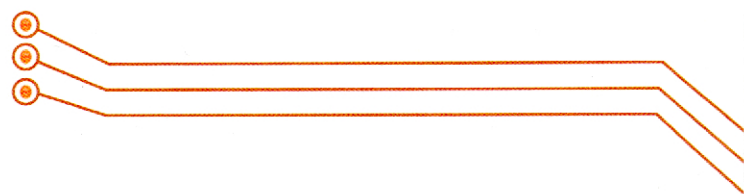


**ENCIRIS**  
TECHNOLOGIES

# CH-007 Carrier Board Hardware Reference Manual

Version 1.0.0, 17-04-2026



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# Chapter 1. Purpose

This document provides the complete hardware reference for the **CH-007 carrier board** designed by Enciris Technologies. It is intended for mechanical engineers, electrical engineers, and system integrators who need to design enclosures, mounting solutions, integrate expansion cards, or wire peripherals to the board.

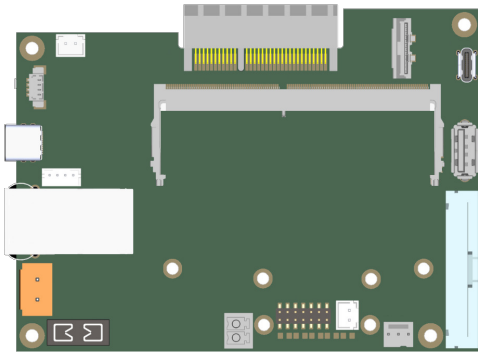
The information covers the board overview, mechanical specifications, connector positions and pinouts, power supply, and debug interfaces.



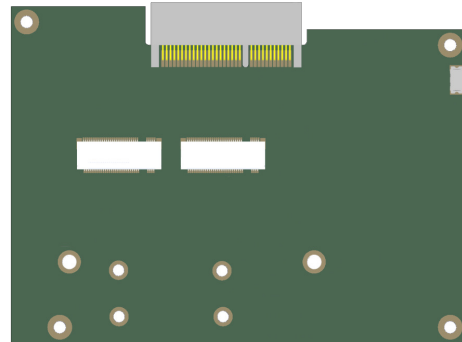
For BSP configuration, flashing workflows, and software customization, refer to the *CH-007 Platform Integration Guide*.

# Chapter 2. Overview

The **CH-007** is a compact, industrial-grade carrier board designed to host NVIDIA Jetson Orin NX and Orin Nano modules in demanding embedded applications.



*Figure 1. Board top view*



*Figure 2. Board bottom view*

Key features include:

- 2x USB 3.2 Type-C (including 1 OTG / Recovery)
- 1x USB 3.2 Type-A host port
- Gigabit Ethernet with optional PoE
- 2x M.2 Key-M NVMe slots (PCIe)
- 1x PCIe x4 expansion slot
- 38-pin GPIO / UART / SPI / I<sup>2</sup>C / Audio header
- HDMI output (via optional FFC card)
- 12-19 V DC input with reverse-polarity and overvoltage protection
- PWM and fixed-speed fan headers
- Industrial temperature range: 5°C-60°C

Typical use cases include:

- Computer vision and embedded image processing
- AI/ML inference at the edge
- Robotic and autonomous systems
- Industrial IoT gateways

# Chapter 3. Mechanical Specifications

## 3.1. Board Dimensions

Parameter	Value
Dimensions (L x W)	118 mm x 87 mm
PCB thickness	1.6 mm
Top highest point	15 mm (USB-A connector J7)
Bottom highest point	5.5 mm (M.2 connectors J17/J18)
PCB stackup	8-layer
Compliance	RoHS compliant
Operating temperature	5°C-60°C

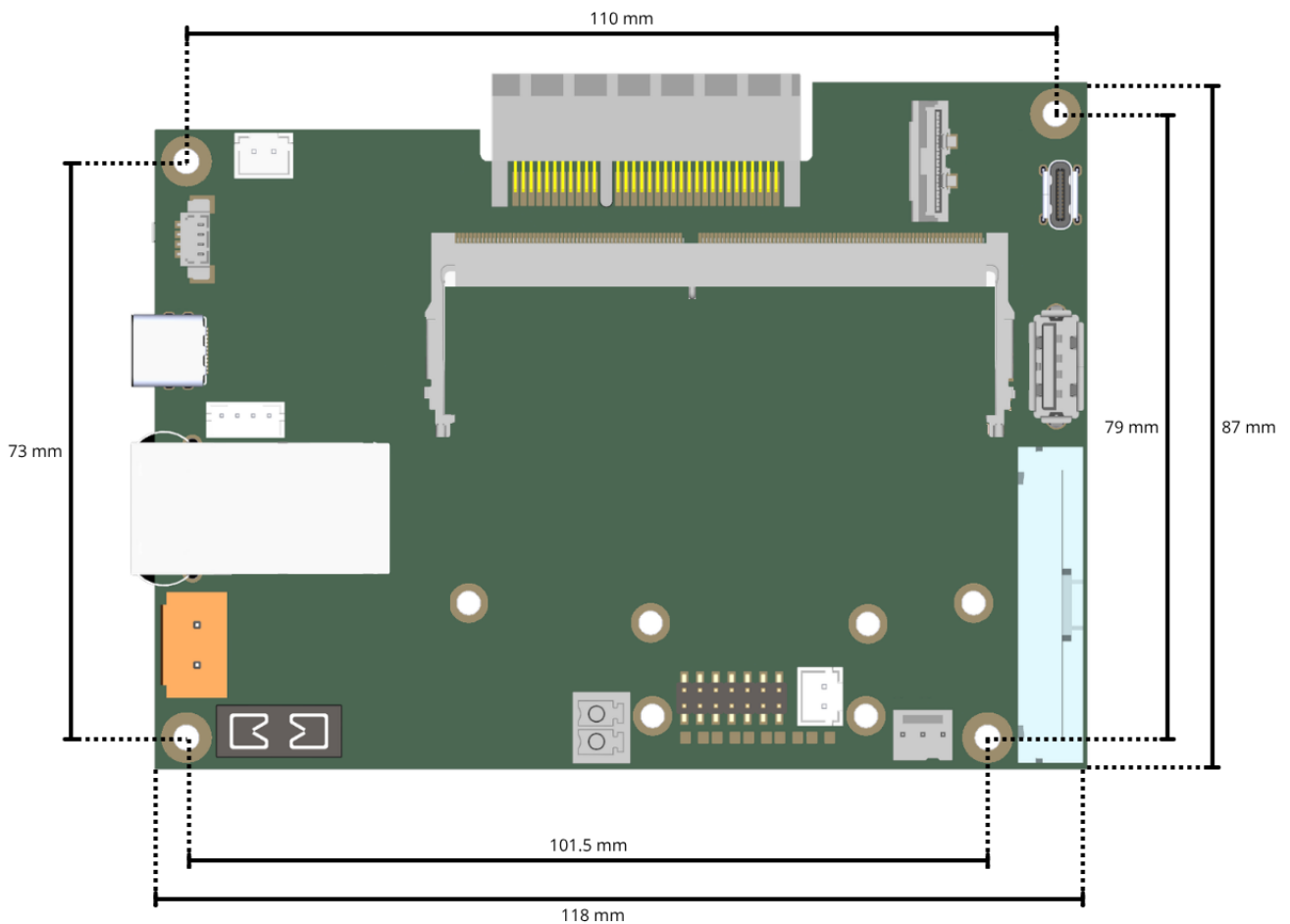


Figure 3. Board mechanical outline

## 3.2. Mounting Holes

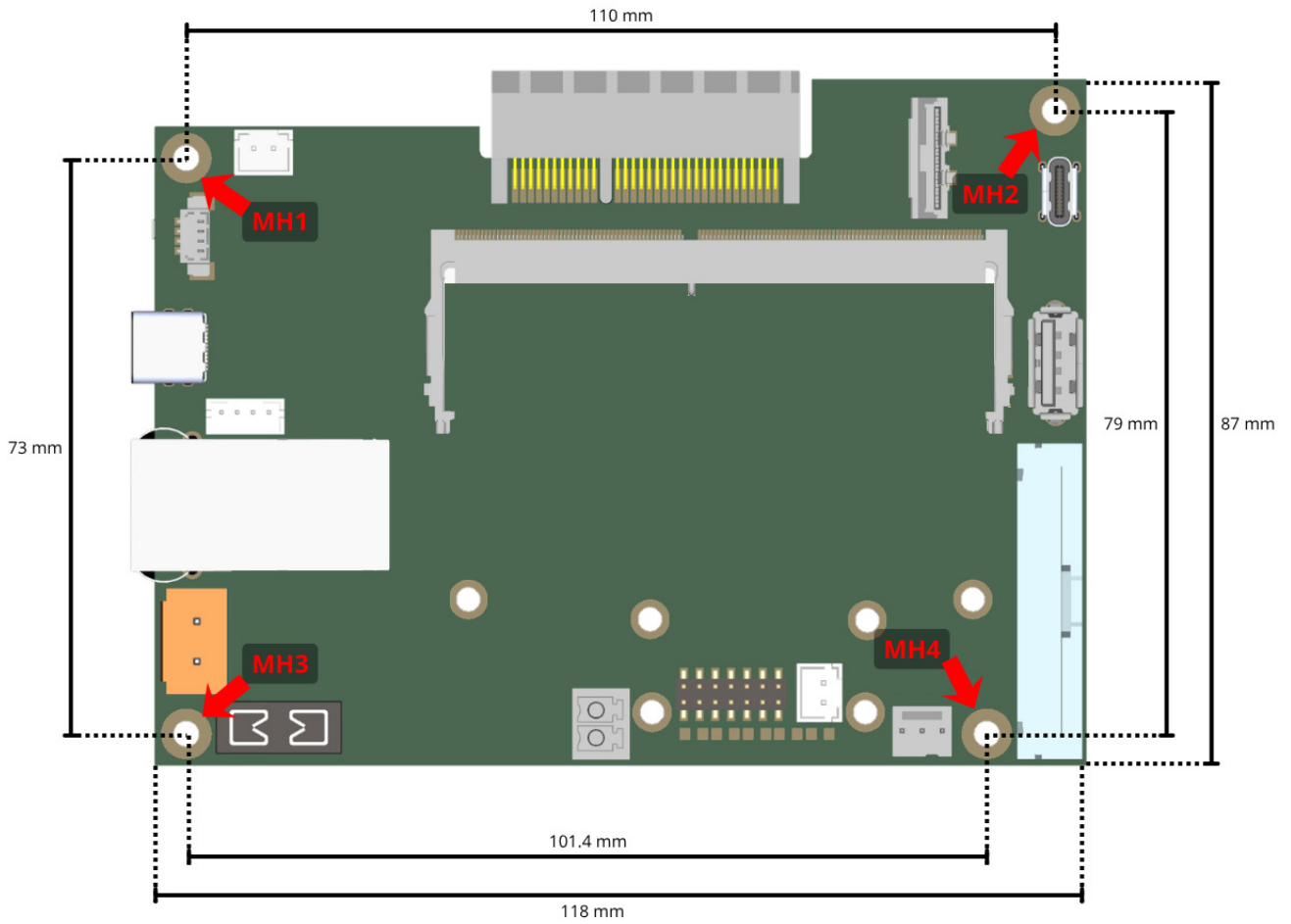


Figure 4. Board mechanical outline with mounting holes

Coordinates are measured from the **bottom-left corner** of the board (X rightward, Y upward).

Ref	X (mm)	Y (mm)	Drill diameter
MH1	4.00	77.00	3.20 mm
MH2	114.00	83.00	3.20 mm
MH3	4.00	4.00	3.20 mm
MH4	105.40	4.00	3.20 mm

# Chapter 4. Power

<b>Parameter</b>	<b>Value</b>
Input voltage range	12 V - 19 V DC
Input connector	5.08 mm screw terminal block
Maximum power consumption	Up to 63 W (varies by module and workload)
Reverse polarity protection	Yes
Overvoltage protection	Yes

# Chapter 5. Interfaces & Connectors

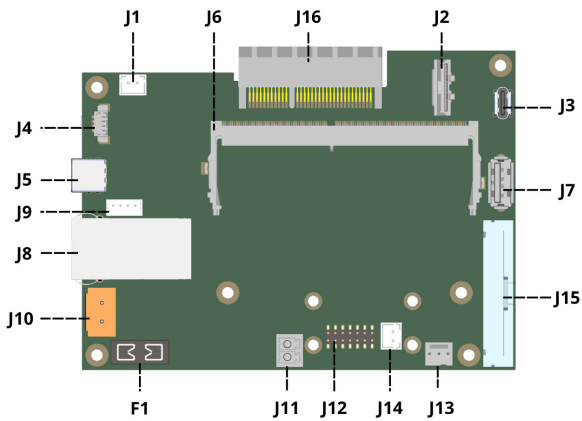


Figure 5. Board top connectors

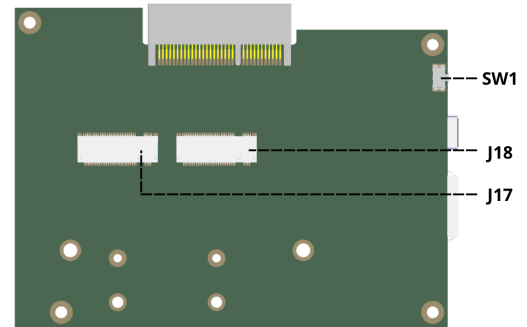


Figure 6. Board bottom connectors

Ref	Interface	Description	Mechanical
F1	Fuse holder	Self-resetting fuse for power input protection	Littelfuse Mini 297 or 997 series / Bussmann ATM or equivalents
J1	RTC battery	Battery header for RTC backup (CR2032 or equivalent)	Vertical header, 2-pin, 2.5 mm pitch
J2	HDMI FFC connector	Optional HDMI card required for display output	FFC connector, 24-pin, 0.5 mm pitch
J3	USB 3.2 Gen 2 Type-C	USB-C host port	Standard vertical USB-C receptacle
J4	Fan header	4-pin fan header with PWM control	Vertical header, 4-pin, 1.25 mm pitch
J5	USB 3.2 Gen 2 Type-C	USB-C OTG / Recovery port (see <a href="#">OTG / Recovery Port</a> )	Standard horizontal USB-C receptacle
J6	SO-DIMM 260	Connector for Jetson Orin NX / Nano module	SO-DIMM 260
J7	USB 3.2 Gen 1 Type-A	1x USB-A host port	Standard vertical USB-A receptacle
J8	Gigabit Ethernet	RJ-45 with PoE support (optional PoE card required)	Standard RJ45 with integrated magnetics
J9	PoE connector	4-pin for Power over Ethernet input (optional PoE card required)	Vertical header, 4-pin, 2 mm pitch
J10	Power input	12-19 V DC via 5.08 mm terminal block	Vertical header, 2-pin, 5.08 mm pitch
J11	5 V output	Header providing +5 V for external peripherals	Vertical header, 2-pin, 3.5 mm pitch

Ref	Interface	Description	Mechanical
J12	Configuration header	2x7-pin header for board configuration via jumpers (see <a href="#">Configuration Header</a> )	Vertical header, 2x7-pin, 2 mm pitch
J13	Fan header	3-pin fan header for fixed-speed fans	Vertical header, 3-pin, 2.54 mm pitch
J14	Power button	Header for power button input	Vertical header, 2-pin, 2.5 mm pitch
J15	GPIO / UART / SPI / I2C / Audio	38-pin header — see <a href="#">GPIO Header</a> for full pinout	Vertical header, 2x19-pin, 2 mm pitch, 2 mm row spacing
J16	PCIe expansion	PCIe x4 slot for expansion cards	Standard 4-lane PCIe x4 edge connector (mechanical x4) — connector start at 42.30 mm from the left board edge
J17, J18	NVMe M.2 storage	2x M.2 Key-M slots (J17 x2, or two x1)	M.2 Key-M slots (2280 size supported)
SW1	Recovery button	Force USB Recovery Mode (RCM)	Tactile switch, 2.5 mm x 1.1 mm, 1.05 mm height

# Chapter 6. Connector Pinouts

## 6.1. Fan Headers

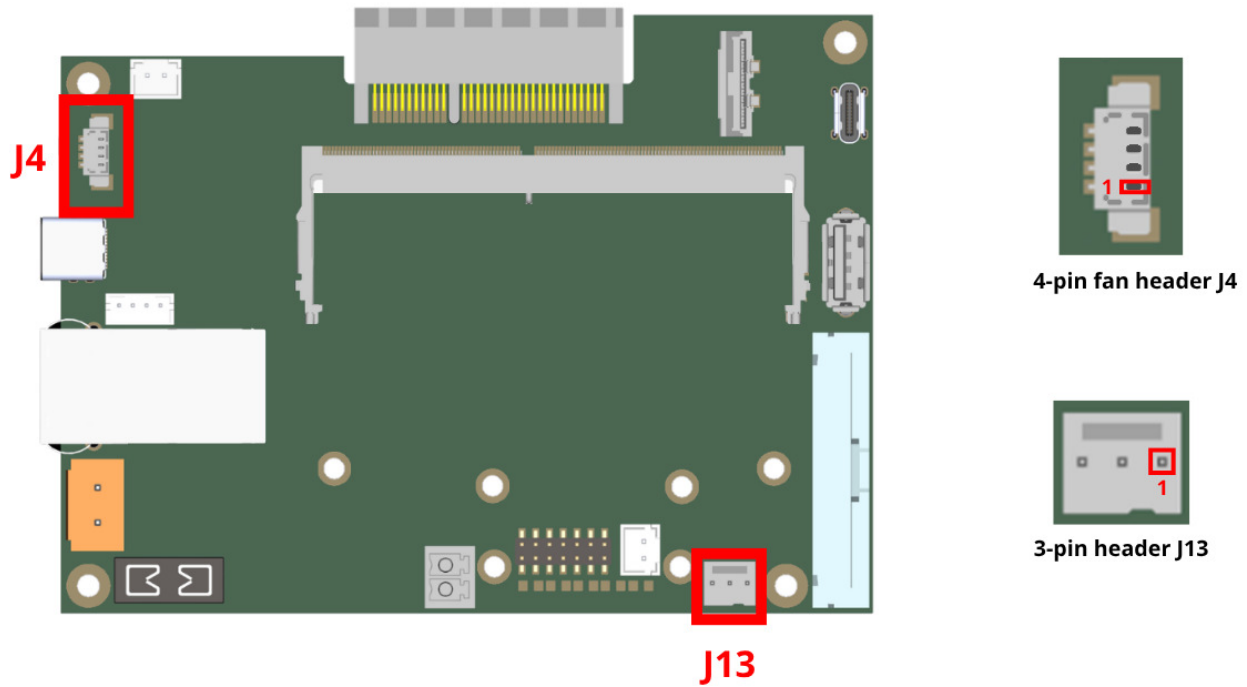


Figure 7. Fan headers location on the board and pin 1 identification

Header	Pin	Signal	Description
J4 — 4-pin PWM	1	GND	Ground
	2	+5 V	+5 V supply
	3	TACH	Tachometer signal — fan speed feedback
	4	PWM	PWM speed control input
J13 — 3-pin fixed speed	1	GND	Ground
	2	+5 V	+5 V supply
	3	—	Not connected

## 6.2. GPIO Header

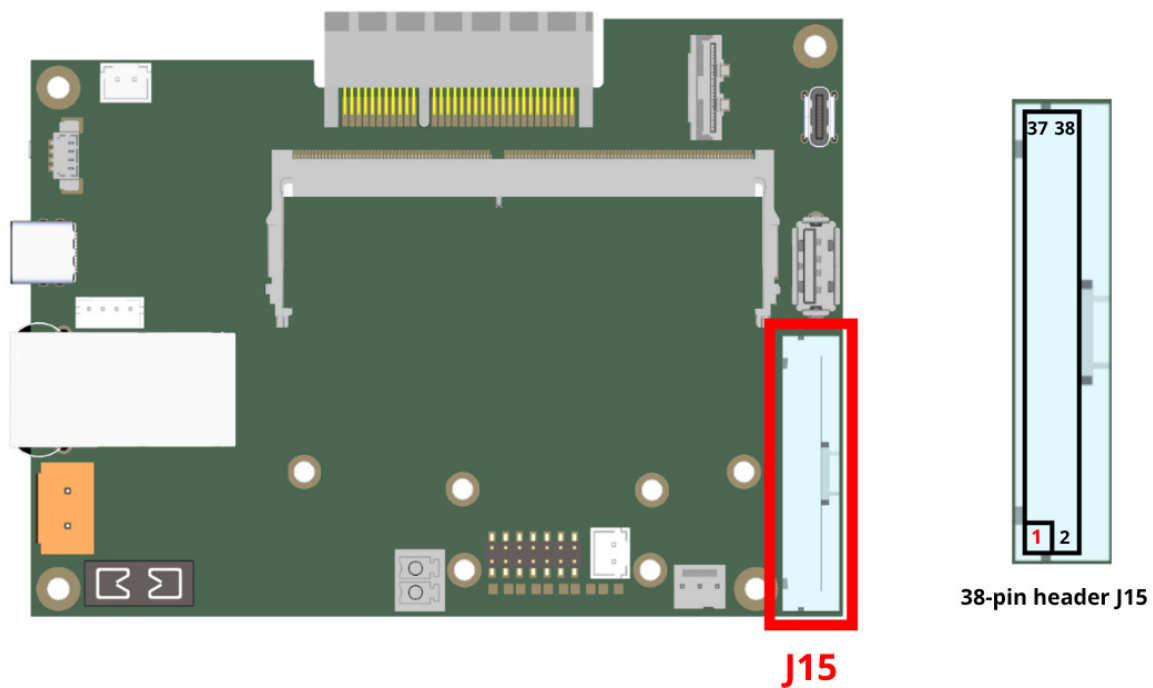


Figure 8. 38-pin GPIO header pinout (J15)

Pin	Name	Description
1	SCL33	I <sup>2</sup> C bus — clock
2	+5 V	5 V power output
3	INT33_N	Interrupt input (active low)
4	SDA33	I <sup>2</sup> C bus — data
5	+3.3 V	3.3 V power output
6	GND	Ground
7	CAM_SCL	Camera I <sup>2</sup> C — clock
8	CAM_SDA	Camera I <sup>2</sup> C — data
9	AUD_SCL	Audio control I <sup>2</sup> C — clock
10	AUD_SDA	Audio control I <sup>2</sup> C — data
11	AUD_33_INT	Audio interrupt
12	GPIO13_33	General-purpose I/O
13	GPIO12_33	General-purpose I/O
14	AUD_33_MCLK	Audio I <sup>2</sup> S — master clock
15	AUD_33_BCLK	Audio I <sup>2</sup> S — bit clock
16	AUD_33_LR	Audio I <sup>2</sup> S — left/right channel
17	AUD_33_DIN	Audio I <sup>2</sup> S — data in

Pin	Name	Description
18	AUD_33_DOUT	Audio I <sup>2</sup> S — data out
19	+3.3 V	3.3 V power output
20	GND	Ground
21	UART1_33_CTS	UART1 — clear to send
22	UART1_33_RTS	UART1 — request to send
23	UART1_33_RXD	UART1 — receive
24	UART1_33_TXD	UART1 — transmit
25	GPIO6_33	General-purpose I/O
26	GPIO5_33	General-purpose I/O
27	GPIO3_33	General-purpose I/O
28	GPIO1_33	General-purpose I/O
29	+3.3 V	3.3 V power output
30	GND	Ground
31	UART0_33_RXD	UART0 — receive
32	UART0_33_TXD	UART0 — transmit
33	+3.3 V	3.3 V power output / PWM
34	GND	Ground
35	SPI1_33_CS0	SPI1 — chip select 0
36	SPI1_33_MISO	SPI1 — master in / slave out
37	SPI1_33_SCK	SPI1 — serial clock
38	SPI1_33_MOSI	SPI1 — master out / slave in



All GPIOs are 3.3 V logic. Do not apply 5 V signals to any pin of this header.

## 6.3. Configuration Header

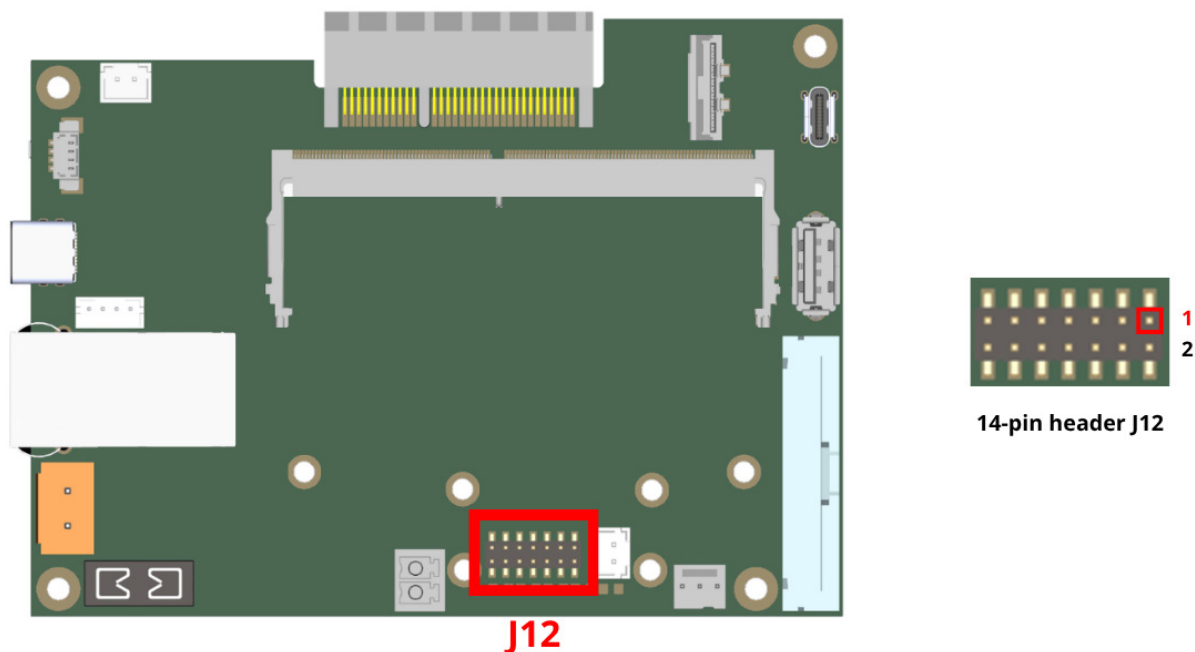


Figure 9. 14-pin Configuration header pinout (J12)

Pin	Signal	Description
1	—	NC
2	GND	Ground
4	LIMIT_N	Limit module input voltage to 12V (active low)
3	GND	Ground
5	—	NC
6	GND	Ground
7	—	NC
8	GND	Ground
9	TX	Debug UART — transmit (see <a href="#">Debug UART / Serial Console</a> )
10	RX	Debug UART — receive (see <a href="#">Debug UART / Serial Console</a> )
11	LAST_STATE	Startup config — paired with pin 12 (see table below)
12	LAST_STATE	Startup config — paired with pin 11 (see table below)
13	AUTOSTART	Startup config — paired with pin 14 (see table below)
14	GND	Startup config — paired with pin 13 (see table below)

Startup behavior depending on jumper configuration:

- **No jumpers on 11-14:** always auto-start when DC power is applied
- **Jumper on pins 11-12:** last state — auto-starts if the board was running when power was lost;

otherwise stays off until power button press

- **Jumper on pins 13-14:** manual start only — always requires a power button press, regardless of previous state

# Chapter 7. OTG / Recovery Port

One of the two USB-C ports (J5) is dedicated to OTG operation and USB Recovery Mode flashing. See [Interfaces & Connectors](#) to locate the recovery port.



Always use the **recovery USB-C port** (J5) when flashing. Using the wrong port will result in the NVIDIA flash tool not detecting the device.

For the recovery and flashing procedure, refer to the *CH-007 Platform Integration Guide*.

# Chapter 8. Debug UART / Serial Console

The debug UART exposes the Jetson serial console and is the primary tool for diagnosing boot issues.

Parameter	Value
Location	Pins 9 (TX) and 10 (RX) of the configuration header J12 (see <a href="#">Configuration Header</a> )
Baud rate	115200

## *Opening a serial console from a Linux host*

```
# Identify the USB-UART adapter port
ls /dev/ttyUSB*

# Open the serial terminal
picocom -b 115200 /dev/ttyUSB0
# or
minicom -D /dev/ttyUSB0 -b 115200
```