



TEST REPORT

Report Reference No:	CHTEW2012013402	Report verification	on: 国际标识社画	
Project No:	SHT2012030405EW			
FCC ID:	QRP-SP-003			
Applicant's name:	Azumi S.A			
Address	Avenida Aquilino de la Guardia 16 of. 16-01, Marbella, Ciudad	a con Calle 47, PH de Panama, Pan	l Ocean Plaza, Piso ama	
Manufacturer	AZUMI HK LTD			
Address:	FLAT/RM 18 BLK 1 14/F GOLI KWAI TAK STREET KWAI CH	DEN INDUSTRIA UNG,HK	L BUILDING 16-26	
Test item description	Mobile Phone			
Trade Mark	AZUMI			
Model/Type reference:	A4			
Listed Model(s)	A4+			
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	Dec. 09, 2020			
Date of testing	Dec. 10, 2020- Dec. 21, 2020			
Date of issue	Dec. 22, 2020			
Result	PASS			
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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	2020-12-21	Add list models, update supplier of power IC,make difference test on Spurious Emissions (radiated), others are the same as report No. CHTEW19020081			

2. TEST DESCRIPTION

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

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

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	Azumi S.A
Address:	Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Piso 16 of. 16-01, Marbella, Ciudad de Panama, Panama
Manufacturer:	AZUMI HK LTD
Address:	FLAT/RM 18 BLK 1 14/F GOLDEN INDUSTRIAL BUILDING 16-26 KWAI TAK STREET KWAI CHUNG,HK

3.2. Product Description

Name of EUT:	Mobile Phone
Trade Mark:	AZUMI
Model No.:	A4
Listed Model(s):	A4+
IMEI:	Conducted: 358554067428999 Radiated: 358554067428981
Power supply:	DC 3.7V
Adapter information:	Input:100-240Va.c., 50/60Hz, 0.15A Output:5.0Vd.c., 0.5A
Hardware version:	SA391_A2
Software version:	AZUMI_A4_SW_V
Bluetooth	
Version:	Supported BT4.0+EDR
Modulation:	GFSK, π/4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	MONOPOLE Antenna
Antenna gain:	1.1dBi

3.3. Operation state

Test frequency list

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

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

> TEST MODE

For RF test items:

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

For AC power line conducted emissions:

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

For Radiated suprious emissions test item:

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

3.4. EUT configuration

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

- supplied by the manufacturer
- supplied by the lab

/		Manufacturer:	/
	,	Model No.:	/
/		Manufacturer:	/
	/	Model No.:	/

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

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

4.2. Test Facility

CNAS-Lab Code: L1225

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

A2LA-Lab Cert. No.: 3902.01

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

FCC-Registration No.: 762235

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

IC-Registration No.:5377A

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.: 5377A.

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 Emissions							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)	
1	EMI Test Receiver	R&S	ESCI	101247	10/27/2018	10/26/2019	
2	Artificial Mains	SCHWARZBECK	NNLK 8121	573	10/27/2018	10/26/2019	
3	Pulse Limiter	R&S	ESH3-Z2	101488	10/27/2018	10/26/2019	
4	RF Connection Cable	HUBER+SUHNER	EF400	N/A	11/14/2017	11/13/2019	
5	Test Software	R&S	ES-K1	N/A	N/A	N/A	
6	Temperature and Humidity Meter	ΜΙΑΟΧΙΝ	TH10R	N/A	10/30/2018	10/29/2019	

Radiated Emissions(Below 1GHz)							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)	
1	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	C11121	2018/09/30	2021/09/29	
2	EMI Test Receiver	R&S	ESCI	100900	2020/10/19	2021/10/18	
3	Loop Antenna	R&S	HFH2-Z2	100020	2018/04/02	2021/04/02	
4	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2020/04/28	2023/04/27	
5	Pre-amplifer	SCHWARZBECK	BBV 9742	N/A	2020/11/12	2021/11/11	
6	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2020/05/27	2021/05/26	
7	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2020/05/27	2021/05/26	
8	Test Software	R&S	ES-K1	N/A	N/A	N/A	
9	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A	
10	Antenna Mast	Maturo Germany	TAM-4.0-P	N/A	N/A	N/A	
11	Temperature and Humidity Meter	KEJIAN	KJ03	N/A	N/A	N/A	

Radiated Emissions(Above 1GHz)						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)
1	Anechoic Chamber	Albatross projects	Albatross projects SAC-3m-01 (09/30/2018	09/29/2021
2	Horn Antenna	SCHWARZBECK	9120D	1011	03/27/2017	03/26/2020
3	Preamplifier	BONN	BLWA0160-2M	1811887	11/14/2018	11/13/2019
4	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	04/28/2018	04/27/2019
5	Spectrum Analyzer	R&S	FSP40	100597	10/27/2018	10/26/2019
6	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	11/15/2018	11/14/2019
7	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	11/15/2018	11/14/2019
8	Test Software	Audix	E3	N/A	N/A	N/A
9	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
10	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A
11	Temperature and Humidity Meter	MINGLE	YH101	N/A	10/30/2018	10/29/2019

RF Conducted Test							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. (mm-dd-yy)	Next Cal. (mm-dd-yy)	
1	Spectrum Analyzer	R&S	FSV40	100048	10/28/2018	10/27/2019	
2	EXA Signal Analyzer	Agilent	N9020A	MY5050187	09/29/2018	09/28/2019	

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

<u>Requirement</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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

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

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

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)
	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

LIMIT

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	4.50		
GFSK	39	5.52	≤ 30.00	Pass
	78	5.05		
π/4DQPSK	00	4.90		
	39	5.98	≤ 21.00	Pass
	78	6.62		
	00	5.86		
8DPSK	39	6.28	≤ 21.00	Pass
	78	7.20		

Modulation Type: GFSK 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] 4.50 dB 2.40213750 GF 10 dBm-M1 ▼ 0 dBm--10 dBm -20 dBm CH00 -30 dBm 40 dBm--50 dBm -60 dBm 70 dBm CF 2.402 .0 MH 691 p Sp **III 1**40 Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 P1Pk View Mode Auto Sweep M1[1] 5.52 dBr 2.44083360 GH 10 dBm-M1 0 dBm -10 dBm--20 dBm CH39 -30 dBm--40 dBm -50 dBm--60 dBm 70 dBm-691 pt CF 2.441 GH .0 MHz **1** 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 5.05 dB 2.47986250 GF M1[1] 10 dBm-M1 0 dBm -10 dBm -20 dBm CH78 -30 dBm-40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GH 691 pts Span 5.0 MHz

Modulation Type:	π/4DQPSK
	Spectrum
	Ref Level 20.00 dBm Offset 1.00 dB ⊕ RBW 2 MHz
	Count 500/500
	M1[1] 4.90 dBm
	10 dBm M1
	0 dBm
	~10 dbm
CH00	-20 dBm
	-30 dBm
	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.402 GHz 691 pts Span 5.0 MHz
	Mexsering. (Internet in the second seco
	Spectrum 🕎
	KerLevel 20.00 dBm Offset 1.00 dB RBW 2 MHz Att 30 dB SWT 1 ms VBW 5 MHz
	olark view
	M1[1] 5.98 dBm 2.44111580 GHz
	0 dBm
	-10 dBm
	-20 dBm-
CH39	-30 dBm
	40.40m
	-40 UDII
	-50 dBm-
	-60 dBm-
	-70 dBm-
	05 0 441 04a 601 atr 8 0 MUa
	Mescuring.
	(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
	Ф1РК VIEW M1[1] 6.62 dBm
	10 dBm 2.47989150 GHz
	D dBm
CH78	-2U 08m
	-30 dBm
	-40 dBm
	-50 dBm
	-60 dgm
	-70 dBm
	CF 2.48 GHz 691 pts Span 5.0 MHz
	Messuring

Modulation Type:			8DI	PSK						
	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 500/50	0				nibuo ne	to oncop			
						М	1[1]		2 401	5.86 dBm
	10 dBm				M1					
	0 dBm									
	-10 dBm									
	00 d0m									
CH00	-20 uBm									
	-30 dBm									
	-40 dBm									
	-50 dBm									
	-60 dBm									
	70.10									
	-70 dBm									
	CF 2.402 GH	z			691	pts			Spa	n 5.0 MHz
		1					Measuri	ng		
	Spectrum									
	Ref Level 2 Att	20.00 dBm Of 30 dB S1	ffset 1.0 WT	00 dB 👄 R 1 ms 👄 V	BW 2 MHz BW 5 MHz	Mode Au	ito Sweep			
	Count 500/50	00								
						М	1[1]		2.440	6.28 dBm 97830 GHz
	10 dBm				W					
	0 dBm		_							
	-10 dBm									
	-20 dBm									
CH39										
	-30 dBm									
	-40 dBm									
	-50 dBm									
	-60 dBm									
	-70 dBm									
	CF 2.441 GH	z			691	pts	Maacuui		Spa	n 5.0 MHz
)			
	Spectrum			-						
	Att	30 dB S1	NT	1 ms 🖶 V	BW 5 MHz	Mode Au	ito Sweep			
	1Pk View						1[1]			7 00 45
	10 dBm				м	M	1[1]	I	2.479	7.20 dBm 97830 GHz
	10 dbm									
	0 dBm									
	-10 dBm									
	-20 dBm									
CH78	-30 dBm									
	-40 d8m									
	-40 uBIII									
	-50 dBm									
	-60 dBm									
	-70 dBm									
	CF 2.48 GHz	Y			691	pts	Measuri		Spa	n 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	0.92		
GFSK	39	0.92	-	Pass
	78	0.92		
	00	1.32		
π/4DQPSK	39	1.32	-	Pass
	78	1.32		
	00	1.30		
8DPSK	39	1.30	-	Pass
	78	1.30		

Modulation Type:	GFSK					
	Spectrum					
	Ref Level 20.00 dBm Offset 1.00 dB ● RBW 10 kHz					
	Count 500/500					
	• 1Pk View M1[1] -22.78 dBm					
	10 dBm 2.40154500 GHz M2[1] -1.76 dBm					
	0 dBm M2 2.40205500 GHz					
	-10 dBm					
	-20 dBm 01 -21 750 dBm 4 100 1 -21 750 dBm					
	-30 dBm					
CH00	-40 dBm					
	-sadema man					
	-60 d8m					
	-/0 doin					
	CF 2.402 GHz 1001 pts Span 2.5 MHz					
	Type Ref Trc X-value Y-value Function Function Result					
	M1 1 2.401545 GHz -22.78 dBm M2 1 2.402055 GHz -1.76 dBm					
	D3 M1 1 922.5 kHz 0.87 dB					
	Spectrum 🕎					
	Ref Level 20.00 dBm Offset 1.00 dB RBW 10 kHz					
	Count 500/500					
	●1Pk View M1[1] -21.45 dBm					
	10 dBm 2.44054750 GHz 2.44054750 GHz 0.68 dBm					
	0 dBm 2.44105500 GHz					
	-10 dBm					
	-20.dBm D1 -20.683.dBm M1 NN					
	-30 d8m					
CH39						
	and the second s					
	Streen.					
	-6U 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 2.4405475 GHz -21.45 dBm M2 1 2.441055 GHz -0.68 dBm					
	D3 M1 1 920.0 kHz 0.75 dB					
	Jessunder Water and Annual					
	Spectrum 🕎					
	Ref Level 20.00 dBm Offset 1.00 dB ● RBW 10 kHz					
	Count 500/500					
	1Pk View M1[1] -21.65 dBm					
	10 dBm 2.47954750 GHz 10 dBm M2[1] -1.04 dBm					
	0 dBm					
	-10 dBm					
	-20.dBm - 01 -21.041 dBm - M1 - WV 7 - V - W - 03					
	-30 dBm AAA					
CH78	10.40 m VW					
	The second					
	-50-dBm//					
	-60 dBm					
	-70 dBm					
	CF 2.48 GHz 1001 pts Span 2.5 MHz					
	Marker					
	туре кег x-value Y-value Function Function Result M1 1 2.4795475 GHz -21.65 dBm -21.65 dBm					
	M2 1 2.480USS GHz -1.04 dBm D3 M1 1 920.0 kHz 0.45 dB					
	Measuring 🚺 Martin 🊧					

Modulation Type:	π/4DQPSK
	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 Count 500/500 Count SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count SWT 50.1 µs VBW 100 kHz Mode SWT 50.1 µs SWT SWT 50.1 µs SWT
	PIPk View M1[1] -21.40 dBm
	10 dBm 2.40134250 GHz 10 dBm M2[1] -1.38 dBm
	0 dBm
	-10 dBm
	-20.dBm 01 -21.380 dBm 4
CHOO	-30 dBm
CIIOO	-40° d8m
	-50 dBm
	-60 dBm-
	-/0 08m
	CF 2.402 GHz 1001 pts Span 2.5 MHz Marker
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.4013425 GHz -21.40 dBm
	M2 1 2.4021575 GHz -1.38 dBm D3 M1 1 1.315 MHz -0.00 dB
	Measuring
	Con order was
	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
	●1Pk View M1[1] -19.90 dBm
	10 dBm 2.44034250 GHz 2.44034250 GHz 0.16 dBm
	0 dBm 2.44115750 GHz
	-10 dBm
	20 dBm D1 -19.839 dBm 4
01100	-30 dBm
CH39	-40 dBm
	-50 dBm
	-60 dBm
	-70 dBm
	CF 2.441 GHz 1001 pts Span 2.5 MHz
	Type Ref Trc X-value Y-value Function Function Result M1 1 2.4403425 GHz -19.90 dBm
	M2 1 2.4411575 GHz 0.16 dBm D3 M1 1 1.3175 MHz -0.36 dB
	Measuring
	Constanting
	Ref Level 20.00 dBm Offset 1.00 dB ● RBW 30 kHz
	Att 30 dB SWT 63.1 µs
	●1Pk View M1[1] -19.12 d8m
	10 dBm 2.47934000 GHz M2[1] 0.95 dBm
	0 dBm 2.48015750 GHz
	-10 dBm
	-20 dBm 01 -19.047 dBm / 01 -19.047 dBm
	-30 dBm
	40 dBm
	-50 dBm
	-60 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 2.4/934 GH2 -19.12 dBm M2 1 2.4801575 GH2 0.95 dBm D2 M1 1 1217 MH2 0.04 dm

Modulation Type:	8DPSK
	Spectrum
CH00	Spectrum Image: Constraint of the second secon
	-50 dBm -50 dBm -60 dBm -60 dBm -70 dBm -70 dBm -70 dBm -70 dBm GF 2.402 GHz 1001 pts Span 2.5 MHz Marker Type Ref Trc X-value M1 1 2.4013475 GHz -0.73 dBm M2 1 2.4021575 GHz -0.73 dBm M1 1 1.3025 MHz 0.44 dB
CH39	Spectrum W Ref Level 20.00 dBm Offset 1.00 dB RBW 30 dB RBW 10 kHz Att 30 dB SWT 63.1 µs VBW 100 kHz Mode Auto FFT Count 500/500 10 dBm M1[1] 2.44034750 GHz 0.77 dBm 10 dBm M2 M2[1] 0.77 dBm 2.4413750 GHz 0 dBm M4 M2 4.004 / 750 GHz 0.77 dBm 20 dBm D1 -19.234 dBm 63 4.004 / 750 GHz 4.004 / 750 GHz -30 dBm
CH78	Spectrum W Ref Level 20.00 dbm Offset 1.00 db @ RBW 30 kHz Att 30 db SWT 63.1 µs @ VBW 100 kHz Marker MI[1] 10 dbm MI[1] 0 dbm MI[1] 2.4934750 GHz 10 dbm M2[1] 2.49015750 GHz 10 dbm M2[1] 2.0 dbm M2[1] 2.0 dbm M2[1] 20 dbm M2[1] 30 db M2[1] 30 db M2[1] 30 dbm M2[1] 40 dbm M2[1] 40 dbm

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	≥0.92	Pass
π/4DQPSK	39	1.00	≥0.88	Pass
8DPSK	39	1.00	≥0.87	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		

	Spectrur	n								Ē
	Ref Leve	I 20.00 dBm	Offset 1	.00 dB 👄 R	BW 100 kH	z				(v)
	Att 1Pk View	30 dB	SWT	1 ms 😑 V	BW 300 kH	z Mode /	Auto Sweep			
	10 dBm									
	oAAAAAAA	ANNANAN	hadaadaa	AADDAADO	ANDAAAAAA	MANNA	AADAAAAA		MINNIN	
		WWWW.	RANAY	AMAR	AWWA	Henry	0.000	ANNA	a la	WWW
	-10 dêû	<u> </u>						, a care a c	••••	
	-20 dBm—									
GFSK	-30 dBm									
										1
	-40 dBm									
	50 dBm—									
	-60 dBm									~~~
	-70 dBm									
	Start 2.4 (GHz			691	pts			Stop 2	.4835 GHz
)[]) Measuri			0
	(a									(mp)
	Spectrur Ref Leve	n I 20.00 dBm	Offset 1	.00 dB 👄 R	BW 100 kH	z				(▽)
	Att IPk View	30 dB	SWT	1 ms 🖷 V	BW 300 kH	z Mode /	Auto Sweep			
	JACK VIEW									
	10 dBm									
	0 Million k Mil	ALKBARE	аладырай	A A A A A A A A A A A A A A A A A A A	UNAAAA	MAANIM	WWW	ANANANA	naaana	ANNAN .
	0,000	100800000	44004400							
	-10 dBm—									
	-20 dBm									
π/4DQPSK										
	BU dBm-									
	-40 dBm									n n
	-50 dBm									
	10 10									L.
	-60 dBm									
	-70 dBm—									
	01				(01				010	1005 011-
	start 2.4 ()]			691	pts	Measuri		5top 2	.4835 GHZ
	Spectrur	n	Offect 1	00 de 🗢 P	BW 100 PU	7				$\left[\nabla \right]$
	Att	30 dB	SWT	1 ms 🖷 V	BW 300 kH	z Mode /	Auto Sweep			
	⊎1PK View									
	10 dBm									
	0.16 · 6 H 4.	nah kowa k	Lodahrina.	67999444	AxAddana	алалтал	IAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	алалала	алкалала	лалад
	O ARMANA	ANAAAAAA (ahhahhh	WAAAMAA,	ነ ላላ የ የ የ የ የ የ የ የ የ የ የ የ የ የ የ የ የ የ	*******	******			N F B II Y
	-10 dBm—									
	-20 dBm									
8DPSK										
ODF SK	-30 dBm									
	7 ⁴⁰ dBm—									h h
	-50 dem-									
	-50 asm									X
	-60 dBm—									
	-70 dBm									
	Start 2.4 (GHz	1 1		691	pts			Stop 2	.4835 GHz
							Measuri		4	

5.7. Dwell Time

<u>LIMIT</u>

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Modulation type	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.39	319.00	0.13		
GFSK	DH3	1.66	153.00	0.25	≤ 0.40	Pass
	DH5	2.89	97.00	0.28		
	2DH1	0.38	319.00	0.12		
π/4DQPSK	2DH3	1.64	162.00	0.27	≤ 0.40	Pass
	2DH5	2.88	94.00	0.27		
	3DH1	0.38	320.00	0.12		
8DPSK	3DH3	1.64	153.00	0.25	≤ 0.40	Pass
	3DH5	2.88	108.00	0.31		

Modulation Type:	GFSK
	Spectrum (₩
	RefLevel 30.00 dBm ● RBW 1 MHz ● Att 40 dB ● SWT 10 ms ● VBW 3 MHz
	SGL TRG:VID ●1AP Cirw
	M1[1] -15.72 dBm 0.00000000 s
	20 dBm D1[1] 11.55 dB 391.25 µS
	10 dBm
	0 dBm
	-10 dBm
DH1	-20 dBm
Burst width	-30 dBm
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	a na star a na mana a na ang ang ang ang ang ang ang ang
	k to all the little of the confidence of the confidence of the confidence of the second states in the second s
	CF 2.441 GHz 1.0 ms/
	Deady (((((()))))
	Spectrum T
	RefLevel 30.00 dBm ● RBW 500 kHz ● Att 40 dB ● SWT 31.6 s ● VBW 3 MHz
	SGL TRG:VID IAP Cirw
	20 dBm
	10 dBm
	D d8 m TRG 1.800 d8m
	rta damining and a second s
DH1	
Burst number	
	CF 2.441 GHz 30001 pts 3.16 s/
	Ready (
	Spectrum 🕎
	RefLevel 30.00 dBm
	M1[1] -17.78 dBm -11.25 us
	20 dBm-D1[1] 22.28 dB 1.65750 ms
	10 dBm
	D dBm
	-10 dBm
DH3	TRG -16.20 dBm
Burst width	~20 uoli
	-30 dBm
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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,forexample:the shift register is initialized with nine ones.

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0	2	4	6	62 64	78 1	73 75 77

Each frequency used equally one the average by each transmitter.

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

5.9. Restricted band (radiated)

<u>LIMIT</u>

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

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

TEST CONFIGURATION



TEST PROCEDURE

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

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☑ Passed □ Not Applicable

Note:

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

Test chann	el:				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	32.37	28.05	6.62	37.59	29.45	74.00	-44.55	Horizontal	Peak
2390.03	31.60	27.65	6.75	37.59	28.41	74.00	-45.59	Horizontal	Peak
2310.00	31.31	28.05	6.62	37.59	28.39	74.00	-45.61	Vertical	Peak
2390.03	32.48	27.65	6.75	37.59	29.29	74.00	-44.71	Vertical	Peak
2310.00	19.73	28.05	6.62	37.59	16.81	54.00	-37.19	Horizontal	Average
2390.03	19.68	27.65	6.75	37.59	16.49	54.00	-37.51	Horizontal	Average
2310.00	19.25	28.05	6.62	37.59	16.33	54.00	-37.67	Vertical	Average
2390.03	19.42	27.65	6.75	37.59	16.23	54.00	-37.77	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	53.12	27.26	6.83	37.59	49.62	74.00	-24.38	Horizontal	Peak
2500.00	32.16	27.20	6.84	37.59	28.61	74.00	-45.39	Horizontal	Peak
2483.50	46.84	27.26	6.83	37.59	43.34	74.00	-30.66	Vertical	Peak
2500.00	30.69	27.20	6.84	37.59	27.14	74.00	-46.86	Vertical	Peak
2483.50	28.06	27.26	6.83	37.59	24.56	54.00	-29.44	Horizontal	Average
2500.00	18.92	27.20	6.84	37.59	15.37	54.00	-38.63	Horizontal	Average
2483.50	27.15	27.26	6.83	37.59	23.65	54.00	-30.35	Vertical	Average
2500.00	18.66	27.20	6.84	37.59	15.11	54.00	-38.89	Vertical	Average

5.10. Band edge and Spurious Emissions (conducted)

<u>LIMIT</u>

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

TEST CONFIGURATION



TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 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
		Spectrum (□□) Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz
		Count 500/500 P1Pk Max M1[1] 4.03 dBm
		10 dBm 2.402040,GHz 0 dBm M2[1] -54.52 dBm 2.400000 GHz
		-10 dBm
CH00 No hopping mode		-40 dBm -50(Bem
		5-0 dBm
		Start 2.31 GHz 691 pts Stop 2.405 GHz Marker
		Type Ref Tro X-value Y-value Function Function Result M1 1 2.40204 GHz 4.03 dBn M2 1 2.4 GHz -56.52 dBm M3 1 2.39 GHz -554.51 dBm M4 1 2.31 GHz -56.43 dBm
		MS 1 2.313442 GHz -52.97 dBm Image: State of the st
		Spectrum Image: Constraint of the system Image: Constand of the system
		Count 500/500 PIR Max M1[1] 4.04 dBm
		10 dBm 2.402040 (cHz 0 dBm M2[1] -55.49 dBm 0 dBm 2.400000 (Hz
		-10 dBm-
		-20 dBm
CH00		-40 dBm
Hopping mode		50 dBm M3 M3 Martineteretereteretereteretereteretereterete
		-70 dBm-
		Start 2.31 GHz 691 pts Stop 2.405 GHz
		Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.40204 GHz 4.04 dBm
		M2 1 2.4 GHz -55.49 dBm M3 1 2.39 GHz -55.86 dBm
		M4 1 2.31 GHz -55.37 dbm M5 1 2.341529 GHz -53.69 dBm
		Spectrum
		e Att 30 dB SWT 56.9 μs e VBW 300 kHz Mode Auto FFT Count 500/500
		P1Pk Max M1[1] 4.49 dBm C 4200010 011
		10 dBm m/1 2.4798310 GH2 M2[1] -57.65 dBm 2.4835000 GHz
		-10 dBm
		-20 dBm
CH78 No hopping mode		-30 dBm
		-90 dBm
		-50 dBm
		-70 dBm
		Start 2.478 GHz 691 pts Stop 2.5 GHz
		Type Ref Trc X-value Y-value Function Function Result M1 1 2.479831 GHz 4.49 dbm
		M2 1 2.4835 GHz -57.65 dBm M3 1 2.5 GHz -58.99 dBm M4 2 0.4040202 GHz -57.65 dBm
		M4 1 2.4848232 GHZ -55.67 dBm

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	Spectrum Ref Level 20.00 dBm Offset 1.00 Att 30 dB SWT 56.7 Count 500/500 SWT 56.7) dB — RBW 100 kHz 9 µs — VBW 300 kHz	Mode Auto FFT	Ⅲ ⊽				
			M1[1]	4.09 dBm 2.4798630 GHz -60.09 dBm 2.4835000 GHz				
	-10 dBm							
CH78	-30 dBm							
	-50 dBm			massan and and and				
	-70 dBm	691 pts		Stop 2.5 GHz				
	Marker	051 pcs						
	Type Ref Trc X-value	Y-value	Function	Function Result				
	M1 1 2.479863 M2 1 2.4835	GHz 4.09 dBm						
	M3 1 2.5 M4 1 2.4847913	GHz -60.88 dBm GHz -57.28 dBm						
			Measur	ing (

Test Item:	Band edge	Modulation type:	π/4DQPSK
	Spectrum Ref Level 20.00 d	m Offset 1.00 dB ● RBW 100 kHz 18 SWT 1.1 ms ● VBW 300 kHz	
	Count 500/500	M1[1]	1.60 dBm
	10 dBm	M2[1]	2.401910 GHz -50.20 ¥8m 2.400000 GHz
	-10 dBm	0 dBm	
CH00 No bopping mode	-30 dBm		Mg Vi
No hopping mode	-50 dBm	an far standard and an	- Master and The Balance and the
	Start 2.31 GHz Marker	691 pts	Stop 2.405 GHz
	Type Ref Trc M1 1 M2 1 M3 1 M4 1	X-value Y-value Function 2.40191 GHz 1.60 dBm 2.40 GHz 2.50.20 dBm 2.39 GHz -54.86 dBm 2.31 GHz -54.86 dBm	Function Result
		2.399906 GHz -50.29 dBm Steasuring.	Constanting 444
	Spectrum Ref Level 20.00 d	m Offset 1.00 dB ● RBW 100 kHz 18. SWT 1.1 ms ● VBW 300 kHz Mode åutoSween	
	Count 500/500	M1[1]	1.79 dBm
	10 dBm	M2[1]	2.402180 GHz -55.53 dBm 2.400000 GHz
	-10 dBm	0 dBm	
CH00 Hopping mode	-40 dBm		Mg Mg
	الاستخلاط (معالم) (معا -70 dBm —		
	Start 2.31 GHz Marker Type Ref Trc	691 pts	Stop 2.405 GHz
	M1 1 M2 1 M3 1 M4 1	2.40218 GHz 1.79 dBm 2.4 GHz -55.53 dBm 2.39 GHz -55.95 dBm 2.31 GHz -55.61 dBm	
	M5 1	2.399493 GHz -52.80 dBm Seasuring.	(*************************************
	Spectrum Ref Level 20.00 d	m Offset 1.00 dB ● RBW 100 kHz B SWT 56 9.0c ● VBW 300 kHz Mode Auto SET	
	Count 500/500 9 1Pk Max	M1[1]	4.20 dBm
	10 dBm 71	M2[1]	2.479310 GH2 -55.04 dBm 2.4835000 GHz
	-10 dBm	0 dBm	
CH78 No hopping mode	-30' dem		
	-60 dBm	With many many and as the the say and the	
	Start 2.478 GHz Marker	691 pts	Stop 2.5 GHz
	Type Ref Trc M1 1 M2 1 M3 1 M4 1	X-value Y-value Function 2.479831 GHz 4.20 dBm - 2.4835 GHz -5.5.04 dBm - 2.4635159 GHz -60.06 dBm - 2.4835159 GHz -55.32 dBm -	Function Result
		Measuring	

Report No.: CHTEW2012013402

	Spectrum Ref Level 20.00 dBm Off • Att 30 dB SW Count 500 / 500	et 1.00 dB 👄 RBW 100 kHz Γ 56.9 μs 👄 VBW 300 kHz	Mode Auto FFT	
	10k May			
	j10 dBm		M1[1] M2[1]	4.07 dBm 2.4780160 GHz -58.66 dBm 2.4835000 GHz
	-10 dBm D1 -15.930 dBm			
CH78	-30 dBm			
Hopping mode	-50 dBm	t	Amage and and a second	www.apmas.an
	-70 dBm	691 m	s	Stop 2.5 GHz
	Marker	0515		
	Type Ref Trc X-1	alue Y-value	Function	Function Result
	M1 1 2.	478016 GHz 4.07 dBm 2.4835 GHz -58.66 dBm		
	M3 1 M4 1 2.4	2.5 GHz -60.04 dBm 336435 GHz -56.76 dBm		
			Measuring	(IIIII) 4/4

Test Item:	Band edge	Modulation type:	8DPSK
CH00 No hopping mode	Band edge	Modulation type: Ref Level 20.00 dBm Offset 1.00 dB @ RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count SO0/S00 ● JPk Max M1[1] 0 dBm M2[1] 0 dBm M2[1] 0 dBm M2[1] -0 dBm M2[1] -30 dBm -1.18.410 dBm -30 dBm -1.29 dBm -40 dBm -1.51.78 dBm M2 1 -2.40 GHz -51.78 dBm -51.78 dBm	8DPSK
		M4 1 2.31 GHz -55.95 dBm M5 1 2.39963 GHZ -50.72 dBm Spectrum Methods Methods Methods Ref Level 20.00 dBm Offset 1.00 dB RBW 100 KHz Mode Auto Sweep Count 500/500 IPk Max MI[1] MI[1]	
CH00 Hopping mode		10 dBm M2[1] 0 dBm M2[1] -10 dBm M2[1] -20 dBm - -30 dBm - -30 dBm - -40 dBm - -50 dBm - -70 dBm -	2.403140 GHz -51.99 dBm 2.400000 GHz
		M1 1 2.4014 GHz 1.87 dBm M2 1 2.4 GHz -51.99 dBm M3 1 2.39 GHz -55.51 dBm M4 1 2.31 GHz -55.83 dBm M5 1 2.399768 GHz -50.31 dBm	
CH78 No hopping mode		Spectrum Main Main	4.45 dBm 2.4801490 GHz -54.64 dBm 2.4835000 GHz

Report No.: CHTEW2012013402

	Spectrum Ref Level 20.00 dBm Att 30 dB	Offset 1.00 dB ● SWT 56.9 µs ●	RBW 100 kHz VBW 300 kHz	Mode Auto FFT		
	1 Dk Max					
	110 dBm			M1[1]	2	4.39 dBm 4.4781430 GHz -56.72 dBm
	b.defile_m				2	.4835000 GHz
	-20 dBm D1 -15.610	dBm				
CH78	-30 dBm					
Hoppig mode	-50 dBm	~M4				N
	-60 dBm	mand	mention			mmini
	Start 2.478 GHz		691 pts	;		Stop 2.5 GHz
	Marker					
	Type Ret Trc	2 478143 GHz	4 39 dBm	Function	Function Re	sult
	M1 1 M2 1	2.4835 GHz	-56.72 dBm			
	M3 1 M4 1	2.5 GHz 2.4835159 GHz	-58.63 dBm -56.84 dBm			
		5.4000129 GHZ	-50.84 QBM	Measu	rico	4,40

Test Item:	SE	Modulation type:	GFSK		
	Spectrum Ref Level 21.00 dBm	offset 1.00 dB ● RBW 100 kHz			
	Att 30 df Count 100/100 PIk Max	3 SWT 75.9 μs 🖶 VBW 300 kHz Mode Auto FFT			
		M1[1]	3.54 dBm 2.4019570 GHz		
	10 dBm	M1 M1			
	-10 dBm				
CH00	-30 dBm				
Reference level	-40 dBm				
	-50 dBm				
	്ർഗ്രണം പംപംപം	monorementer theman	man marked marked by		
	-70 dBm				
	CF 2.402 GHz	691 pts	Span 30.0 MHz		
		Neasuring	*************************************		
	Ref Level 20.00 dBm	n Offset 1.00 dB 👄 RBW 100 kHz			
	Att 30 dt Count 10/10	3 SWT 30.1 ms 🖷 VBW 300 kHz Mode Auto Sweep			
	JEK MGA	M1[1]	-52.85 dBm 658.0380 MHz		
	10 dBm				
	0 dBm				
	-10 dBm D1 -16.460	dBm			
CH00	-20 dBm				
30MHz~1000MHz	-30 dBm				
	-50 dBm	IMI			
	kan seria ya kata ya k	Company of the Hickory of the Hickory of the South Contract Company on the South Company of the South Company	na kasi ng pangkan kasi ng salah kang ng kasi ng kasi ng pangkan ng pangkan ng pangkan ng pangkan ng pangkan ng Ng ng pangkan ng pangka		
	-70 dBm				
	Start 30.0 MHz	30001 nts	Stop 1 0 GHz		
		Neasuring			
	Spectrum	0 Offset 1.00 dB ● BBW 100 kHz			
	 Att 30 di Count 10/10 	3 SWT 250 ms 🖷 VBW 300 kHz Mode Auto Sweep			
	●1Pk Max	M1[1]	-44.66 dBm 25.883333 GHz		
	10 dBm				
	0 dBm				
	-10 dem	dBm			
CH00	-20 dem				
1GHz~26GHz	-30 dem				
	-40 dem	the second se	Ald and bridly as by a star provide and all all and		
			Cherrise Care and a strategic segment of the provided of the Care Strategic segment of the Strategic segment s		
	-70 dem				
	*/0 ubiii				
	Start 1.0 GHz	30001 pts	Stop 26.0 GHz		





Test Item:	SE	Modulation type:	π/4DQPSK						
	Spectrum	Ham Offcot 1 00 dB = PDW 100 bbs							
	Att 30 Count 100/100	Att 30 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT Count 100/100							
	● 1Pk Max	M1[1]	0.53 dBm						
	10 dBm		2.4021740 GHz						
	0 dBm								
	-10 dBm								
01100	-20 dBm								
CHUU Reference level	-30 dBm								
	-40 dBm								
	-50 dBm	- M							
	າສຣີບ d&m=++++++++++++++++++++++++++++++++++++	and manual frame	- Jan Marting - war far and a strange						
	-70 dBm								
	CF 2.402 GHz	691 pts	Span 30.0 MHz						
		Seasuring	1 49						
	Spectrum Ref Level 20.00	d8m Offset 1.00 d8 🖷 RBW 100 kHz							
	Att 30 Count 10/10 Count 10/10) dB SWT 30.1 ms e VBW 300 kHz Mode Auto Sweep							
	O THK MAX	M1[1]	-53.02 dBm 679.0540 MHz						
	10 dBm								
	0 dBm								
	-10 dBm								
CH00	-20 dBm D1 -19.	470 dBm							
30MHz~1000MHz	-30 dBm								
	-40 dBm								
	-50 dBm	MAA	rtent pilanishana anitara kita di Barrada estan k						
	weetlen with a settle	a an altan in yerren en en daantik waan je een af ee arryn in he en ye nada soonaan ee an of daantik skie skie Hinde							
	-70 dBm								
	Start 30.0 MHz	30001 pts	Stop 1.0 GHz						
	Spectrum		E						
	Ref Level 20.00 Att 30	d8m Offset 1.00 dB e RBW 100 kHz) dB SWT 250 ms e VBW 300 kHz Mode Auto Sweep	(*,						
	Count 10/10 1Pk Max								
	10 dBm-	M1[1]	-44.91 dBm 15.902500 GHz						
	0 dBm								
	-10 dBm								
	- 20 d8m	470_d8m							
CH00	-30 dBm								
1GHz~26GHz	-40 dBm								
	-50 dBm	and the second							
	and the second								
	-70 dBm								
	Start 1.0 GHz	30001 pts	Stop 26.0 GHz						





Test Item:	SE	Modulation type:	8DPSK	
	Spectrum Ref Level 21.00 dBm	0 Offset 1.00 dB ● RBW 100 kHz		
	Count 100/100 PIPK Max		1.17 dBm	
	10 dBm		2.4018260 GHz	
	0 dBm			
	-10 dBm			
CH00	-20 dBm			
Reference level	-30 dBm			
	-40 dBm			
	-50 dBm	and have been and the second s		
	-70 dBm		and an office contraction of	
	GE 2.402 GHz	601 nts	Snan 30.0 MHz	
		Measuring	() () () () () () () () () () () () () (
	Spectrum Ref Level 20.00 dBm	n Offset 1.00 dB 🖷 RBW 100 kHz		
	Att 30 de Count 10/10	8 SWT 30.1 ms 🖶 VBW 300 kHz Mode Auto Sweep)	
		M1[1]	-49.57 dBm 914.3680 MHz	
	-10 dBm			
	-20 dBm-01 -18.830	dBm		
	-30 dBm			
30101HZ~1000101HZ	-40 dBm			
	-50 dBm	an a	M1 V	
	Ali se a falosofa de la faso de la compañía de		Territory of States of Sta	
	-70 dBm			
	Start 30.0 MHz	30001 pts	Stop 1.0 GHz	
	Spectrum			
	Ref Level 20.00 dBm ● Att 30 dB 	n Offset 1.00 dB 🖷 RBW 100 kHz 8 SWT 250 ms 🖶 VBW 300 kHz Mode Auto Sweep		
	Pk Max	M1[1]	-44.29 dBm	
	10 dBm		15.880833 GHz	
	0 dBm			
	-10 dBm			
CH00	-20 dem D1 -18.830	dBm		
1GHz~26GHz	-30 dem			
	-40 dBm	Market Loss Loss Bord Will And allows with a strategy with the strategy of the strategy of	in the second states of the second states	
		By a large strain of the second s	and particular design party and particular design from the	
	-70 dBm			
	Start 1.0 GHz	30001 nts	Ston 26.0 GHz	
		Measuring	(,,,,,,,) W	





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
7,5000 1 0112	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





	1	GHz	~	25	GHz
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CH00									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Test value
3933.37	36.58	29.70	8.69	36.81	38.16	74.00	-35.84	Vertical	Peak
4748.67	33.08	31.40	9.52	35.83	38.17	74.00	-35.83	Vertical	Peak
6251.26	31.02	33.00	11.00	33.88	41.14	74.00	-32.86	Vertical	Peak
7900.86	30.98	36.70	12.78	33.06	47.40	74.00	-26.60	Vertical	Peak
3168.08	35.28	28.80	7.68	37.42	34.34	74.00	-39.66	Horizontal	Peak
3805.33	42.60	29.61	8.51	36.90	43.82	74.00	-30.18	Horizontal	Peak
4748.67	37.64	31.40	9.52	35.83	42.73	74.00	-31.27	Horizontal	Peak
7508.69	31.04	36.11	12.42	33.02	46.55	74.00	-27.45	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
3766.79	39.12	29.50	8.46	36.93	40.15	74.00	-33.85	Vertical	Peak
4748.67	34.55	31.40	9.52	35.83	39.64	74.00	-34.36	Vertical	Peak
6032.40	31.37	32.50	10.73	34.11	40.49	74.00	-33.51	Vertical	Peak
7190.69	32.00	36.14	11.86	33.54	46.46	74.00	-27.54	Vertical	Peak
3983.75	34.04	29.70	8.76	36.77	35.73	74.00	-38.27	Horizontal	Peak
4748.67	37.33	31.40	9.52	35.83	42.42	74.00	-31.58	Horizontal	Peak
6544.35	31.24	34.09	11.26	33.64	42.95	74.00	-31.05	Horizontal	Peak
7301.36	31.46	36.30	11.97	33.35	46.38	74.00	-27.62	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
3805.33	34.22	29.61	8.51	36.90	35.44	74.00	-38.56	Vertical	Peak
3943.39	35.86	29.70	8.70	36.80	37.46	74.00	-36.54	Vertical	Peak
4748.67	33.52	31.40	9.52	35.83	38.61	74.00	-35.39	Vertical	Peak
8063.40	31.71	37.04	12.45	33.05	48.15	74.00	-25.85	Vertical	Peak
3728.63	43.99	29.39	8.42	36.96	44.84	74.00	-29.16	Horizontal	Peak
3805.33	44.50	29.61	8.51	36.90	45.72	74.00	-28.28	Horizontal	Peak
4299.89	42.68	30.20	9.03	36.47	45.44	74.00	-28.56	Horizontal	Peak
4748.67	39.21	31.40	9.52	35.83	44.30	74.00	-29.70	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





Shenzhen Huatongwei International Inspection Co., Ltd.



7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No.: CHTEW20120134

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