



RADIO TEST REPORT

Test Report No. : 26LE0004-HO-B-1

Applicant : Mitsubishi Electric Corporation
Himeji Works

Type of Equipment : KIPASS SYSTEM

Model No. : SKEB7A-02 (Smart Transmitter)

Test standard : FCC Part 15 Subpart C Section 15.231:2006


FCC ID : BGBF8T736SKEB7A02

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.
4. The test results in this report are traceable to the national or international standards.

Date of test : August 22, 2006

Tested by : 
Takumi Shimada
EMC Services

Approved by : 
Naoki Sakamoto
Group Leader of 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.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://ulapex.jp/emc/nvlap.htm>

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SECTION 1: Client information

Company Name	:	Mitsubishi Electric Corporation Himeji Works
Address	:	840 Chiyoda-machi Himeji 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	:	KIPASS SYSTEM
Model No.	:	SKEB7A-02 (Smart Transmitter)
Serial No.	:	3 (Smart Transmitter)
Rating	:	DC3V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	August 11, 2006
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

Mitsubishi Electric Corporation Himeji Works Model No: SKEB7A-02 is the KIPASS SYSTEM.
The system is mainly used as a Smart Keyless Entry System for Motorcycles.
The clock frequency of EUT is 5 MHz , 10 MHz and 20MHz

[Smart Transmitter : SKEB7A-02]

UHF Part

Equipment Type	:	Transceiver
Frequency band	:	315MHz
Type of modulation	:	FM
Bandwidth	:	100kHz
Frequency of operation	:	315MHz
Other clock frequency	:	5MHz
Antenna Type	:	Pattern Antenna
Method of Frequency Generation	:	Synthesizer
Operating voltage (inner)	:	DC +3.0V

LF Part

Type of Receiver	:	Receiver
Frequency of operation	:	132.45kHz
Intermediate frequency	:	-
Other clock frequency	:	5MHz
Antenna Type	:	Inductive Loop
Method of Frequency Generation	:	Synthesizer
Operating voltage (inner)	:	DC +3.0V

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	: FCC Part 15 Subpart C : 2006
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

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

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	Deviation	Worst margin	Results
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
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.6	<FCC> Section 15.231(b) <IC> RSS-210 A1.1.2	N/A	5.9dB 315MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.7	<FCC> Section 15.205 Section 15.209 Section 15.231(b) <IC> RSS-210 A1.1.2, 2.6, 2.7	N/A	7.5dB 2205MHz Horizontal	Complied
4	-20dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Section 15.231(c) <IC> Reference data	N/A	-	Complied
5	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

Note: UL Apex's EMI Work procedures No. QPM05 and QPM15

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

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	<IC> RSS-Gen 4.4.1	<IC> RSS-210 A1.1.3	Conducted	N/A	N/A	N/A

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3.4 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.59 dB.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 4.62 dB.
The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is ± 5.27 dB.
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Apex Co., Ltd. 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	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
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	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 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.7 shielded room.

3.6 Test set up, Test instruments and Data of EMI

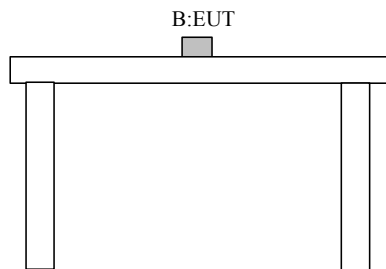
Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

The mode is used : Continuous Transmitting mode (315MHz)
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	Smart Transmitter	SKEB7A-02	3	Mitsubishi Electric Corporation Himeji Works	EUT

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.2 semi anechoic chamber
 Temperature : See data
 Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. 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-3200MHz
 Test distance : 3m
 EUT position : Top of Polyurethane table
 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.
 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.
 The radiated emission measurements were made with the following detector function of the test receiver.

	Below or equal to 1GHz	Above 1GHz (FCC15.205)	Above 1GHz (FCC15.231)
Detector Type	QP	Peak with Duty factor	Peak with Duty factor
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:1MHz	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.

5.5 Results

Summary of the test results: Pass

Date : August 22, 2006

Tested by: Takumi Shimada

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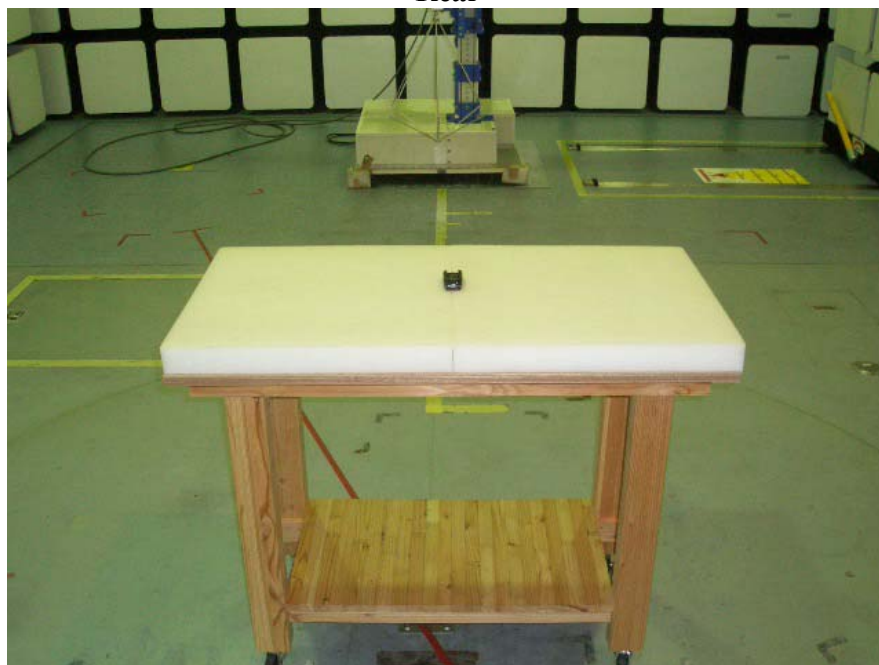
APPENDIX 1: Photographs of test setup

Radiated emission

Front



Rear



Worst case position(Horizontal: X-axis/Vertical : Y-axis)

X-axis



Y-axis



Z-axis



APPENDIX 2: Data of EMI test

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

Company : Mitsubishi Electric Corp., Himeji Works
Equipment : KIPASS SYSTEM
Model : SKEB7A-02
S/N : 3
Power : DC3.0V
Mode : Continuous Transmitting

UL-Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber
Regulation : FCC Part15 Subpart C 15.231(b) / 15.205 / 15.209
Test Distance: 3m
Date : 08/22/2006
Temperature: 24 deg.C.
Humidity : 62 %
Engineer : Takumi Shimada

(fundamental) QP DETECT											
No.	FREQ [MHz]	T/R READING : QP HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT HOR VER [dBuV/m]		Limit [dBuV/m]	MARGIN HOR VER [dB] [dB]
1	315.00	73.6	70.9	14.7	27.2	8.6	-	69.7	67.0	75.6	5.9 8.6

(below 1GHz) QP DETECT											
No.	FREQ [MHz]	T/R READING : QP HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT HOR VER [dBuV/m]		Limit [dBuV/m]	MARGIN HOR VER [dB] [dB]
2	629.98	25.3	30.0	19.6	28.7	9.5	-	25.7	30.4	55.6	29.9 25.2
3	944.95	33.3	32.2	22.2	27.7	10.5	-	38.3	37.2	55.6	17.3 18.4

(above 1GHz) PK DETECT (RBW: 1MHz, VBW: 1MHz) (Inside Restricted bands (PK))											
No.	FREQ [MHz]	S/A READING HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT HOR VER [dBuV/m]		Limit [dBuV/m]	MARGIN HOR VER [dB] [dB]
4	1260.00	44.3	45.0	23.5	33.4	2.6	-	37.0	37.7	75.6	38.6 37.9
5	1575.00	44.8	47.2	25.3	32.9	2.8	-	40.0	42.4	74.0	34.0 31.6
6	1890.00	44.2	44.2	29.9	32.4	3.0	-	44.7	44.7	75.6	30.9 30.9
7	2205.00	47.4	44.6	30.9	32.4	3.2	-	49.1	46.3	74.0	24.9 27.7
8	2520.00	44.5	42.9	30.5	32.4	3.5	-	46.1	44.5	75.6	29.5 31.1
9	2835.00	42.9	42.8	31.4	32.2	3.6	-	45.7	45.6	74.0	28.3 28.4
10	3150.00	42.7	42.6	31.7	32.1	3.8	-	46.1	46.0	75.6	29.5 29.6

AV MEASUREMENT Result = Reading (RBW: 1MHz, VBW: 1MHz) + Duty Factor											
No.	FREQ [MHz]	S/A READING HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT HOR VER [dBuV/m]		Limit [dBuV/m]	MARGIN HOR VER [dB] [dB]
4	1260.00	44.3	45.0	23.5	33.4	2.6	-2.6	34.4	35.1	55.6	21.2 20.5
5	1575.00	44.8	47.2	25.3	32.9	2.8	-2.6	37.4	39.8	54.0	16.6 14.2
6	1890.00	44.2	44.2	29.9	32.4	3.0	-2.6	42.1	42.1	55.6	13.5 13.5
7	2205.00	47.4	44.6	30.9	32.4	3.2	-2.6	46.5	43.7	54.0	7.5 10.3
8	2520.00	44.5	42.9	30.5	32.4	3.5	-2.6	43.5	41.9	55.6	12.1 13.7
9	2835.00	42.9	42.8	31.4	32.2	3.6	-2.6	43.1	43.0	54.0	10.9 11.0
10	3150.00	42.7	42.6	31.7	32.1	3.8	-2.6	43.5	43.4	55.6	12.1 12.2

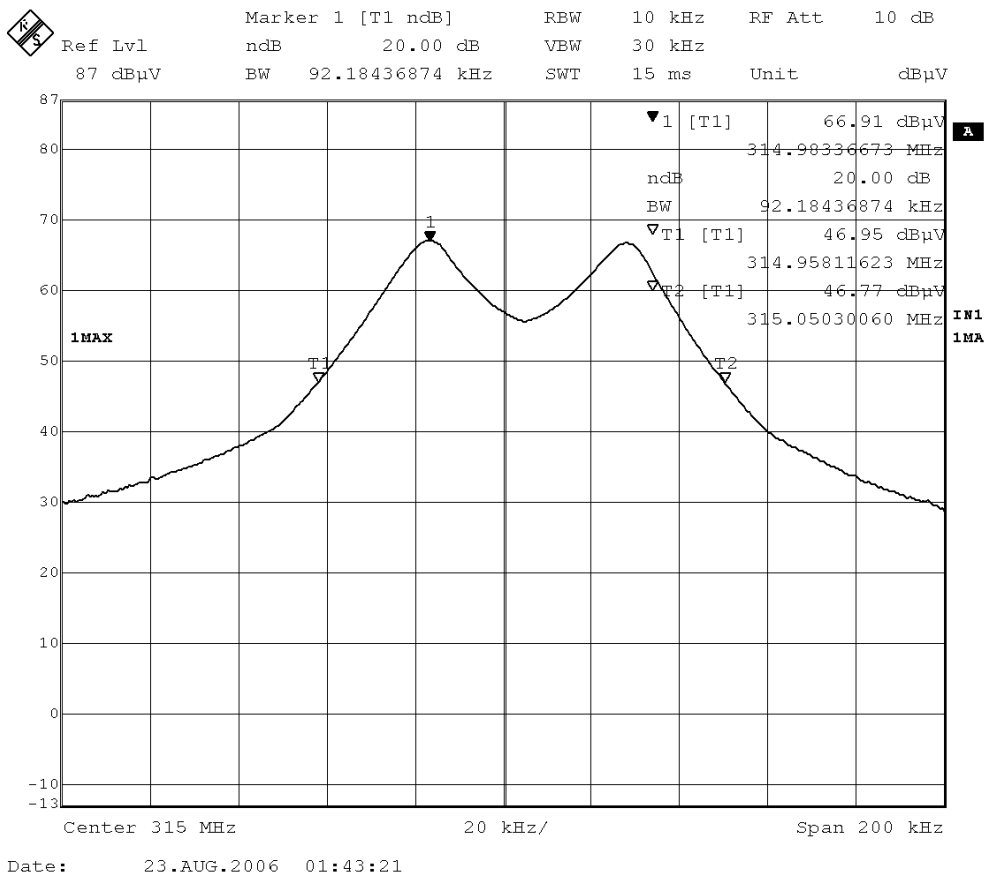
REMARKS
ANTENNA TYPE:30-300MHz Biconical / 300-1000MHz Logperiodic / 1-3.2GHz Horn
CALCULATION RESULT=Reading + ANT Factor - Amp Gain + LOSS (Cable+ ATTN.)+Duty factor
Duty cycle Factor Measurement : The duty cycle factor = 20 log (On time[sec.] / 1 cycle time[sec.]) :-2.6dB
* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*Except for the above table : All other spurious emissions were less than 20dB for the limit.
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.
With the position, the noise levels of all the frequencies was measured.

-20dB Bandwidth

Company	: Mitsubishi Electric Corp., Himeji Works	UL-Apex Co., Ltd.
Equipment	: KIPASS SYSTEM	Head Office EMC Lab. No.1 Semi Anechoic Chamber
Model	: SKEB7A-02	Regulation
S/N	: 3	Test Distance
Power	: DC3.0V	Date
Mode	: Continuous Transmitting	Temperature
		Humidity
		Engineer

Bandwidth Limit : Fundamental Frequency 315.024 MHz X 0.25% = 787.56 kHz

-20dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
92.18	787.56	Pass



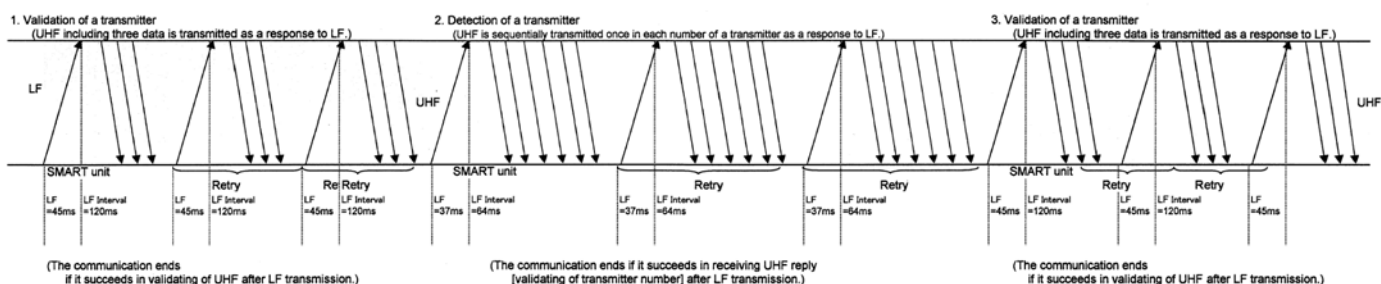
Automatically deactivate

Company : Mitsubishi Electric Corp., Himeji Works	Regulation : FCC Part15 Subpart C 15.231(a)
Equipment : KIPASS SYSTEM	Test Distance : -
Model : SKEB7A-02	
S/N : 3	
Power : DC3.0V	
Mode : Continuous Transmitting	

Time of Transmitting [sec]	Limit [sec]	Result
1.173	5.000	Pass

Outline for SMART validation communication

A sequence of validations of a potable device

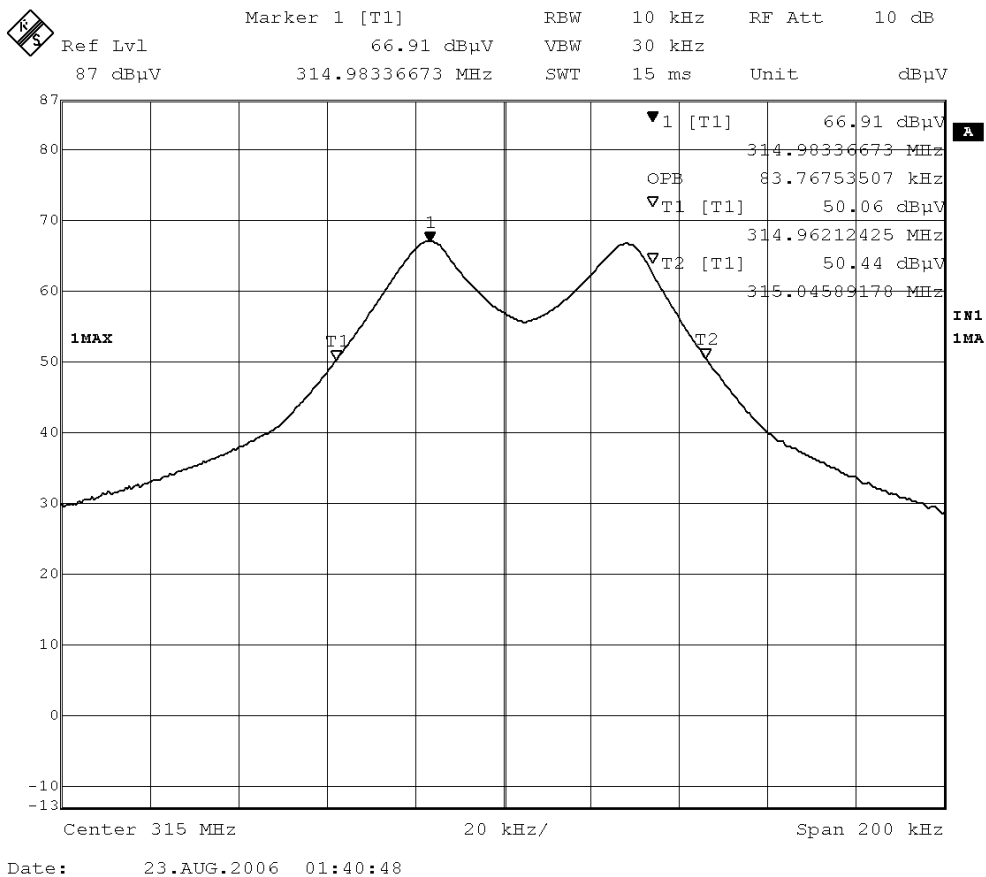


*Total time of transmitting is 1173ms (within the limit of 5 seconds) in this data.

99% Occupied Bandwidth

Company	: Mitsubishi Electric Corp., Himeji Works	UL-Apex Co., Ltd.	
Equipment	: KIPASS SYSTEM	Head Office EMC Lab. No.1 Semi Anechoic Chamber	
Model	: SKEB7A-02	Regulation	: RSS-Gen 4.4.1
S/N	: 3	Test Distance	: -
Power	: DC3.0V	Date	: 08/22/2006
Mode	: Continuous Transmitting	Temperature	: 24 deg.C.
		Humidity	: 62 %
		Engineer	: Takumi Shimada

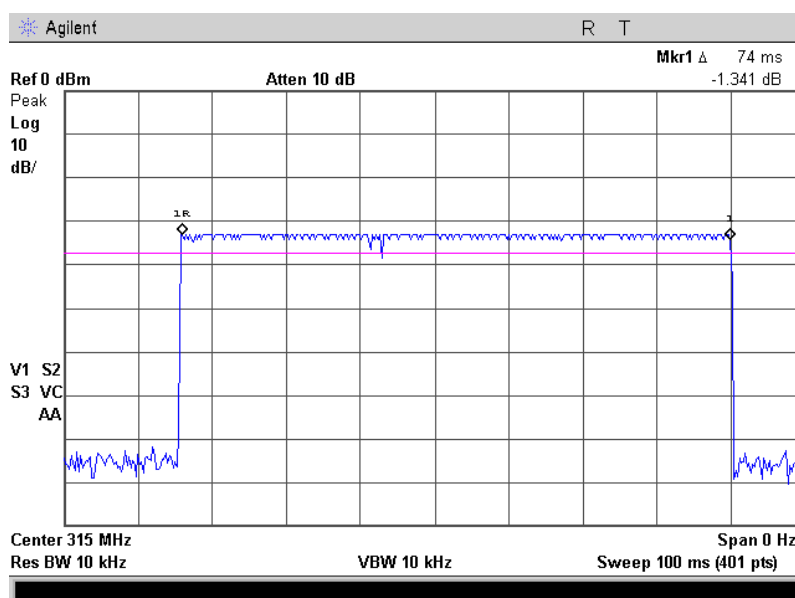
99% Occupied Bandwidth Result: 83.768kHz



Duty Cycle

Company	: Mitsubishi Electric Corp., Himeji Works	UL-Apex Co., Ltd.
Equipment	: KIPASS SYSTEM	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Model	: SKEB7A-02	Regulation
S/N	: 3	Test Distance
Power	: DC3.0V	Date
Mode	: Continuous Transmitting	Temperature
		Humidity
		Engineer

Time of Transmitting [ms]	Time of ON and OFF [ms]	Duty cycle	Duty Factor [dB]
74.00	100.00	0.74	-2.62



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APPENDIX 3:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	ME	2005/11/14 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2005/12/06 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/ Agilent/TSJ	-	ME	2005/12/18 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2006/05/27 * 12
MCC-30	coaxial cable	ULApex	-	ME	2006/05/29 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800		2004/11/25 * 24
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE/ME	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	ME	2005/11/10 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2005/10/10 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2005/10/14 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2006/02/23 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2005/12/16 * 12
MPA-09	Pre Amplifier	Agilent	8447D	RE	2005/09/07 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2006/01/09 * 12
MCC-16	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2006/02/02 * 12
MCC-47	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2005/08/30 * 12
MPA-10	Pre Amplifier	Agilent	8449B	RE	2005/09/07 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	RE	2006/03/04 * 12
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2006/04/10 * 12
MSTW-14	EMI measurement program	TSJ	TEPTO-DV	RE	-
MOS-02	Digital Humidity Indicator	N.T	NT-1800	RE	2004/11/25 * 24
MSA-06	Spectrum Analyzer	Agilent	E4407B	RE	2006/05/24 * 12

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

Test Item:

ME: Spurious emission

RE: Spurious emission

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