

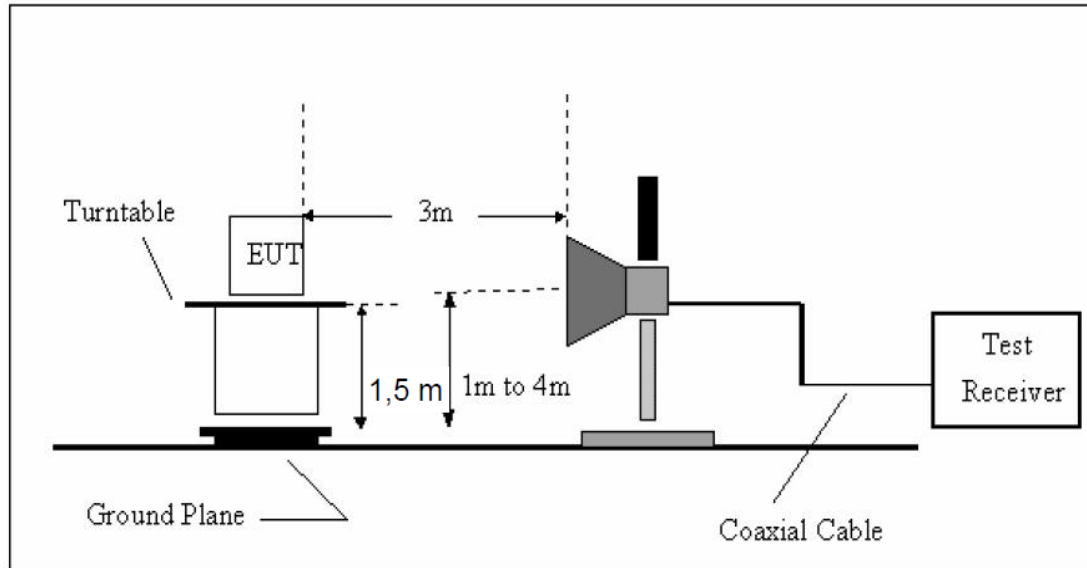
1GHz—25GHz Radiated emission Test result									
EUT: mPOS			M/N: QPOS reader						
Power: DC 3.7V From Battery									
Test date: 2015-11-25 Test site: 3m Chamber Tested by: Reak									
Test mode: 8- DQPSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	41.39	33.95	10.18	34.26	51.26	74	22.74	PK
2	4804	31.66	33.95	10.18	34.26	41.53	54	12.47	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	45.32	33.95	10.18	34.26	55.19	74	18.81	PK
2	4804	35.28	33.95	10.18	34.26	45.15	54	8.85	AV
3	7206	/							
4	9608	/							
5	12010	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emission Test result									
EUT: mPOS			M/N: QPOS reader						
Power: DC 3.7V From Battery									
Test date: 2015-11-25			Test site: 3m Chamber			Tested by: Reak			
Test mode: 8- DQPSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	41.67	33.93	10.2	34.29	51.51	74	22.49	PK
2	4882	31.25	33.93	10.2	34.29	41.09	54	12.91	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	45.02	33.93	10.2	34.29	54.86	74	19.14	PK
2	4882	35.12	33.93	10.2	34.29	44.96	54	9.04	AV
3	7323	/							
4	9764	/							
5	12205	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emission Test result									
EUT: mPOS		M/N: QPOS reader							
Power: DC 3.7V From Battery									
Test date: 2015-11-25 Test site: 3m Chamber Tested by: Reak									
Test mode: 8- DQPSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	41.69	33.98	10.22	34.25	51.64	74	22.36	PK
2	4960	31.28	33.98	10.22	34.25	41.23	54	12.77	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	45.64	33.98	10.22	34.25	55.59	74	18.41	PK
2	4960	35.27	33.98	10.22	34.25	45.22	54	8.78	AV
3	7440	/							
4	9920	/							
5	12400	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

9.3. Test Procedure

All restriction band and non- restriction band have been tested , only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

GFSK (CH Low)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	42.39	27.62	3.92	34.97	38.96	74	35.04	PK
Antenna Polarity: Horizontal								
2390	44.65	27.62	3.92	34.97	41.22	74	32.78	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	48.38	27.89	4	34.97	45.3	74	28.7	PK
Antenna Polarity: Horizontal								
2483.5	50.29	27.89	4	34.97	47.21	74	26.79	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

GFSK (Hopping Low)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	42.74	27.62	3.92	34.97	39.31	74	34.69	PK
Antenna Polarity: Horizontal								
2390	44.92	27.62	3.92	34.97	41.49	74	32.51	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	48.65	27.89	4	34.97	45.57	74	28.43	PK
Antenna Polarity: Horizontal								
2483.5	51.29	27.89	4	34.97	48.21	74	25.79	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	43.55	27.62	3.92	34.97	40.12	74	33.88	PK
Antenna Polarity: Horizontal								
2390	45.26	27.62	3.92	34.97	41.83	74	32.17	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

$\pi/4$ DQPSK (CH High)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	49.01	27.89	4	34.97	45.93	74	28.07	PK
Antenna Polarity: Horizontal								
2483.5	51.39	27.89	4	34.97	48.31	74	25.69	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

$\pi/4$ DQPSK (Hopping Low)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	42.37	27.62	3.92	34.97	38.94	74	35.06	PK
Antenna Polarity: Horizontal								
2390	44.96	27.62	3.92	34.97	41.53	74	32.47	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

$\pi/4$ DQPSK (Hopping High)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	49.66	27.89	4	34.97	46.58	74	27.42	PK
Antenna Polarity: Horizontal								
2483.5	52.39	27.89	4	34.97	49.31	74	24.69	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	43.87	27.62	3.92	34.97	40.44	74	33.56	PK
Antenna Polarity: Horizontal								
2390	46.67	27.62	3.92	34.97	43.24	74	30.76	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	49.66	27.89	4	34.97	46.58	74	27.42	PK
Antenna Polarity: Horizontal								
2483.5	52.68	27.89	4	34.97	49.6	74	24.4	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

8- DPSK (Hopping Low)

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	43.47	27.62	3.92	34.97	40.04	74	33.96	PK
Antenna Polarity: Horizontal								
2390	46.39	27.62	3.92	34.97	42.96	74	31.04	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: mPOS			M/N: QPOS reader					
Power: DC 3.7V From battery								
Test date: 2015-11-26			Test site: 3m Chamber			Tested by: Reak		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	49.99	27.89	4	34.97	46.91	74	27.09	PK
Antenna Polarity: Horizontal								
2483.5	52.69	27.89	4	34.97	49.61	74	24.39	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

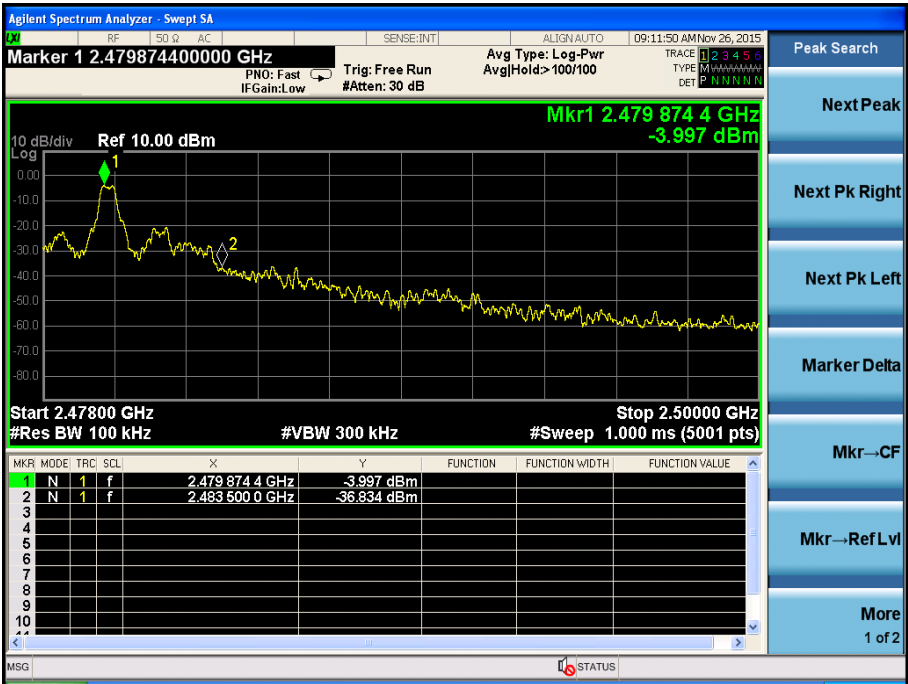
Conducted Method

GFSK

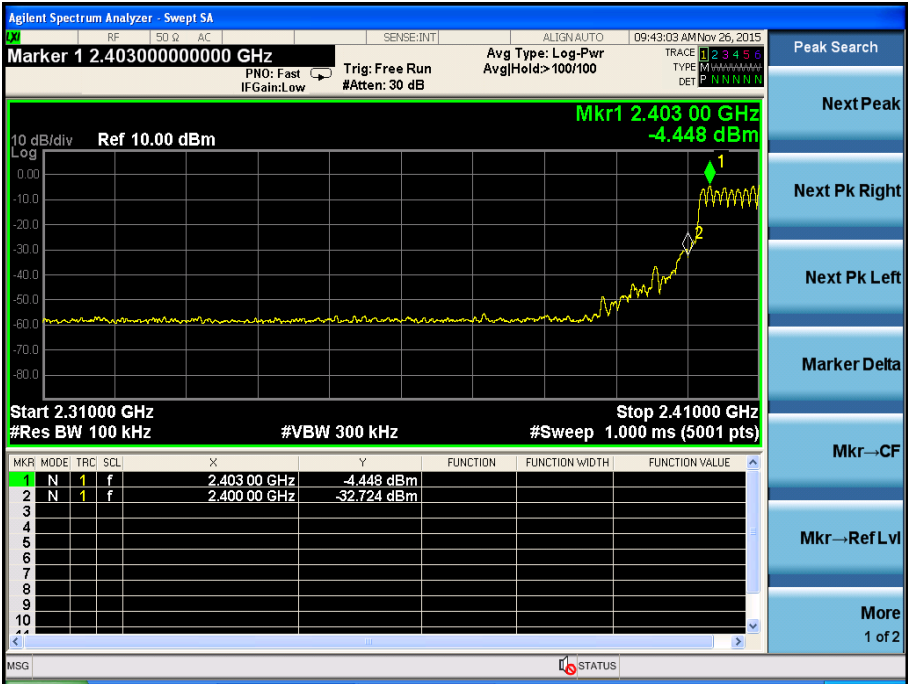
CH LOW :



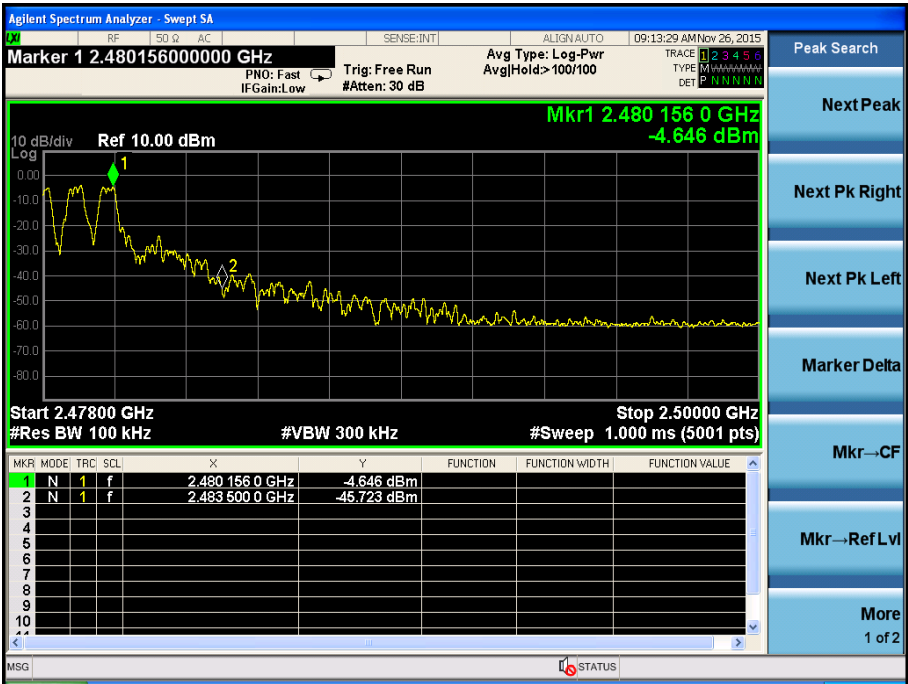
CH High :



Hopping
Low

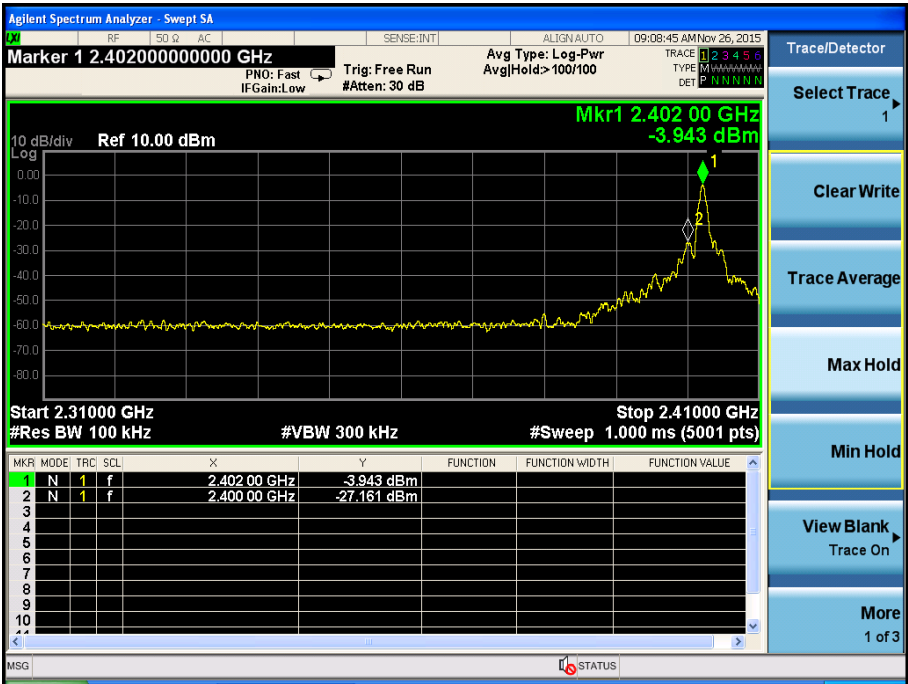


High



$\pi/4$ DQPSK

Low

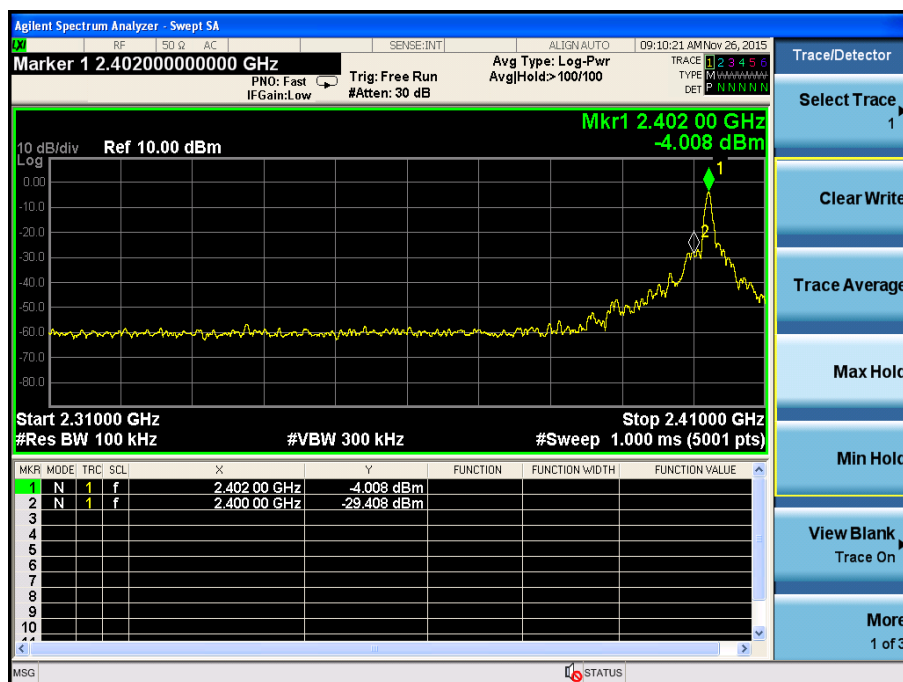


High



8- DPSK:

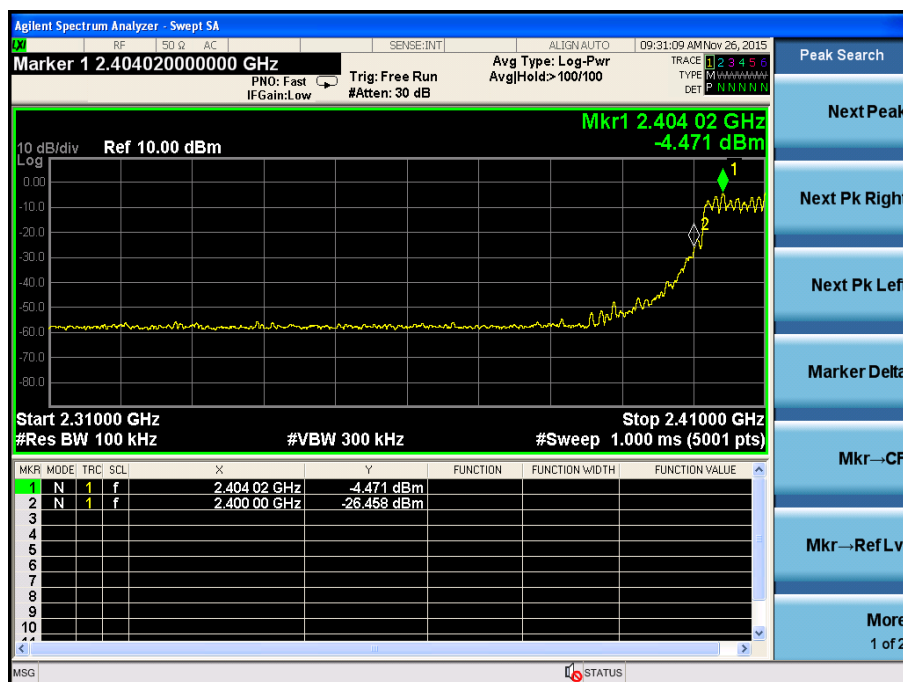
Low



High



Hopping
Low

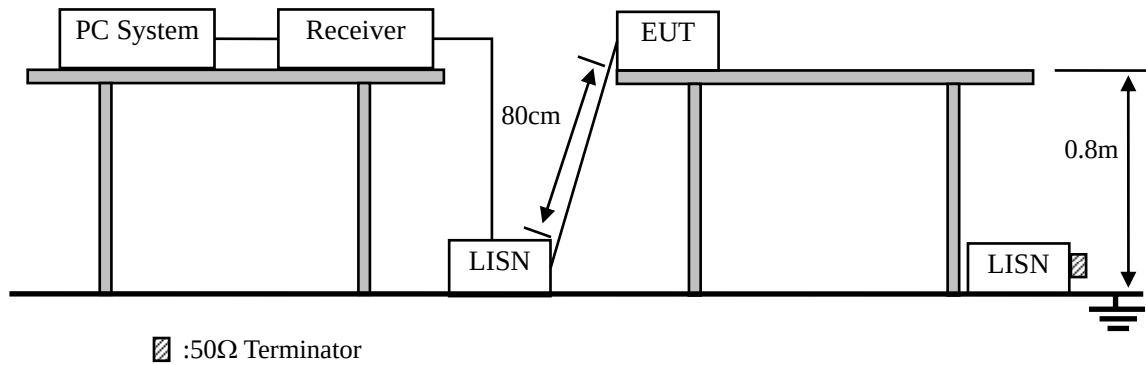


High



10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

10.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 :2014on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

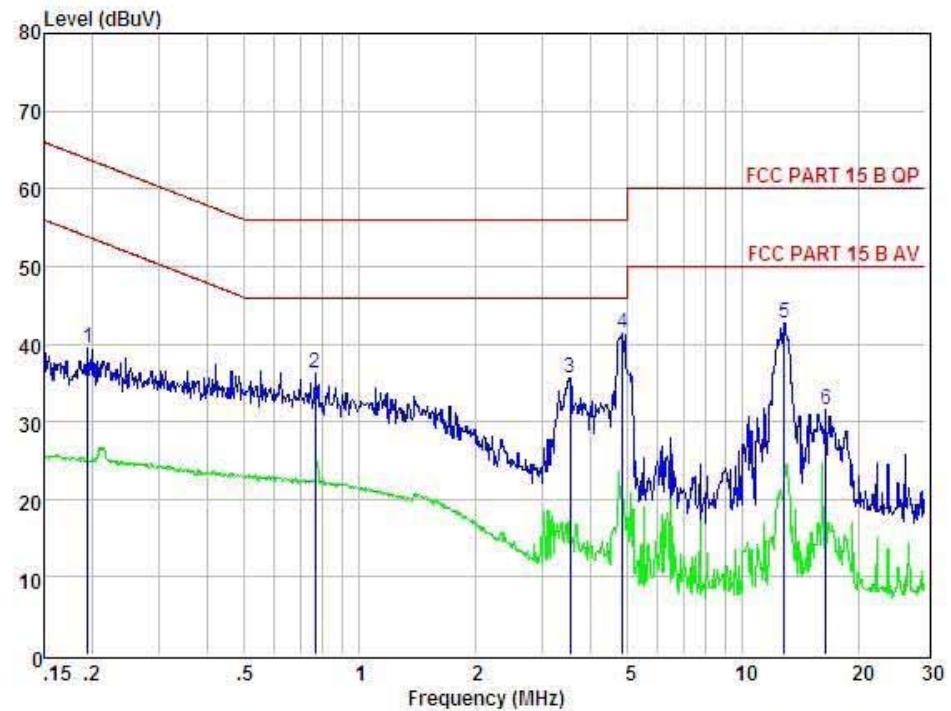
PASS. (See below detailed test data)

Note: If QP Result comply with AV limit, AV Result is deemed to comply with AV limit



Shenzhen Alpha Product Testing Co., Ltd.
 Building B, East Area of Nanchang Second Industrial Zone,
 Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
 Tel: +86-755-29766001 FAX: +86-755-86375565
 Website: <http://www.a-lab.cn> Email: service@a-lab.cn

Data: 17



Condition : FCC PART 15 B QP POL: NEUTRAL Temp: 23.1℃ Hum: 48 %
 EUT :
 Model No :
 Test Mode :
 Power :
 Test Engineer:
 Remark :

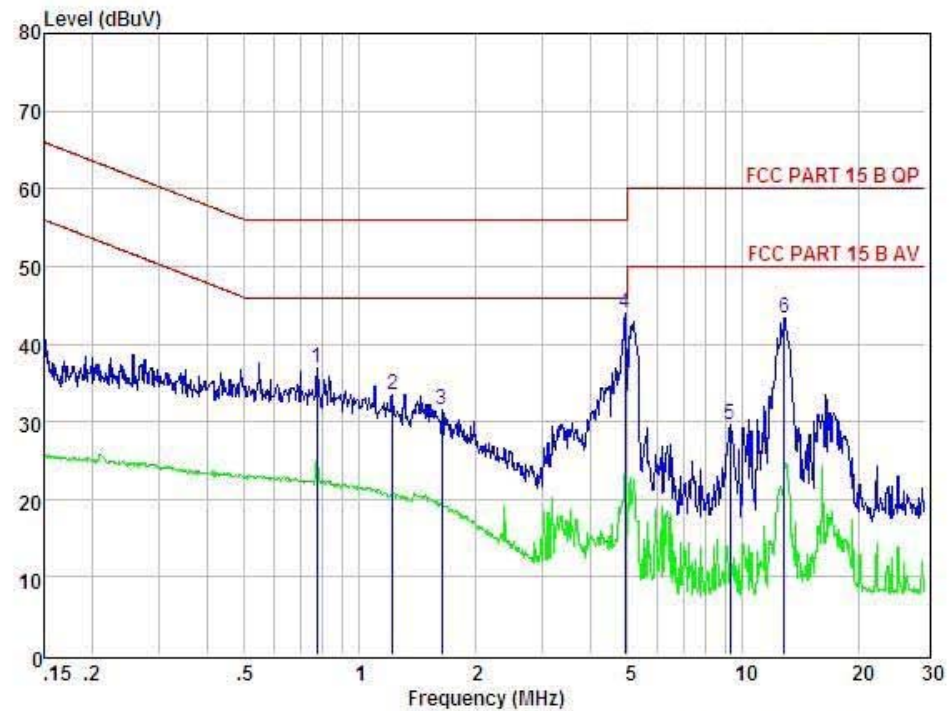
Item	Freq MHz	Read dBuV	LISN Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	0.195	39.28	0.03	0.00	0.10	39.41	63.80	-24.39	Peak
2	0.767	36.04	0.04	0.00	0.10	36.18	56.00	-19.82	Peak
3	3.547	35.49	0.08	0.00	0.12	35.69	56.00	-20.31	Peak
4	4.848	41.22	0.10	0.00	0.12	41.44	56.00	-14.56	Peak
5	12.852	42.15	0.23	0.00	0.22	42.60	60.00	-17.40	Peak
6	16.486	30.98	0.26	0.00	0.28	31.52	60.00	-28.48	Peak

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss



Shenzhen Alpha Product Testing Co., Ltd.
 Building B, East Area of Nanchang Second Industrial Zone,
 Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
 Tel: +86-755-29766001 FAX: +86-755-86375565
 Website: <http://www.a-lab.cn> Email: service@a-lab.cn

Data: 19



Condition : FCC PART 15 B QP POL: LINE Temp: 23.1℃ Hum: 48 %
 EUT :
 Model No :
 Test Mode :
 Power :
 Test Engineer :
 Remark :

Item	Freq MHz	Read dBuV	LISN Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	0.775	36.84	0.00	0.00	0.10	36.94	56.00	-19.06	Peak
2	1.223	33.34	0.04	0.00	0.10	33.48	56.00	-22.52	Peak
3	1.636	31.28	0.05	0.00	0.10	31.43	56.00	-24.57	Peak
4	4.926	43.68	0.10	0.00	0.12	43.90	56.00	-12.10	Peak
5	9.253	29.27	0.16	0.00	0.19	29.62	60.00	-30.38	Peak
6	12.852	42.83	0.23	0.00	0.22	43.28	60.00	-16.72	Peak

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

11. Antenna Requirements

11.1. Limit

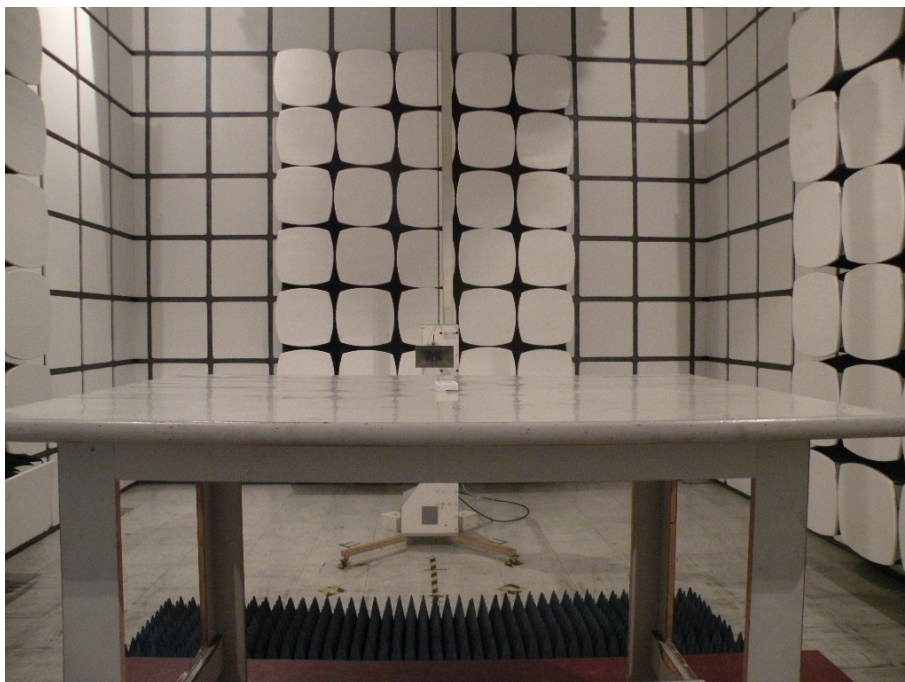
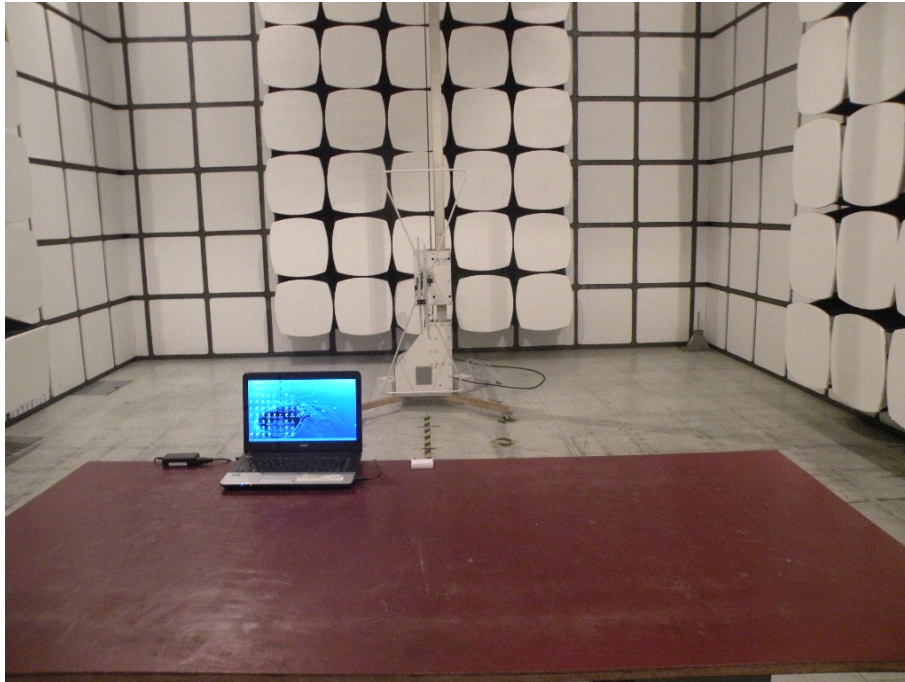
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are PCB Antenna for Bluetooth, no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi for Bluetooth.

12. Test setup photo

12.1. Photos of Radiated emission

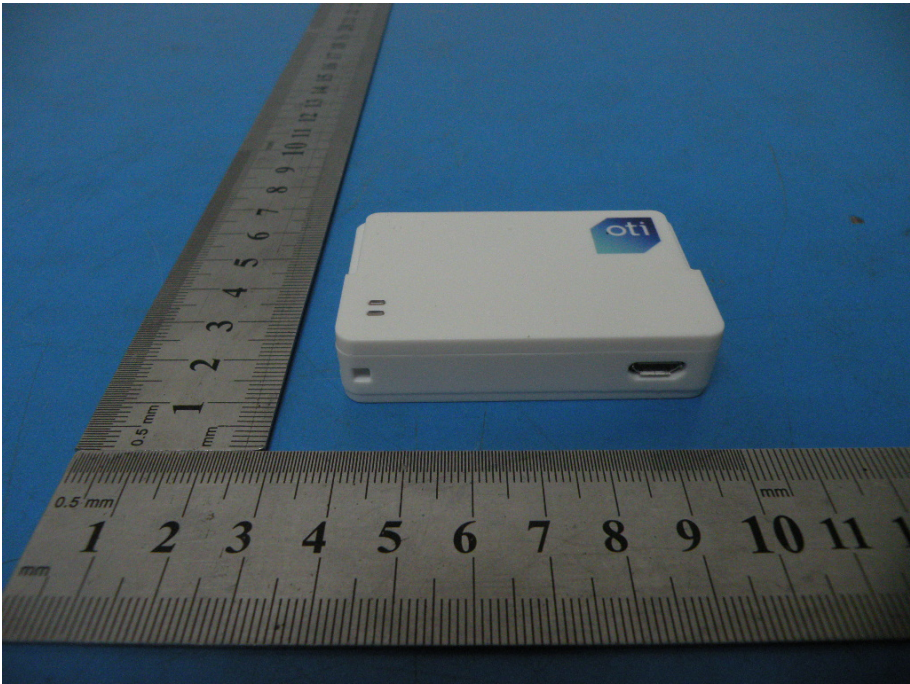


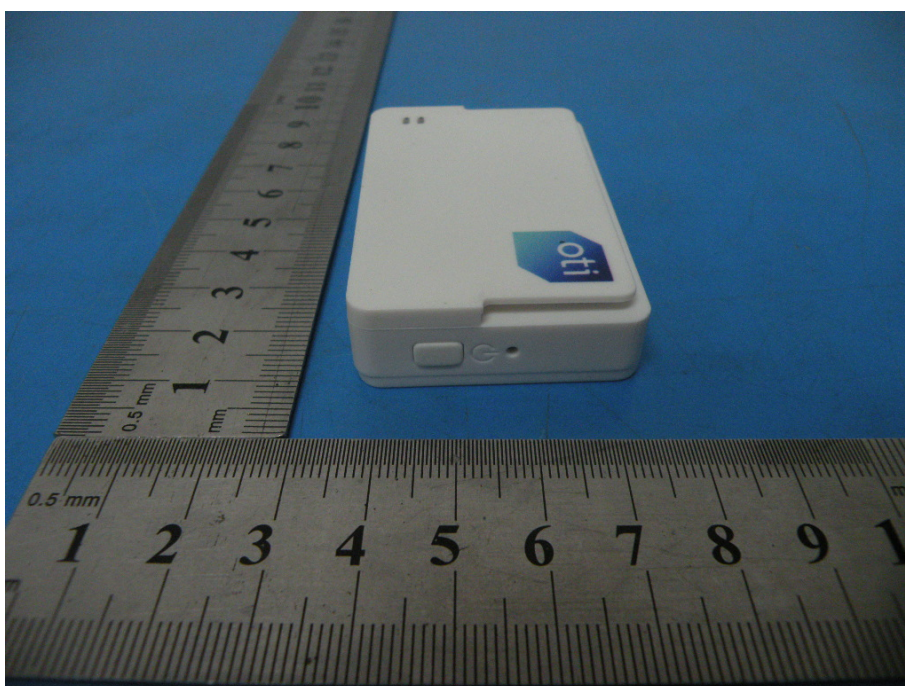
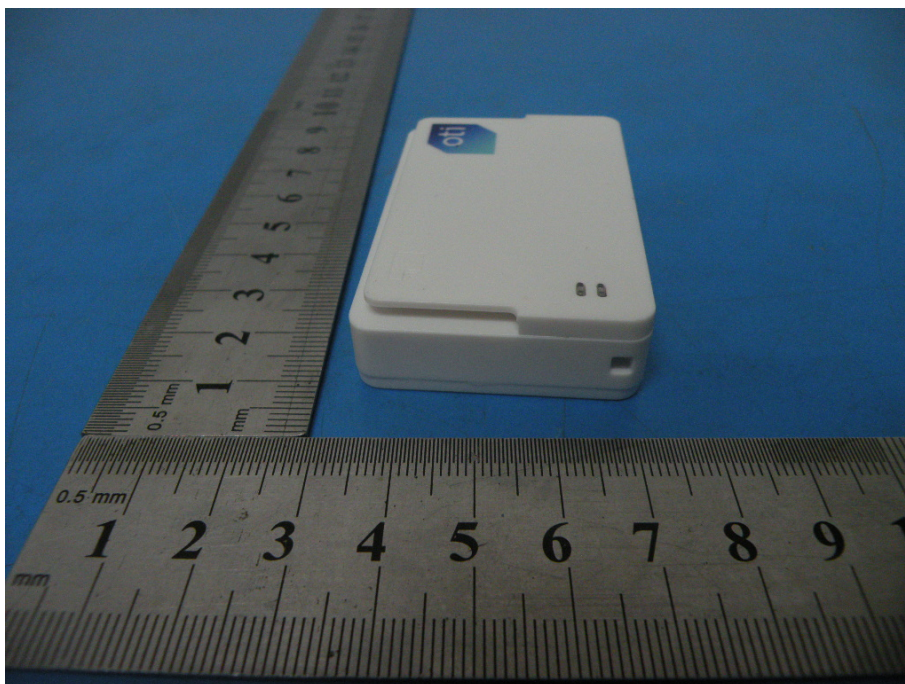
12.2.Photos of Conducted Emission test

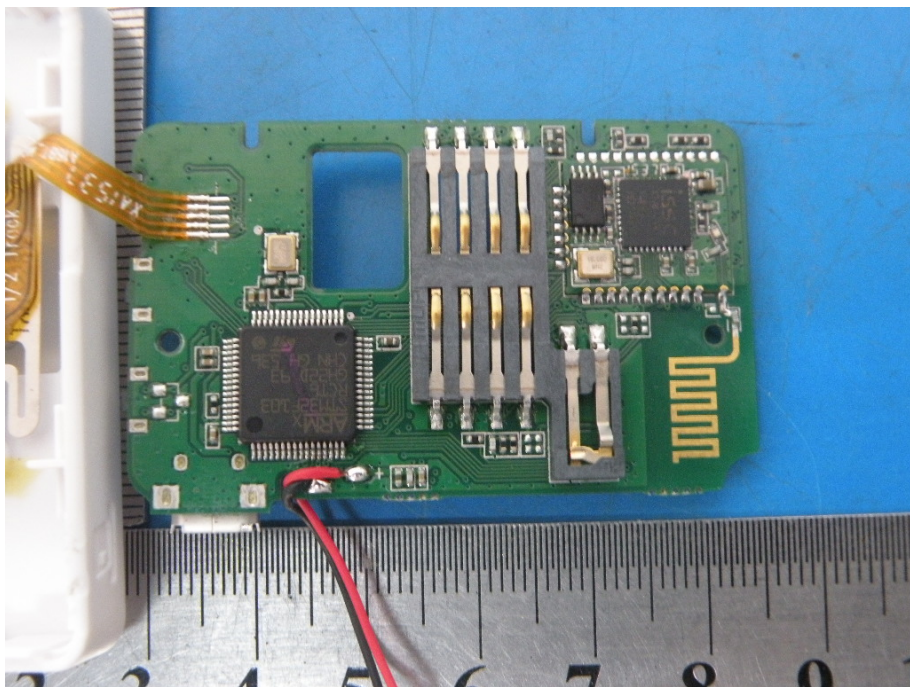
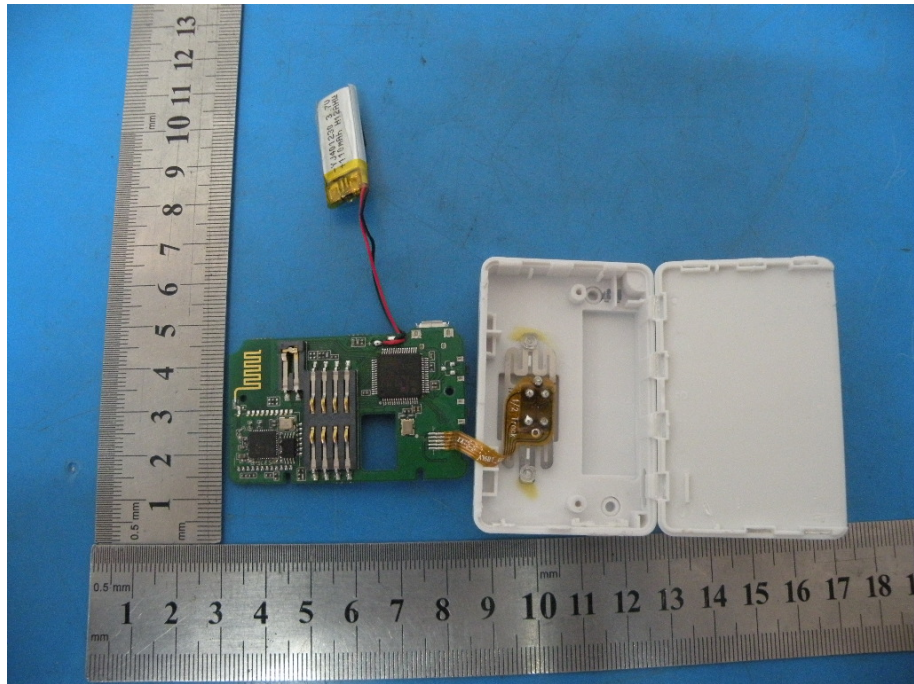


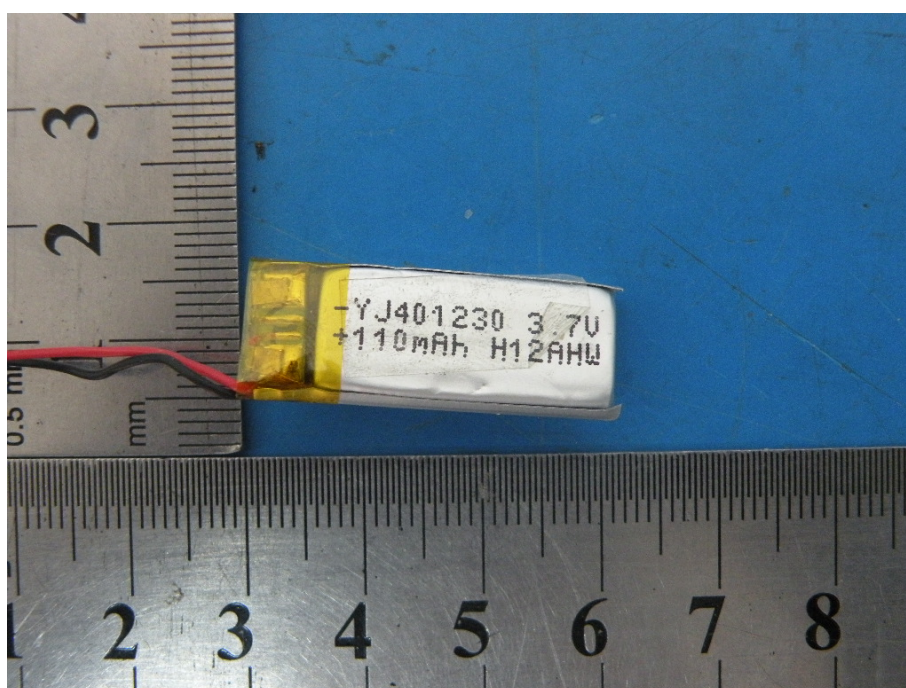
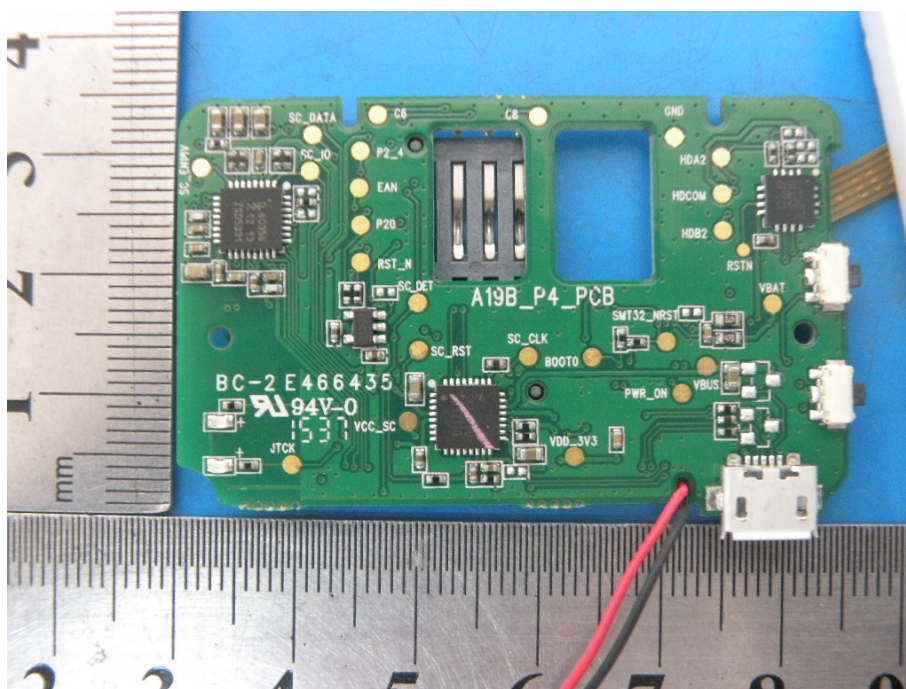
13. Photos of EUT











-----THE END OF REPORT-----