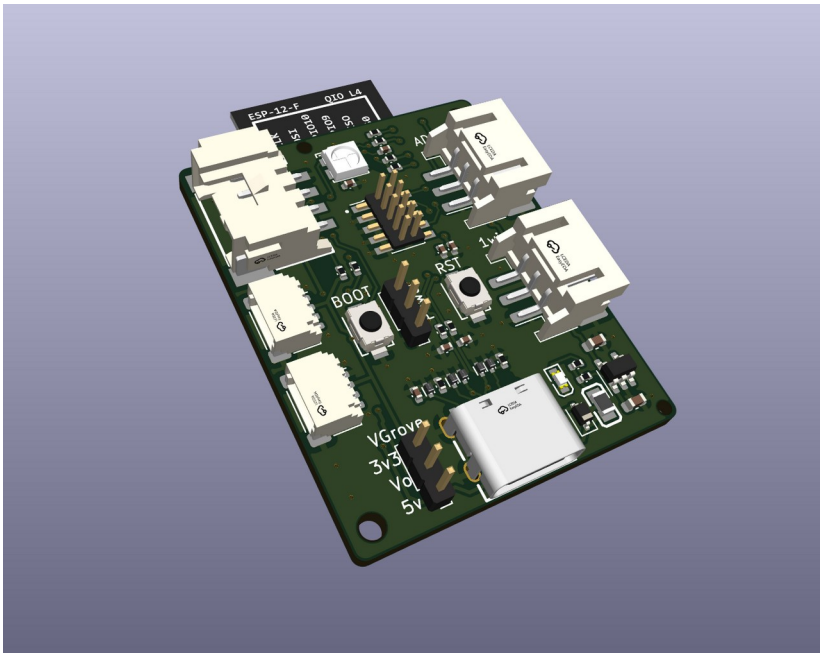
Open Sense Module Datasheet

DI-OSM1 v1.0



Copyright ©2023. Dialedin. All Rights Reserved

Table of Contents

Copyright ©2023. Dialedin. All Rights Reserved

1 Description

The **DI-OSM1** is a compact breakout board meticulously crafted to provide the perfect foundation for creating sensor based modules using open automation platforms like Tasmota, ESPHome or ESPEasy. Its compact design ensures stability and reliability, setting it apart from other development kits on the market.

By offering a selection of standard connectors, the **DI-OSM1** enables seamless integration with a wide range of sensors, displays, real-time clocks, EEPROMs, IO expanders, motor controllers, and more. Unlike conventional development kits that often rely on breadboards or unreliable dupont jumper connectors prone to loose connections, our breakout board guarantees solid connections, eliminating any concerns of compromised wiring.

The **DI-OSM1** is optimised for compatibility with ESP32-C3 modules, such as the **WT32C3-S5** and **ESP8685-WROOM-01** modules. However, it can also accommodate most other modules available in SMD-22 or SMD-16 form factors, including the widely popular **ESP-12F** or the upcoming **ESP8684-WROOM-01**.

The ESP32-C3 was selected, as it provides some key advantages over the older ESP8266 modules:

- 32-bit 160MHz RISC-V core with improved performance, increased memory and better power efficiency
- Bluetooth Low Energy(BLE) support
- USB programming and JTAG debugging
- Improved ADC’s with up to 6 channels
- I2S support for audio devices

Copyright ©2023. Dialedin. All Rights Reserved

2 Features

- Compatible with most SMD-22 and SMD-16 ESP modules
- 2x QWIIC/StemmaQT I2C connectors
- Grove UART connector (optionally I2C)
- 1-wire connector (for sensors such as DS18B20 probes)
- 2x ADC inputs setup for resistive sensors
- on-board WS2812B RGB LED
- 1.27mm pin header with 4x GPIO (JTAG)
- 1x User Programmable Button
- 1x Reset Button
- USB Programming and Debug (ESP32-C3 only)

2.1 Specifications

- Dimensions: 32mm x 40mm x 7mm (excluding esp32 module)
- SDK: Arduino IDE or ESP-IDF
- Platforms: Tasmota, ESPHome, ESPEasy, WLED

2.2 Compatible Modules

The following ESP modules are compatible with this board. Not all features supported on ESP8266 modules. See Chapter 4 Supported Modules for further details. Modules can easily be placed by hand soldering.

ESP32-C3

- WT32C3-S5
- ESP8585-WROOM-01
- ESP-C3-12F (Not recommended)

ESP8266

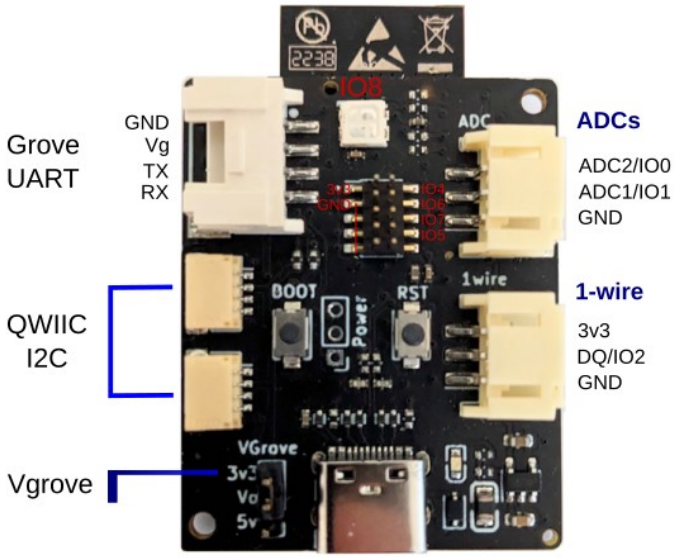
- ESP-07
- ESP-12E, ESP-12F, WT8266-S5
- ESP-12S, WT8266-S6

OTHER

- ESP-12H [ESP32-S2]
- ESP8684-WROOM-01 [ESP32-C2] (requires ESP-IDF v5.1, not supported by Arduino or other platforms yet)

Copyright ©2023. Dialedin. All Rights Reserved

2.3 Pinout



Function	Connector	IO (ESP32-C3)	IO (ESP8266)
U0RX	Grove	GPIO20, RX	GPIO3, RX
U0TX	Grove	GPIO21, TX	GPIO1, TX
SDA	Qwiic	GPIO3	GPIO5
SCL	Qwiic	GPIO10	GPIO4
LED	RGB	GPIO8	GPIO2
Boot Button	Button	GPIO9	GPIO0
DQ	1-wire	GPIO2	GPIO16
ADC2	ADC	GPIO0	N/A, RST
ADC1	ADC	GPIO1	GPIO17, ADC
TMS	JTAG^	GPIO4	GPIO14
TDI	JTAG	GPIO5	GPIO12
TCK	JTAG	GPIO6	GPIO13
TDO	JTAG	GPIO7	GPIO15
USB_D-	USB-C	GPIO18	N/A
USB_D+	USB-C	GPIO19	N/A

^ JTAG on ESP8266 is not officially supported by OpenOCD.

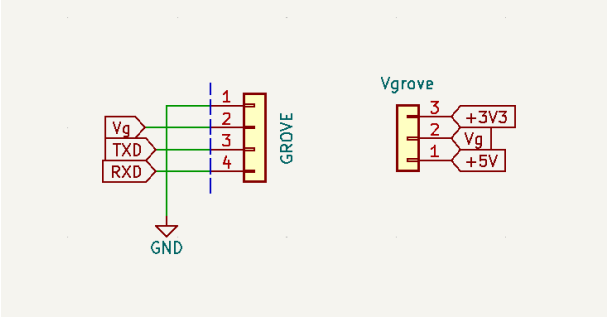
Copyright ©2023. Dialedin. All Rights Reserved

3 Connectors

3.1 Grove UART

Connector: GROVE

This connector is wired directly to UART0 on the ESP chip using the standard Grove UART pinout. A jumper is provided making this selectable between 5v or 3.3v supply depending on the end-device.



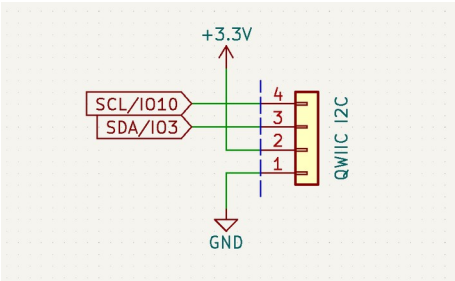
Some popular devices that connect via UART include Nextion HMI displays, Gas Sensors, Ultrasonic distance sensors, RFID Tag reader, Fingerprint scanner, LTE Modem and GPS units.

This port can be configured in software as a Grove I2C port, however in this case I2C must be disabled on QWIIC ports as the ESP32-C3 and ESP8266 modules only support a single I2C bus. It can also be used to program the ESP chip using a USB Serial adapter, you must use the boot button to put the device into bootloader mode in this case as there is no auto-downloader circuit.

3.2 Qwiic I2C

Connector: QWIIC/StemmaQT (JST SR 1mm pitch)

Quick connection of any QWIIC/StemmaQT compatible device or use adapter cables if you need to attach other connector types. You can further expand the number of available ports with a multi-port adapter board. Many devices can be supported on the I2C bus, however all connected devices must have unique addresses.



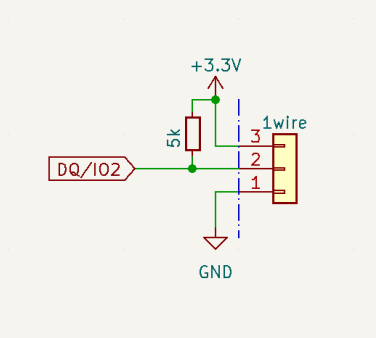
Compatible with a wide range of sensors, displays, and other I2C devices. Some common examples of sensors include temperature, humidity, pressure, light, gas, and moisture sensors. Additionally, there are many other devices that utilize I2C, such as OLED displays, RGB LEDs, I/O expanders, EEPROMs, and numerous others.

Copyright ©2023. Dialedin. All Rights Reserved

3.3 1-Wire

Connector: 3-Pin JST PH (2mm)

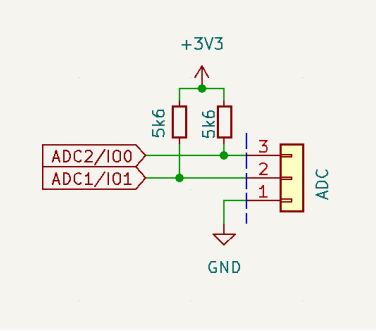
1wire is protocol developed by Dallas Semi, that uses a single data wire to connect sensors. Each sensor has a unique address so you can run many sensors of the same model on a single bus. The integrated pull-up resistance on ESP8266 will be 10kΩ, you may need to add extra resistance if you have more than a couple of sensors. The most popular 1-wire sensor is the Dallas DS18B20 temperature sensor.



3.4 ADC

Connector: 3-Pin JST PH (2mm)

Two ADC inputs with integrated 5.6kΩ pull-up resistors, allows to directly connect a range of resistive sensors. These include thermistors, photoresistors or a Milone Tech eTape water level sensor. It can also be used as an active low digital IO pin.



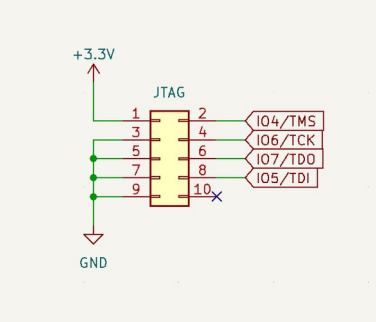
* IO0 must be left disconnected on all ESP8266 based modules, as this is connected to the reset pin.

Copyright ©2023. Dialedin. All Rights Reserved

3.5 GPIO/JTAG Header

1.27mm pitch 10pin IDC header

This header breaks out the remaining 4 GPIO's which are available for general purpose use. This has also been conveniently configured to connect directly to the `Espressif ESP-Prog` JTAG debugger for online debugging.



The WT32C3-S5 and ESP8685 modules use USB debugging by default, you must burn an eFuse if you prefer to use this connector for JTAG debugging.

3.6 Power Header

2.0mm pitch 3-pin header (not soldered)

When the device is connected to USB this header provides access to the USB Vbus 5V and regulated 3.3V rails. Alternatively you can opt to power the board using 5V on this header instead of the USB port.

Copyright ©2023. Dialedin. All Rights Reserved

4 Supported Modules

This board has been designed to be flexible and can be used with most ESP modules available in SMD-22 or SMD-16 form factor including the very popular ESP8266 based ESP-12 series modules. Some features are not available when using ESP8266 compared to the ESP32-C3. An overview of available features is provided below.

GPIO mapping varies depending on module, please check the datasheet for your module. For devices without USB CDC support, these can be programmed using the Grove connector and a USB UART adapter and pressing the boot button to activate download mode.

4.1 Feature Comparison

Comparison of available features on compatible modules

Module	Core	USB CDC	JTAG	Bluetooth	Notes
ESP8685-WROOM-01	ESP32-C3	Y	Y	Y	Full features
ESP8685-WROOM-04	ESP32-C3	N	Y	Y	
ESP8684-WROOM-01	ESP32-C2	N	Y	Y	Esp-idf v5.1 only
ESP-07 / ESP-12F / WT8266-S5	ESP8266	N	N^	N	1x ADC. See 4.2
ESP-12S / WT8266-S6	ESP8266	N	N^	N	1x ADC
ESP-12H	ESP32-S2	N	N	N	2x I2C Bus, different GPIO mapping
ESP-12-C3	ESP32-C3	N	N	Y	different GPIO mapping

^OpenOCD does not officially support ESP8266 for online debugging. Recommended to choose an ESP32 variant if you require debugging.

Copyright ©2023. Dialedin. All Rights Reserved

4.2 Modification for ESP8266 modules

For support of some ESP8266 modules some minor modifications might be required. Check the data sheet for your selected module, as sometimes they include resistors internally. Clone modules can vary from specification and its worth measuring these devices.

4.2.1 Solder Bridge JP1

For ESP8266 modules that require an external pull-down resistor on GPIO15, you must close the solder bridge **JP1** on the back of the board. Some modules such as ESP-12S already include this resistor.

Includes the following modules:

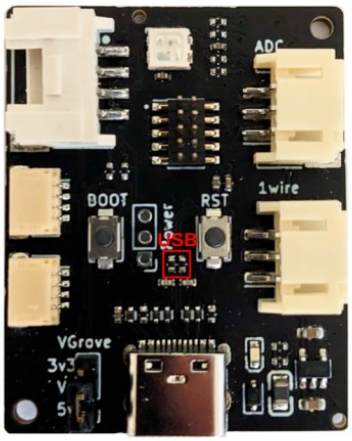
- ESP-07
- ESP-12E, ESP-12F
- WT8266-S5

4.2.2 Remove USB Resistors

For all ESP8266 SMD-22 modules it is required to disconnect the USB data lines as these will interfere with on-module flash memory. This can easily be achieved by removing the two 0Ω resistors marked in red below, you can just swipe these off the board with a hot soldering iron.

Includes the following modules:

- ESP-12E, ESP-12F
- WT8266-S5

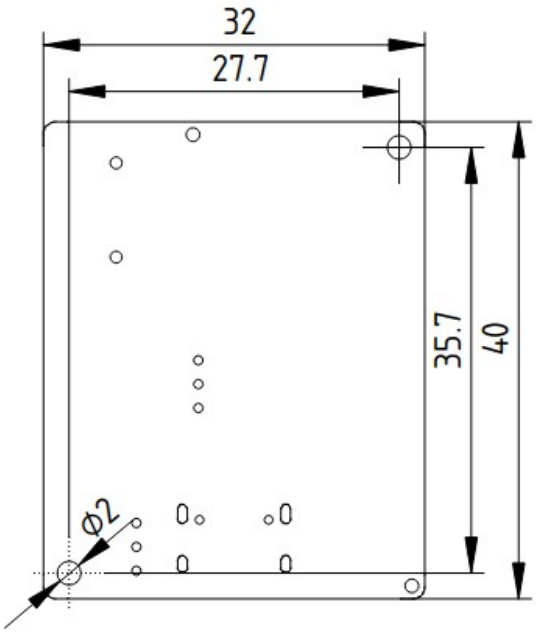


Copyright ©2023. Dialedin. All Rights Reserved

5 Technical Data

5.1 Dimensions

All measurements are in mm.



5.2 Further Resources

Further resources including configuration, examples, firmware builds and more can be found on our Github

https://github.com/DialedIn-Aus/products/tree/main/openSense

Copyright ©2023. Dialedin. All Rights Reserved