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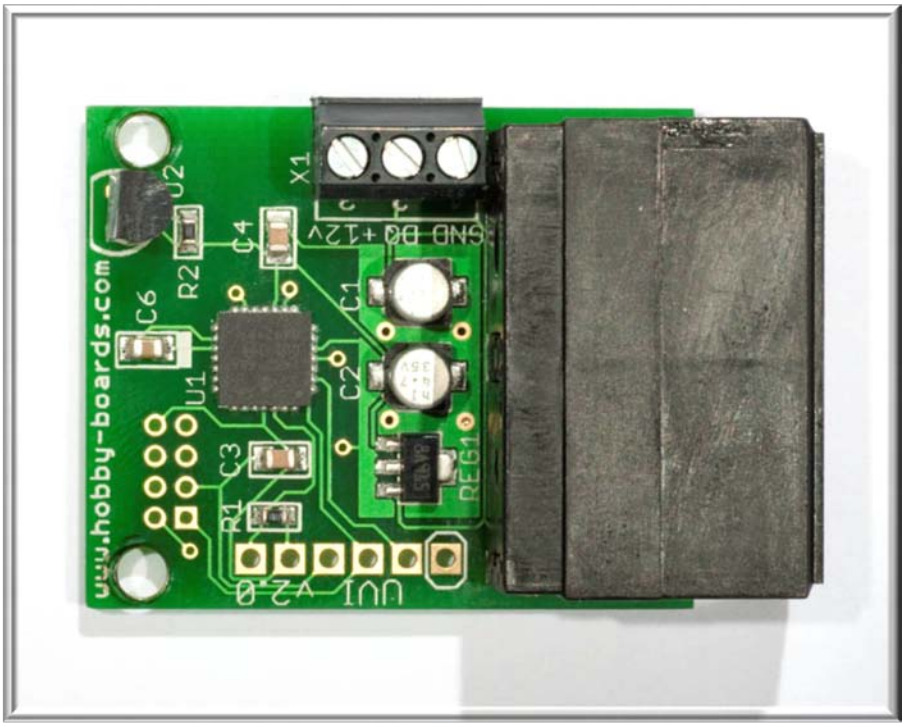
Complete 1-Wire Solutions



UV Index Meter

(1-Wire)

August 2009

Thank you for your interest in Hobby Boards' 1-Wire UV Index Meter. We are confident that this device will form an integral part of your weather station for years to come.

Description

Hobby Boards' UV Index Meter allows you to monitor this important environmental element using your 1-Wire network. If your primary concern is UV, you can use this device on your 1-Wire network on its own; it also nicely rounds out any 1-Wire weather monitoring system.

This device detects and measures UV radiation in both the UVA and UVB spectrum, with peak detection at a wavelength of approximately 365 nm. It will detect both direct and reflected UV, and the directions below will help you locate your device in order to maximize the accuracy of its reading. The device reports results as a UV Index (standard scale 0-16), to a resolution of one decimal place.

In addition to monitoring UV, the Hobby Boards UV Index Meter has an on-board temperature sensor.

Contents of kit

- 1-Wire UV Index Meter

Required but NOT included

- 1-Wire master
- CAT5 cable
- 9-24v DC power supply
- Software to interpret data
- Protective case
    - Note: the UV sensor cannot be directly exposed to the elements, and requires a protective case with a UV-transparent lens over the sensor (glass is not UV transparent). We recommend our custom-designed Hobby Boards UV Detector Case.

Optional

- Recommended: moisture resistant coating (note this can be added as an available option to your order)
- Recommended: use of dielectric compound on all device connections.

Technical Specs

Sensors

- Temperature sensor measures from -55˚ to +125˚ Celsius, with an accuracy of ±0.5˚ between -10˚ and +85˚; accuracy is ±2˚ outside that range. The temperature is updated every 30 seconds.
- Operating temperature of the UV sensor is 0˚ to 70˚ Celsius.

- UV sensor has maximum sensitivity at a wavelength of 365nm. It has an effective range of 280nm to 400 nm (thus detecting both UVA and UVB).
- UV Index Meter will report a UV Index from 0-16, with a resolution of 0.1 and an accuracy of ±0.5.
- UV sensor has a cosine response, within the acceptance angle of ±65˚.
- UV Index Meter has a temperature compensated output.

Controller

- The Hobby Boards' UV Index Meter uses a custom 1-wire chip. See the programming notes below for more details.

Connections

- 1-Wire connections are made through a dual RJ45 jack with pass-through capability or the available screw terminals for easy connectivity to your 1-Wire network.
- Power is supplied through CAT5 cable connected to the RJ45 jack or through the screw terminal.

Power Requirements

- The maximum power draw is 8mA at +15v DC.

Installation

Assembly

1. Unpack all parts and verify against the contents of kit listed above.
2. If a case was ordered at the same time make sure to remove any tape that might be covering the lens on the bottom of the case.

Mounting

1. The UV Detector should be mounted level, with the sensor (located on the underside of the board) pointed directly towards the sky.
2. Do not obstruct the sensor. Glass and many other transparent materials will still block UV, so be sure any covering you use is UV-transparent. Our case uses UV-transparent material for the lens which allows the transmission of UVA and UVB to the sensor.
3. In order to obtain the best reading of both direct and reflected UV, the device should be mounted away from obstructions, with a clear view of the sky. Mounting your UV detector under a porch, under a shade tree, or next to a building or trees will provide an accurate reading for the specific mounting location, but will not give you the best read of ambient UV levels.

Operation

Connecting 1-Wire and Power

To connect the controller board to your 1-Wire network, simply use a standard network cable and connect it to either RJ45 jack. The second jack is provided to allow pass-through connections. The two jacks can be connected interchangeably. Optionally, the controller board can be connected to your 1-Wire network using the screw terminals labeled GND, DQ, and +12v.

The controller board requires a DC voltage between 8 to 30VDC. This will be supplied in one of two ways. Power can be supplied locally, using the screw terminals labeled GND and +12v. Alternatively, power can be supplied through the 1-Wire network if your controller board is connected through a Hub, Master Hub, or Power Injector.

Software Requirements

The UV Index Meter requires 1-Wire software to read, interpret and display the data provided by the device. Many software providers support Hobby Boards devices shortly after they are released. Device support changes frequently, so please check with your software provider to see whether this device is supported or not. Your software provider can also give you information on how to configure the software and read the results.

Optional: Temperature offset

The UV Index Meter allows an offset for temperature readings. This feature may or may not be supported by your software provider. This offset can be changed using the Set Temp Offset (0x22) command.

Optional: UVI case compensation and UVI offset

The UV Index Meter offers a flag to indicate whether a Hobby Boards case is used, and also allows an offset for UVI reading adjustment. This feature may or may not be supported by your software provider.

The UV Index Meter ships by default with the case flag on, indicating that the unit will be used in a Hobby Boards case, which is the recommended configuration. This flag sets a UVI adjustment to compensate for losses due to the transmissivity of our lens and the slightly reduced acceptance angle due to the case itself. Should you choose to use the unit without a case (not recommended) you will need to turn off this flag or your UVI readings will be high. This flag can be set using the Set In Case (0x27) command.

Should you use an alternate case, you can make an adjustment for your specific case using the UVI offset. Otherwise, the UVI offset should not be needed, but might be useful if your device data readings drift over time. The UVI offset is set using the Set UVI Offset (0x25) command.

Programming Notes

The Hobby Boards 1-Wire UV Index Meter uses a custom 1-Wire chip. The device follows familiar 1-Wire programming standards, and we assume you will be familiar with 1-Wire programming before you read these instructions. If you need a refresher, we recommend that you use the 1-Wire links available on our website in order to find good source material.

If you need any assistance from Hobby Boards as you implement support for this device, please contact us – we'd be glad to help you.

Note the UVI Meter does not support 1-Wire overdrive speeds.

Data Reported by the Hobby Boards UV Index Meter

Temperature – Reports temperature in ˚Celsius, to the nearest 0.5˚C.

UV Index (UVI) – Reports a standard UV index, to the nearest 0.1 UVI.

Family Code

The UV Index Meter has a family code of 0xEE.

All Hobby Boards custom 1-Wire devices will have a family code of either 0xEE or 0xEF. 0xEE if they support built-in temperature readings and 0xEF if they do not.

Commands Available for the Hobby Boards UV Index Meter

The following standard 1-Wire commands are supported:

Search ROM (0xF0)
Read ROM (0x33)
Match ROM (0x55)
Skip ROM (0xCC)

Once the 1-Wire Master has addressed the device, the following ROM commands can be issued. All ROM function commands are 8 bits long.

Read Version (0x11) - Returns two separate bytes with the firmware version of the device. The data is returned minor version byte first, followed by the major version byte.

Read Type (0x12) - Returns the type of the device. The UVI Meter will return (0x01).

Read Temperature (0x21) - Returns the current temperature, in half-degrees Celsius, as a 16-bit sign-extended two's complement number. The data is returned least significant byte first, followed by the most significant byte. Note that this value must be divided by 2 in order to report ˚C.

Set Temp Offset (0x22) - Sets the internal offset that will be applied to the temperature before being returned. The data size is a signed byte containing the offset in 0.5˚C. The temperature offset is stored in non-volatile memory so it only has to be set once.

Read Temp Offset (0x23) - Returns a signed byte containing the temperature offset in half-degrees.

Read UVI (0x24) - Returns a byte with the tenths of UVI. Note that this value must be divided by 10 to obtain a decimal format of xx.x. Note that if you get back a reading of 255 this is an invalid reading, and the Read UVI command should be re-sent.

Set UVI Offset (0x25) - Sets the internal offset that will be applied to the UVI before being returned. The data size is a signed byte containing the offset in tenths. The UVI offset is stored in non-volatile memory so it only has to be set once.

Read UVI Offset (0x26) - Returns a signed byte containing the UVI offset in tenths.

Set In Case (0x27) – Sets the flag indicating whether or not the device is in a Hobby Boards case. The data size is an unsigned byte containing either 0 (not in case) or 0xFF (in case, **default**). The In Case flag is stored in non-volatile memory so it only has to be set once.

Read In Case (0x28) – Returns an unsigned byte containing the In Case flag.

ROM IDs used by the Hobby Boards UV Index Meter

Each Hobby Boards UV Index Meter has a unique 64-bit ROM code. The format of the code is as follows:

Position	Function	Code
First 8 bits	Family code	0xEE
Next 48 bits	Serial number	Unique
Last 8 bits	CRC of first 56 bits	