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與認識認识

TEST REPORT

Report No:	CHTEW20010182	Report Verification	
Project No	SHT1912069305EW		
FCC ID:	2AVIMA102		Reportivo: CHTEW20010182
Applicant's name:	CHINA HAINERGY NE	W ENERGY CORP.,LIN	IITED
Address	Unit 1908,19/F,Harbour Chai,HongKong	Centre,25 Harbour Roa	d,Wan
Manufacturer	CHINA HAINERGY NE	W ENERGY CORP.,LIM	ITED
Address:	Unit 1908,19/F,Harbour Chai,HongKong	Centre,25 Harbour Roa	d,Wan
Test item description:	Tablet PC		
Trade Mark:	Plan Ceibal		
Model/Type reference:	ACRUX		
Listed Model(s):	A102		
Standard:	FCC CFR Title 47 Part	15 Subpart C Section	15.247
Date of receipt of test sample:	Dec.27,2019		
Date of testing:	Dec.27,2019 ~ Jan.17,2	2020	
Date of issue	Jan.19,2020		
Result	PASS		
Compiled by (Position+Printed name+Signature):	File administrator Yuem	ing Li	omin ^y .li
Supervised by (Position+Printed name+Signature):	Project Engineer Kiki Ko	ong	z konf
Approved by (Position+Printed name+Signature):	RF Manager Hans Hu	H	amsHu
Testing Laboratory Name:	Shenzhen Huatongwe	i International Inspecti	on Co., Ltd.
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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:

- FCC Rules Part 15.247: 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
- <u>ANSI C63.10:2013</u>: American National Standard for Testing Unlicensed Wireless Devices
- KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2020-01-19	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result
5.1	Antenna Requirement	15.203/15.247 (c)	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	Peak Output Power	15.247 (b)(1)	PASS
5.4	20 dB Bandwidth	15.247 (a)(1)	PASS
5.5	99% Occupied Bandwidth	-	PASS ^{*1}
5.6	Carrier Frequency Separation	15.247 (a)(1)	PASS
5.7	Hopping Channel Number	15.247 (a)(1)	PASS
5.8	Dwell Time	15.247 (a)(1)	PASS
5.9	Duty Cycle Correction Factor	-	PASS ^{*1}
5.10	Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS
5.11	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS
5.12	Radiated Band Edge Emission	15.205/15.209	PASS
5.13	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS

Note:

- The measurement uncertainty is not included in the test result.

*1: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	CHINA HAINERGY NEW ENERGY CORP.,LIMITED
Address:	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong
Manufacturer:	CHINA HAINERGY NEW ENERGY CORP.,LIMITED
Address:	Unit 1908,19/F,Harbour Centre,25 Harbour Road,Wan Chai,HongKong

3.2. Product Description

Name of EUT:	Tablet PC
Trade Mark:	Plan Ceibal
Model No.:	ACRUX
Listed Model(s):	A102
Power supply:	DC 3.7V
Adapter information:	Model: XHY050200UE Input: 100-240Va.c., 50/60Hz, 0.3A Output: 5.0Vd.c., 2.0A
Hardware version:	EM_T8611B-V6.0
Software version:	Ceibal_ACRUX_20200106_SV2.0

3.3. Radio Specification Description

Bluetooth version:	V4.0
Support function ^{*2} :	EDR
Modulation:	GFSK, π/4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	FPC Antenna
Antenna gain:	1.85dBi

Note:

*2: only show the RF function associated with this report.

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.		
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China		
	Туре	Accreditation Number	
Qualifications	CNAS	L1225	
	A2LA	3902.01	
	FCC	762235	
	Canada	5377A	

4. TEST CONFIGURATION

4.1. Test frequency list

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

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

4.2. Descriptions of Test mode

Preliminary tests were performed in different data rates and recorded the RF output power in the clause 5.3

Note:

- 1) The manufacturer declare that the maximum power value of the product is set as a default value in the enter test mode software.
- 2) All the test data for each data rate were verified, found <u>GSFK Modulation</u> which is worse case mode

4.3. Test mode

The engineering test program	was provided and ena	abled to make EUT continuous t	ransmitting.
Modulation / Data Rate			
Test Item	GFSK 1Mbps	π/4DQPSK 2Mbps	8DPSK 3Mbps
Conducted test item	\checkmark	✓	\checkmark
Radiated test item	\checkmark	-	-

the highest RF output power at preliminary tests.

The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

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

Wheth	Whether support unit is used?				
✓	No				
Item	Equipement	Trade Name	Model No.	FCC ID	Power cord
1					
2					

4.5. Testing environmental condition

Туре	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Measurement uncertainty

Test Item	Measurement Uncertainty
AC Conducted Emission (150kHz~30MHz)	3.02 dB
Radiated Emission (30MHz~1000MHz	4.90 dB
Radiated Emissions (1GHz~25GHz)	4.96 dB
Peak Output Power	0.51 dB
Power Spectral Density	0.51 dB
Conducted Spurious Emission	0.51 dB
6dB Bandwidth	70 Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipment Used during the Test

•	Conducted Em	ission					
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
•	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
•	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
•	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
•	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	EF-NM- BNCM-2M	2019/10/23	2020/10/22
•	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

•	Radiated emiss	sion-6th test site					
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
•	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
•	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2017/04/05	2020/04/04
•	Pre-Amplifer	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
•	RF Connection Cable	HUBER+SUHNER	HTWE0062- 01	N/A	N/A	2019/08/21	2020/08/20
•	RF Connection Cable	HUBER+SUHNER	HTWE0062- 02	SUCOFLEX 104	501184/4	2019/05/27	2020/05/26
•	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

•	Radiated emis	sion-7th test site					
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
•	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
•	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
•	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2017/04/01	2020/03/31
•	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	25841	2017/03/27	2020/03/26
•	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/10
•	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
•	Broadband Pre- amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
•	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
•	Test Software	Audix	N/A	E3	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	2019/10/26	2020/10/25
•	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25
0	Power Meter	Anritsu	ML249A	N/A	2019/10/26	2020/10/25
0	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25

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 responseble party shall be used with the device. The use of a permanently attached antenna or of an antenna 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.

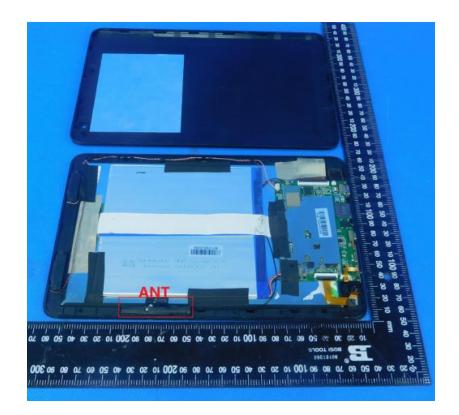
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(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 antenna type is a FPC antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emission

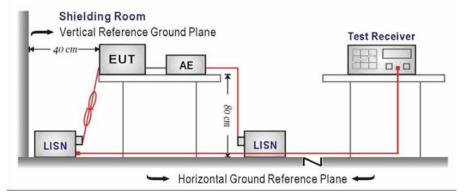
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was setup according to ANSI C63.10 requirements.
- 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.
- 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.

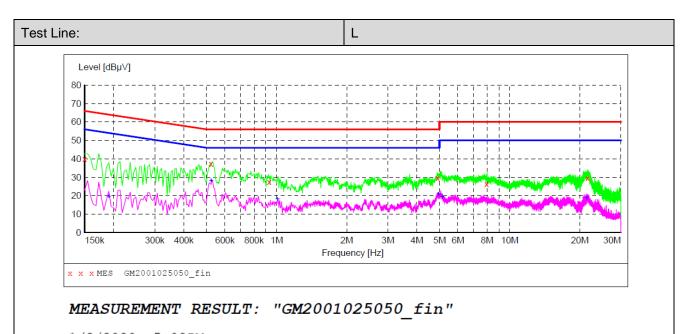
TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☑ Passed □ Not Applicable

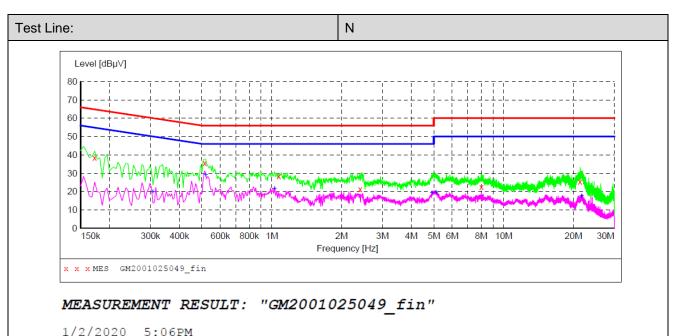
Shenzhen Huatongwei International Inspection Co., Ltd.



1/2/2020 5:08	PM						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dBµV	dB	dBµV	dB			
0.150000	40.10	10.1	66	25.9	QP	L1	GND
0.523500	37.40	10.1	56	18.6	QP	L1	GND
0.928500	27.60	10.1	56	28.4	QP	L1	GND
4.906500	29.60	10.1	56	26.4	QP	L1	GND
7.957500	26.40	10.2	60	33.6	QP	L1	GND
21.588000	29.50	10.2	60	30.5	ÕP	L1	GND
					~		

MEASUREMENT RESULT: "GM2001025050 fin2"

1/2/2020 5:0 Frequency MHz		Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.190500	19.60	10.1	54	34.4	777	L1	GND
0.523500	28.10	10.1	46	17.9	AV	L1	GND
1.009500 4.947000	17.90 20.60	10.1 10.1	46 46	28.1 25.4	AV AV	L1 L1	GND GND
5.127000 21.376500	19.30 18.60	10.2	50 50	30.7 31.4	AV AV	L1 L1	GND GND
21.370300	10.00	10.2	50	51.4	AV	ТТ	GND



1/2/2020 5:06	PM						
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE
MHz	dBµV	dB	dBµV	dB			
0.172500	38.60	10.1	65	26.2	OP	N	GND
0.514500	35.60	10.1	56	20.4	ÕP	N	GND
1.072500	28.30	10.1	56	27.7	ÕP	N	GND
2.404500	21.30	10.1	56	34.7	ÕP	Ν	GND
8.025000	22.60	10.2	60	37.4	ÕP	N	GND
21.349500	25.50	10.2	60	34.5	0P	N	GND
21.345500	23.50	10.2	00	54.5	×-	1	GIND

MEASUREMENT RESULT: "GM2001025049 fin2"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.307500	19.90	10.1	50	30.1	AV	N	GND
0.519000	29.00	10.1	46	17.0	AV	Ν	GND
1.027500	21.70	10.1	46	24.3	AV	Ν	GND
4.897500	19.30	10.1	46	26.7	AV	Ν	GND
5.109000	19.50	10.1	50	30.5	AV	Ν	GND
21.633000	17.40	10.2	50	32.6	AV	Ν	GND

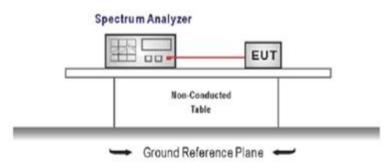
5.3. Peak Output Power

<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 4.3

TEST RESULT

☑ Passed □ Not Applicable

TEST Data

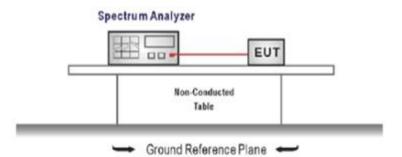
Please refer to appendix A on the appendix report

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
- Use the following spectrum analyzer settings: Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW ≥ 1% of the 20 dB bandwidth, 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 4.3

TEST RESULT

🛛 Passed

Not Applicable

TEST Data

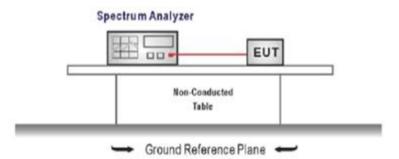
Please refer to appendix B on the appendix report

5.5. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

- 1. Connect the antenna port(s) to the spectrum analyzer input.
- 2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

Center Frequency =channel center frequency Span≥1.5 x OBW RBW = 1%~5%OBW VBW ≥ 3 × RBW Sweep time= auto couple Detector = Peak Trace mode = max hold

3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☑ Passed □ Not Applicable

TEST Data

Please refer to appendix C on the appendix report

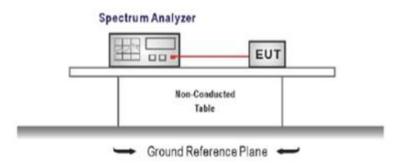
5.6. Carrier Frequencies Separation

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 25kHz 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



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 4.3

TEST RESULTS

☑ Passed □ Not Applicable

TEST Data

Please refer to appendix D on the appendix report

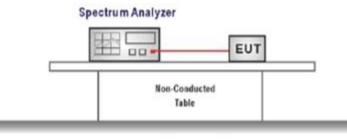
5.7. Hopping Channel Number

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



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 = 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 4.3

TEST RESULTS

☑ Passed □ Not Applicable

TEST Data

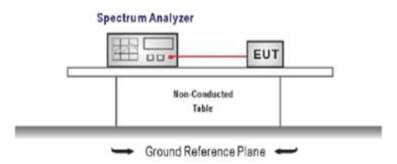
Please refer to appendix E on the appendix report

5.8. Dwell Time

LIMIT

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 4.3

TEST RESULTS

☑ Passed □ Not Applicable

TEST Data

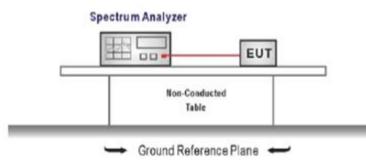
Please refer to appendix F on the appendix report

5.9. Duty Cycle Correction Factor (DCCF)

<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
- 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, Trigger mode
- 4. Measure and record the duty cycle data

TEST MODE:

Please refer to the clause 4.3

TEST Data

Please refer to appendix G on the appendix report

5.10. Pseudorandom Frequency Hopping Sequence

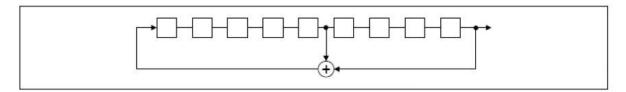
<u>LIMIT</u>

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

TEST RESULTS

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

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:

0	2	4	6	62	64	J	78	1	73	75	77
				 1			1		 Γ	Г	Г
				1			1		İ.		L
							1		1		L
				 1	LJ.				 L		

Each frequency used equally one the average by each transmitter.

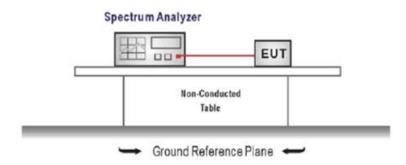
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

5.11. Conducted Band edge and Spurious Emission

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section15.247 (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. Connect the antenna port(s) to the spectrum analyzer input.
- 2. Establish a reference level by using the following procedure

Center frequency=DTS channel center frequency

The span = 1.5 times the DTS bandwidth.

RBW = 100 kHz, VBW \ge 3 x RBW

Detector = peak, Sweep time = auto couple, Trace mode = max hold

Allow trace to fully stabilize

Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

3. Emission level measurement

Set the center frequency and span to encompass frequency range to be measured

RBW = 100 kHz, VBW \ge 3 x RBW

Detector = peak, Sweep time = auto couple, Trace mode = max hold

Allow trace to fully stabilize

Use the peak marker function to determine the maximum amplitude level.

- 4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
- Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☑ Passed □ Not Applicable

TEST Data

Please refer to appendix H on the appendix report

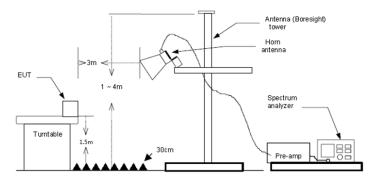
5.12. Radiated Band edge Emission

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 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.
- 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 themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
- 5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)

Averager level = Peak level + DCCF

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☑ Passed □ Not Applicable

Note:

- 1) Level= Reading + Factor; Factor = Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit Level
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

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Issued: 2020-01-19

st cl	hanne	el:	CH00		Pol	arity		Horizonta	al				
	Suspected Data List												
	NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector				
	1	2310.000	45.60	-2.34	43.26	74.00	30.74	Horizontal	PK				
	2	2390.000	44.63	-2.41	42.22	74.00	31.78	Horizontal	PK				
	1	2310.000	45.60	-27.16	18.44	54.00	35.56	Horizontal	AV				
	2	2390.000	44.63	-27.23	17.40	54.00	36.60	Horizontal	AV				
st cl	hanne	el:	CH00		Pol	arity		Vertical					
	Suspe	cted Data	List										
		Freq.	Reading	Factor	Level	Limit	Margin						
	NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector				
	1	2310.000	44.95	-2.34	42.61	74.00	31.39	Vertical	PK				
	2	2390.000	45.60	-2.41	43.19	74.00	30.81	Vertical	PK				
	1	2310.000	44.95	-27.16	17.79	54.00	36.21	Vertical	AV				
	2	2390.000	45.60	-27.23	18.37	54.00	35.63	Vertical	AV				

t channel:		CH78	H78 Polarity			Horizontal		
Susp	ected Data	List						
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Polarity	Detector
1	2483.500	44.52	-2.15	42.37	74.00	31.63	Horizontal	PK
2	2500.000	45.51	-2.10	43.41	74.00	30.59	Horizontal	PK
1	2483.500	44.52	-26.97	17.55	54.00	36.45	Horizontal	AV
2	2500.000	45.51	-26.92	18.59	54.00	35.41	Horizontal	AV
chann	el:	CH78		Pol	arity		Vertical	
Susp	ected Data	List						
	Freq.	Reading	Factor	Level	Limit	Margin		
NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector
1	2483.500	44.83	-2.15	42.68	74.00	31.32	Vertical	PK
2	2500.000	44.36	-2.10	42.26	74.00	31.74	Vertical	PK
1	2483.500	44.83	-26.97	17.86	54.00	36.14	Vertical	AV
					54.00	36.56	Vertical	AV

5.13. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

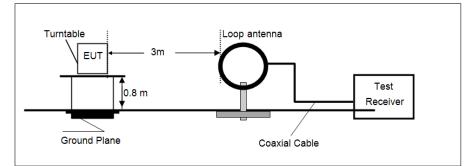
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

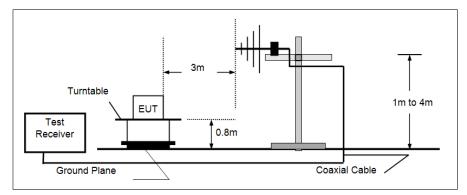
Frequency	Limit (dBuV/m @3m)	Value	
30MHz~88MHz	40.00	Quasi-peak	
88MHz~216MHz	43.50	Quasi-peak	
216MHz~960MHz	46.00	Quasi-peak	
960MHz~1GHz	54.00	Quasi-peak	
Above 1GHz	54.00	Average	
	74.00	Peak	

TEST CONFIGURATION

➢ 9 kHz ~ 30 MHz

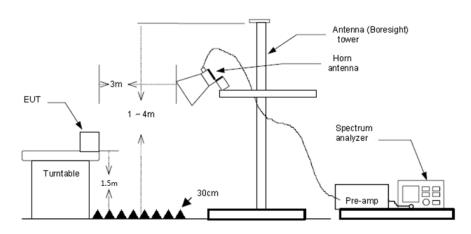


> 30 MHz ~ 1 GHz



> Above 1 GHz

Page: 28 of 34



TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10.
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 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
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) 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 detector is 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.

c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)

Averager level = Peak level + DCCF

TEST MODE:

Please refer to the clause 4.3

TEST RESULT

☑ Passed □ Not Applicable

Note:

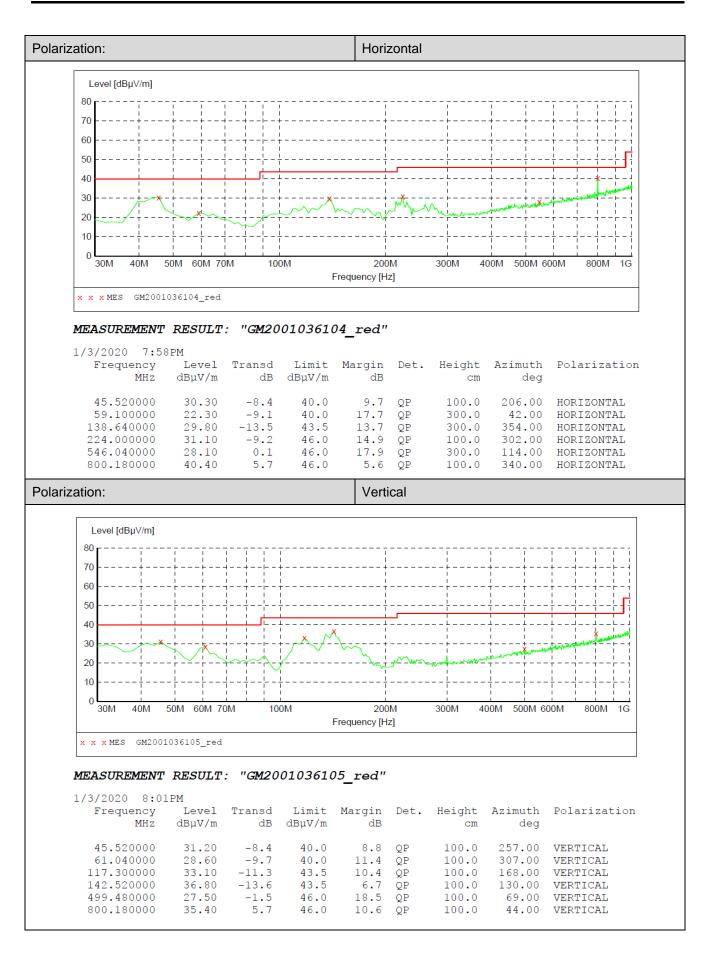
- 1) Level= Reading + Factor/Transd; Factor/Transd = Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit Level
- Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

TEST DATA FOR 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH39 which it was worst case, so only show the worst case's data on this report.

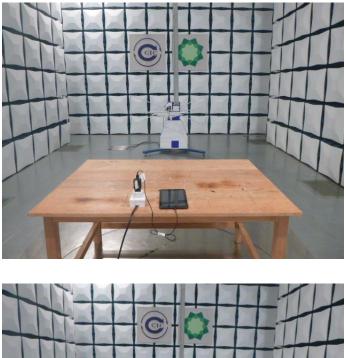


<u> TEST DATA FOR 1 GHz ~ 25 GHz</u>

hanne	:I			СН00				
Suspe	ected Data	List						
	Freq.	Reading	Factor	Level	Limit	Margin		
NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector
1	1226.187	33.29	-5.76	27.53	74.00	46.47	Horizontal	PK
2	3164.937	33.15	0.66	33.81	74.00	40.47	Horizontal	PK
3	8029.437	30.46	16.23	46.69	74.00	27.31	Horizontal	PK
4	9311.656	31.28	17.85	49.13	74.00	24.87	Horizontal	PK
	1		17.00	43.13	74.00	24.07	TIONZONIA	TR
Susp	ected Data	List				1		
NO.	Freq.	Reading	Factor	Level	Limit	Margin	Polarity	Detector
1.0.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	1 Oranty	Detector
1	1135.125	35.40	-6.52	28.88	74.00	45.12	Vertical	PK
2	3185.500	32.93	0.76	33.69	74.00	40.31	Vertical	PK
3	8058.812	30.60	16.28	46.88	74.00	27.12	Vertical	PK
4	10426.43	31.52	17.53	49.05	74.00	24.95	Vertical	PK
					•			
hanne					CH39			
Susp	ected Data	List						
· ·	Freq.	Reading	Factor	Level	Limit	Margin		
NO.		[dBµV/m]	[dB]			[dB]	Polarity	Detector
	[MHz]			[dBµV/m]	[dBµV/m]			
1	1132.187	34.42	-6.55	27.87	74.00	46.13	Horizontal	PK
2	3173.750	31.62	0.70	32.32	74.00	41.68	Horizontal	PK
3	5109.562	30.17	8.82	38.99	74.00	35.01	Horizontal	PK
4	9590.718	31.26	17.18	48.44	74.00	25.56	Horizontal	PK
Susp	ected Data	List						
	Freq.	Reading	Factor	Level	Limit	Margin		
NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector
1	1180.656	34.13	-6.04	28.09	74.00	45.91	Vertical	PK
2	3150.250	32.66	0.58	33.24	74.00	40.76	Vertical	PK
3	8026.500	30.67	16.23	46.90	74.00	27.10	Vertical	PK
4	9230.875	31.46	17.07	48.53	74.00	25.47	Vertical	PK
		•					· · · · · · · · ·	
hanne) 				CH78			
Suspe	ected Data							
NO	Freq.	Reading	Factor	Level	Limit	Margin	Polority	Dotostar
NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector
1	1192.406	34.68	-5.91	28.77	74.00	45.23	Horizontal	PK
2	3170.812	32.54	0.69	33.23	74.00	40.77	Horizontal	PK
3	7938.375	31.32	16.26	47.58	74.00	26.42	Horizontal	PK
4	9640.656	32.14	17.13	49.27	74.00	24.73	Horizontal	PK
	ected Data					·		·
	Freq.	Reading	Factor	Level	Limit	Margin		
NO.	[MHz]	[dBµV/m]	[dB]	[dBµV/m]	[dBµV/m]	[dB]	Polarity	Detector
1	1192.406	35.16	-5.91	29.25	74.00	44.75	Vertical	PK
1		32.29		32.92	74.00	44.75	Vertical	PK
2	3159.062		0.63	-				
	7322.968	30.77	15.12	45.89	74.00	28.11	Vertical	PK
4	9721.437	31.48	17.19	48.67	74.00	25.33	Vertical	PK

6. TEST SETUP PHOTOS

Radiated Emission









AC Conducted Emission



7. EXTERANAL AND INTERNAL PHOTOS

Reference to the test report No. : CHTEW20010180.

8. APPENDIX REPORT

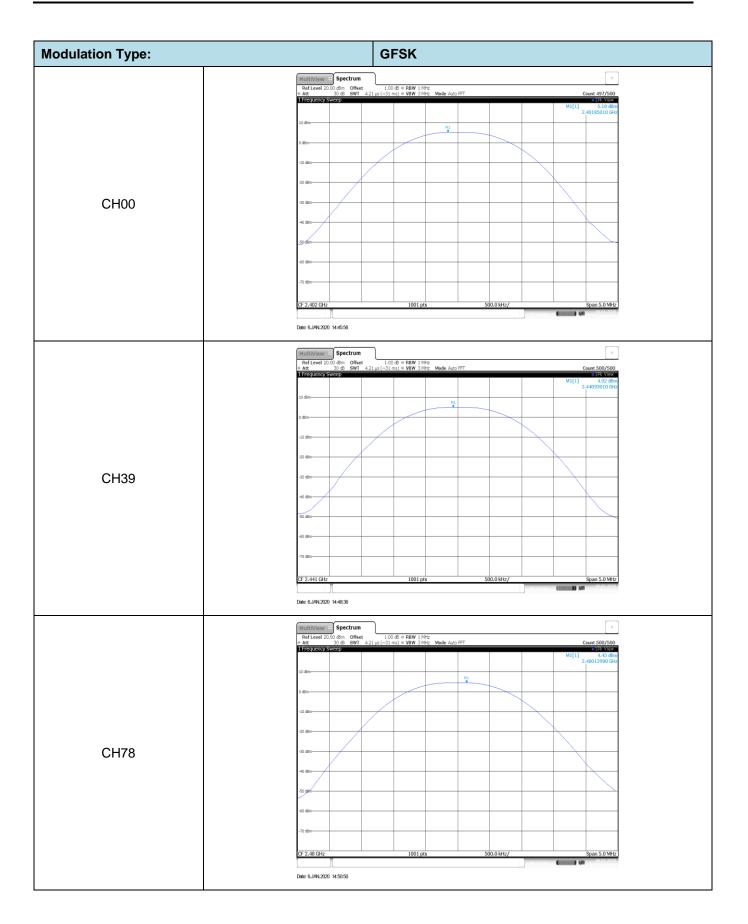
APPENDIX REPORT

Project No.	SHT1912069305EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT19120693012	Model No.	ACRUX
Start test date	2020/1/6	Finish date	2020/1/6
Temperature	25°C	Humidity	50%
Test Engineer	Ximing Huang	Auditor	William . wang

Appendix clause	Test item	Result
A	Peak Output Power	PASS
В	20 dB Bandwidth	PASS
С	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
н	Band edge and Spurious Emissions(coducted)	PASS

Modulation type	Channel	Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
	00	5.18	5.13		
GFSK	39	4.92	4.87	≤ 30.00	Pass
	78	4.45	4.42		
	00	4.46	3.95		
π/4DQPSK	39	2.23	1.68	≤ 21.00	Pass
	78	1.83	1.36		
	00	2.77	2.21		
8DPSK	39	2.15	1.73	≤ 21.00	Pass
	78	1.70	1.18		

Appendix A: Peak Output Power

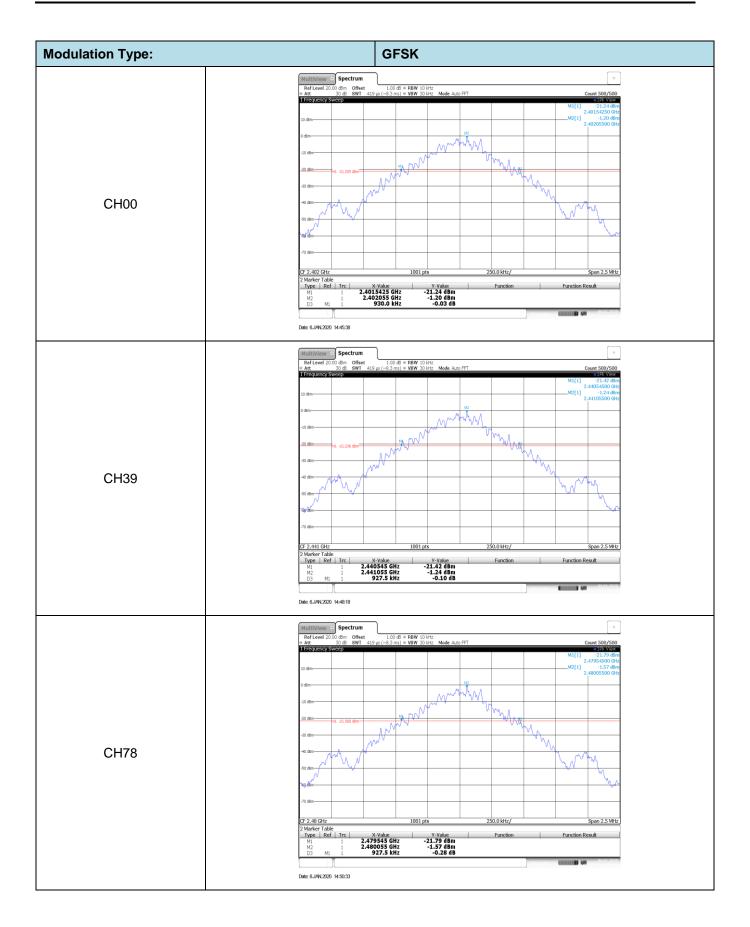


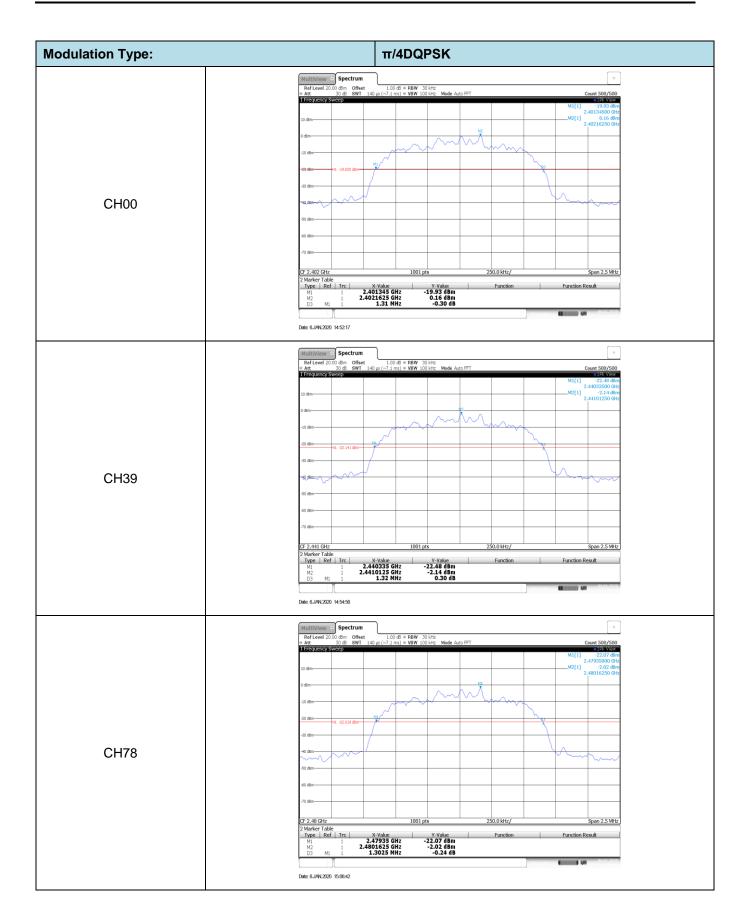
odulation Type:		π/4DQF	SK			
	MultiView = Spectrum	\neg				V
	Ref Level 20.00 dBm Offset Att 30 dB SWT I frequency Sweep	1.00 dB ⊕ RBW 2 MHz 1.01 ms ⊕ VBW 5 MHz Mode	Auto Sweep			ount 500/500 1Pk View
	10 dêm				M1[1] 2	4.46 dBn .40215980 GH
	0 dām		M1			
	15 dBm					
01100	-20 d8m					
CH00	-30 d8m					
	-40 d8m					
	-50 dBm					
	-60 d8m					
	-70 dBm					
	CF 2.402 GHz	1001 pts		500.0 kHz/		Span 5.0 MHz
	Date: 6.JAN.2020 14:52:35					
	MultiView 🕄 Spectrum					V
	Ref Level 20.00 dBm Offset Att 30 dB SWT 1 Frequency Sweep	1.00 dB ⊕ RBW 2 MHz 1.01 ms ⊕ VBW 5 MHz Mode	Auto Sweep			ount 500/500
	10 d8m				M1[1] 2	2.23 dBn .44109990 GH
	0 dēm		M1			
	-10 gBcs					
	-20 dBm					
CH39	-30 dbm					
0139	-40 dbm					
	-50 dkm					
	-60 dbm					
	-70 dbm-					
	CF 2.441 GHz	1001 pts		500.0 kHz/		Span 5.0 MHz
	Dete: 6.JAN.2020 14:55:07					
	MultiView Spectrum					T
	Ref Level 20.00 dBm Offset # Att 30 dB SWT I Frequency Sweep	1.01 ms = VBW 5 MHz Mode	Auto Sweep			ount 500/500 19k View 1.83 dBn
	10 dBm				2	1.83 dBn .48010990 GH
	0 dism		M1			
	-10 dBm			1		
	-10 dbg					
CH78						
CH78	-20 dkm					
CH78	20 dite					
CH78	40 dkn					
CH78	40 din 30 din 40 din 40 din 40 din					
CH78	20 dito	1001 pts		500.0 HHz/		Span 5.0 MHz

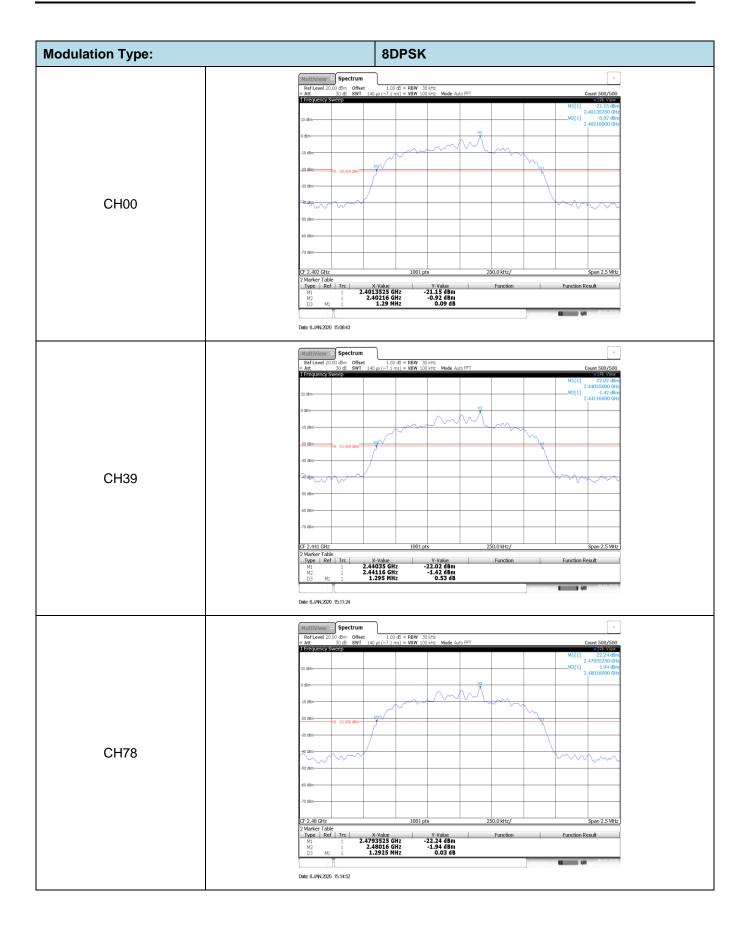
CH00	γ #150/500 2777.dm 136000 ctr μ <tr< th=""></tr<>
CH00	ant 500/500 153/2000 2.7/2000 2.7/2000 0199000 GHz 0199000 GHZ 019900 GHZ 019
CH00	2 154/196m 2,77 dBm 1198000 GHz 198000 GHz pan 5.0 MHz tan 500 CHz tan 500 CHZ
CH00	pan 5.0 MHz
CH00	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH00	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH00	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH00	06 01 2020 ▼ ant 500/500 ● 1Pk View
	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	06 01 2020 ▼ ant 500/500 ● 1Pk View
CH39	ant 500/500
CH39	ant 500/500
CH39	ant 500/500
CH39	2.15 dBm 4096500 GHz
CH39	
CH39	
CH39	_
CH39	
19.000	
-3 de-	
40 dan	
-71 da	
GF 2.441 GHz 1001 pts 500.0 kHz/ Spa	pan 5.0 MHz
Date: 6.J/94/2020 15:11:41	1511-17
MultiView Spectrum FafLerel 2000 dm Offset 100 db # RBW 2 MHz * Att 30 db \$\$WI 101 ms # VBW 5 MHz MultiView SWI 101 ms # VBW 5 MHz	
I ATC 2006 SW1 101 IIIS V VW SW2 Wood Auto Sweep Country Mode Auto Sweep (0) [1] [1] [1] [2] [2] [2] [2] [2] [2] [2] [2] [2] [2	1Pk View
ນີສະ	990000 GHZ
D dan	
-10 dbg	
-22 dbh	
CH78	
-40 dbn	
50.0km	
40 dbn	
-71 da	
OF 2.48 GHz 1001 pts 500.0 kHz/ Spo	pan 5.0 MHz
GF 2.48 GHz 1001 pts 500.0 kHz/ Spa	
Date: 6.JVNL2020 15:15:10	

Appendix B : 20 dB Bandwidth

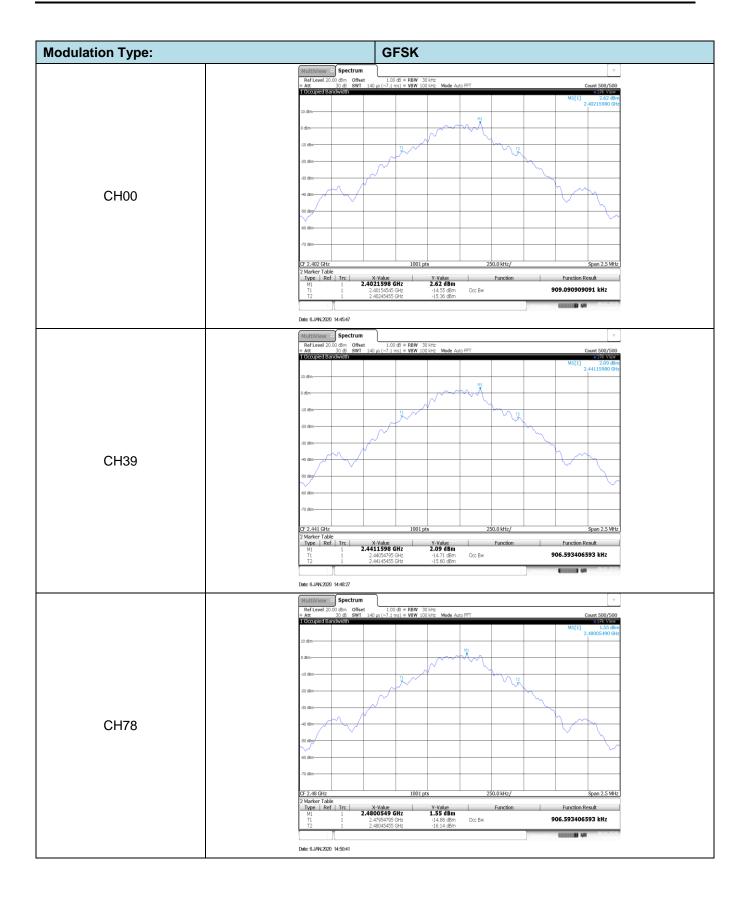
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
	00	930.00		
GFSK	39	927.50	-	Pass
	78	927.50		
	00	1310.00		
π/4DQPSK	39	1320.00	-	Pass
	78	1302.50		
	00	1290.00		
8DPSK	39	1295.00	-	Pass
	78	1292.50		







Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
	00	0.91		
GFSK	39	0.91	-	Pass
	78	0.91		
	00	1.18		
π/4DQPSK	39	1.18	-	Pass
	78	1.18		
	00	1.18		
8DPSK	39	1.18	-	Pass
	78	1.18		



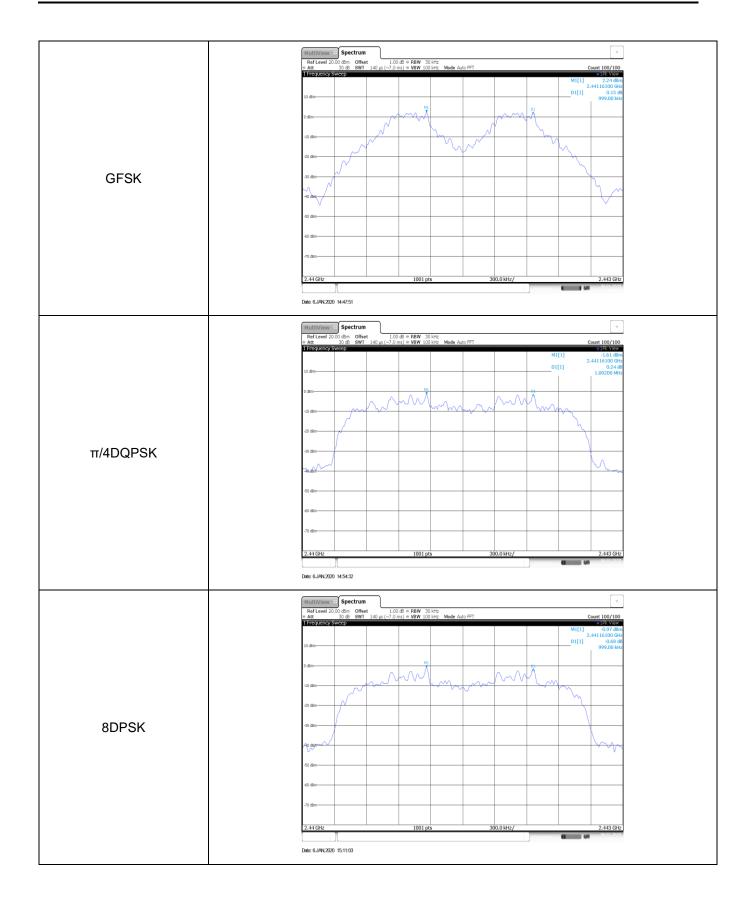
dulation Type:	π/4DQPSK
	MultiView ::: Spectrum
	Ref Level 20:00 dBm Offset 1:00 dB = 0.BW 30:14: = Att 30:dB SWT 1:40 µs (~7.1 ms) = VBW VBW 100 kHz Mode Auto FFT Count 500 1 Occupied BargAWith ■ 1/3 10 10 10 10 10
	M1[1] -0. 2.402012
	10 dan
	-10 d8m
	-20 dbn
	-30 dbn
CH00	
	40 dbm
	40 dkm
	-71 dkn
	CF 2.402 GHz 1001 pts 250.0 kHz/ Span 2.
	2 Marker Table Trype Ref Trc; X-Value Y-Value Function Function Result M1 1 2.4020125 GHz -0.21 dBm
	T1 1 2.4014090 GHz -13.48 dBm Occ Bw 1.176323676 MHz T2 1 2.40259442 GHz -15.75 dBm
	Date: 6.JAN 2020 14:52:28
	MultiView Spectrum RefLevel 20.00 dBm 100 dB = RBW 30 kHz a Att 30 dB a Xt 30 dB
	1 Occupied Bandwidth
	10 dm 4 10 10 10 10 10 10 10 10 10 10 10 10 10
	0.68m
	-10 den
	71 V V V V V V V V V V V V V V V V V V V
	20 da
01100	
CH39	
	-50 d8m-
	40 @m
	-70 dbn
	CF 2.441 GHz 1001 pts 250.0 kHz/ Span 2. 2 Marker Table
	Type Ref Trc X-Value Y-Value Function Function Result M1 1 2.4410125 GHz -2.26 dBm -2.26
	T1 1 2.44040559 GHz -15.74 dBm Occ Bw 1.183816184 MHZ T2 1 2.44158941 GHz -17.11 dBm
	Date: 6.JAN2020 1454:58
	Multiview 🖸 Spectrum
	Ref Level 20.00 dBm Offset 1.00 dB = RBW 30 Hz # Att 30 dB SWT 140 µs (~7.1 ms) = VBW 100 Hz Mode Auto FFT Count 500
	1 Occupied Bandwidth = #19 M1[1] -2-40012
	10 dm
	odan
	-10 d8m
	42 dan
	-32 don
CH78	+ as
51115	40 dm
	40 dan
	-70 dbm
	CF 2.48 GHz 1001 pts 250.0 kHz/ Span 2. 2 Marker Table
	Type Ref Trx X-Value Y-Value Function Function M1 2.4860125 GMz -2.66 dBm Function Function Result T1 1 2.4994090 GHz -16.06 dBm Ouc Bw 1.178821179 MHz T2 1 2.4905091 GHz -17.91 dBm MHz 1.178821179 MHz

dulation Type:	8DPSK
	MultiView 🗄 Spectrum
	Ref Level 20.00 dBm Offset 1.00 dB ⇒ RBW 300 Htz Count 500/500 ⇒ Att 30 dB ≤ WT 140 µs (~7.1 ms) = VBW 100 Htz Count 500/500 T Occurged Bandwidth € BW 100 Htz 6 Hz View
	MI[1] -0.81 GP 2.40215980 GH
	30 dłm
	-13 da-
	-22 dbn
	-30 dbn-
CH00	
Chico	
	48 abr
	70 dan
	CF 2.402 GHz 1001 pts 250.0 kHz/ Span 2.5 MHz 2 Marker Table
	Type Ref Trc X-Value Y-Value Function Function Result M1 1 2.4021598 GHz -0.81 dBm 1.176323676 MHz 1.176323676 MHz T1 1 2.4014190 GHz -16.76 dBm Occ BW 1.176323676 MHz
	ті 1 2.401.41309 GHz - 16.76 dBm Осс. Вик 1.176323676 МНz T2 2.40259941 GHz - 15.09 dBm (1.176323676 МНz)
	Date: 6.JNN.2020 150852
	MultiView :: Spectrum
	Ref Level 20.00 dBm Offset 1.00 dB ≈ RBW 30 kHz a Att 30 dB SWT 1.40 µs (∞2 1 ms) ≈ MBW Mode duto FFT Count 500/500
	1 Occupied Bandwidth eithy literation of the second s
	10 dtm
	0 d8m
	18 da
	-20 das-
	30 dan
01100	
CH39	Been for the second sec
	40 dm-
	40 dbn
	-70 dbm
	CF 2.441 GHz 1001 pts 250.0 kHz/ Span 2.5 MHz
	2 Marker Table Y-Value Function Function Result Type Ref Trc X-Value Y-Value Function Result M1 1 2.4411598 GHz -2.62 dBm
	T1 1 2.44040809 GHz -18.11 dBm Occ Bw 1.183816184 MHz T2 1 2.44159191 GHz -15.71 dBm
	Manarden (11111) 4/1 02 01 2023
	Deter 6.JAN 2020 15:11:32
	Ref Level 2000 GMm Style 1.00 dB + RBW 30 Hrz Count 500/500 # Att 30 dB - SWT 140 µz (~2.1 ms) = VBW 100 Hrz Count 500/500
	1 Occupied Bandwidth
	10 dm
	n dim
	27 den
	-30 dbn
CH78	
CH78	50 dbm
CH78	
CH78	50 dm
CH78	40 dbn
CH78	60 dbn 60 dbn 70 dbn GT 2.48 GHz 1001 pts 250.0 kHz/ Span 2.5 MHz 2 Merker Table
CH78	60 66m- 40 66m- 71 66m- 73 66m- 75 2.48 GHz 1001 pts 250.0 HHz/ Span 2.5 MHz

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥930.00	Pass
π/4DQPSK	39	1.00	≥880.00	Pass
8DPSK	39	1.00	≥863.33	Pass

Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the appendix B. $\pi/4DQPSK$ limit = 2/3 * The maximum 20 dB Bandwidth for $\pi/4DQPSK$ modulation on the appendix B. 8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B



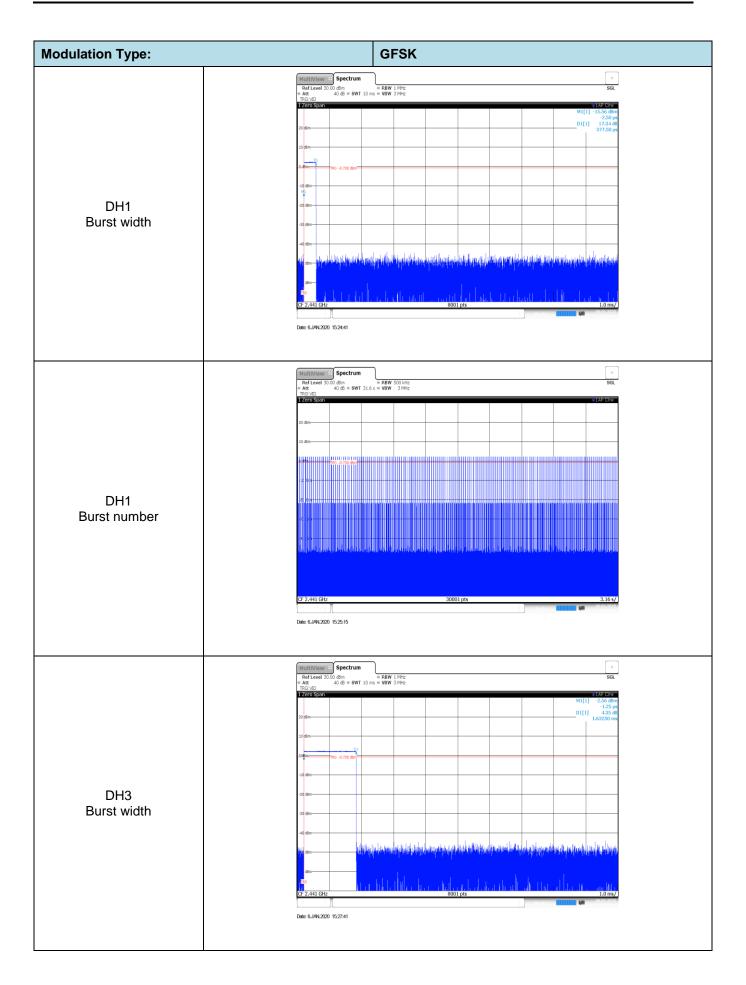
Appendix E: Hopping Channel Number

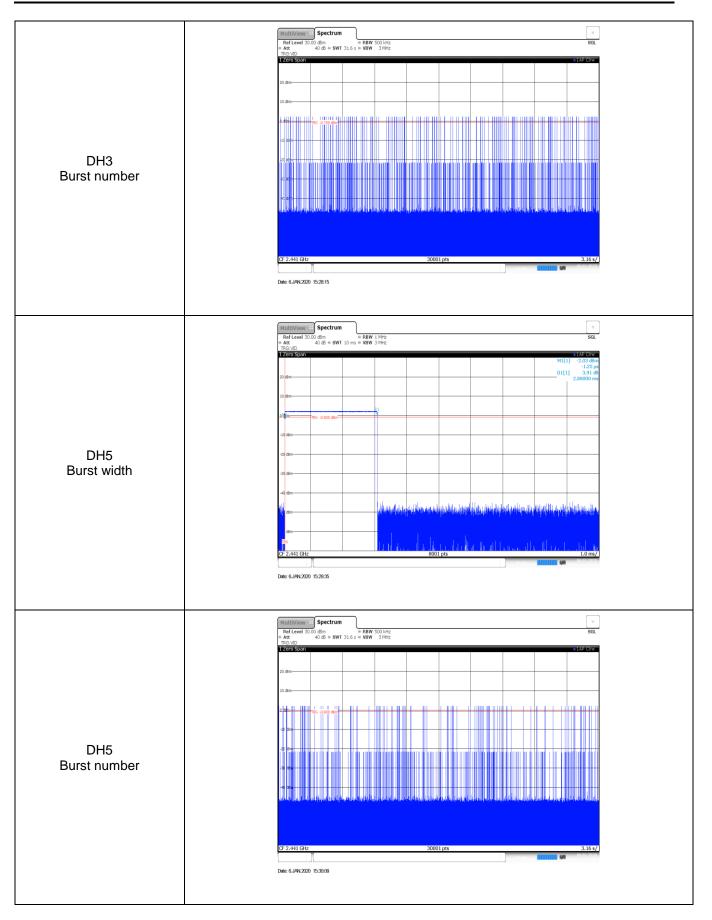
Modulation type	Channel number	Limit	Result
GFSK	79		
π/4DQPSK	79	≥15.00	Pass
8DPSK	79		

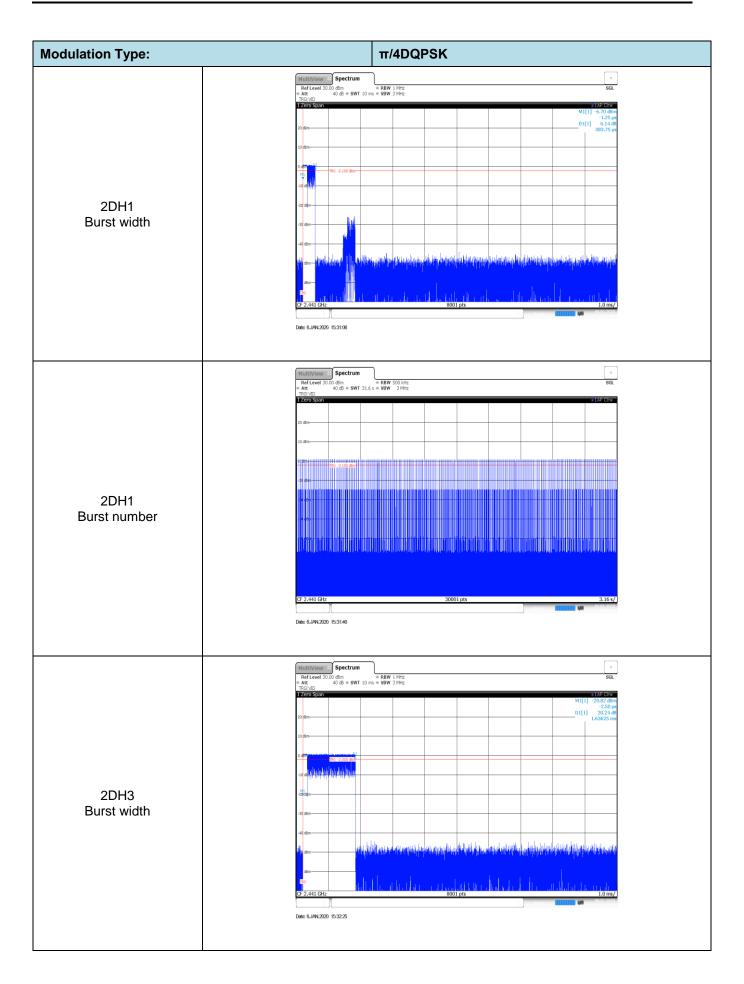
	MultiView ID Spectrum RefLevel 2000 dbm Offset 1.00 db = RBW 100 kHz
	Ref Level 200 dbm Offset 1.00 db = RBW 100 Hz # Att 30 db SWT 1.02 ms = VBW 300 Hz Mode Auto Sweep I Frequency Sweep
	2) dam-
GFSK	-00 dbm
	43 dan
	2.4 GHz 1001 pts 8.35 MHz/ 2.4835 GHz Deter 6.4/N2020 15:18:35
	MultiView Spectrum v Ref Level 200 dbm Offset 1.00 db = RBW 100 HHz + Att 30 db = SWT 1.02 ms = VBW 300 HHz + Att + Att<
π/4DQPSK	20 an 0 any 10 Million Mi Million Million Mi
	40 dan
	-70 80- 2.4 GHz 1001 pts 8.35 MHz/ 2.4835 GHz Dete: 6.3442200 1521:27
	MultiView E Spectrum v RefLevel 2000 dbm Offset 1.00 db = RBW 100 kHz mode Auto Sweep # 120 View = Att 30 db SWT 1.02 ms = VBW 300 kHz Mode Auto Sweep # 120 View
8DPSK	2) dan
	°MMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUMUM
	40 480-
	43 dan
	2.4 GHz 2.4855 GHz 2.48555 GHz 2.48555 GHz 2.48555 GHz 2.48555 GHz 2.48555 GHz 2.485555 GHz 2.485555 GHz 2.485555 GHz 2.485555 GHz 2.4855555 GHz 2.48555555555 GHz 2.48555555555555555555555555555555555555

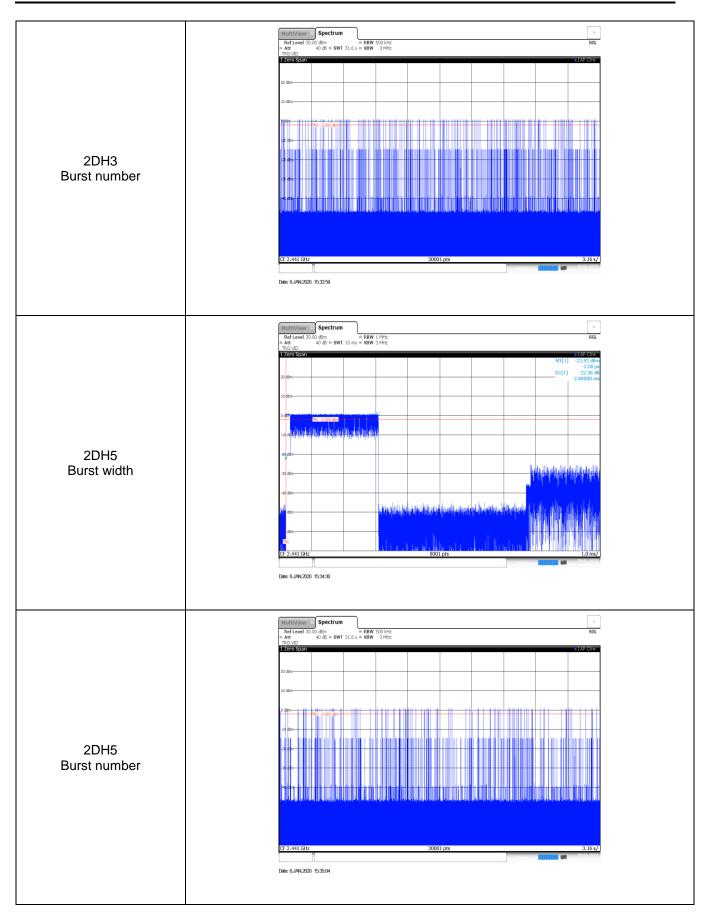
Appendix F: Dwell Time

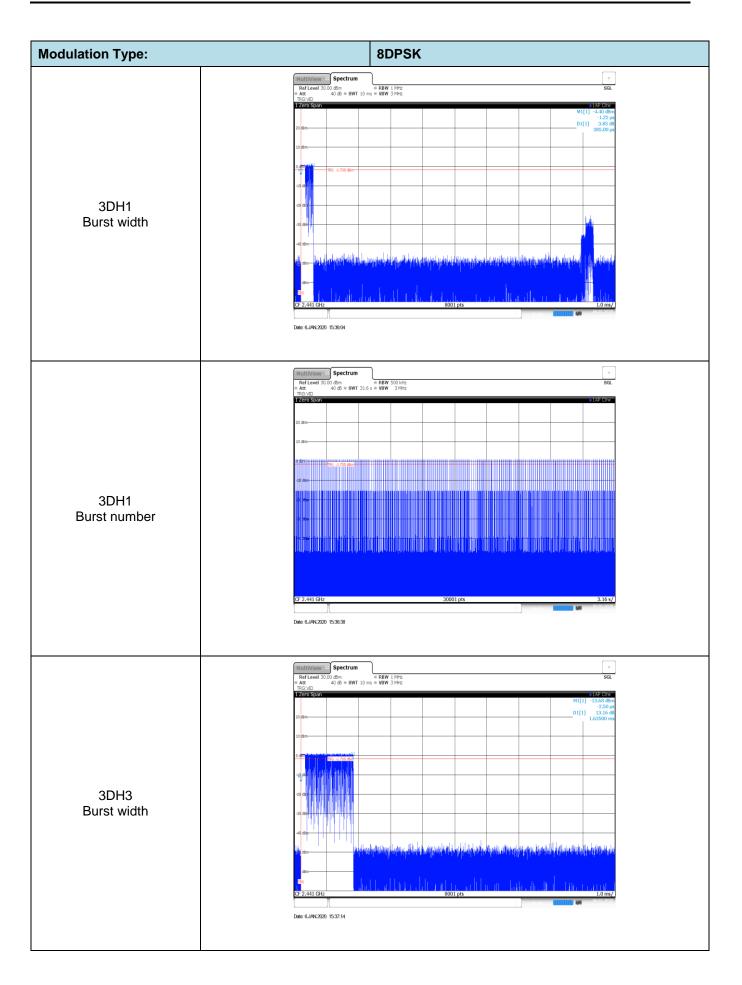
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
	DH1	0.38	314	0.12		Pass
GFSK	DH3	1.63	167	0.27	≤ 0.40	
	DH5	2.88	108	0.31		
	2DH1	0.38	314	0.12		
π/4DQPSK	π/4DQPSK2DH32DH5	1.64	158	0.26	≤ 0.40	Pass
		2.89	106	0.31		
	3DH1	0.38	313	0.12		
8DPSK	3DH3	1.64	159	0.26	≤ 0.40	Pass
	3DH5	2.89	105	0.30		

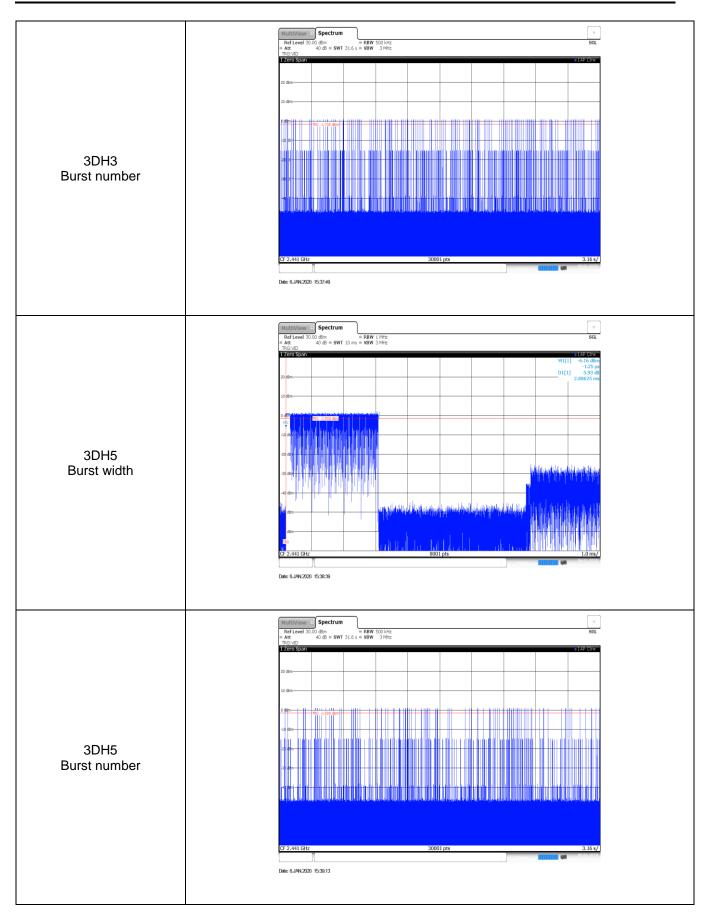






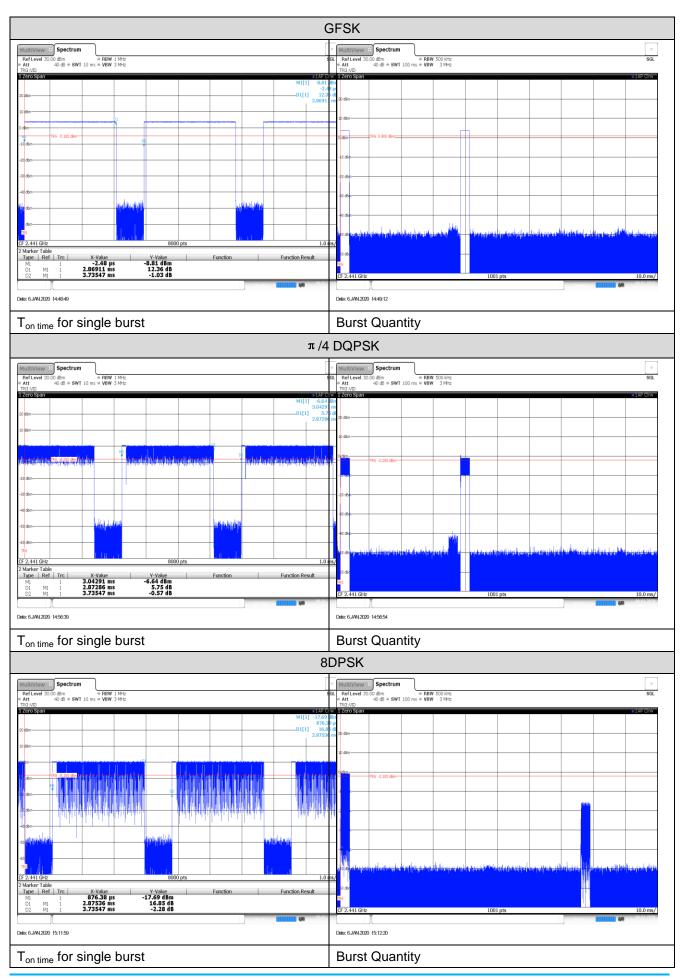






Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculat	e Formula				
DCCF=20 * Lo	g(duty cycle) =	20 * Log(T _{on time} / T _{period})		
Modulation type	Test Frequency (MHz)	T _{on time} for single burst [ms]	T _{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.87	100	2	-24.82
π /4 DQPSK	2441	2.87	100	2	-24.82
8DPSK	2441	2.88	100	2	-24.79



Shenzhen Huatongwei International Inspection Co., Ltd.

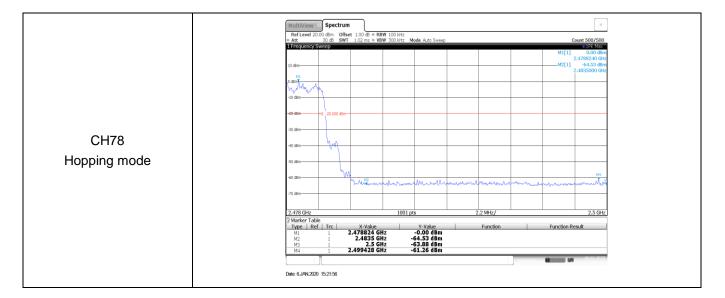
Appendix report page: 26 of 41

fest Item:	Band edge	N	lodulatio	n type:		GFS	K				
		RefLevel 20.00 dBm Offset 1.00 dB ⊕ RBW 100 kHz									
CH00 No hopping mode	1 Frequency 500 1 Frequency 500 30 dam	500 300 1.05 ms =		weep		M1[1 M2[1	 14k Max 5.03 dBm 2.4021050 GHz 				
	-10 dbm	-14.970 dBm									
	40 din						m who				
	2.31 GHz Z.Marker Table Type: Ref	Trc X-Value	1001 pts	9	5 MHz/	Function	2.405 GHz				
	M1 M2 M3 M4 M5	1 2.402105 1 2.4 1 2.39 1 2.31 1 2.399965	GHz 5.03 d GHz 5.03 d GHz -51.80 d GHz -62.68 d GHz -63.76 d GHz -51.76 d	BM							
		Spectrum									
	Ref Level 20.00 # Att T Frequency System 20 dam	dBm Offset 1.00 dB ⊕ 0 dB SWT 1.05 ms ⊕ 20	RBW 100 kHz VBW 300 kHz Mode Auto 5	Sweep		M1[1 M2[1	2.4038140 GHz				
	0 dim	-17.540 dBm									
CH00	-30 d8m										
Hopping mode	40 dim. Di varia dim 70 dim-	and the second second		andthaldenned	nan an	MS malflemailener han the starts (MA					
	2.31 GHz 2 Marker Table Type _ Ref M1 M2 M3 M4 M5	Irc X-Value 1 2.403814 1 2.41 1 2.39 1 2.31 1 2.399965	1001 pts Y-Valu GHz 2.46 d GHz -57.78 d GHz -64.08 d GHz -65.00 d GHz -58.45 d	Bm Bm Bm Bm Bm	5 MHz/ Function	Function					
	Date:: 6.JANL2020 15					loasodae	06.01.2020				
	MultiView 13 Ref Level 20.00 = Att 33 T Frequency Swe	dBm Offset 1.00 dB = 0 dB SWI 1.02 ms =	RBW 100 kHz VBW 300 kHz Mode Auto S	Sweep							
	10 dim M 0 dim					M1[1 M2[1] 4.23 dBm 2.4801430 GHz] -61.31 dBm 2.4835000 GHz				
CH78 No hopping mode	-20 dBm	-15.770 dBm									
	46 dah	N. M. Market									
			1001 pts		2 MHz/	mand	2.5 GHz				
	2 Market adverter 1 <u>Type</u> Ref 1 M1 M2 M3 M4	X-Value 1 2.480143 1 2.4835 1 2.4835 1 2.5 1 2.483984	GHz 4.23 d GHz -61.31 d GHz -63.51 d GHz -58.90 d	e Bm Bm Bm Bm	Function	Function					
	Detie: 6.JAN 2020 14						05.01.2020				

Appendix H: Band edge and Spurious Emissions (conducted)

	MultiView Spectrum T Ref Level 200 dbm Offset 1.00 db = RBW 100 HHz Count 500/500 * Att 30 db SWT 1.02 ms = VBW 300 HHz Count 500/500 Terceurony Sweep * 102 ms = VBW 300 HHz Mode Auto Sweep * 102 Ms =
	10 dam 1.00 dam 2.00030 GH 2.00030 GH 10 dam 2.4835000 GH 10 dam 2.4835000 GH
	-12 dm - H1 -13 500 dm
CH78 Hopping mode	
	42 .85
	2.478 GHz 1001 pts 2.2 MHz/ 2.5 GHz
	Type Ref Trc X-Value Y-Value Function Function Result M1 1 2.4603 GHz 1.40 48m Hermitian Hermitian<
	Date: 6./WL2020 15:20:04

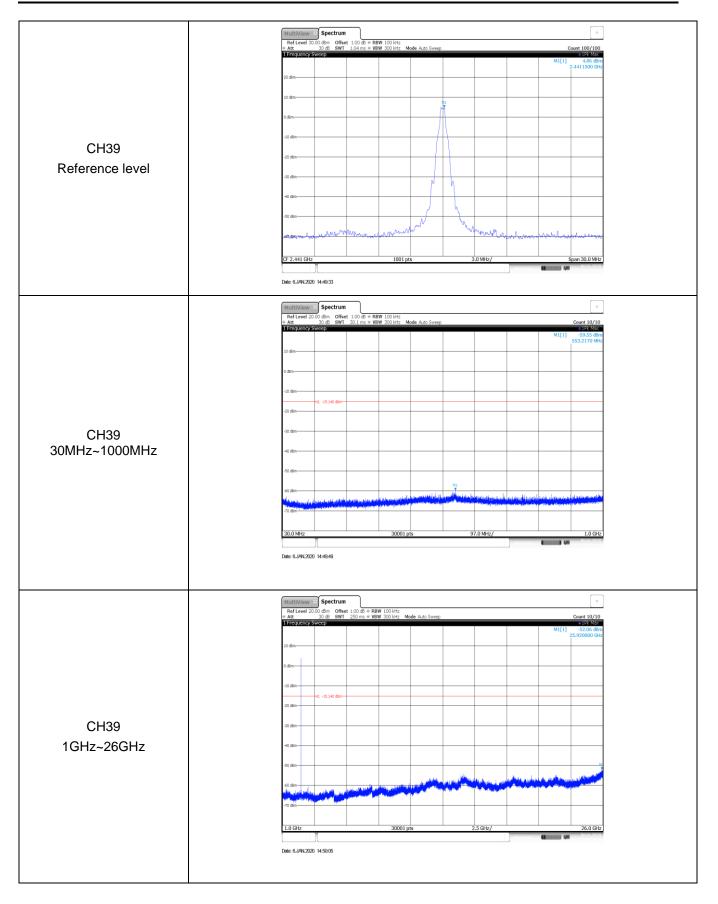
st Item:	Band edge		Modula	ation typ	e:	π/4DQPS					
		MultiView E Spectrum									
		RafLevel 20.00 dbm Offset 1.00 db ⊕ RBW 100 kHz Count 500/500 # Att 30 db SWI 1.05 ms ♥ VBW 300 kHz Mode Auto Sweep Count 500/500 1 Frequency Sweep ● 10% More ● 10% More									
CH00		10 dBm				M1[1] 3.43 d 2.4018210 d M2[1] -53.02 d					
		0 dam-				M2[1] -53.02 d 2.400000					
		-10 dBm-									
		-20 dBm									
		-30 dBm									
		-40 d8m									
No hopping mode		, 60 dBm	and the second second	and and the second states and	a same programmer and a dama from the set	and the second second					
		-70 dBm		Landrese Danse (1984 and 1994							
		2.31 GHz 2 Marker Table	1001	pts	9.5 MHz/	2.405 G					
		Type Ref Trc M1 1 2.4	X-Value 401821 GHz	Y-Value 3.43 dBm	Function	Function Result					
		M2 1 M3 1 M4 1 M5 1 2.	X-Value 401821 GHz 2.4 GHz 2.39 GHz 2.31 GHz 399775 GHz	Y-Value 3.43 dBm -53.02 dBm -63.13 dBm -63.73 dBm -52.94 dBm							
		M5 1 2.	399775 GHZ	-52.94 abiii		tescertes (111111) (A 05.01.2)					
		Date: 6.JAN.2020 14:52:49									
		MultiView :: Spectrum	1.00 /B = PRW 100 kH+								
		Ref Level 20.00 dBm Offset Att 30 dB SWT I Frequency Sweep	1.05 ms = VBW 300 kHz	Mode Auto Sweep		Count 500/5 19k M M1[1] 1.07 d					
		10 dBm				2.4018210 M2[1] -57.43 d					
		0 d8m				2,4000000					
		-10 dBm									
		-20 dBm H1 -18.930 dBm									
CH00		-30 d8m				N					
Hopping mode		-50 d8m									
		60 dBm	- marine and a star and a star for a star	manun temperature	when when more a	menumenter Musich about					
		-70 d8m									
		2.31 GHz 2 Marker Table	1001		9.5 MHz/	2.405 0					
		Type Ref Trc M1 1 2.4 M2 1	X-Value 401821 GHz 2.4 GHz	Y-Value 1.07 dBm -57.43 dBm	Function	Function Result					
		M3 1 M4 1 M5 1 2	X-Value 401821 GHz 2.4 GHz 2.39 GHz 2.31 GHz .39968 GHz	Y-Value 1.07 dBm -57.43 dBm -63.82 dBm -63.77 dBm -56.64 dBm							
		Date: 6.JAN.2020 15:21:41				(() () () () () () () () () () () () ()					
		MultiView Ref Level 20.00 dBm Offset Att 30 dB SWT	1.00 dB = RBW 100 kHz 1.02 ms = VBW 300 kHz	Mode Auto Sweep		Count 500/5					
		1 Frequency Sweep				• 19k M M1[1] 0.86 d 2.4798350 (
		10 d8m				M2[1] -61.11 d 2.4835000					
		0 dBm									
		-10 d8m									
		-20 d8m									
CH78		-# den									
No hopping mode		-50 d8m									
-		-60 d8m	M2	mann	Mt	monound					
		-70 d8m-									
		2.478 GHz 2 Marker Table	1001	pts	2.2 MHz/	2.5 G					
		Type Ref Trc M1 1 2.4 M2 1	X-Value 479835 GHz 2.4835 GHz 2.5 GHz 490738 GHz	Y-Value 0.86 dBm -61.11 dBm	Function	Function Result					
		M3 1 M4 1 2.4	2.5 GHz 190738 GHz	-64.18 dBm -59.32 dBm							
	1					lessuries (((1111)) //A 05.01.2					

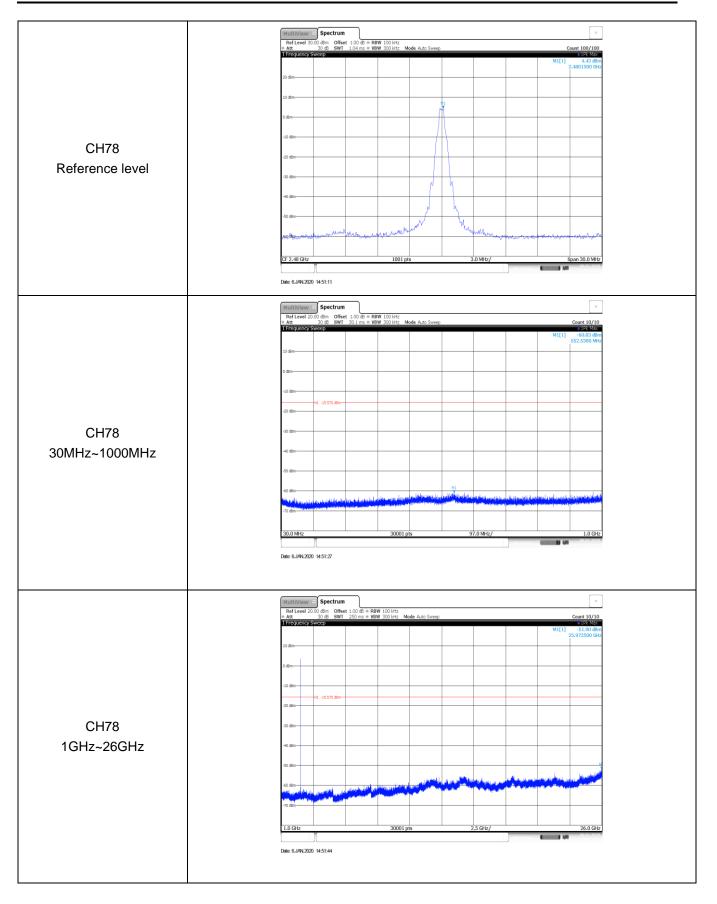


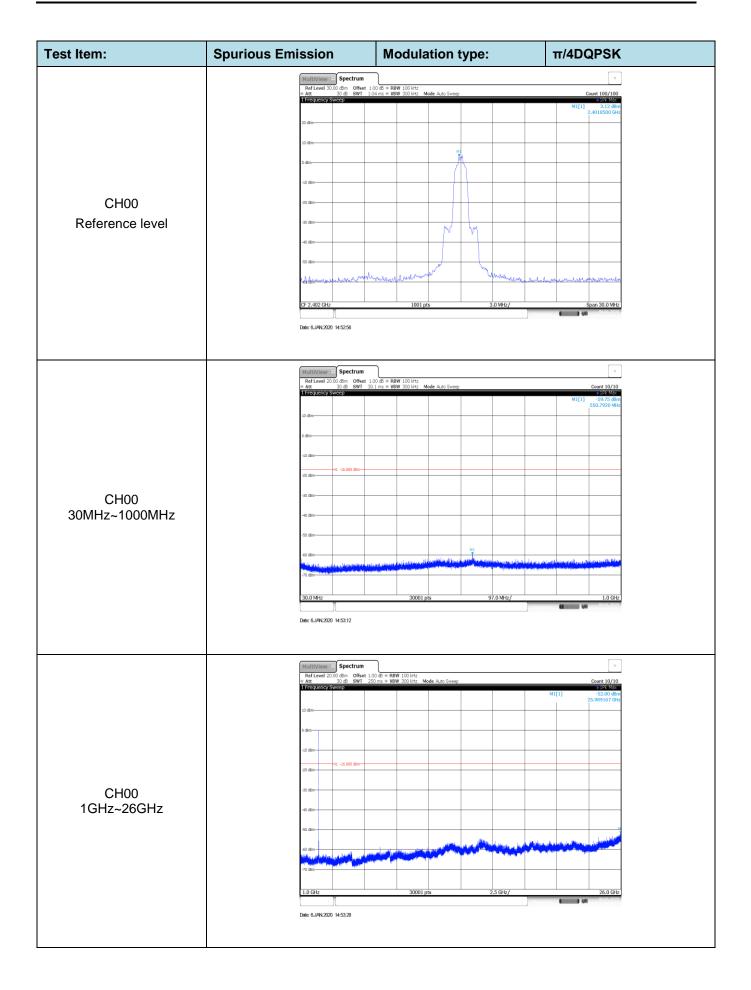
est Item:	Band edge		Modu	lation t	уре:		8DPS	SK			
		MultiView Spectrum									
		Ref Level 20.00 dBm Offset 1.00 dB + RBW 100 kHz Count 500/500 # Att 30 dB SWT 1.05 ms + VBW 300 kHz Count 500/500 1 Frequency Sweep 6 kH M3 6 kH M3									
		10 d8m					M2[1]	2.4021050 GHz			
		0 dBm						T A			
CH00		-10 dBm -20 dBm H1 -18.300 dBm									
		-30 dBm									
		-40 d8m									
No hopping mode		-50 dBm-					M2				
			where the second	ndermanneration	My Medican	mannative	yer marken the	award			
		2.31 GHz	100	1 pts	9.5 MHz	/		2.405 GHz			
		2 Marker Table Type Ref Trc M1 1 2.44 M2 1	X-Value 02105 GHz 2-4 GHz	Y-Value 1.75 dBm -55.24 dBm	Funct	ion	Function	Result			
		M3 1 M4 1 M5 1 2.3	X-Value 02105 GHz 2.4 GHz 2.39 GHz 2.31 GHz 99965 GHz	Y-Value 1.75 dBm -55.24 dBm -62.76 dBm -63.26 dBm -54.60 dBm							
		Date: 6.JAN2020 15:09:33				Measurin	6 10000 4	06.01.2020			
		MultiView Spectrum									
		Ref Level 20.00 dBm Offset 1 Att 30 dB SWT 1. I Frequency Sweep	.00 dB = RBW 100 kHz 05 ms = VBW 300 kHz	Mode Auto Sweep				Count 500/500			
		10 d8m					M1[1] M2[1]	0.42 dBm 2.4021050 GHz -57.40 dBm			
		0 d8m-						2.4000000 GHz			
		-10 dBm-									
		-20 dBm +11 -19.580 dBm									
CH00		-40 d8m						N			
Hopping mode		-50 d8m						Ng.			
		60 dBm		al non have now the	والعرائد تلواليونين والمنام	alighter affection of	M3 generalitetinet	mand			
		2.31 GHz	100	1 pts	9.5 MHz	/		2.405 GHz			
		2 Marker Table			Funct		Function				
		M2 1 M3 1 M4 1 M5 1 2.3	X-Value 02105 GHz 2.4 GHz 2.39 GHz 2.31 GHz 99965 GHz	V-Value 0.42 dBm -57.40 dBm -62.51 dBm -64.02 dBm -57.79 dBm							
		M5 1 2.3	99965 GHZ	-57.79 dbiii		Measurin	(IIIII) 4	05.01.2020			
		MultiView Spectrum Ref Level 20.00 dBm Offset 1 Att 30 dB SWT 1.	.00 dB ⊕ RBW 100 kHz 02 ms ⊕ VBW 300 kHz	Mode Auto Sweep				Count 500/500			
		1 Frequency Sweep					M1[1] M2[1]	 19k Max 0.65 dBm 2.4801430 GHz -60.16 dBm 			
		D dam						2.4835000 GHz			
		-10 dBm				_					
CH78		+20 dBm H1 -19.350 dBm									
		-30 d8m									
No hopping mode		-48 dBm-									
		-60 dBm	M2014 Withmahan	mount	wanner	and the second second second second	unum.	remand			
		-70 d8m-									
		2.478 GHz 2 Marker Table		1 pts	2.2 MHz			2.5 GHz			
		Type Ref Trc M1 1 2.44 M2 1 2 M2 1 2	X-Value 80143 GHz 2.4835 GHz 2.5 GHz 83808 GHz	Y-Value 0.65 dBm -60.16 dBm -62.76 dBm	Funct	ion	Function	Result			
		M3 1 M4 1 2.4	2.5 GHZ 83808 GHz	-62.76 dBm -59.98 dBm		Measurin	6 111110 4	06.01.2020			
		Date: 6.JAN.2020 15:15:24									

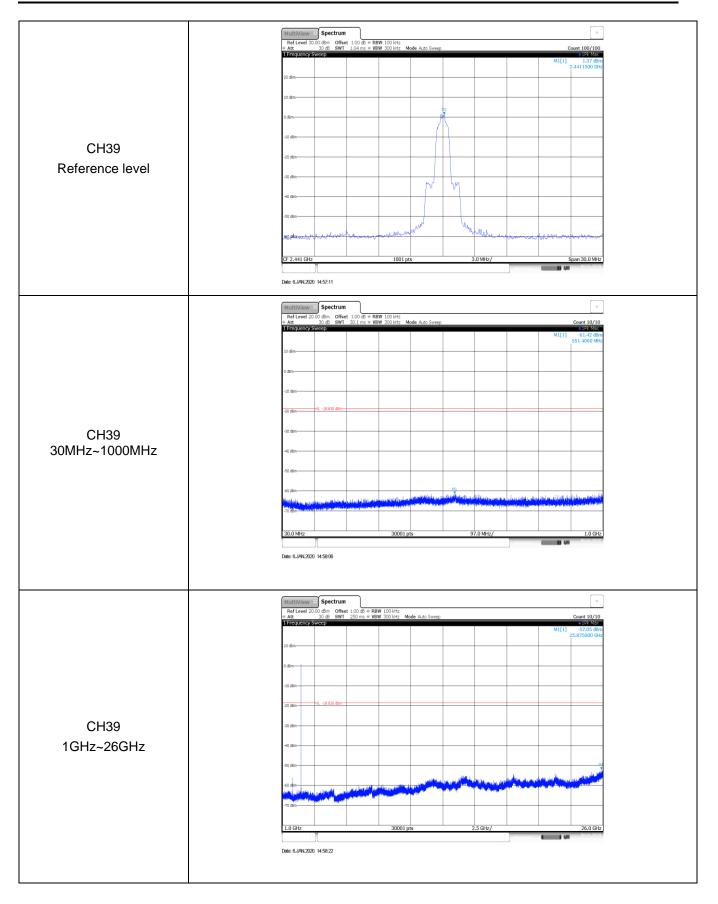
	Att 30 dB S	rum Dffset 1.00 dB ≅ RBW 100 kHz WT 1.02 ms ≡ VBW 300 kHz Me	ode Auto Sweep		v Count 500/500
CH78	1 Frequency Sweep 10 dim 10 dim 11 dim 12 dim 12 dim 13 dim 14 dim 15 dim 15 dim 15 dim 15 dim 16				(1)(4)(3)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)(4)
CH78 Hoppig mode	-50 dbm	M	Mar Mary Mary Mary Mary	mminuter and a second	hadhadh harrachar ann ha
	2.478 GHz 2 Marker Table Type Ref Trc Mi 1	1001 pt X-Vakue 2.479989 GHz	Y-Value	2 MHz/ Function	2.5 GHz Function Result
	M2 1 M3 1 M4 1 Dete: 6J/41200 152347	2.5 GHz -	53.45 dBm 54.00 dBm 51.95 dBm		

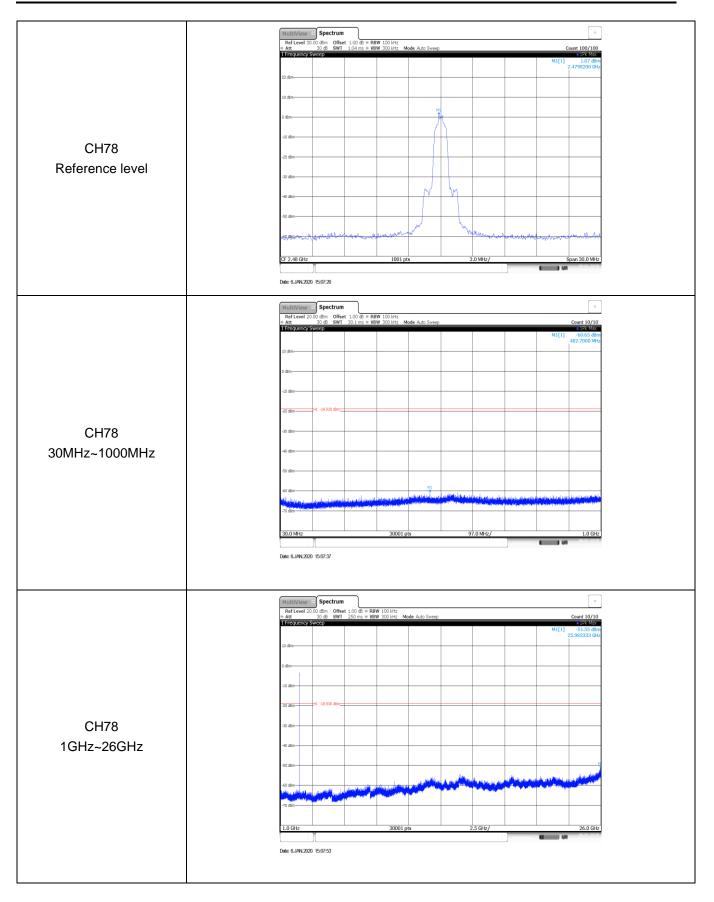
Test Item:	Spurious Emis	purious Emission Modulation type:								GFSK		
	MultiView Spectrum RefLevel 30:00 dm Offset 10:06 = RBW 100 Htz + Att 30:d5 • Att 30:d5 • Offset 10:4 min = VBW 300 Htz											
		Ref Level 30 Att Trequency 5	0.00 dBm Offse 30 dB SWT SWREP	t 1.00 dB ⊕ RB 1.04 ms ⊕ VB	8W 100 kHz 8W 300 kHz Me	ode Auto Sweep		1			Count 100/100 1Pk Max	
01100	20	d8m								M1[1]	5.13 dBn 2.4021500 GH	
		dam										
		18m					1911 1					
) d8m										
) dBm										
CH00 Reference level) d8m										
Reference level) dBm				N	h					
) d8m					h					
		Bengelsune	mand work	mahan	unum	mort	My	hundre	mandon	newman	unuro	
	CT CT	2.402 GHz	J		1001 pt	S		3.0 MHz/	Newseries, a	G	Span 30.0 MHz	
	Dati	e: 6.JAN.202	0 14:46:17									
		undado alla	ener								v	
	5 - /	ultiView Ref Level 20 Att	0.00 dBm Offse 30 dB SWT		8W 100 kHz 8W 300 kHz M	ode Auto Sweep					Count 10/10	
		requency	sweep							M1[1]	 19k Max -60.42 dBn 550.6300 MH 	
	10	d8m										
	Dd	iam										
	-10) dBm	H1 -14.870 dBm									
	-20) d8m										
CH00	-30) dBm										
30MHz~1000MHz	-40	0 d8m										
	-50) dBm										
	-60 [) dBm	in manipulation	mash.contile	Later in the second	dare la chilasia	161 A stable of the	Maanaa ka ku ka	an a	a and that the state of the	l matteria	
	-70	dBm	and the second second	hayy posterini bayi	and an order							
	30	0.0 MHz	1		30001 p	ts	g	97.0 MHz/	Measuring	(IIIII) (4	1.0 GH	
	Defi	e: 6.JAN.202	0 14:46:33									
			Spectrum		M 102 bit						Ψ	
	- /	Ref Level 20 Att Trequency 1	0.00 dBm Offse 30 dB SWT Sweep	1.00 dB ⊕ RB 250 ms ⊕ VB	wr 100 kHz Wr 300 kHz Mo	ode Auto Sweep				MILLI	Count 10/10 19k Max -51.44 dBr	
	10	d8m								[1]	-51.44 dBr 25.989167 GH	
		i8m										
) dBm										
	-) d8m	H1 -14.870 dBm									
CH00) d8m										
1GHz~26GHz) d8m										
) dBm										
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	.		and and and									
	-70											
		0 GHz			30001 pt			2.5 GHz/			26.0 GH	

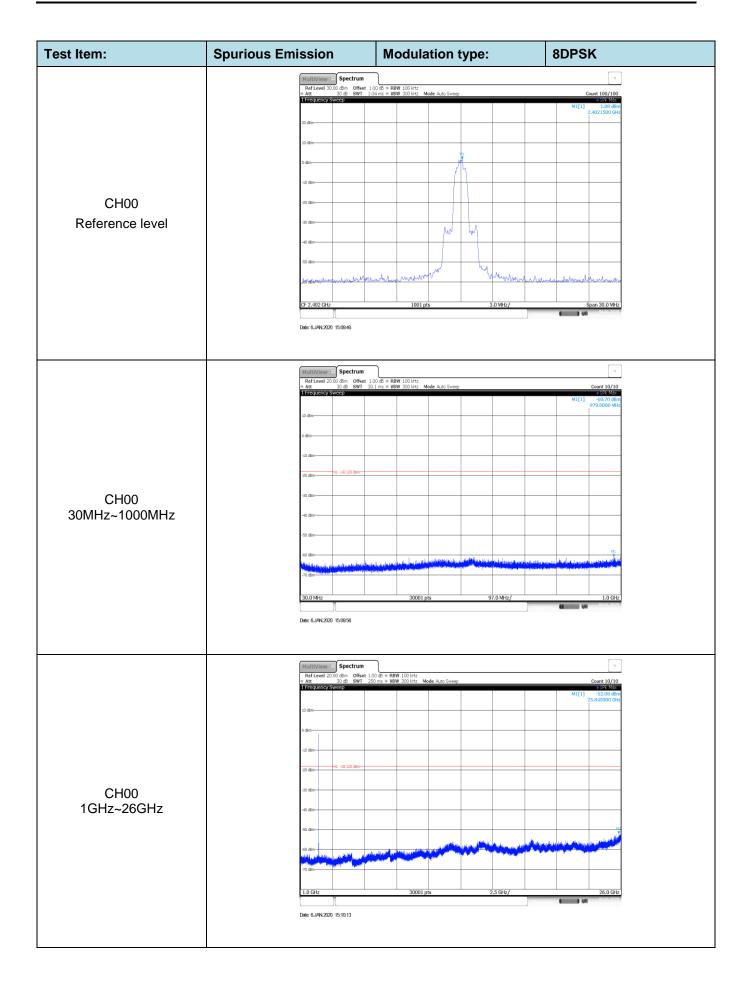


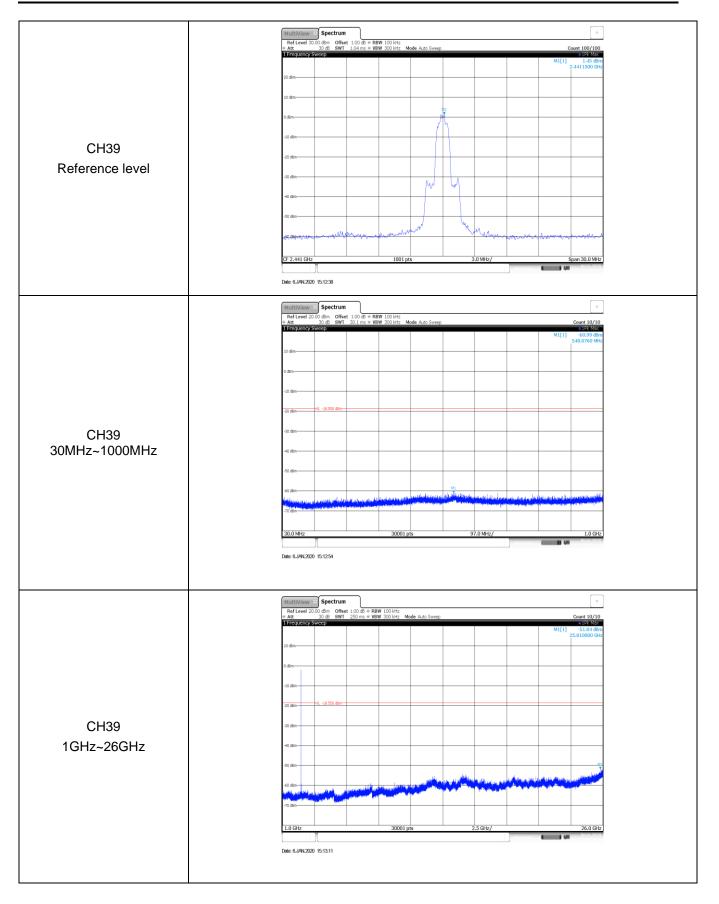


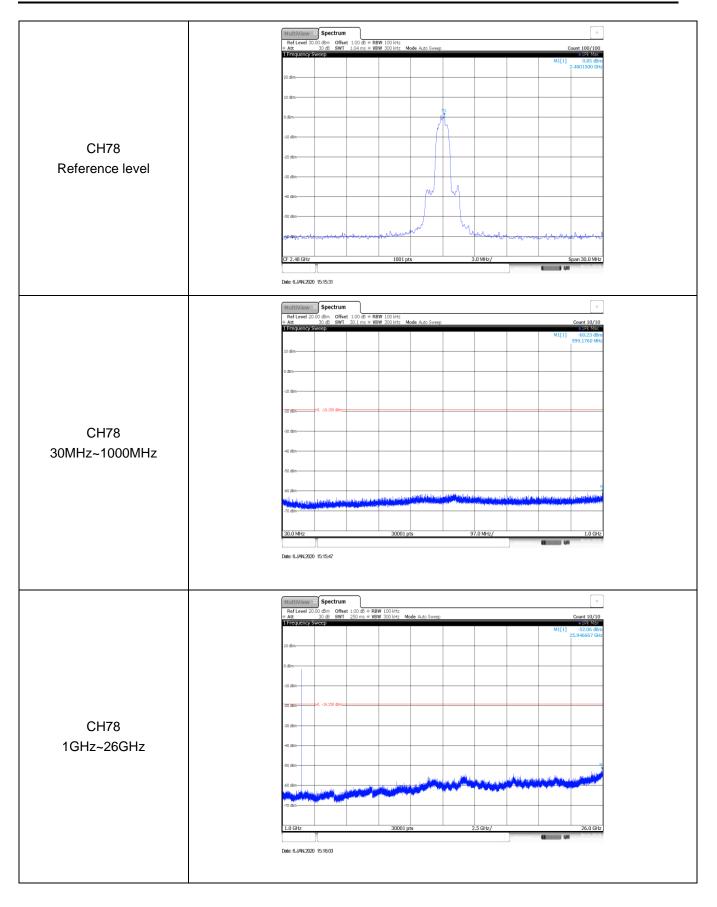












-----End of Report------