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A 1-Wire Serial Interface

TEMP08



Figure 1 TEMP08

TEMP08 User Guide Version 2.20

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2. Introduction

Thank you for your purchase of the TEMP08 1-Wire Serial Interface. The following instructions will assist you in configuring and operating the product.

TEMP08 is a stand-alone 1-Wire™ interface providing standard serial commands to control the Dallas/Maxim 1-Wire bus and the devices used on it. Sensors can be polled on a regular basis (from 1 to 99 minutes), or manually interrogated.

In a typical application, TEMP08 is connected to a serial port on a PC. Serial interface software is then used to gather the data received from TEMP08 and process it. Many users have interfaced TEMP08 into the [HomeSeer](#) product, which can be used to automate lights, HVAC, sprinklers, and other devices, based on the sensor readings from TEMP08.

The TEMP08 can provide a serial interface for the following devices:

- Multiple DS2438-based Humidity Sensors, including, of course, the Midon Design MD3020E Humidity Sensor.
- Multiple DS2438 based Barometric Sensors
- Multiple DS2438 general purpose sensors for analog voltage input
- Multiple DS18S20, DS18S20-PAR, DS18B20, DS1822, DS1920 temperature sensors as well as temperature reading from any DS2438
- One DS2450 based Weather Station for wind speed and wind direction
- Multiple DS2450 voltage sensors
- Multiple DS2423 based rain gauges
- Multiple DS2423 general purpose counters (for use with Lightning sensors and other types of counter inputs)
- Multiple DS2401 or DS1990 1-Wire serial numbers (only presence will be reported)
- Up to 20 1WIO relay interface modules (or equivalent DS2408 based relay module) available from Midon Design
- Up to 10 1WIO LED modules (available from Midon Design)
- Up to 20 1WIO Input modules (available from Midon Design)

TEMP08 has the following features:

- On-board voltage or temperature (provisionable) sensor with an option for an on-board humidity sensor.
- Jumper-less provisioning - all configuration settings are stored in non-volatile memory

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- Up to 60 1-Wire are sensors supported
- Simple instruction set with a Help prompt for recalling command names
- Easy to delete sensors, if they are no longer required, using the DEL command
- 1-Wire bus errors are flagged when they occur
- Support for software serial flow control (Control-S, Control-Q) to permit inspection of long lists without scrolling beyond your terminal's page length
- Continuous poll for ALL sensors - TEMP08 will notify you when any sensor is connected or disconnected, providing that they have been previously recognized by TEMP08 via the **INI** command. Very useful for locating intermittent 1-Wire bus problems or for real-time polling of contact sensors.
- Manual Poll of sensor readings. While TEMP08 is normally used for continuous (from 1 to 99 minute intervals) polling of sensor readings, it may also be used manually to take sensor readings on command from the serial interface.

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3. Installation

To complete this project, you will need to connect a 12 to 16 Volt (AC or DC) transformer to the terminal J1 (see Figure 3 or 4 for the location of J1). If you intend to power 1WIO relay units from the 12V output of TEMP08, the transformer needs to supply at least 350mA (250mA for 1WIO and 100mA for TEMP08) per 1WIO relay unit, up to a maximum of 800mA, or 2 1WIO relay units. Beyond that, supplemental powering will need to be provided for the off-board units. Otherwise, any 12 to 20 Volt adapter capable of at least 100mA will do.

If you are using a sensor network of 1-Wire devices, connect them now to either connector J3 or J5.

If you are using DS18S20 or DS18B20 temperature sensors, only 2 pins of each sensor needs to be connected, however a connection is required between the VDD and GND pins of the sensor if you are using parasitic powering. If +5VDC local power is being used to power the sensor, connect the VDD terminal to it. See Figure 2 for device connections.

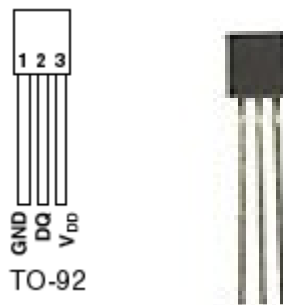


Figure 2 DS18S20/DS18B20 Pin-out

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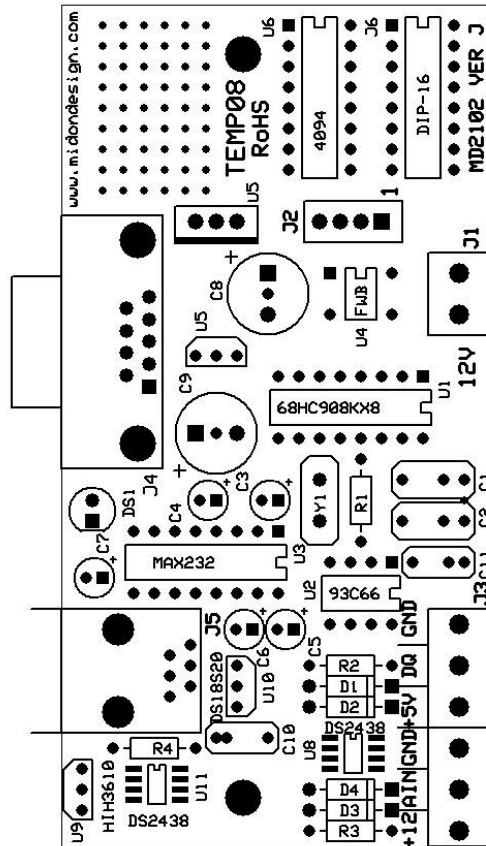


Figure 3 Parts Placement (ver J PCB shown)

4. Using the TEMP08

Connect up a straight-through serial cable between TEMP08's J4 connector and your PC. Open up HyperTerminal (or equivalent terminal emulator program) on your PC. Configure it to 9600 BPS, No parity, 8 bits, 1 start bit and NO hardware handshaking (very important!). Power up the TEMP08 and configure the unit for the devices that you have connected.

Note that after a short delay, all connected DS2408's (if previously recognized) will be set to an off condition. This is done to ensure that DS2408 relay connections are powered off after a power cycle. If there are no DS2408's connected, you will see a "Not Installed" error message. This is normal.

We recommend that you next use the **ERA** command for first time use, to erase the EEPROM. This will remove any previous information that may have been stored in the EEPROM. Next use the **INI** command to search for any 1-Wire devices connected to the 1-Wire bus. If you get any error messages, it is most

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likely a result of a bad connection to the devices. Verify them. Typically, a "OW bus error" message indicates that a sensor has been installed in reverse, or that there is a short on the bus.

Note: an ERA command is not required every time that an INI command is issued. It should only be required for first time use.

Typical response from an INI command

```
>INI
Reading Sensors...
Found 3000000002202920 DS2450
Found 91000800135B9B10 DS1820
Found 440000001EC34228 DS18B2
Found 590000000007B014 DS2430
Found 21000000032E4E22 DS1822
Found 060000003770D026 DS2438
Found D1000000F5868801 DS2401
Found DB0000007520A126 DS2438
Found F5000000B6435726 DS2438
Found A400000001042829 DS2408
Found 00000000107A829 DS2408
Found 9700000000328329 DS2408
Found C200000016A78605 DS2405
Found 3D0000000C8C351D DS2423

01 3000000002202920 DS2450 OK P
02 91000800135B9B10 DS1820 OK P
03 440000001EC34228 DS18B2 OK P
04 590000000007B014 DS2430 OK P
05 21000000032E4E22 DS1822 OK P
06 060000003770D026 DS2438 OK P ?
07 D1000000F5868801 DS2401 OK P
08 DB0000007520A126 DS2438 OK P ?
09 F5000000B6435726 DS2438 OK P ?
10 A400000001042829 DS2408 OK P ?
11 00000000107A829 DS2408 OK P ?
12 9700000000328329 DS2408 OK P ?
13 C200000016A78605 DS2405 OK P
14 3D0000000C8C351D DS2423 OK P ?

Poll = 01 minutes
Temp disp = F
Serial # disp = On
Wind dirn rev = Off
DS2438 Temp Display = On
OnBoard ADC = On
Regular Time Display = Off
Display Wind = Off
SUN 00:01:56
>
06[060000003770D026]=?
Enter type:
```

If a DS2423 or DS2438 is detected by the **INI** command, you may get an error message that requests you to input the unit **TYPE**. See the table 2 for details for the valid inputs. If nothing is entered for 20 seconds in this field for a DS2423, then the sensor **TYPE** will be defaulted to "C" (Counter). A DS2438 will default to

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a “V” (Voltage) type if nothing is entered. DS2408’s also require a TYP setting, however they do not default to any one type to avoid problems.

Now program the configuration by using the **SET** command. Just type **SET** and the program will prompt you for the required settings; logging interval, F/C display, wind direction reverse setting, and finally the real time clock setting.

You might also want to establish the option settings at this time. Please review section 5.6 for options that are available and the commands that are used to change those.

To verify that your setup is working properly, you should next use the **TMP** command to perform an immediate sensor reading. The output of the **TMP** command should look like the sample below (the exact output will depend on what type of sensors and how many you have installed).

```
>
SUN 19:14:37
Reading Sensors...
Voltage #01[060000003770D026]=03.13V 05.08V 00mV
Voltage #02[DB0000007520A126]=01.20V 05.09V 01mV
Voltage #03[F5000000B6435726]=00.02V 04.98V 00mV
Voltage #00=00.86V
Quad Voltage #01[3000000002202920]=05.05V,05.04V,03.18V,03.10V
Wind Speed[9F0000000335111D]=10 MPH, Gust = 10
Rain #01[8E0000000115111D]=02.56 Inch
Counter #01[3D0000000C8C351D]=08957 06228
IWIO #01[A400000001042829]=Off,Off,Off,Off
Temp #01[91000800135B9B10]=76.55F
Temp #02[440000001EC34228]=76.87F
Temp #03[21000000032E4E22]=76.55F
Temp #04[060000003770D026]=76.10F
Temp #05[DB0000007520A126]=76.42F
Temp #06[F5000000B6435726]=77.90F
>
```

If there are no apparent errors, you are ready to use TEMP08. Enjoy!

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5. TEMP08 Commands

These commands are valid for the versions of TEMP08 software shown in the table.

Table 1 TEMP08 Command List

Command	Description	Syntax
DEL	Delete a sensor that was previously installed via the INI command	DEL<sensorid> Note 1
DIS	Display serial numbers of all configured 1-Wire devices	DIS
EAD	Enable on-board ADC voltage display during poll output	EAD<on off> Note 3
EEP	Display and change specific EEPROM memory locations	EEP <start location><cr>
ERA	Erase the EEPROM	ERA
ETE	Enable temperature display for DS2438	ETE<on off>
ETI	Enable Once-Per-Minute Time Display	ETI<on off>
EWN	Enable Wind Direction display for DS2450 sensors	EWN<on off>
HLP	Display a list of available commands	HLP
INI	Search for a list of available 1-Wire sensors.	INI
INP	Display the status of bits 4-7 of all "I" provisioned DS2408's (See 1WIO sensor for details)	INP
LED	Actuate a specific LED on a 1WIO LED unit or equivalent DS2408 LED interface	LED <LED number> <on off>

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Command	Description	Syntax
		Where <LED number> = 01 to 80 or A for All (the leading zero is required for LED numbers less than 10)
MEM	Display and change specific memory locations	MEM <start location><cr>
NOR	Set North for a 1-Wire DS2450-based Weather Station	NOR
RLY	Actuate a specific 1WIO relay	RLY <relay number> <on off> Where <relay number> = 01 to 80 or A for All (the leading zero is required for relay numbers less than 10)
RST	Reset both DS2423 counters for a specific sensor	RST<sensorid>
SCK	Set Clock	SCK dd, hh, mm, ss<cr> dd = 01 to 07 (Sunday = 01) hh = 00 to 23 mm = 00 to 59 ss = 00 to 59 Note 2
SET	Configure all system parameters	SET
SID	Show the Serial Number ID for the 1-Wire Devices in all displays	SID <on off>
SPT	Set the polling interval	SPT xx Where xx is a decimal number from 00 to 99. 00 will disable polling.
STD	Set Temperature Display	STD <F C>

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Command	Description	Syntax
TIM	Display Time from Real Time Clock	TIM
TMP	Display sensor readings of all connected 1-Wire Devices in either verbose (includes serial numbers) or non-verbose manner	TMP
TYP	Select the type of DS2408, DS2438 or DS2423 device. See table 2 for valid parameters.	TYP<sensorid>
VER	Displays the current version of the software loaded	VER
WDR	Wind Direction Reverse (in case your Wind Direction PCB is installed upside down, or in case you want to show the FROM direction instead of the TO direction)	WDR <on off>
ZZZ	Performs a soft reset of TEMP08	ZZZ

Notes

1. *The <sensorid> parameter in some commands above refers to the sensor number as shown via the DIS command. See the DIS command explanation below.*
2. *Most commands do not require a Carriage Return (enter) following the parameter or command input. One exception is the SCK command. Commands requiring a sensor number input will require a CR if the sensor number is only a single digit.*
3. *Command parameters are shown in angled brackets "< >". Where only certain options are permitted, they are indicated with a vertical pipe character "|".*

5.1. Using the SET Command

The **SET** command has multiple parameters. All parameters are also adjustable via discrete commands. **SET** only provisions basic parameters. See the Options section for more parameters.

Update Interval

This parameter determines the time between sensor readings. Set to 00 to stop polling. Enter the time in decimal minutes. Use the **SPT** command to adjust only this parameter.

F or C Display

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This parameter determines how temperature readings are displayed. Enter F for Fahrenheit or C for Celsius. Use the **STD** command to adjust only this parameter.

Serial # Display

Set this to On if you want TEMP08 to display the 1-wire ID of all sensors during poll and other displays. Use the **SID** command to adjust only this parameter.

Wind Dirn Reverse (Wind Direction Reverse)

This parameter is normally set to Off. Set this to On if you accidentally installed the wind direction PCB upside down in your weather station OR if you want to display wind direction as the FROM direction instead of the TO direction. Use the **WDR** command to adjust only this parameter.

Set Clock

Enter the current time here as Day of week (01 = Sunday) followed by Hour, Minutes, and lastly, Seconds. Use the **SCK** command to adjust the clock at any time. Time is entered and displayed in 24 hour (military) format.

5.2. The DIS Display Output

Sample DIS Output

```
01 3000000002202920 DS2450 OK P
02 91000800135B9B10 DS1820 OK P
03 440000001EC34228 DS18B2 OK P
04 5900000000007B014 DS2430 OK P
05 21000000032E4E22 DS1822 OK P
06 060000003770D026 DS2438 OK P V
07 D1000000F5868801 DS2401 OK P
08 DB0000007520A126 DS2438 OK P V
09 F5000000B6435726 DS2438 OK P V
10 A400000001042829 DS2408 OK P I
11 000000000107A829 DS2408 OK P O
12 9700000000328329 DS2408 OK P L
13 C200000016A78605 DS2405 OK P
14 3D0000000C8C351D DS2423 OK P C
15 EA00000040543910 DS1820 OK P
16 9500000015583512 DS2406 OK P
17 9F0000000335111D DS2423 OK P W
18 8E0000000115111D DS2423 OK P R
```

```
Poll = 01 minutes
Temp disp = F
Serial # disp = On
Wind dirn rev = Off
DS2438 Temp Display = On
OnBoard ADC = On
Regular Time Display = Off
Display Wind = Off
SUN 18:21:53
>
```

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5.2.1. DIS output explanations

Sensor numbers do not necessarily match up with the output from the regular sensor output readings from a TMP command or a normal poll cycle. **This is intentional.** The sensor numbers in the **DIS** output are the memory locator and are used by the **DEL**, **RST** and **TYP** commands. The sensor numbers in the poll/TMP output are sequential numbers for each type of sensor.

The Sensor numbers from the **DIS** display are also used for displaying when a sensor is removed or added to the 1-Wire bus. For instance:

```
>MON 09:52:34  
Missing Sensor #04 [590000000007B014]
```

Would indicate that the 4th sensor in the **DIS** display was disconnected.

```
>MON 09:57:01  
Restored Sensor #04 [590000000007B014]
```

Would indicate that the 4th sensor in the **DIS** display had been re-connected.

An OK will be displayed following the sensor type to indicate that the Cyclic Redundancy Counter (CRC) checksum of the sensor's serial number is good. If the serial number has a bad CRC, an **NG** will be displayed. The checksum is validated during the output of the sensor display. If **NG** is displayed, you might want to **DEL**ete that sensor and do another INI to capture a valid serial number.

Following the CRC status, a **P** or **M** will be displayed to show the connectivity of the sensor. A **P** is displayed is the sensor is present, and an **M** when it is missing from the 1-Wire bus. Check your wiring if sensors go Missing.

Letters following the **P** or **M** for DS2408, DS2423 and DS2438 sensors indicate the **TYP**e of sensor equipped. This is a one-time manual input and will need to be set following first discovery of the sensor via the INI command, and also following a power-up of the TEMP08 for the sensors that do not have built-in battery or EEPROM backup, since the sensor TYPE is stored on the device itself. DS2438 sensors have built-in EEPROM and will retain this information over a power outage. The letters designate the sensor type per the following table:

Table 2 Sensor Type Descriptions

Designation	Description	OW Device
B	Barometric Sensor	DS2438

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Designation	Description	OW Device
C	Counter Sensor (use for Lightning counts as well)	DS2423
H	Humidity Sensor	DS2438
I	Input Sensor	DS2408
L	LED Sensor	DS2408
O	Output/Relay Sensor	DS2408
R	Rain Sensor	DS2423
T	Temperature only from DS2438	DS2438
V	Voltage Sensor	DS2438
W	Wind Speed Sensor	DS2423

Following a display of the sensors installed, the output of the **DIS** display then shows the TEMP08 settings that you entered via the **SET** command.

Following that display the **DIS** output proceeds to show how many temperature sensors are installed, by type. The DS18B2 type indicates a DS18B20 sensor. The DS1820 type is valid for DS1820, DS18S20 and DS1920 sensors.

5.3. Using the EEP and MEM Commands

These two commands provide direct access to the memory of TEMP08 and, as such, should be used with extreme caution. After entering the command, TEMP08 will display the contents of memory. Use the “;” key to advance to the next memory location, and use the “/” key to go to the previous memory location. Both commands will wrap around at the appropriate memory boundaries.

To change a memory location using the MEM command, enter a hexadecimal value after the memory contents are displayed. Valid inputs are from “00” to “FF”. If the memory location is read-only, an “? Entry Error” error message will be displayed.

To change a memory location using the EEP command, enter a double hexadecimal value after the memory contents are displayed. Valid inputs are from “0000” to “FFFF”.

In both commands, a carriage return (enter) following display of the memory contents will terminate the command.

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Obviously, these commands can be potentially harmful to the operation of TEMP08 if not used properly. Midon Design recommends that the **EEP** and **MEM** commands only be used under guidance from our support staff.

5.4. TMP Output Display

The **TMP** output and polled output displays are identical. An example is shown below.

```
>
SUN 12:25:27
Reading Sensors...
Humidity #01[F5000000B6435726]=86%
Barometer #01[DB0000007520A126]=31.53 inHg
Voltage #01[060000003770D026]=03.13V 05.08V 00mV
Quad Voltage #01[300000002202920]=05.05V,05.04V,03.18V,03.10V
Counter #01[3D0000000C8C351D]=08957 06228
Voltage #00=00.72V
Wind Dirn[300000002202920]= NNW
Wind Speed[9F0000000335111D]=10 MPH, Gust = 10
Rain #01[8E0000000115111D]=001.09 Inch
Counter #01[3D0000000C8C351D]=08957 06228
lWIO #01[A400000001042829]=Off,Off,Off,Off
Temp #01[91000800135B9B10]=75.41F
Temp #02[440000001EC34228]=75.86F
Temp #03[21000000032E4E22]=75.52F
Temp #04[060000003770D026]=75.07F
Temp #05[DB0000007520A126]=75.07F
Temp #06[F5000000B6435726]=77.10F
>
```

The output starts with a time reading, followed by humidity, barometer, voltage, wind direction, wind speed, rain and counter readings, and ending with all temperature sensors. All DS2438 temperature readings will be displayed in addition to the other temperature sensors, *PROVIDED* that the **ETE On** option has been selected.

The first voltage reading displayed for a DS2438 voltage sensor is always the external voltage from the DS2438 input. This is followed by the VDD voltage and lastly by the voltage from the current sensor input of the DS2438. Changing a humidity or barometric sensor type to a voltage type may be useful for troubleshooting problems with a sensor.

The Quad Voltage output shows the voltages at the A,B,C,D inputs of a DS2450.

Wind direction is expressed via the 16 cardinal points of the compass:

```
N
NNE
NE
```

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ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW

In order for these cardinal points to line up to correct North, you must initialize the TEMP08 first by manually setting the Wind vane to point to North and then use the **NOR** command to save that direction in memory.

Wind speed is shown as an average of the speed over the previous polling interval. The Gust speed is the maximum speed in any 1-minute period of any polling interval. If the polling interval is set to one minute, then the gust speed will always be the same as the wind speed.

Note: the time is always displayed once per minute, on the minute, except during a polling interval or TMP display. See the **ETI off command to disable this display.**

5.5. Missing Sensor Display

TEMP08 continuously polls for the presence of all sensors that have been **INI**'d, in other words, for sensors that are known to TEMP08. If any of the sensors are detected as missing, the following display will result:

```
>MON 09:52:34  
Missing Sensor #04 [590000000007B014]
```

When the sensor is re-connected, the display will look like this:

```
>MON 09:57:01  
Restored Sensor #04 [590000000007B014]
```

Polling of sensors is done sequentially and very fast (milliseconds per sensor). The more sensors that are equipped, however, the more time it will take for TEMP08 to recognize a missing or re-added sensor.

5.6. Options

Additional options available for provisioning outside of the **SET** command. These options are available via discrete commands, shown below.

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5.6.1. On Chip Voltage Display (EAD)

The first option is to enable or disable the on-chip voltage sensor (Voltage #00). The command **EAD on** enables the display.

Please note that the on-chip voltage sensor is not the same one as that of the on-board DS2438 voltage. The on-chip voltage sensor is available on pin 3 of J2 and the on-board DS2438 voltage sensor is available via the AIN pin of J3. Be careful with connections to both inputs.

Note: on J3 pin 2, you are connecting directly to the processor, and input voltages greater than 5 volts, or less than -0.6 volts, will damage the processor pin and possibly the processor itself.

Activating the display results in the following kind of display during a Polling interval:

```
>
SUN 19:14:37
Reading Sensors...
Voltage #01[060000003770D026]=03.13V 05.08V 00mV
Voltage #02[DB0000007520A126]=01.20V 05.09V 01mV
Voltage #03[F5000000B6435726]=00.02V 04.98V 00mV
Voltage #00=00.86V
Quad Voltage #01[3000000002202920]=05.05V,05.04V,03.18V,03.10V
Rain #01[8E0000000115111D]=02.56 Inch
Counter #01[3D0000000C8C351D]=08957 06228
1WIO #01[A400000001042829]=Off,Off,Off,Off
Temp #01[91000800135B9B10]=76.55F
Temp #02[440000001EC34228]=76.87F
Temp #03[21000000032E4E22]=76.55F
Temp #04[060000003770D026]=76.10F
Temp #05[DB0000007520A126]=76.42F
Temp #06[F5000000B6435726]=77.90F
>
```

5.6.2. Once Per Minute Time Display (ETI)

The second option is to enable or disable the once-per-minute time display. The command **ETI on** enables the display.

5.6.3. Display Raw Voltages from DS2450 (EWN)

The third option allows you to display the raw voltages from all connected DS2450's. If enabled, the first connected DS2450 will be assumed to be a Weather Station wind direction sensor and other DS2450's will be ignored. If disabled, only voltages will be displayed from all connected DS2450's. The command **EWN off** will disable the display of wind direction and only voltages will be displayed from DS2450's.

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With **EWN** set to **on**, the polled output (or TMP output) will look like this:

```
Wind Dirn[3000000002202920]= NNW
```

Note that there is no reference number for the wind direction sensor since only one is supported by TEMP08.

With **EWN** set to **off**, the polled output will look like this:

```
Quad Voltage #01[3000000002202920]=05.05V,05.04V,03.18V,03.10V
```

5.6.4. Enable Temperature Display from DS2438

Sometimes, it is not desirable to read temperatures from a DS2438 being used for other functions. The **ETE** command enables or disables this capability. With **ETE On** temperatures will be displayed.

5.6.5. Defaults

TEMP08 ships with the following default settings provisioned:

Table 3 TEMP08 Default Settings

Parameter	Default Setting
Poll Timer	1 Minute
Serial Number Display	On
Wind Direction Reverse	Off
Temperature Display	Fahrenheit
DS2438 Temperature Display	Enabled
On-Board Voltage Display	Enabled
Wind Display for DS2450	Disabled
Once Per Minute Time Display	Disabled
NORth for Wind Direction	Not Set

To restore TEMP08 to these default settings, use the hidden command **FAC**. This will erase your EEPROM, perform an INI and reset all settings to the defaults.

5.7. DS2408 Based Relay, Input and LED Usage

TEMP08 has the ability to actuate relay modules based on the DS2408 port expander chip from Dallas/Maxim. One such module is the Midon Design 1WIO.

5.7.1. 1WIO Relay

TEMP08 supports up to 20 1WIO relay modules (MD2083), each containing 4 relays, and the **RLY** command input then actuates those relays (numbered from 01 to 80). Relay numbers 01 to 04 are for the first connected 1WIO module,

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relay numbers 05 to 08 are for the second, and so on. Note that the leading zero for the relay number is required for the **RLY** command.

The **RLYA<on|off>** command will affect all connected 1WIO relays.

In order for a 1WIO Relay module to be recognized as a relay unit, it must be provisioned to a **TYP** of **O**.

5.7.2. 1WIO LED

The LED command will turn on or off LED's connected to a DS2408. Such a module is orderable from Midon Design as 1WIO LED, part number MD2088.

The **LED** command works the same way as the **RLY** command except that there are 8 LED's per 1WIO acted on instead of 4 relays per 1WIO. Up to 10 1WIO LED units are supported for a total of 80 LED's.

The **LEDA<on|off>** command will affect all connected 1WIO LED's.

In order for a 1WIO LED module to be recognized as a LED unit, it must be provisioned to a **TYP** of **L**.

5.7.3. 1WIO Input

The **INP** command will read the 4 input ports of all connected 1WIO Input modules (Midon Design MD2084). For specifics on the connections, please refer to our website.

The output will look like:

```
1WIO #01[A400000001042829]=On,Off,Off,Off
```

The On/Off parameters refer to the state of the inputs. In the case of the MD2084 module, "On" means that a voltage is connected to the terminals of the module related to the port.

Multiple 1WIO Input devices can be connected to the TEMP08.

In order for a 1WIO Input module to be recognized as an input unit, it must be provisioned to a **TYP** of **I**.

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6. J5 Usage

J5 is an RJ-12 connector, which is equivalent to a phone connector, except that it has 6 pins instead of just 4 (or 2). J5 is 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 J5 connector is shown in Figure 5.

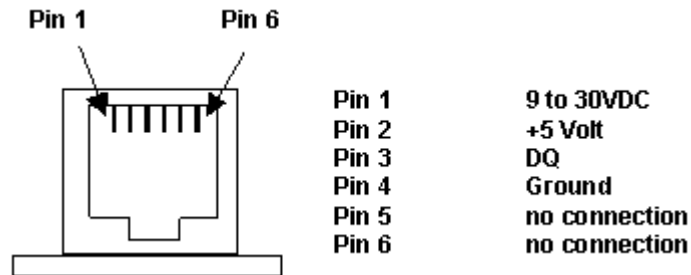


Figure 4 Connector J5 RJ-12 Pin-out

Pin 1 is derived from the power supply feeding TEMP08. It is DC rectified, so it will not matter if your power supply is AC only.

Please note that this pin-out may be different than that of your 1-Wire sensors. At one time, 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 the table 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 TEMP08 to avoid damaging the sensor.**

Table 4 RJ-12 Pin-outs in use

Device	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Dallas/Maxim wiring standard (published Oct 2001)	+5VDC	GND	DQ	GND	N/C	DC Supply
Midon Design MD2004 TEMP05	N/C	+5VDC	DQ	GND	N/C	N/C
Midon Design MD2104 TEMP08	DC Supply	+5VDC	DQ	GND	N/C	N/C
Midon Design MD2204 LOG08	DC Supply	+5VDC	DQ	GND	N/C	N/C
Midon Design MD3009 Temp Sensor	N/C	+5VDC	DQ	GND	N/C	N/C
Midon Design MD3020x Temp and Humidity Sensor	DC Supply	+5VDC	DQ	GND	N/C	N/C

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Device	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
Midon Design MD208x Relay and LED Sensor (1WIO)	DC Supply	+5VDC	DQ	GND	N/C	N/C
Simon Atkins' Hub (shown for reference only. TEMP08 does not support this device)	+5VDC	DC Supply	DQ	GND	DC Supply	GND
AAG TAI8550 Combo Switch	+5VDC	GND	DQ	GND	N/C	N/C
AAG TAI8520 Temp Sensor	+5VDC	GND	DQ	GND	N/C	N/C
AAG V3 1-Wire Weather Station	N/C	+5VDC	DQ	GND	GND	N/C
AAG TAI8540A Humidity Sensor	N/C	N/C (GND?)	DQ	GND	N/C (+5VDC?)	N/C
AAG TAI8555 Latch Relay	N/C	GND	DQ	GND	N/C	N/C
AAG TAI8585 Counter Kit	N/C	N/C	DQ	GND	N/C	N/C
AAG DS9097U-S09-X	N/C	GND	DQ	GND	+5V	N/C

The table entries shown in red above indicate pin configurations that may damage TEMP08 or the connected sensor.

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7. Software Change History

Table 5 TEMP08 Software History

Version	Date	Major Changes from Previous Loads
1.00	8/1/2003	<ul style="list-style-type: none">• Final production version of software
1.02	10/25/2003	<ul style="list-style-type: none">• Bug fix to DS18S20 temperature reading• Robustness improvements• On-chip voltage sensor readout displayed• AAG TAI8555 sensor support added
1.03	11/28/2003	<ul style="list-style-type: none">• Added recognition of a DS2408 device• fixed CMDONA/OFA function for DS2406's• fixed a small bug in DS18S20 temperature display• added a hidden option to display (or not) the voltage from the secondary on-board ADC
1.04	2/13/2004	<ul style="list-style-type: none">• fixed minor bug where only the results of the first sensor of a DS2423 or DS2438 type were being displayed via the polling function
1.05	4/4/2004	<ul style="list-style-type: none">• Added more error checking for invalid readings on humidity sensors• Added Hidden option for not displaying the once-per minute time• Changed ZZZ to perform a hard reset rather than a soft reset• fixed a minor bug with time display
1.06	4/15/2004	<ul style="list-style-type: none">• Added capability for DS2438's to be used as only a temperature sensor• removed verbose Enter Type... description from the TYP command and associated calls.
1.07	4/22/2004	<ul style="list-style-type: none">• fixed an elusive bug that caused the sensor display to stop and the LED to remain in red mode. Was only present with poll time set to 0 and TMP was repeatedly used to obtain sensor readings.
1.08	6/21/2004	<ul style="list-style-type: none">• an interim release with a debug setting added
1.09	8/8/2004	<ul style="list-style-type: none">• Added ONB and OFB commands• Added capability to use DS2408 based Relay outputs instead of, and in addition to, RELAY05.
1.10	8/9/2004	<ul style="list-style-type: none">• final release of new 2408 functionality
1.11	9/11/2004	<ul style="list-style-type: none">• Added INP command for 1WIO use• Changed method of polling to bypass sensor types not previously detected by the DIS command

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		<ul style="list-style-type: none"> • Changed temperature conversion algorithm to speed up display • Added third “hidden option” for displaying DS2450 as voltage only • Added default TYPE parameter for DS2423’s on power up. Will now default to “L” if no selection made prior to 1 minute timeout of the Type error message • Added error check for improper use of OFB/ONB commands
1.12	9/18/2004	<ul style="list-style-type: none"> • Added debounce in missing sensor poll to prevent false "missing" displays.
1.13	11/7/2004	<ul style="list-style-type: none"> • Added Hidden Option 4 to enable/disable polling of 1WIO sensor inputs
2.02	8/1/2005	<ul style="list-style-type: none"> • MAJOR CHANGE to RLY command functionality to assure operation with multiple 1WIO relay modules. See notes above for the RLB, RLT, and RLY commands. • Added discrete commands (DAD, DTI, DWN, EIN) to replace the hidden option manual settings • Added “P” option to the DIS display
2.03	1/2/2006	<ul style="list-style-type: none"> • Bug fix – DS2405 sensors intermittently will not respond to ONA/OFA commands
2.04	7/3/2006	<ul style="list-style-type: none"> • Bug fix – intermittent errors when first sensor is polled
2.05	12/23/2006	<ul style="list-style-type: none"> • Added ability to display voltage readings from multiple DS2450’s.
2.06	12/30/2006	<ul style="list-style-type: none"> • Bug Fix – issue when temperature is at zero Celcius
2.07	2/12/2007	<ul style="list-style-type: none"> • Added display of second counter on DS2423’s
2.08	3/30/2007	<ul style="list-style-type: none"> • Internal revision – not released
2.09	4/5/2007	<ul style="list-style-type: none"> • Major changes to temperature reading calculations to ensure high accuracy at below zero temperatures. • Bug Fix for DS2405 and DS2406 status readings
2.10	N/A	<ul style="list-style-type: none"> • This version was not released.
2.11	5/1/2007	<ul style="list-style-type: none"> • Added the LED command for working with 1WIO LED units. • Added reset of both DS2423 counters using one RST command. • Removed the DEBug command
2.12	11/5/2007	<ul style="list-style-type: none"> • Fixed issues with DS2450 readings and added CRC check.

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2.15	6/28/2008	<ul style="list-style-type: none">• Added “current” reading (actually displayed in milliVolts) from DS2438 sensors• Added increased validity check for readings from any DS2438
2.18	9/14/2009	<ul style="list-style-type: none">• Added display of raw voltages when errors occur on humidity sensor to enhance trouble-shooting. Removed DEL command.
2.19	5/24/2010	<ul style="list-style-type: none">• Restored DEL command. Removed TOG command (DS2405’s are no longer supported)
2.20	6/1/2010	<ul style="list-style-type: none">• Removed remainder of DS2405/6 support• Added TYP capability for DS2408 devices• Added the ETE command (ability to enable or disable temperature readings from DS2438’s)• Added capability for multiple connected 1WIO Input modules• Renamed some option commands to better line up with usage.• Changed output voltage display syntax for DS2450’s• Change character timeout period from one minute to 20 seconds

Note: Midon Design will no longer provide support for software version 1.13. Unless specifically requested, TEMP08’s will be shipped with the current version of software as listed in our web pages.

7.1. Upgrading TEMP08 Software

Midon Design strives to continue to add value to the TEMP08 product and, as result, we release new features to the TEMP08 software from time to time. Upgrading TEMP08 is easy. Software updates can be ordered from our web pages. Upon receipt of your new chip containing the upgraded software, return the original chip to Midon Design and cite the order number. If we receive the device back within 30 days of the upgrade order, we will credit your PayPal account with half the price of the upgrade, less shipping costs. Alternatively, you can apply that credit towards a future purchase from Midon Design.

7.2. Upgrade Instructions

- 1. Remove power from the TEMP08!**
2. Using a small screw-driver, or similar tool, gently remove U1, the 68HC908KX8 micro-controller, by inserting the screw-driver between the micro-controller and the DIP socket that it is inserted to. The location of U1 is shown in Figure 6.

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3. Making sure that you are grounded, or adequately static free, insert the new micro-controller into the socket. Care should be taken to observe correct polarity. The end of the micro-controller with a small notch, or a dot in the left corner, should be positioned to be close to the J1 connector as per the diagram below.
4. Make sure that all micro-controller pins are seated in the socket. Check for pins that may have bent inwards.
5. Restore power to TEMP08.
6. Enjoy your new features.

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8. Upgrading the TEMP08 Hardware

The TEMP08 1-Wire Serial Interface is available with many options as shown in Table 5 below. The basic TEMP08 can be upgraded, by the user, with the addition of some simple components, all of which are available from Midon Design. Others are available as well from your local electronics dealer.

Table 6 TEMP08 Ordering Options

MD2102	The blank PCB
MD2103	The processor with the latest software installed for TEMP08
MD2104	An assembled and tested unit equipped with the basic functionality.
MD2105	As MD2104 but with the addition of an on-board humidity sensor
MD2110	A case for the TEMP08 or LOG08, all options.
MD2111	A front panel for the MD2111 case
MD2112	A case and front panel for the TEMP08 or LOG08.

Users wishing to construct their own TEMP08 should order the MD2102 and MD2103. Alternatively, experimenters wishing to integrate the 1-Wire Serial Interface to another project directly could consider just ordering the MD2103 Processor and supplying the remainder of the components themselves.

Typically, users will order the MD2104 basic TEMP08. To upgrade TEMP08 to add the additional options, see Table 6 below.

Table 7 TEMP08 Upgrade Kit Options

Upgrading from	Upgrading to	Adding functionality	Order Kit #
MD2104 or MD2107	MD2105	Humidity Sensor	MD2205
MD2104 or MD2105 or MD2107		On-board temperature Sensor	MD3003

Of course, adding these options will require soldering skills. If you are not comfortable with soldering, you may return your TEMP08 unit to Midon Design for upgrade at a minimal charge.

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9. Trouble-Shooting Problems with TEMP08

The most common problems associated with using TEMP08 are listed in the following table. If these instructions do not result in better results with your TEMP08, please feel free to contact Midon Design at support@midondesign.com. We would be more than happy to assist you.

Table 8 Common TEMP08 Problems and Resolutions

Problem	Possible Causes
I cannot display TEMP08 output on my PC	Ensure that you are connected with the proper settings (9600 bps, no parity) and that you are using a straight-through, not a null-modem, serial cable
I cannot see what I type on Hyperterm	This is normal for Hyperterm versions that come pre-packaged with Windows. Upgrade to a commercial version of Hyperterm or use different terminal emulator software.
I added a new sensor and now all I get is "OW Bus Error" messages	Your sensor is probable reversed on the 1-Wire bus, OR, there is a short on the bus. Check your wiring.
I was able to add a new sensor but all I get is "???" readings from it.	Check your 1-Wire bus wiring. You may need to add a 100 ohm resistor in series with a new leg of bus that you added.
I removed a sensor from my wiring and now all I get is "???" readings from it.	Delete the sensor (use the DEL command) from the EEPROM.
I added a DS2405 (or 2406 or 2407) sensor and I cannot see the state change when I change the input to it.	DS2405, 6 & 7 sensors are no longer supported by TEMP08 as of V2.15. Please check the Midon Design website for a product (1WSwitch) that is compatible with these sensors.
I tried to add a bunch of sensors via the INI command and only some of them showed up.	Check your wiring. If necessary, add only one "branch" of sensors at a time.
I have a RELAY05 connected to TEMP08 and it will not work with the RLY command.	Software version 2.01 and higher no longer supports the RELAY05 option. Downgrade to v1.13 or replace RELAY05 with the 1WIO Relay module.
I added a DS2408-based sensor and it does not show up in the Poll display.	DS2408 sensors require a TYPE setting in order to be recognized by the Poll and TMP displays. Use the TYP command to set this property. I, O, and L are valid TYPE settings for DS2408's.

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10. Error Messages

Table 9 TEMP08 Error Messages

Message	Description
? Entry error	You have made a syntax error in entering a command or a parameter
Not installed	TEMP08 could not communicate to the device that you were trying to access. Check your 1-Wire bus wiring, or make sure that you are specifying the correct sensor number. At start-up, this is a normal error if you do not have any DS2408 devices connected to the 1-Wire bus and INI'd.
Try again	This error is specific to the NOR command and indicates that TEMP08 could not write to the DS2450 device that controls wind direction. Check your wiring.
OW bus error	Common to any 1-wire bus read operation. This error indicates that something is preventing the bus from changing state. Typical causes include shorts on the bus, or a reversed sensor.
? Input Timeout	A parameter was not received in response to a command within 20 seconds.

Table 10 Reset Type Messages

Reset Type (hex)	Cause of Reset
02	Low voltage – the power supply fell below spec
04	Monitor Mode reset entry – should never be seen
08	Illegal Address – something in the software caused access to an illegal address. Contact Midon Design
10	Illegal Op Code reset – something in the code happened. If this was not the result of a ZZZ command, contact Midon Design
20	Watchdog timeout. The software was busied out with something. If this occurs too frequently, contact Midon Design
40	User reset – you issued a ZZZ command
80	Power on reset – a normal entry

Binary combinations of the types above are possible and normal. For example, a power up reset will usually result in a type 82 message (Power on reset plus low voltage reset) and a ZZZ reset will result in a type 50 message.

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11. TEMP08 Parts List (complete)

Table 11 TEMP08 Parts List

Qty	Designations	Part Number	Description	DigiKey Part Number	JameCo Part #	Other Source
2	C1, 2	22pFd	Capacitor, 22pFd	1358PH-ND	15405	
2	C10, 11	0.1uFd	Capacitor, 0.1uFd (or 0.01uFd)		151116	
5	C3, 4, 5, 6, 7	10uFd	Capacitor, electrolytic, 10uFd	P975-ND	94211	
1	C8	1000uFd	Capacitor, electrolytic, 1000uFd	P6243-ND	158377	
1	C9	100uFd	Capacitor, electrolytic, 100uFd	P6239-ND	94289	
4	D1, 2, 3, 4	1N4148	Signal Diode		36038	
1	DS1	LED	Bipolar LED		34711	
2	J1	2 Term	PC Mount terminal strip, 2 pin		152346	
1	J2	Term 1x4	Optional 1x4 0.100 Header strip			
2	J3A, J3B	3 Term	PC Mount terminal strip, 3 pin		152354	
1	J4	DB-9	DB-9 Female PC Mount connector	A2100-ND	104951	
1	J5	RJ-12	6 pin RJ-12 PCB mount socket	A9043-ND		
1	J6	DIP	16 pin DIP socket		37372	
1	R1	10M	Resistor, 10M, ¼ W	10MEBK-ND	29938	

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Qty	Designations	Part Number	Description	DigiKey Part Number	JameCo Part #	Other Source
1	R2	1.5K	Resistor, 1.5K, ¼ W	1.5KQBK-ND	29760	
2	R3, 4	100K	Resistor, 100K, ¼ W		29997	
1	U1	68HC908KX8	Programmed Micro-Controller			Midon MD2103
3	U1, 3, 6	DIP	16 pin DIP socket		37372	
1	U2	93C66	Serial EEPROM	NM93C666EN-ND	200598	
1	U2	DIP	8 pin DIP socket		51570	
1	U3	MAX232	RS232 Interface		24811	
1	U4	FWB	Full-wave Bridge Rectifier	DF01MIR-ND	103000	
1	U5	LM78L05	Voltage Regulator	LM78L05ACZ-ND	51182	
1	U6	4094	Optional 8 bit Serial in Parallel Out Shift Register		13426	P/o Midon MD2206
2	U8, 11	DS2438	1-Wire Voltage sensor (U11 is optional)			P/o Midon MD2206
1	U9	HIH3610	Optional Humidity Sensor			Midon MD2206
1	U10	DS18S20	Optional 1-Wire Thermometer			Midon MD3003
1	Y1	4.9152 MHz	Crystal		14621	
1	PCB	TEMP08 PCB				Midon MD2102

Option kits are available for upgrading the basic MD2104. They include the following components.

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Table 12 Upgrade Kit Parts List

Upgrade Kit	Parts Contained	Functions added
MD2205	U9, U11, R4, C10	On-board humidity sensor
MD3003	U10	On-board DS18S20 sensor

Accessories are also available for TEMP08. A case with a professional front panel is available, as is as a power supply. Also available are a variety of 1-Wire sensors. Please check the Midon Design web pages for more information.

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12. 1-Wire Bus Wiring

Additional information about 1-Wire bus wiring may be found in Dallas Semiconductor's Application Note AP108 "Microlan in the long run". For a full copy of this article, please check Dallas' web site. A copy is also available via the Midon Design web site under our "Documents" link.

See also our 1-Wire Application Guide available on our website at <http://www.midondesign.com/Documents/1-Wire%20Application%20GuideOO103.pdf>

The principles of wiring devices on the 1-Wire bus are very simple, however, care must be taken when wiring long busses. Bus types may be characterized as follows:

Description	Length of Bus	Topology	Cabling Required
Small	Up to 15 feet (5m)	Straight run	Not critical
Simple	Up to 75 feet (25m)	Straight run	Unshielded twisted pair (UTP), CAT-3 or better
Long	Up to 300 feet (100m)	Straight run	UTP, CAT-5
Complex	Up to 300 feet (100m)	Straight run with 1 to many branches (star)	UTP, CAT-5

Small busses are simple to configure and generally suffer no signal degradation problems.

UTP wiring is recommended for any type of 1-Wire bus other than a small bus. In addition, CAT-5 wiring is preferred for all busses. Use a pair of the CAT-5 wires that is twisted together. If wiring power along with the 1-Wire bus in the same cable, use a different pair for the power.

Complex busses require special attention and may sometimes require the addition of a 100 ohm resistor in series with the DQ lead of branch legs. The resistors should be placed so that one end connects to the main leg and the other end to the branch leg. See the figure below for an idea as to when and where to do this.

The intent of the resistor is to compensate for the branch circuit's impedance and thus reduce signal reflections and bus capacitance, which would result in poor signal performance.

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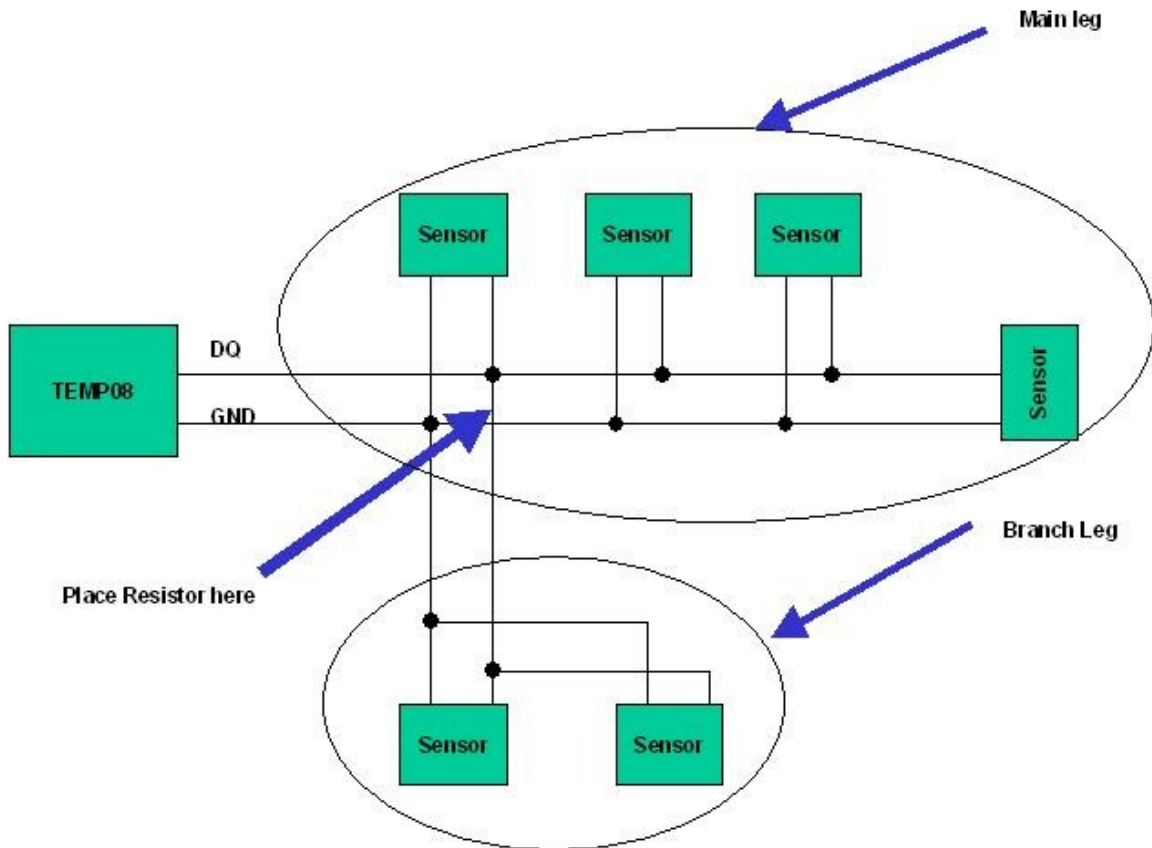
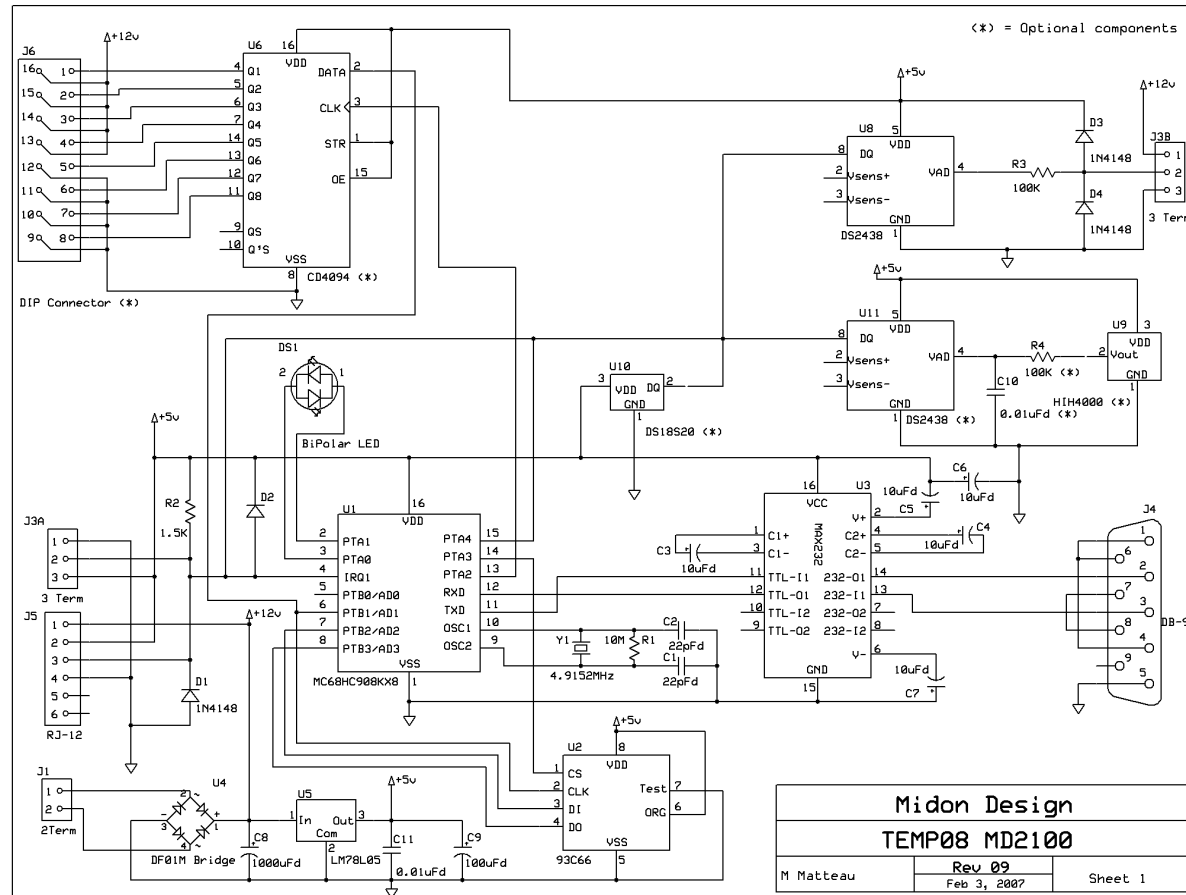


Figure 6 1-Wire Bus Wiring

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13. TEMP08 Schematic



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14. Conclusion

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

Please also check the Frequently Asked Questions link on the TEMP08 web page for more up to date information.

15. Legal Disclaimer

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