

TEST REPORT

Product : Infrared Ear/Forehead Thermometer
Trade mark : N/A
Model/Type reference : DET-218
Serial Number : N/A
Report Number : EED32L00041001
FCC ID : 2AQVU0004
Date of Issue : Mar. 27, 2019
Test Standards : 47 CFR Part 15Subpart C
Test result : PASS

Prepared for:

JOYTECH HEALTHCARE CO., LTD.

**No. 365, Wuzhou Road, Yuhang Economic Development Zone,
Hangzhou city, 311100 Zhejiang, China**

Prepared by:

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Date:

Mar. 27, 2019

Check No.: 3570197790



2 Version

| Version No. | Date | Description |
|-------------|---------------|-------------|
| 00 | Mar. 27, 2019 | Original |
| | | |
| | | |

3 Test Summary

| Test Item | Test Requirement | Test method | Result |
|--|---|------------------|--------|
| Antenna Requirement | 47 CFR Part 15Subpart C Section 15.203/15.247 (c) | ANSI C63.10-2013 | PASS |
| AC Power Line Conducted Emission | 47 CFR Part 15Subpart C Section 15.207 | ANSI C63.10-2013 | N/A |
| Conducted Peak Output Power | 47 CFR Part 15Subpart C Section 15.247 (b)(3) | ANSI C63.10-2013 | PASS |
| 6dB Occupied Bandwidth | 47 CFR Part 15Subpart C Section 15.247 (a)(2) | ANSI C63.10-2013 | PASS |
| Power Spectral Density | 47 CFR Part 15Subpart C Section 15.247 (e) | ANSI C63.10-2013 | PASS |
| Band-edge for RF Conducted Emissions | 47 CFR Part 15Subpart C Section 15.247(d) | ANSI C63.10-2013 | PASS |
| RF Conducted Spurious Emissions | 47 CFR Part 15Subpart C Section 15.247(d) | ANSI C63.10-2013 | PASS |
| Radiated Spurious Emissions | 47 CFR Part 15Subpart C Section 15.205/15.209 | ANSI C63.10-2013 | PASS |
| Restricted bands around fundamental frequency (Radiated Emission) | 47 CFR Part 15Subpart 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(s) and the sample information are provided by the client.

N/A:The device is only battery operated, the test related AC mains is not applicable.

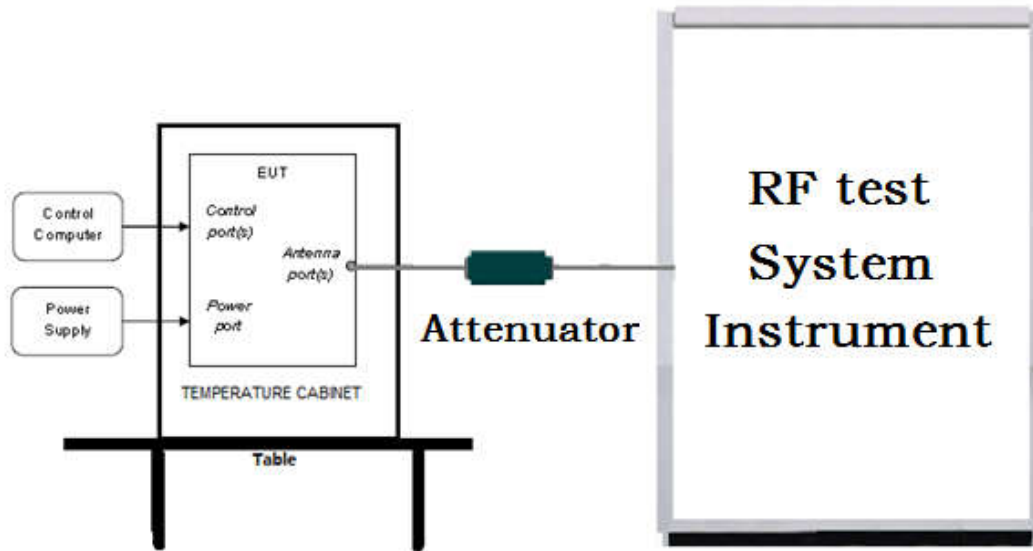
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5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

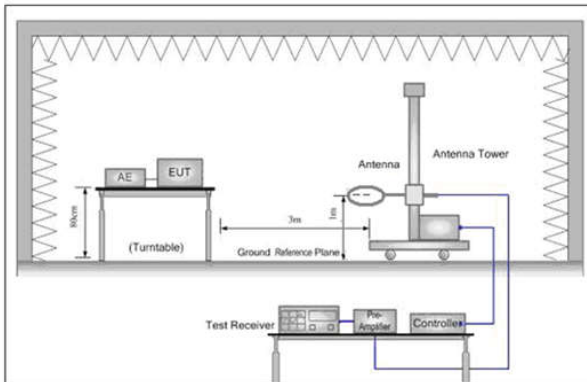


Figure 1. Below 30MHz

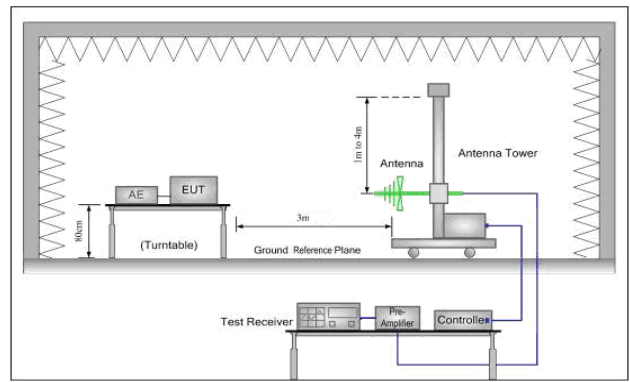


Figure 2. 30MHz to 1GHz

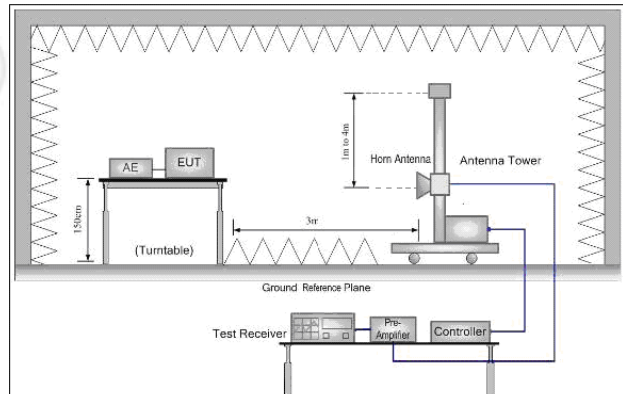
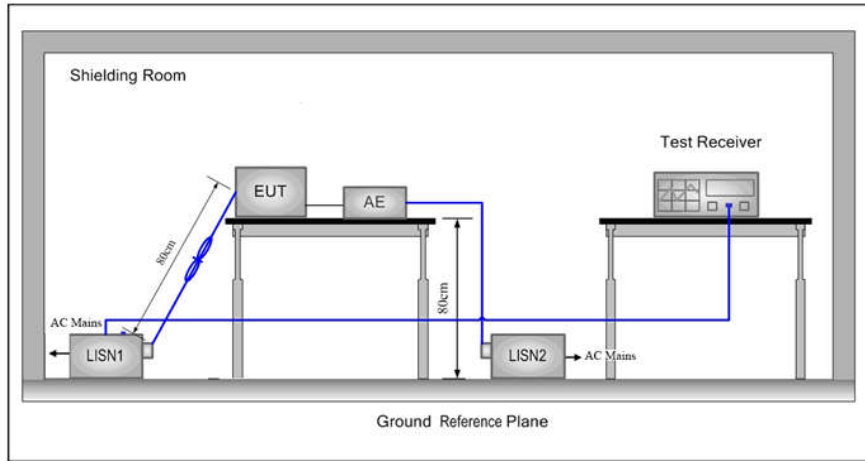


Figure 3. Above 1GHz

**5.1.3 For Conducted Emissions test setup
Conducted Emissions setup**



5.2 Test Environment

| | |
|-------------------------------|----------|
| Operating Environment: | |
| Temperature: | 25.0 °C |
| Humidity: | 59 % RH |
| Atmospheric Pressure: | 1010mbar |

5.3 Test Condition

Test channel:

| Test Mode | Tx/Rx | RF Channel | | |
|--------------------|---|------------|------------|------------|
| | | Low(L) | Middle(M) | High(H) |
| GFSK | 2402MHz ~2480 MHz | Channel 1 | Channel 20 | Channel 40 |
| | | 2402MHz | 2440MHz | 2480MHz |
| Transmitting mode: | The EUT transmitted the continuous signal at the specific channel(s). | | | |

6 General Information

6.1 Client Information

| | |
|--------------------------|---|
| Applicant: | JOYTECH HEALTHCARE CO., LTD. |
| Address of Applicant: | No. 365, Wuzhou Road, Yuhang Economic Development Zone, Hangzhou city, 311100 Zhejiang, China |
| Manufacturer: | JOYTECH HEALTHCARE CO., LTD. |
| Address of Manufacturer: | No. 365, Wuzhou Road, Yuhang Economic Development Zone, Hangzhou city, 311100 Zhejiang, China |
| Factory: | JOYTECH HEALTHCARE CO., LTD. |
| Address of Factory: | No. 365, Wuzhou Road, Yuhang Economic Development Zone, Hangzhou city, 311100 Zhejiang, China |

6.2 General Description of EUT

| | |
|----------------------------------|-------------------------------------|
| Product Name: | Infrared Ear/Forehead Thermometer |
| Model No.(EUT): | DET-218 |
| Trade mark: | N/A |
| EUT Supports Radios application: | BT 4.0 Single mode, 2402MHz-2480MHz |
| Power Supply: | DC3V(2×AAA battery) |
| Firmware version of the sample: | V1.0(manufacturer declare) |
| Hardware version of the sample: | Z(manufacturer declare) |
| Sample Received Date: | Mar. 04, 2019 |
| Sample tested Date: | Mar. 04, 2019 to Mar. 20, 2019 |

6.3 Product Specification subjective to this standard

| | |
|------------------------|---|
| Operation Frequency: | 2402MHz~2480MHz |
| Bluetooth Version: | 4.0 |
| Modulation Technique: | DSSS |
| Modulation Type: | GFSK |
| Number of Channel: | 40 |
| Sample Type: | Portable production |
| Test Power Grade: | N/A |
| Test Software of EUT: | N/A |
| Antenna Type and Gain: | Type: PIFA Antenna Gain: -13.6016dBi |
| Test Voltage: | DC3V(2×AAA battery) |

| Operation Frequency each of channel | | | | | | | |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402MHz | 11 | 2422MHz | 21 | 2442MHz | 31 | 2462MHz |
| 2 | 2404MHz | 12 | 2424MHz | 22 | 2444MHz | 32 | 2464MHz |
| 3 | 2406MHz | 13 | 2426MHz | 23 | 2446MHz | 33 | 2466MHz |
| 4 | 2408MHz | 14 | 2428MHz | 24 | 2448MHz | 34 | 2468MHz |

| | | | | | | | |
|----|---------|----|---------|----|---------|----|---------|
| 5 | 2410MHz | 15 | 2430MHz | 25 | 2450MHz | 35 | 2470MHz |
| 6 | 2412MHz | 16 | 2432MHz | 26 | 2452MHz | 36 | 2472MHz |
| 7 | 2414MHz | 17 | 2434MHz | 27 | 2454MHz | 37 | 2474MHz |
| 8 | 2416MHz | 18 | 2436MHz | 28 | 2456MHz | 38 | 2476MHz |
| 9 | 2418MHz | 19 | 2438MHz | 29 | 2458MHz | 39 | 2478MHz |
| 10 | 2420MHz | 20 | 2440MHz | 30 | 2460MHz | 40 | 2480MHz |

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

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

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

No tests were sub-contracted.

FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

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

| No. | Item | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1 | Radio Frequency | 7.9×10^{-8} |
| 2 | RF power, conducted | 0.46dB (30MHz-1GHz) |
| | | 0.55dB (1GHz-18GHz) |
| 3 | Radiated Spurious emission test | 4.3dB (30MHz-1GHz) |
| | | 4.5dB (1GHz-12.75GHz) |
| 4 | Conduction emission | 3.5dB (9kHz to 150kHz) |
| | | 3.1dB (150kHz to 30MHz) |
| 5 | Temperature test | 0.64°C |
| 6 | Humidity test | 3.8% |
| 7 | DC power voltages | 0.026% |

7 Equipment List

| RF test system | | | | | |
|----------------------------------|---------------|------------------------------|---------------|------------------------|----------------------------|
| Equipment | Manufacturer | Model No. | Serial Number | Cal. Date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Signal Generator | Keysight | E8257D | MY53401106 | 03-01-2019 | 02-29-2020 |
| Spectrum Analyzer | Keysight | N9010A | MY54510339 | 03-01-2019 | 02-29-2020 |
| Signal Generator | Keysight | N5182B | MY53051549 | 03-01-2019 | 02-29-2020 |
| High-pass filter | Sinoscite | FL3CX03WG1 8NM12-0398-002 | --- | 01-09-2019 | 01-08-2020 |
| High-pass filter | MICRO-TRONICS | SPA-F-63029-4 | --- | 01-09-2019 | 01-08-2020 |
| DC Power | Keysight | E3642A | MY54426035 | 03-01-2019 | 02-29-2020 |
| PC-1 | Lenovo | R4960d | --- | 03-01-2019 | 02-29-2020 |
| BT&WI-FI Automatic control | R&S | OSP120 | 101374 | 03-01-2019 | 02-29-2020 |
| RF control unit | JS Tonscend | JS0806-2 | 15860006 | 03-01-2019 | 02-29-2020 |
| RF control unit | JS Tonscend | JS0806-1 | 15860004 | 03-01-2019 | 02-29-2020 |
| RF control unit | JS Tonscend | JS0806-4 | 158060007 | 03-01-2019 | 02-29-2020 |
| BT&WI-FI Automatic test software | JS Tonscend | JS1120-2 | --- | 03-01-2019 | 02-29-2020 |
| Temperature/ Humidity Indicator | biaozhi | HM10 | 1804186 | 10-12-2018 | 10-11-2019 |

| 3M Semi/full-anechoic Chamber | | | | | |
|------------------------------------|---------------------|----------------------------------|----------------|------------------------|----------------------------|
| Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| 3M Chamber & Accessory Equipment | TDK | SAC-3 | --- | 06-04-2016 | 06-03-2019 |
| TRILOG Broadband Antenna | Schwarzbeck | VULB9163 | 9163-401 | 12-21-2018 | 12-20-2019 |
| TRILOG Broadband Antenna | Schwarzbeck | VULB9163 | 9163-618 | 07-30-2018 | 07-29-2019 |
| Microwave Preamplifier | Agilent | 8449B | 3008A024 25 | 08-21-2018 | 08-20-2019 |
| Microwave Preamplifier | Tonscend | EMC051845 SE | 980380 | 01-16-2019 | 01-15-2020 |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 9120D- 1869 | 04-25-2018 | 04-23-2021 |
| Horn Antenna | ETS- LINDGREN | 3117 | 00057410 | 06-05-2018 | 06-03-2021 |
| Double ridge horn antenna | A.H.SYSTEMS | SAS-574 | 374 | 06-05-2018 | 06-04-2021 |
| Pre-amplifier | A.H.SYSTEMS | PAP-1840-60 | 6041.604 1 | 08-08-2018 | 08-07-2019 |
| Loop Antenna | ETS | 6502 | 00071730 | 06-22-2017 | 06-21-2019 |
| Spectrum Analyzer | R&S | FSP40 | 100416 | 05-11-2018 | 05-10-2019 |
| Receiver | R&S | ESCI | 100435 | 05-25-2018 | 05-24-2019 |
| Receiver | R&S | ESCI7 | 100938- 003 | 11-23-2018 | 11-22-2019 |
| Multi device Controller | maturo | NCD/070/107 11112 | --- | 01-09-2019 | 01-08-2020 |
| LISN | schwarzbeck | NNBM8125 | 81251547 | 05-11-2018 | 05-10-2019 |
| LISN | schwarzbeck | NNBM8125 | 81251548 | 05-11-2018 | 05-10-2019 |
| Signal Generator | Agilent | E4438C | MY45095 744 | 03-01-2019 | 02-29-2020 |
| Signal Generator | Keysight | E8257D | MY53401 106 | 03-01-2019 | 02-29-2020 |
| Temperature/ Humidity Indicator | Shanghai qixiang | HM10 | 1804298 | 10-12-2018 | 10-11-2019 |
| Communication test set | Agilent | E5515C | GB47050 534 | 03-01-2019 | 02-29-2020 |
| Cable line | Fulai(7M) | SF106 | 5219/6A | 01-09-2019 | 01-08-2020 |
| Cable line | Fulai(6M) | SF106 | 5220/6A | 01-09-2019 | 01-08-2020 |
| Cable line | Fulai(3M) | SF106 | 5216/6A | 01-09-2019 | 01-08-2020 |
| Cable line | Fulai(3M) | SF106 | 5217/6A | 01-09-2019 | 01-08-2020 |
| Communication test set | R&S | CMW500 | 104466 | 01-18-2019 | 01-17-2020 |
| High-pass filter | Sinoscite | FL3CX03WG 18NM12- 0398-002 | --- | 01-09-2019 | 01-08-2020 |
| High-pass filter | MICRO- TRONICS | SPA-F- 63029-4 | --- | 01-09-2019 | 01-08-2020 |
| band rejection filter | Sinoscite | FL5CX01CA0 9CL12-0395- 001 | --- | 01-09-2019 | 01-08-2020 |
| band rejection filter | Sinoscite | FL5CX01CA0 8CL12-0393- 001 | --- | 01-09-2019 | 01-08-2020 |
| band rejection filter | Sinoscite | FL5CX02CA0 4CL12-0396- 002 | --- | 01-09-2019 | 01-08-2020 |
| band rejection filter | Sinoscite | FL5CX02CA0 3CL12-0394- 001 | --- | 01-09-2019 | 01-08-2020 |

8 Radio Technical Requirements Specification

Reference documents for testing:

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

Test Results List:

| Test Requirement | Test method | Test item | Verdict | Note |
|-----------------------------------|-------------|---|---------|-------------|
| Part15C Section 15.247 (a)(2) | ANSI C63.10 | 6dB Occupied Bandwidth | PASS | Appendix A) |
| Part15C Section 15.247 (b)(3) | ANSI C63.10 | Conducted Peak Output Power | PASS | Appendix B) |
| Part15C Section 15.247(d) | ANSI C63.10 | Band-edge for RF Conducted Emissions | PASS | Appendix C) |
| Part15C Section 15.247(d) | ANSI C63.10 | RF Conducted Spurious Emissions | PASS | Appendix D) |
| Part15C Section 15.247 (e) | ANSI C63.10 | Power Spectral Density | PASS | Appendix E) |
| Part15C Section 15.203/15.247 (c) | ANSI C63.10 | Antenna Requirement | PASS | Appendix F) |
| Part15C Section 15.207 | ANSI C63.10 | AC Power Line Conducted Emission | N/A | N/A |
| Part15C Section 15.205/15.209 | ANSI C63.10 | Restricted bands around fundamental frequency (Radiated Emission) | PASS | Appendix G) |
| Part15C Section 15.205/15.209 | ANSI C63.10 | Radiated Spurious Emissions | PASS | Appendix H) |

Appendix A): 6dB Occupied Bandwidth

Test Result

| Mode | Channel | 6dB Bandwidth [MHz] | 99% OBW[MHz] | Verdict | Remark |
|------|---------|---------------------|--------------|---------|---------------|
| BLE | LCH | 0.6712 | 1.0468 | PASS | Peak detector |
| BLE | MCH | 0.6801 | 1.0596 | PASS | |
| BLE | HCH | 0.6615 | 1.0567 | PASS | |

Test Graphs

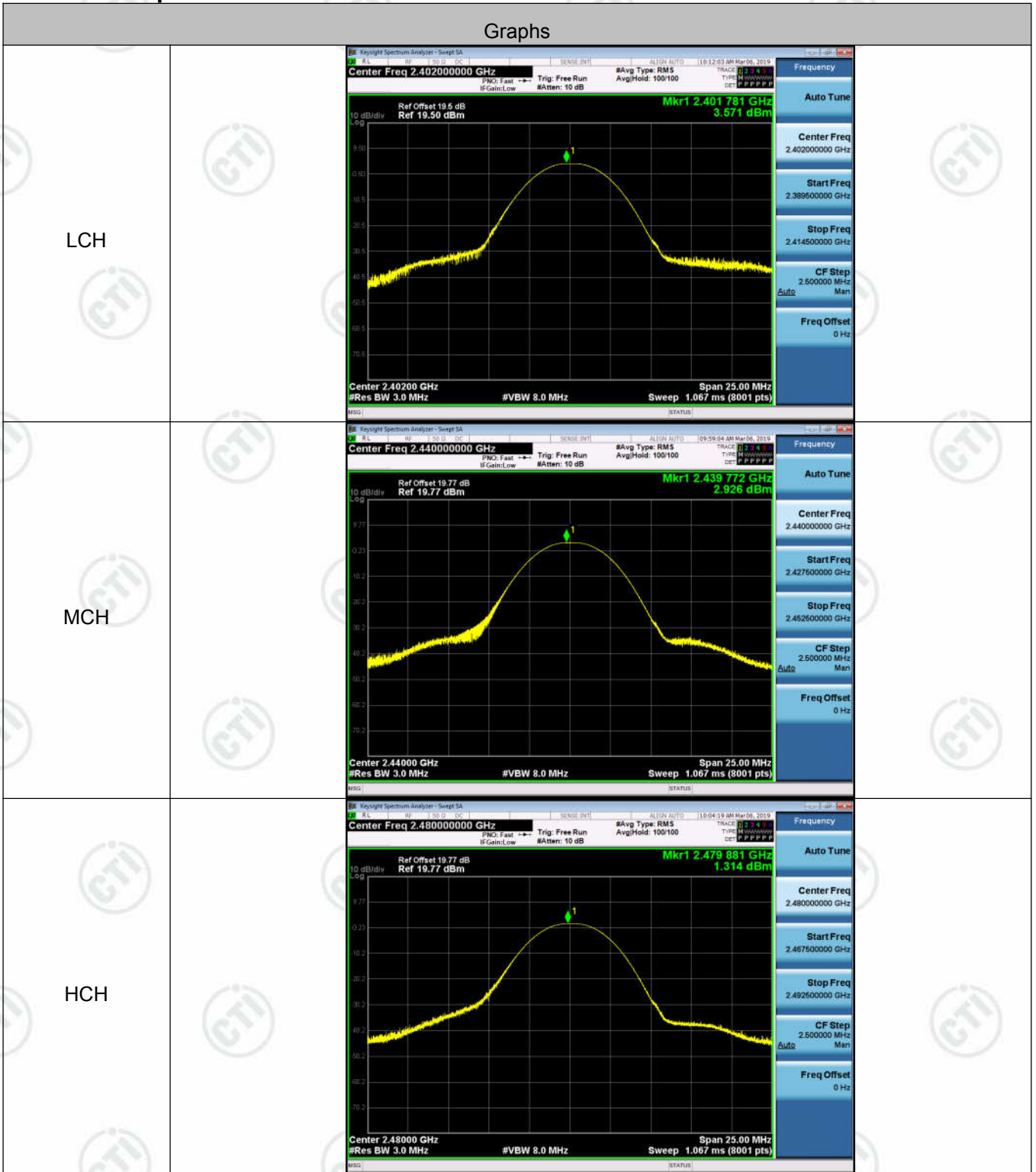
| Graphs | |
|--------|---|
| LCH | <p>Keygraph Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.402000000 GHz</p> <p>Center Freq: 2.402000000 GHz</p> <p>Radio Std: None</p> <p>Ref Offset: 19.6 dB</p> <p>Ref: 10.00 dBm</p> <p>Span: 3 MHz</p> <p>Res BW: 100 kHz</p> <p>VBW: 300 kHz</p> <p>Sweep: 1.067 ms</p> <p>Occupied Bandwidth: 1.0468 MHz</p> <p>Total Power: 10.8 dBm</p> <p>Transmit Freq Error: 13.590 kHz</p> <p>OBW Power: 99.00 %</p> <p>x dB Bandwidth: 671.2 kHz</p> <p>x dB: -6.00 dB</p> |
| MCH | <p>Keygraph Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.440000000 GHz</p> <p>Center Freq: 2.440000000 GHz</p> <p>Radio Std: None</p> <p>Ref Offset: 19.77 dB</p> <p>Ref: 20.00 dBm</p> <p>Span: 3 MHz</p> <p>Res BW: 100 kHz</p> <p>VBW: 300 kHz</p> <p>Sweep: 1.067 ms</p> <p>Occupied Bandwidth: 1.0596 MHz</p> <p>Total Power: 9.70 dBm</p> <p>Transmit Freq Error: 13.015 kHz</p> <p>OBW Power: 99.00 %</p> <p>x dB Bandwidth: 680.1 kHz</p> <p>x dB: -6.00 dB</p> |
| HCH | <p>Keygraph Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.480000000 GHz</p> <p>Center Freq: 2.480000000 GHz</p> <p>Radio Std: None</p> <p>Ref Offset: 19.77 dB</p> <p>Ref: 15.00 dBm</p> <p>Span: 3 MHz</p> <p>Res BW: 100 kHz</p> <p>VBW: 300 kHz</p> <p>Sweep: 1.067 ms</p> <p>Occupied Bandwidth: 1.0567 MHz</p> <p>Total Power: 7.24 dBm</p> <p>Transmit Freq Error: 14.045 kHz</p> <p>OBW Power: 99.00 %</p> <p>x dB Bandwidth: 661.5 kHz</p> <p>x dB: -6.00 dB</p> |

Appendix B): Conducted Peak Output Power

Test Result

| Mode | Channel | Conduct Peak Power[dBm] | Verdict |
|------|---------|-------------------------|---------|
| BLE | LCH | 3.571 | PASS |
| BLE | MCH | 2.926 | PASS |
| BLE | HCH | 1.314 | PASS |

Test Graphs



Appendix C): Band-edge for RF Conducted Emissions

Result Table

| Mode | Channel | Carrier Power[dBm] | Max.Spurious Level [dBm] | Limit [dBm] | Verdict |
|------|---------|--------------------|--------------------------|-------------|---------|
| BLE | LCH | 3.521 | -54.486 | -16.48 | PASS |
| BLE | HCH | 0.760 | -48.524 | -19.24 | PASS |

Test Graphs

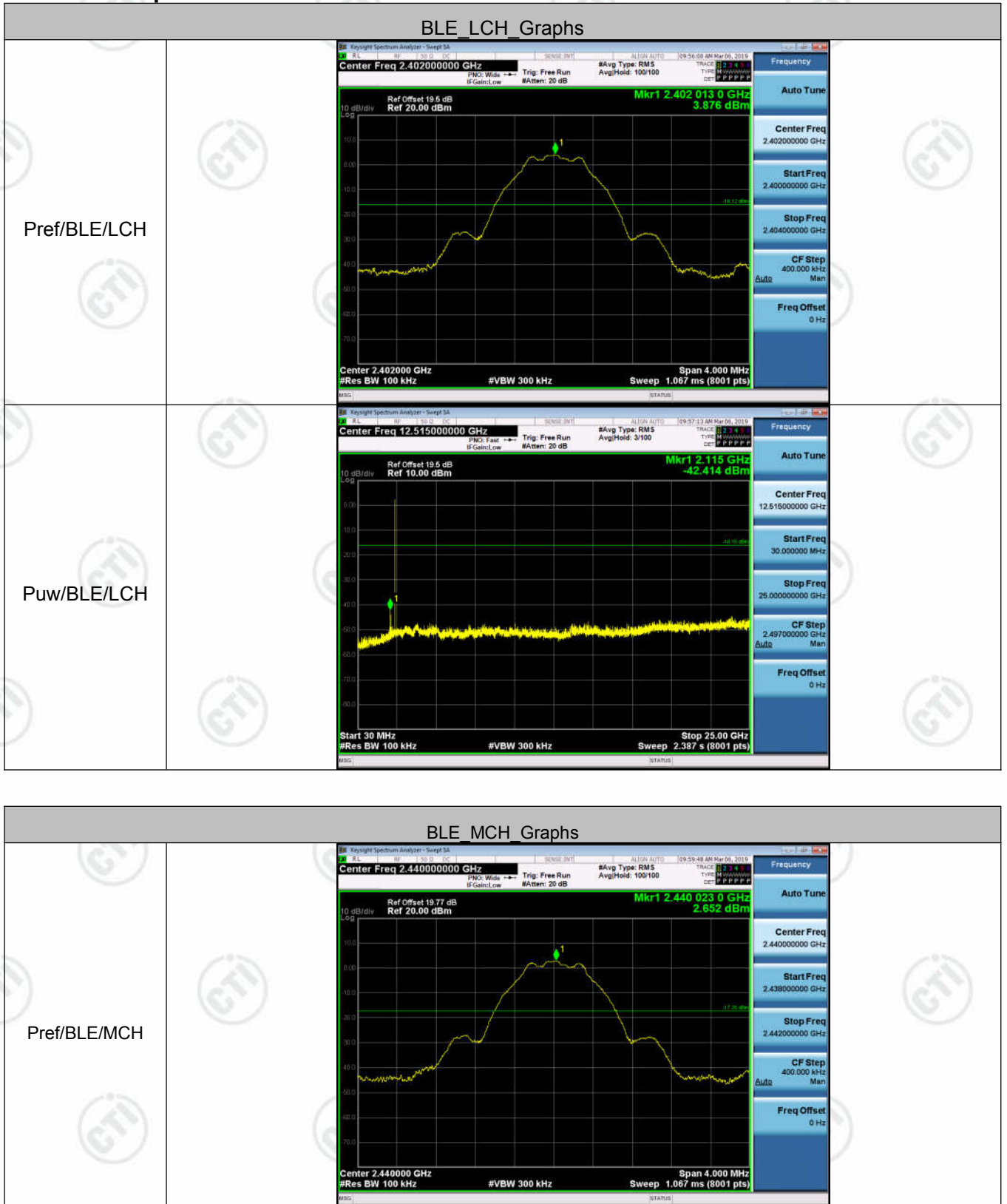


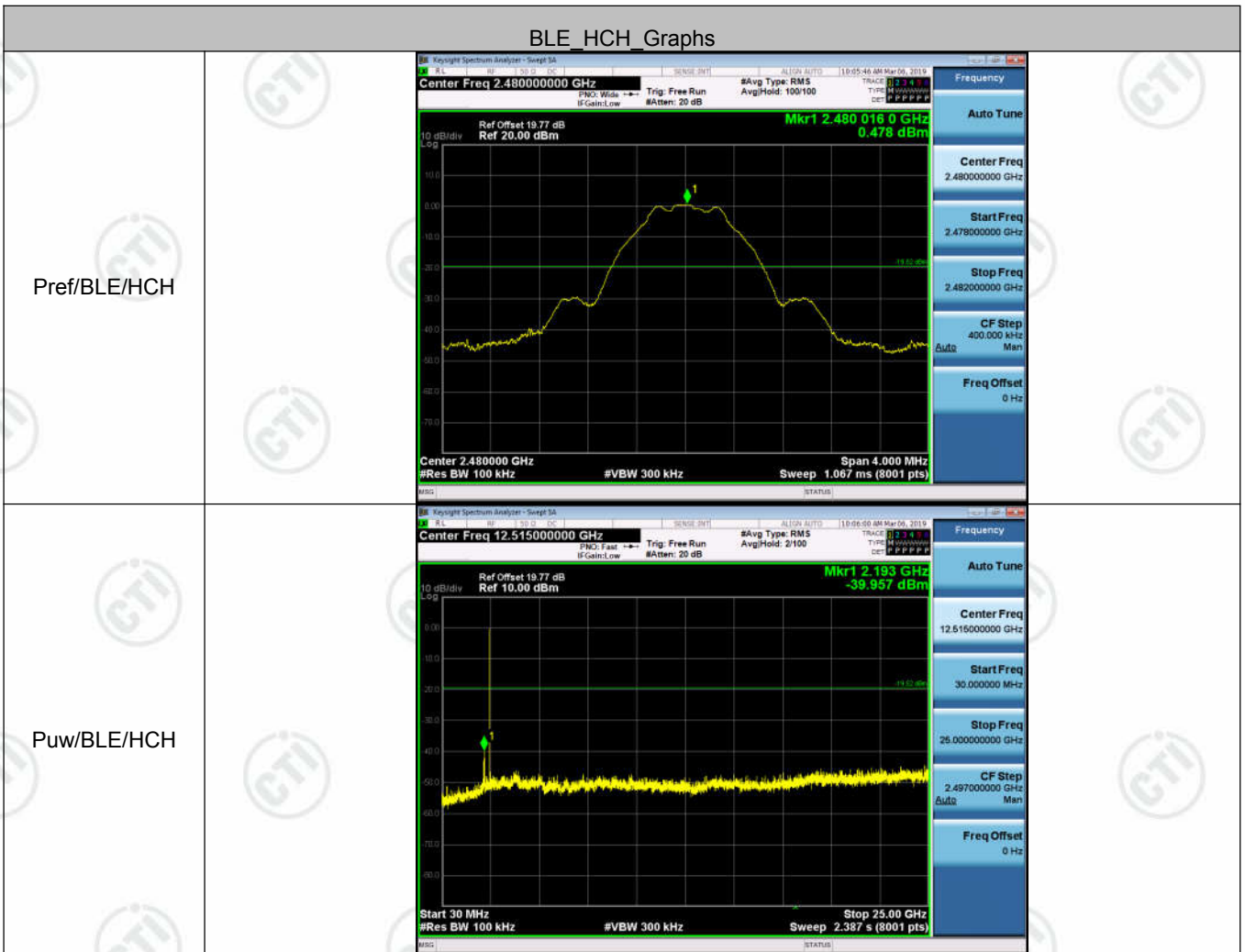
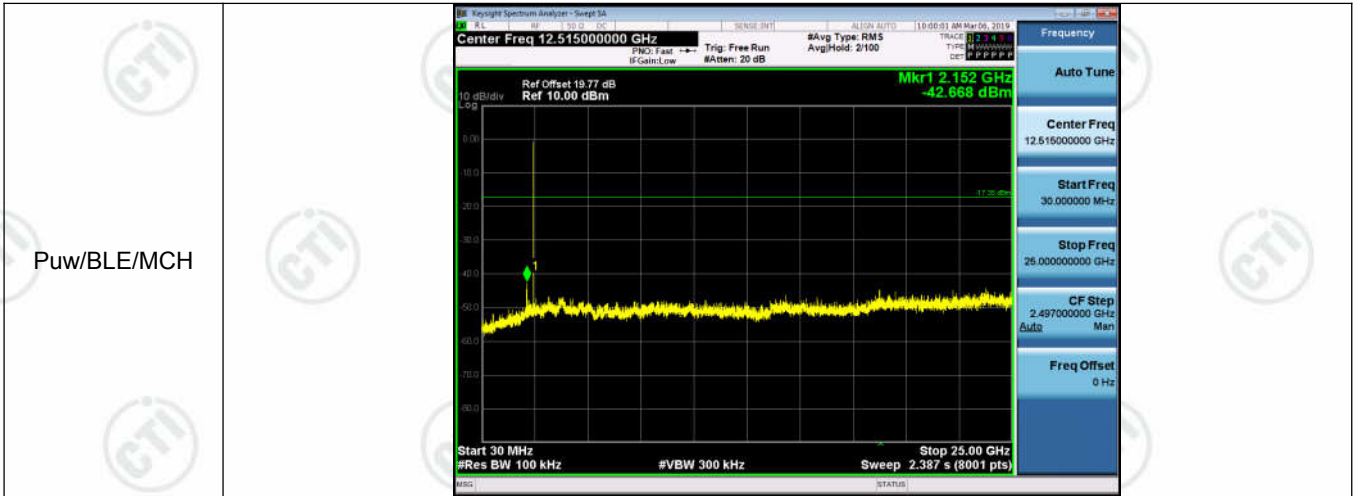
Appendix D): RF Conducted Spurious Emissions

Result Table

| Mode | Channel | Pref [dBm] | Puw[dBm] | Verdict |
|------|---------|------------|----------|---------|
| BLE | LCH | 3.433 | <Limit | PASS |
| BLE | MCH | 2.652 | <Limit | PASS |
| BLE | HCH | 0.478 | <Limit | PASS |

Test Graphs





Appendix E): Power Spectral Density

Result Table

| Mode | Channel | PSD [dBm/3kHz] | Limit [dBm/3kHz] | Verdict |
|------|---------|----------------|------------------|---------|
| BLE | LCH | -8.877 | 8 | PASS |
| BLE | MCH | -9.395 | 8 | PASS |
| BLE | HCH | -11.619 | 8 | PASS |

Test Graphs

| Graphs | |
|--------|---|
| LCH | <p>Keygraph Spectrum Analyzer - Sweep SA Center Freq 2.40200000 GHz #Avg Type: RMS #Att: 10 dB Ref Offset 19.5 dB Ref 10.00 dBm Mkr1 2.402 003 00 GHz -8.877 dBm Center 2.4020000 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 158.4 ms (8001 pts)</p> |
| MCH | <p>Keygraph Spectrum Analyzer - Sweep SA Center Freq 2.44000000 GHz #Avg Type: RMS #Att: 10 dB Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.440 003 56 GHz -9.395 dBm Center 2.4400000 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 158.4 ms (8001 pts)</p> |
| HCH | <p>Keygraph Spectrum Analyzer - Sweep SA Center Freq 2.48000000 GHz #Avg Type: RMS #Att: 10 dB Ref Offset 19.77 dB Ref 10.00 dBm Mkr1 2.480 012 75 GHz -11.619 dBm Center 2.4800000 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 158.4 ms (8001 pts)</p> |

Appendix F): Antenna Requirement

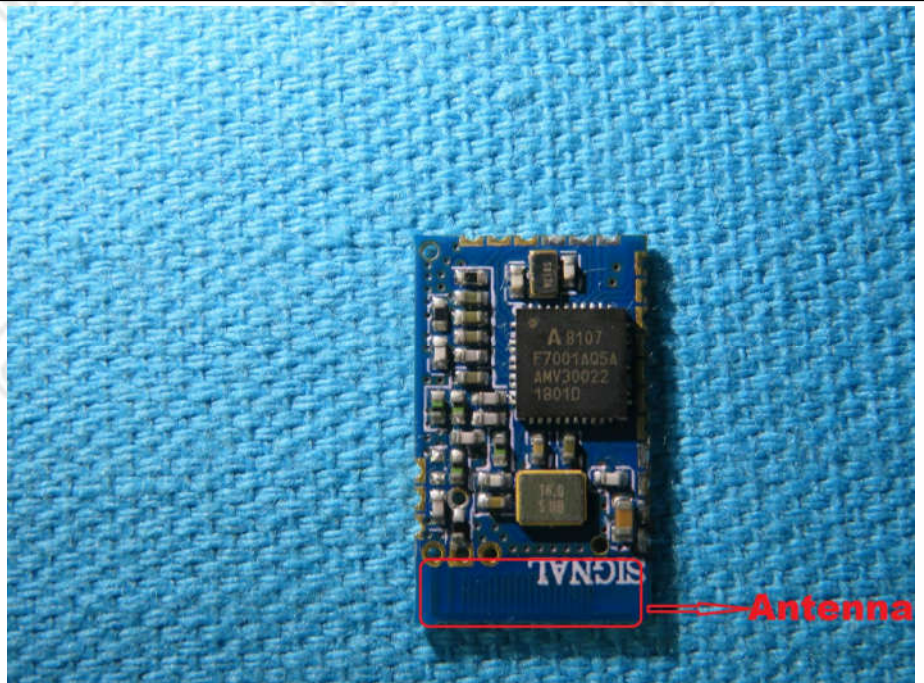
15.203 requirement:

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:



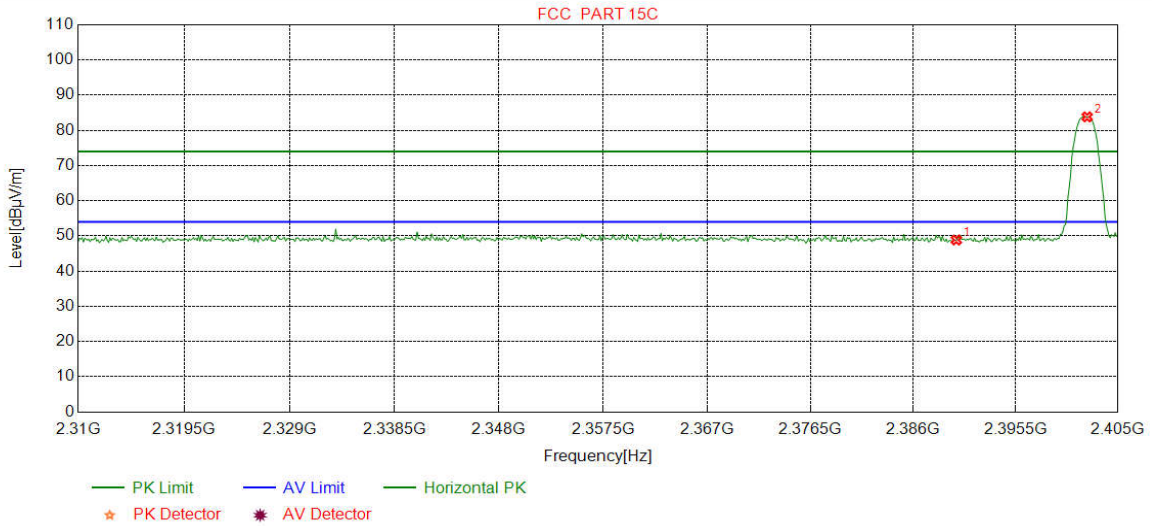
The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 13.6016dBi

Appendix G): 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: | <p>Below 1GHz test procedure as below:</p> <ol style="list-style-type: none"> The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 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. 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 was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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 <p>Above 1GHz test procedure as below:</p> <ol style="list-style-type: none"> Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter). . Test the EUT in the lowest channel , the Highest channel 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. Repeat above procedures until all frequencies measured was complete. | | | | |
| Limit: | Frequency | Limit (dB μ V/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 | | |

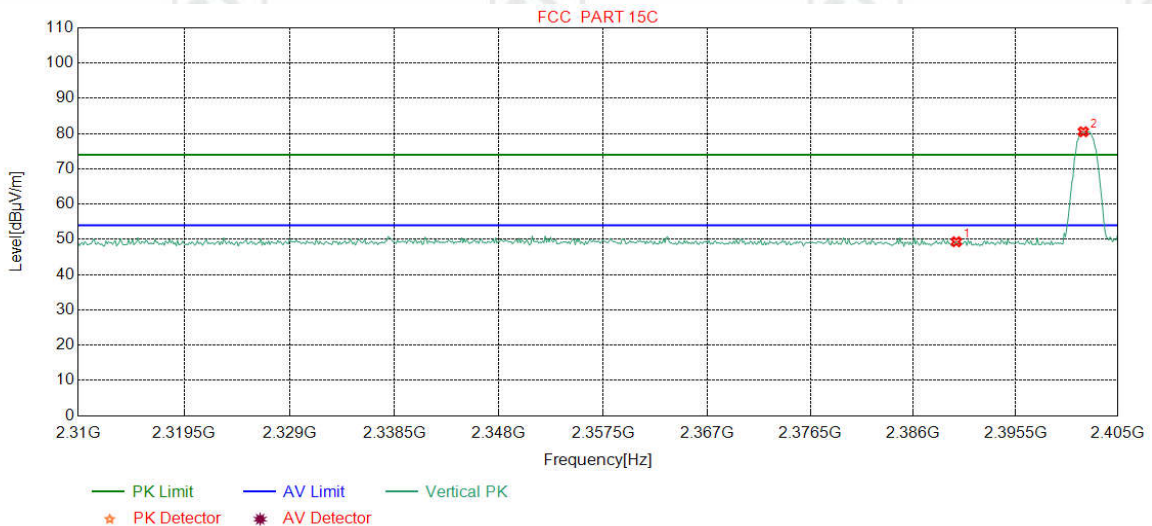
Test plot as follows:

| | | | |
|---------|-------------------|----------|------|
| Mode: | GFSK Transmitting | Channel: | 2402 |
| Remark: | Peak | | |



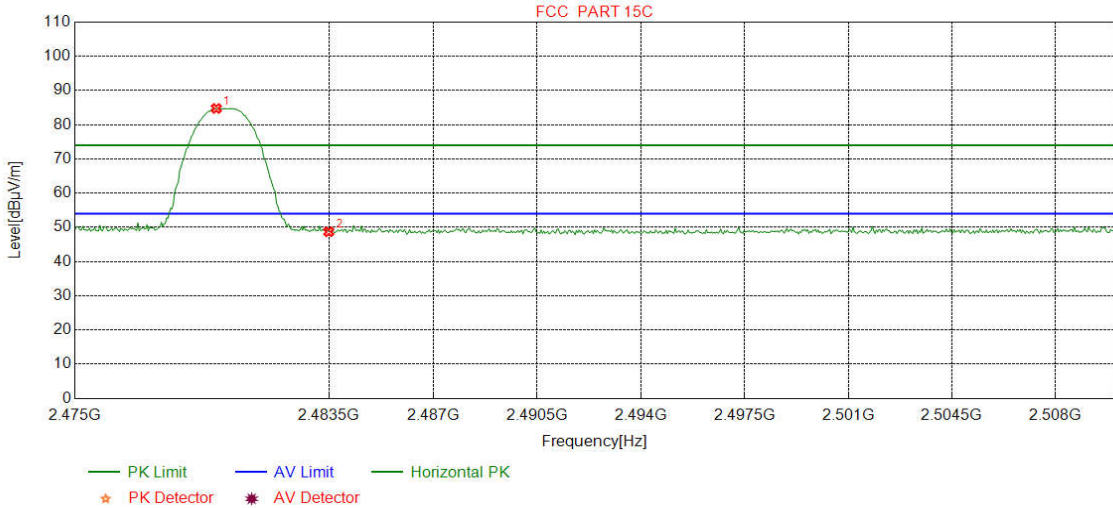
| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1 | 2390.0000 | 32.25 | 13.37 | -42.44 | 45.67 | 48.85 | 74.00 | 25.15 | Pass | Horizontal |
| 2 | 2402.1464 | 32.26 | 13.31 | -42.43 | 80.69 | 83.83 | 74.00 | -9.83 | Pass | Horizontal |

| | | | |
|---------|-------------------|----------|------|
| Mode: | GFSK Transmitting | Channel: | 2402 |
| Remark: | | | |



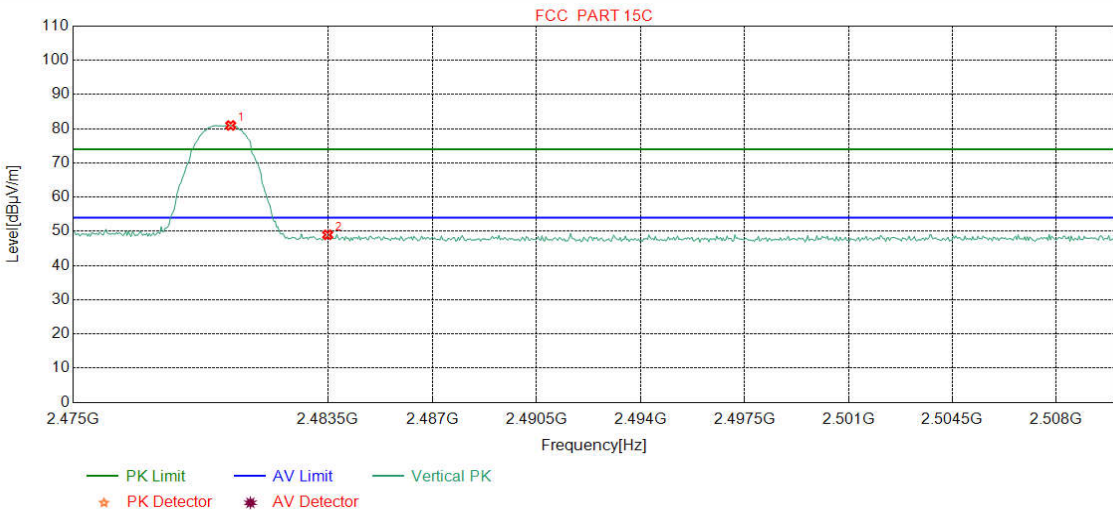
| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1 | 2390.0000 | 32.25 | 13.37 | -42.44 | 46.14 | 49.32 | 74.00 | 24.68 | Pass | Vertical |
| 2 | 2401.7897 | 32.26 | 13.31 | -42.43 | 77.39 | 80.53 | 74.00 | -6.53 | Pass | Vertical |

| | | | |
|---------|-------------------|----------|------|
| Mode: | GFSK Transmitting | Channel: | 2480 |
| Remark: | Peak | | |



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|------------|
| 1 | 2479.7309 | 32.37 | 13.39 | -42.39 | 81.38 | 84.75 | 74.00 | -10.75 | Pass | Horizontal |
| 2 | 2483.5000 | 32.38 | 13.38 | -42.40 | 45.34 | 48.70 | 74.00 | 25.30 | Pass | Horizontal |

| | | | |
|---------|-------------------|----------|------|
| Mode: | GFSK Transmitting | Channel: | 2480 |
| Remark: | Peak | | |



| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|-------------|--------|----------|
| 1 | 2480.2566 | 32.37 | 13.39 | -42.40 | 77.59 | 80.95 | 74.00 | -6.95 | Pass | Vertical |
| 2 | 2483.5000 | 32.38 | 13.38 | -42.40 | 45.62 | 48.98 | 74.00 | 25.02 | Pass | Vertical |

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Pre-amplifier Factor - Antenna Factor - Cable Factor

Appendix H): 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:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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 was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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:

- 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).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- 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.
- Repeat above procedures until all frequencies measured was complete.

| Limit: | Frequency | Field strength (microvolt/meter) | Limit (dB μ V/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**

| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dB μ V] | Level [dB μ V/m] | Limit [dB μ V/m] | Magin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------------|----------------------|----------------------|------------|--------|------------|
| 1 | 37.9548 | 11.65 | 0.69 | -32.12 | 32.74 | 12.96 | 40.00 | 27.04 | Pass | Horizontal |
| 2 | 140.0090 | 7.20 | 1.39 | -31.99 | 36.73 | 13.33 | 43.50 | 30.17 | Pass | Horizontal |
| 3 | 208.8859 | 11.13 | 1.71 | -31.94 | 36.37 | 17.27 | 43.50 | 26.23 | Pass | Horizontal |
| 4 | 625.0575 | 19.20 | 2.97 | -31.98 | 31.87 | 22.06 | 46.00 | 23.94 | Pass | Horizontal |
| 5 | 687.5318 | 19.70 | 3.14 | -32.06 | 34.88 | 25.66 | 46.00 | 20.34 | Pass | Horizontal |
| 6 | 930.8321 | 22.28 | 3.65 | -31.34 | 29.35 | 23.94 | 46.00 | 22.06 | Pass | Horizontal |

| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dB μ V] | Level [dB μ V/m] | Limit [dB μ V/m] | Magin [dB] | Result | Polarity |
|----|-------------|-----------------|-----------------|-----------------|----------------------|----------------------|----------------------|------------|--------|----------|
| 1 | 55.7076 | 12.29 | 0.85 | -32.08 | 39.39 | 20.45 | 40.00 | 19.55 | Pass | Vertical |
| 2 | 67.8338 | 9.56 | 0.94 | -32.05 | 40.43 | 18.88 | 40.00 | 21.12 | Pass | Vertical |
| 3 | 120.0250 | 9.20 | 1.30 | -32.07 | 42.34 | 20.77 | 43.50 | 22.73 | Pass | Vertical |
| 4 | 208.8859 | 11.13 | 1.71 | -31.94 | 44.77 | 25.67 | 43.50 | 17.83 | Pass | Vertical |
| 5 | 625.0575 | 19.20 | 2.97 | -31.98 | 35.69 | 25.88 | 46.00 | 20.12 | Pass | Vertical |
| 6 | 688.0168 | 19.70 | 3.14 | -32.05 | 33.03 | 23.82 | 46.00 | 22.18 | Pass | Vertical |

Transmitter Emission above 1GHz

| Mode: | | BLE GFSK Transmitting | | | Channel: | | | | 2402 | | |
|-------|-------------|-----------------------|-----------------|-----------------|----------------------|----------------------|----------------------|------------|--------|----------|--------|
| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dB μ V] | Level [dB μ V/m] | Limit [dB μ V/m] | Magin [dB] | Result | Polarity | Remark |
| 1 | 1656.6657 | 29.43 | 3.15 | -42.76 | 50.89 | 40.71 | 74.00 | 33.29 | Pass | H | PK |
| 2 | 2114.3114 | 31.86 | 3.60 | -42.56 | 50.34 | 43.24 | 74.00 | 30.76 | Pass | H | PK |
| 3 | 3525.8851 | 33.42 | 4.46 | -41.76 | 49.83 | 45.95 | 74.00 | 28.05 | Pass | H | PK |
| 4 | 4804.0000 | 34.50 | 4.55 | -40.66 | 74.19 | 72.58 | 74.00 | 1.42 | Pass | H | PK |
| 5 | 4804.0000 | 34.50 | 4.55 | -40.66 | 46.07 | 44.46 | 54.00 | 9.54 | Pass | H | AV |
| 6 | 7206.0000 | 36.31 | 5.81 | -41.02 | 53.06 | 54.16 | 74.00 | 19.84 | Pass | H | PK |
| 7 | 7206.0000 | 36.31 | 5.82 | -41.02 | 41.06 | 42.17 | 54.00 | 11.83 | Pass | H | AV |
| 8 | 9608.0000 | 37.64 | 6.63 | -40.76 | 47.19 | 50.70 | 74.00 | 23.30 | Pass | H | PK |
| 9 | 1415.0415 | 28.32 | 2.92 | -42.69 | 50.63 | 39.18 | 74.00 | 34.82 | Pass | V | PK |
| 10 | 2066.9067 | 31.79 | 3.57 | -42.58 | 50.81 | 43.59 | 74.00 | 30.41 | Pass | V | PK |
| 11 | 3197.6132 | 33.28 | 4.65 | -42.01 | 48.94 | 44.86 | 74.00 | 29.14 | Pass | V | PK |
| 12 | 4804.0000 | 34.50 | 4.55 | -40.66 | 74.48 | 72.87 | 74.00 | 1.13 | Pass | V | PK |
| 13 | 4804.0000 | 34.50 | 4.55 | -40.66 | 46.08 | 44.47 | 54.00 | 9.53 | Pass | V | AV |
| 14 | 7206.0000 | 36.31 | 5.81 | -41.02 | 52.90 | 54.00 | 74.00 | 20.00 | Pass | V | PK |
| 15 | 7206.0000 | 36.31 | 5.82 | -41.02 | 40.28 | 41.39 | 54.00 | 12.61 | Pass | V | AV |
| 16 | 9608.0000 | 37.64 | 6.63 | -40.76 | 47.10 | 50.61 | 74.00 | 23.39 | Pass | V | PK |

| Mode: | | BLE GFSK Transmitting | | | Channel: | | | | 2440 | | |
|-------|-------------|-----------------------|-----------------|-----------------|----------------------|----------------------|----------------------|------------|--------|----------|--------|
| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dB μ V] | Level [dB μ V/m] | Limit [dB μ V/m] | Magin [dB] | Result | Polarity | Remark |
| 1 | 1432.2432 | 28.33 | 2.93 | -42.67 | 51.67 | 40.26 | 74.00 | 33.74 | Pass | H | PK |
| 2 | 2141.9142 | 31.90 | 3.64 | -42.55 | 51.95 | 44.94 | 74.00 | 29.06 | Pass | H | PK |
| 3 | 3189.8127 | 33.28 | 4.63 | -42.01 | 49.39 | 45.29 | 74.00 | 28.71 | Pass | H | PK |
| 4 | 4880.0000 | 34.50 | 4.80 | -40.60 | 72.40 | 71.10 | 74.00 | 2.90 | Pass | H | PK |
| 5 | 4880.0000 | 34.50 | 4.80 | -40.60 | 46.18 | 44.88 | 54.00 | 9.12 | Pass | H | AV |
| 6 | 7320.0000 | 36.42 | 5.85 | -40.92 | 54.20 | 55.55 | 74.00 | 18.45 | Pass | H | PK |
| 7 | 7320.0000 | 36.42 | 5.85 | -40.92 | 39.79 | 41.14 | 54.00 | 12.86 | Pass | H | AV |
| 8 | 9760.0000 | 37.70 | 6.73 | -40.62 | 46.46 | 50.27 | 74.00 | 23.73 | Pass | H | PK |
| 9 | 1415.0415 | 28.32 | 2.92 | -42.69 | 50.66 | 39.21 | 74.00 | 34.79 | Pass | V | PK |
| 10 | 1839.0839 | 30.64 | 3.37 | -42.70 | 50.35 | 41.66 | 74.00 | 32.34 | Pass | V | PK |
| 11 | 3507.0338 | 33.41 | 4.48 | -41.81 | 49.50 | 45.58 | 74.00 | 28.42 | Pass | V | PK |
| 12 | 4880.0000 | 34.50 | 4.80 | -40.60 | 73.86 | 72.56 | 74.00 | 1.44 | Pass | V | PK |
| 13 | 4880.0000 | 34.50 | 4.80 | -40.60 | 46.17 | 44.87 | 54.00 | 9.13 | Pass | V | AV |
| 14 | 7320.0000 | 36.42 | 5.85 | -40.92 | 50.69 | 52.04 | 74.00 | 21.96 | Pass | V | PK |
| 15 | 7320.0000 | 36.42 | 5.85 | -40.92 | 39.50 | 40.85 | 54.00 | 13.15 | Pass | V | AV |
| 16 | 9760.0000 | 37.70 | 6.73 | -40.62 | 46.84 | 50.65 | 74.00 | 23.35 | Pass | V | PK |

| Mode: | | BLE GFSK Transmitting | | | Channel: | | | | 2480 | | |
|-------|-------------|-----------------------|-----------------|-----------------|----------------------|----------------------|----------------------|------------|--------|----------|--------|
| NO | Freq. [MHz] | Ant Factor [dB] | Cable loss [dB] | Pream gain [dB] | Reading [dB μ V] | Level [dB μ V/m] | Limit [dB μ V/m] | Magin [dB] | Result | Polarity | Remark |
| 1 | 1405.0405 | 28.31 | 2.91 | -42.69 | 50.50 | 39.03 | 74.00 | 34.97 | Pass | H | PK |
| 2 | 1947.0947 | 31.35 | 3.42 | -42.64 | 49.88 | 42.01 | 74.00 | 31.99 | Pass | H | PK |
| 3 | 4088.1725 | 33.92 | 4.32 | -40.80 | 47.41 | 44.85 | 74.00 | 29.15 | Pass | H | PK |
| 4 | 4960.0000 | 34.50 | 4.82 | -40.53 | 72.91 | 71.70 | 74.00 | 2.30 | Pass | H | PK |
| 5 | 4960.0000 | 34.50 | 4.82 | -40.53 | 45.34 | 44.13 | 54.00 | 9.87 | Pass | H | AV |
| 6 | 7440.0000 | 36.54 | 5.85 | -40.82 | 50.38 | 51.95 | 74.00 | 22.05 | Pass | H | PK |
| 7 | 7440.0000 | 36.54 | 5.85 | -40.82 | 39.49 | 41.06 | 54.00 | 12.94 | Pass | H | AV |
| 8 | 9920.0000 | 37.77 | 6.79 | -40.48 | 46.37 | 50.45 | 74.00 | 23.55 | Pass | H | PK |
| 9 | 1224.0224 | 28.12 | 2.67 | -42.86 | 51.60 | 39.53 | 74.00 | 34.47 | Pass | V | PK |
| 10 | 1798.4798 | 30.37 | 3.32 | -42.71 | 50.60 | 41.58 | 74.00 | 32.42 | Pass | V | PK |
| 11 | 3169.6613 | 33.27 | 4.60 | -42.02 | 50.04 | 45.89 | 74.00 | 28.11 | Pass | V | PK |
| 12 | 4960.0000 | 34.50 | 4.82 | -40.53 | 73.66 | 72.45 | 74.00 | 1.55 | Pass | V | PK |
| 13 | 4960.0000 | 34.50 | 4.82 | -40.53 | 45.31 | 44.10 | 54.00 | 9.90 | Pass | V | AV |
| 14 | 7440.0000 | 36.54 | 5.85 | -40.82 | 52.28 | 53.85 | 74.00 | 20.15 | Pass | V | PK |
| 15 | 7440.0000 | 36.54 | 5.85 | -40.82 | 39.49 | 41.06 | 54.00 | 12.94 | Pass | V | AV |
| 16 | 9920.0000 | 37.77 | 6.79 | -40.48 | 45.43 | 49.51 | 74.00 | 24.49 | Pass | V | PK |

Note:

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

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

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.

PHOTOGRAPHS OF TEST SETUP

Test model No.: DET-218



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



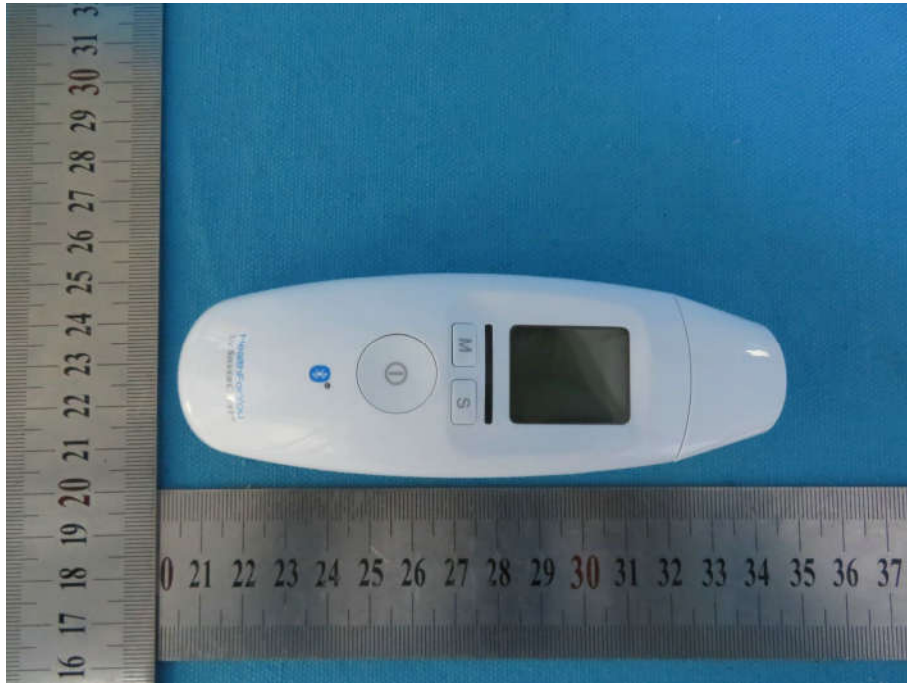
Radiated spurious emission Test Setup-2(30MHz-1GHz)



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

PHOTOGRAPHS OF EUT Constructional Details

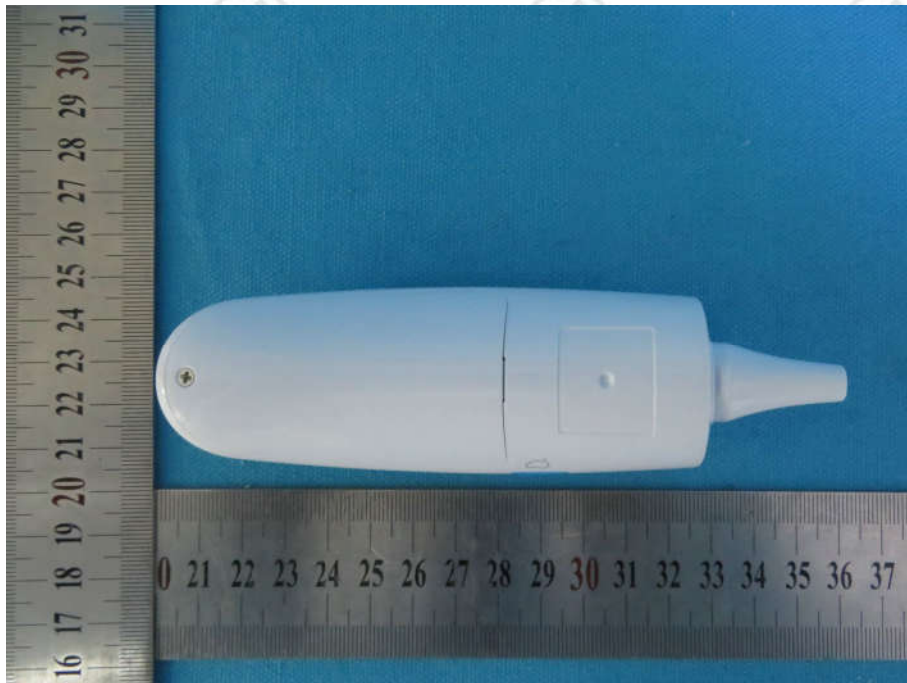
Test model No.: DET-218



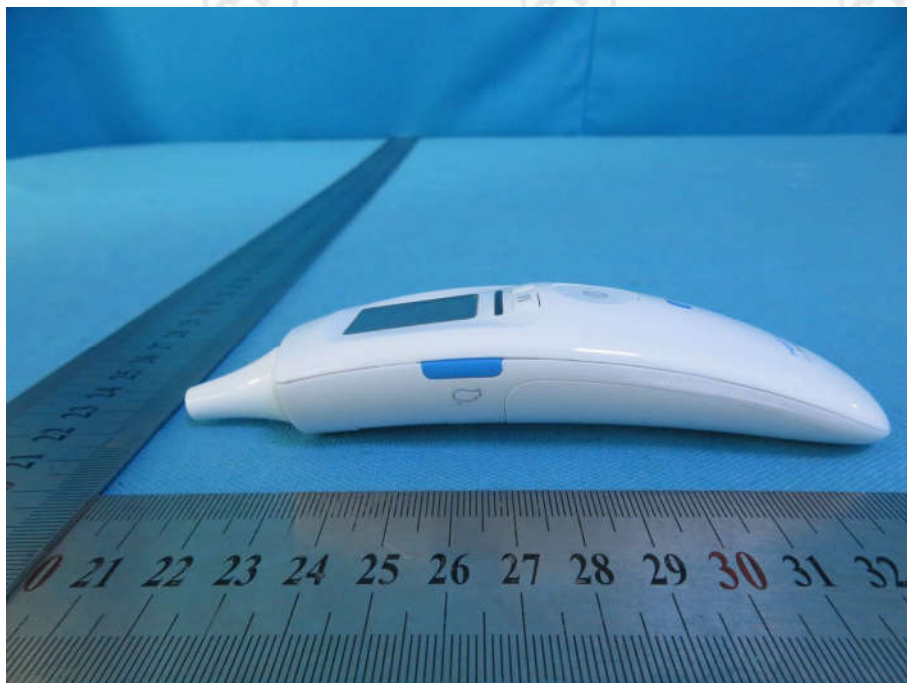
View of Product-1



View of Product-2



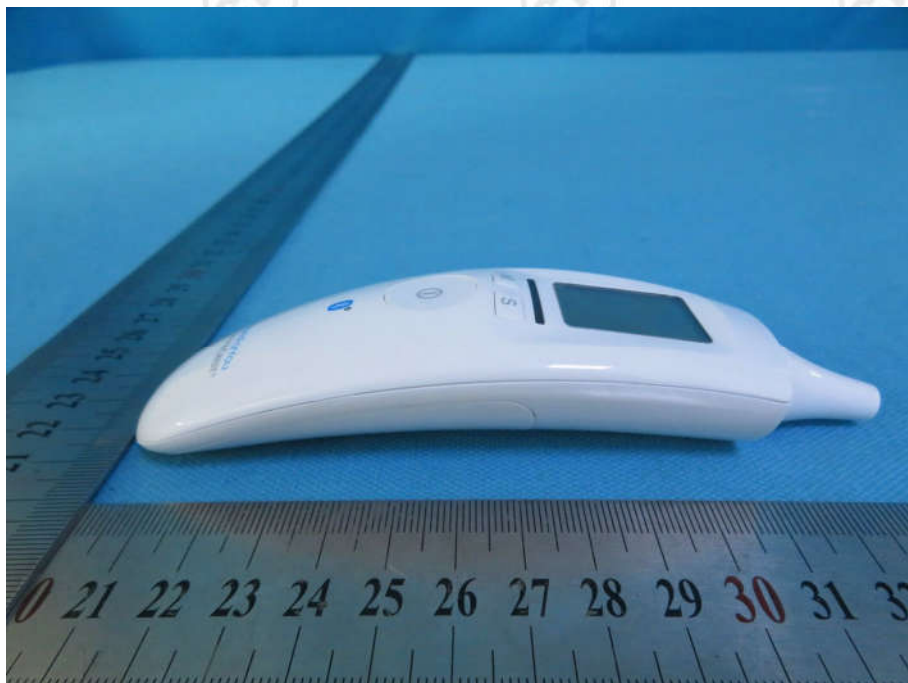
View of Product-3



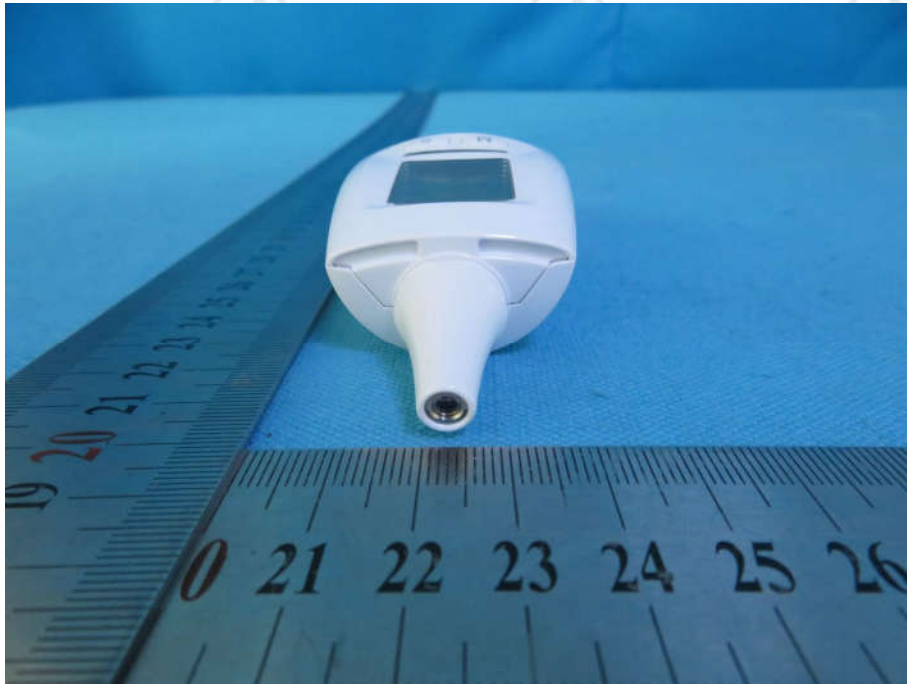
View of Product-4



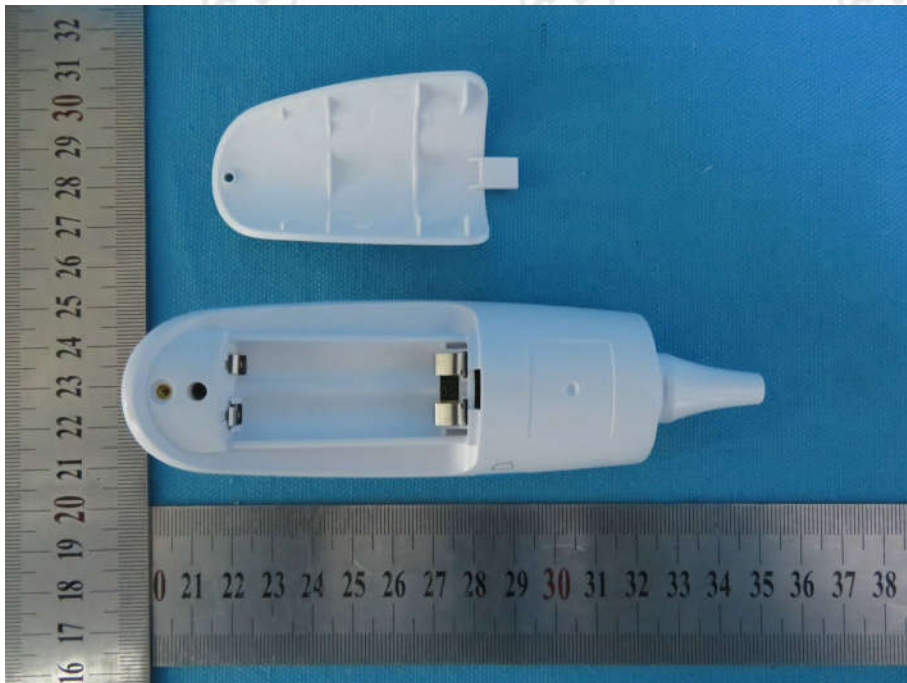
View of Product-5



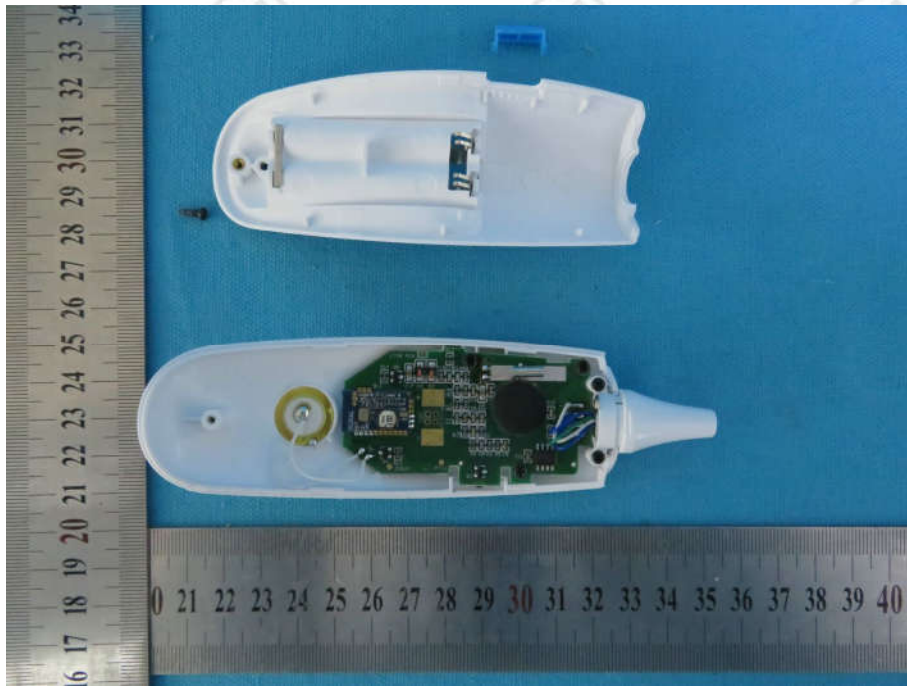
View of Product-6



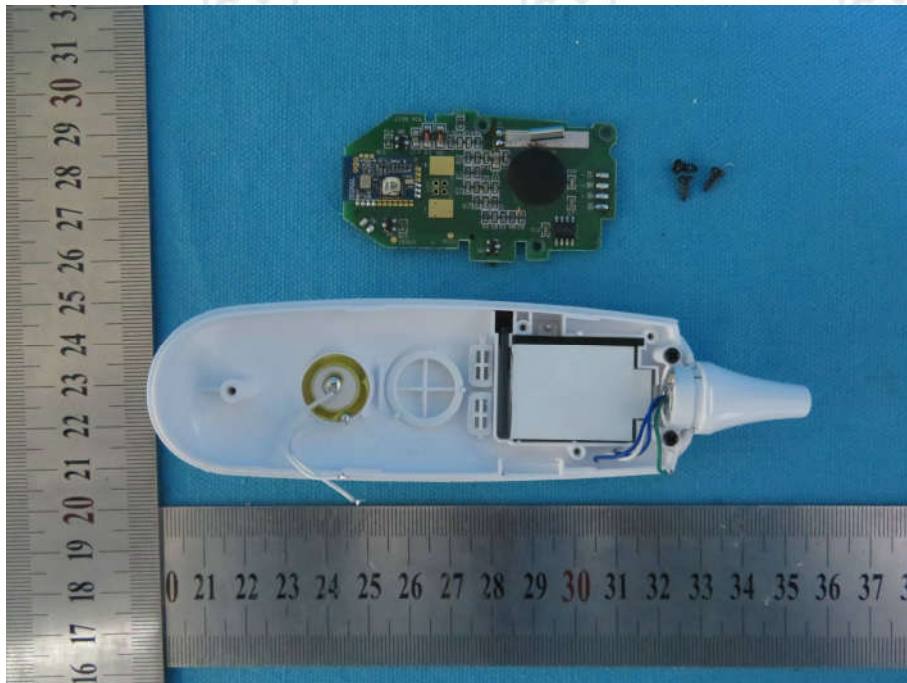
View of Product-7



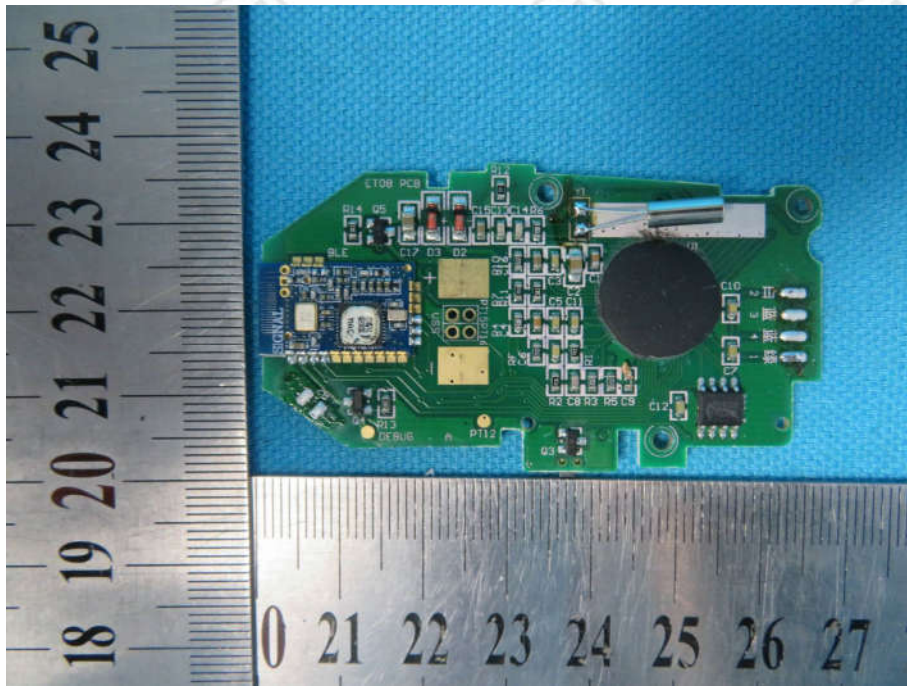
View of Product-8



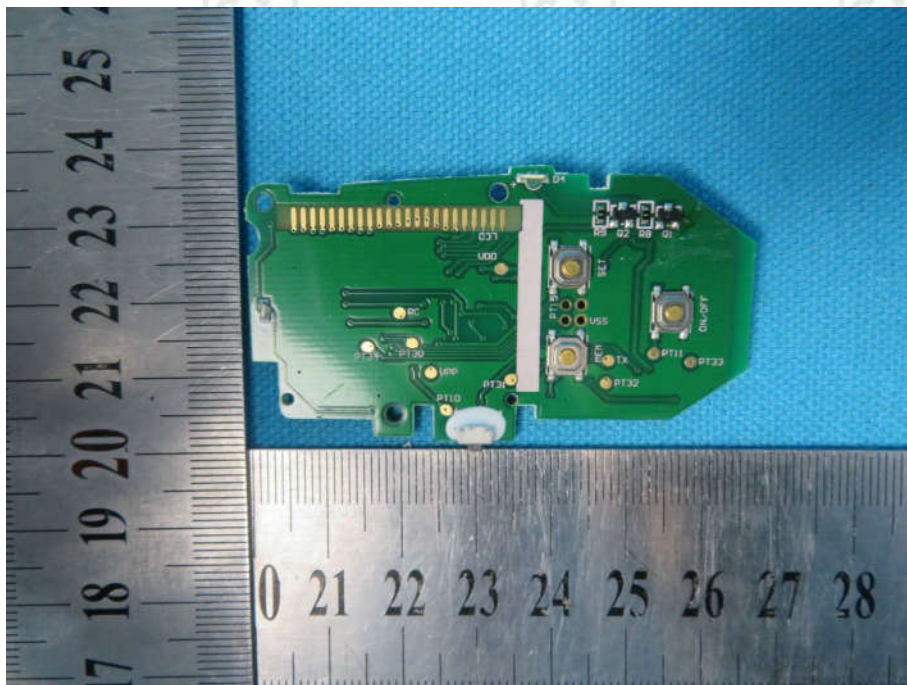
View of Product-9



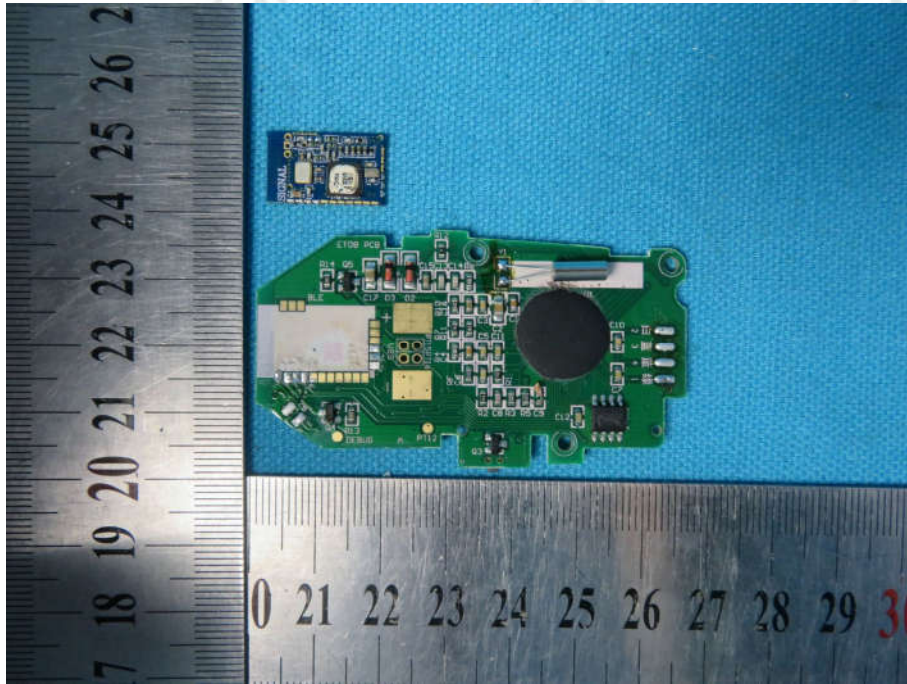
View of Product-10



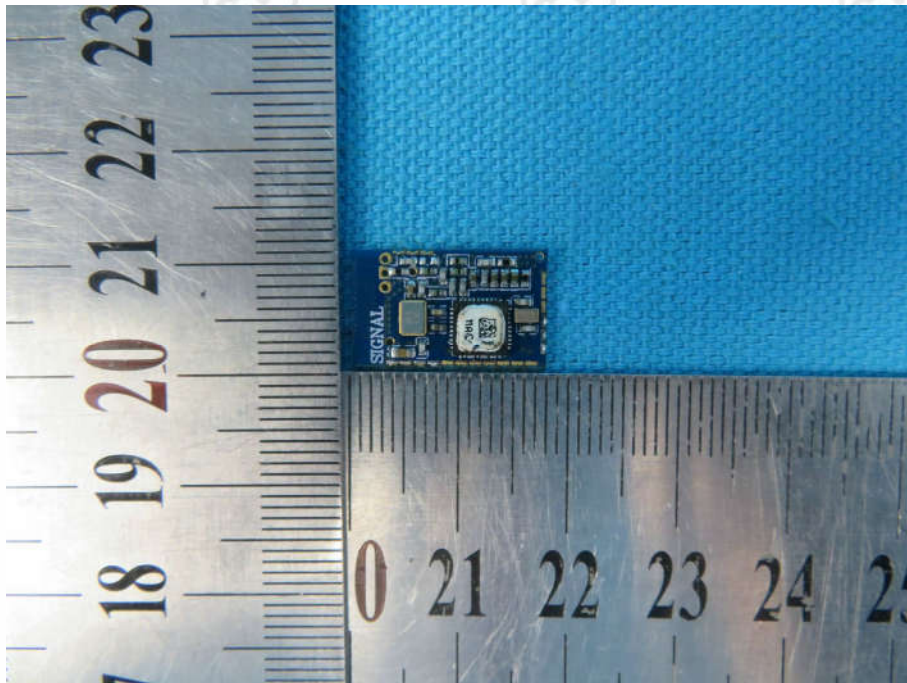
View of Product-11



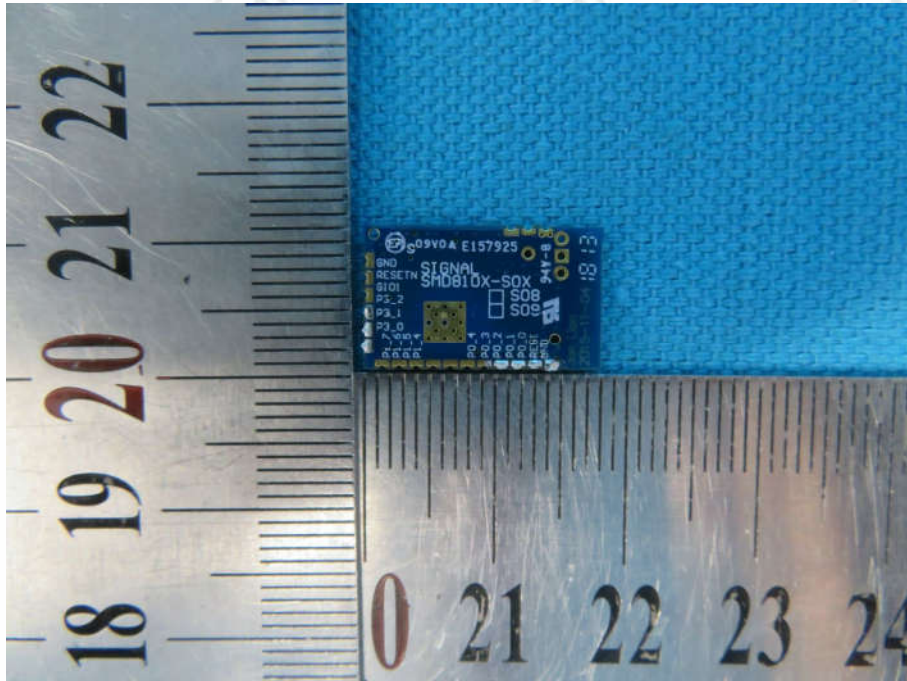
View of Product-12



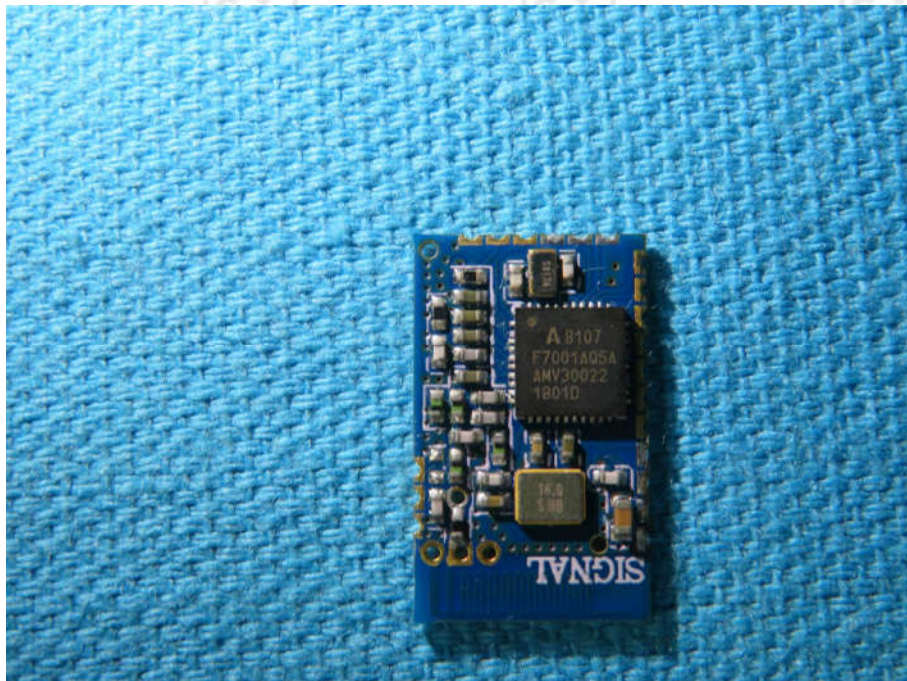
View of Product-13



View of Product-14



View of Product-15



View of Product-16

*** End of Report ***

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