RADIO TEST REPORT

Test Report No. : 29BE0206-HO-03-A-R1

Applicant	:	**Calsonic Kansei Corporation**
Type of Equipment	:	**RF Transmitter for Passive Keyless**
Model No.	:	**TS009**
Test regulation	:	**FCC Part 15 Subpart C:2009 Section 15.231**
FCC ID	:	**KBRTS009**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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.
6. Original test report number of this report is 29BE0206-HO-03-A.

Date of test: December 18 and 22, 2008

Tested by:

Hironobu Ohnishi
EMC Services

Kazufumi Nakai
EMC Services

Approved by :

Makoto Kosaka
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://uljapan.co.jp/emc/nvlap.html

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

CONTENTS **PAGE**

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

SECTION 1: Customer information

Company Name	:	Calsonic Kansei Corporation
Address	:	2-1917 Nisshin-cho Kita-ku Saitama-shi Saitama, 331-8501 Japan
Telephone Number	:	+81-48-661-3461
Facsimile Number	:	+81-48-661-1026
Contact Person	:	Takashi Itou

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

2.1 Identification of E.U.T.

Type of Equipment	:	RF Transmitter for Passive Keyless
Model No.	:	TS009
Serial No.	:	242C (Used for other tests except for Receiver Spurious emission test) 235E (Used for Receiver Spurious emission test)
Rating	:	DC 3.0 ± 0.5V (CR2032 x 1)
Receipt Date of Sample	:	December 16, 2008
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

Model No: TS009 (referred to as the EUT in this report) is the RF Transmitter for Passive Keyless.

Clock frequency(ies) in the system	:	2MHz
Equipment Type	:	Transceiver
[Transmitter]		
Frequency of Operation	:	315MHz
Type of modulation	:	FSK
Mode of Operation	:	Simplex
Antenna Type	:	Pattern Antenna
Method of Frequency Generation	:	Resonator
[Receiver]		
Frequency of Operation	:	125kHz
Antenna Type	:	Coil

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

* The revision on February 27, 2009 does not influence the test specification applied to the EUT.

FCC 15.31 (e)

The test was performed with the New Battery (DC 3.0V) and the stable 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.

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	N/A	Complied
2	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	N/A	25.1dB, 315.01MHz, Horizontal, Peak with Duty Factor	Complied
3	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	N/A	12.1dB, 945.03MHz, Horizontal, Peak with Duty Factor	Complied
4	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	20.9dB 785.336MHz Vertical, Horizontal, QP	Complied
5	-20dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Section 15.231(c) <IC> Reference data	N/A	N/A	Complied
6	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 Japan, Inc.'s EMI Work procedures No. QPM05 and QPM15
*1) The test is not applicable since the EUT does not have AC Mains.

*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	<IC> RSS-Gen 4.6.1	<IC> RSS-210 A1.1.3	Radiated	N/A	N/A	Complied

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic chamber (±)	3.7dB	3.1dB	4.4dB	4.2dB	3.2dB	3.8dB	3.9dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.4dB	4.0dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.6dB	4.0dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	3.9dB	3.9dB	5.9dB	6.1dB

*10m/3m = Measurement distance

Radiated emission test (3m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	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, and Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

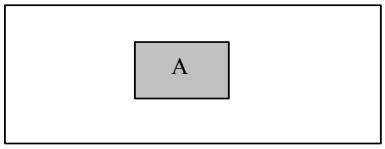
The mode is used : 1) Normal use mode: Automatically deactivate test
2) Transmitting mode: Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission) test, -20dB Bandwidth and 99% Occupied Bandwidth test and Duty Cycle test
3) Receiving 125kHz mode (Mechanical key inserted): Receiver Spurious Emission test

(As for the pulse train of sample used in this test, please refer to "Theory of Operation" in application document.)

Justification : The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

<Other tests except for Receiver Spurious emission test>

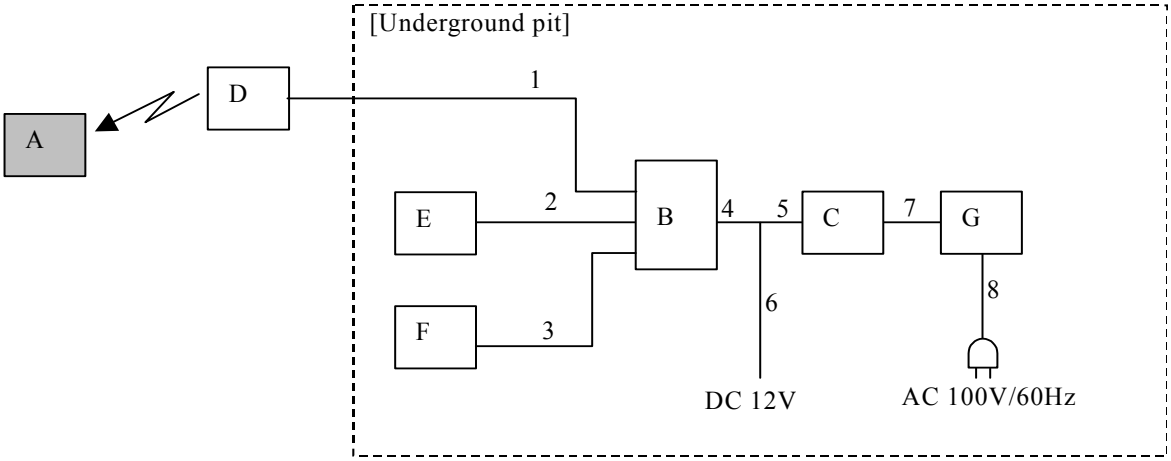


* Test data was taken under worse case conditions.

Description of EUT

No	Item	Model number	Serial number	Manufacturer	Remarks
A	RF Transmitter for Passive Keyless	TS009	242C	Calsonic Kansei Corporation	EUT

<Receiver Spurious emission test>



*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	RF Transmitter for Passive Keyless	TS009	235E	Calsonic Kansei Corporation	EUT
B	BCM2	-	-	Calsonic Kansei Corporation	-
C	Checker Box	-	-	Calsonic Kansei Corporation	-
D	LF Antenna	-	-	Calsonic Kansei Corporation	-
E	LF Antenna	-	-	Calsonic Kansei Corporation	-
F	LF Antenna	-	-	Calsonic Kansei Corporation	-
G	Function Generator	33250A	MY40012914	Agilent	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	3.4	Unshielded	Unshielded	-
2	Signal Cable	3.3	Unshielded	Unshielded	-
3	Signal Cable	3.3	Unshielded	Unshielded	-
4	Signal Cable	0.25	Unshielded	Unshielded	-
5	Signal Cable	0.2	Unshielded	Unshielded	-
6	DC Cable	2.6	Unshielded	Unshielded	-
7	Signal Cable	5.0	Shielded	Shielded	-
8	AC Cable	1.8	Unshielded	Unshielded	-

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

5.1 Operating environment

Tested date	December 18, 2008	December 22, 2008
Test place	No.4 Semi Anechoic Chamber	No.3 Semi Anechoic chamber
Temperature	See data	See data
Humidity	See data	See data

5.2 Test configuration

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.

5.3 Test conditions

	[Transmitting mode]	[Receiving mode]
Frequency range	30MHz-3200MHz	9kHz-1000MHz
Test distance	3m	3m
EUT position	Table top	Table top
EUT operation mode	See Clause 4.1	See Clause 4.1

5.4 Test procedure

[Transmitting mode]
The Radiated Electric Field Strength intensity has been measured on the 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/spectrum analyzer.

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

- The carrier level and noise levels 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.
This EUT has two modes which mechanical key is inserted or not. The worst case was confirmed with and without mechanical key, as a result, the test with mechanical key was the worst case. Therefore the test with mechanical key was performed only.

[Receiving mode]
The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber with a ground plane and at a distance of 3m.

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. 90deg. and 135 deg.

Frequency : From 30MHz to 1000MHz at distance 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/spectrum analyzer.

	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

The worst case in receiving mode was confirmed with and without mechanical key, as a result, no difference was seen. Therefore the test with mechanical key was performed only.

5.5 Results

Summary of the test results: Pass