EMC
TEST REPORT

Report No. : EME-040229
Model No. : GDK02
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.
No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District,
Hsinchu, Taiwan

Project Engineer

Jackey Chiu

Reviewed By

Elton Chen

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Summary of Tests

Keyless Entry Console for Garage Door Opener -Model: GDK02
FCC ID: P66GDK02

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	: Keyless Entry Console for Garage Door Opener
Model No.	: GDK02
FCC ID.	: P66GDK02
Frequency Range	: 310.00MHz
Channel Number	: Single
Type of Modulation	: ASK
Power Supply	: 9Vdc 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 5660 and 56330 are identical to model GDK02 (EUT), the different model number for different brand serves as marketing strategy listed below

Model Number	Trade Name
GDK02	REXON
5660	HOMEMASTER
56330	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 9Vdc battery. Key in four random number and then press key "Enter".

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: The above equipments are within the valid calibration period.

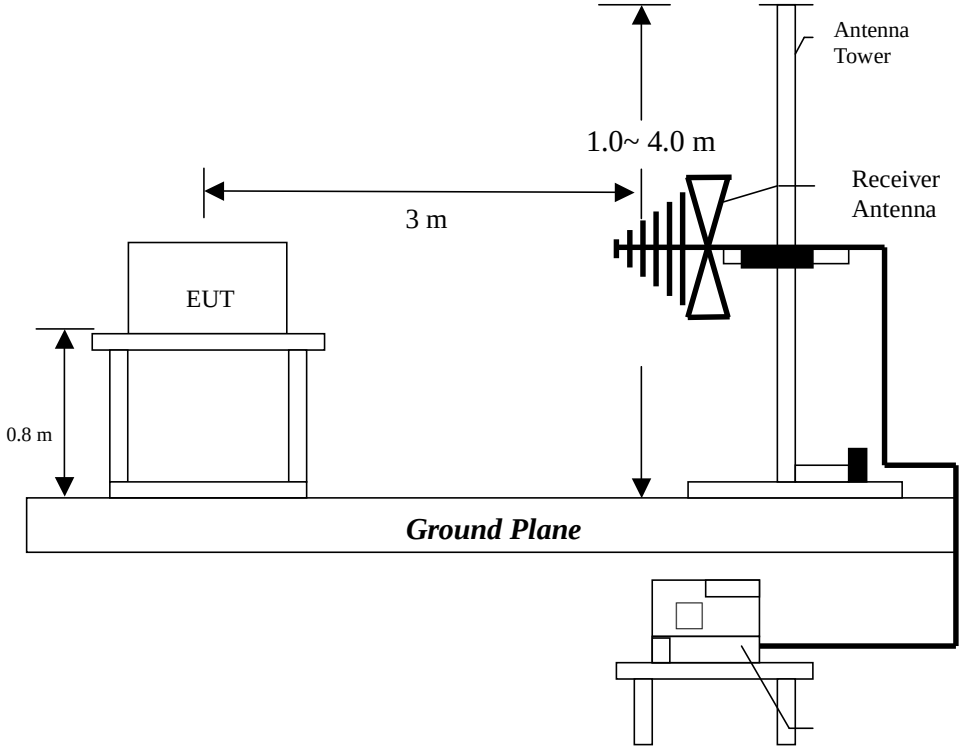
3. Radiated emission test FCC 15.231 (b)

3.1 Operating environment

Temperature:	21	℃	(10-40℃)
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 MHz	15.209 Limits (dB μ 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 ±3.078 dB.

3.4 Radiated emission test data FCC 15.231

3.4.1 Fundamental & Harmonics Radiated Emission Data

EUT : GDK02
Worst Case Condition : Setup 3

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
309.736	PK	V	14.45	48.91	63.36	75.30	-11.94	169	351
619.880	QP	V	20.88	11.64	32.52	46.00	-13.48	100	1
714.990	QP	V	22.22	10.25	32.47	46.00	-13.53	151	265
817.620	QP	V	23.89	10.19	34.08	46.00	-11.92	132	111
879.550	QP	V	24.51	10.89	35.40	46.00	-10.60	186	156
916.590	QP	V	24.76	10.55	35.31	46.00	-10.69	120	132
951.720	QP	V	25.81	11.88	37.69	46.00	-8.31	101	100
309.125	PK	H	14.45	53.64	68.09	75.30	-7.21	109	231
693.990	QP	H	21.72	10.53	32.25	46.00	-13.75	104	251
759.330	QP	H	23.40	10.19	33.59	46.00	-12.41	125	172
792.990	QP	H	23.49	10.58	34.07	46.00	-11.93	111	215
823.650	QP	H	23.89	10.44	34.33	46.00	-11.67	158	125
854.330	QP	H	24.39	11.68	36.07	46.00	-9.93	165	86
904.290	QP	H	24.76	11.56	36.32	46.00	-9.68	143	5

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(20dBc) Limit = 0.25% × f(MHz) = 0.25% × 310MHz = 0.775MHz

From the plot, the bandwidth is observed to be 648.00kHz, at 20dBc where the bandwidth limit is 0.775MHz. and the plot showed below.