TECNOGROUP
LED TECHNOLOGY EXPERTS

NOVASTAR

MX6000 Pro

LED Display Controller

Specifications

Change History

Document Version	Release Date	Description
V1.4.1	2024-08-13	• Added certification information for UL, CB, EAC, PSE, RCM • Updated the video source specifications for DP 1.4
V1.4.0	2024-06-13	• Added MX_1×ST 2110 (25G), MX_2×ST 2110 (25G), MX_1×DP 1.4 + 1×HDMI 2.1 input cards, and MX_1×40G_Fiber output card • Added information for supported receiving card models.
V1.1.1	2023-10-13	Updated input cards information
V1.1.0	2023-09-28	Added MX_2xHDMI 2.1 and MX_4x12G-SDI input cards
V1.0.1	2023-09-08	• Added accessory information • Deleted dynamic booster description
V1.0.0	2023-08-03	First release

Introduction

The MX6000 Pro is a large professional 8K LED display controller from Xi'an NovaStar Tech Co., Ltd. (hereinafter referred to as NovaStar), designed as part of the COEX control system series. Its remarkable features include 12-bit color depth, 480 Hz capability, real-time multi-screen scaling, 0-frame latency, and HDR supportability, providing precise brightness control, true-to-life color fidelity, and an excellent image quality. Its card-based modular design is specifically tailored for future LED displays, allowing for flexible input and output card configurations that are stable and easy to maintain. With a compact 6U size, it supports up to 32x 4K@60Hz or 16x 8K@30Hz video inputs, with a maximum load capacity of 141 million pixels, making it ideal for large-screen configurations.

The MX6000 Pro offers a wide range of options with up to 8 different input cards supporting 8K, 4K, and VoIP. For output, it supports two types of output cards: 4x 10G fiber and 1x 40G fiber. These cards can be configured flexibly to accommodate either 1G or 5G bandwidth for the control system, catering to different requirements. Additionally, it supports seamless backup and automatic switching between devices, cards, and Ethernet ports. In case of any malfunction, it promptly switches over while issuing automatic alerts, ensuring stable output on-site. To further enhance the user experience, it is complemented by the advanced control software, VMP, enabling users to have better control and management capabilities.

The MX6000 Pro offers many advantages such as highly integrated design, premium image quality, powerful performance, tremendous load capacity, and easy control. It is widely used in rental services for large events, xR/VP studios, large fixed installation applications, TV production, e-sports events, exhibition halls, and other application scenarios.

Certifications

CE, FCC, IC, UL, CB, EAC, PSE, RCM

If the product does not have the relevant certifications required by the countries or regions where it is to be sold, please contact NovaStar to confirm or address the problem. Otherwise, the customer shall be responsible for the legal risks caused or NovaStar has the right to claim compensation.

Features

Inputs and Outputs

- 8x input card slots, users may choose input cards of the following types:
  - 4K input cards

    4x HDMI 2.0, 4x DP1.2, 4x 12G-SDI
  - 8K input cards

    2x HDMI 2.1, 2x DP 1.4, 1x DP 1.4 + 1x HDMI 2.1
  - VoIP card (Video over IP)

    1x ST 2110 (25G), 2x ST 2110 (25G)
- Authentic 12bit video input

  12-bit/10-bit/8-bit supported
- 8x output card slots, users may choose output cards of the following types:
  - 1x40G fiber output card

    Work with CVT8-5G fiber converter to achieve 5G transmission (capable of loading 2,951,200 pixels in a single Ethernet cable).
  - 4x10G fiber output card

    Work with CVT10 fiber converter to achieve 1G transmission (capable of loading 650,000 pixels in a single Ethernet cable).
- Supports real-time previewing and monitoring of the video source input and LED screen display status.
- Supports frame rates of up to 480 Hz (max frame rate is decided by the screen's hardware configuration).

Screen Management

- Card-based Screen

  Each screen can be customized to have a different output resolution from the other screens.
- Synchronized Output Splicing

  With the help of frame synchronization, the output images on the same screen are completely synchronized. This enables the output to deliver smooth playback and perfect image without issues such as picture stutter, frame loss, image tearing, and noticeable cut lines.
- Preset

  For optimal display in various scenarios, users can adjust display parameters such as layers, brightness, color temperature, and gamma ahead of time and save them as presets. Users can save up to 128 customizable presets which can be easily applied or switched with just one click
- No rectangle restriction

  No rectangle restriction for irregular screens. This means when calculating resolutions, blank pixels do not count towards the total capacity. The used load capacity of Ethernet ports is the sum of the resolutions of all cabinets with load.

Advanced Features

- Multi-Layer

  A single output card supports up to 4x layers or the entire device supports up to 32x 4K layers.

- Image Scaling

  Each layer supports 4 scaling mode: custom, pixel to pixel, snap to canvas, and fill screen.

- Layer Roaming

  Supports cross-card output of layers within the screen.

- Color Replacement

  Replace any color in the image with another color without affecting other colors. It is recommended to choose color with higher saturation for replacement to achieve better outcome.

- 14Ch Color Correction

  Supports precise adjustment to the hue, saturation, and brightness of black and white, and the12 standard colors derived from the three primary colors (RGB).

- Color Curves

  Supports adjustment to the RGBW mapping curves of the screen.

- 3D LUT

  Use the 3D LUT file (.cube) with an accuracy of 17×17×17 / 33×33×33 / 65×65×65 to adjust the colors of the video source.

- Full-Grayscale Calibration

  Work with NovaStar's high-precision calibration system and the C3200 scientific grade camera to generate unique calibration coefficients for each grayscale, ensuring uniformity of each grayscale and dramatically improving the image quality.

- HDR
  - Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards.
  - Support HLG.

- 3D

  Work with the 3D emitter and 3D glasses to bring a fascinating and immersive 3D viewing experience.

- Latency
  - Different screens can have different latency settings. The minimum processing latency of the LED display controller is reduced to 0-frame (less than 1 ms), achieving low latency without reducing the load.
  - Support additional latency. Users can choose to add zero to two frames of latency.

- Frame Rate Adaptive

  Automatically adapt to video inputs with different frame rates ranging from 23.98 Hz to 480 Hz, and support the automatic calculation of optimal screen parameters based on the input source's frame rate. This ensures that the brightness deviation of the screen remains within 5% across different frame rates. It also supports precise frame rate adjustment in 0.01 Hz increments.

- Shutter Fit

  Automatically adjusts the driver IC parameters according to the camera shutter angle to fix problems of black lines, grayscale addition, and grayscale loss during camera shooting in xR scenarios.

- Frame Multiplication
  - Frame interpolation: Outputs images that are captured from multiple shooting angles with different backgrounds at the same time. Solid green backgrounds can also be inserted to allow for easy post-production adjustments.
  - Frequency multiplication: Supports high frame rates of up to 480 Hz. This feature is to accommodate multi-angle camera shooting to improve the screen performance under the camera.

Device Controls

- LCD touch panel

  Equipped with a 7-inch touch screen, which is responsive, sturdy and durable. Users can easily give commands with a gentle touch, making the operation effortless.

- VMP software control

  The device can be connected to the VMP software to provide easy and convenient operations and smart device management.

- Supports the SNMP protocol.
- Cascading control via Ethernet

  The Gigabit Ethernet control ports support TCP/IP protocol and star topology. No switch or router is needed to deploy multiple devices on the same LAN via device cascading as the network switching function is already built in.

- Automated system monitoring and alarm

  Hardware monitoring capabilities that encompass fan speed, module temperatures, voltage levels, and operational status. It automatically detects and reports any device faults or alarm information, ensuring real-time monitoring of the LED screen's operational status.

- Device backup
  - Hot backup between devices.
  - Hot backup between output cards.
  - Hot backup between Ethernet ports.
- Dual power supply backup to ensure the system stability.

Table 1-1 Function Limitations

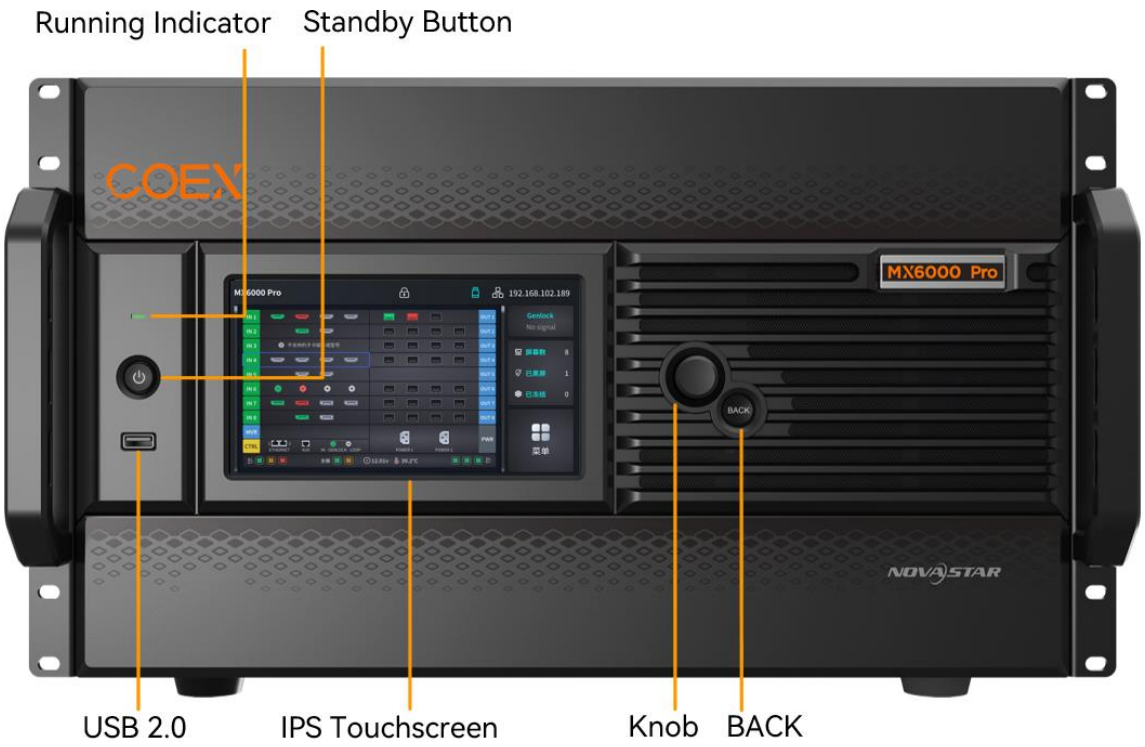
Function	Limitation	
	1G solution (4x10G fiber output card)	5G solution (1x40G fiber output card)
Frame Rate Adaptive	To use this function, it is required to pair with the A10s Pro receiving card and specific driver ICs (for detailed IC models, please see the product specifications on the NovaStar website at https://www.novastar.tech/). Additionally, you must use the Cabinet Tool provided by NovaStar to adjust the driver IC parameters for different frame rates, which will generate the required NCP file.	To use this function, it is required to pair with the CA50E or XA50 Pro receiving cards and specific driver ICs (for detailed IC models, please see the product specifications on the NovaStar website at https://www.novastar.tech/). Additionally, you must use the Cabinet Tool provided by NovaStar to adjust the driver IC parameters for different frame rates, which will generate the required NCP file.
Full-Grayscale Calibration	It is required to work with the A10s Pro receiving card and users need to use a C3200 camera to perform the full-grayscale calibration.	It is required to work with the CA50E or XA50 Pro receiving cards and users need to use a C3200 camera to perform the full-grayscale calibration.
3D	3D cannot be enabled simultaneously with Low Latency and Frame Multiplication. To use the 3D function, specified 3D glasses are needed. For details, please contact NovaStar technical support.	
HDR	Supports automatic parsing and manual setting of HDR. For 12G-SDI, DP1.2, and non-standard HDR sources, they can only be set to HDR properties manually.	
Low Latency	Low Latency cannot be enabled simultaneously with Genlock, 3D, and Frame Multiplication. Moreover, it is recommended to ensure all Ethernet ports load the cabinets vertically and share the same Y coordinate (all set to 0) when Low Latency is enabled.	

Table 1-2 Supported Receiving Card Models

Receiving Card Model	Supported
A5s Plus	Yes
A7s Plus	Yes
A8s and its series	Yes
A8s-N	Yes
A8s Pro and its series	Yes
A10s Pro and its series	Yes
CA50E	Yes
XA50 Pro	Yes

Appearance

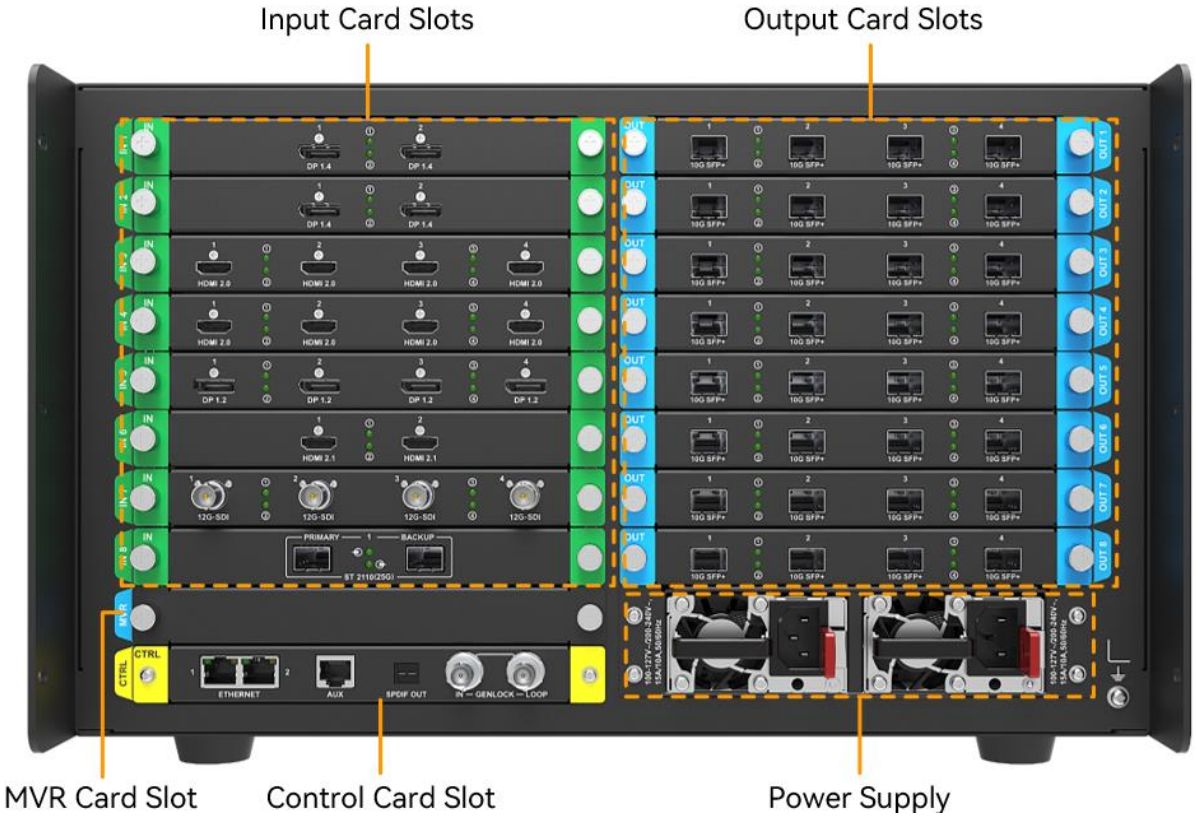
Front Panel



Name	Function
Running indicator	• Solid red: Standby • Solid blue: The device is being powered on. • Solid green: The device is running normally. • Flashing red: The device is running abnormally.
Standby button	• Press the button to power on or power off the device. • Hold down the button for 5s to 10s to restart the device.
USB 2.0	• Connect to a USB drive only to export the device diagnostic result.

	• Only the NTFS and FAT32 file systems are supported. Others are not supported.
IPS touchscreen	A 7-inch screen that is for displaying the device status, setting parameters, and sending commands.
Knob	• On the home screen, press the knob to enter the main menu screen. • On the main menu screen, rotate the knob to select a menu item or adjust the parameter value. Press the knob to confirm the operation. • Hold down the knob and **BACK** button simultaneously for 5s or longer to lock or unlock the buttons and screen.
BACK	Go back to the previous menu or cancel the current operation.

Rear Panel



All product pictures shown in this document are for illustration purpose only. Actual product may vary.

Note:

Markings on the rear panel card slot:

- The card slot marked with "IN x" only supports the installation of input cards, where x is the slot number. For example, IN 1 indicates the first input card slot.
- The card slot marked with "OUT x" only supports the installation of output cards, where x is the slot number. For example, OUT 6 indicates the sixth output card slot.
- The card slot marked with "MVR" only supports the installation of MVR output card.
- The card slot marked with "CTRL" only supports the installation of control cards.

Input Card			
MX_4xHDMI 2.0 input card			
			
Type	Qty	Description	
HDMI 2.0	4	Resolution	Max resolution: 4096×2160@60Hz or 8192×1080@60Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×1080@60Hz) Max height: 7680 pixels (1080×7680@60Hz)
		Frame rate	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 2.2 compliant, backwards compatible with HDCP 1.4/HDCP 1.3.
		Interlaced signal inputs	Not supported.
		Cables	Recommend using the UGREEN HDMI 2.1 cable. Cables up to 5 meters are supported.
MX_2xHDMI 2.1 input card			
			
Type	Qty	Description	
HDMI 2.1	2	Resolution	Max resolution: 8192×4320@30Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×4320@30Hz) Max height: 8192 pixels (4320×8192@30Hz)
		Frame rates	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 /

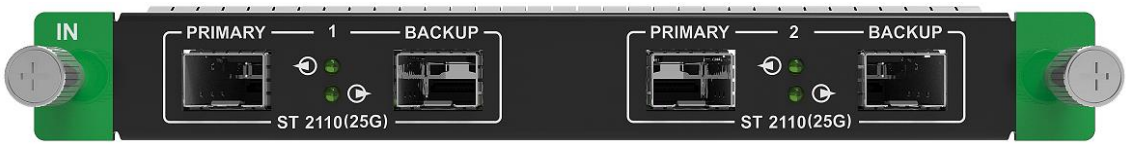
			71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 2.3 compliant, backwards compatible with HDCP 2.2/HDCP 1.4/HDCP 1.3.
		Interlaced signal inputs	Not supported
		Cables	Recommend using the UGREEN HDMI 2.1 cable. Cables up to 5 meters are supported.
MX_4xDP 1.2 input card			
			
Type	Qty	Description	
DP 1.2	4	Resolution	Max resolution: 4096×2160@60Hz or 8192×1080@60Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×1080@60Hz) Max height: 8192 pixels (1080×8192@60Hz)
		Frame rate	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	HDR video is accepted with manual HDR configuration in VMP.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 1.3 compliant
		Interlaced signal inputs	Not supported.
		Cables	Recommend using the UGREEN DP 1.4 cable. Cables up to 5 meters are supported.
MX_2xDP 1.4 input card			

Type	Qty	Description	
DP1.4	2	Resolution	Max resolution: 7680×4320@30Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×4320@25Hz) Max height: 8192 pixels (4320×8192@25Hz)
		Frame rate	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144/ 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	Support HDCP 2.3, backwards compatible with HDCP 2.2/HDCP 1.4/HDCP 1.3.
		Interlaced signal inputs	Not supported.
		Cables	Recommend using the UGREEN DP 1.4 cable. Cables up to 5 meters are supported.
MX_4x12G-SDI input card			

Type	Qty	Description	
12G-SDI	4	Standards	Support ST-2082 (12G), ST-2081 (6G), ST-424 (3G) and ST-292 (HD) standard video inputs. Support 3G-Level A/Level B (DS mode).
		Resolution	Max resolution: 4096×2160@60Hz Min resolution: 720x480i@59.94Hz
		Frame rate	23.98/24/25/29.97/30/47.95/48/50/59.94/60 Hz
		HDR	HDR video is accepted with manual HDR configuration in VMP.

		Interlaced signal inputs	Support interlaced signal inputs, including 1080i/576i/480i.
		Cables	Recommend using the CANARE-12G SDI coaxial cable. Cables up to 50 meters are supported.
MX_1xDP 1.4+1xHDMI 2.1 input card			
			
Type	Qty	Description	
DP1.4	1	Resolution	Max resolution: 7680×4320@30Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×4320@25Hz) Max height: 8192 pixels (4320×8192@25Hz)
		Frame rates	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 2.3 compliant, backwards compatible with HDCP 2.2/HDCP 1.4/HDCP 1.3.
		Interlaced signal inputs	Not supported.
		Cables	Recommend using the UGREEN DP 1.4 cable. Cables up to 5 meters are supported.
HDMI 2.1	1	Resolution	Max resolution: 8192×4320@30Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×4320@30Hz) Max. height: 8192 pixels (4320×8192@30Hz)
		Frame rates	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards.

			Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 2.3 compliant, backwards compatible with HDCP 2.2/HDCP 1.4/HDCP 1.3.
		Interlaced signal inputs	Not supported.
		Cables	Recommend using the UGREEN HDMI 2.1 cable. Cables up to 5 meters are supported.
MX_1x ST 2110 (25G) input card			
			
Type	Qty	Description	
ST 2110 (25G)	1 primary, 1 backup	Standard	Supports SMPTE ST 2110 (-10, 20) and SMPTE 2059 (-1, -2) standards.
		Backup	Supports SMPTE 2022-7 standard.
		Resolution	Max resolution: 4096×2160@60Hz/8192×1080@60Hz Min resolution: 800×600@60Hz
		Max height & width	Max width: 8192 (8192×1080@60Hz) Max height: 8192 (1080×8192@60Hz)
		Frame rate	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 Hz
		VMP control	Support loading video stream configuration by SDP file or directly inputting. Support setting the resolution when managing ST 2110 source in VMP. • Support preset resolutions up to 8192x1080@60Hz. • Allow for custom input resolutions.
		NMOS management	NMOS discovery and control according to standards IS-04 and IS-05.
		Color gamut	Rec.709/DCI-P3/Rec.2020
		IP address	IPv4 DHCP and static IP
		Multicast protocol	IGMPv3, IGMPv2

		Ethernet	• 25 GbE IEEE 802.3cc (25GBASE-LR) • 25 GbE IEEE 802.3by (25GBASE-SR)
		Optical transceiver	The ST 2110 card does not come with an optical transceiver by default. Users need to purchase one separately. • Only supports SFP28 (25GBASE-LR/SR/CR). • It is recommended to purchase the Accelink 25GBASE-LR 10km module.
		Cables	OS1/OS2 optical fiber cables are recommended. • Transmission mode: single-mode duplex • Diameter: 9/125μm • Interface type: LC • Insertion loss: ≤0.3 dB Return loss: ≥45 dB
MX_2x ST 2110 (25G) input card			
			
Type	Qty	Description	
ST 2110 (25G)	2 primaries, 2 backups	Standard	Support SMPTE ST 2110 (-10, -20) and SMPTE 2059 (-1, -2) standards.
		Backup	Support SMPTE 2022-7 standard.
		Resolution	Max resolution: 4096×2160@60Hz/8192×1080@60Hz Min resolution: 800×600@60Hz
		Max height & width	Max width: 8192 (8192×1080@60Hz) Max height: 8192 (1080×8192@60Hz)
		Frame rate	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 Hz
		VMP control	Support loading video stream configuration by SDP file or directly inputting. Support setting the resolution when managing ST 2110 source in VMP. • Support preset resolutions up to 8192x1080@60Hz. • Allow for custom input resolutions.
		NMOS management	NMOS discovery and control according to standards IS-04 and IS-05.

		Color gamut	Rec.709/DCI-P3/Rec.2020
		IP Address	IPv4 DHCP and static IP
		Multicast Protocol	IGMPv3, IGMPv2
		Ethernet	• 25 GbE IEEE 802.3cc (25GBASE-LR) • 25 GbE IEEE 802.3by (25GBASE-SR)
		Optical transceiver	The ST 2110 card does not come with an optical transceiver by default. Users need to purchase one separately. • Only supports SFP28 (25GBASE-LR/SR/CR). • It is recommended to purchase the Accelink 25GBASE-LR 10km module.
		Cables	OS1/OS2 optical fiber cables are recommended. • Transmission mode: single-mode duplex • Diameter: 9/125μm • Interface type: LC • Insertion loss: ≤0.3 dB • Return loss: ≥45 dB
Output Card			
MX_4x10G_Fiber output card			
			
Type	Qty	Description	
10G SFP+	4	10G optical ports • Support single-mode and multi-mode optical fiber modules, with a maximum transmission distance of 10 km. • A single optical port has the same load capacity of 10x 1G Ethernet ports, and a single card supports up to 40x Ethernet port outputs. • The maximum load of a single 1G Ethernet port is as follows. Please refer to Ethernet Port Load Capacity for more details: – 8bit@60Hz: 659,722 pixels – 10bit@60Hz: 494,791 pixels (available only with the A10s Pro receiving card) – 12bit@60Hz: 329,861 pixels • Maximum load of a single output card: 17,694,720 pixels (8/10/12bit@60Hz).	
MX_1x40G_Fiber output card			

Type	Qty	Description
40G QSFP+	1	40G optical port • Support single-mode and multi-mode optical fiber modules, with a maximum transmission distance of 10km. • A single optical port has the same load capacity of 8x 5G Ethernet ports. The maximum load of a single 5G Ethernet port is as follows. Please refer to Ethernet Port Load Capacity for more details: – 8bit@60Hz: 2,951,200 pixels – 10bit@60Hz: 2,213,200 pixels – 12bit@60Hz: 1,475,600 pixels • Maximum load of a single output card: 17,694,720 pixels (8/10/12bit@60Hz).
Control Card		

Type	Qty	Description
ETHERNET	2	Gigabit Ethernet control ports. Support TCP/IP protocol and star topology. They have the same functions without priority and order, and can be connected to VMP software. No switch or router is needed to deploy multiple devices on the same LAN via device cascading as the network switching function is already built in. Up to 20 MX6000 Pro can be cascaded.
GENLOCK	1	A pair of Genlock signal connectors. Support Bi-Level, Tri-Level, and Blackburst. • IN: Accept the sync signal • LOOP: Loop the sync signal The Genlock input signal supports a frame rate range from 23.98 Hz to 60 Hz. For standard Genlock signal generators, up to 20 MX6000 Pro can be cascaded.
AUX	1	An auxiliary connector that connects to the central control device (RS232). (Reserved)
SPDIF	1	A digital audio output (Reserved)
Power		

Type	Qty	Description
100-127V~/200-240V~,	2	AC power input connector and switch

15A/10A, 50/60Hz		

Applications

Solution Build

Based on the installed output cards (4x10G fiber output card/1x40G fiber output card), users can build 1G/5G solutions with different models of fiber converters and receiving cards. 1G/5G refers to the output bandwidth of a single Ethernet port. For more detailed information, please refer to Ethernet Port Load Capacity.

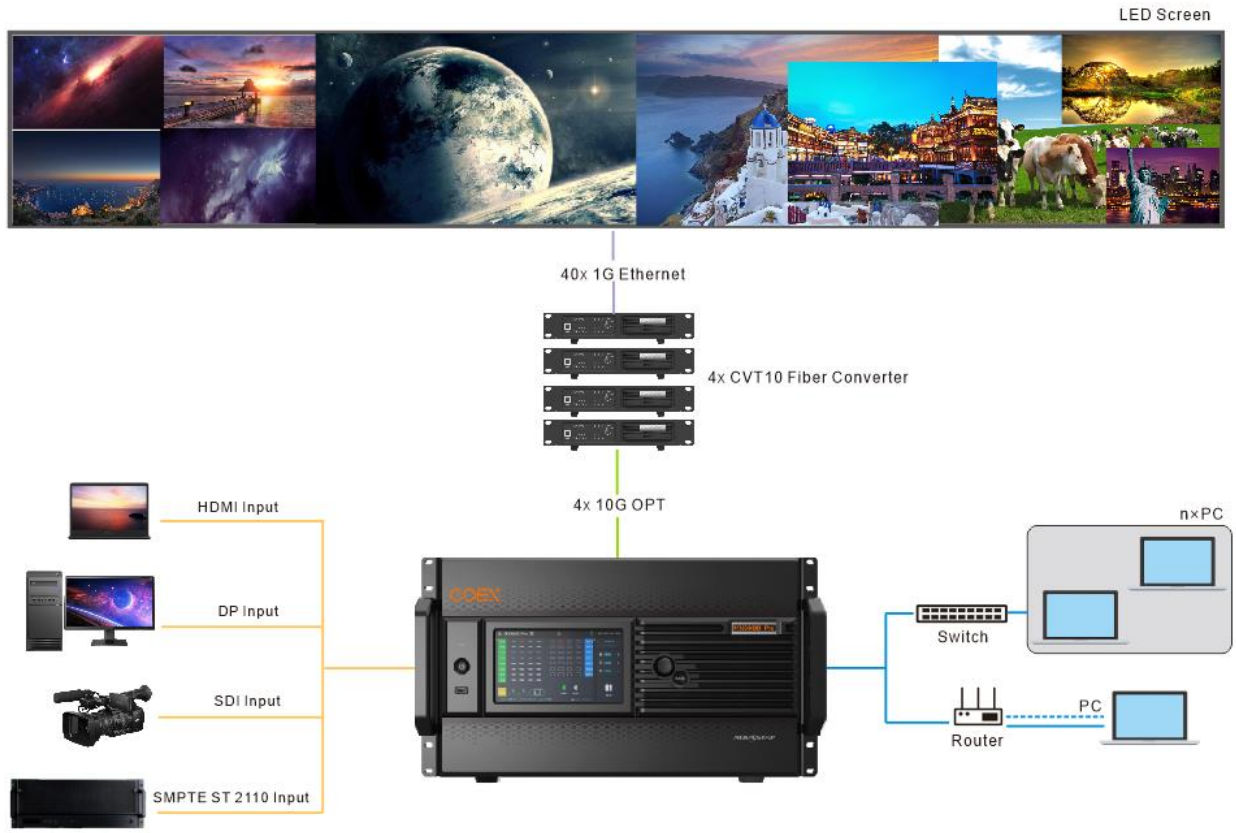
Table 1-3 COEX system build

Solution	Output Card	Fiber Converter	Receiving Card
1G Solution	4x10G fiber output card	CVT10, CVT10 Pro	1G receiving cards such as A10s Pro
5G Solution	1x40G fiber output card	CVT8-5G	5G receiving cards such as CA50E

Note:

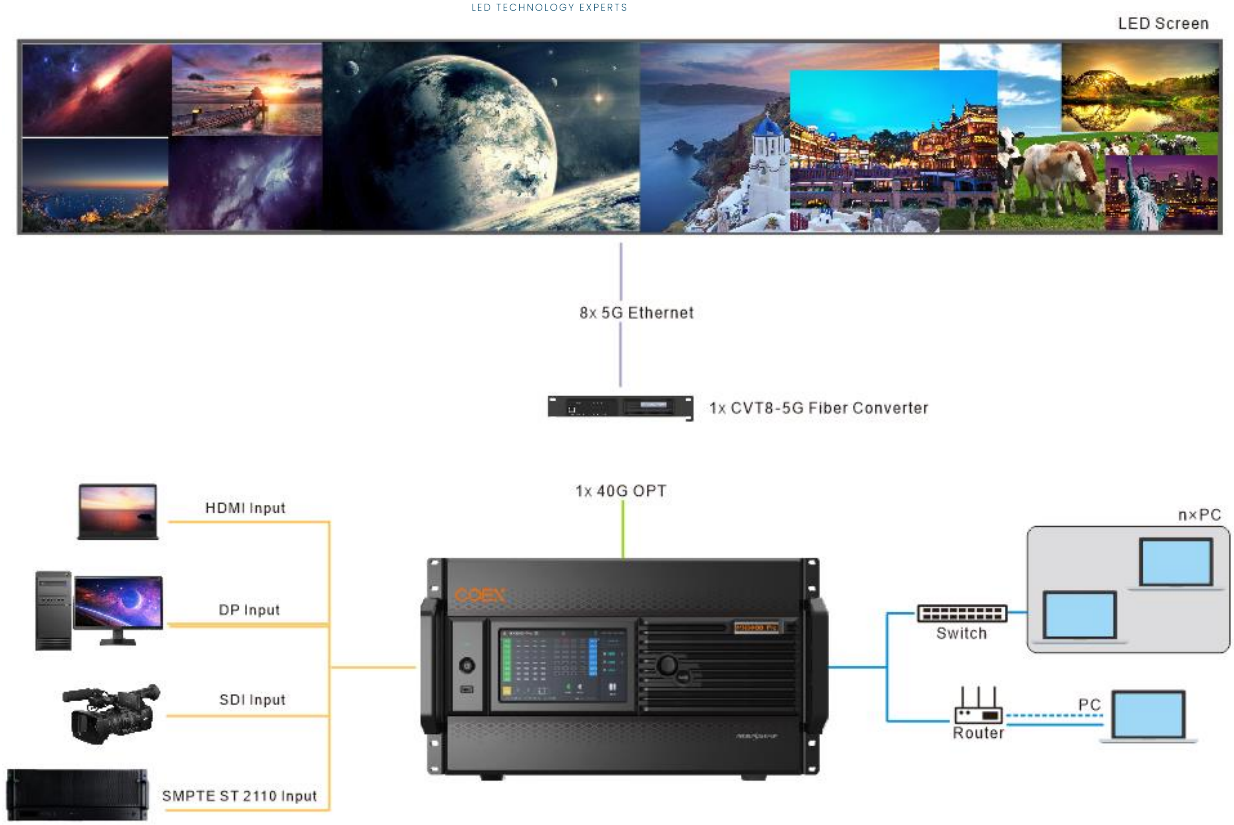
You can install different output cards on the same controller, but output cards with different models cannot be used to load the same screen.

1G Solution (4x10G Fiber Output Card)



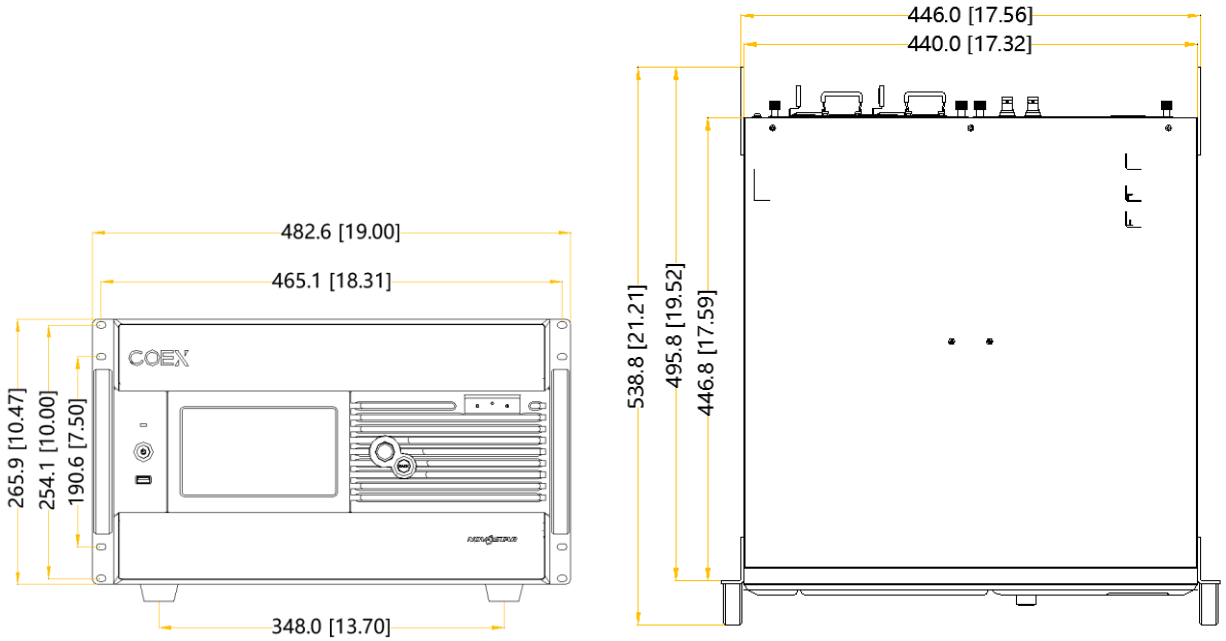
This diagram is an example of four input cards and one 4x10G fiber output card installed on an MX6000 Pro. The actual application may vary.

5G Solution (1x40G Fiber Output Card)



This diagram is an example of four input cards and one 1x40G fiber output card installed on an MX6000 Pro. The actual application may vary.

Dimensions



Tolerance: ±0.3 Unit: mm

Specifications

Electrical Specifications	Power supply	100-127V~/200-240V~,15A/10A,50/60Hz
	Power consumption	740 W
Operating Environment	Temperature	–10°C to +45°C
	Humidity	0% RH to 80% RH, non-condensing
Storage Environment	Temperature	–10°C to +60°C
	Humidity	0% RH to 90% RH, non-condensing
Physical Specifications	Dimensions	482.6 mm × 282.9 mm × 538.8 mm (Height includes foot pads)
	Total weight	31 kg (1x control card + 8x input cards + 8x output cards + packaging)
Packing Information	Packing box	725.0mm × 635.0mm × 410.0mm, kraft paper box
	Accessories	1x Power cord, 1x Ethernet cable 1x Quick Start Guide, 1x Customer Letter, 1x Safety Manual, 1x Certificate of Approval
IP Rating		IP20 (Please prevent the product from water intrusion and do not wet or wash the product).
Noise Level (typical at 25°C/77°F)		53 dB (A)

The amount of power consumption may vary depending on various factors such as product settings, usage, and environment.

Video Source Specifications

Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
HDMI 2.0	4K	4096×2160 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30
					10bit	24/25/30/48/50
					8bit	24/25/30/48/50/60
			YCbCr	4:2:2	8/10/12bit	
		3840×2160	RGB / YCbCr	4:4:4	12bit	24/25/30
					10bit	24/25/30/48/50
					8bit	24/25/30/48/50/60
			YCbCr	4:2:2	8/10/12bit	
	2K	2560×1440	RGB /	4:4:4	12bit	24/25/30/48/50/60/75

Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
			YCbCr		10bit	24/25/30/48/50/60/75/100
					8bit	24/25/30/48/50/60/75/100/120
			YCbCr	4:2:2	8/10/12bit	
		1920×1080	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100/120/144
					10bit	
					8bit	24/25/30/48/50/60/72/75/100/120/144/240 (240 Hz needs to be forced)
			YCbCr	4:2:2	8/10/12bit	
HDMI 2.1	8K	8192×4320 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25
					10bit	24/25/30
					8bit	
			YCbCr	4:2:2	8/10/12bit	
		7680×4320 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25
					10bit	24/25/30
					8bit	
			YCbCr	4:2:2	8/10/12bit	
	5K	5120×2880 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60
					10bit	24/25/30/48/50/60/72/75
					8bit	
			YCbCr	4:2:2	8/10/12bit	
	4K	4096×2160 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100
					10bit	24/25/30/48/50/60/72/75/100/120
					8bit	
			YCbCr	4:2:2	8/10/12bit	
		3840×2160	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100 (75 Hz and above need to be forced)
					10bit	24/25/30/48/50/60/72/75/100/120 (75 Hz and above need to be forced)
					8bit	
			YCbCr	4:2:2	8/10/12bit	

Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
	2K	2560×1440	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100/120/144 (144 Hz needs to be forced)
					10bit	24/25/30/48/50/60/72/75/100/120/144/240 (144 Hz and above need to be forced)
					8bit	
			YCbCr	4:2:2	8/10/12bit	
		1920×1080	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100/120/144/240 (240 Hz needs to be forced)
					10bit	
					8bit	
			YCbCr	4:2:2	8/10/12bit	
DP 1.2	4K	4096×2160 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50
					10bit	24/25/30/48/50/60
					8bit	24/25/30/48/50/60/75
			YCbCr	4:2:2	8/10/12bit	
		3840×2160	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50
					10bit	24/25/30/48/50/60
					8bit	24/25/30/48/50/60/75 (75Hz needs to be forced)
			YCbCr	4:2:2	8/10/12bit	
	2K	2560×1440	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/75/100
					10bit	24/25/30/48/50/60/75/100/120
					8bit	24/25/30/48/50/60/75/100/120/144 (144 Hz needs to be forced)
			YCbCr	4:2:2	8/10/12bit	
		1920×1080	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/75/100/120/144 (144 Hz needs to be forced)
					10bit	
					8bit	24/25/30/48/50/60/75/100/120/144/240 (240 Hz needs to be forced)
			YCbCr	4:2:2	8/10/12bit	
DP 1.4	8K	8192×4320 (Forced)	RGB / YCbCr	4:4:4	12bit	Not supported
					10bit	
					8bit	24/25
			YCbCr	4:2:2	8/10/12bit	

Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
		7680×4320 (Forced)	RGB / YCbCr	4:4:4	12bit	Not supported
					10bit	24
					8bit	24/25/30
			YCbCr	4:2:2	8/10/12bit	
	5K	5120×2880 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30
					10bit	24/25/30/48/50
					8bit	24/25/30/48/50/60
			YCbCr	4:2:2	8/10/12bit	
	4K	4096×2160 (Forced)	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60
					10bit	24/25/30/48/50/60/75
					8bit	24/25/30/48/50/60/75/100
			YCbCr	4:2:2	8/10/12bit	
		3840×2160	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60
					10bit	24/25/30/48/50/60/75 (75Hz needs to be forced)
					8bit	24/25/30/48/50/60/75/100 (75Hz and above need to be forced)
			YCbCr	4:2:2	12bit	
					8/10bit	24/25/30/48/50/60/75/100/120 (75Hz and above need to be forced)
	2K1K	2560×1440	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/75/100/120/144 (144 Hz needs to be forced)
					10bit	
					8bit	24/25/30/48/50/60/75/100/120/144/240 (144Hz and above need to be forced)
			YCbCr	4:2:2	8/10/12bit	
		1920×1080	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/75/100/120/144/240 (240 Hz needs to be forced)
					10bit	
					8bit	
			YCbCr	4:2:2	8/10/12bit	
12G-SDI	4K	4096×2160	YCbCr	4:2:2	10bit	24/25/30/48/50/60

Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
		3840×2160				
	2K	2048×1080				
		1920×1080				
ST 2110	4K	4096×2160	RGB / YCbCr	4:4:4	8bit/10bit	24/25/30/48/50/60
			YCbCr	4:2:2		
		3840×2160	RGB / YCbCr	4:4:4	8bit/10bit	24/25/30/48/50/60
			YCbCr	4:2:2		
	2K	2560×1440	RGB / YCbCr	4:4:4	8bit/10bit	24/25/30/48/50/60/75/100/120
			YCbCr	4:2:2		
		1920×1080	RGB / YCbCr	4:4:4	8bit/10bit	24/25/30/48/50/60/75/100/120
			YCbCr	4:2:2		

Note:

The table above only displays a selection of common resolutions and integer frame rates. Decimal frame rates are also supported, allowing for automatic frame rate adaptation from the highest frame rate of each resolution down to 23.98/29.97/47.95/59.94/71.93/119.88/143.86 Hz.

Ethernet Port Load Capacity

1G Solution (4x10G Fiber Output Card)

When Working with the A10s Pro Receiving Card

When working with the A10s Pro receiving card, the formula of calculating the load capacity per Ethernet port and the detailed parameters are as follows:

- 8bit: Load capacity × 24 × Frame rate < 1000 × 1000 × 1000 × 0.95
- 10bit: Load capacity × 32 × Frame rate < 1000 × 1000 × 1000 × 0.95
- 12bit: Load capacity × 48 × Frame rate < 1000 × 1000 × 1000 × 0.95

Max Load Capacity per Ethernet Port (Pixels)			
Frame Rate / Bit Depth	8bit	10bit	12bit
24 Hz	1,649,306	1,236,979	824,653
25 Hz	1,583,333	1,187,500	791,667
30 Hz	1,319,444	989,583	659,722
50 Hz	791,667	593,750	395,833
60 Hz	659,722	494,792	329,861
120 Hz	329,861	247,396	164,931
144 Hz	274,884	206,163	137,442
240 Hz	164,931	123,698	82,465
300 Hz	131,944	95,958	65,972
360 Hz	109,954	82,465	54,977
480 Hz	82,465	61,849	41,232

When Working with Other Armor Series Receiving Cards

When working with other receiving cards, the formula of calculating the load capacity per Ethernet port and the detailed parameters are as follows:

- 8bit: Load capacity × 24 × Frame rate < 1000 × 1000 × 1000 × 0.95
- 10bit: Load capacity × 48 × Frame rate < 1000 × 1000 × 1000 × 0.95
- 12bit: Load capacity × 48 × Frame rate < 1000 × 1000 × 1000 × 0.95

Max Load Capacity per Ethernet Port (Pixels)			
Frame Rate / Bit Depth	8bit	10bit	12bit
24 Hz	1,649,306	824,653	824,653
25 Hz	1,583,333	791,667	791,667
30 Hz	1,319,444	659,722	659,722
50 Hz	791,667	395,833	395,833
60 Hz	659,722	329,861	329,861
120 Hz	329,861	164,931	164,931
144 Hz	274,884	137,442	137,442
240 Hz	164,931	82,465	82,465
300 Hz	131,944	65,972	65,972
360 Hz	109,954	54,977	54,977
480 Hz	82,465	41,232	41,232

5G Solution (1x40G Fiber Output Card)

When working with the CA50E and XA50 Pro receiving cards, the formula of calculating the load capacity per Ethernet port and the detailed parameters are as follows:

- 8bit: Load capacity × 24 × Frame rate < 5G × 0.85
- 10bit: Load capacity × 32 × Frame rate < 5G × 0.85
- 12bit: Load capacity × 36 × Frame rate < 5G × 0.85

Max Load Capacity per Ethernet Port (Pixels)			
Frame Rate / Bit Depth	8bit	10bit	12bit
24 Hz	7,378,000	5,533,000	3,689,000
25 Hz	7,082,800	5,311,680	3,541,440
30 Hz	5,902,400	4,426,400	2,951,200
50 Hz	3,541,440	2,655,840	1,770,720
60 Hz	2,951,200	2,213,200	1,475,600
120 Hz	1,475,600	1,106,600	737,800
144 Hz	1,229,600	918,478	612,374
240 Hz	737,800	553,300	368,900
300 Hz	590,240	442,640	295,120
360 Hz	491,800	368,800	245,900
480 Hz	368,900	276,650	184,450

Notes and Cautions

Notes for Battery

- The battery is not intended to be replaced.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.

Notes for Installation

The product can be mounted in a standard 19-inch rack capable of withstanding at least four times the total weight of the mounted equipment. Eight M5 screws are required to fix the product.

- Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Reduced Air Flow – Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical Loading – Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

- Circuit Overloading – Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing – Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Others

- This product can only be placed horizontally. Do not mount vertically or upside-down.
- This is Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.