ref Level 21.00 Att 1Pk Max	0 dBm Offset 30 dB SWT				Auto FFT			
		LPK MdX				м	1[1]		2.40	0.32 dBm J21740 GHz
	1	dam								
	0	d8m-				11				
	-	.0 dBm			(	}				
	4	0 dBm								
CH00		10 dBm								
Reference level		0 dBm			p'	M				
		i0 dBm								
					S m	Ч	d.			
		Addamorant	ser and the second	de marte			a partice	when	and the second	- When
		0 dBm								
		F 2.402 GHz			691	pts	Measur		Spar	30.0 MHz
							,			
	C	pectrum	1							Ē
		Ref Level 20.00	) dBm Offset 30 dB SWT	1.00 dB 👄 30.1 ms 👄 1	BW 100 kH	2 2 Mode	áuto Sweer			( <del>\</del>
		1Pk Max	1	1			1[1]	,		-57.31 dBm
	1	0 d8m								8.5950 MHz
	0	dBm								
		.0 dBm								
CH00			9.680 dBm							
30MHz~1000MHz		O dBm								
	-	0 dBm								
	4	i0 dBm							M1	
	1	Q KRmmul Holmes	191.910 Autor (1993)		and a state of the	a de la completa de Completa de la completa de la complet	ار الاستان ال	isildalariyadalar Manadalariya	and a free of the second	الميوارية ويتعادين موردة المعرية بالماري
	-	0 dBm								
	3	tart 30.0 MHz			3000	1 pts			Sto	op 1.0 GHz
							Measur			<u>a</u>
		pectrum Ref Level 20.00	)dBm Offset	1.00 dB 🖷 🖡	BW 100 kH	z				
	•	Att 1Pk Max	30 dB SWT	250 ms 🖷 🔪	BW 300 kH	Z Mode				
						м	1[1]			-46.59 dBm L55000 GHz
		) dBm								
	٥	dBm								
CH00 1GHz~26GHz	-	.0 dBm								
		0 d8m-01 -19	9.680 d8m							
	-	10 d8m	_							
	-	0 dem	_			M1				
		i0 d8m	الانتقار ا		tin for distant	MI	Mala and	ann air	dit on plant	Intellection
					n kum	and the second se			a designed and	
		0 dBm								
				1						1
		tart 1.0 GHz			3000	1 pts	Measue		Stop	o 26.0 GHz





fest Item:	SE		Modula	ation t	ype:		8DPS	ĸ
		Spectrum						( <del>m</del> ⊽
		Ref Level 21.00 dBm Att 30 dB				FFT		
		1Pk Max			M1[1	1		-0.09 dBm
		10 d8m-					2.4	018260 GHz
		0 dBm		M				
					1			
		-10 dBm						
CL 100		-20 dBm-						
CH00 Reference level		-30 dBm			4			
Relefence level		-40 dBm-		M	4			
		-50 dBm						
				r	W.			
		HER der the water	www.wardertal		UP L	and a grand and a grand and a grand a g	dran to sold and	www
		-70 dBm-						
		CF 2.402 GHz		691 p	ots		Spa	n 30.0 MHz
						Measuring	4	
		Spectrum						
		Ref Level 20.00 dBm Att 30 dB	Offset 1.00 dB SWT 30.1 ms	RBW 100 kHz VBW 300 kHz	Mode Aut	o Sweep		
		1Pk Max			M1[1	1		-57.10 dBm
		10 dBm-					74	0.2910 MH2
		0 dBm						
		-10 dBm						
CH00		-20 dBm -01 -20.090 d	d8m					
30MHz~1000MHz		-30 dBm						
		-40 dBm					_	
		-50 dBm						
		-60.dBm	de star a starte de l de		A set of a set of a set	M1 June 1	it of the store of	مديا فالقيد
		Calmany and the specific and the second data of	na na mana ang ang ang ang ang ang ang ang ang		AL AND THE REAL PROPERTY OF	and the second s	je a potratire dans	a
		-70 dBm						
		Start 30.0 MHz		30001	pts			op 1.0 GHz
						Measuring	4	KG
		Spectrum	00000	BB10 (				
		Ref Level 20.00 dBm Att 30 dB		VBW 300 kHz	Mode Aut	Sweep		
		• 1Pk Max			M1[1	1		-47.11 dBm
		10 d8m-					19.	372500 GHz
		0 dBm						
		-10 dgm						
			_					
CH00		<del>~20 d2m _</del> 01 -20.090 o	dBm					
1GHz~26GHz		-30 dBm						
		-40 d <b>e</b> m		+ +			_	
		-50 dgm	a		and the second second	M1	Links and the	فمانى بليما
					and the second		A Stanforder	and the state
		sumplified at Desid						
		-70 dBm						
		Start 1.0 GHz		30001	pts		Sto	p 26.0 GHz
	1					Measuring		





# 5.11. Spurious Emissions (radiated)

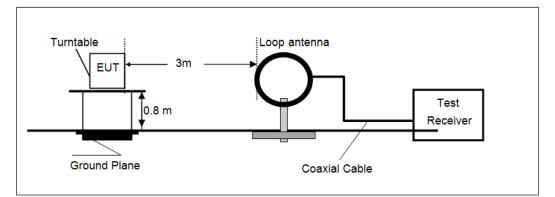
# <u>LIMIT</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.209

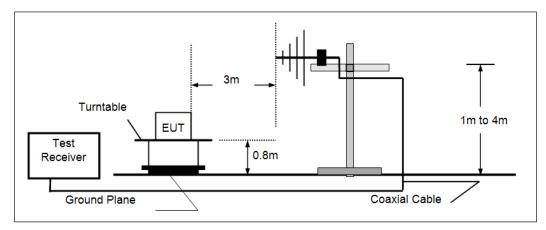
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

# **TEST CONFIGURATION**

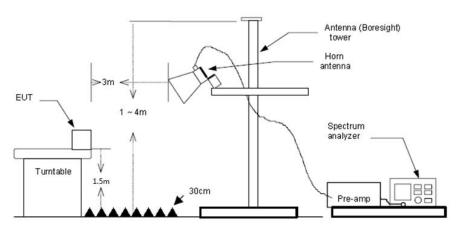
Below 30 MHz



## > 30 MHz ~1000 MHz



> Above 1 GHz



## TEST PROCEDURE

- 1. The EUT was tested according to ANSI C63.10:2013.
- 2. The EUT is placed on a turn table with 0.8 meter above ground for below 1GHz, 1.5 meter above ground for above 1GHz.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
    - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak 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.

#### $\triangleright$ 30 MHz ~ 1 GHz

532.460000

959.260000

29.10

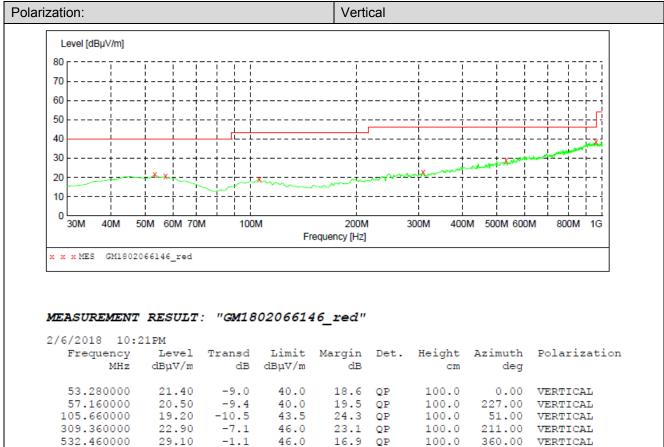
38.50

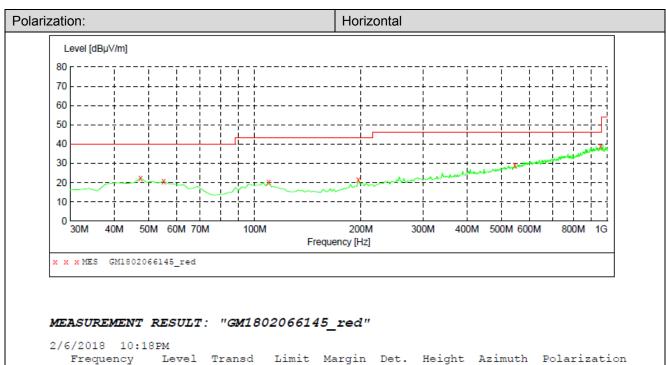
-1.1

7.3

46.0

46.0





7.5 QP

Frequency MHz	Level dBµV/m		Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization	
47.460000	22.40	-8.8	40.0	17.6	QP	300.0	360.00	HORIZONTAL	
55.220000	20.70	-9.2	40.0	19.3	QP	100.0	192.00	HORIZONTAL	
109.540000	20.30	-10.8	43.5	23.2	QP	300.0	103.00	HORIZONTAL	
196.840000	21.40	-9.8	43.5	22.1	QP	300.0	138.00	HORIZONTAL	
546.040000	29.00	-0.8	46.0	17.0	QP	300.0	274.00	HORIZONTAL	
957.320000	38.90	7.3	46.0	7.1	QP	300.0	359.00	HORIZONTAL	

Shenzhen Huatongwei International Inspection Co., Ltd.

Report Template Version: V01 (2018-01)

360.00 VERTICAL

27.00 VERTICAL

100.0

100.0

$\triangleright$	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
1483.73	35.32	25.82	5.24	36.57	29.81	74.00	-44.19	Vertical	Peak
3747.66	35.63	29.44	8.44	38.24	35.27	74.00	-38.73	Vertical	Peak
4809.50	33.87	31.58	9.55	36.93	38.07	74.00	-35.93	Vertical	Peak
7489.60	32.02	36.12	12.36	34.89	45.61	74.00	-28.39	Vertical	Peak
1446.44	35.47	25.85	5.13	36.52	29.93	74.00	-44.07	Horizontal	Peak
3507.65	34.62	29.02	8.13	38.40	33.37	74.00	-40.63	Horizontal	Peak
5880.78	32.87	32.26	10.62	35.37	40.38	74.00	-33.62	Horizontal	Peak
8377.24	31.46	36.55	12.84	34.29	46.56	74.00	-27.44	Horizontal	Peak

CH39									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
1764.12	44.32	25.33	5.89	37.06	38.48	74.00	-35.52	Vertical	Peak
3953.44	35.02	29.70	8.71	38.14	35.29	74.00	-38.71	Vertical	Peak
4883.52	42.37	31.43	9.59	36.73	46.66	74.00	-27.34	Vertical	Peak
7357.33	31.53	36.30	12.03	34.88	44.98	74.00	-29.02	Vertical	Peak
1795.84	35.36	25.39	5.95	37.13	29.57	74.00	-44.43	Horizontal	Peak
3662.78	34.25	29.30	8.34	38.26	33.63	74.00	-40.37	Horizontal	Peak
4883.52	35.50	31.43	9.59	36.73	39.79	74.00	-34.21	Horizontal	Peak
8042.90	31.69	37.06	12.40	34.53	46.62	74.00	-27.38	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
1750.70	36.93	25.30	5.86	37.04	31.05	74.00	-42.95	Vertical	Peak
4004.08	34.61	29.71	8.78	38.10	35.00	74.00	-39.00	Vertical	Peak
4958.68	37.83	31.46	9.64	36.52	42.41	74.00	-31.59	Vertical	Peak
7451.57	32.01	36.20	12.24	34.86	45.59	74.00	-28.41	Vertical	Peak
1768.62	41.53	25.34	5.90	37.07	35.70	74.00	-38.30	Horizontal	Peak
4736.60	32.93	31.35	9.51	37.05	36.74	74.00	-37.26	Horizontal	Peak
4958.68	41.32	31.46	9.64	36.52	45.90	74.00	-28.10	Horizontal	Peak
8681.17	31.48	37.79	12.98	34.42	47.83	74.00	-26.17	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.

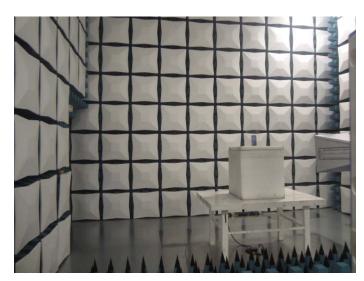
# 6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)



# Radiated Emissions





# 7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: TRE1801023801.

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