

# EMC TEST REPORT

**Report No. : EME-040224**

**Model No. : GDR02M**

**Issued Date : Mar.29, 2004**

**Applicant : Rexon Industrial Corp., Ltd.**  
No. 261, Jen Hwa Road, Tali, Taichung,  
Taiwan

**Test By : Intertek Testing Services Taiwan Ltd.**  
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Project Engineer

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Reviewed By

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**Summary of Tests****Mini Remote Controller for Garage Door Opener -Model: GDR02M**  
**FCC ID: P66GDR02M**

| Test                   | Reference         | Results  |
|------------------------|-------------------|----------|
| Radiated Emission test | 15.231(b), 15.209 | Complies |
| Measured bandwidth     | 15.231(c)         | Complies |

**1. General information****1.1 Identification of the EUT**

Manufacturer : Rexon Industrial Corp., Ltd.  
Product : Mini Remote Controller for Garage Door Opener  
Model No. : GDR02M  
FCC ID. : P66GDR02M  
Frequency Range : 310.00MHz  
Channel Number : Single  
Type of Modulation : ASK  
Power Supply : 12Vdc Battery  
Power Cord : N/A  
Sample Received : Feb. 27, 2004  
Test Date(s) : Feb. 27, 2004 ~ Mar. 25, 2004

A DoC report has been generated for the client.

**1.2 Additional information about the EUT**

The EUT is garage door opener. It has been designed and tested to offer safe service provided it is installed, operated, maintained and tested in strict accordance with the instructions and warnings contained in instruction manual.

The model 5610 and 56550 are identical to model GDR02M (EUT), the different model number for different brand serves as marketing strategy listed below

| Model Number | Trade Name |
|--------------|------------|
| GDR02M       | REXON      |
| 5610         | HOMEMASTER |
| 56550        | HOMEMASTER |

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

**1.3 Antenna description**

The EUT uses a permanently connected antenna.

Antenna Gain : -3.0dBi max

Antenna Type : Loop antenna

Connector Type : N/A

## 2. Test specifications

### 2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section 15.231.

### 2.2 Operation mode

EUT was used a new 12Vdc battery. The EUT transmitted continuously during all the tests.

Once the button releasing, the transmission will be stopped within 1 second. The EUT transmitted continuously during all the tests.

### 2.3 Test equipment

| Equipment           | Brand           | Frequency range | Model No. | Series No. | Last Cal.Date |
|---------------------|-----------------|-----------------|-----------|------------|---------------|
| EMI Test Receiver   | Rohde & Schwarz | 9kHz~2.75GHz    | ESCS 30   | 825788/014 | June 6, 2003  |
| EMI Test Receiver   | Rohde & Schwarz | 20Hz~26.5GHz    | ESMI      | 825428/005 | June 24, 2003 |
| Spectrum Analyzer   | Rohde & Schwarz | 9kHz~30GHz      | FSP 30    | 100137     | July 19, 2003 |
| Horn Antenna        | EMCO            | 1GHz~18GHz      | 3115      | 9906-5890  | Sep. 19, 2003 |
| Horn Antenna        | SCHWARZBECK     | 14GHz~40GHz     | BBHA 9170 | 159        | June 20, 2003 |
| Bilog Antenna       | SCHWARZBECK     | 25MHz~1.7GHz    | VULB 9160 | 3133       | Feb. 21, 2004 |
| Turn Table          | HDGmbH          | N/A             | DS 420S   | 420/669/01 | N/A           |
| Antenna Tower       | HDGmbH          | N/A             | MA 240    | 240/573    | N/A           |
| Microwave Amplifier | Agilent         | 2GHz~26.5GHz    | 8348A     | 3111A00567 | Dec. 20, 2003 |
| LISN                | Rohde & Schwarz | 9KHz~30MHz      | ESH3-Z5   | EC344      | Jan. 20, 2004 |

Note:

Note: The above equipments are within the valid calibration period.

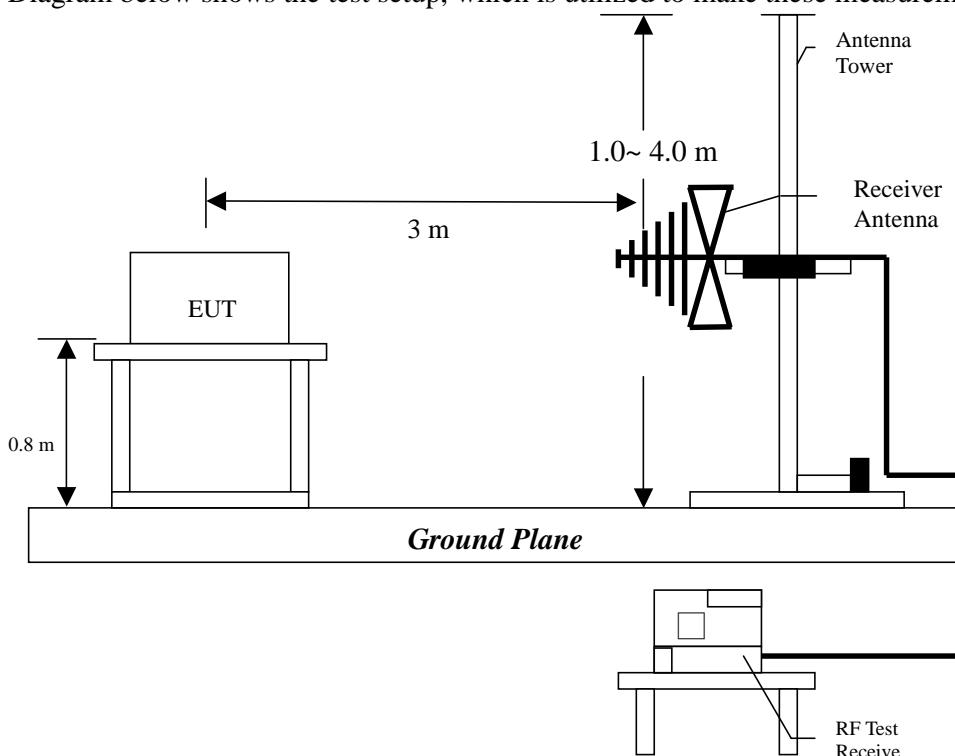
### 3. Radiated emission test FCC 15.231 (b)

#### 3.1 Operating environment

Temperature: 20 °C (10-40°C)  
 Relative Humidity: 54 % (10-90%)  
 Atmospheric Pressure 1023 hPa (860-1060hPa)

#### 3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.

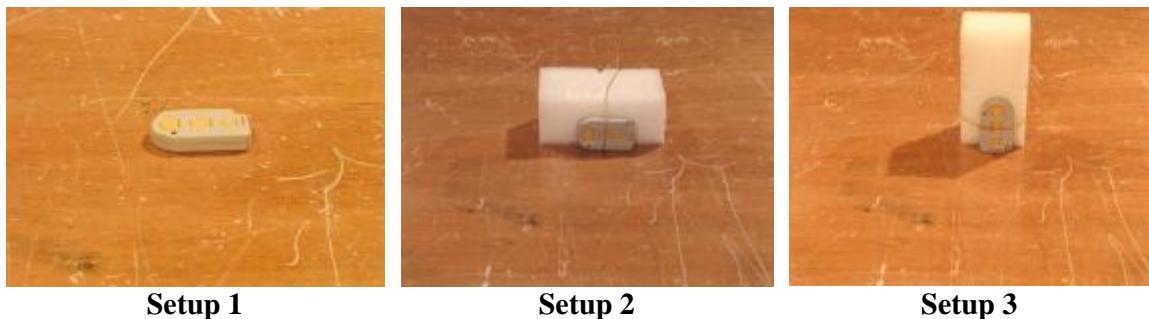


Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.

**Setup 1****Setup 2****Setup 3**

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

### **3.3 Radiated emission limit**

#### **3.3.1 Fundamental and harmonics emission limits**

| Frequency (MHz) | Field Strength of Fundamental |             | Field Strength of Harmonics |             |
|-----------------|-------------------------------|-------------|-----------------------------|-------------|
|                 | (uV/m@3m)                     | (dBuV/m@3m) | (uV/m@3m)                   | (dBuV/m@3m) |
| 310             | 5821.032                      | 75.3        | 582.10                      | 55.3        |

#### **3.3.2 General radiated emission limit**

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

| Frequency<br>MHz | 15.209 Limits<br>(dB $\mu$ V/m@3m) |
|------------------|------------------------------------|
| 30-88            | 40                                 |
| 88-216           | 43.5                               |
| 216-960          | 46                                 |
| Above 960        | 54                                 |

**Remark:**

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81. Expanded uncertainty ( $k=2$ ) of radiated emission measurement is  $\pm 3.078$  dB.

### 3.4 Radiated emission test data FCC 15.231

#### 3.4.1 Fundamental & Harmonics Radiated Emission Data

EUT : GDR02M

Worst Case Condition : Setup 1

| Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Antenna<br>Polariz.<br>(H/V) | Correction<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV) | Limit<br>@ 3 m<br>(dBuV) | Margin<br>(dB) | Antenna<br>high<br>(cm) | Turn Table<br>angle<br>(degree) |
|--------------------|----------------------------------|------------------------------|--------------------------------|-------------------|------------------------------|--------------------------|----------------|-------------------------|---------------------------------|
| 309.656            | PK                               | V                            | 14.45                          | 49.35             | 63.80                        | 75.30                    | -11.50         | 100                     | 112                             |
| 620.110            | QP                               | V                            | 20.88                          | 13.26             | 34.14                        | 46.00                    | -11.86         | 101                     | 85                              |
| 790.120            | QP                               | V                            | 23.49                          | 10.60             | 34.09                        | 46.00                    | -11.91         | 108                     | 360                             |
| 877.500            | QP                               | V                            | 24.51                          | 12.10             | 36.61                        | 46.00                    | -9.39          | 256                     | 122                             |
| 910.880            | QP                               | V                            | 24.76                          | 12.10             | 36.86                        | 46.00                    | -9.14          | 122                     | 56                              |
| 928.230            | QP                               | V                            | 25.46                          | 12.30             | 37.76                        | 46.00                    | -8.24          | 156                     | 11                              |
| 959.990            | QP                               | V                            | 25.81                          | 12.00             | 37.81                        | 46.00                    | -8.19          | 148                     | 186                             |
| 309.652            | PK                               | H                            | 14.45                          | 48.48             | 62.93                        | 75.30                    | -12.37         | 100                     | 252                             |
| 619.800            | QP                               | H                            | 20.88                          | 19.28             | 40.16                        | 46.00                    | -5.84          | 125                     | 85                              |
| 749.700            | QP                               | H                            | 22.60                          | 0.49              | 23.09                        | 46.00                    | -22.91         | 135                     | 353                             |
| 798.200            | QP                               | H                            | 23.49                          | 10.58             | 34.07                        | 46.00                    | -11.93         | 122                     | 10                              |
| 864.200            | QP                               | H                            | 24.39                          | 11.80             | 36.19                        | 46.00                    | -9.81          | 100                     | 225                             |
| 897.200            | QP                               | H                            | 24.51                          | 1.05              | 25.56                        | 46.00                    | -20.44         | 154                     | 345                             |
| 928.300            | QP                               | H                            | 25.46                          | 13.29             | 38.75                        | 46.00                    | -7.25          | 188                     | 51                              |

#### Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

For PK:

1GHz-3GHz: 50dBuV  
3GHz-14GHz: 54dBuV  
14GHz-26.5GHz: 60dBuV

For AV:

1GHz-3GHz: 41.5dBuV  
3GHz-14GHz: 46dBuV  
14GHz-26.5GHz: 46.5dBuV

**3.4.2 Measurement results: frequency above 1GHz****The radiated emissions at**

| Frequency(MHz) | Margin |
|----------------|--------|
| 1548.900       | -0.28  |

**are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.**

EUT : GDR02M  
Worst Case Condition : Tx Setup 1

| Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Antenna<br>Polariz.<br>(H/V) | Preamp<br>(dB) | Correction<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV) | Limit<br>@ 3 m<br>(dBuV) | Margin<br>(dB) | Antenna<br>high<br>(cm) | Turn Table<br>angle<br>(degree) |
|--------------------|----------------------------------|------------------------------|----------------|--------------------------------|-------------------|------------------------------|--------------------------|----------------|-------------------------|---------------------------------|
| 1548.700           | PK                               | V                            | 0              | 28.542                         | 30.518            | 59.06                        | 74                       | -14.94         | 200                     | 170                             |
| 1548.700           | AV                               | V                            | 0              | 28.542                         | 21.128            | 49.67                        | 54                       | -4.33          | 200                     | 170                             |
| 1548.900           | PK                               | H                            | 0              | 28.542                         | 35.208            | 63.75                        | 74                       | -10.25         | 109                     | 177                             |
| 1548.900           | AV                               | H                            | 0              | 28.542                         | 25.178            | 53.72                        | 54                       | -0.28          | 109                     | 177                             |

**Remark:**

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

**For PK:**

1GHz-3GHz: 50dBuV  
3GHz-14GHz: 54dBuV  
14GHz-26.5GHz: 60dBuV

**For AV:**

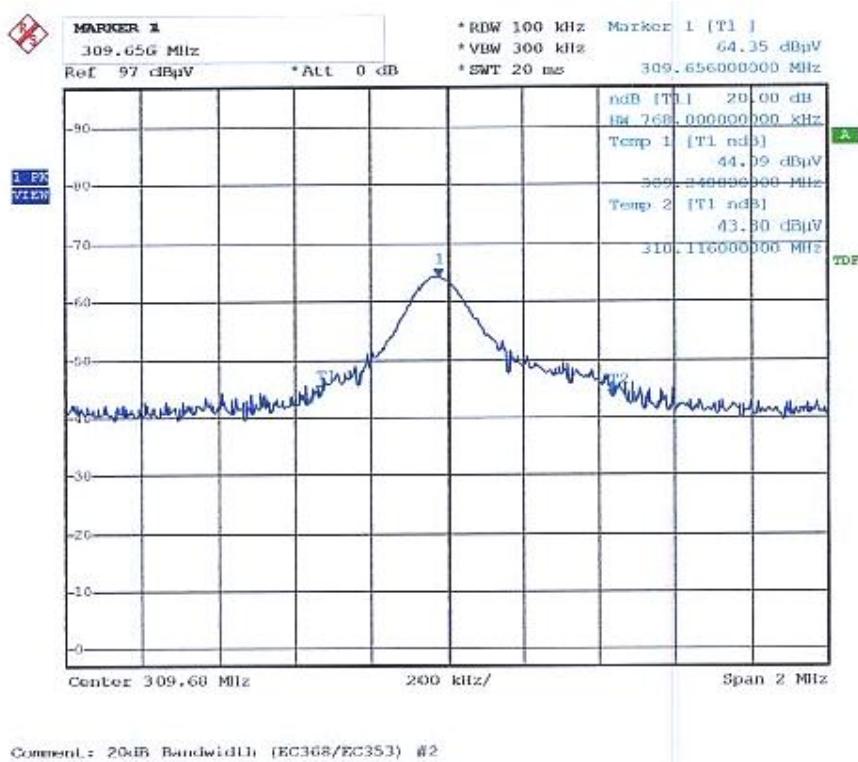
1GHz-3GHz: 41.5dBuV  
3GHz-14GHz: 46dBuV  
14GHz-26.5GHz: 46.5dBuV

### 3.5 Measured bandwidth FCC 15.231(C)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

$$B.W(20\text{dBc}) \text{ Limit} = 0.25\% \times f(\text{MHz}) = 0.25\% \times 310\text{MHz} = 0.775\text{MHz}$$

From the plot, the bandwidth is observed to be 768.00kHz, at 20dBc where the bandwidth limit is 0.775MHz. and the plot showed below.



Comment: 20dB Bandwidth (EC368/EC353) #2