



# NXP i.MX8 Reference Design:

2 Channel MIPI CSI-2 Carrier Board  
with i.MX 8M Plus SoM

CBM-TDX-V-I8P-8-32-PW



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Fig. 1 NXP i.MX8 Reference Design, 2-Channel MIPI CSI-2 Carrier Board with i.MX 8M Plus 4 GB SoM

## Technical Changes

The Imaging Source Europe GmbH reserves the right to change and adapt the information, designs and technical data contained in this documentation without prior notice.

## Revision History

The following versions of this manual have been published:

| Version             | Description        |
|---------------------|--------------------|
| November 2024, V0.6 | Prototype          |
| February 2025, v0.7 | Minor text changes |



## Main Features

|                       |                                                |
|-----------------------|------------------------------------------------|
| Form Factor           | 100 x 72mm (Pico ITX)                          |
| SOM Details           | Verdin Family – iMX8M Mini / iMX8M Plus / AM62 |
| Operating System      | Linux (Yocto) / Torizon                        |
| Configuration Options | Available upon request                         |

## Interfaces and Interface Details

| Interface                    | Interface (IO-Shield Board Edge)             | Standard | Optional |
|------------------------------|----------------------------------------------|----------|----------|
|                              | 1xPoE Ethernet 1000 Mbit with TSN (RJ45)     | ✓        |          |
|                              | 1x Micro USB Debugger                        | ✓        |          |
|                              | 1 x Micro HDMI                               | ✓        |          |
|                              | 1x USB-C 3.0 – Dual Role (Recovery)          | ✓        |          |
|                              | 1x USB-A 3.0 - Host                          | ✓        |          |
|                              | 1x Input Power (MC 1,5/ 2-GF-3,5 AU)         | ✓        |          |
|                              |                                              |          |          |
| <b>Additional Interfaces</b> | <b>Interface</b>                             | ✓        |          |
|                              | 1x MIPI-DSI (22-Pin FPC)                     | ✓        |          |
|                              | 2x MIPI-CSI (22-Pin FPC)                     | ✓        |          |
|                              | 1x I <sup>2</sup> C / SPI (Picoblade 8 pos.) | ✓        |          |
|                              | 1x Debug (2x6 Pos. Pin-Header)               | ✓        |          |
|                              | 1x UART (Picoblade 8 pos.)                   | ✓        |          |
|                              | 1x Camera IO (Picoblade 5 pos.)              | ✓        |          |
|                              | 1x External IO (Picoblade 6 pos.)            | ✓        |          |
|                              | 1x NVMe M.2 Key-M                            | ✓        |          |
|                              | 1x Power (JST-B4B-PH 4 pos.)                 | ✓        |          |
|                              |                                              |          |          |



## Aux Power Supply

Socket type: **MC1.5/ 2-GF-3.5 AU**

| Pin | Description |
|-----|-------------|
| 1   | GND         |
| 2   | +V_AUX_IN   |

| Parameter Name            | Min | Typ | Max | Tol  | Unit |
|---------------------------|-----|-----|-----|------|------|
| Input voltage             | 12  | -   | +48 | ±10% | V    |
| Overcurrent protection    | -   | -   | 8   | -    | A    |
| Recommended input voltage | -   | 24  | -   | -    | V    |

| Vin [V] | n    | Pout [W] |
|---------|------|----------|
| +48     | ±10% | V        |
| 8       | -    | A        |
| -       | -    | V        |

| Note                                                                                |                                                                                               |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|  | <b>Technical Information:</b><br>A slow-blow SMD fuse is installed as overcurrent protection. |

## RTC Backup Supply

A backup battery holder (BAT300) is available on the Pico-ITX carrier board. It supplies the Verdin module's RTC with backup power when the main power supply is switched off.

Supported batteries: CR1025 or compatible button batteries.



## Ethernet Connector with PoE

ETH1 connector RJ45 (X800)  
Würth Elektronik (615008160221)

The pin assignments for 8 pin RJ45 connector are shown in the table below.

| Pin | Connection |
|-----|------------|
| 1   | D0+        |
| 2   | D0-        |
| 3   | D1+        |
| 4   | D2+        |
| 5   | D2-        |
| 6   | D1-        |
| 7   | D3+        |
| 8   | D3-        |

## PoE Classification

As soon as the PoE voltage is detected, the IC classifies the voltage supplied via the PoE power supply unit (PSE).

If an external voltage (AUX) is added, which is in the classified voltage window (stable +12V DC), the LT4275A will prioritize switching to the AUX voltage.



## USB 1 Interface Type-C Connector

The USB-C port X700 is connected to the USB\_1 port. Native USB 2.0 is available, USB SuperSpeed (3.0) is type-specific.

The USB port can be used in recovery mode to enable software loading onto the module by acting as a dual-role port (DRP) for both host and client.

The DRP port has a maximum output current of 1A.

| Pin     | Signal           |     |
|---------|------------------|-----|
| A1      | GND              | PWR |
| A2      | USB1_SSTX1_CON_P | IO  |
| A3      | USB1_SSTX1_CON_N | IO  |
| A4      | USB_1_VBUS       | PWR |
| A5      | USB_1_CC1        |     |
| A6      | USB_1_D_CON_P    | IO  |
| A7      | USB_1_D_CON_N    | IO  |
| A8      | NC               |     |
| A9      | USB_1_VBUS       | PWR |
| A10     | USB1_SSRX2_CON_N | IO  |
| A11     | USB1_SSRX2_CON_P |     |
| A12     | GND              | PWR |
| B1      | GND              | PWR |
| B2      | USB1_SSTX2_CON_P | IO  |
| B3      | USB1_SSTX2_CON_N | IO  |
| B4      | USB_1_VBUS       | PWR |
| B5      | USB_1_CC2        |     |
| B6      | USB_1_D_CON_P    | IO  |
| B7      | USB_1_D_CON_N    | IO  |
| B8      | NC               |     |
| B9      | USB_1_VBUS       | PWR |
| B10     | USB1_SSRX1_CON_N | IO  |
| B11     | USB1_SSRX1_CON_P | IO  |
| B12     | GND              | PWR |
| SH1/SH2 | GND_CHASSIS      | PWR |
| SH3/SH4 | GND_CHASSIS      | PWR |

## USB 2 Interface Type-A Connector

The carrier board provides 1 xUSB 3.x (X600) and supports USB 3.2 Gen 1 and USB 2.0 standards.

Maximum output current 1A.

| Pin | Signal           | IO Type |
|-----|------------------|---------|
| 1   | USB_2_VBUS       | PWR     |
| 2   | USB_2_D_CON_N    | IO      |
| 3   | USB_2_D_CON_P    | IO      |
| 4   | GND              | PWR     |
| 5   | USB_2_SSRX_CON_N | IO      |
| 6   | USB_2_SSRX_CON_P | IO      |
| 7   | GND              | PWR     |
| 8   | USB_2_SSTX_CON_N | IO      |
| 9   | USB_2_SSTX_CON_P | IO      |



## USB Debugger

The carrier board has an FTDI, which enables debugging via USB.

The debugger is based on the FTDI-FT230XQ and has the following features:

- 1x UART port, connected to the debug output of the Cortex-A
- 2x GPIO for controlling board reset and module recovery

The pin assignments of the FT230XQ are shown in the table below.

| Pin | Pin Name | IO Type | Interface | Controlled signal  | Description                             |
|-----|----------|---------|-----------|--------------------|-----------------------------------------|
| 15  | TXD      | I       | UART      | FTDI_UART_3_TXD    | Transmitter data of Cortex-A debug UART |
| 2   | RXD      | O       | UART      | FTDI_UART_3_RXD    | Receiver data of Cortex-A debug UART    |
| 12  | CBUS0    | O       | GPIO      | FTDI_DBG_RESET#    | Verdin module RESET                     |
| 14  | CBUS3    | O       | GPIO      | FTDI_DBG_RECOVERY# | Verdin module RECOVERY mode             |

For reset and recovery, an optional variant can be selected.

Instead of CBUS0 (pin 12) and CBUS3 (pin 14), the pins RTS# (pin 16) and CTS# (pin 4) can be used.

To do this, R902 (CBUS0) and R903 (CBUS3) must be desoldered and replaced by R900 (RTS#) and R901 (CTS#).

Connector type: Micro-AB USB, Würth Elektronik 629105150921.

| Pin         | Signal        | IO Type |
|-------------|---------------|---------|
| 1           | VCC_USB_SDBG  | PWR     |
| 2           | USB_DBG_CON_N | IO      |
| 3           | USB_DBG_CON_P | IO      |
| 4           | NC            |         |
| 5           | GND           | PWR     |
| S1,S2,S3,S4 | GND_CHASSIS   | FE      |



## Power, Reset und Debug Connector

Parallel to USB debug, the carrier board has a 2.54mm, 2x6 pin header (X400) that provides further system CTL signals in addition to the debug UART

| Pin | Signal             | IO Type | Signal Voltage                                   |
|-----|--------------------|---------|--------------------------------------------------|
| A1  | PWR_BTN#           | IO (OD) | 100k to +1.9V                                    |
| B1  | GND                | PWR     | 0V                                               |
| A2  | CTRL_RECOVERY_MICO | IO (OD) | Open Drain +1.8V (on SoM)                        |
| B2  | GND                | PWR     | 0V                                               |
| A3  | CTRL_RESET_MICO    | IO (OD) | Open Drain +1.8V (on SoM)                        |
| B3  | GND                | PWR     | 0V                                               |
| A4  | CTRL_AUTO_ON       | I       | 100k to +5V                                      |
| B4  | GND                | PWR     | 0V                                               |
| A5  | FTDI_UART_3_TXD    | I       | +3V3                                             |
| B5  | FTDI_UART_3_RXD    | O       | +3V3                                             |
| A6  | Power LED+         | PWR     | +5V                                              |
| B6  | Power LED-         | O (OC)  | Open-Collector Heartbeat Signal (330R) SODIMM 17 |

## I<sup>2</sup>C / SPI Connector

The carrier board provides an 8 pin Picoblade (X1604) 1.25mm pitch with SPI and I<sup>2</sup>C bus.  
connector type: CONN HEADER SMD R/A 8POS 1.25MM

Manufacturer: Würth Elektronik

Manufacturer Part No.: 653108131822

The pin assignments for the 8 pin connector are shown in the table below.

| Pin | Connection             | Type | SODIMM | Signal Voltage 3V3 (default) | Signal Voltage 5V | Description              |
|-----|------------------------|------|--------|------------------------------|-------------------|--------------------------|
| 1   | I <sup>2</sup> C_1_SDA | IO   | 12     | Resistor R1604               | Resistor R1603    | I <sup>2</sup> C_1 Data  |
| 2   | I <sup>2</sup> C_1_SCL | IO   | 14     |                              |                   | I <sup>2</sup> C_1 Clock |
| 3   | GND                    | PWR  |        |                              |                   |                          |
| 4   | SPI_1_CLK              | O    | 196    | Resistor R1602               | Resistor R1600    | Clock                    |
| 5   | SPI_1_MISO             | I    | 198    |                              |                   | Master-In                |
| 6   | SPI_1_MOSI             | O    | 200    |                              |                   | Master-Out               |
| 7   | SPI_1_CS               | O    | 202    |                              |                   | Select                   |
| 8   | GND                    | PWR  |        |                              |                   |                          |



## UART Connector X1602

The carrier board has an 8 pin Picoblade 1.25mm (X1602) pitch connector through which universal asynchronous receiver-transmitter signals are accessible.

Connector type: CONN HEADER SMD R/A 8POS 1.25MM

Manufacturer: Würth Elektronik

Manufacturer Part No.: 653108131822

The pin assignments for the 8 pin connector are shown in the table below.

| Pin | Connection     | Type | SODIMM | Signal Voltage 3V3 (default) | Signal Voltage 5V | Description            |
|-----|----------------|------|--------|------------------------------|-------------------|------------------------|
| 1   | UART_2_TXD_CON | O    | 139    | Resistor R1622               | Resistor R1611    | UART 2 Transmit Data   |
| 2   | UART_2_RXD_CON | I    | 137    |                              |                   | UART 2 Receive Data    |
| 3   | GND            | PWR  |        |                              |                   |                        |
| 4   | UART_1_TXD_CON | O    | 131    | Resistor R1623               | Resistor R1612    | UART 1 Transmit Data   |
| 5   | UART_1_RXD_CON | I    | 129    |                              |                   | UART 1 Receive Data    |
| 6   | UART_1_RTS_CON | I    | 133    |                              |                   | UART 1 Request to Send |
| 7   | UART_1_CTS_CON | O    | 135    |                              |                   | UART 1 Clear to Send   |
| 8   | GND            | PWR  |        |                              |                   |                        |

## CAN Connector

The carrier board provides a 6 pin Picoblade 1.25mm pitch (X1603) with CAN signals.

Connector type: CONN HEADER SMD R/A 6POS 1.25MM

Manufacturer: Würth Elektronik

Manufacturer Part No.: 653106131822

The pin assignments for the 6 pin connector are shown in the table below.

| Pin | Connection | Type | SODIMM | Signal Voltage 3V3 (default) | Signal Voltage 5V | Description             |
|-----|------------|------|--------|------------------------------|-------------------|-------------------------|
| 1   | CAN_1_TX   | O    | 20     | R1624                        | R1616             | CAN port 1 transmit pin |
| 2   | CAN_1_RX   | I    | 22     |                              |                   | CAN port 1 receive pin  |
| 3   | GND        | PWR  |        |                              |                   |                         |
| 4   | CAN_2_TX   | O    | 24     |                              |                   | CAN port 2 transmit pin |
| 5   | CAN_2_RX   | I    | 26     |                              |                   | CAN port 2 receive pin  |
| 6   | GND        | PWR  |        |                              |                   |                         |



## PCIe

The carrier board has a standard PCIe interface with M.2 Key-M slot. The following bus is available:

- PCI Express 1 lane

Mountable sizes: 2230, 2242, 2252, 3042, 3052

M.2 connector (X1500)

Connector type: M.2 key M, Amphenol MDT420M01001

The pin assignments for the M.2 connector are shown in the table below.

| Pin | Pin Name       | IO Type | SODIMM | Voltage | Description            |
|-----|----------------|---------|--------|---------|------------------------|
| 1   | CONFIG_3       | I       | NC     |         | Defines module type    |
| 2   | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 3   | GND            | PWR     |        |         |                        |
| 4   | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 5   | PERn3          | IO      | N/A    |         | PCIe Lane 3 Rx         |
| 6   | N/A            |         |        |         |                        |
| 7   | PERp3          | IO      | N/A    |         |                        |
| 8   | N/A            |         |        |         |                        |
| 9   | GND            | PWR     |        |         |                        |
| 10  | DAS/DSS        | O       |        |         | Device Activity Signal |
| 11  | PETn3          | IO      | N/A    |         |                        |
| 12  | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 13  | PETp3          |         | N/A    |         |                        |
| 14  | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 15  | GND            | PWR     |        |         |                        |
| 16  | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 17  | PERn2          |         | N/A    |         |                        |
| 18  | +V3.3_SW       | PWR     |        | +3.3V   | +3.3V input power      |
| 19  | PERp2          |         | N/A    |         |                        |
| 20  | N/A            |         |        |         |                        |
| 21  | CONFIG_0       |         | NC     |         | Defines module type    |
| 22  | N/A            |         |        |         |                        |
| 23  | PETn2          |         | N/A    |         |                        |
| 24  | N/A            |         |        |         |                        |
| 25  | PETp2          |         | N/A    |         |                        |
| 26  | N/A            |         |        |         |                        |
| 27  | GND            | PWR     |        |         |                        |
| 28  | N/A            |         |        |         |                        |
| 29  | PERn1          |         |        |         |                        |
| 30  | N/A            |         |        |         |                        |
| 31  | PERp1          |         |        |         |                        |
| 32  | N/A            |         |        |         |                        |
| 33  | GND            | PWR     |        |         |                        |
| 34  | N/A            |         |        |         |                        |
| 35  | PETn1          | N/A     |        |         |                        |
| 36  | N/A            |         |        |         |                        |
| 37  | PETp1          | N/A     |        |         |                        |
| 38  | DEVSLP         | NC      |        |         |                        |
| 39  | GND            | PWR     |        |         |                        |
| 40  | N/A            |         |        |         |                        |
| 41  | PCIE_1_L0_RX_N | O       | 232    |         |                        |
| 42  | N/A            |         |        |         |                        |
| 43  | PCIE_1_L0_RX_P | O       | 234    |         |                        |
| 44  | N/A            |         |        |         |                        |



| Pin     | Pin Name       | IO Type | SODIMM | Voltage         | Description         |
|---------|----------------|---------|--------|-----------------|---------------------|
| 45      | GND            | PWR     |        |                 |                     |
| 46      | N/A            |         |        |                 |                     |
| 47      | PCIE_1_L0_TX_N | I       | 238    |                 |                     |
| 48      | N/A            |         |        |                 |                     |
| 49      | PCIE_1_L0_TX_P | I       | 240    |                 |                     |
| 50      | PERST#         | I (OD)  | 244    | 10k to +V3.3_SW |                     |
| 51      | GND            | PWR     |        |                 |                     |
| 52      | CLKREQ#        | NC      |        |                 |                     |
| 53      | PCIE_1_CLK_N   | I       | 226    |                 |                     |
| 54      | PEWAKE#        |         | 252    |                 |                     |
| 55      | PCIE_1_CLK_P   | I       | 228    |                 |                     |
| 56      | NC             |         |        |                 |                     |
| 57      | GND            | PWR     |        |                 |                     |
| 58      | NC             |         |        |                 |                     |
| 59 - 66 | Removed        |         |        |                 | Mechanical notch M  |
| 67      | N/A            |         |        |                 |                     |
| 68      | SUSCLK         |         | NC     |                 |                     |
| 69      | CONFIG_1       |         |        | 10k to +V3.3_SW | Defines module type |
| 70      | +V3.3_SW       | PWR     |        | +3.3V           | +3.3V input power   |
| 71      | GND            | PWR     |        |                 |                     |
| 72      | +V3.3_SW       | PWR     |        | +3.3V           | +3.3V input power   |
| 73      | GND            | PWR     |        |                 |                     |
| 74      | +V3.3_SW       | PWR     |        | +3.3V           | +3.3V input power   |
| 75      | CONFIG_2       |         | NC     |                 | Defines module type |

## External Power Connector

The carrier board provides 1 x 4 pin 2mm WR-WTB (EQ: JST - B4B-PH) connector (X1605) for external power supply.

Connector type: CONN HEADER SMD R/A 4POS 2MM

Manufacturer: Würth Elektronik

Manufacturer Part No.: 620104131822

The connector can be loaded up to a maximum output current of 2A per voltage maximum output current of 2A.

| Pin | Pin Name | Voltage |
|-----|----------|---------|
| 1   | +3V3_EXT | +3.3V   |
| 2   | GND      |         |
| 3   | +5V_EXT  | +5V     |
| 4   | GND      |         |

### Note



#### Important Note:

Please note that the voltage on connector X1605 do not have a current limit.



## Camera IO Connector

The carrier board provides 4x GPIOs via the camera IO connector (X1600), whereby pins 3 and 4 capture an external camera trigger signal, which is connected to pin 18 of the MIPI-CSI interfaces.

Connector type: CONN HEADER SMD R/A 5POS 1.25MM,  
Würth Elektronik 653105131822

The pin assignments for camera's IO connector shown in the table below.

| Pin | Signal                 | IO Type | SODIMM | Voltage | Pull-up/<br>Pull-down | Description                                    |
|-----|------------------------|---------|--------|---------|-----------------------|------------------------------------------------|
| 1   | GPIO_1_STROBE_CAM0_CON | O       | 206    | +3.3V   |                       | Strobe signal from camera 0                    |
| 2   | GPIO_3_STROBE_CAM1_CON | O       | 210    | +3.3V   |                       | Strobe signal from camera 1                    |
| 3   | EXT_TRIGGER_CAM0_CON   | I       |        | +3.3V   |                       | External camera trigger signal to OR gate CAM0 |
| 4   | EXT_TRIGGER_CAM1_CON   | I       |        | +3.3V   |                       | External camera trigger signal to OR gate CAM1 |
| 5   | GND                    | PWR     |        |         |                       |                                                |

## External IO Connector

The carrier board provides 4x GPIOs via an external IO connector (X1601).

Connector type: CONN HEADER SMD R/A 6POS 1.25MM,  
Würth Elektronik 653106131822

The pin assignments for the external IO connector are shown in the table below.

| Pin | Signal         | IO Type | SODIMM | Signal Voltage<br>3V3 (default) | Signal Voltage<br>(5V) | Description |
|-----|----------------|---------|--------|---------------------------------|------------------------|-------------|
| 1   | GPIO_5_CSI_CON | IO      | 216    | R1609                           | R1606                  |             |
| 2   | GPIO_6_CSI_CON | IO      | 218    |                                 |                        |             |
| 3   | GND            | PWR     |        |                                 |                        |             |
| 4   | GPIO_7_CSI_CON | IO      | 220    |                                 |                        |             |
| 5   | GPIO_8_CSI_CON | IO      | 222    |                                 |                        |             |
| 6   | GND            | PWR     |        |                                 |                        |             |



## MIPI CSI Camera Interface 1 (Native)

The MIPI CSI camera interface on connector X1200 is intended for applications requiring image capture from CMOS or CCD image sensors.

For details, please see the Verdin module datasheet:

I<sup>2</sup>C select for camera interface 1

| Signal                 | IO Type | SODIMM | Voltage | Pull-up/Pull-down | IC 1204 - Select Control CAM1 |
|------------------------|---------|--------|---------|-------------------|-------------------------------|
| I <sup>2</sup> C_4_SEL | O       | 21     | +1.8V   | 10k to +V3.3_SW   | SEL = H                       |



## MIPI CSI Camera 1 Connector (X1200)

Connector Type: WR-FPC 0.50mm SMT Horiz. Bot. Contact Hinge type,

Würth Elektronik 687122149022

The pin assignments for the MIPI CSI Camera 1 connector are shown in the table below.

| Pin | Signal Name                       | IO Type | SODIMM | Voltage | Pull-up/Pull-down | Description                                           |
|-----|-----------------------------------|---------|--------|---------|-------------------|-------------------------------------------------------|
| 1   | GND                               | PWR     |        |         |                   |                                                       |
| 2   | CSI_1_D0_CON_N                    | I       | 125    |         |                   | Negative differential MIPI CSI data signal, lane 0    |
| 3   | CSI_1_D0_CON_P                    | I       | 123    |         |                   | Positive differential MIPI CSI data signal, lane 0    |
| 4   | GND                               | PWR     |        |         |                   |                                                       |
| 5   | CSI_1_D1_CON_N                    | I       | 119    |         |                   | Negative differential MIPI CSI data signal, lane 1    |
| 6   | CSI_1_D1_CON_P                    | I       | 117    |         |                   | Positive differential MIPI CSI data signal, lane 1    |
| 7   | GND                               | PWR     |        |         |                   |                                                       |
| 8   | CSI_1_CLK_CON_N                   |         | 113    |         |                   | Negative differential MIPI CSI data signal            |
| 9   | CSI_1_CLK_CON_P                   |         | 111    |         |                   | Positive differential MIPI CSI reference clock signal |
| 10  | GND                               | PWR     |        |         |                   |                                                       |
| 11  | CSI_1_D2_CON_N                    | I       | 107    |         |                   | Negative differential MIPI CSI reference clock signal |
| 12  | CSI_1_D2_CON_P                    | I       | 105    |         |                   | Positive differential MIPI CSI data signal, lane 2    |
| 13  | GND                               | PWR     |        |         |                   |                                                       |
| 14  | CSI_1_D3_CON_N                    | I       | 101    |         |                   | Negative differential MIPI CSI data signal, lane 3    |
| 15  | CSI_1_D3_CON_P                    | I       | 99     |         |                   | Positive differential MIPI CSI data signal, lane 3    |
| 16  | GND                               | PWR     |        |         |                   |                                                       |
| 17  | TRIGGER_CAM0                      | O       | 212    | +3.3V   |                   | GPIO_4_TRIGGER_CAM0_CON OR EXT_TRIGGER_CAM0_CON       |
| 18  | GPIO_1_STROBE_CAM0_CON            | I       | 54     | +3.3V   |                   |                                                       |
| 19  | GND                               | PWR     |        |         |                   |                                                       |
| 20  | I <sup>2</sup> C_4_CSI_SCL_NATIVE | IO      | 95     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 21  | I <sup>2</sup> C_4_CSI_SDA_NATIVE | IO      | 93     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 22  | +V3.3_SW                          | PWR     |        | +3.3V   |                   | +3.3V power out                                       |



## MIPI CSI Camera Interface 2 (Type Specific)

The MIPI CSI camera interface on connector X1300 is intended for applications requiring image capture from CMOS or CCD image sensors.

For details, please see the Verdin module datasheet.

I<sup>2</sup>C select for camera interface 2

| Signal                 | IO Type | SODIMM | Voltage | Pull-up/Pull-down | IC 1204 - Select Control CAM1 |
|------------------------|---------|--------|---------|-------------------|-------------------------------|
| I <sup>2</sup> C_4_SEL | O       | 21     | +1.8V   | 10k to +V3.3_SW   | SEL = L                       |



### MIPI CSI Camera 2 Connector (X1300)

Connector Type: WR-FPC 0.50mm SMT Horiz. Bot. Contact Hinge type,

Würth Elektronik 687122149022

The pin assignments for MIPI CSI Camera 2 connector are shown in the table below.

| Pin | Signal Name                  | IO Type | SODIMM | Voltage | Pull-up/Pull-down | Description                                           |
|-----|------------------------------|---------|--------|---------|-------------------|-------------------------------------------------------|
| 1   | GND                          | PWR     |        |         |                   |                                                       |
| 2   | CSI_2_D0_CON_N               | I       | 148    |         |                   | Negative differential MIPI CSI data signal, lane 0    |
| 3   | CSI_2_D0_CON_P               | I       | 150    |         |                   | Positive differential MIPI CSI data signal, lane 0    |
| 4   | GND                          | PWR     |        |         |                   |                                                       |
| 5   | CSI_2_D1_CON_N               | I       | 154    |         |                   | Negative differential MIPI CSI data signal, lane 1    |
| 6   | CSI_2_D1_CON_P               | I       | 156    |         |                   | Positive differential MIPI CSI data signal, lane 1    |
| 7   | GND                          | PWR     |        |         |                   |                                                       |
| 8   | CSI_2_CLK_CON_N              |         | 160    |         |                   | Negative differential MIPI CSI data signal            |
| 9   | CSI_2_CLK_CON_P              |         | 162    |         |                   | Positive differential MIPI CSI reference clock signal |
| 10  | GND                          | PWR     |        |         |                   |                                                       |
| 11  | CSI_2_D2_CON_N               | I       | 166    |         |                   | Negative differential MIPI CSI reference clock signal |
| 12  | CSI_2_D2_CON_P               | I       | 168    |         |                   | Positive differential MIPI CSI data signal, lane 2    |
| 13  | GND                          | PWR     |        |         |                   |                                                       |
| 14  | CSI_2_D3_CON_N               | I       | 172    |         |                   | Negative differential MIPI CSI data signal, lane 3    |
| 15  | CSI_2_D3_CON_P               | I       | 174    |         |                   | Positive differential MIPI CSI data signal, lane 3    |
| 16  | GND                          | PWR     |        |         |                   |                                                       |
| 17  | TRIGGER_CAM1                 | O       |        | +3.3V   |                   | GPIO_2_TRIGGER_CAM1_CON OR EXT_TRIGGER_CAM1_CON       |
| 18  | GPIO_3_STROBE_CAM1_CON       | IO      | 58     | +3.3V   |                   |                                                       |
| 19  | GND                          | PWR     |        |         |                   |                                                       |
| 20  | I <sup>2</sup> C_4_CSI_SCL_S | IO      | 95     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 21  | I <sup>2</sup> C_4_CSI_SDA_S | IO      | 93     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 22  | GND                          | PWR     |        | +3.3V   |                   | +3.3V power out                                       |



## Display Interface

The carrier board provides two display connection options.

- MIPI-DSI
- HDMI

### MIPI DSI Connector (X1400)

Connector Type: WR-FPC 0.50mm SMT Horiz. Bot. Contact Hinge type,  
Würth Elektronik 687122149022

The pin assignments for the MIPI DSI connector are shown in the table below.

| Pin | Signal Name                    | IO Type | SODIMM | Voltage | Pull-up/Pull-down | Description                                           |
|-----|--------------------------------|---------|--------|---------|-------------------|-------------------------------------------------------|
| 1   | GND                            | PWR     |        |         |                   |                                                       |
| 2   | DSI_1_D0_CON_N                 | O       | 47     |         |                   | Negative differential MIPI DSI data signal, lane 0    |
| 3   | DSI_1_D0_CON_P                 | O       | 49     |         |                   | Positive differential MIPI DSI data signal, lane 0    |
| 4   | GND                            | PWR     |        |         |                   |                                                       |
| 5   | DSI_1_D1_CON_N                 | O       | 43     |         |                   | Negative differential MIPI DSI data signal, lane 1    |
| 6   | DSI_1_D1_CON_P                 | O       | 41     |         |                   | Positive differential MIPI DSI data signal, lane 1    |
| 7   | GND                            | PWR     |        |         |                   |                                                       |
| 8   | DSI_1_CLK_CON_N                | O       | 35     |         |                   | Negative differential MIPI DSI data signal            |
| 9   | DSI_1_CLK_CON_P                | O       | 37     |         |                   | Positive differential MIPI DSI reference clock signal |
| 10  | GND                            | PWR     |        |         |                   |                                                       |
| 11  | DSI_1_D2_CON_N                 | O       | 29     |         |                   | Negative differential MIPI DSI reference clock signal |
| 12  | DSI_1_D2_CON_P                 | O       | 31     |         |                   | Positive differential MIPI DSI data signal, lane 2    |
| 13  | GND                            | PWR     |        |         |                   |                                                       |
| 14  | DSI_1_D3_CON_N                 | O       | 23     |         |                   | Negative differential MIPI DSI data signal, lane 3    |
| 15  | DSI_1_D3_CON_P                 | O       | 25     |         |                   | Positive differential MIPI DSI data signal, lane 3    |
| 16  | GND                            | PWR     |        |         |                   |                                                       |
| 17  | NC                             |         |        |         |                   |                                                       |
| 18  | NC                             |         |        |         |                   |                                                       |
| 19  | GND                            | PWR     |        |         |                   |                                                       |
| 20  | I <sup>2</sup> C_2_DSI_SCL_CON | IO      | 55     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 21  | I <sup>2</sup> C_2_DSI_SDA_CON | IO      | 53     | +3.3V   | 1k8 to +V3.3_SW   |                                                       |
| 22  | +V3.3_SW                       | PWR     |        | +3.3V   |                   | +3.3V power out                                       |



## HDMI Connector (X1100)

Connector Type: CONN RCP MICRO HDMI 19POS SMD RA,

Würth Elektronik 685119248123

The pin assignments for the Micro-HDMI connector are shown in the table below.

| Pin   | Signal Name     | IO Type | SODIMM | Voltage | Pull-up/Pull-down       | Description                                       |
|-------|-----------------|---------|--------|---------|-------------------------|---------------------------------------------------|
| 1     | HDMI_1_TXD2_L_P | O       | 87     |         |                         | Positive differential HDMI data signal, lane 2    |
| 2     | GND             | PWR     |        |         |                         |                                                   |
| 3     | HDMI_1_TXD2_L_N | O       | 85     |         |                         | Negative differential HDMI data signal, lane 2    |
| 4     | HDMI_1_TXD1_L_P | O       | 81     |         |                         | Positive differential HDMI data signal, lane 1    |
| 5     | GND             | PWR     |        |         |                         |                                                   |
| 6     | HDMI_1_TXD1_L_N | O       | 79     |         |                         | Negative differential HDMI data signal, lane 1    |
| 7     | HDMI_1_TXD0_L_P | O       | 75     |         |                         | Positive differential HDMI data signal, lane 0    |
| 8     | GND             | PWR     |        |         |                         |                                                   |
| 9     | HDMI_1_TXD0_L_N | O       | 73     |         |                         | Negative differential HDMI data signal, lane 0    |
| 10    | HDMI_1_TXC_L_P  | O       | 69     |         |                         | Positive differential HDMI reference clock signal |
| 11    | GND             | PWR     |        |         |                         |                                                   |
| 12    | HDMI_1_TXC_L_N  | O       | 67     |         |                         | Negative differential HDMI reference clock signal |
| 13    | HDMI_1_CEC_CON  |         | 63     |         | 27k to +V3.3_SW         | HDMI consumer electronic control                  |
| 14    | NC              |         |        |         |                         | Not connected                                     |
| 15    | HDMI_1_DDC_SCL  |         | 59     | +5V     | 1.8k to +V5_HDMI_1_DISP | DDC interface clock                               |
| 16    | HDMI_1_DDC_SDA  |         | 57     | +5V     | 1.8k to +V5_HDMI_1_DISP | DDC interface data                                |
| 17    | GND             | PWR     |        |         |                         |                                                   |
| 18    | +V5_HDMI_1_DISP | PWR     |        | +5V     |                         | HDMI power out                                    |
| 19    | HDMI_1_HPD_CON  | I       | 61     |         |                         | HDMI hot plug detect                              |
| S1,S2 | GND_CHASSIS     | FE      |        |         |                         |                                                   |
| S3,S4 | GND_CHASSIS     | FE      |        |         |                         |                                                   |

## Temperature Sensor

The carrier board provides a digital temperature sensor, with an I<sup>2</sup>C interface. This is a useful feature for remote equipment monitoring.

| Sensor | Sensor Location | Address                 |
|--------|-----------------|-------------------------|
| 1      | Carrier Board   | I <sup>2</sup> C_1 0x44 |



## EEPROM

A 2-Kbit EEPROM (IC1000) with I<sup>2</sup>C interface is installed on the carrier board.

The EEPROM can be used to store important data or for board identification.

Technical details on the EEPROM can be found in data sheet M24C02-FMN6TP.

The EEPROM can be accessed via the address 0x57 on the generic serial bus I2C\_1.

GPIO3\_IO20 can be used to deactivate the EEPROM write protection.

| Signal Name | IO Type | SODIMM | Voltage | Pull-up/Pull-down | Description                                            |
|-------------|---------|--------|---------|-------------------|--------------------------------------------------------|
| WC          | O       | 19     | +1.8V   | 100k to 1.8V_SW   | Set GPIO to logical "0" to deactivate write protection |

## User LED (Heartbeat)

A red user LED is installed on the carrier board (LED 402) that can be used to output a kernel heartbeat.

| Signal Name   | IO Type | SODIMM | Pull-up/Pull-down | Description                                       |
|---------------|---------|--------|-------------------|---------------------------------------------------|
| HEARTBEAT_LED | O       | 17     |                   | LED "double" flashes at a load average based rate |



## Mechanical Dimensions 100 x 72mm (Pico-ITX)

[illegible]



**EMC Test acc. to EN IEC 61000-6-2:2019 and EN IEC 61000-6-4:2019 including Test Report**  
Following ports are included: Enclosure, Power over Ethernet (PoE), 24 V d.c. supply



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Last update: February 2025

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All weights and dimensions are approximate. Unless otherwise specified the lenses shown in the context of cameras are not shipped with these cameras.