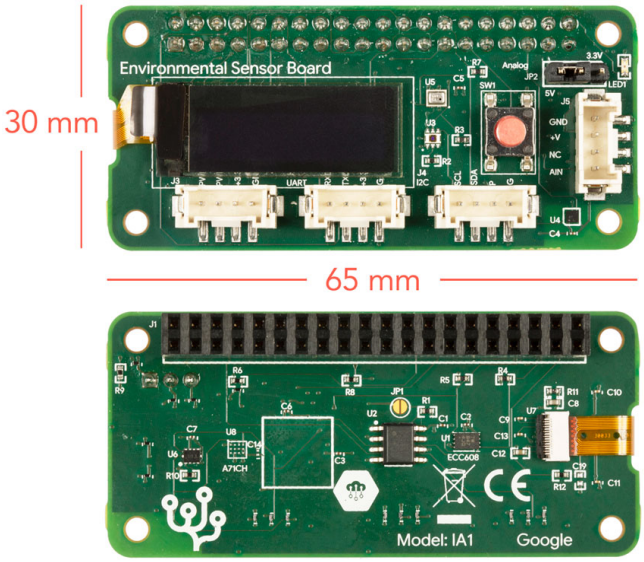
Coral

Environmental Sensor Board datasheet

Version 1.1

Features

- 128x32 OLED display
- Ambient light sensor (OPT3002)
- Barometric pressure sensor (BMP280)
- Humidity / temperature sensor (HDC2010)
- Cryptoprocessor (ATECC608A) with Google keys
- 40-pin GPIO female connector
- Four Grove connectors:
    - 1x UART
    - 1x I2C
    - 1x PWM
    - 1x 3.3/5V analog
- General purpose button
- General purpose LED



Description

The Environmental Sensor Board is an add-on board (also known as a pHAT or bonnet) that adds sensing capabilities to your Coral Dev Board or Raspberry Pi projects. (It includes an EEPROM for compatibility with Raspberry Pi boards.)

The board provides atmospheric data such as light level, barometric pressure, temperature, and humidity. You can also attach additional sensors with the Grove connectors.

The board also includes a secure cryptoprocessor with Google keys to enable connectivity with Google Cloud IoT Core services, allowing you to securely connect to the device and then collect, process, and analyze the sensor data.

Ordering information

Part number	Description
G650-04023-01	Coral Environmental Sensor Board

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1 Dimensions

Table 1. Board mechanical specifications

Measurement	Value
Board size	Board w/ components: 65 x 30 x 18.46 mm 40-pin header height: 8.5 mm
Hole size/spacing	Diameter: 2.4 mm Horizontal spacing: 58 mm Vertical spacing: 23 mm
Weight	14 g

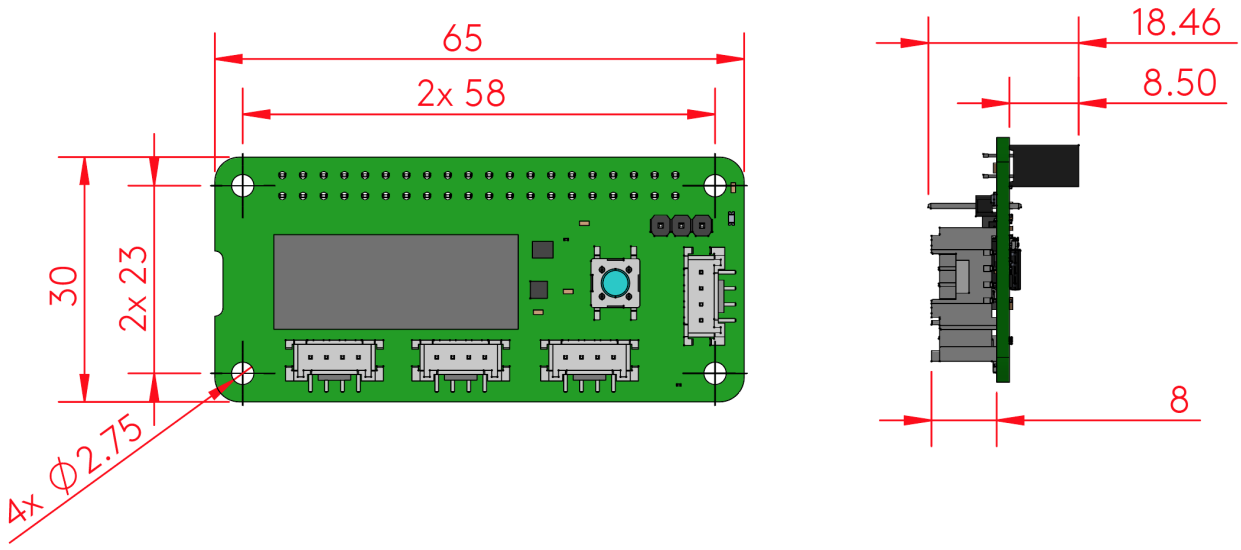

Figure 1. Board and mounting hole dimensions (in millimeters)

2 Requirements

The board must be connected to a host with I2C, SPI, and 3.3V power. The 40-pin GPIO header and Python APIs are designed to work with the Coral Dev Board or Raspberry Pi (running Mendel Linux or Raspberry Pi OS, respectively).

You can install the Environmental Board Python library on the host device as follows:

```
sudo apt-get install python3-coral-enviro
```

If using a device other than the Coral Dev Board, you must first add the Coral package repo to your device. For instructions, see the Coral debian package details.

3 Sensors

All sensors are connected to the I2C lines from header pins 3 and 5 (see the header pinout).

Table 2. Board sensor details

Sensor	Details
Humidity and temperature sensor	Texas Instruments HDC2010: • Humidity range/accuracy: 0-100% ± 2% (typical) • Temperature range/accuracy: -40 to +125 °C (functional) ± 0.2 °C (typical) I2C address: 0x40
Ambient light sensor	Texas Instruments OPT3002: • Optical spectrum: 300-1000 nm • Measurement range: 1.2-10 mW/cm^2 I2C address: 0x45
Barometric pressure sensor	Bosch Sensortec BMP280: • Operation range: 300-1100 hPa • Absolute accuracy (@ 0-65 °C): ~ ± 1 hPa • Relative accuracy (@ 700-900 hPa; 25-40 °C): ± 0.12 hPa (typical) I2C address: 0x76

4 Grove connectors

The Grove connectors provide easy access to the PWM, UART, and I2C pins from the baseboard, plus an on-board analog-to-digital converter (ADC), as illustrated in figure 2.

To interact with the AIN0 analog source, use address 0x49 on the I2C lines from header pins 3 and 5 (see the header pinout). For more detail on the analog-to-digital converter, refer to the ADC part specifications (TLA2021IRUGT).

> **Note:** The VDD_A pin on the analog Grove connector can be powered by either the 5V or 3.3V power rail by the jumper pins indicated in figure 2 as the ANALOG VDD JUMPER.

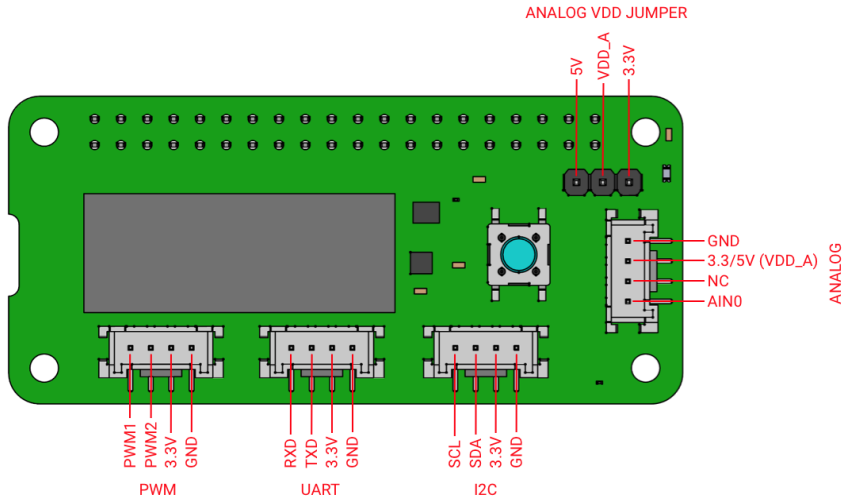

Figure 2. Pin functions for each Grove connector

5 OLED display

The 128x32 OLED display is driven by the SSD1306 control chip, connected with the SPI interface.

Table 3. OLED display pinout for 40-pin header

SPI function	Pin
MOSI	19
MISO	21
SCLK	23
CL	24
RESET	22
DC	18

6 Secure cryptoprocessor

The board includes a secure cryptoprocessor (ATECC608A) with an EEPROM that can store up to 16 keys (256-bit), certificates, or other data. Although this chip provides a range of cryptographic features, it is primarily included to provide secure key generation and management so you can securely authenticate with the device when deployed into the field.

The factory setting for the Environmental Sensor Board includes one Google key (private key, public key, and certificate) to enable communication with Google Cloud IoT Core right out of the box. This key slot is reusable, just like the rest of the memory, so you don't have to keep it.

7 Header pinout

Figure 3 shows which pins from the baseboard are used by the Environmental Sensor Board. Pins highlighted in dark green are used by the board and not available to you (except through software for the corresponding functions), while the pins in light green are used by the board but are still available to you through the Grove connectors.

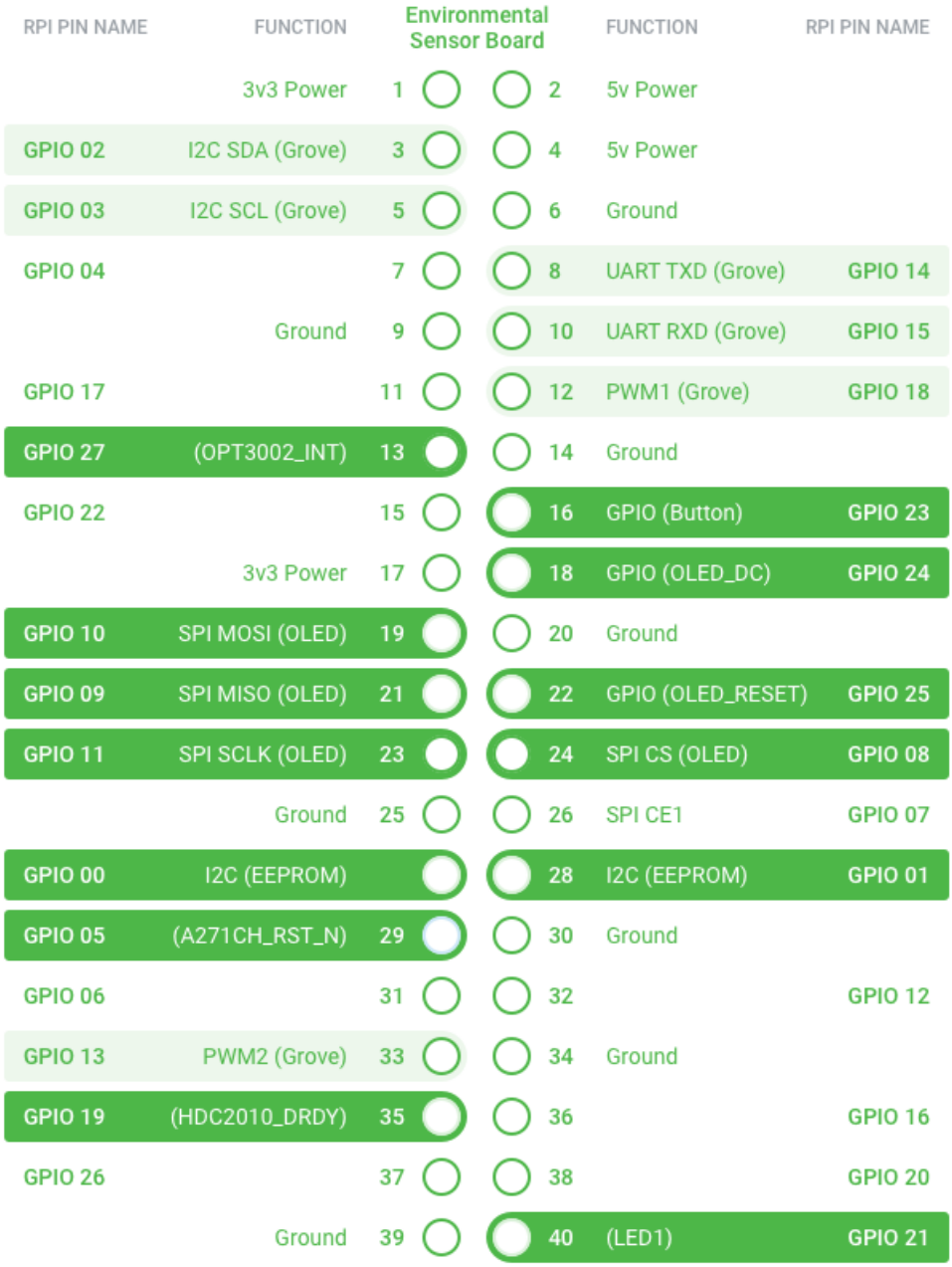

Figure 3. Pins used by the board

8 I2C address reference

Table 4. I2C addresses for all on-board devices

Device	Address
Humidity/temp sensor	0x40
Ambient light sensor	0x45
Barometric pressure sensor	0x76
Analog Grove connector	0x49
Cryptoprocessor	0x30

9 Document revisions

Table 5. History of changes to this document

Version	Changes
1.1 (December 2020)	Added ADC part number (TLA2021IRUGT). Added information about the Python library. Removed list of certifications (instead see product availability). Updated document style and added section numbers (datasheet is now in PDF only).
1.0 (March 2019)	Initial release.