USB-2405

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
- 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
- F ull auto-calibration
- Supporting Time-Frequency analysis software -- Visual Signal DAQ Express

Introduction

The USB-2405 is a 24-bit high-performance dynamic signal acquisition USB module equipped with 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

- LabVIEW, MATLAB, C/C++, Visual Basic, Visual Studio. NET

Supported Operating System

- Windows 7/8 x64/x86, Linux, Mac OS

Software Utility

- **U-Test**
  Ready-to-use functional testing utility
- **Visual Signal DAQ Express**
  Visualized signal process and analysis software

Ordering Information

- **USB-2405**
  4-CH 24-Bit 128kS/s Dynamic Signal Acquisition USB 2.0 Module

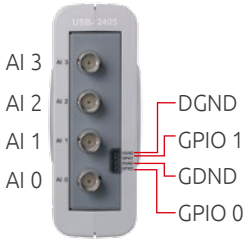
Standard Shipped Accessories

- 4-pin removable spring terminal
- 2 M USB Type A to USB Mini-B cable with lockable connector
- Module stand
- Rail-mount kit
- The installation USB flash drive for Visual Signal DAQ Express

Optional Accessories

- **USB-2M-L**
  2 M USB Type A to USB Mini-B cable with lockable connector

Product Illustration



USB-2405

Specifications

Analog Input

Channels	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	2k samples per 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 (f_{in})	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; IIL = 0.2 mA max. Logic high: VOH = 2.0 V min.; IIH = 24 mA max.
Over-voltage protection	-2V ~ +7V
Supporting modes	• Static digital input/output • Pulse output, max. frequency:4 MHz • Frequency/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: 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 connectors and stand): 115mm (W) x 150 mm (D) x 40 mm (H) (4.5” x 5.91” x 1.57”)
- Relative humidity: 5% to 95%, non-condensing