Series KPXI-SDAQ

Simultaneous Sampling, Multifunction Modules

- 2MSamples/s maximum simultaneous sampling rate
- 14- or 16-bit resolution
- 4 analog inputs per module with multiple module synchronization capabilities
- 2 analog outputs with waveform generation
- 24 digital I/O lines
- Two 16-bit, general purpose counter/timers
- KDAQ-DRVR drivers for Visual Basic, Visual C, .NET, and KI-DAQ drivers for LabVIEW®
- Free configuration, calibration, Code Creator, and data file converter software tools included with drivers

Ordering Information

KPXI-SDAQ-4-2M
4-Channel, 2MS/s, Simultaneous, A/D, Multifunction PXI Module

KPXI-SDAQ-4-500K
4-Channel, 500KS/s, Simultaneous, A/D, Multifunction PXI Module

The Series KPXI-SDAQ modules feature simultaneous sampling as well as multifunction capabilities. Each module can simultaneously sample four analog input channels while generating waveforms through two analog output channels. This makes them ideal for applications such as stimulus response tests, audio analysis where synchronous pulses or devices need to be examined, and characterization tests that require I and V to be tested at the same time. For maximum efficiency, data is transferred to the host system with scatter-gather DMA.

In hybrid test systems, KPXI-SDAQ modules can be used to coordinate analog measurements from multiple instruments and sensors in a test system. For example, to measure low level signals in a test system, connect a KPXI-SDAQ module to the analog outputs of several picoammeters to synchronize low current readings. To improve precision while maintaining test speeds, you can set high and low reading limits on the instruments and wire the pass/fail bits into the digital inputs on the KPXI-SDAQ module.

Versatile

Their multiple input ranges make these modules flexible enough to use with many types of sensors, devices, and instrument signals. Each channel is individually programmable with bipolar and unipolar analog input ranges and gains of 1, 2, 4, and 8.

Five triggering modes make triggering from instruments, devices, and systems possible even with large delays between the trigger and the desired signals. The analog and digital triggering modes include pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger.

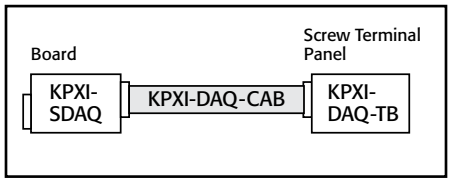
For larger systems, more analog input and output channels can be added by synchronizing multiple Series KPXI-SDAQ modules through the PXI trigger bus. Up to six modules can be synchronized together to provide 24 simultaneous channels with extremely low latency.

Additionally, the auto-calibration feature adjusts the gains and offsets to a specified accuracy, eliminating the need for external calibration sources.

Software

The KDAQ-DRVR driver includes example programs, such as a startup application that performs basic functions, updates the auto calibration feature, and verifies board communication. Also provided is Code Creator, which lets users program with drop down menus and then displays the equivalent code in C.

Configuration Guide



ACCESSORIES AVAILABLE

KPXI-DAQ-TB	Terminal Board with 68-pin SCSI-II connector. One required per module.
KPXI-DAQ-CAB	Cable connecting terminal block KPXI-DAQ-TB to KPXI-SDAQ modules. One required per module.

SERVICES AVAILABLE

KPXI-SDAQ-4-2M-5Y-EW	1-year factory warranty extended to 5 years from date of shipment
KPXI-SDAQ-4-500K-5Y-EW	1-year factory warranty extended to 5 years from date of shipment
TRN-RCMI-1-C	Course: Integrating Mixed Instruments with a Single Software Interface

1.888.KEITHLEY (U.S. only)
www.keithley.com

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Pin Assignments

CH0+	1	35	CH0–
CH1+	2	36	CH1–
CH2+	3	37	CH2–
CH3+	4	38	CH3–
EXTATRIG	5	39	AIGND
DA1OUT	6	40	AOGND
DA0OUT	7	41	AOGND
AOEXTREF	8	42	AOGND
SDI3_1/NC*	9	43	SDI3_0/NC*
SDI2_1/NC*	10	44	SDI2_0/NC*
SDI1_1/NC*	11	45	SDI1_0/NC*
SDI0_1/NC*	12	46	SDI0_0/NC*
AO_TRIG_OUT	13	47	EXTWFTRG
AI_TRIG_OUT	14	48	EXTDTRIG
GPTC1_SRC	15	49	DGND
GPTC0_SRC	16	50	DGND
GPTC0_GATE	17	51	GPTC1_GATE
GPTC0_OUT	18	52	GPTC1_OUT
GPTC0_UPDOWN	19	53	GPTC1_UPDOWN
EXTTIMEBASE	20	54	DGND
AFI1	21	55	AFI0
PB7	22	56	PB6
PB5	23	57	PB4
PB3	24	58	PB2
PB1	25	59	PB0
PC7	26	60	PC6
PC5	27	61	PC4
DGND	28	62	DGND
PC3	29	63	PC2
PC1	30	64	PC0
PA7	31	65	PA6
PA5	32	66	PA4
PA3	33	67	PA2
PA1	34	68	PA0

* Pins 9–12 and pins 43–46 are SDI0–SDI3 on KPXI-SDAQ-4-2M, NC on KPXI-SDAQ-4-500K

Use KDAQ-DRVR Windows® device driver for all programming languages. LabVIEW users should additionally install the KI-DAQ LabVIEW driver. Both drivers are on the KPXI software CD included with the module.

Specifications

ANALOG INPUT

RESOLUTION: **KPXI-SDAQ-4-2M**: 14 bits.
KPXI-SDAQ-4-500K: 16 bits.

NUMBER OF CHANNELS: 4 simultaneous-sampling channels with differential input.

MAXIMUM SAMPLING RATE: **KPXI-SDAQ-4-2M**: 2MS/s.
KPXI-SDAQ-4-500K: 500kS/s.

PROGRAMMABLE GAIN: 1, 2, 4, 8.

BIPOLAR INPUT RANGES: ±10V, ±5V, ±2.5V, ±1.25V.

UNIPOLAR INPUT RANGES: 0–10V, 0–5V, 0–2.5V, 0–1.25V.

OFFSET ERROR: **KPXI-SDAQ-4-2M**: ±3mV.
KPXI-SDAQ-4-500K: ±1mV.

GAIN ERROR: **KPXI-SDAQ-4-2M**: ±0.03% of reading.
KPXI-SDAQ-4-500K: ±0.015% of reading.

INPUT COUPLING: DC.

OVERVOLTAGE PROTECTION: **Power On:** Continuous ±35V.
Power Off: Continuous ±15V.

INPUT IMPEDANCE: 1GΩ/100pF.

CMRR (gain = 1): 85dB.

–3dB SMALL SIGNAL BANDWIDTH (gain = 1):
KPXI-SDAQ-4-2M: 1MHz.
KPXI-SDAQ-4-500K: 700kHz.

TRIGGER SOURCES: Software, external digital/analog trigger, PXI trigger bus.

TRIGGER MODES: Pre-trigger, post-trigger, middle-trigger, delay-trigger, and repeated trigger.

FIFO BUFFER SIZE: **KPXI-SDAQ-4-2M**: 8k samples.
KPXI-SDAQ-4-500K: 512 samples.

DATA TRANSFERS: Polling, scatter-gather DMA.

ANALOG OUTPUT

NUMBER OF CHANNELS: 2 voltage outputs.

RESOLUTION: 12 bits.

OUTPUT RANGES: 0–10V, ±10V, 0–AOEXTREF, ±AOEXTREF.

MAXIMUM UPDATE RATE: 1µs.

SLEW RATE: 20V/µs.

SETTLING TIME: 5µs to ±0.5 LSB accuracy (10%–90%).

OFFSET ERROR: ±3mV.

GAIN ERROR: ±0.02% of output value.

DRIVING CAPACITY: ±5mA.

STABILITY: Any passive load, up to 1500pF.

TRIGGER SOURCES: Software, external digital/analog trigger, PXI trigger bus.

TRIGGER MODES: Post-trigger, delay-trigger, and repeated trigger.

FIFO BUFFER SIZE: 2k samples.

DATA TRANSFERS: Programmed I/O, scatter-gather DMA.

DIGITAL IO

NUMBER OF CHANNELS: 24-CH 8255 programmable input/output.

COMPATIBILITY: 5V/TTL.

DATA TRANSFERS: Programmed I/O.

TIMER/COUNTER

NUMBER OF CHANNELS: 2.

RESOLUTION: 16 bits.

COMPATIBILITY: 5V/TTL.

BASE CLOCK AVAILABLE: 40MHz, external clock up to 10MHz.

AUTO CALIBRATION

ON-BOARD REFERENCE: +5V.

TEMPERATURE DRIFT: ±2ppm/°C.

STABILITY: ±6ppm/1000 hrs.

GENERAL SPECIFICATIONS

DIMENSIONS: 160mm × 100mm (6.3 in × 3.9 in) (not including connectors).

CONNECTOR: 68-pin VHDCI female.

OPERATING TEMPERATURE: 0 to 55°C.

STORAGE TEMPERATURE: –20 to 80°C.

HUMIDITY: 5% to 95%, non-condensing.

POWER REQUIREMENT:
KPXI-SDAQ-4-2M: +5V 1.82A typical.
KPXI-SDAQ-4-500K: +5V 2.04A typical.

EMC: Conforms to European Union Directive 89/336/EEC, EN 55022, EN 55024.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN 60950.

Note: To calculate accuracy of analog I/O channels use the following formulas.

For 12-bit functions:

Allowable error = (<Expected Reading> · <Gain Error>) + (<Offset Error>) + (1 LSB V)

1 LSB V = (<Range Max V> – <Range Min V>) / 4095

For 14-bit functions:

Allowable error = (<Expected Reading> · <Gain Error>) + (<Offset Error>) + (1 LSB V)

1 LSB V = (<Range Max V> – <Range Min V>) / 16383

For 16-bit functions:

Allowable error = (<Expected Reading> · <Gain Error>) + (<Offset Error>) + (1 LSB V)

1 LSB V = (<Range Max V> – <Range Min V>) / 65535

Take the absolute value of each term before adding them together. Additionally, if the module has been autocalibrated, consider the effects of the onboard reference stability and temperature drift on overall accuracy.