

Microfire LLC Mod-EVAL Board

Release Information

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Release History

Release	Date	Description
1.0.0	5/5/2021	Initial

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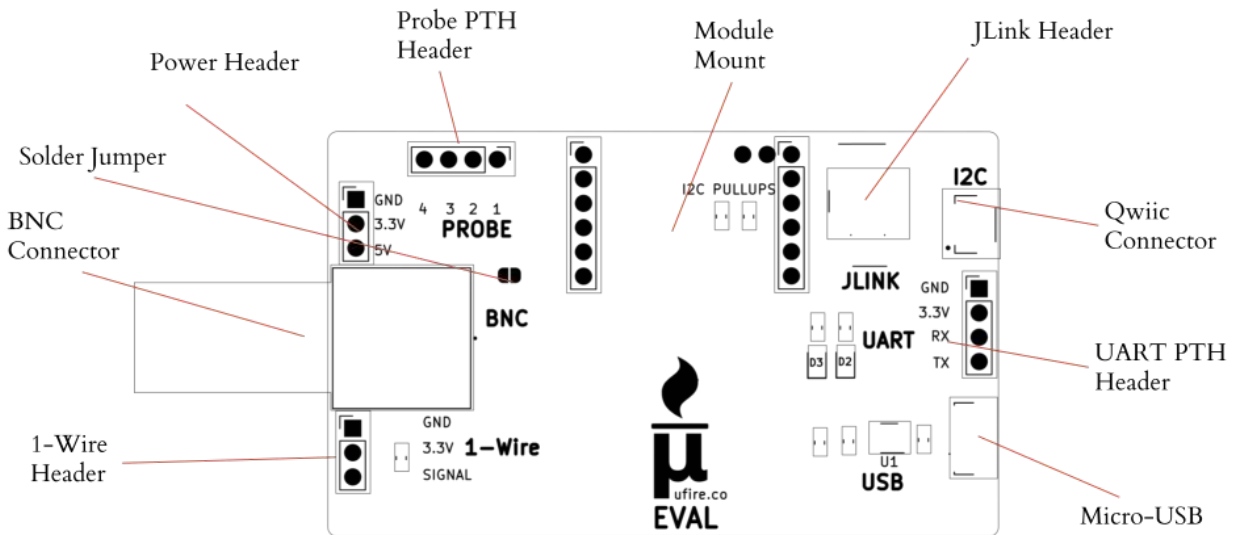
[Justin Decker](#)

Description

The Mod-EVAL board breaks out all the interfaces of Microfire’s sensor modules. This is the best way to prototype sensor modules into a larger hardware application.

Features:

- Access to all interfaces
 - I2C with 4k7 pullup resistors
 - USB with 5v to 3.3v regulator and Micro-USB connector
 - UART with activity-indicator LEDs
 - Probe Connections:
 - BNC using PROBE_1 and PROBE_2 pins of the sensor module
 - All 4 pins broken out
 - GND, 3.3 and 5 volt power header for additional power options



Precautions

Mixing Interfaces

It is generally recommended to not use all the available interfaces. For instance, using I2C and the UART connection will result in slightly different measurements from each interface. This is due to the particularities of implementing them on the module's firmware. All functionality is available from each interface.

Voltage Levels

Ensure the voltage levels for all interfaces remain at or below 3.3 volts (3.6 absolute max). There is no voltage polarity or over-voltage protection onboard.

For the USB interface, the board can be powered and used with USB because there is a 5 volt to 3.3 volt regulator onboard. The Power Header cannot provide 5 volts unless the USB cable is plugged into the board.

Isolation

This board does not provide any isolation. Isolation is available through a Mod-ISO module and can be prototyped using a Mod-ISO_EVAL board, or through custom hardware. It is important to remember that connecting an isolated ground isn't global ground, nor is isolated power the same as a global power supply. They cannot be interconnected.

Additionally, for many sensors (pH, ORP, EC), isolation is almost always required for reliable measurements.

Requirements

1. Mod-EVAL Board
2. An Arduino MCU or Raspberry Pi Zero/3/4
3. Qwiic wires if the Qwiic connectors will be used *-or-* 4 point-to-point wires to use the UART PTH header *-or-* a Micro-USB cable for the USB interface.
4. Probe

Optional Components:

1. DS18B20 waterproof temperature sensor
2. Mod-ISO for isolation

Connections

Decide which interface to use and make the appropriate connections.

I2C

Controller	Isolated Qwiic Dev Board
GND	GND
3.3 volts	VIN
SDA	SDA
SCL	SCL

UART

Controller	Isolated Qwiic Dev Board
GND	GND
3.3 volts	VIN
RX	TX
TX	RX

To use this interface with a computer, an appropriate USB-UART converter operating at 3.3 volts will be needed.

USB

Connect a 4-wire micro-USB wire into the board and connect the other end to any standard USB-compliant device.

Probe

There are two options for connecting a probe

1. The BNC connector makes use of **PROBE_1** and **PROBE_2**. Use it for EC, pH, or ORP probes.

- 2. The Probe PTH Header gives access to the 4 probe pins on the modules.
 - a. Some modules use **PROBE_4** to provide access to the 1-Wire interface. If the module uses **PROBE_4** for something else, the solder jumper must have the small trace between the two pads disconnected.

1-Wire DS18B20 Waterproof Temperature Sensor

1-Wire DS18B20	Mod-EVAL Board
BLK	GND
RED	VIN
YELLOW	SIG

Module

The module can be mounted to the board several ways. Pogo-like pins can optionally be used in conjunction with a clamp to press the module down. Simple pins can also be soldered to the board and the module can be slid down onto the pins.

Software

The Mod-EVAL is just a carrier board for the sensor modules and doesn't have any software requirements of its own. To use the module, install the module's library.

Arduino

All the required libraries can be installed through the Arduino IDE or PlatformIO library manager. Search for `Microfire` and all the available libraries will be in the results list. Install them as needed. Examples are included.

Raspberry Pi

Links to the Python libraries for Raspberry Pi can be found on the sensor's [individual pages](#).

I2C Bus

The I2C system in Raspberry Pi OS is slightly different from an MCU. In an MCU, the I2C system is accessed by connecting the appropriate lines, SDA and SCL. In Raspberry Pi OS, there are also SCL and SDA pins which need to be properly connected, but the pins aren't how the I2C system is referenced in software.

Each set of SDA and SCL pins is given a bus number and treated as a file; they are listed in `/dev/i2c-#` where # is the bus number. By default, Raspberry Pi OS has the I2C system turned off. [Follow their directions](#) to enable the I2C system.

All the examples assume `i2c-1`. The pins for `i2c-1` SDA are **GPIO2** and SCL is **GPIO3**. [A pinout diagram can be found here](#).

The *Shell* Example

Every library comes with a *Shell* example which allows for a command-line like interface to all the module's features.

Each example is slightly different according to the sensor, but there are some similarities between each version.

Typing:

- *config*: display all calibration and system information
- *reset*: revert all calibration data to default values
- *temp*: take a temperature measurement using the attached DS18B20 sensor
- *low/mid/high/sin*: calibrate the sensor at the low, mid, high or single points
- *i2c*: change the I2C address of the module



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Modules

Mod-EC
Mod-pH
Mod-ORP
Mod-ISO_I2C_UART

Development Boards

Isolated Qwiic Dev Board
Mod-EVAL
Mod-EVAL_ISO

Probes

Industrial pH Probe
Industrial EC Probe
Industrial ORP Probe
Lab pH Probe
Lab EC Probe
Lab ORP Probe



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