

## Wide-dynamic Range & Low-noise InGaAs Camera (VGA 0.9~1.6μm)

### Feature of NVU3VL InGaAs SWIR Camera

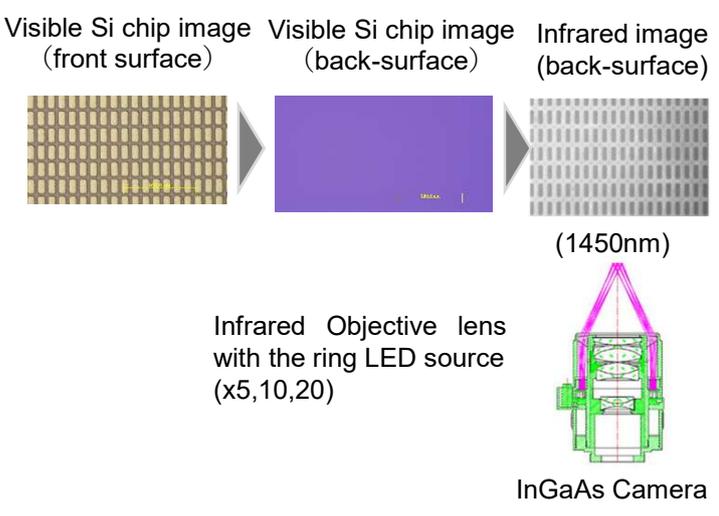
- ✓ High sensitivity with peltier cooling (~5°C)  
NEP 3x10<sup>-17</sup>W/pixel/√Hz (1x10<sup>8</sup>photons/sec/cm<sup>2</sup>/√Hz)
- ✓ Wide dynamic range due to logarithmic image correction  
(adjustable from 10fW to 1μW/pixel(9 decade))
- ✓ High resolution based on the surface potential barrier structure (US Patent 8610170)
- ✓ High reliability based on hybridization with gold micro bumps
- ✓ Includes image-viewer based on Labview and C++  
Calibration of absolute light intensity  
Vignetting correction  
Conform to USB3 vision  
Multiple cameras can be connected to the single USB hub.
- ✓ One-stop services for infrared imaging  
Includes Multi-Color LED illumination, the dark field optical microscope, chromatic aberration correction imaging and objective lenses

### Application of InGaAs Camera NVU3VL

#### Dark-field Infrared Optical Microscope

Example: Infrared image through Si substrate

Edge enhanced dark-field image of the electrodes on the back surface of the silicon chip can be visible with the ring infrared LED illumination.



### Area of Applications

This camera has been highly evaluated for quantitative evaluation of infrared intensity profile for various areas such as bio-medical inspection, optical alignment and moisture content measurement owing to its high dynamic range and high resolution features.

### Example of Image Viewer



Intensity profile along x direction

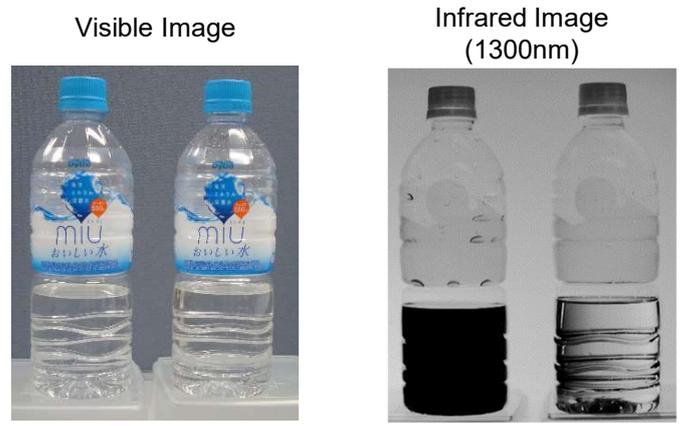
### Multispectral LED Light Source (option)

1100nm, 1200nm, 1300nm, 1450nm and 1550nm spectra are available.



### Multi-spectrum Imaging Technique

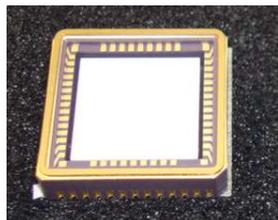
Using *Multispectral LED Light Source*, water and kerosene in pet bottles can be distinguishable. Water is seen dark with the infrared camera under infrared illumination, while both water and kerosene are seen transparent with a visible camera.



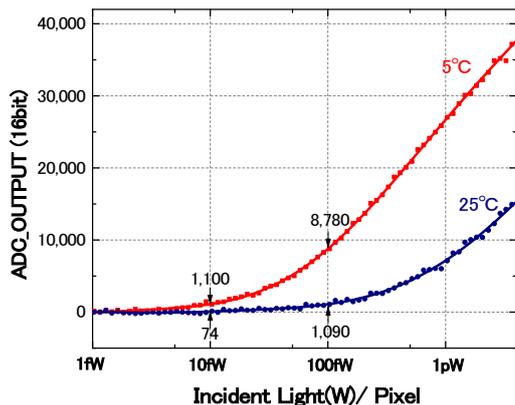
# Core technology of InGaAs Camera NVU3VL

Peltier modules embedded CLCC package

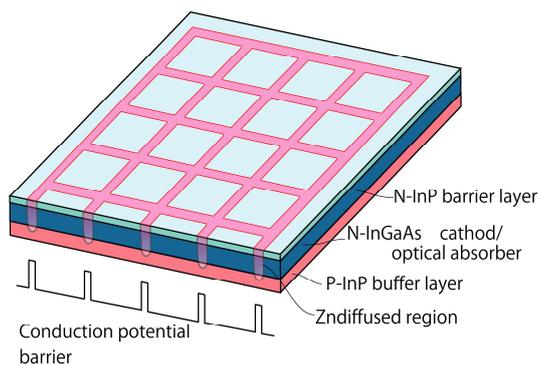
Compact CLCC package with Peltier module enabled low power cooling (~3W) of image sensor to 0 degree C. Output signal was enhanced by 8 times between 5 and 25 degree C at 100fW/pixel.



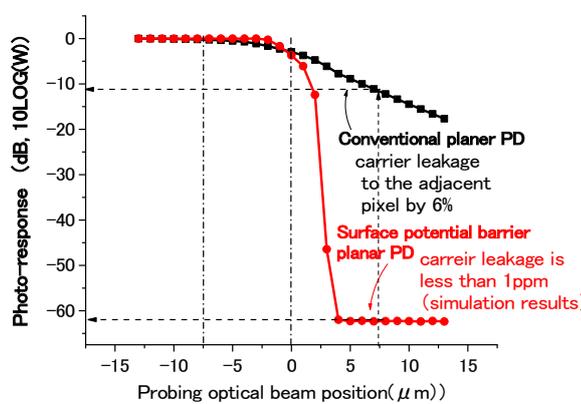
Improvement of the Sensitivity from 25°C to 5°C (about x10)



High resolution based on the patented surface potential barrier structure



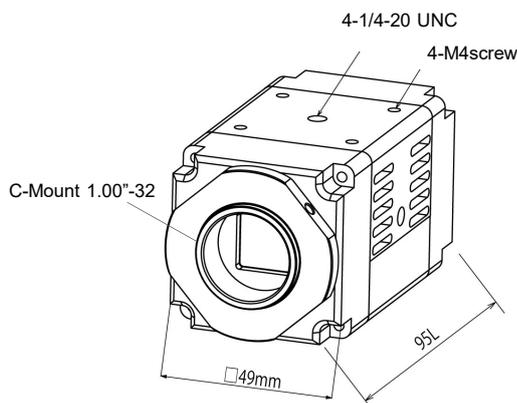
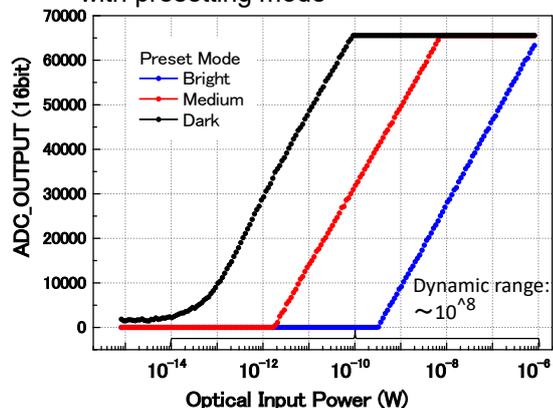
Comparison between conventional ridge and surface potential barrier structures



## Outline of the NVU3VL SWIR camera

Function	Specification
Imaging chip	InGaAs PD array
Package type	Peltier cooled CLCC52
Size of the imaging chip	9.6x7.7mm
Pixel size	15 × 15μm
Number of picture elements	640 × 512
Lens mount	C-mount (field size >1/2 inch)
Dimension and weight	49Wx49Hx95L mm 430g (excludes lens)
Wavelength span	970~1650nm
Pixel format	16 bit gray scale
Frame rate	10~60fps
Shutter method	rolling shutter
Cooling method	PID temperature control with peltier modules embedded in a CLCC package (Chip Temperature ~0°C @ambient temperature of 28°C)
ADC	16bit
Digital I/F	USB3 vision (operable at USB2 interface)
External trigger	1 frame image is transmitted upon TTL trigger pulse.
Power supply	6~24V 6W AC-Adaptor (included)
Recommended host PC	OS Windows7 or 10, Intel Core i5 or equivalent processor.

Gain and dynamic range adjustment with presetting mode



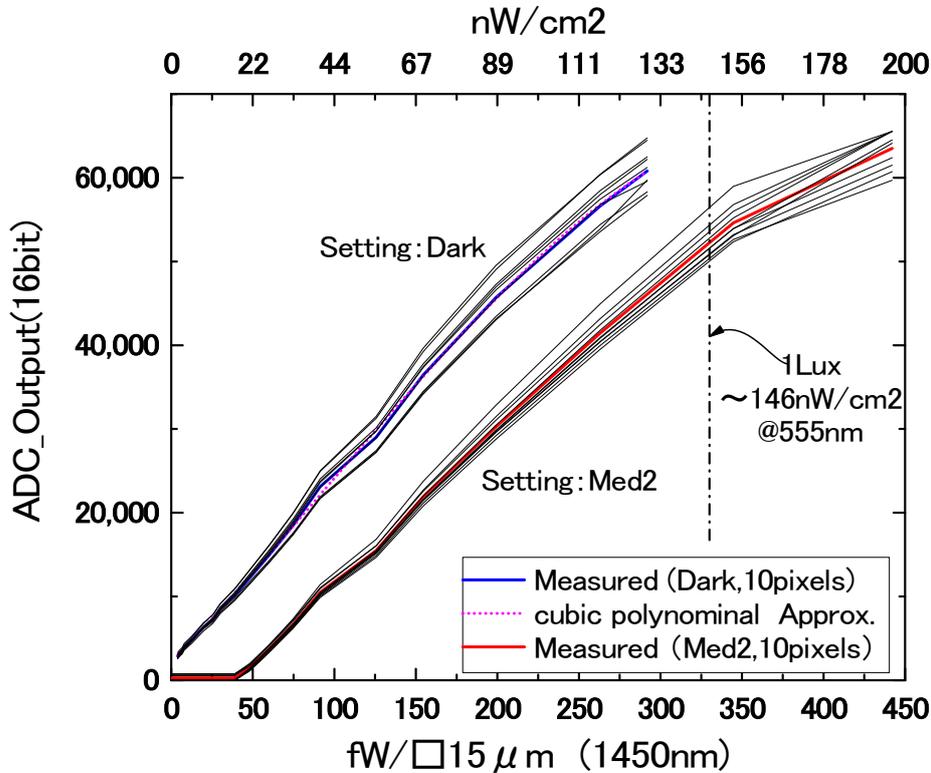
Contact: ➤ Distributor  
**Shibuya Optical Co. Ltd.**  
 ➤ <https://www.shibuya-opt.co.jp>  
 ➤ tel: +81-48-469-1200  
 ➤ e-mail: [sales@shibuya-opt.co.jp](mailto:sales@shibuya-opt.co.jp)

➤ Manufacturer  
**IRSpec Corp.**  
 ➤ <http://www.irspec.com>  
 ➤ e-mail: [asq.cs@irspec.com](mailto:asq.cs@irspec.com)

## Incident light intensity versus ADC output

☆1Lux(146nW/cm<sup>2</sup>) is enough for infrared imaging with NUV3VL.  
Illumination intensity of several μW/cm<sup>2</sup> is adequate for imaging.

☆In order to compensate the variation of sensitivity in each picture elements, every pixel is calibrated to the cubic polynomial to provide equal sensitivity. Therefore, the camera image output can be translated in real time to the absolute light intensity incident on the pixel.



## Noise Equivalent Power (NEP)

☆NEP is several times better than conventional products owing to lower dark current provided by the surface potential barrier structure and peltier cooling.

