

TEST REPORT

Product : Mobile Data Terminal
Trade mark : 
Model/Type reference : Hero-MDT-AT2, Hero-MDT-AT1,
Hero-MDT-WT1, Hero-MDT-WT2,
Hero-MDT Series
Serial Number : N/A
Report Number : EED32H00105101
FCC ID : 2AGBD-HERO-MDT
Date of Issue : Oct. 22, 2015
Test Standards : 47 CFR Part 15 Subpart C (2014)
Test result : PASS

Prepared for:

Howen Technologies Co., Ltd.

**No. 201, 2/F, B Zone, Hivac Building, Langshan 2nd Rd., North Zone of
Technology Park, Nanshan, Shenzhen, Guangdong, China**

Prepared by:

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Date:

Oct. 22, 2015

Check No.:2211408689

2 Version

Version No.	Date	Description
00	Oct. 22, 2015	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10-2013	N/A
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10-2013	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Carrier Frequencies Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Hopping Channel Number	47 CFR Part 15, Subpart C Section 15.247 (b)	ANSI C63.10-2013	PASS
Dwell Time	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Pseudorandom Frequency Hopping Sequence	47 CFR Part 15, Subpart C Section 15.247(b)(4)&TCB Exclusion List (7 July 2002)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Model No.: Hero-MDT-AT2, Hero-MDT-AT1, Hero-MDT-WT1, Hero-MDT-WT2, Hero-MDT Series

Only the model Hero-MDT-AT2 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being model name.

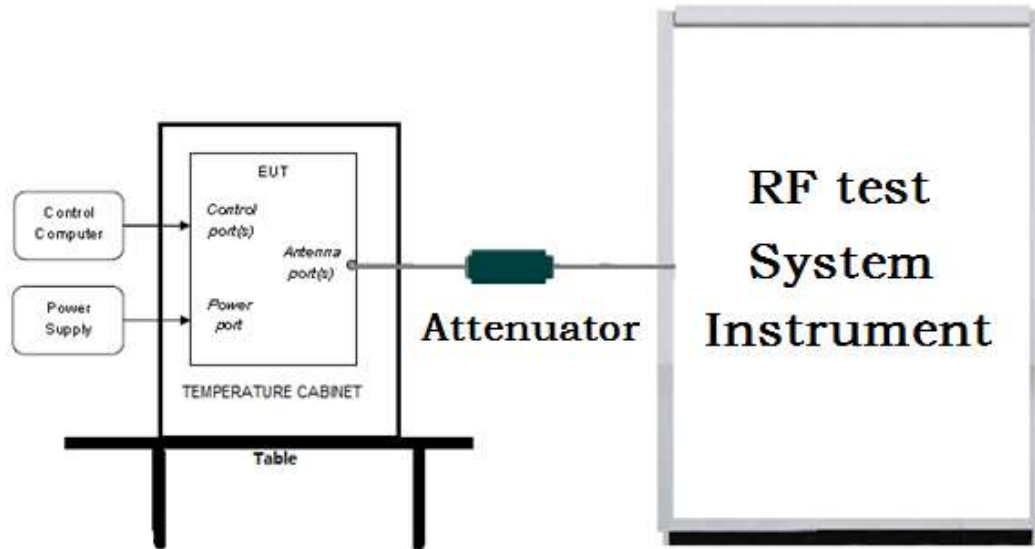
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

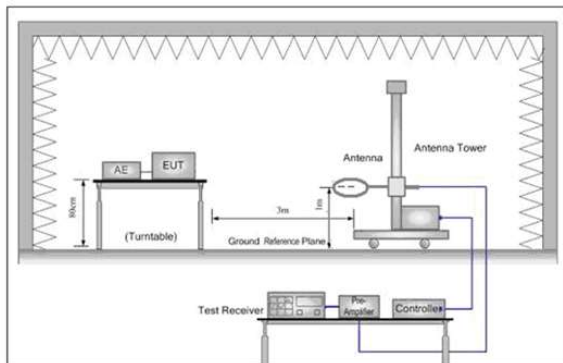


Figure 1. Below 30MHz

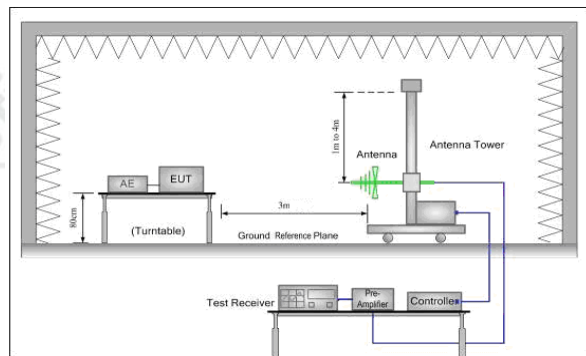


Figure 2. 30MHz to 1GHz

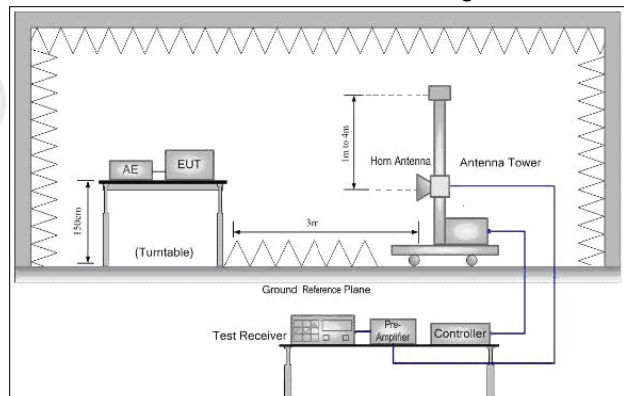
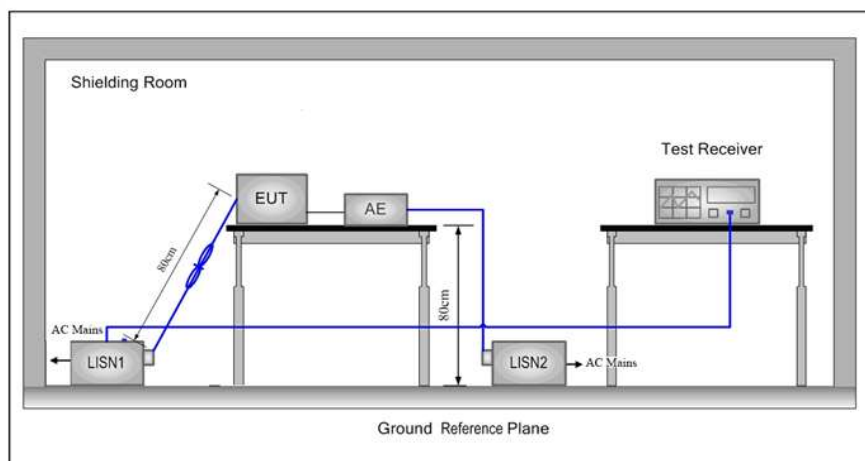


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:

Temperature:	25°C
Humidity:	53 % RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK/ π /4DQPSK/ 8DPSK(DH1,DH3,DH5)	2402MHz ~2480 MHz	Channel 1	Channel 40	Channel79
		2402MHz	2441MHz	2480MHz

6 General Information

6.1 Client Information

Applicant:	Howen Technologies Co., Ltd.
Address of Applicant:	No. 201, 2/F, B Zone, Hivac Building, Langshan 2nd Rd., North Zone of Technology Park, Nanshan, Shenzhen, Guangdong, China
Manufacturer:	Howen Technologies Co., Ltd.
Address of Manufacturer:	No. 201, 2/F, B Zone, Hivac Building, Langshan 2nd Rd., North Zone of Technology Park, Nanshan, Shenzhen, Guangdong, China
Factory:	Howen Technologies Co., Ltd.
Address of Factory:	No. 201, 2/F, B Zone, Hivac Building, Langshan 2nd Rd., North Zone of Technology Park, Nanshan, Shenzhen, Guangdong, China

6.2 General Description of EUT

Product Name:	Mobile Data Terminal
Model No.:	Hero-MDT-AT2, Hero-MDT-AT1, Hero-MDT-WT1, Hero-MDT-WT2, Hero-MDT Series
Test Model No.:	Hero-MDT-AT2
Tark mark:	
EUT Supports Radios application	Bluetooth V3.0
Power Supply:	DC 12V
Sample Received Date:	Aug. 04, 2015
Sample tested Date:	Aug. 04, 2015 to Oct. 22, 2015

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz						
Bluetooth Version:	3.0						
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK						
Number of Channel:	79						
Sample Type:	Fixed production						
Antenna Type:	Integral						
Antenna Gain:	0dBi						
Test Voltage:	DC 12V						
Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz

8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

6.4 Description of Support Units

The EUT has been tested independently.

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China518101

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

6.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1910

Centre Testing International Group Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories..

A2LA-Lab Cert. No. 3061.01

Centre Testing International Group 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.: 565659

Centre Testing International Group 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. Registration 565659.

IC-Registration No.: 7408A

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A .

IC-Registration No.: 7408B

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B.

NEMKO-Aut. No.: ELA503

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The Radiation 3 &10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563. Telecommunication Ports Conducted Disturbance Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

6.7 Deviation from Standards

None.

6.8 Abnormalities from Standard Conditions

None.

6.9 Other Information Requested by the Customer

None.

6.10 Measurement Uncertainty(95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB(1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB(1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

7 Equipment List

RF test system					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Signal Generator	Keysight	E8257D	MY53401106	04-14-2015	04-13-2016
Communication test set test set	Agilent	N4010A	MY47230124	04-02-2015	04-01-2016
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2015	03-31-2016
Attenuator	HuaXiang	SHX370	15040701	04-01-2015	03-31-2016
Signal Generator	Keysight	N5182B	MY53051549	03-31-2015	03-30-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter (GSM900)	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-13-2015	01-12-2016
band rejection filter (GSM850)	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-13-2015	01-12-2016
band rejection filter (GSM1800)	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-13-2015	01-12-2016
band rejection filter (GSM1900)	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-13-2015	01-12-2016
DC Power	Keysight	E3642A	MY54436035	03-31-2015	03-30-2016
PC-1	Lenovo	R4960d	---	04-01-2015	03-31-2016
BT&WI-FI Automatic control	R&S	OSPB157	101374	04-01-2015	03-31-2016
RF control unit	JS Tonscend	JS0806-2	2015860006	04-01-2015	03-31-2016
BT&WI-FI Automatic test software	JS Tonscend	JSTS1120-2	---	04-01-2015	03-31-2016

Shielding Room No. 1 – Conduction Emission Test					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Receiver	R&S	ESCI	100009	06-30-2015	06-28-2016
LISN	R&S	ENV216	100098	06-30-2015	06-28-2016

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Mode No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber	TDK	SAC-3	---	06-02-2013	06-01-2016
TRILOG Broadband Antenna	schwarzbeck	VULB9163	9163-617	07-31-2015	07-29-2016
Microwave Preamplifier	Agilent	8449B	3008A02425	02-05-2015	02-04-2016
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-30-2015	06-28-2016
Receiver	R&S	ESCI	100435	06-30-2015	06-28-2016
Multi device Controller	matureo	NCD/070/10711112	---	01-13-2015	01-12-2016
LISN	schwarzbeck	NNBM8125	81251547	06-30-2015	06-28-2016
LISN	schwarzbeck	NNBM8125	81251548	06-30-2015	06-28-2016
Signal Generator	Agilent	E4438C	MY45095744	04-19-2015	04-18-2016
Signal Generator	Keysight	E8257D	MY53401106	04-14-2015	04-13-2016
Temperature/ Humidity Indicator	TAYLOR	1451	1905	07- 08-2015	07-06-2016
Communication test set	Agilent	E5515C	GB47050533	01-13-2015	01-12-2016
Cable line	Fulai(7M)	SF106	5219/6A	01-13-2015	01-12-2016
Cable line	Fulai(6M)	SF106	5220/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5216/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5217/6A	01-13-2015	01-12-2016
Communication test set	R&S	CMW500	152394	04-19-2015	04-18-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18NM 12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA09CL1 2-0395-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA08CL1 2-0393-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA04CL1 2-0396-002	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA03CL1 2-0394-001	---	01-13-2015	01-12-2016

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C (2014)	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Test Results List:

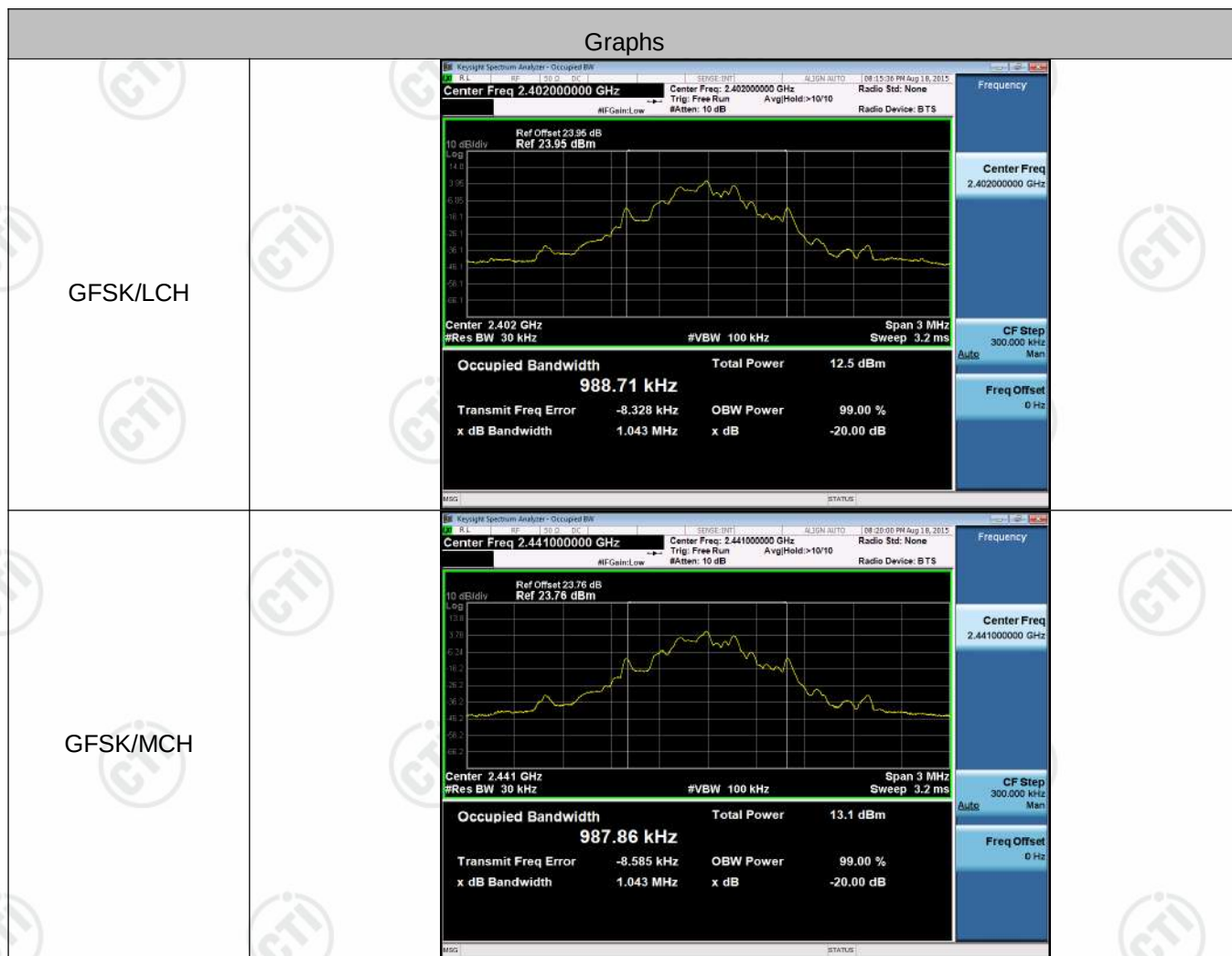
Test requirement	Test method	Test item	Verdict	Note
Part15C Section15.247 (a)(1)	ANSI 63.10	20dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section15.247 (a)(1)	ANSI 63.10	Carrier Frequencies Separation	PASS	Appendix B)
Part15C Section 15.247 (a)(1)	ANSI 63.10	Dwell Time	PASS	Appendix C)
Part15C Section15.247 (b)	ANSI 63.10	Hopping Channel Number	PASS	Appendix D)
Part15C Section15.247 (b)(1)	ANSI 63.10	Conducted Peak Output Power	PASS	Appendix E)
Part15C Section15.247(d)	ANSI 63.10	Band-edge for RF Conducted Emissions	PASS	Appendix F)
Part15C Section15.247(d)	ANSI 63.10	RF Conducted Spurious Emissions	PASS	Appendix G)
Part15C Section 15.247 (a)(1)	ANSI 63.10	Pseudorandom Frequency Hopping Sequence	PASS	Appendix H)
Part15C Section 15.203/15.247 (c)	ANSI 63.10	Antenna Requirement	PASS	Appendix I)
Part15C Section15.207	ANSI 63.10	AC Power Line Conducted Emission	PASS	N/A
Part15C Section 15.205/15.209	ANSI 63.10	Restricted bands around fundamental frequency (Radiated) Emission)	PASS	Appendix J)
Part15C Section 15.205/15.209	ANSI 63.10	Radiated Spurious Emissions	PASS	Appendix J)

Appendix A) 20dB Occupied Bandwidth

Test Result

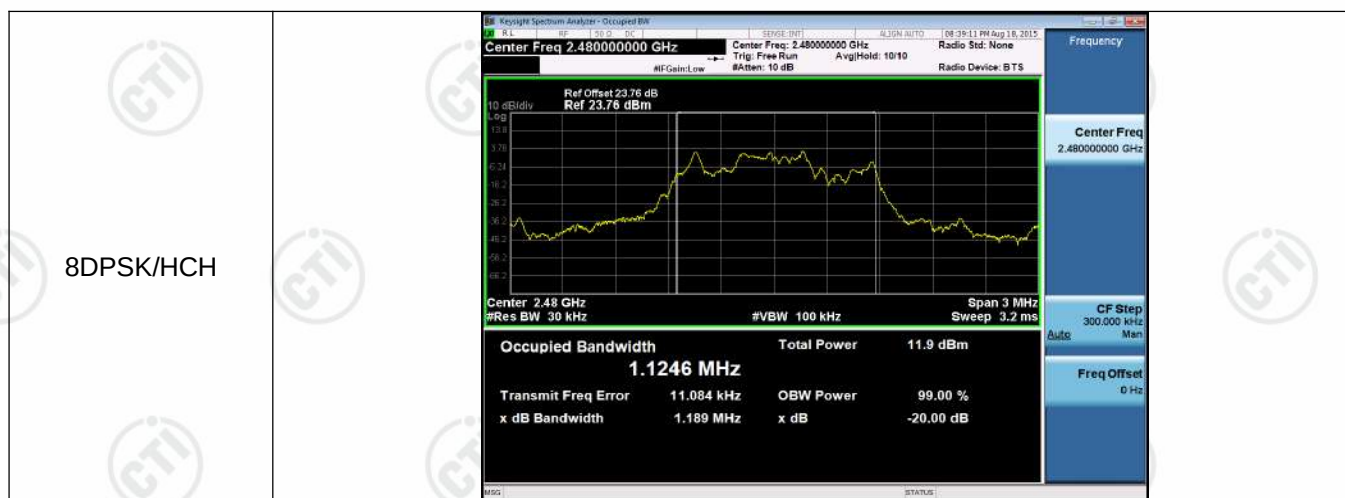
Mode	Channel.	20dB Bandwidth [MHz]	99% OBW [MHz]	Verdict
GFSK	LCH	1.043	0.98871	PASS
GFSK	MCH	1.043	0.98786	PASS
GFSK	HCH	1.042	0.98784	PASS
$\pi/4$ DQPSK	LCH	1.150	1.0841	PASS
$\pi/4$ DQPSK	MCH	1.146	1.0833	PASS
$\pi/4$ DQPSK	HCH	1.136	1.0811	PASS
8DPSK	LCH	1.192	1.1253	PASS
8DPSK	MCH	1.195	1.1259	PASS
8DPSK	HCH	1.189	1.1246	PASS

Test Graph



GFSK/HCH	 Center Freq 2.480000000 GHz Ref Offset 23.76 dB Ref 23.76 dBm Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 987.84 kHz Total Power 12.5 dBm Transmit Freq Error -8.825 kHz OBW Power 99.00 % x dB Bandwidth 1.042 MHz x dB -20.00 dB
$\pi/4$ DQPSK/LCH	 Center Freq 2.402000000 GHz Ref Offset 23.95 dB Ref 23.95 dBm Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.0841 MHz Total Power 12.5 dBm Transmit Freq Error -5.843 kHz OBW Power 99.00 % x dB Bandwidth 1.150 MHz x dB -20.00 dB
$\pi/4$ DQPSK/MCH	 Center Freq 2.441000000 GHz Ref Offset 23.76 dB Ref 23.76 dBm Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.0833 MHz Total Power 12.3 dBm Transmit Freq Error -5.720 kHz OBW Power 99.00 % x dB Bandwidth 1.146 MHz x dB -20.00 dB

$\pi/4$DQPSK/HCH	
8DPSK/LCH	
8DPSK/MCH	



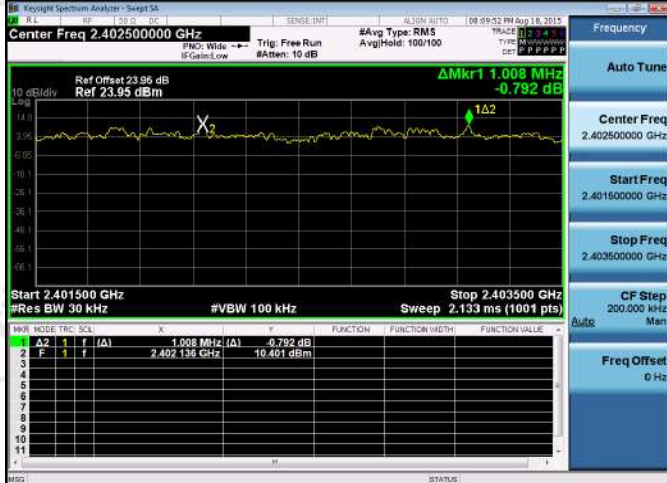
Appendix B) Carrier Frequency Separation

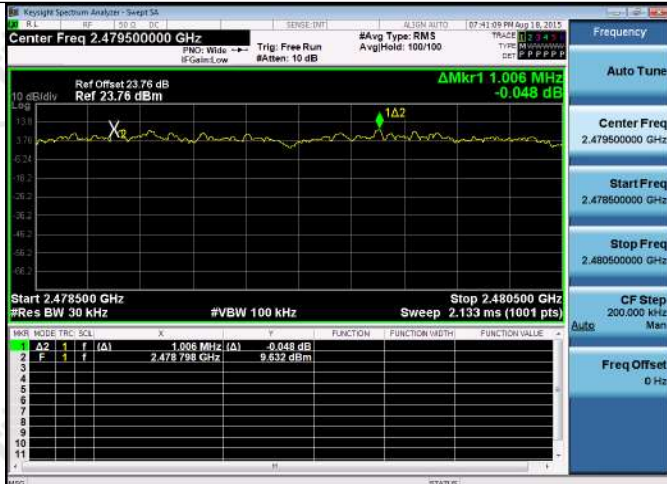
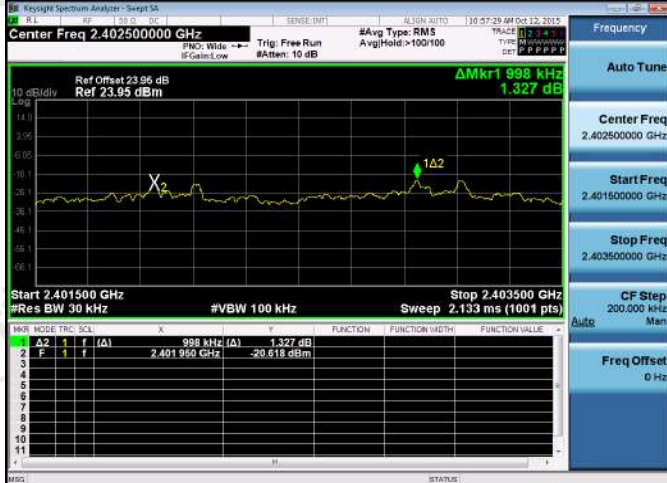
Result Table

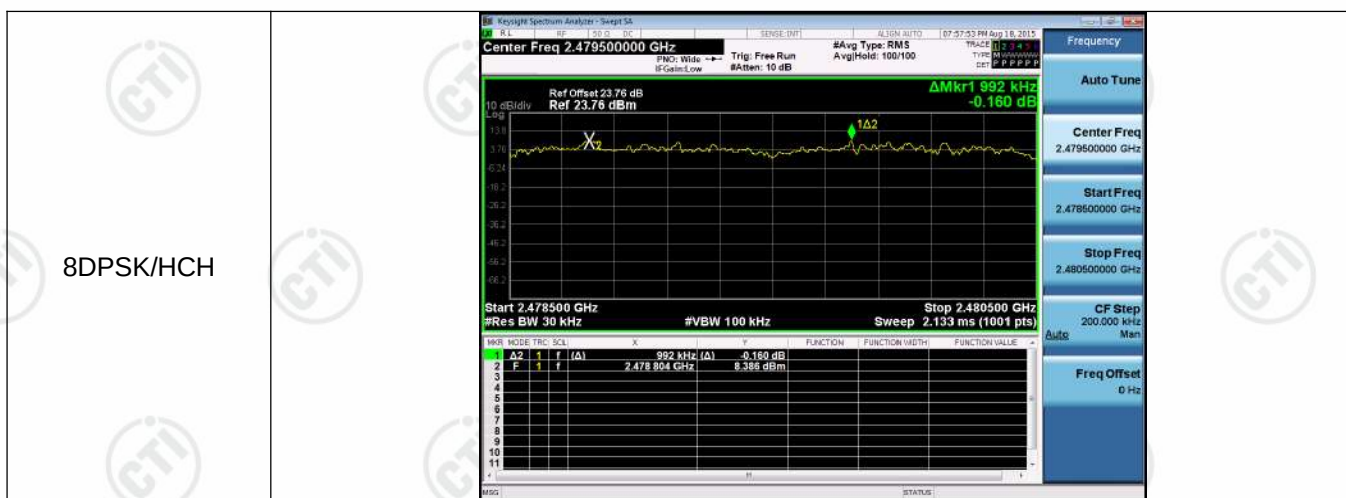
Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
GFSK	LCH	0.926	PASS
GFSK	MCH	0.946	PASS
GFSK	HCH	1.014	PASS
$\pi/4$ DQPSK	LCH	1.008	PASS
$\pi/4$ DQPSK	MCH	1.136	PASS
$\pi/4$ DQPSK	HCH	1.006	PASS
8DPSK	LCH	0.998	PASS
8DPSK	MCH	1.170	PASS
8DPSK	HCH	1.014	PASS

Test Graph



GFSK/HCH	
$\pi/4$ DQPSK/LCH	
$\pi/4$ DQPSK/MCH	

$\pi/4$DQPSK/HCH	
8DPSK/LCH	
8DPSK/MCH	



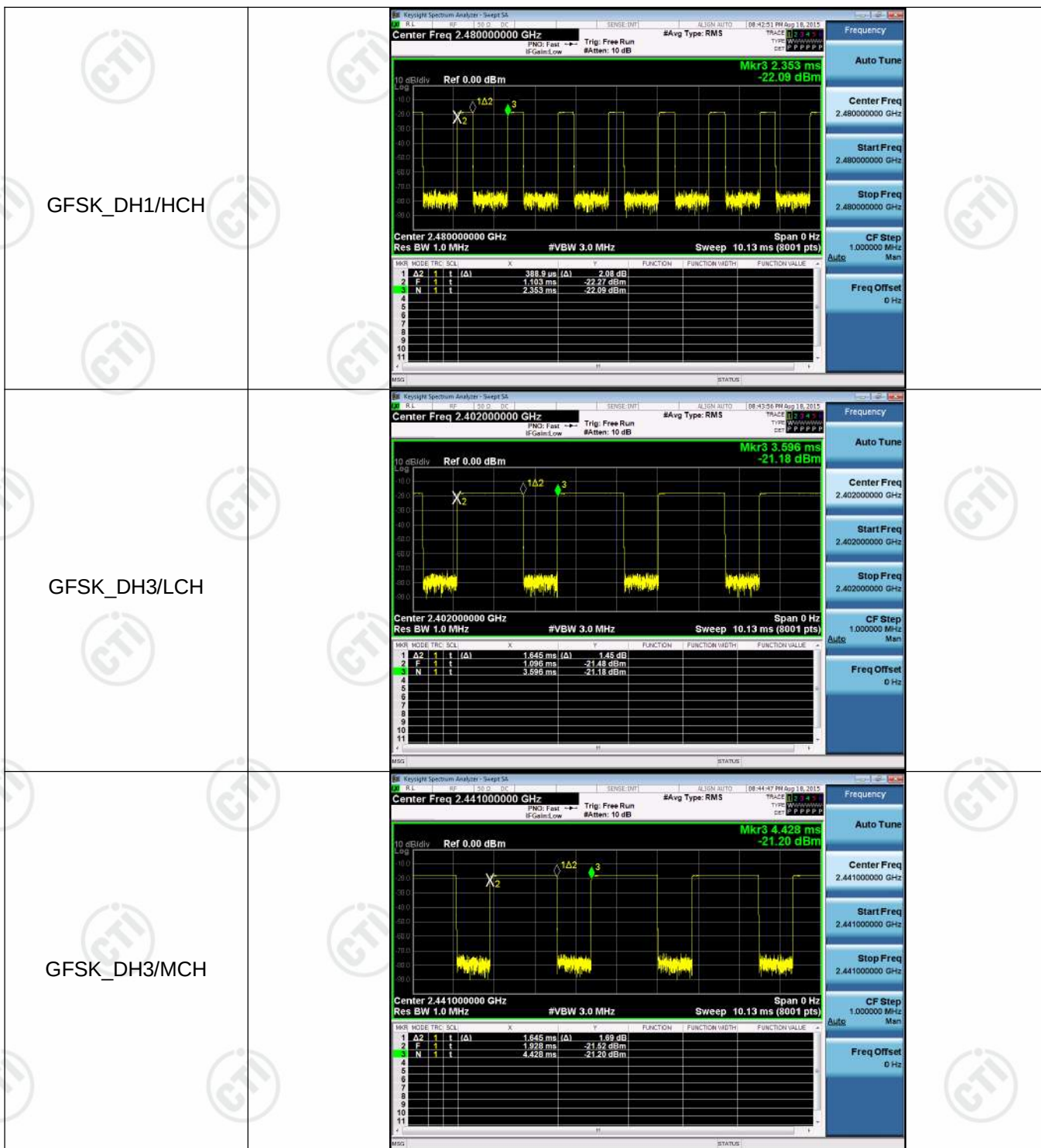
Appendix C) Dwell Time

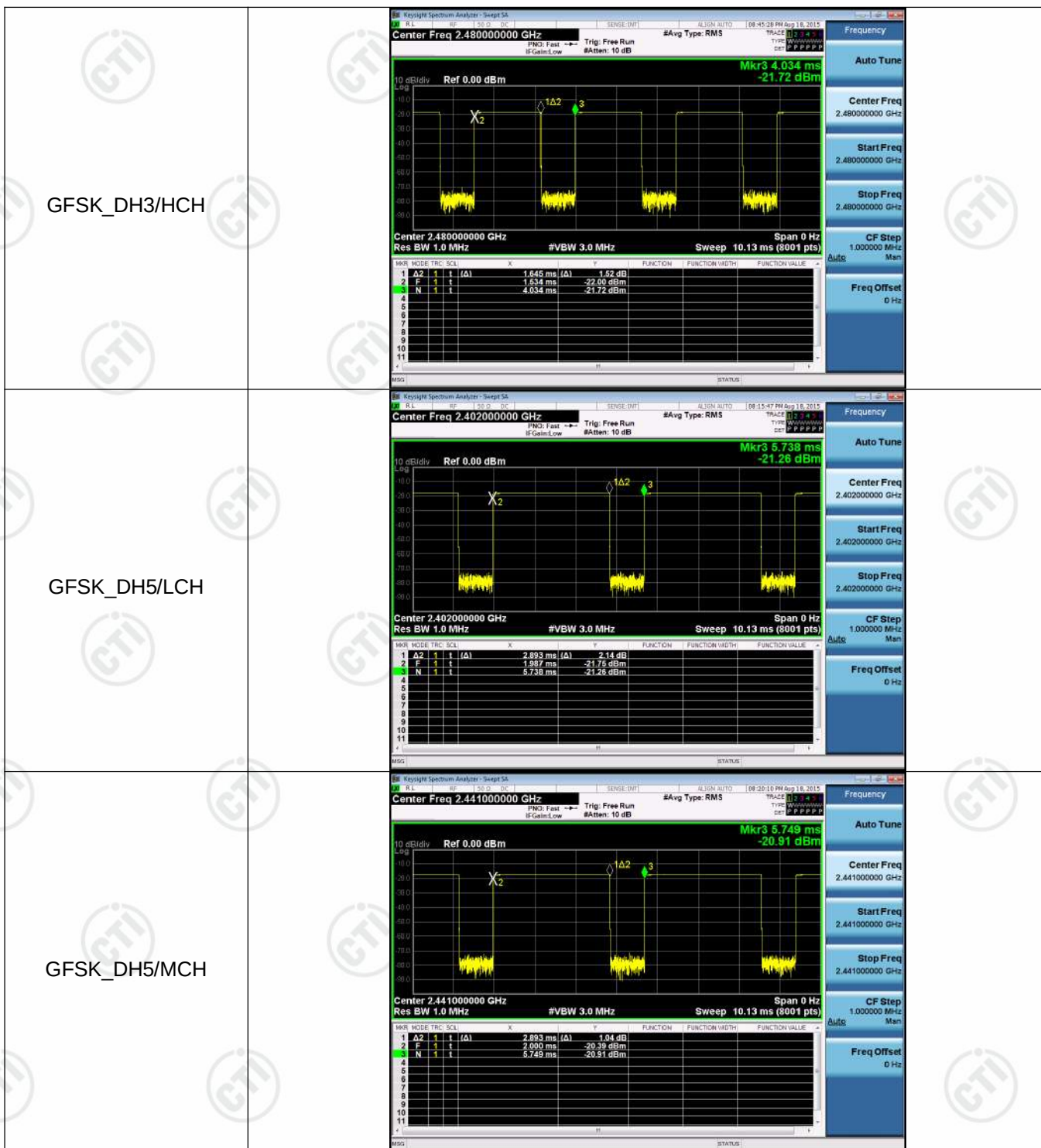
Result Table

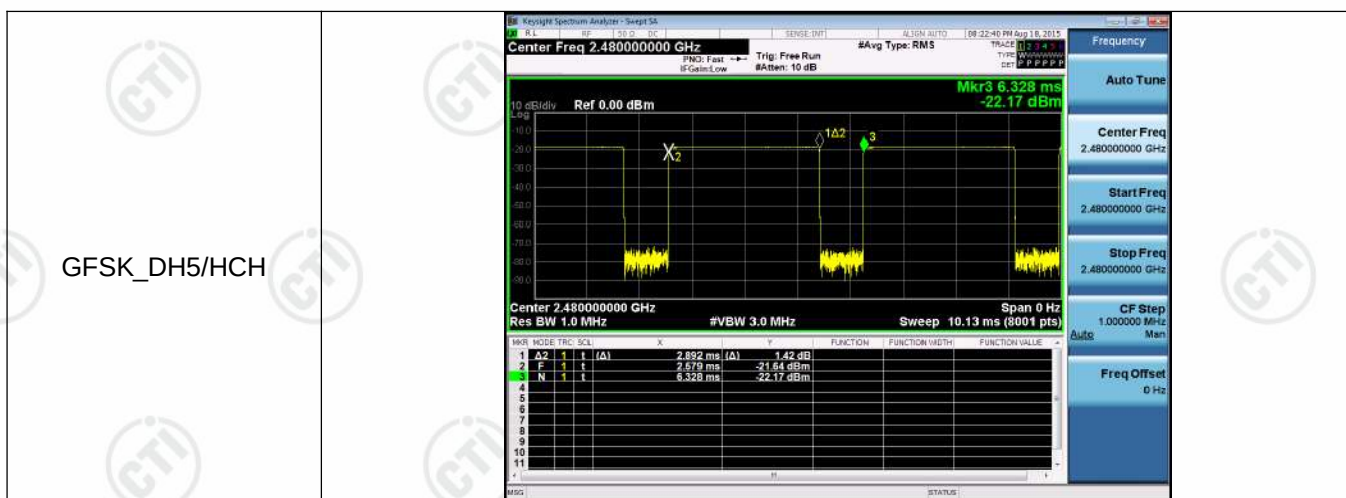
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Duty Cycle [%]	Verdict
GFSK	DH1	LCH	0.389	320	0.124	31.10	PASS
GFSK	DH1	MCH	0.388	320	0.124	31.03	PASS
GFSK	DH1	HCH	0.389	320	0.124	31.10	PASS
GFSK	DH3	LCH	1.645	160	0.263	65.81	PASS
GFSK	DH3	MCH	1.645	160	0.263	65.81	PASS
GFSK	DH3	HCH	1.645	160	0.263	65.81	PASS
GFSK	DH5	LCH	2.893	106.7	0.309	77.14	PASS
GFSK	DH5	MCH	2.893	106.7	0.309	77.16	PASS
GFSK	DH5	HCH	2.892	106.7	0.309	77.13	PASS

Test Graph





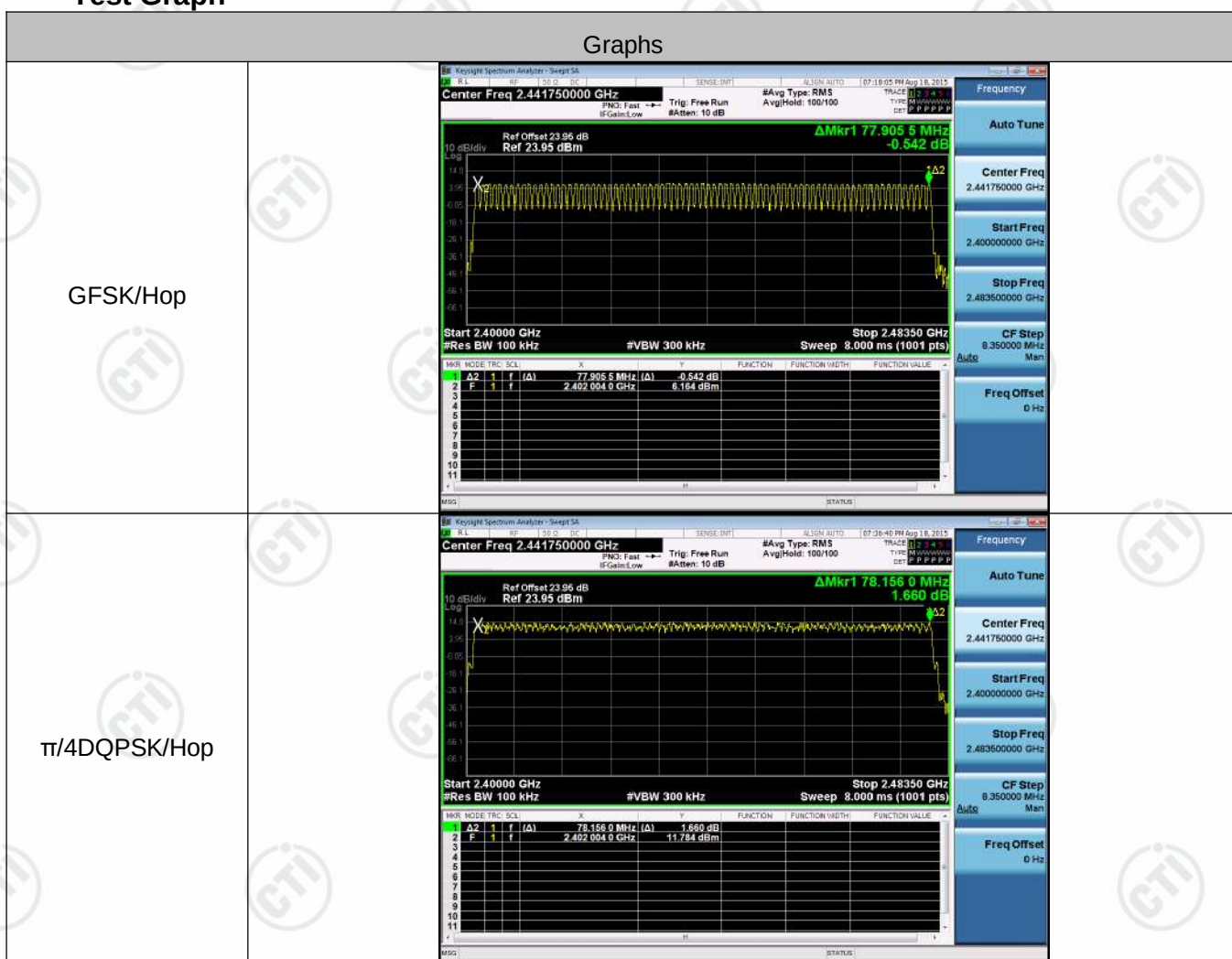


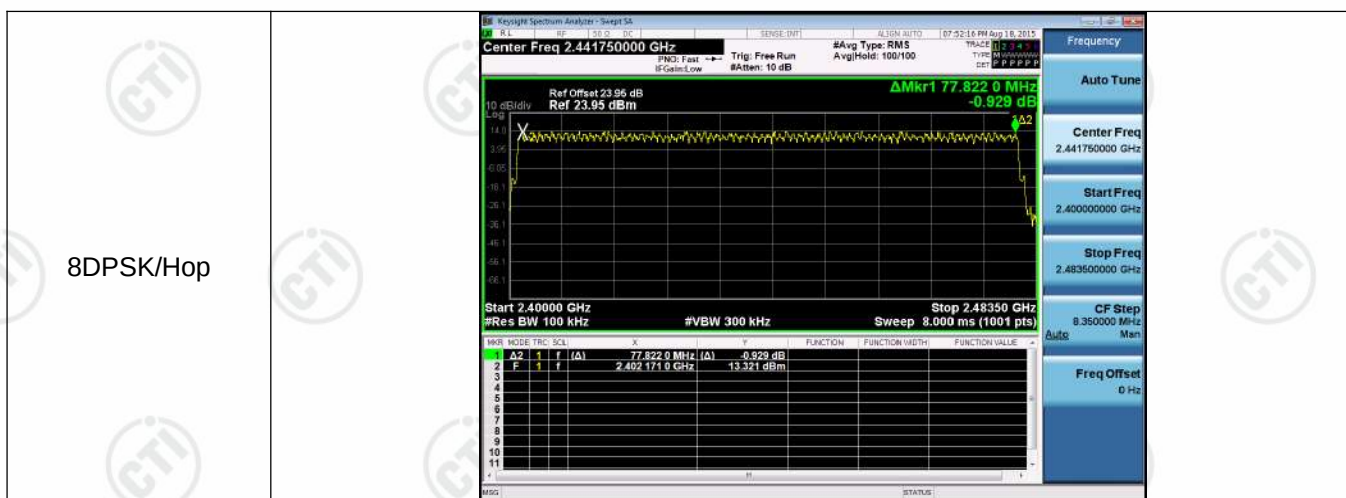


Appendix D) Hopping Channel Number Result Table

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS
$\pi/4$ DQPSK	Hop	79	PASS
8DPSK	Hop	79	PASS

Test Graph



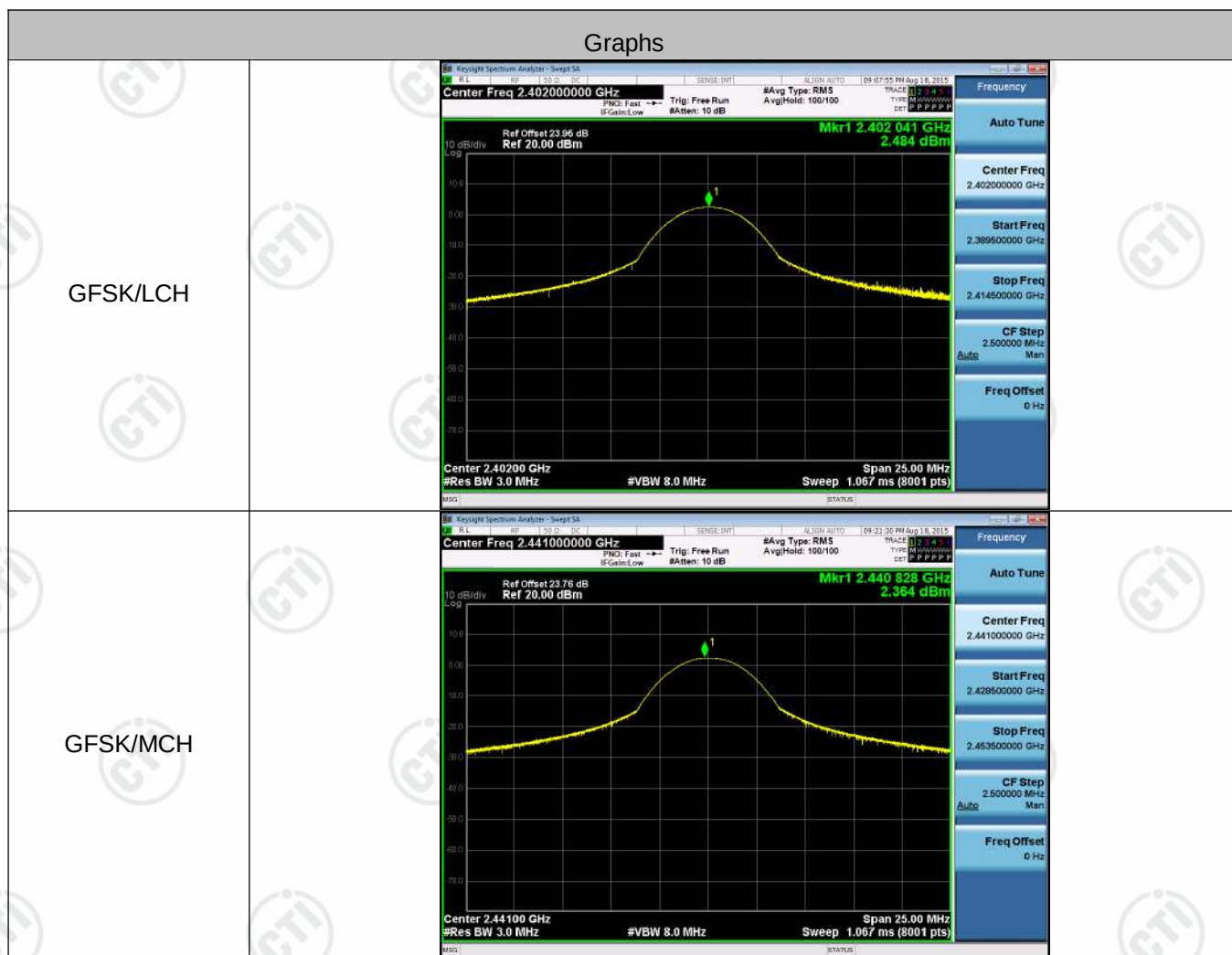


Appendix E) Conducted Peak Output Power

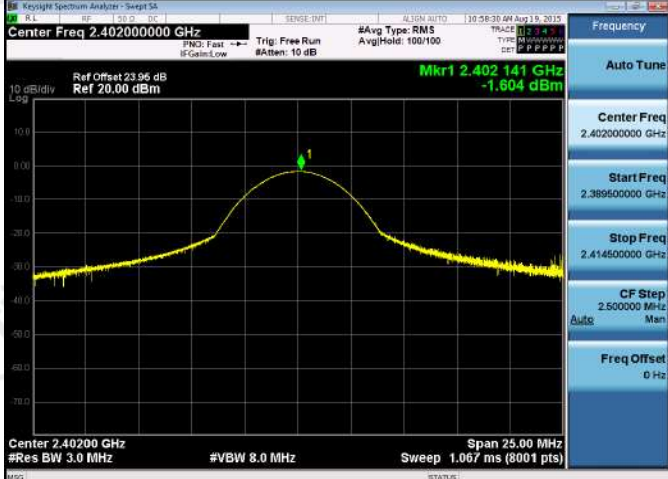
Result Table

Mode	Channel.	Maximum Peak Output Power [dBm]	Verdict
GFSK	LCH	2.484	PASS
GFSK	MCH	2.364	PASS
GFSK	HCH	1.407	PASS
$\pi/4$ DQPSK	LCH	2.788	PASS
$\pi/4$ DQPSK	MCH	2.945	PASS
$\pi/4$ DQPSK	HCH	2.029	PASS
8DPSK	LCH	-1.604	PASS
8DPSK	MCH	-0.368	PASS
8DPSK	HCH	-1.225	PASS

Test Graph



GFSK/HCH	
$\pi/4$ DQPSK/LCH	
$\pi/4$ DQPSK/MCH	

$\pi/4$DQPSK/HCH	
8DPSK/LCH	
8DPSK/MCH	



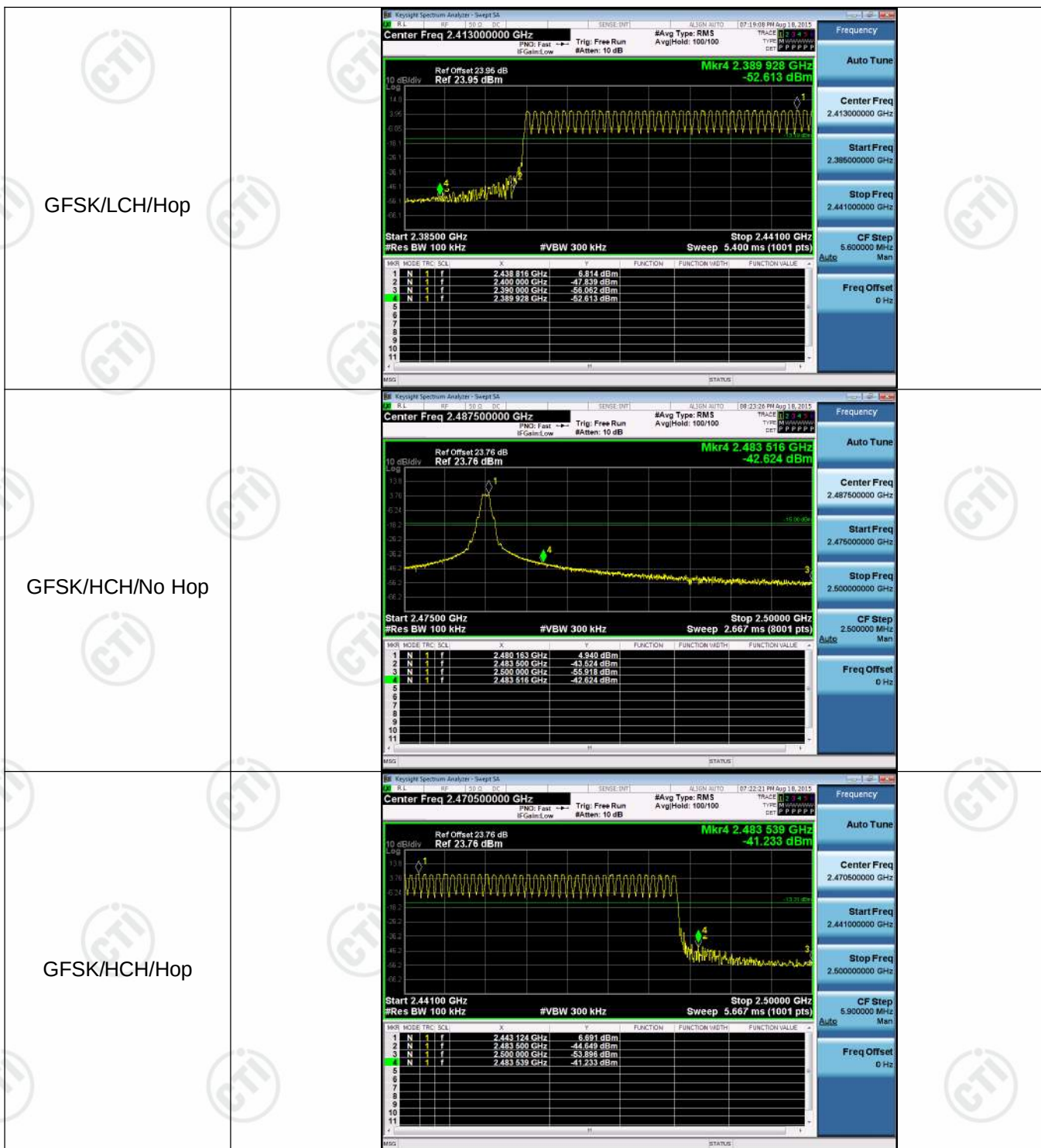
Appendix F) Band-edge for RF Conducted Emissions

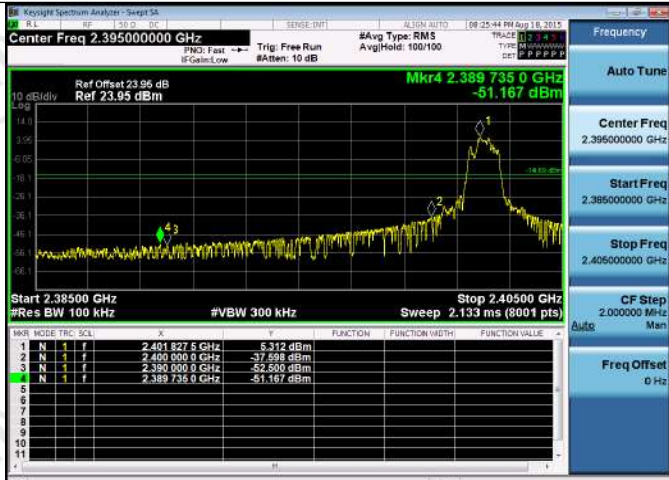
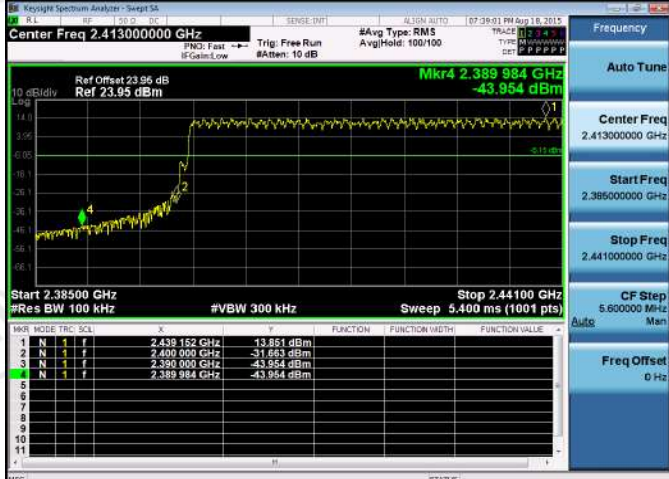
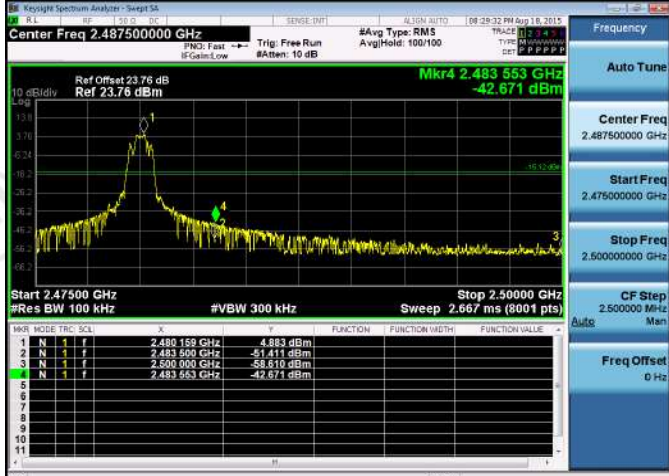
Result Table

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	5.860	Off	-50.941	-14.14	PASS
			6.814	On	-52.613	-13.19	PASS
GFSK	HCH	2480	4.940	Off	-42.624	-15.06	PASS
			6.691	On	-41.233	-13.31	PASS
$\pi/4$ DQPSK	LCH	2402	5.312	Off	-51.167	-14.69	PASS
			13.851	On	-43.954	-6.15	PASS
$\pi/4$ DQPSK	HCH	2480	4.883	Off	-42.671	-15.12	PASS
			13.709	On	-32.119	-6.29	PASS
8DPSK	LCH	2402	5.667	Off	-51.817	-14.33	PASS
			12.419	On	-45.681	-7.58	PASS
8DPSK	HCH	2480	4.872	Off	-43.129	-15.13	PASS
			12.152	On	-33.701	-7.85	PASS

Test Graph





$\pi/4$ DQPSK/LCH/No Hop	 <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION METH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.401 827 5 GHz</td><td>-5.312 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.400 000 0 GHz</td><td>-37.698 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.390 000 0 GHz</td><td>-52.800 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.389 735 0 GHz</td><td>-61.167 dBm</td><td></td><td></td><td></td></tr></table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION METH	FUNCTION VALUE	1	N	1	f	2.401 827 5 GHz	-5.312 dBm				2	N	1	f	2.400 000 0 GHz	-37.698 dBm				3	N	1	f	2.390 000 0 GHz	-52.800 dBm				4	N	1	f	2.389 735 0 GHz	-61.167 dBm			
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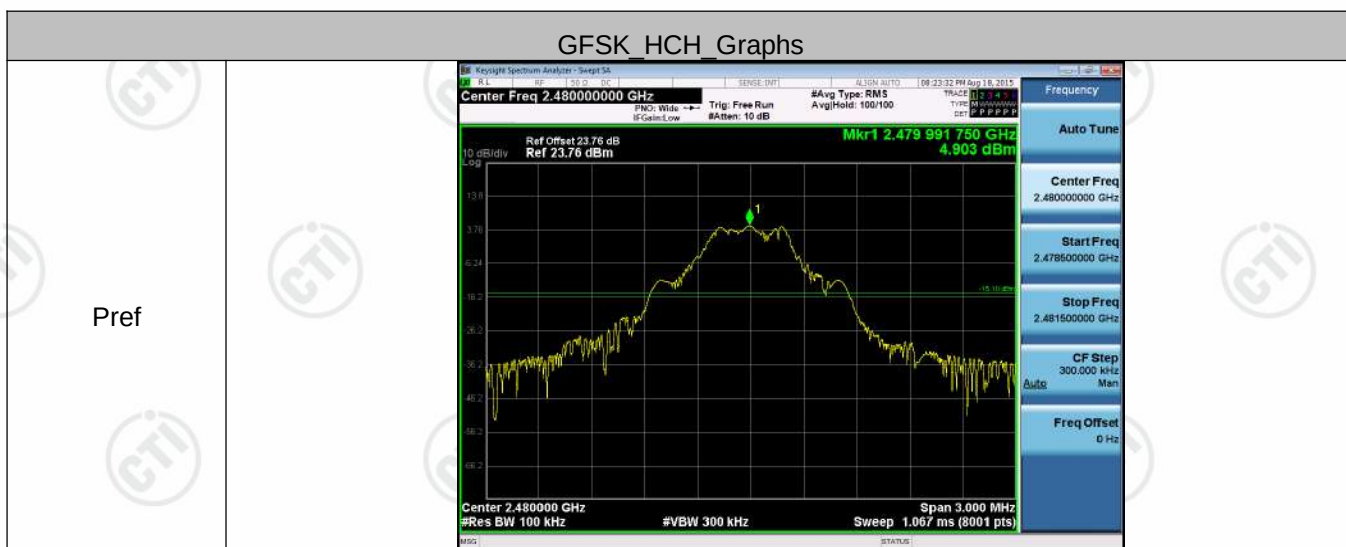
Appendix G) RF Conducted Spurious Emissions

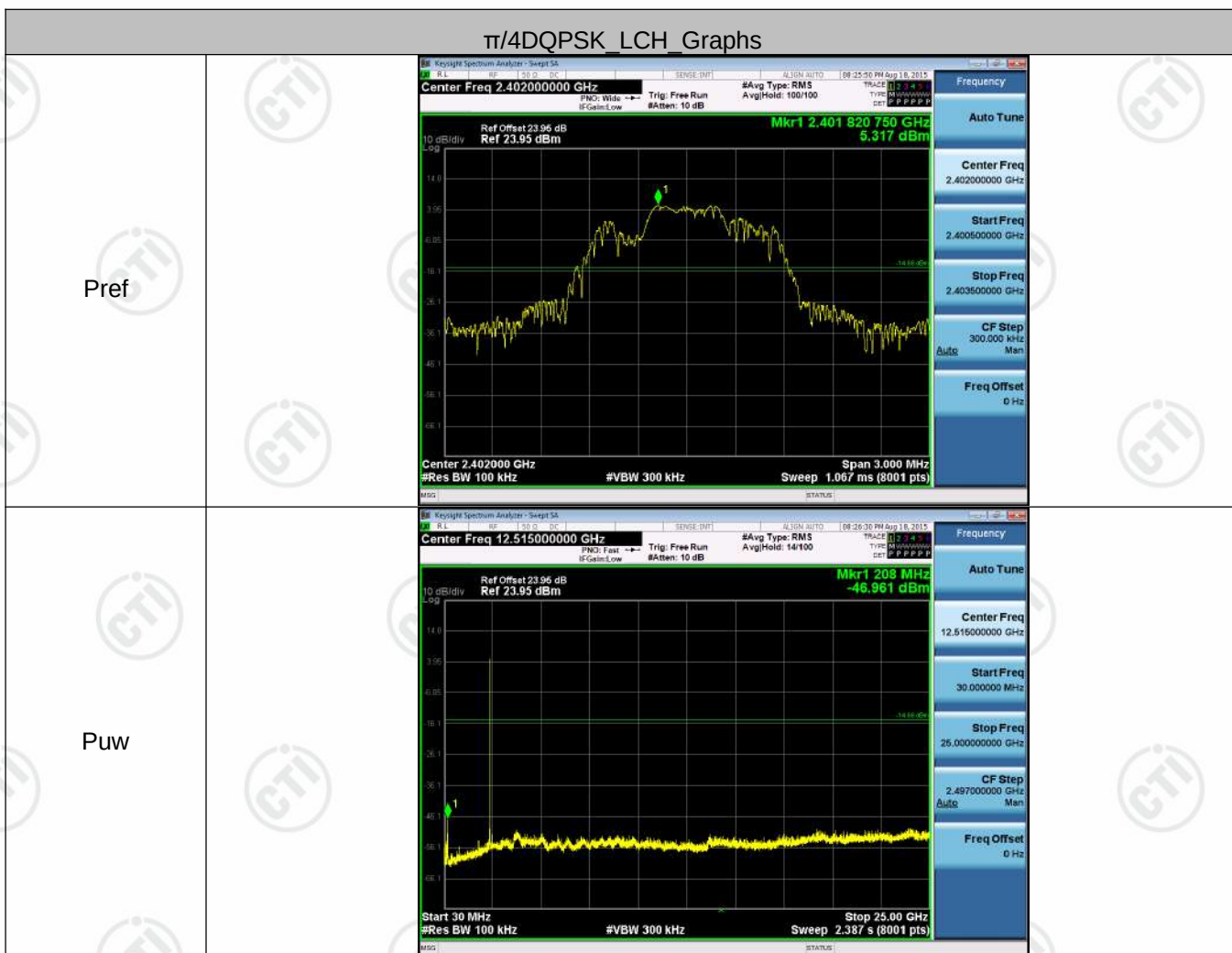
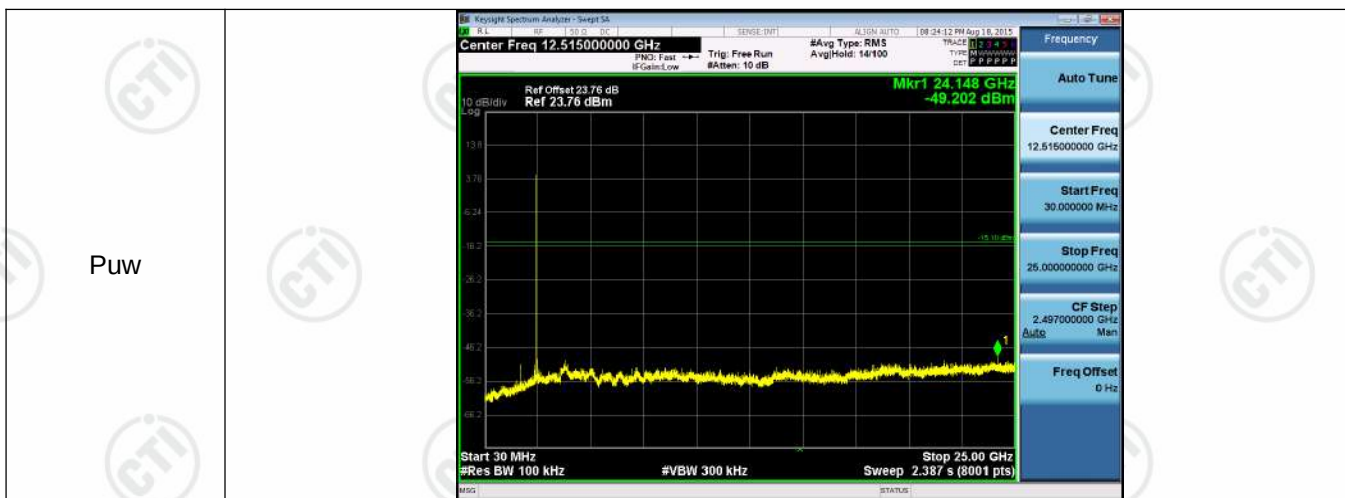
Result Table

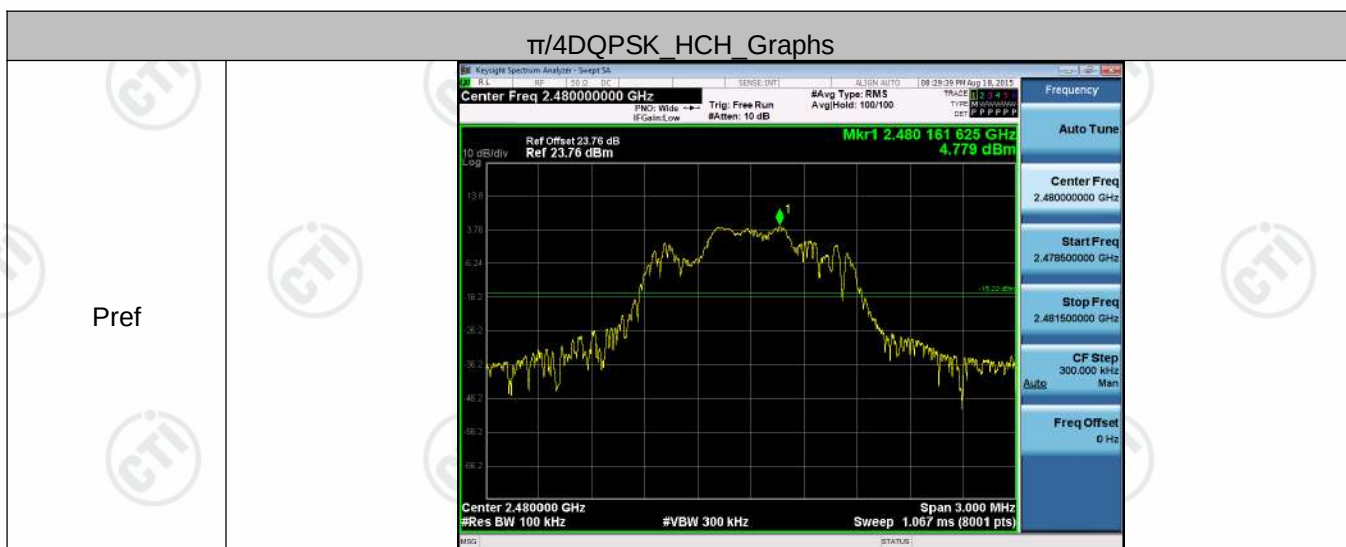
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
GFSK	LCH	5.749	<Limit	PASS
GFSK	MCH	6.126	<Limit	PASS
GFSK	HCH	4.903	<Limit	PASS
$\pi/4$ DQPSK	LCH	5.317	<Limit	PASS
$\pi/4$ DQPSK	MCH	5.53	<Limit	PASS
$\pi/4$ DQPSK	HCH	4.779	<Limit	PASS
8DPSK	LCH	5.655	<Limit	PASS
8DPSK	MCH	5.662	<Limit	PASS
8DPSK	HCH	4.936	<Limit	PASS

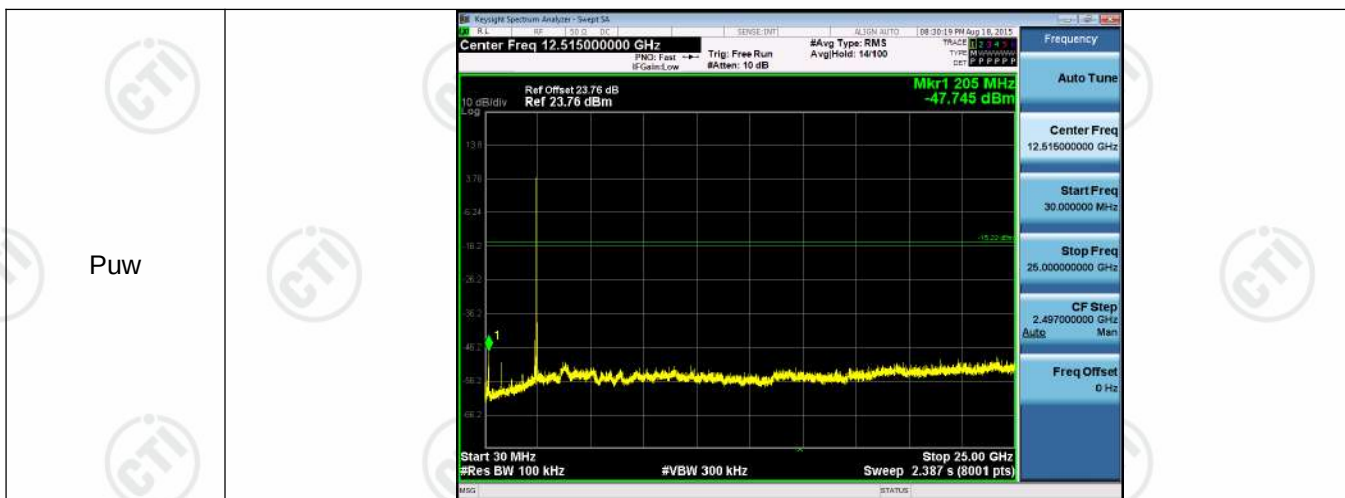
Test Graph

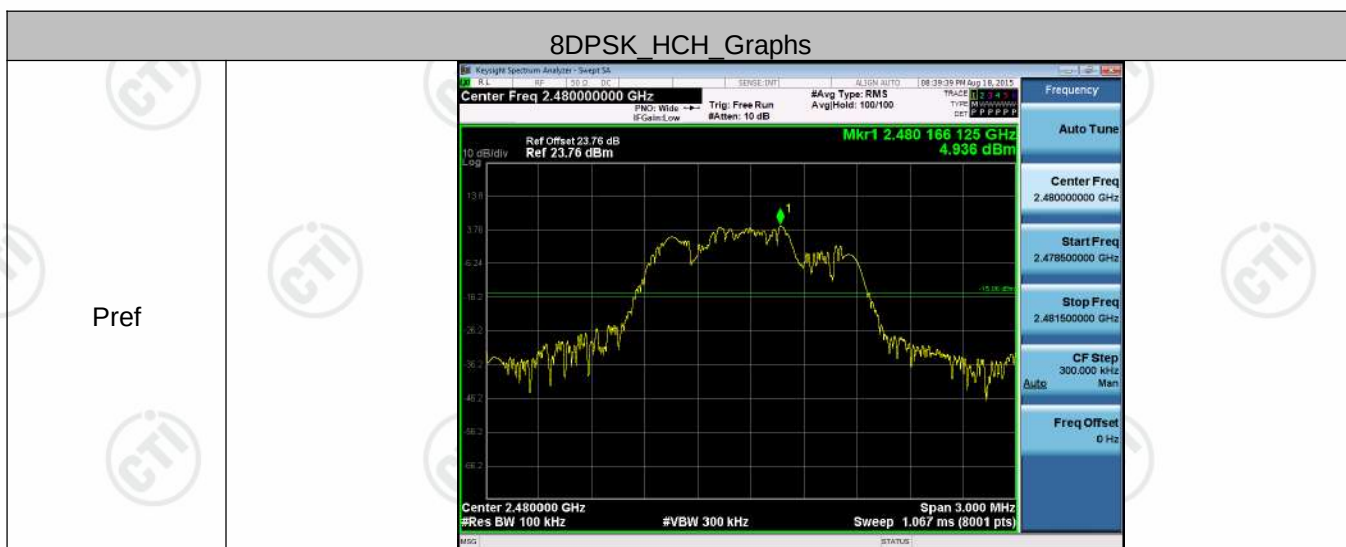


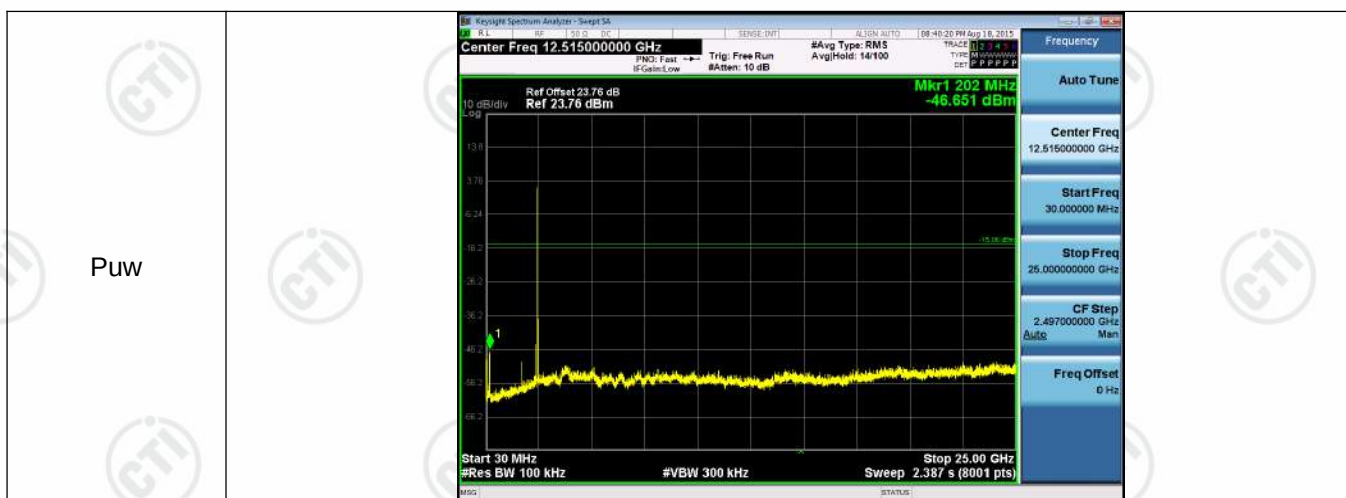












Appendix H) Pseudorandom Frequency Hopping Sequence

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1) requirement:
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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.	
EUT Pseudorandom Frequency Hopping Sequence	
The pseudorandom sequence may be generated in a nine-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 first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones. • Number of shift register stages: 9 • Length of pseudo-random sequence: $2^9 - 1 = 511$ bits • Longest sequence of zeros: 8 (non-inverted signal) <i>Linear Feedback Shift Register for Generation of the PRBS sequence</i> An example of Pseudorandom Frequency Hopping Sequence as follow: Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their Corresponding transmitters and shift frequencies in synchronization with the transmitted signals. The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.	

Appendix I) Antenna Requirement

15.203 requirement:

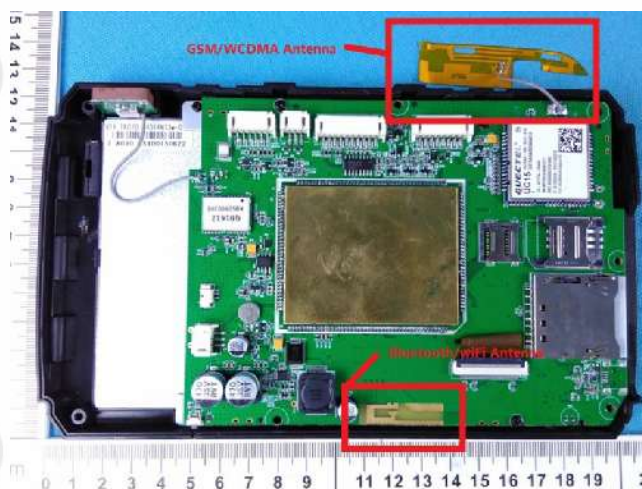
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

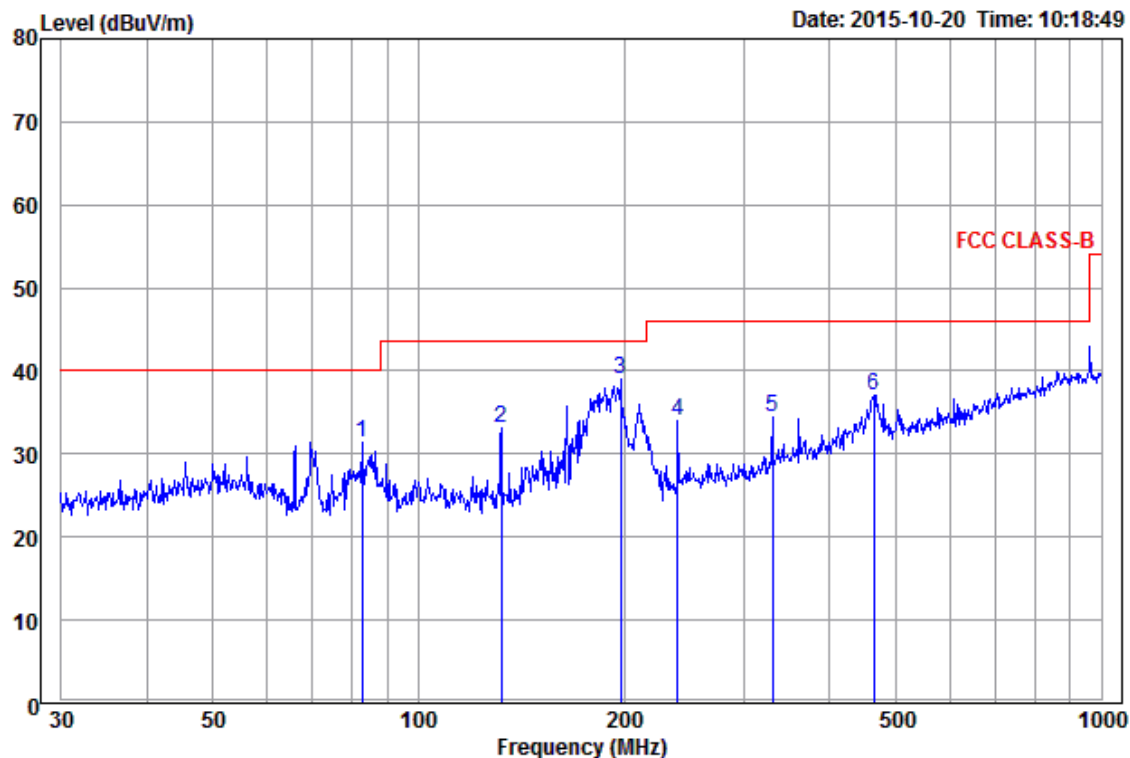
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.



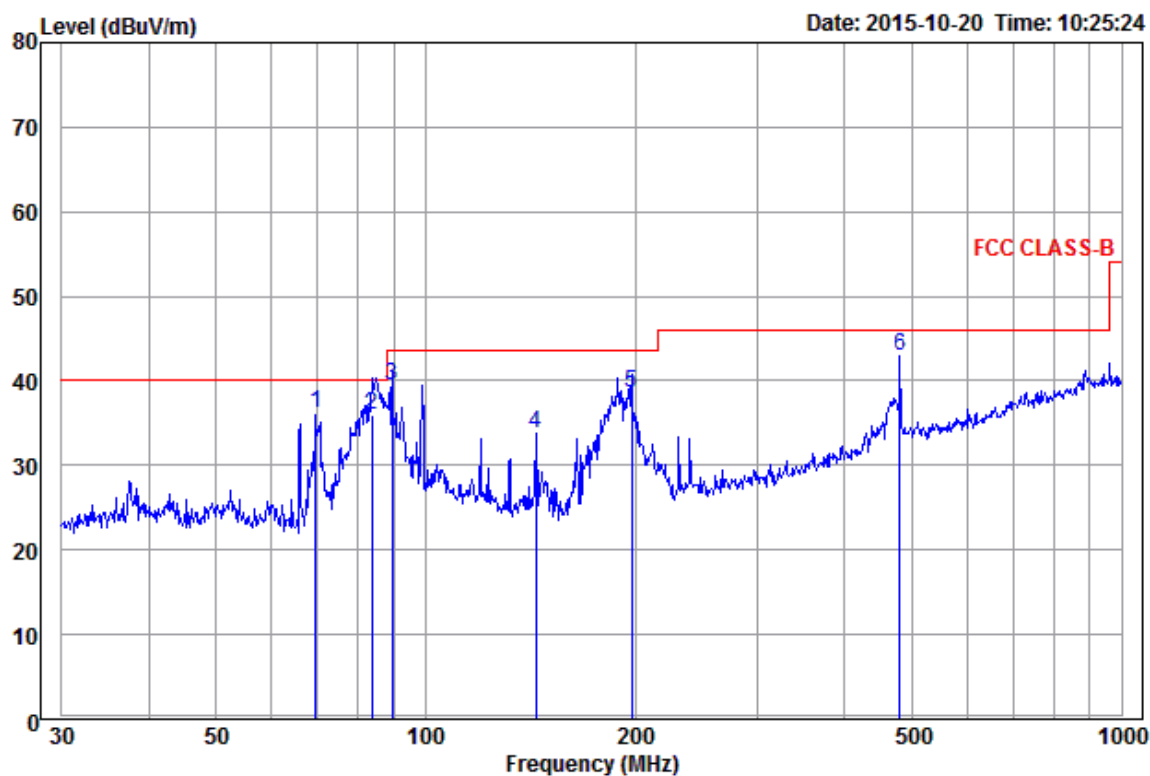
Appendix J) Restricted bands around fundamental frequency (Radiated)/Radiated Spurious Emissions

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Test Procedure:					
Below 1GHz test procedure as below:					
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.					
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.					
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.					
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.					
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.					
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Above 1GHz test procedure as below:					
g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).					
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel					
i. Repeat above procedures until all frequencies measured was complete.					
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Radiated Spurious Emissions test Data: **Radiated Emission below 1GHz**



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	82.65	9.32	1.58	20.55	31.45	40.00	-8.55	Horizontal	
2	132.22	10.79	1.58	20.79	33.16	43.50	-10.34	Horizontal	
3 pp	197.89	11.53	2.19	25.35	39.07	43.50	-4.43	Horizontal	
4	239.99	12.25	2.32	19.43	34.00	46.00	-12.00	Horizontal	
5	330.19	14.31	2.59	17.44	34.34	46.00	-11.66	Horizontal	
6	463.97	17.48	3.03	16.56	37.07	46.00	-8.93	Horizontal	



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	69.60	10.53	1.45	24.10	36.08	40.00	-3.92	Vertical	
2	83.82	9.63	1.58	24.80	36.01	40.00	-3.99	Vertical	
3	89.59	11.10	1.59	26.73	39.42	43.50	-4.08	Vertical	
4	143.83	10.06	1.58	22.17	33.81	43.50	-9.69	Vertical	
5	197.89	11.53	2.19	24.97	38.69	43.50	-4.81	Vertical	
6 pp	480.53	17.91	3.08	21.86	42.85	46.00	-3.15	Vertical	

Transmitter Emission above 1GHz

Test channel: 2402MHz							
Frequency (MHz)	Height (cm)	Azimuth (deg)	SpuriousEmission Level(dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis
2390.00	150	142	45.76	74	-28.24	Pass	H
4804.00	150	24	52.32	74	-21.68	Pass	H
7206.00	150	174	50.35	74	-23.65	Pass	H
8174.13	150	62	52.81	74	-21.19	Pass	H
2390.00	150	231	46.75	74	-27.25	Pass	V
4804.00	150	83	51.23	74	-22.77	Pass	V
7206.00	150	192	51.32	74	-22.68	Pass	V
9270.00	150	58	52.58	74	-21.42	Pass	V

Test channel: 2441MHz							
Frequency (MHz)	Height (cm)	Azimuth (deg)	SpuriousEmission Level(dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis
4882.00	150	63	50.13	74	-23.87	Pass	H
7323.00	150	104	49.42	74	-24.58	Pass	H
9764.00	150	215	51.28	74	-22.72	Pass	H
4882.00	150	5	49.11	74	-24.89	Pass	V
7323.00	150	301	52.87	74	-21.13	Pass	V
9764.00	150	59	53.06	74	-20.94	Pass	V

Test Frequency: 2480MHz							
Frequency (MHz)	Height (cm)	Azimuth (deg)	SpuriousEmission Level(dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis
2483.50	150	42	48.18	74	-25.82	Pass	H
4960.00	150	142	50.32	74	-23.68	Pass	H
7440.00	150	102	51.29	74	-22.71	Pass	H
8341.45	150	60	52.31	74	-21.69	Pass	H
2483.50	150	159	49.15	74	-24.85	Pass	V
4960.00	150	62	51.32	74	-22.68	Pass	V
7440.00	150	91	51.67	74	-22.33	Pass	V
9423.40	150	28	52.68	74	-21.32	Pass	V

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

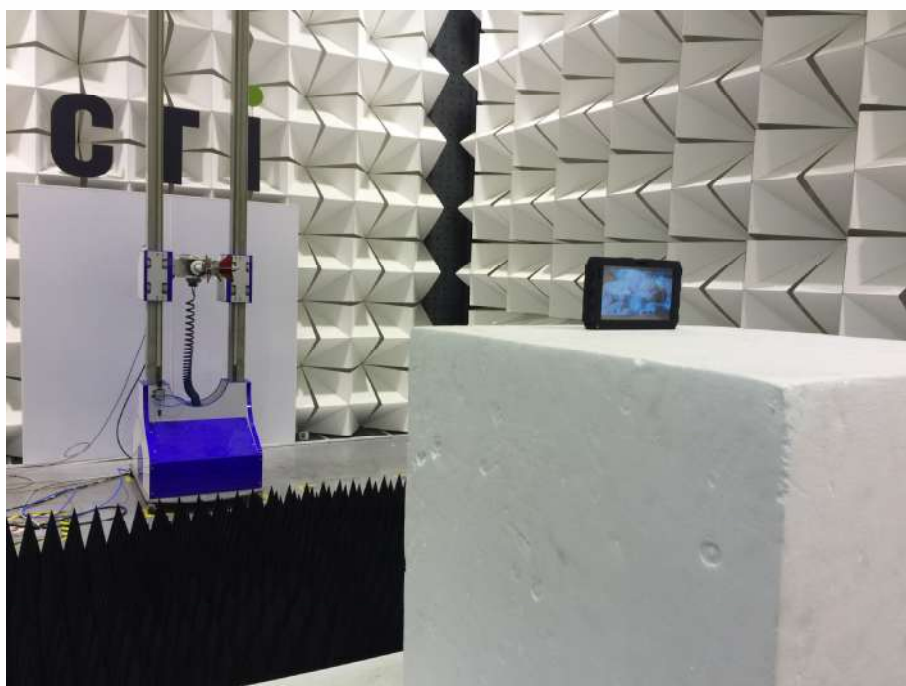
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

PHOTOGRAPHS OF TEST SETUP

Test mode No.: Hero-MDT-AT2



Radiated spurious emission Test Setup-1 (Below 1GHz)



Radiated spurious emission Test Setup-2 (Above 1GHz)

PHOTOGRAPHS OF EUT Constructional Details

Test mode No.: Hero-MDT-AT2



View of Product-1



View of Product-2



View of Product-3



View of Product-4



View of Product-5



View of Product-6



View of Product-7



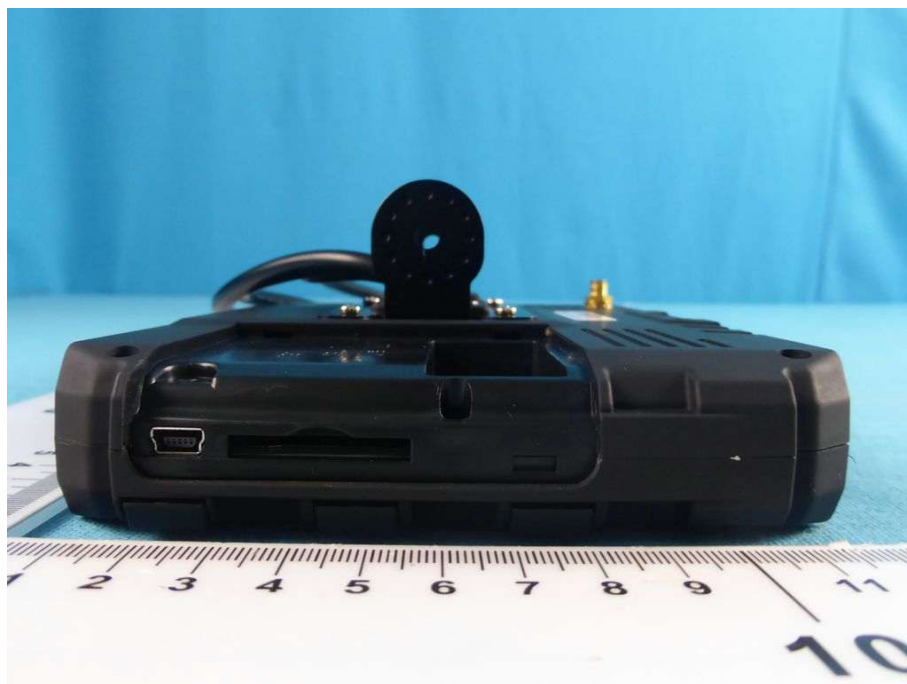
View of Product-8



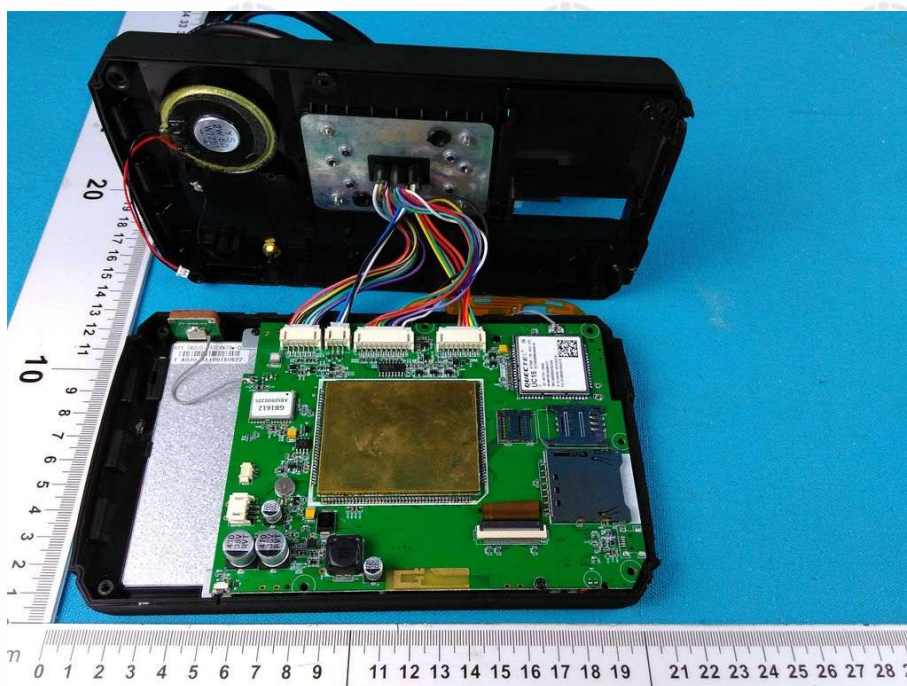
View of Product-9



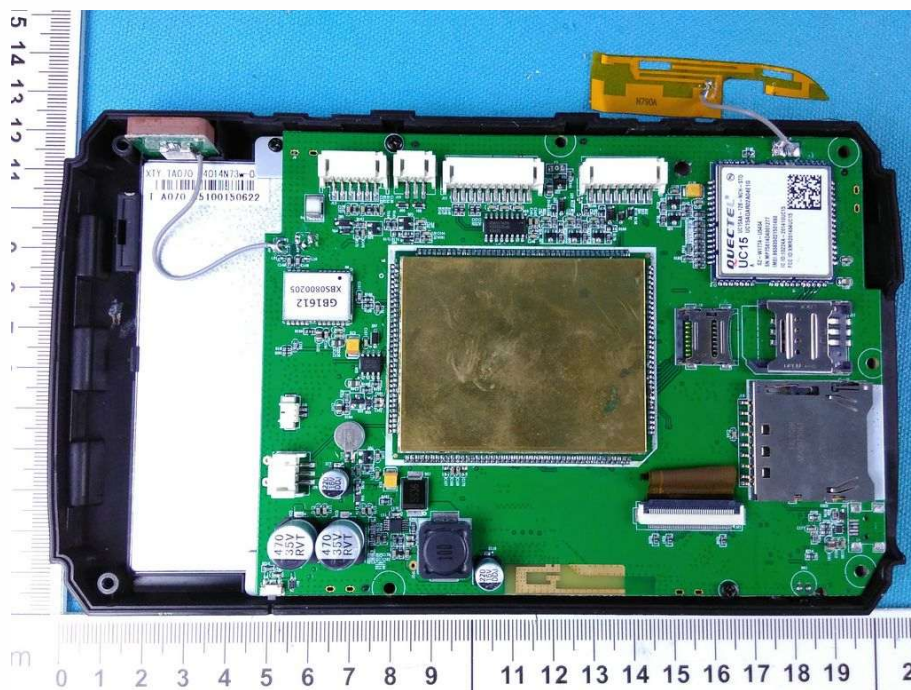
View of Product-10



View of Product-11



View of Product-12



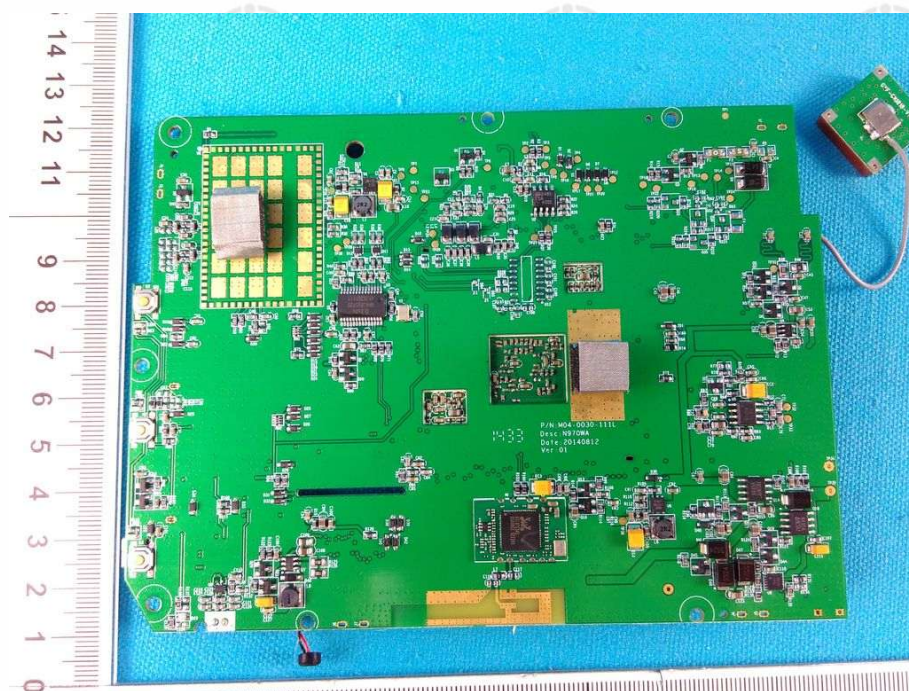
View of Product-13



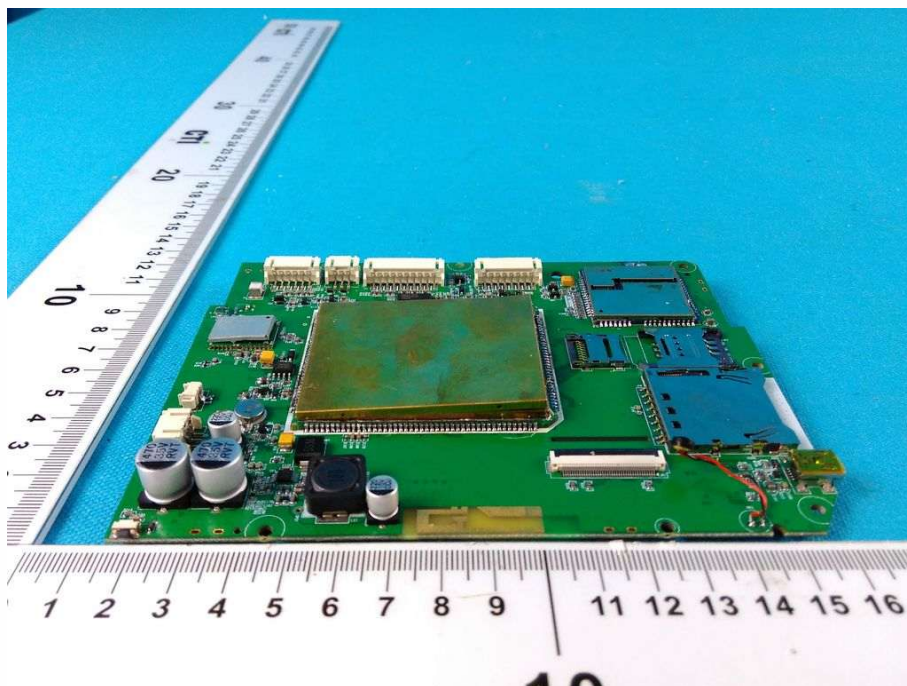
View of Product-14



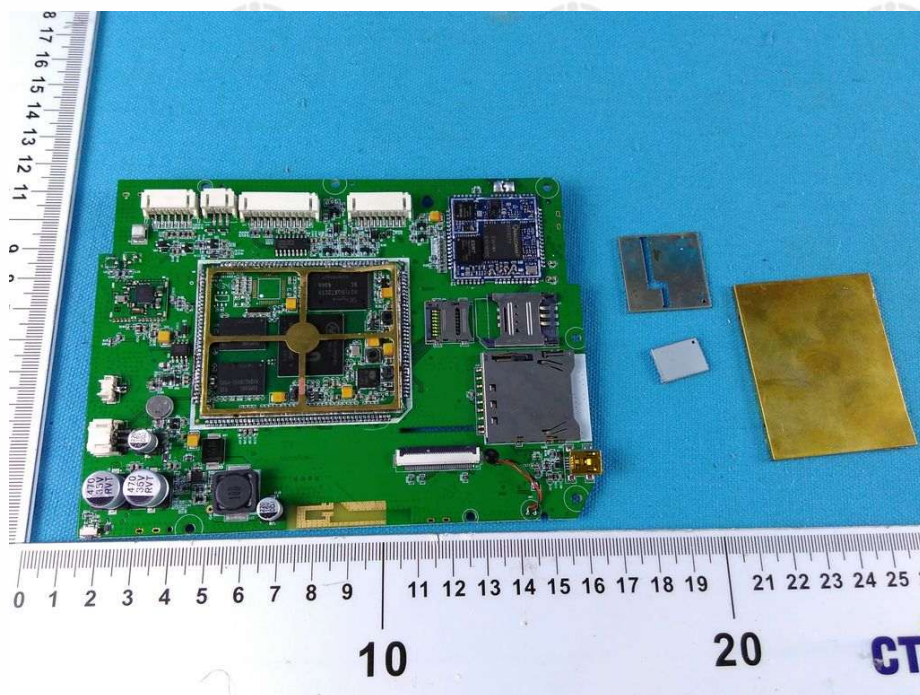
View of Product-15



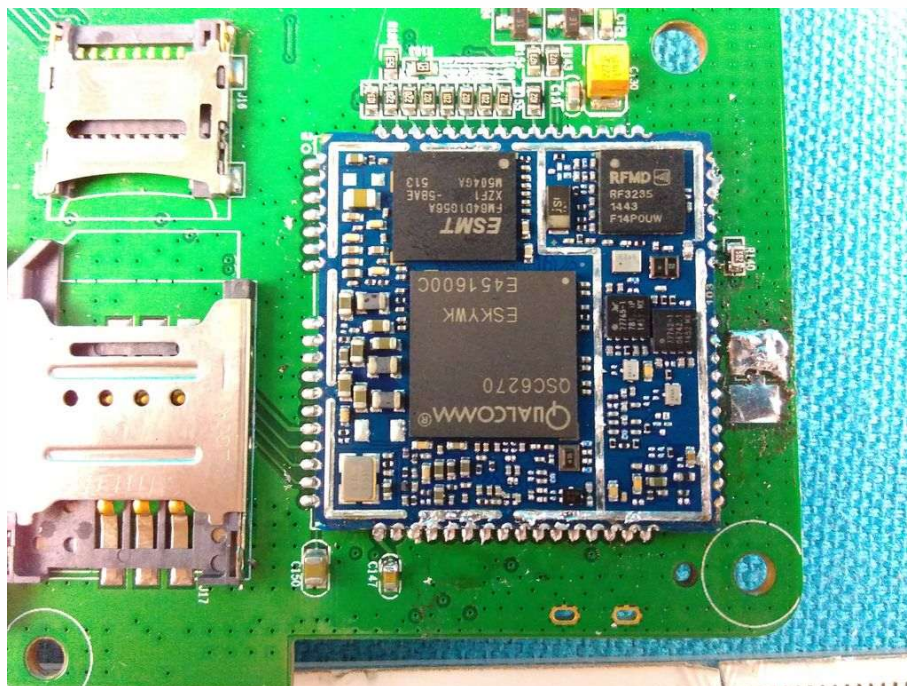
View of Product-16



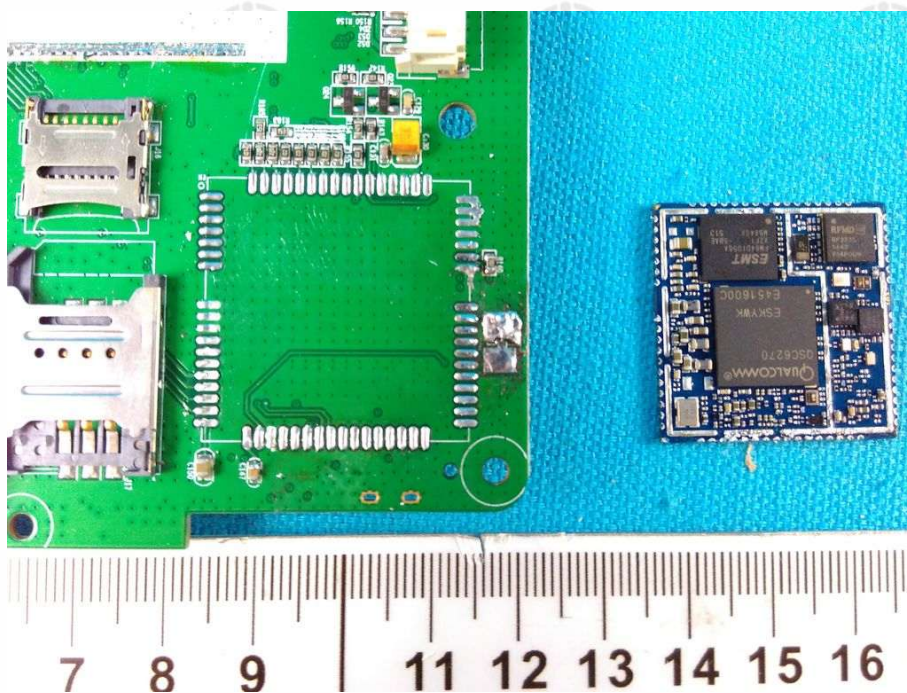
View of Product-17



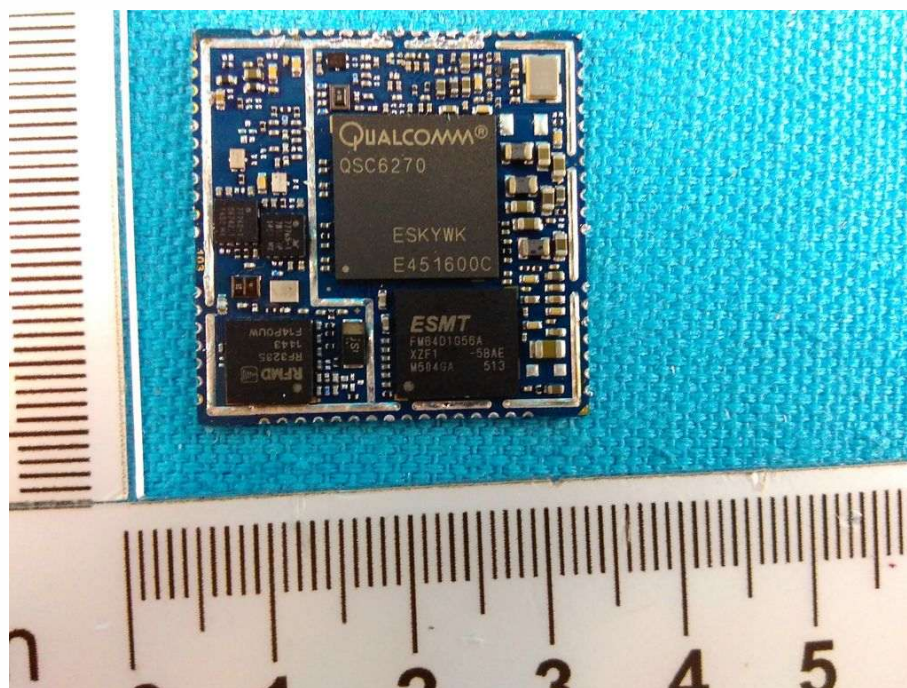
View of Product-18



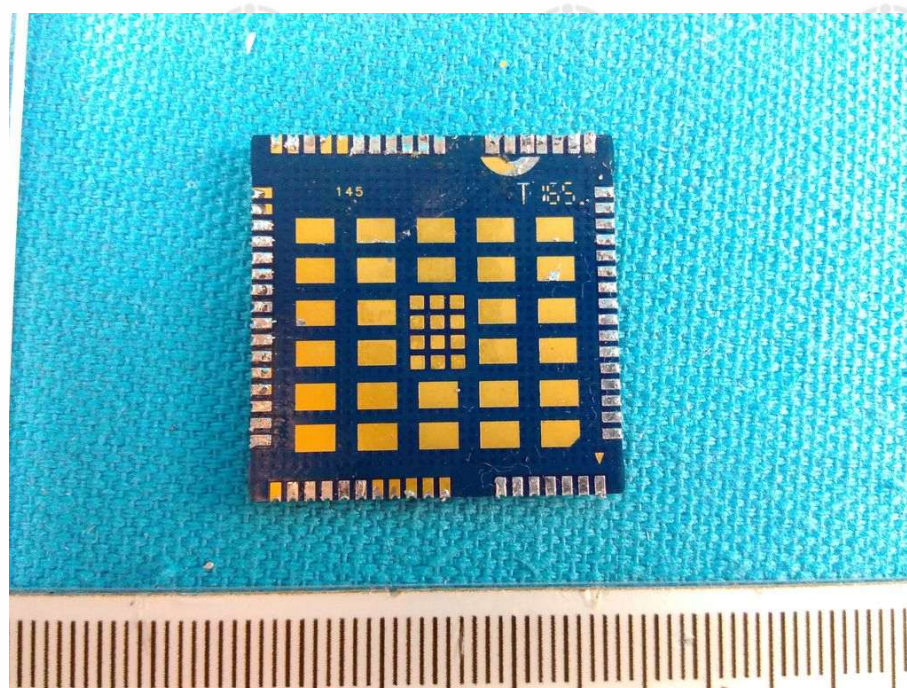
View of Product-19



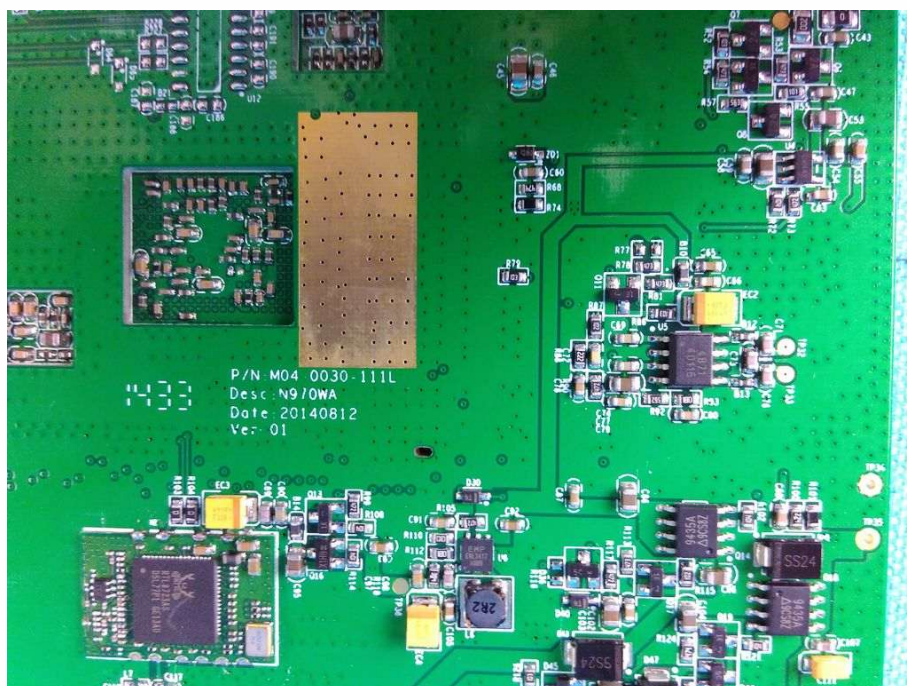
View of Product-20



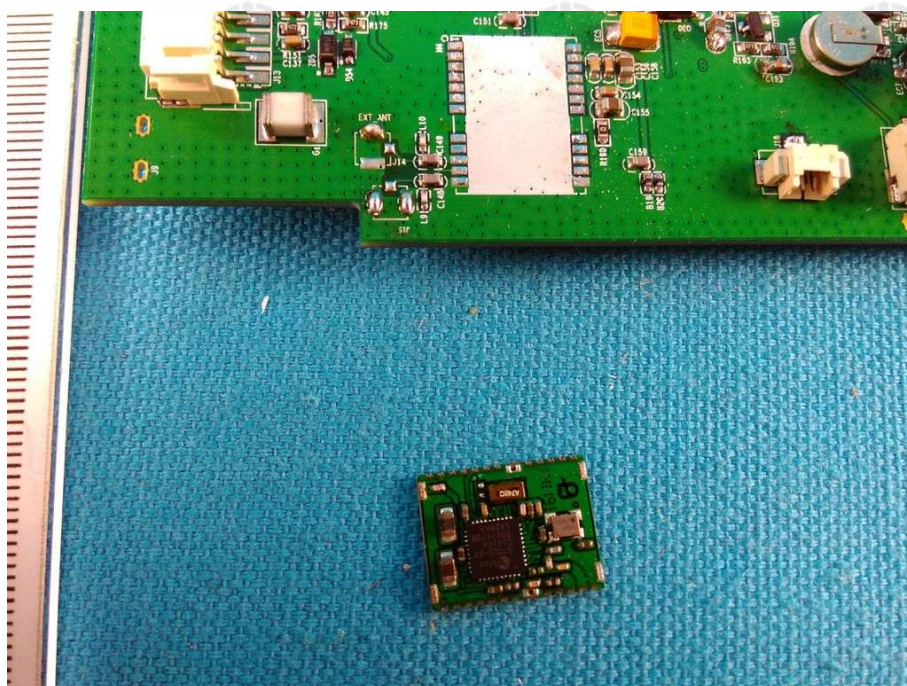
View of Product-21



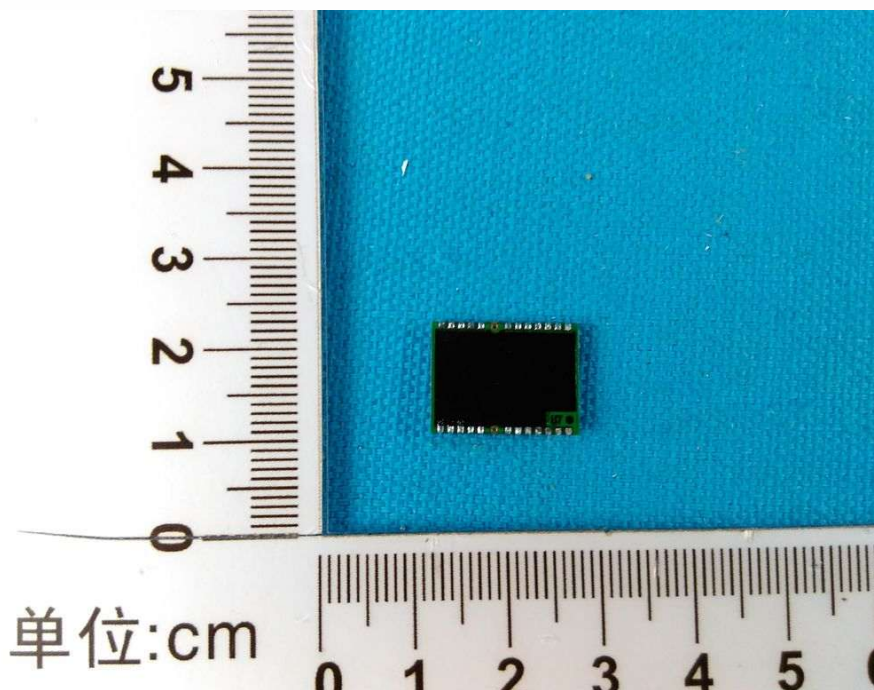
View of Product-22



View of Product-23



View of Product-24



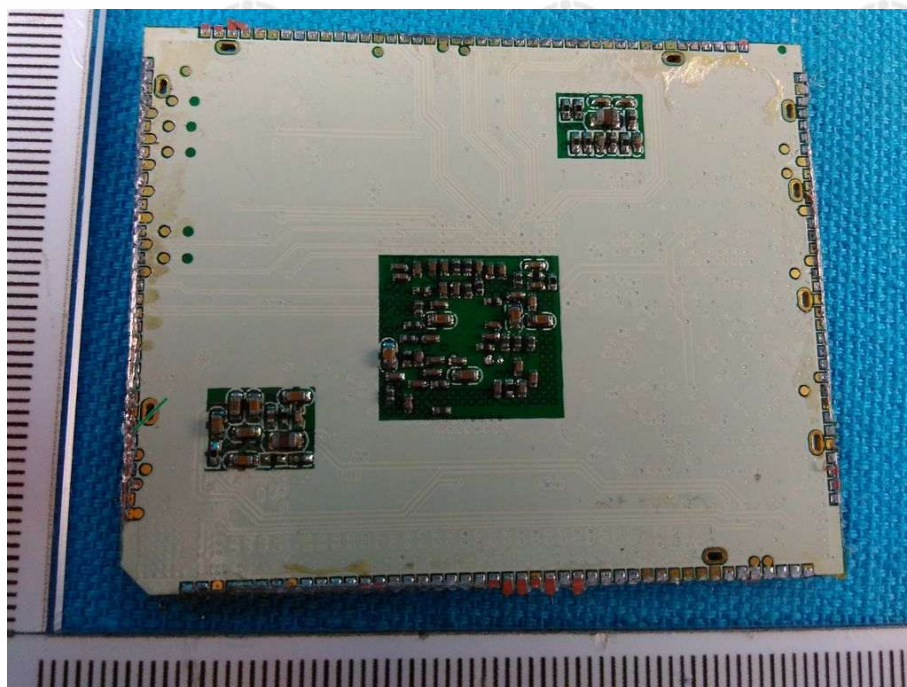
View of Product-25



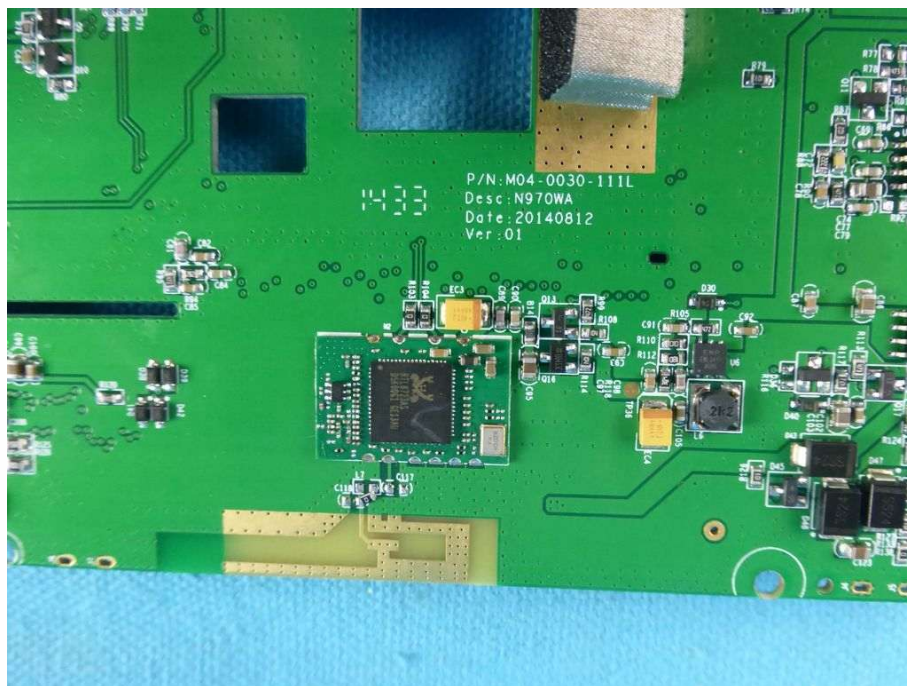
View of Product-26



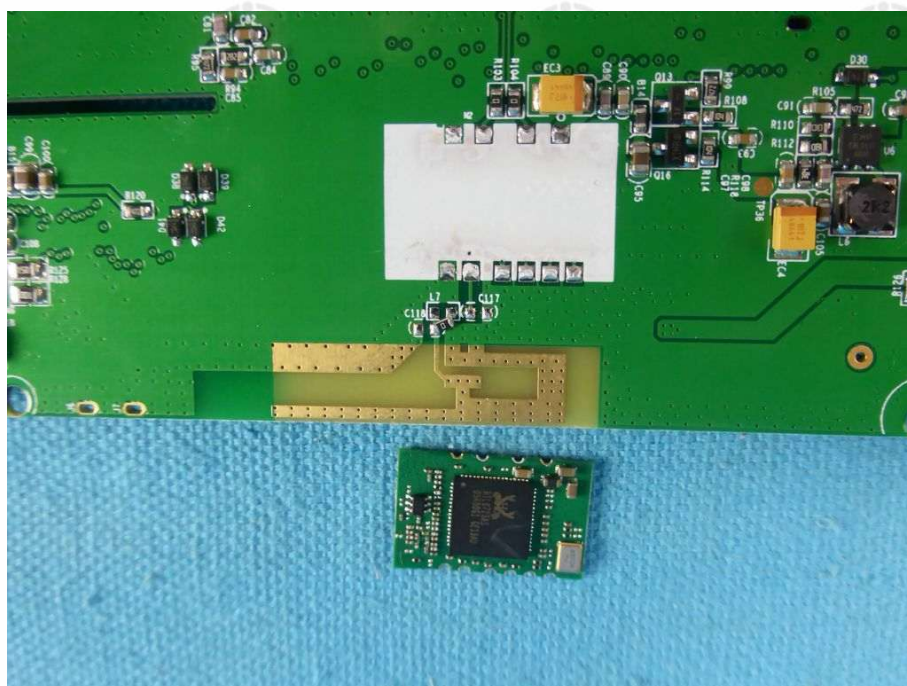
View of Product-27



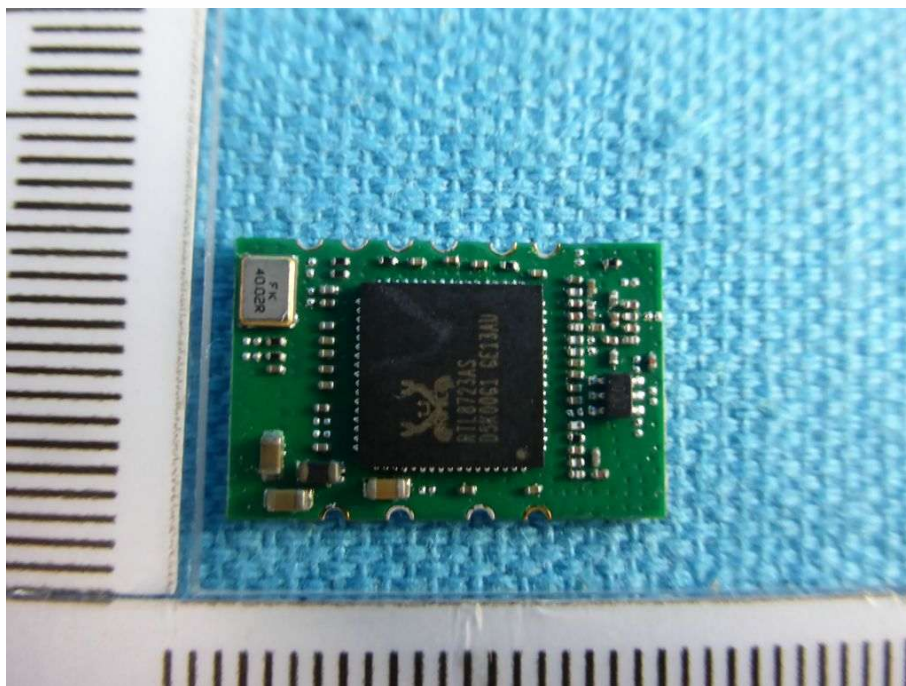
View of Product-28



View of Product-29



View of Product-30



View of Product-31



View of Product-32

*** End of Report ***

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