



TE	ST REPORT					
Report Reference No	CHTEW19040136 R	eport verification:				
Project No:	SHT1901069902EW					
FCC ID:	2AETW-8009					
Applicant's name:	Cleer Limited					
Address	Unit518, Lakeside 1, Science Par	k West Ave. HK Science Park				
Manufacturer	Cleer Limited					
Address	Unit518, Lakeside 1, Science Par	k West Ave. HK Science Park				
Test item description:	Smart Home Speaker					
Trade Mark	Cleer					
Model/Type reference:	SPACE					
Listed Model(s)	-					
Standard:	FCC CFR Title 47 Part 15 Subpa	art C Section 15.247				
Date of receipt of test sample:	Feb 26, 2019					
Date of testing	Feb 27, 2019- Apr 18, 2019					
Date of issue	Apr 19, 2019					
Result:	PASS					
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li	Silvia Li				
Supervised by (Position+Printed name+Signature):	Project Engineer Tom Ouyang	Tom onyang Homsty				
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty				
Testing Laboratory Name: :	Shenzhen Huatongwei Internat	ional Inspection Co., Ltd.				
Address	1/F, Bldg 3, Hongfa Hi-tech Indus Tianliao, Gongming, Shenzhen, C					
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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	2019-04-19	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	Jiongsheng Feng
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	Tony Duan
Radiated Emissions	15.247(d)/15.209	PASS	Tony Duan

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	Cleer Limited	
Address:	ss: Unit518, Lakeside 1, Science Park West Ave. HK Science Park	
Manufacturer: Cleer Limited		
Address:	Unit518, Lakeside 1, Science Park West Ave. HK Science Park	

3.2. Product Description

Name of EUT:	Smart Home Speaker	
Trade Mark:	Cleer	
Model No.:	SPACE	
Listed Model(s):	-	
Power supply:	DC 18V	
Adapter information:Model:GPE060D-180388DInput:100-240Va.c., 50/60Hz, 1.5AOutput:18Vd.c., 3880mA		
Hardware version:	V1.3	
Software version:	2.4.0	
Bluetooth		
Version:	Supported BT4.0+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	FPC Antenna	
Antenna gain:	2.11dBi	

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:	/
7	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
•	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	2018/04/28	2019/04/27
•	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

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Ð	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
Ð	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.

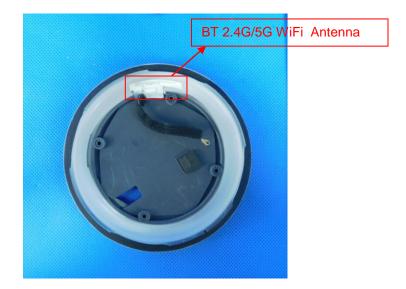
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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)

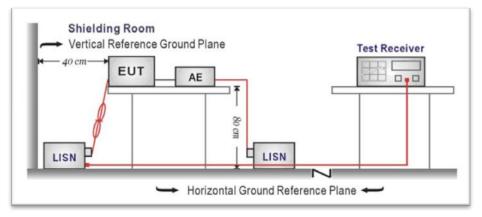
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

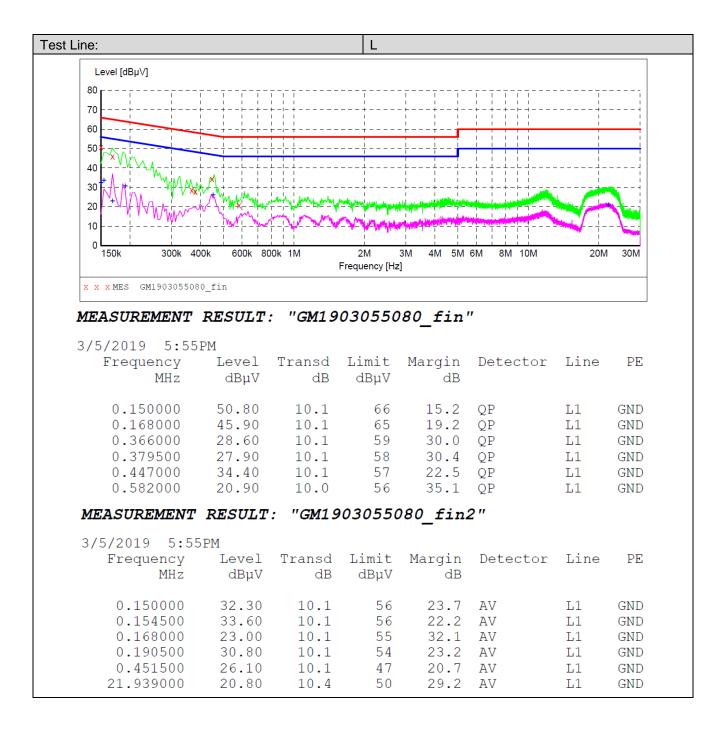
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

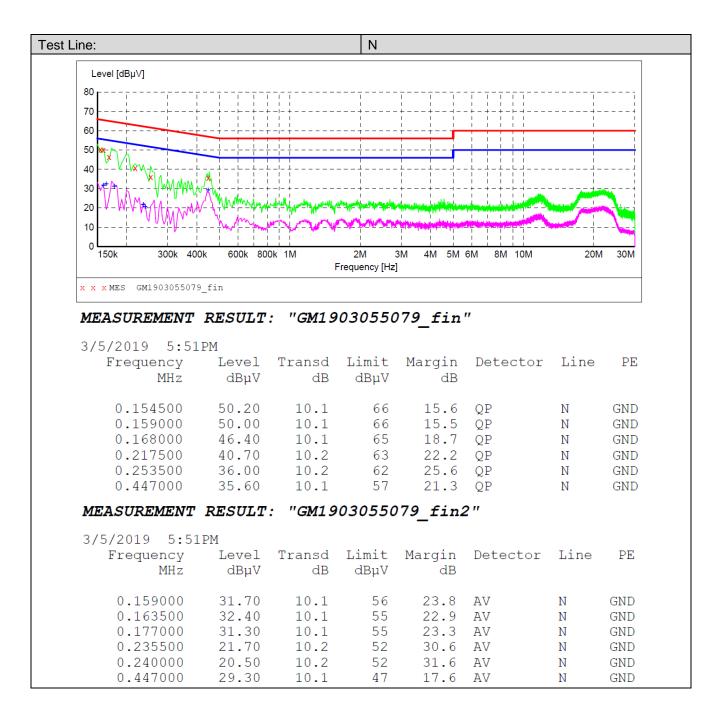
TEST RESULTS

☑ Passed □ Not Applicable

Note:

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



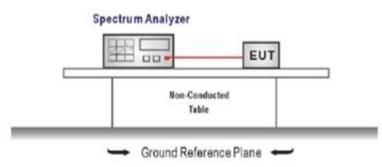


5.3. Conducted Peak Output Power

<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	6.71		
GFSK	39	7.09	≤ 30.00	Pass
	78	6.99		
	00	6.77		
π/4DQPSK	39	7.16	≤ 21.00	Pass
	78	7.06		
	00	7.04		
8DPSK	39	7.45	≤ 21.00	Pass
	78	7.45		

ulation Type:	GFSK
	Spectrum Image: Construction of the sector of
	●1Pk View M1[1] 6.71 dBm
	10 d8m 2:40218090 GHz
	0 dBm
	-10 dBm
0.100	-20 dBm
CH00	-30.48%
	-40 d8m-
	-50 dBm
	-60 dBm-
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Date:12APR_2019 15:44:40
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB RBW 1 MHz Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep Count 500/500
	●1Pk View M1[1] 7.09 dBm
	10 dBm 2,44118810 GHz
	0 dBm
	-10 dBm
01100	-20 dBm
CH39	-30 dBm
	-40 dBm-
	-50 dBm-
	-60 d8m
	-70 dBm-
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Date:12APR.2019 15:51:27
	Spectrum [] Ref Level 20.00 dBm Offset 1.00 dB ● RBW 1 MHz
	Att 30 dB SWT 1 ms VBW 3 MHz Mode Auto Sweep Count 500/500
	10 dBm
	0 dBm
	-10 dBm
CH78	-20 dBm
	-30.48m
	-40 dkm
	-50 UBIN
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz
	Data:12 APR 2019 15:54:00

ulation Type:	π/4DQPSK
	Spectrum Ref Level 20.00 dbm Offset 1.00 db • RBW 2 MHz
	Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500
	● 1Pk View M1[1] 6.77 d
	10 dBm X.40190590 C
	0 dBm
	-10 dBm
01100	-20 dBm
CH00	-30 dBm
	-40 dBm-
	-50 dBm-
	-60 dBm
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 M
	Date:12APR.2019 15:57:40
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB • RBW 2 MHz
	Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500
	P1Pk View M1[1] 7.16 d
	2.44090590 0
	-10 dBm
	-20 dBm-
CH39	-30 dBm
	-40 dBm-
	-50 d8m
	-60 dBm
	-70 dBm-
	CF 2.441 GHz 691 pts Span 5.0 Mi
	Measuring (Attended) 🚧
	Datu:12APR 2019 15:59:41
	Spectrum
	RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep
	Count 500/500 File View
	10.4m M1[1] 7.06 d 2.48011580 C
	10 dBm
	0 d8m
	-10 d8m
	-20 dBm
CH78	-30 d8m
	-40 dBm
	-50 d8m-
	-60 d8m
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 M
	Measuring

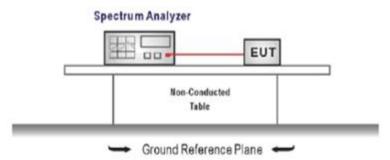
Julation Type:	8DPSK
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Count 500/500 Count 500/500 MHz Mode Auto Sweep
	IPk View M1[1] 7.04 d 2.40204340 0
	10 dBm 041
	-10 d8m
CH00	-20 dBm
	-30 dBm
	-50 d8m
	-60 dBm
	CF 2.402 GHz 691 pts Span 5.0 Mi
	Date:12APR.2019 1603:61
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB • RBW 2 MHz
	Att 500/500 Count 500/500 In Section 200/500
	10 dBm 41 2,44105070 C
	0 dBm
	-10 dBm
СН39	-20 dBm
	-40 d8m
	-50 dBm
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 Mi
	Dam:12APR.2019 16:06:03
	Spectrum Ref Level 20.00 dbm Offset 1.00 db RBW 2 MHz Att 30 db SWT 1 ms VBW 5 MHz Count 500/500 0 SWT 1 ms VBW 5 MHz
	10 dBm 10 dBm
	D dBm
	-10 dBm
CH78	-20 dBm
	-30 USIII
	-50 dBm-
	-60 dBm
	CF 2.48 GHz 691 pts Span 5.0 Mi
	Dabil2APR.2019 169806

5.4. 20 dB Bandwidth

<u>LIMIT</u>

N/A

TEST CONFIGURATION



TEST PROCEDURE

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

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

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

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

🛛 Passed

Not Applicable

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

Iodulation Type:	GFSK
	Spectrum Image: Constraint of the sector of t
CH00	0 dBm 2.40205000 GHz -10 dBm
	-60 dBm -60 dBm -70 dBm -70 dBm CF 2.402 GHz 1001 pts Marker -70 dBm M1 1 1 2:40157 GHz M2 1 2:40205 GHz -70.45 dBm M2 1 03 M1 927.5 KHz 0.39 dB
	Date: 12 APR 2019 15:4425 Spectrum Ref Level 20.00 dBm Offset 1.00 dB ● RBW 10 kHz
CH39	Att 30 dB SWT 189.6 µs VBW 30 kHz Mode Auto FFT count 500/500 19Pk View 110.51 dBm 110.51 dBm 10 dBm M2 M2[1] 1.57 dBm 0 dBm M2 M2[1] 1.57 dBm 0 dBm M1 M2 M2[1] 1.57 dBm -10 dBm M1 M1 M4 M4 M4 -20 dBm M1 M4 M4 M4 M4 M4 -30 dBm M4
CH78	Spectrum Image: Control of the second control of
	Marker Yealue Yualue Function Function Result M1 1 2.4795725 GHz -18.72 dBm -18.72 dBm M2 1 2.4900525 GHz 1.51 dBm -10.72 dBm M3 1 925.0 kHz -1.01 dB -1.01 dB

Modulation Type:	π/4DQPSK
Modulation Type: CH00	Spectrum W Ref Level 20.00 dBm Offset 1.00 dB = RBW 30 kHz Mode Auto FFT • Att 30 dB SWT 63.1 µS = VBW 100 kHz Mode Auto FFT Count 500/500 • IFk View • 17.63 dBm - 17.63 dBm 0 dBm 0 dBm • 00 dBm 0.09 dBm - 2.40204000 GHz -10 dBm • 00 dBm • 00 dBm - 0.00 GHz - 0.00 GHz -20 dBm • 01 -16.923 dBm • 00 dBm • 00 dBm - 0.00 GHz -30 dBm • 00 dBm • 00 dBm • 00 dBm • 00 dBm - 00 dBm -30 dBm • 00 dBm -30 dBm • 00 dBm -70 dBm • 00 dBm -70 dBm • 00 dBm -70 dBm • 00 dBm -70 dBm • 00 dBm
CH39	D3 M1 1.285 MHz 0.49 dB Date 12APR_2019_13d7d1 Date 12APR_2019_13d7d1 Spectrum Image: Control State 100 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.00 dB image: RBW 30 HHz Att 000 SBM Offset 1.
CH78	Spectrum W Ref Level 20.00 dBm Offset 1.00 dB RBW 30 Hz Marker M1[1] -16.77 dBm 10 dBm 0 M2[1] 2.49039250 CHz 0 dBm 0 M2[1] 2.49030250 CHz 10 dBm 0 M2[1] 2.49004000 CHz 10 dBm 0 M2[1] 2.49004000 CHz 10 dBm 0 M3.00 dBm 0 10 dBm 0 -16.770 dBm 3.30 dBm -20 dBm 01 -16.700 dBm -0.30 dBm -0.40 dBm -20 dBm 01 -16.700 dBm -0.00 dBm -0.00 dBm -00 dBm -0.100 dBm -0.00 dBm -0.00 dBm -00 dBm -0.00 dBm -0.00 dBm -0.00 dBm -00 dBm -0.00 dBm -0.00 dBm -0.00 dBm -10 dBm -1.27 x dBm -0.00 dBm -0.00 dBm -10 dBm -1.28 MHz -0.01 pts Span 2.5 MHz -10 dBm -1.28 MHz -0.03 dBm -0.05 dBm 10 1 x28 MHz -0.03 dBm

dulation Type:	8DPSK
	Spectrum 🕎
	RefLevel 20.00 dBm Offset 1.00 dB
	Count 500/500 IPk View
	10 dBm M1[1] -17.15 dBm 2.4013750 GHz 2.013750 GHz
	0 dBm M2 M2[1] 3.10 dBm 2.40203750 GHz
	and a strength of the strength
	-10 dBm
	-30 dBm
CH00	148.d8m
01100	-50 dBm
	-60 dBm-
	-70 dBm
	CF 2.402 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result
	M1 1 2.4013775 GHz -17.15 dBm M2 1 2.4020375 GHz 3.10 dBm
	D3 M1 1 1.29 MHz 0.01 dB Mestoring
	Date:12APR.2019 16:03:42
	Spectrum [] Ref Level 20.00 dBm Offset 1.00 dB ● RBW 30 kHz
	Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count 500/500
	PFk View M1[1] -16.88 dBm
	10 dBm 2.44037750 GHz
	0 dBm
	-10 dBm 01 -16.581 dBm 03
	-20 dBm
	-30 dBm
CH39	yte dam
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.4403775 GHz -16.88 dBm Function Function
	M1 1 2.4403 / 5 MHz -10.86 bin M2 1 2.44104 GHz 3.42 dBm D3 M1 1 1.2875 MHz 0.23 dB
	Data:12APR.2019 16:05:54
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB ● RBW 30 kHz Att 30 dB SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT
	Count 500/500
	M1[1] -16.80 dBm
	10 delli M2 M2[1] 3.43 dBm
	-10 dBm
	-20 dBm
CH78	-50 dBm
	-50 dBm
	-70 dBm
	CF 2.48 GHz 1001 pts Span 2.5 MHz Marker
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.4793775 GHz -16.80 dBm
	M2 1 2.48004 GHz 3.43 dBm D3 M1 1 1.2875 MHz 0.09 dB
	Messuring ((INTERNE) (A)

5.5. Carrier Frequencies Separation

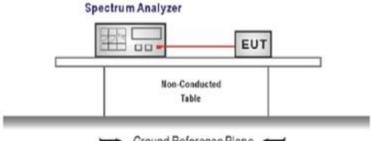
LIMIT

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

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

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

TEST CONFIGURATION



- Ground Reference Plane

TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

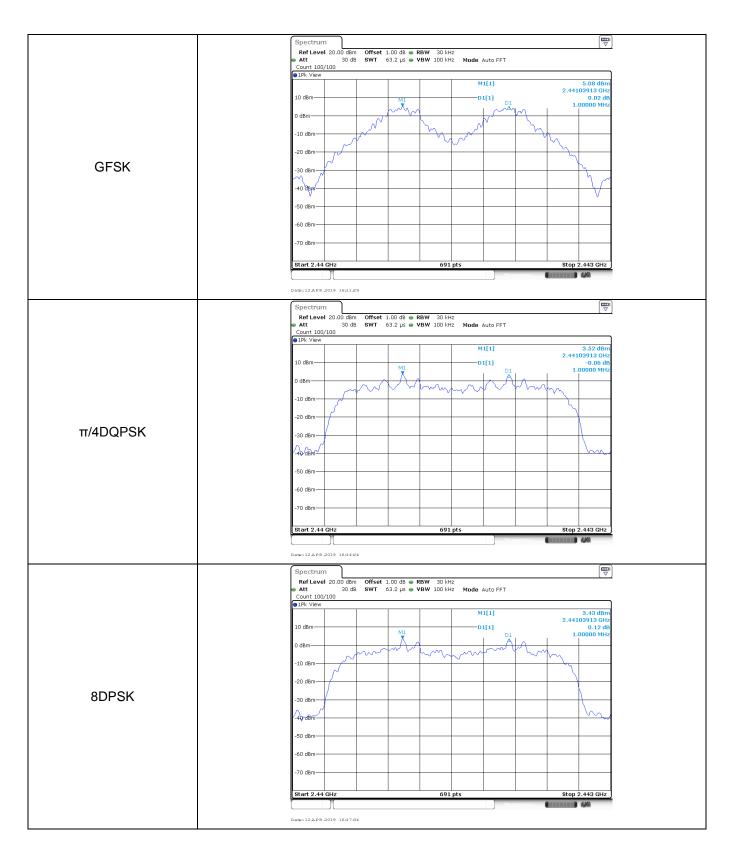
TEST RESULTS

☑ Passed □ Not Applicable

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

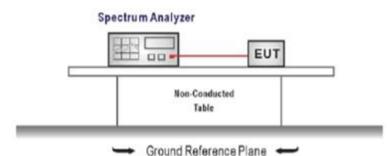


5.6. Hopping Channel Number

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		

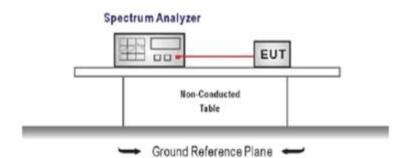
1	
	Spectrum Image: Constraint of the sector of t
	Att 30 db SWT 1 ms VBW 300 kHz Mode Auto Sweep
	10 dBm
	- United to the second state of the second
	-10 dBm
	-20 dBm
GFSK	
	40 d8m
	-50 dBm
	-60 dBm
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Messeinge. BREEFER
	Data:12 APR 2019 16:12:50
	Spectrum Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz
	💩 Att 30 dB SWT 1 ms 👄 VBW 300 kHz Mode Auto Sweep
	Pk View
	10 dBm
	0.000 Martin Mar
	-10 dBm
	-20 dBm
π/4DQPSK	-30 dBm
	-40 d8m
	-50 dBm
	-60 dBm
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Data: 12 APR 2019 16:15:24
	Spectrum [] Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	● Att 30 dB SWT 1 ms ● VBW 300 kHz Mode Auto Sweep ● 1Pk View
	10 dBm
	ole manufacture and a manufacture of the second sec
	-10 dBm
	-20 dBm
8DPSK	-80 dBm-
	140 dBm
	-50 d8m
	-60 d8m
	-70 d8m-
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Date:12.APR.2019 16:18:48

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.

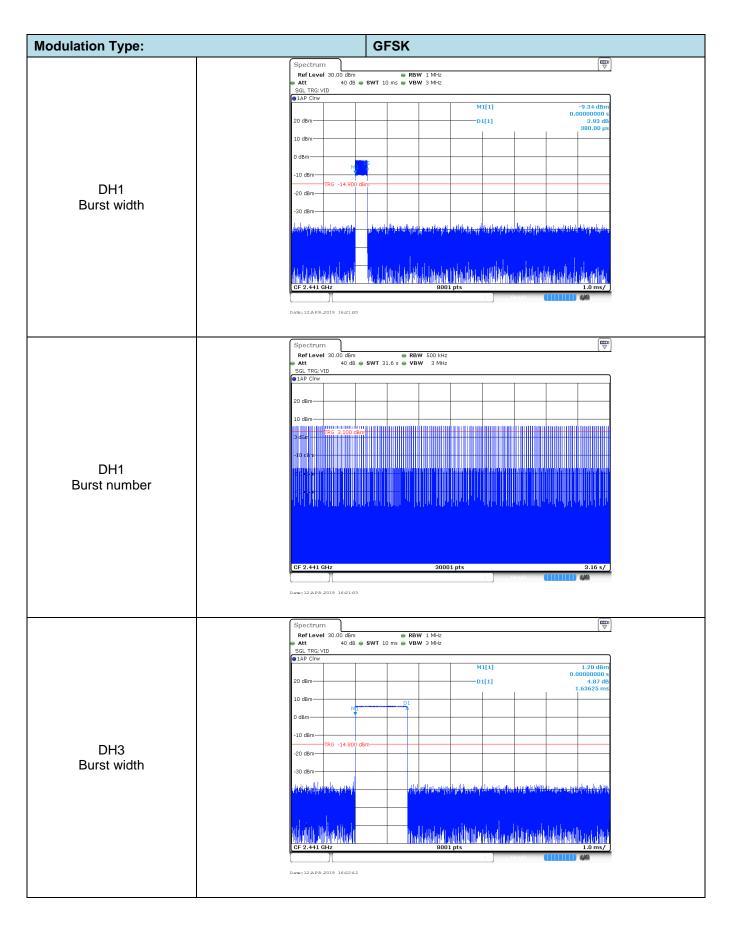
TEST MODE:

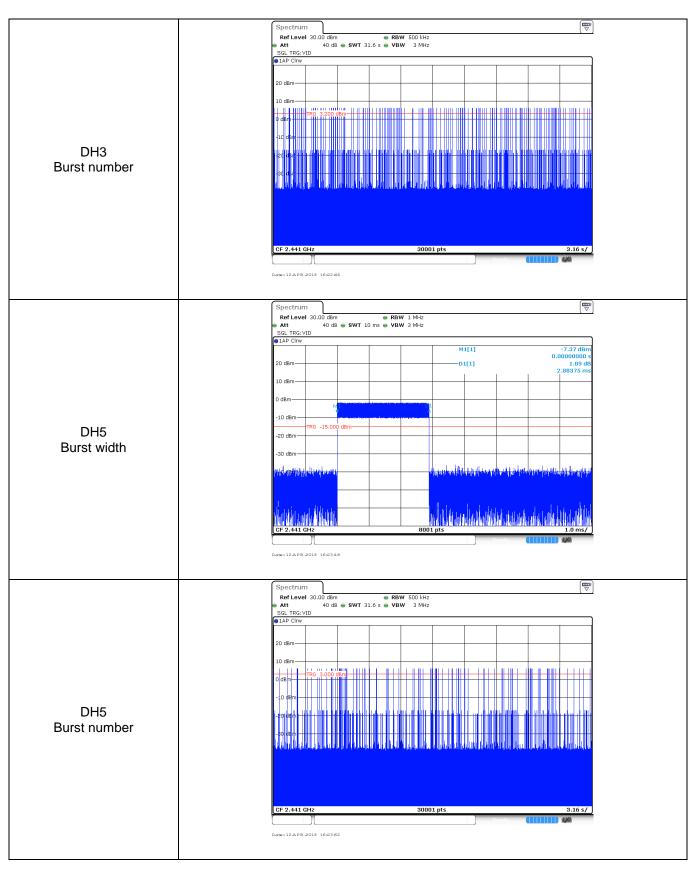
Please refer to the clause 3.3

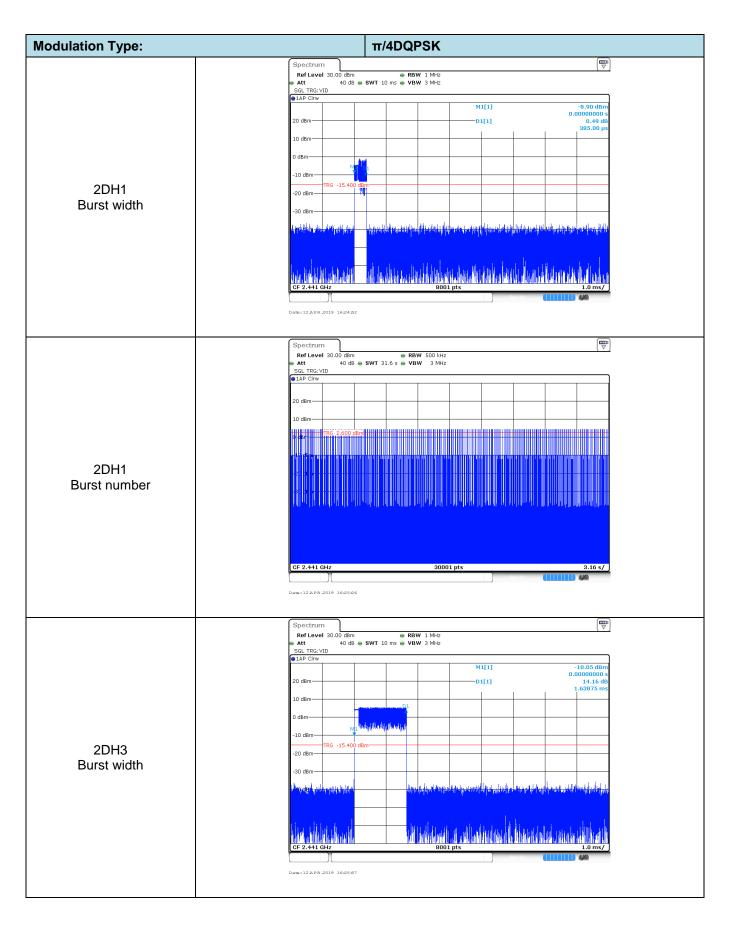
TEST RESULTS

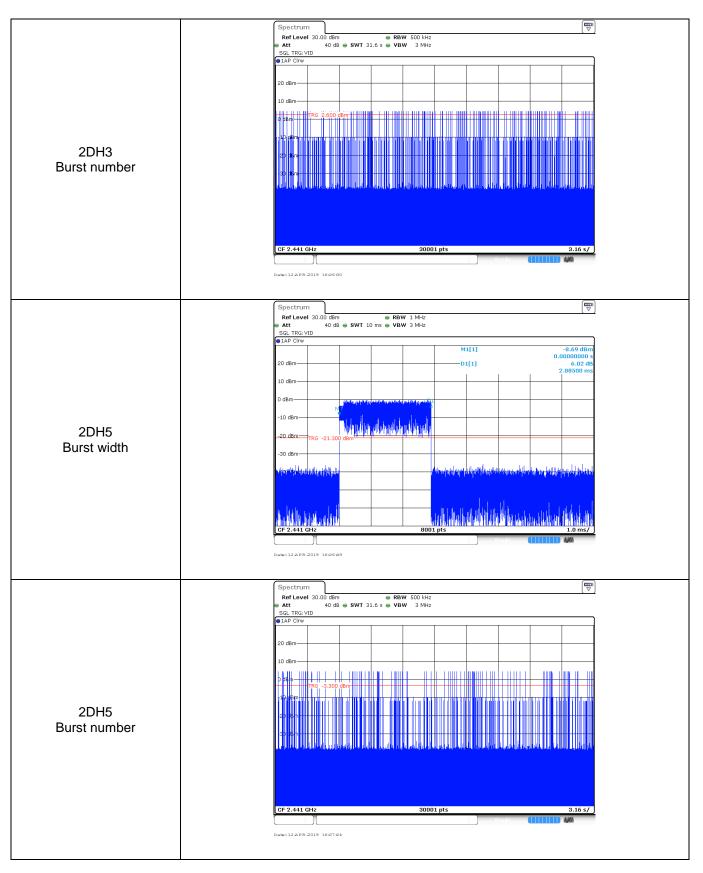
☑ Passed □ Not Applicable

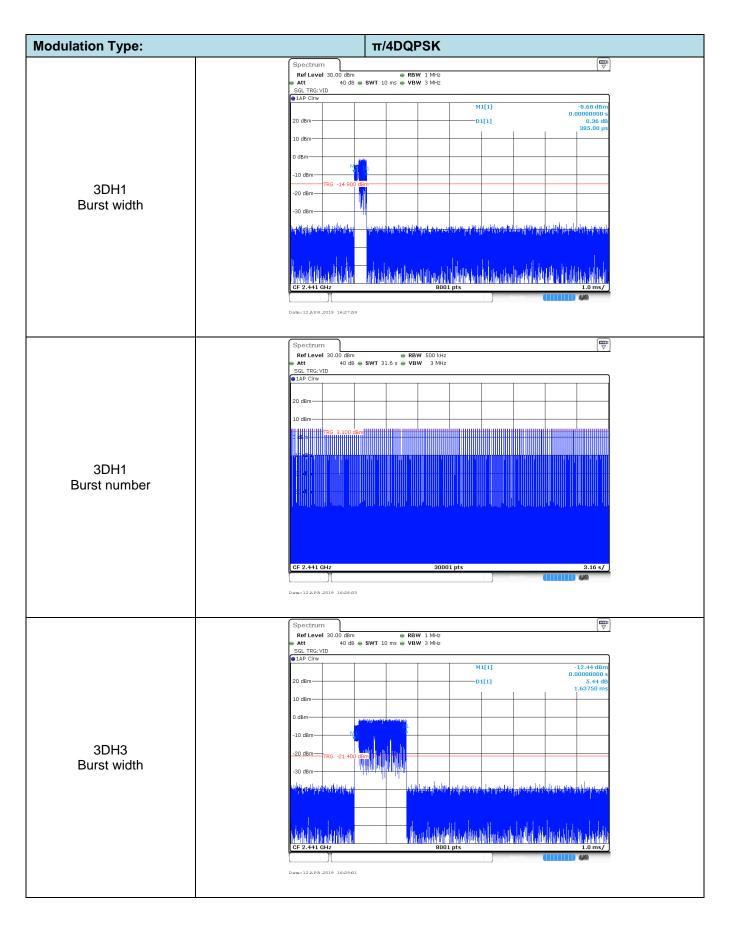
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.38	319.00	0.12		
GFSK	C DH3 DH5	1.64	162.00 0.27		≤ 0.40	Pass
		2.88	101.00	0.29		
	2DH1 0.38		317.00	0.12		
π/4DQPSK	2DH3	1.64	164.00	0.27	≤ 0.40	Pass
	2DH5	2.89	109.00	0.31		
	3DH1	0.38	320.00	0.12		
8DPSK	3DH3	1.64	156.00	0.26	≤ 0.40	Pass
	3DH5	2.89	113.00	0.33		

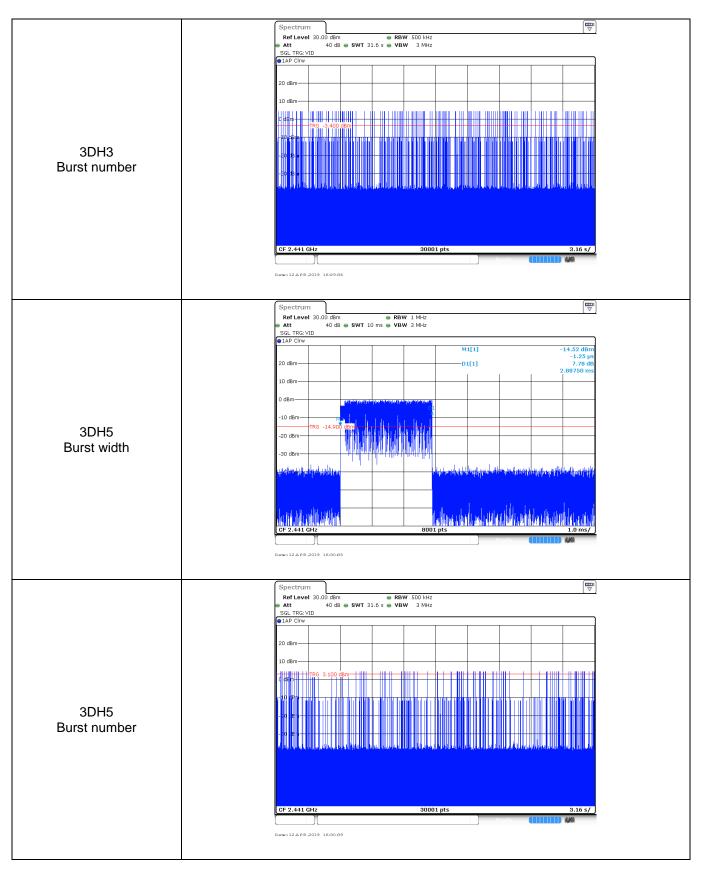












5.8. Pseudorandom Frequency Hopping Sequence

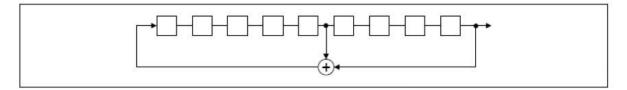
<u>LIMIT</u>

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:

0	2	4	6	62	64	-	78	1	73	75 7
٦				 <u>F</u>			1			П
							i i			
				1			1			
				 			1		 _Ĺ_	

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.

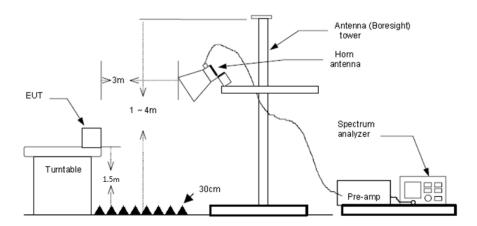
5.9. Restricted band (radiated)

<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:				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	
2310.00	43.13	28.05	6.62	37.59	40.21	74.00	-33.79	Horizontal	Peak	
2390.00	43.34	27.65	6.75	37.59	40.15	74.00	-33.85	Horizontal	Peak	
2310.00	43.91	28.05	6.62	37.59	40.99	74.00	-33.01	Vertical	Peak	
2390.00	43.98	27.65	6.75	37.59	40.79	74.00	-33.21	Vertical	Peak	
2310.00	31.36	28.05	6.62	37.59	28.44	54.00	-25.56	Horizontal	Average	
2390.00	31.11	27.65	6.75	37.59	27.92	54.00	-26.08	Horizontal	Average	
2310.00	31.43	28.05	6.62	37.59	28.51	54.00	-25.49	Vertical	Average	
2390.00	31.08	27.65	6.75	37.59	27.89	54.00	-26.11	Vertical	Average	

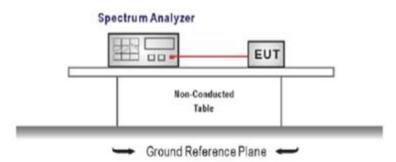
Test channel:					CH78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	56.80	27.26	6.83	37.59	53.30	74.00	-20.70	Horizontal	Peak	
2500.00	43.50	27.20	6.84	37.59	39.95	74.00	-34.05	Horizontal	Peak	
2483.50	52.77	27.26	6.83	37.59	49.27	74.00	-24.73	Vertical	Peak	
2500.00	43.63	27.20	6.84	37.59	40.08	74.00	-33.92	Vertical	Peak	
2483.50	54.21	27.26	6.83	37.59	50.71	54.00	-3.29	Horizontal	Average	
2500.00	30.88	27.20	6.84	37.59	27.33	54.00	-26.67	Horizontal	Average	
2483.50	48.56	27.26	6.83	37.59	45.06	54.00	-8.94	Vertical	Average	
2500.00	30.78	27.20	6.84	37.59	27.23	54.00	-26.77	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

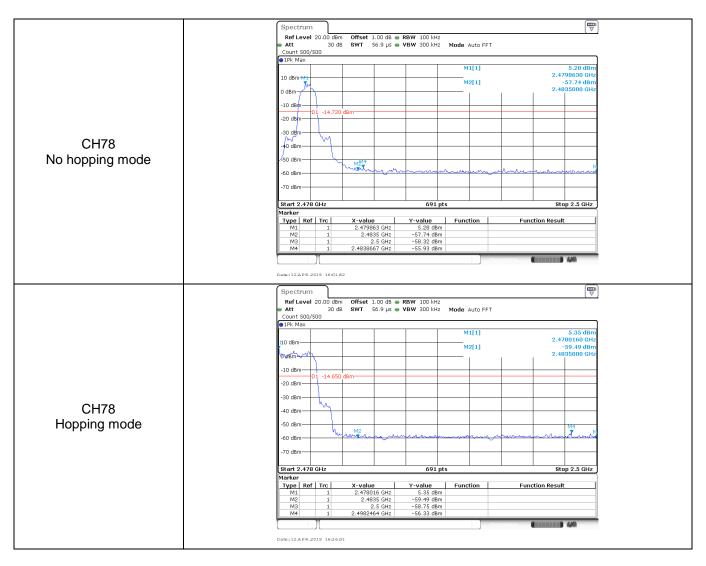
est Item:	Band edge		Modula	ation ty	vpe:	GF	SK	
		Count 500/500			Mode Auto Sweep			
		1Pk Max 10 dBm 0 dBm -10 dBm			M1[1] M2[1]		6.26 dBm 2.402180ੴHz -49.77 dBm 2.400000 GHz	
CH00		-20 dBm -30 dBm -40 dBm	n				NE	
No hopping mode		-50 dBm -60 dBm -70 dBm Start 2.31 GHz	her the manual	691 pt	S	ENT	Stop 2.405 GHz	
		Marker Type Ref Trc M1 1 1 M2 1 1 M3 1 1 M4 1 1 M5 1 1	X-value 2.40218 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.399906 GHz	Y-value 6.26 dBm -49.77 dBm -55.82 dBm -55.81 dBm -51.11 dBm		Function F		
		Spectrum			Ne.	asuring		
		Att 30 dB Count 500/500 1Pk Max	Offset 1.00 dB SWT 1.1 ms	RBW 100 kHz VBW 300 kHz	Mode Auto Sweep M1[1]		5.91 dBm 2.402180թ <u>գH</u> z	
		10 dBm 0 dBm -10 dBm -20 dBm -20 dBm	n		M2[1]		-54.82 dBm 2.400000 cHr	
CH00 Hopping mode		-30 dBm	M5	har the stand there with	miniuman	Mis Mis and Mis		
		-60 dBm -70 dBm Start 2.31 GHz Marker		691 pt			Stop 2.405 GHz	
		Type Ref 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 2.33671 GHz	Y-value 5.91 dBm -54.82 dBm -55.22 dBm -55.51 dBm -53.58 dBm		Function F	tesult	
		Pate: 12 APR 2019 16:13:03			Me	asuring		
		Ref Level 20.00 dBm	Offset 1.00 dB ● SWT 56.9 µs ●		Mode Auto FFT		(∨) 6.87 dBm	
		10 dBm M1 0 dBm	p		M2[1]		2.4801810 GHz -57.15 dBm 2.4835000 GHz	
CH78		-20 dBm -30 dBm -40 dBm	···					
No hopping mode		-50 dBm	Mat		And a trap		and and a state of the second	
		M1 1 M2 1 M3 1	X-value 2.480181 GHz 2.4835 GHz 2.5 GHz	691 pt Y-value 6.87 dBm -57.15 dBm -60.07 dBm	Function	Function F	Stop 2.5 GHz	
			2.4837391 GHz	-56.37 dBm	Me	asuring (199	111) ANA	

Report No.: CHTEW19040136

	Spectrum Image: Constraint of the sector of t
	● IPK Max
	M1[1] 6.36 dBm 10 dBm 2.4781750 dHz 2.4781750 dHz M2[1] -59111 dBm
	0 dBm 2.4835000 GHz
	-20 d8m
CH78 Hopping mode	-40 dBm
	-60 dBm
	Start 2.478 GHz 691 pts Stop 2.5 GHz Marker
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.478175 GHz 6.36 dBm
	M2 1 2.4835 GHz -59.11 dBm M3 1 2.5 GHz -59.72 dBm M4 1 2.4970232 GHz -59.72 dBm
	Meseries () () () () () () () () () () () () ()

Test Item:	Band edge			M	odula	tion t	ype:		٦	π/4D	QPSK
	-	Spectrum Ref Level 21 Att Count 500/50	30 dB	Offset 1 SWT	.00 dB 👄 🖡 1.1 ms 👄 V	BW 100 kHz /BW 300 kHz	: Mode 4	luto Sweep			
CH00 No hopping mode) 1Pk Max 10 dBm) dBm 10 dBm	-15.240 c	dBm	Malika Majora			1[1] 2[1]	Lug-Markana, M		4.76 dBm 401910,GHz -51.74 dBm 400000 SHz
	S M	Start 2.31 GH larker Type Ref M1 M2 M3 M4 M5 M5	Trc 1 1 1 1 1 1	2 2.3 2.39990	91 GHz .4 GHz 39 GHz 31 GHz	691 Y-value 4.76 dBr -51.74 dBr -56.65 dBr -54.84 dBr -51.58 dBr	Funct n n n	tion	Func	ction Resul	2.405 GHz
	-	Spectrum Ref Level 21 Att Count 500/500	30 dB			BW 100 kHz /BW 300 kHz		luto Sweep			
	1	LO dBm						1[1] 2[1]		2.4	4.45 dBm 402040 GHz -49.92 dBm 400000 GHz
CH00	4	10 dBm D1 20 dBm 30 dBm 40 dBm	-15.550 c	dBm							
Hopping mode	-1 -1	50 dBm 60 dBm 70 dBm	showed and a second	ngritation	Mormalino	www.webwter	www.www.	, della construction and a second	numana	M) In North	M2 Nora
	M	Start 2.31 GH Iarker Type Ref M1 M2 M3 M4 M5 M5		2	04 GHz .4 GHz 39 GHz 31 GHz	691 Y-value 4.45 dBr -49.92 dBr -54.89 dBr -55.64 dBr -52.35 dBr	Funct	tion	Func	Stop tion Resul	2.405 GHz
	Da	100:12 APR .201	9 16:15:53	1				Mea	suring		4,44

Shenzhen Huatongwei International Inspection Co., Ltd.

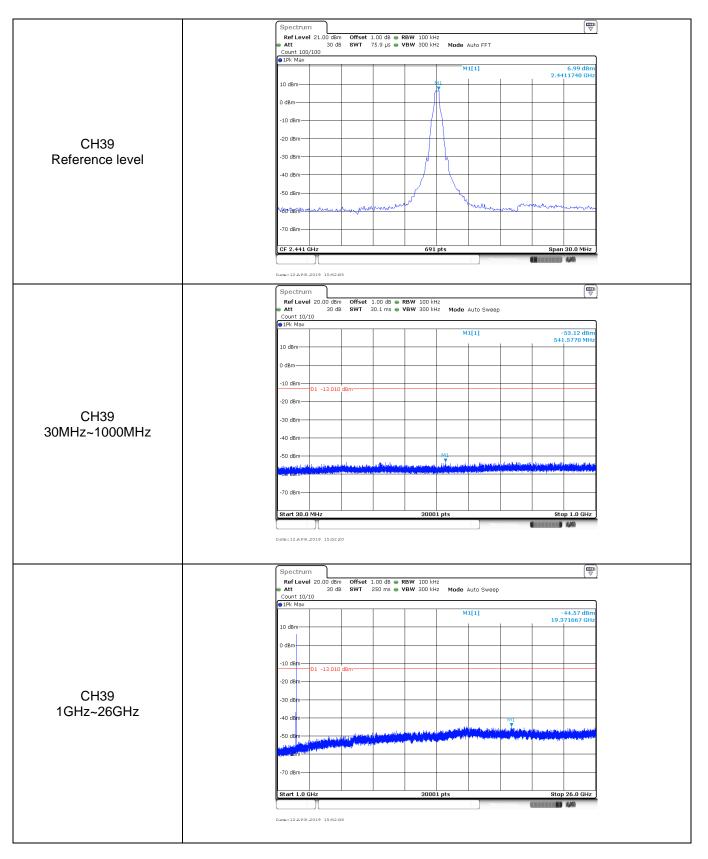


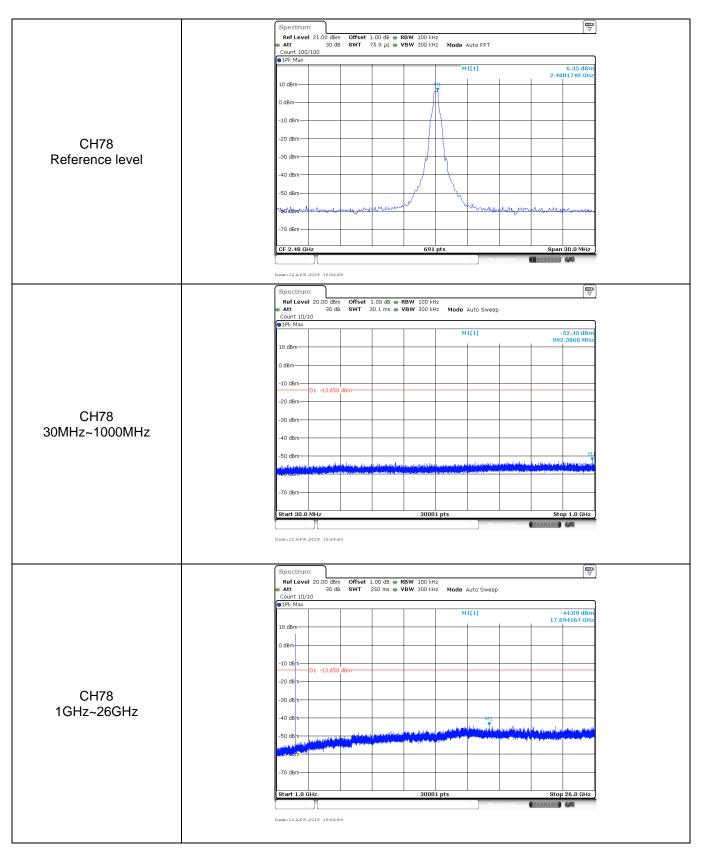
Test Item:	Band edge	Modulation type: 8DPSK
CH00 No hopping mode	Band edge	Spectrum W Ref Level 20.00 dBm Offset 1.00 dB = RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mark M1[1] 2.402.180 gHz 0 dBm M2[1] 2.402.180 gHz 0 dBm M2[1] 2.400000 GHz -10 dBm M2[1] -20 dBm M2[1] -30 dBm M2[1] -20 dBm M2[1] -30 dBm M2[1]
		MS 1 2:399906 GHz -51.57 dBm Date: 12.3.PR.2019 169434 Mestandine Mestandine Spectrum Image: Cffrat 1.00 dB PBW 100 kHz
CH00 Hopping mode		Ref Level 20.00 dbm Offset 1.00 dbm WBW 300 kHz Mode Auto Sweep count 500/500 Image: Sweet 1.1 ms WBW 300 kHz Mode Auto Sweep 10 dbm 1.1 ms VBW 300 kHz M1[1] 4.49 dbm 10 dbm 1.2 403010 GHZ -54.41 dbm -54.41 dbm 20 dbm 1.1 ms M1[1] 2.400000 GHZ 30 dbm 1.1 ms 1.1 ms M1[1] 2.400000 GHZ 30 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 30 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 30 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 4.0 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 4.0 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 1.1 ms 4.1 dbm 1.1 ms 1.1 ms 1.1 ms 1.1 ms 1.1 ms 1.1 ms 10 dbm 1.1 ms 1.1
CH78 No hopping mode		Spectrum W Ref Level 20.00 dbm Offset 1.00 dbm RBW 100 kHz Att 30 dbm Stop 2.5 9 µs VBW 300 kHz 0 19k Max M1[1] 2.401010 GHz 0 19k Max M1[1] 2.401010 GHz 0 dbm M2[1] 2.56.89 dBm 0 dbm M2[1] 2.4035000 GHz -0 dbm -0 dbm -0 dbm -0 dbm -0 dbm -0 dbm <t< td=""></t<>

Report No.: CHTEW19040136

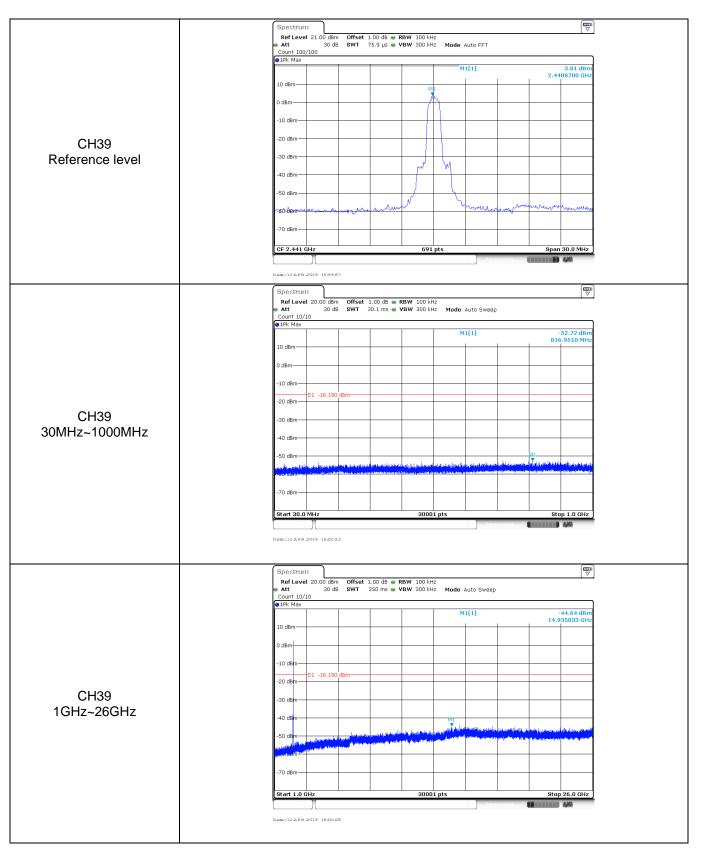
	Spectrum Image: Constraint of the sector of t
CH78 Hoppig mode	• IPk Max M1[1] S.S3 dBm 2.4761750 GHz 2.4761750 GHz -58.52 dBm -58.52 dBm -20 dBm -10 dBm -114.470 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -50 dBm
	-70 dBm 691 pts Stop 2.5 GHz
	Marker Y-value Y-value Function Function Result M1 1 2.479175 GHz 5.53 dBm Function Result Function Result M2 1 2.4895 GHz 5.52 dBm Function Result Function Result M3 1 2.95 GHz -550,74 dBm Function Result Function Result M4 1 2.4897979 GHz -56,95 dBm Function Result Function Result

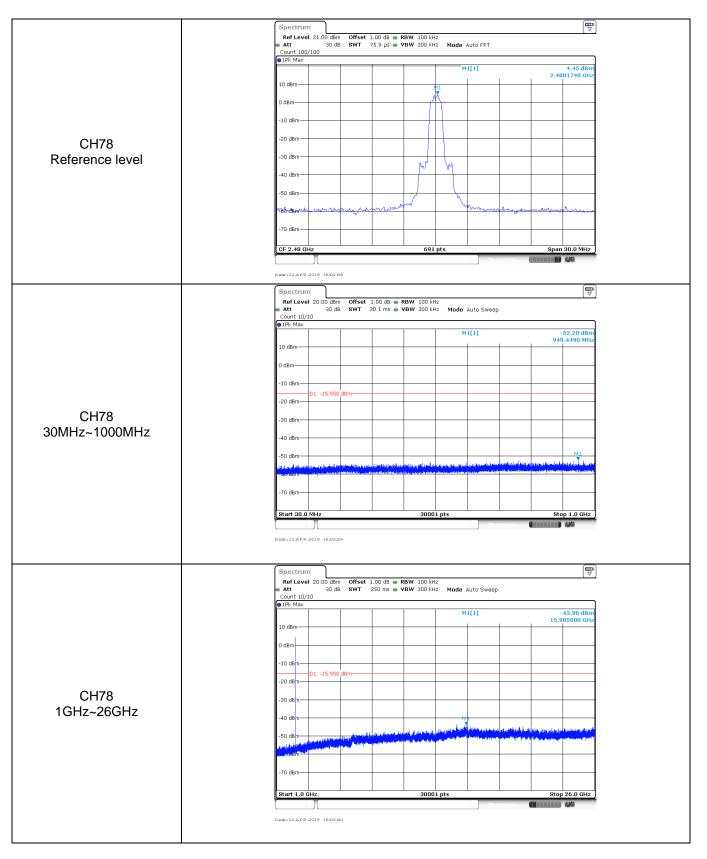
est Item:	SE		Modula	ation type	e:	GFS	GFSK			
		Spectrum Ref Level 21.00 dBm Att 30 dB		RBW 100 kHz						
		Count 100/100								
					M1[1]	2.4	6.11 dBm 1020430 GHz			
		10 dBm		1						
		0 dBm		1 //						
		-10 dBm								
01100		-20 dBm								
CH00 Reference level		-30 dBm								
		-40 dBm		+						
		-50 dBm			Ψ.					
		√ð0 ⁻ dBm -√{∿	- hope marker with	North Contraction of the Contrac	Mandrasan	wardelander of the second s	ىنىلىمىلىن دى			
		-70 dBm								
		CF 2.402 GHz		691 pts		Spa	in 30.0 MHz			
					Measurin		140			
		Data:12 APR 2019 15:45:08								
		Spectrum								
		Ref Level 20.00 dBm Att 30 dB Count 10/10	Offset 1.00 dB SWT 30.1 ms	KBW 100 kHz VBW 300 kHz Me	de Auto Sweep					
		IPk Max			M1[1]		-52.56 dBm			
		10 dBm				9:	20.5430 MHz			
		0 dBm								
		-10 dBm								
		-20 dBm	IBm-							
CH00		-30 dBm								
30MHz~1000MHz		-40 dBm								
		-50 dBm					M1			
		authoritate and the first	Inputte an antiput Mandha anti	a da ang kelula kanal da Mara	United Constant of the American Constant of the Constant of the	independent of the second state of the	and the stranger			
		-70 dBm								
		Start 30.0 MHz		30001 pts	Measurin	S	top 1.0 GHz			
		Data:12APR.2019 15%526								
		Spectrum								
		Ref Level 20.00 dBm Att 30 dB Count 10/10	Offset 1.00 dB 🖷 SWT 250 ms 🖷	RBW 100 kHz VBW 300 kHz Mc	de Auto Sweep					
		● 1Pk Max]		M1[1]		-44.50 dBm			
		10 dBm		<u> </u>		16	.568333 GHz			
		0 dBm					<u> </u>			
		-10 dBm								
		-20 dEm	IBm							
CH00		-30 dem								
1GHz~26GHz										
		-40 dBm	مسيلية والمس	and an and the second	nin and a second second	New Martine Martine	na salaka di Athate			
		-50 dBm		and desired to provide		and the plant of parts works	an Ingininahan Kiti			
		and delin								
		-70 dBm								
		Start 1.0 GHz		30001 pts		Sto	op 26.0 GHz			
							B 4.9/2			
		Date: 12 APR 2019 15:45:42			Measurin		140 C			





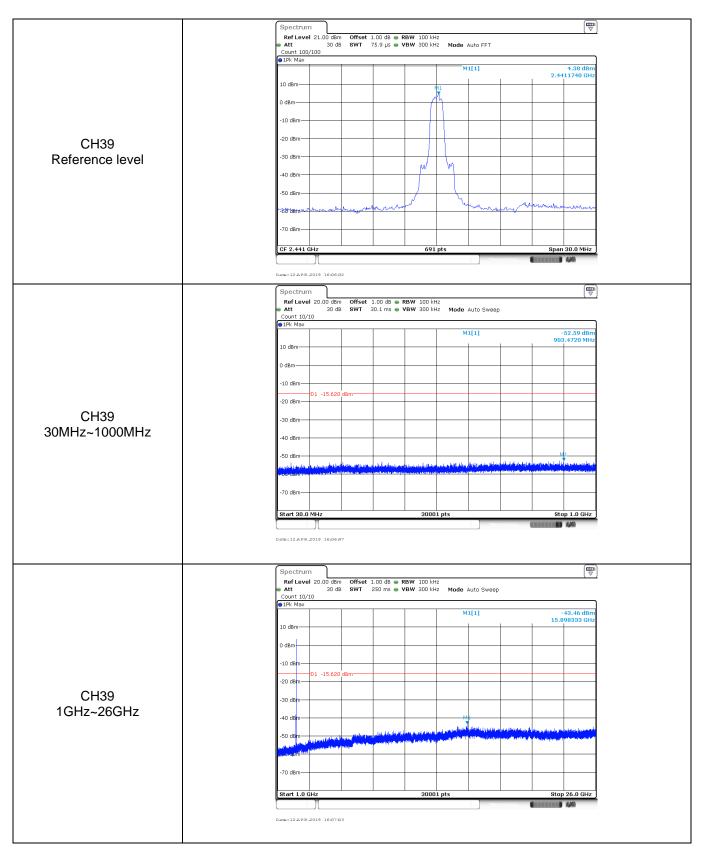
Item:	SE		Modula	tion type	e:	π/4DQPSK				
		Spectrum								
		RefLevel 21.00 dBm Att 30 dB	Offset 1.00 dB ● F SWT 75.9 µs ● V		de Auto FFT		· · · ·			
		Count 100/100 • 1Pk Max								
					M1[1]	2.4	4.07 dBm 4021740 GHz			
		10 dBm		11						
		0 dBm								
		-10 dBm								
0		-20 dBm								
CH00		-30 dBm		WM						
Reference level		-40 dBm		W W						
		-50 dBm								
		160 dBm and a second	manna	nor -	Manufin margada.	مر معمم معمم	- La Lassa de la maria			
		-70 dBm								
		CF 2.402 GHz		691 pts	Measur	Spa ing	an 30.0 MHz			
		Date:12APR.2019 15:58:15								
		Spectrum								
		Ref Level 20.00 dBm Att 30 dB Count 10/10			de Auto Sweep					
		● 1Pk Max			M4[1]		-53.05 dBm			
		10 dBm			M1[1]	6	-33.05 UBm 63.0820 MHz			
		0 dBm								
		-10 dBm								
		D1 -15.930 d	IBm							
CH00		-20 dBm								
0MHz~1000MHz		-30 dBm								
		-40 dBm								
		-50 dBm	tation theorem in the order designs and the second	land terrar all the strengtheres.	101	and all the local large	alau sanau			
			lain anna anns an an Lùmhadhachach aitean	na ji ka anta Mili akan kataling tu.	an an in a sample main and a finish	non freedolige of the standard sectors	tite politer stilpen sin de a.			
		-70 dBm								
		Start 30.0 MHz		30001 pts		s	top 1.0 GHz			
		Messuring.								
		Date:12 APR 2019 15:58:31								
							(
		Spectrum Ref Level 20.00 dBm	Offset 1.00 dB 🕳 F	BW 100 kHz						
		Count 10/10	SWT 250 ms 👄 V	BW 300 kHz Mo	de Auto Sweep					
		● 1Pk Max			M1[1]		-42.87 dBm .785000 GHz			
		10 dBm				15				
		0 dBm								
		-10 dBm								
		-20 dBm	IBm-							
CH00		-30 dBm								
1GHz~26GHz		-40 dBm			м					
			فعاقبه استحديته والمراجع ومروان	and a second part of the second s		A star a star or still	unalitions, and di			
		-50 dBm				a a a a a a a a a a a a a a a a a a a				
		v-og*a≌m								
		-70 dBm								
	1									
		Start 1.0 GHz		30001 pts		Ste	op 26.0 GHz			

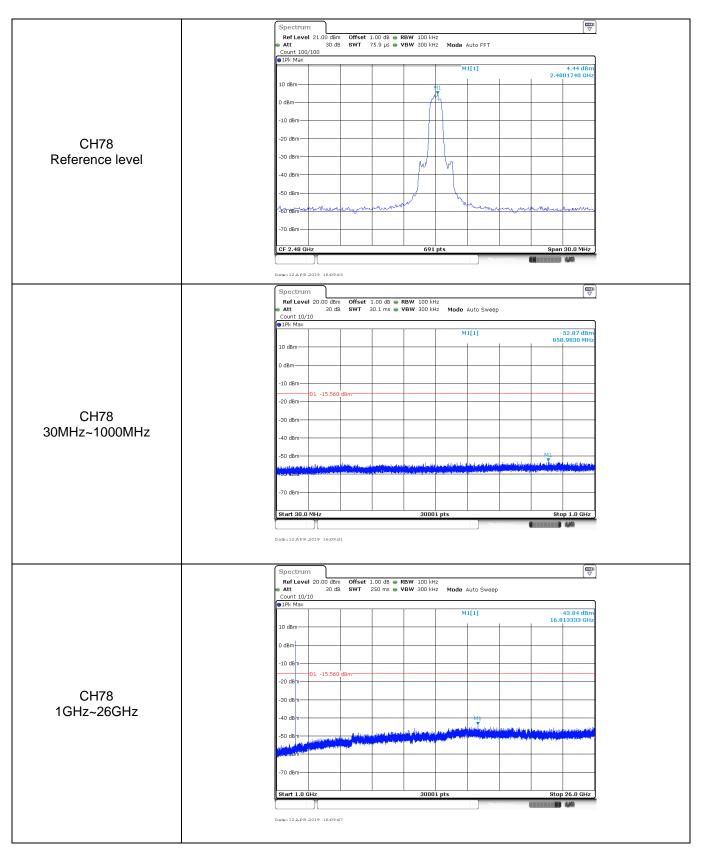




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est Item:	SE		Modu	lation	type:		8DPS	
		Spectrum Ref Level 21.00 dBm Att 30 dB Count 100/100		 RBW 100 ki VBW 300 ki 	Hz Hz Mode Aut	o FFT		
		● 1Pk Max 10 dBm			M1[1	1]	2.4	4.00 dBm 021740 GHz
		0 dBm						
CH00		-20 dBm						
Reference level		-30 dBm		W	M			
		-50 dBm	when when a second	man	Mun	and such	dan har har and har and har and har	
		-70 dBm		691	L pts			n 30.0 MHz
		Data:12APR 2019 16:04:4	8			Measuring		a aka
		Spectrum RefLevel 20.00 dBm Att 30 dB Count 10/10				to Sweep		
		10 dBm			M1[1	u]	7:	-52.34 dBm 30.3650 MHz
CH00		0 dBm						
		-20 dBm	dBm					
30MHz~1000MHz		-40 dBm				M1		
		er posses and a statistic statistic and a statistic statistic statistic statistics and a statistic statistic statistics and a statistic statistics and a statistic statistic statistic statistics and a statistic statistics and a statistics and	ال ماريخ من المريخ ا المريخ المريخ	Hinadalan Jacob (1979) Managar (1999) Managar (1999)	Star of Star on the Astronomy of Star of Star An and Star of St Astronomy of Star	(https://www.university.org/	usielis dijerisedoblice negorijestone glast	An est later form the data the second second second
		-70 dBm		3000)1 pts			top 1.0 GHz
		Date:12APR 2019 16:05:0	3			Measuring		1,00
		Spectrum RefLevel 20.00 dBm Att 30 dB Count 10/10		 RBW 100 ki VBW 300 ki 	Hz Hz Mode Aut	o Sweep		
		● 1Pk Max			M1[1	1]	15	-44.06 dBm .664167 GHz
		0 dBm						
CH00		-20 dBm	dBm					
1GHz~26GHz		-30 dBm			Mi			
		-50 dBm		tere tikkin den som station andre som som som som som som som som		and the second s		
		-70 dBm		3000	01 pts		Sto	p 26.0 GHz
		Date: 12 APR .2019 16:05:1	9			Measuring		





5.11. Spurious Emissions (radiated)

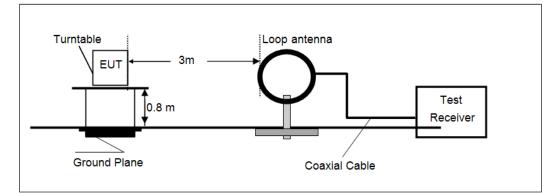
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

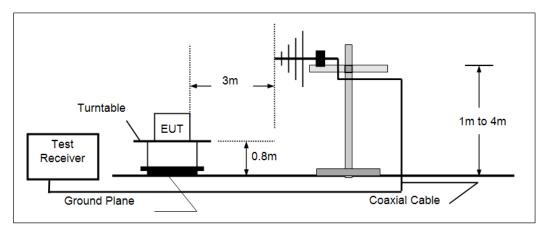
Frequency	Limit (dBuV/m @3m)	Value		
30 MHz ~ 88 MHz	40.00	Quasi-peak		
88 MHz ~ 216 MHz	43.50	Quasi-peak		
216 MHz ~ 960 MHz	46.00	Quasi-peak		
960 MHz ~ 1 GHz	54.00	Quasi-peak		
Above 1 GHz	54.00	Average		
	74.00	Peak		

TEST CONFIGURATION

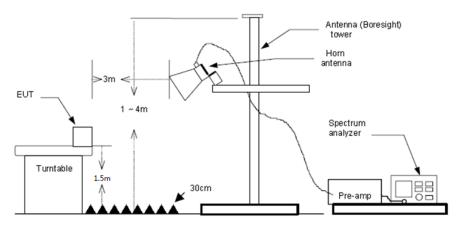
Below 30 MHz



> 30 MHz ~1000 MHz



> Above 1 GHz



TEST PROCEDURE

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

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

 (3) From 1 GHz to 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

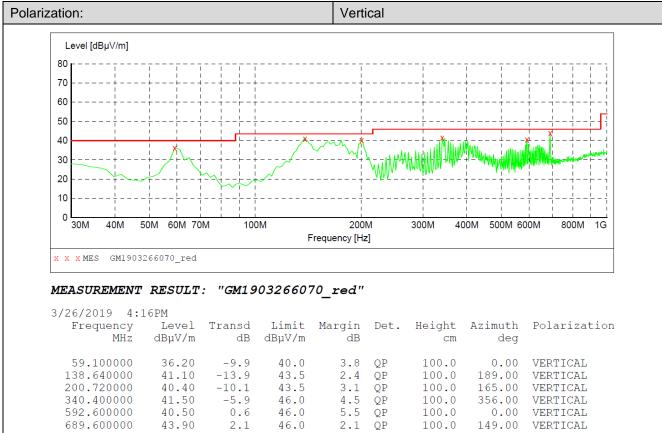
Note:

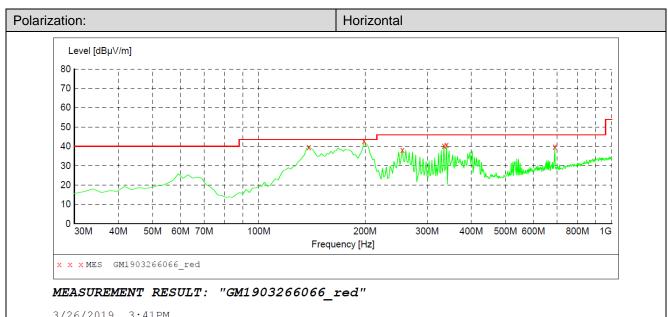
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst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

➢ 30 MHz ~ 1 GHz





3/26/2019 3: Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
$\begin{array}{c} 138.640000\\ 198.780000\\ 255.040000\\ 334.580000\\ 340.400000\\ 689.600000\end{array}$	39.60	-13.9	43.5	3.9	QP	300.0	94.00	HORIZONTAL
	42.80	-9.9	43.5	0.7	QP	100.0	283.00	HORIZONTAL
	38.10	-8.5	46.0	7.9	QP	100.0	283.00	HORIZONTAL
	40.30	-6.2	46.0	5.7	QP	100.0	183.00	HORIZONTAL
	40.70	-5.9	46.0	5.3	QP	100.0	183.00	HORIZONTAL
	39.80	2.1	46.0	6.2	QP	100.0	54.00	HORIZONTAL

➢ 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					
2987.92	41.06	28.59	7.47	37.58	39.54	74.00	-34.46	Vertical	Peak					
4809.50	34.55	31.58	9.55	35.72	39.96	74.00	-34.04	Vertical	Peak					
6662.01	31.24	34.20	11.43	33.71	43.16	74.00	-30.84	Vertical	Peak					
9251.58	31.29	38.91	13.55	33.44	50.31	74.00	-23.69	Vertical	Peak					
2995.54	40.38	28.60	7.48	37.58	38.88	74.00	-35.12	Horizontal	Peak					
4983.99	33.15	31.48	9.66	35.41	38.88	74.00	-35.12	Horizontal	Peak					
7264.28	30.92	36.26	11.93	33.42	45.69	74.00	-28.31	Horizontal	Peak					
9251.58	31.26	38.91	13.55	33.44	50.28	74.00	-23.72	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					
2987.92	42.98	28.59	7.47	37.58	41.46	74.00	-32.54	Vertical	Peak					
4245.51	33.80	30.09	8.98	36.52	36.35	74.00	-37.65	Vertical	Peak					
4996.69	38.75	31.50	9.67	35.39	44.53	74.00	-29.47	Vertical	Peak					
7961.43	32.38	36.95	12.49	33.07	48.75	74.00	-25.25	Vertical	Peak					
2995.54	39.69	28.60	7.48	37.58	38.19	74.00	-35.81	Horizontal	Peak					
5434.56	31.08	31.64	10.15	34.54	38.33	74.00	-35.67	Horizontal	Peak					
6628.18	31.30	34.20	11.39	33.69	43.20	74.00	-30.80	Horizontal	Peak					
7880.77	30.66	36.59	12.87	33.06	47.06	74.00	-26.94	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
2987.92	41.32	28.59	7.47	37.58	39.80	74.00	-34.20	Vertical	Peak
4983.99	35.01	31.48	9.66	35.41	40.74	74.00	-33.26	Vertical	Peak
7508.69	31.56	36.11	12.42	33.02	47.07	74.00	-26.93	Vertical	Peak
9228.06	31.53	38.77	13.53	33.40	50.43	74.00	-23.57	Vertical	Peak
2995.54	37.68	28.60	7.48	37.58	36.18	74.00	-37.82	Horizontal	Peak
4958.68	31.14	31.46	9.64	35.45	36.79	74.00	-37.21	Horizontal	Peak
6713.08	31.14	34.17	11.50	33.73	43.08	74.00	-30.92	Horizontal	Peak
7941.19	31.61	36.87	12.58	33.06	48.00	74.00	-26.00	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

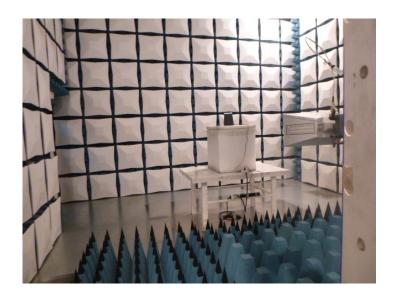
Conducted Emissions (AC Mains)



Radiated Emissions



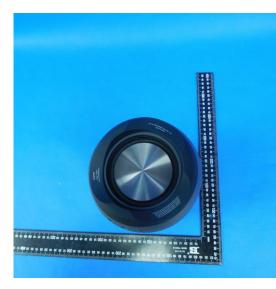


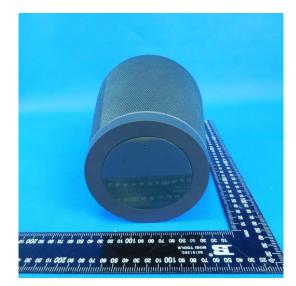


7. EXTERANAL AND INTERNAL PHOTOS

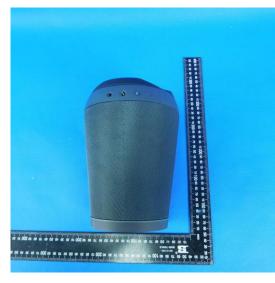
External photos of the EUT

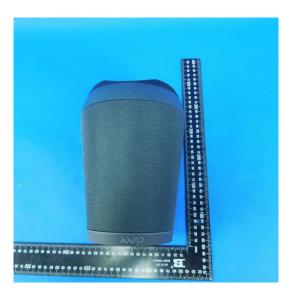


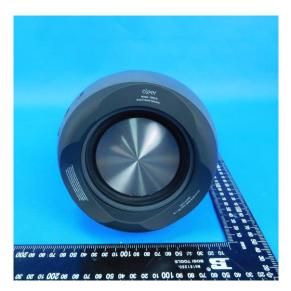




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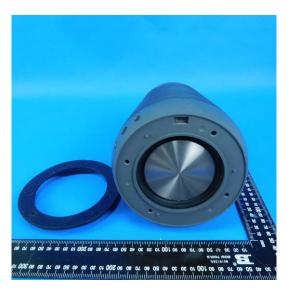


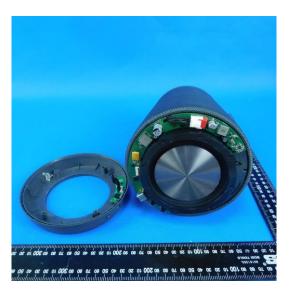


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Internal photos of the EUT

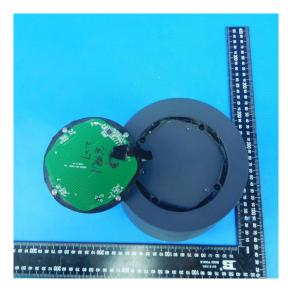


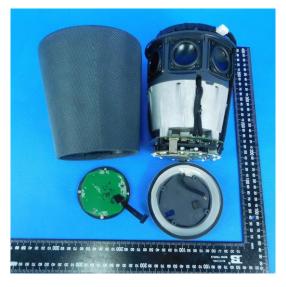


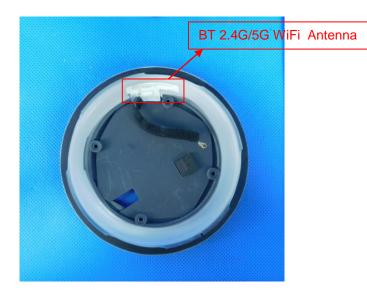








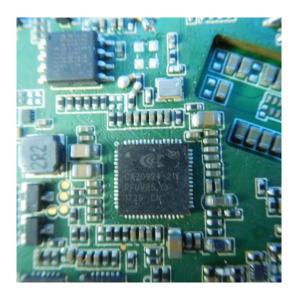


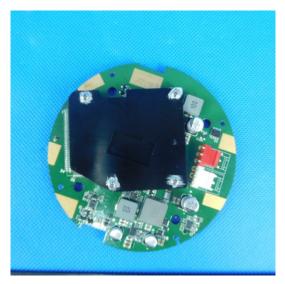


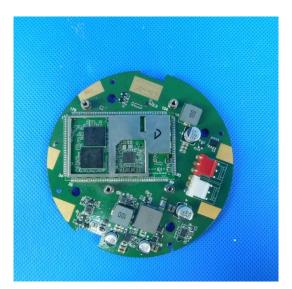


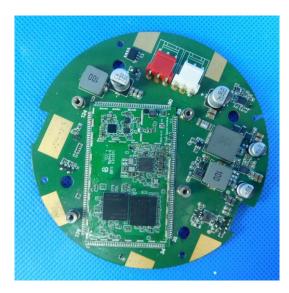


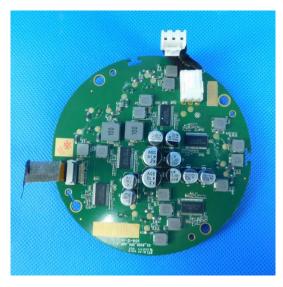


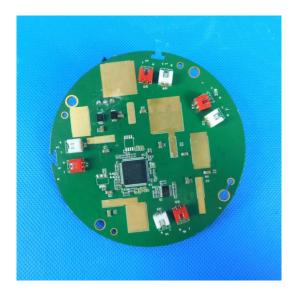












-----End of Report------