



TEST REPORT

Ref. Report No.

04-1341-014

Name and address of the applicant

INSUNG Electronics Co., Ltd.
421, Wonchon-dong, Yongtong-gu, Suwon-shi,
Kyungki-do, 442-823, Korea

Standard / Test regulation

FCC Part 15, Subpart B

Test result

Pass

Incoming date : July 21, 2004

Test date : August 27, 2004

Test item(s) ;

Communication Receiver used with Part
15 Transmitter
(Tire Pressure Monitor System)

Model/type ref. ;

RDU-2000

Manufacturer ;

INSUNG Electronic Co., Ltd.

Additional information ;

-Required Authorization : Certification
-FCC ID. : SE4PMS2000-RDU

Issue date : August 31, 2004

This test report only responds to the tested sample and shall not be reproduced except in full without written approval of the Korea Testing Laboratory.

Tested and reported by

Jeong-Min Kim, Senior Engineer

Reviewed by

Won-Seo Cho, Telecommunication Team
Manager

KOREA TESTING LABORATORY

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? . GENERAL INFORMATION

1. Grantee's Name and Mailing Address : INSUNG Electronics Co., Ltd.
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Kyungki-do, 442-823, Korea

3. Equipment Descriptions

3.1 Operating Frequency : 433.92 MHz
3.2 Detect Method : Superheterodyne Detector
3.3 Local Oscillator : Local Osc. Frequency = Operating Frequency – 10.7 MHz (1st IF)
3.4 Power Supply : DC 12 V (Car Battery)

4. Rules and Regulations : FCC Part 15, Subpart B

5. Measuring Procedure : ANSI C63.4-2001

6. Place of Measurement : Absorber-lined Room (KTL)

7. Date of Measurement

7.1 Conducted Emission : Not Applicable
7.2 Radiated Emission : August 27, 2004

? . GENERAL REQUIREMENTS OF THE EUT

1. Labeling Requirement (Section 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interface, and (2) this device must accept any interference received,
including interference that may cause undesired operation.

1.1 Location of Label: User's Guide Manual1.2 How Applied : Printed

2. Information to User (Section 15.21)

The following or similar statements were provided in the manual for user instruction.

Please refer page 1 of the attached manual for details.

CAUTION : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. Special Accessories (Section 15.27)

3.1 Were the special Accessories provided? [] yes, [x] no

3.2 If yes, details for the special accessories are as follows :

3.3 If yes, were the appropriate instructions provided on the first page of the text concerned with the installation of the device?

[] yes, [] no

3.4 Are these accessories provided of the type which can be readily obtained from multiple retail outlets ?

[] yes, [] no

And therefore does the manual specify what additional components or accessories are required to used in order to comply with the Rules?

[] yes, [] no

? . RADIATED EMISSION MEASUREMENT (Section 15.109)

1. Test Procedure

1.1 Preliminary Testing for Reference

Preliminary testing was performed in a KTL absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna (Biconi-Log antenna : 30 to 1000 MHz or Horn Antenna : 1 to 18 GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT. Emission levels from the EUT with various configurations were examined on a spectrum analyzer connected with a RF amplifier and graphed by a plotter.

1.2 Final Radiated Emission Test at an Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KTL absorber-lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

Based on the test results in preliminary test, measurement was made in same test set up and configuration with 3 orthogonal planes which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer with a RF amplifier.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane with horizontal and vertical polarization to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor(20dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

2. Photograph of the test configuration



3. Sample Calculation

The emission level measured in decibels above one microvolt (dB μ) was converted into microvolt per meter (μ /m) as shown in following sample calculation.

For example :

Measured Value at	<u>423.22 MHz</u>	< 30.0 dB μ
+	Antenna Factor	15.8 dB/m
+	Cable Loss	2.6 dB
-	Preamplifier	30.0 dB
-	Distance Correction Factor *	0.0 dB
<hr/>		
=	Radiated Emission	< 18.4 dB μ /m
		(< 8.3 μ /m)

* Extrapolated from the measured distance to the specified distance by an inverse linear distance extrapolation.

4. Measurement Data

- Detect Mode and Resolution Bandwidth :

CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz for ranges below 1 GHz)

Peak (3 dB Bandwidth : 1 MHz for ranges over 1 GHz)

- Measurement Distance : 3 Meter

Frequency (MHz)	* D.M.	* A.P.	Measured Value (dB?)	* A.F. + C.L. (dB)	* A.G. (dB)	* D.C.F. (dB)	Emission Level		Limit (? /m)	** Margin (dB)
							(dB? /m)	(? /m)		
423.22	Q	H/V	< 30.0	18.4	-30	--	< 18.4	< 8.3	200	< -27.6
--	--	--	--	--	--	--	--	--	--	--
<p>Note</p> <p>The observed Test Receiver's noise floor level with RF preamplifier (30 dB) was 30.0 dB? . And all other emissions not reported on data were more than 25dB below the permitted level.</p> <p>* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average) A.P. : Antenna Polarization (H : Horizontal, V : Vertical) A.F. : Antenna Factor C.L. : Cable Loss A.G. : Amplifier Gain D.C.F. : Distance Correction Factor < : Less than</p> <p>** Margin (dB) = Emission Level (dB) - Limit (dB)</p>										

? . TEST EQUIPMENTS USED FOR MEASUREMENTS

<u>Equipment</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>	<u>Effective Cal. Duration</u>
[x] EMI Receiver (20 MHz-1 GHz)	ESVS30	R & S	830516/002	06/16/04-06/16/05
[x] EMI Receiver (20 Hz-7 GHz)	ESI	R & S	835571/004	09/08/04-09/08/05
[x] Spectrum Analyzer (9 kHz-26.5 GHz)	8563A	H. P.	3222A02069	03/29/04-03/29/05
[x] Spectrum Analyzer (100 Hz-22 GHz)	8566B	H. P.	3014A07057	05/27/04-05/27/05
[x] Quasi-Peak Adapter (10 kHz-1 GHz)	85650A	H. P.	3107A01511	05/27/04-05/27/05
[x] RF-Preselector (20 Hz-2 GHz)	85685A	H. P.	3010A01181	05/27/04-05/27/05
[] Test Receiver (9 kHz-30 MHz)	ESH3	R & S	860905/001	06/16/04-06/16/05
[] Synthesized Sweeper (10 MHz-20 GHz)	83620A	H. P.	3250A01653	06/16/04-06/16/05
[x] Pre-Amplifier (0.1-3000 MHz, 30 dB)	8347A	H. P.	2834A00543	05/27/04-05/27/05
[x] Pre-Amplifier (1-26.5 GHz, 35 dB)	8449B	H. P.	3008A00302	05/27/04-05/27/05
[] LISN(50 Ω , 50 μ H) (10 kHz-100 MHz)	3825/2	EMCO	9010-1710	05/27/04-05/27/05
[] Tuned Dipole Ant. (30 MHz-300 MHz)	VHA 9103	Schwarzbeck	-	*
[] Tuned Dipole Ant. (300 MHz-1 GHz)	UHA 9105	Schwarzbeck	-	*
[] Biconical Ant. (30 MHz-300 MHz)	BBA 9106	Schwarzbeck	-	*
[x] Biconi-Log Ant. (30 MHz-1000 MHz)	VULB9168	Schwarzbeck	9168-167	*
[] Log Periodic Ant. (200 MHz-1 GHz)	3146	EMCO	-	*
[x] Horn Ant. (1 GHz-18 GHz)	3115	EMCO	-	*
[] Active Loop Ant. (9 kHz-30 MHz)	6502	EMCO	2532	*
[] Shielded Room (5.0 m x 4.5 m)	-	SIN-MYUNG	-	-

* Each set of antennas has been calibrated to ensure correlation with ANSI C63.5 standard. The calibration of antennas is traceable to Korea Standard Research Institute(KSRI).