



# RADIO TEST REPORT

Test Report No. : 30AE0049-HO-01-A

**Applicant** : Mitsubishi Electric Corporation Himeji Works  
**Type of Equipment** : Remocon-Key system (Transmitter)  
**Model No.** : SKEA5S-03  
**Test standard** : FCC Part 15 Subpart C : 2009  
Section 15.231  
**FCC ID** : WAZF8T732SKEA5S03  
**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.

**Date of test:** August 17, 2009

**Tested by:**

Hironobu Ohnishi  
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-shi Hyogo, 670-8677, Japan  
Telephone Number : +81-79-298-9143  
Facsimile Number : +81-79-298-8879  
Contact Person : Toshiaki Hata

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

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

Type of Equipment : Remocon-Key system (Transmitter)  
Model No. : SKEA5S-03  
Serial No. : Refer to Clause 4.2  
Rating : DC3.0V (One lithium battery: CR2016 x 1)  
Receipt Date of Sample : August 8, 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**

Remocon-Key(Remote Control Key) system  
for Outboards Engine

### **General Specification**

Clock frequency(ies) in the system : 4MHz

### **Radio Specification**

#### **[Tx part]**

Radio Type : Transmitter  
Frequency of Operation : 314.95MHz  
Modulation : ASK  
Method of Frequency generation : SAW Resonator Tx  
Antenna type : Pattern Antenna

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2009, final revised on February 27, 2009  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.231 Periodic operation in the band 40.66 - 40.70MHz  
and above 70MHz

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
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	N/A*1)	-
Automatically Deactivate	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(a)(1) ----- IC: RSS-210 A1.1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.8	FCC: Section 15.231(b) ----- IC: RSS-210 A1.1.2	14.7dB 314.976MHz Horizontal (PK with Duty factor)	Complied	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: RSS-Gen 4.9	FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.1.2, 2.6, 2.7	5.7dB 1574.878MHz Horizontal (PK with Duty factor) 5.7dB 2519.805MHz Vertical (PK with Duty factor)	Complied	Radiated
-20dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(c) ----- IC: Reference data	N/A	Complied	Radiated
Receiver Spurious Emissions	FCC: ANSI C63.4:2003 12. Measurement of unintentional radiators other than ITE IC: RSS-Gen 4.10	FCC: Section 15.109(a) Section 15.209 ----- IC: RSS-Gen 6(a) RSS-210 2.6	N/A	N/A*2)	-

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.  
\*2) The test is not applicable since the EUT does not have Receiving mode.

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

This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to the EUT during the tests.  
Therefore, the EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

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

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	N/A	Radiated

Other than above, 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)	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

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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, Test instruments.

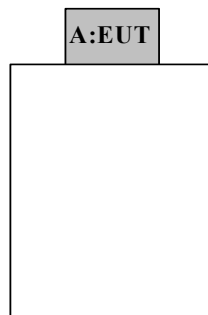
Refer to APPENDIX.

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

### 4.1 Operating Modes

Test Item*	Mode
Automatically Deactivate -20dB & 99% Occupied Bandwidth Duty Cycle	Normal use mode
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission	Transmitting mode (Tx)
* The system was configured in typical fashion (as a customer would normally use it) for testing.	

### 4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.

#### Description of EUT

No	Item	Model number	Serial number	Manufacturer	Remarks
A	Remocon-Key system (Transmitter)	SKEA5S-03	001 *1) 002 *2)	Mitsubishi Electric Corporation Himeji Works	EUT

\*1) Used for Normal use mode

\*2) Used for Transmitting mode (Tx)

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**SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)**

**Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The EUT was set on the center 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.

**[Transmitting mode]**

The Radiated Electric Field Strength has been measured on Semi anechoic chamber 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 strength.  
The measurements were performed for both vertical and horizontal antenna polarization.  
The radiated emission measurements were made with the following detector function of the test receiver/spectrum analyzer.

**Test Antennas are used as below;**

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

	Below or equal to 1GHz	Above 1GHz
Detector Type	Peak and Peak with Duty factor	Peak and Peak with Duty factor
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:1MHz

- 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 was measured.

\*The result is rounded off to the second decimal place, so some differences might be observed.

**Measurement range** : 30MHz-3.2GHz  
**Test data** : APPENDIX  
**Test result** : Pass



## **SECTION 6: Automatically deactivate**

### **Test Procedure**

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

Test data : APPENDIX  
Test result : Pass

## **SECTION 7: -20dB and 99% Occupied Bandwidth**

### **Test Procedure**

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

Test data : APPENDIX  
Test result : Pass