

## usbBase SGC-600-7885 Plug-on MCA

### Plug-on MCA with Negative HV for ET-9390 PMT



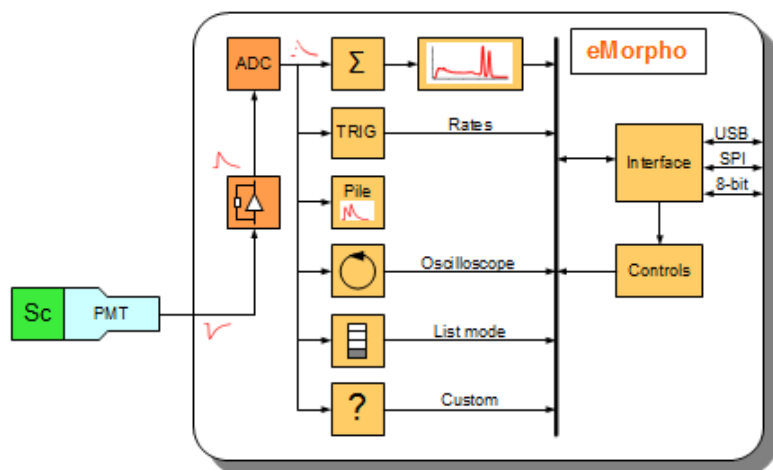
usbBase: eMorpho  
MCA + HV with USB  
& GPIO.

The usbBase is a PMT plug-on with a digital MCA, embedded high-voltage generator and divider.

Its open-source software and modular firmware structure have been designed to let engineers design radiation detection instruments specifically for their target market and application. We support our customers with a rich library of firmware extensions and customization to create a particular functionality.

Low-level detector control relies on the Morpho Data Server (written in Python) that has been implemented on x86/x64 and ARM architectures under Win XP/7/8, Linux and Android operating systems.

Client software, when using web-apps, can run on any device that supports a web-browser – from industrial data terminal to desktop computer.



#### Using the usbBase you can:

- Make full use of the great precision and speed of LaCl<sub>3</sub> and LaBr<sub>3</sub>
- Use NaI(Tl), CsI(Na), LYSO, BGO and many more
- Rely on gain stabilization via LED-pulser or prediction methods
- Operate specialty detectors such as  $\beta/\gamma$  phoswich detectors
- Access your instrument by web-browser from any device:
  - Industrial data terminal, smart phone, tablet, laptop, desktop

#### Low-power MCA with HV

- SGC-600-7885 for 10-stage 14-pin detectors supplied by Saint-Gobain Crystals using ET-9390 PMT
- Powered and controlled by USB, 250 mA
- HV with active divider for high linearity at low power
- GPIO for interconnect and reprogramming
- IP67 watertight, threaded connectors

#### Rugged

- Sealed against intrusion of moisture and dust

#### MCA

- 4096 channels, 32-bit depth
- Best energy resolution and highest histogramming rate for any scintillator
- Maximum rate: 18 Mcps
- Uses pulse shape information for pile-up rejection

#### Rugged

- Oscilloscope, list mode,  $\beta/\gamma$  discrimination
- Optional custom signal processing and functionality.

#### Ideal for embedded systems:

- USB driver based on libusb, used on all Win, Linux and Android OS x86/x64, ARM
- Control interface is TCP/IP via zeroMQ, accessible in over 40 programming languages.

## Principle of operation

- $I \rightarrow V$  input amplifier
- 20 MSPS to 120 MSPS, 10 to 12-bit digitizer
- Parallel digital signal processing in FPGA
- USB data interface

## Functions

- MCA with 4096 32-bit bins
- 32-bit time and event counters
- 1024 sample trace capture
- 340-event list mode buffer

## Common Firmware Extensions

- MCA with 8192 32-bit bins
- 5440-event listmode buffer
- GPS time stamping

## Conversion times

- Only as long as the scintillator light pulse
- 0.20 $\mu$ s for LaBr<sub>3</sub> or plastic scintillator
- 1.0 $\mu$ s for NaI(Tl)
- 10 $\mu$ s for CsI(Na)

## High voltage

- Fixed negative polarity
- 10-stage PMT pinout
- HV-range: -500V to -1400V
- Active divider for low power and high DC-currents
- Power consumption: 70mW at HV=1000V

K	F	D1	D2	D3	D4	D5	D6	D7	D8	D8	D9	A
	8.8	1	1	1	1	1	1	2	3	4.4	3	
1.0k	530	480	425	370	320	265	215	160	105	55	0	

Table 1: Voltage distribution

## Server-side software

- Sensor communicates via USB on Win XP/7 and Linux; x86 & ARM architectures, using libusb
- Morpho Data Server encapsulates device operation
- XML-ASCII command interface
- Client can be written in any programming language
- Ethernet communication via robust transport layer using zeroMQ.

## Client software

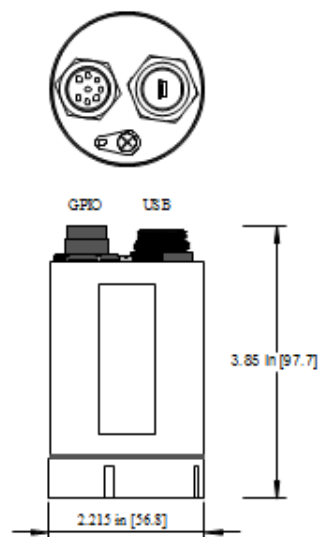
- Web-Apps in PHP/html
- Example clients in C, C++, Python
- API in C and C++, with bindings to C and Python

## Power supply

- Powered via USB, 4.3V to 5.5V @ 250mA

## Environmental

- Operational from -40°C to +60°C



Outline drawing