

CISopto Products

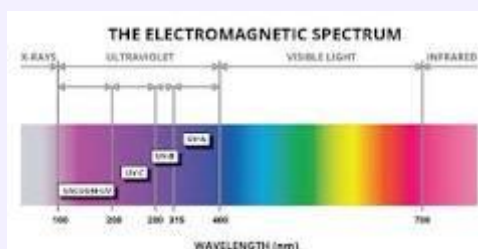
Imaging Spotlight May 2023

Welcome to our May 2023 Imaging Spotlight.

In this month's issue we focus on Ultraviolet (UV) Imaging:

- Applications Note - Ultraviolet (UV) imaging
- HR-8000-SB-U / HB-8000-SB-U: Ultraviolet imaging capable 8.1MP 10GigE and 25GigE cameras with Sony Pregius S IMX487 CMOS sensor
- C-Blue One UV - Ultraviolet global shutter scientific CMOS camera
- BV-C2950 - NUV + Visible ESD (Electrostatic Discharge) Camera
- Ultraviolet (UV) Lenses from Ricoh and Azure
- BP324 Near-UV Bandpass Filter
- CISopto Products JOSCAR Membership

Applications Note - Ultraviolet (UV) imaging



When it comes to ultraviolet (UV) imaging, it's important to distinguish between UV light and UV-fluorescence imaging. Although these processes both use UV lighting, they're entirely different. UV imaging starts with passing the emission of a UV-emitting LED, lamp or diode, or looking at a subject illuminated with UV light that's reflected off the item being inspected. The reflected UV light is then captured by the camera. The wavelength of the UV light is not converted or shifted in this process.

In contrast, UV-fluorescence imaging also requires illuminating a surface with UV light, but the fluorescent material absorbs the UV light and electrons are released, causing the material to radiate light at a longer wavelength. The light emitted during this process is usually in the visible range and, in industrial applications, it will usually be blue light. In this type of reaction, light energy in will always exceed light energy out.

True ultraviolet (UV) imaging inspection isn't used often in machine vision. However, as UV-sensitive cameras and UV-emitting light sources, particularly LED lighting, have become widely available and less costly, new applications are emerging. Monochromatic UV sources, such as lasers and LEDs, are desirable in machine vision applications because when paired with appropriate Bandpass Filters, camera optics don't need to be achromatic, significantly lowering cost.

Images formed with monochromatic illumination are always sharper than images made with broader UV sources, and capability naturally increases as the wavelength used to image the item being inspected is shortened. When

using UV illumination, smaller features can often be formed and detected easier and more accurately.

The UV band is broad, spanning a wavelength range from 10 nm (below this are x-ray wavelengths) to 400 nm (above this are visible wavelengths). A system's cameras, optics, filtering and illumination must be carefully selected according to the UV range being imaged.

The near-UV, between 290 and 400 nm, is most commonly used in industrial imaging applications. This range is typically subdivided into UV-A (320 to 400 nm) and UV-B (290 to 320 nm) radiation. Standard optical glasses absorb light and cannot be used for imaging in the region below 290 nm, known as the UV-C or deep-UV (DUV) portion of the spectrum. Instead, lenses incorporating fused silica, fused quartz or calcium fluoride are designed for these applications. Below 180 to 190 nm air absorbs UV light. This UV portion is often referred to as the vacuum UV (VUV), since imaging can only take place in a very high vacuum or nitrogen environment.

Because UV wavelengths are shorter and easily scattered, some of the most common applications for true UV imaging include detecting scratches and digs on polished or highly specular surfaces. By using darkfield illumination to enhance the scattering effect, scratches that aren't apparent in a visible image can become easier to image in UV.

Other applications involving reflected UV light include detecting surface contamination. Since UV light tends to be absorbed by organic materials, traces of oil or grease can sometimes be detected on surfaces, particularly in the deep-UV. Petroleum-based products can also appear differently in UV, which is useful in identifying the nature and source of oil spills. It's also sometimes possible under UV illumination to distinguish different paints or finishes used if repairs have been made to antiques or valuable objects.

CISopto Products provides a wide range of Ultraviolet (UV) cameras, lenses, filters and lighting - some of which are detailed below:

HR-8000-SB-U: Ultraviolet imaging capable 8.1MP 10GigE camera with Sony Pregius S IMX487 CMOS sensor



HR-8000-SB-U features the Ultraviolet (UV) Sony Pregius S IMX487 sensor. The Sony Pregius S technology features back-illuminated pixel structure that

delivers distortion-free, high imaging performance, miniaturisation and high level of UV sensitivity. At full resolution (2840 x 2840) you get up to 145 frames per second. Its ultra high-speed SFP+ 10GigE interface offers many benefits including low-cost accessories, low CPU overhead, low latency, low jitter, and accurate multi-camera synchronisation using IEEE1588. In addition, 10GigE SFP+ offers three supported cabling options for cable lengths from 1M to 10KM.

Benefits

- High-speed 10GigE SFP+
- UV waveband sensor (200 nm to 400 nm)
- Back-illuminated pixel structure
- 10x the speed of GigE
- Ultra high data/frame rates
- GigE Vision® and GenICam™ compliant
- Optional IP67 housing

Applications

- Semiconductor Manufacturing
- Sorting Waste Plastics
- High-Voltage Cables Inspection
- Printing Inspection
- High Resolution Microscopy
- Luminescence Spectroscopy

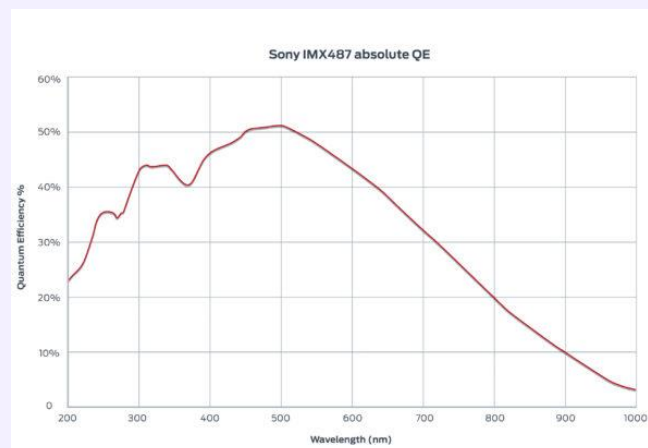
HB-8000-SB-U: UV 8.1MP 25GigE camera

The HB-8000-SB-U also features the Ultraviolet (UV) Sony Pregius S IMX487 sensor. with all of the features of the above camera the HB-8000SB-U, 25 GigE SFP28 camera offers three supported cabling options for cable lengths from 1 M to 10 KM.



Other benefits include:

- High-speed 25GigE SFP28
- Back-illuminated pixel structure
- 25x the speed of GigE
- Simplified solution to CoaXPress



For more information and to order, please follow the link → or call the CISopto Sales Team on +86-0755-86657548 . we will be happy to help:

[Emergent Vision](#)

[Cameras](#)

C-BLUE One UV

UV optimised CMOS scientific camera



C-BLUE One UV is an industrial-grade Ultraviolet-optimised scientific camera which opens new possibilities for high-speed CMOS imaging. The camera offers a spectral sensitivity from 200 to 1000 nm.

Equipped with a high-performance monochrome CMOS global shutter sensor with a very high resolution of 8.1 MP (2856 x 2848 pixels, 2.74 μm pitch), the camera is optimised for the 200-400 nm wavelength range with more than 50% quantum efficiency at 300 nm, and 30% at 220 nm.

C-BLUE One is a GigE Vision interface camera and GenICam compatible.

Main Features

- GLOBAL SHUTTER CMOS monochrome sensor
- up to 170 FPS full frame in 8 bits
- up to 121 FPS full frame in 12 bits
- 1.40 e⁻ RMS
- GigE Vision compliant
- 80 dB linear dynamic range and true 16 bits image
- 2.74 μm pixel pitch
- HDR

Other Features

- 2856 x 2848 Back illuminated stacked CMOS sensor
- QE sensitivity from 200 to 1000 nm, UV-optimisation from 200 to 400 nm
- Outputs :
- CoaXPress 2.0 – CXP12x2 connection
- 10 Gigabit Ethernet / Fibre with SFP+ module
- GenICam compatible
- Sensor thermal stabilisation – cooling down to 10°C (air)
- Liquid cooling optional with cooling plate for optimised performances
- C-Mount / CS-Mount
- SWaP: L 154.3 mm x W 76.2 mm x H 64.1 mm, Weight: 1.1 Kg

For more information and to order, please follow the link → or call the CISopto Sales Team on +86-0755-86657548, we will be happy to help:

C-BLUE One UV

BV-C2950 - NUV + Visible ESD (Electrostatic Discharge) Visualising Camera

Using Prism Spectroscopic Imaging Technology, this ESD phenomenon visualising camera can detect and monitor the location of electrostatic discharge on the production site.

BV-C2950 captures near-ultraviolet (NUV) rays generated at the time of discharge using ultra-sensitive NUV and visible image sensors, it is able to monitor where and when low voltage ESD (200 V as minimum) occurs.

Features BV-C2950 consists of two kinds of sensors, one for taking the visible image of the object and the other for detecting electric discharge phenomenon. It uses a spectroscopic technology adopting a mirror to split the visible light (400 nm to 700 nm) and NUV rays (200 nm to 400 nm). BV-C2950 has two sensors, a visible sensor with 640 × 480 pixels and an ultra-sensitive UV sensor, and one fixed focal lens. As two sensors and one lens are all in one package, images from two sensors are in the same field of view, which enables BV-C2950 to precisely detect the originating point of the ESD damage. ESD means Electrostatic Discharge, and when the ESD occurs, it generates NUV rays from around 200 nm to 400 nm (UV-B). Since the light energy produced by ESD is very small, the ultra-sensitive sensor is required to capture this phenomenon.



Applications:

- Manufacturing process of semiconductors (Discharge inside the substrates)
- Production site for display panel
- Places requiring ESD monitoring such as in chemical plants, discharge on film delamination, discharge of plastic products
- ESD monitoring for moving workers
- ESD of electric tools
- Managing health injury of workers under electrostatic environment
- Efficiency measurement of neutralisation apparatus
- Visualisation of minimal corona discharge

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BV-C2950 ESD

Camera

Ultraviolet (UV) Lens from Ricoh



FL-BC7838-VGUV

FL-BC2528-VGUV

- Format size 1", 2/3, 1/2"
- Focal length 25 mm
- Maximum aperture ratio 1:2.8
- Iris range 2.8 - 16
- C-Mount
- Minimum object distance 0.23 m
- Filter size 25.5 P=0.5 mm
- Optimum wavelength 365 nm

- Format size 1", 2/3, 1/2"
- Focal length 78 mm
- Maximum aperture ratio 1:3.8
- Iris range 3.8 - 16
- C-Mount
- Minimum object distance 0.44 m
- Filter size 49 P=0.75 mm
- Optimum wavelength 365 nm

An optical system that employs optical-grade quartz glass for imaging in the near-ultraviolet region.

- Used for detection of counterfeit banknotes; falsified documents and credit cards, surface inspection of circuit boards for soldering defects
- High performance quartz glass, enabling the capture of sharp images in the near-ultraviolet region.
- Extended wavelength range (230 nm to 800 nm), with peak performance at 365 nm.
- Compact design, ideal for integration into machine vision systems
- Optimised for use with band pass filters and UV illumination

Ultraviolet (UV) Lens range from Azure



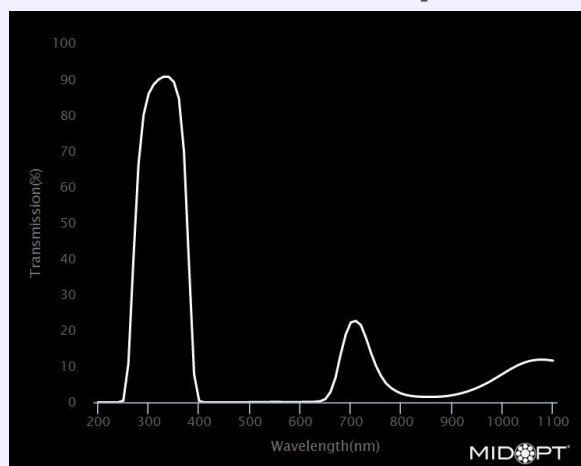
New to the CISopto portfolio is the Azure range of Ultraviolet (UV) machine vision lenses with focal lengths of: 25 mm, 50 mm, 75 mm, 78 mm, 85 mm and 105 mm:

Model	Description	CRA	DISTORTION	Filter thread	Dimension
UV LENSES					
AZURE-2528UV	2/3", 25mm F2.8 Manual Iris C-mount lens, Ultraviolet type 200-1000nm	16.87°	<-0.06%	M46*0.75	φ34.5×34.39mm
AZURE-5030UV	2/3", 50mm F3.0 Manual Iris C-mount lens, Ultraviolet type 200-1000nm	7.95°	<-0.1%	M34*0.5	φ37.6×49.51mm
AZURE-7538UV	2/3", 75mm F3.8 Manual Iris C-mount lens, Ultraviolet type 200-1000nm	5.06°	<-0.1%	M34*0.5	φ40.2×70.38mm
AZURE-NV7838UV	1", 78mm F3.8 Manual Iris C-mount lens, Ultraviolet type 200-1000nm	5.07°	<-0.05%	M30.5*0.5	φ52×104.84mm
AZURE-8528UV	1", 85mm F2.8 Manual Iris F-mount lens, Ultraviolet type 200-1000nm	/	<-0.7%	M55*0.75	φ62×82.73mm
AZURE-10545UV	1.5", 105mm F4.5 Manual Iris F-mount lens, Ultraviolet type 200-1000nm	/	<-0.3%	M67*0.75	φ74×125.01mm

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UV Lenses

BP324 Near-UV Bandpass Filter

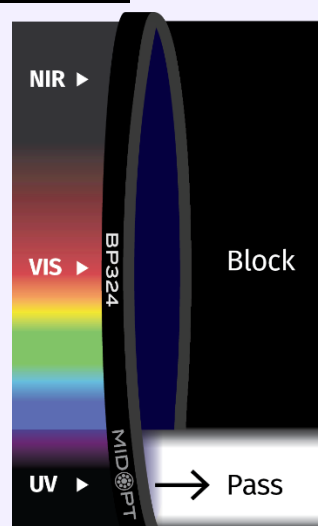


Useful in UV imaging applications, BP324 filters have a broad spectral bandwidth in the UV while effectively blocking most visible and infrared light. Note that there is a slight deep red/near IR leak that peaks at about 720 nm. Because this filter absorbs all unwanted visible and/or infrared light, it is not recommended for placement in front of intense (white) light sources.

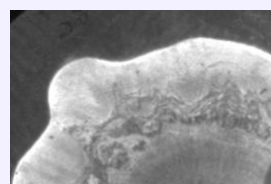
Passes UV portions 320-380 nm and 280-320 nm

Blocks < 280 nm

Configurations can also be supplied for mounting in front of UV LED light sources



Before: Illumination by a UV light source without a filter over the camera lens does not provide enough contrast to differentiate between the plastic substrate and the background.



After: The UV light source together with a MidOpt BP324 UV Bandpass Filter on the lens enhances contrast to highlight imperfections in the plastic.

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MidOpt Filters

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CISopto products has six technology divisions and a wide portfolio of components and products for industrial, scientific, research, medical and academic fields - please check out our divisions below - we will be happy to help with any questions:



CISopto products has been serving the Industrial, Scientific, Medical and Instrumentation markets for five decades and has a wealth of experience in all aspects of Imaging, Photonics, Thermal and Medical sectors.