



## STC Test Report

Date: 2015-01-07

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No.: DM116520

**Applicant:**

VOLFONI R&D

29 rue Jean Jacques Rousseau, 75001 Paris, France

**Manufacturer:**

VOLFONI R&D

29 rue Jean Jacques Rousseau, 75001 Paris, France

**Description of Sample(s):**

Submitted sample(s) said to be

Product: ActivHub RF50 RF emitter

Brand Name: Volfoni

Model Number: VPES-04100

FCC ID: 2AD3Q-VPES04

**Date Sample(s) Received:** 2014-08-12

**Date Tested:** 2014-12-24 to 2014-12-26

**Investigation Requested:**

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 and ANSI C63.4: 2009 for FCC Certification.

**Conclusion(s):**

The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

**Remark(s):**

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LONG Yun Jian, Along  
Authorized Signatory  
ElectroMagnetic Compatibility Department  
For and on behalf of  
STC (Dongguan) Company Limited

### **STC (Dongguan) Company Limited**

68 Fumin Nan Road, Dalang, Dongguan, China. (Zip Code : 523 770)

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### **1.0 General Details**

#### **1.1 Equipment Under Test [EUT] Description of Sample(s)**

Product: ActivHub RF50 RF emitter  
Manufacturer: VOLFONI R&D  
Brand Name: Volfoni  
Model Number: VPES-04100  
Rating: 5.0Vd.c. (Powered by PC USB port)

#### **1.2 Description of EUT Operation**

The Equipment Under Test (EUT) is a ActivHub RF50 RF emitter of VOLFONI R&D. The transceiver operating in the 2.4GHz ISM frequency band. The RF signal was modulated by IC, the type of modulation used is FSK.

#### **1.3 Date of Order**

2014-08-12

#### **1.4 Submitted Sample(s):**

1 Sample

#### **1.5 Test Duration**

2014-12-24 to 2014-12-26

#### **1.6 Country of Origin**

China

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### **2.0      Technical Details**

#### **2.1      Investigations Requested**

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 Regulations and ANSI C63.4:2009 for FCC Certification.

#### **2.2      Test Standards and Results Summary Tables**

| EMISSION<br>Results Summary                               |                  |                 |                     |                                     |                          |                          |
|---|------------------|-----------------|---------------------|-------------------------------------|--------------------------|--------------------------|
| Test Condition  | Test Requirement | Test Method     | Class /<br>Severity | Test Result                         |                          |                          |
|   |                  |                 |                     | Pass                                | Fail                     | N/A                      |
| Field Strength of<br>Fundamental &<br>Harmonics Emissions | FCC 47CFR 15.249 | ANSI C63.4:2009 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Radiated Emissions  | FCC 47CFR 15.209 | ANSI C63.4:2009 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| AC Mains Conducted<br>Emissions                           | FCC 47CFR 15.207 | ANSI C63.4:2009 | N/A                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: N/A - Not Applicable

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### **3.0 Test Results**

#### **3.1 Emission**

##### **3.1.1 Radiated Emissions**

|                    |                                     |
|--------------------|-------------------------------------|
| Test Requirement:  | FCC 47CFR 15.249 & FCC 47CFR 15.209 |
| Test Method:       | ANSI C63.4:2009                     |
| Test Date:         | 2014-12-26                          |
| Mode of Operation: | Communication mode                  |

#### **Test Method:**

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

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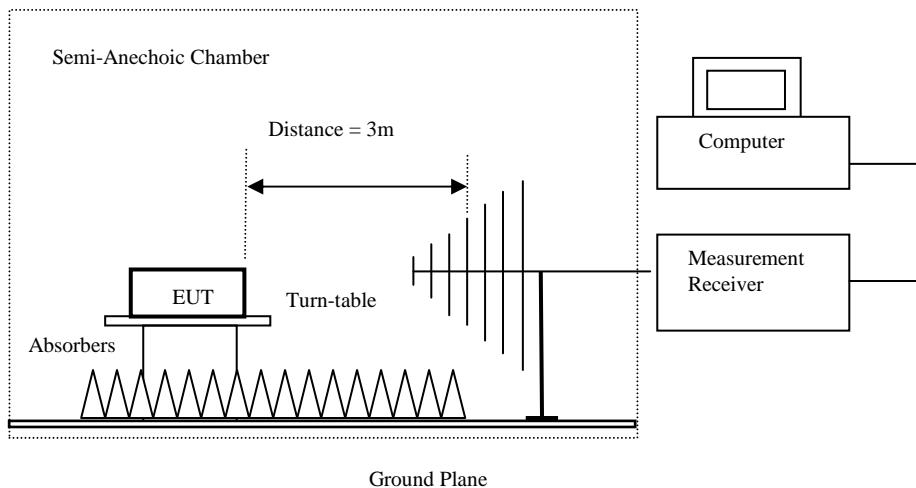
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### **Spectrum Analyzer Setting:**

|                        |   |
|------------------------|---|
| 9KHz – 30MHz (Pk & Av) | RBW: 10kHz<br>VBW: 30kHz<br>Sweep: Auto<br>Span: Fully capture the emissions being measured<br>Trace: Max. hold   |
| 30MHz – 1GHz (QP)      | RBW: 120kHz<br>VBW: 120kHz<br>Sweep: Auto<br>Span: Fully capture the emissions being measured<br>Trace: Max. hold |
| Above 1GHz (Pk & Av)   | RBW: 3MHz<br>VBW: 3MHz<br>Sweep: Auto<br>Span: Fully capture the emissions being measured<br>Trace: Max. hold     |

### **Test Setup:**



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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### **Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:**

| Frequency Range of Fundamental<br>[MHz] | Field Strength of Fundamental Emission<br>[microvolts/meter] | Field Strength of Harmonics Emission<br>[microvolts/meter] |
|---|--|--|
| 902-928                                 | 500,000 [Quasi-Peak]   | 500 [Average]  |
| 2400-2483.5                             | 50,000 [Average]   | 500 [Average]  |

**Results of Tx mode (Lowest Frequency Channel): Pass**

| <b>Field Strength of Fundamental Emissions<br/>Peak Value</b> |                                       |                                      |                                   |                                |                        |                     |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz  | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2401.50   | 57.6                                  | 36.8                                 | 94.4                              | 52,480.7                       | 500,000                | Vertical            |

| <b>Field Strength of Fundamental Emissions<br/>Average Value</b> |                                       |                                      |                                   |                                |                        |                     |
|--|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz   | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2401.50  | 45.9                                  | 36.8                                 | 82.7                              | 13,645.8                       | 50,000                 | Vertical            |

| <b>Field Strength of Harmonics Emission<br/>Peak Value</b> |                                       |                                      |                                   |                                |                        |                     |
|--|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz   | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 4803.0   | 14.1                                  | 41.5                                 | 55.6                              | 602.6                          | 5,000                  | Vertical            |
| 4803.0   | 12.2                                  | 42.4                                 | 54.6                              | 537.0                          | 5,000                  | Horizontal          |
| 7204.5   | 10.4                                  | 45.1                                 | 55.5                              | 595.7                          | 5,000                  | Vertical            |
| 7204.5   | 9.0                                   | 46.2                                 | 55.2                              | 575.4                          | 5,000                  | Horizontal          |
| 9606.0   | 7.1                                   | 48.0                                 | 55.1                              | 568.9                          | 5,000                  | Vertical            |
| 9606.0   | 6.5                                   | 48.8                                 | 55.3                              | 582.1                          | 5,000                  | Horizontal          |
| 12007.5  | 4.2                                   | 51.5                                 | 55.7                              | 609.5                          | 5,000                  | Vertical            |
| 12007.5  | 4.1                                   | 52.4                                 | 56.5                              | 668.3                          | 5,000                  | Horizontal          |

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| Field Strength of Harmonics Emission |                                       |                                      |                                   |                                |                        |                     |
|--------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Average Value                        |                                       |                                      |                                   |                                |                        |                     |
| Frequency<br>MHz                     | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 4803.0                               | 0.5                                   | 41.5                                 | 42.0                              | 125.9                          | 500                    | Vertical            |
| 4803.0                               | -1.3                                  | 42.4                                 | 41.1                              | 113.5                          | 500                    | Horizontal          |
| 7204.5                               | -5.4                                  | 45.1                                 | 39.7                              | 96.6                           | 500                    | Vertical            |
| 7204.5                               | -5.7                                  | 46.2                                 | 40.5                              | 105.9                          | 500                    | Horizontal          |
| 9606.0                               | -7.6                                  | 48.0                                 | 40.4                              | 104.7                          | 500                    | Vertical            |
| 9606.0                               | -6.6                                  | 48.8                                 | 42.2                              | 128.8                          | 500                    | Horizontal          |
| 12007.5                              | -11                                   | 51.5                                 | 40.5                              | 105.9                          | 500                    | Vertical            |
| 12007.5                              | -9.9                                  | 52.4                                 | 42.5                              | 133.4                          | 500                    | Horizontal          |

Results of Tx mode (Middle Frequency Channel): Pass

| Field Strength of Fundamental Emissions |                                       |                                      |                                   |                                |                        |                     |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Peak Value                              |                                       |                                      |                                   |                                |                        |                     |
| Frequency<br>MHz                        | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2419.40                                 | 56.9                                  | 36.8                                 | 93.7                              | 48,417.2                       | 500,000                | Vertical            |

| Field Strength of Fundamental Emissions |                                       |                                      |                                   |                                |                        |                     |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Average Value                           |                                       |                                      |                                   |                                |                        |                     |
| Frequency<br>MHz                        | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2419.40                                 | 45.3                                  | 36.8                                 | 82.1                              | 12,735.0                       | 50,000                 | Vertical            |

| Field Strength of Harmonics Emission |                                       |                                      |                                   |                                |                        |                     |
|--------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Peak Value                           |                                       |                                      |                                   |                                |                        |                     |
| Frequency<br>MHz                     | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 4838.8                               | 13.3                                  | 41.6                                 | 54.9                              | 555.9                          | 5,000                  | Vertical            |
| 4838.8                               | 12.8                                  | 42.5                                 | 55.3                              | 582.1                          | 5,000                  | Horizontal          |
| 7258.2                               | 10.3                                  | 45.2                                 | 55.5                              | 595.7                          | 5,000                  | Vertical            |
| 7258.2                               | 8.9                                   | 46.3                                 | 55.2                              | 575.4                          | 5,000                  | Horizontal          |
| 9677.6                               | 7.0                                   | 48.1                                 | 55.1                              | 568.9                          | 5,000                  | Vertical            |
| 9677.6                               | 6.3                                   | 48.9                                 | 55.2                              | 575.4                          | 5,000                  | Horizontal          |
| 12097.0                              | 2.8                                   | 51.6                                 | 54.4                              | 524.8                          | 5,000                  | Vertical            |
| 12097.0                              | 4.0                                   | 52.5                                 | 56.5                              | 668.3                          | 5,000                  | Horizontal          |

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| Field Strength of Harmonics Emission<br>Avarage Value |                                       |                                      |                                   |                                |                        |                     |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz                                      | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 4838.8  | -1.1                                  | 41.6                                 | 40.5                              | 105.9                          | 500                    | Vertical            |
| 4838.8  | -1.4                                  | 42.5                                 | 41.1                              | 113.5                          | 500                    | Horizontal          |
| 7258.2  | -5.2                                  | 45.2                                 | 40.0                              | 100.0                          | 500                    | Vertical            |
| 7258.2  | -6.7                                  | 46.3                                 | 39.6                              | 95.5                           | 500                    | Horizontal          |
| 9677.6  | -6.8                                  | 48.1                                 | 41.3                              | 116.1                          | 500                    | Vertical            |
| 9677.6  | -8.9                                  | 48.9                                 | 40.0                              | 100.0                          | 500                    | Horizontal          |
| 12097.0   | -11.3                                 | 51.6                                 | 40.3                              | 103.5                          | 500                    | Vertical            |
| 12097.0   | -11.0                                 | 52.5                                 | 41.5                              | 118.9                          | 500                    | Horizontal          |

Results of Tx mode (Highest Frequency Channel): Pass

| Field Strength of Fundamental Emissions<br>Quasi-Peak |                                       |                                      |                                   |                                |                        |                     |
|---|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz                                      | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2438.60   | 56.7                                  | 36.8                                 | 93.5                              | 47,315.1                       | 500,000                | Vertical            |

| Field Strength of Fundamental Emissions<br>Average Value |                                       |                                      |                                   |                                |                        |                     |
|--|---------------------------------------|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Frequency<br>MHz   | Measured<br>Level @3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 2438.60  | 45.0                                  | 36.8                                 | 81.8                              | 12,302.7                       | 50,000                 | Vertical            |

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| Field Strength of Harmonics Emission |                     |                   |                |                |            |                  |
|--------------------------------------|---------------------|-------------------|----------------|----------------|------------|------------------|
| Peak Value                           |                     |                   |                |                |            |                  |
| Frequency                            | Measured Level @ 3m | Correction Factor | Field Strength | Field Strength | Limit @ 3m | E-Field Polarity |
| MHz                                  | dB $\mu$ V/m        | dB $\mu$ V/m      | dB $\mu$ V/m   | $\mu$ V/m      | $\mu$ V/m  |                  |
| 4877.2                               | 14.0                | 41.4              | 55.4           | 588.8          | 5,000      | Vertical         |
| 4877.2                               | 12.4                | 42.7              | 55.1           | 568.9          | 5,000      | Horizontal       |
| 7315.8                               | 9.1                 | 45.6              | 54.7           | 543.3          | 5,000      | Vertical         |
| 7315.8                               | 9.3                 | 46.5              | 55.8           | 616.6          | 5,000      | Horizontal       |
| 9754.4                               | 6.5                 | 48.6              | 55.1           | 568.9          | 5,000      | Vertical         |
| 9754.4                               | 5.3                 | 49.7              | 55.0           | 562.3          | 5,000      | Horizontal       |
| 12193.0                              | 3.7                 | 51.7              | 55.4           | 588.8          | 5,000      | Vertical         |
| 12193.0                              | 2.8                 | 52.7              | 55.5           | 595.7          | 5,000      | Horizontal       |

| Field Strength of Harmonics Emission |  |                                      |                                   |                                |                        |                     |
|--------------------------------------|--|--------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------------|
| Avarage Value                        |  |                                      |                                   |                                |                        |                     |
| Frequency<br>MHz                     | Measured<br>Level @ 3m<br>dB $\mu$ V/m | Correction<br>Factor<br>dB $\mu$ V/m | Field<br>Strength<br>dB $\mu$ V/m | Field<br>Strength<br>$\mu$ V/m | Limit @3m<br>$\mu$ V/m | E-Field<br>Polarity |
| 4877.2                               | -0.4                                   | 41.4                                 | 41.0                              | 112.2                          | 500                    | Vertical            |
| 4877.2                               | -1.1                                   | 42.7                                 | 41.6                              | 120.2                          | 500                    | Horizontal          |
| 7315.8                               | -5.3                                   | 45.6                                 | 40.3                              | 103.5                          | 500                    | Vertical            |
| 7315.8                               | -4.5                                   | 46.5                                 | 42.0                              | 125.9                          | 500                    | Horizontal          |
| 9754.4                               | -8.9                                   | 48.6                                 | 39.7                              | 96.6                           | 500                    | Vertical            |
| 9754.4                               | -10.1                                  | 49.7                                 | 39.6                              | 95.5                           | 500                    | Horizontal          |
| 12193.0                              | -9.9                                   | 51.7                                 | 41.8                              | 123.0                          | 500                    | Vertical            |
| 12193.0                              | -12.3                                  | 52.7                                 | 40.4                              | 104.7                          | 500                    | Horizontal          |

### Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB  
 (30MHz - 1GHz): 4.6dB  
 (1GHz - 26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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### **Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[ $\mu$ V/m] |
|--------------------------|-----------------------------------|
| 0.009-0.490              | 2400/F (kHz)                      |
| 0.490-1.705              | 24000/F (kHz)                     |
| 1.705-30                 | 30                                |
| 30-88                    | 100                               |
| 88-216                   | 150                               |
| 216-960                  | 200                               |
| Above 960                | 500                               |

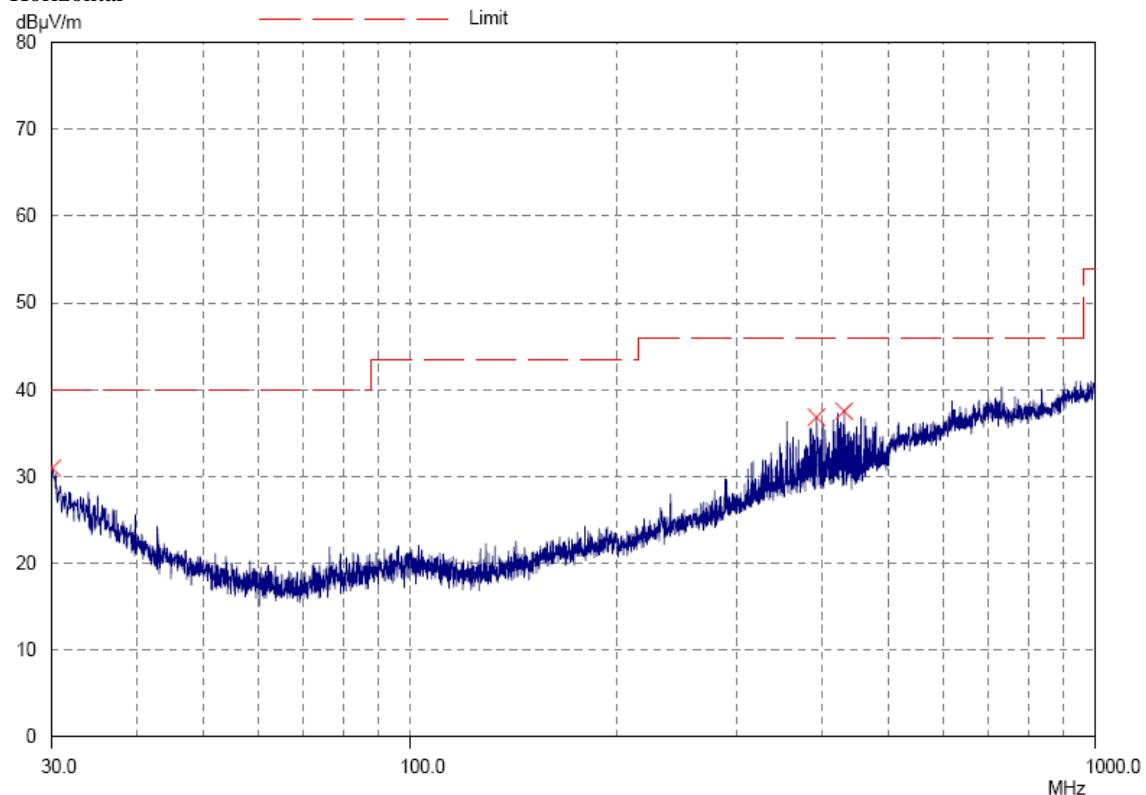
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### **Results of Communication mode (9kHz – 30MHz): PASS**

Emissions detected are more than 20 dB below the FCC Limits

### **Results of Communication mode: PASS**

Horizontal



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### Results of Communication mode: PASS

| <b>Radiated Emissions<br/>Quasi-Peak</b> |                     |                              |                              |                           |                           |
|--|---------------------|------------------------------|------------------------------|---------------------------|---------------------------|
| Emission<br>Frequency<br>MHz             | E-Field<br>Polarity | Level<br>@3m<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Level<br>@3m<br>$\mu$ V/m | Limit<br>@3m<br>$\mu$ V/m |
| 30.1                                     | Horizontal          | 30.9                         | 40.0                         | 35.1                      | 100                       |
| 392.1                                    | Horizontal          | 36.8                         | 46.0                         | 69.2                      | 200                       |
| 430.1                                    | Horizontal          | 37.5                         | 46.0                         | 75.0                      | 200                       |

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### **Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

| Frequency Range [MHz] | Quasi-Peak Limits [ $\mu$ V/m] |
|-----------------------|--------------------------------|
| 0.009-0.490           | 2400/F (kHz)                   |
| 0.490-1.705           | 24000/F (kHz)                  |
| 1.705-30              | 30                             |
| 30-88                 | 100                            |
| 88-216                | 150                            |
| 216-960               | 200                            |
| Above 960             | 500                            |

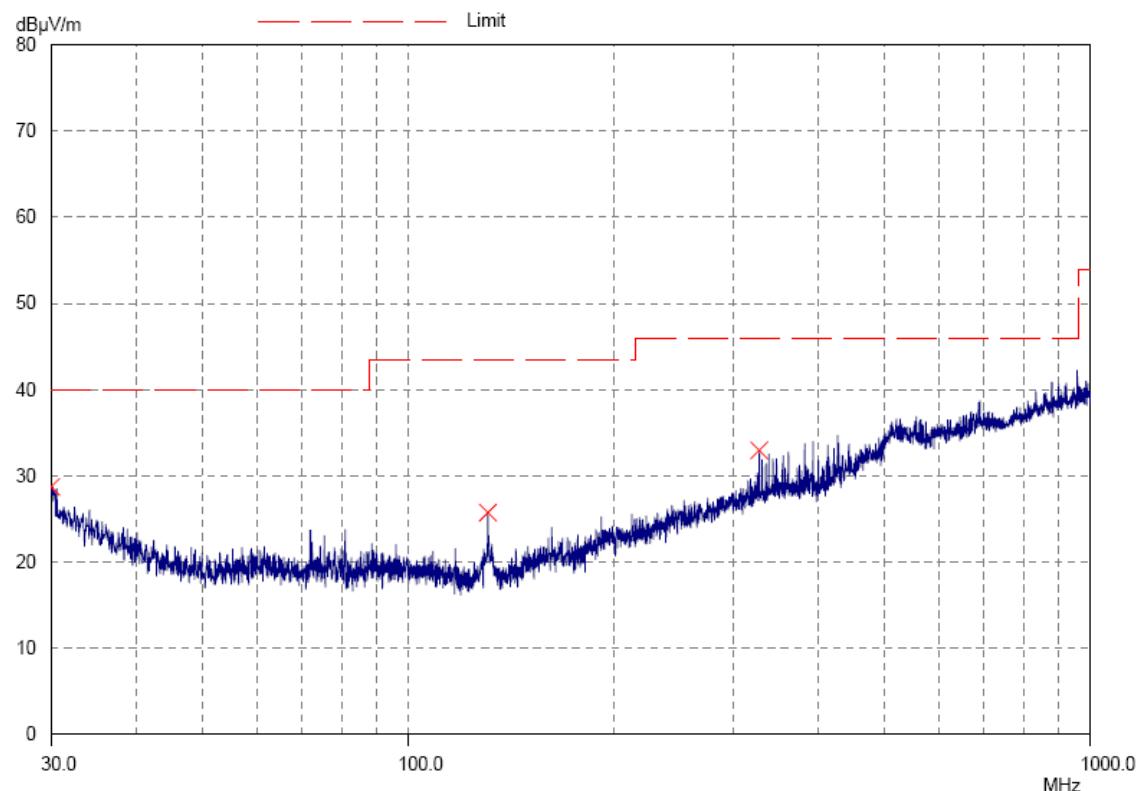
The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### **Results of Communication mode (9kHz – 30MHz): PASS**

Emissions detected are more than 20 dB below the FCC Limits

### **Results of Communication mode: PASS**

Vertical



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### Results of Communication mode: PASS

| <b>Radiated Emissions<br/>Quasi-Peak</b> |                     |                              |                              |                           |                           |
|--|---------------------|------------------------------|------------------------------|---------------------------|---------------------------|
| Emission<br>Frequency<br>MHz             | E-Field<br>Polarity | Level<br>@3m<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Level<br>@3m<br>$\mu$ V/m | Limit<br>@3m<br>$\mu$ V/m |
| 30.0                                     | Vertical            | 28.7                         | 40.0                         | 27.2                      | 100                       |
| 130.9                                    | Vertical            | 25.7                         | 43.5                         | 19.3                      | 150                       |
| 327.1                                    | Vertical            | 32.9                         | 46.0                         | 44.2                      | 200                       |

#### Remarks:

Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB  
(30MHz – 1GHz): 4.6dB  
(1GHz - 26GHz): 4.4dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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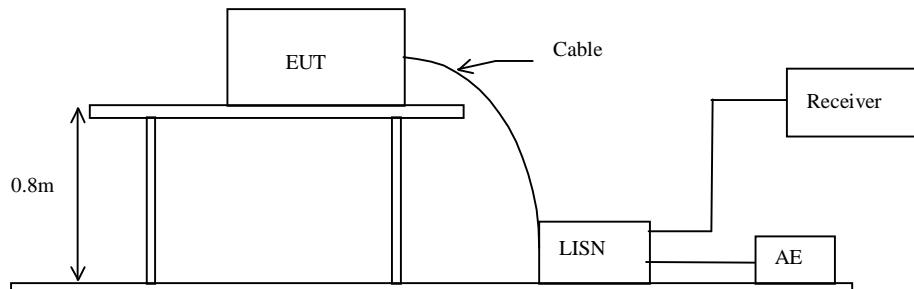
### **3.1.2 AC Mains Conducted Emissions (0.15MHz to 30MHz)**

|                    |                  |
|--------------------|------------------|
| Test Requirement:  | FCC 47CFR 15.207 |
| Test Method:       | ANSI C63.4:2009  |
| Test Date:         | 2014-12-26       |
| Mode of Operation: | Charge mode      |
| Test Voltage:      | 120V a.c. 60Hz   |

#### **Test Method:**

The test was performed in accordance with ANSI C63.4: 2009, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

#### **Test Setup:**



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### Limit for Conducted Emissions (FCC 47 CFR 15.207):

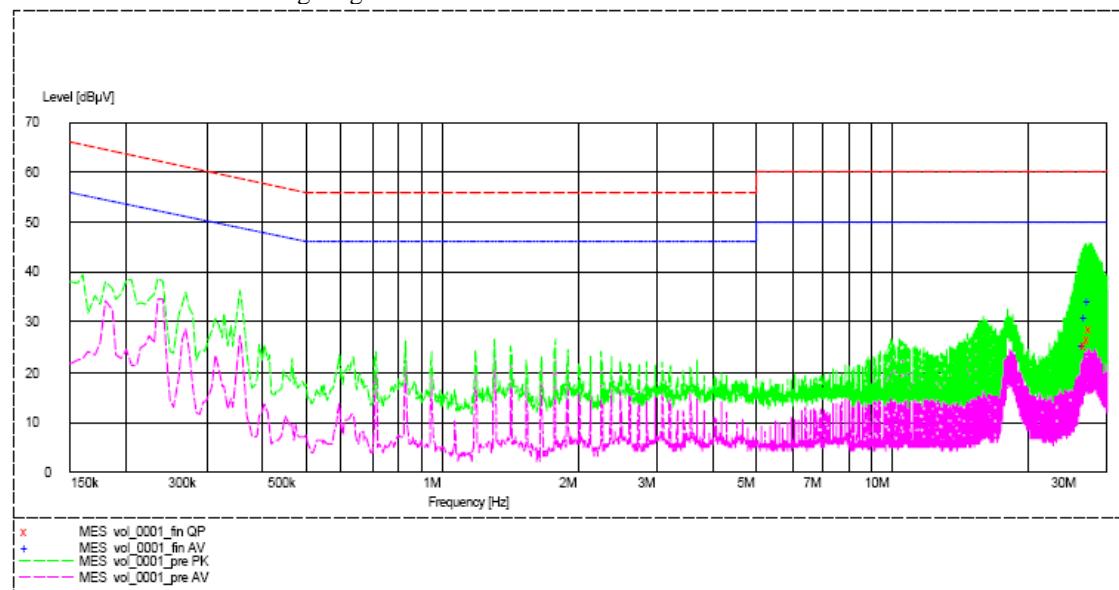
| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[dB $\mu$ V] | Average<br>[dB $\mu$ V] |
|--------------------------|-----------------------------------|-------------------------|
| 0.15-0.5                 | 66 to 56*                         | 56 to 46*               |
| 0.5-5.0                  | 56                                | 46                      |
| 5.0-30.0                 | 60                                | 50                      |

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

### Result of Communication mode(EUT Connected to PC, PC Mains) (L): PASS

Please refer to the following diagram for individual results.



| Conductor<br>Live or Neutral | Frequency<br>MHz | Quasi-peak          |                     | Average             |                     |
|------------------------------|------------------|---------------------|---------------------|---------------------|---------------------|
|                              |                  | Level<br>dB $\mu$ V | Limit<br>dB $\mu$ V | Level<br>dB $\mu$ V | Limit<br>dB $\mu$ V |
| Live                         | 26.910           | 25.5                | 60.0                | —*—                 | —*—                 |
| Live                         | 27.515           | 26.5                | 60.0                | —*—                 | —*—                 |
| Live                         | 27.635           | 28.5                | 60.0                | —*—                 | —*—                 |
| Live                         | 26.790           | —*—                 | —*—                 | 25.5                | 50.0                |
| Live                         | 26.910           | —*—                 | —*—                 | 31.1                | 50.0                |
| Live                         | 27.395           | —*—                 | —*—                 | 34.3                | 50.0                |

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### Limit for Conducted Emissions (FCC 47 CFR 15.207):

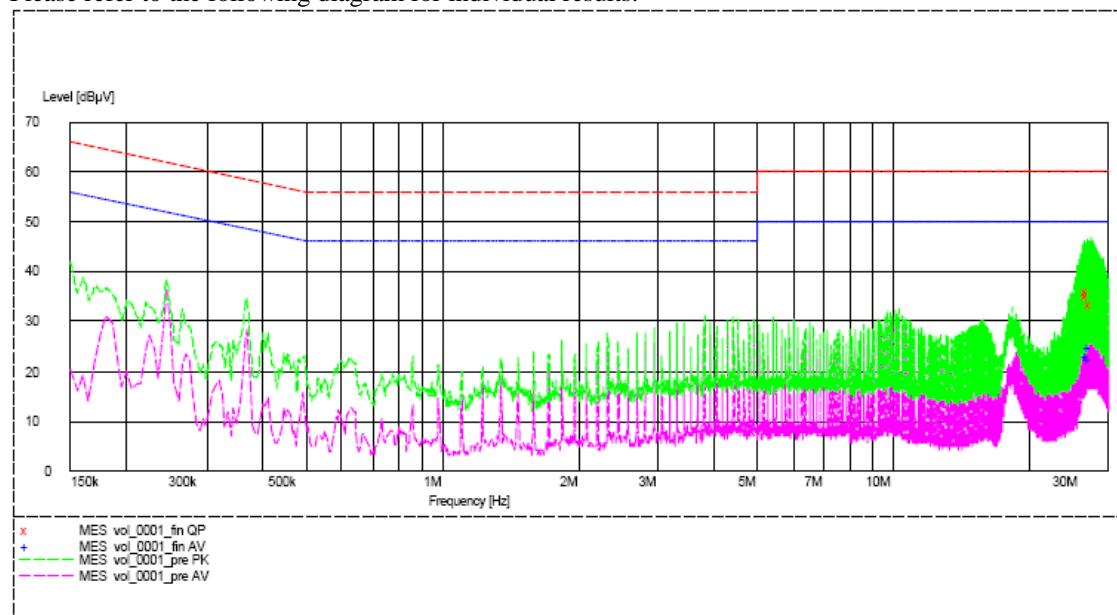
| Frequency Range<br>[MHz] | Quasi-Peak Limits<br>[dB $\mu$ V] | Average<br>[dB $\mu$ V] |
|--------------------------|-----------------------------------|-------------------------|
| 0.15-0.5                 | 66 to 56*                         | 56 to 46*               |
| 0.5-5.0                  | 56                                | 46                      |
| 5.0-30.0                 | 60                                | 50                      |

\* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

### Result of Communication mode(EUT Connected to PC, PC Mains) (N): PASS

Please refer to the following diagram for individual results.



| Conductor<br>Live or Neutral | Frequency<br>MHz | Quasi-peak          |                     | Average             |                     |
|------------------------------|------------------|---------------------|---------------------|---------------------|---------------------|
|                              |                  | Level<br>dB $\mu$ V | Limit<br>dB $\mu$ V | Level<br>dB $\mu$ V | Limit<br>dB $\mu$ V |
| Neutral                      | 26.810           | 35.1                | 60.0                | _-*                 | _-*                 |
| Neutral                      | 26.935           | 36.1                | 60.0                | _-*                 | _-*                 |
| Neutral                      | 27.430           | 33.5                | 60.0                | _-*                 | _-*                 |
| Neutral                      | 26.935           | _-*                 | _-*                 | 23.1                | 50.0                |
| Neutral                      | 27.060           | _-*                 | _-*                 | 22.3                | 50.0                |
| Neutral                      | 27.305           | _-*                 | _-*                 | 24.7                | 50.0                |

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB

-\*- Emission(s) that is far below the corresponding limit line.

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### **3.2 20dB Bandwidth of Fundamental Emission**

|                    |                   |
|--------------------|-------------------|
| Test Requirement:  | FCC 47 CFR 15.249 |
| Test Method:       | ANSI C63.4:2009   |
| Test Date:         | 2014-12-20        |
| Mode of Operation: | Tx mode           |

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. 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.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

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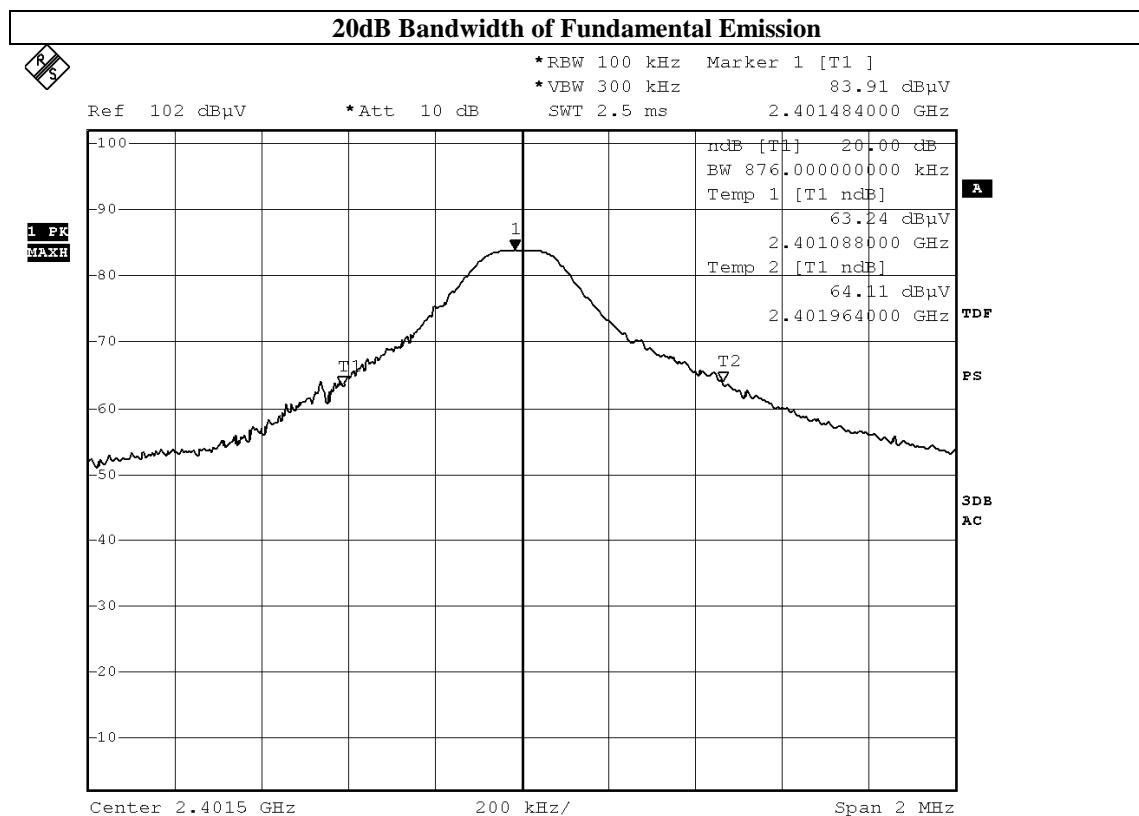
Date: 2015-01-07

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### Limits for 20dB Bandwidth of Fundamental Emission (Low Frequency Channel):

| Frequency Range<br>[MHz] | 20dB Bandwidth<br>[kHz] |
|--------------------------|-------------------------|
| 2401.5                   | 876                     |



Date: 20.DEC.2014 15:09:24

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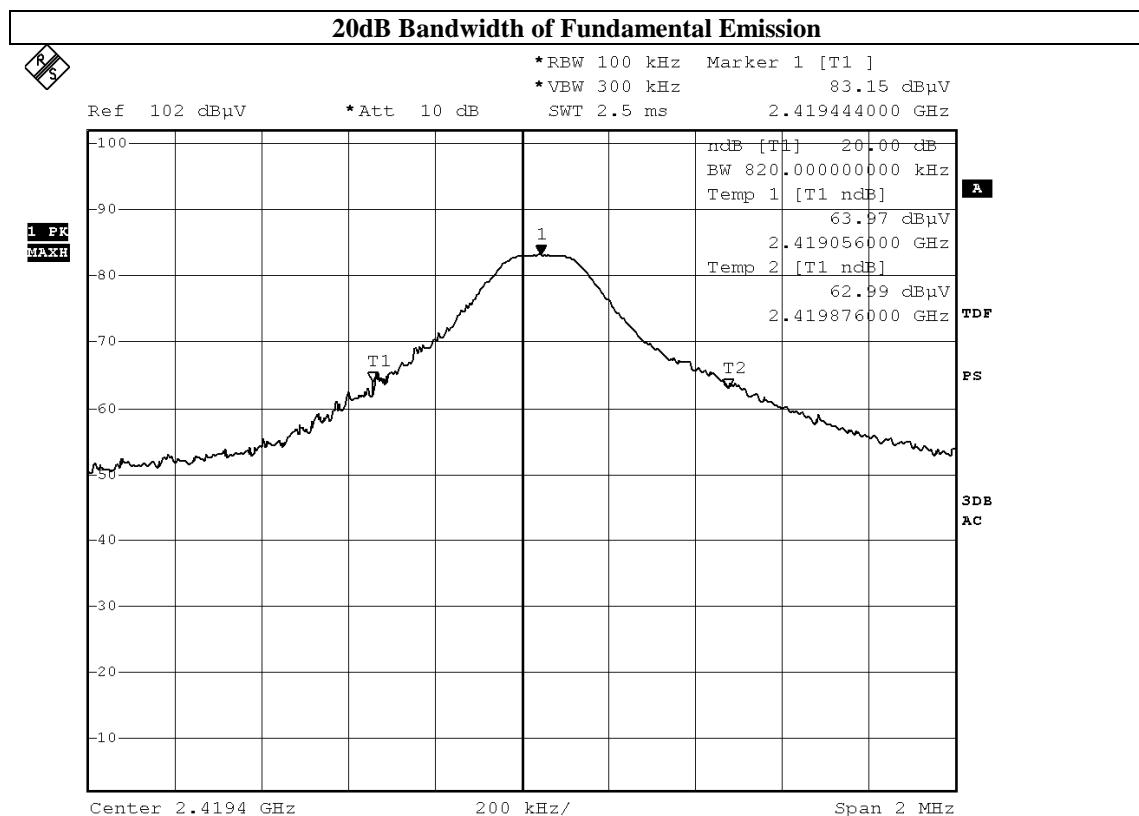
Date: 2015-01-07

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### Limits for 20dB Bandwidth of Fundamental Emission (Middle Frequency Channel):

| Frequency Range<br>[MHz] | 20dB Bandwidth<br>[kHz] |
|--------------------------|-------------------------|
| 2419.4                   | 820                     |



Date: 20.DEC.2014 14:54:32

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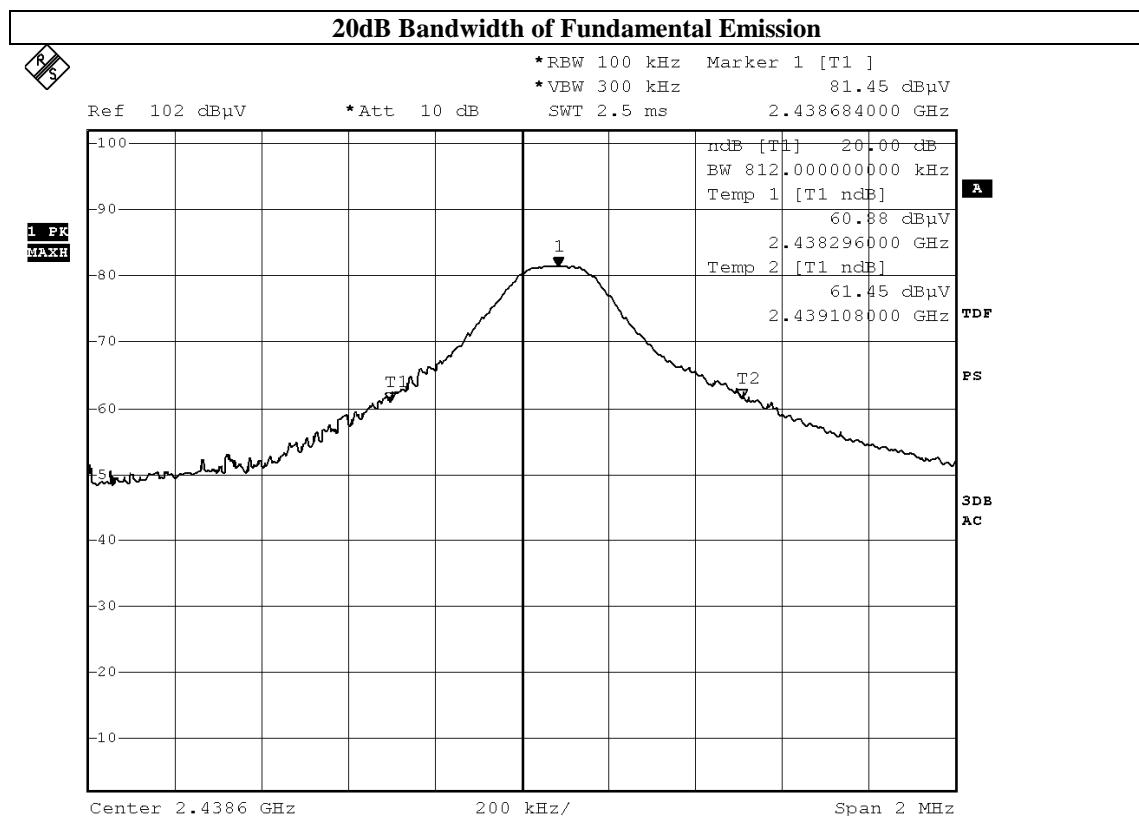
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### Limits for 20dB Bandwidth of Fundamental Emission (High Frequency Channel):

| Frequency Range<br>[MHz] | 20dB Bandwidth<br>[kHz] |
|--------------------------|-------------------------|
| 2438.6                   | 812                     |



Date: 20.DEC.2014 15:28:24

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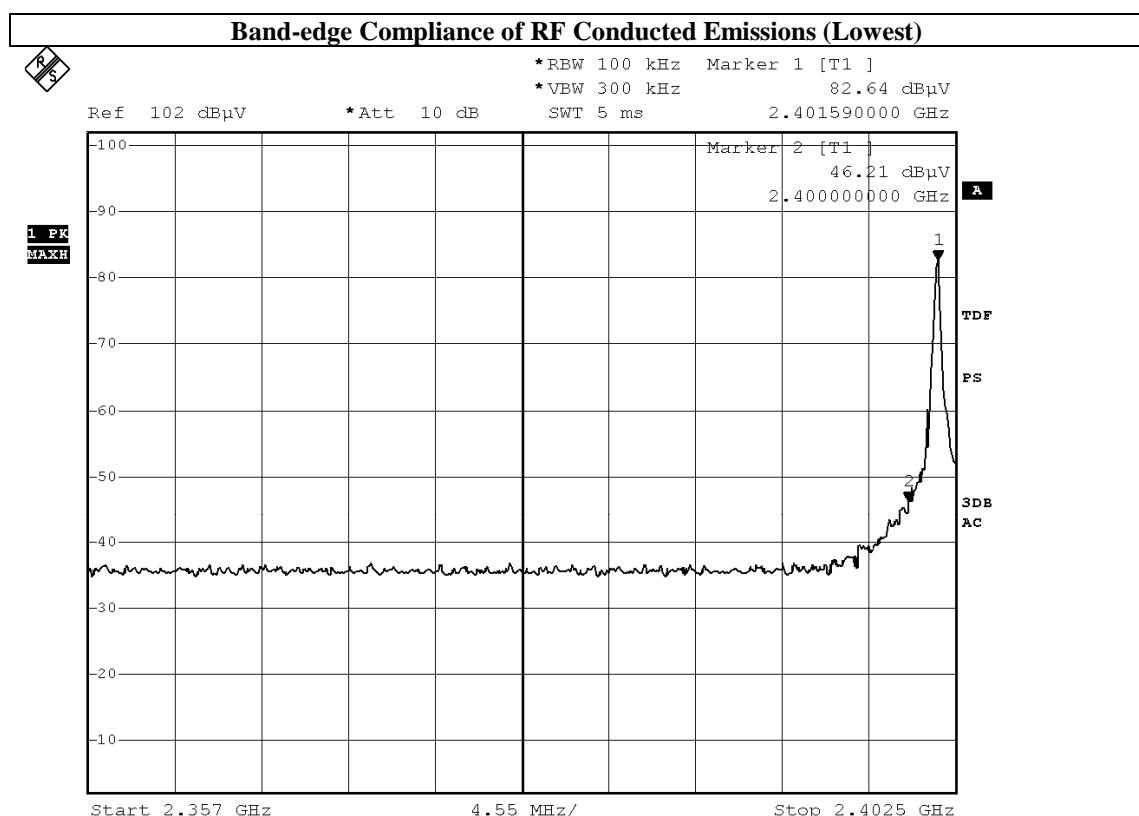
No.: DM116520

### **Band-edge Compliance of RF Conducted Emissions Measurement:**

#### **Limit :**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

| Frequency Range<br>[MHz]           | Radiated Emission Attenuated below the<br>Fundamental<br>[dB] |
|------------------------------------|---|
| 2400 – Lowest Fundamental (2401.5) | 36.43   |



Date: 20.DEC.2014 15:35:32

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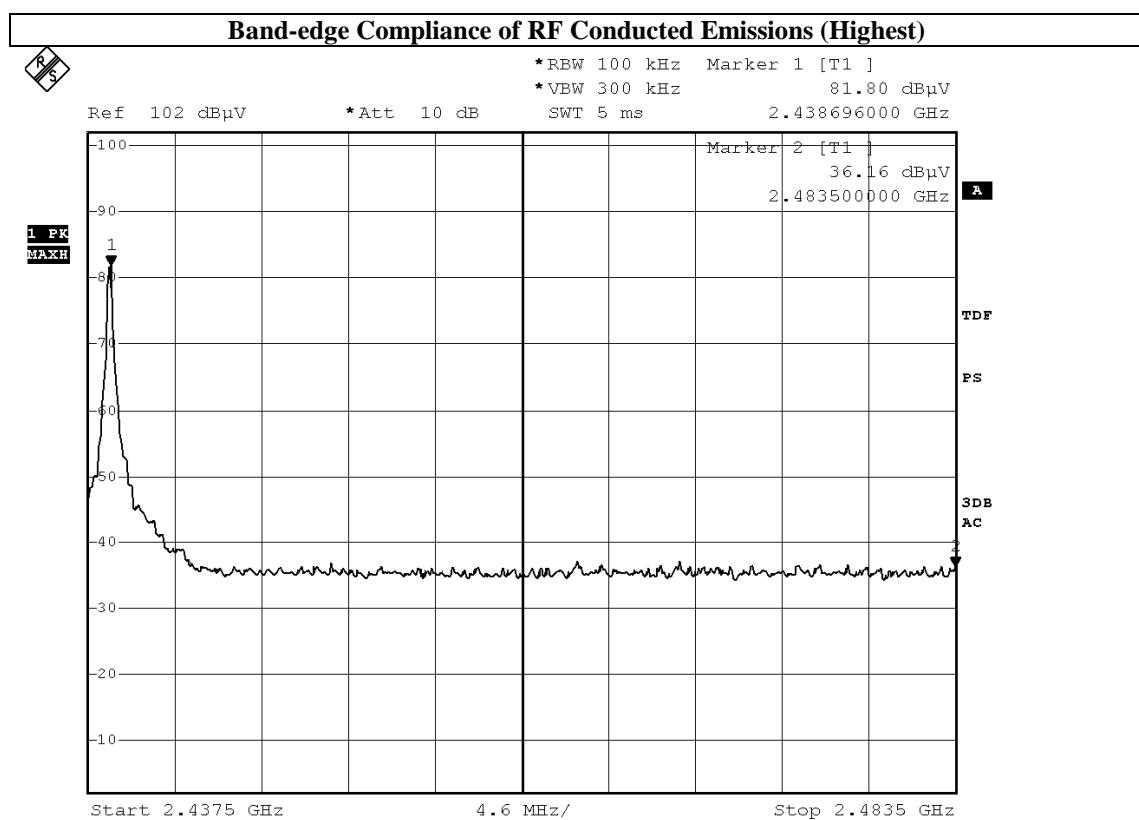
Date: 2015-01-07

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### Band-edge Compliance of RF Conducted Emissions Measurement:

| Frequency Range<br>[MHz]              | Radiated Emission Attenuated below the<br>Fundamental<br>[dB] |
|---------------------------------------|---|
| Highest Fundamental (2438.6) - 2483.5 | 45.64   |



Date: 20.DEC.2014 15:31:27

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### **Band-edge Compliance of RF Radiated Emissions Measurement:**

#### **Limit :**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

### **Result: Band-edge Compliance of RF Radiated Emissions (Lowest)**

| Field Strength of Band-edge Compliance<br>Peak Value |                                     |                              |                                   |                              |                        |                     |
|--|-------------------------------------|------------------------------|-----------------------------------|------------------------------|------------------------|---------------------|
| Frequency<br>MHz                                     | Measured<br>Level @3m<br>dB $\mu$ V | Correction<br>Factor<br>dB/m | Field<br>Strength<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB $\mu$ V/m | E-Field<br>Polarity |
| 2400.0   | 11.7                                | 36.8                         | 48.5                              | 74.0                         | 25.5                   | Vertical            |

| Field Strength of Band-edge Compliance<br>Average Value |                                     |                              |                                   |                              |                        |                     |
|---|-------------------------------------|------------------------------|-----------------------------------|------------------------------|------------------------|---------------------|
| Frequency<br>MHz  | Measured<br>Level @3m<br>dB $\mu$ V | Correction<br>Factor<br>dB/m | Field<br>Strength<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB $\mu$ V/m | E-Field<br>Polarity |
| 2400.0  | 1.3                                 | 36.8                         | 38.1                              | 54.0                         | 15.9                   | Vertical            |

### **Result: Band-edge Compliance of RF Radiated Emissions (Highest)**

| Field Strength of Band-edge Compliance<br>Peak Value |                                     |                              |                                   |                              |                        |                     |
|--|-------------------------------------|------------------------------|-----------------------------------|------------------------------|------------------------|---------------------|
| Frequency<br>MHz                                     | Measured<br>Level @3m<br>dB $\mu$ V | Correction<br>Factor<br>dB/m | Field<br>Strength<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB $\mu$ V/m | E-Field<br>Polarity |
| 2483.5   | 10.4                                | 36.4                         | 46.8                              | 74.0                         | 27.2                   | Horizontal          |

| Field Strength of Band-edge Compliance<br>Average Value |                                     |                              |                                   |                              |                        |                     |
|---|-------------------------------------|------------------------------|-----------------------------------|------------------------------|------------------------|---------------------|
| Frequency<br>MHz  | Measured<br>Level @3m<br>dB $\mu$ V | Correction<br>Factor<br>dB/m | Field<br>Strength<br>dB $\mu$ V/m | Limit<br>@3m<br>dB $\mu$ V/m | Margin<br>dB $\mu$ V/m | E-Field<br>Polarity |
| 2483.5  | 1.2                                 | 36.4                         | 37.6                              | 54.0                         | 16.4                   | Horizontal          |

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### Appendix A

#### List of Measurement Equipment

| EQP NO. | DESCRIPTION                                  | MANUFACTURER              | MODEL NO.         | SERIAL NO.     | LAST CAL   | DUE CAL    |
|---------|--|---------------------------|-------------------|----------------|------------|------------|
| EMD004  | LISN   | ROHDE & SCHWARZ           | ESH3-Z5           | 100102         | 2014.03.21 | 2015.03.21 |
| EMD022  | EMI Test Receiver                            | ROHDE & SCHWARZ           | ESCS30            | 100314         | 2014.03.21 | 2015.03.21 |
| EMD035  | EMI Test Receiver                            | ROHDE & SCHWARZ           | ESCI              | 100441         | 2014.06.10 | 2015.06.10 |
| EMD036  | EMI Test Receiver                            | ROHDE & SCHWARZ           | ESIB 26           | 100388         | 2014.06.10 | 2015.06.10 |
| EMD041  | TWO-LINE V-NETWORK                           | ROHDE & SCHWARZ           | ENV216            | 100261         | 2014.03.21 | 2015.03.21 |
| EMD061  | Biconilog Antenna                            | ETS.LINDGREN              | 3142C             | 00060439       | 2014.11.29 | 2016.11.29 |
| EMD062  | Double-Ridged Waveguide (1GHz – 18GHz)       | ETS.LINDGREN              | 3117              | 00075933       | 2014.11.15 | 2015.11.15 |
| EMD084  | MULTI-DVICE CONTROLLER                       | ETS.LINDGREN              | 2090              | 00060107       | N/A        | N/A        |
| EMD088  | Video Control Unit                           | ETS.LINDGREN              | Y21953A           | 2601073        | N/A        | N/A        |
| EMD093  | Monitor                                      | ViewSonic                 | VA9036            | Q8X064201876   | N/A        | N/A        |
| EMD102  | Intelligent Frequency                        | Ainuo Instrument Co., Ltd | AN97005SS         | 79707454       | N/A        | N/A        |
| EMD103  | Intelligent Frequency                        | Ainuo Instrument Co., Ltd | AN97005SS         | 79707455       | N/A        | N/A        |
| EMD105  | FACT-3 EMC Chamber                           | ETS.LINDGREN              | FACT-3            | 3803           | N/A        | N/A        |
| EMD106  | Shielding Room #1                            | ETS.LINDGREN              | RFD-100           | 3802           | N/A        | N/A        |
|         | 100V Insertion Unit                          | ROHDE & SCHWARZ           | URV5-Z4           | 100464         | 2014.03.21 | 2015.03.21 |
| EMD113  | Pre-Amplifier                                | ROHDE & SCHWARZ           | N/A               | 1129588        | 2014.03.21 | 2015.03.21 |
| EMD124  | Loop Antenna                                 | ETS-Lindgren              | 6502              | 00104905       | 2014.04.28 | 2016.04.28 |
| EMD131  | Standard Gain Horn Antenna (18GHz – 26.5GHz) | Chengdu AINFO Inc.        | JXTXLB-42-15-C-KF | J2021100721001 | 2013.04.09 | 2015.04.09 |

Remarks:-

N/A Not Applicable or Not Available

## STC (Dongguan) Company Limited

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## STC Test Report

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### Appendix B

#### Photographs of EUT

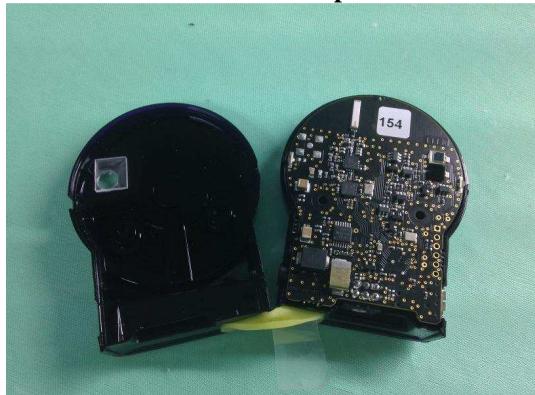
Front View of the product



Rear View of the product



Inside View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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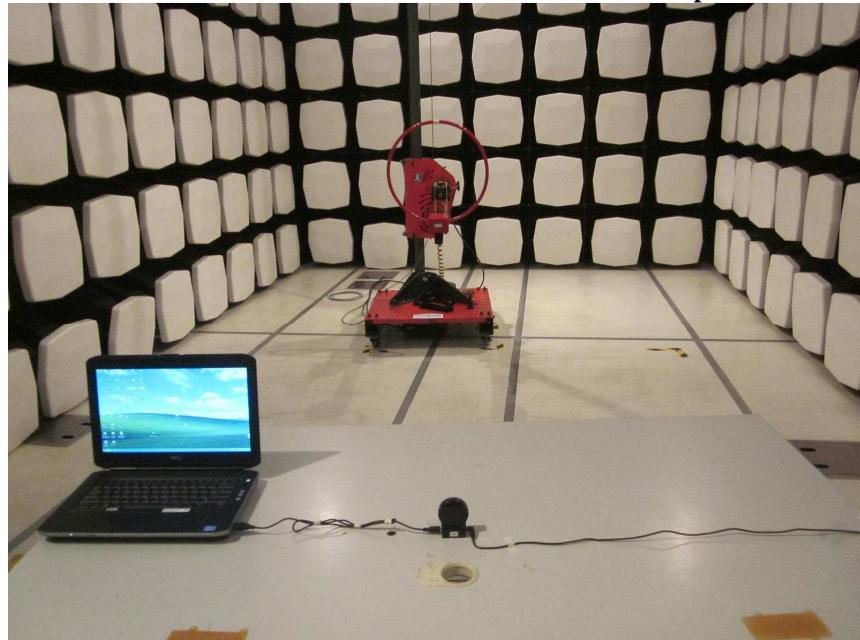
Date: 2015-01-07

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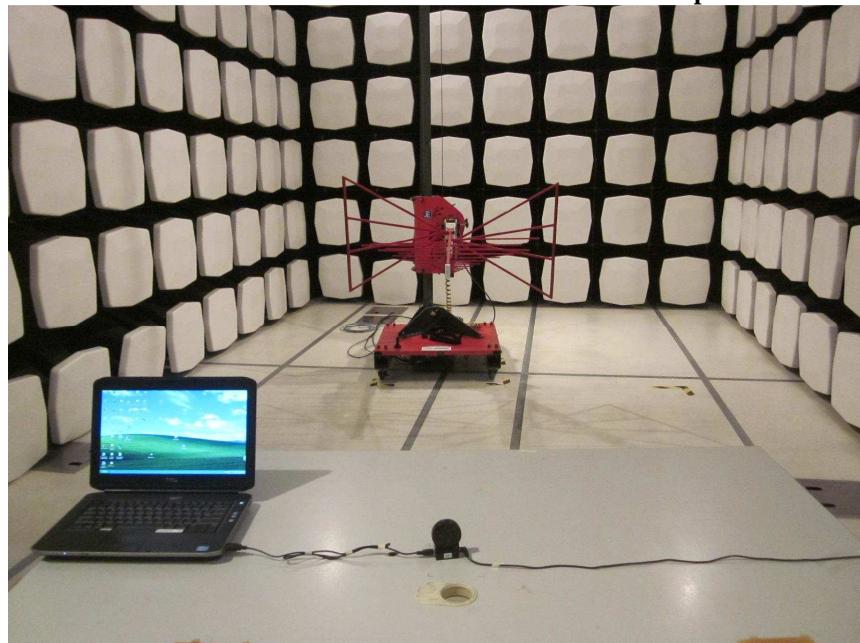
No.: DM116520

### **Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



**Measurement of Radiated Emission Test Set Up**



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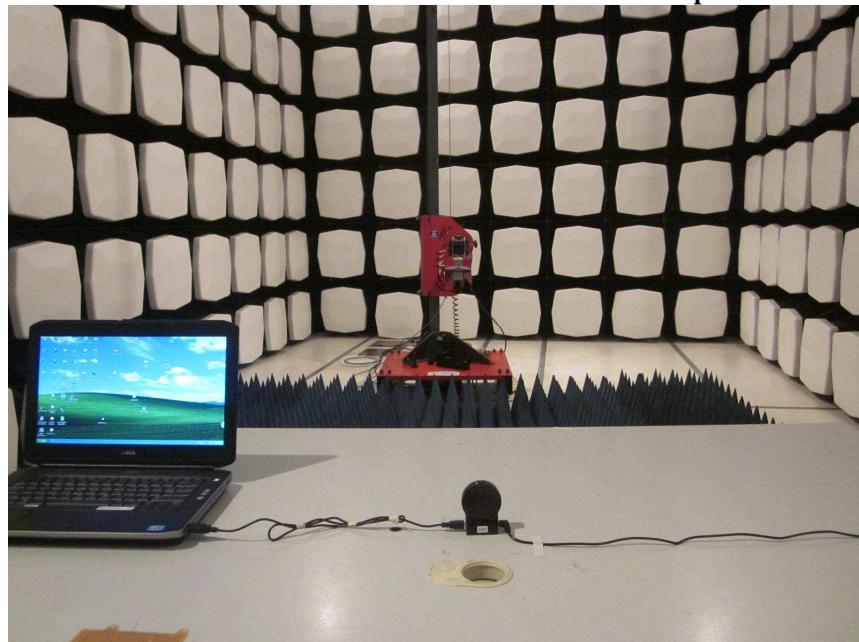
Date: 2015-01-07

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### Photographs of EUT

**Measurement of Radiated Emission Test Set Up**



**Measurement of Conducted Emission Test Set Up**



\*\*\*\*\* End of Test Report \*\*\*\*\*

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