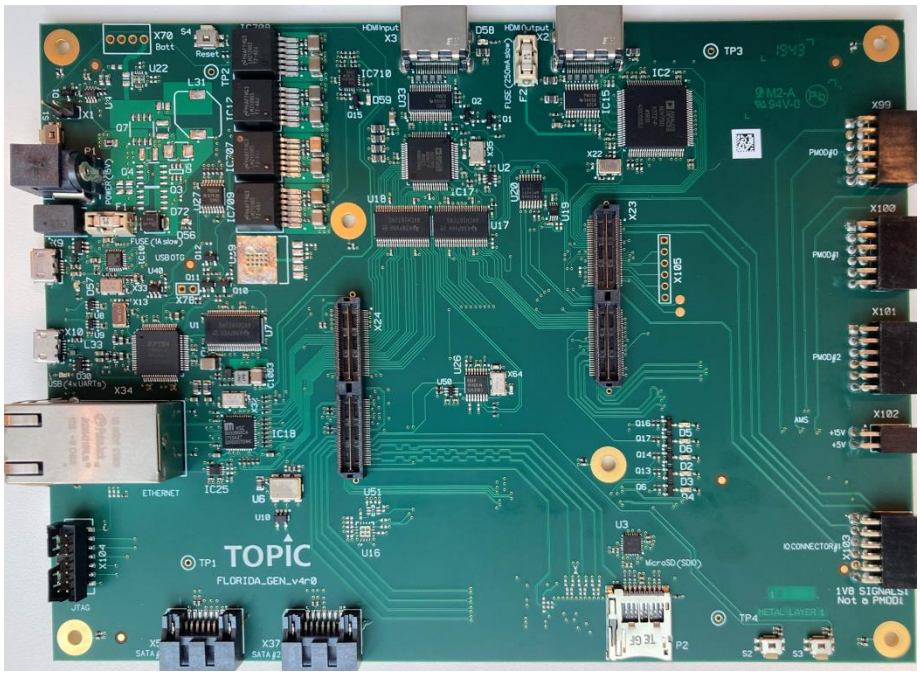
FLORIDA-GEN

Product Guide

V4R0 / 8-4-2021



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1 Introduction

The FLORIDA-GEN can be used as a generic carrier for general purpose applications and is primarily intended as evaluation and prototyping platform for the Miami Zynq, Miami Zynq Lite and Miami MPSOC System-on-Modules (SOM). The board is utilized with a variety of interfaces, which are further detailed in this product guide.

The Xilinx Zynq 7000 series based Miami Zynq and Miami Zynq Lite SoMs, as well as the Xilinx Zynq Ultrascale+ based Miami MPSOC SoM can be used in combination with the FLORIDA-GEN, providing a high performance and flexible development environment. Make sure to use the correct power adapter when powering the FLORIDA-GEN and take the appropriate ESD precautions to prevent damage to the board.

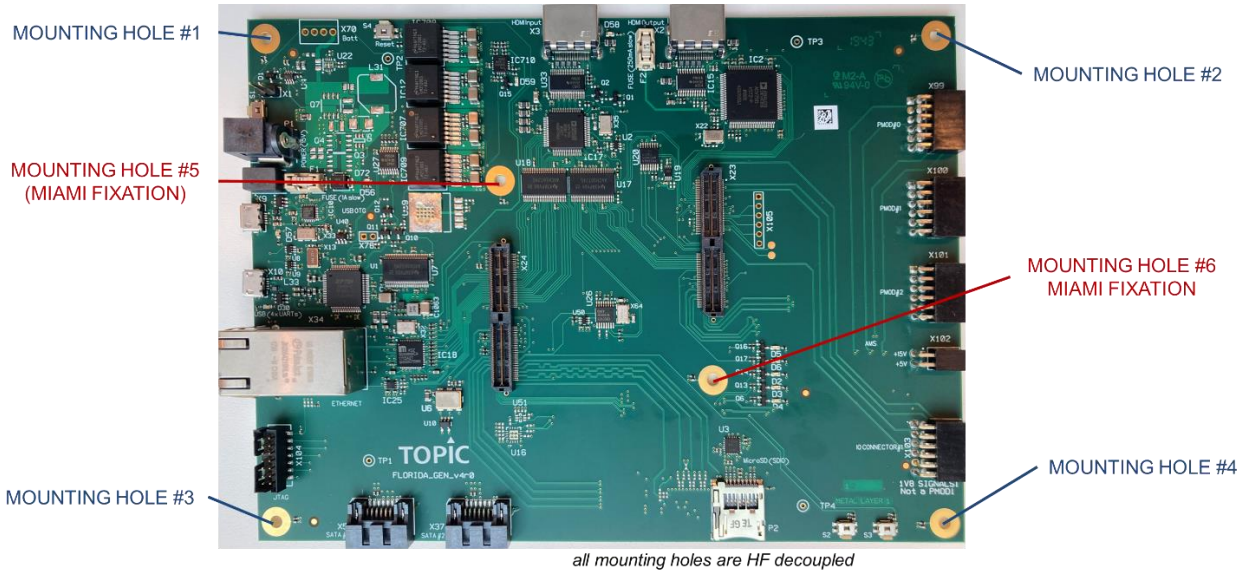
2 Installation

2.1 Setting up the board

Before using the FLORIDA-GEN, mount the board on a rigid and stable underground, using the mounting holes of the board. While doing so, take the following precautions.

- Use ESD safety precautions to prevent damage to the board.
- Make sure to also use mounting holes #5 and #6 in order to prevent excessive bending of the board during insertion / extraction of a MIAMI Zynq/MPSOC SoM.
- Use stand-offs of at least 10mm to ensure the necessary clearance distance for the isolated area (use 5mm stand-offs for mounting the MIAMI to the FLORIDA-GEN).

After mounting the FLORIDA-GEN to the base, first insert the MIAMI. Now move on the next chapter, connecting all interface cables that you require.



all mounting holes are HF decoupled

Figure 1 FLORIDA-GEN MOUNTING-HOLE OVERVIEW

2.2 Interfaces & connectors

Figure 2 shows all the external interfaces of the FLORIDA-GEN. Connect all interface cables that you require and then connect the power adapter to the DC power plug of the board. You can now plug the adapter in the wall outlet and power on the board by moving the ON/OFF switch.

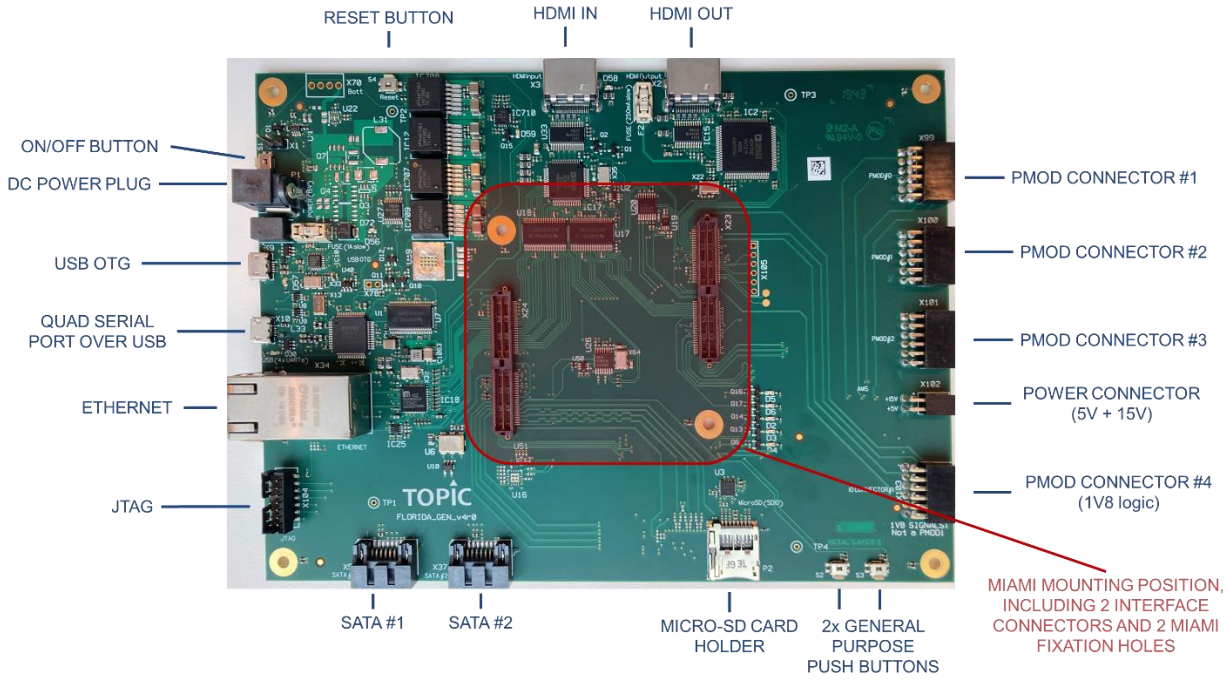


Figure 2 FLORIDA-GEN TOP SIDE INTERFACES

2.3 Software installation

The Florida carrier boards come with a Linux distribution, which can be downloaded from GitHub:

https://github.com/topic-embedded-products/topic-platform

This is an easy starting point for developing your own applications. When accessing this website, you are guided through the steps to download, install and start using the software. The Linux distribution contains:

- Linux configuration and development tools
- Cross compiler for the Zynq/Cortex-A9 processor
- BSP with drivers for all peripherals on the Miami SoMs
- BSP with drivers for most peripherals on the Florida carrier boards
- Simple example program for getting started

Part of the distribution is a program to load the FPGA image from the file system in the NOR, NAND or SD-card flash memory. Therefore you are not required to use Xilinx Impact via the JTAG chain to download FPGA images or boot them from a storage device.

The Miami SoMs/Florida carrier boards are not dependent on versions of Vivado tooling. However, example FPGA images are available for Vivado 2018.3 and higher.

For any help or support, please contact us at support@TopicProducts.com.

3 Florida GEN features

	FLORIDA-GEN
GENERAL	
SOM compatibility	MIAMI ZYNQ 7012S, 7015, 7030 MIAMI ZYNQ LITE 7007S, 7010, 7014S, 7020 MIAMI MPSOC ZU6/ZU9/ZU15
Connector	2x Samtec QTH-060-01-L-D-A
Dyplo® supported platform	Yes
Limitation	Depending on the SOM type, not all features can be used
Communication Interfaces	
LAN (1000M/100M/10M)	1x
WiFi	via USB Host interface or PMOD
CAN / RS485	via PMOD
UART via USB (virtual COM port)	4x, including primary console
SATA-3	2x
PCI-express	-
I2C	via PMOD
SPI	via PMOD
USB 2.0 OTG	1x
SD-CARD / SDIO	1x
Expansion Interfaces	
PMOD	4x (3x 100% Digilent compatible, 1x 1V8 logic)
Audio / Video	
Audio	via HDMI output or USB
HDMI	1.4 input and output
Debug / test	
JTAG	1x
GPIO	5x LED, 2x input switches, 4x PMOD including ADC
Mechanical and environmental	
Temperature range	Commercial (0°C / +70°C)
Power supply	
Power supply	12V or 15Vdc wall adapter

4 Florida architecture

4.1 Block diagram

The FLORIDA provides two high performance connectors to bring out the IO of the MIAMI. The MIAMI contains, for the majority of the interfaces, the MAC layer and upwards. The FLORIDA adds the physical layer interface to these interfaces of the MIAMI. The block diagram shown in Figure 3 provides an overview of the functionality on the FLORIDA.

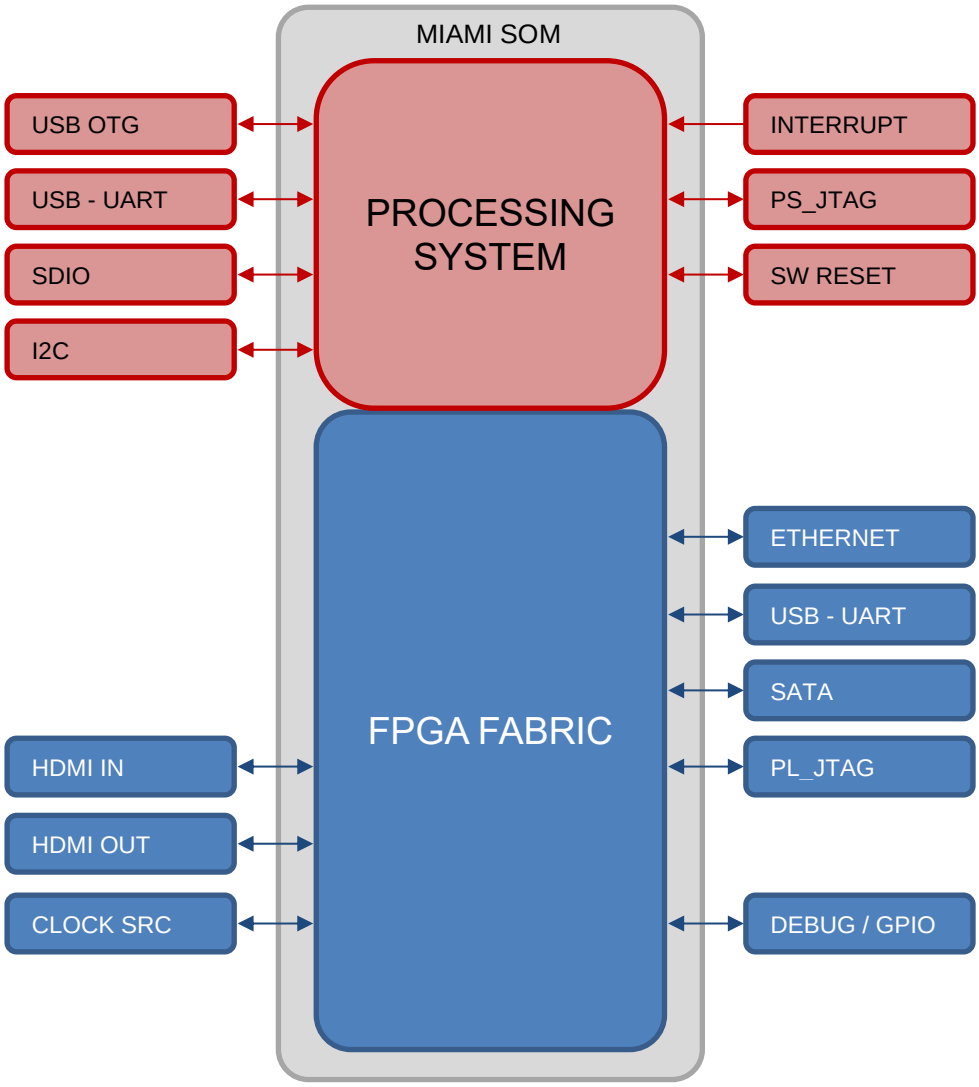


Figure 3 BLOCK DIAGRAM FLORIDA-GEN

5 Florida board functionality

5.1 Power

The FLORIDA is powered from an external adapter. This adapter needs to supply a voltage of 12 to 15V DC and shall be able to deliver at least 15W. It is connected through connector P1, which is a 2.5mm DC plug. The center contact is the positive (+15V) connection and the outer contact is the negative (GND) connection.

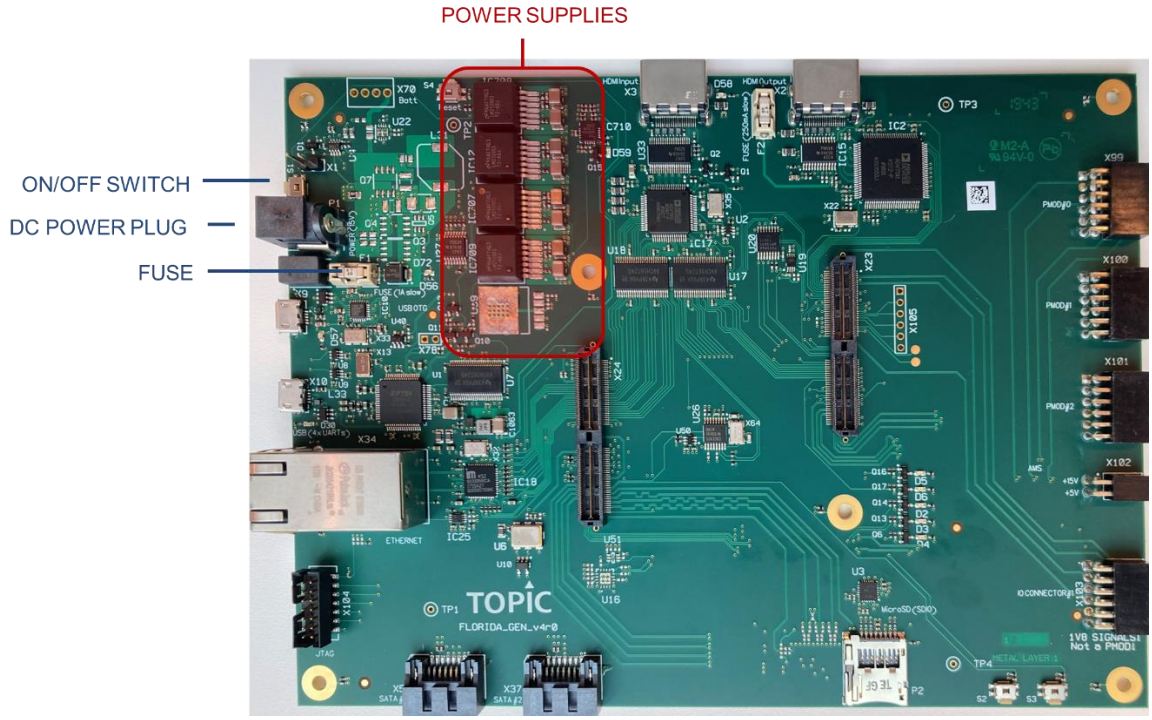


Figure 4 POWER SUPPLIES & INTERFACES

The external supply voltage is protected by a 4A slow blow fuse (see Figure 4). The fuse is placed in a Littlefuse omni-blok holder and can easily be replaced.

The on board power regulators create the internally required voltage rails from the external +15V. They are enabled/disabled by the on/off switch. When turned on, the power on LED will light up. This LED is located to the right of the power supplies and just above mounting hole #7. Switching off the board will remove power from all power supplies, except for the battery charger and turn off the power LED.

If the external +15V is available, a green power LED will light up. This LED is located directly behind and in line with the 4A fuse (D56).

5.2 I2C

A number of FLORIDA peripherals are controlled through the I2C interface. The following table shows how the MIAMI I2C interface is connected to an I2C bus switch. The 4 I2C busses coming out of this switch are described in the following chapters.

PCA9546APW pin #	Signal	SOM pin #	Description
14	PS_SCL	X23-47	I2C clock signal (connected thru level converter)
15	PS_SDA	X23-49	I2C data signal (connected thru level converter)
3	IO_L1P_T0_13	X23-88	Reset for the bus switch (PCA9546APW)

5.2.1 Bus 0 – HDMI Out

Bus 0 (pins 4 and 5) coming out of the bus switch is used for the HDMI output interface. Connected to this bus are the HDMI transmitter, the ADV7511 from Analog Devices and a programmable clock synthesizer, the CDCE925PW from Texas Instruments.

BUS 0 I2C address	Part	Function
0xC8	CDCE925PW	Clock synthesizer
0x72	ADV7511	Main register map
0x70	ADV7511	Packet memory map
0x78	ADV7511	CEC map
0x7C	ADV7511	Fixed I2C map
0x7E	ADV7511	EDID map

5.2.2 Bus 1 – HDMI Out

Bus 1 (pins 6 and 7) coming out of the bus switch is connected to the front end of the HDMI out interface. These are pins 53 and 54 of the ADV7511 and it is also routed to the HDMI out connector. For more information see the ADV7511 datasheet.

5.2.3 Bus 2 – General I2C

Bus 2 (pins 9 and 10) coming out of the bus switch is used as generic I2C interface on the FLORIDA. For the exact functionality of each of the parts see their datasheets.

BUS 2 I2C address	Part	Function
0x40	PCA9534PW	IO expander
0x55	Si514	Programmable clock
0x5E	AD7879-1	Resistive touch interface controller
0xC8	LTC2943CDD	Battery gas gauge

The next table shows the functions that are connected to the IO expander (PCA9534PW) and to which pins. The interrupt output of the PCA9534 is connected to PS_MIO15_500, which can be found on X23-60.

IO expander pin #	IO name	Function
4	IO0 – USB_OTG_OC_N	USB OTG Over Current (active low)
5	IO1 – USB_OTG_EN_N	USB OTG Enable (active low)
6	IO2 – POWER_INT_N	LTC2955CTS8-1 (pin 8)
7	IO3 – RX_HPD_CTRL	HDMI in, Hot Plug Detect Control
9	IO4 – GEN_IRQ_BAT	Interrupt signal from the battery gas gauge

IO expander pin #	IO name	Function
10	IO5 – POWER_KILL_N	LTC2955CTS8-1 (pin 2)
11	IO6 – CHG_IN_PRGRSS_N	Battery charger, charge in progress
12	IO7 – CHG_STAT_SHDWN	Battery charger, status & shutdown

The next table shows the pin connections of the programmable clock (Si514) and to which pins of the Miami SoM connector they are connected to.

Si514 pin #	IO name	Signal	SOM Pin #
4	CLK_P	GTP_REF_CLK_1_N	X24-65
5	CLK_N	GTP_REF_CLK_1_P	X24-64

5.2.4 Bus 3 – HDMI In

Bus 3 (pins 11 and 12) coming out of the bus switch is used for the HDMI input interface. It is connected to a HDMI receiver, the ADV7611 from Analog Devices (pins 53 and 54).

BUS 3 I2C address	Part	Function
0x98	ADV7611	IO map
0x44	ADV7611	CP map
0x68	ADV7611	HDMI map
0x6C	ADV7611	EDID map
0x6A	ADV7611	Info frame map
0x80	ADV7611	CEC map
0x4C	ADV7611	DPLL map

5.3 USB OTG

The USB OTG interface makes use of the dedicated USB peripheral in the Zynq. The Zynq's interface is connected to a USB PHY, the USB3343-CP from SMSC. This PHY uses a 26MHz X-tal to create the clocks. The pin mapping is described in the following table.

USB3343 pin #	Signal	SOM pin #	Description
22	USB_RESET	X23-91	USB PHY Reset
12	USB_DQ7	X23-71	USB PHY Databus bit 7
11	USB_DQ6	X23-77	USB PHY Databus bit 6
10	USB_DQ5	X23-69	USB PHY Databus bit 5
8	USB_DQ4	X23-73	USB PHY Databus bit 4
7	USB_DQ3	X23-67	USB PHY Databus bit 3
6	USB_DQ2	X23-75	USB PHY Databus bit 2
5	USB_DQ1	X23-79	USB PHY Databus bit 1
4	USB_DQ0	X23-89	USB PHY Databus bit 0
24	USB_STP	X23-81	USB PHY, stops data stream
3	USB_NXT	X23-85	USB PHY, current byte has been accepted
1	USB_DIR	X23-87	USB PHY, databus direction
2	USB_CLK	X23-83	USB PHY Clock output to MAC

Apart from the above signals for the PHY, the OTG functionality is controlled via the I2C bus. The bus voltage (5V) can be enabled by making USB_OTG_EN_N low and in case there is an over current

situation, this is indicated via USB_OTG_OC_N going low (see chapter 5.2.3.). Once there is 5V present on Vbus, a green LED right behind the USB connector will light up.

Figure 5 shows the position of the connectors for the USB OTG port, the USB UARTs and the Ethernet connection.

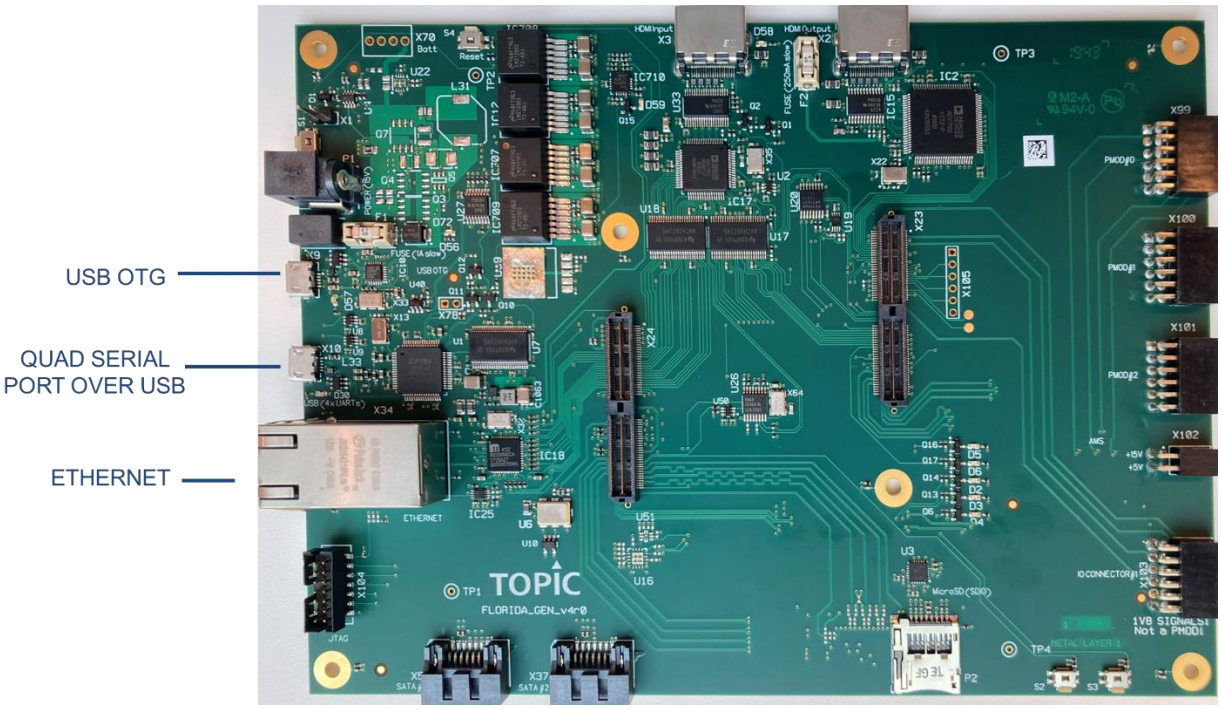


Figure 5 USB OTG, USB UARTs AND ETHERNET INTERFACES

5.4 USB UARTs

There are 4 UART connections to the MIAMI, of which one has a flow control option. One UART, without flow control, is routed to a dedicated UART in the processing system of the Zynq, while the other three UARTs are routed to the programmable logic. On the FLORIDA, the 4 UARTs are connected to a FT4232HL from FTDI, a quad high speed USB to multipurpose UART IC. Connecting the USB provides up to 4 virtual COM ports towards the FLORIDA/MIAMI.

FT4232HL pin #	Signal	SOM pin #	Description
16	UART_RXD	X23-61	Host 1st COM port TXD – MIAMI RXD
17	UART_TXD	X23-63	Host 1st COM port RXD – MIAMI TXD
26	IO_25_13	X23-90	Host 2nd COM port TXD
27	IO_L20N_T3_13	X23-100	Host 2nd COM port RXD
28	IO_L1N_T0_13	X23-94	Host 2nd COM port RTS_n
29	IO_L20P_T3_13	X23-96	Host 2nd COM port CTS_n
38	IO_L7N_T1_13	X24-60	Host 3th COM port TXD
39	IO_L8N_T1_13	X24-59	Host 3th COM port RXD
48	IO_L7P_T1_13	X24-58	Host 4th COM port TXD
52	IO_L8P_T1_13	X24-57	Host 4th COM port RXD

5.5 Ethernet

The Ethernet interface on the FLORIDA is connected to the programmable logic pins of the Zynq on the MIAMI. The dedicated gigabit Ethernet MAC can be routed as EMIO, connecting it to the PHY on the FLORIDA. The PHY, the KSZ9031RNX from Micrel, is set to PHY address 0. The Ethernet connector is a normal RJ45 Ethernet connector with build in LEDs for the link status and activity indication.

KSZ9031 pin #	Signal	SOM pin #	Description
24	IO_L13N_T2_MRCC_34	X24-46	TX Clock
25	IO_L11N_T1_SRCC_34	X24-29	TX Enable
19	IO_L14N_T2_SRCC_34	X24-54	TX Data 0
20	IO_L7N_T1_34	X23-66	TX Data 1
21	IO_L23N_T3_34	X24-50	TX Data 2
22	IO_L23P_T3_34	X24-48	TX Data 3
35	IO_L14P_T2_SRCC_34	X24-52	RX Clock
33	IO_L22N_T3_34	X24-34	RX Enable
32	IO_L16P_T2_34	X24-36	RX Data 0
31	IO_L16N_T2_34	X24-38	RX Data 1
28	IO_L18P_T2_34	X24-40	RX Data 2
27	IO_L18N_T2_34	X24-42	RX Data 3
42	IO_L3P_T0_DQS_PUDC_B_34	X24-24	RESET_N
38	IO_L3N_T0_DQS_34	X24-26	Interrupt
37	IO_L9P_T1_DQS_34	X24-28	MDIO
36	IO_L9N_T1_DQS_34	X24-30	MDC

5.6 MicroSD Memory Card

A microSD Card interface is available on the FLORIDA, allowing the MIAMI to boot from. A normal microSD memory card can be used in this slot. The external interface is connected through an SDIO port expander with voltage level translation, the TXS02612RTWR from Texas Instruments.

TXS02612 pin #	Signal	SOM pin #	Description
6	SDIO_uSD_DQ0	X23-58	SDIO Data 0
7	SDIO_uSD_DQ1	X23-50	SDIO Data 1
1	SDIO_uSD_DQ2	X23-46	SDIO Data 2
3	SDIO_uSD_DQ3	X23-52	SDIO Data 3
4	SDIO_uSD_CMD	X23-54	SDIO Command signal
9	SDIO_uSD_CLK	X23-48	SDIO Clock signal

A card detect signal is routed directly from the micro SD connector to the SOM interface. This signal, SDIO_DETECT is connected to pin X23-56 and is pulled low whenever a card is inserted.

5.7 HDMI input

The HDMI input is built around the ADV7611 HDMI receiver from Analog Devices. Configuration is done through I2C (see chapter I2C) and the captured video stream is output as 24bits parallel data plus some control signals.

The following table shows the mapping of the ADV7611 pins to the MIAMI pins. All back end data and control signals that are connected to the MIAMI are buffered with SN74AVCH16T245 buffers. The buffer is used as level converter, going from 3V3 on the ADV7611 to 1V8 on the MIAMI. All signals, except for the reset, are ADV7611 output and MIAMI input. These signals can be disabled by a single output enable signal (see table).

ADV7611 pin #	Signal	SOM pin #	Description
43	IO_L20N_T3_34	X24-53	HDMI data 0
42	IO_L20P_T3_34	X24-51	HDMI data 1
41	IO_L19N_T3_VREF_34	X24-49	HDMI data 2
39	IO_L19P_T3_34	X24-47	HDMI data 3
38	IO_L17N_T2_34	X24-45	HDMI data 4
37	IO_L17P_T2_34	X24-43	HDMI data 5
36	IO_L15N_T1_34	X24-41	HDMI data 6
35	IO_L15P_T1_34	X24-39	HDMI data 7
33	IO_L21N_T3_DQS_34	X24-37	HDMI data 8
32	IO_L21P_T3_DQS_34	X24-35	HDMI data 9
31	IO_L10N_T1_34	X24-33	HDMI data 10
30	IO_L10P_T1_34	X24-31	HDMI data 11
29	IO_L8N_T1_34	X24-25	HDMI data 12
28	IO_L8P_T1_34	X24-23	HDMI data 13
27	IO_L1N_T0_34	X24-21	HDMI data 14
26	IO_L1P_T0_34	X24-19	HDMI data 15
22	IO_L9P_T1_DQS_AD3P_35	X23-34	HDMI data 16
21	IO_L9N_T1_DQS_AD3N_35	X23-32	HDMI data 17
20	IO_L8P_T1_AD10P_35	X23-23	HDMI data 18
19	IO_L8N_T1_AD10N_35	X23-29	HDMI data 19
18	IO_L7P_T1_AD2P_35	X23-38	HDMI data 20
17	IO_L7N_T1_AD2N_35	X23-36	HDMI data 21
16	IO_L6P_T0_35	X23-25	HDMI data 22
15	IO_L6N_T0_VREF_35	X23-9	HDMI data 23
46	IO_L4P_T0_34	X23-68	HDMI HS, Horizontal Synchronization
47	IO_L24P_T1_34	X23-70	HDMI VS, Vertical Synchronization
45	IO_L5N_T0_34	X23-72	HDMI DE, Data Enable
25	IO_L11P_T1_SRCC_34	X23-27	HDMI LLC, Line Locked Clock
55	IO_L12N_T1_34	X23-74	HDMI Interrupt
1	IO_L5P_T0_34	X23-76	HDMI Interrupt / HPA, Hot Plug Assert
48	IO_L7P_T1_34	X23-78	HDMI SPDIF, serial audio
56	IO_L4N_T0_34	X23-82	ADV7611 reset_n

5.8 HDMI output

The HDMI output is built around the ADV7511 HDMI transmitter from Analog Devices. Just like the HDMI input, configuration is done through I2C (see chapter I2C) and the video stream is transferred as 24bits parallel data plus some control signals. Unlike the HDMI input, the connection between the ADV7511 and the MIAMI is direct, thus no buffering in between.

ADV7511 pin #	Signal	SOM pin #	Description
92	IO_L19P_T3_35	X24-13	HDMI data input 4
91	IO_L19N_T3_VREF_35	X24-15	HDMI data input 5
90	IO_L20N_T3_AD6N_35	X24-9	HDMI data input 6
89	IO_L20P_T3_AD6P_35	X24-11	HDMI data input 7
88	IO_L22P_T3_AD7P_35	X24-5	HDMI data input 8
87	IO_L22N_T3_AD7N_35	X24-7	HDMI data input 9
86	IO_L5N_T0_AD9N_35	X24-1	HDMI data input 10
85	IO_L5P_T0_AD9P_35	X24-3	HDMI data input 11
80	IO_L24P_T3_AD15P_35	X24-16	HDMI data input 16
78	IO_L21N_T3_AD14N_35	X24-12	HDMI data input 17
74	IO_L18N_T2_AD13N_35	X24-4	HDMI data input 18
73	IO_L21P_T3_AD14P_35	X24-10	HDMI data input 19
72	IO_L23N_T3_35	X24-8	HDMI data input 20
71	IO_L18P_T2_AD13P_35	X24-2	HDMI data input 21
70	IO_L24N_T3_AD15N_35	X24-14	HDMI data input 22
69	IO_L23P_T3_35	X24-6	HDMI data input 23
64	IO_L15P_T2_AD12P_35	X23-33	HDMI data input 28
63	IO_L15N_T2_AD12N_35	X23-35	HDMI data input 29
62	IO_L13P_T2_MRCC_35	X23-26	HDMI data input 30
61	IO_L13N_T2_MRCC_35	X23-24	HDMI data input 31
60	IO_L11P_T1_SRCC_35	X23-30	HDMI data input 32
59	IO_L11N_T1_SRCC_35	X23-28	HDMI data input 33
58	IO_L10P_T1_AD11P_35	X23-19	HDMI data input 34
57	IO_L10N_T1_AD11N_35	X23-31	HDMI data input 35
98	IO_L16P_T2_35	X23-16	HDMI HSYNC, Horizontal Synchronization
2	IO_L17N_T2_AD5N_35	X23-14	HDMI VSYNC, Vertical Synchronization
97	IO_L16N_T2_35	X23-18	HDMI DE, Data Enable
79	IO_L14P_T2_AD4P_SRCC_35	X23-20	HDMI CLK, Clock input
10	IO_L17P_T2_AD5P_35	X23-12	HDMI SPDIF input
45	IO_L14N_T2_AD4N_SRCC_35	X23-22	HDMI INT, Interrupt

5.9 SATA1 & SATA2

Figure 6 shows the physical location of the both SATA ports.

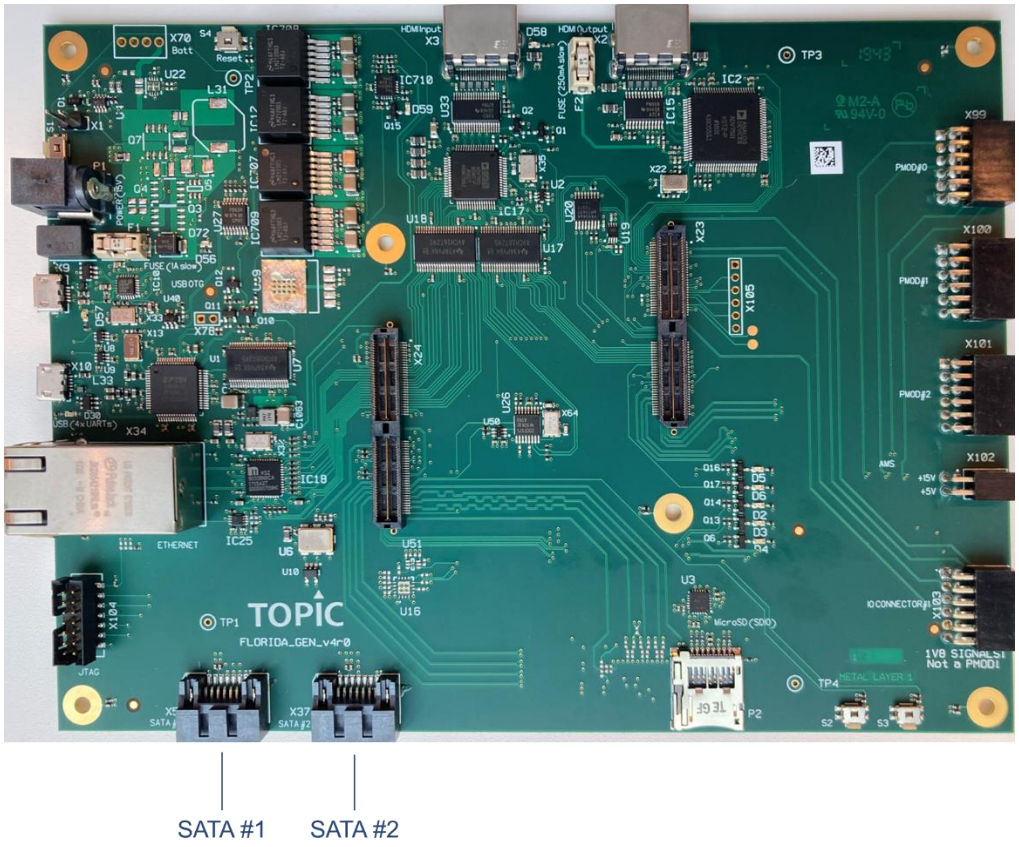


Figure 6 SATA INTERFACES

The FLORIDA contains two SATA interfaces. Both are directly connected to the GTP/GTX transceiver of the Zynq on the MIAMI. Each SATA uses a single lane, thus occupying 2 out of the 4 lanes. SATA1 uses lane 0 and SATA2 uses lane 1. Both the SATA transmitters and receivers are AC coupled; the transmitters on the MIAMI, the receivers on the FLORIDA.

The Si514 programmable clock can be used to provide the reference clock for the SATA interface. See chapter 6.3 and 6.4 for the pin-out of the SATA connectors.

5.10 General purpose LEDs and switches

The FLORIDA contains 2 general purpose switches and 5 general purpose LEDs.

Switch	Signal	SOM pin #	Description
S2	IO_L11N_T1_SRCC_13	X24-99	Input switch S2
S3	IO_L22P_T3_34	X24-32	Input switch S3
LED	**Signal**	**SOM pin #**	**Description**
D2	IO_L16P_T2_13	X24-114	Output LED D2 (green)
D3	IO_L17N_T2_13	X24-108	Output LED D3 (yellow)
D4	IO_L12N_T1_MRCC_35	X23-21	Output LED D4 (red)
D5	IO_L2N_T0_34	X23-64	Output LED D5 (green)
D6	IO_L24N_T1_34	X23-80	Output LED D6 (green)

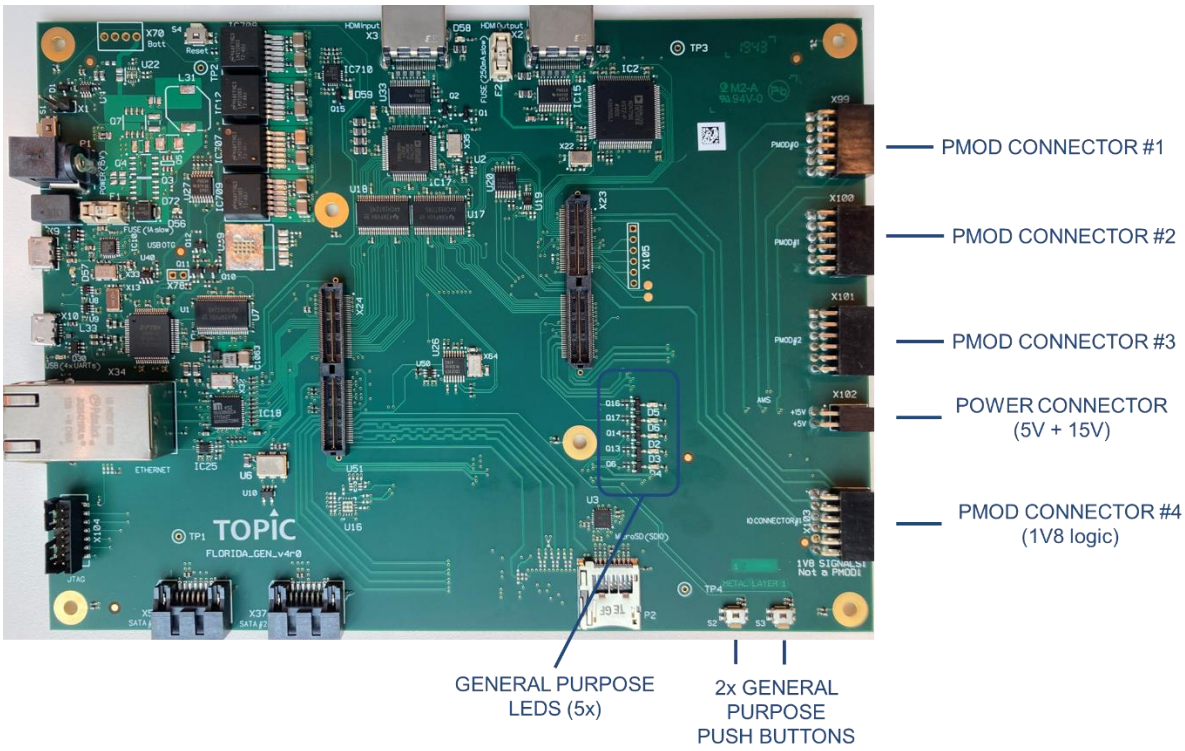


Figure 7 AMS AND PMOD#1 & PMOD#2, SWITCHES AND LEDs

5.11 GPIO expansion (PMOD #1)

There are 8 general purpose, 3V3 IO signals available on connector X99. The exact mappings of the 8 IO lines to the connector are listed in chapter 6.5. The interface complies fully to the Digilent PMOD I/O standard.

5.12 GPIO expansion (PMOD #2)

There are 8 general purpose,3V3 IO signals available on connector X100. The exact mappings of the 8 IO lines to the connector are listed in chapter 6.6. The interface complies fully to the Digilent PMOD I/O standard.

5.13 GPIO expansion (PMOD #3)

There are 8 general purpose, 3V3 IO signals available on connector X101. The exact mappings of the 8 IO lines to the connector are listed in chapter 6.7. The interface complies fully to the Digilent PMOD I/O standard.

5.14 GPIO expansion (PMOD #4)

There are 8 general purpose, 1V8 IO signals available on connector X103. The exact mappings of the 8 IO lines to the connector are listed in chapter 6.8. The interface does NOT (!) comply fully to the Digilent PMOD I/O standard, as the logic interfaces are 1V8 instead of 3V3.

4 of the signals on this connector are connected to the ADC capable pins of the SOM, allowing for direct ADC operation.

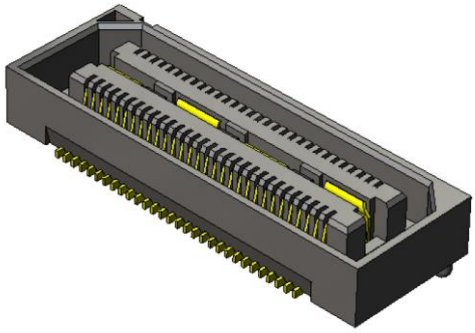
5.15 Power connector

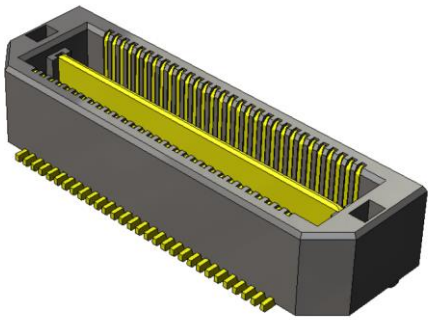
Connector X102 carries both the 5Vdc and 15Vdc (adapter voltage). This intention of this connector is to supply additional power to extension modules, in need of different voltages then the 3V3 on the PMOD devices. Especially useful when driver e.g. motors. Please remind that the supply is protected by a 4A slow blow fuse and the board itself is rated to a maximum power of 15W.

6 Connector pin assignments

6.1 X23: SoM interface (MIAMI)

Part type	Samtec, QTH-060-01-L-D-A, High Speed ground plane socket, 120 pins (2x60), stacking height 5mm
Mating part type (carrier board)	Samtec, QSH-060-01-L-D-A, High Speed ground plane socket, 120 pins (2x60), stacking height 5mm





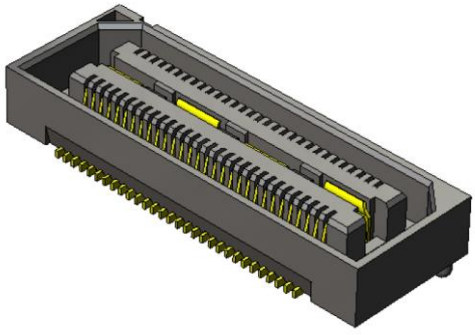
Pin	Signal	Dir.	I/O level	Type		Type	I/O level	Dir.	Signal	Pin
1	+3V3	In	+3V3	PWR		PWR	+3V3	In	+3V3	2
3	+3V3	In	+3V3	PWR		PWR	+3V3	In	+3V3	4
5	IO_L4N_T0_35	I/O	+VCCO1	B35		PWR		In	Vbat	6
7	IO_L4P_T0_35	I/O	+VCCO1	B35		PWR	0V	Ref	GND	8
9	IO_L6N_T0_VREF_35	I/O	+VCCO1	B35		n.a.	+3V3	In	SOM_RST_N	10
11	IO_L1P_T0_AD0P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L17P_T2_AD5P_35	12
13	IO_L1N_T0_AD0N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L17N_T2_AD5N_35	14
15	IO_L2N_T0_AD8N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L16P_T2_35	16
17	IO_L2P_T0_AD8P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L16N_T2_35	18
19	IO_L10P_T1_AD11P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L14P_T2_AD4P_SRCC_35	20
21	IO_L12N_T1_MRCC_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L14N_T2_AD4N_SRCC_35	22
23	IO_L8P_T1_AD10P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L13N_T2_MRCC_35	24
25	IO_L6P_T0_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L13P_T2_MRCC_35	26
27	IO_L12P_T1_MRCC_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L11N_T1_SRCC_35	28
29	IO_L8N_T1_AD10N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L11P_T1_SRCC_35	30
31	IO_L10N_T1_AD11N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L9N_T1_DQS_AD3N_35	32
33	IO_L15P_T2_AD12P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L9P_T1_DQS_AD3P_35	34
35	IO_L15N_T2_AD12N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L7N_T1_AD2N_35	36
37	GND	Ref	0V	PWR		B35	+VCCO1	I/O	IO_L7P_T1_AD2P_35	38
39	PS_JTAG_TDI	I/O	+1V8	B501		B35	+VCCO1	I/O	IO_L3N_T0_DQS_AD1N_35	40
41	PS_JTAG_TCK	I/O	+1V8	B501		B35	+VCCO1	I/O	IO_L3P_T0_DQS_AD1P_35	42
43	PS_JTAG_TDO	I/O	+1V8	B501		n.a.	+3V3		V_PRESENT	44
45	PS_JTAG_TMS	I/O	+1V8	B501		B501	+1V8		SDIO_uSD_DQ2	46
47	PS_SCL	I/O	+1V8	B501		B501	+1V8		SDIO_uSD_CLK	48
49	PS_SDA	I/O	+1V8	B501		B501	+1V8		SDIO_uSD_DQ1	50
51	SCL_1V8	I/O	+1V8	B501		B501	+1V8		SDIO_uSD_DQ3	52
53	SDA_1V8	I/O	+1V8	B501		B501	+1V8		SDIO_uSD_CMD	54
55	GND	Ref	0V	PWR		B501	+1V8		SDIO_DETECT	56
57	+1V8	In	+1V8	PWR		B501	+1V8		SDIO_uSD_DQ0	58
59	+1V8	In	+1V8	PWR		B500	+1V8		PS_MIO15_500	60
61	UART_TXD	Out	+1V8	B501		B34	+VCCO2	I/O	IO_L2P_T0_34	62
63	UART_RXD	In	+1V8	B501		B34	+VCCO2	I/O	IO_L2N_T0_34	64
65	SW_RST_N	In	+3V3	n.a.		B34	+VCCO2	I/O	IO_L7N_T1_34	66
67	USB_DQ3	I/O	+1V8			B34	+VCCO2	I/O	IO_L4P_T0_34	68
69	USB_DQ5	I/O	+1V8			B34	+VCCO2	I/O	IO_L24P_T1_34	70

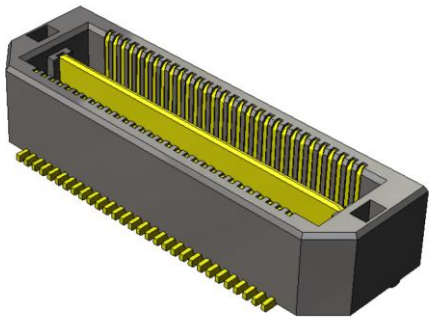
Pin	Signal	Dir.	I/O level	Type		Type	I/O level	Dir.	Signal	Pin
71	USB_DQ7	I/O	+1V8			B34	+VCCO2	I/O	IO_L5N_T0_34	72
73	USB_DQ4	I/O	+1V8			B34	+VCCO2	I/O	IO_L12N_T1_34	74
75	USB_DQ2	I/O	+1V8			B34	+VCCO2	I/O	IO_L5P_T0_34	76
77	USB_DQ6	I/O	+1V8			B34	+VCCO2	I/O	IO_L7P_T1_34	78
79	USB_DQ1	I/O	+1V8	B501		B34	+VCCO2	I/O	IO_L24N_T1_34	80
81	USB_STP	I/O	+1V8	B501		B34	+VCCO2	I/O	IO_L4N_T0_34	82
83	USB_CLK	I/O	+1V8	B501		PWR	+1V25A	In	+1V25A	84
85	USB_NXT	I/O	+1V8	B501		PWR	0V	Ref	GND_XADC	86
87	USB_DIR	I/O	+1V8	B501		B13	+VCCO0	I/O	IO_L1P_T0_13	88
89	USB_DQ0	I/O	+1V8	B501		B13	+VCCO0	I/O	IO_25_13	90
91	USB_RESET	In	+3V3	n.a.		B13	+VCCO0	I/O	IO_L22N_T3_13	92
93	GND	Ref	0V	PWR		B13	+VCCO0	I/O	IO_L1N_T0_13	94
95	+VCCO0	Out	+VCCO0	PWR		B13	+VCCO0	I/O	IO_L20P_T3_13	96
97	+VCCO1	Out	+VCCO1	PWR		B13	+VCCO0	I/O	IO_L21P_T3_DQS_13	98
99	+VCCO2	Out	+VCCO2	PWR		B13	+VCCO0	I/O	IO_L20N_T3_13	100
101	GND_XADC	Ref	0V	PWR		B13	+VCCO0	I/O	IO_L21N_T3_DQS_13	102
103	XADC_VP	In	+1V25A	B0		B13	+VCCO0	I/O	IO_L22P_T3_13	104
105	XADC_VN	In	+1V25A	B0		B13	+VCCO0	I/O	IO_L15N_T2_DQS_13	106
107	XADC_DXP	In	+1V25A	B0		B13	+VCCO0	I/O	IO_L15P_T2_DQS_13	108
109	XADC_DXN	In	+1V25A	B0		B13	+VCCO0	I/O	IO_L19P_T3_13	110
111	PL_JTAG_RSTN	In	+3V3	B0		B13	+VCCO0	I/O	IO_L19N_T3_VREF_13	112
113	PL_JTAG_TDI	In	+3V3	B0		B13	+VCCO0	I/O	IO_L5N_T0_13	114
115	PL_JTAG_TMS	In	+3V3	B0		B13	+VCCO0	I/O	IO_L5P_T0_13	116
117	PL_JTAG_TCK	In	+3V3	B0		B13	+VCCO0	I/O	IO_L6N_T0_VREF_13	118
119	PL_JTAG_TDO	Out	+3V3	B0		B13	+VCCO0	I/O	IO_L6P_T0_13	120

Remark: Ground reference is available on the integrated ground socket as reference to any pin on the connector.

6.2 X24: Carrier board connector pinning

Part type	Samtec, QTH-060-01-L-D-A, High Speed ground plane socket, 120 pins (2x60), stacking height 5mm
Mating part type (carrier board)	Samtec, QSH-060-01-L-D-A, High Speed ground plane socket, 120 pins (2x60), stacking height 5mm





Pin	Signal	Dir.	I/O level	Type		Type	I/O level	Dir.	Signal	Pin
1	IO_L5N_T0_AD9N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L18P_T2_AD13P_35	2
3	IO_L5P_T0_AD9P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L18N_T2_AD13N_35	4
5	IO_L22P_T3_AD7P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L23P_T3_35	6
7	IO_L22N_T3_AD7N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L23N_T3_35	8
9	IO_L20N_T3_AD6N_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L21P_T3_AD14P_35	10
11	IO_L20P_T3_AD6P_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L21N_T3_AD14N_35	12
13	IO_L19P_T3_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L24N_T3_AD15N_35	14

Pin	Signal	Dir.	I/O level	Type		Type	I/O level	Dir.	Signal	Pin
15	IO_L19N_T3_VREF_35	I/O	+VCCO1	B35		B35	+VCCO1	I/O	IO_L24P_T3_AD15P_35	16
17	GND	Ref	0V	PWR		PWR	0V	Ref	GND	18
19	IO_L1P_T0_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L6P_T0_34	20
21	IO_L1N_T0_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L6N_T0_VREF_34	22
23	IO_L8P_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L3P_T0_DQS_PUDC_B_34	24
25	IO_L8N_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L3N_T0_DQS_34	26
27	IO_L11P_T1_SRCC_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L9P_T1_DQS_34	28
29	IO_L11N_T1_SRCC_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L9N_T1_DQS_34	30
31	IO_L10P_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L22P_T3_34	32
33	IO_L10N_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L22N_T3_34	34
35	IO_L21P_T3_DQS_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L16P_T2_34	36
37	IO_L21N_T3_DQS_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L16N_T2_34	38
39	IO_L15P_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L18P_T2_34	40
41	IO_L15N_T1_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L18N_T2_34	42
43	IO_L17P_T2_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L13P_T2_MRCC_34	44
45	IO_L17N_T2_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L13N_T2_MRCC_34	46
47	IO_L19P_T3_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L23P_T3_34	48
49	IO_L19N_T3_VREF_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L23N_T3_34	50
51	IO_L20P_T3_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L14P_T2_SRCC_34	52
53	IO_L20N_T3_34	I/O	+VCCO2	B34		B34	+VCCO2	I/O	IO_L14N_T2_SRCC_34	54
55	GND	Ref	V0	PWR		PWR	V0	Ref	GND	56
57	IO_L8P_T1_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L7P_T1_13	58
59	IO_L8N_T1_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L7N_T1_13	60
61	GND	Ref	V0	PWR		PWR	V0	Ref	GND	62
63	GTP_TX_1_P	Out	+1V2	B112		B112	+1V2	In	GTP_REF_CLK_1_P	64
65	GTP_TX_1_N	Out	+1V2	B112		B112	+1V2	In	GTP_REF_CLK_1_N	66
67	GND	Ref	V0	PWR		PWR	V0	Ref	GND	68
69	GTP_TX_3_P	Out	+1V2	B112		B112	+1V2	In	GTP_RX_3_P	70
71	GTP_TX_3_N	Out	+1V2	B112		B112	+1V2	In	GTP_RX_3_N	72
73	GND	Ref	V0	PWR		PWR	V0	Ref	GND	74
75	GTP_TX_0_P	Out	+1V2	B112		B112	+1V2	In	GTP_RX_0_P	76
77	GTP_TX_0_N	Out	+1V2	B112		B112	+1V2	In	GTP_RX_0_N	78
79	GND	Ref	V0	PWR		PWR	V0	Ref	GND	80
81	GTP_TX_2_P	Out	+1V2	B112		B112	+1V2	In	GTP_RX_1_P	82
83	GTP_TX_2_N	Out	+1V2	B112		B112	+1V2	In	GTP_RX_1_N	84
85	GND	Ref	V0	PWR		PWR	V0	Ref	GND	86
87	GTP_REF_CLK_0_P	In	+1V2	B112		B112	+1V2	In	GTP_RX_2_P	88
89	GTP_REF_CLK_0_N	In	+1V2	B112		B112	+1V2	In	GTP_RX_2_N	90
91	GND	Ref	V0	PWR		PWR	V0	Ref	GND	92
93	IO_L10P_T1_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L4P_T0_13	94
95	IO_L10N_T1_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L4N_T0_13	96
97	IO_L11P_T1_SRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L9P_T1_DQS_13	98
99	IO_L11N_T1_SRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L9N_T1_DQS_13	100
101	IO_L12P_T1_MRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L3P_T0_DQS_13	102
103	IO_L12N_T1_MRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L3N_T0_DQS_13	104
105	IO_L23P_T3_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L17P_T2_13	106
107	IO_L23N_T3_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L17N_T2_13	108
109	IO_L14P_T2_SRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L2P_T0_13	110
111	IO_L14N_T2_SRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L2N_T0_13	112
113	IO_L18P_T2_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L16P_T2_13	114
115	IO_L18N_T2_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L16N_T2_13	116
117	IO_L13P_T2_MRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L24P_T3_13	118
119	IO_L13N_T2_MRCC_13	I/O	+VCCO0	B13		B13	+VCCO0	I/O	IO_L24N_T3_13	120

Remark: Ground reference is available on the integrated ground socket as reference to any pin on the connector.

6.3 X5: SATA1

Part type	Molex, 47080-4001, 7 pin SATA connector with peg and locking latch, 1.27mm pitch
Mating part type	Serial ATA Signal Connector (1.27mm pitch)

X5 pin #	Signal	SOM pin #	Description
1	GND	N.A.	Ground
2	GTP_RX_0_P	X24-76	GTP/GTX receiver lane 0
3	GTP_RX_0_N	X24-78	GTP/GTX receiver lane 0
4	GND	N.A.	Ground
5	GTP_TX_0_N	X24-77	GTP/GTX transmitter lane 0
6	GTP_TX_0_P	X24-75	GTP/GTX transmitter lane 0
7	GND	N.A.	Ground

6.4 X37: SATA2

Part type	Molex, 47080-4001, 7 pin SATA connector with peg and locking latch, 1.27mm pitch
Mating part type	Serial ATA Signal Connector (1.27mm pitch)

X37 pin #	Signal	SOM pin #	Description
1	GND	N.A.	Ground
2	GTP_RX_1_P	X24-82	GTP/GTX receiver lane 1
3	GTP_RX_1_N	X24-84	GTP/GTX receiver lane 1
4	GND	N.A.	Ground
5	GTP_TX_1_N	X24-65	GTP/GTX transmitter lane 1
6	GTP_TX_1_P	X24-63	GTP/GTX transmitter lane 1
7	GND	N.A.	Ground

6.5 X99: PMOD #1

Part type	Wurth, 613 012 243 121, 12 pin through hole pin header, 2.54mm pitch
Mating part type	12 contact, dual row socket header, 2.54mm pitch

X100 pin #	Signal	SOM pin #	Description
1	IO_L19P_T3_13	X23-110	I/O pin
2	IO_L19N_T3_VREF_13	X23-112	I/O pin
3	IO_L15P_T2_DQS_13	X23-108	I/O pin
4	IO_L15N_T2_DQS_13	X23-106	I/O pin
5	GND	---	Ground
6	+3V3	---	3V3 supply voltage
7	IO_L24P_T3_13	X24-118	I/O pin
8	IO_L24N_T3_13	X24-120	I/O pin
9	IO_L21P_T3_DQS_13	X23-98	I/O pin
10	IO_L21N_T3_DQS_13	X23-102	I/O pin
11	GND	---	Ground
12	+3V3	---	3V3 supply voltage

6.6 X100: PMOD #2

Part type	Wurth, 613 012 243 121, 12 pin through hole pin header, 2.54mm pitch
Mating part type	12 contact, dual row socket header, 2.54mm pitch

X101 pin #	Signal	SOM pin #	Description
1	IO_L2P_T0_13	X24-110	I/O pin
2	IO_L2N_T0_13	X24-112	I/O pin
3	IO_L22P_T3_13	X23-104	I/O pin
4	IO_L22N_T3_13	X23-92	I/O pin
5	GND	---	Ground
6	+3V3	---	3V3 supply voltage
7	IO_L6P_T0_13	X23-120	I/O pin
8	IO_L6N_T0_VREF_13	X23-118	I/O pin
9	IO_L5P_T0_13	X23-116	I/O pin
10	IO_L5N_T0_13	X23-114	I/O pin
11	GND	---	Ground
12	+3V3	---	3V3 supply voltage

6.7 X101: PMOD #3

Part type	Wurth, 613 012 243 121, 12 pin through hole pin header, 2.54mm pitch
Mating part type	12 contact, dual row socket header, 2.54mm pitch

X100 pin #	Signal	SOM pin #	Description
1	IO_L19P_T3_13	X23-110	I/O pin
2	IO_L19N_T3_VREF_13	X23-112	I/O pin
3	IO_L15P_T2_DQS_13	X23-108	I/O pin
4	IO_L15N_T2_DQS_13	X23-106	I/O pin
5	GND	---	Ground
6	+3V3	---	3V3 supply voltage
7	IO_L24P_T3_13	X24-118	I/O pin
8	IO_L24N_T3_13	X24-120	I/O pin
9	IO_L21P_T3_DQS_13	X23-98	I/O pin
10	IO_L21N_T3_DQS_13	X23-102	I/O pin
11	GND	---	Ground
12	+3V3	---	3V3 supply voltage

6.8 X103: PMOD #4

Part type	Wurth, 613 012 243 121, 12 pin through hole pin header, 2.54mm pitch
Mating part type	12 contact, dual row socket header, 2.54mm pitch

X101 pin #	Signal	SOM pin #	Description
1	IO_L2P_T0_13	X24-110	I/O pin
2	IO_L2N_T0_13	X24-112	I/O pin
3	IO_L22P_T3_13	X23-104	I/O pin
4	IO_L22N_T3_13	X23-92	I/O pin
5	GND	---	Ground
6	+3V3	---	3V3 supply voltage
7	IO_L6P_T0_13	X23-120	I/O pin
8	IO_L6N_T0_VREF_13	X23-118	I/O pin
9	IO_L5P_T0_13	X23-116	I/O pin
10	IO_L5N_T0_13	X23-114	I/O pin
11	GND	---	Ground
12	+3V3	---	3V3 supply voltage

6.9 X102: Power connector

Part type	Wurth, 613 004 243 121, 4 pin through hole pin header, 2.54mm pitch
Mating part type	4 contact, dual row socket header, 2.54mm pitch

X102 pin #	Signal	SOM pin #	Description
1	GND	---	Ground
2	+15V	---	15V supply voltage
3	GND	---	Ground
4	+5V	---	5V supply voltage

7 Electrical characteristics

7.1 Electrical specifications

Supply voltage	12-15 [V], DC regulated, +/-5%
Current consumption	1.0 [A] (typical)

7.2 Environment specifications

Standard operating temperature	0 … +70[°C]
Storage temperature	-40 … +85[°C]
Relative humidity	0 … 95%, non-condensing

7.3 Mechanical specifications

Weight	approximately 80 [gram]
Board	glass epoxy FR-4, UL-listed, 6 layers, 1.6 [mm]
Dimensions	196.0 [mm] x 143.0 [mm] x 10.0 [mm] (length x width x height)

7.4 Regulatory conformation

CE (EMC, EMI)	Report available on request
Temperature and humidity	Not tested
RoHS & REACH	All applied components, printed circuit board material, production of the printed circuit board as well as the assembly of the boards are conducted in compliance with the RoHS legislation.

8 Dimensions