




# RADIO TEST REPORT


Test Report No. : 10286833H

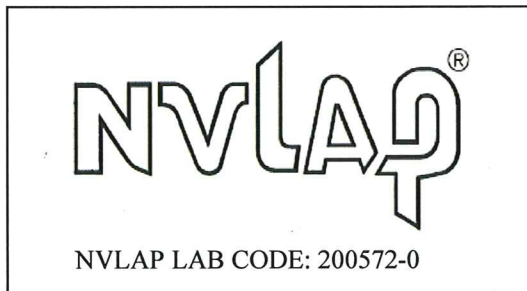
**Applicant** : DENSO CORPORATION  
**Type of Equipment** : Smart Card Key  
**Model No.** : 14CCA  
**Test regulation** : FCC Part 15 Subpart C: 2014  
**FCC ID** : HYQ14CCA  
**Test Result** : Complied

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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:** April 21 and 22, 2014

**Representative test engineer:**   
Shinya Watanabe  
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>



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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 : +81-566-61-5242  
Facsimile Number : +81-566-25-4837  
Contact Person : MASAYUKI YAMAMOTO

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Smart Card Key  
Model No. : 14CCA  
Serial No. : Refer to Clause 4.2  
Rating : DC 3.0V  
Receipt Date of Sample : April 17, 2014  
Country of Mass-production : Japan  
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: 14CCA (referred to as the EUT in this report) is the Smart Card Key.

#### **General Specification**

Clock frequency(ies) in the system : 8 MHz (IC Clock)

#### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 433.58 MHz / 434.30 MHz \*  
Modulation : FSK (F1D)  
Power Supply (radio part input) : DC 3.0V  
Type of Battery : One lithium battery  
Antenna type : Built-in type (Fixed)

\*These two different frequencies are not emitted simultaneously.

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**Ise HQ EMC Lab.**

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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	16.1dB Vertical PK with Duty factor (Tx 434.30MHz)	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	7.5dB 1302.90MHz Vertical PK with Duty factor (Tx 434.30MHz)	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 test report has enough margin, more than the site margin.

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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	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 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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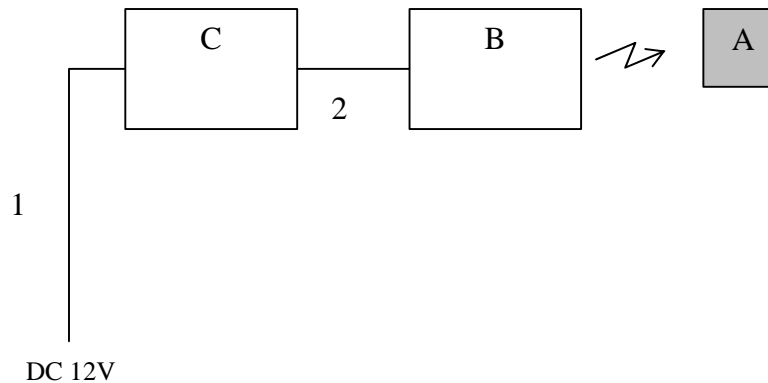
Facsimile : +81 596 24 8124

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

### 4.1 Operating Modes

Test Item	Mode
Automatically Deactivate Duty Cycle	Normal use mode, 433.58MHz Normal use mode, 434.30MHz
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth	Transmitting mode (Tx), 433.58MHz *1) Transmitting mode (Tx), 434.30MHz *1)
<p>* The system was configured in typical fashion (as a customer would normally use it) for testing.  *1) The software of this mode is the same as one of normal product, except that EUT continues to transmit when transmitter button is being pressed (For Normal use mode, the EUT transmits only when it receives 134.2kHz radio signal.)  End users cannot change the settings of the output power of the product.</p>	

### 4.2 Configuration and peripherals



\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

#### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Smart Card Key	14CCA	002 *1) 001 *2)	DENSO CORPORATION	EUT
B	Door handle unit	-	-	DENSO CORPORATION	*1)
C	Test bench	-	-	DENSO CORPORATION	*1)

\*1) Used for Normal use mode only.

\*2) Used for Transmitting mode only.

#### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.4	Unshielded	Unshielded	*1)
2	DC and Signal Cable	1.4	Unshielded	Unshielded	*1)

\*1) Used for Normal use mode only.

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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.

**[Transmitting mode]**

**(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

- 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 without mechanical key was the worst case. Therefore the test without 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 *1)	Spectrum Analyzer

\*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100%.

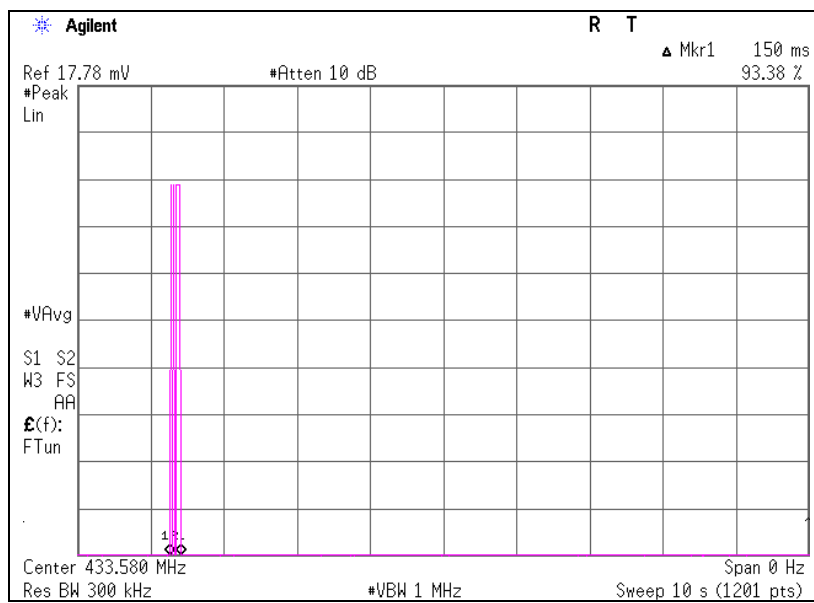
Test data : APPENDIX  
Test result : Pass

**APPENDIX 1: Data of EMI test**

**Automatically deactivate**

Test place Ise HQ EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10286833H  
Date 04/21/2014  
Temperature/ Humidity 25 deg. C / 49% RH  
Engineer Hiroshi Kukita  
Mode Normal use mode 433.58MHz

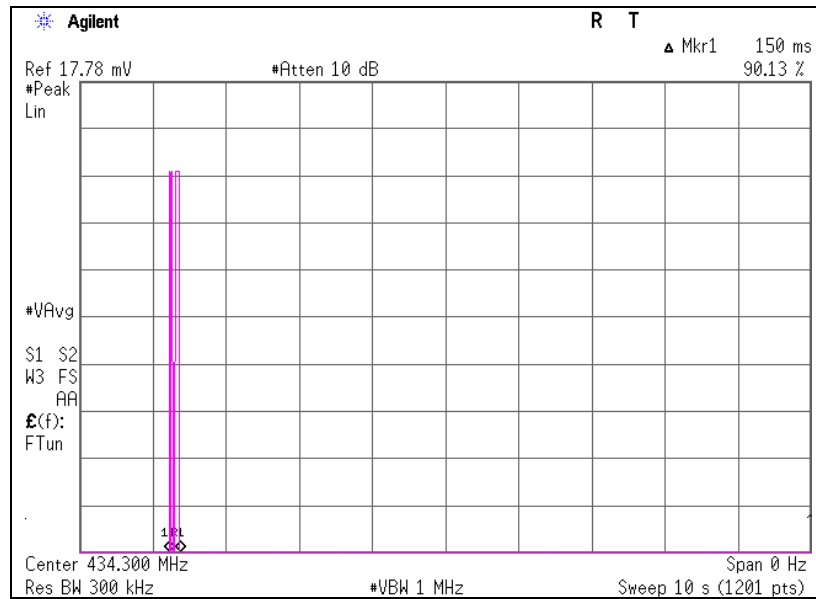
Time of Transmitting [sec]	Limit [sec]	Result
0.1500	5.00	Pass



**Automatically deactivate**

Test place : Ise HQ EMC Lab. No.4 Semi Anechoic Chamber  
 Report No. : 10286833H  
 Date : 04/21/2014  
 Temperature/ Humidity : 25 deg. C / 49% RH  
 Engineer : Hiroshi Kukita  
 Mode : Normal use mode 434.30MHz

Time of Transmitting [sec]	Limit [sec]	Result
0.1500	5.00	Pass



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

Test place Ise HQ EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10286833H  
Date 04/21/2014 04/22/2014  
Temperature/ Humidity 25 deg. C / 49% RH 21 deg. C / 44% RH  
Engineer Hiroshi Kukita Hiroshi Kukita  
(Below 1GHz) (Above 1GHz)  
Mode Transmitting mode 433.58MHz

**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	
433.580	PK	69.9	70.4	18.1	10.8	32.0	-	66.8	67.3	100.8	34.0	33.5	Carrier
867.160	PK	39.2	23.6	23.8	13.1	31.3	-	44.8	29.2	80.8	36.0	51.6	Outside
1300.740	PK	56.1	59.7	24.3	1.9	37.0	-	45.3	48.9	73.9	28.6	25.0	Inside
1734.320	PK	52.1	53.0	25.1	2.2	36.7	-	42.7	43.6	80.8	38.1	37.2	Outside
2167.900	PK	55.4	53.8	25.8	2.4	36.6	-	47.0	45.4	80.8	33.8	35.4	Outside
2601.480	PK	50.5	49.7	26.6	2.6	36.7	-	43.0	42.2	80.8	37.8	38.6	Outside
3035.060	PK	54.9	52.6	26.9	2.9	36.8	-	47.9	45.6	80.8	32.9	35.2	Outside
3468.640	PK	53.1	52.5	26.8	3.1	36.6	-	46.4	45.8	80.8	34.4	35.0	Outside
3902.220	PK	50.5	49.7	28.1	3.3	36.4	-	45.5	44.7	73.9	28.4	29.2	Inside
4335.800	PK	51.3	50.8	28.6	3.5	36.3	-	47.1	46.6	73.9	26.8	27.3	Inside

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	
433.580	PK	69.9	70.4	18.1	10.8	32.0	-3.1	63.7	64.2	80.8	17.1	16.6	Carrier
867.160	PK	39.2	23.6	23.8	13.1	31.3	-3.1	41.7	26.1	60.8	19.1	34.7	Outside
1300.740	PK	56.1	59.7	24.3	1.9	37.0	-3.1	42.2	45.8	53.9	11.7	8.1	Inside
1734.320	PK	52.1	53.0	25.1	2.2	36.7	-3.1	39.6	40.5	60.8	21.2	20.3	Outside
2167.900	PK	55.4	53.8	25.8	2.4	36.6	-3.1	43.9	42.3	60.8	16.9	18.5	Outside
2601.480	PK	50.5	49.7	26.6	2.6	36.7	-3.1	39.9	39.1	60.8	20.9	21.7	Outside
3035.060	PK	54.9	52.6	26.9	2.9	36.8	-3.1	44.8	42.5	60.8	16.0	18.3	Outside
3468.640	PK	53.1	52.5	26.8	3.1	36.6	-3.1	43.3	42.7	60.8	17.5	18.1	Outside
3902.220	PK	50.5	49.7	28.1	3.3	36.4	-3.1	42.4	41.6	53.9	11.5	12.3	Inside
4335.800	PK	51.3	50.8	28.6	3.5	36.3	-3.1	44.0	43.5	53.9	9.9	10.4	Inside

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).

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

Test place Ise HQ EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10286833H  
Date 04/21/2014 04/22/2014  
Temperature/ Humidity 25 deg. C / 49% RH 21 deg. C / 44% RH  
Engineer Hiroshi Kukita Hiroshi Kukita  
(Below 1GHz) (Above 1GHz)  
Mode Transmitting mode 434.30MHz

**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	
434.300	PK	70.4	71.3	17.7	10.8	32.0	-	66.9	67.8	100.8	33.9	33.0	Carrier
868.600	PK	37.4	18.2	22.2	13.1	31.1	-	41.6	22.4	80.8	39.2	58.4	Outside
1302.900	PK	56.2	60.3	24.3	1.9	37.0	-	45.4	49.5	73.9	28.5	24.4	Inside
1737.200	PK	52.4	53.4	25.1	2.2	36.7	-	43.0	44.0	80.8	37.8	36.8	Outside
2171.500	PK	54.0	53.1	25.8	2.4	36.6	-	45.6	44.7	80.8	35.2	36.1	Outside
2605.800	PK	50.8	49.9	26.6	2.6	36.7	-	43.3	42.4	80.8	37.5	38.4	Outside
3040.100	PK	54.6	51.8	26.9	2.9	36.8	-	47.6	44.8	80.8	33.2	36.0	Outside
3474.400	PK	53.4	52.0	26.8	3.1	36.6	-	46.7	45.3	80.8	34.1	35.5	Outside
3908.700	PK	50.1	49.6	28.1	3.3	36.4	-	45.1	44.6	73.9	28.8	29.3	Inside
4343.000	PK	51.2	50.6	28.6	3.5	36.3	-	47.0	46.4	73.9	26.9	27.5	Inside

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	
434.300	PK	70.4	71.3	17.7	10.8	32.0	-3.1	63.8	64.7	80.8	17.0	16.1	Carrier
868.600	PK	37.4	18.2	22.2	13.1	31.1	-3.1	38.5	19.3	60.8	22.3	41.5	Outside
1302.900	PK	56.2	60.3	24.3	1.9	37.0	-3.1	42.3	46.4	53.9	11.6	7.5	Inside
1737.200	PK	52.4	53.4	25.1	2.2	36.7	-3.1	39.9	40.9	60.8	20.9	19.9	Outside
2171.500	PK	54.0	53.1	25.8	2.4	36.6	-3.1	42.5	41.6	60.8	18.3	19.2	Outside
2605.800	PK	50.8	49.9	26.6	2.6	36.7	-3.1	40.2	39.3	60.8	20.6	21.5	Outside
3040.100	PK	54.6	51.8	26.9	2.9	36.8	-3.1	44.5	41.7	60.8	16.3	19.1	Outside
3474.400	PK	53.4	52.0	26.8	3.1	36.6	-3.1	43.6	42.2	60.8	17.2	18.6	Outside
3908.700	PK	50.1	49.6	28.1	3.3	36.4	-3.1	42.0	41.5	53.9	11.9	12.4	Inside
4343.000	PK	51.2	50.6	28.6	3.5	36.3	-3.1	43.9	43.3	53.9	10.0	10.6	Inside

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).

### Duty Cycle

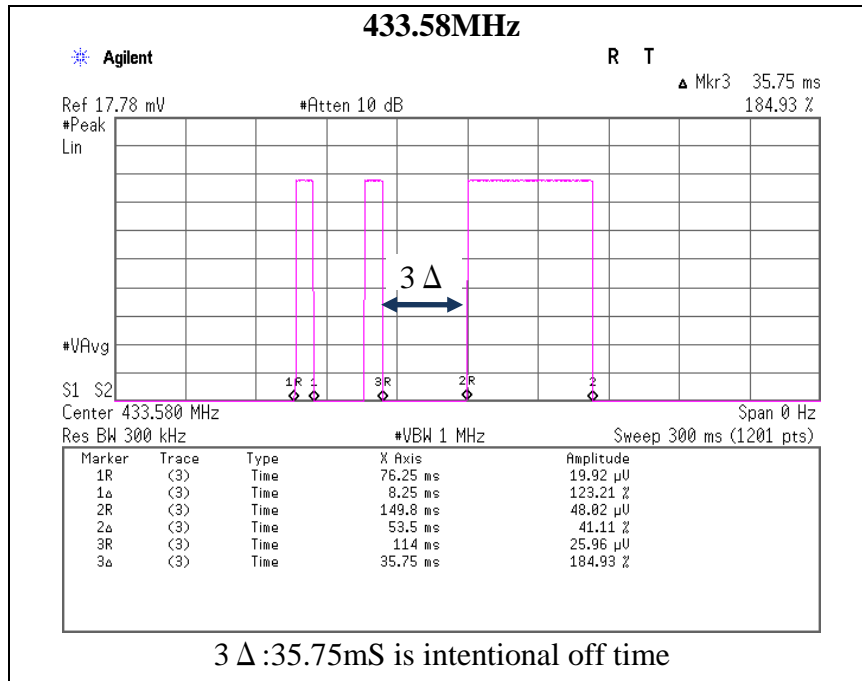
Test place	Ise HQ EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10286833H
Date	04/21/2014
Temperature/ Humidity	25 deg. C / 49% RH
Engineer	Hiroshi Kukita
Mode	Normal use mode 433.58MHz

433.58MHz					
<b>(pulse length)</b>		<b>(duty)</b>			
Type	[ms]	ON time	Cycle	Duty	Duty
short pluse	8.25	[ms]	[ms]	(On time/Cycle)	[dB]
long pulse	53.50	70.00	100.00	0.70	-3.1

\*The sampled 100 msec was the worst case that is included in long pulse transmissions time  
+ the first short pulse transmissions time + the second short pulse transmissions of the second try.

Transmission timing is shown in "UHF transmission specification".

\*Duty = 20log<sub>10</sub>(ON time/Cycle)



### Duty Cycle

Test place                    Ise HQ EMC Lab. No.4 Semi Anechoic Chamber  
Report No.                    10286833H  
Date                            04/21/2014  
Temperature/ Humidity      25 deg. C / 49% RH  
Engineer                      Hiroshi Kukita  
Mode                            Normal use mode 434.30MHz

434.30MHz

**(pulse length)**

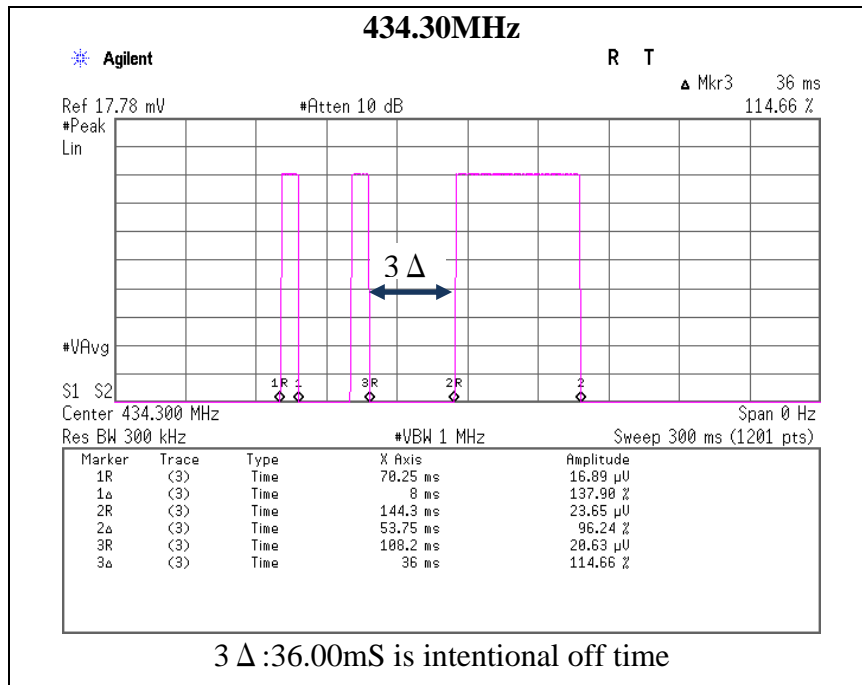
Type	[ms]
short pluse	8.00
long pulse	53.75

**(duty)**

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
69.75	100.00	0.70	-3.1

\*The sampled 100 msec was the worst case that is included in long pulse transmissions time  
+ the first short pulse transmissions time + the second short pulse transmissions of the second try.  
Transmission timing is shown in "UHF transmission specification".

\*Duty = 20log<sub>10</sub>(ON time/Cycle)

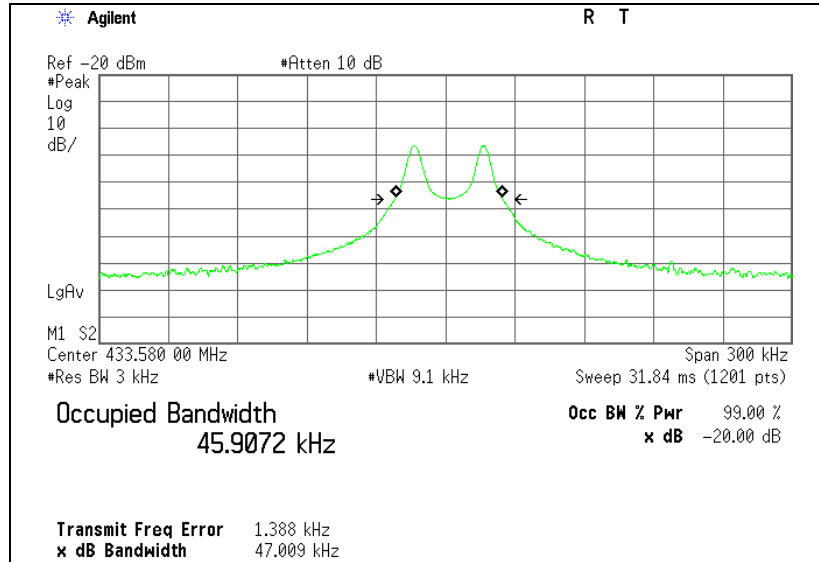




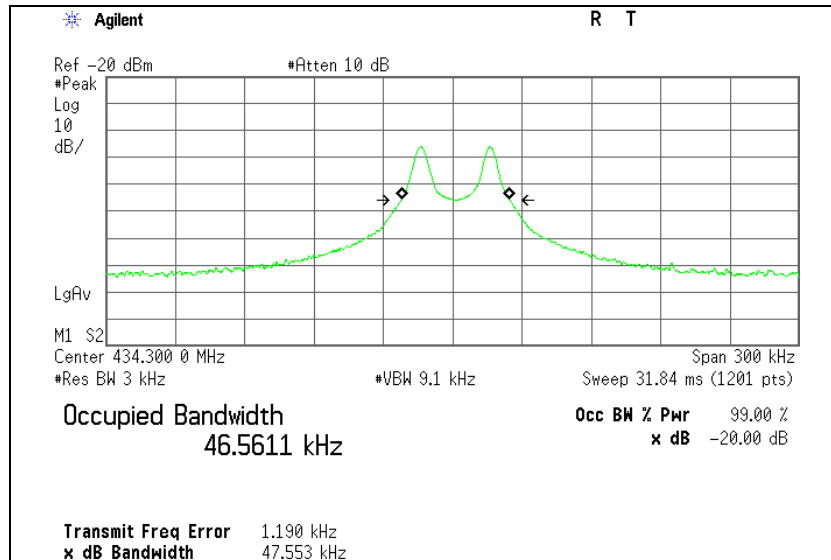
### -20dB and 99% Occupied Bandwidth

Test place	Ise HQ EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10286833H
Date	04/21/2014
Temperature/ Humidity	25 deg. C / 49% RH
Engineer	Hiroshi Kukita
Mode	Transmitting mode 433.58MHz / 434.30MHz

#### 【433.58MHz】



#### 【434.30MHz】



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

Test place Ise HQ EMC Lab.No.4 Semi Anechoic Chamber  
Report No. 10286833H  
Date 04/21/2014  
Temperature/ Humidity 25 deg. C / 49% RH  
Engineer Hiroshi Kukita  
Mode Transmitting mode 433.58MHz / 434.30MHz

Bandwidth Limit : Fundamental Frequency **433.58** MHz x 0.25% = 1083.95 kHz

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

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

**433.58MHz**

-20dB Bandwidth [kHz]
47.01

**434.30MHz**

-20dB Bandwidth [kHz]
47.55

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
47.01+47.55=94.56	1083.95	Pass

Bandwidth Limit : Fundamental Frequency **433.58** MHz x 0.25% = 1083.95 kHz

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
45.91	1083.95	Pass

Bandwidth Limit : Fundamental Frequency **434.30** MHz x 0.25% = 1085.75 kHz

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
46.56	1085.75	Pass

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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-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2014/02/28 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2014/02/20 * 12
MJM-09	Measure	KDS	E19-55	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2013/11/25 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2013/11/12 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2013/11/24 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2013/11/24 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2013/06/18 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2013/11/26 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2014/03/14 * 12
MLPA-06	Loop Antenna	UL Japan	-	-	RE	Pre Check
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2013/08/01 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2014/02/20 * 12
MJM-21	Measure	KOMELON	KMC-36	-	RE	-
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2013/05/13 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2013/06/14 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2014/02/05 * 12
MCC-165	Microwave Cable	Junkosha	MWX221	1203S213(1m) / 1311S166(5m)	RE	2013/11/27 * 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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