



# TEST REPORT

**FCC ID: XT5PGI400 IC :8670A-PGI400**

For

Technologies Humanware Inc.

Prodigi Connect 12

Model No. : PGI-400

Trade Name : N/A

Prepared for : Technologies Humanware Inc.

Address : 1800, Rue Michaud, Drumondville, Quebec, J2C 7G7, Canada

Prepared by : Shenzhen Alpha Product Testing Co., Ltd.

Address : Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, Shenzhen,  
: Guangdong, China

Report No. : T1870080 09

Date of Receipt : January 13, 2017

Date of Test : January 13, 2017 – June 06, 2017

Date of Report : June 06, 2017

Version Number : REV0

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## 1. General Information

### 1.1. Description of Device (EUT)

|                     |   |   |
|---------------------|---|---|
| EUT                 | : | Prodigi Connect 12  |
| Model No.           | : | PGI-400   |
| DIFF.               | : | N/A   |
| Trade mark          | : | N/A   |
| Power supply        | : | DC 12V  |
| Radio Technology    | : | Bluetooth 4.0   |
| Operation frequency | : | 2402-2480MHz  |
| Modulation          | : | GFSK  |
| Antenna Type        | : | Integrated Antenna, max gain 2.81dBi.   |
| Software version    | : | PGI-400_20170117_V2.0   |
| Hardware version    | : | X1162_V1R2 20161125   |
| Applicant           | : | Technologies Humanware Inc.   |
| Address             | : | 1800, Rue Michaud, Drumondville, Quebec, J2C 7G7, Canada  |
| Manufacturer        | : | Shenzhen Minghong Technology Limited.   |
| Address             | : | Unit 906, South Block, Resources Tech Building, No.1 Song Ping Shan Road, High-Tech Park, Shenzhen. |
| Adapter             | : | N/A   |

## 1.2. Description of Test Facility

Shenzhen Alpha Product Testing Co., Ltd

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong,  
China

March 25, 2015 File on Federal Communication Commission

Registration Number: 203110

July 26, 2017 Certificated by IC

Registration Number: 12135A

## 1.3. Test Procedure

### **POWER LINE CONDUCTED INTERFERENCE:**

The test procedure used was ANSI Standard ANSI C63.4:2014 using a 50 u H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25°C with a humidity of 58%.

### **RADIATION INTERFERENCE:**

The test procedure used was ANSI Standard ANSI C63.4:2014 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25°C with a humidity of 58%.

### **FORMULA OF CONVERSION FACTORS:**

The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF + CABLE = FS

33.20 dBuV + 10.36 dB + 0.9 dB= 44.46 dBuV/m @ 3m

### **ANSI STANDARD ANSI C63.4:2014 10.1.7 MEASUREMENT PROCEDURES:**

The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except

that the table did not rotate. The EUT was setup as described in ANSI Standard ANSI C63.4:2014 10.1.7 with the EUT 40 cm from the vertical ground wall.

## 2. Summary of Measurement

### 2.1. Summary of test result

Test procedures according to the technical standards:

KDB 558074 D01 DTS Meas Guidance v03r05

| Description of Test Item  | Standard                                 | Results |
|---|--|---------|
| Spurious Emission   | Section 15.247&15.209<br>RSS-247 ISSUE 2 | PASS    |
| Conduction Emission   | Section 15.207<br>RSS-247 ISSUE 2        | PASS    |
| Bandwidth Test  | Section 15.247<br>RSS-247 ISSUE 2        | PASS    |
| Peak Power  | Section 15.247<br>RSS-247 ISSUE 2        | PASS    |
| Power Density   | Section 15.247<br>RSS-247 ISSUE 2        | PASS    |
| Band Edge   | Section 15.247<br>RSS-247 ISSUE 2        | PASS    |
| Antenna Requirement   | Section 15.203<br>RSS-247 ISSUE 2        | PASS    |
| Note:<br>1: "N/A" denotes test is not applicable in this Test Report<br>2: Test with the test procedure Blue tool.<br>3: All tests are according to ANSI C63.10-2013: |  |         |

### 2.2. Assistant equipment used for test

|              |   |     |
|--------------|---|-----|
| Description  | : | N/A |
| Manufacturer | : | N/A |
| Model No.    | : | N/A |

### 2.3. Block Diagram of Test setup

1, For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz, 1.5 meter high above ground for above 1GHz.



EUT was be set into BT test mode by software before test.

EUT

2, For Power Line Conducted Emissions Test.

EUT

## 2.4. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode.

| Tested mode, channel, and data rate information |              |                 |
|---|--------------|-----------------|
| Mode  | Channel      | Frequency (MHz) |
| GFSK  | Low :CH1     | 2402            |
|   | Middle: CH19 | 2440            |
|   | High: CH40   | 2480            |

## 2.5. Test Conditions

|                   |           |
|-------------------|-----------|
| Temperature range | 21-25°C   |
| Humidity range    | 40-75%    |
| Pressure range    | 86-106kPa |

## 2.6. Measurement Uncertainty (95% confidence levels, k=2)

| Item  | MU                 | Remark      |
|---|--------------------|-------------|
| Uncertainty for Power point Conducted Emissions Test                  | 2.71dB             |             |
| Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)   | 2.13 dB            | Polarize: V |
|   | 2.57dB             | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz) | 3.90dB             | Polarize: V |
|   | 3.92dB             | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz) | 4.28dB             | Polarize: H |
|   | 4.26dB             | Polarize: V |
| Uncertainty for radio frequency                                       | 1×10 <sup>-9</sup> |             |
| Uncertainty for conducted RF Power                                    | 0.16dB             |             |
| Uncertainty for temperature   | 0.2°C              |             |

|   |       |  |
|---|-------|--|
| Uncertainty for humidity                      | 1%    |  |
| Uncertainty for DC and low frequency voltages | 0.06% |  |

## 2.7. Test Equipment List

| Equipment                  | Manufacturer  | Model No.               | Serial No.                 | Cal. Date  | Due to day |
|----------------------------|---------------|-------------------------|----------------------------|------------|------------|
| Bilog Antenna              | SCHWARZBECK   | VULB 9168               | 9168-438                   | 2016.09.30 | 2017.09.29 |
| Test Receiver              | ROHDE&SCHWARZ | ESCI                    | 101165                     | 2016.09.29 | 2017.09.28 |
| Spectrum analyzer          | Agilent       | E4407B                  | MY49510055                 | 2016.09.29 | 2017.09.28 |
| Horn Antenna               | SCHWARZBECK   | BBHA 9120 D             | BBHA 9120<br>D(1201)       | 2016.09.30 | 2017.09.29 |
| Filter                     | KANGMAI       | LPF-LDC-1000-<br>1959   | 1209002075                 | 2016.09.29 | 2017.09.28 |
| Filter                     | WAINWRIGHT    | WHKX2.80 /18<br>G- 12SS | SN1                        | 2016.09.29 | 2017.09.28 |
| RF Cable                   | Resenberger   | Cable 4                 | N/A                        | 2016.09.29 | 2017.09.28 |
| CMU200                     | ROHDE&SCHWARZ | CMU200                  | 116785                     | 2016.09.29 | 2017.09.28 |
| Signal Analyzer            | Agilent       | N9020A                  | MY499100060                | 2016.09.29 | 2017.09.28 |
| vector Signal<br>Generator | Agilent       | N5182A                  | MY49060042                 | 2016.09.29 | 2017.09.28 |
| vector Signal<br>Generator | Agilent       | E4438C                  | US44271917                 | 2016.09.29 | 2017.09.28 |
| Amplifier                  | HP            | HP8347A                 | 2834A00455                 | 2016.09.29 | 2017.09.28 |
| Amplifier                  | Teseq         | LNA6901                 | 72718                      | 2016.09.29 | 2017.09.28 |
| Amplifier                  | Agilent       | 8449B                   | 3008A02664                 | 2016.09.29 | 2017.09.28 |
| Filter                     | WAINWRIGHT    | WHKX1.0G<br>/15G- 10SS  | SN40                       | 2016.09.29 | 2017.09.28 |
| Test Receiver              | ROHDE&SCHWARZ | ESR                     | 1316.3003K03-<br>102082-Wa | 2016.09.29 | 2017.09.28 |
| Bilog Antenna              | SCHWARZBECK   | VULB 9168               | 9168-438                   | 2016.09.29 | 2017.09.28 |
| 9*6*6 anechoic<br>chamber  | CHENYU        | 9*6*6                   | N/A                        | 2016.7.21  | 2019.7.20  |
| RF Cable                   | Resenberger   | Cable 1                 | N/A                        | 2016.09.29 | 2017.09.28 |
| RF Cable                   | Resenberger   | Cable 2                 | N/A                        | 2016.09.29 | 2017.09.28 |
| RF Cable                   | Resenberger   | Cable 3                 | N/A                        | 2016.09.29 | 2017.09.28 |
| Power Sensor               | Power Radio   | RPR3006W                | 15100041SNO91              | 2016.09.29 | 2017.09.28 |
| Power Sensor               | Power Radio   | RPR3006W                | 15100041SNO92              | 2016.09.29 | 2017.09.28 |
| L.I.S.N.                   | SCHWARZBECK   | NSLK8126                | 8126-466                   | 2016.09.29 | 2017.09.28 |
| L.I.S.N.                   | ROHDE&SCHWARZ | ENV216                  | 101043                     | 2016.09.29 | 2017.09.28 |
| 20dB Attenuator            | ICPROBING     | IATS1                   | 82347                      | 2016.09.29 | 2017.09.28 |

### 3. Radiated emissions

#### 3.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

#### 15.205 Restricted frequency band

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

#### 15.209 Limit

| FREQUENCY<br>MHz | DISTANCE<br>Meters | FIELD STRENGTHS LIMIT                           |          |
|------------------|--------------------|---|----------|
|                  |                    | μV/m  | dB(μV)/m |
| 0.009-0.490      | 300                | 2400/F(KHz)                                     | /        |
| 0.490-1.705      | 30                 | 24000/F(KHz)                                    | /        |
| 1.705-30         | 30                 | 30  | 29.5     |
| 30 ~ 88          | 3                  | 100   | 40.0     |
| 88 ~ 216         | 3                  | 150   | 43.5     |
| 216 ~ 960        | 3                  | 200   | 46.0     |
| 960 ~ 1000       | 3                  | 500   | 54.0     |
| Above 1000       | 3                  | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) |          |

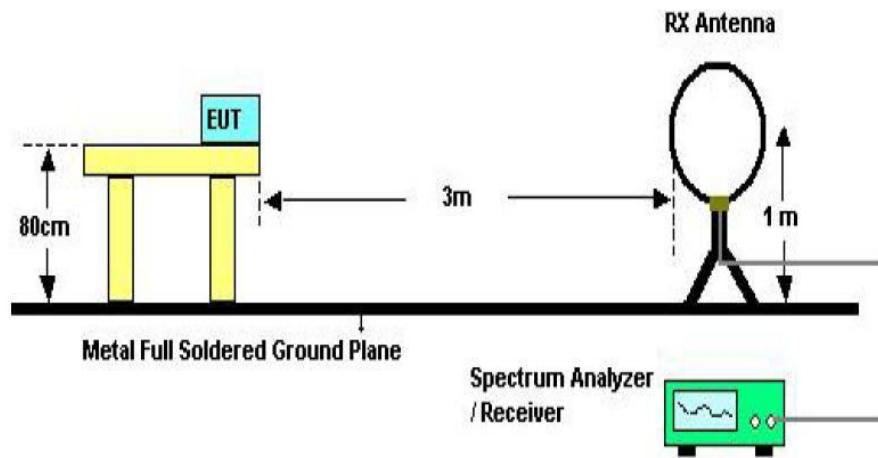
NOTE:

- The tighter limit applies at the band edges.
- Emission Level(dB uV/m)=20log Emission Level(uv/m)

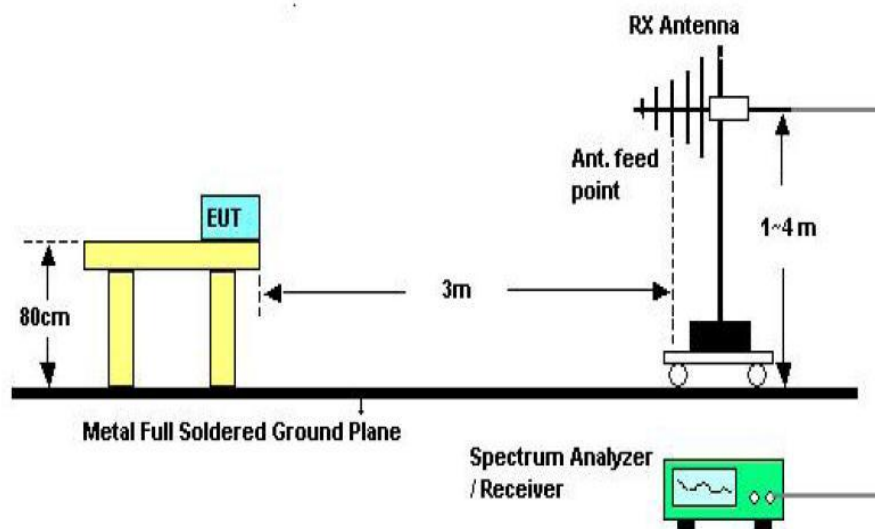
### 3.2. Test Procedure

- a) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation. The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.
- b) Change work frequency or channel of device if practicable. Change modulation type of device if practicable. Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.
- c) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
- d) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4:2014on Radiated Emission test.
- e) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

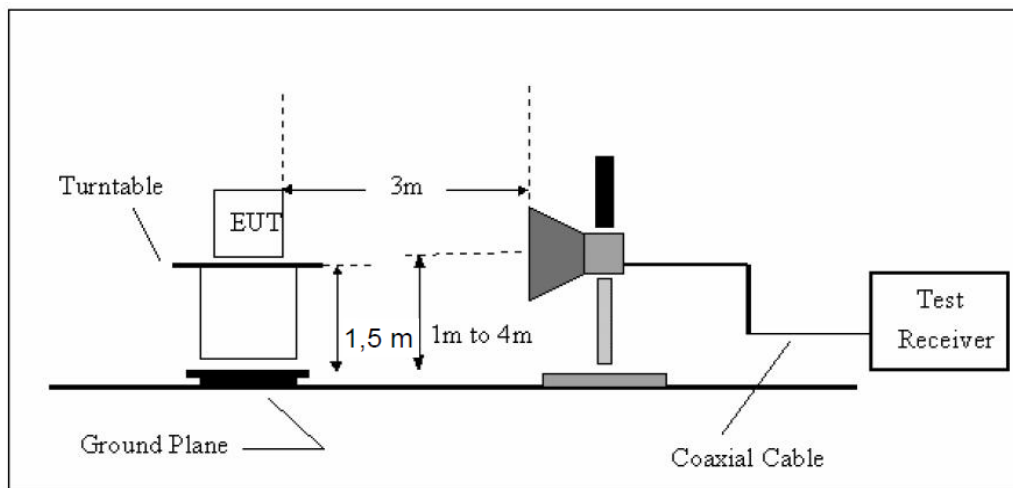
### 3.3. Block Diagram of Test setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

### 3.4. Test Results

We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

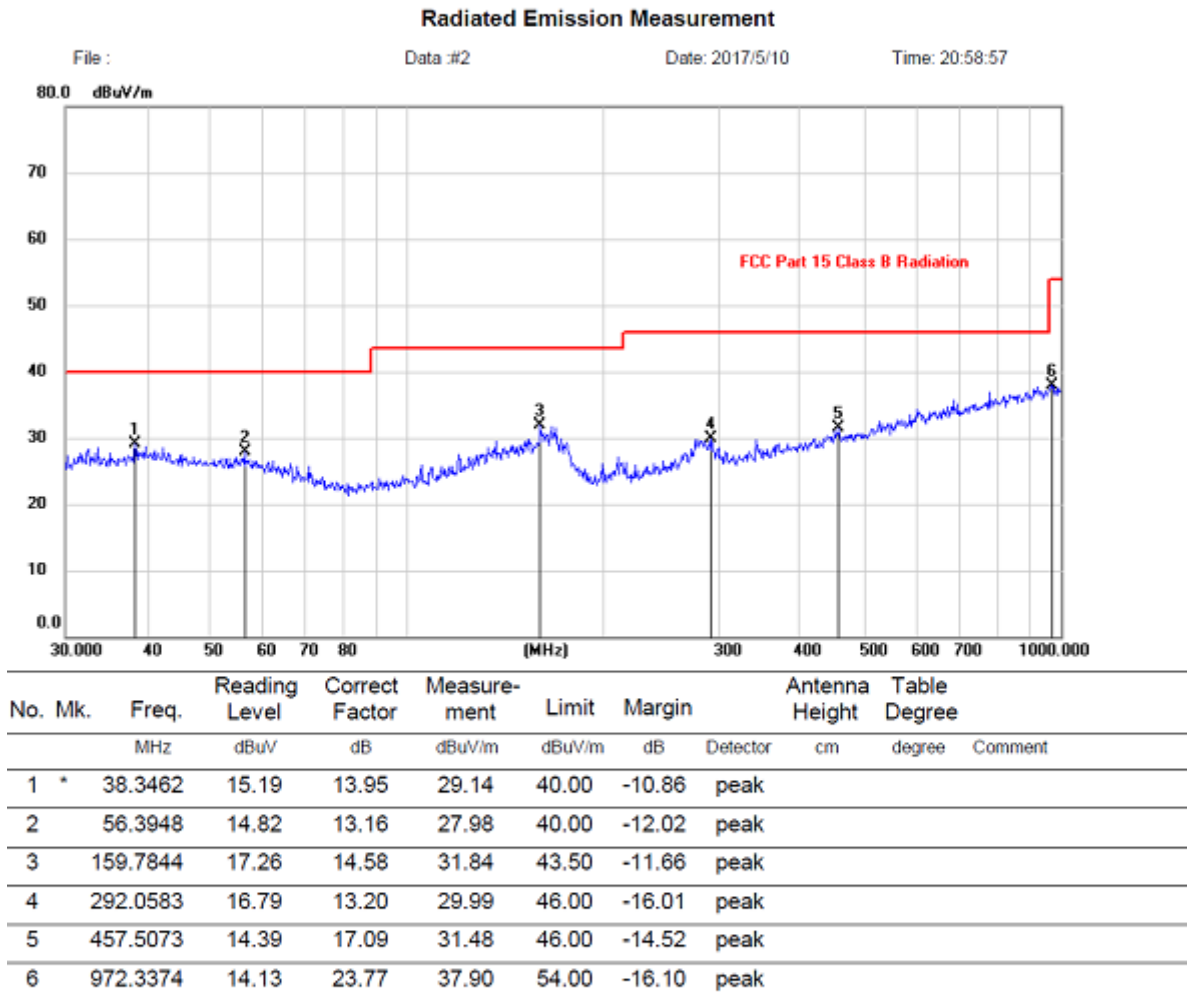
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Site LAB 966-2 Chamber  
 Limit: FCC Part 15 Class B Radiation  
 EUT:  
 M/N:  
 Mode:  
 Note:

Polarization: **Vertical**  
 Power: DC 12V  
 Distance:

Temperature: 23.8  
 Humidity: 56 %

Engineer Signature:





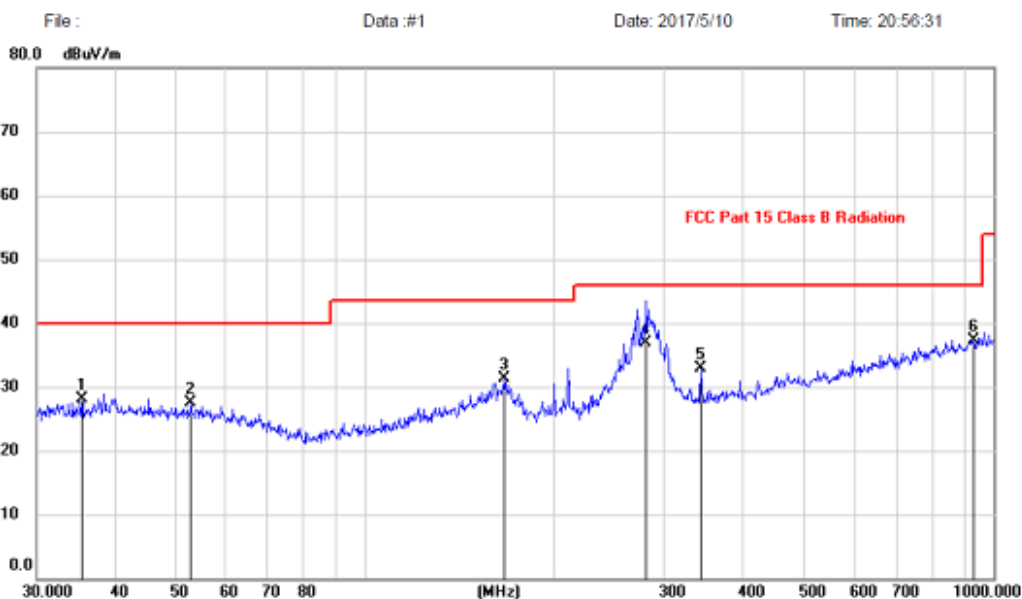
Site: LAB 966-2 Chamber  
 Limit: FCC Part 15 Class B Radiation  
 EUT:  
 M/N:  
 Mode:  
 Note:

Polarization: **Horizontal**  
 Power: DC 12V  
 Distance:

Temperature: 23.8  
 Humidity: 56 %

Engineer Signature:

**Radiated Emission Measurement**



| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement | Limit  | Margin | Antenna Height | Table Degree |         |
|-----|-----|----------|---------------|----------------|-------------|--------|--------|----------------|--------------|---------|
|     |     | MHz      | dBuV          | dB             | dBuV/m      | dBuV/m | dB     | cm             | degree       | Comment |
| 1   |     | 35.2512  | 14.60         | 13.51          | 28.11       | 40.00  | -11.89 |                |              | peak    |
| 2   |     | 52.7600  | 14.06         | 13.48          | 27.54       | 40.00  | -12.46 |                |              | peak    |
| 3   |     | 167.2368 | 17.21         | 14.00          | 31.21       | 43.50  | -12.29 |                |              | peak    |
| 4   |     | 280.0237 | 23.85         | 12.97          | 36.82       | 46.00  | -9.18  | 100            | 0            | QP      |
| 5   |     | 341.9786 | 18.45         | 14.43          | 32.88       | 46.00  | -13.12 |                |              | peak    |
| 6   | *   | 929.0082 | 14.05         | 23.31          | 37.36       | 46.00  | -8.64  |                |              | peak    |

Note:1. \*:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

**Notes:** Above is below 1GHz test data. This report only shall the worst case mode for TX 2402MHz.

From 1G-25GHz

|                    |                    |                          |         |
|--------------------|--------------------|--------------------------|---------|
| <b>EUT</b>         | Prodigi Connect 12 | <b>Model Name</b>        | PGI-400 |
| <b>Temperature</b> | 26°C               | <b>Relative Humidity</b> | 56%     |
| <b>Pressure</b>    | 960hPa             | <b>Test voltage</b>      | DC 12V  |
| <b>Test Mode</b>   | TX Low             |                          |         |

| Antenna Polarity: Vertical   |            |                     |                       |                |                 |                 |                |             |        |
|--|------------|---------------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|--------|
| No   | Freq (MHz) | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
| 1  | 4804       | 43.72               | 33.95                 | 10.18          | 34.26           | 53.59           | 74             | 20.41       | PK     |
| 2  | 4804       | 34.26               | 33.95                 | 10.18          | 34.26           | 44.13           | 54             | 9.87        | AV     |
| 3  | 7206       | /                   |                       |                |                 |                 |                |             |        |
| 4  | 9608       | /                   |                       |                |                 |                 |                |             |        |
| 5  | 12010      | /                   |                       |                |                 |                 |                |             |        |
| Antenna Polarity: Horizontal   |            |                     |                       |                |                 |                 |                |             |        |
| 1  | 4804       | 43.25               | 33.95                 | 10.18          | 34.26           | 53.12           | 74             | 20.88       | PK     |
| 2  | 4804       | 33.78               | 33.95                 | 10.18          | 34.26           | 43.65           | 54             | 10.35       | AV     |
| 3  | 7206       | /                   |                       |                |                 |                 |                |             |        |
| 4  | 9608       | /                   |                       |                |                 |                 |                |             |        |
| 5  | 12010      | /                   |                       |                |                 |                 |                |             |        |
| <p>Note:</p> <p>1, Measuring frequency from 1GHz to 25GHz</p> <p>2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK</p> <p>2, Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto, Detector: RMS</p> <p>3, Result = Read level + Antenna factor + cable loss - Amp factor</p> <p>4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.</p> |            |                     |                       |                |                 |                 |                |             |        |

|                    |                    |                          |         |
|--------------------|--------------------|--------------------------|---------|
| <b>EUT</b>         | Prodigi Connect 12 | <b>Model Name</b>        | PGI-400 |
| <b>Temperature</b> | 26°C               | <b>Relative Humidity</b> | 56%     |
| <b>Pressure</b>    | 960hPa             | <b>Test voltage</b>      | DC 12V  |
| <b>Test Mode</b>   | TX Mid             |                          |         |

| Antenna Polarity: Vertical  |            |                     |                       |                |                 |                 |                |             |        |
|---|------------|---------------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|--------|
| No  | Freq (MHz) | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
| 1   | 4880       | 41.25               | 33.93                 | 10.2           | 34.29           | 51.09           | 74             | 22.91       | PK     |
| 2   | 4880       | 32.73               | 33.93                 | 10.2           | 34.29           | 42.57           | 54             | 11.43       | AV     |
| 3   | 7320       | /                   |                       |                |                 |                 |                |             |        |
| 4   | 9760       | /                   |                       |                |                 |                 |                |             |        |
| 5   | 12200      | /                   |                       |                |                 |                 |                |             |        |
| Antenna Polarity: Horizontal  |            |                     |                       |                |                 |                 |                |             |        |
| 1   | 4880       | 42.40               | 33.93                 | 10.2           | 34.29           | 52.24           | 74             | 21.76       | PK     |
| 2   | 4880       | 32.67               | 33.93                 | 10.2           | 34.29           | 42.51           | 54             | 11.49       | AV     |
| 3   | 7320       | /                   |                       |                |                 |                 |                |             |        |
| 4   | 9760       | /                   |                       |                |                 |                 |                |             |        |
| 5   | 12200      | /                   |                       |                |                 |                 |                |             |        |
| Note:   |            |                     |                       |                |                 |                 |                |             |        |
| 1, Measuring frequency from 1GHz to 25GHz   |            |                     |                       |                |                 |                 |                |             |        |
| 2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,<br>Detector: PK              |            |                     |                       |                |                 |                 |                |             |        |
| 2, Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto,<br>Detector: RMS             |            |                     |                       |                |                 |                 |                |             |        |
| 3, Result = Read level + Antenna factor + cable loss - Amp factor                                 |            |                     |                       |                |                 |                 |                |             |        |
| 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit. |            |                     |                       |                |                 |                 |                |             |        |

|                    |                    |                          |         |
|--------------------|--------------------|--------------------------|---------|
| <b>EUT</b>         | Prodigi Connect 12 | <b>Model Name</b>        | PGI-400 |
| <b>Temperature</b> | 26°C               | <b>Relative Humidity</b> | 56%     |
| <b>Pressure</b>    | 960hPa             | <b>Test voltage</b>      | DC 12V  |
| <b>Test Mode</b>   | TX High            |                          |         |

## Antenna Polarity: Vertical

| No | Freq (MHz) | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss (dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|----|------------|---------------------|-----------------------|-----------------|-----------------|-----------------|----------------|-------------|--------|
| 1  | 4960       | 42.28               | 33.98                 | 10.22           | 34.25           | 52.23           | 74             | 21.77       | PK     |
| 2  | 4960       | 32.73               | 33.98                 | 10.22           | 34.25           | 42.68           | 54             | 11.32       | AV     |
| 3  | 7440       | /                   |                       |                 |                 |                 |                |             |        |
| 4  | 9920       | /                   |                       |                 |                 |                 |                |             |        |
| 5  | 12400      | /                   |                       |                 |                 |                 |                |             |        |

## Antenna Polarity: Horizontal

|   |       |       |       |       |       |       |    |       |    |
|---|-------|-------|-------|-------|-------|-------|----|-------|----|
| 1 | 4960  | 42.71 | 33.98 | 10.22 | 34.25 | 52.66 | 74 | 21.34 | PK |
| 2 | 4960  | 31.36 | 33.98 | 10.22 | 34.25 | 41.31 | 54 | 12.69 | AV |
| 3 | 7440  | /     |       |       |       |       |    |       |    |
| 4 | 9920  | /     |       |       |       |       |    |       |    |
| 5 | 12400 | /     |       |       |       |       |    |       |    |

## Note:

1, Measuring frequency from 1GHz to 25GHz

2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto, Detector: RMS

3, Result = Read level + Antenna factor + cable loss - Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

## 4. Power Line Conducted Emission

### 4.1. Limit

| Frequency<br>MHz | Limits dB( $\mu$ V) |               |
|------------------|---------------------|---------------|
|                  | Quasi-peak Level    | Average Level |
| 0.15 -0.50       | 66 -56*             | 56 - 46*      |
| 0.50 -5.00       | 56                  | 46            |
| 5.00 -30.00      | 60                  | 50            |

Notes: 1. \*Decreasing linearly with logarithm of frequency.

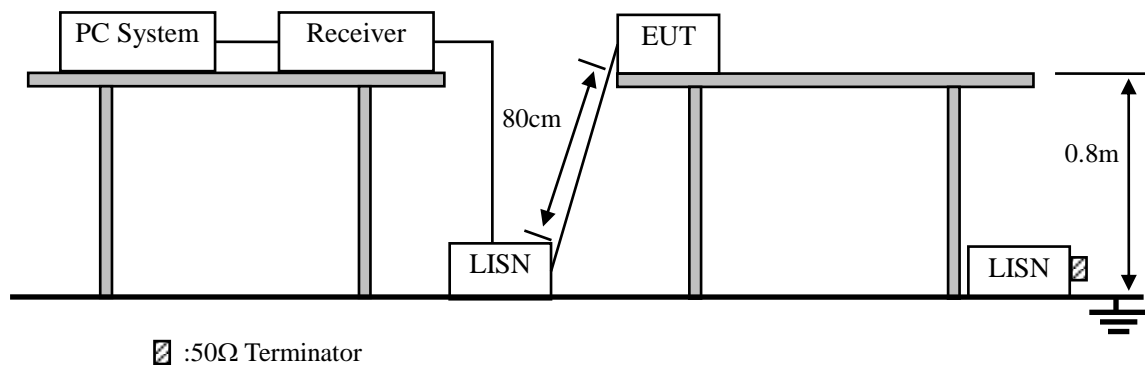
2. The lower limit shall apply at the transition frequencies.

3. The limit decreases in line with the logarithm of the frequency in rang of 0.15 to 0.50 MHz.

### 4.2. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 :2014on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

### 4.3. Block Diagram of Test setup



## 4.4. Test Results

Site LAB

Phase: **N**

Temperature: 24.2

Limit: EN55032 Class B Conduction(QP)

Power: DC 12V

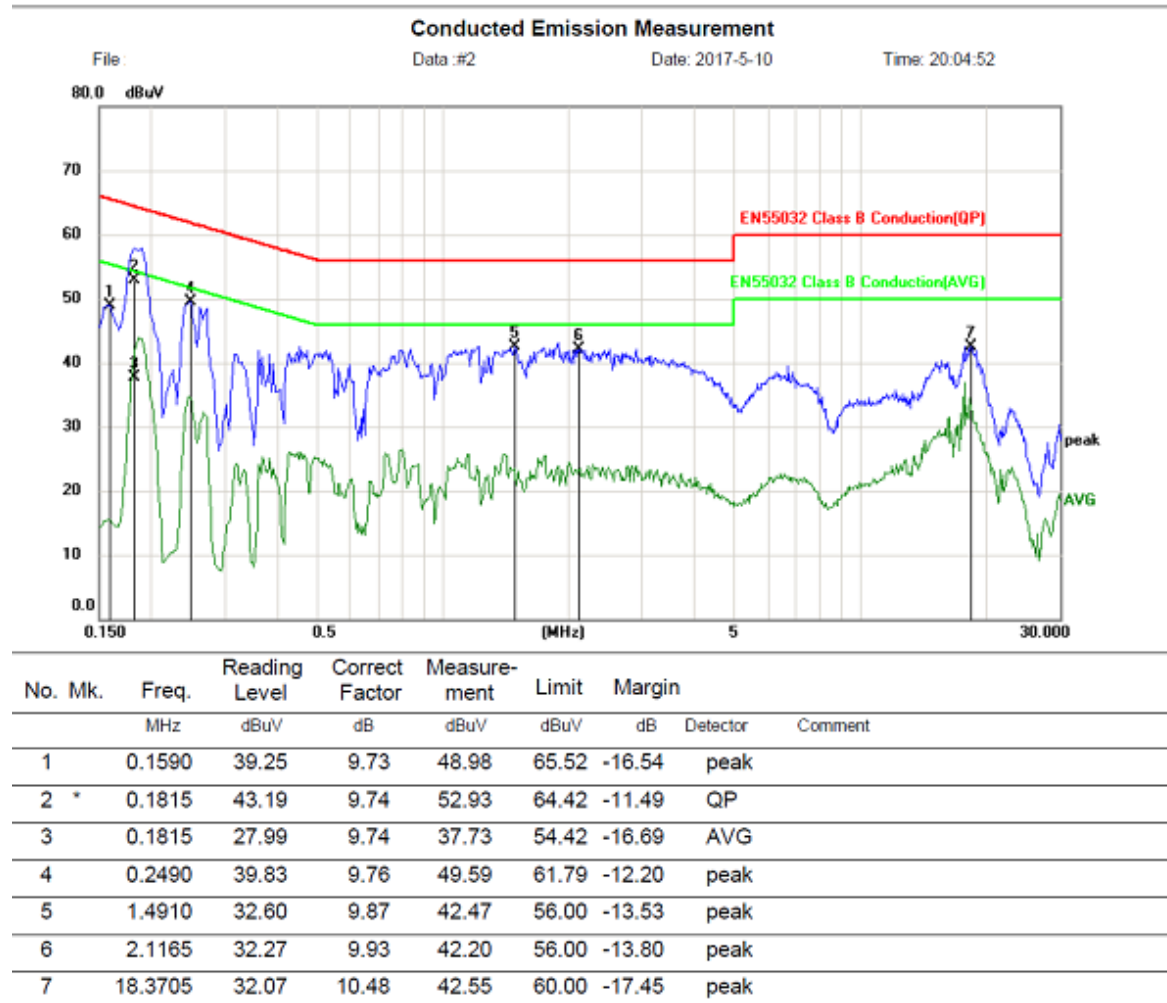
Humidity: 53 %

EUT:

M/N:

Mode:

Note:

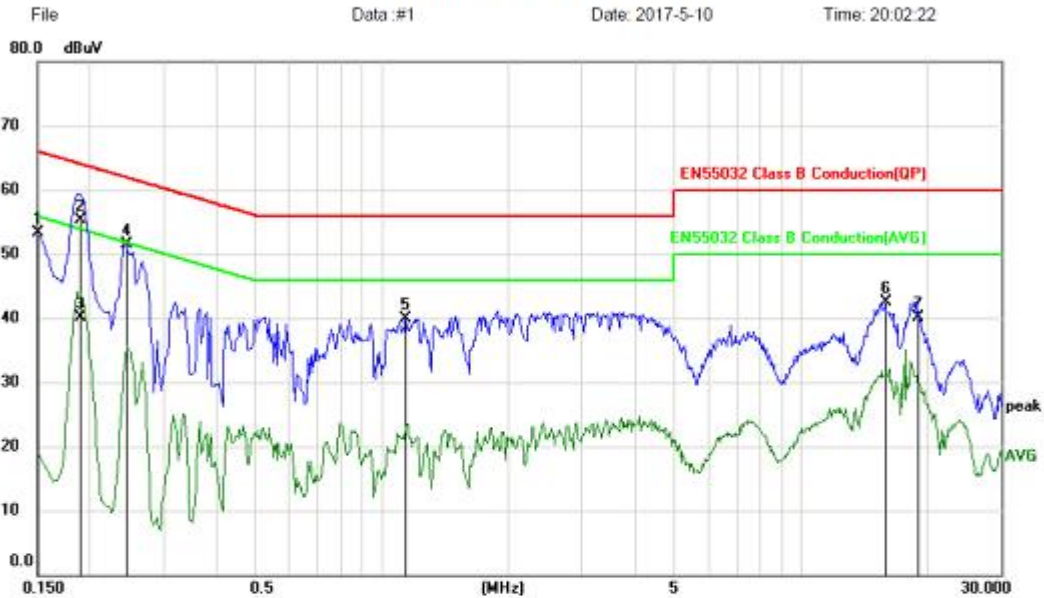


Site: LAB  
 Limit: EN55032 Class B Conduction(QP)  
 EUT:  
 M/N:  
 Mode:  
 Note:

Phase: **L1**  
 Power: DC 12V

Temperature: 24.2  
 Humidity: 53 %

**Conducted Emission Measurement**



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   |     | 0.1500       | 43.54                    | 9.73                    | 53.27                    | 66.00         | -12.73       | peak     |         |
| 2   | *   | 0.1905       | 45.47                    | 9.74                    | 55.21                    | 64.01         | -8.80        | QP       |         |
| 3   |     | 0.1905       | 30.29                    | 9.74                    | 40.03                    | 54.01         | -13.98       | AVG      |         |
| 4   |     | 0.2445       | 41.77                    | 9.76                    | 51.53                    | 61.94         | -10.41       | peak     |         |
| 5   |     | 1.1400       | 30.15                    | 9.84                    | 39.99                    | 56.00         | -16.01       | peak     |         |
| 6   |     | 15.9225      | 32.11                    | 10.47                   | 42.58                    | 60.00         | -17.42       | peak     |         |
| 7   |     | 19.0230      | 29.63                    | 10.49                   | 40.12                    | 60.00         | -19.88       | peak     |         |

## 5. Conducted Maximum Output Power

### 5.1. Test limit

Please refer section RSS-247 & 15.247.

### 5.2. Test Procedure

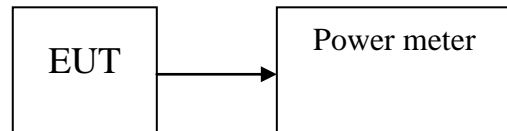
Details see the KDB558074 D01 DTS Meas Guidance v04

5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

### 5.3. Block Diagram of Test setup



### 5.4. Test Results

| Channel | Frequency (MHz) | PK Output Power (dBm) | PK Output Power (mW) | Limit (dBm) |
|---------|-----------------|-----------------------|----------------------|-------------|
| CH1     | 2402            | -3.307                | 0.467                | 21          |
| CH20    | 2440            | -2.843                | 0.520                | 21          |
| CH40    | 2480            | -3.219                | 0.477                | 21          |



## 6. Peak Power Spectral Density

### 6.1. Test limit

6.1.1 Please refer section RSS-247 & 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 6.2. Test Procedure

Details see the KDB 558074 D01 DTS Meas Guidance v04

6.2.1 Place the EUT on the table and set it in transmitting mode.

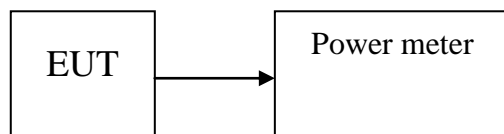
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, span=1.5 DTS BW, detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

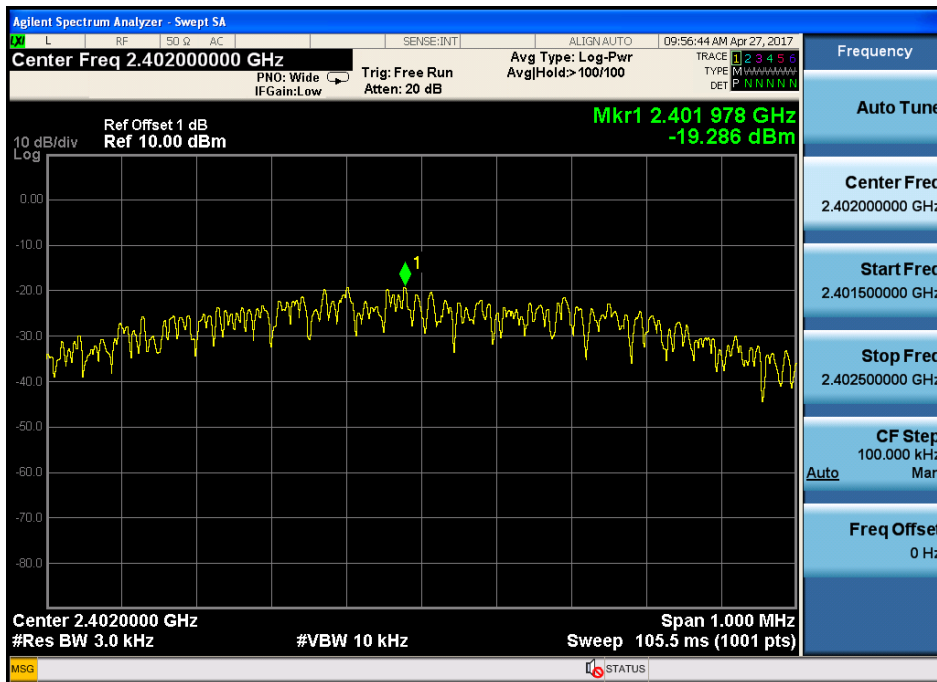
### 6.3. Block Diagram of Test setup



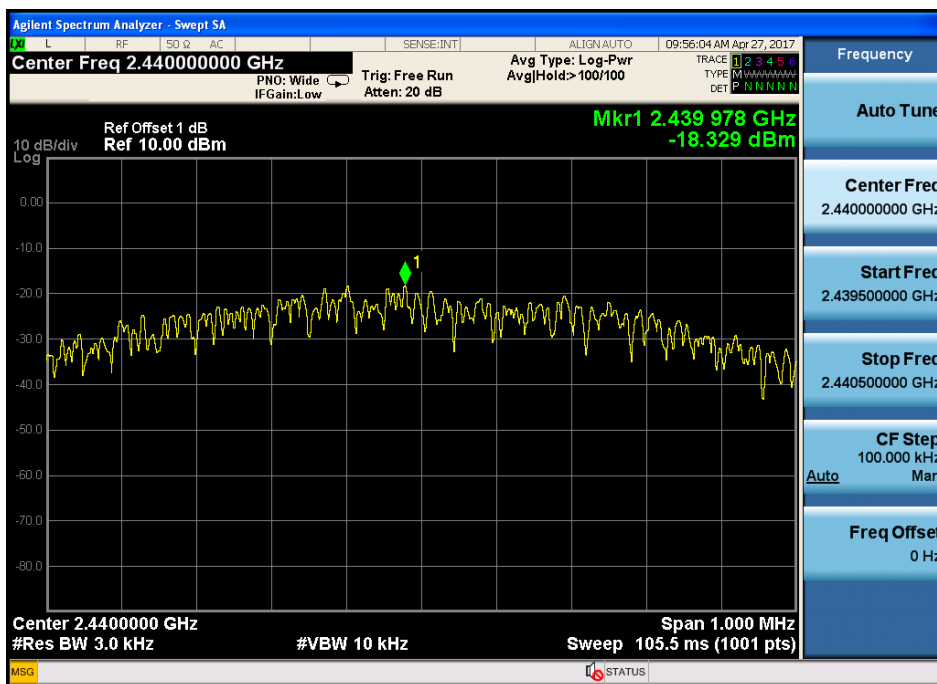
### 6.4. Test Results

| Channel | Frequency (MHz) | Power Spectral Density (dBm) | Limit (dBm) | Result |
|---------|-----------------|------------------------------|-------------|--------|
| CH1     | 2402            | -19.286                      | 8           | PASS   |
| CH20    | 2440            | -18.329                      | 8           | PASS   |
| CH40    | 2480            | -18.823                      | 8           | PASS   |

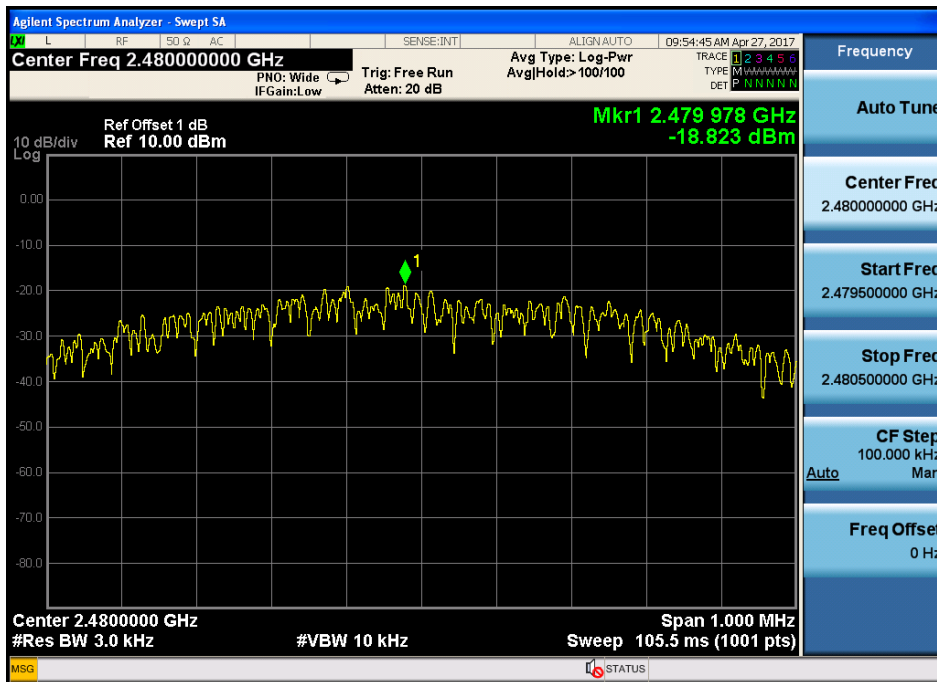
CH Low :



CH Mid:



CH Hig:



## 7. Bandwidth

### 7.1. Test limit

Please refer section RSS-247 & 15.247

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

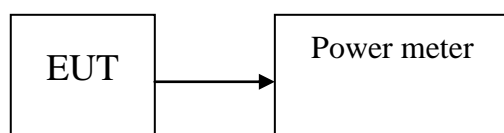
### 7.2. Test Procedure

Details see the KDB558074 DTS Meas Guidance V04.

a) The bandwidth is measured at an amplitude level reduced 20dB 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.

b) The test receiver set RBW = 100kHz, VBW=300kHz, Sweep time set auto, detail see the test plot.

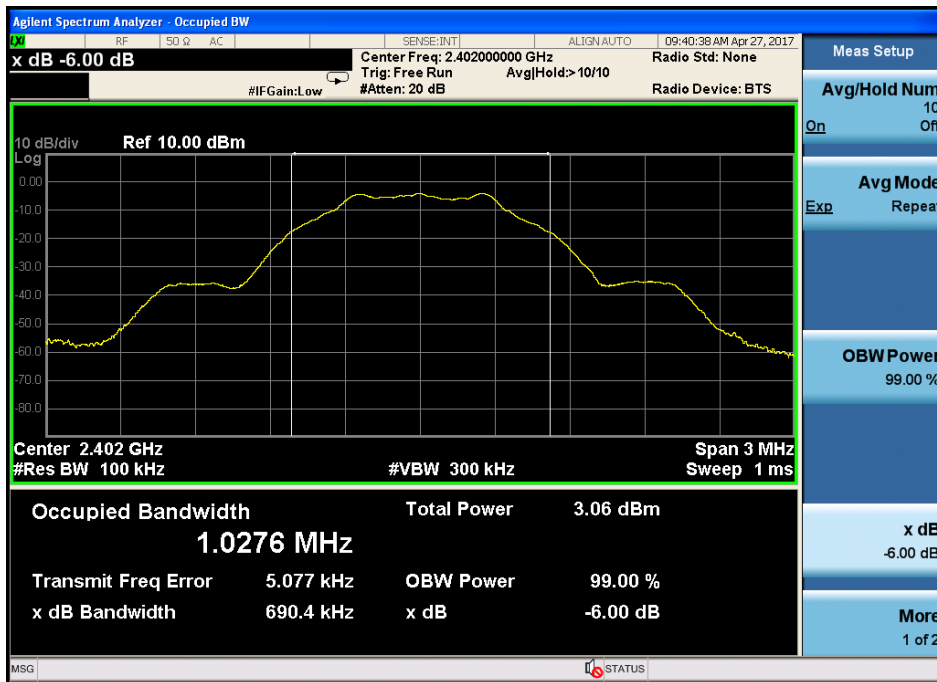
### 7.3. Block Diagram of Test setup



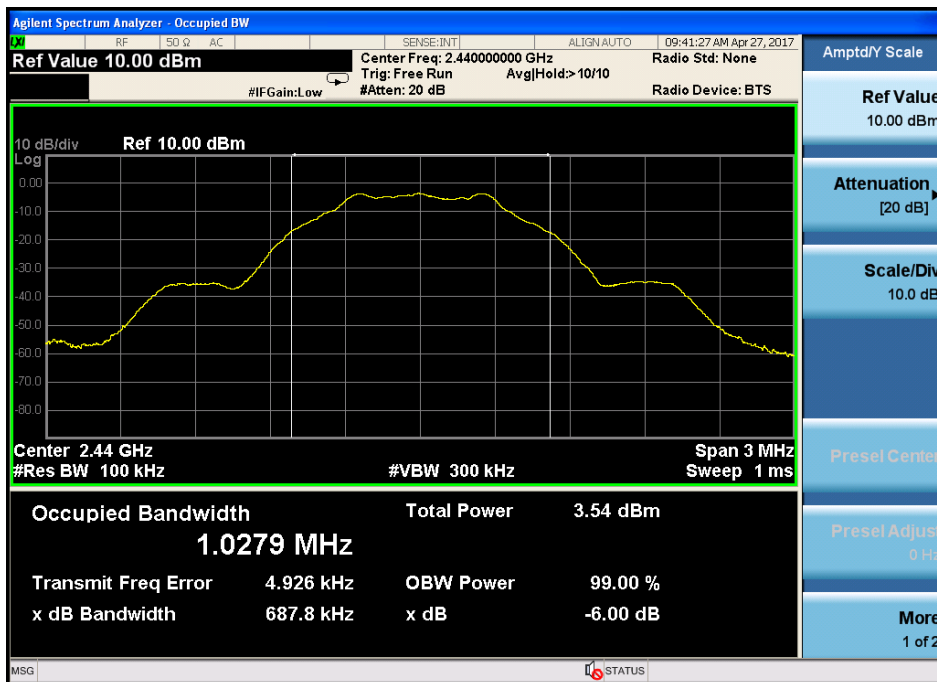
### 7.4. Test Results

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (MHz) | Result |
|---------|-----------------|---------------------|-------------|--------|
| CH1     | 2402            | 0.690               | 0.5         | PASS   |
| CH20    | 2440            | 0.688               | 0.5         | PASS   |
| CH40    | 2480            | 0.687               | 0.5         | PASS   |

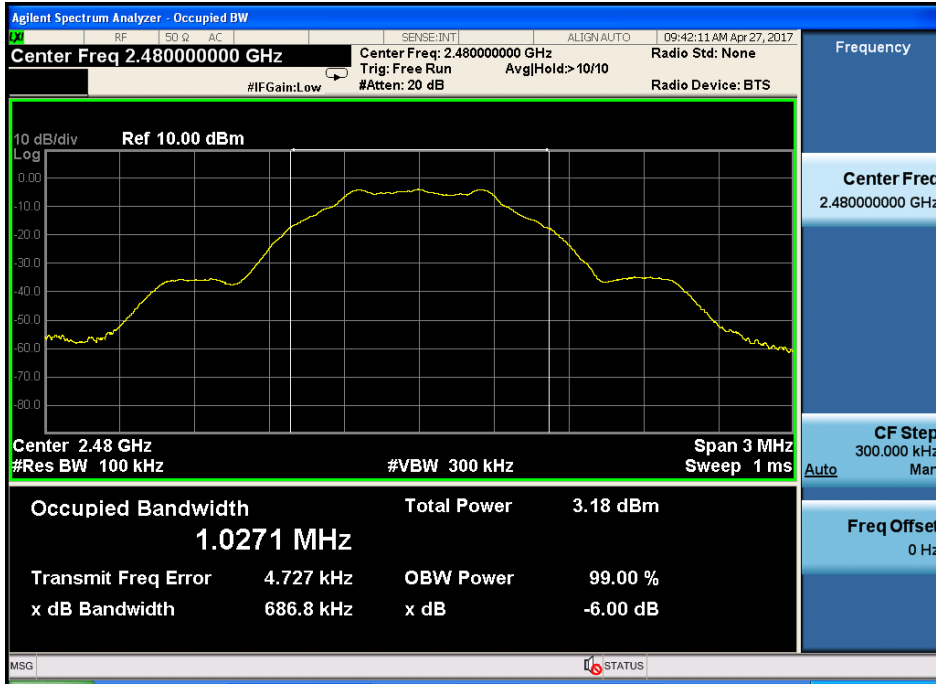
CH Low :



CH Mid :



CH High :



## 8. Band Edge Check

### 8.1. Test limit

Please refer section RSS-GEN&15.247.

### 8.2. Test Procedure

8.2.1 Put the EUT on a 0.8m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz ,VBW 3MHz ,peak detector for peak value, RBW 1MHz ,VBW 3MHz, RMS detector for AV value.

### 8.3. Block Diagram of Test setup

Same as 3.3.

### 8.4. Test Results

PASS.

Detailed information please see the following page.

Radiated Method:

GFSK

| Band Edge Test result   |                     |                       |                |                 |                 |                |             |           |
|---|---------------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|-----------|
| Test mode: Tx Low   |                     |                       |                |                 |                 |                |             |           |
| Antenna polarity: Vertical  |                     |                       |                |                 |                 |                |             |           |
| Freq (MHz)  | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark    |
| 2390  | 43.95               | 27.62                 | 3.92           | 34.97           | 40.52           | 74             | 33.48       | <b>PK</b> |
| 2390  | --                  | 27.62                 | 3.94           | 34.97           | --              | 54             | --          | AV        |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
| Antenna Polarity: Horizontal  |                     |                       |                |                 |                 |                |             |           |
| 2390  | 44.55               | 27.62                 | 3.92           | 34.97           | 41.12           | 74             | 32.88       | <b>PK</b> |
| 2390  | --                  | 27.62                 | 3.94           | 34.97           | --              | 54             | --          | AV        |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
| Note:   |                     |                       |                |                 |                 |                |             |           |
| 1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,<br>Detector: PK              |                     |                       |                |                 |                 |                |             |           |
| 2, Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto,<br>Detector: RMS             |                     |                       |                |                 |                 |                |             |           |
| 3, Result = Read level + Antenna factor + cable loss-Amp factor                                   |                     |                       |                |                 |                 |                |             |           |
| 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit. |                     |                       |                |                 |                 |                |             |           |



| Band Edge Test result   |                     |                       |                |                 |                 |                |             |           |
|---|---------------------|-----------------------|----------------|-----------------|-----------------|----------------|-------------|-----------|
| Test mode: Tx High  |                     |                       |                |                 |                 |                |             |           |
| Antenna polarity: Vertical  |                     |                       |                |                 |                 |                |             |           |
| Freq (MHz)  | Read Level (dBuV/m) | Antenna Factor (dB/m) | Cable loss(dB) | Amp Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark    |
| 2483.5  | 43.75               | 27.89                 | 4              | 34.97           | 40.67           | 74             | 33.33       | <b>PK</b> |
| 2483.5  | --                  | --                    | --             | --              | --              | 54             | --          | AV        |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
| Antenna Polarity: Horizontal  |                     |                       |                |                 |                 |                |             |           |
| 2483.5  | 43.66               | 27.89                 | 4              | 34.97           | 40.58           | 74             | 33.42       | <b>PK</b> |
| 2483.5  | --                  | --                    | --             | --              | --              | 54             | --          | AV        |
|   |                     |                       |                |                 |                 |                |             |           |
|   |                     |                       |                |                 |                 |                |             |           |
| Note:   |                     |                       |                |                 |                 |                |             |           |
| 1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto,<br>Detector: PK              |                     |                       |                |                 |                 |                |             |           |
| 2, Spectrum Set for AV measure: RBW=1MHz, VBW=3MHz, Sweep time=Auto,<br>Detector: RMS             |                     |                       |                |                 |                 |                |             |           |
| 3, Result = Read level + Antenna factor + cable loss-Amp factor                                   |                     |                       |                |                 |                 |                |             |           |
| 4, All the other emissions not reported were too low to read and deemed to comply with FCC limit. |                     |                       |                |                 |                 |                |             |           |



## 9. Antenna Requirement

### 9.1. Standard Requirement

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 9.2. Antenna Connected Construction

The antenna is PCB antenna and no consideration of replacement. Please see EUT photo for details.

### 9.3. Results

The EUT antenna is PCB Antenna. It comply with the standard requirement.

## 10. Photographs of Setup

Please refer to T1870080 04.

## 11. Photos of EUT

Please refer to T1870080 04.

**-----END OF REPORT-----**