



# EMI TEST REPORT

**Test Report No. : 10491306H-B**

**Applicant** : Sharp Corporation, Communication Systems Division  
**Type of Equipment** : Smart Phone  
**Model No.** : 401SH  
**FCC ID** : APYHRO00211  
**Test standard** : FCC Part 15 Subpart B 2014 Class B  
**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 the 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 product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**Date of test:** September 16, 2014

**Representative  
test engineer:**

Tsubasa Takayama  
Engineer  
Consumer Technology Division

**Approved by :**

Takahiro Hatakeda  
Leader  
Consumer Technology Division



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://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 10491306H-B**

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## **SECTION 1: Customer information**

Company Name : Sharp Corporation, Communication Systems Division  
Address : 2-13-1 Iida Hachihonmatsu HigashiHiroshima-City, Hiroshima, 739-0192  
Japan  
Telephone Number : +81-82-420-1552  
Facsimile Number : +81-82-420-1572  
Contact Person : Hiroyuki Uwatoko

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Smart Phone  
Model No. : 401SH  
Serial No. : Refer to Section 4, Clause 4.2  
Receipt Date of Sample : September 16, 2014  
Country of Mass-production : China  
Condition of EUT : Production prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No Modification by the test lab

### **2.2 Product description**

Feature of EUT : 401SH is AXGP, Tri-band (FDD 1/FDD 3/SBM Specific) FDD-LTE, Dual-band (FDD I/FDD VIII) WCDMA & Tri-band (900/1800/1900) GSM Multi-mode Smart Phone.  
The EUT has the function that Bluetooth wireless technology interface and wireless LAN technical interface for establishing contact and transmitting data with certain device.  
Clock frequencies in the system : CPU: 1190.4MHz (max)  
Source oscillation: 19.2MHz

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

#### **3.1 Test specification**

Test Specification : FCC Part 15 Subpart B: 2014, final revised on May 1, 2014 and effective June 2, 2014

Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart B Unintentional Radiators

#### **3.2 Procedures and results**

| Item               | Test Procedure                                                            | Limits  | Deviation | Worst margin                                                                        | Result   |
|--------------------|---------------------------------------------------------------------------|---------|-----------|-------------------------------------------------------------------------------------|----------|
| Conducted emission | ANSI C63.4: 2009<br>7. AC powerline<br>conducted emission<br>measurements | Class B | N/A       | [QP]<br>13.5dB<br>0.17159MHz, L<br>[AV]<br>12.4dB<br>0.17156MHz, N<br>0.17159MHz, L | Complied |
| Radiated emission  | ANSI C63.4: 2009<br>8. Radiated<br>emission measurements                  | Class B | N/A       | 11.0dB<br>447.366MHz,<br>Horizontal, QP                                             | Complied |

\*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.

#### **3.3 Addition to standard**

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<br>(semi-anechoic chamber) | Conducted emission<br>(+dB) |
|--------------------------------------|-----------------------------|
|                                      | 150kHz-30MHz                |
| No.1                                 | 3.5dB                       |
| No.2                                 | 3.5dB                       |
| No.3                                 | 3.6dB                       |
| No.4                                 | 3.5dB                       |

| Test room<br>(semi-anechoic chamber) | Radiated emission |                  |                 |                |                 |                   |                   |
|--------------------------------------|-------------------|------------------|-----------------|----------------|-----------------|-------------------|-------------------|
|                                      | (3m*)(+dB)        |                  |                 |                | (1m*)(+dB)      |                   | (0.5m*)(+dB)      |
|                                      | 9kHz<br>-30MHz    | 30MHz<br>-300MHz | 300MHz<br>-1GHz | 1GHz<br>-10GHz | 10GHz<br>-18GHz | 18GHz<br>-26.5GHz | 26.5GHz<br>-40GHz |
| No.1                                 | 4.0dB             | 5.1dB            | 5.0dB           | 5.1dB          | 6.0dB           | 4.9dB             | 4.3dB             |
| No.2                                 | 3.9dB             | 5.2dB            | 5.0dB           | 4.9dB          | 5.9dB           | 4.7dB             | 4.2dB             |
| No.3                                 | 4.3dB             | 5.1dB            | 5.2dB           | 5.2dB          | 6.0dB           | 4.8dB             | 4.2dB             |
| No.4                                 | 4.6dB             | 5.2dB            | 5.0dB           | 5.2dB          | 6.0dB           | 5.7dB             | 4.2dB             |

\*3m/1m/0.5m = 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 test report has enough margin, more than the site margin.

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### 3.5 Test Location

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Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

|                            | 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 | 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 | 2973C-2                | 7.5 x 5.8 x 5.2m           | 4.0 x 4.0m                                                       | -                      |
| No.3 semi-anechoic chamber | 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 | 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           | 4.0 x 4.5 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      | -                      | 8.8 x 4.6 x 2.8m           | 2.4 x 2.4m                                                       | -                      |
| No.11 measurement room     | -                      | 6.2 x 4.7 x 3.0m           | 4.8 x 4.6m                                                       | -                      |

\* 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

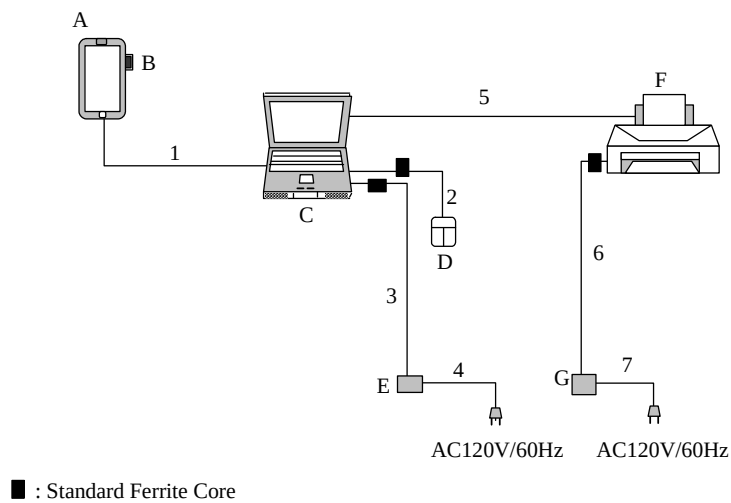
Refer to APPENDIX.

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

### **4.1 Operating modes**

The mode(s) : 1) USB Data Com Mode  
The USB data is communicated between EUT and Personal computer (Pair of EUT).  
2) Standby Mode  
Standby state for USB communication.

### **4.2 Configuration and peripherals**



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



#### Description of EUT and Support equipment

| No. | Item                 | Model number | Serial number            | Manufacturer      | Remarks |
|-----|----------------------|--------------|--------------------------|-------------------|---------|
| A   | Smart Phone          | 401SH        | 004401/11/527019/7       | Sharp Corporation | EUT     |
| B   | microSD Memory Card  | SD-MD008GA   | None                     | TOSHIBA           | -       |
| C   | Personal Computer    | PP11L        | CN-0D4571-48643-55V-1651 | Dell              | -       |
| D   | Mouse                | M-BE55       | LZE21450232              | Logitech          | -       |
| E   | AC Adapter (PC)      | PA-1650-05D2 | CN-0F7970-71615-561-14A1 | Dell              | -       |
| F   | Printer              | 895Cxi       | SG8BL1W16V               | Hewlett Packard   | -       |
| G   | AC Adapter (Printer) | C4557-60004  | C8K28B                   | Hewlett Packard   | -       |

#### List of cables used

| No. | Name                       | Length (m) | Shield     |            | Remarks |
|-----|----------------------------|------------|------------|------------|---------|
|     |                            |            | Cable      | Connector  |         |
| 1   | USB Data Cable             | 0.80       | Shielded   | Shielded   | -       |
| 2   | Mouse Cable                | 0.72       | Unshielded | Unshielded | -       |
| 3   | AC Adaptor Cable (PC)      | 1.76       | Unshielded | Unshielded | -       |
| 4   | AC Power Cable (PC)        | 0.85       | Unshielded | Unshielded | -       |
| 5   | Parallel Cable             | 1.65       | Shielded   | Shielded   | -       |
| 6   | AC Adapter Cable (printer) | 2.00       | Unshielded | Unshielded | -       |
| 7   | AC Power Cable (printer)   | 1.75       | Unshielded | Unshielded | -       |

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## **SECTION 5: Conducted Emission**

### **5.1 Operating environment**

|             |                               |
|-------------|-------------------------------|
| Test place  | : No. 1 semi anechoic chamber |
| Temperature | : See data                    |
| Humidity    | : See data                    |

### **5.2 Test configuration**

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 and its peripherals was 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 the LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the other 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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/AMN to the input power source. All unused 50 ohm connectors of the LISN/AMN were resistivity terminated in 50 ohm when not connected to the measuring equipment.

Photographs of the set up are shown in Appendix 3.

|                    |                  |
|--------------------|------------------|
| Frequency range    | : 0.15 MHz-30MHz |
| EUT position       | : Table top      |
| EUT operation mode | : See Clause 4.1 |

### **5.3 Test procedure**

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a semi anechoic chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains network (AMN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

|               |                           |
|---------------|---------------------------|
| Detector Type | : Quasi-Peak and CISPR AV |
| IF Bandwidth  | : 9 kHz                   |

### **5.4 Test result**

Summary of the test results: Pass

Date: September 16, 2014                      Test engineer: Tsubasa Takayama

## **SECTION 6: Radiated Emission**

### **6.1 Operating environment**

Test place : No. 1 semi anechoic chamber  
Temperature : See data  
Humidity : See data

### **6.2 Test configuration**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

The EUT was set on the edge of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 3.

### **6.3 Test conditions**

Frequency range : 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna)  
1000MHz-6000MHz (Horn antenna)  
Test distance : 3m  
EUT position : Table top  
EUT operation mode : See Clause 4.1

### **6.4 Test procedure**

The height of the measuring antenna 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.

The radiated emission measurements were made with the following detector function of the test receiver and the Spectrum analyzer.

| Frequency       | Below 1GHz    | Above 1GHz    |          |
|-----------------|---------------|---------------|----------|
| Instrument used | Test Receiver | Test Receiver |          |
| Detector Type   | Quasi-peak    | Peak          | CISPR AV |
| IF Bandwidth    | RBW:120kHz    | BW: 1MHz      | BW:1MHz  |

- The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at representative X-axis since no difference was found among each position.

### **6.5 Test result**

Summary of the test results: Pass

Date: September 16, 2014      Test engineer: Tsubasa Takayama

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## APPENDIX 1: Data of EMI test

### Conducted Emission

#### DATA OF CONDUCTED EMISSION TEST

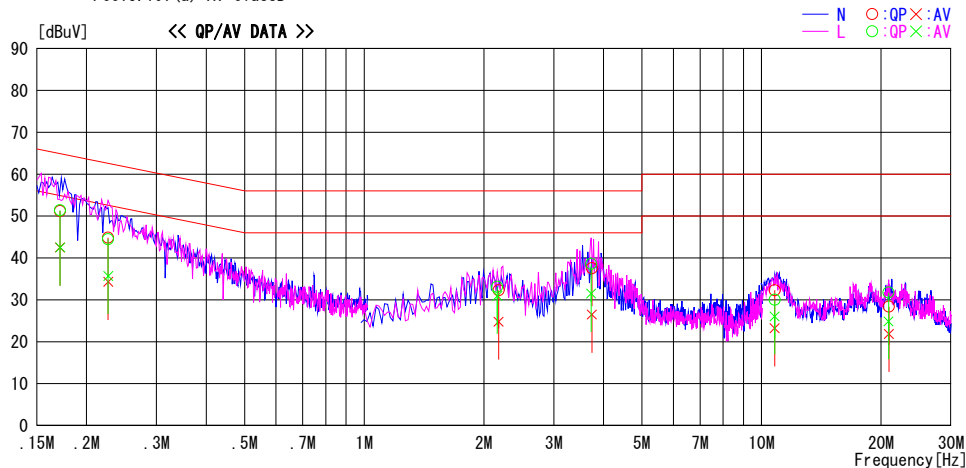
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 25deg. C / 51% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : USB Data Com Mode

LIMIT : FCC15.107(a) QP ClassB  
FCC15.107(a) AV ClassB



| Frequency<br>[MHz] | Reading Level |              | Corr.<br>Factor | Results      |              | Limit        |              | Margin     |            | Phase | Comment |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
|                    | QP<br>[dBuV]  | AV<br>[dBuV] |                 | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dB] | AV<br>[dB] |       |         |
| 0.17156            | 38.0          | 29.3         | 13.2            | 51.2         | 42.5         | 64.9         | 54.9         | 13.7       | 12.4       | N     |         |
| 0.22671            | 31.6          | 21.0         | 13.3            | 44.9         | 34.3         | 62.6         | 52.6         | 17.7       | 18.3       | N     |         |
| 2.17964            | 18.7          | 11.2         | 13.6            | 32.3         | 24.8         | 56.0         | 46.0         | 23.7       | 21.2       | N     |         |
| 3.74280            | 23.8          | 12.7         | 13.8            | 37.6         | 26.5         | 56.0         | 46.0         | 18.4       | 19.5       | N     |         |
| 10.79378           | 17.8          | 8.7          | 14.5            | 32.3         | 23.2         | 60.0         | 50.0         | 27.7       | 26.8       | N     |         |
| 20.91920           | 13.1          | 6.6          | 15.3            | 28.4         | 21.9         | 60.0         | 50.0         | 31.6       | 28.1       | N     |         |
| 0.17159            | 38.2          | 29.3         | 13.2            | 51.4         | 42.5         | 64.9         | 54.9         | 13.5       | 12.4       | L     |         |
| 0.22671            | 31.2          | 22.4         | 13.3            | 44.5         | 35.7         | 62.6         | 52.6         | 18.1       | 16.9       | L     |         |
| 2.16146            | 19.5          | 17.4         | 13.6            | 33.1         | 31.0         | 56.0         | 46.0         | 22.9       | 15.0       | L     |         |
| 3.72462            | 24.8          | 17.7         | 13.8            | 38.6         | 31.5         | 56.0         | 46.0         | 17.4       | 14.5       | L     |         |
| 10.79378           | 15.5          | 11.6         | 14.5            | 30.0         | 26.1         | 60.0         | 50.0         | 30.0       | 23.9       | L     |         |
| 20.87902           | 16.4          | 9.6          | 15.3            | 31.7         | 24.9         | 60.0         | 50.0         | 28.3       | 25.1       | L     |         |

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)  
Except for the above table : adequate margin data below the limits.

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

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## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

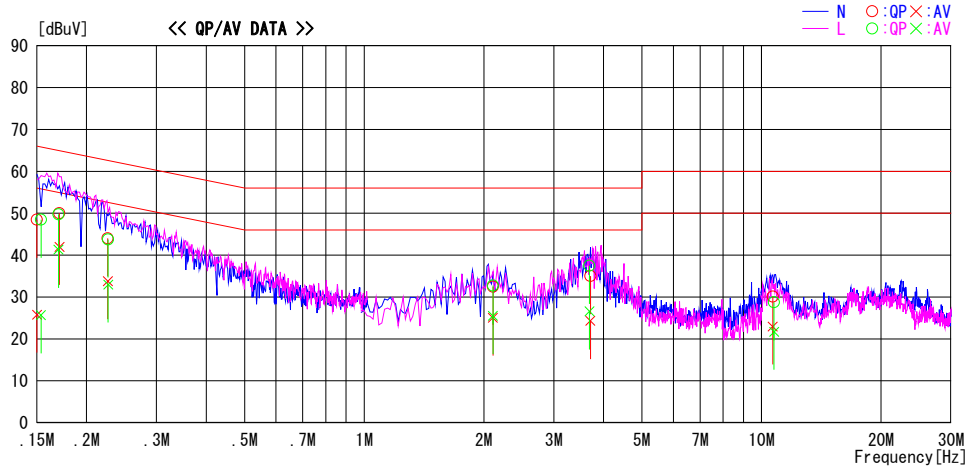
UL Japan, Inc. Ise EMC Lab. No. 1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 25deg. C / 51% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : Standby Mode

LIMIT : FCC15.107(a) QP ClassB  
FCC15.107(a) AV ClassB



| Frequency<br>[MHz] | Reading Level |              | Corr.<br>Factor | Results      |              | Limit        |              | Margin     |            | Phase | Comment |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
|                    | QP<br>[dBuV]  | AV<br>[dBuV] |                 | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dB] | AV<br>[dB] |       |         |
| 0.15000            | 35.3          | 12.6         | 13.2            | 48.5         | 25.8         | 66.0         | 56.0         | 17.5       | 30.2       | N     |         |
| 0.17092            | 36.8          | 28.8         | 13.2            | 50.0         | 42.0         | 64.9         | 54.9         | 14.9       | 12.9       | N     |         |
| 0.22630            | 30.7          | 20.5         | 13.3            | 44.0         | 33.8         | 62.6         | 52.6         | 18.6       | 18.8       | N     |         |
| 2.10693            | 18.9          | 11.5         | 13.6            | 32.5         | 25.1         | 56.0         | 46.0         | 23.5       | 20.9       | N     |         |
| 3.70645            | 21.2          | 10.5         | 13.8            | 35.0         | 24.3         | 56.0         | 46.0         | 21.0       | 21.7       | N     |         |
| 10.67324           | 15.6          | 8.5          | 14.5            | 30.1         | 23.0         | 60.0         | 50.0         | 29.9       | 27.0       | N     |         |
| 0.15349            | 35.3          | 12.5         | 13.2            | 48.5         | 25.7         | 65.8         | 55.8         | 17.3       | 30.1       | L     |         |
| 0.17000            | 36.5          | 28.1         | 13.2            | 49.7         | 41.3         | 65.0         | 55.0         | 15.3       | 13.7       | L     |         |
| 0.22676            | 30.4          | 19.7         | 13.3            | 43.7         | 33.0         | 62.6         | 52.6         | 18.9       | 19.6       | L     |         |
| 2.10693            | 19.1          | 11.9         | 13.6            | 32.7         | 25.5         | 56.0         | 46.0         | 23.3       | 20.5       | L     |         |
| 3.68827            | 23.7          | 12.8         | 13.8            | 37.5         | 26.6         | 56.0         | 46.0         | 18.5       | 19.4       | L     |         |
| 10.75360           | 14.2          | 7.2          | 14.5            | 28.7         | 21.7         | 60.0         | 50.0         | 31.3       | 28.3       | L     |         |

CHART : WITH FACTOR. Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)  
Except for the above table : adequate margin data below the limits.

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

## Radiated Emission (Below 1GHz)

### DATA OF RADIATED EMISSION TEST

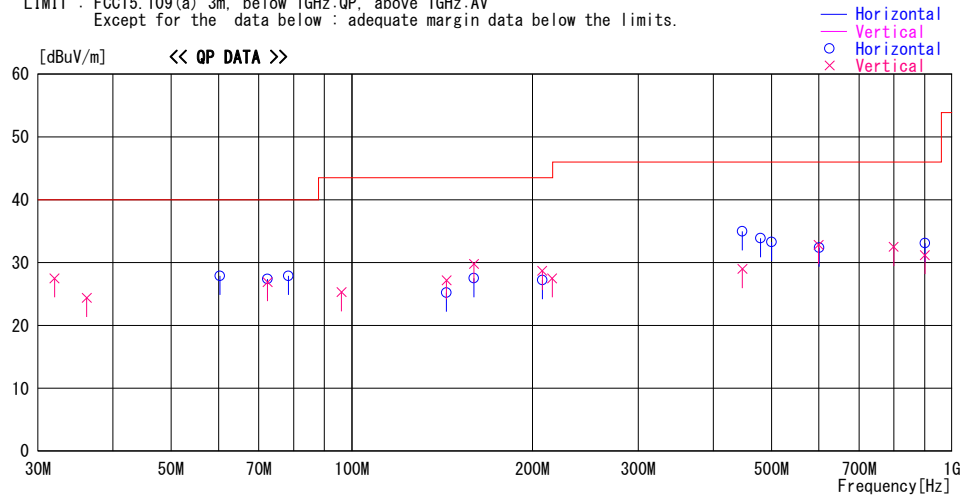
UL Japan, Inc. Ise EMC Lab. No. 1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 24deg. C / 54% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : USB Data Com Mode (Worst axis Ver: Y-axis, Hori: Y-axis)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV  
Except for the data below : adequate margin data below the limits.



| Frequency | Reading | DET | Antenna Factor | Loss& Gain | Level    | Angle | Height | Polar. | Limit    | Margin | Comment |
|-----------|---------|-----|----------------|------------|----------|-------|--------|--------|----------|--------|---------|
| [MHz]     | [dBuV]  |     | [dB/m]         | [dB]       | [dBuV/m] | [Deg] | [cm]   |        | [dBuV/m] | [dB]   |         |
| 31.975    | 42.0    | QP  | 16.9           | -31.4      | 27.5     | 138   | 100    | Vert.  | 40.0     | 12.5   |         |
| 36.183    | 39.8    | QP  | 15.9           | -31.3      | 24.4     | 214   | 100    | Vert.  | 40.0     | 15.6   |         |
| 60.315    | 51.4    | QP  | 7.5            | -31.0      | 27.9     | 289   | 384    | Hori.  | 40.0     | 12.1   |         |
| 72.375    | 51.7    | QP  | 6.5            | -30.8      | 27.4     | 124   | 287    | Hori.  | 40.0     | 12.6   |         |
| 72.385    | 51.2    | QP  | 6.5            | -30.8      | 26.9     | 211   | 100    | Vert.  | 40.0     | 13.1   |         |
| 78.412    | 51.8    | QP  | 6.8            | -30.7      | 27.9     | 158   | 349    | Hori.  | 40.0     | 12.1   |         |
| 96.120    | 46.0    | QP  | 9.7            | -30.4      | 25.3     | 238   | 100    | Vert.  | 43.5     | 18.2   |         |
| 143.780   | 40.4    | QP  | 14.7           | -29.9      | 25.2     | 12    | 280    | Hori.  | 43.5     | 18.3   |         |
| 143.791   | 42.4    | QP  | 14.7           | -29.9      | 27.2     | 278   | 100    | Vert.  | 43.5     | 16.3   |         |
| 159.764   | 41.8    | QP  | 15.5           | -29.8      | 27.5     | 348   | 279    | Hori.  | 43.5     | 16.0   |         |
| 159.770   | 44.1    | QP  | 15.5           | -29.8      | 29.8     | 108   | 100    | Vert.  | 43.5     | 13.7   |         |
| 207.703   | 41.7    | QP  | 16.5           | -29.5      | 28.7     | 10    | 100    | Vert.  | 43.5     | 14.8   |         |
| 207.705   | 40.2    | QP  | 16.5           | -29.5      | 27.2     | 102   | 227    | Hori.  | 43.5     | 16.3   |         |
| 215.684   | 40.2    | QP  | 16.7           | -29.4      | 27.5     | 211   | 100    | Vert.  | 43.5     | 16.0   |         |
| 447.358   | 38.1    | QP  | 17.6           | -26.7      | 29.0     | 180   | 100    | Vert.  | 46.0     | 17.0   |         |
| 447.366   | 44.1    | QP  | 17.6           | -26.7      | 35.0     | 112   | 100    | Hori.  | 46.0     | 11.0   |         |
| 479.307   | 42.5    | QP  | 17.9           | -26.5      | 33.9     | 105   | 208    | Hori.  | 46.0     | 12.1   |         |
| 500.398   | 41.5    | QP  | 18.1           | -26.3      | 33.3     | 359   | 100    | Hori.  | 46.0     | 12.7   |         |
| 598.940   | 39.1    | QP  | 19.4           | -25.7      | 32.8     | 248   | 101    | Vert.  | 46.0     | 13.2   |         |
| 600.475   | 38.6    | QP  | 19.4           | -25.6      | 32.4     | 45    | 100    | Hori.  | 46.0     | 13.6   |         |
| 799.379   | 35.2    | QP  | 22.0           | -24.7      | 32.5     | 330   | 101    | Vert.  | 46.0     | 13.5   |         |
| 900.722   | 34.8    | QP  | 22.1           | -23.8      | 33.1     | 278   | 147    | Hori.  | 46.0     | 12.9   |         |
| 900.730   | 32.9    | QP  | 22.1           | -23.8      | 31.2     | 43    | 101    | Vert.  | 46.0     | 14.8   |         |

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN  
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN) - GAIN(AMP)

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

## Radiated Emission (Below 1GHz)

### DATA OF RADIATED EMISSION TEST

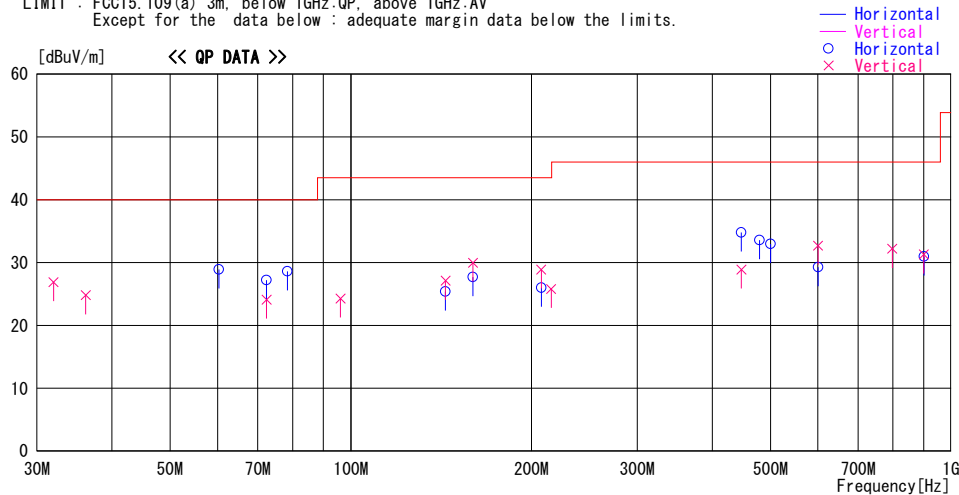
UL Japan, Inc. Ise EMC Lab. No. 1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 24deg. C / 54% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : Standby Mode (Worst axis Ver: Y-axis, Hori: Y-axis)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV  
Except for the data below : adequate margin data below the limits.



| Frequency | Reading | DET | Antenna Factor | Loss& Gain | Level    | Angle | Height | Polar. | Limit    | Margin | Comment |
|-----------|---------|-----|----------------|------------|----------|-------|--------|--------|----------|--------|---------|
| [MHz]     | [dBuV]  |     | [dB/m]         | [dB]       | [dBuV/m] | [Deg] | [cm]   |        | [dBuV/m] | [dB]   |         |
| 31.975    | 41.4    | QP  | 16.9           | -31.4      | 26.9     | 141   | 100    | Vert.  | 40.0     | 13.1   |         |
| 36.183    | 40.2    | QP  | 15.9           | -31.3      | 24.8     | 202   | 100    | Vert.  | 40.0     | 15.2   |         |
| 60.315    | 52.4    | QP  | 7.5            | -31.0      | 28.9     | 283   | 379    | Hori.  | 40.0     | 11.1   |         |
| 72.375    | 51.5    | QP  | 6.5            | -30.8      | 27.2     | 147   | 286    | Hori.  | 40.0     | 12.8   |         |
| 72.385    | 48.4    | QP  | 6.5            | -30.8      | 24.1     | 212   | 100    | Vert.  | 40.0     | 15.9   |         |
| 78.422    | 52.5    | QP  | 6.8            | -30.7      | 28.6     | 303   | 268    | Hori.  | 40.0     | 11.4   |         |
| 96.120    | 45.0    | QP  | 9.7            | -30.4      | 24.3     | 198   | 100    | Vert.  | 43.5     | 19.2   |         |
| 143.780   | 40.6    | QP  | 14.7           | -29.9      | 25.4     | 10    | 200    | Hori.  | 43.5     | 18.1   |         |
| 143.791   | 42.3    | QP  | 14.7           | -29.9      | 27.1     | 282   | 100    | Vert.  | 43.5     | 16.4   |         |
| 159.764   | 42.0    | QP  | 15.5           | -29.8      | 27.7     | 158   | 226    | Hori.  | 43.5     | 15.8   |         |
| 159.770   | 44.3    | QP  | 15.5           | -29.8      | 30.0     | 123   | 100    | Vert.  | 43.5     | 13.5   |         |
| 207.703   | 41.9    | QP  | 16.5           | -29.5      | 28.9     | 13    | 100    | Vert.  | 43.5     | 14.6   |         |
| 207.705   | 39.0    | QP  | 16.5           | -29.5      | 26.0     | 28    | 200    | Hori.  | 43.5     | 17.5   |         |
| 215.684   | 38.5    | QP  | 16.7           | -29.4      | 25.8     | 209   | 100    | Vert.  | 43.5     | 17.7   |         |
| 447.358   | 38.0    | QP  | 17.6           | -26.7      | 28.9     | 182   | 100    | Vert.  | 46.0     | 17.1   |         |
| 447.366   | 43.9    | QP  | 17.6           | -26.7      | 34.8     | 33    | 122    | Hori.  | 46.0     | 11.2   |         |
| 479.307   | 42.2    | QP  | 17.9           | -26.5      | 33.6     | 105   | 208    | Hori.  | 46.0     | 12.4   |         |
| 500.398   | 41.2    | QP  | 18.1           | -26.3      | 33.0     | 292   | 100    | Hori.  | 46.0     | 13.0   |         |
| 600.413   | 38.9    | QP  | 19.4           | -25.6      | 32.7     | 251   | 100    | Vert.  | 46.0     | 13.3   |         |
| 600.475   | 35.5    | QP  | 19.4           | -25.6      | 29.3     | 86    | 100    | Hori.  | 46.0     | 16.7   |         |
| 798.019   | 34.9    | QP  | 22.0           | -24.7      | 32.2     | 328   | 100    | Vert.  | 46.0     | 13.8   |         |
| 900.722   | 32.7    | QP  | 22.1           | -23.8      | 31.0     | 192   | 172    | Hori.  | 46.0     | 15.0   |         |
| 900.620   | 33.1    | QP  | 22.0           | -23.8      | 31.3     | 41    | 103    | Vert.  | 46.0     | 14.7   |         |

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN  
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN) - GAIN(AMP)

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

## Radiated Emission (Above 1GHz)

### DATA OF RADIATED EMISSION TEST

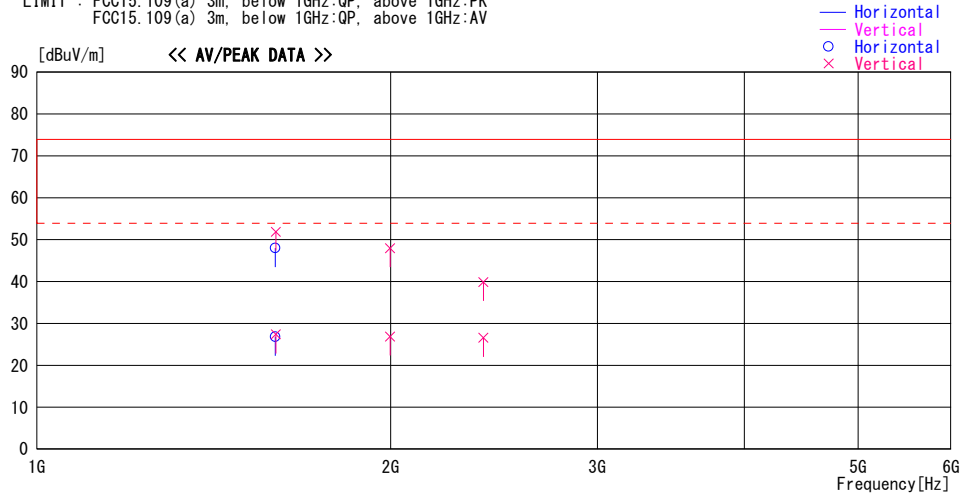
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 24deg. C / 54% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : USB Data Com Mode (Worst axis Ver: Y-axis, Hori: Y-axis)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK  
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



| Frequency | Reading | DET | Antenna Factor | Loss& Gain | Level    | Angle | Height | Polar. | Limit    | Margin | Comment |
|-----------|---------|-----|----------------|------------|----------|-------|--------|--------|----------|--------|---------|
| [MHz]     | [dBuV]  |     | [dB/m]         | [dB]       | [dBuV/m] | [Deg] | [cm]   |        | [dBuV/m] | [dB]   |         |
| 1597.200  | 35.8    | AV  | 26.3           | -34.7      | 27.4     | 41    | 100    | Vert.  | 53.9     | 26.5   |         |
| 1597.200  | 60.3    | PK  | 26.3           | -34.7      | 51.9     | 41    | 100    | Vert.  | 73.9     | 22.0   |         |
| 1594.720  | 56.5    | PK  | 26.2           | -34.7      | 48.0     | 275   | 100    | Hori.  | 73.9     | 25.9   |         |
| 1594.720  | 35.3    | AV  | 26.2           | -34.7      | 26.8     | 275   | 100    | Hori.  | 53.9     | 27.1   |         |
| 1998.006  | 33.8    | AV  | 27.4           | -34.3      | 26.9     | 81    | 112    | Vert.  | 53.9     | 27.0   |         |
| 1998.006  | 54.9    | PK  | 27.4           | -34.3      | 48.0     | 81    | 112    | Vert.  | 73.9     | 25.9   |         |
| 2399.450  | 32.6    | AV  | 28.2           | -34.2      | 26.6     | 0     | 100    | Vert.  | 53.9     | 27.3   |         |
| 2399.450  | 45.9    | PK  | 28.2           | -34.2      | 39.9     | 0     | 100    | Vert.  | 73.9     | 34.0   |         |

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL 300MHz-1000MHz:10GPFRT10D1C 1000MHz:-:HORN  
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN) - GAIN(AMP)

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.



## Radiated Emission (Above 1GHz)

### DATA OF RADIATED EMISSION TEST

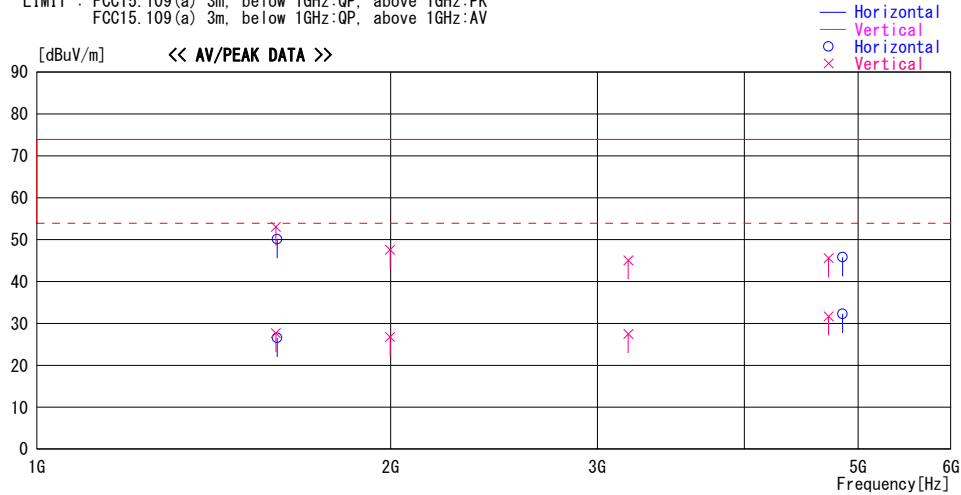
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber  
Date : 2014/09/16

Report No. : 10491306H

Temp./Humi. : 24deg. C / 54% RH  
Engineer : Tsubasa Takayama

Mode / Remarks : Standby Mode (Worst axis Ver: Y-axis, Hori: Y-axis)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK  
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



| Frequency | Reading | DET | Antenna | Loss& | Level    | Angle | Height | Polar. | Limit    | Margin | Comment |
|-----------|---------|-----|---------|-------|----------|-------|--------|--------|----------|--------|---------|
| [MHz]     | [dBuV]  |     | Factor  | Gain  | [dBuV/m] | [Deg] | [cm]   |        | [dBuV/m] | [dB]   |         |
| 1597.200  | 36.1    | AV  | 26.3    | -34.7 | 27.7     | 37    | 100    | Vert.  | 53.9     | 26.2   |         |
| 1597.200  | 61.5    | PK  | 26.3    | -34.7 | 53.1     | 37    | 100    | Vert.  | 73.9     | 20.8   |         |
| 1601.208  | 58.5    | PK  | 26.3    | -34.7 | 50.1     | 282   | 100    | Hori.  | 73.9     | 23.8   |         |
| 1601.208  | 35.0    | AV  | 26.3    | -34.7 | 26.6     | 282   | 100    | Hori.  | 53.9     | 27.3   |         |
| 1998.006  | 33.7    | AV  | 27.4    | -34.3 | 26.8     | 82    | 100    | Vert.  | 53.9     | 27.1   |         |
| 1998.006  | 54.5    | PK  | 27.4    | -34.3 | 47.6     | 82    | 100    | Vert.  | 73.9     | 26.3   |         |
| 3186.371  | 32.7    | AV  | 28.6    | -33.8 | 27.5     | 0     | 112    | Vert.  | 53.9     | 26.4   |         |
| 3186.371  | 50.3    | PK  | 28.6    | -33.8 | 45.1     | 0     | 112    | Vert.  | 73.9     | 28.8   |         |
| 4719.447  | 32.4    | AV  | 31.8    | -32.5 | 31.7     | 212   | 100    | Vert.  | 53.9     | 22.2   |         |
| 4719.447  | 46.3    | PK  | 31.8    | -32.5 | 45.6     | 212   | 100    | Vert.  | 73.9     | 28.3   |         |
| 4851.715  | 46.1    | AV  | 32.2    | -32.5 | 45.8     | 0     | 112    | Hori.  | 53.9     | 8.1    |         |
| 4851.715  | 32.6    | PK  | 32.2    | -32.5 | 32.3     | 0     | 112    | Hori.  | 73.9     | 41.6   |         |

CHART:WITH FACTOR ANT TYPE: <30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:1/2WAVELENGTH, 1000MHz-:HORN  
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN) - GAIN(AMP)

\*The limit is rounded down to one decimal place.

\*The test result is rounded off to one or two decimal places, so some differences might be observed.

## **APPENDIX 2: Test instruments**

### **EMI Test Instruments**

| Control No. | Instrument                 | Manufacturer              | Model No                                               | Serial No                   | Test Item | Calibration Date *<br>Interval(month) |
|-------------|----------------------------|---------------------------|--------------------------------------------------------|-----------------------------|-----------|---------------------------------------|
| MAEC-01     | Semi Anechoic Chamber(NSA) | TDK                       | Semi Anechoic Chamber 10m                              | DA-06881                    | RE        | 2014/09/01 * 12                       |
| MOS-27      | Thermo-Hygrometer          | CUSTOM                    | CTH-201                                                | A08Q26                      | RE        | 2014/02/20 * 12                       |
| MJM-21      | Measure                    | KOMELON                   | KMC-36                                                 | -                           | RE        | -                                     |
| COTS-MEMI   | EMI measurement program    | TSJ                       | TEPTO-DV                                               | -                           | RE        | -                                     |
| MTR-09      | EMI Test Receiver          | Rohde & Schwarz           | ESU26                                                  | 100412                      | RE        | 2014/06/06 * 12                       |
| KBA-05      | Biconical Antenna          | Schwarzbeck               | BBA9106                                                | 2513                        | RE        | 2013/11/24 * 12                       |
| KLA-04      | Logperiodic Antenna        | Schwarzbeck               | USLP9143                                               | 361                         | RE        | 2013/11/24 * 12                       |
| MAT-08      | Attenuator(6dB)            | Weinschel Corp            | 2                                                      | BK7971                      | RE        | 2013/11/26 * 12                       |
| MCC-02      | Coaxial Cable              | Suhner/storm/Agilent /TSJ | -                                                      | -                           | RE        | 2013/09/12 * 12                       |
| MPA-19      | Pre Amplifier              | MITEQ                     | MLA-10K01-B01-35                                       | 1237616                     | RE        | 2014/02/17 * 12                       |
| MHA-05      | Horn Antenna 1-18GHz       | Schwarzbeck               | BBHA9120D                                              | 253                         | RE        | 2014/05/16 * 12                       |
| MPA-01      | Pre Amplifier              | Agilent                   | 8449B                                                  | 3008A01671                  | RE        | 2014/02/05 * 12                       |
| MCC-165     | Microwave Cable            | Junkosha                  | MWX221                                                 | 1203S213(1m) / 1311S166(5m) | RE        | 2013/11/27 * 12                       |
| MAEC-01     | Semi Anechoic Chamber(NSA) | TDK                       | Semi Anechoic Chamber 10m                              | DA-06881                    | CE        | 2014/09/01 * 12                       |
| MLS-24      | LISN(AMN)                  | Schwarzbeck               | NSLK8127                                               | 8127-730                    | CE(EUT)   | 2014/07/10 * 12                       |
| MTA-30      | Terminator                 | TME                       | CT-01                                                  | -                           | CE        | 2014/01/20 * 12                       |
| MCC-03      | Coaxial Cable              | Fujikura/Suhner/TSJ       | 5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher) | - /01068(Switcher)          | CE        | 2013/09/12 * 12                       |
| MAT-64      | Attenuator(13dB)           | JFW Industries, Inc.      | 50FP-013H2 N                                           | -                           | CE        | 2014/01/29 * 12                       |
| MLS-25      | LISN(AMN)                  | Schwarzbeck               | NSLK8127                                               | 8127-731                    | CE(AE)    | 2014/07/09 * 12                       |

**The expiration date of the calibration is the end of the expired month.**

**All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.**

**As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.**

**Test Item:**

**CE: Conducted Emissions**

**RE: Radiated Emissions**

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