



EMI TEST REPORT

Test Report No. : 13053985H-B-R1

Applicant : NIDEC MOBILITY CORPORATION
(formerly OMRON Automotive Electronics Co. Ltd.)

Type of Equipment : ETACS

Model No. : GGM-M016

FCC ID : OUCGGM-M016

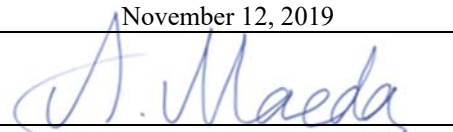
Test regulation : FCC Part 15 Subpart B: 2019

Test Result : Complied (Refer to SECTION 3.2)

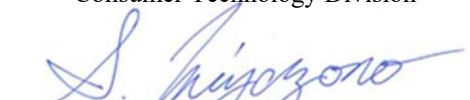
1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the US Government.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 13053985H-B. 13053985H-B is replaced with this report.

Date of test: November 12, 2019

Representative test engineer:


Akihiko Maeda
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/

- This report contains data that are not covered by the NVLAP accreditation.
- There is no testing item of "Non-accreditation".

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.: 13053985H-B

| Revision | Test report No. | Date | Page revised | Contents |
|-----------------|-----------------|-------------------|--------------|--|
| - (Original) | 13053985H-B | December 18, 2019 | - | - |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.1 | Correction of note 7. From: 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. To: 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 US Government. |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.1 | Correction of note for the application scope. From: The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan. To: This report contains data that are not covered by the NVLAP accreditation. |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.5 | Correction of erroneous description of SECTION 1; < Telephone Number > from +81-81-568-78-6394 to +81-568-78-6394 < Facsimile Number > from +81-81-568-78-6178 to +81-568-78-6178 |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.10 | Addition of the software information in Clause 4.1. |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.11 | Correction of the following cable name in "List of cables used" table in Clause 4.2; - Cable No.1: From DC Cable to DC and Signal Cable - Cable No.2: From Signal Cable to DC and Signal Cable |
| 1 | 13053985H-B-R1 | January 21, 2020 | P.12 | Correction of Distance factor calculation in Clause 5.4; From $20 \times \log(3.30\text{m} / 3 \text{ m}) = 4.9 \text{ dB}$ To $20 \times \log(3.30 \text{ m}^*/3.0 \text{ m}) = 0.83 \text{ dB}$ |

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

Reference: Abbreviations (Including words undescribed in this report)

| | | | |
|----------------|---|-------------|--|
| AAN | Asymmetric Artificial Network | ILAC | International Laboratory Accreditation Conference |
| AC | Alternating Current | ISED | Innovation, Science and Economic Development Canada |
| AM | Amplitude Modulation | ISN | Impedance Stabilization Network |
| AMN | Artificial Mains Network | ISO | International Organization for Standardization |
| Amp, AMP | Amplifier | JAB | Japan Accreditation Board |
| ANSI | American National Standards Institute | LAN | Local Area Network |
| Ant, ANT | Antenna | LCL | Longitudinal Conversion Loss |
| AP | Access Point | LIMS | Laboratory Information Management System |
| ASK | Amplitude Shift Keying | LISN | Line Impedance Stabilization Network |
| Atten., ATT | Attenuator | MRA | Mutual Recognition Arrangement |
| AV | Average | N/A | Not Applicable |
| BPSK | Binary Phase-Shift Keying | NIST | National Institute of Standards and Technology |
| BR | Bluetooth Basic Rate | NS | No signal detect. |
| BT | Bluetooth | NSA | Normalized Site Attenuation |
| BT LE | Bluetooth Low Energy | NVLAP | National Voluntary Laboratory Accreditation Program |
| BW | BandWidth | OBW | Occupied Band Width |
| C.F | Correction Factor | OFDM | Orthogonal Frequency Division Multiplexing |
| Cal Int | Calibration Interval | PK | Peak |
| CAV | CISPR AV | PLT | long-term flicker severity |
| CCK | Complementary Code Keying | POHC(A) | Partial Odd Harmonic Current |
| CDN | Coupling Decoupling Network | Pol., Pola. | Polarization |
| Ch., CH | Channel | PR-ASK | Phase Reversal ASK |
| CISPR | Comite International Special des Perturbations Radioelectriques | PST | short-term flicker severity |
| Corr. | Correction | QAM | Quadrature Amplitude Modulation |
| CPE | Customer premise equipment | QP | Quasi-Peak |
| CW | Continuous Wave | QPSK | Quadri-Phase Shift Keying |
| DBPSK | Differential BPSK | r.m.s., RMS | Root Mean Square |
| DC | Direct Current | RBW | Resolution Band Width |
| DET | Detector | RE | Radio Equipment |
| D-factor | Distance factor | REV | Reverse |
| Dmax | maximum absolute voltage change during an observation period | RF | Radio Frequency |
| DQPSK | Differential QPSK | RFID | Radio Frequency Identifier |
| DSSS | Direct Sequence Spread Spectrum | RSS | Radio Standards Specifications |
| EDR | Enhanced Data Rate | Rx | Receiving |
| e.i.r.p., EIRP | Equivalent Isotropically Radiated Power | SINAD | Ratio of (Signal + Noise + Distortion) to (Noise + Distortion) |
| EM clamp | Electromagnetic clamp | S/N | Signal to Noise ratio |
| EMC | ElectroMagnetic Compatibility | SA, S/A | Spectrum Analyzer |
| EMI | ElectroMagnetic Interference | SG | Signal Generator |
| EMS | ElectroMagnetic Susceptibility | SVSWR | Site-Voltage Standing Wave Ratio |
| EN | European Norm | THC(A) | Total Harmonic Current |
| e.r.p., ERP | Effective Radiated Power | THD(%) | Total Harmonic Distortion |
| EU | European Union | TR | Test Receiver |
| EUT | Equipment Under Test | Tx | Transmitting |
| Fac. | Factor | VBW | Video BandWidth |
| FCC | Federal Communications Commission | Vert. | Vertical |
| FHSS | Frequency Hopping Spread Spectrum | WLAN | Wireless LAN |
| FM | Frequency Modulation | xDSL | Generic term for all types of DSL technology (DSL: Digital Subscriber Line) |
| Freq. | Frequency | | |
| FSK | Frequency Shift Keying | | |
| Fund | Fundamental | | |
| FWD | Forward | | |
| GFSK | Gaussian Frequency-Shift Keying | | |
| GNSS | Global Navigation Satellite System | | |
| GPS | Global Positioning System | | |
| Hori. | Horizontal | | |
| ICES | Interference-Causing Equipment Standard | | |
| I/O | Input/Output | | |
| IEC | International Electrotechnical Commission | | |
| IEEE | Institute of Electrical and Electronics Engineers | | |
| IF | Intermediate Frequency | | |

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 information5
SECTION 2: Equipment under test (E.U.T.).....5
SECTION 3: Test specification, procedures & results7
SECTION 4: Operation of E.U.T. during testing.....10
SECTION 5: Radiated Emission.....12
APPENDIX 1: Test data14
 Radiated Emission14
APPENDIX 2: Test instruments16
APPENDIX 3: Photographs of test setup.....17
 Radiated Emission17
 Worst Case Position.....19

SECTION 1: Customer information

Company Name : NIDEC MOBILITY CORPORATION*¹⁾
Address : 6368 Nenjozaka, Okusa, komaki-City, Aichi-Prefecture 485-0802
JAPAN
Telephone Number : +81-568-78-6394
Facsimile Number : +81-568-78-6178
Contact Person : Yamasaki Kazushi

The information provided from the customer is as follows;

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

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

*1) The company name was changed from "OMRON Automotive Electronics Co. Ltd." to "NIDEC MOBILITY CORPORATION" on November 1, 2019.

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

2.1 Identification of E.U.T.

Type of Equipment : ETACS
Model No. : GGM-M016
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12.0 V
Receipt Date of Sample : November 5, 2019
(Information from test lab.)
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: GGM-M016 (referred to as the EUT in this report) is a ETACS.

This EUT is to lock and unlock doors (gate/trunk) by receiving RF signal output by the operation of the registered transmitter (remote transmitter, hereafter referred to as T/M).

Also, the immobilizer function for antitheft and remote engine starter function to start up/stop an engine by where the key is placed to start the engine.

Radio Specification

[Transmitter part] *1)

Radio Type : Transmitter
Frequency of Operation : 125 kHz
Modulation : ASK
Antenna type : Coil Antenna
Clock frequency (Maximum) : 8 MHz (inner = 32.00 MHz (4 multiple of 8 MHz))

[Receiver part]

Equipment Type : Receiver
Frequency of Operation : 315 MHz
Local clock frequency : 325.7 MHz (32 multiple of 10.178125 MHz)
Modulation : FSK
Antenna Type : Antenna type: Internal (L-shape antenna)

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

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B
FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

| Item | Test Procedure | Limits | Deviation | Worst margin | Result | Remarks |
|---|--|-------------------------------------|-----------|---|----------------|---------|
| Conducted emission | FCC: ANSI C63.4: 2014 7. AC power - line conducted emission measurements | FCC:Part 15 Subpart B 15.107(a) | N/A | N/A | N/A | *1) |
| | ISED: RSS-Gen 7.1 | ISED: RSS-Gen 7.2 | | | | |
| Radiated emission | FCC: ANSI C63.4: 2014 8. Radiated emission measurements | FCC: Part 15 Subpart B 15.109(a) | N/A | 13.41 dB 40.946 MHz, Vertical, QP | Complied a) | - |
| | ISED: RSS-Gen 7.1 | ISED: RSS-Gen 7.3 | | | | |
| Antenna Terminal | FCC: ANSI C63.4: 2014 12. Measurement of unintentional radiators other than ITE | FCC: Part 15 Subpart B 15.111(a) | N/A | N/A | N/A | *2) |
| | ISED: - RSS-Gen 7.1 | ISED: RSS-Gen 7.4 | | | | |
| *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. *2) The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). a) Refer to APPENDIX 1 (data of Radiated Emission) Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration. | | | | | | |

3.3 Addition to standard

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

3.4 Uncertainty

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

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

Radiated emission

| Measurement distance | Frequency range | Uncertainty (+/-) |
|----------------------|---|-------------------|
| 3 m | 30 MHz to 200 MHz (Horizontal) (Vertical) | 4.8 dB |
| | | 5.0 dB |
| | 200 MHz to 1000 MHz (Horizontal) (Vertical) | 5.2 dB |
| | | 6.3 dB |
| 10 m | 30 MHz to 200 MHz (Horizontal) (Vertical) | 4.8 dB |
| | | 4.8 dB |
| | 200 MHz to 1000 MHz (Horizontal) (Vertical) | 5.0 dB |
| | | 5.0 dB |
| 3 m | 1 GHz to 6 GHz | 4.9 dB |
| | 6 GHz to 18 GHz | 5.2 dB |
| 1 m | 10 GHz to 26.5 GHz | 5.5 dB |
| | 26.5 GHz to 40 GHz | 5.5 dB |
| 10 m | 1 GHz to 18 GHz | 5.2 dB |

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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

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

| Test site | 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 | 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 | 7.5 x 5.8 x 5.2 | 4.0 x 4.0 | - | 3 m |
| No.3 semi-anechoic chamber | 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 | 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.5 measurement room | 6.4 x 6.4 x 3.0 | 6.4 x 6.4 | - | - |
| No.6 shielded room | 4.0 x 4.5 x 2.7 | 4.0 x 4.5 | - | - |
| No.6 measurement room | 4.75 x 5.4 x 3.0 | 4.75 x 4.15 | - | - |
| No.7 shielded room | 4.7 x 7.5 x 2.7 | 4.7 x 7.5 | - | - |
| No.8 measurement room | 3.1 x 5.0 x 2.7 | 3.1 x 5.0 | - | - |
| No.9 measurement room | 8.8 x 4.6 x 2.8 | 2.4 x 2.4 | - | - |
| No.11 measurement room | 6.2 x 4.7 x 3.0 | 4.8 x 4.6 | - | - |

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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.

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

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

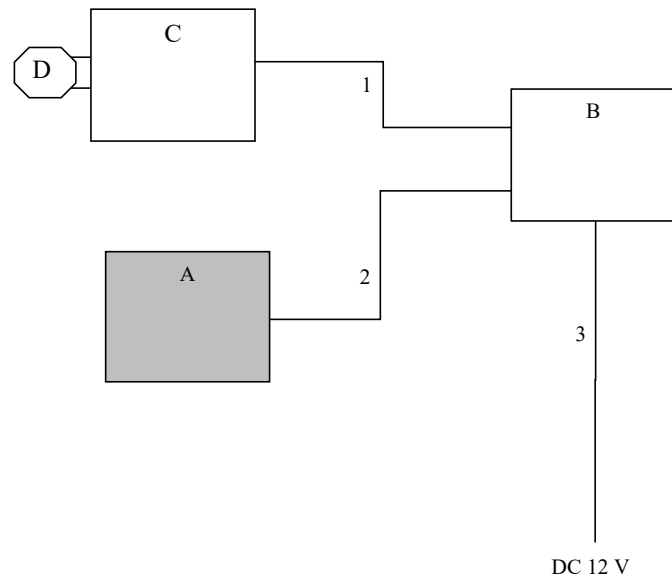
4.1 Operating Mode(s)

| Mode | Remarks |
|--|---------|
| 1) Receiving mode (315.0 MHz) | - |
| *EUT was set by the software as follows; Software: ETACS 3V00 Version 00.02.15.FF | |

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

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

4.2 Configuration and peripherals



- * Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
- *Item No. A includes Receiver Antenna.
- * Item A and Item C are directly connected in Item B.

Description of EUT and Support equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|----------------------------------|--------------|---------------|----------------------------|---------|
| A | ETACS | GGM-M016 | No.2 | NIDEC MOBILITY CORPORATION | EUT |
| B | Control Box | - | - | | - |
| C | Key Cylinder (with Antenna Coil) | - | No.1 | - | - |
| D | Transmitter with Immobilizer | J166N | No.1 | NIDEC MOBILITY CORPORATION | - |

List of cables used

| No. | Name | Length (m) | Shield | | Remarks |
|-----|---------------------|------------|------------|------------|---------|
| | | | Cable | Connector | |
| 1 | DC and Signal Cable | 0.4 | Unshielded | Unshielded | - |
| 2 | DC and Signal Cable | 2.6 | Unshielded | Unshielded | - |
| 3 | DC Cable | 2.0 | Unshielded | Unshielded | - |

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

SECTION 5: Radiated Emission

5.1. Operating environment

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

5.2. Test configuration

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

The EUT was set on the edge of the tabletop.

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

Photographs of the set up are shown in Appendix 3.

5.3. Test conditions

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

5.4. Test procedure

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver.

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

For above 1 GHz, test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

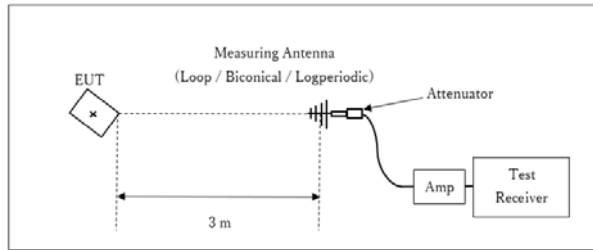
| | | |
|-----------------|----------------|----------------------------------|
| Frequency | Below 1GHz | Above 1GHz *1) |
| Instrument used | Test Receiver | Test Receiver |
| IF Bandwidth | QP: BW 120 kHz | PK: BW 1 MHz, CISPR AV: BW 1 MHz |

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

Distance Factor: $20 \times \log(3.30 \text{ m}^*/3.0 \text{ m}) = 0.83 \text{ dB}$

Figure 2: Test Setup

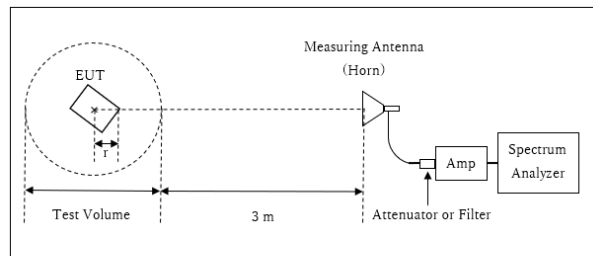
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 2 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor: $20 \times \log(3.30 \text{ m}^*/3.0 \text{ m}) = 0.83 \text{ dB}$

* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.30 \text{ m}$

Test Volume: 2 m

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

$r = 0.70 \text{ m}$

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

5.5. Test result

Summary of the test results: Pass

The limit is rounded down to one decimal place.

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

Date: November 12, 2019

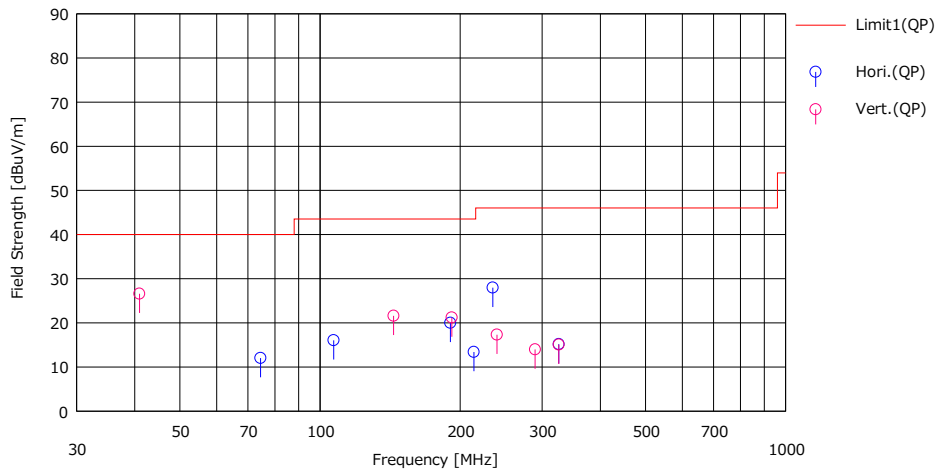
Test engineer: Akihiko Maeda

APPENDIX 1: Test data

Radiated Emission

Report No. 13053985H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date November 12, 2019
Temperature / Humidity 22 deg. C / 43 % RH
Engineer Akihiko Maeda
(Below 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



| No. | Freq. [MHz] | Reading | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | Margn | Pol.a. [H/V] | Height [cm] | Angle [deg] | Ant. Type | Comment |
|-----|----------------|---------|--------------------|--------------|--------------|--------|-------|-------|-----------------|----------------|----------------|--------------|---------|
| | | (QP) | | | | (QP) | (QP) | (QP) | | | | | |
| 1 | 74.534 | 30.00 | 6.45 | 7.76 | 32.19 | 12.02 | 40.00 | 27.98 | Hori. | 225 | 132 | BA | |
| 2 | 106.998 | 28.80 | 11.23 | 8.16 | 32.14 | 16.05 | 43.50 | 27.45 | Hori. | 302 | 354 | BA | |
| 3 | 190.538 | 26.50 | 16.52 | 9.03 | 32.05 | 20.00 | 43.50 | 23.50 | Hori. | 262 | 352 | BA | |
| 4 | 213.995 | 25.10 | 11.07 | 9.25 | 32.02 | 13.40 | 43.50 | 30.10 | Hori. | 224 | 343 | LA22 | |
| 5 | 234.988 | 39.20 | 11.34 | 9.42 | 32.00 | 27.96 | 46.00 | 18.04 | Hori. | 211 | 145 | LA22 | |
| 6 | 325.700 | 22.60 | 14.33 | 10.15 | 31.93 | 15.15 | 46.00 | 30.85 | Hori. | 100 | 0 | LA22 | |
| 7 | 40.946 | 37.10 | 14.46 | 7.23 | 32.20 | 26.59 | 40.00 | 13.41 | Vert. | 100 | 99 | BA | |
| 8 | 143.933 | 30.40 | 14.70 | 8.58 | 32.10 | 21.58 | 43.50 | 21.92 | Vert. | 100 | 85 | BA | |
| 9 | 191.908 | 27.70 | 16.51 | 9.04 | 32.05 | 21.20 | 43.50 | 22.30 | Vert. | 100 | 208 | BA | |
| 10 | 239.966 | 28.30 | 11.53 | 9.47 | 31.99 | 17.31 | 46.00 | 28.69 | Vert. | 100 | 252 | LA22 | |
| 11 | 289.768 | 22.60 | 13.42 | 9.88 | 31.93 | 13.97 | 46.00 | 32.03 | Vert. | 100 | 359 | LA22 | |
| 12 | 325.700 | 22.50 | 14.33 | 10.15 | 31.93 | 15.05 | 46.00 | 30.95 | Vert. | 100 | 0 | LA22 | |

* Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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(CABLE + ATT) - GAIN(AMP)

UL Japan, Inc.

Ise EMC Lab.

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

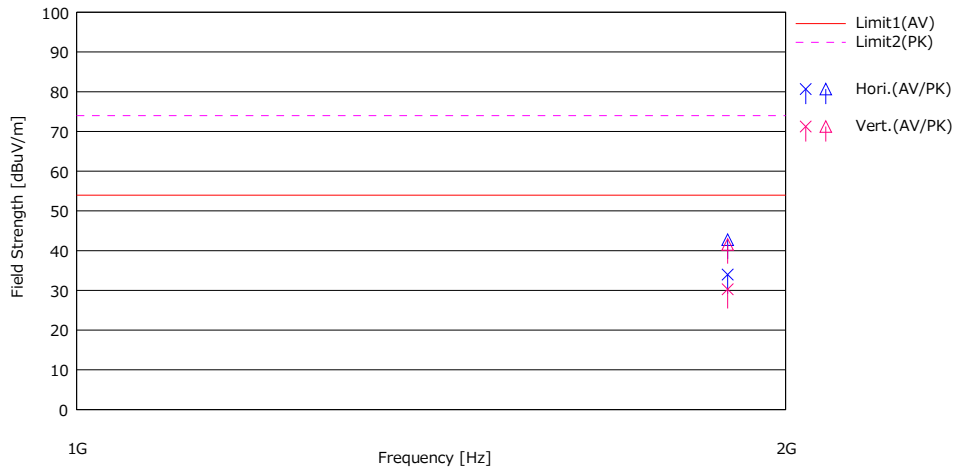
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Emission

Report No. 13053985H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date November 12, 2019
Temperature / Humidity 22 deg. C / 43 % RH
Engineer Akihiko Maeda
(Above 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



| No. | Freq. [MHz] | Reading | | Ant.Fac [dB/m] | Loss [dB] | Gain [dB] | Result | | Limit | | Margin | | Pola [H/V] | Height [cm] | Angle [deg] | Ant. Type | Comment |
|-----|----------------|----------------|----------------|-------------------|--------------|--------------|------------------|------------------|------------------|------------------|--------------|--------------|---------------|----------------|----------------|--------------|---------|
| | | (AV) [dBuV] | (PK) [dBuV] | | | | (AV) [dBuV/m] | (PK) [dBuV/m] | (AV) [dBuV/m] | (PK) [dBuV/m] | (AV) [dB] | (PK) [dB] | | | | | |
| 1 | 1889.786 | 38.60 | 47.40 | 25.60 | 2.97 | 33.20 | 33.97 | 42.77 | 54.00 | 74.00 | 20.03 | 31.23 | Hori. | 270 | 121 | H20 | |
| 2 | 1889.786 | 34.90 | 46.20 | 25.60 | 2.97 | 33.20 | 30.27 | 41.57 | 54.00 | 74.00 | 23.73 | 32.43 | Vert. | 243 | 9 | H20 | |

* Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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(CABLE + D-factor) - 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

APPENDIX 2: Test instruments

Test Instruments

| Test Item | LIMS ID | Description | Manufacturer | Model | Serial | Last Calibration Date | Calibration Due Date | Cal Int |
|-----------|---------|----------------------------------|-------------------|--------------------------|-------------------------------|-----------------------|----------------------|---------|
| RE | 142008 | AC3_Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | 06/26/2018 | 06/30/2020 | 24 |
| RE | 178648 | EMI measurement program | TSJ | TEPTO-DV | - | - | - | - |
| RE | 142013 | AC3_Semi Anechoic Chamber(SVSWR) | TDK | Semi Anechoic Chamber 3m | DA-10005 | 04/08/2019 | 04/30/2021 | 24 |
| RE | 141532 | DIGITAL HiTESTER | HIOKI | 3805 | 51201197 | 01/29/2019 | 01/31/2020 | 12 |
| RE | 141554 | Thermo-Hygrometer | CUSTOM | CTH-180 | 1301 | 01/11/2019 | 01/31/2020 | 12 |
| RE | 141582 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260834 | 02/08/2019 | 02/29/2020 | 12 |
| RE | 142183 | Measure | KOMELON | KMC-36 | - | - | - | - |
| RE | 177964 | Microwave Cable | Junkosha INC. | MMX221 | 1901S329(1m)/ 1902S579(5m) | 03/05/2019 | 03/31/2020 | 12 |
| RE | 141266 | Logperiodic Antenna(200-1000MHz) | Schwarzbeck | VUSLP9111B | 9111B-191 | 08/24/2019 | 08/31/2020 | 12 |
| RE | 141507 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 258 | 09/26/2019 | 09/30/2020 | 12 |
| RE | 141580 | MicroWave System Amplifier | AGILENT | 83017A | MY39500779 | 03/05/2019 | 03/31/2020 | 12 |
| RE | 142314 | Attenuator | Pasternack | PE7390-6 | D/C 1504 | 06/11/2019 | 06/30/2020 | 12 |
| RE | 141424 | Biconical Antenna | Schwarzbeck | VHA9103+BBA9106 | 1915 | 08/24/2019 | 08/31/2020 | 12 |
| RE | 141323 | Coaxial cable | UL Japan | - | - | 07/02/2019 | 07/31/2020 | 12 |
| RE | 141950 | EMI Test Receiver | Rohde & Schwarz | ESU26 | 100412 | 06/27/2019 | 06/30/2020 | 12 |

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

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

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

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

Test item:

RE: Radiated emission

UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124