



-	TEST REPORT	
Report Reference No:	CHTEW19050095 Report veri	fication:
Project No:	SHT1901065803EW	
FCC ID:	2ASRT-SCN650	
Applicant's name:	Screeneo Innovation SA	
Address	Route de Lully 5C, 1131 Tolochenaz, Swit	zerland
Manufacturer	SHENZHEN HOLATEK CO. LTD.	
Address	1001,10F,Building B4,KeXing Science Par	k,Nanshan, Shenzhen,China.
Test item description:	Home Projector	
Trade Mark	Philips	
Model/Type reference:	Screeneo S6	
Listed Model(s)		
Standard:	FCC CFR Title 47 Part 15 Subpart C Sec	tion 15.247
Date of receipt of test sample:	Mar 29, 2019	
Date of testing	Mar 30, 2019- May 23, 2019	
Date of issue	May 24, 2019	
Result:	PASS	
Compiled by (Position+Printed name+Signature):	File administrators Silvia Li	Silvia Li
Supervised by (Position+Printed name+Signature):	Project Engineer Aaron Fang	Aaron.Fang Homsty
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	Homsty
Testing Laboratory Name:	Shenzhen Huatongwei International Ins	pection Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park Gongming, Shenzhen, China	, Genyu 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	2019-05-24	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	N/A	N/A
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:	Screeneo Innovation SA
Address:	Route de Lully 5C, 1131 Tolochenaz, Switzerland
Manufacturer: SHENZHEN HOLATEK CO. LTD.	
Address:	1001,10F,Building B4,KeXing Science Park,Nanshan, Shenzhen,China.

3.2. Product Description

Name of EUT:	Home Projector	
Trade Mark:	Philips	
Model No.:	Screeneo S6	
Listed Model(s):	-	
Power supply:	DC 19V	
Adapter information:Model:GQ150-1900780-E1Input:100-240Va.c., 50/60Hz, 2.0A MaxOutput:19Vd.c., 7.8A		
Hardware version:	H90 MB VerE	
Software version:	1.0.06	
Bluetooth		
Version:	Supported BT4.0+EDR	
Modulation:	GFSK, π/4DQPSK, 8DPSK	
Operation frequency:	2402MHz~2480MHz	
Channel number:	79	
Channel separation:	1MHz	
Antenna type:	PIFA Antenna	
Antenna gain:	1.19dBi	

3.3. Operation state

Test frequency list

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

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

> TEST MODE

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated suprious emissions test item:

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

3.4. EUT configuration

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

- supplied by the manufacturer
- supplied by the lab

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

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

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

4.2. Test Facility

CNAS-Lab Code: L1225

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

A2LA-Lab Cert. No.: 3902.01

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

FCC-Registration No.: 762235

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

IC-Registration No.:5377B-1

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

ACA

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

4.3. Environmental conditions

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

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

4.4. Statement of the measurement uncertainty

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

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

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.63 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 emission-7th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
•	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
•	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
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 Method						
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)

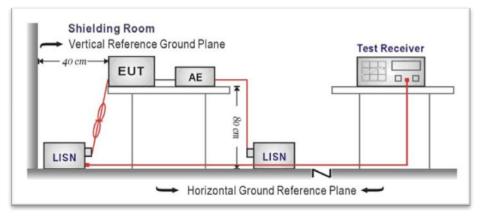
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

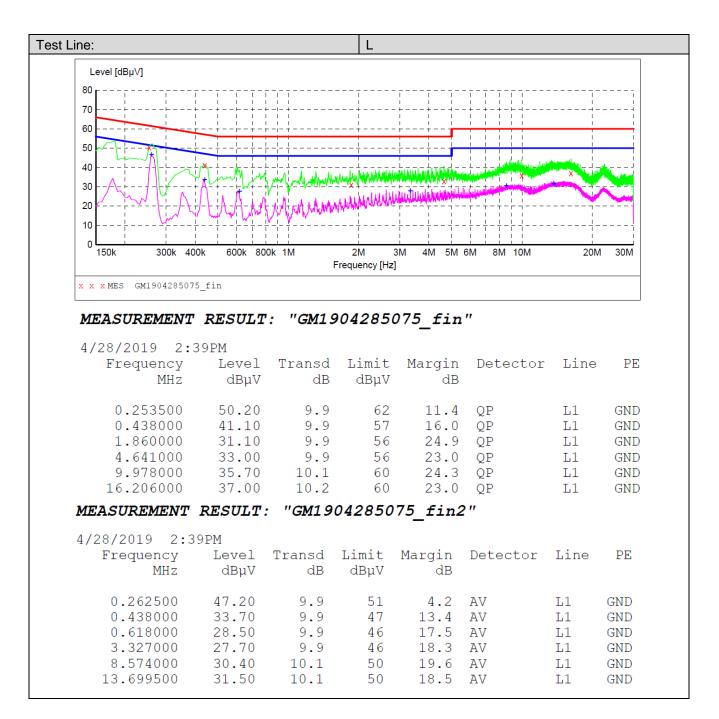
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm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

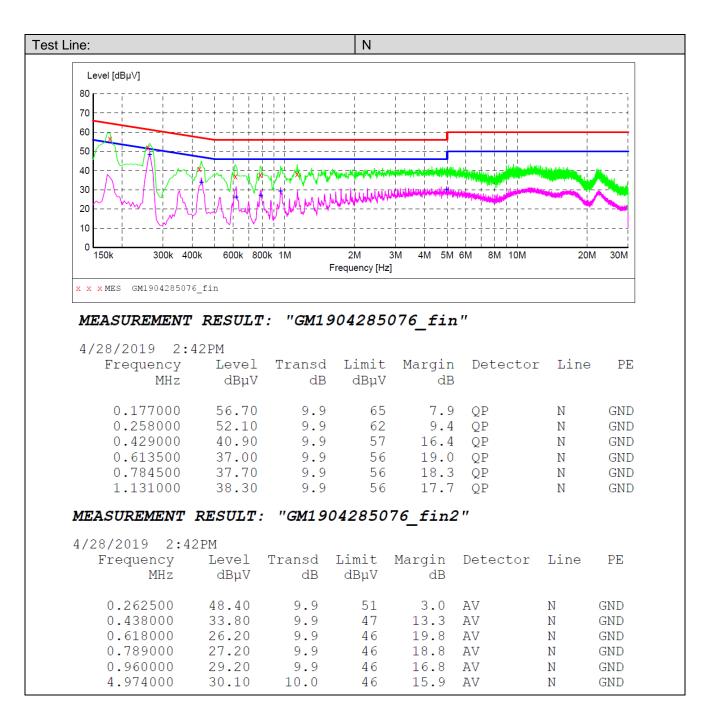
TEST RESULTS

☑ Passed □ Not Applicable

Note:

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



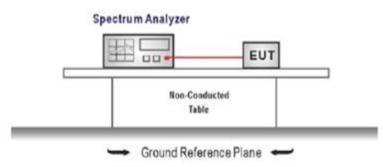


5.3. Conducted Peak Output Power

<u>LIMIT</u>

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	8.04		
GFSK	39	7.84	≤ 30.00	Pass
	78	7.45		
	00	6.70		
π/4DQPSK	39	6.14	≤ 21.00	Pass
	78	5.60		
	00	6.95		
8DPSK	39	6.35	≤ 21.00	Pass
	78	5.90		

Modulation Type: GFSK ₿ Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk View Offset 1.00 dB ● RBW 1 MHz SWT 1 ms ● VBW 3 MHz Mode Auto Sweep M1[1] 8.04 df 2.40220980 G LO dBm-M1) dBm 10 dBm -20 dBm CH00 -30 dBm -40 dBm 50 dBm 60 dBm 70 dBm 691 pts 5.0 MHz CF 2.402 GH 140 Date: 25 APR 2019 14:57:12 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 M1[1] 7.84 dE 84800 G 2.4408 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 1110 A.M Date: 25 APR 2019 14:58:22 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 M1[1] 7.45 dB 2.47984080 GF 10 dBm-M1 0 dBm -10 dBm 20 dBm CH78 -30 dBm 40 dBm -50 dBm -60 dBm 70 dBm 691 pts 5.0 MHz CF 2.48 G -1.430 Date: 25 APR 2019 14:59:04

lodulation 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
	IPk View
	M1[1] 6.70 dBm 2.40218090 GHz
	10 dBm
	0 dBm
	-10 dBm
	-20 dBm-
CH00	-30 dBm-
	-40 dBm-
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Date: 25 A PR 2019 15:04:36
	Spectrum Imm Ref Level 20.00 dbm Offset 1.00 db ● RBW 2 MHz
	Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Court 500/500
	IPk View
	M1[1] 6.14 dBm 2.44084800 GHz
	10 dBm
	0 dBm
	-10 dBm
	-20 dBm
CU 120	-20 Ubiii-
CH39	-30 dBm-
	-40 dBm
	-50 d8m
	-60 dBm-
	-70 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Date: 25 A PR 2019 15:06:00
	Spectrum 🕎
	Ref Level 20.00 dBm Offset 1.00 dB Ref W 2 MHz
	■ Att 30 dB SWT 1 ms ■ VBW 5 MHz Mode Auto Sweep Count 500/500
	●1Pk View M1[1] 5.60 dBm
	2.47987700 GHz
	0 dBm
	510 dBm
	-20 dBm
CH78	-30 d8m
	-40 dBm
	-50 dBm
	-60 d8m
	-70 dBm

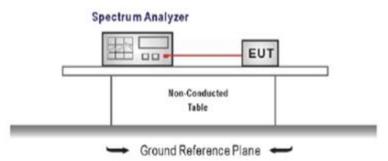
Modulation Type:	8DPSK
	Spectrum
	RefLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz Mode Auto Sweep Count 500/500
	10 dBm 210 21020200 GHz
	O dBm
	-10 dBm
CH00	-20 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Date:25.APR.2019 15:08:03
	Spectrum \forall
	RefLevel 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
	10 dBm M1[1] 6.35 dBm 2.44100720 GHz
	0 dBm
	-10 dBm
CH39	-20 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	CF 2.441 GHz 691 pts Span 5.0 MHz
	Date:23.APR.2019 15.09:10
	Spectrum Image: Constraint of the section of the sectio
	Count 500/500
	10 d8m 112 2.48003620 GHz
	0 dBm
	-20 dBm
CH78	-30 dBm
	-40 dBm
	-60 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	0.93		
	00	1.27		
π/4DQPSK	39	1.24	-	Pass
	78	1.24		
	00	1.26		
8DPSK	39	1.26	-	Pass
	78	1.26		

Modulation Type: GFSK ₿ Spectrum RefLevel 20.00 dBm Att 30 dB Att Count 500/500 1Pk View -17.82 dE 2.40157000 G 2.29 dE 2.40207750 G M1[1] 10 dBm M2[1] 0 dBm-M $\sim M$ -10 dBm MA M1 prv -20 dBm-M -30 dBm .N Any When CH00 -40 dBm M 1 -90 98. 60 dBm 70 dBm CF 2.402 GHz 1001 pts Span 2.5 MHz Y-value 17 82 dBr Type Ref Trc X-value 2.40157 GHz 2.4020775 GHz 925.0 kHz Function Function Result M1 M2 2.29 dBm -1.10 dB M1 Date: 25 APR 2019 14:57:03 ₽ Spectrum
 Ref Level
 20.00 dBm
 Offset
 1.00 dB
 RBW
 10 kHz

 Att
 30 dB
 SWT
 189.6 μs
 VBW
 30 kHz
 Mode
 Auto FFT
 Count 500/500 M1[1] 2.440 10 dBm M2[1] Ma 2.44107750 GH 0 dBm "M 10 dBm Mr. MAR 20 dBm 01 -17.94 M 14 30 dBm NW -40 ABA **CH39** <u>کې ا</u> my ww 50 dBm -60 dBm -70 dBm CF 2.441 GH 1001 pt: Span 2.5 MHz larke Type Ref Trc M1 1 X-value 2.4405675 GHz 2.4410775 GHz 925.0 kHz Y-value -18.52 dBm 2.06 dBm 0.07 dB Function Function Result M2 D3 М1 Date: 25 APR 2019 14:58:13 Spectrum ₿
 Ref Level
 20.00 dBm
 Offset
 1.00 dB
 RBW
 10 kHz

 Att
 30 dB
 SWT
 189.6 µs
 ● VBW
 30 kHz
 Mode
 Auto FFT
 Count 500/500 M1[1] -18.65 dB 10 dBm WW. M2[1] 1.61 dB 2.48007750 GF 0 dBm M. -10 dBm <u>zr</u> -20 dBm-01 -18.3 M 30 dBr -40 ABA **CH78** hu w 50 dBm 60 dBm 70 dBm CF 2.48 larke X-value 2.4795675 GHz 2.4800775 GHz 925.0 kHz Y-value -18.65 dBm 1.61 dBm 0.02 dB Function Result Type Ref Trc Function MI Date: 25 APR 2019 14:58:55

Modulation Type: π/4DQPSK ₿ Spectrum RefLevel 20.00 dBm Att 30 dB Offset 1.00 dB ● RBW 30 kHz SWT 63.1 µs ● VBW 100 kHz Mode Auto FFT Att Count 500/500 1Pk View -15.67 df 2.40139750 G 4.62 df M1[1] 10 dBm M2[1] 2.40202500 G 0 dBmt \sim -10 dBm 1 -15.38 D: -20 dBm -30 dBm CH00 -40 dBm -50 dBm 60 dBm 70 dBm CF 2.402 GHz 1001 pts Span 2.5 MHz Y-value X-value 2.4013975 GHz 2.402025 GHz 1.2725 MHz Type Ref Trc Function Function Result -15.67 dBm 4.62 dBm 0.03 dB M2 M1 Date: 25 APR 2019 15:04:27 ₽ 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 -16.40 d 2.44039250 M1[1] 10 dBm M2[1] 3.81 d 2.44102250 GH 0 dBm \mathcal{N} \sim \sim 10 dBm 1 -16.18 \Q3 20 dBm 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 2.4403925 GHz 2.4410225 GHz 1.2425 MHz Y-value -16.40 dBm 3.81 dBm 0.03 dB Function Function Result M2 D3 М1 Date: 25 APR 2019 15:05:51 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] -17.10 dB 2.47939250 G 10 dBm M2[1] 3.31 dB 2.48002500 GF 0 dBm \mathcal{M} -10 dBm м1 YQ3 20 dBm 30 dBr **CH78** 40 dBm 50 dBm 60 dBm 70 dBm CF 2.48 arke X-value 2.4793925 GHz 2.480025 GHz 1.24 MHz Y-value -17.10 dBm 3.31 dBm 0.37 dB Function Result Type Ref Trc Function MI Data: 25 APR 2019 15:06:2

Modulation Type:	8DPSK
	Spectrum
	KerLevel 20.00 bem Unser 100 be KBW 30 KH2 Att 30 db SWT 63.1 µs VBW 100 kH2 Mode Auto FFT Count 500/S00 ●JPK View
	10 dBm M1[1] -11.5.3 dBm 2.40130250 CHz 10 dBm 02 M2[1] -14.52 dBm 10 dBm 02 M2[1] -2.4000500 CHz
	-10 dBm
	-20 dBm
CH00	-20 JBm
	-50 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 2.4013025 GHz -15.53 dBm M2 1 2.4002025 GHz 4.6c dBm D3 M1 1 1.265 MHz 0.13 dB
	Messuring Messuring Date:25APR.2019 15:07:63
	Ref Level 00.00 Offset 1.00 B RBW 30 KHz att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT
	Count 500/500
	10 dBm 2,44037550 GHz 0 dBm 2,44037550 GHz 0 dBm 2,44102250 GHz
	-10 dBm / / / / / / / / / / / / / / / /
	-20 dBm
CH39	-50 dBm
	-50 Gam
	-70 dBm
	Marker Function Function Result Type Ref Trc X-value Y-value Function Function Result M1 1 2.4403775 GHz -16.32 dBm Function Function
	M2 1 2.4410225 GHz 3.81 dbm D3 M1 1 1.26 MHz -0.33 dB
	Data:25APR.2019 15:09:01
	Spectrum Image: Constraint of the sector of th
	Count 500/500
	10 dBm 42 M2[1] 3.30 dBm 0 dBm 2.4909750 GHz
	-10 dBm
	-20 dBm
CH78	-50 dam
	-60 dBm
	-70 dBm CF 2.48 GHz 1001 pts Span 2.5 MHz
	Marker Type Ref Tc X-value Y-value Function Function Result M1 1 2.4793775 GHz -17.05 dBm
	M2 1 2,400025 GHz 3.30 dBm D3 M1 1.26 MHz 0.03 dB
	Date:25APR.2019 15£953

5.5. Carrier Frequencies Separation

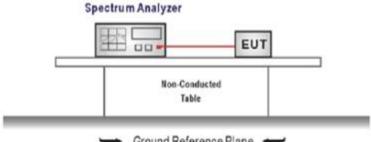
LIMIT

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

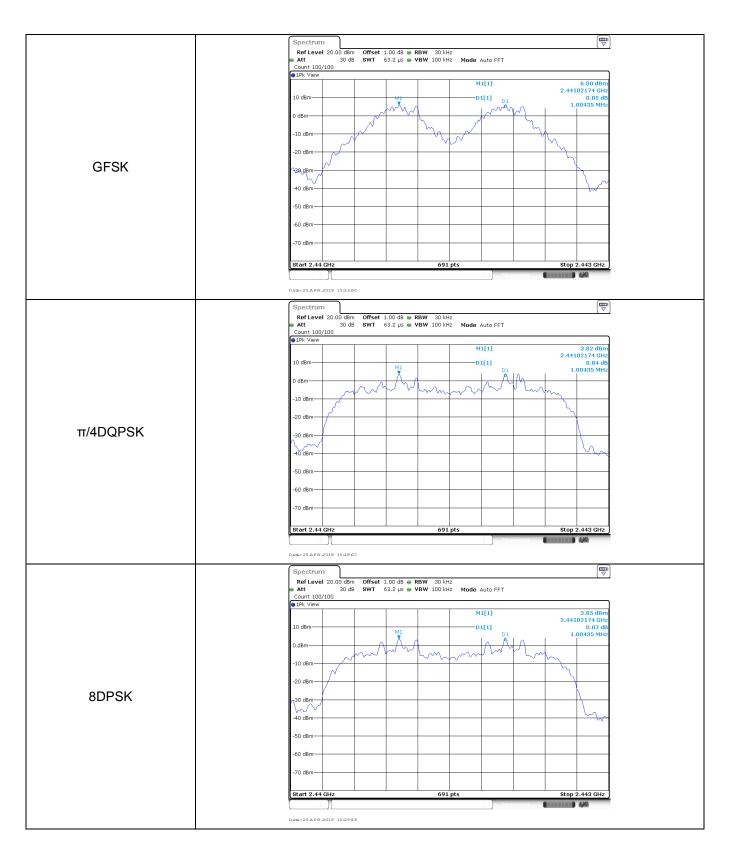
TEST RESULTS

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	≥0.85	Pass
8DPSK	39	1.00	≥0.84	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

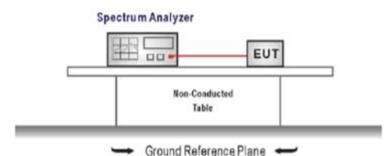


5.6. Hopping Channel Number

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		

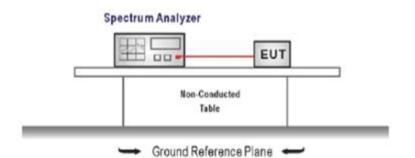
	Spectrum (100 dB → 0 ffset 1.00 dB → RBW 100 kHz
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep 1Pk View
	10 d8m
	o.dzm o i postavno stalo na stalo
	-TO gew
	-20 d8m
0501/	
GFSK	-30 dBm-
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Date: 25APR 2019 15:15:25
	Spectrum (m) Ref Level 20.00 dBm Offset 1.00 dB ● RBW 100 kHz
	Att 30 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep Ink View
	◦₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩
	-10 dBm-
	-20 dBm
π/4DQPSK	-30 d8m-
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	Start 2.4 GHz 691 pts Stop 2.4835 GHz
	Data:253,PR.2019 152645
	Spectrum 🕎
	Ref Level 0.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1 ms VBW 300 kHz
	ALL SU UB SWI I MIS VBW SUU KHZ MODE AUTO SWEEP
	10 dBm 0 88811444411444144444444444444444444444
	0)
	-10 dBm
	-20 dBm
8DPSK	-30 dBm
	-40 dBm
	-50 dBm-
	-60 dBm-
	-70 dBm-
	Start 2.4 GHz 691 pts Stop 2.4935 GHz

5.7. Dwell Time

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):The average time of occupancy on any channel shall not be greater than 0.4 seconds within a pe-riod of 0.4 seconds multiplied by the number of hopping channels employed.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW ≥ RBW Sweep = as necessary to capture the entire dwell time per hopping channel, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

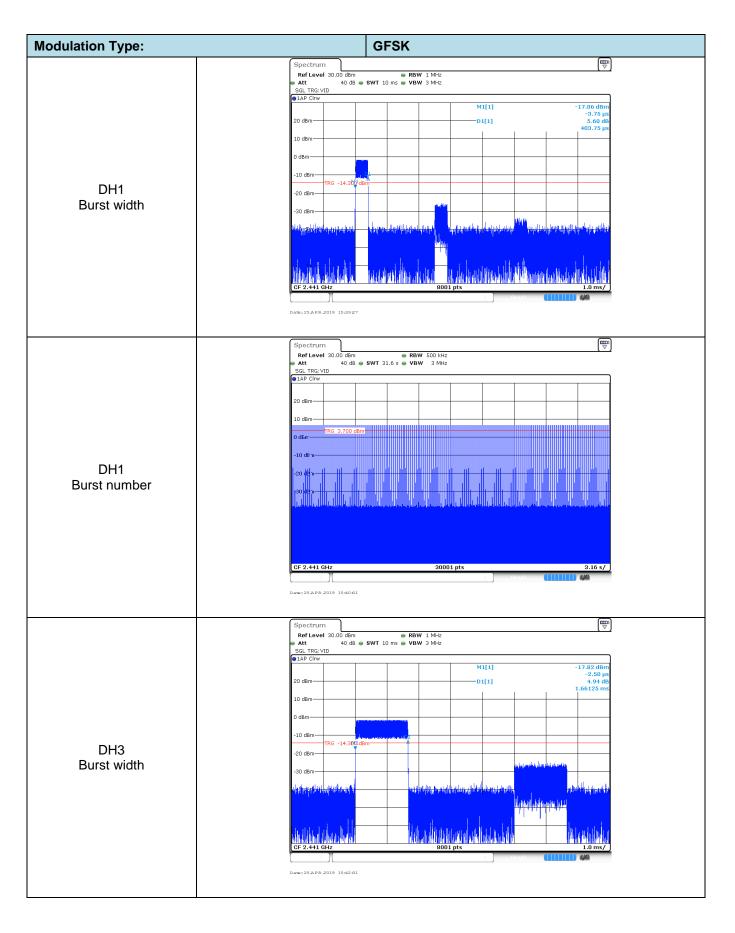
TEST MODE:

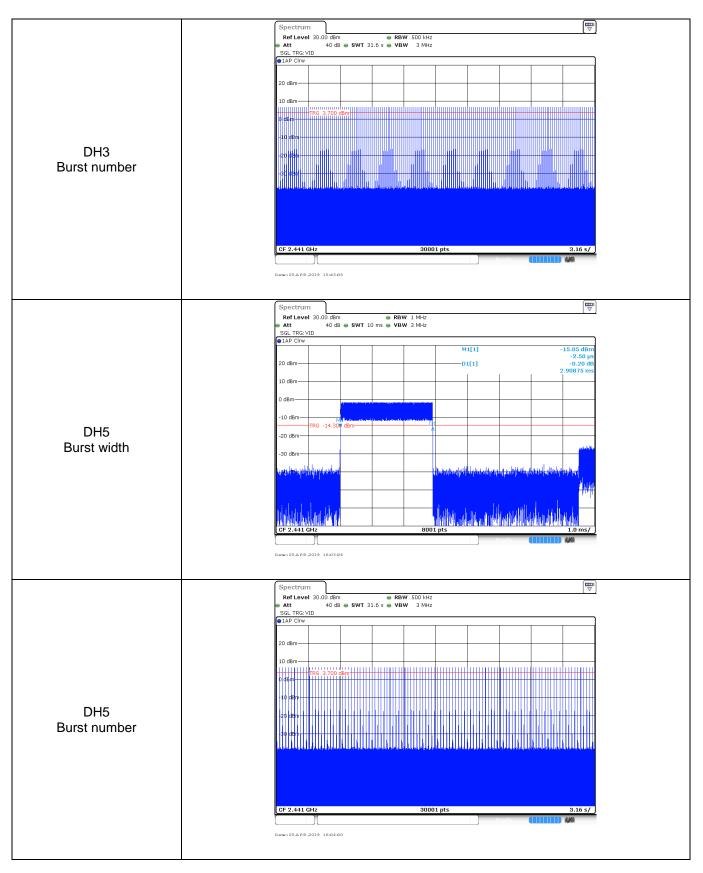
Please refer to the clause 3.3

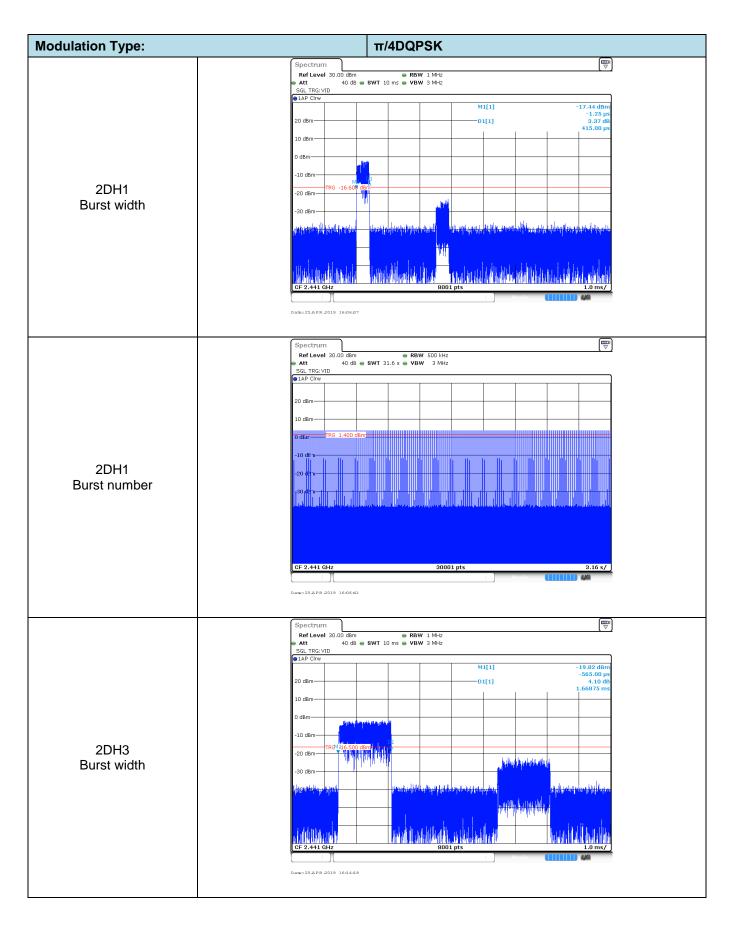
TEST RESULTS

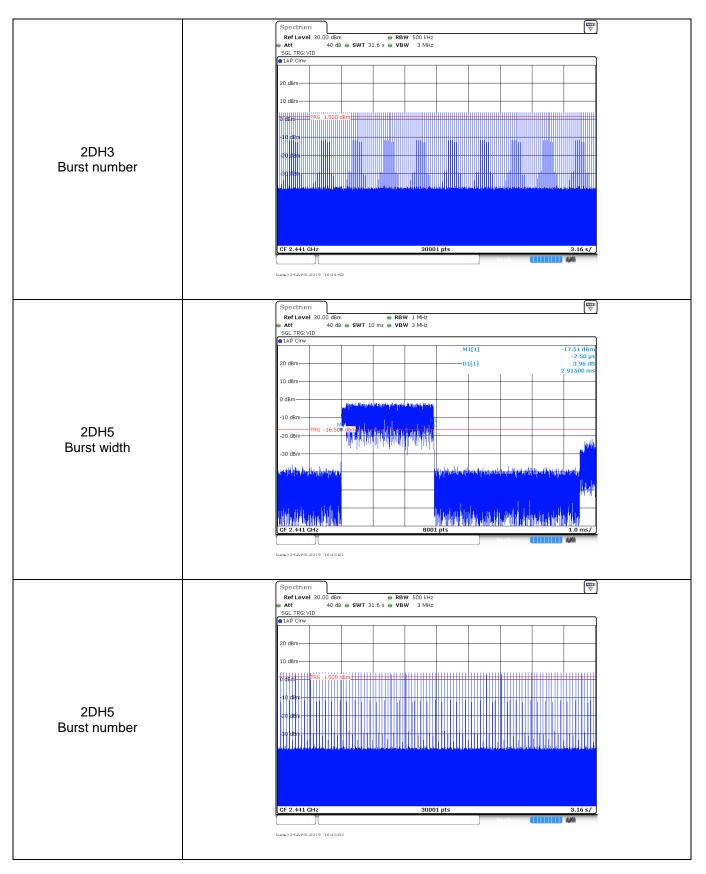
☑ Passed □ Not Applicable

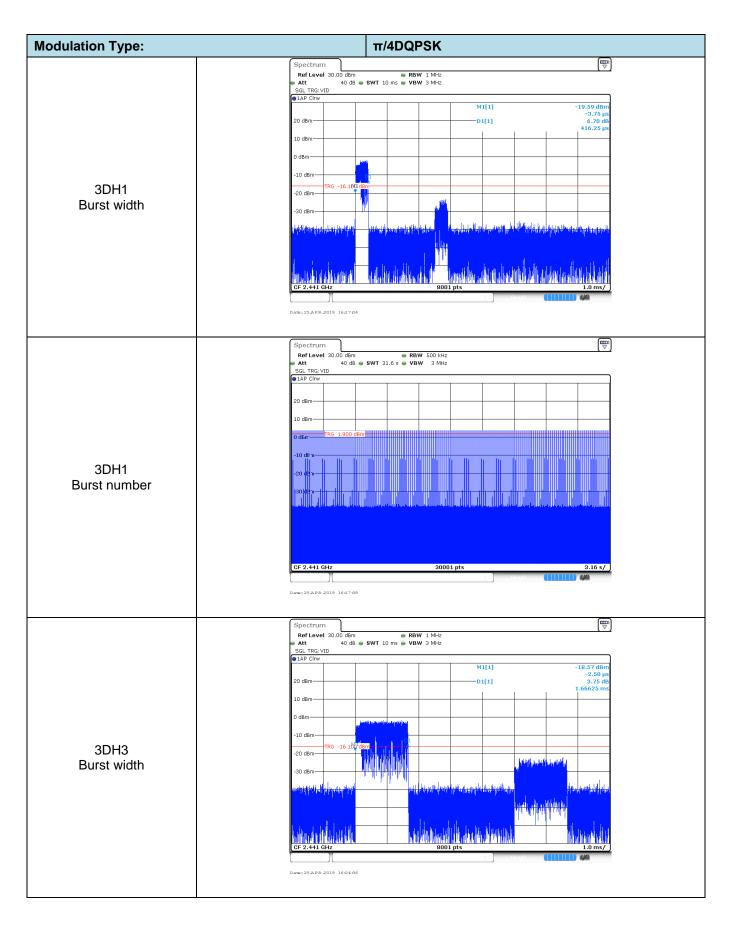
Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result	
	DH1	0.40	320.00	0.13			
GFSK	DH3	1.66	160.00	0.27	≤ 0.40	Pass	
	DH5	2.91	107.00	0.31			
	2DH1	0.42	320.00	0.13		Pass	
π/4DQPSK	2DH3	1.67	160.00	0.27	≤ 0.40		
	2DH5	2.92	107.00	0.31			
	3DH1	0.42	320.00	0.13			
8DPSK	3DH3	1.67	133.00	0.22	≤ 0.40	Pass	
	3DH5	2.92	107.00	0.31			

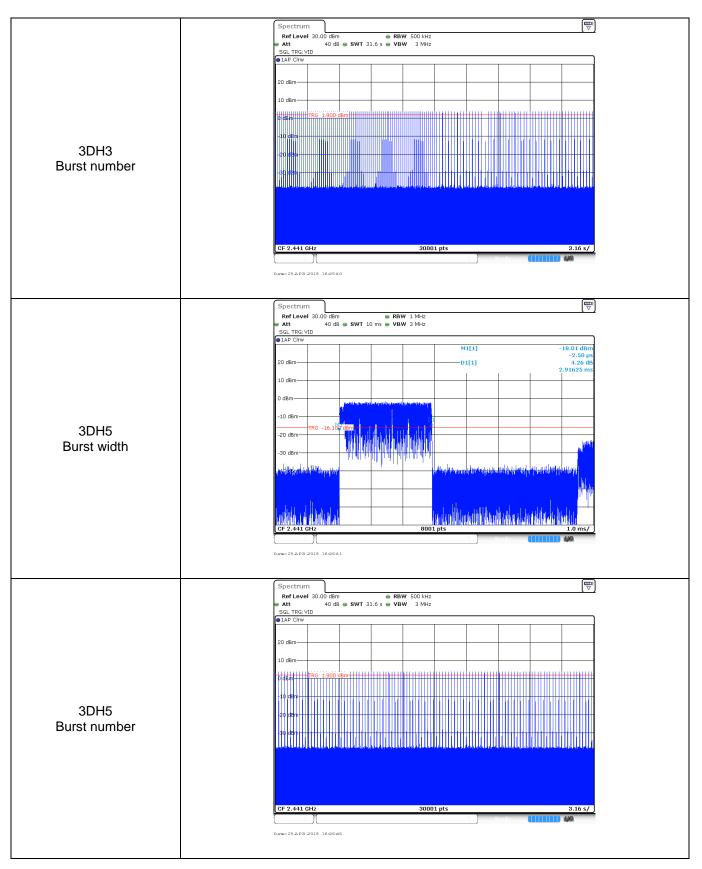












5.8. Pseudorandom Frequency Hopping Sequence

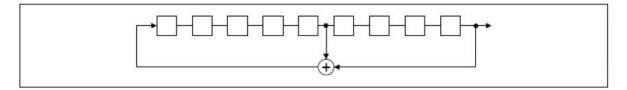
LIMIT

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

TEST RESULTS

The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 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:

75	73	7	1	78	4	6	62		6	4	2)
	\square			1	77	Т	1	 	Т			Т
		Í		1		L	1					1
	1			1	1	L						

Each frequency used equally one the average by each transmitter.

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

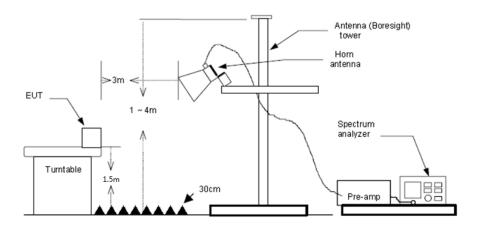
5.9. Restricted band (radiated)

<u>LIMIT</u>

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

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Note:

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

Test chann	el:				СН00					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2310.00	33.33	28.05	6.62	37.59	30.41	74.00	-43.59	Horizontal	Peak	
2390.00	40.93	27.65	6.75	37.59	37.74	74.00	-36.26	Horizontal	Peak	
2310.00	39.45	28.05	6.62	37.59	36.53	74.00	-37.47	Vertical	Peak	
2390.00	50.78	27.65	6.75	37.59	47.59	74.00	-26.41	Vertical	Peak	
2310.00	20.56	28.05	6.62	37.59	17.64	54.00	-36.36	Horizontal	Average	
2390.00	21.57	27.65	6.75	37.59	18.38	54.00	-35.62	Horizontal	Average	
2310.00	22.66	28.05	6.62	37.59	19.74	54.00	-34.26	Vertical	Average	
2390.00	23.61	27.65	6.75	37.59	20.42	54.00	-33.58	Vertical	Average	

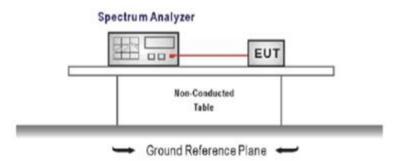
Test chann	el:				CH78					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value	
2483.50	51.96	27.26	6.83	37.59	48.46	74.00	-25.54	Horizontal	Peak	
2500.00	36.44	27.20	6.84	37.59	32.89	74.00	-41.11	Horizontal	Peak	
2483.50	55.11	27.26	6.83	37.59	51.61	74.00	-22.39	Vertical	Peak	
2500.00	38.70	27.20	6.84	37.59	35.15	74.00	-38.85	Vertical	Peak	
2483.50	29.03	27.26	6.83	37.59	25.53	54.00	-28.47	Horizontal	Average	
2500.00	20.43	27.20	6.84	37.59	16.88	54.00	-37.12	Horizontal	Average	
2483.50	30.33	27.26	6.83	37.59	26.83	54.00	-27.17	Vertical	Average	
2500.00	21.67	27.20	6.84	37.59	18.12	54.00	-35.88	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

Test Item:	Band edge	Modulation type: GFSK	
CH00 No hopping mode	• Att Count S • 1Pk Ma 10 dBm 0 dBm 0 dBm -10 dBm -20 dBm -20 dBm -30 dBm -30 dBm -30 dBm -30 dBm -40 dBm -50 dBm -50 dBm -50 dBm -50 dBm -60 dBm -70 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50	evel 20.00 dBm Offset 1.00 dB RBW 100 kHz Mode Auto Sweep 500 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep 500/500 MI[1] 7.60 dBm -40.15 dBm 01 -12.400 dBm M2[1] -40.15 dBm 01 -12.400 dBm M2[1] -40.15 dBm 331 GHz 691 pts Stop 2.405 GHz Ref Trc X-value Y-value 1 2.39 GHz 7.50 dBm 1 2.39 GHz 55.41 dBm 1 2.39 GHz 55.41 dBm	
CH00 Hopping mode	• Att Count 5 • 19k Ma 10 dBm 0 dBm 0 dBm -10 dBm -20 dBm -20 dBm -20 dBm -30 dBm -40 dBm -40 dBm -50	evel 20.00 dBm Offset 1.00 dB RBW 100 kHz 30 dB SWT 1.1 ms VBW 300 kHz 500/500 MI[1] 6.17 dBm 2.404930 GHz -53.46 dPn - - M2[1] - -33.46 dPn - - <	
CH78 No hopping mode	• Att Count 5 • 19k Ma 10 dBm- - 10 dBm - 20 dBm - 30 dBm - 30 dBm - 30 dBm - 30 dBm - 40 dBm - 50 dBm - 60 dBm - 70 dBm Start 2. Marker Type Marker - 10 -	evel 20.00 dBm Offset 1.00 dB RBW 100 kHz 30 dB SWT 56.9 µs VBW 300 kHz Mode Auto FFT 500/500 MI[1] 7.17 dBm -55.49 dBm M M2[1] -55.49 dBm -55.49 dBm 01 -12.830 dBm M2[1] -55.49 dBm -55.49 dBm 01 -12.830 dBm M3[1] -61 µs -55.49 dBm 478 GHz 691 pts Stop 2.5 GHz Stop 2.5 GHz 1 2.493002 GHz -55.49 dBm -55.49 dBm	

Report No.: CHTEW19050095

	Spectrum Image: Constraint of the section of the sectio
	In the second
	0 dBm 2.4835000 GHz -10 dBm D1 -13.500 dBm
CH78	-20 dBm
CH78 Hopping mode	
	-70 dBm
	Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.479003 GHz 6.50 dBm </td
	M4 1 2.4980232 GHz -54.56 dBm Monomorphic Monorphic Monomorphic Monomorphic </td

est Item:	Band edge		Modula	ation t	ype:	Π	/4DQPSK
	-	Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk Max	Offset 1.00 dB SWT 1.1 ms	RBW 100 kHz		ep	(Ţ
	c c	0 dBm			M1[1] M2[1]		5.21 dBm 2.402040,GHz -45.55 dBm 2.400000 SHz
CH00		D1 -14.790 d 20 dBm 30 dBm 40 dBm	Bm				
No hopping mode		50 dBm 50 dBm 70 dBm tart 2.31 GHz	emple	n an		montalit	M3 Mananum Stop 2.405 GHz
	N.	arker Trc M1 1 M2 1 M3 1 M4 1	X-value 2.40204 GHz 2.4 GHz 2.39 GHz 2.31 GHz 2.39963 GHz	691 p 5.21 dBn -45.55 dBn -56.54 dBn -55.60 dBn -46.62 dBn	Function n	Functi	on Result
	De	M5 1	2.39963 GHZ	-46.62 dBn		feasuring 🕕	44
CH00 Hopping mode	-	Ref Level 20.00 dBm Att 30 dB Count 500/500 1Pk Max	Offset 1.00 dB SWT 1.1 ms	RBW 100 kHz VBW 300 kHz	Mode Auto Swe	ер	
	:	0 dBm			M1[1] M2[1]		3.20 dBm 2.403010 GHz -50.64 dBm 2.400000 GVk
	-	20 dBm D1 -16.800 d 30 dBm M5	Bm				M2
		50 dBm	udalinga medina ang		Green all and a start of the st	Marman and an	M3 the second
	M	tart 2.31 GHz arker Type Ref Trc M1 1 M2 1 M3 1	X-value 2.40301 GHz 2.4 GHz 2.39 GHz	691 p Y-value 3.20 dBn -50.64 dBn -55.84 dBn	Function	Functi	Stop 2.405 GHz
	- D4	M4 1 M5 1 	2.31 GHz 2.322942 GHz	-48.56 dBn -47.75 dBn		te asuring 👔	
CH78 No hopping mode	-	Count 500/500	Offset 1.00 dB ● SWT 56.9 µs ●				
	:	1Pk Max			M1[1] M2[1]		4.15 dBm 2.4800220 GHz -55.58 dBm 2.4835000 GHz
	-	10 dBm D1 -15.850 d 20 dBm	Bm				
		50 dBm	Me	200 200 mil			Amer manage
	M	tart 2.478 GHz arker M1 M2 M3	X-value 2.480022 GHz 2.4835 GHz 2.5 GHz	691 p Y-value 4.15 dBn -55.58 dBn -58.64 dBn	Function	Functi	Stop 2.5 GHz
	L Dz	M3 1 M4 1 	2.5 GHz 2.4835159 GHz	-58.54 dBn -55.29 dBn		feasuring 🕕	44

Report No.: CHTEW19050095

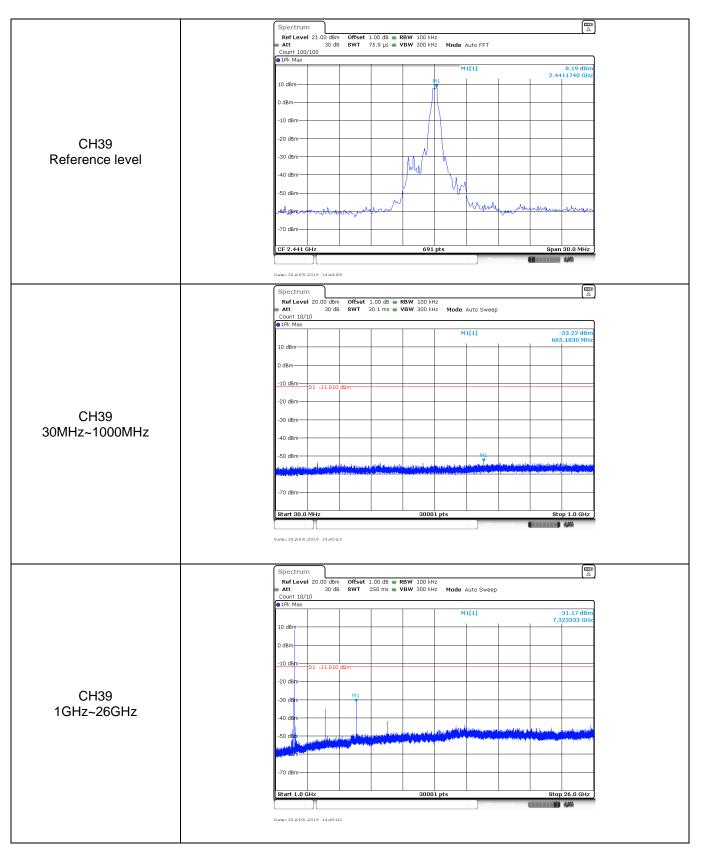
	Spectrum Image: Constraint of the section of the sectio
	• IPk Max M1[1] 4.21 dbm 2.4790350 GHz 2.4790350 GHz 10 dbm M2[1] -58.06 dbm vgets 2.4835000 GHz -10 dbm -10 dbm
CH78 Hopping mode	-20 dBm
	-60 dBm
	Type Ref Trc X-value Y-value Function Function Function M1 1 2.479035 GHz 4.21 dBm -

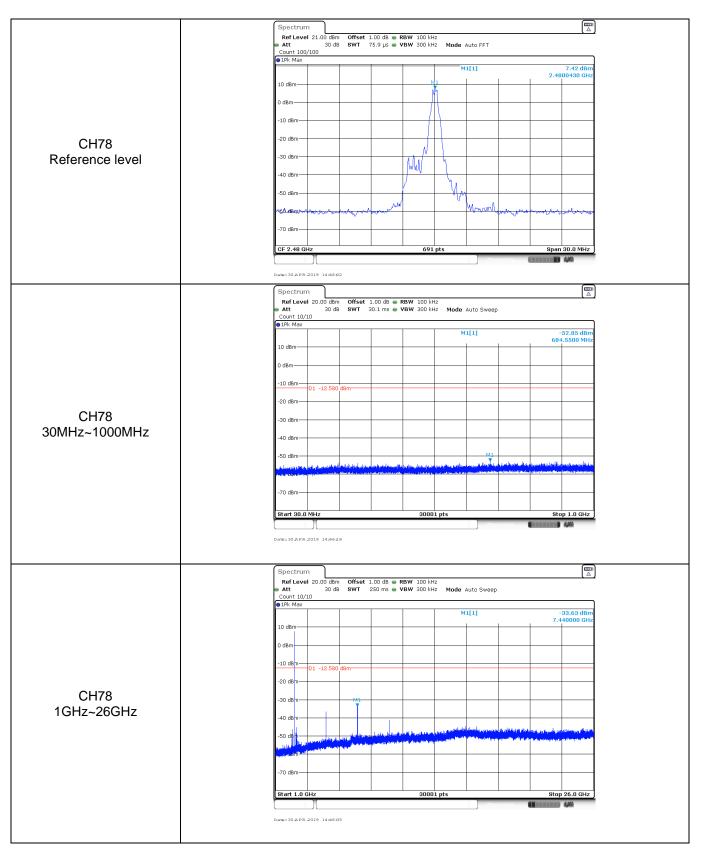
Test Item:	Band edge	Modulation type: 8DPS	
CH00 No hopping mode		Miling Miling<	5.21 dBm .402180@Hz -45.91.0pm .400000 GHz
CH00 Hopping mode	Att Counts 15 9 1Pk Ma 10 dBm	el 20.00 dBm Offset 1.00 dB • RBW 100 kHz 30 dB SWT 1.1 ms • VBW 300 kHz Mode Auto Sweep 0/500 M1[1] 2 01 -16.490 dBm 01 -16.490 dBm 1 GHz 1 GHz 1 C2.40228 GHz 1 2.314957 GHz 1 2 3 GHz 1 2 314957 GHz 1 2 3 GHz 1 3 3 GH	3.51 dBm -403200 GHz -400000 GMk -400000 GMk -400000 GMk -400000 GMk -400000 GMk -400000 GMk -400000 GMk
CH78 No hopping mode	Spectr Ref Le Att Court 5 1Pk Ma 10 dBm -0 dB	el 20.00 dBm Offset 1.00 dB • RBW 100 kHz 30 dB SWT 56.9 µs • VBW 300 kHz Mode Auto FFT 0/500 M1[1] 2.1 M2[1] 2.1 M2[1	

Report No.: CHTEW19050095

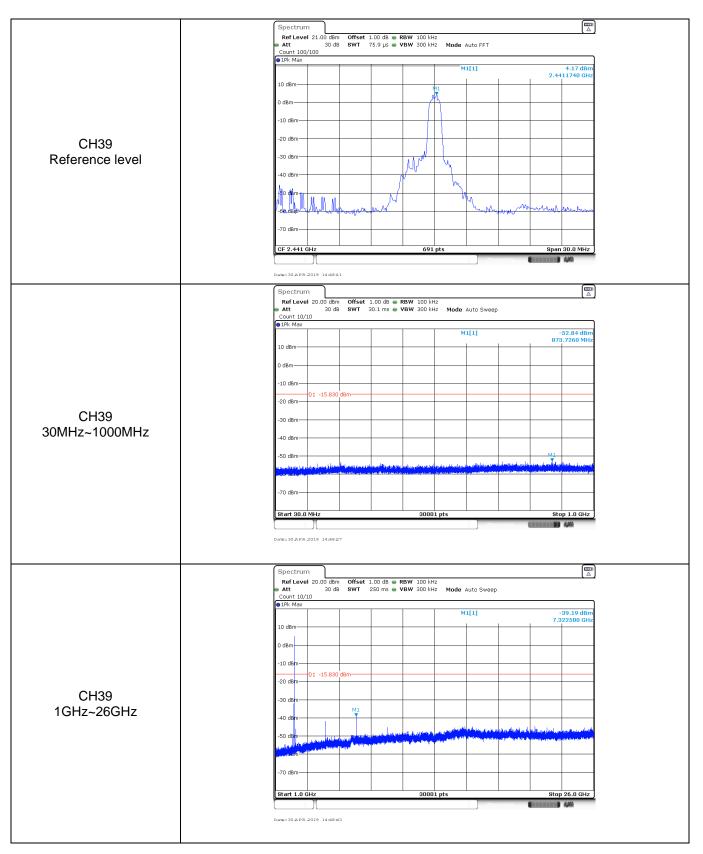
	Spectrum Image: Control of the second
CH78 Hoppig mode	Count 5000/500 9 1Pk Max 10 dbm 2.4700160 CH2 10 dbm 2.4805000 CH2 -10 dbm 2.4805000 CH2 -20 dbm -10.15.780 dbm -30 dbm -10.15.780 dbm -40 dbm -10.15.780 dbm -50 dbm -10.15.780 dbm -50 dbm -10.15.780 dbm -50 dbm -10.15.780 dbm -50 dbm -10.15.780 dbm -70 dbm -10.15.780 dbm 10.12.478016 CH2 -55.81 dbm

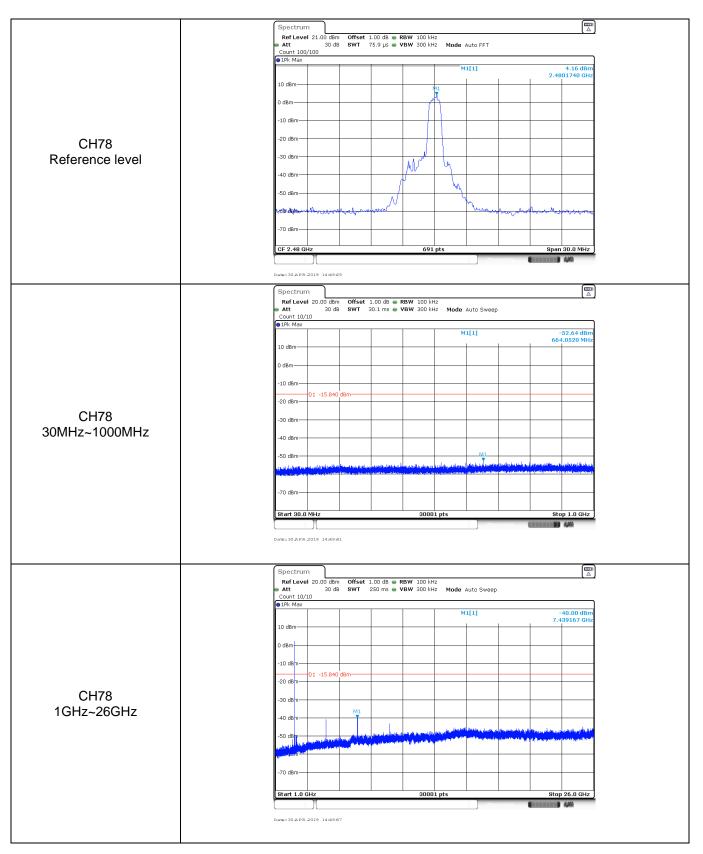
est Item:	SE		Modul	ation type	GFSK	
		🕳 Att 30 di	n Offset 1.00 dB 👄			
		Count 100/100 • 1Pk Max			M1[1]	7.62 dBr
		10 dBm		M1		2.4020430 GH
		0 dBm				
		-10 dBm		<u>+ А</u>		
		-20 dBm				
CH00		-30 dBm		+ / \m	6	
Reference level		-40 dBm		IN IN		
		-50 dBm		- VV		
		~BQ.dBm ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	when when a second	LN	Musuconser	Jund alwowed warm
		-70 dBm				
		CF 2.402 GHz		691 pts		Span 30.0 MHz
		Date: 30 APR 2019 14:444	07		Measuring	4/4
		Spectrum				
		Ref Level 20.00 dBn Att 30 dB Count 10/10		VBW 300 kHz Mod	e Auto Sweep	
		●1Pk Max			M1[1]	-53.09 dBn
		10 dBm			+ +	846.1150 MH
		0 dBm				
		-10 dBm) dBm			
		-20 dBm				
		-30 dBm				
30MHz~1000MHz		-40 dBm				
		-50 dBm	anthe data to a bear all	ander to all an entite of the set	ومراجع والمقاولة والمرجع والمحمور	64.1
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		-70 dBm				
		Start 30.0 MHz		30001 pts	Measuring	Stop 1.0 GHz
		Date: 30 APR 2019 14:442	23			
			n Offset 1.00 dB 👄			
		 Att 30 df Count 10/10 1Pk Max 	B SWT 250 ms 🖷	VBW 300 kHz Mod	a Auto Sweep	
					M1[1]	-33.83 dBr 7.205000 GH
		10 dBm				
		0 dBm				
		-10 dBmD1 -12.380) dBm			
CH00		-20 dBm				
1GHz~26GHz		-30 dBm	The second secon			
		-40 dBm	المتعالية المراجع	and the party of the second	and a state of the state of the state	and any the state of the second state of the second states
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		-70 dBm				
		Start 1.0 GHz		30001 pts	Measuring	Stop 26.0 GHz



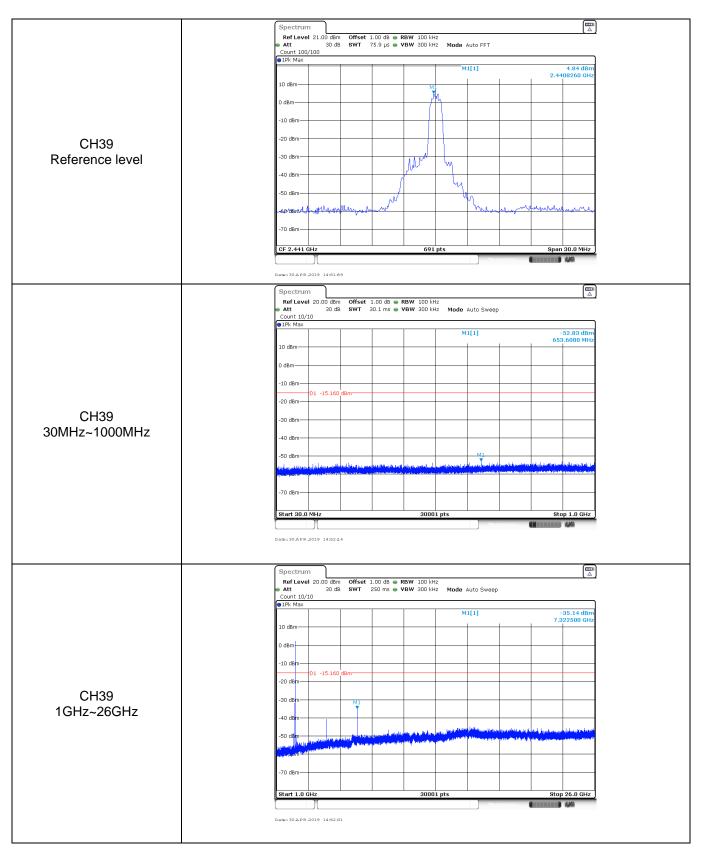


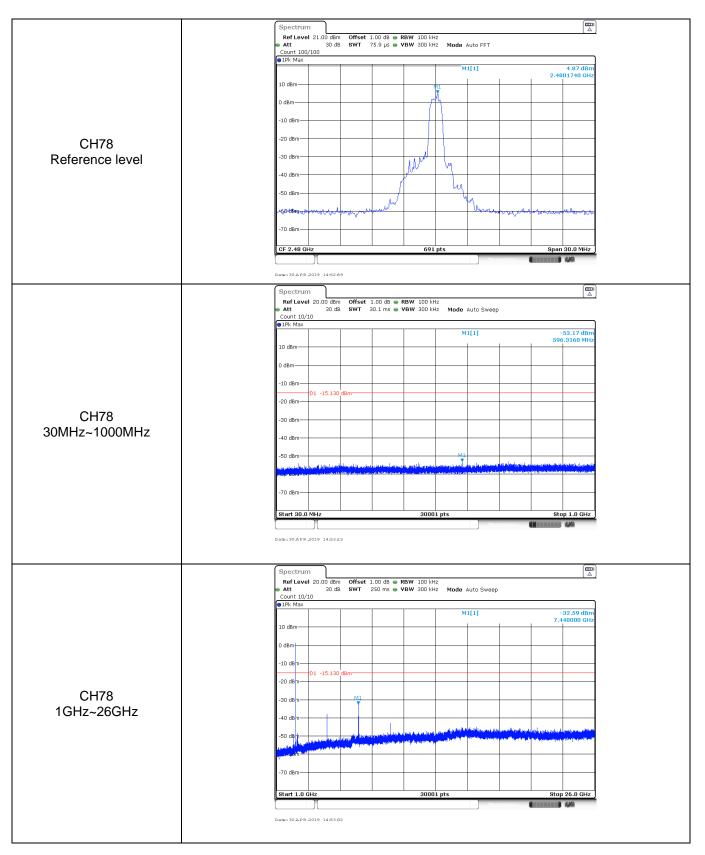
st Item:	SE		Modula	ation typ	π/4DQPSK		
		Spectrum					
		RefLevel 21.00 dBm Att 30 dB	Offset 1.00 dB ● SWT 75.9 µs ●		ode Auto FFT		
		Count 100/100 Pk Max					
					M1[1]	2.4	3.63 dBm 021740 GHz
		10 dBm		N11			
		0 dBm					
		-10 dBm		+ /			
		-20 dBm					
CH00		-30 dBm		- N			
Reference level		-40 dBm			V		
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		-50 dBm		and	hyperson		
		deordemonder to det.	Mon martine and		- Kar	www.	monunt
		-70 dBm					
		CF 2.402 GHz		691 pts			n 30.0 MHz
					Measur	ring	4,49
		Data: 30 APR 2019 14:47/21					
		Gnactering					
		Ref Level 20.00 dBm	Offset 1.00 dB 👄	RBW 100 kHz			L A
		Att 30 dB Count 10/10 IPk Max	SWT 30.1 ms 👄	VBW 300 kHz M	ode Auto Sweep		
		O 1PK Max			M1[1]		-53.17 dBm
		10 dBm				91	6.1790 MHz
		0 dBm					
		-10 dBm					
		-20 dBm	dBm				
CH00		-30 dBm					
30MHz~1000MHz							
		-40 dBm					
		-50 dBm	alasatus meressi andara	and an algorithm to the second of the	والمعادية والمعادية والمعادية	والمتحاد والمتأت والمتحد	141
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		-70 dBm					
		Start 30.0 MHz		30001 pts		St	op 1.0 GHz
					Measur	ing	
		Date: 30 APR 2019 14:47:37					
		Spectrum Ref Level 20.00 dBm	Offset 1.00 dB 👄	PPW 100 kuz			
		 Att 30 dB Count 10/10 			ode Auto Sweep		
		● 1Pk Max			M1[1]		-42.24 dBm
		10 dBm				7.	205833 GHz
		0 dBm					
		-10 dBmD1 -16.370 g	dBm				
01100		-20 dBm					
CH00 1GHz~26GHz		-30 dBm					
IGHZ~20GHZ		-40 dBm	M1	+			
		-50 d2m	all and a state of the state of	u dhuluanna an anairtí	a ha har dhaithe a cath gha tao na an ann an ann ann an ann an ann		decession of the
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		-70 dBm					
		-70 UBII					
				00001			
		Start 1.0 GHz		30001 pts			p 26.0 GHz
		Start 1.0 GHz		30001 pts	Measur	ring	





est Item:	SE		Modu	lation type	:	8DPSK	
		Spectrum Ref Level 21.00 dB	m Offerst 1.00 dD a	BRW 100 kits			
		 Att 30 c Count 100/100 		VBW 300 kHz Mod	e Auto FFT		
		●1Pk Max			M1[1]	4.78 (dBm
		10 dBm		M1		2.4022170	GHz
		0 dBm		K			
		-10 dBm					
		-20 dBm					
CH00		-30 dBm					
Reference level		-40 dBm					
		-50 dBm		M	N.		
			A State of the second sec	n.	1 million		
		-70 dBm	Martin and Marco .		"orner	hand the second second	uwur
		CF 2.402 GHz		691 pts	Measurin	Span 30.0 M	1Hz
		Date: 30 APR 2019 14:51	:07				
							_
		Spectrum Ref Level 20.00 dB	m Offset 1.00 dB (RBW 100 kHz			
		Att 30 c Count 10/10		VBW 300 kHz Mod	e Auto Sweep		
		● 1Pk Max			M1[1]	-52.89 0	dBm
		10 dBm				670.2920	MHZ
		0 dBm					
		-10 dBm					
		-20 dBm	0 dBm				
CH00		-30 dBm					
30MHz~1000MHz		-40 dBm					
		-50 dBm			- M1		
		متحد المقر وأنطر عليه المتنبي وعمل وعند	and all showing a second statements of the	tilan at a para binteren la tra att den Anna a se para tra atta atta atta atta		on the state of the second state of the stat	i (perille Notice e
		-70 dBm					
		Start 30.0 MHz		30001 pts	Measurin	Stop 1.0 G	GHz J
		Date: 30 APR 2019 14:51	23				
		Spectrum Ref Level 20.00 dB	m Offset 1.00 dB 🖷	RBW 100 PH-			
		 Att 30 c Count 10/10 	dB SWT 250 ms (VBW 300 kHz Mod	e Auto Sweep		
		●1Pk Max			M1[1]	-41.62	dBm
		10 dBm			+ +	4.804167	GHz
		0 dBm					
		-10 dBm					
		-20 dBm	0 dBm				
CH00		-30 d e m					
1GHz~26GHz		-40 dem					
		-50 d2m	a di na di	a and the survey of the second	liter and the second second	Red Andrew Relevance dispersion approxim	
			ter parties for the parties of a first	the star for strong of the		Constraint of the second se	
		-70 dBm					
		Start 1.0 GHz		30001 pts	Measurin	Stop 26.0 G	GHz
		Date: 30 APR 2019 14:51	:39				





5.11. Spurious Emissions (radiated)

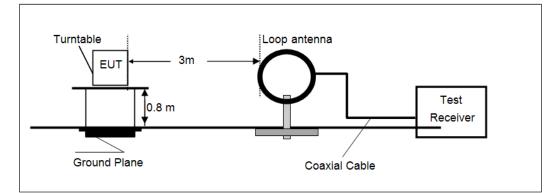
<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209

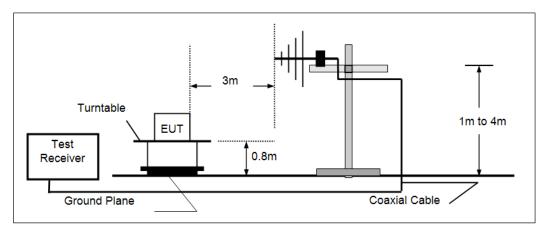
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

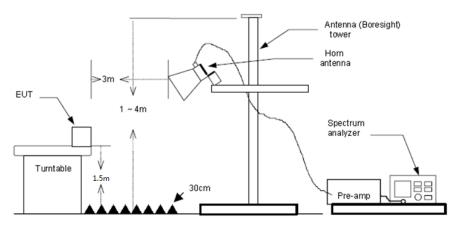
Below 30 MHz



> 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

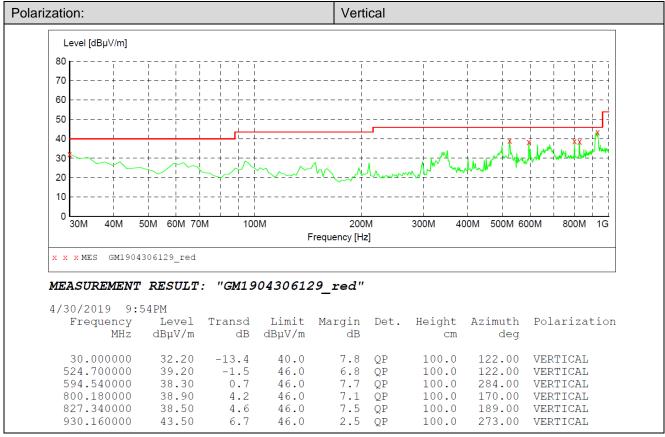
Note:

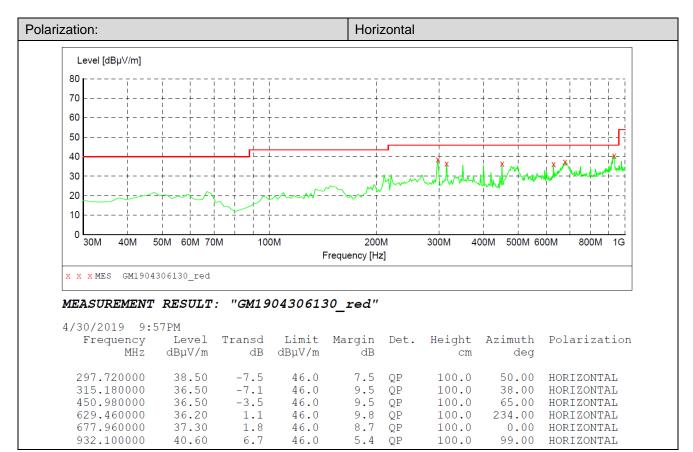
- 1) Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3) Below 1 GHz, Have pre-scan all modulation mode, found the GFSK modulation High channel which it was worst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





					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
2995.54	42.45	28.60	7.48	37.58	40.95	74.00	-33.05	Vertical	Peak
4809.50	49.44	31.58	9.55	35.72	54.85	74.00	-19.15	Vertical	Peak
7209.02	47.19	36.21	11.87	33.51	61.76	74.00	-12.24	Vertical	Peak
9611.66	32.51	39.07	13.73	33.93	51.38	74.00	-22.62	Vertical	Peak
4809.50	33.59	31.58	9.55	35.72	39.00	54.00	-15.00	Vertical	Average
7209.02	26.65	36.21	11.87	33.51	41.22	54.00	-12.78	Vertical	Average
3192.37	33.05	28.80	7.71	37.40	32.16	74.00	-41.84	Horizontal	Peak
4809.50	54.51	31.58	9.55	35.72	59.92	74.00	-14.08	Horizontal	Peak
7209.02	48.38	36.21	11.87	33.51	62.95	74.00	-11.05	Horizontal	Peak
9611.66	32.22	39.07	13.73	33.93	51.09	74.00	-22.91	Horizontal	Peak
4809.50	37.61	31.58	9.55	35.72	43.02	54.00	-10.98	Horizontal	Average
7209.02	28.18	36.21	11.87	33.51	42.75	54.00	-11.25	Horizontal	Average

➤ 1 GHZ ~ 25 GHZ	\triangleright	1 GHz ~ 25 GHz
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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	
3738.13	33.42	29.42	8.43	36.95	34.32	74.00	-39.68	Vertical	Peak	
4883.52	51.42	31.43	9.59	35.58	56.86	74.00	-17.14	Vertical	Peak	
7319.96	44.12	36.30	11.99	33.32	59.09	74.00	-14.91	Vertical	Peak	
9784.47	37.39	39.10	13.65	34.06	56.08	74.00	-17.92	Vertical	Peak	
4883.52	36.08	31.43	9.59	35.58	41.52	54.00	-12.48	Vertical	Average	
7319.96	25.47	36.30	11.99	33.32	40.44	54.00	-13.56	Vertical	Average	
9784.47	22.46	39.10	13.65	34.06	41.15	54.00	-12.85	Vertical	Average	
3757.21	32.91	29.47	8.45	36.94	33.89	74.00	-40.11	Horizontal	Peak	
4883.52	56.36	31.43	9.59	35.58	61.80	74.00	-12.20	Horizontal	Peak	
7319.96	43.84	36.30	11.99	33.32	58.81	74.00	-15.19	Horizontal	Peak	
9784.47	33.56	39.10	13.65	34.06	52.25	74.00	-21.75	Horizontal	Peak	
4883.52	39.72	31.43	9.59	35.58	45.16	54.00	-8.84	Horizontal	Average	
7319.97	25.68	36.30	11.99	33.32	40.65	54.00	-13.35	Horizontal	Average	

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	
3719.15	33.72	29.36	8.41	36.97	34.52	74.00	-39.48	Vertical	Peak	
4958.68	47.89	31.46	9.64	35.45	53.54	74.00	-20.46	Vertical	Peak	
7451.57	42.19	36.20	12.24	33.10	57.53	74.00	-16.47	Vertical	Peak	
9935.05	35.08	39.10	13.57	34.17	53.58	74.00	-20.42	Vertical	Peak	
4958.68	31.12	31.46	9.64	35.45	36.77	54.00	-17.23	Vertical	Average	
7451.57	25.05	36.20	12.24	33.10	40.39	54.00	-13.61	Vertical	Average	
9935.06	21.84	39.10	13.57	34.17	40.34	54.00	-13.66	Vertical	Average	
1676.56	33.97	25.13	5.72	37.28	27.54	74.00	-46.46	Horizontal	Peak	
3184.25	32.98	28.80	7.70	37.41	32.07	74.00	-41.93	Horizontal	Peak	
4958.68	51.57	31.46	9.64	35.45	57.22	74.00	-16.78	Horizontal	Peak	
7451.57	45.27	36.20	12.24	33.10	60.61	74.00	-13.39	Horizontal	Peak	
4958.68	36.87	31.46	9.64	35.45	42.52	54.00	-11.48	Horizontal	Average	
7451.57	26.92	36.20	12.24	33.10	42.26	54.00	-11.74	Horizontal	Average	

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.

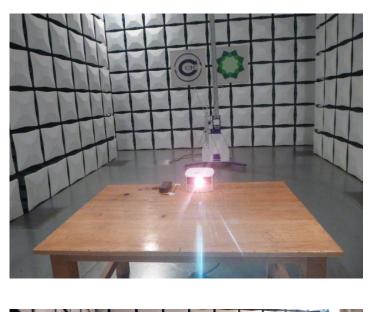
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)



Radiated Emissions





7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW19050094

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