
USB LISM-PI26xx

USB Line Scan Camera System

Datasheet

(Rev 1.0)



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USB LISM-PI26xx – USB Line Scan Camera System

1. System Overview

The **USB LISM-PI26xx** is a modular, software-configurable **USB line scan camera system** designed for integration into industrial, scientific, and embedded applications. It consists of:

- The **Linear Image Sensor Module (LISM-PI26xx)** – a timing-controlled analog imaging frontend for CMOS linear image sensors
- The **USB LISM-PI26xx Interface** – a dedicated board that provides USB communication, power, I²C access, timing synchronization, and image data streaming

This combination forms a complete, host-controlled camera platform for precise line-based image acquisition via USB.

All configuration, synchronization, and data streaming is handled via a software API. Image acquisition parameters are fully programmable, making the system adaptable to a wide range of use cases.

The two modules are connected via a 26-pin flexible flat cable (FPC), allowing the sensor module to be mounted separately from the USB interface. This enables compact or embedded installations, especially where space constraints or mechanical isolation are important.

For LISM-PI26xx register definitions and timing behavior, refer to the [LISM-PI26xx datasheet](#). For a full description of the USB interface functions and available API calls, please see the USB LISM-PI26xx Interface documentation:

- [Windows \(32-/64-Bit\)](#)
- [ARM \(32-64-Bit\)](#)

2. Key Features

- Complete USB line scan camera system (LISM-PI26xx sensor module + USB Interface)
- USB 2.0 communication and power supply
- Full register access to the LISM-PI26xx via I²C
- External, internal, and encoder-based triggering
- Configurable timing and acquisition control
- Real-time streaming of 16-bit pixel data
- API available for multiple platforms (Windows, Linux, embedded)

- Modular design: USB interface and LISM-PI26xx module connected via flexible FPC cable for remote sensor placement

3. Functional Description

The USB LISM-PI26xx Interface enables host software to fully control the LISM-PI26xx sensor module through USB. All acquisition logic, integration timing, and analog frontend parameters are configured via software. Sensor data is transferred to the host as a continuous stream of 16-bit pixel values.

Developers can use the provided API to implement their own control software, define timing parameters, retrieve line data, and configure acquisition behavior. Integration into larger automation or inspection systems is possible through custom host-side software.

A dedicated I²C multiplexer allows access to internal sensor registers as well as optional external I²C devices.

4. Typical Use Case

An example application might involve the linear image sensor mounted above a conveyor. A quadrature encoder connected to the interface provides position-synchronized pulses. The system is configured via the API to acquire one line per encoder step. Data is streamed via USB to a host PC or embedded processor for real-time analysis.

All timing parameters (line length, integration time, trigger mode, clock rates) are programmable via software and can be adjusted at runtime.

5. Hardware Configuration

Host Side:

- USB 2.0 connection (Mini-B receptacle on interface board)
- Power supplied via USB (no external supply required)

Sensor Side:

- 26-pin 0.5 mm pitch FPC ZIF connector
- Connects to LISM-PI26xx module (part of the complete system)
- Transfers image data, clock, I²C control signals, and trigger lines

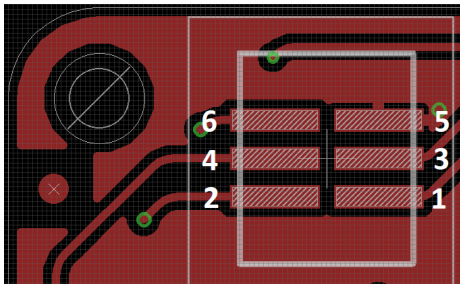
Trigger Signals:

- 2x Trigger Inputs (EXT_TRIG_IN1, IN2)

- 1x Trigger Output (programmable delay/width)

Internal Features:

- I²C multiplexer for internal/external register access
- Ring buffer for high-throughput image transfer

6 pin header / Tiger Eye		
1		I2C SCL
2		External Trigger Input 2
3		I2C SDA
4		External Trigger Input 1
5		Ground
6		Trigger Output

6. Software API

The camera system is controlled entirely through a dedicated software API. The API handles:

- Device detection and initialization
- Register-level I²C communication with the LISM-PI26xx sensor module
- Trigger mode configuration and acquisition control
- Analog frontend tuning including programmable gain, analog offset correction, and external input bias voltage adjustment via DAC.
- Streaming of 16-bit pixel data into a host-side buffer
- EEPROM access for persistent configuration storage

Platform Support:

- Windows (32-/64-bit DLL)
- ARM 32-/64-bit

Data Handling:

- Pixel data: 16-bit MSB-first, streamed line by line
- Access via circular buffer (e.g. `ls_getpipe()` API function)
- Trigger output can be used to synchronize lighting or other hardware

7. Acquisition Modes

The system supports multiple triggering and acquisition methods, which are configured via the LISM-PI26xx registers through the API:

- **Free-running internal mode**
- **External trigger (rising edge or level-sensitive)**
- **Quadrature encoder mode**
- **Internal software trigger (periodic)**

Parameters such as the number of pixels, lines per frame, trigger delay and width, integration time, and clock frequency are all adjustable via API calls.

For detailed timing diagrams and LISM-PI26xx register descriptions, refer to the [LISM-PI26xx documentation](#).

8. Analog Signal Chain

Each image line is processed by a 16-bit analog-to-digital converter with software-controlled analog parameters:

Feature	Controlled via Register
ADC Gain	ADC_GAIN
ADC Offset	ADC_OFFSET
Full Scale Range	ADC_FULL_SCALE
Offset Bias Voltage	ADC_INPUT_BIAS

An external 10-bit DAC (2.0 V reference) is used to apply a coarse input offset voltage to the ADC. This allows compensation of sensor signal baselines beyond the internal correction range. Fine-tuning is performed using the ADC's programmable analog offset.

This allows fine adaptation to varying light levels, sensor types, or application-specific signal ranges.

9. Technical Specifications

Parameter	Value / Note
Power Supply	5 V via USB
Interface Type	USB 2.0
Data Format	16-bit per pixel, MSB-first
Pixel Resolution	Up to 4096 (sensor dependent)
Line Rate	Up to 8.9 kHz (sensor + config dependent)

Parameter	Value / Note
Dimensions (USB-Interface)	48 x 38 mm ²
Dimensions (LISM-PI26xx)	48 x 38 x 7.2 mm ³

10. Documentation & References

- LISM-PI26xx Sensor Module Datasheet ([LISM_PI26xx.pdf](#))
- USB LISM-PI26xx Interface Windows API Manual ([USB_LISMPI26xx_DLL.pdf](#))
- USB LISM-PI26xx Interface ARM API Manual ([USB_LISMPI26xx_ARM_SO.pdf](#))
- Sample Code included in SDK
- Technical support: support@coptonix.com

Revision history

Rev.	Date	Description
1.0	07 August 2025	Initial release