# EMI TEST REPORT

## Test Report No. : 11158943H-R1

| | | |
|---|---|---|
| **Applicant** | : | **DENSO CORPORATION** |
| **Type of Equipment** | : | **Remote Keyless Entry System and TPMS (Receiver)** |
| **Model No.** | : | **23ABB** |
| **FCC ID** | : | **HYQ23ABB** |
| **Test regulation** | : | **FCC Part 15 Subpart B: 2015** |
| **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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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)
7. This report is a revised version of 11158943H. 11158943H is replaced with this report.

**Date of test:** February 24 and 25, 2016

**Representative test engineer:**
S. Matsuyama
Satofumi Matsuyama
Engineer
Consumer Technology Division

**Approved by:**
M. Imura
Motoya Imura
Engineer
Consumer Technology Division

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NVLAP LAB CODE: 200572-0

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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

# REVISION HISTORY

## Original Test Report No.: 11158943H

| Revision | Test report No. | Date | Page revised | Contents |
|---|---|---|---|---|
| - (Original) | 11158943H | March 11, 2016 | - | - |
| 1 | 11158943H-R1 | March 31, 2016 | P.8 | Addition of following sentence;<br>*Supply voltage to EUT is DC 12.0V. |
| 1 | 11158943H-R1 | March 31, 2016 | P.9 | Correction of Cable name [No.1]. |
| 1 | 11158943H-R1 | March 31, 2016 | P.24 to 29 | Deletion of "DATA OF RADIATED EMISSION TEST" |
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**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

**CONTENTS** **PAGE**

# SECTION 1: Customer information

| | | |
|---|---|---|
| Company Name | : | DENSO CORPORATION |
| Address | : | 1-1, Showa-cho, Kariya-shi, Aichi-ken, 448-8661, Japan |
| Telephone Number | : | +81-566-20-3953 |
| Facsimile Number | : | +81-566-25-4837 |
| Contact Person | : | MASASHI URABE |

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

## 2.1 Identification of E.U.T.

| | | |
|---|---|---|
| Type of Equipment | : | Remote Keyless Entry System and TPMS (Receiver) |
| Model No. | : | 23ABB |
| Serial No. | : | Refer to Section 4, Clause 4.2 |
| Receipt Date of Sample | : | February 8, 2016 |
| Country of Mass-production | : | Japan, China, United States of America |
| Condition of EUT | : | Engineering 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 No: 23ABB (referred to as the EUT in this report) is the Remote Keyless Entry System and TPMS (Receiver). 23ABB has 15 variations. For details of variations, see “Theory of Operation”.

Feature of EUT:
<RKES mode>
RKE System is mainly used for locking or unlocking the doors of the vehicle. The transmitter sends a radio wave signal, while the button is pushed. The receiver becomes active in response to the signal from the transmitter.

<TPMS mode>
Tire Pressure Monitoring System is used for monitoring and indicating information of air pressure in vehicle’s tires.
Transmitter sends receiver the data that informs air pressure in vehicle’s tire to the receiver.
The data also includes the information of temperature, battery voltage and identity code of transmitter.
The receiver judges the data, and if the data of air pressure and others is not in a normal condition, the receiver sends signal to a warning lamp. Then, the warning lamp warns drivers.

| | | |
|---|---|---|
| Type of receiving system | : | Super-heterodyne |
| Frequency of Operation | : | RKES (CH1): 433.58 MHz<br>RKES (CH2): 434.42 MHz<br>TPMS: 433.90 MHz |
| Oscillator Frequency | : | 30.32 MHz (Crystal) |
| Type of Modulation | : | RKES: FSK (F1D)<br>TPMS: FSK (F1D) |
| Power Supply | : | DC 12.0 V |
| Antenna Type | : | ANT1: Internal antenna (Inverse F antenna / Inverse L antenna)<br>ANT2: External antenna (Connector) |

Note:
RKES: Remote Keyless Entry System
TPMS: Tire Pressure Monitoring System

# SECTION 3: Test specification, procedures & results

## 3.1 Test specification

Test specification : FCC Part 15 Subpart B: 2015, final revised on November 23, 2015
*Some parts are effective on and after December 17, 2015 or December 23, 2015.
The revision does not affect the test specification applied to the EUT.

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 powerline conducted emission measurements<br>**IC:** RSS-Gen 8.8 | Class B | N/A *1) | N/A | N/A |
| Radiated emission | **FCC:** ANSI C63.4: 2014<br>8. Radiated emission measurements<br>**IC:** RSS-Gen 7 | Class B | N/A | 17.0 dB<br>868.280 MHz<br>Horizontal, QP | Complied |
| Antenna Terminal | **FCC:** ANSI C63.4: 2014<br>12. Measurement of unintentional radiators other than ITE<br>**IC:** RSS-Gen 7 | Receiver | N/A | 25.5 dB<br>1736.560 MHz<br>PK | Complied |

*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.

| Test distance | Radiated emission (±dB) |
|---|---|
| | 9 kHz - 30 MHz |
| 3m | 3.8 dB |
| 10m | 3.7 dB |

*Measurement distance

| Polarity | Radiated emission (Below 1GHz) | | | |
|---|---|---|---|---|
| | (3 m*)(±dB) | | (10 m*)(±dB) | |
| | 30 – 300 MHz | 300 – 1000MHz | 30 – 300 MHz | 300 – 1000MHz |
| Horizontal | 4.8 dB | 5.2 dB | 4.8 dB | 5.0 dB |
| Vertical | 4.5 dB | 5.9 dB | 4.8 dB | 5.1 dB |

| Radiated emission | | | | |
|---|---|---|---|---|
| (3 m*)(±dB) | | (1 m*)(±dB) | (0.5 m*)(±dB) | (10 m*)(±dB) |
| 1 – 6GHz | 6 – 18GHz | 10 – 26.5 GHz | 26.5 – 40GHz | 1 -18 GHz |
| 5.1 dB | 5.3 dB | 5.1 dB | 5.1 dB | 5.3 dB |

| Antenna terminal conducted emission and Power density (±dB) | | | Antenna terminal conducted emission (±dB) | |
|---|---|---|---|---|
| Below 1 GHz | 1 GHz - 3 GHz | 3 GHz - 18 GHz | 18 GHz - 26.5 GHz | 26.5 GHz- 40 GHz |
| 1.4 dB | 1.7 dB | 2.8 dB | 2.8 dB | 2.9 dB |

Radiated emission test(3m)
The data listed in this test report has enough margin, more than the site margin.

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

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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 data, Test instruments, and Test set up

Refer to APPENDIX.

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

## 4.1 Operating modes

The mode used: 1. RKES Receiving mode (433.58 MHz)
2. RKES Receiving mode (434.42 MHz)
3. TPMS Receiving mode (433.90 MHz)

* Refer to the table in "Theory of Operation_Variation_23ABB" for test mode.

Regarding RKES Receiving mode (433.58 MHz / 434.42 MHz), internal antenna receiving was tested with Variation No. 2, because there was no difference in noise level compared to the other representative variants (Variation No. 2, 3, 5, 8, 11 and 14) of the table in "Theory of Operation".

Regarding TPMS Receiving mode (433.90 MHz), internal antenna receiving was tested with Variation No. 2 which was the worst-variation of RKES Receiving mode.

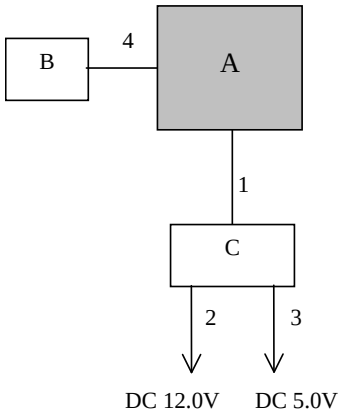
Also, external antenna receiving (Test mode 1, 2, 3) was tested with Variation No. 3 as representative, because there was no difference in circuit construction by variations.

Among Variation No.1 to 15,

- the difference due to the feeding point and antenna variation of the internal antenna was confirmed with Variation No. 2, 3, 5, 8, 11 and 14.
- regarding External antenna, variants with External antenna were tested, which were the worst condition for EMI.

As a result, enough margin for the limit was observed.

## 4.2 Configuration and peripherals




*Cabling and setup were taken into consideration and test data was taken under worse case conditions.
*Supply voltage to EUT is DC 12.0V.

**Description of EUT and Support equipment**

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|---|---|---|---|---|---|
| A | Remote Keyless Entry System and TPMS (Receiver) | 23ABB | 001 (Variation No. 2) *1) | DENSO CORPORATION | EUT |
| | | | 002 (Variation No. 3) | | |
| | | | 003 (Variation No. 5) | | |
| | | | 004 (Variation No. 8) | | |
| | | | 005 (Variation No. 11) | | |
| | | | 006 (Variation No. 14) | | |
| B | External Antenna | - | 4G26 | DENSO CORPORATION | - |
| C | Checker | - | 3 | DENSO CORPORATION | - |

**List of cables used**

| No. | Name | Length (m) | Shield | | Remarks |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | Signal and DC Cable | 1.0 | Unshielded | Unshielded | - |
| 2 | DC Cable | 1.1 | Unshielded | Unshielded | - |
| 3 | DC Cable | 2.5 | Unshielded | Unshielded | - |
| 4 | Antenna Cable | 1.8 | Shielded | Shielded | - |

*1) **Variations owing to antenna matching (Inverse F Antenna Type)** *See " Theory of Operation" for details.
TYPE1 which was used for the tests has 306 "Nothing" and 307 "Nothing".
The result of Radiated emission test was mainly from characteristics of Local Oscillator.
If the range of 306, 307, 308 and 309 becomes "Capacitor 0.1 - 1000pF", or "Inductor 1 - 100nH", there is no influence on the result of Radiated emission test.

# 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 - 300 MHz (Biconical antenna) / 300 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 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.
The radiated emission measurements were made with the following detector function of the Test Receiver.

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

- 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

Date: February 24, 2016 Test engineer: Satofumi Matsuyama and Hiroyuki Furutaka

# SECTION 6: Antenna Terminal

## 6.1 Operating environment

Test place : No.3 semi anechoic chamber
Temperature : See data
Humidity : See data

## 6.2 Test configuration

EUT was placed on a wooden table of nominal size, 1.0 m by 1.5 m, raised 0.8 m from the ground.

## 6.3 Test conditions

Frequency range : 30 MHz - 1000 MHz / 1000 MHz - 2000 MHz
Test distance : N/A
EUT position : Table top
EUT operation mode : See Clause 4.1

## 6.4 Test procedure

The Antenna Terminal was measured with a spectrum analyzer connected to the antenna port.

| Frequency | Below 1 GHz | Above 1 GHz |
|---|---|---|
| Instrument used | Spectrum Analyzer | Spectrum Analyzer |
| IF Bandwidth | PK: RBW:100 kHz/VBW: 100 kHz | PK: RBW:1 MHz/VBW: 3 MHz |

## 6.5 Test result

Summary of the test results: Pass

Date: February 25, 2016 Test engineer: Hiroyuki Furutaka

# APPENDIX 1: Test data

## Radiated Emission

RKES (433.58MHz) Variation No. 2 Internal Antenna
(Below 1GHz)

### DATA OF RADIATED EMISSION TEST

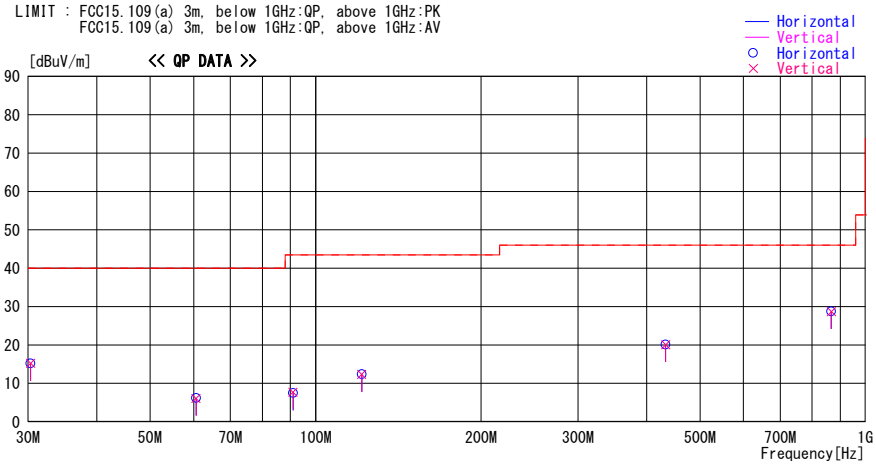
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 300 | Hori. | 40.0 | 24.8 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 100 | Vert. | 43.5 | 35.8 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 300 | Hori. | 43.5 | 36.0 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 100 | Vert. | 43.5 | 31.2 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 300 | Hori. | 43.5 | 31.1 | No Signal |
| 433.300 | 22.4 | QP | 18.8 | -21.1 | 20.1 | 0 | 100 | Vert. | 46.0 | 25.9 | No Signal |
| 433.300 | 22.4 | QP | 18.8 | -21.1 | 20.1 | 0 | 100 | Hori. | 46.0 | 25.9 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Hori. | 46.0 | 17.3 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Vert. | 46.0 | 17.3 | No Signal |

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

*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

RKES (433.58MHz) Variation No. 2 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

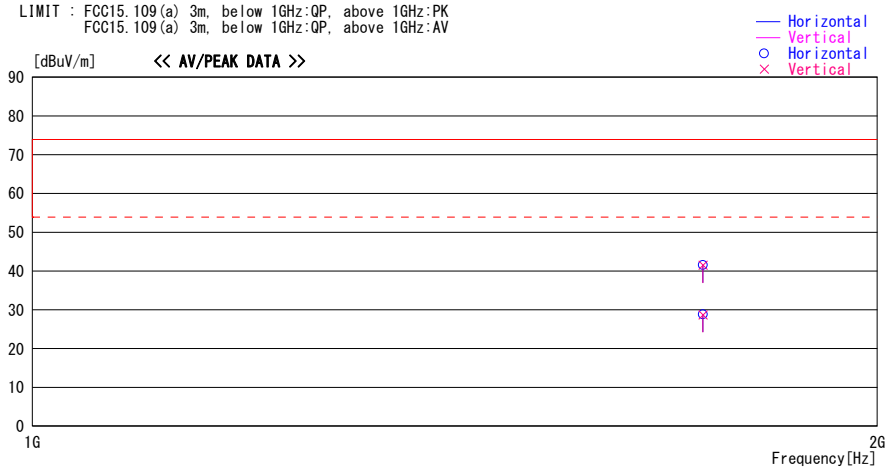
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1733.200 | 42.8 | PK | 26.4 | -27.6 | 41.6 | 0 | 100 | Hori. | 73.9 | 32.3 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1733.200 | 42.7 | PK | 26.4 | -27.6 | 41.5 | 0 | 100 | Vert. | 73.9 | 32.4 | |
| 1733.200 | 29.9 | AV | 26.4 | -27.6 | 28.7 | 0 | 100 | Vert. | 53.9 | 25.2 | |

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

*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

RKES (434.42MHz) Variation No. 2 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

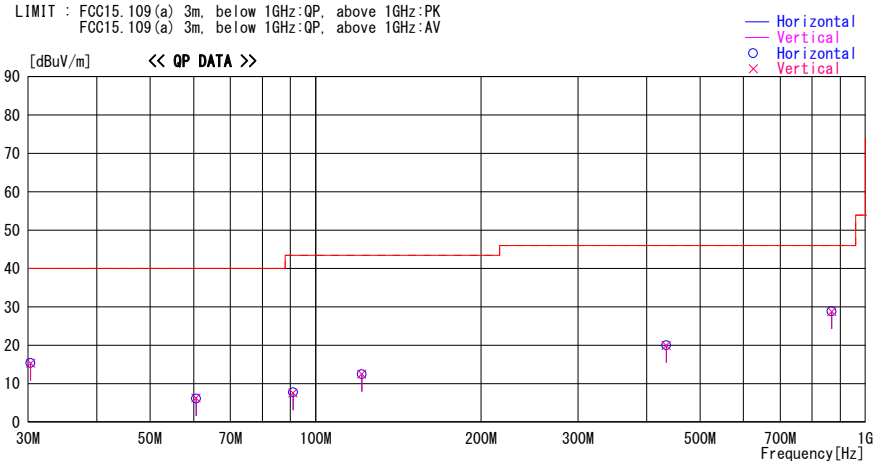
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 100 | Vert. | 40.0 | 24.7 | No Signal |
| 30.320 | 23.3 | QP | 17.1 | -25.0 | 15.4 | 0 | 300 | Hori. | 40.0 | 24.6 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 100 | Vert. | 40.0 | 33.8 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 300 | Hori. | 40.0 | 33.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 300 | Hori. | 43.5 | 35.8 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 300 | Hori. | 43.5 | 31.0 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Hori. | 46.0 | 26.0 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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

RKES (434.42MHz) Variation No. 2 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

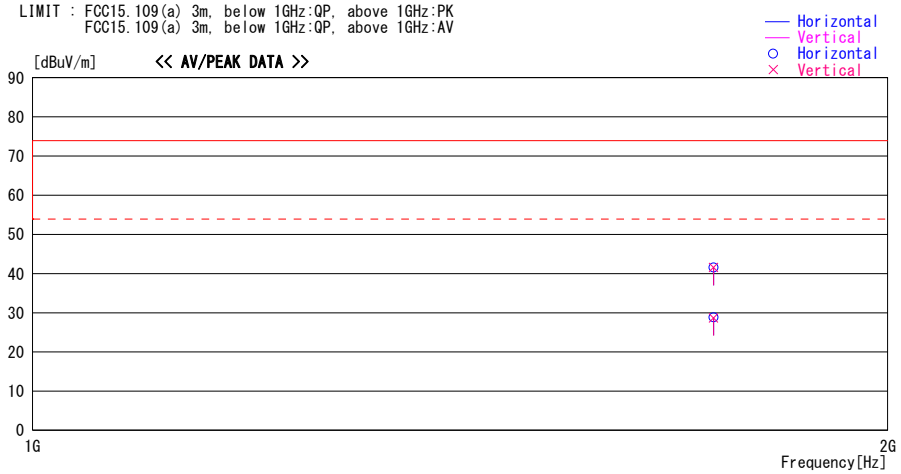
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1736.560 | 42.8 | PK | 26.4 | -27.6 | 41.6 | 0 | 100 | Hori. | 73.9 | 32.3 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1736.560 | 42.8 | PK | 26.4 | -27.6 | 41.6 | 0 | 100 | Vert. | 73.9 | 32.3 | |
| 1736.560 | 29.9 | AV | 26.4 | -27.6 | 28.7 | 0 | 100 | Vert. | 53.9 | 25.2 | |

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

*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.


**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

# Radiated Emission

TPMS (433.90MHz) Variation No. 2 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

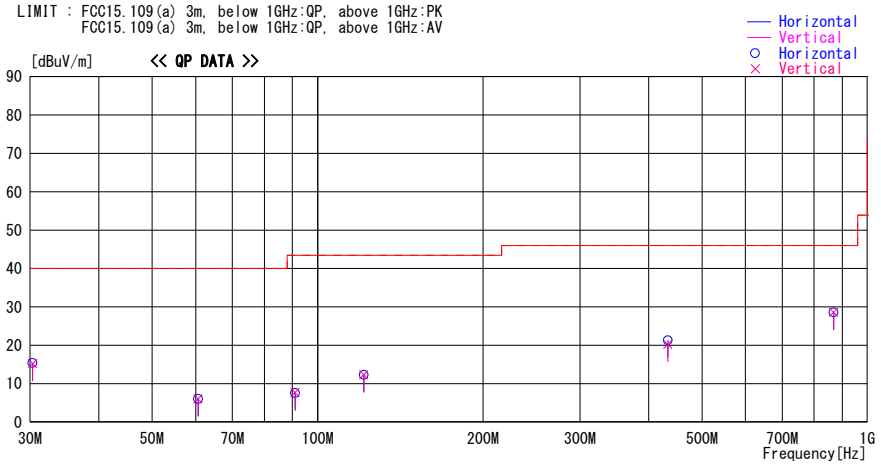
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : TPMS Rx 433.90MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.3 | QP | 17.1 | -25.0 | 15.4 | 0 | 300 | Hori. | 40.0 | 24.6 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.0 | QP | 7.4 | -24.4 | 6.0 | 0 | 300 | Hori. | 40.0 | 34.0 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 100 | Vert. | 43.5 | 35.8 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 100 | Vert. | 43.5 | 31.2 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 300 | Hori. | 43.5 | 31.2 | No Signal |
| 433.620 | 22.5 | QP | 18.8 | -21.1 | 20.2 | 0 | 100 | Vert. | 46.0 | 25.8 | No Signal |
| 433.620 | 23.6 | QP | 18.8 | -21.1 | 21.3 | 0 | 100 | Hori. | 46.0 | 24.7 | No Signal |
| 867.240 | 23.0 | QP | 23.8 | -18.2 | 28.6 | 0 | 100 | Hori. | 46.0 | 17.4 | No Signal |
| 867.240 | 23.0 | QP | 23.8 | -18.2 | 28.6 | 0 | 100 | Vert. | 46.0 | 17.4 | No Signal |

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

*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

TPMS (433.90MHz) Variation No. 2 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

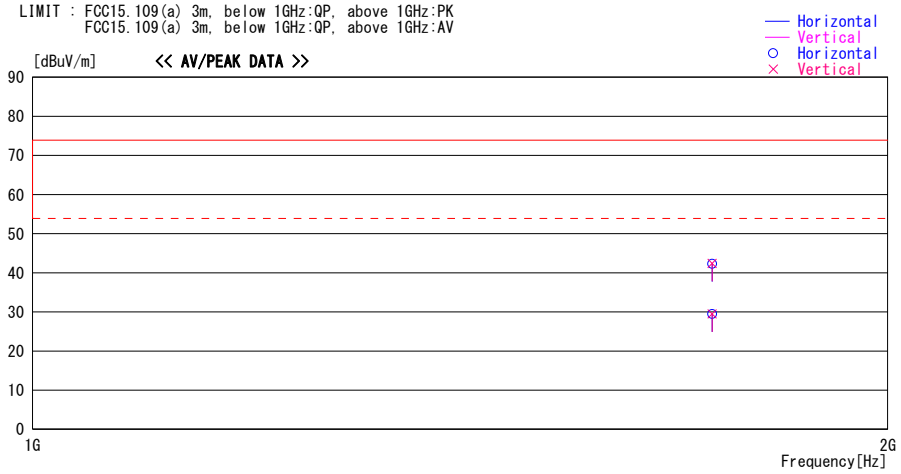
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : TPMS Rx 433.90MHzINT-ANT Worst axis (Hori:X, Ver:X)

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1734.480 | 43.5 | PK | 26.4 | -27.6 | 42.3 | 0 | 100 | Hori. | 73.9 | 31.6 | |
| 1734.480 | 30.7 | AV | 26.4 | -27.6 | 29.5 | 0 | 100 | Hori. | 53.9 | 24.4 | |
| 1734.480 | 43.6 | PK | 26.4 | -27.6 | 42.4 | 0 | 100 | Vert. | 73.9 | 31.5 | |
| 1734.480 | 30.7 | AV | 26.4 | -27.6 | 29.5 | 0 | 100 | Vert. | 53.9 | 24.4 | |

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

*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.


**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

# Radiated Emission

RKES (433.58MHz) Variation No. 3 External Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

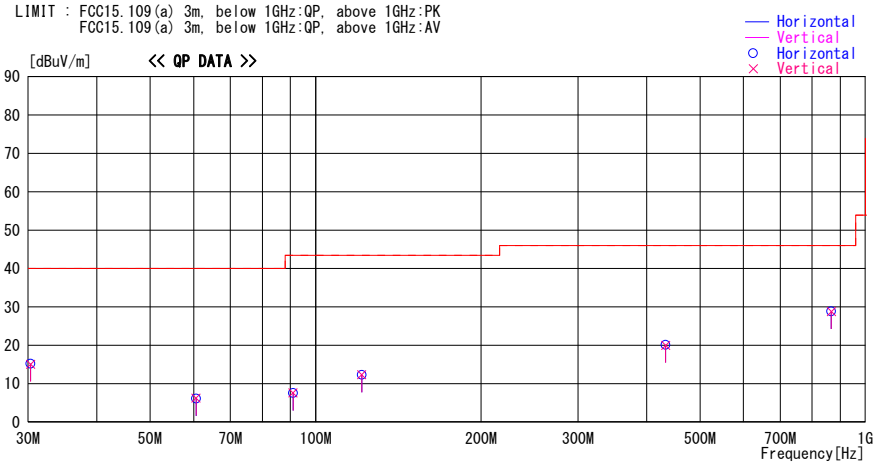
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Ext-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.0 | QP | 17.1 | -25.0 | 15.1 | 0 | 100 | Vert. | 40.0 | 24.9 | No Signal |
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 300 | Hori. | 40.0 | 24.8 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 100 | Vert. | 40.0 | 33.8 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 300 | Hori. | 40.0 | 33.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 100 | Vert. | 43.5 | 31.2 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 300 | Hori. | 43.5 | 31.2 | No Signal |
| 433.300 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 433.300 | 22.4 | QP | 18.8 | -21.1 | 20.1 | 0 | 100 | Hori. | 46.0 | 25.9 | No Signal |
| 866.600 | 23.2 | QP | 23.8 | -18.2 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 866.600 | 23.2 | QP | 23.8 | -18.2 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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

RKES (433.58MHz) Variation No. 3 External Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

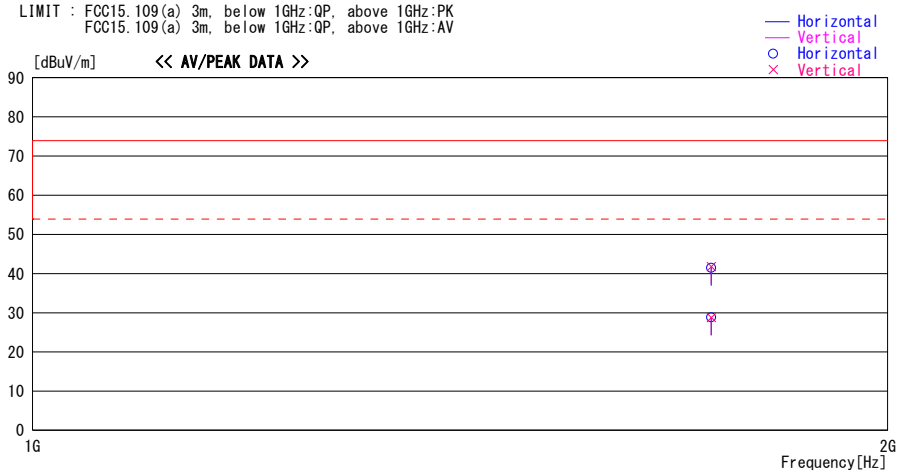
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz EXT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1733.200 | 42.7 | PK | 26.4 | -27.6 | 41.5 | 0 | 100 | Hori. | 73.9 | 32.4 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1733.200 | 43.0 | PK | 26.4 | -27.6 | 41.8 | 0 | 100 | Vert. | 73.9 | 32.1 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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

RKES (434.42MHz) Variation No. 3 External Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

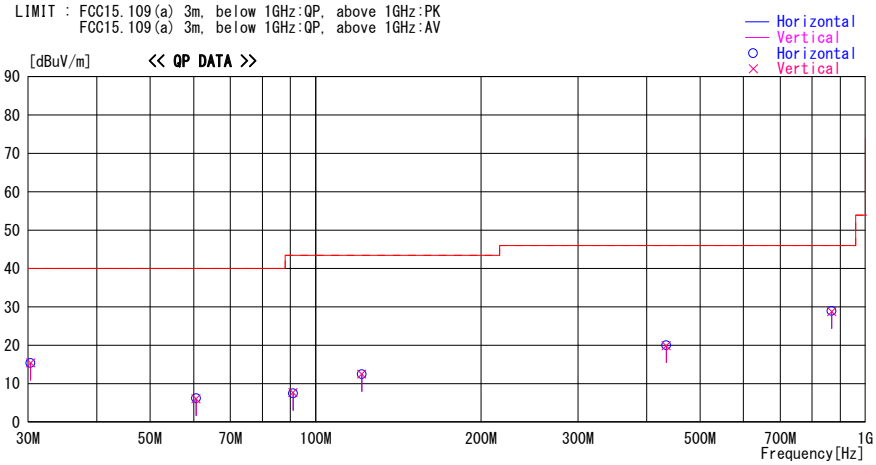
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Ext-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.3 | QP | 17.1 | -25.0 | 15.4 | 0 | 100 | Vert. | 40.0 | 24.6 | No Signal |
| 30.320 | 23.3 | QP | 17.1 | -25.0 | 15.4 | 0 | 300 | Hori. | 40.0 | 24.6 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 100 | Vert. | 43.5 | 35.8 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 300 | Hori. | 43.5 | 36.0 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 300 | Hori. | 43.5 | 31.0 | No Signal |
| 434.140 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Vert. | 46.0 | 26.1 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Hori. | 46.0 | 26.0 | No Signal |
| 868.280 | 23.2 | QP | 23.8 | -18.1 | 28.9 | 0 | 100 | Hori. | 46.0 | 17.1 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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

RKES (434.42MHz) Variation No. 3 External Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

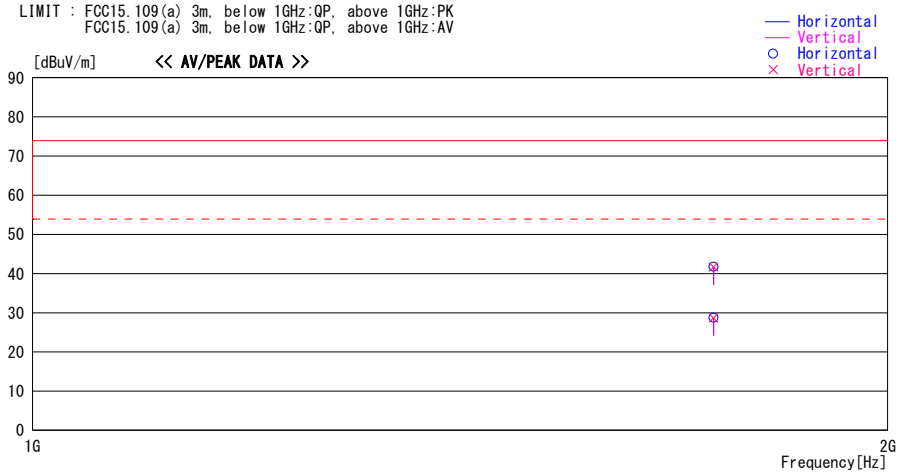
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz EXT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1736.560 | 42.9 | PK | 26.4 | -27.6 | 41.7 | 0 | 100 | Hori. | 73.9 | 32.2 | |
| 1736.560 | 29.9 | AV | 26.4 | -27.6 | 28.7 | 0 | 100 | Hori. | 53.9 | 25.2 | |
| 1736.560 | 42.9 | PK | 26.4 | -27.6 | 41.7 | 0 | 100 | Vert. | 73.9 | 32.2 | |
| 1736.560 | 29.9 | AV | 26.4 | -27.6 | 28.7 | 0 | 100 | Vert. | 53.9 | 25.2 | |

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

*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

TPMS (433.90MHz) Variation No. 3 External Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

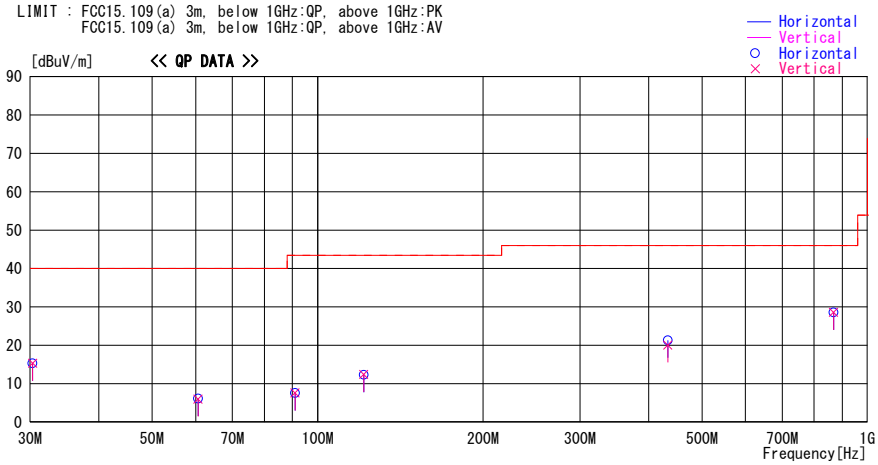
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : TPMS Rx 433.90MHz Ext-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 100 | Vert. | 40.0 | 24.7 | No Signal |
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 300 | Hori. | 40.0 | 24.7 | No Signal |
| 60.640 | 23.0 | QP | 7.4 | -24.4 | 6.0 | 0 | 100 | Vert. | 40.0 | 34.0 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 300 | Hori. | 40.0 | 33.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 100 | Vert. | 43.5 | 31.1 | No Signal |
| 121.280 | 23.0 | QP | 12.9 | -23.6 | 12.3 | 0 | 300 | Hori. | 43.5 | 31.2 | No Signal |
| 433.620 | 22.4 | QP | 18.8 | -21.1 | 20.1 | 0 | 100 | Vert. | 46.0 | 25.9 | No Signal |
| 433.620 | 23.6 | QP | 18.8 | -21.1 | 21.3 | 0 | 100 | Hori. | 46.0 | 24.7 | No Signal |
| 867.240 | 23.0 | QP | 23.8 | -18.2 | 28.6 | 0 | 100 | Hori. | 46.0 | 17.4 | No Signal |
| 867.240 | 23.0 | QP | 23.8 | -18.2 | 28.6 | 0 | 100 | Vert. | 46.0 | 17.4 | No Signal |

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

*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

TPMS (433.90MHz) Variation No. 3 External Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

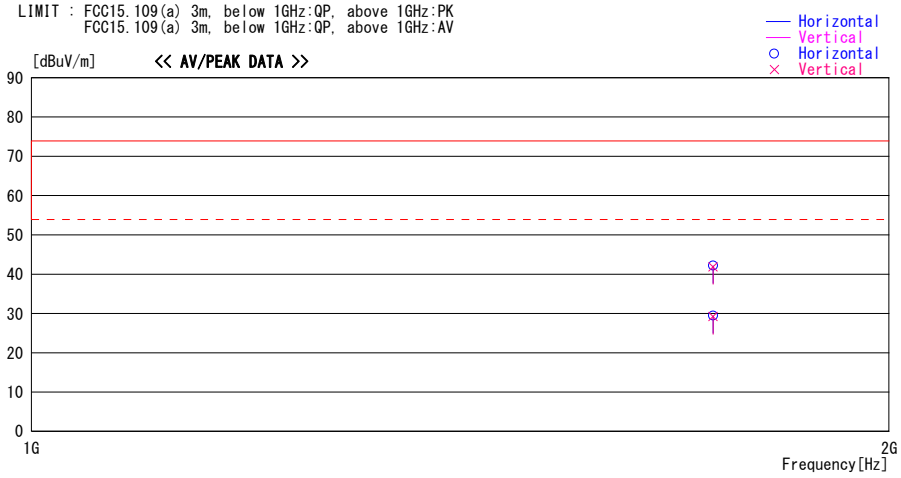
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : TPMS Rx 433.90MHz EXT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1734.480 | 43.4 | PK | 26.4 | -27.6 | 42.2 | 0 | 100 | Hori. | 73.9 | 31.7 | |
| 1734.480 | 30.7 | AV | 26.4 | -27.6 | 29.5 | 0 | 100 | Hori. | 53.9 | 24.4 | |
| 1734.480 | 43.1 | PK | 26.4 | -27.6 | 41.9 | 0 | 100 | Vert. | 73.9 | 32.0 | |
| 1734.480 | 30.4 | AV | 26.4 | -27.6 | 29.2 | 0 | 100 | Vert. | 53.9 | 24.7 | |

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

*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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4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

# Antenna Terminal Conducted Emission

RKES (433.58 MHz) Variation No. 3 External Antenna
(Below 1GHz)

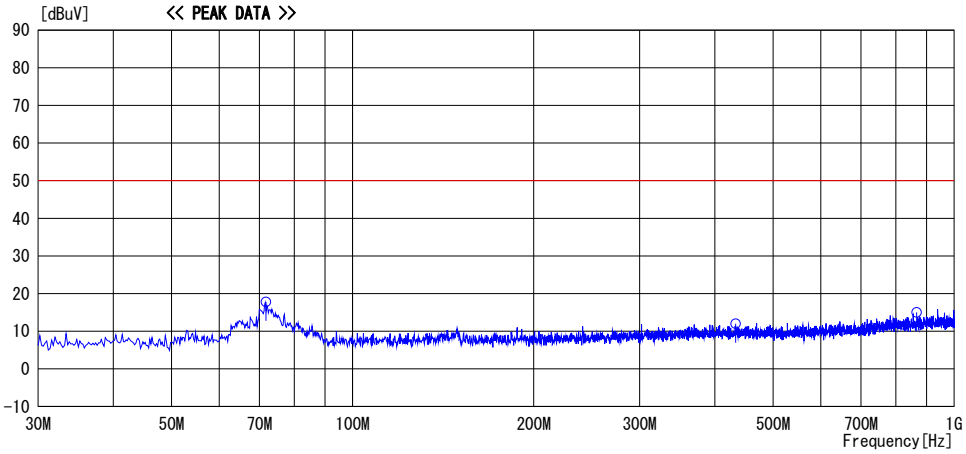
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 02/25/2016

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV] | Angle [Deg] | Height [cm] | Polar. | Limit *1) [dBuV] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 71.750 | 38.0 | PK | 0.0 | -20.2 | 17.8 | 0 | 100 | - | 50.0 | 32.2 | |
| 433.300 | 29.3 | PK | 0.0 | -17.3 | 12.0 | 0 | 100 | - | 50.0 | 38.0 | |
| 866.600 | 29.0 | PK | 0.0 | -14.0 | 15.0 | 0 | 100 | - | 50.0 | 35.0 | |

*1) 2nW = -57dBm = 50dBuV

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

# Antenna Terminal Conducted Emission

RKES (433.58MHz) Variation No. 3 External Antenna
(Above 1GHz)

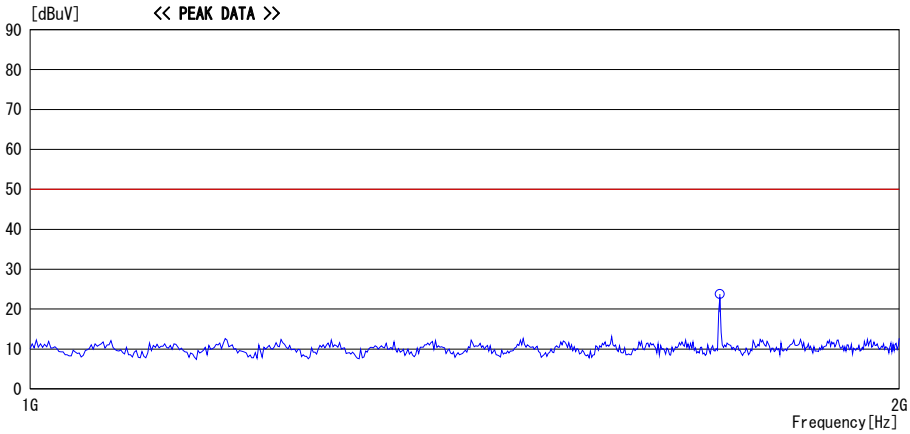
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/02/25

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV] | Angle [Deg] | Height [cm] | Polar. | Limit *1) [dBuV] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1733.200 | 55.6 | PK | 0.0 | -31.8 | 23.8 | 0 | 100 | - | 50.0 | 26.2 | |

*1) 2nW = -57dBm = 50dBuV

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

# Antenna Terminal Conducted Emission

RKES (434.42 MHz) Variation No. 3 External Antenna
(Below 1GHz)

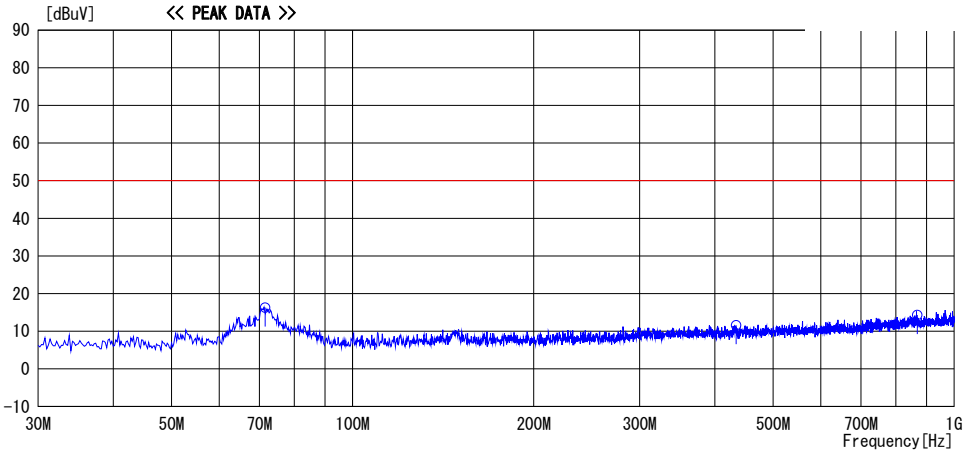
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 02/25/2016

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency | Reading | DET | Antenna Factor | Loss& Gain | Level | Angle | Height | Polar. | Limit *1) | Margin | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBuV] | | [dB/m] | [dB] | [dBuV] | [Deg] | [cm] | | [dBuV] | [dB] | |
| 71.550 | 36.5 | PK | 0.0 | -20.2 | 16.3 | 0 | 100 | - | 50.0 | 33.7 | |
| 434.140 | 28.9 | PK | 0.0 | -17.3 | 11.6 | 0 | 100 | - | 50.0 | 38.4 | |
| 868.280 | 28.3 | PK | 0.0 | -14.0 | 14.3 | 0 | 100 | - | 50.0 | 35.7 | |

*1) 2nW = -57dBm = 50dBuV

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

# Antenna Terminal Conducted Emission

RKES (434.42MHz) Variation No. 3 External Antenna

(Above 1GHz)

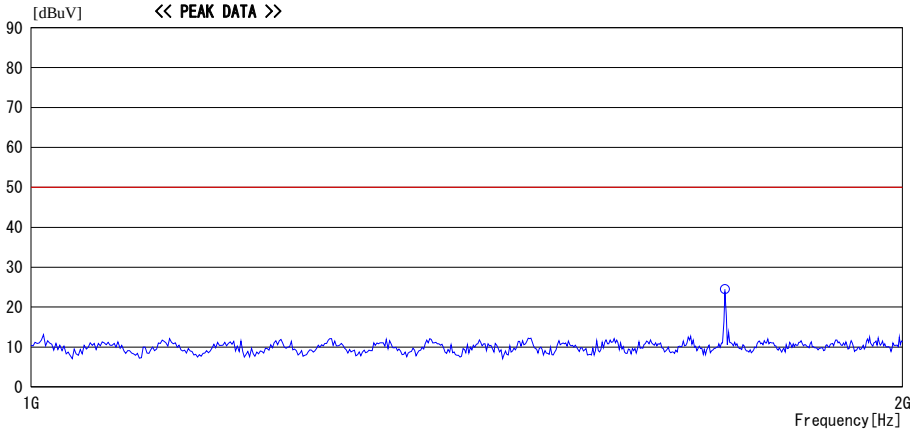
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/02/25

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency | Reading | DET | Antenna Factor | Loss& Gain | Level | Angle | Height | Polar. | Limit *1) | Margin | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBuV] | | [dB/m] | [dB] | [dBuV] | [Deg] | [cm] | | [dBuV] | [dB] | |
| 1736.560 | 56.3 | PK | 0.0 | -31.8 | 24.5 | 0 | 100 | - | 50.0 | 25.5 | |

*1) 2nW = -57dBm = 50dBuV

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

# Antenna Terminal Conducted Emission

TPMS (433.90MHz) Variation No. 3 External Antenna
(Below 1GHz)

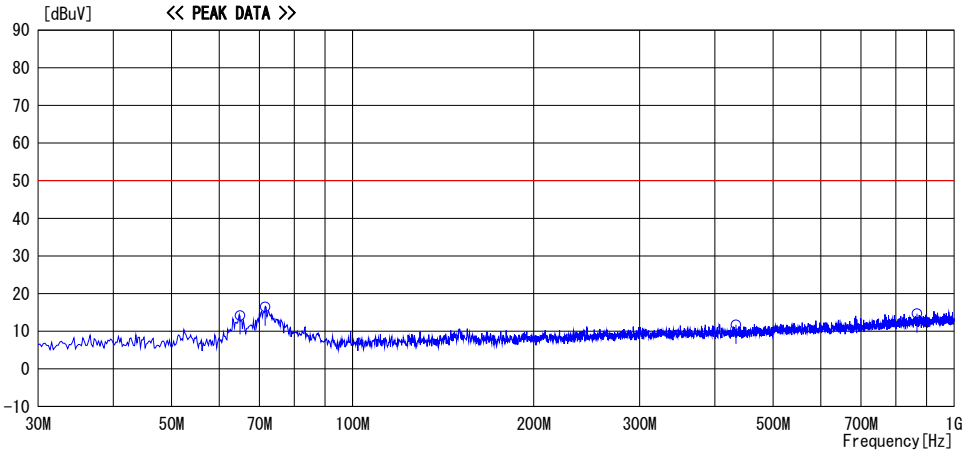
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 02/25/2016

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : TPMS Rx 433.90MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV] | Angle [Deg] | Height [cm] | Polar. | Limit *1) [dBuV] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 65.010 | 34.5 | PK | 0.0 | -20.3 | 14.2 | 0 | 100 | - | 50.0 | 35.8 | |
| 71.550 | 36.7 | PK | 0.0 | -20.2 | 16.5 | 0 | 100 | - | 50.0 | 33.5 | |
| 433.620 | 29.0 | PK | 0.0 | -17.3 | 11.7 | 0 | 100 | - | 50.0 | 38.3 | |
| 867.240 | 28.7 | PK | 0.0 | -14.0 | 14.7 | 0 | 100 | - | 50.0 | 35.3 | |

*1) 2nW = -57dBm = 50dBuV

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


**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

# Antenna Terminal Conducted Emission

TPMS (433.90MHz) Variation No. 3 External Antenna
(Above 1GHz)

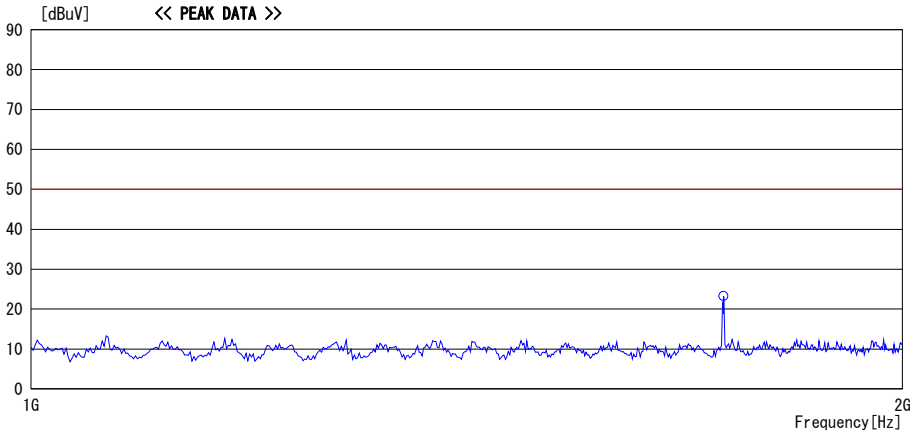
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/02/25

Report No. : 11158943H

Temp./Humi. : 24deg. C / 36% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : TPMS Rx 433.90MHz External Antenna

LIMIT : FCC15.111 Antenna terminal measurement
Except for the data below : adequate margin data below the limits.




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV] | Angle [Deg] | Height [cm] | Polar. | Limit *1) [dBuV] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1734.480 | 55.1 | PK | 0.0 | -31.8 | 23.3 | 0 | 100 | - | 50.0 | 26.7 | |

*1) 2nW = -57dBm = 50dBuV

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

# Radiated Emission (Reference data)

RKES (433.58MHz) Variation No. 5 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

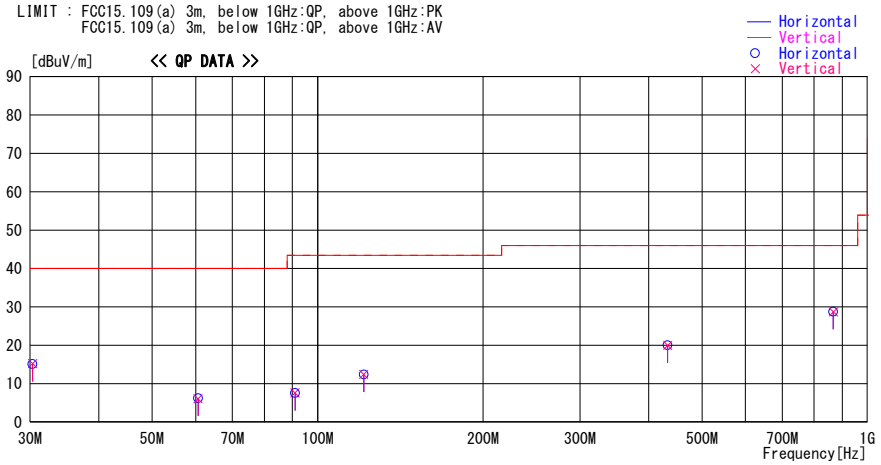
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.0 | QP | 17.1 | -25.0 | 15.1 | 0 | 300 | Hori. | 40.0 | 24.9 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 100 | Vert. | 43.5 | 31.1 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 300 | Hori. | 43.5 | 31.1 | No Signal |
| 433.300 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 433.300 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Hori. | 46.0 | 26.0 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Hori. | 46.0 | 17.3 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Vert. | 46.0 | 17.3 | No Signal |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 5 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

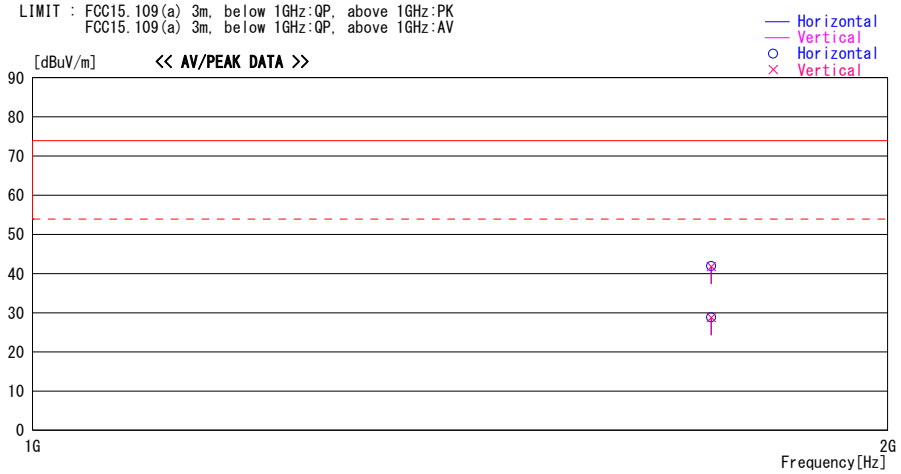
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz INT-ANT Worst axis (Hori:X, Ver:X)

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1733.200 | 43.1 | PK | 26.4 | -27.6 | 41.9 | 0 | 100 | Hori. | 73.9 | 32.0 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1733.200 | 43.0 | PK | 26.4 | -27.6 | 41.8 | 0 | 100 | Vert. | 73.9 | 32.1 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 5 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

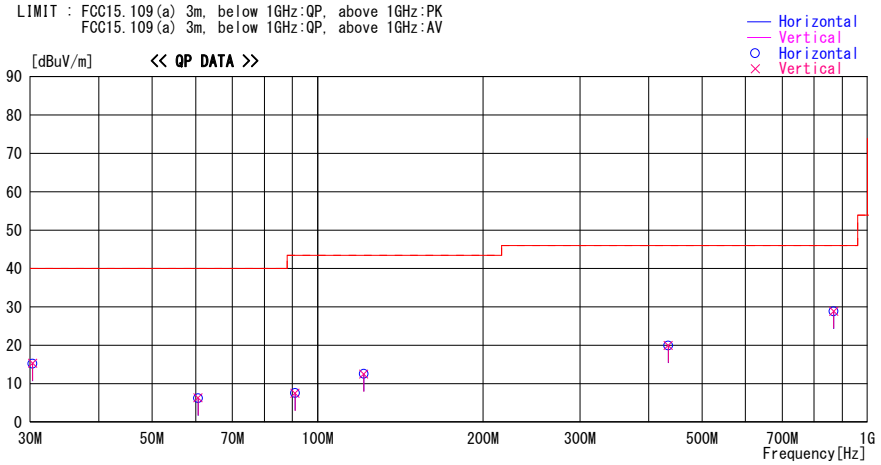
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 100 | Vert. | 40.0 | 24.7 | No Signal |
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 300 | Hori. | 40.0 | 24.8 | No Signal |
| 60.640 | 23.3 | QP | 7.4 | -24.4 | 6.3 | 0 | 100 | Vert. | 40.0 | 33.7 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 100 | Vert. | 43.5 | 36.0 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 300 | Hori. | 43.5 | 30.9 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 434.140 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Hori. | 46.0 | 26.1 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 868.280 | 23.2 | QP | 23.8 | -18.1 | 28.9 | 0 | 100 | Vert. | 46.0 | 17.1 | No Signal |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 5 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

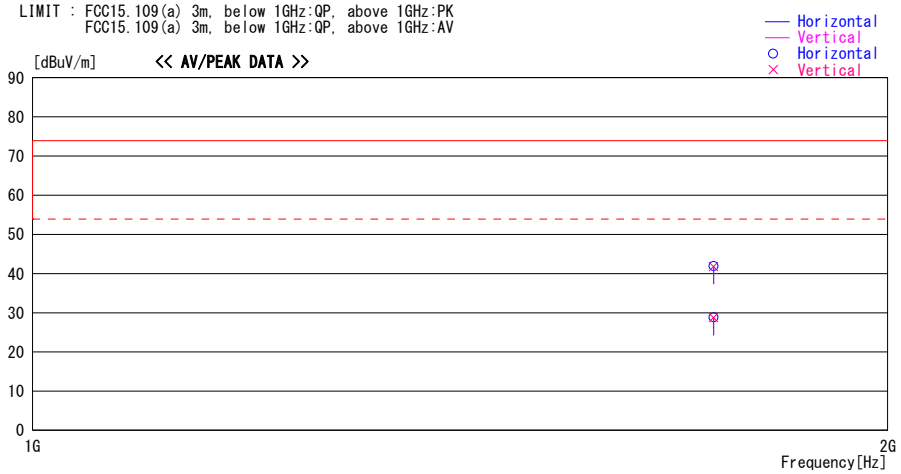
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. :11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1736.560 | 43.1 | PK | 26.4 | -27.6 | 41.9 | 0 | 100 | Hori. | 73.9 | 32.0 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1736.560 | 43.0 | PK | 26.4 | -27.6 | 41.8 | 0 | 100 | Vert. | 73.9 | 32.1 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 8 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

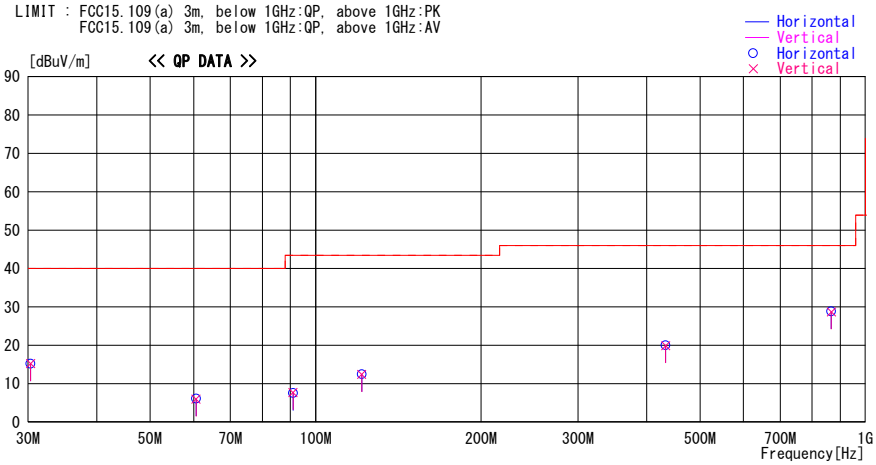
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 300 | Hori. | 40.0 | 24.8 | No Signal |
| 60.640 | 23.0 | QP | 7.4 | -24.4 | 6.0 | 0 | 100 | Vert. | 40.0 | 34.0 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 300 | Hori. | 40.0 | 33.9 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 100 | Vert. | 43.5 | 35.8 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 100 | Vert. | 43.5 | 31.1 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 300 | Hori. | 43.5 | 31.0 | No Signal |
| 433.300 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Vert. | 46.0 | 26.1 | No Signal |
| 433.300 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Hori. | 46.0 | 26.0 | No Signal |
| 866.600 | 23.2 | QP | 23.8 | -18.2 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Vert. | 46.0 | 17.3 | No Signal |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 8 Internal Antenna
(Above 1GHz)

### DATA OF RADIATED EMISSION TEST

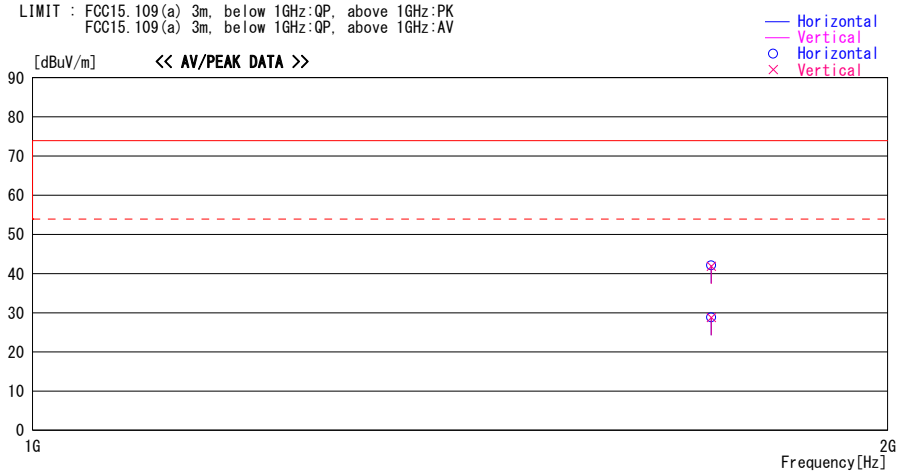
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1733.200 | 43.3 | PK | 26.4 | -27.6 | 42.1 | 0 | 100 | Hori. | 73.9 | 31.8 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1733.200 | 43.1 | PK | 26.4 | -27.6 | 41.9 | 0 | 100 | Vert. | 73.9 | 32.0 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 8 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

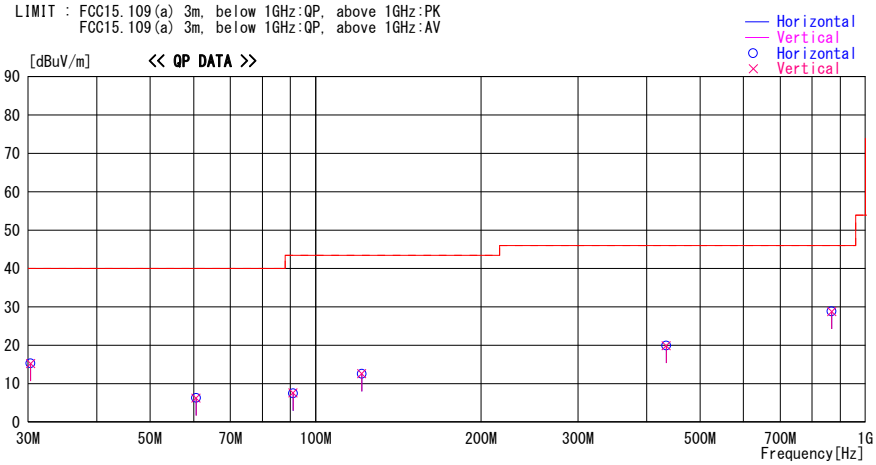
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 300 | Hori. | 40.0 | 24.7 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 100 | Vert. | 40.0 | 33.8 | No Signal |
| 60.640 | 23.3 | QP | 7.4 | -24.4 | 6.3 | 0 | 300 | Hori. | 40.0 | 33.7 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 300 | Hori. | 43.5 | 36.0 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 100 | Vert. | 43.5 | 30.9 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 300 | Hori. | 43.5 | 30.9 | No Signal |
| 434.140 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Vert. | 46.0 | 26.1 | No Signal |
| 434.140 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Hori. | 46.0 | 26.1 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 8 Internal Antenna
(Above 1GHz)

### DATA OF RADIATED EMISSION TEST

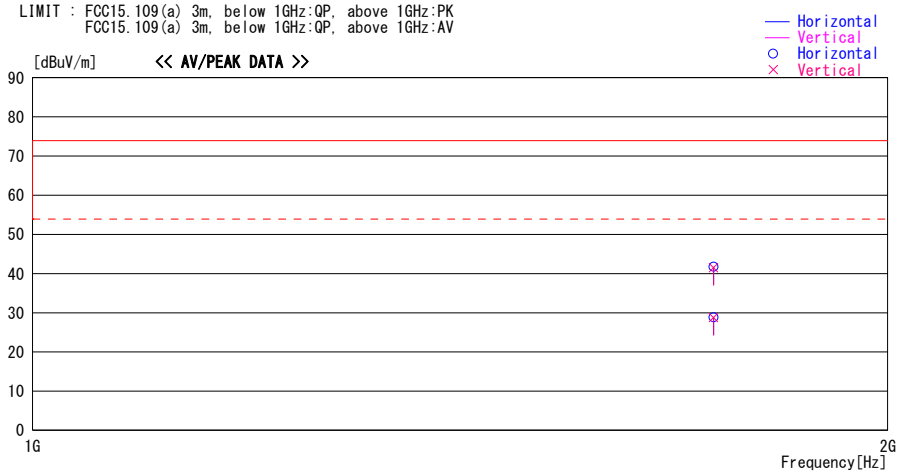
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1736.560 | 42.9 | PK | 26.4 | -27.6 | 41.7 | 0 | 100 | Hori. | 73.9 | 32.2 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1736.560 | 42.7 | PK | 26.4 | -27.6 | 41.5 | 0 | 100 | Vert. | 73.9 | 32.4 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 11 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

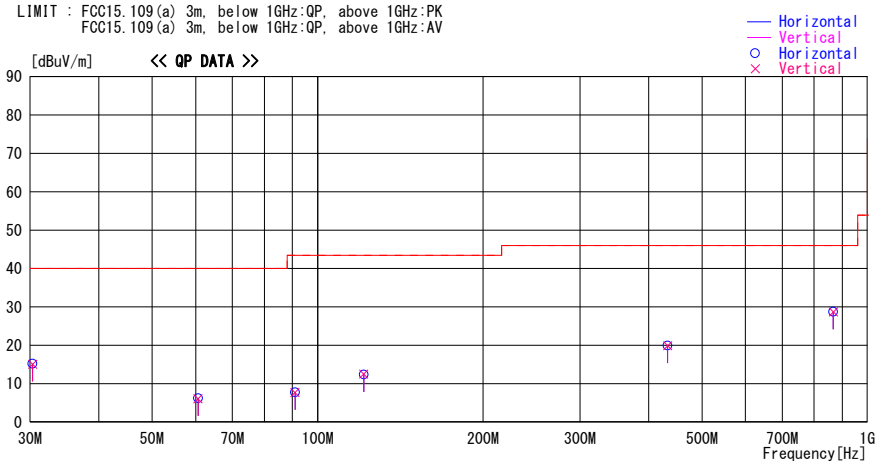
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.0 | QP | 17.1 | -25.0 | 15.1 | 0 | 100 | Vert. | 40.0 | 24.9 | No Signal |
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 300 | Hori. | 40.0 | 24.8 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 100 | Vert. | 43.5 | 35.8 | No Signal |
| 90.960 | 23.3 | QP | 8.5 | -24.1 | 7.7 | 0 | 300 | Hori. | 43.5 | 35.8 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.1 | QP | 12.9 | -23.6 | 12.4 | 0 | 300 | Hori. | 43.5 | 31.1 | No Signal |
| 433.300 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Vert. | 46.0 | 26.1 | No Signal |
| 433.300 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Hori. | 46.0 | 26.1 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Hori. | 46.0 | 17.3 | No Signal |
| 866.600 | 23.1 | QP | 23.8 | -18.2 | 28.7 | 0 | 100 | Vert. | 46.0 | 17.3 | No Signal |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 11 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

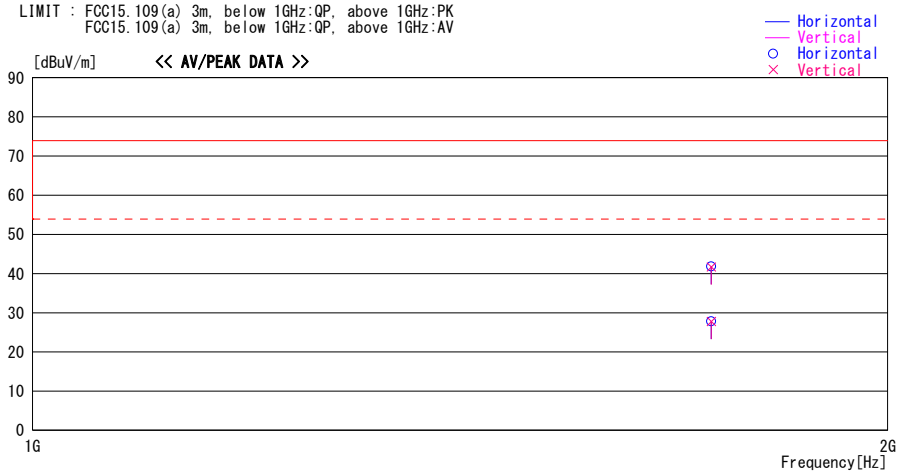
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz INT-ANT Worst axis (Hori:X, Ver:X)

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1733.200 | 43.0 | PK | 26.4 | -27.6 | 41.8 | 0 | 100 | Hori. | 73.9 | 32.1 | |
| 1733.200 | 29.0 | AV | 26.4 | -27.6 | 27.8 | 0 | 100 | Hori. | 53.9 | 26.1 | |
| 1733.200 | 42.9 | PK | 26.4 | -27.6 | 41.7 | 0 | 100 | Vert. | 73.9 | 32.2 | |
| 1733.200 | 29.0 | AV | 26.4 | -27.6 | 27.8 | 0 | 100 | Vert. | 53.9 | 26.1 | |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 11 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

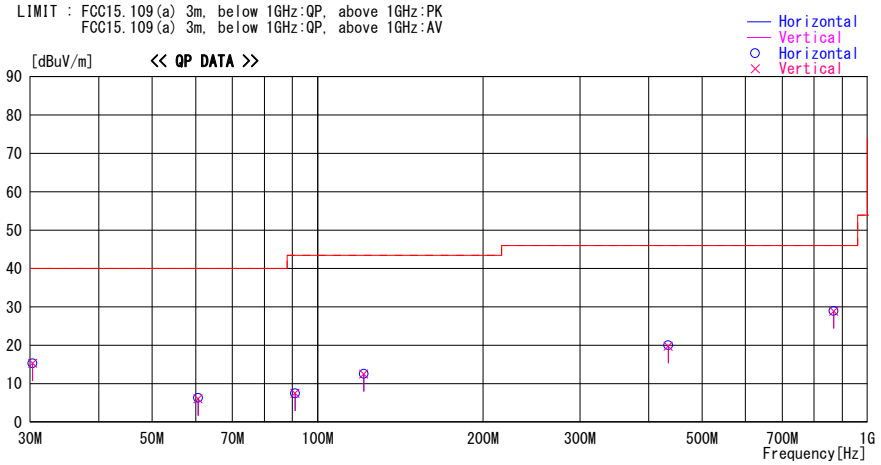
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 100 | Vert. | 40.0 | 24.7 | No Signal |
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 300 | Hori. | 40.0 | 24.7 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.3 | QP | 7.4 | -24.4 | 6.3 | 0 | 300 | Hori. | 40.0 | 33.7 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 100 | Vert. | 43.5 | 36.0 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 300 | Hori. | 43.5 | 36.0 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 300 | Hori. | 43.5 | 30.9 | No Signal |
| 434.140 | 22.1 | QP | 18.8 | -21.1 | 19.8 | 0 | 100 | Vert. | 46.0 | 26.2 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Hori. | 46.0 | 26.0 | No Signal |
| 868.280 | 23.2 | QP | 23.8 | -18.1 | 28.9 | 0 | 100 | Hori. | 46.0 | 17.1 | No Signal |
| 868.280 | 23.2 | QP | 23.8 | -18.1 | 28.9 | 0 | 100 | Vert. | 46.0 | 17.1 | No Signal |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 11 Internal Antenna
(Above 1GHz)

### DATA OF RADIATED EMISSION TEST

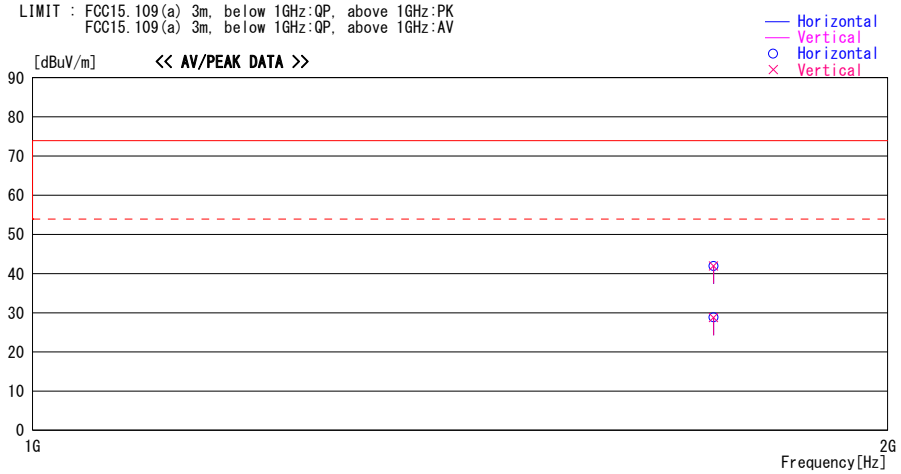
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz INT-ANT Worst axis (Hori:X, Ver:X)

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1736.560 | 43.1 | PK | 26.4 | -27.6 | 41.9 | 0 | 100 | Hori. | 73.9 | 32.0 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1736.560 | 43.2 | PK | 26.4 | -27.6 | 42.0 | 0 | 100 | Vert. | 73.9 | 31.9 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 14 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

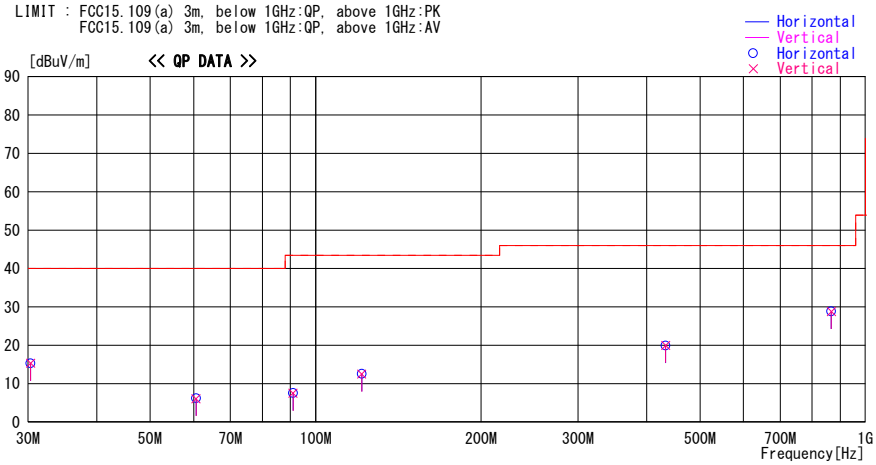
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 433.58MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 100 | Vert. | 40.0 | 24.7 | No Signal |
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 300 | Hori. | 40.0 | 24.7 | No Signal |
| 60.640 | 23.1 | QP | 7.4 | -24.4 | 6.1 | 0 | 100 | Vert. | 40.0 | 33.9 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 100 | Vert. | 43.5 | 36.0 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 300 | Hori. | 43.5 | 35.9 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 300 | Hori. | 43.5 | 30.9 | No Signal |
| 433.300 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 433.300 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Hori. | 46.0 | 26.1 | No Signal |
| 866.600 | 23.2 | QP | 23.8 | -18.2 | 28.8 | 0 | 100 | Hori. | 46.0 | 17.2 | No Signal |
| 866.600 | 23.2 | QP | 23.8 | -18.2 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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 (Reference data)

RKES (433.58MHz) Variation No. 14 Internal Antenna
(Above 1GHz)

### DATA OF RADIATED EMISSION TEST

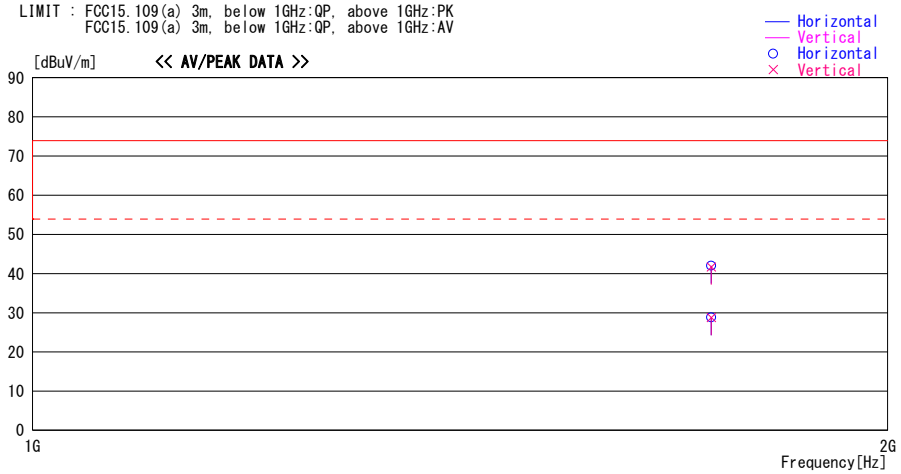
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 433.58MHz INT-ANT Worst axis (Hori:X, Ver:X)

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1733.200 | 43.2 | PK | 26.4 | -27.6 | 42.0 | 0 | 100 | Hori. | 73.9 | 31.9 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1733.200 | 42.9 | PK | 26.4 | -27.6 | 41.7 | 0 | 100 | Vert. | 73.9 | 32.2 | |
| 1733.200 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 14 Internal Antenna
(Below 1GHz)

## DATA OF RADIATED EMISSION TEST

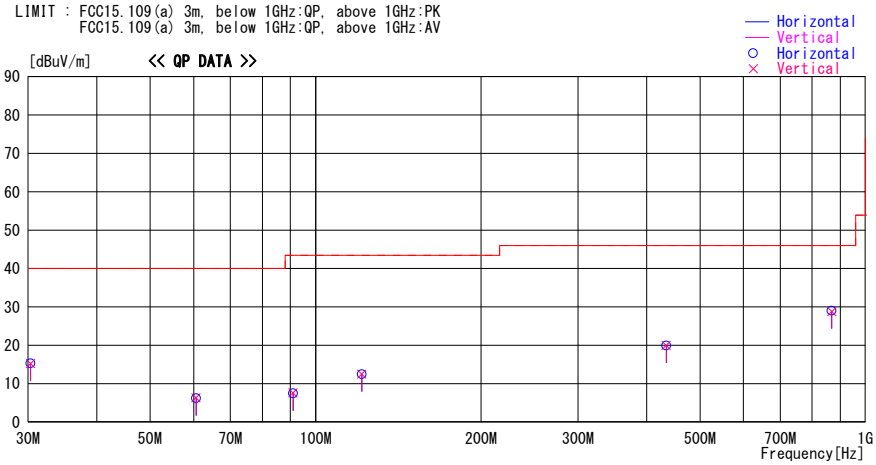
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 40% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : RKES Rx 434.42MHz Int-ANT Worst Axis Hori X Vert X

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




| Frequency [MHz] | Reading [dBuV] | DET | Antenna Factor [dB/m] | Loss& Gain [dB] | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.320 | 23.1 | QP | 17.1 | -25.0 | 15.2 | 0 | 100 | Vert. | 40.0 | 24.8 | No Signal |
| 30.320 | 23.2 | QP | 17.1 | -25.0 | 15.3 | 0 | 300 | Hori. | 40.0 | 24.7 | No Signal |
| 60.640 | 23.3 | QP | 7.4 | -24.4 | 6.3 | 0 | 100 | Vert. | 40.0 | 33.7 | No Signal |
| 60.640 | 23.2 | QP | 7.4 | -24.4 | 6.2 | 0 | 300 | Hori. | 40.0 | 33.8 | No Signal |
| 90.960 | 23.2 | QP | 8.5 | -24.1 | 7.6 | 0 | 100 | Vert. | 43.5 | 35.9 | No Signal |
| 90.960 | 23.1 | QP | 8.5 | -24.1 | 7.5 | 0 | 300 | Hori. | 43.5 | 36.0 | No Signal |
| 121.280 | 23.3 | QP | 12.9 | -23.6 | 12.6 | 0 | 100 | Vert. | 43.5 | 31.0 | No Signal |
| 121.280 | 23.2 | QP | 12.9 | -23.6 | 12.5 | 0 | 300 | Hori. | 43.5 | 31.0 | No Signal |
| 434.140 | 22.3 | QP | 18.8 | -21.1 | 20.0 | 0 | 100 | Vert. | 46.0 | 26.0 | No Signal |
| 434.140 | 22.2 | QP | 18.8 | -21.1 | 19.9 | 0 | 100 | Hori. | 46.0 | 26.1 | No Signal |
| 868.280 | 23.3 | QP | 23.8 | -18.1 | 29.0 | 0 | 100 | Hori. | 46.0 | 17.0 | No Signal |
| 868.280 | 23.1 | QP | 23.8 | -18.1 | 28.8 | 0 | 100 | Vert. | 46.0 | 17.2 | No Signal |

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

*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 (Reference data)

RKES (434.42MHz) Variation No. 14 Internal Antenna
(Above 1GHz)

## DATA OF RADIATED EMISSION TEST

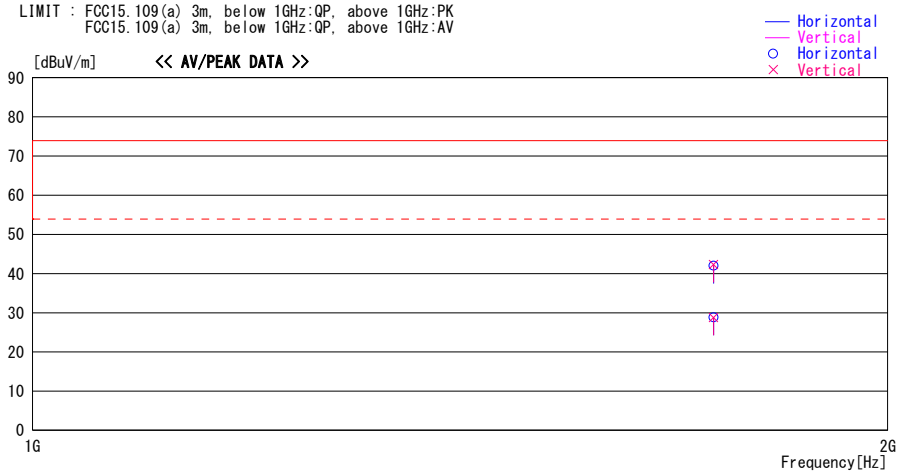
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2016/02/24

Report No. : 11158943H

Temp./Humi. : 25deg. C / 33% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : RKES Rx 434.42MHz INT-ANT Worst axis (Hori:X, Ver:X)

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] | |
| 1736.560 | 43.2 | PK | 26.4 | -27.6 | 42.0 | 0 | 100 | Hori. | 73.9 | 31.9 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Hori. | 53.9 | 25.1 | |
| 1736.560 | 43.5 | PK | 26.4 | -27.6 | 42.3 | 0 | 100 | Vert. | 73.9 | 31.6 | |
| 1736.560 | 30.0 | AV | 26.4 | -27.6 | 28.8 | 0 | 100 | Vert. | 53.9 | 25.1 | |

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

*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.


**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

# APPENDIX 2: Test instruments

**EMI test equipment**

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|---|
| MAEC-04 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2015/10/02 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | 1501 | RE | 2016/01/21 * 12 |
| MJM-26 | Measure | KOMELON | KMC-36 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE | - |
| MTR-01 | Test Receiver | Rohde & Schwarz | ESI40 | 100084 | RE | 2015/11/28 * 12 |
| MHA-21 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 9120D-557 | RE | 2015/08/10 * 12 |
| MCC-141 | Microwave Cable | Junkosha | MWX221 | 1305S002R(1m) / 1405S146(5m) | RE | 2015/06/22 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | 00650 | RE | 2015/10/01 * 12 |
| MMM-10 | DIGITAL HiTESTER | Hioki | 3805 | 051201148 | RE | 2016/01/18 * 12 |
| MBA-05 | Biconical Antenna | Schwarzbeck | BBA9106 | 1302 | RE | 2015/11/02 * 12 |
| MLA-08 | Logperiodic Antenna | Schwarzbeck | UKLP9140-A | N/A | RE | 2015/11/03 * 12 |
| MCC-50 | Coaxial Cable | UL Japan | - | - | RE | 2015/06/19 * 12 |
| MAT-68 | Attenuator | Anritsu | MP721B | 6200961025 | RE | 2015/11/12 * 12 |
| MPA-14 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260833 | RE | 2015/03/09 * 12 |
| MAEC-03 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | AT | 2015/10/01 * 12 |
| MOS-13 | Thermo-Hygrometer | Custom | CTH-180 | 1301 | AT | 2016/01/21 * 12 |
| MJM-16 | Measure | KOMELON | KMC-36 | - | AT | - |
| MSA-15 | Spectrum Analyzer | Agilent | E4440A | MY46187105 | AT | 2015/11/11 * 12 |
| MCC-51 | Coaxial cable | UL Japan | - | - | AT | 2015/07/13 * 12 |
| MAT-10 | Attenuator(10dB) | Weinschel Corp | 2 | BL1173 | AT | 2015/11/10 * 12 |
| MPA-13 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260834 | AT | 2015/03/10 * 12 |
| MMM-08 | DIGITAL HiTESTER | Hioki | 3805 | 051201197 | AT | 2016/01/13 * 12 |
| MCC-92 | Microwave Cable 1G-40GHz | Suhner | SUCOFLEX102 | 30813/2 | AT | 2015/05/01 * 12 |
| MCC-172 | Microwave Cable | Junkosha | MWX221 | 1409S495 | AT | 2015/03/04 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | 00650 | AT | 2015/10/01 * 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**
**AT: Antenna Terminal**