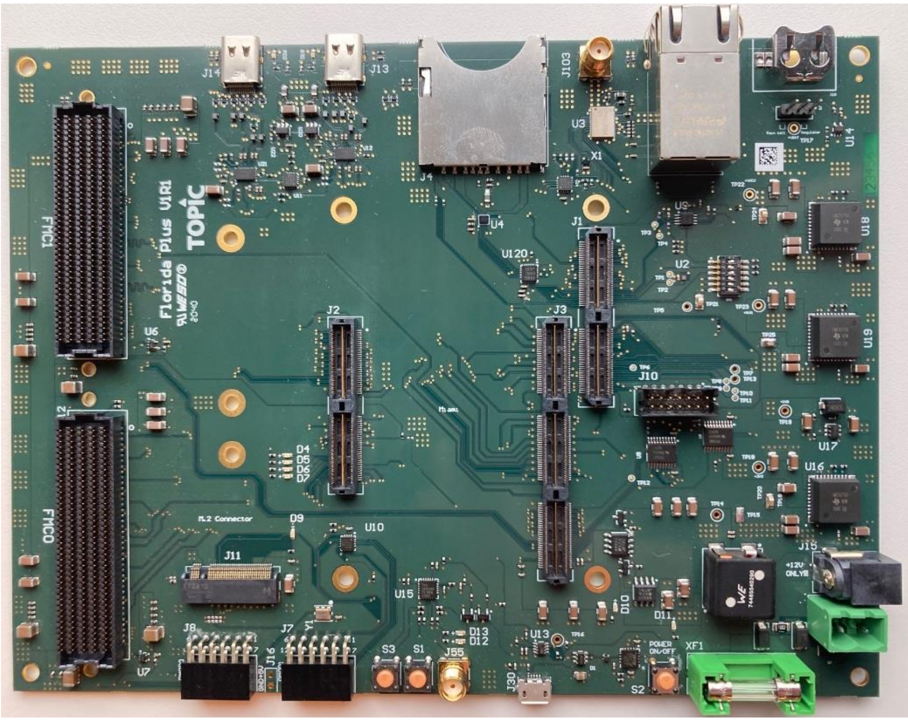
FLORIDA PLUS

Product Guide

V1R1 / 12-4-2021



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1 Introduction

The Florida Plus carrier board is intended as a generic development board for the Miami MPSOC Plus System-on-Modules (SOM) for general purpose applications as well as for the evaluation of the performance of the Miami MPSOC Plus SOM. The board is equipped with a wide variety of interfaces and functionality, which are further explained in this document.

Miami MPSOC Plus is based around the Xilinx Zynq Ultrascale+ series ZU6, ZU9 and ZU15 System-on-Chip (SOC) devices. In combination with the Florida Plus it provides a high performance and flexible development environment. Make sure to use the correct power adapter when powering the Florida Plus and take the appropriate ESD precautions to prevent damage to the board.

The Florida Plus can be purchased in combination with the Miami MPSOC Plus ZU9 and an accessory bag, forming a complete development kit. Reference designs for this development kit configuration can be downloaded from https://downloads.topic.nl/.

2 Getting started

2.1 Florida Plus development environment

The Florida Plus carrier board is a stand-alone board that can be used for prototyping and evaluation purposes. The Florida Plus carrier board should be ordered together with a Miami MPSOC Plus System-on-Module and a Florida Plus accessory bag. It can also be ordered as a complete development kit. The following ordering numbers are applicable:

Order number	Description
miap-zu9-1-7-4-2	Miami MPSOC Plus System-on-Module based on Xilinx Zynq Ultrascale+ ZU9
flo-plus	Florida Plus carrier board
flo_plus_acce	Florida Plus accessory bag
mia-kit-mpsoc-plus	= ***miap-zu9-1-7-4-2*** + ***flo-plus*** + ***flo-plus-acce*** + base plate and tool case

This product guide is about the functional usage of the Florida Plus carrier board, assuming that the Miami MPSOC Plus SOM, Florida Plus carrier board and Florida Plus accessory bag ordered as separate items.

2.1.1 Miami MPSOC Plus

The product guide of the Miami MPSOC Plus describes in detail all the hardware and software functionality and usage of that board. Please refer to the data package delivered with the Miami MPSOC Plus SOM or refer to https://topic.nl/en/products/system-on-modules/miami-mpsoc-plus for more details.

2.1.2 Florida Plus accessory bag

The Florida Plus accessory bag consists of:

- Stand-offs and mounting material for fixing base plate, carrier board and SOM
- Mains power adapter
- SDcard (32GByte)
- Micro-USB cable
- Wuerth cable part 691344510002

With this set of accessories, the usage of the Florida Plus carrier board is kick-started and also supports all functionality implemented in the FPGA and software reference designs provided with this board.

2.2 Setting up the board

Before using the Florida Plus 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 the SOM standoffs mounting holes to support surface contact to avoid excessive bending of the board during insertion/extraction of a MIAMI SOM.
- Use M3 10 mm stand-offs to ensure the necessary clearance distance for the isolated area (use 5mm stand-offs for mounting the MIAMI to the FLORIDA).

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

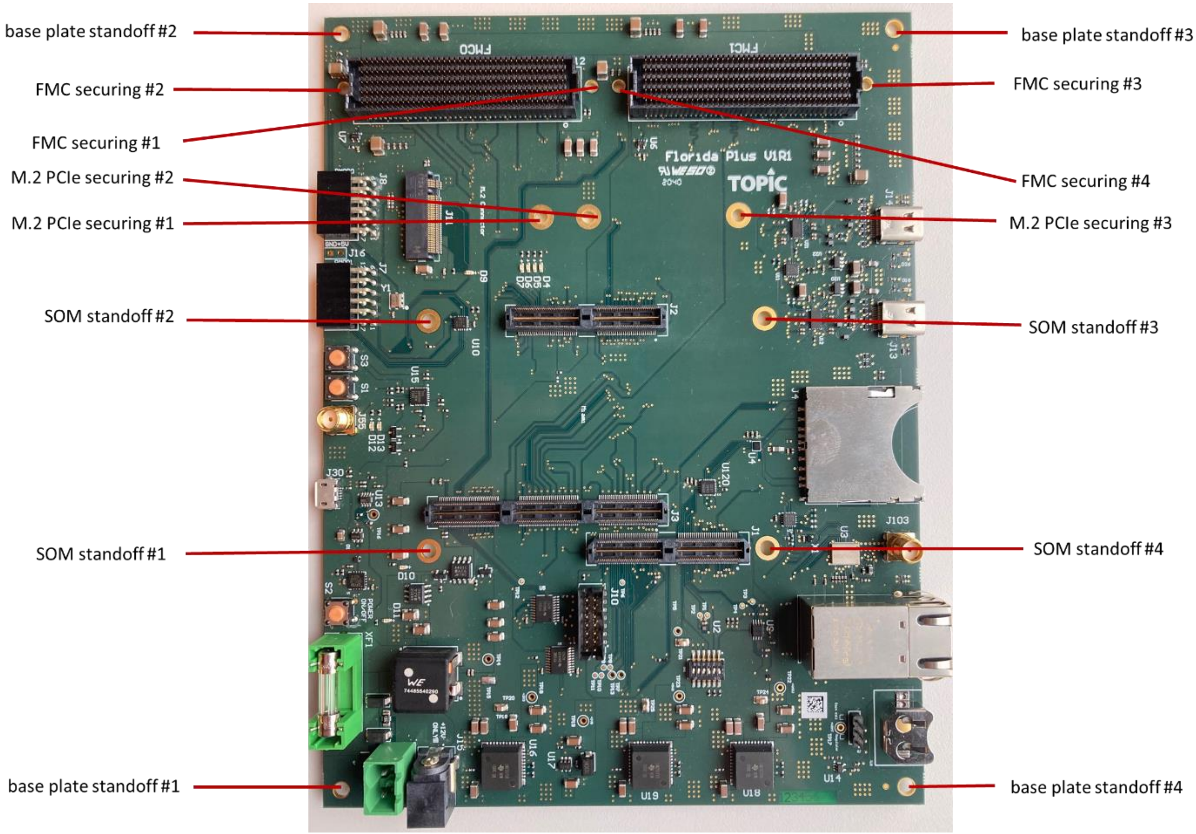

Figure 1 : Florida Plus assembly and mounting instructions

2.3 Interfaces & connectors

Figure 2 shows all the external interfaces of the FLORIDA PLUS. 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.

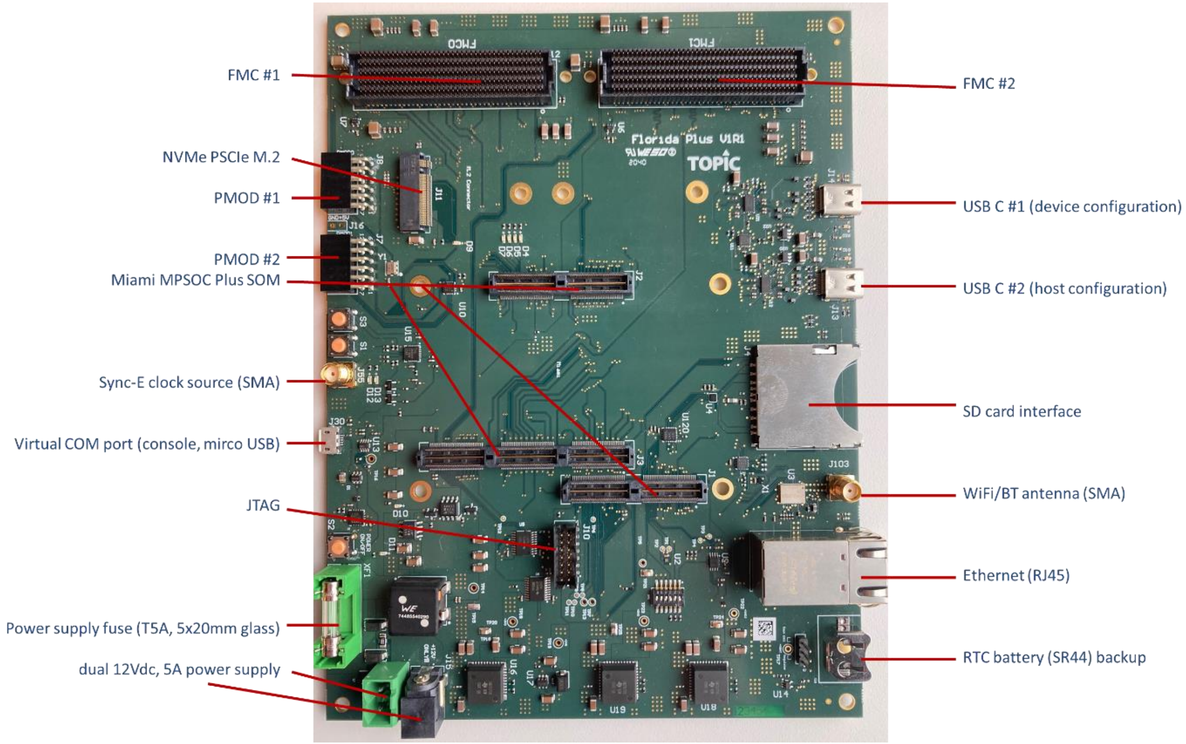

Figure 2 : Florida Plus interfaces

2.4 PMOD extension modules

The Florida Plus provides 2x Digilent, Inc. compliant PMOD interfaces (dual row 6 pins variant). These connectors are particularly suitable to connected lower complexity peripherals to and control via FPGA or processor integrated controllers, such as CAN, RS232, RS485, stepper motor drivers, brushless DC motor drivers, displays, sensors and actuators, etc. PMOD compliant boards are widely available. A large selection of PMOD modules can be ordered at :

- https://store.digilentinc.com/pmod-modules-connectors/

Please contact Topic for advice on recommended PMOD modules for e.g. HDMI output, brushless DC motor stages, CAN 2.0b transceivers, etc.

2.5 FPGA Mezzanine Cards (FMC)

A broad collection expansion cards are available to provide the Florida Plus board with dedicated high performance peripherals and interfaces like analog-digital converters, multi-Gigabit communication links, video interfaces, etc. The following links can be helpful selecting the board of your need:

- https://www.xilinx.com/products/boards-and-kits/fmc-cards.html
- https://www.vita.com/FMC-VITA-57

Please contact Topic for advice on specific FMC functionality.

2.6 Software installation

The Florida Plus carrier board is supported by the Topic Linux Distribution (TLD). This distribution can be downloaded from GitHub:

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

The reference for this board is the Topic Development Kit Miami MPOC Plus ZU9 (TDKMMP9). For more details on the use of the distribution and unique added value, please refer to the Miami MPSOC Plus product guide [1]. Together with the FPGA reference design, it forms 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

The initial boot configuration of the Florida Plus/Miami MPSOC Plus development kit requires the download of the default reference image for the kit from the downloads portal of Topic:

- Download the WIC image "" from http://downloads.topic.nl
- Unzip the WIC image and program the image to an SDcard
- Select the "SDcard" boot mode on the Miami MPSOC Module using the boot switches
- Power the board
- After booting the board, an Ethernet connection can be setup by connecting the RJ45 Ethernet port to your network or use the USB C device to a standard PC.
- This gives you access to the board using SSH or connect to the remote update service.
- Download the software update eMMC eMMC desktop image from http://downloads.topic.nl
- Using the remote update server, program this image to the eMMC memory
- Power the board down
- Set the boot mode switches to the eMMC memory to boot from
- Re-power the board to boot the design reference image for the development kit

Refer to the refence design(s) documentation for the Florida Plus / Miami MPSOC Plus for more details on functionality and built/usage instructions.

3 Florida features

Florida Plus	
GENERAL	
SOM compatibility	MIAMI MPSOC Plus ZU6/ZU9/ZU15
SOM Connector	2x Samtec QTH-060-01-L-D-A + 1x Samtec QTH-090-01-L-D-A
Dyplo® supported platform	Yes
Communication Interfaces	
LAN (1000M/100M/10M)	1x via PS connected GTP link
WiFi/Bluetooth	Connected via MIO with SDIO controller, shared with SDcard
CAN	2x, via PMOD connectivity and EMIO PS/PL bridge
UART	1x via Virtual COM port over USB
PCI-express	M.2 slot intended for SSD mass storage
I2C	via PMOD connectivity and EMIO PS/PL bridge
SPI	via PMOD connectivity and EMIO PS/PL bridge
USB-C	2x, configured as 1x host and 1x device
SD-CARD / SDIO	1x, supporting SD, SDHC and SDXC
Expansion Interfaces	
FMC	2x 100% LPC compatible, limited HPC compatibility
PMOD	2x 100% compatible (3V3 I/O logic)
Audio / Video	
Audio	via PMOD
Video	via FMC expansion board or PMOD expansion board
Debug / test	
JTAG	1x support
Console	via virtual COM over USB
Mechanical and environmental	
Temperature range	Commercial (0°C / +70°C)
Power supply	
Power supply	12Vdc, 5A

4 Florida architecture

4.1 Block diagram

The FLORIDA provides three high speed connectors to connect to the IO of the MIAMI. The MIAMI contains, for the majority of the interfaces, the MAC interfaces and for certain functions also the physical interfaces. 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.

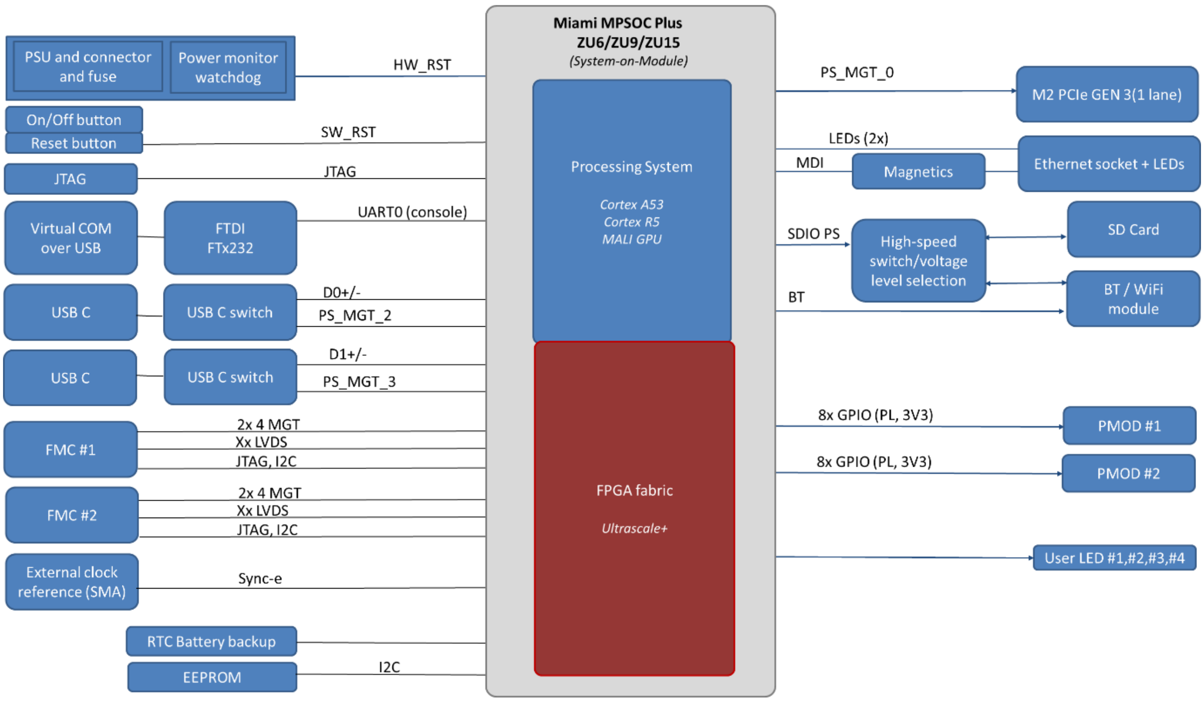

Figure 3 : Block diagram Florida Plus with Miami connectivity

5 Florida board functionality

5.1 Power distribution

The power consumed by the Florida Plus board is dominated by the power consumption of the applied Miami MPSOC Plus SOM or the optionally installed FMC boards. The board is designed to handle up to around 60[W] power or 5[A] current.

The board needs to be powered from 12[Vdc] power source. Normal connection is via a DC power plug J15. Recommended is to use a power adapter providing a barrel plug with center positive 2.5mm x 5.5mm x 10/11mm. A suggested suitable supply is e.g. XP Power VEC50US12 (supplied as part of the optional accessory kit).

Alternatively, power can be supplied using a power header at a 5,05 mm pitch. The cable part of the header is supplied with the board. This allows for a solid, permanent powering solution of the board with e.g. a laboratory supply.

The board is protected for reverse polarity connection as well as over current protection by means of a 5[A] slow blow 5x20 mm glass cartridge fuse (XF1), e.g. Littelfuse 0234005.MXP.

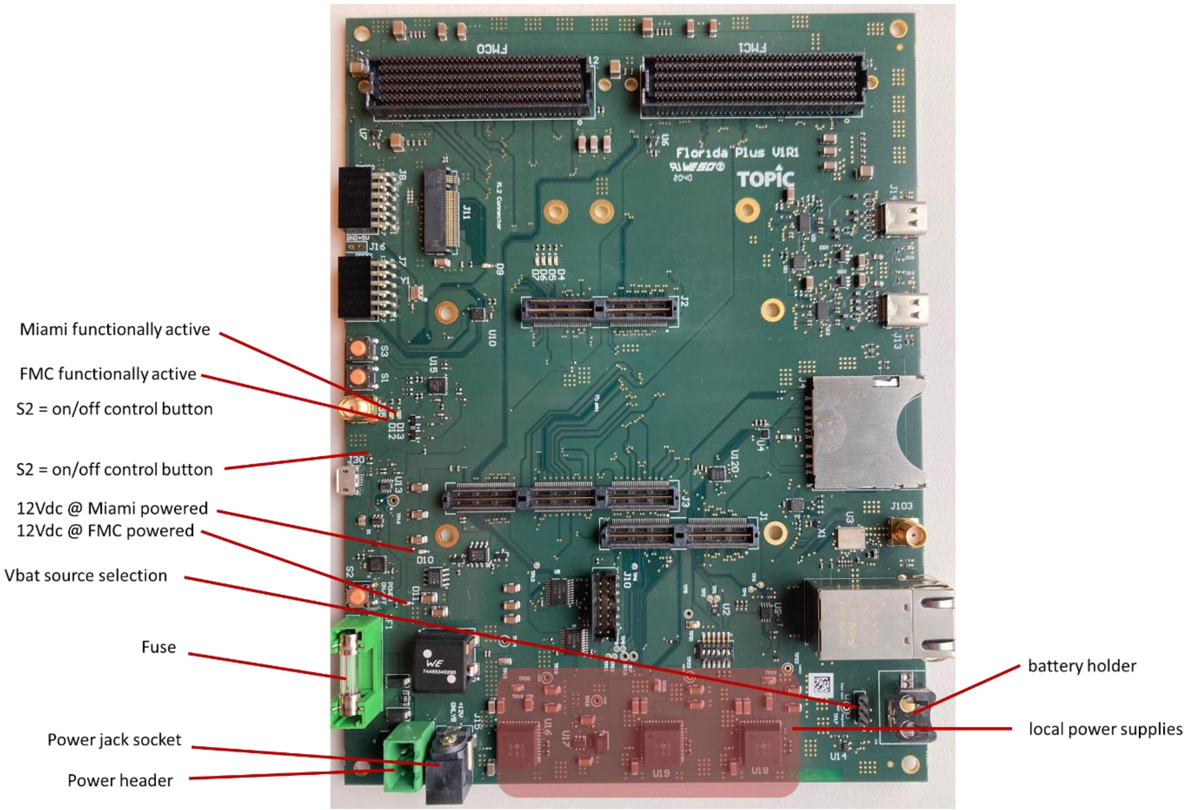

Figure 4 : Power distribution related component locations

5.1.1 Power switching

The power to the Miami MPSOC Plus and the power to the FMC connectors are explicitly controlled via a CMOS power switch. All supplies are controlled via a power switch controller (U13). The power switch controller implements a number of power management functions:

- When the board has been switched off, but power is supplied to the board, pressing button S2 will enable the power distribution over the board and wake the processor. When applying the power, pressing the button is not needed to wake the board.
- When pressing button S2 when the board is awake, an interrupt will be issued by the controller to the Miami MPSOC Plus, which requests a graceful shutdown of the system. When the processor is done shutting down peripherals, it needs to assert the power-kill signal. By doing this, the system powers down, without the need to switch-off the input power.
- When keeping button S2 pressed for around 10 seconds, the board will also power-down. It has the same functional effect as removing the power from the board.
- It is not possible to power cycle the board. It is power-on by asserting the power supply or pressing button S2. It will shut-down under software control after pressing button S2 shortly. When pressing button S2 for a longer period, it will also shut-down. There is no means to enable the power again automatically.

The on board power regulators create the internally required voltage rails from the external 12[V] source. The generated voltage are monitored by a reset and watchdog chip (U15).

- When LED D12 illuminates, the Florida Plus power supply circuitry is operational.
- When LED D13 illuminates, the reset to the Miami MPSOC Plus is de-asserted, allowing it to perform a cold boot.
- When LED D10 illuminates, the 12[V] supply to the Miami MPSOC Plus SOM is enabled.
- When LED D11 illuminates, the 12[V] supply to the two FMC connectors is enabled

When properly powered under normal conditions, LEDs D10, D11, D12 and D13 have all to be illuminated.

5.1.2 FMC connector voltage Vadj

The FMC standard specifies that the supply voltage Vadj on the connector can have a variable level. This is supported by the Florida Plus as a resistor programmable option. Please refer to the Florida Plus schematic sheet 26 for the applicable resistor values for resistors R97 and R98. The default voltage level of Vadj is 1.8[V].

5.1.3 Battery backup

The Miami MPSOC Plus supports battery backup for e.g. the real-time clock circuitry. The Vbat supply of the SOM is exposed to the SOM board connector as the battery solution is not part of the SOM. Using a jumper configuration on header J9, the source of the Vbat supply can be selected:

- No jumper on J9 means a floating Vbat source
- A jumper over pins 1-2 applies a permanent supply of 1.5V as long as the Florida Plus is powered
- A jumper over pins 2-3 selects the battery source on the Florida Plus. The board provides a coin cell battery holder for using SR44 or LR44 type of silver oxide/alkaline batteries. The batteries are NOT delivered together with the board.

5.2 LEDs and switches

Apart from the power supply related LEDs and on/off button, there are a number of LEDs and buttons on the board.

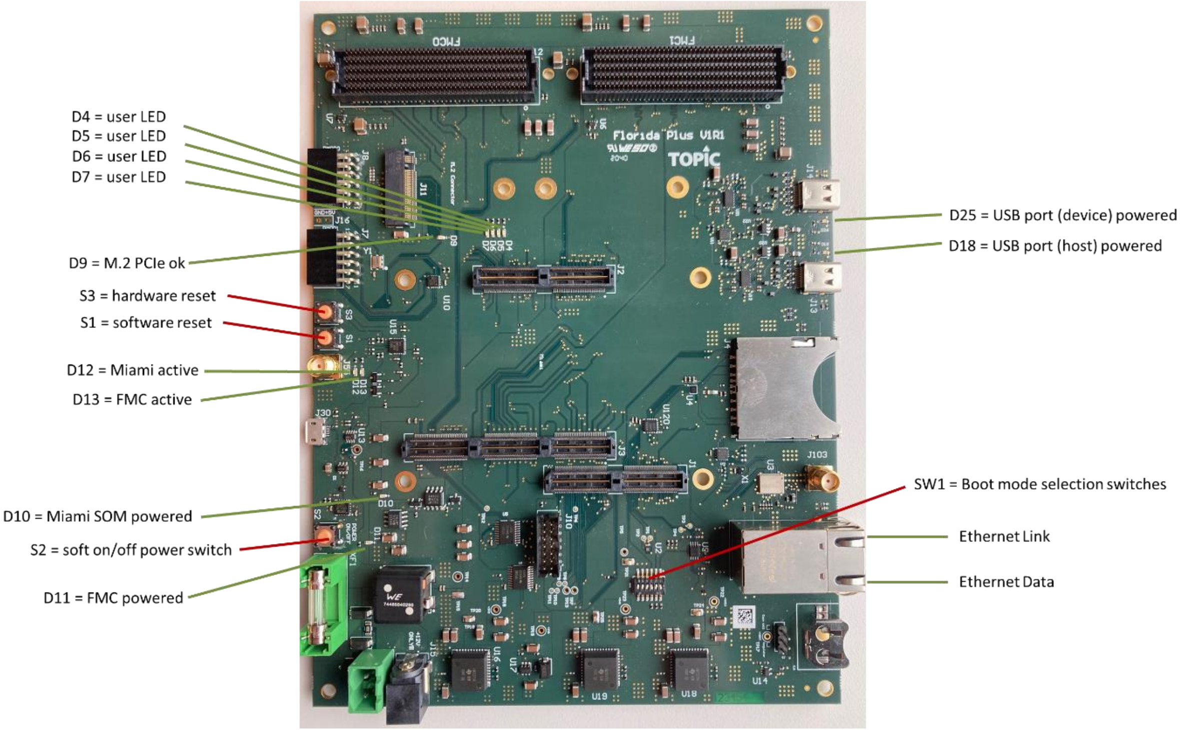

Figure 5 : LEDs and switches on the Florida Plus board

5.2.1 LEDs

The user LEDS are controlled directly using FPGA fabric, where the LEDs are driven using inverted logic. To illuminate the LEDs, they should be driven low.

LED	Signal	SOM #	Description
D4	GPLED0	J2-B38	PL connected general purpose LED (‘0’ = on, ‘1’ = off)
D5	GPLED1	J2-B40	PL connected general purpose LED (‘0’ = on, ‘1’ = off)
D6	GPLED2	J2-B42	PL connected general purpose LED (‘0’ = on, ‘1’ = off)
D7	GPLED3	J2-B44	PL connected general purpose LED (‘0’ = on, ‘1’ = off)

5.2.2 Switches and buttons

There are no user specific buttons and switches, apart from three positions of the mode select dip switch array.

Switch	Signal	SOM #	Description
S1	SW_RST_N	J1.B05	Software reset (only resets the PS system). Can also be controlled using the right JTAG probe.
S2	PWR_ON_OFF	-	When powered, this button can be used to gracefully power the board down and fire it up again.
S3	HW_RESET	J1.A10	Initiates a power-on reset on the system, using the voltage monitoring system.
SW1	-	J1.A08 J1.A37 J1.A55 via I2C via I2C via I2C	SW1.1 = BOOT0, see table below for boot source SW1.2 = BOOT1, see table below for boot source SW1.3 = BOOT2, see table below for boot source SW1.4 = GPSW0, see I2C table for address SW1.5 = GPSW1, see I2C table for address SW1.6 = GPSW2, see I2C table for address

The boot source address is in parallel to the boot source selection on the Miami MPSOC Plus SOM. When using the boot switches on the Miami, please make sure that the switches on the Florida Plus are in the 'open' position = 'on'.

Switch S1 *(sw1 to sw3)*	Boot source	PS boot role
0 0 0	PS JTAG	Slave
0 0 1	QSPI 24 bit addressing (not recommended)	Master
0 1 0	QSPI 32 bit addressing	Master
0 1 1	SD0 SD-card 2.0 FAT 16/32 flash memory	Master
1 0 0	NAND flash (not supported)	Master
1 0 1	SD1 SD-card 2.0 FAT 16/32 flash memory	Master
1 1 0	eMMC1.8V	Master
1 1 1	USB0 (2.0) via DFU protocol	Slave

Boot Mode	Mode Pins [3:0]	Pin Location	CSU Mode	Description
PS JTAG	0000	JTAG	Slave	PSJTAG interface, PS dedicated pins.
Quad-SPI (24b)	0001	MIO[12:0]	Master	24-bit addressing (QSPI24).
Quad-SPI (32b)	0010	MIO[12:0]	Master	32-bit addressing (QSPI32).
SD0 (2.0)	0011	MIO[25:21, 16:13]	Master	SD 2.0.
NAND	0100	MIO[25:09]	Master	Requires 8-bit data bus width.
SD1 (2.0)	0101	MIO[51:43]	Master	SD 2.0.
eMMC (1.8V)	0110	MIO[22:13]	Master	eMMC version 4.5 at 1.8V.
USB0 (2.0)	0111	MIO[52:63]	Slave	USB 2.0 only.
PJTAG (MIO #0)	1000	MIO[29:26]	Slave	PJTAG connection 0 option.
PJTAG (MIO #1)	1001	MIO[15:12]	Slave	PJTAG connection 1 option.
SD1 LS (3.0)	1110	MIO[51:39]	Master	SD 3.0 with a required SD 3.0 compliant voltage level shifter.

5.3 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.

Reference	Device	Address	Description
U21	HD3SS3220IRNHT	0x47	USB-C switch
U12	HD3SS3220IRNHT	0x67	USB-C switch
U10	MCP23009-E/MG	0x20	GPIO expander bit 0 = Power button interrupt (input) bit 1 = PCIe Wake (output) bit 2 = USB 0 OTG flag (input) bit 3 = USB 1 OTG flag (input) bit 4 = PCIe 0 reset (input) bit 5 = PCIe 1 reset (input) bit 6 = PG 0 M2 (input) bit 7 = PG 1 M2 (input)
U11	MCP23009-E/MG	0x23	GPIO expander bit 0 = USB 0 direction (input) bit 1 = USB 1 direction (input) bit 2 = USB 0 VC FLT (input) bit 3 = USB 1 VC FLT (input) bit 4 = USB 0 interrupt (input) bit 5 = USB 1 interrupt (input) bit 6 = USB 0 power (output) bit 7 = USB 1 power (output)
U24	MCP23009-E/MG	0x27	GPIO expander bit 0 = Bluetooth enable (output) bit 1 = Wifi enable (output) bit 2 = Bluetooth host wakeup (input) bit 3 = Bluetooth device wakeup (output) bit 4 = Power kill switch (output) bit 5 = SW1.4 switch (input) bit 6 = SW1.5 switch (input) bit 7 = SW1.6 switch (input)
U2	M24C32S	0x50 = memory 0x54 = identification	32Kbit EEPROM parameter memory

5.4 Ethernet

The 10/100/1000 Mbit/sec Ethernet interface on the Florida Plus consists of a RJ45 socket with two LEDs, indicating the link status and activity. The physical driver is integrated on the Miami MPSOC Plus. Please refer to the Miami MPSOC Plus product guide [1] for more information on how to operate this device. The Ethernet connection is wired to 1 of the 4 gigabit transceivers of the PS. This means that the Ethernet connection is under control of the processor.

Other Ethernet connections can be established by extending the board using an FMC extension board. E.g. using a quad SFP+ FMC expansion board gives you 4 additional 10Gbit/sec Ethernet connections via the PL of the Miami MPSOC Plus.

5.4.1 Synchronous Ethernet

The Miami MPSOC Plus allows for the use of synchronous Ethernet. The use of IEEE 1588 precision time protocol (PTP) is already supported natively on the Miami MPSOC Plus at MAC and PHY level. Synchronous Ethernet is also supported by the SOM. For this purpose, an external clock source can be supplied via SMA connector J55. This is typically a single ended 125[MHz] 50% duty-cycle CMOS compatible 1.8[V] signal.

For more information on the use of PTP, IEEE 1588, synchronous Ethernet and an even more accurate time synchronization method called White Rabbit, please refer to Topic white paper "Ethernet Time Synchronization" [2]

5.5 USB C interfaces

The Florida Plus provides 2 USB C interfaces. The Miami MPSOC Plus provides 2 USB 3.0 type of interfaces. Basically, this is a USB 2.0 OTG configuration accompanied by a differential Gigabit connection. The Miami MPSOC Plus provides 2 USB 2.0 controllers as well as 2 USB 3.0 MACs. On the Florida Plus board, a HD3SS3220 USB Type-C DRP Port Controller (U21, U12) is applied for transforming the USB 3.0 port into a USB type C port. The additional control signals for this port controller are:

Signal	SOM #	Description
	USB type C port #0	
PS_MGT_TX_P1	J2-B03	USB C port 0 high-speed TX (from PS)
PS_MGT_TX_N1	J2-B05	USB C port 0 high-speed TX (from PS)
PS_MGT_RX_P1	J2-B22	USB C port 0 high-speed RX (to PS)
PS_MGT_RX_N1	J2-B24	USB C port 0 high-speed RX (to PS)
USB_PRT0	via I2C	
USB_5V0	J3-B57	
USB_ID0	J3-B55	
USB_D_P0	J3-B51	USB 2.0 PHY data signal
USB_D_N0	J3-B53	
USB_nINT0	via I2C	USB control
nVC_FLT0	via I2C	USB control
USB_OTG_OC_N0	via I2C	USB control
USB_DIR0	via I2C	USB control
	USB type C port #1	
PS_MGT_TX_P3	J2-B09	USB C port 1 high-speed TX (from PS)
PS_MGT_TX_N3	J2-B11	USB C port 1 high-speed TX (from PS)
PS_MGT_RX_P3	J2-B10	USB C port 1 high-speed RX (to PS)
PS_MGT_RX_N3	J2-B12	USB C port 1 high-speed RX (to PS)
USB_PRT1	via I2C	
USB_5V1	J3-B58	
USB_ID1	J3-B56	
USB_D_P1	J3-B52	
USB_D_N1	J3-B54	
USB_nINT1	via I2C	
nVC_FLT1	via I2C	
USB_OTG_OC_N1	via I2C	
USB_DIR1	via I2C	

5.6 M.2 PCIe interface

The M.2 PCIe interface with M-keying allows the use of any device with that specification. However, due to limited resources, only 1-lane PCIe is supported. The M.2 interface is connected to the PS system. As there are already 2 GTx lanes in use by the USB-C connection and 1 for the Ethernet connectivity, only 1 lane is available for this functionality.

5.7 USB UARTs

There is 1 UART connections to the MIAMI via a micro USB interface, which bridges the UART via Virtual COM to a PC without flow control.

Signal	SOM pin #	Description
UART_RXD	J1-B01	Host COM port TXD – MIAMI RXD
UART_TXD	J1-B03	Host COM port RXD – MIAMI TXD

5.8 SD Memory Card WiFi/BT

The Miami MPSOC Plus integrates 2 SDIO controllers. One of these controllers is connected permanently to the on-board eMMC device. The Florida Plus utilizes 2 SDIO devices: a SDcard interface as well as a WiFi/BlueTooth module. Only one of the two devices can be active at a time. The selection of the right SDIO bus is implemented using a MAX4996LETG+ data switch (U120). By default, the SDcard interface is selected. The selection of the peripheral is controlled by the processor using a MIO pin. A logic ‘0’ will select the SDcard, a logic ‘1’ will select the WiFi/BT module.

U120 #	Signal	SOM #	Description
1, 2, 3	nSD_SW_SEL	J1-A39	SDIO device selection - ‘0’ = SDcard - ‘1’ = WiFi/BlueTooth
18	nSD_CLK	J1-A48	Data clock
17	nSD_DQ0	J1-A58	Data bus signal
16	nSD_DQ1	J1-A50	Data bus signal
4	nSD_DQ2	J1-A46	Data bus signal
5	nSD_DQ3	J1-A52	Data bus signal
6	nSD_CMD	J1-A54	Command/data strobe

5.8.1 SDcard interface

The SDcard slot allows for the use of standard SDcards as well as micro SDcards by means of an adapter. The applied physical interface is a NVT4857UKAZ (U4), supporting low-voltage operation and as such support for high-density/high speed SDcards. Successful tests have been conducted with card densities of up to 512 Gbyte. The following flash memory card manufacturers are recommended because of software compatibility and reliability issues:

- Trancend
- Sandisk

Apart from the default SDIO signals, the signals listed in the table below are in use for proper SDcard operation.

Signal	SOM #	Description
uSD_CDO	J1-A56	SDcard card detect (to PS)
uSD_WP	J1-A60	SDcard write protect (to PS)
uSD_SEL	J1-A43	SDcard voltage selection (from PS) - ‘0’ = 1.8[V] operation - ‘1’ = 3.3[V] operation

The SDcard interface can be used as a booting resource. The boot mode can be selected on the Miami MPSOC Plus or by means of boot mode settings on the Florida Plus. Please refer for details to the paragraph 5.2 discussing bootmode selection switches.

5.8.2 WiFi/BlueTooth module

The LBEE5KLIDX module of Murata provides via SDIO a WLAN interface, combined with BlueTooth. The supported WiFi prototcols are 11b/g/n at 2.4[GHz]. Bluetooth 5.1 is supported. Both radio protocols are implemented using the same antenna. The Florida Plus board provides a SMA connector J103, allowing the use of the 2.4[GHz] antenna of your choice. An antenna is part of the development kit as well as the Florida Plus accessory bag.

For proper operation of the WiFi/BlueTooth module via SDIO, a number of additional signals are applicable:

Signal	SOM #	Description
WIFI_EN	via I2C	WiFi enable signal (from PS)
BT_EN	via I2C	BlueTooth enable signal (from PS)
BT_HOST_WK	via I2C	BlueTooth host wakeup flag (to PS)
BT_DEV_WK	via I2C	BlueTooth device wakeup (from PS)
BTU_RXD	J3-C49	BlueTooth UART
BTU_TXD	J3-C47	BlueTooth UART
BTU_RXD	J3-C49	BlueTooth UART
BTU_RTS	J3-C43	BlueTooth UART
BTU_CTS	J3-C45	BlueTooth UART
BTAUDPCM_CLK	J1-B24	BlueTooth audio
BTAUDPCM_SYNC	J1-B30	BlueTooth audio
BTAUDPCM_IN	J1-B26	BlueTooth audio
BTAUDPCM_OUT	J1-B28	BlueTooth audio
BTAUDPCM_I2S_DO	J1-B22	BlueTooth audio

5.9 GPIO expansion (PMOD #1)

As mentioned in the previous chapter, there are 8 general purpose IO signals available on connector X100 (see GPIO in **Error! Reference source not found.**. The exact mapping of the 8 IO lines to the connector is shown in chapter **Error! Reference source not found.**.

J7	Signal	SOM #	Description
1	PMOD_P0	J2-B53	Digital I/O, 100 Ohm differential routed, 3V3 logic
2	PMOD_N0	J2-B55	Digital I/O, 100 Ohm differential routed, 3V3 logic
3	PMOD_P1	J2-B57	Digital I/O, 100 Ohm differential routed, 3V3 logic
4	PMOD_N1	J2-B59	Digital I/O, 100 Ohm differential routed, 3V3 logic
5	GND	-	Ground reference
6	+3V3	-	3V3 power supply
7	PMOD_P2	J2-B49	Digital I/O, 100 Ohm differential routed, 3V3 logic
8	PMOD_N2	J2-B51	Digital I/O, 100 Ohm differential routed, 3V3 logic
9	PMOD_P3	J2-B45	Digital I/O, 100 Ohm differential routed, 3V3 logic
10	PMOD_N3	J2-B47	Digital I/O, 100 Ohm differential routed, 3V3 logic
11	GND	-	Ground reference
12	+3V3	-	3V3 power supply

5.10 GPIO expansion (PMOD #2)

As mentioned in the previous chapter, there are 8 general purpose IO signals available on connector X101 (see GPIO in **Error! Reference source not found.**. The exact mapping of the 8 IO lines to the connector is shown in chapter **Error! Bookmark not defined.Error! Reference source not found.**.

J8	Signal	SOM #	Description
1	PMOD_P4	J2-B50	Digital I/O, 100 Ohm differential routed, 3V3 logic
2	PMOD_N4	J2-B52	Digital I/O, 100 Ohm differential routed, 3V3 logic
3	PMOD_P5	J2-B46	Digital I/O, 100 Ohm differential routed, 3V3 logic
4	PMOD_N5	J2-B48	Digital I/O, 100 Ohm differential routed, 3V3 logic
5	GND	-	Ground reference
6	+3V3	-	3V3 power supply
7	PMOD_P6	J2-B54	Digital I/O, 100 Ohm differential routed, 3V3 logic
8	PMOD_N6	J2-B56	Digital I/O, 100 Ohm differential routed, 3V3 logic
9	PMOD_P7	J2-B58	Digital I/O, 100 Ohm differential routed, 3V3 logic
10	PMOD_N7	J2-B60	Digital I/O, 100 Ohm differential routed, 3V3 logic
11	GND	-	Ground reference
12	+3V3	-	3V3 power supply

5.11 FMC connectivity

6 Connector pin assignments

6.1 J1: SOM connector pinning

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

PIN	Name	FPGA pin	PIN	Name	FPGA pin
A1	Reserved		A2	Reserved	
A3	Reserved		A4	Reserved	
A5	IO_D_VCC1_21_N	AK12	A6	VBAT	
A7	IO_D_VCC1_21_P	AJ12	A8	BOOT_EXT_0	
A9	IO_D_VCC1_22_N	AK1	A10	SOM_RST_N	
A11	IO_D_VCC1_22_P	AL1	A12	IO_D_AD_VCC1_0_P	AN8
A13	IO_D_CC_VCC1_23_N	AM5	A14	IO_D_AD_VCC1_0_N	AP8
A15	IO_D_CC_VCC1_23_P	AM6	A16	O_D_VCC1_16_P	AN9
A17	IO_D_AD_VCC1_11_N	AP4	A18	IO_D_VCC1_16_N	AP9
A19	IO_D_AD_VCC1_11_P	AP5	A20	IO_D_AD_CC_VCC1_1_P	AN6
A21	IO_D_AD_VCC1_12_N	AP3	A22	IO_D_AD_CC_VCC1_1_N	AP6
A23	IO_D_AD_VCC1_12_P	AN3	A24	IO_D_CC_VCC1_17_N	AL7
A25	IO_D_AD_VCC1_13_N	AN1	A26	IO_D_CC_VCC1_17_P	AL8
A27	IO_D_AD_VCC1_13_P	AM1	A28	IO_D_CC_VCC1_18_N	AK7
A29	IO_D_AD_VCC1_14_N	AL2	A30	IO_D_CC_VCC1_18_P	AK8
A31	IO_D_AD_VCC1_14_P	AL3	A32	IO_D_AD_VCC1_2_N	AK4
A33	IO_D_AD_VCC1_15_P	AK3	A34	IO_D_AD_VCC1_2_P	AK5
A35	IO_D_AD_VCC1_15_N	AK2	A36	IO_D_AD_VCC1_3_N	AP2
A37	BOOT_EXT_1		A38	IO_D_AD_VCC1_3_P	AN2
A39	IO_S_VCC4_0	K24	A40	IO_D_AD_VCC1_4_N	AN4
A41	IO_S_VCC4_1	L23	A42	IO_D_AD_VCC1_4_P	AM4
A43	IO_S_VCC4_2	M24	A44	JTAG_VREF	
A45	IO_S_VCC4_3	J24	A46	IO_S_VCC4_4	M25
A47	IO_S_VCC4_5	L22	A48	IO_S_VCC4_6	N25
A49	IO_S_VCC4_7	P22	A50	IO_S_VCC4_8	L25
A51	SCL_1V8	N21	A52	IO_S_VCC4_9	K25
A53	SDA_1V8	K22	A54	IO_S_VCC4_10	P25
A55	BOOT_EXT_2		A56	IO_S_VCC4_11	P24
A57	+1V8		A58	IO_S_VCC4_12	J25
A59	+1V8		A60	IO_S_VCC4_13	N24

PIN	Name	FPGA pin	PIN	Name	FPGA pin
B1	IO_S_VCC4_14	J22	B2	IO_D_VCC2_18_P	AH1
B3	IO_S_VCC4_15	L21	B4	IO_D_VCC2_18_N	AJ1
B5	SOM_SW_RST_N		B6	IO_D_VCC2_19_P	AF2
B7	MDIP0		B8	IO_D_VCC2_19_N	AF1
B9	MDIN0		B10	IO_D_VCC2_20_P	AE2
B11	MDIN1		B12	IO_D_VCC2_20_N	AE1
B13	MDIP1		B14	IO_D_VCC2_21_P	AD2
B15	MDIP2		B16	IO_D_VCC2_21_N	AD1
B17	MDIN2		B18	IO_D_VCC2_22_P	AH7
B19	MDIP3		B20	IO_D_VCC2_22_N	AH6
B21	MDIN3		B22	IO_S_VCC1_0	AM3
B23	LED0		B24	IO_S_VCC1_1	AP1
B25	LED1		B26	IO_S_VCC1_2	AN11
B27	LED2		B28	IO_S_VCC1_3	AJ7
B29	IO_S_VCC4_16	H23	B30	IO_S_VCC2_0	AG1
B31	IO_S_VCC4_17	H22	B32	IO_S_VCC2_1	AH9
B33	IO_S_VCC4_18	N23	B34	IO_S_VCC2_2	AD5
B35	VCC_0		B36	IO_S_VCC2_3	AD9
B37	IO_S_VCC4_21	N22	B38	IO_D_VCC5_0_P	T7
B39	+1V25A		B40	IO_D_VCC5_0_N	T6
B41	AGND		B42	IO_D_VCC5_1_P	W12
B43	XADC_VP	U18	B44	IO_D_VCC5_1_N	W11
B45	XADC_VN	V17	B46	IO_D_VCC5_2_N	V11
B47	XADC_DXP	W18	B48	IO_D_VCC5_2_P	V12
B49	XADC_DXN	W17	B50	IO_D_VCC5_3_P	U9
B51	PL_JTAG_RSTN		B52	IO_D_VCC5_3_N	U8
B53	PL_JTAG_TDI	U25	B54	IO_D_VCC5_4_N	U6
B55	PL_JTAG_TMS	R24	B56	IO_D_VCC5_4_P	V6
B57	PL_JTAG_TCK	R25	B58	IO_D_VCC5_5_N	V7
B59	PL_JTAG_TDO	T25	B60	IO_D_VCC5_5_P	V8

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

6.2 J2: SOM connector pinning

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

PIN	Name	FPGA pin	PIN	Name	FPGA pin
A1	IO_D_AD_VCC1_5_N	AM11	A2	IO_D_AD_VCC1_6_P	AM9
A3	IO_D_AD_VCC1_5_P	AL11	A4	IO_D_AD_VCC1_6_N	AM8
A5	IO_D_AD_VCC1_7_P	AN7	A6	IO_D_VCC5_6_P	U10
A7	IO_D_AD_VCC1_7_N	AP7	A8	IO_D_VCC5_6_N	T10
A9	IO_D_AD_VCC1_8_N	AK10	A10	IO_D_AD_VCC1_9_P	AL10
A11	IO_D_AD_VCC1_8_P	AJ10	A12	IO_D_AD_VCC1_9_N	AM10
A13	IO_D_VCC1_20_P	AJ9	A14	IO_D_AD_VCC1_10_N	AP10
A15	IO_D_VCC1_20_N	AK9	A16	IO_D_AD_VCC1_10_P	AP11
A17	GND		A18	GND	
A19	IO_D_VCC2_0_P	AH5	A20	IO_D_VCC2_1_P	AH12
A21	IO_D_VCC2_0_N	AJ4	A22	IO_D_VCC2_1_N	AH11
A23	IO_D_VCC2_2_P	AG10	A24	IO_D_VCC2_3_P	AE12
A25	IO_D_VCC2_2_N	AG9	A26	IO_D_VCC2_3_N	AF12
A27	IO_D_CC_VCC2_4_P	AJ6	A28	IO_D_VCC2_5_P	AH2
A29	IO_D_CC_VCC2_4_N	AJ5	A30	IO_D_VCC2_5_N	AJ2
A31	IO_D_VCC2_6_P	AG8	A32	IO_D_VCC2_7_P	AG3
A33	IO_D_VCC2_6_N	AH8	A34	IO_D_VCC2_7_N	AH3
A35	IO_D_VCC2_8_P	AD10	A36	IO_D_VCC2_9_P	AE3
A37	IO_D_VCC2_8_N	AE9	A38	IO_D_VCC2_9_N	AF3
A39	IO_D_VCC2_10_P	AE8	A40	IO_D_VCC2_11_P	AF11
A41	IO_D_VCC2_10_N	AF8	A42	IO_D_VCC2_11_N	AG11
A43	IO_D_VCC2_12_P	AE10	A44	IO_D_CC_VCC2_13_P	AF6
A45	IO_D_VCC2_12_N	AF10	A46	IO_D_CC_VCC2_13_N	AG6
A47	IO_D_VCC2_14_P	AD7	A48	IO_D_VCC2_15_P	AG5
A49	IO_D_VCC2_14_N	AD6	A50	IO_D_VCC2_15_N	AG4
A51	IO_D_VCC2_16_P	AD4	A52	IO_D_CC_VCC2_17_P	AE5
A53	IO_D_VCC2_16_N	AE4	A54	IO_D_CC_VCC2_17_N	AF5
A55	GND		A56	GND	
A57	IO_D_VCC0_0_P	L18	A58	IO_D_VCC0_1_P	L17
A59	IO_D_VCC0_0_N	K18	A60	IO_D_VCC0_1_N	K17

PIN	Name	FPGA pin	PIN	Name	FPGA pin
B1	GND		B2	GND	
B3	PS_MGT_D_TX_1_P	Y29	B4	REFCLK_0_P	
B5	PS_MGT_D_TX_1_N	Y30	B6	REFCLK_0_N	
B7	GND		B8	GND	
B9	PS_MGT_D_TX_3_P	V29	B10	PS_MGT_D_RX_3_P	V33
B11	PS_MGT_D_TX_3_N	V30	B12	PS_MGT_D_RX_3_N	V34
B13	GND		B14	GND	
B15	PS_MGT_D_TX_0_P	AB29	B16	PS_MGT_D_RX_0_P	AB33
B17	PS_MGT_D_TX_0_N	AB30	B18	PS_MGT_D_RX_0_N	AB34
B19	GND		B20	GND	
B21	EXT_PHY_CLK		B22	PS_MGT_D_RX_1_P	AA31
B23	n.c.		B24	PS_MGT_D_RX_1_N	AA32
B25	GND		B26	GND	
B27	IO_D_VCC5_7_P	T13	B28	IO_D_VCC5_8_P	U11
B29	IO_D_VCC5_7_N	R13	B30	IO_D_VCC5_8_N	T11
B31	IO_S_VCC4_19	M23	B32	IO_S_VCC4_20	K23
B33	IO_D_VCC0_2_P	G18	B34	IO_D_VCC0_3_P	J17
B35	IO_D_VCC0_2_N	G19	B36	IO_D_VCC0_3_N	H17
B37	IO_D_CC_VCC0_4_P	G21	B38	IO_D_VCC0_5_P	H18
B39	IO_D_CC_VCC0_4_N	F21	B40	IO_D_VCC0_5_N	H19
B41	IO_D_CC_VCC0_6_P	G20	B42	IO_D_VCC0_7_P	C21
B43	IO_D_CC_VCC0_6_N	F20	B44	IO_D_VCC0_7_N	B21
B45	IO_D_VCC0_8_P	E22	B46	IO_D_VCC0_9_P	C18
B47	IO_D_VCC0_8_N	D22	B48	IO_D_VCC0_9_N	C19
B49	IO_D_CC_VCC0_10_P	F17	B50	IO_D_VCC0_11_P	D17
B51	IO_D_CC_VCC0_10_N	F18	B52	IO_D_VCC0_11_N	C17
B53	IO_D_VCC0_12_P	E17	B54	IO_D_VCC0_13_P	A17
B55	IO_D_VCC0_12_N	E18	B56	IO_D_VCC0_13_N	A18
B57	IO_D_CC_VCC0_14_P	E19	B58	IO_D_VCC0_15_P	B18
B59	IO_D_CC_VCC0_14_N	D19	B60	IO_D_VCC0_15_N	B19

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

6.3 J3: SOM connector pinning

Part type (SOM)	Samtec, QTH-090-01-L-D-A-TR, High Speed ground plane socket, 180 pins (3x60), stacking height 5mm

PIN	Name	FPGA pin	PIN	Name	FPGA pin
A1	GND		A2	GND	
A3	MGT_D_RX_0_P	T2	A4	MGT_D_RX_1_P	P2
A5	MGT_D_RX_0_N	T1	A6	MGT_D_RX_1_N	P1
A7	GND		A8	GND	
A9	MGT_D_RX_2_P	M2	A10	MGT_D_RX_3_P	L4
A11	MGT_D_RX_2_N	M1	A12	MGT_D_RX_3_N	L3
A13	GND		A14	GND	
A15	MGT_D_TX_0_P	R4	A16	MGT_D_TX_1_P	P6
A17	MGT_D_TX_0_N	R3	A18	MGT_D_TX_1_N	P5
A19	GND		A20	GND	
A21	MGT_D_TX_2_P	N4	A22	MGT_D_TX_3_P	M6
A23	MGT_D_TX_2_N	N3	A24	MGT_D_TX_3_N	M5
A25	GND		A26	GND	
A27	MGT_D_REFCLK_1_P	J8	A28	MGT_D_RX_4_P	K2
A29	MGT_D_REFCLK_1_N	J7	A30	MGT_D_RX_4_N	K1
A31	GND		A32	GND	
A33	MGT_D_RX_5_P	J4	A34	MGT_D_RX_6_P	H2
A35	MGT_D_RX_5_N	J3	A36	MGT_D_RX_6_N	H1
A37	GND		A38	GND	
A39	MGT_D_RX_7_P	F2	A40	MGT_D_TX_4_P	K6
A41	MGT_D_RX_7_N	F1	A42	MGT_D_TX_4_N	K5
A43	GND		A44	GND	
A45	MGT_D_TX_5_P	H6	A46	MGT_D_TX_6_P	G4
A47	MGT_D_TX_5_N	H5	A48	MGT_D_TX_6_N	G3
A49	GND		A50	GND	
A51	MGT_D_TX_7_P	F6	A52	MGT_D_REFCLK_3_P	E8
A53	MGT_D_TX_7_N	F5	A54	MGT_D_REFCLK_3_N	E7
A55	GND		A56	GND	
A57	MGT_D_TX_8_P	E4	A58	MGT_D_TX_9_P	D6
A59	MGT_D_TX_8_N	E3	A60	MGT_D_TX_9_N	D5

PIN	Name	FPGA pin	PIN	Name	FPGA pin
B1	GND		B2	GND	
B3	MGT_D_TX_10_P	B6	B4	MGT_D_TX_11_P	A8
B5	MGT_D_TX_10_N	B5	B6	MGT_D_TX_11_N	A7
B7	GND		B8	GND	
B9	MGT_D_RX_8_P	D2	B10	MGT_D_RX_9_P	C4
B11	MGT_D_RX_8_N	D1	B12	MGT_D_RX_9_N	C3
B13	GND		B14	GND	
B15	MGT_D_RX_10_P	B2	B16	MGT_D_RX_11_P	A4
B17	MGT_D_RX_10_N	B1	B18	MGT_D_RX_11_N	A3
B19	GND		B20	GND	
B21	MGT_D_REFCLK_5_P	B10	B22	MGT_D_RX_12_P	E31
B23	MGT_D_REFCLK_5_N	B9	B24	MGT_D_RX_12_N	E32
B25	GND		B26	GND	
B27	MGT_D_RX_13_P	D33	B28	MGT_D_RX_14_P	C31
B29	MGT_D_RX_13_N	D34	B30	MGT_D_RX_14_N	C32
B31	GND		B32	GND	
B33	MGT_D_RX_15_P	B33	B34	MGT_D_TX_12_P	F29
B35	MGT_D_RX_15_N	B34	B36	MGT_D_TX_12_N	F30
B37	GND		B38	GND	
B39	MGT_D_TX_13_P	D29	B40	MGT_D_TX_14_P	B29
B41	MGT_D_TX_13_N	D30	B42	MGT_D_TX_14_N	B30
B43	GND		B44	GND	
B45	MGT_D_TX_15_P	B30	B46	MGT_D_REFCLK_7_P	E27
B47	MGT_D_TX_15_N	B31	B48	MGT_D_REFCLK_7_N	E28
B49	GND		B50	GND	
B51	USB0_OTG_DP		B52	USB1_OTG_DP	
B53	USB0_OTG_DM		B54	USB1_OTG_DM	
B55	USB0_ID		B56	USB1_ID	
B57	USB0_5V		B58	USB1_5V	
B59	GND		B60	GND	

PIN	Name	FPGA pin	PIN	Name	FPGA pin
C1	REFCLK_1_P		C2	GND	
C3	REFCLK_1_N		C4	IO_S_VCC5_1	P10
C5	VCC3		C6	IO_S_VCC5_0	P9
C7	IO_D_CC_VCC5_9_P	N9	C8	IO_D_CC_VCC5_10_P	T12
C9	IO_D_CC_VCC5_9_N	N8	C10	IO_D_CC_VCC5_10_N	R12
C11	IO_D_CC_VCC5_11_P	R10	C12	IO_D_CC_VCC5_12_P	N13
C13	IO_D_CC_VCC5_11_N	R9	C14	IO_D_CC_VCC5_12_N	M13
C15	IO_D_VCC5_13_P	M10	C16	IO_D_VCC5_14_P	M11
C17	IO_D_VCC5_13_N	L10	C18	IO_D_VCC5_14_N	L11
C19	IO_D_VCC5_15_P	T8	C20	IO_D_VCC5_16_P	M15
C21	IO_D_VCC5_15_N	R8	C22	IO_D_VCC5_16_N	M14
C23	IO_D_VCC5_17_P	P12	C24	IO_D_VCC5_18_P	P11
C25	IO_D_VCC5_17_N	N12	C26	IO_D_VCC5_18_N	N11
C27	IO_D_VCC5_19_P	L12	C28	IO_D_VCC5_20_P	L16
C29	IO_D_VCC5_19_N	K12	C30	IO_D_VCC5_20_N	K16
C31	IO_D_CC_VCC3_12_P	E14	C32	IO_D_CC_VCC3_13_P	C14
C33	IO_D_CC_VCC3_12_N	D14	C34	IO_D_CC_VCC3_13_N	B14
C35	IO_D_CC_VCC3_14_P	C13	C36	IO_D_CC_VCC3_15_P	E15
C37	IO_D_CC_VCC3_14_N	B13	C38	IO_D_CC_VCC3_15_N	D15
C39	IO_D_VCC3_16_P	B16	C40	IO_D_VCC5_21_P	L13
C41	IO_D_VCC3_16_N	A16	C42	IO_D_VCC5_21_N	K13
C43	IO_S_VCC5_2	K10	C44	IO_D_VCC3_19_P	L12
C45	IO_S_VCC5_3	K14	C46	IO_D_VCC3_19_N	K12
C47	IO_D_VCC3_20_P	C12	C48	IO_S_VCC5_4	W10
C49	IO_D_VCC3_20_N	B12	C50	IO_S_VCC5_5	V9
C51	IO_D_VCC3_22_P	A13	C52	IO_D_VCC5_22_P	L15
C53	IO_D_VCC3_22_N	A12	C54	IO_D_VCC5_22_N	K15
C55	V_IN		C56	V_IN	
C57	V_IN		C58	V_IN	
C59	V_IN		C60	V_IN	

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

6.4 J6: FMC

Part type	Samtec, ASP-134486-01, HPC FMC connector (socket)
Mating part type	Samtec, ASP-134488-01, HPC FMC connector (terminal)

FMC Pin	Signal name	SOM pin
A2	FMC_HPC0_DP1_M2C_P	J3.A04
A3	FMC_HPC0_DP1_M2C_N	J3.A06
A6	FMC_HPC0_DP2_M2C_P	J3.A09
A7	FMC_HPC0_DP2_M2C_N	J3.A11
A10	FMC_HPC0_DP3_M2C_P	J3.A10
A11	FMC_HPC0_DP3_M2C_N	J3.A12
A14	FMC_HPC0_DP4_M2C_P	J3.B22
A15	FMC_HPC0_DP4_M2C_N	J3.B24
A18	FMC_HPC0_DP5_M2C_P	J3.B27
A19	FMC_HPC0_DP5_M2C_N	J3.B29
A22	FMC_HPC0_DP1_C2M_P	J3.A16
A23	FMC_HPC0_DP1_C2M_N	J3.A18
A26	FMC_HPC0_DP2_C2M_P	J3.A21
A27	FMC_HPC0_DP2_C2M_N	J3.A23
A30	FMC_HPC0_DP3_C2M_P	J3.A22
A31	FMC_HPC0_DP3_C2M_N	J3.A24
A34	FMC_HPC0_DP4_C2M_P	J3.B34
A35	FMC_HPC0_DP4_C2M_N	J3.B36
A38	FMC_HPC0_DP5_C2M_P	J3.B39
A39	FMC_HPC0_DP5_C2M_N	J3.B41
D4	FMC_HPC0_GBTCLK0_M2C_P	J3.A27
D5	FMC_HPC0_GBTCLK0_M2C_N	J3.A29
D8	FMC_HPC0_LA01_CC_P	J1.A27
D9	FMC_HPC0_LA01_CC_N	J1.A25
D11	FMC_HPC0_LA05_P	J1.A16
D12	FMC_HPC0_LA05_N	J1.A18
D14	FMC_HPC0_LA09_P	J1.A30
D15	FMC_HPC0_LA09_N	J1.A28
D17	FMC_HPC0_LA13_P	J1.A33
D18	FMC_HPC0_LA13_N	J1.A35
D20	FMC_HPC0_LA17_CC_P	J1.B10
D21	FMC_HPC0_LA17_CC_N	J1.B12
D23	FMC_HPC0_LA23_P	J3.C36
D24	FMC_HPC0_LA23_N	J3.C38
D26	FMC_HPC0_LA26_P	J2.A05
D27	FMC_HPC0_LA26_N	J2.A07

FMC pin	Signal name	SOM pin
B12	FMC_HPC0_DP7_M2C_P	J3.B33
B13	FMC_HPC0_DP7_M2C_N	J3.B35
B16	FMC_HPC0_DP6_M2C_P	J3.B28
B17	FMC_HPC0_DP6_M2C_N	J3.B30
B20	FMC_HPC0_GBTCLK1_M2C_P	J3.B46
B21	FMC_HPC0_GBTCLK1_M2C_N	J3.B48
B32	FMC_HPC0_DP7_C2M_P	J3.B45
B33	FMC_HPC0_DP7_C2M_N	J3.B47
B36	FMC_HPC0_DP6_C2M_P	J3.B40
B37	FMC_HPC0_DP6_C2M_N	J3.B42
G02	FMC_HPC0_CLK1_M2C_P	J1.A20
G03	FMC_HPC0_CLK1_M2C_N	J1.A22
G06	FMC_HPC0_LA00_CC_P	J1.A11
G07	FMC_HPC0_LA00_CC_N	J1.A09
G09	FMC_HPC0_LA03_P	J1.A19
G10	FMC_HPC0_LA03_N	J1.A17
G12	FMC_HPC0_LA08_P	J1.A31
G13	FMC_HPC0_LA08_N	J1.A29
G15	FMC_HPC0_LA12_P	J1.A38
G16	FMC_HPC0_LA12_N	J1.A36
G18	FMC_HPC0_LA16_P	J1.B06
G19	FMC_HPC0_LA16_N	J1.B08
G21	FMC_HPC0_LA20_P	J3.C44
G22	FMC_HPC0_LA20_N	J3.C46
G24	FMC_HPC0_LA22_P	J2.A02
G25	FMC_HPC0_LA22_N	J2.A04
G27	FMC_HPC0_LA25_P	J2.A10
G28	FMC_HPC0_LA25_N	J2.A12
G30	FMC_HPC0_LA29_P	J2.A20
G31	FMC_HPC0_LA29_N	J2.A22
G33	FMC_HPC0_LA31_P	J2.A28
G34	FMC_HPC0_LA31_N	J2.A30
G36	FMC_HPC0_LA33_P	J2.A58
G37	FMC_HPC0_LA33_N	J2.A60

FMC Pin	Signal name	SOM pin
C2	FMC_HPC0_DP0_C2M_P	J3.A15
C3	FMC_HPC0_DP0_C2M_N	J3.A17
C6	FMC_HPC0_DP0_M2C_P	J3.A03
C7	FMC_HPC0_DP0_M2C_N	J3.A05
C10	FMC_HPC0_LA06_P	J1.A12
C11	FMC_HPC0_LA06_N	J1.A14
C14	FMC_HPC0_LA10_P	J1.A34
C15	FMC_HPC0_LA10_N	J1.A32
C18	FMC_HPC0_LA14_P	J1.B02
C19	FMC_HPC0_LA14_N	J1.B04
C22	FMC_HPC0_LA18_CC_P	J1.B60
C23	FMC_HPC0_LA18_CC_N	J1.B58
C26	FMC_HPC0_LA27_P	J2.A11
C27	FMC_HPC0_LA27_N	J2.A09
H4	FMC_HPC0_CLK0_M2C_P	J1.A15
H5	FMC_HPC0_CLK0_M2C_N	J1.A13
H7	FMC_HPC0_LA02_P	J1.A07
H8	FMC_HPC0_LA02_N	J1.A05
H10	FMC_HPC0_LA04_P	J1.A23
H11	FMC_HPC0_LA04_N	J1.A21
H13	FMC_HPC0_LA07_P	J1.A26
H14	FMC_HPC0_LA07_N	J1.A24
H16	FMC_HPC0_LA11_P	J1.A42
H17	FMC_HPC0_LA11_N	J1.A40
H19	FMC_HPC0_LA15_P	J1.B14
H20	FMC_HPC0_LA15_N	J1.B16
H22	FMC_HPC0_LA19_P	J2.A03
H23	FMC_HPC0_LA19_N	J2.A01
H25	FMC_HPC0_LA21_P	J2.A06
H26	FMC_HPC0_LA21_N	J2.A08
H28	FMC_HPC0_LA24_P	J2.A16
H29	FMC_HPC0_LA24_N	J2.A14
H31	FMC_HPC0_LA28_P	J2.A24
H32	FMC_HPC0_LA28_N	J2.A26
H34	FMC_HPC0_LA30_P	J2.A32
H35	FMC_HPC0_LA30_N	J2.A34
H37	FMC_HPC0_LA32_P	J2.A57
H38	FMC_HPC0_LA32_N	J2.A59

6.5 J12: FMC

Part type	Samtec, ASP-134486-01, HPC FMC connector (socket)
Mating part type	Samtec, ASP-134488-01, HPC FMC connector (terminal)

FMC Pin	Signal name	SOM pin
A2	FMC_HPC0_DP1_M2C_P	J3.A04
A3	FMC_HPC0_DP1_M2C_N	J3.A06
A6	FMC_HPC0_DP2_M2C_P	J3.A09
A7	FMC_HPC0_DP2_M2C_N	J3.A11
A10	FMC_HPC0_DP3_M2C_P	J3.A10
A11	FMC_HPC0_DP3_M2C_N	J3.A12
A14	FMC_HPC0_DP4_M2C_P	J3.B22
A15	FMC_HPC0_DP4_M2C_N	J3.B24
A18	FMC_HPC0_DP5_M2C_P	J3.B27
A19	FMC_HPC0_DP5_M2C_N	J3.B29
A22	FMC_HPC0_DP1_C2M_P	J3.A16
A23	FMC_HPC0_DP1_C2M_N	J3.A18
A26	FMC_HPC0_DP2_C2M_P	J3.A21
A27	FMC_HPC0_DP2_C2M_N	J3.A23
A30	FMC_HPC0_DP3_C2M_P	J3.A22
A31	FMC_HPC0_DP3_C2M_N	J3.A24
A34	FMC_HPC0_DP4_C2M_P	J3.B34
A35	FMC_HPC0_DP4_C2M_N	J3.B36
A38	FMC_HPC0_DP5_C2M_P	J3.B39
A39	FMC_HPC0_DP5_C2M_N	J3.B41
D4	FMC_HPC0_GBTCLK0_M2C_P	J3.A27
D5	FMC_HPC0_GBTCLK0_M2C_N	J3.A29
D8	FMC_HPC0_LA01_CC_P	J1.A27
D9	FMC_HPC0_LA01_CC_N	J1.A25
D11	FMC_HPC0_LA05_P	J1.A16
D12	FMC_HPC0_LA05_N	J1.A18
D14	FMC_HPC0_LA09_P	J1.A30
D15	FMC_HPC0_LA09_N	J1.A28
D17	FMC_HPC0_LA13_P	J1.A33
D18	FMC_HPC0_LA13_N	J1.A35
D20	FMC_HPC0_LA17_CC_P	J1.B10
D21	FMC_HPC0_LA17_CC_N	J1.B12
D23	FMC_HPC0_LA23_P	J3.C36
D24	FMC_HPC0_LA23_N	J3.C38
D26	FMC_HPC0_LA26_P	J2.A05
D27	FMC_HPC0_LA26_N	J2.A07

FMC pin	Signal name	SOM pin
B12	FMC_HPC0_DP7_M2C_P	J3.B33
B13	FMC_HPC0_DP7_M2C_N	J3.B35
B16	FMC_HPC0_DP6_M2C_P	J3.B28
B17	FMC_HPC0_DP6_M2C_N	J3.B30
B20	FMC_HPC0_GBTCLK1_M2C_P	J3.B46
B21	FMC_HPC0_GBTCLK1_M2C_N	J3.B48
B32	FMC_HPC0_DP7_C2M_P	J3.B45
B33	FMC_HPC0_DP7_C2M_N	J3.B47
B36	FMC_HPC0_DP6_C2M_P	J3.B40
B37	FMC_HPC0_DP6_C2M_N	J3.B42
G02	FMC_HPC0_CLK1_M2C_P	J1.A20
G03	FMC_HPC0_CLK1_M2C_N	J1.A22
G06	FMC_HPC0_LA00_CC_P	J1.A11
G07	FMC_HPC0_LA00_CC_N	J1.A09
G09	FMC_HPC0_LA03_P	J1.A19
G10	FMC_HPC0_LA03_N	J1.A17
G12	FMC_HPC0_LA08_P	J1.A31
G13	FMC_HPC0_LA08_N	J1.A29
G15	FMC_HPC0_LA12_P	J1.A38
G16	FMC_HPC0_LA12_N	J1.A36
G18	FMC_HPC0_LA16_P	J1.B06
G19	FMC_HPC0_LA16_N	J1.B08
G21	FMC_HPC0_LA20_P	J3.C44
G22	FMC_HPC0_LA20_N	J3.C46
G24	FMC_HPC0_LA22_P	J2.A02
G25	FMC_HPC0_LA22_N	J2.A04
G27	FMC_HPC0_LA25_P	J2.A10
G28	FMC_HPC0_LA25_N	J2.A12
G30	FMC_HPC0_LA29_P	J2.A20
G31	FMC_HPC0_LA29_N	J2.A22
G33	FMC_HPC0_LA31_P	J2.A28
G34	FMC_HPC0_LA31_N	J2.A30
G36	FMC_HPC0_LA33_P	J2.A58
G37	FMC_HPC0_LA33_N	J2.A60

FMC Pin	Signal name	SOM pin
C2	FMC_HPC0_DP0_C2M_P	J3.A15
C3	FMC_HPC0_DP0_C2M_N	J3.A17
C6	FMC_HPC0_DP0_M2C_P	J3.A03
C7	FMC_HPC0_DP0_M2C_N	J3.A05
C10	FMC_HPC0_LA06_P	J1.A12
C11	FMC_HPC0_LA06_N	J1.A14
C14	FMC_HPC0_LA10_P	J1.A34
C15	FMC_HPC0_LA10_N	J1.A32
C18	FMC_HPC0_LA14_P	J1.B02
C19	FMC_HPC0_LA14_N	J1.B04
C22	FMC_HPC0_LA18_CC_P	J1.B60
C23	FMC_HPC0_LA18_CC_N	J1.B58
C26	FMC_HPC0_LA27_P	J2.A11
C27	FMC_HPC0_LA27_N	J2.A09
H4	FMC_HPC0_CLK0_M2C_P	J1.A15
H5	FMC_HPC0_CLK0_M2C_N	J1.A13
H7	FMC_HPC0_LA02_P	J1.A07
H8	FMC_HPC0_LA02_N	J1.A05
H10	FMC_HPC0_LA04_P	J1.A23
H11	FMC_HPC0_LA04_N	J1.A21
H13	FMC_HPC0_LA07_P	J1.A26
H14	FMC_HPC0_LA07_N	J1.A24
H16	FMC_HPC0_LA11_P	J1.A42
H17	FMC_HPC0_LA11_N	J1.A40
H19	FMC_HPC0_LA15_P	J1.B14
H20	FMC_HPC0_LA15_N	J1.B16
H22	FMC_HPC0_LA19_P	J2.A03
H23	FMC_HPC0_LA19_N	J2.A01
H25	FMC_HPC0_LA21_P	J2.A06
H26	FMC_HPC0_LA21_N	J2.A08
H28	FMC_HPC0_LA24_P	J2.A16
H29	FMC_HPC0_LA24_N	J2.A14
H31	FMC_HPC0_LA28_P	J2.A24
H32	FMC_HPC0_LA28_N	J2.A26
H34	FMC_HPC0_LA30_P	J2.A32
H35	FMC_HPC0_LA30_N	J2.A34
H37	FMC_HPC0_LA32_P	J2.A57
H38	FMC_HPC0_LA32_N	J2.A59

7 Electrical characteristics

7.1 Electrical specifications

Supply voltage	12 [V], DC regulated, +/-5%
Current consumption	4.0 [A] maximum

7.2 Environment specifications

Standard operating temperature	0 … +70[°C]
Storage temperature	0 … +70[°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	200.0 [mm] x 150.0 [mm] x 15.0 [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.