



TEST REPORT

Report Reference No:	CHTEW19050043	eport verification:	
Project No:	SHT1904092401EW		
FCC ID:	2ASWW-KS209		
Applicant's name:	XINCHUANGXIN INTERNATION	IAL CO. LTD	
Address	ROOM 605 6/F, FA YUEN COMM STREET MONGKOK KL	MERCIAL BUILDIN	G, 75-77 FA YUEN
Manufacturer	Shenzhen Chiteng Technology C	o.,Ltd	
Address:	Second Floor, Area A, Building 4, Guanguang Road, Tangjia Comm New District, Shenzhen, Guangdo	nunity, Gongming S	
Test item description:	Feature phone		
Trade Mark	CORN		
Model/Type reference:	K8		
Listed Model(s)	K8+,K8 mini,K8 pro,K8s		
Standard:	FCC CFR Title 47 Part 15 Subpa	art C Section 15.2	47
Date of receipt of test sample:	Apr 30, 2019		
Date of testing	May 05, 2019- May 14, 2019		
Date of issue	May 15, 2019		
Result	PASS		
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li	Sil	lvia Li
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Testing Laboratory Name:	Shenzhen Huatongwei Internat	ional Inspection C	Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Indus Gongming, Shenzhen, China	strial Park, Genyu F	Road, Tianliao,
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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	2019-05-15	Original

2. TEST DESCRIPTION

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

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	XINCHUANGXIN INTERNATIONAL CO. LTD		
Address: ROOM 605 6/F, FA YUEN COMMERCIAL BUILDING, 75-77 FA STREET MONGKOK KL			
Manufacturer: Shenzhen Chiteng Technology Co.,Ltd			
Address: Second Floor, Area A, Building 4, Huiye Technolo Guanguang Road, Tangjia Community, Gongming Street, C District, Shenzhen, Guangdong			

3.2. Product Description

Feature phone		
CORN		
К8		
K8+,K8 mini,K8 pro,K8s		
Conducted: 352273017386340 Radiated: 352273017386250		
DC 3.7V		
Model:FSF-01 Input:100-240Va.c., 50/60Hz, 0.25A Output:5.0Vd.c., 500mA		
CE209_MAIN_V1.1		
CE209_3232_240320_A28205_K8_CORN_EnSpFrPo_V02_0_20190507		
Supported BT2.1+EDR		
GFSK, π/4DQPSK, 8DPSK		
2402MHz~2480MHz		
79		
1MHz		
PIFA 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.:	/
	/	Manufacturer:	/
		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	0.63 dB	(1)
Conducted spurious emissions 9kHz~40GHz	0.63 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.35 dB	(1)
Radiated Emissions below 1GHz	4.28 dB	(1)
Radiated Emissions above 1GHz	5.16 dB	(1)
Occupied Bandwidth	69 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
0	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 emissi	on-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
0	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	2019/04/26	2020/04/25
•	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

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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 N	lethod				
Used	Test Equipment	Manufacturer	Model No.	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)

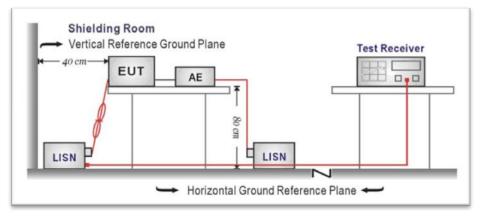
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (d	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

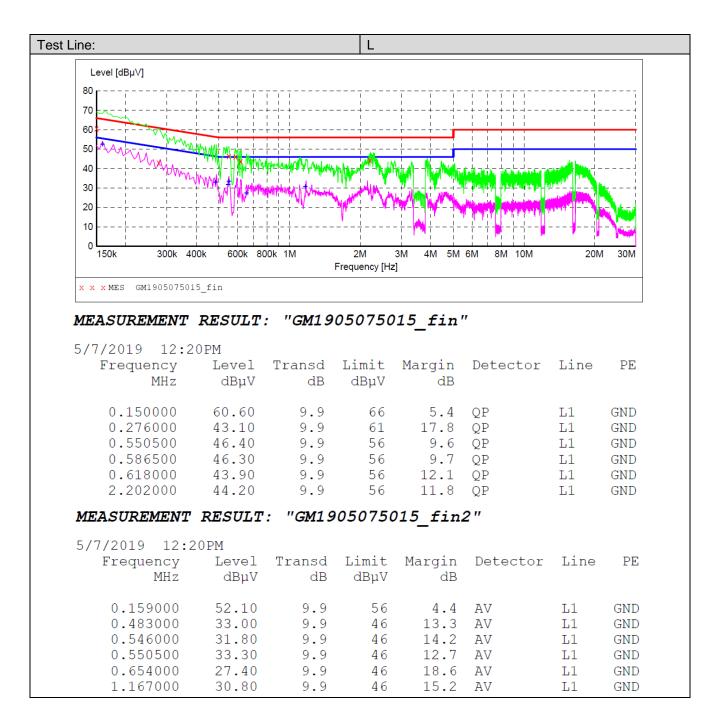
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

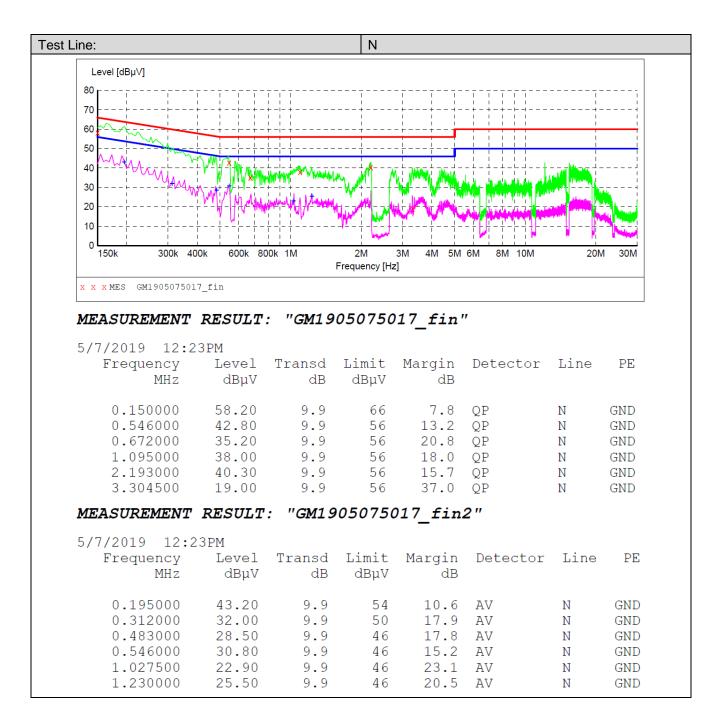
TEST RESULTS

☑ Passed □ Not Applicable

Note:

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



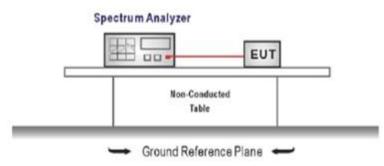


5.3. Conducted Peak Output Power

<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	4.16		
GFSK	39	4.87	≤ 30.00	Pass
	78	5.45		
	00	5.55		
π/4DQPSK	39	6.24	≤ 21.00	Pass
	78	6.27		
	00	5.61		
8DPSK	39	6.37	≤ 21.00	Pass
	78	6.56		

Modulation Type: GFSK Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk View Offset 7.00 dB ● RBW 1 MHz SWT 1 ms ● VBW 3 MHz Mode Auto Sweep M1[1] 4.16 dE 2.40218810 G LO dBm-M1) dBm 10 dBm--20 dBm CH00 -30 dBm--40 dBm 50 dBm -60 dBm 70 dBm 691 pts .0 MHz CF 2.402 GH Date: 7 MAY 2019 11:39 Spectrum
 Ref Level
 20.00
 dBm
 Offset
 7.00
 dB
 RBW
 1
 MHz

 Att
 30
 dB
 SWT
 1
 ms
 VBW
 3
 MHz
 Mode Auto Sweep Count 500/500 4.87 dE M1[1] 2.440 10 dBm M1 0 dBm--10 dBm -20 dBm CH39 -30 dBm-40 dBm -50 dBm -60 dBm 70 dBm-CF 2.441 GH 691 pts 5.0 MHz Sp 11 A 444 Date: 7.MAY.2019 11:41:40
 Spectrum

 Ref Level 20.00 dBm
 Offset 7.00 dB • RBW 1 MHz

 Att
 30 dB • SWT
 1 ms • VBW 3 MHz
 Count 500/500 M1[1] 5.45 dB 2.47986980 GF 10 dBm-MI 0 dBm -10 dBm 20 dBm CH78 30 dBm-40 dBm--50 dBm -60 dBm -70 dBm 691 pts .0 MHz CF 2.48 G **E** Date: 7 MAY 2019 11:43:4

Madulation Tomos	
Modulation Type:	π/4DQPSK
	Spectrum Image: Constraint of the sector of th
	10 dBm 10 dBm
	0 dBm
CH00	-20 dBm
	-40 dBm-
	-50 dBm
	-70 dBm CF 2.402 GHz 691 pts Span 5.0 MHz
	Date: 7 MAY 2019 11:46:12 Spectrum
	Spectrum Image: Constraint of the second secon
	10 dBm
	0 dBm
CH39	-20 dBm
	-40 dBm
	-60 dBm
	CF 2.441 CHz 691 pts Span 5.0 MHz
	D#1021734347 2019 11:4992 Spectrum RefLevel 20:00 dBm Offset 7:00 dB ● RBW 2 MHz
	Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 91Pk View 1 ms VBW 5 MHz Mode 6.27 dBm
	10 dBm
	-20 dBm
CH78	-30 d8m-
	-40 dBm
	-60 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz

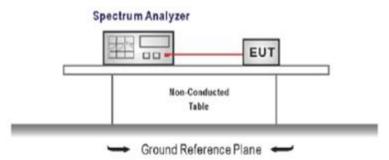
8DPSK
Spectrum (m)
Ref Level 20.00 dBm Offset 7.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 Image: SWT 1 ms VBW 5 MHz Mode Auto Sweep P/F View Image: SWT 1 ms VBW 5 MHz Mode Auto Sweep
10 dBm 10
0 dBm
-20 dBm
-30 dBm
-40 dsm
-60 dBm
-70 dBm
CF 2.402 GHz 691 pts Span 5.0 MHz Date: 7 MAY 2019 13:43:00 Mestering Mestering
Spectrum Ref Level 20.00 dBm Offset 7.00 dB ● RBW 2 MHz
Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500 IPE View
10 dBm
0 dBm
-20 dBm
-30 dBm
-50 d8m
-60 dBm
GE 2.441 GHz 691 pts Span 5.0 MHz
Datu: 7 MAY 2019 13:45:19
Spectrum Image: Construction Image: Construction <th< td=""></th<>
●1Pk View M1[1] 6.56 dBm 2.48000720 GHz
10 dBm
-10 dsm
-20 dBm
-40 dBm
-50 dBm
-70 dBm
CF 2.48 GHz 691 pts Span 5.0 MHz

5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

TEST CONFIGURATION



TEST PROCEDURE

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

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

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

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

🛛 Passed

Not Applicable

Modulation type	Channel	20 dB Bandwidth (MHz)	Limit (MHz)	Result
	00	0.93		
GFSK	39	0.93	-	Pass
	78	0.94		
	00	1.28		
π/4DQPSK	39	1.29	-	Pass
	78	1.29		
	00	1.28		
8DPSK	39	1.28	-	Pass
	78	1.28		

Iodulation Type:	GFSK
	Spectrum (TTR) Ref Level 20.00 dBm Offset 7.00 dB RBW 10 kHz
	Att 30 dB SWT 189.6 µs • VBW 30 kHz Mode Auto FFT Count 500/500 ID 4 M1[1] -22.04 dBm 2.401364500 GHz 10 dBm
0.000	-10 dBm -20 dBm -30 dBm -21.775 dBm -
CH00	-40 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.401545 GHz -22.04 dBm M2 1 2.40206 GHz -1.78 dBm D3 M1 1 932.5 kHz -0.32 dB
	Datus 7 MAY 2019 1138941
	Ref Level 20.00 dm Offset 7.00 dB RBW 10 kHz Att 30 dB SWT 189.6 μs VBW 30 kHz Mode Auto FFT Count 500/500 @1Pk View
	10 dBm 2.44054500 GHz 0 dBm M2[1] -1.07 dBm 0 dBm -10 dBm -2n.dBm 01 -21.055 dBm -30 dBm
CH39	-20.dBm 01 -21.065 dBm WWW
	-60 dBm
	Marker Y-value Y-value Function Function Result M1 1 2:440545 GHz -21.11 dBm Function Result M2 1 2:440566 GHz -1.07 dBm Function Result D3 M1 1 932.5 kHz -0.58 dB
	Date: 7 MAY 2019 11 541 503 Spectrum Ref Level 20.00 dBm Offset 7.00 dB RBW 10 kHz Att 30 dB SWT 189.6 µs VBW 30 kHz Mode Auto FFT
	Count \$00/\$00 PIPk View 10 dBm 0 dBm -10 dBm -10 dBm -10 dBm -21.31 dBm -2.47954280 0CHz -2.48006000 CHz -2.48006000 CHz -10 dBm -10 dBm
CH78	-20.dBm 01 -20.511 dBm 44 44 44 44 44 44 44 44 44 44 44 44 44
	-50 dBm
	Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4795425 GHz -21.31 Bm Million M

Modulation Type: π/4DQPSK Spectrum RefLevel 20.00 dBm Att 30 dB Offset 7.00 dB ● RBW 30 kHz SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT Att Count 500/500 1Pk View -18.19 dB 2.40137000 GI 1.84 dB 2.40216750 GI M1[1] 10 dBm M2[1] 0 dBm--10 dBm 01 -18.16 -20 dBm--30 dBm -40 dBm-CH00 -50 dBm 60 dBm 70 dBm CF 2.402 GHz 1001 pts Span 2.5 MHz X-value Type Ref Trc Function Function Result Y-value -18.19 dBr 2.40137 GHz 2.4021675 GHz 1.2825 MHz -18.19 dBm 1.84 dBm 0.02 dB M1 M2 M1 Date: 7 MAY 2019 11:46:0 Spectrum Ref Level 20.00 dBm Att 30 dB Mode Auto FFT Count 500/500 -18.11 d M1[1] 10 dBm M2 M2[1] 2.55 d 2.44116750 GH 0 dBm \sim 10 dBm -03 20 dBm 1 -17.45 30 dBm CH39 40 dBm-50 dBm -60 dBm -70 dBm CF 2.441 GH 1001 pt: Span 2.5 MHz larke Type Ref Trc M1 1 X-value 2.4403675 GHz 2.4411675 GHz 1.2875 MHz Y-value -18.11 dBm 2.55 dBm 0.28 dB Function Function Result M2 D3 М1 Date: 7 MAY 2019 11:48:53 Spectrum RefLevel 20.00 dBm Att 30 dB Offset 7.00 dB ● RBW 30 kHz SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT Count 500/500 M1[1] -18.35 dB 2.47936750 GF 10 dBm M2 M2[1] 2.33 dB 2.48016750 GF 0 dBm Λ. -10 dBm мμ -20 dBm 30 dBi **CH78** 40 dBm 50 dBm 60 dBm 70 dBm CF 2.48 larke X-value 2.4793675 GHz 2.4801675 GHz 1.285 MHz Y-value -18.35 dBm 2.33 dBm 0.66 dB Function Result Type Ref Trc Function MI Date: 7 MAY.2019 11:5

Modulation Type: **8DPSK** Spectrum RefLevel 20.00 dBm Att 30 dB Offset 7.00 dB ● RBW 30 kHz SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT Att Count 500/500 1Pk View -17.69 dB 2.40136000 GI 2.43 dB 2.40216750 GI M1[1] 10 dBm M2 M2[1] 0 dBm--10 dBm М1, -20 dBm -30 dBm CH00 -40 dBm--50 dBm 60 dBm 70 dBm CF 2.402 GHz 1001 pts Span 2.5 MHz X-value 2.40136 GHz 2.4021675 GHz 1.2775 MHz Type Ref Trc Function Function Result Y-value -17.69 dBr M1 M2 2.43 dBm 0.12 dB M1 Date: 7 MAY 2019 13:42:51 Spectrum
 Ref Level
 20.00 dBm
 Offset
 7.00 dB
 ■ RBW
 30 kHz

 Att
 30 dB
 SWT
 63.1 μs
 ■ VBW
 100 kHz
 Mode Auto FFT Count 500/500 M1[1] -17.34 d 2.44035750 (10 dBm ^{M2} M2[1] ⊼ 3.18 d 2.44116750 GH 0 dBm ~ -10 dBm 01 -16.817 20 dBm 30 dBm CH39 40 dBm-50 dBm -60 dBm -70 dBm CF 2.441 GH 1001 pt: Span 2.5 MHz larke X-value 2.4403575 GHz 2.4411675 GHz 1.28 MHz Type Ref Trc M1 1 Y-value -17.34 dBm 3.18 dBm 0.50 dB Function Function Result M2 D3 М1 440 Date: 7 MAY 2019 13:45:10 Spectrum
 Ref Level
 20.00 dBm
 Offset
 7.00 dB
 ■ RBW
 30 kHz

 Att
 30 dB
 SWT
 63.1 µs
 ■ VBW
 100 kHz
 Mode Auto FFT Count 500/500 M1[1] -17.08 dB 2.47936000 GH 10 dBm M2 M2[1] 2.99 dB 2.48016750 GF 0 dBm ∇ 1 -10 dBm 20 dBm 30 dBr **CH78** 40 dBm 50 dBm 60 dBm 70 dBm CF 2.48 larke X-value 2.47936 GHz 2.4801675 GHz 1.2775 MHz Y-value -17.08 dBm 2.99 dBm -0.04 dB Function Result Type Ref Trc Function M Date: 7 MAY 2019 13:48:2

5.5. Carrier Frequencies Separation

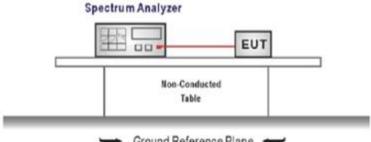
LIMIT

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

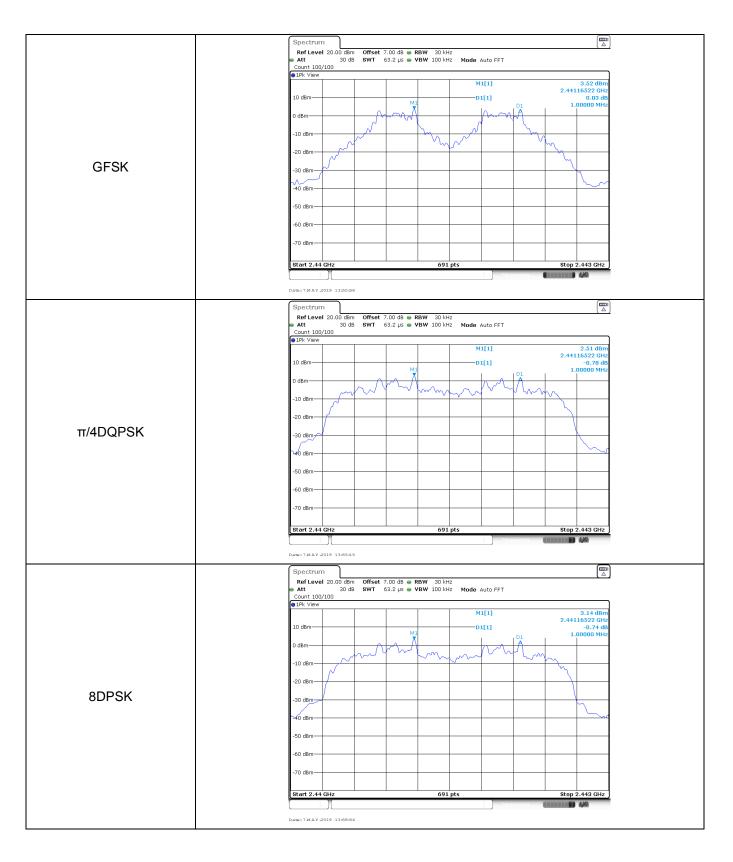
TEST RESULTS

Passed Not Applicable

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (MHz) *	Result
GFSK	39	1.00	≥0.93	Pass
π/4DQPSK	39	1.00	≥0.86	Pass
8DPSK	39	1.00	≥0.85	Pass

Note:

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

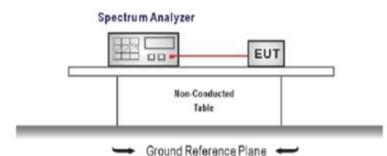


5.6. Hopping Channel Number

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		

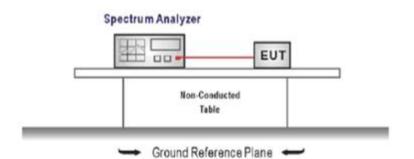
GFSK GFSK GFSK GFSK GFSK Under the second sec
GFSK GFSK GFSK GFSK GFSK GFSK GFSK GFSK
GFSK
GFSK
GFSK ¹
GFSK 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
GFSK GFSK GFSK GFSK GFSK GFSK GFSK GFSK
GFSK
т/4DQPSК 40 dam 40 d
т/4DQPSК 40 dam 40 d
TT/4DQPSK
Т/4DQPSK
TT/4DQPSK
ТТ/4DQPSK
т/4DQPSK
т/4DQPSK
T/4DQPSK
т/4DQPSK
т/4DQPSK
T/4DQPSK
TT/4DQPSK
TT/4DQPSK
TT/4DQPSK
440 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm -70 dBm -50 dBm -50 dBm -70 dBm -50 dBm -50 dBm -50 dBm -50 dBm -50 dBm -70 dBm -50 dBm -50 dBm
-50 dBm -60 dBm -70 dB
-60 dBm -70 dBm -70 dBm -70 dBm -71 dBm -72 dB
-70 dBm
-70 dBm
Start 2.4 GHz 691 pts Stop 2.4835 GH
Date:7#AY.2019 13:5610
Spectrum
RefLevel 20.00 dBm Offset 7.00 dB RBW 100 kHz Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep
So do SWI 1 IIS V DW SO KIL Mode Auto Sweep
0 personal and a state of the second of the
-10 dBm
-20 dBm
8DPSK
(40 dBm
-50 dBm
-60 dBm
-70 dBm
Start 2.4 GHz 691 pts Stop 2.4835 GH
Datus:7.MAY 2019 13:69:60
I

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:

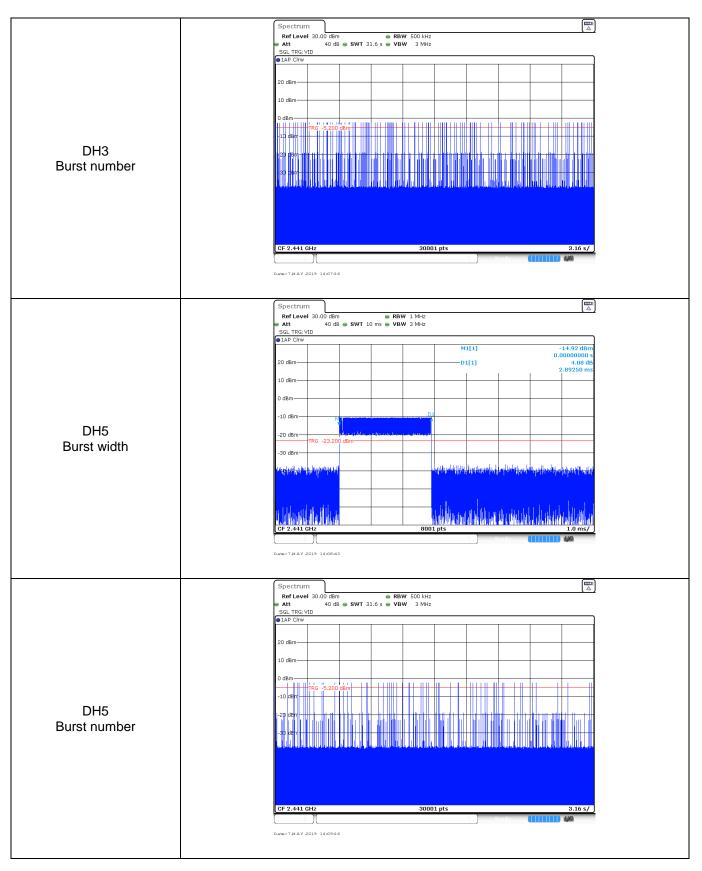
Please refer to the clause 3.3

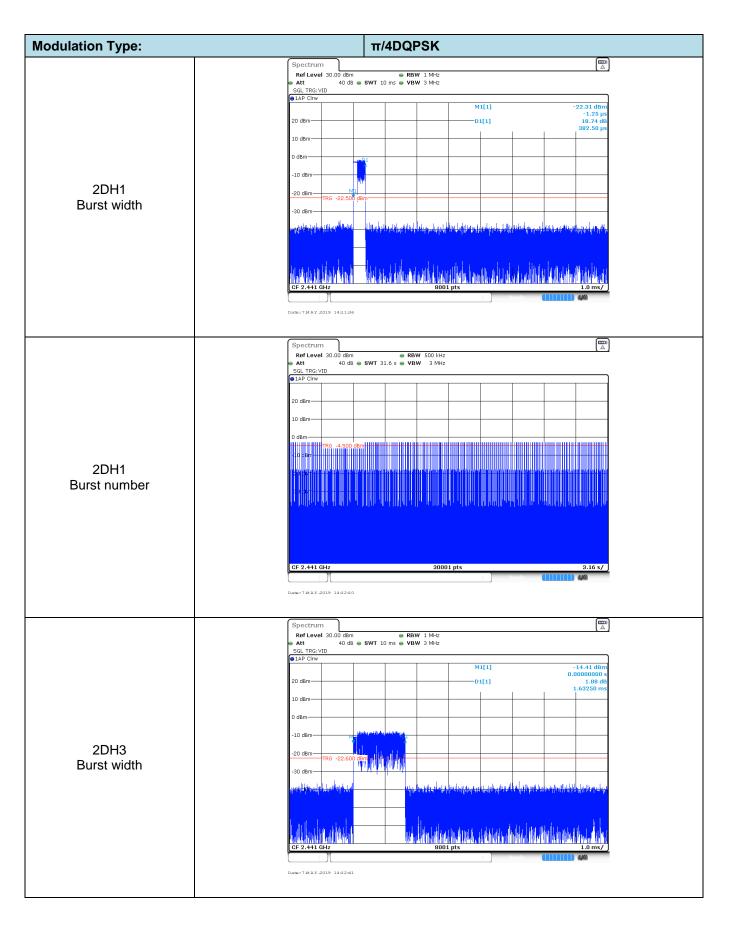
TEST RESULTS

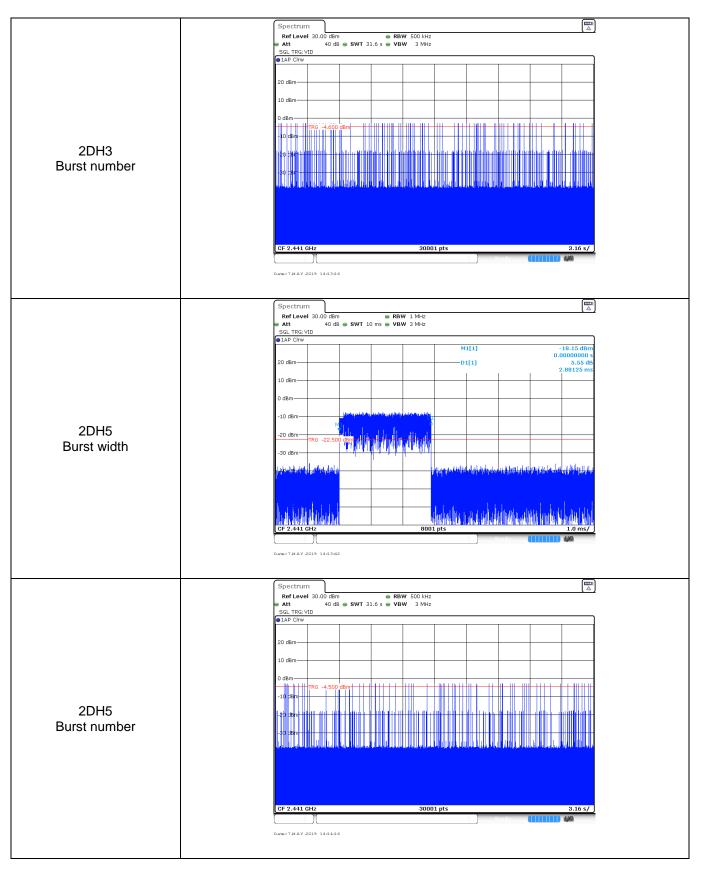
☑ Passed □ Not Applicable

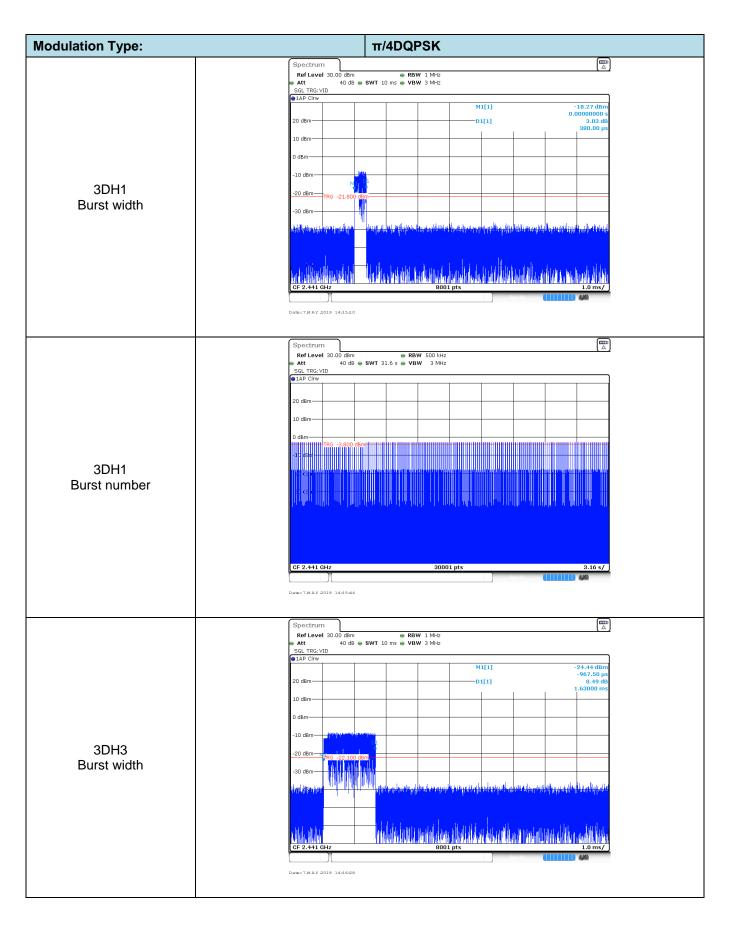
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.39	318.00	0.12		
GFSK	DH3	1.65	117.00	0.19	≤ 0.40	Pass
	DH5	2.89	63.00	0.18		
	2DH1	0.38	320.00	0.12		
π/4DQPSK	2DH3	1.63	100.00	0.16	≤ 0.40	Pass
	2DH5	2.88	70.00	0.20		
	3DH1	0.38	318.00	0.12		
8DPSK	3DH3	1.63	108.00	0.18	≤ 0.40	Pass
	3DH5	2.88	66.00	0.19		

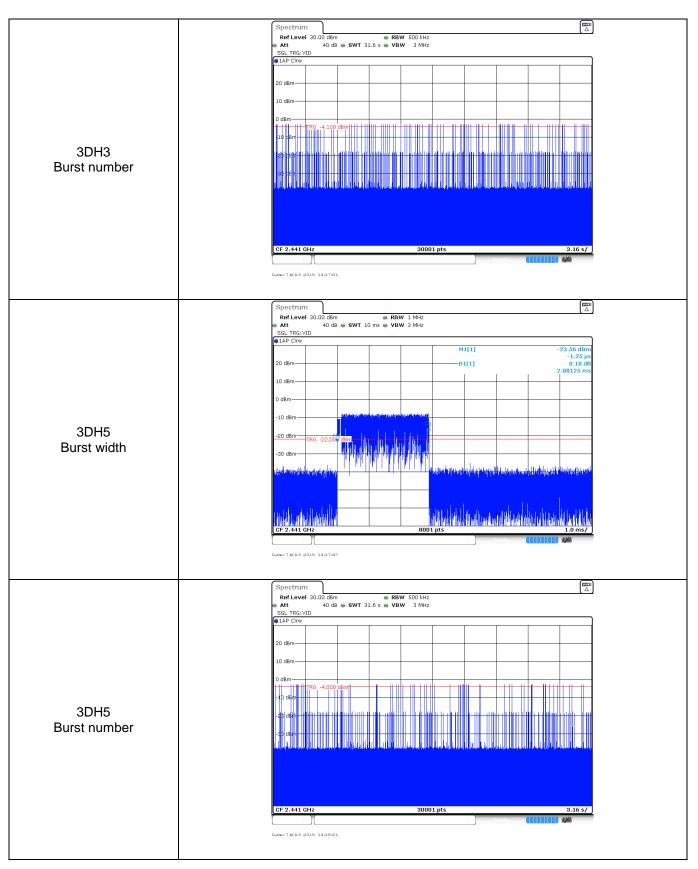
dulation Type:	GFSK	
	Spectrum	
	Ref Level 30.00 dBm RBW 1 MHz Att 40 dB SWT 10 ms VBW 3 MHz	
	SGL TRG:VID @1AP Cirw M1[1] -21.52	2 dBm
	20 dBm D1[1] 0.000000	0000 s .84 dB
	10 dBm 390.0	.00 µs
	o dBm	
	-10 dBm	
DH1		
Burst width	-20 dBm TRG -23.200 dBm	
	-30 dem Mentan land and second of the second	un h
	Spectrum	
	RefLevel 30.00 dBm ● RBW 500 kHz ● Att 40 dB ● SWT 31.6 s ● VBW 3 MHz	
	SGL TRG:VID IAP Cirw	
	20 dBm	
	10 dBm	
	0 dBm-	
	TRG -5200 dBm	
DH1 Burst number		6.5(
		16 s/
	CF 2.441 GHz 30001 pts 3.10	.6 s/)
	СF 2.441 GHz 30001 pts 3.16 Дана: 7.ИАУ 2019 142663	
	CF 2.441 GHz 30001 pts 3.10 Data: 7 MAY 2019 1406613 Mark Mark Spectrum Ref Level 30.00 dBm RBW 1 MHz	
	CF 2.441 CHz 30001 pts 3.10 Date: 7 MAY 2019 14 96:03 model Model Ref Level 30.00 dBm RBW 1 MHz SL Shatt 10 ms VBW 3 MHz SL	
	CF 2.441 GHz 30001 pts 3.10 Date: 7 MAY 2019 14:06:15 MML Spectrum Ref Level 30.000 dBm RBW 1 MHz 40 db SWT 10 ms VBW 3 MHz SQL Ho db SWT 10 ms MAY MHz MHz SQL HO db WT 10 ms MAY MHz MHz SQL MHZ M	E dBm
	CF 2.441 GHz 30001 pts 3.10 Date: 7 MAY 2019 14 96:03 Militian and the second and the secon	6 dBm 0000 s .51 dB
	CF 2.441 GHz 30001 pts 3.16 Date: 7 MAY 2019 14 26 45 30001 pts 3.16 Spectrum Ref Level 30.00 dBm RBW 1 MHz SGL TRG: VID 9.18 SMHz SGL TRG: VID 9.14 9.11 9.14 P Cliv M1[1] -12.26 9.14 0.000000 9.5	6 dBm 0000 s .51 dB
	CF 2.441 GHz 30001 pts 3.10 Date: 7 MAY 2019 14:06:03 0001 pts 3.10 Date: 7 MAY 2019 14:06:03 0001 pts 3.10 CF 2.441 GHz 30001 pts 3.10 Date: 7 MAY 2019 14:06:03 0001 pts 3.10 Date: 7 MAY 2019 14:06:03 0.00 0000 00000 Oat 0.00 0000 00000 00000 Oat 0.00 0000 0.00 0000 0.00 0000 Oat 0.00 0000 0.00 010 9.5 Oat 0.00 010 0.00 010 9.5 Oat 0.00 010 0.00 010 9.5	6 dBm 0000 s .51 dB
Burst number	Spectrum RBW 1 MHz SGL TRG:/VD 40 db SWT 10 ms VBW 3 MHz SGL TRG:/VD 111 -12.26 0 dbm 0 ldm 0.111 0.516450	6 dBm 0000 s .51 dB
Burst number	CF 2.441 GHz 30001 pts 3.16 Daw: 7 MAX 2019 14:06:03	6 dBm 0000 s .51 dB
Burst number	CF 2.441 GHz 30001 pts 3.10 Dew: 7 MAY 2019 14:06:15 Militian Militian Spectrum Ref Level 30.00 dBm RBW 1 MHz Att Re: VID Militian -12.26 OdBm Militian -12.26 10 dBm Militian -12.26	6 dBm 0000 s .51 dB
Burst number	CF 2.441 GHz 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Daw: 7 MAX JOIP 14 Deals 30001 pts 3.10 Observer MI[1] -12.26 Observer 01[1] 0.0000000 O dBm 01[1] 0.0000000 O dBm<	6 dBm 000 s 51 dB 00 ms
Burst number	Spectrum	6 dBm 000 s 51 dB 00 ms
Burst number	Spectrum	6 dBm 1000 s .51 dB 00 ms
Burst number	CF 2.441 CHz 3001 pts 3.10 Dem: 7.84.2 JOL9 146613 3001 pts 3.10 Dem: 7.84.2 JOL9 146613 3001 pts 3.10 Spectrum e RBW 1 MHz 4.11 Att c::/// 40 db = SWT 10 ms = VBW 3 MHz 3.10 State:// 2.8.2 JOL9 146613 9.11 O dbm e RBW 1 MHz Att c::// 40 db = SWT 10 ms = VBW 3 MHz 3.16 O dbm 0.13 0.30000 0 dbm D1(1) 0.30000 0 dbm D1(1) 0.4500 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm	5 dBm 1000 s 5.1 dB 00 ms
Burst number	CF 2.441 CHz 3001 pts 3.10 Date: 7.442 JOL9 14.9643 3001 pts 3.10 Date: 7.442 JOL9 14.9643 3001 pts 3.10 Spectrum Ref Level 30.00 dbm RBW 1 MHz 3.00 Stat: TRS: VID 9.00 9.00 9.00 Oldem D1[1] -12.26 0.000000 10 dbm D1[1] 0.000000 9.5 10 dbm D1[1] 0.12.46 0.000000 0 dbm D1[1] 0.4650 9.5 10 dbm D1[1]	€ 6 dBm 0000 s 51 dB 00 ms
DH3	CF 2.441 CHz 3001 pts 3.10 Dem: 7.84.2 JOL9 146613 3001 pts 3.10 Dem: 7.84.2 JOL9 146613 3001 pts 3.10 Spectrum e RBW 1 MHz 4.11 Att c::/// 40 db = SWT 10 ms = VBW 3 MHz 3.10 State:// 2.8.2 JOL9 146613 9.11 O dbm e RBW 1 MHz Att c::// 40 db = SWT 10 ms = VBW 3 MHz 3.16 O dbm 0.13 0.30000 0 dbm D1(1) 0.30000 0 dbm D1(1) 0.4500 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm D1(1) 0.45400 0 dbm	











5.8. Pseudorandom Frequency Hopping Sequence

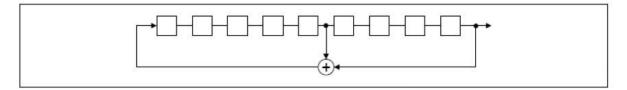
<u>LIMIT</u>

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

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

5 7	73 7		1	78	64	62	1	ł	4	2	0
Т		 		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.

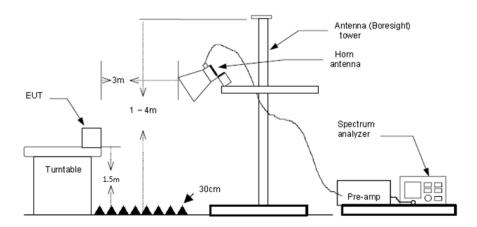
5.9. Restricted band (radiated)

<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 channe	el:				СН00						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value		
2310.00	29.75	28.05	6.62	37.59	26.83	74.00	-47.17	Horizontal	Peak		
2319.70	35.46	28.00	6.64	37.59	32.51	74.00	-41.49	Horizontal	Peak		
2390.00	29.66	27.65	6.75	37.59	26.47	74.00	-47.53	Horizontal	Peak		
2310.00	31.24	28.05	6.62	37.59	28.32	74.00	-45.68	Vertical	Peak		
2320.10	36.87	28.00	6.64	37.59	33.92	74.00	-40.08	Vertical	Peak		
2390.03	30.49	27.65	6.75	37.59	27.30	74.00	-46.70	Vertical	Peak		
2310.00	17.48	28.05	6.62	37.59	14.56	54.00	-39.44	Horizontal	Average		
2320.00	28.99	28.00	6.64	37.59	26.04	54.00	-27.96	Horizontal	Average		
2390.00	17.42	27.65	6.75	37.59	14.23	54.00	-39.77	Horizontal	Average		
2310.00	18.38	28.05	6.62	37.59	15.46	54.00	-38.54	Vertical	Average		
2320.00	30.54	28.00	6.64	37.59	27.59	54.00	-26.41	Vertical	Average		
2390.00	18.53	27.65	6.75	37.59	15.34	54.00	-38.66	Vertical	Average		

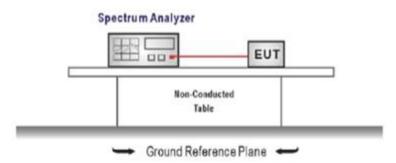
Test channe	el:				CH78						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value		
2483.50	41.51	27.26	6.83	37.59	38.01	74.00	-35.99	Horizontal	Peak		
2500.00	30.11	27.20	6.84	37.59	26.56	74.00	-47.44	Horizontal	Peak		
2483.50	43.06	27.26	6.83	37.59	39.56	74.00	-34.44	Vertical	Peak		
2500.00	31.32	27.20	6.84	37.59	27.77	74.00	-46.23	Vertical	Peak		
2483.50	18.45	27.26	6.83	37.59	14.95	54.00	-39.05	Horizontal	Average		
2496.00	23.19	27.22	6.84	37.59	19.66	54.00	-34.34	Horizontal	Average		
2500.00	17.97	27.20	6.84	37.59	14.42	54.00	-39.58	Horizontal	Average		
2483.50	18.27	27.26	6.83	37.59	14.77	54.00	-39.23	Vertical	Average		
2500.00	17.86	27.20	6.84	37.59	14.31	54.00	-39.69	Vertical	Average		

5.10. Band edge and Spurious Emissions (conducted)

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

est Item:	Band edge	Modulation type: GFSK	
		Dectrum tef Level 20.00 dB Offset 7.00 dB RBW 100 kHz tt 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep sunt 500/500	
		Pk Max	3.67 dBm 02180 GHz 48.59 dam 00000 GHz
CH00 No hopping mode		D dBm D1 -16.330 dBm D1 -16.3300 dBm D1 -16.330	M2
		rker ype Ref Trc X-value Y-value Function Function Result	2.405 GHz
		M1 1 2.40218 GHz 3.67 dBm M2 1 2.4 GHz -44.95 9 dBm M3 1 2.39 GHz -50.10 dBm M4 1 2.31 GHz -44.99 dBm M5 1 2.327761 GHz -44.46 dBm	4/6
		ectrum Ref Level 20.00 dBm Offset 7.00 dB ⊕ RBW 100 kHz	
			3.59 dBm 04240 GHz
		M2[1] -	49-25 dBY等 00000 载相的
CH00 Hopping mode		d8m − − − − − − − − − − − − − − − − − − −	Ma Ma
			2.405 GHz
		Apple Trc X-value Y-value Function Function Result M1 1 2.40424 GHz 3.99 GHm Function Result M2 1 2.4 GHz -449.25 GHm	
		Messeden	
		Dectrum	
		d8m M1[1] 2.4E	5.17 dBm 01810 GHz 53.32 dBm 35000 GHz
CH78 No hopping mode		D 1 - 14.830 dBm	
		dBm M2 M3 make M3 M3 make	
		Image Image <th< td=""><td>p 2.5 GHz</td></th<>	p 2.5 GHz
		M4 1 2.4911362 GHz -51.65 dbm Mertining	4,00

Report No.: CHTEW19050043

	Spectrum Image: Constraint of the sector of t
CH78 Hopping mode	Count 500/500 1Pk Max 018k Max 1018km 1018km 018km 1018km 11 2.483000 GHz 11 2.4910 GBm 2.4910 GBm

Test Item:	Band edge	Modulation type:	π/4DQPSK
	Spectrum Ref Level 21 • Att Count 50/50 • 1Pk Max 10 dBm -10 dBm -20 dBm -30 dBm	30 dB SWT 1.1 ms 🖶 VBW 300 kHz Mode Auto Sweep	3.87 dBm 2.40210 0Hz -47.30 Bm 2.400000 6Hz
CH00 No hopping mode	-40 dBm -40 dBm -50 dBm -60 dBm -70		Stop 2.405 GHz
	Date: 7 M A Y 2019 Spectrum Ref Level 2 Att		
CH00 Hopping mode	Count 500/50	0	3.10 dBm 2.403280 GHz -49.71 dBp 2.400000 GHz - 49.71 dBp 2.400000 GHz - 49.71 dBp - 49.71
	Type Ref M1 M2 M3 M4 M5	1 2.40328 GHz 3.10 dBm 1 2.4 GHz -49.71 dBm 1 2.90 GHz -49.75 dBm 1 2.91 GHz -48.76 dBm 1 2.31 GHz -48.76 dBm 1 2.373058 GHz -46.82 dBm	Function Result
	Date: 7 M A Y 2019 Spectrum Ref Level 21 • Att Count 500/50	0.00 dBm Offset 7.00 dB ● RBW 100 kHz 30 dB SWT 55.9 µs ● VBW 300 kHz Mode Auto FFT	
CH78 No hopping mode		-15.960 dBm	4.04 dBm 2.4801810 GHz - 54.08 dBm 2.4833000 GHz
	+0 dBm +50 dBm -60 dBm -70 dBm		M4 Stop 2.5 GHz

Report No.: CHTEW19050043

	Spectrum Image: Constant of the image: Constant of
	PIPK Max
	M1[1] 4.06 dBm 10 dBm 2.4801810 GHz M2[1] -52.39 dBm 2.4835000 GHz
	• 0 d8m 2.+803000 GHz -10 d8m 01 -10 d8m 01
01170	-20 dBm
CH78 opping mode	-40 dBm M2 M4
	-60 dBm
	Start 2.478 GHz 691 pts Stap 2.5 GHz
	Marker
	Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.480181 GHz 4.06 dBm M2 1 2.4835 GHz -52.39 dBm
	M2 1 2.4835 GHZ -52.39 GBm M3 1 2.5 GHZ -53.16 dBm M4 1 2.499 GHZ -50.35 dBm

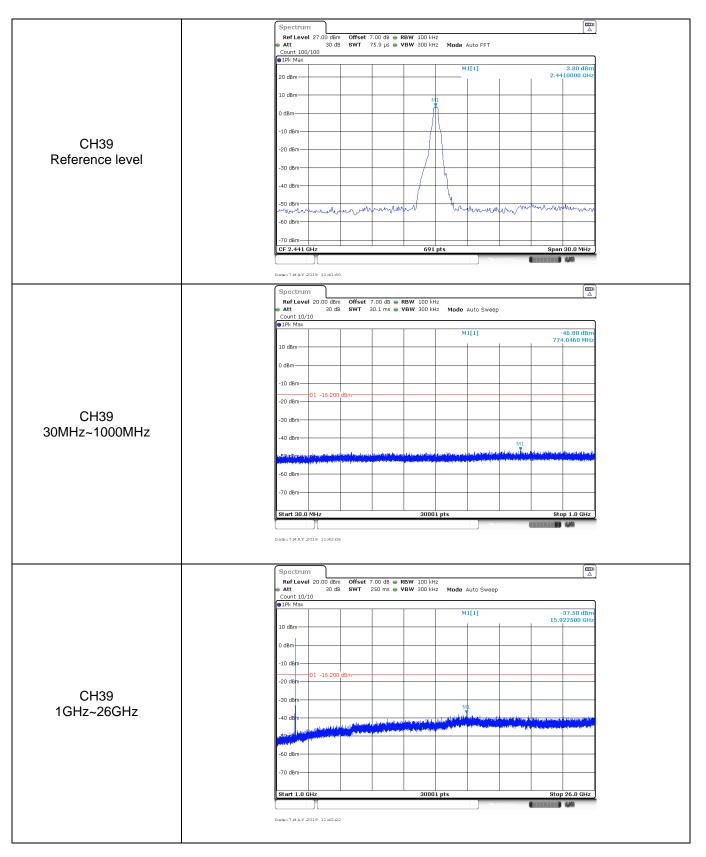
st Item:	Band edge		Modula	ation typ	e:	8DPS	SK
		Att 30 dB Count 500/500	Offset 7.00 dB ● SWT 1.1 ms ●	RBW 100 kHz VBW 300 kHz M	ode Auto Sweep		
		1Pk Max 10 dBm 0 dBm -10 dBm			M1[1] M2[1]		3.21 dBm 402180 GHz -48.60 dBm 400000 GHz
CH00		-20 dBm D1 -16.790 dB				M3	
lo hopping mode		-50 dBm		691 pts		Stop	2.405 GHz
		Marker Trc M1 1 M2 1 M3 1 M4 1 M5 1	X-value 2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.318674 GHz	Y-value 3.21 dBm -48.60 dBm -50.45 dBm -49.29 dBm -47.43 dBm	Function	Function Resu	
		am:7MAY 2019 13:43:14 Spectrum Ref Level 20.00 dBm	Offset 7.00 dB 👄	RBW 100 kHz			
		Att 30 dB Count 500/500 1Pk Max 10 dBm	SWT 1.1 ms •	VBW 300 kHz M	M1[1] M2[1]		3.16 dBm 402180 GHz -49.41 dBm
		0 dBm -10 dBm -20 dBm D1 -16.840 dB -30 dBm	m			2.	400000 ¢Fijz
CH00 Hopping mode			hankanan ang sa panalit na sa	ms 		M3	MP
		-70 dBm Start 2.31 GHz Marker Type Ref Trc	X-value	691 pts Y-value	Function	Stop Function Resu	2.405 GHz
		M1 1 M2 1 M3 1 M4 1 M5 1	2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.356123 GHz	3.16 dBm -49.41 dBm -49.42 dBm -48.12 dBm -46.51 dBm	Measu	aring	444
		ate: 7 MAY 2019 14:01:09 Spectrum Ref Level 20.00 dBm Att 30 dB	Offset 7.00 dB ● SWT 56.9 µs ●	RBW 100 kHz			
		Count 500/500	5WT 30.9 ps •		M1[1] M2[1]		4.08 dBm 801810 GHz -53.57 dBm 835000 GHz
CH78		-10 dBm D1 -15.920 dB -20 dBm	m				
hopping mode		40 dBm -50 dBm -60 dBm -70 dBm	Merrow www.	mm	M4	un and and and and and and and and and an	v Marina
		Start 2.478 GHz Marker Type Ref Trc M1 1 M2 1 M3 1	X-value 2.480181 GHz 2.4835 GHz 2.5 GHz	691 pts Y-value 4.08 dBm -53.57 dBm -52.68 dBm	Function	St Function Resu	iop 2.5 GHz
	[M4 1 M4 1 ate:7 MAY 2019 13:48:58	2.4930493 GHz	-51.10 dBm	Measu		4,44

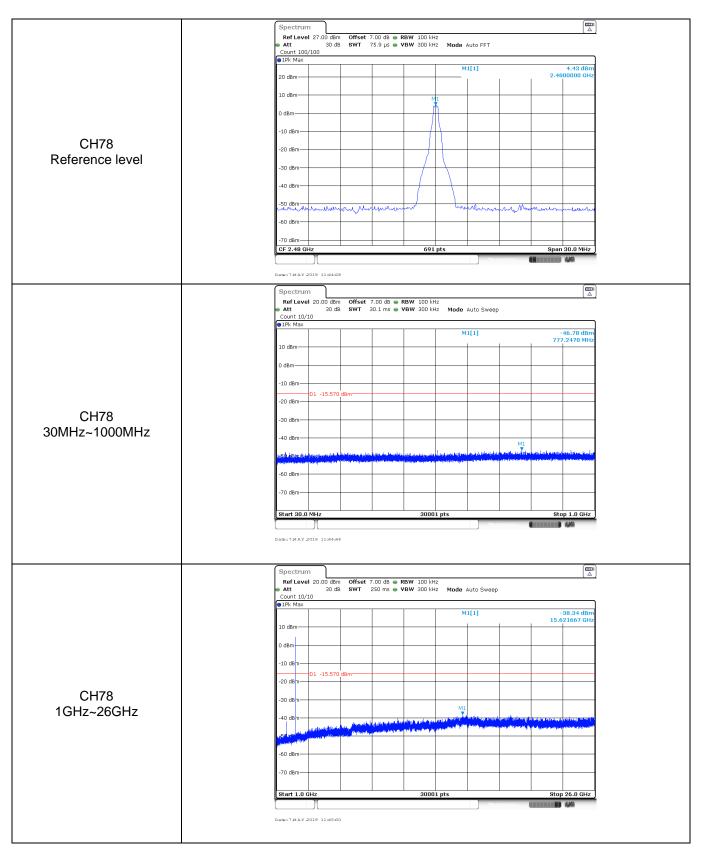
Report No.: CHTEW19050043

Page: 43 of 58

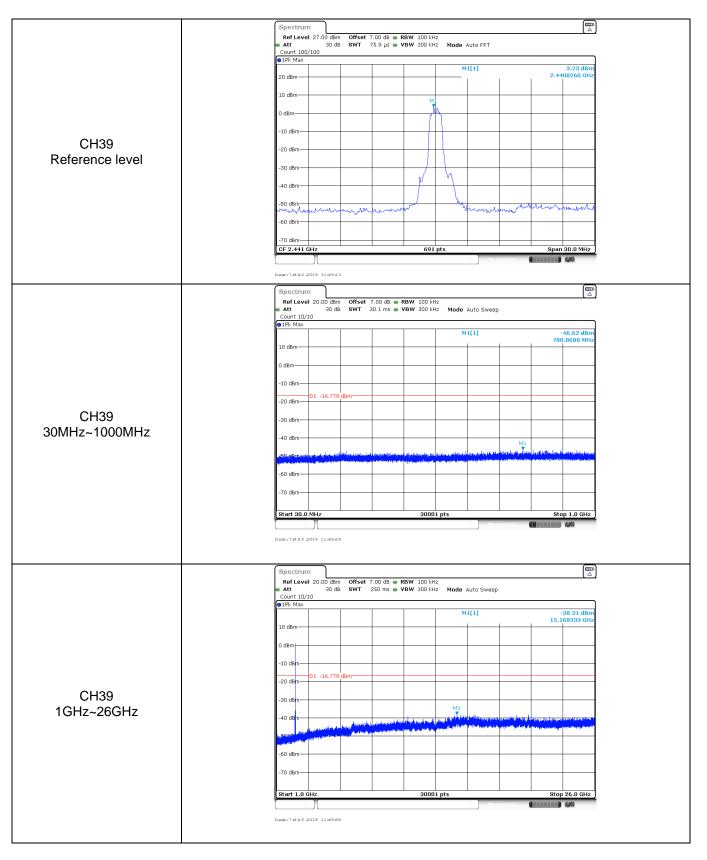
	Spectrum Image: Constraint of the sector of th
	IPk Max
	M1[1] 3.55 dBm 10 dbm 2.4791620 GHz
	2.4835000 GH2
	-10 USIN D1 -16.450 dBm
	-30 dBm
CH78 Hoppig mode	-40 dBm
Hoppig mode	-50 dBm M2
	-60 dBm
	-70 dBm
	Start 2.478 GHz 691 pts Stop 2.5 GHz
	Marker
	Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.479162 GHz 3.55 dBm
	M2 1 2.4835 GHz -52.32 dBm M3 1 2.5 GHz -53.09 dBm
	M4 1 2.4900522 GHz -50.40 dBm
	Measurine
	Datu:7MAY2019 14:03:12

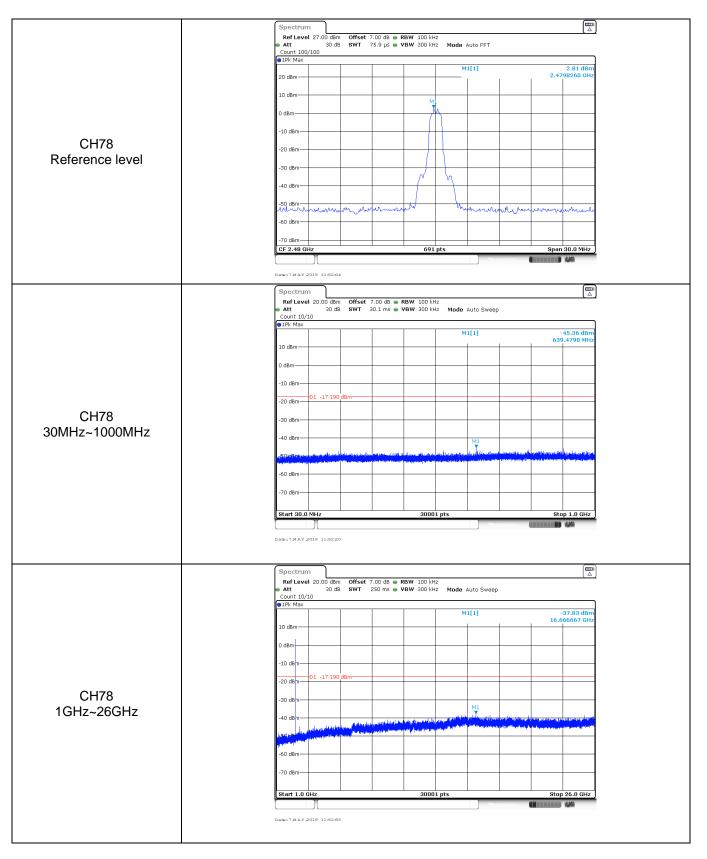
est Item:	SE		Modula	tion t	уре:		GFSM	٢
		Spectrum						
		RefLevel 27.00 dBm Att 30 dB	Offset 7.00 dB	(BW 100 kH /BW 300 kH	: Mode Auto FFT			
		Count 100/100 1Pk Max						0.04.10
		20 dBm			M1[1]	I	2.40	2.94 dBn 020000 GH:
		10 dBm			1			
		0 dBm						
		-10 dBm						
CH00		-20 dBm						
Reference level		-30 dBm						
		-40 dBm			$\langle \langle \rangle \rangle$			
			on manhan	m	tempusher	norwa	mmul	mm
		-60 dBm						
		-70 dBm CF 2.402 GHz		691	pts		Spar	n 30.0 MHz
						feasuring		
		Date:7MAY.2019 11:39:49						
		Spectrum Ref Level 20.00 dBm						
		Count 10/10	SWT 30.1 ms 👄 '	VBW 300 kH	z Mode Auto Swi	зөр		
		● 1Pk Max			M1[1]		EQ	-46.06 dBn 6.2830 MH
		10 dBm					39	0.2030 MH
		0 dBm						
		-10 dBm						
		-20 dBm D1 -17.060 dB	3m					
CH00		-30 dBm						
0MHz~1000MHz		-40 dBm						
		of EQ. 49 million in such in the	مايد ويعالل متطعي ويراج	والاروالي ومطلب الم	M1		والالد المرد المراجع	
		-60 dBm	oler De orloeer je staal de gegeerte de ge	dia paosita totale.	Instance all squares of projections	and a set of set of the set		
		-70 dBm						
		Start 30.0 MHz		3000	pts	1easuring	St	op 1.0 GHz
		Date: 7 MAY 2019 11:40:04						
		Spectrum						
			Offset 7.00 dB = F SWT 250 ms = V			ер		
		PIPK Max			M1[1]			-37.74 dBn
		10 dBm					15.3	525000 GH
		0 dBm						
		-10 dem					1	
		-20 dBm D1 -17.060 dB	3m					
CH00		-30 dgm						
1GHz~26GHz					M1			
		-40 dB m	in the second se	lang gantang bi pang Asarah Pang		and had a start	a la contra de la co La contra de la contra	Property in the start of the second sec
		-60 dBm						
		-70 dBm						
		Start 1.0 GHz		3000	pts			p 26.0 GHz
							All the second second second second	4.1.41
		Date: 7 MAY 2019 11:40:21						10,84



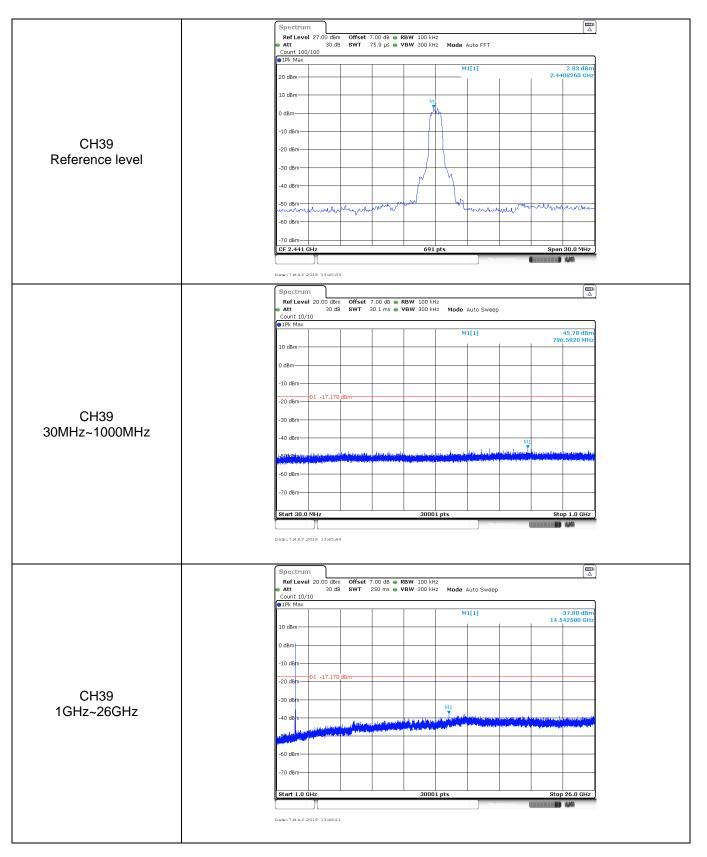


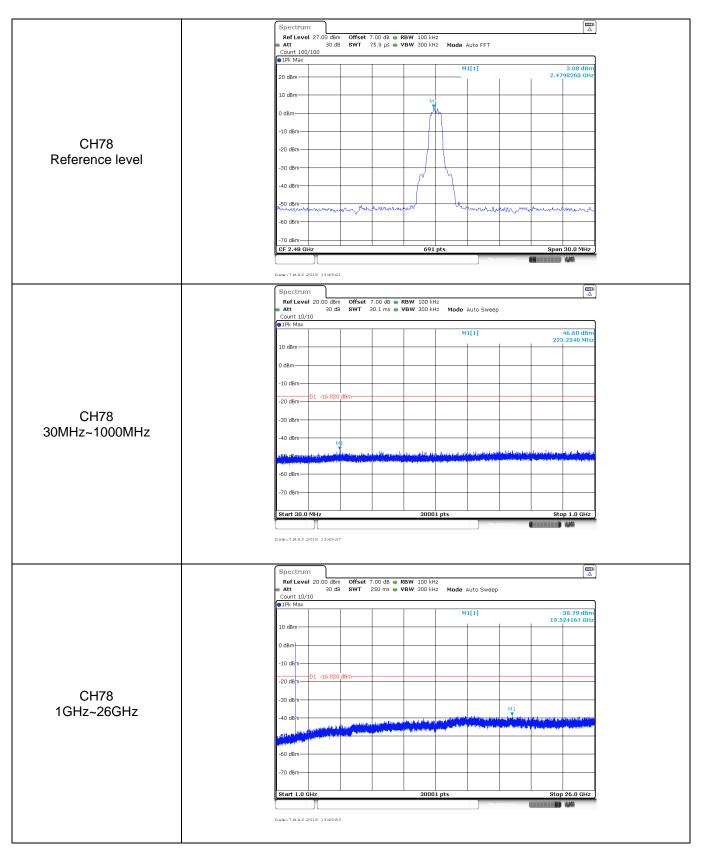
est Item:	SE		Modula	ation typ	e:	π/4[DQPSK			
		Spectrum								
		RefLevel 27.00 dBm Att 30 dB	Offset 7.00 dB ● SWT 75.9 µs ●	RBW 100 kHz VBW 300 kHz N	1ode Auto FFT					
		Count 100/100 1Pk Max								
		20 dBm			M1[1]	. 2	2.20 dBm 2.4018260 GHz			
		10 dBm								
				M						
		0 dBm		L M						
		-10 dBm								
CH00		-20 dBm								
Reference level		-30 dBm		$ \rightarrow \rightarrow$						
		-40 dBm		p '						
		-50 dBm								
		-60 dBm	we have the w	and the second sec	masteringe	mouthour	mondula			
		-70 dBm CF 2.402 GHz		691 pts		s	pan 30.0 MHz			
					Measu		10 444			
		Date:7MAY_2019 11:47:15								
							_			
		Spectrum Ref Level 20.00 dBm	Offset 7 00 dB =	RBW 100 PH2						
		Att 30 dB Count 10/10	SWT 30.1 ms	VBW 300 kHz M	Node Auto Sweep					
		1Pk Max			M1[1]		-46.56 dBm			
		10 dBm					806.7990 MHz			
		0 dBm								
		-10 dBm								
		-20 dBm D1 -17.800 dP	Sm							
CH00		-30 dBm								
30MHz~1000MHz		-40 dBm				M1				
		550, dBm of a state of the	the surger and the states	him distance di sabali	a los a dalas condition en esta	we dopted to a first out of the	an a			
		-60 dBm								
		-70 dBm								
		-70 dbin								
		Start 30.0 MHz	1	30001 pts	Macan	ving	Stop 1.0 GHz			
		Date: 7 MAY 2019 11:47:30					ages)			
		Spectrum								
		Ref Level 20.00 dBm	Offset 7.00 dB SWT 250 ms		Indo Auto Course		ι <u></u> Δ.			
		 Att 30 dB Count 10/10 1Pk Max 	SWT 250 ms 🖷	TERM SUUKHZ N	NULL AUTO SWEEP					
		TEN MIGA			M1[1]		-37.58 dBm			
		10 dBm					.5.109107 GHZ			
		0 dBm								
		-10 dBm								
		-20 dgm D1 -17.800 dg	lm							
CH00										
1GHz~26GHz		-30 dBm			M1					
		-40 dB n	al had a second and a second	data ta dara ang manga	and the second sec	and an effective design of the standard and the standard standard standard standard standard standard standard The standard s				
		-60 dBm								
		-70 dBm					_			
		Start 1.0 GHz		30001 pts	Measu	ring	Stop 26.0 GHz			
		Start 1.0 GHz		30001 pts	Measu					





Fest Item:	SE		Modula	tion typ	be:	8	DPS	
		Att 30 dB Count 100/100	Offset 7.00 dB ● R SWT 75.9 µs ● V	BW 100 kHz				
		1Pk Max 20 dBm			M1[1]		2.40	2.35 dBm 18260 GHz
		10 dBm		M				
CH00 Reference level		-10 dBm						
Reference level		-30 dBm						
		-50 dBm	n manana a	J ⁰⁰	Martine	an work	manting	mahanana
		CF 2.402 GHz		691 pts	Me.	osuring 🚺		30.0 MHz
			Offset 7.00 dB 🖷 F					
		Count 10/10 • 1Pk Max	SWT 30.1 ms • \	'BW 300 kHz	Mode Auto Sweep M1[1]) 	857	16.22 dBm .4960 MHz
		10 dBm						
CH00		-10 dBm -20 dBm D1 -17.650 dBr	m					
30MHz~1000MHz		-30 dBm -40 dBm	le stari seran altera an del con sel		non da majo lipitati	a for the particular day to grow the particular day	M1	Litchered a titulary and
		-60 dBm					hadaa ka	u kulon in ja ja ja sua t
		Start 30.0 MHz		30001 pts	Me	isuring	Sto	p 1.0 GHz
		Date: 7 M AY 2019 13:44:24						
		Spectrum Ref Level 20.00 dBm Att 30 dB Count 10/10 PIPk Max	Offset 7.00 dB	BW 100 kHz BW 300 kHz r	1ode Auto Sweep	1		
		10 dBm			M1[1]		15.5	38.44 dBm 50833 GHz
		0 dBm -10 dEm -20 dEm D1 -17.650 dB	m					
CH00 1GHz~26GHz		-20 dem			M1			
		-40 02 11	ut oraș lantere verse de statilarie Aleman, ani, conspirit Alemania d	Hanna ya ya kutoka kata ya kutoka kutoka Mana kutoka ku	and the state of the			NUT IN A CONTRACT OF CONTRACT
		-70 dBm		30001 pts			Stor	26.0 GHz
		Date: 7 MAY 2019 13:44:41		30001 pts	Mea	suring 📲	Stop	





5.11. Spurious Emissions (radiated)

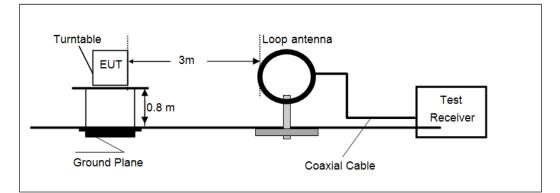
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

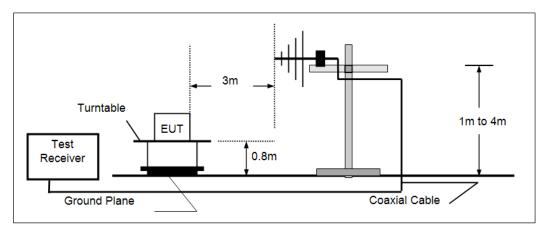
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

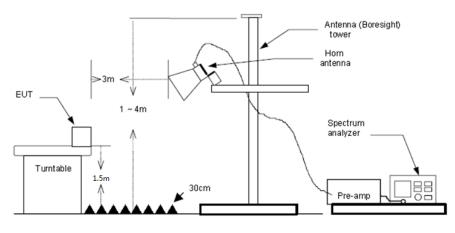
Below 30 MHz



> 30 MHz ~1000 MHz



> Above 1 GHz



TEST PROCEDURE

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

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

 (3) From 1 GHz to 10th harmonic: RBW=1 MHz, VBW=3 MHz Peak detector for Peak value RBW=1 MHz, VBW=10 Hz Peak detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

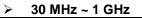
☑ Passed □ Not Applicable

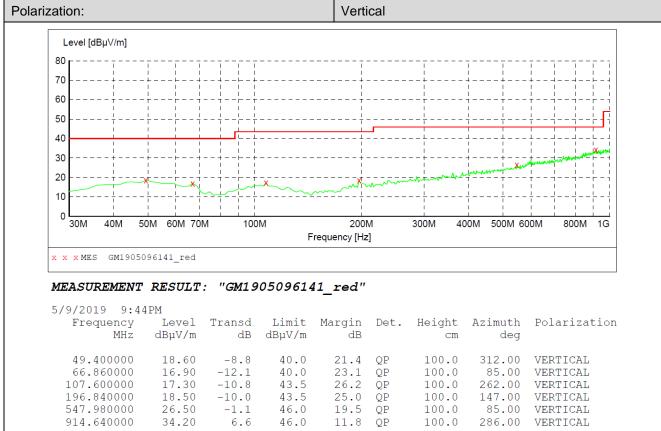
Note:

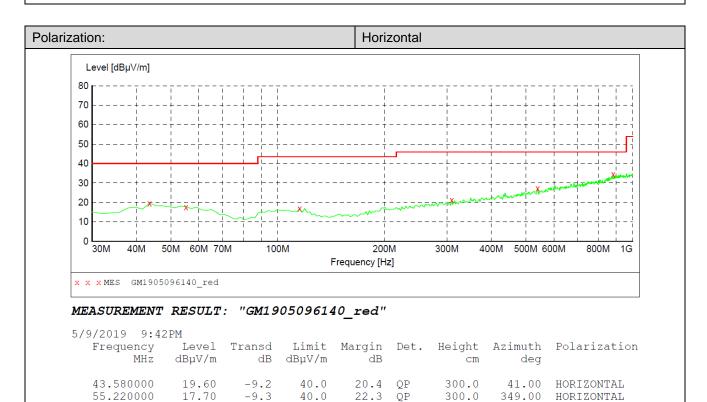
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst case, so only the worst case's data on the test report.
- 4) Above 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation which it was worst case, so only the worst case's data on the test report
- 5) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.

➢ 9 kHz ~ 30 MHz

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







26.6 QP

24.7 QP

18.8 QP

11.6 QP

300.0

100.0

100.0

300.0

16.90

21.30

27.20

34.40

-11.7

-7.3

-1.3

6.0

43.5

46.0

46.0

46.0

115.360000

309.360000

540.220000

881.660000

287.00 HORIZONTAL

HORIZONTAL

HORTZONTAL

HORIZONTAL

323.00

283.00

84.00

➢ 1 GHz ~ 25 GHz

	CH00													
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value					
1201.15	35.07	26.30	4.66	37.22	28.81	74.00	-45.19	Vertical	Peak					
4045.06	35.93	29.79	8.82	36.72	37.82	74.00	-36.18	Vertical	Peak					
4933.50	39.76	31.43	9.63	35.50	45.32	74.00	-28.68	Vertical	Peak					
7376.08	32.73	36.30	12.04	33.23	47.84	74.00	-26.16	Vertical	Peak					
3168.08	34.10	28.80	7.68	37.42	33.16	74.00	-40.84	Horizontal	Peak					
4107.32	34.76	29.91	8.87	36.65	36.89	74.00	-37.11	Horizontal	Peak					
4933.50	37.71	31.43	9.63	35.50	43.27	74.00	-30.73	Horizontal	Peak					
7357.33	32.45	36.30	12.03	33.26	47.52	74.00	-26.48	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				
3151.99	33.97	28.80	7.66	37.44	32.99	74.00	-41.01	Vertical	Peak				
4024.52	37.44	29.75	8.80	36.74	39.25	74.00	-34.75	Vertical	Peak				
4920.96	40.43	31.42	9.62	35.52	45.95	74.00	-28.05	Vertical	Peak				
7376.08	32.27	36.30	12.04	33.23	47.38	74.00	-26.62	Vertical	Peak				
3543.55	33.93	29.13	8.18	37.11	34.13	74.00	-39.87	Horizontal	Peak				
4107.32	34.38	29.91	8.87	36.65	36.51	74.00	-37.49	Horizontal	Peak				
4946.07	36.88	31.45	9.63	35.47	42.49	74.00	-31.51	Horizontal	Peak				
7338.62	33.19	36.30	12.01	33.29	48.21	74.00	-25.79	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
4107.32	35.09	29.91	8.87	36.65	37.22	74.00	-36.78	Vertical	Peak
4908.44	38.22	31.41	9.61	35.54	43.70	74.00	-30.30	Vertical	Peak
7432.62	32.32	36.23	12.18	33.13	47.60	74.00	-26.40	Vertical	Peak
8725.48	31.83	37.85	13.02	32.96	49.74	74.00	-24.26	Vertical	Peak
4034.78	36.45	29.77	8.81	36.73	38.30	74.00	-35.70	Horizontal	Peak
4908.44	37.14	31.41	9.61	35.54	42.62	74.00	-31.38	Horizontal	Peak
6283.16	32.09	33.07	11.00	33.84	42.32	74.00	-31.68	Horizontal	Peak
7338.62	33.69	36.30	12.01	33.29	48.71	74.00	-25.29	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

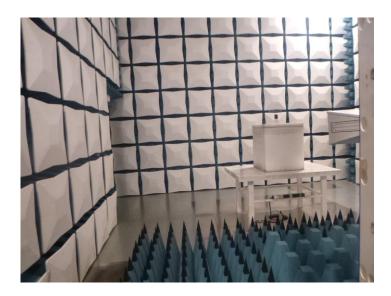
Conducted Emissions (AC Mains)



Radiated Emissions







7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19050042

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