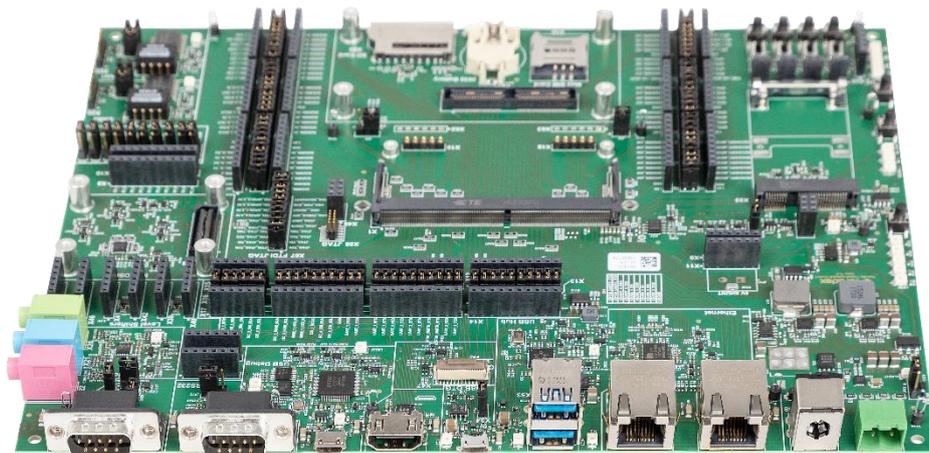




Verdin Development Board

Datasheet



Revision History

Date	Doc. Rev.	Board Version	Changes
17-Mar-2020	Rev. 0.90	V1.0	Initial Release.
27-Mar-2020	Rev. 0.91	V1.0	Table in section 3.14.2.1.5 updated with LEDs designator details Minor changes
8-Apr-2020	Rev. 0.94	V1.0	Minor cosmetic improvements

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1 Introduction

The Verdin Development Board is a flexible development board with which you can explore and evaluate the functionality and performance of the Verdin product family. Complementing the Verdin computer on module, Verdin Development Board supports a wide variety of industry-standard interfaces, while at the same time providing advanced multimedia and high-speed connectivity options making it suitable for an almost unlimited number of applications. Verdin interfaces can be easily accessed using physical connectors and standard pitch headers. The Verdin Development Board PCB is comprised of four layers, of which only one is used for high-speed signal routing. This demonstrates how Direct Breakout technology makes it incredibly easy to implement leading-edge interfaces with minimal risk and effort. CAE data for the board, including schematics, layout, and IPC-7351 compliant component libraries, are freely downloadable from the Toradex developer website.

1.1 Reference Documents

For detailed technical information about suitable computer modules, please refer to the documents listed below.

1.1.1 Verdin Computer Modules

An overview of the Verdin product family:

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

1.1.2 Pushbutton On/Off controller datasheet

<http://cds.linear.com/docs/en/datasheet/2954fb.pdf>

1.1.3 USB Hub datasheet

<http://ww1.microchip.com/downloads/en/DeviceDoc/USB5744-Data-Sheet-DS00001855G.pdf>

1.1.4 Gigabit Ethernet Transceiver datasheet

<http://ww1.microchip.com/downloads/en/DeviceDoc/00002841B.pdf>

1.1.5 RS232 Transceiver datasheet

<http://www.ti.com/lit/ds/symlink/trs3122e.pdf>

1.1.6 RS485 Transceiver datasheet

<http://www.ti.com/lit/ds/symlink/sn65hvd01.pdf>

1.1.7 Audio Codec datasheet

https://statics.cirrus.com/pubs/proDatasheet/WM8904_Rev4.0.pdf

1.1.8 Toradex Developer Website - Development Board Design

<http://developer.toradex.com/carrier-board-design>

2 Features

2.1 Overview

The Verdin Development Board provides the following features and communication interfaces:

- 2x USB 3.0 port through on-board USB HUB
- 1x USB 2.0 OTG Micro-AB connectors for host and host/client
- 1x USB Type Micro-B port (optionally connected to UART3, UART4, and JTAG via multipurpose USB to serial converter based on the FT4232HL IC)
- 2x RJ45 Ethernet 10/100/1000 Mbps ports (1x Ethernet transceiver is placed on the Development Board)
- 1x Mini PCIe Connector
- 1x Digital (TDMS) interface on HDMI connector
- 1x “Module-specific” Board Connector
- 1x MIPI-CSI Camera Interface
- 1x MIPI-DSI Display interface with a mezzanine connector that allows connecting different display adapters: DSI to HDMI, DSI to LVDS, DSI to parallel RGB, etc.
- 1x JTAG connector
- 1x 4-bit SD Card connector
- 1x I2C 2Kb EEPROM IC
- Audio I/O on 3.5mm stereo jacks (Mic IN, Line IN, Headphone OUT)
- 1x RS232 Serial Interface on a 9 pin D-Sub Connector
- 1x RS485 Serial Interface on a 9 pin D-Sub Connector
- 4x I2C, 1x SPI, 3x PWM, 4x ADC inputs
- 2x CAN interface. Both supporting Classical CAN (up to 1Mbps) and CAN FD (up to 5Mbps)
- 1x Real-time clock backup battery
- 8x GPIO
- 4x LEDs, Switches and Buttons
- 12x Bidirectional level-shifted separated I/Os (1.8V to 3.3V and vice versa)
- Power gating circuit (allows power ON and OFF control of various development board peripherals)
- Extremely flexible and easy to use low speed signal breakout and jumper area allowing easy signal re-routing, external connection, and measurement/probing
- Undervoltage, overvoltage, overcurrent and reverse voltage protected power input

2.2 Hardware Architecture Block Diagram

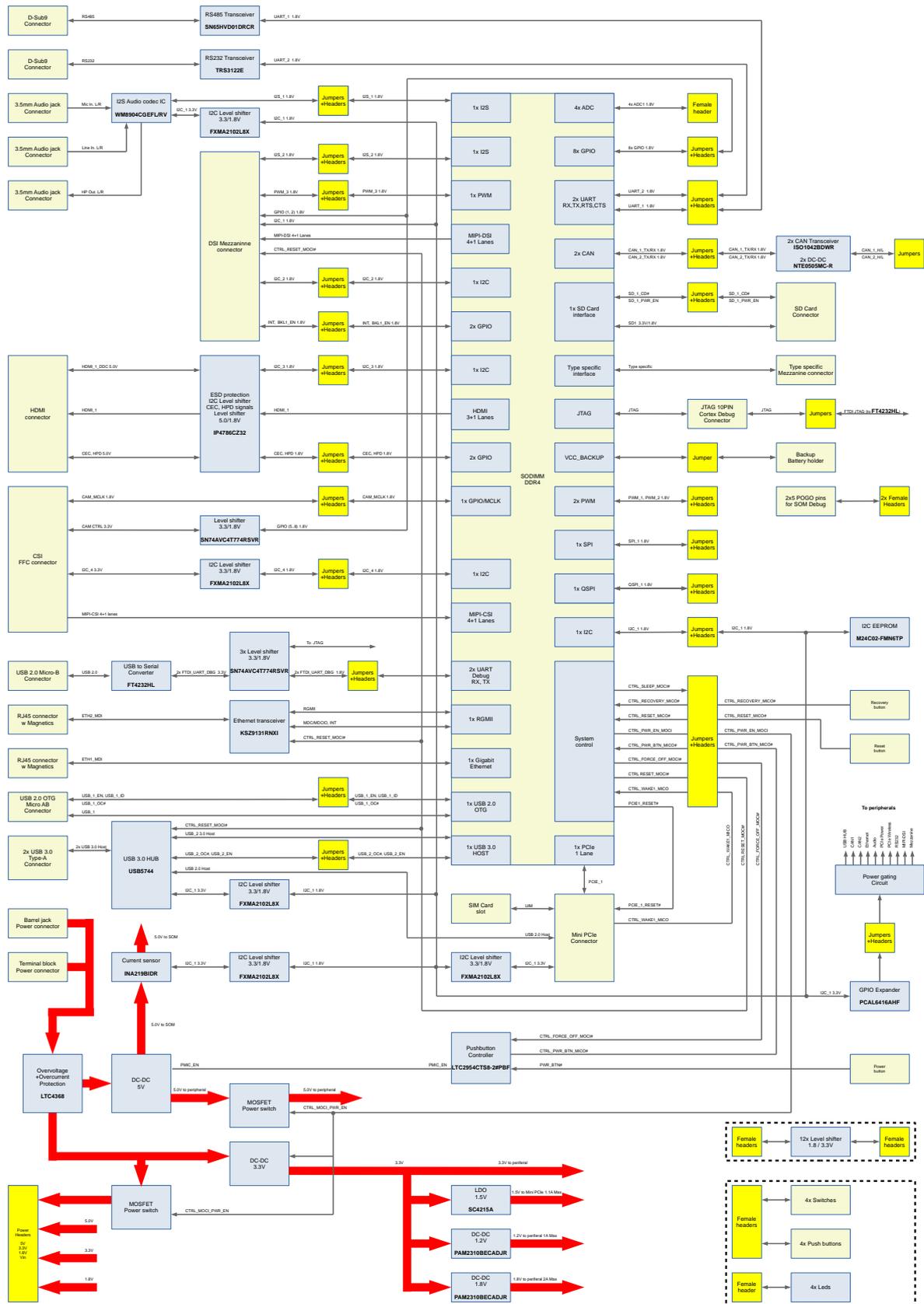


Fig.1 Verdin Development Board Hardware Architecture

2.3 Physical Drawing

2.3.1 Top Side Connectors

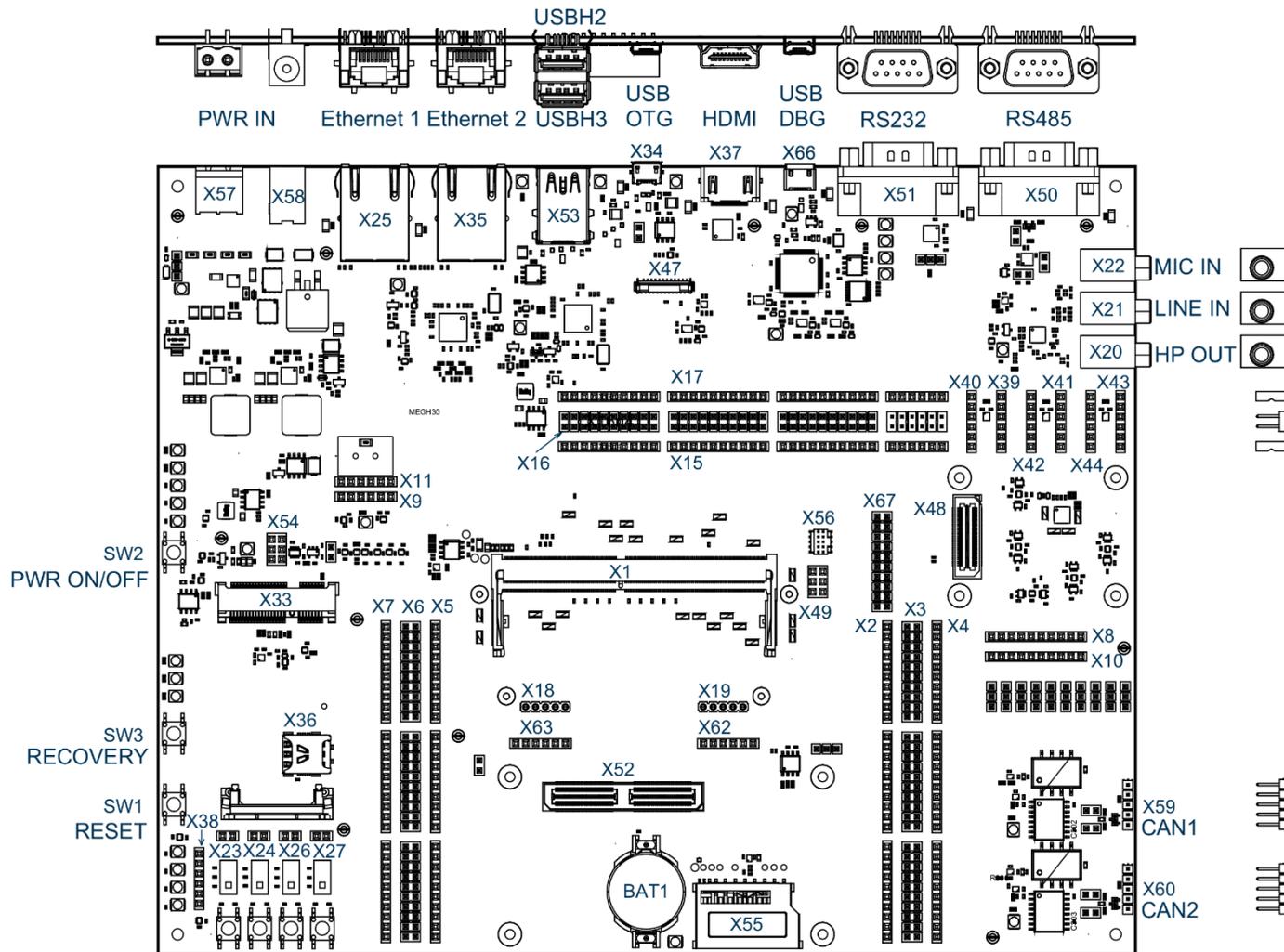


Fig.2 Verdin Development Board Connectors – Top Side

Ref	Description	Remarks
X1	Verdin SODIMM-DDR4	
X2	SODIMM breakout area 1	
X3	Jumper Array 1	
X4	Function Tap 1	
X5	SODIMM breakout area 2	
X6	Jumper Array 2	
X7	Function Tap 2	
X8	I2C GPIO Expander I/Os	
X9	Power out header	
X10	I2C GPIO Expander I/Os	
X11	Power out header	
X15	SODIMM breakout area 3	
X16	Jumper Array 3	
X17	Function Tap 3	
X18	POGO Pins	
X19	POGO Pins	
X20	Analog audio HP Out	
X21	Analog audio Line In	
X22	Analog audio Mic In	
X23	User button and switch header	
X24	User button and switch header	
X25	Ethernet connector	Ethernet_1 interface
X26	User button and switch header	
X27	User button and switch header	
X33	Mini PCIe connector	
X34	USB OTG Micro-AB connector	
X35	Ethernet connector	Ethernet_2 interface
X36	SIM Card Holder	
X37	HDMI connector	
X38	User LEDs header	
X39	Level shifter header	3.3V
X40	Level shifter header	1.8V
X41	Level shifter header	3.3V
X42	Level shifter header	1.8V
X43	Level shifter header	3.3V
X44	Level shifter header	1.8V
X47	MIPI-CSI Camera Connector	
X48	MIPI-DSI Mezzanine Board connector	
X49	ADC input header	
X50	RS485 D-Sub connector	
X51	RS232 D-Sub connector	
X52	"Module-specific" Mezzanine connector	
X53	2x USB HOST SS	UPPER: USBH3 – LOWER: USBH2

Ref	Description	Remarks
X54	Power Control Header	
X55	SD Card 4bit connector	
X56	JTAG connector	
X57	Terminal Block Power Supply Connector	Power Input: 6 – 27V
X58	Barrel Jack Power Supply Connector	Power Input: 6 – 27V
X59	CAN interface header	Isolated
X60	CAN interface header	Isolated
X62	POGO Pin Header	
X63	POGO Pin Header	
X66	USB to Serial, USB to JTAG interface connector	Type Micro-B
X67	USB to Serial, USB to JTAG interface jumper array	

3 Interface Description

3.1 Verdin Computer-On-Module

Type: SODIMM-DDR4 260 pin Socket

Manufacturer: TE-2309409-2

For the pin-out of the Verdin module, please refer to the applicable Verdin module datasheet. Spacers are available on Verdin Development Board for fixing the Verdin module with the Development Board. It is recommended to use M2x0.4 size screws to fasten Verdin module with the Spacers.

3.2 Power Supply

Verdin Development Board has two different power connectors that can be used to power the board:

X57, X58 are both wide input range connectors tied together. Input voltage can vary across a range of 6-27V

The on-board power supply provides the following supplies (maximum power).

- 5V / 8A (40W)
- 3.3V / 8A (24W)
- 1.8V/2A (3.6W)

The power supply input is protected against reverse voltage polarity, overvoltage, undervoltage and short circuits, limiting the maximum input current to about 5A. If your application dissipates more than 25W, please work with a higher input voltage, close to 24V.

Additionally, there are two power out headers X9, X11. The main system voltages are available on these and they can be used to power-up external boards or modules.

3.2.1 Terminal Block Power Supply Connector (X57)

Connector type: AUK TB5102PRB-H

Pin	Description	Voltage / Range
1	GND	
2	+V_PWR_IN_1	6 – 27V

3.2.2 Barrel Jack Power Supply Connector (X58)

Connector type: SWC RAPC722X

Pin	Description	Voltage / Range
1	+V_PWR_IN_1	6 – 27V
2	GND	

3.2.3 Power Out Header (X9)

Connector type: 1x6 Pin Header Female, 2.54mm pitch

Pin	Description	Remarks
1	+V_SUPPLY_FILT_SW	
2	+V5_SW	
3	GND	
4	+V3.3_SW	
5	+V3.3_SW	
6	+V1.8_SW	

3.2.4 Power Out Header (X11)

Connector type: 1x6 Pin Header Female, 2.54mm pitch

Pin	Description	Remarks
1	+V_SUPPLY_FILT_SW	
2	+V5_SW	
3	GND	
4	+V3.3_SW	
5	+V3.3_SW	
6	+V1.8_SW	

3.2.5 Power Control

Power control of the Verdin Development Board is implemented using the Linear LTC2954 Pushbutton On/Off controller and with the signal CTRL_PWR_EN_MOCI which is used to enable the peripheral power supplies.

For further information about the signals provided by the LTC2954 controller please refer to the datasheet. For more information regarding the power-up sequence which is implemented on the board please refer to the document "Verdin Development Board Design Guide".

The switches SW1 and SW2 have been assigned to the RESET and ON/OFF function, respectively. The SW3 is used to put the installed Verdin Computer Module into RECOVERY mode. The Power CTRL connector X54 allows the Reset and Power Button control signals to be accessed externally.

3.2.5.1 Power Control Header (X54)

Connector type: 2 x 3Pin Header Female, 2.54mm pitch

Pin No.	Signal Name	IO Type	Voltage	Pull-up/Pull-down
1	PWR_BTN#	I	+1.9V	100k to +1.9V
2	GND	PWR		
3	PWR_CTRL	I	+3.3V max	100k to GND
4	CTRL_PWR_BTN_MICO#	I	+1.8V	100k to +1.8V on SoM
5	FORCE_OFF#	I	+5V	100k to +V5_STB
6	CTRL_RESET_MICO#	I/O	+1.8V	100k to +1.8V on SoM

The pin 3 of the connector X54 can be used to override the Pushbutton controller. The following table shows the behavior of the board according to the level of the PWR_CTRL signal:

PWR_CTRL Level	Description
0V	The Pushbutton controller is working normally
3.3V	The Verdin Development Board is Always On when power is applied

3.2.5.2 Always ON Jumper (JP7)

Jumper JP7 can be used to obtain "Always On" behaviour.

Type: 1x2 Pin Header Male, 2.54 mm pitch

Jumper position	Description
OPEN	The board power supply is controlled via Power On/Off Switch.
CLOSED	The board power supply will be in the "Always On" state. Verdin Development Board will be powered-up as soon as external power is applied.

3.2.6 Power supply input protection

Supply input is protected against reverse voltage polarity, overvoltage, undervoltage and short circuits. The protection circuit is based on a LTC4368 IC from Analog Devices. For detailed information please refer to the LTC4368 datasheet.

Power supply input protection circuit absolute maximum ratings

Parameter name	Max value	Unit
Input voltage	88	V
Revers polarity input voltage	-40	V
Input current	5	A

Jumper JP23 can be used to turn ON or OFF the retry function of the power supply input protection circuit.

Type: 1x3 Pin Header Male, 2.54 mm pitch

Jumper position	Description
1-2	Power supply input will restart automatically after a forward overcurrent fault. Restart delay time is defined by capacitor C300 (55ms/nF).
2-3	Power supply input stays OFF after a forward overcurrent fault. To turn the power input again external power supply should be switched OFF an ON.

Also, current, voltage and power measurement IC27 INA219 is placed on a Verdin Development Board. This IC provides an option to measure the power consumption of a Verdin module.

3.3 Power gating circuit.

Verdin development board contains a power gating circuit. This circuit allows for switching ON and OFF separate peripheral modules and provides LEDs to show that power is applied.

There are 3 sources of power gating signals: PWR_EN_MOCI, CTRL_SLEEP_MOCI#, EX_1 – EX_10 (from I2C GPIO expander). Please note, EX_1 – EX_10 signals are inverted! **This** means that if it's high then the defined peripheral is powered down. PWR_CTRL_1 – PWR_CTRL_10 signals which are going directly to peripherals are not inverted! The source of the power gating signal for each peripheral can be chosen by jumpers.

As an GPIO expander PCAL6416AHF IC was used. For more details please refer to the PCAL6416AHF datasheet. EX_1 – EX_16 signals from GPIO expander are available on a headers X8, X10.

3.3.1 GPIO expander header (X8)

Connector type: 1x10 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	EX_1	O	+1.8V	100k to GND
2	EX_2	O	+1.8V	100k to GND
3	EX_3	O	+1.8V	100k to GND
4	EX_4	O	+1.8V	100k to GND
5	EX_5	O	+1.8V	100k to GND
6	EX_6	O	+1.8V	100k to GND
7	EX_7	O	+1.8V	100k to GND
8	EX_8	O	+1.8V	100k to GND
9	EX_9	O	+1.8V	100k to GND
10	EX_10	O	+1.8V	100k to GND

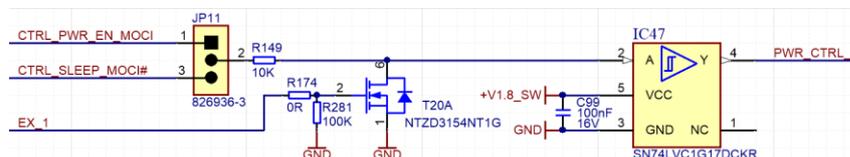


Fig.3 Part of the Power Gating Circuit

3.3.2 GPIO expander header (X10)

Connector type: 1x10 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	EX_11	O	+1.8V	100k to GND
2	EX_12	O	+1.8V	100k to GND
3	EX_13	O	+1.8V	100k to GND
4	EX_14	O	+1.8V	100k to GND
5	EX_15	O	+1.8V	100k to GND
6	EX_16	O	+1.8V	100k to GND
7	NC			
8	NC			
9	NC			
10	NC			

By using the jumpers JP11, JP14, JP15, JP16, JP17, JP18, JP19, JP20, JP21, JP22 it is possible to configure a power gating source signal.

Connector type: 1x3 Pin Header Male, 2.54 mm pitch

Designator	Jumper position	Power gating signal	GPIO expander signal	Power gated peripheral
JP11	1 - 2	CTRL_PWR_EN_MOCI	EX1	USB HUB
	2 - 3	CTRL_SLEEP_MOCI#		
JP14	1 - 2	CTRL_PWR_EN_MOCI	EX2	CAN1 2 transceiver
	2 - 3	CTRL_SLEEP_MOCI#		
JP15	1 - 2	CTRL_PWR_EN_MOCI	EX3	CAN2 2 transceiver
	2 - 3	CTRL_SLEEP_MOCI#		
JP16	1 - 2	CTRL_PWR_EN_MOCI	EX4	Ethernet 2 transceiver
	2 - 3	CTRL_SLEEP_MOCI#		
JP17	1 - 2	CTRL_PWR_EN_MOCI	EX5	Audio codec
	2 - 3	CTRL_SLEEP_MOCI#		
JP18	1 - 2	CTRL_PWR_EN_MOCI	EX6	PCIe connector
	2 - 3	CTRL_SLEEP_MOCI#		
JP19	1 - 2	CTRL_PWR_EN_MOCI	EX7	PCIe Wireless
	2 - 3	CTRL_SLEEP_MOCI#		
JP20	1 - 2	CTRL_PWR_EN_MOCI	EX8	RS232 transceiver
	2 - 3	CTRL_SLEEP_MOCI#		
JP21	1 - 2	CTRL_PWR_EN_MOCI	EX9	MIPI-DSI mezzanine board
	2 - 3	CTRL_SLEEP_MOCI#		
JP22	1 - 2	CTRL_PWR_EN_MOCI	EX10	"Module-specific" mezzanine board
	2 - 3	CTRL_SLEEP_MOCI#		

3.4 Indications

The Verdin Development Board features 26 LEDs. These indicate the status of the main power supplies and all power gated peripherals, in addition to indicating the activity of some peripherals. The LEDs and their functions are listed below.

LED No.	Description
LED1	CAN_1 transceiver power
LED2	CAN_2 transceiver power
LED3	USB OTG power (X34)
LED4	USB Host power (X53 UPPER)
LED5	USB Host power (X53 LOWER)
LED6	Indicate RESET state (CTRL_RESET_MOCI# signal is LOW).
LED8	+V5 power indicator
LED9	+V5_SW power
LED10	+V3.3_SW power
LED11	+V1.2_SW power (Power supply for USB HUB and a second Ethernet interface)
LED12	+V1.8_SW power
LED13	USB HUB power
LED14	Mini PCIe status indicator: WWAN
LED15	Mini PCIe status indicator: WLAN
LED16	Mini PCIe status indicator: WPAN
LED17	Power supply input forward Overcurrent fault
LED18	Mini PCIe connector power
LED19	Ethernet 2 transceiver power
LED20	Audio Codec power
LED26	USB Debugger power (IC41 FT4232HL)
LED27	FTDI JTAG activity
LED28	FTDI UARTC TX LED
LED29	FTDI UARTC RX LED
LED30	FTDI UARTD TX LED
LED31	FTDI UARTD RX LED

Refer to the Verdin Development Board schematics for more details.

3.5 Ethernet

The Verdin Development Board provides 2x RJ45 connectors with integrated magnetics for 10/100/1000Mb Ethernet. One Ethernet transceiver is placed on the board, the other one is located on the SoM.

3.5.1 Ethernet_1 Connector (X25)

Connector type: RJ45, BEL A829-1J1T-KM

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	ETH_1_CTREF_2				
2	ETH_1_MDI2_N	241			
3	ETH_1_MDI2_P	239			
4	ETH_1_MDI1_P	233			
5	ETH_1_MDI1_N	231			
6	ETH_1_CTREF_1				
7	ETH_1_CTREF_3				
8	ETH_1_MDI3_P	247			
9	ETH_1_MDI3_N	245			
10	ETH_1_MDI0_N	227			
11	ETH_1_MDI0_P	225			
12	ETH_1_CTREF_0				
13	ETH_1_ACT_C	237 (via R179)			
14	+V3.3_SW		PWR	+3.3V	
15	ETH_1_LINK_GB	235 (via R181)			
16	+V3.3_SW		PWR	+3.3V	
17	ETH_1_LINK_C	235 (via R180)			
S1/S2	GND_CHASSIS		PWR		

3.5.2 Ethernet_2 Connector (X35)

The Ethernet interface is based on the KSZ9131RNXI 10/100/1000 Mbps Ethernet transceiver. For more information refer to the KSZ9131RNXI IC datasheet.

Connector type: RJ45, BEL A829-1J1T-KM

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	ETH_2_CTREF_2			
2	ETH_2_MDI2_N			
3	ETH_2_MDI2_P			
4	ETH_2_MDI1_P			
5	ETH_2_MDI1_N			
6	ETH_2_CTREF_1			
7	ETH_2_CTREF_3			
8	ETH_2_MDI3_P			
9	ETH_2_MDI3_N			
10	ETH_2_MDI0_N			
11	ETH_2_MDI0_P			
12	ETH_2_CTREF_0			
13	ETH_2_ACT_C			
14	+V3.3_SW	PWR	+3.3V	
15	ETH_2_LINK_GB			
16	+V3.3_SW	PWR	+3.3V	

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
17	ETH_2_LINK_C			
S1/S2	GND_CHASSIS	PWR		

3.6 Verdin USB_1 Interface

The Verdin Development Board integrates a USB 2.0 OTG Micro-AB connector (X34). This port can work as a dual role port HOST or OTG.

Connector type: USB Micro-AB, Würth 629105150921

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	+V5_VBUS_USB_1	159	PWR	+5V	
2	USB_1_CON_D_N	163 (via L2)	I/O		
3	USB_1_CON_D_P	165 (via L2)	I/O		
4	USBO_1_ID	161	I	+1.8V	100k to +V1.8_SW
5	GND_USB_1		PWR		
S1/S2	GND_CHASSIS		PWR		
S3/S4	GND_CHASSIS		PWR		

Jumper JP24 is used to define the role of the X34 connector.

Connector type: 1x2 Pin Header Male, 2.54 mm pitch

Jumper position	Description
OPEN	The connector X34 is used as OTG
CLOSED	The connector X34 are configured as a HOST only

3.7 Verdin USB_2 Interface

The Verdin Development Board integrates a 4 port USB Hub (Microchip USB5744T-I/2G) to provide 4x USB 3.1 Gen 1 / USB 2.0 host interfaces. The HUB is connected to the Verdin USB_2 port. Port 1 of the USB Hub is disabled. On Port 4 of the USB HUB, only the USB 2.0 interface is used, and it is routed to the Mini PCIe connector (X33).

For further information about the USB Hub please refer to the Microchip website.

Also, the Verdin Development Board features 2x USB 3.0 Type A (X53) port which can be used with modules that support a USB SuperSpeed interface.

Connector type: Stacked USB 3.0 Type-A, Amphenol GSB311231HR

(Pins starting with U connect to the UPPER, pins starting with L connect to the LOWER port)

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
U1	+V5_VBUS_USBH3	PWR	+5V	
U2	USBH3_CON_D_N	I/O		
U3	USBH3_CON_D_P	I/O		
U4	GND_USBH3	PWR		
U5	USBH3_SSRX_N	I		
U6	USBH3_SSRX_P	I		
U7	GND_USBH3	PWR		
U8	USBH3_SSTX_N	O		
U9	USBH3_SSTX_P	O		
L1	+V5_VBUS_USBH2	PWR	+5V	
L2	USBH2_CON_D_N	I/O		
L3	USBH2_CON_D_P	I/O		
L4	GND_USBH2	PWR		
L5	USBH2_SSRX_N	I		
L6	USBH2_SSRX_P	I		

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
L7	GND_USBH2	PWR		
L8	USBH2_SSTX_N	O		
L9	USBH2_SSTX_P	O		
S1/S2	GND_CHASSIS	PWR		
S3/S4	GND_CHASSIS	PWR		

3.8 PCIe

The Verdin Development Board makes the standard PCIe interface on the Verdin Module available on a mini PCIe slot.

3.8.1 Mini PCIe Connector (X33)

Connector type: Mini PCIe Card Connector and Latch, Molex 67910-5700, 48099-5701

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	PCIE_1_WAKE#	252	O		
2	+V3.3_PCIE_1		PWR	+3.3V	
3	NC				
4	GND		PWR		
5	NC				
6	+V1.5_PCIE_1		PWR	+1.5V	
7	NC				
8	PCIE_1_UIM_PWR		PWR		
9	GND		PWR		
10	PCIE_1_UIM_DATA		I/O		
11	PCIE_1_CLK_N	226	I		
12	PCIE_1_UIM_CLK		O		
13	PCIE_1_CLK_P	228	I		
14	PCIE_1_UIM_RESET		O		
15	GND		PWR		
16	PCIE_1_UIM_VPP		PWR		
17	NC				
18	GND		PWR		
19	NC				
20	PCIE_1_WDISABLE#		I		47k to +V3.3_PCIE_1
21	GND		PWR		
22	PERST#	244	I		10k to +V3.3_PCIE_1
23	PCIE_1_L0_RX_N	232	I		
24	+V3.3_SW	(via L35)	PWR	+3.3V	
25	PCIE_1_L0_RX_P	234	I		
26	GND		PWR		
27	GND		PWR		
28	+V1.5_PCIE_1		PWR	+1.5V	
29	GND		PWR		
30	PCIE_1_SMCLK	12 (via IC24)	I	+3.3V	10k to +V3.3_PCIE_1

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
31	PCIE_1_L0_TX_N	238	O		
32	PCIE_1_SMDAT	14 (via IC24)	I/O	+3.3V	10k to +V3.3_PCIE_1
33	PCIE_1_L0_TX_P	240	O		
34	GND		PWR		
35	GND		PWR		
36	USBH4_D_N		I/O		
37	GND		PWR		
38	USBH4_D_P		I/O		
39	+V3.3_PCIE_1		PWR	+3.3V	
40	GND		PWR		
41	+V3.3_PCIE_1		PWR	+3.3V	
42	PCIE_1_WWLAN#		O		
43	GND		PWR		
44	PCIE_1_WLAN#		O		
45	NC				
46	PCIE_1_WPAN#		O		
47	NC				
48	+V1.5_PCIE_1		PWR	+1.5V	
49	NC				
50	GND		PWR		
51	NC				
52	+V3.3_PCIE_1		PWR	+3.3V	

3.8.2 SIM Card Holder (X36)

Connector type: NANO Sim, Molex 1042240820

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
S1	PCIE1_B_UIM_PWR	PWR		
S2	PCIE1_B_UIM_RESET	I		
S3	PCIE1_B_UIM_CLK	I		
S4	GND	PWR		
S5	PCIE1_B_UIM_VPP	PWR		
S6	PCIE1_B_UIM_DATA	I/O		
G1/G2	GND	PWR		
G3/G4	GND	PWR		

3.9 SD Card

The Verdin Development Board features a 4-bit SDIO interface. The hardware supported card detect function is implemented. It is possible to read the write-protect status by using a test point present on the PCB. Verdin family support SD Card Low Voltage Signalling. So, if the SD card itself supports this mode of communication the signalling will start with 3.3V I/O signals and after initialization will switch to 1.8V.

SD_1_PWR_EN signal allows for switching the SD card supply +V3.3_SD.

3.9.1 SD Card 4bit Connector (X19)

Connector type: SD Card, Wurth 693063020911

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	SD_1_D3	72	I/O	+1.8/3.3V	
2	SD_1_CMD	74	I	+1.8/3.3V	
3	GND		PWR		
4	+V3.3_SD		PWR	+3.3V	
5	SD_1_CLK	78	I	+1.8/3.3V	
6	GND		PWR		
7	SD_1_D0	80	I/O	+1.8/3.3V	
8	SD_1_D1	82	I/O	+1.8/3.3V	
9	SD_1_D2	70	I/O	+1.8/3.3V	
10	SD1_CD#	84	O	+1.8/3.3V	10k Pull-up on a SoM
11	SD1_WP	(TP8)	O		

3.10 Display Interface

The Verdin Development Board provides many options for connecting LCD panels and monitors, with the following two interfaces supported:

- HDMI
- MIPI-DSI

Almost any TFT or STN display can be connected to the Verdin module by HDMI port X37 or via DSI interface connector X48. As there are a wide range of MIPI-DSI connectors and displays a universal mezzanine board connector X48 was used. This solution allows for the connection of different types of display interface mezzanine boards and converters e.g. MIPI-DSI to HDMI, MIPI-DSI to LVDS, etc. Also, custom boards with appropriate MIPI-DSI connectors can be used.

Toradex provides a range of different tools and utilities to help with the easy configuration of different LCD panels. For details please refer to <http://developer.toradex.com>

3.10.1 HDMI Connector (X11)

Connector type: HDMI Connector Right Angle, Amphenol 10029449-111RLF

Pin	Signal Name	SODIMM Pin ber	I/O Type	Voltage	Pull-up/Pull-down
1	HDMI_1_TXD2_CON_P	87 (via IC30)	O		
2	GND		PWR		
3	HDMI_1_TXD2_CON_N	85 (via IC30)	O		
4	HDMI_1_TXD1_CON_P	81 (via IC30)	O		
5	GND		PWR		
6	HDMI_1_TXD1_CON_N	79 (via IC30)	O		
7	HDMI_1_TXD0_CON_P	75 (via IC30)	O		
8	GND		PWR		
9	HDMI_1_TXD0_CON_N	73 (via IC30)	O		
10	HDMI_1_TXC_CON_P	69 (via IC30)	O		
11	GND		PWR		
12	HDMI_1_TXC_CON_N	67 (via IC30)	O		
13	HDMI_1_CEC_CON	63 (via IC30)	I/O	+5V	
14	HDMI_1_HEC_CON	NC			
15	HDMI_1_DDC_SCL	59 (via IC30)	O	+5V	
16	HDMI_1_DDC_SDA	57 (via IC30)	I/O	+5V	
17	GND		PWR		
18	+V5_HDMI_1_DISP		PWR	+5V	
19	HDMI_1_HPD_CON	61 (via IC30)	I	+5V	
S1/S2	GND_CHASSIS				
S3/S4	GND_CHASSIS				

3.10.2 MIPI-DSI Mezzanine Connector (X48)

Connector type: Samtec QSH-030-01-L-D-A

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	GPIO_1	206	I/O	+1.8V	
2	GPIO_2	208	I/O	+1.8V	
3	I2C_1_SDA	14	I/O	+1.8V	1.8k to +V1.8_SW
4	GND		PWR		
5	I2C_1_SCL	12	O	+1.8V	1.8k to +V1.8_SW
6	NC				
7	DSI_1_INT#	17	I	+1.8V	
8	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
9	GND		PWR		
10	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
11	DSI_1_D0_P	49			
12	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
13	DSI_1_D0_N	47			
14	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
15	GND		PWR		
16	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
17	DSI_1_D1_P	43			
18	NC				
19	DSI_1_D1_N	41			
20	+V5_SW		PWR	+5V	
21	GND		PWR		
22	+V5_SW		PWR	+5V	
23	DSI_1_CLK_P	37			
24	+V5_SW		PWR	+5V	
25	DSI_1_CLK_N	35			
26	+V5_SW		PWR	+5V	
27	GND		PWR		
28	+V5_SW		PWR	+5V	
29	DSI_1_D2_P	31			
30	NC				
31	DSI_1_D2_N	29			
32	+V3.3_SW		PWR		
33	GND		PWR		
34	+V3.3_SW		PWR	+3.3V	
35	DSI_1_D3_P	25			
36	+V3.3_SW		PWR	+3.3V	
37	DSI_1_D3_N	23			
38	+V3.3_SW		PWR	+3.3V	
39	GND		PWR		
40	+V3.3_SW		PWR	+3.3V	
41	I2S_2_BCLK	42	O	+1.8V	
42	NC				
43	I2S_2_SYNC	44	O	+1.8V	

44	+V1.8_SW		PWR	+1.8V	
45	I2S_2_D_OUT	46	O	+1.8V	
46	+V1.8_SW		PWR	+1.8V	
47	I2S_2_D_IN	48	I	+1.8V	
48	+V1.8_SW		PWR	+1.8V	
49	GND		PWR		
50	+V1.8_SW		PWR	+1.8V	
51	I2C_2_DSI_SCL	55	O	+1.8V	1.8k to +V1.8_SW
52	+V1.8_SW		PWR	+1.8V	
53	I2C_2_DSI_SDA	53	I/O	+1.8V	1.8k to +V1.8_SW
54	NC				
55	DSI_1_BKL_EN	21	O	+1.8V	
56	GND		PWR		
57	PWM_3_DSI	19	O	+1.8V	
58	CTRL_RESET_MOCI#		O	+1.8V	
59	GND		PWR		
60	PWR_CTRL_9		O	+1.8V	
61	GND		PWR		

3.11 Audio

The Verdin Development Board offers two audio interfaces: an analog audio interface and digital audio interface routed to display adapter mezzanine connector X48.

3.11.1 Analog Audio

The analog audio interface is based on the WM8904CGEFL/RV audio codec IC from Cirrus Logic. For more detailed info check the WM8904CGEFL/RV datasheet.

The analog audio interface is available on the connectors X20, X21, X22 which are standard 3.5mm stereo jacks for headphone (or loudspeaker) output, line-in input and microphone input.

3.11.1.1 Audio Jack (X20)

Connector type: 3.5mm Jack, CUI SJ1-3535NG-GR

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	GND_A	PWR		
2	AAP_HP_CON_L	O		
3	AAP_HP_CON_R	O		
4	NC			
5	NC			

3.11.1.2 Audio Jack (X21)

Connector type: 3.5mm Jack, CUI SJ1-3535NG-BE

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	GND_A	PWR		
2	AAP_LIN_CON_L	I		
3	AAP_LIN_CON_R	I		
4	NC			
5	NC			

3.11.1.3 Audio Jack (X22)

Connector type: 3.5mm Jack, CUI SJ1-3535NG-PI

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	GND_A	PWR		
2	AAP_MICIN_CON_L	I		
3	AAP_MICIN_CON_R	I		
4	NC			
5	NC			

3.11.2 Digital Audio

Digital audio on the Verdin Development Board is available as an I2S interface. It is provided on the X48 connector (MIPI-DSI interface) to provide the option of using an audio interface along with display solutions. For detailed information refer to the X48 connector pinout.

3.12 Mezzanine “Module-specific”

The “Module-specific” mezzanine connector provides access to the “Module-specific” interfaces on the Verdin module. These interfaces differ across the various Verdin modules. Different “Module-specific” mezzanine boards are available for each Verdin module and are connected to this interface to provide access to the “Module-specific” features. Customers are free to develop their own “Module-specific” mezzanine board for prototyping and development purposes. Please refer to the datasheets for the individual “Module-specific” mezzanine boards and respective Verdin module for more information.

3.12.1 Mezzanine “Module-specific” Connector (X52)

Connector type: Samtec QSH-060-01-L-D-A

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	+V5_STB		PWR	+5V	
2	GND		PWR		
3	GND		PWR		
4	I2S_2_D_IN	48	I	+1.8V	
5	PWR_CTRL_10		O	+1.8V	
6	I2S_2_D_OUT	46	O	+1.8V	
7	I2C_1_SCL	12	O	+1.8V	
8	I2S_2_SYNC	44	O	+1.8V	
9	I2C_1_SDA	14	I/O	+1.8V	
10	I2S_2_BCLK	42	O	+1.8V	
11	GND		PWR		
12	GND		PWR		
13	TS_DIFF1_N	88	I/O		
14	I2C_2_DSI_SDA	53	I/O	+1.8V	
15	TS_DIFF1_P	90	I/O		
16	I2C_2_DSI_SCL	55	O	+1.8V	
17	TS1	92	I/O		
18	I2C_4_CSI_SCL	95	O	+1.8V	
19	TS_DIFF2_N	94	I/O		
20	I2C_4_CSI_SDA	93	I/O	+1.8V	
21	TS_DIFF2_P	96	I/O		
22	GND		PWR		
23	GND		PWR		
24	PWM_1	15	O	+1.8V	
25	TS_DIFF3_N	100	I/O		
26	PWM_2	16	O	+1.8V	
27	TS_DIFF3_P	102	I/O		
28	PWM_3_DSI	19	O	+1.8V	
29	TS2	104	I/O		
30	GND		PWR		
31	TS_DIFF4_N	106	I/O		
32	NC				
33	TS_DIFF4_P	108	I/O		
34	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
35	GND		PWR		
36	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
37	TS_DIFF5_N	112	I/O		
38	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
39	TS_DIFF5_P	114	I/O		
40	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
41	TS3	116	I/O		
42	+V_SUPPLY_FILT_SW		PWR	+6 - 27V	
43	TS_DIFF6_N	118	I/O		
44	+V1.8_SW		PWR	+1.8V	
45	TS_DIFF6_P	120	I/O		
46	+V1.8_SW		PWR	+1.8V	
47	GND		PWR		
48	+V1.8_SW		PWR	+1.8V	
49	TS_DIFF7_N	124	I/O		
50	+V1.8_SW		PWR	+1.8V	
51	TS_DIFF7_P	126	I/O		
52	+V1.8_SW		PWR	+1.8V	
53	TS4	128	I/O		
54	+V1.8_SW		PWR	+1.8V	
55	TS_DIFF8_N	130	I/O		
56	NC				
57	TS_DIFF8_P	132	I/O		
58	+V3.3_SW		PWR	+3.3V	
59	GND		PWR		
60	+V3.3_SW		PWR	+3.3V	
61	TS_DIFF9_N	136	I/O		
62	+V3.3_SW		PWR	+3.3V	
63	TS_DIFF9_P	138	I/O		
64	+V3.3_SW		PWR	+3.3V	
65	TS5	140	I/O		
66	+V3.3_SW		PWR	+3.3V	
67	TS_DIFF10_N	142	I/O		
68	NC				
69	TS_DIFF10_P	144	I/O		
70	+V5_SW		PWR	+5V	
71	GND		PWR		
72	+V5_SW		PWR	+5V	
73	TS_DIFF11_N	148	I/O		
74	+V5_SW		PWR	+5V	
75	TS_DIFF11_P	150	I/O		
76	+V5_SW		PWR	+5V	
77	TS6	152	I/O		
78	+V5_SW		PWR	+5V	
79	TS_DIFF12_N	154	I/O		
80	NC				
81	TS_DIFF12_P	156	I/O		
82	GND		PWR		
83	GND		PWR		

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
84	PWR_1V8_MOCI	214	PWR	+1.8V	
85	TS_DIFF13_N	160	I/O		
86	GND		PWR		
87	TS_DIFF13_P	162	I/O		
88	SPI_1_CLK	196	O	+1.8V	
89	TS7	164	I/O		
90	SPI_1_MISO	198	I	+1.8V	
91	TS_DIFF14_N	166	I/O		
92	SPI_1_MOSI	200	O	+1.8V	
93	TS_DIFF14_P	168	I/O		
94	SPI_1_CS	202	O	+1.8V	
95	GND		PWR		
96	NC				
97	TS_DIFF15_N	172	I/O		
98	NC				
99	TS_DIFF15_P	174	I/O		
100	GPIO_3	210	I/O	+1.8V	
101	TS8	176	I/O		
102	GPIO_4	212	I/O	+1.8V	
103	TS_DIFF16_N	178	I/O		
104	GPIO_5	216	I/O	+1.8V	
105	TS_DIFF16_P	180	I/O		
106	GPIO_6	218	I/O	+1.8V	
107	GND		PWR		
108	GPIO_7	220	I/O	+1.8V	
109	TS_DIFF17_N	184	I/O		
110	GPIO_8	222	I/O	+1.8V	
111	TS_DIFF17_P	186	I/O		
112	CTRL_WAKE1_MICO#	252	I	+1.8V	
113	TS9	188	I/O		
114	CTRL_PWR_EN_MOCI	254	O	+1.8V	
115	TS_DIFF18_N	190	I/O		
116	CTRL_SLEEP_MOCI#	256	O	+1.8V	
117	TS_DIFF18_P	192	I/O		
118	CTRL_RESET_MOCI#	258	O		
119	GND		PWR		
120	GND		PWR		
121	GND		PWR		

3.13 MIPI-CSI Camera Interface

The MIPI-CSI Camera Interface on connector X47 is intended for applications requiring image capture capability from CMOS or CDD image sensors. For details please see the relevant Verdin module datasheet.

3.13.1 MIPI-CSI Camera Connector (X47)

Connector type: 24 Position FFC, FPC, vertical 0.5mm, Hirose FH12-24S-0.5SV(55)

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	GND		PWR		
2	CSI_1_D0_N	125			
3	CSI_1_D0_P	123			
4	GND		PWR		
5	CSI_1_D1_N	119			
6	CSI_1_D1_P	117			
7	GND		PWR		
8	CSI_1_CLK_N	113			
9	CSI_1_CLK_P	111			
10	GND		PWR		
11	CAM_1_CON_RST	216 (via IC46)	O		
12	SCI_1_MCLK	91	O		
13	I2C_4_CSI_CON_SCL	95 (via IC35)	O	+3.3V	10k to +V3.3_SW
14	I2C_4_CSI_CON_SDA	93 (via IC35)	I/O	+3.3V	10k to + V3.3_SW
15	+V3.3_SW		PWR	+3.3V	
16	CSI_1_D2_N	107			
17	CSI_1_D2_P	105			
18	GND		PWR		
19	CSI_1_D3_N	101			
20	CSI_1_D3_P	99			
21	+V5_SW		PWR	+5V	
22	CAM_1_CON_PWRDWN	218 (via IC46)	O	+3.3V	
23	CAM_1_CON_IC_DETECT	220 (via IC46)	I	+3.3V	
24	CAM_1_CON_PWRCTRL	222 (via IC46)	O	+3.3V	

3.14 Digital and Analog I/O

3.14.1 Communication Interface

3.14.1.1 CAN

The Verdin Development Board uses the Texas Instruments isolated ISO1042BDWR CAN transceiver to implement two CAN FD interfaces in conjunction with the two CAN interfaces on the Verdin module. The CAN ports are electrically isolated from the system power supply. The CAN interfaces are available on connectors X59 and X60.

3.14.1.1.1 CAN1 Connector (X59)

Connector type: 1x5 Pin Header Male, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V5_CAN_1_ISO	PWR	+5V	
2	GND_CAN_1_ISO	PWR		
3	GND_CAN_1_ISO through 100 Ohm	-		
4	CAN_1_H	I/O		
5	CAN_1_L	I/O		

3.14.1.1.2 CAN2 Connector (X60)

Connector type: 1x5 Pin Header Male, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V5_CAN_2_ISO	PWR	+5V	
2	GND_CAN_2_ISO	PWR		
3	GND_CAN_2_ISO through 100 Ohm	-		
4	CAN_2_H	I/O		
5	CAN_2_L	I/O		

The jumpers JP1, JP2, JP3, JP4 provide hardware configuration for this interface:

Connector type: 1x2 Pin Header Male, 2.54 mm pitch

Jumper	Status	Function
JP1, JP2	CLOSED	CAN1 split terminated.
JP3, JP4	CLOSED	CAN2 split terminated.

3.14.1.2 UART Interfaces

The Verdin Development Board features 4 UART interfaces that are connected to the following connectors:

- UART1 to the connector X50 through an RS485 transceiver.
- UART2 to the connector X51 through an RS232 transceiver.
- UART3 to a built in USB to Serial transceiver (Debug interface).
- UART4 to a built in USB to Serial transceiver (Debug interface).

3.14.1.2.1 RS485 Connector (X50)

Connector type: D-Sub 9 Male, Assmann WSW A-DS 09 A/KG-T4S

Pin	Signal Name	I/O Type	Voltage	Remarks
1	GND		PWR	
2	NC			
3	NC			
4	NC			
5	NC			
6	NC			
7	NC			
8	RS485_CON_A	I/O		
9	RS485_CON_B	I/O		
S1/S2	GND_CHASSIS			

Jumpers JP6, JP9 and JP10 provide hardware configuration for this interface:

Connector type: 1x2 Pin Header Male, 2.54 mm pitch

Jumper	Status	Function
JP6	CLOSED	Slew rate reduced to 250 kbps. The default is 20 Mbps.
JP9	CLOSED	Insert the 120ohm bus termination for RS485
JP10	CLOSED	ECHO disabled (the sender cannot read the message just sent)

3.14.1.2.2 RS232 Connector (X51)

Connector type: D-Sub 9 Male, Assmann WSW A-DS 09 A/KG-T4S

Pin	Signal Name	I/O Type	Voltage	Remarks
1	NC			
2	RS232_RXD	I		
3	RS232_TXD	O		
4	NC			
5	GND	PWR		
6	NC			
7	RS232_RTS	O		
8	RS232_CTS	I		
9	NC			
S1/S2	GND_CHASSIS			

By using the jumper JP12 it is possible to configure the Auto Powerdown Plus function of RS232 transceiver. The following table shows the JP12 connection possibilities.

Connector type: 1x3 Pin Header Male, 2.54 mm pitch

Jumper position	Description
1 - 2	Auto Powerdown Plus disabled
2 - 3	Auto Powerdown Plus enabled

For detailed information about Auto Powerdown Plus function please refer to the TRS3122ERGER transceiver datasheet (FORCEON and FORCEOFF# pins functions).

3.14.1.3 USB to Serial Connector (X66)

The Verdin Development Board features a built-in USB to Serial UART converter (FTDI FT4232HL) which can be used to interface with the serial debug UART via the USB Type Micro-B connector X66.

Connector type: USB 2.0 Micro-B, Würth 629105150521

Pin	Signal Name	I/O Type	Voltage	Remarks
1	+V5_DBG	PWR	+5V	
2	USB_DBG_CON_N	I/O		
3	USB_DBG_CON_P	I/O		
4	NC			
5	GND	PWR		
S1/S2	GND_CHASSIS	PWR		

Also, additional features of the FTDI FT4232HL IC have been implemented on the Verdin Development board, namely JTAG debugger and GPIO functions. JTAG and GPIO interfaces are connected to the SOM and Development Board via the X67 jumper area.

3.14.1.3.1 Debug Connector (X67)

Connector type: 2x10 Pin Header Male, 2.54 mm pitch

Signal Name	I/O Type	Pin	Pin	I/O Type	Signal Name	Voltage
FTDI_JTAG_TCK	O	B1	A1	I	JTAG_1_TCK	+1.8V
FTDI_JTAG_TDI	O	B2	A2	I	JTAG_1_TDI	+1.8V
FTDI_JTAG_TDO	I	B3	A3	O	JTAG_1_TDO	+1.8V
FTDI_JTAG_TMS	O	B4	A4	I	JTAG_1_TMS	+1.8V
FTDI_JTAG_TRST#	O	B5	A5	I	JTAG_1_TRST#	+1.8V
FTDI_JTAG_VREF	PWR	B6	A6	PWR	JTAG_1_VREF	+1.8V
FTDI_GPIOL0_3.3V	O	B7	A7	I	DBG_FORCE_OFF	+3.3V
FTDI_GPIOL1_3.3V	O	B8	A8	I	DBG_RESET	+3.3V
FTDI_GPIOL2_3.3V	O	B9	A9	I	DBG_PWR_BTN	+3.3V
FTDI_GPIOL3_3.3V	O	B10	A10	I	DBG_RECOVERY	+3.3V

Connector type: 2x10 Pin Header Male, 2.54 mm pitch

Jumper	Status	Function
X67A, X67B, X67C, X67D, X67E, X67F	CLOSED	FTDI JTAG.debugger connected to SOM
X67G, X67H, X67I, X67J	CLOSED	FTDI GPIOs connected to Development Board control signals: FORCE_OFF#, CTRL_RESET_MICO#, PWR_BTN#, RECOVERY_MICO#

3.14.2 Digital Interface

3.14.2.1 Switches / LEDs

The Verdin Development Board features four green LEDs, four switches and four buttons. Interfaces to and from these devices are available on connectors X23, X24, X26, X27, and X38. They can be directly connected to the GPIO breakout connectors or to specific custom hardware. Please note that the buttons and switches are not de-bounced.

3.14.2.1.1 Switches Connector (X23)

Connector type: 1x2 Pin Header Female, 2.54 mm pitch, Samtec SSW-102-01-G-S

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	SW_4	O	+1.8V	100k to GND
2	SW_8	O	+1.8V	10k to GND

3.14.2.1.2 Switches Connector (X24)

Connector type: 1x2 Pin Header Female, 2.54 mm pitch, Samtec SSW-102-01-G-S

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	SW_5	O	+1.8V	100k to GND
2	SW_9	O	+1.8V	10k to GND

3.14.2.1.3 Switches Connector (X26)

Connector type: 1x2 Pin Header Female, 2.54 mm pitch, Samtec SSW-102-01-G-S

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	SW_6	O	+1.8V	100k to GND
2	SW_10	O	+1.8V	10k to GND

3.14.2.1.4 Switches Connector (X27)

Connector type: 1x2 Pin Header Female, 2.54 mm pitch, Samtec SSW-102-01-G-S

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	SW_7	O	+1.8V	100k to GND
2	SW_11	O	+1.8V	10k to GND

3.14.2.1.5 LEDs Connector (X38)

Connector type: 1x2 Pin Header Female, 2.54 mm pitch, Samtec SSW-102-01-G-S

Pin	Signal Name	Linked LED	I/O Type	Voltage	Pull-up/Pull-down
1	+V1.8_SW	-	PWR	+1.8V	
2	LED_1	LED21	I	+1.8V	100k to GND
3	LED_2	LED22	I	+1.8V	100k to GND
4	LED_3	LED23	I	+1.8V	100k to GND
5	LED_4	LED24	I	+1.8V	100k to GND
6	GND	-	PWR	+1.8V	

3.14.2.2 Level shifters

Three universal bidirectional level-shifter NLSX5014 are placed on the Verdin Development Board. Each IC has four independent channels connected to female pin headers X39, X40, X41, X42, X43, X44. These level shifters can be used to connect external hardware with 3.3V signals via jumper wires.

3.14.2.2.1 Level Shifter Connector (X39)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V3.3_SW	PWR	+3.3V	
2	3.3V_IO_1	I/O	+3.3V	
3	3.3V_IO_2	I/O	+3.3V	
4	3.3V_IO_3	I/O	+3.3V	
5	3.3V_IO_4	I/O	+3.3V	
6	GND	PWR		

3.14.2.2.2 Level Shifter Connector (X40)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V1.8_SW	PWR	+1.8V	
2	1.8V_IO_1	I/O	+1.8V	
3	1.8V_IO_2	I/O	+1.8V	
4	1.8V_IO_3	I/O	+1.8V	
5	1.8V_IO_4	I/O	+1.8V	
6	GND	PWR		

3.14.2.2.3 Level Shifter Connector (X41)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V3.3_SW	PWR	+3.3V	
2	3.3V_IO_5	I/O	+3.3V	
3	3.3V_IO_6	I/O	+3.3V	
4	3.3V_IO_7	I/O	+3.3V	
5	3.3V_IO_8	I/O	+3.3V	
6	GND	PWR		

3.14.2.2.4 Level Shifter Connector (X42)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V1.8_SW	PWR	+1.8V	
2	1.8V_IO_5	I/O	+1.8V	
3	1.8V_IO_6	I/O	+1.8V	
4	1.8V_IO_7	I/O	+1.8V	
5	1.8V_IO_8	I/O	+1.8V	
6	GND	PWR		

3.14.2.2.5 Level Shifter Connector (X43)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V3.3_SW	PWR	+3.3V	
2	3.3V_IO_9	I/O	+3.3V	
3	3.3V_IO_10	I/O	+3.3V	
4	3.3V_IO_11	I/O	+3.3V	
5	3.3V_IO_12	I/O	+3.3V	
6	GND	PWR		

3.14.2.2.6 Level Shifter Connector (X44)

Connector type: 1x6 Pin Header Female, 2.54 mm pitch

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	+V1.8_SW	PWR	+1.8V	
2	1.8V_IO_9	I/O	+1.8V	
3	1.8V_IO_10	I/O	+1.8V	
4	1.8V_IO_11	I/O	+1.8V	
5	1.8V_IO_12	I/O	+1.8V	
6	GND	PWR		

3.14.3 Analog Interface

The Analog inputs of a Verdin module are connected to the dedicated connector X49. For detailed information about ADC features, please refer to the Verdin module datasheet.

3.14.3.1 ADC Input (X49)

Type: 2x3Pin Header Female, 2.54mm pitch

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	ADC_1	2	I	+1.8V	
2	ADC_2	4	I	+1.8V	
3	ADC_3	6	I	+1.8V	
4	ADC_4	8	I	+1.8V	
5	GND		PWR		
6	PWR_1V8_MOCI	214	PWR	+1.8V	

3.15 Backup battery

A backup battery holder (BAT1) is available on the Verdin Development Board to provide backup power to a Verdin module RTC when the main power is switched off. Jumper (JP8) is used to connect or disconnect the backup battery.

Connector type: 1x2 Pin Header Male, 2.54 mm pitch

Jumper	Status	Function
JP8	CLOSED	Battery backup voltage connected to the Verdin module internal RTC.
JP8	OPEN	Battery backup voltage disconnected from the Verdin module internal RTC.

For more details on how the backup voltage is used, please refer to the Verdin computer-on-module datasheet.

3.15.1 Battery Holder (BAT1)

A 20 mm (diameter) coin cell/battery should be used with the Battery Holder (BAT1). Coin cell can be used to provide power backup to the Verdin module RTC circuit when an external power supply is not available.

Supported batteries: CR2032 or similar coin cells.

Connector type: Renata HU2032-LF

Pin	Description	Voltage
1	+V_BAT	+3.0V
2	GND	

3.16 JTAG

The Verdin Development Board provides a JTAG interface to the JTAG port available on Verdin modules. Connector X56 provides an interface to an external JTAG device via Cortex Debug Connector which is a 10-pin 1.27mm header. If external JTAG debugger will be used with a Verdin Development Board V1.0, jumpers X67A – X67F should be removed. Check the Verdin Schematic file. This document is available on the Toradex developer website, in the Development Board Design page.

3.16.1 JTAG (X56)

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

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
1	JTAG_1_VREF	7	PWR	+1.8V	
2	JTAG_1_TMS	13	I	+1.8V	
3	GND		PWR		
4	JTAG_1_TCK	9	I	+1.8V	10k to GND on SOM
5	GND		PWR		
6	JTAG_1_TDO	5	O	+1.8V	1M to GND
7	NC				
8	JTAG_1_TDI	1	I	+1.8V	
9	NC				
10	JTAG_1_TRST#	3	I	+1.8V	

3.17 Low-speed IO pins configuration

The Low-speed IO pins breakout connectors offer the flexibility to map the IO pins of the Verdin module to either the onboard function or to external hardware.

The factory setting is a straight-through jumper setting, meaning that the X3-A row is connected straight to the X3-B row. This is also true for the connectors X6 and X16.

To allowing easy measurement, probing, and re-routing, all signals residing on the male header are also available on a female connector in parallel.

To map the SODIMM pin with the corresponding SoC ball name which are specific to individual Verdin modules, please refer to the applicable Verdin module datasheet.

3.17.1 Low-speed IO pins 1 Male (X3 Row A)

Connector Type: 2x30Pin Male, 2.54mm

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
A1	SODIMM_12	12	I/O	+1.8V	
A2	SODIMM_14	14	O	+1.8V	
A3	SODIMM_15	15	O	+1.8V	
A4	SODIMM_16	16	O	+1.8V	
A5	SODIMM_20	20	O	+1.8V	
A6	SODIMM_22	22	I	+1.8V	
A7	SODIMM_24	24	O	+1.8V	
A8	SODIMM_26	26	I	+1.8V	
A9	GND		PWR		
A10	+V1.8_SW		PWR	+1.8V	
A11	SODIMM_30	30	O	+1.8V	
A12	SODIMM_32	32	O	+1.8V	
A13	SODIMM_34	34	O	+1.8V	
A14	SODIMM_36	36	I	+1.8V	
A15	SODIMM_38	38	O	+1.8V	
A16	GND		PWR		
A17	SODIMM_42	42	O	+1.8V	
A18	SODIMM_44	44	O	+1.8V	
A19	SODIMM_46	46	O	+1.8V	
A20	SODIMM_48	48	I	+1.8V	
A21	SODIMM_52	52	O	+1.8V	
A22	SODIMM_54	54	O	+1.8V	
A23	SODIMM_56	56	I/O	+1.8V	
A24	SODIMM_58	58	I/O	+1.8V	
A25	SODIMM_60	60	I/O	+1.8V	
A26	SODIMM_62	62	I/O	+1.8V	
A27	SODIMM_64	64	O	+1.8V	
A28	SODIMM_66	66	I	+1.8V	
A29	SODIMM_76	76	O	+1.8V	
A30	SODIMM_84	84	I	+1.8/3.3V	10k to +1.8/3.3V on SoM

3.17.2 Function 1 Male (X3 Row B)

Connector Type: 2x30Pin Male, 2.54mm

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
B1	I2C_1_SDA		O	+1.8V	1.8k to +V1.8_SW
B2	I2C_1_SCL		I/O	+1.8V	1.8k to +V1.8_SW
B3	PWM_1		O	+1.8V	
B4	PWM_2		O	+1.8V	
B5	CAN_1_TX		O	+1.8V	10k to +V1.8_SW
B6	CAN_1_RX		I	+1.8V	
B7	CAN_2_TX		O	+1.8V	10k to +V1.8_SW
B8	CAN_2_RX		I	+1.8V	
B9	GND		PWR		
B10	+V1.8_SW		PWR	+1.8V	
B11	I2S_1_BCLK		O	+1.8V	
B12	I2S_1_SYNC		O	+1.8V	
B13	I2S_1_D_OUT		O	+1.8V	
B14	I2S_1_D_IN		I	+1.8V	
B15	I2S_1_MCLK		O	+1.8V	
B16	GND		PWR		
B17	I2S_2_BCLK		O	+1.8V	
B18	I2S_2_SYNC		O	+1.8V	
B19	I2S_2_D_OUT		O	+1.8V	
B20	I2S_2_D_IN		I	+1.8V	
B21	QSPI_1_CLK		O	+1.8V	
B22	QSPI_1_CS#		O	+1.8V	
B23	QSPI_1_IO0		I/O	+1.8V	
B24	QSPI_1_IO1		I/O	+1.8V	
B25	QSPI_1_IO2		I/O	+1.8V	
B26	QSPI_1_IO3		I/O	+1.8V	
B27	QSPI_1_CS2#		O	+1.8V	
B28	QSPI_1_DQS		I	+1.8V	
B29	SD_1_PWR_EN		O	+1.8V	100k to GND
B30	SD_1_CD#		I	+1.8/3.3V	

3.17.3 Low-speed IO pins 1 Female (X2)

Connector Type: 1x30Pin Female, 2.54mm
Pin-out identical to X3 Pins A1 to A30

3.17.4 Function 1 Female (X4)

Connector Type: 1x30Pin Female, 2.54mm
Pin-out identical to X3 Pins B1 to B30

3.17.5 Low-speed IO pins 2 Male (X6 Row A)

Connector Type: 2x30Pin Male

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
A1	SODIMM_196	196	O	+1.8V	
A2	SODIMM_198	198	I/O	+1.8V	
A3	SODIMM_200	200	I/O	+1.8V	
A4	SODIMM_202	202	O	+1.8V	
A5	GND		PWR		
A6	SODIMM_206	206	I/O	+1.8V	
A7	SODIMM_208	208	I/O	+1.8V	
A8	SODIMM_210	210	I/O	+1.8V	
A9	SODIMM_212	212	I/O	+1.8V	
A10	PWR_1V8_MOCI	214	PWR	+1.8V	
A11	SODIMM_216	216	I/O	+1.8V	
A12	SODIMM_218	218	I/O	+1.8V	
A13	SODIMM_220	220	I/O	+1.8V	
A14	SODIMM_222	222	I/O	+1.8V	
A15	GND		PWR		
A16	SODIMM_216	216	I/O	+1.8V	
A17	SODIMM_218	218	I/O	+1.8V	
A18	SODIMM_220	220	I/O	+1.8V	
A19	SODIMM_222	222	I/O	+1.8V	
A20	+V1.8_SW		PWR	+1.8V	
A21	SODIMM_246	246	I	+1.8V	10k to +1.8V on SoM
A22	SODIMM_248	248	I	+1.8V	100k to +1.8V on SoM
A23	SODIMM_250	250	O	+1.8V	10k to +1.8V on SoM
A24	SODIMM_252	252	I	+1.8V	
A25	SODIMM_254	254	O	+1.8V	
A26	SODIMM_256	256	O	+1.8V	470k to GND on SoM
A27	SODIMM_258	258	O	+1.8V	
A28	SODIMM_260	260	I	+1.8V	
A29	GND		PWR		
A30	+V1.8_SW		PWR	+1.8V	

3.17.6 Function 2 Female (X5)

Connector Type: 1x30Pin Female, 2.54mm
Pin-out identical to X6 Pins A1 to A30

3.17.7 Function 2 Male (X6 Row B)

Connector Type: 2x30Pin Male, 2.54mm

Pin	Signal Name	SODIMM Pin ber	I/O Type	Voltage	Pull-up/Pull-down
B1	SPI_1_CLK		O	+1.8V	
B2	SPI_1_MISO		I/O	+1.8V	
B3	SPI_1_MOSI		I/O	+1.8V	
B4	SPI_1_CS		O	+1.8V	
B5	GND		PWR		
B6	GPIO_1		I/O	+1.8V	
B7	GPIO_2		I/O	+1.8V	
B8	GPIO_3		I/O	+1.8V	
B9	GPIO_4		I/O	+1.8V	
B10	PWR_1V8_MOCI		PWR	+1.8V	
B11	GPIO_5		I/O	+1.8V	
B12	GPIO_6		I/O	+1.8V	
B13	GPIO_7		I/O	+1.8V	
B14	GPIO_8		I/O	+1.8V	
B15	GND		PWR		
B16	CAM_1_RST		I/O	+1.8V	100k to GND
B17	CAM_1_PWRDWN		I/O	+1.8V	100k to GND
B18	CAM_1_IC_DETECT		I/O	+1.8V	100k to GND
B19	CAM_1_PWRCTRL		I/O	+1.8V	100k to GND
B20	+V1.8_SW		PWR	+1.8V	
B21	CTRL_RECOVERY_MICO#		I	+1.8V	
B22	CTRL_PWR_BTN_MICO#		I	+1.8V	
B23	CTRL_FORCE_OFF_MOCI#		O	+1.8V	1M to +V1.8_SW
B24	CTRL_WAKE1_MICO#		I	+1.8V	
B25	CTRL_PWR_EN_MOCI		O	+1.8V	
B26	CTRL_SLEEP_MOCI#		O	+1.8V	
B27	CTRL_RESET_MOCI#		O	+1.8V	10k to +V3.3_SW
B28	CTRL_RESET_MICO#		I	+1.8V	
B29	GND		PWR		
B30	+V1.8_SW		PWR	+1.8V	

3.17.8 Low-speed IO pins 2 Female (X7)

Connector Type: 1x30Pin Female, 2.54mm

Pin-out identical to X6 Pins B1 to B30

3.17.9 Low-speed IO pins 3 Male (X16 Row B)

Connector Type: 2x36Pin Male

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
B1	NC				
B2	SODIMM_17	17	I	+1.8V	
B3	SODIMM_19	19	O	+1.8V	
B4	SODIMM_21	21	O	+1.8V	
B5	SODIMM_53	53	I/O	+1.8V	
B6	SODIMM_55	55	O	+1.8V	
B7	SODIMM_57	57	I/O	+1.8V	
B8	SODIMM_59	59	O	+1.8V	
B9	SODIMM_61	61	I	+1.8V	
B10	SODIMM_63	63	I/O	+1.8V	
B11	SODIMM_91	91	O	+1.8V	
B12	SODIMM_93	93	I/O	+1.8V	
B13	SODIMM_95	95	O	+1.8V	
B14	GND		PWR	+1.8V	
B15	SODIMM_129	129	I	+1.8V	
B16	SODIMM_131	131	O	+1.8V	
B17	SODIMM_133	133	O	+1.8V	
B18	SODIMM_135	135	I	+1.8V	
B19	SODIMM_137	137	I	+1.8V	
B20	SODIMM_139	139	O	+1.8V	
B21	SODIMM_141	141	O	+1.8V	
B22	SODIMM_143	143	I	+1.8V	
B23	FTDI_UARTD_CTS_EVB		I	+1.8V	
B24	FTDI_UARTD_RTS_EVB		O	+1.8V	
B25	SODIMM_147	147	I	+1.8V	
B26	SODIMM_149	149	O	+1.8V	
B27	FTDI_UARTC_CTS_EVB		I	+1.8V	
B28	FTDI_UARTC_RTS_EVB		O	+1.8V	
B29	SODIMM_151	151	I	+1.8V	
B30	SODIMM_153	153	O	+1.8V	
B31	SODIMM_155	155	O	+1.8V	
B32	SODIMM_157	157	I	+1.8V	
B33	SODIMM_161	161	I	+1.8V	
B34	SODIMM_185	185	O	+1.8V	
B35	SODIMM_187	187	I	+1.8V	
B36	GND		PWR	PWR	

3.17.10 Low-speed IO pins 3 Female (X15)

Connector Type: 1x26Pin Female, 2.54mm
Pin-out identical to X16 Pins B1 to B36

3.17.11 Function 3 Male (X16 Row A)

Connector Type: 2x36Pin Male, 2.54mm

Pin	Signal Name	SODIMM Pin Number	I/O Type	Voltage	Pull-up/Pull-down
A1	NC				
A2	DSI_1_INT#		I	+1.8V	
A3	PWM_3_DSI		O	+1.8V	
A4	DSI_1_BKL_EN		O	+1.8V	
A5	I2C_2_DSI_SDA		I/O	+1.8V	1.8k to +V1.8_SW
A6	I2C_2_DSI_SCL		O	+1.8V	1.8k to +V1.8_SW
A7	I2C_3_HDMI_SDA		I/O	+1.8V	3.65k to +V1.8_SW
A8	I2C_3_HDMI_SCL		O	+1.8V	3.65k to +V1.8_SW
A9	HDMI_1_HPD		I	+1.8V	100k to GND
A10	HDMI_1_CEC		I/O	+1.8V	10k to +V1.8_SW
A11	CSI_1_MCLK		O	+1.8V	
A12	I2C_4_CSI_SDA		I/O	+1.8V	1.8k to +V1.8_SW
A13	I2C_4_CSI_SCL		O	+1.8V	1.8k to +V1.8_SW
A14	GND		PWR		
A15	UART_1_RXD		I	+1.8V	
A16	UART_1_TXD		O	+1.8V	
A17	UART_1_RTS		O	+1.8V	
A18	UART_1_CTS		I	+1.8V	
A19	UART_2_RXD		I	+1.8V	
A20	UART_2_TXD		O	+1.8V	
A21	UART_2_RTS		O	+1.8V	
A22	UART_2_CTS		I	+1.8V	
A23	FTDI_UARTD_CTS		I	+1.8V	1M to +V1.8_SW
A24	FTDI_UARTD_RTS		O	+1.8V	
A25	UART_3_RXD		I	+1.8V	
A26	UART_3_TXD		O	+1.8V	1M to +V1.8_SW
A27	FTDI_UARTC_CTS		I	+1.8V	1M to +V1.8_SW
A28	FTDI_UARTC_RTS		O	+1.8V	
A29	UART_4_RXD		I	+1.8V	
A30	UART_4_TXD		O	+1.8V	1M to +V1.8_SW
A31	USB_1_EN		O	+1.8V	100k to GND
A32	USB_1_OC#		I	+1.8V	100k to +V1.8_SW
A33	USB_1_ID		I	+1.8V	100k to +V1.8_SW
A34	USB_2_EN		O	+1.8V	100k to GND
A35	USB_2_OC#		I	+1.8V	100k to +V1.8_SW
A36	GND		PWR		

3.17.12 Function 3 Female (X17)

Connector Type: 1x26Pin Female, 2.54mm
Pin-out identical to X16 Pins A1 to A36

4 Default low-speed IO pins configuration

The table below lists the default signal mapping (factory setting). Every row of the table shows the mapping of a Verdin pin to the function or connector on the Development Board.

Description of columns used in the table below:

Signal name:	GPIO number on the Verdin module
X3 Row A, X6 Row A, X16 Row B	Pin number on the patch panel connector X2/X5/X15 Verdin side (one end of the jumper)
X3 Row B, X6 Row B, X16 Row A	Pin number on the patch panel connector X4/X7/X17, Development Board side (the other end of the jumper)
External Connector	If the signal is available on an external connector the connector's pin number is listed here
Conn. Type	Lists, if a signal is level-shifted between the patch panel connector X4/X7/X17 and the external connector
Internal Function	If a signal ends at X4/X7/X17 or is only connected to the mezzanine connector then the X4/X7/X14/X17 pin is entered as the external connector. For details please refer to the schematics of the Development Board.
Function	Description of the signal

4.1 X3 mapping

Verdin Side of the Patch Panel		Development Board Side of the Patch Panel					
Signal Name	X3	X3	Internal function	Function	On-board peripheral	External Connector	Note
SODIMM_12	A1	B1	I2C_1	I2C_1_SDA	-	X4-1	
SODIMM_14	A2	B2	I2C_1	I2C_1_SCL	-	X4-2	
SODIMM_15	A3	B3	PWM_1	PWM_1	-	X4-3	
SODIMM_16	A4	B4	PWM_2	PWM_2	-	X4-4	
SODIMM_20	A5	B5	CAN_1	CAN1_TX	CAN transceiver	X59	
SODIMM_22	A6	B6	CAN_1	CAN1_RX	CAN transceiver	X59	
SODIMM_24	A7	B7	CAN_2	CAN2_TX	CAN transceiver	X60	
SODIMM_26	A8	B8	CAN_2	CAN2_RX	CAN transceiver	X60	
SODIMM_30	A11	B11	I2S_1	I2S_1_BCLK	Audio codec		
SODIMM_32	A12	B12	I2S_1	I2S_1_SYNC	Audio codec		
SODIMM_34	A13	B13	I2S_1	I2S_1_D_OUT	Audio codec		
SODIMM_36	A14	B14	I2S_1	I2S_1_D_IN	Audio codec		
SODIMM_38	A15	B15	I2S_1	I2S_1_MCLK	Audio codec		
SODIMM_42	A17	B17	I2S_2	I2S_2_BCLK	-	X48-41	
SODIMM_44	A18	B18	I2S_1	I2S_2_SYNC	-	X48-43	
SODIMM_46	A19	B19	I2S_1	I2S_2_D_OUT	-	X48-45	
SODIMM_48	A20	B20	I2S_1	I2S_2_D_IN	-	X48-47	
SODIMM_52	A21	B21	QSPI_1	QSPI_1_CLK	-	X4-21	
SODIMM_54	A22	B22	QSPI_1	QSPI_1_CS#	-	X4-22	
SODIMM_56	A23	B23	QSPI_1	QSPI_1_IO0	-	X4-23	
SODIMM_58	A24	B24	QSPI_1	QSPI_1_IO1	-	X4-24	
SODIMM_60	A25	B25	QSPI_1	QSPI_1_IO2	-	X4-25	
SODIMM_62	A26	B26	QSPI_1	QSPI_1_IO3	-	X4-26	
SODIMM_64	A27	B27	QSPI_1	QSPI_1_CS2#	-	X4-27	
SODIMM_66	A28	B28	QSPI_1	QSPI_1_DQS	-	X4-28	
SODIMM_76	A29	B29	SD_1	SD_1_PWR_EN	Power switch	X4-29	
SODIMM_84	A30	B30	SD_1	SD_1_CD#		X55-10	

4.2 X6 mapping

Verdin Side of the Patch Panel		Development Board Side of the Patch Panel					
Signal Name	X6	X6	Internal function	Function	On-board peripheral	External Connector	Note
SODIMM_196	A1	B1	SPI_1	SPI_1_CLK	-	X7-1	
SODIMM_198	A2	B2	SPI_1	SPI_1_MISO	-	X7-2	
SODIMM_200	A3	B3	SPI_1	SPI_1_MOSI	-	X7-3	
SODIMM_202	A4	B4	SPI_1	SPI_1_CS	-	X7-4	
SODIMM_206	A6	B6	GPIO	GPIO_1	-	X48-1	
SODIMM_208	A7	B7	GPIO	GPIO_2	-	X48-2	
SODIMM_210	A8	B8	GPIO	GPIO_3	-	X7-8	
SODIMM_212	A9	B9	GPIO	GPIO_4	-	X7-9	
PWR_1V8_MOCI	A10	B10		PWR_1V8_MOCI	-	X7-10	
SODIMM_216	A11	B11	GPIO	GPIO_5	-	X7-11	
SODIMM_218	A12	B12	GPIO	GPIO_6	-	X7-12	
SODIMM_220	A13	B13	GPIO	GPIO_7	-	X7-13	
SODIMM_222	A14	B14	GPIO	GPIO_8	-	X7-14	
SODIMM_216	A16	B16	CAM_1	CAM_1_RST	Level shifter	X47-11	Level-shifted
SODIMM_218	A17	B17	CAM_1	CAM_1_PWRDWN	Level shifter	X47-22	Level-shifted
SODIMM_220	A18	B18	CAM_1	CAM_1_IC_DETECT	Level shifter	X47-23	Level-shifted
SODIMM_222	A19	B19	CAM_1	CAM_1_PWRCTRL	Level shifter	X47-24	Level-shifted
SODIMM_246	A21	B21		CTRL_RECOVERY_MICO#	-	X7-21	
SODIMM_248	A22	B22		CTRL_PWR_BTN_MICO#	-	X7-22	
SODIMM_250	A23	B23		CTRL_FORCE_OFF_MOCI#	-	X7-23	
SODIMM_252	A24	B24		CTRL_WAKE1_MICO#	-	X7-24	
SODIMM_254	A25	B25		CTRL_PWR_EN_MOCI	-	X7-25	
SODIMM_256	A26	B26		CTRL_SLEEP_MOCI#	-	X7-26	
SODIMM_258	A27	B27		CTRL_RESET_MOCI#	-	X7-27	
SODIMM_260	A28	B28		CTRL_RESET_MICO#	-	X7-28	

4.3 X16 mapping

Verdin Side of the Patch Panel			Development Board Side of the Patch Panel				
Signal Name	X16	X16	Internal function	Function	On-board peripheral	External Connector	Note
SODIMM_17	B2	A2		DSI_1_INT#	-	X48-7	
SODIMM_19	B3	A3		PWM_3_DSI	-	X48-57	
SODIMM_21	B4	A4		DSI_1_BKL_EN	-	X48-55	
SODIMM_53	B5	A5		I2C_2_DSI_SDA	-	X48-53	
SODIMM_55	B6	A6		I2C_2_DSI_SCL	-	X48-51	
SODIMM_57	B7	A7		I2C_3_HDMI_SDA	DDC buffer	X37-16	Level-shifted
SODIMM_59	B8	A8		I2C_3_HDMI_SCL	DDC buffer	X37-15	Level-shifted
SODIMM_61	B9	A9		HDMI_1_HPD	DDC buffer	X37-19	Level-shifted
SODIMM_63	B10	A10		HDMI_1_CEC	DDC buffer	X37-13	Level-shifted
SODIMM_91	B11	A11	SCI_1	CSI_1_MCLK		X47-12	
SODIMM_93	B12	A12		I2C_4_CSI_SDA		X47-14	Level-shifted
SODIMM_95	B13	A13		I2C_4_CSI_SCL		X47-13	Level-shifted
SODIMM_129	B15	A15	UART_1	UART_1_RXD	RS485	X50	
SODIMM_131	B16	A16	UART_1	UART_1_TXD	RS485	X50	
SODIMM_133	B17	A17	UART_1	UART_1_RTS	RS485	X50	
SODIMM_135	B18	A18	UART_1	UART_1_CTS		X17-18	
SODIMM_137	B19	A19	UART_2	UART_2_RXD	RS232	X51-2	Level-shifted
SODIMM_139	B20	A20	UART_2	UART_2_TXD	RS232	X51-3	Level-shifted
SODIMM_141	B21	A21	UART_2	UART_2_RTS	RS232	X51-7	Level-shifted
SODIMM_143	B22	A22	UART_2	UART_2_CTS	RS232	X51-8	Level-shifted
SODIMM_147	B25	A25	UART_3	UART_3_RXD	USB-UART	X66	Level-shifted
SODIMM_149	B26	A26	UART_3	UART_3_TXD	USB-UART	X66	Level-shifted
SODIMM_151	B29	A29	UART_4	UART_4_RXD	USB-UART	X66	Level-shifted
SODIMM_153	B30	A30	UART_4	UART_4_TXD	USB-UART	X66	Level-shifted
SODIMM_155	B31	A31	USB_1	USB_1_EN	Power switch	X17-31	Level-shifted
SODIMM_157	B32	A32	USB_1	USB_1_OC#			
SODIMM_161	B33	A33	USB_1	USB_1_ID		X34-4	
SODIMM_185	B34	A34	USB_2	USB_2_EN	USB HUB	X17-34	Level-shifted
SODIMM_187	B35	A35	USB_2	USB_2_OC#			

5 Mechanical Data

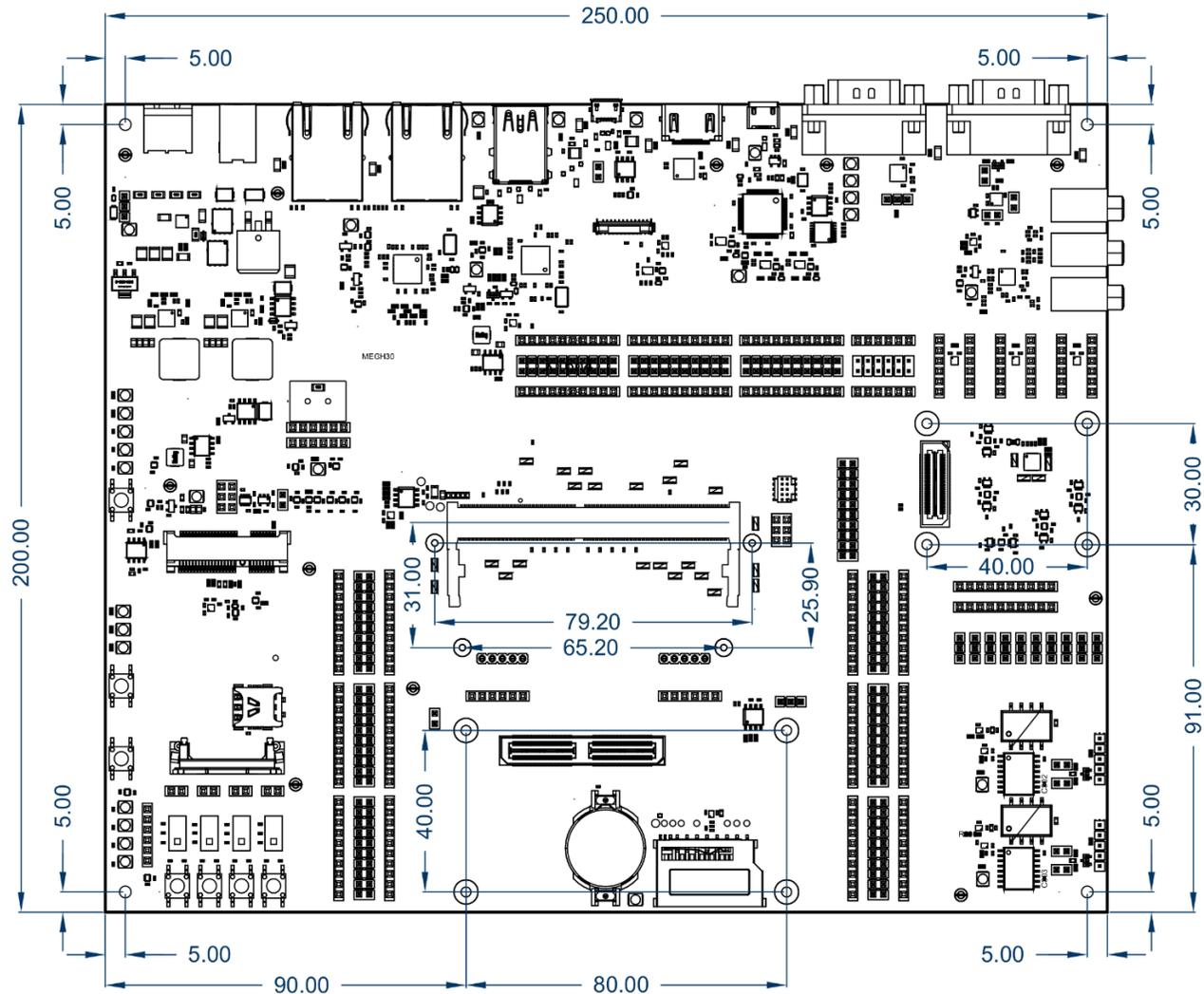


Fig.4 Verdin Development Board Dimensions (in millimeters) – Top Side

6 Design Data

The design data for Toradex Development Board is freely available in the Altium Designer format. The design data includes schematics, layout, and component libraries.

To download the Development Board design data, please use the link below:

<http://developer.toradex.com/carrier-board-design>

7 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 at: <http://www.toradex.com/support/product-compliance>

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