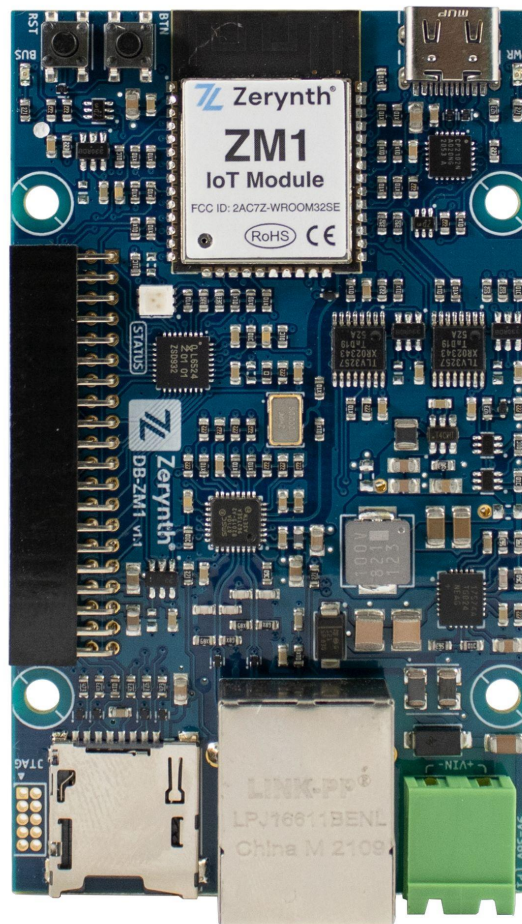


# ZM1-Development Board

## 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 industrial 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 upto 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.

## General Characteristics

- ZM1 Module
  - 32-bit dual Core MCU based on the ESP32-WROOM-32SE.
  - Clock frequency upto 240 Mhz.
  - Embedded 16 MB SPI Flash memory
  - Integrates the ATECC608A crypto element allowing ultra-secure communication.
  - WiFi (Client and AP mode supported) and Bluetooth® Low-Energy Support
- 9 to 36V input Power Supply.
- MicroSD card slot.
- Ethernet support.
- Reset button and user configurable button.
- JTAG support.
- 3 RGB status LEDs.
- USB-C (power and programming).
- Python / C enabled development with Zerynth OS.

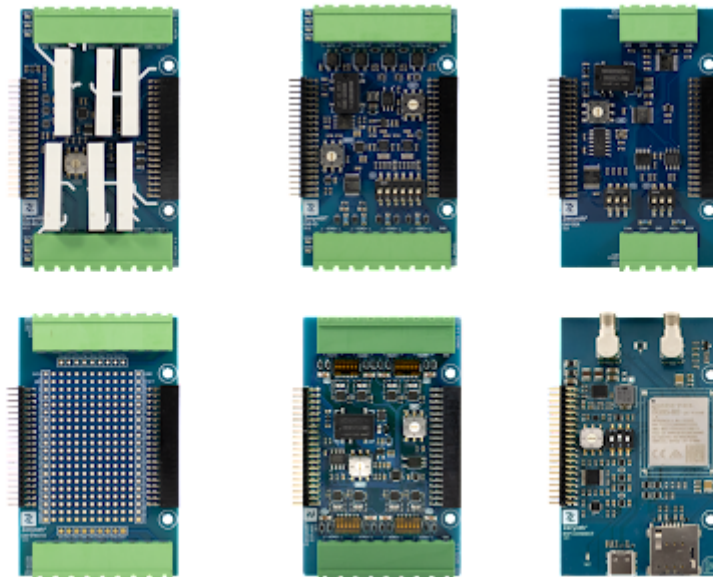
## Modular Expansion System

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.



**Note: The ZM1-DB supports up to 3 attached expansion boards.**

## Screw Description

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

## Technical Specifications

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

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

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

Connectors	
Ethernet	RJ45 Connector
Programming	USB-C Connector
Micro SD	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

**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.

# Pin Map

## Zerynth® PINOUT DIAGRAM

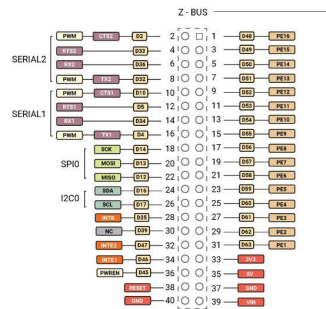
**NOTE:**  
PINS FROM D40 TO D63 ARE CONTROLLED BY  
ON-BOARD PORT EXPANDER

SERIAL2 CAN NOT BE USED IF D2 IS SET AS PWM

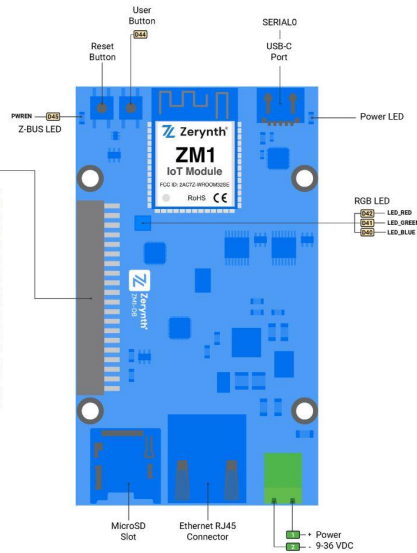
SERIAL2 CAN NOT BE USED IF D32 IS SET AS PWM

SERIAL1 CAN NOT BE USED IF D10 IS SET AS PWM

SERIAL1 CAN NOT BE USED IF D4 IS SET AS PWM



## ZM1-DB



**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.

## Pin-Description

Pin-Name	Direction	Function	Connected to
<b>D0</b>	IN	BOOT	Bootstrap pin on ZM1 and the EMAC_CLK
<b>D1</b>	OUT	TX0 (SERIAL0)	USB Serial port
<b>D2</b>	IN	Clear To Send SERIAL2 (CTS2)	Serial2 Instance
<b>D3</b>	IN	RX0 (SERIAL0)	USB Serial port
<b>D4</b>	OUT	TX1 (SERIAL1)	Serial1 Instance.
<b>D5</b>	OUT	Ready To Send SERIAL1 (RTS1)	Serial1 Instance.
<b>D10</b>	IN	Clear To Send SERIAL1 (CTS1)	Serial1 Instance.
<b>D12</b>	IN	MISO0 (SPI0)	SPI0 High Speed
<b>D13</b>	OUT	MOSI0 (SPI0)	SPI0 High Speed
<b>D14</b>	OUT	SCK0 (SPI0)	SPI0 High Speed
<b>D15</b>	OUT	CS0	CS for MicroSD card
<b>D16</b>	IN/OUT	SDA0 (I2C0)	I2C0 instance
<b>D17</b>	OUT	SCL0 (i2C0)	I2C0 instance
<b>D18</b>	IN/OUT	EMAC MDIO	EMAC MDIO of the LAN8710
<b>D19</b>	OUT	EMAC TXD0	EMAC TXD0 of the LAN8710
<b>D21</b>	OUT	EMAC TXEN	EMAC TXEN of the LAN8710
<b>D22</b>	OUT	EMAC TXD1	EMAC TXD1 of the LAN8710
<b>D23</b>	OUT	EMAC MDC	EMAC MDC of the LAN8710
<b>D25</b>	IN	EMAC RXD0	EMAC RXD0 of the LAN8710
<b>D26</b>	IN	EMAC RXD1	EMAC RXD1 of the LAN8710
<b>D27</b>	OUT	EMAC CSRDV	EMAC CSRDV of the LAN8710



<b>D32</b>	OUT	TX2	SERIAL2 Instance.
<b>D33</b>	OUT	Ready To Send SERIAL2 (RTS2)	SERIAL2 Instance.
<b>D34</b>	IN	RX1 (SERIAL1)	SERIAL1 instance.
<b>D35</b>	IN	INTR	Interrupt pin Exposed on the zBUS ( dedicated native interrupt for Expansion boards)
<b>D36</b>	IN	RX2 (SERIAL2)	SERIAL2 Instance.
<b>D39</b>	IN	INT	Interrupt pin on the port expander NXP PCAL6524

**NOTE:** PCAL6524 primary Port Expander interrupt pin connected to **ZM1** pin D39 driven with I2C at address 0x22.

**NOTE:** Crypto Element Microchip ATECC608A driven in I2C at the address 0x35 with our libraries with 7 bit address or 0xC0 with the 8bit one

## zBUS Pin Description

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

## 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.