



EMI TEST REPORT

Test Report No. : 25BE0104-HO-1

Applicant : Calsonic Kansei Corp.
Type of Equipment : Keyless Transmitter
Model No. : TS004
Test standard : FCC Part 15 Subpart C Section 15.231:2004
FCC ID : KBRTS004
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 1, 2004

Tested by : 
Naoki Sakamoto
EMC Service

Approved by : 
Hironobu Shimoji
Group Leader of EMC Service

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SECTION 1: Client information

Company Name : Calsonic Kansei Corp.
Address : 8 Sakae-cho Sano-shi Tochigi, 327-0816 Japan
Telephone Number : +81- 283-21-8407
Facsimile Number : +81- 283-21-8547
Contact Person : Yutaka Suzuki

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

2.1 Identification of E.U.T.

Type of Equipment : Keyless Transmitter
Model No. : TS004
Serial No. : 7
Rating : DC3.0V, 0.005A
Country of Manufacture : Japan
Receipt Date of Sample : October 1, 2004
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: TS004 (referred to as the EUT in this report) is the Keyless Transmitter.

Operating frequency	315MHz
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FCC 15.31 (e)

This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to this EUT during the tests. Therefore, this 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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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C : 2004
 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 C63.4:2003	Section 15.231(a)(1)	N/A	-	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003	Section 15.231(b)	N/A	1.8dB 314.99MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2003	Section 15.205 Section 15.209 Section 15.231(b)	N/A	15.3dB 944.97MHz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2003	Section 15.231(c)	N/A	-	Complied

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

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4:2004	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4:2004	Conducted	N/A	N/A	N/A

3.4 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 report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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	Listed date (for FCC)	FCC Registration Number	IC Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	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.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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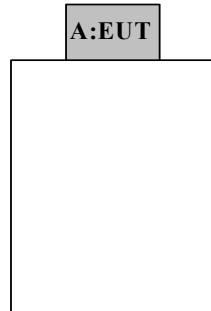
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used : 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
A	Keyless Transmitter	TS004	7	Calsonic Kansei Corp.	KBRTS004 (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 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
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
Detector Type	QP	Peak and Average
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:1MHz AV: S/A:RBW 1MHz, VBW:10Hz

- 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: October 1, 2004 Tested by: Naoki Sakamoto

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APPENDIX 1: Photographs of test setup

Radiated emission Front



Rear



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X, Y, Z axis (Horizontal : X-axis/Vertical : Z-axis)

X-axis



Y-axis



Z-axis



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APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2004/04/12 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12

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

Test Item:

RE: Radiated emission

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APPENDIX 3: Data of EMI test

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

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

COMPANY : Calsonic Kansei Corp.
 EQUIPMENT : Keyless Transmitter
 MODEL : TS004
 S/N : 7
 POWER : DC 3.0V
 Mode : Continuous Transmitting
 Axis : Hor.: X-axis , Ver.: Z-axis

REPORT NO : 25BE0104-HO
 REGULATION : Fcc Part15 Subpart C 231(b) / 205
 TEST DISTANCE : 3m
 DATE : 10/01/2004
 TEMPERATURE : 27 deg.C.
 HUMIDITY : 60 %
 ENGINEER : Naoki Sakamoto

No.	FREQ [MHz]	T/R 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 [dB]	MARGIN VER [dB]
1	314.99	77.7 73.8	14.6	26.9	8.4	0.0	73.8 69.9	75.6	1.8	5.7

(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 [dB]	MARGIN VER [dB]
2	629.98	36.6 31.0	19.7	28.2	9.9	0.0	38.0 32.4	55.6	17.6	23.2
3	944.97	34.8 28.2	22.2	27.7	11.0	0.0	40.3 33.7	55.6	15.3	21.9

(above 1GHz)

PK DETECT (RBW: 1MHz , VBW: 1MHz)

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 [dB]	MARGIN VER [dB]
4	1259.96	35.2 41.4	23.2	27.1	4.5	0.0	35.8 42.0	74.0	38.2	32.0
5	1574.95	40.1 37.5	25.0	27.3	5.0	0.0	42.8 40.2	74.0	31.2	33.8
6	1889.94	37.6 39.5	28.9	27.5	5.6	0.0	44.6 46.5	74.0	29.4	27.5
7	2204.93	37.6 35.5	30.5	27.5	6.2	0.0	46.8 44.7	74.0	27.2	29.3
8	2519.92	34.8 35.5	31.1	27.4	6.6	0.0	45.1 45.8	74.0	28.9	28.2
9	2834.91	35.8 35.0	31.9	27.2	7.0	0.0	47.5 46.7	74.0	26.5	27.3
10	3149.90	35.5 35.9	32.0	27.1	7.4	0.0	47.8 48.2	74.0	26.2	25.8

AV DETECT (RBW: 1MHz , VBW: 10Hz)

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 [dB]	MARGIN VER [dB]
4	1259.96	26.2 35.2	23.2	27.1	4.5	0.0	26.8 35.8	54.0	27.2	18.2
5	1574.95	32.7 26.9	25.0	27.3	5.0	0.0	35.4 29.6	54.0	18.6	24.4
6	1889.94	28.9 31.7	28.9	27.5	5.6	0.0	35.9 38.7	54.0	18.1	15.3
7	2204.93	26.5 25.6	30.5	27.5	6.2	0.0	35.7 34.8	54.0	18.3	19.2
8	2519.92	25.5 25.5	31.1	27.4	6.6	0.0	35.8 35.8	54.0	18.2	18.2
9	2834.91	26.0 25.5	31.9	27.2	7.0	0.0	37.7 37.2	54.0	16.3	16.8
10	3149.90	25.6 25.4	32.0	27.1	7.4	0.0	37.9 37.7	54.0	16.1	16.3

REMARKS

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

CALCULATION RESULT=Reading + ANT Factor - Amp Gain + LOSS (Cable+ ATTEN.)+Duty factor

* 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.

*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 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 duty was not used in the data above 1GHz, and the test was made with AV detector which is severer for the limit.

The test result was applied to the limit in Section 15.209.

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-20dB Bandwidth

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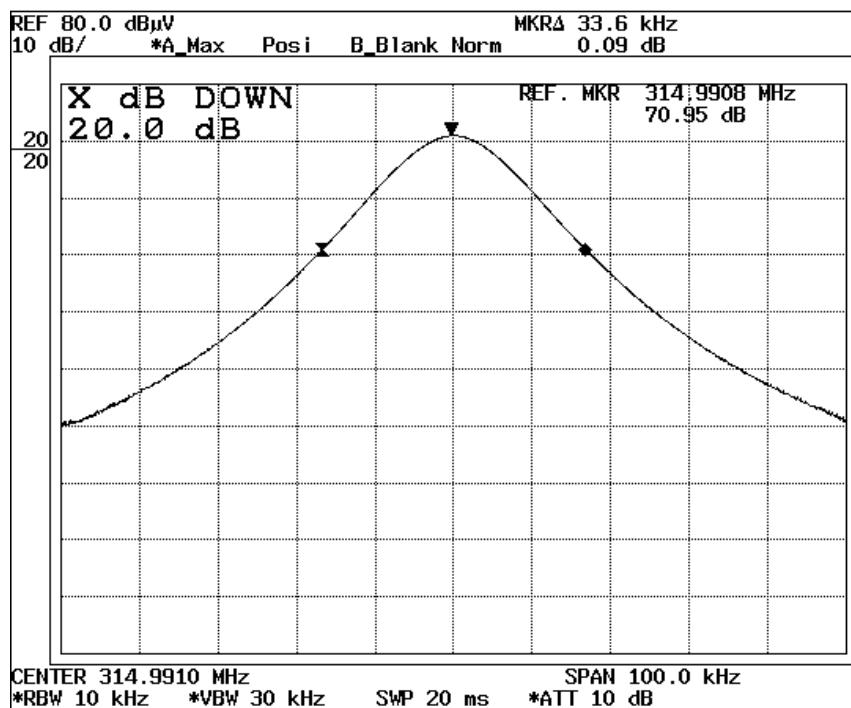
COMPANY : Calsonic Kansei Corp.
 EQUIPMENT : Keyless Transmitter
 MODEL : TS004
 S/N : 7
 POWER : DC 3.0V
 Mode : Transmitting

REPORT NO : 25BE0104-HO
 REGULATION : Fcc Part15 Subpart C 231(c)
 TEST DISTANCE : 3m
 DATE : 10/01/2004
 TEMPERATURE : 27 deg.C.
 HUMIDITY : 60 %

ENGINEER : Naoki Sakamoto

Bandwidth Limit : Fundamental Frequency 314.99 MHz X 0.25% = 787.475 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result	Margin [kHz]
33.60	787.48	Pass	753.88



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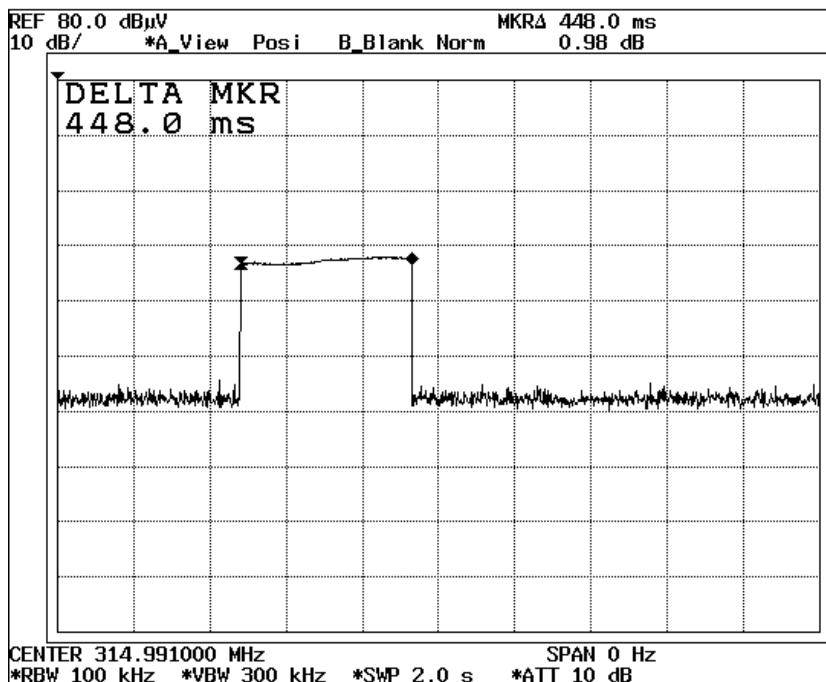
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Automatically deactivate

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COMPANY	: Calsonic Kansei Corp.	REPORT NO	: 25BE0104-HO
EQUIPMENT	: Keyless Transmitter	REGULATION	: Fcc Part15 Subpart C 231(a)
MODEL	: TS004	TEST DISTANCE	: 3m
S/N	: 7	DATE	: 10/01/2004
POWER	: DC 3.0V	TEMPERATURE	: 27 deg.C.
Mode	: Transmitting	HUMIDITY	: 60 %
		ENGINEER	: Naoki Sakamoto

Time of Transmitting [sec]	Limit [sec]	Result	Margin [sec]
0.45	5.00	Pass	4.55



99% Occupied Bandwidth

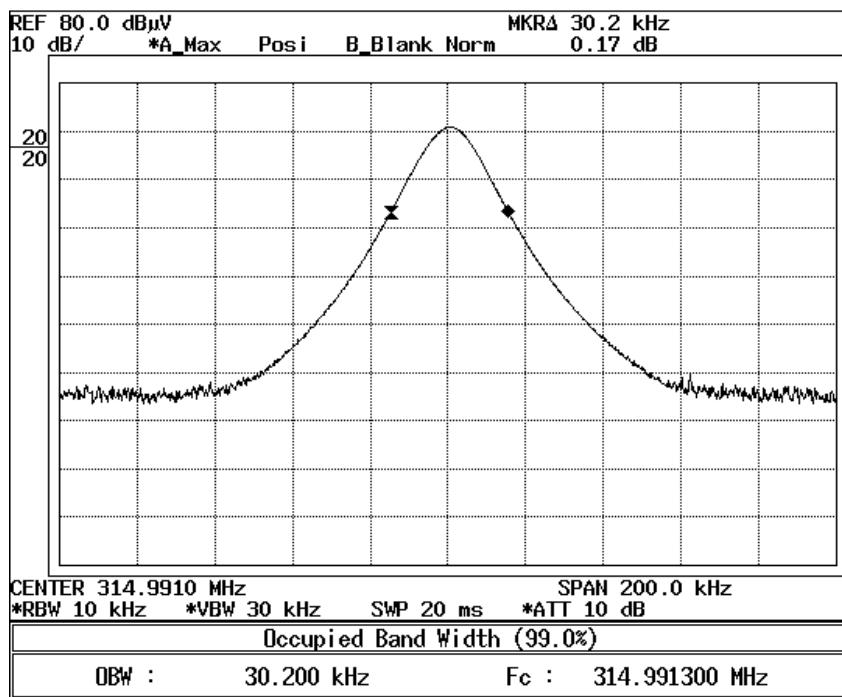
UL Apex Co., Ltd.
 Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : Calsonic Kansei Corp.
 EQUIPMENT : Keyless Transmitter
 MODEL : TS004
 S/N : 7
 POWER : DC 3.0V
 Mode : Transmitting

REPORT NO : 25BE0104-HO
 REGULATION : RSS-210
 TEST DISTANCE : 3m
 DATE : 10/01/2004
 TEMPERATURE : 27 deg.C.
 HUMIDITY : 60 %

ENGINEER : Naoki Sakamoto

99% Occupied Bandwidth (RSS-210)



* 99% Occupied Bandwidth : 30.20 kHz

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