

1. Description

The **EMIT** (Environmental Monitoring IoT) development board, is an IoT (Internet of Things) development board built to help engineers accelerate the development and time-to-market of IoT based Environmental Monitoring products.

The EMIT development board includes a socket for the popular 30-pin ESP32 DevKit1 device – a low cost, low power, dual-core, wireless IoT module with integrated Wi-Fi and Bluetooth connectivity.

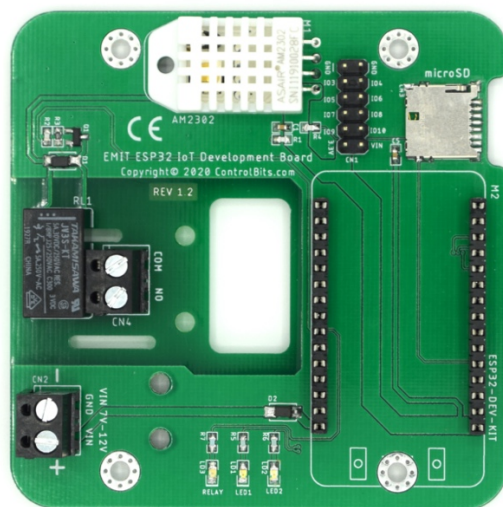
In addition to the ESP32 socket, the EMIT development board includes an AM2302 temperature & humidity sensor and a 5A SPST (Single Pole, Single Throw) relay (with status LED) to provide a simple means of feedback control against a pre-determined temperature or humidity set-point.

The EMIT development board provides 2 programmable status LEDs for user feedback, a microSD card socket for applications requiring local data storage and a 12-pin, GPIO port to extend the boards functionality further.

To help accelerate the development of IoT based Environmental Monitoring firmware, EMIT includes a step-by-step firmware development guide (for MicroPython), a free MQTT broker, a sample MQTT client application, written in Python, and an online support forum. Everything you need to hit the ground running as you develop your next IoT project!

2. Typical Applications

- Building Environmental Sensor
- IoT Weather Station
- Smart Greenhouse Controller
- Internet Connected Room-Stat
- Temperature & Humidity Data Logger
- Internet Driven Relay
- Air Quality Monitoring



3. Features

- AM2302 temperature & humidity sensor
- Socket for 30-pin ESP32 DevKit1
- MicroSD card socket
- 12-pin, GPIO expansion port
- 2 programmable status LEDs (Red & Green)
- 5A SPST relay output with status LED
- Powered by USB or external 7-12v supply
- 81 mm x 81 mm PCB
- Optional wall-mounted, vented enclosure

4. Specifications

- Temperature Measurement

Range:	-40 to +80°C
Resolution:	0.1°C
Accuracy:	+/- 0.5°C
Repeatability:	+/- 0.2°C
Read Frequency:	2 seconds max

- Humidity Measurement

Range:	0 to 99.9 %RH
Resolution:	0.1 %RH
Accuracy:	+/- 2 %RH
Repeatability:	+/- 1 %RH
Read Frequency:	2 seconds max

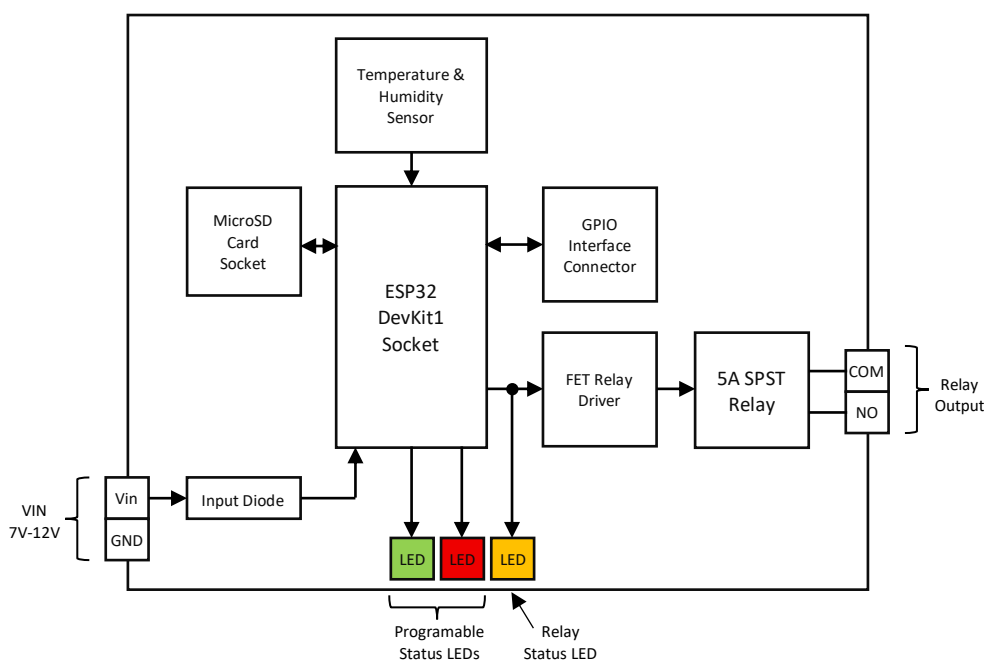
- Power Requirements

Voltage Range:	7 to 12 VDC
Power Consumption:	50mA Typical

- Physical Dimensions

Width:	81 mm
Height:	81 mm
Depth:	18 mm

5. Functional Block Diagram



6. Feature Description

6.1. ESP32 DevKit1 Socket

The processing power of the EMIT development board, is provided by a 30-Pin ESP32 DevKit1 module, a commercial-off-the-shelf module that includes the popular, pre-approved, dual-core, ESP32 wireless IoT module with integrated Wi-Fi and Bluetooth connectivity. The module is not included with the board but is commonly available separately or as part of the EMIT development kit.

6.2. Temperature & Humidity Sensor

The EMIT board includes an AM2302 temperature & humidity sensor that can measure temperatures from -40°C to +80°C and humidity from 0 %RH to 99.9 %RH. The AM2302 uses a single pin serial protocol and is connected to ESP32-GPIO14. The sensor can be read by the ESP32 at a maximum frequency of 0.5 Hz (once every 2 seconds). For the full specification of the Temperature & Humidity Sensor see section 4.

6.3. MicroSD Card Socket

The EMIT development board, also includes a MicroSD card socket to provide

a means of local data storage. The MicroSD Card socket is connected to SPI 'Slot 2' (i.e. SCK = GPIO18, CS = GPIO5, MISO = GPIO19 & MOSI = GPIO23). There is also a hardware 'Card Detect' feature available on GPIO4.

The MicroSD card can be used to store temperature and humidity measurements in applications such as temperature and/or humidity data logging, to buffer data while awaiting transmission via MQTT or other IoT protocol or store settings.

6.4. SPDT Relay & FET Relay Driver

An 5A, SPDT (Single-Pole, Single-Throw) relay is provided as a means of feedback or control. The relay is driven by the ESP32-GPIO26, via an FET (Field Effect Transistor). There is also an orange 'Relay Status' LED.

6.5. GPIO Interface Connector

To enable further expansion, the EMIT development board includes a GPIO Interface Connector. The GPIO Interface Connector has 8x GPIO pins, 3V3, and VIN supplies plus 2x GND pins.

The GPIO Interface pins can be configured to provide any combination of:

- 8x digital inputs/outputs
- 4x analogue inputs (12-bit resolution)
- 1x I2C serial port
- 1x Serial UART

The full interface connector layout is shown in the table below:

Pin Name	ESP32GPIO	Pin No.	ESP32GPIO	Pin Name
GND	GND	1	2	GND
IO1 : A1	GPIO36	3	4	GPIO22
IO2 : A2	GPIO39	5	6	IO8 : I2C SCL
IO3 : A3	GPIO34	7	8	GPIO11
IO4 : A4	GPIO35	9	10	IO7 : I2C SDA
3V3	3V3	11	12	GPIO3
				IO6 : U0 RX
				GPIO1
				IO5 : U0 TX
				VIN
				VIN

6.6. Programmable LEDs

To provide a means of visual status feedback for users, the EMIT board includes two, user programmable LEDs.

A **RED** LED is connected to ESP32-GPIO16 and a **GREEN** LED is connected to ESP32-GPIO17.

These LEDs are ideal for confirming connection to Wi-Fi, receipt of communications or sensor read status.

7. Product Support

The EMIT development board is supported by:

- a step-by-step firmware development guide (for MicroPython) including detailed example code
- use of a free MQTT broker
- a sample MQTT client application, written in Python, and
- an online support forum

All product support, documentation and example software and firmware are available from the ControlBits.com website. Link: <https://ControlBits.com>

8. Suitable Enclosure

The EMIT development board has been designed to fit a wall-mounted, vented enclosure. (CamdenBoss Part No. CBR501VWH)

9. Product Ordering Information

The EMIT development board is available as either a stand-alone development board (Part No. EMIT-1V2-DevBoard) or as part of the EMIT development kit (Part No. EMIT-1v2-DevKit). The EMIT development Kit also includes: 1 off 30-pin ESP32 DevKit1 module, 1 off 8MB MicroSD Card, 1 off Vented Enclosure and 1 off USB cable.

10. International Compliance Statement

This product complies with the requirements of the European Union's Restriction on the use of certain hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2015/863 (RoHS3).

This product complies with all applicable European Union electrical safety and EMC Directives. The product is CE marked as a development board or potential system component. Where this product is to be placed onto the market as part of a larger system or product, it is solely the responsibility of the user to ensure that the 'new' system or product still complies with all applicable European Union electrical safety and EMC Directives.

11. Important Notice & Disclaimer:

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