Excellence in Compliance Testing

Transmitter Certification

Test Report

FCC ID: KJ8-0001543
IC: 3540A-0001543

FCC Rule Part: 15.231
IC Radio Specifications Standard: RSS-210

ACS Report Number: 08-0038-15C

Manufacturer: Wayne Dalton, Corp.
Model: KEP-IV

Test Begin Date: March 28, 2008
Test End Date: April 3, 2008

Report Issue Date: April 17, 2008

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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This report contains 12 pages

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1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15.231 of the FCC's Code of Federal Regulations and RSS-210 of the IC Radio Specifications Standards.

1.2 Product Description

1.2.1 General

The KEP-IV is a wireless keyless transmitter operating at 372.0 MHz with ASK (ON-OFF) modulation. The product is typically located next to the garage door and is used to open it without the aide of keys or wires. All that is required is to enter the user's 4 digit code that has been programmed into garage door opener and the door will go up or down.

Applicant Information:
Wayne-Dalton Corporation
4400 River Green Pkwy.
Suite 220B
Duluth, GA 30096
678-417-0115

Test Sample Condition:
The test samples were provided on working order with no visible defects.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use

The KEP-IV is a wireless, keyless transmitter used to open and close garage doors. For the outside of the house, it is typically mounted on the garage door frame. For the inside of the garage, it would typically be mounted next to the door going into the house.

1.3 Test Methodology and Considerations

The EUT was tested in a configuration which represents normal use. A test mode was supplied to allow continuous transmission of a modulated carrier.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

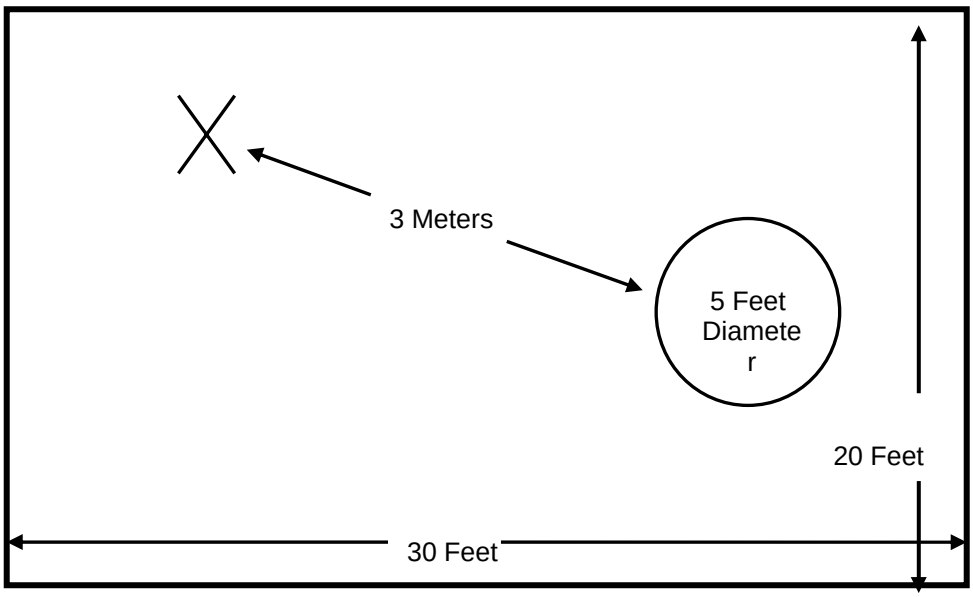

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

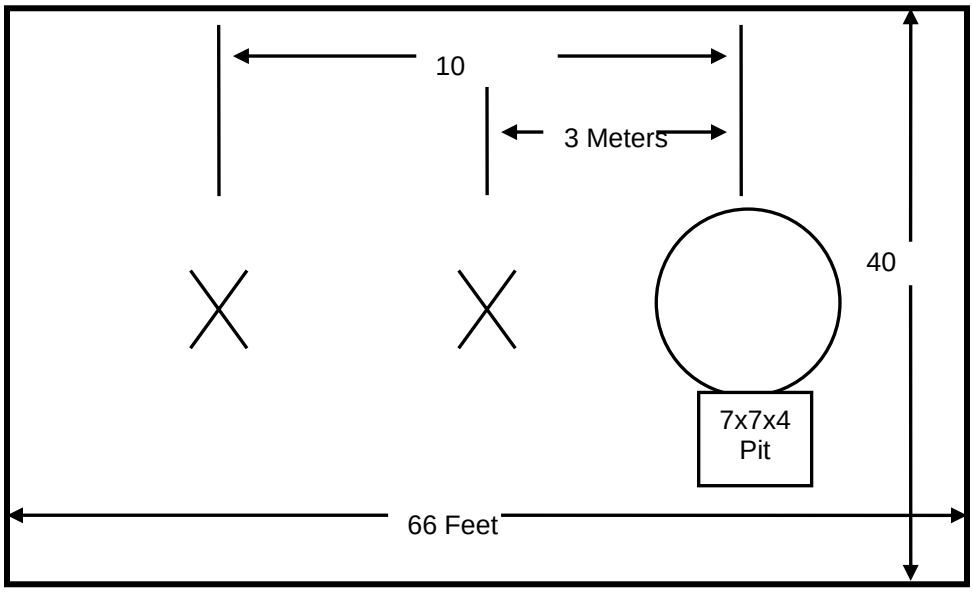

Figure 2.3-2: Open Area Test Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2006
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2006
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 7 June 2007

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Asset ID	Manufacturer	Model Number	Serial Number	Equipment Type	Cal Due
22	Agilent	8449B	3008A00526	Amplifier	4/10/08
30	Spectrum Technologies	DRH-0118	970102	Antenna	5/10/08
283	Rohde & Schwarz	FSP40	1000033	Spectrum Analyzer	11/9/08
213	TEC	PA102	44927	Amplifier	12/19/08
193	ACS	OATS Cable Set	0193	Cables	1/4/09
90	Electro-Metrics	LPA25	1476	Antenna	5/23/08
211	Eagle	C7RFM3NFNM	HLC-700	Filter	1/4/09

5.0 SUPPORT EQUIPMENT

Table 5-3: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number	FCC ID
The EUT was tested as a stand alone device and no support equipment was utilized.					

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

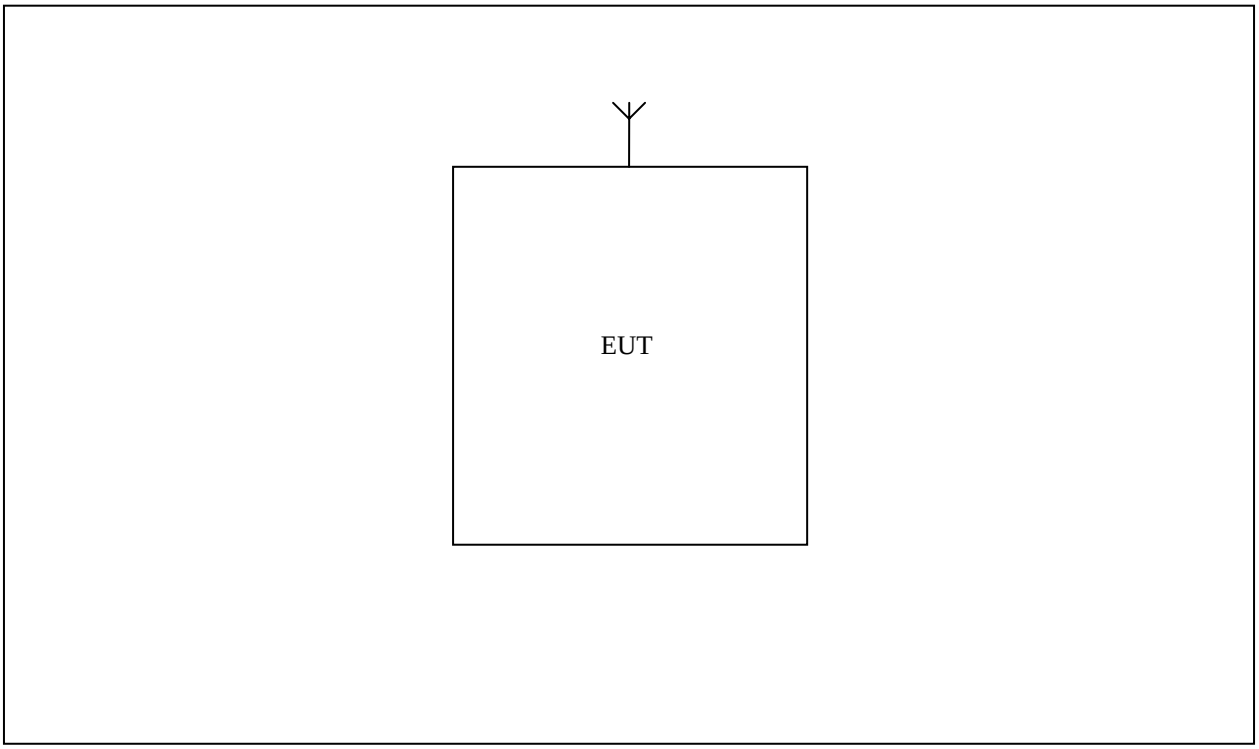

Figure 6.0-1: EUT Test Setup

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement

The EUT employs an integrated ¼ wave etched antenna thus meeting the requirements of 15.203. Gain of the antenna is approximately 0dBi.

7.2 Periodic Operation – CFR 47 15.231(a) (1)/ IC RSS-210 A1.1.1(a)

7.2.1 Test Methodology

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter after 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

The transmitter was manually activated and evaluated using a spectrum analyzer at zero span.

7.2.2 Test Results

The results are shown in Figure 7.2.2-1.

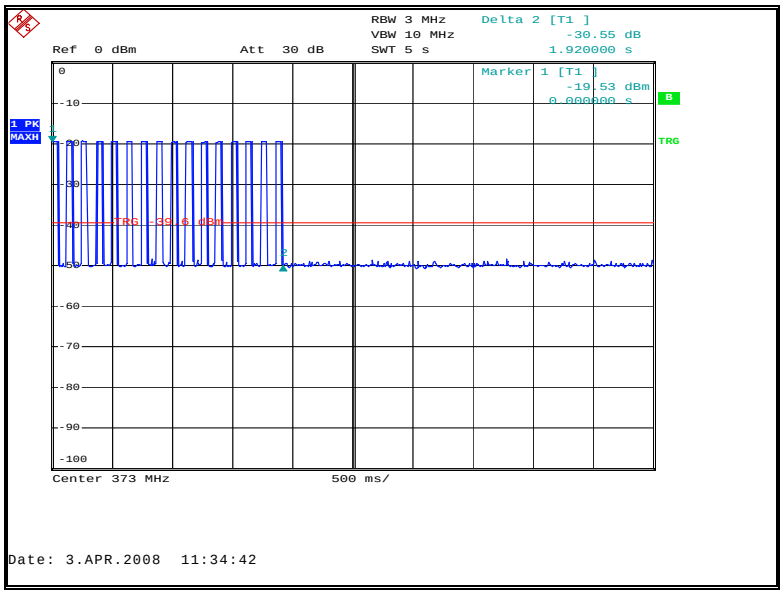

Figure 7.2.2-1 – Transmitter Hold Time

7.3 Occupied Bandwidth - CFR 47 15.231(c) (1)/ IC RSS-210 A1.1.3

7.3.1 Test Methodology

The bandwidth of the emission shall be no wider than 0.25% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

7.3.2 Test Results

The 20dB bandwidth was measured as 54.9kHz. 0.25% of the center frequency 372MHz is equivalent to 930kHz. Therefore the 20dB bandwidth of the emission is less than 0.25% of the center frequency. The results are shown in Figure 7.3.2-1.

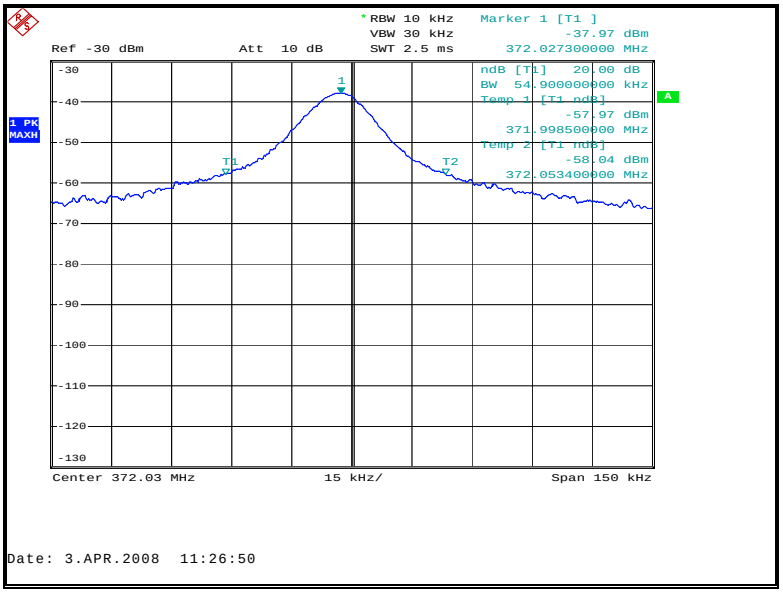

Figure 7.3.2-1 – Occupied Bandwidth

7.4 Field Strength of Emissions – CFR 47 15.231(b) / IC RSS-210 A1.1.2

7.4.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 3.72GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, average measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, average measurements were made using an RBW of 1 MHz and a VBW of 3 kHz and peak measurements were made with RBW of 1 MHz and a VBW of 1 MHz. The provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions were applied.

Further, compliance with the provisions of 15.205 was demonstrated using the measurement instrumentation specified in that section where applicable.

The EUT was modified to operate utilizing a continuous modulated carrier.

7.4.2 Duty Cycle Correction Factor

For average radiated measurements, the measured level was reduced by a factor 10.17dB to account for the duty cycle of the EUT. The duty cycle was determined to be 31% within a 100ms period. The duty cycle correction factor is determined using the formula: 20log (0.31) = -10.17dB. Further justification of the duty cycle can be found in the Theory of Operation contained in this filing.

7.4.3 Test Results

The results for the fundamental and spurious emissions are shown in Table 7.4.3-1

Table 7.4.3-1 - Field Strength of Emissions

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Avg	(H/V)	(dB)	pk	Avg	pk	Avg	pk	Avg
Fundamental Frequency										
372	81.21	81.03	H	-6.72	74.49	64.14	98.5	78.5	24.01	14.37
372	91.76	91.39	V	-6.66	85.10	74.56	98.5	78.5	13.40	3.95
Spurious Emissions										
744	54.70	53.15	H	0.96	55.66	43.94	78.5	58.5	22.84	14.57
744	64.59	63.94	V	0.32	64.91	54.09	78.5	58.5	13.59	4.42
1116	55.54	40.28	H	-4.08	51.46	26.03	74.0	54.0	22.54	27.97
1116	51.63	40.27	V	-4.03	47.60	26.07	74.0	54.0	26.40	27.93
1488	64.68	56.82	H	-1.09	63.59	45.56	74.0	54.0	10.41	8.44
1488	64.10	55.71	V	-0.89	63.21	44.65	74.0	54.0	10.79	9.35
1860	72.33	57.00	H	1.19	73.52	48.02	78.5	58.5	4.98	10.48
1860	73.11	57.47	V	1.18	74.29	48.47	78.5	58.5	4.22	10.03
2232	66.35	45.76	H	3.64	69.99	39.23	74.0	54.0	4.01	14.77
2232	67.79	47.03	V	3.45	71.24	40.31	74.0	54.0	2.76	13.69
2604	52.08	40.55	H	5.84	57.92	36.22	78.5	58.5	20.58	22.29
2604	52.76	41.84	V	5.56	58.32	37.23	78.5	58.5	20.18	21.28
2976	49.35	38.24	H	7.09	56.44	35.16	78.5	58.5	22.06	23.35
2976	49.26	39.39	V	6.88	56.14	36.10	78.5	58.5	22.36	22.40
3348	49.71	35.18	H	9.66	59.37	34.67	74.0	54.0	14.63	19.33
3348	49.53	35.74	V	9.60	59.13	35.17	74.0	54.0	14.87	18.83
3720	48.08	36.02	V	12.01	60.09	37.86	74.0	54.0	13.91	16.14

7.4.4 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak
Corrected Level: 91.76 – 6.66 = 85.10 dBuV
Margin: 98.5dBuV – 85.10 dBuV = 13.40 dB

Example Calculation: Average
Corrected Level: 91.39 – 6.66 – 10.17 = 74.56 dBuV
Margin: 78.5dBuV – 74.56 dBuV= 3.94dB

8.0 CONCLUSION

In the opinion of ACS, Inc. theKEP-IV, provided by Wayne Dalton., meets the requirements of FCC Part 15.231 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT