



# **ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER**

**Test report file number** : E03DR-094

**Applicant** : OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD.

**Address** : 481-2, Kasan-Dong, Kumchun-Gu, Seoul, 153-023 Korea

**Manufacturer** : OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD.

**Address** : 481-2, Kasan-Dong, Kumchun-Gu, Seoul, 153-023 Korea

**Type of Equipment** : REMOTE KEYLESS ENTRY SYSTEM

**FCC ID** : OSLOKA-110T

**Model Name** : OKA-110T

**Multiple Model Name** : N/A

**Serial number** : N/A

**Total page of Report** : 12 pages (including this page)

**Date of Incoming** : November 25, 2003

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## **SUMMARY**

The equipment complies with the requirements of FCC CFR 47 PART 15 SUBPART C, SECTION 15.231.

This test report contains only the result of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

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**1. VERIFICATION OF COMPLIANCE**

- APPLICANT : OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD.  
- ADDRESS : 481-2, Kasan-Dong, Kumchun-Gu, Seoul, 153-023 Korea  
- CONTACT PERSON : Mr. Youngje, Seo / Section Manager  
- TELEPHONE NO : +82-2-850-5743  
- FCC ID : OSLOKA-110T  
- MODEL NO/NAME : OKA-110T  
- SERIAL NUMBER : N/A  
- DATE : December 31, 2003

|                                                         |                                                             |
|---------------------------------------------------------|-------------------------------------------------------------|
| DEVICE TYPE                                             | REMOTE KEYLESS ENTRY SYSTEM<br>- INTENTIONAL RADIATOR       |
| E.U.T. DESCRIPTION                                      | RF REMOTE KEYLESS ENTRY SYSTEM FOR VEHICLE<br>- TRANSMITTER |
| THIS REPORT CONCERNS                                    | ORIGINAL GRANT                                              |
| MEASUREMENT PROCEDURES                                  | ANSI C63.4: 2001                                            |
| TYPE OF EQUIPMENT TESTED                                | PRE-PRODUCTION                                              |
| KIND OF EQUIPMENT<br>AUTHORIZATION REQUESTED            | CERTIFICATION                                               |
| EQUIPMENT WILL BE OPERATED<br>UNDER FCC RULES PART(S)   | FCC PART 15 SUBPART C, 15.231                               |
| MODIFICATIONS ON THE EQUIPMENT<br>TO ACHIEVE COMPLIANCE | No                                                          |
| FINAL TEST WAS CONDUCTED ON                             | 3 METER 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.



## 2. GENERAL INFORMATION

### 2.1 Product Description

The OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD., Model OKA-110T(referred to as the EUT in this report) is a transmitter that it controls locking and unlocking the door of a vehicle and alarm the horn by wireless remote controller. The associated receiver is manufactured by Omron Automotive Electronics Korea Co., Ltd, Model No: OKA-110R, FCC ID: OSLOKA-110R. The product specification described herein was obtained from product data sheet or user's manual.

|                                              |                                 |
|----------------------------------------------|---------------------------------|
| CHASSIS TYPE                                 | Non-Metal                       |
| TX FREQUENCY                                 | 313.85 MHz                      |
| MODULATION                                   | FSK                             |
| LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz) | 9.807813 MHz                    |
| ANTENNA TYPE                                 | Built-in on the PCB in the EUT  |
| TRANSMISSION TIME                            | Not longer than 1 sec           |
| RATED SUPPLY VOLTAGE                         | DC 3V, 5mA (Lithium Battery)    |
| NUMBER OF LAYERS                             | 2 LAYERS                        |
| FUNCTION OF BUTTON                           | Doors Lock, Doors Unlock, PANIC |

Remark: This equipment automatically deactivates the transmitter within not more than 1 second of being released.

### 2.2 Model Differences:

The difference(s) compared to the EUT is as follows: none

### 2.3 Related Submittal(s) / Grant(s)

-. None

### 2.4 Test System Details

The EUT was tested with the following all equipment used in the tested systems are: none

### 2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2001. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

### 2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)



### 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 | FCC ID |
|-------------|-------------------------------------------------|-------------------|--------|
| MAIN BOARD  | OMRON AUTOMOTIVE ELECTRONICS KOREA<br>CO., LTD. | NF EC/US          | N/A    |

#### 3.2 EUT exercise Software

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal. During the testing, the battery of the EUT was changed with a new battery.

#### 3.3 Equipment Modifications

- None

#### 3.4 Configuration of Test System

**Line Conducted Test:** It needs not to test this requirement, because the EUT supplies from a DC battery.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2001 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

**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 picture is taken at 50kHz/division frequency span, 10kHz resolution bandwidth and 10dB/division logarithmic display from an 8566B spectrum analyzer.



### 3.5 Antenna Requirement

For intentional device, according to §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 PCB in the EUT, 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) |
|------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| N/A                                                                                                  | N/A                                                   |
| It is not need to test this requirement, because the power of the EUT is supplied from a DC 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                                                     |



## 5. FINAL RESULT OF MEASUREMENT

### 5.1 Field Strength of the Carrier Test

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

Humidity Level : 48 % Temperature : 16 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
Type of Test : Intentional Radiator  
Result : PASSED BY -6.02 dB

EUT : REMOTE KEYLESS ENTRY SYSTEM Date: November 27, 2003  
Operating Condition : TX mode  
Distance : 3 Meter

| Radiated Emissions     |                |                | Ant  | Correction Factors |               | Total            | FCC Limit         |                |
|------------------------|----------------|----------------|------|--------------------|---------------|------------------|-------------------|----------------|
| Carrier Freq.<br>(MHz) | Amp.<br>(dBuV) | Detect<br>Mode | Pol. | Ant.<br>(dBuV/m)   | Cable<br>(dB) | Amp.<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
| 313.85                 | 54.40          | Peak           | H    | 13.58              | 1.55          | 69.53            | 75.55             | -6.02          |

Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Tested by: In-Sub, Youn / Test Engineer



## 5.2 Spurious Emission Test

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

Humidity Level : 48 % Temperature : 16 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
 Type of Test : Intentional Radiator  
 Result : PASSED BY -6.66dB at 1255.25 MHz

EUT : REMOTE KEYLESS ENTRY SYSTEM Date: November 27, 2003  
 Operating Condition : TX mode  
 Distance : 3 Meter

| Radiated Emissions                                          |                |                | Ant  | Correction Factors |               | Total(dBuV/m) | FCC Limit(dBuV/m) |            |
|-------------------------------------------------------------|----------------|----------------|------|--------------------|---------------|---------------|-------------------|------------|
| Freq.<br>(MHz)                                              | Amp.<br>(dBuV) | Detect<br>Mode | Pol. | Ant.<br>(dBuV/m)   | Cable<br>(dB) | Peak          | Limit             | Margin(dB) |
| 627.68                                                      | 6.80           | Peak           | V    | 19.43              | 2.36          | 28.59         | 55.55             | -26.96     |
| 941.53                                                      | 14.50          | Peak           | H    | 22.45              | 3.87          | 40.82         | 55.55             | -14.73     |
| 1255.25                                                     | 18.80          | Peak           | H    | 25.20              | 4.89          | 48.89         | 55.55             | -6.66      |
| 1569.05                                                     | 13.10          | Peak           | H    | 27.06              | 5.79          | 45.95         | 55.55             | -9.60      |
| 1883.25                                                     | 9.80           | Peak           | H    | 29.23              | 6.21          | 45.24         | 55.55             | -10.31     |
| 2196.95                                                     | 9.10           | Peak           | H    | 30.81              | 7.76          | 47.67         | 55.55             | -7.88      |
| -                                                           |                |                |      |                    |               |               |                   |            |
| Other spurious frequencies were not found up to 3138.5 MHz. |                |                |      |                    |               |               |                   |            |

Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Tested by: In-Sub, Youn / Test Engineer



**5.3 Bandwidth of the operating frequency**

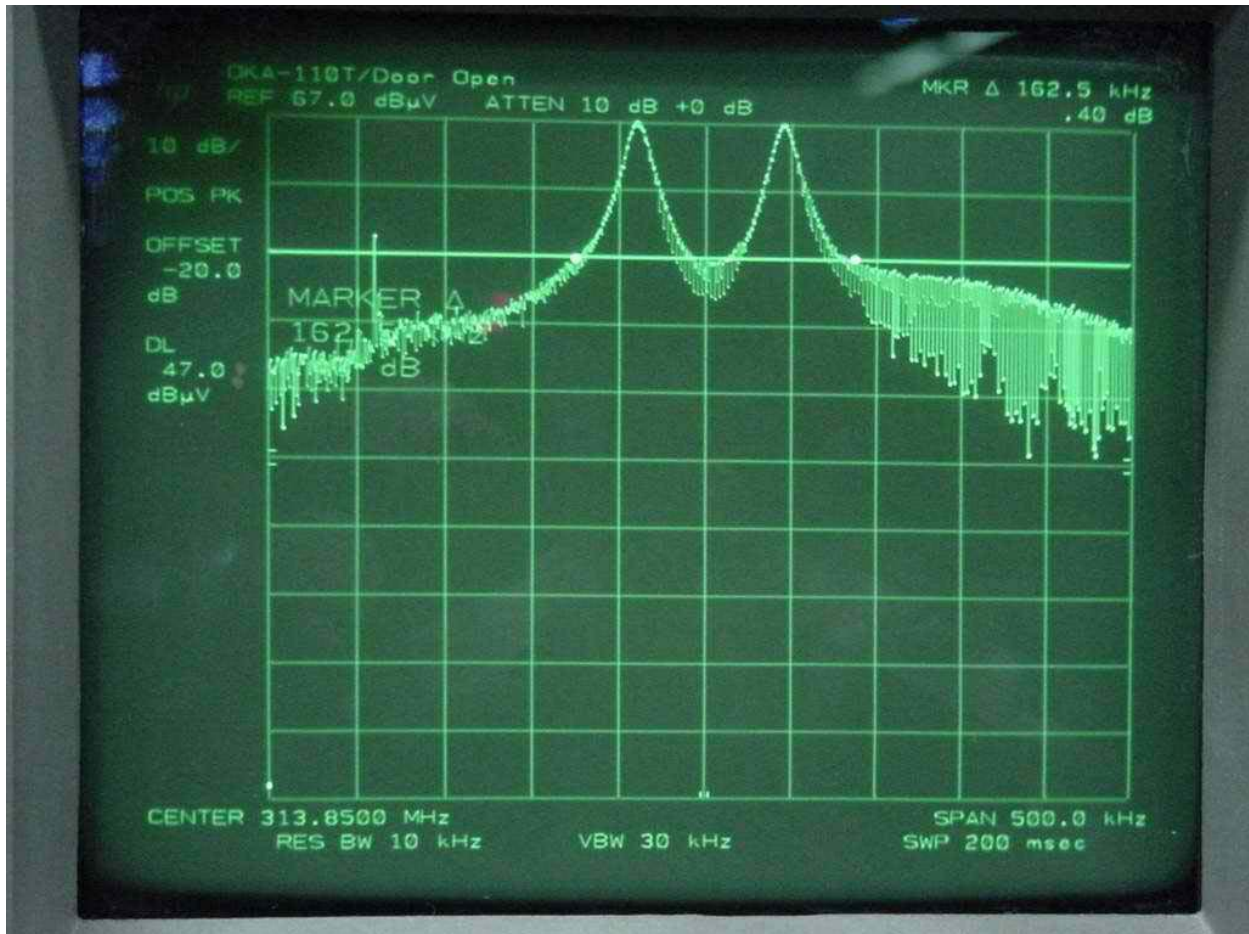
Humidity Level : 51 % Temperature : 19 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (c)  
Type of Test : Intentional Radiator  
Result : PASSED

EUT : REMOTE KEYLESS ENTRY SYSTEM Date: November 27, 2003  
Operating Condition : TX mode  
Minimum Resolution  
Bandwidth : 10 kHz

| Carrier Freq.<br>(MHz) | Bandwidth of the emission.<br>(kHz) | Limit (0.25% of the Carrier Freq.)<br>(kHz) | Remark                                                    |
|------------------------|-------------------------------------|---------------------------------------------|-----------------------------------------------------------|
| 313.85                 | 162.5                               | 784.62                                      | <u>The point 20dB down from<br/>the modulated carrier</u> |

Remark: Please refer to image data for test data in next page.

Tested by: In-Sub, Youn / Test Engineer





## 6. FIELD STRENGTH CALCULATION

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

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

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= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

**7. LIST OF TEST EQUIPMENT**

| No. | EQUIPMENTS               | MFR.        | MODEL       | SER. NO.     | LAST CAL | DUE CAL | USE |
|-----|--------------------------|-------------|-------------|--------------|----------|---------|-----|
| 1.  | Test receiver            | R/S         | ESVS 10     | 827864/005   | DEC/03   | 12MONTH | ■   |
| 2.  | Test receiver            | R/S         | ESHS 10     | 834467/007   | APR/03   | 12MONTH |     |
| 3.  | Spectrum analyzer        | HP          | 8566B       | 3407A08547   | AUG/03   | 12MONTH | ■   |
| 4.  | Spectrum analyzer        | HP          | 8568B       | 3109A05456   | MAY/03   | 12MONTH | ■   |
| 5.  | RF preselector           | HP          | 85685A      | 3107A01264   | MAY/03   | 12MONTH | ■   |
| 6.  | Quasi-Peak Adapter       | HP          | 85650A      | 3107A01542   | MAY/03   | 12MONTH | ■   |
| 7.  | TRILOG Broadband Antenna | Schwarzbeck | VULB9163    | VULB9163 166 | FEB/03   | 12MONTH | ■   |
| 8.  | Biconical antenna        | EMCO        | 3104C       | 9109-4443    | MAY/03   | 12MONTH | ■   |
|     |                          |             |             | 9109-4444    | JUL/03   | 12MONTH |     |
|     |                          | Schwarzbeck | VHA9103     | 91031852     | AUG/02   | 12MONTH |     |
| 9.  | Log Periodic antenna     | EMCO        | 3146        | 9109-3213    | AUG/02   | 12MONTH | ■   |
|     |                          |             |             | 9109-3214    | JUL/03   | 12MONTH |     |
|     |                          |             |             | 9109-3217    | MAY/03   | 12MONTH |     |
|     |                          | Schwarzbeck | 9108-A(494) | 62281001     | AUG/02   | 12MONTH |     |
| 10. | LISN                     | EMCO        | 3825/2      | 9109-1867    | AUG/03   | 12MONTH |     |
|     |                          |             |             | 9109-1869    | OCT/03   | 12MONTH |     |
| 11. | Position Controller      | EMCO        | 1090        | 9107-1038    | N/A      | N/A     | ■   |
| 12. | Turn Table               | EMCO        | 1080-1.21   | 9109-1576    | N/A      | N/A     | ■   |
| 13. | Antenna Master           | EMCO        | 1070-1      | 9109-1624    | N/A      | N/A     | ■   |