TECHNICAL SPECIFICATIONS

bMCA-USB — a compact digital MCA

INTRODUCTION

bMCA is a compact, digital Multi-Channel Analyzer (MCA), which is able to perform Pulse Height Analysis (PHA) of the signal produced by a standard 14-pin standard photomultiplier coupled to a scintillation detector such as NaI(Tl), $LaBr_3$ (Ce), $LaCl_3$(Ce), $CeBr_3$, etc.

The device is useful for obtaining the energy spectrum from the photon radiation detected by the scintillator, and can be easily interfaced to a typical PC or notebook via a standard USB port for further data transfer and analysis.

The bMCA comes with a basic software package that allows you to control the device and to acquire and visualize the energy spectrum. The software incorporates an advanced and easy-to-use "discovery" function that can be used to automatically detect all the bMCAs (USB or Ethernet) in the neighborhood of the PC that are available for connection.

A set of programming libraries are also offered. This makes the incorporation of the bMCA into existing radiation systems or setups very easy. The programming libraries are available for both MS Windows and Linux operating systems.

DESCRIPTION

The bMCA is an advanced, fully digital, compact Multi-Channel Analyzer (MCA). This device is used to process the electronic pulses produced by a photo-multiplier that is coupled to a scintillator detector. Such detectors are commonly used in the detection of gamma-ray radiation due to their high detection efficiency, medium energy resolution, and relatively low price. This kind of MCA is able to produce an energy spectrum from the radiation events detected by the scintillator, storing it in the device's memory for further retrieval and analysis by the PC.

The bMCA implements two modes of data acquisition:

- Pulse Height Analysis (PHA)
- Multi-channel scaling (MCS)

PHA mode is regularly used in nuclear spectrometry and radiometry, while MCS is a very useful feature for following photon detections in specific energy regions in the function of time. MCS acquisition mode is useful for both laboratory and industrial applications that make use of radioactive sources or seek for radioactive materials.

The MCA has built-in advanced PHA data acquisition modes, such as:

- Acquisition on live time
- Acquisition on real time
- Acquisition to a number of counts in a spectrum region (ROI)
- The combination of time (live or real) or counts on ROI,

The bMCA design makes use of the latest advances in digital electronics. The MCA utilizes powerful digital processing techniques and algorithms to separate the useful signals from noise and to maximize performance under high count rate conditions. The acquired spectra under PHA mode is extended for Dead Time. The device has a spectral memory size of up to 4096 channels and can perform MCS in addition to PHA.

The MCA contains a miniaturized high-voltage power supply optimized for low consumption utilization that provides the necessary power for the PMT tube, including those used with large scintillator detectors.

A basic acquisition software package is provided for managing such device operations as setup, control, data acquisition and visualization. A digital oscilloscope function allows monitoring the input and filtered pulses to aid in fine-tuning the MCA parameters. The program also includes a few spectrometry-related functions for processing the spectral data, including calibration, ROI analysis and peak search, to mention a few.

FEATURES

- Fully digital Multi-Channel Analyzer (MCA) built into a compact 14-pin photomultiplier tube socket
- Full Pulse-Height Analysis (PHA) and Multi-Channel Scaling (MCS) modes of data acquisition
- Up to 4096 channels for PHA and MCS acquisition
- Advanced electronic noise reduction algorithms
- Compact MCA with size of H 60 mm x D 55 mm
- USB 2.0 for data communication and device control
- Miniature design combining low-power consumption with low-noise
- Basic spectrum acquisition and device control software included
- Available programming libraries for Windows and Linux Operating System (upon request).
- LED indicators for communication status and device power, HV power and incoming count rate (ICR)
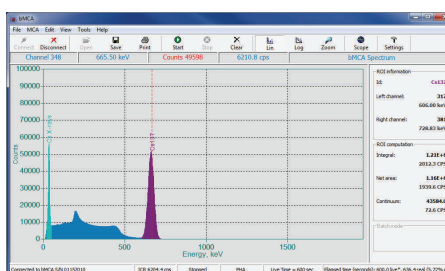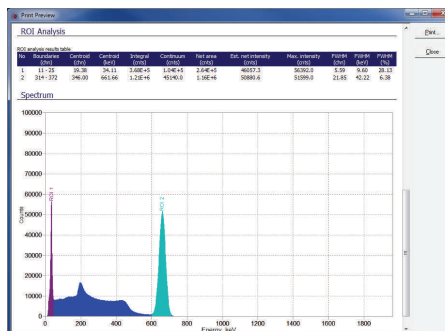
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PHA acquisition mode

- ♦ Spectral memory size of 256, 512, 1024, 2048 and 4096 channels
- ♦ Coarse gain with amplification factors of 1, 2, 4 and 8. Fine gain from 1 to 2 in steps of 1/4096
- ♦ Upper and Lower Level Discriminator settings given in channels
- ♦ PHA acquisition presets on:
    - ♦ Live Time
    - ♦ Real Time
    - ♦ Counts on a ROI
    - ♦ A combination of both Time or ROI counts

MCS acquisition mode

- ♦ Spectral memory size of 256, 512, 1024, 2048 and 4096 channels
- ♦ Dwell time from 0.1 sec to "count-forever"
- ♦ Easy to setup from ROIs or nuclide information.

Digital Settings

- ♦ Rise Time: from 0.1 to 12 µsec in steps of 0.2 µsec
- ♦ Flat Top: from 0.1 to 8.0 µsec in steps of 0.1 µsec
- ♦ Threshold: 1 to 255
- ♦ Digital Base Line Restorer (BLR)
- ♦ Pile-Up Rejector (PUR)

High Voltage Power Supply

- ♦ Miniature HV power supply embedded into the MCA assembly
- ♦ Voltage: 0 to 1 500 Volts in 4096 steps

Data communication

- ♦ USB 2.0, cable included (standardly 3 meters long)

Environmental

- ♦ Industrial temperature range: -40 °C to +85 °C.

Physical

- ♦ Size: height 60 mm, diameter 55 mm
- ♦ Weight: approximately 120 grams
- ♦ Connectors: USB type mini B
- ♦ Indicators:
    - ♦ Red LED for detector high voltage
    - ♦ Yellow LED for incoming count rate (ICR)
    - ♦ Green color LED for power and communication status

Other

- ♦ The device is supplied with a basic software (free download) to control operation, data acquisition and spectrum visualization

Certifications

- ♦ The device is CE compliant

CE
CERTIFIED