



# NCC RADIO TEST REPORT

**Equipment** : 無線接入點  
**Brand Name** : riverbed  
**Model Name** : XD4240  
**Applicant** : RIVERBED TECHNOLOGY INC  
680 Folsom Street San Francisco, California 94107-1397, USA  
**Manufacturer** : RIVERBED TECHNOLOGY INC  
680 Folsom Street San Francisco, California 94107-1397, USA  
**Standard** : NCC LP0002 Section 3.10.1

The product was received on Mar. 08, 2016, and testing was started from Mar. 08, 2016 and completed on Apr. 18, 2018. We, SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013, NCC LP0002 (Jan. 10, 2018), KDB558074 D01 v04 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

**SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory**  
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## History of this test report

|                                |                             |
|--------------------------------|-----------------------------|
| TEL : 886-3-656-9065           | Page Number : 3 of 55       |
| FAX : 886-3-656-9085           | Issued Date : Apr. 27, 2018 |
| Report Template No.: CB Ver1.0 | Report Version : 01         |



## Summary of Test Result

| Report Clause                                             | Ref Std. Clause | Test Items                        | Result (PASS/FAIL) | Remark |
|-----------------------------------------------------------|-----------------|-----------------------------------|--------------------|--------|
| 2.1                                                       | 2.3             | AC Power Line Conducted Emissions | PASS               | -      |
| 2.2                                                       | 3.10.1.2        | Maximum Conducted Output Power    | PASS               | -      |
| 2.3                                                       | 3.10.1.6        | Power Spectral Density            | PASS               | -      |
| 2.4                                                       | 3.10.1.6        | 6dB Spectrum Bandwidth            | PASS               | -      |
| 2.5                                                       | 3.10.1.5        | Radiated Emissions                | PASS               | -      |
| 2.6                                                       | 3.10.1.5        | Band Edge Emissions               | PASS               | -      |
| 2.7                                                       | 3.10.1.4        | Antenna Requirements              | PASS               | -      |
| Note: This device contains four transmitter WLAN modules. |                 |                                   |                    |        |

**Reviewed by: Sam Chen**

**Report Producer: Sandy Chuang**

## 1. General Information

### 1.1. Product Details

| Items                          | Description                             |
|--------------------------------|-----------------------------------------|
| Power Type                     | From PoE                                |
| Modulation                     | DSSS                                    |
| Data Rate (Mbps)               | GFSK: 1                                 |
| Frequency Range                | 2402 ~ 2480MHz                          |
| Channel Number                 | 40 (37 hopping + 3 advertising channel) |
| Channel Band Width (99%)       | 1.05 MHz                                |
| Maximum Conducted Output Power | 10.08 dBm                               |
| Carrier Frequencies            | Please refer to section 1.4             |
| Antenna                        | Please refer to section 1.3             |

### 1.2. Accessories

| Others     |
|------------|
| Pedestal*1 |

### 1.3. Table for Filed Antenna

| Ant. | Brand  | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|--------|------------|--------------|-----------|------------|
| 1    | LITEON | WP8898-XS  | PIFA Antenna | I-PEX     | 2.3        |

### 1.4. Table for Carrier Frequencies

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|----------------|-------------|-----------|-------------|-----------|
| 2400~2483.5MHz | 0           | 2402 MHz  | 20          | 2442 MHz  |
|                | 1           | 2404 MHz  | :           | :         |
|                | 2           | 2406 MHz  | 37          | 2476 MHz  |
|                | :           | :         | 38          | 2478 MHz  |
|                | 18          | 2438 MHz  | 39          | 2480 MHz  |
|                | 19          | 2440 MHz  | -           | -         |

## 1.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items                                                        | Mode                | Data Rate | Channel | Ant. |
|-------------------------------------------------------------------|---------------------|-----------|---------|------|
| AC Power Line Conducted Emissions                                 | Intentional –CTX    | -         | -       | -    |
|                                                                   | Unintentional – CRX | -         | -       | -    |
| Maximum Conducted Output Power<br>Power Spectral Density          | GFSK                | 1 Mbps    | 0/20/39 | 1    |
| 6dB Spectrum Bandwidth                                            | GFSK                | 1 Mbps    | 0/20/39 | 1    |
| Radiated Emissions Below 1GHz                                     | Intentional – CTX   | -         | -       | -    |
|                                                                   | Unintentional – CRX | -         | -       | -    |
| Radiated Emissions<br>Unintentional 1GHz~5 <sup>th</sup> Harmonic | Unintentional – CRX | -         | -       | -    |
| Radiated Emissions 1GHz~10 <sup>th</sup><br>Harmonic              | GFSK                | 1 Mbps    | 0/20/39 | 1    |
| Band Edge Emissions                                               | GFSK                | 1 Mbps    | 0/20/39 | 1    |

The following test modes were performed for all tests:

### For Conducted Emission test:

Mode 1. EUT Intentional\_CTX

Mode 2. EUT Unintentional\_CRX

### For Radiated Emission test<Below 1GHz>:

Mode 1. EUT Intentional\_CTX\_X axis

Mode 2. EUT Intentional\_CTX\_Y axis

Mode 3. EUT Intentional\_CTX\_Z axis

Mode 4. EUT Unintentional\_CRX\_X axis

Mode 5. EUT Unintentional\_CRX\_Y axis

Mode 6. EUT Unintentional\_CRX\_Z axis

Mode 2 and Mode 5 generated the worst test result, so it was recorded in this report.

### For Radiated Emission test (Unintentional 1GHz~5<sup>th</sup> Harmonic)

Mode 1. EUT Unintentional\_CRX\_X axis

Mode 2. EUT Unintentional\_CRX\_Y axis



Mode 3. EUT Unintentional\_CRX\_Z axis

Mode 2 generated the worst test result, so it was recorded in this report.

**For Radiated Emission test<Above 1GHz>:**

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.

Mode 1. EUT Y axis – CTX

Note: The PoE is for measurement only, would not be marketed.

| Support Unit | Brand     | Model           | FCC ID |
|--------------|-----------|-----------------|--------|
| PoE          | Microsemi | PD-9501-10G     | N/A    |
| PoE          | HP        | PD-9001GR/AT/AC | N/A    |

**1.6. Table for Testing Locations**

| Test Site Location                                                           |                                                                            |          |                     |             |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|---------------------|-------------|
| Address:                                                                     | No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C. |          |                     |             |
| TEL:                                                                         | 886-3-656-9065                                                             |          |                     |             |
| FAX:                                                                         | 886-3-656-9085                                                             |          |                     |             |
| Test Site No.                                                                | Site Category                                                              | Location | FCC Designation No. | IC File No. |
| 10CH01-CB<br>(Below 1GHz and Unintentional<br>1GHz~5 <sup>th</sup> Harmonic) | SAC                                                                        | Hsin Chu | TW0006              | IC 4086D    |
| 03CH01-CB<br>(Intentional 1GHz~10 <sup>th</sup> Harmonic)                    | SAC                                                                        | Hsin Chu | TW0006              | IC 4086D    |
| CO01-CB<br>(CRX)                                                             | Conduction                                                                 | Hsin Chu | TW0006              | IC 4086D    |
| CO02-CB<br>(CTX)                                                             | Conduction                                                                 | Hsin Chu | TW0006              | IC 4086D    |
| TH01-CB                                                                      | OVEN Room                                                                  | Hsin Chu | -                   | -           |

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

## 1.7. Table for Supporting Units

For Test Site No: 10CH01-CB

Below 1GHz and Unintentional 1GHz~5<sup>th</sup> Harmonic

| Support Unit | Brand  | Model              | FCC ID |
|--------------|--------|--------------------|--------|
| NB*2         | DELL   | E6430              | DoC    |
| PoE          | HP     | PD-9001GR/AT/AC    | DoC    |
| Test fixture | LITEON | USB to RS232 Board | N/A    |

For Test Site No: 03CH01-CB

Intentional 1GHz~10<sup>th</sup> Harmonic

| Support Unit | Brand     | Model              | FCC ID |
|--------------|-----------|--------------------|--------|
| NB           | DELL      | E4300              | DoC    |
| Test fixture | Lite-On   | USB to RS232 Board | N/A    |
| PoE          | Microsemi | PD-9501-10G        | N/A    |

For Test Site No: CO01-CB

| Support Unit | Brand    | Model              | FCC ID |
|--------------|----------|--------------------|--------|
| NB*2         | DELL     | E6430              | DoC    |
| PoE          | HP       | PD-9001GR/AT/AC    | N/A    |
| Earphone     | e-Power  | S90W               | DoC    |
| Mouse        | Logitech | M-U0026            | DoC    |
| Test fixture | LITEON   | USB to RS232 Board | N/A    |

For Test Site No: CO02-CB

| Support Unit | Brand     | Model              | FCC ID |
|--------------|-----------|--------------------|--------|
| NB*2         | DELL      | E6430              | DoC    |
| PoE          | Microsemi | PD-9501-10G        | N/A    |
| Earphone     | e-Power   | S90W               | N/A    |
| Mouse        | Logitech  | M-U0026            | DoC    |
| Test fixture | Lite-On   | USB to RS232 Board | N/A    |

For Test Site No: TH01-CB

| Support Unit | Brand     | Model              | FCC ID |
|--------------|-----------|--------------------|--------|
| NB           | DELL      | E4300              | DoC    |
| PoE          | Microsemi | PD-9501-10G        | N/A    |
| Test fixture | Lite-On   | USB to RS232 Board | N/A    |



### 1.8. Table for Parameters of Test Software Setting

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

#### Power Parameters:

| Test Software Version | Bluetool1.8.7.2 |          |          |
|-----------------------|-----------------|----------|----------|
| Frequency             | 2402 MHz        | 2442 MHz | 2480 MHz |
| Power Parameters      | Default         | Default  | Default  |

### 1.9. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

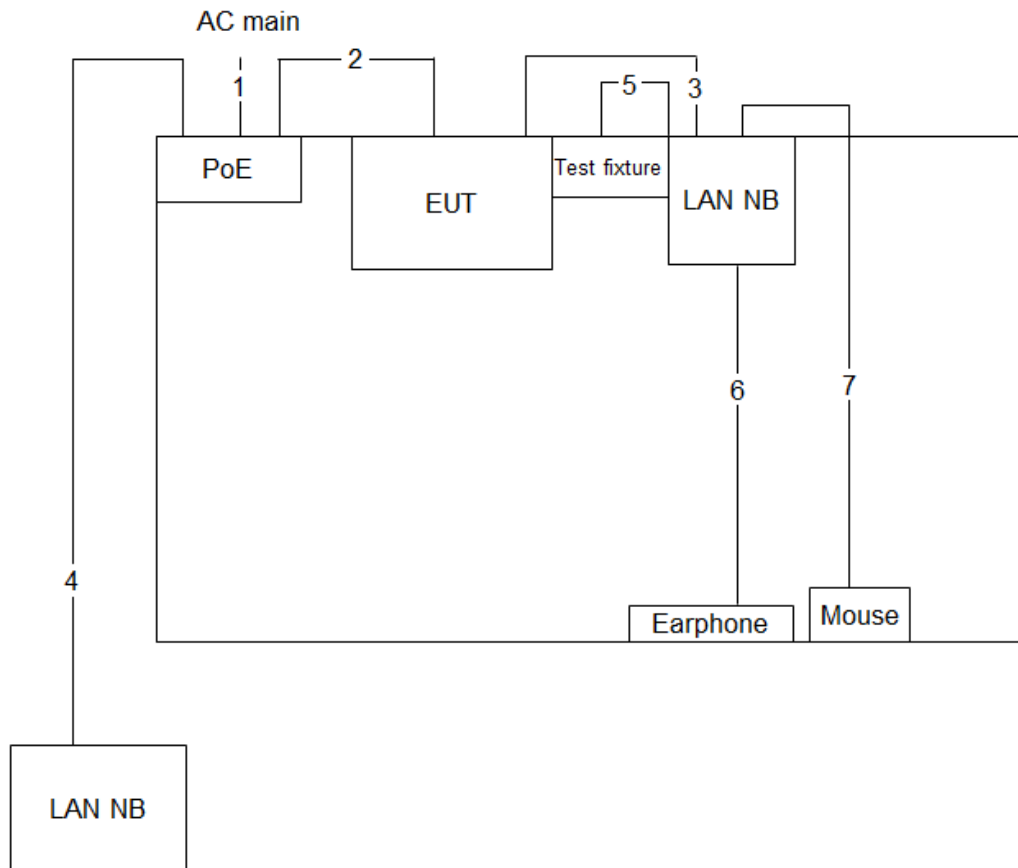
### 1.10. Duty Cycle

| Mode | On Time<br>(ms) | On+Off Time<br>(ms) | Duty Cycle<br>(%) | Duty Factor<br>(dB) | 1/T Minimum VBW<br>(kHz) |
|------|-----------------|---------------------|-------------------|---------------------|--------------------------|
| GFSK | 0.620           | 0.793               | 78.08%            | 1.07                | 1.61                     |

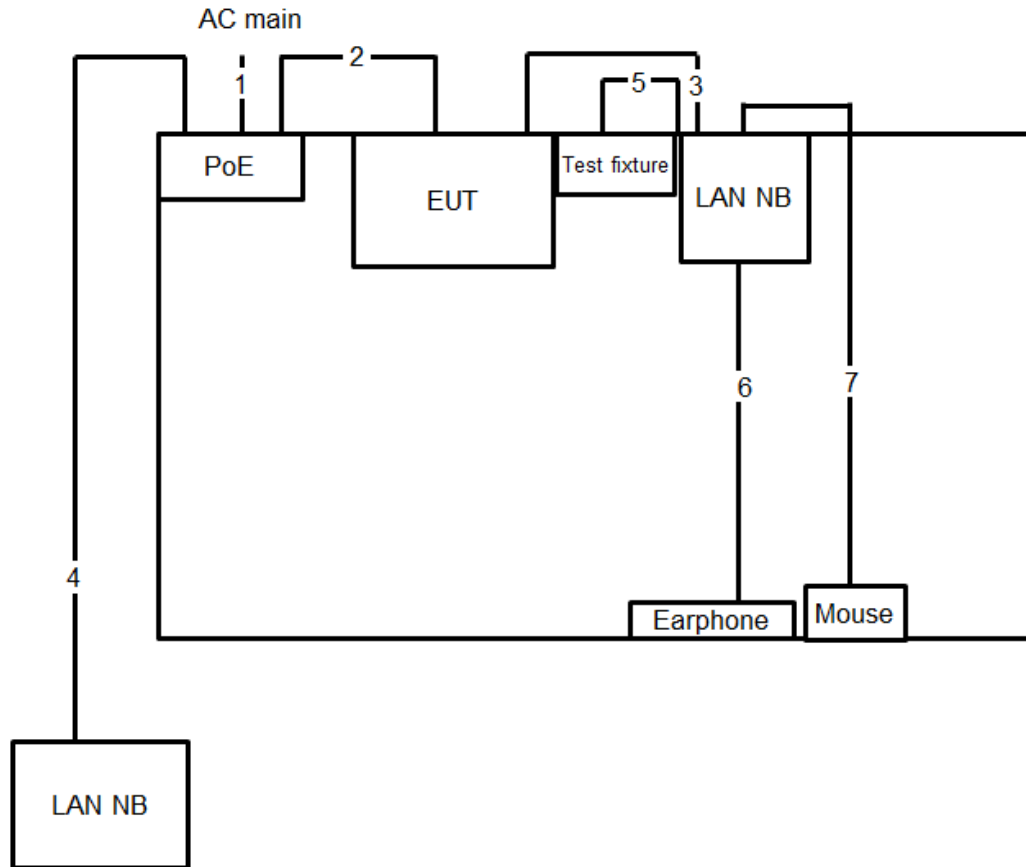
## 1.11. Test Configurations

### 1.11.1. AC Power Line Conduction Emissions Test Configuration

Intentional\_CTX:



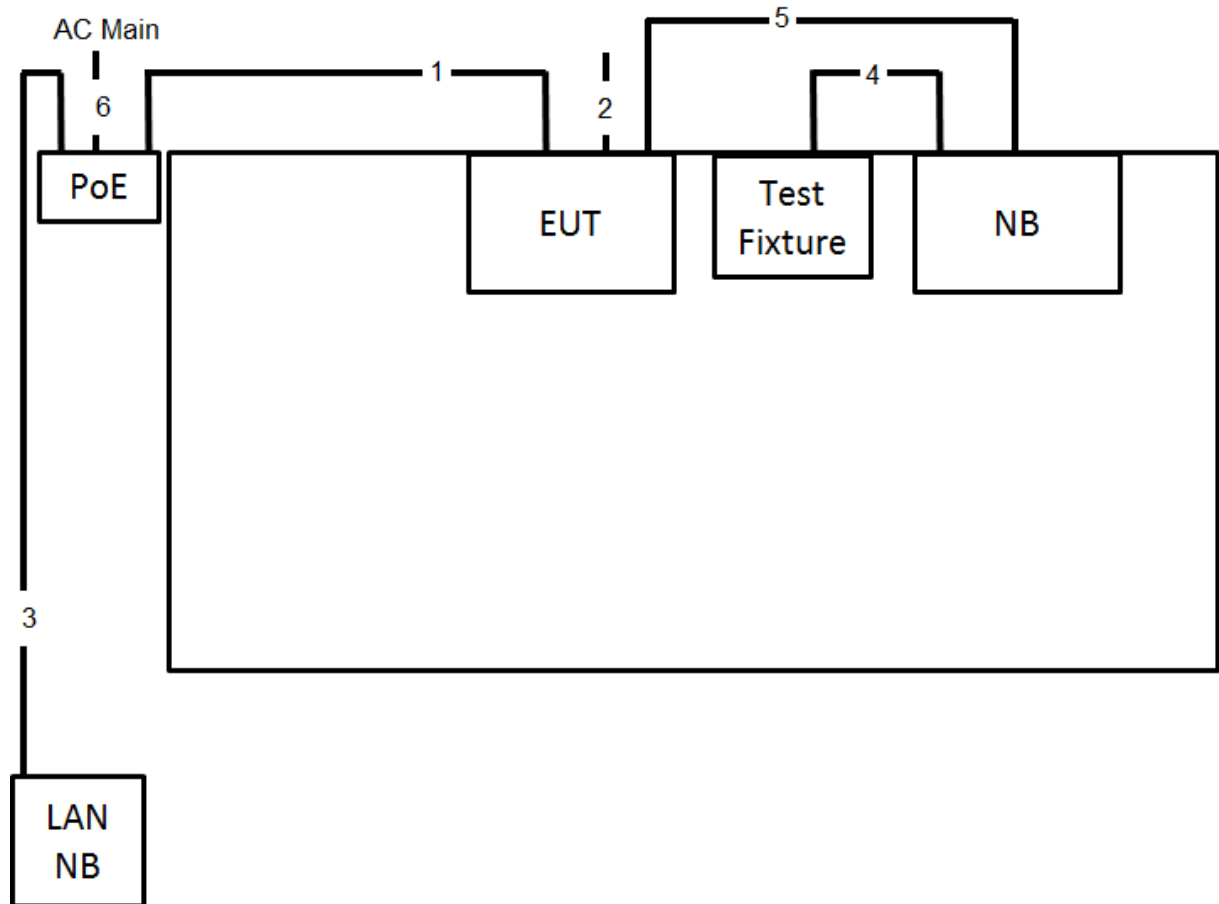
| Item | Connection      | Shielded | Length |
|------|-----------------|----------|--------|
| 1    | Power cable     | No       | 1.5m   |
| 2    | RJ-45 cable     | No       | 1.5m   |
| 3    | RJ-45 cable     | No       | 1.5m   |
| 4    | RJ-45 cable     | No       | 10m    |
| 5    | Micro USB cable | Yes      | 1.5m   |
| 6    | Audio cable     | Yes      | 1.4m   |
| 7    | USB cable       | No       | 1.8m   |

**Unintentional \_CRX:**


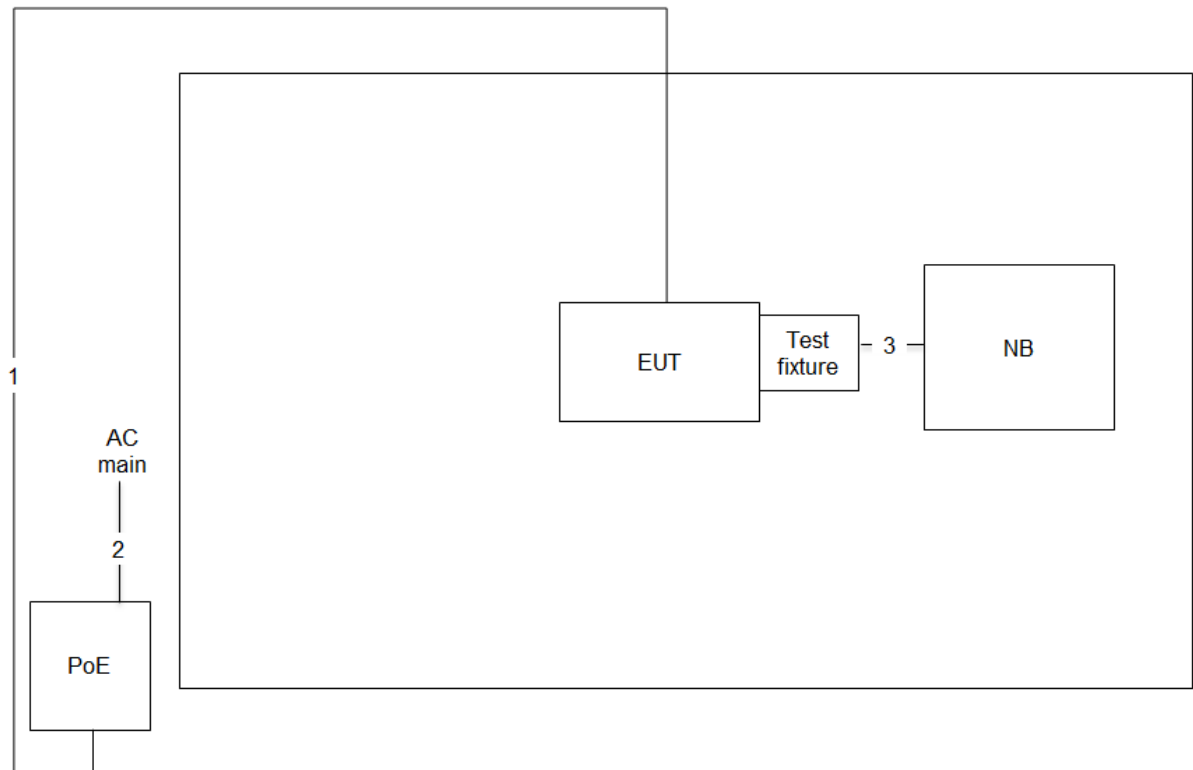
| Item | Connection      | Shielded | Length |
|------|-----------------|----------|--------|
| 1    | Power cable     | No       | 1.5m   |
| 2    | RJ-45 cable     | No       | 1.5m   |
| 3    | RJ-45 cable     | No       | 1.5m   |
| 4    | RJ-45 cable     | No       | 10m    |
| 5    | Micro USB cable | Yes      | 1m     |
| 6    | Audio cable     | No       | 1.4m   |
| 7    | USB cable       | Yes      | 1.8m   |

### 1.11.2. Radiation Emissions Test Configuration

Below 1GHz and Unintentional 1GHz~5<sup>th</sup> Harmonic:



| Item | Connection      | Shielded | Length |
|------|-----------------|----------|--------|
| 1    | RJ-45 cable     | No       | 10m    |
| 2    | RJ-45 cable     | No       | 1m     |
| 3    | RJ-45 cable     | No       | 10m    |
| 4    | Micro USB cable | Yes      | 1.5m   |
| 5    | RJ-45 cable     | No       | 1.5m   |
| 6    | Power cable     | No       | 1.5m   |

**Intentional 1GHz~10<sup>th</sup> Harmonic:**


| Item | Connection  | Shielded | Length |
|------|-------------|----------|--------|
| 1    | RJ-45 cable | No       | 10m    |
| 2    | Power cable | No       | 1.5m   |
| 3    | USB cable   | Yes      | 0.8m   |

## 2. Test Result

### 2.1. AC Power Line Conducted Emissions Measurement

#### 2.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

| Frequency (MHz) | QP Limit (dBuV) | AV Limit (dBuV) |
|-----------------|-----------------|-----------------|
| 0.15~0.5        | 66~56           | 56~46           |
| 0.5~5           | 56              | 46              |
| 5~30            | 60              | 50              |

#### 2.1.2. Measuring Instruments and Setting

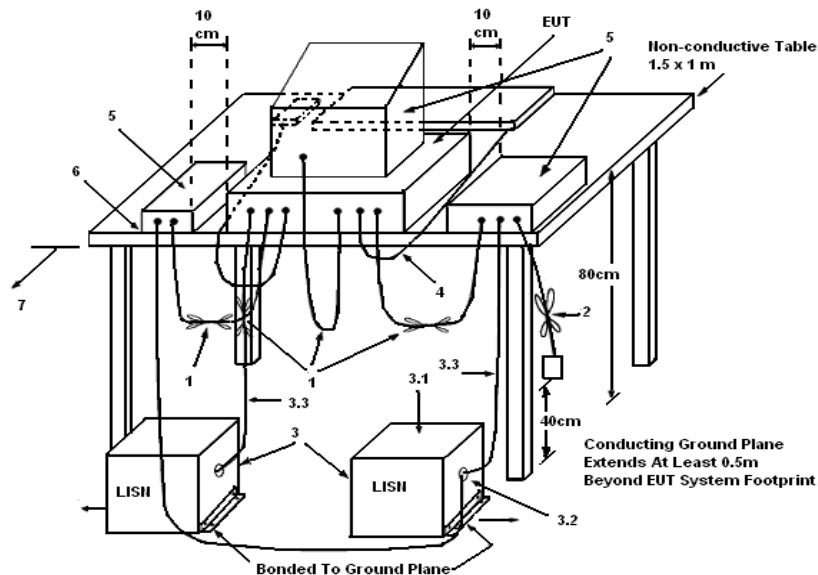
Please refer to section 3 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameters | Setting  |
|---------------------|----------|
| Attenuation         | 10 dB    |
| Start Frequency     | 0.15 MHz |
| Stop Frequency      | 30 MHz   |
| IF Bandwidth        | 9 kHz    |

#### 2.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

### 2.1.4. Test Setup Layout



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . LISN can be placed on top of, or immediately beneath, reference ground plane.
  - (3.1) All other equipment powered from additional LISN(s).
  - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
  - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

### 2.1.5. Test Deviation

There is no deviation with the original standard.

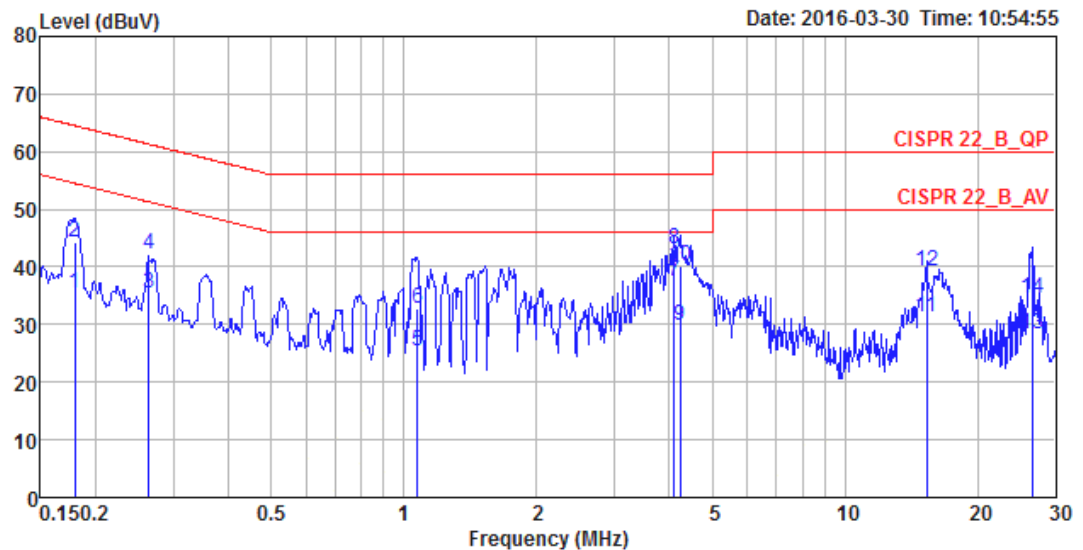
### 2.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.



### 2.1.7. Results of AC Power Line Conducted Emissions Measurement

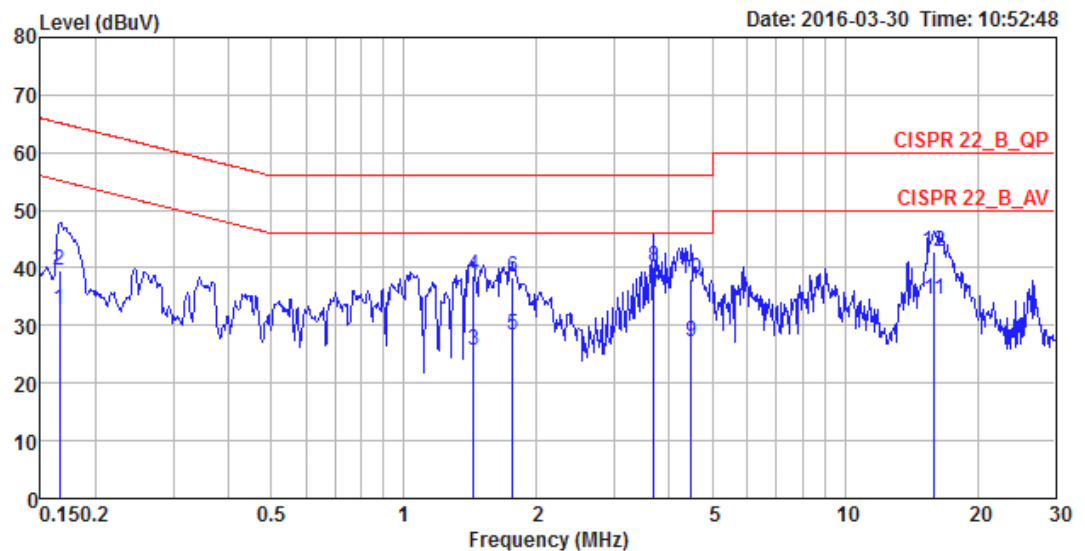
|               |                             |          |      |
|---------------|-----------------------------|----------|------|
| Temperature   | 22°C                        | Humidity | 57%  |
| Test Engineer | Kane Liu                    | Phase    | Line |
| Configuration | Mode 1. EUT Intentional_CTX |          |      |



|    | Freq    | Level | Over   | Limit | Read  | LISN   | Remark  | Cable |           |
|----|---------|-------|--------|-------|-------|--------|---------|-------|-----------|
|    | MHz     | dBuV  | Limit  | Line  | Level | Factor |         | Loss  | Pol/Phase |
|    |         |       | dB     | dBuV  | dBuV  | dB     |         | dB    |           |
| 1  | 0.1796  | 35.45 | -19.05 | 54.50 | 25.32 | 9.95   | Average | 0.18  | LINE      |
| 2  | 0.1796  | 44.40 | -20.10 | 64.50 | 34.27 | 9.95   | QP      | 0.18  | LINE      |
| 3  | 0.2644  | 35.29 | -16.00 | 51.29 | 25.13 | 9.97   | Average | 0.19  | LINE      |
| 4  | 0.2644  | 42.17 | -19.12 | 61.29 | 32.01 | 9.97   | QP      | 0.19  | LINE      |
| 5  | 1.0710  | 25.33 | -20.67 | 46.00 | 15.09 | 10.05  | Average | 0.19  | LINE      |
| 6  | 1.0710  | 32.70 | -23.30 | 56.00 | 22.46 | 10.05  | QP      | 0.19  | LINE      |
| 7  | 4.0920  | 37.63 | -8.37  | 46.00 | 27.19 | 10.11  | Average | 0.33  | LINE      |
| 8  | 4.0920  | 43.14 | -12.86 | 56.00 | 32.70 | 10.11  | QP      | 0.33  | LINE      |
| 9  | 4.2242  | 29.92 | -16.08 | 46.00 | 19.48 | 10.11  | Average | 0.33  | LINE      |
| 10 | 4.2242  | 40.08 | -15.92 | 56.00 | 29.64 | 10.11  | QP      | 0.33  | LINE      |
| 11 | 15.3070 | 31.40 | -18.60 | 50.00 | 20.73 | 10.23  | Average | 0.44  | LINE      |
| 12 | 15.3070 | 39.12 | -20.88 | 60.00 | 28.45 | 10.23  | QP      | 0.44  | LINE      |
| 13 | 26.5581 | 28.44 | -21.56 | 50.00 | 17.57 | 10.33  | Average | 0.54  | LINE      |
| 14 | 26.5581 | 34.41 | -25.59 | 60.00 | 23.54 | 10.33  | QP      | 0.54  | LINE      |



|                      |          |                 |         |
|----------------------|----------|-----------------|---------|
| <b>Temperature</b>   | 22°C     | <b>Humidity</b> | 57%     |
| <b>Test Engineer</b> | Kane Liu | <b>Phase</b>    | Neutral |
| <b>Configuration</b> | CTX      |                 |         |

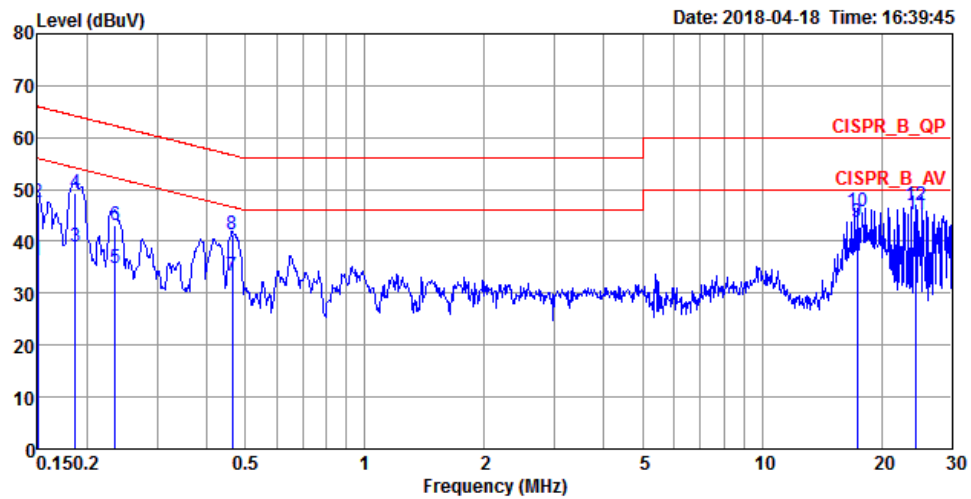


|    | Freq    | Level | Over   | Limit | Read  | LISN   | Remark  | Cable |           |
|----|---------|-------|--------|-------|-------|--------|---------|-------|-----------|
|    | MHz     | dBuV  | Limit  | Line  | Level | Factor |         | Loss  | Pol/Phase |
|    |         |       | dB     | dBuV  | dBuV  | dB     |         | dB    |           |
| 1  | 0.1659  | 32.85 | -22.31 | 55.16 | 22.73 | 9.96   | Average | 0.16  | NEUTRAL   |
| 2  | 0.1659  | 39.42 | -25.74 | 65.16 | 29.30 | 9.96   | QP      | 0.16  | NEUTRAL   |
| 3  | 1.4409  | 25.72 | -20.28 | 46.00 | 15.52 | 9.98   | Average | 0.22  | NEUTRAL   |
| 4  | 1.4409  | 38.55 | -17.45 | 56.00 | 28.35 | 9.98   | QP      | 0.22  | NEUTRAL   |
| 5  | 1.7623  | 28.25 | -17.75 | 46.00 | 18.02 | 9.99   | Average | 0.24  | NEUTRAL   |
| 6  | 1.7623  | 38.39 | -17.61 | 56.00 | 28.16 | 9.99   | QP      | 0.24  | NEUTRAL   |
| 7  | 3.6806  | 35.09 | -10.91 | 46.00 | 24.75 | 10.02  | Average | 0.32  | NEUTRAL   |
| 8  | 3.6806  | 40.07 | -15.93 | 56.00 | 29.73 | 10.02  | QP      | 0.32  | NEUTRAL   |
| 9  | 4.4777  | 27.01 | -18.99 | 46.00 | 16.64 | 10.04  | Average | 0.33  | NEUTRAL   |
| 10 | 4.4777  | 38.22 | -17.78 | 56.00 | 27.85 | 10.04  | QP      | 0.33  | NEUTRAL   |
| 11 | 15.9698 | 34.54 | -15.46 | 50.00 | 23.85 | 10.24  | Average | 0.45  | NEUTRAL   |
| 12 | 15.9698 | 42.78 | -17.22 | 60.00 | 32.09 | 10.24  | QP      | 0.45  | NEUTRAL   |

Note: Level = Read Level + LISN Factor + Cable Loss.



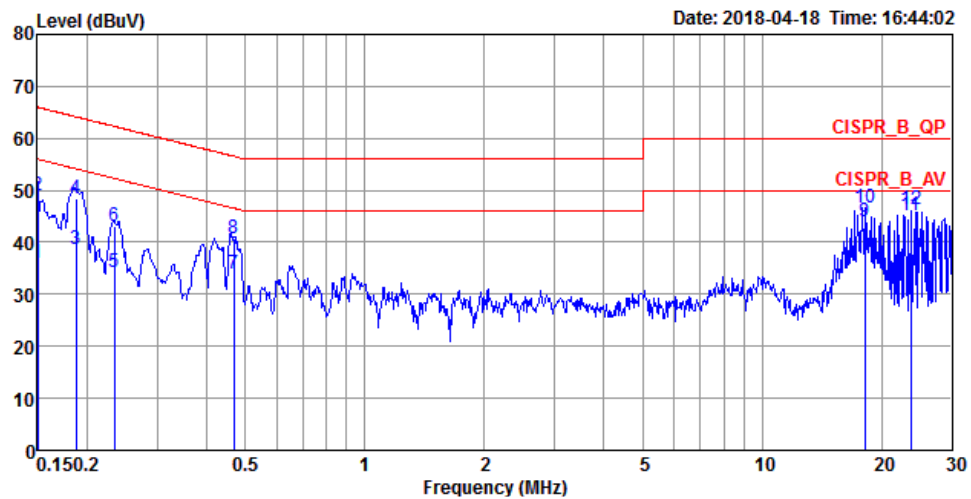
|                      |                               |                 |      |
|----------------------|-------------------------------|-----------------|------|
| <b>Temperature</b>   | 24°C                          | <b>Humidity</b> | 56%  |
| <b>Test Engineer</b> | Howard Liu                    | <b>Phase</b>    | Line |
| <b>Configuration</b> | Mode 2. EUT Unintentional_CRX |                 |      |



|    | Freq    | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  | Pol/Phase |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|-----------|
|    | MHz     | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |           |
| 1  | 0.1500  | 36.26 | -19.74     | 56.00      | 26.19      | 9.91        | 0.16       | Average | LINE      |
| 2  | 0.1500  | 47.58 | -18.42     | 66.00      | 37.51      | 9.91        | 0.16       | QP      | LINE      |
| 3  | 0.1864  | 38.96 | -15.24     | 54.20      | 28.91      | 9.91        | 0.14       | Average | LINE      |
| 4  | 0.1864  | 49.16 | -15.04     | 64.20      | 39.11      | 9.91        | 0.14       | QP      | LINE      |
| 5  | 0.2353  | 34.91 | -17.35     | 52.26      | 24.90      | 9.91        | 0.10       | Average | LINE      |
| 6  | 0.2353  | 43.21 | -19.05     | 62.26      | 33.20      | 9.91        | 0.10       | QP      | LINE      |
| 7  | 0.4637  | 33.33 | -13.30     | 46.63      | 23.38      | 9.91        | 0.04       | Average | LINE      |
| 8  | 0.4637  | 41.40 | -15.23     | 56.63      | 31.45      | 9.91        | 0.04       | QP      | LINE      |
| 9  | 17.3248 | 43.54 | -6.46      | 50.00      | 33.03      | 10.32       | 0.19       | Average | LINE      |
| 10 | 17.3248 | 45.86 | -14.14     | 60.00      | 35.35      | 10.32       | 0.19       | QP      | LINE      |
| 11 | 24.4113 | 45.15 | -4.85      | 50.00      | 34.39      | 10.52       | 0.24       | Average | LINE      |
| 12 | 24.4113 | 46.93 | -13.07     | 60.00      | 36.17      | 10.52       | 0.24       | QP      | LINE      |



|                      |                                |                 |         |
|----------------------|--------------------------------|-----------------|---------|
| <b>Temperature</b>   | 24°C                           | <b>Humidity</b> | 56%     |
| <b>Test Engineer</b> | Howard Liu                     | <b>Phase</b>    | Neutral |
| <b>Configuration</b> | Mode 2. EUT Unintentional _CRX |                 |         |



|    | Freq    | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark  | Pol/Phase |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|-----------|
|    | MHz     | dBuV  | dB         | dBuV       | dBuV       | dB          | dB         |         |           |
| 1  | 0.1500  | 36.11 | -19.89     | 56.00      | 26.03      | 9.92        | 0.16       | Average | NEUTRAL   |
| 2  | 0.1500  | 49.12 | -16.88     | 66.00      | 39.04      | 9.92        | 0.16       | QP      | NEUTRAL   |
| 3  | 0.1874  | 38.67 | -15.48     | 54.15      | 28.61      | 9.92        | 0.14       | Average | NEUTRAL   |
| 4  | 0.1874  | 48.49 | -15.66     | 64.15      | 38.43      | 9.92        | 0.14       | QP      | NEUTRAL   |
| 5  | 0.2341  | 34.23 | -18.07     | 52.30      | 24.21      | 9.92        | 0.10       | Average | NEUTRAL   |
| 6  | 0.2341  | 43.01 | -19.29     | 62.30      | 32.99      | 9.92        | 0.10       | QP      | NEUTRAL   |
| 7  | 0.4686  | 33.94 | -12.60     | 46.54      | 23.98      | 9.92        | 0.04       | Average | NEUTRAL   |
| 8  | 0.4686  | 40.67 | -15.87     | 56.54      | 30.71      | 9.92        | 0.04       | QP      | NEUTRAL   |
| 9  | 18.1155 | 44.01 | -5.99      | 50.00      | 33.59      | 10.22       | 0.20       | Average | NEUTRAL   |
| 10 | 18.1155 | 46.51 | -13.49     | 60.00      | 36.09      | 10.22       | 0.20       | QP      | NEUTRAL   |
| 11 | 23.6276 | 45.21 | -4.79      | 50.00      | 34.64      | 10.33       | 0.24       | Average | NEUTRAL   |
| 12 | 23.6276 | 46.28 | -13.72     | 60.00      | 35.71      | 10.33       | 0.24       | QP      | NEUTRAL   |

Note: Level = Read Level + LISN Factor + Cable Loss.

## 2.2. Maximum Conducted Output Power Measurement

### 2.2.1. Limit

The limit for output power is 30dBm.

### 2.2.2. Measuring Instruments and Setting

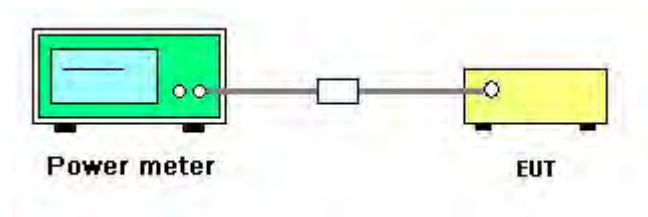
Please refer to section 3 of equipments list in this report. The following table is the setting of the power meter.

| Power Meter Parameter | Setting                                                    |
|-----------------------|------------------------------------------------------------|
| Bandwidth             | 50MHz bandwidth is greater than the EUT emission bandwidth |
| Detector              | Average                                                    |

### 2.2.3. Test Procedures

1. Test procedures refer KDB558074 D01 v04 section 9.2.3.2.
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

### 2.2.4. Test Setup Layout



### 2.2.5. Test Deviation

There is no deviation with the original standard.

### 2.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

**2.2.7. Test Result of Maximum Conducted Output Power**

|                      |                               |                       |      |
|----------------------|-------------------------------|-----------------------|------|
| <b>Temperature</b>   | 25°C                          | <b>Humidity</b>       | 59%  |
| <b>Test Engineer</b> | Peter Wu                      | <b>Configurations</b> | GFSK |
| <b>Test Date</b>     | Mar. 14, 2016 ~ Mar. 23, 2016 |                       |      |

| <b>Channel</b> | <b>Frequency</b> | <b>Conducted Power (dBm)</b> | <b>Max. Limit (dBm)</b> | <b>Result</b>   |
|----------------|------------------|------------------------------|-------------------------|-----------------|
| 0              | 2402 MHz         | 9.02                         | 30.00                   | <b>Complies</b> |
| 20             | 2442 MHz         | 9.93                         | 30.00                   | <b>Complies</b> |
| 39             | 2480 MHz         | 10.08                        | 30.00                   | <b>Complies</b> |

## 2.3. Power Spectral Density Measurement

### 2.3.1. Limit

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

### 2.3.2. Measuring Instruments and Setting

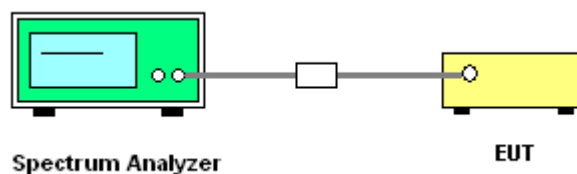
Please refer to section 3 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting                                            |
|--------------------|----------------------------------------------------|
| Attenuation        | Auto                                               |
| Span Frequency     | 5-30 % greater than the DTS channel bandwidth.     |
| RBW                | $3 \text{ kHz} \leq \text{RBW} \leq 100\text{kHz}$ |
| VBW                | $\geq 3 \times \text{RBW}$                         |
| Detector           | Peak                                               |
| Trace              | Max Hold                                           |
| Sweep Time         | Auto couple                                        |

### 2.3.3. Test Procedures

1. Test was performed in accordance with KDB558074 D01 v04 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 10.2 Method PKPSD (peak PSD).
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span/RBW}$  (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be  $\leq 8 \text{ dBm}$ .

### 2.3.4. Test Setup Layout





**2.3.5. Test Deviation**

There is no deviation with the original standard.

**2.3.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

**2.3.7. Test Result of Power Spectral Density**

|                      |          |                       |      |
|----------------------|----------|-----------------------|------|
| <b>Temperature</b>   | 25°C     | <b>Humidity</b>       | 59%  |
| <b>Test Engineer</b> | Peter Wu | <b>Configurations</b> | GFSK |

| <b>Channel</b> | <b>Frequency</b> | <b>Power Density (dBm/3kHz)</b> | <b>Power Density Limit (dBm/3kHz)</b> | <b>Result</b>   |
|----------------|------------------|---------------------------------|---------------------------------------|-----------------|
| 0              | 2402 MHz         | -11.38                          | 8.00                                  | <b>Complies</b> |
| 20             | 2442 MHz         | -10.98                          | 8.00                                  | <b>Complies</b> |
| 39             | 2480 MHz         | -10.86                          | 8.00                                  | <b>Complies</b> |

Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.



Power Density Plot on Configuration Bluetooth / 2480 MHz



Date: 27.MAR.2016 01:29:17

## 2.4. 6dB Spectrum Bandwidth Measurement

### 2.4.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

### 2.4.2. Measuring Instruments and Setting

Please refer to section 3 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 6dB Spectrum Bandwidth |                                |
|------------------------|--------------------------------|
| Spectrum Parameters    | Setting                        |
| Attenuation            | Auto                           |
| Span Frequency         | > 6dB Bandwidth                |
| RBW                    | 100kHz                         |
| VBW                    | $\geq 3 \times \text{RBW}$     |
| Detector               | Peak                           |
| Trace                  | Max Hold                       |
| Sweep Time             | Auto                           |
| 99% Occupied Bandwidth |                                |
| Spectrum Parameters    | Setting                        |
| Span                   | 1.5 times to 5.0 times the OBW |
| RBW                    | 1 % to 5 % of the OBW          |
| VBW                    | $\geq 3 \times \text{RBW}$     |
| Detector               | Peak                           |
| Trace                  | Max Hold                       |

### 2.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB558074 D01 v04 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth=> 8.1 Option 1.
3. Measured the spectrum width with power higher than 6dB below carrier.

### 2.4.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 2.5.4.



#### **2.4.5. Test Deviation**

There is no deviation with the original standard.

#### **2.4.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

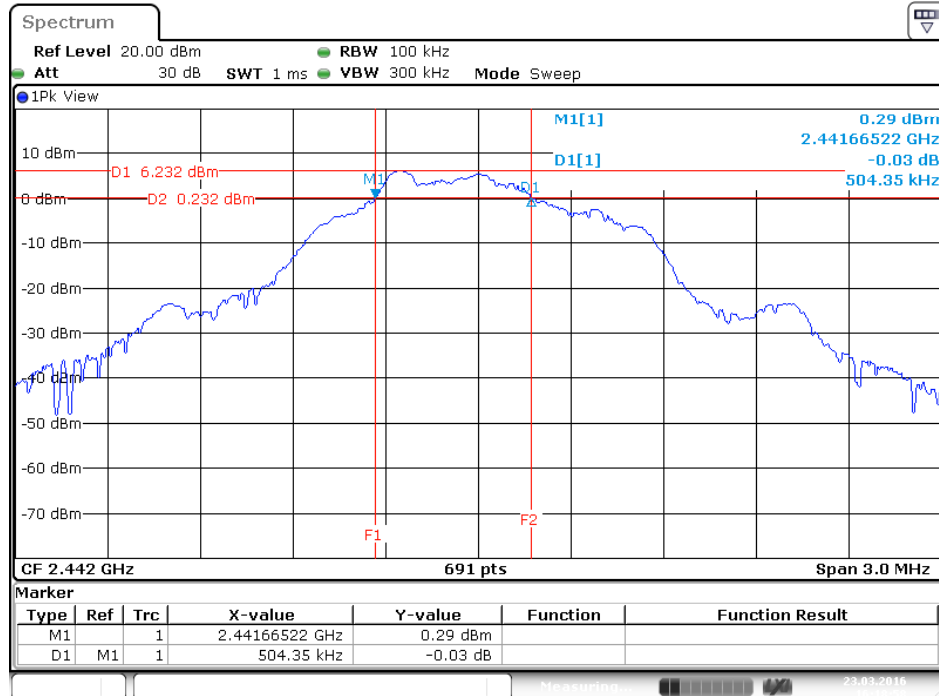
**2.4.7. Test Result of 6dB Spectrum Bandwidth**

|                      |          |                       |      |
|----------------------|----------|-----------------------|------|
| <b>Temperature</b>   | 25°C     | <b>Humidity</b>       | 59%  |
| <b>Test Engineer</b> | Peter Wu | <b>Configurations</b> | GFSK |

| <b>Channel</b> | <b>Frequency</b> | <b>6dB Bandwidth (MHz)</b> | <b>99% Occupied Bandwidth (MHz)</b> | <b>Min. Limit (kHz)</b> | <b>Test Result</b> |
|----------------|------------------|----------------------------|-------------------------------------|-------------------------|--------------------|
| 0              | 2402 MHz         | 0.51                       | 1.05                                | 500                     | <b>Complies</b>    |
| 20             | 2442 MHz         | 0.50                       | 1.05                                | 500                     | <b>Complies</b>    |
| 39             | 2480 MHz         | 0.51                       | 1.05                                | 500                     | <b>Complies</b>    |

Note: All the test values were listed in the report.

For plots, only the channel with worse result was shown.

**6 dB Bandwidth Plot on Configuration Bluetooth / 2442 MHz**

**99% Occupied Bandwidth Plot on Configuration Bluetooth / 2442 MHz**


## 2.5. Radiated Emissions Measurement

### 2.5.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

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

### 2.5.2. Measuring Instruments and Setting

Please refer to section 3 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter                          | Setting                                         |
|---------------------------------------------|-------------------------------------------------|
| Attenuation                                 | Auto                                            |
| Start Frequency                             | 1000 MHz                                        |
| Stop Frequency                              | 10th carrier harmonic                           |
| RBW / VBW (Emission in restricted band)     | 1MHz / 3MHz for Peak,<br>1MHz / 1/T for Average |
| RBW / VBW (Emission in non-restricted band) | 100kHz / 300kHz for peak                        |

| Receiver Parameter     | Setting                           |
|------------------------|-----------------------------------|
| Attenuation            | Auto                              |
| Start ~ Stop Frequency | 9kHz~150kHz / RBW 200Hz for QP    |
| Start ~ Stop Frequency | 150kHz~30MHz / RBW 9kHz for QP    |
| Start ~ Stop Frequency | 30MHz~1000MHz / RBW 120kHz for QP |



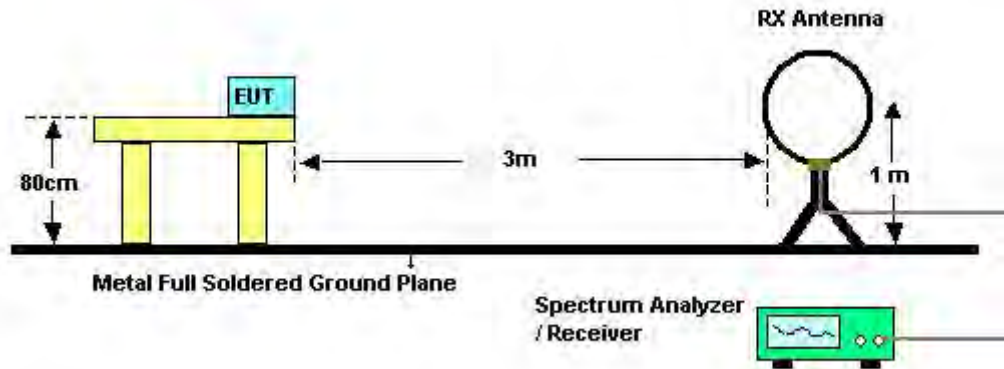
### **2.5.3. Test Procedures**

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 1/T VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

#### 2.5.4. Test Setup Layout

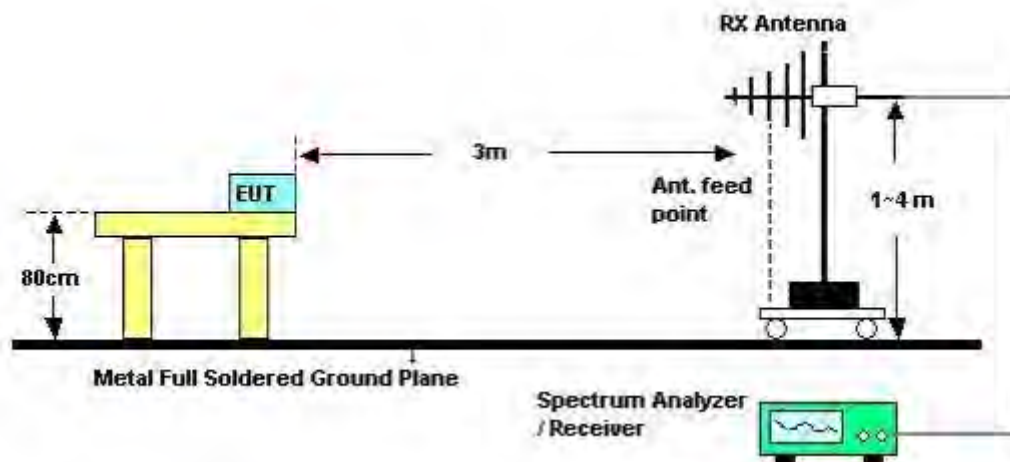
**For Radiated Emissions: 9kHz ~30MHz**

Intentional – CTX and Unintentional – CRX

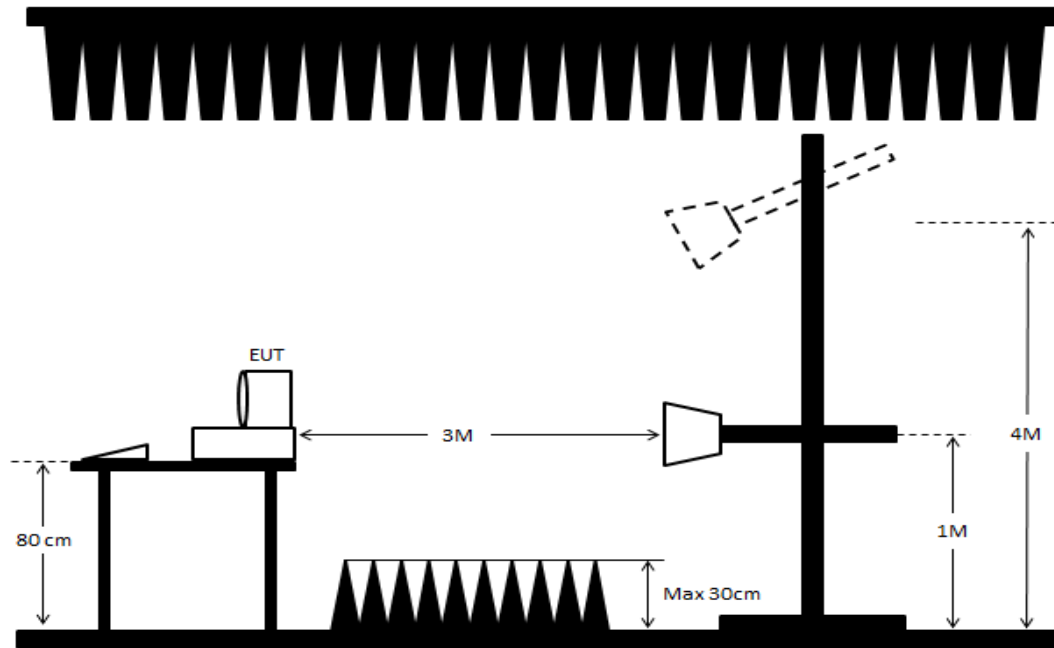


**For Radiated Emissions: 30MHz~1GHz**

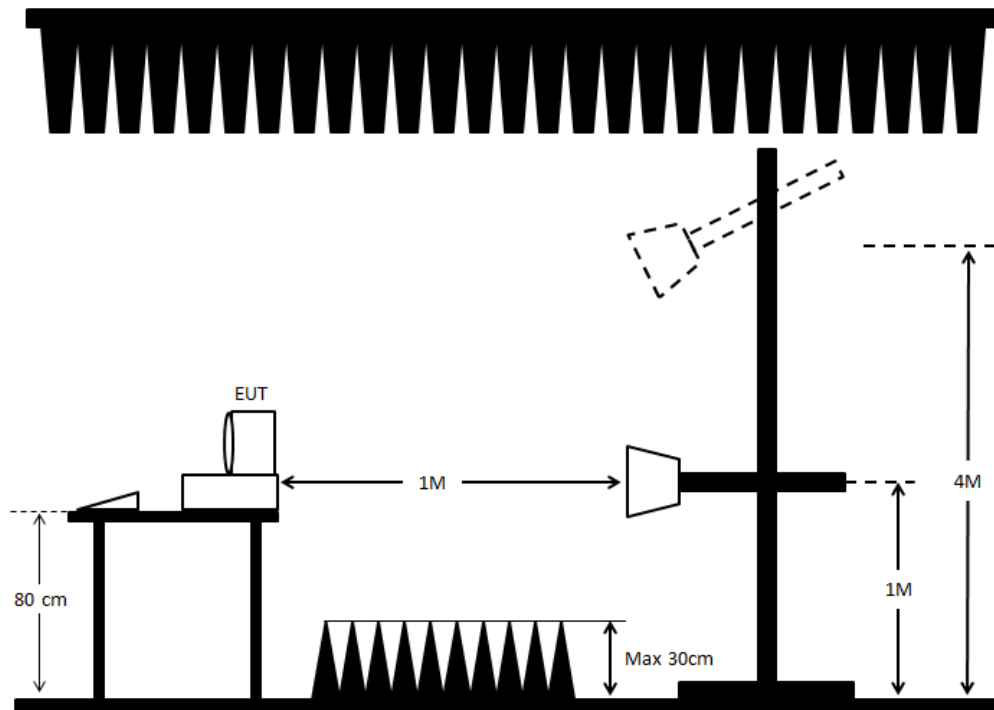
Intentional – CTX and Unintentional – CRX

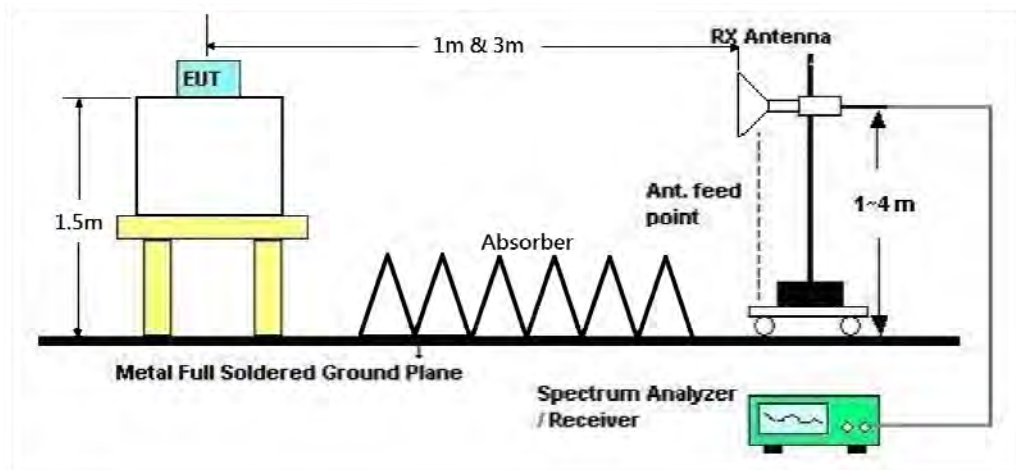


**For Radiated Emissions: Above 1GHz**  
**Unintentional 1GHz~5<sup>th</sup> Harmonic\_CRX**  
**1,000~18,000 MHz**



**18,000~30,000 MHz**



**Intentional 1GHz~10<sup>th</sup> Harmonic\_CTX**

**2.5.5. Test Deviation**

There is no deviation with the original standard.

**2.5.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

**2.5.7. Results of Radiated Emissions (9kHz~30MHz)**

|                      |               |                       |                                       |
|----------------------|---------------|-----------------------|---------------------------------------|
| <b>Temperature</b>   | 22°C          | <b>Humidity</b>       | 58%                                   |
| <b>Test Engineer</b> | Howard Liu    | <b>Configurations</b> | Mode 2. EUT<br>Intentional_CTX_Y axis |
| <b>Test Date</b>     | Apr. 10, 2018 |                       |                                       |

| <b>Freq.<br/>(MHz)</b> | <b>Level<br/>(dBuV)</b> | <b>Over Limit<br/>(dB)</b> | <b>Limit Line<br/>(dBuV)</b> | <b>Remark</b> |
|------------------------|-------------------------|----------------------------|------------------------------|---------------|
| -                      | -                       | -                          | -                            | See Note      |

Note:

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

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

|                      |               |                       |                                         |
|----------------------|---------------|-----------------------|-----------------------------------------|
| <b>Temperature</b>   | 22°C          | <b>Humidity</b>       | 58%                                     |
| <b>Test Engineer</b> | Howard Liu    | <b>Configurations</b> | Mode 5. EUT<br>Unintentional_CRX_Y axis |
| <b>Test Date</b>     | Apr. 10, 2018 |                       |                                         |

| <b>Freq.<br/>(MHz)</b> | <b>Level<br/>(dBuV)</b> | <b>Over Limit<br/>(dB)</b> | <b>Limit Line<br/>(dBuV)</b> | <b>Remark</b> |
|------------------------|-------------------------|----------------------------|------------------------------|---------------|
| -                      | -                       | -                          | -                            | See Note      |

Note:

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

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

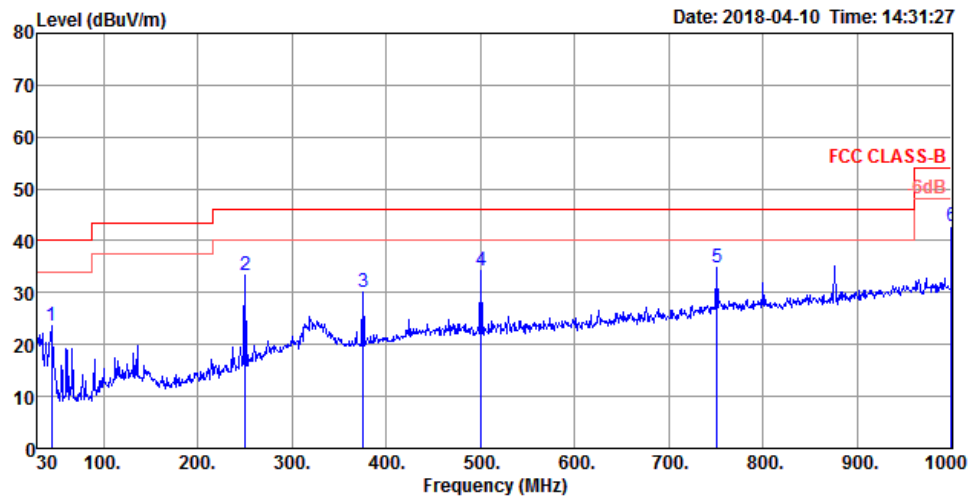
Limit line = specific limits (dBuV) + distance extrapolation factor.



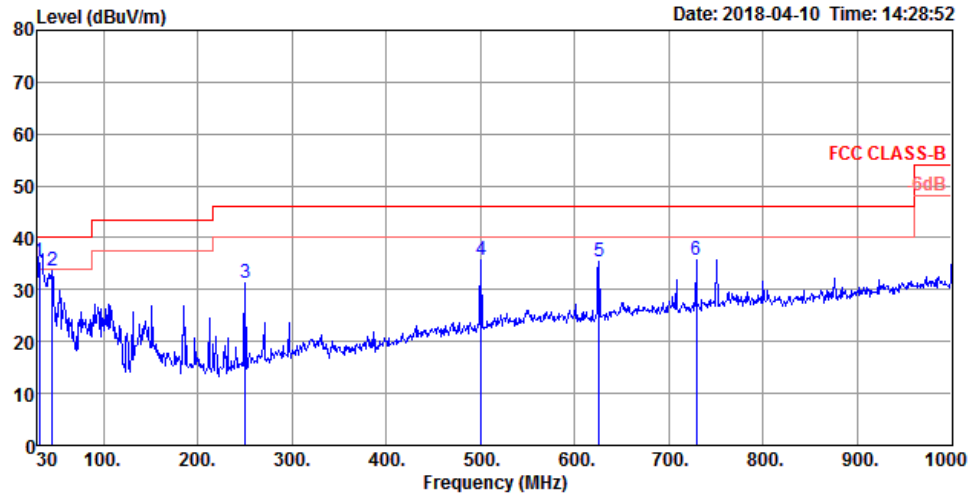
## 2.5.8. Results of Radiated Emissions (30MHz~1GHz)

|               |            |                |                                    |
|---------------|------------|----------------|------------------------------------|
| Temperature   | 22°C       | Humidity       | 58%                                |
| Test Engineer | Howard Liu | Configurations | Mode 2. EUT Intentional_CTX_Y axis |

### Horizontal



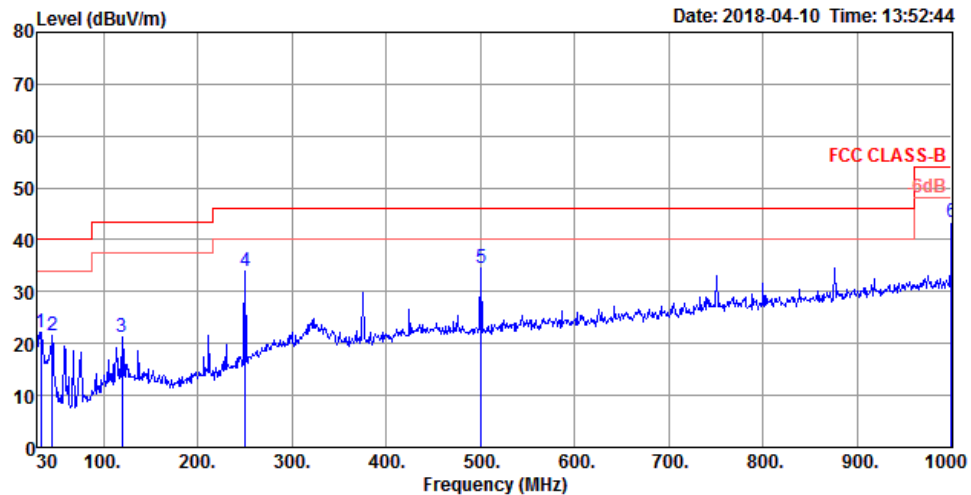
|   | Freq    | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable | Remark | A/Pos | T/Pos | Pol/Phase  |
|---|---------|--------|--------|--------|-------|--------|---------|-------|--------|-------|-------|------------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | Factor | Factor  | Loss  |        | cm    | deg   |            |
| 1 | 44.55   | 23.60  | 40.00  | -16.40 | 37.02 | 27.82  | 12.20   | 2.20  | Peak   | 100   | 360   | HORIZONTAL |
| 2 | 250.19  | 33.35  | 46.00  | -12.65 | 42.49 | 27.22  | 13.10   | 4.98  | Peak   | 100   | 360   | HORIZONTAL |
| 3 | 375.32  | 30.24  | 46.00  | -15.76 | 35.63 | 27.75  | 16.26   | 6.10  | Peak   | 100   | 360   | HORIZONTAL |
| 4 | 500.45  | 34.15  | 46.00  | -11.85 | 37.48 | 28.55  | 18.20   | 7.02  | Peak   | 100   | 360   | HORIZONTAL |
| 5 | 750.71  | 34.92  | 46.00  | -11.08 | 31.95 | 28.02  | 22.30   | 8.69  | Peak   | 100   | 360   | HORIZONTAL |
| 6 | 1000.00 | 42.78  | 54.00  | -11.22 | 34.55 | 26.98  | 24.90   | 10.31 | Peak   | 100   | 360   | HORIZONTAL |

**Vertical**

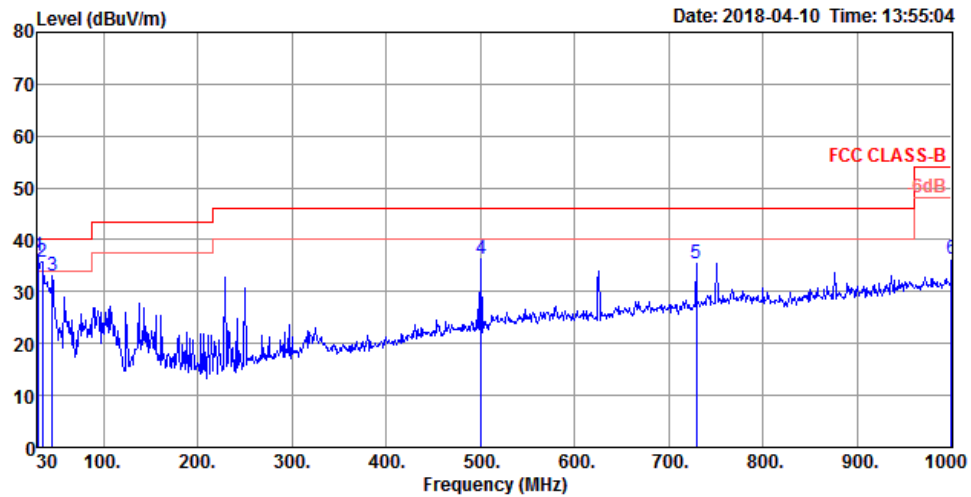
|   | Freq   | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable |        | A/Pos | T/Pos |           |
|---|--------|--------|--------|--------|-------|--------|---------|-------|--------|-------|-------|-----------|
|   | MHz    | dBuV/m | dBuV/m | Limit  | Level | Factor | Factor  | Loss  | Remark | cm    | deg   | Pol/Phase |
| 1 | 31.94  | 35.30  | 40.00  | -4.70  | 42.15 | 27.84  | 19.12   | 1.87  | QP     | 100   | 0     | VERTICAL  |
| 2 | 45.52  | 33.66  | 40.00  | -6.34  | 47.49 | 27.82  | 11.77   | 2.22  | Peak   | 100   | 0     | VERTICAL  |
| 3 | 250.19 | 31.37  | 46.00  | -14.63 | 40.51 | 27.22  | 13.10   | 4.98  | Peak   | 100   | 0     | VERTICAL  |
| 4 | 500.45 | 35.58  | 46.00  | -10.42 | 38.91 | 28.55  | 18.20   | 7.02  | Peak   | 100   | 0     | VERTICAL  |
| 5 | 625.58 | 35.29  | 46.00  | -10.71 | 35.46 | 28.46  | 20.36   | 7.93  | Peak   | 100   | 0     | VERTICAL  |
| 6 | 729.37 | 35.81  | 46.00  | -10.19 | 33.55 | 28.11  | 21.76   | 8.61  | Peak   | 100   | 0     | VERTICAL  |



|                      |            |                       |                                      |
|----------------------|------------|-----------------------|--------------------------------------|
| <b>Temperature</b>   | 22°C       | <b>Humidity</b>       | 58%                                  |
| <b>Test Engineer</b> | Howard Liu | <b>Configurations</b> | Mode 5. EUT Unintentional_CRX_Y axis |

**Horizontal**

|   | Freq    | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable | Remark | A/Pos | T/Pos | Pol/Phase  |
|---|---------|--------|--------|--------|-------|--------|---------|-------|--------|-------|-------|------------|
|   | MHz     | dBuV/m | dBuV/m | dB     | Level | Factor | Factor  | Loss  |        | cm    | deg   |            |
| 1 | 33.88   | 22.02  | 40.00  | -17.98 | 29.88 | 27.84  | 18.04   | 1.94  | Peak   | 100   | 0     | HORIZONTAL |
| 2 | 45.52   | 21.47  | 40.00  | -18.53 | 35.30 | 27.82  | 11.77   | 2.22  | Peak   | 100   | 0     | HORIZONTAL |
| 3 | 119.24  | 21.28  | 43.50  | -22.22 | 33.08 | 27.62  | 12.35   | 3.47  | Peak   | 100   | 0     | HORIZONTAL |
| 4 | 250.19  | 33.89  | 46.00  | -12.11 | 43.03 | 27.22  | 13.10   | 4.98  | Peak   | 100   | 0     | HORIZONTAL |
| 5 | 500.45  | 34.57  | 46.00  | -11.43 | 37.90 | 28.55  | 18.20   | 7.02  | Peak   | 100   | 0     | HORIZONTAL |
| 6 | 1000.00 | 43.38  | 54.00  | -10.62 | 35.15 | 26.98  | 24.90   | 10.31 | Peak   | 100   | 0     | HORIZONTAL |

**Vertical**

|   | Freq    | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable |        | A/Pos | T/Pos |           |
|---|---------|--------|--------|--------|-------|--------|---------|-------|--------|-------|-------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | dB     | dB/m    | dB    | Remark | cm    | deg   | Pol/Phase |
| 1 | 30.97   | 36.97  | 40.00  | -3.03  | 43.31 | 27.84  | 19.66   | 1.84  | Peak   | 100   | 360   | VERTICAL  |
| 2 | 34.85   | 35.79  | 40.00  | -4.21  | 44.16 | 27.84  | 17.50   | 1.97  | Peak   | 100   | 360   | VERTICAL  |
| 3 | 45.52   | 33.15  | 40.00  | -6.85  | 46.98 | 27.82  | 11.77   | 2.22  | Peak   | 100   | 360   | VERTICAL  |
| 4 | 500.45  | 36.44  | 46.00  | -9.56  | 39.77 | 28.55  | 18.20   | 7.02  | Peak   | 100   | 360   | VERTICAL  |
| 5 | 729.37  | 35.55  | 46.00  | -10.45 | 33.29 | 28.11  | 21.76   | 8.61  | Peak   | 100   | 360   | VERTICAL  |
| 6 | 1000.00 | 36.27  | 54.00  | -17.73 | 28.04 | 26.98  | 24.90   | 10.31 | Peak   | 100   | 360   | VERTICAL  |

**Note:**

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

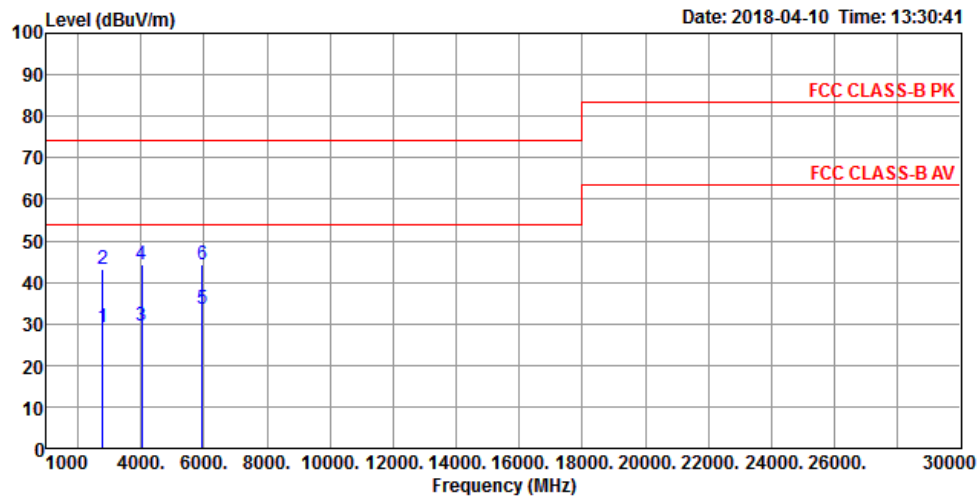
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



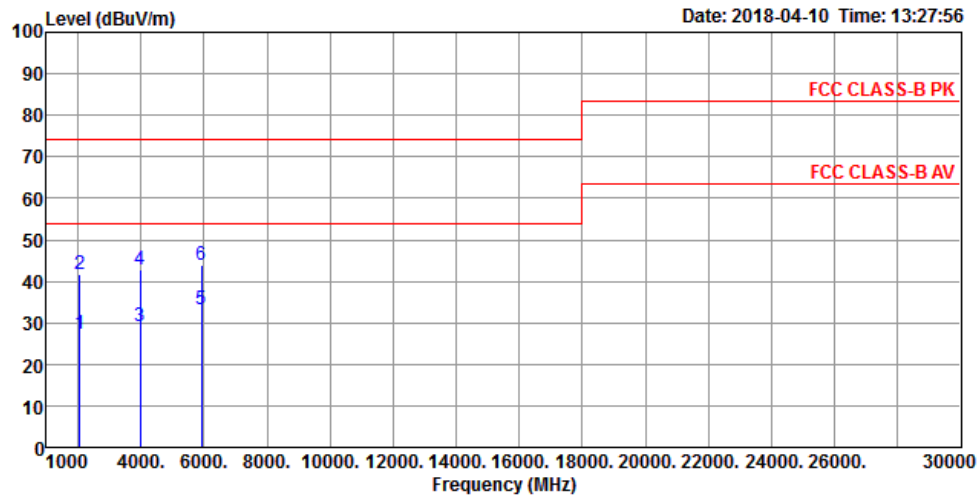
## 2.5.9. Results of For Radiated Emission test (Unintentional 1GHz~5<sup>th</sup> Harmonic)

|               |            |                |                                      |
|---------------|------------|----------------|--------------------------------------|
| Temperature   | 22°C       | Humidity       | 58%                                  |
| Test Engineer | Howard Liu | Configurations | Mode 2. EUT Unintentional_CRX_Y axis |

### Horizontal



|   | Freq    | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable | Remark  | A/Pos | T/Pos | Pol/Phase  |
|---|---------|--------|--------|--------|-------|--------|---------|-------|---------|-------|-------|------------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | dB     | dB/m    | dB    |         | cm    | deg   |            |
| 1 | 2785.00 | 29.26  | 54.00  | -24.74 | 29.35 | 36.11  | 32.63   | 3.39  | Average | 100   | 242   | HORIZONTAL |
| 2 | 2785.00 | 43.24  | 74.00  | -30.76 | 43.33 | 36.11  | 32.63   | 3.39  | Peak    | 100   | 242   | HORIZONTAL |
| 3 | 4009.00 | 29.55  | 54.00  | -24.45 | 27.41 | 36.14  | 33.62   | 4.66  | Average | 100   | 36    | HORIZONTAL |
| 4 | 4009.00 | 44.45  | 74.00  | -29.55 | 42.31 | 36.14  | 33.62   | 4.66  | Peak    | 100   | 36    | HORIZONTAL |
| 5 | 5930.00 | 33.64  | 54.00  | -20.36 | 28.54 | 36.03  | 35.72   | 5.41  | Average | 100   | 356   | HORIZONTAL |
| 6 | 5930.00 | 44.31  | 74.00  | -29.69 | 39.21 | 36.03  | 35.72   | 5.41  | Peak    | 100   | 356   | HORIZONTAL |

**Vertical**

|   | Freq    | Level  | Limit  | Over   | Read  | Preamp | Antenna | Cable | Remark  | A/Pos | T/Pos | Pol/Phase |
|---|---------|--------|--------|--------|-------|--------|---------|-------|---------|-------|-------|-----------|
|   | MHz     | dBuV/m | dBuV/m | dB     | dBuV  | dB     | dB/m    | dB    |         | cm    | deg   |           |
| 1 | 2054.00 | 27.17  | 54.00  | -26.83 | 28.65 | 35.77  | 31.32   | 2.97  | Average | 100   | 138   | VERTICAL  |
| 2 | 2054.00 | 41.68  | 74.00  | -32.32 | 43.16 | 35.77  | 31.32   | 2.97  | Peak    | 100   | 138   | VERTICAL  |
| 3 | 3975.00 | 28.99  | 54.00  | -25.01 | 26.98 | 36.14  | 33.58   | 4.57  | Average | 100   | 318   | VERTICAL  |
| 4 | 3975.00 | 42.89  | 74.00  | -31.11 | 40.88 | 36.14  | 33.58   | 4.57  | Peak    | 100   | 318   | VERTICAL  |
| 5 | 5913.00 | 33.35  | 54.00  | -20.65 | 28.27 | 36.03  | 35.70   | 5.41  | Average | 100   | 157   | VERTICAL  |
| 6 | 5913.00 | 43.93  | 74.00  | -30.07 | 38.85 | 36.03  | 35.70   | 5.41  | Peak    | 100   | 157   | VERTICAL  |

**Note:**

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



**2.5.10. Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)**

|                      |               |                       |           |
|----------------------|---------------|-----------------------|-----------|
| <b>Temperature</b>   | 24°C          | <b>Humidity</b>       | 50%       |
| <b>Test Engineer</b> | Clemens Fang  | <b>Configurations</b> | Channel 0 |
| <b>Test Date</b>     | Mar. 09, 2016 |                       |           |

**Horizontal**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | CableAntenna Loss | Antenna Factor | Preamplifier Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|---------|--------|------------|------------|------------|-------------------|----------------|---------------------|-------|-------|---------|------------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB                | dB/m           | dB                  | cm    | deg   |         |            |
| 1 | 4808.49 | 42.98  | 74.00      | -31.02     | 34.84      | 8.15              | 33.08          | 33.09               | 150   | 53    | Peak    | HORIZONTAL |
| 2 | 4809.19 | 35.51  | 54.00      | -18.49     | 27.37      | 8.15              | 33.08          | 33.09               | 150   | 53    | Average | HORIZONTAL |

**Vertical**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | CableAntenna Loss | Antenna Factor | Preamplifier Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|-------------------|----------------|---------------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB                | dB/m           | dB                  | cm    | deg   |         |           |
| 1 | 4807.75 | 48.89  | 74.00      | -25.11     | 40.75      | 8.15              | 33.08          | 33.09               | 150   | 211   | Peak    | VERTICAL  |
| 2 | 4809.35 | 35.87  | 54.00      | -18.13     | 27.73      | 8.15              | 33.08          | 33.09               | 150   | 211   | Average | VERTICAL  |



|                      |               |                       |            |
|----------------------|---------------|-----------------------|------------|
| <b>Temperature</b>   | 24°C          | <b>Humidity</b>       | 50%        |
| <b>Test Engineer</b> | Clemens Fang  | <b>Configurations</b> | Channel 20 |
| <b>Test Date</b>     | Mar. 09, 2016 |                       |            |

**Horizontal**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamplifier Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------------|-------|-------|---------|------------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB                  | cm    | deg   |         |            |
| 1 | 4876.89 | 35.36  | 54.00      | -18.64     | 27.26      | 7.94       | 33.23          | 33.07               | 150   | 84    | Average | HORIZONTAL |
| 2 | 4876.98 | 48.08  | 74.00      | -25.92     | 39.98      | 7.94       | 33.23          | 33.07               | 150   | 84    | Peak    | HORIZONTAL |

**Vertical**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamplifier Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB                  | cm    | deg   |         |           |
| 1 | 4875.92 | 47.83  | 74.00      | -26.17     | 39.74      | 7.94       | 33.23          | 33.08               | 150   | 187   | Peak    | VERTICAL  |
| 2 | 4878.20 | 35.48  | 54.00      | -18.52     | 27.38      | 7.94       | 33.23          | 33.07               | 150   | 187   | Average | VERTICAL  |



|                      |               |                       |            |
|----------------------|---------------|-----------------------|------------|
| <b>Temperature</b>   | 24°C          | <b>Humidity</b>       | 50%        |
| <b>Test Engineer</b> | Clemens Fang  | <b>Configurations</b> | Channel 39 |
| <b>Test Date</b>     | Mar. 09, 2016 |                       |            |

**Horizontal**

|   | Freq    | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|---------|--------|---------------|---------------|---------------|---------------|-------------------|------------------|-------|-------|---------|------------|
|   | MHz     | dBuV/m | dBuV/m        | dB            | dBuV          | dB            | dB/m              | dB               | cm    | deg   |         |            |
| 1 | 4950.32 | 48.72  | 74.00         | -25.28        | 40.66         | 7.74          | 33.38             | 33.06            | 150   | 17    | Peak    | HORIZONTAL |
| 2 | 4950.99 | 35.35  | 54.00         | -18.65        | 27.29         | 7.74          | 33.38             | 33.06            | 150   | 17    | Average | HORIZONTAL |

**Vertical**

|   | Freq    | Level  | Limit<br>Line | Over<br>Limit | Read<br>Level | Cable<br>Loss | Antenna<br>Factor | Preamp<br>Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|---------------|---------------|---------------|---------------|-------------------|------------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m        | dB            | dBuV          | dB            | dB/m              | dB               | cm    | deg   |         |           |
| 1 | 4954.49 | 35.63  | 54.00         | -18.37        | 27.59         | 7.69          | 33.41             | 33.06            | 150   | 232   | Average | VERTICAL  |
| 2 | 4958.43 | 48.51  | 74.00         | -25.49        | 40.47         | 7.69          | 33.41             | 33.06            | 150   | 232   | Peak    | VERTICAL  |

**Note:**

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

## 2.6. Emissions Measurement

### 2.6.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 2.7, then the 2.8 limit in the table below has to be followed.

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

### 2.6.2. Measuring Instruments and Setting

Please refer to section 3 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter                                  | Setting                                         |
|-----------------------------------------------------|-------------------------------------------------|
| Attenuation                                         | Auto                                            |
| Span Frequency                                      | 100 MHz                                         |
| RBW / VBW (Emission in restricted band)             | 1MHz / 3MHz for Peak,<br>1MHz / 1/T for Average |
| RBW / VBW (30dBc in any 100 kHz bandwidth emission) | 100 kHz / 300 kHz for Peak                      |

### 2.6.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 2.5.3.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB558074 D01 v04 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure.



#### **2.6.4. Test Setup Layout**

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 2.5.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 2.5.4.

#### **2.6.5. Test Deviation**

There is no deviation with the original standard.

#### **2.6.6. EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.



**2.6.7. Test Result of Band Edge and Fundamental Emissions**

|                      |               |                       |                   |
|----------------------|---------------|-----------------------|-------------------|
| <b>Temperature</b>   | 24°C          | <b>Humidity</b>       | 50%               |
| <b>Test Engineer</b> | Clemens Fang  | <b>Configurations</b> | Channel 0, 20, 39 |
| <b>Test Date</b>     | Mar. 09, 2016 |                       |                   |

**Channel 0**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamp Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB            | cm    | deg   |         |           |
| 1 | 2356.65 | 60.05  | 74.00      | -13.95     | 26.81      | 4.97       | 28.27          | 0.00          | 161   | 203   | Peak    | VERTICAL  |
| 2 | 2390.00 | 48.33  | 54.00      | -5.67      | 15.01      | 5.01       | 28.31          | 0.00          | 161   | 209   | Average | VERTICAL  |
| 3 | 2401.84 | 70.19  |            |            | 36.82      | 5.03       | 28.34          | 0.00          | 161   | 209   | Average | VERTICAL  |
| 4 | 2402.32 | 96.48  |            |            | 63.11      | 5.03       | 28.34          | 0.00          | 161   | 203   | Peak    | VERTICAL  |

Item 3, 4 are the fundamental frequency at 2402 MHz.

**Channel 20**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamp Factor | A/Pos | T/Pos | Remark  | Pol/Phase  |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------|-------|-------|---------|------------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB            | cm    | deg   |         |            |
| 1 | 2350.01 | 58.41  | 74.00      | -15.59     | 25.20      | 4.96       | 28.25          | 0.00          | 246   | 272   | Peak    | HORIZONTAL |
| 2 | 2390.00 | 47.97  | 54.00      | -6.03      | 14.65      | 5.01       | 28.31          | 0.00          | 246   | 272   | Average | HORIZONTAL |
| 3 | 2442.00 | 70.36  |            |            | 36.87      | 5.08       | 28.41          | 0.00          | 246   | 272   | Peak    | HORIZONTAL |
| 4 | 2442.00 | 99.01  |            |            | 65.52      | 5.08       | 28.41          | 0.00          | 246   | 272   | Peak    | HORIZONTAL |
| 5 | 2483.50 | 48.64  | 54.00      | -5.36      | 15.04      | 5.12       | 28.48          | 0.00          | 246   | 272   | Average | HORIZONTAL |
| 6 | 2540.40 | 61.10  | 74.00      | -12.90     | 27.26      | 5.18       | 28.66          | 0.00          | 246   | 272   | Peak    | HORIZONTAL |

Item 4 are the fundamental frequency at 2442 MHz.

**Channel 39**

|   | Freq    | Level  | Limit Line | Over Limit | Read Level | Cable Loss | Antenna Factor | Preamp Factor | A/Pos | T/Pos | Remark  | Pol/Phase |
|---|---------|--------|------------|------------|------------|------------|----------------|---------------|-------|-------|---------|-----------|
|   | MHz     | dBuV/m | dBuV/m     | dB         | dBuV       | dB         | dB/m           | dB            | cm    | deg   |         |           |
| 1 | 2480.00 | 69.73  |            |            | 36.16      | 5.11       | 28.46          | 0.00          | 183   | 274   | Average | VERTICAL  |
| 2 | 2480.32 | 97.51  |            |            | 63.94      | 5.11       | 28.46          | 0.00          | 183   | 274   | Peak    | VERTICAL  |
| 3 | 2521.51 | 49.36  | 54.00      | -4.64      | 15.62      | 5.16       | 28.58          | 0.00          | 183   | 274   | Average | VERTICAL  |
| 4 | 2527.76 | 61.48  | 74.00      | -12.52     | 27.71      | 5.16       | 28.61          | 0.00          | 183   | 274   | Peak    | VERTICAL  |

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

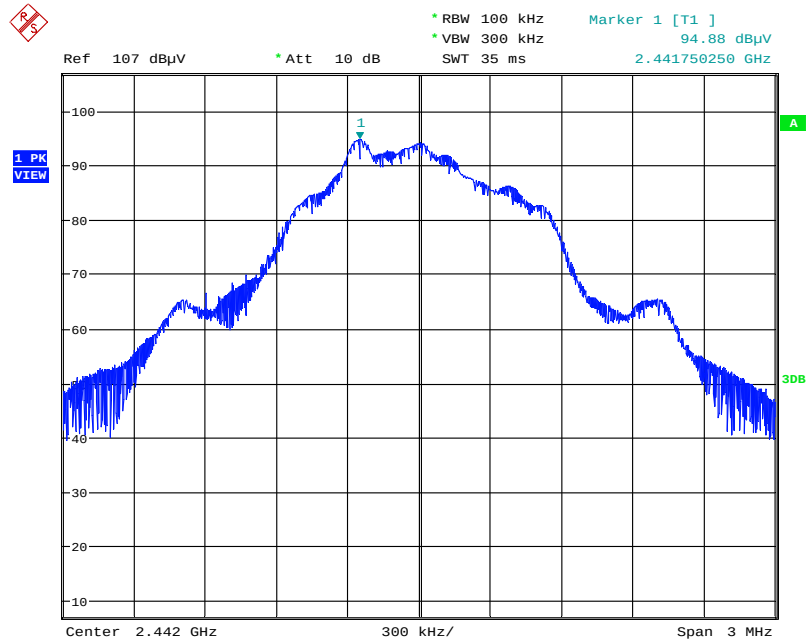
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



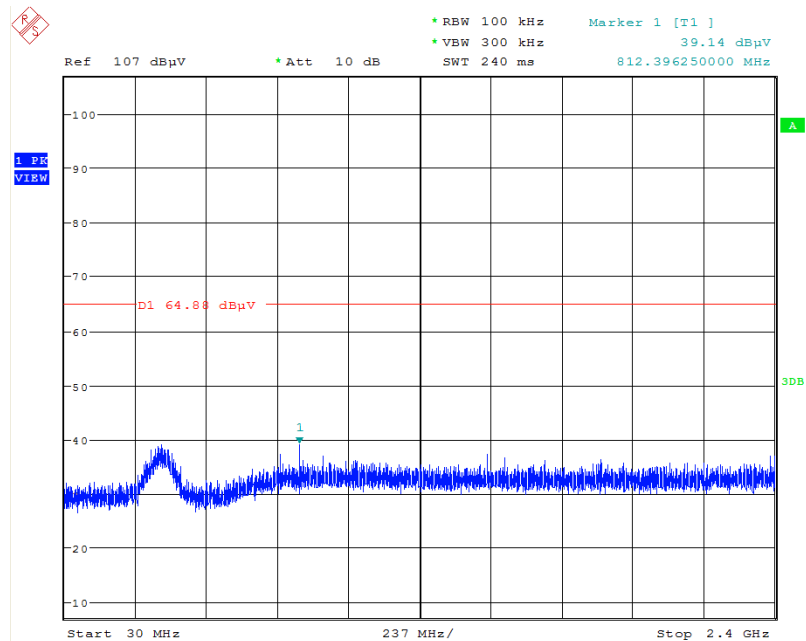
For Emission not in Restricted Band

Plot on Configuration / Reference Level



Date: 9.MAR.2016 01:21:46

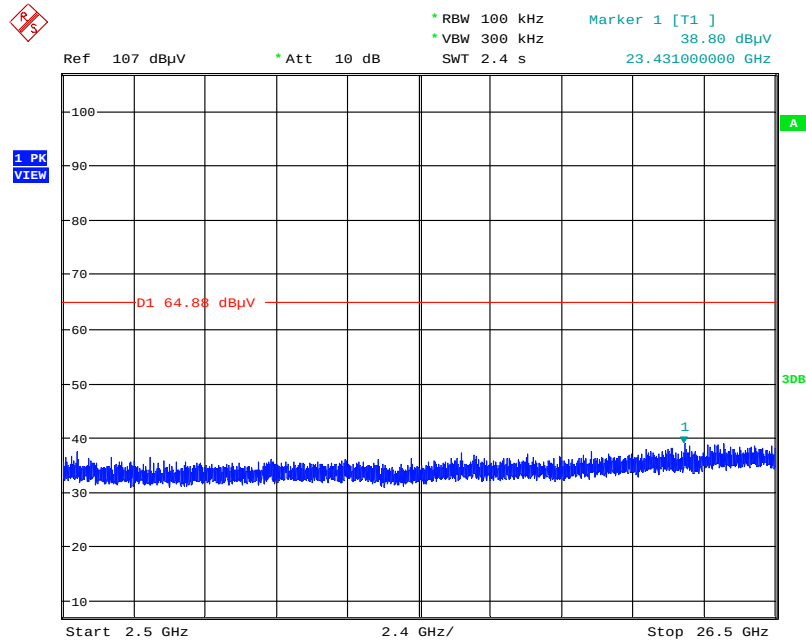
Plot on Configuration For Bluetooth 4.0 / Channel 0 / 30MHz~2400MHz (down 30dBc)



Date: 9.MAR.2016 01:31:40

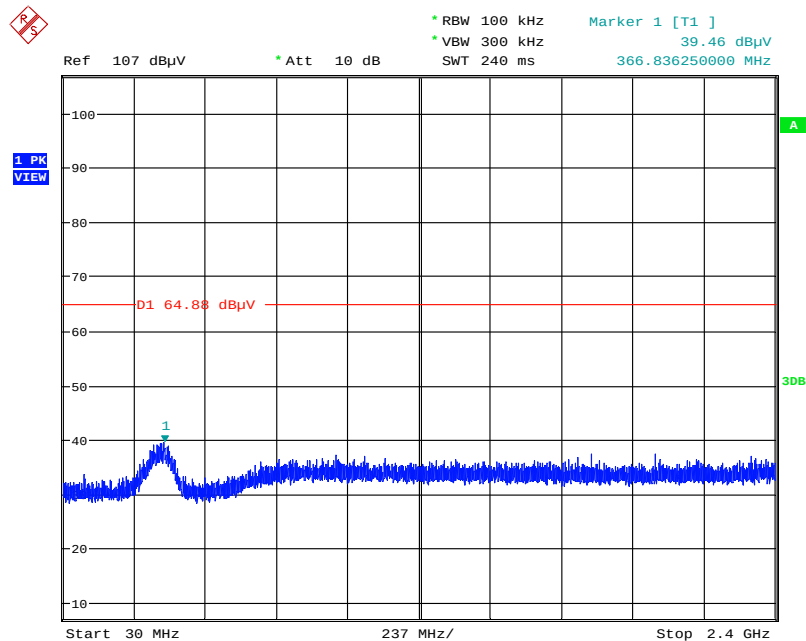


Plot on Configuration For Bluetooth 4.0 / Channel 0 / 2500MHz~26500MHz (down 30dBc)



Date: 9.MAR.2016 01:24:09

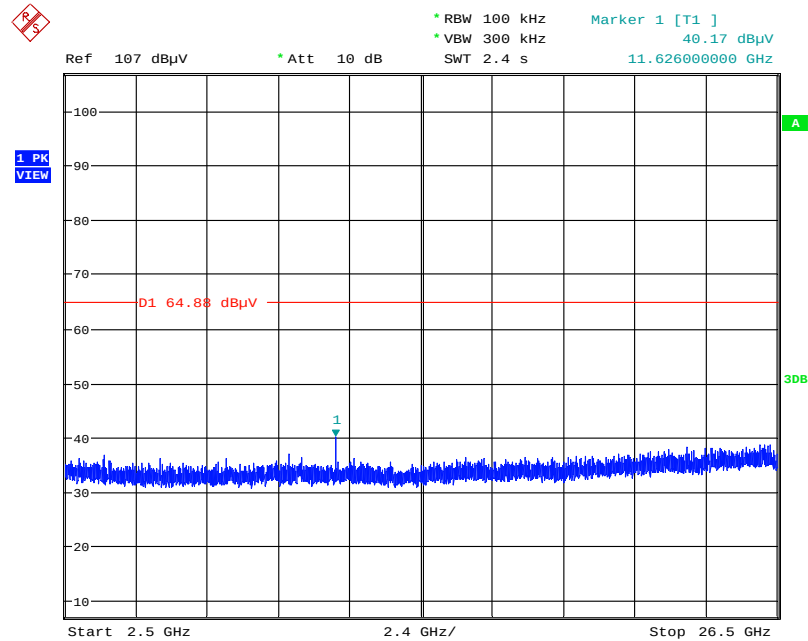
Plot on Configuration For Bluetooth 4.0 / Channel 39 / 30MHz~2400MHz (down 30dBc)



Date: 9.MAR.2016 01:25:37



Plot on Configuration For Bluetooth 4.0 / Channel 39 / 2500MHz~26500MHz (down 30dBc)



Date: 9.MAR.2016 01:24:50



## **2.7. Antenna Requirements**

### **2.7.1. Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

### **2.7.2. Antenna Connector Construction**

Please refer to section 1.3 in this test report; antenna connector complied with the requirements.

### 3. List of Measuring Equipments

| Instrument                       | Manufacturer  | Model No.        | Serial No.   | Characteristics      | Calibration Date | Calibration Due Date | Remark                |
|----------------------------------|---------------|------------------|--------------|----------------------|------------------|----------------------|-----------------------|
| LISN                             | Schwarzbeck   | NSLK 8127        | 8127650      | 9kHz ~ 30MHz         | Nov. 16, 2015    | Nov. 15, 2016        | Conduction (CO02-CB)  |
| LISN                             | Schwarzbeck   | NSLK 8127        | 8127478      | 9kHz ~ 30MHz         | Nov. 13, 2015    | Nov. 12, 2016        | Conduction (CO02-CB)  |
| EMI Receiver                     | Agilent       | N9038A           | MY52260140   | 9kHz ~ 8.4GHz        | Jan. 18, 2016    | Jan. 17, 2017        | Conduction (CO02-CB)  |
| COND Cable                       | Woken         | Cable            | 01           | 0.15MHz ~ 30MHz      | Dec. 01, 2015    | Nov. 31, 2016        | Conduction (CO02-CB)  |
| Software                         | Audix         | E3               | 6.120210n    | -                    | N.C.R.           | N.C.R.               | Conduction (CO02-CB)  |
| Pulse Limiter                    | Schwarzbeck   | VTSD 9561F       | 9561-F073    | 9kHz ~ 30MHz         | Sep. 30, 2015    | Sep. 19, 2016        | Conduction (CO02-CB)  |
| EMI Receiver                     | Agilent       | N9038A           | My52260123   | 9kHz ~ 8.45GHz       | Jan. 31, 2018    | Jan. 30, 2019        | Conduction (CO01-CB)  |
| LISN                             | F.C.C.        | FCC-LISN-50-16-2 | 04083        | 150kHz ~ 100MHz      | Dec. 20, 2017    | Dec. 19, 2018        | Conduction (CO01-CB)  |
| LISN                             | Schwarzbeck   | NSLK 8127        | 8127647      | 9kHz ~ 30MHz         | Dec. 29, 2017    | Dec. 28, 2018        | Conduction (CO01-CB)  |
| Impulsbegrenzer<br>Pulse Limiter | Rohde&Schwarz | ESH3-Z2          | 100430       | 9kHz ~ 30MHz         | Feb. 06, 2018    | Feb. 05, 2019        | Conduction (CO01-CB)  |
| COND Cable                       | Woken         | Cable            | 01           | 150kHz ~ 30MHz       | May 23, 2017     | May 22, 2018         | Conduction (CO01-CB)  |
| Software                         | Audix         | E3               | 6.120210n    | -                    | N.C.R.           | N.C.R.               | Conduction (CO01-CB)  |
| 10m Semi Anechoic Chamber        | TDK           | NSA              | 10CH01-CB    | 30MHz~1GHz<br>10m,3m | Mar. 18, 2018    | Mar. 17, 2019        | Radiation (10CH01-CB) |
| 10m Semi Anechoic Chamber        | TDK           | VSWR             | 10CH01-CB    | 1GHz ~18GHz<br>3m    | Mar. 17, 2018    | Mar. 16, 2019        | Radiation (10CH01-CB) |
| Pre-Amplifier                    | Agilent       | 8447D            | 2944A10783   | 9kHz ~ 1.3GHz        | Mar. 26, 2018    | Mar. 25, 2019        | Radiation (10CH01-CB) |
| Pre-Amplifier                    | Agilent       | 8447D            | 2944A10784   | 9kHz ~ 1.3GHz        | Mar. 13, 2018    | Mar. 12, 2019        | Radiation (10CH01-CB) |
| Low Cable                        | Woken         | SUCOFLEX 104     | low cable-01 | 25MHz ~ 1GHz         | Nov. 27, 2017    | Nov. 26, 2018        | Radiation (10CH01-CB) |
| High Cable                       | Woken         | SUCOFLEX 104     | low cable-02 | 25MHz ~ 1GHz         | Nov. 27, 2017    | Nov. 26, 2018        | Radiation (10CH01-CB) |
| Biconical Antenna                | Schwarzbeck   | VHBB 9124        | 324          | 30MHz ~ 200MHz       | May 03, 2017     | May 02, 2018         | Radiation (10CH01-CB) |
| Log Antenna                      | Schwarzbeck   | VUSLP 9111       | 247          | 200MHz ~ 1GHz        | May 26, 2017     | May 25, 2018         | Radiation (10CH01-CB) |
| EMI Test Receiver                | Rohde&Schwarz | ESCI             | 100186       | 9kHz ~ 3GHz          | Jul. 12, 2017    | Jul. 11, 2018        | Radiation (10CH01-CB) |



| Instrument        | Manufacturer  | Model No.        | Serial No.    | Characteristics  | Calibration Date | Calibration Due Date | Remark                |
|-------------------|---------------|------------------|---------------|------------------|------------------|----------------------|-----------------------|
| Spectrum Analyzer | Rohde&Schwarz | FSV30            | 101026        | 9kHz ~ 30GHz     | Jan. 10, 2018    | Jan. 09, 2019        | Radiation (10CH01-CB) |
| Horn Antenna      | ESCO          | 3117             | 00081283      | 1GHz ~ 18GHz     | Dec. 04, 2017    | Dec. 03, 2018        | Radiation (10CH01-CB) |
| Horn Antenna      | Schwarzbeck   | BBHA 9170        | BBHA9170252   | 15GHz ~ 40GHz    | Jul. 05, 2017    | Jul. 04, 2018        | Radiation (10CH01-CB) |
| Amplifier         | Agilent       | 8449B            | 3008A02660    | 1GHz ~ 26.5GHz   | May 25, 2017     | May 24, 2018         | Radiation (10CH01-CB) |
| Pre-Amplifier     | MITEQ         | TTA1840-35-HG    | 1864479       | 18GHz ~ 40GHz    | Jul. 10, 2017    | Jul. 09, 2018        | Radiation (10CH01-CB) |
| CABLE(1~40G)      | Woken         | SUCOFLEX 104     | high cable-01 | 1GHz ~ 40GHz     | Nov. 27, 2017    | Nov. 26, 2018        | Radiation (10CH01-CB) |
| Loop Antenna      | R&S           | HFH2-Z2          | 100330        | 9kHz - 30 MHz    | Nov. 13, 2017    | Nov. 12, 2018        | Radiation (10CH01-CB) |
| Software          | Audix         | E3               | 6.120210m     | -                | N.C.R.           | N.C.R.               | Radiation (10CH01-CB) |
| Horn Antenna      | EMCO          | 3115             | 00075790      | 750MHz ~ 18GHz   | Oct. 22, 2015    | Oct. 21, 2016        | Radiation (03CH01-CB) |
| Horn Antenna      | Schwarzbeck   | BBHA 9170        | BBHA9170252   | 15GHz ~ 40GHz    | Jul. 21, 2015    | Jul. 20, 2016        | Radiation (03CH01-CB) |
| Pre-Amplifier     | Agilent       | 8449B            | 3008A02310    | 1GHz ~ 26.5GHz   | Jan. 18, 2016    | Jan. 17, 2017        | Radiation (03CH01-CB) |
| Pre-Amplifier     | WM            | TF-130N-R1       | 923365        | 26GHz ~ 40GHz    | Nov. 13, 2015    | Nov. 12, 2016        | Radiation (03CH01-CB) |
| Spectrum Analyzer | R&S           | FSP40            | 100056        | 9kHz ~ 40GHz     | Oct. 27, 2015    | Oct. 26, 2016        | Radiation (03CH01-CB) |
| RF Cable-high     | Woken         | High Cable-16    | N/A           | 1 GHz ~ 18 GHz   | Nov. 02, 2015    | Nov. 01, 2016        | Radiation (03CH01-CB) |
| RF Cable-high     | Woken         | High Cable-17    | N/A           | 1 GHz ~ 18 GHz   | Nov. 02, 2015    | Nov. 01, 2016        | Radiation (03CH01-CB) |
| RF Cable-high     | Woken         | High Cable-40G-1 | N/A           | 18GHz ~ 40 GHz   | Nov. 02, 2015    | Nov. 01, 2016        | Radiation (03CH01-CB) |
| RF Cable-high     | Woken         | High Cable-40G-2 | N/A           | 18GHz ~ 40 GHz   | Nov. 02, 2015    | Nov. 01, 2016        | Radiation (03CH01-CB) |
| Test Software     | Audix         | E3               | 6.2009-10-7   | N/A              | N/A              | N/A                  | Radiation (03CH01-CB) |
| Spectrum analyzer | R&S           | FSV40            | 100979        | 9kHz~40GHz       | Dec. 09, 2015    | Dec. 08, 2016        | Conducted (TH01-CB)   |
| Spectrum Analyzer | R&S           | FSP40            | 100142        | 9kHz~40GHz       | Oct. 13, 2015    | Oct. 12, 2016        | Conducted (TH01-CB)   |
| RF Cable-high     | Woken         | RG402            | High Cable-7  | 1 GHz ~ 26.5 GHz | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB)   |
| RF Cable-high     | Woken         | RG402            | High Cable-8  | 1 GHz ~ 26.5 GHz | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB)   |
| RF Cable-high     | Woken         | RG402            | High Cable-9  | 1 GHz ~ 26.5 GHz | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB)   |



| Instrument    | Manufacturer | Model No. | Serial No.    | Characteristics  | Calibration Date | Calibration Due Date | Remark              |
|---------------|--------------|-----------|---------------|------------------|------------------|----------------------|---------------------|
| RF Cable-high | Woken        | RG402     | High Cable-10 | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB) |
| RF Cable-high | Woken        | RG402     | High Cable-6  | 1 GHz – 26.5 GHz | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB) |
| Power Sensor  | Agilent      | U2021XA   | MY53410001    | 50MHz~18GHz      | Nov. 02, 2015    | Nov. 01, 2016        | Conducted (TH01-CB) |

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.

#### 4. Measurement Uncertainty

| Test Items                                                                       | Uncertainty            | Remark                   |
|----------------------------------------------------------------------------------|------------------------|--------------------------|
| Conducted Emission (150kHz ~ 30MHz)                                              | 3.2 dB                 | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz)                                             | 5.0 dB                 | Confidence levels of 95% |
| Radiated Emission<br>Unintentional 1GHz~5 <sup>th</sup> Harmonic (1GHz ~ 18GHz)  | 5.0 dB                 | Confidence levels of 95% |
| Radiated Emission<br>Unintentional 1GHz~5 <sup>th</sup> Harmonic (18GHz ~ 30GHz) | 5.0 dB                 | Confidence levels of 95% |
| Radiated Emission<br>Intentional 1GHz~10 <sup>th</sup> Harmonic (1GHz ~ 18GHz)   | 3.7 dB                 | Confidence levels of 95% |
| Radiated Emission<br>Intentional 1GHz~10 <sup>th</sup> Harmonic (18GHz ~ 40GHz)  | 3.5 dB                 | Confidence levels of 95% |
| Conducted Emission                                                               | 1.7 dB                 | Confidence levels of 95% |
| Output Power Measurement                                                         | 1.33 dB                | Confidence levels of 95% |
| Bandwidth Measurement                                                            | 9.74 x10 <sup>-8</sup> | Confidence levels of 95% |