

MCA2100R Gamma Spectrometer

Introducing The World's Most Advanced, Self-Contained Sodium Iodide Spectroscopy System!



- MCA, bias supply, amplifier, and preamplifier all in one small package
- Patented Quadratic Compression Conversion™ greatly improves performance
- Easy installation & setup
- Doesn't require internal slots or reserved memory
- Includes 32-bit QuantumMCA Software

PGT has incorporated the latest in modern electronics in the MCA2100R to provide a complete gamma spectrometer for NaI. The MCA2100R features a fast dual-mode ADC with two standard modes of operation—either as a standard 1000 channel MCA in linear mode, or as a 512 channel MCA in QCC™ mode.

What is QCC?

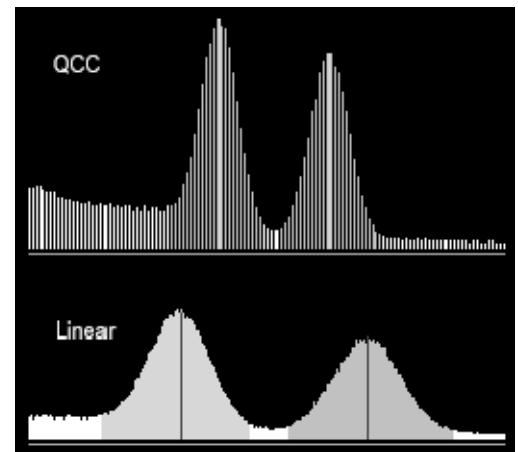
QCC is Quadratic Compression Conversion™. It is PGT's patented signal processing technique that delivers spectra with uniform channel peak widths from 20-2000 keV. This powerful technique employs a pulse processing algorithm that converts a 16k spectrum to a 512 channel spectrum in real time. The peak-to-background ratio of the converted spectrum is significantly improved by using energy channels where they are needed the most. Consequently, the resolving power of the system is greatly improved.

In the figure to the right, the lower peaks are from a conventional 1000-channel linear spectrum of Co60. These are the 1173 keV and 1333 keV peaks. Notice how the peaks are broad and cover many channels. The upper portion shows the same Co60 peaks taken in QCC mode. In this example, the 1333 keV peak of Co60 in the linear spectrum covers 75 channels, whereas the same peak in the QCC spectrum is defined by 28 channels. More importantly, the peak-to-background ratio of this peak in the QCC spectrum is 5.2, while it is only 2.8 in the linear spectrum. This represents an almost factor of two improvement! For low energy peaks, the opposite occurs. The number of channels per peak is increased relative to the number that would be used in a linear spectrum. QCC uses channels where they are needed!

Some of the many MCA2100R features:

- Two MCA modes: QCC (max. 512 channels) and linear mode (max. 1000 channels)
- Internal preamplifier for use with NaI detectors
- Bipolar pulse shaping amplifier
- 3.5µs successive approximation ADC
- PC communication methods: RS-232, RS-485 and Ethernet (MCA2100R-EN)
- Complete computer control
- Standalone operation; no slot required in the PC
- Easy setup and energy calibration via Quantum MCA™ software

The MCA2100R is packaged as a peripheral to the PC. It does not require any internal PC interface slots or special memory reservations. This avoids problems in upgrading to newer PCs and operating systems. The MCA2100R communicates via the RS232 port. Simply connect a serial cable to one of the COM ports on the PC and the other end to the RS232 connector on the MCA2100R, and you are ready to go. To connect multiple units to the PC, use a multiple-port RS232 interface, daisy-chain multiple units together with the built-in RS485 interface, or select the optional Ethernet.



The MCA2100R includes QuantumMCA software for qualitative analysis. All hardware setup and calibration functions are made through the software. It is not necessary to set internal jumpers or switches to configure the unit. For ease of setup, the MCA2100R with the QuantumMCA software can perform an automatic adjustment of the detector bias, coarse gain, and fine gain. Simply place a Cs137 source near the detector and press one software button. The unit performs all hardware adjustments.

For a more precise energy calibration, the system can perform a quadratic energy calibration and resolution calibration based on a Eu152 spectrum. In minutes the MCA2100R is ready to use!

For applications that require quantitative analysis, the powerful, user-friendly Quantum MCA Gold software is also available.

MCA2100R Specifications

ADC

- 3.5 μ s successive approximation
- 14-bit resolution
- Discriminators (computer adjusted): upper (105% full scale) and lower (0% full scale) in increments of 0.41%
- Zero adjustment via computer in increments of 0.41%
- Maximum throughput: 75,000 cps

Spectrum memory

- QCC mode: 256 or 512 channels
- Linear mode: 250, 500, or 1000 channels
- Maximum counts per channel: $2^{24} - 1$ (i.e., 16 million)

Amplifier

- Bipolar, 2 μ s (fixed) shaping
- Built-in dead time correction
- No pole-zero adjustment required
- Coarse gain settings: 1 \times , 2 \times , 4 \times , 8 \times (computer selectable)
- Fine gain settings: 1 to 2.5 \times (computer adjustable) in increments of 0.01 \times

Counting presets

- Real time
- Live time
- Integral of all ROIs
- Integral of selected ROIs
- Gross ROI statistics
- Net ROI statistics
- Total internal amplifier counts (ICR)
- Total SCA counts

Computer Control by

- RS-232 with available baud rates: 2400, 9600, 19200, 38400, 57600, and 115200
- RS-485 with baud rate 115,200
- Maximum number of units connected to PC: 8 total via RS-232 and/or RS-485 or Ethernet

Digital Stabilizer

- Internal ADC and gain stabilization

Multichannel Scaling

- Input rate 5MHz
- Dwell time: 10ms to 2.1E7 seconds
- Dead time: 3 μ s between passes and 3 μ s between channels

Bias supply

- 0 to +1200V in 1-volt increments (computer controlled)

Preamplifier

- Charge sensitive
- Internal for use with detector PMTs

Battery backup for

- Spectrum
- Setup parameters
- Clock memory

Power

- 90–247 VAC, 50–60 Hz with the universal AC power converter (included).
- or 10-18 VDC @ 1A for direct input
- Typical power consumption: 15 watts

Weight

- 2.6 lb. (1.2 kg)

Dimensions

- 10.9 inches (27.7 cm) deep
- 7.63 inches (19.4 cm) wide
- 2.88 inches (7.32 cm) tall

Front panel indicators

- Dead-time meter (3-color LED array)
- Acquire
- Pulse event detect
- Serial communication in progress
- Power on

Rear panel controls and connectors

- Power switch
- 9-pin 12 VDC power connector
- 9-pin D female AUX I/O (auxiliary input/output) connector with the following connections:
 - +5V DC output (100mA maximum output)
 - Multichannel scaling input (MCS)
 - Ground
 - SCA output (TTL)
 - ADC gate input (TTL signal with software selectable positive or negative polarity for coincidence or anti coincidence mode)
- Fuse housing
- 9-pin D male RS-232 connector
- BNC female connector for preamplifier input
- SHV female connector for detector bias
- Two RJ-11 connectors for use with RS-485
- RJ-45 connection for Ethernet (Model MCA2100R-EN)

Software

- 32-bit Quantum-MCA compatible with
- Windows 95/98/NT
- 16-bit Quantum-MCA compatible with
- Windows 3.1 by request

Accessories

- QuantumGold software for quantitative analysis
- Multiple port RS-232 card
- RS-485 card or Ethernet
- 14-pin tube base
- Selection of signal, interface, and detector bias cables
- Sodium iodide detectors



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