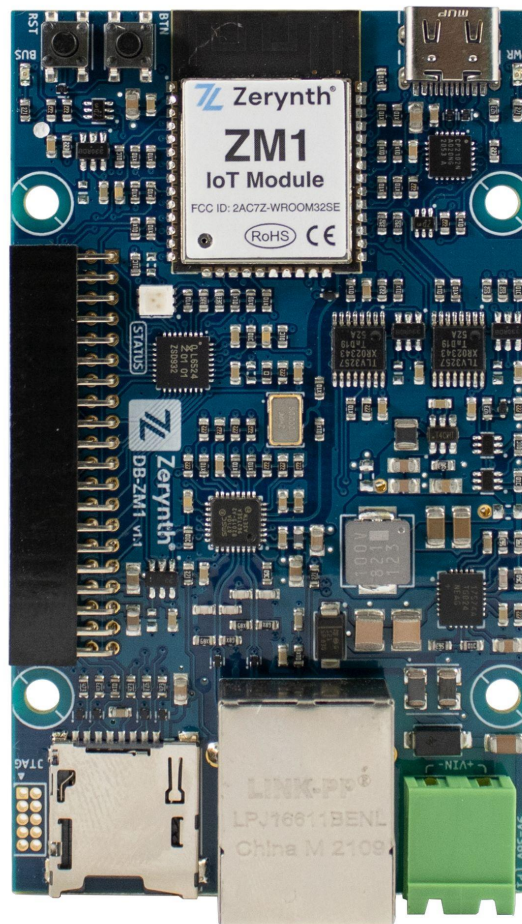


# ZM1-Development Board

## User Manual



For more details, visit: [www.zerynth.com](http://www.zerynth.com)

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Contents of the present documentation refers to products and technologies described within. All technical data contained in this document may be modified without prior notice. The content of this documentation is subject to periodic revision.

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## Overview

The ZM1 Development board is an industrially oriented, modular hardware development unit that facilitates the development of scalable, secure and connected IoT (Internet of Things) applications.

The ZM1-DB uses the ZM1 module, a 32-bit dual Core MCU based on the ESP32-WROOM-32SE. The ZM1 Core features a clock frequency of 240 Mhz, an Embedded 16 MB SPI Flash memory, and integrates the ATECC608A crypto element allowing ultra-secure communication.

The ZM1 Development Board can act as a Development Board for prototyping a product, and as a core for industrial applications thanks to the modular expansion system.

The DB features I/O connectors (the zBUS) that allow connection in a cascade of different add-on modules to create specific industrial applications that fit into a DIN-RAIL case.

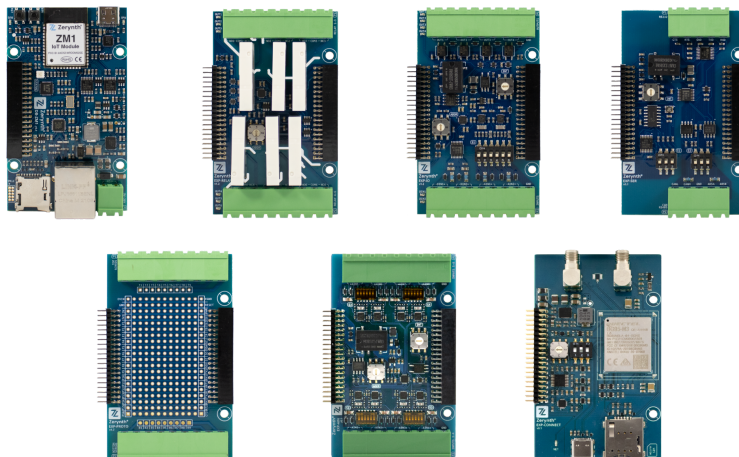
## Modular Expansion System

Zerynth Development boards offer a game-changing way of connecting and adding functionalities to your application in a simple and easy way.

The development board offers a modular expansion system that adds expansion boards through the connectors on the board (zBUS).

Expansion boards vary in features and functionality. Currently, Zerynth offers :

- EXP-AIN: Expansion board with 8 Industrial analog input channels
- EXP-CONNECT: GSM-NB-IoT and GPS enabled expansion module.
- EXP-IO: Industrial input/output board with 4 solid-state relays, 2 analog channels (4-20mA/0-10V/NTC/current clamp) channels, 2 opto-isolated digital inputs
- EXP-RELAY: Expansion board with 6 Electromechanical power relays.
- EXP-SER: Serial Communication board with : CAN, RS232 and RS485 interfaces.
- EXP-PROTO: Prototyping board for connecting and testing different types of sensors and devices.



## zBUS

The modular expansion system uses the zBUS. The zBUS is an efficient and powerful standard for connecting and prototyping different sensors and devices.

The zBUS uses the CN1 pin header (20x2) exposing the following connections:

- 16 GPIO pins.
- 4 interrupt pins.
- 2 USART/UART instances with hardware flow control support (TX,RX,RTS,CTS)
- I2C, SPI support.
- 5V, 3.3 V output pins.
- Enable pin for controlling the power to attached expansion boards.

## General Characteristics

- Based on Espressif ESP32 - 32bit Microcontroller, xTensaLX6.
- Up to 240MHz clock, 16MB of Flash, 312Kb SRAM.
- Python / C enabled development with Zerynth OS.
- Highly customizable solution thanks to the modular expansion system.
- JTAG support.
- 3 RGB status LEDs.
- 9 to 36V input Power Supply.
- MicroSD card slot.
- WiFi (Client and AP mode supported).
- Bluetooth® Low-Energy.
- Ethernet.
- Crypto Chip - ATECC608A Secure Hardware Encryption.
- Reset button and user configurable button.
- USB-C (power and programming).

## Screw Description

Connector J1	Symbol	Description
<b>Screw Number 1</b>	Power+	External Power Supply positive pin
<b>Screw Number 2</b>	Power-	External Power Supply negative pin

## Technical Specifications

Power Supply	
<b>Voltage</b>	9-36 V DC
<b>Power Consumption</b>	Typical: 1 W; Maximum: 5 W.

Inputs / Outputs	
<b>Microcontroller I/O Pin Voltage</b>	Max supported voltage: 3.3 V

Environmental Conditions	
<b>Temperature</b>	-40 to +85 °C
<b>Humidity</b>	Max 80% (not condensing)
<b>Storage Temperature</b>	-40 to +85 °C
<b>Degree Protection</b>	< IP40

Connectors	
<b>Ethernet</b>	RJ45 Connector
<b>Programming</b>	USB-C Connector
<b>Micro SD</b>	Micro SD Slot

## Operating Frequency

Categories	Items	Specifications
<b>Certification</b>	RF Certification	FCC/CE-RED
	Green Certification	RoHS/REACH
<b>Test</b>	Reliability	HTOL/HTSL/uHAST/TCT/ESD
<b>Wi-Fi</b>	Protocols	802.11 b/g/n (802.11n up to 150 Mbps)
		A-MPDU and A-MSDU aggregation and 0.4 $\mu$ s guard interval support
	Frequency Range	2.4 ~ 2.5 GHz
<b>Bluetooth</b>	Protocols	Bluetooth v4.2 BR/EDR
	Radio	NZIF receiver with -97 dBm sensitivity
		NZIF receiver with -97 dBm sensitivity
		AFH

## Components, Guide and Pin Map

**Ethernet:** the board uses the LAN8710 as a physical layer transceiver, The Ethernet components can be reset through the NRST pin as an API in your application code.

**Power Supply:** The development board can be powered through the USB type-C connection, 9-36V Power Supply connector P1.

DC power supply has priority over the USB power supply, but the power circuit automatically detects and uses the available power source.

**Note:** The ZM1-DB uses the CP2102 chip for USB connection.

**CN1 Pin Headers:** The Zerynth zBUS consists of a 20x2 pin header.

PIN-Name	Description
<b>EVIN</b>	External power supply voltage (9-36V)
<b>RESET</b>	Reset pin, Active low.
<b>PWREN</b>	enable/disable the power in the zBUS
<b>5V</b>	Regulated 5V power supply
<b>INTE1</b>	Configurable interrupt for DB-ZM1 on-board port expander.
<b>3V3</b>	Regulated 3.3V power supply.
<b>INTE2</b>	Configurable interrupt for DB-ZM1 on-board port expander.
<b>PE1-16</b>	Digital I/O pins connected to ZM1 on-board Port Expander
<b>INTB</b>	Not Connected for DB-ZM1
<b>INTR</b>	Native Interrupt: user configurable
<b>SCL</b>	I2C Serial Clock
<b>SDA</b>	I2C Serial Data
<b>MISO</b>	SPI Master Input Slave Output
<b>MOSI</b>	SPI Master Output Slave Input
<b>SCK</b>	SPI Serial Clock
<b>TX1</b>	UART/USART 1 Transmit Data
<b>RX1</b>	UART/USART 1 Receive Data
<b>RTS1</b>	UART/USART 1 Request To Send
<b>CTS1</b>	UART/USART 1 Clear To Send
<b>TX2</b>	UART/USART 2 Transmit Data
<b>RX2</b>	UART/USART 2 Receive Data
<b>RTS2</b>	UART/USART 2 Request To Send
<b>CTS2</b>	UART/USART 2 Clear To Send

**LEDs:** The ZM1-development board offers :

- Power-on LED.
- zBUS Power-on: Power Supply of the connected expansion board.
- 3 RGB LEDs Configurable through application code.

**Push-Buttons:** The development board offers an *RST* BTN for resetting the MCU and *USER* *BTN* configurable through application code.

## Zerynth® PINOUT DIAGRAM

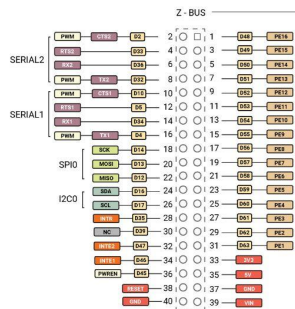
**NOTE:**  
PINS FROM D40 TO D63 ARE CONTROLLED BY  
ON-BOARD PORT EXPANDER

SERIAL2 CAN NOT BE USED IF D2 IS SET AS PWM

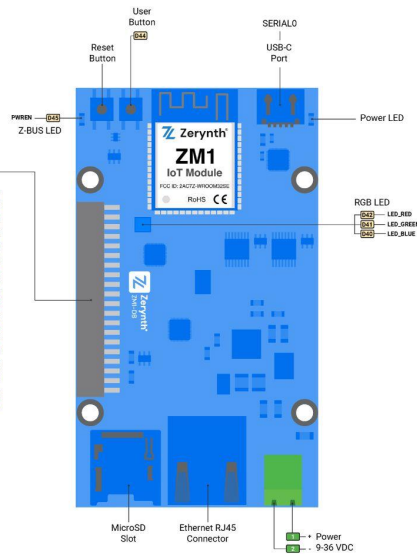
SERIAL2 CAN NOT BE USED IF D32 IS SET AS PWM

SERIAL1 CAN NOT BE USED IF D10 IS SET AS PWM

SERIAL1 CAN NOT BE USED IF D4 IS SET AS PWM



## ZM1-DB



## Getting Started

1. Follow the step-by-step guide for downloading and installing ZSDK  
<https://docsv3.zerynth.com/latest/gettingstarted/>
2. Please check the getting started guide for the ZM1-DB  
<https://docsv3.zerynth.com/latest/gettingstarted/ZM1-DB/>





## Software

Zerynth SDK provides software libraries for each board, alongside API documentation and examples. Please check the Hardware section for more information.

<https://docs.zerynth.com/latest/hardware/>

## Zerynth SDK

Zerynth platform is designed to simplify and accelerate the development of IoT applications. Zerynth offers tools for developers, system integrators, and businesses to enable IoT for their products, rapidly in a secure and connected way.

**Zerynth SDK** is the official development framework for Zerynth hardware. It includes a compiler, device drivers and libraries drivers. In addition to simple tutorials, example codes, and application examples.

Zerynth SDK and all the required libraries can be installed on Windows, Linux and Mac using the Zerynth Installer (<https://www.zerynth.com/zsdk>).

## Declaration of Conformity

IMPORTANT: KEEP THESE INFORMATION FOR FUTURE REFERENCE FOR FULL SET UP AND INSTALLATION INSTRUCTIONS PLEASE VISIT [docs.zerynth.com](https://docs.zerynth.com)

## Warnings

- All external power supplies used with Zerynth boards must comply with the relevant regulations and standards applicable in the country of use and must provide a voltage between 9 and 36 VDC.
- Hereby, ZERYNTH srl declares that the radio equipment type Zerynth Development boards are in compliance with Directive 2014/53/EU (RED). The full text of the EU declaration of conformity is available at the following internet address:  
<https://www.zerynth.com/download/20246/>
- The manufacturer cannot guarantee compliance with the RED directive if the end user uses custom circuits other than those supplied by Zerynth (used in conformity tests).
- All expansion boards that require CE marking have been tested and meet the essential requirements set by the Directives: 2014/30/EU (EMC), 2014/35/EU (LVD), 2011/65/EU (RoHS). The declaration of conformity (DoC) can be downloaded from the website <https://www.zerynth.com/download/20246/>
- All Zerynth boards have undergone compliance testing for conducted and radiated emissions meeting the requirements of the following standards: FCC Part 15 B and IC ICES-003.
- Any device or component connected to one of the expansion connectors must comply with the electrical characteristics defined in the specifications described in the complete manual to ensure that the performance and safety requirements are met.
- Each cable used to connect other devices or components to the Zerynth boards must be less than 300 cm long and must offer adequate insulation and operation so that the appropriate performance and safety requirements are met.

## Instructions for safe use

- Do not expose this product to water or moisture and do not place it on a conductive surface while it is operating.
- Do not expose this product to excessive heat sources which could cause it to operate outside the permitted temperature range defined in the specifications (-40, +85 ° C).
- Be careful when handling the product to avoid mechanical or electrical damage to the printed circuit board and connectors.
- If a board looks damaged, do not use it.
- Do not touch the printed circuit board when it is powered and never operate on live electrical parts.
- The printed circuit board must not come into contact with conductive objects when it is powered.
- Discharge static electricity from your body and touch only the edges of the board to minimize the risk of damage from electrostatic discharge.



### **EN - Waste Electrical and Electronic Equipment (WEEE) Symbol**

The use of the WEEE symbol indicates that this product/board may not be treated as household waste. By ensuring this product/board is disposed of correctly, you will help protect the environment. For more detailed information about recycling of this product/board, please contact your local authority, your household waste disposal service provider or the shop where you purchased it.

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