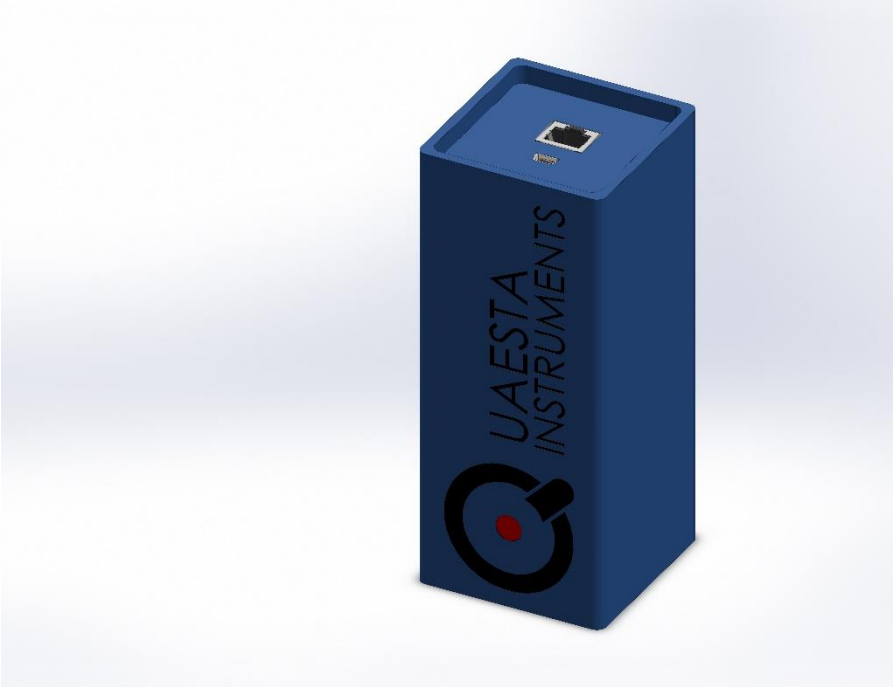
Quaesta Instruments

Product Information Sheet

MODEL: **GSD-2100E/U NEW PRODUCT**



The GSD-2100 is an integrated gamma spectrometer with scintillator, low noise amplifier, multichannel analyzer (MCA), microcontroller, data logger and both Ethernet and USB communications interfaces. This device has multiple output options and data types including List Mode (time-stamped) data. The GSD-2100 can be controlled via a simple command set or with a GUI operating in a browser environment.

The GSD-2100 is optimized for small size while still maintaining high sensitivity. Size reduction is made possible by use of relatively new SiPM detector arrays which can replace bulkier photomultiplier tubes while still offering high gain. For larger scintillators, we provide SiPM arrays in sizes to match the scintillator output facet to optimize spectral resolution and sensitivity.

Quaesta Instruments

Components & Features	Description
GSD-2100	Gamma Spectrometer with integrated scintillator (2”x 2”x 2” cubic, NaI(Tl) crystal standard, or user specified) low noise amplifier and digital interface including MCA.
Mechanical	
Dimensions	2.25” OD x custom length based upon scintillator selection.
Enclosure Finish	Aluminum body, metal plating finish (corrosion resistant)
Communication & Power Connector	Power over Ethernet jack, USB (Type-B) jack
LED	Indicator LED (red) on rear panel.
Scintillator (internal)	2”x 2”x 2” cubic NaI(Tl) crystal (standard), Or user specified type
Electrical	
Analog Components	
Stable Voltage	0 to 35VDC, matched to SiPM detector array and temperature compensated to stabilize spectral output.
Charge Sensitive Amplifier (CSA)	Integrates input charge pulse and converts to voltage. Sensitivity: 1V / pC or custom.
Pulse Shaping Electronics	Pulse shaping time constant 1 to 10□s (typical). Pulse shaping decay time 10 to 100□s (typical).
Deadtime	Minimum time between successive counts, 30 to 100□s (typical).
Gamma Counting Rate	33kHz (higher count rate options are available).
Amplifier Electronics	Gain range 1 to 20, user selectable.
Detector Type	SiPM (gain ~ 10^6, typical)
Digital Components	
Microcontroller & Timer	ARM Processor, 160MHz.
Nonvolatile memory	Up to 128Gb.
Analog-to-Digital Converter (ADC)	12 bit, 8Msps (mega-samples per second).
Temperature & Humidity Sensor	Temperature: range -40C to 124C; resolution 0.01C; accuracy +/- 0.1C Humidity: range 0 to 100% RH; resolution 0.03% RH; accuracy +/- 3%.

Quaesta Instruments

Components & Features	Description
Features	
Shaped Pulse Waveform Capture	Shaped gamma pulse waveform digitized and stored. Up to 256 points per waveform, 100ns timing resolution.
Pulse Height Measurement	Firmware algorithms measure pulse height. Noise rejection algorithms can also be applied.
Discriminators (Digital)	Standard upper and lower digital discriminator levels are user selectable. Multiple discriminator values that allow for multiple regions of interest (ROIs) are possible through firmware customization.
Digital Timer	100nsec resolution, timing up to 7.6hours.
Digital Counter	Counts gamma events within user specified Region of Interest (ROI). Capacity 4 billion counts.
Multichannel Analyzer (MCA)	Signal pulse height spectrum (histogram) is generated and stored. Histogram resolution 64 to 4096 bins, 4 billion counts per bin.
Differential Pulse Arrival Time Spectrum	Differential arrival time (Delta-t) histogram is generated and stored. Records time between successive gamma counts within a single NPM. Variable resolution from 100ns to 1ms. (Optional).
List Mode Data	
Time Stamping	Time stamps each gamma count. 120ns resolution. 33kHz rate. Run duration 7.6hours before clock wrap around. 40-bit counter.
Pulse Height	Stores pulse height for each gamma count. 12-bit resolution.
Source Tagging	Time stamped data is tagged with device identifier. For use in arrays of up to 256 detectors.
External Master Clock Operation (Optional)	Operate up to 256 devices synchronously with a Quaesta-supplied master clock/synchronizer. Master clock signal inserted through existing Ethernet interface.
External Synchronizer Operation (Optional)	Synchronize the time stamp clock of up to 256 devices with a Quaesta-supplied master clock/synchronizer. Synchronizing pulse inserted through existing Ethernet interface.
Diagnostics (Optional)	
Internal Pulse Simulator	Diagnostic mode. NPM internally produces known simulated pulses to test pulse shaper, amplifier, ADC, pulse height measurement algorithms and time stamping.
Power Monitoring	Monitors NPM power consumption.
Data Logging	
Real-Time Clock	Accurate time to 1s per day.
Internal SD Card	Micro SD card, up to 128Gb.
Data Stored	User configurable. Stores list mode data. Also stores gamma counts and elapsed time, pulse height spectrum histogram, coincidence (Delta-t) histogram, device operating parameters, temperature/humidity (optional). Data stored in FAT 32 file format.

Battery	48mA-hours. Estimated 6- year life.

Components & Features	Description
Interface	
Communication Typed	Power Over Ethernet, IEEE 802.3af. and USB
TCP/IP Terminal Interface	Command line interface. Configure device and download data.
GUI (web browser)	HTTP web browser, 100Mbaud. Configure device, display and download numerical and graphical data. Communicate with device from multiple computers simultaneously.
Quick Specifications	
Power	Power Over Ethernet, IEEE 802.3af.
Stable Voltage (internal)	0 to 35VDC
Amplifier Gain	1 to 20
Dead time	30 to 100□s (typical)
Gamma Counting Rate	33kHz maximum
Timing resolution	120ns