

TEST REPORT

Reference No...... : WTS17S0681153E
FCC ID : 2AE6ATHB4002
Applicant..... : ZippyYum LLC
Address..... : 275 Centennial Way, #105 Tustin, California 92780, United States
Manufacturer : CME Electronics Technology Co., LTD.
Address..... : Suite B, 18th Floor, Jingwangem No. 303, Qinglv Road South,
Gongbei, Zhuhai 519020, Guangdong Province, China
Product Name..... : GoTemp, SubTemp
Model No...... : THB4002,THB4001
Brand Name..... : GOTEMP, SUBTEMP
Standards..... : FCC CFR47 Part 15 Section C 15.247:2016
Date of Receipt sample : May 21, 2017
Date of Test : May 22 – Jun. 06, 2017
Date of Issue..... : Jun. 09, 2017
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S0681153E	May 21, 2017	May 22 – Jun. 06, 2017	Jun. 09, 2017	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product Name:	GoTemp, SubTemp
Model No.:	THB4002,THB4001
Model Difference:	All models are the same in PCB circuit, PCB Layout, components and internal structure, only product name, model name, brand name and appearance color are different. The model THB4002 is the tested sample.
Operation Frequency:	2402MHz ~ 2480MHz, separated by 2MHz,40 channels in total
The lowest oscillator:	32MHz
Type of modulation:	GFSK(BLE only)

4.2 Details of E.U.T.

Technical Data:	DC 3.7V, 400mAh by battery; Charging: DC 5V by USB from PC.
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4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

4.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests; the worst data were recorded and reported.

Table 1 Tests carried out under FCC part 15.247

Test mode	Low channel	Middle channel	High channel
Transmitting	2402MHz	2440MHz	2480MHz

Table 2 Tests carried out under FCC part 15.209

Test Item	Test Mode
Radiated Emissions	Charging + Transmitting
Conducted Emissions	Charging + Transmitting

4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, July 12, 2012.

- **FCC Test Site– Registration No.: 328995**

Waltek Services(Shenzhen) 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 328995, December 3, 2014.

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.15,2016	Sep.14,2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.15,2016	Sep.14,2017
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.15,2016	Sep.14,2017
4.	Cable	LARGE	RF300	-	Sep.15,2016	Sep.14,2017
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2016	Sep.14,2017
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2016	Sep.14,2017
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2017	Apr.18,2018
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2016	Sep.14,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2017	Apr.18,2018
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2017	Apr.18,2018
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2017	Mar.16,2018
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.10,2017	Apr.09,2018
9	Test Receiver	R&S	ESCI	101296	Sep.15,2016	Sep.14,2017
10	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.15,2016	Sep.14,2017
11	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.15,2016	Sep.14,2017
12	Cable	HUBER+SUHNER	CBL2	525178	Sep.15,2016	Sep.14,2017
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2016	Sep.14,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2016	Sep.14,2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.15,2016	Sep.14,2017

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 4.74 dB (Horn antenna 1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.205(a) 15.209(a) 15.247	C
Conducted Emissions	15.207(a)	C
Bandwidth Measurement	15.247(a)(2)	C
Maximum Peak Output Power	15.247(b)(3),(4)	C
Power Spectral Density	15.247(e)	C
Band Edge	15.247(d)	C
Antenna Requirement	15.203	C
SAR Evaluation	1.1307(b)(1)	C
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Conducted Emissions

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013,ANSI C63.4:2014
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

7.1 E.U.T. Operation

Operating Environment :

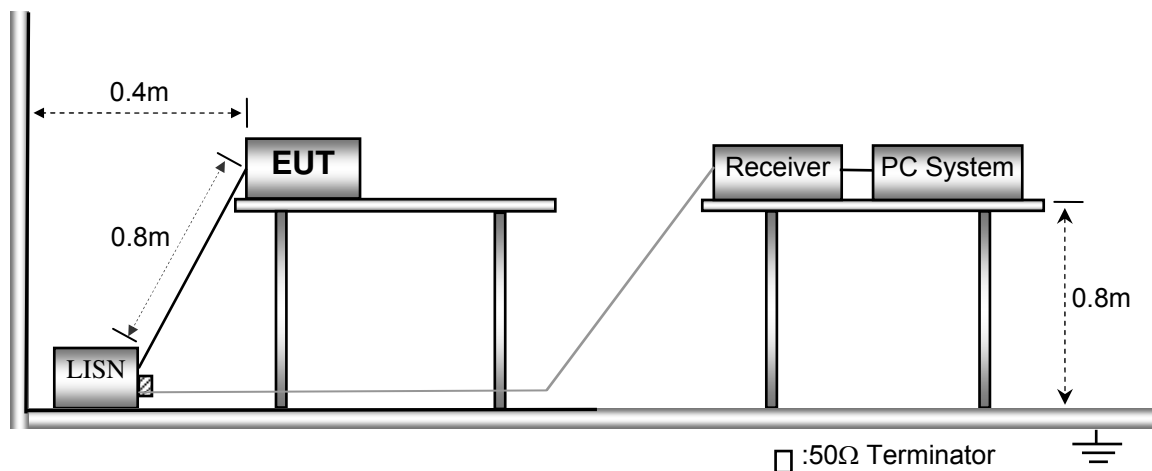
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

The test was performed in Charging + Transmitting mode, the test data were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.

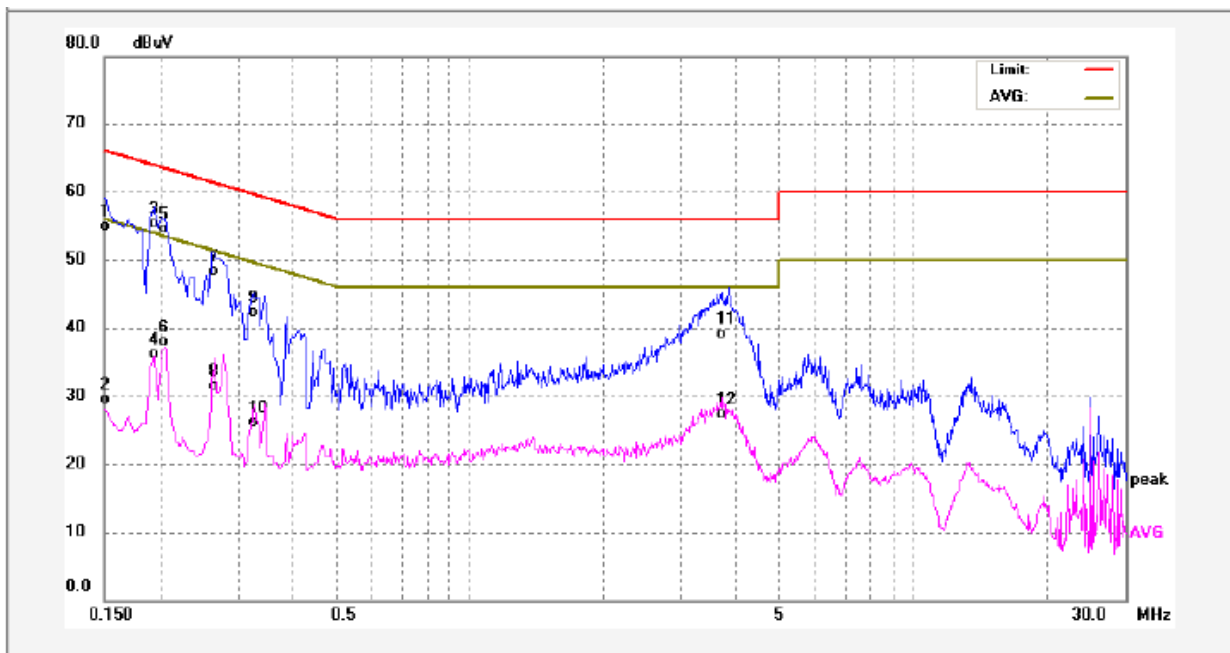


7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

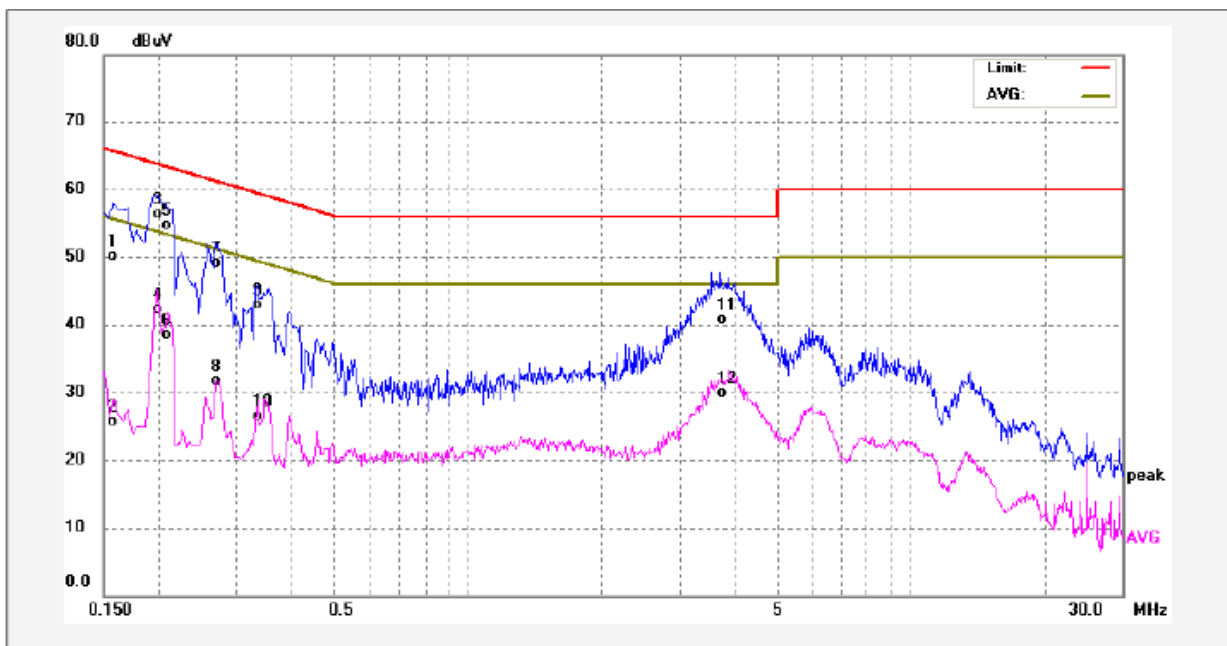
7.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	44.82	10.10	54.92	65.99	-11.07	QP	
2	0.1500	19.50	10.10	29.60	55.99	-26.39	AVG	
3	0.1940	45.23	10.10	55.33	63.86	-8.53	QP	
4	0.1940	26.02	10.10	36.12	53.86	-17.74	AVG	
5	0.2020	44.35	10.10	54.45	63.52	-9.07	QP	
6	0.2020	27.82	10.10	37.92	53.52	-15.60	AVG	
7	0.2630	38.11	10.10	48.21	61.33	-13.12	QP	
8	0.2630	21.39	10.10	31.49	51.33	-19.84	AVG	
9	0.3260	32.17	10.11	42.28	59.55	-17.27	QP	
10	0.3260	15.98	10.11	26.09	49.55	-23.46	AVG	
11	3.6820	28.98	10.22	39.20	56.00	-16.80	QP	
12	3.6820	17.10	10.22	27.32	46.00	-18.68	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	39.92	10.10	50.02	65.56	-15.54	QP	
2	0.1580	15.65	10.10	25.75	55.56	-29.81	AVG	
3	0.1980	46.27	10.10	56.37	63.69	-7.32	QP	
4	0.1980	32.12	10.10	42.22	53.69	-11.47	AVG	
5	0.2117	44.61	10.10	54.71	63.13	-8.42	QP	
6	0.2117	28.37	10.10	38.47	53.13	-14.66	AVG	
7	0.2700	39.03	10.10	49.13	61.12	-11.99	QP	
8	0.2700	21.52	10.10	31.62	51.12	-19.50	AVG	
9	0.3339	32.81	10.11	42.92	59.35	-16.43	QP	
10	0.3339	16.41	10.11	26.52	49.35	-22.83	AVG	
11	3.7020	30.45	10.22	40.67	56.00	-15.33	QP	
12	3.7020	19.68	10.22	29.90	46.00	-16.10	AVG	

8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247& 15.205

Test Method: ANSI C63.10:2013,ANSI C63.4:2014

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

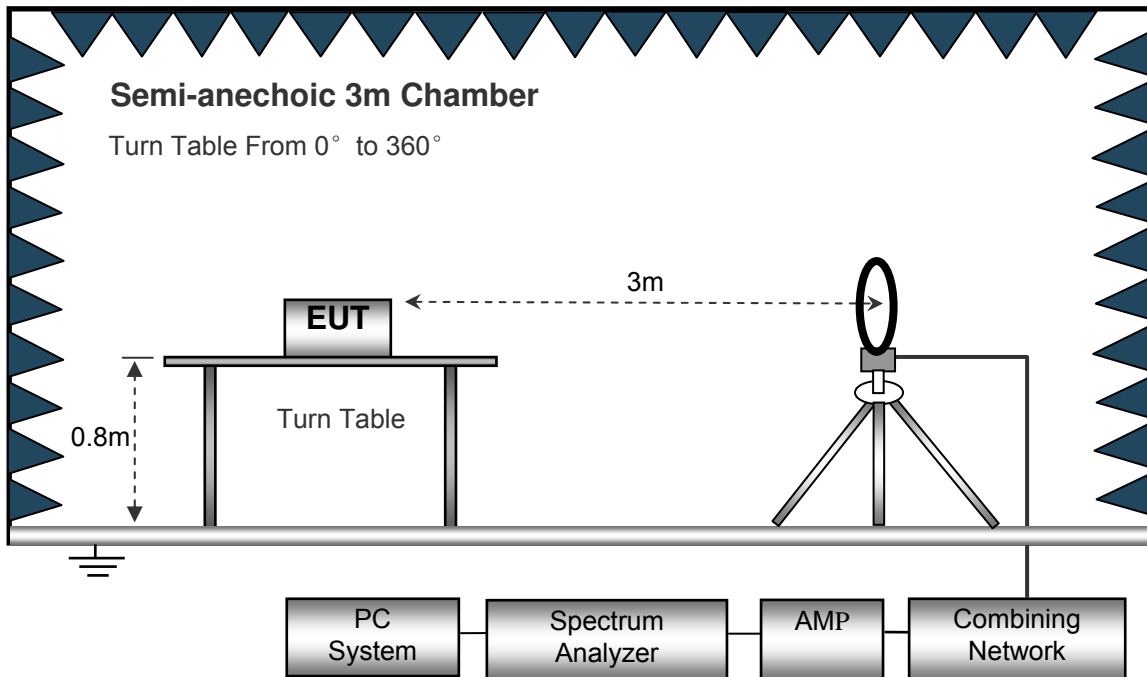
Atmospheric Pressure: 1016 mbar

EUT Operation:

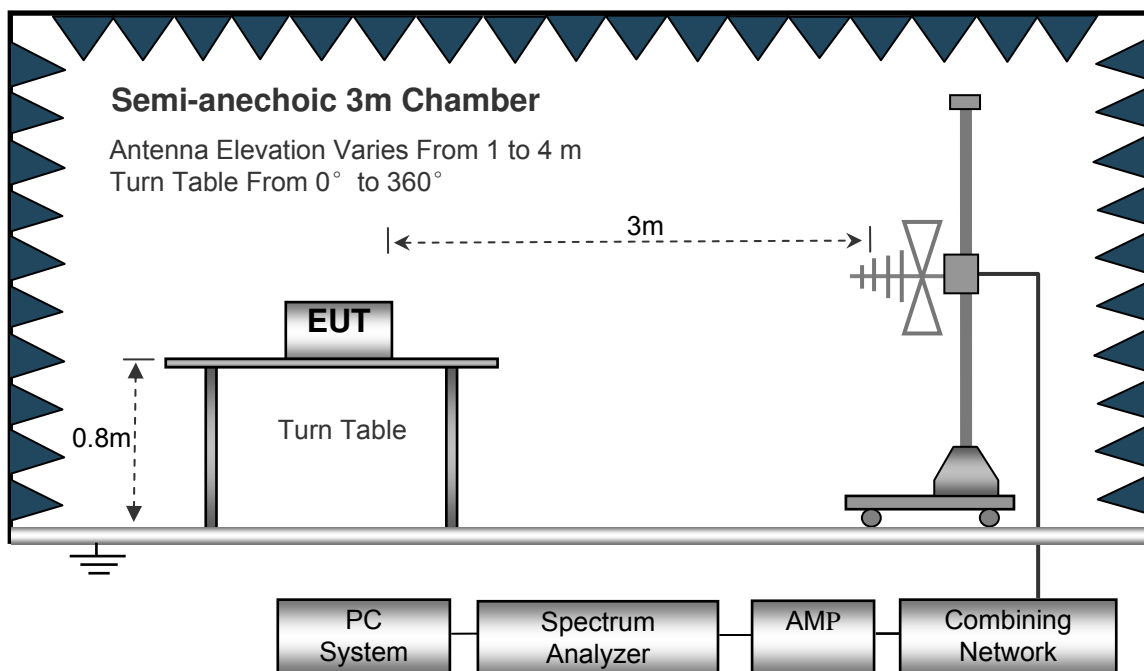
The test was performed in Charging + Transmitting mode, the test data were shown in the report.

8.2 Test Setup

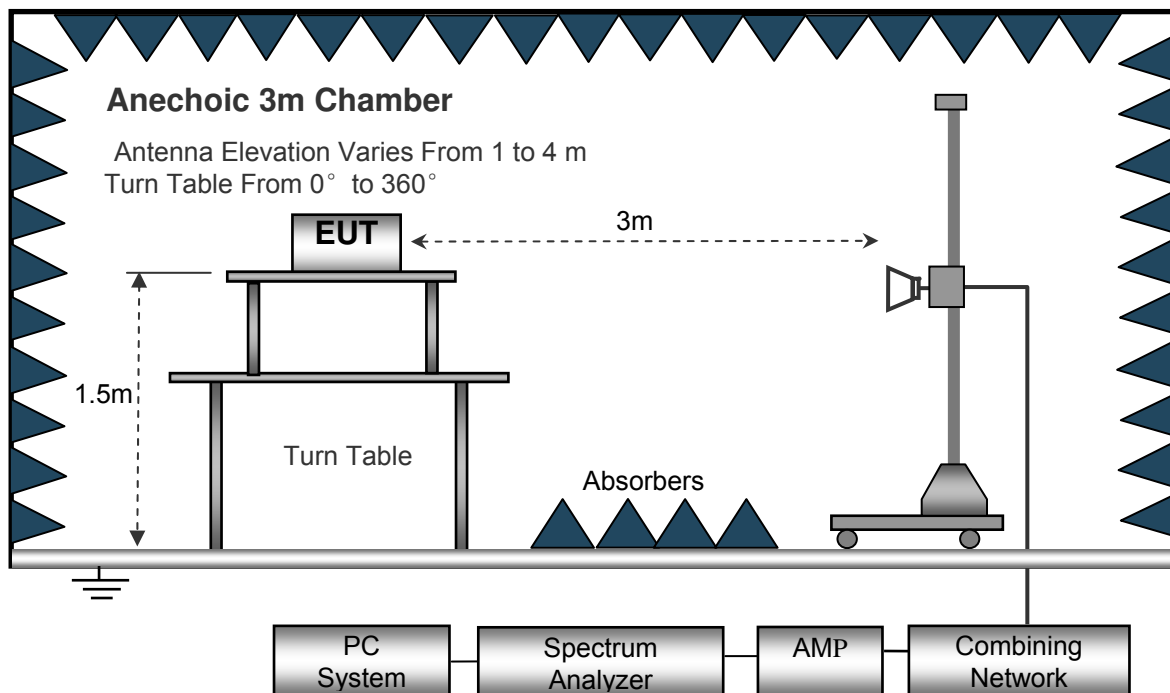
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10:2013.
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

- Sweep Speed Auto
- IF Bandwidth..... 10kHz
- Video Bandwidth..... 10kHz
- Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

- Sweep Speed Auto
- Detector PK
- Resolution Bandwidth..... 100kHz
- Video Bandwidth..... 300kHz

Above 1GHz

- Sweep Speed Auto
- Detector PK
- Resolution Bandwidth..... 1MHz
- Video Bandwidth..... 3MHz
- Detector Ave.
- Resolution Bandwidth..... 1MHz
- Video Bandwidth..... 10Hz

2.1 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high -pass filter is used during radiated emissions above 1GHz measurement.

2.2 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

8.4 Summary of Test Results

Test Frequency: 9KHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported

Test Frequency: 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK(BLE) Low Channel									
175.66	21.25	QP	191	1.3	H	10.59	31.84	43.53	-11.69
175.66	19.56	QP	315	1.7	V	10.59	30.15	43.53	-13.38
4804.00	51.00	PK	325	1.9	V	-1.08	49.92	74.00	-24.08
4804.00	42.23	Ave	325	1.9	V	-1.08	41.15	54.00	-12.85
7206.00	53.66	PK	101	1.5	H	1.34	55.00	74.00	-19.00
7206.00	43.43	Ave	101	1.5	H	1.34	44.77	54.00	-9.23
2319.15	46.58	PK	320	1.3	V	-13.20	33.38	74.00	-40.62
2319.15	37.90	Ave	320	1.3	V	-13.20	24.70	54.00	-29.30
2362.34	42.91	PK	314	1.9	H	-13.12	29.79	74.00	-44.21
2362.34	38.43	Ave	314	1.9	H	-13.12	25.31	54.00	-28.69
2494.40	44.39	PK	339	2.0	V	-13.02	31.37	74.00	-42.63
2494.40	38.22	Ave	339	2.0	V	-13.02	25.20	54.00	-28.80

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK(BLE) Middle Channel									
175.66	20.32	QP	177	1.0	H	10.59	30.91	43.53	-12.62
175.66	19.20	QP	7	1.9	V	10.59	29.79	43.53	-13.74
4880.00	50.15	PK	332	1.4	V	-0.62	49.53	74.00	-24.47
4880.00	40.90	Ave	332	1.4	V	-0.62	40.28	54.00	-13.72
7320.00	51.76	PK	51	1.8	H	2.21	53.97	74.00	-20.03
7320.00	44.51	Ave	51	1.8	H	2.21	46.72	54.00	-7.28
2343.90	46.23	PK	261	1.7	V	-13.19	33.04	74.00	-40.96
2343.90	39.49	Ave	261	1.7	V	-13.19	26.30	54.00	-27.70
2367.04	42.62	PK	57	1.4	H	-13.14	29.48	74.00	-44.52
2367.04	37.13	Ave	57	1.4	H	-13.14	23.99	54.00	-30.01
2498.93	44.57	PK	240	1.8	V	-13.08	31.49	74.00	-42.51
2498.93	37.43	Ave	240	1.8	V	-13.08	24.35	54.00	-29.65

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
GFSK(BLE) High Channel									
175.66	20.59	QP	7	1.7	H	10.59	31.18	43.53	-12.35
175.66	19.92	QP	332	1.6	V	10.59	30.51	43.53	-13.02
4960.00	50.44	PK	99	1.7	V	-0.24	50.20	74.00	-23.80
4960.00	43.75	Ave	99	1.7	V	-0.24	43.51	54.00	-10.49
7440.00	54.41	PK	177	1.9	H	2.84	57.25	74.00	-16.75
7440.00	40.16	Ave	177	1.9	H	2.84	43.00	54.00	-11.00
2324.20	45.95	PK	130	1.6	V	-13.19	32.76	74.00	-41.24
2324.20	38.02	Ave	130	1.6	V	-13.19	24.83	54.00	-29.17
2359.77	43.20	PK	342	1.5	H	-13.14	30.06	74.00	-43.94
2359.77	36.84	Ave	342	1.5	H	-13.14	23.70	54.00	-30.30
2499.57	44.42	PK	96	1.1	V	-13.08	31.34	74.00	-42.66
2499.57	38.08	Ave	96	1.1	V	-13.08	25.00	54.00	-29.00

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported

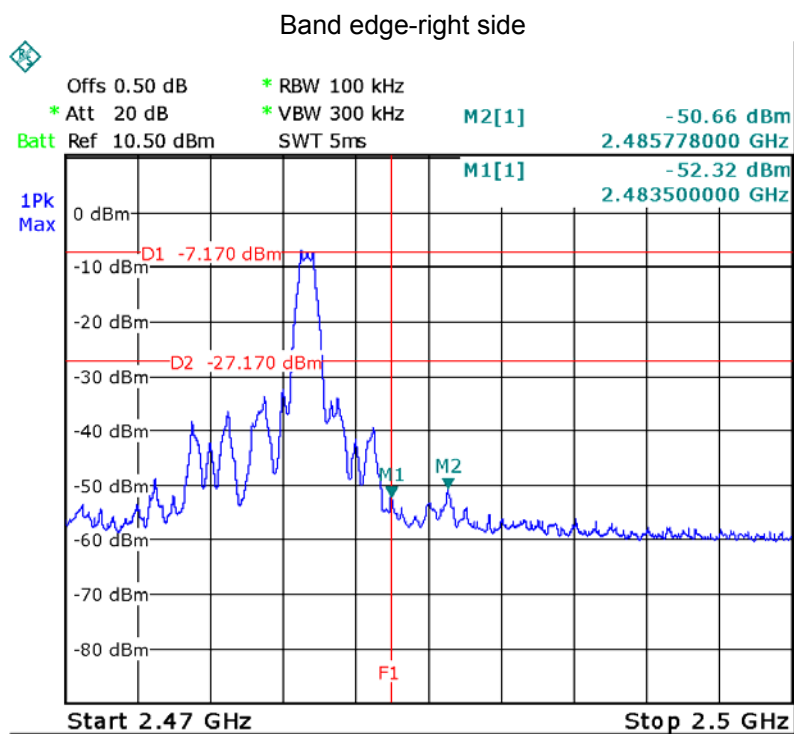
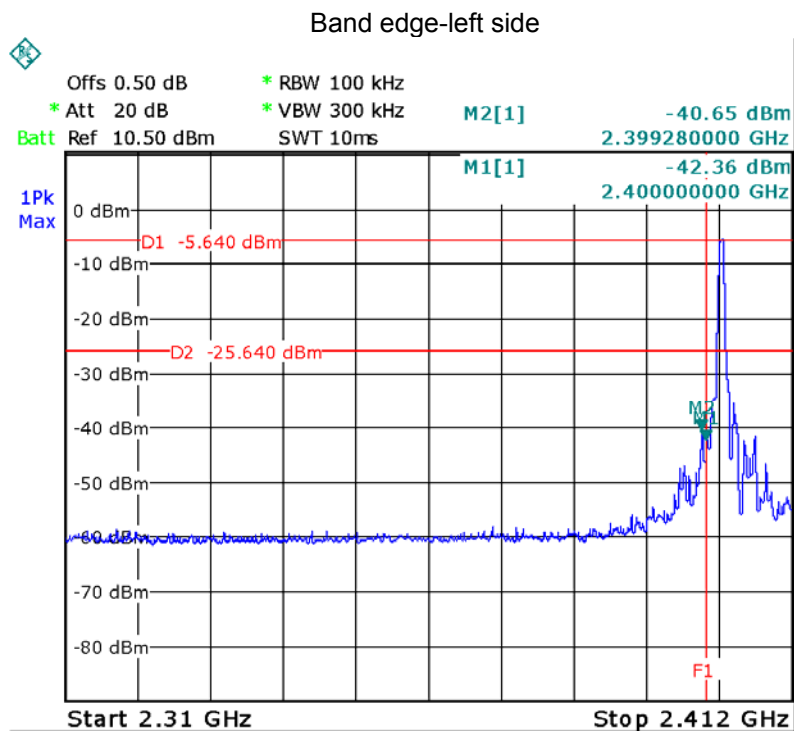
9 Band Edge Measurement

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) and 15.205(c).
Test Method:	558074 D01 DTS Meas Guidance v04, April 5, 2017
Test Limit:	Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

9.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

9.2 Test Result



10 Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

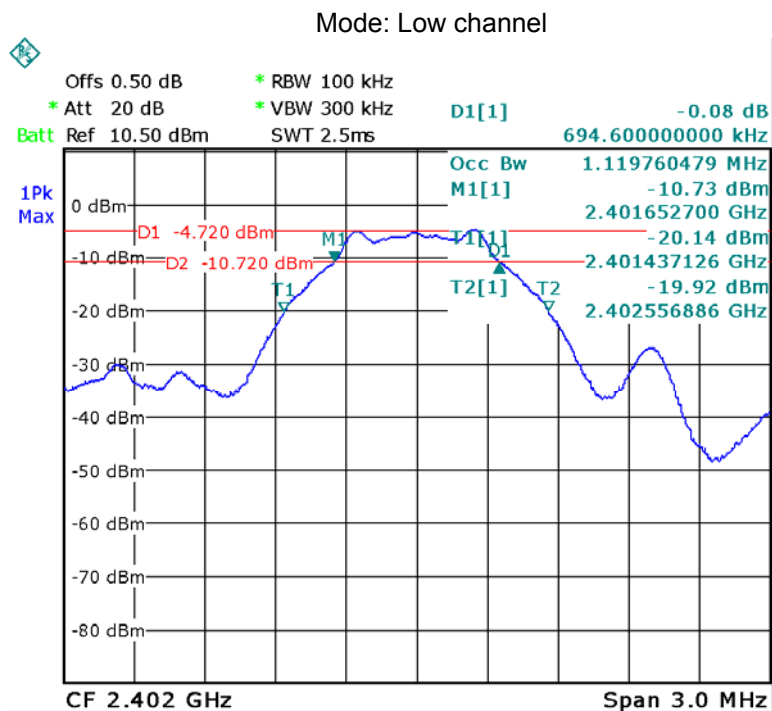
10.1 Test Procedure

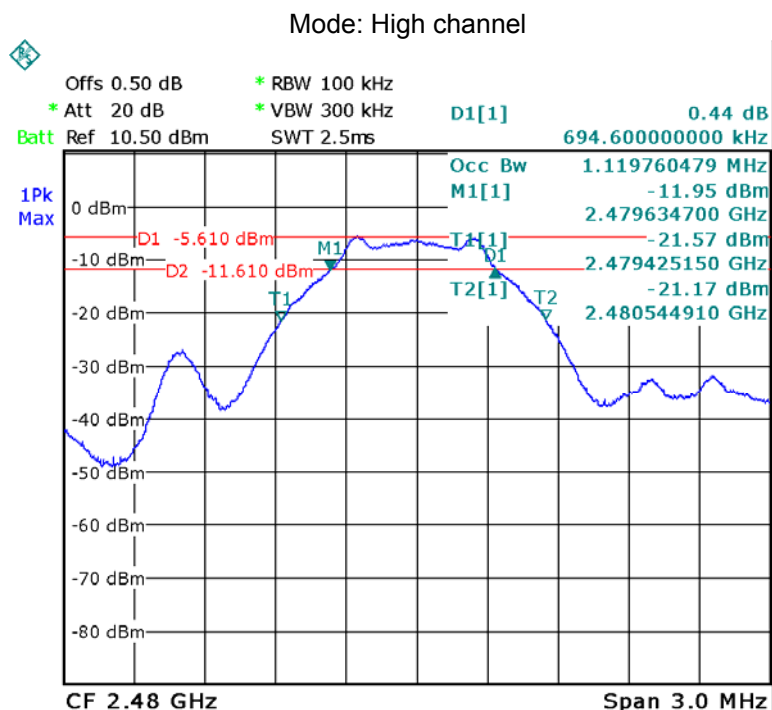
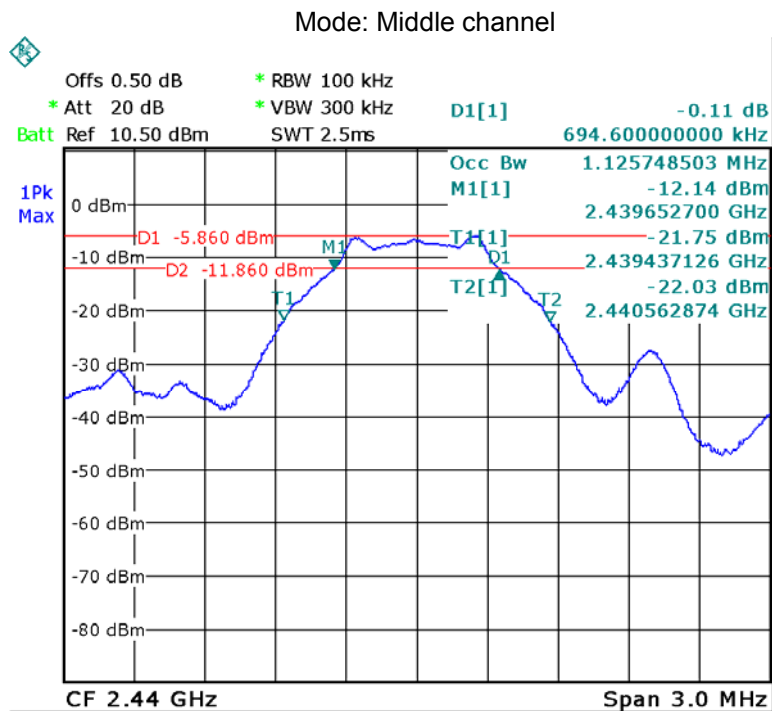
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result

Operation mode	6dB Bandwidth (MHz)	99% Bandwidth(MHz)
Low channel	0.695	1.120
Middle channel	0.695	1.126
High channel	0.695	1.120

Test result plot as follows:





11 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 DTS Meas Guidance v04, April 5, 2017

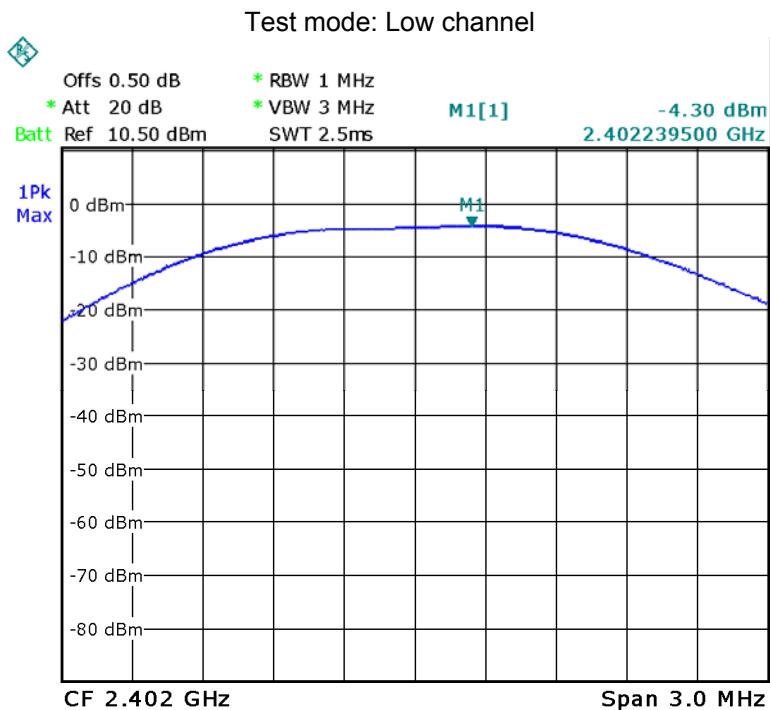
11.1 Test Procedure

558074 D01 DTS Meas Guidance v04, April 5, 2017

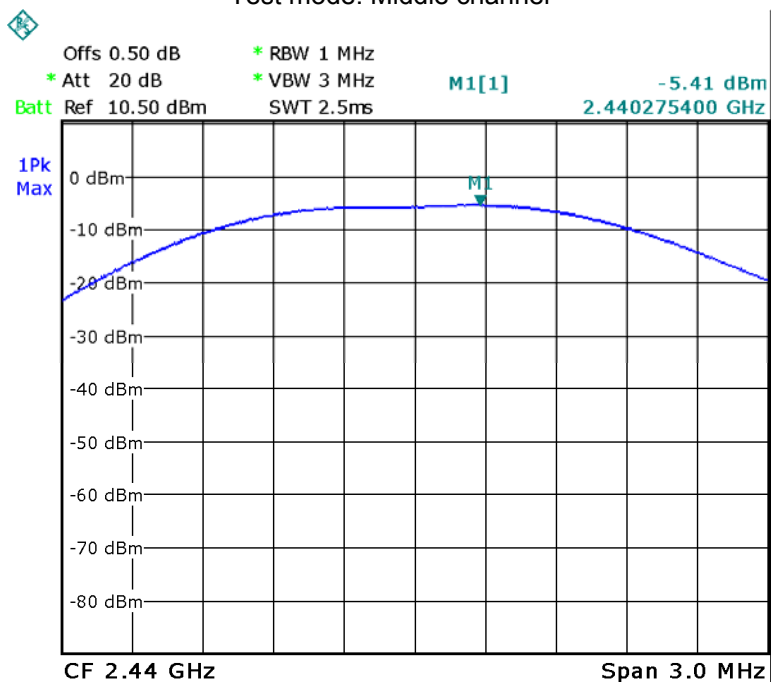
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

11.2 Test Result

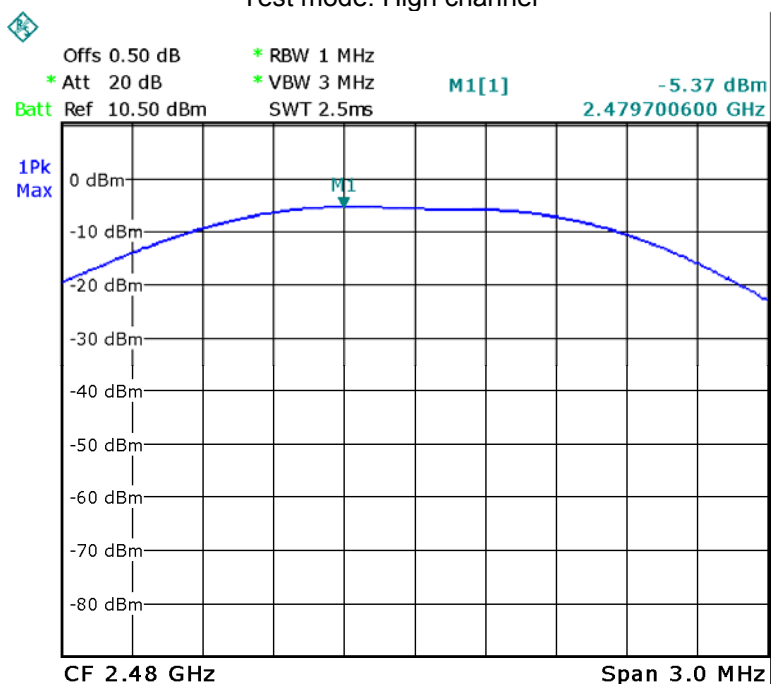
Maximum Peak Output Power (dBm)		
Lower channel	Middle channel	High channel
-4.30	-5.41	-5.37
Limit: 1W/30dBm		



Test mode: Middle channel



Test mode: High channel



12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

12.1 Test Procedure

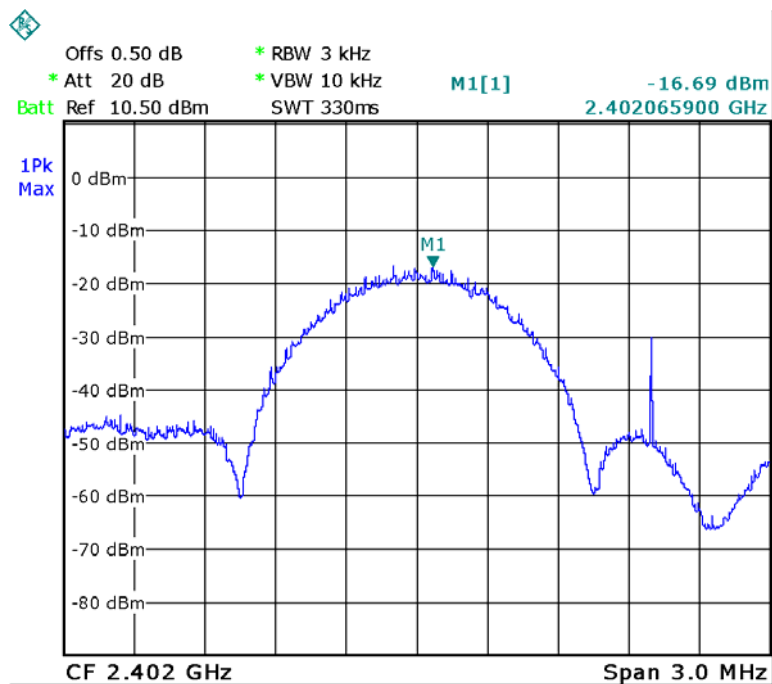
558074 D01 DTS Meas Guidance v04, April 5, 2017

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section
Submit this plot.

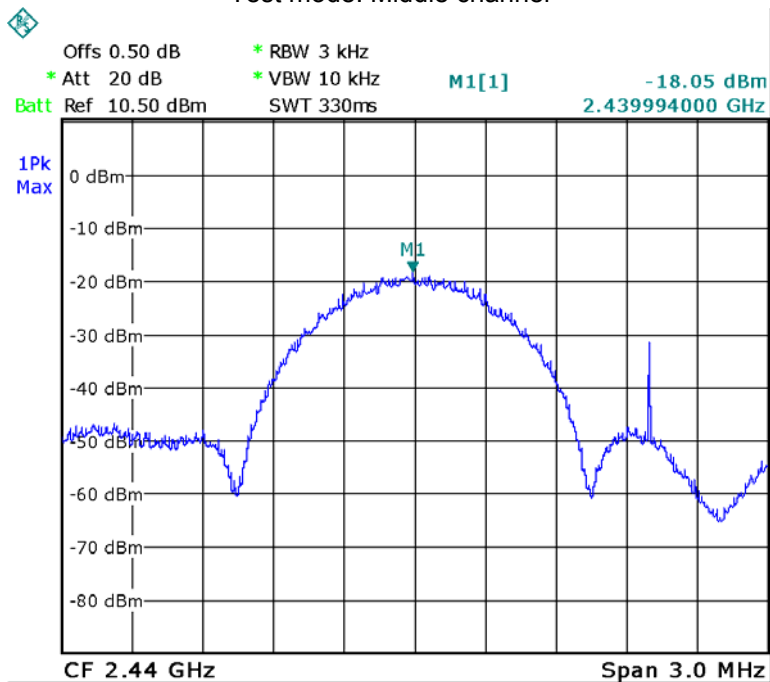
12.2 Test Result

Power Spectral density (dBm per 3kHz)		
Lower channel	Middle channel	High channel
-16.69	-18.05	-18.85
Limit: 8dBm per 3kHz		

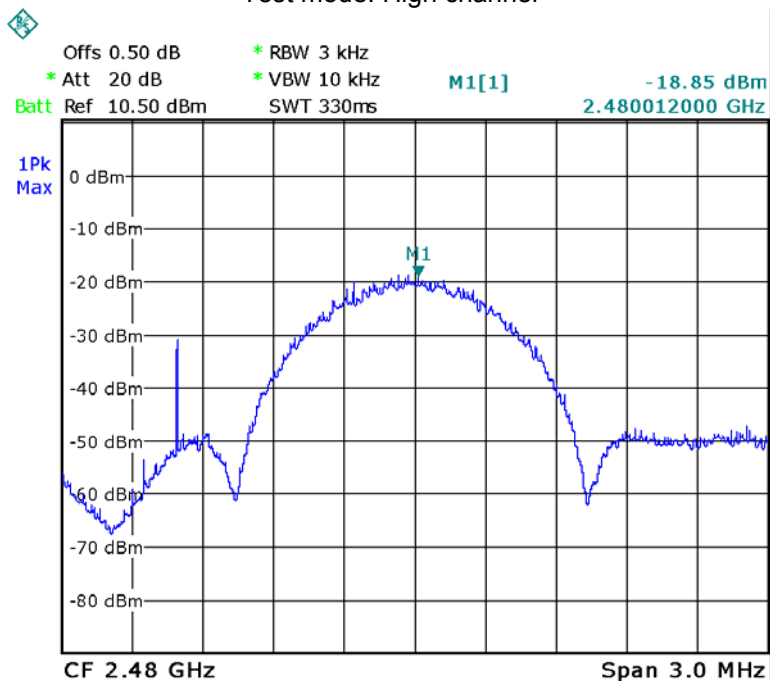
Test mode: Lower channel



Test mode: Middle channel



Test mode: High channel



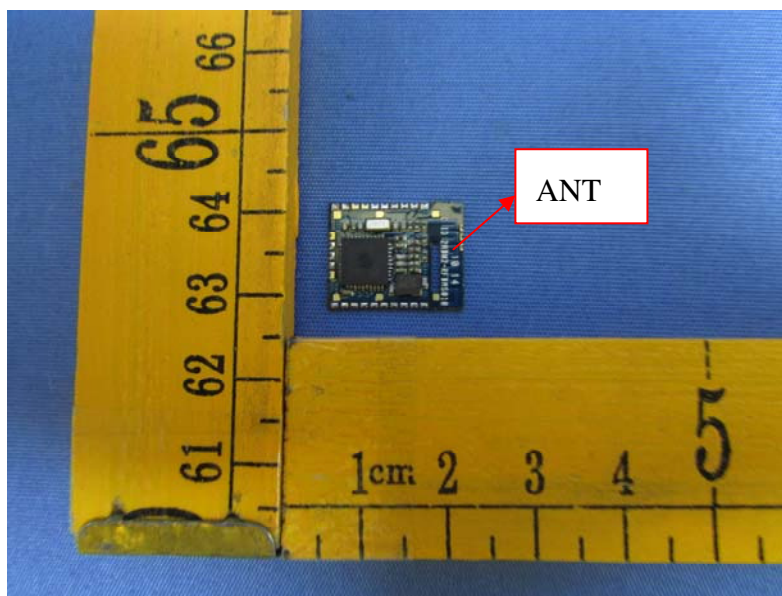
13 Antenna Requirement

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

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.

Result:

The EUT has onePCB Printed Antenna, the gain is 0dBi. meets the requirements of FCC 15.203.



14 SAR Evaluation

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1093 & 447498 D01 General RF Exposure Guidance v06

14.1 Requirements

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR where

1. $f(\text{GHz})$ is the RF channel transmit frequency in GHz
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

14.2 The procedures / limit

Conducted Peak power(dBm)	Conducted Peak power(mW)	Source-based time-averaged maximum conducted output power(mW)	Minimum test separation distance required for the exposure conditions (mm)	SAR Test Exclusion Thresholds(mW)	Result
-4.30	0.372	0.372	5	10	Compliance

Remark: Max. duty factor is 100%

Calculation formula: Source-based time-averaged maximum conducted output power (mW)

=Conducted peak power (mW)*Duty factor

For frequency in 2.402GHz: SAR Test Exclusion Thresholds $\leq 3.0 / [\sqrt{f(\text{GHz})}] \cdot (\text{min. test separation distance, mm}) = 3.0 / (\sqrt{2.402}) \cdot 5 = 9.679 \text{ mW} \approx 10 \text{ mW}$

For frequency in 2.480GHz: SAR Test Exclusion Thresholds $\leq 3.0 / [\sqrt{f(\text{GHz})}] \cdot (\text{min. test separation distance, mm}) = 3.0 / (\sqrt{2.480}) \cdot 5 = 9.525 \text{ mW} \approx 10 \text{ mW}$

14.3 Result: Compliance

No SAR measurement is required.

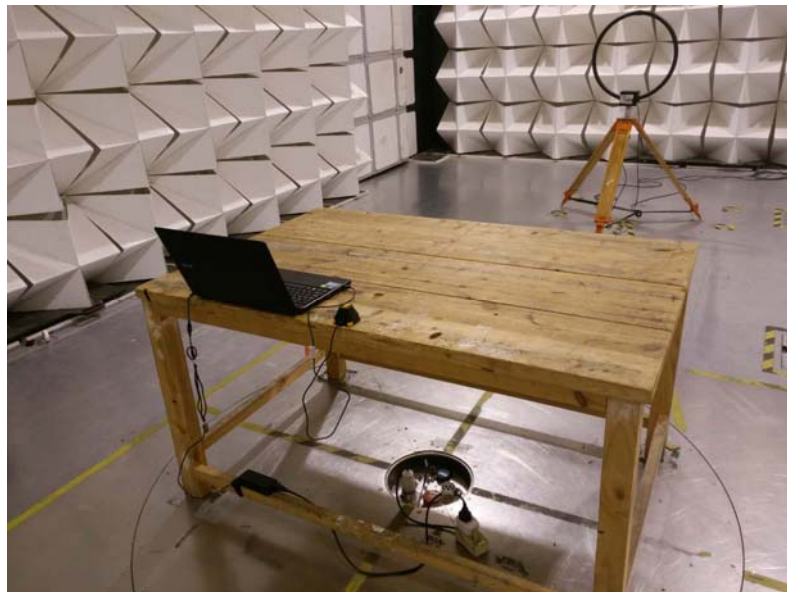
15 Photographs – Model THB4002 Test Setup

15.1 Photograph – Conducted Emission Test Setup

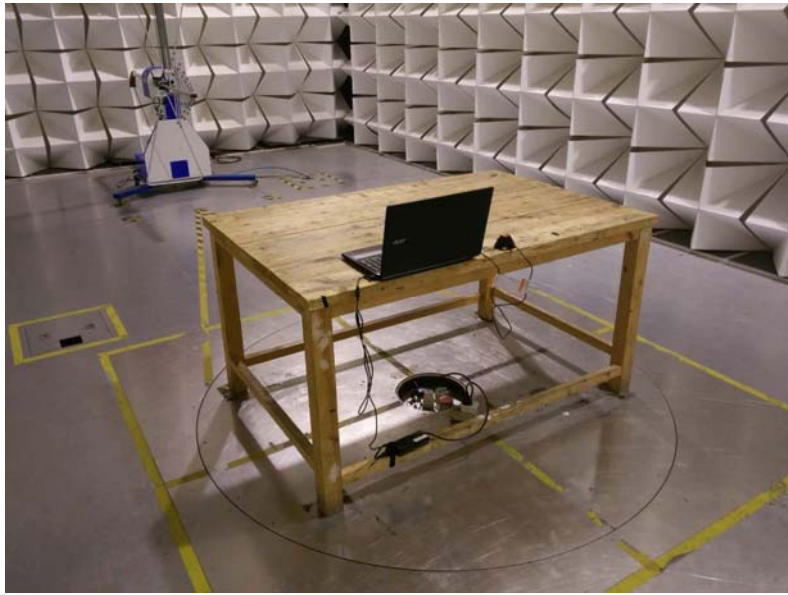


15.2 Radiated Emission

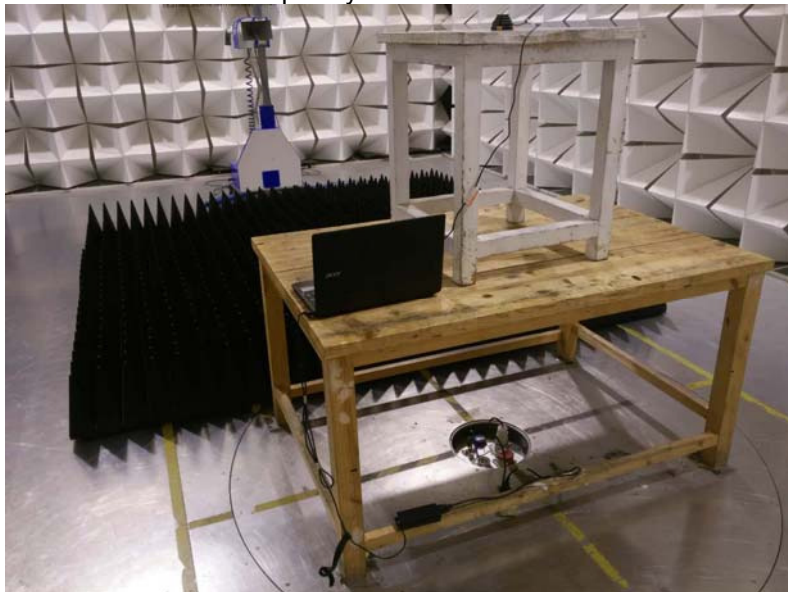
Test frequency from 9KHz to 30MHz

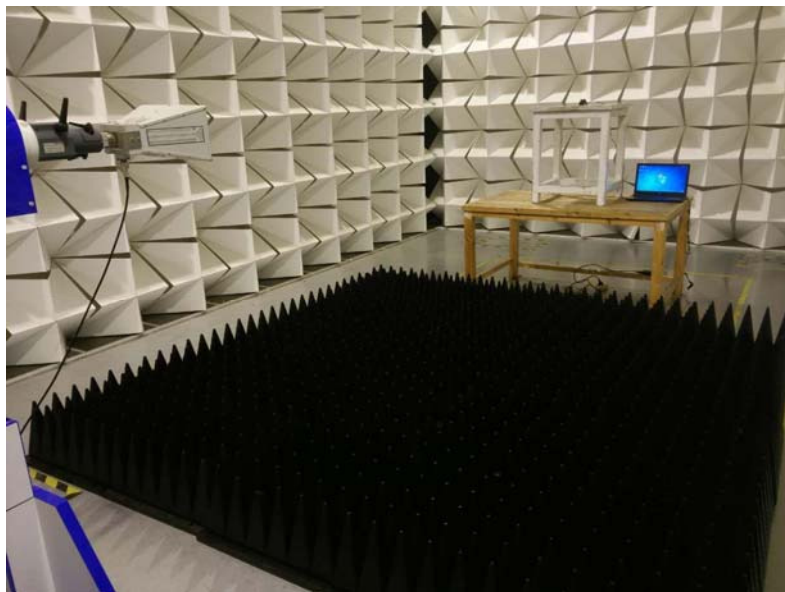


Test frequency from 30MHz to 1GHz



Test frequency from 1GHz to 25GHz





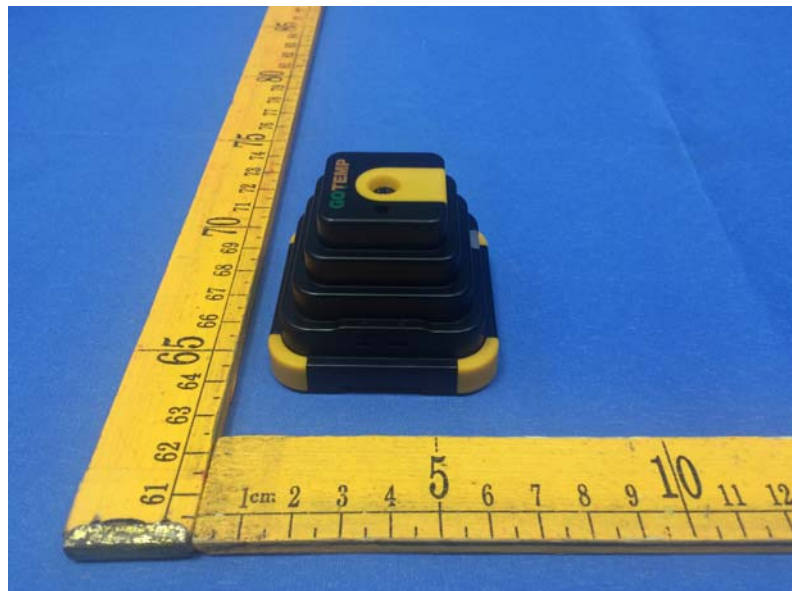
16 Photographs - Constructional Details

16.1 EUT- External Photos

Model THB4002



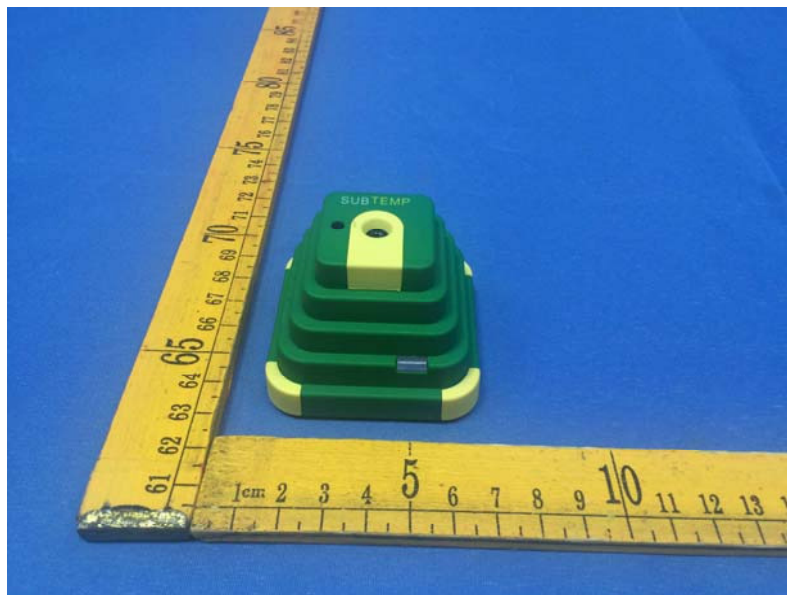
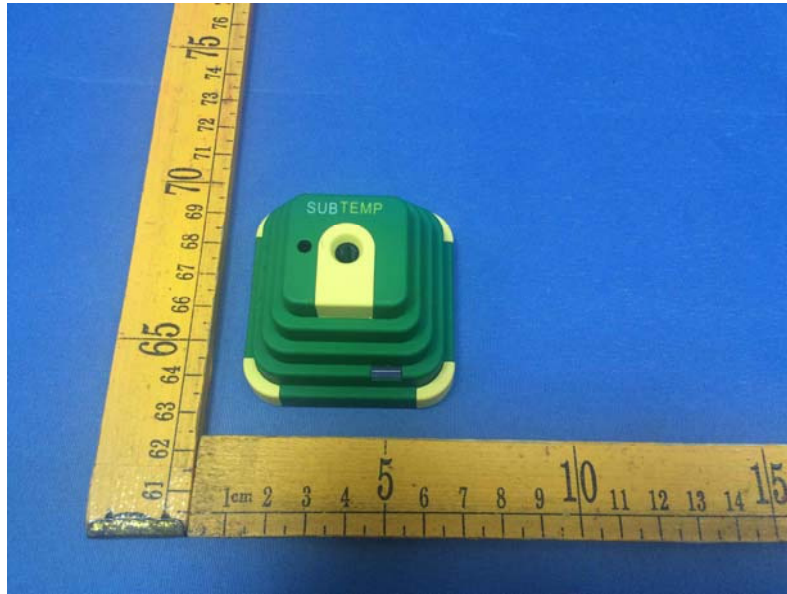


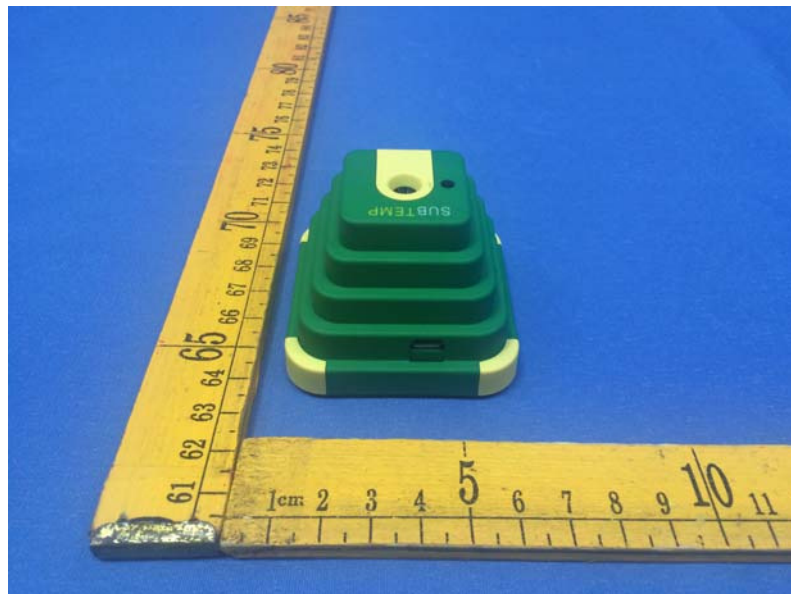
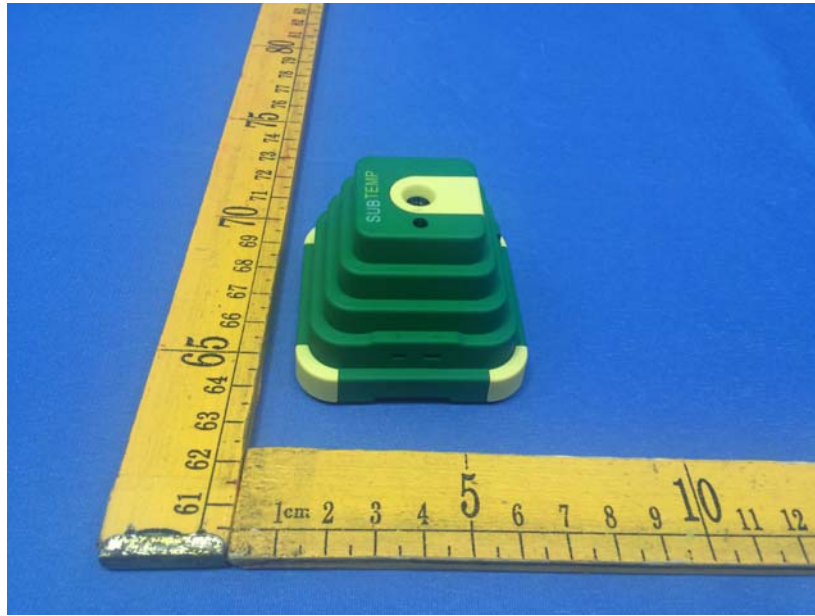


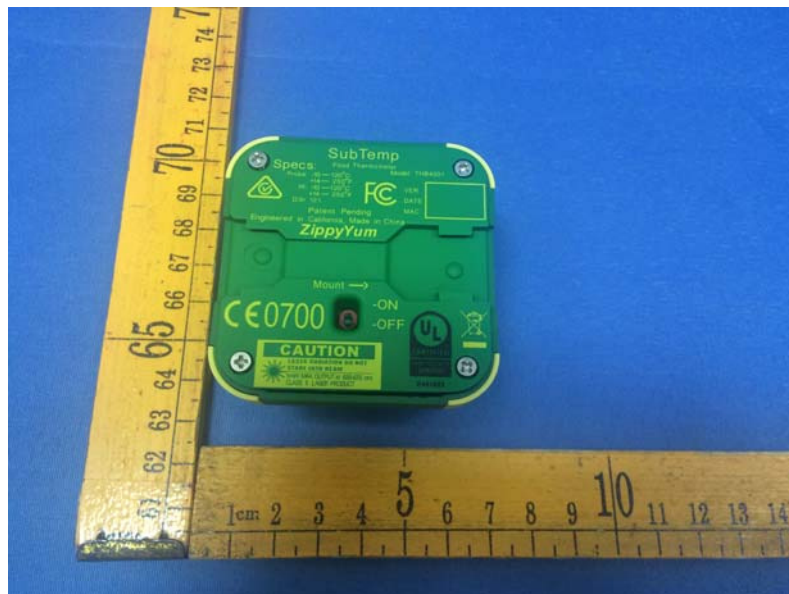
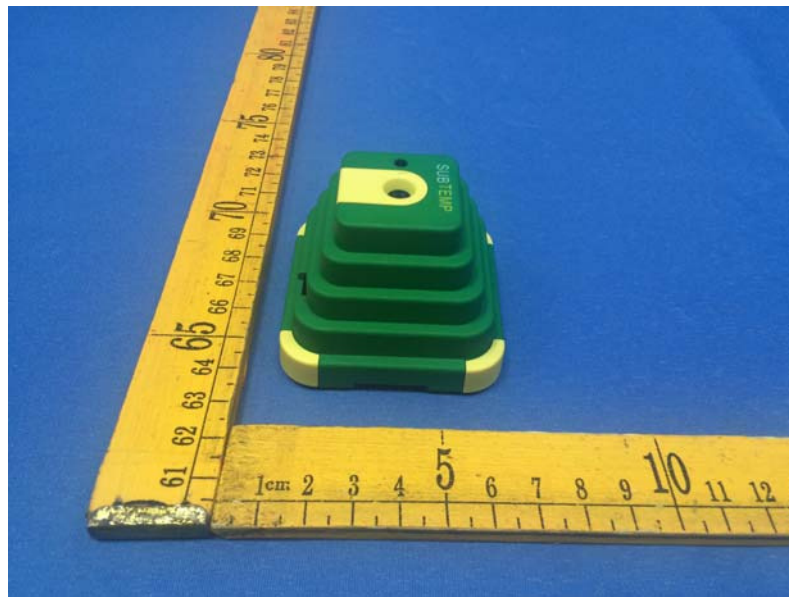


Model THB4001



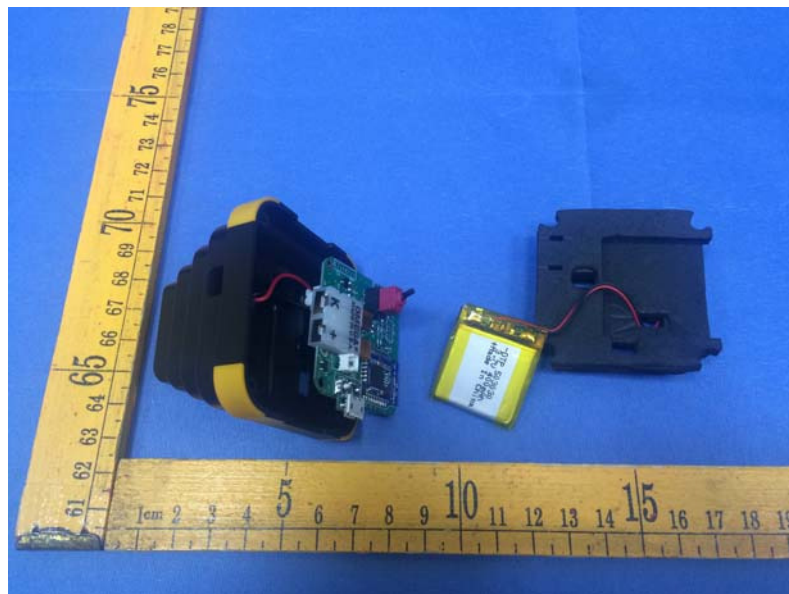


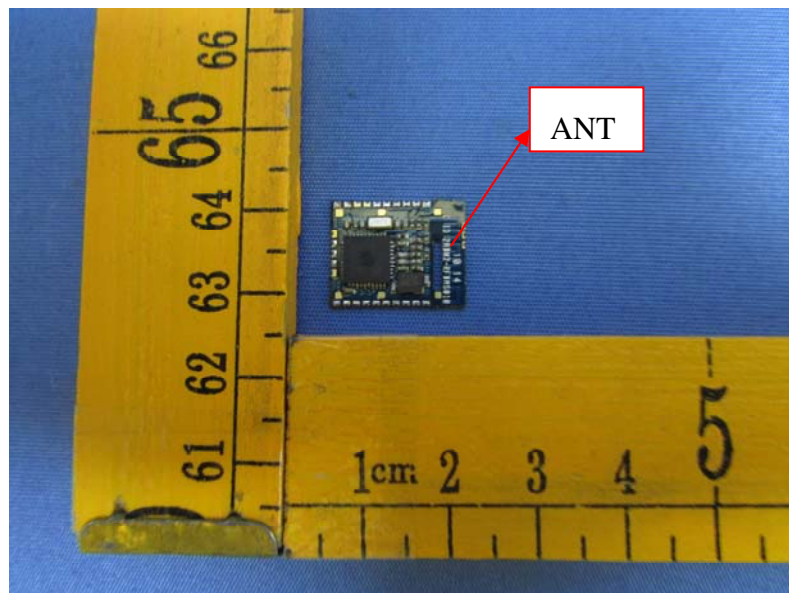
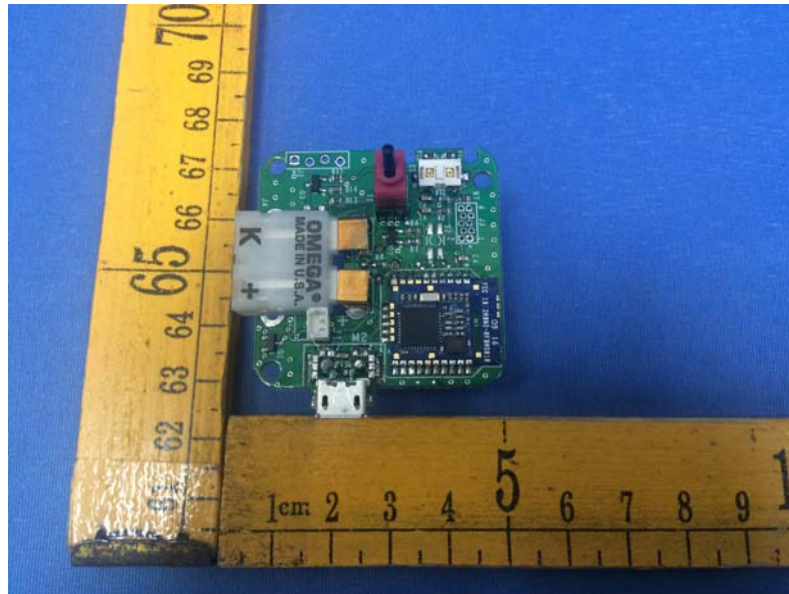


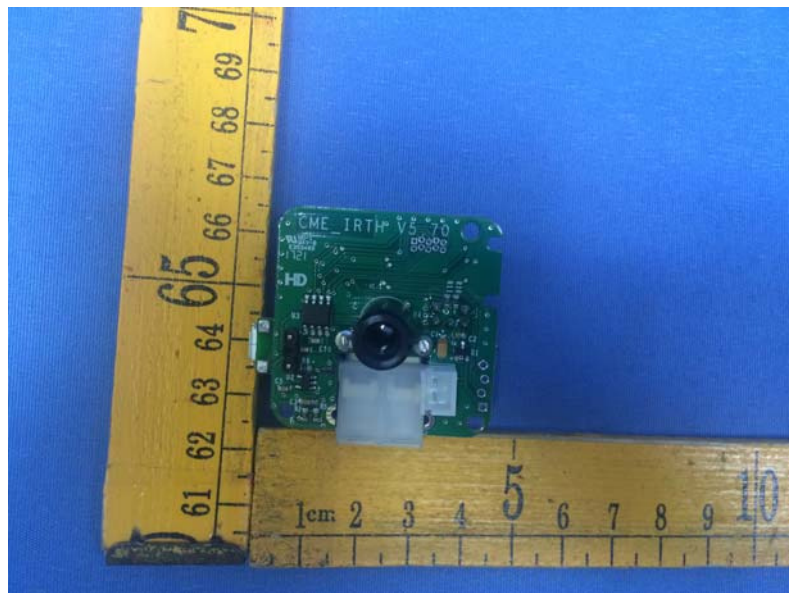
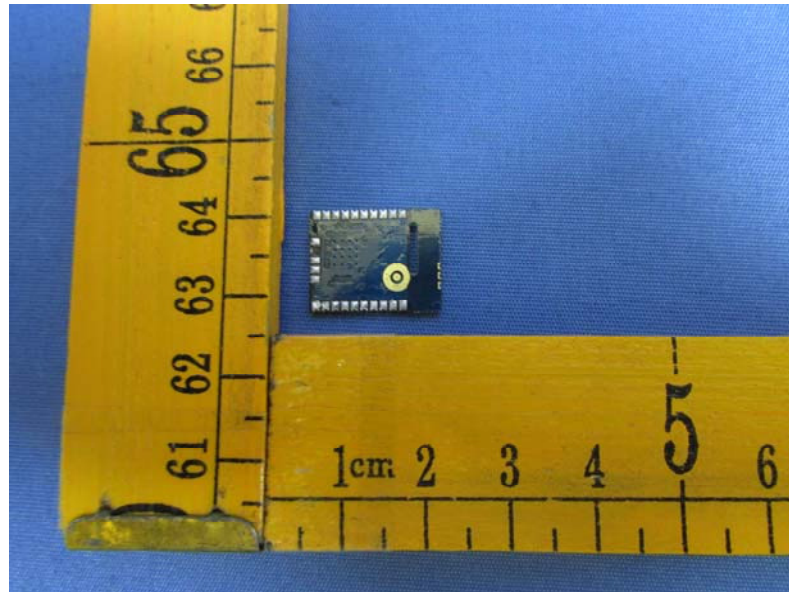


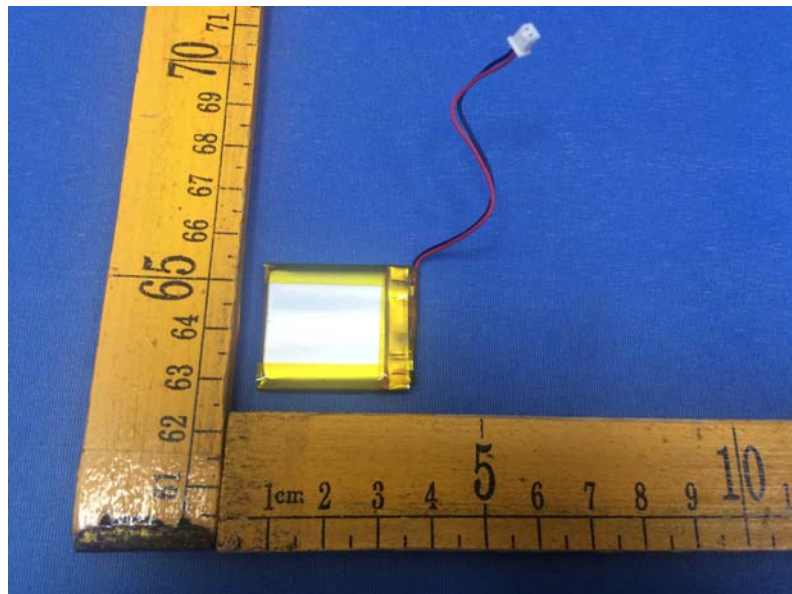
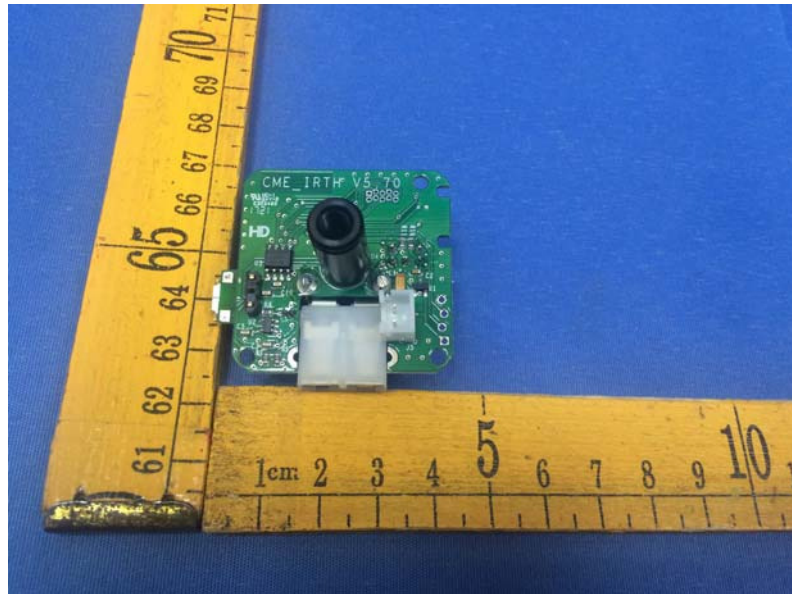
16.2 EUT- Internal Photos

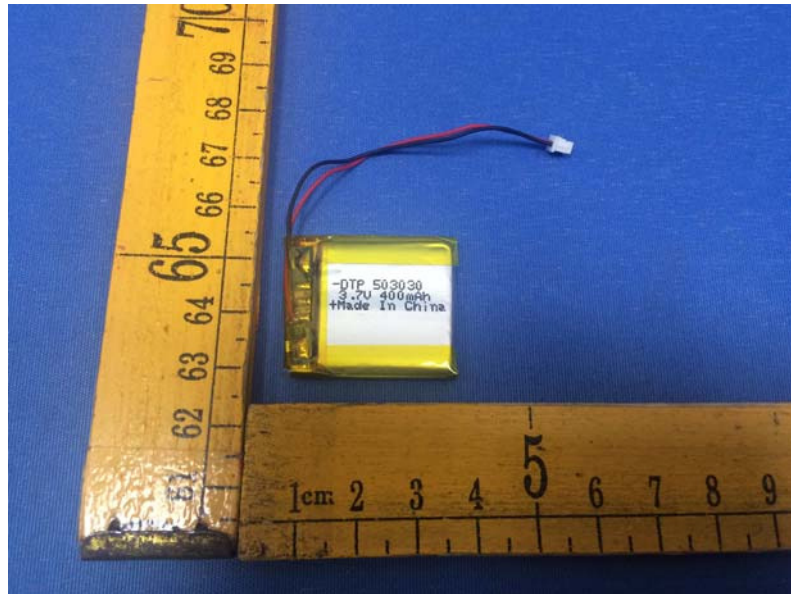
Model THB4002



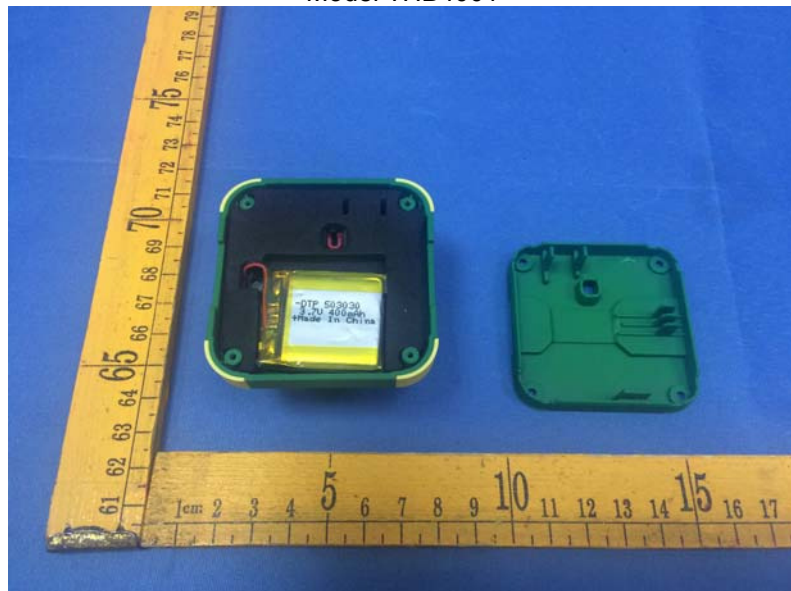


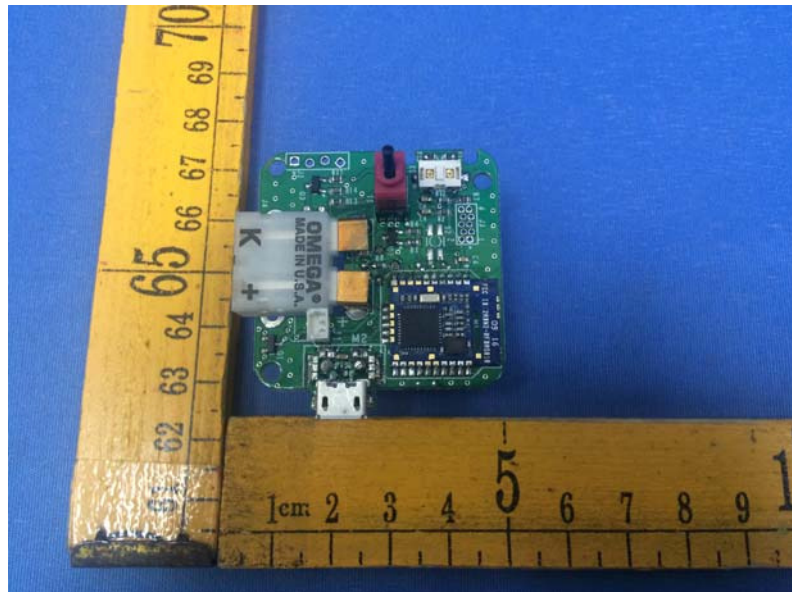
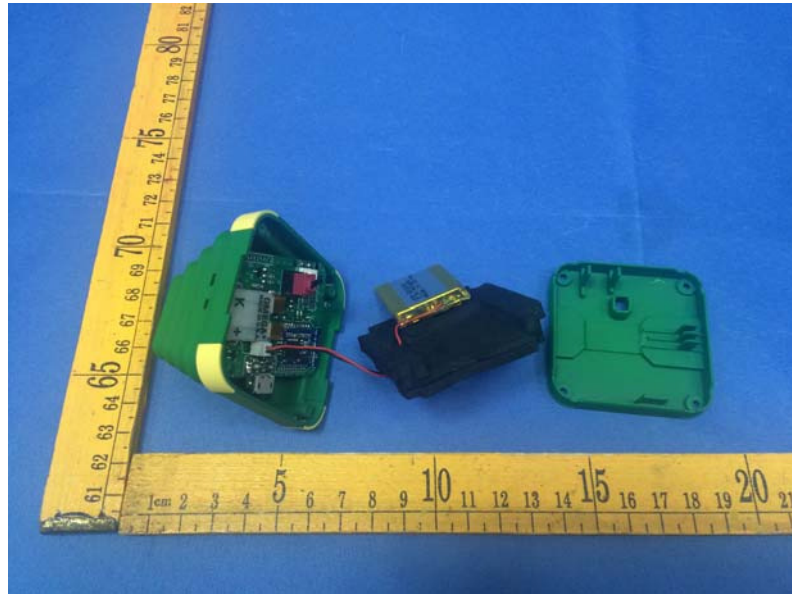


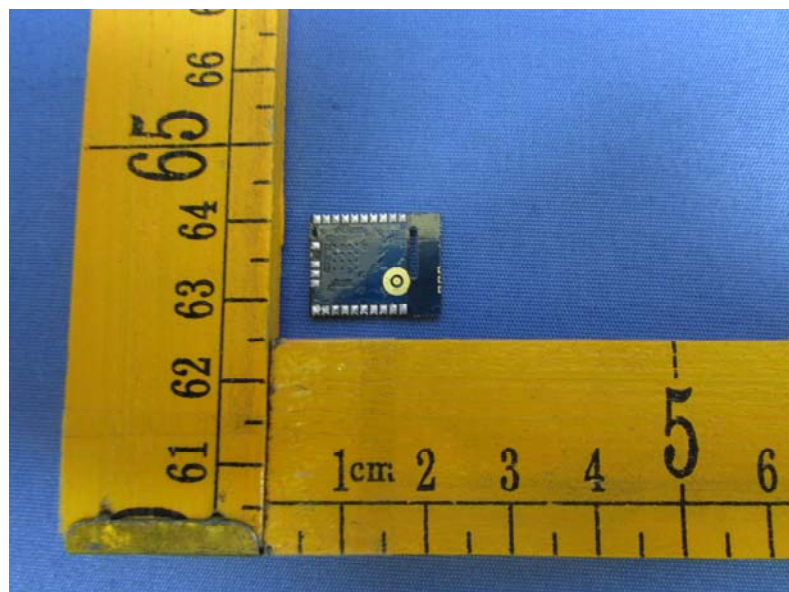
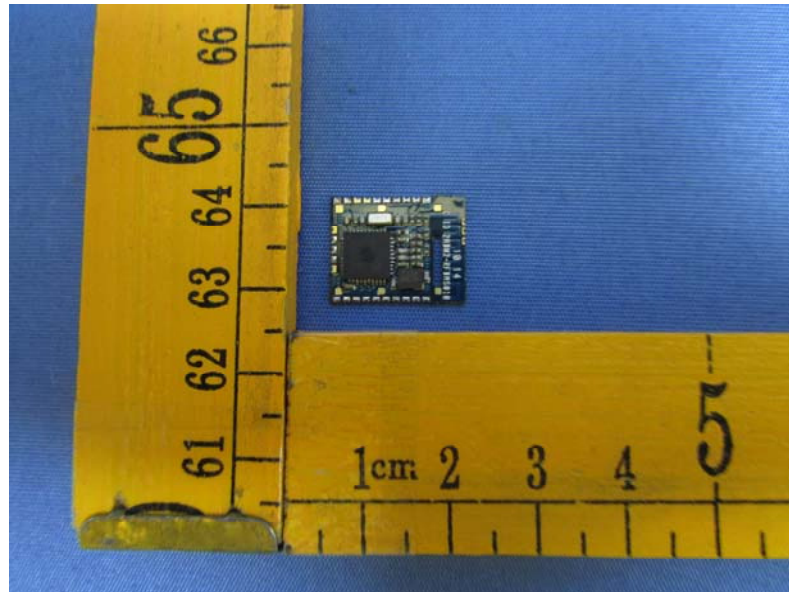


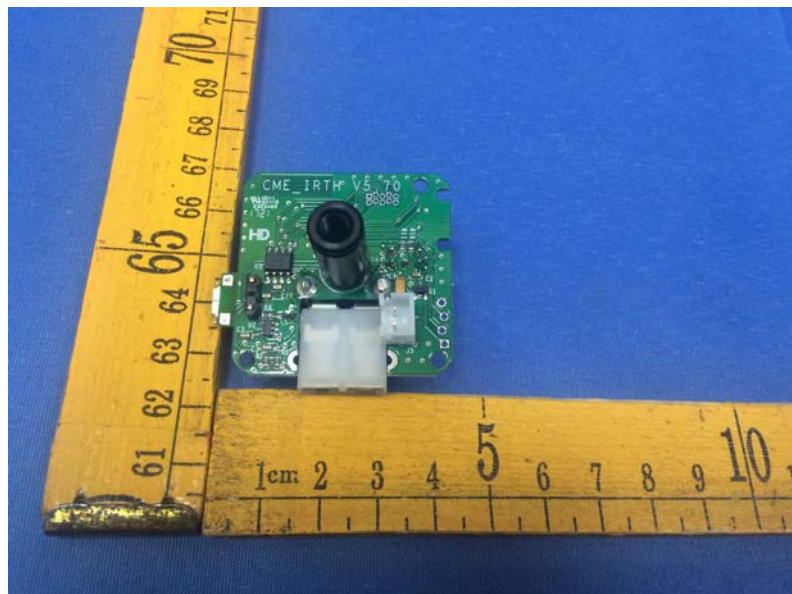
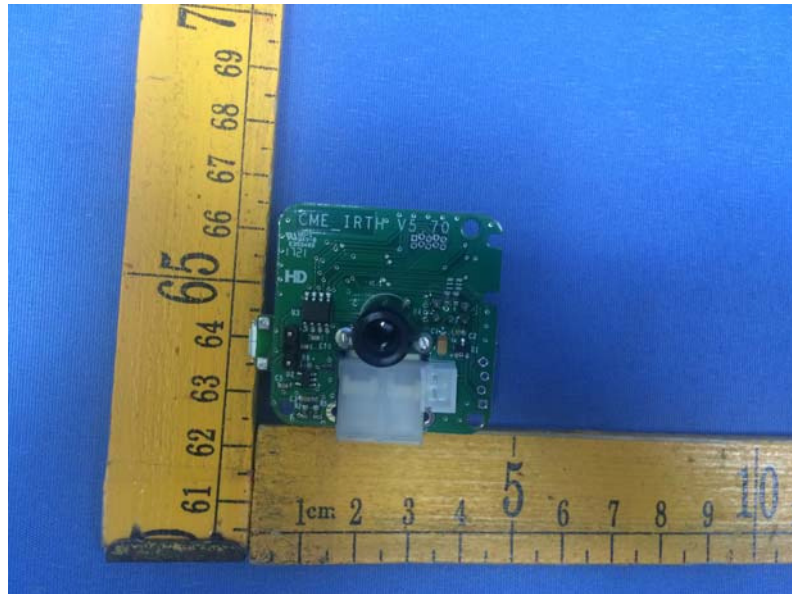


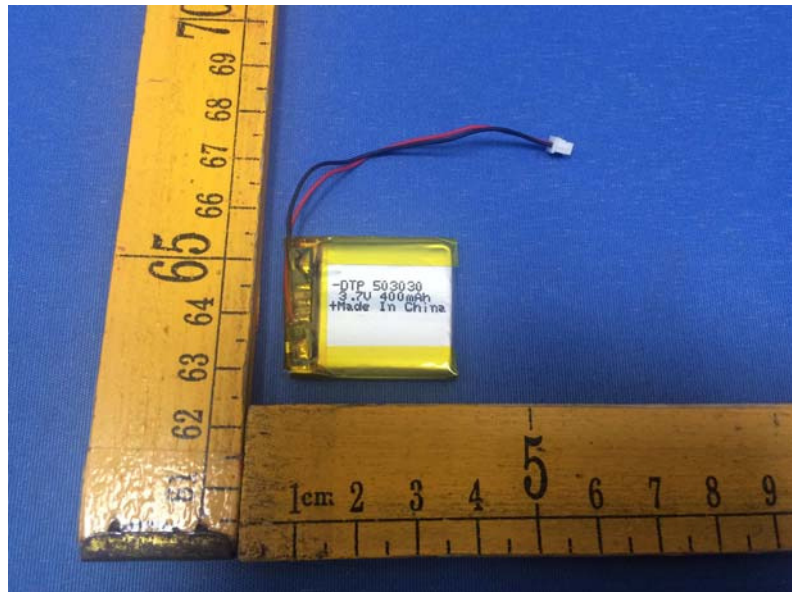
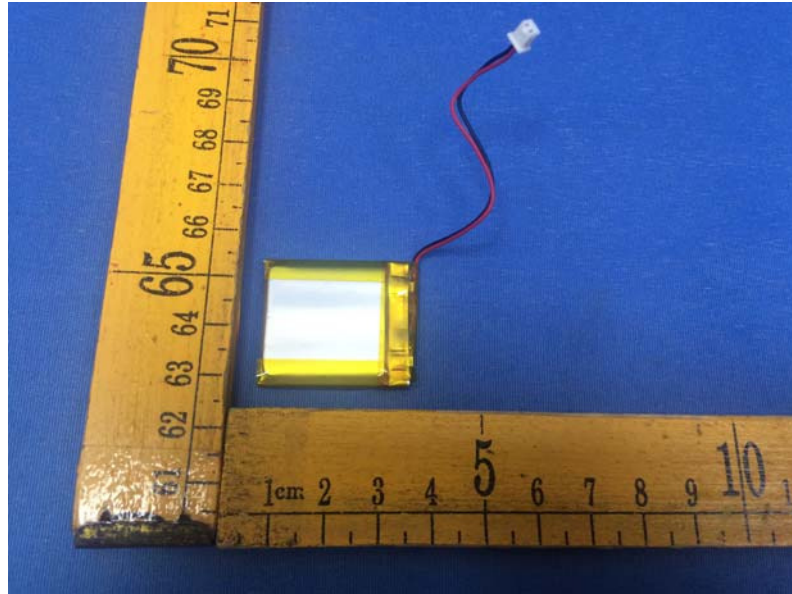
Model THB4001











====End of Report====