usbBase

BRIDGEPORT Instruments, LLC
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usbBase

usbBase: eMorpho MCA + HV generator and divider with USB and GPIO.

Plug-on MCA-Base with GPIO and USB connectivity

The MCA-base is a PMT plug-on with a digital MCA, embedded high-voltage generator and divider. The MCA has been developed to yield the maximum accuracy and throughput for any scintillator. It is available for many different PMT pinouts as well as positive or negative HV.

The HV-system employs an active divider for highest linearity at lowest power consumption.

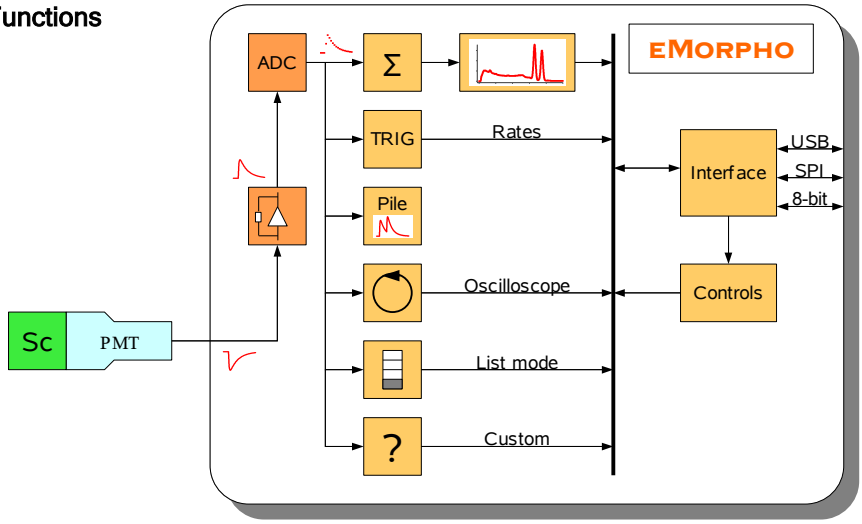
Embedded non-volatile RAM can be used to store calibration and gain data(HV) inside the unit, to be used automatically on power up.

Open source software, modular firmware structure and plenty of FPGA resources for added signal processing make the MCA-base an ideal component to create unique instrumentation.

Starting at $2550

- **Low-power MCA with HV**
  - Powered and controlled by USB, 140 mA to 300 mA
  - For 8 or 10-dynode PMT,
  - Open-source software API
  - GPIO for interconnect and reprogramming
  - IP67 watertight, threaded connectors
- **Rugged**
  - Potted and completely sealed against intrusion of water and dust

Functions



- **MCA**
  - 4096 channels, 32-bit
  - Best energy resolution and highest histogramming rate for any scintillator
  - Maximum rate: 13 Mcps
  - Uses pulse shape information for adaptive pile-up rejection
- **Added features**
  - Oscilloscope, List mode, n/γ, α/β discrimination
  - User-specified signal processing

Using the usbBase you can:

- Work with any and all scintillator detectors
- Make full use of the great precision and speed of $LaCl_3$ and $LaBr_3$
- Operate multiple detectors synchronously
- Perform coincidence or gated spectroscopy
- Perform real time pulse shape analysis for particle discrimination
- Even have functionality added to the MCA to create a unique instrument

- **Ideal for embedded systems**:
  - Low power consumption
  - Potted and sealed
- **Code extensions**
  - Split histogram memory
  - Gain stabilization
  - Multi-detector support

Short Specifications: usbBase

Construction:

- MCA and high voltage unit are integrated into a single housing. The MCA-Base is potted and fully sealed.

Connectors:

- PMT: 14-pin socket for B14-38 di-heptal base. Multiple PMT pinouts and custom pinouts are available.
- USB: IP67 mini-B USB connector with thread lock.
- GPIO: IP67 EN3, 8-position connector with bayonet lock

MCA:

- USB-powered and controlled
- Digital-signal processing MCA, using waveform digitizing ADCs, from 10-bit/20MSPS (power saver) to 12-bit/80MSPS (high performance).
- One unit is suitable for all scintillators by varying programmable parameters.
- 4096 x 32-bit histogram memory
- Very wide range of conversion times: 75 ns to 3.28 ms, programmable in 12.5 ns to 50 ns steps.
- Very high maximum histogramming rate, up to 13Mcps (periodic)

Extended Functionality:

- Trace acquisition for oscilloscope-like display, 1024 samples
- List mode data acquisition stores energy, time-of-arrival and (optional) pulse shape parameter on event-by-event basis.
- Real-time pulse shape discrimination
- Histogram memory can be split into two banks (2048 x 32-bits) with an active and an inactive bank for loss-less data read out. Active/Inactive bank switching occurs via software.

GPIO Pins:

- Six pins available for DAQ synchronization between devices, including DAQ start, histogram bank switching and suspend.
- Secondary function: use GPIO pins for in-field reprogramming of MCA firmware via JTAG interface.

High voltage unit:

- 0 to 1500 V, positive or negative, programmable in 0.73V steps.
- Transistorized divider for highest linearity at lowest power consumption.
- Consumes 15 µA high-voltage current at 1000 V, but supports 50 µA PMT anode DC-current with a gain drift <2%.
- Consumes 40 mA at 3.3V to make 1000 V.

Power consumption:

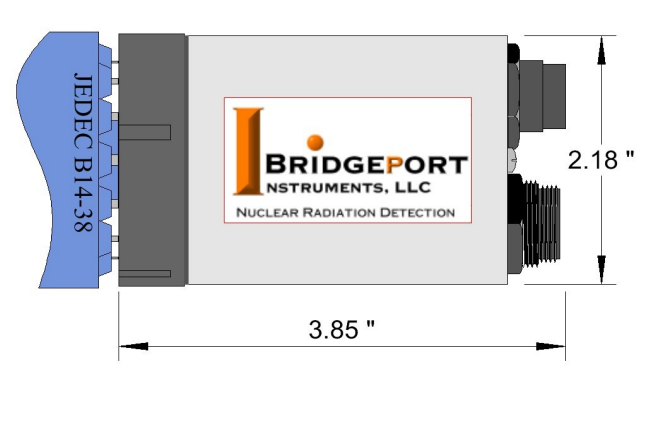
- Depending on ADC and speed: between 140mA to 300mA at 1000 V.

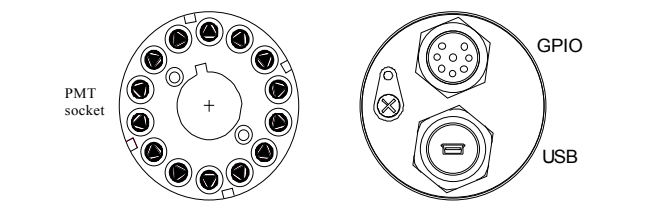
Operating conditions:

- Temperature: -15ºC to +70ºC

Software:

- Open-source Application Programmer's Interface (API), written in C
- API is portable to Windows XP, Vista, CE.net, Linus, MAC OS 8, 9 and X
- IGOR-Pro / Wavemetrics based evaluation software.





Bottom side and top-side view of the connectors.