

Product Specification: SmartEngine (SE) Series Spectrometer

Description

The SmartEngine (SE) Series spectrometers deliver high-performance spectral analysis in a compact, rugged Czerny–Turner optical system. Built with high-sensitivity CCD and CMOS linear sensors and controlled by a 32-bit RISC microcontroller, the SE Series provides excellent optical resolution, low noise, and strong resistance to temperature, vibration, and humidity variations.

Covering 180–1100 nm with multiple sensor options, the SmartEngine Series offers flexibility for UV, visible, and NIR applications. Powered entirely by USB and featuring programmable I/O ports, it integrates seamlessly into laboratory, industrial, and OEM platforms.



Models and Wavelength Ranges

- **CCD Models**
 - SE2010 – 180–1100 nm (front-illuminated CCD)
 - SE2020 – 180–1100 nm (UV-enhanced front-illuminated CCD)
 - SE2040 – 180–1100 nm (front-illuminated CCD, FUV option)
 - SE2050 – 180–1100 nm (NIR-enhanced back-illuminated CCD)
 - SE2070 – 180–1100 nm (high-resolution CCD, 3648 pixels)
 - SE2090 – 180–1100 nm (fast-exposure back-illuminated CCD)
 - SE2120 – 180–1100 nm (UV-enhanced back-illuminated CCD)

- **CMOS Models**
 - SE2030 – 180–1100 nm (fast-exposure CMOS)
 - SE2080 – 180–1100 nm (fast-exposure CMOS, 4096 pixels)
 - SE6160 – 180–1100 nm (high-performance UV-enhanced CMOS)

Main Features

- Wavelength coverage: 180–1100 nm
- Optical resolution: 0.2–10.5 nm (depends on slit width and grating)

- Multiple sensor options: CCD (front-/back-illuminated, UV-enhanced) and CMOS (high-speed, high-resolution)
- Integration time: 0.1 ms – 24 s (sensor dependent)
- 16-bit, 15 MHz A/D converter for precise digital output
- USB 2.0 high-speed interface (480 Mbps)
- 8-pin I/O port with 6 programmable digital lines for external trigger and lamp control
- Flash ROM storage for wavelength, linearity, and intensity calibration parameters
- Supports multiple trigger modes and ring-buffer operation
- Stores up to 4,000 spectra for continuous acquisition
- Compact, rugged construction resistant to humidity, shock, and vibration
- Boot-up time < 4 s

Technical Details

- Optical System: Czerny–Turner, f/# 5, NA 0.1, focal length 60 mm
- Resolution: 0.2–10.5 nm (depends on slit width and grating)
- Wavelength Accuracy: ± 0.3 nm typical (± 1 nm under extreme conditions)
- Wavelength Reproducibility: ± 0.05 nm (100 consecutive measurements, Hg–Ar lamp)
- Thermal Stability: < 0.04 nm/°C
- Stray Light: < 0.2 – 0.45% (model dependent)
- Integration Time: 0.1 ms – 24 s
- A/D Conversion: 16-bit, 15 MHz
- Interface: USB 2.0 (480 Mbps), external I/O (8-pin, 6 GPIO + trigger + lamp control)
- Power: +5 V DC via USB (300 mA typical, 4.75–5.25 V tolerance)
- Boot-up Time: < 4 s
- Environmental: Operating 0–50 °C; Storage –30–70 °C; Humidity 0–90% non-condensing

Dimensions

- Type I: 110 (L) × 86 (W) × 32.4 (H) mm
- Type II: 110 (L) × 86 (W) × 35.4 (H) mm
- Double-layer: 110 (L) × 86 (W) × 53.9 (H) mm (available for select models: SE2030P-FUV2, SE2050P-NIR1, etc.)

Power Requirements

- Power supply: +5 V DC (via USB)
- Typical consumption: 300 mA
- Boot-up time: <4 seconds

Specifications

Model	Wavelength Range (nm)	Sensor Type	Pixels	SNR	Dynamic Range	Stray Light (%)	Thermal Stability (nm/°C)
SE2010	180–1100	Front-illuminated CCD	2048	200	2200	0.2	<0.04
SE2020	180–1100	UV-enhanced front-illuminated CCD	2048	250	1700	0.2	<0.04
SE2030	180–1100	Fast-exposure CMOS	2048	350	4300 (2.5 MHz) / 3000 (10 MHz)	0.2	<0.04
SE2040	180–1100	Front-illuminated CCD	2048	200	2200	0.2	<0.04
SE2050	180–1100	NIR-enhanced back-illuminated CCD	2048	500	4600	0.45	<0.04
SE2070	180–1100	High-resolution CCD	3648	350	2200	0.2	<0.04

SE2080	180-1100	Fast-exposure CMOS	4096	350	3200	0.2	<0.04
SE2090	180-1100	Fast-exposure back-illuminated CCD	2048	500	6000	0.45	<0.04
SE2120	180-1100	UV-enhanced back-illuminated CCD	2048	350	4300	0.2	<0.04
SE6160	180-1100	High-performance CMOS	2048	500	4600	0.45	<0.04