

# RADIO TEST REPORT

## FCC 47 CFR PART 15 SUBPART C

### INDUSTRY CANADA RSS-247

|                          |                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Standard            | FCC Part 15.247<br>IC RSS-247 issue 2 and IC RSS-GEN issue 5                                                                                        |
| Product name             | PRO 8475                                                                                                                                            |
| Trade Name               | MiTAC, Webfleet Solutions                                                                                                                           |
| Model                    | N653                                                                                                                                                |
| Test Result              | Pass                                                                                                                                                |
| Statements of Conformity | Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty. |

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:



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Kevin Tsai  
Deputy Manager

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Report No.: T200407W01-RP2

Page 2 / 35

Rev. 01

### **Revision History**

| Rev. | Issue Date   | Revisions                       | Effect Page | Revised By   |
|------|--------------|---------------------------------|-------------|--------------|
| 00   | May 21, 2020 | Initial Issue                   | ALL         | Allison Chen |
| 01   | June 9, 2020 | See the following note Rev.(01) | ALL         | Allison Chen |

***Rev.(01)***

- 1. Added test data for conduction, power table and radiated emission.*
- 2. Revised product name: PRO 8475, and model name: N653.*



Report No.: T200407W01-RP2

Page 3 / 35  
Rev. 01

## Table of contents

|                                 |                                                |    |
|---------------------------------|------------------------------------------------|----|
| 1.                              | GENERAL INFORMATION .....                      | 4  |
| 1.1                             | EUT INFORMATION .....                          | 4  |
| 1.2                             | EUT CHANNEL INFORMATION .....                  | 5  |
| 1.3                             | ANTENNA INFORMATION .....                      | 5  |
| 1.4                             | MEASUREMENT UNCERTAINTY.....                   | 6  |
| 1.5                             | FACILITIES AND TEST LOCATION .....             | 6  |
| 1.6                             | INSTRUMENT CALIBRATION.....                    | 7  |
| 1.7                             | SUPPORT AND EUT ACCESSORIES EQUIPMENT .....    | 8  |
| 1.8                             | TEST METHODOLOGY AND APPLIED STANDARDS .....   | 8  |
| 2.                              | TEST SUMMERY .....                             | 9  |
| 3.                              | DESCRIPTION OF TEST MODES.....                 | 10 |
| 3.1                             | THE WORST MODE OF OPERATING CONDITION .....    | 10 |
| 3.2                             | THE WORST MODE OF MEASUREMENT .....            | 11 |
| 4.                              | TEST RESULT .....                              | 12 |
| 4.1                             | AC POWER LINE CONDUCTED EMISSION .....         | 12 |
| 4.2                             | OUTPUT POWER MEASUREMENT .....                 | 15 |
| 4.3                             | RADIATION BANDEDGE AND SPURIOUS EMISSION ..... | 17 |
| 4.4                             | TEST DATA RE-USE SUMMARY .....                 | 34 |
| APPENDIX 1 - PHOTOGRAPHS OF EUT |                                                |    |



Report No.: T200407W01-RP2

Page 4 / 35

Rev. 01

## 1. GENERAL INFORMATION

### 1.1 EUT INFORMATION

|                          |                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FCC Applicant</b>     | Mitac Digital Technology Corporation<br>No.200, Wen Hwa 2nd Rd.,Kuei Shan Dist. Taoyuan, 33383<br>Taiwan                                                                  |
| <b>IC Applicant</b>      | MiTAC Digital Technology Corporation<br>No.200, Wenhua 2nd Rd., Guishan Dist. Taoyuan City 333<br>Taiwan                                                                  |
| <b>Manufacturer</b>      | MITAC COMPUTER (KUNSHAN) CO., LTD.<br>No. 269, 2nd Avenue, District A, Comprehensive Free Trade<br>Zone, Kunshan, Jiangsu, P.R. China                                     |
| <b>Equipment</b>         | PRO 8475                                                                                                                                                                  |
| <b>Model</b>             | N653                                                                                                                                                                      |
| <b>Model Discrepancy</b> | Difference of the those trade names (list on this report) are just for<br>marketing purpose only.                                                                         |
| <b>Trade Name</b>        | MiTAC, Webfleet Solutions                                                                                                                                                 |
| <b>Received Date</b>     | April 7, 2020                                                                                                                                                             |
| <b>Date of Test</b>      | June 1 ~ 5, 2020                                                                                                                                                          |
| <b>Power Operation</b>   | 1. Powered from Rechargeable Li-ion Polymer Battery.<br>Rating: 3.7VDC, 4000mAh, 14.8Wh<br>2. Powered from Cradle<br>Fleet cable 12/24V (Pogo power pin)<br>USB Type-C 5V |
| <b>HW Version</b>        | R04                                                                                                                                                                       |
| <b>SW Version</b>        | R01                                                                                                                                                                       |



Report No.: T200407W01-RP2

Page 5 / 35

Rev. 01

## 1.2 EUT CHANNEL INFORMATION

|                    |                    |
|--------------------|--------------------|
| Frequency Range    | 2402MHz-2480MHz    |
| Modulation Type    | GFSK for BLE-1Mbps |
| Number of channels | 40 Channels        |

### Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

| Number of frequencies to be tested                   |                       |                                              |
|------------------------------------------------------|-----------------------|----------------------------------------------|
| Frequency range in which device operates             | Number of frequencies | Location in frequency range of operation     |
| <input type="checkbox"/> 1 MHz or less               | 1                     | Middle                                       |
| <input type="checkbox"/> 1 MHz to 10 MHz             | 2                     | 1 near top and 1 near bottom                 |
| <input checked="" type="checkbox"/> More than 10 MHz | 3                     | 1 near top, 1 near middle, and 1 near bottom |

## 1.3 ANTENNA INFORMATION

|                   |                                                                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Antenna Type      | <input type="checkbox"/> PIFA <input type="checkbox"/> PCB <input type="checkbox"/> Dipole <input type="checkbox"/> Coils <input checked="" type="checkbox"/> Integral |
| Antenna Gain      | Gain: 1.31 dBi                                                                                                                                                         |
| Antenna Connector | i-pex                                                                                                                                                                  |

## 1.4 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| AC Powerline Conducted Emission       | +/- 1.2575  |
| Emission bandwidth, 20dB bandwidth    | +/- 0.0014  |
| RF output power, conducted            | +/- 1.14    |
| Power density, conducted              | +/- 1.40    |
| 3M Semi Anechoic Chamber / 30M~200M   | +/- 4.12    |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 4.68    |
| 3M Semi Anechoic Chamber / 1G~8G      | +/- 5.18    |
| 3M Semi Anechoic Chamber / 8G~18G     | +/- 5.47    |
| 3M Semi Anechoic Chamber / 18G~26G    | +/- 3.81    |
| 3M Semi Anechoic Chamber / 26G~40G    | +/- 3.87    |

**Remark:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

## 1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

| Test site          | Test Engineer | Remark |
|--------------------|---------------|--------|
| AC Conduction Room | Dally Hong    | -      |
| Radiation          | Jerry Chang   | -      |
| RF Conducted       | Jane Wang     | -      |

**Remark:** The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.6 INSTRUMENT CALIBRATION

| RF Conducted Test Site |              |         |            |            |            |
|------------------------|--------------|---------|------------|------------|------------|
| Equipment              | Manufacturer | Model   | S/N        | Cal Date   | Cal Due    |
| Coaxial Cable          | Woken        | WC12    | CC001      | 06/28/2019 | 06/27/2020 |
| EXA Signal Analyzer    | KEYSIGHT     | N9010B  | MY55460167 | 07/31/2019 | 07/30/2020 |
| Power Meter            | Anritsu      | ML2487A | 6K00003260 | 05/21/2020 | 05/20/2021 |
| Power Seneor           | Anritsu      | MA2490A | 032910     | 05/21/2020 | 05/20/2021 |
| Software               | N/A          |         |            |            |            |

| 3M 966 Chamber Test Site         |                  |                 |              |            |            |
|----------------------------------|------------------|-----------------|--------------|------------|------------|
| Equipment                        | Manufacturer     | Model           | S/N          | Cal Date   | Cal Due    |
| Band Reject Filters              | MICRO TRONICS    | BRM 50702       | 120          | 02/25/2020 | 02/24/2021 |
| Bilog Antenna                    | Sunol Sciences   | JB3             | A030105      | 07/26/2019 | 07/25/2020 |
| Coaxial Cable                    | HUBER SUHNER     | SUCOFLEX 104PEA | 20995        | 02/25/2020 | 02/24/2021 |
| Coaxial Cable                    | EMCI             | EMC105          | 190914+25111 | 09/20/2019 | 09/19/2020 |
| Digital Thermo-Hygro Meter       | WISEWIND         | 1206            | D07          | 01/15/2020 | 01/14/2021 |
| double Ridged Guide Horn Antenna | ETC              | MCTD 1209       | DRH13M02003  | 10/04/2019 | 10/03/2020 |
| Loop Ant                         | COM-POWER        | AL-130          | 121051       | 03/27/2020 | 03/26/2021 |
| Pre-Amplifier                    | EMEC             | EM330           | 060609       | 02/25/2020 | 02/24/2021 |
| Pre-Amplifier                    | HP               | 8449B           | 3008A00965   | 02/25/2020 | 02/24/2021 |
| Signal Analyzer                  | Agilent          | N9010A          | MY52220817   | 03/19/2020 | 03/18/2021 |
| Antenna Tower                    | CCS              | CC-A-1F         | N/A          | N.C.R      | N.C.R      |
| Controller                       | CCS              | CC-C-1F         | N/A          | N.C.R      | N.C.R      |
| Turn Table                       | CCS              | CC-T-1F         | N/A          | N.C.R      | N.C.R      |
| Software                         | e3 6.11-20180413 |                 |              |            |            |

| AC line Conduction Test Room |                         |           |          |            |            |
|------------------------------|-------------------------|-----------|----------|------------|------------|
| Equipment                    | Manufacturer            | Model     | S/N      | Cal Date   | Cal Due    |
| CABLE                        | EMCI                    | CFD300-NL | CERF     | 06/27/2019 | 06/26/2020 |
| EMI Test Receiver            | R&S                     | ESCI      | 100064   | 07/26/2019 | 07/25/2020 |
| LISN                         | SCHAFFNER               | NNB 41    | 03/10013 | 02/13/2020 | 02/12/2021 |
| Software                     | EZ-EMC(CCS-3A1-CE-wugu) |           |          |            |            |

**Remark:** Each piece of equipment is scheduled for calibration once a year.



Report No.: T200407W01-RP2

Page 8 / 35

Rev. 01

## 1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

| EUT Accessories Equipment |           |       |       |            |        |       |
|---------------------------|-----------|-------|-------|------------|--------|-------|
| No.                       | Equipment | Brand | Model | Series No. | FCC ID | IC ID |
|                           | N/A       |       |       |            |        |       |

| Support Equipment |                 |         |               |            |          |       |
|-------------------|-----------------|---------|---------------|------------|----------|-------|
| No.               | Equipment       | Brand   | Model         | Series No. | FCC ID   | IC ID |
| 1                 | NB(L)           | Toshiba | PORTEGE R30-A | N/A        | PD97260H | N/A   |
| 2                 | DC Power Source | Agilent | E3640A        | N/A        | N/A      | N/A   |

## 1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074 D01, RSS-247 Issue 2 and RSS-GEN Issue 5



Report No.: T200407W01-RP2

Page 9 / 35

Rev. 01

## 2. TEST SUMMERY

| FCC Standard Section | IC Standard Section | Report Section | Test Item                   | Result |
|----------------------|---------------------|----------------|-----------------------------|--------|
| 15.203               | -                   | 1.3            | Antenna Requirement         | Pass   |
| 15.207(a)            | RSS-GEN 8.8         | 4.1            | AC Conducted Emission       | Pass   |
| 15.247(b)(3)         | RSS-247(5.4)(d)     | 4.2            | Output Power Measurement    | Pass   |
| 15.247(d)            | RSS-GEN 8.9, 8.10   | 4.3            | Radiation Spurious Emission | Pass   |
| 15.247(d)            | RSS-GEN 8.9, 8.10   | 4.3            | Radiation Band Edge         | Pass   |



Report No.: T200407W01-RP2

Page 10 / 35  
Rev. 01

### 3. DESCRIPTION OF TEST MODES

#### 3.1 THE WORST MODE OF OPERATING CONDITION

|                          |                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------|
| Operation mode           | BLE Mode (1Mbps)                                                                        |
| Test Channel Frequencies | 1.Lowest Channel : 2402MHz<br>2.Middle Channel : 2440MHz<br>3.Highest Channel : 2480MHz |

**Remark:**

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.

### 3.2 THE WORST MODE OF MEASUREMENT

| AC Power Line Conducted Emission |                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                   | AC Power line conducted emission for line and neutral                                                                                      |
| Power supply Mode                | Mode 1: EUT power by Battery<br>Mode 2: EUT+Cradle                                                                                         |
| Worst Mode                       | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4 |

| Radiated Emission Measurement Above 1G |                                                                                                                                                                                                                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                         | Radiated Emission Above 1G                                                                                                                                                                                                                                                                    |
| Power supply Mode                      | Mode 1: EUT power by Battery<br>Mode 2: EUT+Cradle                                                                                                                                                                                                                                            |
| Worst Mode                             | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4                                                                                                                                                    |
| Worst Position                         | <input type="checkbox"/> Placed in fixed position.<br><input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane)<br><input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane)<br><input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane) |

| Radiated Emission Measurement Below 1G |                                                                                                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                         | Radiated Emission Below 1G                                                                                                                 |
| Power supply Mode                      | Mode 1: EUT power by Battery<br>Mode 2: EUT+Cradle                                                                                         |
| Worst Mode                             | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4 |

**Remark:**

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

## 4. TEST RESULT

### 4.1 AC POWER LINE CONDUCTED EMISSION

#### 4.1.1 Test Limit

According to §15.207(a) and RSS-GEN section 8.8,

| Frequency Range<br>(MHz) | Limits(dB $\mu$ V) |           |
|--------------------------|--------------------|-----------|
|                          | Quasi-peak         | Average   |
| 0.15 to 0.50             | 66 to 56*          | 56 to 46* |
| 0.50 to 5                | 56                 | 46        |
| 5 to 30                  | 60                 | 50        |

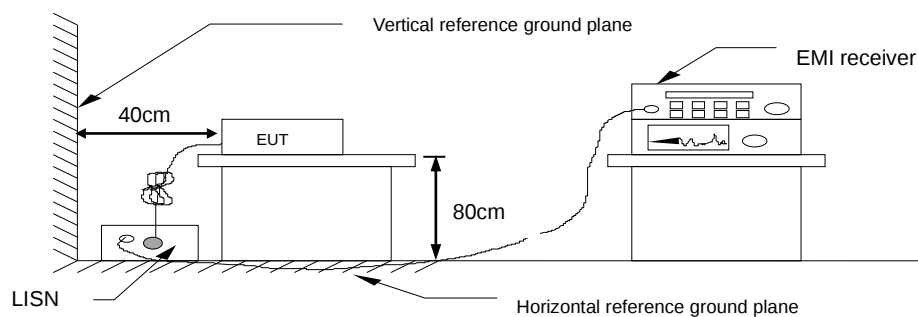
\* Decreases with the logarithm of the frequency.

#### 4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed above horizontal ground plane and 0.4m above vertical ground plane
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

#### 4.1.3 Test Setup

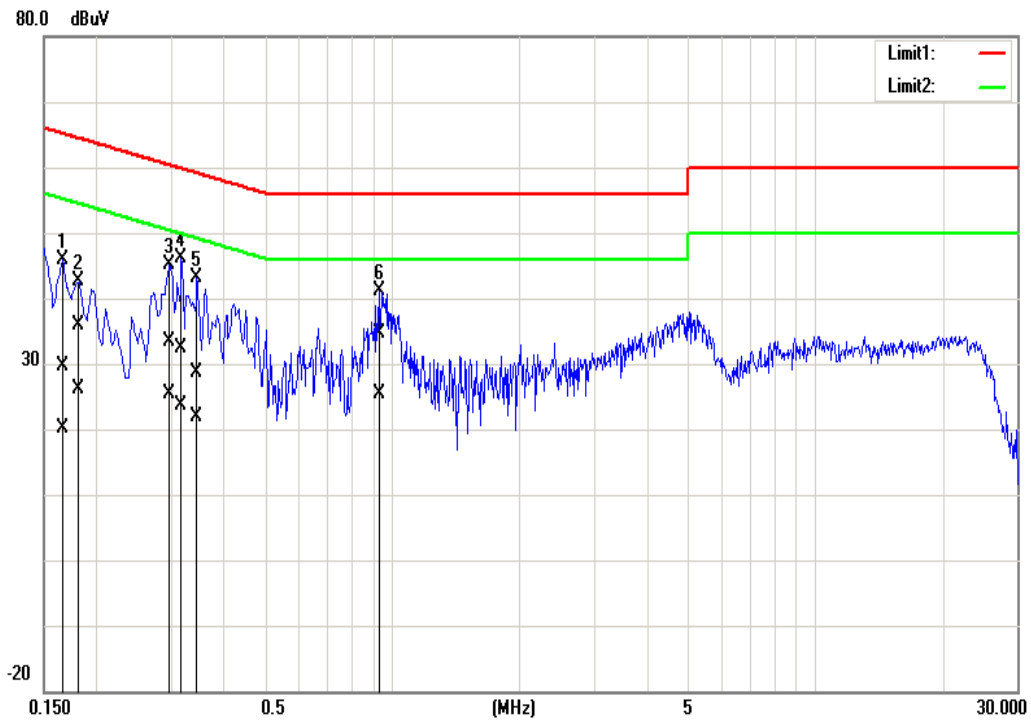


#### 4.1.4 Test Result

**Pass.**

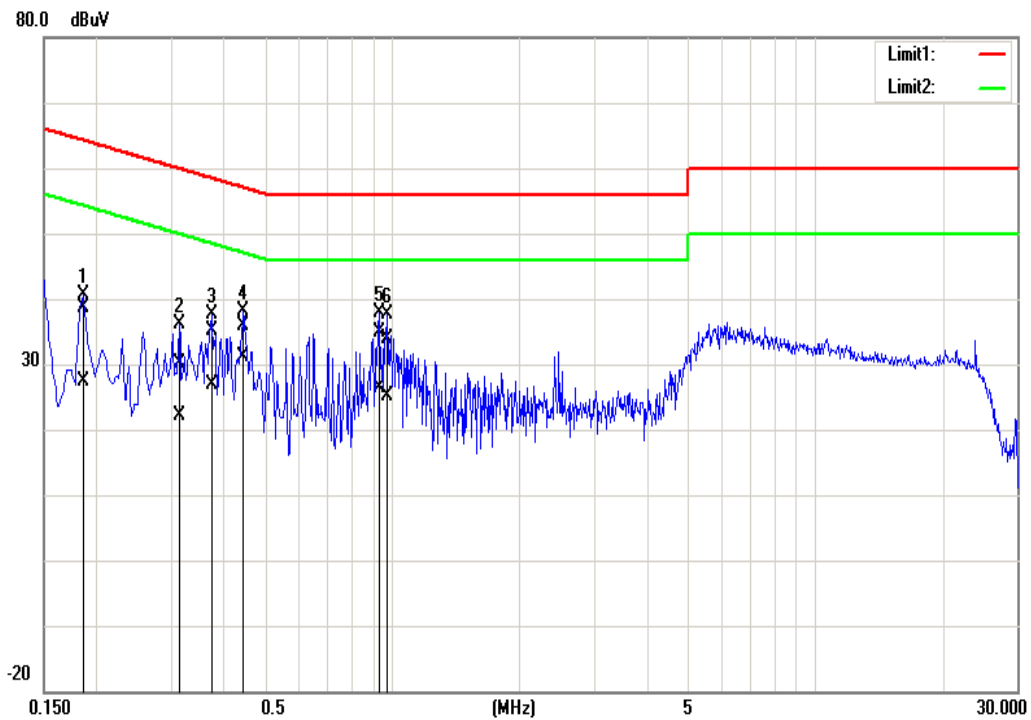
## Test Data

|            |        |               |               |
|------------|--------|---------------|---------------|
| Test Mode: | Mode 1 | Temp/Hum      | 24(°C)/ 50%RH |
| Phase:     | Line   | Test Date     | June 1, 2020  |
|            |        | Test Engineer | Dally Hong    |



| Frequency (MHz) | Quasi Peak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | Quasi Peak result (dBuV) | Average result (dBuV) | Quasi Peak limit (dBuV) | Average limit (dBuV) | Quasi Peak margin (dB) | Average margin (dB) | Remark |
|-----------------|---------------------------|------------------------|------------------------|--------------------------|-----------------------|-------------------------|----------------------|------------------------|---------------------|--------|
| 0.1660          | 19.34                     | 9.89                   | 10.22                  | 40.62                    | 20.11                 | 65.15                   | 55.16                | -35.59                 | -35.05              | Pass   |
| 0.1820          | 25.73                     | 15.80                  | 10.21                  | 36.33                    | 26.01                 | 64.39                   | 54.39                | -28.45                 | -28.38              | Pass   |
| 0.2980          | 23.16                     | 15.16                  | 10.21                  | 35.37                    | 25.37                 | 60.30                   | 50.30                | -26.93                 | -24.93              | Pass   |
| 0.3180          | 22.20                     | 13.32                  | 10.22                  | 39.42                    | 23.54                 | 59.76                   | 49.76                | -27.34                 | -26.22              | Pass   |
| 0.3460          | 18.51                     | 11.75                  | 10.22                  | 34.73                    | 21.97                 | 59.06                   | 49.06                | -30.33                 | -27.09              | Pass   |
| 0.9300          | 24.48                     | 15.15                  | 10.24                  | 34.72                    | 25.39                 | 56.00                   | 46.00                | -21.28                 | -20.61              | Pass   |

|            |         |               |               |
|------------|---------|---------------|---------------|
| Test Mode: | Mode 1  | Temp/Hum      | 24(°C)/ 50%RH |
| Phase:     | Neutral | Test Date     | June 1, 2020  |
|            |         | Test Engineer | Dally Hong    |



| Frequency (MHz) | Quasi Peak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | Quasi Peak result (dBuV) | Average result (dBuV) | Quasi Peak limit (dBuV) | Average limit (dBuV) | Quasi Peak margin (dB) | Average margin (dB) | Remark |
|-----------------|---------------------------|------------------------|------------------------|--------------------------|-----------------------|-------------------------|----------------------|------------------------|---------------------|--------|
| 0.1860          | 28.43                     | 17.15                  | 10.19                  | 38.62                    | 27.34                 | 64.21                   | 54.21                | -25.59                 | -26.87              | Pass   |
| 0.3140          | 19.83                     | 11.94                  | 10.19                  | 30.02                    | 22.13                 | 59.86                   | 49.86                | -29.84                 | -27.73              | Pass   |
| 0.3740          | 25.04                     | 16.62                  | 10.19                  | 35.23                    | 26.81                 | 58.41                   | 48.41                | -23.18                 | -21.60              | Pass   |
| 0.4460          | 25.80                     | 20.90                  | 10.19                  | 43.99                    | 31.09                 | 56.95                   | 46.95                | -20.96                 | -15.86              | Pass   |
| 0.9300          | 24.75                     | 16.17                  | 10.21                  | 36.96                    | 26.38                 | 56.00                   | 46.00                | -21.04                 | -19.62              | Pass   |
| 0.9700          | 23.55                     | 14.97                  | 10.21                  | 36.76                    | 25.18                 | 56.00                   | 46.00                | -22.24                 | -20.82              | Pass   |

## 4.2 OUTPUT POWER MEASUREMENT

### 4.2.1 Test Limit

According to §15.247(b)(3) and RSS-247 section 5.4(d),

#### Peak output power :

##### FCC

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

##### IC

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

|       |                                                                                                                                                                                                                       |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Limit | <input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm<br><input type="checkbox"/> Antenna with DG greater than 6 dBi<br>[ Limit = 30 – (DG – 6) ]<br><input type="checkbox"/> Point-to-point operation |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

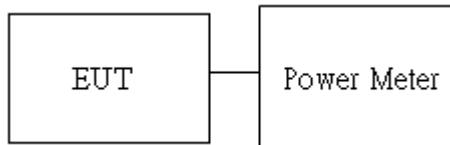
Average output power : For reporting purposes only.

### 4.2.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

### 4.2.3 Test Setup



### 4.2.4 Test Result

#### Peak output power :

| BLE Mode                   |    |             |               |                |                     |              |                   |                 |                |
|----------------------------|----|-------------|---------------|----------------|---------------------|--------------|-------------------|-----------------|----------------|
| Config.                    | CH | Freq. (MHz) | Power Setting | PK Power (dBm) | EIRP PK Power (dBm) | PK Power (W) | EIRP PK Power (W) | FCC Limit (dBm) | IC Limit (dBm) |
| BLE<br>Data rate:<br>1Mbps | 0  | 2402        | Default       | 0.08           | 1.39                | 0.0010       | 0.0014            | 30              | 36             |
|                            | 19 | 2440        | Default       | 1.14           | <b>2.45</b>         | 0.0013       | 0.0018            |                 |                |
|                            | 39 | 2480        | Default       | -0.26          | 1.05                | 0.0009       | 0.0013            |                 |                |

#### Average output power :

| BLE Mode                   |    |             |                |
|----------------------------|----|-------------|----------------|
| Config.                    | CH | Freq. (MHz) | AV Power (dBm) |
| BLE<br>Data rate:<br>1Mbps | 0  | 2402        | -0.16          |
|                            | 19 | 2440        | 0.71           |
|                            | 39 | 2480        | -0.43          |

## 4.3 RADIATION BANDEDGE AND SPURIOUS EMISSION

### 4.3.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

IC according to RSS-247 section 5.5, RSS-Gen, Section 8.9 and 8.10

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

#### Below 30 MHz

| Frequency     | Field Strength<br>(microvolts/m) | Magnetic<br>H-Field<br>(microamperes/m) | Measurement<br>Distance<br>(metres) |
|---------------|----------------------------------|-----------------------------------------|-------------------------------------|
| 9-490 kHz     | 2,400/F (F in kHz)               | 2,400/F (F in kHz)                      | 300                                 |
| 490-1,705 kHz | 24,000/F (F in kHz)              | 24,000/F (F in kHz)                     | 30                                  |
| 1.705-30 MHz  | 30                               | N/A                                     | 30                                  |

#### Above 30 MHz

| Frequency<br>(MHz) | Field Strength<br>microvolts/m at 3 metres (watts, e.i.r.p.) |              |
|--------------------|--------------------------------------------------------------|--------------|
|                    | Transmitters                                                 | Receivers    |
| 30-88              | 100 (3 nW)                                                   | 100 (3 nW)   |
| 88-216             | 150 (6.8 nW)                                                 | 150 (6.8 nW) |
| 216-960            | 200 (12 nW)                                                  | 200 (12 nW)  |
| Above 960          | 500 (75 nW)                                                  | 500 (75 nW)  |

Remark:

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

IC according to RSS-247 section 5.5, RSS-Gen, Section 8.9 and 8.10

**RSS-Gen Table 3 and Table 5 – General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz** <sup>(Note)</sup>

| Frequency<br>(MHz) | Field Strength<br>microvolts/m at 3 metres (watts, e.i.r.p.) |              |
|--------------------|--------------------------------------------------------------|--------------|
|                    | Transmitters                                                 | Receivers    |
| 30-88              | 100 (3 nW)                                                   | 100 (3 nW)   |
| 88-216             | 150 (6.8 nW)                                                 | 150 (6.8 nW) |
| 216-960            | 200 (12 nW)                                                  | 200 (12 nW)  |
| Above 960          | 500 (75 nW)                                                  | 500 (75 nW)  |

**Note:** Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with Section 6.6.

**RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

| Frequency                 | Magnetic field strength<br>(H-Field) (μA/m) | Measurement Distance<br>(m) |
|---------------------------|---------------------------------------------|-----------------------------|
| 9-490 kHz <sup>Note</sup> | 6.37/F (F in kHz)                           | 300                         |
| 490-1,705 kHz             | 63.7/F (F in kHz)                           | 30                          |
| 1.705-30 MHz              | 0.08                                        | 30                          |

**Note:** The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

### 4.3.2 Test Procedure

Test method Refer as KDB 558074 D01

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9KHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.
4. No emission found between lowest internal used/generated frequency to 30MHz (9KHz~30MHz)

Remark:

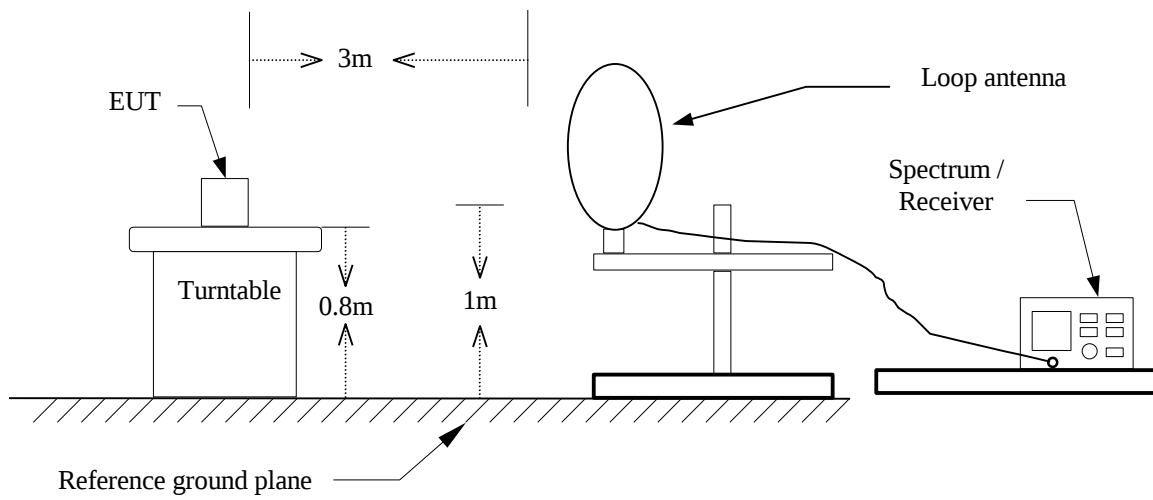
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

5. The SA setting following :

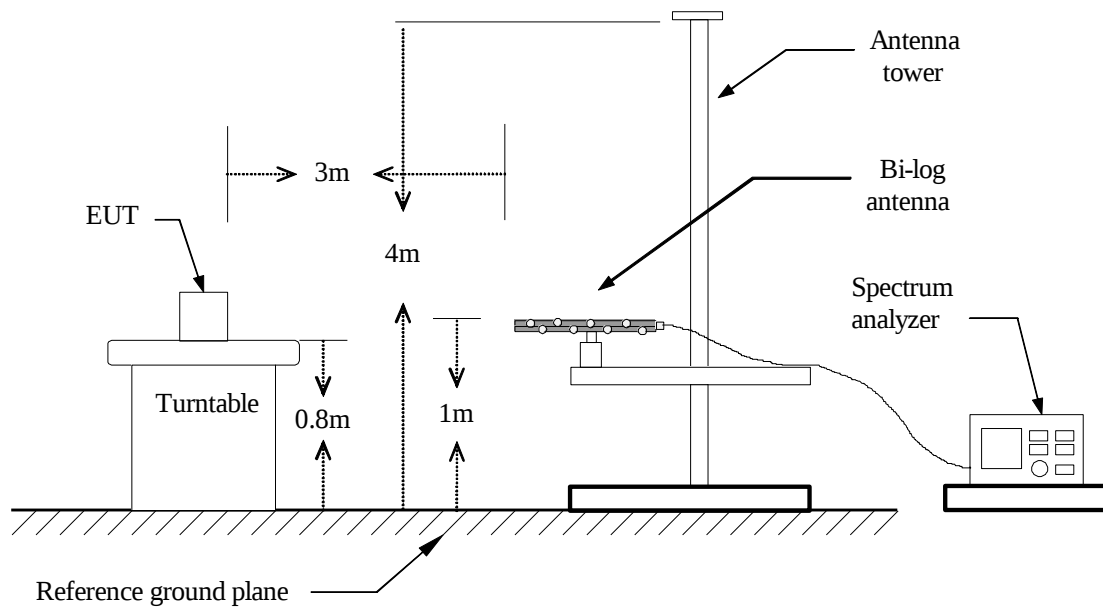
- (1) Below 1G : RBW = 100kHz, VBW  $\geq$  3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
- (2) Above 1G :
  - (2.1) For Peak measurement : RBW = 1MHz, VBW  $\geq$  3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.
  - (2.2) For Average measurement : RBW = 1MHz, VBW
    - 'If Duty Cycle  $\geq$  98%, VBW=10Hz.
    - 'If Duty Cycle < 98%, VBW=1/T.

### 4.3.3 Test Setup

#### 9kHz ~ 30MHz



#### 30MHz ~ 1GHz

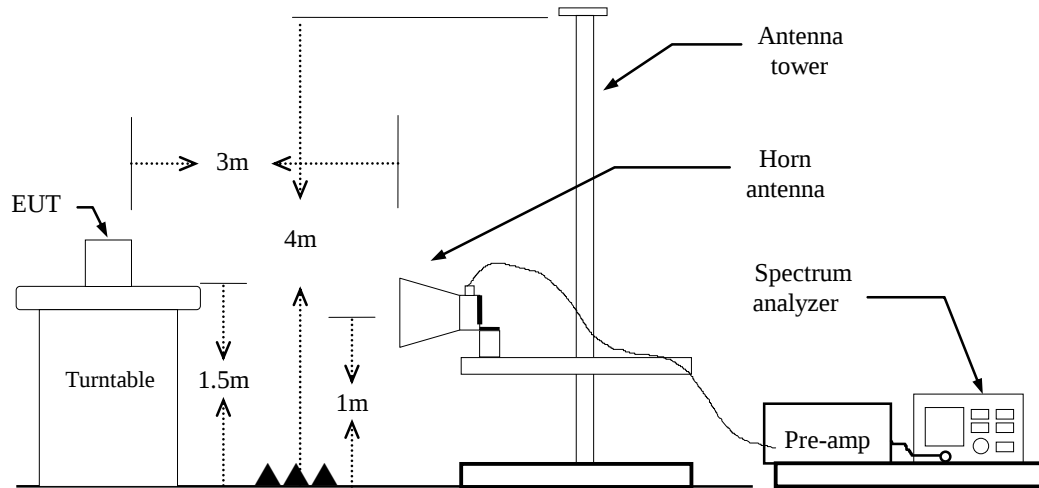


Report No.: T200407W01-RP2

Page 21 / 35

Rev. 01

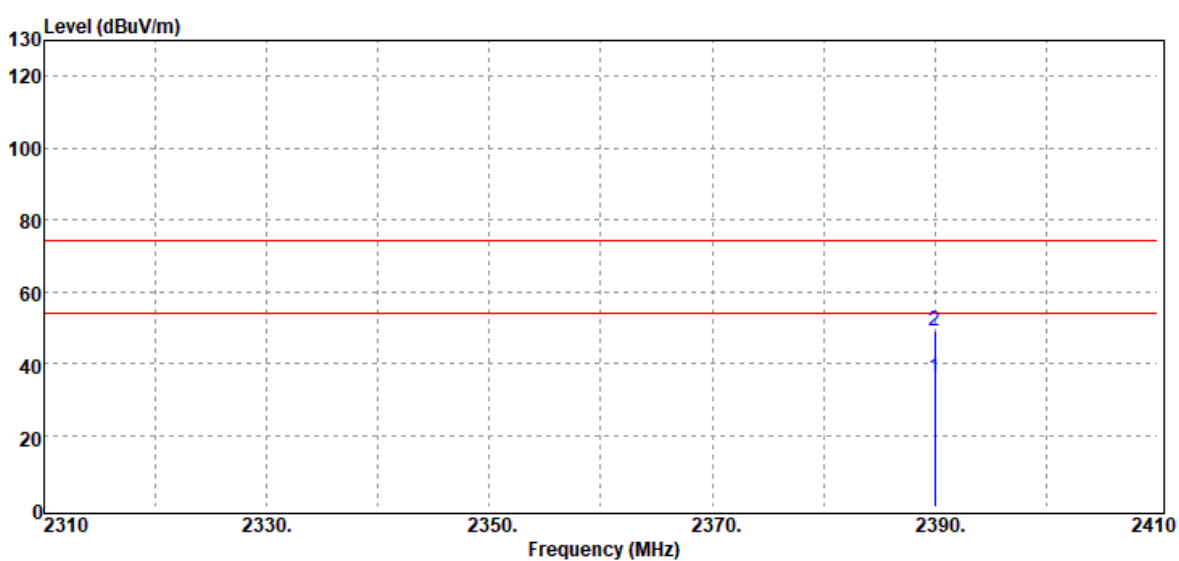
## Above 1 GHz



### 4.3.4 Test Result

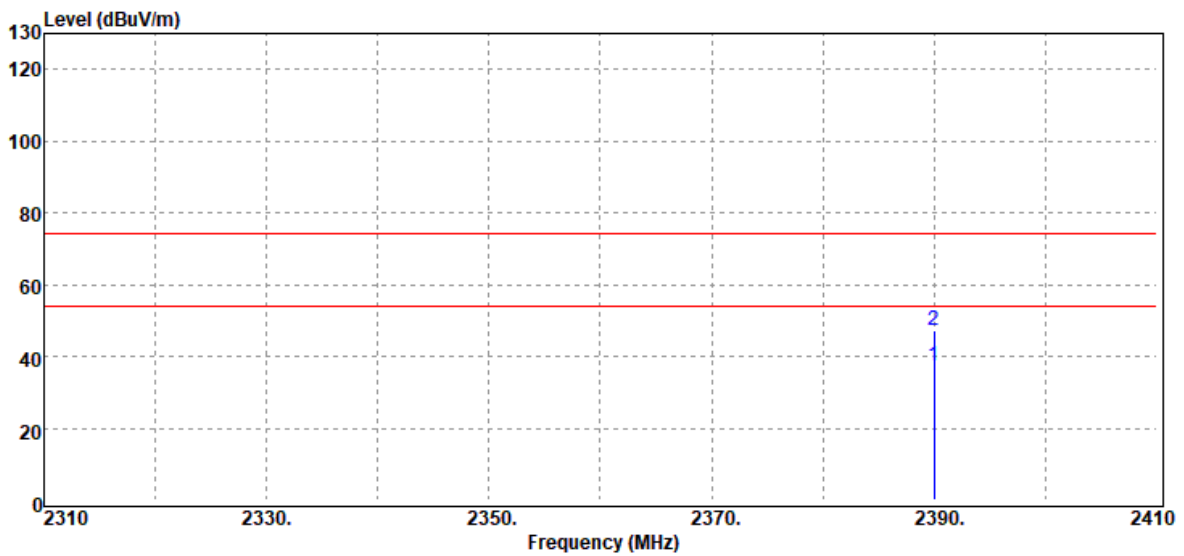
#### Band Edge Test Data

|            |                |               |                 |
|------------|----------------|---------------|-----------------|
| Test Mode: | BLE Low CH     | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Band Edge      | Test Date     | June 5, 2020    |
| Polarize   | Vertical       | Test Engineer | Jerry Chang     |
| Detector   | Peak / Average |               |                 |



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 2390.00      | Average                      | 39.20                             | -3.17        | 36.03                  | 54.00                  | -17.97       |
| 2390.00      | Peak                         | 52.35                             | -3.17        | 49.18                  | 74.00                  | -24.82       |

|            |                |               |                 |
|------------|----------------|---------------|-----------------|
| Test Mode: | BLE Low CH     | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Band Edge      | Test Date     | June 5, 2020    |
| Polarize   | Horizontal     | Test Engineer | Jerry Chang     |
| Detector   | Peak / Average |               |                 |



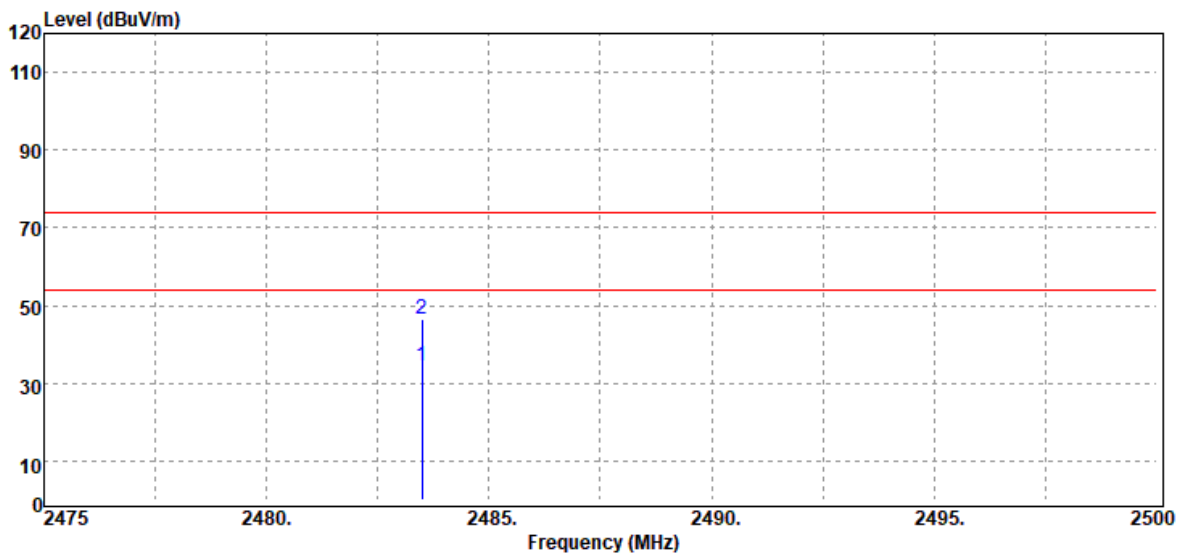
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 2390.00      | Average                      | 40.35                             | -3.17        | 37.18                  | 54.00                  | -16.82       |
| 2390.00      | Peak                         | 50.35                             | -3.17        | 47.18                  | 74.00                  | -26.82       |



Report No.: T200407W01-RP2

Page 24 / 35  
Rev. 01

|            |                |               |                 |
|------------|----------------|---------------|-----------------|
| Test Mode: | BLE High CH    | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Band Edge      | Test Date     | June 5, 2020    |
| Polarize   | Vertical       | Test Engineer | Jerry Chang     |
| Detector   | Peak / Average |               |                 |



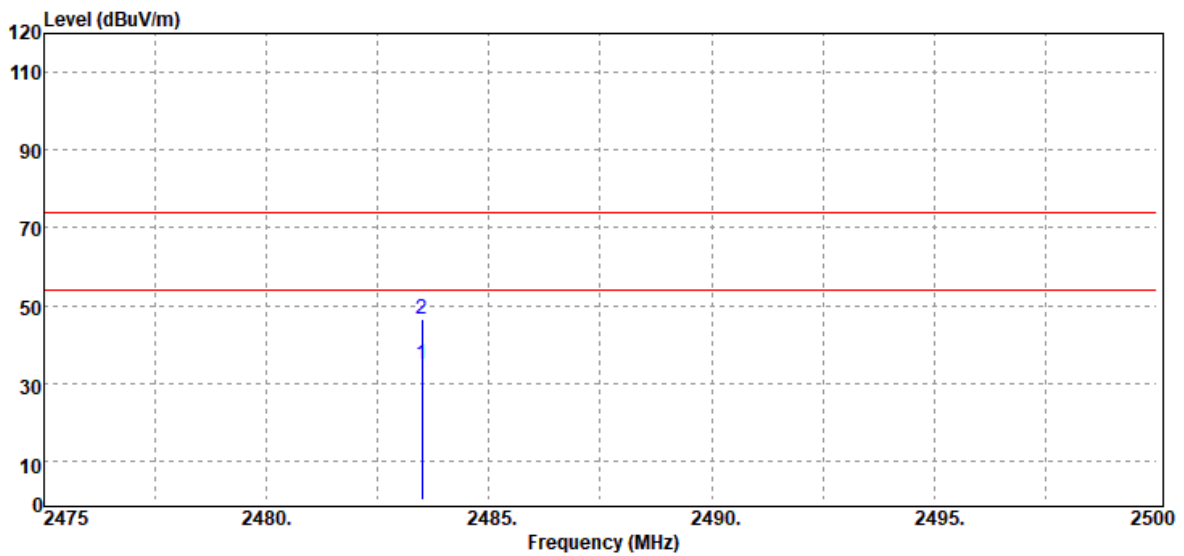
| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 2483.50      | Average                      | 37.15                             | -2.71        | 34.44                  | 54.00                  | -19.56       |
| 2483.50      | Peak                         | 49.36                             | -2.71        | 46.65                  | 74.00                  | -27.35       |



Report No.: T200407W01-RP2

Page 25 / 35  
Rev. 01

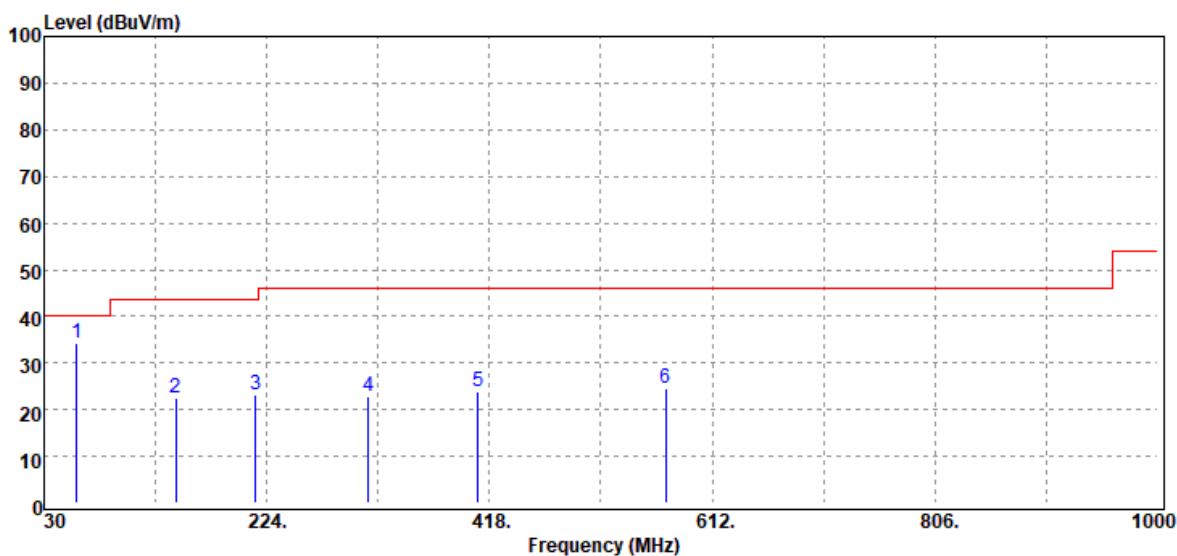
|            |                |               |                 |
|------------|----------------|---------------|-----------------|
| Test Mode: | BLE High CH    | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Band Edge      | Test Date     | June 5, 2020    |
| Polarize   | Horizontal     | Test Engineer | Jerry Chang     |
| Detector   | Peak / Average |               |                 |



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 2483.50      | Average                      | 37.68                             | -2.71        | 34.97                  | 54.00                  | -19.03       |
| 2483.50      | Peak                         | 49.36                             | -2.71        | 46.65                  | 74.00                  | -27.35       |

**Below 1G Test Data**

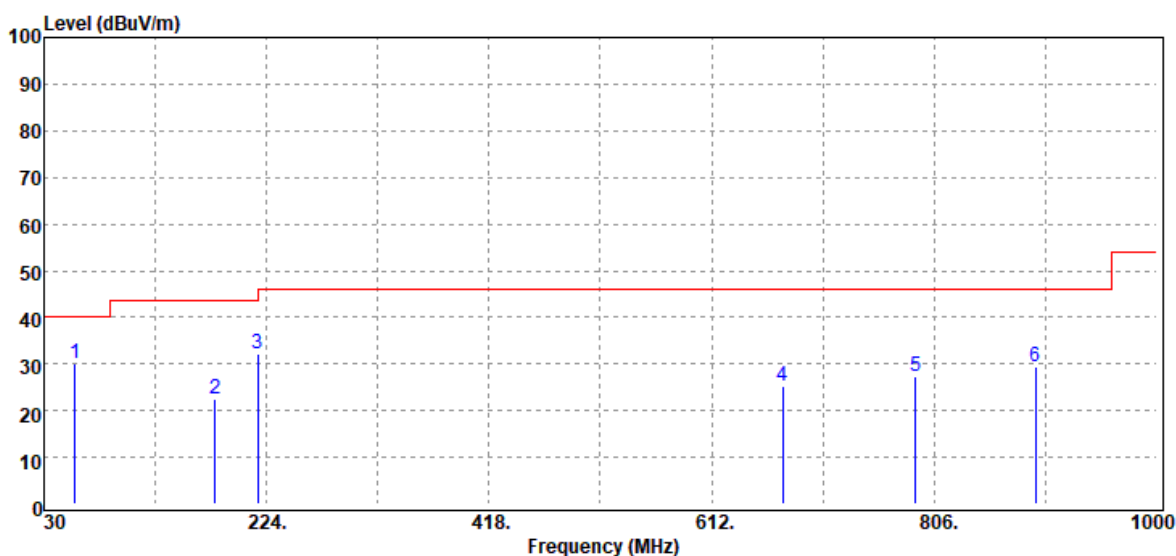
|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BT Mode    | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | 30MHz-1GHz | Test Date     | June 5, 2020    |
| Polarize   | Vertical   | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 58.13        | Peak                         | 50.40                             | -16.08       | 34.32                  | 40.00                  | -5.68        |
| 144.46       | Peak                         | 32.59                             | -10.18       | 22.41                  | 43.50                  | -21.09       |
| 214.30       | Peak                         | 35.17                             | -11.83       | 23.34                  | 43.50                  | -20.16       |
| 312.27       | Peak                         | 30.88                             | -8.06        | 22.82                  | 46.00                  | -23.18       |
| 408.30       | Peak                         | 29.34                             | -5.51        | 23.83                  | 46.00                  | -22.17       |
| 571.26       | Peak                         | 26.63                             | -2.04        | 24.59                  | 46.00                  | -21.41       |

**Note:** No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)

|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BT Mode    | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | 30MHz-1GHz | Test Date     | June 5, 2020    |
| Polarize   | Horizontal | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |

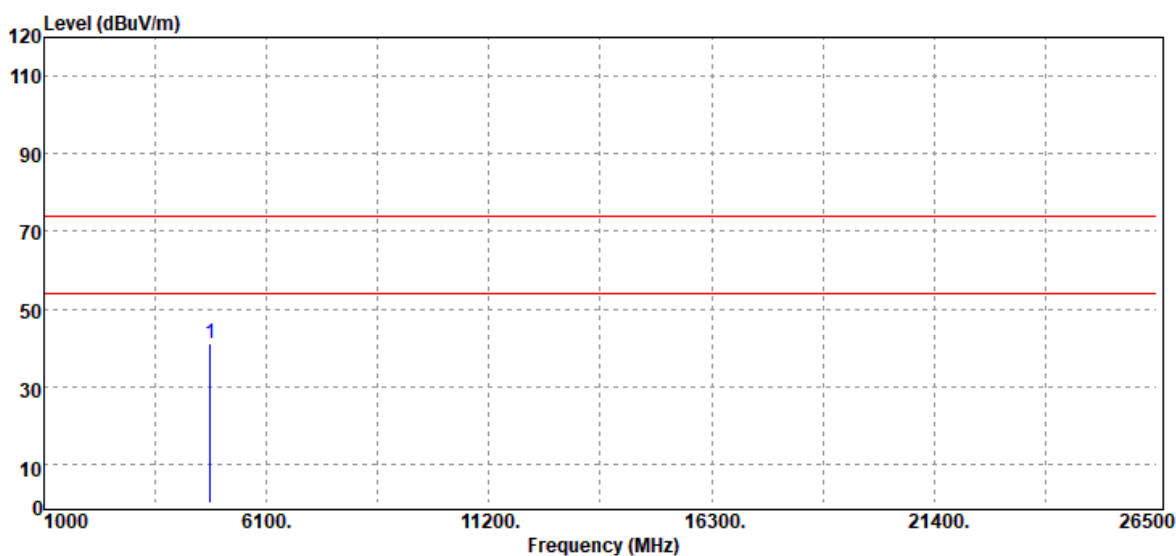


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 57.16        | Peak                         | 46.04                             | -16.00       | 30.04                  | 40.00                  | -9.96        |
| 179.38       | Peak                         | 33.75                             | -11.39       | 22.36                  | 43.50                  | -21.14       |
| 216.24       | Peak                         | 44.07                             | -11.80       | 32.27                  | 46.00                  | -13.73       |
| 674.08       | Peak                         | 25.79                             | -0.48        | 25.31                  | 46.00                  | -20.69       |
| 789.51       | Peak                         | 25.73                             | 1.44         | 27.17                  | 46.00                  | -18.83       |
| 894.27       | Peak                         | 25.95                             | 3.44         | 29.39                  | 46.00                  | -16.61       |

**Note:** No emission found between lowest internal used/generated frequency to 30MHz(9KHz~30MHz)

**Above 1G Test Data**

|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BLE Low CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic   | Test Date     | June 5, 2020    |
| Polarize   | Vertical   | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |

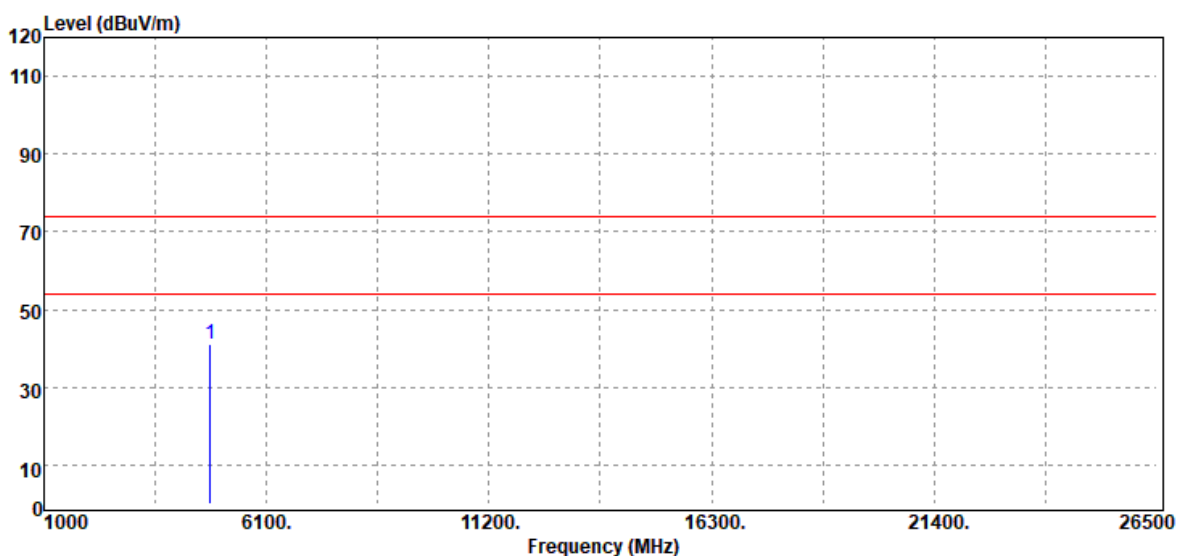


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dB $\mu$ V | Factor<br>dB | Actual<br>FS<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------------|--------------|------------------------------|------------------------------|--------------|
| 4804.00      | Peak                         | 37.65                                   | 3.36         | 41.01                        | 74.00                        | -32.99       |
| N/A          |                              |                                         |              |                              |                              |              |
|              |                              |                                         |              |                              |                              |              |
|              |                              |                                         |              |                              |                              |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BLE Low CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic   | Test Date     | June 5, 2020    |
| Polarize   | Horizontal | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |

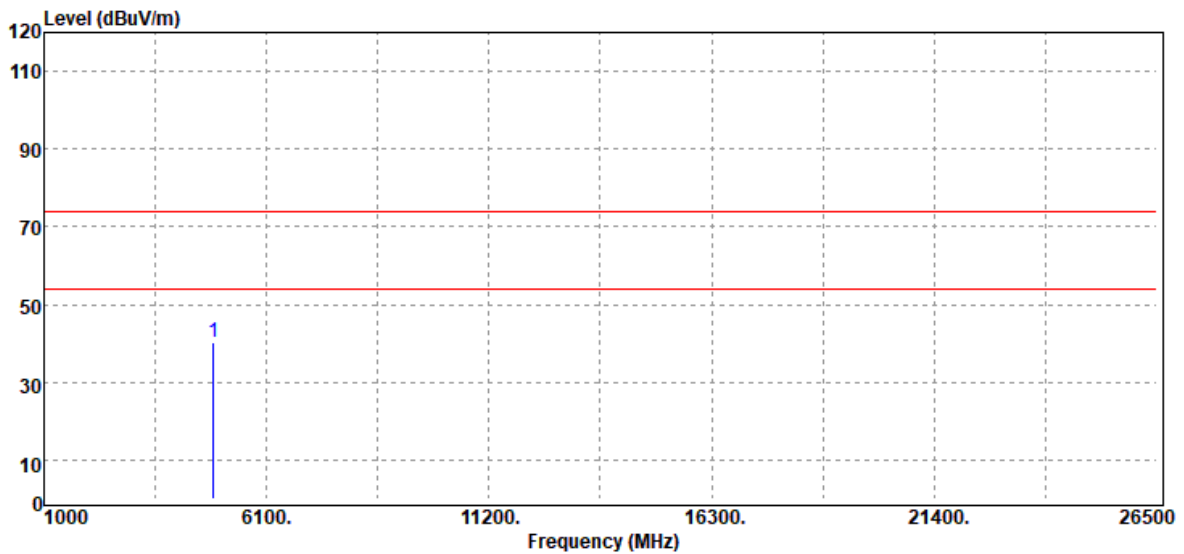


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 4804.00      | Peak                         | 37.70                             | 3.36         | 41.06                  | 74.00                  | -32.94       |
| N/A          |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BLE Mid CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic   | Test Date     | June 5, 2020    |
| Polarize   | Vertical   | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |

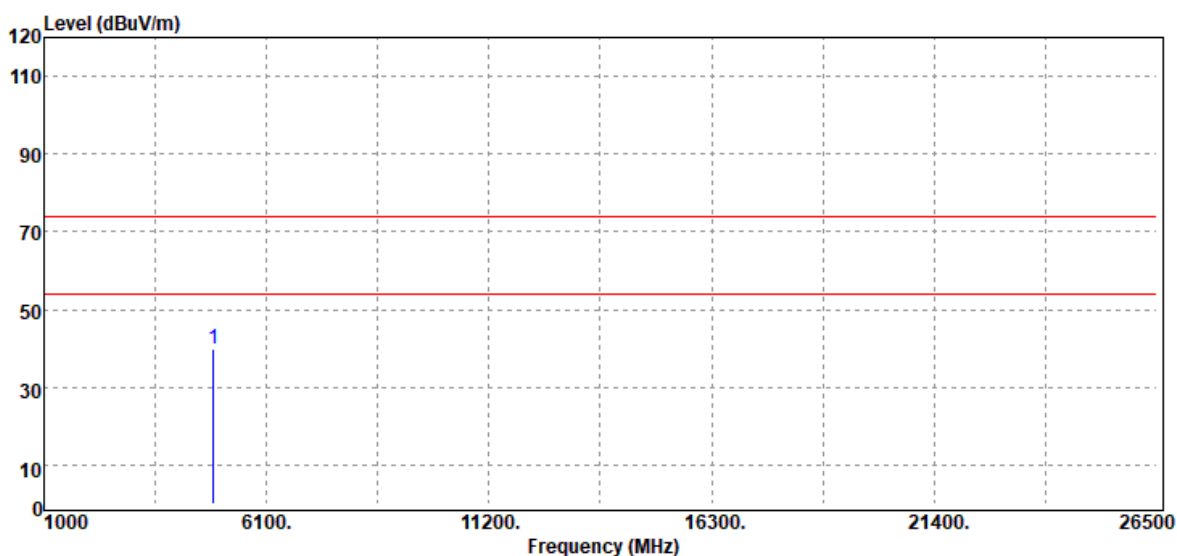


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 4880.00      | Peak                         | 36.57                             | 3.51         | 40.08                  | 74.00                  | -33.92       |
| N/A          |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

|            |            |               |                 |
|------------|------------|---------------|-----------------|
| Test Mode: | BLE Mid CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic   | Test Date     | June 5, 2020    |
| Polarize   | Horizontal | Test Engineer | Jerry Chang     |
| Detector   | Peak       |               |                 |

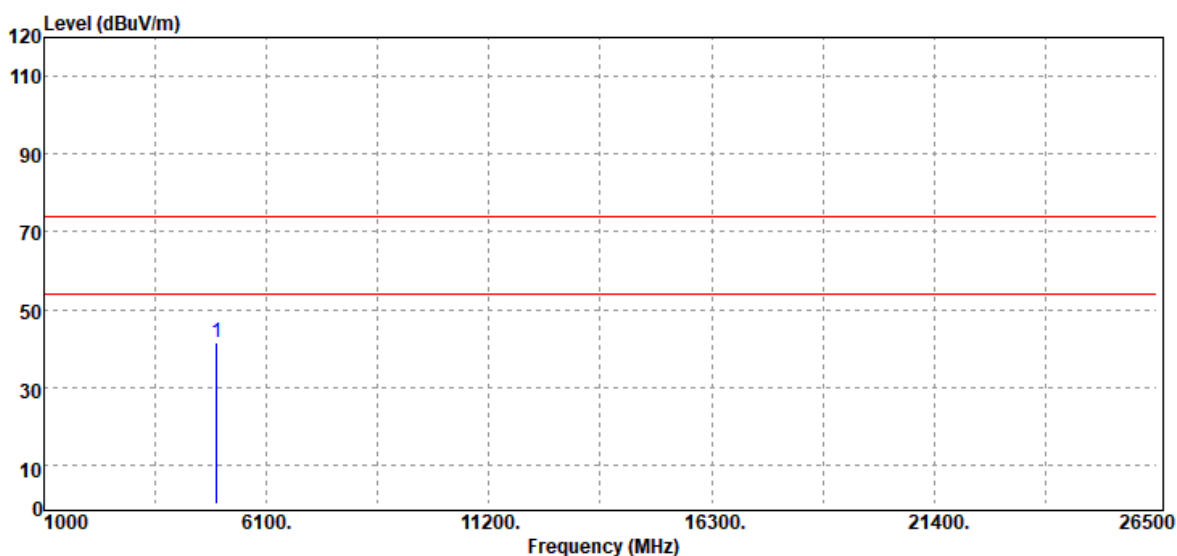


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 4880.00      | Peak                         | 36.16                             | 3.51         | 39.67                  | 74.00                  | -34.33       |
| N/A          |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

|            |             |               |                 |
|------------|-------------|---------------|-----------------|
| Test Mode: | BLE High CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic    | Test Date     | June 5, 2020    |
| Polarize   | Vertical    | Test Engineer | Jerry Chang     |
| Detector   | Peak        |               |                 |

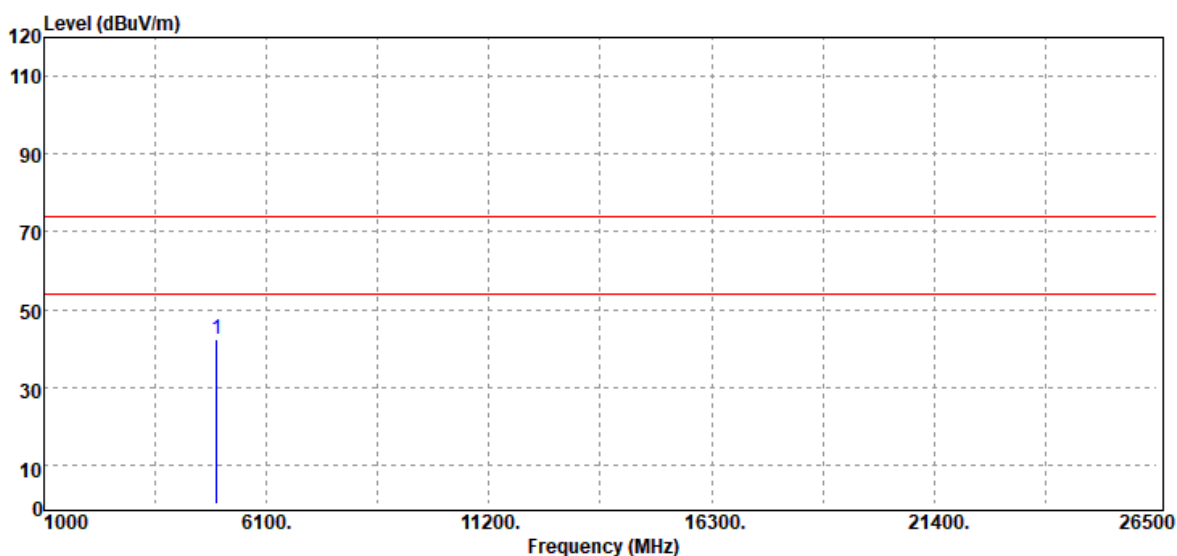


| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 4960.00      | Peak                         | 36.88                             | 4.46         | 41.34                  | 74.00                  | -32.66       |
| N/A          |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

|            |             |               |                 |
|------------|-------------|---------------|-----------------|
| Test Mode: | BLE High CH | Temp/Hum      | 24.0(°C)/ 50%RH |
| Test Item  | Harmonic    | Test Date     | June 5, 2020    |
| Polarize   | Horizontal  | Test Engineer | Jerry Chang     |
| Detector   | Peak        |               |                 |



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV/m | Limit<br>@3m<br>dBμV/m | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 4960.00      | Peak                         | 37.69                             | 4.46         | 42.15                  | 74.00                  | -31.85       |
| N/A          |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |
|              |                              |                                   |              |                        |                        |              |

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit



## 4.4 TEST DATA RE-USE SUMMARY

### Introduction Section:

The application re-uses data collected on a similar device. The subject device of this application (Model: N653, FCC ID: P4Q-N653, IC: 2420C-N653) is electrically identical to the reference device (Model: N635, FCC ID: P4Q-N635A, IC: 2420C-N635A) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

### Differences Brief Description:

The WLAN, WWAN, BT and RFID hardware of this device are identical to the implementation in

FCC ID: P4Q-N653.

IC: 2420C-N653

The Product Equality Declaration document includes detailed information about the changes between the devices. The data from that application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary table below.



Report No.: T200407W01-RP2

Page 35 / 35  
Rev. 01

## Spot Check Verification Result Summary

| Equipment Class | Reference FCC ID / IC No. | Folder Test    | Report Title/ Section                                                                                                         |
|-----------------|---------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|
| DTS-BLE         | P4Q-N635A / 2420C-N635A   | T191105W01-RP2 | All Section<br>(Except for AC Conducted Emission, Output Power Measurement, Radiation Band Edge, Radiation Spurious Emission) |

### Summary of the spot check for Unlicensed bands and Licensed bands

In order to confirm hardware similarity of the subject device with the reference device, we used same setting power to radiated emission measurement were performed on the subject device for the Band edge and Harmonic, the test result were similar with FCC ID: P4Q-N635A / IC: 2420C-N635A.

#### WLAN

| Report    | Test Item | CH.  | Measured Frequency (MHz) | P4Q-N635A / 2420C-N635A |         | P4Q-N653 / 2420C-N653 |         | Gap (dB) |         |
|-----------|-----------|------|--------------------------|-------------------------|---------|-----------------------|---------|----------|---------|
|           |           |      |                          | Peak                    | Average | Peak                  | Average | Peak     | Average |
| DTS (BLE) | Band edge | Low  | 2390                     | 48.7                    | 35.54   | 49.18                 | 37.18   | -0.48    | -1.64   |
|           | RSE       | High | 4960                     | 40.66                   | -       | 42.15                 | -       | -1.49    | -       |

--End of Test Report--