



RADIO TEST REPORT

Test Report No. : 10242184H

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Keyless Entry (Hand Unit)
Model No. : R74P0
Test regulation : FCC Part 15 Subpart C: 2014
FCC ID : CWTR74P0
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.
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.

Date of test: May 2, 2014

Representative test engineer:

Masatoshi Nishiguchi

Engineer

Consumer Technology Division

Approved by:

Takashi Nakazawa

Leader

Consumer Technology Division



NVLAP LAB CODE: 200572-0

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<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10242184H

[illegible]

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SECTION 1: Customer information

Company Name : Alps Electric Co., Ltd.
Address : 6-3-36, Nakazato, Furukawa, Osaki-city, Miyagi-pref, 989-6181, Japan
Telephone Number : +81-229-23-5111
Facsimile Number : +81-229-23-5129
Contact Person : Toru Kinoshita

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

2.1 Identification of E.U.T.

Type of Equipment : Passive Keyless Entry (Hand Unit)
Model No. : R74P0
Serial No. : Refer to Section 4, Clause 4.2
Receipt Date of Sample : April 29, 2014
Country of Mass-production : 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: R74P0 (referred to as the EUT in this report) is the Passive Keyless Entry (Hand Unit).

General Specification

Clock frequency in the system : 18.370366MHz

Radio Specification

Equipment Type : Transceiver
Frequency of operation : 315MHz
Type of modulation : FSK
Antenna Type : PWB Pattern antenna
Method of Frequency Generation : Crystal + PLL IC
Operating voltage (inner) : DC 3.0V
Operating Temperature : -30 to +60 deg. C

* Original model No.: R74P0 has 4 switches.

Variation models have 2 switches and 3 switches.

The difference of Original mode and Variation models is only the number of switches.

They are completely identical in EMC characteristics.

Therefore the test was performed with the representative original type which was the worst one.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2014, final revised on March 6, 2014 and effective April 7, 2014

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

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|--|--|--|----------|----------|
| Conducted emission | FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4 | FCC: Section 15.207 IC: RSS-Gen 7.2.4 | N/A | N/A *1) | - |
| Automatically Deactivate | FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: - | FCC: Section 15.231(a)(1) IC: RSS-210 A1.1.1 | N/A | Complied | Radiated |
| Electric Field Strength of Fundamental Emission | FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.8 | FCC: Section 15.231(b) IC: RSS-210 A1.1.2 | 0.2dB 315.000MHz Horizontal, PK with Duty factor | Complied | Radiated |
| Electric Field Strength of Spurious Emission | FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.9 | FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.1.2, 2.5.1 RSS-Gen 7.2.5 | 0.1dB 3150.000MHz Horizontal, PK with Duty factor | Complied | Radiated |
| -20dB Bandwidth | FCC: ANSI C63.4:2003 13. Measurement of intentional radiators 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 3.0V) and the constant voltage was supplied to the EUT 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 4.6.1 | IC: RSS-Gen 4.6.1 | 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.

| Test room (semi-anechoic chamber) | Radiated emission | | | | | | |
|--------------------------------------|-------------------|------------------|-----------------|----------------|-----------------|-------------------|-------------------|
| | (3m*)(+dB) | | | | (1m*)(+dB) | | (0.5m*)(+dB) |
| | 9kHz -30MHz | 30MHz -300MHz | 300MHz -1GHz | 1GHz -10GHz | 10GHz -18GHz | 18GHz -26.5GHz | 26.5GHz -40GHz |
| No.1 | 4.0dB | 5.1dB | 5.0dB | 5.1dB | 6.0dB | 4.9dB | 4.3dB |
| No.2 | 3.9dB | 5.2dB | 5.0dB | 4.9dB | 5.9dB | 4.7dB | 4.2dB |
| No.3 | 4.3dB | 5.1dB | 5.2dB | 5.2dB | 6.0dB | 4.8dB | 4.2dB |
| No.4 | 4.6dB | 5.2dB | 5.0dB | 5.2dB | 6.0dB | 5.7dB | 4.2dB |

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

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| | FCC Registration Number | 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 | 313583 | 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 | 655103 | 2973C-2 | 7.5 x 5.8 x 5.2m | 4.0 x 4.0m | - |
| No.3 semi-anechoic chamber | 148738 | 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 | 134570 | 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 Data of EMI, Test instruments, and Test set up.

Refer to APPENDIX.

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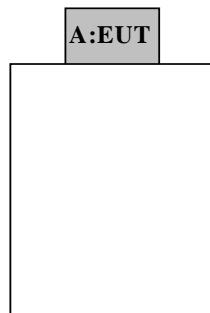
Facsimile : +81 596 24 8124

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

4.1 Operating Modes

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|--------------------------------------|--------------|------------------------------|-------------------------|---------|
| A | Passive Keyless Entry (Hand Unit) | R74P0 | 14042507 *1) 14042503 *2) | Alps Electric Co., Ltd. | EUT |

*1) Used for Continuous Transmitting mode

*2) Used for Normal use mode

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

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The EUT was set on the center 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.

(Below 30MHz)

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

(Above 30MHz)

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

The measuring antenna height was varied between 1 and 4m 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 30MHz | 30MHz to 300MHz | 300MHz to 1GHz | Above 1GHz |
|--------------|-------------|-----------------|----------------|------------|
| Antenna Type | Loop | Biconical | Logperiodic | Horn |

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

* For the test below 30MHz, the noise was not detected when it was confirmed with PK detect.

- The carrier level was 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 inserted or not. The worst case was confirmed with and without mechanical key, as a result, the test with mechanical key was the worst case. Therefore the test with mechanical key was performed only.

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

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

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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: -20dB and 99% Occupied Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

| Test | Span | RBW | VBW | Sweep | Detector | Trace | Instrument used |
|------------------------|--|-------------|--------------------|-------|----------|----------|-------------------|
| 20dB Bandwidth | 300kHz | 3kHz | 9.1kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99% Occupied Bandwidth | Enough width to display 20dB Bandwidth | 1 % of Span | Three times of RBW | Auto | Peak *1) | Max Hold | Spectrum Analyzer |

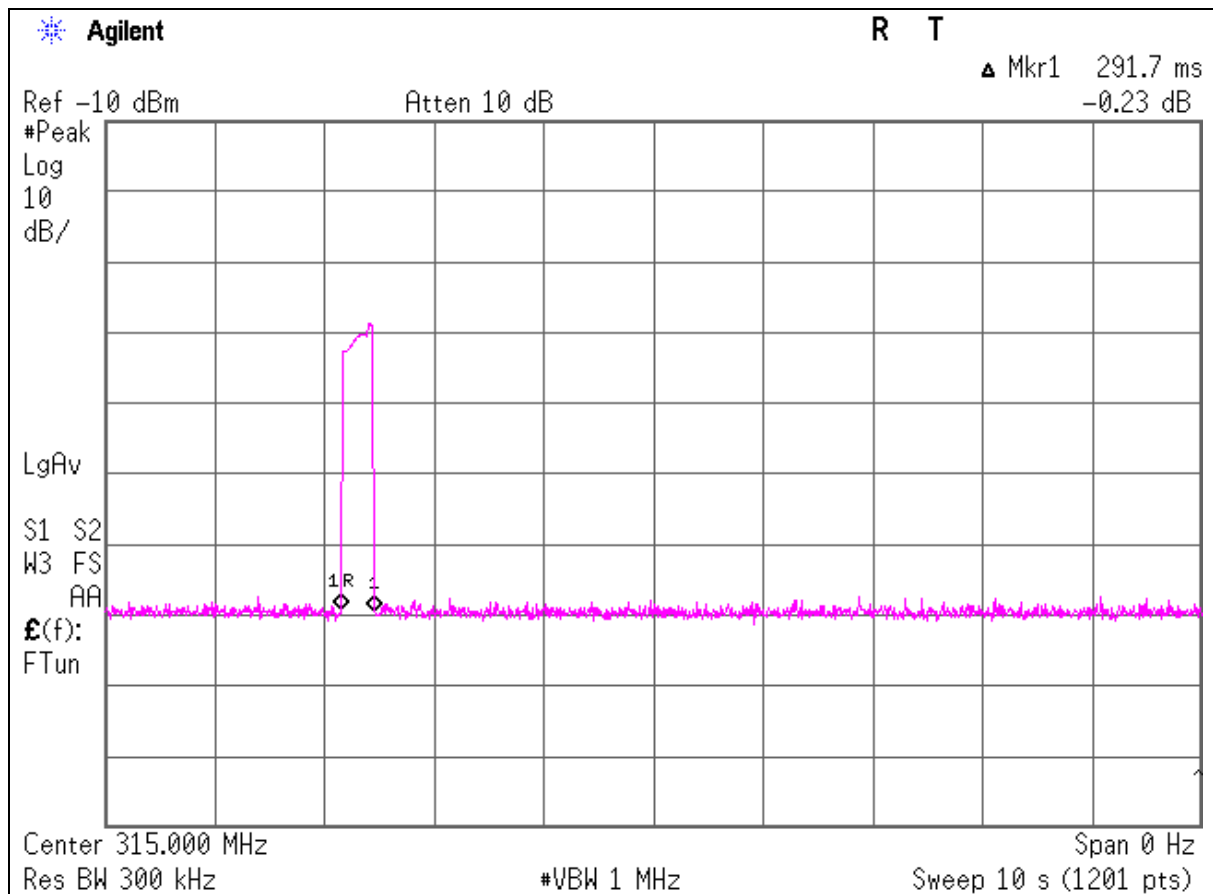
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Automatically deactivate

| | |
|-----------------------|--|
| Test place | Ise HQ EMC Lab. No.2 Semi Anechoic Chamber |
| Report No. | 10242184H |
| Date | 05/02/2014 |
| Temperature/ Humidity | 21 deg.C / 53% RH |
| Engineer | Masatoshi Nishiguchi |
| Mode | Normal use mode |

| Time of Transmitting [sec] | Limit [sec] | Result |
|-------------------------------|----------------|--------|
| 0.2917 | 5.00 | Pass |



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

Test place : Ise HQ EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10242184H
Date : 05/02/2014
Temperature/ Humidity : 21 deg.C / 53% RH
Engineer : Masatoshi Nishiguchi
Mode : Continuous Transmitting mode

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 | |
| 315.000 | PK | 79.7 | 76.7 | 14.7 | 8.8 | 27.8 | - | 75.4 | 72.4 | 95.6 | 20.2 | 23.2 | Carrier |
| 630.000 | PK | 43.2 | 43.2 | 19.8 | 10.1 | 28.8 | - | 44.3 | 44.3 | 75.6 | 31.3 | 31.3 | Outside |
| 945.000 | PK | 34.3 | 34.6 | 22.7 | 11.2 | 27.7 | - | 40.5 | 40.8 | 75.6 | 35.1 | 34.8 | Outside |
| 1260.000 | PK | 46.8 | 45.3 | 25.7 | 1.8 | 35.4 | - | 38.9 | 37.4 | 75.6 | 36.7 | 38.2 | Outside |
| 1575.000 | PK | 45.2 | 46.9 | 26.5 | 2.0 | 35.2 | - | 38.5 | 40.2 | 73.9 | 35.4 | 33.7 | Inside |
| 1890.000 | PK | 52.3 | 53.5 | 27.3 | 2.1 | 34.9 | - | 46.8 | 48.0 | 75.6 | 28.8 | 27.6 | Outside |
| 2205.000 | PK | 51.0 | 49.8 | 27.2 | 2.3 | 34.8 | - | 45.7 | 44.5 | 73.9 | 28.2 | 29.4 | Inside |
| 2520.000 | PK | 51.1 | 51.0 | 26.9 | 2.5 | 34.6 | - | 45.9 | 45.8 | 75.6 | 29.7 | 29.8 | Outside |
| 2835.000 | PK | 53.8 | 51.6 | 27.6 | 2.7 | 34.5 | - | 49.6 | 47.4 | 73.9 | 24.3 | 26.5 | Inside |
| 3150.000 | PK | 58.6 | 58.2 | 28.3 | 2.9 | 34.3 | - | 55.5 | 55.1 | 75.6 | 20.1 | 20.5 | Outside |

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

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 | |
| 315.000 | PK | 79.7 | 76.7 | 14.7 | 8.8 | 27.8 | 0.0 | 75.4 | 72.4 | 75.6 | 0.2 | 3.2 | Carrier |
| 630.000 | PK | 43.2 | 43.2 | 19.8 | 10.1 | 28.8 | 0.0 | 44.3 | 44.3 | 55.6 | 11.3 | 11.3 | Outside |
| 945.000 | PK | 34.3 | 34.6 | 22.7 | 11.2 | 27.7 | 0.0 | 40.5 | 40.8 | 55.6 | 15.1 | 14.8 | Outside |
| 1260.000 | PK | 46.8 | 45.3 | 25.7 | 1.8 | 35.4 | 0.0 | 38.9 | 37.4 | 55.6 | 16.7 | 18.2 | Outside |
| 1575.000 | PK | 45.2 | 46.9 | 26.5 | 2.0 | 35.2 | 0.0 | 38.5 | 40.2 | 53.9 | 15.4 | 13.7 | Inside |
| 1890.000 | PK | 52.3 | 53.5 | 27.3 | 2.1 | 34.9 | 0.0 | 46.8 | 48.0 | 55.6 | 8.8 | 7.6 | Outside |
| 2205.000 | PK | 51.0 | 49.8 | 27.2 | 2.3 | 34.8 | 0.0 | 45.7 | 44.5 | 53.9 | 8.2 | 9.4 | Inside |
| 2520.000 | PK | 51.1 | 51.0 | 26.9 | 2.5 | 34.6 | 0.0 | 45.9 | 45.8 | 55.6 | 9.7 | 9.8 | Outside |
| 2835.000 | PK | 53.8 | 51.6 | 27.6 | 2.7 | 34.5 | 0.0 | 49.6 | 47.4 | 53.9 | 4.3 | 6.5 | Inside |
| 3150.000 | PK | 58.6 | 58.2 | 28.3 | 2.9 | 34.3 | 0.0 | 55.5 | 55.1 | 55.6 | 0.1 | 0.5 | Outside |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier) + Duty factor (Refer to Duty factor data sheet)

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

- * The test above 1GHz was performed with PK detect. Average emission measurements were calculated with PK detect and Duty cycle factor.
- * Duty Factor was calculated with the assumption of the worst condition in 100msec.
- * The noise measured with PK detect was pulse emission.

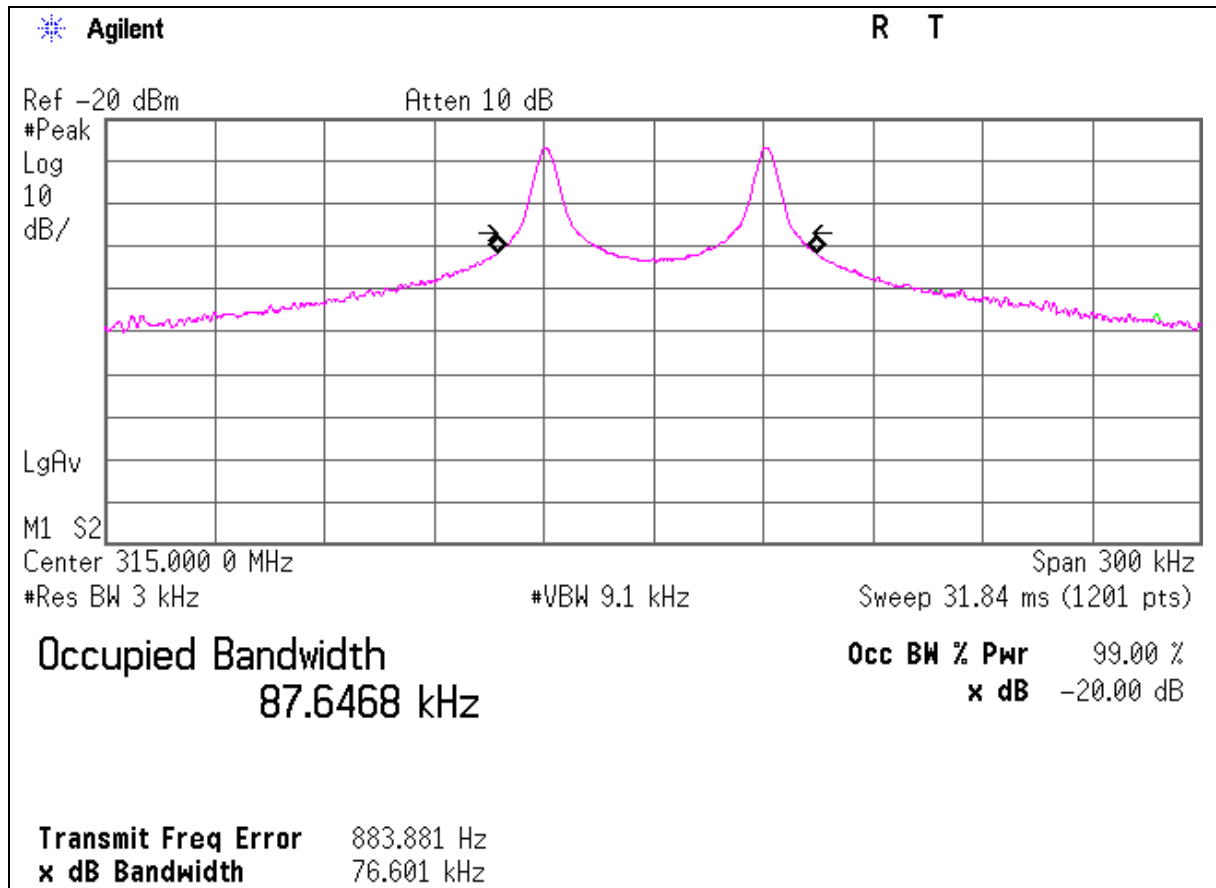
-20dB and 99% Occupied Bandwidth

Test place : Ise HQ EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10242184H
Date : 05/02/2014
Temperature/ Humidity : 21 deg.C / 53% RH
Engineer : Masatoshi Nishiguchi
Mode : Continuous Transmitting mode

Bandwidth Limit : Fundamental Frequency $315 \text{ MHz} \times 0.25\% = 787.50 \text{ kHz}$

| -20dB Bandwidth [kHz] | Bandwidth Limit [kHz] | Result |
|--------------------------|--------------------------|--------|
| 76.60 | 787.50 | Pass |

| 99% Occupied Bandwidth [kHz] | Bandwidth Limit [kHz] | Result |
|---------------------------------|--------------------------|--------|
| 87.65 | 787.50 | Pass |

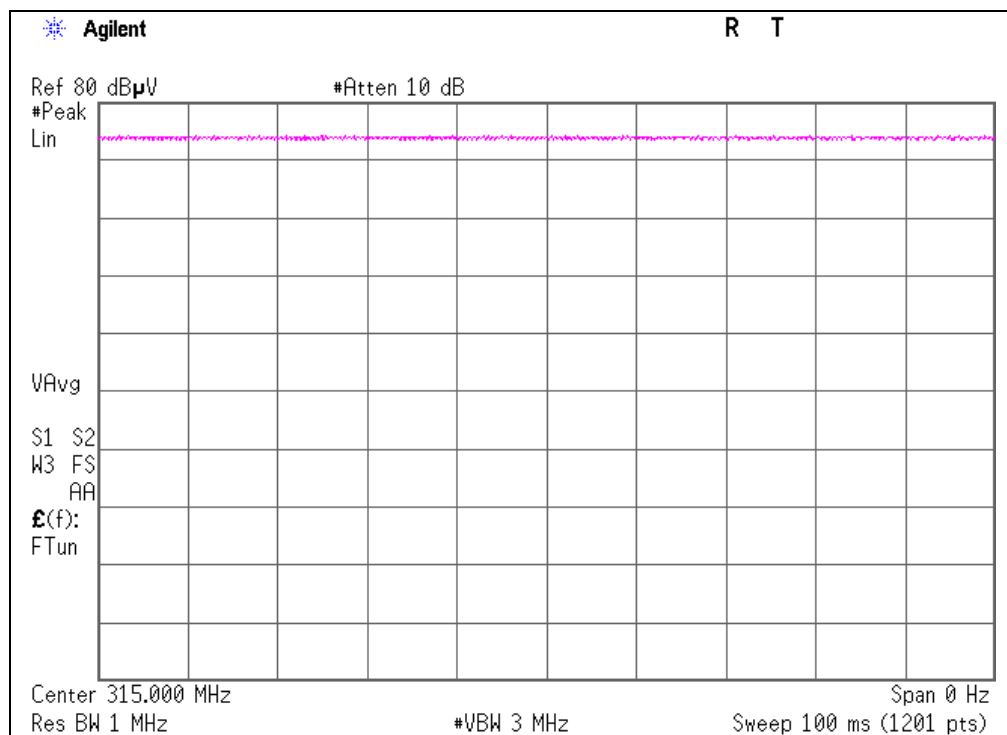


Duty Cycle

| | |
|-----------------------|--|
| Test place | Ise HQ EMC Lab. No.2 Semi Anechoic Chamber |
| Report No. | 10242184H |
| Date | 05/02/2014 |
| Temperature/ Humidity | 21 deg.C / 53% RH |
| Engineer | Masatoshi Nishiguchi |
| Mode | Continuous Transmitting mode |

| ON time [ms] | Cycle [ms] | Duty (On time/Cycle) | Duty [dB] |
|-----------------|---------------|-------------------------|--------------|
| 100.000 | 100.00 | 1.0000 | 0.00 |

*Duty = 20log(ON time/100ms)



APPENDIX 2: Test Instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|----------------------------|------------------|--------------------------|--------------------------------|-----------|---------------------------------------|
| MAEC-02 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-06902 | RE | 2013/06/30 * 12 |
| MOS-22 | Thermo-Hygrometer | Custom | CTH-201 | 0003 | RE | 2014/02/20 * 12 |
| MJM-14 | Measure | KOMELON | KMC-36 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE | - |
| MRENT-116 | Spectrum Analyzer | Agilent | E4440A | MY46187620 | RE | 2014/03/05 * 12 |
| MTR-03 | Test Receiver | Rohde & Schwarz | ESCI | 100300 | RE | 2013/06/11 * 12 |
| MBA-02 | Biconical Antenna | Schwarzbeck | BBA9106 | VHA91032008 | RE | 2013/10/13 * 12 |
| MLA-02 | Logperiodic Antenna | Schwarzbeck | USLP9143 | 201 | RE | 2013/10/13 * 12 |
| MCC-12 | Coaxial Cable | Fujikura/Agilent | - | - | RE | 2014/02/20 * 12 |
| MAT-07 | Attenuator(6dB) | Weinschel Corp | 2 | BK7970 | RE | 2013/11/26 * 12 |
| MPA-09 | Pre Amplifier | Agilent | 8447D | 2944A10845 | RE | 2013/09/12 * 12 |
| MHA-06 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 254 | RE | 2014/02/21 * 12 |
| MCC-166 | Microwave Cable | Junkosha | MWX221 | 1303S120(1m) / 1311S167(5m) | RE | 2013/11/27 * 12 |
| MPA-10 | Pre Amplifier | Agilent | 8449B | 3008A02142 | RE | 2014/01/21 * 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, Automatically deactivate and Duty cycle tests

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