

# Model: UWM-0001

## Universal Wireless Radio Module SETUP & OPERATION GUIDE

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### SECTION 1 – Description & Components

#### 1.1 Description

The Omega Universal Wireless Module UWM-0001 is a 1.2 to 5.5V DC powered, microprocessor based, 915 MHz transmitter that transmits process input voltage ranging from 0 to 1000mV. The input to the module consists of a bridge with a summing node on the input side, and a constant voltage, approximately 0.8V, on the other (hereafter referred to as the "reference side"). The top of the bridge is connected to a 1.3V reference voltage and the bottom to Vss (Ground). This configuration guarantees the ability to read down to zero volts with respect to ground, and allows a minimum input voltage down to a -100 Millivolts. The maximum input voltage is plus 1500 Millivolts with respect to ground.

The microprocessor is brought up from a power down (sleep) state every 2 seconds by an internal timer in the microprocessor. The microprocessor keeps an on board low power 32kHz oscillator running, which is divided down to generate an interrupt every 1 second. During the interrupt, the microprocessor increments a counter and is compared to a value of 2. If the comparison is false, the processor goes back to the sleep state. If true, the microprocessor sets an internal multiplexer (MUX) to read two analog voltages through an internal programmable gain amplifier (PGA) and an internal analog to digital converter (ADC), using an internal voltage reference. First, the MUX is set to read the reference side of the bridge. Then the MUX is set to read the input side of the bridge. The ADC counts for the reference side are subtracted from the input side, and the result is then mathematically converted to Millivolts.

The microprocessor converts this information to digital data and then combines the data with additional data from an onboard stored unique number and then transmits the entire data packet serially with a Texas Instruments CC1101 915 MHz Radio Transmitter IC. The microprocessor then resets the sample rate counter and powers down into a quiescent state to wait for the next interrupt from the on board timer. The PC board has both a top and bottom ground plane. The antenna is a surface mount chip antenna, Johanson Technology Part #0915AT43A0026.

#### 1.1 Main RF Components

Manufacture (Part Number)  
Radio IC: Texas Instruments (CC1101)  
Antenna: Johanson Technology (0915AT43A0026)

### SECTION 2 – Usage Guidelines for FCC Compliance

The UWM-0001 has been awarded a FCC limited modular approval. That means that this module, when integrated into your end product, requires no FCC part 15.249 testing as long as the following guidelines are met. Failure to meet any of the following guidelines will prevent the inheritance of the FCC modular certification.

#### 2.1 Antenna Selection

The antenna is integral to this module design. In order to maintain compliance with FCC regulations the antenna installed in this module can not be modified or removed. This module has been tested with the following antenna:

**Manufacture:** Johanson Technology  
**Part Number:** 0915AT43A0026

#### 2.2 Module Modification

The module must not be physically altered in any way. If any connections are made to the modules that bypass the module pins, socket, or antenna connection, the FCC modular certification cannot be inherited.

#### 2.3 End Product Labeling Requirements

Pursuant to FCC public notice DA 00-1407, the end product must be labeled on its exterior with the following verbiage:

**“Contains FCC ID: “WR3-UWM100”**

#### 2.4 Additional FCC Testing Requirements

While the module's FCC certification can be inherited (presuming the guidelines are met), additional testing will be required to achieve full FCC compliance for your end-product. The integrator is required to perform unintentional radiator testing on the final product per FCC sections 15.107 and 15.109. Additional, product specific testing might be required. Please contact the FCC regarding regulatory requirements for your application.

## SECTION 3 – FCC Statement of Compliance

### 3.1 Statements and Conditions of Modular Compliance

FCC ID: WR3-UWM100

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not in-stalled and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

This device complies with the rules set forth in Part 15 by the Federal Communications

Commission. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference
- 2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by Omega Engineering, Inc. could void the user's authority to operate the equipment.

The UWM-0001 module is provided with an inheritable FCC Modular Certification. This certification may be inherited in an end-user product, negating the need for FCC part 15 intentional radiator testing on this module, provided that the following guidelines are met:

1. Changes or modifications to the antenna or antenna circuit is not permitted.
2. The module must not be modified in any way. Coupling of external circuitry must not bypass the provided connection.
3. End product must be externally labeled with "Contains FCC ID: WR3-UWM100

4. The end product's user's manual must contain an FCC statement equivalent to that listed in section 2.2 of this guide.
5. The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.

6. The integrator must not provide any information to the end-user on how to install or remove the module from the end-product. The integrator is required to perform unintentional radiator testing on the final product per FCC sections 15.107 and 15.109.

### 3.2 Customer FCC Warning Requirements

The end-product user's manual must contain the following or equivalent verbiage.

FCC NOTICE

FCC ID: WR3-UWM100

The RF module (FCC ID: WR3-UWM100 contained within this device complies with the rules set forth in Part 15 by the Federal Communications. Operation is subject to the following conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.
3. Changes or modifications to the antenna or antenna circuit is not permitted.
4. The module must not be modified in any way. Coupling of external circuitry must not bypass the provided connection.
5. The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.

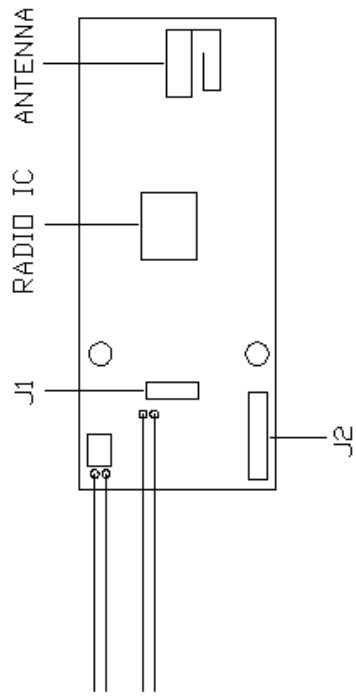
Any changes or modifications could void the user's authority to operate the equipment.

### 3.3 Notices of Limitation

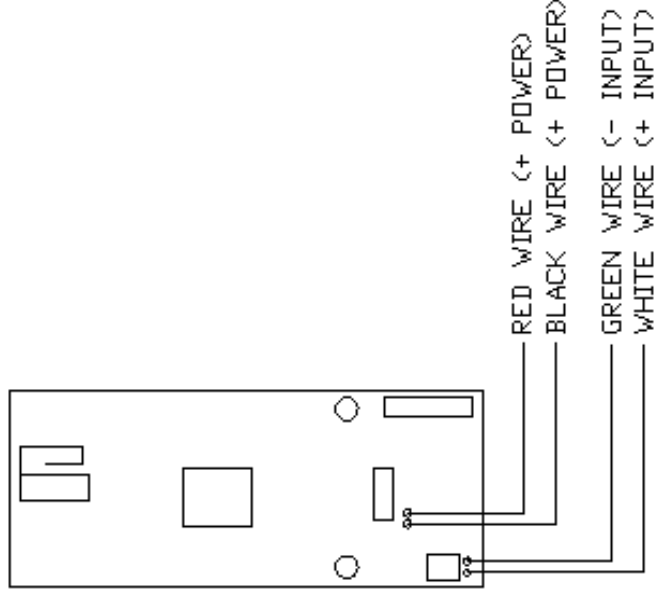
#### 3.3.1 Product Testing

The integrator must still show that their product complies with FCC regulations applicable to their product. The integrator is not required to perform transmitter testing on the UWM-0001 module, provided the guidelines in this document are met.

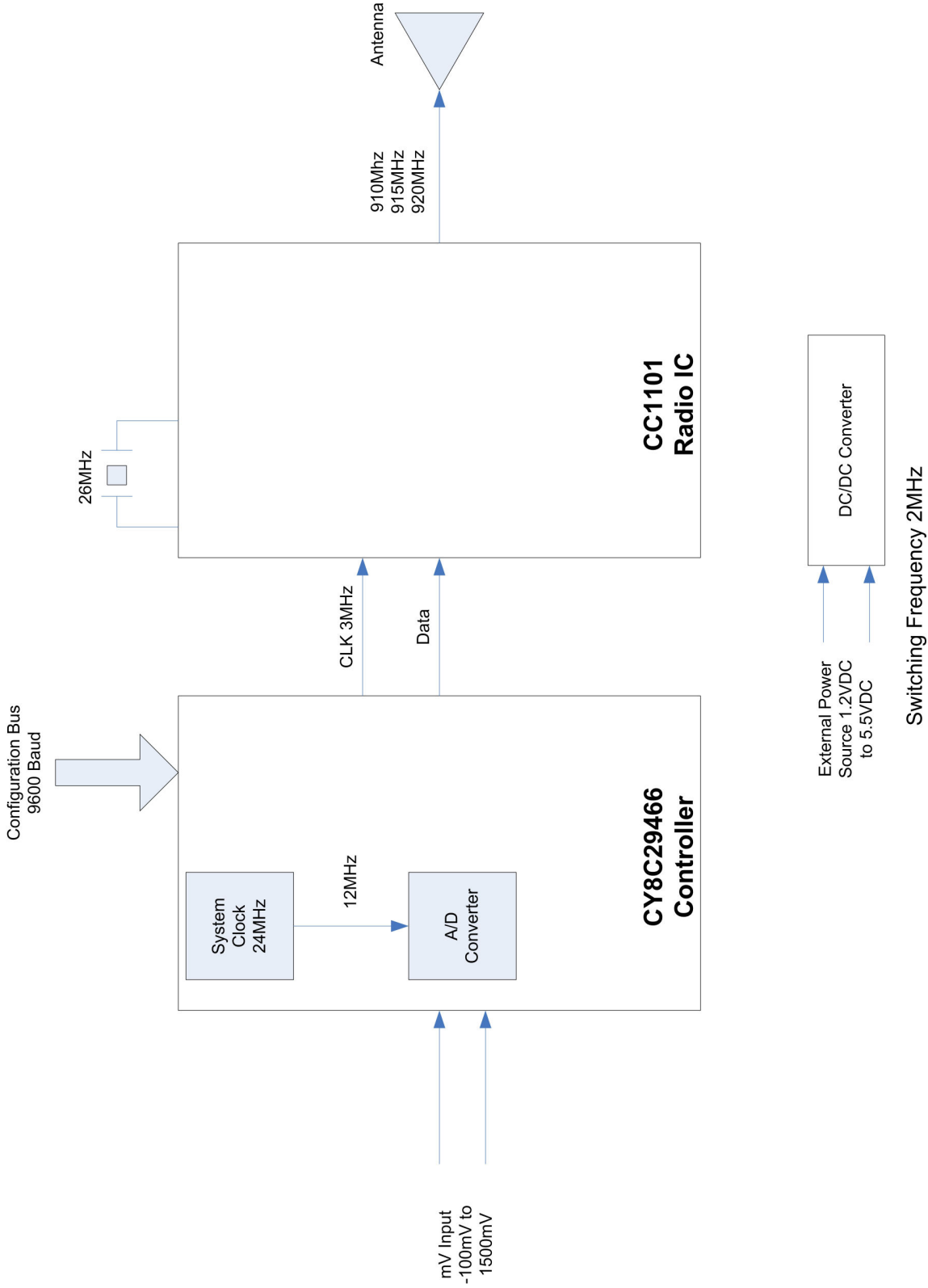
SECTION 4 – Module Diagrams



RF Component Location



Power & Input Connection



<b>Omega Engineering, Inc.</b>	
UWM-0001 Block Diagram	4/30/2009

## SECTION 5 – Setup & Operation

### 5.1 Frequency Band Setting

Frequency band setting within the UWM-0001 can be changed from the default values by connect a computer to the modules programming port. Hyper-terminal is used to communicate to the module. Commands are sent to the module thru a serial connection.

### 5.2 Factory Default Setting

Frequency Band: B (915.038452 MHz)

### 5.2 Communication Settings

Baud Rate: 9600  
Data Bits: 8  
Parity: None  
Stop Bits: 1  
Flow Control: None

### 5.2 Programming Commands

Note: Each of the below commands must end with a Carriage Return or Carriage Return/Line Feed (i.e., ENTER).

The following commands are used in Hyper-terminal to change or view settings in the UWM-0001 module.

#### ENQ

Will display Unit ID Code and Firmware Version

#### F

Display Millivolts or temperature in Millivolts/Deg F

#### CHANNEL

Displays current radio frequency band setting (A, B, or C)

#### CHANNEL n

Change to radio frequency band 'n', where n = 'A', 'B', or 'C', and:

A = 910.039673 MHz  
B = 915.038452 MHz  
C = 920.037231 MHz

### 5.1 Module Operation

#### Normal Mode

The module enters the Normal Mode as soon as power is applied, and the configuration connector is NOT connected. Within 500 milliseconds, the module will sample the analog input; transmit a data packet with the analog data, then go into a sleep state. If installed, the LED will blink once each time a packet is transmitted. The module will remain in the sleep state for two seconds, then repeat the sample and transmit cycle.

#### Configuration Mode

With power applied, the module enters the Configuration Mode when it detects the insertion of the configuration cable. The module returns to the normal mode when the configuration cable is unplugged. While in the configuration mode, if installed, the LED will blink two times per second. When the USB end of the configuration is plugged into a PC USB port, the device will appear as a virtual com port.

### SECTION 6 – Specifications

**Transmit Sample Rate:** 2 Seconds/Sample (fixed)

**Frequency Range:** 910.039673 to 920.037231 MHz

**RF Transmitted Power:** -5 dBm

**RF Baud Rate:** 100 Kbps

**Number of Channels:** 3

**RF Frequency Bands:**  
A = 910.039673 MHz  
B = 915.038452 MHz  
C = 920.037231 MHz

**Number of Channels:** 3

**Module Power:** 1.2 to 5.5 Vdc

**Power Connection:** Red Wire (+ Power), Black Wire (- Power)

**Module Input:** -100 to 1000 millivolts dc

**Input Connection:** White Wire (+ Analog Input), Green Wire (- Analog Input)

**Ambient Operating Temperature:** -10 to 70°C (14 to 158°F)

**Size:** 2" Long x .8" Wide

**Weight:** 0.015 lbs

End of Manual