SK TECH CO., LTD.

Certificate of Compliance

Test Report No.:	SKTTRT-060818-022		
NVLAP CODE:	200220-0		
Applicant:	EZ Telematics		
Applicant Address:	DABO B/D 5F, 164-1, Anyang-1Dong, Manan-Gu Anyang-City, Kyunggi-Do, Korea		
Device Under Test:	CAR ALARM SYSTEM		
FCC ID:	**UGI-R5000**	**Model No.:**	R-5000
Receipt No.:	SKTEU06-0429	**Date of receipt:**	July 20, 2006
Date of Issue:	August 18, 2006		
Location of Testing:	**SK TECH CO., LTD.** 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Procedure:	ANSI C63.4 / 2003		
Test Specification:	47CFR, Part 15 Subpart C		
Equipment Class:	DSR - Part 15 Remote Control / Security Device Transceiver		
Test Result:	The above-mentioned device has been tested and passed.		

Tested & Reported by: *Chang-Min, Moon*

2006. 08. 18

Signature *Date*

Approved by: *Jae-Kyung, Bae*

2006. 08. 18

Signature *Date*

Other Aspects:	
Abbreviations:	**· OK, Pass = passed · Fail = failed · N/A = not applicable**

☞ **•This test report is not permitted to copy partly without our permission.**
•This test result is dependent on only equipment to be used.
•This test result is based on a single evaluation of one sample of the above mentioned.
•This test report must not be used to claim product endorsement by NVLAP or any agency of the U.S Government.
• We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.

NVLAP®

NVLAP Lab. Code: 200220-0

>> CONTENTS <<

1. GENERAL 3

2. TEST SITE 3
2.1 Location 3
2.2 List of Test and Measurement Instruments 4
2.3 Test Date 4
2.4 Test Environment 4

3. DESCRIPTION OF The EQUIPMENT UNDER TEST 5
3.1 Rating and Physical Characteristics 5
3.2 Equipment Modifications 5
3.3 Submitted Documents 5

4. MEASUREMENT CONDITIONS 6
4.1 Description of test configuration 6
4.2 List of Peripherals 6
4.3 Uncertainty 6

5. TEST AND MEASUREMENTS 7

5.1 ANTENNA REQUIREMENT 7
5.1.1 Regulation 7
5.1.2 Result 7

5.2 OCCUPIED BANDWIDTH / Dwell Time 8
5.2.1 Regulation 8
5.2.2 Test Procedure 8
5.2.3 Test Results 9

5.3 RADIATED EMISSION 10
5.3.1 Regulation 10
5.3.2 Test Procedure 10
5.3.3 Test Results 11

1. GENERAL

These tests were performed using the test procedure outlined in ANSI C63.4, 2003 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.231 for Remote Control / Security Device Transceiver.
The EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards.

We attest to the accuracy of data. All measurements reported herein were performed by SK TECH CO., LTD. and were made under Chief Engineer's supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. TEST SITE

SK TECH Co., Ltd.

2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.
This laboratory is accredited by NVLAP for NVLAP Lab. Code: 200220-0 and DATech for DAR-Registration No.: TTI-P-G155/97-01

2.2 List of Test and Measurement Instruments

Description	Manufacturer	Model #	Serial #	
Spectrum Analyzer	Agilent	E4405B	US40520856	☒
EMC Spectrum Analyzer	Agilent	E7405A	US40240203	☒
EMI Test Receiver	Rohde&Schwarz	ESIB40	100277	☒
Pre-amplifier	HP	8447F	3113A05153	☒
Pre-amplifier	MITEQ	AFS44	1116321	☒
Pre-amplifier	MITEQ	AFS44	1116322	
Power Meter	Agilent	E4418B	US39402179	
Power Meter	Agilent	E4417A	MY45100426	
Power Sensor	Agilent	E9327A	MY44420696	
Power Sensor	HP	8485A	3318A13916	
Oscilloscope	Agilent	54820A	US40240160	
Diode detector	Agilent	8473C	1882A03173	
VHF Precision Dipole Antenna (TX/RX)	Schwarzbeck	VHAP	1014 / 1015	
UHF Precision Dipole Antenna (TX/RX)	Schwarzbeck	UHAP	989 / 990	
Loop Antenna	Schwarzbeck	HFH2-Z2	863048/019	
TRILOG Broadband Antenna	Schwarzbeck	VULB9160	3141	☒
TRILOG Broadband Antenna	Schwarzbeck	VULB9168	9168-230	☒
Biconical Antenna	Schwarzbeck	VHA9103	2265	
Log-Periodic Antenna	Schwarzbeck	UHALP9107	1819	
Horn Antenna	AH Systems	SAS-200/571	304	☒
Horn Antenna	EMCO	3115	00040723	
Horn Antenna	EMCO	3115	00056768	
Vector Signal Generator	Agilent	E4438C	MY42080359	
PSG analog signal generator	Agilent	E8257D-520	MY45141255	
DC Power Supply	HP	6634A	2926A-01078	
DC Power Supply	HP	6268B	2542A-07856	
Digital Multimeter	HP	HP3458A	2328A14389	
PCS Interface	HP	83236B	3711J00881	
CDMA Mobile Test Set	HP	8924C	US35360253	
Hygro/Thermo Graph	SATO	PC-5000TRH-II	-	☒
Temperature/Humidity Chamber	All Three	ATH-50M	20030425	

2.3 Test Date

Date of Application: July 20, 2006

Date of Test: July 20, 2006 ~ August 17, 2006

2.4 Test Environment

See each test item's description.

3. DESCRIPTION OF THE EQUIPMENT UNDER TEST

The product specification described herein was obtained from the product data sheet or user's manual.

3.1 Rating and Physical Characteristics

Type (Model No.)	CAR ALARM SYSTEM (R-5000)
Power source	DC 1.5V (Alkaline Battery)
Local Oscillator or X-Tal	X-Tal: 20.945 MHz, 32.768 kHz
Tx / Rx Frequency	433.92 MHz (Tx/Rx)
Antenna Type	Spring Antenna
Type of Modulation	FSK
RF Output Power	80 dBuV/m(@3m) Under
Interface Ports	-

3.2 Equipment Modifications

None.

3.3 Submitted Documents

Block diagram

Schematic diagram

Part List

User manual

4. MEASUREMENT CONDITIONS

4.1 Description of test configuration

The EUT was configured for testing in a typical fashion (as a user would normally use it). During the exploratory tests, the EUT was set to transmit the control signal continuously in order to conduct subpart C tests.

4.2 List of Peripherals

Equipment Type	Manufacture	Model	Cable Description

None

4.3 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = KUc (K = 2)
Radiated disturbance	± 2.30 dB	±4.60 dB
Conducted disturbance	± 1.47 dB	±2.94 dB

5. TEST AND MEASUREMENTS

Summary of Test Results

Requirement	CFR Section	Report Section	Test Result
Antenna Requirement	15.203	5.1	PASS
Occupied Bandwidth / Dwell Time	15.231(c), 15.231(a)(1)	5.2	PASS
Radiated Emission	15.231(b), 15.209	5.3	PASS
Conducted Emission	15.207(a)	N/A	N/A*

* Not required, the EUT is only battery powered.

5.1 ANTENNA REQUIREMENT

5.1.1 Regulation

FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31 (d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

5.1.2 Result: PASS

The EUT have an integral spring antenna and meets the requirements of this section.

5.2 OCCUPIED BANDWIDTH / Dwell Time

5.2.1 Regulation

According to §15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the point 20 dB down from the modulated carrier.
The 20 dB bandwidth limit = F X 0.0025 = 433.92 MHz X 0.0025 = 1084.8 kHz

According to §15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.2.2 Test Procedure

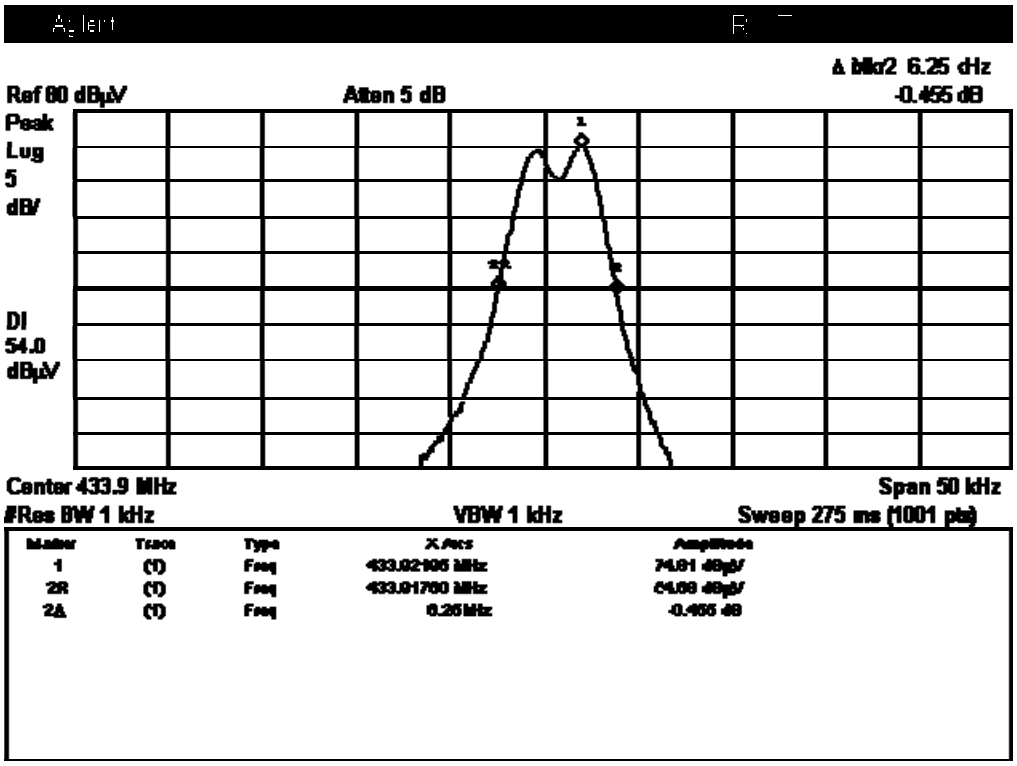
ANSI C63.4-2003 Section 13.1.7, Occupied Bandwidth Measurements.
The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the un-modulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (i.e., the widest) bandwidth.
The measurements were performed at operating frequency (433.92 MHz). The spectrum trace data around fundamental frequency of the EUT was obtained with the spectrum analyzer in Max Hold mode. The bandwidth value was determined between the two points of 20dB down from the reference level.

5.2.3 Test Results: PASS

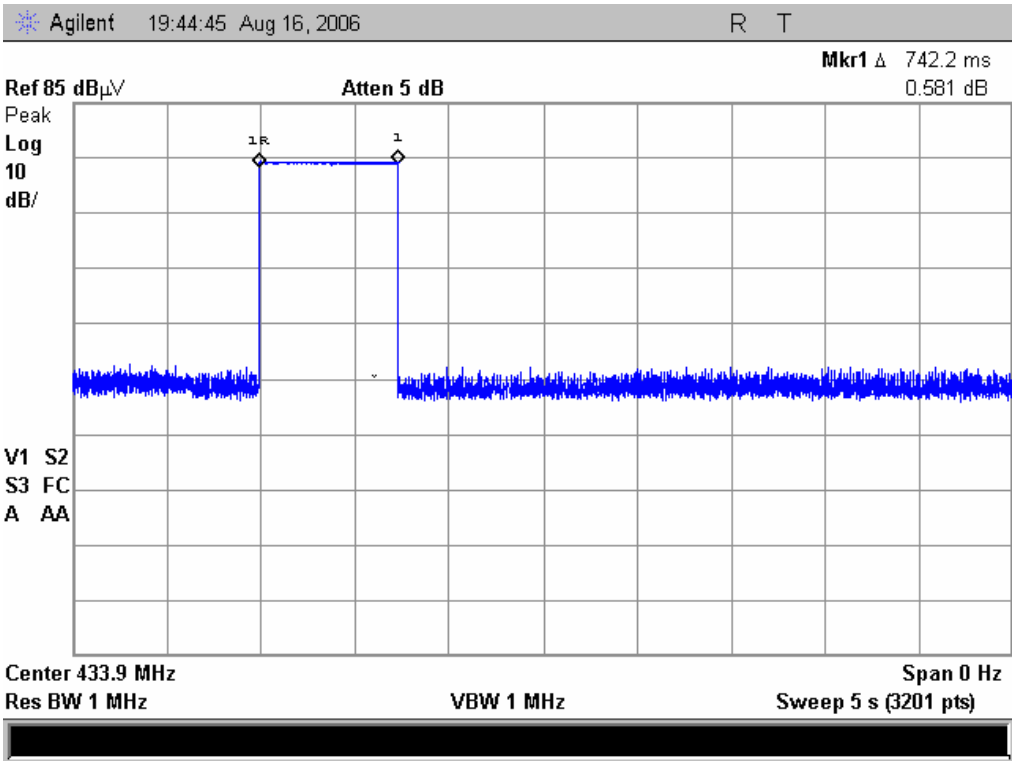
Measured values of the Occupied Bandwidth		
Center frequency (MHz)	Limit (kHz)	Measured occupied bandwidth (kHz)
433.92	1084.8	6.25

Measured values of the Dwell Time		
Center frequency (MHz)	Limit (s)	Measured Dwell Time (s)
433.92	5	0.742

Plot of the Occupied bandwidth



Plot of the Dwell Time



5.3 RADIATED EMISSIONS

5.3.1 Regulation

According to 15.231(b), In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (uV/m @ 3m)	Field strength of Spurious Emissions (uV/m @ 3m)
40.66 ~ 40.70	2250	225
70 ~ 130	1250	125
130 ~ 174	1250 to 3750 **	125 to 375 **
174 ~ 260	3750	375
260 ~ 470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

** Linear interpolations

Any emissions that fall within the restricted bands specified in FCC Section 15.205 shall not exceed the following limits according to §15.209:

Frequency (MHz)	Field strength (uV/m @ 3m)	Field strength (dBuV/m @ 3m)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

5.3.2 Test Procedure

Preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters. The EUT was placed on the top of the 0.8 meter high, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.

The antenna polarization was also changed from vertical to horizontal. The spectrum analyzer was scanned from 30 to 1000 MHz using the Bi-Log antenna. Above 1 GHz, linearly polarized double ridge horn antenna was used.

To obtain the final test data, the EUT was arranged on a turntable situated on a 4x4 meter at the Open Area Test Site. The EUT was tested at a 3-meter test distance. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was operated in transmitting mode.

5.3.3 Test Results: PASS

Measured values of the Field strength								
Frequency (MHz)	Pol. (V/H)	AH/TA (m)/(°)	Reading (dBμV)	Amp Gain (dB)	AF + CL (dB/m)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
433.92	V	1.0 / 119	86.7	27.9	17.0	75.8 PK	108.8 PK	33.0
433.92	V	1.0 / 119	85.6	27.9	17.0	74.7 AV	80.8 AV	6.1
482.13	V	1.0 / 238	51.9	28.2	18.6	42.3 PK	80.8 PK	38.5
482.13	V	1.0 / 238	48.8	28.2	18.6	39.2 AV	60.8 AV	21.6

Note

1. *H = Horizontal, V = Vertical Polarization*
2. *AH=Antenna Height, TA=Table Angle*
3. *PK=Peak detector, AV=Average detector*
4. *AF/CL = Antenna Factor and Cable Loss*
5. *Resolution Bandwidth: 120 kHz for below 1 GHz, 1 MHz for over 1 GHz*
6. *The frequency range was scanned from 30 MHz to 5 GHz. All emissions not reported were more than 20 dB below the specified limit or in the noise floor.*
7. *Field strength limit of the fundamental frequency:*

   Limit = (F-260)(12500-3750)/(470-260) + 3750 = 10996.7uV/m = 80.8 dBuV/m*

   Field strength limit of spurious emissions:

   Limit = (F-260) (1250-375)/(470-260) + 375 = 1099.6uV/m = 60.8 dBuV/m*

Margin (dB) = Limit – Actual

[Actual = Reading – Amp Gain + AF + CL]