

# **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



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 postprocessing. 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

### 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 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 k $\Omega$ (between positive input and negative input) 16.93 k $\Omega$ (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

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#### • Bandwidth

Dalidwidth	
-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 (f <sub>in</sub> )	Crosstalk
1 kHz	-102 dB
46.4 kHz	-95 dB
• System noise	
Mode	Al Noise
High-Resolution (< 52.734 kHz)	50µVrms
High-Speed Mode (52.734 kHz to 128 kHz)	65µVrms
• SFDR (Vin = -1 dBFS)	
	CEDD
Input Signal Frequency (fin)	SFUR
1 kHz	104 dB
1 kHz • Dynamic Range (Vin = -60 dBFs	104 dB 5, fs=102.4kS/s)
<ul> <li>Input Signal Frequency (Fin) 1 kHz</li> <li>Dynamic Range (Vin = -60 dBFS</li> <li>Input Signal Frequency (fin)</li> </ul>	104 dB 5, fs=102.4kS/s) Dynamic range
<ul> <li>Input Signal Frequency (Fin) 1 kHz</li> <li>Dynamic Range (Vin = -60 dBFS Input Signal Frequency (fin) 1 kHz</li> </ul>	5FDR 104 dB 5, fs=102.4kS/s) Dynamic range 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; IIL = 0.2 mA max. Logic high: VOH = 2.0 V min.; IIH = 24 mA max.	
Over-voltage protection	-2V ~ +7V	
Supporting modes	<ul> <li>Static digital input/output</li> <li>Pulse output, max. frequency:4 MHz</li> <li>Event counter, max. frequency: 4MHz</li> <li>Digital trigger IN</li> <li>Synchronization sample clock IN</li> </ul>	
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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