

USB-2405 Series

2 or 4-ch 24-bit 128kS/s Dynamic Signal Acquisition USB 2.0 Module

Features

- Hi-Speed USB 2.0
- USB bus powered
- 24-bit Sigma-Delta ADC with built-in anti-aliasing filter
- 2 or 4-ch simultaneous sampling analog inputs, up to 128kS/s
- AC or DC input coupling, software selectable
- Analog or digital triggering
- Supports 2mA excitation output on each analog input channel for IEPE sensor measurement
- Full auto-calibration

Introduction

The USB-2405 is a 24-bit high-performance dynamic signal acquisition USB module equipped with 2 or 4 analog input channels providing simultaneous sampling at up to 128 kS/s per channel. The USB-2405 also features software-selectable AC or DC coupling input configuration and built-in high precision 2 mA excitation current to measure integrated electronic piezoelectric (IEPE) sensors such as accelerometers and microphones.

The USB-2405 delivers high precision, DC and dynamic measurement performance with very low temperature drift. The onboard 24-bit Sigma-Delta ADC supports anti-aliasing filtering, suppressing modulator and signal out-of-band noise and providing usable signal bandwidth of the Nyquist rate, making it ideal for high dynamic range signal measurement in vibration and acoustic applications.

The USB-2405 supports digital and analog trigger sources and flexible trigger modes, including post, delay, middle, gated, and pre-triggering for efficient data acquisition with no need for post-processing. The USB-2405 is USB bus-powered and equipped with BNC connectors and removable spring terminals for easy device connectivity.

Driver and SDK

- MAPS Core, LabVIEW, C/C++, Visual Studio.NET

Supported Operating System

- Windows 7/10
- Linux



USB-2405/S



USB-2405/2AI

Software Utility

- **ADLINK Connection Explorer (ACE)**
Device management utility
(Install MAPS Core from driver download)
- **U-Test**
Ready-to-use functional testing utility
- **Phoenix GM Lite (Orderable)**
Machine Condition Monitoring Software
(Supported by model USB-2405 and USB-2405/OEM)

Ordering Information

- **USB-2405/S**
4-CH 24-Bit 128kS/s Dynamic Signal Acquisition USB 2.0 Module
- **USB-2405/2AI**
2-CH 24-Bit 128kS/s Dynamic Signal Acquisition USB 2.0 Module
- **USB-2405/OEM**
4-CH 24-Bit 128kS/s Dynamic Signal Acquisition USB 2.0 Module, OEM board-level version, no enclosure

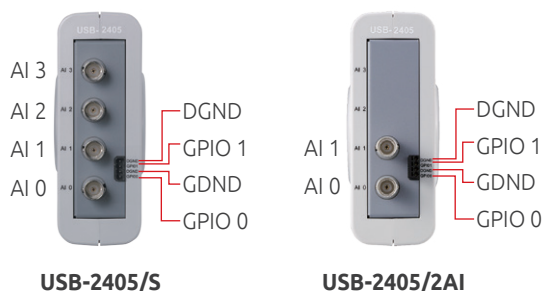
Standard Shipped Accessories

- 4-pin removable spring terminal
- 2 m USB Type A to USB Mini-B cable with lockable connector
- Module stand
- Rail-mount kit

Optional Accessories

- **Phoenix GM Lite (Supported by model USB-2405 and USB-2405/OEM)**
License Key for Phoenix GM Lite
- **ICP Accelerometer IMI_603C01**
ICP Accelerometer IMI_603C01, 100mV/g, 0.5 to 10kHz, 2-pin conn. w/ 10-ft cable and magnetic mount

Product Illustration



Specifications

Analog Input

| | |
|--|---|
| Channels | 2 or 4 (simultaneous sampling) |
| ADC Resolution | 24-bit |
| ADC type | Delta-sigma |
| Sampling rate | 1 kS/s to 128 kS/s |
| Input range | ±10V |
| FIFO buffer size | 8kS across all channel |
| Input Configuration | Differential or pseudo-differential |
| Input impedance | 200 kΩ (between positive input and negative input) 16.93 kΩ (Between negative input and chassis ground) |
| Input coupling | AC or DC, software selectable |
| Integrated Electronic Piezoelectric (IEPE) | Current: 2 mA or 0 mA, software selectable IEPE compliance: 24V |
| Over-voltage protection | ±60V |
| Input common mode range | ±10V |
| Trigger source | Analog or digital, software selectable |
| Trigger mode | Post trigger, delay trigger, middle trigger, gated trigger, pre-trigger, post or delay trigger with re-triggering |
| Data Transfer | Programmed I/O, continuous (bulk transfer mode) |

• DC accuracy (25°C)

| Offset Error (mV) | Gain Error (%) |
|-------------------|-----------------|
| Typical: ±0.15mV | Typical: ±0.15% |
| Max. ±0.3mV | Max. ±0.3% |

• AC Dynamic Performance (typical, 25°C)

• THD, THD+N (Vin = 8.9 Vpk)

| Input configuration | Input Signal Frequency (fin) | THD | THD+N |
|---------------------|------------------------------|--------|--------|
| Differential | 20 Hz to 20 kHz | -94 dB | -91 dB |
| | 20 Hz to 46.4 kHz | -89 dB | -88 dB |
| Pseudodifferential | 20 Hz to 20 kHz | -92 dB | -88 dB |
| | 20 Hz to 46.4 kHz | -85 dB | -85 dB |

• CMRR

| | |
|---------------------|-------|
| AC (20 Hz to 1 kHz) | 60 dB |
|---------------------|-------|

• Bandwidth

| -3dB bandwidth | 0.49 * sampling rate |
|-------------------------------|----------------------|
| AC cut-off frequency (-3dB) | 0.4 Hz |
| AC cut-off frequency (-0.1dB) | 2.4 Hz |

• Flatness

| Input Signal Frequency (fin) | Flatness |
|------------------------------|----------|
| 20 Hz to 20 kHz | ±0.01 dB |
| 20 Hz to 46.4 kHz | ±0.15 dB |

• Crosstalk

| Input Signal Frequency (fin) | Crosstalk |
|------------------------------|-----------|
| 1 kHz | -102 dB |
| 46.4 kHz | -95 dB |

• System noise

| Mode | AI Noise |
|---|----------|
| High-Resolution (< 52.734 kHz) | 50µVrms |
| High-Speed Mode (52.734 kHz to 128 kHz) | 65µVrms |

• SFDR (Vin = -1 dBFS)

| Input Signal Frequency (fin) | SFDR |
|------------------------------|--------|
| 1 kHz | 104 dB |

• Dynamic Range (Vin = -60 dBFS, fs=102.4kS/s)

| Input Signal Frequency (fin) | Dynamic range |
|------------------------------|---------------|
| 1 kHz | 100 dB |

Digital Input / Output

| | |
|-------------------------|--|
| Channels | 2 programmable function I/O |
| Compatibility | 3.3V / TTL (single-ended) |
| Initial status | Input (pull low) |
| Input voltage | Logic low: VIL = 0.8 V max.; IIL = 0.2 mA max. Logic high: VIH = 2.0 V min.; IIH = 0.2 mA max. |
| Output voltage | Logic low: VOL = 0.8 V max.; IOL = 0.2 mA max. Logic high: VOH = 2.0 V min.; IOH = 24 mA max. |
| Over-voltage protection | -2V ~ +7V |
| Supporting modes | <ul style="list-style-type: none"> Static digital input/output Pulse output, max. frequency: 4 MHz Event counter, max. frequency: 4MHz Digital trigger IN Synchronization sample clock IN |
| Data Transfer | Programmed I/O |

Note: Function I/O shares the same I/O pins, such that only one of these modes can be selected at a time.

General Specifications

- I/O connector: Two or four BNC connectors and 4-pin removable spring terminals
- Operating temperature: 0 to 55°C (32 to 131°F)
- Storage temperature: -20 to 70°C (-4 to 158°F)
- Power requirements: 5V @ 400mA (USB bus powered)
- Dimensions (not including stand): 114 mm (W) x 167.5 mm (D) x 41.3 mm (H) (4.5" x 6.6" x 1.63")
- Relative humidity: 5% to 95%, non-condensing

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