



EMI TEST REPORT

Test Report No. : 29JE0146-HO-01-A

Applicant : Mitsubishi Electric Corporation Himeji Works
Type of Equipment : SMART KEYLESS SYSTEM (Receiver)
Model No. : SKE11A-03 (X1T540 VARIANT)
FCC ID : WAZX1T540SKE11A03
Test regulation : FCC Part 15 Subpart B 2009
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 the 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 product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test:

June 5, 2009

Tested by:

Takayuki Shimada
EMC Services

Approved by:

Makoto Kosaka
EMC Services



NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name : Mitsubishi Electric Corporation Himeji Works
Address : 840 CHIYODA-MACHI HIMEJI HYOGO 670-8677, JAPAN
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Contact Person : Yoshiharu Goto

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

2.1 Identification of E.U.T.

Type of Equipment : SMART KEYLESS SYSTEM (Receiver)
Model No. : SKE11A-03 (X1T540 VARIANT)
Serial No. : 20090604-R1
Receipt Date of Sample : June 5, 2009
Country of Mass-production : Japan
Condition of EUT : Production 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: SKE11A-03 (X1T540 VARIANT) (referred to as the EUT in this report) is the SMART KEYLESS SYSTEM (Receiver). Original receiver (Model No: SKE11A-03) was tested before. This model is X1T540 VARIANT of original model.

Clock frequency(ies) in the system : 29.509394MHz
Equipment Type : Receiver
Type of Receiver : Super Heterodyne
Frequency of Operation : 315MHz
Intermediate Frequency : 233kHz
Antenna Type : Bar Antenna
Local Oscillator : $(29.509394\text{MHz} / 3) \times 32 = 314.767\text{MHz}$ (Local Oscillator Frequency)
Method of Frequency Generation : Crystal
Operating voltage : DC 5.0V

FCC15.111(b)

The receiving antenna (of this EUT) is installed in the place where the end users cannot remove it. Therefore, Radiated emission test was performed.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B 2009, final revised on February 27, 2009
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	FCC: ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Receiver	N/A	N/A *1)	N/A
	IC: RSS-Gen 7.2.2				
Radiated emission	FCC: ANSI C63.4: 2003 8. Radiated emission measurements	Receiver	N/A	19.0dB 944.301MHz Horizontal / Vertical, QP	Complied
	IC: RSS-Gen 4.10				

*Note: UL Japan, Inc's EMI Work Procedure QPM05.
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

3.3 Addition to standard

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)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.7dB
No.2	3.7dB
No.3	3.7dB
No.4	3.7dB

Test room (semi-anechoic chamber)	Radiated emission (10m*)(+dB)			Radiated emission (3m*)(+dB)					
	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz
No.1	3.1dB	4.4dB	3.9dB	3.2dB	3.8dB	3.9dB	5.0dB	5.0dB	5.4dB
No.2	-	-	-	3.2dB	4.4dB	4.0dB	5.0dB	5.2dB	5.4dB
No.3	-	-	-	3.2dB	4.2dB	3.8dB	5.0dB	5.3dB	5.3dB
No.4	-	-	-	3.2dB	4.0dB	3.8dB	5.0dB	5.3dB	5.3dB

*10m/3m = 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

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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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	-	-	8.0 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, Data of EMI, and Test instruments

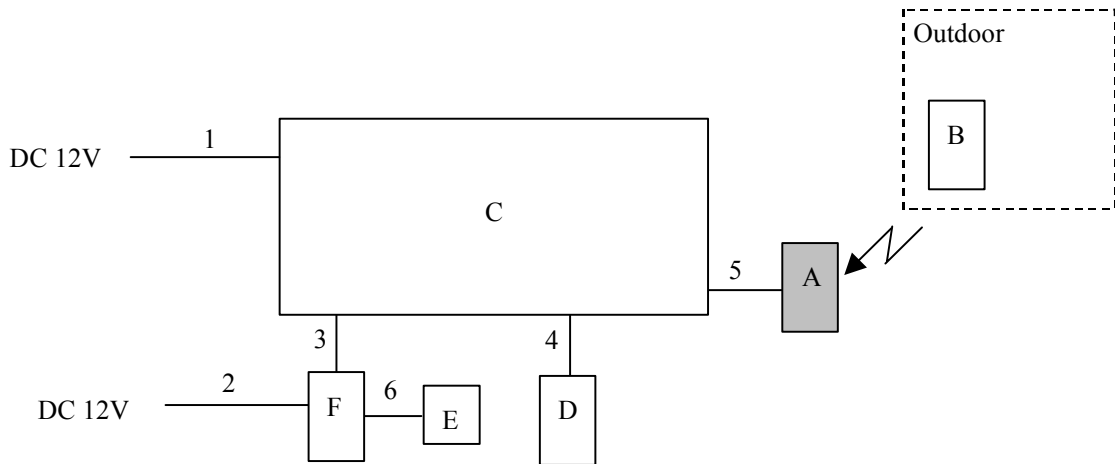
Refer to APPENDIX 1 to 3.

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

4.1 Operating modes

The mode is used : Continuous Receiving mode (315MHz)
*This EUT receives 315MHz signal (FSK modulated) from hand unit.
SMART KEYLESS SYSTEM (Transmitter) was operated manually by a test engineer and the test was performed with the EUT receiving 315MHz.

4.2 Configuration and peripherals



*Cabling and setup 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	Remark
A	SMART KEYLESS SYSTEM (Receiver)	SKE11A-03 (X1T540 VARIANT)	20090604-R1	Mitsubishi Electric Corporation Himeji Works	EUT
B	SMART KEYLESS SYSTEM (Transmitter)	SKE11A-03	20090604-T1	Mitsubishi Electric Corporation Himeji Works	-
C	SMART KEYLESS SYSTEM (Smart ECU)	SKE11A-03	20090604-01	Mitsubishi Electric Corporation Himeji Works	-
D	Antenna A	-	-	Mitsubishi Electric Corporation Himeji Works	-
E	SKE CHECKER LED	-	-	Mitsubishi Electric Corporation Himeji Works	-
F	SKE CHECKER	-	-	Mitsubishi Electric Corporation Himeji Works	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.3	Unshielded	Unshielded	-
2	DC Cable	1.4	Unshielded	Unshielded	-
3	Signal Cable	1.4	Unshielded	Unshielded	-
4	Signal Cable	1.5	Unshielded	Unshielded	-
5	Signal / DC Cable	1.3	Unshielded	Unshielded	-
6	Signal Cable	0.15	Unshielded	Unshielded	-

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SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.3 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 0.8m above the conducting ground plane. The EUT was set on the edge 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 1.

5.3 Test conditions

Frequency range : 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna)
1000MHz-2000MHz (Horn antenna)
Test distance : 3m
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The height of the measuring antenna 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 with the Test Receiver, or the Spectrum Analyzer.
The radiated emission measurements were made with the following detector function of the test receiver and the Spectrum analyzer.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV *1): RBW:1MHz/VBW:10Hz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

- The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

6.5 Test result

Summary of the test results: Pass

Date: June 5, 2009

Test engineer: Takayuki Shimada

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