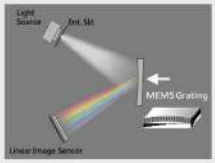
OtO Photonics

CERTIFIED COMPANY
ISO 9001:2015
OtO Photonics Inc.

World's Smartest Spectrometers

OtO Brand Story





OtO's business commenced with MEMS concave gratings, renowned for its exceptional focusing and dispersing capabilities, critical in the creation of miniature spectrometers. Our revolutionary design, the UltraMicro™ Series, delivers various advantages including compactness, high temperature and humidity stability, shock and drop resistance, and cost-effectiveness, making it an ideal solution for handheld product development.

In 2013, OtO introduced the Czerny-Turner structure spectrometer, emphasizing "temperature & humidity stability with shock & drop resistance" as its primary advantage. An optional control board with CPU and memory facilitates quick spectral and color calculations, along with OtO's exclusive high-speed exposure mode that captures multiple sets of exposure data for batch transmission to the measurement system for verification. The SmartEngine™ Series, with selectable sensors (8 total), gratings (over 30), and software/hardware control models, caters to diverse industry needs, including LED, display, semiconductor thin-film inspection, biomedical detection, and environmental monitoring (water and air) analysis applications. With exceptional performance, flexible configuration for customization, wide-ranging applications, and excellent price-performance, SmartEngine™ series has become OtO's flagship product.

2002 Fundamental research on MEMS gratings

2006 OtO founded

2008 2012 2016
- Excellent Electro-Optical Product Award
- National Industry Innovation Award
- MOEA Innovative Research Award
- Excellent Innovative Product Award
- Taiwan Outstanding Photonics Product

2009 Mass production of MEMS series

2014 Mass production of Czerny-Turner spectrometer

2017 High-end infrared & TE-cooled series launched

In 2017, OtO expanded its product portfolio by introducing two high-end series: SideWinder™ and EagleEye™.
The SideWinder™ series focuses on near-infrared spectroscopy measurements, featuring an embedded InGaAs linear sensor that covers the full wavelength range (900-2500nm).
The EagleEye™ series adopts a TE-cooled back-thinned sensor to reduce noise baseline during long integration times, providing ultra-high sensitivity, high resolution, low noise, and a high signal-to-noise ratio. This makes it particularly suitable for applications such as Raman spectroscopy, ellipsometry, thin-film measurement, and advanced LED testing.

In 2018, OtO focused on miniaturizing Czerny-Turner spectrometers and introduced the HummingBird™ and PocketHawk™ series to meet the growing market demand for compact devices. Despite their smaller size, both series maintain excellent signal-to-noise ratio (SNR) and sensitivity, delivering outstanding system integration flexibility and product quality



2018 National Gold Invention Award

2020
- ISO 9001:2015 Quality Management System Certified
- 2020 The Dun & Bradstreet Top 1000 Elite SME Award

In 2021-2022, OtO introduced several ultra-high resolution products: the Dubhe™ series, Merak™ series, and Phekda™ series, all named from prominent Chinese stars constellation. The Dubhe™ series is tailored for the core of OCT (optical coherence tomography) scans, featuring extreme high resolution (<0.04nm) and a fast scan of 80/130/250 KHz. The Merak™ series offers high resolution (<0.1nm) at 850nm & 940nm for VCSEL (Vertical-Cavity Surface-Emitting Laser) probing, 3D sensing, and Laser Diode probing. The Phekda™ series can achieve high spectral resolution < 0.1nm (VIS-NIR) & <0.2nm (NIR), and highly recognized for its flexible customization (grating, wavelength range and resolution). It designed for LIBS (Laser-Induced Breakdown Spectroscopy), Raman analysis, and thickness measurement.

2021 2022 Ultra-high Resolution Series:
DuBhe (DB), MeRak (MR), and PhekDa (PD)

In addition to ultra-high resolution products, OtO has developed new products based on TI DLP technology, launching the DragonFly series, which offers near-infrared spectroscopy measurement.
OtO remains dedicated to innovation in spectrometer miniaturization. In the end of 2022, we released the Bullet series spectrometers, comprising the SilverBullet™ series (UV-VIS) and RedBullet™ series (NIR), featuring a very compact size of 40x36.3x25.1(mm) and 51.4x36.4x29(mm), respectively. They are the best choice for handheld applications, especially in water quality and color analysis; ground, food and textile analysis.

2023 TI DLP NIR Spectrometer
Micro spectrometer: Bullet series

2024 Ultra-high Resolution with TE-cooler models
New models for semi-conductor & NIR market

In 2024-2025, leveraging 20 years of experience in spectrometer research, development, and manufacturing, along with extensive in-depth communication with customers, OtO continued to achieve technological breakthroughs.
OtO introduced the MeGrez™ series, equipped with a TE-cooled back-illuminated sensor in its ultra-high-resolution transmission-type products. The MeGrez™ series is highly customizable according to customer specifications (grating, wavelength range, and resolution) within the 400-1700nm range, making it ideal for applications such as Raman spectroscopy, remote sensing, LIBS, LD, and NIR VCSEL measurements.
Additionally, OtO successfully developed the world's smallest TEC-cooled near-infrared spectrometer series, the GoldenBullet™, covering the 900-2200nm wavelength range. The GoldenBullet™ series features built-in transmission-type collimating and focusing lenses, achieving ultra-high sensitivity and exceptional wavelength stability. This innovative product entered mass production in 2025.

2025 Ultra-High Resolution TE-cooled Series
MeGrez (MG) Series
Ultra-Compact TE-cooled NIR Spectrometer
GoldenBullet (GB) Series

2026
OCT Application Expansion Series: DuBhe (DB), ALoith (AL)
Deep UV (165 nm) Series: VioNeer
Dual Near-Infrared (900–2500 nm) Series: Gemini-Red

In 2026, OtO continues to develop new product series in response to market demands. A new high-resolution spectrometer for OCT measurements, featuring a 150 nm bandwidth and 0.02 nm resolution, will be launched soon.
In addition, a deep-UV spectrometer down to 170 nm and a Dual-NIR spectrometer covering 900–2500 nm are scheduled for release in the second half of 2026.



With over 20 years of dedication in the field of spectroscopy, OtO has persistently refined the specifications and performance of our spectrometers. We have embarked on a focused exploration of applications in the semiconductor and near-infrared markets and have continued to introduce high-value-added products, ensuring that our spectrometers not only meet but exceed the expectations of our customers. With high flexibility of customization, premium quality, timely delivery, and stringent cost controls as our guiding principles, we strive to offer the best spectrometers and services to customers. We look forward to driving new breakthroughs in the spectroscopy market through continuous innovation.



We are confident to give you the best service to create the perfect model for you!

OtO has been completing a lot of successful development projects in various industries. In addition to the spectrometers listed on the website, we can also offer higher sensitivity sensors, higher optical resolution, specific wavelength range and grating, or even with customized software, hardware design. OtO is happy to discuss with customers and offering further specifications to meet your needs in the market.

OtO Photonics Inc.
Ivan, General Manager



Table of Contents

01 Semiconductor Applications

02 Spectrometers

Semiconductor Applications ------- P.01

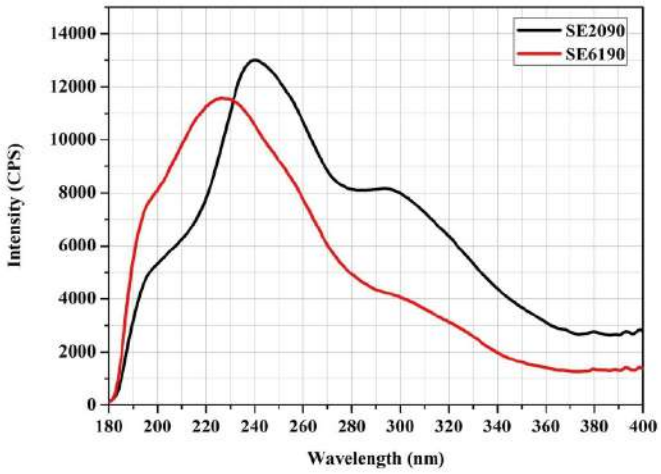
Ultra High Resolution ------- P.05
Ultra Micro - - - - - - - P.09
Best-selling All Purpose - - - - P.13
Near Infrared - - - - - - - P.21
Packages & Accessories - - - - P.27

EagleEye™/SmartEngine™ Series for Semiconductor Applications

Thin-film Thickness measurement, Plasma Inspection, OES Applications
Wide Wangelength Range with High Resolution & High SNR, UV Sensitivity Enhanced Spectrometer



- Standard for Ellipsometric Detection Applications: Balanced Response in Full UV-VIS-NIR Wavelength Range.
- Standard for Plasma Inspection Applicaion: High Resolution 1-2nm within Wavelength Range 200-900nm.
- Using back-thinned CCD (TE-Cooled Function is Optional) with Low Noise and High Sensitivity Performance.
- OtO provides customized high resolution spectrometers with different transmissive gratings. Experts are welcome to explore various applications with us.



Sensitivity Response



SE6190/SE6194E



EE6148E

Model Name	SE6190/SE6194E	EE6148E
TE-Cooling	X	0°C at Ambient of 25°C
Wavelength Range	180-1100nm (configurable)	180-1100nm (configurable)
Slit Size	10/25/50/100/200 um	10/25/50/100 um
Resolution	<1.6nm@10um <2.3nm@25um	<1.7nm@10um* <2.3nm@25um*
Sensor	2048pixel High Speed CCD with UV-enhancement	1024pixel Back-thinned CCD with Low Noise
SNR	500	1200
Dynamic Range	6000	52000
Dark Noise	11	5
Integration Time	1.5ms~24sec.	na
Dimension	110*86*32.4 mm 110*86*35.4 mm	130*96*39.5 mm
Fiber Input Interface	SMA905	SMA905 or FC/PC
Data Transfer Interface	USB/Ethernet/UART	

*Simulated values are for reference only

VioNeer™ Series

Semiconductor Process Monitoring • Photoresist Characterization • Gas/Water Analysis • Biomolecular Absorption Spectroscopy and Other Deep-UV Applications • 155–410 nm Deep-UV Spectrometer



- Spectral response range: 155–410 nm, making this our first deep-UV spectrometer capable of covering wavelengths below 180 nm.
- Ultra-low stray light optical design: Separate processing of zero-order and negative first-order diffraction, combined with a light-blocking structure to significantly reduce stray light interference.
- Optical resolution: 0.3–1.8 nm, with an optional ultra-low-noise detector.
- Features a non-uniform grating spacing design and supports an SMA905 fiber optic connector (with alignment key) and a built-in shutter.
- Equipped with nitrogen purge ports (Ø6 mm inlet / Ø6 mm outlet). Nitrogen can be introduced during measurement to remove oxygen from the optical path, preventing deep-UV absorption by atmospheric oxygen and ensuring stable signal performance in the 155–200 nm wavelength range.

Model Name	VN5190	VN5194
Wavelength Range	155-410nm	
NA	0.11	
Sensor	Back-thinned 2048-pixel CCD	
Diffraction Grating	8xx grooves/mm，Blaze wavelength 200nm	
Resolution	0.3–1.8 nm (10–200 μm slit width selectable)	
Fiber Input Interface	SMA905 (Optional Free-Space Input Port)	
Data Transfer Interface	USB Type B、Ethernet（RJ45）、16 pin GPIO	
Shutter	Built-in Shutter	
Dimension	180 (L) × 144 (W) × 59.9 (H) mm (Excluding Main Board and Connector)	
Weight	< 2kg	
Nitrogen Purge Ports	Ø6 mm Inlet / Ø6 mm Outlet (Nitrogen purging available to minimize deep-UV absorption by atmospheric oxygen.)	
SNR	450	
Dynamic Range	5000	
Dark Noise	Approx. 13	

Spectral Resolution vs. Slit Width (nm)

Wavelength (nm) Slit Width (μm)	170	230	290	350	410	Maximum
10	0.32	0.33	0.29	0.29	0.3	0.33
25	0.36	0.38	0.34	0.34	0.36	0.38
50	0.51	0.52	0.48	0.48	0.53	0.53
75	0.71	0.68	0.66	0.66	0.71	0.71
100	0.9	0.85	0.85	0.84	0.9	0.9
150	1.31	1.19	1.23	1.21	1.28	1.31
200	1.7	1.55	1.61	1.58	1.63	1.7
100*100(Square)	0.9	0.85	0.86	0.84	0.9	0.9

Gemini-Red™ Series

Semiconductor Inspection • Environmental & Geological Sensing • Agriculture & Food Analysis • Material Analysis and Other Broadband NIR Applications• 900-2500nm Integrated Dual-Band NIR Spectrometer with a Single Optical Input



- Single optical input design integrating the 900–1700 nm and 1600–2500 nm spectral ranges into a single system. Both spectral bands share the same optical spot, enabling complete 900–2500 nm near-infrared spectral acquisition.
- Equipped with dual 256-pixel InGaAs detectors (dual-stage TEC cooling) for separate detection of each spectral band, avoiding the significant noise increase of InGaAs detectors at longer wavelengths while maintaining both sensitivity and wavelength accuracy.
- Each spectral band supports independent integration time and gain settings, with dedicated CPU, USB, Ethernet, and GPIO interfaces. Hardware synchronization triggering is supported with a delay of <50 ns, providing near-zero timing offset.
- Supports high-speed data transmission via Ethernet. Compact dimensions of 210 × 180 × 75.5 mm and a weight of <4 kg, making it well suited for broadband near-infrared applications such as environmental remote sensing, agriculture and food, and geology and mining.

Model Name	Gemini-Red Series		
Wavelength Range	900-2500nm		
Input Port	SMA905 Fiber Optic Connector		
Sensor	Dual 256-pixel InGaAs Arrays (Dual-Stage TEC Cooling)		
Resolution	Short-Wavelength Channel	Long-Wavelength Channel	
	2.3-17 nm (25-200nm slit widths available; typical resolution with a 50nm slit: 4.2-4.4 nm)		
SNR (Single Measurement)	High Gain	3200	2200
	Low Gain	4500	4300
Dynamic Range (Single Measurement)	High Gain	8000	7000
	Low Gain	13000	12000
Dark Noise (Average)	High Gain	8	8.5
	Low Gain	5	5.5
Integration Time	Independent integration time settings for each spectral channel to optimize measurement performance.		
Dimension	210(L) x 180(W) x 75.5(H) mm		
Weight	< 4kg		
Fiber Input Interface	SMA905		
Data Transfer Interface	Ethernet/USB/GPIO		

Spectral Resolution vs. Slit Width (900–1700nm)

Wavelength (nm) Slit Width (μm)	900	1100	1300	1500	1700	Maximum
25	2.35	2.29	2.42	2.39	2.33	2.42
50	4.3	4.25	4.21	4.27	4.27	4.3
100	8.48	8.35	8.23	8.3	8.21	8.48
200	16.9	16.65	16.42	16.47	16.45	16.9

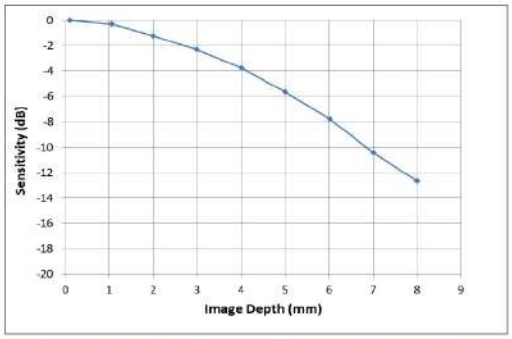
Spectral Resolution vs. Slit Width (1600–2500nm)

Wavelength (nm) Slit Width (μm)	1600	1825	2050	2275	2500	Maximum
25	2.46	2.28	2.28	2.36	2.43	2.46
50	4.27	4.25	4.25	4.33	4.4	4.4
100	8.42	8.38	8.47	8.49	8.54	8.54
200	16.82	16.74	16.75	16.91	17.04	17.04

Alioth™ Series

Eye/Skin/Metal Welding OCT Application
Ultra-High Resolution (0.02nm) SpectrometerSpectrometer





Expected Sensitivity fall-off with Depth

- Wavelength range 820-860nm; Ultra-high spectral resolution 0.02nm.
- Fully transmissive grating and own lens design, integrated system with patented adjustment mechanism.
- Using camera with frame rate 20kHz, 80kHz, 130kHz & 250kHz.
- OtO provides customized ultra-high resolution spectrometers with different transmissive gratings. Experts are welcome to explore various applications with us.

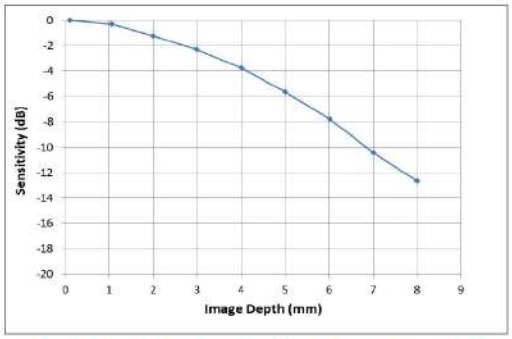
Model Name	AL102GFA AL102CFA	AL108GFA AL208GFA AL108CFA AL208CFA	AL113GFA AL213GFA AL113CFA AL213CFA	AL125GFA AL225CFA
Camera Speed	20kHz	80kHz	130kHz	250kHz
Wavelength Range	820-860nm			
Spectral Resolution	0.02nm			
Imaging Depth	8mm			
Input Fiber	5um single-mode fiber (FC/PC; FC/APC)			
Camera Model Name	e2V octoplus CMOS OCT Camera			
Camera Interface	USB 3.0	USB 3.0 / Cameralink		Cameralink
Camera Package	Ceramic / Organic			
Dimension (w/o camera)	267(L) x 135(W) x 79.8(H) mm			
Weight (w/ camera)	2.3 kg			

*5um Singel-mode FC/PC or FC/APC optical fiber is recommended
*The third digit of the model number: "1" indicates USB 3.0, and "2" indicates Camera Link.
*The sixth digit of the model number: "G" indicates Organic, and "C" indicates Ceramic.

Dubhe Series

Eye/Skin/Material OCT Application
Ultra-high Resolution (0.04nm) Spectrometer





Expected Sensitivity fall-off with Depth

- High-resolution version: Wavelength range 800-880nm; Ultra-high spectral resolution 0.04nm. Wide-band version: Wavelength range 780-930nm & 800-950nm; Spectral resolution 0.075nm.
- Fully transmissive grating and own lens design, integrated system with patented adjustment mechanism.
- Using camera with frame rate 20kHz, 80kHz, 130kHz & 250kHz.
- OtO provides customized ultra-high resolution spectrometers with different transmissive gratings. Experts are welcome to explore various applications with us.

Model Name	DB102GFA DB102CFA	DB108GFA DB208GFA DB108CFA DB208CFA	DB113GFA DB213GFA DB113CFA DB213CFA	DB225GFA DB225CFA
Camera Speed	20kHz	80kHz	130kHz	250kHz
Wavelength Range	800-880nm, Resolution: 0.04nm, Imaging Depth: 4mm			
	780-930nm, Resolution: 0.075nm, Imaging Depth: 2.1mm			
	800-950nm, Resolution: 0.075nm, Imaging Depth: 2.1mm			
Input Fiber	5um single-mode fiber(FC/PC; FC/APC)			
Camera Model Name	e2V octoplus CMOS OCT Camera			
Camera Interface	USB 3.0	USB 3.0 / Cameralink		Cameralink
Camera Package	Ceramic / Organic			
Dimension (w/o camera)	800-880nm: 180(L) x 120(W) x 63(H) mm			
	780-930nm/800-950nm : 210(L) x 120(W) x 60(H) mm			
Weight (w/ camera)	1.65 kg			

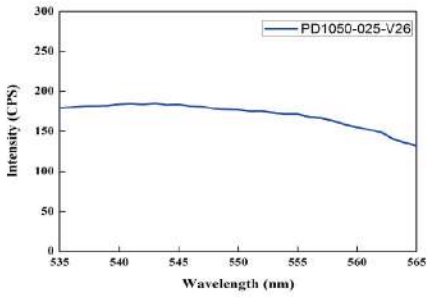
*5um Singel-mode FC/PC or FC/APC optical fiber is recommended
*The third digit of the model number: "1" indicates USB 3.0, and "2" indicates Camera Link.
*The sixth digit of the model number: "G" indicates Organic, and "C" indicates Ceramic.

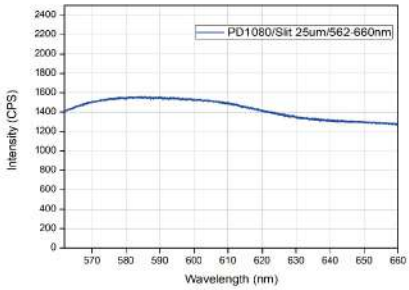
Phekda™ / Phekda-NIR Series

OCT, LIBS, VCSEL, Thin-film, Raman Application Customized High-Resolution Spectrometer

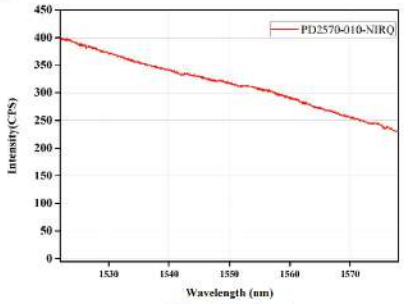


- Wavelength range 400-1100nm & 900-1700nm configurable; High spectral resolution < 0.1nm (VIS-NIR) & <0.2nm (NIR) .
- New T-R-T (Transmissive-Reflective-Transmissive) optical design.
- For VIS-NIR wavelength range (400–1100 nm), a back-thinned 2048-pixel CCD or 4096-pixel CMOS sensor is embedded. For NIR wavelength range (900–1700 nm), a 512-pixel InGaAs sensor is embedded.
- OtO provides customized high resolution spectrometers with different relective gratings. Experts are welcome to explore various applications with us.





PD Series Wavelength Response with Halogen Lamp



PD-NIR Series
Wavelength Response with Halogen Lamp

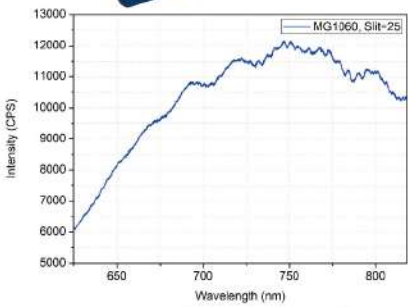
Model Name	PD1050	PD1080	PD2570	
Wavelength Range	Configurable within the wavelength range of 400 to 1100 nm		Configurable within the wavelength range of 900 to 1700 nm	
Resolution	<0.125@535~565nm, Slit 25um <0.35@625-818nm, Slit 25um	<0.1@535~650nm, Slit 10um <0.1@548~658nm, Slit 10um <0.2@548~658nm, Slit 25um <0.31@750~925nm, Slit 25um <0.07@802~878 nm, Slit 5um, FC/APC <0.28@760-1100 nm, Slit 10um	0.2~0.6@1060~1200nm, Slit 10um 0.3~0.65@1270~1350nm, Slit 10um 0.3~0.5@1500~1600nm, Slit 10um 0.5~0.65@1522~1578nm, Slit 10um 0.3~0.5@1590~1700nm, Slit 10um	
Sensor	Back-thinned 2048pixel CCD	4096pixel CMOS	512 pixel InGaAs	
SNR	500	350	High Gain 2600	Low Gain 4300
Dynamic Range	4700	3800	High Gain 6000	Low Gain 7300
Dark Noise	14	17	High Gain 11	Low Gain 9
Integration Time	5ms~65sec.	0.1ms~65sec.	0.1ms~24sec.	
Dimension	180 (L) x 175 (W) x 60.7 (H) mm			
Fiber Input Interface	SMA905 or FC/PC or FC/APC			
Data Transfer Interface	USB 2.0 / UART			

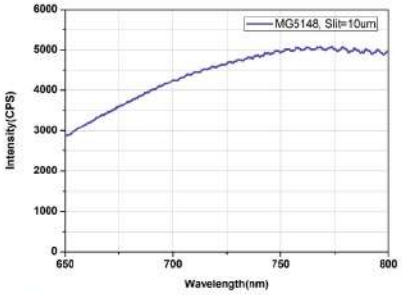
Megrez™ / Megrez-NIR™ Series

Raman, LIBS, VCSEL, Thin-film Application
Customized Thermoelectric Cooling & High-Resolution

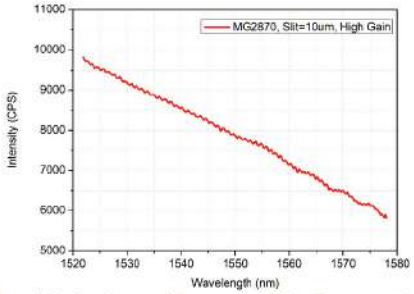


- Wavelength range 400-1100nm & 900-1700nm configurable; High spectral resolution < 0.1nm (VIS-NIR) & <0.2nm (NIR) .
- New T-R-T (Transmissive-Reflective-Transmissive) optical design with thermo-electric cooling dector embedded (Default: 0°C at Ambient of 25°C).
- Extremely low thermal noise, TE-Cooler effectively controls dark background under long measurement time.
- For VIS-NIR wavelength range (400–1100 nm), a TE-cooled back-thinned 2048-pixel CCD sensor is embedded. For NIR wavelength range (900–1700 nm), a TE-cooled 512-pixel or 1024-pixel InGaAs sensor is embedded.
- OtO provides customized high resolution spectrometers with different relective gratings. Experts are welcome to explore various applications with us.





MG Series Spectral Response with a Tungsten-Halogen Lamp



MG Near-Infrared Series Spectral Response with a Tungsten-Halogen Lamp

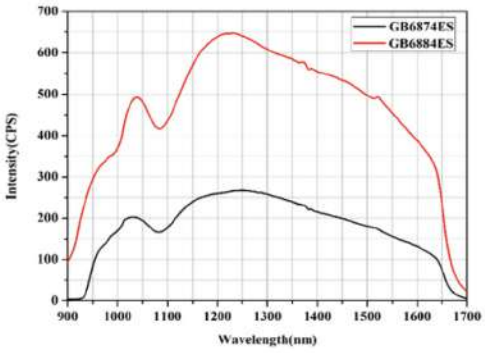
Model Name	MG5148ES	MG1060S	MG1110S	MG2870S	MG6870ES	MG2800S
Wavelength Range	Configurable within the wavelength range of 400 to 1100 nm			Configurable within the wavelength range of 900 to 1700 nm		
Resolution	<0.35@650~800nm, Slit 10nm	<0.35@625-818nm, Slit 25um <0.35@790-960nm, Slit 25um <0.35@560-635nm, Slit 50um <0.17@535-650nm, Slit 10um <0.33@790-1050nm, Slit 10um <0.33@790-1050nm, Slit 25um	<0.35@625-818nm, Slit 25um <0.45@790-1050nm, Slit 10um <0.67@790-1085nm, Slit 25um	0.2~0.6@1060~1200nm, Slit 10um 0.3~0.65@1270~1350nm, Slit 10um 0.3~0.5@1500~1600nm, Slit 10um 0.5~0.65@1522~1578nm, Slit 10um 0.3~0.5@1590~1700nm, Slit 10um	0.2~0.6@1060~1200nm, Slit 10um 0.3~0.65@1270~1350nm, Slit 10um 0.3~0.5@1500~1600nm, Slit 10um 0.5~0.65@1522~1578nm, Slit 10um 0.3~0.5@1590~1700nm, Slit 10um	0.1~0.15@1280-1335nm, Slit 10nm
Sensor	TE-cooled Back-thinned 1024pixel CCD	TE-cooled Back-thinned 2048pixel CCD		512 pixel TE-cooled InGaAs		TE-cooled Back-thinned 1024pixel CCD
CCD Cooling	One Stage TEC (Default: 0。C at Ambient of 25。C)					
SNR	1300	500		High Gain: 2700 / Low Gain: 4900	High Gain: 2700 / Low Gain: 4900	High Gain: 3000 / Low Gain: 5500
Dynamic Range	52000	5000		High Gain: 9300 / Low Gain: 11000	High Gain: 9300 / Low Gain: 12000	High Gain: 9100 / Low Gain: 11000
Dark Noise	5	13		High Gain: 7 / Low Gain: 6	High Gain: 7 / Low Gain: 6	High Gain: 7.2 / Low Gain: 5.6
Integration Time	2.5ms~65sec.	5ms~65sec.		0.1ms~24sec.	6us~24sec.	0.1ms~24sec.
Dimension	199(L) x 170(W) x 64.5(H) mm					
Fiber Input Interface	SMA905 or FC/PC or FC/APC					
Data Transfer Interface	USB 2.0 / UART / Ethernet					

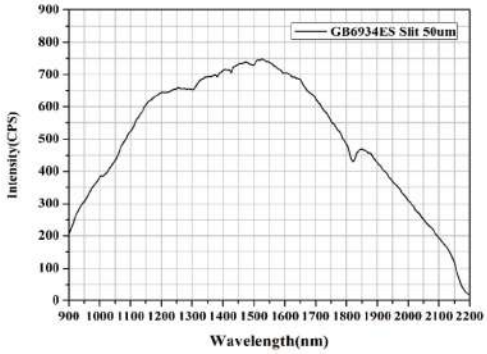
GoldenBullet™ Series

Ground/ Food/ Textile Analysis, NIR Application
Advanced Thermoelectric Cooling NIR Spectrometer

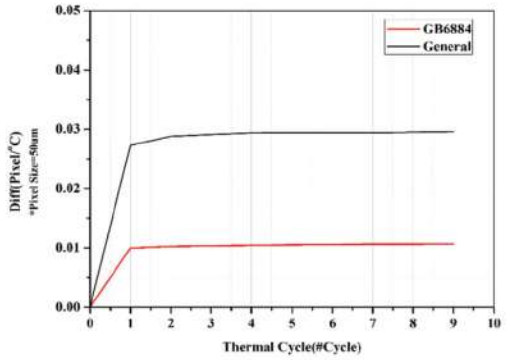




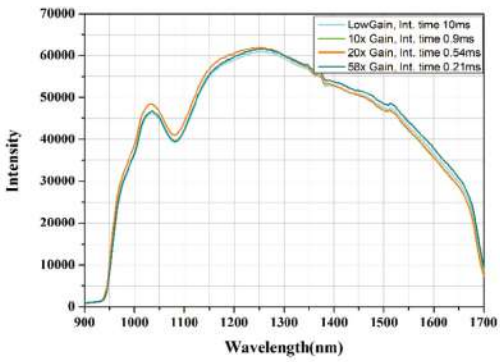




GB Series Wavelength Response with Halogen Lamp



Excellent Wavelength Stability Under Thermal Test



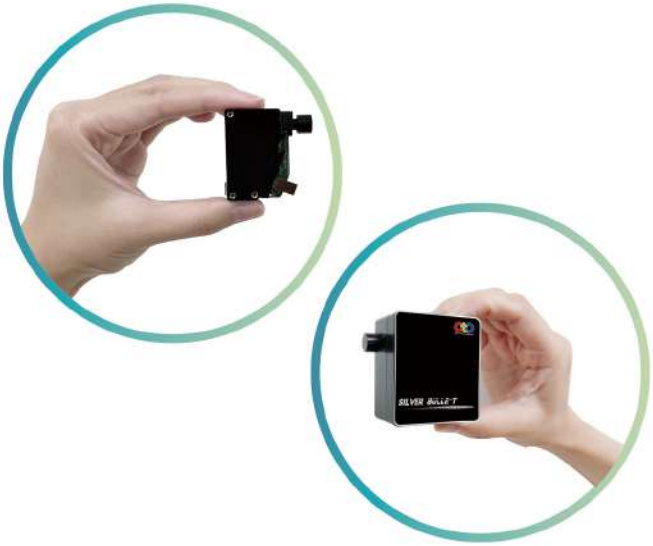
Comparison of High Gain and Low Gain Modes
(Using GB6564ES as an Example)

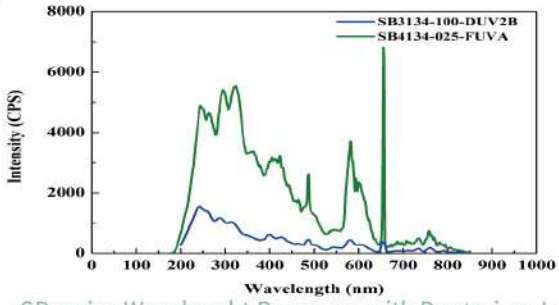
- Wavelength range 900-1700nm & 900-2200nm ; Resolution 8.1nm & 10.2nm (Slit: 50um).
- Czerny-Turner optical design, the most compact NIR spectrometer with thermoelectric cooling InGaAs dector embedded.
- Very excellent wavelength stability under thermal expansion.
- Transmissive lens embedded to have high sensitivity performance.

Model Name	GB6564ES	GB6884ES	GB6874ES	GB6934ES
Wavelength Range	900-1700nm			900-2200nm
Slit	50um		25um	50um
Resolution	4.7~8.1 slit 50um		2.3~4.5 slit 25um	6.4~10.2
TE-Cooled InGaAs Sensor	256 pixels InGaAs		512 pixels InGaAs	256 pixels InGaAs
CCD Cooling	No Cooling	One Stage (Ambient temperature 25°C can be reduced to -5°C)		Two Stage (Ambient temperature 25 °C can be reduced to -20 °C)
SNR (@0。C/ -20。C)	5000@ 1x gain 3000@10x gain 2200@20x gain 1500@58x gain	5000@ 1x gain 3000@10x gain 2500@20x gain 1600@58x gain		5000@ 1x gain 3000@10x gain 2500@20x gain 1500@58x gain
Dynamic Range (@0。C/ -20。C)	5900@ 1x gain 4300@10x gain 2900@20x gain 1300@58x gain	11000@ 1x gain 6500@10x gain 5000@20x gain 2400@58x gain	6500@ 1x gain 5400@10x gain 4600@20x gain 3200@58x gain	12000@ 1x gain 6500@10x gain 5000@20x gain 1800@58x gain
Dark Noise	< 11@ 1x gain <15@10x gain <22@20x gain <50@58x gain	< 7@ 1x gain <10@10x gain <13@20x gain <19@58x gain	< 10@ 1x gain < 12@10x gain < 14@20x gain <20@58x gain	< 7@ 1x gain < 9@10x gain <14@20x gain <35@58x gain
Integration Time	6us~24s			
Dimension	100(L) x 97.5(W) x 69.8(H) mm	109.8(L) x 97.5(W) x 69.8(H) mm		
Fiber Input Interface	SMA905, FC/PC			
Data Transfer Interface	USB2.0 480 Mbps / UART / Ethernet 100 Mbps			

SilverBullet™ Series

Water Quality/ Color Analysis, Handheld Miniature Application Micro UV-VIS-NIR Spectrometer





SB series Wavelenght Response with Deuterium Lamp

Garting groove (line/mm)	Wavelength Range(nm)	Resolution(nm) (slit 50um)	Resolution(nm) (slit 25um)
300	300~1100	10.8	6.5
400	250~1070	7.8	5
500	200~850	6.2	4.2
600	180~700	5.8	3.5
700	180~600	5	3
768	180~550	4.5	2.7
900	180~470	3.9	2.3
1000	180~430	3.5	2.1
1200	180~350	2.9	1.7

- Wavelength range 180-1100nm configurable ; Resolution 1.7nm~ 6.5nm (Slit: 25um).
- New concave mirror Czerny-Turner optical design.
- 1024pixels CMOS Sensor; High Speed CPU.

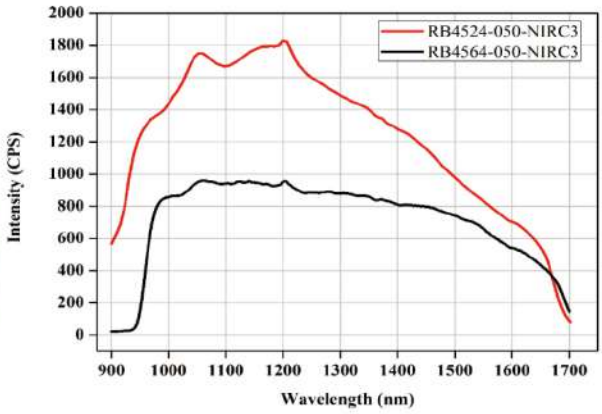
Model Name	SB2134/ SB3134/ SB4134 SB2135/ SB4135 (90-Degree Optical Input Port)	SB4130	SB4234
Wavelength Range	180~1100nm Configurable		
Slit	25um / 50um		
Resolution	1.7~10.8nm (depending on the combination of various gratingsand and slits)		
Sensor	1024pixels CMOS		2048pixels CMOS
SNR	350		350
Dynamic Range	5000		5000
Dark Noise	12.5		13
Integration Time	6us (Sensor Clock rate 10mHz)~65sec. 21us (Sensor Clock rate 2.5mHz)~65sec.		
Dimension	40(L) x 36.3(W) x 25.1(H) mm	49(L) x 43(W) x 28.5(H) mm	40(L) x 36.3(W) x 25.1(H) mm
Fiber Input Interface	SMA905		
Data Transfer Interface	Micro USB / UART		

RedBullet™ Series

Ground/ Food/ Textile Analysis, NIR Handheld Miniature Application Micro NIR Spectrometer







RB Series Spectral Response with a Tungsten-Halogen Lamp

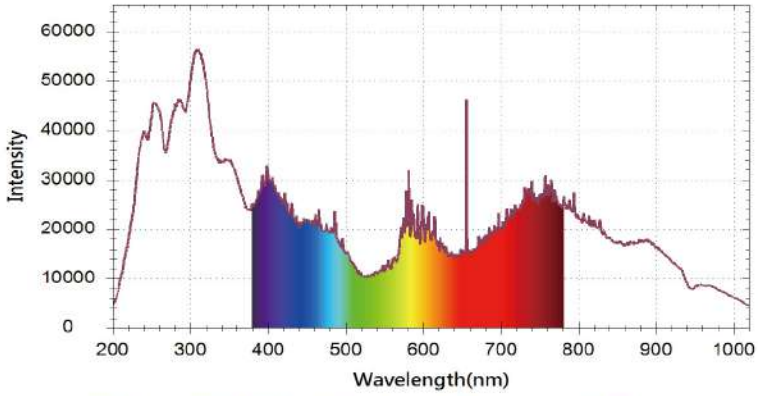
- Wavelength range 900~1700nm; Resolution 10~16nm (Slit : 50um)
- New concave mirror Czerny-Turner optical design.
- Using camera with frame rate 20kHz, 80kHz, 130kHz & 250kHz.

Model Name		RB4504	RB4514	RB2524/RB4524/ RB4520	RB4564
Wavelength Range		900~1700 nm			
Slit		50um	25um/50um	50um	25um/50um
Resolution		8.3~16.2 nm	~9.9nm 7.6~12nm	8.3~16.2 nm	7.4~9.9nm 10.4~12nm
Sensor		128 pixels InGaAs	256 pixels InGaAs	128 pixels InGaAs	256 pixels InGaAs
SNR	High gain	3000		2500	3000
	Low gain	4400		6500	6700
Dynamic Range	High gain	6500		6500	7300
	Low gain	8200		8200	9300
Dark Noise	High gain	16		10	9
	Low gain	14		8	7
Integration Time		1us~24sec.		6us~24sec.	
Dimension		50(L) x 43.4(W) x 20.1(H) mm		50(L) x 36.4(W) x 28.4(H) mm 60(L) x 43.5(W) x 33.79(H) mm (with Enclosure)	
Fiber Input Interface		SMA905			
Data Transfer Interface		Micro USB / UART			

SmartEngine™ Series

LED/ Display/ Semiconductor Thin-film Inspection, Biomedical Detection
Environmental Monitoring (Water and Air) Analysis Application
Best-selling UV-VIS-NIR Spectrometer





SE Series 200-1025nm Wavelength Response with Deuterium-Halogen Lamp

- Wavelength range 180-1100nm configurable; Spectral resolution 0.2nm~13nm depends on various grating and slit combination.
- Standard unfold Czerny-Turner optical design.
- More than 10 different sensors and 30 different gratings for selection.
- Excellent thermal (<0.04nm/°C), humidity, vibration and shock stability.
- Support continuous high-speed & multiple exposures and trigger modes.
- Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- On-board CPU supports optical and color parameters calculation.
- A single-chip processer with faster data transfer rate, using along with a high sensitivity sensor achieves a min. exposure time: 6 us and a max. frame rate: 0.2 ms /frame.
- Pixel Binning mode supports to increase sensitivity, 2/4/8/16 pixel binning optional.
- Dimension: 110 (L) x 86 (W) x 35.4 (H) mm. Fiber input: SMA905 or FC/PC (optional).

  Data interface: USB 2.0, UART, Ethernet.

Customize a Spectrometer for Your Needs

Detector Selections

Model Name	Detector Type	Characteristic	SNR	Dynamic Range
SE2010	Front-illuminated CCD	Entry-level model	200	2200
SE2030 / SE4134	CMOS with Fast Exposure	Shortest Exposure Time (0.2ms)	350	4300 (2.5MHz) 3000 (10MHz)
SE2020/ SE2040	Front-illuminated CCD	Excellent Cost Performance Value	250/ 200	1700/ 2200
SE2070	High Pixel-Resolution CCD	High Pixel-Resolution	400	2200
SE2080	CMOS with Fast Exposure	Short Exposure Time (0.4ms) &High Pixel-Resolution Choice	350	3200
SE2090	Back-thinned CCD with Fast Exposure	Full Wavelength Range with Fast Exposure Time (1.5ms)	500	6000
SE2110	Back-thinned CCD with NIR-enhancement	High NIR sensitivity with High SNR	500	4600
SE2120/ SE4120	CMOS with Fast Exposure	High Sensitivity &Shortest Exposure Time (6us)	350	4300 (2.5MHz)
SE6190/ SE6190E	Back-thinned CCD with Deep UV-enhancement	High Deep UV sensitivity & Support Ethernet Interface	500	6000

Grating/ Range/ Slit and Resolution Combination

Groove Density (g/mm)	Best Efficiency Wavelength (nm)	Band width (nm)	Selectable band (nm)	Resolutions (nm) Under Different Slit Sizes				
				10(um)	25(um)	50(um)	100(um)	200(um)
2400	240/400	100 UV 150	180-520	0.2	0.3	0.4	0.7	1.2
1800	180/250/500	150 UV 210	180-700	0.3	0.4	0.6	1.0	1.8
1600	200	160 UV 240	180-780	0.3	0.4	0.7	1.2	2.0
1400	230	180 UV 260	180-900	0.4	0.5	0.8	1.6	3.0
1200	200/300/500/600/750/850	220 UV 320	180-1010	0.4	0.6	0.9	1.7	3.4
1000	250/900	300 UV 400	180-1100	0.6	0.7	1.1	1.9	3.0
950	1000	330 UV 420	180-1100	0.7	0.9	1.4	2.4	3.5
900	500	360 UV 450	180-1100	0.6	0.8	1.3	2.3	4.6
830	800	410 UV 490	180-1100	0.9	1.0	1.5	2.5	4.5
600	250/300/400/500/800/1000	660 UV 680	180-1100	1.0	1.2	1.9	3.3	6.7
500	300/330/560/770	820 UV 830	180-1100	1.1	1.4	2.4	3.7	7.5
300	230/300/422/500	920	180-1100	1.7	2.3	3.2	6.0	12.8

Recommended Models

Application	Model Name	Wavelength Range (nm)	Resolution (nm) @ Slit: 50um	Min. Exposure Time
LED Test	SE2030/4030, SE2090, SE2120/4120	350-1020	1.9	100 /6, 1500, 100 /6 us
Display Detection	SE2030, SE2120	380-780	1.3	0.1ms
Water Quality Analysis	SE2030	180- 850	1.9	0.1 ms
Air Analysis	SE2030, SE2090	180-500	0.2-0.6	0.1, 1.5 ms
Raman Detection	SE2030, SE2110, SE2120	790-1090	1.1	0.1, 5, 0.1 ms
Educational Requirement	SE1040	350-1020	1.9	1 ms
Film Thickness Measurement	SE6030, SE6090	180-1100	3.2	0.1, 1.5 ms
Gem Stone Examination	SE2030	400-500	0.5	0.1 ms
Food Analysis	SE2030	180-1100	3.2	0.1 ms
Blood Analysis	SE2030, SE2120	300-850	1.9	0.1 ms
Fluorescence Detection	SE2030, SE2080, SE2120	340-850	1.9	0.1, 0.42, 0.1 ms
OCT Application	SE2030, S2080	790-1010	0.9	0.1, 0.42 ms

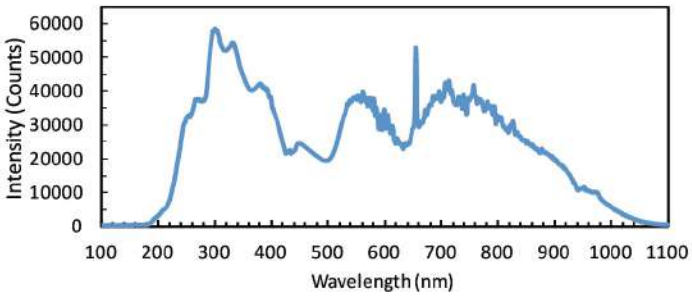
HummingBird™ Series

Display/ Raman/ Semiconductor Thin-film Inspection, Bio-medical Detection
OCT/ Environmental Monitoring (Water and Air) Analysis Application
Best-selling Handheld UV-VIS-NIR Spectrometer

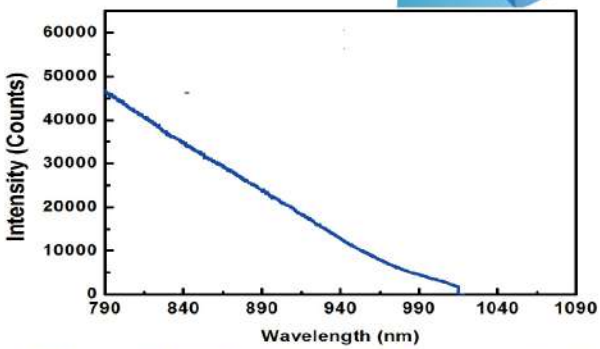


- Wavelength range 180-1100nm configurable; Spectral resolution 0.3nm~15nm depends on various grating and slit combination.
- Folded star-shape Czerny-Turner optical design which is miniaturized and optimized for size and weight, best choice for handheld high-resolution measurement.
- More than 3 different sensors and 20 different gratings for selection.
- Excellent thermal (<0.04nm/°C), humidity, vibration and shock stability.

  Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- On-board CPU supports optical and color parameters calculation.
- Support continuous high-speed & multiple exposures and trigger modes.
- Dimension (including control board): HB: 83 (L) x 75.5 (W) x 26.75 (H) mm;
- Fiber input: SMA905 or FC/PC (optional). Data interface: USB 2.0, UART.



HB Series 180-1100nm Wavelength Response with Deuterium-Halogen Lamp



HB Series 790-1010nm Wavelength Response with Halogen Lamp

Customize a Spectrometer for Your Needs

Detector Selections

Model Name	Detector Type	Characteristic	SNR	Dynamic Range
HB2034 / HB2030	CMOS with Fast Exposure	Shortest Exposure Time (0.2ms)	350	5040 (2.5MHz) 4370 (10MHz)
HB2094/ HB2090	Back-thinned CCD with Fast Exposure	Full Wavelength Range with Fast Exposure Time (1.5ms)	500	3800
HB2114	Back-thinned CCD with NIR-enhancement	High NIR sensitivity with High SNR	500	4100

Grating/ Range/ Slit and Resolution Combination

Groove Density (g/mm)	Best Efficiency Wavelength (nm)	Band width (nm)	Selectable band (nm)	Resolutions (nm) Under Different Slit Sizes				
				10(um)	25(um)	50(um)	100(um)	200(um)
2400	240	140	180-540	0.3	0.4	0.5	0.9	1.4
1800	250	200	190-380	0.3	0.4	0.6	1.0	1.8
1400	230	250	180-920	0.5	0.6	0.8	1.6	3.0
1200	200/250/850	220 UV 320	180-1010	0.6	0.7	1.0	1.9	3.6
1000	900	300	180-1100	0.6	0.8	1.1	1.9	4.0
900	550	400	180-1100	0.8	0.9	1.3	2.5	5.0
600	300/500	670	180-1100	1.2	1.4	1.9	3.7	7.0
500	300/330/560/770	825	180-1100	1.5	1.5	3.0	6.7	8.7
300	230/300	920	180-1100	1.7	2.5	3.9	8.0	15.0

Recommended Models

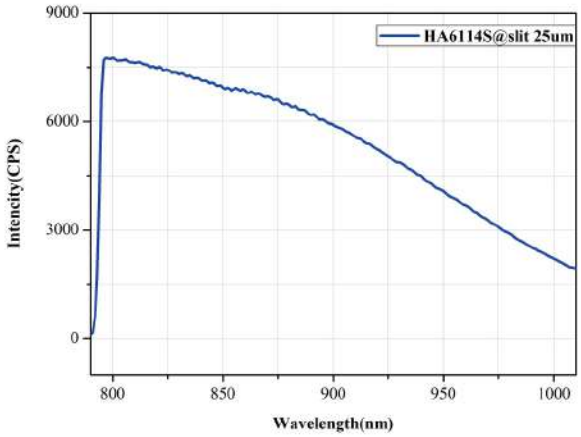
Application	Model Name	Wavelength Range (nm)	Slit (um)	Resolution (nm)	Min. Exposure Time
LED Test	HB2034/ HB2094	350-1020	50	1.9	0.1/1.5 ms
Display Detection	HB2034/ HB2094	380-780	300	8.0	0.1/1.5 ms
Film Thickness Measurement	HB2034/ HB2094	180- 1100	50	3.9	0.1/1.5 ms
Water Quality/ DNA Detection	HB2034/ HB2094	180- 850	50	1.9	0.1/1.5 ms
Air Analysis	HB2034/ HB2094	180-500	10/25	0.6~0.7	0.1/1.5 ms
Food Analysis	HB2034	350- 1020	200	7.0	0.1 ms
Raman Detection	HB2034/ HB2114	790- 1010	25	0.7	0.1/5 ms
OCT Application	HB2034/HB2094	790- 1090	25	0.8	0.1 ms

Hummingbird Advance™ Series

Raman/ Semiconductor Thin-film Inspection, Biomedical Detection
Most Compact UV-VIS-NIR Thermoelectric Cooling Spectrometer



- Wavelength range 180-1100nm configurable; Spectral resolution 0.3nm~15nm depends on various grating and slit combination.
- Folded star-shape Czerny-Turner optical design which is miniaturized and optimized for size and weight, best choice for handheld high-resolution measurement.
- More than 3 different sensors and 20 different gratings for selection.
- Excellent thermal (<0.04nm/°C), humidity, vibration and shock stability.
- Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- On-board CPU supports optical and color parameters calculation.
- Support continuous high-speed & multiple exposures and trigger modes.
- Dimension (including control board): 95 (L) x 109.5 (W) x37.1 (H) mm.
- Capable of reducing the temperature from room temperature (25°C) down to 0°C.
- Fiber input: SMA905 or FC/PC (optional). Data interface: USB 2.0, UART.



HA Series Spectral Response (Halogen Tungsten Lamp)

Make A Spectrometer for Your Own Special Needs

Detector Selections

Model Name	Detector Type	Characteristic	SNR	Dynamic Range
HA6114	Back-thinned TE-cooled CCD with NIR-enhancement	High NIR sensitivity with High SNR	500	5000

Grating/ Range/ Slit and Resolution Combination

Groove Density (g/mm)	Best Efficiency Wavelength (nm)	Band width (nm)	Selectable band (nm)	Resolutions (nm) Under Different Slit Sizes				
				10(um)	25(um)	50(um)	100(um)	**200(um)**
2400	240	140	180-540	0.3	0.4	0.5	0.9	1.4
1800	250	200	190-380	0.3	0.4	0.6	1.0	1.8
1400	230	250	180-920	0.5	0.6	0.8	1.6	3.0
1200	200/250/850	220 UV 320	180-1010	0.6	0.7	1.0	1.9	3.6
1000	900	300	180-1100	0.6	0.8	1.1	1.9	4.0
900	550	400	180-1100	0.8	0.9	1.3	2.5	5.0
600	300/500	670	180-1100	1.2	1.4	1.9	3.7	7.0
500	300/330/560/770	825	180-1100	1.5	1.5	3.0	6.7	8.7
300	230/300	920	180-1100	1.7	2.5	3.9	8.0	15.0

Recommended Models

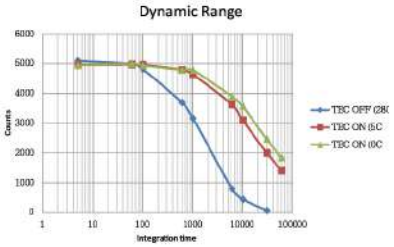
Application	Model Name	Wavelength Range (nm)	**Slit(um)**	Resolution (nm)	Minimum Integration Time
Raman Detection	HA6114S	790- 1010	25	<0.8	5 ms

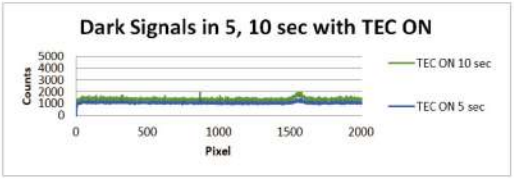
EagleEye™ Series-TE-cooler Model

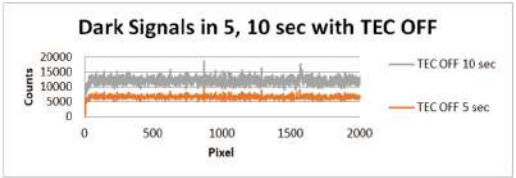
LED/ Raman Measurement, Semiconductor Thin-film Inspection Thermoelectric Cooling UV-VIS-NIR Spectrometer



- Wavelength range 180-1100nm configurable; Spectral resolution 0.2nm~13nm depends on various grating and slit combination.
- Standard unfold Czerny-Turner optical design with thermoelectric cooling dector embedded (Default: 0°C at Ambient of 25°C).
- Different sensors and different gratings for selection. (The resolution table for gratings and corresponding slits can be referenced in the SmartEngine Series Page)
- Extremely low thermal noise, TE-Cooler effectively controls dark background under long measurement time.
- Support continuous high-speed & multiple exposures and trigger modes.
- Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- Pixel Binning mode supports to increase sensitivity, 2/4/8/16 pixel binning optional.







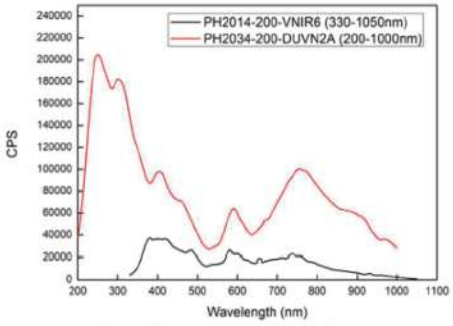
Model	EE2113	EE2063	EE2093
Wavelength Range	500~1100nm	180-1100nm	
Slit	10/ 25/ 50/ 100/ 200/ 300um		
Resolution	0.2nm~13nm *		
Sensor	2048 pixels back-thinned CCD with NIR-enhancement	2048 pixels back-thinned CCD with UV-enhancement	
CCD Cooling	0°C at Ambient of 25°C		
SNR	500		
Dynamic Range	5000	4000	
Dark Noise	13	17	
Integration Time	5ms~65sec.		1.5ms~65sec.
Shutter	Optional		
Dimension	130 (L)*96(W)*57.65(H) mm		
Fiber Input Interface	SMA905 or FC/PC		
Data Transfer Interface	USB2.0 / UART/ Ethernet		

* Depends on various grating and slit combination.

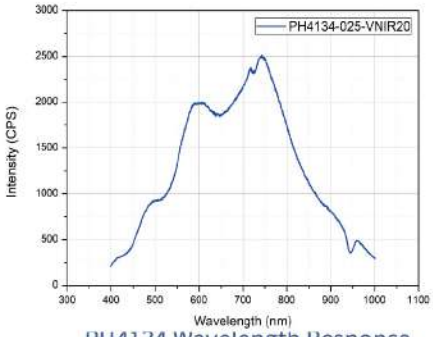
PocketHawk™ Series

Thin-film/ Biomedical Analysis, Handheld Miniature Applications
Compact UV-VIS-NIR Spectrometer with Good Performance & Price





PH2014/2034 Wavelength Response
(Deuterium-Halogen Lamp)



PH4134 Wavelength Response
(Halogen Lamp)

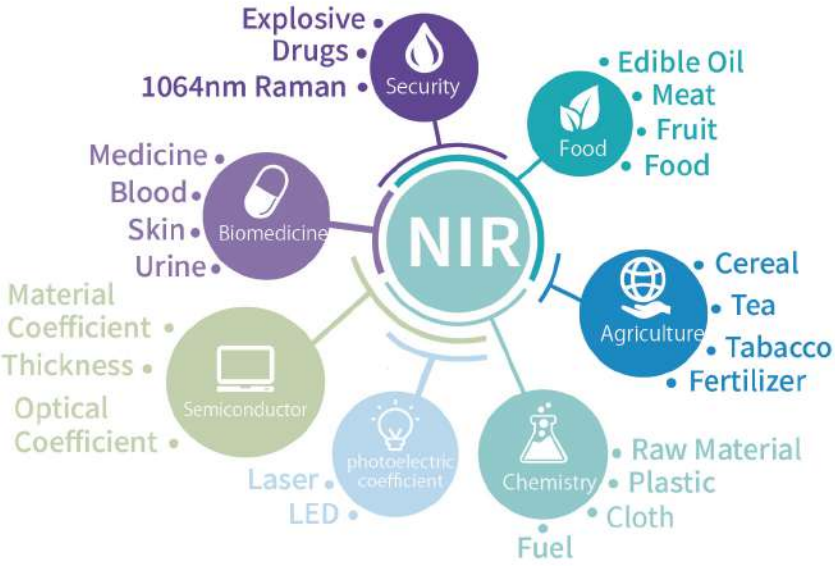
- Wavelength range: Configurable from 180nm to 1100nm.
- Folded star-shape Czerny-Turner optical design which is miniaturized and optimized for size and weight, best choice for handheld measurement.
- Support continuous high-speed & multiple exposures and trigger modes.
- Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- On-board CPU supports optical and color parameters calculation.
- Attractive cost to implement micro & smart spectral application systems.

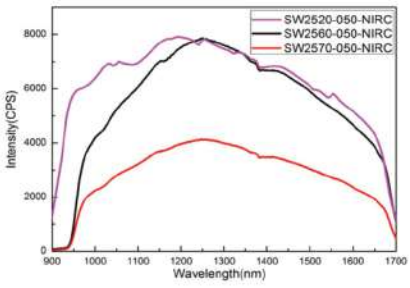
Model Name	PH2014	PH2034	PH4134	PH4234
Wavelength Range	330-1050nm	200–1050 nm (Customizable from 180 to 1100 nm)		
Slit	10/25/50/100/200 um			
Resolution	2.2/2.5/3.1/6/12 nm	NA/NA/10/18.3/36 nm	2.7/3.3/4.7/8.8/20 nm	
Sensor	3000 Pixels	512 Pixels	1024 Pixels	2048 Pixels
SNR	200	350	350	350
Dynamic Range	2200	5500	5000	5000
Dark Noise	30	12	13	13
Integration Time	1.5ms~65sec.	0.1ms~65sec.	0.1ms~65sec.	20us~65sec.
Dimension	65 (L)x 65 (W) x 29.8 (H) mm			
Fiber Input Interface	SMA905			
Data Transfer Interface	Micro USB / UART			

SideWinder™ Series

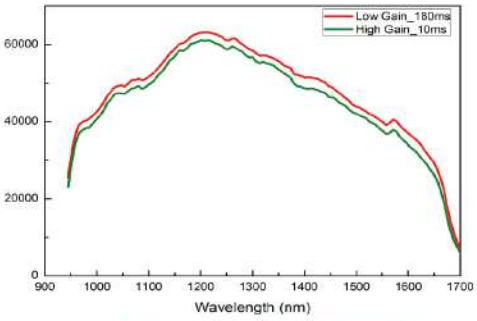
Film Thickness Inspection/ F ood, Pharma, and Bio-chemistry Analysis/ Fabric Material Analysis Applications Excellent Performance & Robust Design NIR Spectrometer



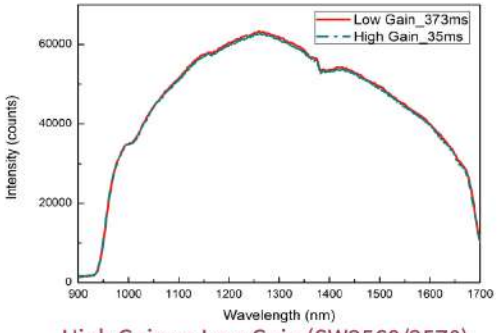




SW2520 & SW2560 & SW2570 Wavelength Response with Halogen Lamp



High Gain vs Low Gain (SW2520)



High Gain vs Low Gain (SW2560/2570)

- Specially designed for Near Infrared region covering from 900~1700nm.
- Standard unfold Czerny-Turner optical design. Compact size and convenient to carry for NIR measurement.
- High SNR, high sensitivity and high resolution.
- High gain mode & low gain mode for options. Sensitivity of high gain mode is at average 10 or 18 times higher than low gain mode.
- Enterance shutter can be built in as an option.
- OtO provides customized higher resolution SW2570 with different relective gratings. Experts are welcome to explore various applications with us.

Model Name	Groove Density (g/mm)	Best Efficiency Wavelength (nm)	Bandwidth (nm)	Selectable Band (nm)	Resolutions (nm) under different slit sizes *				
					25 (um)	50 (um)	100 (um)	150 (um)	200 (um)
SW2520	120	1000	800	900-1700	-	9~14.8	21.8	26.1	34
SW2560	236.8	1350	800	900-1700	-	3.6~7.2	6.2~11.7	12.7	16.5
SW2570	236.8	1350	800	900-1700	2~4.1	3~5.2	6.8~8.4	12.2	14~16.2

*Typical value, Small deviations are possible.

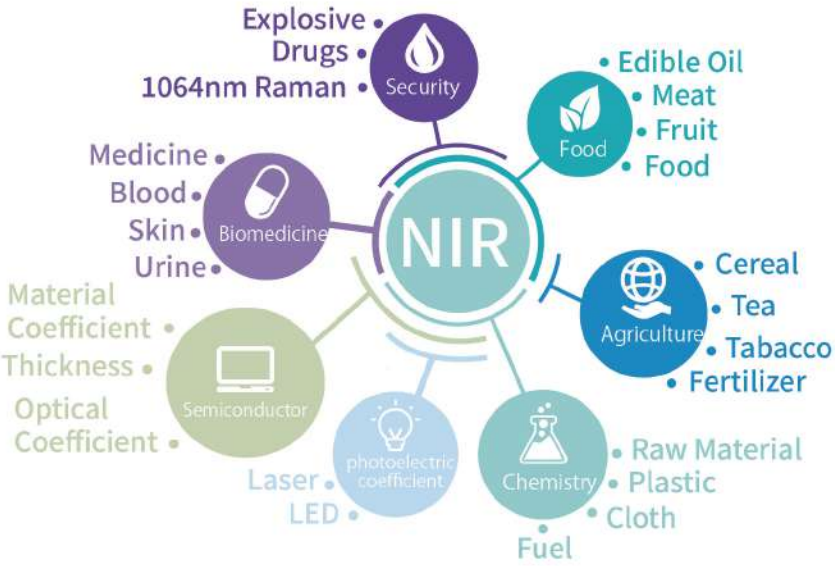
Model Name		SW2520	SW2560	SW2570
Wavelength Range		900~1700nm		
Slit		50/ 100/ 150/ 200um		25/ 50/ 100/ 150/ 200um
Resolution@slit 50um (1083.84nm, 1262.34nm & 1473.28nm of Xenon lamp.)		0.67~14.8	3.6~7.2	3~5.2
InGaAs Sensor		128 pixels	256 pixels	512 pixels
SNR (Single acquisition)	High Gain	2000	2400	2500
	Low Gain	4000	4500	4000
Dynamic Range (avg.)	High Gain	6500	6000	6000
	Low Gain	8200	9300	9300
Dark Noise (Upper Limit)	High Gain	10	11	11
	Low Gain	8	8	8
Integration Time		100 µs~24 sec. depending on sensors		
Dimension		110(L) x 86(W) x 35.4(H) mm		
Fiber Input Interface		SMA905		
Data Transfer Interface		USB2.0 / UART		

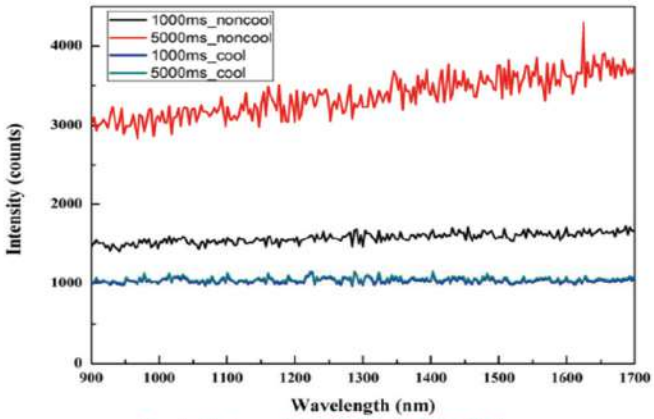
*Typical value, Small deviations are possible.

SideWinder™ Series with TE-cooler

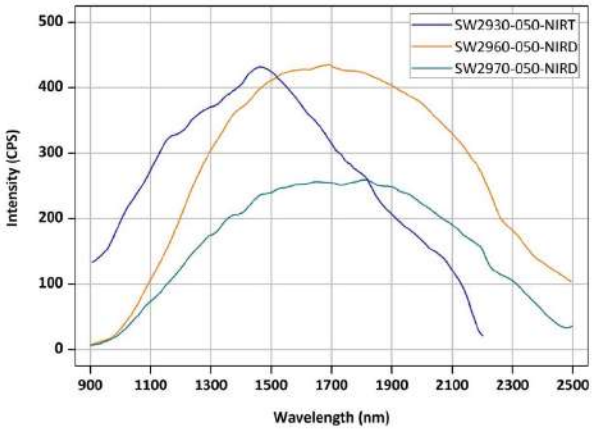
Enviromental Detection/ Film Thickness Inspection/ Food, Pharma, and Bio-chemistry Analysis/ Fabric Material Analysis Applications
Excellent Performance TE-cooled NIR Spectrometer







Dark Noise of TEC ON vs TEC OFF
under different integration time (SW2860)



Spectral Respond of SW2930/2960/2970

- Wavelength range 900-1700nm, 910-2200nm & 900-2500nm.
- Standard unfold Czerny-Turner optical design with thermoelectric cooling InGaAs dector embedded.
- TEC One-Stage: SW2860, SW2870 (shutter is optional).
  TEC Two-Stage: SW2930, SW2960, SW2970 (shutter is included).
- High SNR, high sensitivity and high dynamic range.
- High gain mode & low gain mode for options. Sensitivity of high gain mode can be selected as 10x, 20x, or 58x higher than low gain mode.
- Enterance shutter can be built in as an highly recommended option.

Model	Groove Density (g/mm)	Best Efficiency Wavelength(nm)	Bandwidth (nm)	Selectable Band (nm)	Resolutions (nm) under different slit sizes *				
					25 (um)	50 (um)	100 (um)	150 (um)	200 (um)
SW2860 SW2880	236.8	1350	800	900-1700	-	3.7~7.2	6.7~10	8.5~12.7	16.5
SW2870	236.8	1350	800	900-1700	2.5~4.1	3.5~5.2	8.4	12.2	16.2
	400	1200	340	1090~1450	2.2	2.8	4.6	6.7	8.8
SW2930	150	1250	1290	910-2200	-	6~11.2	10~15.6	15.8~19.4	25.5
SW2960	120	1800	1600	900-2500	-	6.2~14.8	13.8~16.5	20.2~26	25~34
SW2970	120	1800	1600	900-2500	4.6~8.5	6.2~10.7	13.8~17.2	20.2~26.1	25~33.3
	400	1600	350	1600-1950	1.3~2.2	2.8	4	5.7	7.5

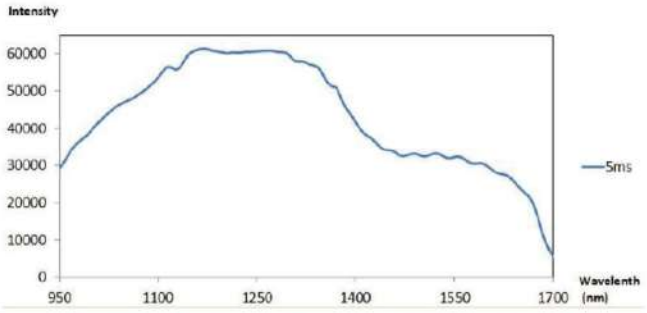
Model Name		SW2860	SW2870	SW2880	SW2930	SW2960	SW2970
Wavelength Range		900-1700nm			910-2200nm	900-2500nm	
Slit		50um/100um/150um/200um	25um/50um/100um/150um/200um	50um/100um/150um/200um	50um/100um/150um/200um		25um/50um/100um/150um/200um
Resolution (*Typical value, Small deviations are possible.)	Slit : 50um	3.7~7.2	3.5~5.2	3.5~5.2	6~11.2	6.2~14.8	6.2~10.7
	Slit : 100um	6.7~10	~8.4	~8.4	10~15.6	13.8~16.5	13.8~17.2
TE-Cooled InGaAs Sensor		256 pixels	512 pixels	256 pixels	256 pixels		512 pixels
		One Stage(Ambient temperature 25°C can be reduced to 0°C)			Two Stage(Ambient temperature 25°C can be reduced to-20°C)		
SNR	High Gain*	3200			3000	2200	3000
	Low Gain	4500			5300	4300	6000
Dynamic Range	High Gain*	8000	7200	8000	6000	7000	6000
	Low Gain	13000	9300	13000	9300	12000	9300
Dark Noise	High Gain*	8	9	8	11	8.5	11
	Low Gain	5	7	5	7	5.5	7
Integration Time	High Gain*	100 µs ~ 24sec. (suggest max.100ms)			100 µs ~ 300ms	100 µs ~ 20ms	
	Low Gain	100 µs ~ 24sec. (suggest max. 1sec.)			100 µs ~ 3sec.	100 µs ~ 200ms	
Dimension		130(L) x 96(W) x 57.65(H) mm					
Fiber Input Interface		SMA905					
Data Transfer Interface		USB2.0 / UART/ Ethernet					

*High Gain is collected with a 10x gain setting

PocketHawk-NIR™ Series

Thin-film/ Food Analysis, Handheld Miniature Application Compact NIR Spectrometer with Good Performance & Price





PH2524 Wavelength Response (Halogen Lamp)

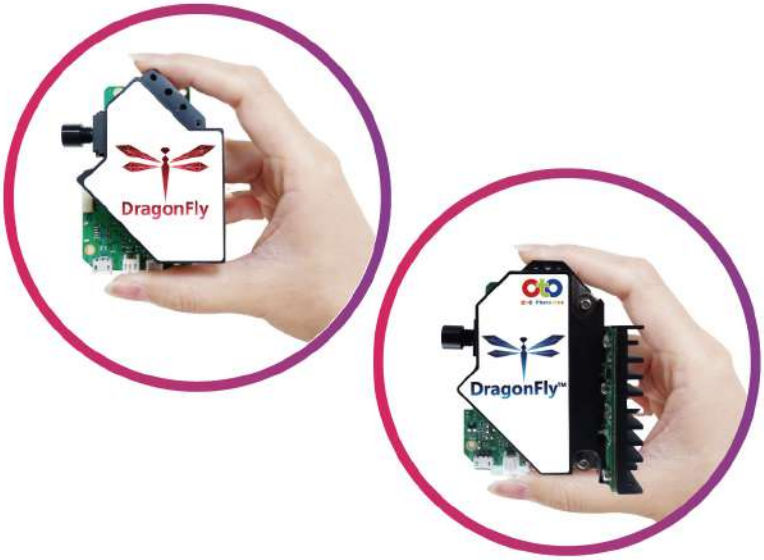
- Wavelength range: 900-1700nm.
- Folded star-shape Czerny-Turner optical design which is miniaturized and optimized for size and weight, best choice for handheld measurement.
- Support continuous high-speed & multiple exposures and trigger modes.
- Proprietary stray light calibration algorithm (stray light can be eliminated to 0.01%).
- On-board CPU supports optical and color parameters calculation.
- Attractive cost to implement micro & smart spectral application systems.

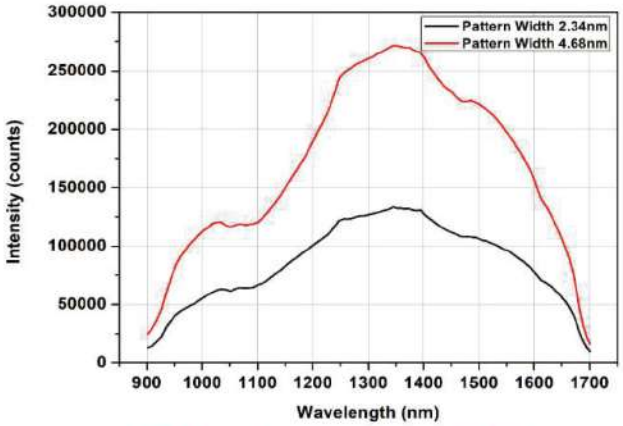
Model Name		PH2524	PH2534
Wavelength Range		900-1700 nm	
Slit		50/100/200 um	
Resolution		7~15.9 / 14.5~21.8 / 29.9 nm	4~8 / 11 / 15 nm
Sensor		128 Pixels InGaAs	256 Pixels InGaAs
SNR	High Gain	2500	
	Low Gain	6500	
Dynamic Range	High Gain	6500	6000
	Low Gain	8000	6500
Dark Noise	High Gain	10	11
	Low Gain	8	10
Integration Time		100us~15sec.(suggest max. 1sec.)	
Dimension		65 (L)x 65 (W) x 29.8 (H) mm	
Fiber Input Interface		SMA905	
Data Transfer Interface		Micro USB / UART	

(*Typical value, Small deviations are possible.)

DragonFly™ Series

Grain measurement/ Fabric Material Analysis Application
Digital Light Processing (DLP™) NIR Spectrometer





DF1514 wavelength response with Halogen Lamp, integration time 0.635 ms

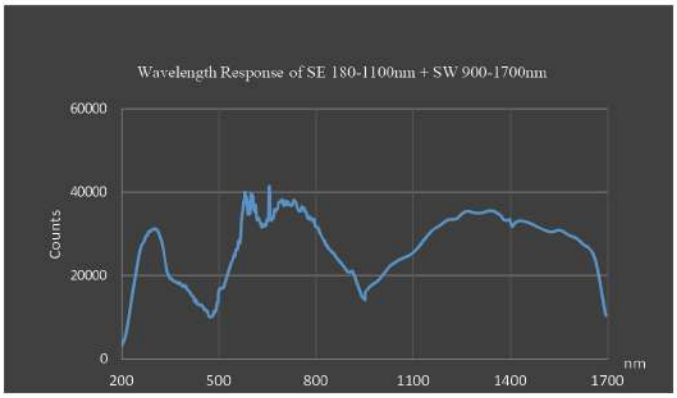
- Wavelength range 900-1700nm (non-cooled or 2-stage TEC); 1340-2280nm, 1500-2280nm & 1250-2050nm (2-stage TEC).
- Developed base on Texas Instrument DLP™ Digital Micromirror Device.
- The most cost-effective near-infrared spectrometer.
- Excellent signal-to-noise ratio performance which improves measurement stability.
- Fully technical support in firmware/software for customized system development.

Model Name	DF1514	DF1914	DF1934		DF1924
Wavelength Range	900-1700nm		1340-2280nm	1500-2280nm	1250-2050nm
Slit	25um				
Spectral Resolution	8.4~12nm (Pattern Width 2.34nm)	8.6~12nm (Pattern Width 2.34nm)	11.4~14nm (Pattern Width 2.34nm)	8.3~12nm (Pattern Width 2.34nm)	
Sensor	InGaAs PD	2 stage TEC InGaAs PD			
SNR	8000	7000			
Scanning Mode	Colunm mode / Hadamard mode/ Slew scan				
Dimension	71.5(L) x 57(W) x 25(H) mm including the PCB	71.5(L) x 57(W) x 25(H) mm including the PCB			
Fiber Input Interface	SMA905				
Data Transfer Interface	Micro USB/ UART				

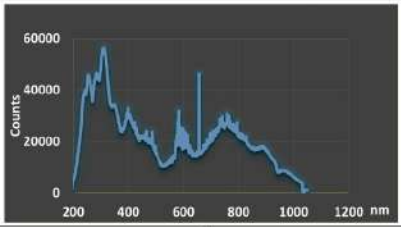
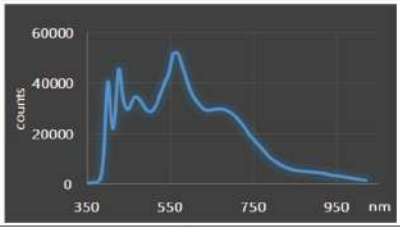
PKG-SE12/SW12-DH/BA/HA

The Best Choice for Teaching, Laboratory and R&D Research and Optical Analysis Applications Spectral Measurement Kit





- Provide a complete, cost effective, wide wavelength range (180-1700nm) spectral measurement solution.
- An excellent measurement platform with OtO SmartEngine (SE) & SideWinder (SW) series spectrometer.
- Free sprectra processing software: SpectraSmart provides you with the best user experience, technology and support. SpectraSmart calculates color temperature, color rendering, color values, transmittance, absorbance ... and many different spectral & color parameters.
- Deuterium-halogen light source : high alignment accuracy, stable and built-in shutter control.
- Offer complete accessories that can fully meet the absorbance, transmittance, fluorescence, color, concentration and other measurement needs

Model	PKG-SE12-DH	PKG-SE12-BA	
Light Source	LS-DH-2 Deuterium-Halogen Light	LS-BA Balance Light	
Spectrum			
Collimator	1	2	pcs
Short Fiber	1	1	pcs
Fiber Collimator	1	1	pcs
Adapter	1	1	pcs
Cuvette Holder	1	1	pcs
Square Cuvette	Quartz*1	Quartz*1, Plastic*1	pcs
RGB Color Film	0	1	set
ND Filter(15%, 50%, 75%)	1	1	set
Multi-function Measurement Platform	1	1	set
Waterproof Outer Box	1	1	pcs
Software(SpectraSmart)	1	1	set

Collimator & Optical Fiber

COL-1 & COL-2 has a f/2 fused silica lens for 200-1000 nm or a K9 glass for 400-2500nm. When focused for collimation, beam divergence is 2° or less, depending on the fiber diameter. The COL can be adjusted for UV-VIS or VIS-NIR setups.



Model	COL-1-UV	COL-2-UV	COL-1-NIR
Connector	SMA 905, 3/8-24 external thread	SMA 905 Fiber Stub, 3/8-24 external thread	SMA 905, 3/8-24 external thread
Back Focal Length (mm)	10		
Clear Aperture (mm)	5		
Material	UV Grade Fused Silica		K9 glass
Range	200 nm~1000 nm		400~2500nm
Numerical Aperture (N.A)	0.2		

OtO Photonics provides optical fibers for customers to satisfy the various needs of spectrum measurement. We offer the optical fibers with excellent optical performance, wide-band spectral transmittance, good bending and mechanical properties.
All of our Optical fibers are terminated with standard SMA-905 connecter and easily to connect with OtO Photonics spectrometers, light sources and other accessories. These fibers belong to multimode step Index and are available with fused silica optical fibers.
Base on different waveband, fiber length and numerical aperture, we offer various optical fiber models as below. OtO Photonics also offer customized products, but can not guarantee the transmittances.

For UV-VIS Waveband Optical Fibers • Better transmission in the UV-VIS range (200-1100 nm) • High OH ion concentration • Assembly length 1m	OF-600-100-UVS OF-600-100-UVB
For UV-VIS Waveband Short Optical Fibers • Better transmission in the UV-VIS range (200-1100 nm) • High OH ion concentration • Assembly length 25.4mm & 40mm (double nut)	OF-S-0400-UV OF-S-0600-UV OF-S-1000-A OF-DS-1000-A
For VIS-IR Waveband Optical Fibers • Better transmission in the VIS-IR range (400-2200 nm) • Low OH ion concentration • Two types of numerical aperture(NA) : NA 0.22 fiber and NA 0.37 • Assembly length 1m	OF-600-100-NIRS2 OF-600-100-NIRS3
For VIS-IR Waveband Short Optical Fibers • Better transmission in the VIS-IR range (400-2200 nm) • Low OH ion concentration • Assembly length 25.4mm	OF-S-1000-NIR

Customized Y-type Optical Fibers & Multicore Optical Fiber



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