



## RADIO TEST REPORT

Test Report No. : 29BE0206-HO-06-A-R2

Applicant : Calsonic Kansei Corporation  
Type of Equipment : BCM2 for Passive Keyless  
Model No. : S57L0  
Test regulation : FCC Part 15 Subpart C : 2009  
Section 15.209  
FCC ID : KBR557L0  
Test Result : Complied

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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.
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6. Original test report number of this report is 29BE0206-HO-06-A-R1.

Date of test: April 13 and 15, 2009

Tested by:

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Approved by:

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NVLAP LAB CODE: 200572-0

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## **SECTION 1: Customer information**

Company Name	:	Calsonic Kansei Corporation
Address	:	2-1917 Nisshin-cho Kita-ku Saitama-shi Saitama, 331-8501 Japan
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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	:	BCM2 for Passive Keyless
Model No.	:	S57L0
Serial No.	:	BCM2: 001
	:	LF Antenna: 001, 002, 003
Rating	:	DC12V
Receipt Date of Sample	:	April 8, 2009
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: S57L0 (referred to as the EUT in this report) is the BCM2 for Passive Keyless.  
The system is mainly used as a Cars door lock, unlock, and trunk opener.  
The clock frequency of EUT is 40MHz.

Equipment Type	:	Transmitter
Type of modulation	:	ASK
Frequency of operation	:	125kHz
Antenna Type	:	Ferrite bar Antenna
Method of Frequency Generation	:	Crystal
Operating voltage	:	DC 8 to 16V
Operating Temperature	:	-40 deg. C. to +80 deg. C.

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## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2009, final revised on February 27, 2009  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.209 Radiated emission limits, general requirements

#### FCC 15.31 (e)

This EUT provides stable voltage (DC 8V) constantly to RF part regardless of input voltage. 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 vehicle. Therefore, the equipment complies with the antenna requirement of Section 15.203.

### 3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	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	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	35.5dB (0.12368MHz 0 deg. PK) 29.5dB (0.12368MHz 0 deg. AV) (MAX ANT1)	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	5.4dB 44.649MHz, Vertical, QP	Complied
4	-26dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Reference data <IC> -	Radiated	N/A	N/A	N/A

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

\*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

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### 3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

Other than above, no addition, exclusion nor deviation has been made from the standard.

### 3.4 Uncertainty

#### EMI

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.

#### Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty for this test is ±3.0dB.

The data listed in this test report has enough margin, more than the site margin.

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### 3.5 Test Location

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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	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 :            Transmitting mode (MAX ANT1 / MIN ANT)

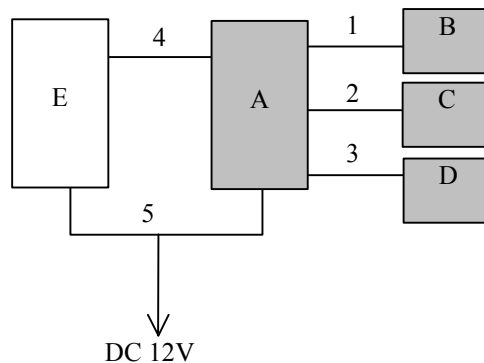
Justification        :        The system was configured in typical fashion (as a customer would normally use it) for testing.

\* Up to six LF Antennas are connected with BCM2 for Passive Keyless. (Please refer to the Block Diagram.)  
Antennas to be tested are MAX ANT1, MAX ANT2 and MIN ANT.  
Fundamental levels of MAX ANT1 and MAX ANT2 were compared on the pre check, and there is no difference.  
The tests were performed with MAX ANT1 and MIN ANT as the representative. Each LF Antenna doesn't have Simultaneous transmission mode.

These antennas are installed in the car as follows:

- 1) ANT (DR): MAX ANT1
- 2) ANT (ASST): MAX ANT1
- 3) ANT (BACK DOOR): MAX ANT2
- 4) ANT (ROOM FR): MIN ANT
- 5) ANT (ROOM MID): MIN ANT
- 6) ANT (ROOM RR): MIN ANT

### **4.2 Configuration and peripherals**



\* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

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#### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	BCM2 for Passive Keyless	S57L0	001	Calsonic Kansei Corporation	EUT
B	LF Antenna (MAX ANT1)	-	001	Calsonic Kansei Corporation	EUT
C	LF Antenna (MAX ANT2)	-	002	Calsonic Kansei Corporation	EUT
D	LF Antenna (MIN ANT)	-	003	Calsonic Kansei Corporation	EUT
E	Switch Box	-	-	Calsonic Kansei Corporation	-

#### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	3.5	Unshielded	Unshielded	-
2	Signal Cable	3.4	Unshielded	Unshielded	-
3	Signal Cable	3.4	Unshielded	Unshielded	-
4	Signal Cable	0.5	Unshielded	Unshielded	-
5	DC Cable	2.5	Unshielded	Unshielded	-

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## **SECTION 5: Radiated emission (Fundamental and Spurious Emission)**

### **Test Procedure**

The Radiated Electric Field Strength intensity has been measured on No.2 and No.4 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.

\*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency : From 30MHz to 1GHz 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

- 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 were measured.

\* 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])

**Test data : APPENDIX 2**

**Test result : Pass**

Date: April 13 and 15, 2009

Test engineer: Kazufumi Nakai and Keisuke Kawamura

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**Figure 1: Direction of the Loop Antenna**

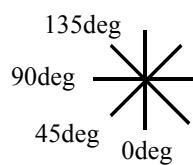
Side View

EUT



Top View

EUT



## **SECTION 6: -26dB Bandwidth**

### **Test Procedure**

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data	: APPENDIX 2
Test result	: Pass

## **SECTION 7: 99% Occupied Bandwidth**

### **Test Procedure**

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data	: APPENDIX 2
Test result	: Pass

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