Matrox® **Display Wall**

Mura™ IPX Series • LUMA Pro Series™

System Builder's Guide

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Contents

Product overview

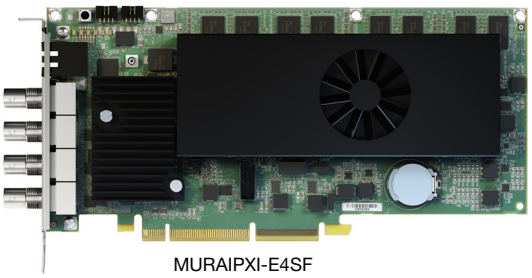
Mura IPX Series products are PCIe ×8 Gen 2.0 cards that provide high-density capture, encode, and decode functionality to enhance video walls and operator workstations with advanced video processing and networking capabilities.

Hardware summary – Mura IPX Series

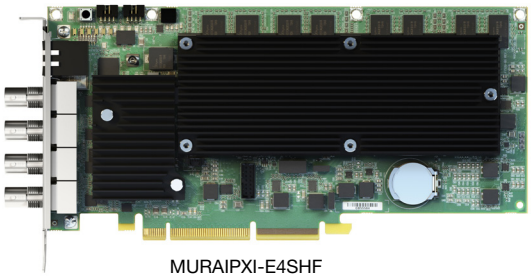
The Matrox Mura IPX Decode and IPX Encode/Decode Series of products include the following key features:

- Multi-channel 4K/HD/SD encode and decode over standard IP
- DisplayPort™, SDI, and HDMI® capture, IP encode, and IP decode support on a single card
- Flexible stream and record capabilities anywhere on the network
- Separate on-board network interface controller for zero impact on the system
- RGB 10:10:10 and 8:8:8 plus YUV 4:4:4, 4:2:2, and 4:2:0 color space support
- Ideal for control rooms, operation centers, board rooms and other mission critical environments as well as digital signage and presentation systems.

MURAIPXI-E4SF/MURAIPXI-E4SHF



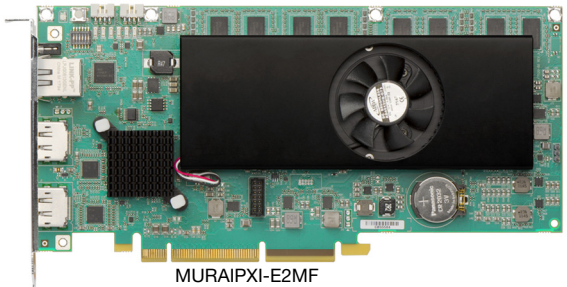
MURAIPXI-E4SF



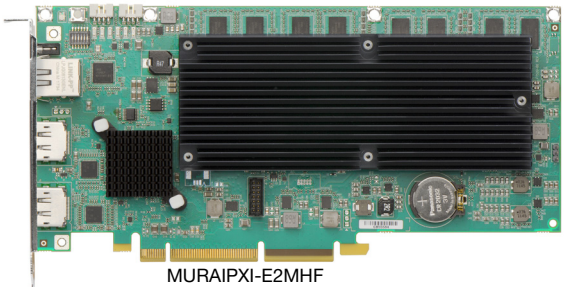
MURAIPXI-E4SHF

	MURAIPXI-E4SF	MURAIPXI-E4SHF
Part number	MURAIPXI-E4SF	MURAIPXI-E4SHF
Card type	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)
Form factor	ATX	ATX
Connector	4× BNC 1x 100/1000 Base-T RJ45 Ethernet Port	4× BNC 1x 100/1000 Base-T RJ45 Ethernet Port
Memory	8 GB	8 GB
Output support	—	—
Input support	4× SDI + IP	4× SDI + IP
Decode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Encode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Power consumption	Typical: 27.12 W @ 12 V, 6.27 W @ 3.3 V, or 33.39 W Total	Typical: 27.12 W @ 12 V, 6.27 W @ 3.3 V, or 33.39 W Total
Weight	398 g	334 g
Dimensions	L: 9.02 in / W: 0.75 in / H: 4.38 in L: 22.91 cm / W: 1.91 cm / H: 11.13 cm	
Regulatory compliance	Class B: FCC, CE, RCM, VCCI, ICES-3, CSA, KC	

MURAIPXI-E2MF/MURAIPXI-E2MHF



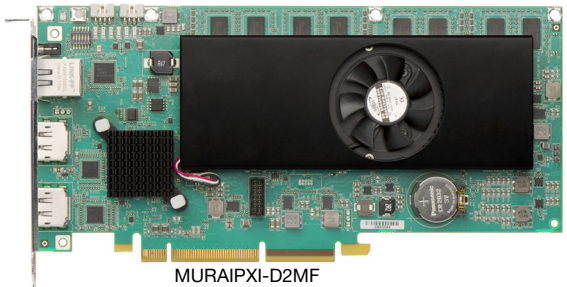
MURAIPXI-E2MF



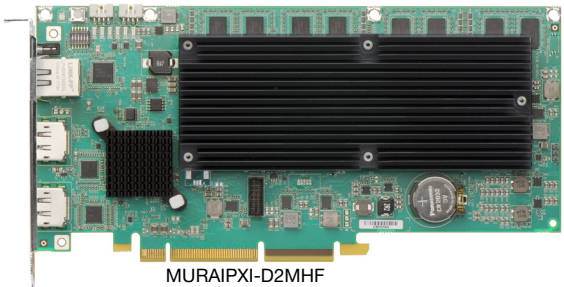
MURAIPXI-E2MHF

	MURAIPXI-E2MF	MURAIPXI-E2MHF
Part number	MURAIPXI-E2MF	MURAIPXI-E2MHF
Card type	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)
Form factor	ATX	ATX
Connector	2× DisplayPort 1.2, 1x 100/1000 Base-T RJ45 Ethernet Port	2× DisplayPort 1.2, 1x 100/1000 Base-T RJ45 Ethernet Port
Memory	8 GB	8 GB
Output support	—	—
Input support	2× DisplayPort 1.2 + IP	2× DisplayPort 1.2 + IP
Decode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Encode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Power consumption	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total
Weight	304 g	268 g
Dimensions	L: 9.02 in / W: 0.75 in / H: 4.38 in L: 22.91 cm / W: 1.91 cm / H: 11.13 cm	
Regulatory compliance	Class B: FCC, CE, RCM, VCCI, ICES-3, CSA, KC	

MURAIPXI-D2MF/MURAIPXI-D2MHF



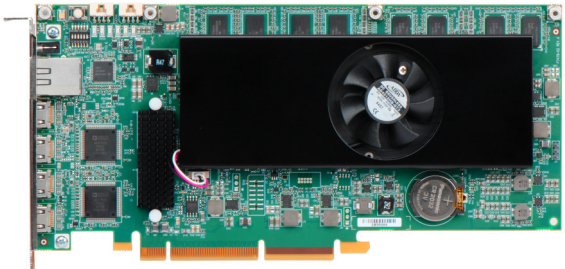
MURAIPXI-D2MF



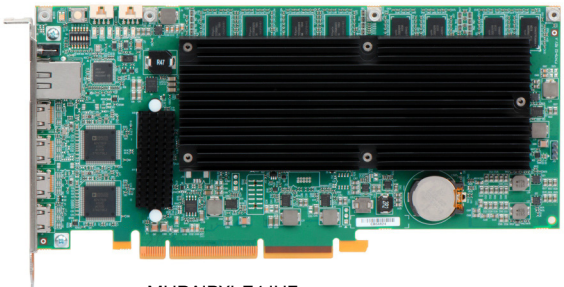
MURAIPXI-D2MHF

	MURAIPXI-D2MF	MURAIPXI-D2MHF
Part number	MURAIPXI-D2MF	MURAIPXI-D2MHF
Card type	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)	PCIe ×16 2.0 (×16 mechanical, ×8 electrical)
Form factor	ATX	ATX
Connector	2× DisplayPort 1.2, 1x 100/1000 Base-T RJ45 Ethernet Port	2× DisplayPort 1.2, 1x 100/1000 Base-T RJ45 Ethernet Port
Memory	8 GB	8 GB
Output support	—	—
Input support	2× DisplayPort 1.2 + IP	2× DisplayPort 1.2 + IP
Decode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Encode support	—	—
Power consumption	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total
Weight	304 g	268 g
Dimensions	L: 9.02 in / W: 0.75 in / H: 4.38 in L: 22.91 cm / W: 1.91 cm / H: 11.13 cm	
Regulatory compliance	Class B: FCC, CE, RCM, VCCI, ICES-3, CSA, KC	

MURAIPXI-E4JF/MURAIPXI-E4JHF



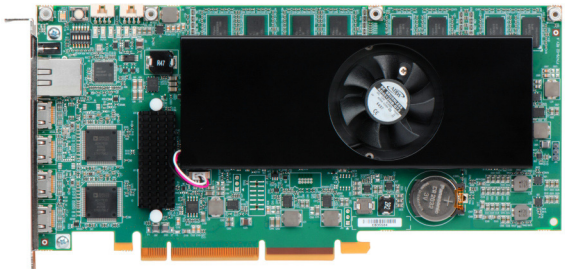
MURAIPXI-E4JF



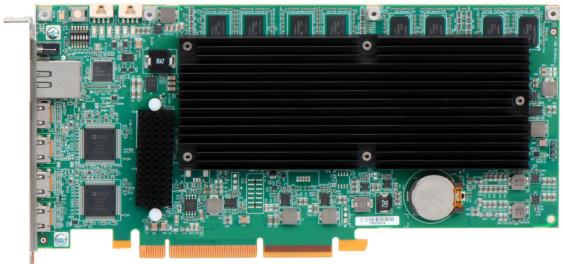
MURAIPXI-E4JHF

	MURAIPXI-E4JF	MURAIPXI-E4JHF
Part number	MURAIPXI-E4JF	MURAIPXI-E4JHF
Card type	PCIe ×16 2.0 (×8 2.0 electrically)	PCIe ×16 2.0 (×8 2.0 electrically)
Form factor	ATX	ATX
Connector	4x Mini HDMI (Type C), 1x 100/1000 Base-T RJ45 Ethernet Port	4x Mini HDMI (Type C), 1x 100/1000 Base-T RJ45 Ethernet Port
Memory	8 GB	8 GB
Output support	—	—
Input support	4× HDMI, IP	4× HDMI, IP
Decode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Encode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Power consumption	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total
Weight	312 g	278 g
Dimensions	L: 9.02 in / W: 0.75 in / H: 4.38 in L: 22.91 cm / W: 1.91 cm / H: 11.13 cm	
Regulatory compliance	Class B: FCC, CE, RCM, VCCI, ICES-3, CSA, KC	

MURAIPXI-D4JF/MURAIPXI-D4JHF



MURAIPXI-D4JF



MURAIPXI-D4JHF

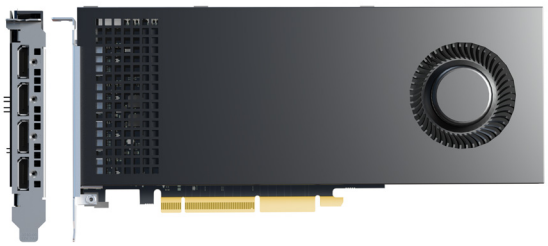
	MURAIPXI-D4JF	MURAIPXI-D4JHF
Part number	MURAIPXI-D4JF	MURAIPXI-D4JHF
Card type	PCIe ×16 2.0 (×8 2.0 electrically)	PCIe ×16 2.0 (×8 2.0 electrically)
Form factor	ATX	ATX
Connector	4x Mini HDMI (Type C), 1× 100/1000 Base-T RJ45 Ethernet Port	4x Mini HDMI (Type C), 1x 100/1000 Base-T RJ45 Ethernet Port
Memory	8 GB	8 GB
Output support	—	—
Input support	4× HDMI, IP	4× HDMI, IP
Decode support	Multi-channel 4K H.264	Multi-channel 4K H.264
Encode support	—	—
Power consumption	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total	Typical: 24.6 W @ 12 V, 6.105 W @ 3.3 V, or 30.705 W Total
Weight	304 g	268 g
Dimensions	L: 9.02 in / W: 0.75 in / H: 4.38 in L: 22.91 cm / W: 1.91 cm / H: 11.13 cm	
Regulatory compliance	Class B: FCC, CE, RCM, VCCI, ICES-3, CSA, KC	

Hardware summary – Matrox LUMA Pro Series

The Matrox LUMA Pro Series family of products includes the following key features:

- Pair up to four (4) LUMA Pro Series cards for up to 16x synchronized 2x 8K @60Hz/5K @120Hz or 4x 5K @ 60Hz HDR 12b outputs
- Support for an over-the-top ribbon synchronization cable (no need for additional synchronization card)
- PCIe 4.0 x16 (x8 electrical) bus interface for higher bandwidth capabilities
- HDCP compliant when used with Matrox Mura IPX HDMI Capture Series cards (as of Mura 4.03.00 driver version)
- Matrox LUMA A380P – Four DisplayPort 2.1 outputs, each with a maximum resolution of 2x 8K @60Hz/5K @120Hz or 4x 5K @ 60Hz HDR 12b
- Matrox LUMA A310FP – Four Mini DisplaPort 2.1 outputs, each with a maximum resolution of 2x 8K @60Hz/5K @120Hz or 4x 5K @ 60Hz HDR 12b
- Microsoft® DirectX 12.0 support enables latest professional applications
- Ideal for control rooms, operation centers, board rooms, and other critical environments as well as digital signage and presentation systems

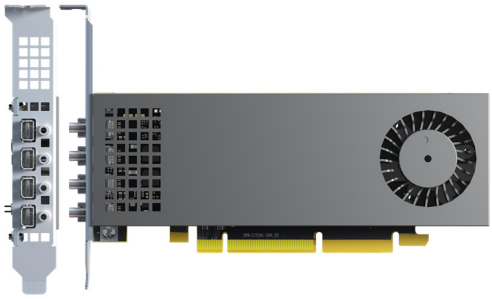
Matrox LUMA A380P



	Matrox LUMA A380P
Part number	LUMA-A380P
Card type	PCIe 4.0 x16 (x8 electrical)
Form factor	Full Height
Connector	4 x DisplayPort
Memory	6GB GDDR6
Output support	4
Input support	—
Power consumption	75W Total
Weight	547 g
Dimensions*	L: 9.99 in / W: 0.737 in / H: 4.99 in L: 25.38 cm / W: 1.872 cm / H: 12.68 cm
Regulatory compliance	Class A: CE, FCC, ICES-3, RCM, KC, UKCA, CSA

* Length and height dimensions are with fansink and bracket.

Matrox LUMA A310FP



	Matrox LUMA A310FP
Part number	LUMA-A310FP
Card type	PCIe 4.0 x16 (x8 electrical)
Form factor	Low profile
Connector	4 x Mini DisplayPort
Memory	4GB GDDR6
Output support	4
Input support	—
Power consumption	50 W Total
Weight	179 g
Dimensions*	L: 6.6 in / W: 0.737 in / H: 2.7 in L: 16.76 cm / W: 1.872 cm / H: 6.86 cm
Regulatory compliance	Class A: CE, FCC, ICES-3, RCM, KC, UKCA, CSA

* Length and height dimensions are with fansink and bracket.

Why choose a validated platform?

Matrox display wall products are designed for control rooms, operation centers, and other critical environments that require stable, reliable, and durable solutions. Matrox display wall products work in numerous non-validated, commercial-off-the-shelf (COTS) motherboards and systems, but only a select few of these off-the-shelf solutions can be thoroughly tested, verified, and validated by Matrox. Choosing a validated platform guarantees a high-quality solution to drive your display wall system.

Some of the key benefits of using a Matrox-validated platform include:

- **Optimized performance** – Carefully selected by Matrox to ensure better performance, a validated platform guarantees that your display wall product will work at or close to optimum performance.
- **Extensive validation process** – Systems are put to the test by Matrox Engineering, QA, Sales, and Marketing departments. From development and testing to sales and product demos, our employees use these systems in various practices to monitor performance. Using a validated platform guarantees the same level of performance experienced by Matrox staff.
- **Easier deployment** – Using an already validated system takes the guesswork out of building a display wall system. Integrators can use a validated platform to quickly and easily deploy solutions across a wide range of project sizes.
- **Faster customer support** – Customer support is faster, easier, and more precise because our technical support team is already familiar with the validated system you're using.
- **Uncompromised compatibility** – Using a validated platform ensures that your display wall product has been thoroughly tested and verified for uncompromised compatibility.
- **Improved reliability** – Systems validated by Matrox have guaranteed thermal and ventilation characteristics, resulting in better product longevity.

Platforms validated by Matrox

Matrox is constantly reviewing new systems and looking to validate new platforms across multiple price points. Any system suggestions are welcome. The following tables are summaries of the active list.

Validated systems

Validated System	Maximum number of boards supported per system
Supermicro SYS-551A-T	6

Validated motherboards

Validated motherboard	Maximum number of boards supported per system
ASUS Pro WS W790-ACE	5
ASUS Pro WS W790E-SAGE SE	7
ASUS WS C422 SAGE/10G	7
Gigabyte MW83-RP0	7
MSI MEG Z790 ACE	3
Supermicro X13SWA-TF	6

Validated chassis

Validated chassis	Currently supported motherboards
Chenbro RM41300 FS81	▪ ASUS Pro WS W790-ACE ▪ ASUS Pro WS W790E-SAGE SE ▪ ASUS WS C422 SAGE/10G ▪ Gigabyte MW83-RP0 ▪ MSI MEG Z790 ACE
Rosewill RSV-L4000U	▪ ASUS Pro WS W790-ACE ▪ ASUS Pro WS W790E-SAGE SE ▪ ASUS WS C422 SAGE/10G ▪ Gigabyte MW83-RP0 ▪ MSI MEG Z790 ACE
Supermicro CSE-747BTS-R2K20BP chassis	▪ Supermicro X13SWA-TF

LUMA Pro Series system requirements

For LUMA Pro Series based display walls (with or without Mura IPX Series cards), the demands and requirements of a system are more generic. To use as a LUMA Pro Series based display wall, a system ***must*** meet the following requirements:

- The system ***must*** be properly ventilated and the Mura IPX Series and LUMA Pro Series cards must not exceed the maximum allowed temperature. For more information, see "System ventilation", page 31.
- Mura IPX Series cards used in a non-validated system ***must*** have a fansink.
- The system ***must*** be populated with at least 64 GB of system memory. Follow the system manufacturer's guideline for memory population sequence.

> **Note:** We recommend choosing memory from the system or motherboard manufacturer's supported list. The actual memory frequency may differ depending on the CPU types and the memory module used.

Validated systems

The following systems have been validated by Matrox to work with the Matrox Mura IPX Series and the Matrox LUMA Pro Series (A380P and A310FP) products.

Note: Ensure that you have the following default settings to launch the Windows operating system:

- In the system BIOS main page, go to **Boot Tab → Boot Mode Select** and select **UEFI**.
- In the system BIOS main page, go to **Boot Tab → CSM → Launch CSM** and select **Disabled**.

Note: Ensure that you have the following default settings:

- In the system BIOS, go to **Advanced → PCI Subsystem Settings → Re-Size Bar** and select **Enabled**.
- In the system BIOS, go to **Advanced → PCI Subsystem Settings → Above 4G Decoding** and select **Enabled**.

Before you begin

To ensure optimal performance, read the following guidelines before installing your Matrox graphics hardware.

LUMA Pro Series based video wall system

Note: Always insert your *LUMA Pro Series* in the *PCIe® 3.0 / 4.0 / 5.0 ×16 or ×8* slots and your *Mura IPX Series* cards in the *PCIe® 2.0 / 3.0 / 4.0 / 5.0 ×16 or ×8* slots (×16 or ×8 electrical).

- **LUMA Pro Series and Mura IPX Series** – Insert these cards in the PCIe ×16 slots that are ×16 /×8 electrical.

Note: LUMA Pro Series cards require Mura 4.02 package or later.

Supported configurations

- Up to 4 x LUMA A380P
- Up to 4 x LUMA A380P and multiple Mura IPX Capture Series cards
- Up to 4 x LUMA A310FP
- Up to 4 x LUMA A310FP and multiple Mura IPX Capture Series cards

Currently supported systems

The following systems have been validated by Matrox to work with Matrox Mura IPX Series and Matrox LUMA Pro Series products.

Validated system	Maximum number of boards supported per system
Supermicro SYS-551A-T	6

Supermicro SYS-551A-T

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	6
Maximum supported Mura IPX Series	5
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19044 Build 19044
Motherboard	Supermicro X13SWA-TF
Chipset	Intel W790
Processor	Intel(R) Xeon(R) W5-3423 CPU @ 2.1GHz
Heatsink (for CPU)	LGA 4677(Part# SNK-P0091AP4)
System BIOS version	1.1, 2023-02-15
System memory	64 GB (4 x16GB 4800MHz ECC DDR5 RDIMM)
Chassis	Supermicro CSE-GS7A-2000B
Power supply	2000 W
PCIe expansion slots	6 PCIe ×16 5.0 slots

Notes	▪ Ensure to order the air-cooled configuration for the chassis.
	▪ One 120 mm x 120 mm x 25 mm 6.4 KRPM optional fan (Part#: FAN-0222L4) must be ordered for the rear fan separately for air-cooled configuration when ordering the system.
	▪ Two 120 mm x 120 mm x 25 mm ***59 CFM*** front fans that come with the system must be replaced with two 120 mm x 120 mm x 25 mm ***150 CFM*** fans.
	▪ The chassis fans speed must be set to **Heavy I/O** in IPMI.
	▪ In the system BIOS go to **Advanced** → **PCIe/PCI/PnP Configuration** → **VGA Priority** → select **Offboard**.
	▪ Ensure to have the following settings for Above 4G Decoding in the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Above 4G Decoding** → select **Enabled**.
	▪ In the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Re-Size Bar** → select **Enabled.**
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Bus Master Enable** → select **Enabled.**
	▪ In the system BIOS go to **Advanced** → **ACPI Settings** → **UMA-Based Clustering** → select **Hemisphere 2-cluster**.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ Optional rack-mount kit mounting rails are available (Supermicro Part#: MCP-290-00057-0B).

Configurations

	LUMA Pro Series based controller	
Slot	**Main**	**Option**
CPUSLOT1PCIe5.0X16	LUMA-A310FP	A, B
SLOT2 (no connector)	-	-
CPUSLOT3PCIe5.0X16	LUMA-A310FP	A, B
CPUSLOT4PCIe5.0X16	MURAIPXI-E4JHF	A
CPUSLOT5PCIe5.0X16	LUMA-A310FP	A, B
CPUSLOT6PCIe5.0X16	MURAIPXI-E4JHF	A
CPUSLOT7PCIe5.0X16	LUMA-A310FP	B

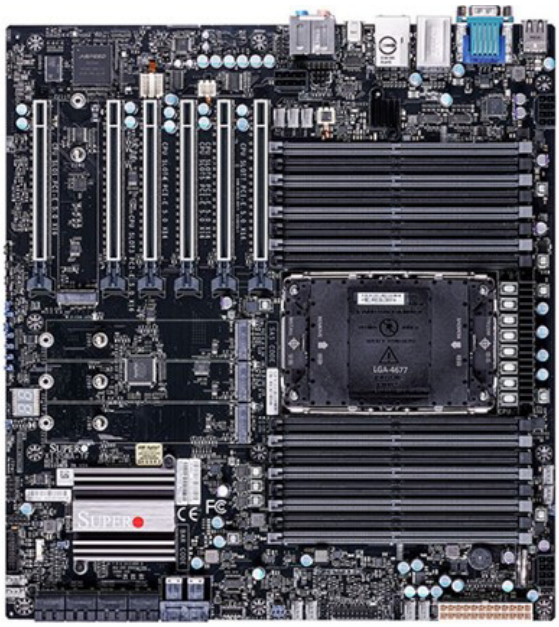
Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
CPUSLOT1PCIe5.0X16	x16	A	A	A	B
SLOT2	No connector	-	-	-	-
CPUSLOT3PCIe5.0X16	x16	A	A	B	B
CPUSLOT4PCIe5.0X16	x16	A	A	A	A
CPUSLOT5PCIe5.0X16	x16	A	B	B	B
CPUSLOT6PCIe5.0X16	x16	A	A	A	A
CPUSLOT7PCIe5.0X16	x16	B	B	B	B

.

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA-A310FP or LUMA-A380P

Motherboard layout



Validated motherboards

The following motherboards have been validated by Matrox to work with Matrox Mura IPX Series, Matrox LUMA A380P, and Matrox LUMA A310FP products.

Note: Ensure to have the following default settings to launch the Windows operating system:

- In the system BIOS main page, go to **Boot Tab** → **Boot Mode Select** → and select **UEFI**.
- In the system BIOS main page, go to **Boot Tab** → **CSM** → **Launch CSM** and select **Disabled**.

Note: The motherboard ***must*** be populated with at least 64 GB of system memory. Follow the system or motherboard manufacturer's guideline for memory population sequence.

- We recommend choosing memory from the system or motherboard manufacturer's supported list. The actual memory frequency may differ depending on the CPU types and the memory module used.

Note: Ensure that you have the following default settings:

- In the system BIOS, go to **Advanced** → **PCI Subsystem Settings** → **Re-Size Bar** and select **Enabled**.
- In the system BIOS, go to **Advanced** → **PCI Subsystem Settings** → **Above 4G Decoding** and select **Enabled**.

Currently supported motherboards

The following validated motherboards are currently supported.

Validated motherboard	Maximum number of boards supported per system
ASUS Pro WS W790-ACE	5
ASUS Pro WS W790E-SAGE SE	7
ASUS WS C422 SAGE/10G	7
Gigabyte MW83-RP0	7
MSI MEG Z790 ACE	3
Supermicro X13SWA-TF	6

ASUS Pro WS W790-ACE

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	5
Maximum supported Mura IPX Series	4
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19044 Build 19044
Motherboard	Asus Pro WS W790-ACE
Chipset	Intel W790
Processor	Intel® Xeon® W7-2495X CPU @ 2.5 GHz
Heatsink (for CPU)	LGA 4677 (Part#: Noctua NH-D9 DX-4677 4U)
System BIOS version	0705, 2023-08-09
System memory	64 GB (4 x 16 GB 4800 MHz ECC DDR5 RDIMM)
Chassis	Chenbro RM41300-FS81
Power supply	850 W (Part#: EVGA Supernova 850 P6)
PCIe expansion slots	5 PCIe ×16 5.0 slots (supports x16, x16, x16, x0/x8, x16/x8 modes)

Notes	▪ The chassis must be ordered from Chenbro. Power supply isn't included with the chassis.
	▪ Only the front chassis fan that comes with the Chenbro chassis must be changed to:
	  ▪ 120 mm x 120 mm x 25 mm ***120 CFM***.
	▪ The chassis fans must run at full speed.
	▪ The dust protection filter in the front door must be removed for proper system ventilation.
	▪ Ensure to have the following default settings in the system BIOS:
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Above 4G Decoding** → select **Enabled**.
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Re-Size Bar** → select **Enabled**.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ Check the Windows Device Manager to ensure all chipset drivers are installed.

Configurations

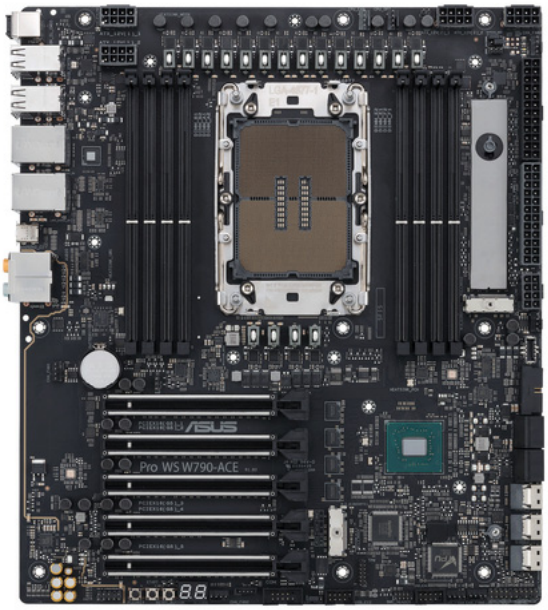
	LUMA Pro Series based controller	
Slot	**Main**	**Option**
PCIEx16_1(x16)	LUMA-A310FP	B
PCIEx16_2(x16)	MURAIPXI-E4JHF	A, B
PCIEx16_3(x16)	LUMA-A310FP	A, B
PCIEx16_4(x0/x8)	MURAIPXI-E4JHF	A
PCIEx16_5(x16/x8)	MURAIPXI-E4JHF	A, B

Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
PCIEx16_1(x16)	x16	B	B	B	B
PCIEx16_2(x16)	x16	A	A	B	B
PCIEx16_3(x16)	x16	A	B	B	B
PCIEx16_4(x0/x8)	x0/x8	A	A	A	A
PCIEx16_5(x16/x8)	x16/x8	A	A	A	B

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA-A310FP or LUMA-A380P

Motherboard layout



ASUS Pro WS W790E-SAGE SE

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	7
Maximum supported Mura IPX Series	6
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19045 Build 19045
Motherboard	Asus Pro WS W790E-SAGE SE
Chipset	Intel® W790
Processor	Intel® Xeon® W5-3425 CPU @ 3.2 GHz
Heatsink (for CPU)	LGA 4677 (Part#: Noctua NH-D9 DX-4677 4U)
System BIOS version	0705, 2023-08-08
System memory	128 GB (8 x16 GB 4800 MHz ECC DDR5 RDIMM)
Chassis	Rosewill RSV-L4000U 4U
Power supply	1200 W (Enermax Revolution D.F.2 1200 W; Part#: ERS1200EWT)
PCIe expansion slots	7 PCIe ×16 5.0 slots

Notes	▪ Power supply isn't included with the chassis.
	▪ The front fans inside the Rosewill chassis must be changed to:
	  ▪ 3x 120 mm x 120 mm x 25 mm ***120 CFM***.
	▪ Ensure to have the **VGA_SW** switch **Enabled** on the motherboard.
	▪ Ensure to have the following default settings for Above 4G Decoding in the system BIOS:
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Above 4G Decoding** → select **Enabled.**
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Resize bar support** → select **Enabled.**
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ On-board console supported with 4.02 or later drivers.

Configurations

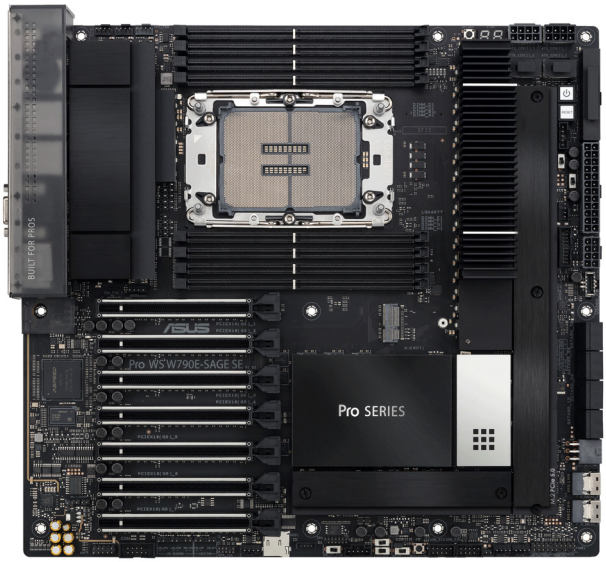
	LUMA Pro Series based controller	
Slot	**Main**	**Option**
PCIEx16(G5)_1	LUMA-A310FP	A, B
PCIEx16(G5)_2	MURAIPXI-E4JHF	A
PCIEx16(G5)_3	LUMA-A310FP	A, B
PCIEx16(G5)_4	MURAIPXI-E4JHF	A
PCIEx16(G5)_5	LUMA-A310FP	A, B
PCIEx16(G5)_6	MURAIPXI-E4JHF	A
PCIEx16(G5)_7	LUMA-A310FP	B

Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
PCIEx16(G5)_1	x16	A	A	A	B
PCIEx16(G5)_2	x16	A	A	A	A
PCIEx16(G5)_3	x16	A	A	B	B
PCIEx16(G5)_4	x16	A	A	A	A
PCIEx16(G5)_5	x16	A	B	B	B
PCIEx16(G5)_6	x8	A	A	A	A
PCIEx16(G5)_7	x16	B	B	B	B

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA-A310FP or LUMA-A380P

Motherboard layout



ASUS WS C422 SAGE/10G

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	7
Maximum supported Mura IPX Series	6
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise; Version 10.0.19045 Build 19045
Motherboard	Asus WS C422 SAGE/10G
Chipset	Intel® C422
Processor	Intel® Xeon® W-2123 CPU @ 3.6 GHz
Heatsink (for CPU)	LGA2066
System BIOS version	4101, 2023-08-25
System memory	64 GB (8 x 8 GB 2666 MHz ECC DDR4 RDIMM)
Chassis	Chenbro RM41300-FS81
Power supply	750 W (Part#: Corsair RM750X)
PCIe expansion slots	7 PCIe ×16 3.0 slots (×16 mechanical, ×16/x8 electrical)

Notes	▪ The chassis must be ordered from Chenbro. Power supply isn't included with the chassis.
	▪ Only the front chassis fan that comes with the Chenbro chassis must be changed to:
	  ▪ 120 mm x 120 mm x 25 mm ***120 CFM***.
	▪ The chassis fans must run at full speed.
	▪ The dust protection filter in the front door must be removed for proper system ventilation.
	▪ Ensure to have the following settings. In the system BIOS:
	  ▪ Go to **Advanced** → **Boot CSM** → select **Disabled**.
	  ▪ Go to **Advanced** → **Platform Misc Configuration** → **ASPM** → select **Disabled**.
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Above 4G Decoding** → select **Enabled**.
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Re-Size Bar** → select **AUTO**.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ Check the Windows Device Manager to ensure all chipset drivers are installed.

Configurations

	LUMA Pro Series based controller	
Slot	**Main**	**Option**
PCIEx16_1	LUMA-A310FP	B
PCIEx16_2	MURAIPXI-E4JHF	A
PCIEx16_3	LUMA-A310FP	A, B
PCIEx16_4	MURAIPXI-E4JHF	A
PCIEx16_5	LUMA-A310FP	A, B
PCIEx16_6	MURAIPXI-E4JHF	A
PCIEx16_7	LUMA-A310FP	A, B

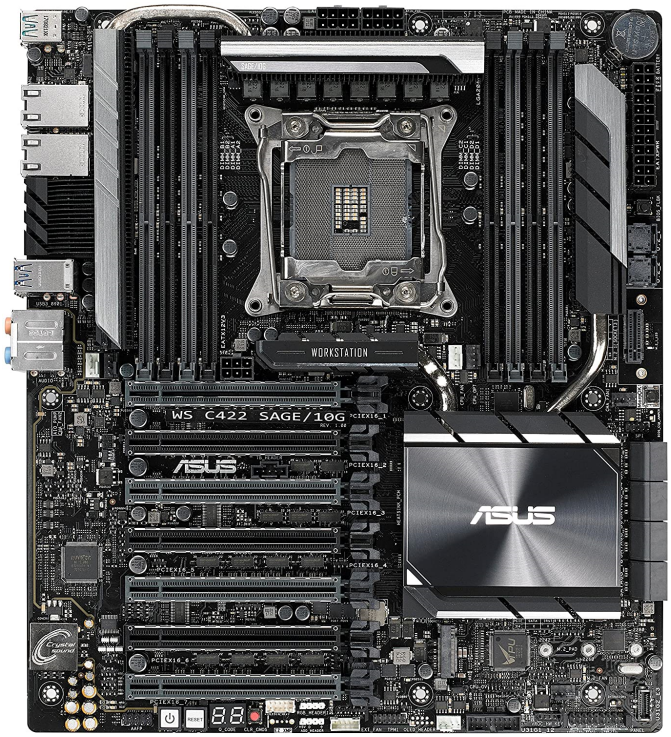
Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
PCIEx16_1	x16	B	B	B	B
PCIEx16_2	x4/x8	A	A	A	A
PCIEx16_3	x16/x8	A	A	B*	B*
PCIEx16_4	x0/x8	A	A	A	A
PCIEx16_5	x16/x8	A	B*	B*	B*
PCIEx16_6	x0/x8	A	A	A	A
PCIEx16_7	x16/x8	A	A	A	B*

Note: * The GPU bandwidth is reduced to 6 GB/s instead of 12 GB/s when shared slots are used. Shared slots are 2 & 3, 4 & 5 and 6 & 7.

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA-A310FP or LUMA-A380P

Motherboard layout



Gigabyte MW83-RP0

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	7
Maximum supported Mura IPX Series	6
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19044 Build 19044
Motherboard	Gigabyte MW83-RP0
Chipset	Intel® W790
Processor	Intel® Xeon® W7-3465 CPU @ 2.5 GHz
Heatsink (for CPU)	LGA 4677 (Part#: Noctua NH-D9 DX-4677 4U)
System BIOS version	F12, 2024-04-08
System memory	128 GB (8 x16 GB 4800 MHz ECC DDR5 RDIMM)
Chassis	Chenbro RM41300-FS81
Power supply	850 W (EVGA Supernova 850 G5; Part#: 220-G5-0850-X1)
PCIe expansion slots	7 PCIe ×16 5.0 slots

Notes	▪ The chassis must be ordered from Chenbro. Power supply isn't included with the chassis.
	▪ Only the front chassis fan that comes with the Chenbro chassis must be changed to
	  ▪ 120 mm x 120 mm x 25 mm ***120 CFM***.
	▪ The chassis fans must run at full speed.
	▪ The dust protection filter in the front door must be removed for proper system ventilation.
	▪ Ensure to have the following setting. In the system BIOS:
	  ▪ Go to **Default Bios Settings** → **Fan setting** → select **DC MODE**.
	▪ Ensure to have the following setting. In the system BIOS:
	  ▪ Go to **Advanced** → **PCI Subsystem Settings** → **Re-Size Bar** → select **AUTO**.
	▪ Ensure to have the following settings. In the system BIOS:
	  ▪ Go to **Chipset** → **Miscellaneous Configuration** → **ACTIVE VIDEO** → select **PCI DEVICE**.
	  ▪ Go to **Chipset** → **Miscellaneous Configuration** → **Decode IO decode for Second GPU** → select **Enabled**.
	  ▪ Go to **Chipset** → **Advanced Power Management Configuration** → **CPU C State Control** → **Enhance Halt State(C1E)** → select **Disable**.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ On-board console supported with 4.02 or later drivers.

Configurations

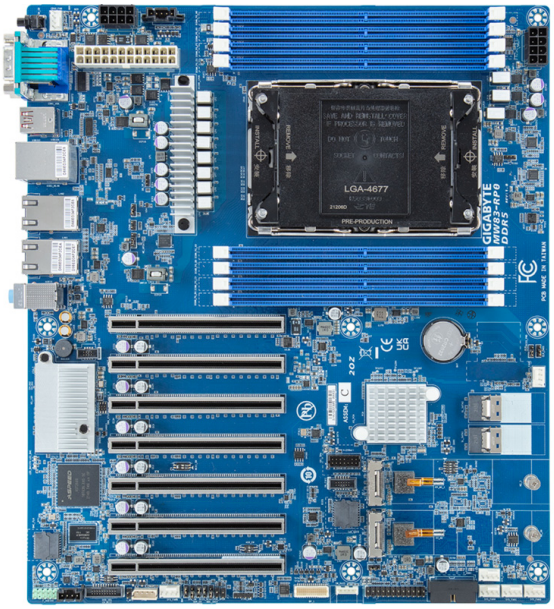
	LUMA Pro Series based controller	
Slot	**Main**	**Option**
PCIE_1(G5x16)	LUMA-A310FP	A, B
PCIE_2(G5x16)	MURAIPXI-E4JHF	A
PCIE_3(G5x16)	LUMA-A310FP	A, B
PCIE_4(G5x16)	MURAIPXI-E4JHF	A
PCIE_5(G5x16)	LUMA-A310FP	A, B
PCIE_6(G5x16)	MURAIPXI-E4JHF	A
PCIE_7(G5x16)	LUMA-A310FP	B

Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
PCIE_1(G5x16)	x16	A	A	A	B
PCIE_2(G5x16)	x16	A	A	A	A
PCIE_3(G5x16)	x16	A	B	B	B
PCIE_4(G5x16)	x16	A	A	A	A
PCIE_5(G5x16)	x16	A	A	B	B
PCIE_6(G5x16)	x16	A	A	A	A
PCIE_7(G5x16)	x16	B	B	B	B

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA-A310FP or LUMA-A380P

Motherboard layout



MSI MEG Z790 ACE

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	3
Maximum supported Mura IPX Series	2
Maximum supported LUMA Pro Series	2
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19044 Build 19044
Motherboard	MSI MEG Z790 ACE
Chipset	Intel Z790
Processor	Intel® Core™ i9-13900K CPU @ 3.0 GHz
Heatsink (for CPU)	LGA 1700 (Part#: Noctua NH-L12S)
System BIOS version	1.7 (2023-10-30)
System memory	64 GB (4 x16 GB 5600 MHz Non ECC DDR5 UDIMM)
Chassis	Chenbro RM41300-FS81
Power supply	850 W (Part#: EVGA Supernova 850 P6 or 850 GT)
PCIe expansion slots	▪ 1 PCIe 5.0 slot ×16 mechanical and electrical ▪ 1 PCIe 5.0 slot x16 mechanical x8 electrical ▪ 1 PCIe 4.0 slot x16 mechanical x4 electrical

Notes	▪ The chassis must be ordered from Chenbro. Power supply isn't included with the chassis.
	▪ Only the front chassis fan that comes with the Chenbro chassis must be changed to
	  ▪ 120 mm x 120 mm x 25 mm ***120 CFM***.
	▪ The chassis fans speed must be set to full speed.
	▪ The dust protection filter in the front door must be removed for proper system ventilation.
	▪ Ensure to have the following settings. In the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI Subsystem Settings** → **Re-Size Bar Support** → select **Enabled**.
	  ▪ Go to **Advanced** → **PCIe/PCI Subsystem Settings** → **PCIe Native Power Management** → select **Disabled**.
	▪ In the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI Subsystem Settings** → **Integrated Graphics Configuration** → **Initiate Graphics Adapter** → **PEG** → select **Enabled**.
	  ▪ Go to **Advanced** → **PCIe/PCI Subsystem Settings** → **Integrated Graphics Configuration** → **IGD Multi-Monitor** → select **Disabled**.
	▪ M2_4 slot will be unavailable when PCI_E2 slot is populated.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.

Configurations

	LUMA Pro Series based controller	
Slot	**Main**	**Options**
PCI_E1x16 (x16/x8)*	LUMA A310FP	B
PCI_E2x16 (x8)	MURAIPXI-E4JHF	A, B
PCI_E3x16 (x4)	MURAIPXI-E4JHF	A

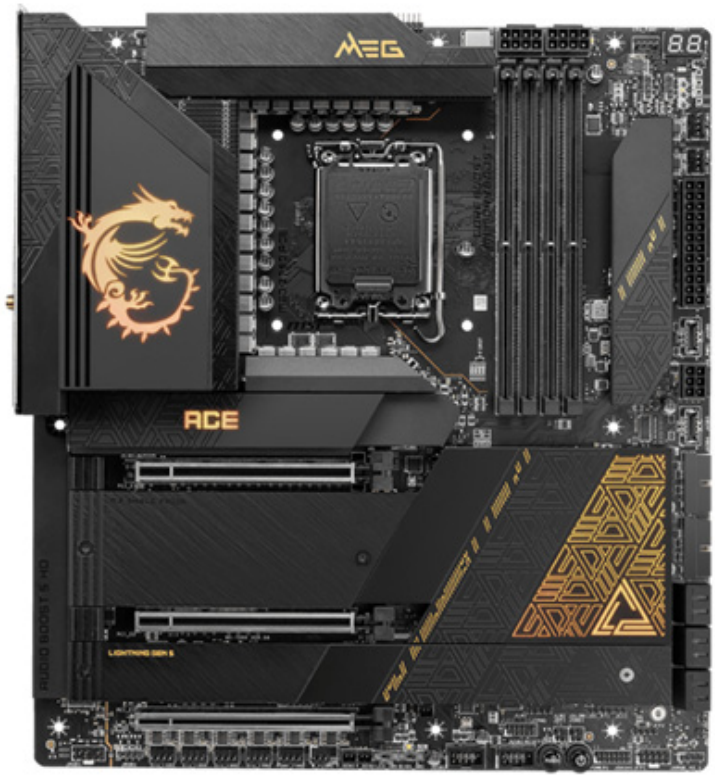
Note: * PCI_E1 slot will run at x8 speed when PCI_E2 slot is populated.

Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2
PCI_E1x16 (x16/x8)*	x16/x8	B	B
PCI_E2x16 (x8)	x8	A	B
PCI_E3x16 (x4)	x4	A	A

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA A310FP or LUMA A380P

Motherboard layout



Supermicro X13SWA-TF

	LUMA Pro Series based controllers	Third-party based controllers
Validated	Yes	No

Maximum number of cards supported	6
Maximum supported Mura IPX Series	5
Maximum supported LUMA Pro Series	4
Validated OS	Windows 10 Enterprise LTSC; Version 10.0.19044 Build 19044
Motherboard	Supermicro X13SWA-TF
Chipset	Intel W790
Processor	Intel® Xeon® W5-3423 CPU @ 2.1 GHz
Heatsink (for CPU)	LGA 4677 (Part#: SNK-P0091AP4)
System BIOS version	1.1, 2023-02-15
System memory	64 GB (4 x16GB 4800MHz ECC DDR5 RDIMM)
Chassis	Supermicro CSE-747BTS-R2K20BP
Power supply	2 x 2200 W Redundant PSU (Part#: PWS-2K20A-1R; included with the chassis)
PCIe expansion slots	▪ 6 PCIe ×16 5.0 slots

Notes	▪ The chassis fans speed must be set to **Heavy I/O** mode in IPMI.
	▪ In the system BIOS, go to **Advanced** → **PCIe/PCI/PnP Configuration** → **VGA Priority** → select **Offboard**.
	▪ Ensure to have the following settings for Above 4G Decoding in the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Above 4G Decoding** → select **Enabled**.
	▪ In the system BIOS:
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Re-Size Bar** → select **Enabled**.
	  ▪ Go to **Advanced** → **PCIe/PCI/PnP Configuration** → **Bus Master Enable** → select **Enabled**.
	  ▪ Go to **Advanced** → **ACPI Settings** → **UMA-Based Clustering** → select **Hemishpere 2-cluster**.
	▪ Require 4.02 or later drivers for LUMA Pro Series controllers.
	▪ Third-party controller is unsupported.
	▪ Optional rack-mount kit mounting rails are available (Supermicro part#: MCP-290-00059-0B).

Configurations

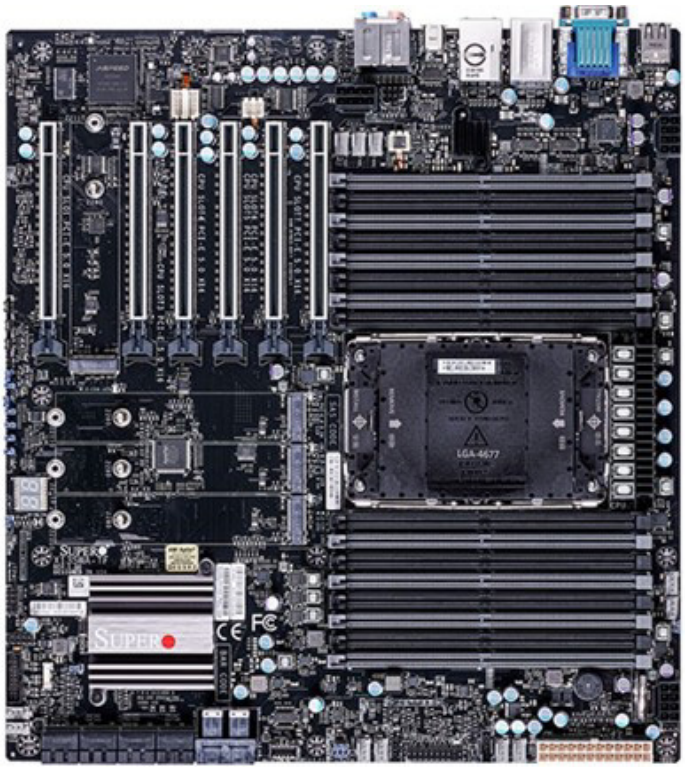
	LUMA Pro Series based controller	
Slot	**Main**	**Options**
CPU SLOT1 PCIe 5.0 X16	LUMA A310FP	A, B
SLOT2 (no connector)	-	-
CPU SLOT3 PCIe 5.0 X16	LUMA A310FP	A, B
CPU SLOT4 PCIe 5.0 X16	MURAIPXI-E4JHF	A
CPU SLOT5 PCIe 5.0 X16	LUMA A310FP	A, B
CPU SLOT6 PCIe 5.0 X16	MURAIPXI-E4JHF	A
CPU SLOT7 PCIe 5.0 X16	LUMA A310FP	B

Performance considerations with LUMA Pro Series controller

Slot	Connectivity	Configuration 1	Configuration 2	Configuration 3	Configuration 4
CPU SLOT1 PCIe 5.0 X16	x16	A	A	A	B
SLOT2	No connector	-	-	-	-
CPU SLOT3 PCIe 5.0 X16	x16	A	A	B	B
CPU SLOT4 PCIe 5.0 X16	x16	A	A	A	A
CPU SLOT5 PCIe 5.0 X16	x16	A	B	B	B
CPU SLOT6 PCIe 5.0 X16	x16	A	A	A	A
CPU SLOT7 PCIe 5.0 X16	x16	B	B	B	B

Option	Product
A	MURAIPXI-E4SF, MURAIPXI-E4SHF, MURAIPXI-D2MF, MURAIPXI-D2MHF, MURAIPXI-E2MF, MURAIPXI-E2MHF, MURAIPXI-D4JF, MURAIPXI-D4JHF, MURAIPXI-E4JF, or MURAIPXI-E4JHF
B	LUMA A310FP or LUMA A380P

Motherboard layout



Validated chassis

The following chassis have been validated by Matrox to work with Matrox Mura IPX Series, Matrox LUMA A380P, and Matrox LUMA A310FP products.

Currently supported chassis

Chenbro RM41300 FS81

Cards supported (maximum)	7
Part number	RM41300-FS81 (includes chassis and fans. Power supply is not included.)
Power supply	750 W (Part#: Corsair RM750X / Part#: EVGA SuperNOVA 750 G3) 850 W (Part#: EVGA Supernova 850G3 1200 W (Enermax Revolution D.F.2 1200 W; Part#: ERS1200EWT)
Power supply bracket	Standard
Fan	▪ One 120 mm x 120 mm x 25 mm 85.5 CFM front fan (included with the chassis) ▪ Two 80 mm x 80 mm x 25 mm ***39 CFM*** rear fans (included with the chassis) ▪ Two 120 mm x 120 mm x 25 mm ***85.5 CFM*** fans on the lid (included with the chassis)
Supported motherboards	▪ ASUS Pro WS W790-ACE ▪ ASUS Pro WS W790E-SAGE SE ▪ ASUS WS C422 SAGE/10G ▪ Gigabyte MW83-RP0 ▪ MSI MEG Z790 ACE
Notes	▪ The chassis fans must run at full speed in the system BIOS. ▪ Only the front chassis fan that comes with the Chenbro chassis must be changed to 120 mm x 120 mm x 25 mm ***120 CFM*** fan, purchased separately (Part#: Orion OD1225-12HBIP69K). ▪ The dust protection filter in the front door must be removed for proper system ventilation.

Rosewill RSV-L4000U

Cards supported (maximum)	7
Part number	Rosewill RSV-L4000U (includes bare-bone chassis only)
Power supply	1200 W (Enermax Revolution D.F.2 1200 W; Part#: ERS1200EWT)
Power supply bracket	Standard
Fan	▪ 2 x 120 mm x 120 mm x 25 mm standard front fans (included with the chassis) ▪ 3 x 120 mm x 120 mm x 25 mm ***113 CFM*** front fans (included inside the chassis) ▪ 2 x 80 mm x 80 mm x 25 mm standard fans (included with the chassis)
Supported motherboards	▪ Asus Pro WS W790-ACE ▪ ASUS Pro WS W790E-SAGE SE ▪ ASUS WS C422 SAGE/10G ▪ Gigabyte MW83-RP0 ▪ MSI MEG Z790 ACE
Notes	▪ Power supply isn't included with the chassis. ▪ Only the three front fans inside the chassis must be changed to 120 mm x 120 mm x 25 mm ***120 CFM*** fans, purchased separately (Part#: Orion OD1225-12HBIP69K).

Supermicro CSE-747BTS-R2K20BP chassis

Cards supported (maximum)	7
Part number	CSE-747BTS-R2K20BP (includes chassis, 2200 W redundant power supply, and fans)
Power supply	2200 W redundant, model PWS-2K20A-1R
Power supply bracket	Standard
Fan	▪ Two 92 mm x 92 mm x 38 mm ***109.7 CFM*** front fans (Supermicro part#: FAN-0114L4, included with the chassis) ▪ Two 92 mm x 92 mm x 38 mm ***150 CFM*** middle fans (Supermicro part#: FAN-0138L4, included with the chassis) ▪ Two 80 mm x 80 mm x 38 mm ***68.3 CFM*** rear fans (Supermicro part#: FAN-0082L4, included with the chassis)
Supported motherboards	▪ Supermicro X13SWA-TF
Notes	▪ The system fan speed must be set to **HeavyIO** mode in IPMI. ▪ Optional rack-mount kit mounting rails are available (Supermicro part#: MCP-290-000590B).

System ventilation

Without proper system ventilation, the motherboard and add-in cards will operate at elevated temperatures. Continued operation at elevated temperatures will reduce the life expectancy of the overall system. Mechanical components (such as fans), in particular, experience higher failure rates when exposed to elevated temperatures over long periods of time. The system integrator must verify that the system – and the add-in card area in particular – is properly ventilated. The result is a system that runs cooler, has a longer operating life, and offers higher reliability.

Note: To guarantee the longevity of your system and the installed cards, make sure your system is installed in a properly ventilated location. Running Matrox Mura IPX and LUMA Pro Series cards above the specified temperatures will lead to permanent damage to the cards that won't be covered by the Matrox warranty.

Mura IPX Series – The Mura IPX Series operating temperature is 0 to 45 °C. When a Mura IPX Series card is installed in a properly ventilated system, the temperature of the Mura IPX Series card recorded by the Matrox IPX Utility tool or APIs ***must never exceed 100 °C***.

To monitor and record the temperature changes of your Mura IPX Series card, use **Matrox IPX utility tool**. From the Mura CD package, install *Network API SDK.msi*. Then, go to system's *Program Files (x86)\Matrox Graphics Inc\Matrox Network API SDK\Applications* and run the *IPX utility.exe*. From the IPX utility tool window, enter **localhost** to get the temperature of your Mura IPX Series card.

LUMA Pro Series – The temperature of your LUMA Pro Series cards should never exceed 90 °C. To retrieve the temperature of your LUMA Pro Series card, use the Matrox PowerDesk software. From the main interface, click **Help and Troubleshooting → Troubleshoot**. Under **Chip temperature data and logging**, you can enable options to monitor the peak temperatures and log the chip temperatures of your LUMA Pro Series card.

Power supply sizing for Matrox LUMA Pro Series based systems

When assembling a system based on LUMA Pro Series products, the power supply must be sized to provide power for the entire system, including the CPU, all add-in cards, and any peripherals connected. To determine the power supply size, you must consider not only the power requirements of all devices but also the power rails from which the current is being drawn.

Each power supply provides different voltages with varying current load capacities, depending on system usage. For example, a -12V supply (still used in some systems) supports less than 1A of load, whereas a +12V supply, which bears the brunt of the load in modern systems, can easily exceed 50A capacity in many mid-sized power supplies. The remaining voltages (typically, +3.3V, +5V, and +5VSB) fall between these extremes in terms of current load capacity.

Matrox cards, being PCI Express based, draw power primarily from the +12V supply, though a small amount of current is drawn from the +3.3V supply (typically on the order of 1-2A). Since each Matrox SKU has slightly different power supply requirements, using the largest possible current requirement to size the power supply will ensure the power supply is adequate, regardless of the SKUs installed.

To properly size the power supply, the power requirements of all the devices must be added together separately for each supply rail and then the appropriate power supply selected. For example, the D1480 can consume up to approximately 4.3 A from the +12V supply, while Mura IPX consumes approximately 2A. A system integrating the maximum configuration of 4 D1480 cards and 3 Mura-IPX cards would therefore require up to approximately 23.2 A (or 4 x 4.3A + 3 x 2A) from the +12V supply. Note: This is *in addition* to any pre-existing requirements of the motherboard and installed hardware (CPU, hard disk drives, etc.). For example, if the system configuration requires 15A from the +12V supply with no Matrox cards installed, once the Matrox cards are installed the power supply must be capable of providing 15A + 23.2A (or 39A, rounding up) on the +12V rail for adequate power supply.

A merely "adequate" power supply, however, isn't sufficient. Most power supplies operate at optimal efficiency at 50-60% of their rated power load. Continually operating beyond this may cause excessive thermal generation and lead to premature aging of the electronic components. It is common practice to ensure that the power supply can supply additional current beyond what's required for the system configuration in typical use. For maximum efficiency and reliability, make sure to provide a minimum 50% margin on the power supply rating. In the example above, a system requiring 39A on the +12V rail would require approximately 468W. Assuming another 50W for the +3.3V rail and 10W for the +5V rail, the total system requirements are approximately 468W + 50W + 10W, for a total of 528W. A 50% margin on the power supply means specifying a supply of 800W that can supply around 59A on the +12V supply.

Providing less margin than specified above may lead to excess heat generation within the power supply and premature wear-out of electronic components, possibly compromising the overall reliability of the product.

Note: The margin provided on the power supply must never be less than 35-40%.

For a common display wall setup that supports up to seven Matrox cards and uses a mid-range Intel CPU, we recommend a minimum power supply of 800W. For larger systems, the power supply must be increased accordingly, taking into account the requirements of the CPU or SHB and backplane/motherboard components.

Shipping an integrated system

While shipping an integrated system, make sure that add-in cards are properly installed in the expansion slots and the board bracket is screwed securely to the chassis. Most systems have a board retaining clip to protect cards from shock and vibration. If your system has a board retaining clip, use it to securely clamp the boards into place. For more information, see the user guide for your system or chassis. Follow the system /chassis manufacturer's guidelines for proper installation, shipment, and transportation of an integrated system. Failure to do so may cause damage to the cards due to shock and vibration during shipping and transportation.

PCI Express® bandwidth considerations in Matrox LUMA Pro Series and Mura IPX Series based systems

System architecture is an important factor in determining overall capture/display performance with Matrox LUMA Pro Series and Matrox Mura IPX based systems. While the input resolutions and formats must be taken into account, the system bus-level architecture also plays an important role in determining how to optimize the system to obtain the best possible performance. This section attempts to clarify some of the issues that must be considered when implementing Mura-based Display Wall architectures.

Input source bandwidth requirements

Any capture architecture receives its data from external sources and transfers it to one or more graphic engines for display. The inputs may take many forms: HDMI, Display Port and SDI. Each of these inputs places a different load on the system in terms of quantity of data to be transferred. Each input type is also associated with a default data format HDMI, Display Port and SDI are typically transferred in RGB: 8:8:8, 10:10:10 (24/32 bits per pixel), and in YUV: 4:4:4, 4:2:2, 4:2:0 (8 /10 bits per component). Understanding the different transmission formats and their bandwidth requirements will help guide the integrator in setting up and configuring a Mura-based capture system.

The bandwidth required by any input source can be expressed as follows:

$$BW = Res_x \times Res_y \times fps \times Bytes_{pixel}$$

Where the values ***fps*** and ***Bytes****pixel* represent the number of frames per second and the number of bytes taken by each pixel, respectively. In HDMI, DP and SDI modes, each pixel requires 3 Bytes for RGB 8:8:8 or YUV 4:4:4 8 bit.

$$BW_{4K} = 3840 \times 2160 \times 60 \times 3 \text{ (4:4:4 8-bit packed)} = 1{,}500 \text{ MB/s}$$

> **Note:** In some cases, it may be possible to capture HDMI, DP or SDI sources and transfer them internally using a 16-bit YUV format. Doing so will reduce the amount of system bandwidth required to transfer the input data; however, it will generally also degrade the capture quality (since less data is used to represent each pixel). This option should be used only when necessary and with sources when the quality of input capture can be sacrificed.

Regardless of the resolutions and formats of the various inputs, the available system bandwidth should not be exceeded. Doing so will result in reduced system performance and/or instability.

PCI Express architecture overview

To understand how system architecture plays a role in the available bandwidth, a basic understanding of the PCI-Express architecture is helpful. This section describes very briefly, and in general terms, the PCI-Express architecture with the goal of providing some background.

PCI-Express is a point-to-point serial transmission interface using high-speed differential signaling to enable high-performance transfer of data within systems. The PCI-Express architecture is currently in its fifth generation, with each generation providing increased performance over its predecessor. The following table summarizes the peak data transfer capabilities of the PCI-Express architecture based on generation and link width (the link width is the “size” of the electrical connection between two PCI-Express devices). Generally speaking, bus efficiency is anywhere in between 70% and 90% of this peak bandwidth.

The PCI Express specification also defines backward-compatibility between PCI Express devices. That is, a device designed for Gen-3 PCI Express functions at Gen-2 speeds when connected to a Gen-2 device, a Gen-2 device functions at Gen-1 speeds when connected to a Gen-1 device, and so on.

Link width*	PCIe Gen-1	PCIe Gen-2	PCIe Gen-3	PCIe Gen-4	PCIe Gen-5
×1	250 MB/s	500 MB/s	1 GB/s	2 GB/s	4 GB/s
×4	1 GB/s	2 GB/s	4 GB/s	8 GB/s	16 GB/s
×8	2 GB/s	4 GB/s	8 GB/s	16 GB/s	32 GB/s
×16	4 GB/s	8 GB/s	16 GB/s	32 GB/s	64 GB/s

* The link width provides a measure of the data transfer capabilities of the link in a single direction. Since each PCI Express lane contains both an upstream and a downstream link, the effective bandwidth is doubled. The numbers in this table represent the maximum bandwidth available *in each direction*.

For maximizing data transfer capabilities within a system, it is desirable to have the widest lane widths possible throughout the system. An ideal system for Display Wall applications provides all add-in boards with x16 PCI-Express Gen3 links or x8 PCI-Express Gen4 links, maximizing throughput at each communication link.

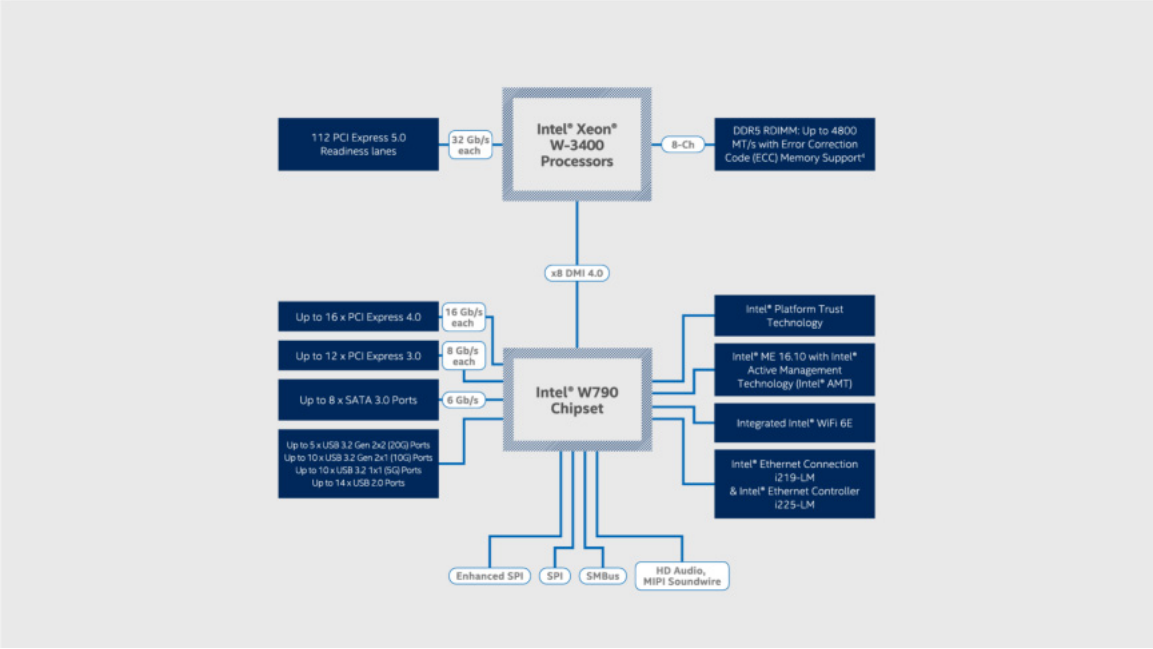
General bandwidth guidelines

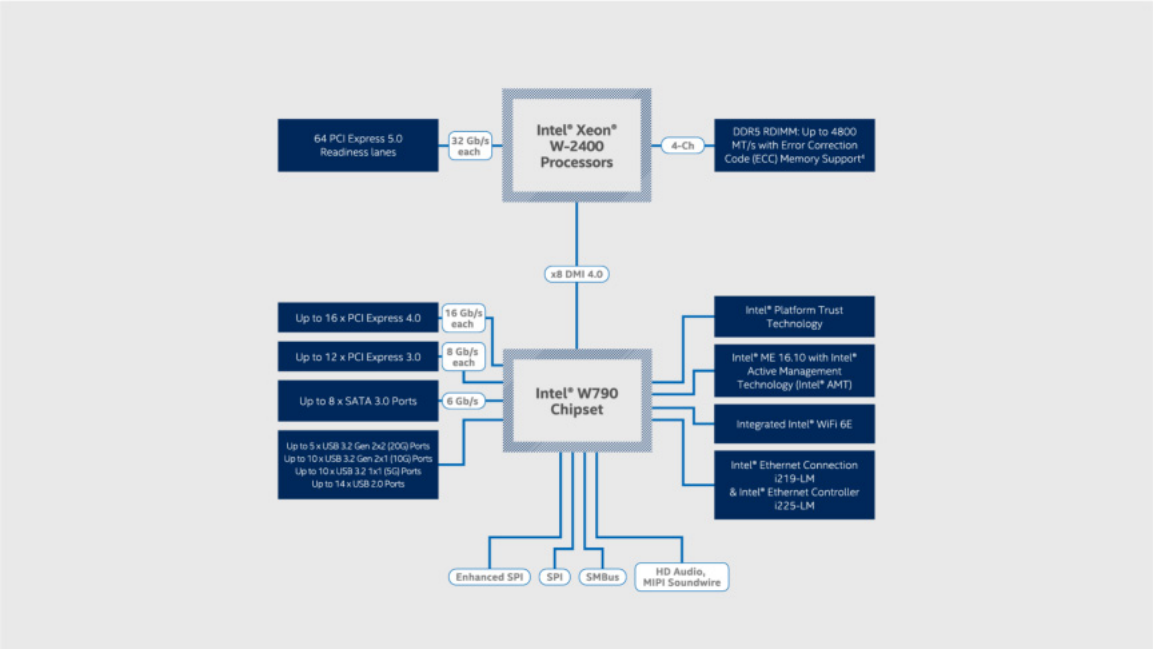
It is virtually impossible to provide general guidelines for the installation of Mura cards in a PCIe-based system as there are many different motherboards, and each client's Display Wall implementation is unique. Knowledge of the system architecture and the number and types of inputs is required to optimally place capture cards in the system. By carefully calculating the required bandwidth and ensuring that no data bottlenecks are present at any point in the system, the integrator can guarantee the optimal functioning of the Mura-based Display Wall.

A word about system architecture and performance

One factor that should be considered when using Matrox LUMA Pro Series and Mura-IPX is that to improve performance, transfers are performed using system memory, rather than peer-to-peer transfers. In other words, transferring graphical or video data from a capture card to a display source involves first transferring the data to system memory and then from system memory to the display adapter. This is done to address performance limitations imposed by the combination of capture and graphics cards.

Prior to Luma based controllers, the systems used for Mura-based Display Walls were based on a switched architecture (that is, the PCI-Express connectors are connected to PCI-Express switches that form the fabric, or backbone, of the system architecture) to provide multiple PCIe slots for add-in cards. However, the most recent motherboards no longer use switch-based architecture but rather use lane-based architecture that is connected directly to the CPU's to provide multiple PCIe slots. For example, shown below is the block diagram of the Intel Xeon W-3400/2400 platform with Intel W790 chipset. The Intel Xeon W-3400/2400 based platforms have 112/64 PCIe lanes available directly from the CPU. Using lane-based architecture provides sufficient bandwidth without any bottlenecks from the chipset, optimal performance, and reduce latency for graphics intense applications. Knowledge of the capabilities of the motherboard is essential to properly configure the system to maximize the overall performance.:





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