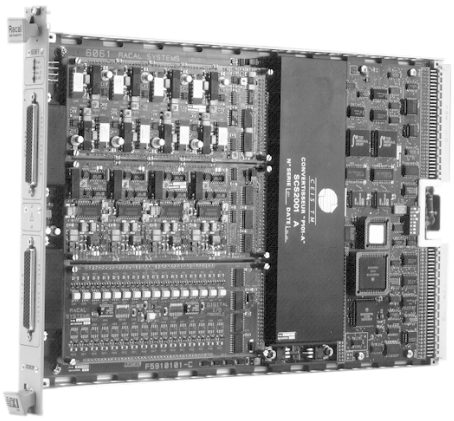
**Racal Instruments**
http://www.racalinstruments.com

# PRODUCT INFORMATION

# New and Improved Isolated A/D & D/A Module with Digital I/O Model 6061



- **Unique Combinations of Analog and Digital Channels**
- **12-Bit Resolution on Analog Channels**
- **16 Isolated Input/Output Channels**
- **32 Digital Channels**
- **Message-Based, SCPI Compatible**
- **Now with 512 kB Internal Trace Memory**

The 6061 provides a unique combination of analog and digital channels in a single-slot, C-size VXIbus module. All 6061 inputs and outputs are isolated from system (VXI) ground.

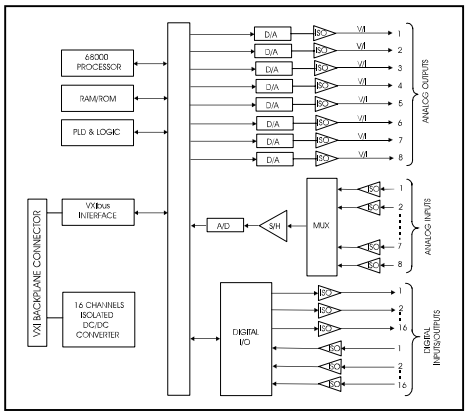
**Multiple Configurations**
The modular design concept of the 6061 Series offers different configurations with different types of inputs and outputs, analog or digital, enabling them to cover a wide range of applications.

**Isolated Channels**
The 6061 provides analog channels with 750 V of isolation between channels and between each channel and ground.

**Triggering Capability**
Triggering can be accomplished via the VXIbus TTLTRG lines, two external trigger lines, by SCPI command or by an internal timer. The internal programmable timer is used to control the timing on each channel. Additional triggering capability allows the analog output channels to be used as multi-channel arbitrary waveform generators at sample rates of up to 14 kS/s. The analog input channels also can serve as digitizers at up to 11 kS/s.

**Powerful Waveform Memory Capability**
The internal memory with trace mode capability allows the user to replace several low frequency arbitrary function generators. The module's newly enhanced 512 kBytes of internal memory can be used to generate signals on the analog or digital outputs or to store measured data from the analog or digital inputs. The user can easily define the size and name for each channel using SCPI commands. Arbitrary waveforms stored in memory can program the outputs to fluctuate, simulating voltage ripple. This is useful when testing power supplies for line regulation.

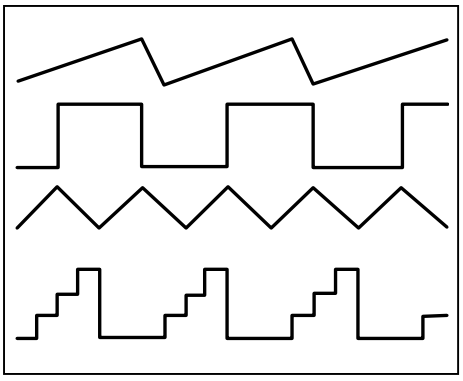
The 6061A versions include eight analog output channels, eight analog input channels, and 32 digital input/output channels. Other configurations provide either 16 analog inputs or 16 analog outputs (rather than eight of each).




*6061A Block Diagram*

## Self-Test

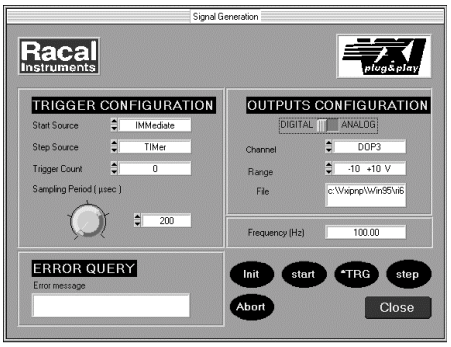
An internal self-test gives the user a high level of confidence that the module is completely functional. The self-test covers all channels, analog and digital. This feature is very important for test system applications.



*Example Output Waveforms*

## SCPI Capability

The 6061 are message-based VXIbus modules, fully compatible with Revision 1.4 of the VXIbus Specification. In addition, these modules can be programmed using SCPI compatible commands.

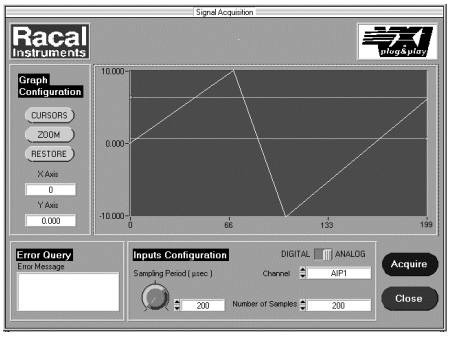



*Example Signal Generation Screen from the VXIplug&play Driver Soft Front Panel*

## Automotive Industry Applications

The combination of digital and analog channels in one module make the 6061 useful for the production test of automotive components and related equipment.

An important application uses the 6061 to simulate inputs and outputs of automotive Engine Control Units (ECU's) where the analog outputs are used as multiple low-frequency and DC function generators. The analog inputs provide verification of control signals. The digital I/O channels control the ECU and read back status. For example, a fuel injection computer must control the opening of the mixing chamber, engine rotation, oil pressure, temperature and battery voltage. To simulate these signals, D/A outputs are used, and the A/D inputs are used to measure the signals generated by the unit under test.




*Example Signal Acquisition Screen from the VXIplug&play Driver Soft Front Panel*

| Model | Isolated Inputs/Outputs | Digital Channels Input/Outputs | Analog Inputs | Analog Outputs |
|---|---|---|---|---|
| 6061A | Yes | 32 | 8 | 8 |
| 6061B | Yes | 32 | - | 16 |
| 6061C | Yes | 32 | 16 | - |

# MODEL 6061 SPECIFICATIONS

## ANALOG OUTPUT CHARACTERISTICS

**Number of Channels**
- A Model: 8
- B Model: 16
- C Model: 0

**Scan Rate**
- 16 Channels: >2.7 kHz
- 8 Channels: >4.7 kHz
- 1 Channel: >14 kHz

**Resolution**
- 12 bits

**Accuracy (23° C ± 5° C)**
- Standard: ±(0.1% FSR + 0.3 mV)
- Option 03: ±(0.2% FSR + 2 μA)

**Linearity**
- 0.1% FSR

**Ranges**
- Standard: 1 V, 5 V, 10 V, ±1 V, ±5 V, ±10 V
- Option 3: 2 mA, 10 mA, 20 mA

**Temperature Coefficient**
- Standard: (0.02% FSR + 0.2 mV)/° C
- Option 3: (0.04% FSR + 0.4 μA)/° C

**AC Rejection**
- 80 dB (50/60 Hz)

**Peak Noise** (20 Hz to 20 MHz)
- Standard: 10 mV
- Option 3: 100 μA

**Leakage Current**
- 10 μArms

**Slew Rate**
- 0.1 V/μs

**Settling Time** (±1% of setting)
- 50 μs

**Maximum Output Loading**
- Standard: 20m A (35° C)
- Option 3: 300 Ω

**Output Impedance**
- Standard: <2 Ω
- Option 3: 50 kΩ

**Isolation Voltage**
- 750 Vrms (50/60 Hz)

## ANALOG INPUT CHARACTERISTICS

**Number of Channels**
- A Model: 8
- C Model: 16
- B Model: 0

**Scan Rate**
- 16 Channels: >2.5 kHz
- 8 Channels: >4.3 kHz
- 1 Channel: >11 kHz

**Resolution**
- 12 bits

**Accuracy (23° C ± 5° C)**
- ±10 V Range: ±0.1% FSR
- All Other Ranges: ±0.15% FSRRanges
- 1 V, 5 V, 10 V, ±1 V, ±5 V, ±10 V

**Temperature Coefficient**
- (0.02% FSR + 0.5 mV)/° C

**Linearity**
- ±10 V, 10 V Ranges: 0.03% FSR
- All Other Ranges: 0.05% FSR

**AC Rejection**
- 70 dB (50/60 Hz)

**Digitization Noise**
- Standard: ±(0.05%+5 mV)

**Over-Voltage Protection**
- 250 Vrms (50/60 Hz)

**Leakage Current**
- 10 μArms

**Slew Rate**
- 0.1 V/μs

**Input Impedance**
- 1 MΩ || 1 nF

**Isolation Voltage**
- 750 Vrms (50/60 Hz)

## DIGITAL I/O CHARACTERISTICS

**Types**
- Standard: Current Receiver Inputs, Open Collector Outputs
- Option 2: TTL Inputs/Outputs

**Number of Channels**
- Standard: 16 Input, 16 Output
- Option 2: 32 Input/Output (Software Configurable)

**Scan Rate**
- 16 Channels: >2.7 kHz
- 8 Channels: >5 kHz
- 1 Channel: >16.6 kHz

**Open Collector Outputs**
- $I_{sink}$ (max): 50 mA
- $V_{pullup}$ Range: 3 V to 35 V
- Slew Rate: >0.5 V/μs

**Current Receiver Inputs**
- $V_{pullup}$ Range: 3 V to 35 V
- $I_{in}$ (max): 5 mA (regulated)
- $V_{IL}$ (max): 2 V

**TTL Outputs (Option 2)**
- $I_{OH}$ (max): -0.1 mA
- $I_{OL}$ (max): +20 mA
- $V_{OL}$: 0.6 V ($I_{OL}$ = +5 mA)
- $V_{OH}$: 2.4 V ($I_{OH}$ = -50 μA)
- Fanout: 10 ALS TTL Loads
- Transition Time: <50 ns

**TTL Inputs** (Option 2)
- $V_{in}$ (max): 5.5 V
- $V_{th}$: >2 V
- $V_{IL}$: <0.8 V
- $I_{OH}$: 20 μA (Vin = 2.7 V)
- $I_{OL}$: -0.1 mA (Vin = 0.4 V)

**Isolation Voltage**
- Standard: 750 Vrms (50/60 Hz)
- Option 2: Ground Referenced

## TRIGGERING CHARACTERISTICS

**Sources**
- TTLTrg0-7
- *TRG (Word Serial)
- Trigger Timer
- External Trigger (two)

**Modes**
- Immediate: Trigger immediately.
- Ecount: Number of trigger events to be counted before a cycle occurs.
- Count: Number of cycles to occur per trigger event.

**Trigger Timer Period Range**
- 8 μs to 2.2 min.

## WAVEFORM MEMORY

**Access Formats**
- ASCII, Hexadecimal, Binary

**Channel Memory**
- Increased to 512 kB (formerly Option 04)

**Memory Format**
- Segmentable
- Linkable to Each Output
- User Defined Length

## FRONT PANEL I/O

**Analog I/O**
- 78-Pin Hi-Density D-Sub, female
- 32 Analog Input and/or Analog Output Pins

**Digital I/O**
- 78-Pin Hi-Density D-Sub, female
- 32 Digital I/O Channels
- External Trigger Inputs (two)
- Trigger Output (TTL)

## VXIbus INTERFACE DATA

(Single-slot, C-sized, VXIbus Rev. 1.4)

**Drivers**

LabVIEW, LabWindows/CVI, VXI*plug&play* (WIN95/98/NT/2000)
For driver updates, please refer to www.racalinstruments.com.

**Native Language**

SCPI

**Backplane Signal Support**

TTLTrg0-7: Trigger Event Input, Sync Output

**Self-Test**

65% @ 25° C

**Status Lights**

Red: Failed
Green: Analog I/O Board #1 Enabled
Yellow: Analog I/O Board #2 Enabled
Green: Digital I/O Enabled

**Cooling** (10° C Rise)

4.0 l/s @ 0.5 mm $H_2O$ Peak

Current & Power Consumption

| | +24 | +5 | -24 |
|---|---|---|---|
| $I_{Pm}$ (A) | 1.67 | 1.85 | 0.33 |
| $I_{Dm}$ (A) | 0.38 | 0.41 | 0.19 |

Total Power: 57 W

## ENVIRONMENTAL

**Temperature**

Operating: 0° C - 50° C

Weight

5.5 lb. (2.5 kg)

**MTBF** (@ 25° C)

56,000 hrs.

**EMC** (Council Directive 89/336/EEC)

EN55022-B, EN50082-1

**Safety** (Low-Voltage Directive 73/23/EEC)

EN6010-1, IEC1010-1, UL3111-1, CSA 22.2#1010

| ORDERING INFORMATION | | |
|---|---|---|
| **Model** | **Description** | **Part Number** |
| 6061A | 8-Channel A/D, 8-Chanel D/A, 32-Channel Digital I/O, Isolated | 33-1020-WXYZ |
| 6061B | 16-Channel D/A, 32-Channel Digital I/O, Isolated | 33-1021-WXYZ |
| 6061C | 16-Channel A/D, 32-Channel Digital I/O, Isolated | 33-1022-WXYZ |
| Option 02 | TTL Digital I/O (open collector) | 2 (added to P/N) |
| Option 03 | Current D/A Outputs (A/B models only) | 3 (added to P/N) |
| Where WXYZ are the options in ascending numerical order. Unused digits are zero. | | |

Note: Option 04 (256 kB additional memory) is now included in the standard Model 6061.

For driver updates, please refer to www.racalinstruments.com.

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



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