



TECHNICAL SPECIFICATIONS

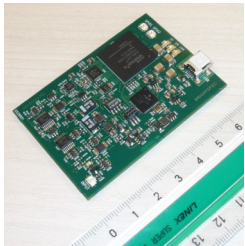
Topaz-X: compact digital MCA for ED XRF

INTRODUCTION

Topaz-X is a compact, stand-alone digital Multi-Channel Analyzer (MCA), which is able to perform Pulse Height Analysis (PHA) of the signal produced by high resolution, Peltier-cooled semiconductor detectors, such as Silicon Drift Detectors (SDD) and Si-PIN diodes. Such detectors are commonly used in energy dispersive X-ray fluorescence (ED XRF) analysis or any X-ray spectrometry method.

The device data communication and power is via a standard USB port (mini USB-B) to a typical PC or notebook.

The MCA is provided with a basic software package that allows 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 detect automatically all the BrightSpec MCAs in the neighborhood of the PC that are available for connection. Alternatively the MCA can be provided with our full-featured and advance X-ray spectrometry software package - bAxil. Using bAxil the user can perform data acquisition and within the same software framework the spectrum analysis and elemental quantization.



A set of programming libraries is also offered, which makes the incorporation of the Topaz-X into existing radiation systems or setups very easy. The programming libraries are available for both MS Windows and Linux operating systems.

DESCRIPTION

The Topaz-X is an advanced, fully digital, compact Multi-Channel Analyzer. This device is used to process the electronic pulses produced by a high-resolution, electrically cooled silicon detector such as Silicon-drift detector (SDD) or Silicon PIN diode (Si-PIN). The MCA implements several advanced modes of data acquisition, such as: Pulse Height Analysis (PHA), Multi-channel scaling (MCS), LIST and Time-LIST mode (TLIST). For the latter, each recorded pulse will be stored not only with the pulse height information (energy), but with the arrival time stamp as well. In TLIST mode the event time resolution is up to 40 nano-seconds.

The Topaz-X design incorporates the latest advances in digital electronics. The core of the MCA is its 14-bit high-quality fast flash ADC running at 50 MHz, a 100 MHz DSP processor and a 200 MHz CPU. The MCA FPGA design implements powerful digital processing techniques and algorithms to better separate the useful signal from noise and to maximize performance under high count rate conditions. The device has a spectral memory size of up to 16 384 (16K) channels available for any acquisition mode (PHA, MCS, LIST or TLIST modes).

The Topaz-X transfers acquired data via an ultra-fast USB connection to the PC with data transfer rates of 480 Mbit/sec. The device can be powered via the USB connection or using an external low-noise AC/DC power supply, which is included in the delivered package.

The device can be controlled via our basic acquisition software (bMCA software), which can be freely downloaded from our WEB site. Alternatively, the MCA control is incorporated into our fully-featured X-ray spectrometry analysis software— bAxil. An attractive package price can be obtained when ordering the MCA together with bAxil software.

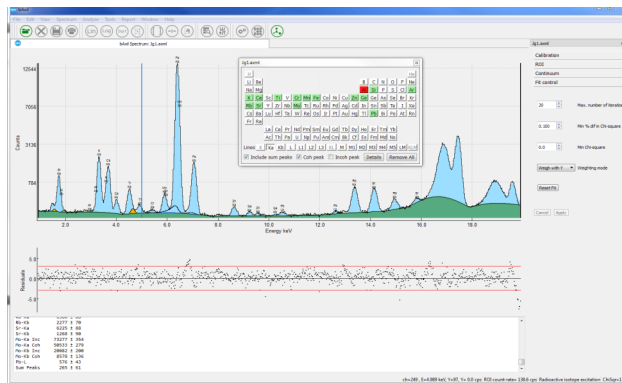
The MCA is cased into a rugged aluminum box of pocket sizes with one input connector (detector preamp signal), two input/output programmable connections and an interface connector (USB mini type B) to the PC. The device can be requested with mini-lemo or standard BNC connectors.

This device is also available as a separate PCB only, which makes it attractive to the OEM market. The programming libraries for Windows and Linux OS are available as well.



FEATURES

- Fully digital, ultra-compact Multi-Channel Analyzer (MCA), suitable for high energy resolution, Peltier-cooled detectors
- **PCB available for OEMs !!!**
- Fast flash 14-bit ADC (50 Hz) with a 100 MHz DSP and a 32-bit CPU at 200 MHz
- **Advanced spectroscopy acquisition modes: PHA, MCS, LIST and TLIST. TLIST with 40 nsec resolution**
- Hi-speed data transfer rate (480 Mbit/sec)
- Up to 16K channels for PHA and MCS acquisition
- Analog shaping parameters automatically adjusted to match digital shaping
- Advanced electronic noise reduction algorithms
- Compact MCA with size of 68 mm x 46 mm (PCB) and 86x70x18 mm in the aluminum case, weight < 150 grams (with case)
- Powered over USB or external low-noise power AC/DC module
- Miniature design combining low power consumption with low noise
- Available programming libraries for Windows and Linux Operating System (upon request)
- **Incorporated into full-featured and powerful X-ray spectrometry software bAxil**



BRIGHTSPEC

is a dynamic engineering company providing novel designs and innovative solutions in the field of nuclear electronics and software development for radiation detection.

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Device

- ◆ 14-bit high-quality flash ADC running at 50MHz
- ◆ 100MHz DSP processor in high-performance FPGA
- ◆ 200 MHz 32-bit CPU

Data acquisition

- ◆ Spectral memory size up-to 16 384 (16K) channels
- ◆ Acquisition modes : PHA, MCS, LIST mode and TLIST mode
 - ◆ LIST and TLIST modes with 40 nsec event time resolution (unique feature !!!)
- ◆ Analog gain from x1 to x256
Coarse gain with amplification factors of 1, 2, 4, 8, 16, 32, 64 and 128. Fine gain from 1 to 2 in steps of 1/16384 (~ 0.000061)
- ◆ Upper and Lower Level Discriminator settings given in channels
- ◆ Adjustable and/or automatic Inhibit signal reset

Digital Settings

- ◆ Analog shaper parameters are automatically adjusted to match the digital shaping settings (unique feature) !!!
- ◆ Trapezoidal filter
- ◆ Rise Time: from 0.1 to 20 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)

Power Supply

- ◆ Device power via USB connection or external low-noise AC/DC power adaptor (supplied).

Data communication

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

Physical

- ◆ Sizes:
 - ◆ MCA box: length 86 mm, width 70 mm, height 18 mm
 - ◆ PCB only: 68 mm x 46 mm
 - ◆ Weight: less than 100 grams (including box)
- ◆ Connectors :
 - ◆ USB type mini B (to computer)
 - ◆ Input signal: Pre-Amplifier detector signal.
 - ◆ Two general purposes programmable input/output ports
 - ◆ The device can be supplied either with Lemo or standard BNC connectors (to be specified at the order)
- ◆ 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 to control operation, data acquisition and visualization.
- ◆ (upon request) necessary programming libraries for Microsoft Windows and Linux

Optional

- ◆ The MCA can be supplied with full-featured X-ray spectrometry software—bAxil, at package cost.

Certifications

- ◆ The device is CE compliant

CE
CERTIFIED