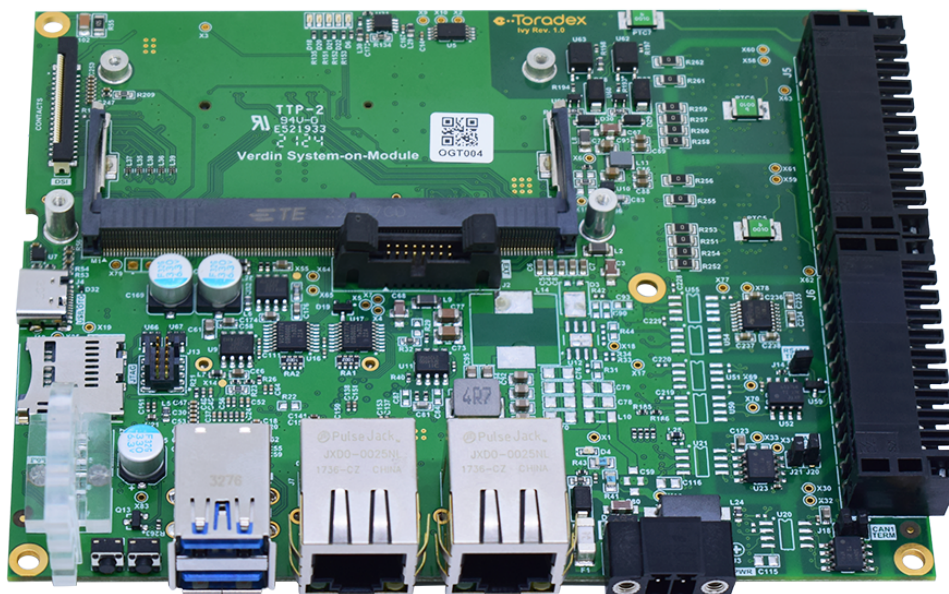


## Ivy Carrier Board V1.0

### HW Datasheet



## Revision History

### Document Revisions

| Date        | Doc. Revision | Product Version | Changes                          |
|-------------|---------------|-----------------|----------------------------------|
| 24-Oct-2024 | Rev. 1.0      | V1.0            | Initial version Ivy and Ivy Plus |

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## 1 Introduction

Ivy is a carrier board for the Verdin family of System-on-Modules (SoMs) / Computer-on-modules (CoMs). Ivy is designed to be use in a industrial enviroment.

### 1.1 Reference Documents

For detailed technical information, please refer to the documents listed below.

#### 1.1.1 Verdin Family Specification

<https://docs.toradex.com/109262-verdin-family-specification.pdf>

#### 1.1.2 Verdin Carrier Board Design Guide

<https://docs.toradex.com/108140-verdin-carrier-board-design-guide.pdf>

#### 1.1.3 Verdin System on Module family overview

<https://www.toradex.com/computer-on-modules/Verdin-arm-family>

#### 1.1.4 Toradex Developer Website – Verdin System on Module documents

<https://developer.toradex.com/products/verdin-som-family/modules>

## 1.2 Abbreviations

Table 1: Abbreviations

| Abbreviation | Explanation                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADC          | Analog to Digital Converter                                                                                                                                                                                                                                                                                                                                                      |
| CAN          | Controller Area Network, a bus that is mainly used in the automotive and industrial environment                                                                                                                                                                                                                                                                                  |
| CAN FD       | Controller Area Network Flexible Data-Rate, an extension to the original CAN bus protocol which allows higher data rates and larger message sizes.                                                                                                                                                                                                                               |
| CEC          | Consumer Electronic Control, HDMI feature that allows controlling CEC compatible devices                                                                                                                                                                                                                                                                                         |
| CPU          | Central Processor Unit                                                                                                                                                                                                                                                                                                                                                           |
| CSI          | Camera Serial Interface                                                                                                                                                                                                                                                                                                                                                          |
| DAC          | Digital to Analog Converter                                                                                                                                                                                                                                                                                                                                                      |
| DDC          | Display Data Channel, interface for reading out the capability of a monitor. In this document DDC2B (based on I2C) is always meant.                                                                                                                                                                                                                                              |
| DFP          | Downstream Facing Port, USB Type-C port that acts as a host                                                                                                                                                                                                                                                                                                                      |
| DRP          | Dual-Role Port, USB Type-C port that can operate as power sink and source                                                                                                                                                                                                                                                                                                        |
| DSI          | Display Serial Interface                                                                                                                                                                                                                                                                                                                                                         |
| DVI          | Digital Visual Interface, digital signals are electrically compatible with HDMI                                                                                                                                                                                                                                                                                                  |
| EDID         | Extended Display Identification Data, timing setting information provided by the display in a PROM                                                                                                                                                                                                                                                                               |
| EMI          | Electromagnetic Interference, high-frequency disturbances                                                                                                                                                                                                                                                                                                                        |
| ESD          | Electrostatic Discharge, high voltage spike or spark that can damage electrostatic-sensitive devices                                                                                                                                                                                                                                                                             |
| FPD-Link     | Flat Panel Display Link, high-speed serial interface for liquid crystal displays. In this document is also called the LVDS interface.                                                                                                                                                                                                                                            |
| GBE          | Gigabit Ethernet, Ethernet interface with a maximum data rate of 1000Mbit/s                                                                                                                                                                                                                                                                                                      |
| GND          | Ground                                                                                                                                                                                                                                                                                                                                                                           |
| GND_CHASSIS  | Chassis Ground                                                                                                                                                                                                                                                                                                                                                                   |
| GPIO         | General Purpose Input/Output, pin that can be configured as an input or output                                                                                                                                                                                                                                                                                                   |
| GSM          | Global System for Mobile Communications                                                                                                                                                                                                                                                                                                                                          |
| HDA          | High-Definition Audio (HD Audio), the digital audio interface between CPU and audio codec                                                                                                                                                                                                                                                                                        |
| I2C          | Inter-Integrated Circuit, the two-wire interface for connecting low-speed peripherals                                                                                                                                                                                                                                                                                            |
| I2S          | Integrated Interchip Sound, serial bus for connecting PCM audio data between two devices                                                                                                                                                                                                                                                                                         |
| I/O          | Input-Output                                                                                                                                                                                                                                                                                                                                                                     |
| JTAG         | Joint Test Action Group, widely used debug interface                                                                                                                                                                                                                                                                                                                             |
| LCD          | Liquid Crystal Display                                                                                                                                                                                                                                                                                                                                                           |
| LSB          | Least Significant Bit                                                                                                                                                                                                                                                                                                                                                            |
| LVDS         | Low-Voltage Differential Signaling, electrical interface standard that can transport high-speed signals over twisted-pair cables. Many interfaces like PCIe or SATA use this interface. Since the first successful application was the Flat Panel Display Link, LVDS became a synonymous for this interface. In this document, the term LVDS is used for the FPD-Link interface. |
| MAC          | Medium Access Control is part of the second layer (data link layer) in the Ethernet stack                                                                                                                                                                                                                                                                                        |
| MIPI         | Mobile Industry Processor Interface Alliance                                                                                                                                                                                                                                                                                                                                     |
| MDI          | Medium Dependent Interface, the physical interface between Ethernet PHY and cable connector                                                                                                                                                                                                                                                                                      |
| MDIO         | Management Data Input/Output, an interface that is used for controlling the Ethernet PHY. The bus consists of the MDC clock and the MDIO bidirectional data signal.                                                                                                                                                                                                              |
| mini PCIe    | PCI Express Mini Card, the card form factor for internal peripherals. The interface features PCIe and USB 2.0 connectivity                                                                                                                                                                                                                                                       |
| MMC          | MultiMediaCard, flash memory card                                                                                                                                                                                                                                                                                                                                                |

*Continued on next page*

Table 1: Abbreviations (Continued)

| Abbreviation | Explanation                                                                                                                                                        |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MSB          | Most Significant Bit                                                                                                                                               |
| NC           | Not Connected                                                                                                                                                      |
| OD           | Open-Drain                                                                                                                                                         |
| OTG          | USB On-The-Go, a USB host interface that can also act as USB client when connected to another host interface                                                       |
| PCB          | Printed Circuit Board                                                                                                                                              |
| PCI          | Peripheral Component Interconnect, parallel computer expansion bus for connecting peripherals                                                                      |
| PCIe         | PCI Express, a high-speed serial computer expansion bus, replaces the PCI bus                                                                                      |
| PCM          | Pulse-Code Modulation, digitally representation of analog signals, standard interface for digital audio                                                            |
| PD           | Pull-Down Resistor                                                                                                                                                 |
| PHY          | The physical layer of the OSI model                                                                                                                                |
| PU           | Pull-up Resistor                                                                                                                                                   |
| PWM          | Pulse-Width Modulation                                                                                                                                             |
| PWR          | Power                                                                                                                                                              |
| QSPI         | Quad SPI, SPI interface with four bidirectional data signals                                                                                                       |
| RGMII        | Reduced Gigabit Media-Independent Interface, the interface between Ethernet MAC and PHY for up to 1Gb/s                                                            |
| RJ45         | Registered Jack, common name for the 8P8C modular connector that is used for Ethernet wiring                                                                       |
| RS232        | The single-ended serial port interface                                                                                                                             |
| RS485        | Differential signaling serial port interface, half-duplex, multi-drop configuration possible                                                                       |
| R-UIM        | Removable User Identity Module, identifications card for CDMA phones and networks, an extension of the GSM SIM card                                                |
| SD           | Secure Digital, flash memory card                                                                                                                                  |
| SDIO         | Secure Digital Input Output, an external bus for peripherals that uses the SD interface                                                                            |
| SIM          | Subscriber Identification Module, an identification card for GSM phones                                                                                            |
| SMBus        | System Management Bus (SMB), a two-wire bus based on the I <sup>2</sup> C specifications, is used in x86 designs for system management.                            |
| SoC          | System on a Chip, IC which integrates the main component of a computer on a single chip                                                                            |
| SoM          | System on a Module, PCB which integrates the main component of a computer on a single board                                                                        |
| SPI          | Serial Peripheral Interface Bus, synchronous four-wire full-duplex bus for peripherals                                                                             |
| TIM          | Thermal Interface Material, thermally conductive material between CPU and heat spreader or heat sink                                                               |
| TMDS         | Transition-Minimized Differential Signaling, serial high-speed transmitting technology that is used by DVI and HDMI                                                |
| TVS Diode    | Transient-Voltage-Suppression Diode, a diode that is used to protect interfaces against voltage spikes                                                             |
| UFP          | Upstream Facing Port, USB Type-C port that acts as a client                                                                                                        |
| UART         | Universal Asynchronous Receiver/Transmitter, serial interface, in combination with a transceiver an RS232, RS422, RS485, IrDA or similar interface can be achieved |
| USB          | Universal Serial Bus, serial interface for internal and external peripherals                                                                                       |

## 1.3 Main Features

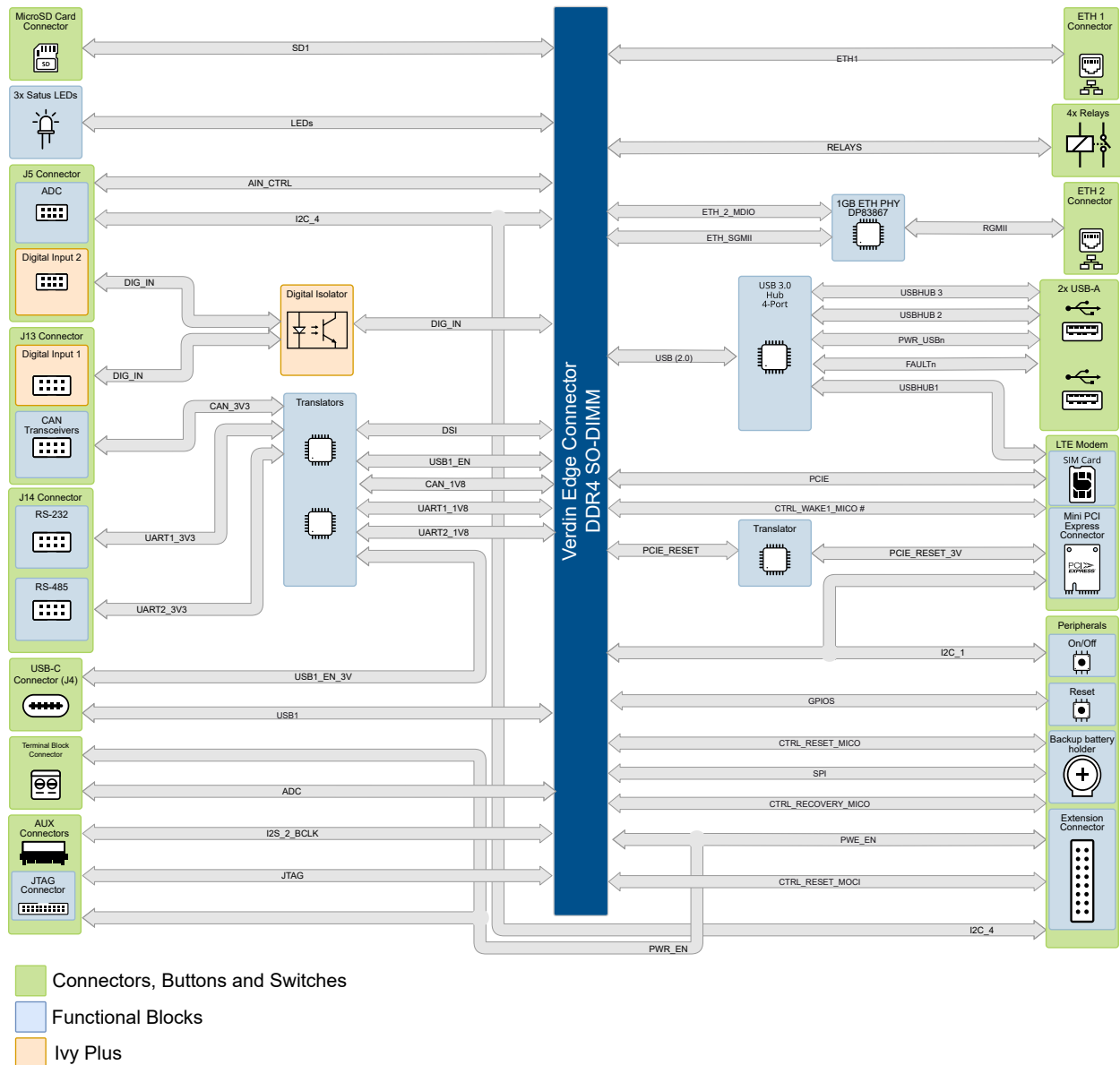
- Power
  - Ivy - DC 8 to 32V, 2A
  - Ivy Plus - DC 8 to 72V, 2A
- Operating temperature range: -40 to 85 °C
- 4x SOM ADC input to measure major power rails (Vin, 5V, 3V3, 1V8)
- 3x GPIO controlled tri color status LEDs (D9 green is always on)
- 2x CAN-FD transceiver, with 120 ohm split termination
  - Ivy - Non-Isolated CAN
  - Ivy Plus - Isolated CAN
- 1x RS-232 Interface, with flow control
  - Ivy - Non-Isolated RS-232
  - Ivy Plus - Isolated RS-232
- 1x RS-485 Interface, with 120 ohm termination
  - Ivy - Non-Isolated RS-485
  - Ivy Plus - Isolated RS-485
- 1x Gigabit Ethernet connector to SOM
- 1x Gigabit Ethernet RGMII (DP83867)
- 2x USB 3.0 Type A connector
- 1x USB 2.0 OTG on USB-C connector, typically used for Linux image reflash
- Micro SD card connector
- 1.8V UART connection for Linux console connection (J17)
- 4x GPIO controlled +/-32V photorelays
- 1x Ivy Plus only: TPM 2.0 IC on SPI bus
- 1x Ivy Plus only: 32 KB SPI FRAM
- 1x I2C temperature sensor
- 1x 32 KB I2C EEPROM
- 2x Analog inputs for ADC measurement, with configuration of 0 to 33V or 0 to 20mA
  - Ivy – Non-Isolated
  - Ivy Plus – Isolated
- 2x Digital inputs, 5 to 32V input voltage
- MIPI DSI connector for Toradex Capacitive Touch Display
- JTAG connector
- RTC backup battery holder for CR1216/1220/1225
- MiniPCle connector
  - Can be used for LTE modem, Ethernet card or other MiniPCle cards
  - PCle signals (for Ethernet cards)
  - USB 2.0 (for LTE modems)
  - 3x LEDs
  - Nano SIM card connector
- Reset and Recovery mode buttons
- Extension connector with the following
  - 1x SPI interface
  - 2x I2C interfaces
  - 5V, 3V3, 1V8 power

- Size of the board 130mm x 105mm



## 1.4 Block Diagram

Figure 1: Ivy Carrier Board Hardware Architecture



## 1.5 Physical Drawing

### 1.5.1 Top Side Connectors

Figure 2: Ivy Carrier Board top side connectors

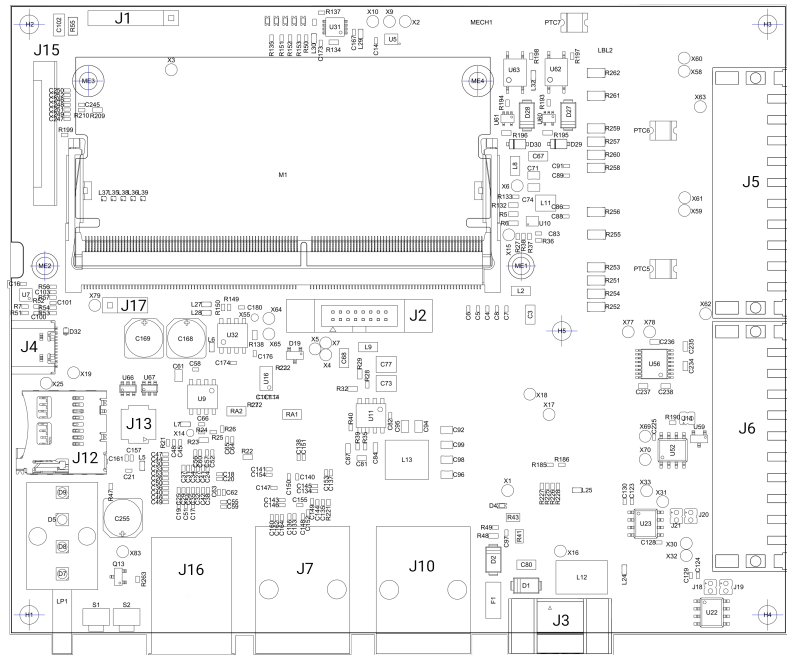


Table 2: List of top side connectors

| Connector | Manufacture | Part Num.           | Side | Description                                                |
|-----------|-------------|---------------------|------|------------------------------------------------------------|
| J1        | N/A         | N/A                 | Top  | 6 pin header 3.3V UART connection for Linux console        |
| J2        | CNC         | 3210-16-001-12-00   | Top  | Extension connector                                        |
| J3        | Molex       | 0395061002          | Top  | Main power connector                                       |
| J4        | GCT         | USB4105-GF-A-120    | Top  | USB 2.0 OTG, Type-C typically used for linux image reflash |
| J5,J6     | Weidmuller  | 1728640000          | Top  | Field Connectors Gigabit Ethernet                          |
| J7        | Pulse       | JXD0-0025NL         | Top  | Gigabit Ethernet                                           |
| J9        | GCT         | SIM8055-6-1-14-00-A | Top  | SIM Card connector                                         |
| J10       | Pulse       | JXD0-0025NL         | Top  | Gigabit Ethernet                                           |
| J12       | GCT         | MEM2052-00-195-00-A | Top  | Micro SD Card connector                                    |
| J15       | Wurth       | 687134149022        | Top  | MIPI DSI connector for Toradex Capacitive Touch Display    |
| J16       | Amphenol    | GSB4112312HR        | Top  | 2x USB3.0 Type A connectors                                |
| J17       | N/A         | N/A                 | Top  | 3 pin header. 1.8V UART connection for Linux console       |

## 1.5.2 Bottom Side Connectors

Figure 3: Ivy Carrier Board Bottom side connectors

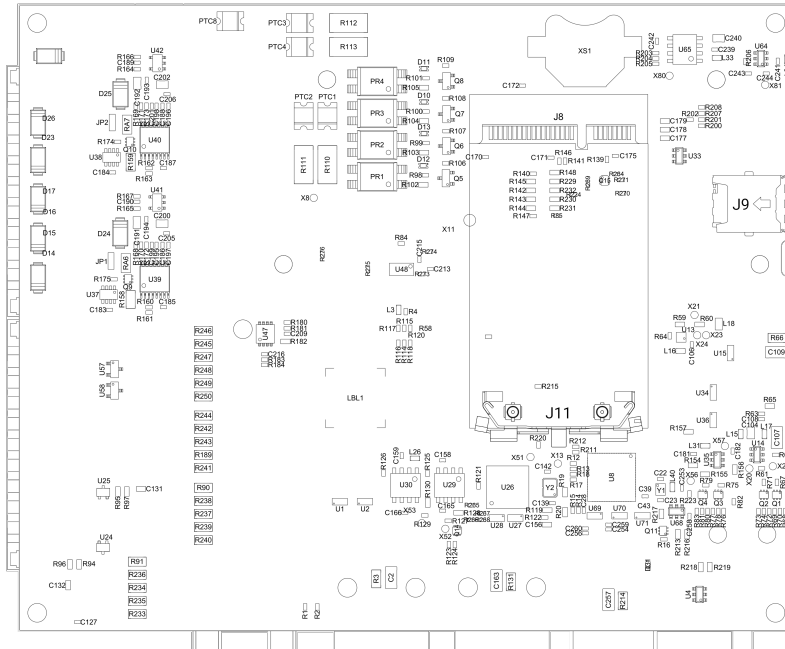


Table 3: List of bottom side connectors

| Connector | Manufacture     | Part Num.           | Side   | Description                        |
|-----------|-----------------|---------------------|--------|------------------------------------|
| X51       | Keystone        | 3000                | Bottom | Battery holder coin 1261/1220/1225 |
| J8        | TE Connectivity | 1775862-2           | Bottom | MiniPCIe card slot, full size      |
| J9        | GCT             | SIM8055-6-1-12-00-A | Bottom | SIM Card connector                 |

## 2 Interface Description

### 2.1 Verdin System-On-Module

**Connector Type:** DDR4 SO-DIMM 260 pin Socket

**Manufacturer** TE-2309409-2

For the pinout of the Verdin SoM, please refer to the applicable Verdin SoM datasheet. Standoffs are available on the Ivy Carrier Board for fixing the Verdin SoM to the carrier board.

### 2.2 Power Supply

The Ivy Carrier Board has a power connector J3, with the polarity as show in the following table:

Table 4: Power Input Connector (J3).

| Pin | Signal Name | Voltage/Range            |
|-----|-------------|--------------------------|
| 2   | +V_PWR_IN_1 | 8V-32V <sup>1</sup> , 2A |
| 1   | GND_IN      |                          |

<sup>1</sup> In the Ivy plus module the voltage are 8V - 72V, 2A.

Board power varies with version of board - Ivy: Rating 8 to 32VDC, 2A - Ivy Plus: Rating 8 to 72VDC, 2A

Power consumption varies with type of SOM, connected peripherals (especially type and number of connected USB devices). With no external devices connected, board and SOM will use typically between 4 and 6 watts. Fuse F1 is installed on power input line, located near power connector, with rating 5A, part number Bel 0680L5000-05.

## 2.3 LEDs Functions

Table 5: LED functions.

| LED | Colour           | Side   | Function - LED is on when                                        |
|-----|------------------|--------|------------------------------------------------------------------|
| D4  | Green            | Top    | Power is applied at input J3                                     |
| D5  | Green            | Top    | 3.3V power rail is active                                        |
| D6  | Green            | Top    | 5V power rail is active                                          |
| D7  | Tri-colour (RGB) | Top    | GPIO control signals are high see status LED section for details |
| D8  | Tri-colour (RGB) | Top    | GPIO control signals are high see status LED section for details |
| D9  | Tri-colour (RGB) | Top    | GPIO control signals are high see status LED section for details |
| D10 | Green            | Bottom | PR3 relay is enabled                                             |
| D11 | Green            | Bottom | PR4 relay is enabled                                             |
| D12 | Green            | Bottom | PR2 relay is enabled                                             |
| D13 | Green            | Bottom | PR1 relay is enabled                                             |
| D18 | Green            | Top    | 3.3V PCIe power rail is active                                   |
| D20 | Green            | Top    | MiniPCIe device enabled WWAN LED signal                          |
| D21 | Green            | Top    | MiniPCIe device enabled WLAN LED signal                          |
| D22 | Green            | Top    | MiniPCIe device enabled WPAN LED signal                          |

## 2.4 Status LEDs

Table 6: Status LED information.

| LED | Colour | GPIO Signal (High to enable) | SODIMM #  |
|-----|--------|------------------------------|-----------|
| D7  | Blue   | LED.GPIO1                    | SODIMM 30 |
|     | Green  | LED.GPIO2                    | SODIMM 32 |
|     | Red    | LED.GPIO3                    | SODIMM 34 |
| D8  | Blue   | LED.GPIO4                    | SODIMM 36 |
|     | Green  | LED.GPIO5                    | SODIMM 54 |
|     | Red    | LED.GPIO6                    | SODIMM 44 |
| D9  | Blue   | LED.GPIO7                    | SODIMM 46 |
|     | Green  | N/A                          | N/A       |
|     | Red    | LED.GPIO8                    | SODIMM 48 |



### Note

D9 green LED is always on, and cannot be controlled.

## 2.5 CAN Transceivers

CAN transceivers on Ivy are isolated in the Ivy Plus, and non-isolated in the Ivy. CAN buses 1 and 2 are equipped with split termination that is set through Jumpers. J18, J19 set CAN1 terminations, and J20, J21 set CAN2 terminations. The two CAN buses go to field connector J6, where it has the following pinout:

Table 7: CAN signals

| J6 Pin number | Signal   |
|---------------|----------|
| 1             | GND_CAN1 |
| 2             | CAN1_H   |
| 3             | GND_CAN1 |
| 4             | CAN1_L   |
| 5             | GND_CAN2 |
| 6             | GND2_H   |
| 7             | GND_CAN2 |
| 8             | CAN2_L   |

The CAN buses are terminated with a split-style termination. To enable this termination, insert jumpers to J18 and J19 (for CAN1), and J20 and J21 (for CAN2).

## 2.6 RS-232/RS-485

The Ivy board is equipped with a full duplex RS-232 transceiver, and a half duplex RS-485 Transceiver. The RS-232 and RS-485 interfaces are isolated in the Ivy Plus, and non-isolated in the Ivy. RS485 Termination is set using Jumper J14. The RS-232 and RS-485 interfaces go to field connector J6. See below for the pinout:

Table 8: RS-232 and RS-485 transceiver signals

| J6 Pin number | Signal    | SOM Interface                     |
|---------------|-----------|-----------------------------------|
| 9             | GND_485   | UART2_TX<br>UART2_RX<br>UART2_RTS |
| 10            | RS485_P   |                                   |
| 11            | GND_485   |                                   |
| 12            | RS485_N   |                                   |
| 13            | GND_RS232 | N/A                               |
| 14            | GND_RS232 | N/A                               |
| 15            | RS232_TX  | UART1_TX                          |
| 16            | RS232_RX  | UART1_RX                          |
| 17            | RS232_RTS | UART1_RTS                         |
| 18            | RS232_CTS | UART1_CTS                         |

The RS485 buses are terminated with a simple 120-ohm termination. To enable this termination, insert jumper to J14.

## 2.7 Relays

Ivy has 4 GPIO controlled photo relays, which can be accessed on field connector J5. These relays should be used with +/- 32V. See the table below for pinout and GPIO information.

Table 9: Photo relay GPIO signal and J5 pinout information.

| Photo Relay | GPIO Signal (High to enable) | SODIMM #  | J5 Pin number | Signal   |
|-------------|------------------------------|-----------|---------------|----------|
| PR1         | REL1                         | SODIMM 60 | 3             | PR_OUT1A |
|             |                              |           | 4             | PR_OUT1B |
| PR2         | REL2                         | SODIMM 62 | 5             | PR_OUT2A |
|             |                              |           | 6             | PR_OUT2B |
| PR3         | REL3                         | SODIMM 64 | 7             | PR_OUT3A |
|             |                              |           | 8             | PR_OUT3B |
| PR4         | REL4                         | SODIMM 66 | 9             | PR_OUT4A |
|             |                              |           | 10            | PR_OUT4B |

## 2.8 ADC/Analog Inputs

Analog inputs on connector J13 can be used for single-ended or differential measurements. The rating of the ADC is 0-32V, 0-20mA. The analog inputs are isolated in the Ivy Plus and non-isolated in the Ivy.

The ADC used on Ivy is part number ADS1119, and is accessed through the I2C4 interface (SODIMM 93 and 95).

AINx\_MODE signal is used to select between single-ended and differential measurement modes:

- AINx\_MODE=0 for single-ended/voltage measurement
- AINx\_MODE=1 for differential/current measurement
- AIN1\_MODE is on SODIMM 216.
- AIN2\_MODE is on SODIMM 218.

Signals AIN1\_DRDY (SODIMM 220) and AIN2\_DRDY (SODIMM 222) are active low digital outputs from the ADC which notifies the processor that new conversion data is ready. AINx\_DRDY transitions high when conversion result is latched for output transmission.

The table below show the pinout information for J5.

Table 10: Analog input signals and J5 pinout information.

| Analog Input | J5 Pin number | Signal         |
|--------------|---------------|----------------|
| AIN1         | 1             | AIN1-          |
|              | 2             | AIN1+          |
| N/A          | 17            | PWR1(Vin/0.1A) |
|              | 18            | PWR2(Vin/0.1A) |
| AIN2         | 19            | AIN2-          |
|              | 20            | AIN2+          |

## 2.9 Digital Inputs

Ivy has 2 optically isolated digital inputs. These inputs activate at 5V, with a maximum input voltage rating of +/-32V. These digital inputs can be accessed through the field connector J5. See the table below for pinout and GPIO information.

Table 11: Digital input GPIO signals and J5 pinout information.

| Digital Input | GPIO Signal | SODIMM #  | Pin number | Signal |
|---------------|-------------|-----------|------------|--------|
| DIO1          | DIGI_1      | SODIMM 54 | 11         | DIO1-  |
|               |             |           | 12         | DIO1+  |
| DIO2          | DIGI_2      | SODIMM 56 | 13         | DIO2-  |
|               |             |           | 14         | DIO2+  |

## 2.10 Extension Connector

The extension connector on the Ivy board is a 2×8 16 position IDC connector. The extension connector has 3 power rails (5V, 3.3V, 1.8V), ground, SPI interface with dedicated SPI\_CS signal, I2C1 and I2C4 interfaces, 2 GPIOs, and power enable signal. Below is a table of the pinout of the extension connector.

Table 12: Extension connector J2 signal and pinout information.

| Pin Number | Signal                | Voltage Level |
|------------|-----------------------|---------------|
| 1,2        | GND                   | N/A           |
| 3          | 3V3                   | 3.3V          |
| 4          | 5V                    | 5V            |
| 5          | PWR_EN                | 1.8V          |
| 6          | 1V8                   | 1.8V          |
| 7          | SPI_CLK               | 1.8V          |
| 8          | GPIO2<br>(SODIMM 208) | 1.8V          |
| 9          | SPI_MOSI              | 1.8V          |
| 10         | GPIO1<br>(SODIMM 206) | 1.8V          |
| 11         | SPI_MISO              | 1.8V          |
| 12         | SPI_CS                | 1.8V          |
| 13         | I2C1_SCL              | 1.8V          |
| 14         | I2C4_SCL              | 1.8V          |
| 15         | I2C1_SDA              | 1.8V          |
| 16         | I2C4_SDA              | 1.8V          |



## 2.11 Miscellaneous Peripherals

Below is a table that lists general peripherals and their corresponding Verdin interfaces.

Table 13: Miscellaneous peripherals

| Peripheral     | Part Number | Verdin Interface         | Notes                                    |
|----------------|-------------|--------------------------|------------------------------------------|
| USB OTG        | N/A         | USB_1                    |                                          |
| USB Hub        | CYUSB3304   | USB_2                    |                                          |
| Ethernet       | N/A         | ETH_1                    |                                          |
| Ethernet2      | DP83867     | ETH_2_RGMII              | Address 0x02, autoneg, 2ns RX clock skew |
| TPM            | SLM9670     | SPI_1                    | GPIO1 (SODIMM 206) used for chip select  |
| FRAM           | MB85RS256   | SPI_1                    | GPIO4 (SODIMM 212) used for chip select  |
| Temp Sens      | TMP1075     | I2C_1                    | Address 0x4F                             |
| EEPROM         | AT24C256C   | I2C_1                    | Address 0x57                             |
| SD Card        | N/A         | SD_1                     |                                          |
| MIPI DSI       | N/A         | DSI_1                    |                                          |
| MiniPCle       | N/A         | PCIE_1<br>I2C_1<br>USB_2 |                                          |
| USB 3.0 Type A | N/A         | Top USB_2<br>Bot USB_2   |                                          |

## 2.12 Buttons

Buttons S1 and S2 provide a means to reset the SOM module, and put the SOM into recovery mode.

S1 – Reset button. Pressing S1 will issues reset to SOM module.

S2 – Recovery button. Used to enter recovery mode for Linux image reflash.

## 3 Operating Conditions

### 3.1 Operating Temperature Range

-40°C to 85°C

## 4 Product Compliance

Up-to-date information about product compliance such as RoHS, CE, UL-94, Conflict Mineral, REACH, etc. can be found on our [website](#)

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