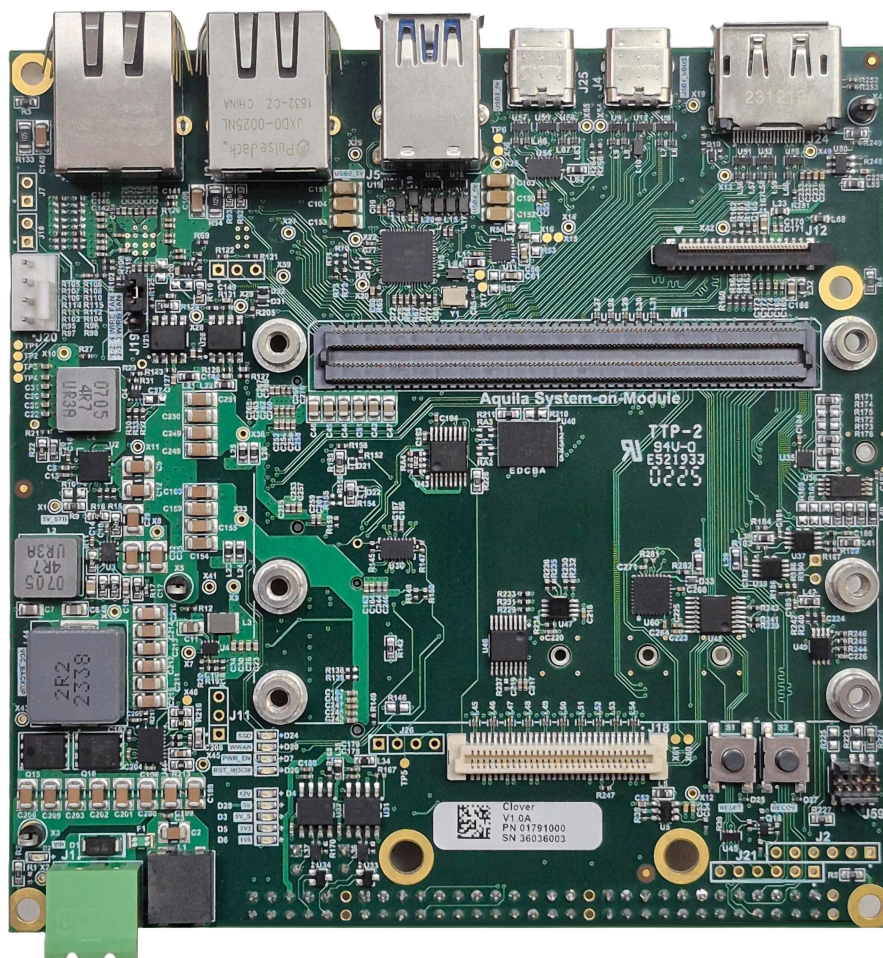


Clover Carrier Board

HW Datasheet

Preliminary – Subject to Change



Revision History

Document Revisions

Date	Doc. Revision	Product Version	Changes
30-May-2025	Rev. 0.1	V1.0A	Initial documentation
22-Oct-2025	Rev. 0.2	V1.0A	Section 3.3 : update connector manufacturer and part number

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1 Introduction

The Clover Carrier Board provides an efficient and versatile design tailored for seamless integration within the Aquila system-on-module family. Its scalable nature ensures optimal performance during large-scale production runs, maintaining high efficiency and reliability while offering ease of customization in diverse industrial computing environments.

1.1 Reference Documents

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

1.1.1 Aquila System-On-Module

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

1.1.2 Aquila Family Specification

<https://docs.toradex.com/102492-layout-design-guide.pdf>

1.1.3 Aquila Carrier Board Design Guide

https://tezi.toradex.com/artifactory/website-hwdocs-prod-frankfurt/aquila/design-resources/design_guide_prerelease/n_a/rev_0_2/aquila_carrier_board_design_guide.pdf

1.1.4 Toradex Developer Website – Aquila System-on-Module Documents

<https://developer.toradex.com/hardware/aquila-som-family/modules/>

1.1.5 Carrier Board Layout Guide

<https://docs.toradex.com/102492-layout-design-guide.pdf>

1.1.6 Pushbutton On/Off Controller Datasheet

<https://www.analog.com/media/en/technical-documentation/data-sheets/2954fb.pdf>

1.1.7 EEPROM Datasheet

<https://www.st.com/resource/en/datasheet/m24c02-w.pdf>

1.1.8 Temperature Sensor Datasheet

<https://www.ti.com/lit/ds/symlink/tmp1075.pdf>

1.1.9 USB HUB Datasheet

<https://ww1.microchip.com/downloads/aemDocuments/documents/UNG/ProductDocuments/DataSheets/USB5744-Data-Sheet-DS00001855.pdf>

1.1.10 Gigabit Ethernet Transceiver Datasheet

<https://www.ti.com/lit/gpn/dp83867is>

1.1.11 USB Type-C Configuration Channel Logic IC Datasheet

<https://www.ti.com/lit/gpn/TUSB321AI>

1.1.12 TPM Datasheet

https://www.infineon.com/dgdl/Infineon-SLM%209670-DataSheet-v01_00-EN.pdf?fileId=5546d46269e1c019016a21819cc80c93

1.1.13 FQSPI Flash Datasheet

<https://www.macronix.com/Lists/Datasheet/Attachments/8707/MX25UM25645G,%201.8V,%20256Mb,%20v1.1.pdf>

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

Continued on next page

Table 1: Abbreviations (Continued)

Abbreviation	Explanation
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
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 ² 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

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Table 1: Abbreviations (Continued)

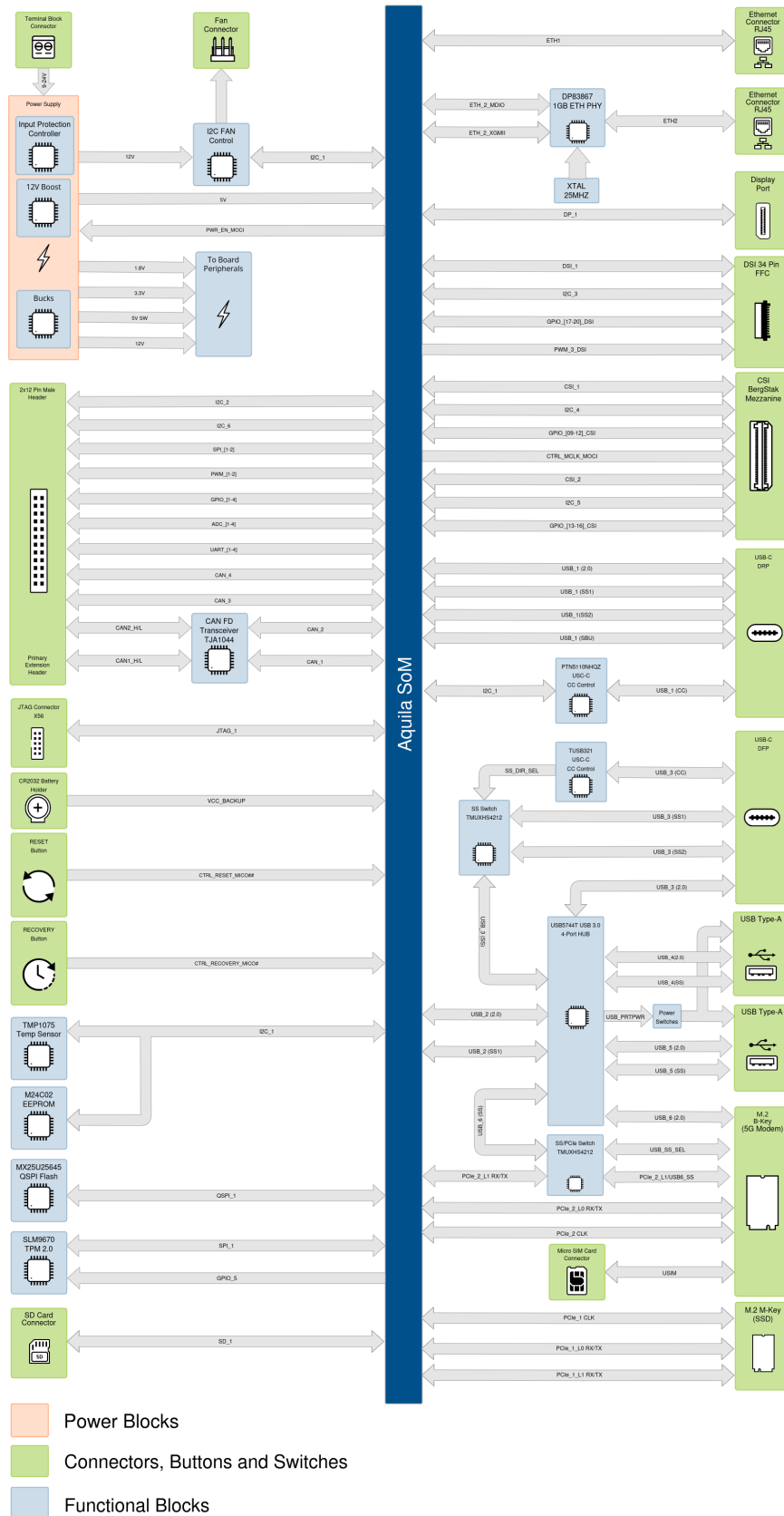
Abbreviation	Explanation
UART	Universal Asynchronous Receiver/Transmitter, serial interface, in combination with a transceiver an RS232, RS422, RS485, IrDA or similar interface can be achieved
USB	Universal Serial Bus, serial interface for internal and external peripherals

2 Features

2.1 Overview

- Supports all Toradex Aquila SOMs
- Nano-ITX Form Factor
- Power:
 - DC 9-24V
- Operating temperature range: -40°C to 85°C (Except DisplayPort connector -20°C to 85°C)
- Size: 120mm x 120mm
- 1x MicroSD Card Reader
- 1x USB-C OTG
- 1x USB-C DFP
- 2x USB-A 3.0
- 1x Gigabit Ethernet to SoM
- 1x Gigabit Ethernet SGMII (DP83867)
- 1x M.2 Key B for WWAN Module (USB 3.0, PCIe)
- 1x M.2 Key M for SSD (PCIe)
- 1x 34 Pin MIPI DSI display (Toradex DSI display compatible)
- 1x CSI Daughter Board connector for 2x CSI
- 2x non-isolated CAN
 - 1x 2.54mm 10 pin female CAN header
- 1x Temperature Sensor (TMP1075)
- 1x 256B EEPROM (M24C02)
- 1x TPM2.0 (SLM9670)
- 1x RTC Battery Holder (CR927, CR1025)
- 1x DisplayPort
- 2x 2.54mm 24 Pin main headers
 - 4x ADC
 - 2x PWM
 - 2x UART
 - 4x GPIO
 - 2x I2C
 - 2x SPI
 - 2x Tamper
 - 5V, 3V3, 1V8 power

2.2 Hardware Architecture Block Diagram



2.3 Physical Drawing

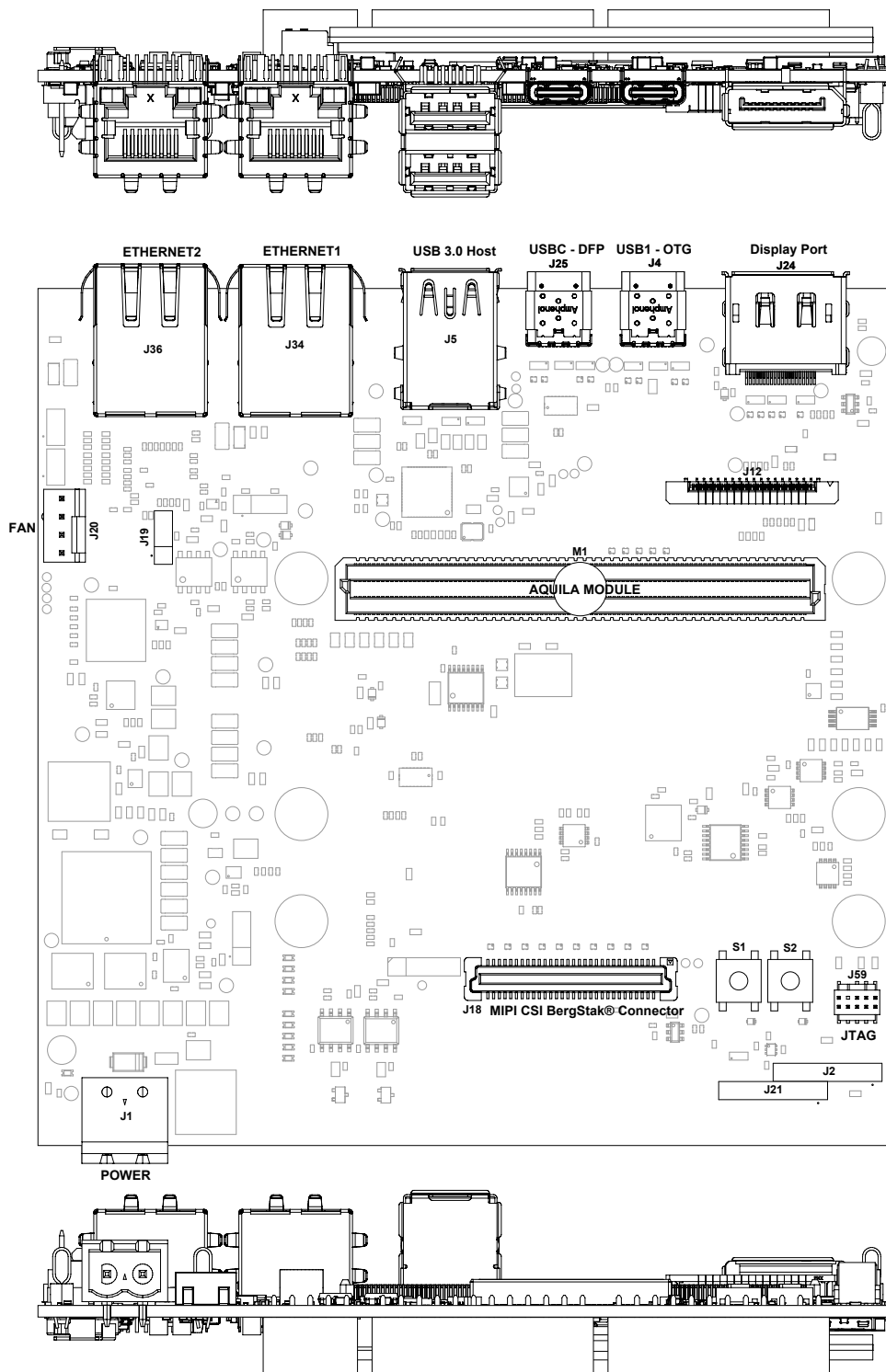
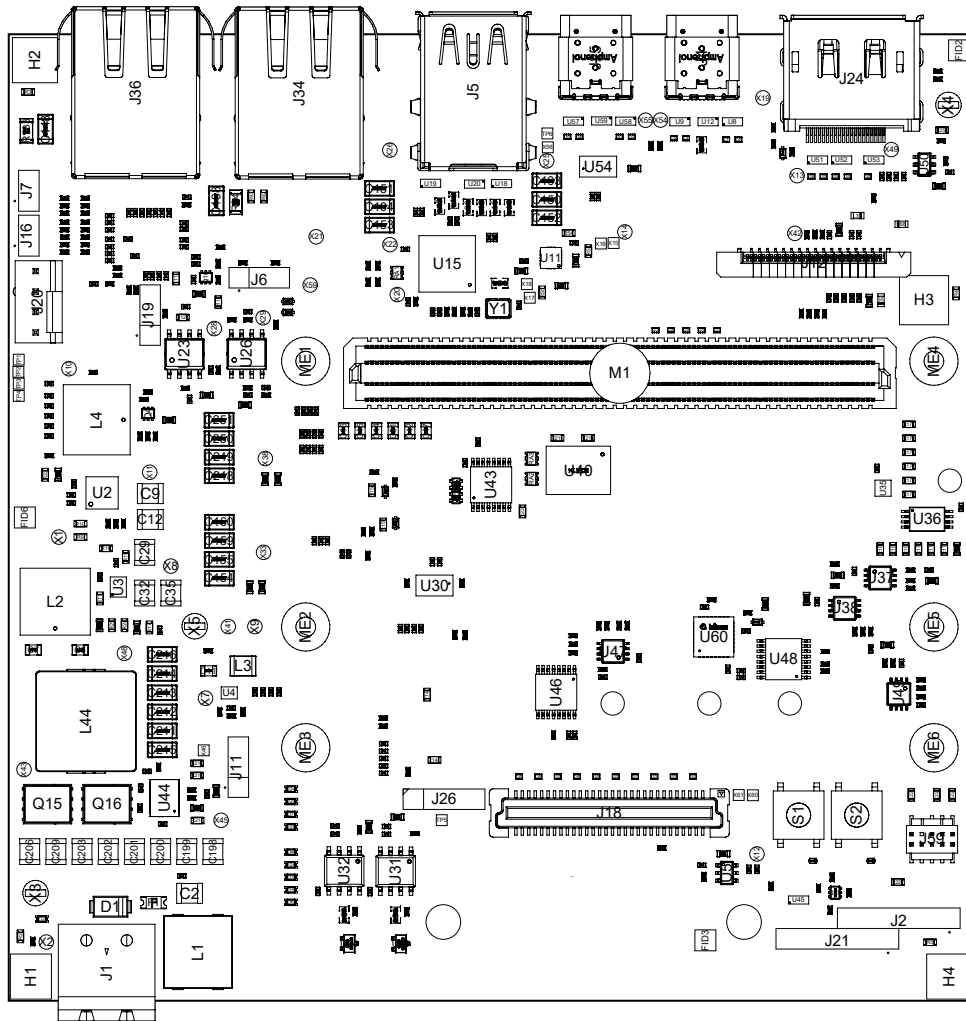


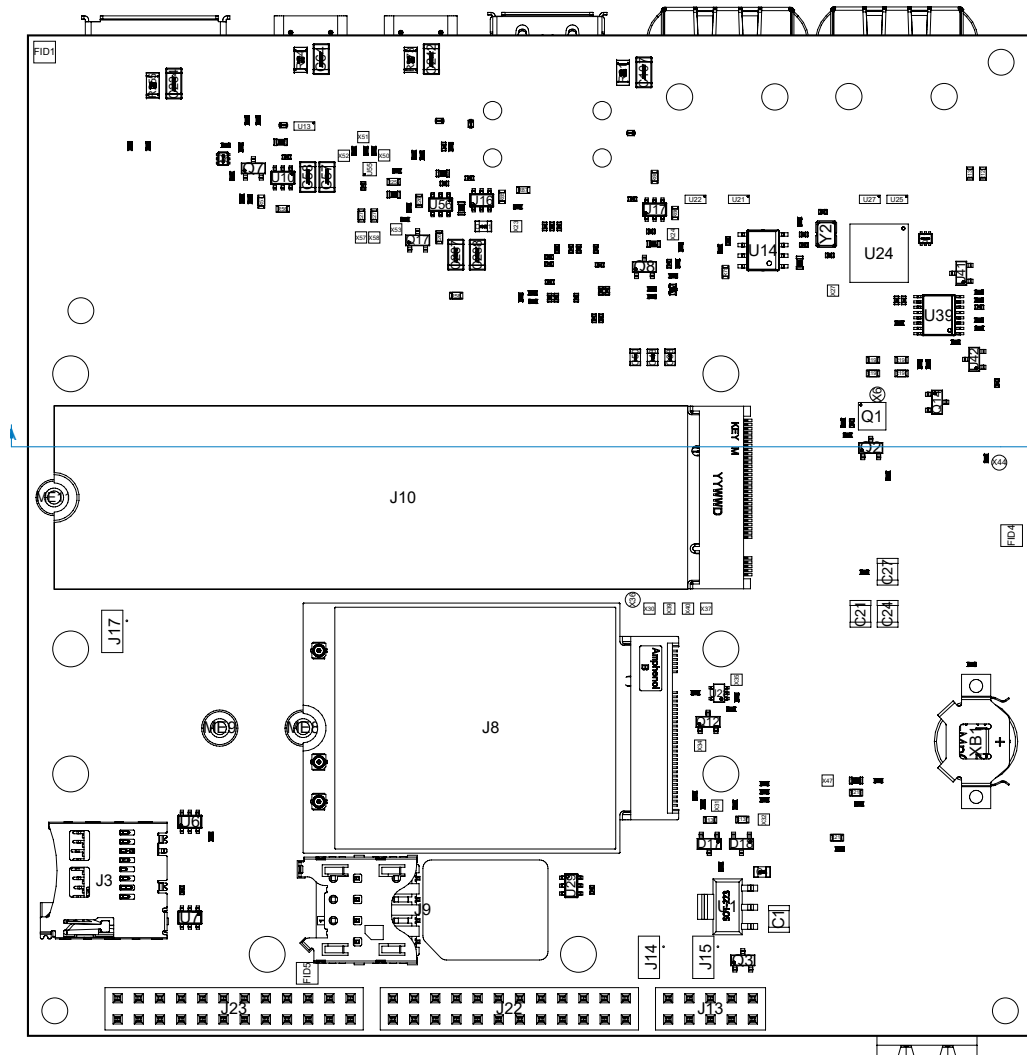
Table 2: Table of Clover Carrier Board Connectors

Connector	Manufacturer	Part Number	Side	Description
XB1	Keystone	3030TR	Bottom	Battery holder coin CR927/CR1025
J1	Phoenix Contact	1923759	Top	2 pin block term. Power input
J2	N/A	N/A	Top	DNP 2.54mm header for FTDI TTL 232R-3V3 console connection
J3	GCT	MEM2052-00-195-00-A	Bottom	Micro SD card reader
J4, J25	Amphenol	12401826E412A	Top	USB-C OTG and USB-C DFP
J5	Amphenol	GSB4112312HR	Top	Stacked USB-A 3.0
J8	Amphenol	MDT420B01001	Bottom	M.2 Key B connector
J9	Molex	787231001	Bottom	SIM Card connector
J10	Amphenol	10128798-005RLF	Bottom	M.2 Key M connector
J12	Amphenol	F314-1A7H1-11034	Top	MIPI DSI connector for Toradex Capacitive Touch Display
J13	Wurth	61301021821	Bottom	CAN header
J14, J15	Amphenol	67996-200HLF	Bottom	CAN term jumper header
J18	Amphenol	10144517-061802LF	Top	Board to board stack connector for CSI camera adapter card
J19	Amphenol	68001-203HLF	Top	Fan 3-wire/4-wire selection jumper header
J20	Molex	470531000	Top	4-pin fan header
J21	N/A	N/A	Top	UART 3/4 depopulated header for console
J22, J23	Wurth	61302421821	Bottom	Main headers
J24	Molex	472720001	Top	DisplayPort
J34, J36	Pulse	JXD0-0025NL	Top	Ethernet
J59	Samtec	FTSH-105-01-L-DV-007-K	Top	JTAG
M1	Samtec	APM6-100-01.5-L-04-0-A-FR	Top	Aquila SOM connector

2.3.1 Top Side Connectors



2.3.2 Bottom Side Connectors



3 Interface Description

3.1 Aquila System-on-Module

Connector Type: Samtec, APM6-100-01.5-L-04-0-A-FR

For the pinout of the Aquila SoM being used, please refer to the applicable Aquila SoM datasheet.

3.2 Aquila Interface Mapping

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

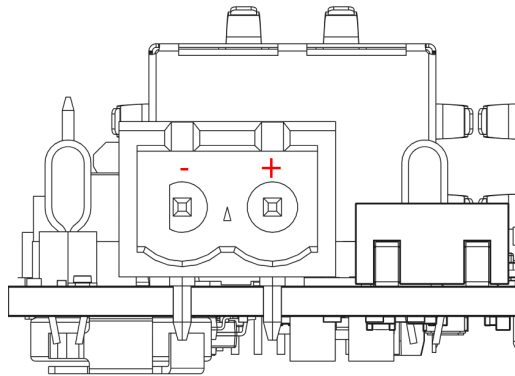
Table 3: Aquila Interface Mapping Table

Peripheral	Part Number	Aquila Interface	Notes
USB OTG	N/A	USB_1	
USB Hub	USB5744	USB_2	
Ethernet	N/A	ETH_1	
Ethernet2	DP83867	ETH_2_XGMII	Address 0x04, autoneg, 2ns RX clock skew
TPM	SLM9670	SPI_1	GPIO5 (AQUILA C21) used for chip select
FLASH	MX25U256	QSPI_1	
Temperature Sensor	TMP1075	I2C_1	Address 0x4F
EEPROM	M24C02-FDW6TP	I2C_1	Address 0x57
SD Card	N/A	SD_1	
MIPI DSI	N/A	DSI_1	
M.2 Key M	N/A	PCIE_1	
M.2 Key B	N/A	PCIE_2 / I2S_2 / USB_6	USB6_SS or extra PCIe_2 lanes available through multiplexer using CONFIG_0, CONFIG_3 M.2 Card pins
USB 3.0 Type A	N/A	USB4	
USB 3.0 Type S	N/A	USB5	
MIPI DSI	N/A	DSI	
Temperature and Fan Control	AMC6821	I2C_1	
DisplayPort	N/A	DP_1	

3.3 Power Supply

Power to the Clover board should be 9 to 24V. Estimated power consumption of the Clover board is up to 70W. Power consumption varies with type of SOM, connected peripherals (especially type and number of connected USB devices). Fuse F1 is installed on the power input line, located near power connector, with a rating of 15A.

Connector type: Phoenix Contact 1923759



3.4 LEDs Indicators

Figure 1: Location of LEDs on Board

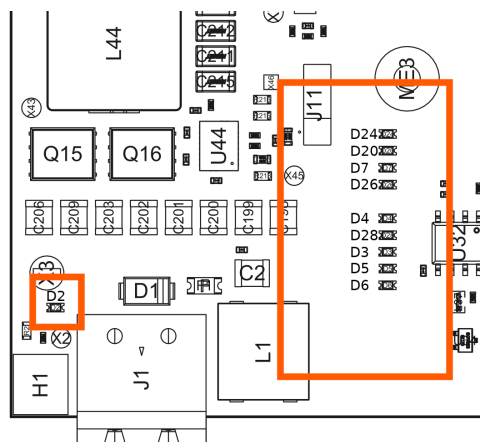


Table 4: LED designators and description

LED	Color	Side	Function – LED is on when:
D2	Green	Top	Input Voltage applied
D3	Green	Top	Switched 5 V Active
D4	Green	Top	12 V Boost Converter Active
D5	Green	Top	3.3 V Buck Converter Active
D6	Green	Top	1.8 V Buck Converter Active
D7	Green	Top	Power to board enabled (Power Enable HIGH)
D20	Green	Top	M.2 Key B LED_1#

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Table 4: LED designators and description (Continued)

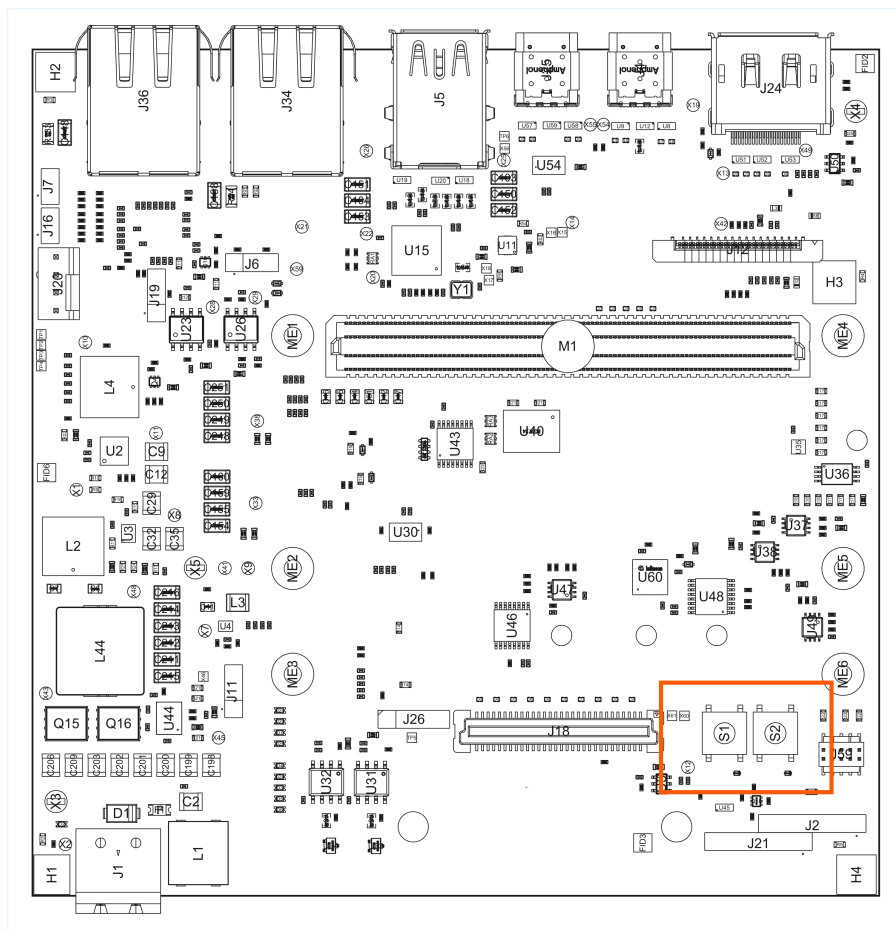
LED	Color	Side	Function – LED is on when:
D24	Green	Top	M.2 Key M LED_1#
D26	Red	Top	Reset State LED
D28	Green	Top	5V Step-Down DC/DC Active

3.5 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 image re-flash.

Figure 2: Location of Buttons on Board



3.6 USB

3.6.1 USB_1: USB-C DRP Connector

Connector Type: USB-C, Amphenol 12401826E412A

The Clover carrier board incorporates a USB-C connector J4, linked to the Aquila USB_1 port (USB 2.0 interface only). This USB_1 port is primarily utilized in recovery mode to enable software loading onto the module, operating as a dual-role-port (DRP) for both host and client functions.

This behavior is similar to the On-The-Go (OTG) functionality. Unlike previous setups, the USB Type-C receptacle lacks the ID pin. Function determination in Type C is managed via the configuration channel (CC) pins, which perform similar functions to the old ID pin. The CC pins also detect whether the connection is being made or whether it is interrupted.

The USB dual-role-port chip PTN5110NHQZ is responsible for managing all connection processes, including determining the port role based on the CC pins that mirror the micro-A/B ID pin behavior. The CC negotiation is handled by the PTN5110NHQZ through the I2C_1 interface. Refer to the PTN5110NHQZ datasheet for further details.

Table 5: USB-C DRP Connector (J4)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Description
A1	GND		PWR		
A2	USB_1_SSTX1_P	A64	O		Positive differential USB 3.x transmit signal
A3	USB_1_SSTX1_N	A65	O		Negative differential USB 3.x transmit signal
A4	USB1_VBUS	B76	PWR	+5V	+5V USB power input/output
A5	USB_CC1				USB-C configuration channel signal 1
A6	USB_1_D_P	A70	I/O		Positive differential USB 2.0 signal
A7	USB_1_D_N	A71	I/O		Negative differential USB 2.0 signal
A8	USB_1_SBU1	A68			USB-C SideBand Use 1
A9	USB1_VBUS	B76	PWR	+5V	+5V USB power output
A10	USB_1_SSRX2_N	A73	I		Negative differential USB 3.x receive signal
A11	USB_1_SSRX2_P	A74	I		Positive differential USB 3.x receive signal
A12	GND		PWR		
B1	GND		PWR		
B2	USB_1_SSTX2_P	A76	O		Positive differential USB 3.x transmit signal
B3	USB_1_SSTX2_N	A77	O		Negative differential USB 3.x transmit signal
B4	USB1_VBUS	B76	PWR	+5V	+5V USB power output
B5	USB_CC2				USB-C configuration channel signal 2
B6	USB_1_D_P	A70	I/O		Positive differential USB 2.0 signal
B7	USB_1_D_N	A71	I/O		Negative differential USB 2.0 signal
B8	USB_1_SBU2	A67			USB-C SideBand Use 2
B9	USB1_VBUS	B76	PWR	+5V	+5V USB power output
B10	USB_1_SSRX1_N	A62	I		Negative differential USB 3.x receive signal
B11	USB_1_SSRX1_P	A61	I		Positive differential USB 3.x receive signal
B12	GND		PWR		

Continued on next page

Table 5: USB-C DRP Connector (J4) (Continued)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Description
SH1	GND		PWR		
SH2	GND		PWR		
SH3	GND		PWR		
SH4	GND		PWR		

3.6.2 USB_3: USB-C DFP Connector

Connector Type: USB-C, Amphenol 12401826E412A

Table 6: USB-C DFP Connector (J25)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Description
A1	GND		PWR		
A2	USB_3_SSTX1_N	O			Negative differential USB 3.x transmit signal
A3	USB_3_SSTX1_P	O			Positive differential USB 3.x transmit signal
A4	USB_3_VBUS	PWR		+5V	+5V USB power output
A5	USB_3_CC1				USB-C configuration channel signal 1
A6	USB_3_P	I/O			Positive differential USB 2.0 signal
A7	USB_3_N	I/O			Negative differential USB 2.0 signal
A8	NC				Not Connected
A9	USB_3_VBUS	PWR		+5V	+5V USB power output
A10	DFP_SSRX2_N	I			Negative differential USB 3.x receive signal
A11	DFP_SSRX2_P	I			Positive differential USB 3.x receive signal
A12	GND		PWR		
B1	GND		PWR		
B2	DFP_SSTX2_P	O			Positive differential USB 3.x transmit signal
B3	DFP_SSTX2_N	O			Negative differential USB 3.x transmit signal
B4	USB_3_VBUS	PWR		+5V	+5V USB power output
B5	USB_CC2				USB-C configuration channel signal 2
B6	USB_3_P	I/O			Positive differential USB 2.0 signal
B7	USB_3_N	I/O			Negative differential USB 2.0 signal
B8	NC				Not Connected
B9	USB_3_VBUS	PWR		+5V	+5V USB power output
B10	DFP_SSRX1_P	I			Positive differential USB 3.x receive signal
B11	DFP_SSRX1_N	I			Negative differential USB 3.x receive signal
B12	GND		PWR		
SH1	GND				
SH2	GND				
SH3	GND				
SH4	GND				

3.6.3 USB_4 and USB_5: USB-A Connector

Connector Type: Stacked USB 3.0 Type-A, Amphenol GSB41123XXHR

Pins with the 'U' prefix belong to the UPPER port, pins starting with 'L' connect to the LOWER port.

Table 7: USB-A Connector Stack (J5)

Pin	Signal Name	I/O Type	Voltage	Description
U1	USB4_5V	PWR	+5V	+5V USB power output
U2	USB4_N	I/O		Negative differential USB 2.0 signal
U3	USB4_P	I/O		Positive differential USB 2.0 signal
U4	GND	PWR		
U5	USB4_SSRX_N	I		Negative differential USB 3.x receive signal
U6	USB4_SSRX_P	I		Positive differential USB 3.x receive signal
U7	GND	PWR		
U8	USB4_SSTX_N	O		Negative differential USB 3.x transmit signal
U9	USB4_SSTX_P	O		Positive differential USB 3.x transmit signal
L1	USB5_5V	PWR	+5V	+5V USB power output
L2	USB5_N	I/O		Negative differential USB 2.0 signal
L3	USB5_P	I/O		Positive differential USB 2.0 signal
L4	GND	PWR		
L5	USB5_SSRX_N	I		Negative differential USB 3.x receive signal
L6	USB5_SSRX_P	I		Positive differential USB 3.x receive signal
L7	GND	PWR		
L8	USB5_SSTX_N	O		Negative differential USB 3.x transmit signal
L9	USB5_SSTX_P	O		Positive differential USB 3.x transmit signal
S1	GND	PWR		
S2	GND	PWR		
S3	GND	PWR		
S4	GND	PWR		

3.7 Ethernet

The Clover Board provides 2x RJ45 connectors with integrated magnetics for 10/100/1000Mb Ethernet. The Ethernet_1 transceiver is located on the SoM while the Ethernet_2 transceiver is placed on the Clover Board. Some modules may not feature both Ethernet interfaces. Please refer to the datasheet of the respective Aquila SoM.

3.7.1 Ethernet_1 Connector

Connector Type: RJ45, JXD1-0025NL

Table 8: Ethernet 1 Connector (J34)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Description
1	GND		PWR		
2	ETH_1_MDI3_N	A98	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 3
3	ETH_1_MDI3_P	A97	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 3
4	ETH_1_MDI2_N	A95	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 2
5	ETH_1_MDI2_P	A94	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 2
6	ETH_1_MDI1_N	A92	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 1
7	ETH_1_MDI1_P	A91	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 1
8	ETH_1_MDI0_N	A89	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 0
9	ETH_1_MDI0_P	A88	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 0
10	NC				Not Connected
11	3V3		PWR	+3.3V	
12	ETH_1_LED2	A99	O (OD)		LED for indication established Ethernet link
13	3V3		PWR	+3.3V	
14	ETH_1_LED1	A100	O (OD)		LED for indication Ethernet activity
S	GND		PWR		

3.7.2 Ethernet_2 Connector

The Ethernet_2 interface is based on the DP83867ISRZ 10/100/1000 Mbps Ethernet PHY which is using ETH_2_XGMII interface of the module. For more information, refer to the DP83867ISRZ IC datasheet. This PHY is configured at MDIO address 0x04, with autonegotiation enabled and a 2ns RX clock skew applied for optimal timing alignment.

Connector Type: RJ45, JXD1-0025NL

Table 9: Ethernet 2 Connector (J36)

Pin	Signal Name	I/O Type	Voltage	Description
1	GND	PWR		
2	ETH_2_D3_N	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 3
3	ETH_2_D3_P	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 3
4	ETH_2_D2_N	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 2
5	ETH_2_D2_P	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 2

Continued on next page

Table 9: Ethernet 2 Connector (J36) (Continued)

Pin	Signal Name	I/O Type	Voltage	Description
6	ETH_2_D1_N	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 1
7	ETH_2_D1_P	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 1
8	ETH_2_D0_N	I/O (Analog)		Negative differential Media Dependent Interface signal, lane 0
9	ETH_2_D0_P	I/O (Analog)		Positive differential Media Dependent Interface signal, lane 0
10	NC			Not Connected
11	3V3	PWR	+3.3V	
12	ETH_2_LED2	O (OD)		LED for indication established Ethernet link
13	3V3	PWR	+3.3V	
14	ETH_2_LED1	O (OD)		LED for indication Ethernet activity
5	GND	PWR		

3.8 M.2

3.8.1 M.2 B-Key

Connector type: Amphenol MDT420B01001



USB6_SS or extra PCIe_2 lanes available through multiplexer using CONFIG_0, CONFIG_3 of the M.2 B Card pins.
 For PCIe Selection: CONFIG_0 - high (NC) CONFIG_3 - high (NC) OR CONFIG_0 - low (NC) CONFIG_3 - low (NC)
 For SS selection: CONFIG_0 - low (GND) CONFIG_3 - high (NC)

Table 10: M.2 Key B Connector (J8)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up / Pull-down	Description
1	CONFIG_3		O		10k to 3.3V	Config 0 and 3 control whether the PCIe or USB3 is selected
2	M2B_3V3		PWR	+3.3V		+3.3V Power input
3	GND		PWR			
4	M2B_3V3		PWR	+3.3V		+3.3V Power input
5	GND		PWR			
6	FULL_CARD_POWER_OFF#		PWR	+3.3V	1.87k to M2B_3V3	Set to high to not turn off WWAN
7	USB6_P		I/O			Positive differential USB 2.0 signal
8	W_DISABLE#		PWR	+3.3V	27k to 1V8	Set to high to not disable WWAN
9	USB6_N		I/O			Negative differential USB 2.0 signal
10	GPIO9DASDSSLED_1#		PWR	+3.3V	1.87k to M2B_3V3	WWAN status indicator LED
11	GND		PWR			
12	NC					Not Connected
13	NC					Not Connected
14	NC					Not Connected
15	NC					Not Connected

Continued on next page

Table 10: M.2 Key B Connector (J8) (Continued)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up / Pull-down	Description
16	NC					Not Connected
17	NC					Not Connected
18	NC					Not Connected
19	NC					Not Connected
20	I2S_2_BCLK	B26				Serial audio bit clock
21	CONFIG_0		PWR		10k to 3.3V	Config 0 and 3 control whether the PCIe or USB3 is selected
22	I2S_2_D_OUT	B28	O			Serial audio output data
23	GPIO_11		I/O			Connected to Secondary Extension Header
24	I2S_2_D_IN	B29	I			Serial audio input data
25	NC					Not Connected
26	GPIO_10		I/O			Connected to Secondary Extension Header
27	GND		PWR			
28	I2S_2_SYNC	B27	O			Synchronization / field select / left-right channel select
29	PCIE_2_L1_RX_N / USB6_SSRX_N	C32	O			Negative differential PCIe Lane 1 or USB6 receive signal
30	UIM_RST		O			SIM Card RESET
31	PCIE_2_L1_RX_P / USB6_SSRX_P	C31	O			Positive differential PCIe Lane 1 or USB6 receive signal
32	UIM_CLK		O			SIM Card Clock
33	GND		PWR			
34	UIM_DATA		I/O			SIM Card Data
35	PCIE_2_L1_TX_N / USB6_SSTX_N	D34	I			Negative differential PCIe Lane 1 or USB6 transmit signal
36	UIM_PWR		PWR			SIM Card Power
37	PCIE_2_L1_TX_P / USB6_SSTX_P	D33	I			Positive differential PCIe Lane 1 or USB6 transmit signal
38	GND		PWR			
39	GND		PWR			
40	NC					Not Connected
41	PCIE_2_L0_RX_N	C29	O			Negative differential PCIe Lane 0 receive signal
42	NC					
43	PCIE_2_L0_RX_P	C28	O			Positive differential PCIe Lane 0 receive signal
44	NC					Not Connected
45	GND		PWR			
46	GPIO_3		I/O			Connected to Secondary Extension Header
47	PCIE_2_L0_TX_N	D31	I			Positive differential PCIe Lane 0 transmit signal
48	GPIO_4		I/O			Connected to Secondary Extension Header
49	PCIE_2_L0_TX_P	D30	I			Negative differential PCIe Lane 0 transmit signal
50	PCIE_2_RESET#	C35	I			Active-low reset signal

Continued on next page

Table 10: M.2 Key B Connector (J8) (Continued)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up / Pull-down	Description
51	GND		PWR			
52	PCIE_2_CLKREQ	C34	I			Clock request signal
53	PCIE_2_CLK_N	D28	I			
54	PCIE_WAKE#	C36	I			Active-low wake signal from the module
55	PCIE_2_CLK_P	D27	I			
56	NC					Not Connected
57	GND		PWR			
58	NC					Not Connected
59	NC					Not Connected
60	NC					Not Connected
61	NC					Not Connected
62	NC					Not Connected
63	NC					Not Connected
64	NC					Not Connected
65	NC					Not Connected
66	UIM_PWR		PWR			SIM Detect
67	RESET#		PWR	+1.8V		+1.8V Power input
68	NC					Not Connected
69	NC					Not Connected
70	M2B_3V3		PWR	+3.3V		+3.3V Power input
71	GND		PWR			
72	M2B_3V3		PWR	+3.3V		+3.3V Power input
73	GND		PWR			
74	M2B_3V3		PWR	+3.3V		+3.3V Power input
75	NC					Not Connected

3.8.2 SIM Card Reader

Connector type: Micro-SIM, Molex 0787231001

Table 11: Micro SIM Connector (J9)

Pin	Signal Name	I/O Type	Description
C1	UIM_PWR	PWR	SIM Card Power
C2	UIM_RST	I	SIM Card RESET
C3	UIM_CLK	I	SIM Card Clock
C4	NC		Not Connected
C5	GND	PWR	
C6	NC		Not Connected

Continued on next page

Table 11: Micro SIM Connector (J9) (Continued)

Pin	Signal Name	I/O Type	Description
C7	UIM_DATA	I/O	SIM Card Data
C8	NC		Not Connected
9	GND	PWR	

3.8.3 M.2 M-Key

Connector type: Amphenol 10128798-005RLF

Table 12: M.2 Key M Connector (J10)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
1	GND					
2	M2M_3V3			+3.3V		+3.3V Power input
3	GND					
4	M2M_3V3			+3.3V		+3.3V Power input
5	NC					Not connected
6	NC					Not connected
7	NC					Not connected
8	NC					Not connected
9	GND					
10	M2M_3V3			+3.3V		+3.3V Power input (LED)
11	NC					Not connected
12	M2M_3V3			+3.3V		+3.3V Power input
13	NC					Not connected
14	M2M_3V3			+3.3V		+3.3V Power input
15	GND					
16	M2M_3V3			+3.3V		+3.3V Power input
17	NC					Not connected
18	M2M_3V3			+3.3V		+3.3V Power input
19	NC					Not connected
20	NC					Not connected
21	GND					
22	NC					Not connected
23	NC					Not connected
24	NC					Not connected
25	NC					Not connected
26	NC					Not connected
27	GND					
28	NC					Not connected
29	PCIE_1_L1_RX_N	C44				Negative differential PCIe receive signal

Continued on next page

Table 12: M.2 Key M Connector (J10) (Continued)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
30	NC					Not connected
31	PCIE_1_L1_RX_P	C43				Positive differential PCIe receive signal
32	NC					Not connected
33	GND					
34	NC					Not connected
35	PCIE_1_L1_TX_N	D43				Negative differential PCIe transmit signal
36	NC					Not connected
37	PCIE_1_L1_TX_P	D42				Positive differential PCIe transmit signal
38	DEVSLP				27K to GND	Controls ultra-low power sleep mode
39	GND					
40	SMB_DATA				1.87k to 1V8	Data line for SMBus communication with management devices
41	PCIE_1_L0_RX_N	C41				Negative differential PCIe receive signal
42	SMB_CLK				1.87k to 1V8	Clock signal for SMBus communication timing
43	PCIE_1_L0_RX_P	C40				Positive differential PCIe receive signal
44	M2M_ALERT#				1.87k to 1V8	Active-low alert signal from device to host
45	GND					
46	NC					Not connected
47	PCIE_1_L0_TX_N	D40				Negative differential PCIe transmit signal
48	NC					Not connected
49	PCIE_1_L0_TX_P	D39				Positive differential PCIe transmit signal
50	PCIE_1_RESET#	C38				PCIE 1 Reset signal
51	GND					
52	PCIE_1_CLKREQ	C37			27k to 1V8	PCIE 1 clock request
53	PCIE_1_CLK_N	D37				Negative differential PCIe reference clock signal
54	PCIE_WAKE#	C36				PCIE wake signal
55	PCIE_1_CLK_P	D36				Positive differential PCIe reference clock signal
56	NC					Not connected
57	GND					
58	NC					Not connected
59	NC					Not connected
60	NC					Not connected
61	NC					Not connected
62	NC					Not connected
63	NC					Not connected
64	NC					Not connected
65	NC					Not connected
66	NC					Not connected

Continued on next page

Table 12: M.2 Key M Connector (J10) (Continued)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
67	NC					Not connected
68	NC					Not connected
69	NC					Not connected
70	M2M_3V3			+3.3V		+3.3V Power input
71	GND					
72	M2M_3V3			+3.3V		+3.3V Power input
73	GND					
74	M2M_3V3			+3.3V		+3.3V Power input
75	GND					

3.9 Display Interface

The Clover carrier board provides multiple options for connecting displays and monitors, with the following interfaces supported on compatible Aquila modules:

- DisplayPort
- MIPI DSI

3.9.1 DisplayPort

Connector: DisplayPort®, Right-Angle, Surface Mount, Molex 47272-0001

Table 13: DisplayPort Connector (J24)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
1	DP_1_LANE0_P	A59	O			Positive differential DP data signal, Lane 0
2	GND		PWR			
3	DP_1_LANE0_N	A58	O			Negative differential DP data signal, Lane 0
4	DP_1_LANE1_P	A56	O			Positive differential DP data signal, Lane 1
5	GND		PWR			
6	DP_1_LANE1_N	A55	O			Negative differential DP data signal, Lane 1
7	DP_1_LANE2_P	A53	O			Positive differential DP data signal, Lane 2
8	GND		PWR			
9	DP_1_LANE2_N	A52	O			Negative differential DP data signal, Lane 2
10	DP_1_LANE3_P	A50	O			Positive differential DP data signal, Lane 3
11	GND		PWR			
12	DP_1_LANE3_N	A49	O			Negative differential DP data signal, Lane 3
13	CONF1		I		100K to GND	DP Control Lane 1
14	CONF2		I		100K to GND	DP Control Lane 2
15	DP_1_AUX_P	A47	I/O		100K to GND	Positive DisplayPort auxiliary channel
16	GND		PWR			

Continued on next page

Table 13: DisplayPort Connector (J24) (Continued)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
17	DP_1_AUX_N	A46	I/O		100K to DP_3V3	Negative DisplayPort auxiliary channel
18	DP_1_HPD	B59	I		100K to GND	Hot Plug Detect signal from display to source
19	RETURN		PWR		100K to GND	
20	DP_3V3		PWR	+3.3V		
S1	GND		PWR		1M to GND	Shield
S2	GND		PWR		1M to GND	Shield
S3	GND		PWR		1M to GND	Shield
S4	GND		PWR		1M to GND	Shield

3.9.2 MIPI DSI Connector

Connector: Amphenol F314-1A7H1-11034

Table 14: MIPI DSI Connector (J12)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
1	GND		PWR			
2	DSI_1_D0_P	A44				Positive differential DSI data 0 signal
3	DSI_1_D0_N	A43				Negative differential DSI data 0 signal
4	GND		PWR			
5	DSI_1_D1_P	A41				Positive differential DSI data 1 signal
6	DSI_1_D1_N	A40				Negative differential DSI data 1 signal
7	GND		PWR			
8	DSI_1_CLK_P	A38				Positive differential DSI clock signal
9	DSI_1_CLK_N	A37				Negative differential DSI clock signal
10	GND		PWR			
11	DSI_1_D2_P	A35				Positive differential DSI data 2 signal
12	DSI_1_D2_N	A34				Negative differential DSI data 2 signal
13	GND		PWR			
14	DSI_1_D3_P	A32				Positive differential DSI data 3 signal
15	DSI_1_D3_N	A31				Negative differential DSI data 3 signal
16	GND		PWR			
17	GPIO_20_DSI_1	B45		IO_VREF	10K to GND	
18	PWM_3_DSI	B46		IO_VREF	10K to GND	Backlight brightness control
19	GPIO_17_DSI_1	B42		IO_VREF	Pull-up required on display	
20	I2C_3_DSI1_SCL	B41		IO_VREF	1.87K to 1V8	I2C DSI clock
21	I2C_3_DSI1_SDA	B40		IO_VREF	1.87K to 1V8	I2C DSI data
22	GPIO_18_DSI_1	B43		IO_VREF	10K to 1V8	
23	1V8_DSI		PWR	+1.8V		+1.8V Power input
24	1V8_DSI		PWR	+1.8V		+1.8V Power input

Continued on next page

Table 14: MIPI DSI Connector (J12) (Continued)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
25	3V3		PWR	+3.3V		+3.3V Power input
26	5V		PWR	+5V		+5V Power input
27	5V		PWR	+5V		+5V Power input
28	5V		PWR	+5V		+5V Power input
29	5V		PWR	+5V		+5V Power input
30	GND		PWR			
31	RFU					Reserved for Future use
32	RFU					Reserved for Future use
33	RFU					Reserved for Future use
34	RFU					Reserved for Future use
SH1	GND		PWR			Shield
SH2	GND		PWR			Shield
SH3	GND		PWR			Shield
SH4	GND		PWR			Shield

3.10 SD Card Reader

Connector Type: GTC MEM2052-00-195-00-A

Table 15: SD Card Connector (J3)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Description
1	SD_1_D2	A10	I/O	+3.3V	Serial Data 2
2	SD_1_D3	A08	I/O	+3.3V	Serial Data 3
3	SD_1_CMD	A07	O		Command
4	SD_1_PWR_EN	A06	PWR	+3.3V	SD Card power input
5	SD_1_CLK	A05	O	+3.3V	Serial Clock
6	GND		PWR		
7	SD_1_D0	A03	I/O	+3.3V	Serial Data 0
8	SD_1_D1	A02	I/O	+3.3V	Serial Data 1
9	SD_1_CD#	A01	I	+3.3V	Card Detect
10	GND		PWR		
11	GND		PWR		
12	GND		PWR		
13	GND		PWR		

3.11 CAN Transceivers

Clover is equipped with two non-isolated CAN transceivers, each featuring 120 ohm termination resistors configured via jumpers J14 and J15 for CAN bus 1 and CAN bus 2, respectively. Both buses are accessible through header J13. Additionally, the same header provides CAN Rx/Tx pins for buses 3 and 4 sourced from the Aquila SoM.



The CAN Rx/Tx are 1V8.

Figure 3: Location of CAN bus 1 (J14) and CAN bus 2 (J15), and J13 Pin Positions

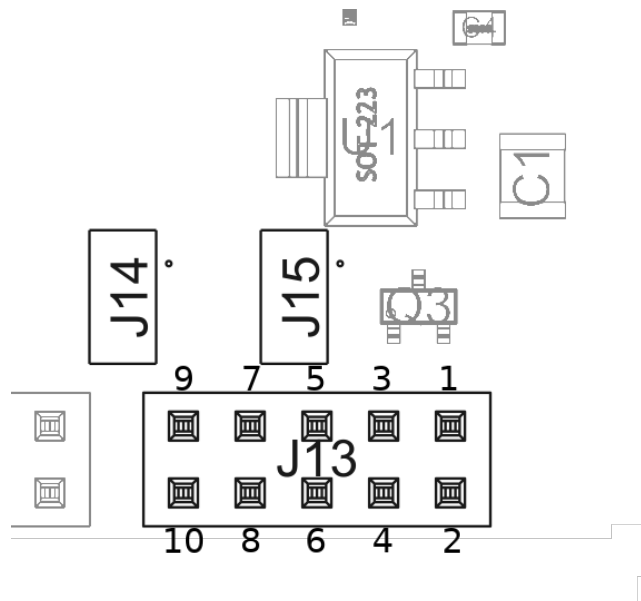


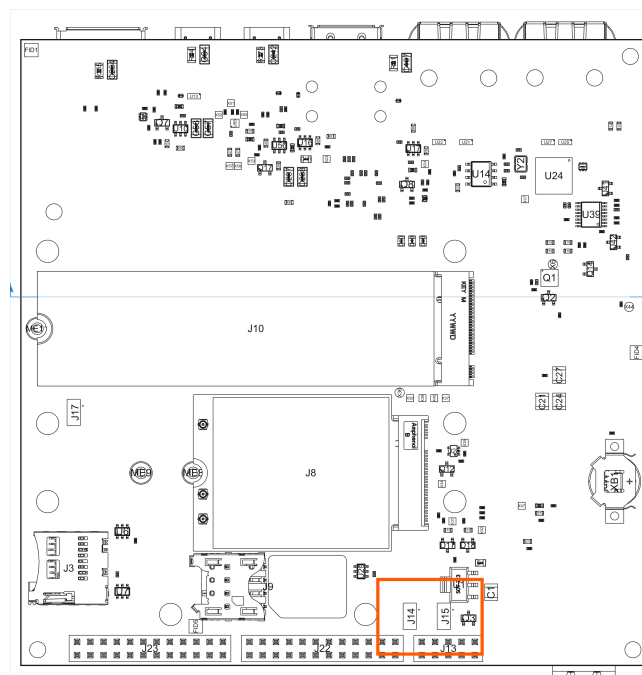
Table 16: CAN Connectors

CAN ID	Signal Name	BTB Pin
1	CAN_1_TX	B48
1	CAN_1_RX	B49
2	CAN_2_TX	B50
2	CAN_2_RX	B51
3	CAN_3_TX	B53
3	CAN_3_RX	B54
4	CAN_4_TX	B55
4	CAN_4_RX	B56

Table 17: CAN Bus Pinout Connectors (J13)

J13 Pin Number	Signal Name
1	CAN_4_TX
2	CAN_4_RX
3	CAN_3_TX
4	CAN_3_RX
5	5V_CAN_A
6	GND
7	CAN_2_H
8	CAN_2_L
9	CAN_1_H
10	CAN_1_L

Figure 4: Bus 1 and 2 (J14 / J15)



3.12 UART Connectors

The Clover Carrier Board features 4 UART interfaces that are connected to the following connectors:

- UART1: connected to the extension header
- UART2: connected to the extension header
- UART3: connected to J2 and J21, exposed pins
- UART4: connected to J21, exposed pins



The depopulated header J21 can be used with a FTDI TTL-232R-3V3 cable.

Figure 5: Location of J2 and J21 Headers on Board

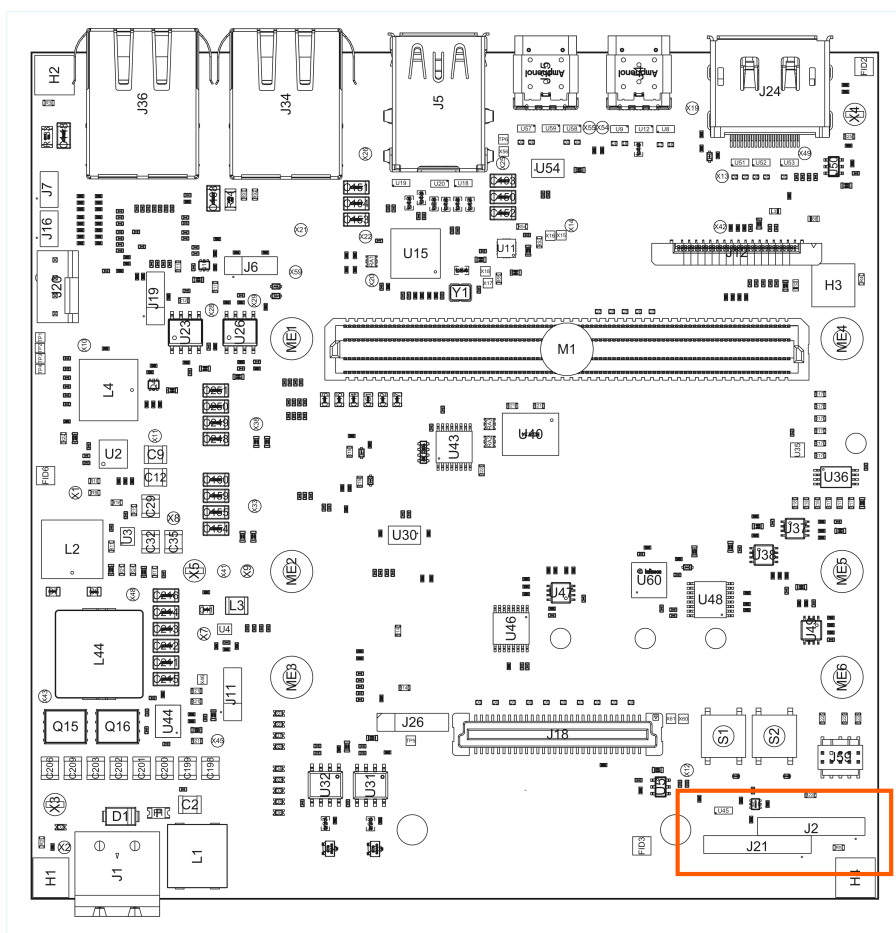


Figure 6: Location of J22 Header on Board

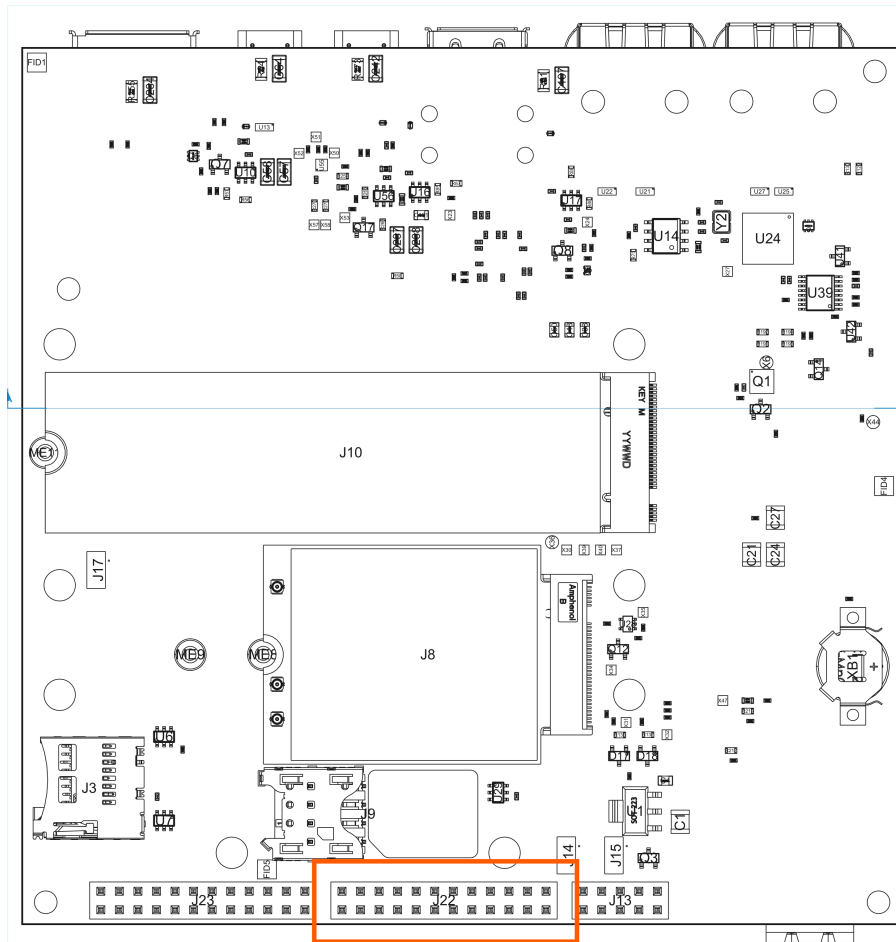


Table 18: UART Connectors

UART ID	Signal Name	BTB Pin	Header ID	Header Pin	I/O Type	Description
1	UART_1_RXD	B35	J22	9	I	UART1 receive data input
1	UART_1_CTS	B36	J22	10	I	UART1 clear to send input
1	UART_1_TXD	B37	J22	11	O	UART1 transmit data output
1	UART_1_RTS	B38	J22	12	O	UART1 request to send output
2	UART_2_RXD	B31	J22	13	I	UART2 receive data input
2	UART_2_CTS	B32	J22	14	I	UART2 clear to send input
2	UART_2_TXD	B33	J22	15	O	UART2 transmit data output
2	UART_2_RTS	B34	J22	16	O	UART2 request to send output
3	UART_3_RXD	D19	J2 / J21	3 / 4	I	UART3 receive data input
3	UART_3_TXD	D20	J2 / J21	4 / 5	O	UART3 transmit data output
4	UART_4_RXD	D21	J21	5	I	UART4 receive data input
4	UART_4_TXD	D22	J21	6	O	UART4 transmit data output

3.13 Main Expansion Connectors

The Clover board is equipped with expansion headers designed to provide access to interfaces available on the SOM. All signals on these expansion connectors (excluding 3V3 power) are sourced from or operate within the 1.8V domain.

Figure 7: Main Expansion Headers Pin Positions

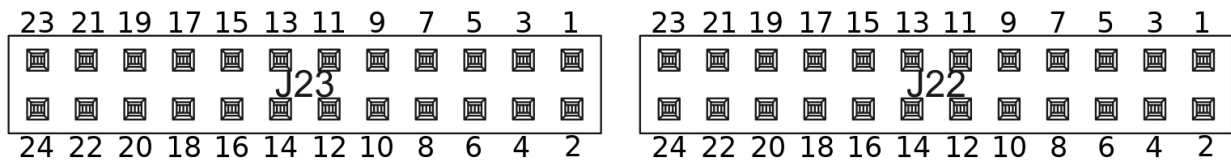


Table 19: Main Expansion Header (J22)

Pin Number	Signal	SOM Interface
1	ADC_1	ADC_1
2	ADC_2	ADC_2
3	ADC_3	ADC_3
4	ADC_4	ADC_4
5	GND	Power
6	GND	Power
7	PWM_1	PWM_1
8	PWM_2	PWM_2
9	UART_1_RXD	UART_1
10	UART_1_CTS	UART_1
11	UART_1_TXD	UART_1
12	UART_1_RTS	UART_1
13	UART_2_RXD	UART_2
14	UART_2_CTS	UART_2
15	UART_2_TXD	UART_2
16	UART_2_RTS	UART_2
17	Not Connected	
18	Not Connected	
19	Not Connected	
20	Not Connected	
21	1V8	Power
22	3V3	Power
23	GND	Power

Table 20: Main Expansion Header (J23)

Pin Number	Signal	SOM Interface
1	GPIO_01	GPIO_01
2	GPIO_02	GPIO_02
3	GPIO_03	GPIO_03
4	GPIO_04	GPIO_04
5	GND	Power
6	GND	Power
7	I2C_2_SDA	I2C_2
8	I2C_6_SDA	I2C_6
9	I2C_2_SCL	I2C_2
10	I2C_6_SCL	I2C_6
11	SPI_1_CS	SPI_1
12	SPI_1_CLK	SPI_1
13	SPI_1_MISO	SPI_1
14	SPI_1_MOSI	SPI_1
15	SPI_2_CS	SPI_2
16	SPI_2_CLK	SPI_2
17	SPI_2_MISO	SPI_2
18	SPI_2_MOSI	SPI_2
19	CTRL_TAMPER0	Tamper
20	CTRL_TAMPER1	Tamper
21	1V8	Power
22	3V3	Power
23	GND	Power
24	5V_S	Power

3.14 MIPI CSI Expansion Connector

The Clover board has a MIPI CSI Expansion Connector that can be used for connecting compatible camera modules or other image sensor devices that support the MIPI CSI interface. This allows for integration of video input capabilities suitable for applications such as computer vision, image processing, and other range of solutions.

Connector type: BergStak® Connector, Amphenol 10144517-061802LF

Table 21: MIPI CSI Connector (J18)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
1	GND		PWR			
2	GND		PWR			
3	CSI_C2_D3_P	B02	I			Positive differential MIPI CSI data signal, group 2, lane 3
4	CSI2_SDA	C05	I/O		Pulled-down via level shifter	MIPI CSI 2 camera control I2C bus data
5	CSI_C2_D3_N	B03	I			Negative differential MIPI CSI data signal, group 2, lane 3
6	CSI2_SCL	C06	I/O		Pulled-down via level shifter	MIPI CSI 2 camera control I2C bus clock
7	GND		PWR			
8	CAM_2_CON_RST	C01	O		100k to GND	Camera 2 RESET
9	CSI_C2_D2_P	B05	I			Positive differential MIPI CSI data signal, group 2, lane 2
10	CAM_2_CON_PWRCTRL	C02	O		100k to GND	MIPI CSI 2 Power Supply Control
11	CSI_C2_D2_N	B06	I			Negative differential MIPI CSI data signal, group 2, lane 2
12	CAM_2_CON_IC_DETECT	C03	I		100k to GND	MIPI CSI 2 Camera Identification
13	GND		PWR			
14	CAM_2_CON_PWRDWN	C04	O		100k to GND	MIPI CSI 2 Camera Power Down
15	CSI_C2_CLK_P	B08	O			Positive differential MIPI CSI 2 reference clock signal
16	GND		PWR			
17	CSI_C2_CLK_N	B09	O			Negative differential MIPI CSI 2 reference clock signal
18	CAM_MCLK	A14	O			MIPI CSI camera master clock
19	GND		PWR			
20	GND		PWR			
21	CSI_C2_D1_P	B11	I			Positive differential MIPI CSI data signal, group 2, lane 1
22	CSI1_SDA	A12	I/O		Pulled-down via level shifter	MIPI CSI 1 camera control I2C bus data
23	CSI_C2_D1_N	B12	I			Negative differential MIPI CSI data signal, group 2, lane 1
24	CSI1_SCL	A13	I/O		Pulled-down via level shifter	MIPI CSI 1 camera control I2C bus clock
25	GND		PWR			
26	CAM_1_CON_RST	B17	O		100k to GND	MIPI CSI 1 camera RESET
27	CSI_C2_D0_P	B14	I			Positive differential MIPI CSI data signal, group 2, lane 0

Continued on next page

Table 21: MIPI CSI Connector (J18) (Continued)

Row	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
28	CAM_1_CON_PWRCTRL	B19	O		100k to GND	MIPI CSI 1 Power Supply Control
29	CSI_C2_D0_N	B15	I			Negative differential MIPI CSI data signal, group 2, lane 0
30	CAM_1_CON_IC_DETECT	A11	I		100k to GND	MIPI CSI 1 Camera Identification
31	GND		PWR			
32	CAM_1_CON_PWRDWN	B18	O		100k to GND	MIPI CSI 1 Camera Power Down
33	CSI_C1_D3_P	A16	I			Positive differential MIPI CSI data signal, group 1, lane 3
34	1V8		PWR	+1.8V		
35	CSI_C1_D3_N	A17	I			Negative differential MIPI CSI data signal, group 1, lane 3
36	1V8		PWR	+1.8V		
37	GND		PWR			
38	GND		PWR			
39	CSI_C1_D2_P	A19	I			Positive differential MIPI CSI data signal, group 1, lane 2
40	GND		PWR			
41	CSI_C1_D2_N	A20	I			Negative differential MIPI CSI data signal, group 1, lane 2
42	3V3		PWR	+3.3V		
43	GND		PWR			
44	3V3		PWR	+3.3V		
45	CSI_C1_CLK_P	A22	I			Positive differential MIPI CSI 1 reference clock signal
46	GND		PWR			
47	CSI_C1_CLK_N	A23	I			Negative differential MIPI CSI 1 reference clock signal
48	GND		PWR			
49	GND		PWR			
50	5V_S		PWR	+5V		
51	CSI_C1_D1_P	A25	I			Positive differential MIPI CSI data signal, group 1, lane 1
52	5V_S		PWR	+5V		
53	CSI_C1_D1_N	A26	I			Negative differential MIPI CSI data signal, group 1, lane 1
54	GND		PWR			
55	GND		PWR			
56	GND		PWR			
57	CSI_C1_D0_P	A28	I			Positive differential MIPI CSI data signal, group 1, lane 0
58	VIN		PWR			
59	CSI_C1_D0_N	A29	I			Negative differential MIPI CSI data signal, group 1, lane 0
60	VIN		PWR			

3.15 Temperature Sensor

Clover carrier board features a digital temperature sensor TMP1075DSGR with an I2C interface. The sensor is connected to the I2C_1 bus. The default I2C address is 0x4F. For details, please check the TMP1075DSGR datasheet.

3.16 EEPROM

Clover features an I2C EEPROM, a 2kbit M24C02-FDW6TP is assembled onto the carrier board and is connected through the I2C_1 bus. The default I2C address is 0x57.

3.17 TPM

Clover features an Infineon SLM9670AQ20FW1311XT MA1 TPM module, which provides hardware-based protection for sensitive information and operations. For details, please check the SLM9670AQ20FW1311XT MA1 datasheet.

3.18 FQSPI Flash

Clover features a Macronix MX25UM25645G 256Mb Octa SPI NOR Flash memory, which provides high-speed, non-volatile storage for firmware, boot code, or system data. It supports up to 200 MHz operation in Octa DTR mode and includes advanced features such as block protection, secured OTP regions, and error correction capabilities. For details, please check the MX25UM25645G datasheet.

3.19 JTAG

The Clover Board provides a JTAG interface to the JTAG port available on Aquila modules. Connector J59 provides an interface to an external JTAG device via a Cortex Debug Connector, which is a 10-pin 1.27mm header. The Clover Board also has an on-board JTAG debugger feature. Please check the Clover Board schematic file for detailed information.

3.19.1 JTAG Connector

Connector Type: 2x5 Pin Shrouded Header Male, 1.27mm, Samtec FTSH-105-01-L-DV-007-K

Table 22: JTAG Connector (J59)

Pin	Signal Name	BTB Pin	I/O Type	Voltage	Pull-up/Pull-down	Description
1	JTAG_1_VREF	C12	PWR	+1.8V		1.8V reference output for JTAG adapter
2	JTAG_1_TMS	C13	I			Test Mode Select
3	GND		PWR			
4	JTAG_1_TCK	C11	I			Test Clock
5	GND		PWR			
6	JTAG_1_TDO	C10	O			Test Data Out
7	NC					Not connected
8	JTAG_1_TDI	C08	I			Test Data In
9	GND		PWR			
10	CTRL_RESET_MICO#		I (OD)			Aquila Module RESET

3.20 Backup Battery

A backup battery holder (XB1) is available on the Clover Board to provide backup power to the RTC of a Aquila module when the main power is turned off. For more details on how the backup voltage is used, please refer to the respective Aquila computer-on-module datasheet. A 10mm (diameter) coin cell/battery should be used with the Battery Holder (XB1). A coin-cell battery can be used to provide power backup to the Aquila module RTC circuit when an external power supply is not available. Supported batteries: CR1025 or compatible coin-cell batteries

4 Operating Conditions

4.1 Operating Temperature Range

Operating temperature range: -40°C to 85°C



The Display Port connector ranges from -20°C to 85°C

5 Product Compliance

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

6 Device and Documentation Legal Information

6.1 Trademarks

DisplayPort™ is a registered trademark of project VESA.

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