



# EMI TEST REPORT

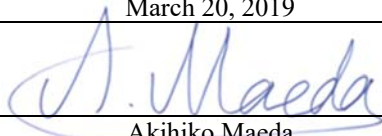
Test Report No. : 12742873H-B-R1

**Applicant** : Sumitomo Wiring Systems, Ltd.  
**Type of Equipment** : UNIT ASSY, BCM  
**Model No.** : HAR0004  
**FCC ID** : 2AKB8HAR0004  
**Test regulation** : FCC Part 15 Subpart B: 2018  
**Test Result** : Complied (Refer to SECTION 3.2)

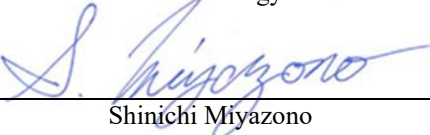
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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. 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.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12742873H-B. 12742873H-B is replaced with this report.

**Date of test:** March 20, 2019

**Representative test engineer:**

  
Akihiko Maeda  
Engineer  
Consumer Technology Division

**Approved by:**

  
Shinichi Miyazono  
Engineer  
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,  
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- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
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## REVISION HISTORY

**Original Test Report No.: 12742873H-B**

[illegible]

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## **SECTION 1: Customer information**

|                  |   |                                                                         |
|------------------|---|-------------------------------------------------------------------------|
| Company Name     | : | Sumitomo Wiring Systems, Ltd.                                           |
| Address          | : | 1820 Nakanoike, Mikkaichi-cho, Suzuka-City, Mie Pref. 513-8631<br>JAPAN |
| Telephone Number | : | +81-59-382-8711                                                         |
| Facsimile Number | : | +81-59-383-3943                                                         |
| Contact Person   | : | Mamoru Nakanishi                                                        |

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

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

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

|                                                        |   |                                                                                           |
|--------------------------------------------------------|---|-------------------------------------------------------------------------------------------|
| Type of Equipment                                      | : | UNIT ASSY, BCM                                                                            |
| Model No.                                              | : | HAR0004                                                                                   |
| Serial No.                                             | : | Refer to Section 4, Clause 4.2                                                            |
| Rating                                                 | : | DC 12 V                                                                                   |
| Receipt Date of Sample<br>(Information from test lab.) | : | February 24, 2019                                                                         |
| Country of Mass-production                             | : | United States of America , China , Thailand, Japan                                        |
| Condition of EUT                                       | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT                                    | : | No Modification by the test lab                                                           |

### **2.2 Product Description**

Model: HAR0004 (referred to as the EUT in this report) is a UNIT ASSY, BCM.

### **General Specification**

|                                 |   |                                                      |
|---------------------------------|---|------------------------------------------------------|
| Clock frequencies in the system | : | LF Transmitter: 9.000 MHz<br>RF Receiver: 24.305 MHz |
|---------------------------------|---|------------------------------------------------------|

### **Radio Specification**

#### **[LF Transmitter]\***

|                        |   |                           |
|------------------------|---|---------------------------|
| Radio Type             | : | Transmitter               |
| Frequency of Operation | : | 125 kHz                   |
| Modulation             | : | OOK (ASK)                 |
| Antenna Type           | : | BAR Antenna, COIL Antenna |

\*The test of transmitter part was performed separately from this test report, and the conformability is confirmed.

#### **[RF Receiver]**

|                        |   |            |
|------------------------|---|------------|
| Radio Type             | : | Receiver   |
| Frequency of Operation | : | 433.92 MHz |
| Receiver Bandwidth     | : | ±146 kHz   |
| Intermediate Frequency | : | 250 kHz    |

### **FCC15.111(b)**

The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). Therefore, Radiated emission test was performed.

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

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart B  
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

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

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

| Item                                                                                                                                   | Test Procedure                                                                    | Limits                                                                                                      | Deviation | Worst margin                            | Result         | Remarks |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------------|----------------|---------|
| Conducted emission                                                                                                                     | FCC: ANSI C63.4: 2014<br>7. AC power - line<br>conducted emission<br>measurements | FCC:Part 15 Subpart B<br>15.107(a)                                                                          | N/A       | N/A                                     | N/A            | *1)     |
|                                                                                                                                        | IC: RSS-Gen 8.8                                                                   | IC: RSS-Gen 8.8                                                                                             |           |                                         |                |         |
| Radiated emission                                                                                                                      | FCC: ANSI C63.4: 2014<br>8. Radiated<br>emission measurements                     | FCC: Part 15 Subpart B<br>15.109(a)                                                                         | N/A       | 19.86 dB<br>867.340 MHz<br>Vertical, QP | Complied<br>a) | -       |
|                                                                                                                                        | IC: RSS-Gen 7                                                                     | IC: RSS-Gen 7.1.2                                                                                           |           |                                         |                |         |
| *Note: UL Japan, Inc’s EMI Work Procedure 13-EM-W0420.                                                                                 |                                                                                   |                                                                                                             |           |                                         |                |         |
| *1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line. |                                                                                   |                                                                                                             |           |                                         |                |         |
| a) Refer to APPENDIX 1 (data of Radiated emission)                                                                                     |                                                                                   |                                                                                                             |           |                                         |                |         |
| Symbols:                                                                                                                               |                                                                                   |                                                                                                             |           |                                         |                |         |
| Complied                                                                                                                               |                                                                                   | The data of this test item has enough margin, more than the measurement uncertainty.                        |           |                                         |                |         |
| Complied#                                                                                                                              |                                                                                   | The data of this test item meets the limits unless the measurement uncertainty is taken into consideration. |           |                                         |                |         |

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

No addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

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

| Test distance | Radiated emission<br>(+/-) |
|---------------|----------------------------|
|               | 9 kHz to 30 MHz            |
| 3 m           | 3.3 dB                     |
| 10 m          | 3.2 dB                     |

\*Measurement distance

| Polarity   | Radiated emission (Below 1 GHz) |                     |                   |                     |
|------------|---------------------------------|---------------------|-------------------|---------------------|
|            | (3 m*)(+/-)                     |                     | (10 m*)(+/-)      |                     |
|            | 30 MHz to 200 MHz               | 200 MHz to 1000 MHz | 30 MHz to 200 MHz | 200 MHz to 1000 MHz |
| Horizontal | 4.8 dB                          | 5.2 dB              | 4.8 dB            | 5.0 dB              |
| Vertical   | 5.0 dB                          | 6.3 dB              | 4.9 dB            | 5.0 dB              |

| Radiated emission (Above 1 GHz) |                 |                    |                    |                 |
|---------------------------------|-----------------|--------------------|--------------------|-----------------|
| (3 m*)(+/-)                     |                 | (1 m*)(+/-)        |                    | (10 m*)(+/-)    |
| 1 GHz to 6 GHz                  | 6 GHz to 18 GHz | 10 GHz to 26.5 GHz | 26.5 GHz to 40 GHz | 1 GHz to 18 GHz |
| 5.0 dB                          | 5.3 dB          | 5.8 dB             | 5.8 dB             | 5.2 dB          |

\* Measurement distance

### 3.5 Test Location

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NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

| Test site                  | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms            | Maximum measurement distance |
|----------------------------|------------------------|----------------------------|------------------------------------------------------------------|------------------------|------------------------------|
| No.1 semi-anechoic chamber | 2973C-1                | 19.2 x 11.2 x 7.7          | 7.0 x 6.0                                                        | No.1 Power source room | 10 m                         |
| No.2 semi-anechoic chamber | 2973C-2                | 7.5 x 5.8 x 5.2            | 4.0 x 4.0                                                        | -                      | 3 m                          |
| No.3 semi-anechoic chamber | 2973C-3                | 12.0 x 8.5 x 5.9           | 6.8 x 5.75                                                       | No.3 Preparation room  | 3 m                          |
| No.3 shielded room         | -                      | 4.0 x 6.0 x 2.7            | N/A                                                              | -                      | -                            |
| No.4 semi-anechoic chamber | 2973C-4                | 12.0 x 8.5 x 5.9           | 6.8 x 5.75                                                       | No.4 Preparation room  | 3 m                          |
| No.4 shielded room         | -                      | 4.0 x 6.0 x 2.7            | N/A                                                              | -                      | -                            |
| No.5 semi-anechoic chamber | -                      | 6.0 x 6.0 x 3.9            | 6.0 x 6.0                                                        | -                      | -                            |
| No.6 shielded room         | -                      | 4.0 x 4.5 x 2.7            | 4.0 x 4.5                                                        | -                      | -                            |
| No.6 measurement room      | -                      | 4.75 x 5.4 x 3.0           | 4.75 x 4.15                                                      | -                      | -                            |
| No.7 shielded room         | -                      | 4.7 x 7.5 x 2.7            | 4.7 x 7.5                                                        | -                      | -                            |
| No.8 measurement room      | -                      | 3.1 x 5.0 x 2.7            | 3.1 x 5.0                                                        | -                      | -                            |
| No.9 measurement room      | -                      | 8.8 x 4.6 x 2.8            | 2.4 x 2.4                                                        | -                      | -                            |
| No.11 measurement room     | -                      | 6.2 x 4.7 x 3.0            | 4.8 x 4.6                                                        | -                      | -                            |

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

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

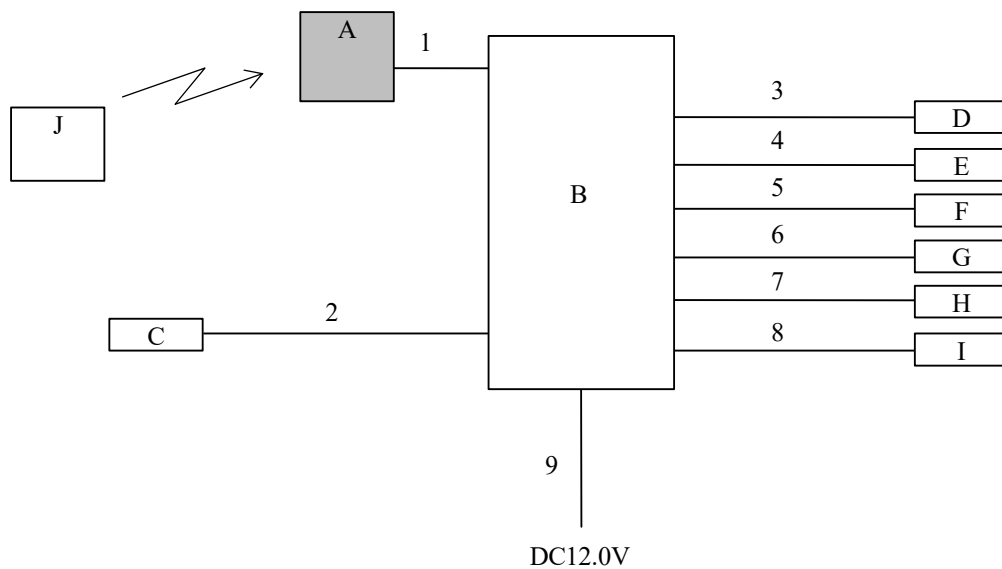
### **4.1 Operating Mode(s)**

| Mode              | Remarks |
|-------------------|---------|
| 1) Receiving mode | -       |

\*The test signal level was confirmed to be sufficient to stabilize the local oscillator of the EUT.

\* It was confirmed by using checker that the EUT receives the signal from the transmitter (pair of EUT).

### **4.2 Configuration and peripherals**



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

\*Item No. A includes Receiver Antenna.



#### Description of EUT and Support equipment

| No. | Item              | Model number      | Serial number        | Manufacturer                  | Remark |
|-----|-------------------|-------------------|----------------------|-------------------------------|--------|
| A   | UNIT ASSY, BCM    | HAR0004           | 003                  | Sumitomo Wiring Systems, Ltd. | EUT    |
| B   | Checker Box       | TVA-001           | -                    | Sumitomo Wiring Systems, Ltd. | -      |
| C   | Start Button      | 35881-TBA-A010-M1 | 290616AG<br>G400041A | Sumitomo Wiring Systems, Ltd. | -      |
| D   | LF Antenna (R)    | 38387-T00-Z010-M1 | 001                  | Sumitomo Wiring Systems, Ltd. | -      |
| E   | LF Antenna (M)    | 38387-TVA-A310-M1 | R16MC644007          | Sumitomo Wiring Systems, Ltd. | -      |
| F   | LF Antenna (F)    | 38387-TVA-A310-M1 | R16MC644031          | Sumitomo Wiring Systems, Ltd. | -      |
| G   | LF Antenna (TR)   | 38387-TVA-A310-M1 | R16MC644015          | Sumitomo Wiring Systems, Ltd. | -      |
| H   | LF Antenna (FRAS) | 38387-TVA-A310-M1 | R16MC6510008         | Sumitomo Wiring Systems, Ltd. | -      |
| I   | LF Antenna (FRDR) | 38387-TVA-A310-M1 | R16MC6510043         | Sumitomo Wiring Systems, Ltd. | -      |
| J   | FOB               | 72147-TVA-H1      | 001                  | Sumitomo Wiring Systems, Ltd. | -      |

#### List of cables used

| No. | Name          | Length (m) | Shield     |            | Remark |
|-----|---------------|------------|------------|------------|--------|
|     |               |            | Cable      | Connector  |        |
| 1   | Signal Cable  | 2.5        | Unshielded | Unshielded | -      |
| 2   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 3   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 4   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 5   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 6   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 7   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 8   | Antenna Cable | 2.5        | Unshielded | Unshielded | -      |
| 9   | DC Cable      | 0.9        | Unshielded | Unshielded | -      |

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## **SECTION 5: Radiated Emission**

### **5.1. Operating environment**

Test place : No.4 semi anechoic chamber  
Temperature : See data  
Humidity : See data

### **5.2. Test configuration**

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m 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.

### **5.3. Test conditions**

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)  
1000 MHz - 2000 MHz (Horn antenna)  
Test distance : 3 m  
EUT position : Table top  
EUT operation mode : See Clause 4.1

### **5.4. Test procedure**

The height of the measuring antenna varied between 1 and 4 m 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.

The radiated emission measurements were made with the following detector function of the Test Receiver.

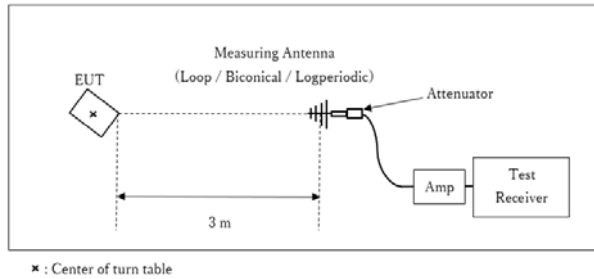
|                 |                |                                  |
|-----------------|----------------|----------------------------------|
| Frequency       | Below 1GHz     | Above 1GHz *1)                   |
| Instrument used | Test Receiver  | Test Receiver                    |
| IF Bandwidth    | QP: BW 120 kHz | PK: BW 1 MHz, CISPR AV: BW 1 MHz |

\*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.

Distance Factor:  $20 \times \log (3.3 \text{ m} / 3 \text{ m}) = 0.83 \text{ dB}$

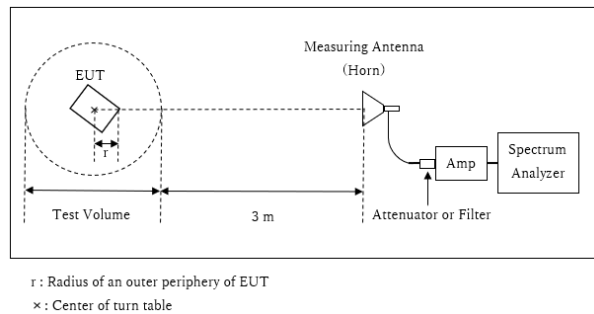
**Figure 2: Test Setup**

Below 1 GHz



Test Distance: 3 m

1 GHz - 2 GHz



Distance Factor:  $20 \times \log (3.3 \text{ m}^*/3.0 \text{ m}) = 0.83 \text{ dB}$

\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 3.3 \text{ m}$

Test Volume: 2 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.7 \text{ m}$

- 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 the position that has the maximum noise.

## 5.5. Test result

Summary of the test results: Pass

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.

Date: March 20, 2019 (Day)  
March 20, 2019 (Night)

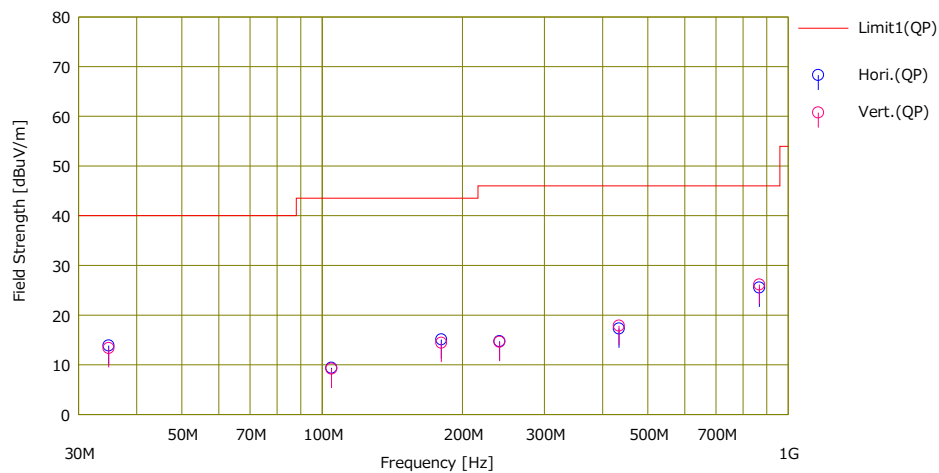
Test engineer: Koji Yamamoto  
Akihiko Maeda

## APPENDIX 1: Test data

### Radiated emission

Report No. 12742873H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date March 20, 2019  
Temperature / Humidity 21 deg. C / 35 % RH  
Engineer Koji Yamamoto  
(Below 1 GHz)  
Mode Mode 1

Limit : FCC\_Part 15 Subpart B(15.109)\_Class B



| No. | Freq.<br>[MHz] | Reading<br>(QP)<br>[dBuV] | Ant.Fac<br>(dB/m) | Loss<br>(dB) | Gain<br>(dB) | Result<br>(QP)<br>[dBuV/m] | Limit<br>(QP)<br>[dBuV/m] | Margn<br>(QP)<br>[dB] | Pola<br>(H/V) | Height<br>(cm) | Angle<br>(deg) | Ant.<br>Type | Comment |
|-----|----------------|---------------------------|-------------------|--------------|--------------|----------------------------|---------------------------|-----------------------|---------------|----------------|----------------|--------------|---------|
|     |                |                           |                   |              |              |                            |                           |                       |               |                |                |              |         |
| 1   | 34.825         | 22.19                     | 16.59             | 7.28         | 32.20        | 13.86                      | 40.00                     | 26.14                 | Hori.         | 300            | 138            | BC           |         |
| 2   | 104.705        | 22.35                     | 10.88             | 8.25         | 32.11        | 9.37                       | 43.50                     | 34.13                 | Hori.         | 300            | 359            | BC           |         |
| 3   | 180.234        | 21.87                     | 16.25             | 9.00         | 32.01        | 15.11                      | 43.50                     | 28.39                 | Hori.         | 300            | 174            | BC           |         |
| 4   | 240.305        | 25.63                     | 11.56             | 9.50         | 31.96        | 14.73                      | 46.00                     | 31.27                 | Hori.         | 100            | 6              | LA23         |         |
| 5   | 433.670        | 21.98                     | 16.44             | 10.82        | 31.96        | 17.28                      | 46.00                     | 28.72                 | Hori.         | 100            | 46             | LA23         |         |
| 6   | 867.340        | 21.76                     | 21.99             | 13.06        | 31.29        | 25.52                      | 46.00                     | 20.48                 | Hori.         | 100            | 353            | LA23         |         |
| 7   | 34.825         | 21.68                     | 16.59             | 7.28         | 32.20        | 13.35                      | 40.00                     | 26.65                 | Vert.         | 100            | 203            | BC           |         |
| 8   | 104.705        | 22.18                     | 10.88             | 8.25         | 32.11        | 9.20                       | 43.50                     | 34.30                 | Vert.         | 100            | 2              | BC           |         |
| 9   | 180.234        | 21.19                     | 16.25             | 9.00         | 32.01        | 14.43                      | 43.50                     | 29.07                 | Vert.         | 100            | 168            | BC           |         |
| 10  | 240.305        | 25.52                     | 11.56             | 9.50         | 31.96        | 14.62                      | 46.00                     | 31.38                 | Vert.         | 100            | 204            | LA23         |         |
| 11  | 433.670        | 22.56                     | 16.44             | 10.82        | 31.96        | 17.86                      | 46.00                     | 28.14                 | Vert.         | 100            | 62             | LA23         |         |
| 12  | 867.340        | 22.38                     | 21.99             | 13.06        | 31.29        | 26.14                      | 46.00                     | 19.86                 | Vert.         | 100            | 150            | LA23         |         |

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE - GAIN(AMP))

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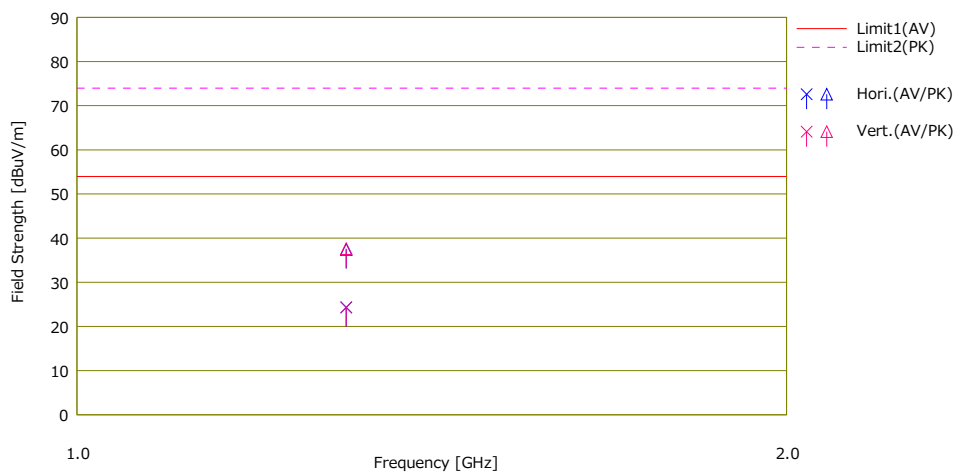
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## Radiated emission

Report No. 12742873H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date March 20, 2019  
Temperature / Humidity 20 deg. C / 38 % RH  
Engineer Akihiko Maeda  
(Above 1 GHz)  
Mode Mode 1

Limit : FCC\_Part 15 Subpart B(15.109)\_Class B



| No. | Freq.<br>[MHz] | Reading        |                | Ant.Fac<br>[dBuV] | Loss<br>[dB] | Gain<br>[dB] | Result           |                  | Limit            |                  | Margin       |              | Pda<br>[H/V] | Height<br>[cm] | Angle<br>[deg] | Ant.<br>Type | Comment |
|-----|----------------|----------------|----------------|-------------------|--------------|--------------|------------------|------------------|------------------|------------------|--------------|--------------|--------------|----------------|----------------|--------------|---------|
|     |                | (AV)<br>[dBuV] | (PK)<br>[dBuV] |                   |              |              | (AV)<br>[dBuV/m] | (PK)<br>[dBuV/m] | (AV)<br>[dBuV/m] | (PK)<br>[dBuV/m] | (AV)<br>[dB] | (PK)<br>[dB] |              |                |                |              |         |
| 1   | 1301.010       | 29.50          | 42.60          | 25.37             | 2.76         | 33.30        | 24.33            | 37.43            | 54.00            | 74.00            | 29.67        | 36.57        | Hori.        | 100            | 0              | H21          |         |
| 2   | 1301.010       | 29.50          | 42.80          | 25.37             | 2.76         | 33.30        | 24.33            | 37.63            | 54.00            | 74.00            | 29.67        | 36.37        | Vert.        | 100            | 0              | H21          |         |

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE - GAIN(AMP))

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## **APPENDIX 2: Test instruments**

### **Test Instruments**

| Test item | LIMS ID | Description                      | Manufacturer      | Model                    | Serial                       | Last Calibration Date | Calibration Due Date | Cal Int |
|-----------|---------|----------------------------------|-------------------|--------------------------|------------------------------|-----------------------|----------------------|---------|
| RE        | 142011  | AC4_Semi Anechoic Chamber(NSA)   | TDK               | Semi Anechoic Chamber 3m | DA-10005                     | 2018/6/28             | 2020/6/30            | 24      |
| RE        | 148898  | Attenuator                       | KEYSIGHT          | 8491A                    | MY52462282                   | 2018/10/3             | 2019/10/31           | 12      |
| RE        | 142227  | Measure                          | KOMELON           | KMC-36                   | -                            | -                     | -                    | -       |
| RE        | 141152  | EMI measurement program          | TSJ               | TEPTO-DV                 | -                            | -                     | -                    | -       |
| RE        | 141949  | Test Receiver                    | Rohde & Schwarz   | ESCI                     | 100767                       | 2018/8/6              | 2019/8/31            | 12      |
| RE        | 141425  | Biconical Antenna                | Schwarzbeck       | BBA9106                  | 1302                         | 2018/6/1              | 2019/6/30            | 12      |
| RE        | 141267  | Logperiodic Antenna(200-1000MHz) | Schwarzbeck       | VUSLP9111B               | 911B-192                     | 2018/6/1              | 2019/6/30            | 12      |
| RE        | 141397  | Coaxial Cable                    | UL Japan          | -                        | -                            | 2018/6/13             | 2019/6/30            | 12      |
| RE        | 141583  | Pre Amplifier                    | SONOMA INSTRUMENT | 310                      | 260833                       | 2019/2/8              | 2020/2/29            | 12      |
| RE        | 141545  | DIGITAL HiTESTER                 | HIOKI             | 3805                     | 51201148                     | 2019/1/29             | 2020/1/31            | 12      |
| RE        | 141562  | Thermo-Hygrometer                | CUSTOM            | CTH-201                  | 10                           | 2019/1/11             | 2020/1/31            | 12      |
| RE        | 141412  | Microwave Cable                  | Junkosha          | MWX221                   | 1305S002R(1m) / 1405S146(5m) | 2018/6/14             | 2019/6/30            | 12      |
| RE        | 141581  | MicroWave System Amplifier       | AGILENT           | 83017A                   | 650                          | 2018/10/4             | 2019/10/31           | 12      |
| RE        | 141901  | Spectrum Analyzer                | AGILENT           | E4440A                   | MY48250080                   | 2018/10/4             | 2019/10/31           | 12      |
| RE        | 141508  | Horn Antenna 1-18GHz             | Schwarzbeck       | BBHA9120D                | 9120D-557                    | 2018/6/8              | 2019/6/30            | 12      |
| RE        | 142017  | AC4_Semi Anechoic Chamber(SVSWR) | TDK               | Semi Anechoic Chamber 3m | DA-10005                     | 2018/4/20             | 2019/4/30            | 12      |

\*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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:

RE: Radiated emission

**UL Japan, Inc.**

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