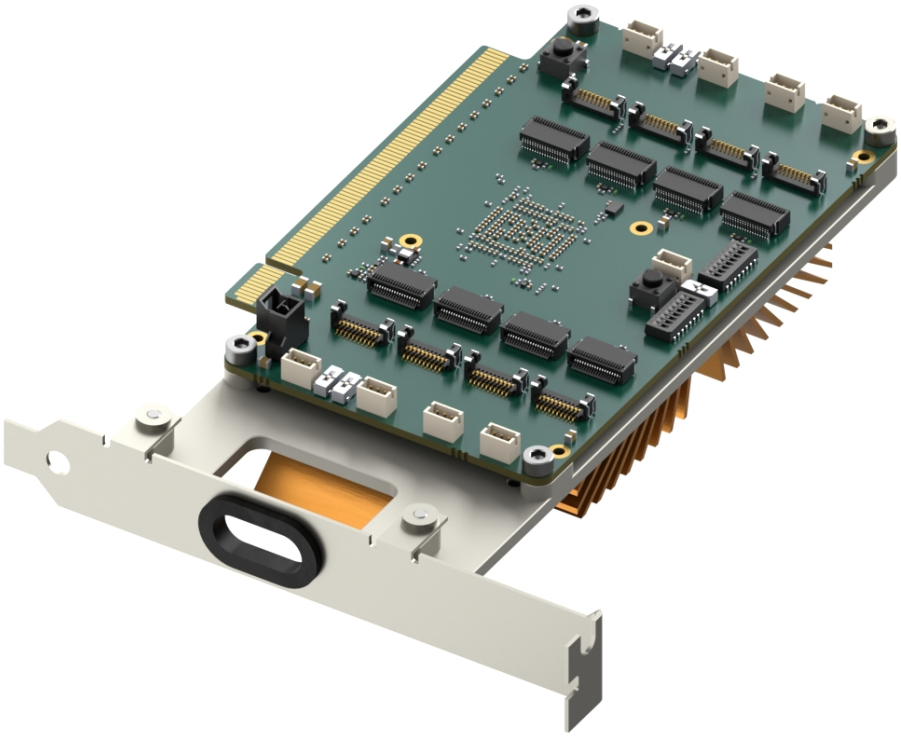
ximea



HA-8P-X4G3-FF-X16G3

Host adapter

XIMEA Accessories

Technical Manual

Version v260831

Introductions

About this manual

Dear customer,

Thank you for purchasing a product from XIMEA.

We hope that this manual can answer your questions, but should you have any further queries or if you wish to claim a service or warranty case, please contact your local dealer or refer to XIMEA Support on our website: www.ximea.com/support

The purpose of this document is to provide a description of XIMEA Accessories and to describe the correct way to install related software, drivers and run it successfully. Please read this manual thoroughly before operating your new XIMEA Accessories for the first time. Please follow all instructions and observe the warnings.

This document is subject to change without notice.

About XIMEA

XIMEA is one of the worldwide leaders for innovative camera solutions with a 30-year history of research, development and production of digital image acquisition systems. Based in Slovakia, Germany and the US, with a global distributor network, XIMEA offers their cameras worldwide. In close collaboration with customers XIMEA has developed a broad spectrum of technologies and cutting-edge, highly competitive products.

XIMEA's camera centric technology portfolio comprises a broad spectrum of digital technologies, from data interfaces such as USB 2.0, USB 3.1 and PCIe to cooled digital cameras with CCD, CMOS and sCMOS sensors, as well as X-ray cameras.

XIMEA has three divisions – generic machine vision and integrated vision systems, scientific imaging and OEM/custom.

Our broad portfolio of cameras includes thermally stabilized astronomy and x-ray cameras, as well as specialty cameras for medical applications, research, surveillance and defense.

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1 General description

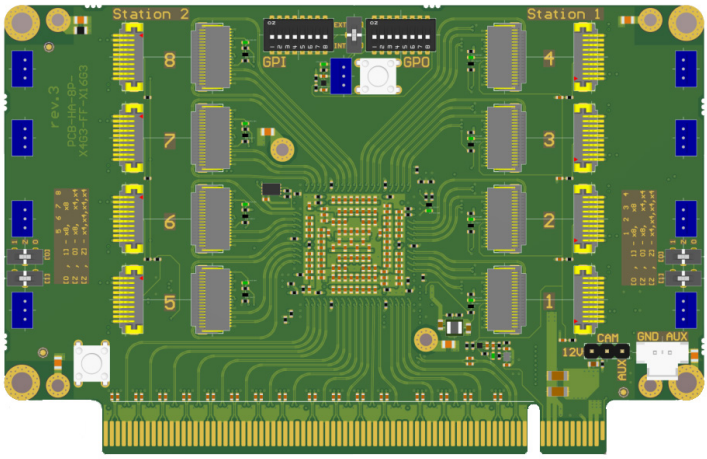


Figure 1: Isometric view of host adapter HA-8P-X4G3-FF-X16G3

- Firefly dual host adapter with 8x Firefly Connectors
- 8x Gen.3 PCIe x4 Firefly downstream ports - 32 Gbits bandwidth each
- Firefly cables provide length options of up to 3 m
- Upstream port PCIe Gen3 x16 - output bandwidth of 128 Gbits

PCIe Gen3 camera accessory host adapter for fiber optics and copper cables. Host adapter has 8 ports for PCIe Gen.3 x4 Firefly cables. Supports Gen 1, Gen 2 and Gen 3 (8.0 GT/s) data rates. Ideal for synchronization of 8 cameras with Firefly connectors from xiX family see: xiX cameras with PCIe interface.

2 Dimensional drawings

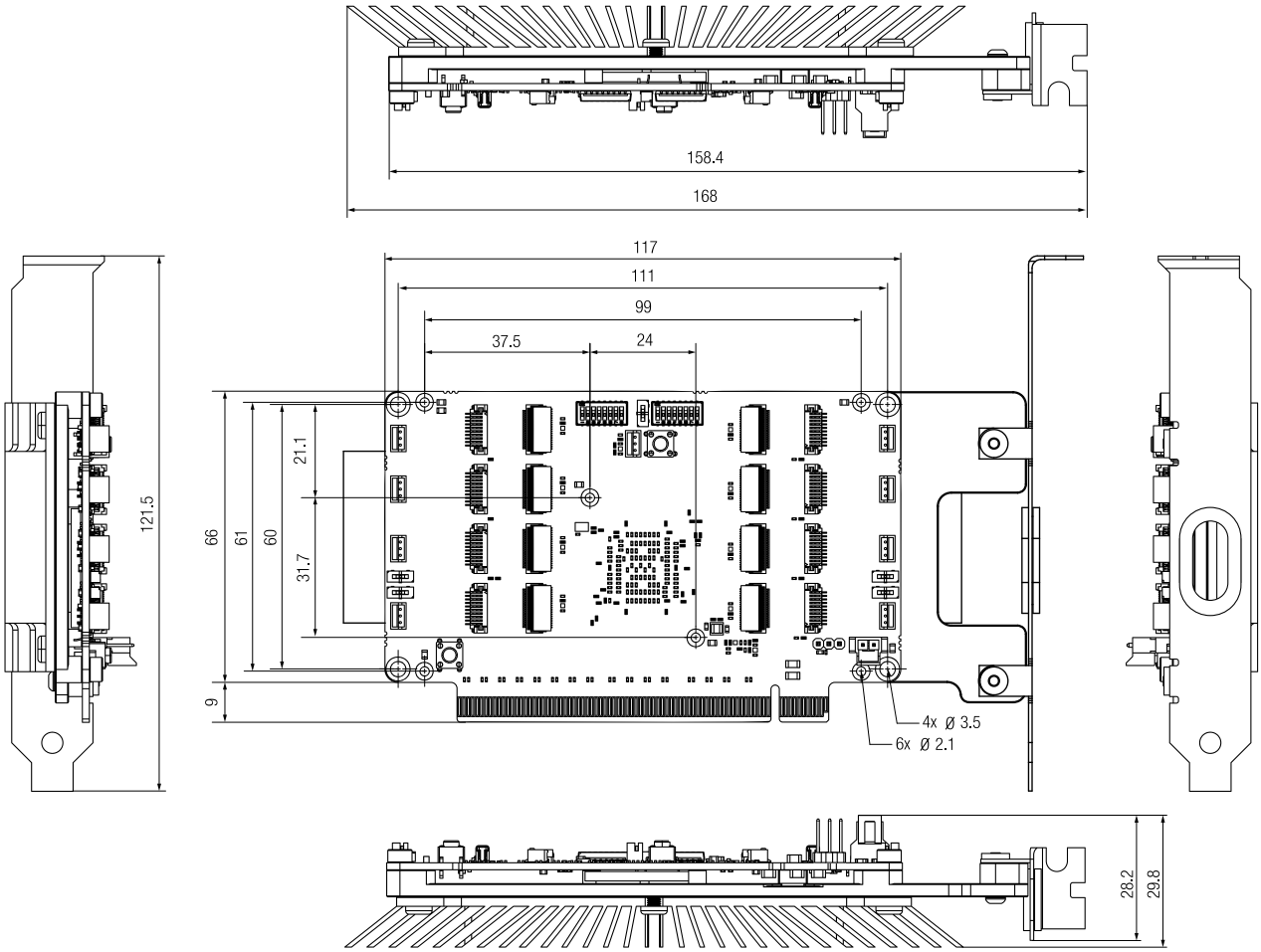


Figure 2: Dimensions of host adapter

Width [W]	Height [H]	Depth [D]	Mass [M]	Cooling options
168 mm	121.5 mm	29.8 mm	213 g[1]	For heatsink options please contact sales

[1]Weight and maximal width / depth are measured with attached heatsink

Table 1: Parameters and mass

3 Configuration

3.1 DIP switches

3.1.1 GPI GPO configuration DIP switches

The host adapter includes an 8-position DIP switch labeled GPI, which is used for configuring external triggering the cameras.

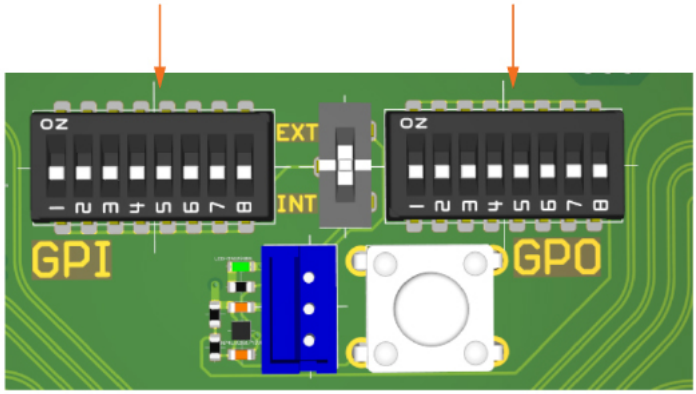


Figure 3: GPI / GPO DIP switches

To enable external triggering for one or more cameras, follow these steps:

For each camera you want to trigger externally, set the corresponding switch on the GPI DIP switch block to the ON position. Set the central DIP switch to the EXT (external) position. This enables external triggering functionality. Provide an appropriate external voltage in the range of 3.3 V to 24 V to the 3-pin connector located directly beneath the central DIP switch (see section External GPI connector for further information about connector) .

3.1.2 PCIe configuration DIP switches

The numbering of the camera ports correspond to the number of the respective GPI and GPO dip switches.

The DIP switches have annotation on their body. The description of DIP switches (GPI, GPO) is written directly on the PCB top layer.

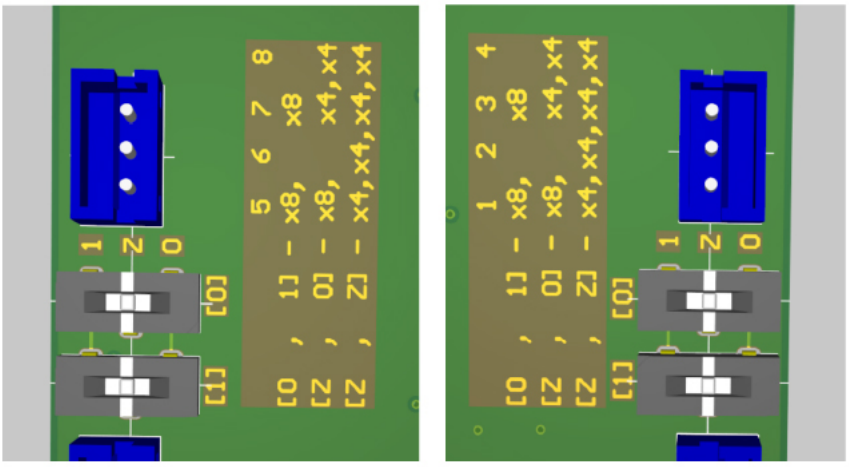


Figure 4: DIP switches location

DIP switch [1] position	DIP switch [0] position	PCIe blade lines	FireFly 1 lines	FireFly 2 lines	FireFly 3 lines	FireFly 4 lines	PCIe port configuration
0	1	x16	(A+B)=x8	(A+B)=x8	(C+D)=x8	(C+D)=x8	port A / B - Port 1[1] port C / D - Port 3[1]
Z	0	x16	(A+B)=x8	(A+B)=x8	x4	x4	port A / B - Port 1[1] port C - Port 3 port D - Port 4
Z	Z	x16	x4	x4	x4	x4	port A - Port 1 port B - Port 2 port C - Port 3 port D - Port 4

[1]FireFly ports (x+y) together work as a single X8G3 PCIe port

Table 2: DIP switch configuration, FireFly port 1-4

DIP switch [1] position	DIP switch [0] position	PCIe blade lines	FireFly 5 lines	FireFly 6 lines	FireFly 7 lines	FireFly 8 lines	PCIe port configuration
0	1	x16	(E+F)=x8	(E+F)=x8	(G+H)=x8	(G+H)=x8	port E / F - Port 5[1] port G / H - Port 7[1]
Z	0	x16	(E+F)=x8	(E+F)=x8	x4	x4	port E / F - Port 5[1] port G - Port 7 port H - Port 8
Z	Z	x16	x4	x4	x4	x4	port E - Port 5 port F - Port 6 port G - Port 7 port H - Port 8

[1]FireFly ports (x+y) together work as a single X8G3 PCIe port

Table 3: DIP switch configuration, FireFly port 5-8

4 Connectors

4.1 Location of connectors

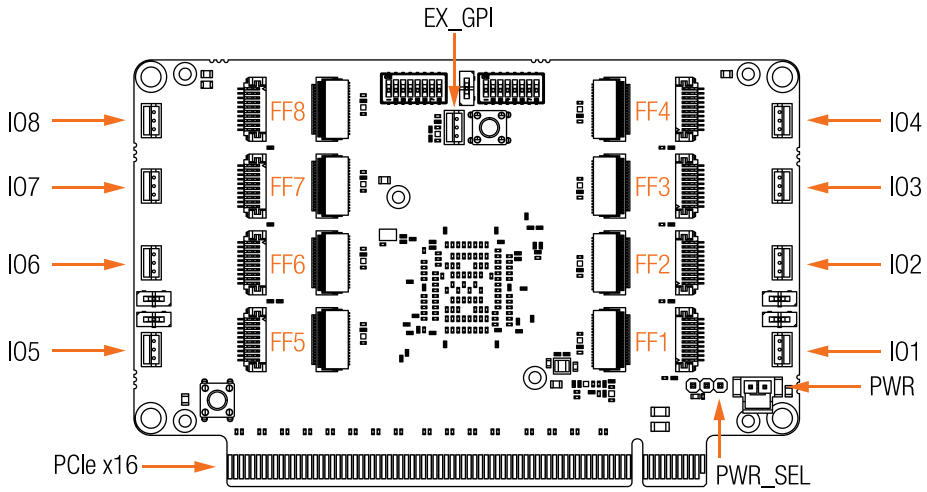


Figure 5: Location of connectors

Connector	Description
FF1 - FF8	PCIe FireFly downstream connectors
IO1 - IO8	3 Positions Header, Shrouded Connector (1.50 mm) Through Hole Tin-Lead
EX_GPI	External GPI connector 3 Positions Header, Shrouded Connector (1.50 mm) Through Hole Tin-Lead
PCIe x16	PCIe x16 PCB Edge connector
PWR_SEL	Camera power selsction jumper CONN HEADER SNGL STR 3POS
PWR	Power Connector Header Through Hole, 2 position (2.50 mm)

Table 4: Description of connectors

4.2 Data interfaces

4.2.1 FireFly connector

Item	Value
Connector	Samtec (UEC5-019-1-H-D-RA-1-A + UCC8-010-1-H-S-1-A)
Signals	PCIe, IO, GND
Mating cables	Ximea PN: CBL-ECUE-X4G3-1M0, CBL-ECUE-X4G3-2M0

Table 5: FireFly connector description

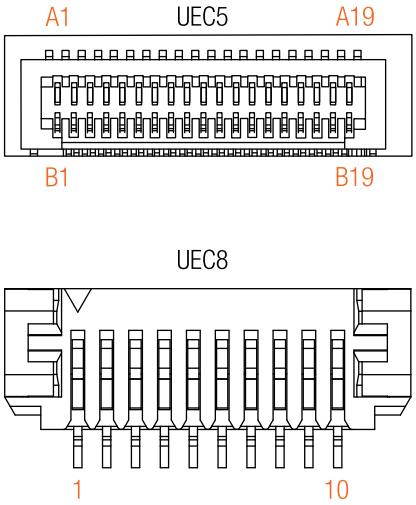


Figure 6: Firefly connector pinout

Pin	Name	Description
1	VCC_TX	TX Power output
2	GND	Ground
3	PRESENTL	Module presence detect
4	SELECT	Signal for selection
5	CPERST	PCIe reset signal
6	CPRSNT	Card presence detect
7	SDA	I2C data line
8	SCL	I2C clock line
9	GND	Ground
10	VCC_RX	RX power output

Table 6: FireFly connector UCC8 pin assignment

Pin	Name	Description	Pin	Name	Description
A1	GND	Signal and power ground	B1	GND	Signal and power ground
A2	PCIe_PETN_2	PCIe TX differential pair 2	B2	PCIe_PETN_3	PCIe TX differential pair 3
A3	PCIe_PETP_2	PCIe TX differential pair 2	B3	PCIe_PETP_3	PCIe TX differential pair 3
A4	GND	Signal	B4	GND	Signal and power ground
A5	PCIe_PETN_1	PCIe TX differential pair 1	B5	PCIe_PETN_0	PCIe TX differential pair 0
A6	PCIe_PETP_1	PCIe TX differential pair 1	B6	PCIe_PETP_0	PCIe TX differential pair 0
A7	GND	Signal and power ground	B7	GND	Signal and power ground
A8	SPARE	Unused/reserved pin	B8	PWR	Power input
A9	CPERST	PCIe reset signal	B9	PWR	Power input
A10	GND	Signal and power ground	B10	GND	Signal and power ground
A11	ISO_GND	Isolated Ground	B11	ISO_GND	Isolated Ground
A12	ISO_GPI	Isolated Input	B12	ISO_GPO	Isolated Output
A13	GND	Signal and power ground	B13	GND	Signal and power ground
A14	PCIe_PERP_2	PCIe RX differential pair 2	B14	PCIe_PERN_3	PCIe RX differential pair 3
A15	PCIe_PERN_2	PCIe RX differential pair 2	B15	PCIe_PERP_3	PCIe RX differential pair 3
A16	GND	Signal and power ground	B16	GND	Signal and power ground
A17	PCIe_PERP_1	PCIe RX differential pair 1	B17	PCIe_PERN_0	PCIe RX differential pair 0
A18	PCIe_PERN_1	PCIe RX differential pair 1	B18	PCIe_PERP_0	PCIe RX differential pair 0
A19	GND	Signal and power ground	B19	GND	Signal and power ground

Table 7: FireFly connector UEC5 pin assignment

4.2.2 Power connector

Item	Value
Connector	Power Connector Header Through Hole, 2 position 1053111202
Signals	Power, Ground
Mating Connectors	2 Position Rectangular Housing Connector, Nano-Fit
Mating Cable	XIMEA PN: CBL-XEC2-PWR-0M15

Table 8: Power connector general description

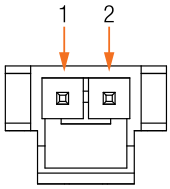


Figure 7: Power connector pinout

Pin	Name	Type
1	GND	Ground
2	PWR	12 to 24 V

Table 9: Power connector (2POS) pin assignment

4.2.3 CAM power selection jumper header (3-pin)

Item	Value
Connector	Connector Header Through Hole 3 position, PRPC003SFAN-RC
Signals	Power input
Mating Connectors	2CONN-JUMPER-2.54-BL[1]

[1] Placing the jumper on CAM-12V pins enables camera power from the PCIe blade. Alternatively, placing the jumper on CAM-AUX pins enables camera power from the GND/AUX connector.

Table 10: Power selection connector general description

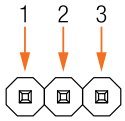


Figure 8: Jumper header (3POS) pinout

Pin	Name	Type
1	12 V	12 V power from PCIe blade
2	CAM	Camera power input
3	AUX	External power from AUX/GND pin

Table 11: Jumper header (3POS) pin assignment

4.3 GPIO

Item	Value
Connector	Connector Header Through Hole, 3 position B3B-ZR
Signals	Input, Output, Ground
Mating Connectors	JUMPER 03ZR-8M-P - 03ZR-8M-P
Mating Cables	XIMEA PN: CBL-ZR3-ZR3-0M25

Table 12: IO connector general description

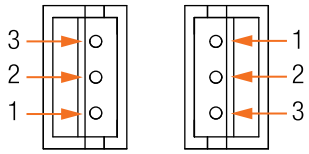


Figure 9: IO connectors pinout

Pin	Connector 1	Connector 2	Connector 3	Connector 4	Connector 5	Connector 6	Connector 7	Connector 8
1	ISO_GPI_1	ISO_GPI_2	ISO_GPI_3	ISO_GPI_4	ISO_GPI_5	ISO_GPI_6	ISO_GPI_7	ISO_GPI_8
2	ISO_GND	ISO_GND	ISO_GND	ISO_GND	ISO_GND	ISO_GND	ISO_GND	ISO_GND
3	ISO_GPO_1	ISO_GPO_2	ISO_GPO_3	ISO_GPO_4	ISO_GPO_5	ISO_GPO_6	ISO_GPO_7	ISO_GPO_8

Table 13: GPIO connectors pin assigment

4.3.1 External GPI connector

Item	Value
Connector	Connector Header Through Hole, 3 position B3B-ZR
Signals	GPI, Trigger signal, Ground
Mating Connectors	JUMPER 03ZR-8M-P - 03ZR-8M-P

Table 14: IO connector general description

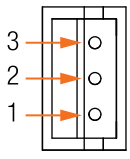


Figure 10: External GPI trigger connector pinout

Pin	Name	Type
1	EXT_GPI	External GPI (General Purpose Input) signal - used when switch is in EXT mode
2	GND	Ground
3	TRIG_3V3	Trigger signal at 3.3 V logic level

Table 15: External GPI trigger connector pin assignment

5 Usages

5.1 Buttons

5.1.1 Trigger button

This button can be used to generate a trigger pulse on the GPI-Selector output position to test the GPI configuration.

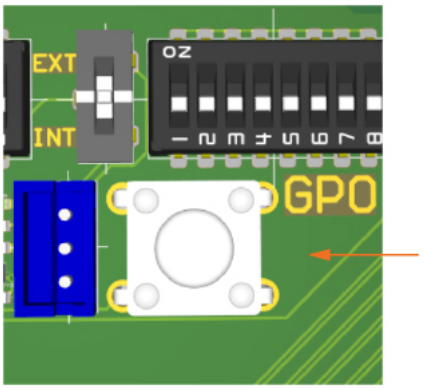


Figure 11: Trigger button

5.1.2 PCIe reset button

Pressing this button will result in reset of the Adapter PCIe bus and all connected cameras.

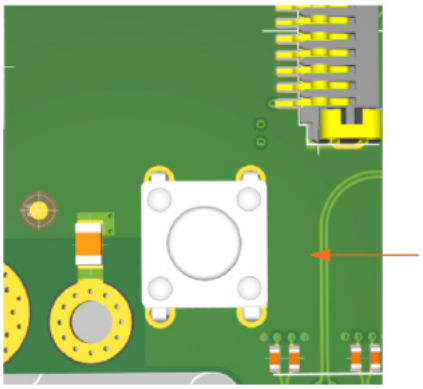


Figure 12: PCIe reset button

Note: This PCIe reset button is for debugging purposes only.

6 Additional information

6.1 Cables

6.1.1 CBL-ECUE-X4G3-1M0/2M0/3M0

The FireFly copper cables are bidirectional and flexible. PCIe Gen3 x4 lanes with performance to 28 Gbps, 12 differential pairs. Both sides are equipped with locking mechanism. The cable is available in 1 m ,2 m, and 3 m lengths. The EMI/EMC performance should be evaluated by customer.

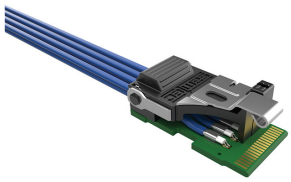


Figure 13: CBL-ECUE-X4G3-1M0

6.1.2 CBL-ZR3-ZR3-0M25

0.25 m I/O and synchronization cable. Cable has rectangular socket-to-socket with a 3-pin JST ZR connector on both ends (JUMPER 03ZR-8M-P to 03ZR-8M-P).



Figure 14: CBL-ZR3-ZR3-0M25

7 Quickstart guide

7.1 Hardware setup

7.1.1 Essential components

It is important that the power is turned off when inserting/detaching the cables. General ESD precautions need to be applied. Failing this requirement may lead to product damage.

- Host computer with at least a PCIe Gen 3 x8 slot (PCIe x16 Gen 3 recommended for optimal performance)
- HA-8P-X4G3-FF-X16G3 host adapter
- Firefly ECUE copper cable (e.g. CBL-ECUE-X4G3-1M0)

7.1.2 Connecting the components

Step 1. Deploy the host adapter to the turned-off PC and ensure the PC is also unplugged from the power source

Step 2. Connect the cables to the host adapter

Step 3. Connect the necessary cables to the connected device (e.g., the camera)

Step 4. Power up the connected device

Step 5. Power up the PC

For more information about HA-8P-X4G3-FF-X16G3 please contact: sales@ximea.com.

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