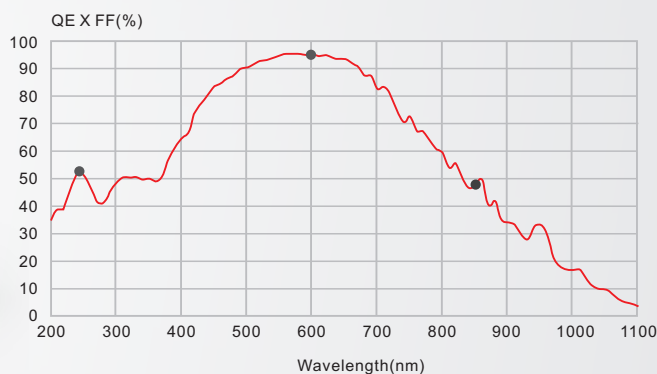


Dhyana 400BSI **V2**

BSI Scientific CMOS Camera



74 fps
CameraLink

40 fps
USB3.0

Faster Capture

6.5 μm
Pixel Size

4.2 MP
Resolution

High Resolution

0.2 e^-
DSNU

0.3 %
PRNU

1.2 e^-
Read Noise

More Accurate

53 % QE UV light
 λ 254 nm

95 % QE Visible light
 λ 600 nm

48 % QE Near-infrared
 λ 850 nm

High Sensitivity



A New Breakthrough for New Discoveries!

Since its launch, the Dhyana 400BSI sCMOS camera has been receiving great attention and focus. The image quality of the product is fully recognized to be comparable, or even better than its competitors. However, the Tucsen R&D group continues to pursue greater levels of excellence. This resulted in an upgraded product, the Dhyana 400BSI V2.

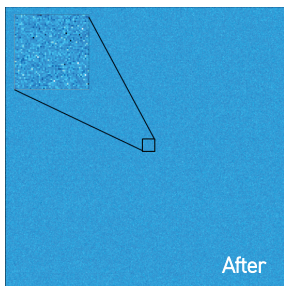
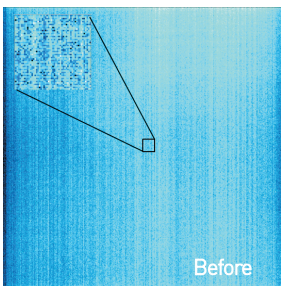
The Dhyana 400BSI V2 achieves a core breakthrough in the transmission speed compared with 400BSI V1, and a high-speed data transmission rate of 74fps @ Cameralink and 40fps @ USB3.0 at full resolution. Moreover to meet the demands for accurate quantification for high-end scientific imaging such as single molecule and super resolution, the 400BSI V2 calibrated DSNU & PRNU, minimized the difference between each pixel and reduced fixed pattern noise. So we are now able to achieve more accurate quantitative imaging data, providing a guarantee of reliable analysis results. The DSNU & PRNU calibration is of a great importance of quantitative analysis.

Simultaneously, the Dhyana 400BSI V2 preserves all the essences of Dhyana 400BSI V1, including the latest developed back-illuminated sCMOS sensor, ultra-high quantum efficiency of 95%, microscope-friendly $6.5\mu\text{m} \times 6.5\mu\text{m}$ pixel and $1.2e^-$ @ Median ultra-low readout noise.

So, no matter of chasing for brilliant scientific images or accurate images quantitative data, 400BSI V2 is easy to implement!

DSNU/PRNU calibration, more accurate quantitative analysis

To improve the overall performance of the camera, the Dhyana 400BSI V2 was calibrated in DSNU (dark signal non-uniformity) and PRNU (photo response non-uniformity) characteristically. After calibration, the DSNU value reduced from 0.3e- to 0.2e-, the PRNU value reduced from 1.6% to 0.3%. Thus the new upgraded camera has a more sophisticated capabilities, making it more suitable for quantitative analysis applications.



Dark Signal Non-Uniformity (DSNU) Optimization

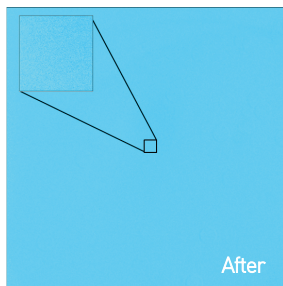
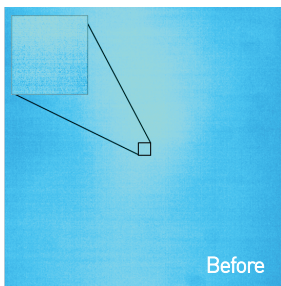


Photo Response Non-Uniformity (PRNU) Optimization

Top-level cooling technology to reduce the impact of noise

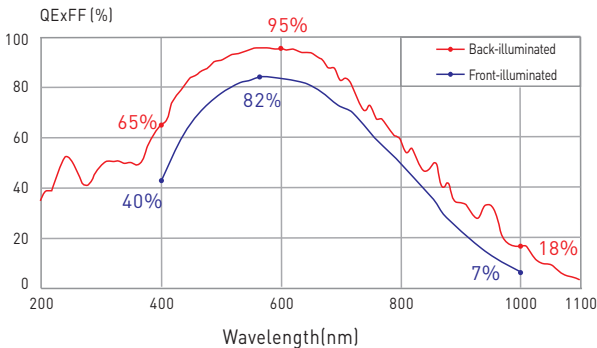
Dhyana 400BSI V2 advanced cooling mode can further reduce the impact of noise on imaging: compared to 1.2e- readout noise and 0.2e-DSNU, the dark current corresponding to 100ms is less than 0.02e-. In high-end imaging applications, dark current becomes negligible.

| Cooling Method | Cooling Temperature | Dark Current |
|-----------------------------------|---------------------|------------------|
| Forced air (Ambient at +20 °C) | -15°C | 0.15e-/p/s(typ.) |
| Water (Ambient at +20 °C) | -25°C | 0.10e-/p/s(typ.) |

Wide spectral response range, high sensitivity

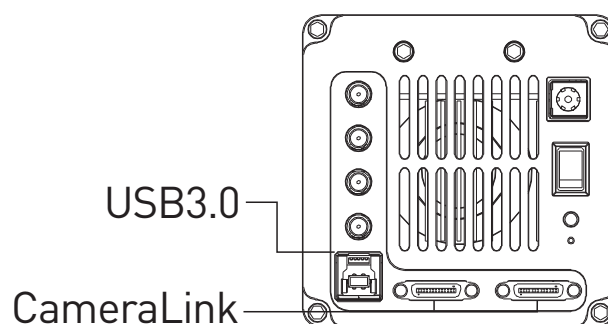
With its ultra-low noise, the advantage of the quantum efficiency in Dhyana 400BSI V2 is very significant. This is a huge breakthrough for scientific applications, not only in the visible region, but also in the ultraviolet and near-infrared.

Quantum Efficiency Comparison ►



74fps @ CameraLink, 40fps @ USB3.0, faster data capture

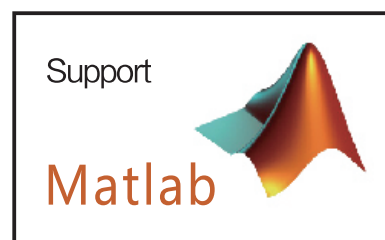
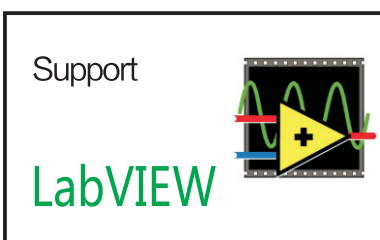
In addition to the signal to noise ratio advantage, the Dhyana 400BSI V2 has enhanced transmission speed, on one hand through the new CameraLink interface to meet the needs of high-end imaging research for higher frame rates, on the other hand through hardware improvements that increase the USB 3.0 throughput. These have achieved the ultimate transfer rate of 74fps with CameraLink and 40fps with USB3.0 at 4.2 MP full resolution.



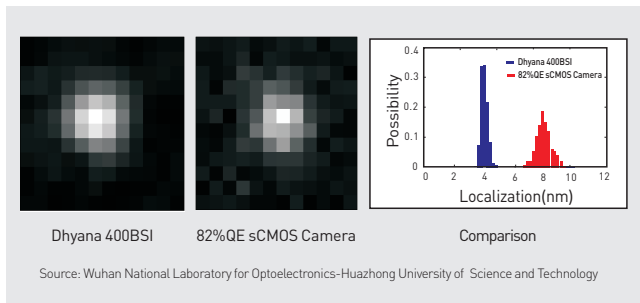
| Column | Row | USB3.0 | CameraLink |
|--------|------|-----------|------------|
| 2048 | 2048 | 40.4fps | 74.0fps |
| 2048 | 1024 | 79.9fps | 147.9fps |
| 2048 | 512 | 158.8fps | 293.9fps |
| 2048 | 256 | 317.6fps | 582.8fps |
| 2048 | 128 | 629.2fps | 1147.9fps |
| 2048 | 64 | 1242.6fps | 2227.8fps |

Third-party applications

Third-party applications supported by Dhyana 400BSI V2 have also been greatly expanded, including Micromanager, Labview, Matlab, etc., to provide more application support and help.

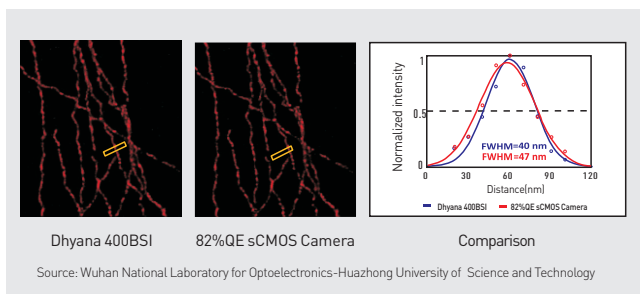


Customer applications



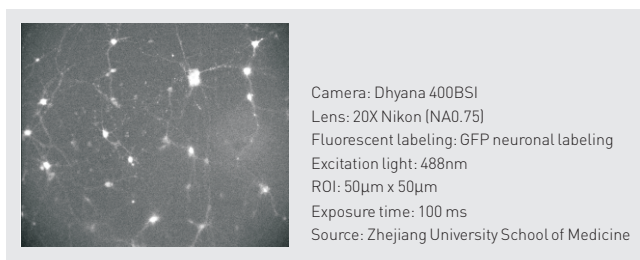
Single molecule localization

The high SNR can effectively improve the intensity of single-molecule fluorescence emission. The statistical results of the localization accuracy of the fluorescent sphere shows that the accuracy of localization with 400BSI is twice as that of the third generation 82% QE sCMOS camera.



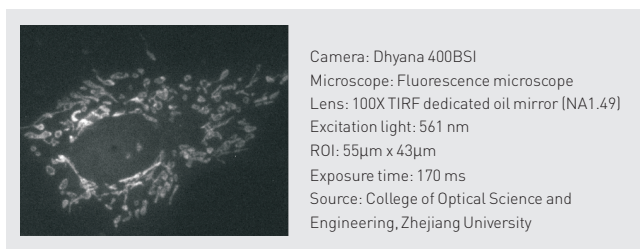
Super-resolution imaging

The lower the FWHM, the higher the resolution. In STORM super-resolution imaging, the capturing spatial resolution of 400BSI reaches to 40 nm, while those of the third generation of 82% QE sCMOS can only achieve 47 nm resolution, so the spatial resolution of 400BSI with STORM super resolution microscope carries a superiority of 7nm.



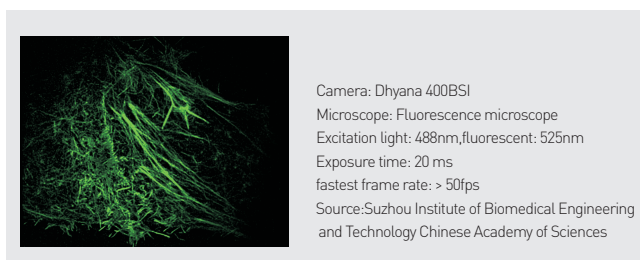
Neuron fluorescence imaging

With the increasing of the exposure time, luminescent fluorophores produce phototoxicity to the cells. Compared with other cameras, the exposure time of 400BSI is shorter, which can protect cell samples from light damage better.



TIRF wide field imaging

In the TIRF applications, the light signal of the samples is very weak, but 400BSI with the ultra-high SNR camera is able to capture the practical and good quantity of images effectively with rather short exposure time, resulting in a faster and fully widefield imaging.



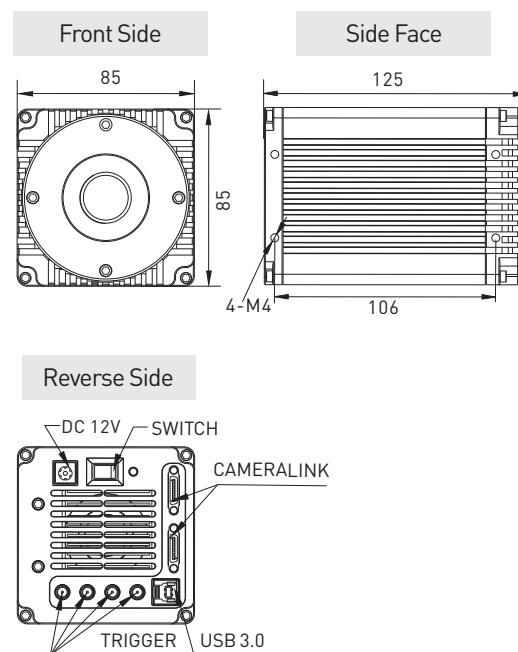
SIM cytoskeleton imaging

SIM imaging requires the cameras to capture as sharp as possible pictures with as low as possible the exposure time, along with others same shooting conditions, the Dhyana 400BSI V2 has a significant signal-to-noise ratio advantage, resulting in better images quality than other cameras.

Technical Specifications

| | |
|------------------------|---|
| Model | Dhyana 400BSI V2 |
| Sensor model | BSI sCMOS |
| Shutter type | Rolling / Global |
| Color/Mono | Mono |
| Effective area | 13.3mm x 13.3mm |
| Resolution | 2048 (H) x 2048 (V) |
| Pixel size | 6.5μm x 6.5μm |
| QE | 95%@600nm |
| Full-Well capacity | 45ke- |
| Dynamic Range | 86dB |
| Frame rate | 74fps@CameraLink; 40fps@USB3.0 |
| Readout noise | CMS: 1.1e- [Median] / 1.2e- [RMS] |
| Exposure time | 6.6μs-10s |
| DSNU | 0.2e- |
| PRNU | 0.3% |
| Cooling Method | Air & Liquid |
| Cooling temperature | 45°C below ambient |
| Dark Current | Air: 0.15e- / pixel / s@-15°C Liquid: 0.10e- / pixel / s@-25°C |
| Binning | 2x2, 4x4 |
| ROI | Support |
| Trigger Mode | Hardware & Software |
| Output Trigger Signals | Exposure, Global, Readout, High level, Low level |
| Trigger Interface | SMA |
| Data Interface | USB3.0 / Cameralink |
| Data Bit Depth | 16bit |
| Optiona Interface | C-mount |
| Power Supply | 12V / 8A |
| Power Consumption | 60W |
| Dimensions | 85mm x 85mm x 125mm |
| Weight | 1460g |
| Software | Mosaic / LabVIEW / Matlab / Micromanager / MetaMorph |
| SDK | Support |
| Operating System | Windows / Linux |
| Operating Environment | Temperature 0-40°C / Humidity 10-85% |

Dimensions



Part Number for Purchase

| | Water cooling (-W) | |
|------------------|--------------------|--------------------|
| | Dhyana 400BSI-W-U3 | Dhyana 400BSI-W-CL |
| USB3.0 (-U3) | ● | |
| CameraLink (-CL) | | ● |
| | Forced air (-F) | |
| | Dhyana 400BSI-F-U3 | Dhyana 400BSI-F-CL |
| USB3.0 (-U3) | ● | |
| CameraLink (-CL) | | ● |

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