



# TEST REPORT

Report Number : A-009-13-C

Date of Issue: 25 December 2013

FCC Rules and Regulations Part 15 Subpart C Intentional Radiators.

This test report is to certify that the device was tested according to the requirements of the above. The results of this report should not be construed to imply compliance of devices other than the sample tested. Without the laboratory approval by the documents, this report should not be copied in part.

### 1. Applicant

Company Name : SHIMANO INC.

Mailing Address : 3-77 Oimatsu-cho, Sakai-ku, Sakai City, Osaka, 590-8577 Japan

### 2. Identification of Tested Device

Type of Device : Transmitter

FCC ID : WY7-11

Device Name : Wireless Unit

Model Number : SM-EWW01

Serial Number : 2

Trade Name : SHIMANO

Type of Test :  Production  Pre-production  Prototype

### 3. Test Items

|  |  |                               |  |
|--|--|-------------------------------|--|
| AC Power Line Conducted Emission Measurement           | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| Carrier Separation Measurement (FHSS only)             | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| Time of Occupancy (Dwell Time) Measurement (FHSS only) | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| Number of Hopping Measurement (FHSS only)              | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| 20dB Bandwidth Measurement (FHSS only)                 | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| 6dB Bandwidth Measurement (DSSS only)                  | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| Peak Conducted Output Power Measurement                | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |
| Spurious Emissions Measurement                         | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input type="checkbox"/> N/A                 |
| Peak Power Spectral Density Measurement (DSSS only)    | <input type="checkbox"/> Pass            | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> N/A (*2) |

Refer the below reason(s) with respect to the decision and justification not to test.

(\*1) EUT Specifications (\*2) Request of Applicant (\*3) According to Test Plan

KEC Electronic Industry Development Center Testing Division  
3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

### Test Engineer(s)

Naoki Norimoto



Approved by

Ikuya Minematsu / Group Manager



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## 1. LABORATORY INFORMATION

### 1.1. Laboratory Accreditation

The KEC has been accredited by the following organizations based on their criteria for testing laboratory (ISO/IEC 17025).

|   |                                  |
|---|----------------------------------|
| (1) American Association for Laboratory Accreditation (A2LA)  | : Accreditation Number: 2070.01  |
| (2) Japan Accreditation Board for Conformity Assessment (JAB) | : Accreditation Number: RTL02810 |
| (3) Voluntary EMC Laboratory Accreditation Center Inc. (VLAC) | : Accreditation Number: VLAC-005 |

### 1.2. Test Facility

All tests described in this report were performed by:

Name: KEC Electronic Industry Development Center  
Testing Division

Address: 3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

|                             |                                 |                                 |  |                                  |                                  |
|-----------------------------|---------------------------------|---------------------------------|--|----------------------------------|----------------------------------|
| Anechoic Chamber            | : <input type="checkbox"/> No.1 | : <input type="checkbox"/> No.2 | : <input checked="" type="checkbox"/> No.3 | : <input type="checkbox"/> No.6  | : <input type="checkbox"/> No.7  |
|                             | : <input type="checkbox"/> No.8 | : <input type="checkbox"/> No.9 | : <input type="checkbox"/> No.10           | : <input type="checkbox"/> No.11 | : <input type="checkbox"/> No.12 |
| Shielded Room               | : <input type="checkbox"/> No.1 | : <input type="checkbox"/> No.7 | : <input type="checkbox"/> No.8            | : <input type="checkbox"/> No.9  | : <input type="checkbox"/> No.10 |
| Harmonic Current Meas. Room | : <input type="checkbox"/>      |                                 |  |                                  |                                  |

### 1.3. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity. And thus the measurand is complete only when a statement of uncertainty is given. KEC quotes Measurement Uncertainty (U) as follows.

|   |                |
|---|----------------|
| Conducted Disturbance at Mains Port (150kHz-30MHz)  | +2.5 / -2.8 dB |
| Conducted Disturbance at Mains Port (9kHz-30MHz)  | +2.9 / -3.4 dB |
| Conducted Disturbance at Telecommunication Ports ISN method (None-Shield type)  | +2.5 / -2.8 dB |
| Conducted Disturbance at Telecommunication Ports ISN method (Shield type)   | +2.4 / -2.6 dB |
| Conducted Disturbance at Telecommunication Ports Current Probe method   | +2.2 / -2.7dB  |
| Conducted Disturbance at Telecommunication Ports 150Ω Load voltage method (using a 150Ω Load to the out side surface of the shield)       | +1.8 / -2.4 dB |
| Conducted Disturbance at Telecommunication Ports None Invasive method (using a combination of current probe and capacitive voltage probe) | +2.7 / -3.8 dB |
| Conducted Disturbance at Lead Terminals and Additional Terminals  | +2.0 / -2.4 dB |
| Disturbance Power (30MHz -300MHz )  | +3.1 / -4.0 dB |
| Radiated Disturbance at Frequency Range from 9kHz up to 30MHz 60cm Loop Antenna method  | +3.6 / -4.1 dB |
| Radiated Disturbance at Frequency Range from 9kHz up to 30MHz LLA method  | +2.1 / -2.7 dB |
| Radiated Disturbance at Frequency Range from 30MHz up to 300MHz 3m method   | +3.1 / -4.5 dB |
| Radiated Disturbance at Frequency Range from 300MHz up to 1GHz 3m method  | +3.4 / -3.6 dB |
| Radiated Disturbance at Frequency Range from 30MHz up to 300MHz 10m method  | +3.4 / -3.6 dB |
| Radiated Disturbance at Frequency Range from 300MHz up to 1GHz 10m method   | +3.8 / -3.9 dB |
| Radiated Disturbance at Frequency Range from 30MHz up to 1GHz 10m method (Hybrid Antenna used measurement)                                | +4.2 / -5.1 dB |
| Radiated Disturbance at Frequency Range from 1GHz up to 6GHz 3m method  | +4.6 / -5.7 dB |
| Radiated Disturbance at Frequency Range from 6GHz up to 26.5GHz 3m method   | +4.6 / -5.2 dB |
| Harmonics Currents Emissions  | +/-4.4%        |
| Voltage Change, Voltage Fluctuations and Flicker  | +5.0 / -5.1%   |

Expiration Date : 2014/9/30

The above values are calculated as Expanded Uncertainty (k=2 [95%]).

[Note]

If the measured result is below the specification limit and a margin is less than the above measurement uncertainty, it is impossible to determine compliance at a level of confidence of 95%. However, the measured result indicates high probability that the tested device complies with the specification limit.

## 2. GENERAL INFORMATION

### 2.1. Product Description

(1) Technical Specifications

- CPU
- ANT+ Module

(2) Radio Specifications

- Frequency Range : 2403~2480MHz
- Operating Voltage : 4.5~9.0V
- Tx Output Power : 0dBm (Typ.)
- Type of Antenna : Monopole Antenna (Typ. 50Ω)
- Antenna Gain : 1.3dBi max
- General Operation : Temperature Range : -10~50°C

(3) Maximum Oscillators Frequency

- Clock Generator for CPU : 16MHz

(4) Software Version

: —

(5) Firmware Version

: —

(6) Interface and Provide Terminal

- Connector : Communication

(7) Rated Power Supply

: DC 7.4V



3. TESTED SYSTEM

3.1. Reference Rule and Specification

|                                   |  |
|-----------------------------------|--|
| (1) Reference Rule and Regulation | : FCC Rule Part 15 Subpart C, Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, 5725-5850MHz |
|                                   | <input type="checkbox"/> Section 15.205  |
|                                   | <input type="checkbox"/> Section 15.207  |
|                                   | <input checked="" type="checkbox"/> Section 15.209   |
|                                   | <input type="checkbox"/> Section 15.247 (a)(1)   |
|                                   | <input type="checkbox"/> Section 15.247 (a)(2)   |
|                                   | <input type="checkbox"/> Section 15.247 (b)(1)   |
|                                   | <input type="checkbox"/> Section 15.247 (b)(3)   |
|                                   | <input checked="" type="checkbox"/> Section 15.247 (d)   |
|                                   | <input type="checkbox"/> Section 15.247 (e)  |
| (2) Test Procedure                | : ANSI C63.4-2003  |

3.2. Date of Test

Receipt of Test Sample : 25 December 2013  
Condition of Test Sample :  Damage is not found on the set.  
 Damage is found on the set. (Details are described in this report)

Test Completed on : 25 December 2013  
Condition of Test Sample :  Damage is not found on the set.  
 Damage is found on the set. (Details are described in this report)

3.3. Deviation of Standard

without deviation,  with deviation (details are found inside of this report)

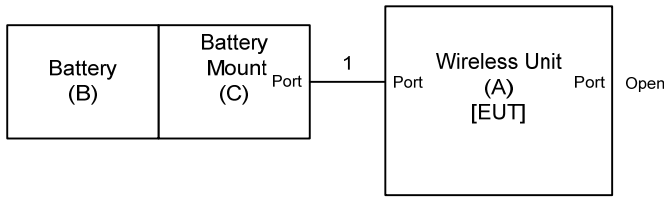
3.4. Test Mode

| Test Item                               | Operating Mode | Test Frequency | Setting Number of Display |
|---|----------------|----------------|---------------------------|
| Spurious Emission Measurement(Radiated) | Low Channel    | 2403MHz        | 1                         |
|   | Middle Channel | 2441MHz        | 2                         |
|   | High Channel   | 2480MHz        | 3                         |

[Note]

- (1) The test program was prepared by applicant.
- (2) The power setting and modulation condition are not changed by the software and it is equivalent to that of mass-produced.
- (3) The all data of the each modes were checked in three orthogonal axes, and the data of the producing the maximum emissions were reported at each frequency.

3.5. Block Diagram of TEST System



3.6. List of Test System

| No. | Device Name   | Model No. | Serial No. | Trade Name | Note |
|-----|---------------|-----------|------------|------------|------|
| A   | Wireless Unit | SM-EWW01  | 2          | SHIMANO    | EUT  |
| B   | Battery       | SM-BTR1   | —          | SHIMANO    |      |
| C   | Battery mount | SM-BMR2   | —          | SHIMANO    |      |

3.7. List of Cables

| No. | Cable Name   | Shielded (Y/N) | Length (m) | Note              |
|-----|--------------|----------------|------------|-------------------|
| 1   | Signal Cable | Y              | 0.7        | Model No: EW-SD50 |

[Note]

- (1) : Undetachable cable type
- (2) : Accessories cable of EUT
- (3) : 3-wires type, earth plug is grounded.
- (4) : 2-wires type

## 4. SPURIOUS EMISSIONS MEASUREMENT

### 4.1. Test Procedure

#### Radiated measurement

- (1) Configure the EUT System in accordance with ANSI C63.4-2003 section 8.  
See also the block diagram and the photographs of EUT System configuration in this report.
- (2) If the EUT system is connected to a public power network, all power cords for the EUT System are connected the receptacle on the turntable.
- (3) Warm up the EUT System.
- (4) Activate the EUT System and run the prepared software for the test, if necessary.
- (5) To find out the emissions of the EUT System, preliminary radiated measurement are performed at a closer distance than that specified for final radiated measurement using the spectrum analyzer (\*1) and the broad band antenna.  
In the frequency below 30MHz, it is performed using the spectrum analyzer (\*1) and the loop antenna and the frequency above 1GHz, it is performed using the spectrum analyzer (\*2) (\*3) and the horn antenna.
- (6) To find out the EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.
- (7) The spectrums are scanned from 9kHz to the upper frequency of measurement range, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
- (8) In final compliance test, the six highest emissions minimum, recorded above, are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver (\*4).  
In the frequency below 30MHz, it is performed using the test receiver (\*4) and the loop antenna and the frequency above 1GHz, the measurements are performed by the horn antenna and the spectrum analyzer (\*2) (\*3) with pre-amplifier.

#### [Note]

- (\*1) Spectrum Analyzer Set Up Conditions
  - Frequency range : 9 – 150kHz / 150kHz – 30MHz / 30 – 1000MHz
  - Resolution bandwidth : 300Hz / 10kHz / 100kHz
  - Detector function : Peak mode
- (\*2) Spectrum Analyzer Set Up Conditions
  - Frequency range : 1GHz – Upper frequency of measurement range
  - Resolution bandwidth : 1MHz
  - Video bandwidth : 3MHz (Peak measurement) / 10Hz (Average measurement)
  - Detector function : Peak mode
  - Y axis : Linear (Average measurement)
- (\*3) Spectrum Analyzer Set Up Conditions
  - Frequency range : Non-Restricted Band
  - Resolution bandwidth : 100kHz
  - Video bandwidth : 3 x RBW
  - Detector function : Peak mode
- (\*4) Test Receiver Set Up Conditions
  - Detector function : Quasi – Peak or Peak or Average
  - Frequency range : 9 – 150kHz / 150kHz – 30MHz / 30 – 1000MHz
  - IF bandwidth : 200Hz / 9kHz / 120kHz





4.2. Test Results

Radiated measurement

2403MHz

| Measured Frequency<br>( MHz ) | Antenna Factor<br>( dB/m ) | Meter Reading                       |                                   | Distance Factor from 1 m to 3m<br>( dB ) | Maximum Field Strength<br>( dBμV/m ) | Limit<br>( dBμV/m ) | Margin for Limit<br>( dB ) |
|-------------------------------|----------------------------|-------------------------------------|-----------------------------------|--|--------------------------------------|---------------------|----------------------------|
|                               |                            | Horizontal Polarization<br>( dBμV ) | Vertical Polarization<br>( dBμV ) |  |                                      |                     |                            |
| 204.26                        | 19.5                       | <0.0                                | 3.3                               | -  | 22.8                                 | 43.5                | 20.7                       |
| 335.99                        | 20.4                       | 1.3                                 | 8.3                               | -  | 28.7                                 | 46.0                | 17.3                       |
| 341.36                        | 20.5                       | 0.7                                 | 2.3                               | -  | 22.8                                 | 46.0                | 23.2                       |
| 431.98                        | 22.3                       | 0.8                                 | 6.0                               | -  | 28.3                                 | 46.0                | 17.7                       |
| 497.72                        | 23.3                       | 0.6                                 | 3.6                               | -  | 26.9                                 | 46.0                | 19.1                       |
| 623.97                        | 25.0                       | 1.0                                 | 4.4                               | -  | 29.4                                 | 46.0                | 16.6                       |
| Peak measurement              |                            |                                     |                                   |  |                                      |                     |                            |
| 2390.00                       | 4.2                        | 47.8                                | 48.3                              | -  | 52.5                                 | 74.0                | 21.5                       |
| 4806.00                       | -0.3                       | 54.7                                | 56.4                              | -  | 56.1                                 | 74.0                | 17.9                       |
| 7209.00                       | -1.4                       | <45.0                               | <45.0                             | -  | <43.6                                | 74.0                | >30.4                      |
| 9612.00                       | 2.2                        | <45.0                               | <45.0                             | -  | <47.2                                | 74.0                | >26.8                      |
| 24030.00                      | 5.9                        | <45.0                               | <45.0                             | 9.5                                      | <41.4                                | 74.0                | >32.6                      |
| Average measurement           |                            |                                     |                                   |  |                                      |                     |                            |
| 2390.00                       | 4.2                        | <35.0                               | <35.0                             | -  | <39.2                                | 54.0                | >14.8                      |
| 4806.00                       | -0.3                       | 35.3                                | 35.7                              | -  | 35.4                                 | 54.0                | 18.6                       |
| 7209.00                       | -1.4                       | <35.0                               | <35.0                             | -  | <33.6                                | 54.0                | >20.4                      |
| 9612.00                       | 2.2                        | <35.0                               | <35.0                             | -  | <37.2                                | 54.0                | >16.8                      |
| 24030.00                      | 5.9                        | <35.0                               | <35.0                             | 9.5                                      | <31.4                                | 54.0                | >22.6                      |

[20dBc Data Sheet]

| Measured Frequency<br>( MHz ) | Antenna Factor<br>( dB/m ) | Meter Reading                       |                                   | Maximum Field Strength<br>( dBμV/m ) | Limit<br>( dBμV/m ) | Margin for Limit<br>( dB ) |
|-------------------------------|----------------------------|-------------------------------------|-----------------------------------|--------------------------------------|---------------------|----------------------------|
|                               |                            | Horizontal Polarization<br>( dBμV ) | Vertical Polarization<br>( dBμV ) |                                      |                     |                            |
| Peak measurement              |                            |                                     |                                   |                                      |                     |                            |
| * 1) 2403.00                  | 4.2                        | 83.1                                | -                                 | 87.3                                 | -                   | -                          |
| 2400.00                       | 4.2                        | 42.8                                | -                                 | 47.0                                 | 67.3                | 20.3                       |
| * 1) 2403.00                  | 4.2                        | -                                   | 83.2                              | 87.4                                 | -                   | -                          |
| 2400.00                       | 4.2                        | -                                   | 42.5                              | 46.7                                 | 67.4                | 20.7                       |



## 2441MHz

| Measured Frequency<br>(MHz) | Antenna Factor<br>(dB/m) | Meter Reading                     |                                 | Distance Factor from 1 m to 3m<br>(dB) | Maximum Field Strength<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin for Limit<br>(dB) |
|-----------------------------|--------------------------|-----------------------------------|---------------------------------|--|------------------------------------|-------------------|--------------------------|
|                             |                          | Horizontal Polarization<br>(dBμV) | Vertical Polarization<br>(dBμV) |  |                                    |                   |                          |
| 204.26                      | 19.5                     | <0.0                              | 3.3                             | -                                      | 22.8                               | 43.5              | 20.7                     |
| 335.99                      | 20.4                     | 1.3                               | 8.3                             | -                                      | 28.7                               | 46.0              | 17.3                     |
| 341.36                      | 20.5                     | 0.7                               | 2.3                             | -                                      | 22.8                               | 46.0              | 23.2                     |
| 431.98                      | 22.3                     | 0.8                               | 6.0                             | -                                      | 28.3                               | 46.0              | 17.7                     |
| 497.72                      | 23.3                     | 0.6                               | 3.6                             | -                                      | 26.9                               | 46.0              | 19.1                     |
| 623.97                      | 25.0                     | 1.0                               | 4.4                             | -                                      | 29.4                               | 46.0              | 16.6                     |
| Peak measurement            |                          |                                   |                                 |  |                                    |                   |                          |
| 4882.00                     | -0.1                     | 47.7                              | 51.8                            | -                                      | 51.7                               | 74.0              | 22.3                     |
| 7323.00                     | -1.2                     | <45.0                             | <45.0                           | -                                      | <43.8                              | 74.0              | >30.2                    |
| 9764.00                     | 2.3                      | <45.0                             | <45.0                           | -                                      | <47.3                              | 74.0              | >26.7                    |
| 24410.00                    | 5.8                      | <45.0                             | <45.0                           | 9.5                                    | <41.3                              | 74.0              | >32.7                    |
| Average measurement         |                          |                                   |                                 |  |                                    |                   |                          |
| 4882.00                     | -0.1                     | <35.0                             | <35.0                           | -                                      | <34.9                              | 54.0              | >19.1                    |
| 7323.00                     | -1.2                     | <35.0                             | <35.0                           | -                                      | <33.8                              | 54.0              | >20.2                    |
| 9764.00                     | 2.3                      | <35.0                             | <35.0                           | -                                      | <37.3                              | 54.0              | >16.7                    |
| 24410.00                    | 5.8                      | <35.0                             | <35.0                           | 9.5                                    | <31.3                              | 54.0              | >22.7                    |

## 2480MHz

| Measured Frequency<br>(MHz) | Antenna Factor<br>(dB/m) | Meter Reading                     |                                 | Distance Factor from 1 m to 3m<br>(dB) | Maximum Field Strength<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin for Limit<br>(dB) |
|-----------------------------|--------------------------|-----------------------------------|---------------------------------|--|------------------------------------|-------------------|--------------------------|
|                             |                          | Horizontal Polarization<br>(dBμV) | Vertical Polarization<br>(dBμV) |  |                                    |                   |                          |
| 204.26                      | 19.5                     | <0.0                              | 3.3                             | -                                      | 22.8                               | 43.5              | 20.7                     |
| 335.99                      | 20.4                     | 1.3                               | 8.3                             | -                                      | 28.7                               | 46.0              | 17.3                     |
| 341.36                      | 20.5                     | 0.7                               | 2.3                             | -                                      | 22.8                               | 46.0              | 23.2                     |
| 431.98                      | 22.3                     | 0.8                               | 6.0                             | -                                      | 28.3                               | 46.0              | 17.7                     |
| 497.72                      | 23.3                     | 0.6                               | 3.6                             | -                                      | 26.9                               | 46.0              | 19.1                     |
| 623.97                      | 25.0                     | 1.0                               | 4.4                             | -                                      | 29.4                               | 46.0              | 16.6                     |
| Peak measurement            |                          |                                   |                                 |  |                                    |                   |                          |
| 2483.50                     | 4.3                      | 55.5                              | 54.6                            | -                                      | 59.8                               | 74.0              | 14.2                     |
| 4960.00                     | -0.2                     | 47.3                              | 47.0                            | -                                      | 47.1                               | 74.0              | 26.9                     |
| 7440.00                     | -1.1                     | <45.0                             | <45.0                           | -                                      | <43.9                              | 74.0              | >30.1                    |
| 9920.00                     | 2.6                      | <45.0                             | <45.0                           | -                                      | <47.6                              | 74.0              | >26.4                    |
| 24800.00                    | 5.7                      | <45.0                             | <45.0                           | 9.5                                    | <41.2                              | 74.0              | >32.8                    |
| Average measurement         |                          |                                   |                                 |  |                                    |                   |                          |
| 2483.50                     | 4.3                      | <35.0                             | <35.0                           | -                                      | <39.3                              | 54.0              | >14.7                    |
| 4960.00                     | -0.2                     | <35.0                             | <35.0                           | -                                      | <34.8                              | 54.0              | >19.2                    |
| 7440.00                     | -1.1                     | <35.0                             | <35.0                           | -                                      | <33.9                              | 54.0              | >20.1                    |
| 9920.00                     | 2.6                      | <35.0                             | <35.0                           | -                                      | <37.6                              | 54.0              | >16.4                    |
| 24800.00                    | 5.7                      | <35.0                             | <35.0                           | 9.5                                    | <31.2                              | 54.0              | >22.8                    |

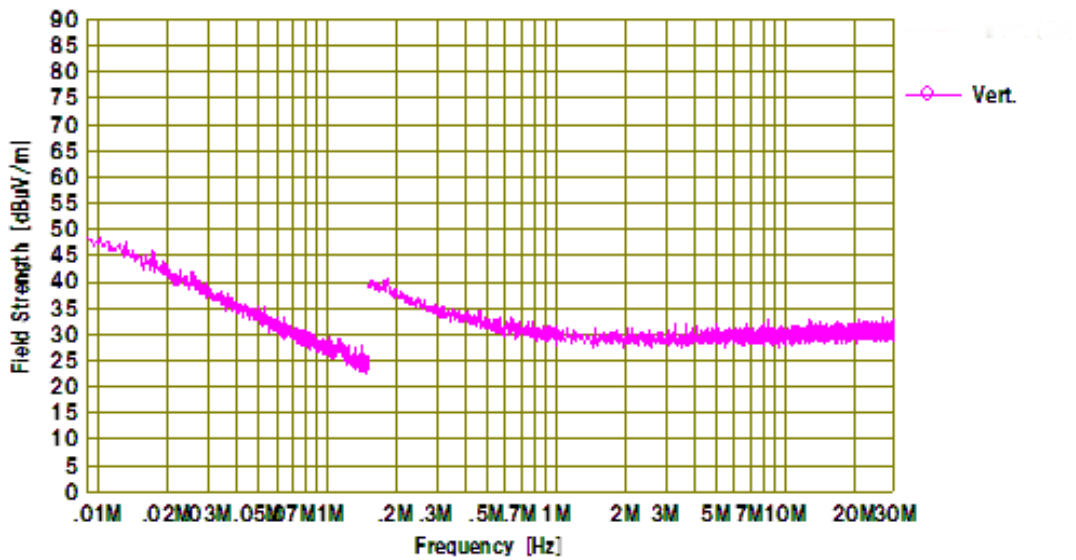
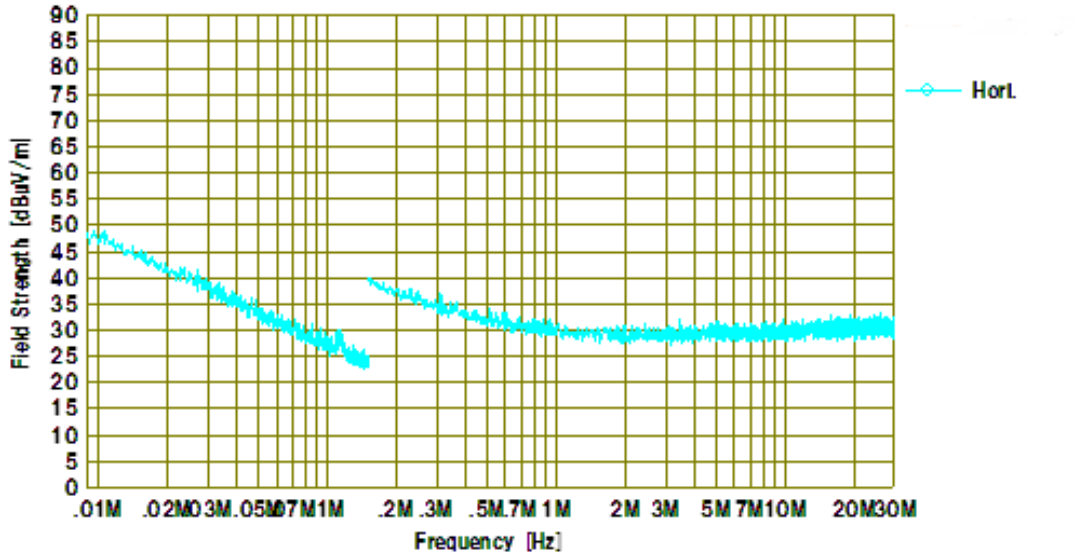


|  |  |
|--|--|
| [Remark]   |  |
| *1) Carrier  |  |
| [Note]   |  |
| <p>(1) Antenna Factor includes the cable loss and attenuator loss.<br/>Above 1000MHz, the antenna factor includes the cable loss, pre-amplifier gain and attenuator loss (if necessary).</p> <p>(2) * mark in Measured Frequency : Measured with the tuned dipole antenna.<br/>no mark in Measured Frequency : Measured with the broadband antenna.</p> <p>(3) Upper Frequency : <input checked="" type="checkbox"/> Transmitter Frequency (TX): TX &lt; 10GHz<br/> <input checked="" type="checkbox"/> 10th harmonic of the highest frequency / <input type="checkbox"/> Up to 40GHz<br/> <input type="checkbox"/> Transmitter Frequency (TX): 10GHz ≤ TX &lt; 30GHz<br/> <input type="checkbox"/> 10th harmonic of the highest frequency / <input type="checkbox"/> Up to 100GHz<br/> <input type="checkbox"/> Transmitter Frequency (TX): 30GHz ≤ TX<br/> <input type="checkbox"/> 10th harmonic of the highest frequency / <input type="checkbox"/> Up to 200GHz</p> <p>The emissions were checked to the upper frequency, and the lower emissions than the listed emissions in the above tables were omitted.</p> <p>(4) Measurement Distance : &lt;below 1GHz&gt; <input checked="" type="checkbox"/> 3m <input type="checkbox"/> 10m<br/> &lt;above 1GHz&gt; 3m<br/> &lt;above 10GHz&gt; 1m</p> |  |
| [Calculation method]   |  |
| Maximum Field Strength (dBμV/m)<br>= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m) - Distance Factor (dB) (*)<br>(*) Applied for Radiated Emission Measurement (above 10GHz) only.<br>Distance Factor : $20 \times \log_{10} (3\text{m}/1\text{m}) = 9.5\text{dB}$   |  |

| Tested Date      | Environment |          |
|------------------|-------------|----------|
|                  | Temperature | Humidity |
| 25 December 2013 | 21 °C       | 36 %     |

Test Results in Graph

- below 30MHz





## 5. TEST EQUIPMENT

## · Spurious Emissions Measurement (Radiated measurement) below 30 MHz

| KEC No. | Equipment     | Manufacturer            | Model No.            | Last Cal. | Next Cal. |
|---------|---------------|-------------------------|----------------------|-----------|-----------|
| AN-054  | Loop Antenna  | ROHDE & SCHWARZ         | HFH2-Z2              | 2013/10   | 2014/10   |
| AM-093  | Pre-Amplifier | MITEQ                   | MLA-10K01-B0<br>1-40 | 2013/04   | 2014/04   |
| SA-062  | Test Receiver | Agilent<br>Technologies | N9038A               | 2013/11   | 2014/11   |

## · Spurious Emissions Measurement (Radiated measurement) 30 -1000 MHz

| KEC No. | Equipment         | Manufacturer    | Model No.   | Last Cal. | Next Cal. |
|---------|-------------------|-----------------|-------------|-----------|-----------|
| AM-098  | Pre-Amplifier     | SONOMA          | SONOMA 310N | 2013/03   | 2014/03   |
| AN-220  | LPDA Antenna      | Schwarzbeck     | UHALP 9108A | 2013/04   | 2014/04   |
| AN-296  | Biconical Antenna | Schwarzbeck     | VHBB9124    | 2013/04   | 2014/04   |
| AT-101  | 3dB Attenuator    | JFW             | 50HF-003    | 2013/03   | 2014/03   |
| FS-099  | Test Receiver     | ROHDE & SCHWARZ | ESS         | 2013/11   | 2014/11   |
| MM-302  | RF Selector       | TOYO            | NS4900      | 2013/04   | 2014/04   |
| SA-058  | Spectrum Analyzer | Agilent         | N9010A      | 2013/04   | 2014/04   |

## · Spurious Emissions Measurement (Radiated measurement) above 1GHz

| KEC No. | Equipment              | Manufacturer       | Model No.         | Last Cal. | Next Cal. |
|---------|------------------------|--------------------|-------------------|-----------|-----------|
| AM-053  | Pre-Amplifier          | HP                 | 8449B             | 2013/04   | 2014/04   |
| AN-104  | Std. Gain Horn Antenna | Scientific-Atlanta | 12-5.8            | 2013/05   | 2014/05   |
| AN-107  | Std. Gain Horn Antenna | Scientific-Atlanta | 12A-18            | 2013/12   | 2015/12   |
| AN-145  | Std. Gain Horn Antenna | Scientific-Atlanta | 12-12             | 2013/05   | 2015/05   |
| AN-210  | DRG Horn Antenna       | Scientific-Atlanta | 12-8.2            | 2013/05   | 2015/04   |
| AN-298  | DRG Horn Antenna       | Schwarzbeck        | BBHA9120LF(A<br>) | 2013/05   | 2015/04   |
| SA-052  | Spectrum Analyzer      | Agilent            | E4446A            | 2013/10   | 2014/10   |
| FL-222  | Band-stop Filter       | TOYO               | 8BRM2442/T300     | 2013/05   | 2014/05   |
| AT-148  | Fixed Attenuator       | Anritsu            | 41KC-10           | 2013/03   | 2014/03   |

Note : (\*1) We check the performance, before using this device.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.