



# RADIO TEST REPORT






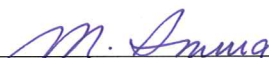

Test Report No. : 29EE0161-HO-01-C

**Applicant** : silex technology, Inc.  
**Type of Equipment** : Wireless 11abg Adapter  
**Model No.** : SX-10WAG-IT  
**FCC ID** : N6C-SX10WAGIT  
**Test regulation** : FCC Part 15 Subpart E: 2009  
Section 15.407  
**Test Result** : Complied


1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**Date of test:** January 16 to February 22, 2009

**Tested by:**

|  |  |  |
|--|--|--|
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**Approved by :**

  
Tetsuo Maeno  
Site Manager of EMC Services



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.  
\*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://uljapan.co.jp/emc/nvlap.html>

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| <b>CONTENTS</b>  | <b>PAGE</b> |
|--|-------------|
| <b>SECTION 1: CUSTOMER INFORMATION .....</b>                                       | <b>3</b>    |
| <b>SECTION 2: EQUIPMENT UNDER TEST (E.U.T.) .....</b>                              | <b>3</b>    |
| <b>SECTION 3: TEST SPECIFICATION, PROCEDURES &amp; RESULTS .....</b>               | <b>4</b>    |
| <b>SECTION 4: OPERATION OF E.U.T. DURING TESTING .....</b>                         | <b>8</b>    |
| <b>SECTION 5: CONDUCTED EMISSION.....</b>  | <b>10</b>   |
| <b>SECTION 6: SPURIOUS EMISSION AND BAND EDGE COMPLIANCE .....</b>                 | <b>11</b>   |
| <b>SECTION 7: BANDWIDTH.....</b>   | <b>12</b>   |
| <b>SECTION 8: MAXIMUM PEAK OUTPUT POWER.....</b>                                   | <b>12</b>   |
| <b>SECTION 9: PEAK POWER SPECTRAL DENSITY .....</b>                                | <b>13</b>   |
| <b>SECTION 10: PEAK EXCURSION RATIO .....</b>                                      | <b>13</b>   |
| <b>APPENDIX 1: PHOTOGRAPHS OF TEST SETUP .....</b>                                 | <b>14</b>   |
| <b>Conducted Emission .....</b>  | <b>14</b>   |
| <b>Spurious Emission (Radiated).....</b>   | <b>16</b>   |
| <b>Worst Case Position.....</b>  | <b>17</b>   |
| <b>APPENDIX 2: DATA OF EMI TEST.....</b>   | <b>18</b>   |
| <b>Conducted Emission .....</b>  | <b>18</b>   |
| <b>26dB Emission Bandwidth and 99% Occupied Bandwidth .....</b>                    | <b>30</b>   |
| <b>Maximum Peak Output Power.....</b>  | <b>33</b>   |
| <b>Radiated Spurious Emission (below 1GHz) .....</b>                               | <b>46</b>   |
| <b>Radiated Spurious Emission (above 1GHz:Inside of the restricted band).....</b>  | <b>54</b>   |
| <b>Radiated Spurious Emission (above 1GHz:Outside of the restricted band).....</b> | <b>60</b>   |
| <b>Conducted Spurious Emission.....</b>  | <b>68</b>   |
| <b>Conducted emission Band Edge compliance.....</b>                                | <b>88</b>   |
| <b>Peak Power Spectral Density.....</b>  | <b>90</b>   |
| <b>Peak Excursion Ratio .....</b>  | <b>92</b>   |
| <b>APPENDIX 3:TEST INSTRUMENTS .....</b>   | <b>95</b>   |

**SECTION 1: Customer information**

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Facsimile Number : +81-774-98-3758  
Contact Person : Toshiro Kometani

**SECTION 2: Equipment under test (E.U.T.)**

Type of Equipment : Wireless 11abg Adapter  
Model No. : SX-10WAG-IT  
Serial No. : 0080920115A5, 0080920115A7  
Rating : DC 3.3V  
Receipt Date of Sample : January 8, 2009  
Country of Mass-production : Japan  
Condition of EUT : Production prototype  
Modification of EUT : No Modification by the test lab

**2.2 Product Description**

Model No: SX-10WAG-IT (referred to as the EUT in this report) is the Wireless 11abg Adapter.

Equipment Type : Transceiver  
Clock frequency : 33MHz, 40MHz  
Method of Frequency Generation : Crystal  
Operating voltage (inner) : DC3.3V +/-0.3V

|                        | <b>IEEE802.11b</b>          | <b>IEEE802.11g</b>                    | <b>IEEE802.11a</b>                    |
|------------------------|-----------------------------|---------------------------------------|---------------------------------------|
| Frequency of operation | 2412-2462MHz                | 2412-2462MHz                          | 5180-5320MHz<br>5745-5825MHz          |
| Type of modulation     | DSSS<br>(CCK, DQPSK, DBPSK) | OFDM<br>(64QAM, 16QAM, QPSK,<br>BPSK) | OFDM<br>(64QAM, 16QAM, QPSK,<br>BPSK) |
| Channel spacing        | 5MHz                        | 5MHz                                  | 20MHz                                 |
| ITU Code               | G1D                         | D1D                                   | D1D                                   |
| Antenna type           | Omni-Directional            | Omni-Directional                      | Omni-Directional                      |
| Antenna Gain           | 1.5dBi                      | 1.5dBi                                | 2.1dBi                                |

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part15 Subpart E: 2009, final revised on February 27, 2009  
Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart E Unlicensed National Information Infrastructure Devices  
Section 15.407 General technical requirements

\* The revision on February 27, 2009 does not influence the test specification applied to the EUT.

#### **FCC 15.31 (e)**

The RF Module has own regulator.

The RF Module is constantly provided voltage (DC3.3V) through own regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203/212 Antenna requirement**

The EUT has a unique coupling/antenna connector (Reverse SMA). Therefore the equipment complies with the requirement of 15.203/212.

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### 3.2 Procedures and results

| No. | Item                        | Test Procedure   | Specification  | Remarks              | Deviation | Worst margin   | Results  |
|-----|-----------------------------|--|--|----------------------|-----------|--|----------|
| 1   | Conducted Emission          | FCC :ANSI C63.4:2003                                       | FCC: 15.407(b)(6) / 15.207                           | Conducted            | N/A       | [QP]<br>16.2dB,<br>0.15000MHz, (L/N)<br>[AV]<br>12.5dB,<br>0.24135MHz, (L)                         | Complied |
|     |                             | IC: RSS-Gen 7.2.2  | IC: RSS-Gen 7.2.2                                    |                      |           |  |          |
| 2   | 26dB Emission Bandwidth     | FCC :ANSI C63.4:2003                                       | FCC : 15.407(a)(1)(2)                                | Conducted            | N/A       |  | N/A      |
|     |                             | IC: -  | IC: RSS-210 A9.2 (1)(2)                              |                      |           |  |          |
| 3   | Maximum Peak Output Power   | FCC :ANSI C63.4:2003,<br>FCC Public Notice DA<br>02-2138A1 | FCC : 15.407(a) (1)(2)                               | Conducted            | N/A       |  | Complied |
|     |                             | IC: -  | IC: RSS-210 A9.2 (1)(2)                              |                      |           |  |          |
| 4   | Peak Power Spectral Density | FCC :ANSI C63.4:2003,<br>FCC Public Notice DA<br>02-2138A1 | FCC : 15.407(a) (1)(2)                               | Conducted            | N/A       | See data   | Complied |
|     |                             | IC: -  | IC: RSS-210 A9.2 (1)(2)                              |                      |           |  |          |
| 5   | Peak Excursion Ratio        | FCC :ANSI C63.4:2003,<br>FCC Public Notice DA<br>02-2138A1 | FCC : 15.407(a)(6)                                   | Conducted            | N/A       |  | Complied |
|     |                             | IC: -  | IC: -  |                      |           |  |          |
| 6   | Spurious Emission           | FCC: ANSI C63.4:2003                                       | FCC : 15.407(b) (1)(2)<br>(5)(6)(7), 15.205and15.209 | Conducted / Radiated | N/A       | [Tx]<br>0.2dB,<br>10600.0MHz,<br>Horizontal, AV<br>[Rx]<br>0.4dB,<br>266.672MHz,<br>Horizontal, QP | Complied |
|     |                             | IC: -  | IC: RSS-210 A.9.3 (1)(2)                             |                      |           |  |          |
| 7   | Band Edge Compliance        | FCC :ANSI C63.4:2003                                       | FCC : 15.407(b) (1)(2)<br>(5), 15.205and15.209       | Conducted / Radiated | N/A       | See data   | Complied |
|     |                             | IC: -  | IC: RSS-210 A.9.3 (1)(2)                             |                      |           |  |          |

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

\*These tests were also referred to FCC Public Notice DA 02-2138A1 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands".

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### 3.3 Addition to standards

| No. | Item                    | Test Procedure    | Specification     | Remarks   | Deviation | Worst margin | Results |
|-----|-------------------------|-------------------|-------------------|-----------|-----------|--------------|---------|
| 1   | 99% Occupied Band Width | IC: RSS-Gen 4.6.1 | IC: RSS-Gen 4.6.1 | Conducted | N/A       | N/A          | N/A     |

\*Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

#### EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

| Test room                      | Conducted emission | Radiated emission (10m*) |              |             | Radiated emission (3m*) |              |             | Radiated emission (3m*) |             |
|--------------------------------|--------------------|--------------------------|--------------|-------------|-------------------------|--------------|-------------|-------------------------|-------------|
|                                | 150kHz-30MHz       | 9kHz-30MHz               | 30MHz-300MHz | 300MHz-1GHz | 9kHz-30MHz              | 30MHz-300MHz | 300MHz-1GHz | 1GHz-18GHz              | 18GHz-40GHz |
| No.1 semi-anechoic Chamber (±) | 3.7dB              | 3.1dB                    | 4.4dB        | 4.2dB       | 3.2dB                   | 3.8dB        | 3.9dB       | 5.9dB                   | 6.1dB       |
| No.2 semi-anechoic chamber (±) | 3.7dB              | -                        | -            | -           | 3.2dB                   | 4.4dB        | 4.0dB       | 5.9dB                   | 6.1dB       |
| No.3 semi-anechoic chamber (±) | 3.7dB              | -                        | -            | -           | 3.2dB                   | 4.6dB        | 4.0dB       | 5.9dB                   | 6.1dB       |
| No.4 semi-anechoic chamber (±) | 3.7dB              | -                        | -            | -           | 3.2dB                   | 3.9dB        | 3.9dB       | 5.9dB                   | 6.1dB       |

\*10m/3m = Measurement distance

#### Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

#### Radiated emission test(3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

#### Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty for this test is ±3.0dB.

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### 3.5 Test Location

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|                            | FCC Registration Number | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms            |
|----------------------------|-------------------------|------------------------|----------------------------|--|------------------------|
| No.1 semi-anechoic chamber | 313583                  | 2973C-1                | 19.2 x 11.2 x 7.7m         | 7.0 x 6.0m   | No.1 Power source room |
| No.2 semi-anechoic chamber | 655103                  | 2973C-2                | 7.5 x 5.8 x 5.2m           | 4.0 x 4.0m   | -                      |
| No.3 semi-anechoic chamber | 148738                  | 2973C-3                | 12.0 x 8.5 x 5.9m          | 6.8 x 5.75m  | No.3 Preparation room  |
| No.3 shielded room         | -                       | -                      | 4.0 x 6.0 x 2.7m           | N/A  | -                      |
| No.4 semi-anechoic chamber | 134570                  | 2973C-4                | 12.0 x 8.5 x 5.9m          | 6.8 x 5.75m  | No.4 Preparation room  |
| No.4 shielded room         | -                       | -                      | 4.0 x 6.0 x 2.7m           | N/A  | -                      |
| No.5 semi-anechoic chamber | -                       | -                      | 6.0 x 6.0 x 3.9m           | 6.0 x 6.0m   | -                      |
| No.6 shielded room         | -                       | -                      | 4.0 x 4.5 x 2.7m           | 4.75 x 5.4 m   | -                      |
| No.6 measurement room      | -                       | -                      | 4.75 x 5.4 x 3.0m          | 4.75 x 4.15 m  | -                      |
| No.7 shielded room         | -                       | -                      | 4.7 x 7.5 x 2.7m           | 4.7 x 7.5m   | -                      |
| No.8 measurement room      | -                       | -                      | 3.1 x 5.0 x 2.7m           | N/A  | -                      |
| No.9 measurement room      | -                       | -                      | 8.0 x 4.5 x 2.8m           | 2.0 x 2.0m   | -                      |
| No.10 measurement room     | -                       | -                      | 2.6 x 2.8 x 2.5m           | 2.4 x 2.4m   | -                      |
| No.11 measurement room     | -                       | -                      | 3.1 x 3.4 x 3.0m           | 2.4 x 3.4m   | -                      |

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

### 3.6 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX 1 to 3.

## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Modes**

| <b>Test Item</b>   | <b>Test mode</b>   | <b>Test frequency</b> | <b>Channel</b> | <b>Used Antenna</b> |   |
|--|--|-----------------------|----------------|---------------------|---|
| Conducted Emission<br>Spurious Emission*   | -IEEE802.11a Transmitting (Tx),<br>24Mbps, Payload: PN9        | 5180MHz(L)            | 36             | A                   |   |
|  |  | 5220MHz(M)            | 44             |                     |   |
|  |  | 5240MHz(H)            | 48             |                     |   |
|  |  | 5260MHz(L)            | 52             |                     |   |
|  | -IEEE802.11a Receiving (Rx)                                    | 5300MHz(M)            | 60             |                     |   |
|  |  | 5320MHz(H)            | 64             |                     |   |
|  | -IEEE802.11a Transmitting (Tx),<br>48Mbps, Turbo, Payload: PN9 | 5220MHz(L)            | 44             |                     | A |
|  |  | 5300MHz(M)            | 60             |                     | A |
|  |  | 5200MHz(L)            | 40             |                     | A |
|  | -IEEE802.11a Receiving (Rx),<br>Turbo                          | 5250MHz(M)            | 50             |                     | A |
| 5290MHz(H)   |  | 58                    | A              |                     |   |
| 26dB Emission Bandwidth<br>Maximum Peak Output Power<br>Peak Power Spectral Density*<br>Peak Excursion Ratio<br>99% Occupied Bandwidth | -IEEE802.11a Transmitting (Tx),<br>24Mbps, Payload: PN9        | 5180MHz(L)            | 36             | A                   |   |
|  |  | 5220MHz(M)            | 44             |                     |   |
|  |  | 5240MHz(H)            | 48             |                     |   |
|  |  | 5260MHz(L)            | 52             |                     |   |
|  | -IEEE802.11a Transmitting (Tx),<br>48Mbps, Turbo, Payload: PN9 | 5300MHz(M)            | 60             |                     | A |
|  |  | 5320MHz(H)            | 64             |                     |   |
|  | -IEEE802.11a Transmitting (Tx),<br>48Mbps, Turbo, Payload: PN9 | 5200MHz(L)            | 40             |                     | A |
|  |  | 5250MHz(M)            | 50             |                     |   |
|  |  | 5290MHz(H)            | 58             |                     |   |
|  |  | 5290MHz(H)            | 58             |                     |   |

As a result of preliminary test, the formal test was performed with the above modes, which had the maximum power. Transmitting duty was 100% on all the tests.

\*Radiated Emission level at Turbo mode has no difference from the ones at usual operation mode.

Peak Power Spectral Density level at Turbo mode is less than the ones at usual operation mode.

Therefore, only the test items such as Conducted Emission, 26dB Emission Bandwidth, Maximum Peak Output Power, Peak Excursion Ratio, 99% Occupied Bandwidth, and Spurious Emission (Conducted) that would be influenced by the Turbo mode were performed.

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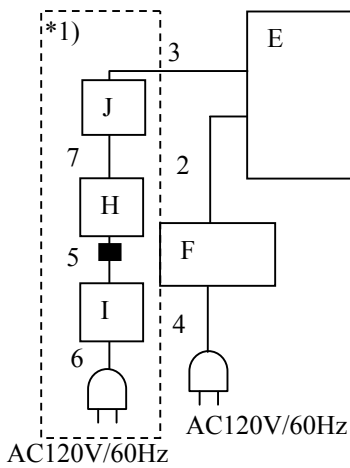
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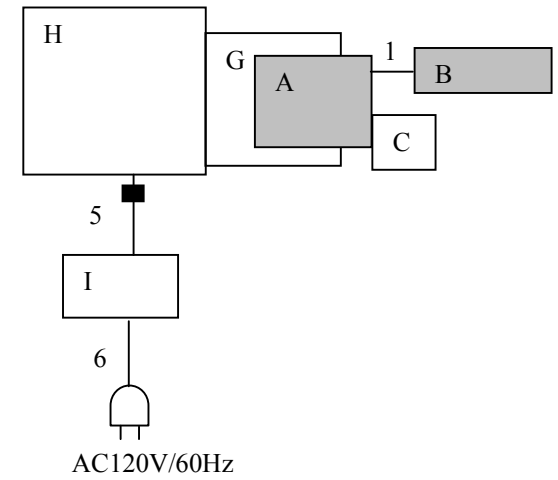


## 4.2 Configuration and peripherals

### (1) Normal mode



### (2) Turbo mode



■ : Standard Ferrite Core

\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

\*1) Used for Conducted emission test only.

### Description of EUT and Support equipment

| No. | Item                                  | Model number | Serial number                    | Manufacturer | Remarks |
|-----|---------------------------------------|--------------|----------------------------------|--------------|---------|
| A   | Wireless labg Adapter                 | SX-10WAG-IT  | 0080920115A7<br>0080920115A5 *2) | silex        | EUT     |
| B   | Antenna                               | ANTB98-061   | 001                              | silex        | EUT     |
| C   | 50 ohm terminator                     | HP909D       | 03745                            | HP           | -       |
| D   | PCMCIA-MiniPCI converted adapter card | -            | -                                | silex        | -       |
| E   | Jig                                   | -            | -                                | silex        | -       |
| F   | AC adapter                            | VE10B-050    | -                                | FAIRWAY      | -       |
| G   | PCMCIA-MiniPCI converted adapter card | -            | -                                | silex        | -       |
| H   | Personal Computer                     | TYPE1171-81J | 97-H2623                         | IBM          | -       |
| I   | AC adapter                            | 02K6542      | 1Z0RM101GHL                      | IBM          | -       |
| J   | Bridge                                | FX-08IS      | 07GF11145CRSB                    | PCI          | -       |

\*2) Used for the test on January 16, 28, 29, 30, 31 and February 2, 2009

### List of cables used

| No. | Name          | Length (m) | Shield     |            | Remarks |
|-----|---------------|------------|------------|------------|---------|
|     |               |            | Cable      | Connector  |         |
| 1   | Antenna Cable | 0.12       | Shielded   | Shielded   | -       |
| 2   | DC Cable      | 0.9        | Unshielded | Unshielded | -       |
| 3   | LAN Cable     | 0.9        | Unshielded | Unshielded | -       |
| 4   | AC Cable      | 0.45       | Unshielded | Unshielded | -       |
| 5   | DC Cable      | 1.8        | Unshielded | Unshielded | -       |
| 6   | AC Cable      | 1.0        | Unshielded | Unshielded | -       |
| 7   | LAN Cable     | 2.0        | Unshielded | Unshielded | -       |

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## **SECTION 5: Conducted Emission**

### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center .

#### For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

**Detector** : quasi-peak and average detector (IF BW 9 kHz)  
**Measurement range** : 0.15-30MHz  
**Test data** : APPENDIX 2  
**Test result** : Pass

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**SECTION 6: Spurious Emission and Band Edge Compliance**

**[Conducted]**

**Test Procedure**

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

**Test data** : APPENDIX 2  
**Test result** : Pass

**[Radiated]**

**Test Procedure**

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) , 1m(10-26.5GHz, Distance Factor :  $20\log(3[m]/1[m])$ ) and 0.5m( Upper 26.5GHz, Distance Factor :  $20\log(3[m]/0.5[m])$  ).

The height of the measuring varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver or the Spectrum Analyzer.

**Below 1GHz**

The result also satisfied with the general limits specified in section 15.209(a).

**Above 1GHz**

Inside of the restricted bands (Section 15.205): Apply to limit in the Section 15.209(a)  
Outside of the restricted bands (Section 15.407): Limit -27dBm EIRP

| Frequency      | Below 1GHz    | Above 1GHz<br>(Inside of the restricted bands) | Above 1GHz<br>(Outside of the restricted bands) |
|----------------|---------------|--|---|
| Instrument use | Test Receiver | Spectrum Analyzer                              | Spectrum Analyzer                               |
| Detector       | QP: BW 120kHz | PK: RBW:1MHz/VBW: 1MHz                         | RBW:1MHz/VBW: 1MHz                              |
| IF Bandwidth   |               | AV *1): RBW:1MHz/VBW: 10Hz                     |   |

\*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

**Test data** : APPENDIX 2  
**Test result** : Pass

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of Module and Antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

## **SECTION 7: Bandwidth**

### **26dB Bandwidth**

#### **Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.  
The following spectrum analyzer setting was used:

- Span: Enough width to display Bandwidth
- RBW: as close to 1% of the Emission Bandwidth as is possible without being below 1%
- VBW: Three times of RBW
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass

### **99% Occupied Bandwidth**

#### **Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.  
The following spectrum analyzer setting was used:

- Span: Enough width to display Bandwidth
- RBW: as close to 1% of the Span as is possible without being below 1%
- VBW: Three times of RBW
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass

## **SECTION 8: Maximum Peak Output Power**

#### **Test Procedure**

The Peak Transmit Power was measured with a spectrum analyzer connected to the antenna port.  
The test was made with the spectrum analyzer that has a function of channel-power measurement.  
We followed the method 1 specified in DA-02-2138A1.

**Test data** : APPENDIX 2  
**Test result** : Pass

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## **SECTION 9: Peak Power Spectral Density**

### **Test Procedure**

The Peak Power Spectral Density was measured with a spectrum analyzer connected to the antenna port.  
We followed the method 2 specified in DA-02-2138A1.

**Test data** : APPENDIX 2  
**Test result** : Pass

## **SECTION 10: Peak Excursion Ratio**

### **Test Procedure**

The Peak Excursion Ratio was measured with a spectrum analyzer connected to the antenna port.  
The second sweep was measured based on method 1 (Maximum Peak Output Power) specified in DA-02-2138A1.

**Test data** : APPENDIX 2  
**Test result** : Pass