

**FCC EMC TEST REPORT
FOR THE
INTERNATIONAL ELECTRONICS, INC.
DWA-120 DRIVEWAY ALERT SYSTEM
TRANSMITTER FCC ID JLFPIR**

Prepared for:

International Electronics, Inc.
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Submitted by:

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International Electronics, Inc.
FCC EMC Testing
At
Green Mountain Electromagnetics, Inc.
Middlebury, Vermont

Unit: DWA-120 Driveway Alert System Transmitter FCC ID JLFPIR

Received: 4/26/01

Tested: April 26, 2001

I. Applicable Standards:

The unit described in this report was measured for verification of compliance with the FCC Intentional Radiator EMC standard, 47 CFR: Part 15, Subpart C paragraphs 209 & 231. Measurement procedures were in accordance with ANSI C63.4, "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992)."

II. Units Tested:

The International Electronics, Inc. DWA-120 Driveway Alert System Transmitter provides a signal when the motion-detector circuit is activated. The unit consists of a plastic case containing the transmitter electronics, motion-detector electronics, a permanently attached internal antenna, and a battery. There is no provision for connecting the Transmitter to an AC power source: a conducted emissions test was not performed. The DWA-120 electronics use SAW technology and all assemblies are permanently installed. Device operation was verified with a spectrum analyzer as a receiver. The table below describes the unit that was subjected to measurements determining compliance with applicable EMC standards.

Product	Manufacturer	Model	FCCID
315-MHz Low-Power Transmitter	International Electronics, Inc.	DWA-120 Driveway Alert System	JLFPIR

III. Equipment and Cable Configuration:

GME witnessed the unit in satisfactory condition for testing, however the manufacturer is responsible for ensuring that the equipment under test (EUT) represents the product line. The manufacturer is also responsible for the EMC test plan and for assuring that this report is consistent with that plan.

The EUT was arranged as in the photographs in Section IX. The EUT configuration produced the maximum radiated emissions. The equipment was subjected to complete emissions tests. A receiver was used to verify transmitter operation during all testing.

The equipment was operating in a continuous mode utilizing and testing its control functions. The EUT was also set to self-test upon power up. The temperature, humidity, and atmospheric pressure during testing were 15°C, 31% RH and 100.8 kPa.

IV. Measuring Equipment:

The table below describes the instrumentation used by Green Mountain Electromagnetics, Inc. (GME) to perform this testing:

Unit	Manufacturer	Model	Serial #	Last Cal.	Next Cal.
Spectrum Analyzer	Hewlett-Packard	8592	3624A00631	12/01/00	12/01/01
Amplifier	Kalmus	700A	7945-1	8/18/00	8/18/01
Pre-amplifier	Mini-Circuits	ZJL-7G	D122298	11/14/00	11/14/01
Plotter	Hewlett-Packard	7475A	2517A05281	n/a	n/a
Broadband E-field Antenna	Antenna Research Associates	LPB-2513/A	1125	10/03/00	10/03/01

V. Units of Measurement:

Measurements of radiated electric fields were made in units of dB referenced to 1 microvolt per meter (dBuV/m). Limits appearing on the spectrum analyzer data were corrected for the appropriate antenna factor, cable loss, amplifier gain and measurement distance X.

The following equations were employed:

Corrected Limit (dBuV/m) = Limit (dBuV/m) + 20 log(X/3 meters) - Antenna Factor (dB) + (Amplifier Gain (dB) - Cable Loss (dB)).

Sample calculation at 30 MHz:

55.0 dBuV corrected limit = 40.0 dBuV/m limit + 20 log(3/3) dB distance - 19.0 dB/m AF + 34.0 dB amp/cable loss.

Uncertainty:

The combined uncertainties for GME emissions measurements are: $u(y) = 1.946$ for radiated and $u(y) = 1.298$ for conducted.

VI. Measurement Location:

The GME laboratory and Open Area Test Site (OATS) are located at 219 Blake Roy Road, Middlebury, VT. The OATS is a 3-meter site complete with antenna positioner, ground plane and motorized turntable. The OATS is constructed in accordance with ANSI C63.7-1992 and complies with the requirements for radiated emissions testing in ANSI C63.4-1992 and CISPR 16-1993.

The electromagnetics laboratory is constructed in accordance with CE immunity standards and ANSI C63.4-1992 (conducted emissions).

GME is internationally accredited by the American Association for Laboratory Accreditation (A2LA) and meets the quality requirements in EN 45001-1989 and ISO/IEC Guide 25-1990, "General Requirements for the Competence of Calibration and Testing Laboratories."

VII. Measurement Procedure:

1. Radiated Emissions in accordance with Part 15.209 & 15.231.

Frequency range: 30 MHz to 88 MHz

Limit: 40 dBuV @ 3 meters

Frequency range: 88 MHz to 216 MHz

Limit: 43.5 dBuV @ 3 meters

Frequency range: 216 MHz to 960 MHz

Limit: 46 dBuV @ 3 meters

Frequency range: 960 MHz to 3.1 GHz

Limit: 54 dBuV @ 3 meters

Fundamental frequency: 315 MHz

Limit: 73.9 dBuV average/93.9 dBuV peak @ 3 meters

Harmonic frequencies: 630, 945, 1260, 1575, 1890, 2205, 2520, 2835, 3150 MHz

Limit: 61.9 dBuV @ 3 meters

- a. Set up instrumentation at open area test site.
 - i. Mount EUT on table and broadband antenna on antenna positioner.
 - ii. Record temperature, humidity and atmospheric pressure.
 - iii. Measurement distance is 3 meters and antenna scan height is varied from 1 to 4 meters.
- b. Verify spectrum analyzer and antenna operation.
 - i. Spectrum analyzer is connected to antenna.
 - ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit.
- c. Set up, power and operate EUT as described in Section III.
- d. Perform preliminary evaluation of equipment in the near field.
 - i. Vary antenna height, antenna polarization, and antenna orientation to EUT.
 - ii. Repeat step d.i. while evaluating electromagnetic radiation in the 30 MHz to 3150 MHz spectrum.
- e. Determine frequencies and equipment orientations that produce maximum radiation.
 - i. Identify processor, clock and beat frequencies, and harmonics.
- f. Perform final evaluation of unit by recording spectrum analyzer data on the plotter.
 - i. Ensure the EUT is producing the maximum radiation found in step e.
 - ii. Collect data over the entire frequency range.
 - iii. Collect fundamental frequency and spurious harmonics data per 15.231.

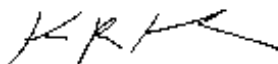
VIII. Summary of Results:

The International Electronics, Inc. DWA-120 Driveway Alert System Transmitter complies with the FCC Part 15, Subpart C emissions requirements.

Sections X contains the spectrum analyzer output identified in measurement procedure VII-1. It compares the unit radiated emissions to the applicable limit from 30 MHz to 3.15 GHz in accordance with the equation identified in V. Section X also contains the fundamental frequency characteristic required by 15.231.

Testing was performed by Kyle R. Kowalczyk, president, Green Mountain Electromagnetics and requested by:

International Electronics, Inc.
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Kyle R. Kowalczyk
5/03/01

IX. Photograph of Measurement Setup:

This page is a photograph of the equipment as it was tested.



Photograph 1 – Radiated Emissions

X. Radiated Emissions Data:

The following pages contain spectrum analyzer output with the corrected intentional radiator limit superimposed. The black pen is the ambient condition, and the other color identifies EUT emissions. All data is peak detect, is horizontally and vertically polarized, and is taken at all frequencies.

Frequency MHz	IR @ 3m dBuV	Antenna dB	Cable/Amp dB	Delta dB	Corrected Limit dBuV
30	40.0	19.0	34.0	15.0	55.0
50	40.0	15.6	33.0	17.4	57.4
88	40.0	8.7	33.0	24.3	64.3
89	43.5	8.7	33.0	24.3	67.8
100	43.5	12.5	32.0	19.5	63.0
125	43.5	12.2	32.0	19.8	63.3
150	43.5	10.5	31.0	20.5	64.0
215	43.5	13.7	30.0	16.3	59.8
216	46.0	13.7	30.0	16.3	62.3
300	46.0	15.1	30.0	14.9	60.9
315	73.9	15.1	30.0	14.9	88.8
500	46.0	18.2	30.0	11.8	57.8
630 (Spurious)	61.9	18.8	30.0	11.2	73.1
945	46.0	24.0	25.0	1.0	47.0
959	46.0	24.0	25.0	1.0	47.0
960	54.0	24.0	25.0	1.0	55.0
1260	54.0	25.2	8.7	-16.5	37.5
1575	54.0	26.7	8.5	-18.2	35.8
1890	54.0	27.5	8.1	-19.4	34.6
2205	54.0	28.6	7.8	-20.8	33.2
2520	54.0	29.3	7.5	-21.8	32.2
2835	54.0	30.1	7.2	-22.9	31.1
3150	54.0	31.2	6.5	-24.7	29.3

Table 1 – Corrected FCC Limit

