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PCIe-NPL54

Fanless 4-port GMSL2 Camera Frame Grabber Card

Key Features

- **4x GMSL2 FAKRA Z inputs supporting automotive GMSL2 cameras**
- **Driver ready for selected 8MP/ 5MP/ 3MP/ 2MP GMSL2 cameras**
- **1x GPS PPS input and 1x GPS PPS output for frame synchronization calibration**
- **Single-slot, half-length PCIe card form factor. Powered directly via PCIe connectors; no external PCIe power cable required**
- **x4 Gen2 PCI Express interface**
- **-40°C to 70°C fanless operation**
- **Compatible with Linux host computers**

Introduction

The PCIe-NPL54 is a cost-effective, fanless, wide-temperature, 4-channel GMSL2 frame grabber designed to meet the growing demand for seamless integration of automotive GMSL2 cameras with x86 systems. As edge AI applications—such as autonomous driving, ADAS, and outdoor AMRs—increasingly rely on robust sensor inputs, the PCIe-NPL54 can deliver exceptional performance, and enable reliable camera integration in demanding environments.

The PCIe-NPL54 is driver-ready for selected automotive GMSL2 cameras, which are a preferred choice for edge AI applications due to their superior performance in outdoor settings. Even under dynamic lighting conditions, these cameras deliver high-quality images with 120–140 dB HDR and LED Flicker Mitigation (LFM), while the ISP on the camera side fine-tunes image settings within a single frame through auto exposure, auto gain control, and auto white balance. Automotive GMSL2 cameras also offer deployment advantages, including a compact footprint and simplified cabling—using a single coaxial cable for both power and signal—secured with FAKRA connectors for robust connectivity. Additionally, their IP67 and IP69K ratings ensure reliable operation in dusty and wet environments.

Built with advanced FPGA technology, the PCIe-NPL54 offers a cost-effective solution with minimal power consumption: under 20W while streaming from four 5MP GMSL2 cameras at 30 FPS. Its low power design enables fanless operation at temperatures up to 70°C. The card's single-slot width and PCIe Gen2 x4 interface ensure compatibility with rugged, space-constrained edge AI platforms. Its integrated power design draws all necessary power from the PCIe connector, eliminating the need for an external 6-pin power connector and streamlining installation.

Engineered for precision and scalability, the PCIe-NPL54 features a GPS PPS input for frame synchronization across multiple PCIe-NPL54 units and LiDAR systems, ensuring accurate data alignment for sensor fusion. A GPS PPS output mirrors the input, enabling daisy-chaining of multiple units from a single GPS PPS source. Additionally, the PCIe-NPL54 features an auto recovery mechanism that automatically restores GMSL2 camera streaming after unexpected disconnections caused by electrostatic discharge (ESD).

The PCIe-NPL54 is a cutting-edge GMSL2 frame grabber designed to empower edge AI applications that rely on x86-based systems, where native MIPI interfaces are typically scarce on Intel and AMD platforms. It redefines the GMSL2 frame grabber category by combining affordability, efficiency, and advanced functionality—making it ideal for both automotive and industrial environments.

Specifications

Bus Interface	x4, Gen2 PCI Express
GMSL2 Camera	4x GMSL2 FAKRA Z connectors, supporting multiple camera configurations, including but not limited to: Configuration A: 2x 8MP + 1x 3MP @ 30 FPS Configuration B: 4x 5MP @ 30 FPS Configuration C: 4x 3MP @ 30 FPS Configuration D: 4x 2MP @ 60 FPS Configuration E: 4x 2MP @ 30 FPS
GPS PPS	1x isolated GPS PPS input 1x GPS PPS output (follows the GPS PPS input; designed for GPS PPS signal daisy-chaining)
Serial Port	1x RS-232 (connected to onboard MCU)
Dimension	167.7 mm (W) x 111 mm (H)
Weight	183 g
Storage Temperature	-40°C to 85°C
Operating Temperature	-40°C to 70°C fanless operation
Humidity	10% to 90%, non-condensing
EMC	CE/ FCC Class A, according to EN 55032 & EN 55035

Verified Host Configurations

Verified OS

Ubuntu 20.04
Ubuntu 22.04
Ubuntu 24.04

System Requirements

Please note that the PCIe-NPL54 is designed to minimize latency with minimal buffering. BIOS settings and the choice of OS storage can significantly impact PCIe stability. We strongly recommend referring to our verified configuration below when selecting a host system for PCIe-NPL54 integration.

Verified Host Configuration 01	
Model	Nuvo-10208GC
CPU	Intel® Core™ i9-13900E (24 cores / 32 threads)
Memory	2x 32GB DDR5 5600 ECC Memory (Trained as DDR5 4800)
Camera Configuration (60 Mega Pixels via 4x PCIe-NPL54 cards)	PCIe-NPL54 #01: 2x 8MP @ 30 FPS – PEG slot PCIe-NPL54 #02: 4x 3MP @ 30 FPS – PCH slot PCIe-NPL54 #03: 4x 5MP @ 30 FPS – PCH slot PCIe-NPL54 #04: 4x 3MP @ 30 FPS – PCH slot
OS Storage	Installed on NVMe SSD

Verified Host Configuration 02	
Model	Nuvo-10208GC
CPU	Intel® Core™ i9-13900E (24 cores / 32 threads)
Memory	2x 32GB DDR5 5600 ECC Memory (Trained as DDR5 4800)
Camera Configuration (55 Mega Pixels via 4x PCIe-NPL54 cards)	PCIe-NPL54 #01: 2x 8MP + 1x 3MP @ 30 FPS – PCH slot PCIe-NPL54 #02: 4x 2MP @ 30 FPS – PEG slot PCIe-NPL54 #03: 4x 5MP @ 30 FPS – PCH slot PCIe-NPL54 #04: 4x 2MP @ 30 FPS – PCH slot
OS Storage	Installed on NVMe SSD

Verified Host Configuration 03	
Model	Nuvo-8034
CPU	Intel® Xeon E-2278GEL (8 cores / 16 threads)
Memory	2x DDR4 3200 Memory (trained as DDR4 2133)
Camera Configuration (32 Mega Pixels via 2x PCIe-NPL54 cards)	PCIe-NPL54 #01: 4x 3MP @ 30 FPS – PCH slot PCIe-NPL54 #02: 4x 5MP @ 30 FPS – PCH slot
OS Storage	Installed on NVMe SSD

Ordering Information

Model No.	Product Description
PCIe-NPL54	Fanless 4-port GMSL2 camera frame grabber card

Optional Accessories

Model No.	Product Description
GMSL2 cameras	The system is compatible with a wide range of GMSL2 cameras with pre-built driver. For the complete list, please click on this link.
Cbl-FAKRA-ZFM-ZFM-12M	Waterproof FAKRA Z-code Female to Waterproof FAKRA Z-code Female, Length: 12M