

Shenzhen Toby Technology Co., Ltd.

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# FCC Radio Test Report FCC ID: XMF-MID7015

#### **Original Grant**

| Report No.               | -  | TB-FCC166206  |
|--------------------------|----|---|
| Applicant                | 1  | Lightcomm Technology Co., Ltd.  |
| Equipment Under          | Те | st (EUT)  |
| EUT Name                 | ÷  | 7"Tablet  |
| Model No.                |    | 100005206   |
| Serial Model No.         | 6  | MID7015   |
| Brand Name               |    | onn   |
| Receipt Date             | 1  | 2019-05-21  |
| Test Date                |    | 2019-05-21 to 2019-05-27  |
| Issue Date               |    | 2019-06-10  |
| Standards                | :  | FCC Part 15: 2017, Subpart C(15.247)  |
| Test Method              | ÷  | ANSI C63.10: 2013   |
| Conclusions              |    | PASS  |
|                          |    | In the configuration tested, the EUT complied with the standards specified above, |
| Test/Witness<br>Engineer |    | : Jason Xu TECHNOLOG  |
|                          |    | 2   |

Supervisor

Engineer

**Engineer Manager** 



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.



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# **Revision History**

| Report No.   | Version | Description             | Issued Date |
|--------------|---------|-------------------------|-------------|
| TB-FCC166206 | Rev.01  | Initial issue of report | 2019-06-10  |
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### 1. General Information about EUT

#### **1.1 Client Information**

| Applicant    | - | ightcomm Technology Co., Ltd.  |  |
|--------------|---|--|--|
| Address      | : | NIT 1306 13/F ARION COMMERCIAL CENTRE, 2-12 QUEEN'S<br>OAD WEST, SHEUNG WAN HK                 |  |
| Manufacturer |   | luizhou HengDu Electronics Co., Ltd  |  |
| Address      | • | No.8 Huitai Road, Huinan High-tech Industrial Park, Huiao Avenue,<br>Huizhou, Guangdong, China |  |

#### 1.2 General Description of EUT (Equipment Under Test)

| EUT Name                  | : | 7"Tablet   | The states                                  |  |  |
|---------------------------|---|--|---|--|--|
| Models No.                | - | 100005206, MID7015   |   |  |  |
| Model<br>Difference       | : | All models are in the same PCB layout interior structure and electrica circuits, The only difference is model.                   |   |  |  |
|                           |   | Operation Frequency:   | Bluetooth 4.0(BLE): 2402MHz~2480MHz         |  |  |
|                           |   | Number of Channel:   | Bluetooth 4.0(BLE): 40 channels see note(3) |  |  |
| Product                   |   | RF Output Power:   | 5.628dBm Conducted Power                    |  |  |
| Description               |   | Antenna Gain:  | 3.02dBi FPC Antenna                         |  |  |
|                           |   | Modulation Type:   | GFSK  |  |  |
|                           |   | Bit Rate of Transmitter:   | 1Mbps(GFSK)                                 |  |  |
| Power Supply              | : | DC Voltage Supply from Adapter(TEKA006-0501000UK).<br>DC Voltage supplied by Li-ion battery.                                     |   |  |  |
| Power Rating              |   | TEKA006-0501000UK:<br>Input: AC 100-240V 50/60Hz 0.3A(MAX)<br>Output: DC 5.0V 1A by adapter<br>DC 3.7V by 2100mAh Li-ion battery |   |  |  |
| Software<br>Version       | : | PPR1.180610.011 relea  | PPR1.180610.011 release-keys                |  |  |
| Hardware<br>Version       | • | LC-MT8167-REV 0.1  |   |  |  |
| Connecting<br>I/O Port(S) | Ś | Please refer to the User   | 's Manual                                   |  |  |

Remark: One electronic material suppliers are different, such as display screen.

#### Note:

This Test Report is FCC Part 15.247 for Bluetooth BLE, the test procedure follows the FCC KDB

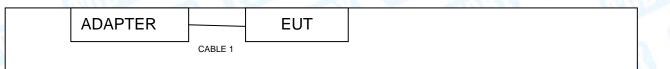


558074 D01 DTS Means Guidance v05.

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) Antenna information provided by the applicant.
- (3) Channel List:

| Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) |
|---------|--------------------|---------|--------------------|---------|--------------------|
| 00      | 2402               | 14      | 2430               | 28      | 2458               |
| 01      | 2404               | 15      | 2432               | 29      | 2460               |
| 02      | 2406               | 16      | 2434               | 30      | 2462               |
| 03      | 2408               | 17      | 2436               | 31      | 2464               |
| 04      | 2410               | 18      | 2438               | 32      | 2466               |
| 05      | 2412               | 19      | 2440               | 33      | 2468               |
| 06      | 2414               | 20      | 2442               | 34      | 2470               |
| 07      | 2416               | 21      | 2444               | 35      | 2472               |
| 08      | 2418               | 22      | 2446               | 36      | 2474               |
| 09      | 2420               | 23      | 2448               | 37      | 2476               |
| 10      | 2422               | 24      | 2450               | 38      | 2478               |
| 11      | 2424               | 25      | 2452               | 39      | 2480               |
| 12      | 2426               | 26      | 2454               | 1       |                    |
| 13      | 2428               | 27      | 2456               |         |                    |

1.3 Block Diagram Showing the Configuration of System Tested





#### 1.4 Description of Support Units

| Cable Information |   |    |      |           |  |  |
|-------------------|---|----|------|-----------|--|--|
| Number            | Number   Shielded Type   Ferrite Core   Length   Note |    |      |           |  |  |
| Cable 1           | Yes   | NO | 1.0M | Accessory |  |  |

#### 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

| For Conducted Test           |  |  |  |  |
|------------------------------|--|--|--|--|
| Final Test Mode              | Description  |  |  |  |
| Mode 1                       | Charging+TX Mode (Channel 20)                        |  |  |  |
|                              | For Radiated Test                                    |  |  |  |
| Final Test Mode              | Description  |  |  |  |
| Mode 2                       | TX Mode (Channel 20)                                 |  |  |  |
| Mode 3                       | TX Mode (Channel 00/20/39)                           |  |  |  |
| Remark: One electronic mater | ial suppliers are different, such as display screen. |  |  |  |

#### Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

- BLE Mode: GFSK Modulation Transmitting mode.
- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

#### 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.



| Test Software Version | MTK Engineer Mode.exe |         |          |   |
|-----------------------|-----------------------|---------|----------|---|
| Frequency             | 2402 MHz              | 2442MHz | 2480 MHz | 6 |
| BLE GFSK              | DEF                   | DEF     | DEF      | 6 |

#### 1.7 Measurement Uncertainty

The reported uncertainty of measurement y  $\pm$  U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

| Test Item          | Parameters                           | Expanded Uncertainty (U <sub>Lab</sub> ) |
|--------------------|--------------------------------------|--|
| Conducted Emission | Level Accuracy:<br>9kHz~150kHz       | ±3.42 dB                                 |
| AUDO A             | 150kHz to 30MHz                      | ±3.42 dB                                 |
| Radiated Emission  | Level Accuracy:<br>9kHz to 30 MHz    | ±4.60 dB                                 |
| Radiated Emission  | Level Accuracy:<br>30MHz to 1000 MHz | ±4.40 dB                                 |
| Radiated Emission  | Level Accuracy:<br>Above 1000MHz     | ±4.20 dB                                 |



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#### 1.8 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

#### CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

#### A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.

#### IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

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## 2. Test Summary

| Standard Section            |                    | - 19   | M102     |        |
|-----------------------------|--------------------|--|----------|--------|
| FCC IC                      |                    | Test Item  | Judgment | Remark |
| 15.203                      |                    | Antenna Requirement  | PASS     | N/A    |
| 15.207(a)                   | RSS-GEN<br>7.2.4   | Conducted Emission   | PASS     | N/A    |
| 15.205&15.247(d)            | RSS-GEN<br>7.2.2   | Band-Edge & Unwanted<br>Emissions into Restricted<br>Frequency                       | PASS     | N/A    |
| 15.247(a)(2)                | RSS 247<br>5.2 (1) | 6dB Bandwidth  | PASS     | N/A    |
| 15.247(b)(3)                | RSS 247<br>5.4 (4) | Conducted Max Output<br>Power  | PASS     | N/A    |
| 15.247(e)                   | RSS 247<br>5.2 (2) | Power Spectral Density   | PASS     | N/A    |
| 15.205,<br>15.209&15.247(d) | RSS 247<br>5.5     | Transmitter Radiated<br>Spurious &Unwanted<br>Emissions into Restricted<br>Frequency | PASS     | N/A    |



# 3. Test Equipment

|                            |  |                   |               |               | Cal. Due         |
|----------------------------|--|-------------------|---------------|---------------|------------------|
| Equipment                  | Manufacturer   | Model No.         | Serial No.    | Last Cal.     | Date             |
| EMI Test Receiver          | Rohde & Schwarz  | ESCI              | 100321        | Jul. 18, 2018 | Jul. 17, 2019    |
| RF Switching Unit          | Switching Unit Compliance<br>Direction Systems RSU-A4 34403<br>Inc |                   | 34403         | Jul. 18, 2018 | Jul. 17, 2019    |
| AMN                        | SCHWARZBECK  | NNBL 8226-2       | 8226-2/164    | Jul. 18, 2018 | Jul. 17, 2019    |
| LISN                       | Rohde & Schwarz  | ENV216            | 101131        | Jul. 18, 2018 | Jul. 17, 2019    |
| Radiation Emissic          | on Test  |                   |               |               | -                |
| Equipment                  | Manufacturer   | Model No.         | Serial No.    | Last Cal.     | Cal. Due<br>Date |
| Spectrum<br>Analyzer       | Agilent  | E4407B            | MY45106456    | Jul. 18, 2018 | Jul. 17, 2019    |
| EMI Test<br>Receiver       | Rohde & Schwarz  | ESPI              | 100010/007    | Jul. 18, 2018 | Jul. 17, 2019    |
| Bilog Antenna              | ETS-LINDGREN   | 3142E             | 00117537      | Jan. 27, 2019 | Jan. 26, 2020    |
| Bilog Antenna              | ETS-LINDGREN   | 3142E             | 00117542      | Jan. 27, 2019 | Jan. 26, 2020    |
| Horn Antenna               | ETS-LINDGREN   | 3117              | 00143207      | Mar.03, 2019  | Mar. 02, 2020    |
| Horn Antenna               | ETS-LINDGREN   | 3117              | 00143209      | Mar.03, 2019  | Mar. 02, 2020    |
| Loop Antenna               | SCHWARZBECK  | FMZB 1519 B       | 1519B-059     | Jul. 14, 2018 | Jul.13, 2019     |
| Pre-amplifier              | Sonoma   | 310N              | 185903        | Mar.04, 2019  | Mar. 03, 2020    |
| Pre-amplifier              | HP   | 8449B             | 3008A00849    | Mar.03, 2019  | Mar. 02, 2020    |
| Cable                      | HUBER+SUHNER   | 100               | SUCOFLEX      | Mar.03, 2019  | Mar. 02, 2020    |
| Positioning Controller     | ETS-LINDGREN   | 2090              | N/A           | N/A           | N/A              |
| Antenna Conducte           | ed Emission  |                   |               | _             |                  |
| Equipment                  | Manufacturer   | Model No.         | Serial No.    | Last Cal.     | Cal. Due<br>Date |
| Spectrum Analyzer          | Agilent  | E4407B            | MY45106456    | Jul. 18, 2018 | Jul. 17, 2019    |
| Spectrum Analyzer          | Rohde & Schwarz  | ESCI              | 100010/007    | Jul. 18, 2018 | Jul. 17, 2019    |
| MXA Signal Analyzer        | Agilent  | N9020A            | MY49100060    | Sep. 15, 2018 | Sep. 14, 2019    |
| Vector Signal<br>Generator | Agilent  | N5182A            | MY50141294    | Sep. 15, 2018 | Sep. 14, 2019    |
| Analog Signal<br>Generator | Agilent  | N5181A            | MY50141953    | Sep. 15, 2018 | Sep. 14, 2019    |
|                            | DARE!! Instruments   | RadiPowerRPR3006W | 17100015SNO26 | Sep. 15, 2018 | Sep. 14, 2019    |
|                            | DARE!! Instruments   | RadiPowerRPR3006W | 17100015SNO29 | Sep. 15, 2018 | Sep. 14, 2019    |
| RF Power Sensor            | DARE!! Instruments   | RadiPowerRPR3006W | 17100015SNO31 | Sep. 15, 2018 | Sep. 14, 2019    |
|                            | DARE!! Instruments   | RadiPowerRPR3006W | 17100015SNO33 | Sep. 15, 2018 | Sep. 14, 2019    |



### 4. Conducted Emission Test

- 4.1 Test Standard and Limit
  - 4.1.1Test Standard FCC Part 15.207
  - 4.1.2 Test Limit

| Eroguopov     | Maximum RF Line Voltage (dBµV) |               |  |  |  |
|---------------|--------------------------------|---------------|--|--|--|
| Frequency     | Quasi-peak Level               | Average Level |  |  |  |
| 150kHz~500kHz | 66 ~ 56 *                      | 56 ~ 46 *     |  |  |  |
| 500kHz~5MHz   | 56                             | 46            |  |  |  |
| 5MHz~30MHz    | 60                             | 50            |  |  |  |

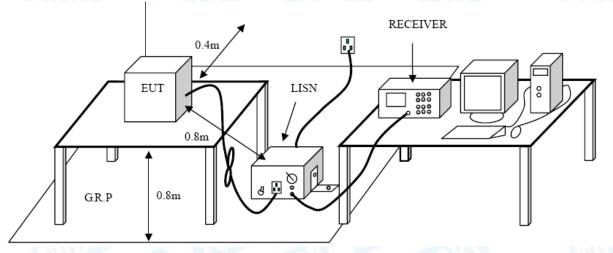
Notes:

(1) \*Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



#### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Da5ta

Please refer to the Attachment A.



### 5. Radiated Emission Test

- 5.1 Test Standard and Limit
  - 5.1.1 Test Standard
    - FCC Part 15.247(d)
  - 5.1.2 Test Limit

#### Radiated Emission Limits (9kHz~1000MHz)

| Frequency<br>(MHz | Field Strength<br>(microvolt/meter) | Measurement Distance<br>(meters) |
|-------------------|-------------------------------------|----------------------------------|
| 0.009~0.490       | 2400/F(KHz)                         | 300                              |
| 0.490~1.705       | 24000/F(KHz)                        | 30                               |
| 1.705~30.0        | 30                                  | 30                               |
| 30~88             | 100                                 | 3                                |
| 88~216            | 150                                 | 3                                |
| 216~960           | 200                                 | 3                                |
| Above 960         | 500                                 | 3                                |

#### Radiated Emission Limit (Above 1000MHz)

| Frequency  | Distance Met     | ers(at 3m)          |  |
|------------|------------------|---------------------|--|
| (MHz)      | Peak<br>(dBuV/m) | Average<br>(dBuV/m) |  |
| Above 1000 | 74               | 54                  |  |

#### Note:

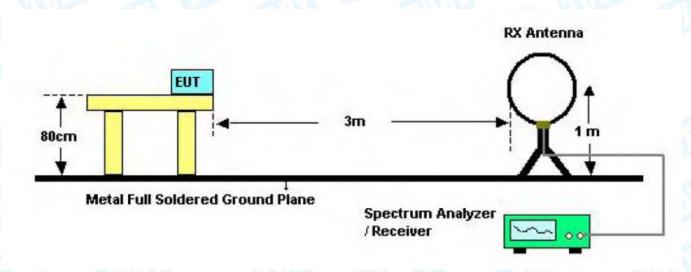
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

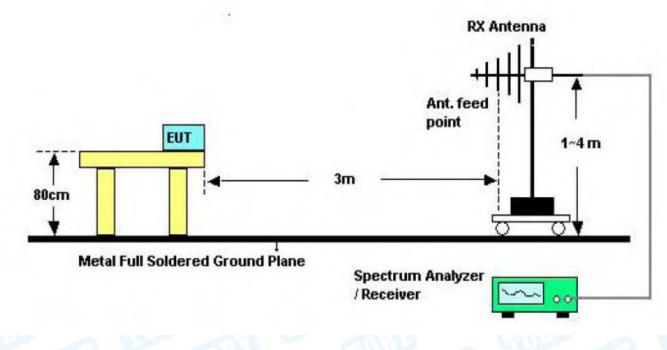


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5.2 Test Setup

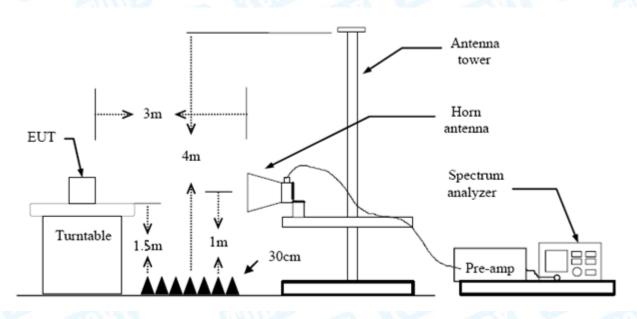


Below 30MHz Test Setup



Below 1000MHz Test Setup





Above 1GHz Test Setup

#### 5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



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#### 5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Please refer to the Attachment B.

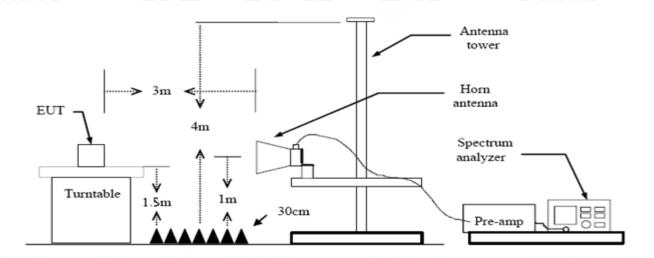


### 6. Restricted Bands Requirement

- 6.1 Test Standard and Limit
  - 6.1.1 Test Standard
    - FCC Part 15.247(d) FCC Part 15.205
  - 6.1.2 Test Limit

| Restricted Frequency | Distance Meters(at 3m) |                     |  |  |
|----------------------|------------------------|---------------------|--|--|
| Band<br>(MHz)        | Peak<br>(dBuV/m)       | Average<br>(dBuV/m) |  |  |
| 2310 ~2390           | 74                     | 54                  |  |  |
| 2483.5 ~2500         | 74                     | 54                  |  |  |

#### 6.2 Test Setup



#### 6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector



mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values. Please refer to the Attachment C.

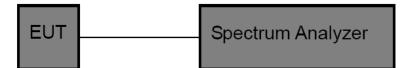


### 7. Bandwidth Test

- 7.1 Test Standard and Limit
  - 7.1.1 Test Standard
    - FCC Part 15.247 (a)(2)
  - 7.1.2 Test Limit

| FCC       | FCC Part 15 Subpart C(15.247)/RSS-247 |                      |  |  |  |  |
|-----------|---------------------------------------|----------------------|--|--|--|--|
| Test Item | Limit                                 | Frequency Range(MHz) |  |  |  |  |
| Bandwidth | >=500 KHz<br>(6dB bandwidth)          | 2400~2483.5          |  |  |  |  |

7.2 Test Setup



#### 7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

#### 7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

7.5 Test Data

Please refer to the Attachment D.

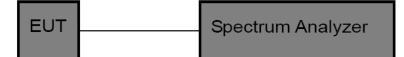


### 8. Peak Output Power Test

- 8.1 Test Standard and Limit
  - 8.1.1 Test Standard
    - FCC Part 15.247 (b)(3)
  - 8.1.2 Test Limit

| FCC Part 15 Subpart C(15.247)/RSS-247 |                  |             |  |  |  |  |
|---------------------------------------|------------------|-------------|--|--|--|--|
| Test Item Limit Frequency Range(MHz   |                  |             |  |  |  |  |
| Peak Output Power                     | 1 Watt or 30 dBm | 2400~2483.5 |  |  |  |  |

#### 8.2 Test Setup



#### 8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v05.

- (1) Set the RBW≥DTS Bandwidth
- (2) Set VBW≥3\*RBW
- (3) Set Span≥3\*RBW
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

#### 8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

#### 8.5 Test Data

Please refer to the Attachment E.

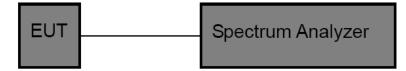


### 9. Power Spectral Density Test

- 9.1 Test Standard and Limit
  - 9.1.1 Test Standard
    - FCC Part 15.247 (e)
  - 9.1.2 Test Limit

| FCC Part 15 Subpart C(15.247)        |                    |             |  |  |  |  |
|--------------------------------------|--------------------|-------------|--|--|--|--|
| Test Item Limit Frequency Range(MHz) |                    |             |  |  |  |  |
| Power Spectral Density               | 8dBm(in any 3 kHz) | 2400~2483.5 |  |  |  |  |

#### 9.2 Test Setup



#### 9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequency.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz
- (5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

#### 9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

#### 9.5 Test Data

Please refer to the Attachment F.



### 10. Antenna Requirement

#### 10.1 Standard Requirement

#### 10.1.1 Standard

FCC Part 15.203

#### 10.1.2 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.

#### 10.2 Antenna Connected Construction

The gains of the antenna used for transmitting is 3.02dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

#### 10.3 Result

The EUT antenna is a FPC Antenna. It complies with the standard requirement.

| Antenna Type |                                   |  |  |
|--------------|-----------------------------------|--|--|
|              | Permanent attached antenna        |  |  |
| a US         | Unique connector antenna          |  |  |
|              | Professional installation antenna |  |  |

### **Attachment A-- Conducted Emission Test Data**

TOBY

| Tempera   | ture: | <b>24</b> ℃ |              |   | Relative Hu   | midity:    | 55%    | - MA     |
|-----------|-------|-------------|--------------|---|---------------|------------|--------|----------|
| Test Volt | age:  | AC 1        | 20V 60Hz     |   | 21 6          | 6          | and    |          |
| Terminal  | :     | Line        | 2            | 010   |               | <u>a</u> 1 |        | A DAY    |
| Test Mod  | le:   | Mode        | ə 1          |   |               |            | ~      | BAR      |
| Remark:   |       | Only        | worse case   | e is reported   |               | -          | 643    |          |
| 90.0 dBuV |       |             |              | Enter and the second |               |            |        |          |
| -10       |       | 0.9         | 5<br>Reading | (MHz)   | 5<br>Measure- |            |        | 30.000   |
| No. Mk    | . Fr  | eq.         | Level        | Factor  | ment          | Limit      | Over   |          |
|           | M     | Ηz          | dBuV         | dB  | dBuV          | dBuV       | dB     | Detector |
| 1         | 0.17  | 00          | 24.13        | 9.58  | 33.71         | 64.96      | -31.25 | QP       |
| 2         | 0.17  | 00          | 11.34        | 9.58  | 20.92         | 54.96      | -34.04 | AVG      |
| 3         | 0.27  | 40          | 23.24        | 9.59  | 32.83         | 60.99      | -28.16 | QP       |
| 4         | 0.27  | 40          | 11.97        | 9.59  | 21.56         | 50.99      | -29.43 | AVG      |
| 5         | 0.41  | 40          | 32.07        | 9.60  | 41.67         | 57.57      | -15.90 | QP       |
| 6 *       | 0.41  | 40          | 22.89        | 9.60  | 32.49         | 47.57      | -15.08 | AVG      |
| 7         | 0.83  | 340         | 27.88        | 9.61  | 37.49         | 56.00      | -18.51 | QP       |
| 8         | 0.83  | 340         | 15.01        | 9.61  | 24.62         | 46.00      | -21.38 | AVG      |
| 9         | 1.08  | 320         | 20.07        | 9.60  | 29.67         | 56.00      | -26.33 | QP       |
| 10        | 1.08  | 320         | 12.28        | 9.60  | 21.88         | 46.00      | -24.12 | AVG      |
| 11        | 13.89 | 940         | 19.11        | 10.38   | 29.49         | 60.00      | -30.51 | QP       |
|           |       |             |              |   |               |            |        |          |



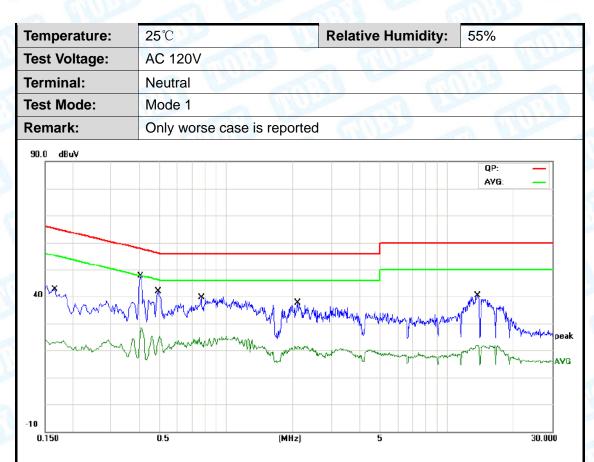
| Temperatu  | Jre: 2          | 2 <b>5</b> ℃                          |                                    | Relative H                     | lumidity:             | 55%          | ant's       |  |  |
|------------|-----------------|---------------------------------------|------------------------------------|--------------------------------|-----------------------|--------------|-------------|--|--|
| Fest Volta | oltage: AC 120V |                                       |                                    |                                |                       |              |             |  |  |
| Terminal:  | N               | Neutral                               |                                    |                                |                       |              |             |  |  |
| Fest Mode  | ≱: N            | Mode 1                                |                                    |                                |                       |              |             |  |  |
| Remark:    | C               | Only worse cas                        | e is reported                      | (()) t                         | 2                     |              | 10          |  |  |
| 90.0 dBuV  |                 | · · · · · · · · · · · · · · · · · · · |                                    |                                | · · · · · ·           |              |             |  |  |
|            |                 |                                       |                                    |                                |                       | QP:<br>AVG:  | _           |  |  |
|            |                 |                                       |                                    |                                |                       |              |             |  |  |
|            |                 |                                       |                                    |                                |                       |              |             |  |  |
|            |                 |                                       |                                    |                                |                       |              |             |  |  |
| X X        | Mu              |                                       |                                    |                                |                       |              |             |  |  |
| 40 WWWW    | month           | monoral mander                        | X.                                 |                                |                       | A well for   |             |  |  |
|            | M               | h. m. Mymman                          | Philipping the month of the second | where and have the way the way | Any work works served | Wanter and P | Waytowaw pe |  |  |
|            | V V V           |                                       | James and the                      |                                | maria                 | mun magain   | marmal AV   |  |  |
|            |                 |                                       |                                    |                                |                       |              |             |  |  |
|            |                 |                                       |                                    |                                |                       |              |             |  |  |
| 0<br>0.150 |                 | 0.5                                   | (MHz)                              | 5                              |                       |              | 30.000      |  |  |
| 0.100      |                 | Reading                               | Correct                            | Measure-                       |                       |              |             |  |  |
| No. Mk.    | Freq.           |                                       | Factor                             | ment                           | Limit                 | Over         |             |  |  |
|            | MHz             | dBuV                                  | dB                                 | dBuV                           | dBuV                  | dB           | Detector    |  |  |
| 1          | 0.1582          | 2 29.99                               | 9.64                               | 39.63                          | 65.55                 | -25.92       | QP          |  |  |
| 2          | 0.1582          | 2 14.62                               | 9.64                               | 24.26                          | 55.55                 | -31.29       | AVG         |  |  |
| 3          | 0.2340          | ) 25.31                               | 9.62                               | 34.93                          | 62.30                 | -27.37       | QP          |  |  |
| 4          | 0.2340          | ) 12.90                               | 9.62                               | 22.52                          | 52.30                 | -29.78       | AVG         |  |  |
| 5 *        | 0.4260          |                                       | 9.58                               | 42.42                          |                       | -14.91       | QP          |  |  |
| 6          | 0.4260          |                                       | 9.58                               | 29.60                          |                       | -17.73       | AVG         |  |  |
| 7          | 0.8220          |                                       | 9.59                               | 34.70                          |                       | -21.30       | QP          |  |  |
|            |                 |                                       |                                    |                                |                       | -18.15       |             |  |  |
| 8          | 0.8220          |                                       | 9.59                               | 27.85                          |                       |              | AVG         |  |  |
| 9          | 1.1980          |                                       | 9.59                               | 29.52                          |                       | -26.48       | QP          |  |  |
| 10         | 1.1980          | ) 14.73                               | 9.59                               | 24.32                          | 46.00                 | -21.68       | AVG         |  |  |
| 10         | 14.0180         | ) 16.89                               | 10.54                              | 27.43                          | 60.00                 | -32.57       | QP          |  |  |
| 10         | 14.0100         |                                       |                                    |                                |                       |              |             |  |  |



### Material difference sample

| Temperature  | : 24°C  |  | 288  | Relative Hum   | idity:  | 55%  | ALC:   |
|--|---|--|--|--|---|--|--|
| Test Voltage:  |   | 20V 60Hz   |  |  |   |  |  |
| Terminal:  | Line  | 3  | 110  |  |   |  | 130  |
| Test Mode:   | Mode  | e 1  |  | 600  | 0   | ~  | TUP  |
| Remark:  | Only  | worse case   | is reported  | ł  | -   | AL.  |  |
| 90.0 dBuV  | · · · ·   |  |  | 1 1 1  |   |  |  |
| 40 MmM   | mm  | My Mining  | hunn Man M   | Emphantin and a second se | an mana   |  | i:   |
| -10  | 0.5   | j  | (MHz)  | 5  |   |  | 30.000   |
|  | _   | Reading  | Correct  |  | 1.1   | 0  |  |
| No. Mk.  | Freq.   | Level  | Factor   | ment   | Limit   | Over   |  |
|  | MHz   | Level<br>dBuV  | Factor<br>dB   | ment<br>dBuV   | dBuV  | dB   | Detector   |
|  |   | Level  | Factor   | ment   | dBuV  |  | Detector<br>QP   |
| 1 * (  | MHz   | Level<br>dBuV  | Factor<br>dB   | ment<br>dBuV   | dBuV<br>57.65   | dB   |  |
| 1 * (  | MHz<br>0.4100   | Level<br>dBuV<br>33.42   | Factor<br>dB<br>9.77   | ment<br>dBuV<br>43.19  | dBuV<br>57.65<br>47.65  | dB<br>-14.46   | QP   |
| 1 * (<br>2 (<br>3 (  | MHz<br>0.4100<br>0.4100   | Level<br>dBuV<br>33.42<br>18.01  | Factor<br>dB<br>9.77<br>9.77   | ment<br>dBuV<br>43.19<br>27.78   | dBuV<br>57.65<br>47.65<br>56.03   | dB<br>-14.46<br>-19.87   | QP<br>AVG  |
| 1 * (<br>2 (<br>3 (<br>4 (                                   | MHz<br>0.4100<br>0.4100<br>0.4980   | Level<br>dBuV<br>33.42<br>18.01<br>26.79   | Factor<br>dB<br>9.77<br>9.77<br>9.79   | ment<br>dBuV<br>43.19<br>27.78<br>36.58  | dBuV<br>57.65<br>47.65<br>56.03<br>46.03  | dB<br>-14.46<br>-19.87<br>-19.45   | QP<br>AVG<br>QP  |
| 1 * (<br>2 (<br>3 (<br>4 (<br>5 (                            | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980   | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13  | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.79                                 | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92   | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00                                     | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11   | QP<br>AVG<br>QP<br>AVG<br>QP                           |
| 1 * (<br>2 (<br>3 (<br>4 (<br>5 (<br>6 (                     | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980<br>0.4980<br>0.8980   | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13<br>22.63                                     | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.79<br>9.84                         | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92<br>32.47  | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00<br>46.00                            | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11<br>-23.53   | QP<br>AVG<br>QP<br>AVG                                 |
| 1 * (<br>2 (<br>3 (<br>4 (<br>5 (<br>6 (<br>7 )              | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980<br>0.4980<br>0.8980<br>0.8980<br>1.1300                     | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13<br>22.63<br>12.03<br>24.33                   | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.84<br>9.84<br>9.88                 | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92<br>32.47<br>21.87<br>34.21  | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00<br>46.00<br>56.00                   | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11<br>-23.53<br>-24.13                               | QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG<br>QP              |
| 1 * (<br>2 (<br>3 (<br>4 (<br>5 (<br>6 (<br>7 )<br>8 )       | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980<br>0.8980<br>0.8980<br>0.8980<br>1.1300<br>1.1300           | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13<br>22.63<br>12.03<br>24.33<br>14.56          | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.84<br>9.84<br>9.88<br>9.88         | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92<br>32.47<br>21.87<br>34.21<br>24.44   | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00<br>46.00<br>56.00<br>46.00          | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11<br>-23.53<br>-24.13<br>-21.79<br>-21.56           | QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG       |
| 1 * 0   2 0   3 0   4 0   5 0   6 0   7 *   8 *   9 2        | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980<br>0.8980<br>0.8980<br>0.8980<br>1.1300<br>1.1300<br>2.3179 | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13<br>22.63<br>12.03<br>24.33<br>14.56<br>18.58 | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.84<br>9.84<br>9.88<br>9.88<br>9.88 | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92<br>32.47<br>21.87<br>34.21<br>24.44<br>28.44  | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00<br>46.00<br>56.00<br>46.00          | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11<br>-23.53<br>-24.13<br>-21.79<br>-21.56<br>-27.56 | QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG<br>QP |
| 1 * 0   2 0   3 0   4 0   5 0   6 0   7 *   8 *   9 2   10 2 | MHz<br>0.4100<br>0.4100<br>0.4980<br>0.4980<br>0.8980<br>0.8980<br>0.8980<br>1.1300<br>1.1300           | Level<br>dBuV<br>33.42<br>18.01<br>26.79<br>15.13<br>22.63<br>12.03<br>24.33<br>14.56          | Factor<br>dB<br>9.77<br>9.77<br>9.79<br>9.79<br>9.84<br>9.84<br>9.88<br>9.88         | ment<br>dBuV<br>43.19<br>27.78<br>36.58<br>24.92<br>32.47<br>21.87<br>34.21<br>24.44   | dBuV<br>57.65<br>47.65<br>56.03<br>46.03<br>56.00<br>46.00<br>56.00<br>46.00<br>56.00 | dB<br>-14.46<br>-19.87<br>-19.45<br>-21.11<br>-23.53<br>-24.13<br>-21.79<br>-21.56           | QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG<br>QP<br>AVG       |





| No. | Mk. | Freq.   | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit | Over   |          |
|-----|-----|---------|------------------|-------------------|------------------|-------|--------|----------|
|     |     | MHz     | dBuV             | dB                | dBuV             | dBuV  | dB     | Detector |
| 1   |     | 0.1660  | 25.45            | 9.68              | 35.13            | 65.15 | -30.02 | QP       |
| 2   |     | 0.1660  | 11.84            | 9.68              | 21.52            | 55.15 | -33.63 | AVG      |
| 3   | *   | 0.4100  | 33.52            | 9.72              | 43.24            | 57.65 | -14.41 | QP       |
| 4   |     | 0.4100  | 15.22            | 9.72              | 24.94            | 47.65 | -22.71 | AVG      |
| 5   |     | 0.4900  | 25.27            | 9.72              | 34.99            | 56.17 | -21.18 | QP       |
| 6   |     | 0.4900  | 13.55            | 9.72              | 23.27            | 46.17 | -22.90 | AVG      |
| 7   |     | 0.7700  | 24.20            | 9.73              | 33.93            | 56.00 | -22.07 | QP       |
| 8   |     | 0.7700  | 12.68            | 9.73              | 22.41            | 46.00 | -23.59 | AVG      |
| 9   |     | 2.1060  | 21.08            | 9.80              | 30.88            | 56.00 | -25.12 | QP       |
| 10  |     | 2.1060  | 11.39            | 9.80              | 21.19            | 46.00 | -24.81 | AVG      |
| 11  |     | 13.8060 | 22.59            | 9.94              | 32.53            | 60.00 | -27.47 | QP       |
| 12  |     | 13.8060 | 10.81            | 9.94              | 20.75            | 50.00 | -29.25 | AVG      |
|     |     |         |                  |                   |                  |       |        |          |



### **Attachment B-- Radiated Emission Test Data**

#### 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB Below the permissible value has no need to be reported.

#### 30MHz~1GHz

| Temperature:  | <b>25℃</b> | arup               | <b>Relative Humi</b> | dity:    | 55%      | ,          |      |
|---------------|------------|--------------------|----------------------|----------|----------|------------|------|
| Fest Voltage: | DC 3.7V    | 21                 | 6032                 |          | 19       | (U)        |      |
| Ant. Pol.     | Horizontal |                    |                      | <u> </u> |          |            | 5    |
| fest Mode:    | Mode 2     | GUD2               |                      |          | 1        |            |      |
| Remark:       | Only worse | e case is reported |                      | -        | U III    | 1          |      |
| 80.0 dBuV/m   |            | · · · ·            |                      |          |          |            |      |
|               |            |                    |                      |          |          |            |      |
|               |            |                    |                      |          |          |            |      |
|               |            |                    |                      | (RF)FCC  | 15C 3M R | adiation   |      |
|               |            |                    |                      |          | M        | argin -6 o | ab F |
|               |            |                    |                      |          |          |            |      |
| 30            | ſ          |                    |                      |          |          |            | c    |
| 30            | 3          |                    | 4                    | 5<br>X   |          | 1          | , ž  |
|               | 2          |                    | MMM                  | malin    | rund     | M.M.       |      |
| 1             |            | 1 I.               | 3.4 p/               |          |          |            |      |
| MM 1          | Ť          | Jan man mark mark  | mann                 |          |          |            |      |
|               |            | monorman           | Managara             |          |          |            |      |
|               |            | - man man          |                      |          |          |            |      |
|               |            | hummonoume         |                      |          |          |            |      |

| No. | Mk. | Freq.    | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |
|-----|-----|----------|------------------|-------------------|------------------|--------|--------|----------|
|     |     | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |
| 1   |     | 46.9948  | 36.00            | -22.24            | 13.76            | 40.00  | -26.24 | QP       |
| 2   |     | 67.2022  | 37.11            | -23.74            | 13.37            | 40.00  | -26.63 | QP       |
| 3   |     | 87.7248  | 41.64            | -22.10            | 19.54            | 40.00  | -20.46 | QP       |
| 4   |     | 289.0021 | 40.67            | -16.42            | 24.25            | 46.00  | -21.75 | QP       |
| 5   |     | 410.3825 | 37.21            | -12.21            | 25.00            | 46.00  | -21.00 | QP       |
| 6   | *   | 887.6099 | 30.34            | -4.08             | 26.26            | 46.00  | -19.74 | QP       |

\*:Maximum data x:Over limit !:over margin



| Temperature:     | <b>25℃</b>          |                  | Relative Humic | lity: 58       | 5%              |
|------------------|---------------------|------------------|----------------|----------------|-----------------|
| Test Voltage:    | DC 3.7V             |                  | E TU           |                |                 |
| Ant. Pol.        | Vertical            | 1                |                | (Ind)          | 30              |
| Test Mode:       | Mode 2              |                  |                |                |                 |
| Remark:          | Only wors           | e case is report | ed             |                | 1 Due           |
| 80.0 dBuV/m      |                     |                  |                |                |                 |
|                  |                     |                  |                |                |                 |
|                  |                     |                  |                |                |                 |
|                  |                     |                  |                | (RF)FCC 150    | C 3M Radiation  |
|                  |                     |                  |                |                | Margin -6 dB    |
|                  |                     |                  |                |                |                 |
|                  |                     |                  |                |                |                 |
| 30               |                     |                  |                |                | 6               |
|                  |                     | 2                | 3<br>X 4       | . the head had | 5 Martin Martin |
| mm /             | hand and the second |                  | many mark me   | mound          |                 |
|                  | Column 1            | markarkarkark    |                |                |                 |
|                  |                     |                  |                |                |                 |
|                  |                     |                  |                |                |                 |
| -20 30.000 40 50 | 0 60 70 80          | (MI              | Iz) 300        | 400 500        | 600 700 1000.00 |
|                  |                     | (***             | -, 300         | 405 500        | 000 100 1000.00 |
|                  |                     | ading Corre      | ect Measure-   |                |                 |
| No. Mk. F        | req. L              | evel Fact        | or ment        | Limit          | Over            |
| N                | MHz (               | dBuV dB/m        | dBuV/m         | dBuV/m         | dB Detecto      |
|                  |                     | dD/m             |                |                |                 |

|   |   | MHz      | dBuV  | dB/m   | dBuV/m | dBuV/m | dB     | Detector |
|---|---|----------|-------|--------|--------|--------|--------|----------|
| 1 | * | 47.9940  | 45.92 | -22.57 | 23.35  | 40.00  | -16.65 | QP       |
| 2 |   | 85.8984  | 40.05 | -22.21 | 17.84  | 40.00  | -22.16 | QP       |
| 3 |   | 181.9202 | 36.70 | -20.10 | 16.60  | 43.50  | -26.90 | QP       |
| 4 |   | 284.9767 | 30.85 | -16.49 | 14.36  | 46.00  | -31.64 | QP       |
| 5 |   | 539.4775 | 28.66 | -9.43  | 19.23  | 46.00  | -26.77 | QP       |
| 6 |   | 724.2611 | 29.68 | -6.70  | 22.98  | 46.00  | -23.02 | QP       |

\*:Maximum data x:Over limit !:over margin



#### Material difference sample

#### 30MHz~1GHz

| Ten       | nperatu  | re:               | 26           | <b>6°</b> ℃    |      |                   | 2           | 60                | Relative H     | lumidi | ty:            | 5      | 5%           |                   | _        |        |
|-----------|----------|-------------------|--------------|----------------|------|-------------------|-------------|-------------------|----------------|--------|----------------|--------|--------------|-------------------|----------|--------|
| Tes       | t Voltag | je:               | D            | C 3.           | .7V  |                   |             |                   |                |        |                |        | 1            | 1                 | 199      |        |
| Ant       | t. Pol.  |                   | Н            | oriz           | onta | al                |             |                   |                |        | 2              |        |              |                   |          | 2      |
| Tes       | t Mode:  |                   | М            | lode           | 2    |                   |             | 199               |                | 5      |                |        | 2            |                   | 2        |        |
| Rer       | mark:    |                   | 0            | nly            | wor  | se                | case i      | is reported       |                |        |                |        | a            |                   | 3        |        |
| 80.0      | 0 dBuV/m | -                 |              | -              |      |                   |             |                   |                | -      | -              | _      |              | _                 | -<br>-   |        |
| 30        | 1        |                   |              |                | 2    | 3                 |             | mmm               | 4              |        | 6<br>6         |        |              | liation<br>gin -6 | L   d    |        |
| -20<br>30 | 0.000 40 | <u> </u>          | 06           | 60 7           | 70 8 | 0                 |             | (MHz)             |                | 300    | 400            | 500    | 600          | 700               | 1000.0   |        |
| JU        | 1.000 40 | י (<br>           | J 0          | , U,           |      |                   |             |                   |                |        | 400            | 000    | 600          | 700               | 1000.0   | .00    |
| N         | lo. Mk.  | . F               | Freq         | <b>]</b> .     |      | lea<br>Lev        | ding<br>vel | Correct<br>Factor |                |        | imit           |        | Ove          | e                 |          |        |
|           |          |                   | MHz          |                |      | dB                | uV          | dB/m              | dBuV/m         | ı di   | BuV/r          | m      | dB           |                   | Detec    | tor    |
|           |          |                   |              |                |      |                   | 77          | 44.04             | 40.40          |        | 0.00           | )      | -20.         | 87                | QF       | )      |
| 1         |          | 32                | .179         | )4             |      | 33.               | . ( (       | -14.64            | 19.13          | 4      | 0.00           |        |              |                   |          |        |
| 1<br>2    |          |                   | .179<br>.321 |                |      | 33.<br>37.        |             | -14.64<br>-22.79  | 19.13          |        | 10.00          | )      | -25.         | 37                | QF       | )      |
|           |          | 77                |              | 12             | 1    |                   | .42         |                   |                | 4      |                |        | -25.<br>-20. |                   | QF<br>QF |        |
| 2         |          | 77<br>87          | .321         | 12<br>18       |      | 37.<br>41.        | .42         | -22.79            | 14.63          | 4      | 10.00          | 0      |              | 46                |          | þ      |
| 2         |          | 77.<br>87.<br>188 | .321<br>.724 | 12<br>18<br>24 |      | 37.<br>41.<br>41. | .42<br>.64  | -22.79<br>-22.10  | 14.63<br>19.54 | 4      | 10.00<br>10.00 | D<br>D | -20.         | 46<br>32          | QF       | )<br>) |

\*:Maximum data x:Over limit !:over margin



| Temperatu   | re: 26℃  |                  | Re                | lative Humi      | idity:  | 55%                          |         |
|-------------|----------|------------------|-------------------|------------------|---------|------------------------------|---------|
| Test Voltag | e: DC 3  | .7V              | 10                | 10               | 200     |                              | 199     |
| Ant. Pol.   | Vertio   | cal              | -                 |                  | (mal)   | 162                          | -       |
| Test Mode:  | Mode     | 2                | A RUE             |                  |         | A                            |         |
| Remark:     | Only     | worse case i     | s reported        | (U)              | 2       |                              |         |
| 80.0 dBuV/m |          |                  |                   |                  |         |                              |         |
| 30          | 2        | 3<br>3<br>M      | 4 × ×             | 6<br>6<br>       | (RFJFCC | 15C 3M Radiatio<br>Margin -t |         |
| 30.000 40   | 50 60    | 70 80            | (MHz)             | 300              | 400     | 500 600 700                  | 1000.00 |
| No. Mk.     | Freq.    | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit   | Over                         |         |
|             | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m  | dB                           | Detecto |
| 1           | 35.2511  | 36.98            | -16.87            | 20.11            | 40.00   | -19.89                       | QP      |
| 2 *         | 47.9939  | 44.92            | -22.57            | 22.35            | 40.00   | -17.65                       | QP      |
| 3           | 85.2980  | 42.79            | -22.24            | 20.55            | 40.00   | -19.45                       | QP      |
| 4           | 130.8369 | 39.08            | -22.44            | 16.64            | 43.50   | -26.86                       | QP      |
|             | 100 5000 | 44.04            | 20.54             | 24.40            | 43.50   | -22.40                       |         |
| 5           | 169.5989 | 41.64            | -20.54            | 21.10            | 45.50   | -22.40                       | QP      |

\*:Maximum data x:Over limit !:over margin

# TOBY

#### Above 1GHz

| em                | perature:     | <b>25</b> ℃ |               |              | Relative Hu  | imidity:    | 55%             |
|-------------------|---------------|-------------|---------------|--------------|--------------|-------------|-----------------|
| <b>Fest</b>       | Voltage:      | DC 3.7      | V             |              | 2 19         |             |                 |
| Ant.              | Pol.          | Horizor     | ntal          | (III)        |              | 199         |                 |
| <b>Fest</b>       | Mode:         | BLE M       | ode TX 240    | 2 MHz        | 2003         | 5           | 6115            |
| Rem               | ark:          | No rep      | ort for the e | mission w    | hich more th | an 10 dB    | below the       |
| prescribed limit. |               |             |               |              |              | 20          |                 |
| 100.0             | dBuV/m        |             |               |              |              |             |                 |
|                   |               |             |               |              |              |             |                 |
|                   |               |             |               |              |              |             |                 |
| -                 |               |             |               |              |              | (RF) FCC    | PART 15C (PEAK) |
|                   |               |             |               |              |              |             |                 |
|                   | 2<br>X        |             |               |              |              |             |                 |
|                   | X             |             |               |              |              | (RF) FCC    | PART 15C (AVG)  |
| 50 _              | 1<br>X        |             |               |              |              |             |                 |
| -                 | ^             |             |               |              |              |             |                 |
|                   |               |             |               |              |              |             |                 |
|                   |               |             |               |              |              |             |                 |
|                   |               |             |               |              |              |             |                 |
| -                 |               |             |               |              |              |             |                 |
| 0.0               | 0.000 3550.00 | 6100.00 8   | 650.00 11200  | .00 13750.00 | 16300.00 18  | 350.00 2140 | 0.00 26500.00   |

| No. | Mk | . Freq.  |       | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |
|-----|----|----------|-------|-------------------|------------------|--------|--------|----------|
|     |    | MHz      | dBuV  | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |
| 1   | *  | 4804.312 | 28.40 | 14.43             | 42.83            | 54.00  | -11.17 | AVG      |
| 2   |    | 4804.864 | 42.78 | 14.44             | 57.22            | 74.00  | -16.78 | peak     |



| ſen        | perature:  |        | <b>25</b> ℃  |            |          | Relative | Humidity: | 55%               |  |
|------------|------------|--------|--|------------|----------|----------|-----------|-------------------|--|
| <b>Tes</b> | t Voltage: |        | DC 3.  | 7V         | 132      | 5        | RUPP -    |                   |  |
| ۱nt        | . Pol.     |        | Vertica  | al         | -        | 118      | 61        | 132               |  |
| es         | t Mode:    |        | BLE N  | lode TX 2  | 2402 MHz | 2        |           |                   |  |
| Ren        | nark:      |        | No report for the emission which more than 10 dB below the |            |          |          |           |                   |  |
|            |            |        | presci   | ibed limit |          | a v      |           | 13                |  |
| 00.0       | dBu¥/m     |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          | (RF) FC   | C PART 15C (PEAK) |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            | 1<br>X |  |            |          |          | (00) 0    |                   |  |
| 50         |            | ^      |  |            |          |          | (RF) F    | CC PART 15C (AVG) |  |
| 50         |            | 2<br>X |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
|            |            |        |  |            |          |          |           |                   |  |
| 0.0        |            |        |  |            |          |          |           |                   |  |

| No. | Mk. | Freq.    | Reading<br>Level |       | Measure-<br>ment | Limit  | Over   |          |
|-----|-----|----------|------------------|-------|------------------|--------|--------|----------|
|     |     | MHz      | dBuV             | dB/m  | dBuV/m           | dBuV/m | dB     | Detector |
| 1   |     | 4804.006 | 42.65            | 14.43 | 57.08            | 74.00  | -16.92 | peak     |
| 2   | *   | 4804.330 | 28.40            | 14.43 | 42.83            | 54.00  | -11.17 | AVG      |



| emperat     | ure:   | <b>25</b> ℃  |      | Rela | Relative Humidity: 55% |                  |  |  |  |
|-------------|--------|--|------|------|------------------------|------------------|--|--|--|
| est Volta   | ige:   | DC 3.7   | V    |      | all market             |                  |  |  |  |
| nt. Pol.    |        | Horizor  | ntal | 1200 |                        | 152              |  |  |  |
| est Mod     | 10     |  |      |      |                        |                  |  |  |  |
| Remark:     |        | No report for the emission which more than 10 dB below the prescribed limit. |      |      |                        |                  |  |  |  |
| 100.0 dBuV/ | m      |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      | (RF) FCC               | PART 15C (PEAK)  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             | 1<br>X |  |      |      | (BE) EC                | C PART 15C (AVG) |  |  |  |
| 50          |        |  |      |      |                        |                  |  |  |  |
|             | 2<br>X |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
|             |        |  |      |      |                        |                  |  |  |  |
| 0.0         |        |  |      |      |                        |                  |  |  |  |

| No. | Mk. Freq. |          | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |
|-----|-----------|----------|------------------|-------------------|------------------|--------|--------|----------|
|     |           | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |
| 1   |           | 4884.198 | 43.43            | 14.92             | 58.35            | 74.00  | -15.65 | peak     |
| 2   | *         | 4884.924 | 28.68            | 14.93             | 43.61            | 54.00  | -10.39 | AVG      |



| Гem   | perature     | :      | <b>25</b> ℃  |            |             | Relative H | umidity:     | 55%             |  |  |
|-------|--------------|--------|--|------------|-------------|------------|--------------|-----------------|--|--|
| Test  | Voltage      |        | DC 3.7V  |            |             |            |              |                 |  |  |
| Ant.  | Pol.         |        | Vertical   | 1000       | -           | 20         | Gall         | 152             |  |  |
| Test  | Mode:        |        | BLE Mo   | de TX 24   | 42 MHz      | /          |              |                 |  |  |
| Rem   | nark:        |        | No report for the emission which more than 10 dB below the prescribed limit. |            |             |            |              |                 |  |  |
| 100.0 | dBuV/m       |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            | (RF) FCC     | PART 15C (PEAK) |  |  |
| -     |              |        |  |            |             |            |              |                 |  |  |
|       |              | 1<br>X |  |            |             |            | (RF) FC      | PART 15C (AVG)  |  |  |
| 50    |              | 2      |  |            |             |            |              |                 |  |  |
| -     |              | x      |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
|       |              |        |  |            |             |            |              |                 |  |  |
| 0.0   | 0.000 3550.0 | 0 6    | 100.00 865   | 50.00 1120 | 0.00 13750. |            | 3850.00 2140 | 0.00 26         |  |  |

| No | . Mk. | Freq.    | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |
|----|-------|----------|------------------|-------------------|------------------|--------|--------|----------|
|    |       | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |
| 1  |       | 4884.258 | 43.27            | 14.93             | 58.20            | 74.00  | -15.80 | peak     |
| 2  | *     | 4885.158 | 28.66            | 14.93             | 43.59            | 54.00  | -10.41 | AVG      |



| Tempera    | ture:  | <b>25</b> ℃  |               | Relative Hu | midity:  | 55%             |  |  |  |
|------------|--------|--|---------------|-------------|----------|-----------------|--|--|--|
| Test Volt  | age:   | DC 3.7V  |               |             |          |                 |  |  |  |
| Ant. Pol.  |        | Horizonta  | al            |             | Gal      | 133             |  |  |  |
| Test Mod   | le:    | BLE Mod  | le TX 2480 MI | Hz          |          |                 |  |  |  |
| Remark:    |        | No report for the emission which more than 10 dB below the prescribed limit. |               |             |          |                 |  |  |  |
| 100.0 dBu¥ | /m     |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            |        |  |               |             | (RF) FCC | PART 15C (PEAK) |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            | 1<br>X |  |               |             | (RF) FCC | PART 15C (AVG)  |  |  |  |
| 50         | 2      |  |               |             |          |                 |  |  |  |
|            | ×      |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
|            |        |  |               |             |          |                 |  |  |  |
| 0.0        |        |  |               |             |          |                 |  |  |  |

| No | o. Mk. Freq. |          | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |
|----|--------------|----------|------------------|-------------------|------------------|--------|--------|----------|
|    |              | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |
| 1  |              | 4960.690 | 42.80            | 15.40             | 58.20            | 74.00  | -15.80 | peak     |
| 2  | *            | 4961.002 | 28.66            | 15.40             | 44.06            | 54.00  | -9.94  | AVG      |



| Temperature:  | <b>25℃</b>                             | Relative Humidity:55%                   |  |  |  |  |  |  |  |
|---------------|--|---|--|--|--|--|--|--|--|
| Test Voltage: | DC 3.7V                                |   |  |  |  |  |  |  |  |
| Ant. Pol.     | Vertical                               | 603                                     |  |  |  |  |  |  |  |
| fest Mode:    | BLE Mode TX 2480                       | BLE Mode TX 2480 MHz                    |  |  |  |  |  |  |  |
| Remark:       | No report for the er prescribed limit. | mission which more than 10 dB below the |  |  |  |  |  |  |  |
| 00.0 dBu∀/m   |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |
|               |  | (RF) FCC PART 15C (PEAK)                |  |  |  |  |  |  |  |
| 1             |  |   |  |  |  |  |  |  |  |
| ×             |  | (RF) FCC PART 15C (AVG)                 |  |  |  |  |  |  |  |
| 50 2          |  |   |  |  |  |  |  |  |  |
| ×             |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |
|               |  |   |  |  |  |  |  |  |  |

| No. | Mk. | Freq.    | Reading<br>Level |       | Measure-<br>ment | Limit  | Over   |          |
|-----|-----|----------|------------------|-------|------------------|--------|--------|----------|
|     |     | MHz      | dBuV             | dB/m  | dBuV/m           | dBuV/m | dB     | Detector |
| 1   |     | 4959.268 | 43.54            | 15.39 | 58.93            | 74.00  | -15.07 | peak     |
| 2   | *   | 4961.224 | 28.65            | 15.40 | 44.05            | 54.00  | -9.95  | AVG      |



# **Attachment C-- Restricted Bands Requirement Test Data**

| Temperature:     | : <b>25</b> ℃     | R               | elative Humidity: | : 55%                   |
|------------------|-------------------|-----------------|-------------------|-------------------------|
| Test Voltage:    | DC 3.7V           |                 |                   |                         |
| Ant. Pol.        | Horizontal        | 51              | 6000              |                         |
| Test Mode:       | BLE Mode TX 24    | 402 MHz         |                   |                         |
| Remark:          | N/A               | MIDS            |                   | 9                       |
| 110.0 dBuV/m     |                   |                 |                   |                         |
|                  |                   |                 |                   | 4<br>×                  |
|                  |                   |                 |                   |                         |
|                  |                   |                 |                   |                         |
|                  |                   |                 | H)                | RF) FCC PART 15C (PEAK) |
|                  |                   |                 |                   |                         |
| 60               |                   |                 |                   | (RF) FCC PART 15C (AVG) |
|                  |                   |                 |                   | 1                       |
|                  |                   |                 |                   | ×                       |
|                  |                   |                 |                   | 2<br>X                  |
|                  |                   |                 |                   |                         |
| 10.0             |                   |                 |                   |                         |
| 2309.000 2319.00 | 0 2329.00 2339.00 | 2349.00 2359.00 | 2369.00 2379.00   | 2389.00 240             |
| l                |                   |                 |                   |                         |
|                  | Readin            | g Correct       | Measure-          |                         |
| No. Mk.          | Freq. Level       | Factor          | ment Lir          | mit Over                |
|                  | MHz dBuV          | dB/m            | dBuV/m dB         | BuV/m dB D              |
| 1 23             | 390.000 43.02     | 2.82            | 45.84 74          | 4.00 -28.16             |
| 2 23             | 390.000 31.31     | 2.82            | 34.13 54          | 4.00 -19.87             |
| 3 X 24           | 402.000 72.07     | 2.87            | 74.94 Fundan      | mental Frequency        |
|                  |                   |                 |                   |                         |



| Tem   | peratu    | re:   | <b>25°</b> ℃ |         |                   |           | Rel  | ative  | Hun  | nidity:         | 55%          |             |              |
|-------|-----------|-------|--------------|---------|-------------------|-----------|------|--------|------|-----------------|--------------|-------------|--------------|
| Test  | Voltag    | ge:   | DC 3         | .7V     | 10                | 30        |      |        | 40   | 100             |              | 160         |              |
| Ant.  | Pol.      |       | Vertic       | al      |                   |           | 2    |        | 100  | Ind             | 132          |             | -            |
| Test  | Mode      | :     | BLE          | Mode T  | <sup>-</sup> X 24 | 02 MHz    | 1    |        | ~    |                 |              | 3           |              |
| Rem   | ark:      |       | N/A          | -       |                   | $\sim$    |      | 1      |      | 2               |              |             |              |
| 100.0 | dBuV/m    |       |              |         |                   |           |      |        |      |                 |              |             | _            |
|       |           |       |              |         |                   |           |      |        |      |                 |              | 4<br>X      |              |
|       |           |       |              |         |                   |           |      |        |      |                 |              |             |              |
|       |           |       |              |         |                   |           |      |        |      | (RF) FCC        | PART 15C (P  | EAK         |              |
|       |           |       |              |         |                   |           |      |        |      |                 |              | Ň           |              |
|       |           |       |              |         |                   |           |      |        |      | (RF) FC         | C PART 15C ( | 4461        |              |
| 50    |           |       |              |         |                   |           |      |        |      |                 | 1<br>X       | $/ \langle$ |              |
|       |           |       |              |         |                   |           |      |        |      |                 |              | / \         | $\downarrow$ |
|       |           |       |              |         |                   |           |      |        |      |                 | 2<br>*       |             | 1            |
|       |           |       |              |         |                   |           |      |        |      |                 |              |             |              |
|       |           |       |              |         |                   |           |      |        |      |                 |              |             |              |
| 0.0   |           |       |              |         |                   |           |      |        |      |                 |              |             |              |
| 23    | 08.000 23 | 18.00 | 2328.00      | 2338.00 | ) 23              | 48.00 235 | 8.00 | 2368.0 | )0 2 | 378.00 2388     | .00          | 2408.0      | о мн         |
|       |           |       |              |         |                   |           |      |        |      |                 |              |             |              |
|       |           | -     |              | Rea     |                   | Corre     |      | Meas   |      | Limit           | Over         |             |              |
| N     | o. Mk.    |       | req.         | Lev     |                   | Facto     | or   | me     |      |                 |              |             |              |
|       |           | N     | 1Hz          | dBi     | uV                | dB/m      |      | dBu    | V/m  | dBuV/m          | dB           | Det         | tecto        |
| 1     |           | 2390  | 0.000        | 43.     | 52                | 2.82      |      | 46.    | 34   | 74.00           | -27.6        | 6 p         | eak          |
| 2     |           | 2390  | 0.000        | 31.     | 16                | 2.82      |      | 33.    | 98   | 54.00           | -20.0        | 2 A         | VG           |
| 3     | Х         | 2402  | 2.000        | 67.     | 55                | 2.87      |      | 70.    | 42   | –<br>Fundamenta | I Frequenc   | y A         | VG           |
| 4     | *         | 2400  | 2.200        | 90.     | 03                | 2.87      |      | 93.    | 80   | –<br>Fundamenta | l Frequenc   | v n         | eak          |



| Гетр         | eratu    | re:    | <b>25℃</b> | :02     |      |          |      | Rela | tive l | Humidit | y:   | 55%          |         |        |
|--------------|----------|--------|------------|---------|------|----------|------|------|--------|---------|------|--------------|---------|--------|
| Test \       | Voltag   | ge:    | DC :       | 3.7V    | n'i  |          |      | ~    | 24     | Job C   |      |              | AT A    |        |
| Ant. F       | Pol.     |        | Hori       | zontal  |      |          | 6    |      | 100    | 6       | 77   | 132          |         | ~      |
| Test I       | Node     | :      | BLE        | Mode T  | X 24 | 80 MHz   |      |      | -      |         |      | -            | 2       | 8      |
| Rema         | ark:     |        | N/A        | -       |      |          |      | 5    |        | P       | 1    | 2            | NAR.    |        |
| 110.0        | dBuV/n   | 1      |            |         |      |          |      |      |        |         |      |              |         | _      |
|              | ×        |        |            |         |      |          |      |      |        |         |      |              |         |        |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         | 1      |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
|              | 2        |        |            |         |      |          |      |      |        | (RF)    | FCC  | PART 15C (PI | EAK]    |        |
|              |          | 4      |            |         |      |          |      |      |        |         |      |              |         |        |
| 60           |          |        |            |         |      |          |      |      |        |         |      |              | wei     |        |
|              |          | 3<br>X |            |         |      |          |      |      |        |         | ·jru | : PART 15C ( | 4903    | -      |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
| F            | )        |        |            |         |      |          |      |      | _      |         |      |              |         | -      |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
| 10.0<br>2472 | 2.000 24 | 82.00  | 2492.00    | 2502.00 | 251  | 2.00 252 | 2.00 | 2532 | 2.00   | 2542.00 | 2552 | .00          | 2572.00 | _ <br> |
|              |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
|              |          |        |            | Readi   | na   | Correc   | •t   | Mea  | curo   |         |      |              |         |        |
| No.          | Mk.      | Fr     | eq.        | Leve    | -    | Facto    |      |      | ent    | Lim     | it   | Over         |         |        |
|              |          | M      | Ηz         | dBu\    | /    | dB/m     |      | dBu  | JV/m   | dBu\    | //m  | dB           | Dete    | ecto   |
| 1            | *        | 2479   | 600        | 102.5   | 56   | 3.38     |      | 10   | 5.94   | Fundame | ntal | Frequency    | pe      | ak     |
| 2            | Х        | 2480   |            | 74.8    |      | 3.38     |      |      | 3.23   | _       |      | Frequency    |         |        |
| 3            |          | 2483   |            | 48.0    |      | 3.41     |      |      | .43    | 54.     | 00   | -2.57        |         |        |
| 4            |          |        |            |         |      |          |      |      |        |         |      |              |         |        |
| 4            |          | 2483   | 000        | 62.4    |      | 3.41     |      | 65   | 5.82   | 74.     | UU   | -8.18        | 3 pe    | aĸ     |



|                    |          |           |                    |                      |                                |                        | _    |                       |                     |                               |                |                 |         | -           |
|--------------------|----------|-----------|--------------------|----------------------|--------------------------------|------------------------|------|-----------------------|---------------------|-------------------------------|----------------|-----------------|---------|-------------|
| ſemp               | peratu   | re:       | <b>25°</b> ℃       | 1010                 |                                | a                      | Re   | ative                 | e Hun               | nidity                        | :              | 55%             | -       | 2           |
| lest \             | Voltag   | ge:       | DC 3               | .7V                  |                                | 30                     |      |                       | 211                 |                               | 2              | ~               | A.R.    |             |
| Ant. I             | Pol.     |           | Vertic             | al                   | 100                            |                        |      |                       | V                   |                               | 1              | 152             |         | R.          |
| lest l             | Mode     | :         | BLE I              | Mode                 | TX 248                         | 30 MHz                 |      |                       |                     | 5                             | C)             | -               | 3       |             |
| Rema               | ark:     |           | N/A                |                      | 697                            | 5                      |      | 5                     | 00                  | 9                             | 1              |                 |         |             |
| 100.0              | dBu¥/m   |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         | _           |
|                    |          | x         |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          | 2         |                    |                      |                                |                        |      |                       |                     | (F                            | RF) FCC        | PART 15C (PI    | EAK)    |             |
|                    |          | Ň         |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          | / \ 3     |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
| 50                 |          | ×         |                    |                      |                                |                        |      |                       |                     |                               | (RF) FC        | C PART 15C      | AVG)    | -           |
|                    | /        | X         |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
| M                  | $\sim$   |           |                    |                      |                                |                        |      |                       |                     | _                             |                |                 |         |             |
|                    |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
| 0.0                |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
| 2469               | 9.000 24 | 79.00     | 2489.00            | 2499                 | .00 25                         | 09.00 251              | 9.00 | 2529                  | ).00                | 2539.00                       | 2549           | .00             | 2569.00 | M           |
|                    |          |           |                    |                      |                                |                        |      |                       |                     |                               |                |                 |         |             |
|                    |          |           |                    | Re                   | ading                          | ~                      | - 4  |                       |                     |                               |                |                 |         |             |
|                    |          |           |                    | T\C                  | auing                          | Corre                  |      | viea                  | sure-               |                               |                | -               |         |             |
| No.                | . Mk.    | F         | eq.                |                      | evel                           | Facto                  |      |                       | sure-<br>ent        |                               | nit            | Over            |         |             |
| No.                | . Mk.    |           | req.<br>Hz         | Le                   |                                |                        |      | me                    |                     | Lir                           | nit<br>u∨/m    | Over<br>dB      | Dete    | ecto        |
|                    | . Mk.    | М         |                    | Le                   | evel                           | Facto                  | or   | dBu                   | ent<br>uV/m         | Lir<br>dB                     | uV/m           |                 |         |             |
| 1                  |          | М         | Hz<br>.600         | Le<br>di<br>92       | evel<br><sup>BuV</sup>         | Facto<br>dB/m          | or   | dBu<br>95             | ent<br>iV/m<br>i.59 | Lir<br>dB<br>Fundan           | uV/m<br>nental | dB              | pe      | al          |
| No.<br>1<br>2<br>3 | *        | м<br>2479 | Hz<br>.600<br>.800 | Le<br>di<br>92<br>68 | evel<br><sup>BuV</sup><br>2.21 | Factor<br>dB/m<br>3.38 | or   | me<br>dBu<br>95<br>71 | ent<br>iV/m<br>i.59 | Lir<br>dB<br>Fundan<br>Fundan | uV/m<br>nental | dB<br>Frequency | pe<br>A | ecto<br>eal |



### (2) Conducted Test

| perature:  | <b>25</b> ℃  | 1.2.2   | Relative Humidity:                                   | 55%  |
|--|--|---|--|--|
| t Voltage:   | DC 3.7V  |   |  | an BL  |
| t Mode:  | BLE Mode TX  | 2402MHz / B   | LE Mode TX 2480M                                     | 1Hz  |
| nark:  | The EUT is pro   | gramed in co  | ntinuously transmit                                  | ting mode  |
| Keysight Spectrum  |  | SENSE:INT   | ALIGN AUTO   | 01:34:46 AM May 22, 2019   |
|  | 2.356000000 GHz  | ast 😱 Trig: Free Run  | Avg Type: Log-Pwr<br>Avg Hold:>100/100               | TRACE 1 2 3 4 5 6<br>TYPE MWWWWW<br>DET P NNNN   |
| Ret  | IFGain:<br>f Offset 3.61 dB<br>ef 23.61 dBm  | Low Atten: 30 dB  |  | /kr1 2.402 2 GHz   |
| 10 dB/div Re   | ef 23.61 dBm   |   |  | 3.079 dBm  |
| 3.61   |  |   |  | <b>\</b>   |
| -6.39<br>-16.4   |  |   |  | -17.01 dBm   |
| -26.4<br>-36.4   |  |   |  |  |
| -46.4  |  |   | <b>↓</b>   | 3  |
| -56.4  |  | anderdige and a single of the second free of the second second second second second second second second second |  | abilites (not equal to the second   |
| Start 2.30600<br>#Res BW 100   |  | #VBW 300 kHz  | Sween  | Stop 2.40600 GHz<br>9.600 ms (1001 pts)  |
|  | L X  | Y FUNCTION  | -  | NCTION VALUE   |
| 2 N 1 f<br>3 N 1 f   | 2.400 0 GHz<br>2.390 0 GHz   | 3.079 dBm<br>-52.360 dBm<br>-56.010 dBm   |  |  |
| 4 N 1 f<br>5 6   | 2.379 7 GHz  | -53.206 dBm   |  | E  |
| 8  |  |   |  |  |
| 9  |  |   |  |  |
| 9<br>10<br>11  |  |   |  |  |
| 10   |  | m   | STATUS   | *  |
|  |  | m<br>SENSE:INT  |  | 01:40:30 AM May 22, 2019   |
| 10<br>11<br>MSG<br>MSG<br>Keysight Spectrum<br>VX R R  | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: 1  | sense:inti<br>at  | ALIGN AUTO   | 01-40:30 AM May 22, 2019<br>01-40:30 AM May 22, 2019<br>TYPE M 444<br>DEP PINNINN  |
| 10<br>11<br>MSG<br>Keysight Spectrum<br>(XI R RF<br>Center Freq  | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: I<br>IFGain:   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 3 4 5 6<br>TYPE MWWWW<br>DET P NNNN<br>Akr1 2,480 0 GHz  |
| 10<br>11<br>MSG<br>Keysight Spectrum<br>(XI R RF<br>Center Freq  | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: 1  | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 3 4 5 6<br>TYPE MWWWW<br>DET PNNNN   |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: I<br>IFGain:   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 3 4 5 6<br>TYPE MWWWW<br>DET P NNNN<br>Akr1 2,480 0 GHz  |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: I<br>IFGain:   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 3 4 5 6<br>TYPE MWWWW<br>DET P NNNN<br>Akr1 2,480 0 GHz  |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75 Ω AC CORREC<br>2.526000000 GHz<br>PNO: I<br>IFGain:   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 2 3 4 5 6<br>TYPE M WWWWW<br>DET P NNNNN<br>Akr1 2.480 0 GHz<br>3.542 dBm  |
| 10<br>11<br>MSG<br>MSG<br>Center Freq<br>10 dB/div Re<br>10 dB/div Re<br>13 6<br>13 6<br>1 - 6.39<br>-16.4<br>-26.4<br>-46.4   | F 75.9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>f 23.61 dBm   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 2 3 4 5 6<br>TYPE M WWWWW<br>DET P NNNNN<br>Akr1 2.480 0 GHz<br>3.542 dBm  |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75.9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>f 23.61 dBm   | ast 😱 Trig: Free Run  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 2 2 3 4 5 6<br>TYPE M WWWWW<br>DET P NNNNN<br>Akr1 2.480 0 GHz<br>3.542 dBm  |
| 10<br>11<br>MSG  | F 75 9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>f 23.61 dB<br>f 33.61 d | ast<br>Low Trig: Free Run<br>Atten: 30 dB   | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May 22, 2019<br>TRACE 12 3 4 5 6<br>TYPE M WWWWW<br>DET P N N N N<br>Akr1 2:480 0 GHz<br>3.542 dBm<br>-16 55 dbm<br>-16 55 dbm<br>Stop 2:57600 GHz |
| 10<br>11<br>MSG<br>MSG<br>Center Freq<br>10 dB/div Re<br>10 dB/div Re<br>13 6<br>13 6<br>13 6<br>13 6<br>14<br>-56 4<br>-56 4<br>-56 4<br>-56 4<br>Start 2.47600<br>#Res MU 100<br>MRR MDD TRC SCI | F 75 9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>2.3.61 dBm<br>2.3.61 dBm<br>4.4<br>4.4<br>4.4<br>4.4<br>4.4<br>4.4<br>4.4<br>4.   | Trig: Free Run<br>Atten: 30 dB  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May22, 2019<br>TRACE 12 3 4 5 G<br>TYPE MANNAN<br>DET P NN NN NN<br>Akr1 2.480 0 GHz<br>3.542 dBm  |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75 9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>of 23.61 dBm<br>2.44<br>2.44<br>4.45<br>CHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz   | Trig: Free Run<br>Atten: 30 dB  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May22, 2019<br>TRACE 12 3 4 15 6<br>Type 14 23 4 15 6<br>Type 14 24 4 10 6<br>Akr1 2.480 0 GHz<br>3.542 dBm<br>                                    |
| 10<br>11<br>MSG  | F 75 9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>of 23.61 dBm<br>2.44<br>2.44<br>4.45<br>CHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz   | Trig: Free Run<br>Atten: 30 dB  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May22, 2019<br>TRACE 12 3 4 15 6<br>Type 14 23 4 15 6<br>Type 14 24 4 10 6<br>Akr1 2.480 0 GHz<br>3.542 dBm<br>                                    |
| 10<br>11<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG<br>MSG   | F 75 9. AC CORREC<br>2.526000000 GHz<br>PNO:<br>IFGain:<br>f Offset 3.61 dB<br>of 23.61 dBm<br>2.44<br>2.44<br>4.45<br>CHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz<br>2.480 0 GHz   | Trig: Free Run<br>Atten: 30 dB  | ALIGN AUTO<br>Avg Type: Log-Pwr<br>Avg Hold:>100/100 | 01:40:30 AM May22, 2019<br>TRACE 12 3 4 15 6<br>Type 14 23 4 15 6<br>Type 14 24 4 10 6<br>Akr1 2.480 0 GHz<br>3.542 dBm<br>                                    |



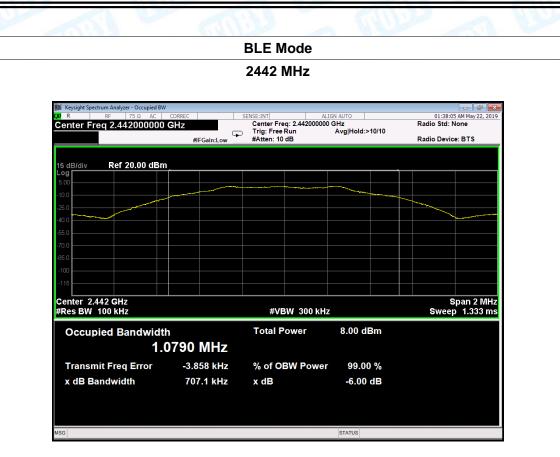
# Attachment D-- Bandwidth Test Data

| Temperature:      | <b>25</b> ℃ |               | Relative Humidity: | 55%    |  |
|-------------------|-------------|---------------|--------------------|--------|--|
| Test Voltage:     | DC 3        | 8.7V          |                    | mill - |  |
| Test Mode:        | BLE         | TX Mode       |                    |        |  |
| Channel frequency |             | 6dB Bandwidth | 99% Bandwidth      | Limit  |  |
| (MHz)             |             | (kHz)         | (kHz)              | (kHz)  |  |
| 2402              |             | 707.4         | 1079.8             |        |  |
| 2442              |             | 707.1         | 1079.0             | >=500  |  |
| 2480              |             | 705.7         | 1079.9             | -      |  |
|                   |             |               |                    |        |  |

### BLE Mode

| Keysight Spectrum Analyzer - Occupied BW<br>R RF 75 Ω AC | CORREC      | SENSE:INT ALIG | IN AUTO         | 01:34:00 AM May 22, 2019<br>Radio Std: None |
|--|-------------|----------------|-----------------|---|
| Center Freq 2.402000000                                  | #IFGain:Low | T 1            | Avg Hold:>10/10 | Radio Device: BTS                           |
|  |             |                |                 |   |
| 5 dB/div Ref 20.00 dBm                                   |             |                |                 |   |
| 5.00   |             |                |                 |   |
| 0.0  |             |                |                 |   |
| 25.0   |             |                |                 |   |
|  |             |                |                 |   |
| 70.0   |             |                |                 |   |
| 35.0   |             |                |                 |   |
| 100  |             |                |                 |   |
| 115  |             |                |                 |   |
| enter 2.402 GHz  |             |                |                 | Span 2 MHz                                  |
| Res BW 100 kHz   |             | #VBW 300 kHz   |                 | Sweep 1.333 m                               |
| Occupied Bandwidt  | า           | Total Power    | 6.10 dBm        |   |
| 1.0  | 0798 MHz    |                |                 |   |
| Transmit Freq Error                                      | -3.229 kHz  | % of OBW Power | 99.00 %         |   |
| x dB Bandwidth   | 707.4 kHz   | x dB           | -6.00 dB        |   |
|  |             |                |                 |   |





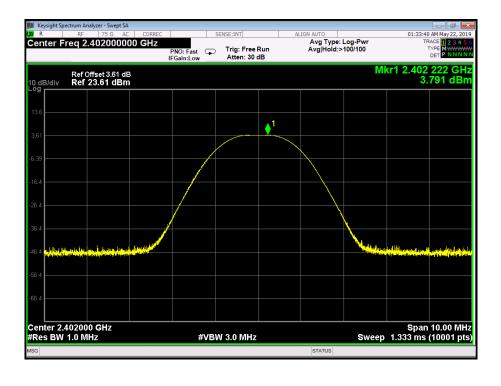
#### BLE Mode

| Keysight Spectrum Analyzer - Occupied BW     R   RF   75 Ω   AC | CORREC      |  | GN AUTO                | 01:39:49 AM May 22, 20 |
|---|-------------|--|------------------------|------------------------|
| enter Freq 2.480000000  |             | Center Freq: 2.480000000<br>Trig: Free Run | GHz<br>Avg Hold:>10/10 | Radio Std: None        |
|   | #IFGain:Low | #Atten: 30 dB                              |                        | Radio Device: BTS      |
|   |             |  |                        |                        |
| 0 dB/div Ref 20.00 dBm  | r           |  |                        |                        |
| 10.0  |             |  |                        |                        |
| 0.00  |             |  |                        |                        |
| 10.0  |             |  |                        |                        |
| 20.0  |             |  |                        |                        |
| 80.0  |             |  |                        |                        |
| 40.0  |             |  |                        |                        |
| 50.0  |             |  |                        |                        |
| 60.0  |             |  |                        |                        |
| 70.0  |             |  |                        |                        |
| Center 2.48 GHz   |             |  |                        | Span 2 MF              |
| Res BW 100 kHz  |             | #VBW 300 kHz                               |                        | Sweep 1.333 m          |
| Occupied Bandwidth  | า           | Total Power                                | 7.29 dBm               |                        |
| 1.0   | )799 MHz    |  |                        |                        |
|   | -5.512 kHz  | % of OBW Power                             | 99.00 %                |                        |
| Transmit Freq Error   |             |  |                        |                        |
| Transmit Freq Error<br>x dB Bandwidth                           | 705.7 kHz   | x dB                                       | -6.00 dB               |                        |
|   | 705.7 kHz   | x dB                                       | -6.00 dB               |                        |
|   | 705.7 kHz   | x dB                                       | -6.00 dB               |                        |
|   | 705.7 kHz   | x dB                                       | -6.00 dB               |                        |

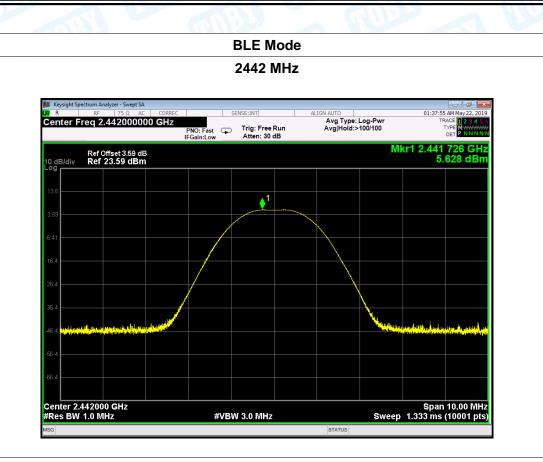


## **Attachment E-- Peak Output Power Test Data**

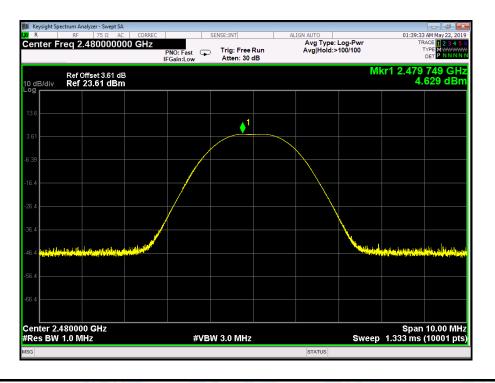
| Temperature:    | <b>25</b> ℃ | Rel            | ative Humidity: | 55%    |  |
|-----------------|-------------|----------------|-----------------|--------|--|
| Test Voltage:   | DC 3.7V     | L'AL           |                 | mill - |  |
| Test Mode:      | BLE TX M    | lode           |                 |        |  |
| Channel frequen | icy (MHz)   | Test Result (d | Limit (dBm)     |        |  |
| 2402            |             | 3.791          |                 |        |  |
| 2442            |             | 5.628          |                 | 30     |  |
| 2480            |             | 4.629          |                 |        |  |
|                 |             | BLE Mod        | 9               |        |  |
|                 |             | 2402 MH        | 2               |        |  |





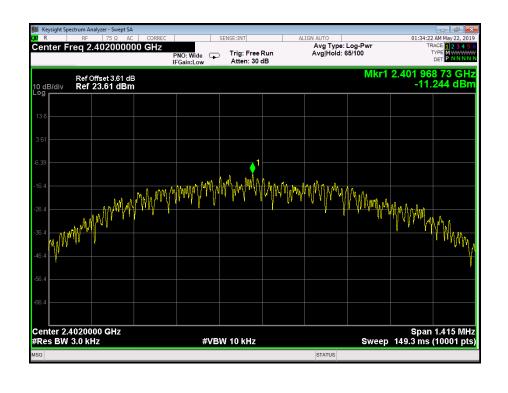


BLE Mode

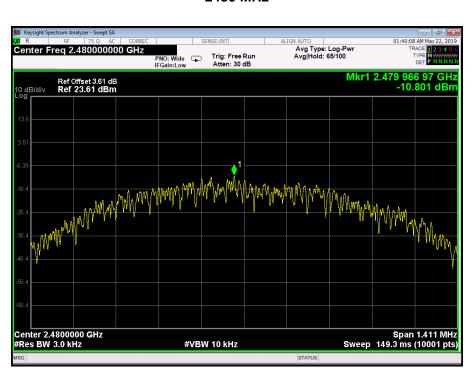


### **Attachment F-- Power Spectral Density Test Data**

| Temperature:      | <b>25</b> ℃ | Relative H    | Relative Humidity: 55%     |    |        |  |
|-------------------|-------------|---------------|----------------------------|----|--------|--|
| Test Voltage:     | DC 3.7V     |               | 61                         | R  |        |  |
| Test Mode:        | BLE TX N    | lode          | aU                         |    |        |  |
| Channel Frequency |             | Power Density | Lim                        | it | Result |  |
| (MHz)             |             | (dBm)         | (dBn                       | n) | Result |  |
| 2402              |             | -11.244       | -11.244<br>-9.853 <b>8</b> |    |        |  |
| 2442              |             | -9.853        |                            |    | PASS   |  |
| 2480              |             | -10.801       |                            |    |        |  |
|                   |             | BLE Mode      |                            |    |        |  |
|                   |             |               |                            |    |        |  |







#### BLE Mode 2480 MHz

