# FCC REPORT

| | |
|---|---|
| **Applicant:** | STEELMATE CO., LTD. |
| **Address of Applicant:** | Steelmate Industrial Park, Heping Street, Dongfu Road, Dongfeng Town, Zhongshan 528425, China |
| **Manufacturer/Factory:** | STEELMATE CO., LTD. |
| **Address of Manufacturer/Factory:** | Steelmate Industrial Park, Heping Street, Dongfu Road, Dongfeng Town, Zhongshan 528425, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Baby seat alarm system |
| Model No.: | BSA-1, BSA-2, BSA-3 |
| Trade Mark: | STEEL MATE |
| **FCC ID:** | Q6WBOT244 |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.231 |
| **Date of sample receipt:** | November 20, 2018 |
| **Date of Test:** | November 21, 2018-December 06, 2018 |
| **Date of report issued:** | December 07, 2018 |
| **Test Result :** | PASS * |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Lo**
**Laboratory Manager**

## 2 Version

| Version No. | Date | Description |
|---|---|---|
| *01* | *December 07, 2018* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:*** Bill. Yuan ***Date:*** *December 07, 2018*

***Project Engineer***

***Check By:*** ***Date:*** *December 07, 2018*

***Reviewer***

# 3 Contents

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# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna Requirement | 15.203 | Pass |
| Conduction Emission | 15.207 | N/A |
| Field strength of the Fundamental Signal | 15.231 (b) | Pass |
| Spurious Emissions | 15.231 (b)/15.209 | Pass |
| 20dB Bandwidth | 15.231 (c) | Pass |
| Dwell Time | 15.231 (a)(1) | Pass |

*Pass: The EUT complies with the essential requirements in the standard.*

## 4.1 Measurement Uncertainty

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 9kHz ~ 30MHz | ± 4.54dB | (1) |
| Radiated Emission | 30MHz ~ 1000MHz | ± 5.34dB | (1) |
| Radiated Emission | 1GHz ~ 26.5GHz | ± 5.34dB | (1) |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | ± 3.44dB | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |

# 5 General Information

## 5.1 General Description of EUT

| | |
|---|---|
| Product Name: | Baby seat alarm system |
| Model No.: | BSA-1, BSA-2, BSA-3 |
| Test Model No: | BSA-1 |
| *Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are model name for commercial purpose.* | |
| Serial No.: | E9C02081 |
| Test sample(s) ID: | GTS201811000151-1 |
| Sample(s) Status: | Engineer sample |
| Hardware Version: | v1.8 |
| Software Version: | v1.8 |
| Operation Frequency: | 433.92MHz |
| Modulation technology: | FSK |
| Antenna Type: | PCB Antenna |
| Antenna gain: | 0dBi(declare by applicant) |
| Power supply: | DC 3.0V(TX), DC 12V(RX) |

## 5.2 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in transmitting mode with modulation（new battery used） |

**Per-test mode.**

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report and defined as follows: only worse case is reported

| | | | | |
|---|---|---|---|---|
| 433.92MHz | Axis | X | Y | Z |
| | Field Strength(dBuV/m) | 80.42 | 81.27 | 80.05 |

## 5.3 Description of Support Units

None.

## 5.4 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383, January 08, 2018.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

## 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China
Tel: 0755-27798480
Fax: 0755-27798960

## 5.6 Other Information Requested by the Customer

None.

# 6 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | July. 03 2015 | July. 02 2020 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | June. 27 2018 | June. 26 2019 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | June. 27 2018 | June. 26 2019 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | 9120D-829 | GTS208 | June. 27 2018 | June. 26 2019 |
| 6 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | June. 27 2018 | June. 26 2019 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Coaxial Cable | GTS | N/A | GTS213 | June. 27 2018 | June. 26 2019 |
| 9 | Coaxial Cable | GTS | N/A | GTS211 | June. 27 2018 | June. 26 2019 |
| 10 | Coaxial cable | GTS | N/A | GTS210 | June. 27 2018 | June. 26 2019 |
| 11 | Coaxial Cable | GTS | N/A | GTS212 | June. 27 2018 | June. 26 2019 |
| 12 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | June. 27 2018 | June. 26 2019 |
| 13 | Amplifier(2GHz-20GHz) | HP | 8349B | GTS206 | June. 27 2018 | June. 26 2019 |
| 14 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June. 27 2018 | June. 26 2019 |
| 15 | Band filter | Amindeon | 82346 | GTS219 | June. 27 2018 | June. 26 2019 |
| 16 | Power Meter | Anritsu | ML2495A | GTS540 | June. 27 2018 | June. 26 2019 |
| 17 | Power Sensor | Anritsu | MA2411B | GTS541 | June. 27 2018 | June. 26 2019 |
| 18 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS588 | June. 27 2018 | June. 26 2019 |
| 19 | Splitter | Agilent | 11636B | GTS237 | June. 27 2018 | June. 26 2019 |
| 20 | Loop Antenna | ZHINAN | ZN30900A | GTS534 | June. 27 2018 | June. 26 2019 |
| 21 | Spectrum Analyzer | Agilent | E4440A | GTS533 | June. 27 2018 | June. 26 2019 |

| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Barometer | ChangChun | DYM3 | GTS257 | June 27 2018 | June 26 2019 |

# 7 Test results and Measurement Data

## 7.1 Antenna Requirement

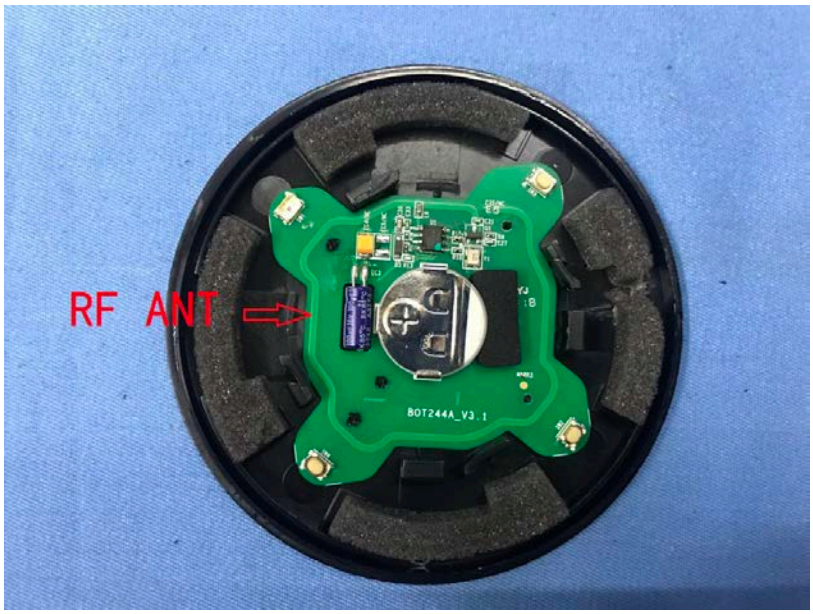
| | |
|---|---|
| **Standard requirement:** | FCC Part15 C Section 15.203 |

**15.203 requirement:**

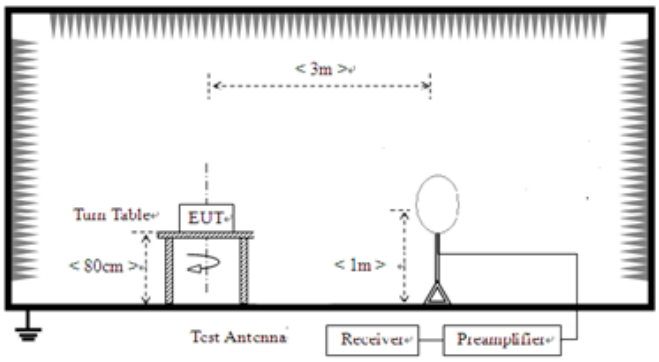
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit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

**EUT Antenna:**

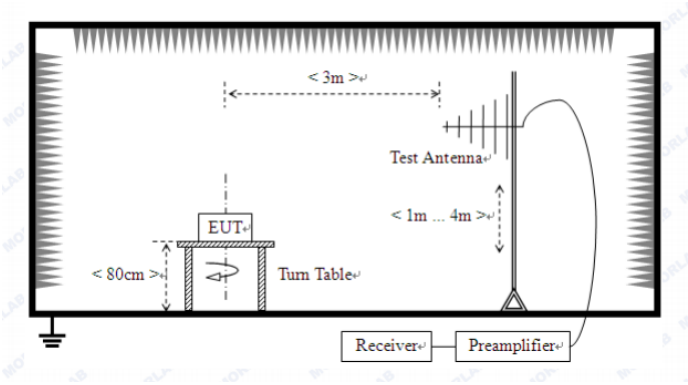
*The antenna is PCB antenna, the best case gain of the antenna is 0dBi*

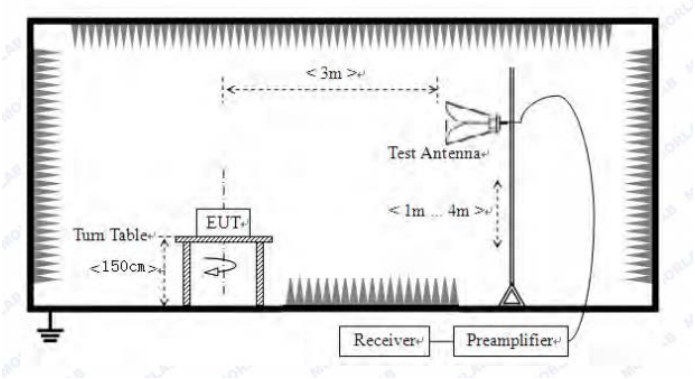


## 7.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.231 (b)& Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 5000MHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak</td></tr>
<tr><td>Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
</table>
</td></tr>
<tr><td>Limit:<br>(Field strength of the fundamental signal)</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td rowspan="2">433.92MHz</td><td>100.83</td><td>Peak Value</td></tr>
<tr><td>80.83</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:<br>(Spurious Emissions)</td><td>
<table>
<tr><th>Fundamental Frequency (MHz)</th><th>Field Strength of fundamental (microvolts/meter)</th><th>Field Strength of Unwanted Emissions (microvolts/meter)</th></tr>
<tr><td>40.66-40.70</td><td>1,000</td><td>100</td></tr>
<tr><td>70-130</td><td>500</td><td>50</td></tr>
<tr><td>130-174</td><td>500 to 1,500**</td><td>50 to 1,50**</td></tr>
<tr><td>174-260</td><td>1,500</td><td>1,50</td></tr>
<tr><td>260-470</td><td>1,500 to 5,000**</td><td>1,50 to 5,00**</td></tr>
<tr><td>Above 470</td><td>5,000</td><td>5,00</td></tr>
</table>
<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Class B(dBuV/m @3m)</th></tr>
<tr><th>Peak</th><th>Average</th></tr>
<tr><td>Above 1000</td><td>74</td><td>54</td></tr>
</table>
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.
</td></tr>
<tr><td>Test setup:</td><td>Below 30MHz<br> 

<br>Below 1GHz</td></tr>
</table>

<table>
<tr><td></td><td> 

Above 1GHz

</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. 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.<br>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. 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.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

**Measurement data:**

### 7.2.1 Field Strength of The Fundamental Signal

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 86.21 | 17.53 | 3.02 | 29.43 | 77.33 | 100.83 | -23.50 | Horizontal |
| 433.92 | 90.15 | 17.53 | 3.02 | 29.43 | 81.27 | 100.83 | -19.56 | Vertical |

**Average value:**

| Frequency (MHz) | Peak Value (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 433.92 | 77.33 | -4.68 | 72.65 | 80.83 | -8.18 | Horizontal |
| 433.92 | 81.27 | -4.68 | 76.59 | 80.83 | -4.24 | Vertical |

*Remarks:*

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *Average value=Peak value + Duty cycle factor*

### 7.2.2 Spurious Emissions

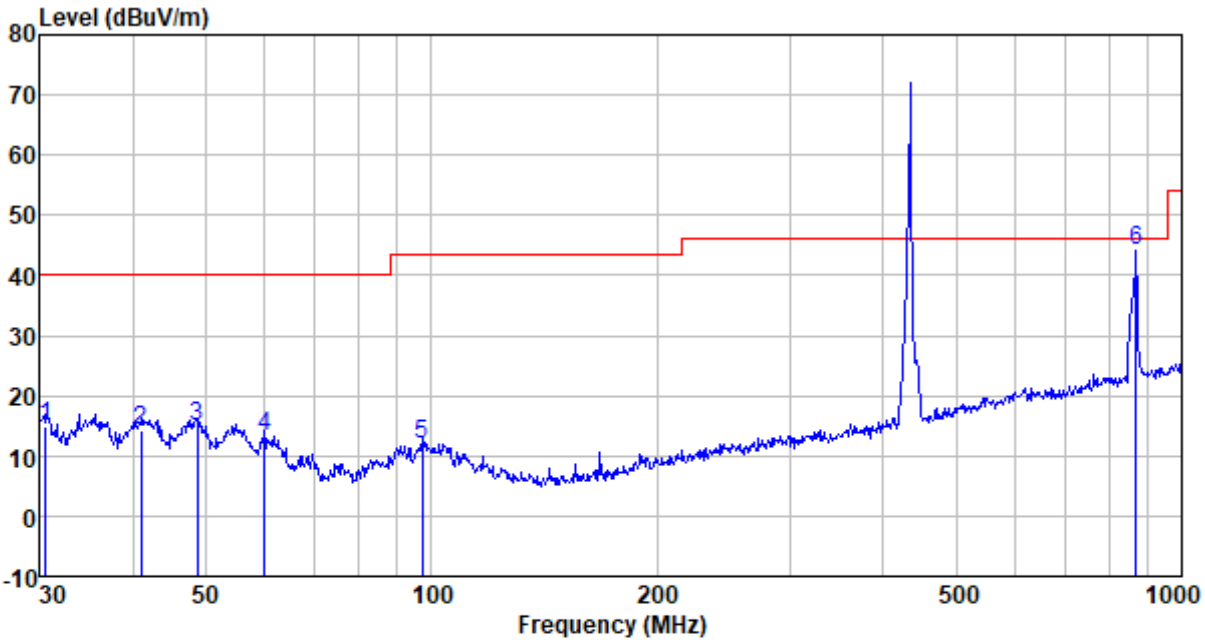
**Measurement data:**

**9 kHz ~ 30 MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

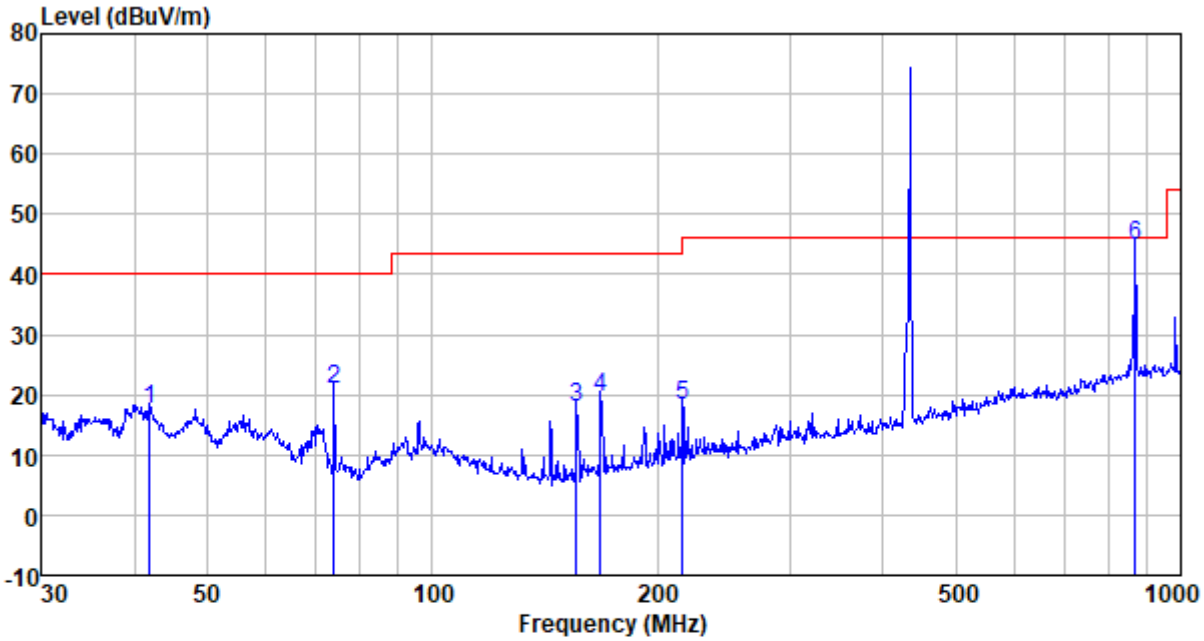
**Below 1GHz:**

| | | | |
|---|---|---|---|
| **Mode:** | **Transmitting mode** | **Test by:** | **Bill** |
| **Temp./Hum.(%H):** | **26℃/56%RH** | **Polarziation:** | **Horizontal** |




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 30.638 | 38.12 | 11.22 | 0.56 | 35.05 | 14.85 | 40.00 | -25.15 | QP |
| 40.988 | 37.01 | 12.21 | 0.67 | 35.72 | 14.17 | 40.00 | -25.83 | QP |
| 48.672 | 37.96 | 12.29 | 0.76 | 36.12 | 14.89 | 40.00 | -25.11 | QP |
| 59.859 | 37.41 | 11.32 | 0.86 | 36.32 | 13.27 | 40.00 | -26.73 | QP |
| 97.115 | 35.53 | 11.79 | 1.17 | 36.70 | 11.79 | 43.50 | -31.71 | QP |
| 869.130 | 55.00 | 22.02 | 4.74 | 37.61 | 44.15 | 46.00 | -1.85 | QP |

| | | | |
|---|---|---|---|
| **Mode:** | **Transmitting mode** | **Test by:** | **Bill** |
| **Temp./Hum.(%H):** | **26℃/56%RH** | **Polarziation:** | **Vertical** |




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 41.860 | 40.28 | 12.22 | 0.68 | 35.77 | 17.41 | 40.00 | -22.59 | QP |
| 73.876 | 48.83 | 7.46 | 0.97 | 36.48 | 20.78 | 40.00 | -19.22 | QP |
| 155.910 | 45.29 | 8.05 | 1.60 | 37.11 | 17.83 | 43.50 | -25.67 | QP |
| 167.824 | 46.77 | 8.46 | 1.67 | 37.18 | 19.72 | 43.50 | -23.78 | QP |
| 216.024 | 42.73 | 11.02 | 1.93 | 37.35 | 18.33 | 46.00 | -27.67 | QP |
| 869.130 | 55.78 | 22.02 | 4.74 | 37.61 | 44.93 | 46.00 | -1.07 | QP |

**Above 1G:**

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1735.65 | 65.82 | 25.05 | 4.82 | 34.00 | 61.69 | 80.83 | -19.14 | Vertical |
| 2169.25 | 52.41 | 27.74 | 5.15 | 34.27 | 51.03 | 80.83 | -29.80 | Vertical |
| 2603.12 | 52.25 | 27.82 | 5.58 | 33.78 | 51.87 | 80.83 | -28.96 | Vertical |
| 1735.57 | 63.37 | 25.05 | 4.82 | 34.00 | 59.24 | 80.83 | -21.59 | Horizontal |
| 2169.26 | 51.24 | 27.74 | 5.15 | 34.27 | 49.86 | 80.83 | -30.97 | Horizontal |
| 2603.41 | 51.75 | 27.82 | 5.58 | 33.78 | 51.37 | 80.83 | -29.46 | Horizontal |

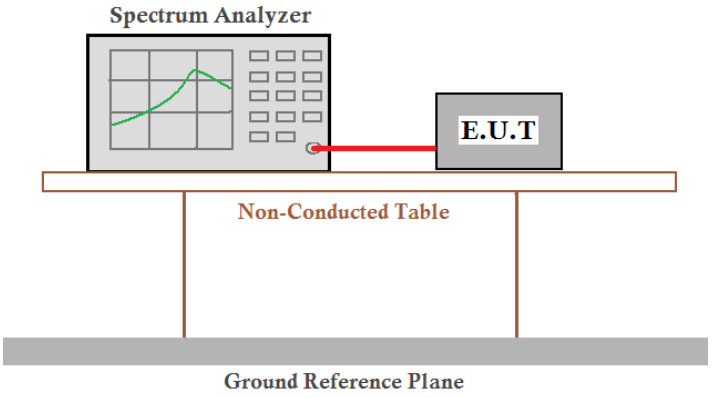
**Average value:**

| Frequency (MHz) | Level (dBuV/m) | Duty cycle factor | Average value (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|---|---|---|---|---|---|---|
| 1735.65 | 61.69 | -4.68 | 57.01 | 60.83 | -3.82 | Vertical |
| 2169.25 | 51.03 | -4.68 | 46.35 | 60.83 | -14.48 | Vertical |
| 2603.12 | 51.87 | -4.68 | 47.19 | 60.83 | -13.64 | Vertical |
| 1735.57 | 59.24 | -4.68 | 54.56 | 60.83 | -6.27 | Horizontal |
| 2169.26 | 49.86 | -4.68 | 45.18 | 60.83 | -15.65 | Horizontal |
| 2603.41 | 51.37 | -4.68 | 46.69 | 60.83 | -14.14 | Horizontal |

*Remarks:*

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *Average value=Peak value + Duty cycle factor*

## 7.3 20dB Occupy Bandwidth

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (c) |
| Test Method: | ANSI C63.10:2013 |
| Limit: | The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

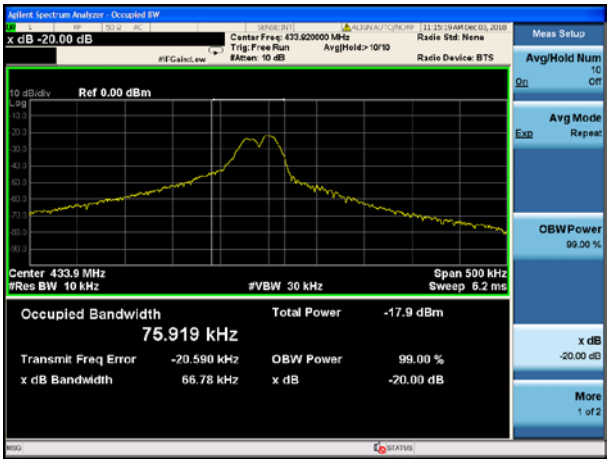
**Measurement Data**

| Test Frequency (MHz) | 20dB bandwidth (MHz) | Limit (MHz) | Result |
|---|---|---|---|
| 433.92 | 0.06678 | 1.085 | Pass |

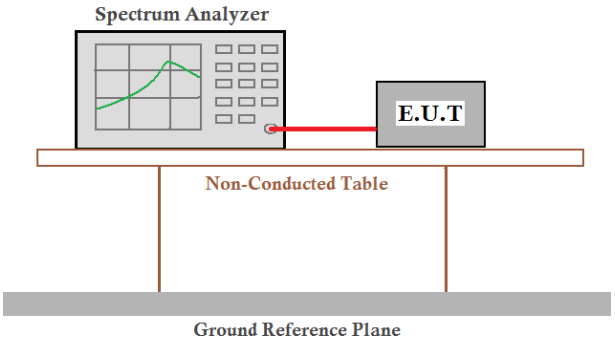
Note: Limit= Fundamental frequency×0.25%

433.92×0.25%=1.085MHz

Test plot as follows:



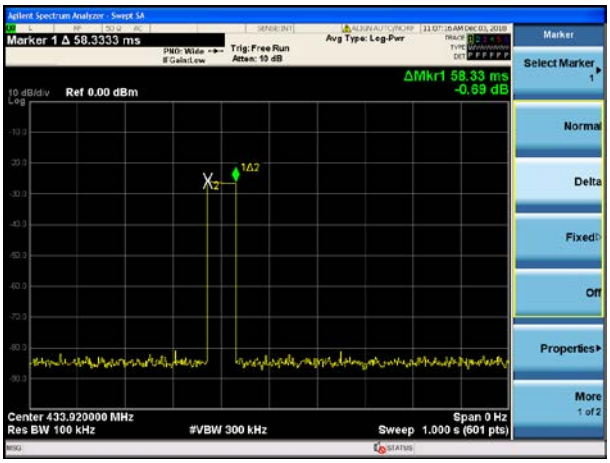
## 7.4 Dwell Time

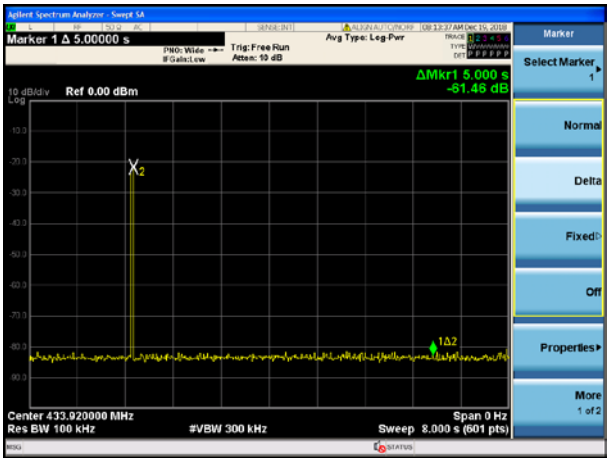
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (a)(1) |
| Test Method: | ANSI C63.10:2013 |
| Receiver setup: | RBW=100KHz, VBW=100KHz, span=0Hz, detector: Peak |
| Limit: | Not more than 5 seconds |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement data:**

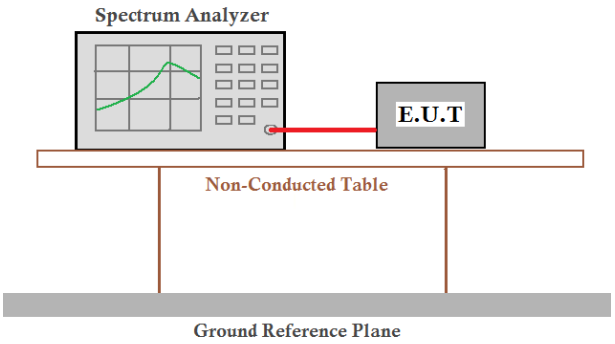
| Frequency (MHz) | Duration of each TX (second) | Limit (second) | Result |
|---|---|---|---|
| 433.92 | 0.058 | <5.0 | Pass |

Test plot as follows:



## 7.5 Duty Cycle

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 |
| Test Method: | ANSI C63.10:2013 |
| Receiver setup: | RBW=100KHz, VBW=100KHz, span=0Hz, detector: Peak |
| Limit: | No dedicated limit specified in the Rules. |
| Test Procedure: | 1. Place the EUT on the table and set it in transmitting mode.<br>2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.<br>3. Set centre frequency of spectrum analyzer=operating frequency.<br>4. Set the spectrum analyzer as RBW=100kHz, VBW=100KHz, Span=0Hz, Adjust Sweep=100ms to obtain the “worst-case” pulse on time<br>5. Repeat above procedures until all frequency measured was complete. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement data:**

Calculate Formula: Duty cycle factor =20 log(Duty cycle)

Duty cycle=on time/0.1 seconds or period, whichever is less

Test data:

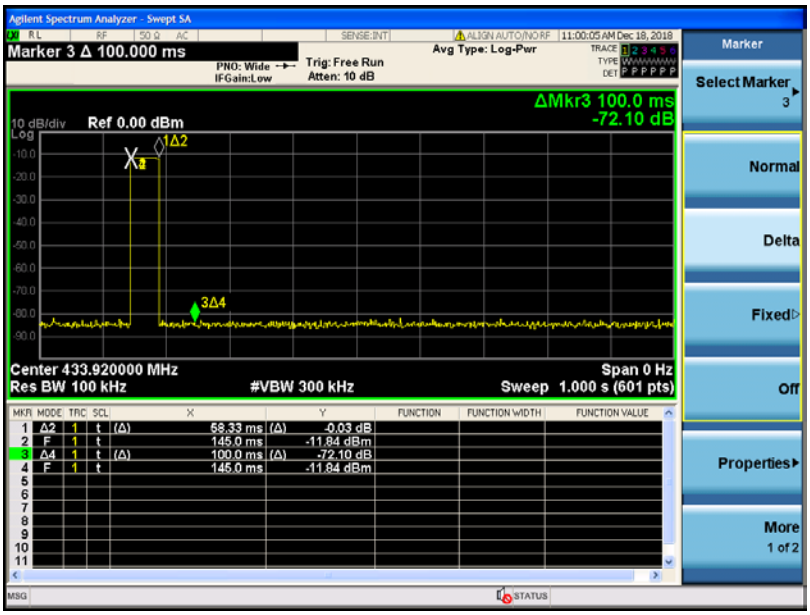
T on time =58.33(ms)

T period =100(ms)

Duty cycle=58.33/100=58.33%

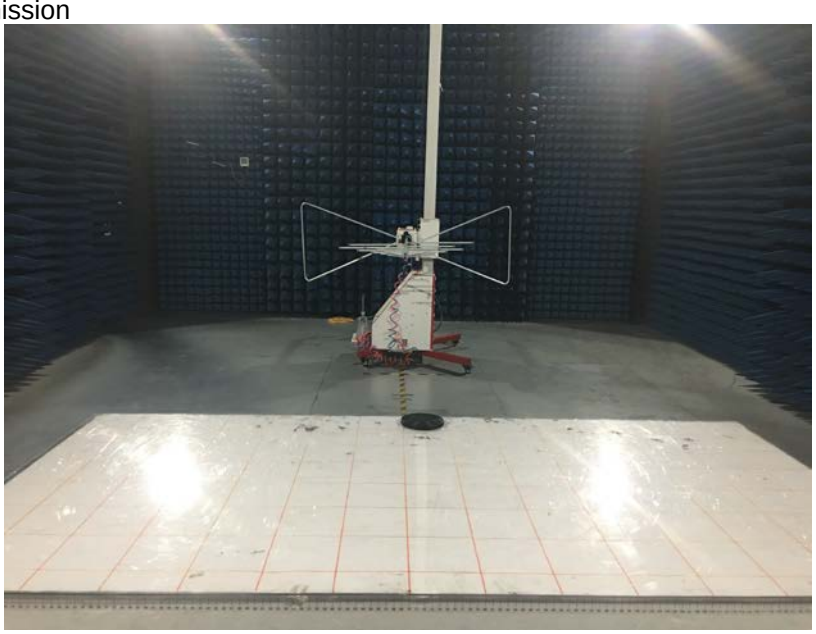
Duty cycle factor =20 log(0.5833)=-4.68

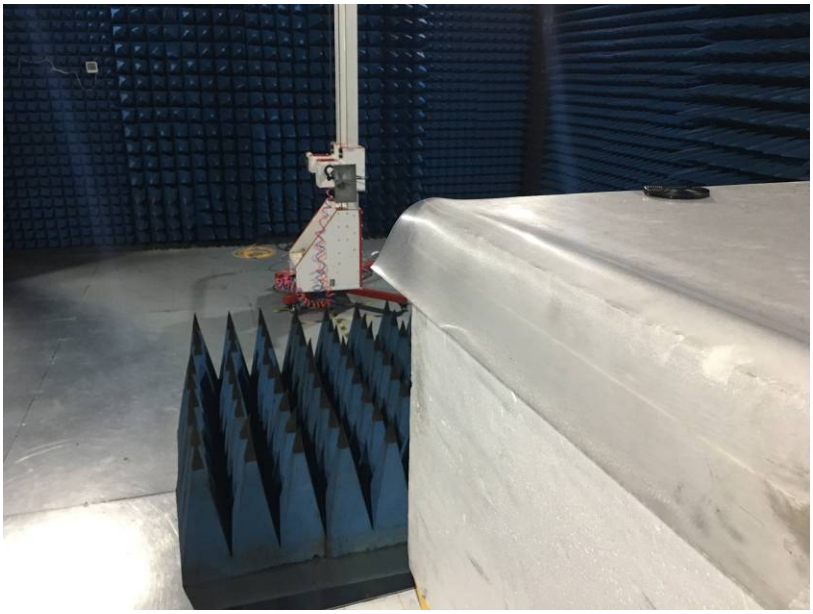
Test plot as follows:



# 8 Test Setup Photo

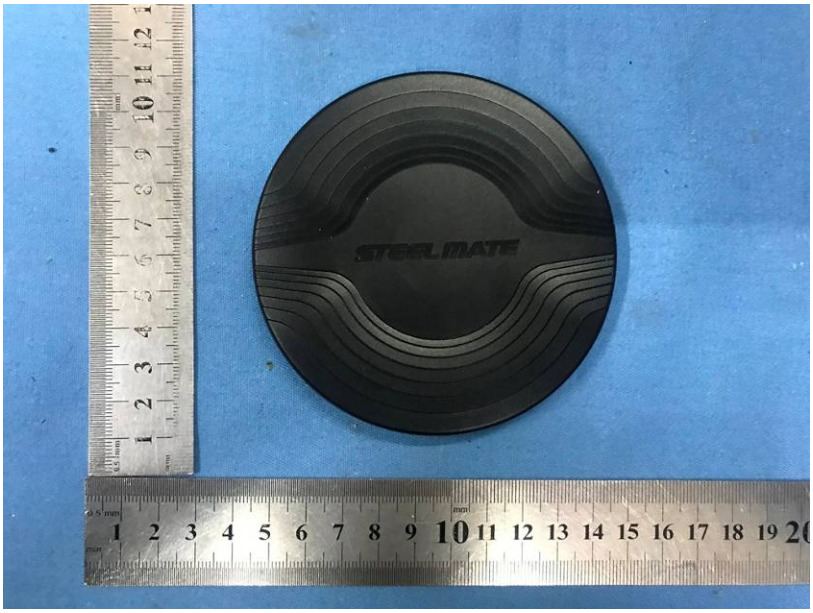
Radiated Emission

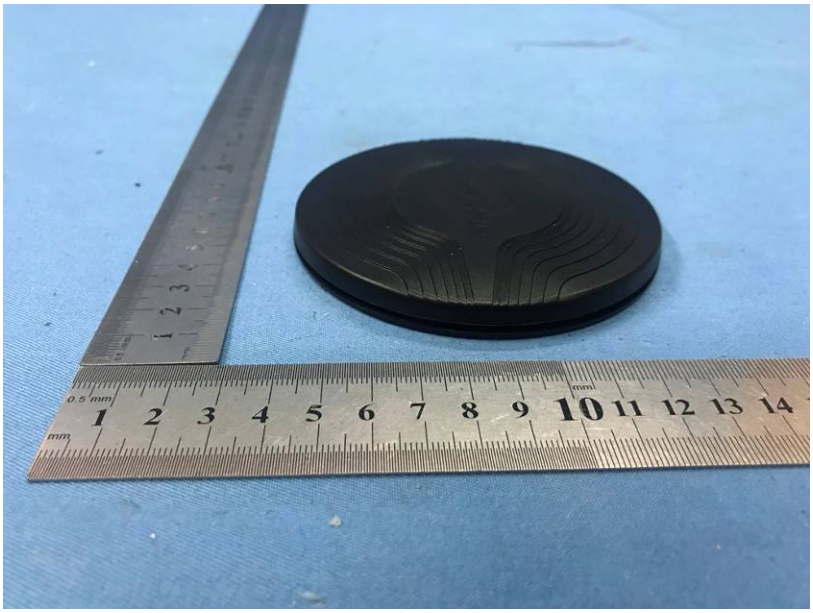


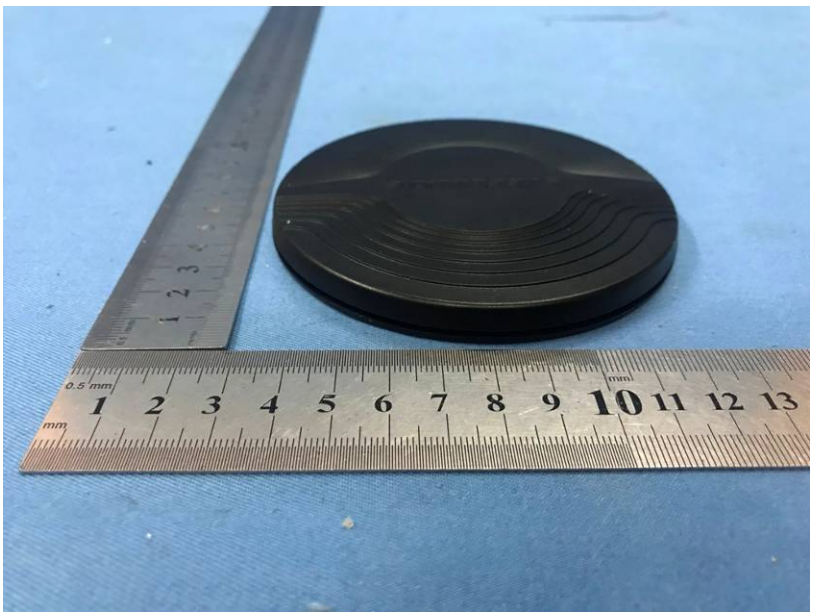


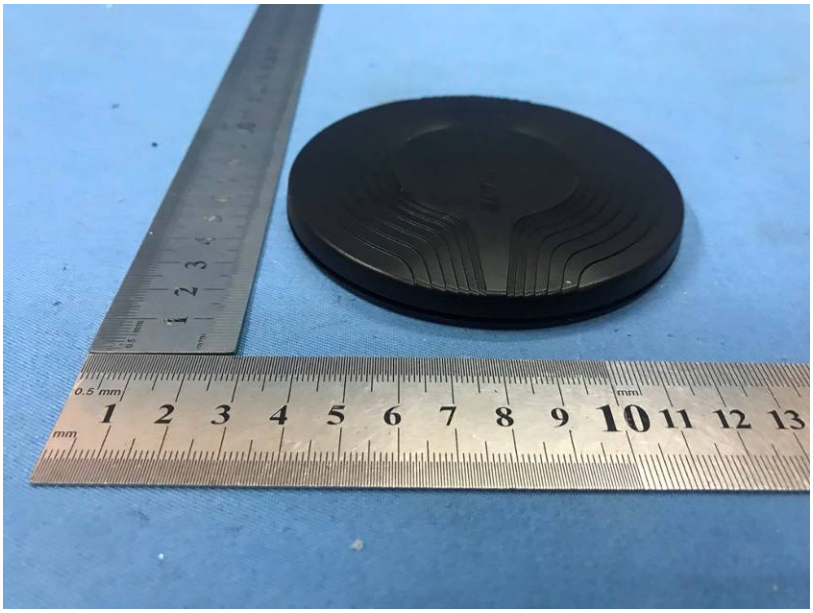
# 9 EUT Constructional Details

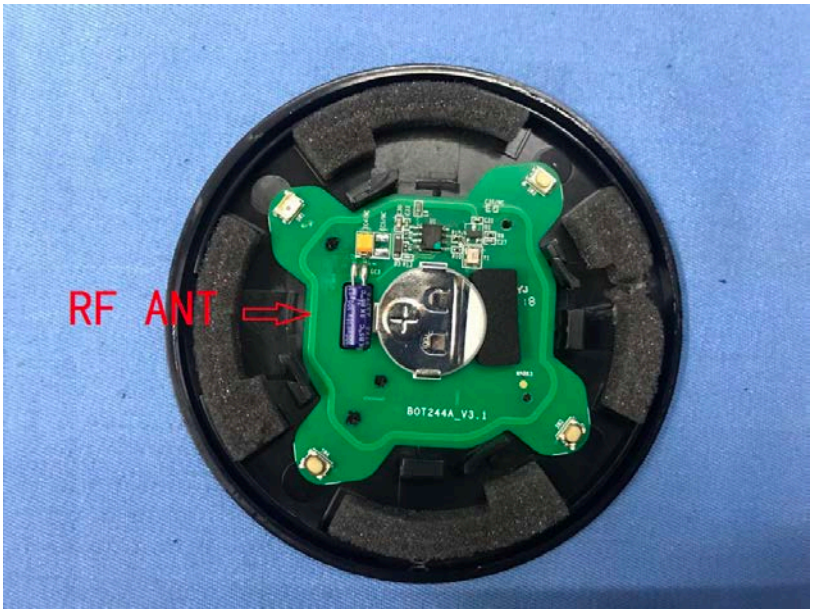

TX

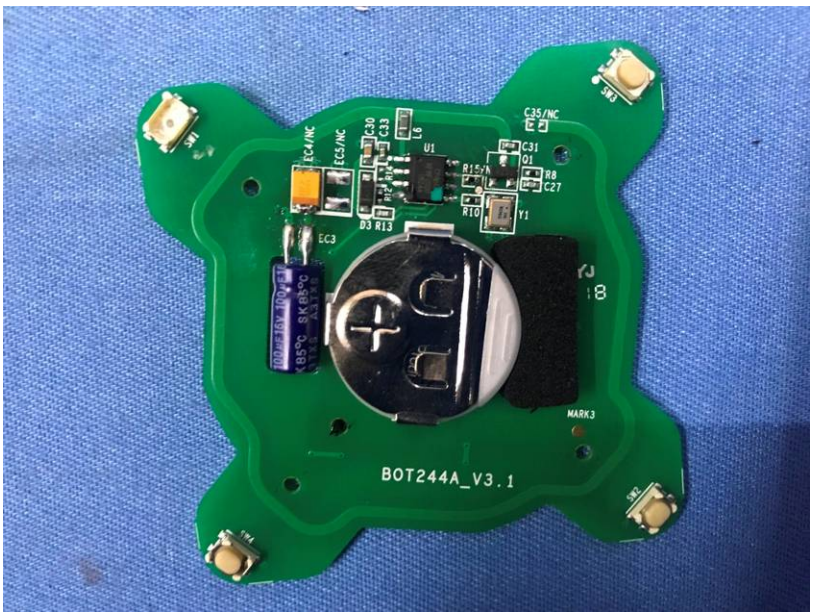








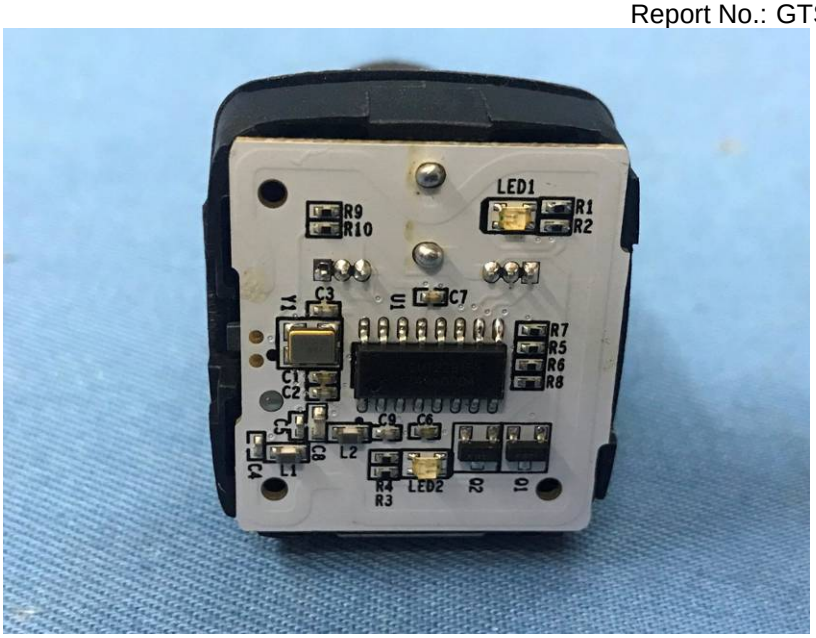

RF ANT
BOT244A_V3.1

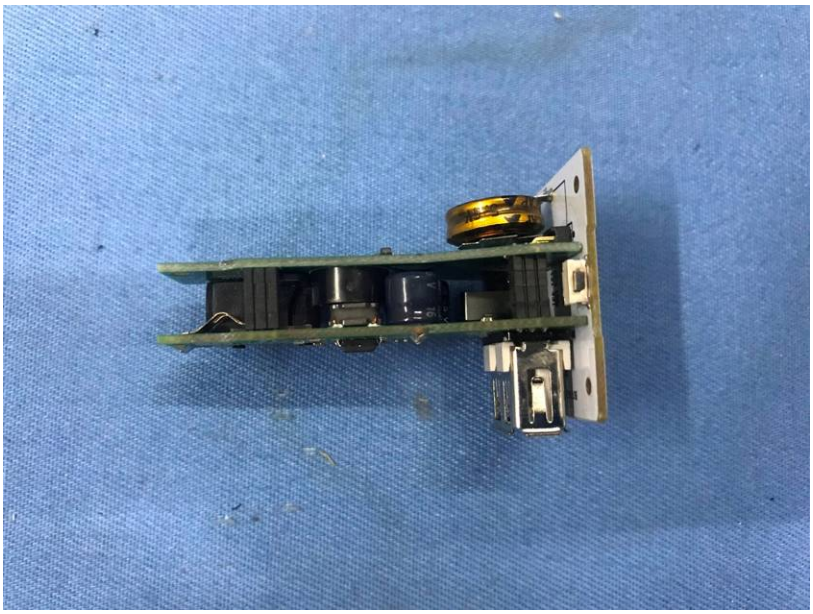

C35/NC
C31
Q1
R8
C27
Y1
R10
EC4/NC
EC5/NC
C30
C33
L6
U1
R15
D3 R13
EC3
MARK3
BOT244A_V3.1

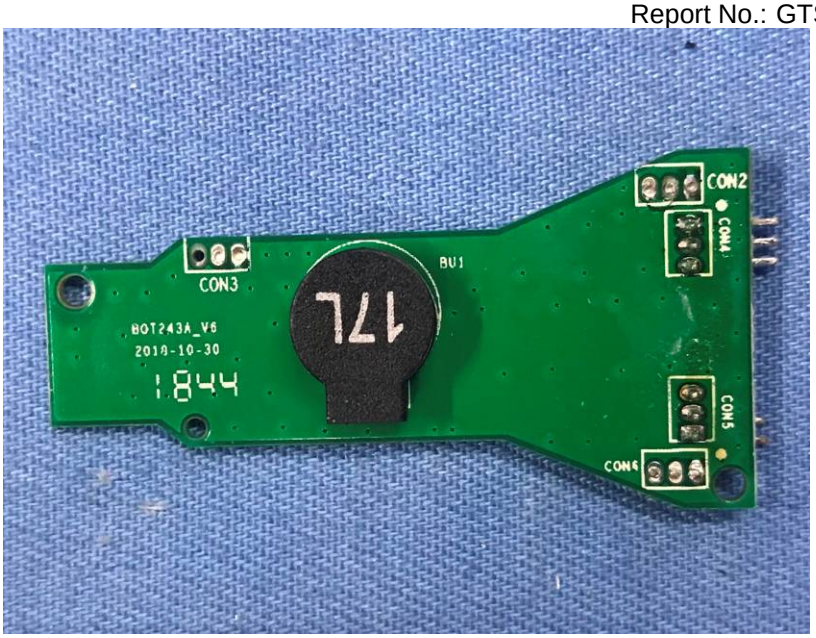

TEAPO TEAP
9/18 08/18

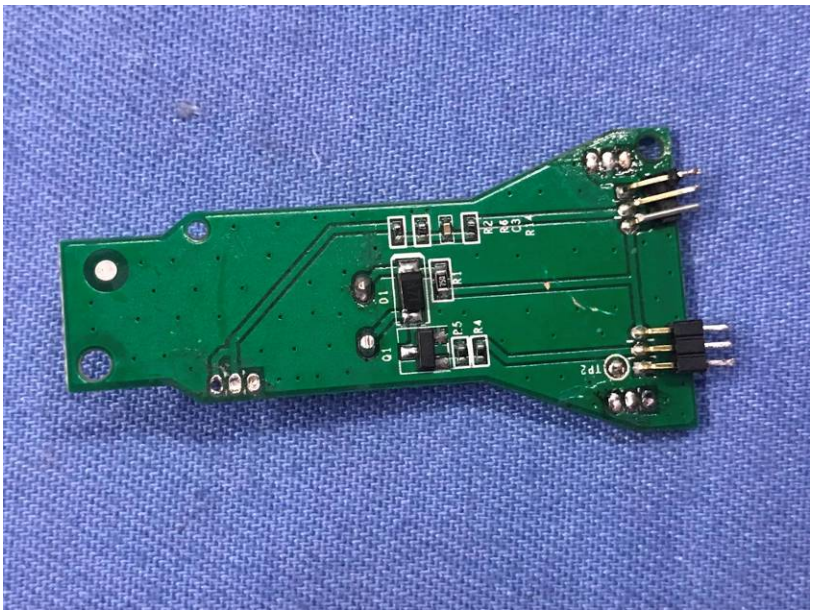
RX

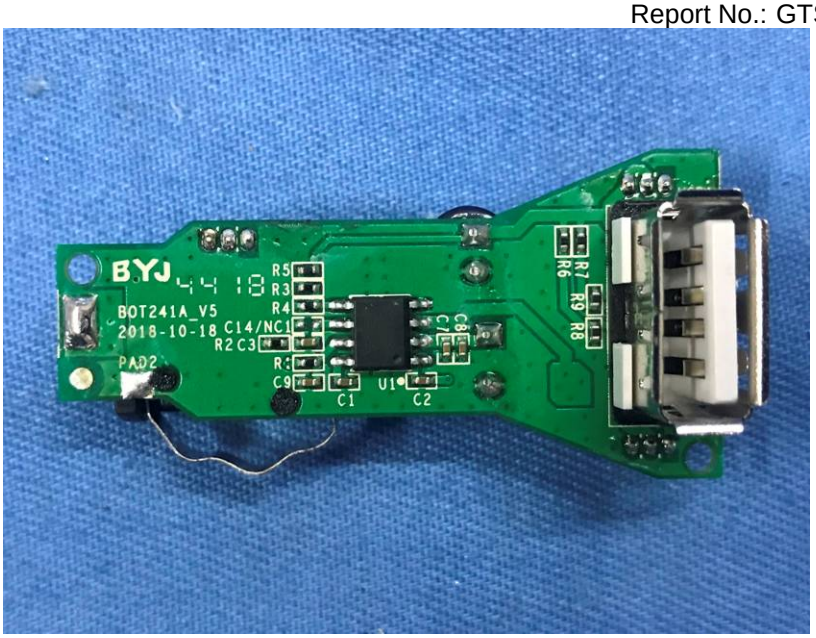

SET

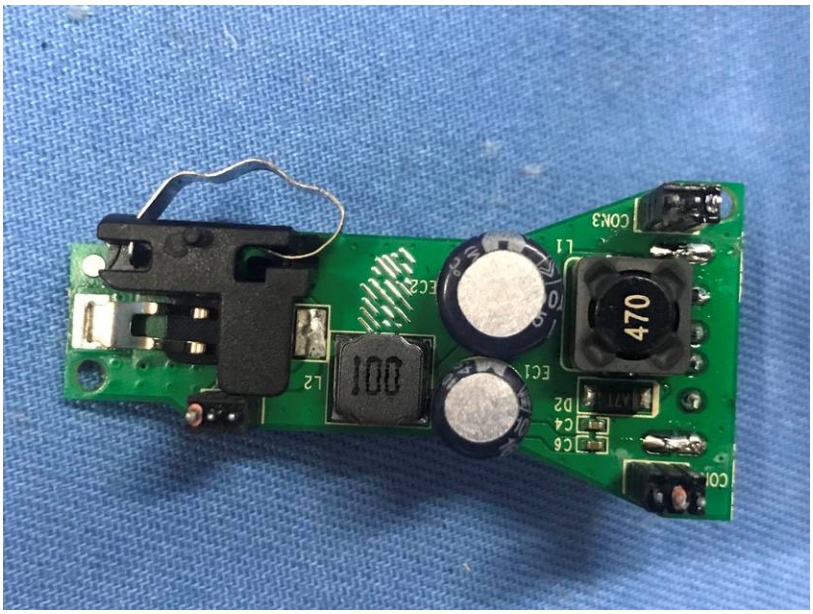

LED1
R9
R10
R1
R2
C3
C7
Y1
U1
R7
R5
R6
R8
C1
C2
C9
C6
C5
C8
L2
C4
L1
R4
R3
LED2
R2
R1

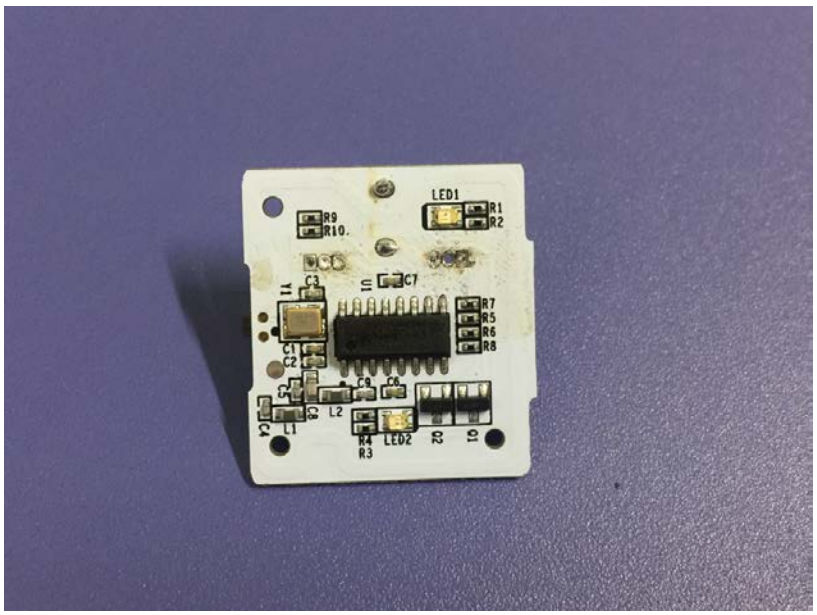


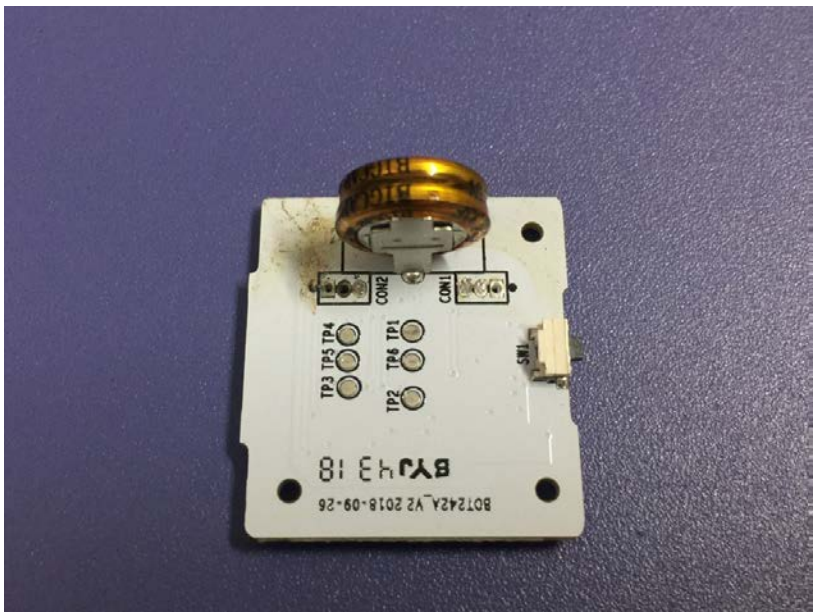

CON2
CON4
CON3
BU1
BOT243A_V6
2018-10-30
CON5
CON6




BYJ
BOT241A_V5
2018-10-18
PAD2
C1
C2


470
100
L2
L1


LED1
R1
R2
R9
R10
C3
U1
C7
R7
R5
R6
R8
C2
C9
C8
C5
L2
C4
L1
R4
R3
LED2
Q2
Q1


CON2
CON1
TP4
TP5
TP3
TP1
TP6
TP2
SW1
B0724A_V2 2018-09-26

------ End ------