IRIV EdgeAI CM5

IR4.0 CM5 Edge AI Controller

Datasheet

Rev 1.0
July 2025

Contents

1. Features

Features	Description
Compute Module	Raspberry Pi CM5
CPU	Broadcom BCM2712 quad-core 64-bit Cortex-A76 (ARM v8) SoC @ 2.4GHz
RAM	2GB/4GB/8GB/16GB LPDDR4-4267
Storage	16GB/32GB/64GB eMMC, expandable via M.2 NVMe SSD
Wireless	2.4GHz / 5.0GHz IEEE 802.11 b/g/n/ac WiFi, Bluetooth 5.0, BLE
Interfaces	1x Full-size HDMI 2.0 (up to 4K@60Hz)
	2x USB 3.0 port
	1x USB-C (for boot and debug)
	2x MIPI port for CSI camera
	2x RJ45 Gigabit Ethernet (10/100/1000M)
	2x Isolated bidirectional digital input (up to 50V)
	2x Isolated bidirectional digital output (up to 50V)
	2x LED lighting driver (Output voltage follows Vin)
	1x Isolated RS485
	1x M.2 Key-M socket for NVMe SSD
	1x PCIe port for Raspberry Pi AI HAT+
	1x mPCIe socket for 4G/LoRa modules (Only USB2.0 is connected to this port. PCIe signal is not available).
Power Supply	DC 10-30V surge-protected
Additional Features	ATECC608B Secure Authentication
	SSD1315 0.96” OLED Display
	1x Power button & 1x Programmable button
	1x Active buzzer & 2x Programmable LED
Enclosure	Metal enclosure, fanless design, DIN rail mountable
Dimension	139mm x 88mm x 38mm (metal enclosure only, excl. antenna, DIN socket & connectors)

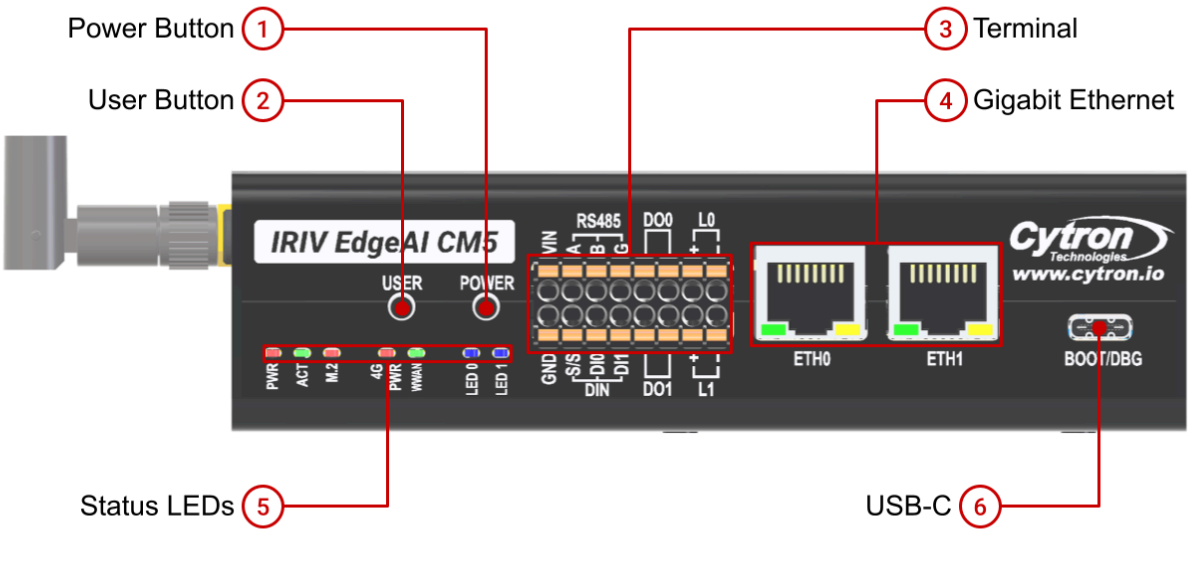
2. Specifications

No.	Parameters		Min	Max	Unit
1	Power Input Voltage (Vin)	Terminal (Surge Protected up to 60V 20ms)	10	30	VDC
		USB-C	4.9	5.2	VDC
2	Power Consumption ** When running stress test command "stress-ng --cpu 4 --cpu-method fft"* ** USB load not included.*		-	11	W
3	Isolated Digital Input	Low Level (V_{IL})	0	0.8	V
		High Level (V_{IH})	3	50	V
		Isolation Voltage	3750		Vrms
4	Isolated Digital Output (Dry Contact)	Voltage	-	50	V
		Current	-	500	mA
		Isolation Voltage	1500		Vrms
5	LED Lighting Driver (Wet Contact)	Output Voltage	Vin		
		Current	-	2	A
		PWM Capable	Yes		
6	Isolated RS485	Maximum Baud Rate	500		kbps
		Isolation Voltage	5000		Vrms
		Onboard Termination Resistor	120		Ω
7	Operating Temperature		-20	60	℃

3. Layout

3.1 External Layout

FRONT



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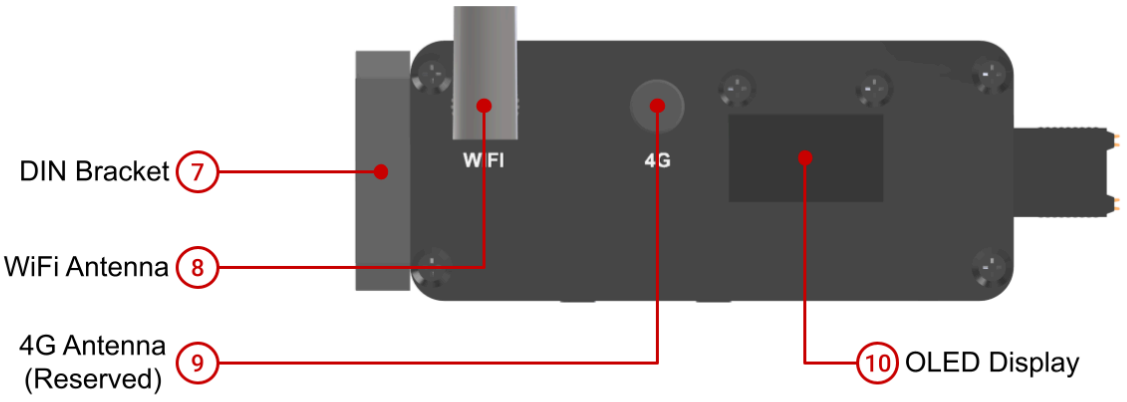

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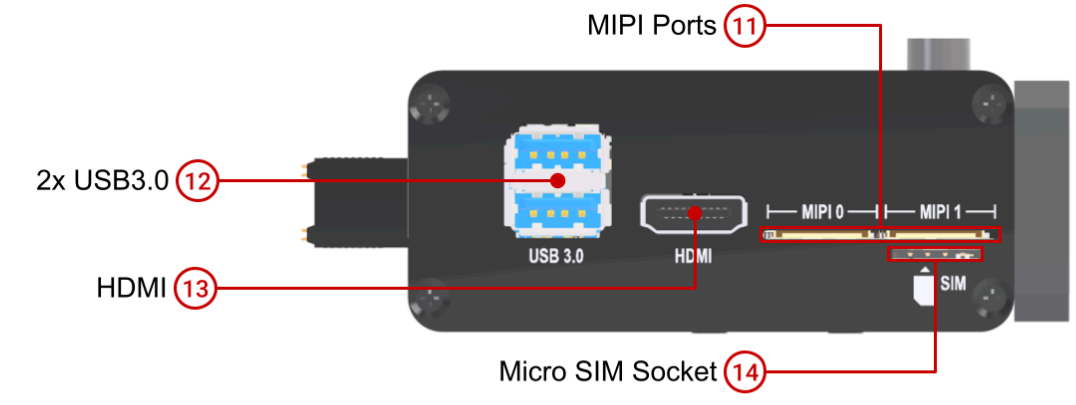
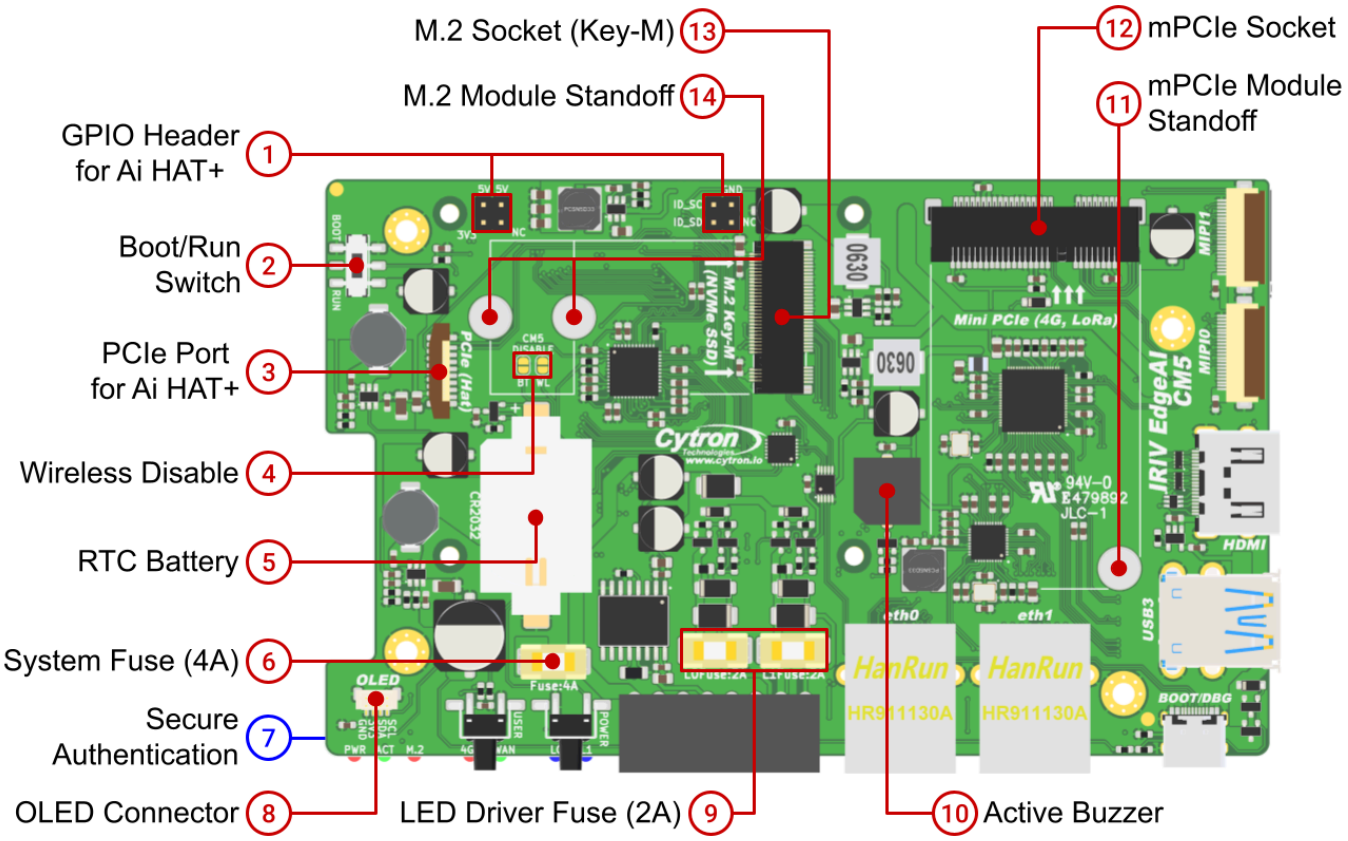
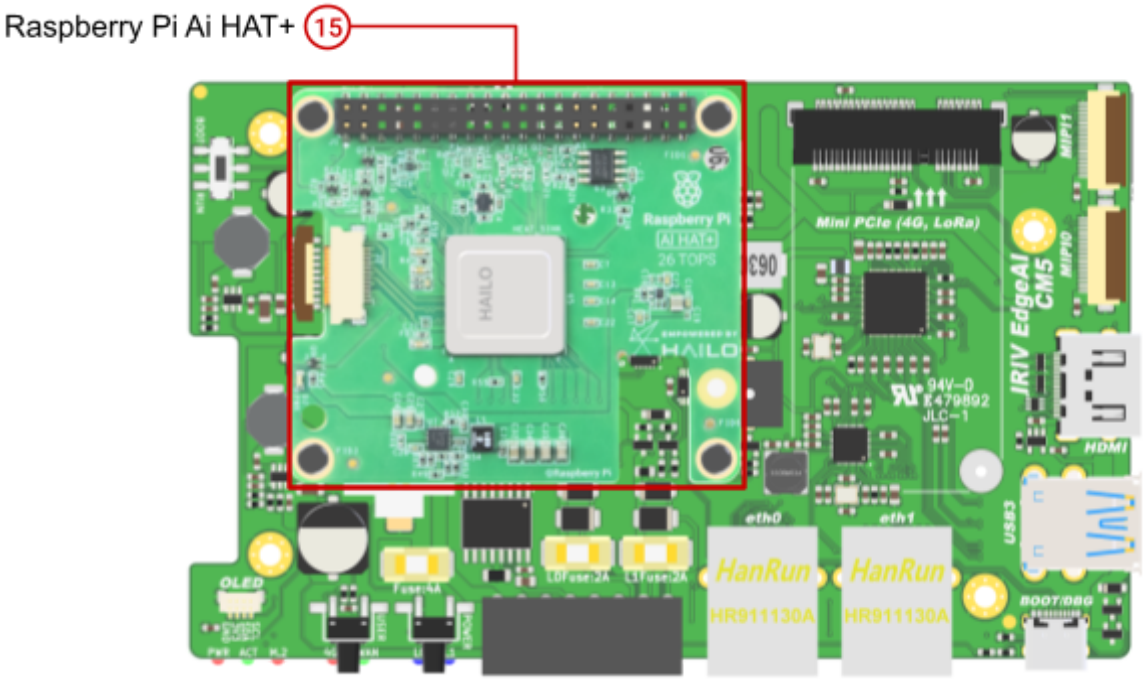


No.	Function	Description
1	**Power Button**	Single press to turn on the IRIV EdgeAI CM5. Double-press to soft shutdown. Long-press to force shutdown.
2	**User Button**	User programmable button. Connected to **GPIO4**.
3	**Terminal**	Pluggable terminal for RS485, Digital Input/Output, and LED Driver Output. See here for more details.
4	**Gigabit Ethernet**	2x Gigabit Ethernet Ports: eth0 - The default 10/100/1000M Gigabit Ethernet of CM5. eth1 - From the USB 3.0 to Gigabit Ethernet Controller.
5	**LEDs**	**PWR** - CM5 power. Same as the red LED on Pi 5. **ACT** - CM5 activity. Same as the green LED on Pi 5. **M.2** - NVMe SSD activity. **4G PWR** - Power indicator for the 4G module. **WWAN** - Indicator for the 4G WWAN activity. **LED0** - User-programmable LED 0. Controlled by **GPIO20**. **LED1** - User programmable LED 1. Controlled by **GPIO21**.
6	**USB-C**	This port is dual-function and selectable via the onboard boot/run switch. **Boot** - Used to load the OS image into the EMMC of CM5. **Run** - Connected to the UART0 of the CM5 via a USB-UART chip. Can be used to show the console of the CM5. This port can also be used to power up the IRIV EdgeiAI CM5 with a PD capable power supply, which can support up to 5V 5A.
7	**DIN Bracket**	For mounting on DIN rail. Can be repositioned to the bottom of the IRIV EdgeAI CM5 as well.
8	**WiFi Antenna**	Antenna for CM5 WiFi and Bluetooth.
9	**4G Antenna (Reserved)**	Reserved mounting hole for 4G antenna.
10	**OLED Display**	SSD1315 0.96” OLED display (I2C Slave Address = 0x3C).
11	**MIPI Ports**	2x 22-way MIPI ports for CSI Camera.
12	**USB 3.0 Ports**	2x USB 3.0 host. Both ports share an USB 3.0 Hub.
13	**HDMI**	Full-size Type-A HDMI for external display. Up to 4K resolutions.
14	**Micro SIM Socket**	Insert SIM card for the 4G module.

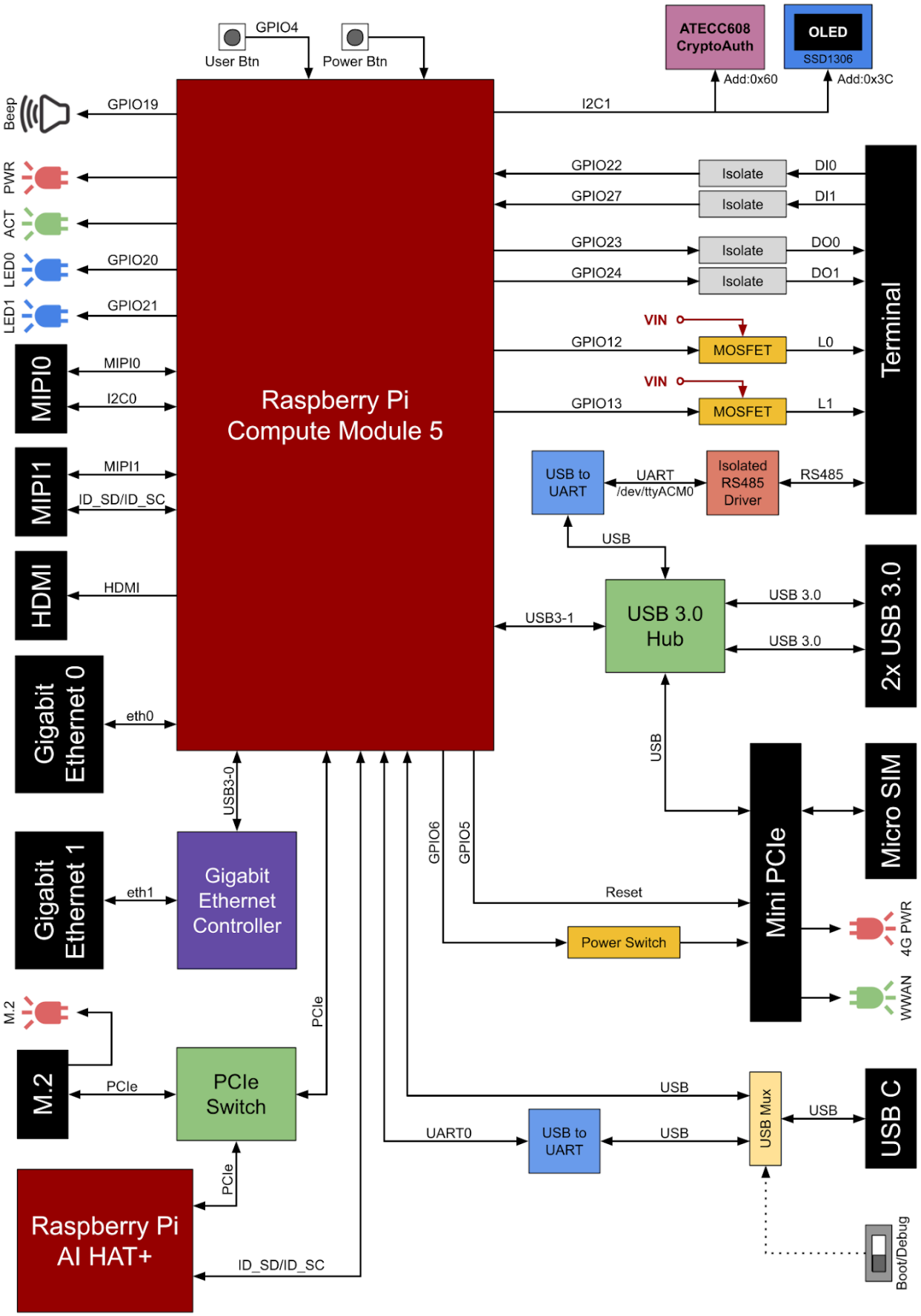
3.2 Internal Board Layout





No.	Function	Description
1	**GPIO Header for Ai HAT+**	Connect to the 40-pin GPIO header on the Ai HAT+. Only a few important pins are connected: **5V** - 5V power supply to the Ai HAT+. **3V3** - 3.3V power supply to the Ai HAT+. **GND** - Ground. **ID_SC** - I2C clock for the HAT+ EEPROM. **ID_SD** - I2C data for the HAT+ EEPROM. ** HAT+ EEPROM is for auto identification of the HAT+ by Raspberry Pi.*
2	**Boot/Run Switch**	**Boot** - CM5 will enter boot mode for OS programming via USB-C. **Run** - CM5 runs normally and the USB-C can be used for debugging. It's connected to CM5 UART0 via USB-UART converter.
3	**PCIe Port for Ai HAT+**	PCIe port to connect to the Raspberry Pi Ai HAT+. Similar to the PCIe port on Raspberry Pi 5.
4	**Wireless Disable**	Solder the jumper together to disable WiFi (WL) or Bluetooth (BT).
5	**RTC Battery**	Insert a CR2032 coin cell to keep the CM5 RTC running when the system is powered off.
6	**System Fuse (4A)**	4 Amp replaceable fuse for the system (LED drivers are not included). ** LED drivers have an independent fuse for protection.*
7	**Secure Authentication**	ATECC608B Secure Authentication (Bottom Layer). I2C Slave Address = 0x60.
8	**OLED Connector**	Connect to the SSD1315 0.96" OLED display here.
9	**LED Driver Fuse (2A)**	Fuse for the LED driver outputs.
10	**Active Buzzer**	User-programmable active piezo buzzer. Controlled by **GPIO19** (active high).
11	**mPCIe Module Standoff**	M2 standoff for mounting the mini PCIe module.
12	**mPCIe Socket**	Mini PCIe Socket for 4G or LoRa module. Only USB 2.0 is connected and there is no PCIe connection. Reset pin (active low) is connected to **GPIO5** while power to the mPCIe socket can be turned on/off via **GPIO6**.
13	**M.2 Socket (Key-M)**	M.2 Key-M Socket for PCIe module (Gen 2* 1-lane PCIe). Support NVME SSD size 2230 & 2242 (Bootable). ** M.2 SATA SSD is not supported.*
14	**M.2 Module Standoff**	M2 standoff for mounting the 2230 or 2242 M.2 PCIe module.
15	**Raspberry Pi Ai HAT+**	The AI Accelerator from Raspberry Pi.

4. Block Diagram



5. Interfaces and Functions

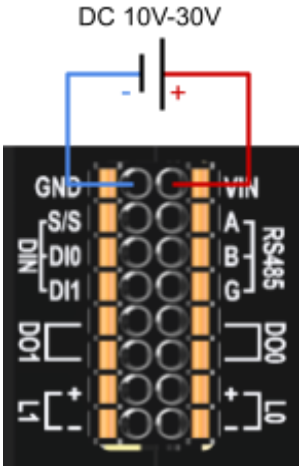
5.1 Pin & Interface Mapping

Functions		Raspberry Pi CM5
RS485		/dev/ttyACM0
Digital Input	DI0	GPIO22
	DI1	GPIO27
Digital Output	DO0	GPIO23
	DO1	GPIO24
LED Lighting Driver	L0	GPIO12
	L1	GPIO13
User Button		GPIO4
User LED	LED0	GPIO20
	LED1	GPIO21
Active Buzzer		GPIO19
mPCIe	Reset (Active Low)	GPIO5
	Power	GPIO6
USB-C Debug		UART0
SSD1315 0.96” OLED		I2C1 (Add: 0x3C)
ATECC608 Secure Authentication		I2C1 (Add: 0x60)

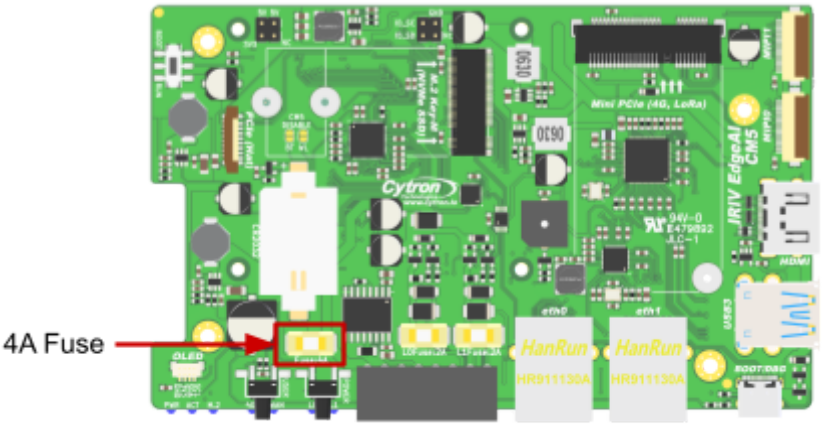
5.2 Terminal

5.2.1 Power Supply Input

The power supply input is compatible with DC voltage from 10V to 30V. Diagram below shows the connection to the power supply. No earth connection is required for this device.

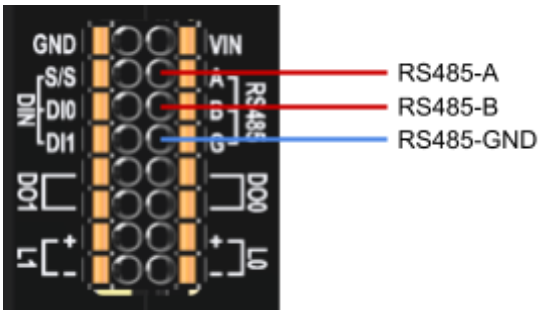


The power supply input is fuse-protected. The fuse might break in the event of a surge or overcurrent. If the device is unable to power up, check the 4 Amp fuse and replace it if needed.



5.2.2 Isolated RS485

The RS485 interface is isolated from the system and other interfaces.
It has a maximum baud rate of 500kbps, automatic direction control and it's mapped to /dev/ttyACM0 in the Raspberry Pi.

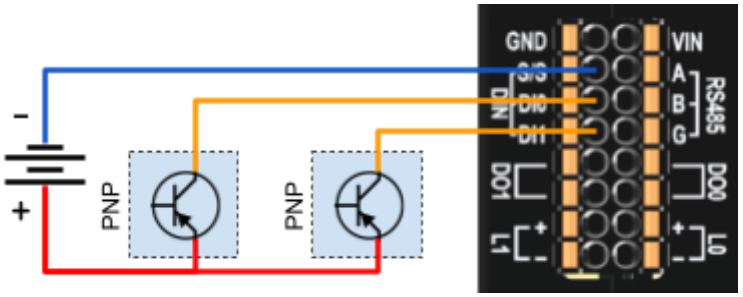


RS485 can work by only connecting the A-B signal. However, we do also recommend connecting the GND too for better noise immunity.

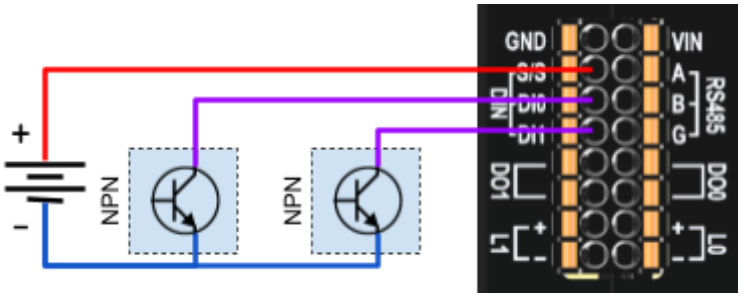
There's also an **onboard 120 ohm termination resistor** and not required to connect it externally.

5.2.3 Isolated Bidirectional Digital Input

There are 2 isolated digital inputs sharing a common S/S (Sink/Source) pin. The inputs are bidirectional and provide the flexibility to connect to either the PNP or NPN sensors up to 50V.



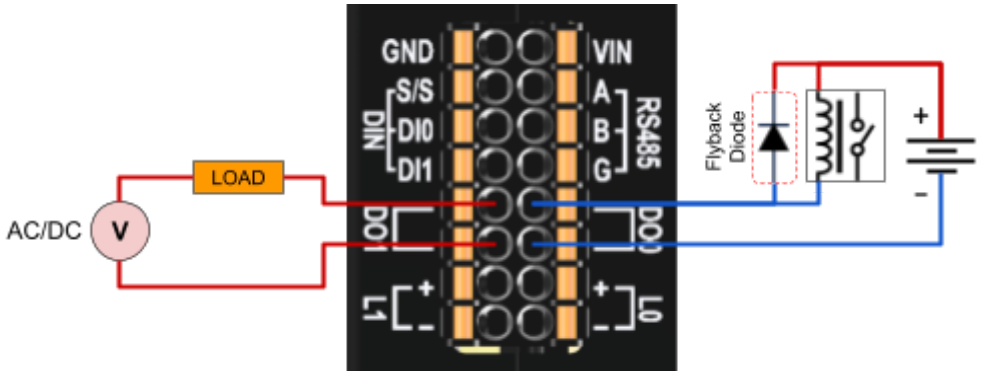
PNP Connection



NPN Connection

5.2.4 Isolated Bidirectional Digital Output

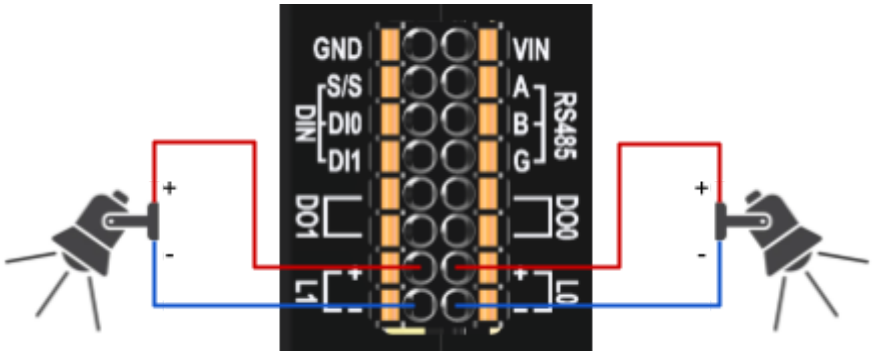
There are two digital outputs which are isolated from the system as well as among the different output channels. They are dry contact outputs driven by the solid state relays and able to handle DC or AC load up to 50V 500mA.



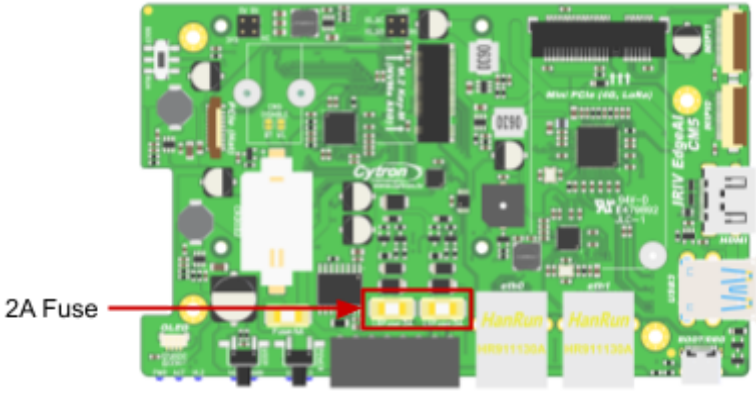
** For inductive load such as relay, it's recommended to connect a **flyback diode** in parallel with the load. This helps to reduce the EMI from switching the inductive load; even though it's still safe to operate without the diode as the outputs have built-in surge protection.*

5.2.5 LED Lighting Driver

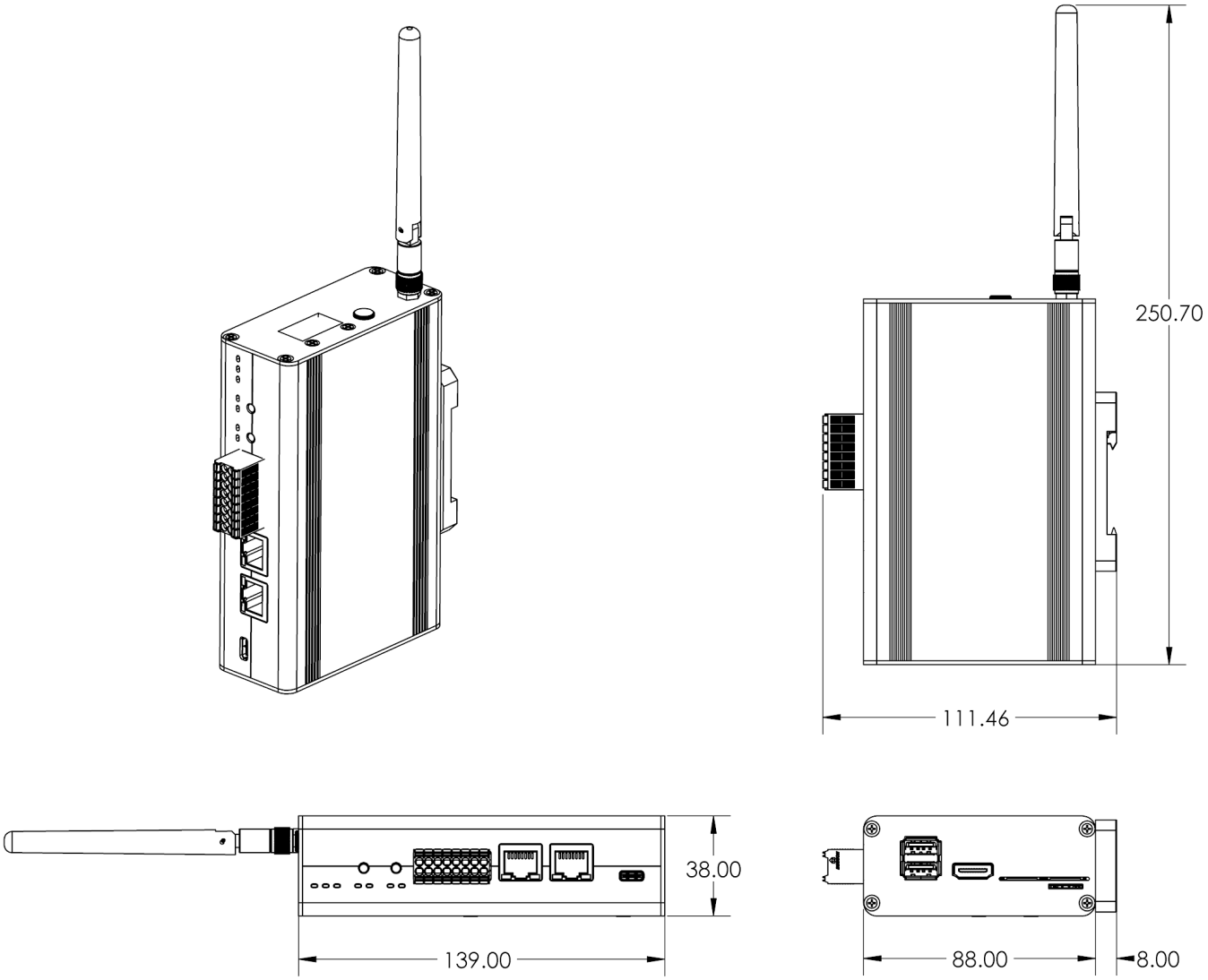
There are two channels of LED lighting drivers designed to drive LED lighting up to 2A per channel. These outputs are PWM capable and can be used for brightness control. They are wet contact outputs and the voltage will be the same as the Vin.



Each channel is protected by an independent 2A fusel.



6. Dimension



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