PIXELHUE
PRO AV

PD3-4K

Dual-Streaming AVoIP Processor

Specifications

Change History

File Version	Release Date	Description
V1.0.0	2025-05-27	First release

Introduction

The PD3-4K distributed processor is an innovative dual-streaming AVoIP processor that supports simultaneous transmission of both the primary stream (video content in high quality) processed by InstSight algorithm and the secondary stream (video content in standard quality) processed by H.264/H.265. Integrated with efficient encoding and decoding technologies, the PD3-4K can be flexibly used as an encoding or decoding node. With its cutting-edge InstSight technology, the PD3-4K reduces network bandwidth usage significantly while ensuring high-quality audio and video transmission. The system features low-latency transmission, high-definition image quality, and robust network adaptability, making it perfect for use in control rooms, large conference communication centers, monitoring centers, data centers and dispatch centers.

Breaking the limitations of traditional centralized deployment, the PD3-4K is suitable for the decentralized deployment scenarios across floors, areas and networks. It offers features like long-distance digital audio and video transmission, signal processing, signal switching, KVM operator management, screen management, and intelligent central control. Together with distributed and visualized management and KVM AVoIP collaboration systems, the PD3-4K offers strong support for audio and video applications, providing an optimal solution for high-end video monitoring, command control, and multimedia presentations.

Certifications

None

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

Features

- Integrated encoding and decoding, one device with dual purposes

  The PD3-4K can be used as either an encoding or decoding node, allowing for one device with dual purposes.

- Dual stream transmission, across-area sharing
  - Primary streams

    Self-developed InstSight compression algorithm
  - Secondary streams

    H.264/265 compression algorithm (Self-developed algorithm based on standard H.264/265)

- Discrete deployment, unified management

  Signal nodes scattered in different locations can be quickly integrated into the system through VLAN, thereby realizing centralized control and management of signal data across various locations.

- Mass access, unlimited expansion
  - With its IP-based architecture, the system can easily expand by adding more nodes through VLAN, requiring only an IP address for each node to connect.
  - Supports direct access to IP cameras and NVRs from various brands like Hikvision, Dahua and Uniview without the need for transcoding, and is fully compatible with protocols such as ONVIF and RTSP.

- Hierarchical permissions, secure management

  The system offers role-based hierarchical user permission management, allowing administrators to assign specific permissions to users. This enables fine-grained control over operations, so that users with different roles can perform specific tasks, significantly enhancing both work efficiency and security.

- Stable, secure and reliable
  - The decentralized design allows a single node to be used as an independent control center. Each node works independently and the control failure of a single node will not affect the operation of the entire system. Only the faulty node needs to be repaired. This ensures the stability of the entire system operation and facilitates system maintenance.
  - Supports PoE and external power supply redundancy backup, multi-level user permission management and system file backup.

- Convenient implementation and easy maintenance

  Encoding and decoding nodes can be added directly to the system network to quickly expand the system, and the system automatically synchronizes system parameters without manual reconfiguration. Remote update and batch update are also supported.

- Equipment isolation, tidy and efficient

  By relocating distributed processors to an equipment room, ample space is made available in the command and control center, eliminating workspace clutter and noise. This setup allows for separation between operators and equipment, enabling one person to oversee multiple devices while enhancing data security.

- Visualized management and precise arrangement

  The system provides full visualization of the output images on screens, allowing for real-time previews of signal source images, screen layouts, and displays. This ensures precise screen display arrangement, minimizes the risk of signal switching errors, and enhances switching efficiency.

- Diversified and free presentation
  - Flexible screen configuration, supporting irregular screen configuration to meet the on-site requirements
  - Powerful EDID management, allowing for customized output resolutions and breaking the common output resolution limit
  - LCD bezel compensation

- Fully controlled by KVM operators
  - Supports KVM operator control, virtual keyboard, remote power on/off, USB drive transmission, touchscreen control and more.

  - Enables mouse roaming for seamless control: one KVM operator can manage multiple screens, with each screen capable of displaying and controlling up to 4 signal images. This setup uses a single keyboard and mouse for multiple monitors, simplifying the desktop environment and ensuring smooth, lag-free operation.
  - KVM cross-platform control, such as Windows, Linux, macOS and more
  - Supports signal pushing, collaboration and signal sharing, realizing timely decision-making and efficient work flows.
  - A single KVM operator can control up to 8 screens.
- Multiple audio and video access
  - Supports access of signals in various formats, including HDMI, network video streams and more.
  - Supports access of analog audio in Line IN and Mic IN formats.
  - Supports access of videos of various types and compatible with multiple resolutions.
  - Supports access of IP cameras using the ONVIF protocol and streaming media data using the RTSP protocol.
- Secure KVM operator management

  KVM operators can assign permissions to different KVM groups, enabling them to display and interact with specified data. This setup ensures system data security and meets the management needs of projects with high-security requirements.
- Multiple layers, free layout

  The screen loaded by a single device supports free layer overlapping and layout, achieving a variety of visual presentation effects. The layer specifications are as follows.

H.264+ InstSight	H.265+ InstSight
• 16x 1920×1080@30Hz secondary stream layers • 1x 4096×2160@60Hz primary stream layer+15x 1920×1080@30Hz secondary stream layers	• 24x 1920×1080@30Hz secondary stream layers • 1x 4096×2160@60Hz primary stream layer+23x 1920×1080@30Hz secondary stream layers

- Industry-leading nanosecond synchronization

  The PD3-4K adopts unique synchronization technology, which combines NetSync and SuperSync at both software and hardware levels. This innovative technology fundamentally eliminates asynchronization of mosaic images from different output nodes and prevents tearing during high-speed image playback, ensuring seamless image display that withstands scrutiny from both the naked eye and cameras.
- Various OSD options
  - Supports text OSD, weather OSD and clock OSD.
  - Supports both static and dynamic text OSD.
  - Supports customized content, font, color, size, background color, opacity of the text OSD.
  - Support configurations of the text scrolling direction, initial position and speed.
- BKG settings
  - Up to 1 GB internal storage space
  - BKG images do not occupy the layer resources.
  - Max width×height of a BKG image: 16380×4320
  - Supported formats: JPG, JPEG, BMP, PNG
  - Up to 256 images can be imported.

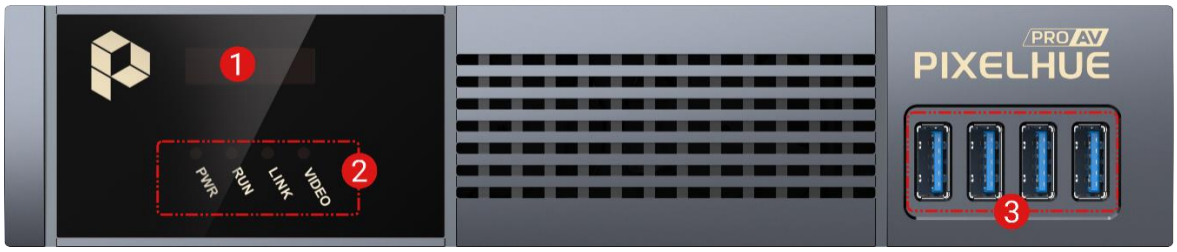
- Channel logo management

  Set a text logo for identifying the input source.

- Customized presets and preset playlist playbacks
  - Supports management of multiple screens and presets.
  - Supports two preset playback modes. The options include loop and scheduled playback.
- Input source management
  - Supports customized group management of input sources.
  - Supports EDID settings for input sources.
  - Supports configurations of input source audio.
- Flexible audio options
  - Supports accompanied and independent audio inputs.
  - Supports output of audio that comes with the layer. The audio output can be the accompanied audio or independent audio.
  - Supports output volume adjustment.
- Switch and use local signals on the OSD menu of the KVM operator system.
- System call for quick device identifying
- Firmware update through a web interface
- Multiple backup design
  - Backup between HDMI input connectors
  - Backup between the Ethernet port and OPT port
  - Backup between PoE and external power supply

Appearance

Front Panel

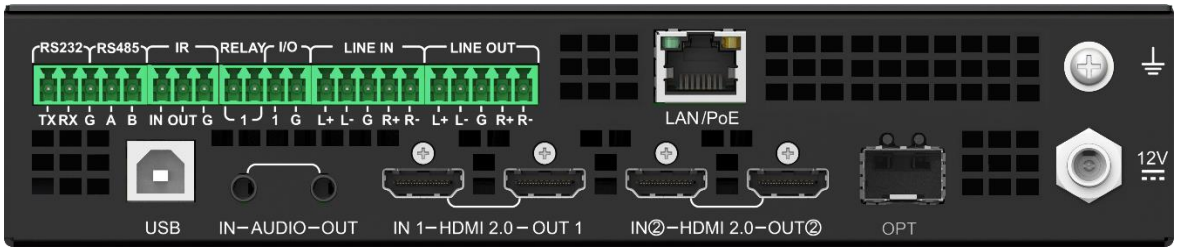


*The picture shown is for illustration purpose only. Actual product may vary due to product enhancement.

No.	Area	Function
1	OLED screen	• Display the device IP address. • Display the device encoding and decoding modes. • Scrolling display of screen content
2	Indicators	• PWR: Power indicator

No.	Area	Function
		– On: The power supply is normal. – Off: The power supply is abnormal. • RUN: Running status indicator – Flashing: The device is functioning normally. – On/Off: The device is functioning abnormally. • LINK: Ethernet port and OPT port connection status indicator – On: At least one of the Ethernet port or OPT port is connected normally. – Off: Both the Ethernet port and OPT port are connected abnormally or not connected. • VIDEO: Video transmission and processing status indicator – On: The video stream processing is normal in the encoding mode, or the backend device connection is normal in the decoding mode. – Off: The video stream processing is abnormal or there is no video stream in the encoding mode, or the backend device is not connected or the connection is interrupted in the decoding mode. Note When the device is called, the RUN, LINK and VIDEO indicators will flash simultaneously.
3	USB connectors	4x USB connectors • Connect various peripherals, including keyboard, mouse and touchscreen and cameras. • For USB passthrough • Up to USB 3.0 high-speed transmission

Rear Panel



*The picture shown is for illustration purpose only. Actual product may vary due to product enhancement.

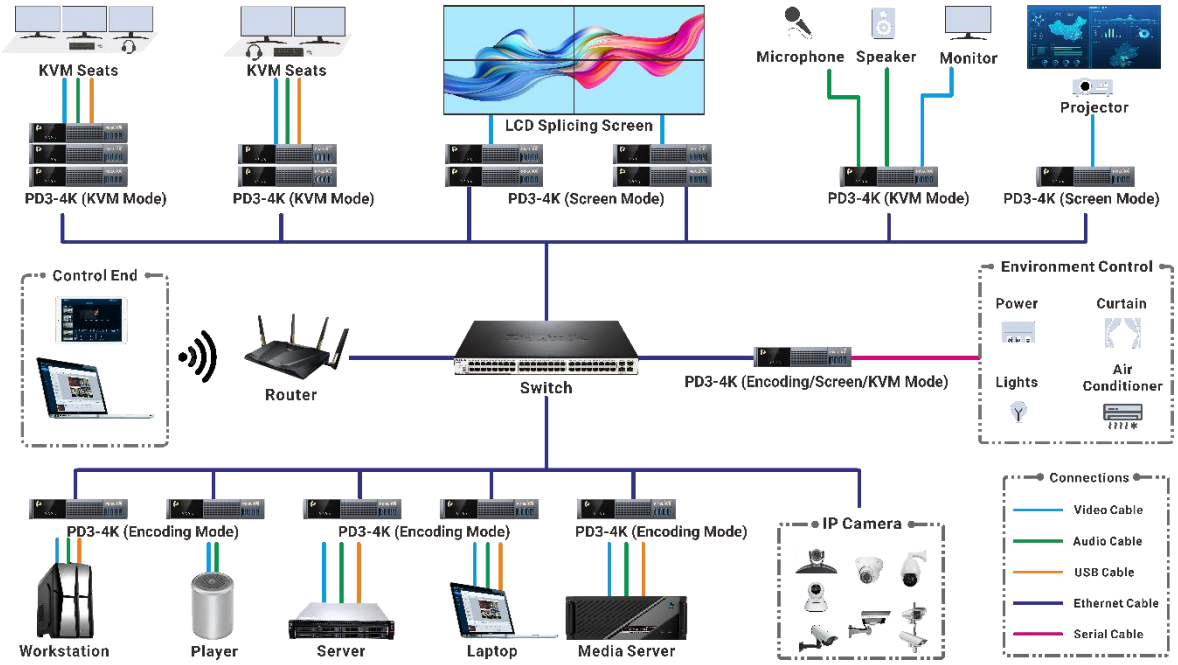
Input/Output Connectors		
Connector	**Qty**	**Description**
HDMI 2.0 IN	2	• When the PD3-4K is used as an encoding node, the HDMI 2.0 IN serves as an input connector. – Two HDMI IN connectors serve as the backup for each other.

		– Input resolutions up to 4096×2160@60Hz – Up to 8-bit/10-bit 4:4:4 video input and processing – SDR input and processing supported – Support HDCP 2.2, backwards compatible with HDCP 1.4 – Accompanied audio input supported Audio sampling rate up to 48 kHz Dual channels with depth of 16bit and 24bit – EDID management supported Width: 800 to 4096 pixels Height: 600 to 2160 pixels • When the PD3-4K is used as a decoding node, the HDMI 2.0 IN is unavailable.
HDMI 2.0 OUT	2	• When the PD3-4K is used as an encoding node, the HDMI 2.0 OUT loops out the audio and video on the HDMI 2.0 IN. – The HDMI 2.0 OUT 1 loops out the audio and video on the HDMI 2.0 IN 1. – The HDMI 2.0 OUT 2 loops out the audio and video on the HDMI 2.0 IN 2. – Two HDMI OUT connectors can loop out the audio and video normally after power failure. • When the PD3-4K is used as a decoding node, the HDMI 2.0 OUT serves as an output connector. – Two HDMI OUT connectors copy the output on each other. – Output resolutions up to 4096×2160@60Hz – Up to 8-bit/10-bit 4:4:4 video output – Support HDCP 2.2, backwards compatible with HDCP 1.4 – Accompanied audio output supported Audio sampling rate up to 48 kHz Dual channels with depth of 16bit and 24bit – Progressive signal output supported – EDID management supported Width: 1360 to 4096 pixels Height: 768 to 2160 pixels
Audio Connectors		
Connector	**Qty**	**Description**
AUDIO	2	1x AUDIO input, 1x AUDIO output • 3.5 mm standard audio input and output connectors • For AUDIO IN, two audio input modes are supported, including Line In and Mic In. • Audio sampling rate: 48kHz • Audio encoding format: AAC, G711a, G711u • Bit Depth: 16bit, 24bit • For AUDIO OUT, two modes are supported, including Line Out and Phone Out. • AUDIO OUT and LINE OUT can output the HDMI accompanied audio and audio input through LINE IN and AUDIO IN. • Volume adjustment on AUDIO OUT

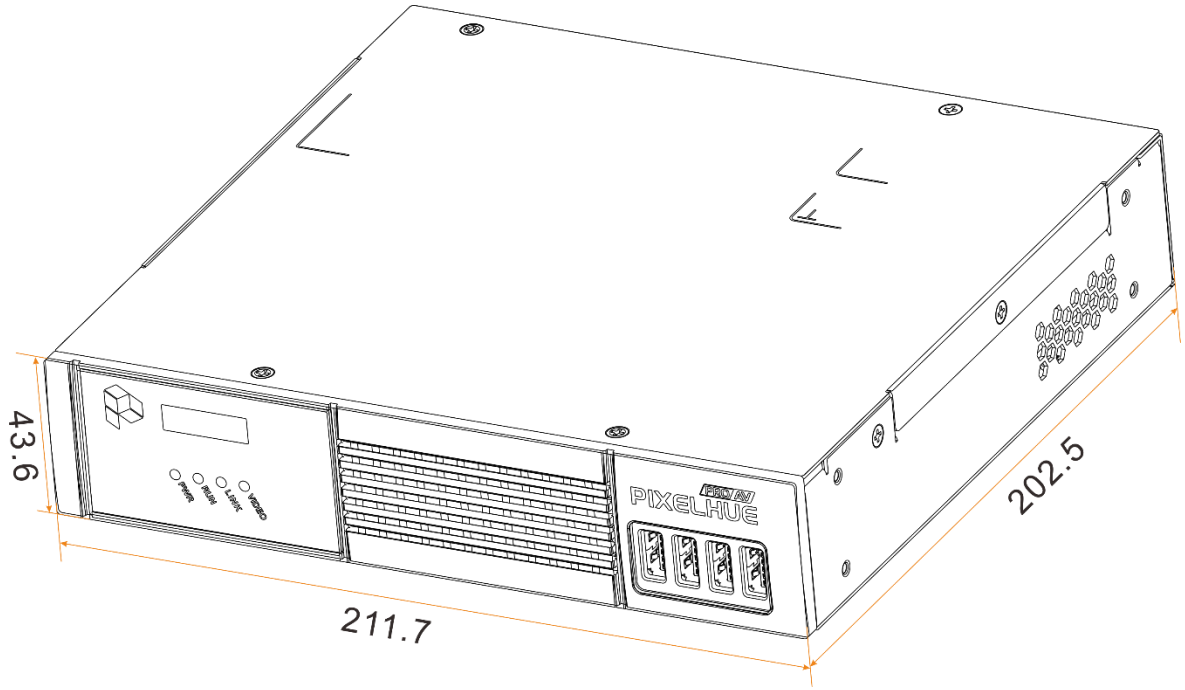
Transmission Connectors		
Connector	**Qty**	**Description**
LAN/PoE	1	1G Ethernet ports • Standard RJ45 connector with the transmission rate up to 1Gbps • For the transmission of the streaming media and control commands • PoE++: 51 W (IEEE 802.3bt). • Secondary streams: H.264/AVC, H.265/HEVC Supported protocols: rtsp/rtcp/rtp/ONVIF protocols Status LEDs: • The top left one (green) indicates the connection status. – On: The port is properly connected. – Flashing: The port is not properly connected, such as loose connection. – Off: The port is not connected. • The top right one (yellow) indicates the communication status. – On: The Ethernet cable is short-circuited. – Flashing: The communication is good and data is being transmitted. – Off: No data transmission Note Cat5e and above standard wires are recommended.
OPT	1	1x 1G optical ports • Standard SFP connector with the transmission rate of 1Gbps • For the transmission of the streaming media and control commands • Compatible with the mainstream single-mode single-core, single-mode twin-core and multimode twin-core optical fiber modules • Transmission distance up to 10 km (single-mode twin-core), transmission distance up to 300 m (multimode twin-core)
Control Connectors		
RS232	1x RS232 programmable connector Supports the central control signal input or output.	
RS485	1x RS485 programmable connector Supports the central control signal input or output.	
IR	• 1x IR IN connector Supports the learning of the infrared control instructions. • 1x IR OUT connector Supports the programmable infrared control.	
RELAY	1x RELAY connector Voltage: 30V DC, current: 2A to 3A	
I/O	1x I/O connector • Supports the programming to trigger the execution of various functional requirements. • Supports the input and output modes. • Input and output I/O voltage: 3.3V	
LINE IN	5-pin phoenix connectors with balanced audio	

LINE OUT	5-pin phoenix connectors with balanced audio
USB	1x Type-B USB 2.0 • When the PD3-4K is used as an encoding node, this connector is connected to the input computer for keyboard and mouse data transmission. • When the PD3-4K is used as a decoding node, this connector is reserved.
Power connector	DC 12V 5A • Connect an external power outlet. • Serve as a redundant power supply for LAN PoE.

Applications



Dimensions



Tolerance: ±0.3 Unit: mm

Specifications

Overall Specifications	
Model	PD3-4K
Layer Specifications	• H.264+ InstSight – 16x 1920×1080@30Hz secondary stream layers – 1x 4096×2160@60Hz primary stream layer+15x 1920×1080@30Hz secondary stream layers • H.265+ InstSight – 24x 1920×1080@30Hz secondary stream layers – 1x 4096×2160@60Hz primary stream layer+23x 1920×1080@30Hz secondary stream layers
MTBF (Hours)	591,016
Primary Streams	• Self-developed InstSight compression algorithm • Max Bandwidth: 102400 Kbps • Min end to end latency: 2 ms • Average end to end latency: 25 ms Note

	To reduce the latency to 2 ms, please refer to User Manual for detailed requirements.	
Secondary Streams	• H.264/265 compression algorithm (Self-developed algorithm based on standard H.264/265) • Max Bandwidth: 1024 Kbps • End to end latency: ≤60 ms	
InstSight Algorithm (primary stream)	Video stream compression based on self-developed InstSight algorithm • ≤SL specification (1920×1080@60Hz, width: ≤2048 pixels) – Smooth: 6× compression ratio – Excellent: 5× compression ratio – Ultimate: 4× compression ratio • >SL specification – Smooth: Compress to a target bitrate of 400 Mbps – Excellent: Compress to a target bitrate of 600 Mbps – Ultimate: Compress to a target bitrate of 700 Mbps • Maximum compression ratio: 24×, minimum compression ratio: 6×	
Network Bandwidth	• Unicast: Up to 5 clients can pull the unicast stream from an encoder simultaneously. • Multicast supported • Bit rate peak: 950 Mbps	
KVM Connections	4x Type-A USB connectors • Connect various peripherals, including keyboard, mouse and touchscreen and cameras. • For USB passthrough	
PoE++	• IEEE 802.3bt on LAN/PoE port • 42 to 57V, max consumption: 51 W	
Electrical Parameters	Power connector	DC 12V, 3A
	Max power consumption	32 W
Operating Environment	Temperature	–10°C to +50°C
	Humidity	0% RH to 80% RH, non-condensing
Storage Environment	Temperature	–20°C to +70°C
	Humidity	0% RH to 95% RH, non-condensing
Physical Specifications	Dimensions	211.7 mm × 210.0 mm ×43.6 mm
Packing Information	Accessories	1x Power adapter 1x USB cable 1x HDMI cable 5x Phoenix connectors 1x Hanging bracket 1x Connecting piece (Left) 1x Connecting piece (Right)

		8x Phillips screws 1x Dustproof plug 4x Foot pads 1x Certificate of Approval 1x Safety Manual
	Net weight	1.6 kg
	Packing Box	580 mm × 495 mm × 285 mm Note Each box contains up to 6 devices.

Video Source Features

Input Connectors	Bit Depth		Max Input Resolution
HDMI 2.0	8-bit	RGB 4:4:4	4096×2160@60Hz
		YCbCr 4:4:4	
		YCbCr4:2:2	
		YCbCr4:2:0	
	10-bit	YCbCr4:2:2	4096×2160@60Hz
		YCbCr4:2:0	

Input and Output Resolutions

Input Resolutions

Standard Resolutions		Input Connectors
Standard Resolutions	**Frame Rate (Hz)**	**HDMI 2.0 (Default: 3840×2160@60Hz)**
4096×2160p	30/60	√
3840×2160p	30/60	√
3840×1080p	30/50/59.94/60	√
2560×1600p	50/59.94/60	√
2560×1400p	50/59.94/60	√
2560×1080p	50/59.94/60	√
2304×1152p	60	√
2048×1152p	30/60	√
2048×1080p	30/48/50/59.94/60	√

Standard Resolutions		Input Connectors
Standard Resolutions	**Frame Rate (Hz)**	**HDMI 2.0 (Default: 3840×2160@60Hz)**
1920×1200p	50/59.94/60	√
1920×1080p	30/48/50/59.94/60	√
1792×1280p	60	√
1680×1050p	60	√
1600×1200p	48/50/59.94/60	√
1600×900p	48/50/59.94/60	√
1400×1050p	48/50/59.94/60/75	√
1440×900p	60/75/85	√
1366×800	50/59.94/60	√
1366×768	50/59.94/60	√
1364×768p	50/59.94/60	√
1364×1024p	48/50/59.94/85	√
1360×768p	60	√
1280×1024p	48/50/59.94/60/75/85	√
1280×960p	50/59.94/60/85	√
1280×800p	50/59.94/60	√
1280×768p	48/50/59.94/60/75	√
1280×720p	48/50/59.94/60	√
1152×864p	75	√
1024×768p	48/50/59.94/60/75/85	√
800×600p	59.94/60/75/85	√

- √: The connector supports the standard resolution and frame rate settings.
- ×: The connector does not support the standard resolution and frame rate settings.

Output Resolutions

Standard Resolutions		HDMI 2.0 Default: 3840×2160@60Hz
Standard Resolutions	**Frame Rate (Hz)**	
7680×1080p	30/60	×
4096×2160p	30/60	√

Standard Resolutions		HDMI 2.0 Default: 3840×2160@60Hz
Standard Resolutions	**Frame Rate (Hz)**	
3840×2160p	30/60	√
3840×1080p	30/50/59.94/60/120	√
2560×1600p	50/59.94/60/120	√
2560×1400p	50/59.94/60	√
2560×1080p	50/59.94/60	√
2304×1152p	60	√
2048×1152p	30/60	√
2048×1080p	30/48/50/59.94/60	√
1920×1200p	50/59.94/60	√
1920×1080p	30/48/50/59.94/60	√
1792×1280p	60	√
1680×1050p	60	√
1600×1200p	48/50/59.94/60	√
1600×900p	48/50/59.94/60	√
1440×900p	60/75/85	√
1400×1050p	48/50/59.94/60/75	√
1366×800	50/59.94/60	√
1366×768	50/59.94/60	√
1364×1024p	48/50/59.94/85	√
1364×768p	50/59.94/60	√
1360×768p	60	√
1280×1024p	48/50/59.94/60/75/85	√
1280×960p	50/59.94/60/85	√
1280×800p	50/59.94/60	√
1280×768p	48/50/59.94/60/75	√
1280×720p	48/50/59.94/60	√
1152×864p	75	√
1024×768p	48/50/59.94/60/75/85	√
800×600p	59.94/60/75/85	√

- √: The connector supports the standard resolution and frame rate settings.
- ×: The connector does not support the standard resolution and frame rate settings.

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