TEST REPORT

Product	:	7”Tablet PC
Trade mark	:	DragonTouch, KINGPAD, KINGSLIM, AKASO
Model/Type reference	:	S7, S70, S7 PLUS, S7 PRO, S7X, S7 KIDS
Serial Number	:	N/A
Report Number	:	EED32I00225101
FCC ID	:	S5V-D07S70
Date of Issue	:	Oct. 27, 2016
Test Standards	:	47 CFR Part 15 Subpart C (2015)
Test result	:	PASS

Prepared for:

PROEXPRESS DISTRIBUTOR LLC
11011 Greenwood Ave N 11011 Greenwood Ave N, Seattle Washington United States

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao’an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested By: Tom chen (Test Project)

Compiled by: Kevin yang (Project Engineer)

Reviewed by: Kevin Ian (Reviewer)

Approved by: Sheek Luo (Lab supervisor)

Date: Oct. 27, 2016

Check No.: 2496558845

2 Version

Version No.	Date	Description
00	Oct. 27, 2016	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	PASS
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

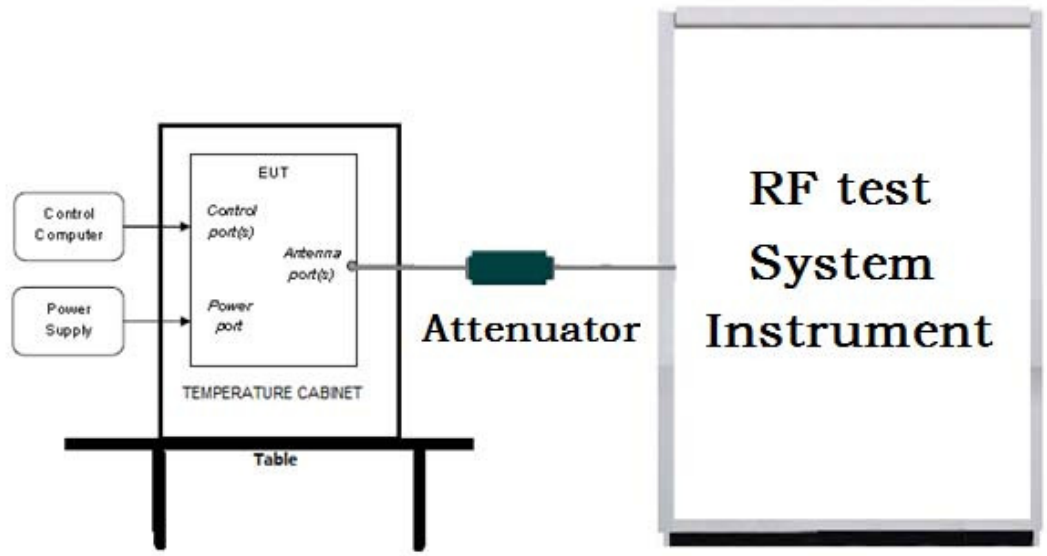
Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.
The tested sample and the sample information are provided by the client.
Model No.: S7, S70, S7 PLUS, S7 PRO, S7X, S7 KIDS
Only the model S7 was tested, the PCB, Schematic, Hardware etc were identical for the above models,
Only different model name due to difference agent and marketing purposes.

4 Content

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:

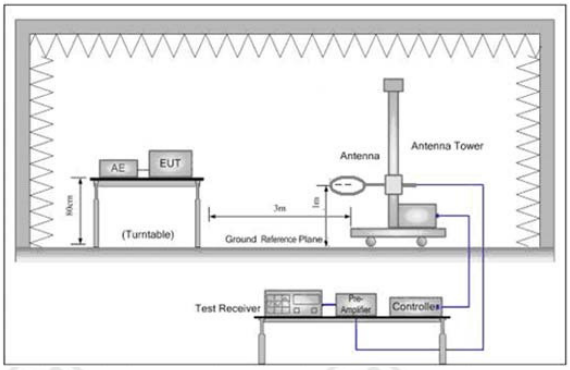


Figure 1. Below 30MHz

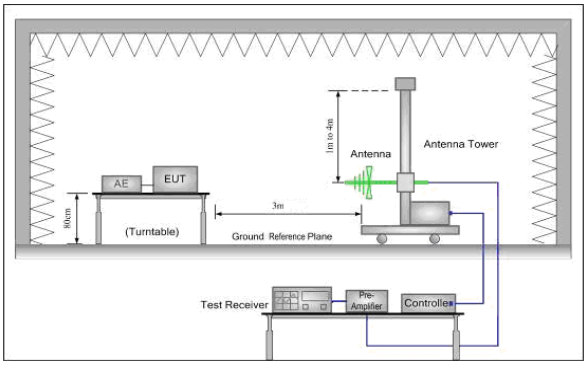


Figure 2. 30MHz to 1GHz

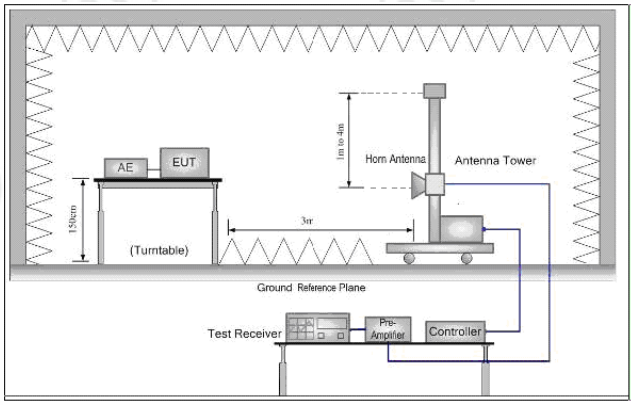
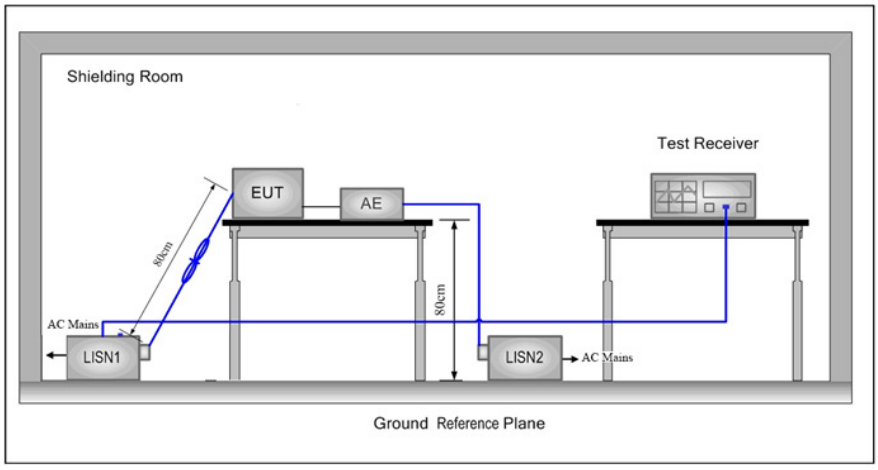


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	21°C
Humidity:	54% RH
Atmospheric Pressure:	10105mbar

5.3 Test Condition

Test Mode	Tx	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
Transmitting mode:	Keep the EUT at Transmit mode.			

Test mode:

Pre-scan under all rate at Lowest channel 1

Mode	**GFSK**		
packets	**1-DH1**	**1-DH3**	**1-DH5**
Power(dBm)	0.588	0.591	0.595

Mode	π/4DQPSK		
packets	**2-DH1**	**2-DH3**	**2-DH5**
Power(dBm)	1.461	1.550	1.554
Mode	8DPSK		
packets	**3-DH1**	**3-DH3**	**3-DH5**
Power(dBm)	1.399	1.405	1.410

Through Pre-scan, 1-DH5 packet the power is the worst case of GFSK, 2-DH5 packet the power is the worst case ofπ/4DQPSK, 3-DH5 packet the power is the worst case of 8DPSK.

6 General Information

6.1 Client Information

Applicant:	PROEXPRESS DISTRIBUTOR LLC
Address of Applicant:	11011 Greenwood Ave N 11011 Greenwood Ave N, Seattle Washington United States
Manufacturer:	PROEXPRESS DISTRIBUTOR LLC
Address of Manufacturer:	11011 Greenwood Ave N 11011 Greenwood Ave N, Seattle Washington United States
Factory:	PROEXPRESS DISTRIBUTOR LLC
Address of Factory:	11011 Greenwood Ave N 11011 Greenwood Ave N, Seattle Washington United States

6.2 General Description of EUT

Product Name:	7”Tablet PC
Model No.(EUT):	S7, S70, S7 PLUS, S7 PRO, S7X, S7 KIDS
Test Model No.:	S7
Trade Mark:	DragonTouch, KINGPAD, KINGSLIM, AKASO
EUT Supports Radios application:	Bluetooth V3.0+EDR, Bluetooth V4.0 BLE, WiFi b/g/n(HT20), GSM/GPRS/EDGE 850/1900, WCDMA/HSDPA HSUPA 850/1900
Power Supply:	Model: UBP-623-052000 Input: 100-240V~ 50/60Hz Output: 5.0V ⎓2000mA
Battery	Li-ion 3.7V 2700mAH
Sample Received Date:	Aug. 11, 2016
Sample tested Date:	Aug. 11, 2016 to Oct. 27, 2016

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	3.0+EDR
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Sample Type:	Portable production
Test Power Grade:	N/A
Test software of EUT	WLAN Test Version:1.0.4
Antenna Type:	Integral
Antenna Gain:	0.39dBi
Test voltage:	AC 120V/60Hz & AC 230V/50Hz

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, China 518101
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.: 886427

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 886427.

IC-Registration No.: 7408A-2

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-2 .

IC-Registration No.: 7408B-1

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-1.

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	04-01-2016	03-31-2017
Communication test set test set	Agilent	N4010A	MY51400230	04-01-2016	03-31-2017
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2016	03-31-2017
Signal Generator	Keysight	N5182B	MY53051549	04-01-2016	03-31-2017
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2016	01-11-2017
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-12-2016	01-11-2017
DC Power	Keysight	E3642A	MY54436035	04-01-2016	03-31-2017
PC-1	Lenovo	R4960d	---	04-01-2016	03-31-2017
power meter & power sensor	R&S	OSP120	101374	04-01-2016	03-31-2017
RF control unit	JS Tonscend	JS0806-2	158060006	04-01-2016	03-31-2017
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	04-01-2016	03-31-2017

Conducted disturbance Test					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100009	06-16-2016	06-15-2017
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	04-26-2017
Communication test set	Agilent	E5515C	GB47050534	04-01-2016	03-31-2017
Communication test set	R&S	CMW500	152394	04-01-2016	03-31-2017
LISN	R&S	ENV216	100098	06-16-2016	06-15-2017
LISN	schwarzbeck	NNLK8121	8121-529	06-16-2016	06-15-2017
Voltage Probe	R&S	ESH2-Z3	--	07-09-2014	07-07-2017
Current Probe	R&S	EZ17	100106	06-16-2016	06-15-2017
ISN	TESEQ GmbH	ISN T800	30297	01-29-2015	01-27-2017

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-484	05-23-2016	05-22-2017
Microwave Preamplifier	Agilent	8449B	3008A02425	02-04-2016	02-03-2017
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Horn Antenna	A.H.SYSTEMS	SAS-574	374	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-16-2016	06-15-2017
Receiver	R&S	ESCI	100435	06-16-2016	06-15-2017
Multi device Controller	maturo	NCD/070/10711 112	---	01-12-2016	01-11-2017
LISN	schwarzbeck	NNBM8125	81251547	06-16-2016	06-15-2017
LISN	schwarzbeck	NNBM8125	81251548	06-16-2016	06-15-2017
Signal Generator	Agilent	E4438C	MY45095744	04-01-2016	03-31-2017
Signal Generator	Keysight	E8257D	MY53401106	04-01-2016	03-31-2017
Temperature/ Humidity Indicator	TAYLOR	1451	1905	04-27-2016	04-26-2017
Communication test set	Agilent	E5515C	GB47050534	04-01-2016	03-31-2017
Cable line	Fulai(7M)	SF106	5219/6A	01-12-2016	01-11-2017
Cable line	Fulai(6M)	SF106	5220/6A	01-12-2016	01-11-2017
Cable line	Fulai(3M)	SF106	5216/6A	01-12-2016	01-11-2017
Cable line	Fulai(3M)	SF106	5217/6A	01-12-2016	01-11-2017
Communication test set	R&S	CMW500	152394	04-01-2016	03-31-2017
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2016	01-11-2017
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2016	01-11-2017
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-12-2016	01-11-2017

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C (2015)	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

Test Results List:

Test requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(1)	ANSI 63.10	20dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (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 Section 15.247 (b)	ANSI 63.10	Hopping Channel Number	PASS	Appendix D)
Part15C Section 15.247 (b)(1)	ANSI 63.10	Conducted Peak Output Power	PASS	Appendix E)
Part15C Section 15.247(d)	ANSI 63.10	Band-edge for RF Conducted Emissions	PASS	Appendix F)
Part15C Section 15.247(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 Section 15.207	ANSI 63.10	AC Power Line Conducted Emission	PASS	Appendix J)
Part15C Section 15.205/15.209	ANSI 63.10	Restricted bands around fundamental frequency (Radiated) Emission)	PASS	Appendix K)
Part15C Section 15.205/15.209	ANSI 63.10	Radiated Spurious Emissions	PASS	Appendix L)

Appendix A): 20dB Occupied Bandwidth

Test Result

Mode	Channel.	20dB Bandwidth [MHz]	99% OBW [MHz]	Verdict	Remark
GFSK	LCH	0.7697	0.80390	PASS	Peak detector
GFSK	MCH	0.7650	0.79708	PASS	
GFSK	HCH	0.7622	0.80400	PASS	
π/4DQPSK	LCH	1.187	1.1309	PASS	
π/4DQPSK	MCH	1.181	1.1216	PASS	
π/4DQPSK	HCH	1.183	1.1356	PASS	
8DPSK	LCH	1.177	1.1024	PASS	
8DPSK	MCH	1.176	1.1092	PASS	
8DPSK	HCH	1.172	1.1140	PASS	

Test Graph

Graphs			
GFSK/LCH			
GFSK/MCH			
GFSK/HCH			

π/4DQPSK/LCH			
π/4DQPSK/MCH			
π/4DQPSK/HCH			

8DPSK/LCH			
8DPSK/MCH			
8DPSK/HCH			

Appendix B): Carrier Frequency Separation

Result Table

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
GFSK	LCH	1.000	PASS
GFSK	MCH	1.000	PASS
GFSK	HCH	1.000	PASS
π/4DQPSK	LCH	1.000	PASS
π/4DQPSK	MCH	1.000	PASS
π/4DQPSK	HCH	1.000	PASS
8DPSK	LCH	1.002	PASS
8DPSK	MCH	1.002	PASS
8DPSK	HCH	1.000	PASS

Test Graph

Graphs			
GFSK/LCH			
GFSK/MCH			
GFSK/HCH			

π/4DQPSK/LCH			
π/4DQPSK/MCH			
π/4DQPSK/HCH			

8DPSK/LCH			
8DPSK/MCH			
8DPSK/HCH			

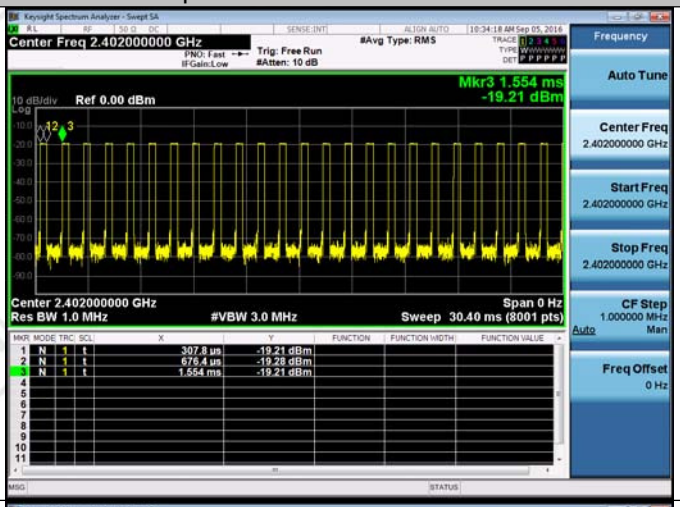
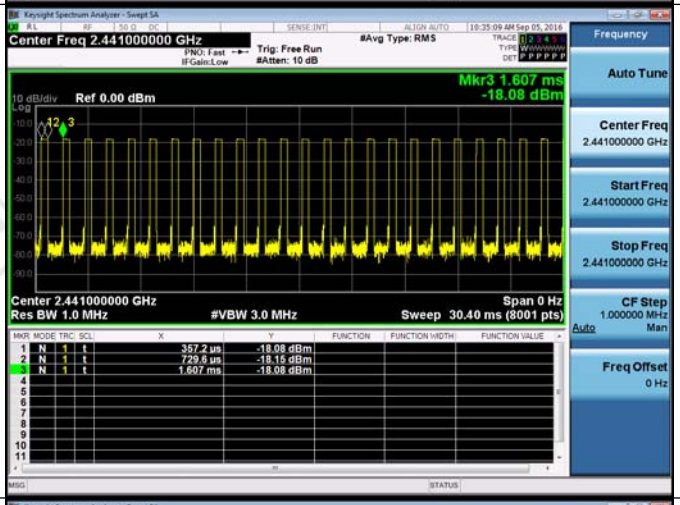
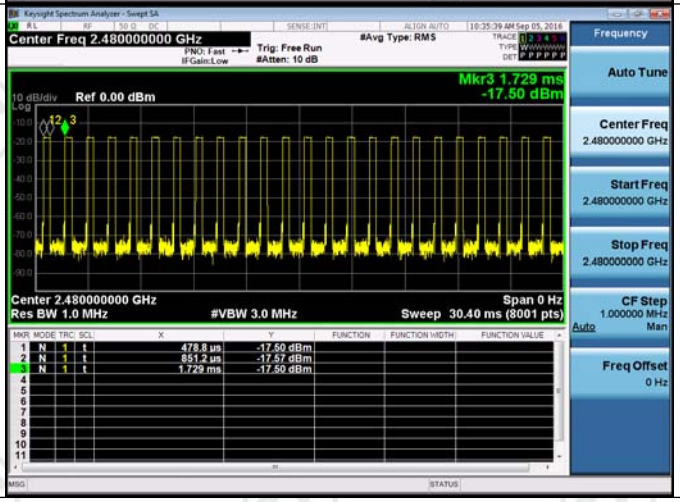
Appendix C): Dwell Time

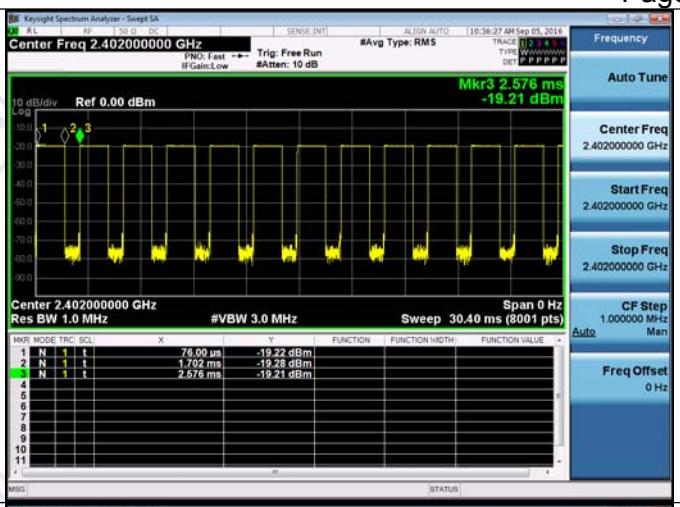
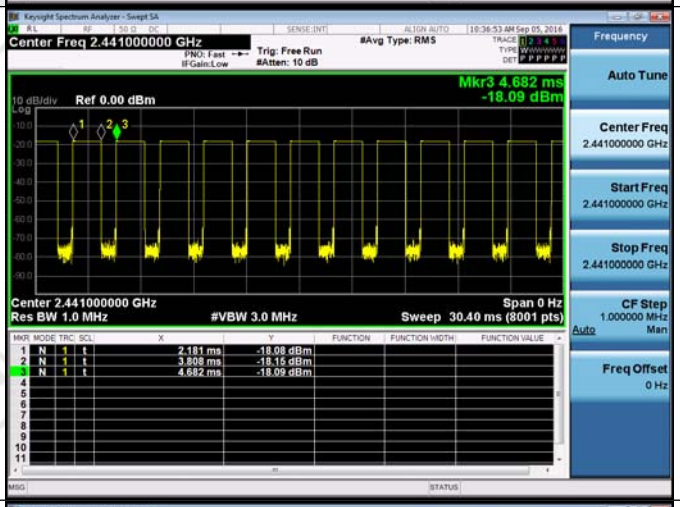
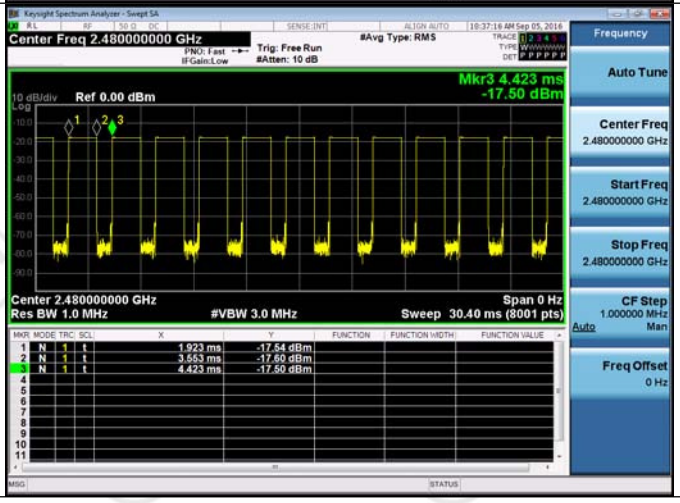
Result Table

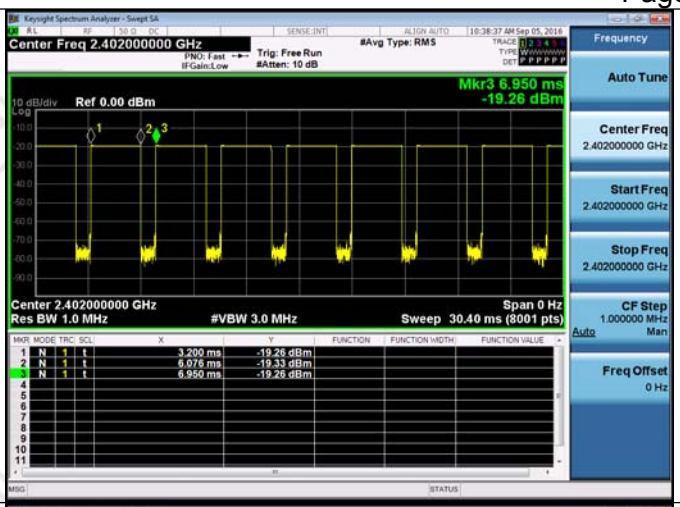
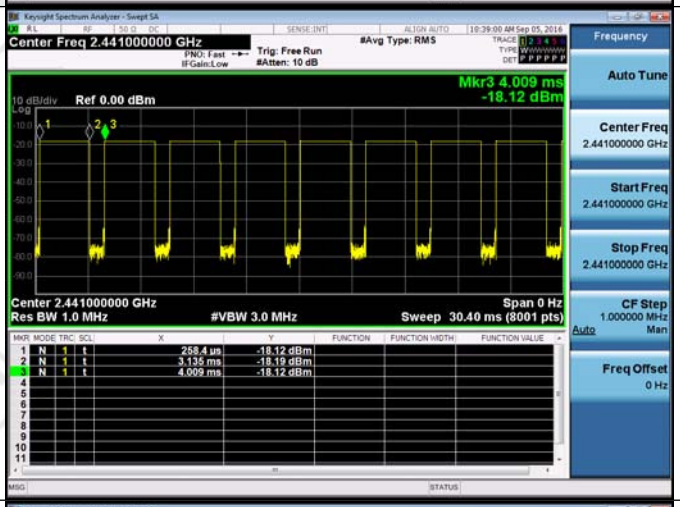
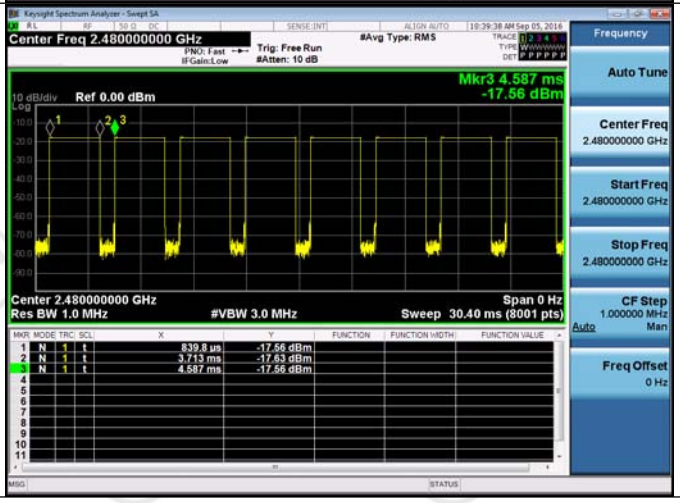
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Duty Cycle [%]	Verdict
GFSK	DH1	LCH	0.3686	320	0.118	0.30	PASS
GFSK	DH1	MCH	0.3724	320	0.119	0.30	PASS
GFSK	DH1	HCH	0.3724	320	0.119	0.30	PASS
GFSK	DH3	LCH	1.6264	160	0.26	0.65	PASS
GFSK	DH3	MCH	1.6264	160	0.26	0.65	PASS
GFSK	DH3	HCH	1.6302	160	0.261	0.65	PASS
GFSK	DH5	LCH	2.8766	106.7	0.307	0.77	PASS
GFSK	DH5	MCH	2.8766	106.7	0.307	0.77	PASS
GFSK	DH5	HCH	2.8728	106.7	0.307	0.77	PASS

Remark : All modes are tested, only the worst mode GFSK is reported.

Test Graph

Graphs		
GFSK_DH1/LCH		
GFSK_DH1/MCH		
GFSK_DH1/HCH		

GFSK_DH3/LCH		
GFSK_DH3/MCH		
GFSK_DH3/HCH		

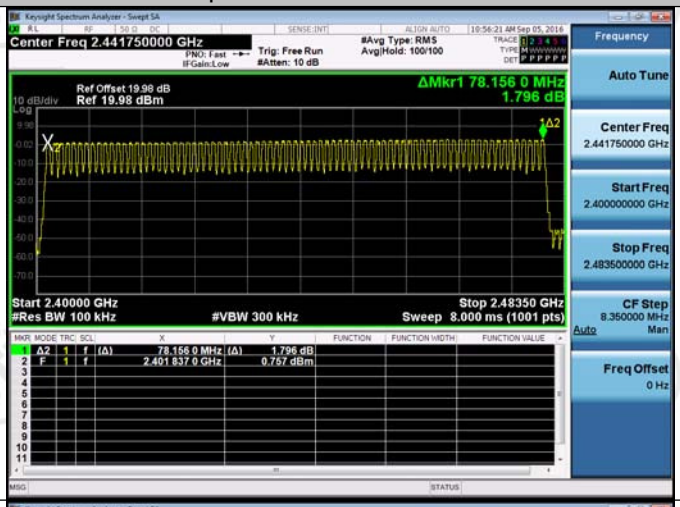
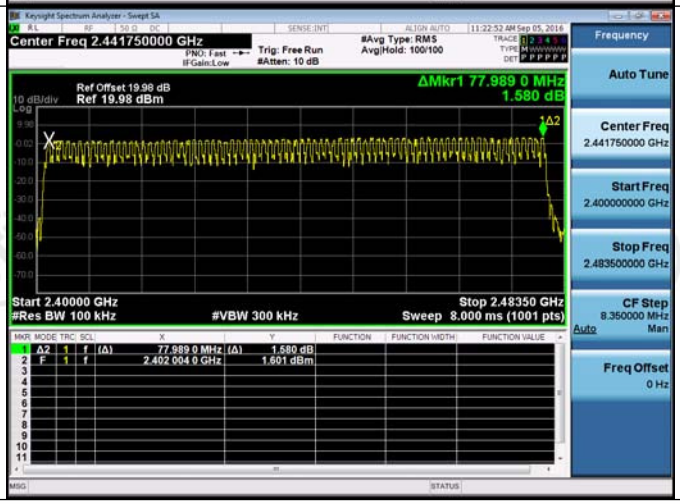
GFSK_DH5/LCH		
GFSK_DH5/MCH		
GFSK_DH5/HCH		

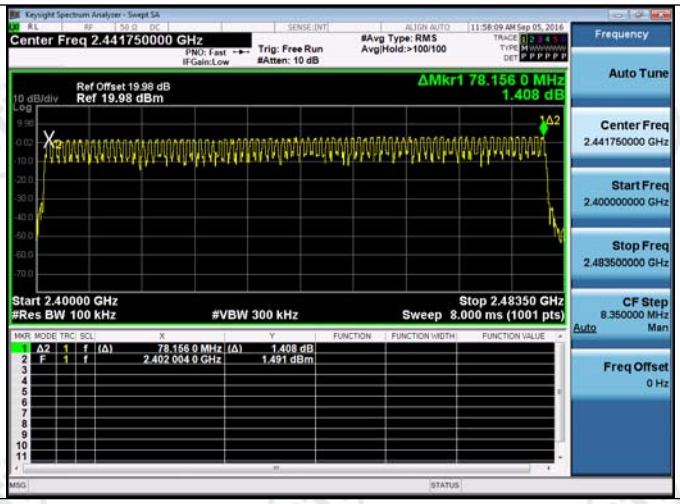
Appendix D): Hopping Channel Number

Result Table

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

Test Graph

Graphs			
GFSK/Hop			
π/4DQPSK/Hop			

8DPSK/Hop		 Keysight Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold:>100/100 11:58:09 AM Sep 05, 2016 Frequency Auto Tune ΔMkr1 78.156 0 MHz 1.408 dB Ref Offset 19.98 dB 10 dB/div Ref 19.98 dBm Log Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Auto Man Freq Offset 0 Hz Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (1001 pts) 1 Δ2 1 f (Δ) 78.156 0 MHz (Δ) 1.408 dB 2 F 1 f 2.402 004 0 GHz 1.491 dBm MSG STATUS	

Appendix E): Conducted Peak Output Power

Result Table

Mode	Channel.	Maximum Peak Output Power [dBm]	Verdict
GFSK	LCH	0.595	PASS
GFSK	MCH	1.880	PASS
GFSK	HCH	2.492	PASS
π/4DQPSK	LCH	1.554	PASS
π/4DQPSK	MCH	2.601	PASS
π/4DQPSK	HCH	3.142	PASS
8DPSK	LCH	1.410	PASS
8DPSK	MCH	2.459	PASS
8DPSK	HCH	3.016	PASS

Test Graph

Graphs			
GFSK/LCH			
GFSK/MCH			
GFSK/HCH			

π/4DQPSK/LCH			
π/4DQPSK/MCH			
π/4DQPSK/HCH			

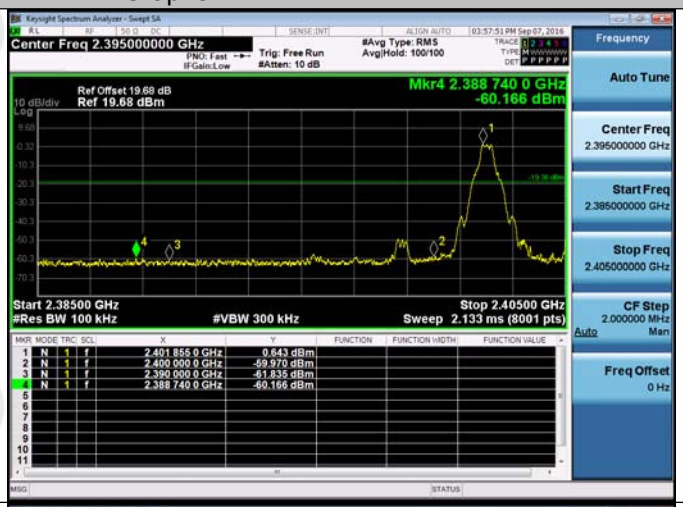
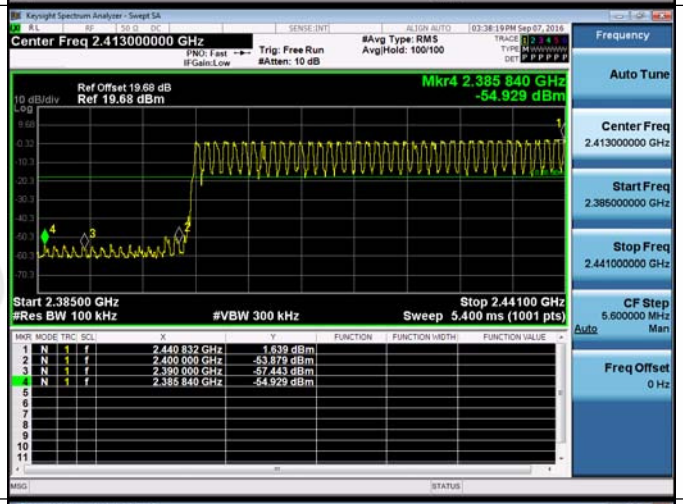
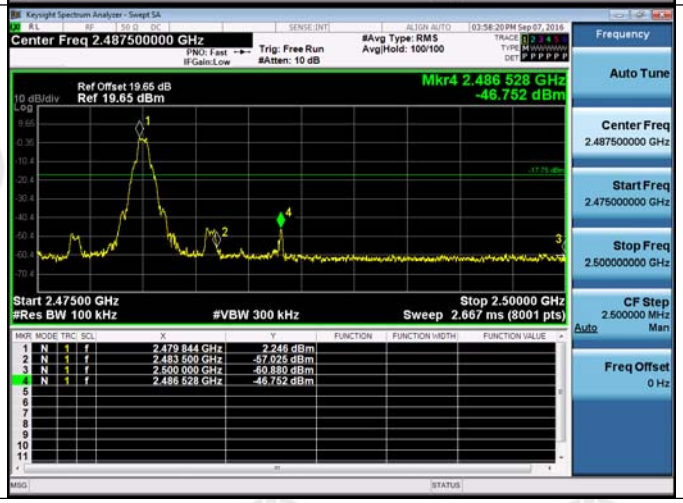
8DPSK/LCH			
8DPSK/MCH			
8DPSK/HCH			

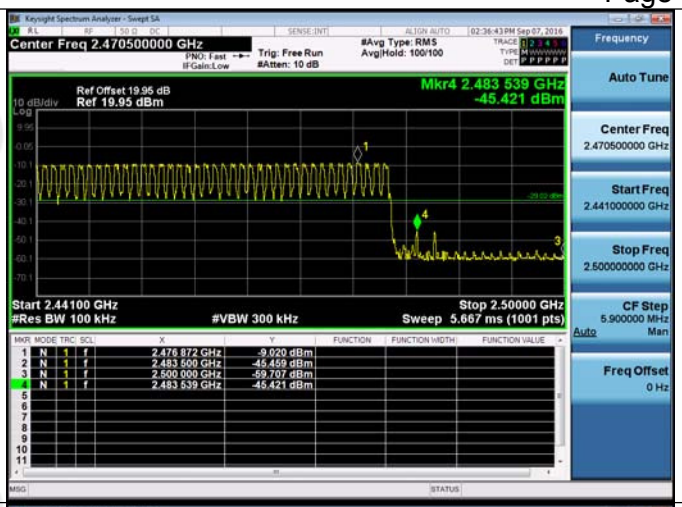
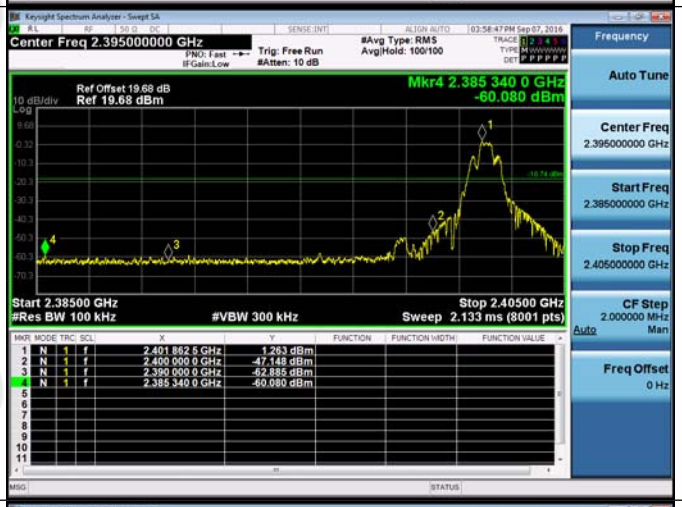
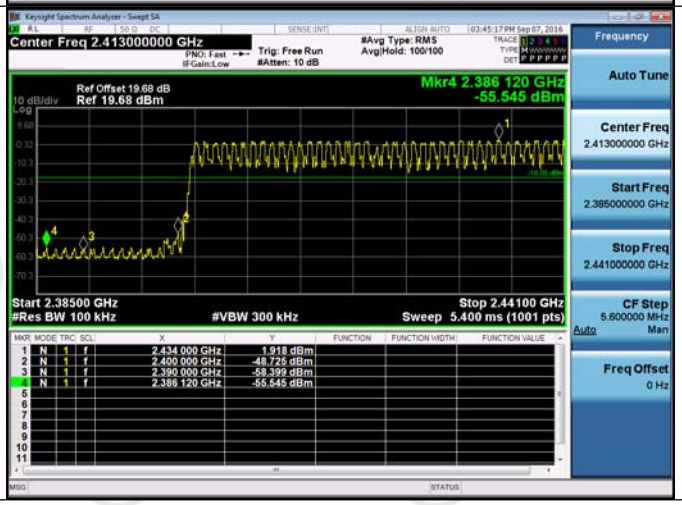
Appendix F): Band-edge for RF Conducted Emissions

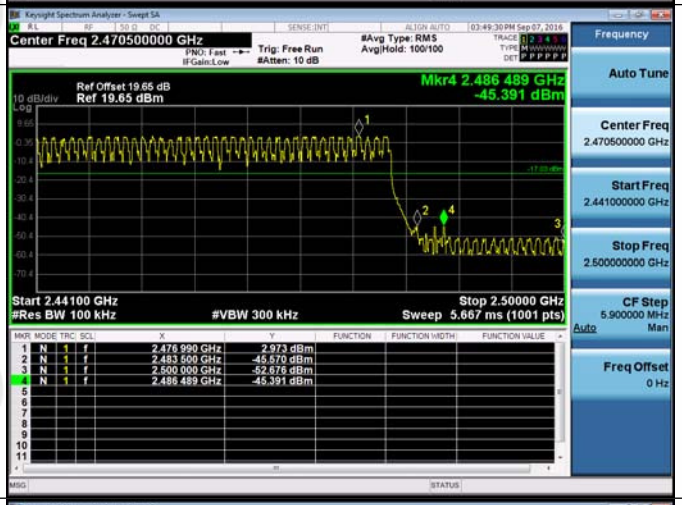
Result Table

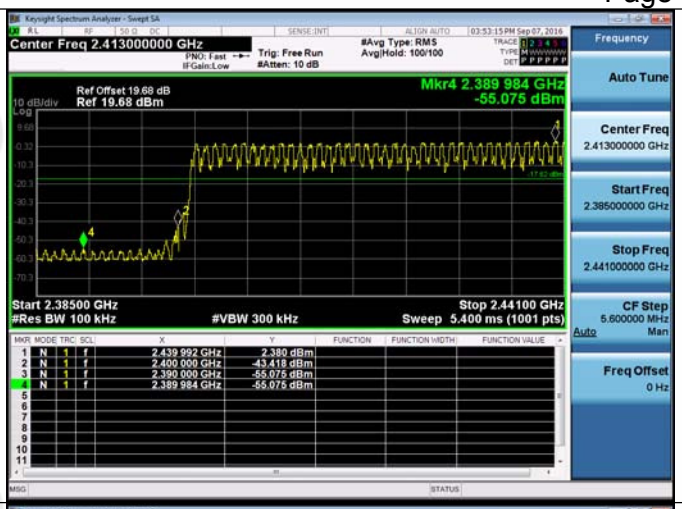
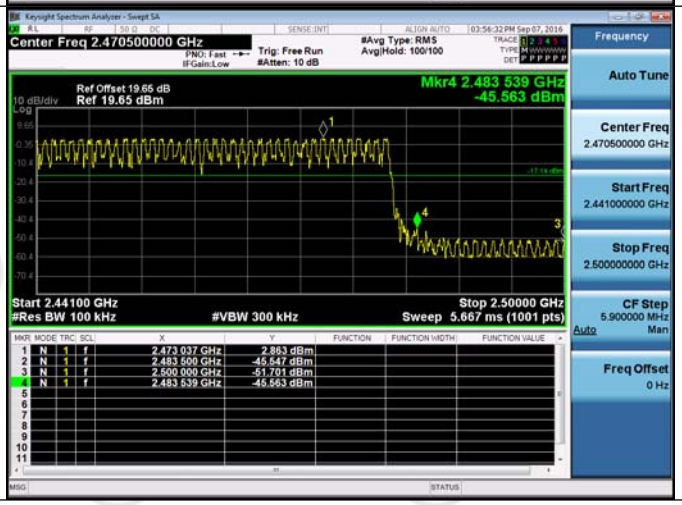
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.643	Off	-60.166	-19.36	PASS
			1.639	On	-54.929	-18.36	PASS
GFSK	HCH	2480	2.246	Off	-46.752	-17.75	PASS
			-9.020	On	-45.421	-29.02	PASS
π/4DQPSK	LCH	2402	1.263	Off	-60.080	-18.74	PASS
			1.918	On	-55.545	-18.08	PASS
π/4DQPSK	HCH	2480	2.436	Off	-46.310	-17.56	PASS
			2.973	On	-45.391	-17.03	PASS
8DPSK	LCH	2402	0.849	Off	-60.840	-19.15	PASS
			2.380	On	-55.075	-17.62	PASS
8DPSK	HCH	2480	2.611	Off	-46.024	-17.39	PASS
			2.863	On	-45.563	-17.14	PASS

Test Graph

Graphs		
GFSK/LCH/No Hop		
GFSK/LCH/Hop		
GFSK/HCH/No Hop		

GFSK/HCH/Hop		
π/4DQPSK/LCH/No Hop		
π/4DQPSK/LCH/Hop		

π/4DQPSK/HCH/No Hop		
π/4DQPSK/HCH/Hop		
8DPSK/LCH/No Hop		

8DPSK/LCH/Hop		
8DPSK/HCH/No Hop		
8DPSK/HCH/Hop		

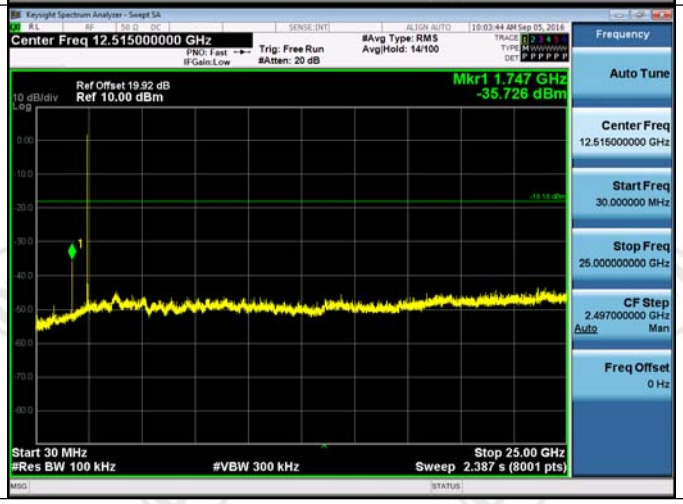
Appendix G): RF Conducted Spurious Emissions

Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
GFSK	LCH	0.537	<Limit	PASS
GFSK	MCH	1.821	<Limit	PASS
GFSK	HCH	2.434	<Limit	PASS
π/4DQPSK	LCH	1.422	<Limit	PASS
π/4DQPSK	MCH	2.434	<Limit	PASS
π/4DQPSK	HCH	3.023	<Limit	PASS
8DPSK	LCH	1.344	<Limit	PASS
8DPSK	MCH	2.423	<Limit	PASS
8DPSK	HCH	2.929	<Limit	PASS

Test Graph

GFSK_LCH_Graphs		
Pref		
Puw		

GFSK_MCH_Graphs		
Pref		
Puw		

GFSK_HCH_Graphs		
Pref		

Puw	

π/4DQPSK_LCH_Graphs	
Pref	
Puw	

π/4DQPSK_MCH_Graphs		
Pref		
Puw		

π/4DQPSK_HCH_Graphs		
Pref		

Puw	

8DPSK_LCH_Graphs	
Pref	
Puw	

8DPSK_MCH_Graphs		
Pref		
Puw		

8DPSK_HCH_Graphs		
Pref		

Puw		 Keysight Spectrum Analyzer - Swept SA Center Freq 12.515000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB #Avg Type: RMS Avg|Hold: 14/100 10:33:33 AM Sep 05, 2016 Frequency Auto Tune Ref Offset 19.95 dB 10 dB/div Ref 10.00 dBm Mkr1 24.916 GHz -43.431 dBm Center Freq 12.515000000 GHz Start Freq 30.000000 MHz Stop Freq 25.000000000 GHz CF Step 2.497000000 GHz Auto Man Freq Offset 0 Hz Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Stop 25.00 GHz Sweep 2.387 s (8001 pts) MSG STATUS

Appendix H): Pseudorandom Frequency Hopping Sequence

Test Requirement:	47 CFR Part 15**C Section 15.247 (a)(1) requirement:**

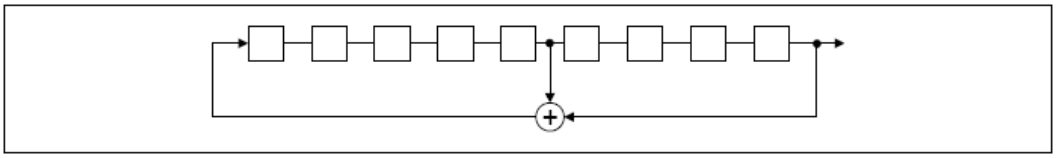
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

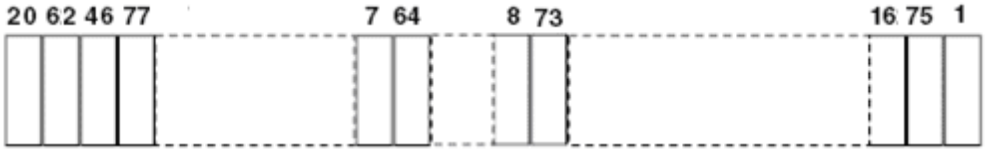
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized 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)



Linear Feedback Shift Register for Generation of the PRBS sequence

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:

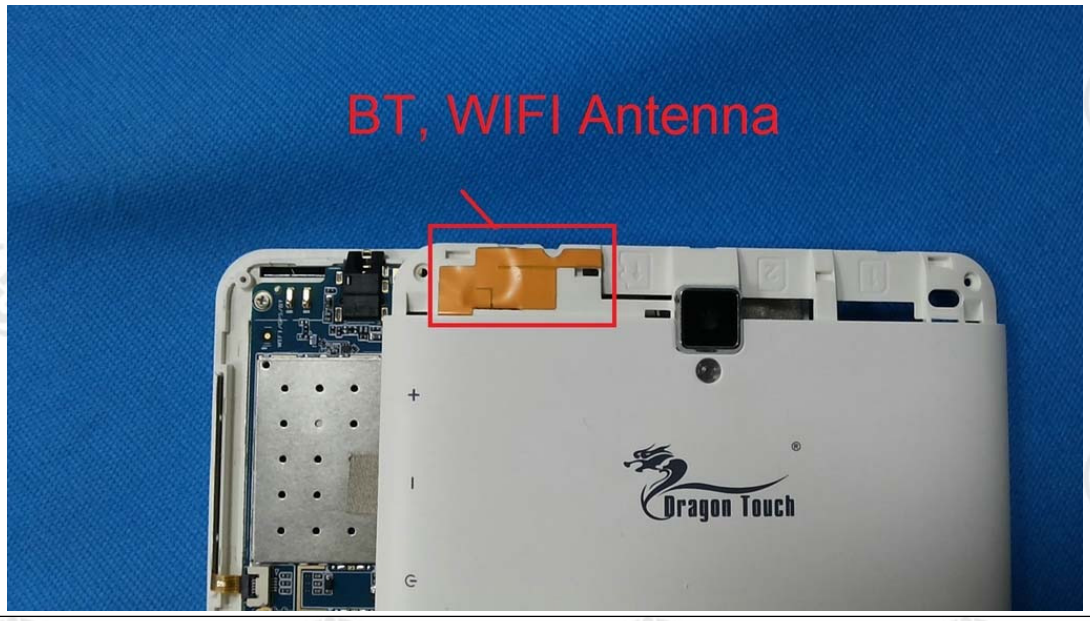
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 0.39dBi.



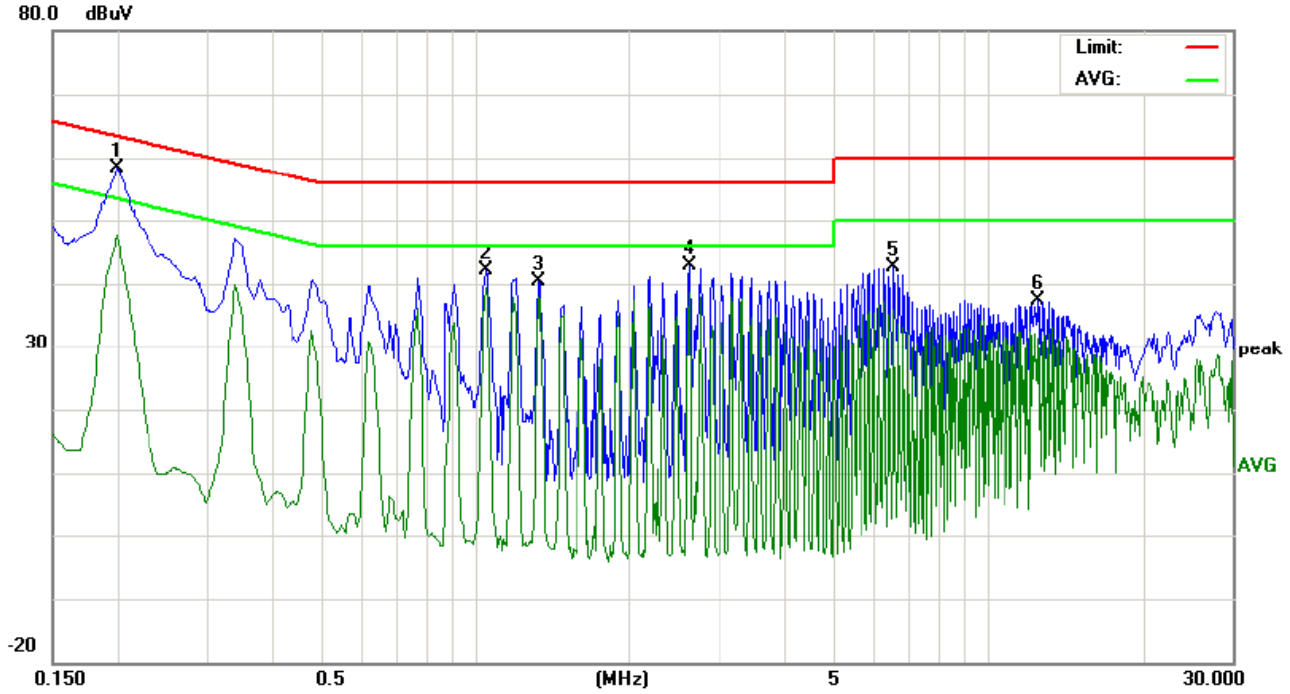
Appendix J): AC Power Line Conducted Emission

<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1)The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency</td></tr>
</table>

Measurement Data

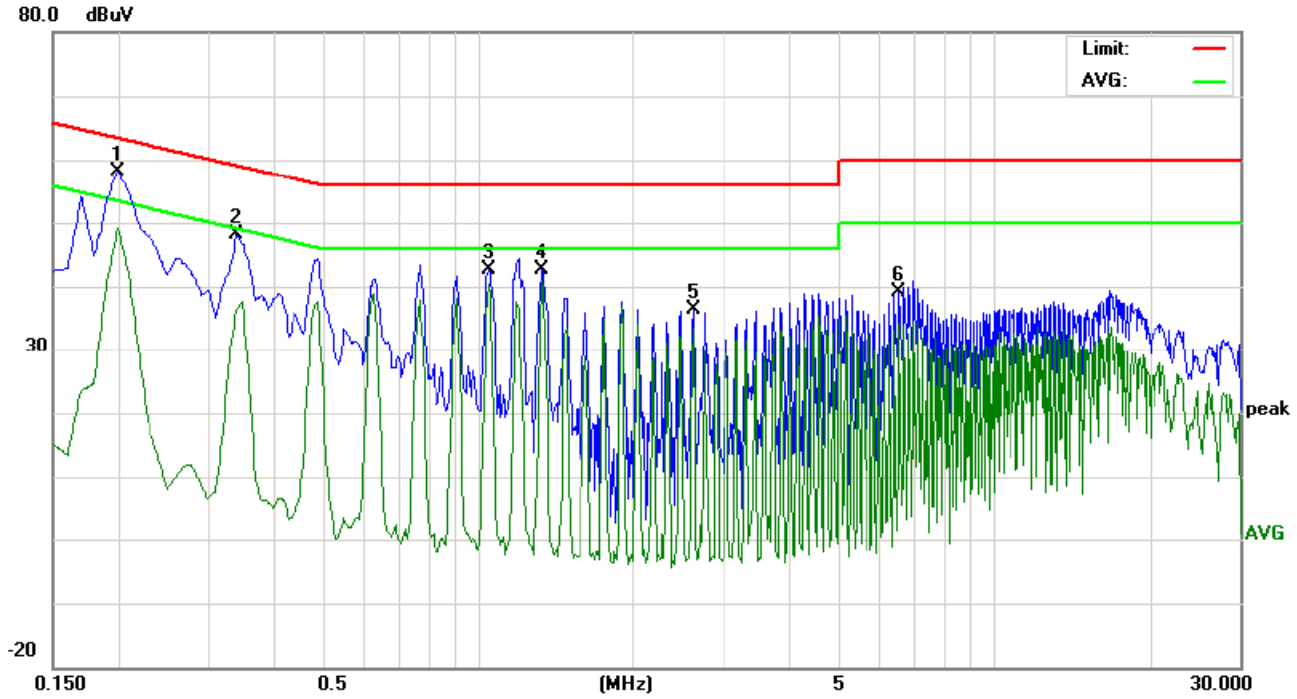
An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.2000	48.77	43.20	37.84	9.80	58.57	53.00	47.64	63.61	53.61	-10.61	-5.97	P	
2	1.0500	32.22		29.33	10.00	42.22		39.33	56.00	46.00	-13.78	-6.67	P	
3	1.3300	30.26		27.78	10.00	40.26		37.78	56.00	46.00	-15.74	-8.22	P	
4	2.6099	32.76		28.66	10.00	42.76		38.66	56.00	46.00	-13.24	-7.34	P	
5	6.5799	32.60		25.90	10.00	42.60		35.90	60.00	50.00	-17.40	-14.10	P	
6	12.5198	27.36		21.38	10.05	37.41		31.43	60.00	50.00	-22.59	-18.57	P	

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.2000	48.33	43.15	39.37	9.80	58.13	52.95	49.17	63.61	53.61	-10.66	-4.44	P	
2	0.3400	38.30		26.62	9.84	48.14		36.46	59.20	49.20	-11.06	-12.74	P	
3	1.0500	32.71	31.00	30.41	10.00	42.71	41.00	40.41	56.00	46.00	-15.00	-5.59	P	
4	1.3300	32.59	31.70	30.81	10.00	42.59	41.70	40.81	56.00	46.00	-14.30	-5.19	P	
5	2.6099	26.48		23.44	10.00	36.48		33.44	56.00	46.00	-19.52	-12.56	P	
6	6.5799	29.20		24.18	10.00	39.20		34.18	60.00	50.00	-20.80	-15.82	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. AC120V and 240V are tested and found the worst case is 120V, So only the 120V data were shown in the above.

Appendix K): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	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 camber. 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 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. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

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 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).

h. b. Test the EUT in the lowest channel , the Highest channel

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.

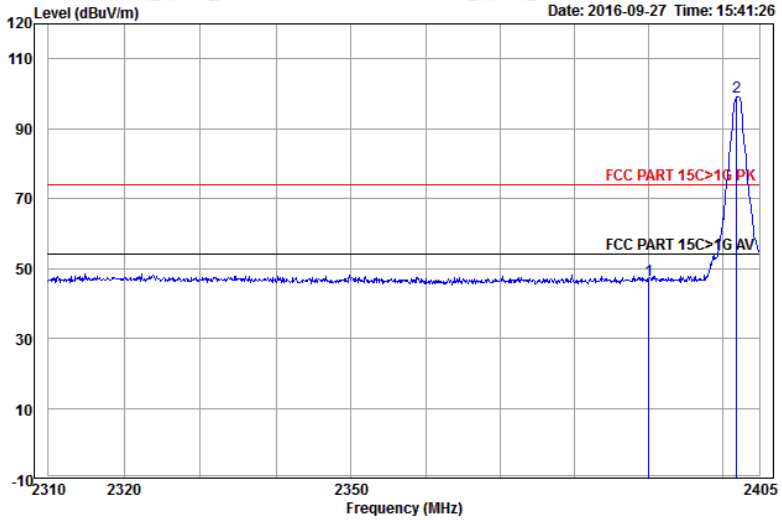
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Limit (dBμV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

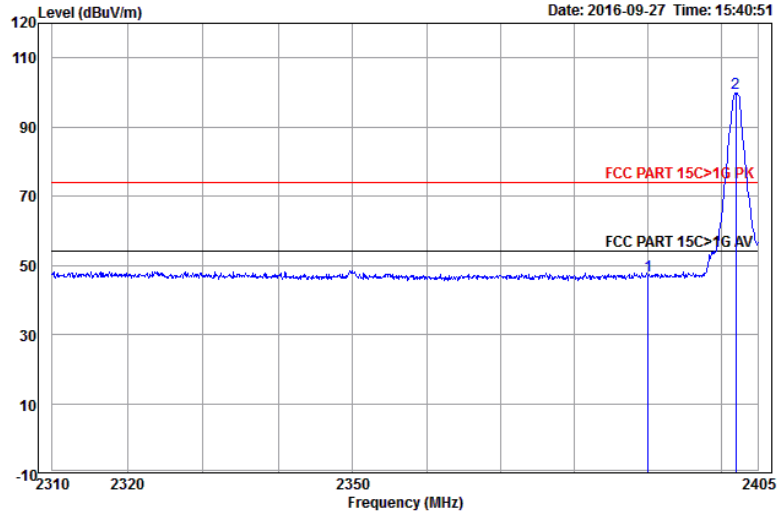
Test plot as follows:

Worse case mode:	GFSK(1-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



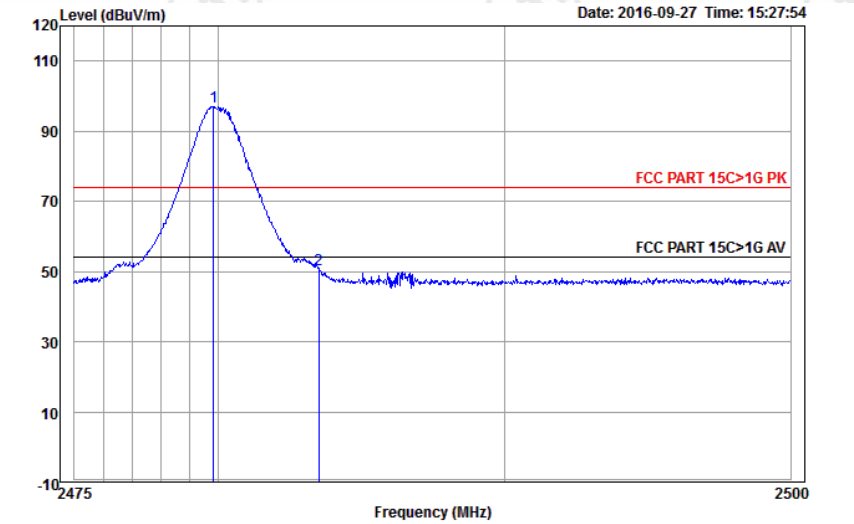
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	44.34	46.76	74.00	-27.24	Horizontal	
2 pp	2401.900	32.56	4.31	34.39	96.76	99.24	74.00	25.24	Horizontal	

Worse case mode:	GFSK(1-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



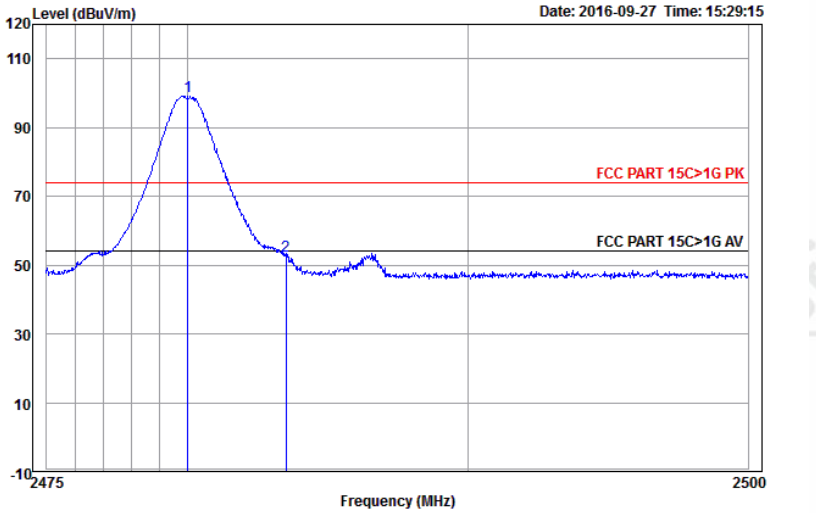
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	44.78	47.20	74.00	-26.80	Vertical	
2 pp	2401.997	32.56	4.31	34.39	97.45	99.93	74.00	25.93	Vertical	

Worse case mode:	GFSK(1-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



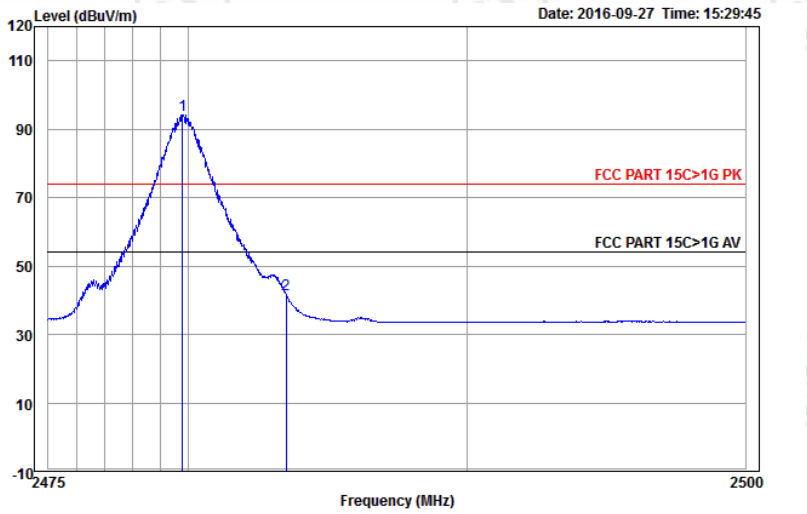
Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp 2479.830	32.71	4.50	34.41	94.09	96.89	74.00	22.89	Horizontal	
2 2483.500	32.71	4.51	34.41	47.76	50.57	74.00	-23.43	Horizontal	

Worse case mode:	GFSK(1-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



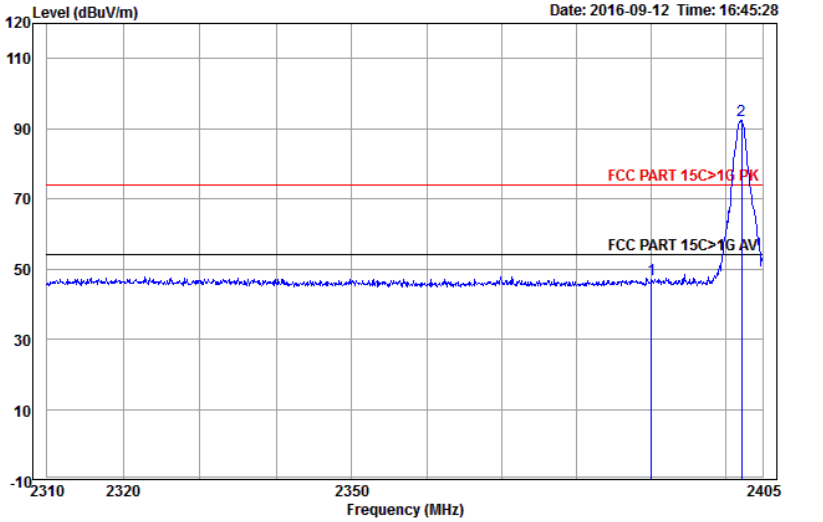
Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp 2480.005	32.71	4.50	34.41	96.23	99.03	74.00	25.03	Vertical	
2 2483.500	32.71	4.51	34.41	49.86	52.67	74.00	-21.33	Vertical	

Worse case mode:	GFSK(1-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: Average



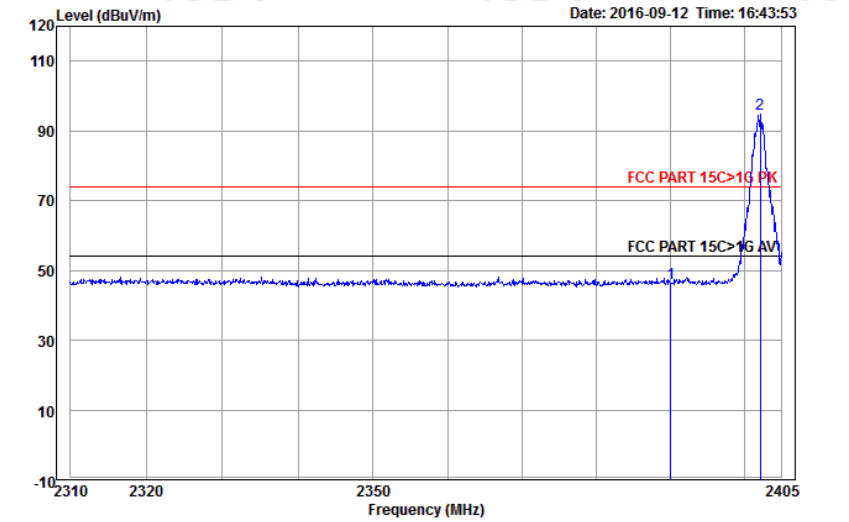
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.805	32.71	4.50	34.41	91.46	94.26	54.00	40.26	Vertical	Average
2	2483.500	32.71	4.51	34.41	38.87	41.68	54.00	-12.32	Vertical	Average

Worse case mode:	π/4DQPSK(2-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



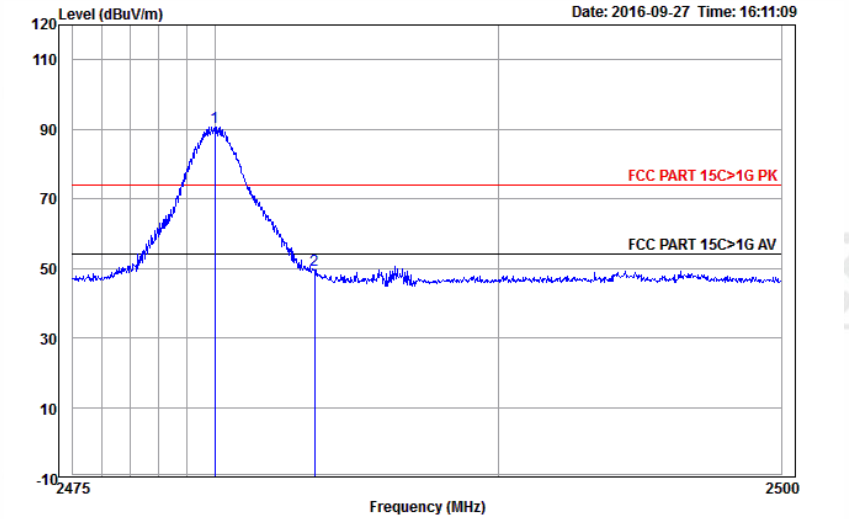
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	44.44	46.86	74.00	-27.14	Horizontal	
2 pp	2402.191	32.56	4.31	34.39	89.93	92.41	74.00	18.41	Horizontal	

Worse case mode:	π/4DQPSK(2-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



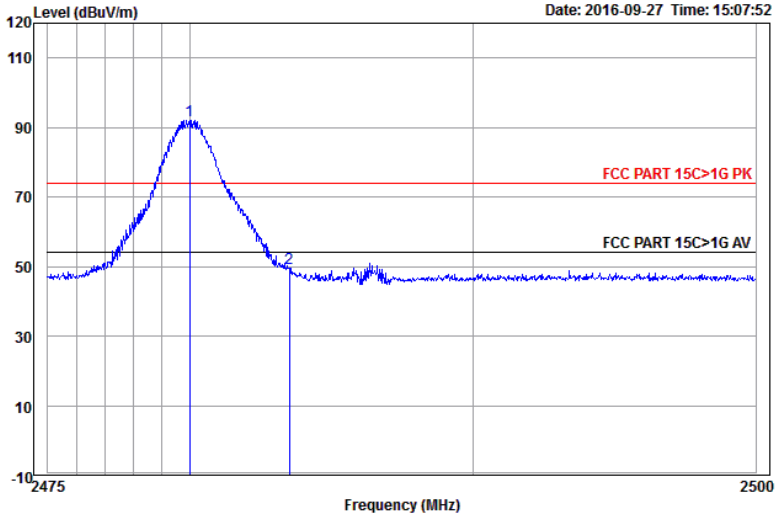
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	43.76	46.18	74.00	-27.82	Vertical	
2 pp	2402.191	32.56	4.31	34.39	92.44	94.92	74.00	20.92	Vertical	

Worse case mode:	π/4DQPSK(2-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



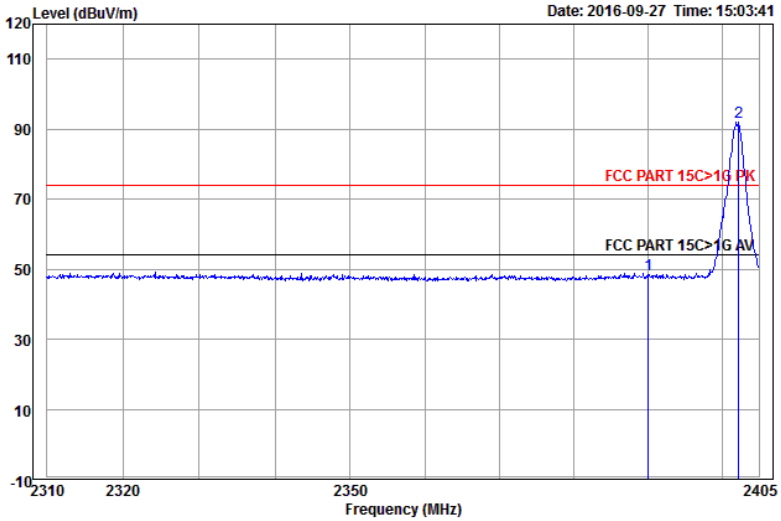
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.980	32.71	4.50	34.41	87.84	90.64	74.00	16.64	Horizontal	
2	2483.500	32.71	4.51	34.41	46.71	49.52	74.00	-24.48	Horizontal	

Worse case mode:	π/4DQPSK(2-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



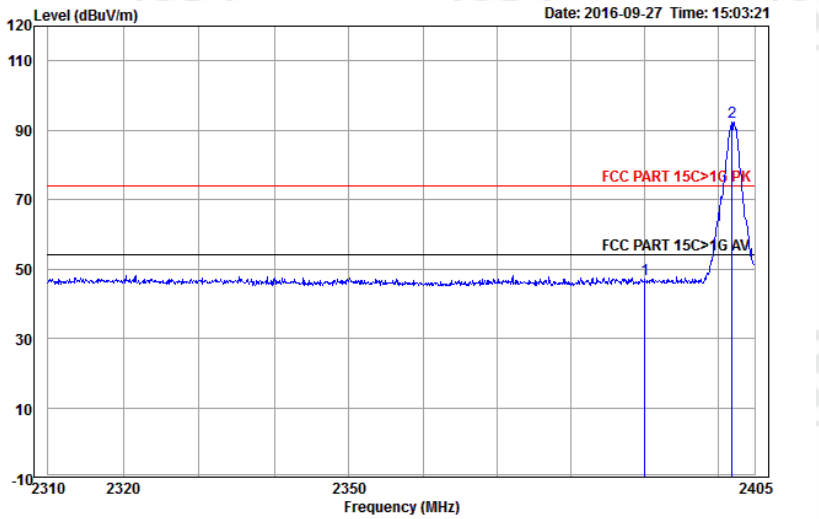
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.980	32.71	4.50	34.41	89.34	92.14	74.00	18.14	Vertical	
2	2483.500	32.71	4.51	34.41	46.81	49.62	74.00	-24.38	Vertical	

Worse case mode:	8DPSK(3-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Horizontal	Remark: Peak



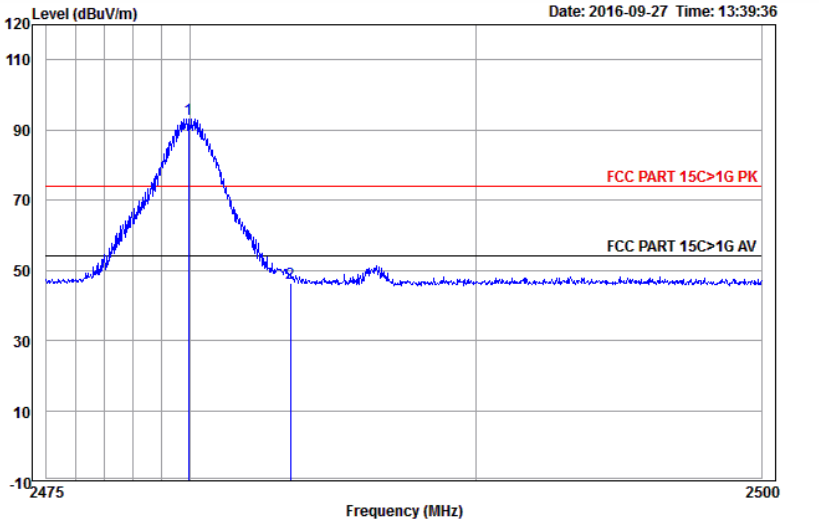
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	46.02	48.44	74.00	-25.56	Horizontal	
2 pp	2402.288	32.56	4.31	34.39	89.61	92.09	74.00	18.09	Horizontal	

Worse case mode:	8DPSK(3-DH5)		
Frequency: 2390.0MHz	Test channel: Lowest	Polarization: Vertical	Remark: Peak



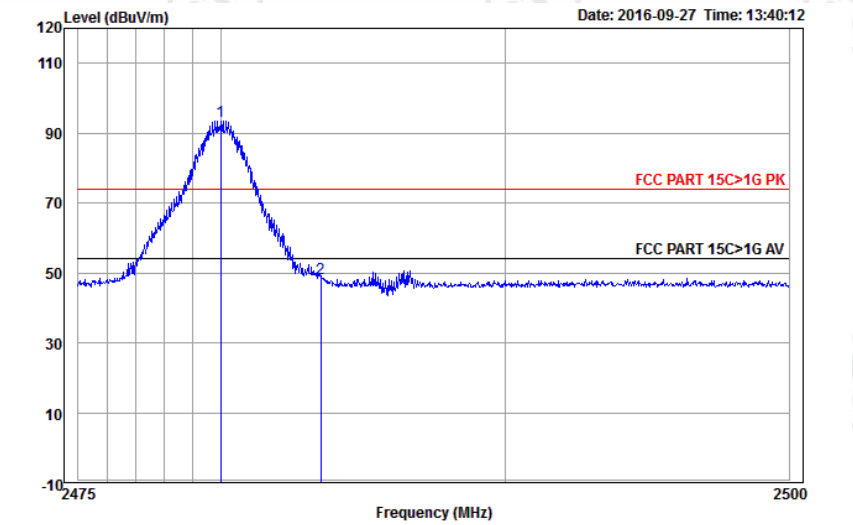
	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	4.28	34.39	44.44	46.86	74.00	-27.14	Vertical	
2 pp	2401.900	32.56	4.31	34.39	89.95	92.43	74.00	18.43	Vertical	

Worse case mode:	8DPSK(3-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Horizontal	Remark: Peak



	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.955	32.71	4.50	34.41	90.34	93.14	74.00	19.14	Horizontal	
2	2483.500	32.71	4.51	34.41	43.63	46.44	74.00	-27.56	Horizontal	

Worse case mode:	8DPSK(3-DH5)		
Frequency: 2483.5MHz	Test channel: Highest	Polarization: Vertical	Remark: Peak



	Freq	Ant Factor	Cable Loss	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.980	32.71	4.50	34.41	90.76	93.56	74.00	19.56	Vertical	
2	2483.500	32.71	4.51	34.41	45.53	48.34	74.00	-25.66	Vertical	

Note:

1) Through Pre-scan transmitter mode with all kind of modulation and all kind of data type, find the 1-DH5 of data type is the worse case of GFSK modulation type, the 2-DH5 of data type is the worse case of π/4DQPSK modulation type, the 3-DH5 of data type is the worse case of 8DPSKmodulation type in transmitter mode.

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

Level =Receiver Reading -Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix L): 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	120kHz	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 camber. 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, whichwas 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 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

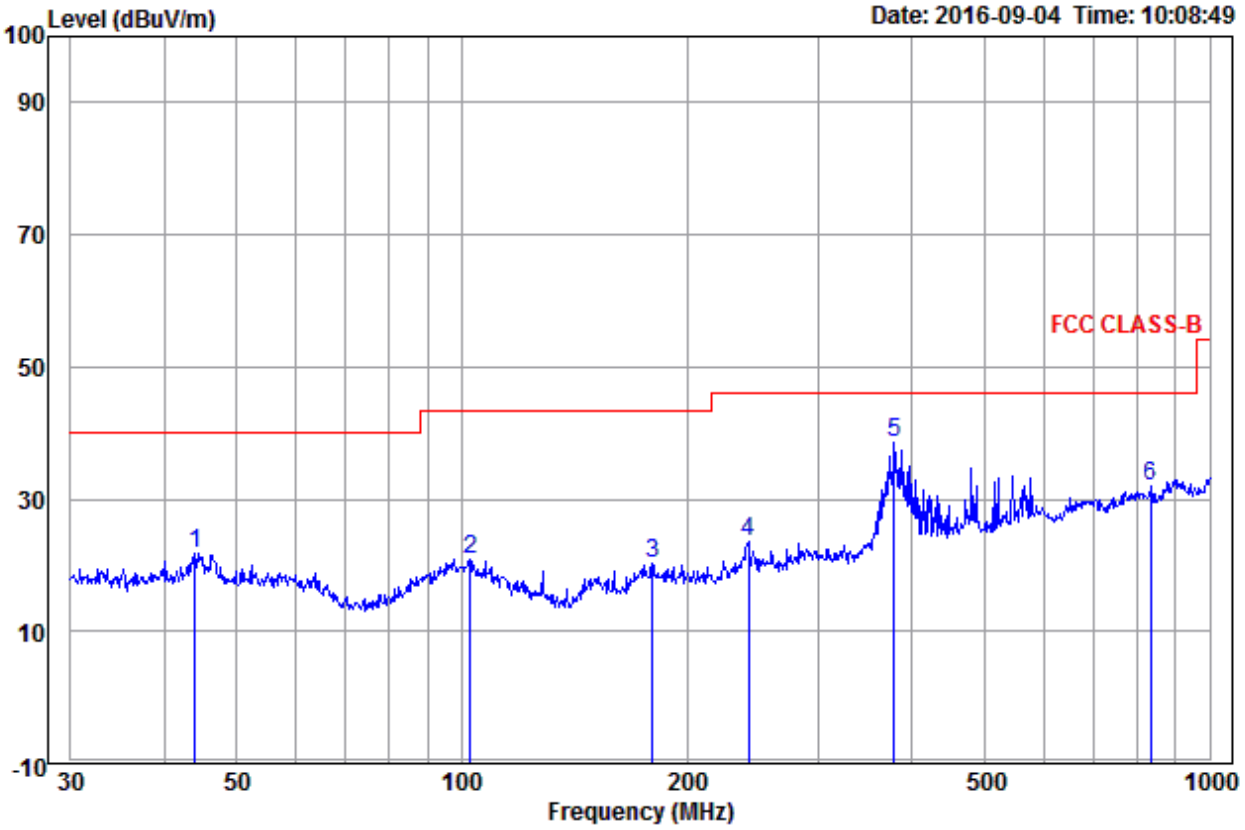
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	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.

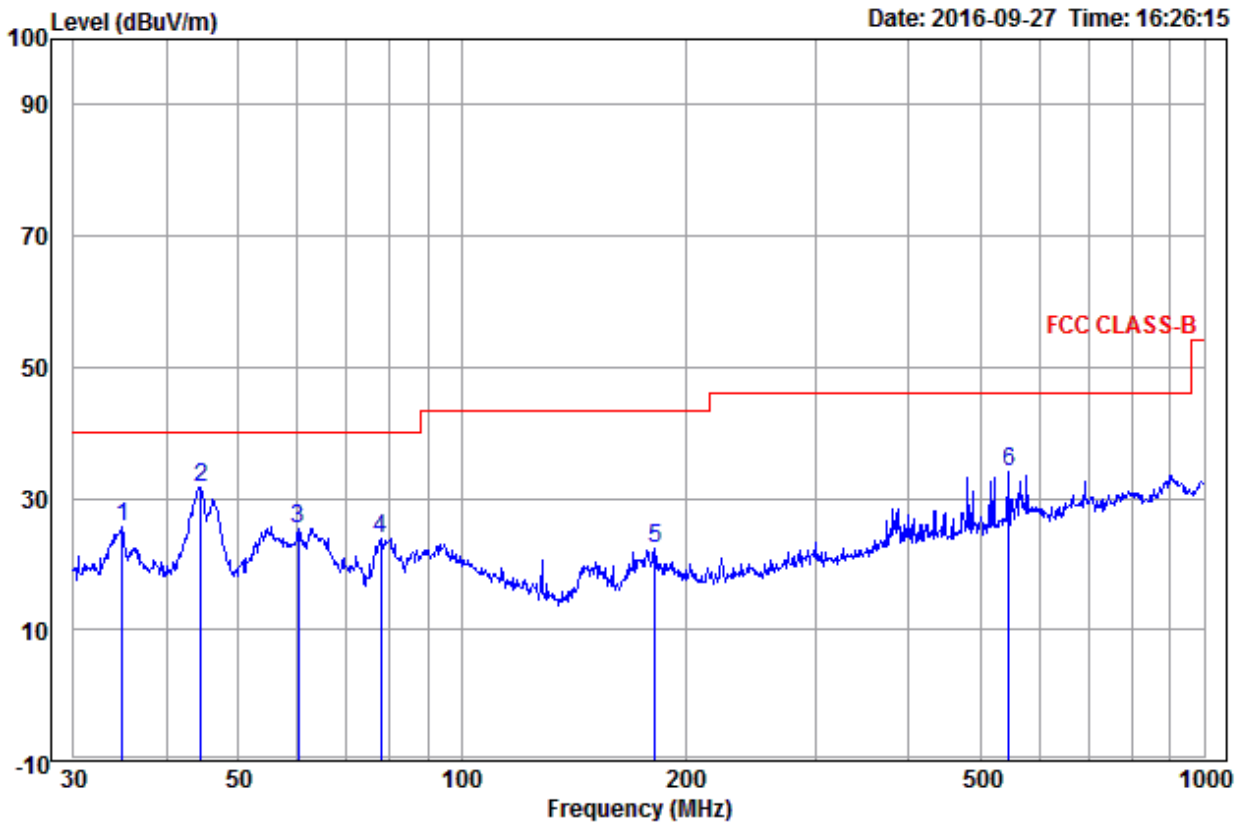
Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

30MHz~1GHz (QP)



	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	43.966	14.65	0.90	6.28	21.83	40.00	-18.17	Horizontal	
2	102.719	14.00	1.57	5.24	20.81	43.50	-22.69	Horizontal	
3	180.017	10.88	1.98	7.34	20.20	43.50	-23.30	Horizontal	
4	241.676	13.34	2.33	7.95	23.62	46.00	-22.38	Horizontal	
5 pp	378.584	15.91	2.76	19.98	38.65	46.00	-7.35	Horizontal	
6	833.317	21.81	4.07	6.12	32.00	46.00	-14.00	Horizontal	



	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	34.882	13.40	0.84	11.44	25.68	40.00	-14.32	Vertical	
2 pp	44.587	14.64	0.95	16.02	31.61	40.00	-8.39	Vertical	
3	60.280	13.67	1.43	10.25	25.35	40.00	-14.65	Vertical	
4	77.865	9.33	1.55	13.14	24.02	40.00	-15.98	Vertical	
5	181.920	11.05	2.00	9.29	22.34	43.50	-21.16	Vertical	
6	545.183	18.83	3.20	12.06	34.09	46.00	-11.91	Vertical	

Note:

1) for 30MHz~1GHz test, low middle highest channel are tested, only show worst data in the report.

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

Transmitter Emission above 1GHz

Worse case mode:		GFSK(1-DH5)		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1132.844	30.06	2.43	35.04	48.05	45.50	74.00	-28.50	Pass	Horizontal
1663.803	31.17	2.97	34.54	49.90	49.50	74.00	-24.50	Pass	Horizontal
4804.000	34.69	5.11	34.35	44.93	50.38	74.00	-23.62	Pass	Horizontal
5850.919	35.79	7.10	34.30	42.12	50.71	74.00	-23.29	Pass	Horizontal
7206.000	36.42	6.66	34.90	39.89	48.07	74.00	-25.93	Pass	Horizontal
9608.000	37.88	7.73	35.08	38.81	49.34	74.00	-24.66	Pass	Horizontal
1276.818	30.41	2.60	34.88	47.29	45.42	74.00	-28.58	Pass	Vertical
1663.803	31.17	2.97	34.54	48.11	47.71	74.00	-26.29	Pass	Vertical
3766.785	32.97	5.48	34.58	46.04	49.91	74.00	-24.09	Pass	Vertical
4804.000	34.69	5.11	34.35	44.11	49.56	74.00	-24.44	Pass	Vertical
7206.000	36.42	6.66	34.90	39.93	48.11	74.00	-25.89	Pass	Vertical
9608.000	37.88	7.73	35.08	37.26	47.79	74.00	-26.21	Pass	Vertical

Worse case mode:		GFSK(1-DH5)		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1132.844	30.06	2.43	35.04	47.25	44.70	74.00	-29.30	Pass	Horizontal
1364.182	30.60	2.69	34.80	46.38	44.87	74.00	-29.13	Pass	Horizontal
4882.000	34.85	5.08	34.33	44.73	50.33	74.00	-23.67	Pass	Horizontal
6315.233	36.07	7.11	34.50	42.19	50.87	74.00	-23.13	Pass	Horizontal
7323.000	36.43	6.77	34.90	38.31	46.61	74.00	-27.39	Pass	Horizontal
9764.000	38.05	7.60	35.05	38.00	48.60	74.00	-25.40	Pass	Horizontal
1276.818	30.41	2.60	34.88	47.08	45.21	74.00	-28.79	Pass	Vertical
1668.044	31.18	2.98	34.54	47.91	47.53	74.00	-26.47	Pass	Vertical
3728.625	33.00	5.48	34.58	44.86	48.76	74.00	-25.24	Pass	Vertical
4882.000	34.85	5.08	34.33	45.04	50.64	74.00	-23.36	Pass	Vertical
7323.000	36.43	6.77	34.90	37.64	45.94	74.00	-28.06	Pass	Vertical
9764.000	38.05	7.60	35.05	38.13	48.73	74.00	-25.27	Pass	Vertical

Worse case mode:		GFSK(1-DH5)		Test channel:		Highest		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1132.844	30.06	2.43	35.04	48.17	45.62	74.00	-28.38	Pass	Horizontal
1663.803	31.17	2.97	34.54	50.20	49.80	74.00	-24.20	Pass	Horizontal
4960.000	35.02	5.05	34.31	44.54	50.30	74.00	-23.70	Pass	Horizontal
5762.235	35.72	6.90	34.30	42.05	50.37	74.00	-23.63	Pass	Horizontal
7440.000	36.45	6.88	34.90	38.72	47.15	74.00	-26.85	Pass	Horizontal
9920.000	38.22	7.47	35.02	37.42	48.09	74.00	-25.91	Pass	Horizontal
1204.210	30.24	2.52	34.96	47.19	44.99	74.00	-29.01	Pass	Vertical
1668.044	31.18	2.98	34.54	48.49	48.11	74.00	-25.89	Pass	Vertical
4960.000	35.02	5.05	34.31	41.20	46.96	74.00	-27.04	Pass	Vertical
5895.771	35.82	7.20	34.30	40.99	49.71	74.00	-24.29	Pass	Vertical
7440.000	36.45	6.88	34.90	39.57	48.00	74.00	-26.00	Pass	Vertical
9920.000	38.22	7.47	35.02	37.39	48.06	74.00	-25.94	Pass	Vertical

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Lowest		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1167.982	30.15	2.48	35.00	47.59	45.22	74.00	-28.78	Pass	Horizontal
1585.248	31.03	2.90	34.60	46.49	45.82	74.00	-28.18	Pass	Horizontal
4804.000	34.69	5.11	34.35	40.69	46.14	74.00	-27.86	Pass	Horizontal
6461.583	36.14	6.97	34.59	41.08	49.60	74.00	-24.40	Pass	Horizontal
7206.000	36.42	6.66	34.90	37.50	45.68	74.00	-28.32	Pass	Horizontal
9608.000	37.88	7.73	35.08	34.91	45.44	74.00	-28.56	Pass	Horizontal
1201.149	30.23	2.52	34.96	46.95	44.74	74.00	-29.26	Pass	Vertical
1621.985	31.10	2.94	34.57	45.77	45.24	74.00	-28.76	Pass	Vertical
3728.625	33.00	5.48	34.58	44.91	48.81	74.00	-25.19	Pass	Vertical
4804.000	34.69	5.11	34.35	40.61	46.06	74.00	-27.94	Pass	Vertical
7206.000	36.42	6.66	34.90	39.33	47.51	74.00	-26.49	Pass	Vertical
9608.000	37.88	7.73	35.08	38.12	48.65	74.00	-25.35	Pass	Vertical

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Middle		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1127.091	30.05	2.43	35.04	46.29	43.73	74.00	-30.27	Pass	Horizontal
1663.803	31.17	2.97	34.54	45.24	44.84	74.00	-29.16	Pass	Horizontal
4882.000	34.85	5.08	34.33	38.38	43.98	74.00	-30.02	Pass	Horizontal
5776.922	35.73	6.93	34.30	40.17	48.53	74.00	-25.47	Pass	Horizontal
7323.000	36.43	6.77	34.90	37.25	45.55	74.00	-28.45	Pass	Horizontal
9764.000	38.05	7.60	35.05	35.19	45.79	74.00	-28.21	Pass	Horizontal
1150.279	30.10	2.46	35.02	47.79	45.33	74.00	-28.67	Pass	Vertical
1764.123	31.34	3.05	34.46	45.78	45.71	74.00	-28.29	Pass	Vertical
4882.000	34.85	5.08	34.33	40.22	45.82	74.00	-28.18	Pass	Vertical
6379.864	36.10	7.05	34.54	41.98	50.59	74.00	-23.41	Pass	Vertical
7323.000	36.43	6.77	34.90	39.89	48.19	74.00	-25.81	Pass	Vertical
9764.000	38.05	7.60	35.05	36.76	47.36	74.00	-26.64	Pass	Vertical

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Highest		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1115.673	30.02	2.41	35.06	46.59	43.96	74.00	-30.04	Pass	Horizontal
1668.044	31.18	2.98	34.54	46.74	46.36	74.00	-27.64	Pass	Horizontal
4960.000	35.02	5.05	34.31	39.45	45.21	74.00	-28.79	Pass	Horizontal
5732.974	35.70	6.83	34.30	40.82	49.05	74.00	-24.95	Pass	Horizontal
7440.000	36.45	6.88	34.90	38.16	46.59	74.00	-27.41	Pass	Horizontal
9920.000	38.22	7.47	35.02	35.71	46.38	74.00	-27.62	Pass	Horizontal
1150.279	30.10	2.46	35.02	47.71	45.25	74.00	-28.75	Pass	Vertical
1381.656	30.63	2.71	34.78	46.15	44.71	74.00	-29.29	Pass	Vertical
4960.000	35.02	5.05	34.31	39.03	44.79	74.00	-29.21	Pass	Vertical
5850.919	35.79	7.10	34.30	41.55	50.14	74.00	-23.86	Pass	Vertical
7440.000	36.45	6.88	34.90	38.30	46.73	74.00	-27.27	Pass	Vertical
9920.000	38.22	7.47	35.02	37.34	48.01	74.00	-25.99	Pass	Vertical

Worse case mode:		8DPSK(3-DH5)		Test channel:		Lowest		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1280.072	30.41	2.61	34.88	47.52	45.66	74.00	-28.34	Pass	Horizontal
1668.044	31.18	2.98	34.54	46.75	46.37	74.00	-27.63	Pass	Horizontal
4804.000	34.69	5.11	34.35	41.30	46.75	74.00	-27.25	Pass	Horizontal
5732.974	35.70	6.83	34.30	42.77	51.00	74.00	-23.00	Pass	Horizontal
7206.000	36.42	6.66	34.90	38.83	47.01	74.00	-26.99	Pass	Horizontal
9608.000	37.88	7.73	35.08	37.81	48.34	74.00	-25.66	Pass	Horizontal
1204.210	30.24	2.52	34.96	45.99	43.79	74.00	-30.21	Pass	Vertical
1676.558	31.19	2.98	34.53	45.65	45.29	74.00	-28.71	Pass	Vertical
4804.000	34.69	5.11	34.35	40.48	45.93	74.00	-28.07	Pass	Vertical
6396.125	36.11	7.03	34.55	39.86	48.45	74.00	-25.55	Pass	Vertical
7206.000	36.42	6.66	34.90	37.11	45.29	74.00	-28.71	Pass	Vertical
9608.000	37.88	7.73	35.08	36.30	46.83	74.00	-27.17	Pass	Vertical

Worse case mode:		8DPSK(3-DH5)		Test channel:		Middle		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1150.279	30.10	2.46	35.02	47.43	44.97	74.00	-29.03	Pass	Horizontal
3192.366	33.43	5.58	34.52	45.63	50.12	74.00	-23.88	Pass	Horizontal
4882.000	34.85	5.08	34.33	39.97	45.57	74.00	-28.43	Pass	Horizontal
5836.044	35.78	7.07	34.30	40.73	49.28	74.00	-24.72	Pass	Horizontal
7323.000	36.43	6.77	34.90	39.04	47.34	74.00	-26.66	Pass	Horizontal
9764.000	38.05	7.60	35.05	36.97	47.57	74.00	-26.43	Pass	Horizontal
1204.210	30.24	2.52	34.96	47.63	45.43	74.00	-28.57	Pass	Vertical
1680.831	31.20	2.99	34.53	46.69	46.35	74.00	-27.65	Pass	Vertical
4882.000	34.85	5.08	34.33	40.00	45.60	74.00	-28.40	Pass	Vertical
5910.798	35.83	7.23	34.30	40.71	49.47	74.00	-24.53	Pass	Vertical
7319.964	36.43	6.77	34.90	37.89	46.19	74.00	-27.81	Pass	Vertical
9764.000	38.05	7.60	35.05	37.61	48.21	74.00	-25.79	Pass	Vertical

Worse case mode:		8DPSK(3-DH5)		Test channel:		Highest		Remark: Peak	
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1198.095	30.22	2.51	34.97	47.20	44.96	74.00	-29.04	Pass	Horizontal
1846.834	31.47	3.12	34.40	46.07	46.26	74.00	-27.74	Pass	Horizontal
4960.000	35.02	5.05	34.31	39.62	45.38	74.00	-28.62	Pass	Horizontal
6561.030	36.19	6.87	34.65	41.38	49.79	74.00	-24.21	Pass	Horizontal
7440.000	36.45	6.88	34.90	38.87	47.30	74.00	-26.70	Pass	Horizontal
9920.000	38.22	7.47	35.02	37.15	47.82	74.00	-26.18	Pass	Horizontal
1118.517	30.02	2.42	35.05	47.29	44.68	74.00	-29.32	Pass	Vertical
1663.803	31.17	2.97	34.54	47.00	46.60	74.00	-27.40	Pass	Vertical
4960.000	35.02	5.05	34.31	39.61	45.37	74.00	-28.63	Pass	Vertical
6379.864	36.10	7.05	34.54	40.45	49.06	74.00	-24.94	Pass	Vertical
7440.000	36.45	6.88	34.90	39.17	47.60	74.00	-26.40	Pass	Vertical
9920.000	38.22	7.47	35.02	36.85	47.52	74.00	-26.48	Pass	Vertical

Note:

1) Through Pre-scan transmitting mode with all kind of modulation and all kind of data type, find the DH5 of data type is the worse case of GFSK modulation type in charge + transmitter mode.

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

Level =Receiver Reading -Correct Factor

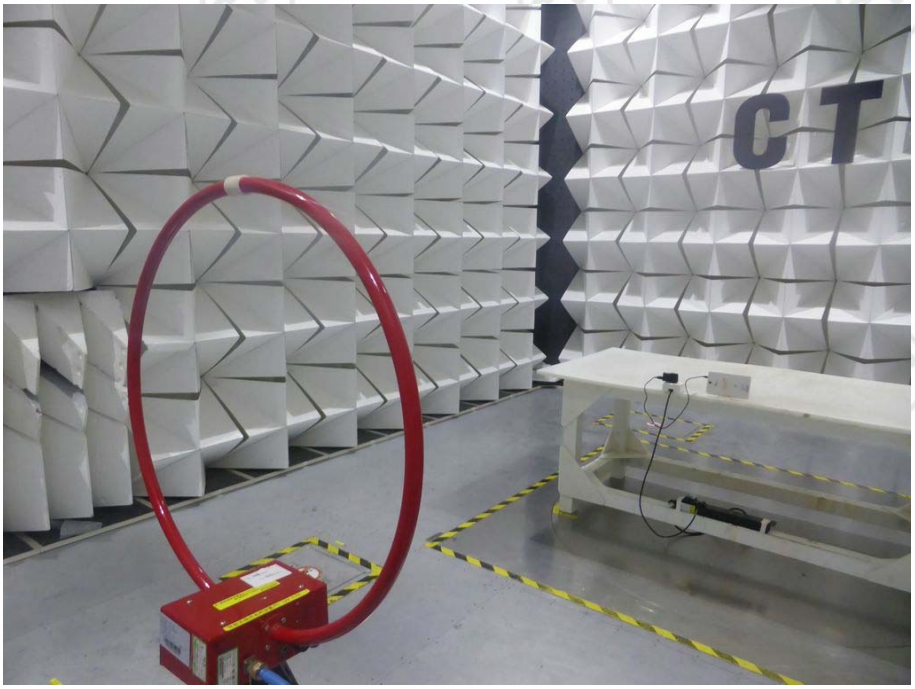
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

3) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

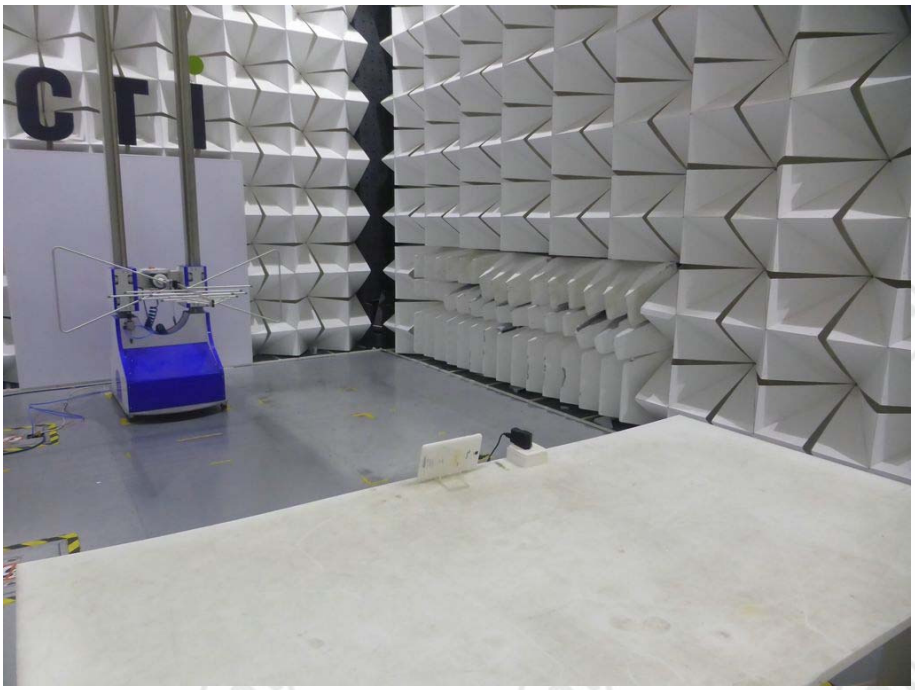
4) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak values are measured.

PHOTOGRAPHS OF TEST SETUP

Test Model No.: S7



Radiated spurious emission Test Setup-1(Below 30MHz)



Radiated spurious emission Test Setup-2(30MHz-1GHz)

Radiated spurious emission Test Setup-3(Above 1GHz)

Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

Test Model No.: S7

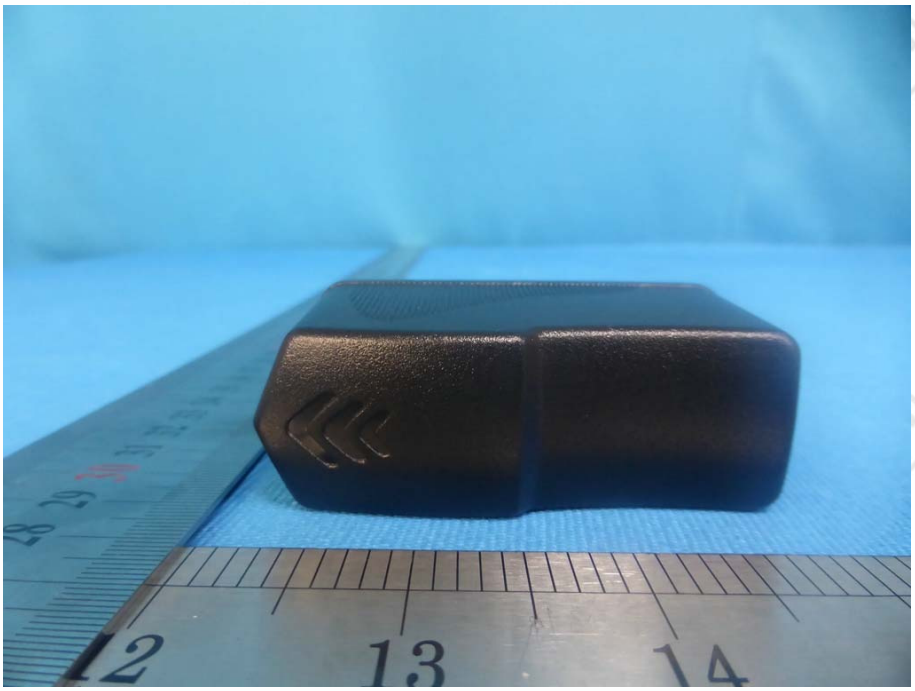
View of Product-1

View of Product-2

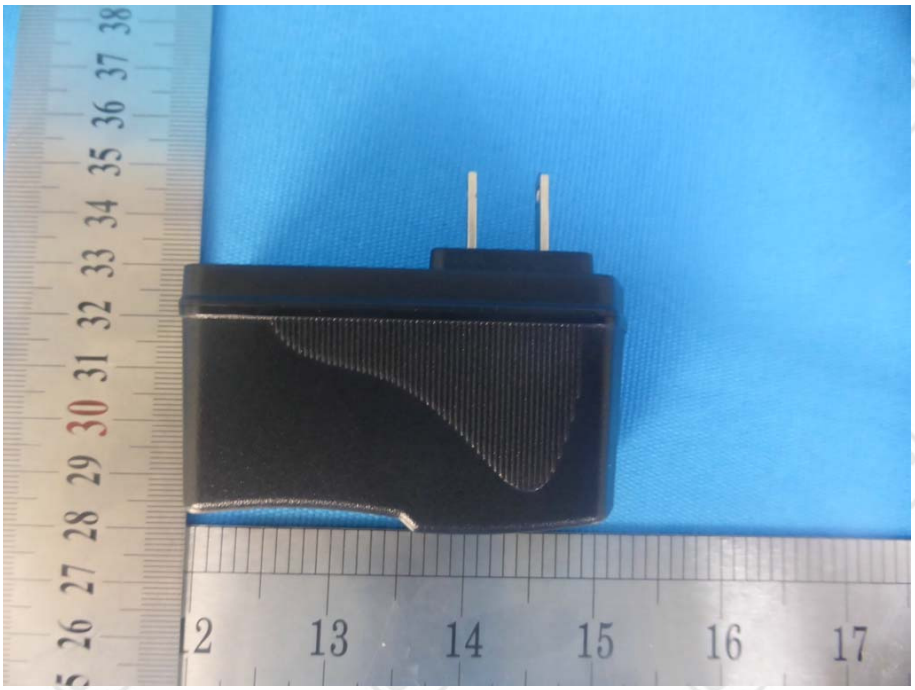
View of Product-3

View of Product-4

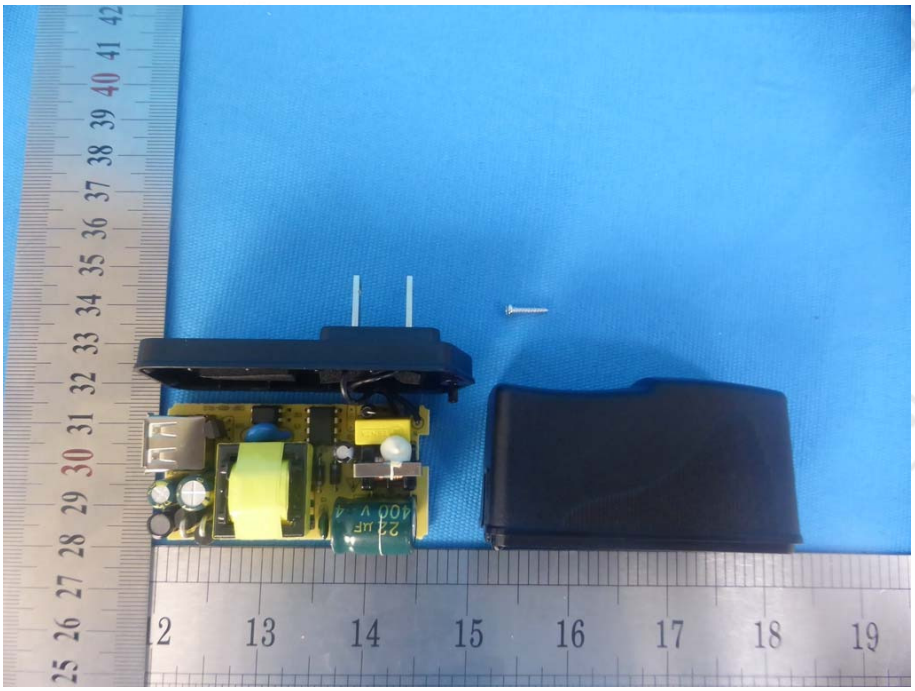
View of Product-5



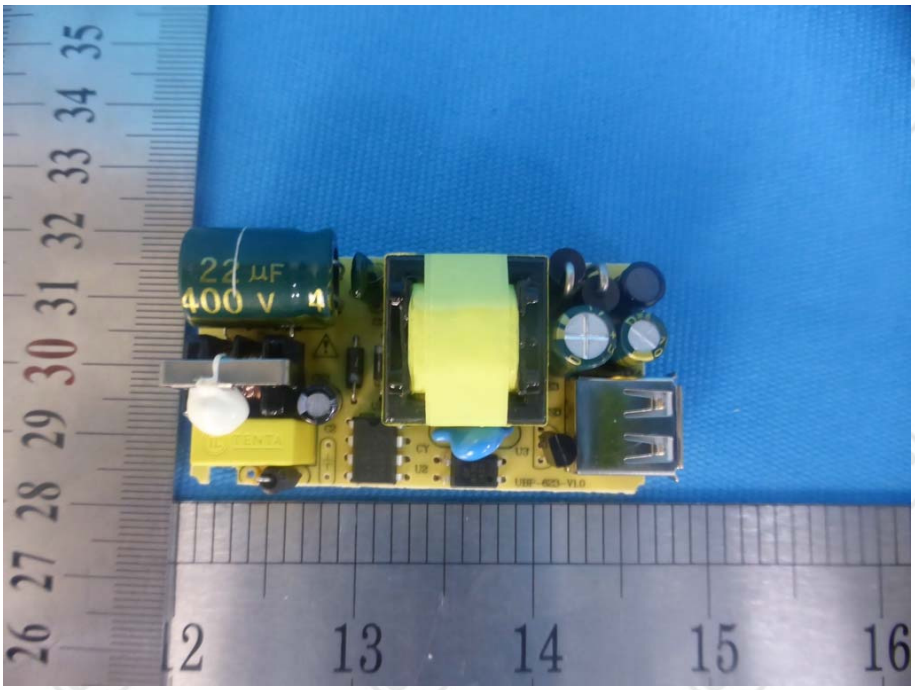
View of Product-6



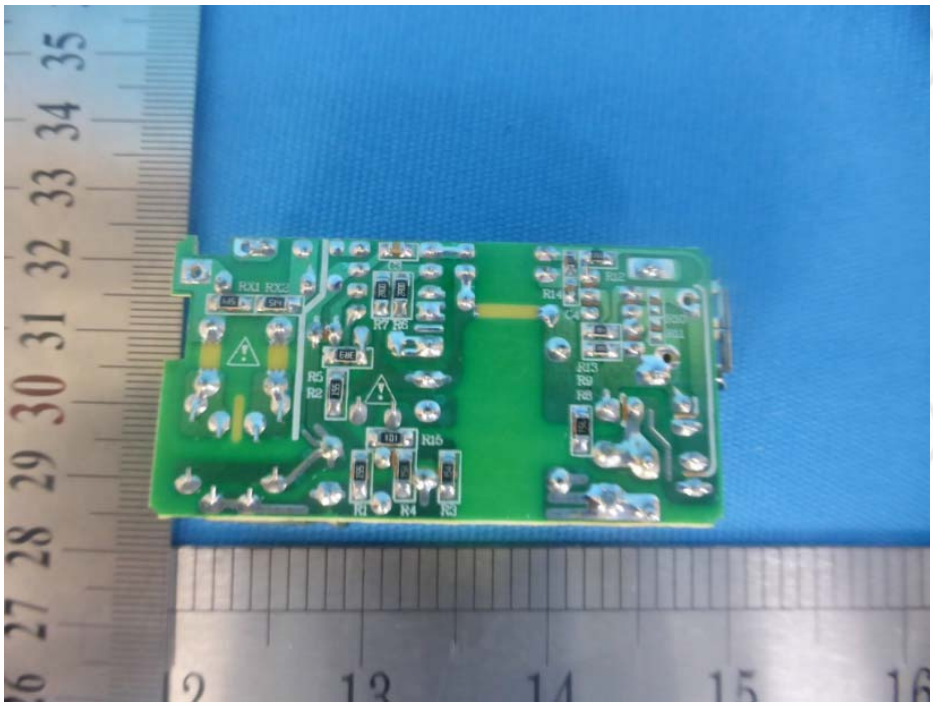
View of Product-7



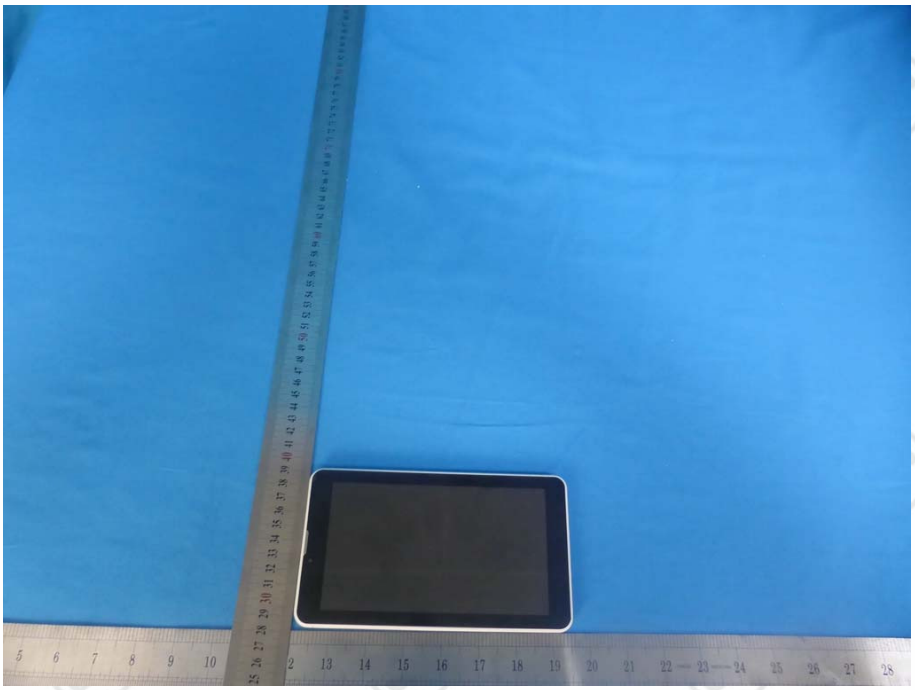
View of Product-8



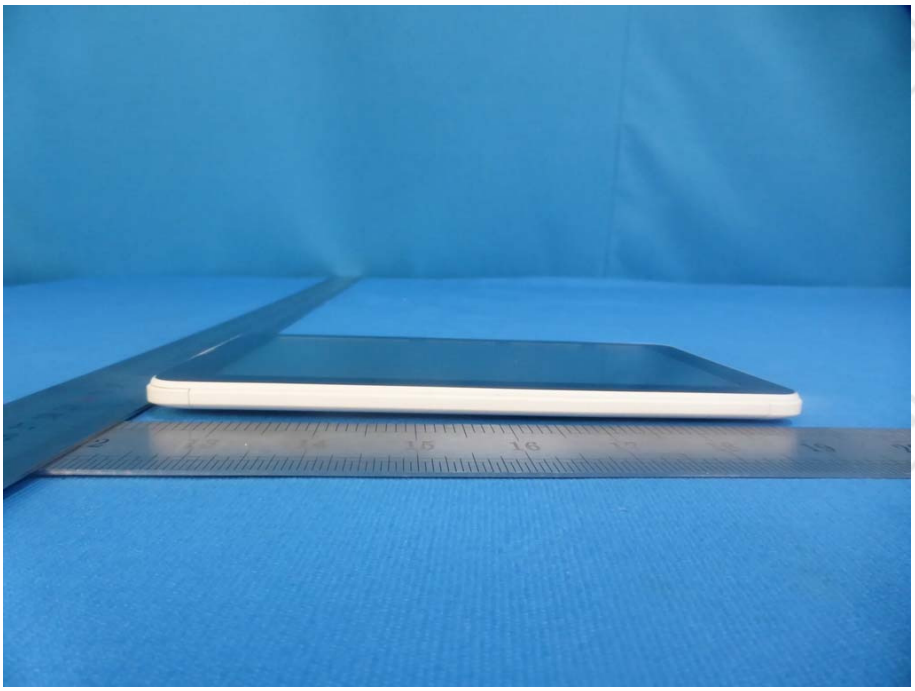
View of Product-9



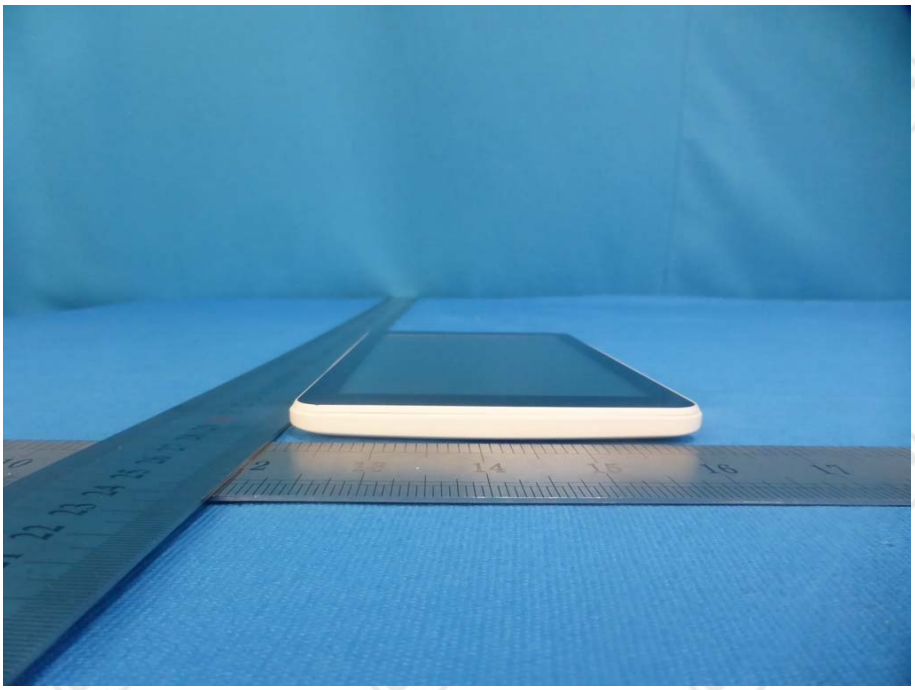
View of Product-10



View of Product-11

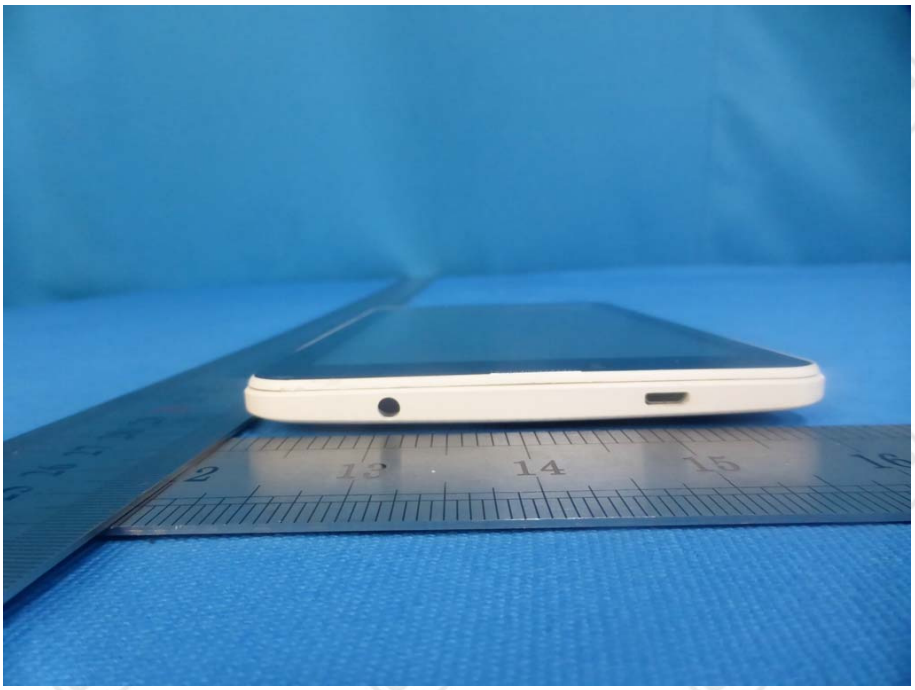


View of Product-12



View of Product-13

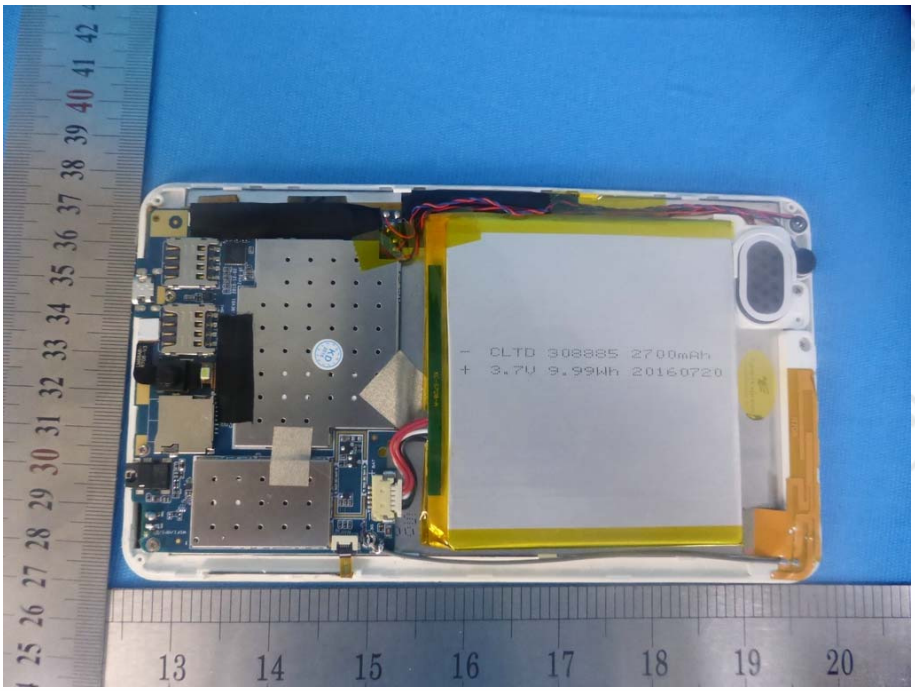
View of Product-14



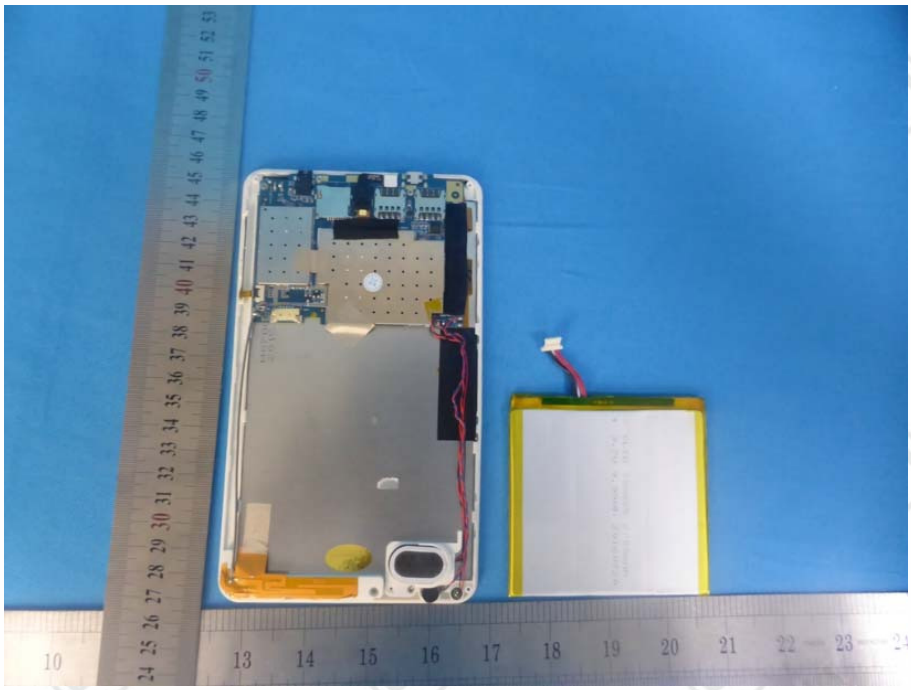
View of Product-15

View of Product-16

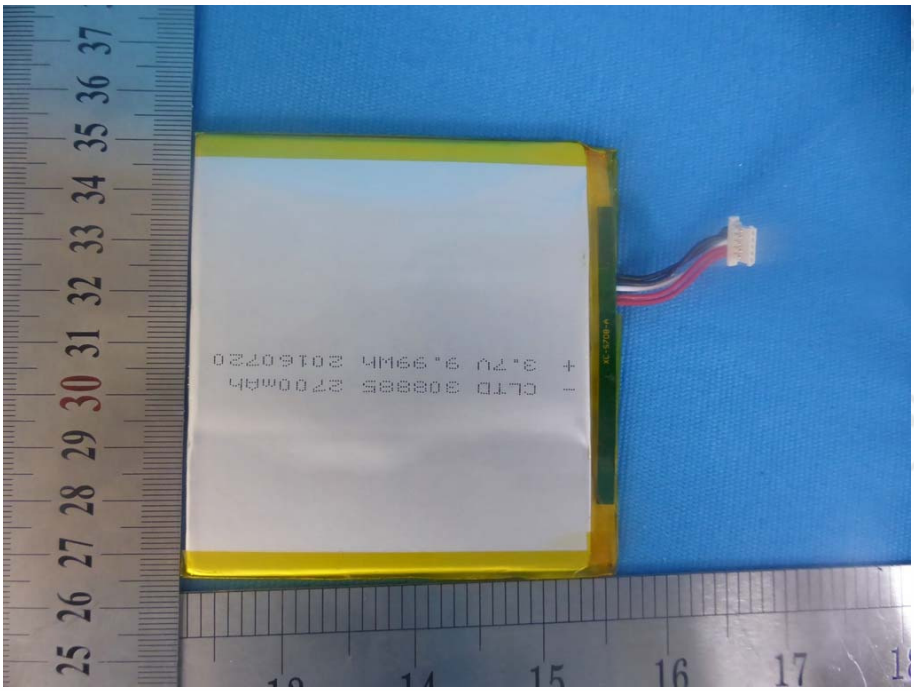
View of Product-17



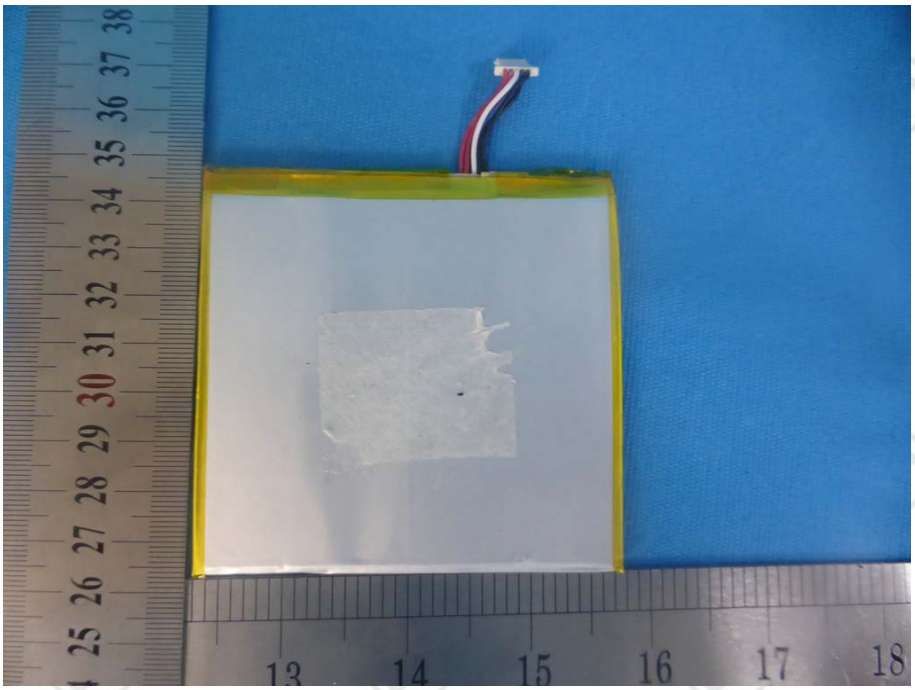
View of Product-18



View of Product-19

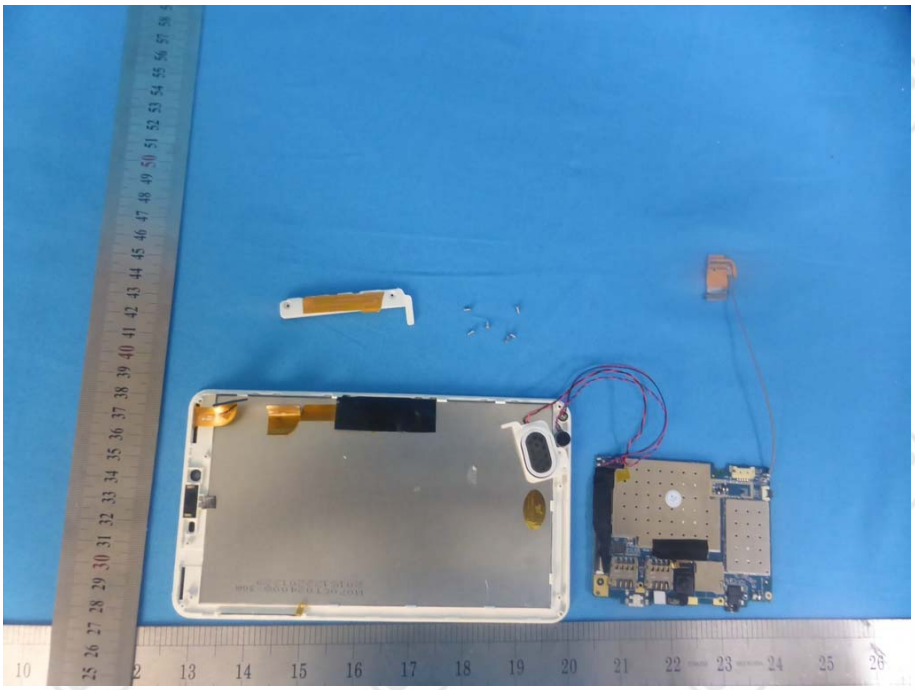


View of Product-20

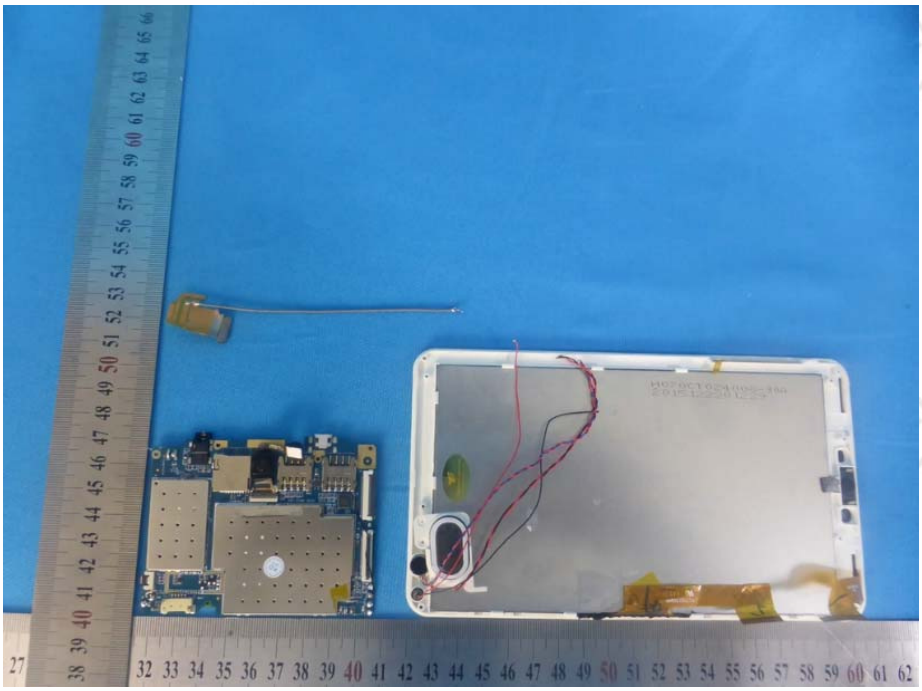


View of Product-21

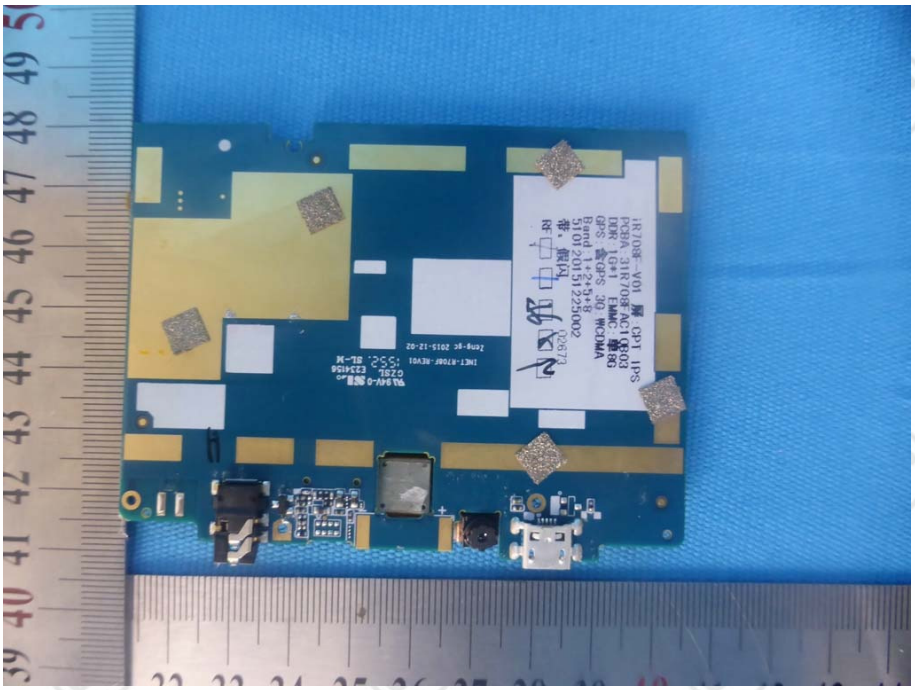
View of Product-22



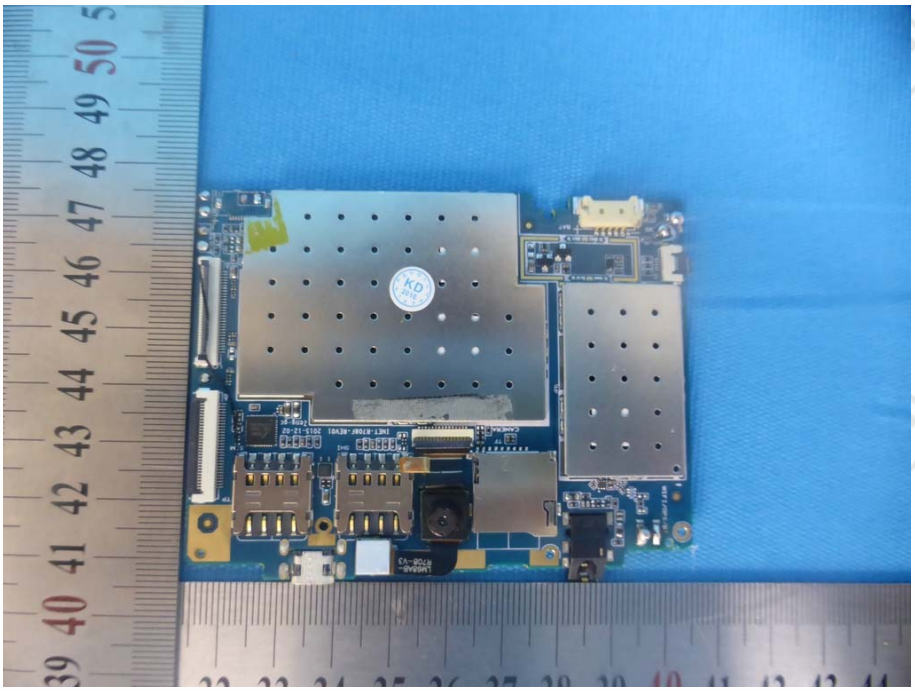
View of Product-23



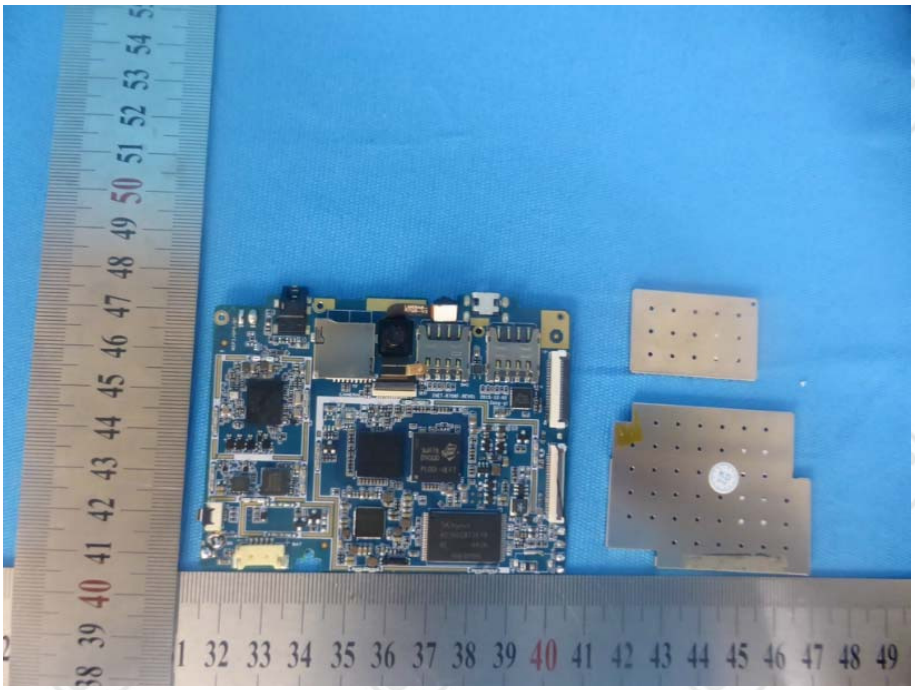
View of Product-24



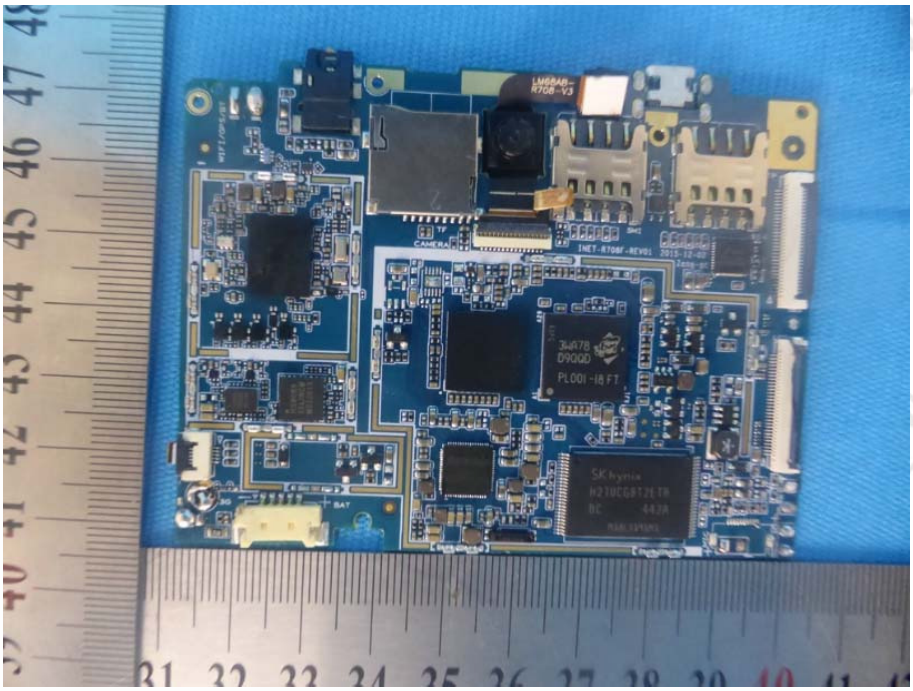
View of Product-25



View of Product-26



View of Product-27



View of Product-28

*** End of Report ***