

Gamma stream

Digital MCA Tube Base for Gamma-Ray Spectroscopy



Features



- **Compact, stand-alone, tube base MCA** including high voltage power supply ($0 \div +1500V / 500 \mu A$) and charge sensitive preamplifier
- **On-board battery and data storage** capability for active on-field measurements
- **Embedded ARM based CPU** for unattended operations
- **Wired and wireless connectivity** through USB, Ethernet, Wi-Fi and Bluetooth interfaces
- Compatible with scintillation detectors as NaI(Tl), LaBr₃(Ce) and CeBr₃, using standard 14-pin and 10/8-stage PMTs
- Embedded GPS for data geo-localization
- Acquisition modes:
 - PHA
 - PHA with time stamp
 - Signal inspector
- Gain stabilizer based on natural or calibration radioactivity
- Front panel digital I/O connectors

- Software selectable coarse and fine gain
- Supported by **MC² Analyzer** software GUI for Windows OS

Description

CAEN Gamma stream is a compact and portable system for gamma ray spectroscopy with scintillation detectors, which provides an active **Multi-Channel Analyzer (MCA)** integrated in a 14-pin photomultiplier tube (PMT) base. Gamma *stream* fully integrates in a stand-alone device the high voltage to bias the PMT, the preamplifier to shape the signal from detector, and the MCA for a complete Pulse Height Analysis online. Gamma stream makes easy the measurements with scintillation detectors, such as NaI(Tl), LaBr₃(Ce) and CeBr₃, with no need of additional cables. Its socket and voltage divider can supply standard 14-pin and 10-stage (S2580 and S2580G models) or 8-stage (S2580LB and S2580LBG models) PMTs.

Gamma stream has been designed to work stand-alone, with no need of additional devices, cables, nor human assistance. Gamma stream features internal rechargeable Li-Ion battery providing long-term duration for unattended on-field acquisitions. Once Gamma stream is programmed via computer or mobile phone, it then acquires and logs data in an internal SSD memory. An embedded CPU, running Linux® OS, controls the acquisition and data recording, as well as the supported communication interfaces.

Multi-interface communication capability by **Ethernet, USB 2.0, Bluetooth®** or **Wi-Fi**, makes possible the remote control via computer or smartphone.

Gamma stream can be fully controlled by the **MC² Analyzer** software running on Windows® OS PC. Besides the standard board and spectra configuration, the software features basic mathematical analysis on collected spectra (peak search, background subtraction, peak fitting, etc.). S2580G and S2580LBG versions feature an embedded GPS component.

Considering that scintillation detectors are usually sensitive to temperature changes, and advanced algorithm for gain stabilization is available. The user can select a specific range where the algorithm recognizes a peak and adjust its position according to the temperature variations.

Technical Specifications

Mechanical

- **Dimensions** : 71.2 W x 66.4 H x 163.8 L mm³ (including connectors)
- **Weight**: 700 g

Detector & PMT

- Scintillation detectors
- 14-pin 10-stage PMTs (S2580)
- 14-pin 8-stage (S2580LB)

Digital Signal Processing

- 12-bit and 62.5 MHz ADC
- Software selectable coarse gain: x1, x2, x4, x8
- Trapezoidal filter for the energy calculation with software adjustable rise time in the range 0÷16 μ s and flat top in the range 0÷16 μ s
- Trigger threshold software adjustment
- Software fine tuning of the Pole-Zero cancellation
- Digital fine gain
- Automatic gain stabilization
- Pile-up rejection and Live Time correction
- Baseline restorer with programmable averaging
- Time stamp: 16 ns resolution
- High frequency noise filter

Data Storage

- Internal SSD memory can guarantee data logging for the whole battery autonomy

High Voltage Power Supply

- Output Bias Voltage: 0 ÷ +1500 V
- Output Bias Current: 500 μ A max.
- Output ripple (full load): Typical < 5 mVpp; Maximum < 10 mVpp
- Setting resolution: steps of 1 V

Operating Modes

- PHA (Pulse Height Analysis): pulse height histogram over 1k-2k channels
- List mode: pulse height and time stamp for each event
- Signal Inspector: input and internal filters waveforms

Trigger Modes

- Stand-alone: triggering based on the channel self-trigger
- Correlated: Veto with other GammaStream
- External: triggering based on an external trigger

Front Panel Digital I/O

OUT (LEMO LVTTTL 3.3V, $R_t = 50 \Omega$)

General Purpose Output:

- OUT: Fast Trigger Discrimination signal

N1 & IN2 (LEMO LVTTTL 3.3V, $Z_{in} = 1 \text{ k}\Omega$)

General Purpose Input:

- IN1: Veto signal
- IN2: Trigger time stamp reset

Indicators

- Status and battery LEDs

Communication Interface

Ethernet

- 10/100 Mbit interface RJ45 connector

Bluetooth

- USB host port (USB2.0) compliant to BT dongle included in the kit

USB

- MiniUSB client port, USB 2.0 compliant, Up to 30 MB/s transfer rate

Wi-Fi

- USB host port (USB2.0), compliant to Wi-Fi Micro, Adapter included in the kit

GPS (S2580G and S2580LBG only)

- Front panel SMA female jack to interface with GPS active antenna included in the kit

Firmware

- Firmware can be upgraded via USB/Ethernet

Software

- Fully controlled by the **MC² Analyzer** spectroscopy software for Windows PC

Power Consumption

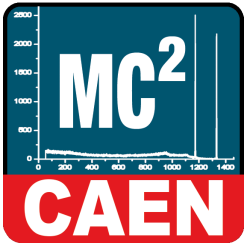
- Bluetooth: 300 (typ.) $\pm 10\%$ mA
- Ethernet: 320 (typ.) $\pm 10\%$ mA
- WiFi: 330 (typ.) $\pm 10\%$ mA
- Battery discharging time (HV and acquisition on, list mode continuous dump): about 6 hours

Ordering Options

Code	Description	
WS2580GXAAA	S2580G - GAMMASTREAM - Digital MCA Tube Base with GPS for Gamma-Ray Spectroscopy	RoHS
WS2580LBGXAA	S2580LBG - GAMMASTREAM - Digital MCA Tube Base with GPS for LaBr3 (Ce) Gamma-Ray Spectroscopy	RoHS
WS2580LBXAAA	S2580LB - GAMMASTREAM - Digital MCA Tube Base for LaBr3 (Ce) Gamma-Ray Spectroscopy	RoHS
WS2580XAAAAA	S2580 - GAMMASTREAM - Digital MCA Tube Base for Gamma-Ray Spectroscopy	RoHS

Related Software

MC²Analyzer



Graphical software tool for digitizers running DPP-PHA firmware



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