



RADIO TEST REPORT

Test Report No. : 30LE0268-SH-01-A

Applicant : MITSUBISHI ELECTRIC CORPORATION
Type of Equipment : Card Reader
Model No. : UCR-8212A
FCC ID : YS34D454C2D5001
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

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Date of test:

September 10 to 17, 2010

**Representative
test engineer:**

S. Takano

Shinichi Takano
Engineer of EMC Service

Approved by:

G. Ishiwata

Go Ishiwata
Assistant Manager of Shonan EMC Lab.

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MF058d (15.09.10)

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SECTION 1: Customer information

Company Name : MITSUBISHI ELECTRIC CORPORATION
Address : No.1, Hishi-machi, Inazawa-shi, Aichi-ken, 492-8682, Japan
Telephone Number : +81-587-24-5560
Facsimile Number : +81-587-24-5768
Contact Person : Koki Okunishi

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

2.1 Identification of E.U.T.

Type of Equipment : Card Reader
Model No. : UCR-8212A
Serial No. : 0460795
Rating : DC 24V
Country of Mass-production : Japan
Receipt Date of Sample : September 9, 2010
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab

2.2 Product description

Model No: UCR-8212A, referred to as the EUT in this report, is the Card Reader.

EUT have a series models.

UCR-8212A: with 10 keys (measurement equipment)
UCR-8202A: without keys Only cover is changed. Printed circuit boards are same.
UCR-8222A: water proof With water proof case. Printed circuit boards are same.
UCR-8262A: for elevator With elevator designed case.
For making to be thinner, connector is replaced to angle, and tall switch is omitted.

* These models are same radio specification.

General Specification

Clock frequency(ies) in the system : 22.1184 MHz, 14.7456MHz, 13.56MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 13.56MHz
Power Supply (inner) : DC 12.0V
Antenna type : Pattern antenna (Coil)
Operating Temperature : -10deg.C. to +40deg.C.

FCC 15.31 (e)

The EUT provides stable voltage (DC12V) constantly to the EUT (RF part) regardless of input voltage.
Therefore, the EUT complies with the requirement.

FCC Part 15.203

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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SECTION 3: Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2010, final revised on January 22, 2010
and effective March 1, 2010
Title : FCC 47CFR Part15 Radio Frequency Device, Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.215 Additional provisions to the general radiated emission limitations.
Section 15.225 Operation within the bands 13.110-14.010MHz.

The EUT complies with FCC Part 15 Subpart B: 2010, final revised on January 22, 2010 and effective March 1, 2010.
Refer to the test report 30LE0268-SH-01-B.

3.2 Procedures & results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section15.207	-	N/A	0.8dB (27.12000MHz, AV, N)	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (a)	Radiated	N/A	47.5dB (Ver, 45deg.)	Complied
Electric Field Strength of Outside the Allocated bands	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (b)(c)	Radiated	N/A	25.8dB (13.553MHz, Ver 45deg.)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.209 FCC Section15.225 (d)	Radiated	N/A	2.5dB (40.682MHz, Vertical),	Complied
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.215 (c)	Radiated	N/A	-	Complied
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (e)	Radiated	N/A	-	Complied

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

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	-	N/A

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

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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.

	No.1 anechoic chamber (±)	No.2 anechoic chamber (±)	No.3 anechoic chamber (±)
Conducted emission (AC mains)			
150kHz-30MHz	3.0 dB	2.7 dB	2.8 dB
Radiated emission (3m)			
9kHz-30MHz	3.1 dB	2.9 dB	3.0 dB
30MHz-300MHz	4.4 dB	4.3 dB	4.5 dB
300MHz-1000MHz	4.3 dB	4.2 dB	4.5 dB

*3m = Measurement distance

Conducted emission test

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

Radiated Emission Test

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

Frequency (Normal condition) Measurement uncertainty for this test was: (±) 1.3×10^{-6} .

Frequency (Extreme condition) Measurement uncertainty for this test was: (±) 1.3×10^{-6} .

3.5 Test location

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JAB Accreditation No. : RTL02610

No.1/ No.2/ No.3 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on April 17, 2009 (Registration No.: 697847).

IC Registration No. : 2973D-1 (No1 anechoic chamber)
2973D-2 (No2 anechoic chamber)
2973D-3 (No3 anechoic chamber)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7

3.6 Test Configuration Photographs, Data of EMI test and Test instruments

Refer to APPENDIX 1 to 3, in this report

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SECTION 4: System test configuration

4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Mode
(1) Transmitting (Tx and Rx) with Card mode
(2) Transmitting (Tx and Rx) without Card mode
(3) Transmitting (Tx and Rx) without Card (Antenna terminated with dummy load) mode
The EUT was operated in a manner similar to typical use during the tests.
The EUT Transmits and Receives at the same time and there is no receiving mode.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

Test Item	Operating mode*
Conducted emission	(1), (2), (3)
Electric Field Strength of Fundamental Emission, Electric Field Strength of Outside the Allocated bands, Electric Field Strength of Spurious Emission	(1), (2)
20dB Bandwidth, Frequency Tolerance	(1)

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

Frequency Tolerance:

Temperature : -10deg.C to +40deg.C Step 10deg.C
Voltage : Normal Voltage DC 24.0V
Maximum Voltage DC 27.6V, Minimum Voltage DC 20.4V (DC 24.0V ±15%)

*This EUT provides stable voltage (DC12V) constantly to RF Part regardless of input voltage

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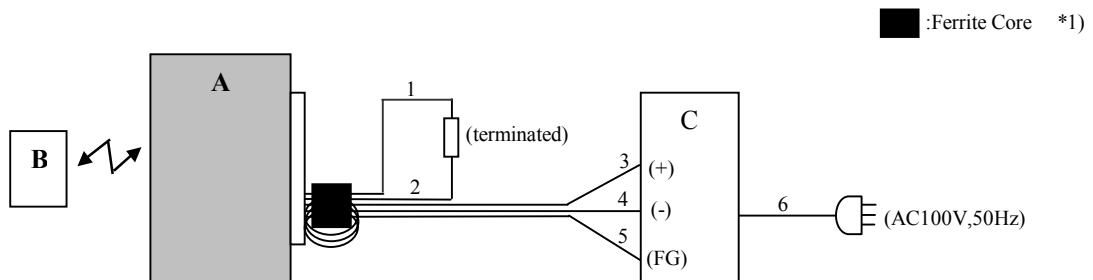
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	Card Reader (EUT)	UCR-8212A	0460795	MITSUBISHI ELECTRIC CORPORATION	YS34D454C2D5001
B	Card	-	-	-	-
C	Power supply	R25A-24	6291201LR	COSEL	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	RS485+	1.0	Unshielded	Unshielded	-
2	RS485-	1.0	Unshielded	Unshielded	-
3	DC Power Cable (+)	1.4	Unshielded	Unshielded	-
4	DC Power Cable (-)	1.4	Unshielded	Unshielded	-
5	DC Power Cable (FG)	1.4	Unshielded	Unshielded	-
6	AC Cable	3.0	Unshielded	Unshielded	-

<Notes for Ferrite cores>

*1) 1 Ferrite Core, Model No. SFT-59SNB-026K (Manufacturer: Takeuchi Industry Co.,Ltd.), 1.5cm from Item A, 3 turns.

*This is Removal Ferrite Core that is included in finished goods.

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SECTION 5: Conducted emission

5.1 Operating environment

The test was carried out in No.3 Shielded room.

Temperature : See test data
Humidity : See test data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was 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 and excess AC cable was bundled in center. They were folded back and for the 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 to the input power source.

Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded room.

The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver.

Detector Type : Quasi-Peak/ Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass

Date : September 10, 2010

Test engineer : Shinichi Takano

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SECTION 6: Radiated emissions (Fundamental, Spurious and Outside the Allocated bands)

6.1 Operating environment

The test was carried out in No.3 Semi anechoic chamber.

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The configuration was set in accordance with ANSI C63.4: 2003. Photographs of the setup are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 1GHz
 Test distance : 3m

6.4 Test procedure

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

Frequency: From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for vertical polarization (antenna angle: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30MHz to 1GHz at distance 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 intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with QP, PK, and AV detector.

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

	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz	30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	10kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

* 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])

The EUT was tested in the direction normally used.

6.5 Results

Summary of the test results : Pass

Date : September 10 to 17, 2010

Test engineer : Shinichi Takano and Makoto Hosaka

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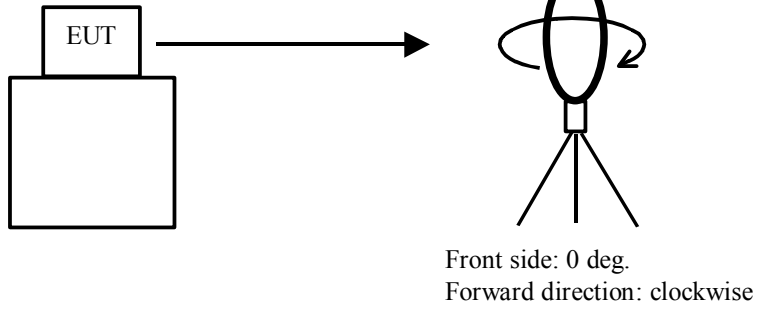
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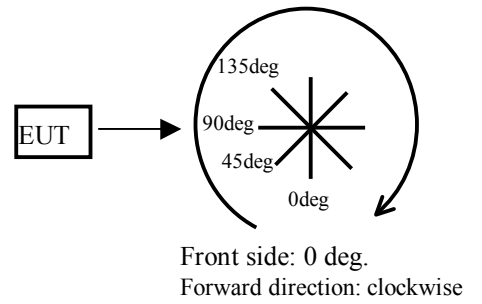
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Figure 1: Direction of the Loop Antenna

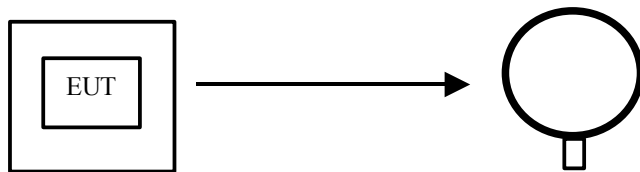
Side View (Vertical)



Top View (Vertical)



Top View (Horizontal)



Antenna was not rotated.

SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

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

Summary of the test results: Pass

Date : September 10, 2010

Test engineer : Shinichi Takano

SECTION 8: Frequency tolerances

Test procedure

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

The temperature test was started after the temperature stabilization time of 30 minutes.

Summary of the test results: Pass

Date : September 12, 2010

Test engineer : Akio Hayashi

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