

**FCC Certification Test Report
for**

FCC ID: JHICED1

**Mfg:
Graco, Inc.
*20500 David Koch Ave
Rogers, MN 55374
USA***

February 8, 2010

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1. Introduction

The JHICED1 is a transmitter used for controlling a sprayer. The unit is powered by a 3VDC battery. The transmitter is centered at 433.92MHz and is controlled by a SAW resonator. The device measures approximately 130 mm(L) x 60 mm(H) x 30 mm(W) and has mass approximately 100 grams.

Certification is requested under FCC Rules, Part 15, Subpart C, Paragraph 15.231.

2. Statement of Compliance

Specific sections of FCC Rules Part 2 that require information or listing are given below.

2.1. FCC Part 2 §2.907

This is an application for certification of original equipment

2.2. FCC Part 2 §2.911

- a) This application has been filed electronically using form 731.
- b) All required information has been supplied in this application and its attachments.
- c) This applicant has signed the application electronically.
- d) The technical test data has been signed by the agency performing the testing.
- e) Signature supplied in appropriate block on form 731.
- f) Processing fee has been paid by credit card.
- g) Signatures have been supplied electronically.

2.3. FCC Part 2 §2.913

- a) This application has been filed electronically.
- b) Appropriate fees have been filed electronically.
- c) Equipment samples shall be supplied as requested.

2.4. FCC Part 2 §2.915

We are requesting a grant of certification. This application shows compliance with the technical standards.

2.5. FCC Part 2 §2.925

A label shall be affixed to each piece of equipment, showing the FCC identifier. The label shall read "FCC ID: JHICED1". See Exhibit A for a photograph showing the label and location on the back of the device.

2.6. FCC Part 2 §2.943, 2.945

Sample production equipment shall be submitted to the FCC upon request.

2.7. FCC Part 2 §2.947

- a) Measurement procedure follows ANSI C63.4.
- b) A description of utilized test equipment is contained in the report.

2.8. FCC Part 2 §2.948

Radiated measurements were taken at the following FCC-approved facility:

Rhein Tech Laboratories, Inc.
360 Herndon Pkwy, Suite 1400
Herndon, VA 20170
Contact: Rick McMurray
Phone: 703-689-0368

A photograph of the test site is shown below:



2.9. FCC Part 2 §2.1033

- a) Form 731 has been filed electronically.
- b) The technical report, along with its exhibits, contains the information as follows:
 - (1) full name and mailing address of the manufacturer of the device and the applicant for certification:
Graco Inc.
20500 David Koch Ave
Rogers, MN 55374
USA
 - (2) FCC Identifier is JHICED1
 - (3) Copy of the installation/user instructions is furnished in Exhibit E.
 - (4) A brief description of the device and operation is furnished in Exhibit F. Schematic is furnished in Exhibit G.
 - (5) Block diagram is furnished in Exhibit H.
 - (6) This document constitutes a technical test report.
 - (7) Internal and external photographs have been furnished in Exhibits A through C.
 - (8) Not applicable. There are no peripheral or accessory devices used with this device. It is a standalone device.
 - (9) This application not pursuant to the transition rules of section 15.37
 - (10) Not applicable. This device does not include a scanning receiver.
 - (11) Not applicable.
 - (12) Not applicable.
- c) Not applicable. This device shall operate under Part 15 of the rules.
- d) Not applicable.
- e) Not applicable. This is not a composite system.

3. Discussion of Laboratory Measurements and Rules Compliance

3.1. FCC Part 15 §15.231(a)(1)

This transmitter is activated via one of two buttons. Packets are sent every 300ms while the button is manually activated. These packets are 19.2 ms in length. The transmitter stops transmitting when a button is released and goes into a low-power mode waiting for another button press.

3.2. FCC Part 15 §15.231(a)(2)

A plot of the transmissions is shown in Exhibit I. This plot shows the transmissions occurring in a 5-second window as a result of one brief activation. The packets are shown to conclude within the 5-second window.

3.3. FCC Part 15 §15.231(a)(3)

This transmitter does not send supervisory packets.

3.4. FCC Part 15 §15.231(a)(4)

The transmitter does not continue transmitting beyond the packets resulting from each activation.

3.5. FCC Part 15 §15.231(a)(5)

While this device is used in a security application, there is no setup information transmitted with this device.

3.6. FCC Part 15 §15.231(b)

3.6.1. Raw Field Strength Limits

Interpolation performed on the data in the §15.231(b) table yields raw field strength limits as follows:

Fundamental:	80.8 dBuV/m	$(20 * \text{Log}_{10}(3750 + (433.92-260) * (12500-3750)/(470-260)))$
Spurious:	60.8 dBuV/m	

Certain harmonics of the transmitted signal fall in the restricted bands of §15.205. These harmonics are all above 960MHz and have the following limit as given in §15.209:

Restricted band limit = 500uV/m = 54dBuV/m.

3.6.2. Duty Cycle Correction Factor and Resulting Limits

This transmitter uses ASK modulation. 64 bits are transmitted in each packet, and the “on” time for each bit is 150usec. The resulting “on” time per packet is 9.6ms. The transmitted packets are limited to one packet in a 300ms period. The transmitter duty cycle over a 100ms time period is therefore $9.6/100 = 9.6\%$.

Packet width measurements were made using Hewlett Packard Model 8594E Spectrum Analyzer.

Plot in Exhibit J shows duration of a single packet in a 100ms window.

Plot in Exhibit K shows an expanded view of the transmitted packet.

Calculating the allowed duty cycle correction factor as given in §15.35(c):

$$20*\log_{10}(9.6/100) = -20.3\text{dB}$$

This transmitter therefore qualifies for the maximum 20dB duty cycle correction factor allowed per §15.35(c).

Resulting radiated field strength limits are as follows:

Fundamental:	100.8 dBuV/m
Spurious:	80.8 dBuV/m
Restricted Band:	74 dBuV/m

3.6.3. Measured Radiated Field Strength Data

Measured radiated field strength data is shown in Exhibit L. Test equipment used for the measurements is shown in Exhibit P. Emissions from 0.009 MHz to the tenth harmonic were measured. Emissions data was taken at 3 meters in all three orthogonal planes in order to measure the highest emissions. The emissions data was taken using the CE substitution method. Exhibit L demonstrates compliance with the FCC limits by using the following approach: First convert the CE radiated power limits into equivalent 3-meter field strengths. Then calculate the EUT’s true field strength by subtracting the margin of passing. The resulting field strengths are then compared directly with the FCC field strength limits. The data from the CE compliance testing is shown in Exhibit Q.

The fundamental signal, at 79.4 dBuV/m, passed by 21.3 dB

The highest spurious signal was the third harmonic, which passed by 17.4 dB.

The highest restricted band signal was the third harmonic, which passed by 17.4 dB.

3.7. FCC Part 15 §15.231(c)

Allowed 20dB bandwidth of the transmitted signal is 0.25% of the carrier frequency.

$$\text{BW Limit} = 0.0025 * 433.92\text{MHz}$$

$$\text{BW Limit} = 1.085\text{MHz}$$

Bandwidth measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer.

Exhibit M shows the unmodulated carrier signal

Exhibit N shows the modulated signal. Bandwidth of the modulated signal is .148MHz.

These measurements show compliance with the bandwidth requirements.