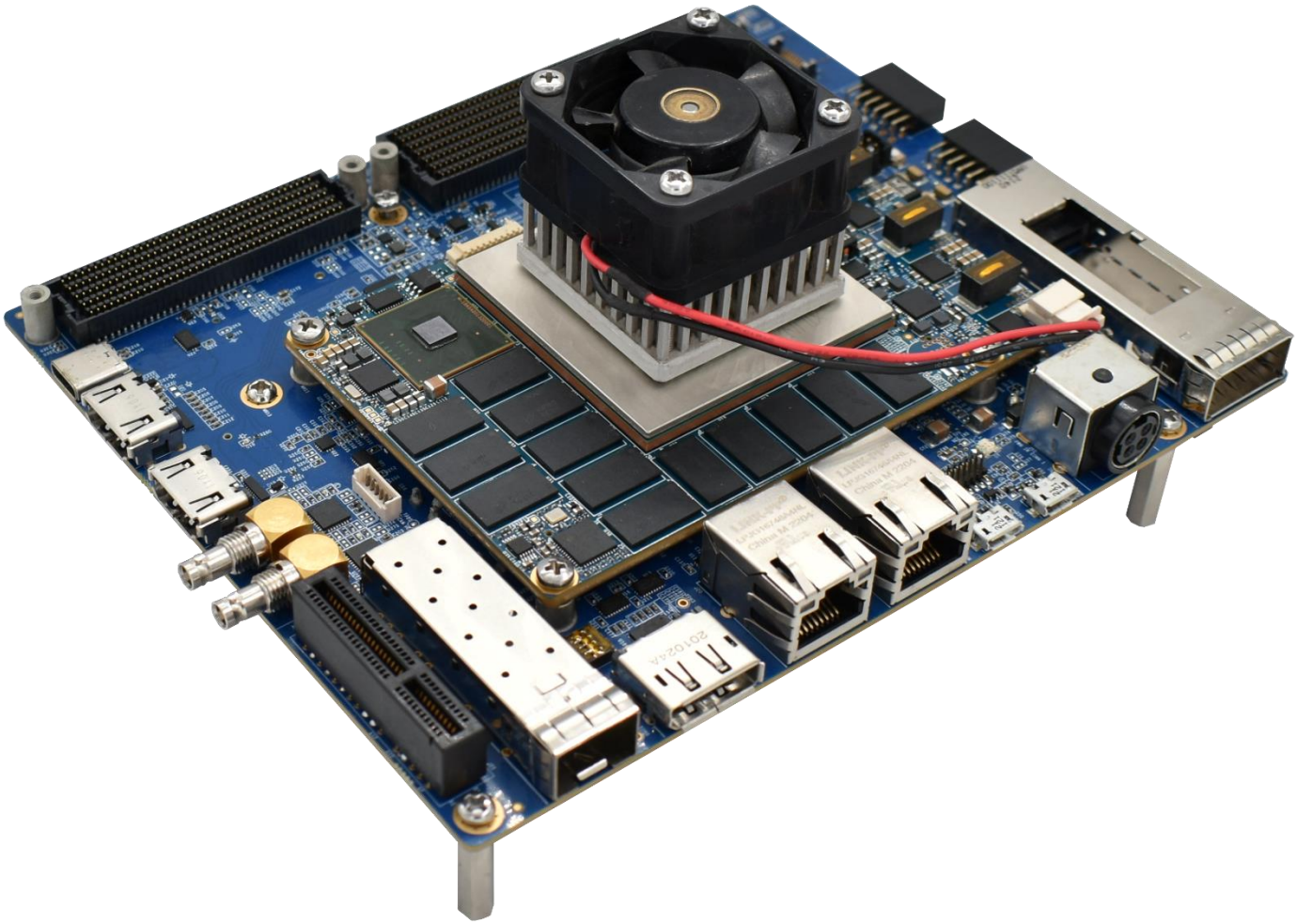
iW-RainboW-G47D
Virtex UltraScale+ FPGA SOM
Development Platform
Datasheet



iWave
Embedding Intelligence

Document Revision History

Document Number		iW-PRHBZ-UM-01-R3.1-REL0.1-Hardware-VirtexUltraScale+ FPGA-UHS-DevKit
Revision	**Date**	**Change Description**
0.1	21st July 2023	Initial Draft Version

Disclaimer

iWave Systems reserves the right to change details in this publication including but not limited to any Product specification without notice.

No warranty of accuracy is given concerning the contents of the information contained in this publication. To the extent permitted by law no liability (including liability to any person by reason of negligence) will be accepted by iWave Systems, its subsidiaries or employees for any direct or indirect loss or damage caused by omissions from or inaccuracies in this document.

CPU and other major components used in this product may have several silicon errata associated with it. Under no circumstances, iWave Systems shall be liable for the silicon errata and associated issues.

Trademarks

All registered trademarks, product names mentioned in this publication are the property of their respective owners and used for identification purposes only.

Certification

iWave Systems Technologies Pvt. Ltd. is an ISO 9001:2015 Certified Company.

Warranty & RMA

Warranty support for Hardware: 1 Year from iWave or iWave's EMS partner.
For warranty terms, go through the below web link,
http://www.iwavesystems.com/support/warranty.html

For Return Merchandise Authorization (RMA), go through the below web link,
http://www.iwavesystems.com/support/rma.html

Technical Support

iWave Systems technical support team is committed to provide the best possible support for our customers so that our Hardware and Software can be easily migrated and used.

For assistance, contact our Technical Support team at,

Email : support.ip@iwavesystems.com
Website : www.iwavesystems.com
Address : iWave Systems Technologies Pvt. Ltd.
7/B, 29th Main, BTM Layout 2nd Stage,
Bangalore, Karnataka,
India – 560076

Table of Contents

List of Figures

List of Tables

1. INTRODUCTION

1.1 Purpose

The Virtex UltraScale+ FPGA SOM Development platform incorporates Virtex UltraScale+ FPGA based SOM and Ultra-High-Performance Carrier board for complete validation of Virtex UltraScale+ FPGA and LS1021A Layerscape processor functionality. This document is the Hardware Datasheet for the Virtex UltraScale+ FPGA Carrier Board and provides detailed information on the overall design & usage of the Carrier Board from a Hardware Systems perspective. The details about the Virtex UltraScale+ FPGA SOM hardware is explained in another document "iW-RainboW-G47M-Virtex-UltraScale+FPGA-SOM-Datasheet".

1.2 Overview

iWave's Virtex UltraScale+ FPGA Development platform comes with Virtex UltraScale+ FPGA SOM and the Ultra-High-Performance Carrier Board. The development board can be used for quick prototyping of various applications targeted by the Virtex UltraScale+ FPGA. With the 140mmx170mm size, carrier board is packed with all the necessary on-board connectors to validate the features of Virtex UltraScale+ FPGA SOM.

1.3 List of Acronyms

The following acronyms will be used throughout this document.

Table 1: Acronyms & Abbreviations

Acronyms	Abbreviations
B2B	Board To Board Connector
CPU	Central Processing Unit
DDR4	Double Data Rate fourth-generation
EEPROM	Electrically Erasable Programmable Read-only Memory
FMC	FPGA Mezzanine Card
FMC+	FPGA Mezzanine Card+
FPGA	Field Programmable Gate Array
GB	Giga Byte
Gbps	Gigabits per sec
GHz	Giga Hertz
GPIO	General Purpose Input Output
HDMI	High-Definition Multimedia Interface
HPC	High Performance Computing
I2C	Inter-Integrated Circuit
IC	Integrated Circuit
JTAG	Joint Test Action Group
LED	Light-Emitting Diode
MB	Mega Byte

Acronyms	Abbreviations
Mbps	Megabits per sec
MDI	Medium-dependent interface
MHz	Mega Hertz
MRAM	Magneto-resistive Random Access Memory
OTG	On-The-Go
PCB	Printed Circuit Board
PCIe	Peripheral Component Interconnect Express
PMIC	Power Management Integrated Circuit
PMOD	Peripheral Module Interface
QSFP	Quad Small Form-factor Pluggable
RGMII	Reduced Gigabit Media Independent Interface
RTC	Real Time Clock
SDI	Serial Digital Interface
SerDes	Serializer/Deserializer
SFP	Small Form-factor Pluggable
SOM	System On Module
SRAM	Static Random Access Memory
TPM	Trusted Platform Module
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

1.4 Terminology Description

In this document, wherever Signal Type is mentioned, below terminology is used.

Table 2: Terminology

Terminology	Description
I	Input Signal
O	Output Signal
IO	Bidirectional Input/output Signal
CMOS	Complementary Metal Oxide Semiconductor Signal
LVDS	Low Voltage Differential Signal
GBE	Gigabit Ethernet Media Dependent Interface differential pair signals
USB	Universal Serial Bus differential pair signals
OD	Open Drain Signal
OC	Open Collector Signal
Power	Power Pin
PU	Pull Up
PD	Pull Down
NA	Not Applicable
NC	Not Connected

Note: Signal Type does not include internal pull-ups or pull-downs implemented by the chip vendors and only includes the pull-ups or pull-downs implemented on board.

1.5 References

- Virtex UltraScale+ FPGA Datasheet & Reference Manual.
- QorIQ LS1021A Data Sheet & Reference Manual.
- Virtex UltraScale+ FPGA SOM Datasheet.

2. ARCHITECTURE AND DESIGN

This section provides detailed information about the Virtex UltraScale+ FPGA Development platform carrier board features with high level block diagram and detailed information about each block.

2.1 Virtex UltraScale+ FPGA SOM Carrier Board Block Diagram

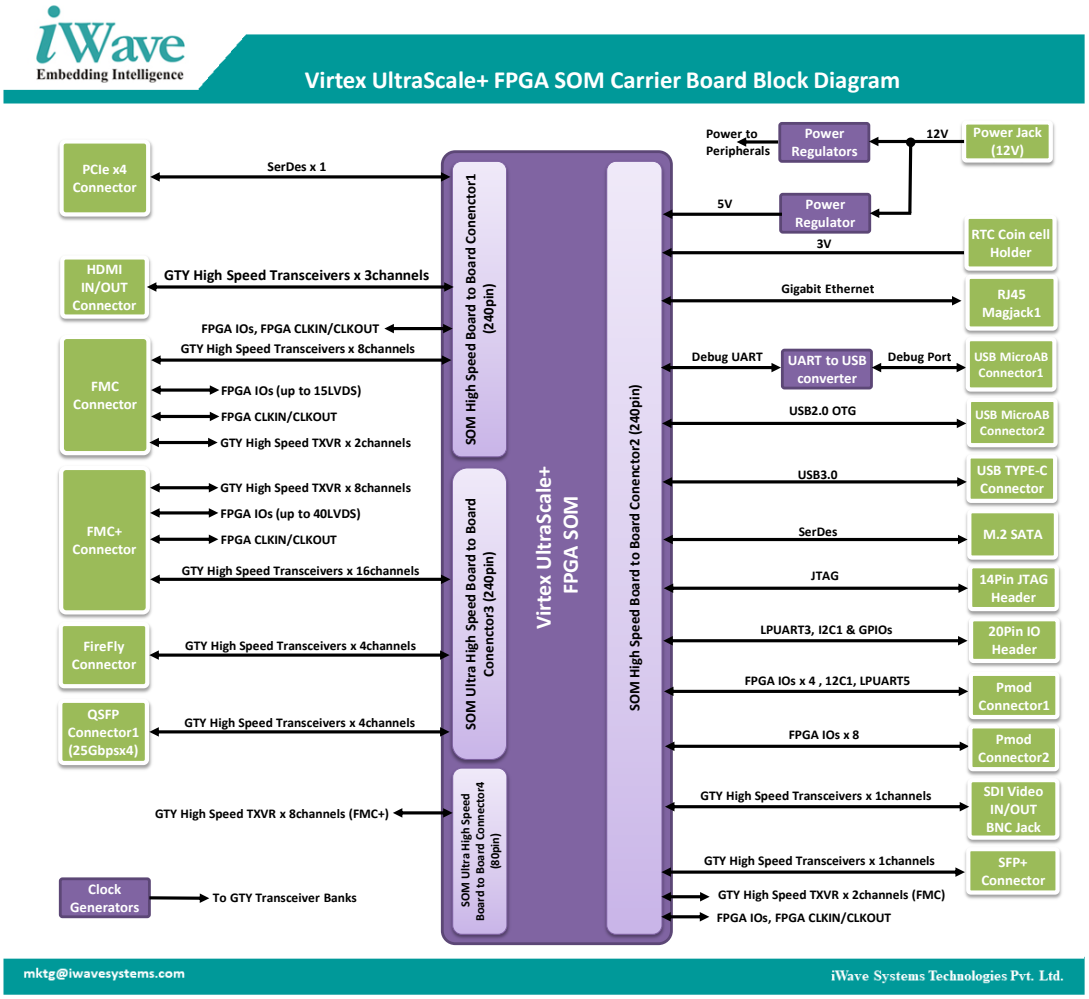


Figure 1: Virtex UltraScale+ FPGA SOM Carrier Board Block Diagram

2.2 Virtex UltraScale+ FPGA SOM Carrier Board Features

The Virtex UltraScale+ FPGA Carrier board supports the following features to validate the Virtex UltraScale+ FPGA SOM supported interfaces.

CPU Interface Features

- PCIe x4 Connector x 1
- M.2 SATA Connector x1
- Gigabit Ethernet through RJ45MagJack x 1
- USB2.0 OTG through Micro AB Connector x 1
- USB 3.0 through Type-C Connector x 1
- Debug UART through USB Micro AB Connector x 1

FPGA Interface Features

- QSFP28/QSFP+/QSFP Connector x 1
- FireFly Connector x 1
- SFP+ Connector x 1
- SDI IN/OUT Connector x1
- HDMI IN/ OUT Connector x 1
- SMA Connector x 2
- FMC High Pin Count (HPC) Connector
    - 10 GTY High Speed Transceivers
    - 2 GTY Reference Clock
    - Up to 15 LVDS IOs/31 Single ended (SE) IOs from HP Bank
    - 2 Clock Input Capable LVDS/4 SE pins from HP Bank
    - 2 Clock Output Capable LVDS/5 SE pins from HP Bank
- FMC+ High Pin Count (HPC) Connector
    - 24 GTY High Speed Transceivers
    - 6 GTY Reference Clock
    - Upto 40 LVDS IOs/88 Single ended (SE) IOs from HP Bank
    - 2 Clock Input Capable LVDS/SE pins from HP Bank
    - 2 Clock Output Capable LVDS/SE pins from HP Bank
    - Up to 6 SE IOs from CPU

Additional Features

- Clock Synthesizers/Generators x2
- JTAG Connector x 1
- PMOD Connector x 2
- 16-Bit IO Expanders x 3
- I2C Bus Switch x 1
- 20 Pin GPIO Header x 1
- Power ON/OFF Switch x 1
- Reset Push Button Switch x 1
- RTC Coin Cell Holder x 1
- 12V Fan Header x 1

General Specification

- Power Supply : DC 12V, 14A Power Input Jack
- Form Factor : 140mm X 170mm

2.3 Board to Board Connectors

The Virtex UltraScale+ FPGA Carrier board supports four Board to Board mating connectors for Virtex UltraScale+ FPGA SOM attachment. This Board-to-Board connector are capable of handling high-speed serialized signals and can be used for size constrained embedded applications.

2.3.1 Board to Board Connector1

Board to Board Connector1 (J18) is physically located at the top of the board as shown below.

Note: For the Board-to-Board Connector1 pinout, refer the Virtex UltraScale+ FPGA SOM Datasheet.

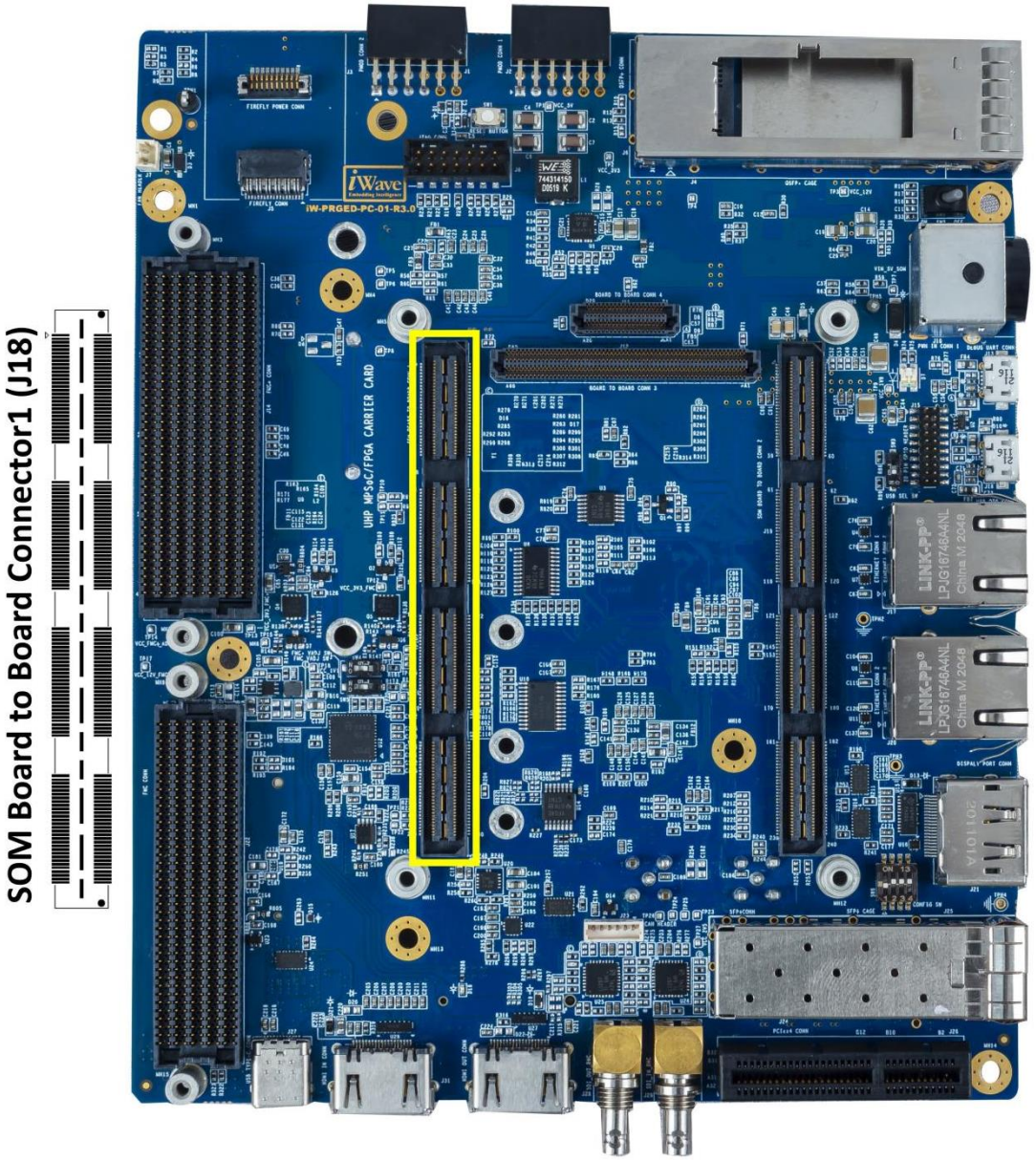


Figure 2: Board to Board Connector1

2.3.2 Board to Board Connector2

Board to Board Connector2 (J19) is physically located at the top of the board as shown below.

Note: For the Board-to-Board Connector2 pinout, refer the Virtex UltraScale+ FPGA SOM Datasheet.

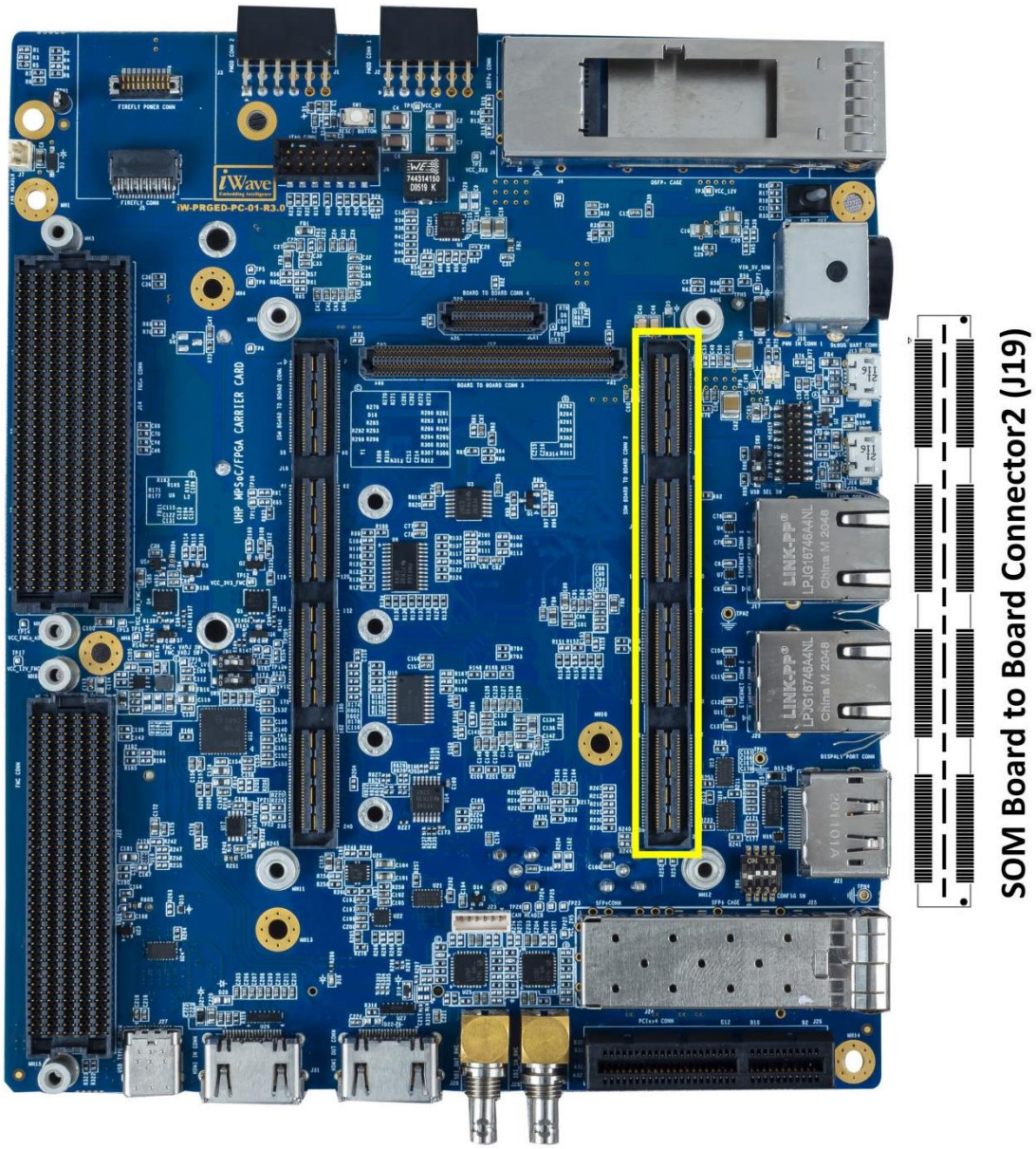


Figure 3: Board to Board Connector2

2.3.3 Board to Board Connector3

Board to Board Connector3 (J12) is physically located at the top of the board as shown below.

Note: For the Board-to-Board Connector3 pinout, refer the Virtex UltraScale+ FPGA SOM Datasheet.

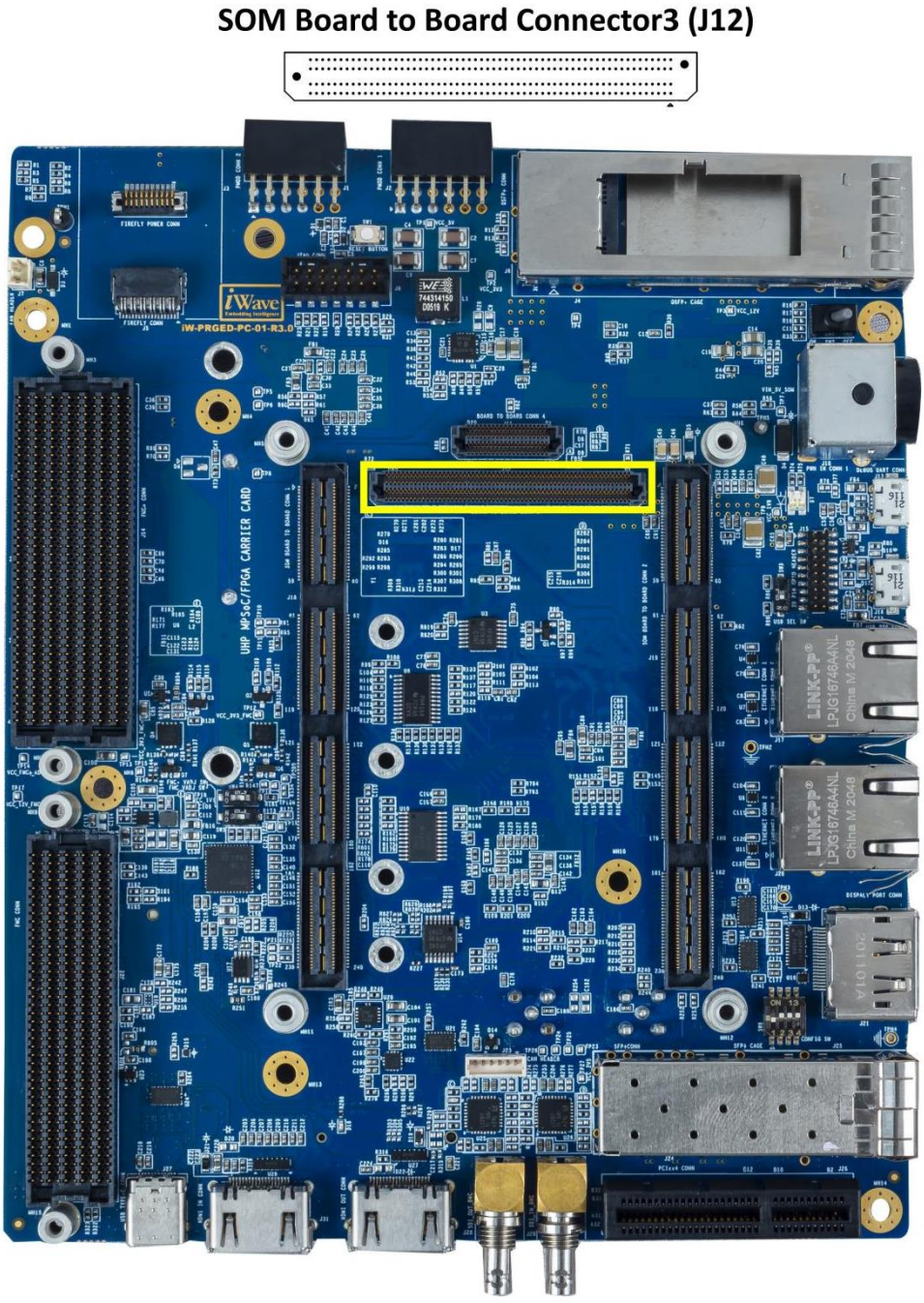


Figure 4: Board to Board Connector3

2.3.4 Board to Board Connector4

Board to Board Connector4 (J11) is physically located at the top of the board as shown below.

Note: For the Board-to-Board Connector4 pinout, refer the Virtex UltraScale+ FPGA SOM Datasheet.

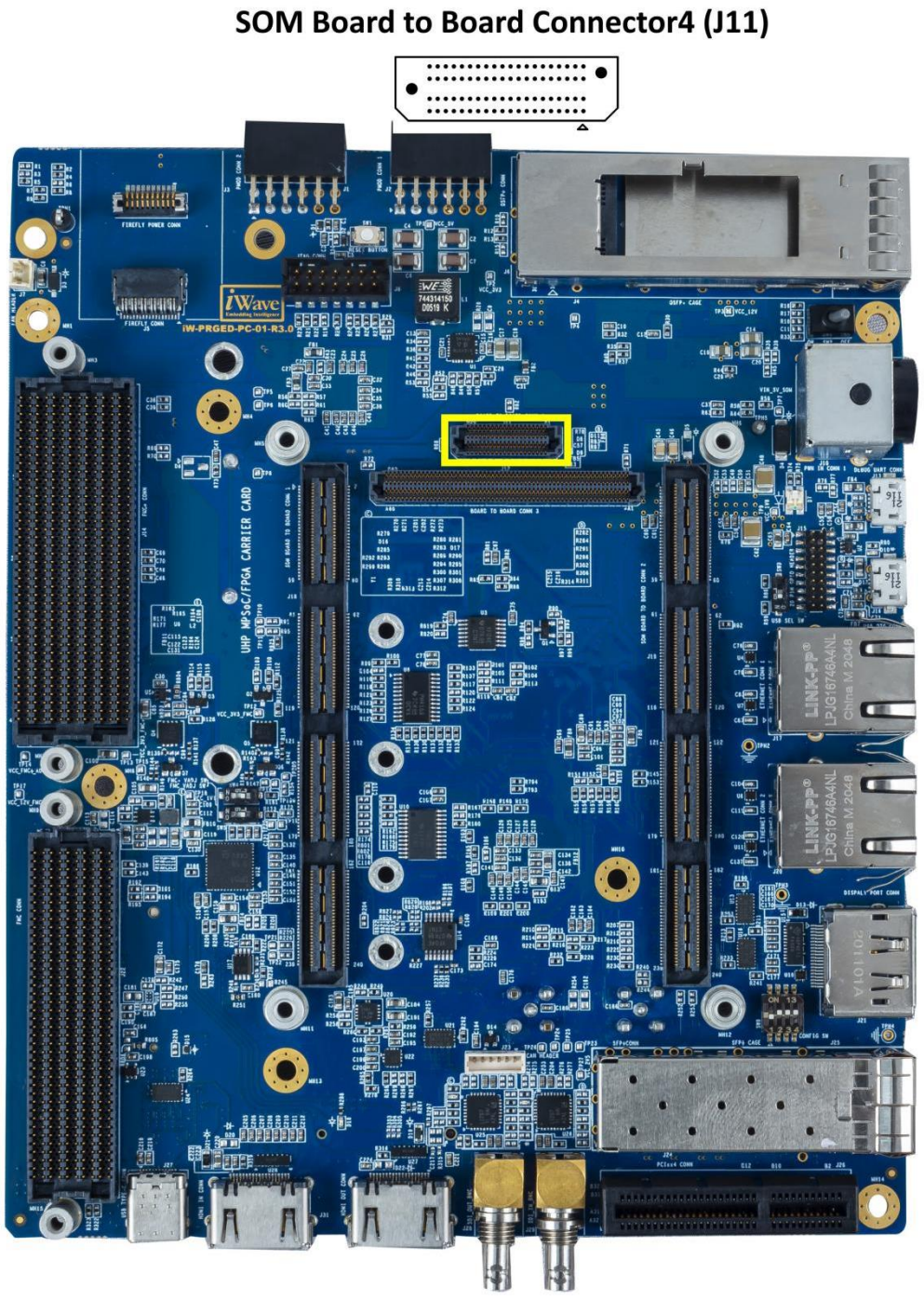


Figure 5: Board to Board Connector4

2.4 CPU Interface Features

The features which are supported from LS1021A Layerscape processor is explained in the following section.

2.4.1 High-speed Serial Interfaces (SerDes)

The Virtex UltraScale+ SOM Carrier board supports a high-speed serial interconnect application through Serializer/Deserializer (SerDes) Lanes of CPU. The SerDes lanes can be used for PCI Express, SGMII, and serial ATA (SATA) data transfers.

Each SerDes lane is connected to High-speed MUX/DEMUX IC to support different high-speed interfaces. High speed MUX/DEMUX is switching is controlled by 4-bit DIP Switch (SW6). The Switch selection details are explained below.

Table 3: Switch Selection Setting

Switch6 Bit Number	Functionality	
	OFF	**ON**
Bit1	SerDes Lane2 is connected to Lane0 of PCIe x4 connector (Default)	Not Applicable
Bit2	SerDes Lane3 is connected to Lane1 of PCIe x4 connector /JTAG pin of FPGA to JTAG connector (Default)	JTAG pin of CPU to JTAG connector
Bit3	Not Applicable	USB3.0 is connected to TypeC port (Default)
Bit4	Not Applicable	SerDes Lane1 is connected to TypeC port (Default)

Note: Make sure SW6 selection is done properly before power on.

SW6 in Virtex UltraScale+ Devkit is available on top side of board as shown below.

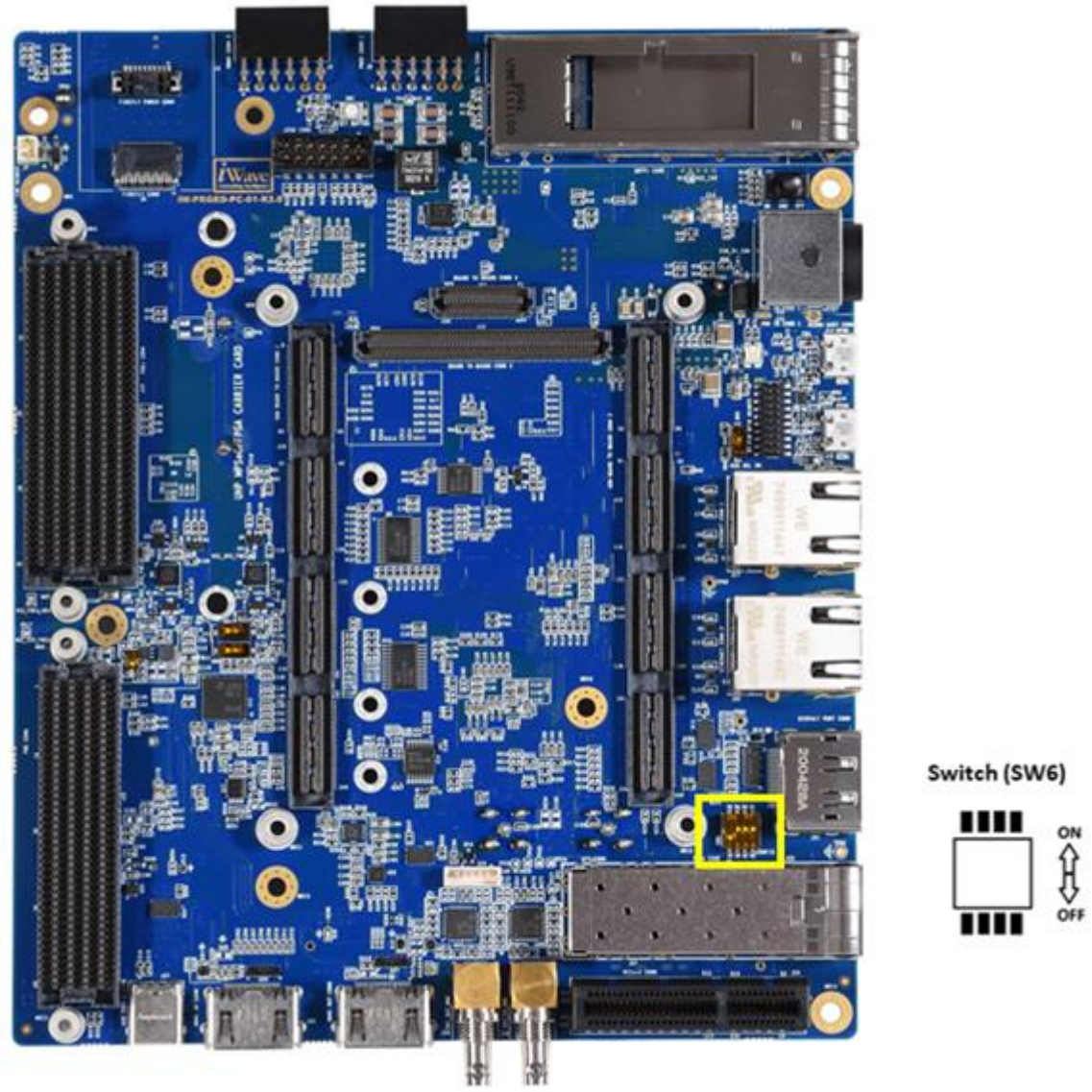


Figure 6: Lane Selection Switch

2.4.1.1 PCIe X4 Connector

The Virtex UltraScale+ FPGA Carrier board supports PCIe Gen2 Interface through Serdes Lanes of LS1021A Processor. The SerDes lane2 and Lane3 from Board-to-Board Connector1 is connected to PCIex4 connector to support PCIe x1 or PCIe x2 Interface. The SerDes Lane selection to PCIe connector is done through Selection Switch (SW6), refer Table 3 for proper Lane selection.

This PCIe x4 connector (J26) is physically located at the top of the board as shown below.

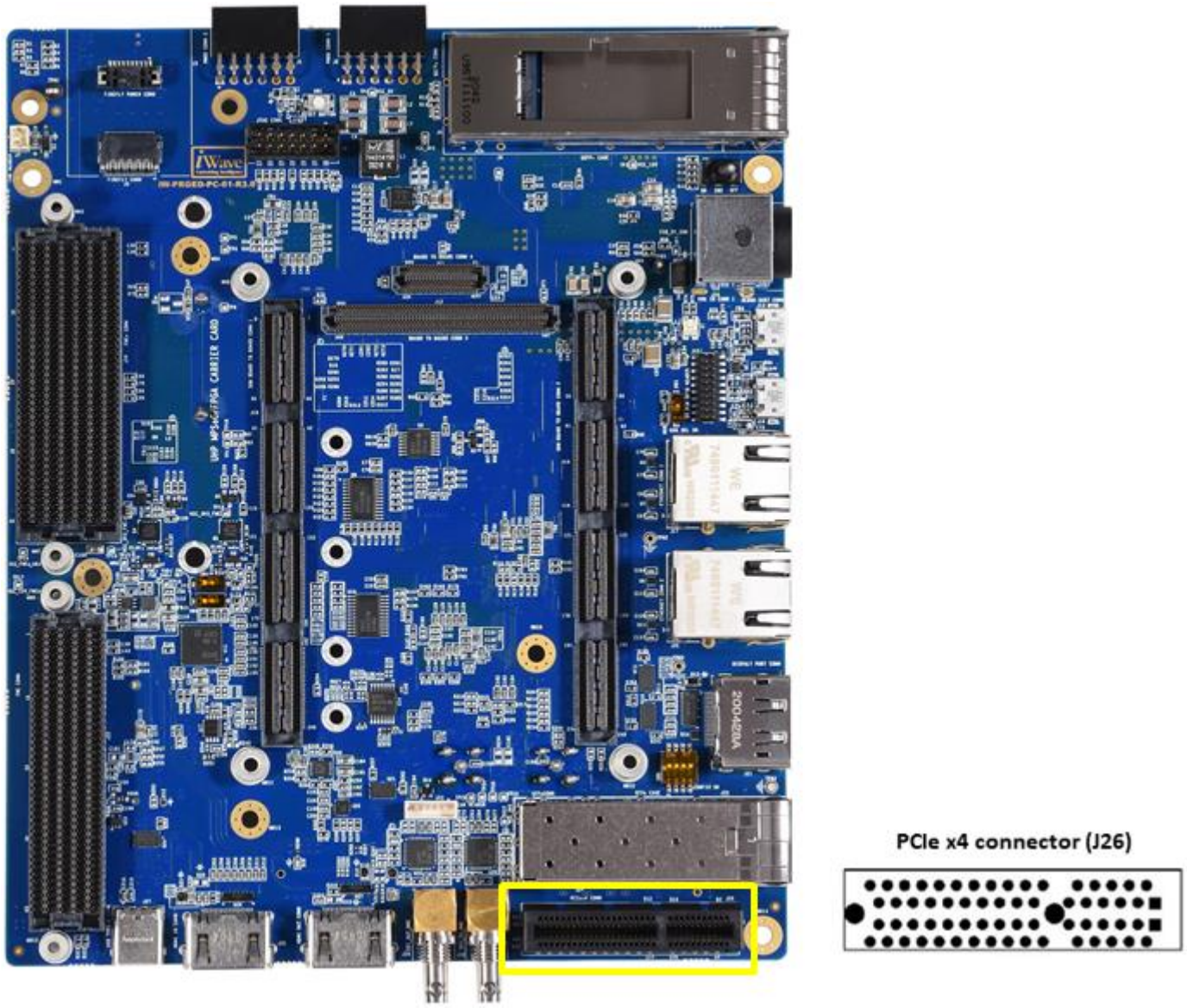


Figure 7: PCIe x4 Connector

Table 4: PCIe x4 Connector Pin Assignment

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
A1	PRSNT1#	PRSNT1#	O, 3.3V CMOS	Present pin, default Grounded.
A2	+12V_3	VCC_12V	O, 12V Power	12V Supply Voltage.
A3	+12V_4	VCC_12V	O, 12V Power	12V Supply Voltage.
A4	GND	GND	Power	Ground.
A5	TCK	NA	NA	NC.
A6	TDI	NA	NA	NC.
A7	TDO	NA	NA	NC.
A8	TMS	NA	NA	NC.
A9	+3V3_2	VCC_3V3	O, 3.3V Power	3.3V Supply Voltage.
A10	+3V3_3	VCC_3V3	O, 3.3V Power	3.3V Supply Voltage.
A11	PERST#	PL_AV23_LVDS64_L13P_GC	O, 3.3V CMOS	PCIe Reset through FPGA Bank IO.
A12	GND	GND	Power	Ground.
A13	REFCLK+	PCIex4_REFCLKP	O, DIFF	100MHz PCIe Reference Clock positive.
A14	REFCLK-	PCIex4_REFCLKn	O, DIFF	100MHz PCIe Reference Clock negative.
A15	GND	GND	Power	Ground.
A16	PERp0	LS_SD1_RX2_P	I, DIFF	PCIe Lane0 Receive pair positive.
A17	PERn0	LS_SD1_RX2_N	I, DIFF	PCIe Lane0 Receive pair negative.
A18	GND	GND	Power	Ground.
A19	RSVD4	NA	NA	NC.
A20	GND	GND	Power	Ground.
A21	PERp1	LS_SD1_RX3_P	I, DIFF	PCIe Lane1 Receive pair positive.
A22	PERn1	LS_SD1_RX3_N	I, DIFF	PCIe Lane1 Receive pair negative.
A23	GND	GND	Power	Ground.
A24	GND	GND	Power	Ground.
A25	PERp2	NA	NA	NA
A26	PERn2	NA	NA	NA
A27	GND	GND	Power	Ground.
A28	GND	GND	Power	Ground.
A29	PERp3	NA	NA	NA
A30	PERn3	NA	NA	NA
A31	GND	GND	Power	Ground.
A32	RSVD5	NA	NA	NC.
B1	+12V_1	VCC_12V	O, 12V Power	12V Supply Voltage.
B2	+12V_2	VCC_12V	O, 12V Power	12V Supply Voltage.
B3	RSVD1	NA	NA	NC.
B4	GND	GND	Power	Ground.
B5	SMCLK	I2C0_SD1_SCL	O, 3.3V CMOS	SMB Clock.
B6	SMDAT	I2C0_SD1_SDA	IO, 3.3V CMOS	SMB DATA.
B7	GND	GND	Power	Ground.

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
B8	+3V3_1	VCC_3V3	O, 3.3V Power	3.3V Supply Voltage.
B9	TRST#	NA	NA	NC.
B10	3V3AUX	VCC_3V3	O, 3.3V Power	3.3V Supply Voltage
B11	WAKE#	PL_AW23_LVDS64_L13N_GC	O, 3.3V CMOS	PCIe Wake through FPGA Bank IO.
B12	RSVD2	NA	NA	NC.
B13	GND	GND	Power	Ground.
B14	PETp0	LS_SD1_TX2_P	O, DIFF	PCIe Lane0 Transmit pair positive.
B15	PETn0	LS_SD1_TX2_N	O, DIFF	PCIe Lane0 Transmit pair negative.
B16	GND	GND	Power	Ground.
B17	PRSNT2#_1	NA	NA	NC.
B18	GND	GND	Power	Ground.
B19	PETp1	LS_SD1_TX3_P	O, DIFF	PCIe Lane1 Transmit pair positive.
B20	PETn1	LS_SD1_TX3_N	O, DIFF	PCIe Lane1 Transmit pair negative.
B21	GND	GND	Power	Ground.
B22	GND	GND	Power	Ground.
B23	PETp2	NA	NA	NA
B24	PETn2	NA	NA	NA
B25	GND	GND	Power	Ground.
B26	GND	GND	Power	Ground.
B27	PETp3	NA	NA	NA
B28	PETn3	NA	NA	NA
B29	GND	GND	Power	Ground.
B30	RSVD3	NA	NA	NC.
B31	PRSNT#2_2	NA	NA	NC.
B32	GND	GND	Power	Ground.

2.4.1.2 M.2 SATA Connector

The Virtex Ultrascale+ Carrier board supports one SATA interface through M.2 (Key M) SATA connector. SerDes Lane1 of LS1021A CPU is used for SATA interface. Speeds of 1.5 Gbps (first-generation SATA), 3 Gbps (second generation SATA), and 6 Gb/s (third-generation SATA). The SerDes Lane selection to M.2 SATA connector is done through Selection Switch (SW6), refer Table 3 for proper Lane selection.

This M.2 SATA connector (J36) is physically located at the bottom of the board as shown below.

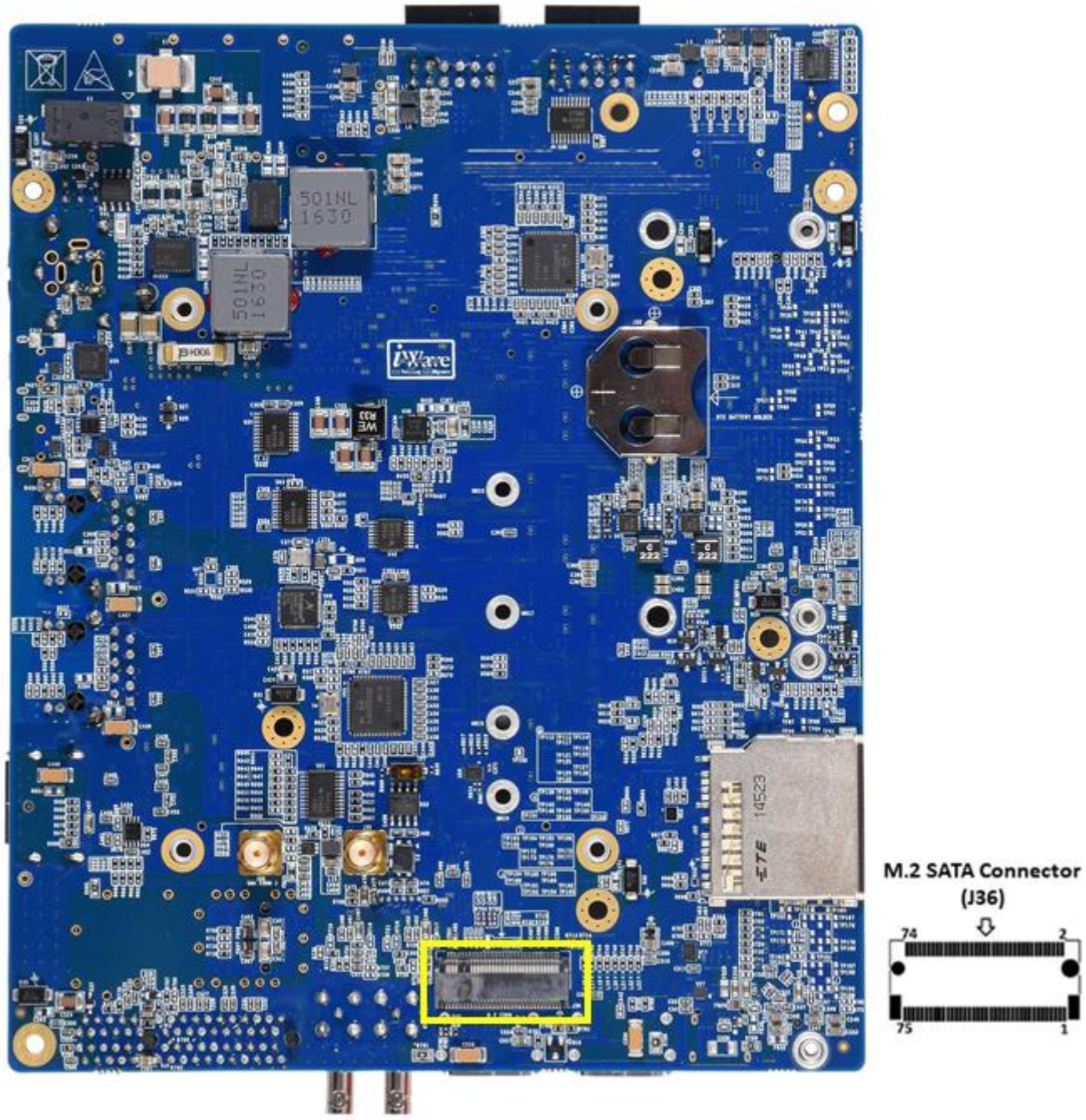


Figure 8: M.2 SATA Connector (Key M)

Table 5: M.2 SATA Connector Pin Assignment

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
1	CONFIG_3	NA	NA	NC
2	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
3	GND	GND	Power	Ground.
4	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
5	PERn3	NA	NA	NC.
6	N/A1	NA	NA	NC.
7	PERp3	NA	NA	NC.
8	N/A2	NA	NA	NC.

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
9	GND	GND	Power	Ground.
10	DAS/DSS	DAS	IO, 3.3V CMOS	Connected to LED D20 for the activity indication
11	PETn3	NA	NA	NC.
12	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
13	PETp3	NA	NA	NC.
14	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
15	GND	GND	Power	Ground.
16	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
17	PERn2	NA	NA	NC.
18	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
19	PERp2	NA	NA	NC.
20	N/A3	NA	NA	NC.
21	CONFIG_0	NA	NA	NC
22	N/A4	NA	NA	NC.
23	PETn2	NA	NA	NC.
24	N/A5	NA	NA	NC.
25	PETp2	NA	NA	NC.
26	N/A6	NA	NA	NC.
27	GND	GND	Power	Ground.
28	N/A7	NA	NA	NC.
29	PERn1	NA	NA	NC.
30	N/A8	NA	NA	NC.
31	PERp1	NA	NA	NC.
32	N/A9	NA	NA	NC.
33	GND	GND	Power	Ground.
34	N/A10	NA	NA	NC.
35	PETn1	NA	NA	NC.
36	N/A11	NA	NA	NC.
37	PETp1	NA	NA	NC.
38	DEVSLP	NA	NA	NC.
39	GND	GND	Power	Ground.
40	SMB_CLK	NA	NA	NC.
41	SATA-B+/PERn0	LS_SD1_RX1_P	I, DIFF	SATA Receive pair positive.
42	SMB_DATA	NA	NA	NC.
43	SATA-B-/PERp0	LS_SD1_RX1_N	I, DIFF	SATA Receive pair negative.
44	N/A14	NA	NA	NC.
45	GND	GND	Power	Ground.
46	N/A15	NA	NA	NC.
47	SATA-A-/PETn0	LS_SD1_TX1_N	O, DIFF	SATA Transmit pair negative.
48	N/A16	NA	NA	NC.
49	SATA-A+/PETp0	LS_SD1_TX1_P	O, DIFF	SATA Transmit pair positive.

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
50	PERST#	B_M2_PCI_RST#	O, 3.3V CMOS	This pin is connected to IO Expander port 14
51	GND	GND	Power	Ground.
52	CLKREQ#	B_PCI_CLKREQ#	O, 3.3V CMOS	This pin is connected to IO Expander port 16
53	REFCLKN	NA	NA	NC.
54	PEWAKE#	B_M2_PCI_WAK#	I, 3.3V CMOS	This pin is connected to IO Expander port 15
55	REFCLKP	NA	NA	NC.
56	MFG1	NA	NA	NC.
57	GND	GND	Power	Ground.
58	MFG2	NA	NA	NC.
59	M1	NA	NA	NC.
60	M2	NA	NA	NC.
61	M3	NA	NA	NC.
62	M4	NA	NA	NC.
63	M5	NA	NA	NC.
64	M6	NA	NA	NC.
65	M7	NA	NA	NC.
66	M8	NA	NA	NC.
67	N/A17	NA	NA	NC.
68	SUSCLK	NA	NA	NC.
69	CONFIG_1	PCI/SATA_CONFIG	Power, 10K PU	This pin is connected to VCC_3V3
70	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
71	GND	GND	Power	Ground.
72	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
73	GND	GND	Power	Ground.
74	3.3V	VCC_3V3	O, 3.3V Power	Supply Voltage.
75	CONFIG_2	NA	NA	NC

2.4.2 Gigabit Ethernet Port1

The Virtex UltraScale+ FPGA SOM Carrier board supports one 10/100/1000Mbps Ethernet port. This port is supported through Ethernet Controller1 interface of L1021A processor in the Virtex UltraScale+ FPGA SOM. The Interface is supported through on SOM Ethernet PHY. MDI signals from Board-to-Board connector2 is directly connected to RJ45 MagJack (J17). The Ethernet supports Speed (Yellow) and Link/Activity (Green) LED indications on RJ45 MagJack connector. This RJ45 MagJack connector(J17) is physically located at the top of the board as shown below.

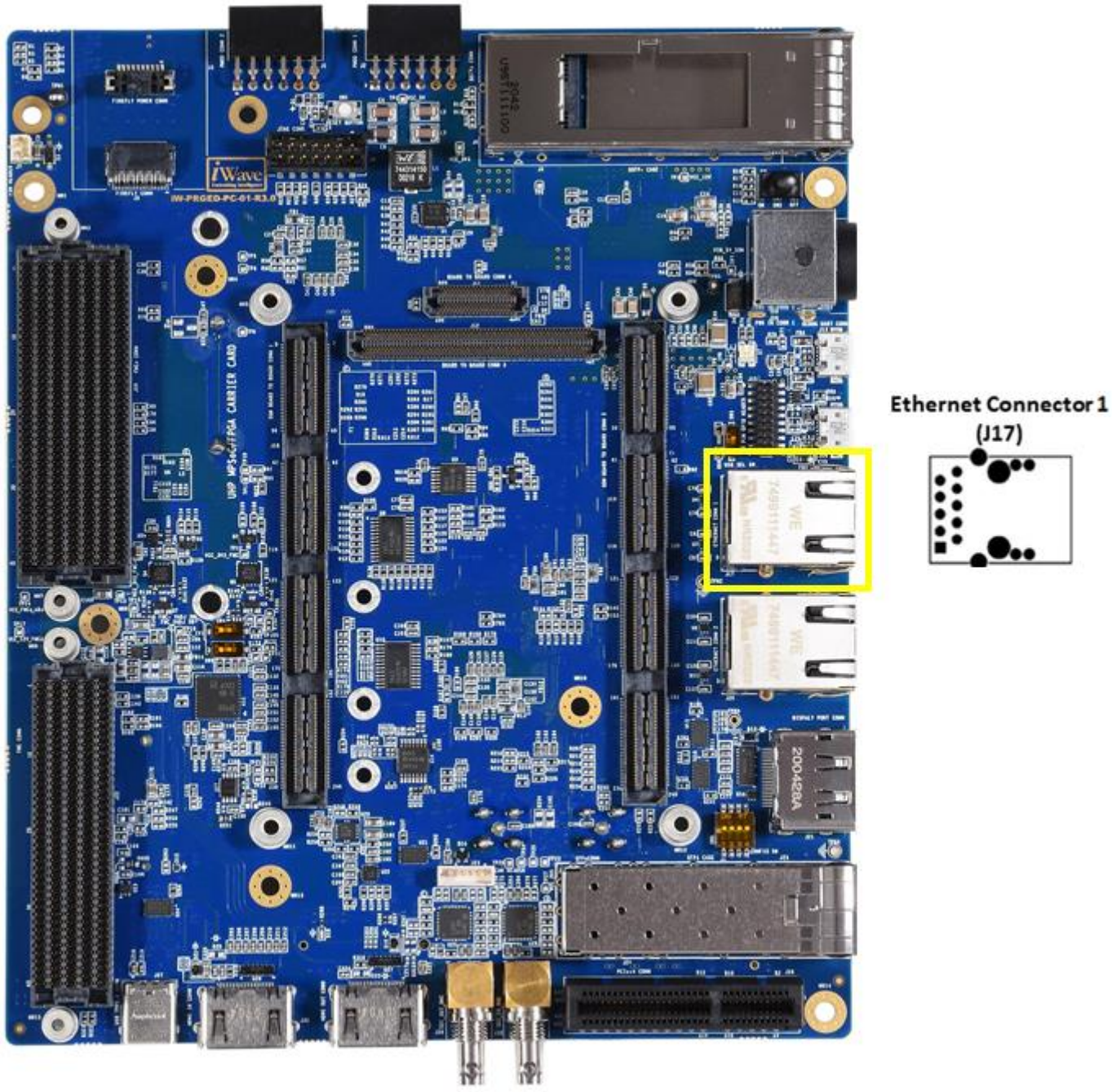


Figure 9: Gigabit Ethernet Connector1

2.4.3 USB2.0 OTG Port

The Virtex UltraScale+ FPGA carrier Board supports USB2.0 High Speed OTG interface through USB1 Controller of LS1021A processor. This USB2.0 OTG interface is supported through USB2.0 MicroAB connector (J16). The USB output signals from Board-to-Board connector2 is connected to "FUSB340" USB Switch for selecting the USB2.0 OTG connection between USB2.0 MicroAB connector (J16) and USB3.0 TypeC connector (J27). The selection can be done by setting the Single bit DIP switch (SW3). If the DIP switch (SW3) is set to OFF, USB2.0 OTG is connected to MicroAB connector (J16) and if the switch (SW3) is set to ON, USB2.0 OTG is connected to USB3.0 TypeC connector (J27).

The USB2.0 OTG port can be used as full functional OTG functionality which supports USB2.0 host and USB2.0 device based on USB ID pin status. The VBUS power of this USB2.0 MicroAB connector is connected through current limit power switch which can be used to switch On/Off the power based on the device or Host and also limits the current above 500mA in host mode. The USB PHY transceiver in LS1021A detects the USB functionality through USB ID pin (34^{th} pin of B2B-2) and controls the power using the GPIO pin (32^{nd} pin of B2B-2). This USB2.0 OTG connector (J16) is physically located at the top of the board as shown below.

Note: *Connect the USB2.0 pendrive/mouse to the microAB to Host connector first, then connect the connector to the board connector(J16).*

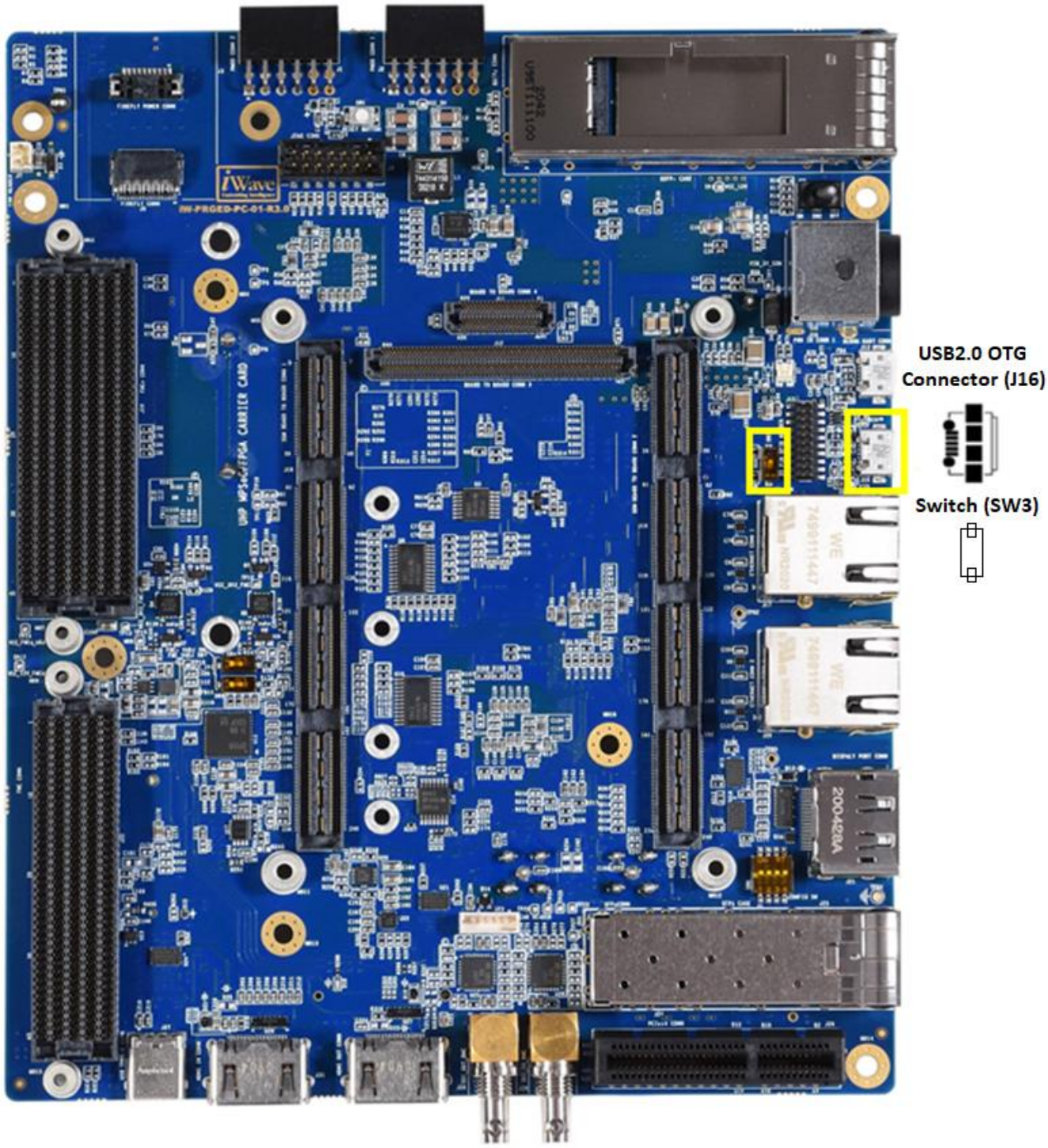


Figure 10: USB OTG Connector

2.4.4 USB 3.0 Type-C Port

The Virtex UltraScale+ FPGA Carrier Board supports one Super Speed USB3.0 OTG through USB Type-C connector. The USB1 Controller of LS1021A processor from Board-to-Board Connector2 is used for USB3.0 OTG interface. The USB signal from Board-to-Board connector is through High-Speed MUX/DEMUX switch. Refer Table 3 for proper lane selection through Switch SW6.

The Virtex UltraScale+ FPGA Carrier board supports “FUSB302” USB Type-C controller for port detection & cable orientation and controlled through I2C0 interface of LS1021A processor. To support double-way plug in on USB Type-C connector, USB1 Controller Lane is connected to “FUSB340” 2:1 data Switch and then connected to USB Type-C connector. The lane selection to Type-C connector (top or bottom port) is controlled through FPGA Bank IO “PL_AL21_LVDS64_L24P” from Board-to-Board Connector1 pin70. This USB Type-C connector (J27) is physically located at the top of the board as shown below.

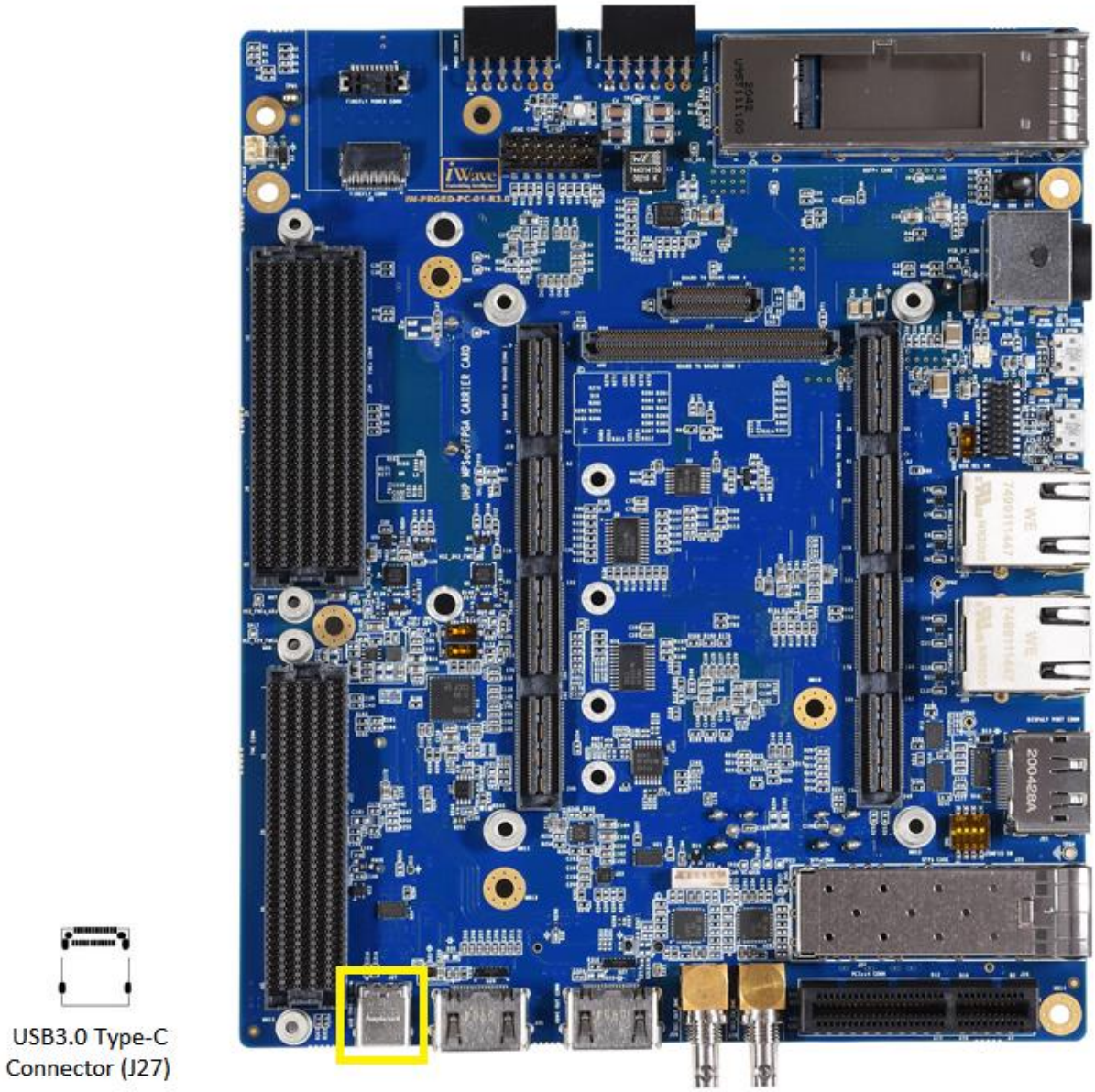


Figure 11: USB 3.0 Type-C Connector

2.4.5 Debug UART

The Virtex UltraScale+ FPGA Carrier Board supports debug interface through UART1 of LS1021A. The DUART controller of LS1021A is used for Debug UART interface. This UART1 signals from Board-to-Board Connector2 is connected to

UART to USB Converter “FT232RQ”. The output of the USB converter is connected to USB MicroAB Connector (J13). This USB MicroAB Connector can be used for Debug purpose which is physically located at the top of the board as shown below.

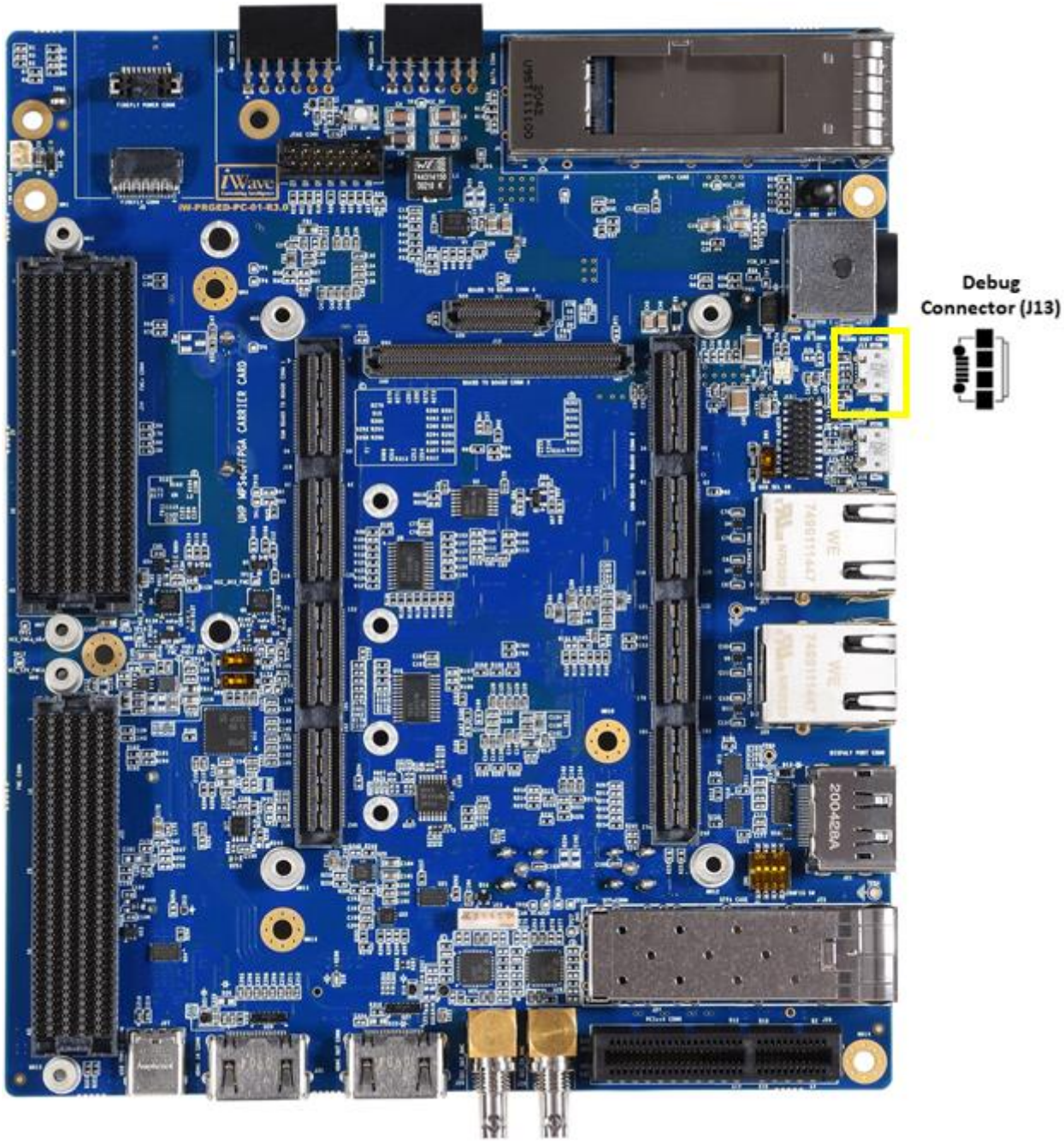


Figure 12: Debug UART Connector

2.5 FPGA Interface Features

The features which are supported from Virtex UltraScale+ FPGA FPGA is explained in the following section.

2.5.1 GTY High Speed Transceivers

The Virtex UltraScale+ FPGA Carrier board supports different highspeed interfaces through 48 GTY Transceivers as mentioned below.

- QSFP28/QSFP+/QSFP Connector (4 GTY Transceivers)
- FireFly Connector (4 GTY Transceivers)
- FMC HPC Connector (10 GTY Transceivers)
- FMC+ HPC Connector (24 GTY Transceivers)
- SFP+ Connector (1 GTY Transceivers)
- SDI IN/OUT Connector (1 GTY Transceivers)
- HDMI IN/OUT Connector (3 GTY Transceivers)
- SMA Connector (1 GTY Transmitter)

2.5.1.1 QSFP28/QSFP+/QSFP Connector

The Virtex UltraScale+ FPGA Carrier board supports one QSFP28/QSFP+/QSFP Connector through GTY transceiver of Virtex UltraScale+ FPGA. GTY transceiver of FPGA Bank230 Channel0 to Channel3 from Board-to-Board Connector3 is connected to QSFP+ connector. Also, I2C0 through I2C bus switch0 is connected to this connector for control and configuration. All other control signals of QSFP+ connector is connected from IO Expander2 (U6). This QSFP+ connector with dust case (J4) is physically located at the top of the board as shown below.

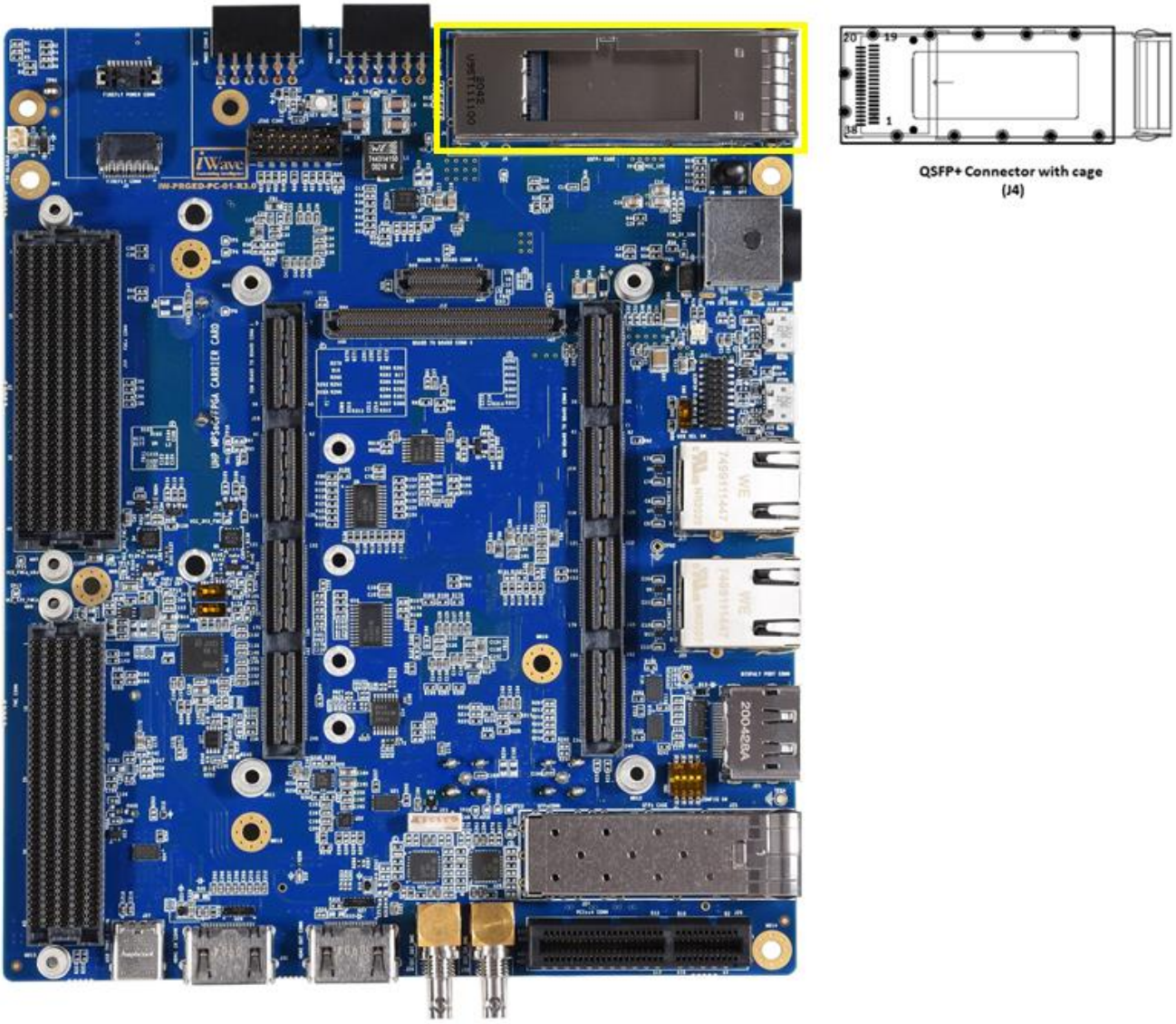


Figure 13: QSFP28/QSFP+/QSFP+ Connector with Cage

Table 6: QSFP28/QSFP+/QSFP Connector Pin Out

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
1	GND1	GND	Power	Ground.
2	Tx2n	GTYTXN1_230	O, DIFF	QSFP+ Transmit2 Data Negative
3	Tx2p	GTYTXP1_230	O, DIFF	QSFP+ Transmit2 Data Positive.
4	GND2	GND	Power	Ground.
5	Tx4n	GTYTXN3_230	O, DIFF	QSFP+ Transmit4 Data Negative
6	Tx4p	GTYTXP3_230	O, DIFF	QSFP+ Transmit4 Data Positive.
7	GND3	GND	Power	Ground.
8	ModSelL	IOEXP_P00_Q_MODESEL	O, 3.3V CMOS/ 4.7K PD	Module Select. This Pin is connected to IO Expander2 Port 0 for software access if required
9	ResetL	IOEXP_P01_Q_RESETL	O, 3.3V CMOS/ 4.7K PU	Module reset. This Pin is connected to IO Expander2 Port 1 for software access if required
10	Vcc Rx	VCCRX_3V3	O, 3.3V Power	3.3V Receiver Supply Voltage
11	SCL	I2C0_SD0_SCL	O, 3.3V CMOS	I2C Clock. This Pin is connected from 5th pin of I2C Bus switch (U29).
12	SDA	I2C0_SD0_SDA	IO, 3.3V CMOS	I2C Data. This Pin is connected from 4th pin of I2C Bus switch (U29).
13	GND4	GND	Power	Ground.
14	Rx3p	GTYRXP2_230	I, DIFF	QSFP+ Receiver3 Data Positive
15	Rx3n	GTYRXN2_230	I, DIFF	QSFP+ Receiver3 Data Negative
16	GND5	GND	Power	Ground.
17	Rx1p	GTYRXP0_230	I, DIFF	QSFP+ Receiver1 Data Positive
18	Rx1n	GTYRXN0_230	I, DIFF	QSFP+ Receiver1 Data Negative
19	GND6	GND	Power	Ground.
20	GND7	GND	Power	Ground.
21	Rx2n	GTYRXN1_230	I, DIFF	QSFP+ Receiver2 Data Negative
22	Rx2p	GTYRXP1_230	I, DIFF	QSFP+ Receiver2 Data Positive
23	GND8	GND	Power	Ground.
24	Rx4n	GTYRXN3_230	I, DIFF	QSFP+ Receiver4 Data Negative
25	Rx4p	GTYRXP3_230	I, DIFF	QSFP+ Receiver4 Data Positive
26	GND9	GND	Power	Ground.
27	ModPrsL	IOEXP_P04_Q_MODPRSL	I, 3.3V CMOS/ 4.7K PU	Module present. This Pin is connected to IO Expander2 Port 4 for software access if required
28	IntL	IOEXP_P03_Q_INTL	I, 3.3V CMOS/ 4.7K PU	Module Interrupt. This Pin is connected to IO Expander2 Port 3 for software access if required

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
29	Vcc Tx	VCCTX_3V3	O, 3.3V Power	3.3V Transmit Supply Voltage
30	Vcc1	VCC1_3V3	O, 3.3V Power	3.3V Supply Voltage
31	LPMode	IOEXP_P02_Q_LPMODE	O, 3.3V CMOS/ 4.7K PD	Module Low power mode. This Pin is connected to IO Expander2 Port 2 for software access if required
32	GND10	GND	Power	Ground.
33	Tx3p	GTYTXP2_230	O, DIFF	QSFP+ Transmit3 Data Positive.
34	Tx3n	GTYTXN2_230	O, DIFF	QSFP+ Transmit3 Data Negative.
35	GND11	GND	Power	Ground.
36	Tx1p	GTYTXP0_230	O, DIFF	QSFP+ Transmit1 Data Positive
37	Tx1n	GTYTXN0_230	O, DIFF	QSFP+ Transmit1 Data Negative.
38	GND12	GND	Power	Ground.

2.5.1.2 FireFly Connector

The Virtex UltraScale+ FPGA Carrier board supports one FireFly Connector through GTY transceiver of Virtex UltraScale+ FPGA which can support FireFly x4 devices. GTY transceiver of FPGA Bank227 Channel0 to Channel3 from Board-to-Board Connector3 is connected to FireFly data connector(J5). Also, I2C0 through I2C bus switch1 is connected to this connector for control and configuration. All other control signals of FireFly connector are connected from IO Expander. And FireFly module power is supplied from FireFly power connector (J3). This FireFly data with power connector (J5) is physically located at the top of the board as shown below.

Note: *Transceiver Lane3 is muxed with between LS1021A processor and Virtex UltraScale+ FPGA.*

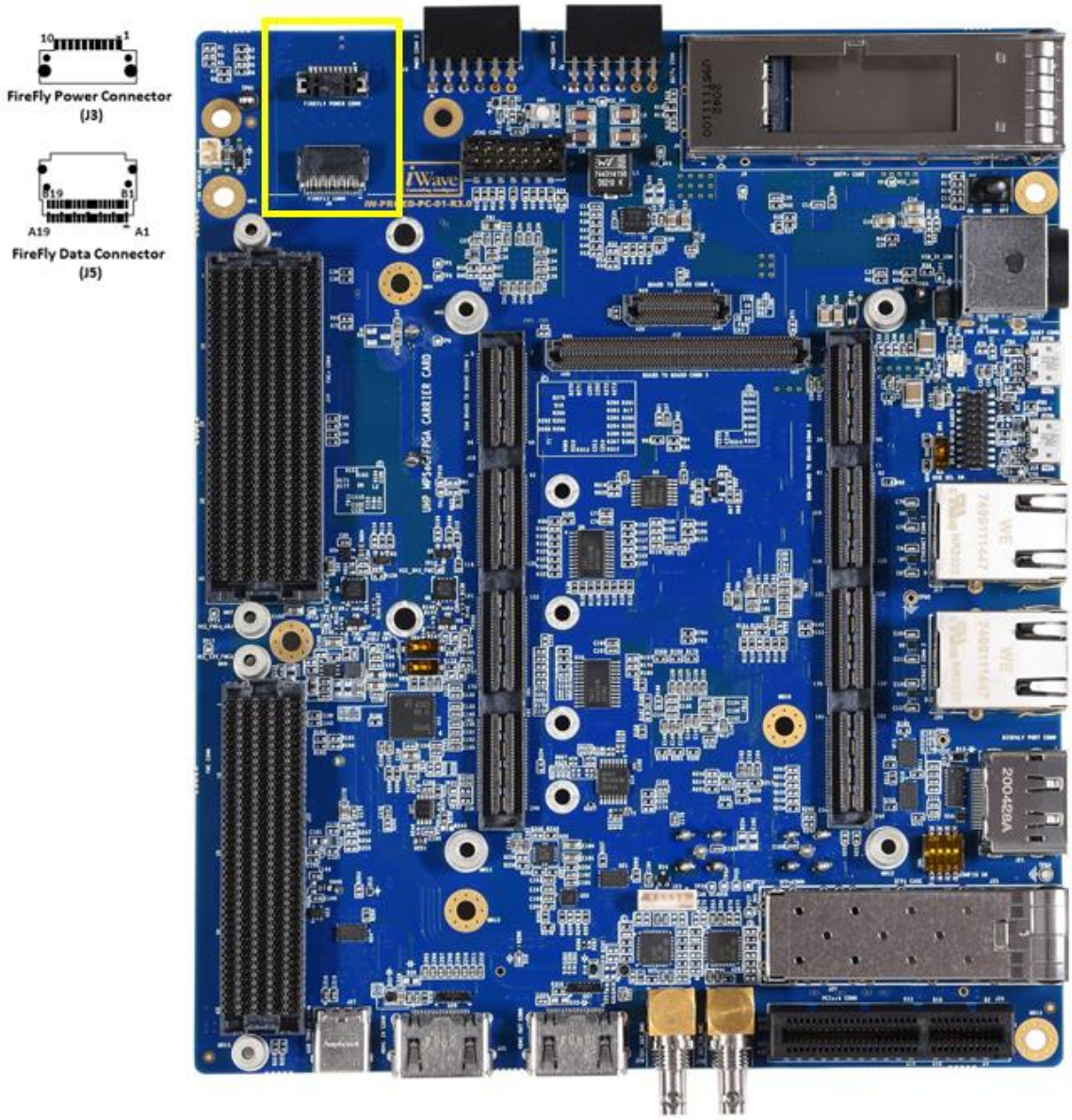


Figure 14: Fire-Fly connector

Table 7: FireFly Data Connector Pin Out

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
A1	GND_1	GND	Power	Ground.
A2	TX1N	GTYTXN0_227	O, DIFF	FireFly Transmit0 Data Negative
A3	TX1P	GTYTXP0_227	O, DIFF	FireFly Transmit0 Data Positive.
A4	GND_2	GND	Power	Ground.
A5	TX3N	GTYTXN1_227	O, DIFF	FireFly Transmit1 Data Negative
A6	TX3P	GTYTXP1_227	O, DIFF	FireFly Transmit1 Data Positive.
A7	GND_3	GND	Power	Ground.
A8	RSVD_1	NA	NA	NC
A9	RSVD_2	NA	NA	NC
A10	RSVD_3	NA	NA	NC
A11	RSVD_4	NA	NA	NC
A12	RSVD_5	NA	NA	NC
A13	GND_4	GND	Power	Ground.
A14	RX4P	GTYRXP3_227	I, DIFF	FireFly Receiver3 Data Positive
A15	RX4N	GTYRXN3_227	I, DIFF	FireFly Receiver3 Data Negative
A16	GND_5	GND	Power	Ground.
A17	RX2P	GTYRXP2_227	I, DIFF	FireFly Receiver2 Data Positive
A18	RX2N	GTYRXN2_227	I, DIFF	FireFly Receiver2 Data Negative
A19	GND_6	GND	Power	Ground.
B1	GND_7	GND	Power	Ground.
B2	TX2N	GTYTXN2_227	O, DIFF	FireFly Transmit2 Data Negative
B3	TX2P	GTYTXP2_227	O, DIFF	FireFly Transmit2 Data Positive.
B4	GND_8	GND	Power	Ground.
B5	TX4N	GTYTXN3_227	O, DIFF	FireFly Transmit3 Data Negative
B6	TX4P	GTYTXP3_227	O, DIFF	FireFly Transmit3 Data Positive.
B7	GND_9	GND	Power	Ground.
B8	RSVD_6	NA	NA	NC
B9	RSVD_7	NA	NA	NC
B10	RSVD_8	NA	NA	NC
B11	RSVD_9	NA	NA	NC
B12	RSVD_10	NA	NA	NC
B13	GND_10	GND	Power	Ground.
B14	RX3P	GTYRXP1_227	I, DIFF	FireFly Receiver1 Data Positive
B15	RX3N	GTYRXN1_227	I, DIFF	FireFly Receiver1 Data Negative
B16	GND_11	GND	Power	Ground.
B17	RX1P	GTYRXP0_227	I, DIFF	FireFly Receiver0 Data Positive
B18	RX1N	GTYRXN0_227	I, DIFF	FireFly Receiver0 Data Negative
B19	GND_12	GND	Power	Ground.

Table 8: FireFly Power Connector Pin Out

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
1	VCC_TX	VCCTX_F_3V3	O, 3.3V Power	3.3V Transmit Supply Voltage
2	GND_14	GND	Power	Ground
3	MODPRS	IOEXP_P10_F_MODPRS	I, 3.3V CMOS/ 4.7K PU	FireFly Module Present. This Pin is connected to IO Expander2 Port 10 for software access if required
4	MODSEL	IOEXP_P06_F_MODSEL	O, 3.3V CMOS/ 4.7K PU	FireFly Module Select. This Pin is connected to IO Expander2 Port 6 for software access if required
5	INTL	IOEXP_P07_F_INTL	I, 3.3V CMOS/ 4.7K PU	FireFly Module Interrupt. This Pin is connected to IO Expander2 Port 7 for software access if required
6	RESETL	IOEXP_P05_F_RESETL	O, 3.3V CMOS/ 4.7K PU	FireFly Module Reset. This Pin is connected to IO Expander2 Port 5 for software access if required
7	SDA	I2C0_SD1_SDA	IO, 3.3V CMOS	I2C1 Data. This Pin is connected from 6th pin of I2C Bus switch (U29).
8	SCL	I2C0_SD1_SCL	O, 3.3V CMOS	I2C1 Clock. This Pin is connected from 7th pin of I2C Bus switch (U29).
9	RSVD_14	VCC_F_1V8	O, 1.8V Power	1.8 V supply
10	VCC_RX	VCCRX_F_3V3	O, 3.3V Power	3.3V Receive Supply Voltage

2.5.1.3 SFP+ Connector

The Virtex UltraScale+ FPGA Carrier board supports one SFP+ Connector through GTY transceiver of Virtex UltraScale+ FPGA. Channel2 of Transceiver Bank125 from Board-to-Board Connector2 is connected to SFP+ connector. Also, I2C0 through I2C bus switch2 is connected to this connector for control and configuration. All other control signals of SFP+ connector is connected from IO Expander. This SFP+ connector with dust case (J25) is physically located at the top of the board as shown below.

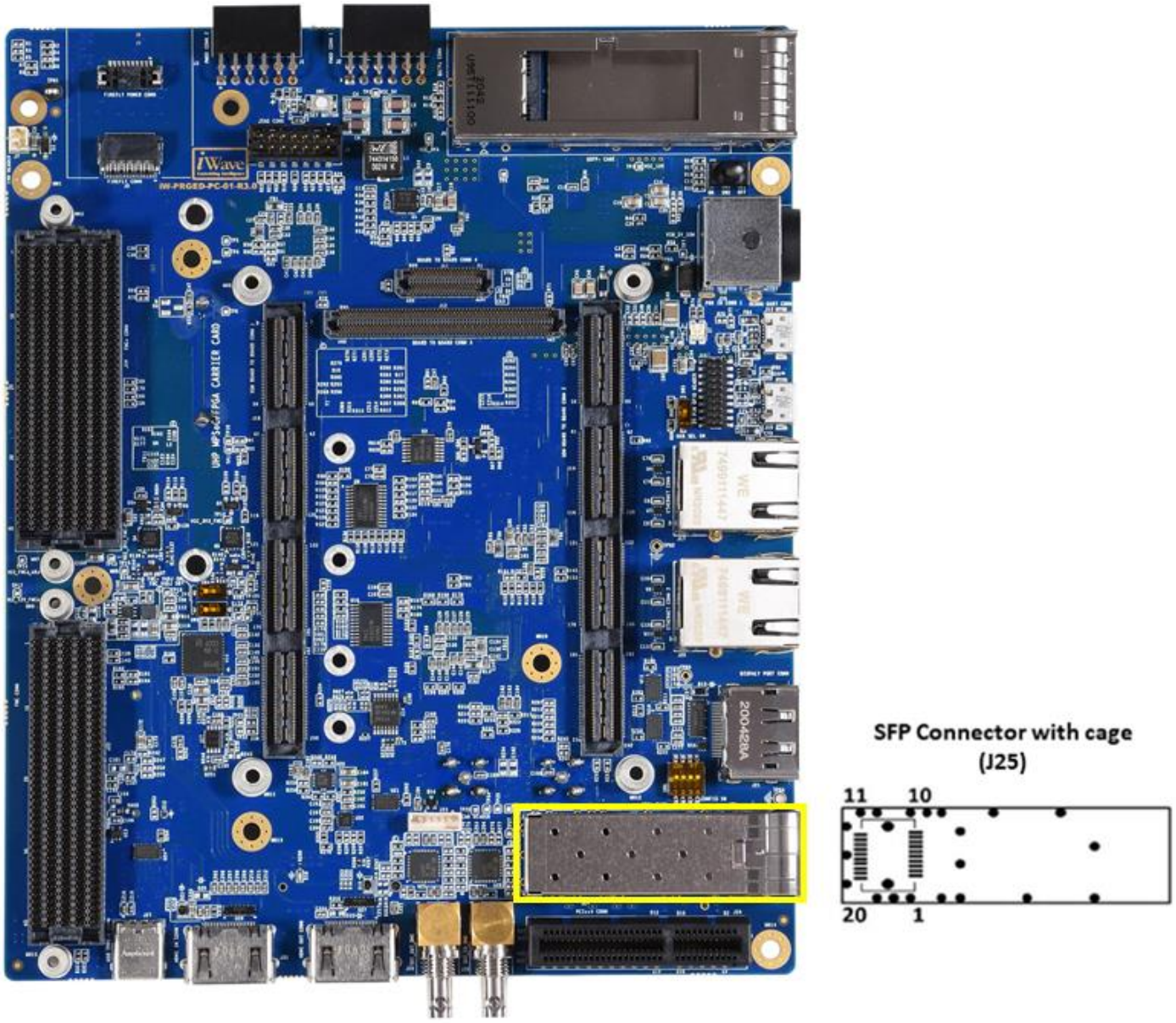


Figure 15: SFP+ Connector with Cage

Table 9: SFP+ Connector Pin Assignment+

Pin No	Pin Name	Signal Name	Signal Type/ Termination	Description
1	VEET1	GND	Power	Ground.
2	TFAULT	IOEXP_P00_SFP_TFAULT	I, LVTTL/ 4.7K PU	Module Transmitter Fault. This Pin is connected to IO Expander1 Port 0 for software access if required.
3	TDIS	IOEXP_P05_SFP_TDIS	O, LVTTL/ 4.7K PD	Transmitter Disable. This Pin is connected to IO Expander1 Port 5 for software control if required.
4	SDA	I2C0_SD2_SDA	IO, 3.3V CMOS	I2C Data. This Pin is connected from 9th pin of I2C Bus switch (U29).
5	SCL	I2C0_SD2_SCL	O, 3.3V CMOS	I2C Clock. This Pin is connected from 10th pin of I2C Bus switch (U29).
6	MOD_ABS	IOEXP_P02_SFP_MOD_ABS	I, 3.3V CMOS/ 4.7K PU	Module Definition. This Pin is connected to IO Expander1 Port 2 for software access if required.
7	RS0	IOEXP_P04_SFP_RS0	O, 3.3V CMOS/ 4.7K PU	Rate select 0. This Pin is connected to IO Expander1 Port 4 for software control if required.
8	RX_LOS	IOEXP_P01_SFP_RX_LOS	I, 3.3V CMOS/ 4.7K PU	Receiver loss of signal indication. This Pin is connected to IO Expander1 Port 1 for software access if required.
9	RS1	IOEXP_P03_SFP_RS1	O, 3.3V CMOS/ 4.7K PU	Rate select 1. This Pin is connected to IO Expander1 Port 3 for software control if required.
10	VEER1	GND	Power	Ground.
11	VEER2	GND	Power	Ground.
12	RD-	GTYRXN2_125	I, DIFF	SFP+ Receiver Data Negative
13	RD+	GTYRXP2_125	I, DIFF	SFP+ Receiver Data Positive
14	VEER3	GND	Power	Ground.
15	VCCR	VCC_3V3	O, 3.3V Power	3.3V Receiver Supply Voltage
16	VCCT	VCC_3V3	O, 3.3V Power	3.3V Transmitter Supply Voltage
17	VEET2	GND	Power	Ground.
18	TD+	GTYTXP2_125	O, DIFF	SFP+ Transmit Data Positive
19	TD-	GTYTXN2_125	O, DIFF	SFP+ Transmit Data Negative
20	VEET3	GND	Power	Ground.

2.5.1.4 SDI Video IN

The Virtex UltraScale+ FPGA Carrier board supports one 3G/12G SDI Video IN interface through HD Micro BNC connector (J29). The Video input signals from Micro BNC Connector is directly connected to Adaptive Cable Equalizer chip and then connected to FPGA Bank125 Channel3 GTY receiver of Virtex UltraScale+ FPGA through Board-to-Board connector2.

The Virtex UltraScale+ FPGA Carrier board supports Video Input Lock status LED (D17) for presence and absence of the Video Input signal on HD Micro BNC connector (J29). This LED will glow when the Video Input signal is detected on HD BNC connector (J29). Also, I2C0 is connected to Adaptive Cable Equalizer chip for control and configuration with I2C address 0x2D. SDI Video IN HD Micro BNC connector (J29) is physically located at the top of the board as shown below.

Note: By default, 12G Adaptive Cable Equalizer chip "LMH1297" is supported on the board. To support 3G Adaptive Cable Equalizer chip "LMH0397", contact iWave.

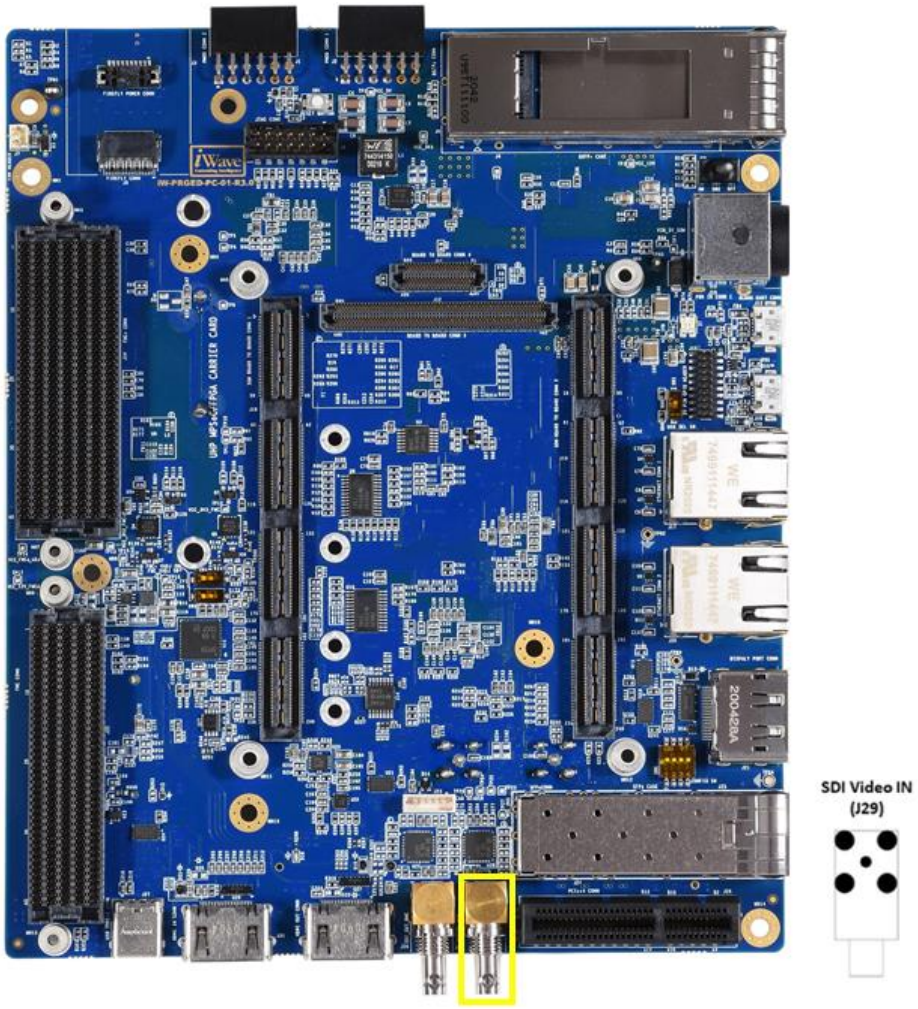


Figure 16: SDI Video IN HD Micro BNC Connector

2.5.1.5 SDI Video OUT

The Virtex UltraScale+ FPGA Carrier board supports one 3G/12G SDI Video OUT interface through HD Micro BNC connector (J28). Virtex UltraScale+ FPGA's Bank125 Channel3 GTY transmitter from Board-to-Board connector2 is directly connected to Cable Driver chip and then connected to HD Micro BNC Connector (J28) for Video out.

The Virtex UltraScale+ FPGA Carrier board supports Video Output Lock status LED (D16). This LED will glow when the video signal from FPGA's GTY transmitter is detected on Cable Driver chip. Also, I2C0 is connected to Cable Driver chip for control and configuration with I2C address 0x30. SDI Video OUT HD Micro BNC connector (J28) is physically located at the top of the board as shown below.

Note: By default, 12G Adaptive Cable Equalizer chip "LMH1297" is supported on the board. To support 3G Adaptive Cable Equalizer chip "LMH0397", contact iWave.

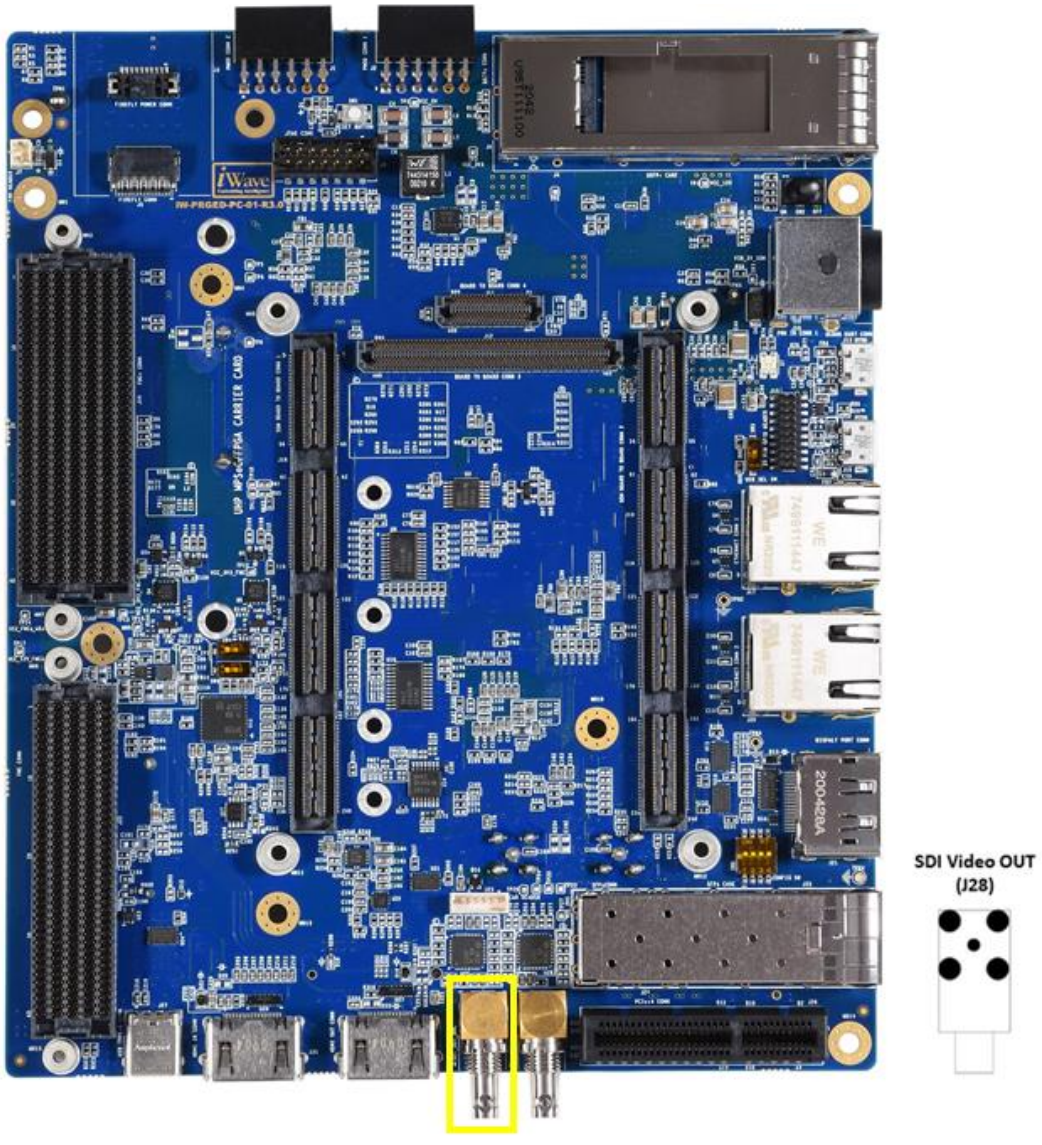


Figure 17: SDI Video OUT HD Micro BNC Connector

2.5.1.6 HDMI IN

The Virtex UltraScale+ FPGA Carrier board supports one HDMI IN interface through HDMI connector (J30). Virtex UltraScale+ FPGA's Bank124 Channel0 to Channel2 GTY receiver from Board-to-Board connector1 is directly connected from HDMI IN Connector (J30) for HDMI IN support. HDMI IN connector (J30) is physically located at the top of the board as shown below.

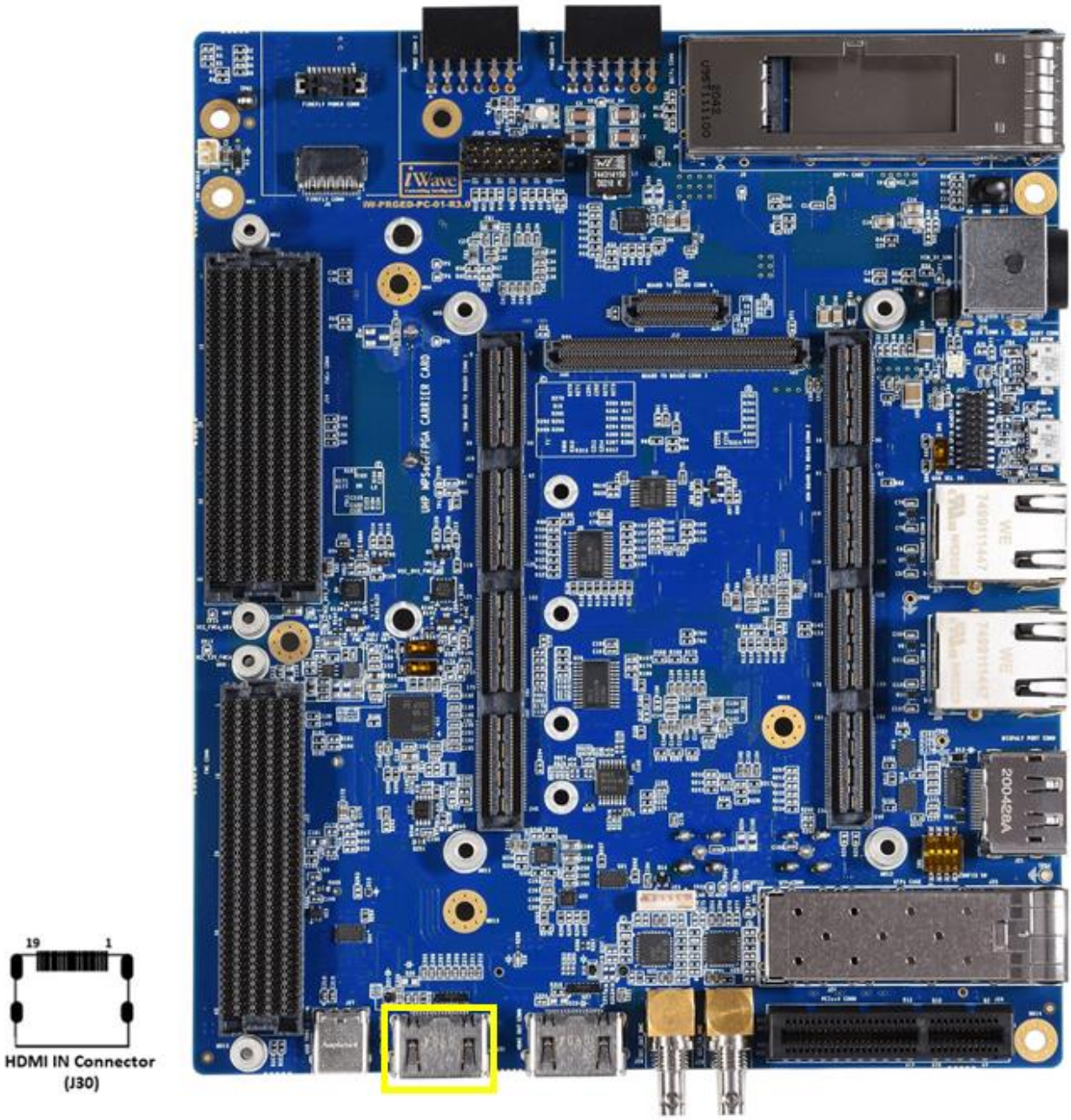


Figure 18: HDMI IN Connector

2.5.1.7 HDMI OUT

The Virtex UltraScale+ FPGA Carrier board supports one HDMI OUT interface through HDMI connector (J31). Virtex UltraScale+ FPGA's Bank124 Channel0 to Channel2 GTY transmitter from Board-to-Board connector1 is directly connected to HDMI Remitter chip (SN65DP159RGZR) and then connected to HDMI OUT Connector (J31) for HDMI Video out.

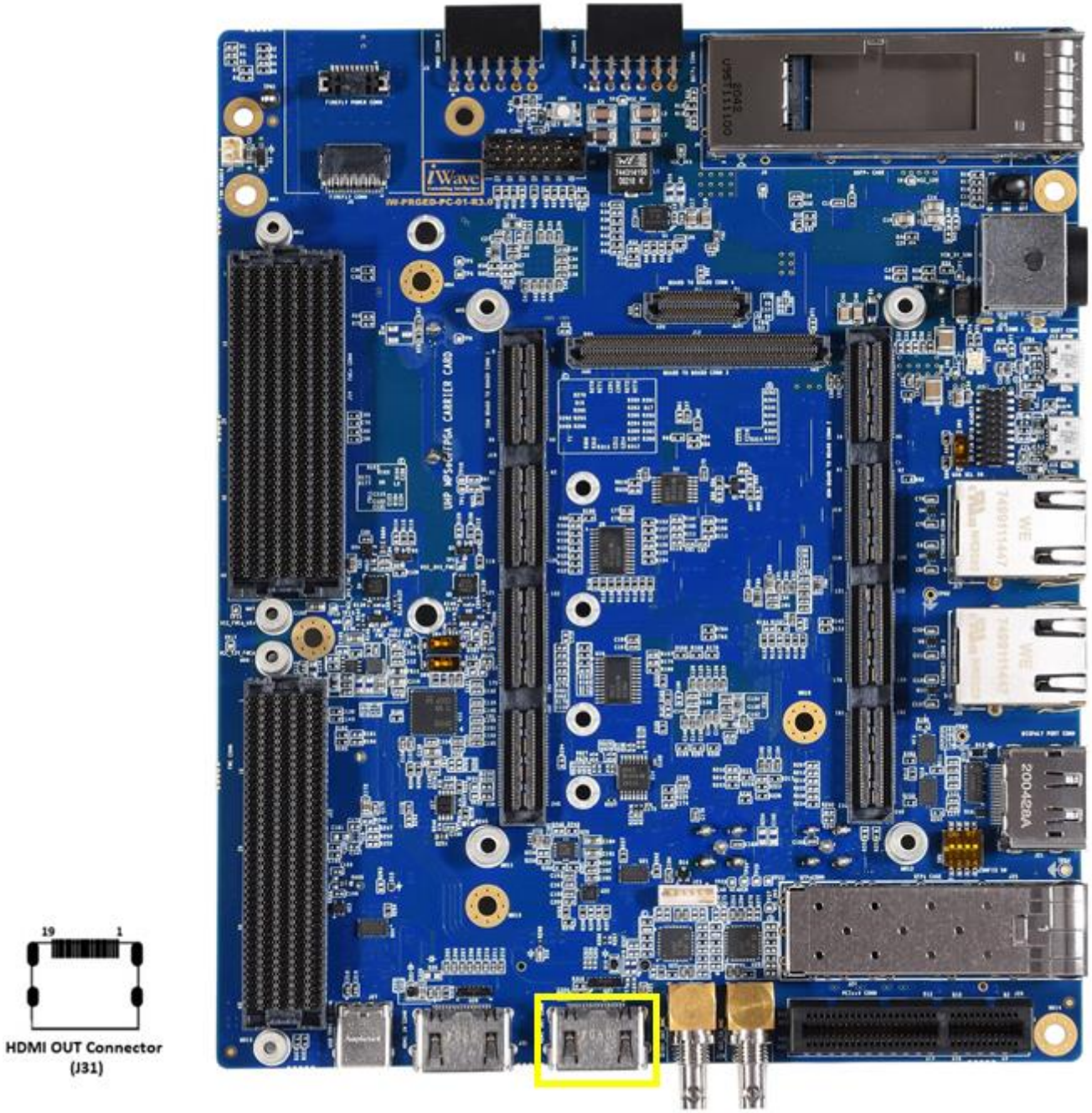


Figure 19: HDMI OUT Connector

2.5.1.8 SMA Connector

The Virtex UltraScale+ FPGA Carrier board supports two SMA Connectors through GTY transceiver of Virtex UltraScale+ FPGA. GTY transmitter of FPGA Bank124 Channel3-TXP from Board-to-Board Connector1 is connected to SMA Connector (J34) and Channel3-TXN from Board-to-Board Connector1 is connected to SMA Connector (J35). SMA connectors (J34 & J35) are physically located at the bottom of the board as shown below.

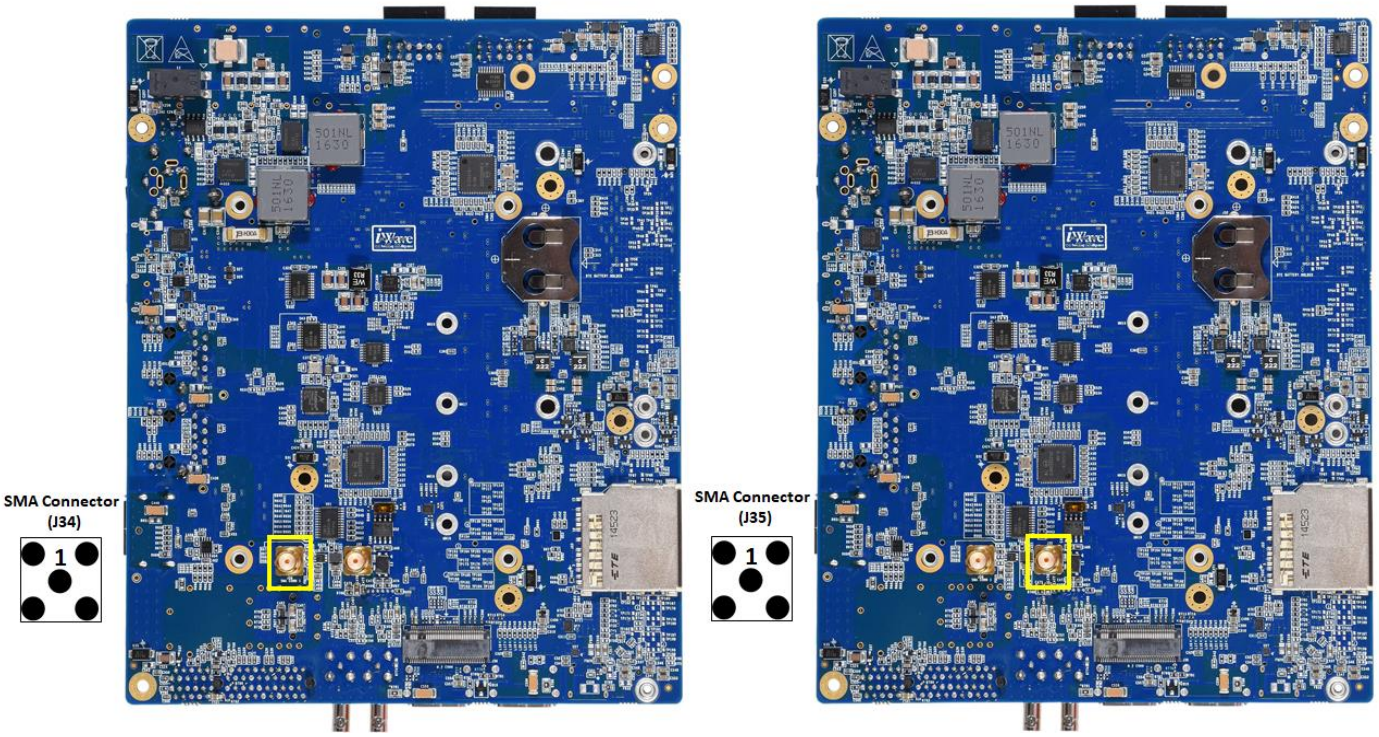


Figure 20: SMA Connectors

Table 10: SMA Connector Pin Assignment

B2B Pin No	Signal Name	Signal Type/ Termination	Description
223	GTYTXP3_124	O, DIFF	GTY Bank124 channel3 High speed differential transmitter positive.
225	GTYTXN3_124	O, DIFF	GTY Bank124 channel3 High speed differential transmitter negative.

2.5.2 FMC HPC Connector

The Virtex UltraScale+ FPGA Carrier board supports one 400Pin Standard FMC HPC connector to support standard ANSI/VITA 57.1 FMC modules.

The FMC HPC Connector (J22) supports the below mentioned interface from Virtex UltraScale+ FPGA.

- 10 GTY High Speed Transceivers
- 2 GTY Reference Clock
- Up to 15 LVDS IOs/31 Single ended (SE) IOs from HP Bank
- 2 Clock Input Capable LVDS/4 SE pins from HP Bank
- 2 Clock Output Capable LVDS/5 SE pins from HP Bank

This 400Pin FMC HPC connector (J22) is physically located at the top of the board as shown below.

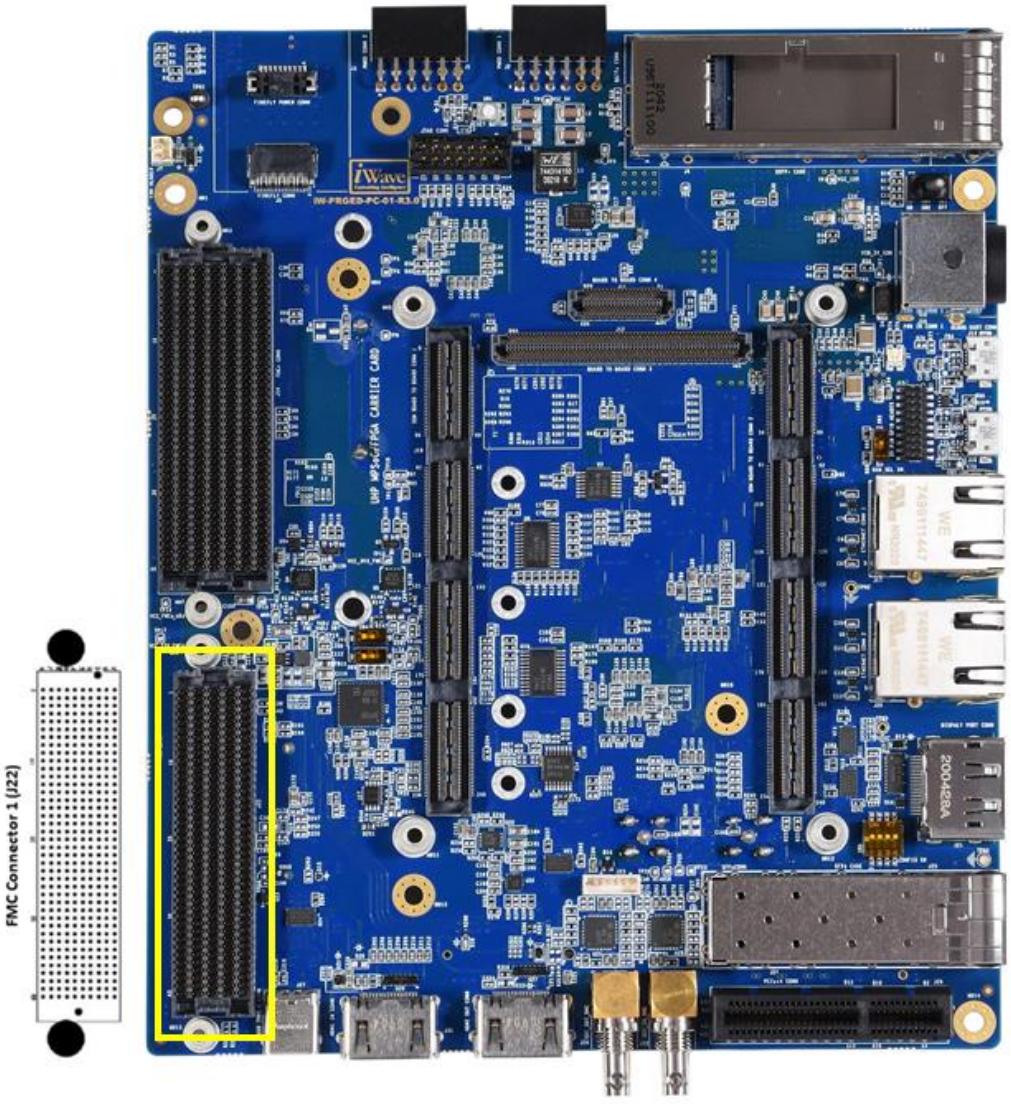


Figure 21: FMC Connector

This 400Pin FMC HPC connector (J22) pin mapping is shown below.

	K	J	H	G	F	E	D	C	B	A
1	NC	GND	NC	GND	PG_M2C	GND	PG_C2M	GND	CLK_DIR	GND
2	GND	NC	PRSNT_M2C_L	CLK1_M2C_P	GND	NC	GND	DP0_C2M_P	GND	DP1_M2C_P
3	GND	NC	GND	CLK1_M2C_N	GND	NC	GND	DP0_C2M_N	GND	DP1_M2C_N
4	NC	GND	NC	GND	NC	GND	GBTCLK0_M2C_P	GND	DP9_M2C_P	GND
5	NC	GND	NC	GND	NC	GND	GBTCLK0_M2C_N	GND	DP9_M2C_N	GND
6	GND	NC	GND	LA00_P_CC	GND	NC	GND	DP0_M2C_P	GND	DP2_M2C_P
7	NC	NC	LA02_P	LA00_N_CC	NC	NC	GND	DP0_M2C_N	GND	DP2_M2C_N
8	NC	GND	LA02_N	GND	NC	GND	LA01_P_CC	GND	DP8_M2C_P	GND
9	GND	NC	GND	LA03_P	GND	NC	LA01_N_CC	GND	DP8_M2C_N	GND
10	NC	NC	LA04_P	LA03_N	NC	NC	GND	LA06_P	GND	DP3_M2C_P
11	NC	GND	LA04_N	GND	NC	GND	LA05_P	LA06_N	GND	DP3_M2C_N
12	GND	NC	GND	LA08_P	GND	NC	LA05_N	GND	DP7_M2C_P	GND
13	NC	NC	LA07_P	LA08_N	NC	NC	GND	GND	DP7_M2C_N	GND
14	NC	GND	LA07_N	GND	NC	GND	LA09_P	LA10_P	GND	DP4_M2C_P
15	GND	NC	GND	LA12_P	GND	NC	LA09_N	LA10_N	GND	DP4_M2C_N
16	NC	NC	LA11_P	LA12_N	NC	NC	GND	GND	DP6_M2C_P	GND
17	NC	GND	LA11_N	GND	NC	GND	LA13_P	GND	DP6_M2C_N	GND
18	GND	NC	GND	NC	GND	NC	LA13_N	NC	GND	DP5_M2C_P
19	NC	NC	NC	LA16_N	NC	NC	GND	NC	GND	DP5_M2C_N
20	NC	GND	NC	GND	NC	GND	NC	GND	GBTCLK1_M2C_P	GND
21	GND	NC	GND	NC	GND	NC	NC	GND	GBTCLK1_M2C_N	GND
22	NC	NC	NC	NC	NC	NC	GND	NC	GND	DP1_C2M_P
23	NC	GND	NC	GND	NC	GND	NC	NC	GND	DP1_C2M_N
24	GND	NC	GND	NC	GND	NC	NC	GND	DP9_C2M_P	GND
25	NC	NC	NC	NC	NC	NC	GND	GND	DP9_C2M_N	GND
26	NC	GND	NC	GND	NC	GND	NC	NC	GND	DP2_C2M_P
27	GND	NC	GND	NC	GND	NC	NC	NC	GND	DP2_C2M_N
28	NC	NC	NC	NC	NC	NC	GND	GND	DP8_C2M_P	GND
29	NC	GND	NC	GND	NC	GND	TCK	GND	DP8_C2M_N	GND
30	GND	NC	GND	NC	GND	NC	TDI	SCL	GND	DP3_C2M_P
31	NC	NC	NC	NC	NC	NC	TDO	SDA	GND	DP3_C2M_N
32	NC	GND	NC	GND	NC	GND	3P3VAUX	GND	DP7_C2M_P	GND
33	GND	NC	GND	NC	GND	NC	TMS	GND	DP7_C2M_N	GND
34	NC	NC	NC	NC	NC	NC	TRST_L	GA0	GND	DP4_C2M_P
35	NC	GND	NC	GND	NC	GND	GA1	12P0V	GND	DP4_C2M_N
36	GND	NC	GND	NC	GND	NC	3P3V	GND	DP6_C2M_P	GND
37	NC	NC	NC	NC	NC	NC	GND	12P0V	DP6_C2M_N	GND
38	NC	GND	NC	GND	NC	GND	3P3V	GND	GND	DP5_C2M_P
39	GND	NC	GND	VADJ	GND	VADJ	GND	3P3V	GND	DP5_C2M_N
40	NC	GND	VADJ	GND	VADJ	GND	3P3V	GND	NC	GND

Figure 22: FMC HPC Connector Pin Out

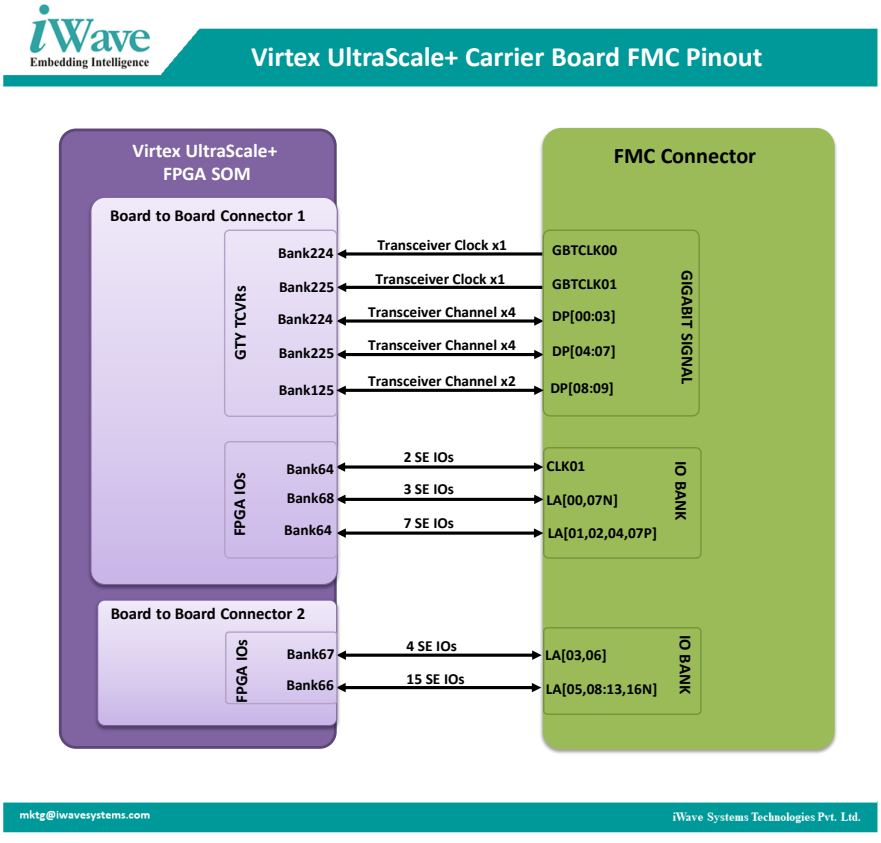


Figure 23: FMC Board to Board Connector Block Diagram

Number of Pins - 400

Connector Part Number - ASP-134486-01

Mating Connector - ASP-134488-01 from Samtec

Staking Height - 10mm

Note:

** By default, FMC connector power is disabled as per Vita Specification. While booting the FMC Module EEPROM is read and enabling the FMC connector power.*

** If FMC modules EEPROM is not programmed, then FMC connector power is not enabled.*

Table 11: FMC HPC Connector Pin Assignment

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
1	A1	GND	NA	NA	GND	NA	NA	Power	Ground.
2	A2	DP1_M2C_P	Board to Board Connector 1	17	GTYRXP1_224	224	BA2	I, DIFF	GTY Bank224 channel1 High speed differential receiver positive.
3	A3	DP1_M2C_N	Board to Board Connector 1	15	GTYRXN1_224	224	BA1	I, DIFF	GTY Bank224 channel1 High speed differential receiver Negative.
4	A4	GND	NA	NA	GND	NA	NA	Power	Ground.
5	A5	GND	NA	NA	GND	NA	NA	Power	Ground.
6	A6	DP2_M2C_P	Board to Board Connector 1	57	GTYRXP2_224	224	AW4	I, DIFF	GTY Bank224 channel2 High speed differential receiver positive.
7	A7	DP2_M2C_N	Board to Board Connector 1	55	GTYRXN2_224	224	AW3	I, DIFF	GTY Bank224 channel2 High speed differential receiver Negative.
8	A8	GND	NA	NA	GND	NA	NA	Power	Ground.
9	A9	GND	NA	NA	GND	NA	NA	Power	Ground.
10	A10	DP3_M2C_P	Board to Board Connector 1	51	GTYRXP3_224	224	AV2	I, DIFF	GTY Bank224 channel3 High speed differential receiver positive.
11	A11	DP3_M2C_N	Board to Board Connector 1	49	GTYRXN3_224	224	AV1	I, DIFF	GTY Bank224 channel3 High speed differential receiver Negative.
12	A12	GND	NA	NA	GND	NA	NA	Power	Ground.
13	A13	GND	NA	NA	GND	NA	NA	Power	Ground.
14	A14	DP4_M2C_P	Board to Board Connector 1	117	GTYRXP0_225	225	AU4	I, DIFF	GTY Bank225 channel0 High speed differential receiver positive.
15	A15	DP4_M2C_N	Board to Board Connector 1	115	GTYRXN0_225	225	AU3	I, DIFF	GTY Bank225 channel0 High speed differential receiver Negative.
16	A16	GND	NA	NA	GND	NA	NA	Power	Ground.
17	A17	GND	NA	NA	GND	NA	NA	Power	Ground.
18	A18	DP5_M2C_P	Board to Board Connector 1	111	GTYRXP1_225	225	AT2	I, DIFF	GTY Bank225 channel1 High speed differential receiver positive.
19	A19	DP5_M2C_N	Board to Board Connector 1	109	GTYRXN1_225	225	AT1	I, DIFF	GTY Bank225 channel1 High speed differential receiver Negative.
20	A20	GND	NA	NA	GND	NA	NA	Power	Ground.
21	A21	GND	NA	NA	GND	NA	NA	Power	Ground.
22	A22	DP1_C2M_P	Board to Board Connector 1	9	GTYTXP1_224	224	BD5	O, DIFF	GTY Bank224 channel1 High speed differential transmitter positive.
23	A23	DP1_C2M_N	Board to Board Connector 1	11	GTYTXN1_224	224	BD4	O, DIFF	GTY Bank224 channel1 High speed differential transmitter Negative.
24	A24	GND	NA	NA	GND	NA	NA	Power	Ground.
25	A25	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
26	A26	DP2_C2M_P	Board to Board Connector 1	37	GTYTXP2_224	224	BB5	O, DIFF	GTY Bank224 channel2 High speed differential transmitter positive.
27	A27	DP2_C2M_N	Board to Board Connector 1	39	GTYTXN2_224	224	BB4	O, DIFF	GTY Bank224 channel2 High speed differential transmitter Negative.
28	A28	GND	NA	NA	GND	NA	NA	Power	Ground.
29	A29	GND	NA	NA	GND	NA	NA	Power	Ground.
30	A30	DP3_C2M_P	Board to Board Connector 1	43	GTYTXP3_224	224	AV7	O, DIFF	GTY Bank224 channel3 High speed differential transmitter positive.
31	A31	DP3_C2M_N	Board to Board Connector 1	45	GTYTXN3_224	224	AV6	O, DIFF	GTY Bank224 channel3 High speed differential transmitter Negative.
32	A32	GND	NA	NA	GND	NA	NA	Power	Ground.
33	A33	GND	NA	NA	GND	NA	NA	Power	Ground.
34	A34	DP4_C2M_P	Board to Board Connector 1	97	GTYTXP0_225	225	AU9	O, DIFF	GTY Bank225 channel0 High speed differential transmitter positive.
35	A35	DP4_C2M_N	Board to Board Connector 1	99	GTYTXN0_225	225	AU8	O, DIFF	GTY Bank225 channel0 High speed differential transmitter Negative.
36	A36	GND	NA	NA	GND	NA	NA	Power	Ground.
37	A37	GND	NA	NA	GND	NA	NA	Power	Ground.
38	A38	DP5_C2M_P	Board to Board Connector 1	103	GTYTXP1_225	225	AT7	O, DIFF	GTY Bank225 channel1 High speed differential transmitter positive.
39	A39	DP5_C2M_N	Board to Board Connector 1	105	GTYTXN1_225	225	AT6	O, DIFF	GTY Bank225 channel1 High speed differential transmitter Negative.
40	A40	GND	NA	NA	GND	NA	NA	Power	Ground.
41	B1	CLK_DIR	NA	NA	NA	NA	NA	O, 3.3V	CLK-DIR. This Pin is connected to 15th pin of IO Expander (U10).
42	B2	GND	NA	NA	GND	NA	NA	Power	Ground.
43	B3	GND	NA	NA	GND	NA	NA	Power	Ground.
44	B4	DP9_M2C_P	Board to Board Connector 2	187	GTYRXP0_125	125	AU45	I, DIFF	GTY Bank125 channel0 High speed differential receiver positive.
45	B5	DP9_M2C_N	Board to Board Connector 2	189	GTYRXN0_125	125	AU46	I, DIFF	GTY Bank125 channel0 High speed differential receiver Negative.
46	B6	GND	NA	NA	GND	NA	NA	Power	Ground.
47	B7	GND	NA	NA	GND	NA	NA	Power	Ground.
48	B8	DP8_M2C_P	Board to Board Connector 2	199	GTYRXP1_125	125	AT43	I, DIFF	GTY Bank125 channel1 High speed differential receiver positive.
49	B9	DP8_M2C_N	Board to Board Connector 2	201	GTYRXN1_125	125	AT44	I, DIFF	GTY Bank125 channel1 High speed differential receiver Negative.
50	B10	GND	NA	NA	GND	NA	NA	Power	Ground.
51	B11	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
52	B12	DP7_M2C_P	Board to Board Connector 1	137	GTYRXP3_225	225	AP2	I, DIFF	GTY Bank225 channel3 High speed differential receiver positive.
53	B13	DP7_M2C_N	Board to Board Connector 1	135	GTYRXN3_225	225	AP1	I, DIFF	GTY Bank225 channel3 High speed differential receiver Negative.
54	B14	GND	NA	NA	GND	NA	NA	Power	Ground.
55	B15	GND	NA	NA	GND	NA	NA	Power	Ground.
56	B16	DP6_M2C_P	Board to Board Connector 1	143	GTYRXP2_225	225	AR4	I, DIFF	GTY Bank225 channel2 High speed differential receiver positive.
57	B17	DP6_M2C_N	Board to Board Connector 1	141	GTYRXN2_225	225	AR3	I, DIFF	GTY Bank225 channel2 High speed differential receiver Negative.
58	B18	GND	NA	NA	GND	NA	NA	Power	Ground.
59	B19	GND	NA	NA	GND	NA	NA	Power	Ground.
60	B20	GBTCLK1_M2C_P	Board to Board Connector 1	98	GTREFCLK0P_225	225	AT11	I, DIFF	GTY Bank225 differential reference clock0 positive.
61	B21	GBTCLK1_M2C_N	Board to Board Connector 1	100	GTREFCLK0N_225	225	AT10	I, DIFF	GTY Bank225 differential reference clock0 negative.
62	B22	GND	NA	NA	GND	NA	NA	Power	Ground.
63	B23	GND	NA	NA	GND	NA	NA	Power	Ground.
64	B24	DP9_C2M_P	Board to Board Connector 2	193	GTYTXP0_125	125	AU40	O, DIFF	GTY Bank125 channel0 High speed differential transmitter positive.
65	B25	DP9_C2M_N	Board to Board Connector 2	195	GTYTXN0_125	125	AU41	O, DIFF	GTY Bank125 channel0 High speed differential transmitter negative.
66	B26	GND	NA	NA	GND	NA	NA	Power	Ground.
67	B27	GND	NA	NA	GND	NA	NA	Power	Ground.
68	B28	DP8_C2M_P	Board to Board Connector 2	205	GTYTXP1_125	125	AT38	O, DIFF	GTY Bank125 channel1 High speed differential transmitter positive.
69	B29	DP8_C2M_N	Board to Board Connector 2	207	GTYTXN1_125	125	AT39	O, DIFF	GTY Bank125 channel1 High speed differential transmitter negative.
70	B30	GND	NA	NA	GND	NA	NA	Power	Ground.
71	B31	GND	NA	NA	GND	NA	NA	Power	Ground.
72	B32	DP7_C2M_P	Board to Board Connector 1	129	GTYTXP3_225	225	AP7	O, DIFF	GTY Bank225 channel3 High speed differential transmitter positive.
73	B33	DP7_C2M_N	Board to Board Connector 1	131	GTYTXN3_225	225	AP6	O, DIFF	GTY Bank225 channel3 High speed differential transmitter Negative.
74	B34	GND	NA	NA	GND	NA	NA	Power	Ground.
75	B35	GND	NA	NA	GND	NA	NA	Power	Ground.
76	B36	DP6_C2M_P	Board to Board Connector 1	123	GTYTXP2_225	225	AR9	O, DIFF	GTY Bank225 channel2 High speed differential transmitter positive.
77	B37	DP6_C2M_N	Board to Board Connector 1	125	GTYTXN2_225	225	AR8	O, DIFF	GTY Bank225 channel2 High speed differential transmitter Negative.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
78	**B38**	GND	NA	NA	GND	NA	NA	Power	Ground.
79	**B39**	GND	NA	NA	GND	NA	NA	Power	Ground.
80	**B40**	RES0	NA	NA	NA	NA	NA	NA	NC.
81	**C1**	GND	NA	NA	GND	NA	NA	Power	Ground.
82	**C2**	DP0_C2M_P	Board to Board Connector 1	3	GTYTXP0_224	224	BF5	O, DIFF	GTY Bank224 channel0 High speed differential transmitter positive.
83	**C3**	DP0_C2M_N	Board to Board Connector 1	5	GTYTXN0_224	224	BF4	O, DIFF	GTY Bank224 channel0 High speed differential transmitter Negative.
84	**C4**	GND	NA	NA	GND	NA	NA	Power	Ground.
85	**C5**	GND	NA	NA	GND	NA	NA	Power	Ground.
86	**C6**	DP0_M2C_P	Board to Board Connector 1	23	GTYRXP0_224	224	BC2	I, DIFF	GTY Bank224 channel0 High speed differential receiver positive.
87	**C7**	DP0_M2C_N	Board to Board Connector 1	21	GTYRXN0_224	224	BC1	I, DIFF	GTY Bank224 channel0 High speed differential receiver Negative.
88	**C8**	GND	NA	NA	GND	NA	NA	Power	Ground.
89	**C9**	GND	NA	NA	GND	NA	NA	Power	Ground.
90	**C10**	LA06_P	Board to Board Connector 2	122	PL_AN18_LVDS66_L19P_DBC	66	AN18	IO, 1.8V	PL Bank66 IO19 differential positive.
91	**C11**	LA06_N	Board to Board Connector 2	124	PL_AN17_LVDS66_L19N_DBC	66	AN17	IO, 1.8V	PL Bank66 IO19 differential negative
92	**C12**	GND	NA	NA	GND	NA	NA	Power	Ground.
93	**C13**	GND	NA	NA	GND	NA	NA	Power	Ground.
94	**C14**	LA10_P	Board to Board Connector 2	115	PL_AY13_LVDS67_L12P_GC	67	AY13	IO, 1.8V	PL Bank67 IO12 differential positive.
95	**C15**	LA10_N	Board to Board Connector 2	117	PL_BA13_LVDS67_L12N_GC	67	BA13	IO, 1.8V	PL Bank67 IO12 differential negative.
96	**C16**	GND	NA	NA	GND	NA	NA	Power	Ground.
97	**C17**	GND	NA	NA	GND	NA	NA	Power	Ground.
98	**C18**	LA14_P	NA	NA	NA	NA	NA	NA	NC.
99	**C19**	LA14_N	NA	NA	NA	NA	NA	NA	NC.
100	**C20**	GND	NA	NA	GND	NA	NA	Power	Ground.
101	**C21**	GND	NA	NA	GND	NA	NA	Power	Ground.
102	**C22**	LA18_P_CC	NA	NA	NA	NA	NA	NA	NC.
103	**C23**	LA18_N_CC	NA	NA	NA	NA	NA	NA	NC.
104	**C24**	GND	NA	NA	GND	NA	NA	Power	Ground.
105	**C25**	GND	NA	NA	GND	NA	NA	Power	Ground.
106	**C26**	LA27_P	NA	NA	NA	NA	NA	NA	NC.
107	**C27**	LA27_N	NA	NA	NA	NA	NA	NA	NC.
108	**C28**	GND	NA	NA	GND	NA	NA	Power	Ground.
109	**C29**	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
110	C30	SCL	NA	NA	NA	NA	NA	O, 3.3V LVCMOS	FMC+ I2C Clock Signal. This Pin is connected from 12th pin of I2C Bus switch (U29).
111	C31	SDA	NA	NA	NA	NA	NA	IO, 3.3V LVCMOS	FMC+ I2C Data Signal. This Pin is connected from 11th pin of I2C Bus switch (U29).
112	C32	GND	NA	NA	GND	NA	NA	Power	Ground.
113	C33	GND	NA	NA	GND	NA	NA	Power	Ground.
114	C34	GA0	NA	NA	NA	NA	NA	1K, PU	Geographical address 0
115	C35	12P0V	NA	NA	VCC_12V_FMC	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
116	C36	GND	NA	NA	GND	NA	NA	Power	Ground.
117	C37	12P0V	NA	NA	VCC_12V_FMC	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
118	C38	GND	NA	NA	GND	NA	NA	Power	Ground.
119	C39	3P3V	NA	NA	VCC_3V3_FMC	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
120	C40	GND	NA	NA	GND	NA	NA	Power	Ground.
121	D1	PG_C2M	NA	NA	NA	NA	NA	O, 3.3V	Power Good Signal from Carrier to FMC Module. This Pin is connected to 17th pin of IO Expander (U10).
122	D2	GND	NA	NA	GND	NA	NA	Power	Ground.
123	D3	GND	NA	NA	GND	NA	NA	Power	Ground.
124	D4	GBTCLK0_M2C_P	Board to Board Connector 1	4	GTREFCLK0P_224	224	AW9	I, DIFF	GTY Bank224 differential reference clock0 positive.
125	D5	GBTCLK0_M2C_N	Board to Board Connector 1	6	GTREFCLK0N_224	224	AW8	I, DIFF	GTY Bank224 differential reference clock0 Negative.
126	D6	GND	NA	NA	GND	NA	NA	Power	Ground.
127	D7	GND	NA	NA	GND	NA	NA	Power	Ground.
128	D8	LA01_P_CC	Board to Board Connector 1	87	PL_AT24_LVDS64_L18P	64	AT24	IO, 1.8V	PL Bank64 IO18 differential positive.
129	D9	LA01_N_CC	Board to Board Connector 1	89	PL_AU24_LVDS64_L18N	64	AU24	IO, 1.8V	PL Bank64 IO18 differential negative.
130	D10	GND	NA	NA	GND	NA	NA	Power	Ground.
131	D11	LA05_P	Board to Board Connector 2	123	PL_AY16_LVDS67_L9P	67	AY16	IO, 1.8V	PL Bank67 IO9 differential positive.
132	D12	LA05_N	Board to Board Connector 2	121	PL_AY15_LVDS67_L9N	67	AY15	IO, 1.8V	PL Bank67 IO9differential negative
133	D13	GND	NA	NA	GND	NA	NA	Power	Ground.
134	D14	LA09_P	Board to Board Connector 2	116	PL_BA15_LVDS67_L11P_GC	67	BA15	IO, 1.8V	PL Bank67 IO11 differential positive.
135	D15	LA09_N	Board to Board Connector 2	118	PL_BA14_LVDS67_L11N_GC	67	BA14	IO, 1.8V	PL Bank67 IO11 differential negative.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
136	**D16**	GND	NA	NA	GND	NA	NA	Power	Ground.
137	**D17**	LA13_P	Board to Board Connector 2	103	PL_AP15_LVDS67_L20P	67	AP15	IO, 1.8V	PL Bank67 IO20 differential positive.
138	**D18**	LA13_N	Board to Board Connector 2	105	PL_AP14_LVDS67_L20N	67	AP14	IO, 1.8V	PL Bank67 IO20 differential negative.
139	**D19**	GND	NA	NA	GND	NA	NA	Power	Ground.
140	**D20**	LA17_P_CC	NA	NA	NA	NA	NA	NA	NC.
141	**D21**	LA17_N_CC	NA	NA	NA	NA	NA	NA	NC.
142	**D22**	GND	NA	NA	GND	NA	NA	Power	Ground.
143	**D23**	LA23_P	NA	NA	NA	NA	NA	NA	NC.
144	**D24**	LA23_N	NA	NA	NA	NA	NA	NA	NC.
145	**D25**	GND	NA	NA	GND	NA	NA	Power	Ground.
146	**D26**	LA26_P	NA	NA	NA	NA	NA	NA	NC.
147	**D27**	LA26_N	NA	NA	NA	NA	NA	NA	NC.
148	**D28**	GND	NA	NA	GND	NA	NA	Power	Ground.
149	**D29**	TCK	Board to Board Connector 2	31	JTAG_TCK	0	AE13	I, 3.3V CMOS/ 49.9K PU	JTAG Test Clock This Pin is connected to 31st pin of Board-to-Board Connector2 (J19).
150	**D30**	TDI	NA	NA	NA	NA	NA	O, 3.3V CMOS	NC. This pin is connected from D31st pin of FMC+ Connector(J14)
151	**D31**	TDO	NA	NA	FMC2_JTAG_TDO	NA	NA	O, 3.3V CMOS	NC
152	**D32**	3P3VAUX	NA	NA	VCC_3V3	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
153	**D33**	TMS	Board to Board Connector 2	29	JTAG_TMS	0	AG15	I, 3.3V CMOS/ 49.9K PU	JTAG Test Mode Select This Pin is connected to 29th pin of Board-to-Board Connector2 (J19).
154	**D34**	TRST_L	Board to Board Connector 2	25	NC	NC	NC	NA	NC. This Pin is connected to 25th pin of Board-to-Board Connector2 (J19).
155	**D35**	GA1	NA	NA	NA	NA	NA	1K, PD	Geographical address 1
156	**D36**	3P3V	NA	NA	VCC_3V3_FMC	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
157	**D37**	GND	NA	NA	GND	NA	NA	Power	Ground.
158	**D38**	3P3V	NA	NA	VCC_3V3_FMC	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
159	**D39**	GND	NA	NA	GND	NA	NA	Power	Ground.
160	**D40**	3P3V	NA	NA	VCC_3V3_FMC	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
161	**E1**	GND	NA	NA	GND	NA	NA	Power	Ground.
162	**E2**	HA01_P_CC	NA	NA	NA	NA	NA	NA	NC.
163	**E3**	HA01_N_CC	NA	NA	NA	NA	NA	NA	NC.
164	**E4**	GND	NA	NA	GND	NA	NA	Power	Ground.
165	**E5**	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
166	E6	HA05_P	NA	NA	NA	NA	NA	NA	NC.
167	E7	HA05_N	NA	NA	NA	NA	NA	NA	NC.
168	E8	GND	NA	NA	GND	NA	NA	Power	Ground.
169	E9	HA09_P	NA	NA	NA	NA	NA	NA	NC.
170	E10	HA09_N	NA	NA	NA	NA	NA	NA	NC.
171	E11	GND	NA	NA	GND	NA	NA	Power	Ground.
172	E12	HA13_P	NA	NA	NA	NA	NA	NA	NC.
173	E13	HA13_N	NA	NA	NA	NA	NA	NA	NC.
174	E14	GND	NA	NA	GND	NA	NA	Power	Ground.
175	E15	HA16_P	NA	NA	NA	NA	NA	NA	NC.
176	E16	HA16_N	NA	NA	NA	NA	NA	NA	NC.
177	E17	GND	NA	NA	GND	NA	NA	Power	Ground.
178	E18	HA20_P	NA	NA	NA	NA	NA	NA	NC.
179	E19	HA20_N	NA	NA	NA	NA	NA	NA	NC.
180	E20	GND	NA	NA	GND	NA	NA	Power	Ground.
181	E21	HB03_P	NA	NA	NA	NA	NA	NA	NC.
182	E22	HB03_N	NA	NA	NA	NA	NA	NA	NC.
183	E23	GND	NA	NA	GND	NA	NA	Power	Ground.
184	E24	HB05_P	NA	NA	NA	NA	NA	NA	NC.
185	E25	HB05_N	NA	NA	NA	NA	NA	NA	NC.
186	E26	GND	NA	NA	GND	NA	NA	Power	Ground.
187	E27	HB09_P	NA	NA	NA	NA	NA	NA	NC.
188	E28	HB09_N	NA	NA	NA	NA	NA	NA	NC.
189	E29	GND	NA	NA	GND	NA	NA	Power	Ground.
190	E30	HB13_P	NA	NA	NA	NA	NA	NA	NC.
191	E31	HB13_N	NA	NA	NA	NA	NA	NA	NC.
192	E32	GND	NA	NA	GND	NA	NA	Power	Ground.
193	E33	HB19_P	NA	NA	NA	NA	NA	NA	NC.
194	E34	HB19_N	NA	NA	NA	NA	NA	NA	NC.
195	E35	GND	NA	NA	GND	NA	NA	Power	Ground.
196	E36	HB21_P	NA	NA	NA	NA	NA	NA	NC.
197	E37	HB21_N	NA	NA	NA	NA	NA	NA	NC.
198	E38	GND	NA	NA	GND	NA	NA	Power	Ground.
199	E39	VADJ	NA	NA	VCC_FMC_ADJ	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
200	E40	GND	NA	NA	GND	NA	NA	Power	Ground.
201	F1	PG_M2C	NA	NA	NA	NA	NA	I, 3.3V CMOS/ 10K PU	Power Good Signal from FMC Module to Carrier.
202	F2	GND	NA	NA	GND	NA	NA	Power	Ground.
203	F3	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
204	F4	HA00_P_CC	NA	NA	NA	NA	NA	NA	NC.
205	F5	HA00_N_CC	NA	NA	NA	NA	NA	NA	NC.
206	F6	GND	NA	NA	GND	NA	NA	Power	Ground.
207	F7	HA04_P	NA	NA	NA	NA	NA	NA	NC.
208	F8	HA04_N	NA	NA	NA	NA	NA	NA	NC.
209	F9	GND	NA	NA	GND	NA	NA	Power	Ground.
210	F10	HA08_P	NA	NA	NA	NA	NA	NA	NC.
211	F11	HA08_N	NA	NA	NA	NA	NA	NA	NC.
212	F12	GND	NA	NA	GND	NA	NA	Power	Ground.
213	F13	HA12_P	NA	NA	NA	NA	NA	NA	NC.
214	F14	HA12_N	NA	NA	NA	NA	NA	NA	NC.
215	F15	GND	NA	NA	GND	NA	NA	Power	Ground.
216	F16	HA15_P	NA	NA	NA	NA	NA	NA	NC.
217	F17	HA15_N	NA	NA	NA	NA	NA	NA	NC.
218	F18	GND	NA	NA	GND	NA	NA	Power	Ground.
219	F19	HA19_P	NA	NA	NA	NA	NA	NA	NC.
220	F20	HA19_N	NA	NA	NA	NA	NA	NA	NC.
221	F21	GND	NA	NA	GND	NA	NA	Power	Ground.
222	F22	HB02_P	NA	NA	NA	NA	NA	NA	NC.
223	F23	HB02_N	NA	NA	NA	NA	NA	NA	NC.
224	F24	GND	NA	NA	GND	NA	NA	Power	Ground.
225	F25	HB04_P	NA	NA	NA	NA	NA	NA	NC.
226	F26	HB04_N	NA	NA	NA	NA	NA	NA	NC.
227	F27	GND	NA	NA	GND	NA	NA	Power	Ground.
228	F28	HB08_P	NA	NA	NA	NA	NA	NA	NC.
229	F29	HB08_N	NA	NA	NA	NA	NA	NA	NC.
230	F30	GND	NA	NA	GND	NA	NA	Power	Ground.
231	F31	HB12_P	NA	NA	NA	NA	NA	NA	NC.
232	F32	HB12_N	NA	NA	NA	NA	NA	NA	NC.
233	F33	GND	NA	NA	GND	NA	NA	Power	Ground.
234	F34	HB16_P	NA	NA	NA	NA	NA	NA	NC.
235	F35	HB16_N	NA	NA	NA	NA	NA	NA	NC.
236	F36	GND	NA	NA	GND	NA	NA	Power	Ground.
237	F37	HB20_P	NA	NA	NA	NA	NA	NA	NC.
238	F38	HB20_N	NA	NA	NA	NA	NA	NA	NC.
239	F39	GND	NA	NA	GND	NA	NA	Power	Ground.
240	F40	VADJ	NA	NA	VCC_FMC_ADJ	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
241	G1	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
242	G2	CLK1_M2C_P	Board to Board connector 1	144	PL_AY22_LVDS64_L11P_GC	64	AY22	IO, DIFF	PL Bank64 IO11 differential positive.
243	G3	CLK1_M2C_N	Board to Board connector 1	142	PL_BA22_LVDS64_L11N_GC	64	BA22	IO, DIFF	PL Bank64 IO11 differential negative.
244	G4	GND	NA	NA	GND	NA	NA	Power	Ground.
245	G5	GND	NA	NA	GND	NA	NA	Power	Ground.
246	G6	LA00_P_CC	Board to Board connector 1	118	PL_BE12_LVDS68_L5P	68	BE12	IO, 1.8V	PL Bank68 IO5 differential positive.
247	G7	LA00_N_CC	Board to Board connector 1	116	PL_BF12_LVDS68_L5N	68	BF12	IO, 1.8V	PL Bank68 IO5 differential negative.
248	G8	GND	NA	NA	GND	NA	NA	Power	Ground.
249	G9	LA03_P	Board to Board connector 2	126	PL_AW20_LVDS66_L9P	66	AW20	IO, 1.8V	PL Bank66 IO9 differential positive.
250	G10	LA03_N	Board to Board connector 2	128	PL_AY20_LVDS66_L9N	66	AY20	IO, 1.8V	PL Bank66 IO9 differential negative.
251	G11	GND	NA	NA	GND	NA	NA	Power	Ground.
252	G12	LA08_P	Board to Board connector 2	127	PL_BD16_LVDS67_L3P	67	BD16	IO, 1.8V	PL Bank67 IO3 differential positive.
253	G13	LA08_N	Board to Board connector 2	125	PL_BE16_LVDS67_L3N	67	BE16	IO, 1.8V	PL Bank67 IO3 differential negative.
254	G14	GND	NA	NA	GND	NA	NA	Power	Ground.
255	G15	LA12_P	Board to Board connector 2	109	PL_AW16_LVDS67_L14P_GC	67	AW16	IO, 1.8V	PL Bank67 IO14 differential positive.
256	G16	LA12_N	Board to Board connector 2	111	PL_AW15_LVDS67_L14N_GC	67	AW15	IO, 1.8V	PL Bank67 IO14differential negative.
257	G17	GND	NA	NA	GND	NA	NA	Power	Ground.
258	G18	LA16_P	NA	NA	NA	NA	NA	NA	IO expander U51
259	G19	LA16_N	Board to Board connector 2	112	PL_AW13_LVDS67_L13N_GC	67	AW13	IO, 1.8V	PL Bank67 IO13 differential negative.
260	G20	GND	NA	NA	GND	NA	NA	Power	Ground.
261	G21	LA20_P	NA	NA	NA	NA	NA	NA	NC.
262	G22	LA20_N	NA	NA	NA	NA	NA	NA	NC.
263	G23	GND	NA	NA	GND	NA	NA	Power	Ground.
264	G24	LA22_P	NA	NA	NA	NA	NA	NA	NC.
265	G25	LA22_N	NA	NA	NA	NA	NA	NA	NC.
266	G26	GND	NA	NA	GND	NA	NA	Power	Ground.
267	G27	LA25_P	NA	NA	NA	NA	NA	NA	NC.
268	G28	LA25_N	NA	NA	NA	NA	NA	NA	NC.
269	G29	GND	NA	NA	GND	NA	NA	Power	Ground.
270	G30	LA29_P	NA	NA	NA	NA	NA	NA	NC.
271	G31	LA29_N	NA	NA	NA	NA	NA	NA	NC.
272	G32	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
273	G33	LA31_P	NA	NA	NA	NA	NA	NA	NC.
274	G34	LA31_N	NA	NA	NA	NA	NA	NA	NC.
275	G35	GND	NA	NA	GND	NA	NA	Power	Ground.
276	G36	LA33_P	NA	NA	NA	NA	NA	NA	NC.
277	G37	LA33_N	NA	NA	NA	NA	NA	NA	NC.
278	G38	GND	NA	NA	GND	NA	NA	Power	Ground.
279	G39	VADJ	NA	NA	VCC_FMC_ADJ	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
280	G40	GND	NA	NA	GND	NA	NA	Power	Ground.
281	H1	VREF_A_M2C	NA	NA	NA	NA	NA	NA	NC.
282	H2	PRSNT_M2C_L	NA	NA	NA	NA	NA	I,3.3V CMOS/ 10K PU	Module Preset Signal. This Pin is connected to 4th pin of IO Expander (U10).
283	H3	GND	NA	NA	GND	NA	NA	Power	Ground.
284	H4	CLK0_M2C_P	NA	NA	NA	NA	NA	NA	NC.
285	H5	CLK0_M2C_N	NA	NA	NA	NA	NA	NA	NC.
286	H6	GND	NA	NA	GND	NA	NA	Power	Ground.
287	H7	LA02_P	Board to Board connector 1	46	PL_AR22_LVDS64_L16P	64	AR22	IO, 1.8V	PL Bank64 IO16 differential positive.
288	H8	LA02_N	Board to Board connector 1	48	PL_AT22_LVDS64_L16N	64	AT22	IO, 1.8V	PL Bank64 IO16 differential negative.
289	H9	GND	NA	NA	GND	NA	NA	Power	Ground.
290	H10	LA04_P	Board to Board connector 1	24	PL_AN23_LVDS64_L20P	64	AN23	IO, 1.8V	PL Bank64 IO20 differential positive.
291	H11	LA04_N	Board to Board connector 1	22	PL_AP23_LVDS64_L20N	64	AP23	IO, 1.8V	PL Bank64 IO20 differential negative.
292	H12	GND	NA	NA	GND	NA	NA	Power	Ground.
293	H13	LA07_P	Board to Board connector 1	50	PL_AV22_LVDS64_L15N	64	AV22	IO, 1.8V	PL Bank64 IO15 differential negative.
294	H14	LA07_N	Board to Board connector 1	52	PL_BF9_LVDS68_L3N	68	BF9	IO, 1.8V	PL Bank68 IO15 differential negative.
295	H15	GND	NA	NA	GND	NA	NA	Power	Ground.
296	H16	LA11_P	Board to Board connector 2	95	PL_BD13_LVDS67_L4P_DBC	67	BD13	IO, 1.8V	PL Bank67 IO4 differential positive.
297	H17	LA11_N	Board to Board connector 2	97	PL_BE13_LVDS67_L4N_DBC	67	BE13	IO, 1.8V	PL Bank67 IO4 differential negative.
298	H18	GND	NA	NA	GND	NA	NA	Power	Ground.
299	H19	LA15_P	NA	NA	NA	NA	NA	NA	NC.
300	H20	LA15_N	NA	NA	NA	NA	NA	NA	NC.
301	H21	GND	NA	NA	GND	NA	NA	Power	Ground.
302	H22	LA19_P	NA	NA	NA	NA	NA	NA	NC.
303	H23	LA19_N	NA	NA	NA	NA	NA	NA	NC.
304	H24	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
305	H25	LA21_P	NA	NA	NA	NA	NA	NA	NC.
306	H26	LA21_N	NA	NA	NA	NA	NA	NA	NC.
307	H27	GND	NA	NA	GND	NA	NA	Power	Ground.
308	H28	LA24_P	NA	NA	NA	NA	NA	NA	NC.
309	H29	LA24_N	NA	NA	NA	NA	NA	NA	NC.
310	H30	GND	NA	NA	GND	NA	NA	Power	Ground.
311	H31	LA28_P	NA	NA	NA	NA	NA	NA	NC.
312	H32	LA28_N	NA	NA	NA	NA	NA	NA	NC.
313	H33	GND	NA	NA	GND	NA	NA	Power	Ground.
314	H34	LA30_P	NA	NA	NA	NA	NA	NA	NC.
315	H35	LA30_N	NA	NA	NA	NA	NA	NA	NC.
316	H36	GND	NA	NA	GND	NA	NA	Power	Ground.
317	H37	LA32_P	NA	NA	NA	NA	NA	NA	NC.
318	H38	LA32_N	NA	NA	NA	NA	NA	NA	NC.
319	H39	GND	NA	NA	GND	NA	NA	Power	Ground.
320	H40	VADJ	NA	NA	VCC_FMC_ADJ	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
321	J1	GND	NA	NA	GND	NA	NA	Power	Ground.
322	J2	CLK3_BIDIR_P	NA	NA	NA	NA	NA	NA	NC.
323	J3	CLK3_BIDIR_N	NA	NA	NA	NA	NA	NA	NC.
324	J4	GND	NA	NA	GND	NA	NA	Power	Ground.
325	J5	GND	NA	NA	GND	NA	NA	Power	Ground.
326	J6	HA03_P	NA	NA	NA	NA	NA	NA	NC.
327	J7	HA03_N	NA	NA	NA	NA	NA	NA	NC.
328	J8	GND	NA	NA	GND	NA	NA	Power	Ground.
329	J9	HA07_P	NA	NA	NA	NA	NA	NA	NC.
330	J10	HA07_N	NA	NA	NA	NA	NA	NA	NC.
331	J11	GND	NA	NA	GND	NA	NA	Power	Ground.
332	J12	HA11_P	NA	NA	NA	NA	NA	NA	NC.
333	J13	HA11_N	NA	NA	NA	NA	NA	NA	NC.
334	J14	GND	NA	NA	GND	NA	NA	Power	Ground.
335	J15	HA14_P	NA	NA	NA	NA	NA	NA	NC.
336	J16	HA14_N	NA	NA	NA	NA	NA	NA	NC.
337	J17	GND	NA	NA	GND	NA	NA	Power	Ground.
338	J18	HA18_P	NA	NA	NA	NA	NA	NA	NC.
339	J19	HA18_N	NA	NA	NA	NA	NA	NA	NC.
340	J20	GND	NA	NA	GND	NA	NA	Power	Ground.
341	J21	HA22_P	NA	NA	NA	NA	NA	NA	NC.
342	J22	HA22_N	NA	NA	NA	NA	NA	NA	NC.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
343	J23	GND	NA	NA	GND	NA	NA	Power	Ground.
344	J24	HB01_P	NA	NA	NA	NA	NA	NA	NC.
345	J25	HB01_N	NA	NA	NA	NA	NA	NA	NC.
346	J26	GND	NA	NA	GND	NA	NA	Power	Ground.
347	J27	HB07_P	NA	NA	NA	NA	NA	NA	NC.
348	J28	HB07_N	NA	NA	NA	NA	NA	NA	NC.
349	J29	GND	NA	NA	GND	NA	NA	Power	Ground.
350	J30	HB11_P	NA	NA	NA	NA	NA	NA	NC.
351	J31	HB11_N	NA	NA	NA	NA	NA	NA	NC.
352	J32	GND	NA	NA	GND	NA	NA	Power	Ground.
353	J33	HB15_P	NA	NA	NA	NA	NA	NA	NC.
354	J34	HB15_N	NA	NA	NA	NA	NA	NA	NC.
355	J35	GND	NA	NA	GND	NA	NA	Power	Ground.
356	J36	HB18_P	NA	NA	NA	NA	NA	NA	NC.
357	J37	HB18_N	NA	NA	NA	NA	NA	NA	NC.
358	J38	GND	NA	NA	GND	NA	NA	Power	Ground.
359	J39	VIO_B_M2C	NA	NA	NA	NA	NA	NA	NC.
360	J40	GND	NA	NA	GND	NA	NA	Power	Ground.
361	K1	VREF_B_M2C	NA	NA	NA	NA	NA	NA	NC.
362	K2	GND	NA	NA	GND	NA	NA	Power	Ground.
363	K3	GND	NA	NA	GND	NA	NA	Power	Ground.
364	K4	CLK2_BIDIR_P	NA	NA	NA	NA	NA	NA	NC.
365	K5	CLK2_BIDIR_N	NA	NA	NA	NA	NA	NA	NC.
366	K6	GND	NA	NA	GND	NA	NA	Power	Ground.
367	K7	HA02_P	NA	NA	NA	NA	NA	NA	NC.
368	K8	HA02_N	NA	NA	NA	NA	NA	NA	NC.
369	K9	GND	NA	NA	GND	NA	NA	Power	Ground.
370	K10	HA06_P	NA	NA	NA	NA	NA	NA	NC.
371	K11	HA06_N	NA	NA	NA	NA	NA	NA	NC.
372	K12	GND	NA	NA	GND	NA	NA	Power	Ground.
373	K13	HA10_P	NA	NA	NA	NA	NA	NA	NC.
374	K14	HA10_N	NA	NA	NA	NA	NA	NA	NC.
375	K15	GND	NA	NA	GND	NA	NA	Power	Ground.
376	K16	HA17_P_CC	NA	NA	NA	NA	NA	NA	NC.
377	K17	HA17_N_CC	NA	NA	NA	NA	NA	NA	NC.
378	K18	GND	NA	NA	GND	NA	NA	Power	Ground.
379	K19	HA21_P	NA	NA	NA	NA	NA	NA	NC.
380	K20	HA21_N	NA	NA	NA	NA	NA	NA	NC.
381	K21	GND	NA	NA	GND	NA	NA	Power	Ground.

Sl.no	FMC Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA (FHGB2104)			Description
	FMC Connector Pin No	FMC Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	Signal Type/ Termination*	
382	K22	HA23_P	NA	NA	NA	NA	NA	NA	NC.
383	K23	HA23_N	NA	NA	NA	NA	NA	NA	NC.
384	K24	GND	NA	NA	GND	NA	NA	Power	Ground.
385	K25	HB00_P_CC	NA	NA	NA	NA	NA	NA	NC.
386	K26	HB00_N_CC	NA	NA	NA	NA	NA	NA	NC.
387	K27	GND	NA	NA	GND	NA	NA	Power	Ground.
388	K28	HB06_P_CC	NA	NA	NA	NA	NA	NA	NC.
389	K29	HB06_N_CC	NA	NA	NA	NA	NA	NA	NC.
390	K30	GND	NA	NA	GND	NA	NA	Power	Ground.
391	K31	HB10_P	NA	NA	NA	NA	NA	NA	NC.
392	K32	HB10_N	NA	NA	NA	NA	NA	NA	NC.
393	K33	GND	NA	NA	GND	NA	NA	Power	Ground.
394	K34	HB14_P	NA	NA	NA	NA	NA	NA	NC.
395	K35	HB14_N	NA	NA	NA	NA	NA	NA	NC.
396	K36	GND	NA	NA	GND	NA	NA	Power	Ground.
397	K37	HB17_P_CC	NA	NA	NA	NA	NA	NA	NC.
398	K38	HB17_N_CC	NA	NA	NA	NA	NA	NA	NC.
399	K39	GND	NA	NA	GND	NA	NA	Power	Ground.
400	K40	VIO_B_M2C	NA	NA	NA	NA	NA	NA	NC.

Note:

**FMC connector supports VADJ 1.8V and 1.2V. By default, VADJ is set to 1.8V. Contact iWave for further details.*

** If VCC_FMC_ADJ voltage changed from default value 1.8 to 1.2V, please make sure that SOM concern IO voltage also to be modified to avoid IO conflict.*

**IO Type of IOs originating from Virtex UltraScale+ FPGA is configurable. Hence for exact IO type configuration options, refer Xilinx Virtex UltraScale+ FPGA datasheet.*

2.5.3 FMC+ HPC Connector

The Virtex UltraScale+ FPGA Carrier board supports one 560Pin FMC+ HPC connector to support standard ANSI/VITA 57.4 FMC modules.

The FMC+ HPC Connector (J14) supports the below mentioned interface from Virtex UltraScale+ FPGA SOM module.

- 24 GTY High Speed Transceivers
- 6 GTY Reference Clock
- Up to 40 LVDS IOs/88 Single ended (SE) IOs from HP Bank
- 2 Clock Input Capable LVDS/SE pins from HP Bank
- 2 Clock Output Capable LVDS/SE pins from HP Bank

This 560Pin FMC+ HPC connector (J14) is physically located at the top of the board as shown below.

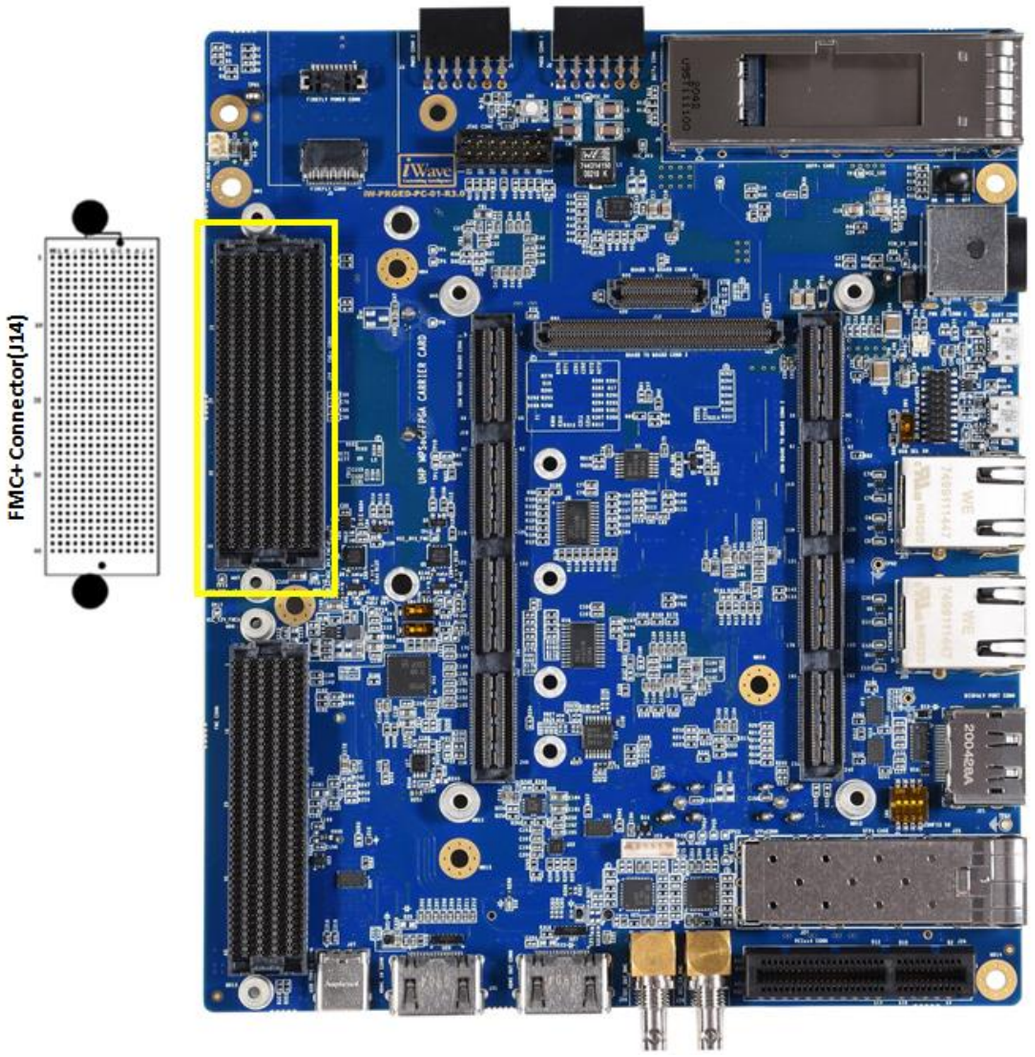


Figure 24: FMC+ Connector

This 560Pin FMC HPC connector (J14) pin mapping is shown below.

	M	L	K	J	H	G	F	E	D	C	B	A	Z	Y
1	GND	NC	NC	GND	NC	GND	PG_M2C	GND	PG_C2M	GND	CLK_DIR	GND	HSPC_PRSNT_M2C_L	GND
2	DP23_M2C_P	GND	GND	NC	PRSNT_M2C_L	CLK1_M2C_P	GND	NC	GND	DP0_C2M_P	GND	DP1_M2C_P	GND	DP23_C2M_P
3	DP23_M2C_N	GND	GND	NC	GND	CLK1_M2C_N	GND	NC	GND	DP0_C2M_N	GND	DP1_M2C_N	GND	DP23_C2M_N
4	GND	GBTCLK4_M2C_P	NC	GND	CLK0_M2C_P	GND	NC	GND	GBTCLK0_M2C_P	GND	DP9_M2C_P	GND	DP22_C2M_P	GND
5	GND	GBTCLK4_M2C_N	NC	GND	CLK0_M2C_N	GND	NC	GND	GBTCLK0_M2C_N	GND	DP9_M2C_N	GND	DP22_C2M_N	GND
6	DP22_M2C_P	GND	GND	HA03_P	GND	LA00_P_CC	GND	HA05_P	GND	DP0_M2C_P	GND	DP2_M2C_P	GND	DP21_C2M_P
7	DP22_M2C_N	GND	HA02_P	HA03_N	LA02_P	LA00_N_CC	HA04_P	HA05_N	GND	DP0_M2C_N	GND	DP2_M2C_N	GND	DP21_C2M_N
8	GND	GBTCLK3_M2C_P	HA02_N	GND	LA02_N	GND	HA04_N	GND	LA01_P_CC	GND	DP8_M2C_P	GND	DP20_C2M_P	GND
9	GND	GBTCLK3_M2C_N	GND	HA07_P	GND	LA03_P	GND	HA09_P	LA01_N_CC	GND	DP8_M2C_N	GND	DP20_C2M_N	GND
10	DP21_M2C_P	GND	NC	HA07_N	LA04_P	LA03_N	HA08_P	HA09_N	GND	LA06_P	GND	DP3_M2C_P	GND	DP10_M2C_P
11	DP21_M2C_N	GND	HA06_N	GND	LA04_N	GND	HA08_N	GND	LA05_P	LA06_N	GND	DP3_M2C_N	GND	DP10_M2C_N
12	GND	GBTCLK2_M2C_P	GND	HA11_P	GND	LA08_P	GND	NC	LA05_N	GND	DP7_M2C_P	GND	DP11_M2C_P	GND
13	GND	GBTCLK2_M2C_N	HA10_P	HA11_N	LA07_P	LA08_N	HA12_P	NC	GND	GND	DP7_M2C_N	GND	DP11_M2C_N	GND
14	DP20_M2C_P	GND	HA10_N	GND	LA07_N	GND	HA12_N	GND	LA09_P	LA10_P	GND	DP4_M2C_P	GND	DP12_M2C_P
15	DP20_M2C_N	GND	GND	NC	GND	LA12_P	GND	NC	LA09_N	LA10_N	GND	DP4_M2C_N	GND	DP12_M2C_N
16	GND	NC	NC	NC	LA11_P	LA12_N	NC	NC	GND	GND	DP6_M2C_P	GND	DP13_M2C_P	GND
17	GND	NC	NC	GND	LA11_N	GND	NC	GND	LA13_P	GND	DP6_M2C_N	GND	DP13_M2C_N	GND
18	DP14_C2M_P	GND	GND	HA18_P	GND	LA16_P	GND	NC	LA13_N	LA14_P	GND	DP5_M2C_P	GND	DP14_M2C_P
19	DP14_C2M_N	GND	NC	NC	LA15_P	LA16_N	NC	NC	GND	LA14_N	GND	DP5_M2C_N	GND	DP14_M2C_N
20	GND	NC	NC	GND	LA15_N	GND	NC	GND	LA17_P_CC	GND	GBTCLK1_M2C_P	GND	GBTCLK5_M2C_P	GND
21	GND	NC	GND	NC	GND	LA20_P	GND	NC	LA17_N_CC	GND	GBTCLK1_M2C_N	GND	GBTCLK5_M2C_N	GND
22	DP15_C2M_P	GND	NC	NC	LA19_P	LA20_N	NC	NC	GND	LA18_P_CC	GND	DP1_C2M_P	GND	DP15_M2C_P
23	DP15_C2M_N	GND	NC	GND	LA19_N	GND	NC	GND	LA23_P	LA18_N_CC	GND	DP1_C2M_N	GND	DP15_M2C_N
24	GND	NC	GND	NC	GND	LA22_P	GND	NC	LA23_N	GND	DP9_C2M_P	GND	DP10_C2M_P	GND
25	GND	NC	NC	NC	LA21_P	LA22_N	NC	NC	GND	GND	DP9_C2M_N	GND	DP10_C2M_N	GND
26	DP16_C2M_P	GND	NC	GND	LA21_N	GND	NC	GND	LA26_P	LA27_P	GND	DP2_C2M_P	GND	DP11_C2M_P
27	DP16_C2M_N	GND	GND	NC	GND	LA25_P	GND	NC	LA26_N	LA27_N	GND	DP2_C2M_N	GND	DP11_C2M_N
28	GND	NC	NC	NC	LA24_P	LA25_N	NC	NC	GND	GND	DP8_C2M_P	GND	DP12_C2M_P	GND
29	GND	NC	NC	GND	LA24_N	GND	NC	GND	TCK	GND	DP8_C2M_N	GND	DP12_C2M_N	GND
30	DP17_C2M_N	GND	GND	NC	GND	LA29_P	GND	NC	TDI	SCL	GND	DP3_C2M_P	GND	DP13_C2M_P
31	DP17_C2M_N	GND	NC	NC	LA28_P	LA29_N	NC	NC	TDO	SDA	GND	DP3_C2M_N	GND	DP13_C2M_N
32	GND	NC	NC	GND	LA28_N	GND	NC	GND	3P3VAUX	GND	DP7_C2M_P	GND	DP16_M2C_P	GND
33	GND	NC	GND	NC	GND	LA31_P	GND	NC	TMS	GND	DP7_C2M_N	GND	DP16_M2C_N	GND
34	DP18_C2M_P	GND	NC	NC	LA30_P	LA31_N	NC	NC	TRST_L	GA0	GND	DP4_C2M_P	GND	DP17_M2C_P
35	DP18_C2M_N	GND	NC	GND	LA30_N	GND	NC	GND	GA1	12P0V	GND	DP4_C2M_N	GND	DP17_M2C_N
36	GND	12P0V	GND	NC	GND	LA33_P	GND	NC	3P3V	GND	DP6_C2M_P	GND	DP18_M2C_P	GND
37	GND	12P0V	NC	NC	LA32_P	LA33_N	NC	NC	GND	12P0V	DP6_C2M_N	GND	DP18_M2C_N	GND
38	DP19_C2M_P	GND	NC	GND	LA32_N	GND	NC	GND	3P3V	GND	GND	DP5_C2M_P	GND	DP19_M2C_P
39	DP19_C2M_N	GND	GND	NC	GND	VADJ	GND	VADJ	GND	3P3V	GND	DP5_C2M_N	GND	DP19_M2C_N
40	GND	12P0V	NC	GND	VADJ	GND	VADJ	GND	3P3V	GND	NC	GND	3P3V	GND

Figure 25: FMC+ HPC Connector Pin Out

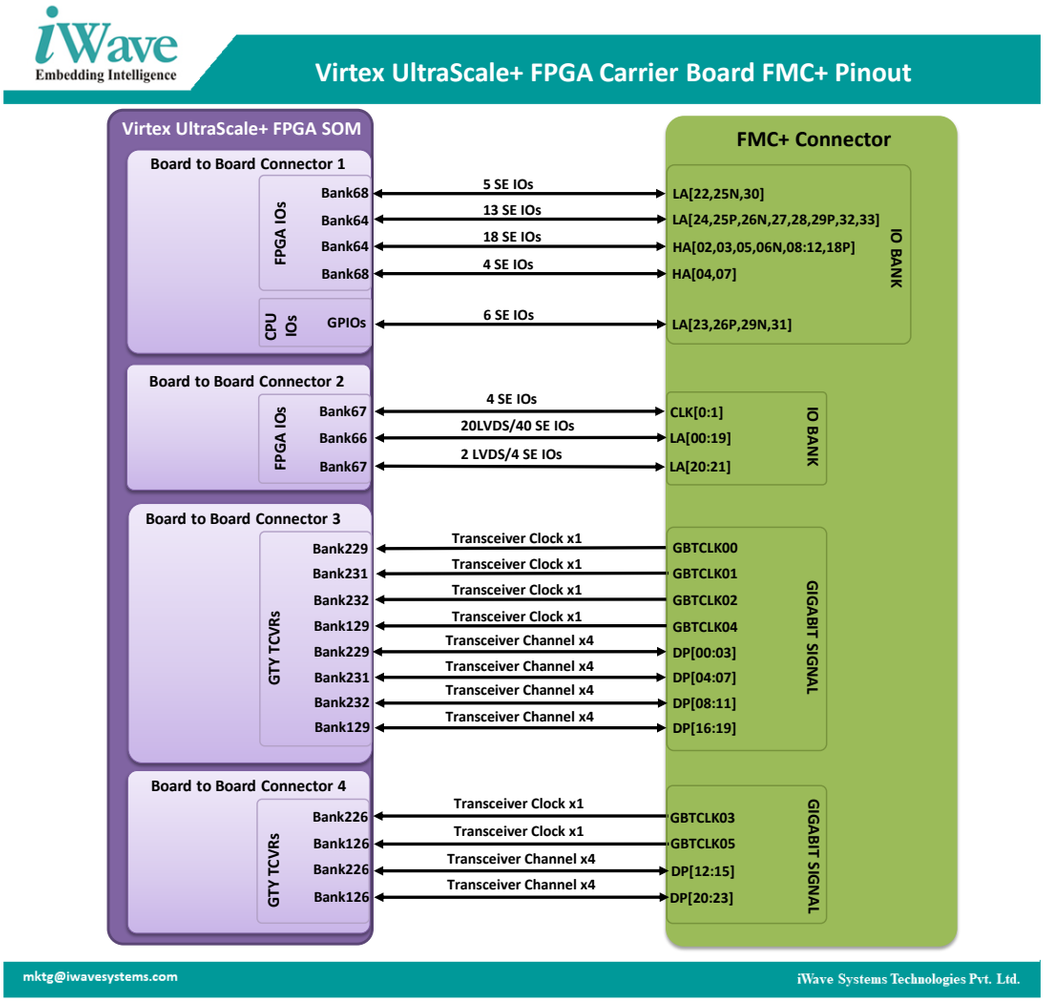


Figure 26: FMC+ Board to Board Connector Block Diagram

Number of Pins - 560

Connector Part Number - ASP-184329-01 from Samtec

Mating Connector - ASP-184330-01 from Samtec

Staking Height - 10mm

Note:

** By default, FMC+ connector power is disabled as per Vita Specification. While booting the FMC or FMC+ Modules EEPROM is read and enabling the FMC+ connector power.*

** If FMC & FMC+ modules EEPROM is not programmed, then FMC+ connector power is not enabled.*

Table 12: FMC+ HPC Connector Pin Assignment

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
1	A1	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
2	A2	DP1_M2C_P	Board to Board Connector 3	A36	GTYRXP1_229	229	Y2	NA	I, DIFF	GTY Bank229 channel1 High speed differential receiver positive.
3	A3	DP1_M2C_N	Board to Board Connector 3	A37	GTYRXN1_229	229	Y1	NA	I, DIFF	GTY Bank229 channel1 High speed differential receiver negative.
4	A4	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
5	A5	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
6	A6	DP2_M2C_P	Board to Board Connector 3	A25	GTYRXP2_229	229	W4	NA	I, DIFF	GTY Bank229 channel2 High speed differential receiver positive.
7	A7	DP2_M2C_N	Board to Board Connector 3	A24	GTYRXN2_229	229	W3	NA	I, DIFF	GTY Bank229 channel2 High speed differential receiver negative.
8	A8	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
9	A9	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
10	A10	DP3_M2C_P	Board to Board Connector 3	B23	GTYRXP3_229	229	V2	NA	I, DIFF	GTY Bank229 channel3 High speed differential receiver positive.
11	A11	DP3_M2C_N	Board to Board Connector 3	B22	GTYRXN3_229	229	V1	NA	I, DIFF	GTY Bank229 channel3 High speed differential receiver negative.
12	A12	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
13	A13	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
14	A14	DP4_M2C_P	Board to Board Connector 3	C9	GTYRXP0_231	231	N4	NA	I, DIFF	GTY Bank231 channel0 High speed differential receiver positive.
15	A15	DP4_M2C_N	Board to Board Connector 3	C8	GTYRXN0_231	231	N3	NA	I, DIFF	GTY Bank231 channel0 High speed differential receiver negative.
16	A16	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
17	A17	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
18	A18	DP5_M2C_P	Board to Board Connector 3	C29	GTYRXP1_231	231	M2	NA	I, DIFF	GTY Bank231 channel1 High speed differential receiver positive.
19	A19	DP5_M2C_N	Board to Board Connector 3	C28	GTYRXN1_231	231	M1	NA	I, DIFF	GTY Bank231 channel1 High speed differential receiver negative.
20	A20	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
21	A21	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
22	A22	DP1_C2M_P	Board to Board Connector 3	B30	GTYTXP1_229	229	Y7	NA	O, DIFF	GTY Bank229 channel1 High speed differential transmitter positive.
23	A23	DP1_C2M_N	Board to Board Connector 3	B31	GTYTXN1_229	229	Y6	NA	O, DIFF	GTY Bank229 channel1 High speed differential transmitter negative.
24	A24	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
25	A25	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
26	A26	DP2_C2M_P	Board to Board Connector 3	A28	GTYTXP2_229	229	W9	NA	O, DIFF	GTY Bank229 channel2 High speed differential transmitter positive.
27	A27	DP2_C2M_N	Board to Board Connector 3	A29	GTYTXN2_229	229	W8	NA	O, DIFF	GTY Bank229 channel2 High speed differential transmitter negative.
28	A28	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
29	A29	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
30	A30	DP3_C2M_P	Board to Board Connector 3	B26	GTYTXP3_229	229	V7	NA	O, DIFF	GTY Bank229 channel3 High speed differential transmitter positive.
31	A31	DP3_C2M_N	Board to Board Connector 3	B27	GTYTXN3_229	229	V6	NA	O, DIFF	GTY Bank229 channel3 High speed differential transmitter negative.
32	A32	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
33	A33	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
34	A34	DP4_C2M_P	Board to Board Connector 3	C41	GTYTXP0_231	231	N9	NA	O, DIFF	GTY Bank231 channel0 High speed differential transmitter positive.
35	A35	DP4_C2M_N	Board to Board Connector 3	C40	GTYTXN0_231	231	N8	NA	O, DIFF	GTY Bank231 channel0 High speed differential transmitter negative.
36	A36	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
37	A37	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
38	A38	DP5_C2M_P	Board to Board Connector 3	C13	GTYTXP1_231	231	M7	NA	O, DIFF	GTY Bank231 channel1 High speed differential transmitter positive.
39	A39	DP5_C2M_N	Board to Board Connector 3	C12	GTYTXN1_231	231	M6	NA	O, DIFF	GTY Bank231 channel1 High speed differential transmitter negative.
40	A40	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
41	B1	CLK_DIR	NA	NA	NA	NA	NA	NA	O, 3.3V	CLK-DIR This Pin is connected to 16th pin of IO Expander (U10).
42	B2	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
43	B3	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
44	B4	DP9_M2C_P	Board to Board Connector 3	D43	GTYRXP1_232	232	H2	NA	I, DIFF	GTY Bank232 channel1 High speed differential receiver positive.
45	B5	DP9_M2C_N	Board to Board Connector 3	D42	GTYRXN1_232	232	H1	NA	I, DIFF	GTY Bank232 channel1 High speed differential receiver Negative.
46	B6	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
47	B7	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
48	B8	DP8_M2C_P	Board to Board Connector 3	D51	GTYRXP0_232	232	J4	NA	I, DIFF	GTY Bank232 channel0 High speed differential receiver positive.
49	B9	DP8_M2C_N	Board to Board Connector 3	D50	GTYRXN0_232	232	J3	NA	I, DIFF	GTY Bank232 channel0 High speed differential receiver negative.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
50	**B10**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
51	**B11**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
52	**B12**	DP7_M2C_P	Board to Board Connector 3	C25	GTYRXP3_231	231	K2	NA	I, DIFF	GTY Bank231 channel3 High speed differential receiver positive.
53	**B13**	DP7_M2C_N	Board to Board Connector 3	C24	GTYRXN3_231	231	K1	NA	I, DIFF	GTY Bank231 channel3 High speed differential receiver negative.
54	**B14**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
55	**B15**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
56	**B16**	DP6_M2C_P	Board to Board Connector 3	C4	GTYRXP2_231	231	L4	NA	I, DIFF	GTY Bank231 channel2 High speed differential receiver positive.
57	**B17**	DP6_M2C_N	Board to Board Connector 3	C5	GTYRXN2_231	231	L3	NA	I, DIFF	GTY Bank231 channel2 High speed differential receiver negative.
58	**B18**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
59	**B19**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
60	**B20**	GBTCLK1_M2C_P	Board to Board Connector 3	C20	GTREFCLK0P_231	231	M11	NA	I, DIFF	GTY Bank231 differential reference clock0 positive.
61	**B21**	GBTCLK1_M2C_N	Board to Board Connector 3	C21	GTREFCLK0N_231	231	M10	NA	I, DIFF	GTY Bank231 differential reference clock0 negative.
62	**B22**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
63	**B23**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
64	**B24**	DP9_C2M_P	Board to Board Connector 3	C57	GTYTXP1_232	232	H7	NA	O, DIFF	GTY Bank232 channel1 High speed differential Transmitter positive.
65	**B25**	DP9_C2M_N	Board to Board Connector 3	C56	GTYTXN1_232	232	H6	NA	O, DIFF	GTY Bank232 channel1 High speed differential Transmitter Negative.
66	**B26**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
67	**B27**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
68	**B28**	DP8_C2M_P	Board to Board Connector 3	C52	GTYTXP0_232	232	J9	NA	O, DIFF	GTY Bank232 channel0 High speed differential transmitter positive.
69	**B29**	DP8_C2M_N	Board to Board Connector 3	C53	GTYTXN0_232	232	J8	NA	O, DIFF	GTY Bank232 channel0 High speed differential transmitter negative.
70	**B30**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
71	**B31**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
72	**B32**	DP7_C2M_P	Board to Board Connector 3	C33	GTYTXP3_231	231	K7	NA	O, DIFF	GTY Bank231 channel3 High speed differential transmitter positive.
73	**B33**	DP7_C2M_N	Board to Board Connector 3	C32	GTYTXN3_231	231	K6	NA	O, DIFF	GTY Bank231 channel3 High speed differential transmitter negative.
74	**B34**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
75	**B35**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
76	**B36**	DP6_C2M_P	Board to Board Connector 3	C37	GTYTXP2_231	231	L9	NA	O, DIFF	GTY Bank231 channel2 High speed differential transmitter positive.
77	**B37**	DP6_C2M_N	Board to Board Connector 3	C36	GTYTXN2_231	231	L8	NA	O, DIFF	GTY Bank231 channel2 High speed differential transmitter negative.
78	**B38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
79	**B39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
80	**B40**	RES0	NA	NA	NA	NA	NA	NA	NA	NC.
81	**C1**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
82	**C2**	DP0_C2M_P	Board to Board Connector 3	A32	GTYTXP0_229	229	AA9	NA	O, DIFF	GTY Bank229 channel0 High speed differential transmitter positive.
83	**C3**	DP0_C2M_N	Board to Board Connector 3	A33	GTYTXN0_229	229	AA8	NA	O, DIFF	GTY Bank229 channel0 High speed differential transmitter negative.
84	**C4**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
85	**C5**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
86	**C6**	DP0_M2C_P	Board to Board Connector 3	A40	GTYRXP0_229	229	AA4	NA	I, DIFF	GTY Bank229 channel0 High speed differential receiver positive.
87	**C7**	DP0_M2C_N	Board to Board Connector 3	A41	GTYRXN0_229	229	AA3	NA	I, DIFF	GTY Bank229 channel0 High speed differential receiver negative.
88	**C8**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
89	**C9**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
90	**C10**	LA06_P	Board to Board Connector 2	183	PL_BB17_LVDS66_L5P	66	BB17	NA	IO, 1.8V	PL Bank66 IO5 differential positive.
91	**C11**	LA06_N	Board to Board Connector 2	181	PL_BC17_LVDS66_L5N	66	BC17	NA	IO, 1.8V	PL Bank66 IO5 differential negative.
92	**C12**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
93	**C13**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
94	**C14**	LA10_P	Board to Board Connector 2	176	PL_AV18_LVDS66_L11P_GC	66	AV18	NA	IO, 1.8V	PL Bank66 IO11 differential positive.
95	**C15**	LA10_N	Board to Board Connector 2	178	PL_AW18_LVDS66_L11N_GC	66	AW18	NA	IO, 1.8V	PL Bank66 IO11 differential negative.
96	**C16**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
97	**C17**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
98	**C18**	LA14_P	Board to Board Connector 2	147	PL_AP20_LVDS66_L18P	66	AP20	NA	IO, 1.8V	PL Bank66 IO18 differential positive.
99	**C19**	LA14_N	Board to Board Connector 2	149	PL_AR20_LVDS66_L18N	66	AR20	NA	IO, 1.8V	PL Bank66 IO18 differential negative.
100	**C20**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
101	**C21**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
102	**C22**	LA18_P_CC	Board to Board Connector 2	152	PL_BE17_LVDS66_L1P_DBC	66	BE17	NA	IO, 1.8V	PL Bank66 IO1 differential positive.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
103	**C23**	LA18_N_CC	Board to Board Connector 2	154	PL_BF17_LVDS66_L1N_DBC	66	BF17	NA	IO, 1.8V	PL Bank66 IO1 differential negative.
104	**C24**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
105	**C25**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
106	**C26**	LA27_P	Board to Board Connector 1	27	PL_AV24_LVDS64_L14P	64	AV24	NA	IO, 1.8V	PL Bank64 IO14 differential positive.
107	**C27**	LA27_N	Board to Board Connector 1	29	PL_AW24_LVDS64_L14N	64	AW24	NA	IO, 1.8V	PL Bank64 IO14 differential negative.
108	**C28**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
109	**C29**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
110	**C30**	SCL	NA	NA	NA	NA	NA	NA	O, 3.3V LVCMOS	FMC+ I2C Clock Signal. This Pin is connected from 12th pin of I2C Bus switch (U29).
111	**C31**	SDA	NA	NA	NA	NA	NA	NA	IO, 3.3V LVCMOS	FMC+ I2C Data Signal. This Pin is connected from 11th pin of I2C Bus switch (U29).
112	**C32**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
113	**C33**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
114	**C34**	GA0	NA	NA	NA	NA	NA	NA	1K, PU	Geographical address 0
115	**C35**	12P0V	NA	NA	VCC_12V_FMC+	NA	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
116	**C36**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
117	**C37**	12P0V	NA	NA	VCC_12V_FMC+	NA	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
118	**C38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
119	**C39**	3P3V	NA	NA	VCC_3V3_FMC+	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
120	**C40**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
121	**D1**	PG_C2M	NA	NA	NA	NA	NA	NA	O, 3.3V	Power Good Signal from Carrier to FMC Module. This Pin is connected to 18th pin of IO Expander (U10).
122	**D2**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
123	**D3**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
124	**D4**	GBTCLK0_M2C_P	Board to Board Connector 3	B38	GTREFCLK0P_229	229	Y11	NA	I, DIFF	GTY Bank229 differential reference clock0 positive.
125	**D5**	GBTCLK0_M2C_N	Board to Board Connector 3	B39	GTREFCLK0N_229	229	Y10	NA	I, DIFF	GTY Bank229 differential reference clock0 negative.
126	**D6**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
127	**D7**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
128	**D8**	LA01_P_CC	Board to Board Connector 2	132	PL_AL17_LVDS66_L22P_DBC	66	AL17	NA	IO, 1.8V	PL Bank66 IO22 differential positive.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
129	D9	LA01_N_CC	Board to Board Connector 2	134	PL_AM17_LVDS66_L22N_DBC	66	AM17	NA	IO, 1.8V	PL Bank66 IO22 differential negative.
130	D10	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
131	D11	LA05_P	Board to Board Connector 2	148	PL_BD18_LVDS66_L3P	66	BD18	NA	IO, 1.8V	PL Bank66 IO3 differential positive.
132	D12	LA05_N	Board to Board Connector 2	150	PL_BE18_LVDS66_L3N	66	BE18	NA	IO, 1.8V	PL Bank66 IO3 differential negative.
133	D13	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
134	D14	LA09_P	Board to Board Connector 2	164	PL_AT18_LVDS66_L15P	66	AT18	NA	IO, 1.8V	PL Bank66 IO15 differential positive.
135	D15	LA09_N	Board to Board Connector 2	166	PL_AU17_LVDS66_L15N	66	AU17	NA	IO, 1.8V	PL Bank66 IO15 differential negative.
136	D16	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
137	D17	LA13_P	Board to Board Connector 2	169	PL_AT20_LVDS66_L14P_GC	66	AT20	NA	IO, 1.8V	PL Bank66 IO14 differential positive.
138	D18	LA13_N	Board to Board Connector 2	171	PL_AU20_LVDS66_L14N_GC	66	AU20	NA	IO, 1.8V	PL Bank66 IO14 differential negative.
139	D19	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
140	D20	LA17_P_CC	Board to Board Connector 2	144	PL_AP18_LVDS66_L17P	66	AP18	NA	IO, 1.8V	PL Bank66 IO17 differential positive.
141	D21	LA17_N_CC	Board to Board Connector 2	146	PL_AR18_LVDS66_L17N	66	AR18	NA	IO, 1.8V	PL Bank66 IO17 differential negative.
142	D22	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
143	D23	LA23_P	Board to Board Connector 1	32	GPIO3_24(EC2_RXD1)	NA	NA	U1	IO, 1.8V	GPIO3_24 from CPU
144	D24	LA23_N	Board to Board Connector 1	34	GPIO4_09(TDMA_RXD)	NA	NA	H3	IO, 1.8V	GPIO4_09 from CPU
145	D25	GND	NA	NA	GND	NA	NA		Power	Ground.
146	D26	LA26_P	Board to Board Connector 1	38	GPIO3_19(EC2_TXEN)	NA	NA	T5	IO, 1.8V	GPIO3_19 from CPU
147	D27	LA26_N	Board to Board Connector 1	40	PL_AP24_LVDS64_L21N	64	AP24	NA	IO, DIFF	PL Bank64 IO21 differential negative.
148	D28	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
149	D29	TCK	Board to Board Connector 2	31	JTAG_TCK	0	AE13	NA	I, 3.3V CMOS/ 49.9K PU	JTAG Test Clock. This Pin is connected to 31st pin of Board-to-Board Connector2 (J19) through Voltage level translator.
150	D30	TDI	Board to Board Connector 2	33	NA	NA	NA	NA	O, 3.3V CMOS	JTAG Test Data Output. This Pin is connected to 33rd pin of Board-to-Board Connector2 (J19) through Voltage level translator.
151	D31	TDO	NA	NA	NA	NA	NA	NA	O, 3.3V CMOS	FMC+ Test Data Output.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
										This pin is connected to D30th pin of FMC Connector(J22)
152	**D32**	3P3VAUX	NA	NA	VCC_3V3	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
153	**D33**	TMS	Board to Board Connector 2	29	JTAG_TMS	0	AG15	NA	I, 3.3V CMOS/ 49.9K PU	JTAG Test Mode Select. This Pin is connected to 29th pin of Board-to-Board Connector2 (J19) through Voltage level translator.
154	**D34**	TRST_L	Board to Board Connector 2	25	NC	NA	NA	NA	NA	NC. This Pin is connected to 25th pin of Board-to-Board Connector2 (J8) through Voltage level translator.
155	**D35**	GA1	NA	NA	NA	NA	NA	NA	1K, PU	Geographical address 1
156	**D36**	3P3V	NA	NA	VCC_3V3_FMC+	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
157	**D37**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
158	**D38**	3P3V	NA	NA	VCC_3V3_FMC+	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
159	**D39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
160	**D40**	3P3V	NA	NA	VCC_3V3_FMC+	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.
161	**E1**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
162	**E2**	HA01_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
163	**E3**	HA01_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.
164	**E4**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
165	**E5**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
166	**E6**	HA05_P	Board to Board connector 1	128	PL_BE22_LVDS64_L4P	64	BE22	NA	IO, 1.8V	PL Bank64 IO4 differential positive.
167	**E7**	HA05_N	Board to Board connector 1	134	PL_BD24_LVDS64_L3N	64	BD24	NA	IO, 1.8V	PL Bank64 IO3 differential negative.
168	**E8**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
169	**E9**	HA09_P	Board to Board connector 1	112	PL_BD21_LVDS64_L5P	64	BD21	NA	IO, 1.8V	PL Bank64 IO5 differential positive.
170	**E10**	HA09_N	Board to Board connector 1	110	PL_BE21_LVDS64_L5N	64	BE21	NA	IO, 1.8V	PL Bank64 IO5 differential negative.
171	**E11**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
172	**E12**	HA13_P	NA	NA	NC	NA	NA	NA	NA	NC.
173	**E13**	HA13_N	NA	NA	NC	NA	NA	NA	NA	NC.
174	**E14**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
175	**E15**	HA16_P	NA	NA	NC	NA	NA	NA	NA	NC.
176	**E16**	HA16_N	NA	NA	NC	NA	NA	NA	NA	NC.
177	**E17**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
178	**E18**	HA20_P	NA	NA	NC	NA	NA	NA	NA	NC.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
179	E19	HA20_N	NA	NA	NC	NA	NA	NA	NA	NC.
180	E20	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
181	E21	HB03_P	NA	NA	NC	NA	NA	NA	NA	NC.
182	E22	HB03_N	NA	NA	NC	NA	NA	NA	NA	NC.
183	E23	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
184	E24	HB05_P	NA	NA	NC	NA	NA	NA	NA	NC.
185	E25	HB05_N	NA	NA	NC	NA	NA	NA	NA	NC.
186	E26	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
187	E27	HB09_P	NA	NA	NC	NA	NA	NA	NA	NC.
188	E28	HB09_N	NA	NA	NC	NA	NA	NA	NA	NC.
189	E29	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
190	E30	HB13_P	NA	NA	NC	NA	NA	NA	NA	NC.
191	E31	HB13_N	NA	NA	NC	NA	NA	NA	NA	NC.
192	E32	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
193	E33	HB19_P	NA	NA	NC	NA	NA	NA	NA	NC.
194	E34	HB19_N	NA	NA	NC	NA	NA	NA	NA	NC.
195	E35	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
196	E36	HB21_P	NA	NA	NC	NA	NA	NA	NA	NC.
197	E37	HB21_N	NA	NA	NC	NA	NA	NA	NA	NC.
198	E38	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
199	E39	VADJ	NA	NA	VCC_FMC+_ADJ	NA	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
200	E40	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
201	F1	PG_M2C	NA	NA	NA	NA	NA	NA	I, 3.3V CMOS/ 10K PU	DNP. Power Good Signal from FMC Module to Carrier. This Pin is connected to 20th pin of IO Expander (U10).
202	F2	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
203	F3	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
204	F4	HA00_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
205	F5	HA00_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.
206	F6	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
207	F7	HA04_P	Board to Board Connector 1	204	PL_BE8_LVDS68_L2P	68	BE8	NA	IO, 1.8V	PL Bank68 IO2 differential positive.
208	F8	HA04_N	Board to Board Connector 1	202	PL_BF8_LVDS68_L2N	68	BF8	NA	IO, 1.8V	PL Bank68 IO2 differential negative.
209	F9	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
210	F10	HA08_P	Board to Board Connector 1	153	PL_BD23_LVDS64_L2P	64	BD23	NA	IO, 1.8V	PL Bank64 IO2 differential positive.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
211	**F11**	HA08_N	Board to Board Connector 1	151	PL_BE23_LVDS64_L2N	64	BE23	NA	IO, 1.8V	PL Bank64 IO2 differential negative.
212	**F12**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
213	**F13**	HA12_P	Board to Board Connector 1	150	PL_BA24_LVDS64_L10P	64	BA24	NA	NA	PL Bank64 IO10 differential positive.
214	**F14**	HA12_N	Board to Board Connector 1	148	PL_BB24_LVDS64_L10N	64	BB24	NA	NA	PL Bank64 IO10 differential negative.
215	**F15**	GND	NA	NA	NC	NA	NA	NA	Power	Ground.
216	**F16**	HA15_P	NA	NA	NC	NA	NA	NA	NA	NC.
217	**F17**	HA15_N	NA	NA	NC	NA	NA	NA	NA	NC.
218	**F18**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
219	**F19**	HA19_P	NA	NA	NC	NA	NA	NA	NA	NC.
220	**F20**	HA19_N	Board to Board Connector 1	10	NC	NA	NA	NA	NA	NC.
221	**F21**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
222	**F22**	HB02_P	NA	NA	NC	NA	NA	NA	NA	NC.
223	**F23**	HB02_N	NA	NA	NC	NA	NA	NA	NA	NC.
224	**F24**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
225	**F25**	HB04_P	NA	NA	NC	NA	NA	NA	NA	NC.
226	**F26**	HB04_N	NA	NA	NC	NA	NA	NA	NA	NC.
227	**F27**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
228	**F28**	HB08_P	NA	NA	NC	NA	NA	NA	NA	NC.
229	**F29**	HB08_N	NA	NA	NC	NA	NA	NA	NA	NC.
230	**F30**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
231	**F31**	HB12_P	NA	NA	NC	NA	NA	NA	NA	NC.
232	**F32**	HB12_N	NA	NA	NC	NA	NA	NA	NA	NC.
233	**F33**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
234	**F34**	HB16_P	NA	NA	NC	NA	NA	NA	NA	NC.
235	**F35**	HB16_N	NA	NA	NC	NA	NA	NA	NA	NC.
236	**F36**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
237	**F37**	HB20_P	NA	NA	NC	NA	NA	NA	NA	NC.
238	**F38**	HB20_N	NA	NA	NC	NA	NA	NA	NA	NC.
239	**F39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
240	**F40**	VADJ	NA	NA	VCC_FMC+_ADJ	NA	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
241	**G1**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
242	**G2**	CLK1_M2C_P	Board to Board Connector 2	92	PL_AU13_LVDS67_L15P	67	AU13	NA	IO, 1.8V	PL Bank67 IO15 differential positive.
243	**G3**	CLK1_M2C_N	Board to Board Connector 2	94	PL_AV13_LVDS67_L15N	67	AV13	NA	IO, 1.8V	PL Bank67 IO15 differential negative.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
244	G4	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
245	G5	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
246	G6	LA00_P_CC	Board to Board Connector 2	159	PL_BC19_LVDS66_L4P_DBC	66	BC19	NA	IO, 1.8V	PL Bank66 IO4 differential positive.
247	G7	LA00_N_CC	Board to Board Connector 2	161	PL_BD19_LVDS66_L4N_DBC	66	BD19	NA	IO, 1.8V	PL Bank66 IO4 differential negative.
248	G8	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
249	G9	LA03_P	Board to Board Connector 2	163	PL_BB19_LVDS66_L6P	66	BB19	NA	IO, 1.8V	PL Bank66 IO6 differential positive.
250	G10	LA03_N	Board to Board Connector 2	165	PL_BC18_LVDS66_L6N	66	BC18	NA	IO, 1.8V	PL Bank66 IO6 differential negative.
251	G11	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
252	G12	LA08_P	Board to Board Connector 2	155	PL_AV21_LVDS66_L10P_QBC	66	AV21	NA	IO, 1.8V	PL Bank66 IO10 differential positive.
253	G13	LA08_N	Board to Board Connector 2	157	PL_AW21_LVDS66_L10N_QBC	66	AW21	NA	IO, 1.8V	PL Bank66 IO10 differential negative.
254	G14	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
255	G15	LA12_P	Board to Board Connector 2	175	PL_AT19_LVDS66_L13P_GC	66	AT19	NA	IO, 1.8V	PL Bank66 IO13 differential positive.
256	G16	LA12_N	Board to Board Connector 2	177	PL_AU19_LVDS66_L13N_GC	66	AU19	NA	IO, 1.8V	PL Bank66 IO13 differential negative.
257	G17	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
258	G18	LA16_P	Board to Board Connector 2	131	PL_AL20_LVDS66_L24P	66	AL20	NA	IO, 1.8V	PL Bank66 IO24 differential positive.
259	G19	LA16_N	Board to Board Connector 2	133	PL_AM20_LVDS66_L24N	66	AM20	NA	IO, 1.8V	PL Bank66 IO24 differential negative.
260	G20	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
261	G21	LA20_P	Board to Board Connector 2	145	PL_BE15_LVDS67_L2P	67	BE15	NA	IO, 1.8V	PL Bank67 IO2 differential positive.
262	G22	LA20_N	Board to Board Connector 2	143	PL_BF15_LVDS67_L2N	67	BF15	NA	IO, 1.8V	PL Bank67 IO2 differential negative.
263	G23	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
264	G24	LA22_P	Board to Board Connector 1	84	PL_BC12_LVDS68_L7P	68	BC12	NA	IO, 1.8V	PL Bank68 IO7 differential positive.
265	G25	LA22_N	Board to Board Connector 1	82	PL_BC11_LVDS68_L7N	68	BC11	NA	IO, 1.8V	PL Bank68 IO7 differential negative.
266	G26	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
267	G27	LA25_P	Board to Board Connector 1	44	PL_AN24_LVDS64_L21P	64	AN24	NA	IO, 1.8V	PL Bank64 IO21 differential positive.
268	G28	LA25_N	Board to Board Connector 1	42	PL_BF10_LVDS68_L3P	68	BF10	NA	IO, 1.8V	PL Bank68 IO3 differential positive.
269	G29	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
270	**G30**	LA29_P	Board to Board Connector 1	16	PL_AU22_LVDS64_L15P	64	AU22	NA	IO, 1.8V	PL Bank64 IO15 differential positive.
271	**G31**	LA29_N	Board to Board Connector 1	18	GPIO3_22(EC2_RXD3)	NA	NA	R2	NA	GPIO3_22 from CPU
272	**G32**	GND	NA	NA	GND	NA	NA		Power	Ground.
273	**G33**	LA31_P	Board to Board Connector 1	30	GPIO3_18(EC2_TXD0)	NA	NA	T3	NA	GPIO3_18 from CPU
274	**G34**	LA31_N	Board to Board Connector 1	28	GPIO3_17(EC2_TXD1)	NA	NA	T4	NA	GPIO3_17 from CPU
275	**G35**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
276	**G36**	LA33_P	Board to Board Connector 1	130	PL_BF24_LVDS64_L1P	64	BF24	NA	IO, 1.8V	PL Bank64 IO1 differential positive.
277	**G37**	LA33_N	Board to Board Connector 1	132	PL_BF23_LVDS64_L1N	64	BF23	NA	IO, 1.8V	PL Bank64 IO1 differential negative.
278	**G38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
279	**G39**	VADJ	NA	NA	VCC_FMC+_ADJ	NA	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
280	**G40**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
281	**H1**	VREF_A_M2C	NA	NA	NC	NA	NA	NA	NA	NC.
282	**H2**	PRSNT_M2C_L	NA	NA	NA	NA	NA	NA	I,3.3V/10K PU	Module Present Signal. This Pin is connected to 5th pin of IO Expander (U10).
283	**H3**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
284	**H4**	CLK0_M2C_P	Board To Board Connector 2	104	PL_BA12_LVDS67_L7P_QBC	67	BA12	NA	IO, 1.8V	PL Bank67 IO7 differential positive.
285	**H5**	CLK0_M2C_N	Board To Board Connector 2	106	PL_BB12_LVDS67_L7N_QBC	67	BB12	NA	IO, 1.8V	PL Bank67 IO7 differential negative.
286	**H6**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
287	**H7**	LA02_P	Board to Board Connector 2	156	PL_AR17_LVDS66_L16P_QBC	66	AR17	NA	IO, 1.8V	PL Bank66 IO16 differential positive.
288	**H8**	LA02_N	Board to Board Connector 2	158	PL_AT17_LVDS66_L16N_QBC	66	AT17	NA	IO, 1.8V	PL Bank66 IO16 differential negative.
289	**H9**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
290	**H10**	LA04_P	Board to Board Connector 2	162	PL_BF19_LVDS66_L2P	66	BF19	NA	IO, 1.8V	PL Bank66 IO2 differential positive.
291	**H11**	LA04_N	Board to Board Connector 2	160	PL_BF18_LVDS66_L2N	66	BF18	NA	IO, 1.8V	PL Bank66 IO2 differential negative.
292	**H12**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
293	**H13**	LA07_P	Board to Board Connector 2	151	PL_AY18_LVDS66_L8P	66	AY18	NA	IO, 1.8V	PL Bank66 IO8 differential positive.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
294	H14	LA07_N	Board to Board Connector 2	153	PL_BA18_LVDS66_L8N	66	BA18	NA	IO, 1.8V	PL Bank66 IO8 differential negative.
295	H15	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
296	H16	LA11_P	Board to Board Connector 2	170	PL_AV19_LVDS66_L12P_GC	66	AV19	NA	IO, 1.8V	PL Bank66 IO12 differential positive.
297	H17	LA11_N	Board to Board Connector 2	172	PL_AW19_LVDS66_L12N_GC	66	AW19	NA	IO, 1.8V	PL Bank66 IO12 differential negative.
298	H18	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
299	H19	LA15_P	Board to Board Connector 2	182	PL_AY17_LVDS66_L7P_QBC	66	AY17	NA	IO, 1.8V	PL Bank66 IO7 differential positive.
300	H20	LA15_N	Board to Board Connector 2	184	PL_BA17_LVDS66_L7N_QBC	66	BA17	NA	IO, 1.8V	PL Bank66 IO7 differential negative.
301	H21	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
302	H22	LA19_P	Board to Board Connector 2	140	PL_AL19_LVDS66_L23P	66	AL19	NA	IO, 1.8V	PL Bank66 IO23 differential positive.
303	H23	LA19_N	Board to Board Connector 2	142	PL_AM19_LVDS66_L23N	66	AM19	NA	IO, 1.8V	PL Bank66 IO23 differential negative.
304	H24	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
305	H25	LA21_P	Board to Board Connector 2	139	PL_BD15_LVDS67_L5P	67	BD15	NA	IO, 1.8V	PL Bank67 IO5 differential positive.
306	H26	LA21_N	Board to Board Connector 2	141	PL_BD14_LVDS67_L5N	67	BD14	NA	IO, 1.8V	PL Bank67 IO5 differential negative.
307	H27	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
308	H28	LA24_P	Board to Board Connector 1	12	PL_AL22_LVDS64_L23P	64	AL22	NA	IO, 1.8V	PL Bank64 IO23 differential positive.
309	H29	LA24_N	Board to Board Connector 1	14	PL_AM22_LVDS64_L23N	64	AM22	NA	IO, 1.8V	PL Bank64 IO23 differential negative.
310	H30	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
311	H31	LA28_P	Board to Board Connector 1	31	PL_AL24_LVDS64_L22P	64	AL24	NA	IO, 1.8V	PL Bank64 IO22 differential positive.
312	H32	LA28_N	Board to Board Connector 1	33	PL_AM24_LVDS64_L22N	64	AM24	NA	IO, 1.8V	PL Bank64 IO22 differential negative.
313	H33	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
314	H34	LA30_P	Board to Board Connector 1	58	PL_BB11_LVDS68_L8P	68	BB11	NA	IO, 1.8V	PL Bank68 IO8 differential positive.
315	H35	LA30_N	Board to Board Connector 1	56	PL_BB10_LVDS68_L8N	68	BB10	NA	IO, 1.8V	PL Bank68 IO8 differential negative.
316	H36	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
317	H37	LA32_P	Board to Board Connector 1	91	PL_AR23_LVDS64_L17P	64	AR23	NA	IO, 1.8V	PL Bank64 IO17differential positive.
318	H38	LA32_N	Board to Board Connector 1	93	PL_AT23_LVDS64_L17N	64	AT23	NA	IO, 1.8V	PL Bank64 IO17 differential negative.
319	H39	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
320	**H40**	VADJ	NA	NA	VCC_FMC+_ADJ	NA	NA	NA	O, 1.8V Power	Carrier Board Supply Voltage.
321	**J1**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
322	**J2**	CLK3_BIDIR_P	NA	NA	NC	NA	NA	NA	NA	NC.
323	**J3**	CLK3_BIDIR_N	NA	NA	NC	NA	NA	NA	NA	NC.
324	**J4**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
325	**J5**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
326	**J6**	HA03_P	Board to Board Connector 1	238	PL_AY23_LVDS64_L12P_GC	64	AY23	NA	IO, 1.8V	PL Bank64 IO12 differential positive.
327	**J7**	HA03_N	Board to Board Connector 1	236	PL_BA23_LVDS64_L12N_GC	64	BA23	NA	IO, 1.8V	PL Bank64 IO12 differential negative.
328	**J8**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
329	**J9**	HA07_P	Board to Board Connector 1	147	PL_BE7_LVDS68_L1P	68	BE7	NA	IO, 1.8V	PL Bank68 IO1 differential positive.
330	**J10**	HA07_N	Board to Board Connector 1	149	PL_BF7_LVDS68_L1N	68	BF7	NA	IO, 1.8V	PL Bank68 IO1 differential negative.
331	**J11**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
332	**J12**	HA11_P	Board to Board Connector 1	154	PL_BB22_LVDS64_L9P	64	BB22	NA	IO, 1.8V	PL Bank64 IO9 differential positive.
333	**J13**	HA11_N	Board to Board Connector 1	152	PL_BC22_LVDS64_L9N	64	BC22	NA	IO, 1.8V	PL Bank64 IO9 differential negative.
334	**J14**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
335	**J15**	HA14_P	NA	NA	NC	NA	NA	NA	NA	NC.
336	**J16**	HA14_N	NA	NA	NC	NA	NA	NA	NA	NC.
337	**J17**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
338	**J18**	HA18_P	Board to Board Connector 1	172	PL_BC24_LVDS64_L3P	64	BC24	NA	IO, 1.8V	PL Bank64 IO3 differential positive.
339	**J19**	HA18_N	NA	NA	NC	NA	NA	NA	NA	NC.
340	**J20**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
341	**J21**	HA22_P	NA	NA	NC	NA	NA	NA	NA	NC.
342	**J22**	HA22_N	NA	NA	NC	NA	NA	NA	NA	NC.
343	**J23**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
344	**J24**	HB01_P	NA	NA	NC	NA	NA	NA	NA	NC.
345	**J25**	HB01_N	NA	NA	NC	NA	NA	NA	NA	NC.
346	**J26**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
347	**J27**	HB07_P	NA	NA	NC	NA	NA	NA	NA	NC.
348	**J28**	HB07_N	NA	NA	NC	NA	NA	NA	NA	NC.
349	**J29**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
350	**J30**	HB11_P	NA	NA	NC	NA	NA	NA	NA	NC.
351	**J31**	HB11_N	NA	NA	NC	NA	NA	NA	NA	NC.
352	**J32**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
353	**J33**	HB15_P	NA	NA	NC	NA	NA	NA	NA	NC.
354	**J34**	HB15_N	NA	NA	NC	NA	NA	NA	NA	NC.
355	**J35**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
356	**J36**	HB18_P	NA	NA	NC	NA	NA	NA	NA	NC.
357	**J37**	HB18_N	NA	NA	NC	NA	NA	NA	NA	NC.
358	**J38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
359	**J39**	VIO_B_M2C	NA	NA	NC	NA	NA	NA	NA	NC.
360	**J40**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
361	**K1**	VREF_B_M2C	NA	NA	NC	NA	NA	NA	NA	NC.
362	**K2**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
363	**K3**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
364	**K4**	CLK2_BIDIR_P	NA	NA	NA	NA	NA	NA	NA	NA
365	**K5**	CLK2_BIDIR_N	NA	NA	NA	NA	NA	NA	NA	NA
366	**K6**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
367	**K7**	HA02_P	Board to Board Connector 1	108	PL_BD20_LVDS64_L6P	64	BD20	NA	IO, 1.8V	PL Bank64 IO6 differential positive.
368	**K8**	HA02_N	Board to Board Connector 1	106	PL_BE20_LVDS64_L6N	64	BE20	NA	IO, 1.8V	PL Bank64 IO6 differential negative.
369	**K9**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
370	**K10**	HA06_P	NA	NA	NC	NA	NA	NA	NA	NC.
371	**K11**	HA06_N	Board to Board Connector 1	104	PL_BF22_LVDS64_L4N	64	BF22	NA	IO, 1.8V	PL Bank64 IO4 differential negative.
372	**K12**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
373	**K13**	HA10_P	Board to Board Connector 1	136	PL_BA20_LVDS64_L7P	90	BA20	NA	IO, 1.8V	PL Bank64 IO7 differential positive.
374	**K14**	HA10_N	Board to Board Connector 1	138	PL_BB20_LVDS64_L7N	90	BB20	NA	IO, 1.8V	PL Bank64 IO7 differential negative.
375	**K15**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
376	**K16**	HA17_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
377	**K17**	HA17_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.
378	**K18**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
379	**K19**	HA21_P	NA	NA	NC	NA	NA	NA	NA	NC.
380	**K20**	HA21_N	NA	NA	NC	NA	NA	NA	NA	NC.
381	**K21**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
382	**K22**	HA23_P	NA	NA	NC	NA	NA	NA	NA	NC.
383	**K23**	HA23_N	NA	NA	NC	NA	NA	NA	NA	NC.
384	**K24**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
385	**K25**	HB00_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
386	**K26**	HB00_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
387	**K27**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
388	**K28**	HB06_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
389	**K29**	HB06_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.
390	**K30**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
391	**K31**	HB10_P	NA	NA	NC	NA	NA	NA	NA	NC.
392	**K32**	HB10_N	NA	NA	NC	NA	NA	NA	NA	NC.
393	**K33**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
394	**K34**	HB14_P	NA	NA	NC	NA	NA	NA	NA	NC.
395	**K35**	HB14_N	NA	NA	NC	NA	NA	NA	NA	NC.
396	**K36**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
397	**K37**	HB17_P_CC	NA	NA	NC	NA	NA	NA	NA	NC.
398	**K38**	HB17_N_CC	NA	NA	NC	NA	NA	NA	NA	NC.
399	**K39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
400	**K40**	VIO_B_M2C	NA	NA	NC	NA	NA	NA	NA	NC.
401	**L1**	RES1	NA	NA	NC	NA	NA	NA	NA	NC.
402	**L2**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
403	**L3**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
404	**L4**	GBTCLK4_M2C_P	Board to Board Connector 3	B42	GTREFCLK0P_129	129	AC36	NA	I, DIFF	GTY Bank129 differential reference clock0 positive.
405	**L5**	GBTCLK4_M2C_N	Board to Board Connector 3	B43	GTREFCLK0N_129	129	AC37	NA	I, DIFF	GTY Bank129 differential reference clock0 negative.
406	**L6**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
407	**L7**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
408	**L8**	GBTCLK3_M2C_P	Board to Board Connector 4	A6	GTREFCLK0P_226	226	AM11	NA	I, DIFF	GTY Bank226 differential reference clock0 positive.
409	**L9**	GBTCLK3_M2C_N	Board to Board Connector 4	A7	GTREFCLK0N_226	226	AM10	NA	I, DIFF	GTY Bank226 differential reference clock0 negative.
410	**L10**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
411	**L11**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
412	**L12**	GBTCLK2_M2C_P	Board to Board Connector 3	C48	GTREFCLK0P_232	232	H11	NA	I, DIFF	GTY Bank232 differential reference clock0 positive.
413	**L13**	GBTCLK2_M2C_N	Board to Board Connector 3	C49	GTREFCLK0N_232	232	H10	NA	I, DIFF	GTY Bank232 differential reference clock0 Negative.
414	**L14**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
415	**L15**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
416	**L16**	SYNC_C2M_P	NA	NA	NC	NA	NA	NA	NA	NC.
417	**L17**	SYNC_C2M_N	NA	NA	NC	NA	NA	NA	NA	NC.
418	**L18**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
419	**L19**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
420	**L20**	REFCLK_C2M_P	NA	NA	NC	NA	NA	NA	NA	NC.
421	**L21**	REFCLK_C2M_N	NA	NA	NC	NA	NA	NA	NA	NC.
422	**L22**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
423	**L23**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
424	**L24**	REFCLK_M2C_P	NA	NA	NC	NA	NA	NA	NA	NC.
425	**L25**	REFCLK_M2C_N	NA	NA	NC	NA	NA	NA	NA	NC.
426	**L26**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
427	**L27**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
428	**L28**	SYNC_M2C_P	NA	NA	NC	NA	NA	NA	NA	NC.
429	**L29**	SYNC_M2C_N	NA	NA	NC	NA	NA	NA	NA	NC.
430	**L30**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
431	**L31**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
432	**L32**	RES2	NA	NA	NC	NA	NA	NA	NA	NC.
433	**L33**	RES3	NA	NA	NC	NA	NA	NA	NA	NC.
434	**L34**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
435	**L35**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
436	**L36**	12P0V	NA	NA	VCC_12V_FMC+	NA	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
437	**L37**	12P0V	NA	NA	VCC_12V_FMC+	NA	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
438	**L38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
439	**L39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
440	**L40**	12P0V	NA	NA	VCC_12V_FMC+	NA	NA	NA	O, 12V Power	Carrier Board Supply Voltage.
441	**M1**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
442	**M2**	DP23_M2C_P	Board to Board Connector 4	D16	GTYRXP3_126	126	AK43	NA	I, DIFF	GTY Bank126 channel3 High speed differential receiver positive.
443	**M3**	DP23_M2C_N	Board to Board Connector 4	D17	GTYRXN3_126	126	AK44	NA	I, DIFF	GTY Bank126 channel3 High speed differential receiver negative.
444	**M4**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
445	**M5**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
446	**M6**	DP22_M2C_P	Board to Board Connector 4	C14	GTYRXP2_126	126	AL45	NA	I, DIFF	GTY Bank126 channel2 High speed differential receiver positive.
447	**M7**	DP22_M2C_N	Board to Board Connector 4	C15	GTYRXN2_126	126	AL46	NA	I, DIFF	GTY Bank126 channel2 High speed differential receiver negative.
448	**M8**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
449	**M9**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
450	**M10**	DP21_M2C_P	Board to Board Connector 4	D13	GTYRXP1_126	126	AM43	NA	I, DIFF	GTY Bank126 channel1 High speed differential receiver positive.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
451	**M11**	DP21_M2C_N	Board to Board Connector 4	D12	GTYRXN1_126	126	AM44	NA	I, DIFF	GTY Bank126 channel1 High speed differential receiver negative.
452	**M12**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
453	**M13**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
454	**M14**	DP20_M2C_P	Board to Board Connector 4	C19	GTYRXP0_126	126	AN45	NA	I, DIFF	GTY Bank126 channel0 High speed differential receiver positive.
455	**M15**	DP20_M2C_N	Board to Board Connector 4	C18	GTYRXN0_126	126	AN46	NA	I, DIFF	GTY Bank126 channel0 High speed differential receiver negative.
456	**M16**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
457	**M17**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
458	**M18**	DP14_C2M_P	Board to Board Connector 4	A18	GTYTXP2_226	226	AL9	NA	O, DIFF	GTY Bank226 channel2 High speed differential transmitter positive.
459	**M19**	DP14_C2M_N	Board to Board Connector 4	A19	GTYTXN2_226	226	AL8	NA	O, DIFF	GTY Bank226 channel2 High speed differential transmitter negative.
460	**M20**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
461	**M21**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
462	**M22**	DP15_C2M_P	Board to Board Connector 4	B12	GTYTXP3_226	226	AK7	NA	O, DIFF	GTY Bank226 channel3 High speed differential transmitter positive.
463	**M23**	DP15_C2M_N	Board to Board Connector 4	B13	GTYTXN3_226	226	AK6	NA	O, DIFF	GTY Bank226 channel3 High speed differential transmitter negative.
464	**M24**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
465	**M25**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
466	**M26**	DP16_C2M_P	Board to Board Connector 3	A44	GTYTXP0_129	129	AA40	NA	O, DIFF	GTY Bank129 channel0 High speed differential transmitter positive.
467	**M27**	DP16_C2M_N	Board to Board Connector 3	A45	GTYTXN0_129	129	AA41	NA	O, DIFF	GTY Bank129 channel0 High speed differential transmitter negative.
468	**M28**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
469	**M29**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
470	**M30**	DP17_C2M_N	Board to Board Connector 3	B46	GTYTXP1_129	129	Y38	NA	O, DIFF	GTY Bank129 channel1 High speed differential transmitter positive.
471	**M31**	DP17_C2M_N	Board to Board Connector 3	B47	GTYTXN1_129	129	Y39	NA	O, DIFF	GTY Bank129 channel1 High speed differential transmitter negative.
472	**M32**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
473	**M33**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
474	**M34**	DP18_C2M_P	Board to Board Connector 3	A52	GTYTXP2_129	129	W40	NA	O, DIFF	GTY Bank129 channel2 High speed differential transmitter positive.
475	**M35**	DP18_C2M_N	Board to Board Connector 3	A53	GTYTXN2_129	129	W41	NA	O, DIFF	GTY Bank129 channel2 High speed differential transmitter negative.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
476	M36	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
477	M37	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
478	M38	DP19_C2M_P	Board to Board Connector 3	A48	GTYTXP3_129	129	V38	NA	O, DIFF	GTY Bank129 channel3 High speed differential transmitter positive.
479	M39	DP19_C2M_N	Board to Board Connector 3	A49	GTYTXN3_129	129	V39	NA	O, DIFF	GTY Bank129 channel3 High speed differential transmitter negative.
480	M40	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
481	Y1	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
482	Y2	DP23_C2M_P	Board to Board Connector 4	C6	GTYTXP3_126	126	AK38	NA	O, DIFF	GTY Bank126 channel3 High speed differential transmitter positive.
483	Y3	DP23_C2M_N	Board to Board Connector 4	C7	GTYTXN3_126	126	AK39	NA	O, DIFF	GTY Bank126 channel3 High speed differential transmitter negative.
484	Y4	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
485	Y5	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
486	Y6	DP21_C2M_P	Board to Board Connector 4	D4	GTYTXP1_126	126	AM38	NA	O, DIFF	GTY Bank126 channel1 High speed differential transmitter positive.
487	Y7	DP21_C2M_N	Board to Board Connector 4	D5	GTYTXN1_126	126	AM39	NA	O, DIFF	GTY Bank126 channel1 High speed differential transmitter negative.
488	Y8	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
489	Y9	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
490	Y10	DP10_M2C_P	Board to Board Connector 3	C45	GTYRXP2_232	232	G4	NA	I, DIFF	GTY Bank232 channel2 High speed differential receiver positive.
491	Y11	DP10_M2C_N	Board to Board Connector 3	C44	GTYRXN2_232	232	G3	NA	I, DIFF	GTY Bank232 channel2 High speed differential receiver Negative.
492	Y12	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
493	Y13	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
494	Y14	DP12_M2C_P	Board to Board Connector 4	B17	GTYRXP0_226	226	AN4	NA	I, DIFF	GTY Bank226 channel0 High speed differential receiver positive.
495	Y15	DP12_M2C_N	Board to Board Connector 4	B16	GTYRXN0_226	226	AN3	NA	I, DIFF	GTY Bank226 channel0 High speed differential receiver negative.
496	Y16	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
497	Y17	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
498	Y18	DP14_M2C_P	Board to Board Connector 4	B9	GTYRXP2_226	226	AL4	NA	I, DIFF	GTY Bank226 channel2 High speed differential receiver positive.
499	Y19	DP14_M2C_N	Board to Board Connector 4	B8	GTYRXN2_226	226	AL3	NA	I, DIFF	GTY Bank226 channel2 High speed differential receiver negative.
500	Y20	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
501	Y21	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
502	**Y22**	DP15_M2C_P	Board to Board Connector 4	B5	GTYRXP3_226	226	AK2	NA	I, DIFF	GTY Bank226 channel3 High speed differential receiver positive.
503	**Y23**	DP15_M2C_N	Board to Board Connector 4	B4	GTYRXN3_226	226	AK1	NA	I, DIFF	GTY Bank226 channel3 High speed differential receiver negative.
504	**Y24**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
505	**Y25**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
506	**Y26**	DP11_C2M_P	Board to Board Connector 3	D58	GTYTXP3_232	232	F7	NA	O, DIFF	GTY Bank232 channel3 High speed differential Transmitter positive.
507	**Y27**	DP11_C2M_N	Board to Board Connector 3	D59	GTYTXN3_232	232	F6	NA	O, DIFF	GTY Bank232 channel3 High speed differential Transmitter Negative.
508	**Y28**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
509	**Y29**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
510	**Y30**	DP13_C2M_P	Board to Board Connector 4	A14	GTYTXP1_226	226	AM7	NA	O, DIFF	GTY Bank226 channel1 High speed differential transmitter positive.
511	**Y31**	DP13_C2M_N	Board to Board Connector 4	A15	GTYTXN1_226	226	AM6	NA	O, DIFF	GTY Bank226 channel1 High speed differential transmitter negative.
512	**Y32**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
513	**Y33**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
514	**Y34**	DP17_M2C_P	Board to Board Connector 3	A56	GTYRXP1_129	129	Y43	NA	I, DIFF	GTY Bank129 channel1 High speed differential receiver positive.
515	**Y35**	DP17_M2C_N	Board to Board Connector 3	A57	GTYRXN1_129	129	Y44	NA	I, DIFF	GTY Bank129 channel1 High speed differential receiver negative.
516	**Y36**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
517	**Y37**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
518	**Y38**	DP19_M2C_P	Board to Board Connector 3	B58	GTYRXP3_129	129	V43	NA	I, DIFF	GTY Bank129 channel3 High speed differential receiver positive.
519	**Y39**	DP19_M2C_N	Board to Board Connector 3	B59	GTYRXN3_129	129	V44	NA	I, DIFF	GTY Bank129 channel3 High speed differential receiver negative.
520	**Y40**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
521	**Z1**	HSPC_PRSNT_M2C_L	NA	NA	NA	NA	NA	NA	I,3.3V/10K PU	FMC+ Module Present Signal. This Pin is connected to 6th pin of IO Expander (U10).
522	**Z2**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
523	**Z3**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
524	**Z4**	DP22_C2M_P	Board to Board Connector 4	C11	GTYTXP2_126	126	AL40	NA	O, DIFF	GTY Bank126 channel2 High speed differential transmitter positive.
525	**Z5**	DP22_C2M_N	Board to Board Connector 4	C10	GTYTXN2_126	126	AL41	NA	O, DIFF	GTY Bank126 channel2 High speed differential transmitter negative.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
526	**Z6**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
527	**Z7**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
528	**Z8**	DP20_C2M_P	Board to Board Connector 4	C2	GTYTXP0_126	126	AN40	NA	O, DIFF	GTY Bank126 channel0 High speed differential transmitter positive.
529	**Z9**	DP20_C2M_N	Board to Board Connector 4	C3	GTYTXN0_126	126	AN41	NA	O, DIFF	GTY Bank126 channel0 High speed differential transmitter negative.
530	**Z10**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
531	**Z11**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
532	**Z12**	DP11_M2C_P	Board to Board Connector 3	D47	GTYRXP3_232	232	F2	NA	I, DIFF	GTY Bank232 channel3 High speed differential receiver positive.
533	**Z13**	DP11_M2C_N	Board to Board Connector 3	D46	GTYRXN3_232	232	F1	NA	I, DIFF	GTY Bank232 channel3 High speed differential receiver Negative.
534	**Z14**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
535	**Z15**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
536	**Z16**	DP13_M2C_P	Board to Board Connector 4	A3	GTYRXP1_226	226	AM2	NA	I, DIFF	GTY Bank226 channel1 High speed differential receiver positive.
537	**Z17**	DP13_M2C_N	Board to Board Connector 4	A2	GTYRXN1_226	226	AM1	NA	I, DIFF	GTY Bank226 channel1 High speed differential receiver negative.
538	**Z18**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
539	**Z19**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
540	**Z20**	GBTCLK5_M2C_P	Board to Board Connector 4	D9	GTREFCLK0P_126	126	AR36	NA	I, DIFF	GTY Bank126 differential reference clock0 positive.
541	**Z21**	GBTCLK5_M2C_N	Board to Board Connector 4	D8	GTREFCLK0N_126	126	AR37	NA	I, DIFF	GTY Bank126 differential reference clock0 negative.
542	**Z22**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
543	**Z23**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
544	**Z24**	DP10_C2M_P	Board to Board Connector 3	D54	GTYTXP2_232	232	G9	NA	O, DIFF	GTY Bank232 channel2 High speed differential Transmitter positive.
545	**Z25**	DP10_C2M_N	Board to Board Connector 3	D55	GTYTXN2_232	232	G8	NA	O, DIFF	GTY Bank232 channel2 High speed differential Transmitter Negative.
546	**Z26**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
547	**Z27**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
548	**Z28**	DP12_C2M_P	Board to Board Connector 4	A10	GTYTXP0_226	226	AN9	NA	O, DIFF	GTY Bank226 channel0 High speed differential transmitter positive.
549	**Z29**	DP12_C2M_N	Board to Board Connector 4	A11	GTYTXN0_226	226	AN8	NA	O, DIFF	GTY Bank226 channel0 High speed differential transmitter negative.
550	**Z30**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
551	**Z31**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.

Sl.no	FMC+ Connector VITA		Board to Board Connectors			Virtex UltraScale+ FPGA(FHGB2104)				Description
	FMC+ Connector Pin No	FMC+ Connector Pin Name	Board to Board Connector Number	Board to Board Connector Pin Number	Board to Board Connector Signal Name (SOM)	FPGA Bank	FPGA Pin No	LS1021A Pin No	Signal Type/ Termination*	
552	**Z32**	DP16_M2C_P	Board to Board Connector 3	B50	GTYRXP0_129	129	AA45	NA	I, DIFF	GTY Bank129 channel0 High speed differential receiver positive.
553	**Z33**	DP16_M2C_N	Board to Board Connector 3	B51	GTYRXN0_129	129	AA46	NA	I, DIFF	GTY Bank129 channel0 High speed differential receiver negative.
554	**Z34**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
555	**Z35**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
556	**Z36**	DP18_M2C_P	Board to Board Connector 3	B54	GTYRXP2_129	129	W45	NA	I, DIFF	GTY Bank129 channel2 High speed differential receiver positive.
557	**Z37**	DP18_M2C_N	Board to Board Connector 3	B55	GTYRXN2_129	129	W46	NA	I, DIFF	GTY Bank129 channel2 High speed differential receiver negative.
558	**Z38**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
559	**Z39**	GND	NA	NA	GND	NA	NA	NA	Power	Ground.
560	**Z40**	3P3V	NA	NA	VCC_3V3_FMC+	NA	NA	NA	O, 3.3V Power	Carrier Board Supply Voltage.

Note:

** FMC+ connector supports VADJ 1.8V and 1.2V. By default, VADJ is set to 1.8V. Contact iWave for further details.*

** If VCC_FMC+_ADJ voltage changed from default value 1.8 to 1.2V, please make sure that SOM concern IO voltage also to be modified to avoid IO conflict.*

**IO Type of IOs originating from Virtex UltraScale+ FPGA is configurable. Hence for exact IO type configuration options, refer Xilinx Virtex UltraScale+ FPGA datasheet.*

2.6 Additional Features

2.6.1 Clock Synthesizers

The Virtex UltraScale+ FPGA Carrier board supports two 10-output Clock Synthesizer "SI5341B-D-GM" for on board clock distribution. This Clock Generator outputs are connected to FPGA-GTY, SerDes Reference clock on Board-to-Board Connectors through 0.01uF AC coupling capacitors. An external 48MHz crystal is connected to this Clock Synthesizer for reference. This Clock Synthesizer supports from 100 Hz to 1028 MHz clock output and configurable through I2C0.

Table 13: Clock Synthesizer 1 Output Clocks

Pin No	Pin Name	Signal Name	Programmed Frequency	Connected To
23	OUT0	NC	-	NA
24	OUT0b	NC		NA
27	OUT1	GTREFCLK0P_125	156.25MHz	B2B-2 188th pin.
28	OUT1b	GTREFCLK0N_125		B2B-2 190th pin.
30	OUT2	HS_TXVR2_RX_CH5p	-	B2B-1 171st pin.
31	OUT2b	HS_TXVR2_RX_CH5n		B2B-1 169th pin.
34	OUT3	NC	-	NA
35	OUT3b	NC		NA
37	OUT4	PCIex4_REFCLKP	100MHz	PCIe x4 connector A13th pin.
38	OUT4b	PCIex4_REFCLKN		PCIe x4 connector A14th pin.
41	OUT5	LS_SD1_REF_CLK2_P	100MHz	B2B-1 77th pin.
42	OUT5b	LS_SD1_REF_CLK2_N		B2B-1 75th pin.
44	OUT6	GTREFCLK1P_224	156.25MHz	B2B-1 64th pin.
45	OUT6b	GTREFCLK1N_224		B2B-1 66th pin.
50	OUT7	GTREFCLK1P_225	156.25MHz	B2B-1 158th pin.
51	OUT7b	GTREFCLK1N_225		B2B-1 160th pin.
53	OUT8	GTREFCLK1P_124	156.25MHz	B2B-1 218th pin.
54	OUT8b	GTREFCLK1N_124		B2B-1 220th pin.
58	OUT9	GTREFCLK1P_125	156.25MHz	B2B-2 223rd pin.
59	OUT9b	GTREFCLK1N_125		B2B-2 225th pin.

Table 14: Clock Synthesizer 2 Output Clocks

Pin No	Pin Name	Signal Name	Programmed Frequency	Connected To
23	OUT0	GTREFCLK1P_232	156.25MHz	B2B-3 A2nd pin.
24	OUT0b	GTREFCLK1N_232		B2B-3 A1st pin.
27	OUT1	GTREFCLK1P_230	156.25MHz	B2B-3 A21st pin.
28	OUT1b	GTREFCLK1N_230		B2B-3 A20th pin.
30	OUT2	GTREFCLK1P_231	156.25MHz	B2B-3 C17th pin.
31	OUT2b	GTREFCLK1N_231		B2B-3 C16th pin.
34	OUT3	GTREFCLK1P_226	156.25MHz	B2B-4 B2nd pin.
35	OUT3b	GTREFCLK1N_226		B2B-4 B1st pin.
37	OUT4	GTREFCLK0P_230	100MHz	B2B-3 B19th pin.
38	OUT4b	GTREFCLK0N_230		B2B-3 B18th pin.
41	OUT5	GTREFCLK1P_126	156.25MHz	B2B-4 D20th pin.
42	OUT5b	GTREFCLK1N_126		B2B-4 D19th pin.
44	OUT6	GTREFCLK1P_227	156.25MHz	B2B-3 D39th pin.
45	OUT6b	GTREFCLK1N_227		B2B-3 D38th pin.
50	OUT7	GTREFCLK1P_229	156.25MHz	B2B-3 B34th pin.
51	OUT7b	GTREFCLK1N_229		B2B-3 B35th pin.
53	OUT8	GTREFCLK1N_129	156.25MHz	B2B-3 A59th pin.
54	OUT8b	GTREFCLK1P_129		B2B-3 A60th pin.
58	OUT9	B2B_GTREFCLK0P_227	100MHz	B2B-3 D2nd pin.
59	OUT9b	B2B_GTREFCLK0N_227		B2B-3 D3rd pin

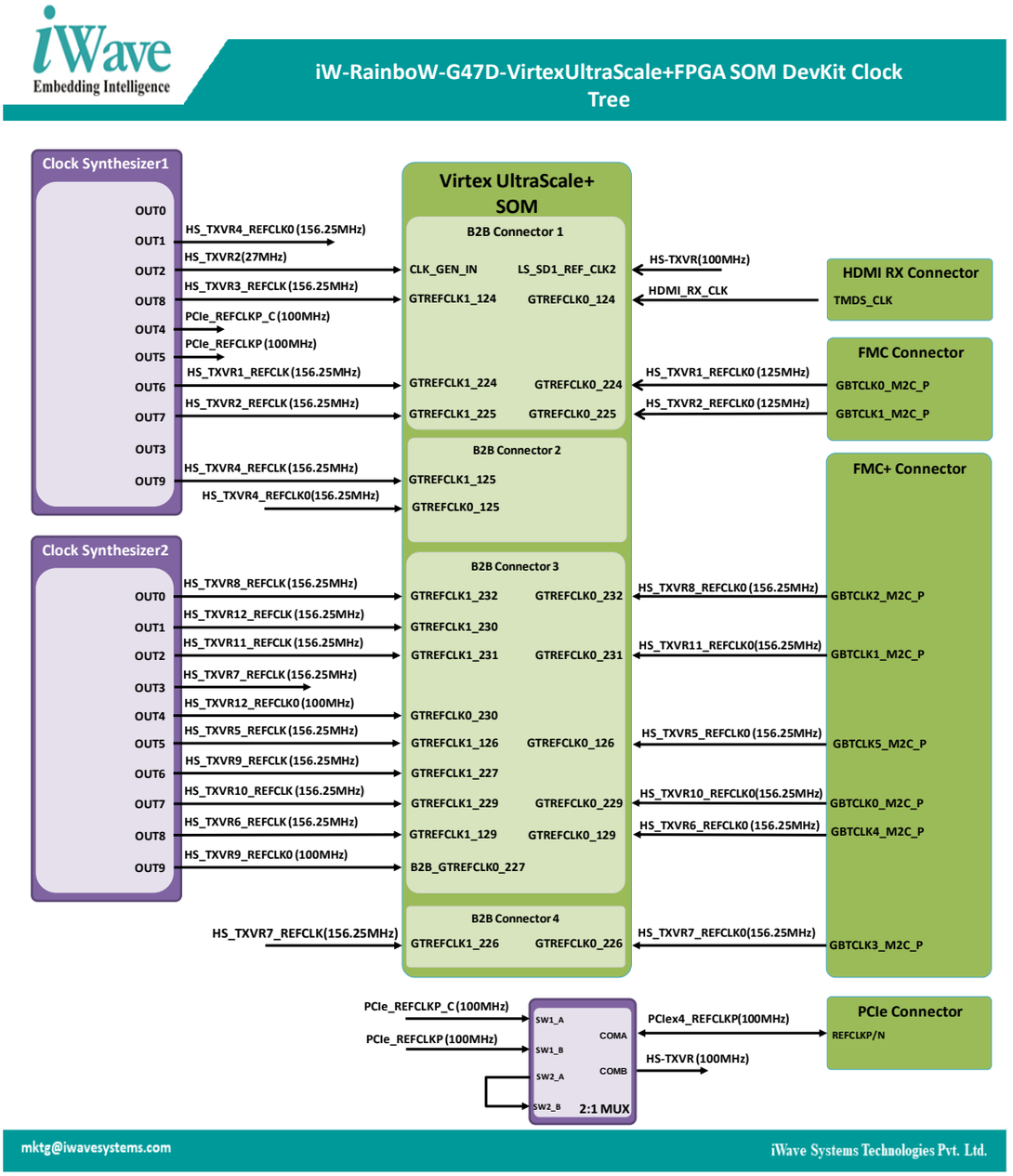


Figure 27: Clock Tree

2.6.2 JTAG Connector

A Standard Xilinx 14-pin JTAG Header is available in Virtex UltraScale+ FPGA Carrier board for debug purpose. Virtex UltraScale+ SOM share a common pinout for both FPGA and CPU JTAG signals on board-to-board connector. The JTAG signals are muxed to board-to-board connector using mux/demux switch in SOM. The logic level on JTAG_SEL signal of 224th pin on board-to-board connector2 selects the JTAG chain on JTAG Header (J8) and same JTAG signals are also connected to FMC+ & FMC connector. JTAG-HS2/ JTAG-HS3 programming cable can be plugged to this JTAG Header for programming and debugging purpose of FPGA and for LS1021A CodeWarrior TAP is connected.

Virtex UltraScale+ Carrier board supports JTAG selection using Bit2 of SW6. Refer the below table for JTAG selection details.

Table 15: JTAG Selection

JTAG Device	SW6 (4 Position Switch)	
	SW6.2	Switch Position Image
FPGA	OFF	
LS1021A	ON	

This JTAG Header (J8) is physically located at the top of the board as shown below.

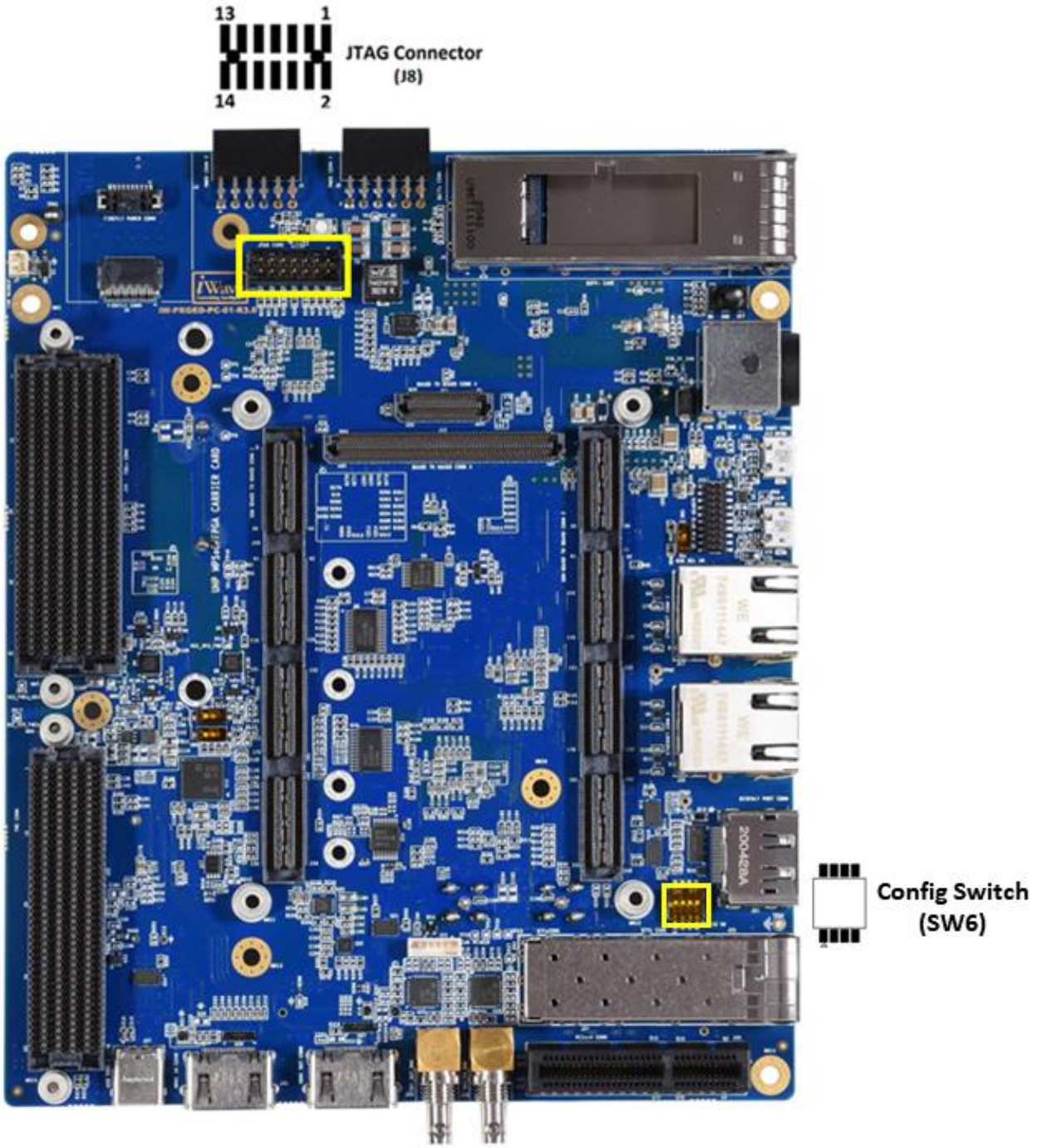


Figure 28: JTAG Connector

Table 16: JTAG Header Pin Assignment

Pin No	Signal Name	Signal Type/ Termination	Description
1	NC	-	Not Connected
2	VCC_3V3	O, 3.3V Power	3V3 Supply Voltage.
3	GND	Power	Ground
4	JTAG_TMS	I, 3V3 LVCMOS	JTAG test mode select.
5	GND	Power	Ground
6	JTAG_TCK	I, 3V3 LVCMOS/ 3K PU	JTAG test Clock
7	GND	Power	Ground
8	JTAG_TDO	O,3V3 LVCMOS	JTAG test data output.
9	GND	Power	Ground
10	JTAG_TDI	I, 3V3 LVCMOS	JTAG test data input
11	GND	Power	Ground
12	NC	-	Not Connected
13	GND	Power	Ground
14	JTAG_TRSTB	I, 3V3 LVCMOS/ 1K PU	Not Connected

2.6.3 Pmod Host Port Connectors

Pmod interface or Peripheral Module interface is a standard defined by Digilent Inc. The Pmod interface is used to connect low frequency, low I/O pin count peripheral modules to host controller boards. There are twelve-pin of the interface defined, encompassing I²C1, LPUART and GPIO protocols.

The Virtex UltraScale+ FPGA Carrier board supports two 12pin Pmod host port connector for plugging Pmod modules. Since Pmod interface specification requires 3.3V IO level, the signals from Board-to-Board connector are connected to Pmod Connectors through Voltage level translator. Pmod Host port connector1 (J2) and Connector2 (J1) are physically located at the top of the board as shown below.

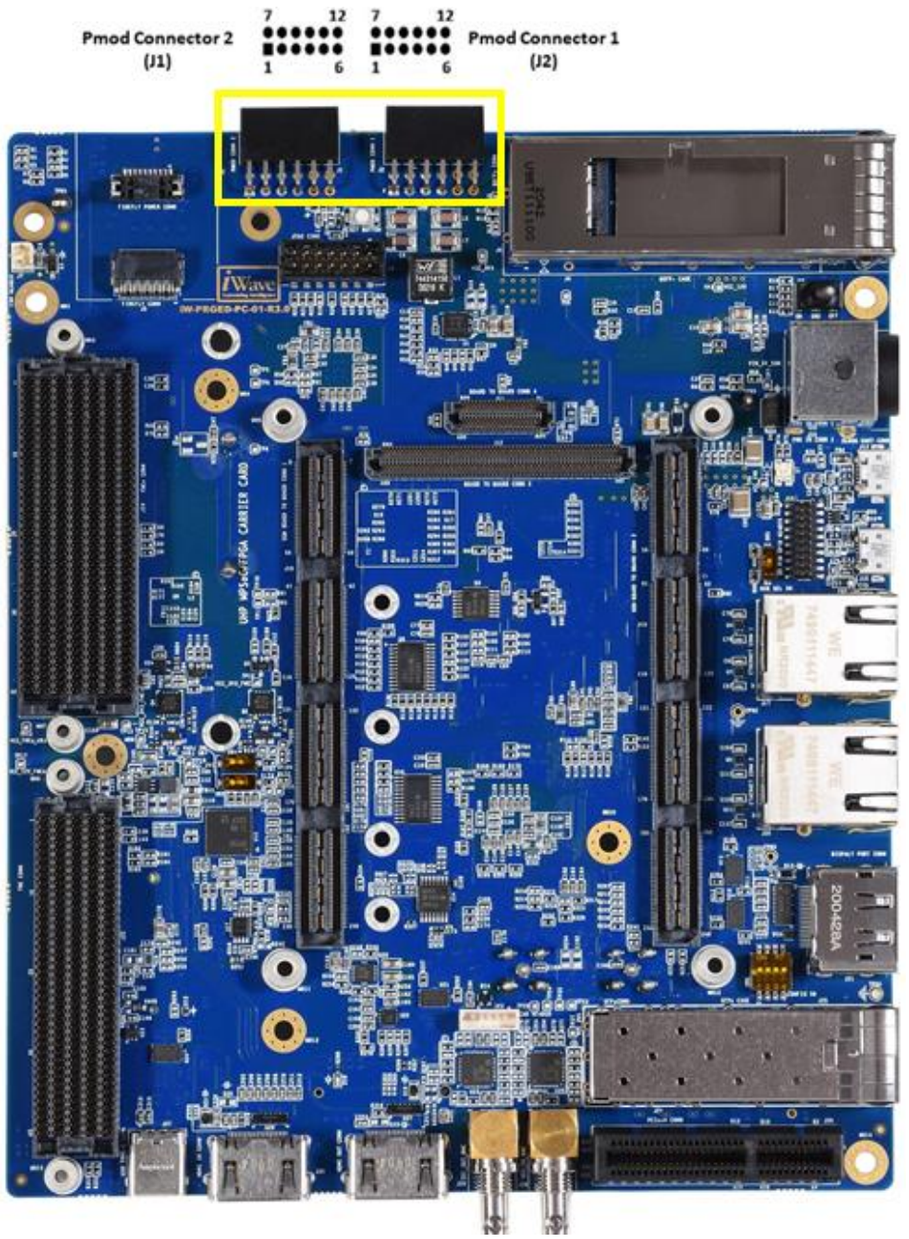


Figure 29: Pmod Host Port Connectors

Table 17: Pmod Connector1 Pin Assignment

Pin No	Signal Name	Signal Type/ Termination	Description
1	PL_AY11_LVDS67_L8N	IO, 3V3 LVCMOS	General purpose Input Output.
2	LS_LPUART5_SIN	IO, 3V3 LVCMOS	General purpose Input Output.
3	LS_IIC2_SDA	IO, 3V3 LVCMOS	General purpose Input Output.
4	PL_AV16_LVDS67_L18N	IO, 3V3 LVCMOS	General purpose Input Output.
5	GND	Power	Ground.
6	VCC_3V3	O, 3.3V Power	3V3 Supply Voltage.
7	PL_AY12_LVDS67_L8P	IO, 3V3 LVCMOS	General purpose Input Output.
8	LS_LPUART5_SOUT	IO, 3V3 LVCMOS	General purpose Input Output.
9	LS_IIC2_SCL	IO, 3V3 LVCMOS	General purpose Input Output.
10	PL_AU16_LVDS67_L18P	IO, 3V3 LVCMOS	General purpose Input Output.
11	GND	Power	Ground.
12	VCC_3V3	O, 3.3V Power	3V3 Supply Voltage.

Table 18: Pmod Connector2 Pin Assignment

Pin No	Signal Name	Signal Type/ Termination	Description
1	PL_AR15_LVDS67_L19N_DBC	IO, 3V3 LVCMOS	General purpose Input Output.
2	PL_BC13_LVDS67_L6N	IO, 3V3 LVCMOS	General purpose Input Output.
3	PL_BF13_LVDS67_L1N	IO, 3V3 LVCMOS	General purpose Input Output.
4	PL_AR13_LVDS67_L22N_DBC	IO, 3V3 LVCMOS	General purpose Input Output.
5	GND	Power	Ground.
6	VCC_3V3	O, 3.3V Power	3V3 Supply Voltage.
7	PL_BC14_LVDS67_L6P	IO, 3V3 LVCMOS	General purpose Input Output.
8	PL_AR16_LVDS67_L19P_DBC	IO, 3V3 LVCMOS	General purpose Input Output.
9	PL_BF14_LVDS67_L1P	IO, 3V3 LVCMOS	General purpose Input Output.
10	PL_AP13_LVDS67_L22P_DBC	IO, 3V3 LVCMOS	General purpose Input Output.
11	GND	Power	Ground.
12	VCC_3V3	O, 3.3V Power	3V3 Supply Voltage.

2.6.4 IO Expanders

The Virtex UltraScale+ FPGA Carrier board supports three GPIO 16-Bit port Expander. Refer below table for IO Expander pin mapping.

Table 19: IO EXPANDER 1 Output

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
IO EXPANDER 1 (TCA6416APWR) - I2C address: 0x20				
4	P00	IOEXP_P00_SFP_TFAULT	I, 3.3V CMOS/4.7K PU	Connected to SFP+
5	P01	IOEXP_P01_SFP_RX_LOS	I, 3.3V CMOS/4.7K PU	Connected to SFP+
6	P02	IOEXP_P02_SFP_MOD_ABS	I, 3.3V CMOS/4.7K PU	Connected to SFP+
7	P03	IOEXP_P03_SFP_RS1	I, 3.3V CMOS/4.7K PU	Connected to SFP+
8	P04	IOEXP_P04_SFP_RS0	O, 3.3V CMOS/4.7K PU	Connected to SFP+
9	P05	IOEXP_P05_SFP_TDIS	O, 3.3V CMOS/4.7K PD	Connected to SFP+
10	P06	IOEXP_P07_SDI_IN_CD_INT	I, 3.3V CMOS	Connected to SDI Video IN
11	P07	IOEXP_P10_SDI_CD_INT	I, 3.3V CMOS	Connected to SDI VIDEO OUT
13	P10	IOEXP_P11_MUX_SEL1	O, 3.3V CMOS	Connected to MUX Selection Switch
14	P11	NC	NA	NA
15	P12	IOEXP_P13_MUX_SEL3	O, 3.3V CMOS	Connected to MUX Selection Switch
16	P13	NC	NA	NA
17	P14	B_IO_EXP_INT2	I, 3.3V CMOS/4.7K PU	Connected to IO EXPANDER 2
18	P15	B_IO_EXP_INT3	I, 3.3V CMOS/4.7K PU	Connected to IO EXPANDER 3
19	P16	IOEXP_FMC_LA16P	IO, 1.8V CMOS	Connected to FMC connector G18th pin
20	P17	IOEXP_HDMI_TX_CEC	I, 3.3V CMOS	Connected from HDMI OUT

Table 20: IO EXPANDER 2 Output

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
IO EXPANDER 2 (TCA6416APWR)- I2C address: 0x21				
4	P00	IOEXP_P00_Q_MODESEL	O, 3.3V CMOS/4.7K PD	Connected to QSFP28 Connector
5	P01	IOEXP_P01_Q_RESETL	O, 3.3V CMOS/4.7K PU	Connected to QSFP28 Connector
6	P02	IOEXP_P02_Q_LPMODE	O, 3.3V CMOS/4.7K PD	Connected to QSFP28 Connector
7	P03	IOEXP_P03_Q_INTL	I, 3.3V CMOS/4.7K PU	Connected to QSFP28 Connector
8	P04	IOEXP_P04_Q_MODPRSL	I, 3.3V CMOS/4.7K PU	Connected to QSFP28 Connector
9	P05	IOEXP_P05_F_RESETL	O, 3.3V CMOS/4.7K PU	Connected to FireFly Power Connector
10	P06	IOEXP_P06_F_MODSEL	O, 3.3V CMOS/4.7K PU	Connected to FireFly Power Connector
11	P07	IOEXP_P07_F_INTL	O, 3.3V CMOS/4.7K PU	Connected to FireFly Power Connector
13	P10	IOEXP_P10_F_MODPRS	I, 3.3V CMOS/4.7K PU	Connected to FireFly Power Connector
14	P11	IOEXP_P11_HDMI_TX_OE	O, 3.3V CMOS	Connected to IO HDMI OUT
15	P12	IOEXP_HDMI_RX_CEC_SINK	I, 3.3V CMOS	Connected to IO HDMI OUT
16	P13	NC	NA	NA
17	P14	NC	NA	NA
18	P15	NC	NA	NA
19	P16	NC	NA	NA
20	P17	NC	NA	NA

Table 21: IO EXPANDER 3 Output

Pin No	Pin Name	Signal Name	Signal Type / Termination	Description
IO EXPANDER 3 (TCA9535PWR)- I2C address: 0x23				
4	P00	B_FMC_PR_M2C_L	I, 3.3V CMOS/10K PU	Connected to FMC connector
5	P01	B_FMC+_PR_M2C_L	I, 3.3V CMOS/10K PU	Connected to FMC+ connector
6	P02	B_HSPC_PRSNT_M2C_L	I, 3.3V CMOS/10K PU	Connected to FMC+ connector
7	P03	EN_VCC_12V_FMC	O, 3.3V CMOS/10K PD	Connected to FMC Power
8	P04	EN_VCC_3V3_FMC	O, 3.3V CMOS/1K PD	Connected to FMC Power
9	P05	EN_VCC_FMC_ADJ	O, 3.3V CMOS/10K PD	Connected to FMC Power
10	P06	EN_VCC_FMC+_ADJ	O, 3.3V CMOS/10K PD	Connected to FMC+ Power
11	P07	NC	NA	NA
13	P10	EN_VCC_12V_FMC+	O, 3.3V CMOS/10K PD	Connected to FMC+ Power
14	P11	EN_VCC_3V3_FMC+	O, 3.3V CMOS/1K PD	Connected to FMC+ Power
15	P12	B_FMC_CLK_DIR	I, 3.3V CMOS	Connected to FMC connector
16	P13	B_FMC+_CLK_DIR	I, 3.3V CMOS	Connected to FMC+ connector
17	P14	B_FMC_PG_C2M	O, 3.3V CMOS/10K PD	Connected to FMC control
18	P15	B_FMC+_PG_C2M	O, 3.3V CMOS/10K PD	Connected to FMC+ connector
19	P16	NC	NA	NA
20	P17	NC	NA	NA

2.6.5 I2C Tree

The Virtex UltraScale+ FPGA Carrier board supports one 4 channel I2C Bus Switch (PI4MSD5V9546ALEX). I2C tree shown below.

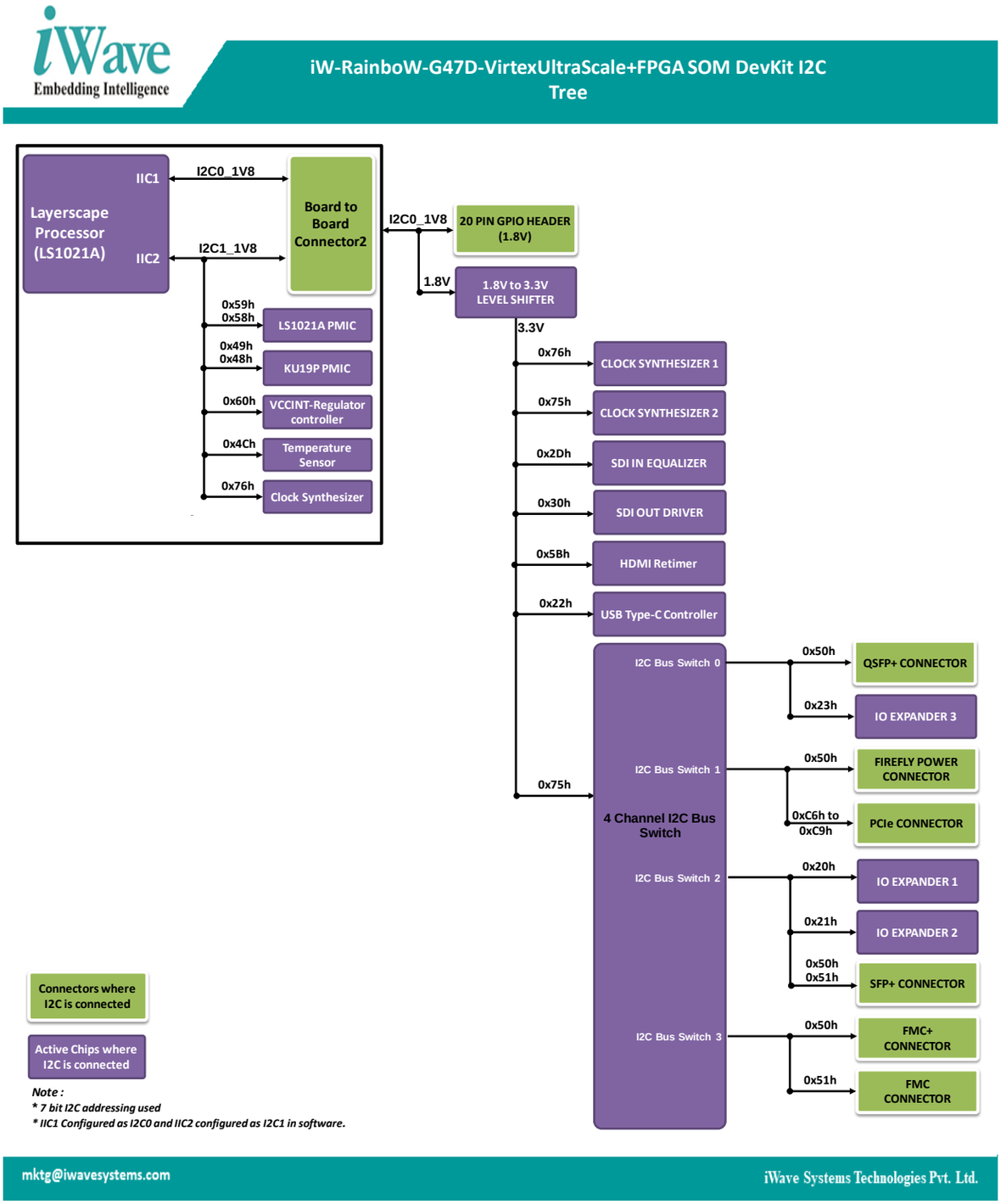


Figure 30: I2C Tree

2.6.6 GPIO Header

The Virtex UltraScale+ FPGA Carrier board supports GPIO Header (J15) for General Purpose. This Header signals are directly connected from Board to Board 1 & 2 connectors. This header supports I2C0, LPUART1 and FPGA GPIOs. This GPIO Header (J15) is physically located at the top of the board as shown below.

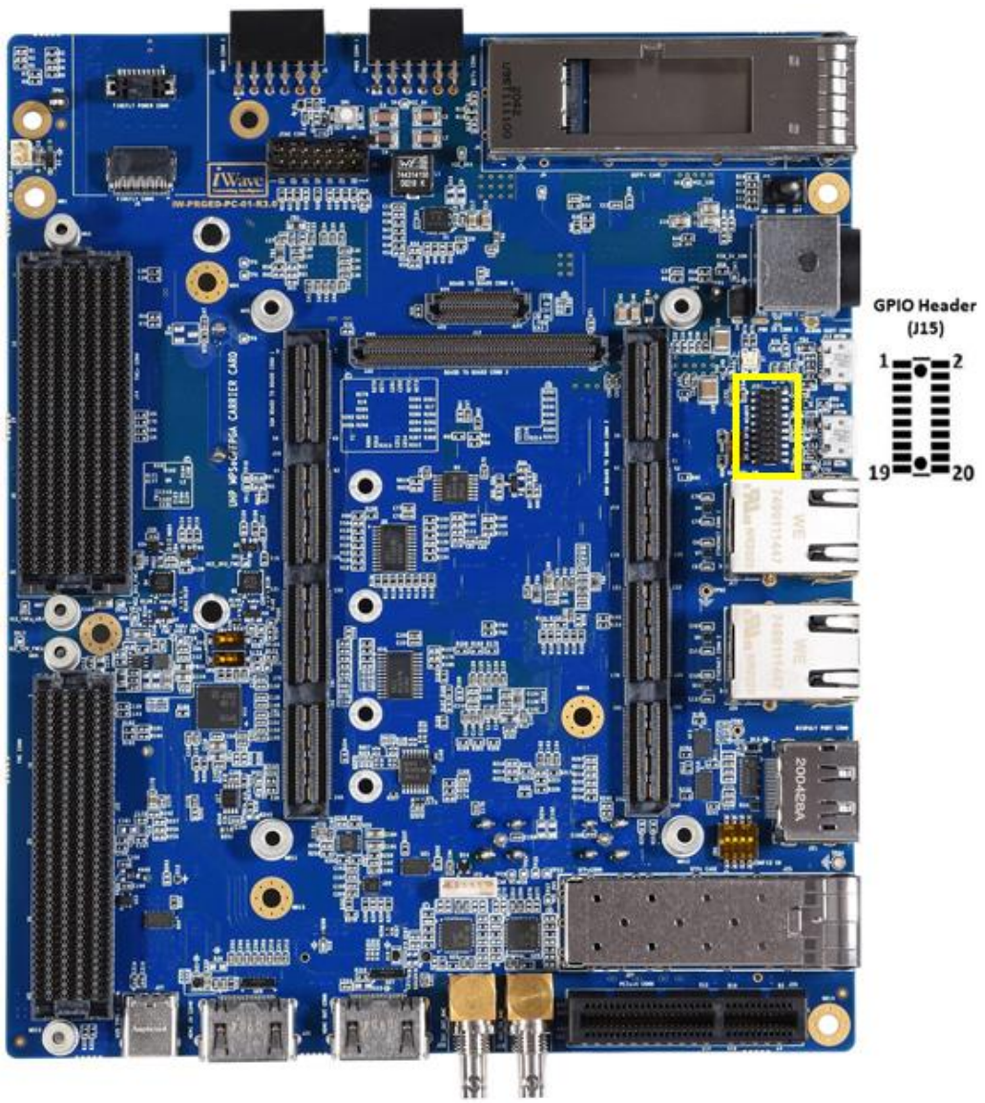


Figure 31: GPIO Header

Table 22: GPIO Header Pin Assignment

Pin No	Signal Name	Signal Type/ Termination	Description
1	VCC_1V8	O, 1.8V Power	1V8 Supply Voltage.
2	VCC_5V	O, 5V Power	5V Supply Voltage.
3	PL_BB9_LVDS68_L11P_GC	IO, 1.8V LVCMOS	PL Bank68 IO11 Differential positive. Same pin can be used as Single ended I/O. This Pin is connected to 211th pin of Board-to-Board Connector1 (J18).

Pin No	Signal Name	Signal Type/ Termination	Description
4	LS_IIC1_SDA	IO, 1.8V OD/ 1K PU	I2C1 data. This Pin is connected to 46th pin of Board-to-Board Connector2 (J19).
5	IO_L11N_T1U_N9_GC_68	IO, 1.8V LVCMOS	PL Bank68 IO11 Differential Negative. Same pin can be used as Single ended I/O. This Pin is connected to 213th pin of Board-to-Board Connector1 (J18).
6	LS_IIC1_SCL	O, 1.8V OD/ 1K PU	I2C1 Clock. This Pin is connected to 48th pin of Board-to-Board Connector2 (J19).
7	NC	NA	NC.
8	LS_LPUART3_SOUT	O, 1.8V LVCMOS	LPUART3 Transmit data line. Same pin can be configured as General-Purpose Input/Output if required. This Pin is connected to 50th pin of Board-to-Board Connector2 (J19).
9	PL_BE10_LVDS68_L4N	IO, 1.8V LVCMOS	PL Bank68 IO4 Differential Negative. Same pin can be used as Single ended I/O. This Pin is connected to 176th pin of Board-to-Board Connector1 (J18).
10	LS_LPUART3_SIN	I, 1.8V LVCMOS	LPUART3 Receive data line. Same pin can be configured as General-Purpose Input/Output if required. This Pin is connected to 52nd pin of Board-to-Board Connector2 (J19).
11	GND	Power	Ground
12	GND	Power	Ground
13	GPIO3_15(EC2_TXD3)	IO, 1.8V	General Purpose I/O from LS1021A processor. This Pin is connected to 61st pin of Board-to-Board Connector2 (J19).
14	NC	NA	NC.
15	PL_AN28_LVDS65_L20P_D08	IO, 1.8V	PL Bank65 IO20 Differential positive. Same pin can be used as Single ended I/O. This Pin is connected to 63rd pin of Board-to-Board Connector2 (J19).
16	NC	NA	NC.
17	GPIO4_25(SDHC_DAT6)	IO, 1.8V	General Purpose I/O from LS1021A processor. This Pin is connected to 65th pin of Board-to-Board Connector2 (J19).
18	PL_AV17_T1U_N12_66	IO, 1.8V	I/O from FPGA processor. This Pin is connected to 67th pin of Board-to-Board Connector2 (J19).
19	GND	Power	Ground
20	GND	Power	Ground

2.6.7 Power ON/OFF Switch

The Virtex UltraScale+ FPGA Carrier board has power ON/OFF switch (SW2) to control the Main power Input ON/OFF functionality. This power switch is physically located at the top of the board as shown below.

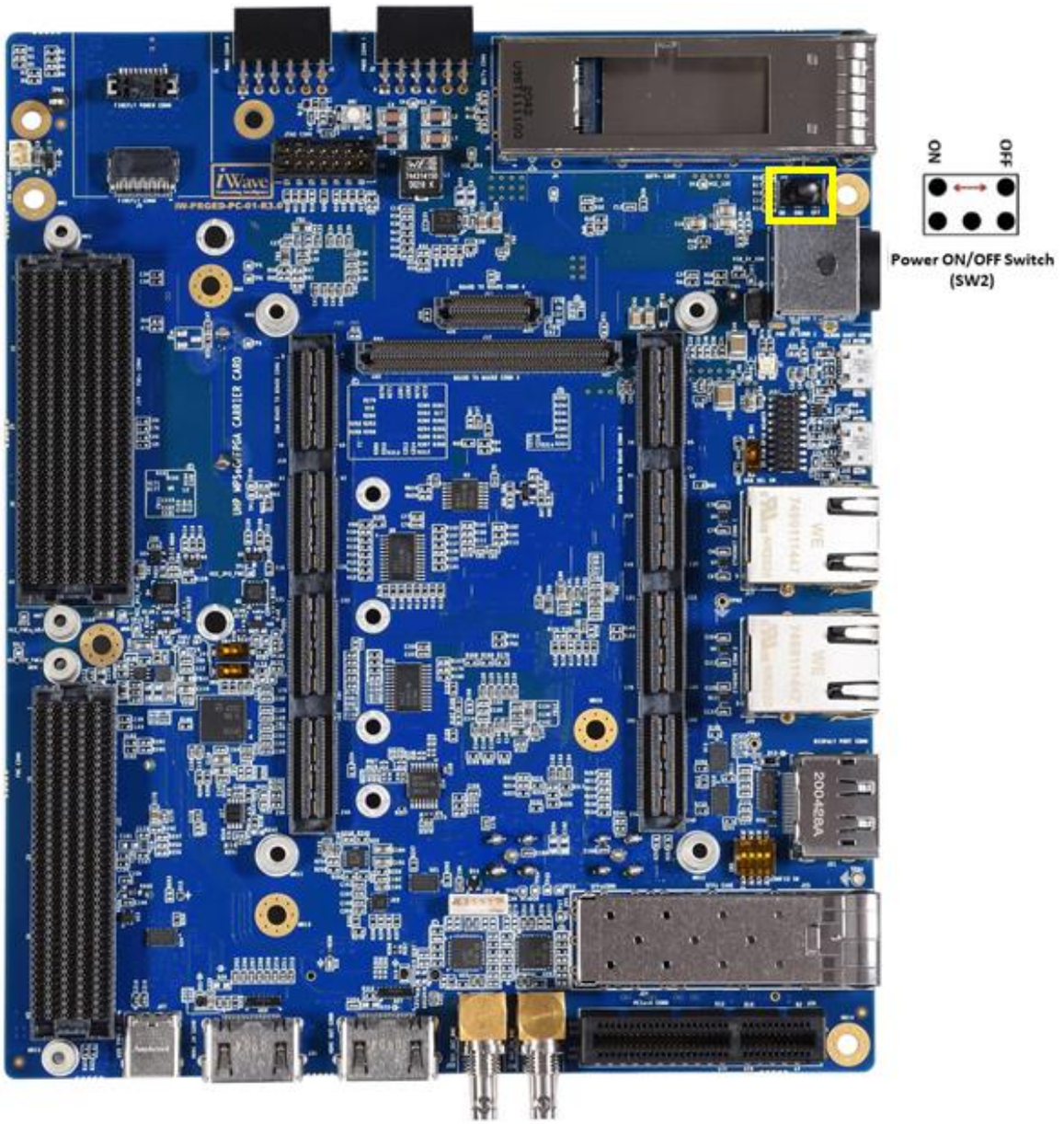


Figure 32: Power On/Off Switch

2.6.8 Reset Switch

The Virtex UltraScale+ FPGA Carrier board supports Push button switch (SW1) to reset the Virtex UltraScale+ SOMs CPU. Reset signal of Board-to-Board connector2 Pin 35 is directly connected from Reset Push button switch. This Reset Push button switch (SW1) is physically located at the top of the board as shown below.

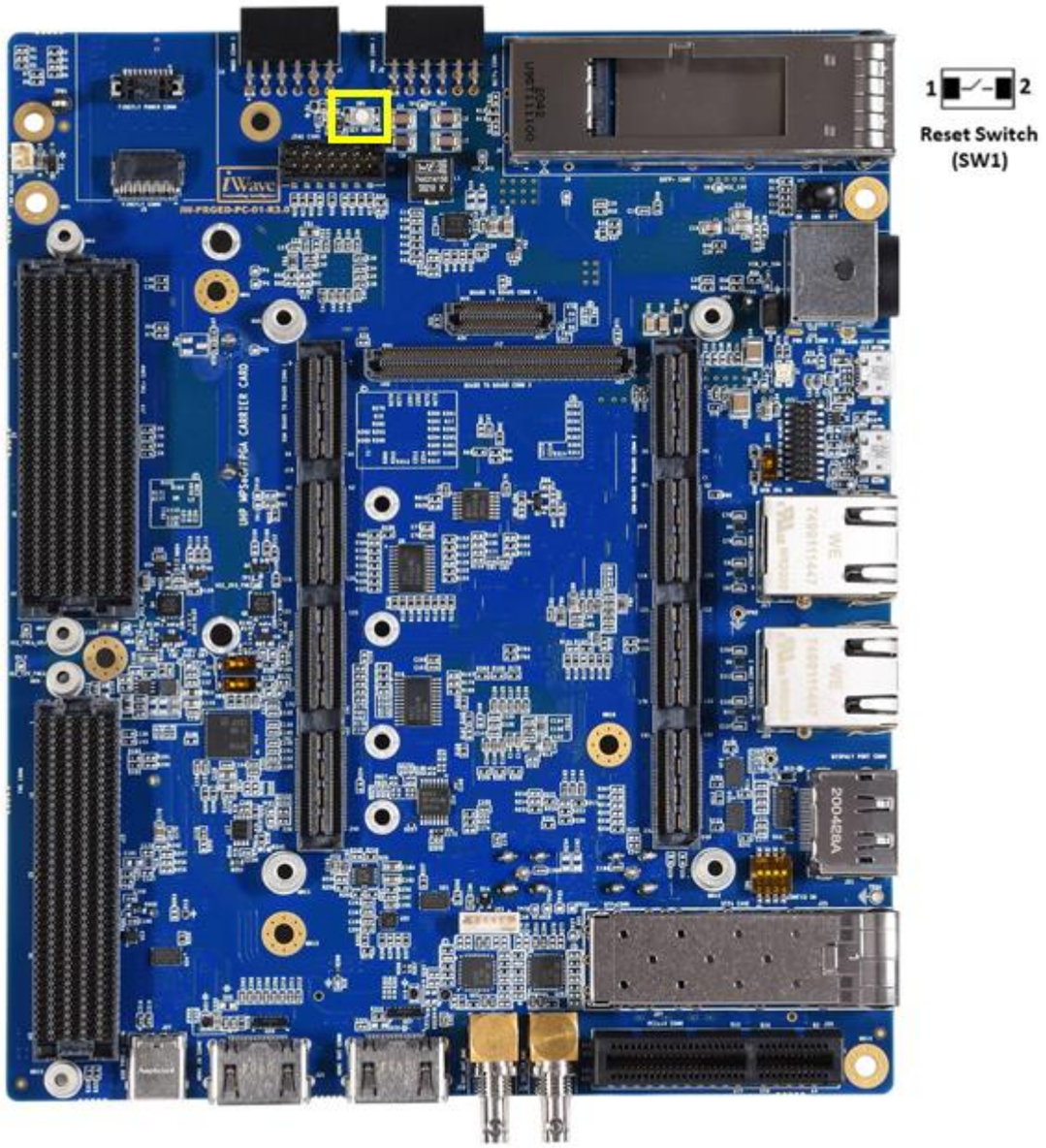


Figure 33: Reset Switch

2.6.9 RTC Coin Cell Holder

The Virtex UltraScale+ FPGA Carrier board supports Coin Cell Holder to connect “2032” series 3V coin cell. This coin cell voltage is connected to Virtex UltraScale+ FPGA SOM for RTC back up voltage when VCC main power is off. This Coin Cell Holder (J32) is physically located at the bottom of the board as shown below.

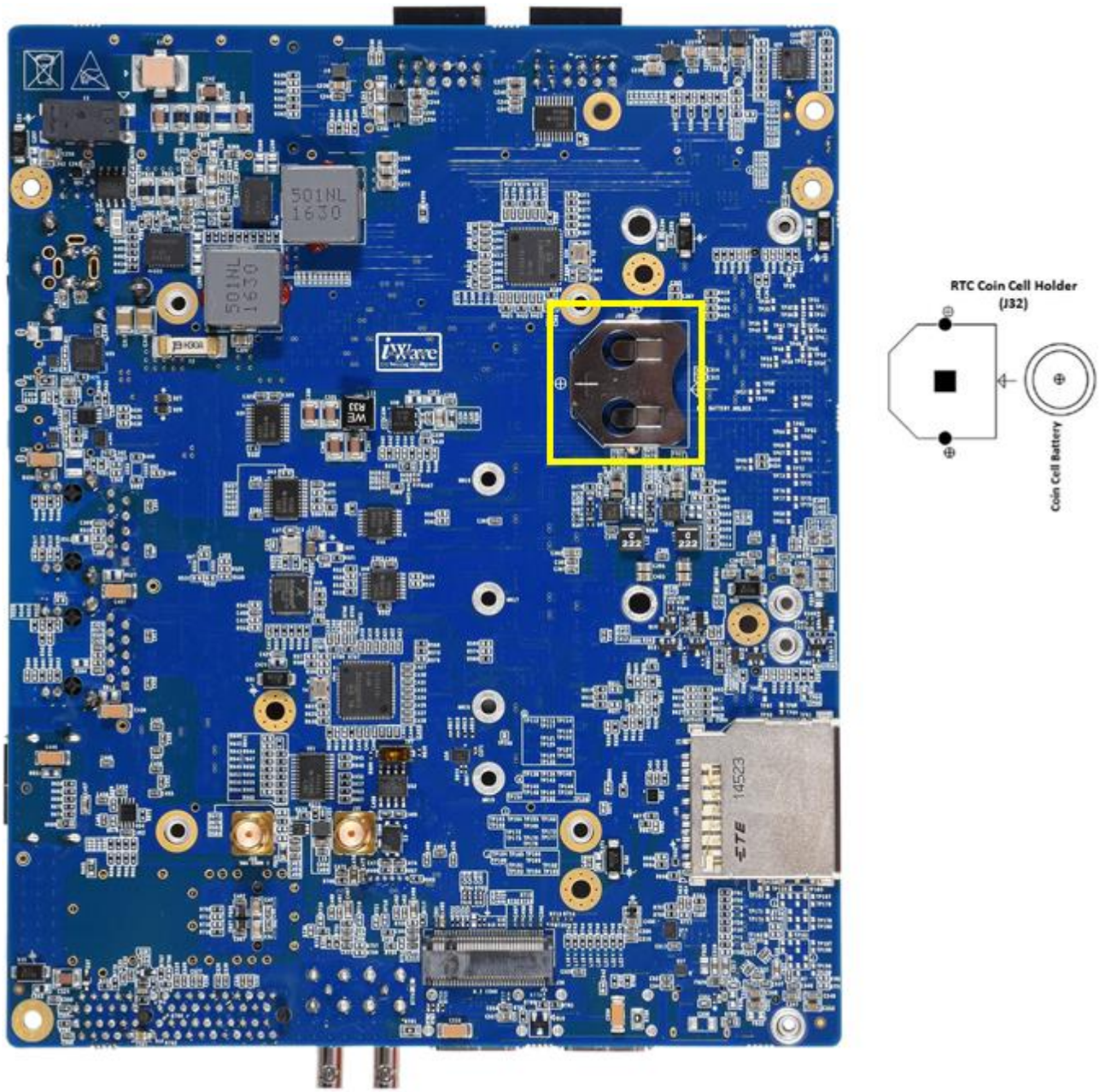


Figure 34: RTC Coin Cell Holder

2.6.10 12V Fan Header

The Virtex UltraScale+ FPGA Carrier Board supports a 12V Fan Header (J7) to connect cooling Fan if required. The Fan Header (J7) is physically located on topside of the carrier board as shown below.

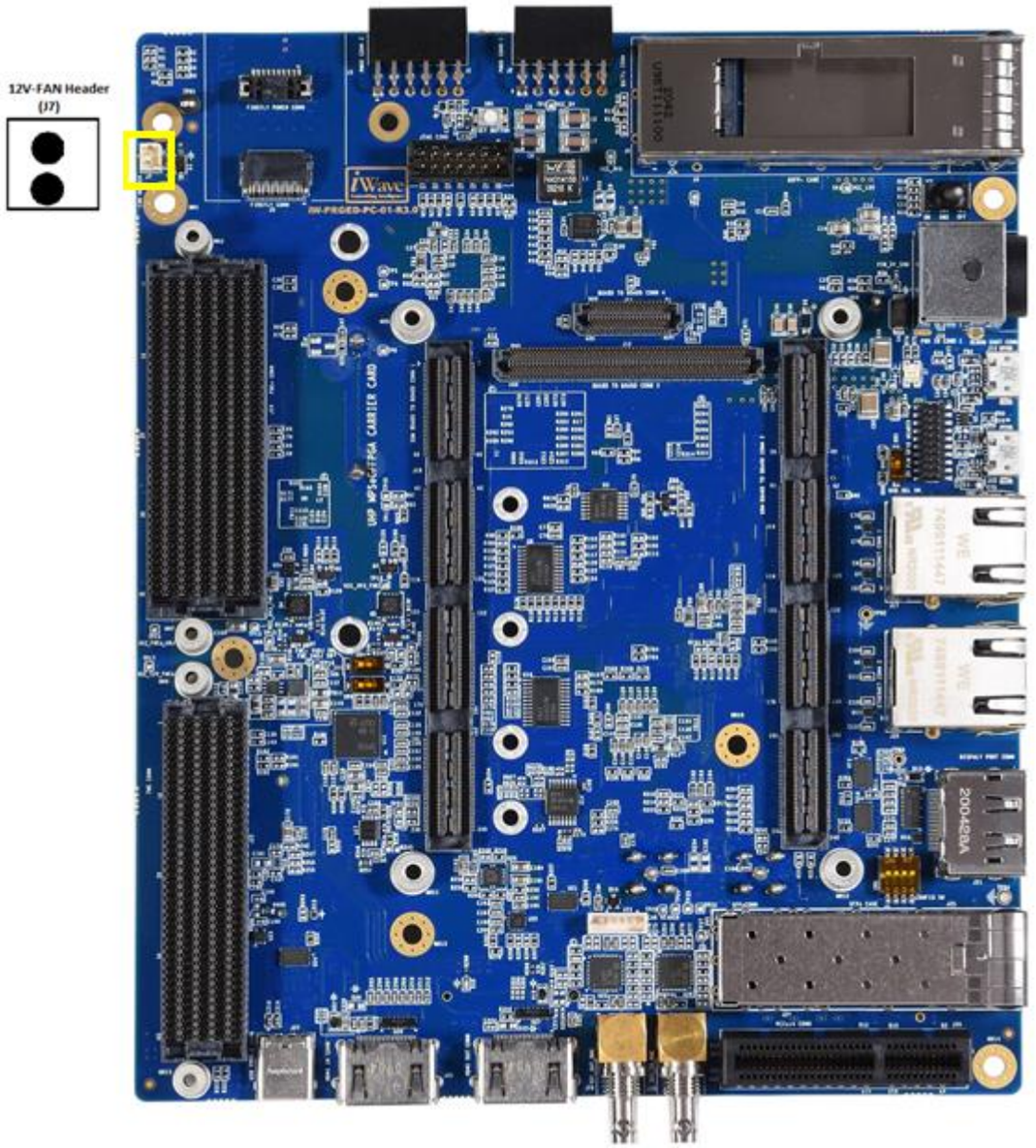


Figure 35: 12V-Fan Header

Table 23: 12V Fan Header Pinout

Sl. No.	Power Rail	Signal Type/ Termination	Description
1	VCC_12V [1]	O, 12V Power	Supply Voltage.
2	GND	Power	Ground.

[1] Do not connect the SOM Heat Sink Fan to 12V FAN Connector in Carrier board. By Default, iW-RainboW-G47D Virtex UltraScale+ FPGA SOM Development platform comes with Heat Sink + Fan mounted on SOM itself.

3. TECHNICAL SPECIFICATION

This section provides detailed information about the Virtex UltraScale+ FPGA Carrier Board technical specification with Electrical, Environmental and Mechanical characteristics.

3.1 Power Input Requirement

The Virtex UltraScale+ FPGA Carrier Board is designed to work with 12V external power and uses on board voltage regulators for internal power management. 12V power input from an external power supply is connected to the Virtex UltraScale+ FPGA Carrier Board through Power Jack (J10). This connector is physically placed at the top of the board as shown below.

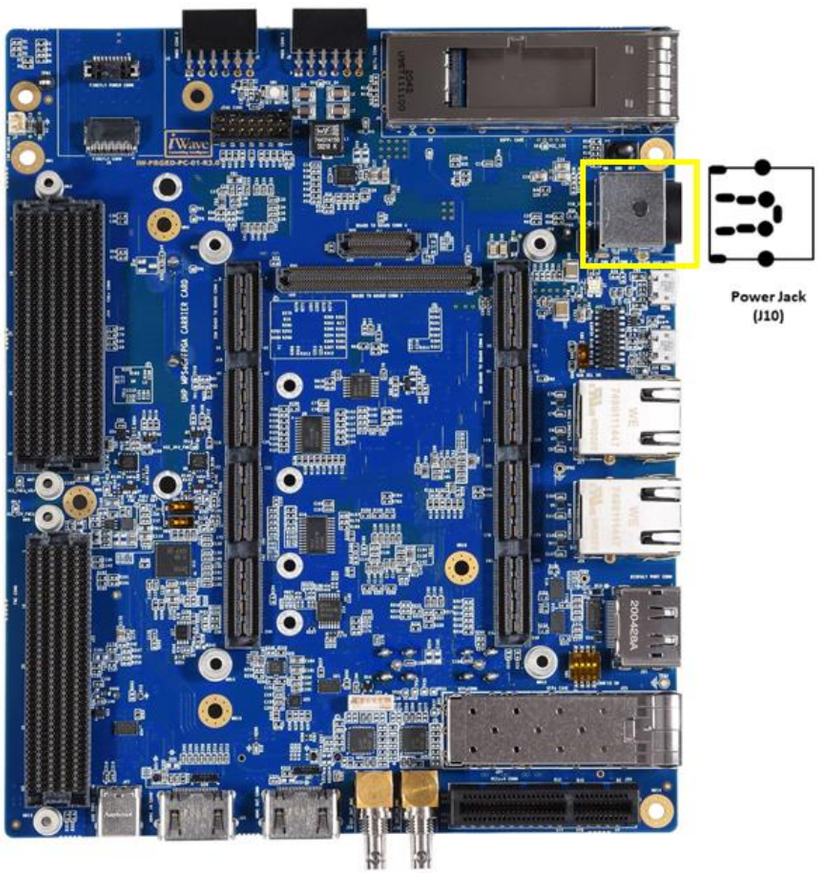


Figure 36: Power Jack

The below table provides the Power Input Requirement Virtex UltraScale+ FPGA Carrier Board.

Table 24: Power Input Requirement

Sl. No.	Power Rail	Min (V)	Typical (V)	Max(V)	Max Input Ripple
1	VCC_12V	11.75V	12V	12.25V	±50mV
2	VRTC_3V0[1]	0	3V	3.15V	±20mV

[1] *The Virtex UltraScale+ FPGA Devkit uses this voltage as backup power source to On-SOM PMIC RTC controller when VCC is off.*

3.2 Power Output Specification

The Virtex UltraScale+ FPGA SOM Carrier Board has dedicated power regulator to provide +5V power to SOM for VCC power supply. Also +3V RTC power from coin cell holder is provided for Real time clock support.

The Virtex UltraScale+ FPGA SOM Carrier Board also shares different on-board power to FMC connectors, Pmod connectors and GPIO Header for its Add-On Module power.

Table 25: Power Output Specification

Sl. No.	Power Rail	Min (V)	Typical (V)	Max(V)	Max Output Current
To Board-to-Board Connector2 (for Virtex UltraScale+ FPGA SOM)					
1	VCC_5V	4.85V	5V	5.15V	40A
2	VRTC_3V0	0V	3V	3.15V	-
To FMC Connector					
1	VCC_FMC_ADJ	1.75	1.8	1.85	4A
2	VCC_3V3	3.15	3.3	3.45	3A
3	3P3VAUX	3.15	3.3	3.45	100mA
4	VCC_12V	11.75V	12V	12.25V	1A
To FMC+ Connector					
1	VCC_FMC_ADJ	1.75	1.8	1.85	4A
2	VCC_3V3	3.15	3.3	3.45	3A
3	3P3VAUX	3.15	3.3	3.45	100mA
4	VCC_12V	11.75V	12V	12.25V	1A
To Pmod Connector1					
1	VCC_3V3	3.15	3.3	3.45	500mA
To Pmod Connector2					
1	VCC_3V3	3.15	3.3	3.45	500mA
To GPIO Header					
1	VCC_5V	4.85V	5V	5.15V	500mA
2	VCC_1V8	1.75	1.8	1.85	200mA

3.3 Environmental Characteristics

3.3.1 Environmental Specification

The below table provides the Environment specification of Virtex UltraScale+ FPGA SOM Development platform.

Table 26: Environmental Specification

Parameters	Min	Max
Operating temperature range[1]	0°C	70°C

[1] *iWave only guarantees the component selection for the given operating temperature.*

3.3.2 RoHS Compliance

iWave's Virtex UltraScale+ FPGA SOM Development platform is designed by using RoHS compliant components and manufactured on lead free production process.

3.3.3 Electrostatic Discharge

iWave's Virtex UltraScale+ FPGA SOM Development platform is sensitive to electrostatic discharge and so high voltages caused by static electricity could damage some of the devices on board. It is packed with necessary protection while shipping. Do not open or use board except at an electrostatic free workstation.

3.4 Mechanical Characteristics

3.4.1 Carrier Board Mechanical Dimensions

The Ultra-High-Performance Carrier board PCB form factor is 140mm x 170mm and Board mechanical dimension is shown below.

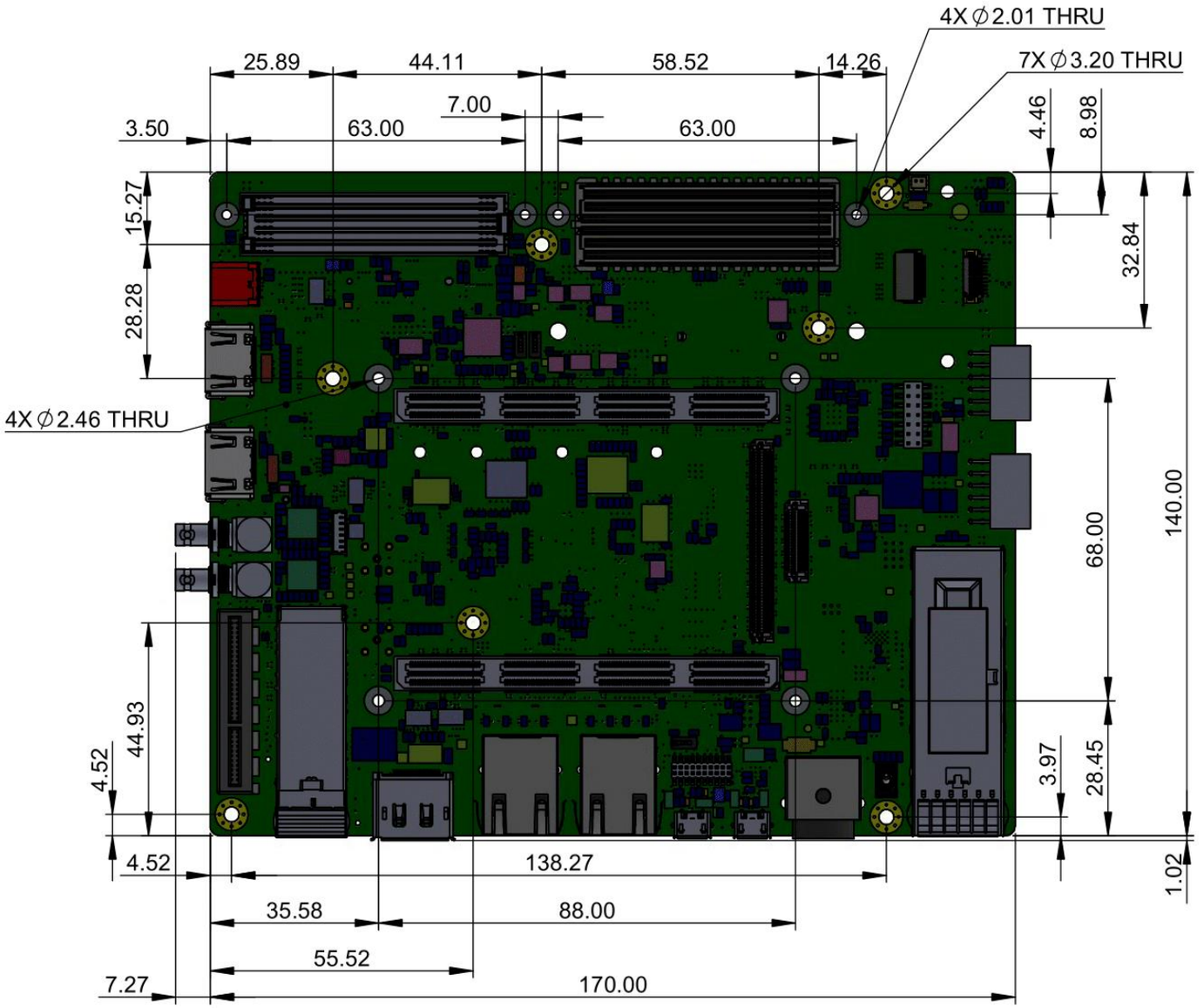


Figure 37: Carrier board Mechanical dimension – Top View

The Ultra-High-Performance Carrier board PCB thickness is 1.55mm±0.1mm, top side maximum height component is Ethernet Magjack Connector (15.00mm) and bottom side maximum height component is SMA Connector (9.55mm). Please refer the below figure for height details of the Virtex UltraScale+ FPGA SOM Carrier board.

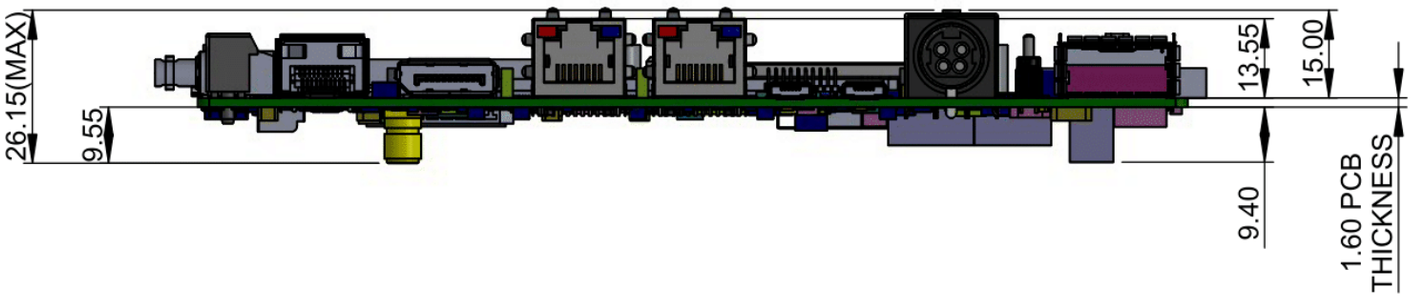


Figure 38: Carrier board Mechanical dimension – Side View

3.4.2 Guidelines to insert the Virtex UltraScale+ SoC SOM into Carrier Board

- Make sure the power is not provided to the carrier Board
- Insert the Virtex UltraScale+ SOM in to the Board to Board(B2B) as shown below in the first photo
- Check the position of B2B1, B2B2, B2B3 and B2B4 of Virtex UltraScale+ SOM is proper while inserting
- Press the SOM in to B2B connectors as shown below in the first photo such that the board is fixed firmly into the B2B connectors
- To remove the SOM from carrier board, Lift the SOM as shown in the second photo

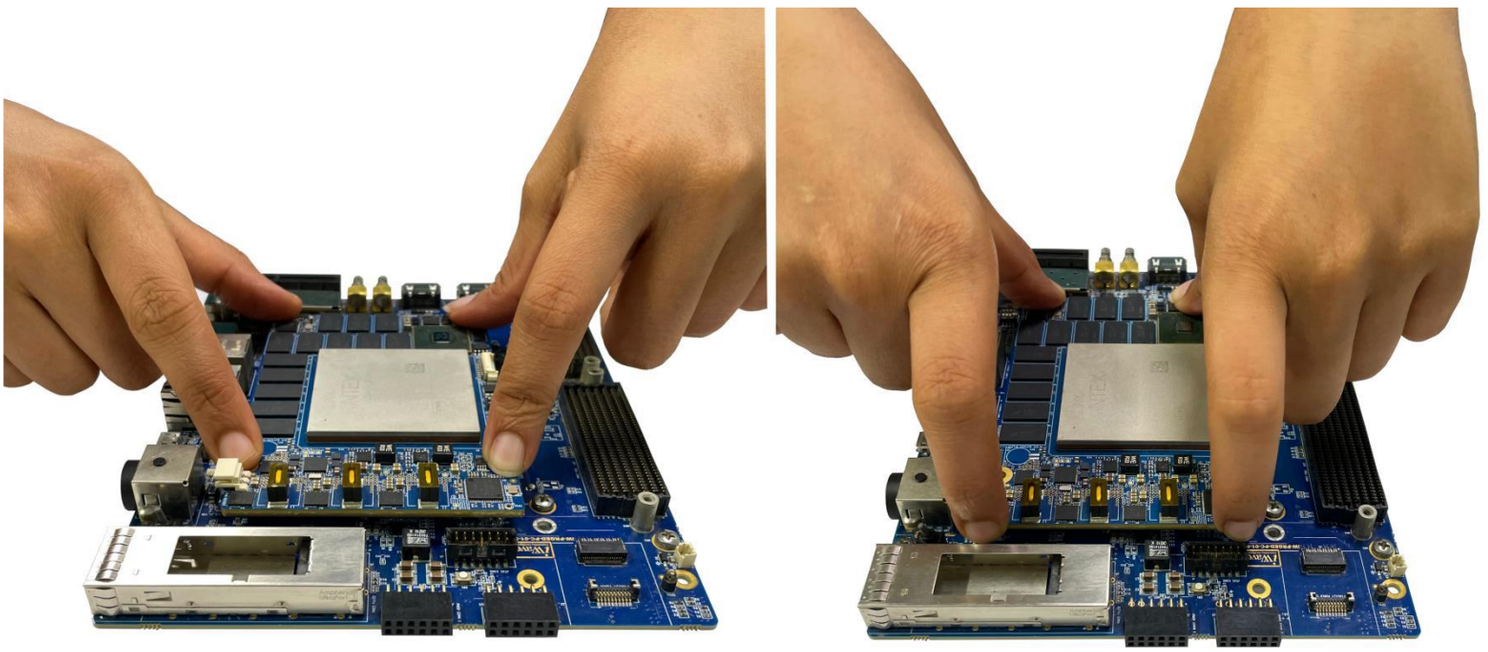
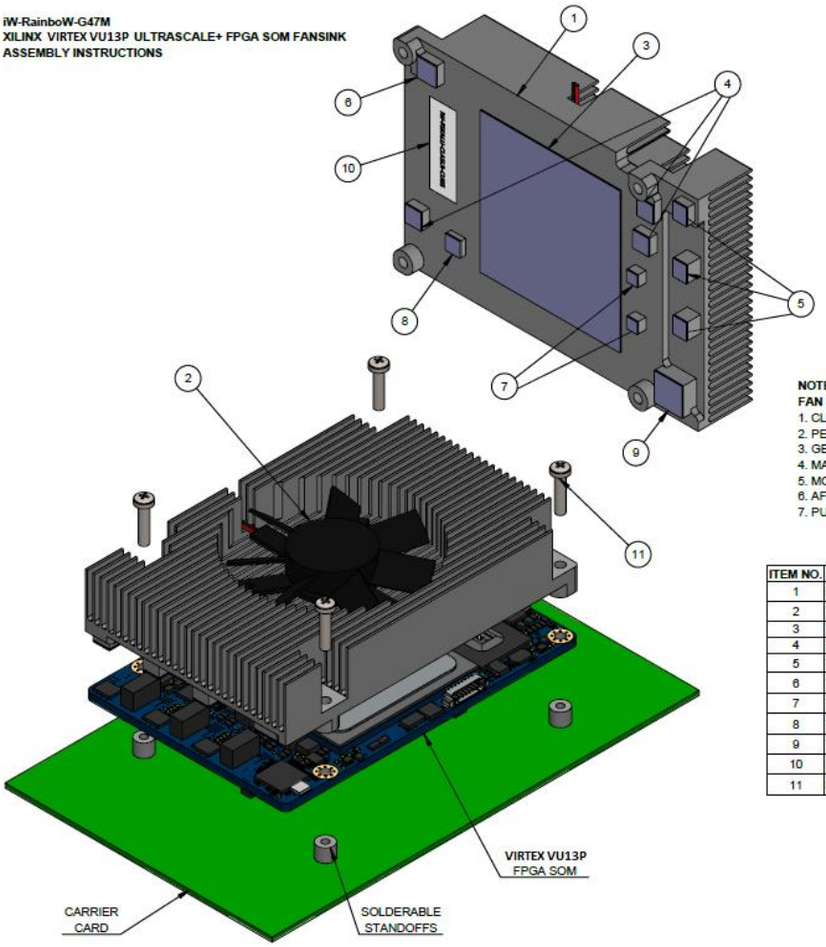


Figure 39: Virtex UltraScale+ FPGA SOM inserting and removing

3.4.3 FAN Sink Fixing procedure on SOM with Carrier Board

The Ultra-High-Performance Carrier board and Virtex UltraScale+ SOM with Fan sink fixing procedure is shown below.



NOTE 1.1:
CAUTION:-
1. ASSEMBLY MUST BE DONE VERY CAREFULLY SINCE PUTTING THE FAN SINK IN A WRONG WAY AND OVER THIGHTENING OF SCREWS WILL DAMAGE THE SOM MODULE OR PREVENT THE SYSTEM FROM WORKING PROPERLY.
2. FOLLOW THE ASSEMBLY INSTRUCTIONS (NOTE 1.2) CAREFULLY TO ENSURE THAT THE MODULE DOES NOT GET DAMAGED.
3. NECESSARY PRECAUTIONS SHOULD BE TAKEN CARE TO AVOID THE ELECTROSTATIC CHARGES.

NOTE 1.2:
FAN SINK ASSEMBLY INSTRUCTIONS: -
1. CLEAN THE PROCESSOR SURFACE.
2. PEEL OFF THE LINER PRESENT ON THE THERMAL PAD.
3. GENTLY PLACE THE FAN SINK ON SOM MODULE.
4. MAKE SURE THAT SOM MODULE AND FAN SINK MOUNTING HOLES ARE ALIGNED.
5. MOUNT THE ASSEMBLED FAN SINK AND SOM ON THE CARRIER CARD SPACERS.
6. AFTER ASSEMBLING MAKE SURE ALL THE SOM MOUNTING HOLES ARE ALIGNED WITH CARRIER CARD SPACERS.
7. PUT THE SCREWS FROM TOP OF THE FAN SINK AND TIGHTEN THEM TO HAND TIGHT(REFER Fig1.1).

ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.
1	iW-PRHBZ-MP-01-R1.0-REL1.0-FSK01	FAN SINK FOR FPGA/SoC SOM	AL 6063-T5 ALLOY	1
2	T056010BHZC0U3aR	60mm FAN (COMES ASSEMBLED WITH FANSINK)	PBT(BLACK) PLASTIC	1
3	TIF540-52.5-52.5-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	1
4	TIF540-06-06-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	3
5	TIF540-06-05-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	3
6	TIF540-07-07-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	1
7	TIF540-04-04-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	2
8	TIF540-5.5-5.5-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	1
9	TIF540-10.5-10.5-1.0	1mm THICK THERMAL PAD	SILICONE RUBBER (SIR)	1
10	LABEL-30X10	LABEL FOR PRODUCTION LOT PART NUMBER	STICKER	1
11	M3X16 PAN PHILLIPS DIN 7985	SCREW	SS 304	4

Figure 40: Virtex UltraScale+ SOM with Fan sink fixing procedure

4. ORDERING INFORMATION

The below table provides the standard orderable part numbers for Virtex UltraScale+ FPGA Development platform which includes Virtex UltraScale+ FPGA SOM and Carrier Board.

Table 27: Orderable Product Part Numbers

Product Part Number	Description	Temperature
VU07P FPGA Based SOM		
iW-G47D-V07P-4E008G-Q128M-LEB	Virtex UltraScale+ VU07P(-1) with Dual 4GB FPGA DDR4,128MB QSPI Flash and LS1021A CPU with 2GB DDR4, 256MB NOR Flash - Development kit with Linux	Commercial
VU13P FPGA Based SOM		
iW-G47D-V13P-4E008G-Q128M-LEB	Virtex UltraScale+ VU13P(-1) with Dual 4GB FPGA DDR4,128MB QSPI Flash and LS1021A CPU with 2GB DDR4, 256MB NOR Flash - Development kit with Linux	Commercial

Note: For Development platform identification purpose, Product part number is pasted as Label with Barcode readable format.


iWave
Embedding Intelligence