



# EMI TEST REPORT

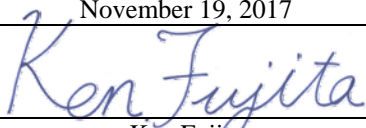
**Test Report No. : 11997862H-A**

**Applicant** : ALPS ELECTRIC CO., LTD.  
**Type of Equipment** : TPMS/KEYLESS TUNER  
**Model No.** : TD1G141  
**Test regulation** : FCC Part 15 Subpart B: 2017  
**FCC ID** : CWTD1G141  
**Test Result** : Complied

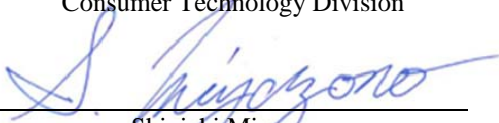
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3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)

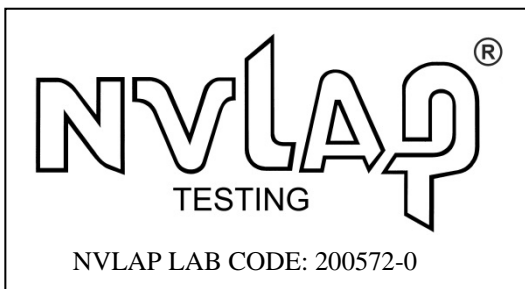
**Date of test:** November 19, 2017

**Representative test engineer:**

  
Ken Fujita  
Engineer  
Consumer Technology Division

**Approved by:**

  
Shinichi Miyazono  
Engineer  
Consumer Technology Division



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://japan.ul.com/resources/emc\\_accredited/](http://japan.ul.com/resources/emc_accredited/)

**UL Japan, Inc.**

**Ise EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : ALPS ELECTRIC CO., LTD.  
Address : 6-3-36, Nakazato, Furukawa, Osaki-city, Miyagi-pref, 989-6181, Japan  
Telephone Number : +81-229-23-5111  
Facsimile Number : +81-229-22-6290  
Contact Person : Yasuhiro Yabe

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

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

Type of Equipment : TPMS/KEYLESS TUNER  
Model No. : TD1G141  
Serial No. : Refer to Section 4, Clause 4.2  
Receipt Date of Sample : November 14, 2017  
Rating : DC 12.0 V  
Country of Mass-production : Japan  
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**

Model No: TD1G141 (referred to as the EUT in this report) is the TPMS/KEYLESS TUNER.

#### **General Specification**

Feature of EUT : This TPMS/KEYLESS TUNER receives and detects RF signal from remote control, and performs locking or unlocking of a door. It also receives RF signal from TPMS sensor, warns trouble of air pressure.  
Clock frequency in the system : 16 MHz (Used at 32 MHz inside the CPU) / 30.32 MHz

#### **Radio Specification**

Frequency of operation : 433.92 MHz  
Oscillator Frequency : 16 MHz (CPU), 30.32 MHz (RF\_IC)  
Local Oscillator Frequency : 1734.56 MHz  
Intermediate Frequency : 280 kHz  
Bandwidth : 280 kHz (-3 dB)  
Type of modulation : FSK  
Operation voltage range : DC 9 V to 16 V  
Antenna Type : Monopole antenna  
Operating Temperature : -30 deg. C to +80 deg. C

#### **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 November 2, 2017

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 | 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 *1)   | N/A                                    | N/A      |
|                    | 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       | 18.9 dB<br>855.997 MHz<br>Vertical, QP | Complied |
|                    | 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.

### **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  $k = 2$ .

| 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 | 5.0 dB                          | 5.3 dB              | 5.0 dB            | 5.0 dB              |
| Vertical   | 5.2 dB                          | 6.3 dB              | 5.0 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 |
| 5.2 dB                          | 5.5 dB          | 5.5 dB             | 5.4 dB             | 5.5 dB          |

\* Measurement distance

#### Radiated emission test (3 m)

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

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**Ise EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.  
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124  
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            | N/A  | -                      | -                            |
| 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.

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Telephone : +81 596 24 8999  
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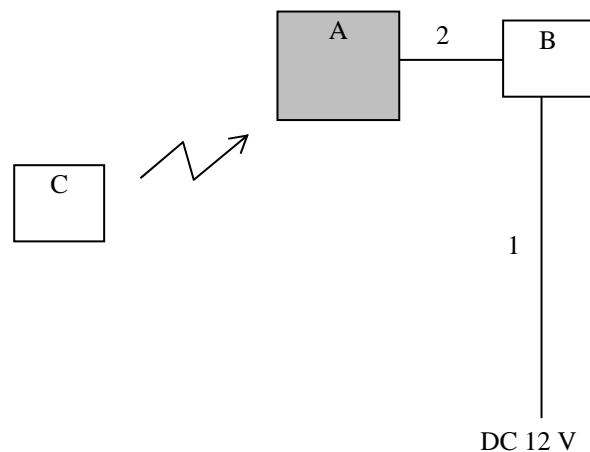
## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating modes**

| Mode                           | Remarks |
|--------------------------------|---------|
| Receiving mode (Rx) 433.92 MHz | -       |

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

### **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            | Remark |
|-----|--------------------|--------------|---------------|-------------------------|--------|
| A   | TPMS/KEYLESS TUNER | TD1G141      | 17111004      | ALPS ELECTRIC CO., LTD. | EUT    |
| B   | Jig board          | -            | -             | ALPS ELECTRIC CO., LTD. | -      |
| C   | Transmitter        | TB1G077      | 17111006      | ALPS ELECTRIC CO., LTD. | -      |

### **List of cables used**

| No. | Name         | Length (m) | Shield     |            | Remark |
|-----|--------------|------------|------------|------------|--------|
|     |              |            | Cable      | Connector  |        |
| 1   | DC Cable     | 1.5        | Unshielded | Unshielded | -      |
| 2   | Signal Cable | 1.0        | Unshielded | Unshielded | -      |

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## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Test place : No.2 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 - 6000 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:  $20 \times \log(3.2 \text{ m} / 3 \text{ m}) = 1.46 \text{ dB}$

- 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: November 19, 2017

Test engineer: Ken Fujita

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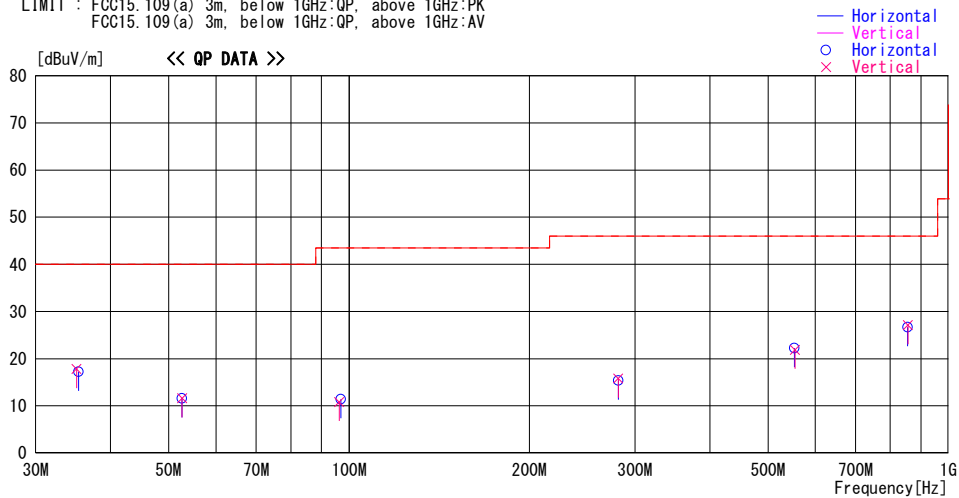


**APPENDIX 1: Test data**

**Radiated Emission**

Report No. 11997862H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.2  
Date November 19, 2017  
Temperature / Humidity 22 deg. C / 34 % RH  
Engineer Ken Fujita  
(Below 1 GHz)  
Mode Receiving mode

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



| Frequency<br>[MHz] | Reading<br>[dBuV] | DET | Antenna          |                    | Level<br>[dBuV/m] | Angle<br>[Deg] | Height<br>[cm] | Polar. | Limit<br>[dBuV/m] | Margin<br>[dB] | Comment |
|--------------------|-------------------|-----|------------------|--------------------|-------------------|----------------|----------------|--------|-------------------|----------------|---------|
|                    |                   |     | Factor<br>[dB/m] | Loss& Gain<br>[dB] |                   |                |                |        |                   |                |         |
| 35.100             | 25.3              | QP  | 16.2             | -23.7              | 17.8              | 0              | 100            | Vert.  | 40.0              | 22.2           |         |
| 35.383             | 24.8              | QP  | 16.1             | -23.7              | 17.2              | 0              | 300            | Hori.  | 40.0              | 22.8           |         |
| 52.667             | 24.9              | QP  | 10.1             | -23.4              | 11.6              | 0              | 300            | Hori.  | 40.0              | 28.4           |         |
| 52.667             | 24.9              | QP  | 10.1             | -23.4              | 11.6              | 0              | 100            | Vert.  | 40.0              | 28.4           |         |
| 96.300             | 24.3              | QP  | 9.4              | -22.9              | 10.8              | 0              | 100            | Vert.  | 43.5              | 32.7           |         |
| 96.867             | 24.8              | QP  | 9.5              | -22.9              | 11.4              | 0              | 300            | Hori.  | 43.5              | 32.1           |         |
| 281.333            | 23.1              | QP  | 12.8             | -20.5              | 15.4              | 0              | 100            | Hori.  | 46.0              | 30.6           |         |
| 281.333            | 23.5              | QP  | 12.8             | -20.5              | 15.8              | 0              | 200            | Vert.  | 46.0              | 30.2           |         |
| 553.334            | 23.6              | QP  | 18.4             | -19.8              | 22.2              | 0              | 100            | Hori.  | 46.0              | 23.8           |         |
| 554.668            | 23.2              | QP  | 18.5             | -19.8              | 21.9              | 0              | 200            | Vert.  | 46.0              | 24.1           |         |
| 854.663            | 22.4              | QP  | 21.5             | -17.2              | 26.7              | 0              | 100            | Hori.  | 46.0              | 19.3           |         |
| 855.997            | 22.7              | QP  | 21.6             | -17.2              | 27.1              | 0              | 200            | Vert.  | 46.0              | 18.9           |         |

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 + ATT - GAIN(AMP))

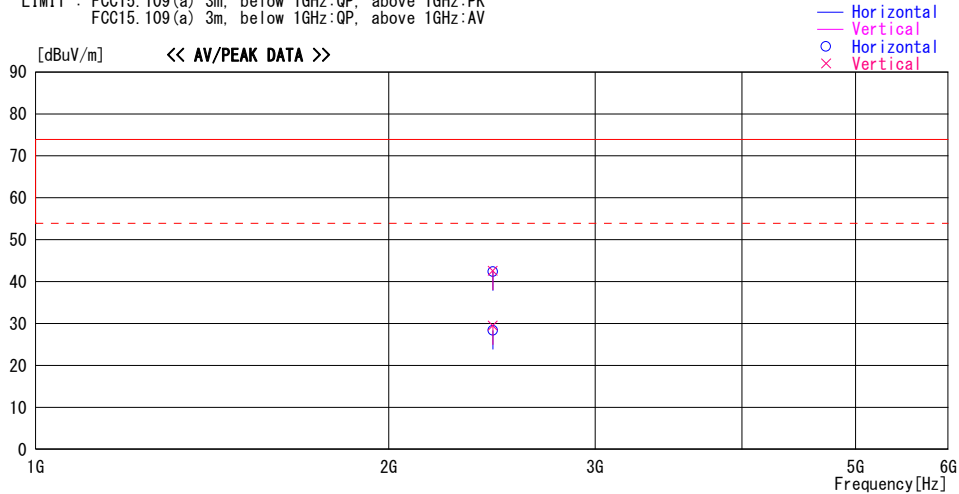
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## Radiated Emission

Report No. 11997862H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.2  
Date November 19, 2017  
Temperature / Humidity 22 deg. C / 34 % RH  
Engineer Ken Fujita  
(Above 1 GHz)  
Mode Receiving mode

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



| Frequency<br>[MHz] | Reading<br>[dBuV] | DET | Antenna          | Loss&        | Level<br>[dBuV/m] | Angle<br>[Deg] | Height<br>[cm] | Polar. | Limit<br>[dBuV/m] | Margin<br>[dB] | Comment |
|--------------------|-------------------|-----|------------------|--------------|-------------------|----------------|----------------|--------|-------------------|----------------|---------|
|                    |                   |     | Factor<br>[dB/m] | Gain<br>[dB] |                   |                |                |        |                   |                |         |
| 2453.336           | 47.4              | PK  | 27.0             | -32.0        | 42.4              | 0              | 100            | Hori.  | 73.9              | 31.5           |         |
| 2453.336           | 47.6              | PK  | 27.0             | -32.0        | 42.6              | 0              | 100            | Vert.  | 73.9              | 31.3           |         |
| 2453.336           | 33.4              | AV  | 27.0             | -32.0        | 28.4              | 0              | 100            | Hori.  | 53.9              | 25.5           |         |
| 2453.336           | 34.5              | AV  | 27.0             | -32.0        | 29.5              | 0              | 100            | Vert.  | 53.9              | 24.4           |         |

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) + D-factor)

## **APPENDIX 2: Test instruments**

### **EMI test equipment**

| <b>Control No.</b> | <b>Instrument</b>                | <b>Manufacturer</b> | <b>Model No</b>          | <b>Serial No</b>                 | <b>Test Item</b> | <b>Calibration Date *<br/>Interval(month)</b> |
|--------------------|----------------------------------|---------------------|--------------------------|----------------------------------|------------------|---|
| MAEC-02            | Semi Anechoic Chamber(NSA)       | TDK                 | Semi Anechoic Chamber 3m | DA-06902                         | RE               | 2017/08/31 * 12                               |
| MOS-22             | Thermo-Hygrometer                | Custom              | CTH-201                  | 0003                             | RE               | 2016/12/13 * 12                               |
| MJM-14             | Measure                          | KOMELON             | KMC-36                   | -                                | RE               | -   |
| COTS-MEMI          | EMI measurement program          | TSJ                 | TEPTO-DV                 | -                                | RE               | -   |
| MSA-03             | Spectrum Analyzer                | Agilent             | E4448A                   | MY44020357                       | RE               | 2017/11/07 * 12                               |
| MTR-03             | Test Receiver                    | Rohde & Schwarz     | ESCI                     | 100300                           | RE               | 2017/08/21 * 12                               |
| MBA-08             | Biconical Antenna                | Schwarzbeck         | VHA9103B                 | 08031                            | RE               | 2017/09/13 * 12                               |
| MLA-21             | Logperiodic Antenna(200-1000MHz) | Schwarzbeck         | VUSLP9111B               | 911B-190                         | RE               | 2017/01/05 * 12                               |
| MCC-12             | Coaxial Cable                    | Fujikura/Agilent    | -                        | -                                | RE               | 2017/02/24 * 12                               |
| MAT-07             | Attenuator(6dB)                  | Weinschel Corp      | 2                        | BK7970                           | RE               | 2017/11/14 * 12                               |
| MPA-09             | Pre Amplifier                    | Agilent             | 8447D                    | 2944A10845                       | RE               | 2017/09/27 * 12                               |
| MMM-01             | Digital Tester                   | Fluke               | FLUKE 26-3               | 78030611                         | RE               | 2017/08/07 * 12                               |
| MHA-06             | Horn Antenna 1-18GHz             | Schwarzbeck         | BBHA9120D                | 254                              | RE               | 2017/02/24 * 12                               |
| MCC-216            | Microwave Cable                  | Junkosha            | MWX221                   | 1604S253(1 m) /<br>1608S087(5 m) | RE               | 2017/08/04 * 12                               |
| MPA-10             | Pre Amplifier                    | Agilent             | 8449B                    | 3008A02142                       | RE               | 2017/01/16 * 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:**

**RE: Radiated emission**

**UL Japan, Inc.**

**Ise EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124