



UL Apex Co., Ltd.

Test report No. : 25LE0285-HO-1a
Page : 1 of 21
Issued date : August 18, 2005
Revised date : August 19, 2005
FCC ID : BGBX1T406SKE11A01,
BGBX1T502SKE11A01

EMI TEST REPORT

Test Report No. : 25LE0285-HO-1a

Applicant : Mitsubishi Electric Corporation Himeji Works

Type of Equipment : Smart Keyless System (ECU)

Model No. : SKE11A-01 (ECU)

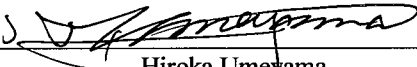
Test standard : FCC Part 15 Subpart C : 2005
Section 15.209 (Certification)
FCC Part 15 Subpart B : 2005
Section 15.109 (Certification)

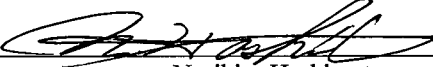
FCC ID : BGBX1T406SKE11A01 (Smart ECU)
BGBX1T502SKE11A01 (Receiver)

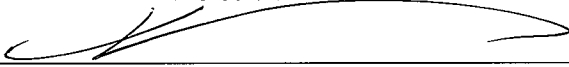
Test Result : Complied

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.

Date of test : October 30 and November 5, 2004

Tested by : 
Hiroka Umezama
EMC Service

: 
Norihisa Hashimoto
EMC Service

Approved by : 
Naoki Sakamoto
Group Leader of EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

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SECTION 1: Client information

Company Name : Mitsubishi Electric Corporation Himeji Works
Address : 840 CHIYODA-MACHI HIMEJI HYOUGO 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 : Smart keyless system (ECU)
Model No. : SKE11A-01
Serial No. : 1
Country of Manufacture : Japan
Receipt Date of Sample : October 19, 2004
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Equipment Type : Transceiver
Rating : DC 12.0V (Car battery)
Temperature of operation : -40 deg. C. -+85 deg. C.

Transmitter (Smart ECU)

Frequency Characteristics	132.45kHz
Modulation	PPM (Pulse Position Modulation)
Information antenna	Inductive loop
Mode of Operation	Simplex
Other Clock Frequency	10MHz
Method of frequency Generation	Crystal
Operating voltage (inner)	DC5V

Receiver

Type of Receiver	Super Heterodyne
Receiving Frequency	315MHz
Intermediate Frequency	10.7MHz
Method of frequency Generation	Crystal
Operating voltage (inner)	DC5V

FCC 15.31 (e)

This test was performed with the New Battery.

The power supply of this EUT is transformed by ECU and provides stable voltage(DC5.0V) constantly to Radio part.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

All Antennas are installed inside the vehicle doors and users cannot detach them from vehicle. Therefore, the equipment complies the requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C : 2005
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements.
Test Specification : FCC Part 15 Subpart B : 2005
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators
Section 15.109 Radiated emission limits

3.2 Procedures and results

1) FCC Part 15 Subpart C: 2005

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003	FCC Section 15.209	N/A	3.9dB 0.13245MHz 0 deg. AV	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2003	FCC Section 15.205 FCC Section 15.209	N/A	9.4dB 0.662MHz QP	Complied
3	Conducted Emission	ANSI C63.4:2003	FCC Section 15.207(a)	AC Mains only *1)	N/A	N/A

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

*1) This test is not applicable since the EUT does not have AC power port.

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

2) FCC Part 15 Subpart B: 2005

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Result
1	Radiated emission	ANSI C63.4:2003	FCC Section 15.109(a)	N/A	15.2dB 69.803MHz Horizontal	Complied
2	Conducted Emission	ANSI C63.4:2003	FCC Section 15.107(a) and 207	N/A	N/A *1)	N/A

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

*1) This test is not applicable since the EUT does not have AC power port.

*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): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4:2004	RSS210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4:2004	Radiated	N/A	N/A	N/A
2	-26dB Bandwidth	ANSI C63.4:2003	Reference data	Radiated	N/A	N/A	N/A

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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 : 2005 Section 15.209 and FCC Part 15 Subpart B : 2005 Section 15.109(a).

3.5 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 1.8 dB.
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. (For FCC Part 15 Subpart C and FCC Part 15 Subpart B)

3.6 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	846015	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 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 and No.2 semi-anechoic and No.3 shielded room.

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 mode is used :

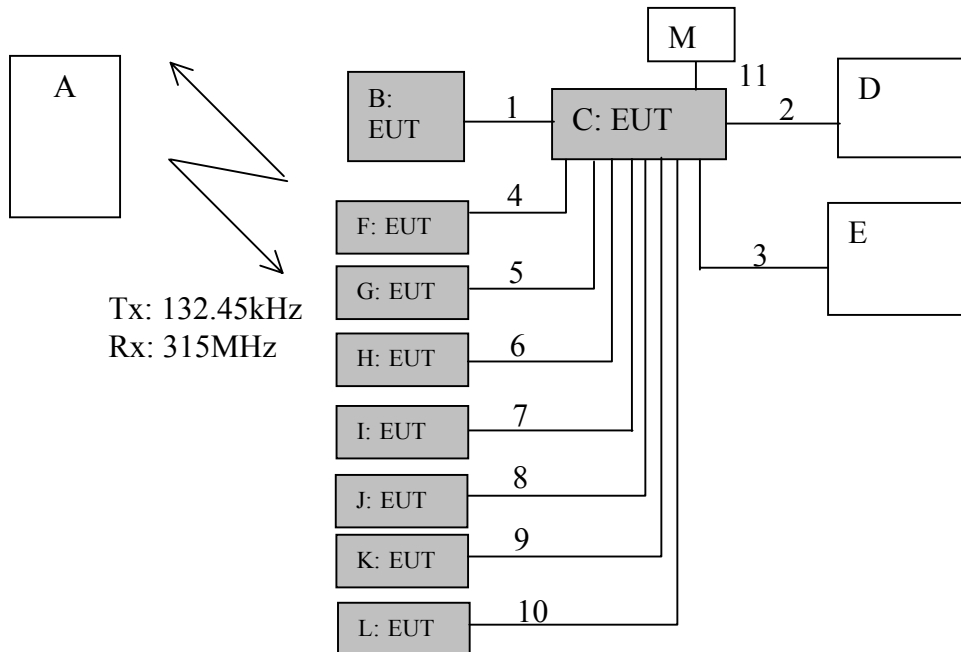
1. Continuous Transmitting mode (132.45kHz)
2. Continuous Receiving mode (315MHz)

*Receiving mode: the test was performed under the signal from the transmitter.

Justification:

The carrier level of antenna was confirmed by the antennas that have the maximum and minimum level as is demonstrated like in the actual usage. Output powers are controlled at the fixed point of antennas on a vehicle although all these antennas are the same type. The simultaneous transmitting mode of all antennas was not possible based on the specification of EUT. The test for antenna was confirmed in the directions of X, Y and Z. With the position that has the maximum level of antenna, the maximum level for Receiver was confirmed in the directions of X, Y and Z.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and Support Equipment

[Continuous Receiving mode]

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Smart keyless system (Transceiver)	SKE11A-01	1	Mitsubishi Electric Corporation	BGBX1T458SKE11A01
B	Receiver	SKE11A-01	N/A	Mitsubishi Electric Corporation	BGBX1T502SKE11A01
C	SMART ECU	SKE11A-01	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
D	SKE System Checker	N/A	N/A	Mitsubishi Electric Corporation	-
E	SKE SW BOX	N/A	N/A	Mitsubishi Electric Corporation	-
F	LF Antenna	ANT-A	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
G	LF Antenna	ANT-B	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
H	LF Antenna	ANT-C	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
I	LF Antenna	ANT-D	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
J	LF Antenna	ANT-E	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
K	LF Antenna	ANT-F	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
L	LF Antenna	ANT-G	N/A	Mitsubishi Electric Corporation	BGBX1T406SKE11A01
M	Car Battery	50B24L	N/A	YUASA	-

List of cables used (used for only Continuous Receiving mode)

No.	Name	Length (m)	Shield	Remark
1	I/F Cable	2.0	N	-
2	Cable for Checker	1.9	N	-
3	Cable for SKE SW BOX	2.3	N	-
4	Antenna Cable	2.3	N	-
5	Antenna Cable	2.3	N	-
6	Antenna Cable	2.3	N	-
7	Antenna Cable	2.3	N	-
8	Antenna Cable	2.3	N	-
9	Antenna Cable	2.3	N	-
10	Antenna Cable	2.0	N	-
11	DC Power Cable	0.5	N	-

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.1 and 2 semi anechoic chamber
 Temperature : See data
 Humidity : See data

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.

1) 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.

2) Frequency : From 30MHz to 2GHz 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.

	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

Frequency	Above 1GHz
Instrument used	Spectrum Analyzer
Detector	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	AV: RBW:1MHz/VBW:10Hz

*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])

5.5 Results

Summary of the test results: Pass

Date: October 30 and November 5, 2004

Tested by: Hiroka Umeyama and Norihisa Hashimoto

SECTION 6: -26dB Bandwidth (Reference data)

Fundamental Frequency : 132.4kHz
 Test data : APPENDIX 3
 Test result : N/A

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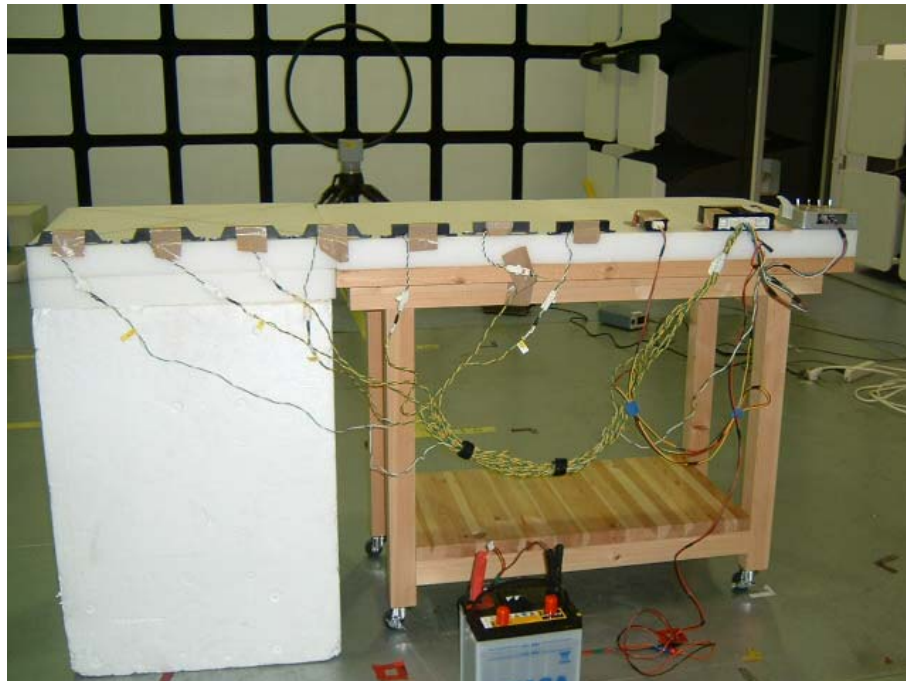
APPENDIX 1: Photographs of test setup

Radiated Magnetic Field Strength (Transmitting)

Front



Rear

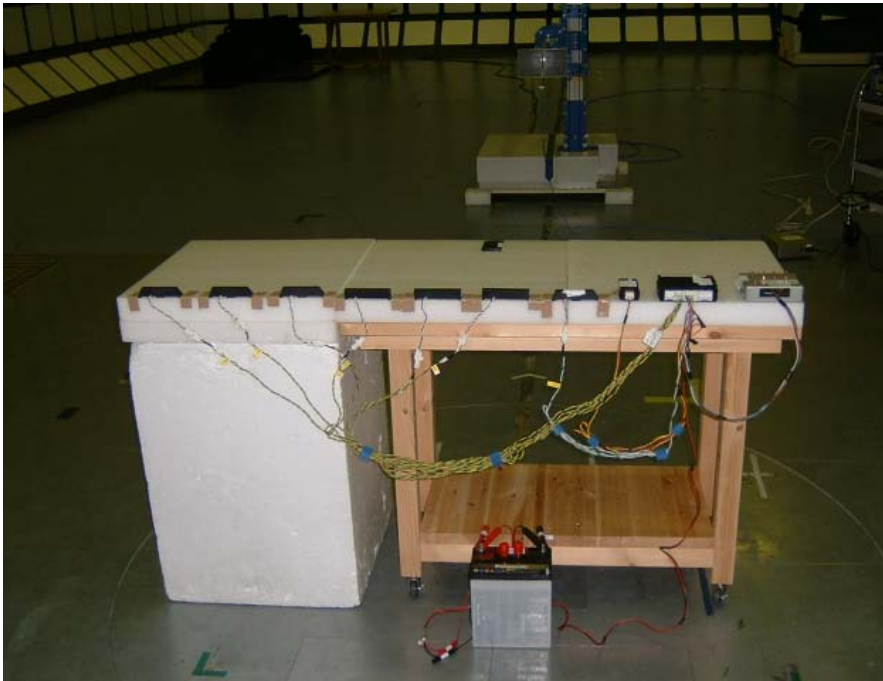


Radiated emission(Transmitting and Receiving mode)

Front

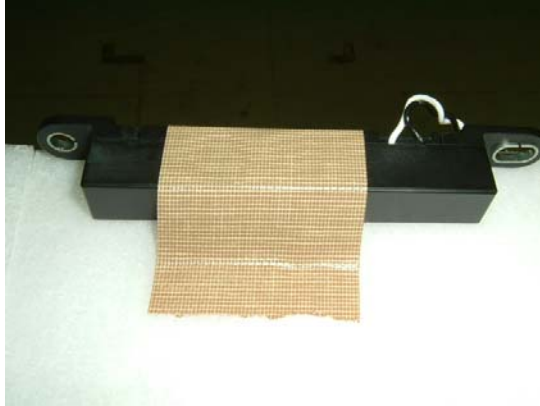


Rear



Worst Case Position:Antenna(Axis Y)

Axis X



Axis Y



Axis Z



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Worst Case Position:Receiver (Axis X)

Axis X



Axis Y



Axis Z



APPENDIX 2: Test Instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE /ME	2004/04/12 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	ME	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	ME	2004/02/18 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	ME	2004/02/24 * 12
MCC-31	coaxial cable	ULApex	-	ME	2004/06/12 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	ME	2003/12/16 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	ME	2004/08/29 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2004/01/08 * 12
MCC-01	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	RE	2003/12/19 * 12
MCC-05	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-23	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2003/11/12 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2004/05/25 * 12
MPA-05	Pre Amplifier	TSJ	TSJ 1-26.5GHz PreAmp	RE	2004/06/12 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE	2003/12/27 * 12

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

Test Item:

RE: Radiated emission

ME: Radiated Magnetic Field Strength 150kHz – 30MHz

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APPENDIX 3: Data of EMI test

Radiated Emission (Transmitting)

UL Apex Co., LTD.
Head office EMC Lab. No.2 Semi Anechoic Chamber

Company : Mitsubishi Electric Corporation
Equipment : SMART KEYLESS SYSTEM
Model : SKE11A-01 (Receiver and Antenna)
Sample No. : 1
Power : DC12.0V (ECU)
Mode : Transmitting (132.45kHz)
Antenna : B B-Axis, Receiver X-Axis (MAX)
Temperature : 24deg.C
Humidity : 60%

Report No. : 25LE0285-HO
Regulation : FCC Part15C Section 15.209
Test Distance : 3m
Date : 2004/10/30
Engineer : Hiroka Umeyama

No.	FREQ [kHz]	Loop Max Angle [deg]	detector	T/R	ANT Factor [dB]	ATTEN [dB]	CABLE LOSS [dB]	AMP GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]
			type	READING [dBuV]							
1	132.45	0	PK	103.4	19.9	5.7	0.1	26.4	102.7	125.1	22.4
2	132.45	0	AV	101.9	19.9	5.7	0.1	26.4	101.2	105.1	3.9
3	264.90	0	PK	80.0	19.9	5.7	0.1	27.3	78.4	119.1	40.7
4	264.90	0	AV	64.9	19.9	5.7	0.1	27.3	63.3	99.1	35.8
5	397.35	0	PK	69.2	19.8	5.7	0.1	27.6	67.2	115.6	48.4
6	397.35	0	AV	55.4	19.8	5.7	0.1	27.6	53.4	95.6	42.2
7	529.80	0	QP	59.5	19.8	5.8	0.1	27.7	57.5	73.1	15.6
8	662.25	0	QP	63.7	19.8	5.8	0.1	27.7	61.7	71.1	9.4
9	794.70	0	QP	59.0	19.8	5.7	0.1	27.8	56.8	69.6	12.8
10	927.15	0	QP	60.6	19.8	5.8	0.1	27.8	58.5	68.2	9.7
11	1059.60	0	QP	53.0	19.8	5.8	0.1	27.8	50.9	67.1	16.2
12	1192.05	0	QP	57.8	19.8	5.8	0.1	27.8	55.7	66.0	10.3
13	1324.50	0	QP	51.8	19.8	5.8	0.1	27.8	49.7	65.1	15.4

REMARKS

ANTENNA TYPE : 10kHz-30MHz (Loop Antenna)

CALCULATION: READING + ANT Factor + ATTEN + Cable Loss - AMP Gain

For fundamental, the measured field strength was extrapolated to distance 300m, using the formula that field strength varies as the inverse distance square (40dB per decade of distance).

Sample calculation:

Peak: 102.2dBuV/m -40log(300/3)= 102.2 - 80 = 22.2dBuV/m at 300m

Limits for fundamental (section 15.209(a))=20log(2400/125) + 20 = 45.7dBuV/m

Average: 76.7dBuV/m -40log(300/3)= 76.7 - 80 = -3.3dBuV/m at 300m

Limits for fundamental (section 15.209(a))=20log(2400/125) = 25.7dBuV/m

Limit: (9kHz - 490kHz): 2400/Freq (Converted dBuV/m) + 40log(300/3)

Limit: (490kHz - 1.705MHz): 24000/Freq (Converted dBuV/m) + 40log(30/3)

Limit: (1.705MHz - 30MHz): 30(Converted dBuV/m) + 40log(30/3)

All other spurious emissions are more than 20dB below the limits.

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Radiated Emission (Transmitting)

UL Apex Co., LTD.
Head office EMC Lab. No.2 Semi Anechoic Chamber

Company : Mitsubishi Electric Corporation
Equipment : SMART KEYLESS SYSTEM
Model : SKE11A-01 (Receiver and Antenna)
Sample No. : 1
Power : DC12.0V (ECU)
Mode : Transmitting (132.45kHz)
: Antenna D Y-Axis (MIN), Receiver X-Axis
Temperature : 24deg.C
Humidity : 60%

Report No. : 25LE0285-HO
Regulation : FCC Part15C Section 15.209
Test Distance : 3m
Date : 2004/10/30
Engineer : Hiroka Umeyama

No.	FREQ [kHz]	Loop Max Angle [deg]	detector	T/R	ANT Factor [dB]	ATTEN [dB]	CABLE LOSS [dB]	AMP GAIN [dB]	RESULT	LIMIT	MARGIN
			type	READING [dBuV]					[dBuV/m]	[dBuV/m]	[dB]
1	132.40	0	PK	85.3	19.9	5.7	0.1	26.4	84.6	125.1	40.5
2	132.40	0	AV	83.4	19.9	5.7	0.1	26.4	82.7	105.1	22.4
3	264.80	0	PK	58.7	19.9	5.7	0.1	27.3	57.1	119.1	62.0
4	264.80	0	AV	42.7	19.9	5.7	0.1	27.3	41.1	99.1	58.0
5	397.20	0	PK	64.8	19.8	5.7	0.1	27.6	62.8	115.6	52.8
6	397.20	0	AV	50.5	19.8	5.7	0.1	27.6	48.5	95.6	47.1
7	529.60	0	QP	53.8	19.8	5.8	0.1	27.7	51.8	73.1	21.3
8	662.00	0	QP	53.8	19.8	5.8	0.1	27.7	51.8	71.1	19.3
9	794.40	0	QP	42.3	19.8	5.7	0.1	27.8	40.1	69.6	29.5
10	926.80	0	QP	48.3	19.8	5.8	0.1	27.8	46.2	68.2	22.0
11	1059.20	0	QP	39.7	19.8	5.8	0.1	27.8	37.6	67.1	29.5
12	1191.60	0	QP	45.7	19.8	5.8	0.1	27.8	43.6	66.0	22.4
13	1324.00	0	QP	37.5	19.8	5.8	0.1	27.8	35.4	65.1	29.7

REMARKS

ANTENNA TYPE : 10kHz-30MHz (Loop Antenna)
CALCULATION: READING + ANT Factor + ATTEN + Cable Loss - AMP Gain

For fundamental, the measured field strength was extrapolated to distance 300m, using the formula that field strength varies as the inverse distance square (40dB per decade of distance).

Sample calculation:

Peak: $102.2\text{dBuV/m} - 40\log(300/3) = 102.2 - 80 = 22.2\text{dBuV/m}$ at 300m
Limits for fundamental (section 15.209(a)) $= 20\log(2400/125) + 20 = 45.7\text{dBuV/m}$

Average: $76.7\text{dBuV/m} - 40\log(300/3) = 76.7 - 80 = -3.3\text{dBuV/m}$ at 300m
Limits for fundamental (section 15.209(a)) $= 20\log(2400/125) = 25.7\text{dBuV/m}$

Limit: (9kHz - 490kHz): $2400/\text{Freq (Converted dBuV/m)} + 40\log(300/3)$
Limit: (490kHz - 1.705MHz): $24000/\text{Freq (Converted dBuV/m)} + 40\log(30/3)$
Limit: (1.705MHz - 30MHz): $30(\text{Converted dBuV/m}) + 40\log(30/3)$

All other spurious emissions are more than 20dB below the limits.

Page:

Radiated Emission (Transmitting) above 30MHz

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/11/05 14:04:55

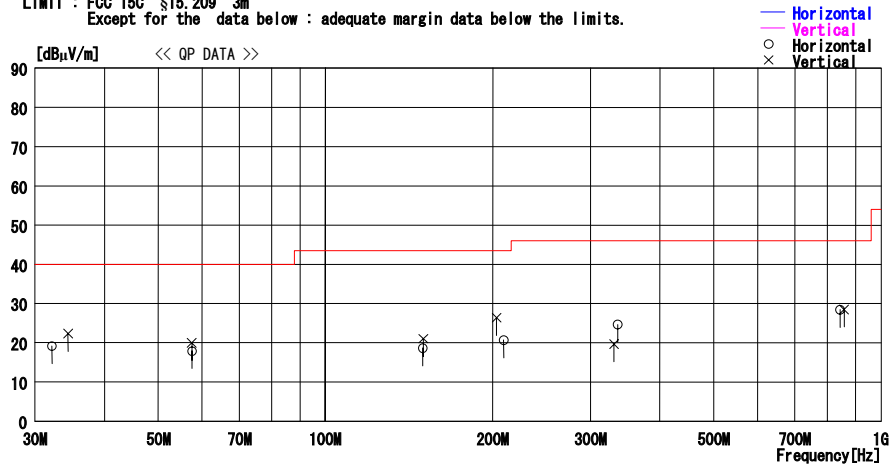
Applicant : Mitsubishi Electric Corporation
Kind of EUT : SMART KEYLESS SYSTEM
Model No. : SKE11A-01
Serial No. : 1

Report No. : 25LE0285-H0
Power : DC12.0V
Temp°C/Humi% : 23deg.C / 40%
Operator : Norihisa Hashimoto

Mode / Remarks : Transmitting:132.45kHz

LIMIT : FCC 15C §15.209 3m

Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	32.188	21.9	17.9	7.0	27.7	19.1	40.0	20.9	121	304
2	57.478	29.4	8.8	7.4	27.7	17.9	40.0	22.1	359	166
3	149.638	22.7	15.0	8.5	27.6	18.6	43.5	24.9	119	238
4	209.475	21.5	17.2	9.3	27.3	20.7	43.5	22.8	299	331
5	335.716	26.2	15.8	10.1	27.5	24.6	46.0	21.4	106	206
6	844.252	22.8	21.3	12.9	28.6	28.4	46.0	17.6	291	134
Vertical										
7	34.405	26.1	16.9	7.2	27.9	22.3	40.0	17.7	395	9
8	57.480	31.5	8.8	7.4	27.7	20.0	40.0	20.0	118	238
9	149.977	25.1	15.0	8.5	27.6	21.0	43.5	22.5	145	207
10	203.350	27.2	17.1	9.3	27.2	26.4	43.5	17.1	140	251
11	330.706	21.5	15.6	10.1	27.5	19.7	46.0	26.3	385	42
12	858.458	22.9	21.3	12.9	28.6	28.5	46.0	17.5	354	195

CHART:WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

Page:

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MF060b(01.06.05)

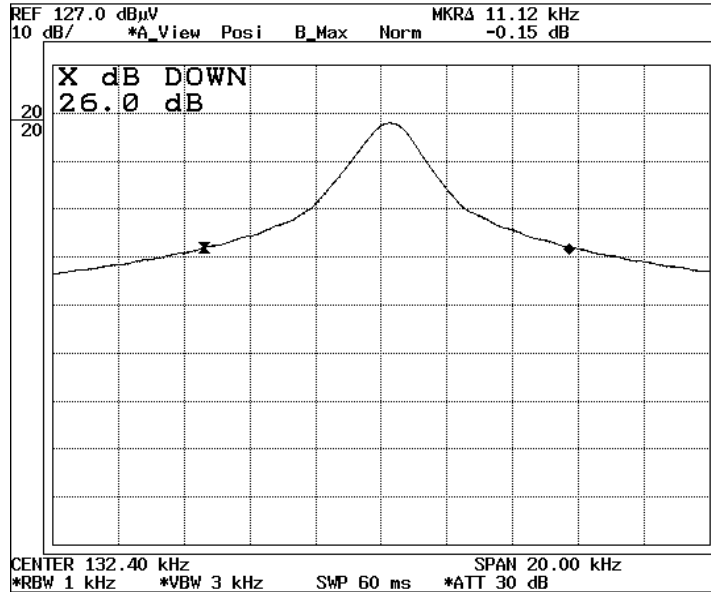
-26dB Bandwidth

UL Apex Co., LTD.
Head office EMC Lab. No.2 Semi Anechoic Chamber

Company : Mitsubishi Electric Corporation
Equipment : SMART KEYLESS SYSTEM
Model : SKE11A-01 (Receiver and Antenna)
Sample No. : 1
Power : DC12.0V (ECU)
Mode : Transmitting (132.45kHz)
: Antenna B Y-Axis, Receiver X-Axis (MAX)
Temperature : 24deg.C
Humidity : 60%

Report No. : 25LE0285-HO
Regulation : -
Test Distance : 3m
Date : 2004/10/30
Engineer : Hiroka Umeyama

-26dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
11.12	-	-



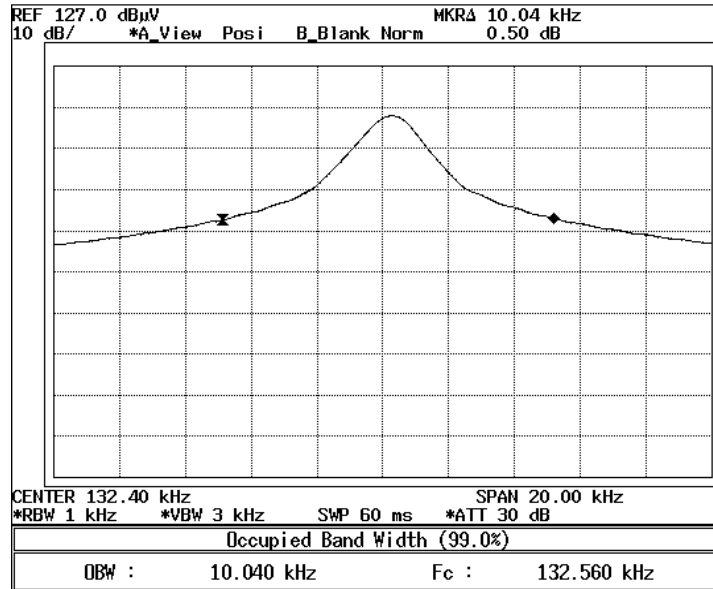
99% Occupied Bandwidth

UL Apex Co., LTD.
Head office EMC Lab. No.2 Semi Anechoic Chamber

Company : Mitsubishi Electric Corporation
Equipment : SMART KEYLESS SYSTEM
Model : SKE11A-01 (Receiver and Antenna)
Sample No. : 1
Power : DC12.0V (ECU)
Mode : Transmitting (132.45kHz)
: Antenna B Y-Axis, Receiver X-Axis (MAX)
Temperature : 24deg.C
Humidity : 60%

Report No. : 25LE0285-HO
Regulation : RSS210
Test Distance : 3m
Date : 2004/10/30
Engineer : Hiroka Umeyama

99% Occpied Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
10.04	-	-



Radiated Emission (Receiving)

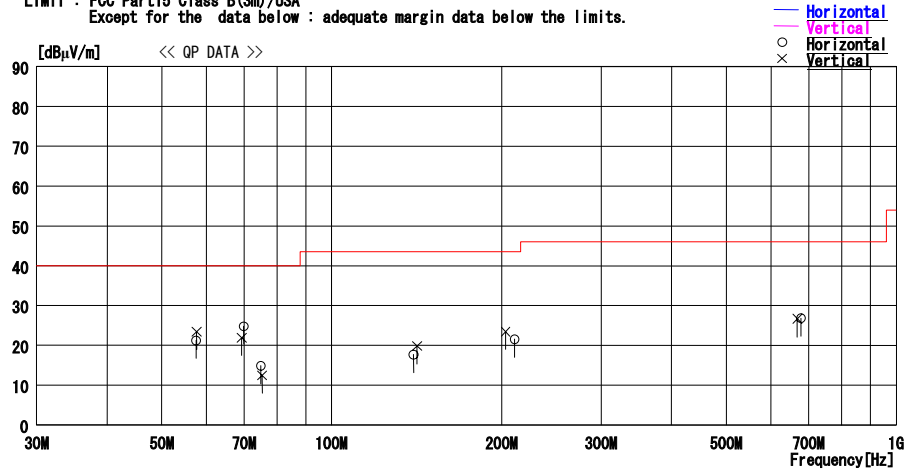
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/11/05 11:02:33

Applicant : Mitsubishi Electric Corporation
Kind of EUT : SMART KEYLESS SYSTEM
Model No. : SKE11A-01
Serial No. : 1
Report No. : 25LE0285-HO
Power : DC12.0V
Temp°C/Humi% : 23deg.C / 40%
Operator : Norihisa Hashimoto

Mode / Remarks : Receiving:315MHz

LIMIT : FCC Part15 Class B(3m)/USA
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	57.469	32.7	8.8	7.4	27.7	21.2	40.0	18.8	325	177
2	69.803	38.1	6.9	7.6	27.8	24.8	40.0	15.2	266	185
3	74.910	28.2	6.8	7.4	27.6	14.8	40.0	25.2	269	187
4	139.587	22.3	14.4	8.5	27.6	17.6	43.5	25.9	241	294
5	210.721	22.3	17.2	9.3	27.3	21.5	43.5	22.0	270	131
6	678.720	22.8	20.6	12.2	28.8	26.8	46.0	19.2	100	190
Vertical										
7	57.622	35.0	8.8	7.4	27.8	23.4	40.0	16.6	100	270
8	69.261	35.1	7.0	7.6	27.8	21.9	40.0	18.1	100	246
9	75.271	25.9	6.7	7.4	27.6	12.4	40.0	27.6	100	258
10	141.606	24.3	14.5	8.6	27.6	19.8	43.5	23.7	102	203
11	203.225	24.2	17.1	9.3	27.2	23.4	43.5	20.1	100	256
12	667.796	22.7	20.5	12.1	28.7	26.6	46.0	19.4	100	202

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN Page:

DATA OF RADIATED EMISSION TEST

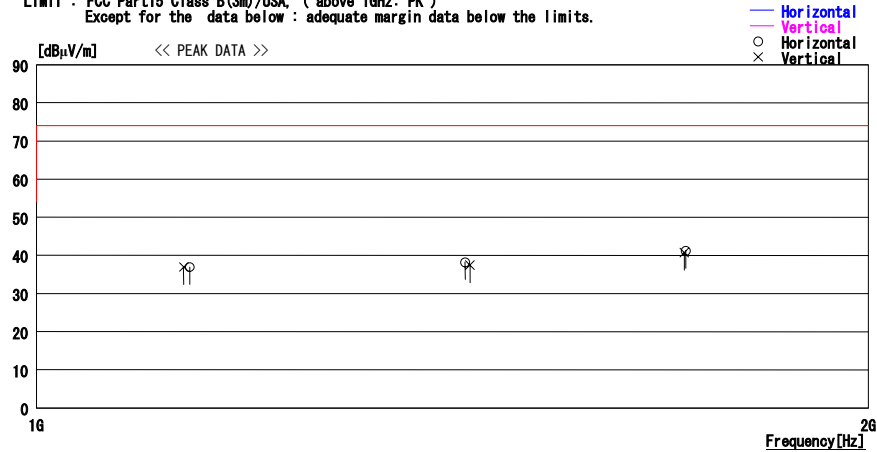
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/11/05 16:04:27

Applicant : Mitsubishi Electric Corporation
Kind of EUT : SMART KEYLESS SYSTEM
Model No. : SKE11A-01
Serial No. : 1

Report No. : 25LE0285-HO
Power : DC12.0V
Temp/C/Humi% : 23deg.C / 40%
Operator : Norihisa Hashimoto

Mode / Remarks : Receiving:315MHz

LIMIT : FCC Part15 Class B(3m)/USA, (above 1GHz: PK)
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING PK [dB μ V]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μ V/m]	LIMIT [dB μ V/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	1136.274	50.3	22.8	3.7	39.9	36.9	74.0	37.1	100	353
2	1428.862	49.9	23.9	4.1	39.7	38.2	74.0	35.8	100	133
3	1717.442	49.2	26.9	4.6	39.5	41.2	74.0	32.8	100	342
Vertical										
4	1130.262	50.4	22.8	3.6	39.9	36.9	74.0	37.1	100	353
5	1434.874	49.0	24.0	4.1	39.7	37.4	74.0	36.6	100	210
6	1715.438	48.8	26.8	4.6	39.5	40.7	74.0	33.3	100	67

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN Page:

DATA OF RADIATED EMISSION TEST

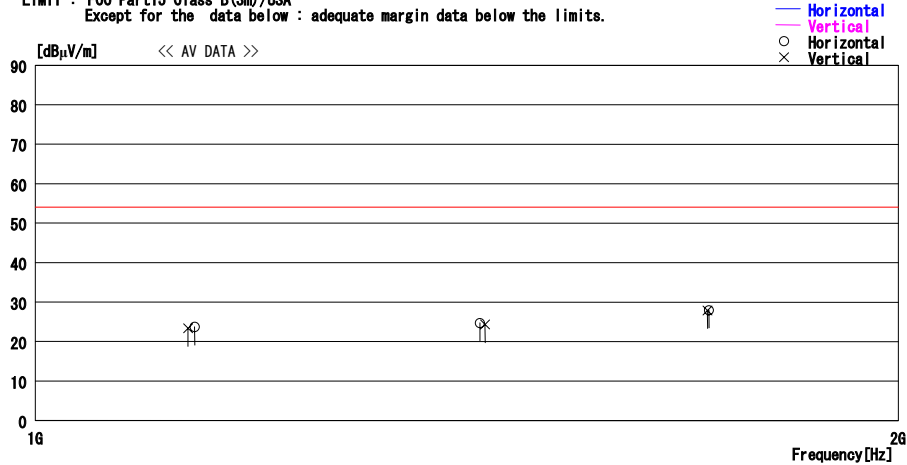
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2004/11/05 16:04:27

Applicant : Mitsubishi Electric Corporation
Kind of EUT : SMART KEYLESS SYSTEM
Model No. : SKE11A-01
Serial No. : 1

Report No. : 25LE0285-HO
Power : DC12.0V
Temp°C/Humi% : 23deg. C / 40%
Operator : Norihisa Hashimoto

Mode / Remarks : Receiving:315MHz

LIMIT : FCC Part15 Class B(3m)/USA
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING AV [dB μ V]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dB μ V/m]	LIMIT [dB μ V/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
Horizontal										
1	1136.274	37.1	22.8	3.7	39.9	23.7	54.0	30.3	100	353
2	1428.862	36.4	23.9	4.1	39.7	24.7	54.0	29.3	100	133
3	1717.442	36.0	26.9	4.6	39.5	28.0	54.0	26.0	100	342
Vertical										
4	1130.262	36.9	22.8	3.6	39.9	23.4	54.0	30.7	100	353
5	1434.874	35.9	24.0	4.1	39.7	24.3	54.0	29.7	100	210
6	1715.438	36.0	26.8	4.6	39.5	27.9	54.0	26.1	100	67

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

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MF060b(01.06.05)