



RADIO TEST REPORT

Test Report No. : 11796130H

Applicant : DENSO CORPORATION

Type of Equipment : Remote Keyless Entry System (Transmitter)

Model No. : 12BFW

Test regulation : FCC Part 15 Subpart C: 2017

FCC ID : HYQ12BFW

Test Result : Complied

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

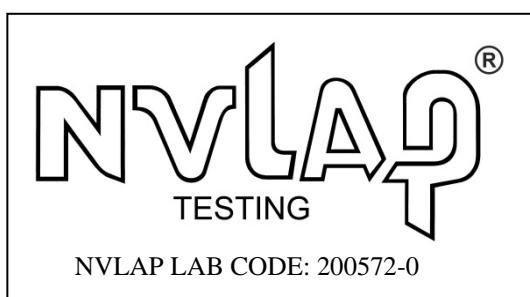
Date of test: June 13, 2017

Representative test engineer: S. Ohyama

Shuichi Ohyama
Engineer
Consumer Technology Division

Approved by: M. Imura

Motoya Imura
Engineer
Consumer Technology Division



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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11796130H

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SECTION 1: Customer information

Company Name : DENSO CORPORATION
Address : 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number : +81-566-61-7252
Facsimile Number : +81-566-25-4837
Contact Person : HIROMICHI HANAI

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

2.1 Identification of E.U.T.

Type of Equipment : Remote Keyless Entry System (Transmitter)
Model No. : 12BFW
Serial No. : Refer to Clause 4.2
Rating : DC 3.0 V
Receipt Date of Sample : June 13, 2017
Country of Mass-production : Japan, United States of America, China
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model No: 12BFW (referred to as the EUT in this report) is the Remote Keyless Entry System (Transmitter).

Radio Type : Transmitter
Frequency of Operation : 314.35 MHz / 312.10 MHz*
*These two different frequencies are not emitted simultaneously.
Clock frequency(ies) in the system : 33.6 MHz Crystal
Modulation : FSK (F1D)
Power Supply (radio part input) : DC 3.0 V
Type of Battery : One lithium battery
Antenna type : Built-in type (Fixed)

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
 FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.231 Periodic operation in the band 40.66 - 40.70MHz
 and above 70MHz

* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|--|--|---|----------|----------|
| Conducted emission | FCC: ANSI C63.10:2013 6 Standard test methods IC: RSS-Gen 8.8 | FCC: Section 15.207 IC: RSS-Gen 8.8 | N/A | N/A*1) | - |
| Automatically Deactivate | FCC: ANSI C63.10:2013 6 Standard test methods IC: - | FCC: Section 15.231(a)(1) IC: RSS-210 A1.1 | N/A | Complied | Radiated |
| Electric Field Strength of Fundamental Emission | FCC: ANSI C63.10:2013 6 Standard test methods IC: RSS-Gen 6.12 | FCC: Section 15.231(b) IC: RSS-210 A1.2 | 5.5 dB Horizontal PK with Duty factor (Tx 314.35 MHz) | Complied | Radiated |
| Electric Field Strength of Spurious Emission | FCC: ANSI C63.10:2013 6 Standard test methods IC: RSS-Gen 6.13 | FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.2, 4.4 RSS-Gen 8.9 | 7.6 dB 1571.750 MHz Horizontal PK with Duty factor (Tx 314.35 MHz) | Complied | Radiated |
| -20dB Bandwidth | FCC: ANSI C63.10:2013 6 Standard test methods IC: - | FCC: Section 15.231(c) IC: Reference data | N/A | Complied | Radiated |

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

*1) The test is not applicable since the EUT does not have AC Mains.

FCC 15.31 (e)

This test was performed with the New Battery (DC 3.0 V) during the tests. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|-------------------------|-----------------|--------------------|--------------|----------|----------|
| 99 % Occupied Bandwidth | IC: RSS-Gen 6.6 | IC: RSS-210 A1.1.3 | N/A | Complied | Radiated |

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

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

| Polarity | Radiated emission (Below 1 GHz) | | | |
|------------|---------------------------------|-----------------------|---------------------|-----------------------|
| | (3 m*)(+/-) | | (10 m*)(+/-) | |
| | 30 MHz - 200 MHz | 200 MHz - 1000 MHz | 30 MHz - 200 MHz | 200 MHz - 1000 MHz |
| Horizontal | 5.0 dB | 5.3 dB | 5.0 dB | 5.0 dB |
| Vertical | 4.7 dB | 5.9 dB | 5.0 dB | 5.1 dB |

| Radiated emission (Above 1 GHz) | | | | |
|---------------------------------|----------------|----------------------|----------------------|---------------|
| (3 m*)(+/-) | | (1 m*)(+/-) | | (10 m*)(+/-) |
| 1 GHz - 6 GHz | 6 GHz - 18 GHz | 10 GHz - 26.5 GHz | 26.5 GHz - 40 GHz | 1 GHz -18 GHz |
| 5.2 dB | 5.4 dB | 5.5 dB | 5.5 dB | 5.4 dB |

* Measurement distance

Radiated emission test(3 m)

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

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3.5 Test Location

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| | 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 | - | 8.0 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.

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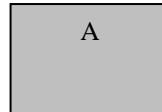
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SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

| Test Item | Mode |
|---|--|
| Automatically Deactivate | Normal use mode, 312.10 MHz Normal use mode, 314.35 MHz |
| Electric Field Strength of Fundamental Emission | Transmitting mode (Tx), 312.10 MHz |
| Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth | Transmitting mode (Tx), 314.35 MHz |
| * The system was configured in typical fashion (as a customer would normally use it) for testing. | |

4.2 Configuration and peripherals



* Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|---|--------------|--------------------|-------------------|---------|
| A | Remote Keyless Entry System (Transmitter) | 12BFW | 002 *1) 001 *2) | DENSO CORPORATION | EUT |

*1) Used for Normal use mode only.

*2) Used for Transmitting mode only.

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SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

Test Procedure and conditions

[For below 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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.

[Transmitting mode]

(Below 30 MHz)

The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

(Above 30 MHz)

The Radiated Electric Field Strength has been measured on Semi anechoic chamber with a ground plane and at a distance of 3 m.

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

The measurements were performed for both vertical and horizontal antenna polarization.

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

Test Antennas are used as below;

| Frequency | Below 30 MHz | 30 MHz to 200 MHz | 200 MHz to 1 GHz | Above 1 GHz |
|--------------|--------------|-------------------|------------------|-------------|
| Antenna Type | Loop | Biconical | Logperiodic | Horn |

| | From 9 kHz to 90 kHz and From 110 kHz to 150 kHz | From 90 kHz to 110 kHz | From 150 kHz to 490 kHz | From 490 kHz to 30 MHz | From 30 MHz to 1 GHz | Above 1 GHz |
|---------------|--|------------------------|-------------------------|------------------------|--------------------------------|--------------------------------|
| Detector Type | Peak | Peak | Peak | Peak | Peak and Peak with Duty factor | Peak and Peak with Duty factor |
| IF Bandwidth | 200 Hz | 200 Hz | 9.1 kHz | 9.1 kHz | 120 kHz | PK: S/A: RBW 1 MHz, VBW: 3 MHz |

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

Noise levels of all the frequencies were measured at the position.

- This EUT has two modes which mechanical key is folded in or out. The worst case was confirmed that mechanical key is folded in or out, as a result, the test which mechanical key was folded in was the worst case. Therefore the test was performed under the worst condition.

*The result is rounded off to the second decimal place, so some differences might be observed.

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Measurement range : 9 kHz - 3.2 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Automatically deactivate

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

Test data : APPENDIX
Test result : Pass

SECTION 7: -20 dB and 99 % Occupied Bandwidth

Test Procedure

The test was measured with a spectrum analyzer using a test fixture.

| Test | Span | RBW | VBW | Sweep | Detector | Trace | Instrument used |
|--|---|-----------------|--------------------|-------|----------|----------|-------------------|
| 20 dB Bandwidth | 150 kHz | 1.5 kHz | 5.1 kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99 % Occupied Bandwidth | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| Peak hold was applied as Worst-case measurement. | | | | | | | |

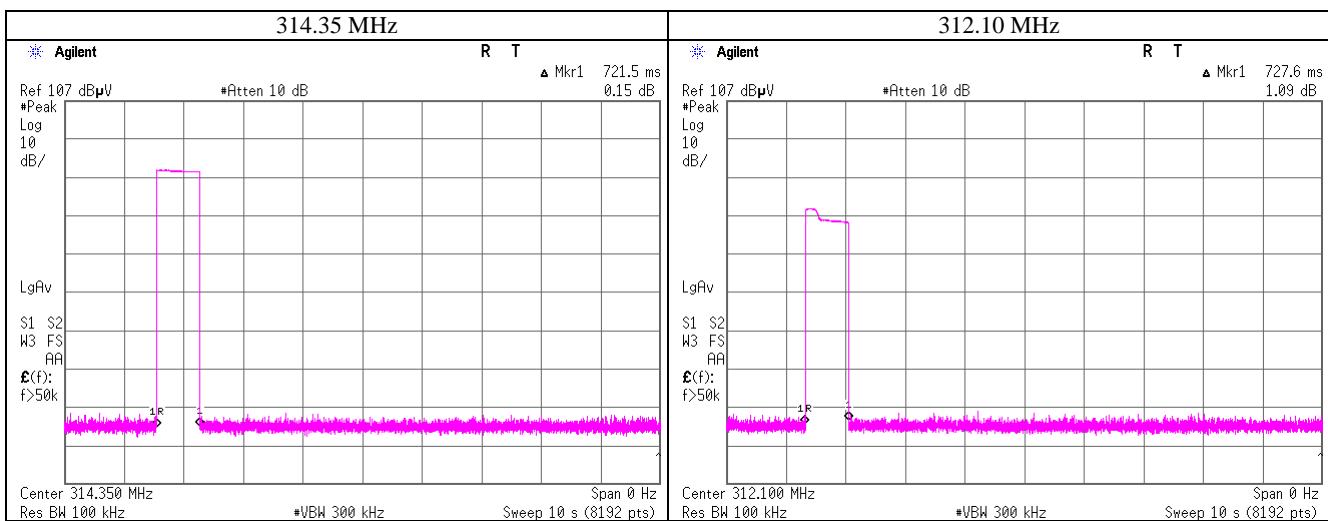
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Automatically deactivate

Test place Ise EMC Lab. No.3 Measurement Room
 Report No. 11796130H
 Date 06/13/2017
 Temperature/ Humidity 23 deg. C / 42% RH
 Engineer Shuichi Ohyama
 Mode Normal use mode

| Tx Freq | Time of Transmitting [sec] | Limit [sec] | Result |
|------------|----------------------------|-------------|--------|
| 314.35 MHz | 0.7215 | 5.00 | Pass |
| 312.10 MHz | 0.7276 | 5.00 | Pass |



* The test was performed by a button-pressed operation as representative, because the EUT transmits UHF when LF signal is received from a car or a button on the EUT is pressed, and the UHF transmission is stopped within 5 seconds even when receiving request signal.

Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
 Report No. 11796130H
 Date 06/13/2017
 Temperature/ Humidity 23 deg. C / 42% RH
 Engineer Shuichi Ohyama
 Mode Transmitting mode 314.35 MHz

PK

| Frequency [MHz] | Detector | Reading [dBuV] | | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Result [dBuV/m] | | Limit [dBuV/m] | Margin [dB] | | Remark Inside or Outside of Restricted Bands |
|--------------------|----------|-------------------|------|-------------------------|--------------|--------------|------------------------|--------------------|------|-------------------|----------------|------|--|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver | |
| | | 314.350 | PK | 78.1 | 73.9 | 13.8 | 10.1 | 32.0 | - | 70.0 | 65.8 | 95.5 | 25.5 |
| 628.700 | PK | 31.3 | 30.7 | 19.2 | 12.1 | 32.1 | - | 30.5 | 29.9 | 75.5 | 45.0 | 45.6 | Outside |
| 943.050 | PK | 37.0 | 32.1 | 22.2 | 13.6 | 30.8 | - | 42.0 | 37.1 | 75.5 | 33.5 | 38.4 | Outside |
| 1257.400 | PK | 48.3 | 47.5 | 25.2 | 7.2 | 34.3 | - | 46.4 | 45.6 | 75.5 | 29.1 | 29.9 | Outside |
| 1571.750 | PK | 47.2 | 46.9 | 25.8 | 6.8 | 33.5 | - | 46.3 | 46.0 | 73.9 | 27.6 | 27.9 | Inside |
| 1886.100 | PK | 43.4 | 44.0 | 26.6 | 6.7 | 32.9 | - | 43.8 | 44.4 | 75.5 | 31.7 | 31.1 | Outside |
| 2200.450 | PK | 42.7 | 43.6 | 27.3 | 6.8 | 32.5 | - | 44.3 | 45.2 | 73.9 | 29.6 | 28.7 | Inside |
| 2514.800 | PK | 42.5 | 42.7 | 27.9 | 6.9 | 32.4 | - | 44.9 | 45.1 | 75.5 | 30.6 | 30.4 | Outside |
| 2829.150 | PK | 42.2 | 42.4 | 28.7 | 7.0 | 32.2 | - | 45.7 | 45.9 | 73.9 | 28.2 | 28.0 | Inside |
| 3143.500 | PK | 41.3 | 41.6 | 29.2 | 7.1 | 32.1 | - | 45.5 | 45.8 | 75.5 | 30.0 | 29.7 | Outside |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Anmpifier)

PK with Duty factor

| Frequency [MHz] | Detector | Reading [dBuV] | | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Result [dBuV/m] | | Limit [dBuV/m] | Margin [dB] | | Remark |
|--------------------|----------|-------------------|------|-------------------------|--------------|--------------|------------------------|--------------------|------|-------------------|----------------|------|---------|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver | |
| | | 314.350 | PK | 78.1 | 73.9 | 13.8 | 10.1 | 32.0 | 0.0 | 70.0 | 65.8 | 75.5 | 5.5 |
| 628.700 | PK | 31.3 | 30.7 | 19.2 | 12.1 | 32.1 | 0.0 | 30.5 | 29.9 | 55.5 | 25.0 | 25.6 | Outside |
| 943.050 | PK | 37.0 | 32.1 | 22.2 | 13.6 | 30.8 | 0.0 | 42.0 | 37.1 | 55.5 | 13.5 | 18.4 | Outside |
| 1257.400 | PK | 48.3 | 47.5 | 25.2 | 7.2 | 34.3 | 0.0 | 46.4 | 45.6 | 55.5 | 9.1 | 9.9 | Outside |
| 1571.750 | PK | 47.2 | 46.9 | 25.8 | 6.8 | 33.5 | 0.0 | 46.3 | 46.0 | 53.9 | 7.6 | 7.9 | Inside |
| 1886.100 | PK | 43.4 | 44.0 | 26.6 | 6.7 | 32.9 | 0.0 | 43.8 | 44.4 | 55.5 | 11.7 | 11.1 | Outside |
| 2200.450 | PK | 42.7 | 43.6 | 27.3 | 6.8 | 32.5 | 0.0 | 44.3 | 45.2 | 53.9 | 9.6 | 8.7 | Inside |
| 2514.800 | PK | 42.5 | 42.7 | 27.9 | 6.9 | 32.4 | 0.0 | 44.9 | 45.1 | 55.5 | 10.6 | 10.4 | Outside |
| 2829.150 | PK | 42.2 | 42.4 | 28.7 | 7.0 | 32.2 | 0.0 | 45.7 | 45.9 | 53.9 | 8.2 | 8.0 | Inside |
| 3143.500 | PK | 41.3 | 41.6 | 29.2 | 7.1 | 32.1 | 0.0 | 45.5 | 45.8 | 55.5 | 10.0 | 9.7 | Outside |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Anmpifier) + Duty factor

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

Sample calculation:

Result of PK = Reading + Ant Factor + Loss (Cable + Attenuator +Filter) - Gain (Amplifier)

Result of PK with Duty factor = Reading + Ant Factor + Loss (Cable + Attenuator + Filter) - Gain (Amplifier) + Duty factor

For above 1GHz : Distance Factor: $20 \times \log (4.5 \text{ m} / 3.0 \text{ m}) = 3.52 \text{ dB}$

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

Since the peak emission result satisfied the average limit, duty factor was omitted.

The result of AV (PK with Duty factor) was calculated by applying Duty 100%.

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Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
 Report No. 11796130H
 Date 06/13/2017
 Temperature/ Humidity 23 deg. C / 42% RH
 Engineer Shuichi Ohyama
 Mode Transmitting mode 312.10 MHz

PK

| Frequency [MHz] | Detector | Reading [dBuV] | | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Result [dBuV/m] | | Limit [dBuV/m] | Margin [dB] | | Remark Inside or Outside of Restricted Bands |
|--------------------|----------|-------------------|------|-------------------------|--------------|--------------|------------------------|--------------------|------|-------------------|----------------|------|--|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver | |
| | | 312.100 | PK | 77.7 | 73.5 | 13.7 | 10.1 | 32.0 | - | 69.5 | 65.3 | 95.4 | 25.9 |
| 624.200 | PK | 30.0 | 30.8 | 19.2 | 12.0 | 32.1 | - | 29.1 | 29.9 | 75.4 | 46.3 | 45.5 | Outside |
| 936.300 | PK | 36.2 | 32.7 | 22.2 | 13.6 | 30.8 | - | 41.2 | 37.7 | 75.4 | 34.2 | 37.7 | Outside |
| 1248.400 | PK | 47.7 | 47.0 | 25.2 | 7.2 | 34.3 | - | 45.8 | 45.1 | 75.4 | 29.6 | 30.3 | Outside |
| 1560.500 | PK | 46.5 | 46.7 | 25.8 | 6.8 | 33.5 | - | 45.6 | 45.8 | 73.9 | 28.3 | 28.1 | Inside |
| 1872.600 | PK | 43.8 | 44.7 | 26.6 | 6.7 | 32.9 | - | 44.2 | 45.1 | 75.4 | 31.2 | 30.3 | Outside |
| 2184.700 | PK | 42.5 | 43.7 | 27.3 | 6.8 | 32.5 | - | 44.1 | 45.3 | 75.4 | 31.3 | 30.1 | Outside |
| 2496.800 | PK | 42.6 | 42.6 | 27.8 | 6.9 | 32.4 | - | 44.9 | 44.9 | 73.9 | 29.0 | 29.0 | Inside |
| 2808.900 | PK | 42.1 | 42.2 | 28.6 | 7.0 | 32.2 | - | 45.5 | 45.6 | 73.9 | 28.4 | 28.3 | Inside |
| 3121.000 | PK | 41.2 | 41.1 | 29.2 | 7.1 | 32.1 | - | 45.4 | 45.3 | 75.4 | 30.0 | 30.1 | Outside |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Anmpifier)

PK with Duty factor

| Frequency [MHz] | Detector | Reading [dBuV] | | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Result [dBuV/m] | | Limit [dBuV/m] | Margin [dB] | | Remark |
|--------------------|----------|-------------------|------|-------------------------|--------------|--------------|------------------------|--------------------|------|-------------------|----------------|------|---------|
| | | Hor | Ver | | | | | Hor | Ver | | Hor | Ver | |
| | | 312.100 | PK | 77.7 | 73.5 | 13.7 | 10.1 | 32.0 | 0.0 | 69.5 | 65.3 | 75.4 | 5.9 |
| 624.200 | PK | 30.0 | 30.8 | 19.2 | 12.0 | 32.1 | 0.0 | 29.1 | 29.9 | 55.4 | 26.3 | 25.5 | Outside |
| 936.300 | PK | 36.2 | 32.7 | 22.2 | 13.6 | 30.8 | 0.0 | 41.2 | 37.7 | 55.4 | 14.2 | 17.7 | Outside |
| 1248.400 | PK | 47.7 | 47.0 | 25.2 | 7.2 | 34.3 | 0.0 | 45.8 | 45.1 | 55.4 | 9.6 | 10.3 | Outside |
| 1560.500 | PK | 46.5 | 46.7 | 25.8 | 6.8 | 33.5 | 0.0 | 45.6 | 45.8 | 53.9 | 8.3 | 8.1 | Inside |
| 1872.600 | PK | 43.8 | 44.7 | 26.6 | 6.7 | 32.9 | 0.0 | 44.2 | 45.1 | 55.4 | 11.2 | 10.3 | Outside |
| 2184.700 | PK | 42.5 | 43.7 | 27.3 | 6.8 | 32.5 | 0.0 | 44.1 | 45.3 | 55.4 | 11.3 | 10.1 | Outside |
| 2496.800 | PK | 42.6 | 42.6 | 27.8 | 6.9 | 32.4 | 0.0 | 44.9 | 44.9 | 53.9 | 9.0 | 9.0 | Inside |
| 2808.900 | PK | 42.1 | 42.2 | 28.6 | 7.0 | 32.2 | 0.0 | 45.5 | 45.6 | 53.9 | 8.4 | 8.3 | Inside |
| 3121.000 | PK | 41.2 | 41.1 | 29.2 | 7.1 | 32.1 | 0.0 | 45.4 | 45.3 | 55.4 | 10.0 | 10.1 | Outside |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Anmpifier) + Duty factor

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

Sample calculation:

Result of PK = Reading + Ant Factor + Loss (Cable + Attenuator +Filter) - Gain (Amplifier)

Result of PK with Duty factor = Reading + Ant Factor + Loss (Cable + Attenuator + Filter) - Gain (Amplifier) + Duty factor

For above 1GHz : Distance Factor: $20 \times \log (4.5 \text{ m}/3.0 \text{ m}) = 3.52 \text{ dB}$

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

Since the peak emission result satisfied the average limit, duty factor was omitted.

The result of AV (PK with Duty factor) was calculated by applying Duty 100%.

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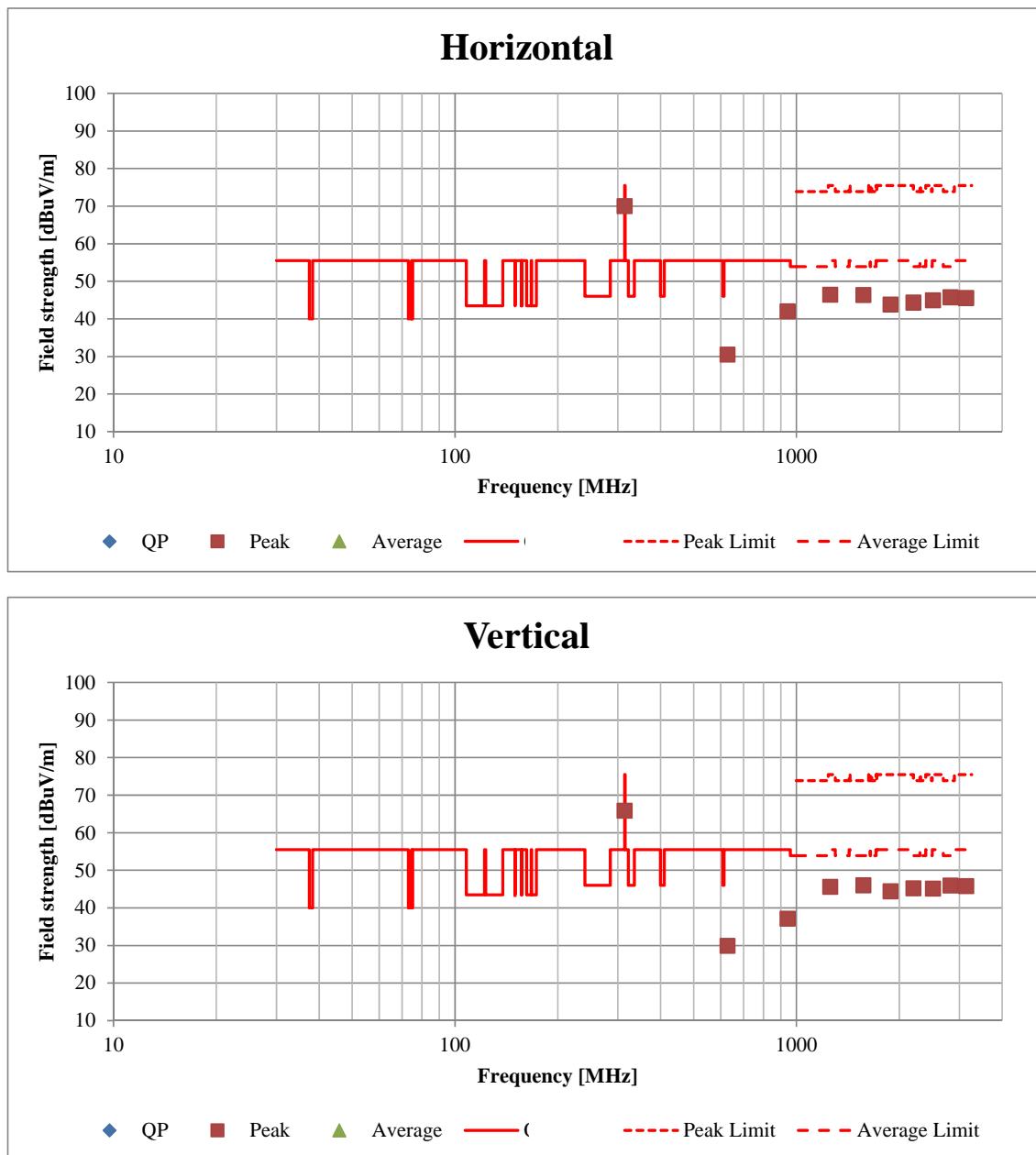
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Faxsimile : +81 596 24 8124

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 11796130H
Date 06/13/2017
Temperature/ Humidity 23 deg. C / 42% RH
Engineer Shuichi Ohyama
Mode Transmitting mode 314.35 MHz



*These plots data contains sufficient number to show the trend of characteristic features for EUT.

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-20dB and 99% Occupied Bandwidth

Test place Ise EMC Lab. No.3 Measurement Room
Report No. 11796130H
Date 06/13/2017
Temperature/ Humidity 23 deg. C / 42% RH
Engineer Shuichi Ohyama
Mode Transmitting mode 314.35 MHz / 312.10 MHz

Bandwidth Limit : Fundamental Frequency **312.10** MHz x 0.25% = 780.25 kHz

* The above limit was calculated from more stringent nominal frequency.

* Method of KDB 926416 for systems employing non sweeping frequencies was referred.

314.35 MHz

| -20dB Bandwidth [kHz] |
|--------------------------|
| 62.27 |

312.10MHz

| -20dB Bandwidth [kHz] |
|--------------------------|
| 59.28 |

| -20dB Bandwidth [kHz] | Bandwidth Limit [kHz] | Result |
|--------------------------|--------------------------|--------|
| 62.27 + 59.28 = 121.55 | 780.25 | Pass |

Bandwidth Limit : Fundamental Frequency **314.35** MHz x 0.25% = 785.88 kHz

99% Occupied Bandwidth
[kHz]

Bandwidth Limit
[kHz]

Result

112.86

785.88

Pass

Bandwidth Limit : Fundamental Frequency **312.10** MHz x 0.25% = 780.25 kHz

99% Occupied Bandwidth
[kHz]

Bandwidth Limit
[kHz]

Result

111.65

780.25

Pass

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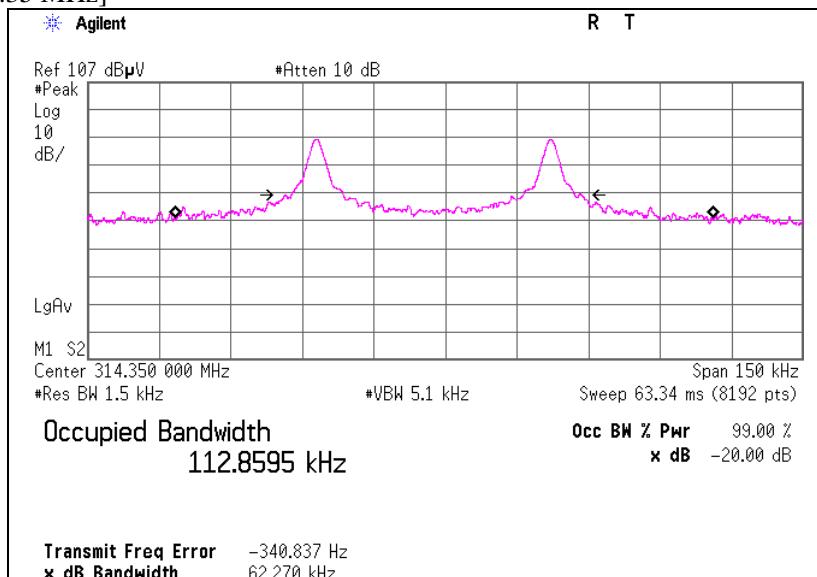
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

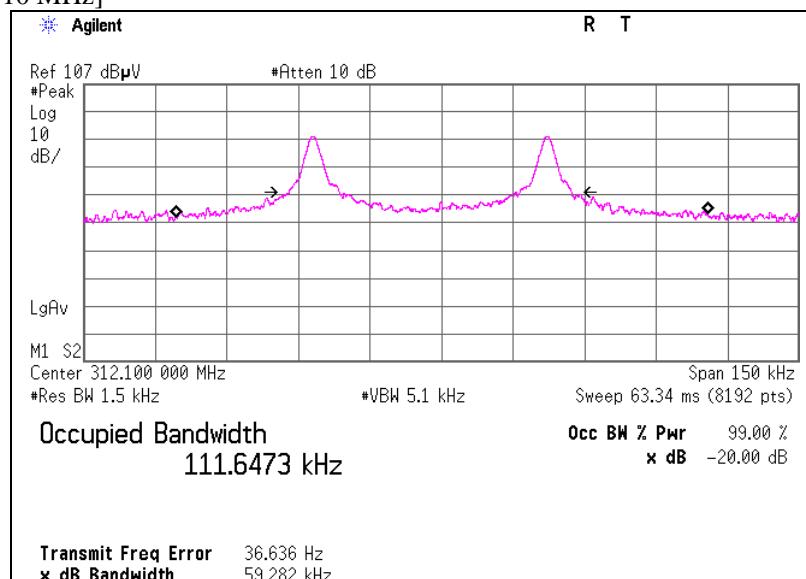
-20dB and 99% Occupied Bandwidth

Test place Ise EMC Lab. No.3 Measurement Room
 Report No. 11796130H
 Date 06/13/2017
 Temperature/ Humidity 23 deg. C / 42% RH
 Engineer Shuichi Ohyama
 Mode Transmitting mode 314.35 MHz / 312.10 MHz

[314.35 MHz]



[312.10 MHz]



UL Japan, Inc.

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APPENDIX 2: Test Instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|--------------------|----------------------------------|---------------------|--------------------------|-----------------------------|------------------|---|
| MAEC-03 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2016/10/20 * 12 |
| MOS-13 | Thermo-Hygrometer | Custom | CTH-180 | 1301 | RE | 2017/01/20 * 12 |
| MJM-16 | Measure | KOMELON | KMC-36 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE | - |
| MSA-04 | Spectrum Analyzer | Agilent | E4448A | US44300523 | RE | 2016/11/10 * 12 |
| MTR-08 | Test Receiver | Rohde & Schwarz | ESCI | 100767 | RE | 2016/09/15 * 12 |
| MBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | 1915 | RE | 2016/10/15 * 12 |
| MLA-22 | Logperiodic Antenna(200-1000MHz) | Schwarzbeck | VUSLP9111B | 911B-191 | RE | 2017/01/26 * 12 |
| MCC-51 | Coaxial cable | UL Japan | - | - | RE | 2016/07/26 * 12 |
| MAT-98 | Attenuator | KEYSIGHT | 8491A | MY52462349 | RE | 2016/12/05 * 12 |
| MPA-13 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260834 | RE | 2017/03/27 * 12 |
| MLPA-07 | Loop Antenna | UL Japan | - | - | RE | Pre Check |
| MHA-20 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 258 | RE | 2017/05/22 * 12 |
| MCC-167 | Microwave Cable | Junkosha | MWX221 | 1404S374(1m) / 1405S074(5m) | RE | 2017/05/29 * 12 |
| MPA-11 | MicroWave System Amplifier | Agilent | 83017A | MY39500779 | RE | 2017/03/21 * 12 |
| MHF-27 | High Pass Filter(1.1-10GHz) | TOKYO KEIKI | TF219CD1 | 1001 | RE | 2017/01/16 * 12 |

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

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

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

Test Item:

RE: Radiated emission, 99% Occupied Bandwidth, -20dB bandwidth, and Automatically deactivate tests

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