



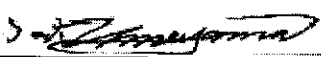
EMI TEST REPORT

Test Report No. : 24AE0064-HO-4

Applicant : Mitsubishi Electric Corporation Himeji Works
Type of Equipment : Remocon-Key system (Transmitter)
Model No. : SKEA5S-01
Test standard : FCC Part 15 Subpart C Section 15.209, Section 15.231
FCC ID : BGBF8T732SKEA5S01
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : September 19 and 22, 2003

Tested by : 
Hiroka Umeyama
EMC Service

Approved by : 
Hironobu Shimoji
Group Leader of EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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MF060b(10.04.03)

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SECTION 1: Client information

Company Name : Mitsubishi Electric Corporation Himeji Works
Address : 840 Chiyoda-machi Himeji-shi Hyogo, 670-8677, Japan
Telephone Number : +81-792-98-9143
Facsimile Number : +81-792-98-8879
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-01
Serial No. : 125, 126
Country of Manufacture : Japan
Receipt Date of Sample : September 16, 2003
Condition of EUT : Production prototype
(Not for sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Mitsubishi Electric Corporation Himeji Works, Model No:SKEA5S-01 is the Remocon-Key system (Transmitter).
The system is mainly used as a Remocon-Key system for Personal Water Craft.
The clock frequency of EUT is 4MHz.

(Transmitter)
Frequency operation : 314.95MHz
Type of modulation : ASK
Antenna Type : Pattern Antenna
Bandwidth : 220kHz
Power Supply : DC2.3-3V
Temperature of operation : -10 deg. C. -+60 deg. C.
ITU Code : K1D

FCC 15.31 (e)

This EUT is provided with stable voltage(DC3V) constantly from battery. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

Type of Equipment and its antenna comply with this requirement since they are built in host device M/N: SKEA5S-01
When they are put up for sale and they are used with a particular antenna connector for this EUT.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
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

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Automatically Deactivate	ANSI C63.4:2001	Section 15.231(a)(1)	N/A	-	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2001	Section 15.231(b)	N/A	31.2dB 315.00MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2001	Section 15.205 Section 15.209 Section 15.231(b)	N/A	19.6dB 2835.00MHz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2001	Section 15.231(c)	N/A	-	Complied

Note: UL Apex's EMI Work procedures No. QPM05

*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	RSS210(issue 5) + Amendment	RSS210(issue 5) + Amendment	Conducted	N/A	N/A	N/A

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.209, Section 15.231.

Remarks : The EUT was separately tested in accordance with FCC Part 15 Subpart B and Declaration of Conformity was applied

3.5 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is ± 6.6 dB.

The data listed in this test report has enough margin.

The result is within Head Office EMC lab's uncertainty.

UL Apex Co., Ltd.

Head Office EMC Lab.

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3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.

No.2 semi anechoic chamber.

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No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)

*NVLAP Lab. code: 200572-0

3.7 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

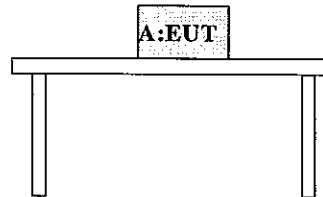
4.1 Operating Modes

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

The sequence is used : Transmitting mode

Justification: 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	FCC ID	Remarks
A	Remocon-Key system (Transmitter)	SKEA5S-01	125/126	Mitsubishi Electric Corporation Himeji Works	BGBF8T732SKEA5S01	EUT

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

The test was carried out in No.2 semi anechoic chamber (7.5x5.8x5.2m).

Temperature : See data
Humidity : See 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 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.

A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 30MHz-3150MHz
Test distance : 3m
EUT position : Tabletop
EUT operation mode : Transmitting

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on No.2 semi anechoic chamber with a ground plane and at a distance of 3m.

Measurements were performed with the Peak, Quasi-Peak, and Average Detector.

The measuring antenna height was varied between 1 to 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.

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

	Below or equal to 1GHz	Above 1GHz
Detector Type	Peak/Quasi-Peak	Peak/Average
IF Bandwidth	120kHz	1MHz

-The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise level was recorded.

5.5 Results

Summary of the test results: Pass

Date: September 19, 2003

Tested by: Hiroka Umeyama

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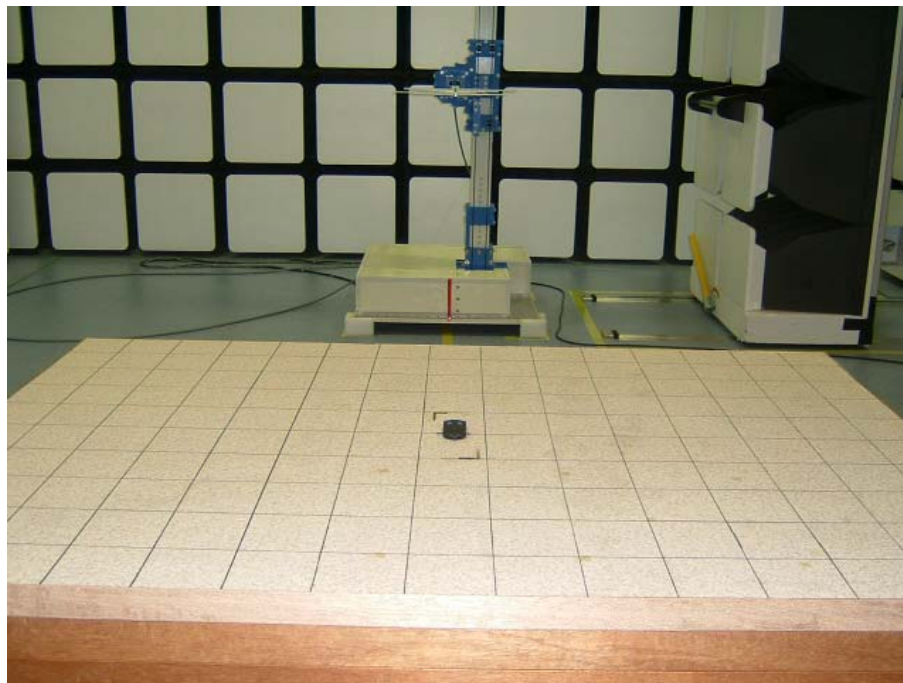
APPENDIX 1: Photographs of test setup

Radiated emission(Worst case position)

Front



Rear

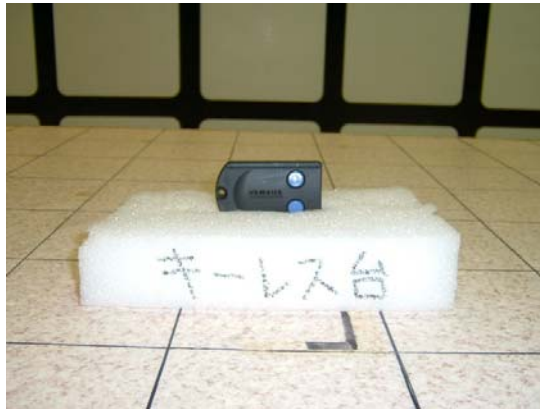


Worst Case Position (Horizontal : X-axis/ Vertical: Z-axis)

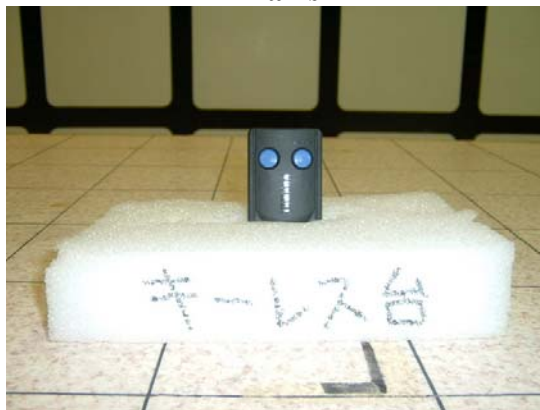
X-axis



Y-axis



Z-axis



APPENDIX 2:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacture	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	1, 2, 3	2003/04/11 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	1, 2, 3	2002/12/10 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	1	2003/01/31 * 12
MCC-04	Microwave Cable	Storm	421-011	1	2003/01/14 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1	2003/04/28 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	1	2003/04/28 * 12
MPA-02	Pre Amplifier	Agilent	87405A	1	2003/04/17 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	1	2002/12/24 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	—	1	2003/05/08 * 12
MPA-01	Pre Amplifier	Agilent	8449B	1	2003/02/08 * 12
MCC-24	Microwave Cable	Storm	—	1	2003/04/30 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	1	2003/01/11 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test item:

- 1: Radiated Emission
- 2: -20dB bandwidth, 99% Occupied Bandwidth
- 3: Automatically deactivate

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Revised date : December 19, 2003
FCC ID : BGBF8T732SKEA5S01

APPENDIX 3: Data of EMI test

Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

UL Apex Co., Ltd.
EMC HEAD OFFICE DIVISION No.2 SEMI ANECHOIC CHAMBER

COMPANY : Mitsubishi Electric Corporation himeji Works
EQUIPMENT : Remocon-Key system (Transmitter)
MODEL : SKEA5S-01
S/N : 126
FCC ID : BGBF8T732SKEA5S01
IC Number : 662F-SKEA5S01
POWER : DC3.0V
Mode : Transmitting

REPORT NO : 24AE0064-HO
REGULATION : Fcc Part15 Subpart C 231(b) / 205
TEST DISTANCE : 3m / 1m
DATE : 2003/09/19
TEMPERATURE : 26°C
HUMIDITY : 62%

ENGINEER : Hiroka Umeyama

No.	FREQ [MHz]	T/R READING : PK		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
		HOR	VER					HOR	VER		HOR	VER
		[dBuV/m]						[dB]	[dB]		[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Factor												
1	315.00	50.4	47.5	14.8	23.2	2.4	0.0	44.4	41.5	75.6	31.2	34.1

No.	FREQ	T/R READING : QP		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN	
	[MHz]	HOR [dBuV/m]	VER					HOR [dBuV/m]	VER		HOR [dB]	VER [dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Factor												
2	630.00	22.7	32.4	19.9	23.2	3.6	0.0	23.0	32.7	55.6	32.6	22.9
3	945.00	16.6	14.6	22.4	22.9	4.7	0.0	20.8	18.8	55.6	34.8	36.8

No.	FREQ	T/R READING : PK		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
	[MHz]	HOR	VER					Factor	GAIN		Factor	HOR
		[dBuV/m]		[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Factor												
4	1260.00	41.5	46.5	22.9	37.6	4.6	0.0	31.4	36.4	75.6	44.2	39.2
5	1575.00	46.2	46.9	25.1	37.2	5.2	0.0	39.3	40.0	74.0	34.7	34.0
Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Fator - Dfac												
6	1890.00	45.5	45.4	29.0	37.0	5.7	0.0	33.7	33.6	75.6	41.9	42.0
7	2205.00	45.3	45.3	30.4	36.9	6.1	0.0	35.4	35.4	74.0	38.6	38.6
8	2520.00	45.4	45.4	30.7	36.9	6.5	0.0	36.2	36.2	75.6	39.4	39.4
9	2835.00	45.6	45.5	31.9	37.1	6.9	0.0	37.8	37.7	74.0	36.2	36.3
10	3150.00	45.7	45.7	31.8	37.1	7.2	0.0	38.1	38.1	75.6	37.5	37.5

No.	FREQ	T/R READING : AV		ANT	AMP	LOSS	Duty	RESULT		Limit	MARGIN	
	[MHz]	HOR	VER					Factor	GAIN		Factor	HOR
		[dBuV/m]		[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	[dB]
Test distance 3meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Factor												
4	1260.00	27.3	33.1	22.9	37.6	4.6	0.0	17.2	23.0	55.6	38.4	32.6
5	1575.00	33.5	34.1	25.1	37.2	5.2	0.0	26.6	27.2	54.0	27.4	26.8
Test distance 1meter RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS + Duty Factor - Dfac												
6	1890.00	32.3	32.2	29.0	37.0	5.7	0.0	20.5	20.4	55.6	35.1	35.2
7	2205.00	32.5	32.4	30.4	36.9	6.1	0.0	22.6	22.5	54.0	31.4	31.5
8	2520.00	32.6	32.5	30.7	36.9	6.5	0.0	23.4	23.3	55.6	32.2	32.3
9	2835.00	32.7	32.6	31.9	37.1	6.9	0.0	24.9	24.8	54.0	29.1	29.2
10	3150.00	32.7	32.7	31.8	37.1	7.2	0.0	25.1	25.1	55.6	30.5	30.5

REMARKS

ANTENNA TYPE:30-300MHz Biconical / 300-1000MHz Logperiodic / 1-3.2GHz Horn

Test Distance 1.0m : Distance Factor(Dfac) = 20log(3/1.0) = 9.5 dB

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

*EUT was placed in X axis when the measurement antenna was positioned horizontally.

*EUT was placed in Z axis when the measurement antenna was positioned vertically.

*The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise.

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-20dB Bandwidth/Automatically deactivate

DATA OF -20dB-Bandwidth

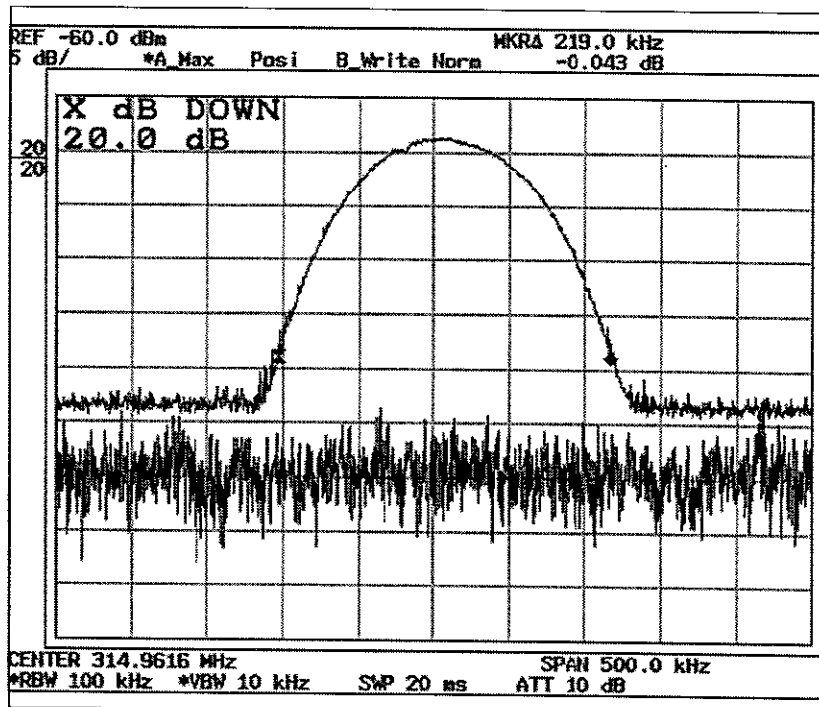
UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: Mitsubishi Electric Corporation Himeji Works	REPORT NO	: 24AE0064-HO
EQUIPMENT	: Remocon-Key system (Transmitter)	REGULATION	: Fcc Part15 Subpart C 231(c) / 205
MODEL	: SKEA5S-01	TEST DISTANCE	: -
S/N	: 126	DATE	: 09/22/2003
FCC ID	: BGBF8T732SKEA5S01	TEMPERATURE	: 25°C
IC No.	: 662F-SKEA5S01	HUMIDITY	: 45%
POWER	: DC3.0V		
Mode	: Transmitting		

ENGINEER : Hikoka Umeyama

Bandwidth Limit : Fundamental Frequency 314.95MHz X 0.25% = 787.375 kHz

-20dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
219.00	787.38	Pass



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DATA OF AUTOMATICALLY DEACTIVATE

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

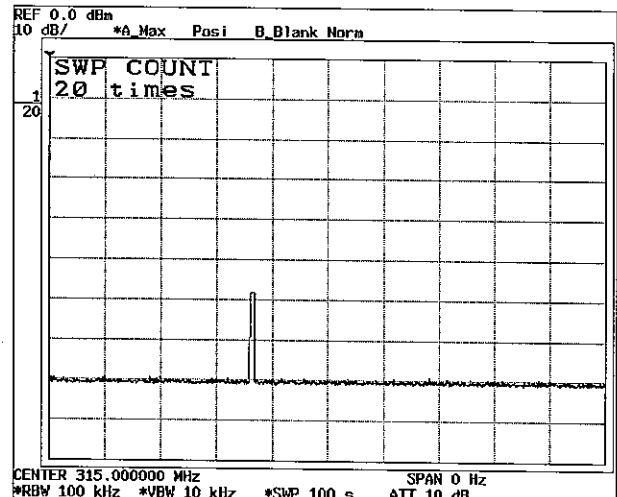
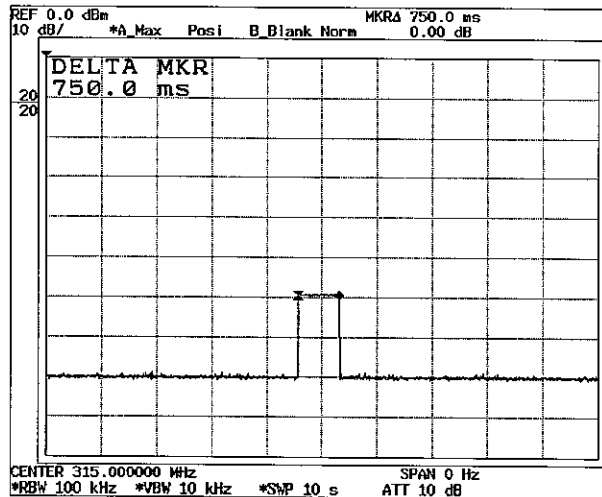
COMPANY : Mitsubishi Electric Corporation Himeji Works
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MODEL : SKEA5S-01
S/N : 126
FCC ID : BGBF8T732SKEA5S01
IC No. : 662F-SKEA5S01
POWER : DC3.0V
Mode : Transmitting

REPORT NO : 24AE0064-HO
REGULATION : Fcc Part15 Subpart C 231(a) / 205
TEST DISTANCE : -
DATE : 09/22/2003
TEMPERATURE : 25°C
HUMIDITY : 45%

[Signature]

ENGINEER : Hiroka Umeyama

Time of Transmitting [sec]	Limit [sec]	Result
0.75	5.00	Pass



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99% Occupied Bandwidth

