



RADIO TEST REPORT

Test Report No.: 28KE0028-YK-A

Applicant : Mitsubishi Cable Industries, LTD.
Type of Equipment : Remote Control Unit
Model No. : PZ113-00121
FCC ID : WKE-PZ113-00121
Test regulation : FCC Part15 Subpart C: 2008
Test result : Complied

1. This test report shall not be reproduced except 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 the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: July 23 and 24, 2008

Tested by:

Tatsuya Arai

Approved by:

Toyokazu Imamura
Engineer of Yamakita EMC Lab.

UL Japan, Inc.

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1 Applicant Information

Company Name : Mitsubishi Cable Industries, LTD.
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Facsimile Number : +81 566 97 3251
Contact Person : Hiroshi Kurumagawa

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

2.1 Identification of E.U.T.

Type of Equipment : Remote Control Unit
Model No. : PZ113-00121
Serial No. : Refer to 4.2 in this report.
Rating : DC12V
Country of Manufacture : Japan
Receipt Date of Sample : July 23, 2008
Condition of EUT : Production prototype
(This sample is equivalent to mass-produced items)
Modification of EUT : No modification by the test lab.

2.2 Product Description

Model: PZ113-00121 (referred to as the EUT in this report) is a Remote control unit which transmits coded radio signal to the vehicle according to wired serial communication with the in-vehicle main unit.

Equipment type : Transmitter
Frequency of operation : 315MHz
Clock frequency : Module:9.84375MHz
Type of modulation : FSK (Manchester)
Antenna type : Loop Antenna
Antenna connector type : None
ITU code : F1D
Operation temperature range : -30 to +75 deg.C.

*FCC Part15.31 (e)

This test was performed with the power supply (DC 3V); therefore, this EUT complies with the requirement.

*FCC Part15.203

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 requirement.

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3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2008 , final revised on May 19, 2008
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.209 Radiated emission limits, general requirements
 Section 15.231 Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz

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 15.207	-	N/A *1)	-	N/A
Automatically Deactivate	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.231(a)(1)	Radiated	N/A	-	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.231 (b)	Radiated	N/A	20.4dB (Horizontal, PK)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.205 FCC 15.209 FCC 15.231 (b)	Radiated	N/A	3.6dB (1890.00MHz, Horizontal, AV)	Complied
-20dB Bandwidth	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.231(c)	Radiated	N/A	-	Complied

*1) The test is not applicable since the EUT has no AC mains.

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	-	Complied

* 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 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Radiated emission (3m)			
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB
1GHz<	5.7 dB	5.7 dB	5.7 dB

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

3.5 Test Location

UL Japan, Inc. Yamakita EMC Lab.

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Telephone number : +81 465 77 1011

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NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on July 23, 2008 (Registration No.: 95486).

IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on February 27, 2008 (Registration No.: 466226).

IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

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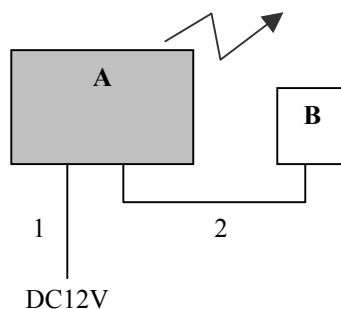
4 System Test Configuration

4.1 Justification

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

Test item	Operating mode	Tested frequency
All items	Transmitting (FSK), PRBS9	315MHz

4.2 Configuration of Tested System



* 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 *1)	Manufacturer	Remarks
A	Remote Control Unit	PZ113-00121	UPR0001 UPR0002	Mitsubishi Cable Industries, LTD.	EUT
B	Switch	-	-	-	Jig

*1) Test of Automatically deactivate and Bandwidth: UPR0002, Other test: UPR0001

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	DC power cable	0.75	Unshielded	Unshielded
2	Switch cable	0.4	Unshielded	Unshielded

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5 Automatically Deactivate

5.1 Operating environment

The test was carried out in No.1 anechoic chamber.

5.2 Test procedure

The bandwidth was measured with a spectrum analyzer and a search coil placed by the EUT.

Limit: A manually transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.3 Results

Summary of the test results : Pass

Date : July 23, 2008 Test engineer : Tatsuya Arai

6 Radiated Emissions (Fundamental & Spurious)

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

6.3 Test conditions

Frequency range : 30MHz - 4GHz
Test distance : 3m
EUT operation mode : Transmitting

The Radiated Electric Field Strength intensity has been measured 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 intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with PK detector.

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

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector	PK: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz
IF Bandwidth		AV: PK with Duty factor

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

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 12. With the position, the noise levels of all the frequencies were measured.

	Below 1GHz	Above 1GHz
Horizontal	Y	X
Vertical	Y	Z

6.4 Results

Summary of the test results : Pass

Date : July 24, 2008 Test engineer : Tatsuya Arai

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7 Bandwidth

7.1 Operating environment

The test was carried out in No.1 anechoic chamber.

7.2 Test procedure

The bandwidth was measured with a spectrum analyzer and an antenna which is placed by the EUT.

7.3 Results

Summary of the test results: Pass

Date : July 23, 2008 Test engineer : Tatsuya Arai

APPENDIX 1: Photographs of test setup

Page 11 : Radiated emission
Page 12 : Pre-check of the worst position

APPENDIX 2: Test Data

Page 13 : Automatically Deactivate

Page 14 - 17 : Radiated Emission
14 : Fundamental
15 : Spurious (30-1000MHz)
16-17 : Spurious (1-4GHz)
18 : Duty Cycle

Page 19 - 20 : -20dB Bandwidth and Occupied Bandwidth

APPENDIX 3: Test instruments

Page 21 : Test instruments