



RADIO TEST REPORT

Test Report No. : 27JE0286-HO-A-R1

Applicant : Mitsubishi Electric Corporation Himeji Works
Type of Equipment : Immobilizer System
Model No. : IMB111-04
Test standard : FCC Part 15 Subpart C
Section 15.209: 2007
FCC ID : BGBX1T266IMB11104
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. Original test report number of this report is 27JE0286-HO-A.

Date of test:

July 30, 2007

Tested by:

Shinya Watanabe
EMC Services

Approved by :

Mitsuru Fujimura
EMC Services



NVLAP LAB CODE: 200572-0

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.
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CONTENTS	PAGE
SECTION 1: Client information	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing	7
SECTION 5: Radiated emission (Fundamental and Spurious Emission and –26dB Bandwidth)...	8
APPENDIX 1: Photographs of test setup	9
Radiated Emission.....	9
Worst Case Position (X-axis).....	10
APPENDIX 2: Data of EMI test.....	11
Radiated Emission below 30MHz (Fundamental and Spurious Emission).....	11
Radiated Emission above 30MHz (Spurious Emission)	12
-26dB Bandwidth.....	13
99% Occupied Bandwidth.....	14
APPENDIX 3: Test instruments	15

SECTION 1: Client information

Company Name	:	Mitsubishi Electric Corporation Himeji Works
Address	:	840 Chiyoda-machi Himeji-city, Hyogo-pref. 670-8677, Japan
Telephone Number	:	+81-792-98-8896
Facsimile Number	:	+81-792-98-9262
Contact Person	:	Yoshiharu Goto

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

2.1 Identification of E.U.T.

Type of Equipment	:	Immobilizer System
Model No.	:	IMB111-04
Sample No.	:	20070727-01
Country of Manufacture	:	Japan
Rating	:	DC12V
Receipt Date of Sample	:	July 30, 2007
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: IMB111-04 (referred to as the EUT in this report) is Immobilizer System.

Clock frequencies	:	CPU: 4MHz
Equipment Type	:	Transceiver
[Transmitter]		
Frequency of Operation	:	134.45kHz
Type of modulation	:	CW
Method of Frequency generation	:	Crystal
Antenna Type	:	Inductive loop
Operating voltage (Inner)	:	DC5.0V

[Receiver]		
Frequency of Operation	:	134.45kHz
Type of modulation	:	FSK
Operating voltage (Inner)	:	DC5.0V

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2007
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements

FCC 15.31 (e)

The power supply of this EUT is transformed to DC5.0V and provides stable voltage (DC5.0V) constantly to Radio part. 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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3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	<FCC> ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC> RSS-Gen 7.2.2	<FCC> Section 15.207 <IC> RSS-Gen 7.2.2	-	N/A *1)	N/A	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	25.4dB 0.13464MHz 0 deg. AV (Ant-Max)	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	8.3dB 160.172MHz, QP, Horizontal	Complied
4	-26dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Reference data <IC> -	Radiated	N/A	N/A	N/A

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

*1) The test is not applicable since the EUT does not have AC Mains.

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

3.3 Addition to standards

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	N/A

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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.

Spurious Emission (Radiated)

The measurement uncertainty for this test using Loop antenna is $\pm 4.41\text{dB}(3\text{m})/\pm 4.39\text{dB}(10\text{m})$.

The measurement uncertainty for this test using Biconical antenna is $\pm 4.59\text{dB}(3\text{m})/\pm 4.58\text{dB}(10\text{m})$.

The measurement uncertainty for this test using Logperiodic antenna is $\pm 4.62\text{dB}(3\text{m})/\pm 4.60\text{dB}(10\text{m})$.

The measurement uncertainty for this test using Horn antenna is $\pm 5.27\text{dB}$.

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

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty for this test is $\pm 3.0\text{dB}$.

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	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	-

* 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.

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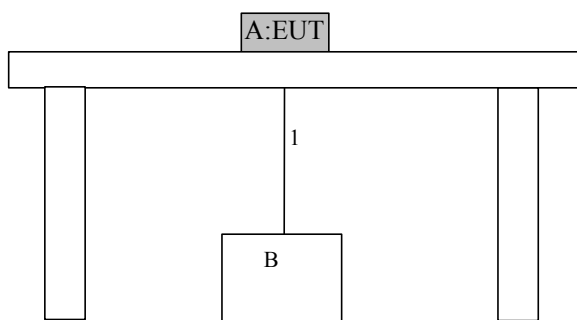
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used : Continuous Transmitting mode (and Continuous Receiving mode)

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

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	Immobilizer System	IMB111-04	20070727-1	Mitsubishi Electric Corporation Himeji Works	EUT
B	Car Battery	40B19L	A030402	YUASA	-

List of cables used

No.	Name	Length (m)	Shield
1	DC Cable	1.3	N

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SECTION 5: Radiated emission (Fundamental and Spurious Emission and -26dB Bandwidth)

Test Procedure

The Radiated Electric Field Strength intensity has been measured on No 4 semi anechoic chamber 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 each antenna angle 0deg. , 45deg. and 90deg.

Frequency : From 30MHz to 1GHz at distance 3m

The measuring antenna height 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 (below 1GHz).

	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 (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies were measured.

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

[Limit at 3m]=[Limit at 300m]-40 x log (3[m]/300[m])

[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

Test data : APPENDIX 3

Test result : Pass

Date: July 30, 2007

Test engineer: Shinya Watanabe

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