



# **TEST REPORT**

Report Reference No	CHTEW19060043	Report verification:	
Project No:	SHT1905043901EW		
FCC ID:	ZSW-30-087		Reportivo: CHTEW19060043
Applicant's name:	b mobile HK Limited		
Address	Flat 18; 14/F Block 1; Golden I Street; Kwai Chung; New Terri		6-26 Kwai Tak
Manufacturer	b mobile HK Limited		
Address	Flat 18; 14/F Block 1; Golden I Street; Kwai Chung; New Terri		6-26 Kwai Tak
Test item description:	Mobile Phone		
Trade Mark	Bmobile		
Model/Type reference:	AX1082		
Listed Model(s)	-		
Standard:	FCC CFR Title 47 Part 15 Sul	bpart C Section 15.	247
Date of receipt of test sample:	May 17, 2019		
Date of testing	May 18, 2019- Jun 06, 2019		
Date of issue	Jun 10, 2019		
Result	PASS		
Compiled by ( Position+Printed name+Signature):	File administrators Silvia Li	Silı	/ia Li
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Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	How	изНи
Testing Laboratory Name: :	Shenzhen Huatongwei Interr	national Inspection	Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Ind Tianliao, Gongming, Shenzher		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

Revision No.	Date of issue	Description
N/A	2019-06-10	Original

# 2. TEST DESCRIPTION

Test Item	Section in CFR 47	Result	Test Engineer
Antenna Requirement	15.203/15.247 (c)	PASS	Jiongsheng Feng
AC Power Line Conducted Emissions	15.207	PASS	Tony Duan
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 Feng
Restricted band	15.247(d)/15.205	PASS	Shower Dai
Radiated Emissions	15.247(d)/15.209	PASS	Shower Dai

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

# 3. <u>SUMMARY</u>

# 3.1. Client Information

Applicant:	b mobile HK Limited
Address: Flat 18; 14/F Block 1; Golden Industrial Building;16-26 Kwai Tak 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.:	AX1082	
Listed Model(s):	-	
IMEI:	Conducted: 352378094017948 Radiated: 352378094013285	
Power supply:	DC 3.8V	
Adapter information: Input:100-240Va.c., 50/60Hz, 0.2A Output:5.0Vd.c., 1.0A		
Hardware version:	V00	
Software version:	Bmobile_AX1082_TEM_CL_V010	
Bluetooth		
Version:	Supported BT4.2+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	PIFA Antenna	
Antenna gain:	-3.0dBi	

# 3.3. Operation state

#### Test frequency list

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

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

#### > TEST MODE

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated suprious emissions test item:

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

# 3.4. EUT configuration

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

- supplied by the manufacturer
- supplied by the lab

	/	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	0.51 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.93 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.02 dB	(1)
Radiated Emissions below 1GHz	4.90 dB	(1)
Radiated Emissions above 1GHz	4.96 dB	(1)
Occupied Bandwidth	70 Hz	(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

•	Conducted Emission						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
•	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27	
•	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26	
•	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26	
•	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26	
•	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14	
•	Test Software	R&S	ES-K1	N/A	N/A	N/A	
0	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27	
0	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27	
0	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27	
0	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26	
0	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26	
0	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26	

•	Radiated Emission-6th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
•	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
•	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
•	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
•	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
•	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
•	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
•	Test Software	R&S	ES-K1	N/A	N/A	N/A
•	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	Radiated emission-7th test site									
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)				
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29				
•	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26				
•	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26				
•	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13				
•	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13				
•	Broadband Pre- amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/28	2020/04/27				
•	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14				
•	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14				
•	Test Software	Audix	E3	N/A	N/A	N/A				

Shenzhen Huatongwei International Inspection Co., Ltd.

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•	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
•	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

•	RF Conducted Method									
Used	Test Equipment	Test Equipment Manufacturer		Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)				
•	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27				
•	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28				
0	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28				
0	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A				
0	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A				

# 5. TEST CONDITIONS AND RESULTS

# 5.1. Antenna requirement

#### **Requirement**

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

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

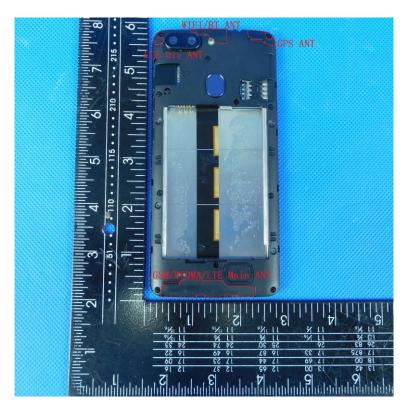
#### FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

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

# Test Result:

## ☑ Passed □ Not Applicable

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



# 5.2. Conducted Emissions (AC Main)

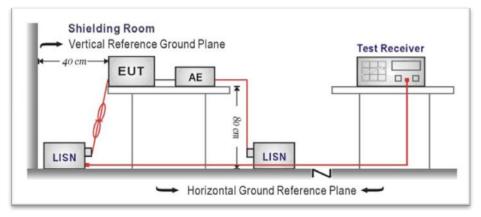
# <u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (d	lBuV)
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

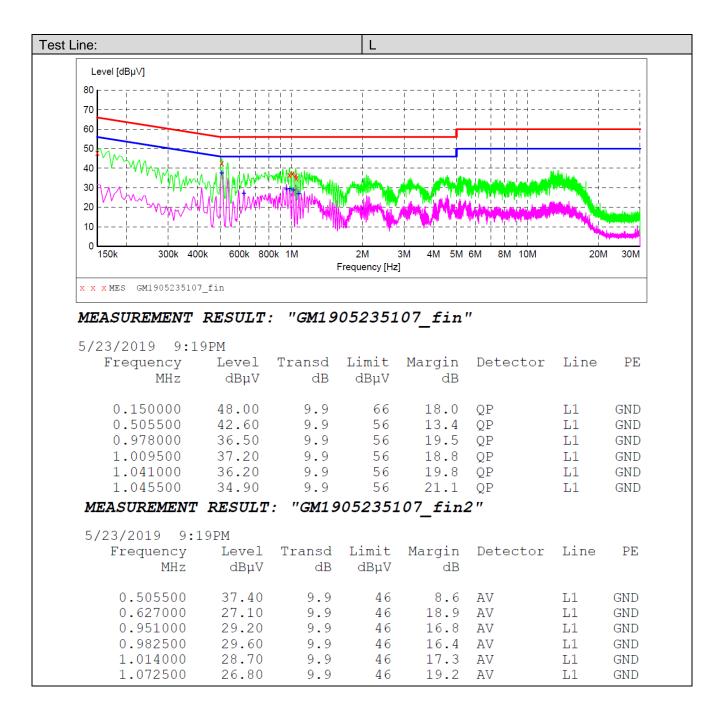
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

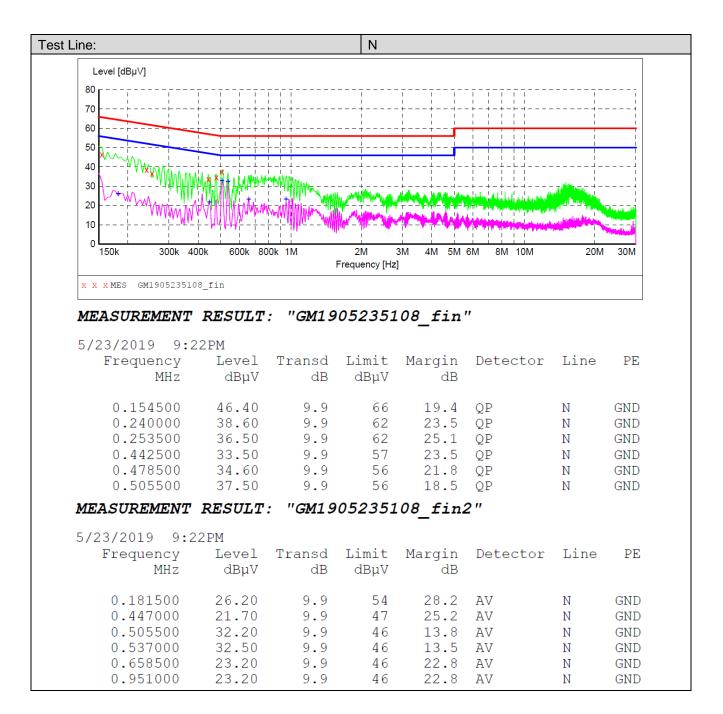
## TEST RESULTS

#### ☑ Passed □ Not Applicable

Note:

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



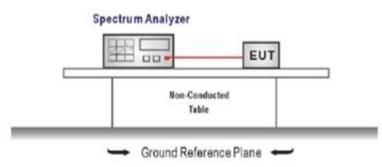


# 5.3. Conducted Peak Output Power

#### <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.

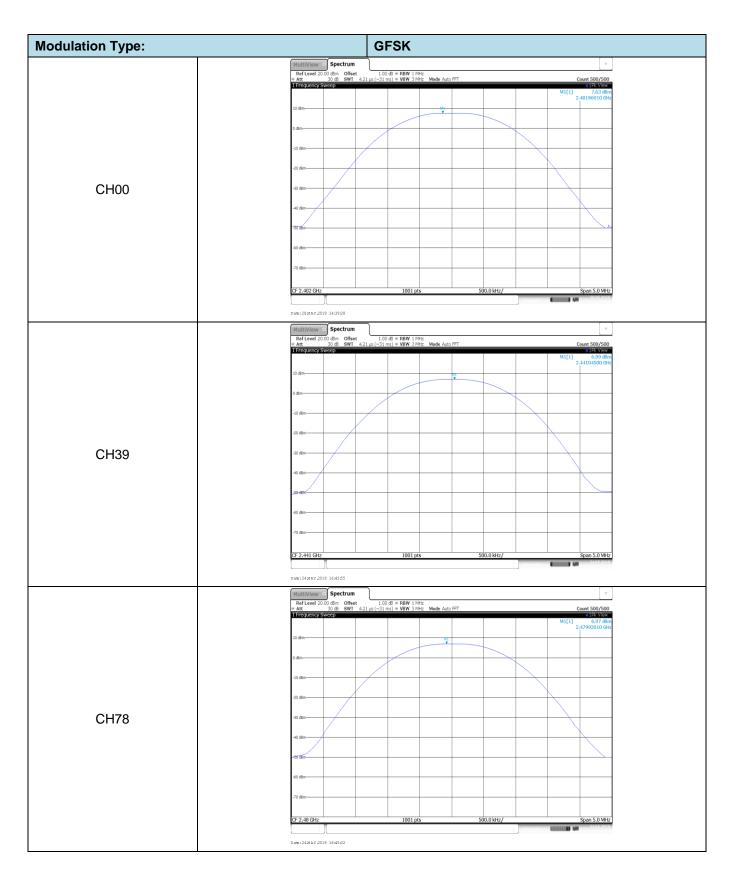
#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

#### ☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result	
GFSK	00	7.63			
	39	6.99	≤ 30.00	Pass	
	78	6.97			
	00	8.64			
π/4DQPSK	39	7.61	≤ 21.00	Pass	
	78	7.75			
	00	8.96			
8DPSK	39	7.98	≤ 21.00	Pass	
	78	8.08			



odulation Type:		π/4DQPS	SK			
	MultiView Spectrum					v
	Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0 1 Frequency Sweep	00 dB ⊜ RBW 2 MHz 01 ms ⊜ VBW 5 MHz Mode Au	ito Sweep		Cou	nt 500/500 • 1Pk View
					M1[1] 2.40	8.64 dBm 0214490 GHz
	10 d8m		M1			
	0 dam					
	-10 dBm					
	-10 dbm					
	-20 d8m-					
CH00	-30 dBm					
	-40 dBm-					
	-50 d8m					
	-60 d8m-					
	-70 d8m					
	CF 2.402 GHz					50151
	CF 2.402 GH2	1001 pts		00.0 kHz/	St.	oan 5.0 MHz
	Date:28MAY.2019 14:48:42					
	MultiView  Spectrum					v
	Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 1.0 1 Frequency Sweep	00 db ≕ KBW 2 MHZ 01 ms ≕ VBW 5 MHz Mode Au	ito Sweep			nt 500/500 • 1Pk View
					M1[1] 2.44	7.61 dBm 1110990 GHz
	10 dBm		M1 ¥			
	0 dām					
	-10 dBm-					
	-20 d8m					
	120 00m					
CH39	-30 dBm					
	-40 dBm					
	-50 d8m					
	10 m					
	-60 d8m					
	-70 dBm					
	CF 2.441 GHz	1001 pts		i00.0 kHz/	S	oan 5.0 MHz
				Measurie	(mmm) 40	24.05.2019
	Date:24.MAY 2019 16:49:08					[
	MultiView Spectrum RefLevel 20.00 dbm Offset 1. * Att 30 d8 SWT 1.0 Hirequency Sweep	00 dB = RBW 2 MHz	to Sweep		C	v nt 500/500
	1 Frequency Sweep		no smoop		M1[1] 2.48	• 1Pk View
	10 d8m		M1		2.48	3009490 GHz
	0 dBm					
	-10 dBm					
	-20 d8m					
CH78	-20 dbm					
CH78	-30 d8m					
CH78						
CH78	-30 d8m					
CH78	30 dbn					
CH78	-10 dbn					
CH78	40 dbn					
CH78	30 dbn	1001 pts		00.0 kHz/	Si Connell Vi	Dan 5.0 MHz

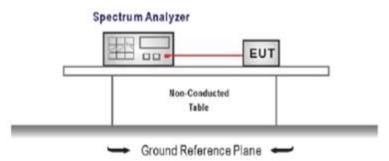
Iodulation Type:	8DPSK
	MultiView 🕀 Spectrum
	Ref Level 20.00 dbm         Offset         1.00 db         # RBW 2 MHz           # Att         30 db         SWF         1.01 ms         VBW 5 MHz         Mode Auto Sweep         Count 500/500
	1 Frequency Sweep = 15k View 8.96 dBm 2.49720000 GHz
	30 dim
	0 dm
	-41 dan
	40.65
CH00	-30 dbn
	40.60
	50 dbn
	40.don
	-70 des-
	CF 2.402 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz
	The second se
	Dam:28 MAY 2019 146646
	MultiView Spectrum
	Ref Level 20.00 dBm         Offset 1.00 dB = RBW 2.1%12           # Att         30.dB SWT 1.01 ms = VBW 5.1%12         Mode Auto Sweep         Count 500/500           I Frequency Sweep         = 181 K VBm         = 181 K VBm
	M1[1] 7.98 dBm 2.44097000 GHz
	10 dan
	0.8%
	-10 dBn
	40 dan
<b>0</b>	
CH39	-01.050
	-40 dan
	41 dan-
	40 dkm
	-70 dan
	CF 2.441 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz
	Date:24 MAY 2019 16:54:98
	Statistics
	Multipolities         Spectrum           Reflexel>2000 dmill         068 + RBW 21%trc           # Att         30.db         SWT 1.01 ms = VBW 51%trc           Mode Auto Sweep         Count 500/500           I Frequency Sweep         #11.01 ms = VBW 51%trc
	This output output and the first set of the mean set of the mean set of the
	11 C 2.47996500 GHz
	10 Gan
	0 din
	10 60
	40.60
CH78	-10 dan
	-42 dan-
	51 den
	40 dan
	-70 dan
	CF 2.48 GHz 1001 pts 500.0 kHz/ Span 5.0 MHz
	GF 2.40 GF 2 1001 PG 2001 PG 2
	CF-2-48 GH2 1001 pts 5000 kH2/ Span 50 MH2

# 5.4. 20 dB Bandwidth

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

N/A

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

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

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

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

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

#### TEST MODE:

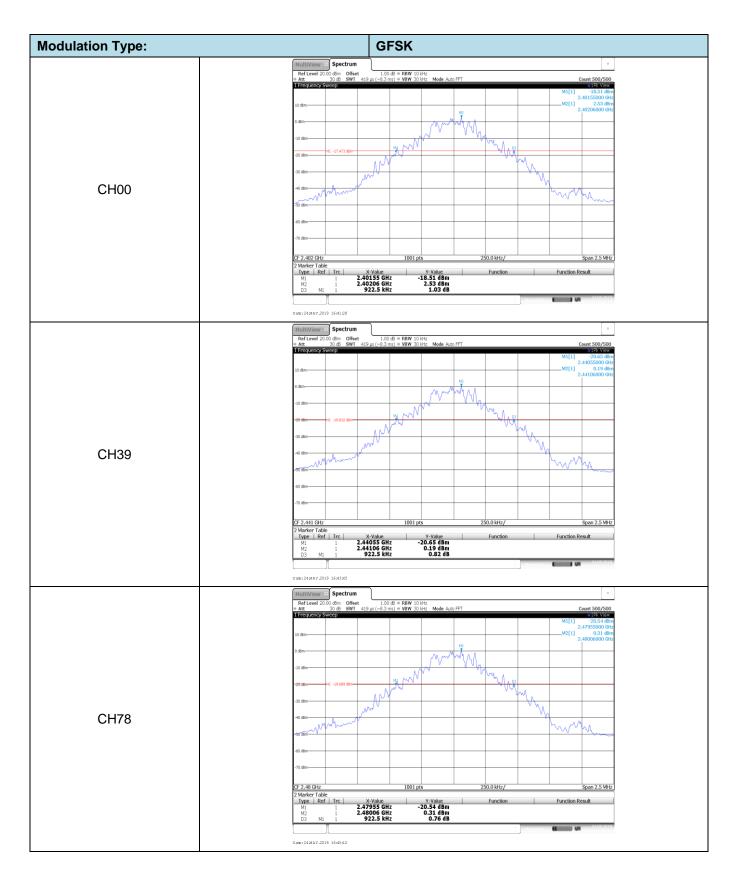
Please refer to the clause 3.3

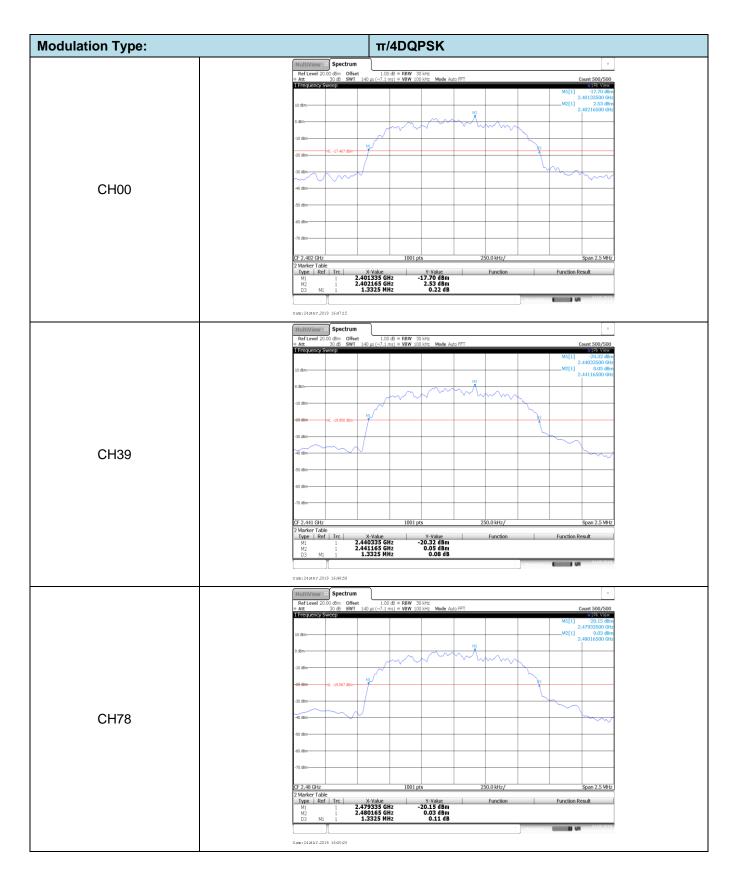
#### TEST RESULTS

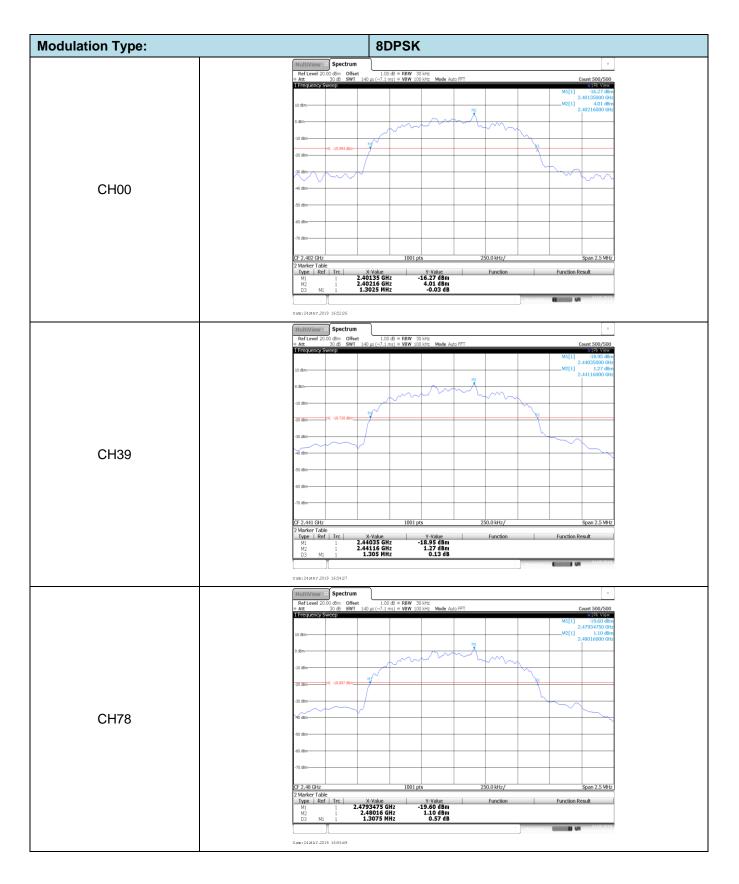
🛛 Passed

#### Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result	
	00	0.92			
GFSK	39	0.92	-	Pass	
	78	0.92			
	00	1.33			
π/4DQPSK	39	1.33	-	Pass	
	78	1.33			
8DPSK	00	1.30			
	39	1.31	-	Pass	
	78	1.31			







# 5.5. Carrier Frequencies Separation

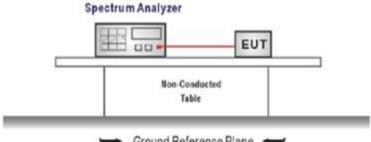
#### LIMIT

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**

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

#### **TEST MODE:**

Please refer to the clause 3.3

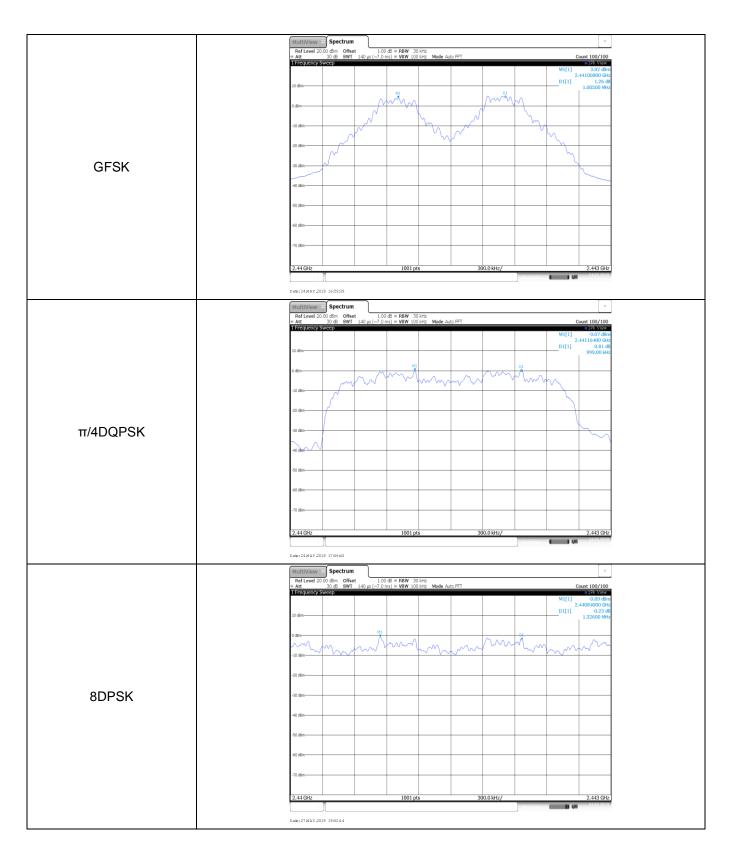
#### **TEST RESULTS**

#### **Passed** Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.92	Pass
π/4DQPSK	39	1.00	≥0.87	Pass
8DPSK	39	1.33	≥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

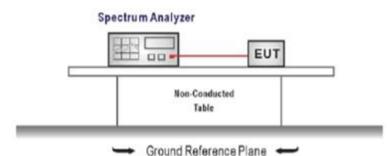


# 5.6. Hopping Channel Number

#### 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	79	≥15.00	Pass
8DPSK	79		

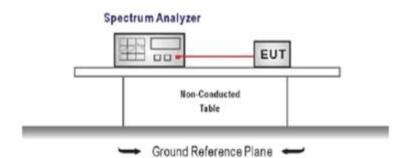
	MultiView 🗄 Spectrum
	RefLevel 20.00 dBm Offset 1.00 dB = RBW 100 kHz Att 30 dB SWT 1.02 ms = VBW 300 kHz Mode Auto Sweep
	1 Frequency Sweep • 19k Vie
	10.08m-
	0.69
GFSK	4) de-
	-10 dan
	-10.08m-
	60 den-
	d0 dm
	-70 dbn
	2.4 GHz 1001 pts 8.35 MHz/ 2.4835 C
	Date:24 MAY 2019 17 31 38
	Hutbiliew         Spectrum           RefLevel 2000 dbm         Offset         100 db         RBW 100 kHz           ext         30 db         SWT 102 ms         VBW 300 kHz
	■ Att 30 d8 SWT 1.02 ms ■ VBW 300 kHz Mode Auto Sweep TFrequency Sweep  ST5% VE
	10 dBm
	MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
	-1) den
	40 dan-
π/4DQPSK	-10 dbm
	40 dan-
	50 d8m
	40 den
	-70 den-
	2.4 GHz 1001 pts 8.35 MHz/ 2.4835 (
	Dab:24MAY 2019 17:11:30
	MultiView 🖶 Spectrum
	Ref Level 20:00 dbm         Offset         1:00 db         # RBW 100 Hrz           m Att         30:db         SWT         1:02 ms         # VBW 300 Hrz         Mode Auto Sweep           Trécquency wordep         Graduation         Graduation         Graduation         Graduation
	of Marindan of many and marine was a with the property with the second of the second o
	-1) den
	4) den
8DPSK	pa den
	-40 dbn
	50 den-
	40 dbm
	-70 den
	2.4 GHz 1001 pts 8.35 MHz/ 2.4835 C

### 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.

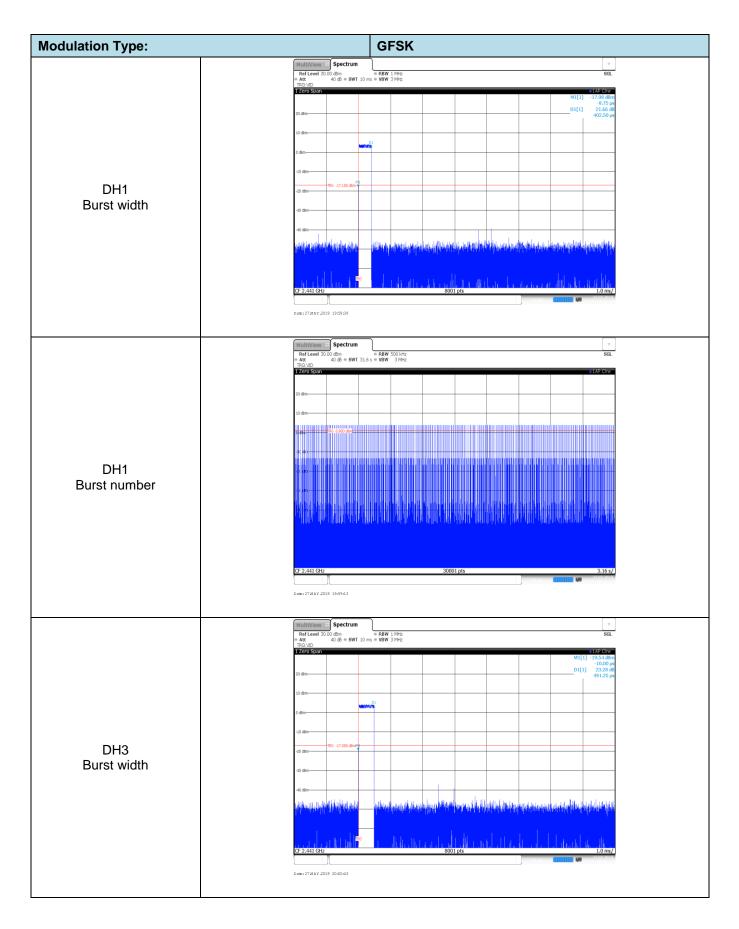
#### TEST MODE:

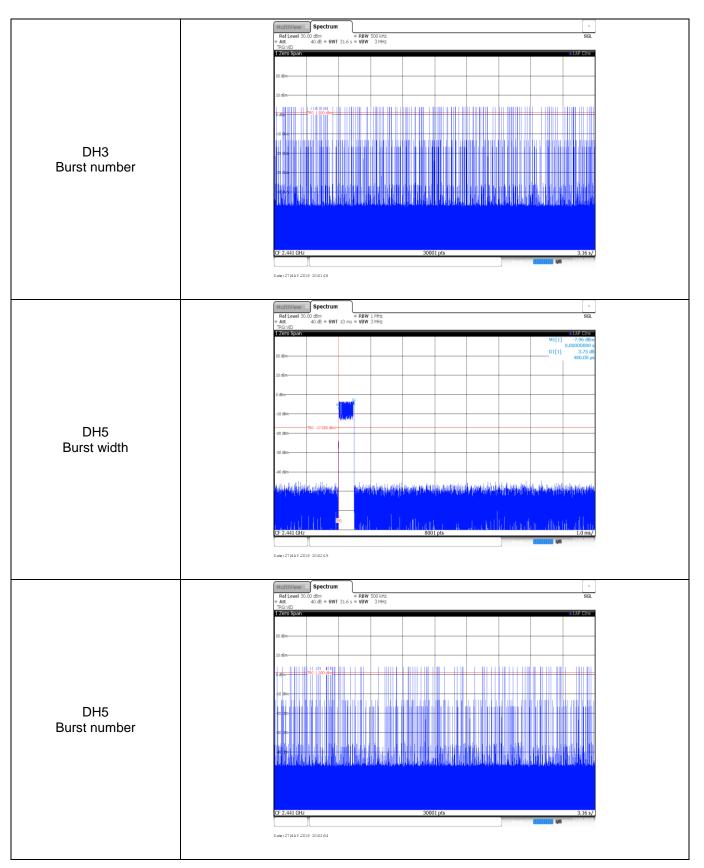
Please refer to the clause 3.3

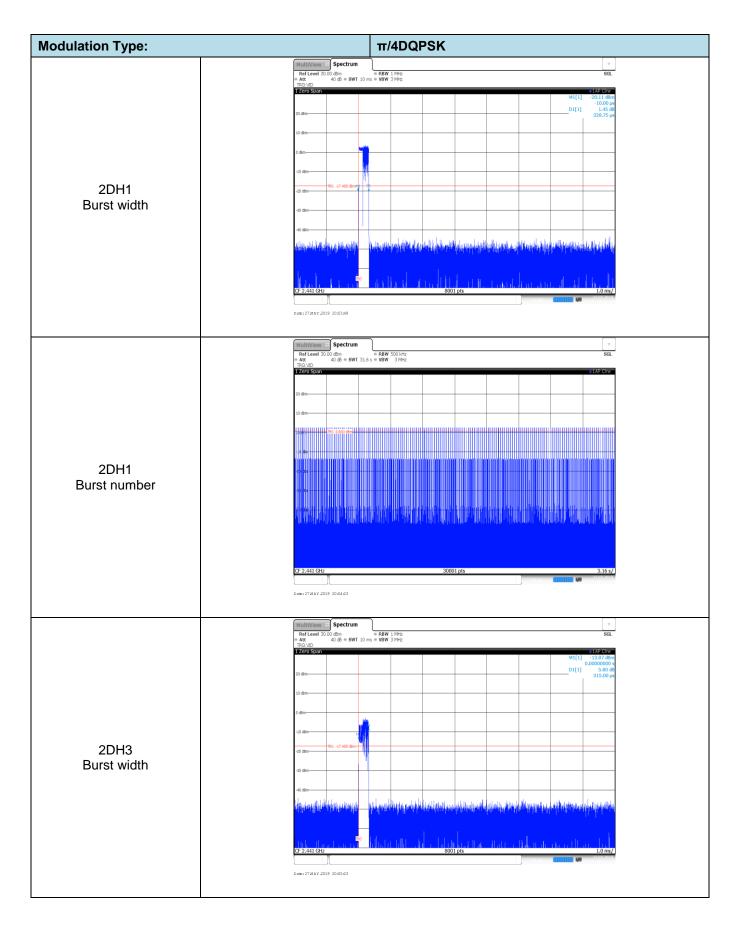
#### TEST RESULTS

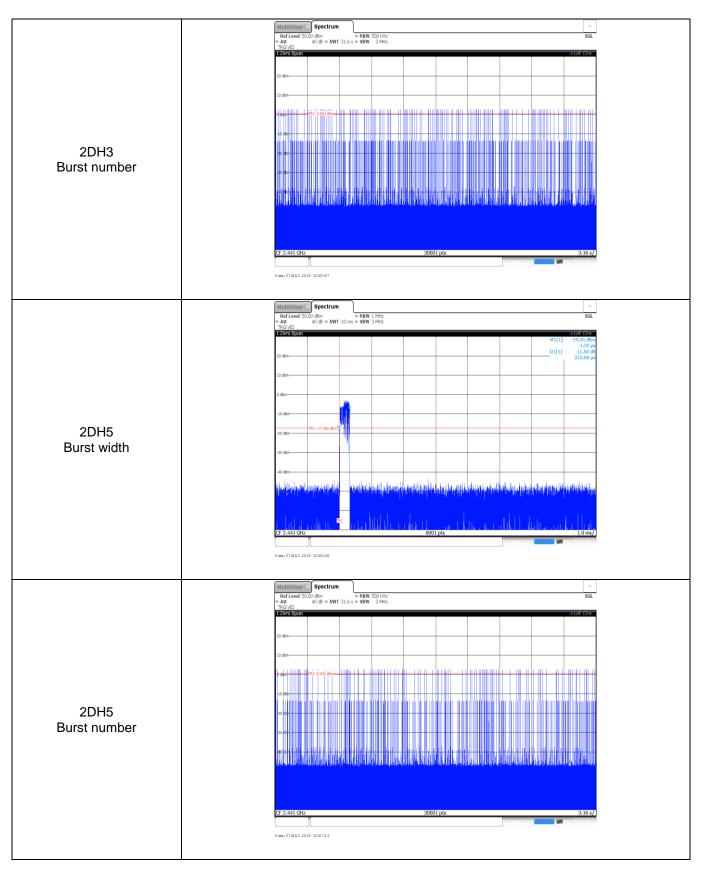
#### ☑ Passed □ Not Applicable

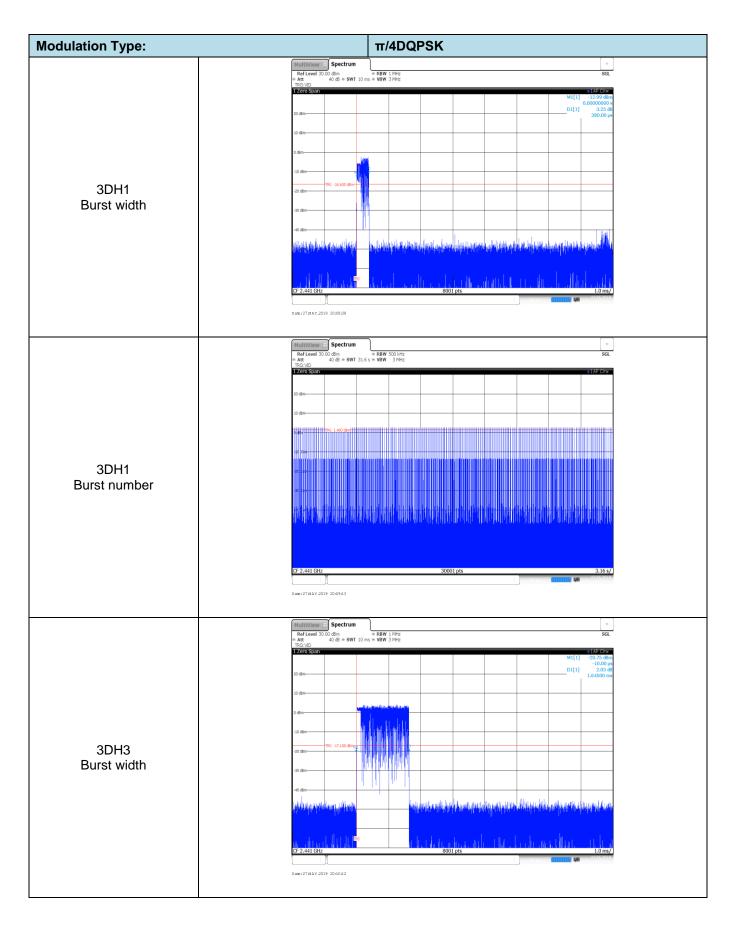
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.40	317.00	0.13		
GFSK	DH3	0.49	162.00	0.08	≤ 0.40	Pass
	DH5	0.48	113.00	0.05		
	2DH1	0.33	320.00	0.11		
π/4DQPSK	2DH3	0.31	160.00	0.05	≤ 0.40	Pass
	2DH5	0.31	118.00	0.04		
	3DH1	0.38	320.00	0.12		
8DPSK	3DH3	1.65	164.00	0.27	≤ 0.40	Pass
	3DH5	2.88	101.00	0.29		

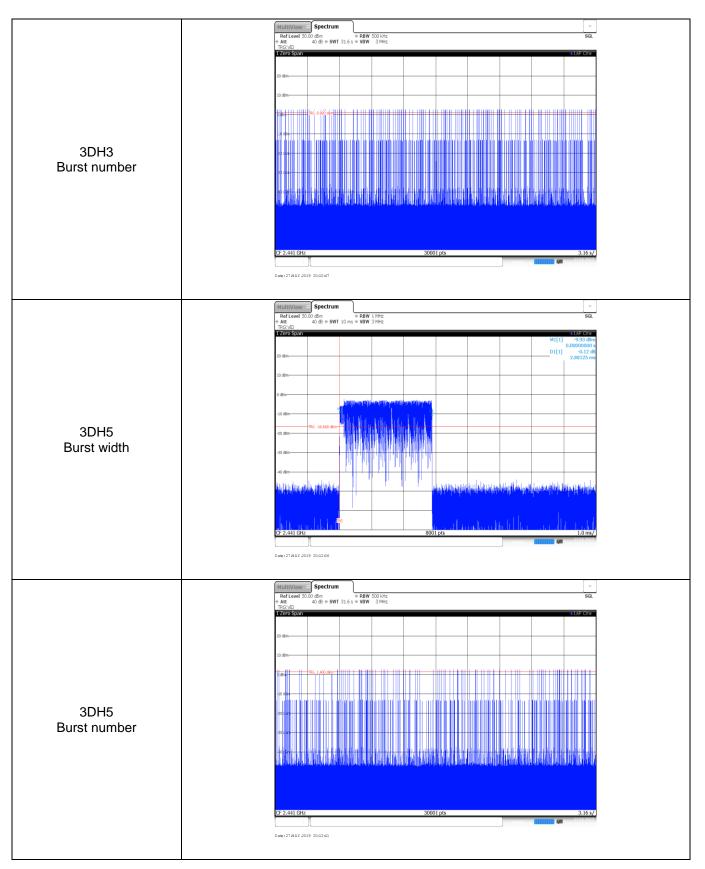












# 5.8. Pseudorandom Frequency Hopping Sequence

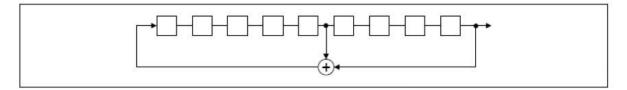
#### <u>LIMIT</u>

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:

73 75 77		 8 1			62 64		0 2 4 6			
		 		1			 Τ	Т	Г	Т
				1		1		Т		
				1						

Each frequency used equally one the average by each transmitter.

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

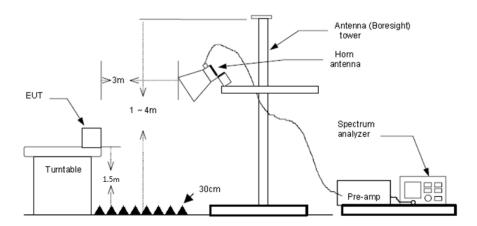
# 5.9. Restricted band (radiated)

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

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

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

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

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

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

Note:

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

Test chann	el:				СН00					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2310.00	45.70	28.05	7.73	38.17	43.31	74.00	-30.69	Horizontal	Peak	
2377.30	57.47	27.71	7.81	38.08	54.91	74.00	-19.09	Horizontal	Peak	
2390.00	63.01	27.65	7.84	37.97	60.53	74.00	-13.47	Horizontal	Peak	
2310.00	44.31	28.05	7.73	38.17	41.92	74.00	-32.08	Vertical	Peak	
2376.90	55.65	27.71	7.81	38.08	53.09	74.00	-20.91	Vertical	Peak	
2390.00	63.33	27.65	7.84	37.97	60.85	74.00	-13.15	Vertical	Peak	
2310.00	32.07	28.05	7.73	38.17	29.68	54.00	-24.32	Horizontal	Average	
2390.00	32.01	27.65	7.84	37.97	29.53	54.00	-24.47	Horizontal	Average	
2310.00	32.09	28.05	7.73	38.17	29.70	54.00	-24.30	Vertical	Average	
2390.00	31.99	27.65	7.84	37.97	29.51	54.00	-24.49	Vertical	Average	

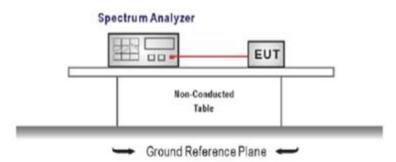
Test channe	el:				CH78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	62.88	27.26	8.04	37.59	60.59	74.00	-13.41	Horizontal	Peak	
2492.50	64.37	27.23	8.06	37.48	62.18	74.00	-11.82	Horizontal	Peak	
2500.00	44.04	27.20	8.08	37.38	41.94	74.00	-32.06	Horizontal	Peak	
2483.50	62.00	27.26	8.04	37.59	59.71	74.00	-14.29	Vertical	Peak	
2492.50	63.23	27.23	8.06	37.48	61.04	74.00	-12.96	Vertical	Peak	
2500.00	43.36	27.20	8.08	37.38	41.26	74.00	-32.74	Vertical	Peak	
2483.50	35.24	27.26	8.04	37.59	32.95	54.00	-21.05	Horizontal	Average	
2500.00	31.53	27.20	8.08	37.38	29.43	54.00	-24.57	Horizontal	Average	
2483.50	34.34	27.26	8.04	37.59	32.05	54.00	-21.95	Vertical	Average	
2500.00	31.44	27.20	8.08	37.38	29.34	54.00	-24.66	Vertical	Average	

# 5.10. Band edge and Spurious Emissions (conducted)

### LIMIT

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

### TEST CONFIGURATION



## TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10<sup>th</sup> harmonic. Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

#### TEST MODE:

Please refer to the clause 3.3

#### TEST RESULTS

☑ Passed □ Not Applicable

Fest Item:	Band edge		Modul	ation type	<b>e</b> :	GFSI	K	
		MultiView :: Spectrum					~	
		Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 1.0 1 Frequency Sweep	0 dB ⊕ <b>RBW</b> 100 kHz 5 ms ⊕ <b>VBW</b> 300 kHz	Mode Auto Sweep			Count 500/500 19k Max	
		a mequality off cep				M1[1	] 7.11 dBn 2.4020100 GH;	
		10 dBm					] -49.99/dBn 2.4000000 GH	
		0 d8m-						
		-10 dBm						
		-20 dBm					+ $+$	
		-30 dBm			_		++	
CH00		-40 dBm-					+	
No hopping mode		-50 dBm-					- 7	
		60 dBm	المراجع والمراجع والمراجع المراجع الم	mm. Maliliano alga	walnum and marked	M3 Law History and Martin	abaterrar	
		-70 dBm-						
		2.31 GHz	1001	pts	9.5 MHz/		2.405 GHz	
		2 Marker Table Type   Ref   Trc	( Mahan I		Function	Function		
		M1 1 2.40 M2 1 M3 1	201 GHz 2.4 GHz 2.39 GHz 2.31 GHz	Y-Value 7.11 dBm -49.99 dBm -61-93 dBm				
		M3 1 M4 1 M5 1 <b>2.39</b>	2.31 GHz 968 GHz	-61.93 dBm -63.42 dBm -50.45 dBm				
							20.05.2019	
		Date: 30 MAY 2019 11:42:56	<u> </u>					
		MultiView         Spectrum           Ref Level 20.00 dBm         Offset 1.0           Att         30 dB         SWT         1.0	0 dB = RBW 100 kHz	Hade too A			7	
		Att 30 dB SWT 1.0     I Frequency Sweep	oms = VBW 300 kHz	Mode Auto sweep		M1[1	Count 500/500 19k Max 1 8,55 dBn	
		10 dBm				M2[1	2.4049530 GH -56.43 dBr	
		0 d8m					2.4000000 CH	
CH00 Hopping mode		-10 dBm +11 -11.450 dBm					141	
		-20 dBm-						
		-30 dBm						
		-40 d8m						
		-50 d8m						
Hopping mode		-60 dBm-				MO	NA	
		anterspecture water Manage Inc	which which have	puralish had with made	nomentandariantan	where the second s	water -	
		-70 dBm-						
		2.31 GHz 2 Marker Table	1001		9.5 MHz/		2.405 GHz	
		Type         Ref         Trc         X-Value         Y-Value         Function         Function Result           M1         1         2.404933 GHz         8.55 dBm         1						
		M2 1 M3 1 M4 1	2.39 GHz 2.31 GHz	-62.78 dBm -63.61 dBm				
		M5 1 2.3	9911 GHz	-53.66 dBm		(11111) (	<b>VO</b> 24105.2019	
		Dame:24.MAY 2019 17:01:44						
		MultiView Spectrum					V	
		Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 1.0 1 Frequency Sweep	u ad ⊜ RBW 100 kHz 2 ms ⊜ VBW 300 kHz	Mode Auto Sweep			Count 500/500	
						M1[1	] 6.44 dBn 2.4799890 GH;	
		10 d8m // 10				M2[1	] -54.43 dBn 2.4835000 GH	
		0 dBm						
		-10 dBm H1 -13.560 dBm					_	
		-20 d8m						
		-30 d8m			_			
CH78		-40 d8m						
No hopping mode		/50 d8m	No					
		-60 d8m	Whenther	munhame	wark more more war		-	
		-70 d8m			and a second	manna	ummanni	
		2.478 GHz 2 Marker Table	1001		2.2 MHz/		2.5 GHz	
		Type         Ref         Trc         X           M1         1         2.47         X <t< td=""><td>(-Value 9989 GHz 4835 GHz 2.5 GHz 3522 GHz</td><td>Y-Value 6.44 dBm -54.43 dBm -62.67 dBm -53.98 dBm</td><td>Function</td><td>Function</td><td>Result</td></t<>	(-Value 9989 GHz 4835 GHz 2.5 GHz 3522 GHz	Y-Value 6.44 dBm -54.43 dBm -62.67 dBm -53.98 dBm	Function	Function	Result	
		M3 1 M4 1 <b>2.48</b>	2.5 GHz 3522 GHz	-62.67 dBm -53.98 dBm				
	1	N N					24.05.2019	

## Report No.: CHTEW19060043

Ref Level 20:0 dbm         Offset 1:0 db         #RBW 100 Hz sold         Count 500/500           I recouncy Sweep         0 db         0 db
0.8m         MI(1)         6.36 dim 0.2/70010 Oith -58.25 dim 2.4835000 Gib           0.8m         -2.4835000 Gib           0.8m         -11,600 dim
18 20
2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz
2 Marker Table         V-Value         V-Value         Function           Type   Ref         Trc         X-Value         V-Value         Function           Mod         1         2.4833 GHz         -58.25 dBm         Function         Function Result           Mod         1         2.4833 GHz         -58.25 dBm         Function         Function           Mod         1         2.483764 GHz         -56.79 dBm         Function         Function

st Item:	Band edge	Modulation type: π/4D					4DQPSK		
		MultiView Spectrum					[ ]		
		Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 1.0 1 Frequency Sweep	00 dB ⊕ RBW 100 kHz 5 ms ⊕ VBW 300 kHz	Mode Auto Sweep			Count 500/50		
		a moquanty ownedge					M1[1] 7.16 d 2.4021050 0		
		10 dBm					M2[1] -43.15 2.4000000		
		0 d8m							
		-10 dBm H1 -12.840 dBm							
		-20 dBm							
		-30 dBm							
CH00		-40 d8m-					NS		
No hopping mode		-50 dBm					and the second sec		
511 5		-60 d8m				Manu Martin	www.www.www.		
		Valuedan solo win margan	بغيريمهم المحسرين	all aman and the stand of the stand and the	hand many programmed and many many	www.goddull.al.mahada.u.a.a			
		2.31 GHz 2 Marker Table	1001		9.5 MHz/		2.405 G		
		Type         Ref         Trc           M1         1         2.40           M2         1	K-Value 2105 GHz 2.4 GHz	Y-Value 7.16 dBm -43.15 dBm	Function	Fun	ction Result		
		M3 1 M4 1	2.39 GHz 2.31 GHz	-60.66 dBm -63.90 dBm					
		M5 1 2.39	9585 GHz	-41.84 dBm			2105.20		
		Dama: 24 MAY 2019 16:47:40							
		MultiView         Spectrum           Ref Level 20.00 dBm         Offset 1.0           Att         30 dB         SWT         1.0	00 dB = RBW 100 kHz	Mada Auto Course					
		Att 30 dB SWT 1.0     IFrequency Sweep	omš≡ <b>VBW</b> 300 kHz	Mode Auto Sweep			Count 500/50 19k Ms M1[1] 7.02 d		
		10 dBm					2.4040030 0 M2[1] -44.91 d		
		0 dBm-					2.4000000		
		-10 dBm							
CH00 Hopping mode		H1 -12.980 dBm							
		-20 d8m							
		-30 d8m							
		-40 d8m-					¥		
		-50 d8m-					N <sup>ral</sup>		
		+60 dBm	and the second second and a second	to an and the second	and all server and the	Mit Mary and Stranger	warden		
		-70 d8m							
		2.31 GHz	1001	pts	9.5 MHz/		2.405 G		
		2 Marker Table Type   Ref   Trc	K-Value	Y-Value	Function	Fun	ction Result		
		M1 1 2.40 M2 1 M3 1	K-Value 4003 GHz 2.4 GHz 2.39 GHz 2.31 GHz	Y-Value 7.02 dBm -44.91 dBm -62.28 dBm -62.41 dBm					
		M3 1 M4 1 M5 1 <b>2.39</b>	2.31 GHz 9585 GHz	-62.41 dBm -43.40 dBm					
						New York Control of Co	210520 10 100		
		Date: 24 MAY 2019 17:12:55	ר				[]		
		Ref Level 20.00 dBm Offset 1.0 Att 30 dB SWT 1.0	00 dB = RBW 100 kHz	Mode Auto Swaan			Count 500/50		
		TFrequency Sweep	UU = YUTF JUU KIIZ				• 1Pk Ma		
		10 d8mM1					2.4798350 0 M2[1] -54.24 d		
		D dBm					2.4835000 0		
		-10 dBm							
		H1 -15.230 dBm							
		-20 d8m							
01170		-30 g/m							
CH78		-40 dBm							
o hopping mode		NSO dBm - W	MB						
		-60 d8m	" la manuta	man My man.	mannen	Marine	Annandada		
		-70 d8m							
		0.170.01							
		2.478 GHz 2 Marker Table	1001		2.2 MHz/		2.5 G		
		Type         Ref         Trc           M1         1         2.47           M2         1         2.	K-Value 9835 GHz 4835 GHz 2.5 GHz 3522 GHz	Y-Value 4.77 dBm -54.24 dBm -63.33 dBm -54.24 dBm	Function	Fun	ction Result		
		M2 1 2.48 M3 1 M4 1 2.48	2.5 GHz	-63.33 dBm					
		M4 1 2.48	3322 012	-34.24 0.0111					
		M4 1 2.48	5522 662	-54.24 0511			21.05.20		

## Report No.: CHTEW19060043

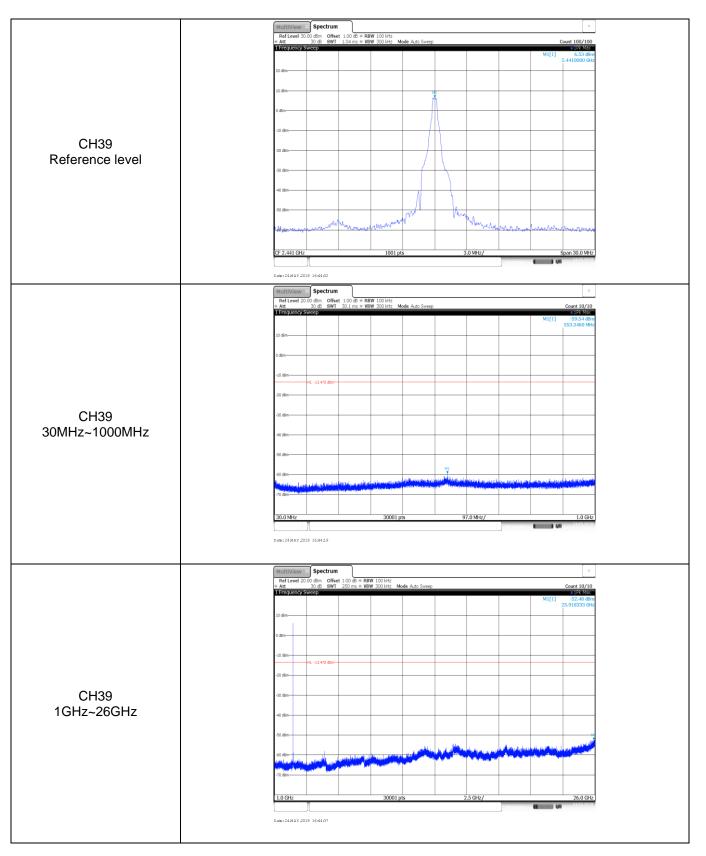
	WultiView : Spectrum RefLevel 2000 dbm Offset 100 db = RBW 100 kHz	V
	Att 30 dB SWT 1.02 ms = VBW 300 kHz Mode Auto Sweep Count 50	00/500 Pk Max
	M1[1] 4- 2.48016	i.42 dBm 650 GHz i.97 dBm
	-10 dbn	
CH78	-10 dbn	
Hopping mode		
	42 de	anna
	2.478 GHz 1001 pts 2.2 MHz/ 2	2.5 GHz
	2 Marker Table         Y-Yalue         Function         Function Result           Type         Ref         Trc         X-Yalue         Yule         Function         Function Result           M1         1         2.480165 GHz         -4.42 dBm         Function         Function Result           M2         1         2.4833 GHz         -55.279 dBm         Function         Function Result           M3         1         2.5 GHz         -55.757 dBm         Function         Function Result	
		1.05.2019
	Dam: 24 MAY 2019 1743:40	

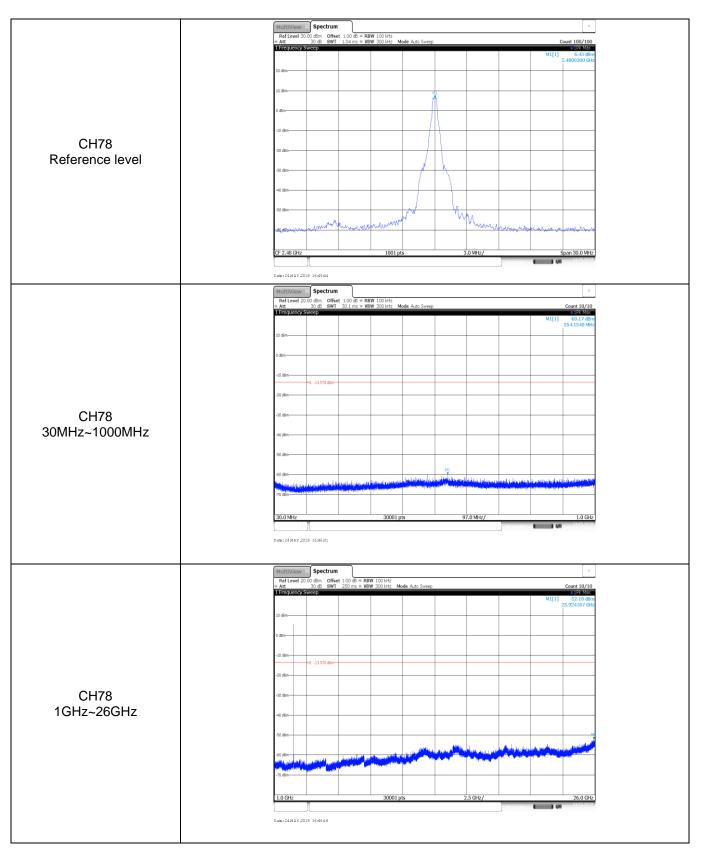
Item:	Band edge		Modula	ation typ	be:	8DPS	K
		MultiView Spectrum					v
		Ref Level 20.00 dBm Offset : Att 30 dB SWT 1 1 Frequency Sweep	LOD dB ⊕ <b>RBW</b> 100 kHz .05 ms ⊕ <b>VBW</b> 300 kHz M	Iode Auto Sweep			Count 500/500
						M1[1]	7.27 dBr 2.4018210 GH
		10 dBm				M2[1]	-44.7418br 2.4000000 GH
		0 d8m					
		-10 dBm					
		-20 d8m-					
		-30 dBm					
CH00		-40 d8m					MS
o hopping mode		-50 d8m					- Jul 1
		60 dBm	and the second state of the second state of the second state of the second state of the second states of the secon	and the second starts	and the second second second second	M3	North Contraction of the Contrac
		-70 dBm	all what we have a start of the				
		2.31 GHz	1001 p		9.5 MHz/		2.405 GH
		2 Marker Table	V Value		Function	Function	
		M1 1 2.4 M2 1	01821 GHz 2.4 GHz	Y-Value 7.27 dBm -44.74 dBm -62.54 dBm	Punction	Puncaon	cesuit
		M3 1 M4 1		-63.62 abm			
		M5 1 2.3	99585 GHz	-41.43 dBm			24.05.2019
		Date:24_MAY_2019 16:52:51					
	1	MultiView 🗄 Spectrum					V
		Ref Level 20.00 dBm Offset : Att 30 dB SWT 1	.00 dB = RBW 100 kHz .05 ms = VBW 300 kHz	dode Auto Sweep			Count 500/500
		1 Frequency Sweep				M1[1]	<ul> <li>1Pk Max</li> <li>3.70 dBr</li> <li>2.4031490 GH</li> </ul>
		10 d8m				M2[1]	-50.00 dBr 2.4000000 GH
		0 d8m					- M
		-10 d8m					
		-20 d8m-					
CH00 Hopping mode		-30 d8m					
		-40 dBm					
		-50 d8m					MS.
Spping mode		-60 d8m-					JW/
		-70 dBm-	decourses and the owners and a second	un and the second	mandementer	han war war war	w <sup>rus</sup>
		2.31 GHz 2 Marker Table	1001 p		9.5 MHz/		2.405 GH
		Type         Ref         Trc           M1         1         2.4           M2         1	X-Value 03149 GHz 2.4 GHz	Y-Value 3.70 dBm -50.00 dBm	Function	Function	Result
		M3 1 M4 1	2.39 GHz 2.31 GHz	-63.56 dBm -63.63 dBm			
		M5 1 2.3	99585 GHz	-46.93 dBm			Q 271.05.2019
		Date:27MAY_2019 19:53:26					
		MultiView 🗄 Spectrum					
		Ref Level 20.00 dBm Offset : Att 30 dB SWT 1	.00 dB ⊕ RBW 100 kHz .02 ms ⊕ VBW 300 kHz M	Hode Auto Sweep			Count 500/500
		1 Frequency Sweep				M1[1]	<ul> <li>1Pk Max</li> <li>4.76 dBr</li> <li>2.4801430 GH</li> </ul>
		10 d8mNL				M2[1]	-52.50 dBr 2.4835000 GH
		D dBm					
		-10 dBm					
		-20 dBm					
		-30 000					
CH78							
hopping mode		-40/d8m					
Abbind mode		y <sup>6</sup> 0 d8m	Mur.				
		-60 dBm-	m. Marchan	and the man	www.a.Muner	monument	nonman
		-70 d8m					
		2.478 GHz	1001 p	its	2.2 MHz/		2.5 GH
		2 Marker Table			Function	Function	
			80143 CH-	4.76 dBm			
		M1 1 2.4 M2 1	2.4835 GHz	-52.50 dBm			
		M1 1 2.4 M2 1 M3 1 M4 1 2.4	X-Value 80143 GHz 2.4835 GHz 2.5 GHz 83522 GHz	Y-Value 4.76 dBm -52.50 dBm -62.67 dBm -53.03 dBm		<b>6</b>	21.05.2017

## Report No.: CHTEW19060043

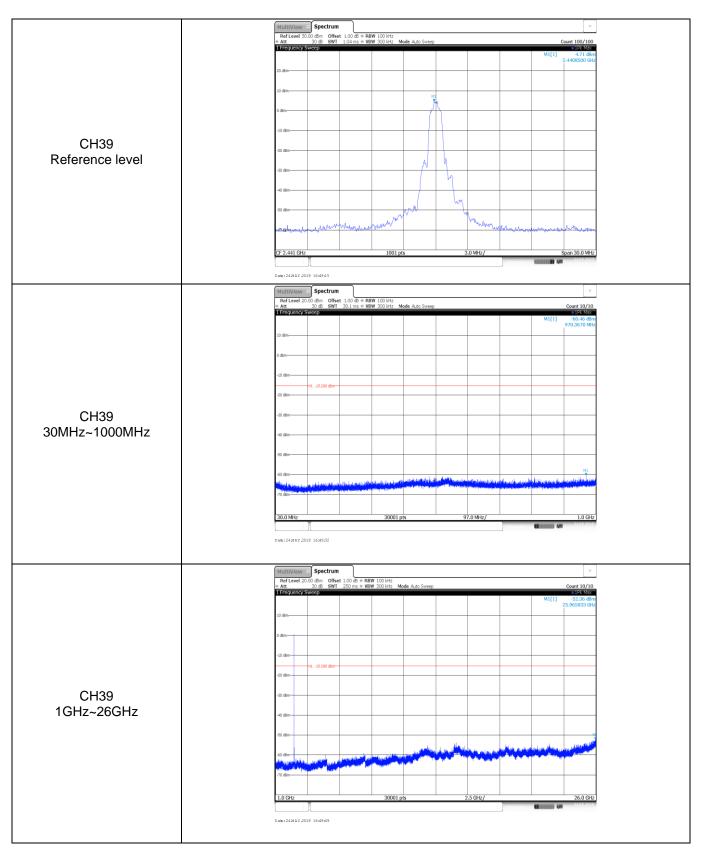
	MultiView Spectrum			
	Ref Level 20.00 dBm Offset 1.00 Att 30 dB SWT 1.02	dB ⊜ RBW 100 kHz ms ⊜ VBW 300 kHz Mode Auto Sweep		Count 500/500
	1 Frequency Sweep			© 19k MBX M1[1] 2.42 dBm 2.4788460 GHz M2[1] -59.00 dBm 2.4835000 GHz
	10 dBm			
CH78 Hoppig mode	-30 dbm			
	-50 d8m	te Me	monte	antenation
	2.478 GHz	1001 pts	2.2 MHz/	2.5 GHz
	M1 1 2.478 M2 1 2.4 M3 1	Value Y-Value 346 GHz 2.82 dBm 335 GHz -59.00 dBm 2.5 GHz -62.86 dBm 182 GHz -58.31 dBm	Function	Function Result
			. Mexicular	27.05 2019
	Date:27 MAY 2019 19:53:41			

est Item:	SE		GFSK				
		MultiView 🗄 Spectrum		tion type			V
		Ref Level 30.00 dBm Offset 1. Att 30 dB SWT 1. Trequency Sweep	00 dB = RBW 100 kHz 04 ms = VBW 300 kHz Me	de Auto Sweep			Count 100/100 • 1Pk Max
		Thequency sweep				M1[1]	8.70 dBr 2.4020000 GH
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		10 dBm		м			
				N			
		0 dām					
		-10 d8m					
CH00		-20 d8m		/_			
Reference level		-30 d8m					
		-40 d8m					
		-50 dBm	n north	med "	Winner		
		18 2 mar mar Mar Mar	mh		Window	when the work where the	munne
		CF 2.402 GHz	1001 pt	\$	3.0 MHz/	(	Span 30.0 MHz
		Dama:24 MAY 2019 16:42:00					
		MultiView = Spectrum	7				v
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 30	00 dB = RBW 100 kHz 1.1 ms = VBW 300 kHz M	de Auto Sweep			Count 10/10
		1 Frequency Sweep				M1[1]	<ul> <li>19k Max</li> <li>-60.66 dBr</li> <li>485.2540 MH</li> </ul>
		10 dBm-					
CH00 30MHz~1000MHz		D dām					
		-10 dBm					
		H1 -11.300 dBm					
		-20 d8m-					
		-30 dBm					
		-40 d8m					
		-50 d8m-					
		-Ja don		M1			
		-60 dBm	a marting the foreground the		allifici an east tends but	مغوسه بالتجالد ستوبغ	امورالية ارتعاري
		-70 dBm	an fan en en en fan en				
		30.0 MHz	30001 p	s	97.0 MHz/		1.0 GH:
				-		(	
		Date:24MAY 2019 16:42:17					
		MultiView :: Spectrum					V
		Ref Level 20.00 dBm Offset 1. Att 30 dB SWT 25 1 Frequency Sweep	uu ad ≡ RBWI 100 kHz 50 ms ≡ VBWI 300 kHz Mo	de Auto Sweep			Count 10/10 1Pk Max
						M1[1]	-45.81 dBr 4.803333 GH
		10 dBm					
		0 dām-					
		-10 dBm H1 -11.300 dBm					
		11 11 10 00 000					
		-20 dBm-					
CH00		-30 dBm					
1GHz~26GHz		-40 dBm					
		-50 dBm-					
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		and a second					
		-70 dBm					
					2.5 GHz/		26.0 GH
		1.0 GHz	30001 pl	s	2.3 002/		26.0 GH
		1.0 GHz	30001 pi	\$	2.3 GHZ/	(IIIII) //	

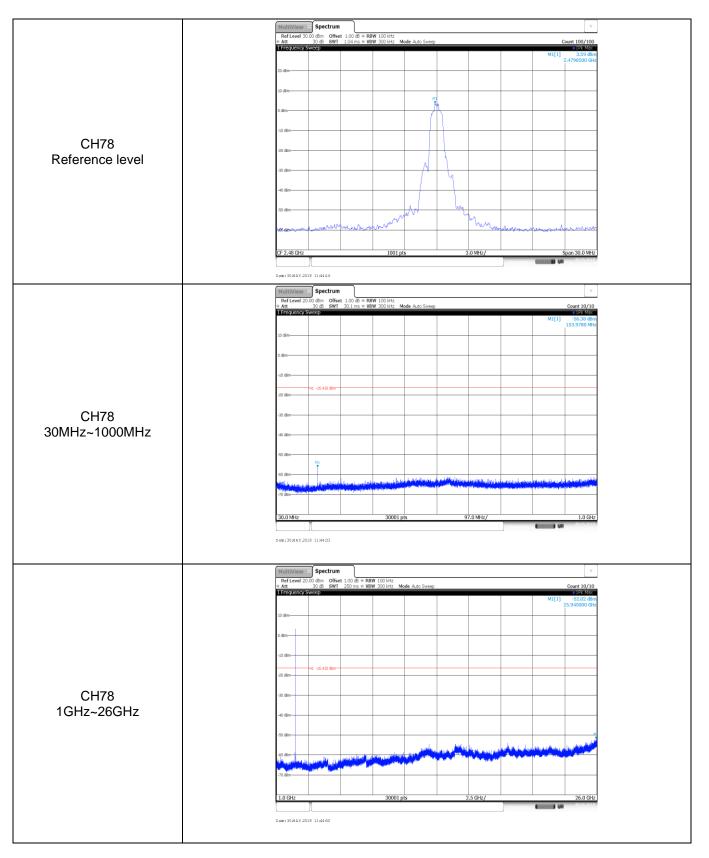




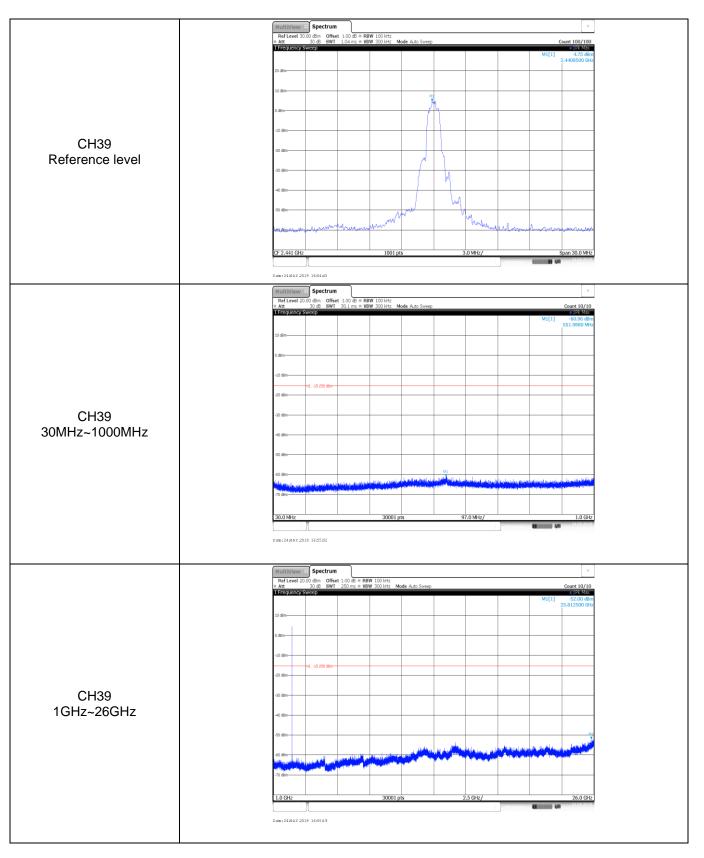
est Item:	SE			Mo	odula	tion f	type:		1	π/4D0	QPSK
		MultiView									V
		Ref Level 30.0 Att 1 Frequency Sv	00 dBm Offset 30 dB SWT	1.00 dB ⊕ RBV 1.04 ms ⊕ VBV	WI 100 kHz WI 300 kHz Mo	de Auto Sweep	)			(	Count 100/100 19k Max
										M1[1]	7.31 dBr 2.4021500 GH
		20 dBm-									
		10 dBm					Ţ				
		0 d8m				/	1				
		-10 dBm									
CH00		-20 d8m				A					
Reference level		-30 dBm				- <sup>0</sup> ·					
		-40 d8m-									
						Ju	M				
		-50 d8m	withmen	mahand	with			You way	10.00 va	_	
		debran un	welgen						* White were	her land an and have	hunn
		CF 2.402 GHz			1001 pt	;		3.0 MHz/			Span 30.0 MH
									Measuring	44	24.05.201
		Date:24 MAY 201	9 16:47:48								
		MultiView	Spectrum								v
		Ref Level 20.0	00 dBm Offset 30 dB SWT	1.00 dB = RBV 30.1 ms = VBV	W 100 kHz W 300 kHz Mo	de Auto Sweep					Count 10/10
		1 Frequency Sv	weep							M1[1]	<ul> <li>1Pk Max</li> <li>-60.78 dBr</li> <li>920.1550 MH</li> </ul>
		10 dBm-									520.1330 Mil
CH00 30MHz~1000MHz		0 d8m									
		-10 d8m-	H1 -12.690 dBm								
		-20 d8m									
		-30 d8m									
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		-50 d8m									
		-60 dBm	المعطام ما	A. S. C. S. Alida	د	hanedaaya	and the section	المتحدية فأحد المتحاط	the Marson of Sector	distances	- MI 
		-70 dBm		al per al presentations	and the second			i Manada Banan mang kaparan	den a projekti da	o travé part-da bloare.	
		30.0 MHz			30001 pt			7.0 MHz/			1.0 GH
		30.0 MH2			30001 pi	5	9	7.0 MH2/	Measuring		
		Date:24 MAY 201	9 16:48:04								
		(	( En-at-								[
		Ref Level 20.0 Att	30 dB SWI	1.00 dB = RBV 250 ms = VRV	V 100 kHz V 300 kHz Mo	de Auto Sween					Count 10/10
		1 Frequency Sv	weep							M1[1]	<ul> <li>19k Max</li> <li>-49.69 dBr</li> </ul>
		10 dBm									4.803333 GH
		0 dam									
		-10 dBm	H1 -12.690 dBm								
		-20 d8m-									
CH00		-30 dBm									
1GHz~26GHz		-40 dBm-									
			MI								
		-50 d8m				L	ulua		all a select		الم الله دفين
		-60 dBm	ىلىرى الموقعين	Il la long an	Sec. Contraction	and a state of the					- Contraction
		-70 dBm	and the second	and a second second second	and a second second						
		1.0 GHz			30001 pt	\$		2.5 GHz/	Measuring		26.0 GH



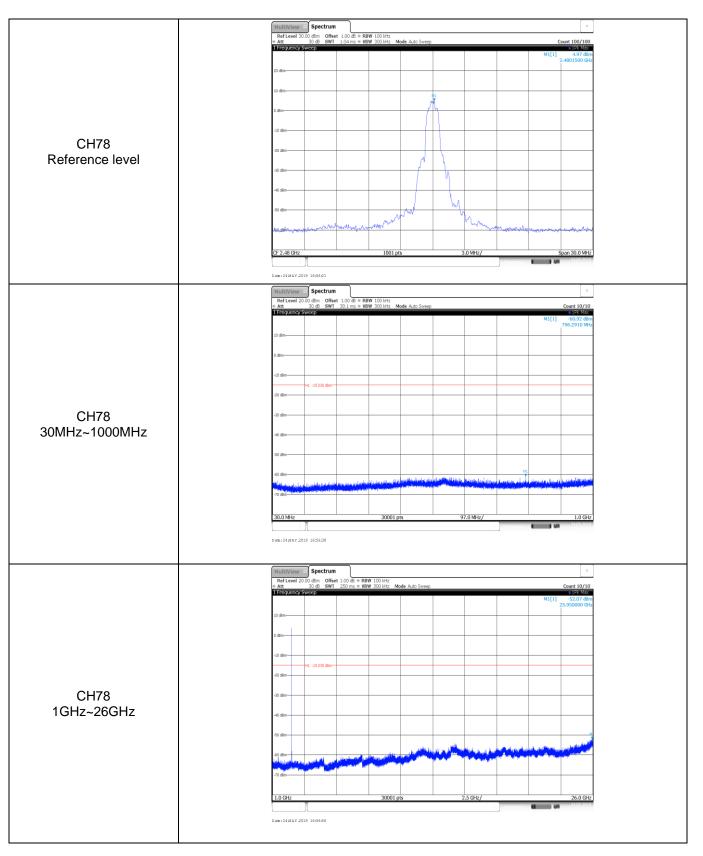
Shenzhen Huatongwei International Inspection Co., Ltd.



est Item:	SE		Modula	ation	type:		8	DPS	K
		MultiView 🗄 Spectrum							v
		Ref Level 30.00 dBm Offset Att 30 dB SWT 1 Frequency Sweep	1.00 dB ⊕ RBW 100 kHz 1.04 ms ⊕ VBW 300 kHz M	lode Auto Sweep				(	Count 100/100
		T Frequency sweep						M1[1]	7.46 dBr 2.4021500 GH
		20 dBm							
		10 d8m			-				
				1	h				
		0 dBm							
		-10 dBm-							
CH00		-20 dBm			\				
Reference level		-30 dBm		MN	M				
		-su dam-							
		-40 d8m		N	1				
		-50 dBm	- New	<u>л</u> —	- ~~	4			
		see and the second	wand			Wellinghow	within	mm	manun
		CF 2.402 GHz	1001 p	ts	3	0 MHz/			Span 30.0 MH
		Dama:24.MAY.2019 16:52:58							19.52.5
		MultiView Spectrum Ref Level 20.00 dBm Offset Att 30 dB SWT	1.00 dB = RBW 100 kHz						Ţ
		Att 30 dB SWT 1 1 Frequency Sweep	30.1 ms ⊕ VBW 300 kHz M	Iode Auto Sweep			_		Count 10/10 • 19k Max
CH00								M1[1]	-59.71 dBr 554.9950 MH
		10 d8m							
		0 dBm							
		-10 d8m							
		+11 -12.540 dBm							
		-co den-							
		-30 dBm							
30MHz~1000MHz		-40 dBm							
		-50 d8m							
					M1				
		-60 dBm-	dan yang malakan sa sa sa			(Helistane)	industriantes	مردان روانه محمد بروانه محمد ا	
		-70 dBm	and a second						
		30.0 MHz	30001 p	ots	97	.0 MHz/			1.0 GH
							Measuring	<b></b> 44	
		Date:24MAY.2019 16:53:41							
		MultiView E Spectrum							V
		Ref Level 20.00 dBm Offset Att 30 dB SWT 1 Frequency Sweep	250 ms = NBW 300 kHz M	lode Auto Sweep					Count 10/10 1Pk Max
							M1[1	]	-50.96 dBr 4.803333 GH
		10 dBm							
		D dBm							
		-10 dBm							
		H1 -12.540 dBm							
		-20 d8m							
CH00		-30 dBm-							
1GHz~26GHz		-40 dBm-							
		-50 d8m							
				لفعرل	L. Martine		والمراجع والمرافع	i turi dan.	
		-60 dBm-							franciska a filmani
		-70 dBm							
		1.0 GHz	30001 p	ate		5 GHz/			26.0 GH
		1.0 0112	300010		Z	U JIIC/			20.0 OH.
							Nexuring	<b>B</b> 44	



Shenzhen Huatongwei International Inspection Co., Ltd.



# 5.11. Spurious Emissions (radiated)

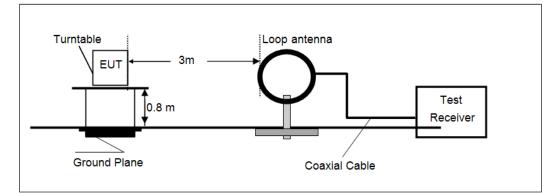
## <u>LIMIT</u>

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

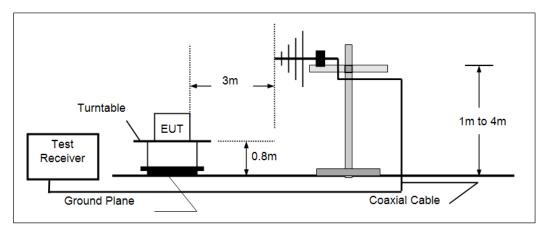
Frequency	Limit (dBuV/m @3m)	Value		
30 MHz ~ 88 MHz	40.00	Quasi-peak		
88 MHz ~ 216 MHz	43.50	Quasi-peak		
216 MHz ~ 960 MHz	46.00	Quasi-peak		
960 MHz ~ 1 GHz	54.00	Quasi-peak		
Above 1 GHz	54.00	Average		
	74.00	Peak		

# **TEST CONFIGURATION**

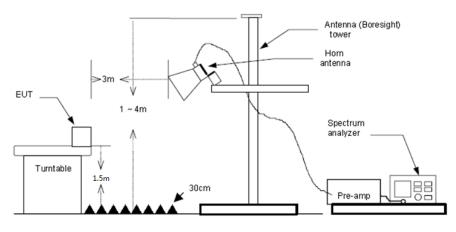
Below 30 MHz



## > 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

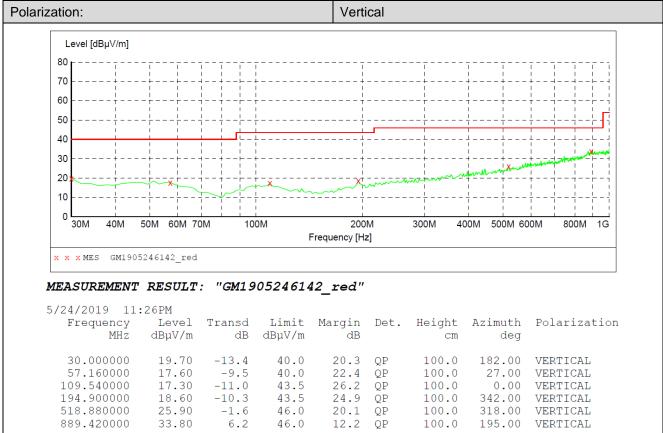
#### Note:

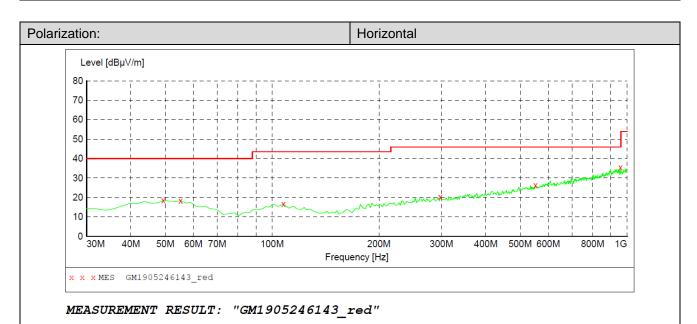
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst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

#### ➢ 30 MHz ~ 1 GHz





5/24/2019 11 Frequency MHz	:29PM Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
49.400000 55.220000	18.50 18.30	-8.8 -9.3	40.0 40.0	21.5 21.7	QP OP	100.0	199.00 162.00	HORIZONTAL HORIZONTAL
107.600000	16.60	-10.8	43.5	26.9	QP	100.0	138.00	HORIZONTAL
297.720000	20.20	-7.5	46.0	25.8	QP	100.0	138.00	HORIZONTAL
551.860000	26.30	-1.0	46.0	19.7	QP	100.0	75.00	HORIZONTAL
957.320000	35.40	6.9	46.0	10.6	QP	100.0	340.00	HORIZONTAL

$\triangleright$	1	GHz	~	25	GHz
-				20	

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
2839.61	35.08	28.26	8.91	35.97	36.28	74.00	-37.72	Vertical	Peak
3525.56	35.42	29.08	9.94	37.80	36.64	74.00	-37.36	Vertical	Peak
4809.50	36.72	31.58	11.74	36.27	43.77	74.00	-30.23	Vertical	Peak
6678.99	30.91	34.20	14.17	34.96	44.32	74.00	-29.68	Vertical	Peak
3844.28	34.03	29.64	10.29	37.61	36.35	74.00	-37.65	Horizontal	Peak
4809.50	42.17	31.58	11.74	36.27	49.22	74.00	-24.78	Horizontal	Peak
6696.01	30.47	34.20	14.19	34.93	43.93	74.00	-30.07	Horizontal	Peak
8042.90	30.43	37.06	15.67	34.37	48.79	74.00	-25.21	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
3216.84	35.41	28.70	9.48	37.38	36.21	74.00	-37.79	Vertical	Peak
3844.28	34.29	29.64	10.29	37.61	36.61	74.00	-37.39	Vertical	Peak
5099.49	32.02	31.90	12.03	35.13	40.82	74.00	-33.18	Vertical	Peak
7319.96	30.80	36.30	14.58	34.77	46.91	74.00	-27.09	Vertical	Peak
3176.16	35.40	28.80	9.37	37.56	36.01	74.00	-37.99	Horizontal	Peak
4138.80	33.49	29.94	10.69	37.20	36.92	74.00	-37.08	Horizontal	Peak
4883.52	36.64	31.43	11.68	35.97	43.78	74.00	-30.22	Horizontal	Peak
6645.07	31.89	34.20	14.12	35.03	45.18	74.00	-28.82	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
3923.37	34.89	29.70	10.41	37.32	37.68	74.00	-36.32	Vertical	Peak
5138.58	31.97	31.74	12.04	34.94	40.81	74.00	-33.19	Vertical	Peak
6662.01	31.46	34.20	14.14	35.00	44.80	74.00	-29.20	Vertical	Peak
8022.46	30.99	37.08	15.60	34.40	49.27	74.00	-24.73	Vertical	Peak
2818.01	34.20	28.17	8.92	35.42	35.87	74.00	-38.13	Horizontal	Peak
3625.67	34.75	29.30	9.99	37.88	36.16	74.00	-37.84	Horizontal	Peak
5177.97	31.21	31.59	12.05	34.71	40.14	74.00	-33.86	Horizontal	Peak
7172.41	30.48	36.04	14.52	34.72	46.32	74.00	-27.68	Horizontal	Peak

Remark:

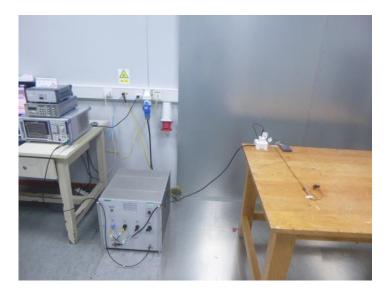
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor

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.

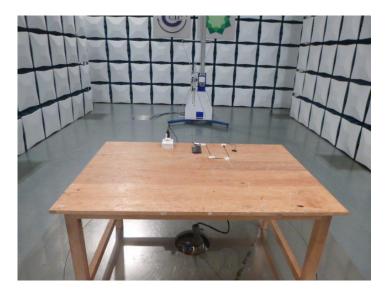
# 6. TEST SETUP PHOTOS

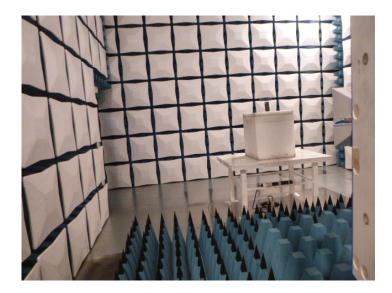
## Conducted Emissions (AC Mains)



#### **Radiated Emissions**







# 7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19060040

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