



## SIGNAL PROCESSING

# Multiport II™

*Multichannel Analyzer*

The Multiport II module is a double width NIM intended for use where existing amplifier and HVPS modules are to be combined with a high analog performance, low-cost ADC/MCA.



## FEATURES

- Up to six independent Multichannel Analyzers (in-the-field customer upgradable)
- Each MCA fully computer controlled
- 16K ADC, 1  $\mu$ s fast fixed conversion time with linearization enhancement circuit for excellent non-linearity
- Fully buffered memory allowing simultaneous ADC memory write and spectrum transfer to host computer
- PHA and MCS acquisition modes
- Full I/O control (including sample changer)
- On-board data backup
- Suitable for HPGe, NaI(Tl), CdTe, PIPS®, X-PIPS™ and other detector technologies
- Communications interface: Ethernet/USB
- Fully supported by Genie™ 2000 software

## DESCRIPTION

The Multiport II MCA module provides greater flexibility than traditional bus plug-in boards but at a comparable cost. It can be purchased in versions from one to six inputs. Units with fewer than six inputs can be field upgraded with additional inputs.

The Multiport II module is easy to install and easy to link. Host computer interfacing is accomplished via a standard USB port or a standard Ethernet port (unshielded twisted pair) and through standard protocols. These widely recognized interfaces make the unit compatible with a wide range of computer platforms. Also, multiple Multiport II units can be totally remote-controlled from a single computer. Furthermore, there is only one cable between the host computer and the Multiport II NIM module for simplicity of inter connection.

## Multiport II | MULTICHANNEL ANALYZER

The Multiport II MCAs are suitable for use with a wide range of radiation detectors. Selecting a proper preamplifier, amplifier and high voltage power supply, makes the unit compatible with NaI(Tl), HPGe, SiLi, CdTe, ion implanted, plastic scintillation, BGO and other detector technologies. Modular NIM packaging makes it easy to reconfigure systems as needs change or as new technologies become available.

The use of parallel processing technique results in an effective zero time to “add one” in memory, resulting in a fast conversion time. Furthermore, the on-board implementation of the sliding scale method improves the linearity and the channel uniformity. To protect long collections from power failure, the Multiport II unit features on-board data and settings retention at fixed time intervals for each of its MCAs.

Each Multiport II MCA provides full I/O support, including Mirion standard PUR/LTC, sample changer synchronization and advanced PHA operations.

For more flexibility and more applications, both Pulse Height Analysis (PHA) and Multichannel Scaling (MCS) modes of operation are supported. In MCA mode, a single channel analyzer (SCA) is also available as well as input/output that allows acquisition to be synchronized by external modules.

SCA output works in both modes, PHA and MCS. In MCS mode, SCA pulses may also be selected as input pulses. The maximum input rate is 10 MHz in TTL input mode.

### ADC INPUT

- ADC IN: Accepts positive unipolar or bipolar, positive lobe leading, pulses for PHA and MCS (Internal Pulse Source); amplitude 0 to +10 V or 0 to +5 V, switch selectable; rise time >0.25  $\mu$ s; width >0.5  $\mu$ s;  $Z_{in}$  = 1.33 k $\Omega$  (10 V range) or 2 k $\Omega$  (5 V range); direct coupled; front and rear panel BNCs, one pair per MCA.

### LOGIC INPUTS

Rear panel mini-D I/O connectors for logic input and output signals, one per MCA.

- XINPUT: External start/stop and sample changer ready input; active high, active low setting; 10 k $\Omega$  pull-up to 5 V; TTL pulse; pin 1 of the I/O connector.
- XSUSPEND: Suspends pulse processing and preset counters; fixed active low; 10 k $\Omega$  pull-up to +5 V; TTL pulse; pin 3 of the I/O connector.
- XDT: PUR dead time input; active high, active low setting; forced to inactive state by 1 k $\Omega$  pull-up to +5 V or pull-down to GND when no signal is present; TTL pulse; pin 5 of the I/O connector.
- XMCSRESTART: MCS sweep advance input; active high, active low setting; edge triggered; 10 k $\Omega$  pull-up to +5 V; TTL pulse; pin 10 of the I/O connector.

- XMCSADVANCE: External channel advance input; active high, active low setting; edge triggered; duration  $\geq$ 10 ns; max. rate 1 MHz; 10 k $\Omega$  pull-up to +5 V; positive TTL pulse; pin 11 of the I/O connector.
- XMCSPULSE: MCS input; active high, active low setting; edge triggered; duration  $\geq$ 10 ns; rate  $\leq$ 10 MHz; 10 k $\Omega$  pull-up to +5 V; positive TTL pulse; pin 12 of the I/O connector.
- XCOINC: Coincidence/Anticoincidence input; active high, active low setting; edge triggered, level sensitive selection; forced to inactive state by 1 k $\Omega$  pull-up to +5 V or pull-down to GND when no signal is present; TTL pulse; pin 13 of the I/O connector.
- XREJ: Pileup reject input; must occur during the ADC linear gate (LG) time active high, active low setting; forced to inactive state by 1 k $\Omega$  pull-up to +5 V or pull-down to GND when no signal is present; positive TTL pulse; pin 14 of the I/O connector.

### LOGIC OUTPUTS

Rear panel mini-D I/O connectors for logic input and output signals, one per MCA.

- XOUTPUT: Advance sample changer output; active high, active low setting; 150 ms TTL pulse; pin 2 of the I/O connector.
- XSCA: Single channel analyzer output;  $\approx$ 250 ns TTL pulse generated for input pulses detected between LLD and ULD; active high; pin 4 of the I/O connector.
- XLG: PUR linear gate output; active when ADC acquires an input pulse; active high, active low setting; TTL pulse; pin 6 of the I/O connector.
- XCOLLECTSTATUS: External acquire status; active high, active low setting; TTL pulse; pin 9 of the I/O connector.
- +5 V: Power output for external circuitry; 100 mA max. per connector; pin 7 of the I/O connector.

### REAR PANEL CONTROL

- RESET: Resets the CPU and communication; stops any acquisition in progress; spectra and MCA status stored in flash memory not affected; rear panel pushbutton.

### INTERNAL CONTROLS

- ADC Input Range: Sets the ADC input range to 0–10 V (default) or 0–5 V; slide switch on the MCA board.
- Power Supply Voltage: Selects either  $\pm$ 12 V (default) or  $\pm$ 6 V; slide switch on the main board.

### SOFTWARE CONTROLS

- ADC LLD: 0 to 100% of full scale (4096 steps).
- ADC ULD: 0 to 110% of full scale (4096 steps).
- ADC Zero:  $\pm$ 2.5% of full scale (4096 steps).
- ADC Conversion Gain: 256, 512, 1024, 2048, 4096, 8192, 16 384.
- Real Time Preset: Maximum of  $\approx$ 49.71 days.
- Live Time Preset: Maximum of  $\approx$ 49.71 days.

# Multiport II | MULTICHANNEL ANALYZER

## INDICATORS

- MCA #n: ON when MCA board in slot #n is installed and power is ON; front panel green LED.
- ACQUIRE: ON when the corresponding MCA is acquiring; front panel green LED.
- RATE: Flashes for every input pulse processed in the corresponding MCA; front panel yellow LED.
- COMM: ON when unit is ready for USB and/or Ethernet communication; flashes brighter when data transfer occurs; front panel yellow LED.

## COMMUNICATION

- USB: Standard USB port; rear panel USB type-B connector.
- Ethernet: Ethernet port; rear panel RJ-45 connector.

## PERFORMANCE

- Integral Nonlinearity:  $<\pm 0.025\%$  of full scale over the top 99.5% of selected range.
- Differential Nonlinearity:  $<\pm 0.9\%$  of full scale over the top 99.5% of range including effects from differential nonlinearity.
- Gain Drift:  $<\pm 0.005\%$  of full scale/ $^{\circ}\text{C}$ .
- Zero Drift:  $<\pm 0.005\%$  of full scale/ $^{\circ}\text{C}$ .
- Long Term Drift:  $<\pm 0.005\%$  of full scale/24 h at a constant temperature.
- Peak Shift:  $<\pm 0.025\%$  of full scale at rates up to 100 kHz.
- ADC Dead Time: Linear gate time  $+1.2 \mu\text{s}$ .
- Channel Profile: Typically flat over 90% of channel width.

## MCS

- Input Rate: Up to 10 MHz.
- Dwell Time: Software selectable from  $1 \mu\text{s}$  to  $\approx 71 \text{ min}$ , with varying resolution in increments of  $1 \mu\text{s}$ .
- Sweep Selection: Software selectable preset sweeps from 1 to  $2^{32} - 1$ .
- Dead Time: Between channels: 0. Between sweeps: 0 for internal sweep restart, 0–40 ns for external sweep restart.
- Number of Channels: 16 384.
- Counts/Channel:  $2^{32} - 1$ .

## POWER

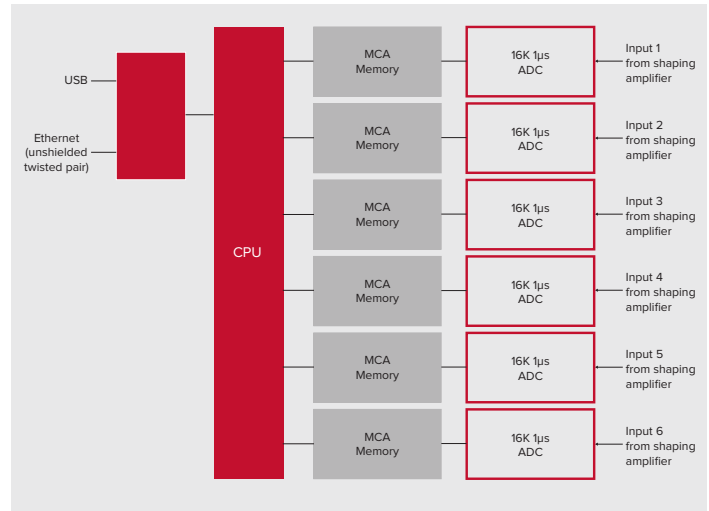
Depends on the setting of the internal control for Power Supply Voltage ( $\pm 12 \text{ V}$  or  $\pm 6 \text{ V}$ ):

### $\pm 12 \text{ V}$ Power Supply

- One MCA board:
  - $+12 \text{ V dc} - 250 \text{ mA}$      $-12 \text{ V dc} - 50 \text{ mA}$
- Each additional MCA board:
  - $+12 \text{ V dc} - 90 \text{ mA}$      $-12 \text{ V dc} - 50 \text{ mA}$

### $\pm 6 \text{ V}$ Power Supply

- One MCA board:
  - $+6 \text{ V dc} - 475 \text{ mA}$      $-6 \text{ V dc} - 50 \text{ mA}$
- Each additional MCA board:
  - $+6 \text{ V dc} - 150 \text{ mA}$      $-6 \text{ V dc} - 50 \text{ mA}$



## PHYSICAL

- Size: Standard double width NIM module 6.86 x 22.12 cm (2.70 x 8.71 in.) per DOE/ER-0457T.
- Net Weight: 1.36 kg (3.0 lb) with one MCA/ADC board.

## ENVIRONMENTAL

- Operating Temperature: 0–45  $^{\circ}\text{C}$ .
- Operating Humidity: 0–80% relative, non-condensing. Meets the environmental conditions specified by EN 61010, Installation Category I, Pollution Degree 2.

## SYSTEM REQUIREMENTS

- A PC-based system with a USB or Ethernet port.
- Model S500 Genie 2000 Basic Spectroscopy Software.

## ORDERING INFORMATION

- MP2-nE: Multiport II Ethernet/USB module with n inputs, where n is 1 to 6; includes one 3 m shielded USB cable.
- MPT2-MCA: One additional Multiport II MCA/ADC board.
- C1801: Multiport II PUR/LTC Cable (included with each MCA/ADC board).
- C1802: Multiport II PUR/LTC Start/Stop and Sample Changer Cable.
- C1804: Multiport II PUR/LTC and MCS Start/Stop Cable.

