




# RADIO TEST REPORT


Test Report No. : 10242184H

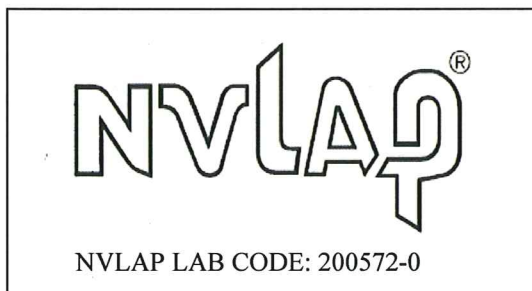
**Applicant** : Alps Electric Co., Ltd.  
**Type of Equipment** : Passive Keyless Entry (Hand Unit)  
**Model No.** : R74P0  
**Test regulation** : FCC Part 15 Subpart C: 2014  
**FCC ID** : CWTR74P0  
**Test Result** : Complied

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 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



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

# **REVISION HISTORY**

**Original Test Report No.: 10242184H**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10242184H	May 9, 2014	-	-

<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Customer information</b> .....	<b>4</b>
<b>SECTION 2: Equipment under test (E.U.T.)</b> .....	<b>4</b>
<b>SECTION 3: Test specification, procedures &amp; results</b> .....	<b>5</b>
<b>SECTION 4: Operation of E.U.T. during testing</b> .....	<b>8</b>
<b>SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)</b> 9	
<b>SECTION 6: Automatically deactivate</b> .....	<b>10</b>
<b>SECTION 7: -20dB and 99% Occupied Bandwidth</b> .....	<b>10</b>
<b>APPENDIX 1: Data of EMI test</b> .....	<b>11</b>
Automatically deactivate.....	11
Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission).....	12
-20dB and 99% Occupied Bandwidth.....	13
Duty Cycle .....	14
<b>APPENDIX 2: Test Instruments</b> .....	<b>15</b>
<b>APPENDIX 3: Photographs of test setup</b> .....	<b>16</b>
Radiated emission .....	16
Worst case position .....	17

## **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.

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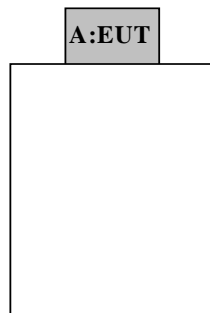
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## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Modes**

<b>Test Item*</b>	<b>Mode</b>
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**

<b>No.</b>	<b>Item</b>	<b>Model number</b>	<b>Serial number</b>	<b>Manufacturer</b>	<b>Remarks</b>
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

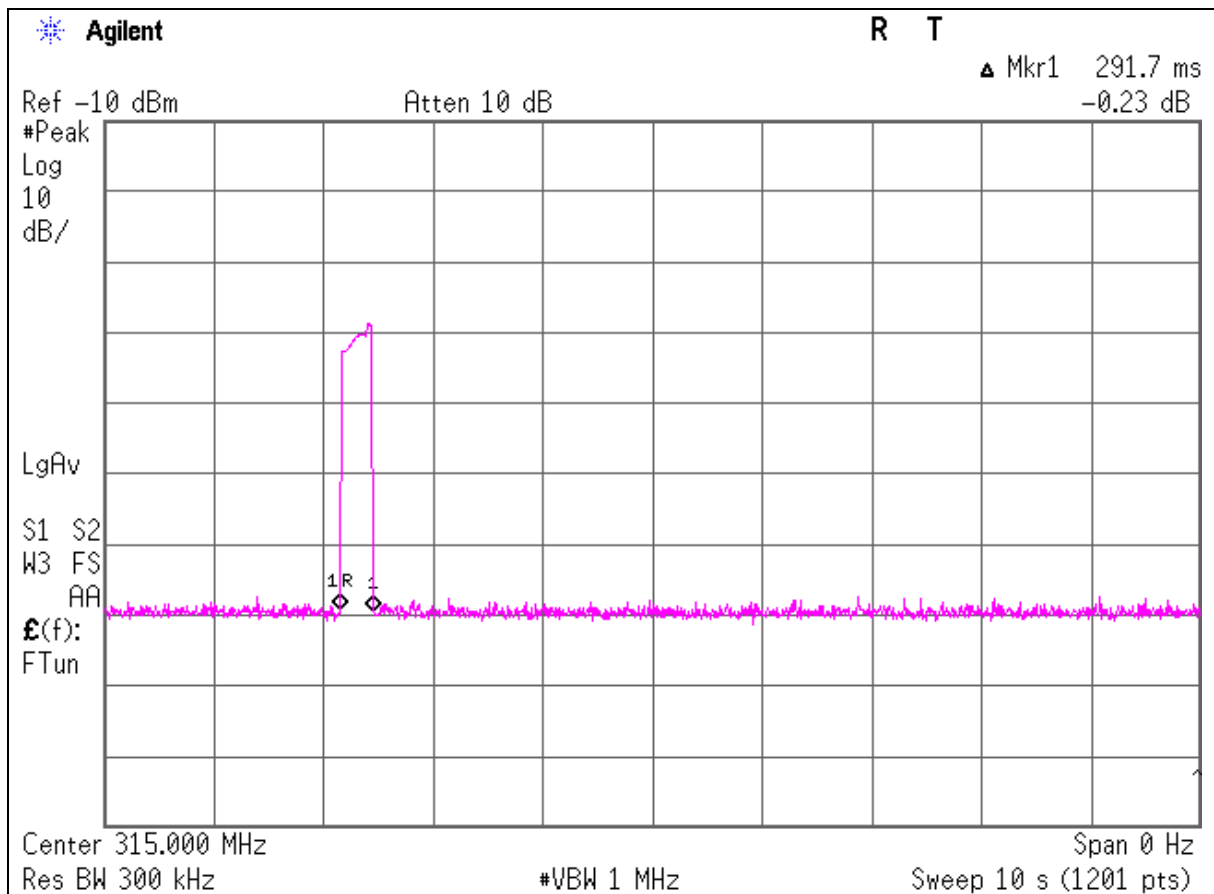
Test data : APPENDIX  
Test result : Pass

**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.

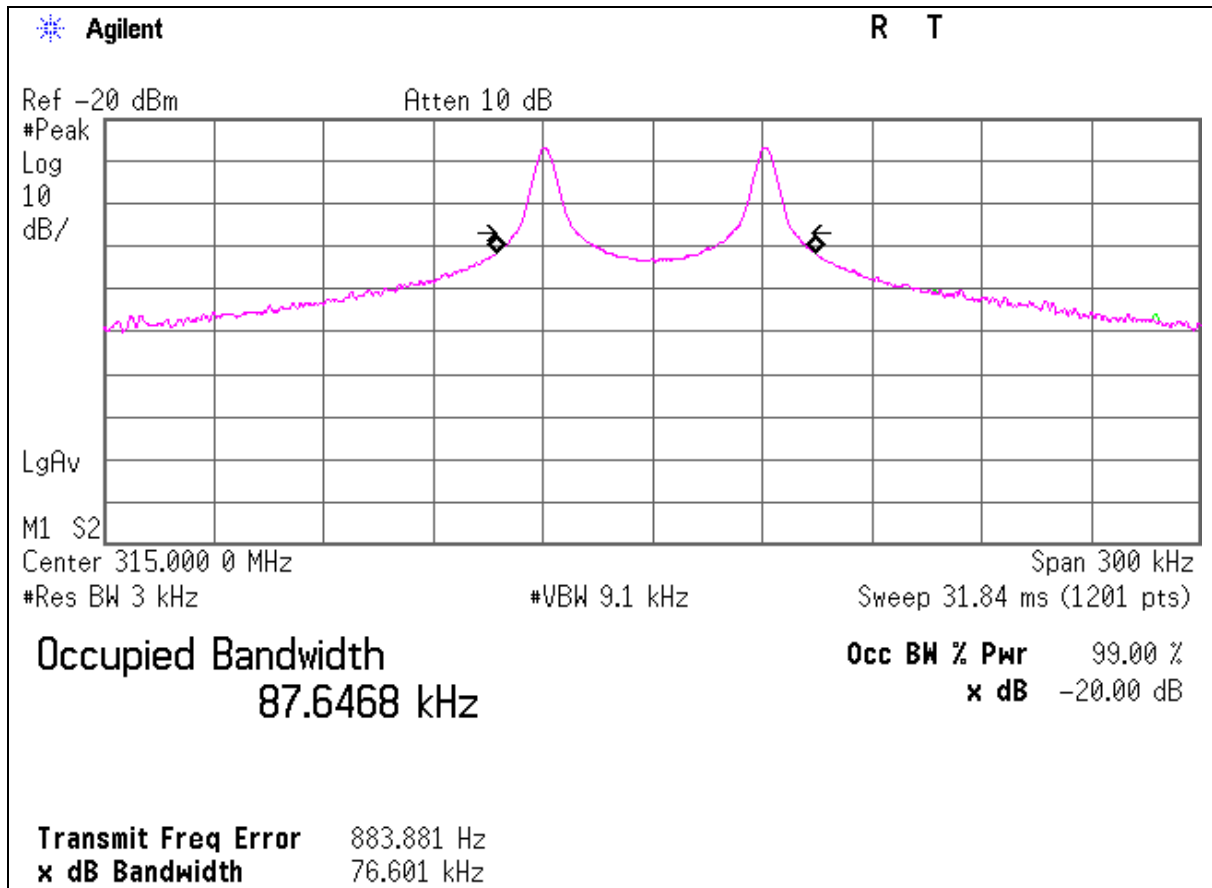
**-20dB and 99% Occupied Bandwidth**

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

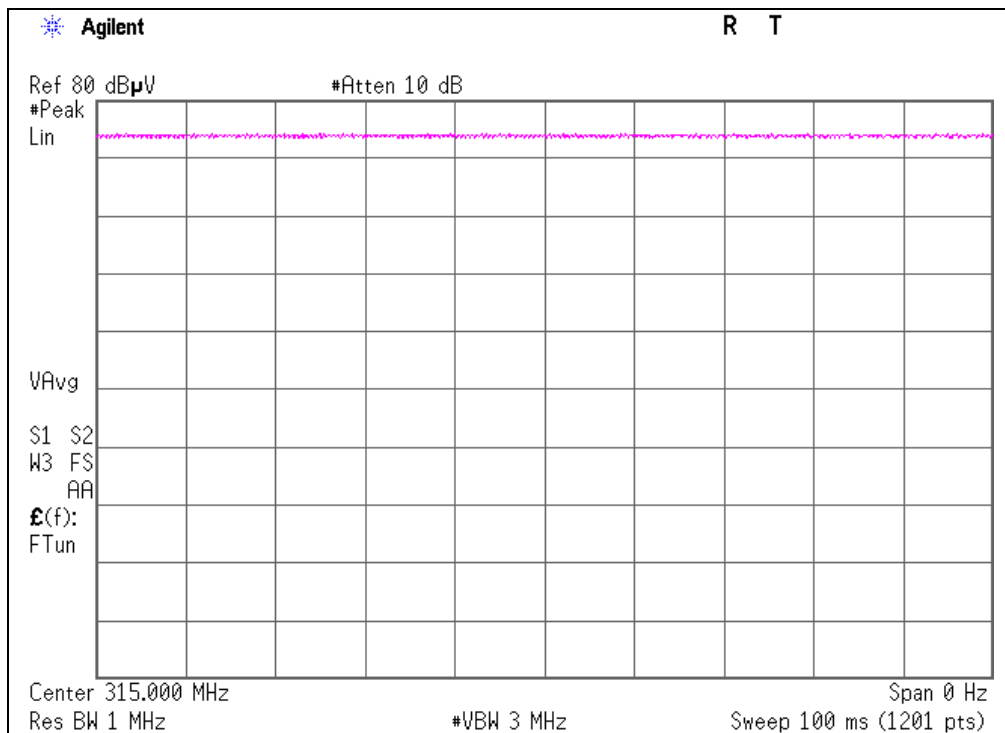


### Duty Cycle

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**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Serial No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
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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