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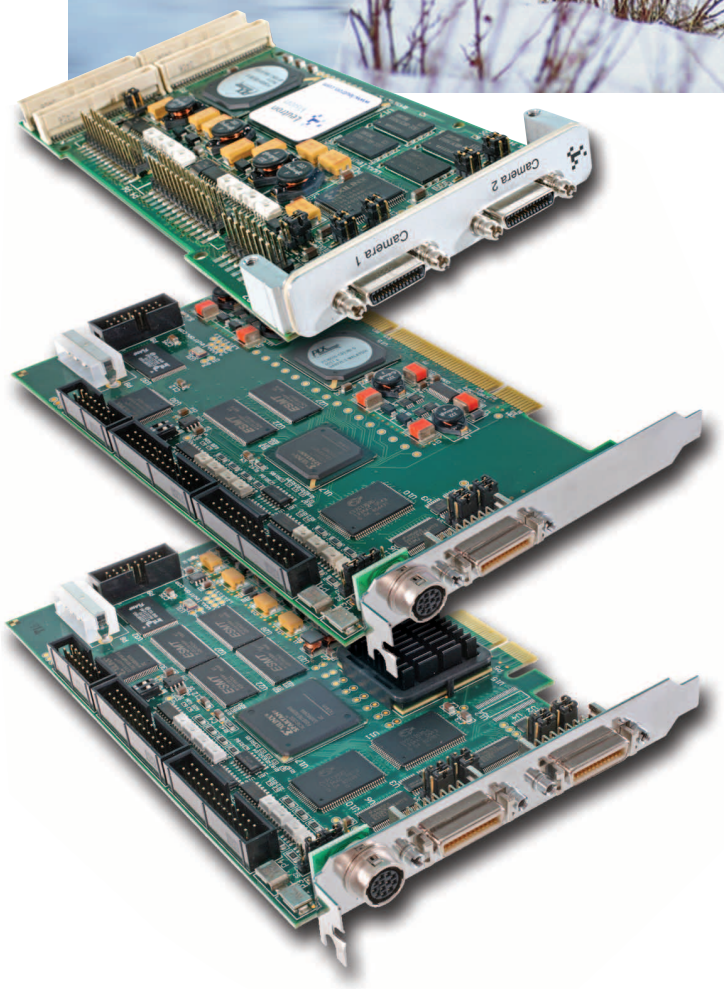
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Find the *Leutron Vision PP-Exp-CL-S-4/64* at our website: *Click HERE*

PIONEERS IN IMAGE ACQUISITION





PicPort®-X-CL
PicPort®-X-CL-PMC
PicPort®-Express-CL

Frame grabber for

- PCI-Express bus ×1 or ×4 or PCI/PCI-X Bus as standard board or PMC module
- Camera Link cameras
- Up to 2 base or 1 medium cameras
- Input/output for trigger, flash and shaft encoder
- Camera power – PoCL SafePower
- On-board Real-Time Function support
- Up to 512 MB 1 GB/s frame buffer
- Multi-taps/packed pixel reformatting
- 2 hardware LUTs
- LV-SDS and 3rd party software support

CAMERA Link®

PoCL™

Leutron Vision

Architecture

PicPort®-Express-CL, **PicPort®-X-CL** *and* **PicPort®-X-CL-PMC** *are members of the LV Camera Link family of products. Each member of this family is a multiple camera frame grabber which supports the Camera Link standard interface. This high-speed board can be used with both line-scan and area-scan Camera Link compatible cameras. It is suitable for both color and monochrome applications and supports high-speed and high-resolution.* **PicPort®-CL** *family is cost effective, compact and high performance, meeting the demanding requirements of diverse image processing and machine vision applications.*

Overview

A comprehensive array of on-board features include Camera Link interface for 2 base or 1 medium cameras at up to 85 MHz, large LUTs, Bayer color decoder, Color space matrix converter, 1D/2D gain/offset correction, multi-taps/packed pixel reformatting, color/monochrome format conversion, up to 512 MB 1GB/s frame buffer with advanced features and PCI/PCI Express ×1 or ×4/PMC bus interface with 4 DMA channels.
The frame buffer ensures no data loss under varying operating system conditions by virtue of its memory size and its ability to generate interrupts to the user application that flag dynamic image buffer watermark depth thresholds.
LV Camera Link frame grabber architecture is user friendly, employing innovative re-programmable flash memory and FPGA (Field Programmable Gate Array) technologies.
This allows the user to reconfigure the on-board hardware via downloadable software updates. The flash memory can also be used for security coding to prevent unauthorized copying of user application proprietary technology.

The **PicPort®-CL** architecture block diagram

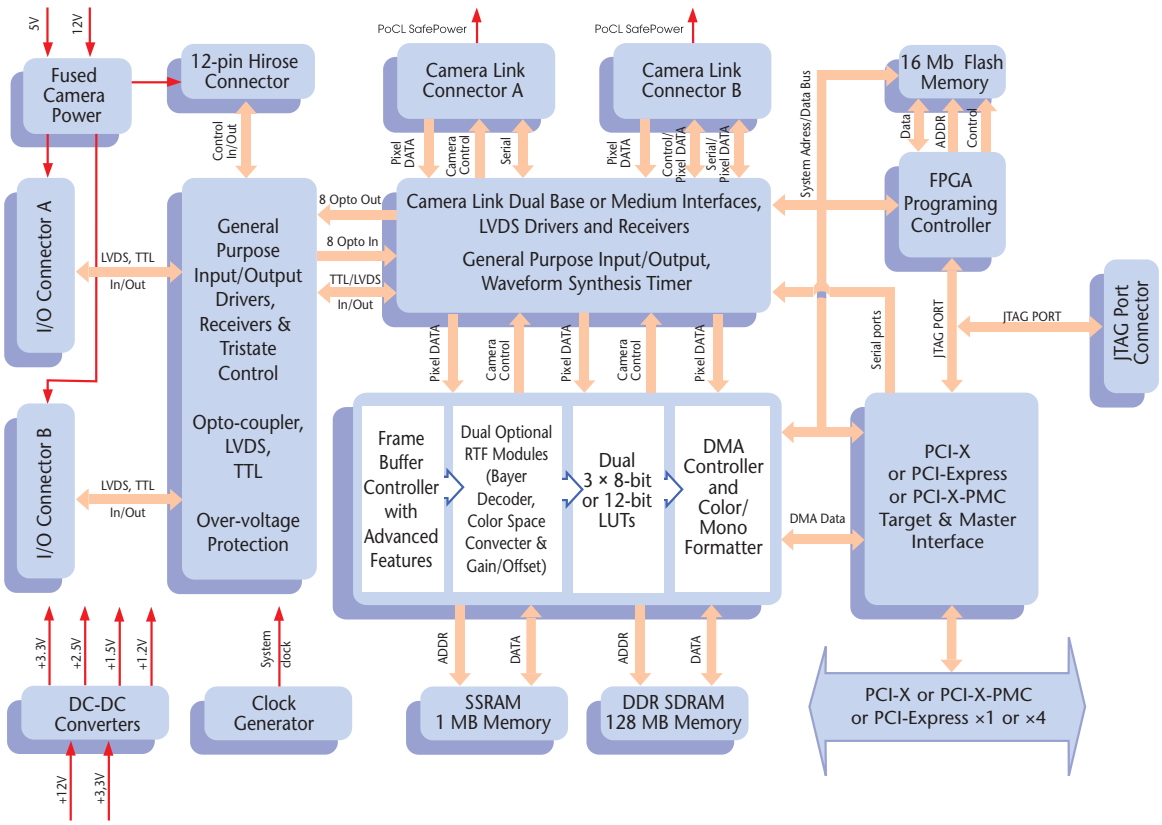


Image Acquisition & Conditioning

Camera Link Interfaces

Depending on board model, LV Camera Link frame grabber supports 1 or 2 base (3 × 8-bit or 2 × 8/10/12-bit or 1 × 8/10/12/14/16-bit monochrome or 24-bit RGB) or one medium (4 × 8/10/12-bit monochrome or 30/36-bit RGB). Area-scan up to 64K × 64K and line-scan up to 64K × infinity with input frequencies up to 85 MHz.

Camera Link control lines for asynchronous reset and exposure control.

Camera Link serial ports for camera setup and control.

General Purpose input/output Interfaces

Camera power, LVDS/TTL and opto-coupler input/outputs are accessible via the PCI backplate 12-pin Hirose connector or via two 26-pin header sockets on the PCB top edge. Assemblies consisting of ribbon cable to DB-25 connectors mounted on PCI backplate (these can be disassembled to mount on chassis cut-outs) may also be ordered.

4 LVDS and TTL input/output pairs share the same physical pins. Selection of the desired functionality such as trigger input, flash control output or shaft encoder input is performed via software setup.
Facilities are provided for shaft encoder use including negative rotation compensation and input pulse programmable divider, thus avoiding costly additional control hardware. Some of the input/output pairs of the header connectors are replicated on the 12-pin Hirose connector.

8 opto-coupler inputs and 8 outputs are provided on the header connectors. These have built-in resistors to minimize external components.
All I/O pins are protected by over/under voltage protection devices clamping to +5 V and ground.

Camera Power

PoCL SafePower is supported for each Camera Link connector, providing +12V at up to 400mA on each.
PoCL allows the camera to be powered by the frame grabber along the Camera Link cable. This allows a single cable solution to provide power and data, useful in low cost applications.

SafePower is a protocol to prevent the frame grabber from attempting to supply power to a conventional cable or camera.

Camera power is provided for 2 cameras: +12 V factory defaults, while either of the outputs is hardware changeable for +5 V. These are available on both Hirose and header connectors. Resettable fuses of 1 A are provided for both voltages.

LUTs

2 LUTs are provided for user configuration as dual 4K × 12-bit or dual 256 × 8 × 3.
Note: only one instead of two LUTs is available for any Mono (PicPort®-X-CL-Mono/PicPort®-Express-CL-Mono/ PicPort®-X-CL-Mono-PMC), resulting in half the LUTs mentioned above for this model.

Real-Time Functions

Real time functions are available in some board configurations.
A **Bayer Color Decoder** provides high-speed decoding of the Bayer pattern output by many color cameras.
A **Color Space Matrix Converter** is provides high-speed conversion of RGB color components in order to obtain an optimum color mix for RGB and Bayer color cameras.
1-Dimensional and 2-Dimensional Gain/Offset Correction provides high-speed per-pixel correction based on per-pixel gain & offset parameters. Monochrome, Bayer color and RGB color cameras are supported.



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Data Storage and Transfer

Frame Buffer

A frame buffer (up to 512 MB) is provided to buffer and reformat the pixel data grabbed from the camera, before passing it to the PCI-X/PCI-Express/PMC bus DMA.
A sophisticated controller facilitates combining of camera taps into a raster output to the PCI-Express DMA. Features include:

- auto line and frame length detection
- multi-tap pixel rasterization
- buffer fill level water mark interrupt
- excellent bandwidth of up to 1 GB/s

DMA Controller

Output data from the Frame Buffer is passed to the DMA controller. This innovative design allows up to 4 DMA channels to be user defined, controlling data burst transfers over the PCI-X/PCI-Express/PMC bus. Each DMA channel can also define a Region-Of-Interest within the data stream.

In conjunction with the color/monochrome data formatter, various formats of the image data can be transferred to host memory or graphic display memory.

Host Bus Interface

- PCI-X version of the frame grabber provides interface to the standard PCI bus and PCI-X bus
- PCI-Express version of the frame grabber provides a PCI-Express ×1 or ×4 interface. This provides hi-end PCI-Express bus bandwidth at an affordable price
- PCI-PMC version of the frame grabber provides interface to the PMC bus (PCI-X)

Flash Memory Controller

The on-board flash memory stores the various configurations of the board that are loaded at power-up and also any software technology security information (software dongle).

Configurations

PicPort®-X-CL exists in following different fixed configurations:

- **PicPort®-X-CL-Mono:** with one base input
- **PicPort®-X-CL-Stereo:** with 2 base or one medium input
- **PicPort®-X-CL-Mono-RTF:** supports 1 base input with on-board Real-Time Function features
- **PicPort®-X-CL-Stereo-RTF:** supports 2 base or 1 medium input with on-board Real-Time Function features

PicPort®-Express-CL exists in following different fixed configurations:

- **PicPort®-Express-CL-Mono:** with one base input
- **PicPort®-Express-CL-Stereo:** with 2 base or one medium input
- **PicPort®-Express-CL-Mono-RTF:** supports 1 base input with on-board Real-Time Function features
- **PicPort®-Express-CL-Stereo-RTF:** supports 2 base or 1 medium input with on-board Real-Time Function features

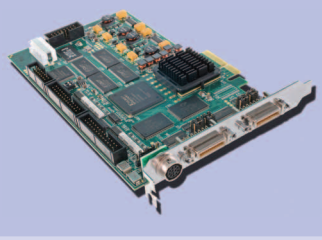
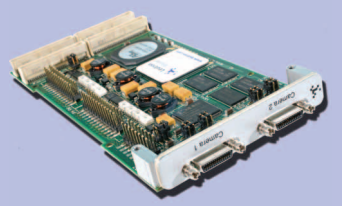
PicPort®-X-CL-PMC exists in following different fixed configurations:

- **PicPort®-X-CL-PMC-Mono:** with one base input
- **PicPort®-X-CL-PMC-Stereo:** with 2 base or one medium input
- **PicPort®-X-CL-PMC-Mono-RTF:** supports 1 base input with on-board Real-Time Function features
- **PicPort®-X-CL-PMC-Stereo-RTF:** supports 2 base or 1 medium input with on-board Real-Time Function features

Applications

- industrial image processing
- web inspection
- traffic vision systems
- medical imaging
- and many more...

PicPort®-CL Family

	PicPort®-X	PicPort®-Express	PicPort®-X-PMC
	Standard PCI Board PCI/PCI-X, 32/64 bit up to 133 MHz	PCI-Express x1 or x4	PMC Module PCI/PCI-X, 32/64 bit up to 133 MHz
			
ALL	24 bit Camera Link-interface with PoCL (Power over Camera Link) capability		
	TTL/LVDS and opto-coupler input/outputs		
	FPGA (software updates) and Flash memory (with capability to use for security coding to prevent unauthorized usage)		
	Frame buffer features: • Low-latency input/output • Multi-tap combining • Up to 64k × 64k area-scan • Up to 64k × infinity line-scan • Image fill level interrupt		
	Hardware LUTs (lookup tables)		
	100% compatible with all of the Leutron Vision products Windows 2K/XP/Vista (32/64 bit), Linux (32/64 bit) and VxWorks ready 3rd-party development tools ready: Halcon 6, Halcon 7, Halcon 8 (32/64 bit), ActivVisionTools, Neurocheck, Common Vision Blox		
RTF	**R**eal **T**ime **F**unctions • Bayer color decoder (interpolation in 5×5 matrix using a treshold-based variable number of gradients) • Color Space Matrix Converter • 1 and 2-dimensional Gain/Offset Correction • Shading Correction (per pixel)		
MONO	• 1 camera in base mode • single LUT • up to 256 MB (default 32 MB) DDR Sdram, 512 KB SSRAM and 16 Mb flash on-board memory		
STEREO	• 2 cameras in base CL mode or 1 camera in medium CL mode • 2 LUTs • up to 512 MB (default 64 MB) DDR Sdram, 1 MB SSRAM and 16 Mb flash on-board memory		

Software

Driver Software

Leutron Vision Software Development Suite, LV-SDS, is a software development suite (Windows, Linux, VxWorks) that allows full control of all PicPort®/ PicSight® (GigE/USB) and PicProdigy® products. The package consists of Daisy – the basic software interface for PicPort®/PicProdigy® cards, Camera Editor – easy interactive setup of standard and non-standard cameras, DRAL – a library for handling specific time-critical tasks, Orchid – high level library (DLL or OCX or .NET) for quick and easy design of PicPort®/PicProdigy®/ PicSight® (GigE/USB) applications, TWAIN Driver and Video for Windows – provide a simple interface between Leutron Vision hardware and other office and image manipulation programs (e.g. MS Office, CorelDRAW, etc.).

The software products come complete with a set of demo programs and additional examples with source code as a guide to the programmer in developing particular applications. To obtain more comprehensive information please download the LV-SDS documentation from www.leutron.com/download.

Third Party Software

Several well-known third party packages for real-time image processing and analysis are also supported. The packages include HALCON, ActivVisionTools, NeuroCheck, and others. Please refer to our detailed software brochure for more details.

Technical Specifications

	PicPort®-CL-Mono PicPort®-CL-Mono-RTF	PicPort®-CL-Stereo PicPort®-CL-Stereo-RTF
Camera Link modes	Base	Base and medium
Multiple Camera Link inputs	1 in base mode	2 in base mode 1 in medium mode
Camera Link acquisition rate	Up to 85 MHz per input	
Camera scan modes	Area-scan or line-scan	
PCI form factor	**PCI-X/PCI-Express:** PCI short card, **PCI-X-PMC:** PMC	
PCI interface	**PCI-X/PCI-X-PMC:** PCI-X/PCI 32/64 bit, up to 133 MHz **PCI-Express:** PCIe ×1 or ×4	
PCI transfer rate	**PCI-X/PCI-X-PMC:** 533MB/sec. peak, 360MB/sec. sus. **PCI-Express:** ×1: up to 200MB/s, ×4: up to 800MB/s	
PCI DMA channels	Up to 4 with independent ROI	
On-board memory	up to 256MB (default 32MB) 512 KB SSRAM 16 Mb flash	up to 512MB (default 64MB) 1 MB SSRAM 16 Mb flash
Color/monochrome data conversion	RGB or monochrome target formats with various depths and data packing options	
LUTs	Single	Dual
Frame buffer bandwidth	500 MB/s	1 GB/s
Frame buffer features	Low-latency input/output Multi-tap combining, Up to 64K×64K area-scan Up to 64K×infinity line-scan, Image fill level interrupt	

	PicPort®-CL-Mono PicPort®-CL-Mono-RTF	PicPort®-CL-Stereo PicPort®-CL-Stereo-RTF
Bayer color decoder	RTF version only	RTF version only
Shading correction (per pixel)	RTF version only	RTF version only
TTL inputs*	8	
TTL outputs*	10	
LVDS inputs*	4	
LVDS outputs*	4	
Opto coupled inputs	8	
Opto coupled outputs	8	
Camera power	Hirose connector: +12 V @ 1.5A (+5 V option) Camera Link connectors: +12 V @ 400mA PoCL SafePower	
Camera power protection	Hirose connector: resettable fuse Camera Link connectors: PoCL SafePower	
Hardware technology	FPGA user re-programmable	
Board power requirements (excluding camera power)	Total 7.62 W (9.24 W for two connected cameras): 3.3 V @ 1000 mA (1200 mA) 12 V @ 360 mA (440 mA)	
Operating temperature range	0 °C to 70 °C	
Relative humidity	Up to 95% (non-condensing)	
FCC	Class A	
CE	Class A	
Dimensions	**PCI, PCIe:** 16.5×11 cm, **PCI-PMC:** 7.5×15 cm	

* LVDS and TTL inputs and outputs share common pins and hence only one format can be selected for each pair of pins.

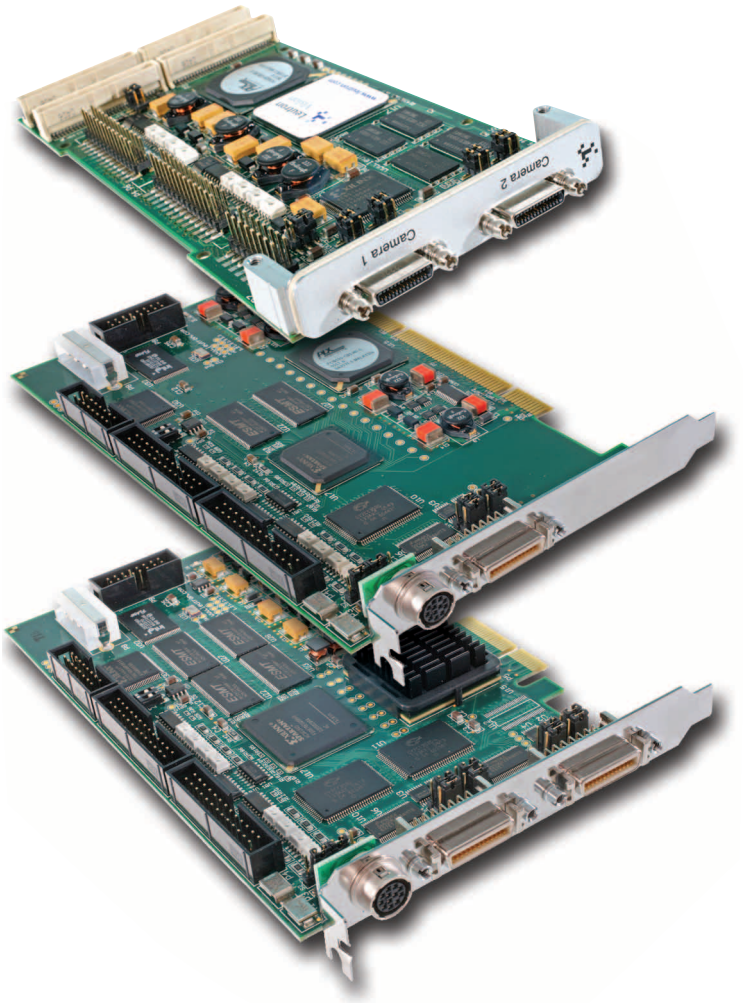
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CAMERA Link

Ordering Information

	PCI PCI bus or PCI-X bus	PCI Express ×1 up to 200 MB/s PCI rate	PCI Express ×4 PCI-Express bus ×4	PMC Module standard PCI bus or PCI-X bus (32 bit/64 bit)
PicPort®-CL-Mono/32/PoCL	11121	11201	11211	-----
	CameraLink Frame grabber, 1 base input, 85MHz, multitap area/linescan, 32MB DDR-SDRAM, 512kB LUT, various TTL, LVDS and optoisolated I/O, PoCL SafePower			
PicPort®-CL-Mono-RTF/32/PoCL	11131	11221	11231	-----
	CameraLink Frame grabber, 1 base input, 85MHz, multitap area/linescan, 32MB DDR-SDRAM, 512kB LUT, various TTL, LVDS and optoisolated I/O, RealTime functions implemented in onboard FPGA, PoCL SafePower			
PicPort®-CL-Stereo/64/PoCL	11141	11251	11261	-----
	CameraLink Frame grabber, 2 base- or 1 medium input, 85MHz, multitap area/linescan, 64MB DDR-SDRAM, 1MB LUT, various TTL, LVDS and optoisolated I/O, PoCL SafePower			
PicPort®-CL-Stereo-RTF/64/PoCL	11151	11271	11281	-----
	CameraLink Frame grabber, 2 base- or 1 medium input, 85MHz, multitap area/linescan, 64MB DDR-SDRAM, 1MB LUT, various TTL, LVDS and optoisolated I/O, RealTime functions implemented in onboard FPGA, PoCL SafePower			
PicPort®-CL-Mono/64-PMC/PoCL	-----	-----	-----	11127
	CameraLink Frame grabber, 1 base input, 85MHz, multitap area/linescan, 64MB DDR-SDRAM, 512kB LUT, various TTL, LVDS and optoisolated I/O, PoCL SafePower, for use as PMC-Module			
PicPort®-CL-Mono-RTF/64-PMC/PoCL	-----	-----	-----	11137
	CameraLink Frame grabber, 1 base input, 85MHz, multitap area/linescan, 64MB DDR-SDRAM, 512kB LUT, various TTL, LVDS and optoisolated I/O, RealTime functions implemented in onboard FPGA, PoCL SafePower, for use as PMC-Module			
PicPort®-CL-Stereo/128-PMC/PoCL	-----	-----	-----	11147
	CameraLink Frame grabber, 2 base- or 1 medium input, 85MHz, multitap area/linescan, 128MB DDR-SDRAM, 1MB LUT, various TTL, LVDS and optoisolated I/O, PoCL SafePower, for use as PMC-Module			
PicPort®-CL-Stereo-RTF/128-PMC/PoCL	-----	-----	-----	11157
	CameraLink Frame grabber, 2 base- or 1 medium input, 85MHz, multitap area/linescan, 128MB DDR-SDRAM, 1MB LUT, various TTL, LVDS and optoisolated I/O, RealTime functions implemented in onboard FPGA, PoCL SafePower, for use as PMC-Module			

All information in this document is subject to change without prior notice.



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