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A 1-Wire Multi-purpose Sensor

1WIO



Figure 1 MD2083 As-Shipped

August 23, 2009

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1WIO User Guide Version 1.7

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2. Introduction

Thank you for your purchase of the Midon Design 1WIO Multi-Purpose Sensor. The following instructions will assist you in configuring and operating the product.

2.1. 1WIO Features

The 1WIO sensor is based on the Dallas/Maxim 1-Wire™ technology and uses the DS2408 1-Wire port expander to interface between the 1-Wire bus master and the “real world”. Options are available for:

- 4 SPDT relay outputs
- 4 Opto-Isolator inputs
- up to 8 LED displays
- Standard LCD displays

When used with the Midon Design TEMP08 1-Wire Serial interface, the 1WIO sensor can be used instead of the Midon Design RELAY05 relay interface device. Up to forty 1WIO relay units (MD2083) can be used in this manner with V2.02 and higher software on TEMP08. V2.01 is limited to only 1 1WIO Relay or LED unit.

An on-board option is available for mounting a DS18S20 temperature sensor as well. Simply add MD3003 to your order when ordering 1WIO.

Connections to TEMP08 are made via a 6-wire connector J9 or J10. When used in this manner, power and signals are all available via this connector. When used with other 1-Wire bus masters, care should be taken to properly connect using these connectors. Alternative connections to a bus master may be made via connector J12.

Table 1 shows the details of all the connectors available with 1WIO. Figure 2 shows the locations of the connectors on the board.

LED's 1 to 4 are connected in parallel with relays K1 to K4 and are used as indicator lights for these relays. LED's 5 to 8 are connected to bits 4 to 7 of the DS2408 and can be used with the TEMP08 LED command as auxiliary indicators. The LED command is only available with TEMP08 V2.11 or higher. Use the RLY command to control all 8 LED's in TEMP08 V2.01 only. These LED's are not available when the input function is used. 1WIO is fully compatible with 1WSwitch.

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Table 1 Connector Pinouts

Connector	Pin	Description	Type
J1	1	NC Relay output for K1	Relay
J1	2	Common Relay output for K1	Relay
J1	3	NO Relay output for K1	Relay
J2	1	NC Relay output for K2	Relay
J2	2	Common Relay output for K2	Relay
J2	3	NO Relay output for K2	Relay
J3	1	NC Relay output for K3	Relay
J3	2	Common Relay output for K3	Relay
J3	3	NO Relay output for K3	Relay
J4	1	NC Relay output for K4	Relay
J4	2	Common Relay output for K4	Relay
J4	3	NO Relay output for K4	Relay
J5	1	Opto-isolator 1 negative input	Input
J5	2	Opto-isolator 1 positive input	Input
J6	1	Opto-isolator 2 negative input	Input
J6	2	Opto-isolator 2 positive input	Input
J7	1	Opto-isolator 3 negative input	Input
J7	2	Opto-isolator 3 positive input	Input
J8	1	Opto-isolator 4 negative input	Input
J8	2	Opto-isolator 4 positive input	Input
J9	1	+12VDC	Input
J9	2	+5VDC	Input
J9	3	DQ 1-Wire	Input/output
J9	4	Ground	Ground
J9	5	No connection	
J9	6	No connection	
J10	1	+12VDC	Input
J10	2	+5VDC	Input
J10	3	DQ 1-Wire	Input/output
J10	4	Ground	Ground
J10	5	No connection	
J10	6	No connection	
J11	1	LCD Ground (Note 1)	Ground
J11	2	LCD VCC	Power
J11	3	LCD Contrast (Note 3)	Input
J11	4	LCD D/C	Input
J11	5	LCD R/W	Input
J11	6	LCD STB	Input
J11	7	LCD Ground	Ground
J11	8	LCD Ground	Ground
J11	9	LCD Ground	Ground
J11	10	LCD Ground	Ground

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J11	11	LCD D4	Input
J11	12	LCD D5	Input
J11	13	LCD D6	Input
J11	14	LCD D7	Input
J11	15	LCD LED A (Note 2)	Input
J11	16	LCD LED K	Input
J12	1	Ground	Ground
J12	2	DQ 1-Wire	Input/output
J12	3	+12VDC	Input
J13	1	To pin 2 of J9 and J10 (Note 4)	
J13	2	+5VDC from on-board voltage regulator	

Notes:

1. J11 is wired in reverse to permit mounting of the LCD connections via the rear of the PCB.
2. J11 LED connections are pre-wired to resistor R7 on board the 1WIO.
3. J11 contrast connection is pre-wired to variable resistor R6 on the 1WIO and contrast adjustments are provided via that resistor.
4. J13 is a shorting connection on board – it is the 2 PCB pads between U9 and U4.

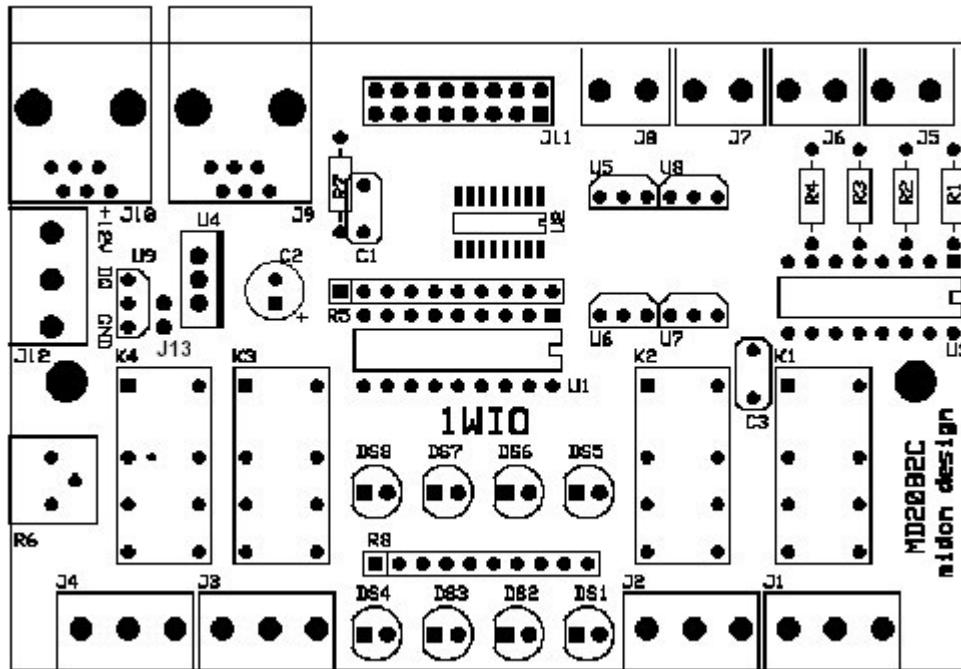


Figure 2 Parts Placement

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3. Ordering the 1WIO

1WIO is available with several different board options. All are orderable from Midon Design via the following part numbers:

Table 2 1WIO Ordering Options

Part Number	Description
MD2082	Bare PCB – no parts included
MD2083	4 Relay DS2408 version only. LED's 1-4 only equipped
MD2084	4 Input version only. No LED's
MD2088	8 LED display only. No relays or inputs provided.
MD3003	Add an on-board DS18S20 by adding this part when ordering a 1WIO.

Please also see the 1WIO parts list for details of what is provided with each option.



Figure 3 MD2084 As Shipped

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Figure 4 MD2083 Mounted in TEMP08 Case

Referring to Figure 4 above, you can see that the PCB for 1WIO has been designed to fit within the optional case for Midon Design's TEMP08 unit. It is not practical to use the RJ-12 connectors when used in this manner, so J12 should be used to connect to J3 on TEMP08. Note that the connectors for 1WIO intentionally extend beyond the end of the case for ease of connection.

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4. J9 & 10 Usage

J9 and J10 are RJ-12 connectors, which is equivalent to a phone connector, except that they have 6 pins instead of just 4 (or 2). J9/10 are connected to the One Wire bus and can be used for adding connectivity to One Wire busses configured for RJ-11/12 connection.

The pin-out of the J9/10 connectors is shown in Figure 3.

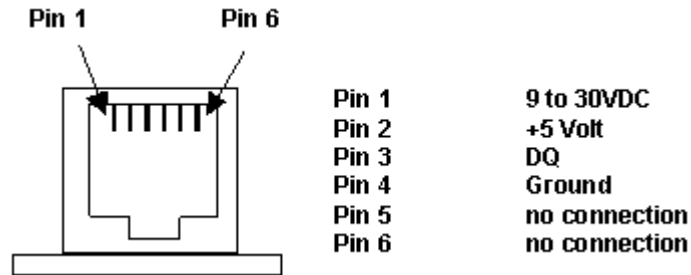


Figure 5 Connector J9/10 RJ-12 Pin-out

Pin 1 is required to power the 1WIO and is expected to be about 9 to 30 Volts DC. Alternatively, this voltage can be supplied via J12.

Please note that this pin-out may be different than that of your 1-Wire bus master. Up until recently, there was no established standard pin-out for the RJ-12 wiring and, as a result, different manufacturers have chosen to use the pins in various ways. The common pins (DQ and Ground) have remained the same for all manufacturers, however, as of the time of writing this manual. These pins are shown **in color** in Table 3 below. Some of the published pin-outs available today are shown in the table below. **Please take caution in connecting up your 1-Wire sensor to your master 1-Wire bus driver to avoid damaging the sensor or the driver.**

If your bus master does not conform to this pin-out, we suggest that you use 2 wire cables to connect the RJ-12 jacks and power 1WIO via J12.

1WIO is fully compatible with the RJ-12 wiring provided on the Midon Design TEMP08 serial 1-Wire interface device. Note that the +5VDC input on the RJ-12 connectors is not used on the 1WIO PCB since 1WIO generates it's own 5VDC from the 12VDC input. The 5VDC pins on the connectors J9 and J10 are bussed through for convenience when using other sensors on the 1-Wire network. If you want to power the 1-Wire bus from 5VDC on the 1WIO, add a jumper to J13.

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Table 3 1-Wire Connector Pinouts

Device	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	RJ-45
		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6		RJ-12
			Pin 1	Pin 2	Pin 3	Pin 4			RJ-11
Original Dallas Weather Station			N/C	DQ	GND	N/C			RJ-11
AAG RJ-11 Sensors/Interfaces			GND	DQ	GND	+5VDC			RJ-11
Dallas/Maxim RJ-12 wiring standard (published Oct 2001)		+5VDC	GND	DQ	GND	N/C	DC Supply		RJ-12
Midon Design MD2104 TEMP08/LOG08-II/1WSwitch		DC Supply	+5VDC	DQ	GND	N/C	N/C		RJ-12
Midon Design Sensors		DC Supply	+5VDC	DQ	GND	N/C	N/C		RJ-12
AAG RJ-12 Sensors		+5VDC	GND	DQ	GND	N/C	N/C		RJ-12
Texas Weather Instruments sensors		N/C	GND	DQ	GND	N/C	DC Supply		RJ-12
Simon Atkins' Hub	+5VDC	+5VDC	DC Supply	DQ	GND	DC Supply	GND	GND	RJ-45
AAG RJ-45 Sensors	DQ	GND	+5VDC	+12VDC	+12VDC	+5VDC	GND	GND	RJ-45
Hobby-Boards Sensors	GND	+5VDC	GND	DQ	GND	N/C	+12VDC	GND	RJ-45
1Wire.org draft standard for RJ45	GND	+5VDC	GND	DQ	GND	Analog Signal	+12VDC	GND	RJ-45

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5. Using the Inputs

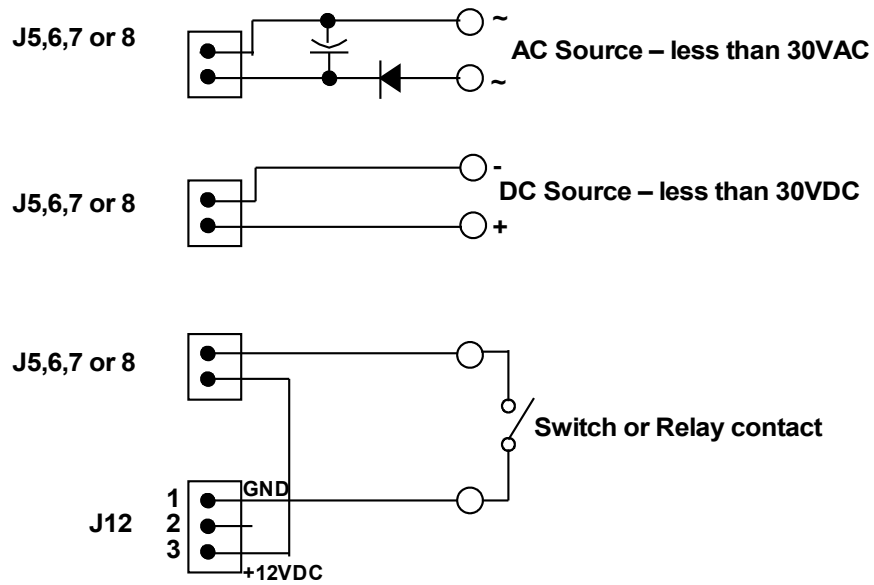


Figure 6 Input Examples

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Three different methods of using the Opto-isolator inputs are shown above in Figure 4. The first, at the top, shows how to connect an input to an AC voltage source. The diode and capacitor are required to rectify the AC waveform to DC so that recurrent changes do not occur as the AC switches from negative to positive to negative voltage.

The second, simplest, interface is to a DC source. Simply connect the voltage directly to J5, 6,7 or 8, ensuring that the polarity is correct. Whenever the voltage is present, the input will show an “on” state.

Lastly, connecting to a switch or relay contact is shown. This may be useful for monitoring alarm sensor switches, for example. Connect the switch in series with a source of voltage. In this example, the voltage is provided by the 1WIO sensor itself from J12.

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6. 1WIO Parts List (complete)

Table 4 1WIO Parts List – all Types

Qty	Designations	Description	MD2082	MD2083	MD2084	MD2088
1	C1	0.01uFd capacitor		X	X	X
1	C2	100uFd capacitor electrolytic		X	X	X
1	C3	0.01uFd capacitor		X		
4	DS1,2,3,4	LED Red		X		X
4	DS5,6,7,8	LED Red				X
4	J1,2,3,4	3 Term		X		
4	J5,6,7,8	2 Term			X	
2	J9,10	RJ-12 connector		X	X	X
1	J11	Connector 16P				
1	J12	3 Term		X	X	X
4	K1,2,3,4	5V SPDT		X		
4	R1	1.5K resistor ¼ watt			X	
1	R5	SIP 10Kx9 resistor		X	X	X
1	R6	10K Trimmer				
1	R7	1K resistor ¼ watt				
1	R8	SIP 330x9 resistor		X		X
1	U1	ULN2803 driver		X		X
1	U2	DS2408 1-Wire port expander		X	X	
1	U3	P2501 4 input opto-isolator			X	
1	U4	LM78M05 voltage regulator		X	X	X
1	U9	DS1820 1-Wire temperature sensor				
1	PCB	MD2082 PCB	X	X	X	X

U9 is available as a separately ordered option via part number MD3003.

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7. 1WIO Schematic

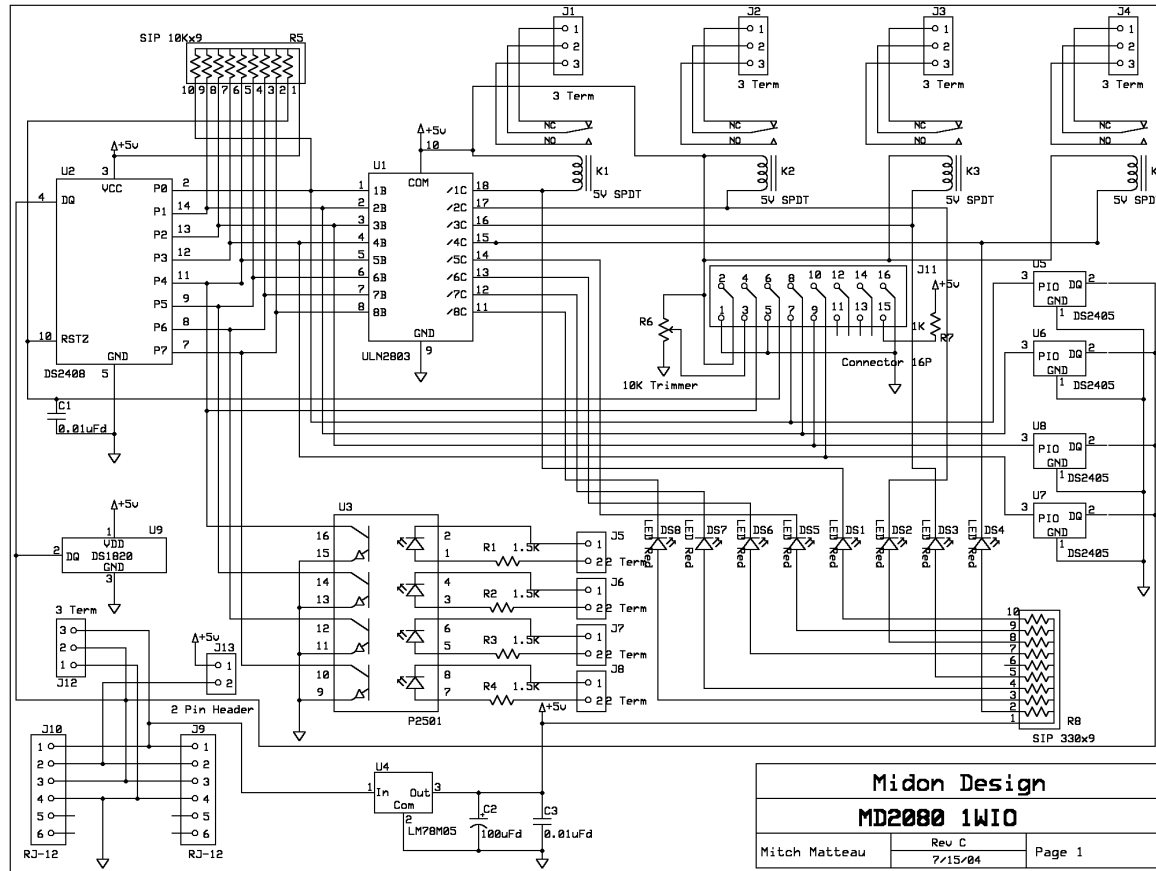


Figure 7 1WIO Schematic

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8. Specifications

Unit Size: 4.080" x 2.650" (10.36 cm x 6.73 cm) (fits standard TEMP08 case)

Relay Contact rating:	1.25A at 100VDC, 0.5A at 120VAC
Opto-Isolator Input rating:	5 to 30 Volts (AC or DC) current limited to 20mA
Power Requirements:	12VDC at 180mA (MD2083 – all relays on)
	12VDC at 9mA (MD2083 – all relays off)
	12VDC at 4mA (MD2084 – no inputs)

9. Conclusion

Your comments are appreciated. If you would like to submit feature requests or product recommendations, please e-mail us.

10. Legal Disclaimer

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