

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

**Test Report No.**

**: E069R-039**

**AGR No.**

**: A067A-155R**

**Applicant**

**: DETECTOR Electronics Co., Ltd.**

**Address**

**: 277-2, Yangpyeong-Dong 4 Ka, Youngdeungpo-Ku, Seoul, Korea**

**Manufacturer**

**: DETECTOR Electronics Co., Ltd.**

**Address**

**: 277-2, Yangpyeong-Dong 4 Ka, Youngdeungpo-Ku, Seoul, Korea**

**Type of Equipment**

**: Remote Keyless Entry System**

**FCC ID**

**: OP92WTC2**

**Model Name**

**: T-2WAY-CT**

**Serial number**

**: N/A**

**Total page of Report**

**: 13 pages (including this page)**

**Date of Incoming**

**: September 01, 2006**

**Date of issuing**

**: September 20, 2006**

## SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C §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 : DETECTOR Electronics Co., Ltd.  
ADDRESS : 277-2, Yangpyong-Dong 4 Ka, Youngdeungpo-Ku, Seoul, Korea  
CONTACT PERSON : Se-Ryun, Lee / Chief Manager  
TELEPHONE NO : +82-2-2632-0527  
FCC ID : OP92WTC2  
MODEL NAME : T-2WAY-CT  
SERIAL NUMBER : N/A  
DATE : September 20, 2006

|   |   |
|---|---|
| DEVICE TYPE   | Intentional Radiator  |
| E.U.T. DESCRIPTION                                      | RF Remote Keyless Entry System for vehicle<br>- Transceiver |
| THIS REPORT CONCERNS                                    | ORIGINAL GRANT  |
| MEASUREMENT PROCEDURES                                  | ANSI C63.4: 2003  |
| 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 DETECTOR Electronics Co., Ltd., Model T-2WAY-CT (referred to as the EUT in this report) is a transceiver that it controls door locking and unlocking, engine staring and stopping, trunk releasing of a vehicle by wireless remote controller. The associated transceiver is manufactured by DETECTOR Electronics Co., Ltd., Model No: T-2WAY-CR, FCC ID: OP92WRM2. The product specification described herein was obtained from product data sheet or user's manual.

|  |             |
|--|-------------|
| CHASSIS TYPE                                 | Plastic     |
| TX FREQUENCY                                 | 433.92 MHz  |
| MODULATION                                   | FM          |
| LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz) | 48.2133 MHz |
| ANTENNA CONNECTOR TYPE                       | Fixed Type  |
| ANTENNA GAIN                                 | 1.5 dBi     |
| RATED SUPPLY VOLTAGE                         | DC 1.5V     |
| NUMBER OF LAYERS                             | 2 LAYERS    |

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

### 2.2 Model Differences:

- None

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

- Original submittal only

### 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

The radiated testing was performed according to the procedures in ANSI C63.4: 2003 and 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 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on August 30, 2005. (Registration Number: 340658)

### 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  | N/A          | ATRX1304DT        | N/A    |
| RF Board    | N/A          | 2WCM415           | N/A    |

#### 3.2 EUT exercise Software

To get a maximum radiated emission from the EUT at Transmitter mode, the button on the EUT was continuously pressed to transmit the signal. To activate continuous transmission, place a small plastic block between rubber band and the push button on the EUT.

Also, for getting maximum emission from the EUT at Receiver mode, the signal generator set to transmit at 433.92MHz and the EUT receives the signal.

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

#### 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: 2003 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.

#### Coherent Test:

During Radiated Emission Tests, H.P. signal generator model no: E4432B was used to radiate an unmodulated CW signal to EUT at 433.92 MHz in order to cohere the individual components of the characteristic broadband emissions from EUT.

**Antenna Power Conduction Test:**

This equipment was only with a permanently attached antenna, so the radiated emission measurement was performed with the attached antenna.

**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 10dB/division logarithmic display from an 8568B spectrum analyzer.

**3.5 Antenna Requirement**

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) |
|--|---|
| 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.

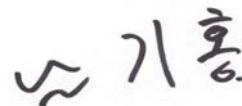
|                 |   |                           |
|-----------------|---|---------------------------|
| Humidity Level  | : <u>43 %</u>   | Temperature : <u>23°C</u> |
| Limits apply to | : <u>FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)</u>    |                           |
| Type of Test    | : <u>Transmitter</u>  |                           |
| Result          | : <u>PASSED BY -5.58 dB at 433.92 MHz under Peak detector</u> |                           |

|                     |                               |                          |
|---------------------|-------------------------------|--------------------------|
| EUT                 | : Remote Keyless Entry System | Date: September 06, 2006 |
| Operating Condition | : TX mode                     |                          |
| Distance            | : 3 Meter                     |                          |

| Radiated Emissions  |                  |               | Ant  | Correction Factors |            | Total              | FCC            |             |
|---------------------|------------------|---------------|------|--------------------|------------|--------------------|----------------|-------------|
| Carrier Freq. (MHz) | Amplitude (dBuV) | Detector Mode | Pol. | Antenna (dB/m)     | Cable (dB) | Amplitude (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 433.92              | 42.45            | Peak          | H    | 17.74              | 4.47       | 64.66              | 100.83         | -16.17      |
| 433.92              | 53.04            | Peak          | V    | 17.74              | 4.47       | 75.25              | 100.83         | -5.58       |

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

“H”: Horizontal Polarization, “V”: Vertical Polarization



Tested by: **Ki-Hong, Nam / 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  | : <u>43 %</u>   | Temperature : <u>23°C</u> |
| Limits apply to | : <u>FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)</u>    |                           |
| Type of Test    | : <u>Transmitter</u>  |                           |
| Result          | : <u>PASSED BY -16.08 dB at 867.84 MHz under average mode</u> |                           |

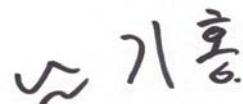
|                     |                               |                          |
|---------------------|-------------------------------|--------------------------|
| EUT                 | : Remote Keyless Entry System | Date: September 06, 2006 |
| Operating Condition | : TX mode                     |                          |
| Distance            | : 3 Meter                     |                          |

| Radiated Emissions |                  |             | Ant  | Correction Factors |            | Total              | FCC            |             |
|--------------------|------------------|-------------|------|--------------------|------------|--------------------|----------------|-------------|
| Freq. (MHz)        | Amplitude (dBuV) | Detect Mode | Pol. | Antenna (dBuV/m)   | Cable (dB) | Amplitude (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 867.84             | 13.50            | Peak        | H    | 23.35              | 7.10       | 43.95              | 80.83          | -36.88      |
| 867.84             | 14.80            | Peak        | V    | 23.35              | 7.10       | 45.25              | 80.83          | -35.58      |

Other spurious frequencies were not found up to 4400 MHz.

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

“H”: Horizontal Polarization, “V”: Vertical Polarization



Tested by: Ki-Hong, Nam / Test Engineer

### 5.3 Radiated Emission Test for Receiver Mode

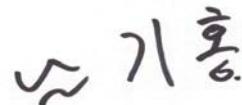
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

|                 |   |                           |
|-----------------|---|---------------------------|
| Humidity Level  | : <u>43 %</u>                             | Temperature : <u>23°C</u> |
| Limits apply to | : <u>FCC CFR 47, PART 15, SUBPART B</u>   |                           |
| Type of Test    | : <u>Un-Intentional Radiator</u>          |                           |
| Result          | : <u>PASSED BY -9.53 dB at 187.80 MHz</u> |                           |

EUT : REMOTE KEYLESS ENTRY SYSTEM Date: September 06, 2006  
 Operating Condition : RX mode  
 Distance : 3 Meter

| Radiated Emissions |                  |             | Ant  | Correction Factors |            | Total              | FCC            |             |
|--------------------|------------------|-------------|------|--------------------|------------|--------------------|----------------|-------------|
| Freq. (MHz)        | Amplitude (dBuV) | Detect Mode | Pol. | Antenna (dBuV/m)   | Cable (dB) | Amplitude (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 50.13              | 13.50            | Peak        | H    | 11.10              | 1.50       | 26.10              | 40.00          | -13.90      |
| 65.70              | 18.10            | Peak        | H    | 6.34               | 1.50       | 25.94              | 40.00          | -14.06      |
| 95.15              | 17.15            | Peak        | H    | 9.17               | 1.90       | 28.22              | 43.52          | -15.30      |
| 133.50             | 15.30            | Peak        | H    | 13.73              | 2.27       | 31.30              | 43.52          | -12.22      |
| 157.00             | 13.80            | Peak        | V    | 14.89              | 2.37       | 31.06              | 43.52          | -12.46      |
| 187.80             | 15.40            | Peak        | H    | 15.79              | 2.80       | 33.99              | 43.52          | -9.53       |

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



Tested by: Ki-Hong, Nam / Test Engineer

**5.4 Bandwidth of the operating frequency**Humidity Level : 43 % Temperature: 23°CLimits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (c)Type of Test : TransmitterResult : PASSED

EUT : Remote Keyless Entry System Date: September 06, 2006

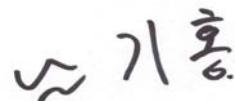
Operating Condition : TX mode

Minimum Resolution

Bandwidth : 10 kHz

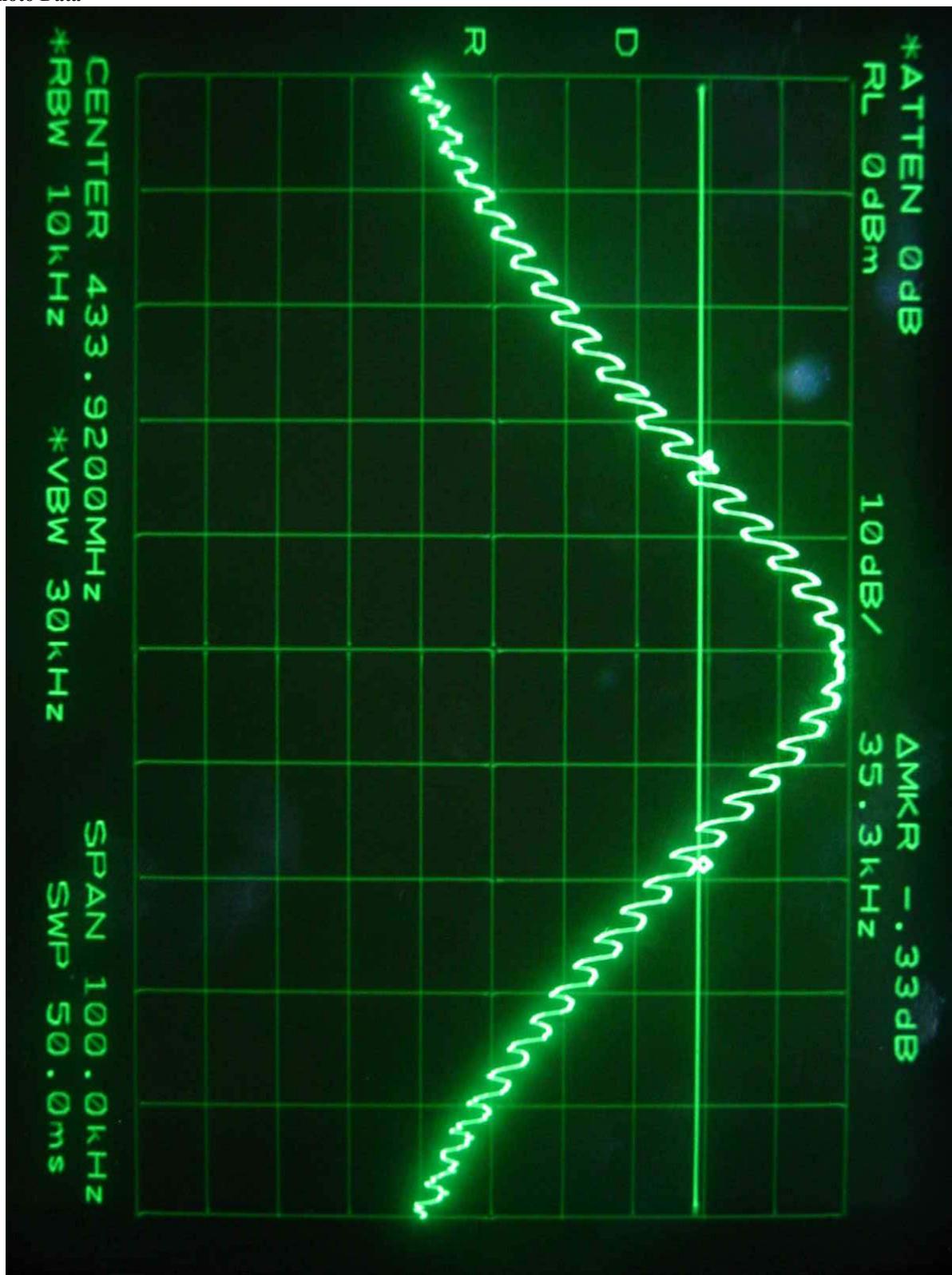
| Carrier Freq.<br>(MHz) | Bandwidth of the emission.<br>(kHz) | Limit<br>(kHz) | Remark   |
|------------------------|-------------------------------------|----------------|--|
| 433.92                 | 35.30                               | 787.5          | The point 20dB down from the modulated carrier |

Remark: Please refer to Photo Data for test data.



Tested by: Ki-Hong, Nam / Test Engineer

## Photo Data



## 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)

---

= 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         | ESVS10      | 827864/005   | DEC/05   | 12MONTH | ■   |
| 2.  | Test receiver            | R/S         | ESHS 10     | 834467/007   | MAY/06   | 12MONTH | ■   |
| 3.  | Spectrum analyzer        | R/S         | FSP         | 100017       | JUN/06   | 12MONTH | ■   |
| 4.  | TRILOG Broadband Antenna | Schwarzbeck | VULB9163    | VULB9163 166 | MAY/06   | 12MONTH |     |
| 5.  | Biconical antenna        | EMCO        | 3110        | 9003-1121    | FEB/06   | 12MONTH |     |
|     |                          | Schwarzbeck | VHA9103     | 91031852     | FEB/06   |         | ■   |
| 6.  | Log Periodic antenna     | EMCO        | 3146        | 9001-2614    | FEB/06   | 12MONTH |     |
|     |                          | Schwarzbeck | 9108-A(494) | 62281001     | FEB/06   |         | ■   |
| 7.  | LISN                     | EMCO        | 3825/2      | 9109-1867    | JUN/06   | 12MONTH |     |
|     |                          |             |             | 9109-1869    | JUN/06   |         |     |
|     |                          | Schwarzbeck | NSLK 8126   | 8126-404     | JUL/06   |         |     |
| 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     | ■   |