# Product Brief: QIS16 Camera

## 16.7 Megapixel Quanta Image Sensor Camera

### Reliable Photon Counting at Room Temperature at Full Speed


The Gigajot QIS16 Camera is a complete camera platform ready for integration into systems that operate in extreme low-light conditions and require photon counting and photon number resolving. The camera is equipped with Gigajot's 16.7 Megapixel (GJ01611) Quanta Image Sensor (QIS) and utilizes the convenient USB 3.0 SuperSpeed interface. Gigajot's user friendly software enables control of the camera settings, image/video capture, real-time processing, and analysis. Alternatively, Gigajot's software development kit (SDK) allows control of the camera and customization for integration into your own application platform.

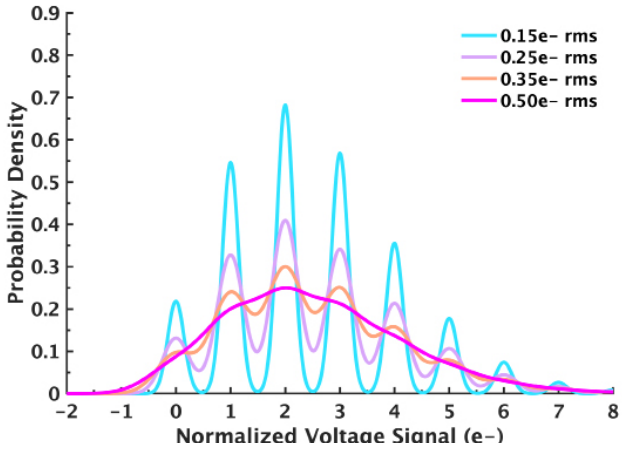
## Key Features

- 16.7 Megapixel QIS
- Photon counting at room temperature & full speed
- Accurate photon number resolving
- Market leading low read noise
- Market leading low dark current
- Sensor with advanced stacked CMOS BSI process
- Equipped with TE temperature stabilization
- USB 3.0 interface
- Software for camera control and image acquisition
- SDK & 3rd party software support for system integration

## Applications

- Bio-luminescence
- Fluorescence
- Microscopy
- Live cell imaging
- Spectroscopy
- Astronomy
- Quantum physics

## Photon Counting Capability




| Read Noise | Is Photon Counting Possible? |
|---|---|
| 0.5 e- | ✗ |
| 0.3 e- | ✔ |
| <0.2 e- | ✔ (<1% error rate) |

## Specification

| | QIS16TS<br>Temperature Stabilized | QIS16C<br>Compact Camera |
|---|---|---|
| Sensor Temperature | 10˚C | 25-35˚C at ambient 25˚C |
| QIS Sensor | GJ01611 | |
| Resolution | 4096 x 4096 (16.7 MP) | |
| Pixel Size | 1.1 µm x 1.1 µm | |
| Optical Format | 1/2.8" (6.37 mm diagonal) | |
| Active Area | 4.5 mm x 4.5 mm | |
| Read Noise @ full speed (RMS) | 0.19 e- peak | |
| | 0.21 e- median | |
| | 0.31 e- rms | |
| Dark Current | 0.002 e-/s/pix (10˚C) | 0.03 e-/s/pix (25˚C) |
| Full Well Capacity | 2,000 e- | |
| Non-linearity | <0.5% | |
| Dynamic Range | 80 dB | |
| Peak QE (mono) | 81% | |
| Chroma | Mono/Color | |
| Shutter Type | Rolling Shutter | |
| Exposure Time at Full Resolution | 97 µs to 1800 s | |
| Sensor Modes | Normal | |
| | Ultra Low Light | |
| | Photon Number Resolving | |
| Digital Binning | 2 x 2 | |
| Windowing | User selectable ROI (see table below) | |
| Interface | USB 3.0 SuperSpeed | |
| Digital Output | 12 bits | |
| Frame Rate | 10 frames/s at full resolution | |
| | 15,974 frames/s at 4 rows & 1024 columns | |
| Input Trigger | Start image capture | |
| Output Trigger | Global exposure start and stop | |
| Lens Mount | C-mount | |
| Recommended Operating Environment | 0 to 40˚C, 30 to 80% humidity (no condensation) | |
| Recommended Storage Environment | -10 to 50˚C, 90% max. humidity (no condensation) | |
| External Power Supply | 100 V to 240 V AC, 50 Hz/60 Hz | |
| Power Input | 5.9 VDC @ 7 A | |
| Dimensions | 110mm x 112mm x 131mm | 77mm x 111mm x 79mm |
| Weight | 4.7 lbs. (2.1 kg) | 1.3 lbs. (0.6 kg) |

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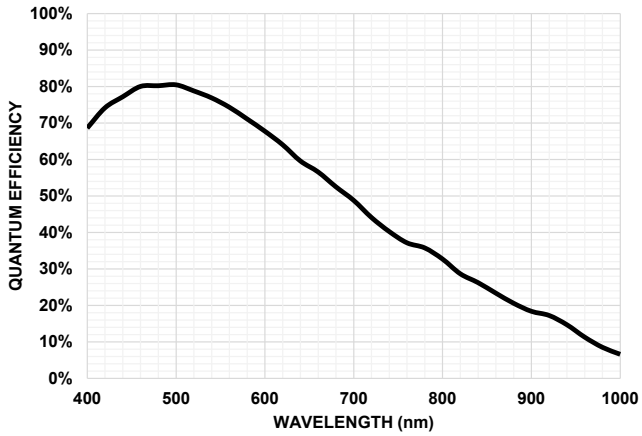
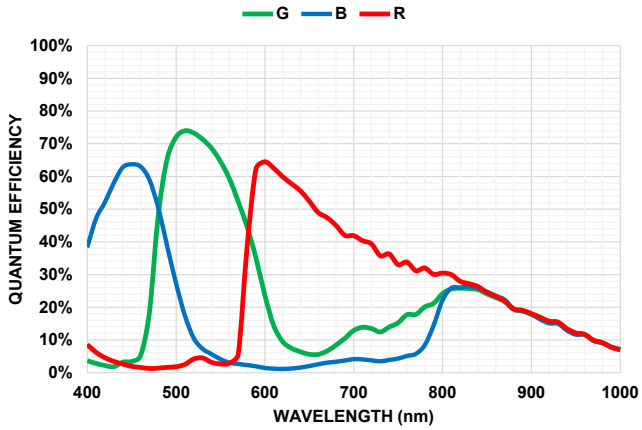
## Monochrome QE




## Color QE




## ROI

| Frame Rate (fps) with USB | | Horizontal Scan Range (# Columns) | | |
|---|---|---|---|---|
| | | 4096 | 2048 | 1024 |
| Vertical Scan Range (# Rows) | 4096 | 10 | 14 | 16 |
| | 2048 | 20 | 27 | 31 |
| | 1024 | 40 | 54 | 62 |
| | 512 | 81 | 107 | 125 |
| | 256 | 161 | 215 | 250 |
| | 128 | 322 | 429 | 499 |
| | 64 | 644 | 859 | 998 |
| | 32 | 1289 | 1717 | 1997 |
| | 16 | 2577 | 3434 | 3994 |
| | 8 | 5155 | 6868 | 7987 |
| | 4 | 10309 | 13736 | 15974 |

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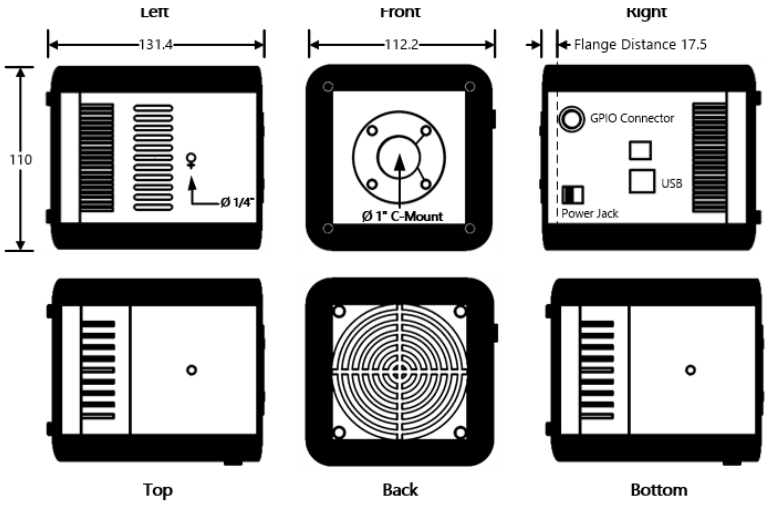
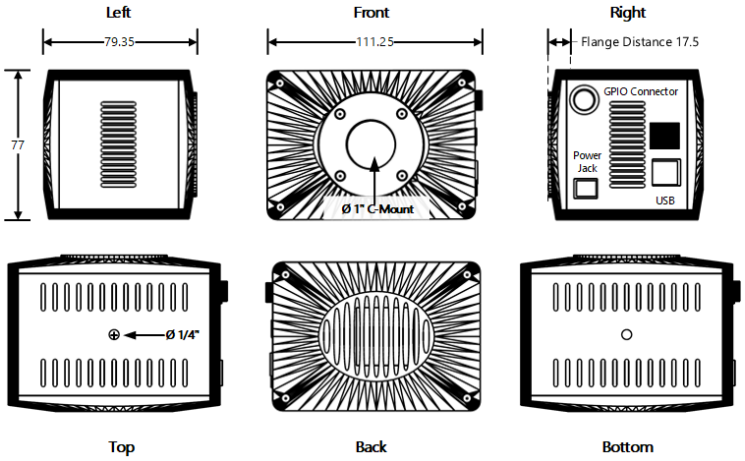
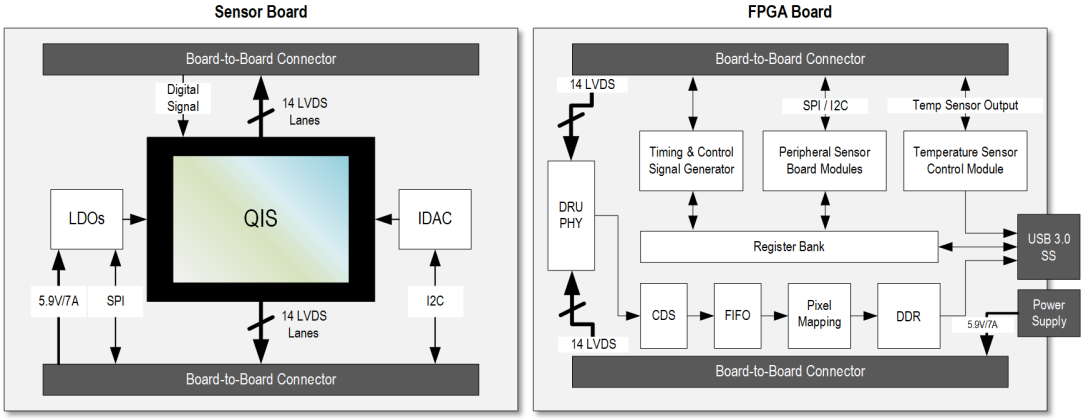
## QIS16TS Dimensions (units: mm)




## QIS16C Dimensions (units: mm)




## QIS16 Camera Block Diagram

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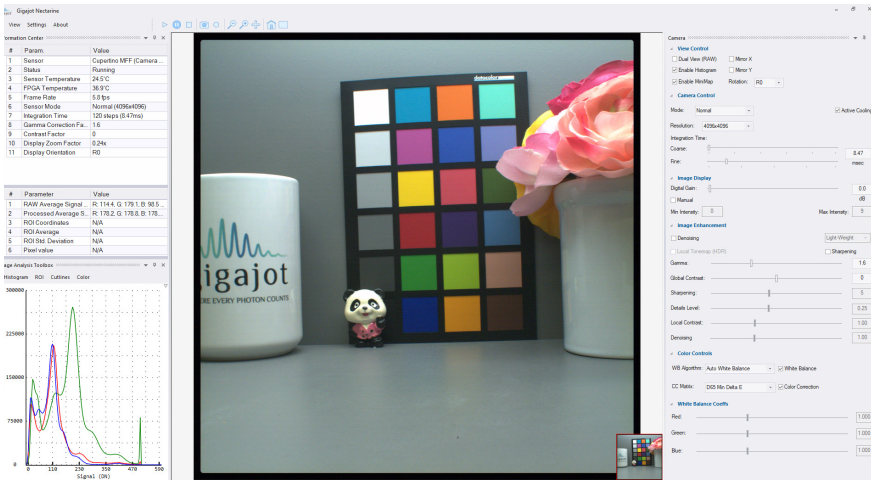
## Software

- User friendly GUI
- Sensor control: integration time, binning, cropping
- RAW image processing: row and column noise correction, dark frame subtraction, defect correction
- HDR processing
- AI-based low-light noise reduction
- Color processing: automatic and manual white balance, color correction using predefined 3x3 matrices
- Image enhancement: image sharpening, contrast enhancement, global and local tone mapping for HDR mode
- Image analysis tools: image histogram and ROI histogram, image signal level and ROI signal level, horizontal (x-cut) and vertical (y-cut) pixel line plots
- Image manipulation tools: zoom in and out, image rotation and mirroring
- SDK to allow control of camera from Python, MATLAB, LabVIEW and MicroManager under Windows or Linux




## Included in Box

- Sensor board and FPGA board in enclosure
- USB 3.0 cable
- Power supply: 5.9 V AC adapter
- Camera User's Manual
- Download access to camera software
- Lens not included

## Recommended System Requirements

- Intel CoreTM i7 9000 Series CPU
- 16GB RAM
- Windows 10 v1909
- NVIDIA GPU (GTX 1660 Ti recommended)
- Nvidia Driver v452
- Microsoft Visual C++ Redistributable v142 (2019)
- 20GB free disk space (Including space for data acquisition)
- USB 3.0 SuperSpeed

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