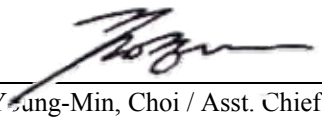
ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW POWER TRANSMITTER BELOW 1 705 KHZ

Test Report No.	**: E107R-059**
AGR No.	**: A107A-081**
Applicant	**: SHINCHANG ELECTRICS CO., LTD.**
Address	**: 734-2, Wonshi-dong, Danwon-gu, Ansan-si, Kyungki-do, 425-090, Korea**
Manufacturer	**: SHINCHANG ELECTRICS CO., LTD.**
Address	**: 734-2, Wonshi-dong, Danwon-gu, Ansan-si, Kyungki-do, 425-090, Korea**
Type of Equipment	**: CONTROL UNIT IMMOBILIZER**
FCC ID.	**: NYOSISJC10BEM**
Model Name	**: SISJC10BEM**
Serial number	**: N/A**
Total page of Report	**: 13 pages (including this page)**
Date of Incoming	**: July 20, 2010**
Date of issuing	**: July 29, 2010**

SUMMARY

The equipment complies with the regulation of **FCC Part 15 Subpart C Section 15.209.**

This test report contains only the result of a single test of the sample supplied for the examination.

Prepared by: 

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Reviewed by: 

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EMC Testing Dept : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

Applicant	: SHINCHANG ELECTRICS CO., LTD.
Address	: 734-2, Wonshi-dong, Danwon-gu, Ansan-si, Kyungki-do, 425-090, Korea
Contact Person	: Mr. Hak-Su, Khim / Quality Control Assistant Manager
Telephone No.	: +82-41-901-0463
FCC ID	: NYOSISJC10BEM
Model Name	: SISJC10BEM
Serial Number	: N/A
Dare	: July 29, 2010

Equipment Class	**DCD – Part 15, Low Power Transmitter below 1 705 kHz**
Kind of Equipment	CONTROL UNIT IMMOBILIZER
This Report Concerns	Original Grant
Measurement Procedures	ANSI C63.4: 2009
Type of Equipment Tested	Pre-Production
Kind of Equipment Authorization Requested	Certification
Equipment will be Operated Under FCC Rules Part(s)	FCC PART 15 SUBPART C Section 15.209
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m open area test site

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The SHINCHANG ELECTRICS CO., LTD., Model SISJC10BEM (referred to as the EUT in this report) is a CONTROL UNIT IMMOBILIZER that is fixed inside the vehicle and receives the signal from the transponder. If the key is inserted into the key cylinder and rotated to the "ignition on" position, the transponder, which was incorporated in the key grip, is energized by coil antenna and then the transponder transmits ID code to coil antenna. The Immobilizer Control Unit receives the ID code and compare with the valid ID code stored in Immobilizer EEPROM. So, the EUT has a function for preventing unauthorized use of vehicle. Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
SYSTEM CONSTRUCTION	Coiled Antenna and Controller
TRANSMITTING FREQUENCY	134.2 kHz
RECEIVING FREQUENCY	0: 134.2 kHz, 1: 123.2 kHz
MODULATION	FSK
ANTENNA TYPE	Coiled Antenna
LIST OF EACH OSC. OR CRY. FREQ.(FREQ. >= 1 MHz)	4 MHz
RATED SUPPLY VOLTAGE	DC 12 V
NUMBER OF LAYERS	2 Layers

2.2 Alternative type(s)/model(s); also covered by this test report

-. None

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 15.209.

2.5 Test Methodology

The radiated testing was performed according to the procedures in ANSI C63.4: 2003 at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

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3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER
Transponder	N/A	9CA08PG
Main Board	SHINCHANG ELECTRICS CO., LTD.	SMART-IMMO V4.0

3.2 Peripheral equipment

The EUT was tested with the following all equipment used in the tested systems are:

Model	Manufacturer	Description	FCC ID	Connected to
SISJC10BEM	SHINCHANG	CONTROL UNIT IMMOBILIZER	NYOSISJC10BEM	-
N/A	N/A	Battery	N/A	EUT
N/A	STF	Simulator	N/A	EUT
SEKS-AM11ATx	SHINCHANG	Car Key	NYOSEKSAM11ATX	-

3.3 Mode of operation during the test

The key that has a transponder in the key grip was inserted into the key cylinder and rotated to the “ignition on” position and then transponder transmits a certain ID code, which was already registered to the immobilizer controller to Coil Antenna. The Immobilizer Control Unit receives the ID Code and compare with valid ID Code stored in the EEPROM in the Controller Unit. The EUT was continuously transmitted and received the signal during the testing for the testing purpose.

3.4 Equipment Modifications

-. None

3.5 Configuration of Test System

Line Conducted Emission Test:

It is not need to test this requirement, because the power of the EUT shall be supplied by a car battery.

Radiated Emission Test:

Preliminary radiated emissions tests were conducted using the procedure in ANSI C63.4: 2003, 8.3.1.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meters open area test site.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The plot is taken at 20 kHz/division frequency span, 10 kHz resolution bandwidth and 5 dB/division logarithmic displays from the spectrum analyzer.

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3.6 Antenna Requirement

According to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is built-in on the key, so no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the power of the EUT is supplied from a car battery.	

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Tx Mode	X
RX modes	-

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5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Radiated Emission Test below 30 MHz

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % R.H. Temperature : 22 ˚C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209
Type of Test : Low Power Transmitter below 1 705 kHz
Result : PASSED BY –33.95 dB at 0.134 2 MHz

EUT : CONTROL UNIT IMMOBILIZER Date: July 22, 2010
Operating Condition : TX mode
Distance : 3 m

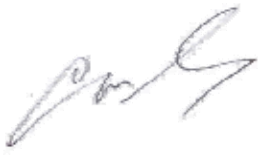
Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
0.134 2	52.60	H	1.00	190.00	18.44	0.10	71.14	105.09	-33.95
0.162	8.20	H	1.00	210.00	18.43	0.10	26.73	69.54	-42.81
3.42	7.70	H	1.00	190.00	18.25	0.37	26.32	69.54	-43.22
6.73	8.50	H	1.00	360.00	18.17	0.87	27.54	69.54	-42.00
16.72	9.30	H	1.00	360.00	19.30	1.14	29.74	69.54	-39.80
20.33	7.30	H	1.00	140.00	20.13	1.13	28.56	69.54	-40.98

Radiated Emission Tabulated Data below 30 MHz

Note: According to the distance of measurements was reduced to 3 m, the limit was extrapolated by using the square of an inverse linear distance extrapolation factor (40 dB/decade) as follows.

Limit calculation: Limit at specified distance + 40log (300/3) = Limit + 80 dB for up to 0.418 4 MHz

Limit at specified distance + 40log (30/3) = Limit + 40 dB for above 0.418 4 MHz



Tested by: In-Sub, Youn / Project Engineer

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5.2 Radiated Emission Test above 30 MHz

5.2.1 Operating Condition: Tx Mode

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % R.H. Temperature :22 ˚C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
Type of Test : Low Power Transmitter below 1 705 kHz
Result : PASSED BY –12.54 dB at 80.06 MHz

EUT : CONTROL UNIT IMMOBILIZER Date: July 22, 2010
Operating Condition : TX mode
Distance : 3 m

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
76.67	11.30	H	1.00	160.00	6.35	2.10	19.75	40.00	-20.25
80.06	19.20	H	1.00	220.00	6.16	2.10	27.46	40.00	-12.54
112.09	16.20	H	1.00	145.00	12.32	2.26	30.78	43.52	-12.74
128.10	12.30	H	1.00	360.00	14.05	2.34	28.69	43.52	-14.83
159.98	6.70	H	1.00	280.00	15.33	2.60	24.63	43.52	-18.89
176.01	4.20	H	1.00	300.00	16.10	3.20	23.50	43.52	-20.02
Other frequencies are more than 20 dB below the limit up to 2 GHz.									

Radiated Emission Tabulated Data

Tested by: In-Sub, Youn / Project Engineer

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5.2.2 Operating Condition: Rx Mode

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 41 % R.H. Temperature : 22 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Type of Test : Low Power Transmitter below 1 705 kHz

Result : PASSED BY –21.11 dB at 143.91 MHz

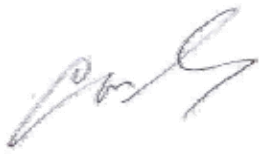
EUT : CONTROL UNIT IMMOBILIZER Date: July 22, 2010

Operating Condition : RX mode

Distance : 3 m

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
76.67	6.80	H	1.00	190.00	6.35	2.10	15.25	40.00	-24.75
95.94	5.60	H	1.00	180.00	9.57	2.20	17.37	43.52	-26.15
119.80	4.20	H	1.00	160.00	13.61	2.10	19.91	43.52	-23.61
131.89	4.40	H	1.00	150.00	14.23	2.42	21.05	43.52	-22.47
139.88	4.30	H	1.00	190.00	14.63	2.50	21.43	43.52	-22.09
143.91	5.10	H	1.00	240.00	14.77	2.54	22.41	43.52	-21.11

Radiated Emission Tabulated Data



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5.3 Bandwidth of the operating frequency

Humidity Level : 42 % R.H. Temperature: 22 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Type of Test : Low Power Transmitter below 1 705 kHz

EUT : CONTROL UNIT IMMOBILIZER Date: July 22, 2010

Operating Condition : TX mode

Resolution Bandwidth : 0.3 kHz

Video Bandwidth : 1.0 kHz

SPAN : 10.00 kHz

Carrier Freq. (kHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
134.2	1.10	None	The point 20 dB down from the modulated carrier

Remark: Please refer to Photo Data for bandwidth for test data.

Tested by: In-Sub, Youn / Project Engineer

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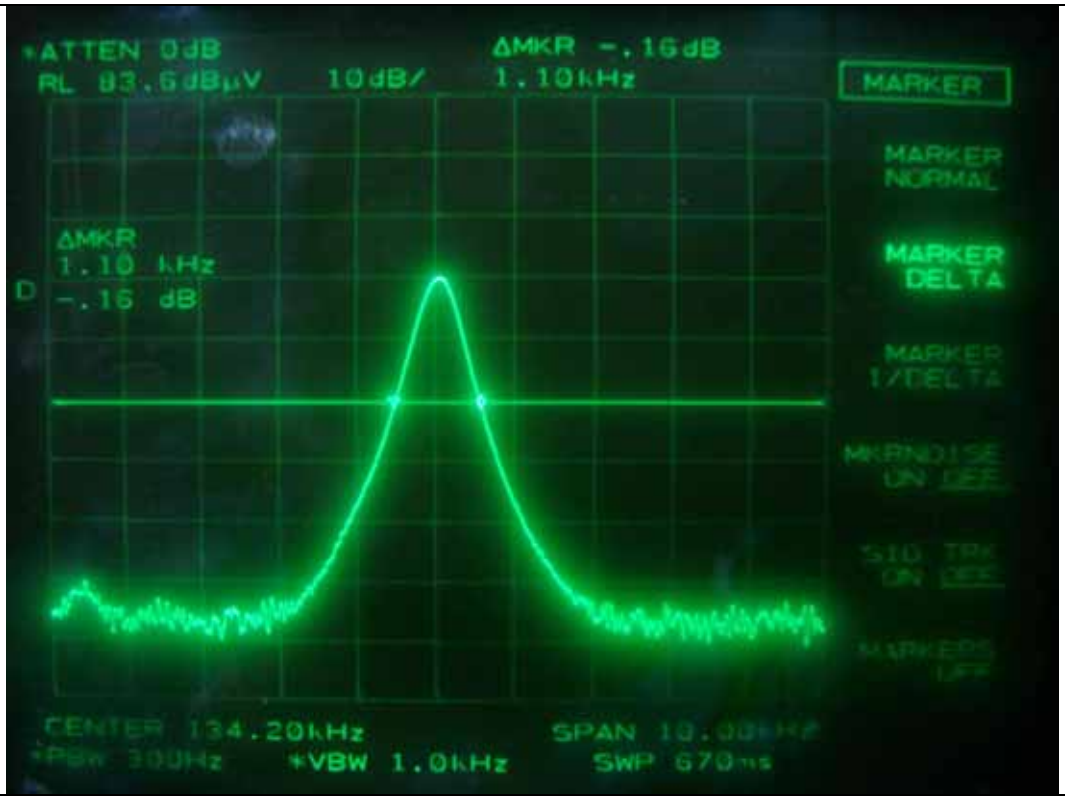
Plotted Data for bandwidth



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6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBμV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/m)
=	Corrected Reading	(dBμV/m)
-	Specification Limit	(dBμV/m)
=	dB Relative to Spec	(+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVD	838453/018	NOV/09	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/10	12MONTH	
3.	Spectrum analyzer	HP	8566B	2516A01677	JUN/10	12MONTH	■
4.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 202	MAY/10	24MONTH	
5.	Biconical antenna	EMCO	3110	9003-1121	FEB/10	24MONTH	
		Schwarzbeck	VHA9103	91031852	MAR/10		■
6.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/10	24MONTH	
		Schwarzbeck	9108-A(494)	62281001	MAR/10		■
7.	LISN	EMCO	3825/2	9109-1867	JUN/10	12MONTH	
				9109-1869	JUN/10		
		Schwarzbeck	NSLK 8128	8128-216	JUN/10		
8.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
9.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
10.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■
11.	RF Amplifier	HP	8447D	2727A04987	JUN/10	12MONTH	■
12.	Loop Antenna	R/S	HFH 2-Z2	889 285 / 26	OCT/08	24MONTH	■

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