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Racal Instruments™ 6062

OBSOLETE

8-Channel A/D and D/A Module

The Racal Instruments™ 6062 VXIbus precision A/D and D/A module provides versatility, configurability, and precision in a single-slot, C-sized module.

The unique design of the 6062 allows the configuration of a 4- or 8-channel instrument with mixed A/D and D/A inputs and outputs, independently or synchronously triggered.

Key Features

- **Unique combination of digitizer and waveform generator**
- **Message and pseudo-register based control**
- **Up to eight channels in a single-slot with 16-bit resolution**
- **Sample rate with options to 250 ks/S (A/D) or 2.5 MS/s (D/A)**
- **128 K samples per channel or 64 k samples per channel with 576 k samples on one channel**
- **Built-in waveforms: Sine, Square, Triangle, Ramp, and the two user-defined waveforms**

Product Information

High-Speed and Ease-of-Use

The 6062 can be programmed using SCPI messages. It also can be controlled at the pseudo-register level, providing response times of several microseconds for high-speed system throughput.

The unique multi-timer design allows independent control of each channel, providing versatility and flexibility. The 16-bit precision I/O, configurability options, and multi-timer design provide the 6062 with the capabilities necessary to perform high-performance data acquisition and control.

The 6062's memory configurations allow it to be used in a wide variety of applications. Each channel has enough memory to store 64 k points of data. The extended memory enables the 6062 to be configured with 576 k points behind a single channel or 128 k points each for four channels. This, coupled with 2- or 4-wire capability on the D/A and differential or single-ended inputs on the A/D, provides a unique combination not found on any other product.

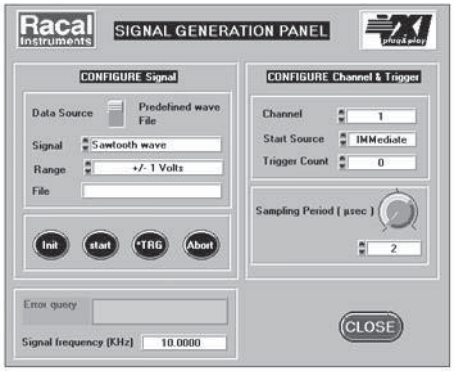
The 6062 comes complete with VXI*plug&play* drivers and SCPI compatibility.

Flexible Triggering Capability

The 6062's triggering scheme allows A/D or D/A channels to be triggered independently or synchronously in groups of two to four channels. D/A channels may be triggered to run continuously or in bursts of 1 k to 64 k waveforms. A/D and D/A channels also have independent trigger outputs that can be used for inter-channel triggering to generate complex waveforms. The standard model is triggered with a gate (on/off) signal, and Option 10 adds edge triggering.

Waveforms

Built-in waveforms allow the 6062 to be used as a function generator capable of generating sine, triangle, sawtooth, and ramp waveforms.



Waveform Generation Screen from the VXIplug&play Soft Front Panel

Built-in Waveforms

Built-in waveforms generate signals with frequencies up to 50 kHz and square waves up to 25 kHz with selectable amplitudes. In addition, two user-defined signals may be specified (and stored in flash ROM) describing an arbitrary waveform using the sum of Fourier coefficients.

Arbitrary Waveforms

Waveforms can be loaded from a file or test program to create standard or arbitrary waveforms. For example, instead of using the built-in 50-point square wave, a 6-point square wave may be loaded to generate a higher maximum frequency.

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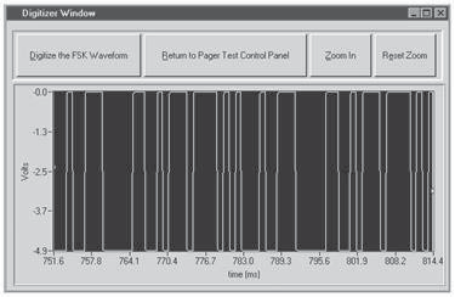
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Product Information continued

Pictured below is a digital waveform that creates a pager signal.



6062 Used to Digitize an FSK Pager Waveform, from "Pager" Whitepaper

As another example, LabVIEW™ may be used to add noise to a standard sine waveform, and this may be loaded into waveform memory using the LabVIEW™ driver.

Extensive Waveform Management Utilities

Managing input and output waveforms is easy with the 6062's rich set of commands for manipulating data stored in the A/D and D/A waveform memory. A/D and D/A waveform trace data can be re-sized, moved, or modified with built-in SCPI commands. In addition, data may be transferred in ASCII format enabling import and export from spreadsheets or waveform creation/analysis software.

Real Time Data Transfer

Using the 6062's Shared Memory Mode register and direct VXIbus access, the user can update D/A waveform memory or download A/D trace memory in real-time. VXIbus interrupt control allows the memory buffer to be updated even while the 6062 is generating a waveform. Wheel speed simulation (e.g., for ABS control testing) is performed with real-time data transfer to four 6062 D/A channels.

Isolated Output and Gain Control

The 6062B-4-06 provides four channels of 750 V isolated, differential outputs with a maximum output voltage of 50 V_{pk-pk}. You can source or sink up to 50 mA of current from each output. Isolated outputs are useful for ground loop elimination or whenever there is a requirement to connect a signal to a device which is "floating" with respect to ground. The S2 Option is available to extend this to 80 V_{pk-pk}. For the S2 option, all channels are isolated from ground but share a common isolation ground in pairs.

In addition, the output level of each 6062 channel is independently controlled by a gain control circuit with 12-bit resolution. This makes each output of the 6062B-4 into an independent, 16-bit arbitrary waveform generator.

Specifications

Note: The Astronics Test Systems policy is one of continuous development and improvement. Consequently, the equipment may vary in detail from the description and specifications in this publication.

Analog Outputs

Output Modes
- 2-wire or 4-wire

Built-in Waveforms
- Sine: 100 mHz to 50 kHz
- Sawtooth: 100 mHz to 50 kHz
- Square: 250 mHz to 125 kHz
- Triangle: 100 mHz to 50 kHz
- Ramp: 100 mHz to 50 kHz

Selectable Amplitudes

0 to 1 V	5 V to 5 V
1 V to 1 V	0 to 10 V
0 to 5 V	10 V to 10 V

User Waveforms (2)
- Sum of 10 sine and cosine terms

Resolution
- 16 bits

Monotonicity
- 14 bits

Voltage Range
- ±10 V

Integral Non-linearity
- ±0.006% FSR

Differential Non-linearity
- ±0.006% FSR

Accuracy (at 23° C ±2° C)
- ±(0.01% FSR + 1 mV)

Temperature Coefficient
- ±(0.002% FSR + 0.1 mV)/° C

Settling Time
- 10 µs to 0.1%, 50 µs to 0.01%

Small Signal Bandwidth
- >200 kHz

Sample Rate
- Standard: 1 to 500 k samples/s
- Option 3: 10 to 2.5 Ms/s

Slew Rate
- >5 V/µs

Ripple Voltage
- 2 mV_{rms}, 5 mV_{pk-pk}

Output Resistance
- <2 Ω in 2-wire mode
- <0.2 Ω in 4-wire mode

Maximum Output Current
- 20 mA/channel

Analog Outputs
(With 6062B-4-06-Isolation & Gain Control)

Max Number of Channels
- Four

Output Type
- Differential

Isolation
- 750 V_{rms}, chan-chan, chan-gnd

Output Level
- 50 V_{pk-pk}, max

Bandwidth
- DC to 10 kHz

Slew Rate
- 2 V/µs

Offset Error
- ±10 mV

Offset Thermal Drift
- ±300 µV/ C

Gain (Full Scale)
- 2.5

Gain Resolution
- 12 bits

Gain Accuracy
- ±0.1%

Gain Thermal Drift
- ±20 ppm/ C

Output Current (per channel)
- ±50 mA, max

Linearity Error
- 0.02%, max

Settling Time to 0.1%
- 60 µs

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Specifications continued

Short Circuit Protection
- Continuous

Capacitive Load
- 3.3 nF, max

S2 Opt. Analog Outputs

Max Number of Channels
- 4 (6064-4) or 6 (6064-8)

Output Type
- Isolated in pairs and from ground

Isolation
- 750V_{rms}, by channel pairs, chan-gnd

Output Level
- 80 V_{pk-pk} max. @ 50 mA

Ripple Voltage (20 Hz to 20 MHz)
- 30 mV_{rms}, 200 mV_{pk-pk}

Channel to Channel Crosstalk
- <-40 dB at 10 kHz

Bandwidth
- DC to 20 kHz Full Power Bandwidth
- DC to 50 kHz Small Signal Bandwidth

Slew Rate
- 2 V/ms

Offset Error (23° C ±2° C)
- ±10 mV

Offset Thermal Drift
- ±1 mV/° C typ

Gain (Full Scale)
- 0 to 2.5

Gain Resolution
- 12-bits

Gain Accuracy
- ±15 mV

Gain Thermal Drift
- +2 mV/° C max

Output Current
- ±50 mA max

Linearity Error
- ±15 mV

Settling Time to 0.1%
- 50 ms

Short Circuit Protection
- Continuous

Capacitive Load
- 3.3 nF max

Analog Inputs

Input Modes
- Differential or Single Ended

Maximum Common Mode Voltage
- ±10 V

Resolution
- 16 bits

No Missing Codes
- 15 bits

Voltage Range
- ±10 V

Integral Non-linearity
- ±0.005% FSR

Differential Non-linearity
- ±0.005% FSR

Accuracy (at 23° C ±2° C)
- ±(0.01% FSR ±1 mV)

Temperature Coefficient
- ±0.002% FSR +0.1 mV/° C

Input Impedance
- 10 MΩ//100 pF

Over Voltage Protection
- 250 VDC or rms (50/60 Hz)

Small Signal Bandwidth
- >200 kHz

Sample Rate
- Standard: 1 k to 100 k samples/s
- Option 5: 10 k to 250 k samples/s

DC CMRR
- 80 dB

AC CMRR (50/60 Hz)
- 70 dB

Triggering Characteristics

Types
- Standard: Gate
- Option 10: Rising Edge

Sources
- External: front panel connector
- VXI backplane: TTLTRG0-7

External Trigger Inputs (50 Ω, TTL)
- One/channel
- Start/stop Logic

External Trigger Outputs (per channel)
- One start/stop Logic
- One configurable to trigger with the sample clock, at the halfway point of memory or at the end of each waveform cycle.

Modes
- Immediate: One waveform cycle is input or output.
- Continuous: Sampling is controlled by a start/stop command or trigger.
- Burst: 1 k to 64 k waveforms.
- Synchronous Trigger: Trigger 1 to 4 channels simultaneously.
- Independent Trigger: Trigger a channel by itself.

Minimum Trigger Pulse Width
- 100 ns

Trigger Output Transition Time
- <100 ns

Over Voltage Protection
- 100 VDC

Waveform Memory

Access Modes
- Message Based Mode: ASCII, Hex, or binary data
- Shared Memory Mode: DMA (binary data)

Channel Memory
- 128 k-points/channel or 576 k-points on one channel (the rest are 64 k)

Shared Memory Transfer Rate (max)
- 5 Mb/s

External Clock Input

Input Impedance
- >10 kΩ

Over voltage Protection
- 100 VDC or rms

Frequency Range
- 10 Hz to 16 MHz

Minimum Amplitude
- 3 V_{pk-pk} (square wave)

Reference Input

Input Impedance
- 100 kΩ

Level
- 10 V ±1%

Over-voltage Protection
- 100 VDC or rms

Reference Output

Accuracy (at 23° C ±2° C, I_{out}=1 mA)
- ±0.1%

Temperature Coefficient
- 50 ppm/° C

Maximum Current Output
- 20 mA

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Specifications continued

Interface

Device Type
- VXIbus Message-Based
- Alternate Control: Pseudo-register-based

Compatibility
- VXIbus Rev. 1.4

VXIbus Protocol
- Word serial protocol
- Shared memory capability

Execution Time in Interactive Mode
- <5 ms per channel

Input/Output Connector Type
- Positronic SGMC, 20 pins

Trigger Connector Type
- Positronic SGMC, 26 pins

Power Requirements
- Total Power: <39 W

	+24 V	+5 V	-24 V
I_{Pm}	0.92 A	2.6 A	0.42 A
I_{Dm}	0.32 A	0.5 A	0.32 A

Self-Test Coverage
- 90% at 25° C

Software

Languages
- Native: SCPI

Drivers
- LabVIEW, LabWindows™/CVI, VXI*plug&play* support for frameworks based on Microsoft Win32® application programming software

Environmental

Operating Temperature
- 10° C to 50° C

EMC
- Tested to the requirements of: EN55022-B, EN 50082-1EMC

Mechanical

Dimensions
- C-size, Single-Slot VXIbus Module

Weight
- 3.25 lb (1.5 kg)

Cooling
- 4 l/s, 0.5 mm H_20

CE The CE Mark indicates that the product has completed and passed rigorous testing in the area of RF Emissions and Immunity to Electromagnetic Disturbances, and complies with European electrical safety standards.

Ordering Information

33-1070-VWXYZ : Racal Instruments™ 6062A (Obsolete)
4-Channel Analog Input/4-Channel Analog Output Module

33-1071-VWXYZ : Racal Instruments™ 6062B-4 (Obsolete)
4-Channel Analog Output Module

33-1072-VWXYZ : Racal Instruments™ 6062B-8 (Obsolete)
8-Channel Analog Output Module

33-1073-VWXYZ : Racal Instruments™ 6062C-4 (Obsolete)
4-Channel Analog Input Module

33-1074-VWXYZ : Racal Instruments™ 6062C-8 (Obsolete)
8-Channel Analog Input Module

33-1075-VWXYZ : Racal Instruments™ 6062B4-06 (Obsolete)
4-Channel Analog Output w/50 V_{pk-pk} Programmable Isolation Amplifiers

33-1075-VWXYZS2 : Racal Instruments™ 6062B4-S2 (Obsolete)
4-Channel Analog Output w/50 V_{pk-pk} Programmable Isolation Amplifiers

Maximum Option Mix

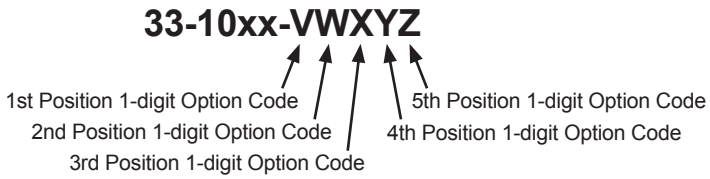
Option	3	5	10
Model	**D/A 2.5 MS/s**	**A/D 250 kS/s**	**Edge Trigger**
6062A	1	1	1
6062B-4	1	0	1
6062B-8	1 or 2	2	
6062C-4	0	1	0
6062C-8	0	2	0
6062B-4-06	1	0	1

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Ordering Information

continued

Expansion Memory Configurator (now included as standard on all 6062 modules)



Directions: Construct the expansion memory part number by first choosing the module you need (from the previous page) and then substituting the Option Code from the table below for the "VWXYZ" in ascending numerical order in the part number configurator above.

Option	Option Code	Description
Opt 3	3	Four 2.5 MS/s D/A Channels (Replacing Four Standard Channels)
Opt 5	5	Four 250 kS/s A/D Channels (Replacing Four Standard Channels)
Opt 10	A	Edge-Triggering Option

Part Number Ordering Examples:

33-1070-3000	6062A with 4-Channel Input/Output Module with 2.5 MS/s D/A
33-1075-00000	6062B-4-06 with 4-Channel Output Module with Isolation and Gain Control Amplifiers
33-1073-A0000	6062C-4 with 4-Channel Input Module with Edge Triggering

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