



## RADIO TEST REPORT

Test Report No. : 28GE0207-HO-01-A-R1

Applicant : Matsushita Electric Industrial Co., Ltd.  
Type of Equipment : Contactless IC Card Reader  
Model No. : JT-R210CR-50  
Test regulation : FCC Part 15 Subpart C : 2008  
Section 15.207 and 15.225  
FCC ID : ACJJT-R210CR  
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.
6. Original test report number of this report is 28GE0207-HO-01-A.

Date of test:

April 14, 2008

Tested by:

*K. Nakai*

Kazufumi Nakai  
EMC Services

*Takayuki S.*

Takayuki Shimada  
EMC Services

Approved by :

*M. Kosaka*

Makoto Kosaka  
EMC Services



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UL Japan, Inc.

Head Office EMC Lab.

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

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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## **SECTION 1: Customer information**

Company Name : Matsushita Electric Industrial Co., Ltd.  
Address : 4-3-1 Tsunashima-higashi, Kohoku-ku, Yokohama City, Kanagawa,  
223-8639, Japan  
Telephone Number : +81-45-540-5500  
Facsimile Number : +81-45-540-1272  
Contact Person : Kouichi Okada

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

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

Type of Equipment : Contactless IC Card Reader  
Model No. : JT-R210CR-50  
Serial No. : ES001  
Rating : DC24.0V  
Receipt Date of Sample : April 11, 2008  
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: JT-R210CR-50 is the Contactless IC Card Reader.  
This is the contactless IC card reader/writer which corresponds to "FeliCa" technology.

The clock frequency of EUT : CPU:12.000MHz / RTC:32.768kHz / RF:13.56MHz  
Equipment Type : Transceiver  
Frequency band : 13.110-14.010 MHz  
Frequency of operation : 13.56MHz  
Type of modulation : ASK  
Antenna Type : Printed Circuit Board (under the illumination ring)  
Antenna connector type : nylon connector  
Method of Frequency Generation : Crystal  
Operating voltage : DC 24V/ 5V / 3.3V

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## **UL Japan, Inc.**

### **Head Office EMC Lab.**

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

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### **SECTION 3: Test specification, procedures & results**

#### **3.1 Test Specification**

Test Specification : FCC Part15 Subpart C: 2008 , final revised on March 24, 2008

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.225 : Operation within the band 13.110-14.010MHz

#### **FCC 15.31 (e)**

The RF part of EUT is constantly provided with stable voltage(DC5.0V) regardless of input voltage. Therefore, this 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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**Head Office EMC Lab.**

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

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### 3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	[QP] 16.4dB 27.11954MHz, N (With Tag) [AV] 7.0dB 27.11954MHz, N (With Tag)	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	Radiated	N/A	54.7dB 13.55994MHz, QP 0 deg. (Without Tag)	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	Radiated	N/A	35.5dB 13.553MHz, QP 0 deg. (Without Tag)	Complied
4	20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	Radiated	N/A	See data	Complied
5	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	Radiated	N/A	2.5dB 542.815MHz, QP Vertical (Without Tag)	Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	Radiated	N/A	See data	Complied

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15

\*These tests were performed without any deviations from test procedure except for additions or exclusions.

### 3.3 Addition to standards (Reference data)

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	Complied

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

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### 3.4 Uncertainty

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

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic Chamber (±)	3.7dB	3.1dB	4.7dB	4.4dB	3.2dB	3.7dB	4.4dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.3dB	3.9dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.2dB	4.4dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.2dB	4.4dB	5.9dB	6.1dB

\*10m/3m = Measurement distance

#### Conducted emission test

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

#### Radiated emission test(3m)

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

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**Head Office EMC Lab.**

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

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. \*NVLAP Lab. code: 200572-0  
 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
 Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	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	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247-3	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	IC4247-4	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	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

\* 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 set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

### **4.1 Operating Modes**

The mode is used :       1) Transmitting (Tx) with Tag and Communication  
                              2) Transmitting (Tx) without Tag and Communication

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

Frequency Tolerance:

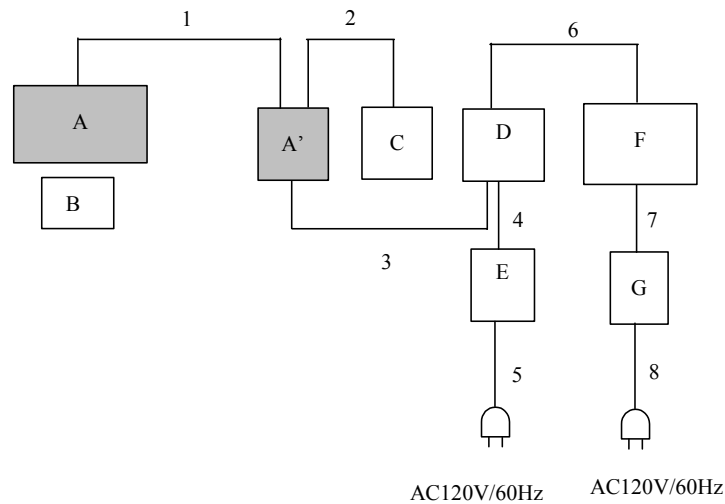
Temperature for the extreme tests :       -20 deg.C.(minimum) to + 50deg.C.(maximum)

Voltage for the extreme tests :       Vnom:AC120V, Vmin:AC102V, Vmax:AC138V : AC mains voltage

\* The RF part of EUT is constantly provided with stable voltage(DC5.0V) regardless of input voltage.

However, the tests were performed with changing the voltage of AC Mains.

### **4.2 Configuration and peripherals**



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

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**Description of EUT and Support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Contactless IC Card Reader	JT-R210CR-50	ES001	Matsushita Electric Industrial Co., Ltd.	EUT
A'	Cable and Connector Box	JT-R210CR-50	ES001	Matsushita Electric Industrial Co., Ltd.	A part of EUT
B	IC Tag	-	-	TOYOTA FINANCE CORPORATION	-
C	PIN Pad	ZEC-11B302	ES001	Matsushita Electric Industrial Co., Ltd.	-
D	Serial Jig	CBUR1003	-	-	-
E	AC Adapter	JT-211AD-101	A03408537	Matsushita Electric Industrial Co., Ltd.	-
F	Note PC	nx9040	CNF5332GXY	Hewlett Packard	-
G	AC Adapter	PPP009L	557C40DLLS1VQ1	Hewlett Packard	-

**List of cables used**

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Signal Cable	2.0	Shielded	Unshielded
2	Signal Cable	3.0	Shielded	Shielded
3	Signal Cable	0.5	Shielded	Shielded
4	DC Cable	1.8	Unshielded	Unshielded
5	AC Cable	2.0	Unshielded	Unshielded
6	RS-232C Cable	1.0	Shielded	Shielded
7	DC Cable	1.7	Unshielded	Unshielded
8	AC Cable	1.7	Unshielded	Unshielded

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## **SECTION 5: Conducted emission**

### **5.1 Operating environment**

Test place : No.4 semi anechoic chamber  
Temperature : See data  
Humidity : See data

### **5.2 Test configuration**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN were resistively terminated in 50ohm when not connected to the measuring equipment. The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a semi Anechoic Chamber. A drawing of the set up is shown in the photos of APPENDIX 1.

### **5.3 Test conditions**

Frequency range : 0.15MHz – 30MHz  
EUT position : Table top  
EUT operation mode : See Clause 4.1

### **5.4 Test procedure**

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN). An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with an average detector. The conducted emission measurements were made with the following detector function of the test receiver.  
Detector Type : QP and AV  
IF Bandwidth : 9kHz

### **5.5 Test result**

Summary of the test results : Pass

## **SECTION 6: Radiated emission (Fundamental, Spurious Emission and Spectrum Mask)**

### **6.1 Operating environment**

Test place : No.4 semi anechoic chamber  
Temperature : See data  
Humidity : See data

### **6.2 Test Procedure**

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

Frequency: From 9kHz to 30MHz at distance 3m, Used antenna: Loop  
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.  
The measurements were performed for each antenna angle 0deg. , 45deg. and 90deg.

Frequency: From 30MHz to 1GHz at distance 3m, Used antenna: Biconical (30-300MHz), Logperiodic (300-1000MHz)  
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 intensity.  
The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with a QP, PK, and AV detector.  
The radiated emission measurements were made with the following detector function of the test receiver.

	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
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT (with/without Tag) to see the position of maximum noise, and the test was made at the position that has the maximum noise.

\* FCC Part 15 Section 15.31 (f)(2) (9kHz-30MHz)  
9kHz – 490kHz [Limit at 3m]=[Limit at 300m]-40log (3[m]/300[m])  
490kHz – 30MHz[Limit at 3m]=[Limit at 30m]-40log (3[m]/30[m])

### **6.3 Test result**

Summary of the test results : Pass

## **SECTION 7: 20dB Bandwidth**

### **Test Procedure**

The measurement was performed under the condition which has the maximum Electric field strength.

Test data : APPENDIX 2  
Test result : Pass

## **SECTION 8: Frequency Tolerance**

### **Test Procedure**

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

Test data : APPENDIX 2  
Test result : Pass

## **SECTION 9: 99% Occupied Bandwidth (Reference data)**

### **Test Procedure**

The measurement was performed under the condition which has the maximum Electric field strength.

Test data : APPENDIX 2  
Test result : Pass